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MONTHLY REPORT
CHEMICAL PROCESSING DEPARTMENT

OCTOBER 1956

GENERAL SUMMARY

PRODUCTION

The production of plutonium from the primary plants exceeded the forecasts for Purex and Redox Plants. Purex Plant operated at a 12 ton per day rate during the month; however, a lack of adequately aged high-exposure uranium necessitated the shutdown of the plant from October 7 to October 21. During the shutdown period one organic treatment column was replaced in order to improve the operation of the organic recovery system.

During the month the Redox Plant was down approximately four days as the result of the failure of a head end centrifuge. Advantage was taken of this outage to acid flush the extraction columns.

Operation of the TBP Plant was satisfactory with 124% of the forecast being achieved.

The UO_3 Plant established a new production record as the result of 9% of the month's output being processed through the continuous calciners. Production for the month was 116% of the forecast which was 7% greater than any previous month.

Plutonium production met or exceeded the forecast covering fabricated acres, plutonium nitrate, and unfabricated plutonium metal.

ENGINEERING

The installation of equipment in the Purex regulated shop was started for the prototypical cation exchange system for plutonium concentration. In Redox two series of dichromate oxidized feed batches were processed for comparison with permanganate-oxidized feed performance. As expected, the ruthenium content of the uranium and plutonium product solutions increased markedly, the uranium requiring ozonization and the plutonium approaching closely the gamma specification limit for subsequent processing.

The prototype continuous calciner was shut down after sufficient UO_3 had been produced to ship a carload to Paducah. Technical and operating personnel moved to 224-UA for start-up of the new production calciners. Prototype-produced UO_3 was used to test new powder handling and milling equipment, and the J cell calciner was put into production. The maximum rate has not yet been achieved. Mechanical difficulties (e.g. jammed rotary valve and plugged collection bin) have forced shutdowns.

Agreement was reached during the month between the AEC and the General Electric Company to proceed with a design study for the recovery of cesium from waste products. Preliminary planning work for this study has been started. It is expected that the study would examine the engineering feasibility of modifying

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one of the bismuth phosphate plants for processing waste streams and would be complete with cost estimates, construction schedules, and economic evaluations.

GENERAL

Preparation of the mid-year budget review was started. The budgets for "Equipment Not Included in Construction Projects," "General Plant Projects," and "Personnel" were completed and submitted for final approval.

The most recent cost of living adjustment based on changes in the official Consumer Price Index, became effective for non-exempt personnel October 29, and was added to base salary and isolation pay.

During the month of October, Fire Prevention Week was observed in the Chemical Processing Department. There was news coverage on this through various Department Newsletters, fire protection demonstrations were staged, and a plaque was presented to the group having the best fire prevention display.

A new non-exempt personnel development program was established and arrangements made for instructing supervision in its use.

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STAFF

Vice President and General Manager, Atomic Products Division . . F. K. McCune
 General Manager, Hanford Atomic Products Operation W. E. Johnson
 General Manager, Chemical Processing Department W. K. MacCreedy
 Manager, Production Operation J. H. Warren
 Manager, Purex Operation O. C. Schroeder
 Manager, Redox Operation C. T. Groswith
 Manager, Finished Products Operation W. N. Mobley
 Manager, Power & General Maintenance Operation T. G. LaFollette
 Manager, Financial Operation K. G. Grimm
 Manager, Facilities Engineering Operation H. P. Shaw
 Manager, Research and Engineering Operation R. B. Richards
 Manager, Employee Relations Operation D. S. Roberts

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CHEMICAL PROCESSING DEPARTMENT
NUMBER OF EMPLOYEES
OCTOBER 31, 1956

<u>OPERATION</u>	<u>EXEMPT</u>		<u>OTHER</u>		<u>TOTAL</u>	
	<u>9-30-56</u>	<u>10-31-56</u>	<u>9-30-56</u>	<u>10-31-56</u>	<u>9-30-56</u>	<u>10-31-56</u>
GENERAL MANAGER'S GROUP	10	10	1	1	11	11
PRODUCTION	6	6	4	4	10	10
PUREX	44	44	279	277	323	321
REDOX	53	52	302	298	355	350
FINISHED PRODUCTS	68	68	439	440	507	508
POWER & GENERAL MAINTENANCE	42	42	277	279	319	321
FINANCIAL	21	21	50	51	71	72
FACILITIES ENGINEERING	76	76	29	33	105	109
RESEARCH & ENGINEERING	83	81	23	24	106	105
EMPLOYEE RELATIONS	31	32	57	58	88	90
GRAND TOTAL	434	432	1461	1455	1895	1897

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CHEMICAL PROCESSING DEPARTMENT

PATENT SUMMARY
FOR
MONTH OF OCTOBER, 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.

<u>INVENTOR</u>	<u>TITLE</u>
R. A. Schneider	HW-46488 "The removal of Cesium 137 from Aqueous Solutions by precipitations with Cobalticyanide Ion"
H. A. Moulthrop	Continuous Operation Filter Unit

W. J. Macready
GENERAL MANAGER
CHEMICAL PROCESSING DEPARTMENT

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CHEMICAL PROCESSING DEPARTMENT
PRODUCTION OPERATION

October, 1956

I. RESPONSIBILITY

There were no changes in responsibilities assigned to the Production Operation.

II. ACHIEVEMENT

A. Production Statistics

Attention was given during the month to developing better methods for presenting production data concisely and to provide more secure methods for transmitting classified information between facilities in the Chemical Processing Department.

1. Purex Operations

	<u>October</u>	<u>September</u>
Tons Uranium delivered to storage	186.0	315.0
Average Production Rate per Operating day (tons)	10.95	12.1
Average Daily Operating Rate for the month (tons)	6.0	10.5
Average yield, %		
Uranium	100.8	98.2
Plutonium	100.22	96.0
Total Waste Loss, %		
Uranium	0.60	0.34
Plutonium	1.78	1.30
Average cooling time (days)	117	118
Minimum cooling time (days)	104	109
Time Operated, %	54.8	86.7

2. Redox Operations

	<u>October</u>	<u>September</u>
Tons uranium delivered to storage	278.33	241.3
Average Production Rate per Operating day (tons)	10.3	9.75
Average Daily Operating Rate for the month (tons)	9.0	8.04
Average yield, %		
Uranium	102.6	100.4
Plutonium	92.4	98.1

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2. Redox Operations (Continued)

	<u>October</u>	<u>September</u>
Total Waste Loss, %		
Uranium	0.33	0.67
Plutonium	0.25	0.56
Average cooling time (days)	157	148
Minimum cooling time (days)	115	121
Time Operated, %	87	82.5

3. 231

	<u>October</u>	<u>September</u>
Batches started	202	168
Batches completed	201	164
Batches awaiting processing	1	1
Average yield, %	94	94
Average purity, %	98.4	98.8

4. 234-5 Operations

	<u>October</u>	<u>September</u>
Batches completed through Task I	297	321
Batches completed through Task II	295	320
Runs completed through Task III	169	175
Reduction yield, %	98.13	98.65
Waste Disposal (units)	498.24	195.48

5. UC₃ Operations

	<u>October</u>	<u>September</u>	<u>To Date</u>
Uranium drummed (tons)	602.97*	486.24	16,842.81*
Uranium shipped (tons)	593.15**	449.49	16,771.46**
Average cooling time (days)	163	154	
Minimum cooling time (days)	121	127	
Waste Loss, %	0.02	0.02	

* Includes 54.43 of UA

** Includes 49.55 of UA

6. TBP Operations

	<u>October</u>	<u>September</u>	<u>To Date</u>
Tons received from Metal Removal	166.72	179.57	7,838.82
Tons shipped to UO ₃ Plant	167.54	176.62	7,582.36
Average Production Rate per Operating day (tons)	5.40	5.89	

6. TBP Operations (Continued)

	<u>October</u>	<u>September</u>
Average Daily Operating Rate for the month (tons)	5.40	5.89
Average yield, %	100.00	99.34
Total Waste Loss, %	0.54	0.56
Time Operated, %	100	100

7. Power

	<u>200 East</u>	<u>200 West</u>
Raw water pumped, gpm	6 388	6 722
Filtered water pumped, gpm	583	1 050
Steam generated, lbs/hr.	102 000	235 000
Maximum steam generated, M lbs.	75 922	126 670
Coal consumed, est. (tons)	4 449	8 016

8. Waste Storage

	<u>Equivalent Tons U</u>	
	<u>October</u>	<u>September</u>
Redox Waste reserve storage capacity	1 771	1 945
Purex Waste reserve storage capacity	1 909	1 998

B. Production Planning and Scheduling Operation

Important activities carried on by Production Planning and Scheduling are described briefly in the following:

1. Members of the Operation took part in an engineering study conducted by Facilities Engineering Operation which developed capacity, cost and long range planning required by the Chemical Processing Department in support of "Hanford 1956 Capacity Study" (HW-46402 by A. B. Carson).
2. Contact Engineer activities relating to scoping and project preparation for "Utilization of UO₃ Recovered Acid at Redox and Purex" were carried along.
3. A plan was developed, on basis of current feed schedule from Irradiation Processing Department, for operation of Redox and Purex Plants for the next year.
4. Efforts toward obtaining a realistic revision of the present AEC schedule for UO₃ deliveries were continued. A proposed revision to this schedule, based on latest information available regarding UO₃ Plant production limitations, was prepared on an informal basis for the AEC.

5. Waste storage requirements for Redox and Purex Plants were reviewed, and it was indicated to Facilities Engineering Operation that requirements for new tank farms would be approximately as follows:

SY Farm for Redox Plant - October 1959
 AX Farm for Purex Plant - February 1959

C. AEC Liaison

A five year HAPO planning forecast (XX-1724) which will be used in the development of budget assumptions for FY 1959, was developed for transmittal to the Commission. A document (HW-46404) to be issued early in November, containing Chemical Processing Department research, development and engineering programs for five years and to be used in preparing HAPO research, development and engineering programs for FY 1959 budget assumptions, was prepared in cooperation with Facilities Engineering and Research & Engineering.

D. Essential Materials

Because of a price increase scheduled November 1, 1956, 50 tons of sodium dichromate were ordered for delivery at current prices. In anticipation of price increases for sodium carbonate, 150 tons were ordered for delivery at current prices. Total savings are expected to be approximately \$1,230.00.

Progress is being made in reducing essential materials stocks in anticipation of the impending shutdown of the TBP Plant. Large chemical storage tanks located at U Plant are being cleaned and placed in lay-away status as they are emptied.

E. Reports and Documents Prepared

Prepared and Issued

HW-45689 Essential Material Consumption, September 1956,
 TBP Plant, M. A. Thress, 10-5-56

HW-45690 Essential Material Consumption, September 1956,
 Redox Plant, M. A. Thress, 10-5-56

HW-45691 Essential Material Consumption, September 1956,
 Purex Plant, M. A. Thress, 10-5-56

HW-45692 Essential Material Report to Cost and Purchasing,
 September 1956, M. A. Thress, 10-5-56

HW-45693 Essential Materials Order, D. E. Peterson, 10-5-56

HW-45694 RD TBP-UO₂ Building Production Schedules for October
 1956, E. F. Campbell, 10-1-56

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- HW-45695 RD Redox Plant Production Schedule for October 1956, D. McDonald, 10-1-56
 - HW-45696 RD Purex Plant Production Schedule for October 1956, D. McDonald, 10-1-56
 - HW-45697 RD Z Plant Production Schedules for October 1956, B. F. Campbell, 10-1-56
 - HW-45738 Chemical Processing Department Waste Status Summary for September 1956, D. E. Peterson, 9-30-56
 - HW-45963 RD Nine Month Cost Forecast, D. McDonald, 10-5-56
 - HW-46080 RD Mid-Year Budget Review, October 1956 Thru FY 1957, B. F. Campbell and D. McDonald, 10-12-56
 - HW-46097 RD Redox Plant Production Schedule, October 1956 (Revision), D. McDonald, 10-16-56
 - HW-46152 RD Operating Program for Redox and Purex, D. McDonald, 10-17-56
 - HW-46353 RD Budget Assumption Forecast, D. McDonald, 10-24-56
- Prepared for Signature and Issuance
- XX-1724 Five Year Planning (Pre-Budget) Forecast, W. E. Johnson, 10-30-56

III. ORGANIZATION AND PERSONNEL

A. Force Summary

	<u>Personnel on Roll</u>	
	<u>Beginning of Month</u>	<u>End of Month</u>
Exempt	7	7
Non-Exempt	<u>4</u>	<u>4</u>
Total	11	11

B. Safety

There were no plant injuries incurred by Production Operation personnel during October.

C. Visitors

The following representatives visited the Department and conferred with W. N. Mobley, O. C. Schroeder, and J. H. Warren on reactor and fuel component matters:

C. Visitors (Continued)

Bruce R. Prentice, Nuclear System Design Study, APED, GE
Chapman J. Walker, Nuclear System Design Study, APED, GE
Edward J. Schmidt, Nuclear System Design Study, APED, GE

The following representatives visited the Department and conferred with W. N. Mobley, R. B. Richards, and J. H. Warren on production matters:

E. F. Miller, Division of Production, AEC Washington
George Quinn, Division of Production, AEC Washington

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CHEMICAL PROCESSING DEPARTMENT
PUREX OPERATION

October, 1956

I. RESPONSIBILITY

There was no change in the scope of Purex Operation responsibility during the month.

II. ACHIEVEMENT

A. Processing Operation

1. Normal Processing

A shortage of properly aged high exposure metal necessitated a plant shutdown during the period October 7 to October 21, 1956. The resulting plant monthly operating efficiency was 55 percent. Maximum production rate during the month was 1.44 CF. Production commitment was exceeded by three percent. Waste losses were 1.76 and 0.62 percent respectively for plutonium and uranium. Approximately 0.50 percent of the plutonium waste loss was a result of equipment flushes conducted during the shutdown period. All plutonium produced prior to the shutdown met specifications; however, following startup the product was low in concentration and required rework. The low concentration was apparently caused by process condensate from the plutonium concentrator top section leaking back through the vent line into the plutonium receiver. This situation was rectified and the operation returned to normal. Ninety-six percent of the uranium produced required processing through silica gel to meet gamma ratio specifications.

Operation stability and instrument performance of the modified #1 organic treatment column (T-62), installed during the shutdown, has been very good. Decontamination efficiency of the column has not as yet been determined because of the poor quality of the recovered organic solvent prior to the shutdown and the aqueous entrainment through one of the liquid-liquid-solid centrifuges. Partial plugging of the aqueous overflow weirs in the centrifuge is suspected to be the cause of the carbonate solution carryover.

2. Special Processing

Following the processing of all available irradiated metal early in the month, approximately 15 tons of uranium product were recycled through the extraction equipment to strip the plutonium in the system. All extraction equipment was then emptied and given chemical and steam flushes to remove accumulated crud. The #1 waste concentrator was given a special caustic flush to remove the organic degradation products which caused partial plugging of

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the concentrator overflow line. The plutonium concentrator package was given flushes of dilute nitric acid to reduce product buildup, and extensive decontamination of the IO column was carried out in preparation for its removal and storage.

B. Product and Material Handling Operation

Dissolution and feed preparation operations were without incident. The metal heels in the dissolvers were removed as a part of the building clean out, and during the time the processing equipment was essentially free of uranium and plutonium, an SS material inventory was taken to establish a reliable material balance. Although previous monthly material balances have indicated sizeable discrepancies between transfer points within process, the inventory showed the overall plant material balance to be excellent. Since July 14, when a similar clean out was made, the Purex Operation is 0.86 percent overaccounted in plutonium and 0.93 percent underaccounted in uranium.

Recovered nitric acid from the UO_3 Operation was used on a test basis to dissolve 15 tons of metal. The acid concentration was not representative of that expected (34 vs 45 percent), and the information obtained is of limited usefulness. The low recovered acid concentration necessitated butting with 60 percent fresh acid to prepare metal solution of suitable concentration for column feed.

The silica gel system for cleanup of second cycle uranium product operated almost continuously throughout the month. While the low acid precycle flowsheet, adopted on August 29, has increased ruthenium contribution to the total gamma fission product content of uranium, the silica gel treatment (which achieves only zirconium-niobium decontamination) continued to produce specification material.

The compressors supplying air for recirculation of boiling wastes in the 241-A-103 tank are now in operation and performing satisfactorily. No pressure surges in the boiling tank were experienced during the month. The constant boiling rate established in the tank has permitted a decrease (300 g.p.m. to 80 g.p.m.) in raw water flow to the contact condensers with a consequent 40 inch drop in liquid level in the A-9 crib. The life of this crib is thereby extended. The A-6 crib, handling steam condensate from boilup vessel heat exchangers, has receded 34 inches from the high level measured prior to shutdown. While no danger of exceeding capacity appears imminent, plans are being made to provide an overflow basin to contain the overflow in the event of crib stoppage.

Analysis of a vapor sample taken from the boiling 103-A waste tank indicated approximately 0.3 percent hydrogen - a value well below the lower explosive limit for hydrogen-air mixtures. The major source of the hydrogen is believed to be dissociation of water by high level radiation from the fission products.

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C. Radiation Monitoring Operation

1. Radiation Occurrence Experience

Six radiation occurrences were reported in the Purex Operation during the month, reflecting no significant increase in previous Purex experience. None of the occurrences were serious and the necessary corrective action has been taken.

2. Personnel Exposure Experience

Repairs to the in-line sample monitors, located in the side of the process samplers, were conducted at maximum personnel exposure rates of 3 r/hr and contamination levels in excess of a million d/m. Repairs to sample control valves in the sampler pits were made in fields as high as 3.5 r/hr with lead and water shielding in place. Decontamination of the failed valves was accomplished at a maximum dose rate of 600 mr/hr. The maximum dose rate to personnel in the removal of the decontaminated #1 organic treatment column was 800 mr/hr. After the column was set in a burial box and parked on the railroad siding north of Purex, radiation levels of 1.5 r/hr and 70 mr/hr were measured at six inches and fifty feet, respectively, from the box. The area has been roped accordingly.

3. Contamination Experience

Remote cell work during the period did not increase contamination levels on the remote crane, the crane maintenance platform, or the crane cabway. However, this work contaminated certain cell cover blocks to a maximum of 23 rads/hr. Decontamination is in progress. The slug storage basis was drained and the floor cleaned at a maximum dose rate of 250 mrad/hr. Contamination levels of 12.5 rads/hr were encountered on all horizontal surfaces of the prototype dual-pass silver reactor when it was removed from C cell for minor repairs. A maximum contamination of 750 mrad/hr was observed in the trap pit under the condensate lines from the #2 acid concentrator right tube bundle.

4. Exposure Card Audit

An unscheduled audit of hand and shoe counts recorded by employees in the building on their score cards indicated generally acceptable performance in obtaining the required minimum two checks per day. In the few non-conforming cases, corrective action has been taken.

D. Maintenance Operation

1. Manual Sampler Valves

The plastic diaphragms of seventeen Hills-McCanna type valves, located in the process sampler pits, have failed during the past

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two months. Since these valves are welded into the sampler pit piping systems, complete valve replacement is not practical. Repair of these valves was complicated further by high level radiation which reduced working time limits to one to three minutes. To effect repair the valves were shielded with water and the valve bonnet assemblies removed with extension tools. A quick clamping device was developed which permitted rapid replacement of new bonnet assemblies equipped with teflon diaphragms. Inasmuch as there are 178 such Hills-McCanna valves in sample pit service, the problem was referred to Facilities Engineering for resolution.

2. Instrument Air Tubing Connections

Approximately one hundred brass flare nuts, of the type used with tubing fittings, were replaced during plant startup after October 21, to eliminate leaks in instrument control systems in the P & O gallery. Investigation of the failures revealed that brass flare nuts, machined from bar stock, are subject to fracture when exposed to acid-contaminated atmosphere. Drop forged brass nuts were installed as replacements since they have been used successfully elsewhere in CFD to correct a similar problem. Approximately two thousand bar stock nuts will have to be replaced before the problem will be eliminated.

3. In-Line Gamma Monitors

All eleven in-line gamma sample monitors have been taken out of service pending the procurement or development of a solenoid valve suitable for this service. Repeated failures have been experienced with the valves presently installed because of a silver soldered joint which is subject to failure in contact with the process stream being sampled. Procurement of a more suitable valve is being investigated.

4. Suspected Tube Bundle

A minor leak, detectable only by unexpected radiation readings in a trap pit, is believed to exist in the tube bundle of the #2 acid concentrator (F-6). The tube bundle was continued in service. Further attempts will be made in future outages to confirm the leak by hydrostatic tests.

5. E Cell Centrifuge Repair

Maintenance activity associated with the scheduled shutdown during the month delayed the projected E-4 centrifuge inspection and repair work. Fabrication of a suitable shielding shroud, to reduce personnel exposure and permit removal of the motor by contact maintenance, is 95 percent complete.

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E. Analytical Control Operation

Control laboratory operation continued without incident during the month. During the plant shutdown (October 7 to October 21), several activities were undertaken to improve the quality of the service after startup. The difficulty with nitric acid analyses on two column feed control samples was investigated and, with the concurrence of Research and Engineering, the official method was changed from HC-1a (Nitric Acid by Coulometer) to HpH-1b (Determination of Nitric Acid by pH Measurement). Results since startup have been good. Further improvement in precision was obtained by installing a model W Beckman pH meter with a Bristol recorder.

The requested change of the coating waste sampler to a modified bayonet proved infeasible when readings in excess of 300 mg/hr were measured through the bayonet base. Consequently, return to the Gilmont samples for coating waste was made soon after startup.

F. Improvement Experience

1. Process Tests and Revisions

Stability tests on the HA column were conducted to determine the optimum pulse frequency and feed acidity. Results indicate that better column control is obtained by increasing the acidity of the feed from 0.5 to 1.0 molar. The precycle low acid flow-sheet is still in effect; and while the decontamination factor across precycle is improved, the total plant df remains about the same.

An attempt is being made to collect and condense vapors from the boiling waste storage tank 103-A for accurate measurement of activity cribbed from a single boiling tank. This data, when extrapolated for six tanks in the present 241-A tank farm, will provide information of value to Soil Sciences in selection of a site and specifications of conditions for construction of a new A-3 crib.

Two 12-gallon drums of commercial grade ferrous sulfamate have been received for test. The contents of one drum were prepared for use in process startup with no unusual effects noted. The second drum will be stored for two months to obtain the effect of aging prior to process use. If this chemical is satisfactory, drum shipment will provide a cheaper source of handling and supply than the carboys now in service.

2. Inventions and Discoveries

No inventions or discoveries were reported during the month.

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G. Events Influencing Costs

Elimination of the equipment support cradle in burial box design for the IO column resulted in a savings of \$3,000 in fabrication costs. Burial boxes of this design will be used for subsequent column burials.

Unit processing costs will be unusually high for the month of October because of the limited supply of irradiated metal available for processing. While steam, water, and essential material total costs will drop appreciably because of the low production, their contribution to the unit processing cost will be somewhat higher than normal because of the flushing activity carried on during the plant shutdown.

Tests carried out on the TF-5 acid fractionator/absorber during the month have shown that an absorber only can function in this position at plant rates greater than CF 2.75 after the vacuum fractionator (now under construction) has been placed in operation. While there will be no direct reflection in operating costs until the installation is made, the \$115,000 estimated saving in capital investment of the absorber only as compared to an absorber/fractionator (dual purpose unit) is significant.

H. Plant Development and Expansion

The H-3 metering pump installed in the nitric acid addition line to the precycle HC column was replaced with a prototype recorder-controller rotameter system. The metering pump system installed in six positions in the plant, has proved to be difficult to maintain and unreliable in operation. Initial results indicate the rotameter system is a substantial improvement over metering pumps.

The spare second uranium cycle 2-3 column is currently undergoing modifications designed to improve column control and to obtain a greater decontamination across the column. To achieve these results, the total number of cartridge plates will be increased, a portion of the stainless steel plates will be replaced with fluorothene, and interface control will be relocated to the bottom disengaging section. Plans have been made to install the modified column during a shutdown tentatively scheduled for the latter part of November.

Considerable difficulty was experienced in installing the prototype dual-pass silver reactor in C cell. After an extensive recheck of design drawings for possible discrepancies, transit and level measurement for proper location of connector nozzles, and rejigging of jumpers, it was found that interference between floor pad bolts and the dunnage feet held the equipment piece approximately two inches too high. With the source of trouble definitely established, corrections can be completed and the new equipment made available for service.

I. Reports Issued

No secret reports were issued by Purex Operation personnel during the month of October, 1956.

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III. ORGANIZATION AND PERSONNEL

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A. Force Summary

	<u>Exempt*</u>		<u>Other</u>		<u>Total</u>	
	<u>9/30</u>	<u>10/31</u>	<u>9/30</u>	<u>10/31</u>	<u>9/30</u>	<u>10/31</u>
Processing	7	7	79	75	86	85
Product & Mat'l Handling	7	7	64	64	71	71
Maintenance	10	10	67	67	77	77
Radiation Monitoring	7	7	19	19	26	26
Analytical	12	12	49	48	61	60
General	2	2	1	1	3	3
Total	45	45	279	277	324	322

* Includes Manager - Purex Operation

B. Safety

There were no disabling injuries. Only six medical treatment injury cases were reported during the month.

C. Security

There were no security violations during the month.

D. Personnel Activities

Revised personnel training check-off lists were put into use in the Processing Operation as a method of completing and renewing training of personnel for all normal assignments. Training in the Product and Material Handling Operation included process information on the acid fractionator which is currently being installed, power personnel functional training, and radiation work timekeeping practices and procedures.

A program of building tours was initiated to acquaint certain non-exempt personnel with the processing portion of the building and its functions.

One Technical Graduate completed prescribed training and was reassigned to IFD. One supervisor attended Principles and Methods of Supervision lectures.

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CHEMICAL PROCESSING DEPARTMENT
REDOX OPERATION

OCTOBER, 1956

I. RESPONSIBILITY

There were no changes in the scope of responsibility of the Redox Operation this month.

II. ACHIEVEMENT

A. Processing Operation

1. Production Rates and Operating Continuity

The Redox Operation production commitment for the month of October was exceeded by 18%, with an operating efficiency of 89% during this period. Mechanical operation was continuous except for a shutdown on 10-6-56 through 10-8-56 (60 hours) for the replacement of the failed H-2 centrifuge, and a 1.3 hour shutdown on 10-12-56 for a nitric acid tie-in to the 2-DX system.

During the latter part of the month, there was evidence of flooding in the 1A and 1B columns and on 10-27-56 the columns were shut down for a 10% nitric acid flush. Flushing was completed on 10-28-56 and metal feed was again started to the columns on 10-29-56.

Considerable difficulty was experienced at the beginning of the month in the operation of the various boil-up vessels of the organic system, G-1, G-2, and G-3, and resulted in fission products being carried over into the collection tank. While the process was shutdown to permit replacement of the H-2 centrifuge, the entire organic system was thoroughly checked and it was found that the 2DX rotameter was out of calibration and feeding approximately 80% excess organic to the column. Correction of the 2DX flow stream has cleared up many of the previously experienced operating irregularities of column operation and the hexone recovery system is now operating in a normal manner. It is planned to establish a routine check of the various rotameters in the building to prevent similar drifting of these units.

Past performance of the D-14 backcycle pump has been unsatisfactory due to frequent pump failures. A series of laboratory tests, made on the solution handled through this system, was completed this month and revealed that a salting out was occurring at the specified nitric acid deficiency. On this basis means of adding nitric acid to the 2-D column were installed and the acid deficiency of the D-14 solution modified. This change has apparently eliminated the salts in the backcycle solution as indicated by current D-14 samples. Continued operation of backcycle with this process

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change should prolong the life of the D-14 pump and may aid in keeping the 1-A and 1-S column on the line for longer periods of time without acid flushing.

All UNH and plutonium shipped this month met process specifications. Process waste material discarded to 241 during the month was well within normal throw-away limits.

2. Equipment Experience

a. H-2 Centrifuge

After 26 months of operation, the H-2 centrifuge failed in service and was replaced on 10-6-56. This is the 6th centrifuge replacement. The 26 month run of the No. 5 unit is by far the longest of any centrifuge yet installed. Installation of the replacement was accomplished without incident. Surveys of the crane before and after the performance of this work in H-Cell indicated no increase in radiation levels on the crane. Extreme precautions were exercised in preventing crane contamination during the installation, such as blanking all lines to the vessel, etc., which it is felt enabled the successful performance of this work.

b. D-14 Pump

The D-14 pump which failed on 9-23-56 due to a frozen shaft was replaced on 10-13-56. Replacement could not be made earlier due to the lack of a spare. The stock of spare pumps for this position has been rapidly depleted due to the numerous pump replacements (8) which have been required due to failure during the past three months. The old D-14 pump which failed was cleaned to radiation levels sufficient to enable transfer of the pump to TBP for further decontamination. It is now planned to decontaminate this unit to the lowest possible readings which will allow dismantling for inspecting. To date, it has not been possible to inspect a failed pump from Redox due to the high levels of radiation. Inspection of the above unit as to the cause of failure should provide Engineering personnel invaluable data relative to improving design features of future pumps for the Redox facility.

c. H-3 Weight Factor Jumper HG-39

Plugging of the dip tube in the H-3 weight factor jumper necessitated the jumper replacement on 10-7-56. However, operation of the H-3 weight factor was still erratic and the trouble was traced to sludge in the bottom of the H-3 tank.

A caustic flush of the tank did not satisfactorily clear up the trouble and an HF flush of the H-3 tank is currently contemplated.

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d. D-14 Steam Jumper

On 9-29-56, when a new D-14 sample jumper was installed, it was found that the new jumper interfered with the D-14 steam jumper. Due to installation difficulties, it was more feasible to replace the steam jumper than modify the sample jumper. The steam jumper was subsequently replaced on 10-11-56 and operation to-date has been satisfactory.

e. D-8 to 241 Jet (DT-40)

On 10-11-56, the dip leg on the D-8 to 241 jet jumper became plugged and replacement was necessary. However, operation of the new unit has not been checked out completely due to a plug in the waste line at the diversion box. Continuity of operations has been maintained by using the D-8 to 241 pump line.

f. Dissolver Lids

On 10-17-56, the C-2 dissolver lid was replaced with one having a remotely replaceable gasket. Operation was subsequently satisfactory and on 10-26-56 a similar unit was placed in service on the B-2 dissolver. Both installations were necessary because of the high in-leakage of air around the dissolver lids. Two of the three dissolver lids are now provided with this remotely removable gasket and should eliminate the need for replacing lids as a result of gasket failures.

g. G-5 Agitator

On 10-18-56, the agitator in the G-5 tank failed because of a broken shaft. Since this is not a critical location, replacement was deferred to a period when building operations were down. The unit was successfully replaced on 10-27-56, while the 10% acid flush of the 1-A and 1-S columns was in progress.

h. G-5 to H-2 Jets

Erratic operation of the G-5 to H-2 jets was encountered during the early part of the month and by the middle of the month they operated so poorly that production rates through the Head-end were attained only with difficulty. The trouble was traced to a sticking valve (remotely controlled) down stream of the jets and the problem was subsequently solved by placing air at a higher pressure on the control diaphragm. The G-5 to H-2 jets are now operating in a satisfactory manner.

i. ZDX Rotameter

On 10-8-56, during an investigation into the erratic operation of the various boil-up vessels of the organic recovery system, the ZDX rotameter calibration was found to be reading low by approximately 80%. Further investigation disclosed that the calibration

had probably been gradually changing over a period of several months due to the fact that the edge of the rotameter bob had worn away as the bob rotated in the glass tube. Since no replacement rotameter was available, a non-transmitting rotameter was installed in series with the 2DX transmitting rotameter and a new calibration curve for the unit was devised. Correction of the 2DX flow stream has corrected many of the previously experienced operating irregularities of the organic recovery system. A complete transmitting rotameter, factory calibrated, has been ordered and delivery is expected in six to eight weeks.

j. Iodine Monitor Units

Operation of the I¹³¹ monitors, which were installed on each of the dissolver off-gas lines several months ago, is proving to be quite unsatisfactory. The system tends to plug frequently, maintenance costs are high, and dependability of operation is low. Consequently, the units have been taken out of service and returned to the Contact Engineering Group for further study and development.

B. Product & Material Handling Operation

1. Production and Operating Continuity

Supporting activities of the Product & Material Handling Operation were satisfactory, and the 233-S Operation was able to process all flushes and normal production received from the 202-S Operation without delay to the parent operation. All UNH received from the 202-S Operation during the month met shipping specifications.

The L-3 to L-4 valve, which failed at the bellows, was replaced on 10/9/56 without interrupting the 202-S Operation. This was the third failure of the subject valve since startup of the 233-S Operation. The valve failure resulted in two plutonium batches being under-concentrated and necessitated recycling to the L-1 tank for re-concentration. Four cans of flush material resulting from the clean out prior to the L-3 to L-4 valve change were returned to H-4 for rework.

2. Equipment Experience

The 233-S Building main exhaust filters were replaced on 10-4-56 and the entire installation was completed without incident. Air flow measurements taken during September indicated a gradual plugging of these units.

High level contamination detected this month in the 233-S greenhouse was traced to a leaking flange gasket above the L-3 thermohm. Inasmuch as no leakage occurs during normal operation, a shutdown procedure has been established which will maintain the liquid level below the leaking flange. This is only a temporary measure to prevent further difficulty pending the next scheduled shutdown when the gasket will be replaced.

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The ozone generating equipment for tail-end processing was checked out and placed in service this month. Minor difficulties with the air driers and the dew-point recorder have been encountered but sufficient ozone to meet processing requirements has been generated and satisfactory performance is anticipated.

Modifications to the inert gas system were started this month in an effort to improve the physical and chemical characteristics of the gas produced. Modifications made to-date include: (1) installation of filters in series rather than in parallel, (2) placing of aftercoolers in parallel, (3) installation of separate cooling systems to the compressors and after coolers and (4) reactivation of the inert gas humidifier. With these modifications incorporated into the inert gas system an improvement in the quality of the gas produced is expected.

Inspection of an inert gas filter which was replaced on 10-10-56 revealed that the filter media (activated alumina) had practically disintegrated from the corrosive action of the carbonic acid which is present in the system. This condition has led to some concern over the corrosive action on the high pressure inert gas storage tank and the system in general. Plans have been made to flush and inspect the entire inert gas system during the next scheduled building shutdown.

During the month a cleanout and inspection program of the Reflux Operation chemical storage tanks was begun. Tanks which have been completed to-date include the 101, 102, and 604 caustic tanks, and the 113 ANN tank.

Coils in general were found in good condition and only minor maintenance was required on the plug valves and float gauges. Small amounts of solids were found in the caustic tanks, but these were flushed clean with little difficulty. However, the 113 ANN tank was found to have an 18 inch heel of solids which completely covered the coils. Five days of water slushing were required to clean the tank and discard the contents.

3. Bismuth Phosphate Plant Standby and Lay-Away

a. Standby Operations

The B and T Plant Canyon Building equipment is being held in standby condition by operating all power driven equipment two hours each week. B Plant Canyon is in a dry state and water is processing through T Plant Canyon piping once each week.

b. T Plant Lay-Away

Lay-away of the 224-T Concentration Building is essentially complete with minor decontamination, blanking of the pipe gallery cell fans and isolation of electricity, water and air yet to be done. All equipment, chemical lines, and tanks in the 211 Tank Farm Area with the exception of 108, 141, and 161, which are partly filled with chemicals, have been flushed, drained and put in lay-away condition.

c. B Plant Lay-Away

Lay-away of the 224-B Concentration Building is progressing as manpower is available and is currently approximately 50% complete. The sampler rooms and cell balconies have been decontaminated from an average of 50,000 d/m to less than 20,000 d/m. Flushing, draining and blanking of service lines, chemical lines, tanks and strainers has been completed.

During the latter part of the month the transfer of approximately 800,000 lbs of 60% nitric acid from the storage tanks in the 211 Tank Farm Area to other CPD components was begun. To date one tank car load has been moved.

C. Maintenance Operation

1. Operating Continuity and Equipment Replacement

The overall mechanical efficiency of the Redox Operation was 89% for the month of October. The facility has enjoyed a rather successful run with very few interruptions because of equipment failures. Since the first of the month the following pieces of canyon equipment have been replaced: one D-8 pump, one D-14 pump, one H-2 centrifuge, one G-5 agitator, and four jumpers.

2. Inspection and Maintenance

A total of 258 inspection cards were issued during the month, of which 138 were returned by the respective foremen leaving a balance of 120. This represents some improvement over the previous month. Our efforts will continue to be directed toward the prompt return of inspection cards. The program of reducing the number and the frequency of inspections is also continuing. Eighty-six of the cards issued in September were also returned leaving a balance of 24.

On two occasions during the month the canyon tunnel door was struck by a flat car mounted with Minor Construction scaffolding. Damage resulting from the first incident was such that on October 8 the tunnel door was replaced with a new one. However, the new door which was installed is apparently not suited for this type of service because of the new type guides which tend to hang-up as the door leaves the roll to descend into the stationary guides. This hang-up has occurred twice since the installation resulting in extensive repairs on both occasions. To further complicate the problem, on October 20, the Minor Construction scaffold car was again pushed into the tunnel door while it was being spotted to make repairs on the door. Two courses of action are currently underway to improve this tunnel door situation. (1) An emergency order has been placed for a door of the original type constructed of 16 gauge material and a permanent scaffold is being installed above the tunnel door to facilitate maintenance. During the interim period, four hundred pounds of lead has been attached to the present door to lessen the chance of a hang-up. This has resulted in smoother operation and may prove to be the ultimate

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answer to our door problem especially after Minor Construction completes the installation of the ventilation barriers (Project 01-624) which will take the air pressure off of our present door during the raising and lowering operation. (2) Engineering has been requested to design another type tunnel door, possibly a guillotine type or a sliding door type. The latter is to be preferred because of its simplicity. Transportation has assured us that they will take appropriate action to eliminate future incidents of this type.

A de-entrainment section was fabricated and installed this month in the exhaust line of the vent tank from the South Operating Gallery. This unit will separate condensate from the exhaust air and drain it back into F Cell through a spare wall nozzle. The new arrangement will correct a potential contamination hazard since the exhaust air is discharged over the building roof.

The charging wrench on the 60 ton crane failed on 10-13-56 due to a short in the electrical cord where it enters the wrench. Radiation levels were of such magnitude that repairs were not practical and the wrench was replaced.

D. Analytical Control Operation

1. Control Statistics

<u>Month</u>	<u>Samples</u>	<u>Determinations</u>
September	3622	9574
October	3994	10662

2. Building Maintenance

Principal 222-S Building maintenance included the installation of new preheat coils in the No. 3 and No. 4 air supply units, change of wet and dry filters in air supply unit No. 3 and the wet filter in No. 4, change of two C.W.S. and two dust stop filters in Room 1-L, replacement of a bent wrist pin in the No. 1 vacuum pump, and rewiring of a defective electronic controller on both the No. 1 and No. 2 vacuum pumps.

3. Waste Disposal

4,980 gallons of 222-S Laboratory waste were transferred to the 202-S Building for storage. 3,960 gallons of low level laboratory waste were sent to the 216-SL crib, and 450,000 gallons of 222-S Building retention waste were transferred to the swamp.

4. Analytical Procedures

The analytical procedure manual for process reagents was completely revised and brought up-to-date this month.

In an effort to improve the possibility of the Redox Plant approaching a material balance on fission products, the method of reporting results obtained on the gamma ray spectrometer was changed. Results are now

reported in terms of gamma photons per minute per unit volume instead of the previously used ratio of fission products with no actual amounts.

Adoption of the use of a small amount of anhydrous sodium sulfate as a drying agent in the analysis of 30% TBP deobase solvent has corrected a one percent high bias in the TBP content due to inefficient drying.

A procedure change involving addition of hydroxylamine sulfate to the dish mounts was adopted in order to minimize ruthenium loss during analysis of the E-12 sample for gamma ratio. The ruthenium content of these samples previously has been too low to make its loss important; however, adoption of the dichromate head-end treatment in the Redox Operation has increased the possibility of a ruthenium contribution to the gamma ratio of this solution.

5. Equipment Experience

Seven days down time were experienced with the mass spectrometer during the month because of electrical shorts which followed the failure of a cooling water line.

E. Radiation Monitoring Operation

1. Radiation occurrence Experience

Eight radiation occurrences were reported during the month, four of which occurred in the last two days. Six of the eight reflected deviations from established procedures. The necessity of following established procedures and the importance of individual care while working in radiation zones is being re-emphasized to all employees.

One radiation occurrence was detected through a routine hand count before lunch where a Facilities Engineering Operation employee experienced hand contamination up to 20,000 c/m. The employee had stepped into the No. 3 cable room, which is adjacent to his regular office, to observe some maintenance work. Contamination levels up to 5,000 c/m with smears up to 3,000 c/m were observed on the electrical cable conduits which lead into the canyon cells. The source and time of the contamination spread is not known, however, some contamination problems occurred in this area back in 1954.

2. Personnel Exposure Experience

Decontamination and maintenance work was accomplished on the 60 ton crane impact wrenches in personnel dose rates from 900 mr/hr at 8 inches to 5 rads/hr including 1 r/hr at 6 feet. Appropriate shielding and decontamination made it possible to repair one of the failed wrenches which otherwise would have been discarded. Some decontamination work was accomplished on the 60 ton hook by steam cleaning to enable the riggers to realign one of the cables which had become unseated from one of the sheaves. Inasmuch as the decontamination work was done in the railroad tunnel it was necessary to decontaminate on a follow-up basis in the tunnel.

REPRODUCTION

Extensive work was accomplished in the 233-S Building with continued excellent contamination control. Specifically; (1) the L-3 and L-4 valve was changed, (2) the 233-S exhaust filter was changed, (3) extensive relagging was accomplished in the grossly contaminated pipe gallery and (4) a new PR dip leg was installed. The potential for contamination spreads in all of these jobs was great, but through proper planning and care during the work, only minor contamination spreads occurred.

3. Other Contamination Experience

Routine surveys of the first five AMU levels indicate that we are experiencing some minor amounts of contamination seepage from around the lightports and/or viewing windows. The second level AMU was particularly bad and required the establishment of a temporary radiation zone until control could be regained. Contamination smears up to 4,000 c/m were observed on the second level AMU lightports in areas where no contamination smears were detected in September.

A radiation survey audit of incoming cask cars revealed that some of the cars are coming into the Redox Plant area above the prescribed contamination limits established. Smears up to 30,000 c/m on well lids with specks up to 1.5 rads/hr have been observed. The problem has been discussed with IPD Radiation Monitoring groups and they report similar observations on their incoming cars. As a result, Monitoring groups of both departments are now being more critical on their radiation release surveys for cask cars leaving the appropriate plants, in order to maintain cask car contamination within the acceptable levels. In some instances this will probably result in cars being held up for decontamination.

F. Improvement Experience

1. Processing Operation

The ozone generating equipment for tail-end processing was checked out and placed in service this month. Following shakedown, five Head-end runs were processed with dichromate for evaluation. The plutonium product stream and waste losses for these five runs were unchanged while the gamma activity of the final uranium increased. However, ozonization of the final uranium product reduced the gamma activity well within specifications. Since no adverse effects were noted on the plutonium and waste streams for these five runs, additional dichromate runs are currently being processed to fully evaluate this process.

The new down-draft dissolver tower which was installed in the A-2 position has performed satisfactorily with substantial savings in nitric acid. Results of tests utilizing weak nitric acid comparable to that which is to be received from recovery sources have been superior with this type tower than with the old. It is planned to convert the spare dissolver tower to either the type which is in the A-2 position or to one which has cooling coils in place of the packing (Savannah type) and have this installed in either the B-2 or C-2 position. Ultimate use of down-draft type towers on all dissolvers is planned for the

Redox Operation. Substantial nitric acid savings are anticipated from these changes as well as improved iodine control.

The remote maintenance shop and decontamination room were thoroughly cleaned and decontaminated this month and utilization of these facilities for the intended purpose has been restored. Radiation has been reduced to such levels that repairs on hot equipment can now be completed in the remote shop. Repairs to a crane charging wrench were successfully accomplished in the remote shop thus providing a suitable spare without requiring a new purchase. Use of the decontamination hoods for decontamination purposes has also been restored.

2. Product & Material Handling Operation

Ventilation in the operating galleries was improved by the installation of ball joint individual flow directors at the operating boards. These units proved satisfactory at T Plant and were moved to Redox to allow the operators to adjust the ventilation as desired for their personal comfort.

An automatic air purge of the steam coil in the L-2 organic stripper was installed this month. This equipment was designed to apply 2 to 3 lbs of air pressure to the coil and thus prevent a possible suck back of contamination into the steam header should an L-2 coil failure occur.

Access doors and maintenance platforms have been installed in the process side of the 276-S Building which will facilitate maintenance work on the heater units for this part of the building.

3. Maintenance Operation

On October 19, a new Wilfley pump and motor was installed on the caustic service line to the building to replace the Byron-Jackson pump which has given considerable maintenance trouble over the years. The main source of trouble has been with packing leaks. It is felt that the mechanical seal in the Wilfley pump will eliminate this difficulty. This pump is so designed that when it is in operation there is no pressure exerted on the seal. The only time a seal is actually required is when equipment is not in operation. It is too early to make definite improvement claims, however, everything to date points to a very successful operation.

The installation of the equipment for automatically switching the vent jets from air to steam during a process air failure is complete. Tests of J-Cell systems were satisfactory; tests of the E-13 and dissolver vent jet systems have not been completed.

4. Radiation Monitoring Operation

All Radiation Work Procedures have been revised and issued to the appropriate groups. The use of the Maintenance Work Permit in connection with radiation work revealed a weakness in the adherence

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to special instructions where flammable hazards may exist. Agreement among maintenance, operating and monitoring management has clarified the condition, and uniform instructions on the use of Maintenance Work Permits will be included in the Radiation Work Procedures where applicable.

b. Inventions and Discoveries

There were no inventions or discoveries reported in the Redox Operation during the month of October, 1956.

G. Plant Development and Expansion

1. Design Liaison, Construction Checking

P-77 Chemical Storage and Maintenance Equipment Facility

Scope design is nearing completion for both buildings. Project proposal preparation will be complete and inter-departmental approvals in progress by approximately 11-30-56.

P-89 Cask Car Decontamination Facility

A project proposal is in preparation for a metal prefabricated building for the cleaning of cask cars. Scope design has been completed, commented upon and approved. The structure is to be located astraddle a new spur near the junction of the 211-S spur and the tracks leading to the Redox railroad tunnel.

CA-539 Additional Waste Storage - 241-SX

All work on the final exception list will be completed this month. An instrument panel for recording specific gravity, air flows, differential pressure and temperatures is installed. Wiring of the system was delayed until data from Minneapolis Honeywell was received this month.

CG-621 Redox Contamination Control

E-Cell Ozonization:

The ozone generating equipment is being operated for check out and training purposes. Equipment for the E-13 continuous gamma monitor is on order. Redesign of the sampling system has not yet been completed.

J-6 Precondenser:

The drainage problem on the J-6 precondenser was solved with the installation of the redesigned drain line jumper. Lagging of service piping is the only item remaining to be completed.

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Contaminated Equipment Replacement:

Replacement equipment for H-4, H-5, H-6 and J-1 are on order. These units will not be installed until the cell ventilation units are in operation.

Canyon Wash-Down Facility:

Construction pipe fitters have been assigned to high priority work in the 100 areas and, therefore, no progress has been made on installation of piping for the canyon wash-down system during the past month.

CG-624 Redox Railroad Tunnel Ventilation Barriers

About 75% of the holes for mounting the tunnel door support rails have been drilled. Installation of the rails and doors should proceed rapidly after the drilling is completed. The control system in the craneway is about 95% complete.

CG-636 Redox SWP Service Area

Facilities Engineering has conducted a study to reduce the overall cost of this project. By elimination of certain areas in the original proposal, the cost has been reduced substantially. Revision of the project proposal and rescoping is now in progress.

CG-648 Redox Auxiliary Iodine Removal and Nitric Acid Recovery

Construction of the 293-S Building is proceeding satisfactorily. The process sewer line has been pressure tested and accepted and the raw water line is ready for testing. Backfilling of the sewer line trench has been started. Pouring of walls and floors of the 293-S Building is continuing.

H. Events Influencing Costs

Arrangements were completed this month for the use of the 222-S Laboratory store room for most of the Redox Operation requirements. Space limitations at the store room will necessitate purchasing some bulky items from Central Stores. However, this arrangement will result in a \$7,000 reduction in the project proposal for enlarging the SWP change room and storage area in the Redox facility.

The critical equipment list was reviewed and the "ready to install" spares for noncritical positions were reduced from 2 to 1 on rotating equipment stored in the shop. This can result in potential inventory reduction of approximately 12 pumps and agitators at an average cost of \$5,000. The reductions will be realized as the respective pieces of equipment are installed.

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Items valued at approximately \$5,000 were excessed from building inventories in the form of valves, fittings, bearings, seals and other materials for which no immediate use could be foreseen. Approximately \$2,000 worth will be returned to stores for credit. An additional \$1,000 will be stored in 272-Z and made available for use in other facilities. The remaining \$2,000 will be excessed at 15% of the actual value.

By removing the burial boxes as a Spare Parts item, the facility will avoid 15% handling charge on all future boxes in addition to saving the handling charges on boxes already fabricated and stored in the burial grounds. Actually one of these boxes, amounting to \$3,000, is all that can be claimed although there are approximately 10 other boxes stored and which ultimately may be used.

During the month, two boxes of failed rotating equipment and jumpers, which had accumulated in the 202-S Canyon Building over the past three months, were removed to the burial ground. This equipment, having a total acquisition value of approximately \$87,000, could not be repaired because of the high radiation levels. Twenty-five obsolete and un-repairable jumpers, having an acquisition value of approximately \$28,000, were also removed from the 241-S-151 diversion box. Removal of the jumpers, which have accumulated since the startup of the Redox Operation in 1951, has significantly reduced the radiation levels around the diversion box.

On 10-8-56, the 2DX rotameter was found to be out of calibration and feeding approximately 80% excess organic to the column. Recalibration of this instrument together with the effective use of the J-6-E precondenser should reflect a material saving in hexone usage this month. Prior to 9-27-56 the J-6-E precondenser could not be effectively used due to improper drainage of the J-6 filter vessel. However, on this date a newly designed drain jumper was installed and normal operation of the precondenser has resulted.

I. Significant Reports Issued

None

III. ORGANIZATION AND PERSONNEL

A. Force Summary

Component	Exempt		Other		Total	
	9-30-56	10-31-56	9-30-56	10-31-56	9-30-56	10-31-56
General	2	2	1	1	3	3
Maintenance Oper.	10	10	54	55	64	65
Product & Mat'l						
Handling Oper.	13	12	80	70	93	82
Processing Oper.	7	7	70	76	77	83
Rad. Monitoring Oper.	5	5	22	22	27	27
Analytical Laboratory Oper.	17	17	75	74	92	91
Totals	54	53	302	298	356	351

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B. Safety

There were no disabling injuries, serious accidents or incidents, in the Redox Operation during October.

On 10-15-56 a third party inspector, from the Hartford Insurance Co., examined the 202-S Building elevator and found it in good repair.

On 10-16-56 the upper limit switches on both the 10 and 60 ton crane hoists in the 202-S Building were inspected and found to be set properly and in good working order.

C. Security

There were no security violations in the Redox Operation during the month of October.

D. Personnel Activities

On 10-12-56, F. R. Lewis, M-1033-6730, left the General Electric Company to accept employment with the Boeing Aircraft Co., at Seattle, Washington.

P. E. Alley, M-16174-6742, successfully completed the conferences on "Principles and Methods of Supervision", this month.

A redistribution of responsibility, authority and manpower was effected this month between the Processing Operation and the Product & Material Handling Operation. This change was made to provide an overall smoother building operation and to improve the means of measuring the performance of individual shift components. The Processing Operation is now covering all aspects of the 202-S Building proper, including the operating gallery, pipe gallery, sampling gallery, south storage gallery, 8th level AMU, and the SWP lobby. The Product and Material Handling Operation is responsible for AMU levels one through five, 233-S Building, and all other existing responsibilities associated with ventilation, chemical handling, waste storage, etc. Personnel adjustments made in this change of responsibility took into consideration the influx of new personnel who will be transferred to the Redox Operation as the TBP and Tank Farm Operations are shut down.

A considerable amount of unrest has been exhibited by many of our people as a result of the recent announcement concerning the plans to complete the TBP Operation. In an effort to improve morale and employee relations during this period of uncertainty, a series of talks have been given by members of Redox Management at each of the shift safety meetings held this month. The effects of the shutdown, the Company's interest in the problem, and the efforts being made to provide each employee an opportunity to remain at HAPO were discussed. Employees were very receptive and a better understanding of the problem appears to have resulted.

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A study of the Redox manpower indicates that 20 of the present 37 chemical workers in the Product and Material Handling Operation will be lost to other positions or ROF'd as a result of the TBP shutdown. This major shift of personnel will present a continuous and well managed training program to avoid costly incidents during the next six months.

A study of the effect the TBP shutdown will have on the 222-S Laboratory manpower requirements was completed this month. If this facility shuts down as scheduled, the 222-S Laboratory will be able to supply personnel as required by the 234-5 and 202-A Laboratories after January 1, 1957. It is anticipated that normal turnover will absorb excess personnel by July, 1957.

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CHEMICAL PROCESSING DEPARTMENT
FINISHED PRODUCTS OPERATION

OCTOBER, 1956

I. RESPONSIBILITY

There were no changes in responsibility within the Finished Products Operation during the month.

II. ACHIEVEMENT

A. Metal Finishing Operation

231 Processing

The 231 Building processed plutonium originating from Redox. This material was isolated and loaded to sample cans for shipment offsite as plutonium nitrate. Operations generally progressed satisfactorily and schedules were met easily without resorting to overtime. Some difficulties were experienced from higher than normal recycle on random batches. While these troubles were significant enough to warrant the start of investigations to determine the cause, the overall progress of the work was not adversely affected.

234-5 Processing

Fabrication activities were devoted to the preparation of two different sizes of conventional model cores and unfabricated plutonium. Schedules were exceeded in the case of both models and were met for the unfabricated material. Operations progressed satisfactorily during the month and it was not necessary to resort to overtime to meet schedules. Difficulties with leaks in one of the remelting furnaces developed about the middle of the month and continued through month end, but did not curtail production sufficiently to prevent the meeting of commitments. No feed was received from Purex for two weeks during the month and advantage was taken of the opportunity to extensively clean the process equipment and hoods of plutonium in order to improve overall accountability.

B. Product Recovery Operation

A total of sixty-six dissolver runs was processed to set a record 29% over any previous production. The amount of plutonium charged to Task I of the Metal Finishing Operation set a record 40% over previous shipments to this task. Almost half of this total was from recoverable waste accounts. The record dissolver and extraction column performance is more remarkable because the system was adversely involved at the beginning of the month from the troubles caused by three bellows failures during September. Also on October 2, the bottom section of glass in the H-1 (extraction) column shattered, causing a two-day outage and an extensive rework

B. Product Recovery Operation (Cont'd.)

of solutions. Shortly after this, the Purex and Redox plants shut down for a period of two weeks necessitating the processing of all Task I supernatant solutions (normally returned to these plants) in Recuplex. The material from this source was processed using it as a diluent in the dissolver replacing the water normally added at this point. Also, during this period a number of Purex acid flushes were processed along with some substandard solutions from the hood 40 dissolver.

The resolution of several operational problems contributed significantly to the month's outstanding performance. Slow dissolver solution filtration was corrected by scheduled caustic flushes of the filter blocks. The oxidation (by water vapor) of calcium of Task III fluoride powders allowed some of this material to be charged in a wet instead of a dry dissolver, eliminating approximately three hours from the processing cycle. The stepwise reduction of dissolver slag and crucible coagulating time from six to two hours, along with the addition of Separan, a coagulating agent, also helped. In addition to this the pulser rates were increased and more salting agent was added, and this resulted in decreased waste losses.

The recovery of plutonium metal scrap in hoods 40 and 41 proceeded without incident until late in the month when the hood 40 dissolver pot failed. Fortunately, this was observed during a cleanout run and no plutonium was lost. A relatively large amount of material was recovered in these hoods during the month was due principally to the return of a sizeable amount of material from research programs.

General building operation proceeded routinely with very few problems. The main 234-5 Building process drain line (D-6) developed a leak in the pipe tunnel. Repairs were effected without interrupting continuity of operation. Power and ventilation control was good and no significant problems were experienced. The old burial garden, being full, was abandoned in favor of the new one located just west of the industrial burial ground.

C. Maintenance Operation (Z)

In Task I maintenance activity during the month was routine, being concerned with defective valves and a plugged dip tube. Task II activity was also routine. However, during the low production activity resulting from the two-weeks shutdown of the Purex and Redox plants the opportunity was taken to do considerable preventative work in this task. Visibility at Hood 9, Station #10 was improved by the addition of an 11" glove port window. In Task III there were no significant problems. Task IV maintenance activity was also routine with one exception; Remelt Furnace #4 was damaged on October 19 and repairs were complicated by numerous leaks in the system, faulty valves, and a doubtful diffusion pump. Corrections occupied approximately two weeks before satisfactory performance was obtained. Task V presented no significant problems. In Task VII it was necessary to replace twenty-one thermocouple gauges, otherwise activity there was normal.

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C. Maintenance Operation (2) (Cont'd.)

In Recuplex the only significant item concerned the shattering of the bottom glass section on the H-1 column. During the replacement of this section it was discovered that the lower portion of the column was out of alignment. This was corrected and no further difficulty is anticipated.

Maintenance activity in the 231 and 234-5 Buildings proper was routine and considerable winterizing of equipment was accomplished during the month.

Work in connection with the installation of the Task I and II prototype hood for the Research and Engineering Operation is approximately 35% complete.

D. Analytical Control Operation

A new record for total determinations in the 234-5 Analytical Laboratory was established during October, exceeding last months record by 6%.

Three Technologists and a Chemist were assigned specifically to the chemical assay determination of plutonium. The Analytical precision has steadily improved to the point that results are now within allowable limits. Nineteen percent (19%) more finished pieces were inspected during October than were forecast. Inspection time lost to rejections was nominal, amounting to only 8% of the pieces received. This is a decided reduction in the rejection rate.

E. Metal Recovery Operation

Production was satisfactory during October, with a net of 167.54 Tons of uranium processed. This represents 108% of goal production, but was somewhat less than last month's when fewer operating difficulties were encountered. Gross production was 176.80 Tons during October which included 9.26 Tons of rework from the 224 Building and from recovered nitric acid.

There was no downtime for the metal recovery extraction batteries during October, however there were three periods when operating rates were sharply curtailed due to mechanical difficulties either in the 224-U Building or at the Metal Removal facilities.

Failure occurred on the 002-WR waste pump early in the month which forced a rate reduction while replacement was being installed. The replacement pump failed within four days causing continued operation at reduced process rates, while a second replacement was being made ready. A process shutdown was avoided only by utilizing the 001-WR vault for temporary storage of waste.

Processing difficulties at the Metal Removal Operation about mid-month resulted in a period when the feed stream was extremely low in uranium. This forced a rate reduction in 221-U due to concentrator and flow limitations. This condition has improved at month end.

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E. Metal Recovery Operation (Cont'd.)

Near the end of the month pump failures, as evidenced by sharply decreasing flow rates, occurred in the intercycle concentrator feed, and the pumpout tanks. Failure also occurred to a trap on the discharge side of the Section 6 concentrator. Replacement of these units is scheduled to begin November 1, to coincide with a raw water outage scheduled by the Power Operation.

Production and waste streams have been in good control throughout the month.

Building layaway planning continued throughout the month with detailed record and history forms being prepared. Several chemical storage tanks, along with their related pumps and piping, have already been placed in layaway status.

F. Metal Removal Operation

Sluicing operations were discontinued in the 101-U and 107-TX tanks due to low metal removal rates, and commenced in the 102-U and 108-TX tanks. Subsequent removal rates have been less than forecasted; however, rates have been sufficient to maintain a five to seven T/Day rate in 221-U.

The dual sluicing operation continued satisfactorily in the 102-T Tank.

A total of 182 Tons of Uranium was blended during the month, representing 110% of goal forecast.

Ditching of TBP non-cribbable scavenged waste has been completed to the first ditch of Phase II and the ditch backfilled.

In-farm scavenging was limited to approximately seven days during the period due to lack of storage space and to pump failure.

G. Uranium Oxide Operation

Overall production of uranium oxide powder was 116% of commitment. This was made up of decomposition pot production, prototype continuous calciner production (milled through calciner powder system), plus product from the J Cell continuous calciner.

Feed was first started to the J Cell calciner on October 23. It produced smoothly for about eleven hours when it had to be shut down because of powder backup and star valve stoppage in the hopper under the calciner. It again went into production on October 30 and was running at month end. The performance of the calciner proper has been most promising; however considerable delays and interruptions have stemmed from auxiliary equipment such as electrical interlocks, star powder discharge valves, Gemco power line valves and the calciner discharge weir.

The Luckey Pots produced at about 84% efficiency for the month. One of these two pots lost a total of about eighty hours for igniter and burner control problems.

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G. Uranium Oxide Operation (Cont'd.)

The electric pots ran with high efficiency through October until it was necessary to segregate the TA-3 acid absorber for calciner outage. Approximately 50% efficiency for four to six electric pots was lost during the last week of the month because of low pot vacuum.

Fume conditions were kept under satisfactory control during this period by cutback and by evacuating the pot room on several occasions.

H. Maintenance Operation (U)

Two Nagle sludge pumps failed during the month and one pump was lost due to a broken cable. These failures bring the spare pump inventory down to one new pump, with the possibility of repairing three used pumps by replacing the motors.

Moisture in the conduit carrying power to the two blend tank agitators in the TXR vault caused a temporary interruption in this operation until emergency circuits could be installed.

Two OO-2WR waste pumps failed during the month and were replaced. Shear coupling pins on the Bingham sludge pump required downtime for repair.

Twenty-five "hot" jumpers were removed from the 241-S diversion box and buried. This reduced radiation and makes future work in this box more economical with regards to exposure time.

Three pumps failed at the 221-U canyon and three pumps were repaired, with a fourth pump partially completed during the month.

Repairs to gas fired calciner pot #19 consisted of lowering the agitator, replacing one control thermocouple and one agitator drive motor and gear reduction unit. Individual temperature control units were installed on both of the Luckey Pots.

Additional lines have been installed to the ED-7 evaporator and X-19 UNH feed tank such that material from this evaporator can be routed to the X-19 tank.

Six craftsmen were borrowed from other facilities for temporary shift work in the startup of the UA facility. Maintenance in this facility has consisted of replacing flexible metal airlines to the back filter blow rings with rubber air-lines, removal and alteration of rotary valves, repair and replacement of Gemco isolation valves, correction of electrical alarm circuits, voltage checks on ACA agitation drive motor, repair and calibration of loading scales, and replacement of faulty steam valves.

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I. Radiation Monitoring Operation

Twenty (20) radiation occurrences took place during the month of October as compared to twenty-one (21) during September. Distribution of these occurrences showed five (5) in Metal Finishing, one (1) in Product Recovery, one (1) in Maintenance (Z), five (5) in Analytical, one (1) Uranium Oxide, two (2) in Metal Removal, one (1) in Metal Recovery, and four (4) in Maintenance (U).

A marked reduction in the number of skin contamination cases was noted in October. There were nine (9) cases in the Z Plant, four (4) in Metal Removal, two (2) in Uranium Oxide, and one (1) in Metal Recovery, for a total of sixteen (16). This compares favorably against the thirty-three (33) cases that occurred in September.

High radiation levels around the trenches used for cribbing scavenged metal recovery waste necessitated the use of several heavy equipment operators during backfilling. Seven of these operators were allowed to receive up to 200 mrem in a 24-hour period.

One radiation occurrence was formally investigated by a committee consisting of members from both the Irradiation Processing Department and Chemical Processing Department when a heavy equipment operator from 100-H Area was allowed to receive a 200 mrem dose to backfill the scavenged waste filled trench located south of 200-E Area. Permission to receive this dose was given by Radiation Monitoring when this employee exposure record card showed him to have had no exposure for the previous six-day period. Later investigation revealed that he had an estimated 215 mrem during this previous six-day period.

The Radiation Protection Operation of the Hanford Laboratories Operation was requested to survey the home of a Laboratory Assistant when her protective clothing, pencils and the sample cards she had been handling were found to be contaminated. There was no indication that she had made a personal survey or hand count before leaving the building. The survey revealed no contamination to the employee or in her home.

J. Improvement Experience

1. Process Tests and Revisions

Information relating to this item will be covered in the Research and Engineering Operation portion of the department report. Other information containing weapons data will be covered in a separate report to be written at a later date.

2. Miscellaneous Improvement Items

In Recuplex dissolver capacity was increased by (1) the oxidation (by water vapor) of calcium contained in plutonium fluoride powders (permitting this material to be charged to a dissolver without first drying it), (2) scheduled caustic flushes of the filter blocks, and (3) addition of a coagulating agent and decreasing of the coagulation time.

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J. Improvement Experience (Cont'd.)

2. Miscellaneous Improvement Items (Cont'd.)

In Recuplex decreased waste losses resulted from an increase in pulser rates at the extraction columns and the addition of more salting agent to the column feeds.

In the Uranium Oxide Operation maintenance to the scales in the 224-UA Building has been lessened by new scale platform stops which are anchored independent of the scales.

Continuity of operation of the Luckey Pots was improved by separating the burner control systems.

3. Inventions and Discoveries

No inventions or discoveries of a patentable nature were reported during the month.

K. Events Influencing Cost

Cost reports received during October indicated that in the Metal Recovery Operation reduced manpower, coupled with high production rates and a minimum of mechanical difficulties resulted in a record low unit cost for the month of September.

In the Metal Removal Operation equipment cost rose appreciably due to five pump failures and the grounding out of two agitator jumpers.

In the Uranium Oxide Operation it was necessary to issue work orders at a rate higher than normal to provide repairs, equipment maintenance and fabrication on adaptations to improve the physical status and operability of the 224-U Building.

L. Plant Development and Expansion

1. Project CG-691 - Continuous Task I and II

Detail design is slightly over 50% complete and is ahead of schedule. Requisitions for such critical equipment as the calciner, fluorinator, drum filter, valves, and the main process hood have been issued. Meeting of the beneficial occupancy date of August 1, 1957 will depend primarily on delivery dates from vendors since essentially all of the equipment will be fabricated offsite.

2. Project CG-613 - UO₃ Expansion

Performance testing continues on "J" Cell calciner and the powder unloading system. Performance tests revealed malfunctioning of the rotary valves. The valves were altered by increasing the clearance of the valve rotors, and placed back in operation.

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2. Project CG-613 - UO₃ Expansion (Cont'd.)

Calciners alterations include relocation of the feed point thermocouples, and the installation of larger sized rotometers in the shaft seal air supply system. Auxiliary heating has been supplied to the "J" Cell feed box, and the air operated valves altered to allow increased feed flow to the calciners.

Modification of the shipping containers to conform with ICC and Security regulations have been completed on 70% of the containers. Modifications to the locking dogs which hold the containers in place on the five Milwaukee Railroad cars have been completed. The design of sample containers which are to be permanently attached to the railroad cars has been completed, and fabrication of the containers, by Minor Construction, is underway.

Hoffman Construction started work on the new maintenance facility on October 22. The existing building and concrete pad has been removed and pouring of the new footings is scheduled for the week ending October 28, 1956. A temporary shielding wall consisting of steel drums filled with water was installed between 224-U and the work location to reduce the radiation level to that permissible for lump sum contract personnel. Design modifications to the heating and ventilation systems to reduce the cost of the contract is being prepared by the Architect Engineer. The uncontaminated portion of the existing hutment was sold to the contractor.

The screw conveyor was installed in 224-U Building on September 25, 1956, and it is now operating satisfactorily.

3. Project CG-603 - In-Farm Scavenging - West Area

Project CG-603 is complete except for minor punch list items.

4. Project Request - Reduction of Air-Borne Noxious Fumes, 224-U Bldg.

The project proposal is being circulated for necessary GE approvals before being submitted to the commission for approval.

5. Project CA-688 Additional Waste Facilities 216-BC Crib Area

Phase II has been completed with the exception of one test well, and the disposal of the scavenged wastes to the ditches is in progress. High radiation readings in the area, due to disposal of the wastes to the ditches, has delayed the completion of the final Phase II well by the contractor. Preparation of the Phase III bid package for submission to lump sum contractors is scheduled for the week of November 5, 1956.

6. Engineering Study - Compressed Air and Venting Facilities

A project proposal is being prepared by Construction Engineering to provide compressed air and venting facilities for U Area, completely independent of the existing facilities in the 221-U Building as required following the lay-away of the 221-U Building.

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7. Project Proposal - Nitric Acid Transfer Facilities

The project proposal is being circulated for departmental approvals.

8. Engineering Study - Supplemental Product Unloading Facilities

An engineering design study has been requested to investigate supplemental facilities for the calciner pot unloading system in the 224-U Building, and to examine the feasibility of project action for such facilities.

9. Engineering Study - Redesign of Calciner Pot Agitator, Shaft and Seals, 224-U Bldg.

An engineering study is in progress to correlate the available agitation information, and with this information, redesign the electric calciner pots, shafts, and seals.

10. Request For Project Proposal - Installation of Product Rework Facilities, Uranium Oxide Operation

Results of studies concerning the 224-UM Building UO₃ product rework facilities by Facilities Engineering Operation, have been submitted to Finished Products Operation, for preparation of the project justification.

M. Reports Issued

HW-45707-E Finished Products Operation Monthly Report September 1956, by W. N. Mobley

HW-46006 Finished Products Operation Z Plant Monthly Report, September 1956, by W. N. Mobley

HW-45600 Dosimetry of Plutonium Fabrication-Interim Report, by G. L. Helgeson

III. ORGANIZATION AND PERSONNELA. Organization Changes

In the Metal Finishing Operation the Analyst, Processing (W. Watson, Jr.) was transferred to a position in the Employee Relations Operation. The position of Analyst, Processing is to remain vacant until it can be filled by an exempt employee made available by the shutdown of the Metal Recovery or Metal Removal facilities.

In the Analytical Operation one Chemist (R. W. James) was added to the organization to permit closer supervision and additional training of personnel relative to plutonium analyses.

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A. Organization Changes (Cont'd.)

In the Radiation Monitoring Operation one non-exempt employee (R. A. Wonacott) was promoted to Supervisor and replaced a Supervisor (W. G. Howell) who was transferred to Irradiation Processing Department.

In the Maintenance Operation (U) one Supervisor-in-Training (J. J. Gore) was returned to his non-exempt craftsman status and was replaced by a Maintenance Foreman (M. B. Swartz) from Maintenance Operation (Z) who in turn was replaced by a Supervisor-in-Training (A. N. Mabbutt) who was upgraded from non-exempt craftsman.

B. Force Summary

	Exempt		Non-Exempt		Total	
	<u>9-30-56</u>	<u>10-31-56</u>	<u>9-30-56</u>	<u>10-31-56</u>	<u>9-30-56</u>	<u>10-31-56</u>
General	2	2	1	1	3	3
Metal Finishing	7	6	51	51	58	57
Product Recovery	6	6	51	49	57	55
Maintenance (Z)	8	8	44	44	52	52
Radiation Monitoring	7	7	29	28	36	35
Analytical	9	10	39	39	48	49
Metal Recovery	7	7	58	58	65	65
Metal Removal	7	7	36	37	43	44
Uranium Oxide	6	6	52	51	58	57
Maintenance (U)	<u>10</u>	<u>10</u>	<u>78</u>	<u>82</u>	<u>88</u>	<u>92</u>
	69	69	439	440	508	509

C. Safety Experience

No Disabling Injuries occurred in the Finished Products Operation during the month. One Near-Serious Accident occurred which involved a paint scraper being caught and thrown by a grinding wheel. Formally reported in Near-Serious Accident Investigation Report CPD #1. Twenty-eight (28) medical-treatment injuries were experienced in the operation during the period. The frequency rate for October is 2.99% as compared with 2.20% for September.

D. Radiation Experience

All significant information relative to radiation experience in the Finished Products Operation is carried in Item II - 1. (Radiation Monitoring Operation) and in the formal report of Irradiation Processing Department radiation occurrence under date 10-20-56.

E. Security Experience

No security violations were experienced during the month.

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F. Personnel Activities

No new programs were started during the month. Considerable time and effort were spent in shift discussions of the plan to transfer the more senior operators out of the plants which will be laid away in the near future. The Uranium Oxide Operation is continuing its training of operators for the new continuous calciners and the Analytical Operation has accomplished considerable training and retraining of its personnel.

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CHEMICAL PROCESSING DEPARTMENT
POWER AND GENERAL MAINTENANCE OPERATION

OCTOBER, 1956

I. RESPONSIBILITY

The responsibilities of this Operation remained unchanged during the month.

II. ACHIEVEMENT

A. Operating Continuity

There were no outages of water, steam or electrical services that affected continuity of operations during the month.

The 200-E area experienced a ruptured 8" sanitary water line in the administration area. No serious resultant damages were sustained. The broken section was isolated and repairs effected in a normal manner.

B. Inspection, Maintenance, and Replacement

Principal liaison relations with the prime separations facilities consisted of coordinating shop activities to meet a scheduled shutdown of the Purex facility for replacement of the 1-0 column, and for the fabrication of 31 pipe jumpers required for the October-November shutdown of Redox.

Major items fabricated and/or made ready for the production plants included a G-L pulse column, a shield and cover plate for a 40-inch centrifuge, two agitators, three burial boxes, nine pumps and 25 cell pipe jumpers. In addition, ten electric motors and three welding machine generators were rewound.

Preparations were completed by the Shops Operation for the repair of three failed Nagle slurry pumps. The work will be performed in the 221-B canyon where a fresh air pump has been provided and other preventive measures taken for minimizing the exposure to radiation and radioactive contamination. Site preparation included locating a temporary frame building at R-13 entrance to B Canyon for use as an SWP change room.

The application of lead shielding over the floor area of "A" Cell at the Hot Semi-Works was interrupted when the area was exposed to additional contamination. At month end, Maintenance forces were pouring a 2" thick concrete pad over the entire floor area. To enhance the shielding qualities of concrete, magnetite was used in place of rock aggregate and over the areas where radiation was at an excessively high level a mixture of 7500 lbs. of lead shot per cubic yard of concrete was used. The job was an estimated 50% complete at month end.

A survey of the underground condition of 200 area steam line support poles was completed. Examination disclosed that many were cracked below ground level and all were in a state of dry-rot. A program

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for reinforcing by stubbing has been initiated. Construction Operation is submitting cost estimates for the proposed work.

Efforts to rid the 200 areas of a dense growth of Russian Thistle continued throughout the month. To better cope with the situation the work force is being increased and a weed control program established which includes the following three phases:

1. Weed removal.
2. Sterilizing grounds where no vegetation is required.
3. Selective spraying where native grasses are required for soil stabilization.

Phases 1 and 2 are currently in progress and phase 3 will commence in the spring when seed germination has taken place.

Informal Approval No. 209, which authorized installation of strainers in the raw water pump discharge lines, was complete at month end. The work involved installing a total of ten McClellan, type 528, cast steel strainers in the raw water discharge lines in the 282 Buildings in 200-E and 200-W areas. The installations were deemed necessary to eliminate difficulties encountered as a result of debris entering process coolant systems via the raw water supply.

An inspection of all tank farm fences, barricades and other types of barriers was completed. A program was developed for the mass replacement of those found in a deteriorated condition with metal posts, chain and adequate regulatory markings. Substitution of this more economical type of barrier will also minimize accumulation of wind-blown vegetation.

C. Improvement Experience

In cooperation with Facilities Engineering personnel, a program was initiated for the development and installation of a preventive maintenance program in all P&GM components and for the initiation of work sampling and related performance measurements in the 200-E and W Shops. Personnel from both P&GM and Facilities Engineering cooperated in visiting three eastern General Electric plants to observe preventive maintenance programs, to which attention had been called by the Manufacturing Services Division.

III. ORGANIZATION AND PERSONNEL

A. Force Summary

Component	Exempt*		Other		Total	
	9-30	10-31	9-30	10-31	9-30	10-31
*P&GM General	1	1	0	0	1	1
Administration	6	6	8	9	14	15
Power	10	10	56	56	66	66
Shops	10	9	93	92	103	101
E General	7	8	65	65	72	73
W General	7	7	52	54	59	61
Plant Liaison	2	2	3	3	5	5
Totals	43	43	277	279	320	322

*Includes Level Three Manager.

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B. Safety

The Operation experienced no disabling injuries during the month.

There were 22 medical treatment cases tabulated which reflects a frequency rate of 4.45.

No incidents occurred in which there was a lapse of radiation control.

C. Personnel Activities

One non-exempt employee was upgraded to "Supervisor-In-Training".

One significant report was issued, titled M.S.A. Ultra-Aire (Special) Space Filter Moisture and Burning Tests - J.H. Palmer.

A total of eight employees suggestions were evaluated, two of which contained values sufficient to merit acceptance.

The first of a carefully planned series of training courses was presented to a group of the Operation's Power Operators. The subject "Water Treatment" was presented by a Specialist in that field and covered the topic "Ion Exchangers and Water Softening Principles".

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CHEMICAL PROCESSING DEPARTMENT
FINANCIAL OPERATION

October, 1956

I. RESPONSIBILITY

There were no significant changes in the responsibilities assigned to the Financial Operation during the month.

II. ACHIEVEMENT

A. Product Cost

The physical inventory of precious metals and other special materials was reconciled during the month. The physical inventory of this material was taken during September in order to determine and record the quantities transferred to the Chemical Processing Department at the time of reorganization.

Incorrect usage of expense codes resulted in many erroneous charges during September. Cost Accumulation personnel has concentrated on the detection and correction, through contacts with responsible supervision, and a substantial improvement has resulted.

Auditing of charges received from other Departments, during the month, revealed a total of \$32,327 charged to the Chemical Processing Department in error. These charges are being billed back and will be offset against October's cost.

Preparation of the mid-year budget review was started. The budgets for "Equipment Not Included in Construction Projects", "General Plant Projects", and "Personnel" were completed and submitted for final approval.

Ozolid masters, of the operating reports, have been received for use in reporting October's cost. Direct transcription to these masters from the cost sub-ledgers and reproduction with the Ozomatic machine will eliminate an appreciable amount of the typing and verifying effort presently required and thus permit the earlier issuance of the operating report.

A summary of "Man Months" and "Overtime Hours" utilized by the various operations were prepared and issued to the responsible Level 3 Managers.

B. Personnel Accounting

Time card drop boxes have been installed in the 200 East and West gate houses. It is expected that the utilization of the boxes by Department supervision will permit Personnel Accounting to process time cards faster and provide Department supervision with a convenient place to deposit their time cards.

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Considerable delay has developed in the transfer of personnel records between the various components. A procedure to decrease this delay is being reviewed and developed by Personnel Accounting.

The most recent cost of living adjustment, based on changes in the official Consumer Price Index, became effective for non-exempt personnel October 29, and was added to the base salary and isolation pay. This increase brought the cost of living adjustment to 1.77% and increased the total salary "adder" to 22.77% above the 1951 base point. Exempt salaries were not adjusted; however, exempt employees entitled to area differential received an increase from \$40.08 per month to \$40.27 per month.

Statistics:

1. <u>Number of CPD Employees</u>	<u>Monthly</u>	<u>Weekly</u>	<u>Total</u>
Employees at Beginning of Month	436	1 450	1 886
Additions and Transfers In	0	36	36
Removals and Transfers Out	6	24	30
Transfers from Weekly to Monthly	3	(3)	0
Transfers from Monthly to Weekly	(1)	1	0
Employees at End of Month	432	1 460	1 892

2. <u>Overtime Payments During Month</u>	<u>October</u>	<u>September</u>
Non-Exempt Employees	\$14 854.00	\$15 066.66
Exempt Employees	4 659.00	5 603.87
Total	\$19 513.00	\$20 670.53

3. <u>Gross Payroll for Month</u>	<u>October</u>	<u>September</u>
Monthly	\$ 315 359	\$ 311 001
Weekly	668 191*	666 080*
Total	\$ 983 550	\$ 977 081

* Payments to non-exempt employees cover a four week period.

4. <u>Participation in Benefit Plans at Month End</u>	<u>October</u>		<u>September</u>	
	<u>Number</u>	<u>%</u>	<u>Number</u>	<u>%</u>
Pension Plan	1 822	99.8	1 802	98.6
Insurance Plan - Personal Coverage	1 894	99.7	1 879	99.6
- Dependent Coverage	1 459	76.8	1 457	77.3
Stock Bonus Plan	1 040	54.9	1 047	55.5
Savings Plan	262	13.8	252	13.4
Total Both Plans	1 313	60.4	1 273	62.2

5. <u>Pension Plan</u>	<u>October</u>	<u>September</u>
Number Retired	1	0
Number who became eligible for participation	10	12
Number who elected to participate	10	12
Number who elected not to participate	0	0
Replies not received	0	0
6. <u>Insurance Claims Paid</u>	<u>October</u>	<u>September</u>
Employee Life Insurance	0	0
Employee Accident and Health	62	67
Dependent Accident and Health	84	90
7. <u>Good Neighbor Fund</u>	<u>October</u>	<u>September</u>
Number participating	1 165	1 339
Percentage participation	61.6	71.0
8. <u>Suggestion Awards</u>	<u>October</u>	<u>September</u>
Number of Awards	63	0
Total Amount of Awards	\$ 778	\$ 0
9. <u>Preferential Rates</u>	<u>October</u>	<u>September</u>
Number added (or eliminated)	3	0
Number currently in effect	59	56
10. <u>Number of Military Allowance Payments</u>	<u>October</u>	<u>September</u>
	0	0

C. General Accounting

During October the Equipment and General Plant Projects Budgets for CPD were prepared and submitted to Contract Administration. The Plant Acquisition and Construction Budget was completed and reviewed with the various operations managers on October 31, 1956. This budget will be submitted to Contract Administration on November 2, 1956.

Depreciation expense charged to product cost for October amounts to \$1,274,902. This includes an export water assessment of \$9,588 from IPD and a general use assessment of \$62,034 from Relations and Utilities.

The revised listing of CPD Property Custodians and Property Representatives was distributed to all Plant Managers, control units, and to Contract Administration. The uninstalled portion of the HAPO Property Record Unit Catalog is scheduled for issue in the near future. Copies will be distributed to CPD Property Representatives when received.

An IBM listing has been received of movable equipment items which could not be identified to the proper organizational component at the time of reorganization. This plant wide listing is to be reviewed by each department or operation for proper identification and assignment of this equipment.

Advances by check and currency for travel and conference expenses totaling \$2,525 were made to CPD personnel during October. In addition to the above, invoices covering air travel expenses of CPD personnel in the amount of \$2,350 and invoices covering moving expenses of new employees in the amount of \$275 were processed for payment.

Two procedural changes were instituted during the month in an effort to simplify procedures and improve financial reporting dates.

1. A preprinted journal entry form has been developed for the General Ledger accounts used most often during previous business. The preprinted entries may be completed in long hand for amounts and explanations. It is hoped that the adoption of this form will expedite the flow of journal entries, reduce the typing load, and simplify journalization procedures, without minimizing the importance of the document as a permanent record.
2. Beginning with November business, Billing Operation will use specialized books of original entry for recording second class invoices. One book for incoming invoices and one book for outgoing invoices will be used. As Second Class Invoices are received, they will be recorded in the appropriate book which has columns for General Ledger accounts to debit and credit, date, reference number, and description. These books will be totaled and posted once each month and should help speed the processing of Second Class Invoices by eliminating time required for preparing Journal Entries. Posting time should also be reduced.

D. Auditing

Field work was completed for the Audit of Motor Pool Operations. Findings and recommendations have been summarized for review with supervision of audited Operations prior to issuing report early in November.

A revision to AEC Manual Chapter 5141 - Official Use of AEC Motor Vehicles and Aircraft, which was accepted for compliance, was received October 17 with a letter by the General Manager - HAPO. This Chapter was reviewed with the Manager of Employee Relations who will participate in establishing a uniform procedure among Departments for disciplinary action in cases of misuse of government vehicles, and will issue an appropriate CPD directive to implement Company and Department procedures.

Arrangements were made with Contract Administration Operation for the joint development and execution of an Audit program of 200 Areas S.S. Accountability Operation. Tentatively, November 15 has been established as the starting date for this Audit.

The Commission has verbally agreed that their Auditors will review CPD Audit programs at the operating location. This arrangement will preclude the necessity for furnishing a copy of our Audit program to Contract Administration Operation.

During the month, 201 purchase requisitions were reviewed to ascertain whether or not expenditures are reimbursable under this provision of the Prime Contract. In two instances procurement action was cancelled as items requisitioned could not be considered as necessary and proper for the performance of the work. Action on a third requisition involving the procurement of blanket lined jackets is being held in abeyance pending submission of adequate justification for procurement.

A schedule of pertinent provisions of Appendix "B" of the Prime Contract and comments and references to assist management in administering Appendix "B" was prepared for distribution during November.

A complete set of AEC Manual Chapters was obtained and will be maintained in this office for CPD reference.

E. Procedures

A survey of Telephones and Office Equipment was completed during the month. This survey reveals that the Financial Operation is adequately supplied with a few minor exceptions. These exceptions are in the process of being corrected.

A Procedure study has been initiated for the expressed purpose of isolating and eliminating the delay points in month end closing routines. The elimination of these delay points will result in realistic reporting dates.

The first corrective measures scheduled for action are as follows:

1. An Invoice Journal will be adopted by the billings group. This Journal will eliminate the necessity of issuing a general journal entry for each second class invoice and reduce General Ledger postings to one combined entry per month from the Invoice Journal.
2. A new media of transmitting information to Cost Accumulation will be utilized. At the present time the Billing Group retypes the incoming second class invoices on a journal entry form and sends this to Cost along with the supporting detail. This retyping may be eliminated through the use of a "thermofax" machine. The second class invoice may be reproduced by the "thermofax", the detail attached and sent directly to Cost. This method will save a minimum of 4 hours at month end closing time.
3. A new method of reproduction will be utilized in presenting the monthly Operating statement. The format has been set up on Ozalid Masters and the operating figures will be entered on these masters in scroll. This type of reporting will eliminate the

necessity of one typing and one proofing which generally requires 1 to 2 days. The Operating figures may be erased and the Master reused time after time. This reuse eliminates the necessity of reprinting new masters every month.

The adoption of the above three recommendations is expected to reduce month end work by 1-1/2 to 2-1/2 days.

F. Measurements

During the month major activities centered around the issuance of CPD OPG's and Advices. A total of 42 CPD OPG's and Advices were approved and issued to department personnel. Included in this group was Advice 1.1.1 "Delegation of Routine Authorities - By Position" which outlines in one report, all routine authorities delegated to department management.

Mr. C. A. Gillespie of Measurements Services, visited Hanford late in the month. Several general meetings were held with Mr. Gillespie and a specific visit to CPD was made by him to discuss measurements in our area of operations. Many helpful suggestions and comments were obtained from Mr. Gillespie and these are being passed on to other individuals in the department working with Measurements.

The measurements specialist took part in an engineering study conducted by Facilities Engineering Operation which developed capacity, cost, and long-range planning required by CPD in support of "Hanford 1956 Capacity Study" (HW-46402, by A. B. Carson).

III. ORGANIZATION AND PERSONNEL

A. Force Summary

	<u>Exempt *</u>		<u>Other</u>		<u>Total</u>	
	<u>9-30-56</u>	<u>10-31-56</u>	<u>9-30-56</u>	<u>10-31-56</u>	<u>9-30-56</u>	<u>10-31-56</u>
Financial General	1	1	1	1	2	2
Gen. Accounting	6	6	15	16	21	22
General	1	1	2	2		
Gen. Books	1	1	4	4		
Billing	1	1	3	3		
Plant Acctg.	2	2	6	6		
Projects	1	1	0	1		
Product Cost	6	6	20	20	26	26
General	1	1	1	1		
Cost Accumulation	1	1	14	14		
Budgets	1	1	1	1		
Cost Analysis	2	2	3	3		
Inventories	1	1	1	1		
Measurements	1	1	1	1	2	2
Auditing	2	2	0	0	2	2
Procedures	1	1	0	0	1	1

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	Exempt *		Other		Total	
	9-30-56	10-31-56	9-30-56	10-31-56	9-30-56	10-31-56
Personnel Accounting	5	5	13	13	18	18
General	1	1	2	2		
Weekly Payroll	1	1	4	4		
Monthly Payroll	1	1	2	2		
Benefit Plans	1	1	4	4		
Records & Reports	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>		
Total	22	22	50	51	72	73

*Includes Level 3 Managers.

B. Safety

One safety meeting for all Financial personnel was held during the month.

One minor injury was experienced during the month.

Safety treads were installed on the steps and landing leading in to entrance 13 of the 271-B Building and on the stairs between the first and second floor to prevent slipping.

C. Security

Two security violations were experienced during the month.

D. Personnel Activities

A meeting of the Institute of Internal Auditors in Seattle, October 5, was attended by T. E. Sparks. One of the highlights of the trip was a tour of the Boeing Aircraft Factory and a review of Internal Audit Activity at this installation.

CHEMICAL PROCESSING DEPARTMENT
FACILITIES ENGINEERING OPERATION

October, 1956

I. RESPONSIBILITY

There were no changes in responsibilities of the Facilities Engineering Operation in the month of October, 1956.

II. ACHIEVEMENTS

A. Purex Operation

Research and Development

An engineering study was completed and a report EW-46019 issued on the cause and proposed correction of the high dissolver tower differential pressure during uranium dissolving. A recommendation was made for the installation of test air jets in A-Cell Dissolver to overcome the high dp condition. The high dp which occurs during cuts at the higher dissolution rates makes dissolver vacuum control difficult. This condition is responsible for the occasional pressurization of dissolvers with accompanying contamination of the canyon ventilation system. The high dp also limits dissolver air in-bleed and contributes to a high dissolver acid consumption. With the completion of the Project CG-647 acid and iodine recovery facilities, and Project CA-513-A electrical off-gas heater installation, dissolver operations will be retarded by the high differential pressure across the dissolver towers. The accepted theory, proposed to explain the phenomenon and corroborated by operating data, attributes the high dp to dissolver foaming. Test jets have been designed for installation in A-Cell dissolver to alleviate the problem. Three air jets, installed in a single jumper, would discharge into the foam blanket at the top of the dissolver to break the foam by mechanical action.

Process Technology

A project proposal is being prepared to cover the detailed scope and detailed design for additional facilities to handle Purex Tank Farm Vapor wastes. These engineering costs have been estimated at \$60,000. The total cost for the project as now conceived is \$800,000 plus \$75,000 in transferable capital equipment. The proposed facilities are outlined on drawings SK-2-2134, SK-2-2142 and SK-2-2144. An instrumentation scope drawing for operational control of the surface condensers will be ready for comments at the end of

the month. Another scope drawing will show a new crib near the 200 West Area and the necessary piping to convey the condensate waste from the surface condensers to the 241-C transfer facilities thence to the new crib via 200-East-West waste transfer facilities.

Study activities are continuing and direct cost estimates being prepared on a number of alternate methods. The results of this work including engineering studies of the alternates will be reviewed before the scope document is issued.

Plant Engineering

Liaison was conducted with the Purex Operation on the establishment of a program to test the efficiency of the present canyon ventilation filter and the dissolver and vessel vent filters and to determine the need, if any, of new facilities.

Process and equipment design calculations are in progress for a new Purex T-F5 in-canyon acid absorber, designed to supply liquid feed for the T-U6 Vacuum Fractionator to achieve a 2.75 capacity factor across the dual absorber-fractionator system. Acid from the dissolver acid recovery facility (Project CG-647) would be blended with T-F5 absorber bottoms prior to feeding T-U5. Overhead acid losses are to be limited to one percent both on T-F5 and T-U5. Preliminary calculations show that an 18.5 percent nitric acid bottom product will be required from T-F5 to permit operation of the vacuum fractionator at 2.75 capacity factor on the PFFS II Flowsheet.

Interim considerations were published on possible rehabilitation of the existing Purex plutonium concentration equipment by substitution of titanium as material of construction for critical items of equipment. If the existing concentrator, concentrator tube bundle, and critical concentrator piping were replaced with titanium equipment, the life of each package would be approximately 1.5 years, and the total cost for both packages, \$88,000. If the concentrator condenser were included with the above replacement equipment, the life of each package would be extended to 2.5 years, and the total cost would be increased to approximately \$100,000.

A welding procedure was prepared and proposed to aid in producing an acceptable titanium heat exchanger by refabrication. To refabricate, the tubes were cut beneath the tube sheet support so that a shorter bundle could be made using the remaining tube lengths. Incomplete results on test pieces subsequently machine and subjected to rolling and welding tests indicate that the rolling will be irregular due to variations in wall thickness of individual tubes. Radiographic inspection of 14 tubes indicates four of them to be cracked, one at the middle of the length.

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A work order was issued to Construction Engineering to initiate work on a Purex crib master plan. The work is urgent as it has a close relationship with Project CA-683 and the project for additional facilities for Handling Purex Tank Farm Vapor Wastes. The civil and structural unit has started preliminary work. Preliminary evaluations indicate that the most favorable site will be east and south of the Redox area.

The current condition of the 216-A-6 crib was described in a letter dated October 3, 1956, V. W. Wood to E. Doud with chart attached. It called attention to the high liquid level in the crib and the indicated low dispersal rate of the crib as determined from Manufacturing records. Subsequently Operations has reduced the amount of water used to prevent the steam condensate from flashing. This has temporarily caused the liquid level in the crib to recede. A study of methods to economically expand the steam condensate disposal capacity is underway.

Centrifuge Failures

Following review of the failed centrifuge units at Purex, and an inspection by the vendors of a failed rotor, six replacement rotors were ordered and have been received on plant site. One rotor has been installed in a spare motor and has been satisfactorily run-in. A second rotor is being held in the shop in readiness for installation, if possible, in the contaminated machine in Purex. The shield for inspection of the failed unit in the canyon has been completed and moved into the Purex building. Arrangements have been made with the Reliance Motor Company and Bird Machinery Company to have an inspection team at HAPO on November 12; at this time inspection and a determination, if possible, of the causes of failure will be made. Recording voltmeter and ammeter readings have been furnished Bird Machinery Company for study prior to their arrival on plant site. A procurement Request for a spare centrifuge unit is being submitted to Purchasing and any information derived from the November 12 inspection will be incorporated in the specification.

Essential Material Study

The Purex essential material accounting system is being studied. A review was made of aqueous makeup procedures and inventory forms. Specifications for three variations of the flowsheet have been calculated and a new procedure is being devised to measure actual chemical usage and to compare it with specified flowsheet consumption. This system will enable supervision to spot variance from the standard use of chemicals.

Project Activities

CG-59B - Purex Vacuum Acid Fractionator

Recent capacity tests on the 216-A-9 Crib, which were terminated on September 19, indicated that the crib will be able to handle the design water flow of 600 gallons per minute with a depth of less than eight inches when it is first placed in service. Percolation capacity in this crib may be limited in the future, however, due to the presence of silt in the cooling water in the contact condenser and

expected growth of fungus at the 125 F. condenser effluent temperature. To alleviate such a limitation in the event that it is encountered in the future, process design work has been initiated covering corrective measures. To cover the possibility that all Purex cribs may require relocation from the 200 East Area plateau at some time in the future, a crib overflow line and temporary ditch and pond disposal are being considered. Extension of the present crib will also be considered. A chronological record was prepared listing the more important completion dates of the various phases of this project.

CG-644 - Silica Gel Tail-End Treatment Facilities

Comments on the design package submitted by the Architect-Engineer, W. C. Nickum & Sons have been received from appropriate HAPO personnel and are being consolidated for transmittal to the AEC for their action in prosecution of the design contract. The design package in its present form cannot be approved by the General Electric Company.

CG-647 - Back-Up Radioiodine Removal Facilities

Construction by the Fixed-Price Contractor, H. L. Hoffman, was started late this month. Due to an increase of contamination in the construction work area, contractor personnel must wear protective clothing. This condition was not anticipated when the contract was awarded, and the Commission has negotiated an extra amounting to \$12,600.

CA-683 - Purex Cooling Water Swamp Relocation

A revision letter, V.W. Wood to C. E. Kent was issued October 17, 1956. It recommends that Gray and Osborne, Architect-Engineers, be instructed to proceed with final design. The final design will reflect new features required for greater flexibility in line use. This revision pertained to the effluent line running north to the Gable Mountain disposal area.

A scope letter V. W. Wood to C. E. Kent was issued October 26, 1956. This described new facilities not included in the original proposal to be used to divert the waste cooling water from the originally proposed line via an additional line to a depression on the 540 ft. contour south east of the 200 East Area. This letter recommends that the project proposal be revised to include funds to accomplish detailed scope and detailed design on the new facilities. Construction funds would not be requested at this time. This facility would be sufficiently flexible to divert any or all of the non contaminated Purex cooling water waste to the south east. This would make it possible to extend the scope of a proposed underground hydrological dam to the south east of the 200 East area for purposes of confining and or restraining contaminated ground water under the 200 East Area.

E-33334 - Waste Tank Farm, 241 AX (Design)

The preliminary scope, design, preliminary project cost estimates, and the design schedule have been completed. The proposal smooth draft and Plant and Equipment Analysis Report are now complete.

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The preliminary savings evaluation indicates that about \$900,000 annually in capital expenditure (crib replacement) will be saved by the proposed surface condensers. Beneficial use of the proposed work is anticipated for February, 1958. The project scope includes a new crib for utilization with the proposed surface condensers. The present crib, 216-A-8, has been determined to have a useful life until April, 1957. Process improvement recommendations have been made by L. R. Michels, Process Design and Development, to extend the life of this crib. Depending upon the extension of crib life which appears possible with these improvements, a temporary replacement crib may be required.

B. Redox Operation

Slug Storage Facilities

A report has been prepared indicating that action to provide slug storage facilities in Redox should be deferred at this time. With the use of statistical control charts for the dissolving operation as proposed in the study and careful scheduling of charging, no difficulty is anticipated in meeting Phase III production rates in the dissolvers. Although the storage facilities would simplify operation of the building somewhat, the gains are more than offset by the additional load on the crane caused by double handling of the slug buckets, and the difficulties and high cost associated with installation of the equipment in the presently contaminated Redox canyon.

Maintenance Planning & Scheduling

A special method of handling information for scheduling maintenance manpower mathematically has been developed. This technique uses a Matrix which handles each variable in proper order. The use of the Matrix permits solving the problem in a series of simple steps which help to keep all variables under control.

Maintenance Measurements

Fifteen maintenance performance measurements have been established and maintained by the Industrial Engineering Operation at the request of Department and Plant management. These measurements have been evaluated this month in cooperation with Redox maintenance management and by agreement the most useful are to be transferred to the Maintenance Operation for continued application. The current study will be concluded with transfer except the Time Utilization Index (Work Sampling) which will be periodically re-established by the Industrial Engineering Operation.

Process Technology

The operation of the cycle timer control valve in the discharge line of the final product concentrator to the product receiver was investigated at both the Redox and Purex Plants. Frequent failures of the valve bellows at Redox required either a change in type of valve or a change in method of operation of the present valve. Recommendations were transmitted to the Redox Operation covering a program for improved

operation of the present valve and possible replacement with a new valve of improved design.

Preliminary conceptual design studies were made on dissolvers for the 1956 special HAPO study. These dissolvers would be installed at Redox and would be designed to be critically safe in processing enriched slugs at Redox Phase III rates. Because of the enrichment, departures from normal HAPO dissolver design are required to provide adequate slug capacity for necessary Phase III dissolving rates.

Project Activities

CG-621 - Contamination Control Facilities

The purchase orders covering the last connectors were placed this month and delivery is promised in six months.

CG-643 - Phase III Expansion

Design Instruction Letter No. 6 covering alterations to flow control equipment, pumps, and associated jumpers has been approved by the AEC. The estimated total project cost for the changes outlined in this instruction letter is \$42,000.

Design Instruction Letter No. 7 covering modifications to the inert gas facility was approved by appropriate Chemical Processing Department representatives. The compressed air facility was found to have adequate capacity for Phase III rates.

CG-648 - Iodine Removal and Nitric Acid Recovery Facility

Savannah River data on the activity of recovered acid, when translated to HAPO conditions, indicates that a tolerable radiation level of 1 mr/hr at the surface of the header can be expected when Project CG-648 recovered acid is routed through the North Pipe Gallery at a future date.

Outstanding orders are being expedited as 100 percent critical, to meet contract commitments and project schedule.

CG-657 - Improvements to Plant Ventilation

Placing of the purchase order for the ventilation units was delayed pending clarification of purchase specifications regarding vibration of the unit. This matter has been cleared up and a firm order placed with the low bidder.

CG-692 - Modifications to Redox Pu Concentration Building 233-S

The directive for this project has been received by the Projects Budget Operation. This directive stipulates a physical completion date of 18 months after authorization, whereas the requested completion date was 21 months after authorization. The acceptability of this directive has been determined, and a letter will be issued to KK Leiser to allow further processing of the directive.

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Agreement has been reached with Construction Engineering to provide a bid package three months after the work is authorized to them instead of five months after authorization as stipulated in the project proposal.

P-33359 - Cook Car Decontamination Facility

This proposal was prepared by the Construction Engineering Operation and approvals are being obtained by the Project Operation. The recommended method of performing the railroad switch and turn-out work has been changed from Plant Forces to Construction Operation forces. The cost estimate was increased from \$78,000 to \$82,000. It is planned to have the proposal transmitted to the AEC in early November.

C. Finished Products Operation

Chemical Processing and Reduction

Preliminary scoping studies have been started on a second button line installed in the RG Line area. These studies are expected to accomplish a three-fold purpose.

1. They will provide a basis for determining the best possible solution regarding the disposition of the Project CG-691 process hood which is being installed temporarily in the RG Line.
2. The study will provide a firm basis for making complete scope of second button line in the event that it becomes desirable to proceed with work on this line prior to its budgeted time in Fiscal Year 1958.
3. The study will provide a relatively firm estimate on the RG Line space requirements as is needed for studies on additional plutonium fabrication equipment.

Design and development studies were also undertaken during the month to evaluate an alternate process for continuous killing of Task I filtrates to determine its possible application to either RMA Line or a new button line installed in the RG Line area. This new process for killing of filtrates consists basically of increasing the nitric acid molarity by evaporation. At the higher acid concentration, the filtrate will then be killed under the proper conditions of temperature, time, and suitable catalysts.

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Project Activities

CG-691 - Continuous Task I and Task II - Z Plant

Some of the design forces were kept on a six-day week for the first half of the month in order to expedite procurement of all the critical materials on the project. However, by mid-month a normal five-day work week was resumed. By the end of the month detail design on this project is estimated to be about 60% complete. The estimated total number of drawings required has been increased from 138 to 153 drawings.

A-00427 - Conversion of Recuplex to a Manufacturing Facility

The total estimated project cost is \$170,000. Cost savings and other points of justification relative to these facilities are currently being evaluated. This has been prompted by the detailed savings breakdown required in the Plant and Equipment Analysis Report.

The project proposal and Plant and Equipment Analysis Report will be typed for approval signatures when this justification becomes firm.

UO₃ Plant

Because of the unfavorable project completion schedules for the new 80 foot off-gas stack on the 224-U Building, design and development studies were made on an alternate corrective method. This alternate method uses an existing four inch line to convey the NO₂ gas to the 291-U stack. The results of this study were transmitted to the Project Engineering Operation. Although this study showed that the use of the existing four inch line was not attractive from either the scheduling or cost standpoint, it did show the existing condenser EB-3 can be used instead of installing a new condenser. The EB-3 condenser is not needed after the TRP Plant shutdown and its use would result in a project cost reduction of about \$25,000.

A study was completed to determine methods of providing temporary relief from the air-borne NO₂ vapors in and around the UO₃ Plant. On the basis of this study, recommendations were forwarded to the Finished Products Operation that the most practical temporary solution to this problem would be to vent the two A-Cell acid absorbers to the 291-U stack via the 24 inch ventilation duct leading to the 221 Building, the 221 air tunnel and the 291 filter and fans.

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Several studies concerning improvements to the UO₃ Plant were completed during the month. These included:

1. Methods were developed for by-passing the X-3 bag filter in the calciner batch pot unloading system so that work can be performed on this filter without shutting down the unloading system. Although several alternate systems were investigated, a system whereby a by-pass line is installed from the X-3 filter to the X-28-1 filter was recommended as the most suitable alternate. The results of this study were documented and transmitted to the Finished Products Operation.
2. Several alternate schemes were investigated which would permit reworking of off-standard UO₃ powder. Under one of these schemes it would be possible to both redissolve the powder in the event of too high a metallic ion content and remill that powder in which the particle size is too large. In other schemes, provisions are made for remilling the powder only. Preliminary scope information and cost estimates for these various schemes were provided to the Finished Products Operation for their evaluation for possible project action.

In addition to the above studies, a work order was given to the Design Engineering Operation to complete the redesign of agitators, shafts, seals and bearings on the existing batch pot calciner. Also, a design criteria to perform this work was prepared and transmitted to the Design Engineering Operation.

Project Activities

CG-613

Several attempts were made on the actual performance tests of the continuous calciner but repeated difficulties were encountered with such items as valves in the powder unloading system and leakage of powder past the unloading weir inside the calciners.

Project Operation personnel have been maintaining 24 hours per day coverage on this project since October 10, 1956, in order to expedite the carrying out of the functional tests and adjusting of the equipment. Design Engineering personnel of Construction Engineering Operation are cooperating fully in providing assistance in resolving the problems.

Construction work by a Fixed-Price Contractor was started on the Maintenance Facility. By the erection of a temporary shielding wall consisting of 55-gallon drums filled with water, the radiation level at the site was reduced sufficiently to permit the contractor's forces to work a full 8-hour day. At the present time, the Commission is negotiating with the contractor for a reduction of the contract price due to changes in the heating and ventilating system and partitions.

The installation of the new screw conveyor and load-out facilities in the existing "U" Plant to handle the new bulk shipping containers was completed and is operating satisfactorily.

Heating transformers have been replaced by General Electric. All procurement necessary for project operation has been received.

224-U Building Labor & Materials Utilization Study

A study was initiated in the 224-U Building to provide the plant manager with a group of standards to be used internally for control of the plant. A preliminary phase to provide a basis for realistic standards on laundry and shop supplies consisted of planning a better layout in the building SWP lobby. The proposed plan was chosen to encourage re-use of un-contaminated SWP clothing and masks, and to decrease traffic bottlenecks.

D. General

Preliminary design study planning work for the recovery of cesium from waste products has been started. The study will examine the engineering feasibility of modifying one of the bismuth-phosphate plants for processing waste streams, construction schedules, and economic evaluations. According to present schedules, a project proposal requesting money to make this study will be starting next month.

Special studies were completed during the month to determine what effect the various reactor and separations plant expansion programs would have on Z and U Plants. The basic conclusion of these studies were as follows:

1. The plans for increasing Z Plant capacity that are presently underway would provide sufficient 234-5 Building capacity even in the event an entirely new separations plant were constructed.
2. If a new separations plant were constructed, it would be necessary to either renovate the existing calciner pots for continued operation or install new continuous calcining equipment.
3. If Purex and Redox Plant capacities were expanded, it will not be necessary to provide additional calcining equipment providing goal rates for the existing continuous calciners can be achieved. However, if production from these two plants must be kept segregated, major changes to the calciner feed and unloading systems will be required.

Research and Development

Bids covering titanium bar stock were received and reviewed. This bar stock, which will be used to fabricate experimental titanium pipe connectors, is promised for about January 1, 1957. Information has been received that some development work on applying hard surfacing to titanium has been done by Western Gear Corporation, under a classified Navy contract. It is hoped that we may gain access to whatever information has been developed by this work, since hard surfacing of male pipe connectors is considered vitally necessary.

A study has been initiated to determine the rate of wear of pulse generator cylinder walls and piston rings. As an aid to the solution of the problem, a test set-up to simulate actual operating conditions is being designed. Data from this test will indicate very nearly the amount of wear that has

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taken place on the actual generators in the operating pulse columns. Results will help decide whether a variable stroke piston is feasible in the pulse generators.

Work is continuing to further the studies already made for an ideal gasket material. Tests are being performed by the laboratory on a piece of Teflon impregnated felt with glass fibers as a part of the reinforcement (a product of the duPont Co.). Other tests have been performed on a gasket material for use as a connector head gasket for steam service. Results reveal that a Teflon impregnated blue asbestos yarn gasket, a product of the Crane Packing Company, withstood accelerated tests better than other materials and is being made a temporary stock item.

Plans are underway to negotiate a stud testing contract with Washington State College. This negotiation, which is being conducted by the Contract Unit of Purchasing, is expected to be completed by about December 1, 1956. The studs which will be used for this testing have not been received but are promised for about November 1. Purchase requisitions for other testing accessories have been processed.

Arrangements have been made to decontaminate a failed D-14 Redox pump to determine cause of failure. It is planned that the precedent and use of equipment established on this job can be developed into more extensive decontamination and inspection and perhaps repair of hot equipment.

An extensive review of six preferred consulting firms has been completed with the recommendation of Ammann and Whitney, Consulting Engineers, to perform a critical review of two new tank designs submitted by General Electric Company for the storage of high-level radioactive Purex process wastes. The realization of internal vapor pressures and increased temperatures of the Purex wastes constitutes special design problems for future waste storage tanks. Purchasing and Stores Operation is to begin negotiating a contract immediately to insure completion by the first of the calendar year. An outline scope of the new 241-AX Tank farm was submitted to Project Engineering Operation as a basis for high-spot construction cost estimate, and a preliminary project proposal.

Two rolls of films were used in taking pictures inside the 104-U Tank. The film magazine had a mal-function and one roll of film was lost. Six proofs illustrate more clearly the conditions of the steel liner than the previous photographs. It will be necessary to take additional pictures to complete the photographing of the tank liner.

In support of the proposed conversion of F and G cells in 224-T to a contaminated equipment inspection and repair shop, a new type filter box for housing CWS filters has been designed. The filter box in addition to being of a streamlined standard design to permit its easy passage through ordinary doorways includes provisions for avoiding passage of filterable material across the filter barriers when any one of its six filter units is removed during periodic changing. Application of an interposed pressurized area across the back of the hole from which the filter was removed insures against the momentary escape of unfiltered air during the filter change.

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The electronic hand press initially used as an experimental model for plastics closures has been proven highly satisfactory on large volume work assignments. Seals five feet long can be routinely made in less than one minute on a continuing basis. Further development is planned towards eliminating the need for a teflon buffer strip between the metal sealing plate and the plastic. It is also planned to extend the length of the hand press to permit its use for sealing of plastic bags in routine material transfers.

Research and Development

The drawings which have been prepared on the CG-686 program for the In-Line Alpha Monitor, Model III, instrument are being given a final check prior to release for fabrication. A review has been made of a vendor's ability to produce a special low range log count-rate-meter for the Purex plant application. The instrument was found to be impracticable however, and a standard model has been selected. Tests have been made with a standard model to determine the normal random variation of readings.

Experimental work is continuing to develop an improved alpha scintillation screen, primarily with respect to corrosion resistance. Materials under test are Mylar, rubber hydrochloride, neoprene, Pliogard and Saran. The problem is to find a material thin enough to pass alpha particles, but with chemical resistance to acid fumes. Performance comparisons are also being made with glass, lucite, or other backing materials.

The problem of in-line sampling was renewed by the desire of Redox personnel to eliminate the degassers on in-line instrument sampling systems. This was brought about by the question of plugging the degasser orifice by crystallization of high salt content solutions or by "curd" built up in the process. There is no agreement however, whether eliminating of degassers will adversely affect instrument performance. The problem is under discussion. Several possible methods are being considered. Experience with in-line instruments in the Purex Plant shows that no problems directly attributable to degasser plugging have occurred. The solenoid valves, particularly with small ports and poor valve seat material, have been the worst offender in sampling. The process Equipment Development Operation, Hanford Laboratories, has valves under development for trial replacement of the solenoid valves. The present in-line instruments have given limited service because of sampling and back flushing problems. Eliminating these problems is necessary to provide information continuity on process streams and additional instrument performance data.

The problem of carrying co-axial cable connections through cell jumpers and connectors is being studied. The desirability of application of such a connector is apparent on a gamma absorptometer installation, and several other possibilities exist. Sketches have been prepared on one connector configuration, and another is under consideration.

Plans are complete for installing the In-Line pH Meter, prototype instrument in Redox. The equipment is being supplied by Laboratories, and should be ready early in November.

Data has been compiled on the pump failures at Redox which indicates that the old single stage Peerless pumps are superior to the present deep well turbine units in some services. Recent design changes in the deep well pumps should improve their life.

The drawings which are used for procurement of deep well turbine pumps are being revised to include the latest developments including a new discharge head. These will be ready for the next pump order.

Plant Engineering

A design of a piston type pulse generator to replace the existing bellows type was developed for Recuplex. This design utilizes the existing reciprocating mechanism by introducing a system of levers to convert horizontal reciprocation to vertical movement, thus allowing the piston and cylinder to be vertical. A unit built to this design may be installed on the Recuplex H-1 column which has experienced several bellows failures.

Conversion of Used 221-U Pumps and Agitators for Redox and Purex Service

A detailed survey was undertaken to determine the possible conversion of U-Plant pumps and agitators for service as spare equipment in Redox and Purex facilities. This survey has revealed that it is not practicable to rebuild these used units for either Redox or Purex service. The costs involved amounts to as much, or more in some cases, than an equivalent new piece purchased, coupled with the fact that even though rebuilt, these prices would represent used equipment with adjustments and alignment made under very difficult conditions and suffering in accuracy to some extent. Since these pieces of installed equipment represent a large investment of critical material, the recommendation made is that they be held in the U-Plant canyon for emergency usage only.

Ultrasonic Cleaner

An ultrasonic cleaner, "General Ultrasonics," purchased for small tool cleaning the Redox Plant has been temporarily installed for test purposes in the 221-T pipe gallery, head end. Tests are being conducted to determine the most satisfactory arrangement for a permanent installation. Several small objects have been satisfactorily cleaned, including a plastic trombone tip from the S-Plant for a reduction from 8R to 150 mr.

Central Control Systems Study (DO-P-33309)

Work is continuing on a report appraising the status of the prime separations Plants with regard to automation. The report will be completed in November and includes the extent of automatic control that might be reached in the future--both short and long range. Possible benefits and courses of action will be developed together with recommendations.

Budgets

The Mid-Year Review of the Fy-1957 Plant Acquisition and Construction Budget was prepared, reviewed with the Managers of the Operating plants, and transmitted to Finance on October 30, 1956.

A compilation of possible line items for future budget submittal was developed as a result of contacts with Plant Operations and Research and Engineering personnel. The purpose of this survey was to determine funds required for Advance Engineering on FY-1959 Budget items.

The compilation was transmitted to the Finance Operation for use in obtaining the engineering fund allocation. Current advice of Relations and Utilities indicates funds will not be available for FY-1959 Budget studies before about December 15, 1956. This will put the Construction Budget work about four weeks behind last year's schedule.

III. Organization and Personnel

At the end of its second month of existence, Facilities Engineering Operation comprised the following:

	<u>Exempt</u>	<u>Non-Exempt</u>
Manager	5	
Engineer Consultant	2	
Engineers, Supervisors & Specialists	70	
Engineering Assistants		1
Draftsmen		9
Secretaries & Stenos		15
Clerks		8
	<u>77</u>	<u>33</u>
	Total	110
Technician Trainees		2

The net decrease by three people during the month was caused by the transfer of C. C. Thiesen to A.P.R.D., San Jose, California, and of J. L. Weeks and J. O. Ludlow to Hanford Laboratories Operation.

Personnel Training and Development

An information meeting was conducted by the Manager, Facilities Engineering on October 12, 1956 for all Facilities Engineering Operation employees at work. The two-hour session consisted of Mr. H. P. Shaw's discussion of F.E.O. organization, functions, budgets, objectives, and other related information. This talk was followed by a question-and-answer period to emphasize topics of particular interest.

About 55% of Facilities Engineering Operation people attended four lectures which were given by R. E. Toczec, Personnel Development Specialist. These programs were combined lectures and demonstrations to portray the separations processes and to describe the inter-relationships with other phases of manufacturing. Mr. Toczec's presentations were excellent, and the total effect to our people is believed to be beneficial for those newly assigned to the areas.

Personnel Activities

Drafts of an illustrated talk titled "Application of Flexible Plastics for Contamination Control" were submitted to the Speakers Committee of the Society of Plastics Engineers by H. A. Moulthrop. If the paper is accepted it will be presented at the Thirteenth Annual Convention of SPE in St. Louis in January 1957.

Safety

An aggressive safety program was continued, with emphasis on removal or correction of safety hazards in the office areas, dissemination of information regarding radiation hazards and protective methods and procedures, and concentration on individual safety responsibility and guidance by senior personnel.

Security

There were no security violations during the month of October.

Reports Issued

- HW-44927 (Official Use Only) - "Project Proposal, Reduction of Air-Borne Noxious Fumes, 224-U Building (Project CG-712," dated September 17, 1956, by A. A. Janos.
- HW-45493 (Secret) - "Project Proposal, Revision 1, Improved Task I and Task II Facilities, 234-5 (Project CG-691)," dated September 24, 1956, by D. A. Snyder.
- Report - "Chemical Processing Department, FY-1957 Mid-Year Review, Plant Acquisition and Construction Budget," dated October 26, 1956.
- Letter - "Plant Acquisition and Construction Budget, Supporting Data for Inclusion in Mid-Year Review," from C. E. Kent to K. G. Grimm, dated October 31, 1956.
- Letter - "Project CG-613, Hanford 4X Program, Metal Conversion Plant - Interim Report on Rotary Star Valves," from C. A. Lyness to C. E. Kent, dated October 23, 1956.
- Report - "Semimonthly Status Report, Facilities Engineering, Chemical Processing Department," dated October 12, 1956.
- Report - "Semimonthly Status Report, Facilities Engineering, Chemical Processing Department," dated October 29, 1956.
- HW-46019 "Dissolver Anti-Foam Jets," by J. R. LaRiviere and L. R. Michels, dated October 17, 1956.
- HW-46092 "Facilities for Fabricating the Pit 65 Weapon Core, 234-5 Building," by J. W. Kolb and E. C. Swain, October 15, 1956.

- HW-46370 "Project Design Meeting Minutes, Project C3-691 - Continuous Task I and Task II," by E. O. Swain, October 30, 1956.
- Letter - "X-3 Filter Back-Up, 224-U Building," R. E. Olson from H. G. Johnson, October 19, 1956.
- Letter - "Temporary Method to Eliminate the NO₂ Problem Outside the 224-U Building," R. E. Olson from H. G. Johnson, October 15, 1956.
- Letter - "Redesign of Electric Pot Agitators, Shafts, and Seals," W. R. Felts from K. L. Sanborn, October 15, 1956.
- Letter - "Alternate Method for Eliminating the NO₂ Hazard Outside the 224-U Building," D. A. Snyder from H. G. Johnson, October 5, 1956.
- Letter - "Uranium Product Recycle - 224-UA Building," R. E. Olson from H. G. Johnson, October 17, 1956.
- Letter - "Uranium Product Recycle - 224-UA Building," R. E. Olson from H. G. Johnson, October 25, 1956.
- HW-45707 Chemical Processing Department, Facilities Engineering Monthly Report, Secret.
- Letter "Mechanical Development Problems in Fission Product Recovery," W. P. Ingalls from A. R. Skaran, October 24, 1956.
- "Analytical Service Standard for the Redox Plant," A. C. Morganthaler, September 25, 1956, Confidential-Unclassified.
- "The Chemical Processing Department Standards Program," V. P. Madsen, October 18, 1956, no classification.
- HW-46111 "Visit to National Metal Exposition, Mallinckrodt Chemical Works, and Argonne National Laboratory," W. T. Kattner, October 16, 1956, Official Use Only.

Inventions

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

<u>Inventor</u>	<u>Subject</u>	<u>Report of Invention</u>
H. A. Moulthrop	Continuous Operation Filter Unit	October 31, 1956.

A new type filter box for housing CWS filters which includes provisions

for preventing passage of filterable materials across the filter barrier when any one of several filter units is removed during periodic changing.

Visitors

A third party inspector, K. A. Jones of the Travelers Insurance Company, completed elevator inspections in the T-Plant, 234-5, and the U-Plant on 10-15-16, 1956. One remaining facility remains to be inspected on the next visit - these are the elevators in the B-Plant.

R. D. Rowe, from General Machinery Company, Spokane, Washington visited the plant on 10-10-56 to discuss pump development.

L. J. Haight, from Johnston Pump Company, Pasadena, California visited the plant on 10-10-56, to discuss pump development.

R. C. Mann, (G.E.) from the Idaho Test Station, Arco Idaho, visited the plant on 10-24-56, to discuss instrumentation.

Trips

R. M. Shervem attended the Methods & Time Standards Conference (G.E.) in Cleveland, Ohio on October 16 and 17. The trip included a visit to the Niles Glass Company (G.E.) in Niles, Ohio and the Aircraft Products Plant (G.E.) in Johnson City, New York to discuss preventive maintenance systems; and a visit to the Savannah River Plant (duPont) in Augusta, Georgia to discuss mutual maintenance and industrial engineering problems.

W. T. Kattner and R. D. Switters attended the Metal Exposition and Technical meetings of the American Society for Metals, the American Institute of Mining, Metallurgical, and Petroleum Engineers, the American Welding Society, and the Society for Non-Destructive Testing the week of October 7-12.

W. T. Kattner also visited the Mallinckrodt Chemical Works on October 16 to discuss experience there with stainless steel and other materials in uranium refinery and UF₄ production use, and the Argonne National Laboratory on October 17 to become acquainted with the ANL program for investigation the causes of pyrophoricity of uranium, thorium, zirconium, and plutonium and to consider the desirability of requesting the extension of this program to include titanium.

R. D. Switters visited Republic Steel on October 13 for demonstrations of an eddy current test for soundness of welds in stainless steel tubing, ORNL on October 16-17 to discuss materials experience gained at that site having bearing on CPD problems, and the Pfaudler Company and Brooks and Perkins on October 14 and 18 respectively to discuss the fabrication of titanium.

E. L. Reed visited the G. E. Schenectady, N.Y. plant from October 3 to October 5, 1956 to discuss manufacturing services as related to Chemical Processing Department problems.

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CHEMICAL PROCESSING DEPARTMENT
RESEARCH AND ENGINEERING OPERATIONS

October, 1956

ADVANCE PROCESS DEVELOPMENT

E Metal Processing

Additional cost data were received from the AEC during the month. These data indicate that the cost of blending irradiated E metal (0.94% U-235 before irradiation) with irradiated natural uranium will vary from 45 cents to 90 cents per pound of E metal processed. This cost variation is dependent primarily on the assumed cost of electrical power at the isotope separation cascade, and to a much smaller degree on the ratio of E metal to natural uranium in the blend. The most probable cost of blending in the next five years is believed to be 55 cents to 60 cents per pound of E metal processed. At the 20 tons per month rate foreseen in 1959, an annual degradation cost of about \$275,000 is probable, or double this value if other uses of E metal are exploited simultaneously.

The design and processing restrictions imposed on separations plants were documented in HW-46138, "Processing E-Metal in the 200 Areas", by A. M. Platt and R. E. Tomlinson. No processing restriction is required in the handling of solutions of E metal in any concentration, or in the calcination of these materials. The dissolution of the metal is potentially hazardous, and nuclear safety must be maintained by limiting the quantity of metal in a dissolver or by geometrical design. A minimum critical mass of water-moderated metallic uranium (0.94% U-235) is computed to be about 7,000 pounds, and a practical operating charge would be somewhat less.

A comparison of predicted separations capacity with projected processing requirements (excluding E metal) indicates that the capacity can exceed requirements by at least 200 tons per month through 1961. A few years later, improved fuel element design and higher irradiation limits are predicted to decrease the processing requirements. It appears practicable, then, to process the E metal through the Redox plant without equipment modification, limiting the processing rate to the 75 to 100 tons per month rate believed to be attainable by limited batch operation of the dissolvers. The full processing capacity of the Redox plant for natural uranium would be immediately available in an emergency by temporarily holding the E metal in inventory.

It is therefore recommended that separations planning include the following.

1. The current Phase III Redox expansion project should be completed.
2. The capacity of the Parax plant should be expanded to the maximum obtainable with minimum expenditure by mid FY 1959. It is believed that a capacity factor of 3.5 to 4.0 can be attained with an expenditure of less than one million dollars.

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3. The operating characteristics and capacity of the Redox dissolvers should be determined when operating under the restrictions imposed by nuclear safety while processing E metal.
4. The design and prototype demonstration of a dissolver capable of dissolving E metal at rates up to 5 tons per day should be completed to the point of scope design for Redox installation.

Aluminum Jackets Containing Nickel

A limited number of fuel elements canned in aluminum containing one per cent nickel are being irradiated on an experimental basis. Previous work (HW-41205 H, p 38) has shown that this alloy dissolves with no difficulty, the nickel apparently remaining in a sludge. While no difficulty is anticipated, the behavior of nickel in subsequent solvent extraction steps is being investigated.

Anion Exchange

The possibility of removing aluminum from coating wastes by anion exchange was recommended (HW-46146, "Proposal for Recovery of Aluminum From Coating Removal Wastes," by R. H. Moore) for research and development attention. Potentially, the aluminum present in the coating wastes from Redox and Purex could provide all of the salting agent needed for the Redox operation, and simplify subsequent disposal processes for the residual coating wastes. The extension of this technology to high activity Redox wastes could simplify the removal of cesium and strontium from these wastes.

Fission Product Isolation

The decision was reached during the month to carry the design and development of the B plant conversion to the point of material procurement. While no construction monies will be committed, this effort will permit a firm estimate of the conversion cost. The calcination and packaging equipment is to be prototyped by the Hanford Laboratories Operation, and the scope and engineered-equipment design will be completed by the Facilities Engineering Operation.

DECLASSIFIEDPUREX TECHNOLOGY OPERATIONSummary

The Purex Plant continued to operate at a nominal capacity factor of 1.44 until October 7 when a shutdown was initiated. During the shutdown all the solvent extraction columns (except IX and IBS) were flushed to remove accumulated solids and cruds which were reducing decontamination. In addition, the IO Column was replaced with the spare column modified to improve its performance. Start-up of the plant was initiated on October 21 and completed on October 25 with the same production rate and flowsheet conditions as in use at the previous shutdown. Except for a few days after start-up, process decontamination performance and recovery has been normal. The No. 1 Organic Treatment System solvent is approximately five-fold higher in gamma activity than normal, but since both plutonium and uranium (after silica gel treatment) product solutions are meeting specifications, continued use of this solvent is contemplated.

Installation of equipment for the prototypical cation exchange system for plutonium concentration has been started, and equipment fabrication and delivery is generally on schedule.

Solvent Extraction

Irradiated uranium with an exposure of 3.4 to 5.1 MW/T (639 to 843 MWD/T) and cooling times from 103 to 145 days was processed. A nominal Purex Plant capacity factor of 1.44 was maintained until October 7. The following table summarizes the typical performance of the solvent extraction cycles from October 1 to 7:

<u>Cycle</u>	<u>Log Gamma Decontamination Factor, dF</u>		<u>Per Cent Waste Loss</u>	
	<u>Uranium</u>	<u>Plutonium</u>	<u>Uranium</u>	<u>Plutonium</u>
Precycle	2.9	2.9	--	0.26
Partition	2.4	2.1	--	0.25 (IBU 0.03)
Final	1.2	3.4	0.10	0.05
Overall	6.5	8.4	0.10	0.59

Although operation of the IX Column was stabilized by the increase in the HAF acidity from 0.5 to 1.0 M HNO₃ late in September, the mean Precycle decontamination factor did not improve because of continued sporadic bursts of activity. Throughout the period, however, plutonium product remained within specifications; uranium product required silica gel treatment because the 2RU remained two to four-fold above the gamma specifications.

Shutdown of the plant was initiated on October 7, and after the plant inventory of uranium and plutonium was depleted, a complete shutdown was effected by October 10. Procedures for these operations were aimed at (a) prevention of activity spread through the processing equipment which had previously occurred as a result of A-Column upsets during stripping, and (b) prevention of an accumulation of solids in the L Cell plutonium concentration equipment. Accordingly, shutdown operations included plant operation for approximately one day using HAF and IAF prepared from decontaminated uranium product followed by:

- (a) shutdown of HA and IA Columns without stripping but following reduction of column saturation by reduction of feed flow rate;
- (b) only partial draining of the HC and IC Columns to their respective concentrators;
- (c) emptying the remainder of the HA, HC, IA, and IC Column contents directly to the waste cell (but on a batch basis for possible segregation and rework, if needed); and
- (d) flushing of the 2B Column and final flushing of the L Cell plutonium concentration equipment directly to waste.

As a result of the operations described above, the shutdown was accomplished with relatively little spread of contamination through the processing equipment. Only 24 units of plutonium were lost from the column drainings. During the shutdown all columns, except the IBX and IBS Columns, were flushed with water, steam and warm concentrated nitric acid to remove accumulated solids and cruds which deleteriously affect decontamination.

Start-up of the plant was initiated on October 21 and completed by October 25 with the same production rate and flowsheet conditions as in use at shutdown. Waste losses were initially approximately three-fold higher than normal but soon decreased after the columns were stabilized. Uranium and plutonium product batches were likewise six-fold above normal, but the benefit of a flushed plant was revealed in a rapid decrease in the product activities. At the end of the report period the gamma activities of the product solutions are approximately normal.

Plutonium Concentration

A new plutonium concentration flowsheet was required in order to prevent plutonium polymer formation in the T-L3 Plutonium Stripper and simultaneously produce product solution meeting acceptable acidity limits and concentration limits. This flowsheet, documented in HW-46384 and shown below, is to be used for design of a new L Cell Package:

<u>Stream</u>	<u>Flows(a)</u>	<u>M HNO₃</u>	<u>Pu, g./l.(b)</u>
2BX	8.2	0.01	
2BP	8.2	0.19	3.3
2BP+HNO ₃	0.2	13.0	
2BP	8.4	0.51	
2BP	5.4	0.75	5.0
2BP	3.0	trace	
2BP	0.21	6.7	130

- (a) Flows relative to EAF of 750 gallons per ton U @ 100
- (b) Based on EAF containing 765 grams Pu per ton U.

Operation of the concentration equipment under these conditions has been satisfactory except for an operational difficulty. The final plutonium concentrate was acidic for a few days, originally thought to be due to inadequate re-oxidation

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in the E-14 Plutonium Concentrator loop permitting PSC to by-pass the concentrator partially. However, it was finally determined that reflux from E-14 tower was draining into the TK-L6 Plutonium Receiver instead of returning to the PSC stream.

Prototypical Ion Exchange Facility

Following preparation of the installation site (east end of Regulated Shop now designated N Cell) during September, equipment installation has been started. Aqueous make-up vessels have been installed. Piping to the tanks and new pipes through the N Cell wall are being installed. The ion exchange columns and XAF slab tank and the process hoods are essentially complete. Receipt of off-site purchased items is now about 25 per cent of ordered material.

Organic Treatment

The overall performance of both organic treatment systems is summarized below:

<u>Organic Treatment System</u>	<u>Organic Activity, uc/gal.</u>				<u>Average Decontamination Factor</u>
	<u>Unwashed</u>		<u>Washed</u>		
	<u>Max.</u>	<u>Min.</u>	<u>Max.</u>	<u>Min.</u>	
No. 1 (Before shutdown)	2.4x10 ⁵	1.5x10 ⁴	4300	1800	16 (a)
No. 2 (After start-up)	6x10 ⁴	2.3x10 ⁴	19,000	8200(b)	3
No. 2	170	23	32	3	5

(a) Includes decontamination from batch washing during extended period of IO Column flooding prior to shutdown.

(b) Extensive carbonate washing in laboratory reduces activity to only 6000 uc/gal. In addition, IA-IC contacts reduce the activity by a factor of two. Partial cause of low decontamination factor discussed below.

During the plant shutdown the IO Column T-32 was decontaminated and replaced with a spare unit which had been modified for improved performance. The replacement column contains fluorothene plates of 23 per cent free area (vice stainless steel nozzle plates of 10 per cent free area) and an interface probe extending into the center of the column (instead of into a side chamber). By means of ten per cent caustic and fifty per cent nitric acid flushes, the original column was decontaminated from a maximum reading of ca. 300 R/hour to 2 R/hour. The maximum reading located at the top of the column indicated the location of large amounts of solids which prevented free flow of IOS down the column and resulted in frequent flooding of the original nozzle-plate column.

The new fluorothene cartridge column has so far performed well from an operational standpoint; the pulse frequency has been maintained at the flooding frequency measured by development personnel, and no signs of instability are

evident. A true comparison of the old and new columns must await an accumulation of cruds after an extended operating period, however. Process performance indicated in the above tabulation is misleading since it was based on analyses of solvent containing entrained sodium carbonate; apparently the aqueous effluent line from one of the organic centrifuges was plugged resulting in negligible centrifugation of IOO for an extended period. Efforts are currently in progress to remove the solids plugging the line, solids which originated from the IO Column decontamination. There is also laboratory indication of a low solvent quality. The cause of the loss of solvent quality is not definitely known, but it is related to either the poor IO Column performance prior to shutdown or the batch caustic (ten weight per cent) washing operations performed in the IOO Receivers G5 and G7 during the shutdown. The activity of the washed organic increased markedly after the caustic washing, and it is postulated that activity from the tank surfaces entered the solvent. However, since the overall plant performance is satisfactory, even with the poor centrifugation, continued use of this solvent is contemplated and improvement in decontamination is expected.

Waste Treatment

The Waste Treatment and Acid Recovery Systems satisfactorily processed the solvent extraction and plant acid flushes during the report period. Pre-flush difficulties with Waste Concentrator E-F11 due to foaming and overflow line plugging were remedied by a five weight per cent caustic flush of the entire waste system to remove ferric dibutyl phosphate solids. Operation since start-up has been normal.

Abnormally high waste volumes occurred during the period primarily due to maloperation of the IO Column T-G2 (before replacement), batch washing of organic, plant flushes, high IWW flows because of plugging, and high cell drainage. These factors doubled the monthly average volume of waste per unit of production. Carbonate wastes and neutralized IWW volumes averaged 640 and 360 gallons per ton, respectively. Flushing and cell drainage added 270 gallons per ton to Tank 241-A-103. It appears that the contents of this tank can still be maintained below the hydrostatic head limitation until it is filled to the terminal condition (8 M sodium ion) if excessive volumes such as these above are only of short duration. Presently, the tank contains ca. 31 per cent of the terminal sodium ion content.

The results of the recent T-F5 Acid Fractionator plant tests and theoretical considerations relating to the acid recovery system have been documented (HW-46348, "T-F5 Absorber Fractionator Replacement"). A recommendation is made that the new T-F5 replacement be an absorber only.

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REDOX TECHNOLOGY OPERATION**RECLASSIFIED**Summary

Processing of low MWD/T metal was sustained at rates ranging up to 132 percent of Phase II, the only appreciable shutdown periods being for replacement of the failed feed solution centrifuge and for dilute nitric acid flushing of the HA and HS Columns toward the end of the report period. Uranium and plutonium recoveries averaged 99.66 and 99.68 percent, respectively, and all final product batches met specifications except for three 2EU batches which required blending. Dissolution of metal, having an average exposure of 249 (161 to 267) MWD/T, caused negligible iodine emission due to the relatively long cooling time, 115 to 179 days.

Studies of down-draft dissolving and the use of 50 percent nitric acid for up-draft dissolution revealed 7 to 8 percent reductions in processing rate counterbalanced by 10 to 20 percent improvement in acid utilization. Two series of dichromate-oxidized feed batches were processed through the extraction system without significant effect on waste losses. The first series of five batches, which did not include waste rework, caused no change in plutonium decontamination; however, a decrease in the average over-all uranium decontamination factor (logarithmic) from 7.1 to 6.3 necessitated ozone treatment to produce uranium-meeting specifications. The second series of eighteen batches, which included appreciable waste rework, caused reductions in the average decontamination factors (logarithmic) from 7.1 to 5.9 and from 8.1 to 7.1 for uranium and plutonium, respectively, and caused both the plutonium and ozone-treated uranium to approach very closely the specification limits.

Increasing the acidity of the LAW minimized solids formation in that stream and permitted successful resumption of second-stage waste back-cycle which had been temporarily abandoned due to repeated back-cycle pump failures. Incomplete results indicated moderate success in attempts to develop a more economical flowsheet through reductions in the 2DA flow and through the use of a smaller but more concentrated 3AS flow. Excessive 1AX flow, due to faulty instrumentation, caused flooding in the 1C Column and resultant uranium losses due to inadequate stripping. Attendant effects were significant hexone losses resulting from flooding of the condensate stripper and increased water entrainment in the recycled organic stream as a consequence of operating the solvent recovery system at rates equal to 170 percent of Phase II.

Feed Preparation

Incomplete testing of the down-draft dissolver tower installed last month, indicated that a 20 percent improvement in acid economy could be realized at dissolution rates 7.5 percent lower than those attainable with conventional

up-draft dissolving. Inadequate cooling area in the lower section of the tower prevented cooling the off-gas below 55 C and thus limited the acid recovery. The design of subsequent down-draft towers is being revised to extend the cooling area and improve the efficiency of gas-liquid contact. Dissolution rates were limited by inability to maintain a normal heel in the dissolver, as indicated by the fact that the second cut time cycles were disproportionately long in comparison to up-draft dissolution. A few eight-bucket charges were made when the availability of metal permitted, and it appears that nine-bucket charges may be possible. Additional testing is necessary to permit complete evaluation of the relative effects of heel size, air sparge rate, acid concentration and acid addition rate.

Evaluation of the use of 50 percent nitric acid, simulating recovered acid from UO_3 , was completed for the up-draft dissolvers and indicated a 10 percent improvement in acid economy and a reduction of 7.2 percent of the Phase II rate for each of two dissolvers.

Permanganate feed treatment was used throughout the month except for two series of tests of 5 and 18 batches with dichromate oxidation. For this oxidation the solutions were made 0.15 M in sodium dichromate and were digested for two hours at boiling at 0.1 M nitric acid and two hours at 0.3 M nitric acid. The first five dichromate batches included no rework, but seven batches of the second series contained 25 volume percent waste rework solution (see Waste Losses, below).

Continued leakage from the LAFS concentrator necessitated inclusion of 10 to 25 volume percent sump rework solution in approximately one-third the feed batches prepared during the month.

The centrifuge motor failed on October 4 after an operating period of 786 days, the longest to date for any Redox centrifuge. The service lives of the Redox centrifuges to date are summarized as follows:

Centrifuge No.	No. of Batches	No. of Cake Removals	Hours of Operation	
			At 870 RPM	At 1740 RPM
1	507	91	0	3050
2	189	67	1685	970
3	8	2	235	43
4	157	52	1850	836
5	1249	299	11828	5808

The significant improvement in service life can be attributed in part to 1) reduction of the number of cake removal surries from four to three, 2) removal of the cake without using the plows, and 3) installation of a "plug" cut-out control to prevent reversing of rotation.


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Decontamination

The decontamination of uranium and plutonium was excellent throughout the month except for brief periods associated with the initial start-up and the processing of the second series of dichromate-oxidized feed batches. The first two uranium product batches and one ozone-treated batch originating from dichromate-oxidized feed required blending to meet final product specifications. The first five dichromate-oxidized feed batches produced no change in plutonium decontamination, but caused a seven-fold increase in the gamma activity of the 2EU stream. Ozone treatment of these product batches gave decontamination factors (arithmetic) ranging from 2.6 for a two-hour sparge to 4.8 for a six-hour treatment. The second series of dichromate runs, which included relatively large amounts of waste rework, caused a ten-fold increase in plutonium gamma activity and a fifteen-fold rise in uranium gamma activity. Since ruthenium was the major contaminant, all the 3BP batches met specifications and ozone-sparging for six hours each brought all but one 2EU batch within specification limits. The average over-all decontamination factors (logarithmic) of the extraction system for the two series of dichromate-oxidized feed may be compared with normal permanganate-treated feed as follows:

	<u>Permanganate Oxidation, With Rework</u>	<u>Dichromate Oxidation, Without Rework</u>	<u>Dichromate Oxidation, With Rework</u>
U	7.1	6.3	5.9
Pu	8.1	8.1	7.1

Solvent Extraction

Laboratory investigations aimed at eliminating precipitation in the LAW concentrator (D-14) and associated piping and equipment, revealed that increasing the solution acidity from -0.27 M to -0.10 M would greatly delay the formation of the precipitate. Acidification of the LAX to 0.084 M nitric acid prevented precipitation in the LAW and permitted resumption of LAW back-cycle. The LA Column decontamination performance did not suffer following acidification of the LAX, and reduction of the HAF acidity from -0.2 M to -0.3 M prevented adverse effects on HA Column decontamination performance as a consequence of the increased HAF acidity.

Reductions in the ZDA flow rate of 25 percent and 50 percent for periods of 24 hours each, were made to test the feasibility of a more economical 2D flowsheet. The 25 percent reduction proved satisfactory, but further testing of the 50 percent reduction will be required as indicated by the following summary:

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<u>2DA Flow,</u> <u>% of Normal</u>	<u>Aqueous Phase</u> <u>Interfacial Velocity,</u> <u>Gal./(Hr.)(Sq.Ft.)</u>	<u>Scrub Sec.</u> <u>L/V</u>	<u>Average 2EU</u> <u>Gamma Ratio</u>	<u>Conc. of</u> <u>Sodium in 2EU,</u> <u>ppmp U</u>
100	64	0.08	0.20	10-50
75	48	0.06	0.19	20
50	32	0.04	0.31	20,50,100

An increase in the 3AS aluminum nitrate concentration from 1.3 M to 2.25 M for a two-day period, to permit evaluation of a more economical 3A flow-sheet, produced no change in 3A Column fission product decontamination. If the as yet incomplete spectrographic analyses indicate satisfactory control of metallic impurities in the 3BP, the tests will be extended to include 2.5 M 3AS.

Due to flooding and unstable operation, aqueous 10 percent nitric acid, known to be very effective in loosening the LAW precipitate, was used for flushing the HA and HS Columns. This restored smooth operation even after processing rates were increased approximately 20 percent. The successful application of 10 percent acid flushes would not necessitate the time-consuming complete removal of hexone from the building required prior to the standard flushing with 60 percent nitric acid.

Plutonium Concentration

The final product concentration was returned to normal after it was found that the 35 percent reduction in concentration previously reported was ineffective in reducing the iron contamination below the average of 10 percent by weight of plutonium.

Waste Losses

The over-all recoveries for uranium and plutonium of 99.66 and 99.68, respectively, were reduced principally by LOW losses and two brief periods of inadequate salt strength in the HA Column. Deformation of the LAX rotameter bob over the period of a year produced nearly a two-fold change in calibration and resulted in an excessive LAX flow. The high organic flow caused flooding and incomplete stripping in the IC Column with resultant LOW losses which accounted for approximately 42 percent of the uranium losses for the month. Inadequate instrumentation caused two instances of HAW flow, and consequent HAW losses, following start-ups of the extraction system. Waste rework following the second occurrence permitted recovery of 210 pounds of uranium and 20 units of plutonium, approximately 90 percent of the material lost in the HAW.

Waste Storage

Neutralized salt waste is currently being routed to the 111-SX tank which is now full and overflowing to the 112-SX tank. This will permit increased heat accumulation in 111-SX while using the 400,000 gallons of storage volume available in 112-SX. Air-lift circulators are being operated in the 101-SX, 104-SX and 111-SX tanks. No pressurizations occurred in the underground storage tanks during the month.

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FINISHED PRODUCTS TECHNOLOGY OPERATIONMETAL RECOVERY OPERATIONSummary

The Metal Recovery Plant processed feed aged about 16 months since irradiation to 250 MWD/T. The over-all waste loss was 0.5 per cent of the new feed uranium, 0.4 per cent in the pooled solvent extraction waste and 0.1 per cent in evaporator condensates. The over-all logarithmic gamma decontamination factor was 4.9. The decontaminated UNH, transferred to the UO₃ Plant, contained 93 per cent of the gamma activity of aged natural uranium. To decrease chemical consumption and reduce stored waste volumes, the second cycle acid scrub was made 3.0 M, vice 4.0 M nitric acid, and the flow reduced to 50 per cent of the flowsheet rate. Minor reduction of the water scrub rate was also made to control uranium reflux in the low acid scrub section. These reductions had no adverse effects on solvent extraction decontamination performance.

Approximately 2.3 million gallons of "in-plant" and "in-farm" scavenged waste with cobalt-60 concentrations from 3×10^{-4} to 1×10^{-3} microcuries per milliliter were transferred to ditches on a specific retention basis. The standard nickel ferrocyanide procedure with supplemental strontium nitrate treatment is currently being used in the plant and in the tank farm. It is anticipated that all wastes so treated will require disposal to trenches, since the present scavenging method does not remove cobalt-60 to permissible cribbing limits.

Metal Removal

Feed shipments to the 241-WR vault consisted of slurry blends from tanks 101-U or 102-U (minimum age 14 months), and 107-TX or 108-TX (minimum age 16 months), and supernatant blends from tank 115-TX. TXR and UR facilities supplied 72 and 28 per cent of the uranium, respectively, at an average uranium concentration of 0.18 pounds per gallon. Although over-all removal rates were generally satisfactory, equipment failures caused rather wide variations in feed composition.

A second sluicing operation at the TXR facility, to minimize the time for final tank cleanout, was continued throughout the month. Heel cleanout in three of five possible tanks is nearly complete.

Solvent Extraction

Uranium losses in the RAW, RCW, and REW averaged 0.11, 0.22, and 0.03 per cent of the gross feed uranium, respectively. The stripping column losses did not vary significantly from the average. Although RAW losses generally ranged from 0.01 to 0.05 per cent, transient RA Column upsets such as the use of feed at 100 C and the weekly interface cleaning operation caused the average RAW loss to be considerably greater than that sustained during steady-state operation.

The RCU and REU gamma activities averaged 1.8×10^4 and 93 per cent of the activity of aged natural uranium, respectively, and the over-all logarithmic

decontamination factor was 4.9. The gamma activity of the RCU ranged from 2,000 to 100,000 per cent of that of aged natural uranium, depending on the amount of entrained activity and feed temperature. The use of feed at 100 C caused a ten fold increase in RCU gamma activity. Reduction of the feed temperature to the desired 55 C was accompanied by a rapid decrease in RCU gamma activity. The REU gamma activity ranged from about 70 to 130 and was rather sensitive to changes in the RD Column uranium reflux. Several adjustments in the RDS (water scrub) flow rate were made to balance good second cycle decontamination against the increased first cycle waste losses which would occur if too much uranium were backcycled.

The nitric acid concentration of the second cycle acid scrub (RDIS) was decreased from four to three molar to increase the ferrous ion half life, and the flow rate of this stream was decreased from 90 to 50 per cent of the flowsheet rate. The plutonium concentrations of the RCU and REU averaged nine and one part per billion parts of uranium, respectively, showing no significant variation because of the reduced ferrous ion concentrations. A decrease in gross fission product scavenging in the waste has been noted, however, and may force a return to flowsheet iron concentration in the pooled waste.

Waste Treatment

Approximately 2.3 million gallons of scavenged waste ("in-plant" batches 44, 45, and 46, and "in-farm" batches 4 and 7) containing cobalt-60 concentrations greater than MPC (4×10^{-4} microcuries per milliliter) were transferred to the BC No. 9 and 10 trenches on a specific retention basis.

Approximately 600,000 gallons of "in-farm" stored waste were scavenged to remove only cesium-137 and strontium-90 as no process has been developed that will simultaneously remove cesium-137, strontium-90, and cobalt-60 to cribbable levels. This scavenged waste will be transferred to trenches on a specific retention basis.

About 6.7 million gallons (12 batches) of "in-plant" scavenged waste have high cobalt-60 concentrations and remain in storage for disposal to open trenches. About 2.2 million gallons of this waste will be rescavenged for strontium before being transferred to the ground. Sufficient trench space has been provided in Phase III of Project CA-688 for the disposal of this waste. Approximately 16 million gallons of stored TBP wastes are awaiting scavenging treatment in the "in-farm" facilities.

URANIUM CONVERSION OPERATION

UO₃ Quality

All powder produced during the month was within specifications. Gamma activity ranged between 19 and 69 per cent of aged natural uranium, and averaged 35 per cent. Total metallic impurities averaged 83 parts per million of uranium. The reactivity ratio ranged from 0.818 to 1.01 for continuous calciner and pot powder, respectively. The continuously produced UO₃ contained nominally 1400 parts sulfur per million of uranium.

while the pot material averaged 100 parts sulfur per million parts of uranium.

Tests and Process Changes

Car No. 464, shipped on September 28, was the first shipment made utilizing the bulk containers. These new containers will be the standard shipping units for all subsequent shipments.

Pot vacuum was substantially reduced when the TA-3 acid absorber was removed from pot room service and scheduled for the continuous calciner operation. Currently, the loading and unloading of the electric and Luckey pots is limited by the indicated fume vent line vacuum reading.

The average acid concentration was 39 per cent, a decrease from the 43 per cent experienced during September. This decrease can be attributed to the failure of the X-3 and X-11 filtering systems and also the frequent startup and shutdown of the continuous calciner.

The reflux water to the TD-4 fractionator was orificed down to one gallon per minute and later shut off completely to further reduce the steam consumption and also to prevent additional dilution of the TA-1 acid. Insufficient data have been accumulated to date to make conclusive statements of improvement.

UO₃ Continuous Calciner - Prototype Development

The prototype continuous calciner was shut down after sufficient UO₃ had been produced to ship a carload to Paducah. The operating crew moved to the 224-UA Building for startup.

The prototype produced UO₃ was used in the 224-UA Building to test the powder handling and milling system. Solids metering rotary valves were found to be inoperable as installed due to close clearances between the valve rotor and body. Opening these clearances allowed the valves to operate without jamming but permitted sufficient air to pass to prevent the cyclones from unloading. The rotary valve problem has not been satisfactorily resolved and, although the valves are operating with a compromise clearance, it is still possible to draw calcination off-gas into the powder system.

The calciner in J cell was tested and put into production. Agitator loading tests indicated proper drive sizing. Heat tests and production testing indicate minor and controllable distortion. With a shell temperature of 900 F, a production rate of about six tons of uranium per day was indicated in spite of dilute feed (8 lbs U per gallon). The maximum rate has not yet been achieved. Since startup on October 23, the calciner has been shut down twice; the first due to a jammed rotary valve at the calciner discharge, and the second due to a plugged collection bin (calciner discharge) when wet off-gas caused UO₃ caking. Simultaneously with the second shutdown, excessive pressure drop across one off-gas filter was indicated. The reason for filter pluggage has not been determined.

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234-5 LABORATORY OPERATION -Continuous Plutonium Trifluoride Precipitation

Another continuous precipitation run showed the feasibility of this type of operation. Feed was prepared by bubbling sulfur dioxide through 400 ml of plutonium nitrate solution for 20 minutes and then adding 10 ml of 1 M ascorbic acid. Final feed concentration was 36 g/l Pu, 5.1 M HNO_3 , 0.2 sulfamic acid, and 0.02 M ascorbic acid. The 3 M HF feed rate resulted in a calculated 0.43 M HF excess in the reactor. Start-up was made by starting first the plutonium and then the hydrofluoric acid feeds into the empty reactor and allowing it to fill to operating level, with the agitator taking hold at about 11 per cent of operating volume. Average residence time of slurry in the reactor was about 18 minutes. The slurry was first sampled as soon as operating level was reached. For every sample taken during the run the precipitate was completely retained by medium fritted Pyrex filters, but not by coarse frits. Filtrate losses ranged from 2 to 4.6 g/l Pu (8 to 17 per cent). In further tests, the fluoride concentration will be increased to 1 M HF to reduce this. Separation factors across the process were iron 10, nickel 20, chromium 10, and magnesium 4 where the feed contained 10,000 ppm Fe, 2000 ppm Mg, and 1000 ppm Ni and 1000 ppm Cr.

The preparation of stable plutonium(III) feed solutions requires careful control of conditions. Temperature is somewhat critical and in reducing plutonium in a large volume (at about 35 g/l Pu), the temperature may increase enough to cause instability and subsequent re-oxidation. The tendency to instability seems to increase sharply above an acid concentration somewhere between five and six molar. Consistently stable small scale reductions have been obtained in solutions approximately 38 g/l Pu, 4.9 M HNO_3 , 0.2 M sulfamic acid, and with 0.1 M ascorbic acid. Attempts to reduce with sulfurous acid have given variable results. However, by bubbling sulfur dioxide gas through a solution 35 g/l Pu, 5 M HNO_3 , and 0.2 M sulfamic acid, nearly complete reduction was obtained. Heating the solution to ca 40 C and again bubbling sulfur dioxide through or making the solution 0.02 M ascorbic acid resulted in complete reduction.

Ascorbic Acid Stability

Tests of ascorbic acid for a reductant in the ion exchange process continue to indicate marginal stability for plant application. In a solution 5 g/l Pu and 6 M HNO_3 , ascorbic acid would not reduce the plutonium without the addition of sulfamic acid. Where reduction did occur, in all cases except two a solid film formed on the sides of the test tubes in 19 to 20 days. It is interesting to note, however, that at the same plutonium concentration, less precipitate formed at 6 M HNO_3 than had at 0.3 M HNO_3 . With higher plutonium concentrations (e.g., 35 g/l Pu - 6 M HNO_3), there was considerable gas formation in the solution and it was not possible to obtain complete reduction of the plutonium.

Processing of ion exchange elutes may include concentration by evaporation. Solutions 5 g/l Pu - 6 M HNO_3 reduced with 0.1 M ascorbic - 0.3 M sulfamic acid mixture were tested for safe handling and solids formation in a "continuous kill" concentration. The reactivity of the plutonium-ascorbic acid solutions is approximately the same as peroxide supernatants. The ascorbic acid solutions are adaptable to "continuous kill" techniques, but probably

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would react too vigorously when heated to be safe in "batch" type "kills". The plutonium was concentrated by a factor of four in this test and the resulting solution was a clear green with no precipitate or tars formed.

Examination of Solids from Purex Plutonium Concentrator

Silica-bearing solids deposited in the Purex plutonium concentrator have presented a recurring problem. Samples of nitric acid flush solution were obtained and examined. Valence state determinations indicated the deposited plutonium to be similar to that in normal Purex product. Spectrographic analysis showed the deposited material to be high in iron and silica. The precipitation and accumulation of silica is due to the dehydration of hydrous silica caused by the high acid and plutonium concentration and the higher temperatures occurring in the concentrator. The ratio of silicon to plutonium was found to be one to five. Composition of the deposited material was similar to that examined earlier in the month.

Corrosion Studies in Plutonium - Nitric Acid Solution

The corrosion of 304-L stainless steel, titanium, and tantalum in nitric acid-plutonium solutions was determined to provide a basis for estimating the life of contemplated plutonium concentrators. The expected superiority of titanium and tantalum was borne out. Standard corrosion test methods were employed and the exposures were over consecutive 48-hour periods, with test solution replaced after each 48-hour period. Following are some conclusions resulting from this study and based on weight loss:

- a. The corrosion rate of 304-L stainless steel in 100 g/l Pu - 6 M HNO₃ was ca 0.003 ipm, which is two to three times the rates found for this alloy by the standard test in 65% HNO₃.
- b. The sulfate ion did not accelerate corrosion of stainless steel in the nitric acid - plutonium solution.
- c. The presence of titanium or tantalum metal or their corrosion products did not affect the rate of corrosion of 304-L stainless steel.
- d. A measurable corrosion rate of titanium (ca 0.0004 ipm) was noticed in the sulfate-containing solution but not in the sulfate-free solution. The rates were a factor of four to five less than those observed for 304-L.
- e. The corrosion rate of tantalum was insignificant and too small to be measured under the conditions of this experiment.
- f. The stainless steel corrosion products did not significantly affect corrosion of titanium or tantalum.
- g. Simple direct spectrographic methods are not sufficiently sensitive to follow the corrosion of stainless steel, titanium, or tantalum.

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PROCESS CHEMISTRY OPERATIONPROCESS ASSISTANCEPurex Process Studies

Samples of Metal Recovery Plant solvent (RIOO and RIIIO) were butted to 30 per cent TBP and tested to determine whether or not the solvent is of high enough quality that it can be used in the Purex Plant. The standard Purex solvent quality tests showed that the solvent meets or exceeds the Purex quality standards, with the exception that the DBP content may be above normal (the "C contact" test extraction coefficient, E_a^O , a measure of DBP content, was about ten times greater than normal for both samples). The feasibility of using this solvent in the Purex Plant following shut-down of the Metal Recovery Plant will depend upon the residual gamma activity of the solvent and the resultant problems in moving it between plants. At present, the RIIIO and RIOO contain about 10 $\mu\text{c/gal}$ and 160 $\mu\text{c/gal}$ gamma activity (65 per cent Ru, 35 per cent Zr-Nb), respectively. Normal washing procedures, with dilute NaOH or Na_2CO_3 solutions, reduced the RIOO activity only to about 100 $\mu\text{c/gal}$. Additional reduction in activity was obtained by scavenging with Sea Sorb, Filtrol, MgO, or MnO_2 .

Solvent clean-up tests were also performed on a sample of the Purex solvent (IOO) which had been used for flushing the IO column and auxiliary equipment and in which, as a result of the flushing, the gamma activity had increased from 1000-2000 $\mu\text{c/gal}$ to about 19,000 $\mu\text{c/gal}$. Use of two washes with 3% Na_2CO_3 , followed by a water wash, reduced the activity to 6000 $\mu\text{c/gal}$, most of the reduction coming with the first wash. Contacting the carbonate-washed IOO with IAF to give about 70 per cent uranium saturation in the organic reduced the activity to about 3000 $\mu\text{c/gal}$, with further, slight reductions being achieved by additional contacts with 3 M HNO_3 . A series of batch contacts of the carbonate-washed solvent with Purex IAF, simulating the 1A-1C columns, gave a decontamination factor only 30 per cent smaller than obtained with laboratory solvent. The contaminated solvent was decontaminated by a factor of 2.5 in this operation. These data showed that the Purex solvent in question could be used safely, and that with continued recycling, the gamma activity should decrease to the normal value of 1000-2000 $\mu\text{c/gal}$.

Batch, countercurrent extraction studies were made of the use, for Purex 2DIS (2D column scrub), of nitric acid recovered from the uranyl nitrate calcination process. The results (summarized in HW-46098, "Use of UO_3 Plant Recovered Acid in Purex 2DIS", G. L. Richardson) showed no adverse effects on either the dispersion characteristics or on the 2D column decontamination factor.

Redox Process Studies

In attempting to determine the cause for the accumulation of plutonium in certain of the Redox process tanks (see HW-45115H, R. B. Richards, "Separations Technology Monthly Report - August, 1956", p. 8), samples of hexone-saturated, Redox 3AF (1.3 M Al^{+3} , 0.3 M H^+ , 2 g/l Pu) and 3BP (0.34 M H^+ , 2 g/l Pu) solutions were allowed to stand for 60 days. At the end of this period, a brown precipitate, containing an estimated 70 to 90 per cent of the plutonium originally present in the solution, was found in each of the

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containers. The precipitates dissolved readily in hot, 60% HNO_3 , but formed again (removing 40 per cent of the plutonium from solution) upon dilution to 5% HNO_3 . These results indicate that the observed plutonium hold-up in plutonium cycle tanks of the Redox Plant was a direct result of the storage and eventual processing of hexone-containing solutions.

UO_2 Process Studies

The laboratory, continuous calciner was used for a series of hydration runs, producing powders for which, after dehydration, the following reactivity ratios were measured: 1) original UO_2 (unhydrated) - 0.50; 2) hydration with 6 M HNO_3 at 150 to 170 C - 0.84; and 3) hydration with 3 M HNO_3 at 150 C - 0.87 and at 180 C - 0.63. A combination denitration-hydration run gave no increase in reactivity ratio.

Metal Recovery Waste-Scavenging Studies

In determining whether or not it will be safe to completely fill the waste tanks used for the storage of the sludge produced in the Metal Recovery waste scavenging program, densities were measured for a series of precipitates simulating those produced in the scavenging operations. Precipitates from the In-Farm and Current Metal Recovery wastes had densities of 1.4 and 1.2 g/cc, respectively. These densities were not altered by simulated aging (reflux, digestion, or prolonged centrifugation). Since a density of 1.4 has been set as the safe upper limit, it is evident that some form of control will have to be established for the In-Farm sludge additions to the waste tanks.

Cesium-137 Analysis, Recovery and Scavenging

The observation that cesium-137 is carried from acid solutions by cobaltous cobaltocyanide has led to a laboratory study of the use of various metal cobaltocyanides for the scavenging and recovery of radiocesium from waste solutions. To date, it has been shown that cesium-137 may be easily removed from Purex LWV on precipitates of zinc, cadmium, or cobaltous cobaltocyanide. The zinc compound has given the most complete recovery of cesium (>99.9 per cent), the preferred conditions being an acidity range from 1 M to pH 4.0 and equivalent precipitant concentrations of 0.002 M or greater.

ANALYTICAL ASSISTANCE

Cobalt-60 Analysis

The chemical phase of the analytical determination for cobalt-60 has been standardized to the extent that trained laboratory assistants can carry out the separation procedure with little or no technical assistance.

Nitric Acid Determinations

Continued investigation of the coulometric method of determining nitric acid in low-acid, uranyl nitrate solutions such as the Purex E-6 and J-1 samples (ca. 0.5 lbs./gal HNO_3 and 1.7 M UNH) has shown that the method can be successfully applied provided that enough Na_2HPO_4 is added to completely precipitate the uranium and that the aliquot selected contains greater than 0.01 milliequivalent of free acid. Trouble in coulometric analysis of Purex samples

apparently resulted from the dilution used and the resulting small amount of free acid (0.002 milliequivalent) in the aliquot assayed.

An HpH curve (Table 12) has been prepared for the determination of acid deficiency in Redox LABS samples (-0.250 M HNO_3 , 2.3 M Al^{+3} , 0.60 M Na^+ , and minor amounts of other constituents).

Plutonium Assay

The ceric sulfate titration method for the determination of the plutonium content of plutonium metal has continued under intensive study. Recommendations resulting from the study as to procedure and equipment changes and maintenance have been adopted by the 234-5 Laboratory, and recent data obtained in that laboratory indicate satisfactory analytical precision.

Quality Control and Standards

During the month, the quality control program for the Chemical Processing Department analytical laboratories was maintained as usual. Difficulties were encountered with certain of the standard samples provided to the laboratories, and it is planned to concentrate more effort on the standards program. Instrument difficulties with the alpha counters (ASP's and ASVP's) prevented the delivery of new standard alpha disks to the control laboratories, but at month end, the service was ready to be resumed. The Standards Laboratory provided standard solutions, standard samples, and checked or calibrated pipets and flasks as needed.

INVENTIONS

All Research and Engineering Operation 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 October, 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

R. A. Schneider

HW-46488 "The Removal of Cesium 137 from Aqueous Solutions by Precipitations with Cobalticyanide Ion"

ORGANIZATION AND PERSONNEL

	<u>September</u>	<u>October</u>
Research and Engineering	3	3
Advance Process Development	7	7
Purex Technology Operation	18	17
Redox Technology Operation	14	15
Finished Products Technology Operation	25	25
Process Chemistry Operation	26	26
234-5 Laboratory Operation	14	13
Total	<u>107</u>	<u>106</u>

E. R. Irish

Manager, Research and Engineering
CHEMICAL PROCESSING DEPARTMENT

RB Richards:khs

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CHEMICAL PROCESSING DEPARTMENT
EMPLOYEE RELATIONS OPERATION
October 1956

I. RESPONSIBILITY

There were no changes in responsibilities assigned to the Operation during the month.

II. ACHIEVEMENTS

Personnel Development and Communications

Participation in training courses		
Monthly Personnel		48
Process and Equipment Orientation	42	
Data Processing	3	
PMS	3	
Weekly Personnel		76
Analytical Procedures	12	
Technologist - Leader Training	3	
Special Hazards	30	
Equip. Maintenance & Work Schedule	12	
Process and Equipment Orientation	19	
G.E. Selection Program - number completed		3
Attendance at Films		36
Films Previewed		1
Orientation of New Employees (Technicians)		7
Technical Graduates on Rotation		2
Technicians in Training		7
Management News Bulletins Issued		5
Items in Newspapers		5

Communications was active in several phases of the CPD Fire Prevention Activities during the month. Included were: attendance at several planning board meetings, taking part in preparation of the Employee Relations display, and furnishing the GE NEWS with pictures and outline material during the month.

The GE NEWS was provided material and pictures for three other stories during October, including the Purex crane operation, Purex employees' orientation, and CPD's first suggestion award winners.

Copies of the October Health Bulletin, "Can You Stomach It", were distributed to all non-exempt people through Operations Managers' offices. Copies for exempt personnel were addressographed and distributed through regular channels.

The CPD and IPD Communications groups are working together to prepare two radiation booklets for distribution to employees in these departments.

Arrangements were made for a group of University Relations people to tour the Purex building early in October. The group consisted of men from ORNL, BNL, Ames Laboratory, and the University of California Radiation Laboratory.

Pictures of the Purex tunnel received wide coverage in Northwest newspapers during the month, and as a result Universal-Movietone News requested some motion picture footage. HAPO photographers, using Universal-Movietone camera and film, shot the footage and it is now being reviewed by the AEC offices in Washington, D.C.

Two meetings were held with Personnel Development representatives of all HAPO components in attendance. Agreement was reached with the Relations and Utilities Operation to present PMS, Report Writing, Secretarial Training and HORSO on a centralized basis. All others will be conducted within each department.

A completely revised program was submitted by CPD for the new Supervisor Orientation. This was accepted by all HAPO components and will be conducted on a centralized basis by the Relations and Utilities Operation.

A new course, Survey Course in Data Processing, was conducted by Kendall Wright of the Data Processing Operation. It is designed to give an appreciation of Data Processing so that our people can make use of these facilities. Three persons were enrolled from C.P.D.

Agreement was finally reached with the other Departments and Operations on the content of the Non-Exempt Personnel Development Program form. The Specialist, Personnel Training has been actively engaged in preparing material for use in instructing supervision in the usage of the new form.

Salary and Wage Administration

A move to reclassify Designers I and II from non-exempt to exempt status, which was initiated by Construction Engineering Department, was postponed.

A title comparison study was completed from which it was concluded that CPD position titles were logical and reasonably standardized with other HAPO departments with one or two exceptions. Title changes will be made for these positions.

It has become increasingly evident that the salary status of our engineering graduate employees has, on the average, fallen behind the current hire-in salary ranges which prevail both here and at outside competing companies. We, in cooperation with Personnel Practices, have been trying to evaluate our position in this regard and to determine what corrective steps, if any, should be recommended.

An Exempt Salary Report covering the quarter ending September 30, 1956 was compiled.

A 3% increase was added to the salaries of the Fire Protection personnel effective October 1, 1956. Exempt Fire Protection positions are "Fixed Rate" positions and are therefore not governed by the exempt salary structure which was revised in July, 1956. The 3% addition was made, therefore, in order to maintain the proper relationship between these "Fixed Rate" positions and the reporting non-exempt positions. In addition, a 1.18% cost of living increase retroactive to August 1 was added.

Exempt Position Title Changes	1
Exempt Positions Added	1
Exempt Positions Deleted	1
Salary Changes - Promotional	2
Merit (Salary Review)	18
Merit (Interim)	0
Promotions - Exempt	3
Non-Exempt to Exempt	2
Demotions	1
Exempt Reassignments (Intra Department)	2
Exempt Reassignments (Inter Department)	3

Administrative personnel for level 3 operations and level 4 supervision for operations not having administrative personnel have been contacted relative to preparation of job descriptions for their non-unit jobs. In particular eleven descriptions have been received from Personnel Accounting with two more to be completed.

A job numbering list to cover classifications and descriptive titles of all CPD non-unit jobs has been prepared in draft form. A wage records file designed to reflect at any given time the number of people in each classification is in process.

The mechanics for processing Payroll Status changes both intra and inter departmental have been established in conjunction with representatives of Personnel Practices and Personnel Accounting. There are still, however, some inter-departmental procedures which are not completely satisfactory.

The major activity relative to Union Relations activities was in connection with the grievance involving a reassignment of work and downgrading the incumbent who remained on the job from which some of the duties had been removed. Union Relations was advised as to the proper classification of this job. None of the other grievances involved wage questions.

The Department General Manager's secretarial job was reviewed with the incumbent and rewritten in draft form for use in connection with the general discussion with the Salary and Wage personnel in the other HAPO Departments relative to establishment of the proper classification for this type of job and to review the classification of all secretarial jobs.

Eleven financial jobs received from Personnel Accounting and one semi-technical job from Research and Engineering are at present in process of evaluation.

Grades and classifications were established for three other jobs during the month. A 0.59% cost of living increase was added to all non-exempt rates effective October 29, 1956.

Administratively, the following were processed and any discrepancies incident thereto handled with supervision concerned.

<u>Payroll Status Changes</u>	<u>Inter-Dept.</u>	<u>Intra-Dept.</u>	<u>Total</u>
Transfers		51	92
Into CPD	25		
From CPD	16		
From Exempt to Non-Exempt	1	1	2
Non-exempt to Exempt	0	3	3
Non-exempt upgrades	1	14	15
Non-exempt downgrades	0	3	3
Temporary reclassification		7	7
			<u>122</u>
Requisitions			
Processed			31
Number personnel requested thereon			43
Reactivations			
From LOW			1
Others			9
New Hires			2
Automatic increase papers			74

Union Relations Operation

The impending shut-down of the TBP Operation continues to present numerous problems to supervision. Six or more grievances have been filed in protest to the plans by which this shut-down will be effected.

The C.P.D. Negotiating Committee met on two occasions during the month to process and resolve a nonunit grievance.

The Finished Products Operation has conceived a plan by which craftsmen within that Operation will be transferred or rotated between the various facilities in order to create a work force which is flexible and competent to handle maintenance work in all of the buildings within that Operation - viz: 224-U Building, 234-5 Building, and 231 Building. The Union is giving token protest to these plans, contending that the transfer procedure is being violated. The Company does not share this opinion and contends that it is a logical plan to increase efficiency at this location.

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It is significant to note the number of bargaining unit employees who are active within the Union to the extent that union dues are being deducted from their pay checks. This information, as follows, will be included in each month's report:

Bargaining unit employees in C.P.D.	1385
Bargaining unit employees utilizing check-off	653
Percentage of total bargaining unit employees using check-off	60.2 %

The HAPC-wide check-off percentage is 52% as compared with CPD's 60.2%.

Four Step II Grievance Meetings were held during the month. Following is the summary of grievance statistics for the month of October, 1956:

	<u>Unit</u>	<u>Nonunit</u>
Pending at Step II on 9-30-56	11	1
Grievances received during October	17	0
Satisfactorily answered at Step I	3	0
Processed at Step II	10	1
Pending at Step II on October 31, 1956	15	
Intent by Union to carry to arbitration	1	

Health and Safety Operation

	<u>October</u>	<u>September</u>
Disabling Injuries	0	0
Serious Accident or Incidents	2	0
Medical Treatment Injuries	81	56
Radiation Incidents	0	1
Radiation Occurrences	34	30
Fires		
Security Violations	1	1

One medical treatment injury in the 234-5 Maintenance Shop was formally investigated. Refer to Serious Accident or Incident Investigation No. 1.

An incident in the 234-5 Development Laboratory was formally investigated although no injury occurred. Refer to Serious Accident or Incident Investigation No. 2.

The Medical Treatment Injury frequency rate increased by 38 percent over the previous month. Despite this, the current injury experience was better than average. Radiation occurrences increased by four over September experience. Although slightly higher than normal no unusual trends were apparent.

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One Security violation in the Financial Operation resulted from an unlocked repository. Overall conformance with security regulations was satisfactory considering the increase in custodians and the volume of classified material which was handled.

Presentation of a Best Display plaque to Power and General Maintenance Operation culminated the various activities of the Fire Prevention Week Program. Employee Relations and Redox entered Fire Prevention displays in the contest.

Two life size paintings of a typical male and female employee were procured and mounted on plywood. The figures were placed at the main badge houses to create interest in and emphasize injury prevention.

Arrangements were completed with Radiation Protection Operation for programming the IBM processing of external exposure records of Chemical Processing Department personnel.

Installation of the ozone generation equipment in Redox was approved and recommendations were made for minor alterations prior to start-up.

Action was initiated to improve area roads and walkways.

Efforts by Hanford Lab personnel to install a leaking fluorine gas cylinder and associated testing equipment in the Redox laboratory were halted. Methods of installation were recommended.

Blueprints for the proposed Redox material storage and paint shop were reviewed and comments were made on fire prevention considerations.

A revised Chemical Processing Department Evacuation Procedure was issued to level three managers for comment and approval. General acceptance was gained. New shelter instructions were posted in non-shelter buildings.

Methods were established with Radiation Protection Operation for reduction of pencil requirements and elimination of unnecessary "A" type photo badges in the 200 Areas.

Recommendations were issued for a proposed project to standardize fencing and identification of outside Radiation Zones.

Fire Protection Operation

A revised training and instruction schedule has been completed and put into operation to better acquaint members with territory of responsibility, knowledge of buildings, hydrants, alarm boxes and roads of accessibility.

The Fire Protection Operation conducted eight extinguisher demonstrations to 170 personnel of Operations and Maintenance of 202A, 202S, 222S, and 234-5 buildings; and three meetings on Fire Prevention to 69 personnel of 202S, 277W

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and 202A buildings, one meeting on reorganization and responsibilities of the Fire Protection Operation and one meeting with eleven personnel of the 222S building on the new Arm Lift Back Pressure method of artificial respiration.

Personnel of the Fire Protection Operation made fifteen company tours of 37 buildings in the Administration and Process areas of both East and West Areas.

In cooperation with the Fire Protection Engineer, the Fire Protection Operation conducted a two week Fire Prevention campaign with demonstrations to personnel of both East and West Areas.

The Chemical Processing Department experienced one fire during the month on October 2, 1956 in the 2704 E building in 200 East area, room 24 at 10:37 AM. Fire was confined to wall receptacle and cord to adding machine. Estimated damage was \$15.00

Fire Extinguisher Service

Inspected	400
Installed	18
Delivered to new location	15
Seals broken	20
Serviced	45
Weighed	360
Gas Masks Serviced	10
Hand Lines Inspected	22

On Friday, October 12, 1956 at 1:00 PM., a practice evacuation was held at 222 S building by the Fire Protection Operation. Approximately fifty-five persons evacuated the building in one minute and twenty seconds in a very orderly manner. Practice evacuations held at 2704 E and 2704 W also.

Fire Alarm Box 24 in the 200 West area was removed from service on October 26, 1956, due to inaccessibility and same area being covered with other boxes. Box was located east of 272 W.

Personnel Practices Operation

	<u>Exempt</u>	<u>Non-Exempt</u>	<u>Total</u>
<u>Additions to Payroll</u>	0	40	40
New Hires	0	2	2
Reactivate	0	8	8
Rehires	0	1	1
Re-engage	0	2	2
Transfers into CPD	0	27	27
<u>Removals from Payroll</u>	6	29	35
Illness	0	7	7
Resigned, other employment	1	4	5
Transferred from CPD	5	17	22
Retired	0	1	1

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Requisitions for Personnel (Non-Exempt)

Number on hand End of September	13
Number Received	30
Number Completed	20
Number on hand End of October	23

Requests for Transfer (Non-Exempt)

Number on hand End of September	111
Number Received	8
Number Transferred	0
Number on hand End of October	119

Service Recognition Plan: Thirteen Five-year pins were awarded (10 to male employees and 3 to female employees) and fourteen Ten-Year service award pins were issued (13 to male employees and 1 to a female employee). During this period 33 pass folders were issued for perfect attendance for records ranging from one year to six years.

A majority of the payroll additions and payroll removals reflected the rotation of Radiation Monitoring personnel between IPD and CPD, purpose being more equitable distribution of radiation exposure, and the transfer of power operators covered by contractual agreements. In regard to removals from payroll related to Chemical Process Operators being affected by the forthcoming TBP shutdown, this month one Utility Operator has resigned for other employment, while two pipefitters and one instrument technician resigned for other employment in the crafts field.

Forty-one preliminary interviews were conducted during this period in conjunction with the anticipated layoff status of Chemical Process operators. Of the forty-one, eleven were interviewed the second time by interested supervision in other HAPO components.

The first supervisory program test was conducted as a service for IPD.

Requests for Transfer (Exempt)

Number on hand End of September	24
Number this month	1
Number transferred	1
Number closed out	2
Number on hand end of October	22

Number of Interview Trips	3
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Applications for Employment

Applications	5
Hired	0
Closed Out	3
Invited for Interview	2

Memorandums from the Research and Engineering Operation and Finished Products Operation, listing technical personnel available for assignment elsewhere, have been received. Resumes on personnel listed by name have been sent to all other departments at HAPO to determine interest. The combined list represents approximately 32 personnel. To date two have been removed from the list after receiving a permanent assignment within the CPD. Attempts to place all of these technically trained personnel are being vigorously pursued, not only in CPD but in other departments at HAPO. Three resumes of personnel on this list have also been sent to APED, San Jose, California for consideration there and some negotiations have been made with the AEC to develop an interest in two job openings now existent there.

A recruiting trip was made by the Specialist, Technical Personnel Placement, to the campuses of San Diego State College, University of California at Los Angeles and University of Southern California. The turnout of candidates at each school was excellent and the caliber of personnel interviewed was generally high.

Suggestion Plan

	<u>September</u>	<u>October</u>
Suggestions Received	316*	52
Acknowledgements to Suggesters	74	87
Pending acknowledgement	33	7
Referred to Operation for investigation	76	81
Pending referral to Operations	33	11
Investigations completed & closed	121	47
Approved by Board for awards	54	13
Adopted, pending award	10	29
Total Net Savings	\$7875.93	\$955.95
Total cash awards approved by Bd.	1250.00	180.00
Number outstanding to Operations (End of month)	212	250

* This figure reflects 207 suggestions sent to CPD when Suggestion Plan was decentralized.

The first award checks to be distributed under decentralization were delivered to level 3 managers on October 30, totaling \$1768.33.

One employee retired under optional retirement during October namely:
Roy Haas W-4456-6926 Finished Products Operation.

All matters pertaining to this man's retirement as to Insurance Plan, Pension Plan, together with any questions this employee had, were satisfactorily handled.

The administration of the Personnel Development Program for non-exempt employees is an Employee Services function. In this capacity two meetings during the month, composed of the plan administrators from the other five HAPO components, were attended. The purpose of the meetings was to discuss

changes in the plan as it was presented by the original task force, and to lay plans for launching the program. Three minor changes were agreed upon and the revised samples of the form have been distributed to the six components for final approval. Arrangements have been made with the Data Processing Operation to provide, (on a monthly basis) IBM runs listing the employees' name, payroll number, continuity of service date, job classification etc.

Level 3 Operation managers were interviewed for the purpose of determining the desirability of having vending machines installed in the area buildings.

Plans are underway for providing a third lane of traffic for badge and pencil distribution through 200 East badge house to speed up movement through the badge house, and to eliminate the situation where people are required to stand in line during cold weather.

Level 3 managers were surveyed concerning special arrangements for allowing straight day workers to work the Saturdays following Christmas and New Years in lieu of the Monday preceding these holidays.

Card files on those who have signed the revised Patent Agreement and those who have not sent in the revised form have been obtained from the 700 Area and set up in the file room here. Action is being taken to bring the files up-to-date.

We have a total of 80 non-veterans, subject to military training through the Selective Service System. These fall in the following classifications:

1A	16
2A	17
3A	29
4A	1
4F	8
4D	1
1S-H	1
1S	1
1F-F	1
No Classification	5
Total	80

Deferments

Deferments Pending End of September	3
Cases on which deferments had been requested and then trans. to CPD	3
Deferments requested (October)	2
Cases on which deferments had been requested and then trans. from CPD	1
Deferments Granted	1
Deferments Pending	6
Appeals Pending (Local Board)	2

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All deferments for October were processed on a routine basis and no difficulties have been encountered as yet in obtaining these deferments.

The two deferment appeals which are pending were processed previous to reorganization. A follow-up inquiry to the local board on one of these was made to which there has been no reply.

Duplicating

Orders on Hand (October 1)	43
Orders Received	859
Orders Completed	882
Orders on Hand (Nov. 1)	20

Total Production (No. copies)	182,150
Total Embossograp Signs Made	639

Construction work on the new duplicating room in 271-B Building is nearing completion. Target date for move to the new location has been moved back to November 15. We are opening a new mail room for 200-E in the location now occupied by Duplicating, which installation is scheduled for completion during the latter part of the month.

A shortage of telephone facilities in the "B" Plant Area has resulted in work starting on a new 10 pair cable installation to this location. Completion is expected between November 15 and December 1.

Justification questionnaires covering personnel carrying vehicles assigned to the Chemical Processing Department have been completed. Consolidation of vehicles into pools at the various buildings and facilities is under study, which should result in more efficient utilization of such equipment.

Approval for temporary assignment of four additional Power Wagons has been received verbally from Transportation. These vehicles are scheduled for excess by Transportation, thus they are being assigned to CPD on a temporary basis, or until such time as return is required.

III. ORGANIZATION AND PERSONNEL

A. Force Summary -- Employee Relations Operation

	<u>Start of Month</u>	<u>End of Month</u>
Exempt *	32	33
Non-exempt	57	58
Total	89	91

* Includes Level 3 Manager

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B. Safety

There were no injuries, accidents, fires, or security violations in the Operation.

C. Personnel Activities

Personnel of the Operation attended better than fifty meetings during the month in order to conduct the Operation's business. These consisted of both intra and inter department meetings. In addition, safety and information meetings were conducted.

Special trips included Mr. H. E. Garrison's trip to Chicago to attend the National Safety Council, October 22-26, 1956, also Mr. W. Watson's trip to California for recruiting purposes. He visited the San Diego State College, University of California at Los Angeles, and the University of Southern California.

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**DATE
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