HW-47056-254

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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT
FOR
NOVEMBER 1956

HW-47056-DEL.

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Compiled by
OPERATION MANAGERS

December 21, 1956

LANFORD ATOMIC PRODUCTS OPERATION
RICHLAND, WASHINGTON

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

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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

NOVEMBER, 1956

GENERAL SUMMARY

PRODUCTION

Total production of plutonium from the primary plants exceeded the forecast; however, a lack of adequately aged high exposure uranium caused by high production in previous months necessitated the shutdown of Purex Plant on November 21 through the balance of the month. The actual production of Purex Plant was therefore 97% of the forecast. During the month instantaneous rates of 16 T/D on virgin feed and 18 T/D on a combined feed of virgin and recycled uranium was satisfactorily demonstrated. During the shutdown period the extraction column in the final uranium cycle was replaced with a modified unit in an attempt to improve uranium decontamination.

Approximately 70 hours of downtime was required in Redox Plant to permit replacement of faulty plutonium concentration equipment and flushing of the extraction columns.

Problems associated with the removal of residual uranium from the metal storage tanks resulted in lowered rates through the TBP Plant. Production was 80% of the forecast.

Although a new plant production record 13% higher than any previous month was established in the UO_2 Plant, the production was 97% of the forecast. Mechanical difficulties with the newly activated continuous calciners and the associated solids handling equipment caused the reduction in anticipated production.

Plutonium production met or exceeded the forecast covering fabricated cores, plutonium nitrate, and unfabricated plutonium metal. A new record for material processed in the fabrication facility was established which exceeded the previous high by 7%.

ENGINEERING

Three continuous calciners were operated with good process performance but considerable difficulty with off-gas filters and rotary valves was experienced. An accelerated improvement program resulted in fair performance at month end. Approximately 700 calciner-hours of operation were achieved during the month on the three operational units. Design rates have been demonstrated for periods up to one week.

The development program for the recovery of fission products has been expanded somewhat to include methods for separating gross fission products by filtration methods.

Construction of the prototypical ion exchange unit is proceeding on schedule.

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A preliminary economic comparison of alternative installations for processing 241-A Waste Tank Farm vapor was completed.

The study to evaluate the advisability of providing additional slug storage at Redox has been completed and the final report has been issued.

GENERAL

Project authorization for "Modification of Redox Plutonium Concentration Building - 233-S" (Project CG-692) was received during the month.

An agreement was negotiated with HAMTC which provided that, effective December 1, 1956, isolation pay would be regarded as a part of the gross earnings for purposes of calculating the amount of insurance coverage to which employees who receive isolation pay are entitled.

A series of training courses was initiated to acquaint supervisors with the new Non-Exempt Personnel Development Program.

A "Back the Attack on Traffic Accidents" program was initiated during the month. The program will continue through December and will coincide with the nation-wide drive to reduce traffic accidents.

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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. MacCready
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
NOVEMBER 30, 1956

<u>OPERATION</u>	<u>EXEMPT</u>		<u>OTHER</u>		<u>TOTAL</u>	
	<u>10-31-56</u>	<u>11-30-55</u>	<u>10-31-56</u>	<u>11-30-56</u>	<u>10-31-56</u>	<u>11-30-56</u>
GENERAL MANAGER'S GROUP	10	10	1	1	11	11
PRODUCTION	6	6	4	4	10	10
PUREX	44	43	277	273	321	316
REDOX	52	51	298	296	350	347
FINISHED PRODUCTS	68	65	440	429	508	494
POWER AND GENERAL MAINTENANCE	42	44	278	295	320	339
FINANCIAL	21	21	51	55	72	76
FACILITIES ENGINEERING	76	77	33	32	109	109
RESEARCH AND ENGINEERING	81	79	24	24	105	103
EMPLOYEE RELATIONS	<u>32</u>	<u>32</u>	<u>58</u>	<u>58</u>	<u>90</u>	<u>90</u>
	432	428	1464	1467	1896	1895

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CHEMICAL PROCESSING DEPARTMENTPATENT SUMMARY
FOR
MONTH OF NOVEMBER, 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. F. Corlett	Automatic Reactor Tube Extraction Machine
C. R. Anderson	Variegated Filter Media for Fission Product Recovery
C. R. Anderson	Filtering Process for Fission Product Recovery
C. R. Anderson	A Filter Cartridge and Container Tube for Recovery of Fission Products
C. R. Anderson	An Irradiation Facility with a Fixed Source Chamber Combined With Removable Material Handling Equipment
C. R. Anderson	Process of Trapping Fission Product Containing Precipitates from Separations Process Wastes so as to Increase Source Intensity

GENERAL MANAGER
CHEMICAL PROCESSING DEPARTMENT

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CHEMICAL PROCESSING DEPARTMENT
PRODUCTION OPERATION

November, 1956

I. RESPONSIBILITY

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

II. ACHIEVEMENT

A. Production Statistics

An overlay-underlay presentation of classified HAPO production statistics was developed to facilitate transmitting of this information to Management. Considerable attention was given, also, to the preparation of Chemical Processing Department section of the 1956 Annual HAPO Report.

1. Purex Operation

	<u>November</u>	<u>October</u>
Tons Uranium delivered to storage	272.0	186.0
Average Production Rate per operating day (tons)	12.95	10.95
Average Daily Operating Rate for the month (tons)	9.07	6.0
Average yield, %		
Uranium	98.0	100.8
Plutonium	99.93	100.22
Total Waste Loss, %		
Uranium	0.53	0.60
Plutonium	0.93	1.78
Average cooling time (days)	108	117
Minimum cooling time (days)	97	104
Time Operated, %	70.0	54.8

2. Redox Operation

	<u>November</u>	<u>October</u>
Tons uranium delivered to storage	278.5	278.33
Average Production rate per operating day (tons)	9.9	10.3
Average Daily Operating Rate for the month (tons)	9.3	9.0
Average yield, %		
Uranium	101.5	102.6
Plutonium	107	92.4

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2. Redox Operation (Continued)

	<u>November</u>	<u>October</u>
Total Waste Loss, %		
Uranium	0.26	0.33
Plutonium	0.27	0.25
Average cooling time (days)	137	157
Minimum cooling time (days)	114	115
Time Operated, %	90.3	87.0

3. 231

	<u>November</u>	<u>October</u>
Batches started	219	202
Batches completed	220	201
Batches awaiting processing	0	1
Average yield, %	92	94
Average purity, %	98.7	98.4

4. 234-5 Operation

	<u>November</u>	<u>October</u>
Batches completed through Task I	328	297
Batches completed through Task II	335	295
Runs completed through Task III	201	169
Reduction yield, %	98.21	98.13
Waste Disposal (units)	380.17	498.24

5. UO₃ Operations

	<u>November</u>	<u>October</u>	<u>To Date</u>
Uranium drummed (tons)	681.97*	602.97**	17,524.78
Uranium shipped (tons)	658.25	593.15	17,429.71
Average cooling time (days)	143	163	
Minimum cooling time (days)	120	121	
Waste Loss, %	0.01	0.02	

* Includes 134.06 UA.

** Includes 54.43 UA.

6. TBP Operations

	<u>November</u>	<u>October</u>	<u>To Date</u>
Tons received from Metal Removal	110.34	166.72	7,949.16
Tons shipped to UO ₃ Plant	108.52	167.54	7,690.88
Average Production Rate per Operating day (tons)	3.79	5.40	
Average Daily Operating Rate for the month (tons)	3.62	5.40	

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6. TBP Operations (Continued)

	<u>November</u>	<u>October</u>
Average yield, %	97.52	100.00
Total Waste Loss, %	1.85	0.54
Time Operated, %	95.42	100.0

7. Power

	<u>200 East</u>	<u>200 West</u>
Raw water pumped, gpm	6,581.8	6,137.8
Filtered water pumped, gpm	628.7	1,226.73
Steam generated, lbs/hr	211,000	274,000
Maximum steam generated, M lbs.	99,747	140,959
Coal consumed, est. (tons)	5,764	9,028

8. Waste Storage

	<u>Equivalent Tons U</u>	
	<u>Nov.</u>	<u>Oct.</u>
Redox Waste reserve storage capacity	1,607	1,771
Purex Waste reserve storage capacity	1,871	1,909

B. Production Planning and Scheduling Operation

Activities of Production Planning and Scheduling centered around the following:

1. Assistance to Facilities Engineering in the preparation of justifications for "Redox Phase III" and "Utilization of Recovered Acid from UO_3 Plant" project proposals.
2. Preparation of a 15 months commitment forecast to be issued early in December.
3. Development of a detailed operating plan for operation of the primary separations plants through September, 1957.
4. Directing and coordinating a study by Chemical Processing Department of the impact of new Top Secret criteria.

C. AEC Liaison

W. K. MacCready, General Manager, CPD and J. H. Warren, Manager, Production Operation, attended an AEC Plutonium Scheduling Meeting held in Washington, D.C., on November 19, 1956.

D. Essential Materials

Following are the significant activities accomplished with respect to essential materials handling and inventories:

1. The inventory of RCDS-1102 crucibles, which had been critical through October because of production difficulties experienced by the supplier, was improved during November. Accordingly, air express shipment of crucibles to HAPO, resorted to for more than a month, was discontinued and railway express shipments resumed.
2. Representatives of General Electric Company and General Chemical Company met during the month to discuss and resolve safety problems associated with unloading chemical solution trucks.

E. Reports and Documents Prepared

Prepared and Issued

HW-46382	Chemical Processing Department - Waste Status Summary for October, 1956, D. E. Peterson, 10-31-56
HW-46404	Five Year Planning (Pre-Budget) Forecast - Research, Development & Design Work, V. R. Chapman, 11-1-56
HW-46423	Essential Material Consumption - October, 1956, TBP Plant, M. A. Thress, 11-5-56
HW-46424	Essential Material Consumption - October, 1956, Redox Plant, M. A. Thress, 11-5-56
HW-46425	Essential Material Consumption - October, 1956, Purex Plant, M. A. Thress, 11-5-56
HW-46426	Essential Material Report to Cost and Purchasing, October, 1956, M. A. Thress, 11-5-56
HW-46427	Essential Materials Ordered, D. E. Peterson, 11-5-56
HW-46428 RD	TBP-UO ₃ Building Production Schedule for November, 1956, B. F. Campbell, 11-1-56
HW-46429 RD	Redox Plant Production Schedule, D. McDonald, 11-1-56
HW-46430 RD	Purex Plant Production Schedule, D. McDonald, 11-1-56
HW-46431 RD	Z Plant Production Schedule for November, 1956, B. F. Campbell, 11-1-56
HW-46681 RD	Operating Program for Redox & Purex Plants, D. McDonald, 11-1-56

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E. Reports and Documents Prepared

Prepared and Issued (Continued)

HW-46696 RD Purex Plant Production Schedule (Revised,) D. McDonald,
11-13-56

HW-47020 RD Official Quarterly Forecast, D. McDonald, 11-27-56

Prepared for Signature and Issuance

HW-46480 Recovery of UO_3 From Wrecked Car No. 395, W. E. Johnson,
11-7-56

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 November.

C. Visitors

Dr. George Watt, University of Texas, visited the 234-5 Development Operation during November, 1956, in conjunction with the consulting services program.

The following representatives visited the Department to confer with J. H. Warren and R. B. Richards on the recovery of neptunium and tour the plants:

H. H. Zodtner, UCRL, Livermore, California
W. T. Crane, UCRL, Livermore, California
J. S. Stellar, UCRL, Livermore, California
S. J. Brady, UCRL, Livermore, California
J. L. Bloom, AEC, UCRL, Livermore, California

CHEMICAL PROCESSING DEPARTMENT
PUREX OPERATION

November, 1956

I. RESPONSIBILITY

There were no changes in the scope of the Purex Operation responsibility during the month.

II. ACHIEVEMENT

A. Processing Operation

1. Normal Processing

Processing of high exposure metal was continuous through November 21, at which time plant operation was suspended for the remainder of the month because of a lack of properly aged feed material. The resulting operating efficiency for the month was 70 percent. Production for the month was one percent less than the commitment. The monthly commitment was not reached because extra material processed in preceding months depleted the metal supply. The product waste losses, including those encountered in flushing the organic treatment and the final plutonium cycle equipment, were 0.92 percent for plutonium and 0.53 percent for uranium. Approximately 75 percent of the uranium produced required silica gel treatment to meet shipping specifications, and about one percent of the plutonium product was reworked to increase the concentration of the plutonium in the solution.

Plant processing rates were raised from a capacity factor of 1.44 to a new high of C.F. 1.92 for a two day period. Except for a slight increase in the final uranium gamma activity, all operations were satisfactory. The new rate could not be maintained because of 234-5 Building capacity limitations. (For additional tests of the uranium processing capacity, see item F, Improvement Experience.)

2. Special Processing

During the November shutdown, flushing of the #1 and #2 organic treatment systems and the plutonium concentrator equipment was carried out. The 2D column (2nd cycle uranium) was given decontamination flushes in preparation for its removal.

Rework of accumulated uranium product stream which would not respond further to silica gel treatment, was initiated late in November, utilizing the recently completed return routing from the uranium storage tanks to K cell. This return line provides a high degree of in-plant flexibility and breaks the dependence of Purex on the TBP Plant for processing of material which cannot

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be treated successfully with silica gel.

B. Product and Material Handling Operation

Charging operations for the month were terminated on November 17. Dissolver heels were then removed to sustain extraction battery operation through November 20. On two separate occasions during the month, I^{131} discharge from the 291-A stack exceeded the daily and weekly permissible limits for this material. A gradual increase in discharge of radioiodine was first detected on November 8 through analyses of 24-hour stack samples taken by the Regional Survey group. Regeneration of B-2 reactor restored controlled conditions for one day, after which an increase in emission was again noted. Before month end, regeneration of A-2 and a second recoating of B-2 reactor packing were performed to bring I^{131} release within limits. The capacity of the down draft silver reactor units for iodine absorption has been quite unpredictable during the last several months of operation. On the several occasions of iodine breakthrough during November, detection was delayed because of total dependence for control on the results of Regional Survey 24-hour stack samples. The scintillation monitor, normally used for routine control of iodine conditions, was out of service following a severe acid leak, and the recently completed caustic scrubber monitors continue to be subject to severe plugging.

The silica gel facility operated for 87 percent of the available hours during November to produce specification product for shipment to the UO_3 Plant. Interruptions were occasioned by two shutdowns for bed regenerations and a third outage for recirculation pump repair.

C. Radiation Monitoring Operation

1. Radiation Occurrence Experience

Four radiation occurrences were reported in the Purex Operation during the month. These involved two sample spills, one case of skin contamination, and one isolated spot of contamination discovered in a routine survey of the maintenance shop. Decontamination was successful in all instances.

2. Personnel Exposure Experience

Maintenance work in the sample gallery on in-line process monitoring equipment continues to be a major source of personnel exposure. The maximum dose rate to instrument personnel and monitors was 1 rad/hr with an average exposure of 100 to 400 mrad/hr for this work.

Removal of the centrifuge motor from a failed E-4 machine was performed with shielding and semi-remote hand tools. The maximum dose rate encountered in performing this work was 7 rads/hr, including 1 r/hr to the hands while working at a distance of 18 inches. Average dose rates varied from 100 mrad/hr to 600 mrad/hr. The crane operator received a maximum dose rate of 250 mr/hr in the

slave crane while moving the centrifuge into position.

3. Contamination Experience

Extensive remote maintenance in the process cells carried out during the month, in addition to the exploratory work on the E-4 centrifuge carried out on the canyon deck, resulted in cover block contamination. Contamination levels from 1 rad/hr at surface up to 20 rads/hr at one foot were encountered in numerous small spots on cell and trench cover blocks from A through F cell. This area is responding to decontamination efforts and it is expected that normal conditions will be restored. The movement to storage of the repaired L cell plutonium concentrator package will clear M cell for future canyon maintenance jobs involving appreciable potential for contamination spread.

D. Maintenance Operation

Slight leakage was detected in the L-4 plutonium concentrator tube bundle during routine hydrostatic tests of the November shutdown. A replacement tube bundle fabricated from 309 SCb stainless steel (heat treated) was installed November 28. The failed unit, also 309 SCb (heat treated), had been in operation 55 days. Four tube bundle failures have been experienced in this location since startup of the Purex Plant. The pattern of the latest failure was somewhat different, possibly indicating mechanical rather than corrosion failure.

The small test heat exchanger, which was installed during plant construction, was removed from the left tube bundle of the #2 acid waste concentrator (F-6) and stored for future decontamination and examination. As a follow up on low level radiation readings discovered in the trap pit from the F-6 concentrator during the October shutdown, the unit was again hydrostatically tested. No leak was discovered. The test heat exchanger will be examined later to determine if it was the source of the leak which caused the trap pit contamination.

The steam tube bundle of the acid fractionator (F-5) is in severe corrosive service and a total life expectancy of less than a year is predicted. A scheduled hydrostatic test was made during the shutdown and a slight leak was detected. The bundle is continued in service as the magnitude of the leak does not warrant replacement at this time.

Removal of the electric drive motor from the E-4 centrifuge, which failed in August, was successfully accomplished by utilization of a shielding shroud and special tools to reduce radiation exposure to personnel engaged in the work. Subsequent inspection indicated probable failure of the upper drivehead bearing (reason unknown) as the centrifuge could not be rotated, whereas the motor rotated freely. Since only one spare liquid-solid centrifuge remains on hand, effort will be made to decontaminate the failed unit to radiation levels which will permit replacement of the drive head. Electrical tests on the motor will continue.

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The inboard bearing of the 200 HP electric motor that drives the #1 exhaust fan was replaced. Bearing failure was attributed to misalignment of the motor shaft. A previous failure was experienced with the #3 fan motor in July of this year; however, the failure was not caused by shaft misalignment.

An unscheduled electrical outage occurred November 15 when a Minor Construction electrician inadvertently caused an electrical short circuit in the east switchgear room. The short circuit automatically tripped three circuit breakers, resulting in temporary loss of power to several pieces of canyon process equipment. A second unscheduled outage occurred November 16, when a maintenance electrician misinterpreted instructions and tripped a relay in the west switchgear room, which caused a momentary outage as automatic transfer was made to the emergency circuit. Rapid restoration of service and prompt action by operating personnel prevented a major break in processing continuity.

E. Analytical Control Operation

Routine analytical control in support of plant operation was performed until the November 21 shutdown. Advantage was taken of the downtime to recheck calibration and standardization curves on all analytical instruments and to make repairs as found necessary. No new changes of procedure were instituted.

F. Improvement Experience

1. Process Tests and Revisions

(For more detailed information on these items, see the Research and Engineering portion of the Chemical Processing Department report.)

An extraction capacity factor of 1.92 - the highest rate to date through the Purex Plant - was demonstrated with irradiated metal solution feed for a period of two days during the month. Continued operation at this rate was not possible because of 234-5 Building capacity limitations. By maintaining the new feed at a capacity factor of 1.44 and recycling decontaminated uranium from plant output to the head end to make up the difference, a capacity factor of 2.16 was demonstrated on a test basis in the uranium processing equipment of the building. No equipment limitations were apparent at the highest rate demonstrated.

The organic scrub to the partition cycle IBS column was reduced incrementally to 60 percent of the normal flowsheet. No significant increase of uranium in the plutonium product was detected. The capacity factor of the column was increased to approximately 2.35 by this reduction. Operation at the 60 percent figure was continued throughout the remainder of the month.

An increase of HA column feed temperature to 50 C has resulted in better column stability and a slight decontamination improvement,

Performance of the 2D (final uranium decontamination) column originally installed in the process has not been adequate to produce on a routine basis a uranium product meeting fission product specifications. Much of the uranium solution produced has required further decontamination via silica gel prior to shipment to the Finished Products Operation. During the November shut-down, the 2D column was replaced with a unit modified to operate with the organic-aqueous interface at the bottom of the column (i.e. organic phase continuous). Improved decontamination, with no sacrifice of capacity, is expected as a result of this column change.

2. Miscellaneous Improvements

As a result of information obtained from representatives of the Bird Company and the Reliance Motor Company, several revisions, designed to decrease heat load and extend motor life, were made in the centrifuge operating procedure. Changes in the low speed resistance elements of the electrical circuit were also made.

An investigation of the centrifuge drivehead bearing failures has been initiated through Facilities Engineering Operation. The program includes vendor sponsored tests at Hanford, increased care in drivehead assembly, probable oil filtration, and a review of the suitability of the upper (thrust) bearing with the vendor. Results from this program may not be available, however, for inclusion in the two spare machines now on order.

3. Inventions and Discoveries

No inventions or discoveries were reported for the month of November.

G. Events Influencing Costs

The shortage of properly aged irradiated metal did not allow full utilization of the available operating time during the month. Accordingly, unit costs for the period will be higher than for a month in which metal is available for continuous on-stream operation.

The loss of organic solvent to waste has decreased approximately 0.2 percent as a result of the improved performance of the new organic treatment IO column installed in October. This represents an essential material cost saving of \$9 to \$10 per ton of uranium processed.

The slug storage basin was flushed and decontaminated in preparation for the erection of a ventilation barrier and the second process crane

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by Minor Construction forces. For the next calendar year all dissolver charging will be confined to the 4-12 and 12-8 shifts. Economic advantage and operational flexibility associated with storage of extra metal in the building will be lost during this period.

Recycling of UNH during the capacity testing raised the direct processing cost about four percent for a period of one week. This cost is considered a small expenditure for the information obtained.

H. Plant Development and Expansion

(Items of a project nature involving the Purex Operation will be found in the Facilities Engineering portion of the Chemical Processing Department report.)

The prototype dual-pass silver reactor was installed in "C" cell. Difficulties previously experienced because of interference between cell floor pad bolts and equipment dunnage were corrected. The reactor will be available for service after two associated jumpers have been modified. Installation of these jumpers is scheduled for the first week in December.

A sample of the vapors from the boiling Purex waste tank has been obtained and condensed. This sample will provide material for experimental work by groups interested in the problems of ground disposal of condensate from the surface condenser installation now in the project preparation stage. Approximately four liters of condensate were obtained. A complete analysis has not been obtained; however, from a total activity standpoint, the liquid approximates second cycle waste from the bismuth phosphate plant.

I. Reports Issued

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

III. ORGANIZATION AND PERSONNEL

A. Force Summary

	<u>Exempt*</u>		<u>Other</u>		<u>Total</u>	
	<u>10-31</u>	<u>11-30</u>	<u>10-31</u>	<u>11-30</u>	<u>10-31</u>	<u>11-30</u>
Processing	7	7	78	75	85	82
Product & Mat'l Handling	7	7	64	64	71	71
Maintenance	10	9	67	66	77	75
Radiation Monitoring	7	7	19	19	26	26
Analytical	12	12	48	48	60	60
General	2	2	1	1	3	3
Total	<u>45</u>	<u>44</u>	<u>277</u>	<u>273</u>	<u>322</u>	<u>317</u>

* Includes Manager - Purex Operation

B. Safety

There were no disabling injuries during the month of November. Twelve

medical treatment injury cases were reported during the month.

C. Security

There were no security violations during the month.

D. Personnel Activities

Thirty-one Purex Operation supervisors attended lectures on the new Non-Exempt Personnel Development program designed for evaluating non-exempt employees.

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CHEMICAL PROCESSING DEPARTMENT
REDOX OPERATION

NOVEMBER, 1956

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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 November was exceeded by 22%, with an operating efficiency of 90% during this period. Two 202-S Building shutdowns were necessary during the period. On 11-15-56, the facility was shut down for a 10% nitric acid flush when the 1A and 1S columns gave evidence of excessive flooding. Flushing was completed on 11-16-56 and metal feed was again started to the columns on this same date. Total down time for acid flushing was 23 hours. A second facility shutdown occurred on 11-26-56 and extended through 11-28-56 (47 hours) to allow replacement of the L-3 recirculator and tube bundle in the 233-S Building. During this time, extensive cell work as listed under equipment experience was completed and a second 10% nitric acid flush of the columns was made as flooding in the 1A column had been noted.

The first 31 head-end batches processed this month were treated with dichromate to further evaluate the merits of this process as compared to the permanganate treatment. However, during this series of runs, it was found that the problems which were formerly localized in H Cell were being dispersed to other places, although to a lesser degree. Of particular concern was the build-up of radiation readings from ruthenium in the Contact-Maintenance equipment in the 233-S Building. Radiation levels increased by a factor of two as a result of the dichromate runs and showed a higher gamma ratio in the final plutonium stream from the 202-S Building. Several batches of UNH were over specification on gamma ratio even after ozonization in E-13, however, these batches were easily blended with low gamma UNH solution to meet shipping specifications. Since the disadvantages of the dichromate treatment were felt to far out weigh the advantages, the dichromate head-end treatment was abandoned in favor of permanganate beginning with head-end batch number 32. The UNH gamma ratio subsequently returned to normal and ozonization was discontinued with E-12 batch number 43.

During the month, 15 batches of E-3 plutonium solution were out of specification due to excessive gamma ratios. Of this material, it was necessary to recycle only one batch; the others being easily blended. There were also 10 batches of uranium solution from E-12 or E-13 which were out of specification and all of these were satisfactorily blended to meet shipping specifications. All waste batches sent to the tank farms were well within normal throw away limits.

Backcycling of the salt waste from the LAW and LSW streams was made periodically during the latter part of the month to evaluate the feasibility of a partial recycle of the high fission product containing salt waste. Although a complete evaluation from the limited attempts is not possible, preliminary results indicate that backcycling of the salt waste may be feasible. Further work is contemplated on this problem.

2. Equipment Experience

a. H-4 to G-5 Jets

On 11-8-56, the two parallel jets from the H-4 oxidation tank to the G-5 metal solution hold tank became inoperable due to plugged dip legs. Since normal flushing did not clear the plugs, one of the units was immediately replaced. Installation was accomplished without a building shutdown by previously building up the metal feed inventory and shutting down H Cell only. During the 11-26-56 shutdown the second unit was also replaced. Both jets are now operating satisfactorily.

b. G-5 to H-2 Jet

During the latter part of the month, considerable trouble was experienced with the jet from the G-5 metal solution hold tank to the H-2 centrifuge. The trouble was finally traced to in-cell valves which were not opening properly. On 11-28-56, the unit was replaced and subsequent operation has been satisfactory.

c. J-5A Filter

During the past several months, the differential pressure across the filter (J-5A) in the vent system for air blanketed tanks has been gradually increasing. On 11-14-56, the filter appeared to be completely plugged. It was theorized that the plug was due to condensed water since the hot air purge had been inoperable due to the oily condition of the process air. Instrument air, which is presumably oil free, was subsequently tied into the purge line and the heater units reactivated. Hot air purging of the filter during the past 15 days has reduced the differential pressure to very near normal and future operation is expected to be satisfactory. Prior to their replacement

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this month, it is felt that the trouble experienced with the transfer jets from the H-4 and G-5 tanks materially aided in the plugging of the J-5A filter, as these jets were gassing out more frequently than normal.

d. Silver Reactor Regeneration

The A-3 and B-3 Silver Reactors were regenerated on 11-18-56 and 11-17-56 respectively. Although there was no evidence of an ^{131}I break through at the time of regeneration these steps were taken as a preventive measure.

e. D-12 Tower Plug

During the start up following the shutdown on 11-16-56 for a 10% acid flush of the columns, considerable trouble was experienced with the differential pressure across the D-12 waste concentrator tower. There were indications that the free vapor space in the tower was insufficient at high boil-up rates. When full backcycle was established, the required boil-up rate in D-12 was reduced and the tower differential pressure fell into an operable range even at high production rates. However, any dilution of the salt waste feed to D-12 upset the system and on 11-27-56, the tower was given a prolonged 10% nitric acid flush. The unit is now operating satisfactorily at a rate of 8 and the rates are being gradually increased to evaluate the effect of the 10% nitric flush.

f. 1B Let-Down Valve

A prohibitive leak in the 1BP let-down valve in the 1B partition column necessitated a new jumper installation on 11-27-56. The new jumper is currently operating satisfactorily.

g. F-1 Pump

On 11-23-56, the F-1 feed pump to the 2D partition column developed a leak of approximately 30 gallons/hour at the top seal. On 11-26-56, the leaking pump was replaced and subsequent operation has been satisfactory.

h. H-2 Weight Factor Jumper

During the H-2 centrifuge replacement on 10-6-56, the wall end of the weight factor jumper fell apart from corrosion. Since a replacement was not immediately available, the nozzle on H-2 was blanked. During the shutdown of 11-28-56, a newly fabricated jumper was installed and the H-2 weight factor instrument reactivated.

i. 1A Backcycle Jumper (1ABS)

The DP cell on the 1 ABS jumper, which signals the flow of back-

cycle to the 1A precycle column, drifted so far out of calibration during the month that the amount of backcycle to the 1A column could only be roughly estimated. On 11-28-56 a new 1 ABS jumper, with an improved DP cell, was installed and subsequent operation has been satisfactory.

j. 3DW Let-Down Valve

During a routine cell entry on 11-27-56, a small leak was observed around the 3DW let-down valve from the 3D column. On 11-28-56, a new 3DW jumper was installed and the leaking assembly was transferred to the 10W location as a part of the 10W backcycle program. The small leak at the 10W location will present no rework problems.

k. 10W Backcycle Installation

On 11-28-56, in-cell jumpers were installed whereby the 10W stream from the organic recovery column may be diverted to the D-14 backcycle concentrator. The 10W stream, containing small amounts of fission products, plutonium and uranium can now be recycled to the 1A and 1S precycle columns along with the concentrated ANN solution from the 2D column of the partition cycle. Recovery of the plutonium and uranium from the 10W stream, which was formerly directed to the D-13 waste concentrator, can now be effected in the 1A and 1S precycle columns. It is anticipated that the new installation will further reduce the waste losses in the Redox Operation.

B. Product and Material Handling Operation

1. Production and Operating Continuity

Product concentration in the 233-S Building continued uninterrupted through 11-27-56 when the facility was shut down for replacement of the L-3 recirculator and tube bundle. All UNH received from the 202-S Operation during the month met shipping specifications. A total of 1,869,000 pounds of UNH were received in storage and 2,347,000 pounds were shipped to the 224-U Building.

2. Equipment Experience

Numerous product leaks in the piping and equipment associated with the L-3 product concentrator in the 233-S Building necessitated a building shutdown for replacement of this equipment on 11-27-56. Employing the "plastic man" technique, the L-3 recirculator and tube bundle were successfully replaced and the installation was accomplished with excellent contamination control. The product concentration operation in the 233-S Building was again resumed on 11-29-56.

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Although the L-3 tube bundle had not failed at this time, the decision was made to replace it. Analytical results of the iron content in the final product solution during the period that this tube bundle had been in service indicated that a failure could be expected at any time.

During the 233-S Building shutdown mentioned above, the diaphragm operated valve and piping from the L-3 to the L-4 tank was also replaced. The original equipment was inadequate in several respects, namely; (1) deposits of solid material in this slow moving stream had resulted in frequent plugging of the line, and (2) the convolute type bellows in the diaphragm valve had failed on three occasions due to the continuous flexing. On the basis of a previous engineering study of these problems, the one-half inch piping was replaced with one inch piping and a one inch welded bellows type valve, which has been used with considerable success in the Purex Operation, was installed. In addition, the piping was rerouted to backflush the L-4 tank without draining the L-3 circulator and a mud leg was installed to collect the solids which have previously plugged this line. It is anticipated that the new installation will provide a more trouble free operation and improve the quality of the final product solution.

Rerouting of the waste stream from the D-8 tank was necessary this month because of plugs which developed in the two waste lines which have normally been used. Rerouting was accomplished by the fabrication and installation of one diversion box jumper and the manipulation of valves in the 241-SX diversion box so that a spare line could be used. Several unsuccessful attempts have been made to free the plugged lines. High pressure steam, high pressure water, and a four percent hot caustic solution under pressure have been tried. However, high radiation exposure levels and flushing equipment failures have made the job extremely difficult and to date unsuccessful. Further attempts at unplugging the lines will be made during the coming month.

With the abandonment of the head-end dichromate process in favor of permanganate treatment in the 202-S Building, the ozone generators were shut down on 11-16-56.

The cleanout and inspection program of the Redox Operation chemical storage tanks, which was begun during October, was continued this month. Cleanout and inspection of the ANN sample tank SS-114 was completed and the tank was found in good condition.

Excavation of a new chemical sewer pond was completed this month and water was diverted to it on 11-29-56.

3. Bismuth Phosphate Plant Standby and Lay-Away

a. Standby Operations

Pending receipt of a directive from the AEC to permanently lay-away the Bismuth Phosphate Plants, 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

Instrument lay-away in the 221-T Canyon Building is complete except for the weight factor instrument for the precipitating tank in each cell. These weight factor instruments will remain in service until the routine water flushes are discontinued. Canyon clean-up and decontamination is 75% complete. Operating gallery clean-up and lay-away 90% complete. Lay-away of the 224-T Concentration Building is essentially complete.

c. B Plant Lay-Away

Decontamination and lay-away of the 224-B Concentration Building is complete except for the F-10 cage and the blanking of the exhaust fans. Instrument lay-away in the 221-B Canyon Building is 40% complete and lay-away of other equipment has been initiated.

During the month, two tank cars of 60% nitric acid were transferred from the storage tanks in the 211 Tank Farm Area to other CPD components.

C. Maintenance Operation

1. Operating Continuity and Equipment Replacement

The facility operated until the 27th of the month before operations were interrupted due to an equipment failure. At this time the F-1 feed pump to the 2D partition column developed a leak in the top seal of sufficient magnitude that replacement was required. This replacement coincided with the 233-S Building shutdown on 11-27-56 which was made to replace the L-3 recirculator and tube bundle.

2. Inspection and Maintenance

A total of 239 inspection cards were issued during the month, of which 176 were returned by the respective foreman. This represents a considerable improvement over previous months and practically puts the Redox Operation inspection program on a current basis.

The inspection for creepage in the pipe lines for the pipe gallery to the cells was completed this month and found to be satisfactory. Lines with a creepage in excess of a quarter inch have been scheduled for a recheck in May 1957. All other lines

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are scheduled for reinspection in November, 1957.

The inert gas filters were again inspected and cleaned this month in order to evaluate the modifications to the inert gas system which were made during October. The upstream filter continued to show signs of rusting and efforts have been intensified toward resolving this problem.

The canyon tunnel door continued to operate satisfactorily throughout the month indicating that the four hundred pounds of lead, attached to the bottom of the door during October, has been successful in correcting the frequent hang-ups which have occurred in the past. A new replacement door which arrived during the month has been temporarily stored pending continued trouble free operation of this unit.

The extensive scale inspection and overhaul program, which was initiated in an effort to further reduce essential material consumption, was continued throughout the month. Several minor mal-functioning scales were discovered and corrections made. In two locations the dial faces on the scales were rotated 180 degrees to allow the operators to continually observe the dials while operating the control valves on the chemical addition lines.

Although intensive efforts are currently being made to improve the physical characteristics of the inert gas, maintenance of the inert gas rotameters and PRV's for blanketing pump and agitator seals continues to be a problem. The moisture and oily crud in the gas collects in the rotameters and PRV's, thus lowering the visibility of the rotameter floats and making the PRV's inoperable. Due to the frequent need for removing these units for cleaning, the original installations are now being rebuilt to facilitate easy removal.

The outboard bearing on the No. 2 compressor in the 202-S Building was replaced because the old bearing was running noisy and hot. Since it was felt that the frequent failures of this bearing were due to the tight fit of the outer bearing race with the end bell, the end bell was sent to the shop for re-machining. Since 11-7-56, no further trouble has been experienced with this unit.

Painting in the South Operating Gallery of the 202-S Building is now 80% complete. Completion of the work depends upon the satisfactory clean-up of contamination near the H-4 oxidizing tank.

Cleaning of the floor and application of "celastic" around the pipes and into the cracks in the floor of the Crane Maintenance Platform was completed this month. The old paint has been partially removed in preparation for the application of No. 74 Amercoat. This work is being done to correct the water leakage into the SWP change room.

D. Analytical Control Operation

1. Control Statistics

<u>Month</u>	<u>Samples</u>	<u>Determinations</u>
October	3994	10662
November	3397	9101

2. Building Maintenance

Principal 222-S Building maintenance included the repair of a leaking propane main cut-off valve, installation of new water lines and rearrangement of lines and valves on the mass spectrometer to prevent recurrence of damage to electrical components from a broken water line, completion of repairs to the 222-S Building roof, and removal of approximately five tons of blow sand from the 222-S retention basin by flushing.

3. Waste Disposal

7,654 gallons of 222-S Laboratory waste were transferred to the 202-S Building for storage. 4,150 gallons of low level 222-S Laboratory waste and 140,000 gallons of low level 300 Area Laboratory waste were sent to the 216-SL crib. 450,000 gallons of 222-S Building retention waste were transferred to the swamp.

4. Analytical Procedures

A new colorimetric procedure for determining aluminum was provided on request by the Process Chemistry Operation and is now in service for analysis of condensate samples.

5. Equipment Experience

Six days down time were experienced with the mass spectrometer during the month due to difficulty in the maintenance of electronic components.

E. Radiation Monitoring Operation

1. Radiation Occurrence Experience

Four radiation occurrences were reported during the month, reflecting some improvement over previous months. One of the occurrences resulted when water pressure was being used to unplug a process weight factor line. Contaminated water was subsequently bled back into the pipe gallery, contaminating the floor area to 250 mrads/hr and the employee to levels up to 3,000 c/m on his personal shoes and 500 c/m to both hands. Since this occurrence, a positive procedure has been established whereby a bleed-off system must be installed to relieve the pressure through a closed system. One radiation occurrence involved a Research and Engineering Operation employee and

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resulted in a localized overexposure of 6 rads to the employee's wrist. The cause of the localized overexposure was due to inadequate care in removing a 70 pound process sample cask. A routine survey of the cask after it was removed from the laboratory hood led to the discovery of high level spot contamination on the outside surface of the cask and further followup surveys revealed the high level spot of contamination measuring 180 rads/hr (by film dosimetry method) on the employee's shirt cuff. Although the action was prompt, the dose rate to the skin was at the rate of 50 mrad/second, giving an estimated 6 rads exposure in two minutes.

2. Personnel Exposure Experience

A localized process spill around the unused air lift circulator riser at the 2DW sample port was discovered on a routine process sample entry into the sample galleries. The Radiation Monitor Journeyman detected abnormal personnel dose rates in the normal sample gallery passageway and a followup investigation revealed a small pool of liquid around the subject spare riser. Dose rates up to 500 rads/hr at 8 inches made decontamination and inspection somewhat difficult. The cause of this process solution backup at this location has not yet been determined.

A review of the external exposure reports of the Hanford Laboratories Operation indicate the Redox Operation will not have any employees receive more than 2 r whole body gamma exposure in 1956. One employee, a radiation monitor, has received approximately 1.9 r to date and steps have been taken to control his exposure in December to keep his 1956 external exposure below 2 r. This record enables us to demonstrate that we can operate within the projected 2 r whole body gamma exposure limit and we will make this our goal in 1956 and 1957.

3. Other Contamination Experience

The L-3 tube bundle and recirculator in the 233-S Building was replaced under difficult working conditions with highly acceptable contamination control. The "plastic man" technique was used throughout the work and added significantly in the overall contamination control. The contamination spreads encountered were detected quickly and the progress of the work stopped until the contamination was either removed, or defined and controlled. Work in the 233-S Building greenhouse enclosure is certainly the most difficult that we encounter in the Redox Operation exceeding significantly the potential problems of the Redox crane.

F. Improvement Experience

1. Process and Equipment

It is anticipated that the installation of the LOW backcycling

procedure will further reduce the Redox Operation waste losses and thereby show an increase in the recovered SF material. Since the installation was only recently made (11-28-56), no actual data has been obtained. However, estimates of the annual savings this installation will produce range around \$55,000 based on current SF material costs.

The installation of Hoke type fine point needle valves in the methane gas lines to the ASP counting instruments in the 222-S Analytical Control Laboratory should improve the control on these instruments and effect a methane gas savings.

A permanent catwalk has now been installed at the canyon tunnel door, thus permitting the removal of a temporary scaffold which has constituted a potential safety hazard and housekeeping problem. The new catwalk will also facilitate any future tunnel door maintenance or repair.

2. Inventions and Discoveries

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

G. Events Influencing Costs

Spare parts valued at approximately \$7736 were excessed during the month. This consisted primarily of boron-carbide bearings, seals and other parts for the obsolete water sealed agitators. Included also in the above amount is \$1700 for jumper ET-28-E6 which was installed and not reordered because it is no longer a critical item. A continuous review is being made of spare parts items with the idea of making reductions without jeopardizing operating continuity.

A list of all spare parts for the Bismuth Phosphate Plants is now being circulated to other operations to determine if any parts should be transferred to their operation. Following this, all Bismuth Phosphate spare parts and spare equipment will be excessed. We assume that we will shortly receive a directive to permanently lay-away the Bismuth Phosphate Plants, but in the meantime we are going ahead with lay-away and excessing spare parts and equipment. A detail value of these spares is not yet available, but it is estimated that it will be in excess of \$100,000.

Significant reductions in the number of inspections required in our Preventive Maintenance Program were made this month. The frequency of annual inspections on 137 controllers was reduced from 4 to 3 and a potential savings of 1,644 manhours will be realized. Of the 249 motor inspections currently scheduled, the frequency of annual inspections has been reduced from 4 to 2, thus resulting in a savings of 208 manhours per year. Inspection frequencies were not altered on critical units or compressor motors.

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H. Plant Development and Expansion

1. Design Liaison, Construction Checking

CG-621 Redox Contamination Control

E-Cell Ozonization:

Operation of the generators and equipment was successful during the test program. Cancellation of the larger E-13 is planned as a result of the decision to abandon dichromate head-end treatment. Other components such as the gamma monitor will still be needed.

J-6 Precondenser:

A minor amount of lagging in the sample gallery and behind A panel is delaying the close out of this phase of the project. Completion is scheduled for December 14, 1956.

Contaminated Equipment Replacement:

The abandoning of the dichromate head-end treatment eliminated the necessity of replacing H-4, H-5, H-6 and J-1. Due to high cancellation costs the vessels ordered for this purpose will become spare equipment. With one exception we anticipate the need for these spares. This one exception which is the H-6 condenser we expect to use in another position.

Canyon Wash-Down Facility:

The time available to construction forces has been utilized by them the past two weeks. Completion by mid-December appears feasible.

P-89 Cask Car Decontamination Facility

As previously indicated a project proposal has been written and partially approved for a metal building on a railroad spur near the Redox Building, for decontamination of cask cars. The project was scoped and designed with a minimum of refinements in order to reduce costs and speed up design, approvals, and procurement. The building will accommodate a cask car or locomotive, and is to be equipped with steam, electric, and water lines as well as a waste water crib. The total cost estimate is \$82,000. To date, all approvals up to the Manager of the Chemical Processing Department and the AEC have been received.

P-114 Processing of AECL Fuel Elements

Through an informal directive from the AEC, the Redox Operation has been assigned the processing of irradiated fuel elements, purchased from Atomic Energy of Canada Ltd. This

material from the power reactor at Chalk River, Ont., ranging from 600 to 2,000 MWD/T, has been aged at least six months. The first half of 1957, when Redox commitments will be low, will be the time selected for holding out one dissolver from normal production to process the material. Ten foot long irradiated rods will be sheared to suitable length at Chalk River and delivered by rail in casks smaller than ours. Immediate problems are the design and fabrication of charging equipment for use when the material arrives. The slugs will be open at the ends from the shearing operation, thus presenting contamination problems in the transfer operation. Good control will necessarily have to be maintained.

P-77 Chemical Storage and Maintenance Equipment Facility

This project includes the erection of two buildings (a chemical storage building and a maintenance equipment building). Since the last report, a recheck was made of the radiation levels at the construction site of the proposed chemical storage building. Radiation levels from the 202-S Building UNH line were found high enough to eliminate work performance by a fixed price contractor. As a result, the work will necessarily have to be done by the Construction Operation and a re-estimate of the overall project is now being obtained.

CG-635 Stack Particulate Sampler

A dissolver shutdown on 10-30-56 afforded the opportunity to cut an aperture in the stack liner at the 50 foot level, for insertion of a stack gas sampler probe. Six hours were required to complete the work. It is to be noted that the stack is definitely pressurized at the 50 foot level since strong hexone fumes were detected when the opening was made. All water, steam and instrument air tie-ins have been made and the sampling building set in place at the 50 foot level. Remaining work consists of instrument installations and some pipe work.

CG-692 Modifications to 233-S Concentration Building

All approvals have been made and a directive from the AEC received. Detailed design is underway. Some changes in the auxiliary ventilation system design have been requested to reduce the number of filter changes in the 233-S Building exhaust. An additional request was made to include an airlock at the entry to the change room to eliminate ventilation disruptions when this door is opened.

I. Significant Reports Issued

None

III. ORGANIZATION AND PERSONNEL

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A. Force Summary**DECLASSIFIED**

<u>Component</u>	<u>Exempt</u>		<u>Other</u>		<u>Total</u>	
	<u>10-31</u>	<u>11-30</u>	<u>10-31</u>	<u>11-30</u>	<u>10-31</u>	<u>11-30</u>
General	2	2	1	1	3	3
Maintenance Oper.	10	10	55	55	65	65
Prod. & Mat'l						
Handling Oper.	12	12	70	70	82	82
Processing Oper.	7	7	76	76	83	83
Rad. Monitoring						
Oper.	5	5	22	22	27	27
Analytical Labor-						
atory Oper.	<u>17</u>	<u>16</u>	<u>74</u>	<u>72</u>	<u>91</u>	<u>88</u>
Totals	53	52	298	296	351	348

B. Safety

On 11-26-56, a medical treatment injury occurred as an operator in descending from the catwalk of a caustic car stepped onto a rubber hose laying on the ground. A fracture of one of the metatarsus bones of the right foot was suffered.

On 11-28-56, a near serious incident occurred when an operator was sprayed in the face with 4 percent caustic solution. This accident happened while the operator was attending a pump truck in the 241-S-151 diversion box area. The truck was being used to pump a hot 4 percent caustic solution into a plugged waste line. As the pressure built up in the line, a packing gland failed on the pump and the operator received a spray of caustic in the face. The accident is being investigated and the necessary corrective action will be taken to prevent future occurrences of similar incidents. There was no apparent injury resulting from this accident.

C. Security

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

D. Personnel Activities

An evening meeting of exempt personnel in the Radiation Monitoring Operation was held on 11-27-56 to discuss general staff items including policy matters within the organization. A member of the Instrument Development group of the Hanford Laboratories Operation also presented an interesting discussion on radiological instrumentation of the future.

Thirty-eight exempt personnel in the Redox Operation attended the

training course on the use of the new Non-Exempt Personnel Development form, as given by R. E. Toczek of the Personnel Development and Communications Operation. Two employees also attended the Professional Business Writing courses given by Dave Smith of the Relations & Utilities Operation, Personnel Development. Enrollment in these classes were limited.

Effective November 26, 1956, E. L. Kelley, M-1856-6735, and H. L. Maxfield, M-3906-6730, were loaned and assigned on a temporary task force basis estimated to last four to eight weeks, to the Uranium Oxide Operation, of the Finished Products Operation.

On 11-15-56, D. T. Crawley, M-12716-6762, transferred from the Redox Analytical Control Operation to the Research and Engineering Operation.

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CHEMICAL PROCESSING DEPARTMENT
FINISHED PRODUCTS OPERATION

NOVEMBER 1956

I RESPONSIBILITY

Effective November 26, start-up responsibility for the continuous calciners in the 224-UA Building was transferred from Process Engineering, Research & Engineering to Uranium Oxide Operation, Finished Products Operation.

II ACHIEVEMENT

A. Metal Finishing Operation

Fabrication activities progressed routinely during the entire month. Two separate types of model assemblies and unfabricated plutonium were produced. Production schedules were met or exceeded in all cases.

The 231 Building processed plutonium originating from the Redox Plant. This material was isolated and loaded to sample cans for shipment off-site as plutonium nitrate. Some minor difficulties were experienced with regards to erratic waste losses on random batches. These troubles which started in October and continued into this month were related to higher than standard iron concentration in the feed and leaking filters. All other phases of the operation progressed very satisfactory and production commitments were met without resorting to overtime.

B. Product Recovery Operation

In Recuplex a generally satisfactory production was achieved. The operating efficiency of the columns was somewhat lower than October but was compensated for by the fact that the thru-put rate was higher. The overall performance was somewhat marred by two failures of the G-10 pump (primary feed pump to the columns). These failures resulted in approximately five days of lost production time.

The slag and crucible dissolvers operated well during the month and almost equaled the record set in October.

The operation of Hoods 40 and 41 proceeded routinely.

Ventilation control was normal during the month.

C. Maintenance Operation - (Z)

In the RMA Line maintenance work was generally of a routine nature. The only severe jobs encountered were in Task IV where two furnace lifts were bent and the welds broken during operation. In this task heating elements on all furnaces failed during the month and were replaced with new elements which have been wound in the 234-5 maintenance shop. Various difficulties with the vacuum system in this task were also encountered but were corrected by month end.

C. Maintenance Operation - (Z) Cont'd.

In the Recuplex operation maintenance problems centered around two failures of the G-10 pump. Failures were due to improper alignment which is extremely hard to detect and correct since these pumps have to be overhauled in the regulated hoods in the 234-5 Building.

In the ventilation equipment three bearing failures were experienced during the month. Also several steam coils were replaced as it was not feasible to effect repairs by welding.

In the 272-Z Building 440 volt service was installed and connected to the rolling mill which is used by the Metallurgy group of the Hanford Laboratories.

D. Analytical Control Operation

Progress was made in the improvement of precision of analytical results on the chemical assay of plutonium. The results on one model were well within the control. Data is being collected on a second model.

The November commitment of finished pieces through final inspection was completed easily. Time lost to rejects amounted to only fifteen hours of instantaneous inspection time. This is a continuation of the downward trend started last month on rejections, moving from 8.0% to 5.3% of total pieces received.

Five of the plutonium nitrate samples were received from the Rocky Flats Plant as part of a sample exchange program between the two sites. Analytical results are not available at this time.

E. Metal Recovery Operation

An unusually large number of mechanical failures, combined with sharply reduced production rates of the Metal Removal Operation resulted in a net production which was somewhat less than 70% of goal for the month. In spite of the rather low production during the month first cycle was down only about twenty-four hours, and second cycle about thirty-six hours. Other shutdowns were averted by rate reductions on a carefully controlled basis.

The major mechanical difficulty was encountered on the section 8 intercycle concentration when the condensate line plugged and two pump failures occurred almost simultaneously. Repair work at this location required almost a week and a sustained shutdown was avoided when this section was temporarily bypassed. Other serious mechanical difficulties occurred when the 002-WR waste pump failed on two occasions.

The sharply curtailed feed supplies during the month resulted from cleanout activities in the tank farms. Uranium concentration of the feed stream dropped to a low of 20% of flow sheet and averaged about 35%, throwing very heavy loads on the concentration equipment to maintain minimum extraction rates.

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F. Metal Removal Operation

Sluicing operations were discontinued in two tanks due to low recovery rates and were resumed in two other tanks. Subsequent removal rates, augmented with supernate blends, were sufficient to maintain a 3-Ton to 5-Ton per day rate in the Metal Removal Operation. However, when the supernate supply was exhausted near month end metal removal operation could not maintain a feed rate sufficient for continued first cycle operation in the 221-U Building. It was necessary to build up a feed inventory before resuming operation.

The dual sluicing program was started in the 101-T tank late in the month.

Ditching of TBP non-cribbable scavenged waste has been completed in the second ditch of Phase III and the ditch has been backfilled. The third ditch has been filled to approximately one-half of capacity.

Approximately one million gallons of Bismuth Phosphate Plant first cycle scavenged waste was transferred to the #1-TR Crib.

The in-farm scavenging program has been suspended indefinitely due to lack of manpower.

G. Uranium Oxide Operation

Overall production of uranium oxide powder was 97.4% of commitment for the month. This production was composed of decomposition pot material (which was actually 122% of the amount committed) and continuous calciner material (which was only 54% of the amount committed).

Continuous calciner production was limited during the month by problems with off-gas filters and diaphragm valves, and by powder discharge star valves. Three calciners were operated about one-half of the month, intermittently while repairs and solutions to the problems were pursued. At month end the auxiliary equipment mentioned above had been repaired and modified sufficiently to permit calciner operation at reasonable rates. Three calciners were operating at month end and had operated continuously, except for about fifty calciner hours lost in four separate, short shutdowns. Operation techniques were initiated by which calciners can frequently be kept producing by on-line repair or replacement of auxiliary equipment. Task forces composed of additional supervision and engineering representatives were studying the troublesome equipment for permanent solution to the problems.

Pot room production was achieved through high on-line efficiency on both the electric and the gas fired pots, replacement of all pot lids to improve vacuum, and increase UNH feed concentration. The gas fired (Luckey) pot ignition system, although improved, has given trouble frequently throughout November.

H. Maintenance Operation - (U)

In the Tank Farms one Nagle sludge pump failed during the month. Work in the 241-S diversion box required excessive use of manpower due to extremely high radiation levels. One 002-WR Vault waste transfer pump failed and was replaced with a new pump which had been altered in an effort to reduce shaft whip.

In the 221-U canyon four pumps and one agitator failed during the month. Four pumps which had failed previously were repaired and made ready for service.

In the 224-U Building the ED-2 feed evaporator was regasketed. Two electric calcination pot overhauls were completed. All front lids on the electric calcination pots have been replaced with new lids. The de-entrainment section of gas fired pots #19 and #20 required regasketing, and the agitator on Pot #19 required lowering to proper clearance. Six pumps were repaired and one pump replaced. Extensive difficulties have been experienced in ignition of the gas fired calcinator pots due to cold weather and failure of the heat exchanger control elements.

In the 224-UA Building two new continuous calciners have required continuous maintenance on the off-gas filters, rotary valves, alarm boxes, calciner bearings, feed rotometers, feed point and vacuum and vent valves. One agitator was replaced due to contact with a thermo element.

I. Radiation Monitoring Operation

A marked improvement was noted in the number of radiation occurrences during November, when ten occurrences were documented in comparison to twenty in October and twenty-one in September. The breakdown of the occurrences among the different operations is as follows: Metal Finishing (2), Product Recovery (1), Maintenance (2) (0), Radiation Monitoring (1), Analytical Control (2), Metal Removal (1), Metal Recovery (0), Uranium Oxide (0), and Maintenance (U) (3).

Twelve cases of skin contamination occurred during the month of November as compared to sixteen cases in October and thirty-three in September. These were distributed seven to Z Plant, four to U Plant, and one to the Tank Farms. One Laboratory Assistant in the Analytical Control Operation was contaminated with a plutonium bearing TBP- CCl_4 solution. This again proved very difficult to decontaminate as it did in a similar but much more severe case in January when a Utility Operator contaminated his hand with this solution and was not completely decontaminated for approximately six weeks.

Strenuous decontamination efforts were necessary to keep the 224-UA Building in satisfactory condition. At month's end the contamination status of the UO_3 Plant, in general, was good.

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J. Improvement Experience

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1. Process Test 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 the Recuplex facility of the Product Recovery Operation, the reduction of dissolver coagulation time from six hours to three hours per batch has resulted in an approximate 25% increase in the capacity of these vessels.

In the Uranium Oxide Operation regasketing and pot lid replacement have caused major gains in pot room vacuums. Pot room production loss due to fuming is now considered to be under proper control.

In the UO_3 Operation the concentration of recovered nitric acid has been improved materially by revising the process requirements for absorber operation. Shippable acid was being produced at month end.

In the Uranium Oxide Operation the specific gravity of the feed to the calciners and pots has been increased to 2.50 - 2.55 with a resultant capacity increase of about 4% for the equipment.

3. Inventions and Discoveries

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

K. Events Influencing Cost

Overall cost in the Uranium Oxide Operation was increased during the month due to the high manpower required to maintain and repair the new continuous calciners during the start-up phase, the replacement of electric pot lids, maintenance work on the pot room fume system, and work on the pot deentrainment sections.

L. Plant Development and Expansion

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

The final project proposal for CG-691 requesting the balance of funds was approved by the AEC on 11-15-56.

Detailed design of equipment and hoods is ahead of schedule and is 80% complete.

L. Plant Development and Expansion (Cont'd.)

2. Project CG-613 - UO₃ Expansion

Performance tests are continuing on J, G, and H Cells. The tests revealed malfunctioning of several items of process equipment. Modifications to the rotary valves, rotary valve drives, and replacement of the GEMCO valves in the product unloading system are in progress. Frequent plugging of the off-gas filters has greatly reduced the calciner operating efficiency.

The scheduling of acceptance tests for Cells K, L, and M has been delayed pending the completion of necessary modifications to the cell equipment by Construction Operations.

Work on the maintenance facility is in progress.

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

Minor punch list items were completed and the project was signed out on November 21, 1956.

4. Project Proposal - Reduction of Air Borne Noxious Fumes - 224-U Building

Project proposal CG-712, Reduction of Air Borne Noxious Fumes, 224-U Building, was submitted to HDO-AEC on October 24, 1956, and has been forwarded to AEC - Washington for approval.

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

Phase II ditches have been completed and are being utilized by Chemical Processing Operations. Digging of the Phase III test wells by U.S.G.S. is in progress. The Phase III contract for the final six ditches has been awarded and work is expected to be underway during the week ending December 2, 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 existing facilities in the 221-U Building, as required following the lay-away of the 221-U Building.

7. Project Proposal - Nitric Acid Transfer Facilities

The draft of the revised proposal is currently being reviewed by Facilities Engineering Operation prior to routing for approval signatures.

8. Engineering Study - Supplemental Product Unloading Facilities - 224-U

Facility Engineering has submitted an Engineering design study of supplemental facilities for calciner pot unloading system in the 224-U Building. The study is being reviewed by Chemical Processing Operations for possible action.

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L. Plant Development and Expansion (Cont'd.)

9. Engineering Study - Redesign of Calciner Pot Agitator, Shafts, and Seals, 224-U Building

Prints of the redesigned calciner pot agitators, shafts and seals are being circulated for comment.

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

The results of studies concerning the 224-UA Building UO_3 product rework facilities by Facilities Engineering Operations have been submitted to Finished Products Operation for preparation of the Project Justification.

M. Reports Issued

HW-46801 - Study of PR and RC Can Transportation, Nov. 26, 1956, by L. M. Knights

HW-46523 - Sky Shine Problems at 200-E Trenches, by G. L. Helgeson

HW-48000 - Dosimetry of Plutonium Fabrication, by G. L. Helgeson

HW-46714 - Chemical Processing Department, Finished Products Operation, Z Plant Monthly Report, October 1956, by W. N. Mobley

III ORGANIZATION AND PERSONNEL

A. Organization Changes

In the Radiation Monitoring Operation, G. L. Helgeson, Analyst, Radiation Studies, was transferred to the Atomic Products Equipment Department at San Jose, California. The position of Analyst, Radiation Studies, is to remain vacant until it can be filled by an exempt employee made available by the shutdown of the Metal Recovery and Metal Removal Operations.

Five supervisors and four operators were temporarily added to the Uranium Oxide Operation to aid in the start-up problems of the new continuous calciners. Two of the supervisors are on loan from the Redox Operation. The other supervisors and the operators are on loan from other operations within the Finished Products Operation.

B. Force Summary

	<u>Exempt</u>		<u>Non-Exempt</u>		<u>Total</u>	
	<u>10-31-56</u>	<u>11-30-56</u>	<u>10-31-56</u>	<u>11-30-56</u>	<u>10-31-56</u>	<u>11-30-56</u>
General	2	2	1	1	3	3
Metal Finishing	6	6	51	50	57	56
Product Recovery	6	6(1)	49	47	55	53
Maintenance (Z)	8	8	44	44	52	52
Radiation Monitoring	7	6	28	28	35	34
Analytical	10	10	39	38	49	48
Metal Recovery	7	8(2)	58	57	65	65
Metal Removal	7	6	37	31	44	37
Uranium Oxide	6	12(3)	51	54(4)	57	66
Maintenance (U)	<u>10</u>	<u>9</u>	<u>82</u>	<u>83</u>	<u>92</u>	<u>92</u>
Total	69	73	440	433	509	506

- (1) Includes 1 Supervisor on loan from Research & Engineering
 (2) Includes 1 Supervisor on loan from Research & Engineering
 (3) Includes 1 Supervisor on loan from Product Recovery
 " 1 " " " " Metal Removal
 " 1 Engineer " " Maintenance (U)
 " 2 Supervisors " " Redox Operation
 (4) Includes 4 Process Operators on loan from Product Recovery

C. Safety Experience

No Disabling Injuries or Near-Serious Accidents occurred in the Finished Products Operation during the month. Seventeen (17) Medical Treatment Injuries were incurred as compared to twenty-eight (28) for October. Frequency rate decreased from 3.56 to 2.26.

D. Radiation Experience

All significant information relative to radiation experience in the Finished Products Operation is carried in Item II - I. (Radiation Monitoring Operation).

E. Security Experience

One security violation, which involved an open file, was experienced during the month.

F. Personnel Activities

Essentially all supervision attended training sessions relative to the new Non-Exempt Development Program during the month.

One Engineer from the Analytical Operation attended instruction classes relative to the IBM - 702 for three days

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F. Personnel Activities (Cont'd.)

Two Engineers from the Analytical Operation attended a course in Report Preparation.

In the Uranium Oxide Operation training in continuous calciner operation was stepped up with the temporary addition of four supervisors.

High seniority operators in the Metal Recovery and Metal Removal Operations are being rotated to other operations for three week periods for training in the jobs to which they will be assigned subsequent to shutdown.

G. Miscellaneous Items of Interest

Several members of the Congressional Sub-Committee on Appropriations, together with some Army and Navy personnel visited the Fabrication Facility on November 16, 1956.

W. M. Wright and G. F. Root of the Dow Chemical Company visited the Fabrication Facility November 26 to 30.

CHEMICAL PROCESSING DEPARTMENT
POWER AND GENERAL MAINTENANCE OPERATION

NOVEMBER, 1956

I. RESPONSIBILITY

The responsibilities of this Operation remained unchanged during the month.

II. ACHIEVEMENT

A. Operating Continuity

There were no outages of steam, water, or electrical services that affected continuity of operations of any prime facility.

B. Inspection, Maintenance, and Replacement

Modification of the K-2 pulse column, required for the scheduled November shutdown of the Purex facility, was completed, and the unit delivered to the job site.

Two Nagle pumps, required for operation of the tank farms, were successfully repaired and restored to service as spare equipment. These pumps, having failed while in service, were highly contaminated, which imposed certain limitations. It was essential, however, that repairs be completed since new units of this kind are presently not available.

Other services rendered the prime operating plants included the fabrication and/or making ready of several pieces of major equipment. Principal items were a cyclone separator, a prototype calcinator, a lead lined sulphuric mix tank, and eight process pumps.

The fabrication of 47 cell and diversion box pipe jumpers was necessary during the month as was the repair of one 5000 KVA generator, 8 electric motors and numerous machined items for process development groups.

Modifications to the 2701-E Building (200-E Badge House) were completed. Due to the recent influx of personnel, certain changes were deemed necessary to increase the traffic flow through the badge house at shift change. By rebuilding existing badge counters, installing a new badge cart, and rearranging the electric heaters, adequate room for an additional two lanes of foot traffic was provided.

Arrangements were completed for providing the Purex facility with a potential of 6000 GPM of raw water. Evidence accumulated in a previous test indicated that the one steam-driven 3000 GPM pump could not deliver an ample raw water supply to the Purex facility in case of an electrical outage. To correct this condition a 3000 GPM motor-driven raw water pump was connected to the emergency electrical circuit. Thus a maximum of 6000 GPM of raw water can be supplied the 202-A Building in case of an electrical outage.

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Emphasis continued to be placed on ridding the areas of the dense growth of Russian Thistle. All exclusion areas and approximately 500 acres of open ground have been cleared. Exclusion areas are currently having a soil sterilant applied which will curtail all growth. The presently dormant growth is being burned under strict SWP and fire control.

An excavation 500' long x 15' deep was completed in the 200-W area for use as a new dry waste burial trench. Location is west of and adjacent to the industrial burial grounds. At the 216-S crib area, 200-W, a 100' long x 25' deep excavation was necessary to provide additional percolation area.

C. Improvement Experience

Continued emphasis was placed on the development of a preventive maintenance program for all components of this Operation.

A program for the initiation of work sampling and related performance measurements in the 200-E and 200-W Shops was in effect at month end.

A comprehensive study of the Shops Engineering unit, with a view toward reorganization, was in progress throughout the month. Facilities Engineering personnel are currently engaged in making a study of Tool & Die Shop facilities. Appropriation Requests were being prepared at month end to expedite that additional equipment known to be required at this time.

To further enable the Shops Operation to meet customer demands, a proposal to establish one additional shift was submitted to CPD Union Relations personnel for study. Pending concurrence by HAMTC, the additional shift will become effective January 14, 1957.

III. ORGANIZATION & PERSONNEL

A. Force Summary

<u>Component</u>	<u>*Exempt</u>		<u>Other</u>		<u>Total</u>	
	<u>11-1</u>	<u>11-31</u>	<u>11-1</u>	<u>11-31</u>	<u>11-1</u>	<u>11-31</u>
P&GM General	1	1	0	0	1	1
Administration	6	6	9	10	15	16
Power	10	11	55	61	65	72
Shops	9	10	92	92	101	102
East General	8	9	65	74	73	83
West General	7	7	54	58	61	65
Plant Liaison	2	1	3	0	5	1
Totals	43	45	278	295	321	340

* Includes Level 3 Manager

B. Safety

There were no disabling injuries reported.

There was a total of 20 medical treatment cases tabulated which reflects an injury frequency rate of 4.25.

There were no incidents reported in which a lapse of radiation control occurred.

C. Personnel Activities

Power Operator training courses continued with four sessions being presented under the direction of a Water Specialist from the Irradiation Processing Department. The subject was Water Treatment.

Progress continued on the development of a training program that will make available to all exempt and non-exempt personnel in the Operation an opportunity for self-development during the year 1957.

A total of thirteen employee suggestions was received, three of which were considered as having possible application. Cash awards in the total amount of \$50.00 were presented to employees of suggestions previously submitted.

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CHEMICAL PROCESSING DEPARTMENT
FINANCIAL OPERATION

November, 1956

I. RESPONSIBILITY

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

II. ACHIEVEMENT

A. Product Cost

An analysis of the tributyl phosphate and ferrous ammonium sulphate inventory was initiated to determine utilization of these materials after the shut down of the Metal Recovery Facility. A review of field reports, budget forecasts and revised usage estimates indicate that the tributyl phosphate account will not be materially affected, but that a considerable balance of ferrous ammonium sulphate will remain in inventory at the completion of the Metal Recovery program. A continuing review of this account will be made in an effort to determine any factor(s), affecting the account, which might develop.

A study of the overheads assessed to and charges incurred by T and B Plants, while in standby status, and the expected effect on total costs should these facilities be placed in a complete shut down status is in process.

An analysis of Construction Engineering Operation charges for inspection services rendered indicated numerous discrepancies. A summary of the discrepancies noted was forwarded to the Manager - Finance, Construction Engineering Operation, with a request for review and correction.

As a result of experience gained in September, the more favorable cut off dates in October, and the use of ozomatic duplication, the operating cost statements, for October, were issued nine days earlier than the previous month.

The Chemical Processing Department operating budget, Mid-Year Review, was submitted to the Relations and Utilities Consolidation Operation during the month. Effort directed toward a detailed breakdown of this budget, in order to provide all levels of management with a control, is continuing.

B. Personnel Accounting

Effective December 1, 1956, employees who are participants in the General Electric Insurance Plan, and who work in the 100 or 200 Area, will pay premiums based on gross straight time salary which now will include isolation pay.

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This will increase an employee's personal premium approximately eight cents a week, or \$4.35 a year. For this small additional cost the employee will receive an increase in weekly sickness and accident benefits of \$4.64, to a maximum weekly benefit of \$85.00 a week. Life insurance coverage, for employees in the outer areas, will increase \$967.00.

Insurance certificates were distributed to all participants in the General Electric Insurance plan on November 30, 1956.

Statistics:

1. <u>Number of CPD Employees</u>	<u>Monthly</u>	<u>Weekly</u>	<u>Total</u>
Employees at Beginning of Month	432	1 459	1 891
Additions and Transfers In	0	34	34
Removals and Transfers Out	6	18	24
Transfers from Weekly to Monthly	1	(1)	0
Transfers from Monthly to Weekly	0	0	0
Employees at End of Month	427	1 474	1 901
2. <u>Overtime Payments During Month</u>	<u>November</u>	<u>October</u>	
Non-Exempt Employees	\$22 180.00	\$14 854.00	
Exempt Employees	3 879.00	4 659.00	
Total	\$26 059.00	\$19 513.00	
3. <u>Gross Payroll for Month</u>	<u>November</u>	<u>October</u>	
Monthly	\$303 428	\$315 359	
Weekly	863 454*	668 191**	
* Payment to non-exempt covers a five week period.			
** Payment to non-exempt covers a four week period.			
4. <u>Participation in Benefit Plans at Months End</u>	<u>November</u>	<u>October</u>	
	<u>Number</u>	<u>%</u>	<u>Number</u> <u>%</u>
Pension Plan	1 830	99.8	1 822 99.8
Insurance Plan - Personal Coverage	1 895	99.7	1 894 99.7
- Dependent Coverage	1 472	77.4	1 459 76.8
Stock Bonus Plan	1 063	55.9	1 040 54.9
Savings Plan	261	13.7	262 13.8
5. <u>Pension Plan</u>	<u>November</u>	<u>October</u>	
Number Retired	0	1	
Number who became eligible for participation	8	10	
Number who elected to participate	8	10	
Number who elected not to participate	0	0	
Replies not received	0	0	

6. <u>Insurance Claims</u>	<u>November</u>	<u>October</u>
Employee Life Insurance	0	0
Employee Accident and Health	84	62
Dependent Accident and Health	115	84
7. <u>Good Neighbor Fund</u>	<u>November</u>	<u>October</u>
Number participating	1 161	1 165
Percentage participating	61.1	61.6
8. <u>Suggestion Awards</u>	<u>November</u>	<u>October</u>
Number of Awards	28	63
Total Amount of Awards	\$380	\$778
9. <u>Preferential Rates</u>	<u>November</u>	<u>October</u>
Number added (eliminated)	0	3
Number currently in effect	59	59
10. <u>Number of Military Allowance Payments</u>	0	0

C. General Accounting

Project authorization for "Modification of Redox Plutonium Concentration Building - 233-S"(Project CG-692) for \$98,000 was received during the month.

Due to delay in obtaining qualified personnel the effective date for acceptance of responsibility for accounting for CPD construction projects has been postponed until January 1, 1957. Several new report forms have been designed to expedite the reporting on projects during the transition period. Two employees are presently spending full time in Construction Engineering Operation to obtain necessary training in project cost accumulation and reporting functions.

During November, the Plant Acquisition and Construction budget was completed and forwarded to Contract Administration. Work is now in progress on the FY 1959 Plant Acquisition and Construction Budget.

CPD revised depreciation allocation budget for FY 1957 has been completed and amounts to \$16,367,601. The breakdown by processes is: Purex \$5,295,503; Redox \$3,831,910; Fabrication \$970,121; Isolation \$173,106; TBP \$2,980,515; UO₃ \$453,754; Recuplex \$122,614; and Plant and Equipment Held for Future Use \$2,540,051.

Property Records for waste facilities are currently being reviewed in anticipation of the shut down of TBP and the possibility of an amortization rate revision for waste tank farms.

Custodian responsibility has been established for approximately 2,600 of the 2,850 movable equipment items assigned to CPD at the September 1, 1956 reorganization.

A correction tape has been forwarded to Computing for those items which could not be converted by the 702 machine according to cost code at the time of reorganization, but were manually segregated and given to CPD.

During the month HAPO Property Record Unit Catalogs were received and distributed to Property control custodians.

D. Auditing

An audit of 200 Areas S. S. Accountability Operation was started November 15, 1956. The audit will be executed jointly by the Chemical Processing Department Auditing Operation and the Contract Administration Operation of Relations and Utilities Operation.

Findings and recommendations developed in the audit of Motor Pool Operations were reviewed with appropriate supervision. The audit report covering this activity was prepared and is ready for reproduction and distribution.

An analysis of Appendix "B" to the Prime Contract which covers reimbursable items relating to salaries, travel expenses, and employee benefit plans was transmitted to CPD Level 3 Managers November 19, 1956.

Field work was completed on follow-ups to audits performed under the centralized Audit Section and reports covering the extent of compliance and the adaptability of recommendations to CPD Operations are in the preparation stage.

During the month, 135 purchase requisitions were reviewed to ascertain whether or not expenditures are reimbursable under the provisions of the Prime Contract.

E. Procedures

An invoice journal for all second class invoices was designed during the month. The new journal system will save typing time and speed the flow of month end closing data to the Cost Accumulation Operation.

A comprehensive study of the present work order system has been initiated. The object of this study will be to find a basis for streamlining and strengthening the present system.

A study of the possibility of adopting the Burroughs Sensimatic for the posting of project cost accumulations is now under way.

The CPD Financial Operation portion of the new telephone directory was drafted and submitted to printing.

F. Measurements

During the month the major activity centered around the preparation of the Chemical Processing Department goals for FY 1957 and FY 1958 and bogeys for FY 1957.

A general meeting of all HAPO Measurements Specialists was held November 20, 1956 in order to discuss the possible use of the ERI (Employee Relations Index) as a measurement at HAPO. Dr. Conant attended the meeting and brought forth several helpful suggestions as to means and methods of developing an employee relation measurement.

III. ORGANIZATION AND PERSONNELA. Force Summary

	<u>Exempt *</u>		<u>Other</u>		<u>Total</u>	
	<u>10-31-56</u>	<u>11-30-56</u>	<u>10-31-56</u>	<u>11-30-56</u>	<u>10-31-56</u>	<u>11-30-56</u>
Financial General	1	1	1	1	2	2
Gen. Accounting	6	6	16	17	22	23
General	1	1	2	2		
General Books	1	1	4	4		
Billing	1	1	3	2		
Property Acctg.	2	2	6	6		
Projects	1	1	1	3		
Product Cost	6	6	20	21	26	27
General	1	1	1	1		
Cost Accumulation	1	1	14	15		
Budgets	1	1	1	1		
Cost Analysis	2	2	0	1		
Inventories	1	1	1	1		
Measurements	1	1	1	1	2	2
Auditing	2	2	0	1	2	2
Procedures	1	1	0	0	1	1
Personnel Accounting	5	5	13	14	18	19
General	1	1	2	3		
Weekly Payroll	1	1	4	4		
Monthly Payroll	1	1	2	2		
Benefit Plans	1	1	4	4		
Records and Reports	1	1	1	1		
Total	<u>22</u>	<u>22</u>	<u>51</u>	<u>55</u>	<u>73</u>	<u>77</u>

* Includes Level 3 Manager.

B. Safety

A safety meeting, for all Financial Operation personnel, was held November 26, 1956.

One minor injury was experienced during the month.

C. Security

There were no security violations during the month.

D. Reports Issued

HW-46442	Secret	"Chemical Processing Department Essential Material Inventory and Consumption Report for Month of October, 1956" by S. R. Myers.
HW-46753	Secret	"October Unit Cost Information" by K. G. Grimm.
HW-46730-RD	Secret	"Chemical Processing Department Quarterly Savings and Improvement Report - July 1, 1956 Through September 30, 1956" by K. G. Grimm.

CHEMICAL PROCESSING DEPARTMENT
FACILITIES ENGINEERING OPERATION

November, 1956

I. RESPONSIBILITY

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

II. ACHIEVEMENTS

A. Purex Operation

Process Technology

Shortly after startup of the caustic scrubber iodine monitors, all three monitors (A Cell, B Cell, and F Cell) became plugged. Investigation revealed that caustic entrainment was plugging the jets in the lines downstream from the scrubbers. It was recommended that the gas flow rate be reduced from 1 SCFM to 1/2 SCFM to decrease entrainment. Following adoption of this recommendation, the A and B Cell monitors have operated satisfactorily. The F Cell (process vessel vent) monitor is still plugged, apparently in the sample suction line. More operating time will be required to establish optimum operating variables.

A preliminary economic comparison of ten alternative installations for processing 241-A Waste Tank Farm vapor was completed. The tentative direct cost estimate on the proposed installation is \$475,000. An engineering flow diagram covering this installation and a plot plan depicting the proposed condensate disposal lines which transfer the condensate from the surface condensers to the new 216-A-23 crib were completed.

Plant Engineering

Flowsheet changes in the acid recovery section of the Purex Plant have limited the capacity of the existing T-F5 acid fractionator to the equivalent of 20 tons per day instantaneous capacity. The in-canyon vessel has been in service for several months, and because of its limited corrosion life as an acid fractionator, replacement or maintenance is expected in the near future. In view of this, a study was made to determine the best design for a replacement unit. In this study the system was considered as a whole; that is, process acid is rectified in T-F5, combined with dissolver off-gas acid from Project CG-647, and fractionated to 60 per cent in the Vacuum Fractionator, T-U6. The

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proposed design for T-F5 and its condenser, E-F5, gives an equivalent instantaneous capacity of 33.3 tons per day for the overall system at 99 per cent acid recovery. In this scheme the T-F5 fractionator serves only as a rectifier recovering acid at approximately 25 1/2 weight per cent.

A program was prepared jointly with Purex Technology to evaluate the performance of the Purex Exhaust Ventilation Filter. This program has been made necessary by the increased activity discharging from the ventilation filter to the stack and the fallout of very low level activity at the base of the 291-A Stack. A thorough step-wise investigation was recommended to determine the source and magnitude of the problem.

The definition of scope for remote plutonium concentration equipment to be installed in the Purex L Cell was completed. The proposed design is adequate for an instantaneous capacity of 33.3 tons per day equivalent on the present flowsheet. With the exception of the concentrator tube bundle, which should have a life of approximately five years, the package is estimated to have a life of ten years. The cost of the remote equipment was estimated to be \$435,000 with no spare equipment, but including procurement of duplicate concentrator assemblies, one of stainless steel and one of titanium. Procurement of the stainless steel assembly is necessary to improve the completion date of the project schedule.

A preliminary drawing for the Purex Waste Crib Master Plan was completed and is ready for the addition of future development features as may be required for replacements of such cribs as 216-A-5, 216-A-6 and 216-A-9.

Centrifuges

Representatives of the Bird Centrifuge Company and the Reliance Electrical and Engineering Company visited here November 12 through 14 to consult with CPD personnel concerning the centrifuge failures which have occurred at Purex. As a result of this meeting, the following conclusions were reached regarding the motor failures:

1. The operating cycle has been changed to reduce the amount of motor heating by allowing for cooling runs and eliminating the 300 RPM operation during the "cake wash" cycle. During previous operation, the motors in "E" cell have been subjected to overheating because the cooling runs were eliminated during the cake wash cycle.
2. Operation at low speed can be obtained for the cake wash cycle by resistor revisions in the control circuit.

3. All replacement centrifuges should be equipped with motors assembled with the new aluminum bronze alloy rotors. This alloy developed by Reliance for high slip applications has three times the heat capacity of the original rotors which were made with a rather unconventional Dow metal alloy having $1\frac{1}{2}$ to 2 times the heat capacity of the more conventional aluminum alloy.
4. Reliance will make detailed calculations based on the current operating cycle to estimate temperatures for the original Dow metal rotor, as well as the new aluminum bronze rotors for comparison with previous calculations. These will be used as a basis for additional modification of the operating cycle, if necessary.

Shortly before the departure of the vendor representatives, it was established that the second centrifuge failure involved a drive head bearing failure. Plans are being made to decontaminate this machine, replace the drive-head, and further investigate the failed unit.

A requisition by Stores for a replacement centrifuge was reviewed and rewritten; the AEC is currently negotiating this procurement.

Improved Product Concentrator

Samples were taken from the weld area of the titanium tube bundle which was fabricated by HLO and leaked when tested. Hardness tests of the weld samples indicate gross pickup of interstitial impurities in the weld and heat-affected areas with resulting embrittlement. Refabrication of the tube bundles is delayed until additional tubing can be obtained to replace the cracked tubes.

Materials Engineering assistance was provided in the design of titanium equipment for improved product concentration equipment for the Purex Plant. Material recommendations were made and fabrication criteria prepared.

Laboratory tests of stainless steel in synthetic product concentrator solutions are being performed by Process Chemistry Operation. These tests indicate that corrosion rates of 304-L stainless steel and titanium in product concentrator solution are $1\frac{1}{2}$ - 2 times higher than corrosion rates in plain nitric acid of the same acidity.

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Essential Material Control Study

A procedure was developed at the request of Purex Operation to provide a comparison of actual chemical consumption with flow sheet specifications. The system was devised to require a minimum of additional clerical work yet spot any significant variations from standard.

Project Activity

CG-598 - Vacuum Acid Fractionator

Studies of the predicted condensate load on the 216-A-9 Crib and the expected crib capacity indicated that emergency facilities for the disposal of condensate from the vacuum fractionator may be required by August 1, 1957, at which time flow to the crib is expected to be approximately 300 gallons per minute. The following alternates were considered to alleviate the anticipated problem:

1. Provide an overflow line from the present crib together with a disposal pond. Cost - \$20,000
2. Provide additional cribs. Minimum cost - \$80,000
3. Replace the contact condenser with a surface condenser.

The first alternate is undesirable because of cost and potential contamination problems. The second alternate is undesirable because of cost and because of the fact that rapid ground water movement under the 200-E Area may require that all Purex cribs be relocated from the 200-E Area plateau at some time in the future. The third alternate is attractive from a long range viewpoint, since condensate flow would be only about 24 gallons per minute at maximum fractionator capacity. Comparative studies are in progress on installation of: (1) a new surface condenser designed for optimum utilization of raw cooling water; or (2) an existing unused surface condenser originally purchased for the 241-A Tank Farm. Preliminary calculations indicate the new condenser would require about 500 gallons per minute of cooling water, while the existing condenser would require approximately 1,000 gallons per minute.

CG-644 - Silica Gel Facility

A detailed review of the design package prepared by the Architect-Engineer, W. C. Nickum & Sons, was completed, and a list of comments forwarded to the local AEC. Revision of the design package by the Architect-Engineer in accordance with these comments and another review for approval are expected to require an additional three months.

A revised project proposal (Revision 3) which requests extension of design completion from September 30, 1956, to March 1, 1957, is nearing completion of approvals. It is expected to be transmitted to the Commission early in December.

CA-683, Revision 1 - Relocation of Cooling Water Swamp

The scope document was received on November 6, 1956. The comment issue of the project proposal was issued and all comments have been incorporated. Final schedules and estimates are being prepared.

CA-688 - Additional Waste Disposal Facilities, BC Crib Area

A letter was issued on November 8 requesting authorization of General Electric to perform Title III inspection and management of the construction work on Phase III of this project. Additional funds in the amount of \$3,800 were requested, bringing the total General Electric funds to \$25,000 which was the amount originally estimated for the Company portion of the work. This letter was transmitted to the Commission on November 30, 1956.

P-33360 - Additional Facilities for Tank Farm Vapor Wastes (Design Only)

This project proposal is in approval. Justification is being based on the provision of surface condensers, West Area crib, and associated facilities at a much smaller capital investment than would be required for additional cribs in West Area and a new high capacity cross-country line with associated pumping facilities. It is expected that this project proposal will have all internal approvals by mid-December.

P-33334 - 241-AX Waste Tank Farm (Design Only)

The Plant and Equipment Analysis Report has been completed and is being routed for approval. Comments have been completed and approvals will start on the project proposal early in December.

E-33395 - L-Cell Equipment Replacement

The preliminary project proposal for design and advance procurement of \$190,000 for improved, remotely-maintained L-cell equipment is currently routing for approval signatures.

Process Design and Development is continuing a study on an improved contact-maintained package and it is to be pointed out in the proposal that the adoption on this alternate at a later date is a possibility depending on comparative costs.

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DECLASSIFIED**B. Redox Operation**

The study to evaluate the advisability of providing additional slug storage at Redox has been completed and the final report HW-46780 issued. It was recommended that the project be deferred since it appears that no difficulties will be encountered in achieving Phase III capacity in the dissolvers.

Process Technology

A survey of the pump failures since the start-up of the Redox Plant has been completed. The purpose of this survey was to summarize the apparent cause of failure of the various types of pumps. It should be noted that the cause of failure of any unit can only be surmised since it has not been practicable to have them decontaminated for close inspection.

Records on 23 failed Peerless one stage regenerative turbine pumps show that their average life was 17.5 months. Four units still in service have accumulated 26 months average life. No account is taken of failures that occurred during construction and cold runs because these units were repaired and returned to service. Records of 16 deep well turbine pumps that have failed show an average life of 5.1 months. Ten units still in service have accumulated 8.5 months per pump. By way of comparison, the first 16 failures of one stage Peerless pumps were after an average life of 11 months.

Cause of failure of six of the Peerless one stage regenerative turbine units must be listed as unknown at present. Seven failures were due to lost capacity presumably caused by worn parts. Nine failures were due to mechanical seizure or overload sometimes followed by evidence of a broken shaft or coupling. Some of these failures were accompanied by excessive water seal leakage so that it is presumed that most of them were due to seal break-up which either jammed the shaft or broke it. Other possible causes of mechanical seizures might be bad motor bearings or introduction of solids into the pump impeller. One pump was lost due to a leaking gasket at the vessel flange.

Eight of the deep well turbine pumps that have failed were made by Peerless Pump Company and eight by Johnston Pump Company. Nine of the failures were from liquid seal leakage, five were from mechanical seizures and two were electrical. Changes have been made in the vicinity of the seal in an effort to improve its performance but it is too early to determine the effectiveness of these changes.

A diagrammatic "scope" sketch of a possible experimental pump, having bearings lubricated from an external source, has been prepared. It

is planned to discuss the problems involved with the various pump manufacturers and explore the possibility of procuring a prototype pump for experiment and further development.

Project Activity

CG-621 - Redox Contamination Control Facilities

The plugging problems in the Savannah River vessel vent system caustic scrubber and in the Redox H5 caustic scrubber were reviewed with respect to the new caustic scrubbers, H5 and T3, presently in procurement, to determine if design changes to correct this problem would be in order. It was concluded that any H5 or T3 plugging would occur locally within the vapor inlet nozzle since stoichiometric considerations did not indicate the possibility of crystallization of the sodium carbonate or sodium bicarbonate under normal operating conditions elsewhere in the scrubbers. Installation of a liquid deflector above the vapor inlet nozzle was considered to be the most feasible solution to this problem; however, since plugs in the H5 scrubber have been removed in the past without difficulty, it was decided that corrective action should be limited to new installations where such action would be relatively inexpensive and convenient. Accordingly, installation of the deflector was recommended for the H5 scrubber presently being fabricated under Project CG-621 and for any future caustic scrubbers. The new T3 Caustic Scrubber and the existing H5 vessels were not recommended for change due to the difficulty involved.

CG-643 - Capacity Increase - Phase III

Design Instruction No. 7, covering additional inert gas capacity, has been approved by the AEC. The estimated design cost is \$11,500.

The completion date for design is eleven weeks after authorization. The estimated total project cost is \$149,500.

CG-621 - Contamination Control Facilities

A project proposal revision is in preparation--reducing the scope, cost estimate, and giving revised justification. This change was discussed with representatives of HOO-AEC on November 15, 1956. Our vessel order is being cancelled in keeping with the revision.

CG-624 - Railroad Tunnel Ventilation Barrier

This project was scheduled for completion on December 1, 1956. This date was not met. A project proposal is in process.

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Field work is 95 per cent complete. It is estimated that about 80 man days of effort remain to complete the job.

Working time limits have been from 15 minutes to two hours under SWP controls. Major factors contributing to the schedule extension are: (1) short-time limits, (2) economical manpower scheduling, (3) scheduling problems in coordinating with plant operations; and (4) unanticipated other demands on Construction Operation manpower.

Spare Dissolver of Improved Design

An appropriation request has been forwarded to HAPO General Manager after being studied for several weeks in Process Design and Development Operation.

P-33359 - Cask Car Decontamination Facilities

This project proposal has been approved internally. It is being held pending completion of the Irradiation Processing Department study (P-33358).

E-33380 - Transfer Facilities for Redox Non-Boiling Wastes

The Plant and Equipment Analysis Report, which was rewritten on October 31, was approved by the HAPO General Manager on November 16, 1956. Approvals have been obtained from Managers of Facilities Engineering and Research and Engineering Operations on the project proposal. It was forwarded to the Manager of Financial Operation for approval on November 26, 1956.

C. Finished Products Operation - Z Plant

Chemical Processing and Reduction

A study to determine the economics associated with installation of the CG-691 process hood into a permanent location in the RG Line area was completed. No significant economic advantage was apparent even though the second button line were authorized in the immediate future; the high cost of a temporary conveyor to tie this hood into the RMA Line would completely off-set the cost of relocating the hood to a permanent location.

Definitive scoping studies on a second button line were initiated to serve as a basis for project proposal action in pursuit of final design authorization.

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DECLASSIFIEDProject ActivityCG-691 - Continuous Task I and Task II

It is estimated that the detail design of this project is about 80 per cent complete at the end of the month. A total of 81 drawings have been approved and issued to the field with 153 drawings as the estimated total requirements.

Directive HW-394, Modification 1, dated November 15, 1956, authorized General Electric additional funds of \$160,000 for design, procurement, and preparation for installation of equipment. Total funds now authorized are \$335,000. Although not all points of this directive modification were in agreement with the project proposal recommendations, the directive was accepted. Washington approval of total project funds is currently being awaited. These funds are required in January.

Twenty-five purchase requisitions totaling approximately \$50,000 were issued by Design during the month. These requisitions were for instrument panels, agitators, conveyors, and miscellaneous mechanical and electrical equipment. Bids for diaphragm-operated valves and for the platinum liners for the fluorinator tubes were received and are being evaluated.

Critical mass considerations on equipment inside hoods H-9A and H-9B were evaluated and the necessary corrective steps taken. It was necessary to relocate equipment and piping inside the hood which caused a temporary delay in obtaining approved equipment drawings.

A-00427 - Conversion of Recuplex to a Manufacturing Facility

The justification for the Task I filtrate concentrator, which represents about 40 per cent of the project cost, has required considerable analysis. Cost and capacity data has been accumulated and incorporated into the project proposal justification section. Agreement has been reached among the major signatories, and it is expected that this project proposal will be routed for approvals by mid-December.

UO₃ Plant

Design studies have been started to re-evaluate the various components of the nitric acid recovery system and to analyze the capacity of the continuous calciner off-gas system.

Plant Engineering

The new designs of the agitator shafts, seals, and bearings on the existing batch pot calciners are presently being studied.

Project Activity

CG-613

The scope work on providing deluge water to the UNH evaporators was completed and transmitted to Project Engineering. Close design field liaison was maintained throughout the month to follow the startup of the continuous calciners. A task force was established with the objective of obtaining more precise data on the problems being encountered with the filters in the off-gas system and to develop solutions to these problems. Preliminary designs are being prepared by Mechanical Design and Development to install additional unloading hoppers at each of the continuous calciners to permit batch unloading of powder in the event that the current problems with rotary valves cannot be resolved.

Actual work progress on this project is as follows:

Known critical start-up work in G. H, and J Cells has been completed. Several clean-up items of work remain to be done.

Construction work on K. L, and H Cells is scheduled for completion with exceptions in December.

Major known start-up problems remaining are: (1) frequent plugging of off-gas filter systems, (2) mechanical reliability of rotary valves under the calciner, (3) high-pressure drop across certain product handling valves, and (4) filtration of feed streams. All of these are being actively pursued.

About 700 calciner-hours of operation had been achieved in G. H, and J Cells at the month's end.

D. Research and Development

An attempt to obtain additional photographs of the Waste Storage Tank, TK-104U, which has evidenced failure, was unsuccessful due to fogging of the camera lens by the vapor in the tank. Measurements will be taken to determine the profile of the tank bottom, and a leak test will be made.

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A proposal from Amman and Whitney, Consulting Engineers, for their structural review of three alternative HAPO waste tank designs was reviewed and rejected. The consultant's base fee would be \$10,500. Travel and per diem allowances and consulting fees away from the home office would be additional. The consultant would complete the work within three months. Purchasing and Stores was appraised of the intent of the proposed contract, apparently misunderstood by Amman and Whitney, that structural evaluations were to be made on the two proposed tank designs for the 241-AX Tank Farm only; the third design was of existing 241-A tanks which was included for a comparative cost estimate, not for structural evaluation. Amman and Whitney will be contacted and necessary contractual changes will be made to clarify this point and obtain a new proposal. The revised proposal will be less than \$10,000.

The program to determine corrosion resistance of materials with potential application as waste storage tank liners is under immediate consideration. Investigations of means for extending the present corrosion testing methods to new waste tanks have been started.

An outline has been prepared for a hazards study of waste storage facilities to evaluate the reliability of existing facilities. The outline will include economic appraisals of alterations or additions to existing facilities to insure maximum safety for the sustained storage of self-concentrating radio-active wastes. A leak detection program is being initiated to quantify the term "significant leak" so that leak detection methods may be analyzed to insure the detection of leaks in waste storage tanks before the quantity is sufficient to affect the surrounding tank area.

A report HW-47009 proposing a number of methods for reducing the cost of radioactive contact maintenance, while at the same time increasing the overall safety and operating efficiency of the processes, was issued. New adaptations of improved plastic applications, revisions in the design of process equipment and the repairing for greater re-use of contaminated equipment are among the recommended approaches. An initial aim of the suggested development work is a ten percent reduction in the cost of radioactive contact maintenance. As a long range objective, the reduction of such costs to one-half of their present value is being considered.

Although the overall improvement of contamination barriers is included in the total program for reducing maintenance cost of contaminated equipment, a specific proposal for improving process enclosure design was developed for possible application to the RMC line in the Z Plant. This improved enclosure combines advantages of the conventional process hood with those of process cells and is referred to as a hood cell. A characteristic feature of the proposed hood cell is an

internal aisle with an overhead monorail permitting work on all enclosed equipment through plastic suits. Convenient access to and ease in repair or replacement of all enclosed equipment provide the advantages of a combined process area and maintenance shop. A report HW-47022 describing the hood cell and presently the advantages of this type enclosure for simplifying the perennial problem of revisions to existing equipment was issued. This feature makes the hood cell construction particularly attractive in any field where specification changes and aggressive competition are major factors.

Problems of in-line sampling were investigated further during the month. The Redox gamma monitors are inoperative a large part of the time due to valve trouble. Recommendations have been made for temporarily blanking off the top-works of certain solenoid valves, and for replacement on a trial basis with new components obtained by HLO Equipment Development. Plugging from crystallization is a severe problem in Redox streams. It is planned to omit the degassers and valves in the CG-686 instruments. Some work has been done in the laboratory on a simplified form of degasser, and further development will be continued. Work has been initiated on the design of a pneumatically operated plug valve. The use of this type valve is questionable, but the performance of a special design in alpha monitors has been satisfactory over the past year. As there is no other proven valve available, it is considered worthwhile to further investigate the use of this type valve.

Further tests have been made by the laboratory on steam connector gaskets furnished by Johns Mansville Co. and the Crane Packing Co. Results are sufficient to provide new data for inclusion in vendor's drawings and purchase specifications to better define the material required.

Advance Engineering

A letter was prepared and transmitted to Project Engineering to serve as the basis for a project proposal for performing scope and preliminary engineering on modifying one of the bismuth phosphate plants for the recovery of fission products from the Purex waste streams.

Plant and Equipment Engineering

Analysis of Huey Test Data

Compiled results of Huey tests performed on stainless steel procured during past years are being studied to provide additional data for improvement of materials procurement specifications. Results of a statistical evaluation of Huey test data representing several thousand tests are expected during the next sixty days.

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Central Control Systems Study**DECLASSIFIED**

Rough draft of an appraisal report of Central Control Systems in CPD has been completed. The purpose of the report is to evaluate some of the newest control techniques used in the general chemical industry and their possible use in CPD. A brief discussion of central control evolution and implementation is also included.

Remote Operated Bulldozer

Preliminary work has been done to scope a remote operated bulldozer for contaminated equipment burial work. Proposals will be developed for both radio and remote cable operated units. Contacts have been made to obtain information from vendors of remote radio equipment.

Equipment Examination

An attempt was made to examine the failed concentrator from the Redox product concentration facility. It was not possible to obtain satisfactory visual examination without interfering with replacement operations. Redox Operation has been requested to store the failed equipment until decontamination and examination facilities can be prepared.

III. ORGANIZATION AND PERSONNELA. Organization

W. T. Kattner, Senior Engineer, terminated 11-30-56, to accept employment elsewhere.

L. W. Finch was added to Facilities Planning Project Operation 11-12-56.

Force Summary

	<u>Exempt</u>	<u>Non-Exempt</u>	<u>Total</u>
Management	3	2	5
Engineering Administration Operation	7	6	13
Maintenance & Industrial Engineering	18	14	32
Project Engineering Operation	23	5	28
Project Design and Development	<u>27</u>	<u>5</u>	<u>32</u>
Total	78	32	110

B. Safety

An active safety program is being conducted by the individual Engineering Operations. All aspects of personnel safety are being considered; safety rules, evacuation problems, radiation hazards and security matters have been discussed in our meetings by members of the Department who are thoroughly informed on these subjects. The discussions have proved interesting and were well received by those in attendance.

C. Security

There were no security violations during the month of November.

D. Personnel Activities

Eighteen Supervisors have attended the program outlining the new appraisal method to be used for non-exempt people.

Exempt personnel are being scheduled to attend the Professional Business.

E. Reports

HW-47009, "Presentation of a Program for Improving Radioactive Contact Maintenance," by H. A. Moulthrop, November 29, 1956.

HW-47011, "Replacement Plutonium Concentration Equipment - Purex, Definition of Scope," by J. R. LaRiviere and L. L. Zahn, November 30, 1956.

HW-47022, "Use of Hood Cells for Enclosing Low Level Radiation Processes," by H. A. Moulthrop, November 28, 1956.

Letter, J. B. Fecht from C. F. Yuenger, "CG-691, Proposed Relocation of Hood, H-9-B", November 6, 1956.

Letter, R. H. Silletto from E. O. Swain, "Project Proposal for Advanced Design, Recovery of Fission Products," November 9, 1956.

Letter, O. C. Schroeder from E. R. Irish and L. R. Michels, "Proposed Test Program for the Ventilation Exhaust Filter and In-Canyon Process Filters," November 14, 1956.

Letter, M. K. Harmon from L. L. Zahn, "Redox Contamination Control Facility - Project CG-621, Design Revision to Caustic Scrubber, H-5," November 16, 1956.

HW-46432 Facilities Engineering Operation Monthly Report 11-8-56.

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Letter W. P. Ingalls from R. A. Kennedy, "Redox Pump Performance," November 20, 1956.

Letter R. H. Silletto from E. O. Swain, "Additional Information Concerning the Project Proposal for Advanced Design of Fission Product Recovery Facilities," November 21, 1956.

HW-46780 "Slug Storage at Redox," G. B. Smyth, November 20, 1956.

CPD-6 "Appropriation Request, Special Recovery Equipment for Redox."

Report "Semimonthly Status Report, Facilities Engineering, Chemical Processing Department," November 14, 1956.

Report "Semimonthly Status Report, Facilities Engineering, Chemical Processing Department," November 30, 1956.

F. 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>
R. F. Corlett	Automatic Reactor Tube Extraction Machine	November 28, 1956
C. R. Anderson	Variegated Filter Media for Fission Product Recovery	November 20, 1956
C. R. Anderson	Filtering Process for Fission Product Recovery	November 20, 1956
C. R. Anderson	A Filter Cartridge and Container Tube for Recovery of Fission Products	November 20, 1956

<u>Inventor</u>	<u>Subject</u>	<u>Report of Invention</u>
C. R. Anderson	An Irradiation Facility with a Fixed Source Chamber Combined With Removable Material Handling Equipment	November 20, 1956
C. R. Anderson	Process of Trapping Fission Product Containing Precipitates from Separations Process Wastes so as to Increase Source Intensity	November 20, 1956

G. Trips

None

Visitors

W. T. Short, Manager, Methods & Time Standards Services Section,
Schenectady, New York on November 19, 1956.

The following personnel of the Bird Machinery Company and the Reliance
Electrical and Engineering Company were on the project November 12,
13 and 14 for the purpose of investigating Purex centrifuge motor and
drive head assemblies:

Mr. George Sherrerd - Bird Machinery Company
Mr. R. O. Gee - Reliance Electrical Company
Mr. J. G. Rosswog - Reliance Electrical Company

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CHEMICAL PROCESSING DEPARTMENT
RESEARCH AND ENGINEERING OPERATION

November, 1956

ADVANCE PROCESS DEVELOPMENT - R.E. TOMLINSON

Fission Product Isolation

The scope of the development effort was somewhat modified as the study plans were crystallized. The "firm" chemical flowsheet forming the basis of the 221-B conversion studies is to provide for the separate isolation of cesium and gross fission products, including uranium and plutonium. Flowsheet steps are to be incorporated for the recovery and partial decontamination for recycle of uranium and plutonium if these flowsheet steps can be made simple enough to be economically attractive. The separation and packaging of the products is to be developed along two lines. As originally proposed, the solids would be separated by centrifugation, calcined, and packaged as a compact, chemically stable powder. An alternate approach involves the separation of the solids by filtration. The filter unit might be assembled coaxially in a pipe, and the entire unit sealed after the filtered material had been dried at a high temperature. The development program is estimated to require about eighteen months to complete.

PUREX PROCESS TECHNOLOGY - ER IrishSolvent Extraction

Irradiated uranium with an exposure rate of 3.2 to 6.0 MW/T (715 to 765 MWD/T) and cooling times of 111 to 97 days was processed during the month. The overall plant processing rate was increased from a capacity factor (CF) of 1.44 to 1.92 but had to be reduced to a plutonium processing rate of 1.44 because of 234-5 Building capacity limitations. However, uranium processing was maintained at a CF = 1.92 and later increased to a CF = 2.16 by blending uranium product with the virgin feed. Upon conclusion of the capacity test, the overall rate was dropped to a CF = 1.44 for the remainder of the operating period which was concluded on November 21. Typical performance for the solvent extraction cycles during the operating period is tabulated below:

Cycle	Log Gamma Decontamination Factor, dF		Per Cent Waste Loss	
	Uranium	Plutonium	Uranium	Plutonium
Precycle	3.4	3.4	--	0.22
Partition	2.1	1.7	--	0.34 (IBU 0.04)
Final	1.1	3.1	.05	0.12
Overall	6.6	8.2	--	0.72

Operation of the plant at the higher capacities was smooth, and a further increase up to a CF = 2.4 appeared possible with the IBXF valve and the IA Column limiting at this capacity. In general, rate increases caused no more than normal disturbance of the process. The Partition Cycle seemed to be the most sensitive to the rate changes with both the IA and the IBX Columns responsible for passing activity bursts downstream. Although the gamma activity in the plutonium product remained normal while operating at the higher processing rates, a temporary activity increase of two to four-fold resulted from column upsets during the processing rate reduction and from increased gamma activity in the solvent. The uranium produced during the month was two to four-fold above gamma specifications and required silica gel treatment.

Two solvent extraction flowsheet changes were tested during the month. Inconclusive results were obtained from an increase in HAF temperature from 40° to 70°C; however, some improvement in the HA Column stability and decontamination may have resulted from operation at the higher temperatures.

The IC Column L/V was reduced from 1.2 to 0.96 as the ICX temperature was increased from 30° to 55°C. No increase in pulse frequency was required to maintain the ICW uranium loss at 0.03 per cent. This reduction in ICX will increase the processing capacity of both the IC Column and the ICU Concentrator approximately twenty per cent.

During the plant shutdown the 2D Column was decontaminated and replaced with the spare column modified to operate organic continuous. The extraction cartridge consists of 0.1675-in. hole, 23 per cent free area, stainless steel nozzle plates on 2-inch spacing while the "zebra" scrub cartridge is composed of alternate pairs of 0.085-in. hole, 21 per cent free area, stainless steel sieve plates and 0.1675-in. hole, 23 per cent free area fluorothene plates all on 1-inch spacing.

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Louver plates of 23 and 16 per cent free area are installed in the proper locations in the extraction and scrub sections, respectively.

Plutonium Concentration

When the production rate was increased to a capacity factor of 1.92, the differential pressure as measured across the Plutonium Stripper, T-L3, packed section (referenced to the condenser vent header) became excessive necessitating an L Cell Flowsheet change in order to prevent pressurizing T-L3.

The new flowsheet is as follows:

<u>Stream</u>	<u>Flows(a)</u>	<u>M HNO₃</u>	<u>Pu g./l.(b)</u>
2BX	7.0	0.01	-
2BP	7.0	0.22	3.9
2BP-HNO ₃	0.2	13.0	-
PSF	7.2	0.6	3.6
PSC	4.4	0.98	5.9
IPC	0.2	6.0	150
IPD	4.2	0.7	-

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

Operation on the revised flowsheet was good at both a capacity factor of 1.92 and later 1.44. Cause of the high E-L3 differential pressure has been identified as inadequate drainage from the Plutonium Concentrator Condenser, E-L5. Inasmuch as the present capacity limitation of about 2.0 is not detrimental to plant operation, modification to the condenser piping will be delayed until later. A revised L Cell Flowsheet for use with the currently proposed remote package which utilizes live steam stripping was documented in HW-47033, "Purex Plant L Cell Plutonium Concentration Revised Flowsheet."

Following the shutdown the Plutonium Stripper and Concentrator were acid flushed to permit contact maintenance in the cell. Approximately 25 per cent of a normal day's production of plutonium was removed by flushing, thus indicating that some deposition of plutonium is still occurring.

Hydrostatic testing of the Plutonium Concentrator, E-L4, tube bundle indicated a small leak in the 309 SCb-heat treated bundle after 55 days of service. Although the life of this bundle was comparable to the three previous 304-L bundles (66, 60, 30 days), the iron contamination in the product remained essentially constant throughout the life of the bundle instead of increasing sharply just prior to failure as was the case with each of the 304-L bundles. The tentative conclusion drawn from this observation is that the failure of the 309-SCb bundle was a weld failure whereas the 304-L bundles failed because of general corrosion. A new 309-SCb-heat treated bundle was installed because the fabrication of a satisfactory titanium tube bundle is still not completed.

Prototypical Ion Exchange Facility

Installation of the process hoods, XAF slab tank, ion exchange contactors, process pumps, non-process electrical installations, and influent piping to the head

tanks was completed during the month. Pump and process piping installations are now in progress. Approximately seventy per cent of the estimated overall project cost has been expended to date.

Organic Treatment

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

Organic Treatment System	<u>Organic Activity, uc/gal.</u>				Average Decontamination Factor, DF
	<u>Unwashed</u>		<u>Washed</u>		
	<u>Max.</u>	<u>Min.</u>	<u>Max.</u>	<u>Min.</u>	
No. 1	4.9 x 10 ⁴	1.5x10 ⁴	8000	5400	3.5
No. 2	180	25	30	14	2

Solvent losses for the month dropped from a previously reported 0.25 per cent to 0.20 per cent of the total solvent processed representing a \$100 per day saving at current processing rates.

The recently installed fluorothene-plate IO Column performed smoothly during the plant processing rate increases; however, during the last six days of operation either emulsion formation or crud buildup caused difficulty in determining the interface location. Neither drastic pulse frequency reductions nor recycled sodium carbonate changes coupled with interface jettings improved the response of the interface probe which started to give dubious indications shortly after the processing rate was reduced to CF = 1.44 and the HAF temperature increased. Decontamination of the solvent remained unchanged during the month except during periods of reduced pulse frequency.

Early in the run period plutonium in the IOO (0.1 per cent, calculated as HCW loss) may have contributed to the high plutonium loss in the HCW (0.6 to 0.8 per cent), but later samples showed a 100-fold reduction in the plutonium content of the solvent. However, HCW plutonium losses remained at 0.2 to 0.4 per cent which could indicate a tendency for the solvent to retain appreciable amounts of plutonium until washed by carbonate in the No. 1 Solvent Treatment System. The gamma activity of the washed solvent gradually decreased from 8000 to 5000 uc/gal. with continued operation. Except for this abnormally high gamma activity, laboratory quality tests on a recent sample indicate very little difference between plant and virgin solvent. Laboratory attempts to wash the activity from the solvent are continuing but have been only moderately successful to date (activity reduced to 4000 uc/gal.).

Waste Treatment

The Waste Treatment and Acid Recovery Systems performed satisfactorily at capacity factors ranging from 1.44 to 2.16 during the report period without flow-sheet variations. Increased waste volumes resulted from recycling uranium product to obtain the higher processing rates, organic system carbonate changes caused by interface probe difficulties and flushes after shutdown. Neutralized INW and carbonate volumes averaged 230 and 464 gallons per ton of uranium, respectively. Overall waste losses for the month were 0.92 and 0.53 per cent for plutonium and uranium, respectively. Tank 241-A-103 continues to self-concentrate at about 4 gal/min., and currently contains 37 per cent of the terminal 8.0 M sodium ion content.

DECLASSIFIED

DECLASSIFIEDREDOX TECHNOLOGY OPERATION - M. K. HarmonFeed Preparation

Dissolution of low (198 to 264) MWD/T metal and testing of the down-draft dissolver were continued. Metal cooling time ranged from 114 to 199 days. Two of the three silver reactors were regenerated during the month although iodine-131 emissions to the stack averaged only 0.15 curie/day.

The two-cut dissolution of eight-bucket charges was demonstrated in the down-draft dissolver using 50 percent nitric acid to simulate recovered acid from UO₃ Plant. Rates of 156 percent of Phase II thus appear feasible on the basis of three down-draft units using 50 percent acid.

The use of 42 percent acid in the initial addition resulted in a five percent improvement in acid economy in the down-draft dissolver. However, the latter procedure would limit the capacity of three down-draft units to 134 percent of Phase II while attaining an acid economy about 14 percent better than the conventional up-draft units using 50 percent acid.

Testing of the dichromate feed oxidation procedure was continued during the initial part of the month with apparently negligible effects on losses; effects on decontamination are discussed below.

Beginning November 12, all feed batches were given the standard permanganate feed pretreatment using 0.02 M KMnO₄ in the initial, and 0.01 M KMnO₄ in the final oxidation step, followed by complete dissolution of the manganese dioxide. Approximately 10 to 25 volume percent rework was included in most feed batches to recover product from miscellaneous sump solutions including that leaking continuously from the LAFS concentrator.

Throughout the month the centrifuge was cleaned out after every eighth batch instead of after every sixth batch as previously. The change was made to improve head-end time cycles and there were no apparent effects on process performance.

Solvent Extraction

The processing of the low MWD/T metal was continued at rates ranging up to 140 percent of Phase II. A shutdown was required on November 15 to flush the HA and HS Columns with 10 percent nitric acid after a short period of increasing instability in these columns. The success of the 10 percent nitric acid flush on October 27 was shown by the period of stable operation which followed. Another shutdown was required on November 26 to replace the failed section in the plutonium concentrator and an additional 10 percent acid flush was given the HA and HS Columns at that time.

The HAF flow ratio has been maintained 7 percent high to allow for the increased feed volume since the routine addition of salt waste to feed batches was inaugurated.

Further testing of 2DS flow ratios indicated that a 40 percent reduction in ratio resulted in sodium concentrations in the final uranium product equalling or exceeding 100 ppm uranium. The 2DS flow ratio has therefore been established at 25 percent below the former standard as the minimum flow which still provides satisfactory sodium decontamination. The reduction in 2DS flow ratio has permitted a reduction of 14 percent in the 2DIS flow or approximately 5 percent in over-all aluminum nitrate consumption.

Spectrographic analyses of 3BP samples collected during the two-day test (October) of 3AS with 2.25 M aluminum nitrate concentration showed all metal ions average or below average in concentration in the plutonium product.

In order to reduce losses, the LOW stream was routed to the LAW concentrator instead of to the waste receiver tank beginning with the start-up on November 28.

Decontamination

The continued testing of the dichromate feed oxidation procedure during the first twelve days of the month resulted in 3BP (plutonium) batches which were generally within specifications on gamma activity. However, the increased sensitivity of the process to changes in acidity resulted in the production of three high-gamma 3BP batches during a period of poor acid control which had but little effect on 2EU activity. Two of the out-of-specification 3BP batches were blended off and the third was reprocessed into the 2AF stream. The final plutonium gamma activity, which increased during the dichromate head-end testing by a factor of about 10, returned to normal levels when the permanganate feed treatment was resumed.

The 2EU batches produced from the dichromate-oxidized feed were all above specifications because of ruthenium activity and were given approximately six-hour ozone sparge treatments. This tail-end procedure reduced the ruthenium activity by arithmetic factors ranging from 3 to 14, but about 17 percent of the batches did not meet specifications after treatment. These were nearly in specifications and were blended to satisfactory levels. All 2EU batches produced after resumption of permanganate feed treatment met specifications without tail-end treatment.

Waste Losses

The over-all recoveries for uranium and plutonium were 99.73 and 99.75 percent, respectively. These were reduced principally by losses from the HA and HS Columns during periods of unstable operation which preceded the 10 percent acid flushes mentioned above.

Plutonium Concentration

During the processing of the 3BP from dichromate-oxidized feed, the gamma radiation from the 233-S Building vessels increased by approximately 50 percent, but the radiation readings of the PR cans showed no increase.

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UFC

Leaks developed at welds and flanges in the bottom section of the reboiler in the I-3 Concentrator which necessitated a shutdown between November 26 and 28. The failed reboiler, of Type 304-L stainless steel with Type 347 welds, had been used about 200 days. Both the reboiler and the tube bundle were replaced (with units of Type 304-L with Type 308 welds) although the heat exchanger itself had not failed.

Waste Disposal

The tower of the waste concentrator was partially plugged during the entire month. As a consequence, the concentrator operation was erratic and numerous waste batches were underconcentrated. A definite improvement in the concentrator operation resulted from a 10 percent nitric acid flush on October 27. However, the differential pressure across the tower later increased in spite of further 10 percent acid flushes.

Because of the concentrator trouble and various line flushing operations, the waste volumes sent to underground storage exceeded the nominal flowsheet by about 35 percent.

The neutralized salt wastes are currently routed to 109-SX Tank where the probability for self-concentration is low. The change in routing from 111-SX Tank was necessitated by pluggage of the waste line to 111-SX. This line has not yet been re-opened.

FINISHED PRODUCTS TECHNOLOGY OPERATION - R. E. SmithMETAL RECOVERY OPERATIONMetal Removal

Feed shipments to the 241-WR vault consisted of slurry blends from tanks 102-U or 103-U (minimum age 15 months) and 108-TX or 105-TX (minimum age 15 months) and supernatant blends from tanks 106-U and 115-TX. TXR and UR facilities supplied 56 and 44 per cent of the uranium, respectively, at an average uranium concentration of 0.12 pound per gallon. Wide variations in feed composition were caused by the fact that very little uranium remains in any one tank, and longer sluicing times are required to produce satisfactory feed.

A second sluicing operation at the TXR facility has completed the cleanout of two tanks. The cleanout of two more tanks is nearly complete.

Solvent Extraction

Uranium losses in the RAW, RCW, and REW averaged 0.4, 0.4, and 0.06 per cent of the feed uranium, respectively. In addition to the usual transient high losses which generally accompany interface cleaning operations and rate changes, high RAW losses were caused by the high phosphate, low uranium feed which was processed. High RCW losses were caused by the addition of aged, decomposed organic phase (which is entrained into the RAF feed tank through the RA column vent line) to the in-process solvent inventory. RCW losses from 0.8 to 2.0 per cent were sustained immediately after this organic phase was pumped into the system. About three weeks (roughly 60 organic phase throughputs) were required before this loss returned to "normal".

The gamma activity of the RCU was consistently about 15,000 per cent of that of aged natural uranium. Although the REU activity increased from 70 to 130 per cent, there was an equivalent increase in feed activity, and the over-all logarithmic gamma decontamination factor was consistently about 4.9. Since the REU activity increase was gradual and not caused by a transient column upset, flowsheet conditions are probably the cause of the increased activity. Scrub flow rates have been adjusted to improve the second cycle decontamination.

The use of second cycle acid scrub (RDIS) reduced to half of the flowsheet rate caused no significant variations in product plutonium concentrations. Although one batch of scavenged waste supernatant reportedly contained a higher activity than normal (presumably because of the reduced iron concentrations), the activity of subsequent batches did not vary significantly with iron concentration. The use of reduced RDIS flow will be continued.

Waste Treatment

Approximately 1.5 million gallons of "in-plant" scavenged waste, batches 40, 47, and 48, containing cobalt-60 concentrations greater than 0.1 MPC (4×10^{-5} microcuries per milliliter) were transferred to the BC No. 11 and 12 trenches on a specific retention basis.

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URANIUM CONVERSION OPERATIONUO₃ Continuous Calciner

Three continuous calciners (G, H, and J cells) were placed into operation in 224-UA Building during the month. Initial operation was with a bed temperature of 500 F and an agitator speed of 60 RPM. Later in the month, bed temperatures were increased to 570 F to help alleviate filter plugging problems discussed below. The UO₃ produced at 500 F containing approximately 1200 parts sulfur per million parts uranium resulted in a reactivity ratio of 0.8 at 925 C and 600 C reduction and hydrofluorination temperatures, respectively. No data are available on the reactivity of the powder produced at the 570 F temperature.

Operating difficulties were associated mainly with auxiliary equipment performance such as rotary valves and apparent rapid pluggage of the off-gas filters. The large clearances required for mechanical operation of the rotary valves allowed off-gas leakage into the powder collection bin which resulted in powder caking and jamming of the valves. This trouble has been remedied to a large extent by lagging of the collection bins to retard condensation and by improved calciner vacuum control. Occasional valve jamming is still being experienced, however, and a new valve of different design is being fabricated for test,

The problem of apparent premature plugging of the off-gas filters was approached by increasing the off-gas temperature to 570 degrees and varying the methods of filter operation, i.e., either singularly or in parallel. These measures helped to prolong filter life, but did not provide the whole answer. Faulty performance of pneumatically operated valves in the vent system was ultimately found to be allowing the escape of filter blowback air; hence inadequate filter cleaning resulted. Replacement of one of these valves with one of butterfly design on an apparently plugged filter restored the filter to satisfactory operation when a full measure of blowback was applied. At month end, the filter problem appears to be well on its way toward resolution.

Pot Calciners

UO₃ produced in the pots met specifications in all respects, with the exception of a minor deviation of particle size on one carload. The reactivity ratio averaged 0.91, with a sulfur content of 123 parts per million parts uranium. The fume vent deentrainment section was redesigned and tested on one pot with improved results. It is planned to outfit one pot as a prototype to evaluate control of air in-leakage and dust entrainment.

Acid Recovery

Acid recovery operation was good following an increase in UNH feed concentration. Recovered acid averaged 47.4 per cent for the month, with month end values over 48 per cent.

RECUPLEX

The addition of 250 ppm of Separan to dissolved slag and crucible material in order to improve coagulation time was discontinued during the month. Excessive accumulation of solids at the column interfaces was noted following the addition of this coagulant. Post-precipitation of solids after filtration was a contributing cause. Some improvement in interface condition was gained.

Hydroxylamine sulfate additions (vice sulfuric acid alone) to the H-3 column stripping agent (CCX) were made to reduce the plutonium loss to the organic. Using CCX of the composition, 0.18 M HNO_3 , 0.02 M $\text{NH}_2\text{OH} \cdot 1/2 \text{H}_2\text{SO}_4$, 0.005 M H_2SO_4 , the following improvement in distribution coefficients of the H-3 column effluent organic (CCW) vs the CCX, were obtained:

<u>CCW Plutonium Concentration (g/l)</u>	<u>E_a° with Sulfuric Acid</u>	<u>E_a° with Hydroxylamine</u>
0.03	0.32	0.01
0.08	1.7	0.36*
0.15	4.7	0.36

* Average of two samples.

Neutron counting techniques were applied to dissolver filtrates in order to reduce batch transfer time awaiting laboratory results. Agreement within 0.2 g/l is being obtained between the laboratory and counter results.

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DECLASSIFIEDPROCESS CHEMISTRY OPERATION - K. M. HarmonPROCESS ASSISTANCEPurex Process Studies

In recent weeks the plutonium losses in both the HCW and LAW streams have been unusually high, averaging 0.1 to 0.3 per cent. Laboratory investigation of the cause for these high losses has given the following information:

- 1) Batch contacts of samples of these streams with laboratory extractants indicated that the plutonium was "fixed" in the waste streams. A plutonium extraction coefficient (E_a) of 1.4, about 100 times normal, was measured for the HCW, while the coefficient measured for the LAW was 0.8, about one-third normal. Uranium distribution ratios in both streams were normal.
- 2) After a series of five successive batch contacts (each contact with new laboratory LAX) of Purex LAF sampled October 4, 1956, the extraction coefficient (E_a) of the plutonium remaining in the aqueous phase was reduced to 0.5, about 10 to 20 per cent of the value predicted from the nitrate salting strength. About 0.3 per cent of the initial plutonium remained in the aqueous phase. These results show that the "fixed" plutonium was in the LAF sample, in a form not as yet determined. The uranium distribution ratio after five contacts was also much lower than normal, a possible indication of the presence in the feed of a complexing agent such as sulfate, phosphate, or solvent decomposition products. Analysis of the feed and aqueous waste for DEF and phosphate showed only insignificant amounts of these materials, four parts per million DEF and less than $0.002 \text{ M PO}_4^{3-}$.
- 3) The aqueous waste from the above experiment was given a sixth contact with laboratory solvent after standing several days and showed a three-fold increase in plutonium extraction coefficient. In an attempt to confirm this indication of a change in the plutonium species with aging of the waste, the plutonium extraction coefficient was then investigated as a function of age, using a Purex LAW sample taken November 19. Over a seven-day period, coefficients varying between 1.2 and 0.5 were measured, but with no significant trend.

The solvent washing procedure of the Purex Plant IO solvent system was simulated in the laboratory to estimate its efficiency. Consecutive contacts of 30 ml of Purex HCW with two 1 ml quantities of 3% Na_2CO_3 served to reduce the plutonium concentration and gross gamma activity by factors of 40 and 3, respectively. Most of the benefit came from the first contacting.

Redox Process Studies

The precipitate observed in back-cycled wastes was analyzed and found to contain 2.5 weight per cent aluminum, 37.3 weight per cent iron, and 8.1 weight per cent chromium. The precipitate is thought to be a mixture of ferric chromate and iron, aluminum and chromium hydroxides. The formation of the precipitate in the Redox plant is being successfully controlled by acidifying the IDW stream to approximately -0.1 M HNO_3 . Laboratory tests indicate that formation of the precipitate can also be curtailed by 1) making the IABS

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stream greater than 0.05 M U, 2) reducing any chromium(VI) to chromium(III), or 3) increasing the ANN concentration to 2.5 M.

UO₃ Reduction Studies

The rates of hydrofluorination of UO₂ produced by reduction of UO₃ with hydrogen, ammonia, and carbon monoxide were determined in the thermobalance as a function of the UO₃ source (High Temperature Standard, pot powder, and continuous UO₃ from run P-292) and the reduction temperature. From the results obtained, the following general conclusions may be drawn:

- 1) Reduction of UO₃ from any of the sources tested with CO gave UO₂ with about the same reactivity. However, carbon was formed in objectionable quantities. The UO₂ produced from continuous UO₃ by reduction with NH₃ or H₂ was less reactive than that formed under similar conditions from the pot or standard powders.
- 2) Reduction at 590 C with NH₃ or CO produced more-reactive powder than did reduction with H₂. Upon reduction at 925, the CO produced more-reactive powder than NH₃ or H₂.

Cesium Recovery and Scavenging Studies

Cesium-137 has been successfully scavenged from samples of Redox D-13 waste by precipitation of zinc cobalticyanide. The compound, a fine, crystalline precipitate which was easily centrifuged, removed more than 99 per cent of the cesium when precipitated from solutions ranging from 0.0 M HNO₃ to 0.15 M acid deficient. Reagent concentrations of 0.002 to 0.004 M were most effective.

ANALYTICAL ASSISTANCE

Nitric Acid Determinations

Continued investigation of the coulometric method of determining nitric acid in low-acid solutions such as the Purex J-1 and H-1 sample dilutions has shown that the five per cent bias (high) recently observed in the Purex Laboratory can be corrected by reduction of the titration current from 5.000 to 2.500 milliamps and by subtraction of a diluent blank. Satisfactory synthetic E-6 standards (ca. 0.5 lbs./gal. HNO₃ and 1.7 M UNH), have now been prepared from recrystallized uranyl nitrate and by dissolving UO₃ in nitric acid. Good agreement with calculated values for the acid contents of the two solutions was obtained by anion exchange techniques and by cross-checking with the HpH method.

Plutonium Assay

Laboratory work on the ceric sulfate titration method for determination of the plutonium content of plutonium metal has centered on a study of the electrode system and the preparation of a primary standard. A study of platinum electrode behavior showed that a potential drift occurred when the electrode was allowed to stand in a ceric sulfate solution, after it had been treated by immersion in a ferrous ion solution. A similar drift was observed when the procedure was reversed. In both cases, the drift was proportional to the

concentration of the reductant and the oxidant. The phenomenon is believed to be at least partly responsible for the troubles with end-point determination experienced in the plutonium titrations. In a search for alternate electrodes, graphite, gold, and platinum-10% rhodium electrodes were tried (again against a calomel reference electrode). Very little potential shift was found with the platinum-rhodium alloy electrode, and this type electrode has been installed for use in plutonium titrations. Preliminary results show the system to be more stable than was the platinum electrode system.

Analytical Development for the Plutonium Ion Exchange Process

Preliminary work on analytical methods needed for support and evaluation of the plutonium ion exchange process has given the following results: 1) a satisfactory method for estimation of resin capacity consists of equilibration of the acid form of the resin with standard base and back titration of the excess base with acid; and 2) the reducing normality of Purex 2BP (resin column feed) can be determined by reacting the hydroxylamine with ferric alum and determining the ferrous ion produced spectrophotometrically.

Quality Control and Standards

During the month, the quality control program for the Chemical Processing Department analytical laboratories was maintained as usual. The Standards Laboratory provided standard solutions, standard samples, and checked or calibrated pipets and flasks as needed.

Although instrument break-down continued to be a major source of difficulty in the calibration of alpha geometry disks for the control laboratories, service was maintained as required. It appears that some of the standard disks will need to be replaced by new ones, since the three Standards ASP's give good agreement on some disks and widely different results on others. This behavior is indicative of differences in the alpha pulse distributions on the disks.

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234-5 DEVELOPMENT OPERATION - H. H. Hopkins, Jr.Sulfate in Task I Feed

Tests have been run to determine the effect of sulfate on Task I (plutonium(IV) oxalate precipitation). No adverse effects were found.

A synthetic feed solution was made up containing 120 g/l Pu and 0.65 M $(\text{NH}_4)_2\text{SO}_4$ in 5 M HNO_3 . The strike solution consisted of 11 ml of 50 per cent H_2O_2 added to 200 ml of 1 M oxalic acid. In making the strike 25 ml of plutonium solution were heated to 50 C and then 35.5 ml of strike solution added with moderate agitation over a period of 25 minutes, holding the temperature at approximately 55 C. The slurry was cooled to 20 C and was filtered satisfactorily through a coarse fritted Pyrex filter. Filtrate losses were about 0.3 per cent. However, the cake was orange in color, suggesting that it was plutonium(VI) oxalate rather than plutonium(IV) oxalate. Consequently, another experiment was performed by first adding 1.8 ml of 50 per cent H_2O_2 to 25 ml of plutonium solution and then making the strike as before, using 33.5 ml of 1 M oxalic acid. Again a crystalline cake was obtained. The filtrate loss was about 0.5 per cent. The cake was still orange, although slightly lighter than in the first strike. Subsequent assay of both cakes showed approximately 45 per cent plutonium which is about right for $\text{Pu}(\text{C}_2\text{O}_4)_2 \cdot 6\text{H}_2\text{O}$. The cake will be analyzed for sulfate.

Evaporative Kill in Recuplex

In comparing the Recuplex dissolver flow sheet with experimental results on the decomposition of oxalate supernatants by boiling, it appears that Task I oxalate supernatants could be killed in the dissolution process. Unkilled Task I supernatants would be used in the initial charge to the dissolver. After the second ANN addition (omitting the Task I supernate flush), the oxalate concentration would be reduced to the order of 0.001 M.

Valence Adjustment

Semicarbazide and aminoguanidine have been tested as reducing agents for plutonium in ion exchange process streams. Semicarbazide reduced 10 g/l Pu(IV) rapidly in solutions ranging from 0.3 M to 6.0 M HNO_3 . Some of these solutions were blue after 25 days, indicating a high percentage of plutonium(III) remained. The aminoguanidine reduced the plutonium slowly at low acid concentrations. In some cases more than one day was required for complete reduction. In 6.0 M HNO_3 complete reduction was not obtained with aminoguanidine concentrations up to 0.05 M. Addition of sulfamic acid did not change the reduction characteristics but did improve the stability of the reduced solutions. Tests will continue with higher concentrations of the reducing agents and with higher plutonium concentrations.

TBP Strip With Sulfurous Acid

The Purex 2 BP stream which presently feeds into the concentrator is a suitable ion exchange feed except that valence adjustment is required. This stream is approximately 5 g/l in plutonium normally in the plutonium(IV) valence state, and an acid concentration up to 0.3 M HNO_3 . The most convenient method of re-

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ducing the plutonium would be the addition of a reducing agent to the 2 B column which would produce a 2 BP stream of plutonium(III). Reducing agents considered for the 2 B column are sulfurous acid and ascorbic acid as well as hydroxylamine sulfate. Initial tests have been made with sulfurous acid; however, two strips of simulated 2 AP with 0.05 M H_2SO_3 - 0.01 M HNO_3 did not reduce the plutonium. Evidently too much nitrite was present from the original aqueous. Further experiments are being made.

Plutonium-Polymer

Plutonium-bearing solids have occasionally been found in the Purex plutonium concentrator and have been attributed to polymer. Hence the formation of polymeric plutonium(IV) is being investigated to determine permissible nitric acid concentrations and acid to plutonium ratios in extraction plant stripper-concentrator solutions. The role of plutonium polymer as a foam producer in boiling plutonium nitrate is also being studied. In addition, the range of conditions includes cases where polymer might be suspected of causing solvent extraction losses. Polymer formation is also a problem in analytical work, especially with waste solutions requiring extraction of the small amounts of plutonium and where polymer adsorption on glass would be significant.

Experimental data are being taken on polymer formation at room temperature and near boiling under a range of acid and plutonium concentrations. Where precipitates are formed these will be checked for stability at various acid concentrations. Absorption spectrograms are being made on all solutions.

Plutonium(IV) nitrate solutions are emerald green at high and low acidities. At intermediate acidities - from about 1 M to 5 M HNO_3 - the solutions are amber to dark brown, according to concentration. Solutions at both high and low acidities show high general absorption in the low wave length region of the visible spectrum. At very low acidities - when polymerization is predominant - the absorption spectrum is devoid of the typical plutonium(IV) absorption peaks. The sharp absorption peak at 475 mμ (due to plutonium(IV)) was found to grow linearly in the acidity range 0 to 0.4 M HNO_3 . The green colloidal polymer is formed at acidities of 0.3 M HNO_3 or lower. The tendency for polymer formation is greater at lower plutonium nitrate concentrations as these are more completely hydrolyzed. In the more concentrated polymeric solutions, the precipitation of plutonium hydroxide occurs until the free nitric acid concentration resulting from the hydrolysis is sufficient to stabilize the colloid. The green polymeric solutions have indistinct absorption peaks at 510, 610, 730, 825, and 1935 mμ. The high absorbance at low wave length increases with the polymer concentration.

A bluish-grey polymeric solution is formed at acidities above 0.3 M HNO_3 when the nitric acid to plutonium ratio is below 0.1. Indistinct absorption peaks at 890 and 600 mμ were noted under these conditions.

The typical plutonium(IV) absorption peaks which appear as the acidity is increased beyond the polymer region parallel the change to amber-brown color of the solutions. The change back to green starting at about 5 M HNO_3 is accompanied by wave length shifts of the absorption peaks. The peaks at 426 and 475 mμ for example, diminish, and corresponding peaks appear at 445 and 495 mμ as the acidity is increased. This change back to green and the shift to the new

absorption peaks is complete at 10 M HNO_3 concentration. This shift of about 20 μ in the direction of longer wave length is presumed to follow increased nitrate complexing of the ion.

Results to date indicate that polymer formation is much enhanced by high temperature and that precipitation will take place from solutions which are stable at room temperature.

Permanent Mold Casting

One goal of permanent mold casting is to produce a shape requiring not more than 10 mils machining on any surface. Attempts to machine plutonium pieces cast in the copper mold have shown that the pieces cannot be chucked in the collet-type chucks used on the lathes with sufficient accuracy to complete machining and still maintain dimensional tolerances. The copper mold has, therefore, been modified to produce a simpler shape. This will allow a greater deviation in chucking and will result in less exposure time to the operator. The new shape will also eliminate sampling difficulties encountered in obtaining an MC-2 sample from the old shape. The increase in recycle will be an estimated 20 grams.

Continuous Ion Exchange Equipment

Calibration and cold testing of the laboratory-scale continuous ion exchange equipment is now in progress. Hot testing is planned for the latter half of December. The major items of progress for the month of November are the following:

1. The resin valves and valve operating mechanism have been run until they now function well without leakage or stalling.
2. The columns and interconnecting piping have been assembled with Koroseal gaskets at all joints not subject to strong acid and are free of leakage. Those joints subject to strong acid have polyethylene gaskets.
3. Filters of light-weight Dynel filter cloth have been installed at all solution entry and exit lines of the columns.
4. All solution lines to rotameters and Saran-body valves have been provided with fritted-glass filters to prevent jamming or damage due to stray resin.
5. Ecod bottles for non-radioactive solutions have been installed and connected.
6. The resin exchange system has been filled with Dowex 50-X12 resin (50-100 mesh) freed of fines. This resin should behave the same as the Dowex 50W-X8 resin to be used for hot tests.
7. The resin pump has been tested and has adequate resin-moving capacity. Filters have been installed to prevent resin entry into the pump.
8. The Eastern pumps for solution feed to the columns are being provided

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with Variac speed-controllers to prevent heating of the feed solutions to the columns.

9. The rotameters are now being calibrated.
10. The hood closure panels are ready for installation as soon as cold testing is finished.
11. The feed make-up and solution storage hood is rapidly nearing completion.

Thermocouple Wells

Straight thermocouple wells without warpage have been produced for the first time. In the past the Ceramic Shop has slip cast magnesium oxide thermocouple wells. The current model is six inches long overall, o.d. at the top 1/2" tapering to 7/16" at the bottom radius of curvature of the bottom 7/32". The wall thickness is from 1/16" to 1/32". Various methods of holding the wells during firing had been tried. All resulted in some degree of curvature or warpage. The new method was to imbed them vertically, right side up full length in coarse (-10 / 20) magnesium oxide grain during induction furnace firing at 1650 C. They need not be filled with magnesium oxide. They may then be oxidize-fired (at 1150 C) without warpage by the convenient method of laying them flat on a bed of coarse grain.

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)
None

Title
None

ORGANIZATION AND PERSONNEL

	<u>October</u>	<u>November</u>
Research and Engineering	3	3
Advance Process Development	7	7
Purex Technology Operation	17	17
Redox Technology Operation	15	15
Finished Products Technology Operation	25	23
Process Chemistry Operation	26	26
234-5 Laboratory Operation	13	13
	<u>106</u>	<u>104</u>

RB Richards:khs

R.B. Richards
Manager, Research and Engineering
CHEMICAL PROCESSING DEPARTMENT

CHEMICAL PROCESSING DEPARTMENT
EMPLOYEE RELATIONS OPERATION
November 1956

I. RESPONSIBILITY

There were no changes in responsibilities assigned to the Operation during the month, except that the preparation and issuance of OPGs was added.

II. ACHIEVEMENTS

FIRE PROTECTION OPERATION

A. Fire Responses

1. Description of fire

200 W Area - 12:05 P.M. November 9, 1956

A Jeep station wagon assigned to Hanford Laboratories, had collected sage brush around the exhaust pipe and muffler. This material became ignited by the heat from the exhaust. No loss.

B. Fire Extinguisher Service (200-E, 200-W, 200-N, Batch Plant and the Yakima Barricade

Fire Extinguishers

Inspected	425
Installed	15
Delivered to new location	10
Seals Broken	15
Serviced	26
Weighed	275

Gas Masks

Inspected	32
Serviced	10

Hand Lines

Inspected	20
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C. Two training classes were conducted in the use of CO 2, Dry Powder and Water Pump Can extinguishers. There were 12 employees in attendance at Purex and 23 at Redox.

D. A survey was made of all fire hydrants in 200-E and 200-W regarding the need for maintenance and painting. The results were given to Health and Safety for necessary action.

E. Gave assistance to Redox to unblock a plugged line. Stood by with Fire Protection Tanker for controlled burning.

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HW-47056

EMPLOYEE RELATIONS OPERATION
PERSONNEL DEVELOPMENT AND COMMUNICATIONS OPERATION

November, 1956

PERSONNEL DEVELOPMENT AND COMMUNICATIONS OPERATION

A. Measurement Statistics

Participation in Training Courses		
Monthly Personnel		202
Process and Equipment Orientation	4	
Non-Exempt Personnel Development	148	
Communications Workshop	3	
Special Hazards	12	
Practical Business Writing I	14	
Practical Business Writing II	15	
Data Processing	6	
Weekly Personnel		65
Analytical Procedures	14	
Technologist - Leader Training	5	
Special Hazards	15	
Craft Training (Power Operators)	24	
Process and Equipment Orientation	7	
G.E. Selection Program - Number completed		3
Attendance at Films (1)		21
Films Previewed		1
Technical Graduates on Rotation		1
Technicians in Training		6
CPD Dinner (Business Review)		1
Management News Bulletins Issued		7
GE News Items		5
Employee News Letters		1
OPG's issued		19

B. Comments on Statistics

Approximately one-half the supervisors have participated in the training session designed to acquaint them with the operation of the new Non-Exempt Personnel Development Program.

The film shown was "Hands Across the Atom".

The Employee News Letter was about the Diabetes Detection Program.

C. Employee Communication

The GE NEWS carried five items from CPD. These included a Can You Tell Me answer, material concerning CPD suggestion award winners, a picture of the Specialist, Personnel Training conducting

a supervisory course for the new non-exempt development program, and a picture of the Health & Safety dummy "Safety Sal" promoting the BTAOTA campaign.

Arrangements were made for a representative of Audio-Visual Operations to meet with the Manager, Research and Engineering to discuss plans for a HAPO film on Hanford Scientific and Engineering activities. The film will be used in connection with the Technical Recruiting Program.

Arrangements have been made with Salary & Wage to notify Communications of all CPD promotions. A biography form will be sent to the employee to be filled out and then taken to the GE NEWS office where a portrait will be arranged and further information obtained for publicity purposes.

A meeting was held with R & U representatives and other Communications Specialists to discuss publicity and plans for the Company sponsored "Photo Contest". It was agreed to allow 6 Hanford winners of the photo contest to be eligible for the Company-wide contest. Each department was asked to contribute enough money for the purchase of 4 additional radios. Approval was obtained from the CPD for this purpose during the month.

D. Public Communications

A letter was sent to all Level 3 Managers during the month asking them to submit names of employees eligible for inclusion in the General Electric Theater Progress Report to be selected on the basis of outstanding contributions to society either in work or in their private lives.

A speech written by a member of Employee Relations for presentation at a convention of county Commissioners in Richland was reviewed during the month.

E. Personnel Development

One Technical Graduate completed his rotation and transferred out of the department. The remaining Technical Graduate completed his assignment in Purex Process and elected to take another assignment in Purex Contact Engineering.

Two sessions of the survey course in data processing were conducted by the Data Processing Operation with six CPD people in attendance. This course will be offered in 1957, with participants separated into technical and business categories.

The Atomic Energy Commission approved funds for PEM-I and preliminary arrangements were made to start this course in December.

Practical Business Writing courses, scheduled during November, were over subscribed and a waiting list established for the January classes.

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Union Relations Operation

The Company received a decision on the arbitration case involving a change in shift schedule - 200-W Laundry Operation - which will result in retroactive payment of about \$1,000 for each of some sixty laundry workers. A similar situation had arisen in the Hot Semi Works, 200-E Area, in which a shift change was also made without Union concurrence. It was assumed that the local Union would also take this case to arbitration in view of the favorable decision on the laundry problem. However, the time limit has expired during which the Union can arbitrate this matter, and the Company assumes that the Hot Semi Works shift change is a closed issue. There is nothing to prevent the Union from initiating a new grievance on this subject, which could ultimately permit arbitration, but this does not appear likely.

A certification election was held on November 26, 1956 involving twenty-one Radiation Field Inspectors who are associated with the Hanford Laboratories Department. Results of the elections were nineteen in favor of union representation and one opposed. None of these employees is in the Chemical Processing Department.

An arrangement has been negotiated with the H.A.M.T.C. which will extend the Christmas and New Year holidays for most employees. The Union has agreed that December 24, 1956 and December 31, 1956 will be regarded as days of rest in lieu of any other day within each of these work weeks which has previously been designated as the first day of rest for the particular employees involved.

Gradual curtailment and shut-down of the T.B.P. Operation is proceeding in a smooth and orderly fashion. The H.A.M.T.C., while watching this activity closely, is apparently satisfied with the method of accomplishment.

An understanding was negotiated with the H.A.M.T.C. which provided that, effective December 1, 1956, isolation pay would be regarded as a part of gross earnings for purposes of calculating the amount of insurance coverage to which employees who receive isolation pay are entitled.

As indicated in previous reports, the H.A.M.T.C. has advised the Company of its intention to arbitrate a jurisdictional matter involving Radiation Monitors. The Union has given the Company a letter indicating certain work assignments which they contend are the exclusive jurisdiction of the Monitors. The Company has taken the position that the Union's demand is unrealistic in that to conform with such a demand would require that the force of Radiation Monitors be approximately doubled; furthermore, that there are certain activities of radiation or contamination detection and control with which all employees should be familiar in the interest of maximum safety and protection for the work force. Union Relations, Chemical Processing Department, will cooperate with the Legal Department in preparing for this case. A decision unfavorable to the Company on this matter could have serious and far reaching impact insofar as assignment of future work is concerned. It would appear that the H.A.M.T.C. is desirous of making this a test case in behalf of all crafts whom they represent.

The H.A.M.T.C. has expressed concern over the status of certain work which they contend has been held up pending a review of Davis-Bacon considerations. Union Relations has advised the Council that in addition to Davis-Bacon provisions, the Company's contract with the Atomic Energy Commission designates the kind of work which the Company can accomplish at H.A.P.O. The Council was also assured that the Company is well aware of its contractual obligation to the Union "to maintain a work force consistent with scheduled requirements." The H.A.M.T.C.'s Business Agent expressed his recognition of the Company's position, but it can be assumed that they will keep this matter under their closest scrutiny.

Within the Chemical Processing Department, the check-off system, which pertains to the deduction of union dues from employees' pay checks, is as follows:

	<u>Nov.</u>	<u>Oct.</u>
Bargaining unit employees in C.P.D.	1099	1085
Bargaining unit employees utilizing check-off	664	653
Percentage of total bargaining unit employees using check-off	61.2%	60.2%

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

	<u>Unit</u>	<u>Nonunit</u>
Pending at Step II on 10-31-56	15	0
Grievances received during November	13	0
Satisfactorily answered at Step I	3	0
Processed at Step II	4	0
Pending at Step II on 11-30-56	21	0
Pending arbitration	1	0

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SALARY & WAGE ADMINISTRATION

A revaluation of the Specialist, Waste Storage and Recovery position in the production Operation was completed and reconciled internally.

A discussion was held with the Level 3 managers of the Manufacturing components relative to the supervisor-in-training classification. A proposal for handling this classification will be issued next month.

A detailed study is underway to determine the individual pay differentials between our first line supervisors and their people. Complete information for all the lower level supervisors is being prepared to be available to their managers before the coming salary review period.

We have continued with the development of additional data which will show our position in respect to the salaries of our technical graduate employees as compared with hire in and outside available salary ranges. Data on an individual basis is also being prepared to be made available to managers before the next salary review period.

Two advice letters were prepared for issue: "Procedure for Changing the Payroll Status of an Exempt Employee" and "Addition, Change, or Deletion of Exempt Positions". These Advices will be issued in December.

Position Title or Level Changes	1
Positions Added	1
Positions Deleted	0
Salary Changes - Promotional	2
Merit (Salary Review)	22
Merit (Interim)	1
Reclassification Promotions	
Non-Exempt to Exempt	3
Exempt (No change in salary)	0
Demotions	0
Reassignments (Intra Department)	3
Reassignments (Inter Department)	0
Number of personnel below position rate	16

Supervisors in Level 3 components have been contacted to complete preparation of job descriptions for their non-unit jobs (including secretarial). Where the jobs were essentially the same as prior to reorganization, copies of the pertinent descriptions were procured for each component. At the end of November 53% of these descriptions are evaluated.

The job numbering list showing descriptive titles and classifications has been completed in draft form but not published as yet. It is being held pending receipt of more of the Financial jobs which are currently in process of preparation.

The wage records file by classification, in process during October, is complete.

Grades were established for eleven Financial jobs in Personnel Accounting, three semi technical jobs in Research and Engineering, one clerical job in Power and General Maintenance during November. Five job descriptions from General Accounting and one from Power and General Maintenance are at present in process of evaluation.

In conjunction with other HAPO Departments a proposal for a secretarial classification system was made and reviewed. Comments made on the proposal are being incorporated in the final draft which is being prepared at month end.

Administratively the following were processed and discrepancies incident thereto handled with supervision concerned:

Payroll Status Changes

	<u>Inter Dept.</u>	<u>Intra Dept.</u>	<u>Total</u>
<u>Transfers</u>			
Exempt to CPD Non-Exempt	1		1
Into or Within CPD (straight across)	28	19	47
Into or Within CPD (downgrade)	13	3	16
Into or Within CPD (upgrade)	1	25	26
From CPD	8		8
Non-Exempt to CPD Exempt		3	3
Temporary Reclassification		2	2
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Requisitions

Number Processed	10
Number Personnel Requested Thereon	10

Reactivations

From Military Service	1
Other	3
New Hires	5
Automatic Increase Papers	39

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HEALTH AND SAFETY OPERATION

Chemical Processing Department	<u>November</u>	<u>October</u>	<u>Year to Date</u>
Disabling Injuries	0	0	0
Serious Accidents or Incidents	1	2	3
Medical Treatment Injuries	69	81	206
Radiation Incidents	1	0	2
Radiation Occurrences	24	34	88
Fires	0	2	3
Security Violations	1	1	3

A medical treatment injury to a chemical worker was formally investigated as Serious Accident or Incident #3. The injured sustained a caustic burn to the left eye when a pump seal failed. No eye protection was worn.

The medical treatment injury monthly frequency rate decreased 9 per cent.

One occurrence formally investigated as Radiation Incident #2 involved localized skin overexposure to a Process Chemist. His sleeve came in contact with a contaminated sample cask resulting in overexposure to a small wrist area.

The monthly total of radiation occurrences was reduced by ten. Twenty four occurrences is the lowest monthly total since September 1, 1956.

A security violation in the 234-5 Building resulted from failure to secure a repository containing classified documents.

A "Back The Attack On Traffic Accidents" program was initiated on November 20 and will continue through the month of December. A trend toward the worst death toll in history from motor vehicle accidents, and the vehicle accident frequency rate at Hanford prompted this action. A variety of written, spoken and visual media will be utilized in this safety package.

Loudspeakers were mounted on the 200 East and West main badgehouses. Facilities for tape recording and direct announcements will be installed. Adaptable to the general safety program, this equipment will be used for "Back The Attack."

A Chemical Processing Department Safety Program Committee of ten exempt people representing each Operation was formulated.

Recommendations were made to the Plant Telephone and Radio Operation for an alternate, more economical method of accomplishing the intent of Project CA-699, Public Address System - 200 Areas.

Advice and counsel was provided on the following items:

Redox sodium nitrate storage building.
Automatic fire control devices for Redox SWP Lobby Addition.
Office annex for 234-5 Development Laboratory.
Gas cylinder storage, 277-W Building.
Unloading Hedges nitric acid at Purex and Redox.
Radiation instrument development needs, with Hanford Laboratories Operation representative.
Radiation Monitoring W-10 night school refresher with Relations and Utilities representative.

An analysis was prepared comparing results of an Irradiation Processing Department radiation attitude survey with the Chemical Processing Department attitude survey.

A review was made at the request of Relations and Utilities Operation, of the problems of contamination control of Chemical Processing Department shipments to Stores.

There were no routine reports issued. One non-routine report, Radiation Incident Investigation CPD #2, HW-47036 was issued.

PERSONNEL PRACTICES OPERATION

	<u>Exempt</u>	<u>Non-Exempt</u>	<u>Total</u>
<u>Additions to Payroll</u>	1	37	38
New Hires	0	5	5
Reactivates	1	4	5
Rehires	0	0	0
Re-engage	0	0	0
Transfers into CPD	0	28	28
<u>Removals from Payroll</u>	7	17	24
Illness	1	1	2
Resigned, other employment	4	7	11
Transferred from CPD	2	8	10
Retired	0	0	0
Leave of Absence	0	1	1

Requisitions for Personnel (Non-Exempt)

Number on Hand End of October	30*
Number Received	10
Number Filled	29
Number on Hand End of November	11

*Equivalent to 23 requisitions reported last month since figure now represents people instead of number of requisitions.

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Requests for Transfer (Non-Exempt)

Number on Hand End of October	119
Number Received	28
Number Transferred	1
Number on Hand End of November	146

Service Recognition Plan

A Total of 38 pass folders were issued for the following:

One Year	11 Men	
Two Year	7 Men	
Three Year	6 Men	3 Women
Four Year	None	
Five Year	8 Men	
Six Year	3 Men	

The increase in the number of non-exempt employees is due mainly to the ten service men hired for weed control. These employees were hired on a temporary basis; the period of employment depending on the time required for clearing the area of tumble weed and weather conditions.

One Supervisory Selection Program test was conducted for an employee of the C.P.D.

Seventeen inquiries in regard to employment and credit references of various employees within C.P.D. were answered during the month.

Twenty-seven preliminary interviews in regard to requests for transfer submitted by non-exempt employees in the C.P.D. were completed.

Requests for Transfer (Exempt)

Number on Hand End of October	22
Number This Month	3
Number Transferred	2
Number Closed Out	4
Number on Hand End of November	19
Number of Interview Trips	0

Applications for Employment

Applications Received during November	6
Hired	0
Closed Out	7
Invited for Interview	0

The original list of 32 exempt personnel listed as available by the Research and Engineering Operation and Finished Products Operation has now been reduced to twenty-two. Two exempt persons from the Finished Products Operation

have accepted offers but have not physically moved as yet; one from Research and Engineering will transfer to I.P.D. in December; one from Research and Engineering has resigned to accept employment elsewhere; and the remainder removed from the available list have been placed within the C.P.D. Detailed experience resumes on five of the remaining personnel have been sent to other departments for consideration in anticipated openings.

A list of requirements in the C.P.D. for outstanding junior students in college, and college professors was submitted during the month to the Technical Placement Center, Relations and Utilities Operation. The response within C.P.D. was very gratifying for this very worthwhile program as six juniors and two professors were listed as needed. The names of Dr. Homer Grant, Dean of Industrial Engineering, University of Southern California and Dr. Ralph M. Barnes, Department Head, Industrial Engineering and Industrial Management, UCLA were submitted as candidates to fill the two requisitions for professors.

<u>Suggestion Plan</u>	<u>October</u>	<u>November</u>
Suggestions Received	52	78
Acknowledgements to Suggesters	87	57
Suggestions Pending Acknowledgement	7	32
Suggestions Referred to Operations for Investigation	81	57
Suggestions Pending Referral to Operations	11	32
Investigations Completed and Closed	47	92
Adopted Suggestions Approved by Board for Awards	13	38
Adopted Suggestions Pending Award by Board	29	34
Total Net Savings	\$955.95	\$12,034.79
Total Cash Awards Approved by Board	180.00	1,785.00*
Total No. of Suggestions outstanding to Operations at the end of month	250	236

*This figure reflects awards approved by Board of \$1,355.00 which will require approval of the Atomic Energy Commission.

In our October report checks delivered to Level 3 managers for distribution was \$873.33, rather than \$1,768.33 as reported. In November, checks totalling \$390.00 were distributed to Level 3 managers for distribution.

One application was submitted during November for an educational loan.

In support of the Personnel Development Program I.B.M. runs listing continuity of service date of all non-exempt employees have been received from the Data Processing Operation. From these listings, notices are being prepared for supervisors, indicating which employees are to be interviewed during the month of January in accordance with the new personnel development program.

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We have a total of 84 non-veterans subject to military training through the Selective Service System.

During the month of November, one exempt employee for whom we had routinely requested deferment terminated.

There were five additions to the non-veteran file. We will request deferment for one of these.

The 84 non-veterans are classified as follows:

1A	17
2A	17
3A	31
4A	1
4F	9
4D	1
1S	1
1S-H	1
1F-F	1
No Classification	5
Total	84

Deferments

Deferments requested (November)	0
Deferments granted (November)	3
Deferment requests pending	3
Routine	1
Appeals	2

Duplicating

Duplicating Orders on Hand (11-1-56)	20
Duplicating Orders Received	725
Duplicating Orders Completed	666
Duplicating Orders on Hand (11-30-56)	79
Total Copies Produced	140,414
Embossograp Signs Made	410
Verifax Copies Produced	334
Ozomatic Copies Produced	3,429

200-E Duplicating Facility was moved from 2701-M to 271-B on November 29. It is anticipated this relocation will provide more efficient service for a larger number of customers and will be readily accessible for rush financial reports.

A verifax duplicating machine was received and installed in the 200-E Duplicating Facility on November 20th. The addition of this machine completes the planned equipment for this facility and now enables us to provide a variety of duplicating services.

Considerable study is being made on the cost of Xerox Developer. The cost of this material has increased from some \$5 per 1/2 lb. to \$23 per 1/2 lb. A meeting has been scheduled with the manufacturer for December 6th in an effort to reconcile this excessive cost.

An additional motor messenger was placed on the roll on November 12th. This now provides us with two mail messengers for each 200-E and 200-W.

A new mail room will be established in 200-E Area as soon as the necessary mail distribution racks are received.

Installation of a new telephone cable to provide additional telephone service for "B" Plant offices is progressing. Completion date is December 10th and installation of new telephones will start shortly thereafter.

III. ORGANIZATION AND PERSONNEL

A. Force Summary -- Employee Relations Operation

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

*Includes Level 3 Manager

B. Meetings

Weekly Level 4 staff meetings were held. The monthly safety meeting was spearheaded by the Health and Safety Operation. Employee Relations Operation personnel attended some 22 meetings during the month. The bulk of these were liaison meetings with counterparts in other departments.

C. Safety

There were no fires or security violations in the Operation. Two injuries occurred, neither of the lost-time variety. Proper education and follow up action was activated.

D. Personnel Activities

Ten exempt personnel attended class on the Non-exempt Self Development Program. Members of Personnel Development Operation participated in discussion seminars with the four speakers featured at the ASM Education series.

END

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