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Compiled by
OPERATION MANAGERS

January 21, 1957

HANFORD ATOMIC PRODUCTS OPERATION
RICHLAND, WASHINGTON

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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

RW-47675 **DEL**

DECEMBER, 1956

GENERAL SUMMARY

PRODUCTION

The production of plutonium from the primary plants exceeded the forecast. A lack of adequately aged high exposure uranium necessitated the shutdown of Purex Plant on December 22 for the remainder of the month. A significant improvement in decontamination and waste losses was attributed to the newly installed extraction column in the Purex final uranium cycle.

Redox Plant completed the charging of all the available low exposure uranium during the month, and at month end the building inventory was being removed in preparation for flushing. Problems associated with the processing of uranium aged less than 105 days from pile discharge necessitated intermittent operation of the plant during the latter part of the month.

Problems associated with the removal of residual uranium from the storage tanks became more acute, and as a result the TBP Plant production was 68% of the forecast.

For the third consecutive month a new high in UO_2 production was established with December production exceeding the previous high by 27%. Major difficulties in the operation were associated with the solids handling system of the continuous calciners.

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

ENGINEERING

An investigation covering neptunium-237 recovery has been initiated. Studies are underway to determine the path of neptunium in the Purex process and to develop flowsheets to recover the neptunium in a usable form. Flowsheet modifications will be attempted to route the neptunium with the plutonium for subsequent separation by ion exchange.

Preliminary process designs for critically-safe Redox and Purex Dissolvers to process enriched uranium fuel elements (9.94 per cent U^{235}) have been completed and are being reviewed for nuclear safety by the Hanford Laboratories Operation.

A review of the potential uses for an anion exchange in separations processes has shown evidence of an attractive new application for the recovery of plutonium now being lost with the Purex high level waste stream.

GENERAL

The Chemical Processing Department Midyear Budget Review for FY 1957 was completed and submitted to Contract Administration for HAPO consolidation.

Efforts continued on placement of people to be made available by the impending shutdown of the TBP Plant.

Final plans were completed for the presentation of Professional Business Management courses in the Chemical Processing Department. First classes will start in January.

An indefinite postponement of the hearing on a jurisdictional matter involving Radiation Monitors has been agreed upon between HAMTC and the Company, leaving open avenues for direct negotiation without having to resort to arbitration to resolve the dispute.

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STAFF

Vice President and General Manager, Atomic Products Division . . F. K. McGune
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 DEPARTMENTNUMBER OF EMPLOYEESDECEMBER 31, 1956

OPERATION	EXEMPT		OTHER		TOTAL	
	11-30-56	12-31-56	11-30-56	12-31-56	11-30-56	12-31-56
GENERAL MANAGER'S GROUP	10	10	1	1	11	11
PRODUCTION	6	6	4	4	10	10
PUREX	43	42	273	273	316	315
REDOX	51	52	296	293	347	345
FINISHED PRODUCTS	65	65	429	424	494	489
POWER AND GENERAL MAINTENANCE	44	43	295	293	339	336
FINANCIAL	21	21	55	53	76	74
FACILITIES ENGINEERING	77	77	32	32	109	109
RESEARCH AND ENGINEERING	79	76	24	25	103	101
EMPLOYEE RELATIONS	32	32	58	58	90	90
	428	424	1467	1456	1895	1880

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CHEMICAL PROCESSING DEPARTMENT

PATENT SUMMARY
FOR
MONTH OF DECEMBER, 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>
C. R. Anderson	Self Induced Vapor Lift Circulator for Reactors.
C. R. Anderson	An Elutriation Type Classifier and Separator for Slurry Homogeneous Reactor Fuel Recovery and Separation of Fission Products.
C. R. Anderson	Accretion Process for Preparing Particulate Heterogeneous Fuel Elements for a Nuclear Reactor

GENERAL MANAGER
 CHEMICAL PROCESSING DEPARTMENT

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CHEMICAL PROCESSING DEPARTMENT
PRODUCTION OPERATION

December, 1956

I. RESPONSIBILITY

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

II. ACHIEVEMENT

A. Production Statistics

Production commitments for all plants, with the exception of TBP, were either met or exceeded. Output from TBP was lower than forecast due to near depletion of feed material in the few metal waste storage tanks yet to be emptied in the 200 West Area. Successful operation of three continuous calciners in conjunction with the electrically fired pots resulted in record production from the uranium oxide plant and reduced the backlog of feed uranium nitrate to approximately 150 tons.

1. Purex Operation

	<u>December</u>	<u>November</u>
Tons Uranium delivered to storage	279	272
Average Production Rate per operating day (tons)	14.6	12.95
Average yield, %		
Uranium	99.48	98.0
Plutonium	95.06	99.93
Total Waste Loss, %		
Uranium	0.50	0.53
Plutonium	0.77	0.93
Average cooling time (days)	114	108
Minimum cooling time (days)	100	144
Percent time operated	62.4	70.0

2. Redox Operation

	<u>December</u>	<u>November</u>
Tons Uranium delivered to storage	247	278.5
Average Production Rate per operating day (tons)	9.7	9.9
Average yield, %		
Uranium	101.7	101.5
Plutonium	112.2	107
Total Waste loss, %		
Uranium	0.23	0.26
Plutonium	0.26	0.27

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2. Redox Operation (Continued)

	<u>December</u>	<u>November</u>
Average cooling time (days)	114	137
Minimum cooling time (days)	90	114
Percent time operated	82.2	93.6

3. 231

	<u>December</u>	<u>November</u>
Batches started	178	219
Batches completed	182	220
Batches awaiting processing	0	0
Average yield, %	94.7	92
Average purity, %	99.5	98.7

4. 234-5 Operation

	<u>December</u>	<u>November</u>
Batches completed through Task I	296	328
Batches completed through Task II	317	335
Runs completed through Task III	178	201
Reduction yield, %	99.77	98.21
Waste Disposal (units)	310.66	380.17

5. UO₃ Operation

	<u>December</u>	<u>November</u>	<u>To Date</u>
Uranium drummed (tons)	327.48 UA	134.06 UA	18,387.33
	535.07	547.91	)
Uranium shipped (tons)	667.02	658.25	18,096.73
Average cooling time (days)	120	143	
Minimum cooling time (days)	96	120	
Waste Loss, %	0.01	0.01	

6. TBP Operations

	<u>December</u>	<u>November</u>	<u>To Date</u>
Tons received from Metal Removal	66.72	110.34	8,015.88
Tons shipped to UO ₃ Plant	67.48	108.52	7,758.36
Average Production Rate per operating day (tons)	3.50*	3.79	
Average yield, %	95.26	97.52	
Total Waste Loss, %	1.81	1.85	
Percent time operated	83.7	95.42	

* Based on 5-day week production schedule effective 12-15-56.

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7. Power

	<u>200 East</u>	<u>200 West</u>
Raw water pumped, gpm	5,564	5,435
Filtered water pumped, gpm	623	1,285
Steam generated, lbs/hr.	228,000	277,000
Maximum steam generated, M lbs.	111,510	145,502
Coal consumed, est. (tons)	6,952	9,816

8. Waste Storage

	<u>Equivalent Tons U</u>	
	<u>December</u>	<u>November</u>
Redox Waste reserve storage capacity	2,204*	1,607
Purex Waste reserve storage capacity	5,207*	1,871

* Based on an allowance for a reduction in waste volume by self-concentration.

B. Production Planning and Scheduling Operation

Production planning and scheduling activities centered around the following:

1. Participation by specialists in reviews conducted by Facilities Engineering to establish items to be included in FY 1958 Construction Budget.
2. Planning of schedules to be used when both primary separations plants will be processing only high g/t material starting late in January. The main problem involved is development of schedules designed to distribute and time production through the separations plants, so that each can run without break in operation for at least three weeks each month without peaking loads on the 234-5 facility to the extent that operation in excess of five days per week will be forced.
3. Laying the groundwork with IPD and the Purex Operation for a test of loaded cask washing as a contamination control measure.
4. Completion of a report consolidating predicted effects of new Top Secret criteria on CPD activities.
5. Cooperating in a literature research on the utilization of fission products with the view of determining possible markets for fission products.

C. AEC Liaison

J. H. Warren, Manager, Production Operation, attended an AEC Scheduling Meeting held in Washington, D.C. on December 18, 1956.

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D. Essential Materials

Significant items accomplished relating to essential materials are as follows:

1. Development of procedures, mutually satisfactory to the General Chemical Company and the General Electric Company, for unloading liquid chemical trucks were continued.
2. Arrangements were almost completed to receive 50% caustic soda via tank truck from bulk storage maintained in Pasco, Washington by Pennsylvania Salt Manufacturing Company. Savings of approximately \$2.85 per ton over costs presently paid for caustic received by railroad tank cars are expected.
3. During October and November, essential material inventories were reduced by almost \$168,000. Reductions occurred at the TEP plant in anticipation of the imminent shutdown of that facility and at the Redox plant.

E. Reports and Documents Prepared

Prepared and Issued

HW-47052	CPD Waste Status Summary Report for November, 1956 D. E. Peterson
HW-47069	Essential Material Consumption - November, 1956, TEP Plant, M. A. Thress
HW-47070 RD	Redox Plant Production Schedules, D. McDonald
HW-47071	Essential Material Consumption - November, 1956, Purex Plant, M. A. Thress
HW-47072	Essential Material Report to Cost and Purchasing, November, 1956, M. A. Thress
HW-47073	Essential Materials Ordered, D. E. Peterson
HW-47074 RD	TEP-UO ₂ Production Schedule for December, 1956, B. F. Campbell
HW-47075 RD	Z Plant Production Schedule for December, 1956, B. F. Campbell
HW-47076 RD	Purex Plant Production Schedule for December, 1956, D. McDonald
HW-47229 RD	Goal Production Forecast, December 3, 1956, B. F. Campbell and D. McDonald

Prepared for Signature and Issuance

HW-47116 Special Recovery Operation, W. E. Johnson/V. R. Chapman,
December 7, 1956

HW-47167 Plutonium Fabrication, W. E. Johnson/J. H. Warren,
December 10, 1956.

XX-1740 Production Forecast - December 1, 1956 to March 31,
1958, W. E. Johnson/V. R. Chapman, December 4, 1956

II. ORGANIZATION AND PERSONNEL

A. Force Summary

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

B. Safety

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

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CHEMICAL PROCESSING DEPARTMENT
PUREX OPERATION

December, 1956

I. RESPONSIBILITY

The new Purex vacuum fractionator (Project CG-598) was accepted on a conditional basis from the Construction Engineering Department for test runs and calibration.

II. ACHIEVEMENT

A. Processing Operation

1. Normal Processing

Plant operations were resumed on December 3, following the November outage, and continued through December 22, at which time processing was suspended for the remainder of the month because of a lack of properly aged metal. Plant operating efficiency was 68 percent for December. The uranium production forecast for the month was exceeded by 1.45 percent. Some improvement in plutonium waste losses was achieved, the months average being 0.77 percent and 0.50 percent for plutonium and uranium respectively. All plutonium and uranium produced during the month met product specifications without rework or silica gel treatment.

A processing rate of C.F. 1.92 was maintained from startup on December 3 until the scheduled shutdown on December 22, except for a three day period near the middle of the operating period when 234-5 Building limitations necessitated a reduction to C.F. 1.44.

2. Special Processing

Approximately 42 tons of non-specification uranium (high gamma content) produced in previous months was satisfactorily reworked through the second uranium cycle equipment by combining rework and normal feed for a new high processing rate of C.F. 2.40 for this equipment. Performance at this rate for the ten day period was entirely satisfactory.

Approximately 250 units of plutonium contained in accumulated flushes of the head end centrifuges were successfully recovered by blending into the pre-decontamination cycle feed stream.

3. Equipment Experience

Operating continuity was threatened during the latter part of the processing period by a rapid decrease in gas flow through the vessel vent silver reactor system. Following completion of the operating

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period it was determined that an internal steam leak in the off-gas heater caused an accumulation of water in the reactor and high pressure drop in the system. Because it is believed that only nominal amounts of I_{131} are being released through the vessel vent system at this time, the vent system will be operated without steam on the heater until it is established that the I_{131} in the system is sufficient to justify operation with the silver reactor.

B. Product and Material Handling

Despite incidental crane outages, the presence of Minor Construction forces in the canyon on the day shift, and insufficient capacity of the silver reactor inlet gas heaters, dissolver and feed preparation activities were able to sustain the C.F. 1.92 extraction battery rates during the early part of the operating period. The initial operation of the third dissolver (C Cell) on December 11, 1956, relieved the tight scheduling situation and also permitted better control of I_{131} emission from the 291-A stack. Prior to that date it was necessary to maintain a 24-hour cycle with the A and B dissolvers and the inadequate heating capacity of the associated silver reactor inlet gas heaters made iodine control difficult. While weekly limits were not exceeded, there were four occasions on which the daily discharge to the atmosphere was in excess of the one curie/day goal.

Continuous operating attention was required to maintain unrestricted transfer of coating waste to the 104-C tank at C Farm. An increasing number of hot caustic flushes were necessary to prevent line pluggage between transfers of waste batches. An alternate routing which will allow better line drainage is under consideration. The present routing contains a fourteen foot liquid trap in a 241-C tank farm diversion box.

Erratic performance of both the scintillation and caustic scrubber types of iodine monitors made current information on I_{131} discharge rather difficult to obtain. At month end, however, the scintillation monitors were in service and appeared to be recording reliably, giving information during dissolving on iodine release.

Operational activity has been increased on the vacuum fractionator system accepted conditionally from Construction Engineering Department near month end. A thorough water flush, leak check, and calibration of the feed tank and fractionator were completed during the month.

C. Radiation Monitoring Operation

1. Radiation Occurrence Experience

Four radiation occurrences were reported in the Purex Operation during the month. Two occurrences involved uranium product contamination spread during tank truck loading operations. One case of skin contamination to a maximum level of 1800 c/m was reported and was readily decontaminated. The fourth occurrence was a skin burn from UO_3 recovered acid. No detectable contamination

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was found in the burn.

2. Personnel Exposure Experience

A maximum radiation level of 450 r/hr. was measured in the F-8 sampler pit adjacent to the valves and piping during preparation for valve diaphragm replacement. A maximum dose rate of 2 r was experienced from this source in placing a stopper in the box drain by remote means. Using water shielding and remote tools, the diaphragm replacement was accomplished at an average dose rate of 500 mr/hr. Decontamination of process jumpers on the canyon deck was performed at personnel dose rates up to 500 mrad/hr, and routine cleanup of process sample hoods was accomplished with maximum dose rate of 3 rads/hr. to the hands.

3. Contamination Experience

The original L Cell plutonium concentrator package, which was repaired during October, was moved from M Cell in a plastic shroud and stored in a box in the burial tunnel extension. This unit, generally contaminated to a level in excess of six million d/m, was moved through the canyon to storage with no detectable spread of contamination. Decontamination of the floor and walls of M Cell, contaminated to six million d/m and 4,000 d/m respectively during the repair operation, is in progress to prepare the cell for use in repairing other vital plant equipment.

D. Maintenance Operation

A Wilfley pump was installed in parallel with the two R Cell (#2 organic system) feed pumps (Pacific) to assure continuity of building operation. The latter pumps have experienced abnormal bearing failures during plant operation to date.

The steam tube bundles of the two acid waste concentrators (F6 and F11), the acid absorber (F5), and the plutonium concentrator (L4) were hydrostatically tested during the December shutdown. No significant leakage was detected. Periodic tests will be continued because of the limited life expectancy of these equipment pieces.

The G-2 interface probe jumper developed a short early in the month and was replaced during the shutdown. Repairs were attempted, but not completed, on the final uranium decontamination (2D) feed stream rotameter. This rotameter was inoperative the entire month. Feed rate was judged from other instrumentation. To permit future projected capacity tests on the 2D column, the trim size of the organic extraction stream diaphragm-operated valve was increased from 1-1/4 to 1-1/2 inches during the outage.

E. Analytical Control Operation

Routine analytical control in support of process was performed until the plant shutdown December 22. During the outage, extensive review

was made of the calibration of the X-Ray Photometer, the recovery values of the solvent extraction method used for determining plutonium in the final uranium product sample, and the fluorimetric determination of uranium in low level waste streams. The methods were found to be satisfactory.

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.)

The new 2D (final uranium decontamination) column, installed during the November outage, has provided the additional decontamination required to produce, on a routine basis, uranium product well within building specifications. Dependence on the TBP Plant and silica gel for final purification of the uranium produced by Purex is now obviated.

An organic system centrifuge was operated at one-half normal speed on a test basis to determine its process efficiency at this value. Analytical results indicate little if any loss in efficiency at the lower speed. The test is to continue for further evaluation.

The concentration of carbonate in the organic wash solution was increased from 2-1/2 to 5 percent. The resulting decreased volume of carbonate waste permits greater utilization of the heat content in the stored fission product wastes for self concentration. No deleterious conditions are apparent as a result of this flowsheet change.

The scrub flow to the 2A (final plutonium decontamination) column was reduced incrementally by 40 percent to determine the decontamination performance of the column scrub section. This change was to explore the possibility of increasing column capacity by reducing the length of the scrub section. Results were not encouraging and the scrub flow is being returned to normal.

2. Inventions and Discoveries

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

G. Events Influencing Cost

The limited supply of properly aged irradiated metal permitted operation of the plant for only 62.4 percent of the available hours in the month. Accordingly, product unit costs are higher than for a period in which an ample supply of metal is available.

In addition to advantages gained in the elimination of the need for silica gel treatment of uranium product, the increased decontamination efficiency of the new 2D column permitted satisfactory rework of about

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42 tons of out-of-specification uranium product produced in previous months and stored for rework. Without the benefit of the new column this material would have to be reprocessed through TBP at a cost of approximately \$200/ton. Incremental cost of reprocessing through Purex was estimated at \$8.00/ton.

Operation of the process at the increased rate (capacity factor of 1.75) during the month achieved the forecasted production commitment in a minimum of time. Three-fold benefits were derived: 1) The maximum number of personnel (87 percent) observed the Christmas holiday; 2) the labor cost was reduced proportionately and; 3) needed maintenance work was performed without resorting to overtime.

H. Plant Development and Expansion

1. Recovered Acid Facilities

Instrumentation and piping modifications required to use UO_3 recovered acid in the 2D (final uranium cycle) intermediate scrub stream were completed during the month. A shipment of recovered acid was received and initial use of the material will probably take place in January.

2. Vacuum Acid Fractionator

The Purex vacuum acid fractionator (Project CG-598) was accepted conditionally from Construction Engineering on December 21, 1956. Equipment calibrations are in progress and functional tests have been scheduled so that the unit will be on the line by the February 1, 1957 target date.

I. Reports Issued

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

III. ORGANIZATION AND PERSONNEL

A. Force Summary

	<u>Exempt*</u>		<u>Other</u>		<u>Total</u>	
	<u>11-30</u>	<u>12-31</u>	<u>11-30</u>	<u>12-31</u>	<u>11-30</u>	<u>12-31</u>
Processing	7	7	75	77	82	84
Product & Mat'l Handling	7	8	64	65	71	73
Maintenance	9	9	66	65	75	74
Radiation Monitoring	7	7	19	19	26	26
Analytical	12	10	48	46	60	56
General	2	2	1	1	3	3
Total	<u>44</u>	<u>43</u>	<u>273</u>	<u>273</u>	<u>317</u>	<u>316</u>

* Includes Manager - Purex Operation

B. Safety

There were no disabling injuries during the month of December. Eleven medical treatment injury cases were reported, including two near-serious injuries. The first near-serious injury occurred on December 5 when a Maintenance pipefitter received a nitric acid burn in the corner of his left eye. This accident was investigated on December 6 and Safety Investigation Report CPD 56-5 was issued. The second incident occurred on December 13, when the tip of an operators left middle finger was severely pinched. This accident was investigated on December 18 and is covered in Safety Investigation Report CPD 56-6.

C. Security

There were no security violations during the month.

D. Personnel Activities

Operator training is being intensified on the vacuum acid fractionator equipment in anticipation of the target startup date - February 1, 1957.

Harvey Tenny, Junior Chemist, was transferred to the Hanford Laboratories Operation, effective December 1, 1956.

On December 10, Jack Mee, Process Chemist, attended a special seminar in the 300 Area on the Hanford Methods of Beta and Gamma Counting.

OC Schroeder

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CHEMICAL PROCESSING DEPARTMENT
REDOX OPERATION

DECEMBER, 1956

I. RESPONSIBILITY

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

II. ACHIEVEMENT

A. Processing Operation

1. Production Rates and Operating Continuity

The Redox Operation production commitment for the month of December was exceeded by 5%, and represents the completion of the current low MWD production program. The material in excess of commitment represents dissolver heel removals and miscellaneous low MWD material acquired from the 100 Areas.

The facility equipment performance was above average during the month and a mechanical efficiency of 95% was achieved during the period. Only two 202-S Building shutdowns were necessary due to equipment failures. On 12-6-56 the facility was shut down for 27 hours to replace a condensate outlet jumper from one of the D-12 waste concentrator tube bundles which was leaking at the trap flange. On 12-28-56 the facility was again shut down for 13 hours to replace the F-1, 2DF feed tank pump which developed a leak at the top seal.

Processing operations in the facility were normal during the major portion of the month. However, during the latter part of the month, significantly high I^{131} emissions occurred during metal dissolution and for the period 12-20-56 through 12-24-56 dissolving was discontinued due to the lack of properly aged metal. Processing operations were subsequently shut down for a 93 hour period (12-24 through 12-27-56) due to lack of feed. Although the dissolver silver reactors were regenerated, this did not materially help since "green" metal (supposedly 94 day cooling) was being processed. A total of 85.8 curies of I^{131} was emitted during the dissolution of the "green" metal.

The 1A and 1S columns were alternately given a 10% nitric acid flush on 12-17-56 and 12-18-56 when flooding became excessive. Processing rates during the flushing period were reduced to one-half of normal, as only one of the precycle columns could be kept on the line during flushing.

All of the final uranium and plutonium streams were within shipping specifications the entire month. All waste batches sent to the tank farms were within normal throw-away limits.

2. Equipment Experience

a. H-2 Centrifuge

On 12-1-56 a leak developed in the hydraulic system controlling the skimmer mechanism on the H-2 centrifuge. Since the hydraulic oil leakage to the H-Cell sump was felt to have a detrimental effect upon the process, the hydraulic system was converted so that water might be used instead of oil. Operation of the centrifuge skimmer has subsequently been satisfactory and the small water leakage to the cell sump has not been significant. A similar installation in the 221-T Canyon Building during its operation extended the life of a centrifuge approximately one year.

b. D-12 Tube Bundle Jumper (D-12-DW)

On 12-4-56 a leak developed at the trap flange in the condensate outlet jumper from the right hand tube bundle in the D-12 waste concentrator. The trap in the left hand tube bundle condensate outlet jumper was also found to be stuck in the closed position. New jumpers were fabricated and on 12-7-56 a 27 hour process shutdown was taken for installation. The unit is now operating in a normal manner.

c. Waste Concentrator Tower Plugging (D-12 Tower)

During the first part of the month, it appeared as though the D-12 tower was plugging as the tower differential pressure was abnormally high and the pot vacuum abnormally low. As processing continued and the general process leveled out this trouble disappeared to a large degree. This may, in part, be attributed to a 10% HNO₃ flush which was given the D-12 tower while the condensate jumpers were being fabricated and installed. (Item b)

d. H-8 to H-7 Jet Failure

On 12-11-56 the transfer jet between the H-8 metal solution storage tank and the H-7 metal solution blending tank failed due to a plugged dip leg. All efforts to free the plug by normal back flushing techniques failed, so a new assembly was installed. The change out of this assembly was made without any loss of production.

e. D-5 Coil Outlet Jumper

On 12-26-56 the condensate outlet jumper on the D-5 waste condensate hexone stripper failed due to a plugged line. All

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efforts to dislodge the plug failed and on 12-27-56 a new jumper was installed. The installation was made without the loss of production as the building was shut down for the lack of properly aged metal.

f. J-5N Vessel Vent Filter

During the latter part of the month, the differential pressure on the J-5N nitrogen blanketed tank vent filter was noted to be gradually increasing, thus denoting a blinding of the filter media presumably by condensed water vapors. The original design on this system included an inert gas purge heated to 300°F. However, the inert gas has had such a high impurity content (oil and iron oxide) that it was felt that purging the filter with this gas would do more harm than good. As the differential pressure increased, it became evident that the heated gas purge was necessary. After careful calculations to assure that a safe inert gas content would remain in the filter, 10 cfm of clean, dry instrument air was piped through the heaters to the filter. This installation was made on 12-23-56 and it now appears that the filter media is slowly drying out as a gradual decrease in the differential pressure across the J-5N filter has been noted.

g. Dissolver Vacuum

Trouble was experienced with low vacuum on the A-2 and B-2 dissolvers during mid-month and coincided with an operational test program on the recently overhauled individual dissolver off-gas iodine monitors. Part of the trouble was traced to caustic from the iodine monitor scrubber system being sucked back into the dissolver vent lines. Since the small amount of caustic lost from the scrubbers in this manner could not entirely account for the plugging of the vent lines, it has been theorized that the vent lines may be partially plugged with a coating of NH_4NO_3 which is a product of the coating removal operation. A³ purge of the dissolver vent lines is contemplated during the January shutdown.

h. F-1 Pump

On 12-28-56, the F-1 feed pump to the 2D partition column developed a significant leak at the top seal. The pump was replaced on this same date and subsequent operation has been satisfactory.

B. Product and Material Handling Operation

1. Production and Operating Continuity

Product concentration in the 233-S Building continued uninterrupted through 12-24-56 when the facility was shut down

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for replacement of the L-1 feed pump. This installation was accomplished without any loss of production since it coincided with a 202-S Building shutdown. All UNH received from the 202-S Building during the month met shipping specifications. A total of 1,487,000 pounds of UNH were received in storage and 2,279,000 pounds were shipped to the 224-U Building.

2. Equipment Experience

The L-1 concentrator feed pump failed on 12-19-56. Replacement was deferred to coincide with a scheduled 202-S Building shutdown at month-end. During the interim period, operations were continued by using a spare transfer jet.

Rerouting of the waste stream from the D-8 tank was necessary during November because of plugs which developed in the two waste lines normally used. Five attempts were made this month to break the plug in one of the lines between the 241-S-151 and the 241-SX diversion boxes, but all were unsuccessful. High pressure steam, high pressure water, and a four percent hot caustic solution under pressure have all been tried with no success. Preparations are now under way to attempt unplugging the lines with a "go-devil" reamer.

Power outages of very short duration occurred on three occasions during the month. Several of the ventilation fans failed; however, the fans were restarted without any air reversals being experienced.

On 12-11-56 Minor Construction tied into the medium pressure steam at the 291-S Building to provide a steam supply for the stack gas sampler at this location.

3. Process Waste Handling

The D-8 waste stream was diverted from the 109-SX to the 112-SX tank on 12-3-56, when the 109-SX tank had been filled to capacity.

A total of 142,000 gallons of condensate collected in the 106-SX tank from the boiling waste tanks was pumped to the cribs on 12-7-56.

4. Bismuth Phosphate Plant Standby and Lay-Away

a. Standby Operations

Pending receipt of a directive from the A.E.C. to permanently lay-away the Bismuth Phosphate Plants the B and T Plant Canyon Building equipment is continuing to be 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.

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b. T Plant Lay-Away

Except for the instruments necessary to follow the routine water flushing program, instrument lay-away in the 221-T Canyon Building is complete. Canyon clean-up and decontamination is 85% complete and 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 blanking the cell blower fans in the pipe gallery. Instrument lay-away in the 221-B Canyon Building is 90% complete and blanking of lines to the canyon cells is now 35% complete.

During the month, all remaining 60% nitric acid was transferred from the storage tanks in the 211-B Tank Farm Area to other CPD components.

C. Maintenance Operation

1. Operating Continuity and Equipment Replacement

The facility operated at a mechanical efficiency of 95% during the month. On 12-6-56, the process was shut down for 27 hours to replace a leaking condensate outlet jumper from one of the D-12 waste concentrator tube bundles. On 12-28-56, the process was again shut down for 13 hours to replace the F-1 feed pump to the 2D partition column which had developed a leak at the top seal. One small chem-pump and three additional jumper replacements were also made during the month but no lost processing time was involved.

2. Inspection and Maintenance

A total of 250 inspection cards were issued during the month, of which 181 were returned by the respective foreman together with 68 cards from November. The improvement made in November's performance was maintained during December and at the present time only 80 inspection cards are outstanding. Arrangements are being made to complete these early in January.

Numerous difficulties have been encountered in the past with the servicing of instruments in the Tank Farm Areas due to a lack of information, operating manuals, and blueprints. Many of these difficulties were cleared up this month through consultations with Harold Copeland, of the Facilities Engineering Operation, who provided sources of information and several helpful suggestions. The Brown Multiple Temperature Recorder, which has given the most trouble, is now operating satisfactorily.

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The Republic Transmitters, in the dissolver off-gas Iodine Monitoring System, were rebuilt this month as a part of the program to place the Iodine Monitors in satisfactory operating condition. Internal corrosion of the transmitters had been observed and was apparently due to an improper valving procedure. A new valving procedure has now been prepared and should eliminate a recurrence of this condition.

In the 222-S Building Laboratory a major overhaul was made on the No. 4 Ingersoll Rand vacuum pump. During this overhaul, the base was machined to improve gasket surfaces, the oil system was changed from a splash to a forced feed system, an oil cooler was installed, and the crank case venting system was revised to prevent oil vapor from exhausting into the room. These changes will improve the operation of the pump as well as remove a potential fire hazard.

D. Analytical Control Operation

1. Control Statistics

<u>Month</u>	<u>Samples</u>	<u>Determinations</u>
November	3397	9101
December	3297	7622

2. Building Maintenance

Principal 222-S Building maintenance included the replacement of twelve dust-stop and seven C.W.S. filters in the various laboratory rooms, change of dry filters in air supply units #3 and #4, freeing of a plugged condensate line in the service tunnel, overhaul of the #4 Ingersoll Rand vacuum pump, installation of all-weather conduit to the cell vent fan at the 291-S Building, replacement of a broken V belt on the No. 8 building exhaust, and installation of a partition in Room 1B to provide more space for a tenant.

3. Waste Disposal

7,588 gallons of 222-S Laboratory waste were transferred to the 202-S Building for storage. 5,380 gallons of low level 222-S Laboratory waste and 90,000 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. Equipment Experience

Four days down time were experienced with the mass spectrometer during the month. Loose electrical connections in the isatron source caused the outage.

5. Assistance to Process

The addition of sulfuric acid to material being processed through the continuous calciners at the Uranium Reduction Plant to improve reactivity and physical characteristics of material has necessitated considerable analytical work. Requests for sulfate determinations on nitric acid in the recovery system were met by adoption of a relatively simple turbidimetric method. However, requests for sulfur determinations on the UO_3 powder increased to an appreciable work load during the month. These results are important for process control and necessary for application to the gravimetric uranium assay. Since the available method is time consuming and requires considerable care, a faster method for use on lot samples is now being investigated.

6. General

A new customer, Industrial Hygiene of the Relations and Utilities Operation submitted several samples for uranium assay by the fluorimetric procedure.

A series of standard determinations were performed as an aid to the Purex Laboratory in resolution of an apparent bias in the uranium calibration of their X-Ray instrument.

E. Radiation Monitoring Operation

1. Radiation Occurrence Experience

Twelve Radiation Occurrences were reported during the month, reflecting the sharpest deviation from satisfactory radiation control in 1956 for a one month period. One occurrence involved a localized exposure approaching the permissible limit when a radioactive particle deposited on an employee's neck, during cask car decontamination work and went undetected for an estimated period of more than two hours. The localized exposure was estimated to not exceed 420 mrad and was so recorded in the employee's exposure file. Dust-type contamination was a major contributor to the undesirable radiation control, and steps were taken during the month to improve the overall control. The efforts to improve control were apparently effective inasmuch as no radiation occurrences were recorded after the 20th of the month. The 222-S Analytical Control Operation continued their excellent radiation control experience with no loss of control reported.

2. Personnel Exposure Experience

Skin and personal clothing contamination experience paralleled the radiation occurrence experience with 11 skin contamination cases and 9 cases of personal clothing contamination. In only one instance of clothing contamination was it necessary to reimburse the employee for the confiscated articles.

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3. Other Contamination Experience

Decontamination work on the second aqueous makeup level proceeded well, by chipping portions of the wall and floor which was contaminated, and by re-caulking the contaminated edges of the viewing windows. The 2nd AMU level should be restored to normal early next month.

Decontamination work in conjunction with Project CG-621 (Redox Contamination Control) was accomplished in both emergency entrances to the canyon, in order that Minor Construction forces could install flashing around the doors. Radiation levels up to 6 rads/hr at 18 inches were encountered just inside the west door to the canyon. Construction work on the flashing has proceeded satisfactorily since moderate amounts of decontamination were accomplished.

F. Improvement Experience

1. Process and Equipment

The silo craneway air sampler was removed from the 7th level sample gallery and relocated in the operating gallery. This change was made so that Radiation Monitoring personnel would not have to dress in SWP clothing to collect a routine air sample.

As the result of a formal suggestion, one-half inch orificed by-pass lines were installed around the condensate traps from the preheat coils in all the 202-S Building air conditioning units. This was done to prevent freezing of the traps and preheat coils during severe winter weather.

As a result of the experience gained during the replacement of the L-3 recirculator and tube bundle in the 233-S Building during November, a new type lucite panel has been installed at five locations in the 233-S Building Greenhouse. These panels have a flanged opening which will facilitate installing plastic barriers to permit contact maintenance of the Greenhouse equipment.

Two permanent flushing nozzles were installed at strategic locations in the 233-S Building Greenhouse panels to facilitate flushing of the Greenhouse floor. The new installation should eliminate a potential source of contamination since previous floor flushing was accomplished by inserting a flushing wand through the ventilation louvres in the Greenhouse panels.

Improvements were made this month to the sulphuric acid handling system located on the 3rd level AMU. The original system consisted of two drums of sulfuric acid hooked to a common manifold which in turn was piped to the demineralizer

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located on the 2nd level AMU. When it became necessary to change the empty drums, full ones were loaded on portable barrel racks in the Maintenance Shop by using the overhead chain hoist and then transported to the 3rd level and hooked up to the manifold. The new installation now provides a spare tank located on the 3rd level and a syphon system from a drum located on the 4th level, thus eliminating the use of the barrel racks and permitting the drums to be emptied from an upright position. A manometer permits the operator to determine the liquid level without the assistance of a craftsman to disconnect the piping.

2. Inventions and Discoveries

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

G. Events Influencing Costs

A contract was negotiated this month with the Pennsylvania Salt Manufacturing Co., for the delivery of sodium hydroxide by tank trucks instead of tank cars. This change will result in a savings of \$2.85 per ton or a conservatively estimated savings for the Redox Operation of \$10,000 per year. The caustic will be delivered from Pasco, Washington and will arrive at the Redox Plant hot and ready to pump. This will eliminate long periods of heating which have been necessary when pumping from tank cars; thereby, eliminating potential demurrage charges which on occasion have been experienced in the past.

Indications are that the J-6-E precondenser on the Condenser Vent System filter is recovering approximately \$35.00 worth of hexone per ton of material processed. Based on normal building production this would amount to an annual savings of approximately \$100,000.

A concerted effort is being made to run the process streams at minimum possible salting strength compatible with good operating techniques. During the month, the 2DA stream was reduced from 25 to 15 flows with no detrimental effect on the process and the ANN butt to the E-1 solution was eliminated by adjusting the molarity of the 2AS and 3AS streams. Since these changes were made late in the month, it is too early to determine the actual savings involved.

H. Plant Development and Expansion

1. Design Liaison, Construction Checking

CG-621, Redox Contamination Control

A new project proposal, Revision 3, dated December 12, is now being circulated for approval. This revision purposes cancellation of the E-13 vessel and gamma monitor, cancellation

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of H Cell equipment replacement, and the closing out of the project on December 31, 1956 with exceptions as follows: minor testing, painting, water tie-ins, sealing of craneway joints and hose reel installation on the canyon wash-down facilities. The utilization of Redox personnel, during January shutdown, in decontaminating the tar joints will expedite completion of the project.

CG-653, Redox Cooling Water Segregation

Because of interference problems experienced with equipment previously designed, a recheck of jumper design has been made and it revealed considerable cell interferences and dimensional differences. Eleven jumpers already built are being redesigned and must be altered or rebuilt at the shop. While involving additional cost the changes should not delay project completion in January.

CG-636, Redox SWP Service Area

An unexpected high estimate of \$117,000 was received, which brings the construction cost to \$53 per square foot. This figure does not enhance the possibility of this project being approved.

P-77, Maintenance, Equipment and Dry Chemical Storage Facility 202-S Building

A revised estimate of \$108,000 has been made, based on the exclusion of a fixed price contractor from certain portions of the work. This figure includes \$1,000 for transferred capital property in the form of a paint spray booth from the 222-S Building.

P-89, Cask Car Decontamination Facility

For the past month, this proposal has been dormant. Approval is being held up awaiting results of a test to determine if washing out casks prior to shipment will overcome the contamination problems on well cars.

P-99, Sealing of the Silo Lights and Windows

Design of the new proposed type bazooka light has been held up due to higher priority design on cask car buckets and water segregation jumpers.

CG-624, Redox Railroad Tunnel Ventilation Barriers

A project proposal requesting extension of the completion date to March 31, 1957, has been approved. Work to be completed consists of alignment, adjustments, and installation of the door drive mechanisms. The continued short time limits to-

gether with limited access periods have made it impossible to meet the current directive completion date of December 1, 1956.

CG-648, Redox Auxiliary Iodine Removal and Nitric Acid Recovery Facilities

Pouring of concrete for the walls and cover slabs is complete. Installation of the instrument and electrical conduit to the 202-S Building outside wall is complete except for backfilling. Project Engineering has agreed to the rerouting of the nitric return line from the J-5 vent to a new line direct to the north sample gallery. This change of design will effect a savings of from \$1,500 to \$2,000 and will accomplish the following: (1) Eliminate the potential of mixing nitric acid and hexone in either the 191 tank or the D-13 vessel. (2) Save the installation of 2 jumpers in J Cell and eliminate acid under pump pressure in this cell. (3) Allow pumping of 293-S Building recovered acid to the proposed 294-S Building storage tanks which are to be used for 224-U recovered nitric acid. This will permit greater flexibility in the recovered nitric acid storage facilities and in case blending of the two acids is necessary to meet required concentrations, this will be possible.

I. Significant Reports Issued

None

III. ORGANIZATION AND PERSONNEL

A. Force Summary

<u>Component</u>	<u>Exempt</u>		<u>Other</u>		<u>Total</u>	
	<u>11-30</u>	<u>12-31</u>	<u>11-30</u>	<u>12-31</u>	<u>11-30</u>	<u>12-31</u>
General	2	2	1	1	3	3
Maintenance Oper.	10	11	55	53	65	64
Prod. & Mat'l						
Handling Oper.	12	11	70	71	82	82
Processing Oper.	7	7	79	77	86	84
Rad. Monitoring						
Oper.	5	5	22	22	27	27
Analytical Labor-						
atory Oper.	16	17	72	69	88	86
	<u>52</u>	<u>53</u>	<u>299</u>	<u>293</u>	<u>351</u>	<u>346</u>

B. Safety

The best medical treatment injury record for the year 1956 in the Redox Operation was established during the month of December. Only three medical treatment injuries occurred among the 346 employees.

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Considerable attention was given in all Redox Operation safety meetings to the "Back The Attack On Traffic Accidents" campaign. Four motion picture films were shown and particular emphasis was placed on "wanting to be safe" in order to control traffic accidents.

An unusual situation was experienced in the 222-S Laboratory during the opening of a new reagent container of cobalt fluoride when a pressure release caused a thin layer of the powder to be deposited over the chemist and the area in front of the working hood. This material is a strong oxidizing agent and is particularly hazardous since hydrolysis yields hydrofluoric acid. Prompt use of water in copious quantities prevented possible injury. A special procedure covering the opening of containers of this material has been prepared and forwarded to the CPD, Health and Safety Operation, for publicity purposes.

A small fire occurred in the freight elevator pit in the 202-S Building when hot slag or sparks from a welding job in the elevator cab dropped into the pit. The fire was quickly extinguished by an operator with a water hose and no damage resulted. To prevent a recurrence of this type incident, a procedure has been set up to inspect the elevator pit for flammable material before any welding work is done at or near the elevator pit. In addition a routine monthly inspection of the elevator pit has been set up.

C. W. S. filters of the approved fire retardant type were installed in seven hood locations considered to have the most probable fire hazard potential in the 222-S Laboratory.

C. Security

One security violation occurred during the month when two classified documents were left on top of a file cabinet in the 271-T Building. On the basis of this violation, the handling of all classified documents has been carefully reviewed with all personnel involved.

D. Personnel Activities

E. L. Kelley, M-1856-6735, and H. L. Maxfield, M-3906-6730, who were loaned to the Uranium Oxide Operation on a temporary task force basis on November 26, 1956 returned to the Redox Operation on December 26, 1956.

On 12-1-56, O. D. Erlandson, M-1344-6757, transferred from the Redox Contact Engineering group to the Research and Engineering Operation.

D. L. Uebelacker, M-15344-6767, attended the "Management Orientation program on December 7 and 10.

Seven employees attended the "CPD Process and Equipment Orientation" program as presented by the Personnel Development and Communication Operation.

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Messrs. S. J. Brady, J. L. Bloom, J. W. Crane, and J. S. Steller of the University of California Radiation Laboratory, Livermore, California visited the Redox Plant during the month. They were interested in Hanford capabilities in the recovery of Neptunium²³⁷ and specifically the use of the Redox and Purex Plants on a possible production scale.

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CHEMICAL PROCESSING DEPARTMENT
FINISHED PRODUCTS OPERATION

DECEMBER 1956

I RESPONSIBILITY

There were no significant changes in the responsibilities assigned to the Finished Products Operation.

II ACHIEVEMENT

A. Metal Finishing Operation

The 231 Building processed plutonium originating from the Redox Plant. Most of this material was isolated and loaded to sample cans for shipment offsite as plutonium nitrate. A small amount was converted to plutonium oxalate for subsequent processing in the 234-5 Building and fabrication into plutonium shapes. All phases of the operation progressed smoothly and production commitments were met without difficulty.

B. Product Recovery Operation

A record total of eighty dissolver runs were made. The entire backlog of casting crucibles was eliminated as of December 27, at which time efforts were directed towards the elimination of the fluoride powder backlog. Recoveries on the casting crucibles were extremely low (approximately 20% of the charge-in value). Accountability experience gained during this processing will be used in the future to assist in assigning a more accurate value to casting crucible fragments.

In the solvent extraction section waste losses were sharply reduced, throughput rates were increased to 2112 liters per day and operating efficiency was upped to 91.3%. The throughput rate and the operating efficiency were the highest achieved since Recuplex startup.

Recovery of plutonium metal scrap was curtailed somewhat during the month while personnel were loaned to the UO₃ Plant to assist there in start-up problems with new equipment. In spite of this, and the fact that the Hood 41 dissolver pot failed and was replaced, approximately 16 kg of plutonium was recovered and returned to the RMA Line for processing.

Operation and control of power and ventilation equipment was normal during the month.

C. Maintenance Operation (Z)

In the RMA Line, maintenance work was generally of a routine nature during the entire month. In Task I, an improved lid filter was successfully installed on each of the boat stations. Also in Task I, considerable difficulty was experienced with ruptured diaphragms on the air operated valves. In Task II repairs were necessary to numerous heating elements. In Task III limit switch difficulties were experienced. In Task IV difficulty was encountered with heating elements and faulty thermocouple wells. In Task V lathe difficulties requiring bearing replacements were experienced. In Task VII difficulties were encountered with defective heat traps.

In Recuplex maintenance problems were also routine with no significant items noted.

Elsewhere in Z Plant maintenance work was routine and was concerned principally with repairs and replacements to steam lines and ventilation equipment.

D. Analytical Control Operation

A sufficient number of samples were analyzed and the Analytical precision was such that the statistical requirements on all models were met.

The December commitment of finished parts through Final Inspection was completed with ease and enough material is on hand in various stages of inspection at month end so that a steady rate of completion is assured well into the coming month. Rejects amounted to only 7% of the total number of parts received.

The sample exchange program between HAFD and Rocky Flats continues and results will be reported ultimately by the Research and Engineering Operation.

E. Metal Recovery Operation

Continually declining feed supply resulting from tank cleanout activities in the Metal Removal Operation limited production to less than 70 Tons in the Metal Recovery Operation during December. Gross production was over 86 Tons, the balance being rework material from the 224-U Building.

Several mechanical difficulties developed early in the month but these difficulties had no adverse effect on overall production. Three pump failures occurred, among which was included the 002-WR waste pump.

On December 10 the Metal Recovery Operation discontinued the seven-day work week in favor of a five-day schedule. This change was made possible by the cleanout status of the Metal Removal Operation and has resulted in no delays for that operation. The week-end shutdown of the solvent extraction batteries has not resulted in any unusual process or equipment difficulties.

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DECLASSIFIED**F. Metal Removal Operation**

Sluicing operations were discontinued in the 103-U and 105-TX tanks due to low recovery rates and were resumed in the 106-U and 101-TX tanks. However, subsequent removal rates were not sufficient to maintain 221-U Building operations at a three to five Ton per day rate. Sluicing operations were discontinued in the 106-U and 101-TX tanks and resumed in the 107-TX tank where removal rates proved to be satisfactory. Sluicing operation at the UR farm is shut down indefinitely due to failure of the 001-UR slurry accumulator tank.

Dual sluicing was completed in the 101-T and the 108-TX tank during the period. The 101-T and the 108-U tanks were inspected and declared empty during the month.

Ditching of TBP non-cribbable scavenged waste was continued until the middle of the #13 trench was filled.

The in-farm scavenging program remains suspended due to lack of manpower.

G. Uranium Oxide Operation

Overall production of uranium oxide powder was approximately 131% of commitment with continuous calciner powder representing about 38% of total production. Three continuous calciners operated the entire month except for short shutdowns for repairs to diaphragm operated offgas valves, filter changes, and one oil seal leak. Average rates ranged from 3.4 Tons per day on H calciner up to 6.8 Tons per day on G calciner for a short period.

The backlog of UNH was reduced to less than 150 Tons by the combined operation of three continuous calciners and the electric and gas fired pots.

The continuous calciners remain down after December 24 for repairs to G and H unloading weirs and to J calciner bearing oil seal. K Cell calciner was readied for operation at month end and a revised star valve had been calibrated and tested for use on this calciner.

H. Maintenance Operation (U)

In the Tank Farms one Nagle sludge pump and one 125 h.p. Johnson sluice pump failed during the month.

In the WR vault the modified 001-WR pump, installed in the 002-WR position last month, failed mechanically and was replaced with a conventional 001-WR pump. In spite of numerous studies and changes as recommended by Engineering, this waste pump continues to be the source of more difficulty than any

H. Maintenance Operation (U) Cont'd.

other unit within the operation. Average operating life of a pump at this location has been less than two months during the past two years.

In the 221-U Canyon, during the month, four pump failures were experienced. One agitator and four pumps, which had previously failed, were repaired, tested and made available for service. Lay-away activities at 211-U and 221-U were continued during the month.

In Uranium Oxide Operation, ED-1 concentrator bottom was removed and regasketed. Class A overhauls on two electric calcinator pumps were completed. Approximately 100 unloading nozzles and ten bent or broken agitators were repaired.

In the 224-UA Building considerable maintenance has been required on the G, H and J Cell continuous calciners, largely directed towards the maintenance of shaft seals. Frequent cleaning of the continuous calciner feed rotometers has been necessary. Six feed rotometer transmitters have been replaced due to diaphragm failure from heat. New high temperature diaphragms have been ordered from the vendor for all the feed transmitters.

I. Radiation Monitoring Operation

Fifteen radiation occurrences were documented in December as compared to ten in November. The breakdown of occurrences among the different operations is as follows: Metal Finishing - none, Product Recovery - one, Analytical Control - none, Maintenance (Z) - three, Radiation Monitoring - none, Metal Recovery - none, Metal Removal - three, Uranium Oxide - seven, and Maintenance (U) - one.

Nineteen cases of skin contamination were detected in December as compared to twelve cases for November. Ten of the cases occurred in 224-U Building, four in the Tank Farms, and five in Z Plant.

J. Improvement Experience

1. Process Tests and Revisions

Information relating to this item will be covered in the Research and Engineering portion of the Department report. Other information containing Weapon Data will be covered in a separate report to be written at a later date.

2. Miscellaneous Improvement Items

In the RMA Fabrication Line the installation of improved type lid filters at Task I boat stations has reduced filtering time and decreased the frequency of filter changes.

In Recuplex the installation of blanks in recirculation lines on H-9 and H-10 tanks to prevent excessive evaporation had resulted in the saving of approximately ten liters of carbon tetrachloride per day.

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J. Improvement Experience (Cont'd.)

3. Inventions or Discoveries

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

K. Events Influencing Cost

The Metal Recovery Operation discontinued the standard seven-day work week in favor of a five-day schedule on December 10. This change was made possible by the fact that the Metal Removal Operation was unable to maintain sufficient feed for continued operation, and was done in order to hold production costs to a minimum, and at the same time release operators to other plants where they were needed as replacements for employees who were transferred out of Chemical Processing Department. In spite of this, it is expected that unit cost for the Metal Recovery Operation will rise somewhat during the month.

In the Uranium Oxide Operation during the startup phase for the new continuous calciners it was necessary to maintain extra manpower. At month end startup problems were sufficiently identified that supervision has been returned to one per shift but non-exempt manpower is still being maintained at a higher than normal level. Numerous repairs and adjustments to the new calciners have resulted in higher than expected normal maintenance cost. Also in order to maintain pot room production at required levels during the month it was necessary that additional maintenance time be used.

During the month a gasket failure on the X-1 tank (6% UNH Storage Tank) failed, spilling 11,278 gallons to the diked enclosure. It was necessary to process this material by recycling through the TBP Plant in order to recover the 3500 pounds of uranium which it contained.

L. Plant Development and Expansion

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

Minor Construction forces started work incidental to this project. This work included erection of barrier across corridor 6, knocking out the concrete blocks in the south wall of the RG Line opposite Room 170, and hanging a double door over this opening. Preparations for the removal and burial of the RG Line Hoods H-9 through H-16 have also been started.

2. Mechanized Piece Cleaner and Polisher - Mating Room, 234-5 Bldg.

The drawings for a mechanical cleaner and polisher for use in the mating room were completed and an order has been placed

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

2. Mechanized Piece Cleaner and Polisher - Mating Room, 234-5 Bldg.

for fabrication and installation of this equipment. This machine will reduce significantly the hand exposure presently encountered in cleaning and polishing pieces and will permit better control of final dimensions.

3. Recuplex - Conversion to a Manufacturing Facility

Completion of Chemical Processing Department approvals of proposal to convert Recuplex to a manufacturing facility is forecast during first week of January.

4. Gas Cylinder Storage - 234-5 Building

A shed and pad for storing compressed gas cylinders has been erected by Construction Operations at the rear of 234-5 Building. The helium manifold was moved into the shed and placed in service.

5. D-2 Drain System, 234-5 Building

The drain from the photo baths in Final Inspection Facility was routed from the D-2 (clear water sewer) to the D-3 (cooling water sewer) system. Numerous backups from the D-2 system have occurred affecting photo solutions.

6. Project CG-613 - UO₂ Expansion

The final three calciners K, L, and M were accepted with exceptions by the Finished Products Operation on December 14, 1956. It is anticipated K calciner will be placed in operation January 2, 1957, and calciners L and M will be activated some time later during the month of January.

Work is continuing on project acceptance exceptions and on various startup items. Improvements to rotary valves, rotary valve drives and calciner off-gas filters are among items required to insure a properly efficient operations facility.

Pouring of the concrete slab between 224-UA and the new maintenance facility has been completed. Further work on the maintenance shop is awaiting delivery of structural steel to the contractor.

7. Project CG-712 - Reduction of Air Borne Noxious Fumes - 224-U Bldg.

Approval of the Project Proposal was received from AEC-Washington on December 7, 1956, and detailed design work is in progress.

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

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

Digging of the test wells by U.S.G.S. is continuing with one well completed and two in progress. Fixed Price Contractor C. J. Painter has completed the access roadway and is digging the first of six ditches.

9. Project Proposal - Compressed Air and Venting Facilities, U Area

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 to permit lay away of the 221-U Building.

10. Project Proposal - Nitric Acid Transfer Facilities

The project proposal is being routed for necessary General Electric departmental signatures.

11. Engineering Study - Supplemental Product Unloading Facilities, 224-U Building

Action on this study is deferred until production schedules indicate its need to meet production commitments.

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

The prints of the redesigned calciner pot agitator, shafts and seals are being revised following receipt of print comments from Finished Products Operation.

13. Capital Work Order - Installation of Product Rework Facilities - Uranium Oxide Operation

A capital work order has been issued to Construction Operations for installation of product rework facilities for 224-UA Building.

M. Reports Issued

HW-47175 - Chemical Processing Department, Finished Products Operation, Z Plant Monthly Report, November 1956, by W. N. Mobley.

HW-47056-E - Chemical Processing Department, Finished Products Operation Monthly Report, November 1956, By Members of Finished Products Operation.

III ORGANIZATION AND PERSONNEL

A. Organization Changes

In the Metal Recovery Operation, one Supervisor-Operations, J. P. Derouin, terminated in order to take a position with the Atomic Energy Commission. This termination was concurrent with this operation going to a five-day, three-shift schedule, and no replacement is to be made.

Also in the Metal Recovery Operation, one Supervisor-Utility Services, N. W. Hope, was released to permit his transfer to Hanford Laboratories Operation. His former responsibilities are being discharged by supervision in Metal Recovery, Uranium Oxide, and Product Recovery Operations.

Responsibility for power and ventilation activities in the U Plant has been reassigned from the Metal Recovery Operation to the Uranium Oxide Operation.

The additional shift supervision employed at the Uranium Oxide Operation to cover startup problems with the new continuous calciners has been discontinued.

B. Force Summary

	<u>Exempt</u>		<u>Non-Exempt</u>		<u>Total</u>	
	<u>11-30-56</u>	<u>12-31-56</u>	<u>11-30-56</u>	<u>12-31-56</u>	<u>11-30-56</u>	<u>12-31-56</u>
General	2	2	1	1	3	3
Metal Finishing	6	6	50	50	56	56
Product Recovery	6(1)	6	47	52	53	58
Maintenance (2)	8	8	44	44	52	52
Radiation Monitoring	6	6	28	28	34	34
Analytical	10	10	38	38	48	48
Metal Recovery	8(2)	5	57	42	65	47
Metal Removal	6	6	31	29	37	35
Uranium Oxide	12(3)	9(5)	54(4)	59	66	68
Maintenance U	<u>9</u>	<u>9</u>	<u>83</u>	<u>81</u>	<u>92</u>	<u>90</u>
Total	73	67	433	424	506	491

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

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C. Safety Experience

No disabling injuries or near-serious accidents occurred in the Finished Products Operation during the month. Twenty-three medical treatment injuries were experienced compared with sixteen (corrected) during November. Frequency rate increased from 2.13 to 2.57.

In the past three months over 60% of the injuries which were experienced occurred to hands and forearms. The need for protection of these members will be stressed in future safety meetings.

D. Radiation Experience

All significant information relative to radiation experience in the Finished Products Operation is carried under the Radiation Monitoring Operation Activity (Item II - 1).

E. Security Experience

No security violations were experienced during the month.

Five additional Top Secret Repositories were approved for use by individuals associated with plutonium production data from the Z Facility.

F. Personnel Activities

On-the-job training of non-exempt personnel in the Uranium Oxide and Analytical Operations continued during the month.

Several more high seniority operators from the Metal Recovery and Metal Removal Plants have been rotated to other operations to which they will be assigned subsequent to shutdown.

Two grievances involving alleged misassignment of craft work were processed and forwarded for possible discussion at Step II.

Two Metal Recovery Operators shared the highest suggestion award history of HAFU. The total award of \$3070.00 was made for three suggestions which involved improvements in pump decontamination procedures.

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CHEMICAL PROCESSING DEPARTMENT
POWER AND GENERAL MAINTENANCE OPERATION

DECEMBER 1956

I. RESPONSIBILITY

There were no significant changes in the responsibilities assigned this Operation.

II. ACHIEVEMENT

A. Operating Continuity

A momentary electrical power failure occurred at 3:00 a.m., December 27. The outage, lasting approximately 15 cycles, was caused by an instantaneous ground at the Bonneville power plant. Prime facilities affected were "Z", "A" and "U" plants which sustained outage of all ventilation and auxiliary equipment. The Redox facility was only partially affected. Operations in the 200 East and 200 West power houses remained constant.

B. Inspection, Maintenance, and Replacement

The fabrication of six fuel buckets, complete with liners, an unloading adaptor, and a bucket yoke was completed as required for the transporting and processing of power reactor fuel elements at the Redox facility.

Other services rendered the prime operating facilities include the repair of two Nagle slurry pumps; the fabrication and delivery of six equipment burial boxes; the rewinding of four electric motors, two coils, and a generator; the making ready of seven process pumps, and the fabrication of thirty-three pipe jumpers.

Important development work required by the Metallurgical Laboratory group resulted in the Machine Shop and Tool and Die Shop expending an average of 480 man-hours per week or 72% of the maximum available man-hours (straight time basis 40 hours per week).

Maintenance activity at the Hot Semi-Works was routine with no significant problems. The removal of certain process pipe lines, which were a high radiation source, has increased the time limits in "A" cell. Renovation work in "A" cell is on schedule and approximately 45% complete at month end. The nine pulsers in "B" cell were removed. After corrective alterations were completed, five had been replaced at month end.

The 2901-W high tank, 200 West Area, developed excessive leakage to the extent that immediate repairs were in order. The unit, which serves as a soft water storage for the power house, was removed from service and drained on December 4. Corrective measures were completed and the unit returned to service on the evening of the same day.

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The Shops Operation met requirements for the planned December outage of the Purex production plant on schedule. Emergency outage requirements of the Redox production plant were completed with due regard for timing.

A P-130 (Redox) pump which failed in service was disassembled for inspection. Facilities Engineering personnel are evaluating the evidence accumulated to determine the course of action to be taken.

Continued emphasis was placed on the program of installing stubs on steam line support poles. Six were installed at locations in the 200 West Area where examination disclosed the existing poles to be in an advanced state of dry rot. Approximately 200 poles are involved in East.

A by-pass was installed around the inlet house to the 200 West Area reservoir in order to circumvent the export water line valving arrangement. The installation was deemed necessary to assure continuity of a water supply in the event of failure of the main valve on the export water line. A failure of this nature occurred in September of 1956. The new installation, consisting of two 6" lines, will permit diverting the flow from a point upstream from the inlet house directly to the reservoir.

Additional burial space is being created in the 200 West industrial burial gardens. Excavation of a new trench was 70% complete at month end. Specifications of the new trench will require the removal of approximately 40,000 cubic yards of earth. Estimated completion date is January 31, 1957. It is anticipated that space in the currently used trench will be depleted in March.

Maintenance and operation of the steam generating plants continued throughout the month with no significant problems. Difficulties encountered in the development of a strain gauge coal-measuring device appear to have been solved through the use of temperature compensating thermocouples. Recent tests indicate satisfactory performance; consequently, it is planned to install coal-measuring devices on all bunkers in the 200 East power house by March 15, 1957.

"Hilliard" clutches were installed on the stoker drives of No. 4 and No. 5 boilers in 200 East power house. This completes the conversion to "Hilliard" equipment which was deemed desirable in view of the high maintenance cost and numerous mechanical failures of the originally installed "Riley" equipment.

C. Improvement Experience

The program to improve the efficiency of the Shops Operation continued in anticipation of increased customer demands. Noticeable among the items accomplished were: improved lighting; modification of the Tool and Die Shop; improved material storage facilities; and reactivation of the 273-E heat treat facility.

III. ORGANIZATION AND PERSONNEL

A. Force Summary

<u>Component</u>	<u>* Exempt</u>		<u>Other</u>		<u>Total</u>	
	<u>December</u>		<u>December</u>		<u>December</u>	
	<u>1</u>	<u>31</u>	<u>1</u>	<u>31</u>	<u>1</u>	<u>31</u>
*P&GM General	1	1	0	0	1	1
Administration	6	6	10	10	16	16
Power	11	10	61	61	72	71
Shops	10	10	92	90	102	100
East General	9	9	74	74	83	83
West General	7	7	58	58	65	65
Plant Liaison	1	1	0	0	1	1
Totals	45	44	295	293	340	337

* Includes Level 3 Manager.

B. Safety and Security

No disabling injuries were reported. Medical treatment cases tabulated for the month totaled 27, reflecting a frequency rate of 4.25.

No incidents were reported in which a lapse of radiation control was allowed to occur.

There were no incidents reported in which a breach of security was evident.

C. Personnel Activities

The series of Personnel Development Courses on the subject of "Water Treatment", prepared and presented for training of power operators, was completed. A second series of training sessions covering the subject "Ventilation and Heat Transmission" is scheduled to start January 4.

Eleven employee suggestions were evaluated of which six were recommended for acceptance. Cash awards totaling 120 dollars were distributed among eight employees for suggestions previously submitted.

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CHEMICAL PROCESSING DEPARTMENT
FINANCIAL OPERATION

December, 1956

I. RESPONSIBILITY

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

II. ACHIEVEMENT

A. Product Cost

A complete review of expense codes and work orders was made during the month. This review was accomplished in cooperation with operating personnel and was for the purpose of updating descriptions, codes and elimination of unnecessary codes and orders.

The Chemical Processing Department Midyear Budget Review for FY 1957 was completed, on schedule, and submitted to Contract Administration for HAPO consolidation. These Midyear Budget Review figures will appear on the December Operating Reports.

In order to detail liquidations of Research Engineering, Process Technology and Process Control, five new reports were issued in December at the request of the two Chemical Processing Department engineering operations. These new reports will provide an additional control factor and assist in determining if expenditures are within budgeted funds.

The Weekly Design Order cost report issued for Facilities Engineering was reviewed with administrative personnel of that operation and each design order was checked against records still held by Construction Engineering Operation. As a result of this review corrections, to the authorized amount, were made in a number of active design orders.

As a result of using Ozomatic masters instead of the typed Duplimat master, it has been possible to reduce the force by one clerical employee.

B. Personnel Accounting

Claims for insurance benefits rose from a total of 199 in November to 286 in December. This increase in claim submittals is attributed to the employees desire to submit accumulated bills by year end.

Since the new insurance plan, which became effective November 1, 1955, admits many additional items for payment, maintaining a file of duplicates has become expensive, burdensome and time consuming. The Schenectady office has recognized this added effort and has prepared a streamlined procedure which will eliminate many of the bulky files

and much of the auditing. It is anticipated that with the new procedure the number of claims pending can be held to a minimum.

A life insurance benefit in the amount of \$12,971.78 became payable in December as a result of the death of a CPD employee. This is the first CPD life insurance benefit paid since the decentralization and establishment of the Chemical Processing Department.

Until 1955, it was G.E. practice to send each employee a Federal tax exemption form (W-4) instructing him to complete and forward to his payroll department. However, after surveying a number of G. E. installations relative to the need for this annual submission of revised exemption forms, it was found that about 50% of the employees made no change in their tax exemption status. With the weight of this finding, the Schenectady office left it up to the various components to continue as in the past, or discontinue the canvassing process and merely remind employees to prepare new W-4's if the number of their exemptions had increased or decreased. This latter practice was adopted locally resulting in considerable reduction of detail and paper work at a time of year when reduction of detail is needed. This notice was made to CPD personnel through the Management News Bulletin.

Statistics:

1. <u>Number of CPD Employees</u>	<u>Monthly</u>	<u>Weekly</u>	<u>Total</u>
Employees at Beginning of Month	427	1 474	1 901
Additions and Transfers In	0	8	8
Removals and Transfers Out	4	12	16
Transfers from Weekly to Monthly	2	(2)	0
Transfers from Monthly to Weekly	0	0	0
Employees at End of Month	425	1 468	1 893

2. <u>Overtime Payments During Month</u>	<u>December</u>	<u>November</u>
Non-Exempt Employees	\$20 399.00*	\$22 180.00**
Exempt Employees	3 432.00	3 879.00
Total	\$23 831.00	\$26 059.00

3. <u>Gross Payroll for Month</u>	<u>December</u>	<u>November</u>
Monthly	\$ 314 633	\$ 303 428
Weekly	702 458*	863 454**
Total	\$1 017 091	\$1 166 882

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

**Payments to non-exempt cover a five week period.

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

**Payments to non-exempt cover a five week period.

4. Participation in Benefit Plans at Month End

	<u>December</u>		<u>November</u>	
	<u>Number</u>	<u>%</u>	<u>Number</u>	<u>%</u>
Pension Plan	1 814	98.3	1 830	99.8
Insurance Plan - Personal Coverage	1 887	99.7	1 895	99.7
-Dependent Coverage	1 475	77.8	1 472	77.4
Stock Bonus Plan	1 053	55.6	1 063	55.9
Savings Plan	262	13.8	261	13.7

5. Pension Plan

	<u>December</u>	<u>November</u>
Number retired	0	0
Number who became eligible for participation	5	8
Number who elected to participate	4	8
Number who elected not to participate	1	0
Replies not received	0	0

6. Insurance Claims Paid

	<u>December</u>	<u>November</u>
Employee Life Insurance	1	0
Employee Accident and Health	108	84
Dependent Accident and Health	178	115

7. Good Neighbor Fund

	<u>December</u>	<u>November</u>
Number participating	1 159	1 161
Percentage participating	61.2	61.1

8. Suggestion Awards

	<u>December</u>	<u>November</u>
Number of Awards	47	28
Total Amount of Awards	\$3 495	\$ 380

9. Preferential Rates

	<u>December</u>	<u>November</u>
Number added (eliminated)	0	0
Number currently in effect	59	59

10. Number of Military Allowance Payments

	0	0
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C. General Accounting

In order to assist operating managers in the control of their spare equipment, the program aimed at control of this equipment is being accelerated. The initial step, updating the spare equipment records for Redox, Purex, TBP and UO₃ which were made available as of June, 1956, is underway. Equipment cards are being forwarded to custodians in order that they may complete the Spare Equipment Authorization cards. As these cards are completed and returned to Stores and

Property Accounting, they will replace the old Stock Adjustment Requests and will provide each manager with an up-to-date list of equipment under his responsibility.

Informational meetings, regarding the preparation of FY 1959 Plant Acquisition and Construction budget, were held with the appointed representatives of each CPD Operation. Funds in the amount of \$52,500 were allocated to Chemical Processing Department for preparation and study of the FY 1959 budget. Additional funds will be available from Contract Administration if needed. The AEC directive authorized \$200,000, but only \$150,000 was allocated to the HAPO Departments by the General Manager - HAPO.

During December, the General Manager - HAPO proposed a revision of General Plant Project funds. This proposal would allocate an additional \$141,000 of General Plant Project money to CPD. The proposal was acceptable to all concerned and the additional money has been added to the CPD General Plant Project funds.

A form letter to remind employees to make a prompt accounting for contract funds advanced for travel has been developed. This memorandum will be sent on a routine basis beginning in January, 1957, to Chemical Processing Department employees to whom a travel advance has been issued and for which no accounting has been received within thirty days following estimated completion date of travel.

D. Auditing

Word has been received that five members of the Traveling Auditing Staff are scheduled to arrive at HAPO January 21 for an audit of each of the HAPO components activities. The auditors are scheduled to be here for ten weeks and as in the past, the various HAPO components' Internal Audit Staffs will participate in the audits.

Progress with respect to the audit of S. S. Accountability Operation in the Chemical Processing Department is proceeding satisfactorily. Field work has been completed in the Redox Plant and is currently underway in the Purex Plant.

A schedule of health insurance benefits payments to HAPO employees by the Metropolitan Life Insurance Company during the month of May, 1956, was received from Insurance Plan Accounting - Schenectady, with a request for verification on a test check basis. Verification of benefits paid to CPD employees was completed and no items requiring reconciliation were found.

During the month, 128 purchase requisitions were reviewed to ascertain whether or not expenditures were reimbursable under the provisions of the Prime Contract. One purchase requisition was cancelled as it was found that the items covered by the requisition were available from A.E.C. excess on a no-charge basis.

A complete set of "Delegation of Authority Letters" covering the authority delegated to A.E.C. personnel was obtained and is available for departmental reference.

E. Procedures

A method of accumulating and posting the project cost information was devised and all necessary forms were designed and orders placed with Duplicating. The Burroughs Sensimatic posting machine was changed over and adapted to fit the desired results required in project cost accumulations posting.

A comprehensive study of the Product Cost Operation was begun. The first phase of this study was the method of accumulating and reporting engineering costs. One major and several minor changes in procedures have been recommended. A better job of accumulating and reporting of engineering costs may be expected because of enlightening discussions held with the affected personnel. A new form design will be utilized in accumulating the costs and should eliminate many minor irritations.

Forms design work has consumed a large portion of the available time. Much of this design work has been directed toward utilizing the Ozalid method of reproduction on all cost reports and engineering reports.

F. Measurements

The Chemical Processing Department cost and production estimates for FY 1957 were developed and discussed with the Managers of Redox, Purex, and Finished Products. These goals were accepted by the managers and are being prepared for issuance early in January.

Since it is planned to issue a Chemical Processing Department Measurements report for CY 1956, much time was devoted to the preliminary work, development of an outline and cover design, required to develop such a report.

III. ORGANIZATION AND PERSONNEL

A. Force Summary

	<u>Exempt *</u>		<u>Other</u>		<u>Total</u>	
	<u>11-30-56</u>	<u>12-31-56</u>	<u>11-30-56</u>	<u>12-31-56</u>	<u>11-30-56</u>	<u>12-31-56</u>
Financial General	1	1	1	1	2	2
General Accounting	6	6	17	16	23	22
Product Cost	6	6	21	31	27	27
Measurements	1	1	1	1	2	2
Auditing	2	2	1	1	3	3
Procedures	1	1	0	0	1	1
Personnel Accounting	<u>5</u>	<u>5</u>	<u>14</u>	<u>14</u>	<u>19</u>	<u>19</u>
Total	22	22	55	54	77	76

* Includes Level 3 Manager.

B. Safety

A safety meeting, for all Financial Operation personnel, was held December 21, 1956.

One minor injury was experienced during the month.

C. Security

One security violation, which involved improperly stored documents, was experienced during the month.

D. Reports Issued

HW-47256 Secret "Unit Cost Analysis for November" by
E. M. Dobbs.

HW-47127 Secret "CPD Essential Material Inventory and
Consumption Report for the Month of
November, 1956" by S. R. Myers.

E. Personnel Activities

G. H. Temple, Measurements Specialist, attended the Budget and Measurements Seminar held in Forest Hills, New York, from December 10 through December 14.

CHEMICAL PROCESSING DEPARTMENT
FACILITIES ENGINEERING OPERATION

December, 1956

I. RESPONSIBILITY

Contract Administration responsibility for construction work was received by Facilities Planning, Project Engineering Operation during the month of December.

II. ACHIEVEMENT

A. Purex Operation

Research and Development Activities

A review of the potential uses for an anion exchange in separations processes has shown evidence of an attractive new application for the recovery of plutonium now being lost with the Purex high level waste stream. At the present Purex plant rate, approximately \$1,000,000 per year worth of plutonium may be recovered from the LWW stream by means of an anion exchange. Some equilibrium and kinetic data are available for this system; the outstanding unknowns at the present time are associated with the radiation stability of the anion resin and the degree and effect of solubility of the resin in the process stream. Conceptual design of a prototype, plant-scale anion exchange installation for recovery of plutonium from Purex LWW is underway.

Process Technology Activities

Preliminary process designs for critically-safe Redox and Purex Dissolvers to process enriched uranium fuel elements (0.94 per cent U235) have been completed and are being reviewed for nuclear safety by the Hanford Laboratories. The proposed Redox dissolvers would be capable of supporting a 14 ton per day instantaneous rate, with either enriched or natural uranium elements, and the Purex dissolvers, the currently proposed 33 ton of uranium per day instantaneous rate.

Process specifications were prepared to cover procurement of any future solvent system pumps for Purex. A review of the performance of these pumps on the current plant flowsheet PPFS II, revealed that they will not support the Phase I rate.

The feasibility and cost of providing and installing a small, versatile dissolver in the Purex Plant to permit separate dissolution and accurate

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sampling of special reactor chargings is being evaluated. Two alternate locations are being considered; one in the vacant F17 position of the Purex canyon, the other in a separate building exterior to 202-A. The former approach appears more promising, and preliminary design and layout work is being completed on this alternate. Cost estimates on this alternate will determine whether additional work on the other alternate is warranted.

Plant Engineering Activities

The process design of the replacement acid rectifier and condenser, based on an acid equivalent of 33 tons of uranium per day instantaneous rate under PFFS-II flowsheet conditions with 99 per cent acid recovery, was completed. The project cost estimate was \$395,000 including \$82,000 for contingencies. The beneficial use and physical completion dates were estimated at 19 and 22 months, respectively, after project authorization.

A preliminary process design for contact maintained plutonium concentration equipment, of improved design and capacity, for Purex has been completed. This design is compatible with an earlier design made for remote maintained equipment and is intended to serve as the basis for cost estimates to be compared with those for the remote maintained installation in making the final choice between the two maintenance philosophies for any new equipment.

Engineering studies have been completed on methods of reducing the volume of radioactive liquid waste from the Purex Acid Fractionator requiring underground disposal. This study was initiated because of anticipated percolation limitations of the present 216-A9 Crib and recent observations of the movement of activity in the water table under the 200 East Area towards the river. Preliminary process design drawings were completed on a new surface condenser to replace the present contact condenser. Following installation of this surface condenser, the total flow to the crib would be reduced from 580 GPM to about 45 GPM at the design capacity of the fractionator. The new surface condenser would require about 2000 square feet of surface at a water consumption of 550 GPM. A vapor-side pressure drop of less than 10 mm Hg would be imposed by the new condenser. A new 6-inch line about 650 feet long would be required to discharge used cooling water into the present 30-inch header east of the 202-A Building.

Engineering calculations completed on the existing 241-A Tank Farm surface condenser showed that this unit would not be suitable for vacuum fractionator service.

The engineering flow diagram SK-2-2914 for additional facilities to handle Purex tank farm vapor wastes is being modified to include a sample for the condensate effluent and a radiation monitor and sampler

on the waste cooling water line as requested by Chemical Effluents Technology. A request to the vendor was made through Purchasing to submit data on the predicted performance of the contact condensers when used in series and located up stream of the surface condensers.

An increase in the activity delivered to the Purex 216-A-6 coil and jacket steam condensate crib was reported for October. If this continues, it will make the use of the proposed overflow swamp undesirable and require that a replacement crib be ready for use when the present 216-A-6 becomes exhausted.

Centrifuges

A representative of Bird Machine Company visited Richland, December 6, accompanied by a representative of SKF Industries to discuss drivehead bearing problems. Inspection of a spare drivehead torn down in the mock-up shop revealed a small amount of foreign material, largely metallic, in the lubrication system. Spectrochemical and X-ray diffraction analyses have been made of the material, which was of two separate compositions. One type reveals a composition that is high in iron, aluminum, and silicon, and also has a chromite pattern ($\text{FeO}(\text{Cr Al})_2\text{O}_3$). A second type was found to be brass, probably from wear on the brass bearing retainer ring. Origin of the chromite is not known. Drivehead bearings which had operated in this and one other head were shipped to SKF for examination. Bird is setting up a drivehead test stand to investigate oil flows, temperatures, possible different lubrication systems, etc. Representatives of Facilities Engineering intend to observe this testing during January.

During installation of new rotors in spare centrifuge motors, it was noted that motor bearings are "shielded" in direct contradiction to the original specification. Reliance was contacted and are quoted as believing shields are necessary and desirable, even with our system of remote greasing. It was tentatively agreed that the representative of Bird Co. and FEO personnel would discuss this problem with Reliance subsequent to our observation of the drivehead test operation.

A contract with the Bird Company to supply two machines by June 1957 was completed. The two new units will incorporate all possible improvements to drivehead and motor. Further development will not be allowed to impede this delivery.

Silver Reactor Heaters

The method of attaching steam heads to the tube sheets on heat exchangers has been modified to eliminate leakage. Original equipment and construction procured spares had bolted flanges and Flexitallic gaskets one of which has developed leaks in service. It will be very

difficult, if not impossible, to regasket these flanges because of high radiation levels. The heads on the spare units are being welded in place before they are installed as replacements. New units to be purchased as spares will be of a welded head design.

Project Activities

The HAPO General Manager's approval was obtained on Appropriation Request CPD-2, "Spare Redox Dissolver of Improved Design," on December 4, 1956.

CA-513-A - Expansion of 200 Areas Facilities (Modification to Off-Gas Heaters)

The heater boxes for the off-gas jumpers have been completed and the fabrication has been accepted. Installation of the Calrod heater units is being held up to determine if spacing of the units is necessary to keep them from touching. Work in 202-A Building is complete and acceptable, with the exception of a cooling system for the saturable reactors, which are being designed.

CG-598 - Acid Fractionator

Beneficial use of the Purex vacuum fractionator facility was achieved on December 26, 1956, and operation of the reboiler and tower is scheduled for early January subsequent to vessel calibration.

CG-719, Rev. 1 - Additional Facilities for Purex Tank Farm Vapor Wastes

Advance design funds in the amount of \$8,000 have been authorized by HOO-AEC.

The Plant and Equipment Analysis Report and project proposal revision were approved and transmitted to Contract Administration on December 21, 1956. The project proposal was approved by the HAPO General Manager on December 29, 1956.

CG-724, Rev. 1 - L-Cell Equipment Replacement

Advance design funds in the amount of \$5,000 have been authorized by HOO-AEC.

The revised project proposal and the Plant and Equipment Analysis Report were approved and transmitted to Contract Administration on December 21, 1956. We have requested Contract Administration to withhold further action on this pending a review of new information on the ion exchange unit.

CG-726, Rev. 1 - T-F5 Fractionator Replacement

Advance design funds in the amount of \$5,000 have been authorized by HOO-AEC with the stipulation that no detailed design would be started until operating experience with the existing T-F5 fractionator used as an absorber indicates a definite need for the project. This directive was being studied at month's end.

B. Redox OperationProcess Technology ActivitiesD-14 Pump

A failed Redox D-14 pump has been decontaminated and is being disassembled for inspection. This is the first Redox canyon deepwell turbine pump so treated. At this writing work has progressed only enough to ascertain that the motor and the lower shaft were free and that failure was caused by seizure in the section adjacent to the throttle or vapor bushings at the top of the pump.

Industrial EngineeringLabor and Materials Standards

A revised essential materials standard HW-47061 RD for Redox was published. The report format was simplified and a method was prepared to allow the assignment of essential material variances to the proper source. The Redox labor standards for the Processing and the Product and Material Handling Operations were revised and issued.

Project ActivitiesCG-621 - Contamination Control Facilities

Work on the roof of the Redox Building associated with Canyon Wash-Down Facilities is virtually completed. Steps have been taken to close out the project with exceptions. A revised project proposal was awaiting the Hanford General Manager's approval at month's end.

CG-643, Rev. 2 - Capacity Increase, Phase III

An estimate for this project was received late in the month (\$795,000). The estimate was delayed because of higher priority given to other work (Project CG-621).

Previously indicated stand-by costs for the bismuth phosphate plants of \$400,000 annually have been re-evaluated at \$175,000 annually. It

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appears that this project cannot be justified on the stand-by cost differential alone but must be based on the high start-up cost which would be encountered if the bismuth phosphate plants were started up.

CG-648 - Iodine Removal and Nitric Acid Recovery Facility

The routing of recovered acid from the 293-S Building to the 202-S Building has been changed to avoid the potential for a nitric acid-hexone reaction in the 291-S stack drain collection tank. The new routing, around the northeast corner of the 202-S Building, consists of a new, unencased, cathodically protected line from the 293-S Building to the sample gallery level of 202-S.

CG-717, Rev. 1 - Transfer of Non-Boiling Wastes

This project proposal was approved by the HAPO General Manager on December 20, 1956. It was transmitted to HOO-AEC on December 21, 1956.

C. Finished Products Operation - Z Plant

Research and Development Activities

Chemical Processing and Reduction

A letter was issued during the month in answer to a previous request by the Finished Products Operation for a study concerning the feasibility of installing one of the continuous Task I - Task II process hoods in the proposed RMC button line instead of in the RMA line as is presently planned. This letter reviewed the recent developments regarding the location of the Task I - Task II process hoods such as the decision to make these two hoods identical in design and the study which showed that the present temporary location of hood H-9B is still the best location for this hood regardless of where it is eventually installed. On the basis of these developments it was concluded that if a new RMC line is authorized, the scope of this new project should be based on utilizing hood H-9B in the new button line. It is also pointed out that when authorization for this new button line is received, it may be necessary to revise the project proposal for Project CG-691 to eliminate that portion of work of relocating hood H-9B from its temporary location and to revise the project costs and schedules accordingly.

Advance engineering and preliminary scoping studies are being continued on the proposed second button line for the RG Line area. Since all of these studies are assuming the scope of this new line will be based on utilization of H-9B for Task I and II and close duplication of the existing Task III equipment, the major effort is presently being directed at developing the best arrangement of equipment and the utilization of available space.

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The basic concepts of hood cells for enclosing contaminated process equipment have been further developed. Emphasis has been placed on design variations which permit application of the hood cell principle to specific processes. The proposed button line is being used for studying designs of one level operation.

Area arrangement drawings and other information needed to provide a basis for a construction cost estimate for the proposed button line was prepared and transmitted to the Cost Estimating group. The cost estimates that were prepared indicate a total project cost for the RMC button line of \$1,500,000.

Weapons

Studies that were requested by the AEC in document HAN-63918 were completed during the month. Information was requested regarding the costs and schedules of new facilities for fabricating new weapon cores and how these new facilities would be integrated with the existing Z-Plant process equipment. This information was documented in HW-47086 RD, "New Facilities for Fabrication of Special Weapon Cores." The study showed that there are two different alternates for installing this new fabrication equipment. Under the first alternate the equipment would be installed in the space presently occupied by the RMB Line and would cost approximately \$1,000,000. Under the second alternate the equipment would be installed in the RMB Line space plus all available space in the RG Line and would cost approximately \$1,600,000. The second of these alternates was recommended because of the superior flexibility that is needed in order to maintain a modernized fabrication line.

Design and development studies are continuing on equipment that will be needed for either a new fabrication line or for modifications to the existing fabrication line.

Project Activities

CG-691

It is estimated that the detail design of this project is about 86% complete at the end of the month. A total of 114 drawings have been approved and issued to the field and the estimated total number of drawings required has been raised from 153 to 160. A meeting of the Project representatives was held during the month and it was agreed to revise the design scope of the project to make the two principal hoods H-9A and H-9B identical. This design scope revision was approved since it appeared certain that one of these hoods would be installed in the proposed RMC button line, and for that reason identical hoods would result in some simplification and economies in spare parts and

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in certain operational advantages. This design scope revision was approved by the appropriate members of the Chemical Processing Department and by the AEC.

CG-727 - Permanent Mold Casting

Advance design funds in the amount of \$5,000 have been authorized by HOO-AEC.

Office Annex to 234-5 Development & Metallurgy Laboratories

The project proposal has been completed with a total cost of \$98,000. The job is currently being reanalyzed in an attempt to reduce the cost.

E-33413 - RMC Button Line

A Plant and Equipment Analysis Report, rough draft, was issued. A project proposal rough draft requesting design only was issued for comments.

UO3 Plant

Process Technology Activities

Process technology studies have been started on methods for cleaning and reclaiming of filter bags in the 224-U and 224-UA Buildings. A letter was issued during the month which discusses the possibility of cleaning these bags by use of tumbling equipment recently assessed by the 200 Area laundry. The chances of this system performing satisfactorily appear good, and in view of the relatively small expense for a test set-up it was recommended that one of the tumblers be set up in the 224-UA Building and actual tests be conducted to evaluate its effectiveness in cleaning the filter bags.

104-U Tank

Further inspection of the 104-U tank liner by photographing or leak detection methods has been temporarily discontinued. It is the general opinion of Chemical Effluents Technology and Research and Engineering Operation that although the liner bottom has an extreme bulge there was apparently no loss of wastes to the environs. It is presently conceived that the 104-U tank will be excluded from future waste storage.

Plant Engineering Activities

Material & Manpower Utilization Study

A manpower study for the 224-U and 224-UA Buildings was completed. The current and future requirements were considered in view of the initial building startup and possible future production demands. An

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opportunity was found to increase manpower utilization in one area by a more accurate reporting of personal radiation exposure.

Nitric Acid Handling Costs

The problem of purchasing recovered nitric acid from the Metal Reduction Operation for use in Purex was studied. It was concluded that costs incurred by using the recovered acid such as equipment modification, additional handling, and the processing of uranium in the solution is equivalent to about \$0.0075 per pound of 100% nitric acid.

Project Activities

CG-613 - UO₃ Expansion

The special task force that was established last month to determine the nature of the difficulties with the continuous calciner off-gas filters was disbanded during the month. The plant experience during the life of the task force indicated that the filters were not enough of a problem to justify a special study.

Drawings have been completed of a rearrangement of powder collection lines under the continuous calciners to provide for manual powder transfer pick-up. This new arrangement is for use in case a considerable amount of additional trouble is encountered at this point, and is considered a temporary solution.

The first three calciners have been operating at production rates substantially over design rates during the month except for occasional intermittent shutdowns for maintenance. G-cell calciner has been operating at approximately twice the nominal design rate for the greater part of the month. Beneficial use of the remaining three calciners and auxiliary equipment was attained on December 14, 1956, with six minor exceptions. Experience in operation during the month indicates that the most significant cause of the troubles encountered with the off-gas filters lies in the diaphragm-operated valves and plugging of instrument lines rather than the filters themselves.

CG-712 - Reduction of Air-Borne Noxious Fumes

Directive HW-410, dated December 7, 1956, authorized \$61,000 plus \$25,000 for transferred capital property.

D. General Activities

A document concerning the functions and responsibilities of General Electric in connection with construction at HAPO was completed and

transmitted to E. T. Maher on December 5, 1956. Information copies were provided to all Department Managers and to Contract Administration.

Research and Development Activities

Canyon Remote Stud Testing

A fixed price contract was negotiated with the Washington State College Division of Industrial Research for testing a number of remote studs for their basic physical characteristics. Studs of two materials and various heat treatments will be broken under several simulated conditions to obtain tension and torque stress data. It is estimated that actual testing can be started about January 21, 1957.

Instruments

The digital to analog converter for the In-Line Alpha Monitor was returned by the factory. The equipment is currently undergoing performance tests and the results to date are satisfactory.

Process Technology Activities

The problem of carrying co-axial cable connections through cell jumpers and connectors has been under investigation. A prototype connector has been made for testing in a typical cell electrical jumper. Tests were run on the prototype co-axial connector using a low current source and a Model V Beckman Micro-Microammeter. The connector was found to make satisfactory connection at very low currents (3×10^{-13} amps). The prototype connector design was changed to include spring loading and was tested in a similar manner. Satisfactory electrical connection was again made. Document research is being made to determine a suitable insulation material for the co-axial connector that will last two to three years under the present levels of radiation. Polyethylene or polystyrene offers possibilities of being suitable for the purpose.

Several minor changes have been suggested for the connector and these will be incorporated in the initial sketches being prepared. Performance testing of a completed connector would precede plant acceptance.

Plant Engineering Activities

Ultrasonic Cleaner

A report is being issued on the tests performed with the ultrasonic cleaner procured for the Redox remote shop. Decontamination was attained to some degree on most operations but the overall picture indicates that the degree of decontamination obtainable with this unit will not justify its intended installation.

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Tool Fabrication

A study is underway for the shop operation involving a rearrangement and a specification for installation of precision tooling and other facilities for the TS shop section in 272 W. This facility is designed as a tool fabrication shop as a back-up for the Whitney Project and similar work.

Remote Control Bulldozer

Due to the ease of conversion to remote operation it was proposed to P&GM personnel that the Le Tourneau Tournadozer be used for the purpose since it is electrically controlled and ideally arranged for such operation. It was their opinion that this dozer lacked sufficient traction for the burial operation. Power and General Maintenance personnel also expressed a strong desire for radio control rather than cable control. Contacts with remote radio equipment vendors have been made to secure the necessary detailed information to expedite this work.

Mid-Year Review of FY-1957 Budget

The final HAPO issue of the Mid-Year Review of the FY-1957 Plant Acquisition and Construction Budget was transmitted to HOO-AEC.

A study was made concerning the criteria to be used for a project justification (pay-out period). A secret rough draft document was issued on December 6, 1956, entitled "Criteria for Project Justification." The contents of this document were used to advise Research and Engineering of the effects anticipated by reducing acceptable pay-out periods from three years to two years in the justification of projects.

Project Activities

CG-686 - In-Line Instruments

The Redox D-14 alpha monitor is scheduled to be deleted from Project CG-686. The instrument will be considered for possible future application if developments indicate the need for it. Technical developments in the Redox plant point to the feasibility and incentive of back-cycling a portion of the combined HAW stream in the D-14 concentrator to the HA and HS columns. Any significant back-cycle of HAW to D-14 would prevent determination of the plutonium content of the concentrate by means of the D-14 alpha monitor included in this project.

The following directives or work authorities were received during the month for projects.

Work Authority CA-688 (3), dated December 5, 1956, was received for

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Project CA-688, "Additional Waste Disposal Facilities, BC Crib Area." This work authority authorized performance of Title III and management of construction for Phase III of the subject project.

Directive HW-413, dated December 20, 1956, was received for Project CG-721, "Additional Automatic Sampling and Monitoring of Radioactive Process Streams," authorizing \$15,000.

CG-718, Rev. 1 - Fission Product Isolation (Scope Design)

Advance design funds in the amount of \$5,000 have been authorized by HOO-AEC.

It was decided that the project proposal revision should request design scope only. The project scope of work would include facilities for recovering "cesium and possible other fission products." Design scope has been estimated to cost \$55,000. The draft copies of the project proposal were issued on December 17, and a revised draft was ready for typing on December 21, 1956. Final approvals started on December 29, 1956.

CG-722, Rev. 1 - Utilization of 224-U Acid at Redox and Purex

Advance design funds in the amount of \$5,000 have been authorized by HOO-AEC.

The revised project proposal and the Plant and Equipment Analysis Report have been completed and are being routed for final approvals.

III. ORGANIZATION AND PERSONNEL

A. Organization

W. H. Sevier, M-3767, was added to Facilities Planning Project Operation 12-1-56.

Force Summary

	<u>Exempt</u>	<u>Non-Exempt</u>	<u>Total</u>
Management	3	2	5
Engineering Administration	7	6	13
Maintenance & Industrial Engineering	17	14	31
Project Engineering Operation	24	5	29
Process Design & Development	<u>27</u>	<u>5</u>	<u>32</u>
	78	32	110

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B. Safety

Regular safety meetings have been held during the month by all Operations. Health and safety of the feet, radiation hazards and other aspects of personnel safety have been emphasized.

C. Security

There were no security violations during the month of December.

E. Reports

- HW-47056 "Facilities Engineering Operation Monthly Report."
- CPD-2 "Appropriation Request, Spare Redox Dissolver of Improved Design."
- Letter J. E. Travis from W. K. MacCready, "Chemical Processing Department, Request for Initiation of Design on Certain Projects of the FY-1957 Plant Acquisition and Construction Budget Approved by Congress," dated November 19, 1956.
- HW-45168 "Project Proposal, Rev. 1 - L-Cell Equipment Replacement, Purex (Project CG-724)," dated November 15, 1956, D. A. Snyder.
- HW-45968 "Project Proposal, Rev. 1 - Transfer of Non-Boiling Redox Wastes (Project CG-717)," dated October 31, 1956, R. H. Silletto.
- HW-46505 "Project Proposal, Rev. 3 - Silica Gel Tail-End Treatment Facilities, Purex (Project CG-644)," dated November 30, 1956, L. W. Finch.
- HW-46524 "Project Proposal, Rev. 1, Additional Facilities for Purex Tank Farm Vapor Wastes (Project CG-719)," dated November 19, 1956, R. C. Baker.
- HW-47102 "Project Proposal, Rev. 1, Relocation of Purex Cooling Water Swamp (Project CA-683)," dated December 5, 1956, R. H. Silletto.
- "Project Proposal, Rev. 3, Redox Contamination Control Facilities (Project CG-621)," dated December 14, 1956, M. R. Dempster.
- "Project Proposal, Rev. 3, Redox Railroad Tunnel Ventilation Barrier (Project CG-624)," dated December 10, 1956, M. L. Oldfather.

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Letter AEC from M. L. Oldfather, "A Plant Off-Gas Treatment Facilities," dated December 7, 1956.

Letter H. H. Schipper from W. K. MacCready, "Additional Waste Disposal Facilities, BC Crib Area (Project CG-688)," dated November 8, 1956.

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

Report "Semimonthly Status Report, Facilities Engineering, Chemical Processing Department," dated December 28, 1956.

Report "Functions and Responsibilities of General Electric Company in Connection with Construction at HAP0," dated December 9, 1956, L. B. Bradley.

HW-47061 RD Essential Material Standards for the Redox Plant for October, November, December, 1956, dated November 1, 1956, A. C. Morgenthaler.

Report "Purex Essential Material Control," dated December 11, 1956, G. R. Ruzicka.

HW-47148 RD "Labor Standards - Redox Operation Facility for the Processing and the Product & Material Handling Operations," dated October 31, 1956, A. C. Morgenthaler.

HW-47254 "Six Months Post Acceptance Report CG-587," dated December 18, 1956, V. P. Madsen

Report "Maintenance Management Program for Power & General Maintenance," dated December 12, 1956, G. B. Smyth.

Report "Trip Report: Republic Steel Corp., Cleveland, Ohio; National Metal Exposition, Cleveland, Ohio; Pfaudler Co., Elyria, Ohio; ORNL, Oak Ridge, Tennessee; Brooks & Perkins, Detroit, Michigan," dated December 14, 1956, R. D. Switters.

HW-47086 RD "New Facilities for Fabrication of Special Weapon Cores," dated December 5, 1956, J. W. Kolb and E. C. Swain.

HW-47142 "Process Design Replacement Acid Rectifier and Condenser Purex Plant," dated December 17, 1956, D. E. Braden.

Report "Trip Report - Design Discussions with Pump Vendors," dated December 28, 1956, R. C. Hollingshead.

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Report "Trip Report - Titanium Surfacing Work by Western Gear," dated December 27, 1956, R. C. Hollingshead.

Letter "Design of Process Hoods H-9-A and H-9-B - Design Scope Revision - 234-5 Building - Project CG 691 - Improvements to Task I and II," H. P. Shaw from E. O. Swain, December 7, 1956.

Letter "Meeting Minutes of December 3, 1956 - Project CG-691 - Improvements to Task I and II," dated December 7, 1956, File from E. O. Swain.

Letter "Location of Process Hoods H-9A and H-9B - Task I and II - 234-5 Building," dated December 28, 1956, J. B. Fecht from C. F. Yuenger.

Letter "Cleaning and Re-Claiming of Filter Bags in 224-U and 224-UA," dated December 19, 1956, E. O. Swain from J. M. Gerhart.

Letter "Calciner Off-Gas Filter - Special Team Meeting No. 5 - December 14, 1956, Project CG-613 - Metal Conversion Plant," dated December 17, 1956, C. A. Lyneis from H. G. Johnson.

Letter "Status of Work Planned by Filter Special Team," M. J. Szulinski from K. L. Sanborn, dated December 20, 1956.

Letter "Flowsheet Basis Purex Plant Phase II Expansion," dated December 4, 1956, J. H. Warren and R. B. Richards from H. P. Shaw.

Letter "Project CG-644 - Purex Silica Gel Tail-End Treatment Facility Review of Architect-Engineer Design Package," dated December 6, 1956, B. Kirz from J. B. Fecht.

Letter "Development of Externally Lubricated Pumps," dated December 7, 1956, R. C. Hollingshead from G. K. Carpenter.

Letter "Process Design Replacement Acid Rectifier and Condenser Purex Plant," dated December 18, 1956, C. E. Kent from L. L. Zahn.

Letter "Project CG-686, In-Line Instrumentation for Redox and Purex Deletion of Redox D-14 Alpha Monitor Deferment of Installation of Purex 2DW Alpha Monitor," dated December 19, 1956, H. P. Shaw from L. L. Zahn.

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Letter "Process Specifications #1 Solvent Feed System Pumps Purex Plant," dated December 20, 1956, A. Bradway from R. J. Pence.

Letter "Project CG-648 - Redox Iodine Removal and Nitric Acid Recovery Rerouting Recovered Acid to 202-S Building," dated December 21, 1956, K. E. Kolb from G. K. Carpenter.

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>
C. R. Anderson	Self Induced Vapor Lift Circulator for Reactors	December 4, 1956
C. R. Anderson	An Elutriation Type Classifier and Separator for Slurry Homogeneous Reactor Fuel Recovery & Separation of Fission Products	December 10, 1956
C. R. Anderson	Accretion Process for Preparing Particulate Heterogeneous Fuel Elements for a Nuclear Reactor.	December 26, 1956

G. Trips

R. C. Hollingshead visited several pump vendors plants in the Los Angeles area from 12-11 to 12-13-56, to discuss development of deepwell turbine pumps. He also visited the Los Angeles and Seattle plants of the Western Gear Corp. on 12-10, 14 and 15-56, to confer with them on hard surfacing titanium.

W. P. Ingalls visited Washington State College on 12-20-56, to discuss methods of testing remote studs.

H. Visits

I. R. Compton of Hawthorn Electronic Co. visited the plant on 12-4 & 5-56, to investigate faulty operation of the digital analog converter.

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H. A. Gunderson of Ron Merritt Co. visited the plant on December 10, 1956, to demonstrate electronic equipment.

G. Sherrerd of Bird Machine Co. visited the plant on December 6, 7, 11 12 & 13 to discuss the Purex centrifuge problems. Otto Neumer of SKF Industries visited the plant on December 6, 7-56 to discuss the bearing problems on the Purex centrifuges.

G. Sherrerd and C. King of Bird Machine Co. visited the plant on December 17, 18 & 19-56 to discuss centrifuge improvements and to negotiate a contract with AEC.

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CHEMICAL PROCESSING DEPARTMENT
RESEARCH AND ENGINEERING OPERATION

December, 1956

ADVANCE PROCESS DEVELOPMENT - R. E. Tomlinson

Recovery of Neptunium-237

The production potential of neptunium-237 at Hanford is being investigated. When uranium is irradiated to 700 MWD/T, neptunium-237 is formed by the decay of uranium-237 to the extent of about 1.7 grams per ton of uranium processed. About 85% of the uranium-237 is formed by an $n - 2n$ reaction of uranium-238, the balance being formed by the successive capture of neutrons by uranium-235 to form uranium-236 and then uranium-237. If additional neptunium production were desired, the yield could be increased by recycling the uranium within the Hanford fuel cycle, thereby retaining all of the uranium-236 formed. For example, on the sixth pass of uranium through the Hanford pile (about one year per pass), the neptunium yield would be about 4.8 grams per ton, the increased neptunium production displacing a comparable weight of plutonium production. The uranium losses and uranium-235 burnout could be replaced simultaneously by blending in cascade product at about 3 to 5 per cent enrichment. Neptunium production could be increased even more rapidly, although at a much higher cost, by replacing the burnout with uranium recovered from irradiated, highly-enriched fuels.

Laboratory investigations are in progress to determine the path of neptunium in the Purex process, and to devise flowsheets to recover the neptunium in a useable form. Preliminary results indicate that the neptunium is being routed with the hot aqueous waste. Flowsheet modifications will be attempted to route the neptunium with the plutonium, with subsequent separation by ion exchange.

Pyrochemical Processes

The potential value of pyrochemical processing at Hanford is being evaluated on the premise that fuels containing relatively large amounts of zirconium may sometime require reprocessing. Based on pertinent literature references and detailed thermodynamic calculations, a pyrochemical process has been devised as a dissolution, head-and treatment to be followed by solvent extraction. The process was designed specifically to handle zirconium clad fuel elements, but is equally applicable to aluminum canned fuel elements.

In brief, the fuel element and cladding is dissolved in CdCl_2 (or CdBr_2), with the separation of Cd metal which extracts Ru, Rh, Pd, Mo, and Te. Volatile ZrCl_4 and NbCl_5 are removed by evaporation at the dissolution temperature (AlCl_3 is also volatile). Decontamination factors up to 100 may be realized for these elements. The separated Cd is decontaminated by distillation, a portion chlorinated for recycle to the dissolver and the remainder oxidized to CdO for subsequent use.

The uranium and plutonium chlorides in the salt phase are oxidized by CdO

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to form the oxide or oxychloride, with the regeneration of CdCl_2 which is recycled to the dissolver by distillation. The uranium and plutonium salts are routed to a dissolver-still where the metals are dissolved in nitric acid and the chloride removed by distillation.

The process has the following attractive features.

- (1) It is compact, in common with pyrochemical processes in general.
- (2) It produces a partially decontaminated feed (from Ru, Rh, Pd, Mo, Te, Zr, and Nb) free of halogens, suitable for further processing in a conventional solvent extraction plant.
- (3) Chemical consumption is low. Oxygen from air and chlorine to replace losses as ZrCl_4 , NbCl_5 , UOCl are required. Recycle minimizes the loss of cadmium.
- (4) The process may be operated continuously or batchwise.
- (5) Operating temperatures (range $710 - 970^\circ \text{C}$) are low in comparison with most projected pyrochemical processes, so conventional materials of construction may be used. Nickel or molybdenum might be used in the process equipment, copper for gaskets. A titanium dissolver-still is suggested for the dissolution of uranium in nitric acid and the subsequent distillation to remove residual chloride.

Details and theory of this process are reported in HW-47650 (in preparation). Experimental work is needed to verify predictions from theory. The solution of active metals in the salt of a less active metal is a known reaction. Oxidation in a manner such as to regenerate the solvent salt and separate it from the uranium - plutonium bearing product, as proposed here, is believed to be unique and should be verified experimentally.

Contact Engineering

The construction of the vacuum fractionator for the nitric acid recovered in the Purex process is essentially complete, and the shakedown of the equipment is scheduled during January. Project work was started on the continuous Task I and II facilities at 234-5.

PUREX PROCESS TECHNOLOGY - E. R. IrishSolvent Extraction

Irradiated uranium with an exposure rate of 3.3 to 6.2 MW/T (261 to 856 MW/T) and cooling times of 124 to 99 days was processed during the month. The plant processing rate (excluding the Final Uranium Cycle) was maintained at a capacity factor (CF) of 1.92 for the entire period except for three days when the rate was reduced to CF = 1.44 because of Task I processing limitations. Uranium rework, in addition to normal production, boosted the processing rate of the Final Uranium Cycle to CF = 2.4 for the majority of the operating period which was concluded on December 22. Typical performance for the solvent extraction cycles during the month is tabulated below:

<u>Cycle</u>	<u>Log Gamma Decontamination Factor, dF</u>		<u>Instantaneous Per Cent Waste Loss</u>	
	<u>Uranium</u>	<u>Plutonium</u>	<u>Uranium</u>	<u>Plutonium</u>
Precycle	3.4	3.4	--	0.18
Partition	2.1	1.7	--	0.23 (DBU - 0.02)
Final	2.0	3.0	0.01	0.08
Overall	7.5	8.1	--	0.49

Start-up, after the November shutdown, centered around the newly-installed, organic-continuous 2D Column which was started first on rework uranium. When the Final Uranium Cycle had leveled out, the remainder of the plant start-up was completed. Start-up was smooth except for temporarily increased uranium losses in the ICW and 2EW which were caused by a loss of temperature control on the demineralized water. Although the first three batches of plutonium failed to meet the normal fission product gamma specifications, probably as a result of start-up gamma activity surges and internal contamination loosened by changing the tube bundle in the E-14 Plutonium Concentrator, no plant recycle was necessary. Only the initial batch of uranium failed to meet gamma specifications, and this batch was blended with specification product.

The organic-continuous 2D Column containing a nozzle plate extraction cartridge and a "zebra" scrub cartridge gave excellent performance during the entire period. Waste losses consistently remained less than 0.001 per cent. The "zebra" scrub cartridge and the bottom interface location improved the decontamination of the Final Uranium Cycle by a factor of 10 to 20. Uranium product previously produced in an aqueous-continuous column with a standard cartridge ranged from 2 to 12 in gamma ratio whereas the product currently produced ranges from 0.3 to 1.2. (The UX contribution to the gamma ratio of the uranium product has now been determined to be 0.2 to 0.3.) No uranium re-quired treatment in the silica gel equipment during the month.

Beneficial effects of increased stability and decontamination performance and/or reduced waste losses were achieved by increasing the feed and extractant temperatures to all cycles. Specifically, operation of the HAF and 2AF at 50°C, with the corresponding organic streams at 45°C, improved the HA Column decontamination performance by approximately 25 per cent while the 2AW plutonium waste losses were reduced by a factor of three.

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Reduction of the 2AS flow to seventy per cent of the current flowsheet value (PPFS-III currently being issued in HW-47712, "Process Specifications for Operational Control - Purex Plant") produced no deleterious effect on the 2A Column decontamination performance.

Plutonium Concentration

Prior to start-up, the Plutonium Stripper, T-L3, deentrainment section reflux line was blanked, thus preventing return of solution to the IAF Tank. Operation of the L Cell package with this modification was smooth, but no effect on the IAW plutonium losses was noted. It had been previously hypothesized that plutonium returned to the IAF Tank via this line may have been responsible for consistently high IAW losses. No indications of an excessive plutonium buildup were noted during the operating period, and less than twenty per cent of a normal day's production was removed from the package by flushing after shutdown.

Organic Treatment

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

Organic Treatment System	Organic Activity, uc/gal.				Average Decontamination Factor, DF
	Unwashed		Washed		
	Max.	Min.	Max.	Min.	
No. 1	5x10 ⁴	1.4x10 ⁴	1.3x10 ⁴	4x10 ³	4
No. 2	40	10	20	10	2

Higher processing rates (CF = 2.4) in the new organic-continuous 2D Column apparently resulted in greater organic-in-aqueous entrainment and increased the organic losses from the low of 0.20 per cent of throughput reported last month to 0.32 per cent for the current month.

Four solvent system tests conducted during the month produced the following results:

- Relatively little particulate "crud" was detected in the carbonate solution below the interface in Batch Contactor TK-G1. (Interface sampling was not possible.)
- Although a plutonium decontamination factor of five is obtained in the No. 1 Organic Treatment System, the plutonium remaining in the washed solvent amounts to approximately 25 per cent of the plutonium in the HCW.
- A four-fold reduction in organic centrifuge acceleration (factor of two reduction in speed) together with a two-fold reduction in holdup time caused no significant increase in the solvent gamma activity.
- An increase of from 2-1/2 to five per cent in the carbonate concentration of the wash solution used in the solvent recovery

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systems (to reduce waste volume by 50 per cent) produced no noticeable effect on the solvent.

Waste Treatment

Although the performance of the Waste Treatment and Acid Recovery Systems was satisfactory during the operating period, the No. 1 Waste Concentrator was flushed with five per cent caustic, after shutdown, to remove a partial plug in the overflow line. Waste volumes sent to the 241-A Tank Farm averaged 159, 288, and 119 gallons per ton of uranium for neutralized IWV, carbonate washes, and cell drainage and flushes, respectively. The reduced carbonate volume reflected the increase to five per cent in the carbonate concentration of the wash solutions. Overall waste losses for the month were 0.77 and 0.50 per cent for plutonium and uranium, respectively. Plutonium and uranium coating removal waste losses accounted for 0.13 and 0.14 per cent, respectively.

A new maximum rate of self-concentration (6.2 gal./min.), attained in Tank 241-A-103 which currently contains 43 per cent of the terminal 8 M sodium ion content, kept the tank liquid level essentially constant while operating. However, approximately a one per cent volume reduction resulted from gains made during shutdown period.

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DECLASSIFIEDREDOX TECHNOLOGY OPERATION - M. K. HarmonFeed Preparation

The program for dissolution of low (198 to 264) MWD/T metal was completed during the month with metal cooling times ranging from 90 to 261 days. Despite regenerations of each of the three silver reactors in this period, the iodine-131 emission to the stack averaged 2.9 curies per day, while reactor daily efficiencies dropped as low as 93 per cent during processing of the shorter-cooled metal.

Evaluation of the maximum charge size for the down-draft dissolver included the completely successful two-cut dissolution of three successive nine-bucket charges. These charges were quite reactive and permitted time cycles equivalent to 180 per cent of Phase II if attained in three down-draft units.

Elimination of the water rinse of the dissolvers following coating removal reduced the combined coating waste volume from 260 to 160 gallons per unit of uranium with resultant savings in waste storage volume valued at 35 dollars per unit of uranium. No adverse effects on the process were observed as a consequence of this change in procedure which was effected on December 1.

Permanganate treatment was employed exclusively in preparing EAF, most of which contained approximately 20 volume per cent of solution from the cell sump for rework. This was principally IAFS solution from the leaking concentrator and pump.

Excessive leakage from the hydraulic actuating system of the centrifuge skimmer necessitated the centrifugation of fourteen feed batches, vice the normal eight, without removal of the cake. This deviation produced no discernible effects in the solvent extraction system despite the elimination of the dissolver rinse previously mentioned.

Solvent Extraction

Low MWD/T metal was processed at rates up to 144 per cent of Phase III with sufficient decontamination to permit all product batches to meet specifications. Flushes of the HS and HA Columns on December 17 and 18, respectively, were required to permit maintenance of satisfactory processing rates. Inadequate stripping of the LB Column during a start-up on December 28 resulted in uranium contamination of the plutonium stream, and necessitated the reprocessing of approximately 600 units of plutonium to remove the uranium contaminant.

Reduction of the IAS flow ratio by 40 per cent decreased the over-all aluminum nitrate consumption by 5 per cent with a negligible sacrifice of plutonium decontamination and an increase in the final uranium gamma activity to 40 per cent of the specification limit. The LA Column interface was intentionally lowered below the feed point briefly, following the reduction in IAS flow ratio. However, any effect of this on decontamination was obscured by extensive fluctuations in the acidity of the uranium cycles.

Satisfactory tests using acidified stock aluminum nitrate solution (2.7 M) for 3AS prompted adoption of this solution for both the 2AS and 3AS to permit an additional 5 per cent reduction in the over-all aluminum nitrate consumption. Plugging in the relatively cool pipes leading from the head tank gallery to the columns dictated a reduction of the 2AS-3AS aluminum nitrate concentration to 2.5 M. At this lower concentration, no plugging problems were encountered.

The reductions in plutonium and uranium cycle aluminum nitrate consumption decreased the HAFS flow ratio by 12 per cent to give an aluminum nitrate concentration of 1.19 M in HAW vice 1.26 M previously employed. Waste losses from the HA and HS Columns remained essentially unchanged despite the fact that the HAF flow ratio was maintained at 7 per cent above normal regardless of whether the feed contained waste rework.

Waste Losses

The over-all recoveries for uranium and plutonium of 99.79 and 99.75 per cent, respectively, were reduced principally by losses from the HA and HS Columns during brief periods of unstable operation. During stable operation the HA and HS Columns recoveries average approximately 99.9%.

Waste Disposal

The new temperature scanning instrument for waste storage tanks 107-115-SX, intended to monitor the vertical temperature gradients in the tanks, was placed in limited service near the end of the month. To date no abnormal temperature gradients have been detected.

Air-lift circulators are being operated in the 101-SX, 104-SX, and 111-SX tanks. There were no pressure surges in the underground storage tanks during the month.

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

Feed shipments to the 241-WR vault consisted of slurry blends from tanks 101-TX, 105-TX, 103-U, and 106-U (minimum age 16 months). TXR and UR facilities supplied 76 and 24 per cent of the uranium, respectively, at an average uranium concentration of 0.09 pounds per gallon. When cleanout of tank 101-TX (the slurry accumulator for the second sluicing operation) was started, metal removal rates were good. To date, about 40 tons of uranium have been removed from tank 101-TX, which indicates that a rather thorough cleanout of tanks 102-TX, 104-TX, 101-T, 102-T, and 103-T was made. Subsequent inspections of tanks 104-TX, 101-T, and 102-T found that the tanks did not contain sufficient sludge to justify additional sluicing.

Solvent Extraction

Uranium losses in the RAW, RCW, and REW averaged 0.5, 0.6, and 0.1 per cent of the feed uranium, respectively. Starting on December 10, the 221-U Building was placed on XYZ shift coverage, with shutdown over the weekends. Startups following the weekend shutdowns produced high losses for approximately 24 hours before normally low losses were obtained. In addition to the high losses encountered during startup, high RCW losses (up to three per cent of the feed uranium) were obtained for 72 hours following the processing of aged, decomposed organic phase (which was entrained into the RAF feed tank through the RA Column vent line). About six organic throughputs were required before the loss returned to normal.

The gamma activity of the first cycle product was consistently about 5,000 per cent of that of aged natural uranium. The second cycle product activity increased from 130 to 190 per cent, which was caused, in part, by the shutdowns for the weekends. The over-all logarithmic gamma decontamination factor decreased from 4.9 to 4.5 because of a decrease in the feed gamma activity and the increase in REU activity. Scrub flow rates to the second cycle have been adjusted to give improved decontamination during second cycle startup.

Waste Treatment

Approximately 1.4 million gallons of "in-plant" scavenged waste (batches 38, 39, and 49), containing cobalt-60 concentrations greater than 0.1 MFC (4×10^{-5} microcuries per milliliter), were transferred to the BC Nos. 12 and 13 trenches on a specific retention basis.

URANIUM CONVERSION OPERATIONProcess Performance

A total of 14 carloads of uranium trioxide were shipped during the month. Of these, eight were produced in the pots and the remainder in the continuous calciners. With the exception of one carload, all UO_3 shipped was within specifications. Carload 495 was shipped with 97.6 per cent passing 40 mesh screen

compared to the specification of 98 per cent minimum. The gamma activity ranged from 16 to 69 per cent of aged natural uranium, with an average of 40 per cent. The average of the total metallic impurities was 93 parts per million parts of uranium. The high temperature reactivity ratio (925 C reduction and 600 C hydrofluorination) averaged 0.99 and 0.77 for pot and continuous calciner material, respectively. The low temperature reactivity ratios (590 C reduction and 410 C hydrofluorination) of the continuous UO_3 ranged from 1.0 to 1.2. It is currently estimated that this test more nearly predicts operation of the fluidized bed-screw line for production of UF_4 at Paducah. Sulfur content of the UO_3 was 110 and 1,287 parts per million parts of uranium for pot and continuous UO_3 , respectively. Although deficiencies in the sulfate addition system have not yet been corrected, a significant decrease in variations in the sulfate content was effected through operational control.

Continuous Calcination

Major operational difficulties with the continuous calciners are in frequent rotameter sticking and rotary valve malfunction. Strainers of smaller pore size (0.020 inch) are under test to alleviate rotameter jamming. A three inch rotary valve has been tested with cold powder. Satisfactory mechanical performance with air leakage rates of less than one cubic foot per minute at operating conditions is indicated.

Off-gas filters performed satisfactorily. The elements of one cell were changed due to pluggage after 462 hours of operation, while those of another cell are satisfactory after 746 hours. It was indicated that the plugged filter failed by pluggage on the reverse side when dust leaked past gaskets and was driven into the element mesh by the cleanup "bump" air. It was also indicated that apparent filter failures occurred when the diaphragm operated valves failed to isolate the filters. The plug guides of these valves have been modified to alleviate sticking. Hand operated butterfly valves were also tested, with no apparent advantage at this time.

METAL FINISHING OPERATION

Task I

New supernate filter housings of improved design were installed in all Task I filter boat stations. Initial operation has resulted in a 50 per cent reduction in filtering time, i.e., from 30 minutes to 15 minutes. The design, which allows more efficient backflushing, has virtually eliminated filter block changes caused by plugged elements.

Recuplex

A total of 80 runs were processed through the SC hood, including 56 Task IV casting crucible runs, 12 Task III fragment runs, eight powder runs, and four cleanout runs. The SE hood processed 36,622 liters of feed through the columns, for an average of 1,936 liters per day. The operating efficiency was 91.5 per cent, giving an instantaneous rate of 2,100 liters per day. The extraction waste loss averaged 0.0035 g/l, resulting in a 99.39 per cent recovery across the columns.

The relatively untried Task IV flowsheet received a good test with 56 runs. Initial runs at 0.15 M fluoride ion gave some high slurries, so the flowsheet was changed to 0.30 M and slurry losses were reduced. At three hours coagulation time and 1.0 M ANN, spasmodic long filtration times were evident. On two of the final runs, the ANN concentration was increased to 1.1 M, and some improvement in filtration time was noted.

Task IV type feed caused ca. four plugs in the feed rotameter to the SE columns, resulting in about 12 hours down time; no trouble in column flooding or waste losses could be attributed to any of the feeds. One series of high extraction waste losses was attributed to organic impurities that could not be eliminated by normal wash procedures. Discarding the old organic for fresh 15 per cent TBP in CCl₄ reduced waste losses to below average, 0.0025 g/l.

The "no-salt" CAFA (concentrated feed stream) flowsheet underwent a rigid test while processing 117 SN runs, 20 flush and cleanout runs, one MR run, and many sump and condensate runs. Extra salting agent (ANN) was added at the SC hood for coagulation improvement. Column stability was improved, and no appreciable increase in waste losses was noted.

The supernate (SN) addition to Task III fragments test was completed, and it was concluded that no serious foaming will result if the peroxide normality is below 0.002 N and nitric is first added to the fragments. The supernate is added after a 15 minute period for hydrogen evolution. By following this procedure, supernate was added routinely to Task IV casting crucibles and Task II powders with no ill effects.

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

In continued investigations of the plutonium losses (0.1 to 0.3 per cent) in the HCW and LAW streams, the following results have been obtained:

- 1) Purex LAW sampled November 19, 1956, was spiked with nitric acid in varying concentrations, and the distribution ratios for extraction into laboratory, 30 per cent TBP-Shell E-2342 were measured. The distribution ratios (E_d) exhibited the expected acid dependency, varying from 0.47 to 16 with variations in nitric acid content from 0.73 (LAW concentrations) to 4.3 M. The measured ratios were low, by a factor of about 2.5, however.
- 2) The effect of monobutylphosphate (MBP) in the solvent on plutonium extraction from 3 M HNO_3 into 30 per cent TBP was investigated. At a plutonium concentration corresponding to that in LAW, about 0.001 g/l, the E_d was constant at 10-11, through an MBP concentration range of 0.0001 to 0.1 per cent. The measured extraction coefficient decreased, in general, with decreasing plutonium concentration.

A study of the path of nitrite in the Purex 2A column was begun, with a measurement, at room temperature, of the distribution of nitrite between equal volumes of 30 per cent TBP-Shell E-2342 and synthetic 2AF containing varying nitric acid and sodium nitrite concentrations. The measured distribution ratios (E_d) ranged from 15.1 for 1.5 M HNO_3 and 0.5 M NO_2^- in the 2AF to 88 for 0.5 M HNO_3 and 0.125 M NO_2^- . The ratios decreased with increase in either nitrite or nitric acid concentrations, the nitrite effect being much the greater.

Redox Process Studies

In the head-end process currently used in the Redox plant, the KMnO_4 is added to the oxidizer from the operating gallery as an eight per cent solution made as needed in the operating gallery. As laboratory data showed that a seven per cent KMnO_4 solution showed no reduction of KMnO_4 in one week, it was recommended that KMnO_4 make-up be moved to the aqueous make-up level of the silo.

Uranium Recovery Studies

The possibility of recovering uranium from UO_3 plant sump flushes (collected in Tank C-2) by passing this waste through a cation resin bed (Dowex 50W-80) was briefly investigated. Over 90 per cent of the soluble impurities (about 10,000 ppm uranium) remained on the resin with the uranium. Elution with 6 M HNO_3 removed both the uranium and the impurities; elution with 0.25 M H_2SO_4 removed about 40 per cent of the impurities with the uranium.

Cesium Recovery and Scavenging Studies

Further investigations on the removal of Cs^{137} from synthetic Redox D-3 waste were made during the month. The results show that Cs^{137} is effectively carried by zinc cobalticyanide over a wide range of acidities from -0.15 M

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to 1.54 M HNO_3 . At reagent concentrations of 0.003 M, the addition of 10^{-5} M inert cesium does not significantly affect the carrying of cesium 137. However, Cs^{137} decontamination factors fall off rapidly as the concentration of inert cesium is increased and approaches the concentration of the zinc and cobalticyanide reagents.

ANALYTICAL ASSISTANCE

Analysis for Nitrite in Purex Solvent

A procedure for the determination of nitrite in Purex solvent has been developed. After a sample of the solvent is contacted with a large excess of ferrous sulfate solution, the ferric ion produced is determined colorimetrically by a thiocyanate method. In calibrating the procedure, a linear curve was obtained, relating ferric ion produced to the original nitrite concentration.

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 was moved from the 234-5 Control Laboratory to the 222-S Building.

234-5 DEVELOPMENT OPERATION - H. H. Hopkins, Jr.Valence Stabilization in Ion Exchange Process

Four reducing agents have been tested: hydroxylamine, ascorbic acid, amino-guanidine, and semicarbazide, which offers most promise. Hydroxylamine reduces the plutonium rapidly but forms gas in solutions of high acid concentration which may make elution of the plutonium difficult or even dangerous. Ascorbic acid forms oxidation products which produce plutonium precipitates and may also form gaseous products at high acid and plutonium concentrations. Amino-guanidine is not strong enough to reduce plutonium under high acid conditions and is slow in reducing the plutonium even in low acid solutions. Semicarbazide reduces plutonium less rapidly than either hydroxylamine or ascorbic acid and may be required in higher concentrations, but appears to be the most stable reducing agent thus far tested. It has been used in 6 M HNO_3 -10 g/l Pu solutions without gassing or precipitate formation and has held the plutonium in the plus three state for two months. One experiment with 50 g/l Pu in 6 M HNO_3 resulted in the formation of a precipitate after seven days. Further tests will be made.

TEP Strip Experiments

Reduction of the plutonium during the stripping step on the Purex 2B column would produce an ideal feed for ion exchange. Three reducing agents have been tested in simulated 2AP streams: sulfurous acid, ascorbic acid, and hydroxylamine. Sulfurous acid in concentrations up to 0.1 M did not reduce the plutonium even when the nitrite ion in the organic was reduced by treatment with sulfamic acid. Both ascorbic acid and hydroxylamine (0.05 M) reduced the plutonium rapidly without gas formation and held the plutonium in the plus three state.

Plutonium Polymer

The study of plutonium(IV) nitrate solutions at low acidity has been completed and a rough draft of this work has been written. This study describes areas of stability and instability for plutonium(IV) solutions at ambient temperature and temperatures near boiling. The spectrophotometric detection and estimation of plutonium polymer was evaluated. Conditions leading to polymer formation are now known.

The absorption spectra of plutonium(IV) from 0.02 M HNO_3 to 14 M HNO_3 has been recorded and studied. These more complete spectrograms should be useful in interpreting solvent extraction data as influenced by changes in plutonium ionic species. It is also desirable to have standard tracings of absorption spectra for pertinent plant solutions.

Sulfate Precipitation in Task I Feed

If PR cans containing sulfate are allowed to stand, precipitation can be expected. After a week a small amount of precipitate had formed in the simulated feed material made up for this study. The solution contained 120 g/l Pu and 0.65 M $(\text{NH}_4)_2\text{SO}_4$ in 5 M HNO_3 . The limited solubility data applicable to these conditions indicates that the precipitation could well be expected.

The spectrographic results on the oxalate precipitates made from the above solution are given below.

	Fe	Ni	Cr
Feed	50,000 ppm	5000 ppm	10,000 ppm
Cake 1	520	200	200
Cake 2	1,440	1000	200

Corrosion in Oxalic Acid

A corrosion test indicated little attack of stainless steel under conditions that might be encountered in the evaporative kill of oxalate supernatants. A solution was made up containing 0.005 M oxalic acid and 1.8 g/l Cr^{+3} in 5 M HNO_3 . Coupons were fabricated from 304-L stainless steel. Two coupons were immersed in boiling solution for two 48-hour periods and the weight loss of the coupons determined over each period. Since the oxalate decomposed during the test it was necessary to recharge with fresh solution at periodic intervals. The average oxalate concentration throughout the test was about 0.003 M.

For the first 48-hour period the corrosion rate was 0.00018 in/month and for the second period 0.00013 in/month. In each case the two coupons had lost the same weight (0.8 and 0.6 mg, respectively, out of 1.6 grams).

Stability of Plutonium Trifluoride

A sample of plutonium trifluoride that had been dried at 600 C for one-half hour showed no weight change over a 17-day period of exposure to hood atmosphere.

Recovery of Plutonium from Miscellaneous Scrap

The recovery of plutonium from the scrap sandpaper and sweepings has been investigated, and a recovery method suitable for use in the Recuplex dissolving scheme has been tested. In the process the sandpaper is first ashed at a low temperature (to eliminate organic and pulpy material from the system); the plutonium is then leached from the ashes with a 6 M HNO_3 -0.25 M HF solution heated to the boiling temperature for a period of two hours. The material is then filtered, and the filtrate retained for purification by solvent extraction. The residual ash cake may be discarded. Experimental results indicate that greater than 90 per cent of the recovered plutonium will be in solution after two hours digestion.

Continuous Ion Exchanger

Calibration, cold-testing, and modification of the laboratory-scale continuous ion exchanger are under way. The major items of recent progress are:

1. All rotameters have been calibrated with water, the elutant rotameter with 6 M HNO_3 .
2. The Ecco pump intended for resin pumping, while of adequate capacity, proved undesirable for the purpose because of excessive pulsing,

particularly at low speeds. This pulsing was feared to lead to turbulence and mixing of the resin in the columns.

3. A bellows pump operated by an air cylinder was tested for resin pumping. The air cylinder available proved too small. Further use of this bellows pump will depend on the outcome of present testing of a hydraulic ram pump.
4. A crude form of hydraulic ram was installed and tested, which proved highly effective for resin pumping. A refined version of this pump is now being installed. This method of resin movement is based on volume of slip-water displacement rather than time of pumping and provides more precise control than the latter.
5. The variac speed controllers provided for the Eastern solution pumps have proven effective in eliminating heat-up of the pumped solution and provide good flow control.
6. Elutant flow control proved difficult at the expected rate of about three ml/min with the 1/8 inch needle control valve available. One of these bar-stock valves has been modified to provide controllable, low flow rate by installation of a fluorethene seat with 1/16 inch port and a long-taper needle plug.
7. The ion exchange hood and solution storage hood are ready to go "hot" as soon as the ion exchange equipment proves operable in all respects.
8. The only major cold-testing item remaining is the testing of the slip-water conductivity probe, which should be under way very soon.

Improved Slip Preparation

A more efficient means of preparing magnesium oxide slip was adopted. The revised method is in two parts. The first involves the method of resuspending the slurry after aging. In the standard procedure for preparing slip, -200 MgO is ball milled in water for eight hours, the slurry decanted, then let stand overnight to age. The next morning the supernatant liquid is poured off, and the fine solids which have settled out are broken up and resuspended in the supernatant by stirring with a Lightnin mixer. This operation is slow and tedious, the precipitate being very gummy and cohesive. In the revised method the ball mill is opened after eight hours of milling, and let stand overnight without removing any of its contents. The next morning the jar is closed, put back on the rotating device, and milling performed for about 1/2 hour. During the early part of this milling, many of the Burundum balls are imbedded in the precipitate, but as the action continues, the balls are freed, and at the end of the mixing period a smooth and uniform slurry is present. This slurry is then decanted free of the Burundum balls.

The second part of the revised method involves the means of adding the calculated quantity of -100 + 200 MgO to the resuspended slurry. In the standard procedure this is done by hand, using a spatula or similar implement, small quantities being added at a time. When necessary, hydrochloric acid is added to thin the slip. In the revised procedure the coarse magnesium oxide is fed

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in automatically from a hopper which is agitated through contact with a cam on the vertical shaft of the Lightnin mixer. This leaves the hands free for adding hydrochloric acid, and the operator may attend to other duties since his constant attention is not required.

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 December, 1956 except as listed below. Such persons further advise that, for the period therein covered by this report, notebook records, if any, kept in the course of their work have been examined for possible inventions or discoveries.

Inventor(s)Title

None

None

ORGANIZATION AND PERSONNEL

	<u>November</u>	<u>December</u>	
		<u>Ex.</u>	<u>N-Ex.</u>
Research and Engineering	3	2	1
Advance Process Development	7	6	1
Purex Technology Operation	16	14	2
Redox Technology Operation	15	13	3
Finished Products Technology Operation	23	20	2
Process Chemistry Operation	26	13	12
234-5 Development Operation	13	9	4
	<u>103</u>	<u>77</u>	<u>25</u>

VISITORS AND BUSINESS TRIPS

R. E. Smith, Mgr., of Finished Products Technology visited S. H. Smiley at the Oak Ridge National Laboratory on 12-11 and 12-12-56 and C. Powell of Union Carbide Nuclear Co., Paducah, Kentucky on 12-13-56 and S. Lawroski at the Argonne National Laboratory, Lemont, Ill. on 12-14-56 to discuss uranium oxide processing.

Messrs. B. Chow, D. MacDonald, J. Mackin and Miss Marion Sandomire of the Naval Radiological Defense Laboratories, San Francisco visited K. M. Harmon, Mgr., Process Chemistry on 12-10 thru 12-12-56 to discuss Hanford counting techniques and instrumentation.

Manager, Research and Engineering
CHEMICAL PROCESSING DEPARTMENT

RB Richards:khs

CHEMICAL PROCESSING DEPARTMENT
EMPLOYEE RELATIONS OPERATION
December 1956

I. RESPONSIBILITY

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

II. ACHIEVEMENTS

FIRE PROTECTION OPERATION

A. Fire Responses

1. C.P.D. Loss--Nil
202-S Bldg., 200-W Area - 9:38 A.M. December 19, 1956.
This fire occurred when a welder was welding wire screen on elevator. The hot metal fell to bottom of elevator shaft, and ignited scrap waste material that had accumulated.
2. Private Company, Morton Supply Company, Yakima, Washington
Loss--Nil.
Outside of main gate, 200-W area, 3:07 P.M. December 29, 1956.
Morton Company employees had cut iron from telephone poles with a torch, prior to loading them on truck. Poles were either smoldering prior to loading, or became ignited while enroute from hot metal or slag.

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

1. Fire Extinguishers

Inspected	465
Installed	12
Delivered	8
Seals broken	20
Serviced	36
Weighed	425

2. Gas Masks

Inspected	35
Serviced	12

3. Hand Lines

Inspected	18
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C. Other

Fifteen employees of Hot Semi Plant were given instructions in extinguishing small fires with CO₂, water pump can and dry powder fire extinguishers. Pumping operation performed for 241-S Tank farm.

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PERSONNEL DEVELOPMENT AND COMMUNICATIONS

A. Measurement Statistics

Participation in Training Courses

Monthly Personnel		56
Process and Equipment Orientation	1	
Non-Exempt Personnel Development	31	
Special Hazards	10	
Management Orientation	11	
Job Instruction Training	1	
Responsibilities of a Supervisor	1	
Customer Relations	1	
Weekly Personnel		43
Analytical Procedures	11	
Technologist Leader Training	5	
Special Hazards	13	
Craft Training (Power Operators)	12	
Process and Equipment Orientation	2	

G.E. Selection Program - number completed	1
Attendance at Films (1)	27
Technical Graduates on Rotation	1
Technicians in Training	6
Luncheons	1
Management News Bulletins issued	4
GE News Items	10
Employee News Letters	1
CPG's issued	32
Bulletin Board notices prepared	2

B. Comments on Statistics

Approximately 90% of the supervisors have attended the training session designed to acquaint them with the operation of the new Non-Exempt Personnel Development Program.

A special luncheon was arranged in the 2704-Z Building in connection with the visit to Hanford by Senator John O. Pastore and James T. Ramey, Executive Director, Joint Committee on Atomic Energy.

C. Employee Communications

An Employee News Letter was prepared and distributed during the month to all CPD employees' homes. This letter, signed by the General Manager, briefly discussed the TBP problem, the CPD safety record, production and costs, and ended with a holiday greeting.

A 50-word explanation of CPD's role in the Plutonium Recycle Program was furnished the GE NEWS at their request.

Arrangements were made during the month for publicity of a sizeable

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suggestion award. This includes still photographs for the GE NEWS and local and regional papers, movie footage for TV use and tape recordings for the local radio stations. The story appeared in the December 14 issue of the GE NEWS and local papers. KEPR-TV used the footage on its 6:45 local news program, December 14.

In connection with the GE 7 million dollar suggestion award total, a picture of the L. H. Meyers family was taken as representative of HAPO suggestion award winners. This picture was used in the December 29 issue of the NEWS.

Several other pictures with cut-line material were furnished the GE NEWS during the month. This included three pictures on CPD traffic safety campaign, a group of 200-E people listening to Christmas music from the badge house speakers, and a shot of Christmas decorations in the Redox lobby.

D. Public Communications

Two news releases were reviewed and approved during the month from a communications standpoint. These included a story about continuous calcination and a feature about the Flexiglass greenhouse.

Press Relations were provided with 5 or 6 suggestions regarding pictures showing the use of optics in CPD. Pictures were requested by Life Magazine on the use of optics and viewing equipment at Hanford.

A news release prepared by Press Relations for national release on the use of precious metals at Hanford was circulated within the department for approvals and returned to Press Relations with several suggested comments.

E. Personnel Development

Management Orientation classes were held at W-10 in Richland. This course formerly titled "New Exempt and Supervisory Orientation" has been revised and all departments contributed to the centralized presentation. C.P.D. supplied four speakers and eleven participants. Speakers were D. S. Roberts, J. H. Warren, E. T. Walsh and C. J. Sheeran.

Professional Business Management will be presented in January 1957. Study guides and text books were delivered at the end of the month and only final details remain to be completed.

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UNION RELATIONS OPERATION

As indicated in previous monthly reports, the H.A.M.T.C. had indicated its intention to arbitrate a jurisdictional matter involving Radiation Monitors. An arbitrator was chosen and January 17, 1957 set as the date of the hearing. However, an indefinite postponement of the hearing has been agreed upon between the H.A.M.T.C. and the Company, thus leaving open avenues for direct negotiation without having to resort to arbitration to resolve the dispute.

In conformance with OPG 3.3, complete files with all pertinent information have been directed to Legal Counsel and the Manager, Union Relations, Relations and Utilities Operation.

At month end there were no new developments in the case, with the initiative for the next move left up to the H.A.M.T.C.

The arrangement agreed to between the H.A.M.T.C. and the Company concerning extension of the holiday weekends has apparently worked to the satisfaction of the majority of the employees. There have been relatively few situations where the arrangement was questioned, and no grievances are known to have been filed by month end. Since it was clearly stipulated in the agreement that continuity of operations at certain locations would make it impossible for every employee to benefit, the few questions that did arise were concerned with the necessity for scheduling people to work on the holiday eves and continuing the normal schedule of Monday through Friday with Saturday and Sunday as normal days of rest.

Transition from A-B-C-D shift coverage to X-Y-Z shift coverage in TBP was made without any objections from the H.A.M.T.C. Objections were anticipated despite the fact that the new shift is recognized in the Union contract.

The ratio of Chemical Process Operators to Utility Operators presently exceeds the agreed 2.5:1 figure by approximately eighteen Process Operators. In view of the impending shut-down of TBP, consideration was given to allowing the imbalance to exist until the first series of layoffs. However, it appears that TBP will continue in operation until after February 1, 1957, and the decision was made to make the downgrades necessary to restore the 2.5:1 ratio.

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REF ID: A68000

[REDACTED]

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>Dec.</u>	<u>Nov.</u>
Bargaining unit employees in C.P.D.	1085	1099
Bargaining unit employees utilizing check-off	662	664
Percentage of total bargaining unit employees using check-off	60.1%	60.2%

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

	<u>Unit</u>	<u>Nonunit</u>
Pending at Step II on 11-30-56	21	0
Grievances received during December	7	0
Satisfactorily answered at Step I	2	0
Settled at Step I through expiration of 90 day time limit	6	0
Processed at Step II	3	0
Pending at Step II on 12-31-56	17	0
Pending at arbitration	1	0

[REDACTED]

SALARY AND WAGE ADMINISTRATION

The new position "Specialist, Property Management", was established in the Power and General Maintenance organization. This position replaces the deleted "Specialist, Buildings and Equipment: and its provisional position.

The new position "Supervisor, Laboratory Auxiliaries", was established in the Purex organization to replace the deleted position "Chemist, Process".

A letter was issued to outline our policy for handling the payroll status of non-exempt personnel who are receiving supervisory training. In general, such personnel will remain on weekly payroll. When supervisory responsibilities will be assigned them for a period they will be reclassified to full monthly payroll status on a temporary basis.

The study to accumulate data to show the pay differentials that exist between our first line supervisors and their crew members has been completed and will be sent out to the applicable operations soon for their use in the coming Salary Review period.

The preparation of individual salary history charts for exempt personnel has been continued and with the assistance of some components are approximately 20 % complete. It is our plan to have all cards complete and ready for Salary Review.

A study in conjunction with other HAPO Departments was made concerning payment of shift differential to exempt people. The final draft of this proposal will be prepared by Relations & Utilities.

An analysis of secretarial position grades in CPD versus the proposed HAPO grading system was prepared and is presently being studied. Final adoption of the system is awaiting development of this criteria by Relations and Utilities.

A correlation of Bacon-Davis rates versus HAPO rates was prepared and determination made as to the cost to CPD if these rates or the higher of the two were to be used. In both cases there would be a substantial cost increase.

Grades were established for four semi-technical jobs in Research and Engineering and for fourteen financial jobs during December. Ten jobs from the Product Cost Operation are in process of evaluation.

In conjunction with the Wage Administrator of HLO a title study has been completed for presentation to the Managers of Employee Relations on January 4, 1957. This study concerns Engineering Assistants, Technologists and Laboratory Assistants.

Administratively papers were processed and discrepancies incident thereto handled with supervision concerned as listed for non-exempt employees in the statistical portion of this report.

ADDITIONS TO ROLL

	<u>Exempt</u>	<u>Non-Exempt</u>
New Hires and Rehires		2
Reactivations		1
Transfers from Other Departments		3
Reassignments from Non-Exempt to Exempt	3	
Reassignments from Exempt to Non-Exempt		

REDUCTIONS FROM ROLL

Terminations	1	
Transfers to Other Departments or Divisions	3	13
Reassignments from Non-Exempt to Exempt		3
Reassignments from Exempt to Non-Exempt		

CHANGES IN STATUS (NO SALARY CHANGE)

Intra-Departmental Transfers	4	25
Reassignments	3	
Level Changes - Increase		
Level Changes - Decrease		
Location Changes	2	

CHANGES IN SALARY

Promotions	10	22 (Intra)
Demotions		1 (Intra)
Merit - Salary Review	17	
Merit - Interim		
Automatics		52
Temporary Reclassifications		3
Salary Adjustments (Gen'l Adj. on Firemen)		

REQUISITIONS	1	10 (13 Personnel)
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ORGANIZATION CHANGES

Positions Added	1
Positions Deleted	3
Position Title or Level Changes	1

DEFERRED

HEALTH AND SAFETY OPERATION

Chemical Processing Department	<u>December</u>	<u>November</u>	<u>Year to Date</u>
Disabling Injuries	0	0	0
Serious Accidents	3	1	6
Medical Treatment Injuries	66	68*	271
Radiation Incidents	1	1	3
Radiation Occurrences	33	24	121
Fires	1	0	4
Security Violations	3	1	6

*Correction resulting from declassification of one injury from plant to personal.

Two medical treatment injuries were formally investigated as Serious Accidents Numbers 5 and 6. A chemical worker suffered a partial amputation of the tip of the left middle finger when a manhole cover was dropped. Failure to observe safe practice was the cause. When a pipefitter drilled into a header containing nitric acid, his helper sustained a burn in the corner of his eye. No eye protection was worn. Serious Accident Number 4 occurred when an overhead chainfall dropped to the floor: the chainfall supporting member was not secured. No injury resulted.

The medical treatment injury frequency rate decreased by three per cent. Lack of ordinary care was noted to be the prevailing cause of injuries.

The trend in radiation occurrences was unfavorable. Lack of care was the most frequent cause.

One occurrence formally investigated as Radiation Incident Number 3 involved localized skin exposure approaching the permissible limit to a process operator. The cause was failure to promptly detect a radioactive particle which probably lodged on the employee's neck during cask car decontamination.

Emission of I^{131} exceeded the department goal of 10 curies per week on three occasions. A decrease in silver reactor efficiency and processing of shorter period cooled metal caused the increase.

One fire occurred in an elevator shaft pit when weld spatter ignited debris. No property damage resulted.

Three security violations occurred. Two were from an unsecured repository and one was a failure to properly store classified material.

The fourth quarter safety program, "Back The Attack On Traffic Accidents" was successfully completed. There was one motor vehicle accident involving no injuries and \$100 damage during this period.

The first quarter 1957 safety program, "Signs of Life," was presented to the Department Safety Council and approved.

Printing and distribution of the revised department evacuation procedure was completed. Plans were completed for a Practice Evacuation in January.

Two issues of the Health and Safety bulletin "As We See It," were printed. The first provided advice to all exempt personnel for use in safety meetings on the traffic problem. The second alerted all department people to the unexpected hazard of deer crossing the plant highway.

Counsel and service was provided on the following items:

- Rejection of hand and hammer powered drive-it tool.
- Compressed gas piping system and storage - 277-W Building.
- Acid drum lift - 202-S Building.
- Improved method of pouring babbeted cable socket.
- Installation of area walkways.
- Revision of Accident Prevention Bulletins.
- Installation of amplifier speakers at both main badgehouses.
- Installation of motor vehicle safety signs at 200-East main gate.
- Relocation of large safety board outside 200-West Area.
- Procurement of new safety flags for both main badge houses.
- Relocation of instrument equipment storage and plastic shop - 202-S Building.
- Partial conversion of 2707-E change house to office space.
- Proposed replacement of combustible CWS filters - Purex and Finished Products.

The following non-routine reports were issued:

- Serious Accident Investigation #56-4
- Serious Accident Investigation #56-5
- Serious Accident Investigation #56-6
- Radiation Incident Investigation CPD-3, HW-47569.

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PERSONNEL PRACTICES OPERATION

	<u>Exempt</u>	<u>Non-Exempt</u>	<u>Total</u>
<u>Additions to Payroll</u>	0	6	6
New Hires	0	2	2
Reactivates	0	1	1
Rehires	0	0	0
Re-engage	0	0	0
Transfers into C.P.D.	0	3	3
<u>Removals from Payroll</u>	4	20	24
Leave of Absence	0	0	0
Personal Illness	0	3	3
Illness in Family	0	1	1
Resigned, other employment	1	0	1
Returned to School	0	1	1
Deceased	0	1	1
Husband leaving vicinity	0	1	1
Retirements	0	0	0
Transferred from C.P.D.	3	13	16

The net decrease in C.P.D. employees was 18, consisting of 17 non-exempt and 1 exempt employees. Only nine non-exempt employees were directly involved in the T.B.P. shutdown status. There still remains 69 T.B.P. operators to be placed. Based on the belief that there will be jobs for all, the placement of these employees has been extremely slow. In the entire H.A.P.O. Organization, there are 52 non-exempt openings, while the 69 T.B.P. operators qualify for only 22 of these. Also, these existing openings can not be held indefinitely. Even in some cases where the employees could be transferred at the same job level they refuse since they do not desire to take the wage cut to the starting rate that is required by contractual agreement when transferring between seniority groups. Steps have been taken during interviews to present a more realistic picture to the operators so that they will be more cognizant of the situation when refusing transfers.

Requisitions for Personnel (Non-exempt)

Number on Hand End of November	11
Number received	16
Number filled	4
Number on Hand End of December	23

Requests for Transfer (Non-exempt)

Number on Hand End of November	146
Number received	7
Number transferred	4
Number on Hand End of December	149

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Service Recognition Plan

A total of 30 ten-year pins were distributed as follows:

5 females
25 males

A total of 22 five-year pins were distributed as follows:

2 females
20 males

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

Requests for Transfer (Exempt)

Number on Hand End of November	19
Number This Month	2
Number Transferred	0
Number Closed Out	0
Number on Hand End of December	21
Number of Interview Trips	0

Applications for Employment

Applications Received during December	0
Hired	0
Closed Out	0
Invited for Interview	0

The total number of available personnel from the Research and Engineering and Finished Products Operations now stands at 19, with one person having been placed back on the available list from Finished Products Operation. Two of the Research and Engineering Operation personnel were placed, one transferring to the Hanford Laboratories Operation and the other to Irradiation Processing Department. One person from the Finished Products Operation was transferred to the Hanford Laboratories and another resigned to accept employment with the A.E.C.

A meeting was held by the technical placement people in Relations and Utilities Operation during the month to reconcile the Departmental requirements for rotational trainees, summer juniors, and college professors. These requirements have been tentatively reduced for the summer juniors and professors since it was felt that with the original requests from the departments for 174 persons in these three categories there would not be challenging assignments in all cases and the close follow-up for each individual required could not be carried out as efficiently as it should be. The departments will review the reduced numbers during the coming month.

Negotiations were begun during the month with Electronics Park in Syracuse, New York in an attempt to fill an open requisition within the Company for an experienced electronics engineer for the Facilities Engineering Operation.

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<u>Suggestion Plan</u>	<u>November</u>	<u>December</u>
Suggestions Received	78	68
Acknowledgements to Suggestors	57	73
Suggestions Pending Acknowledgement	32	26
Suggestions Referred to Operations for Investigation	57	73
Suggestions pending Referral to Operations	32	26
Investigations Completed and Closed	92	80
Adopted Suggestions Approved by Board	38	47
Adopted Suggestions Pending Approval by Board	34	35
Total Net Savings	\$12,034.79	\$32,916.79
Total Cash Awards Approved by Board	1,785.00*	3,765.00*
Total Number of Suggestions outstanding to Operations at the end of the Month	236	224

* These figures reflect awards approved by Board of \$2,010.00 which require approval of the Atomic Energy Commission.

In December, checks for \$3,495. were delivered to Level 3 Managers for distribution.

Benefit Plans Participation

Insurance Plan	99.7%	99.7%
Pension Plan	98.9%	98.3%
Stock Bonus Plan	55.9%	55.9%
Good Neighbor Fund	61.1%	61.2%

Three pre-retirement interviews were held with employees of C.P.D. during December.

A letter together with a form "How to Submit an Insurance Claim" and four pages of questions and answers were distributed to all employees of C.P.D. during December to assist them in the filing of their insurance claims.

C.P.D. has a total of 84 non-veterans who are subject to military training through the Selective Service System.

During the month of December there were no additions or removals from the non-veteran selective service file.

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

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Deferments

Deferments requested (December)	1
Deferments granted (December)	0
Deferments requests pending	4
Routine	2
Appeals	2

Recent changes in the Selective Service System procedures gives the Selective Service Local Board authority to determine the availability of members of the Standby Reserve for order to active duty in time of war or national emergency declared by Congress, or whenever is otherwise authorized by law.

The availability determinations fall into three categories:

Category IR: Reservist available for order to active duty.
 Category IIR: Reservist not available for order to active duty because of civilian occupation.
 Category IIIR: Reservist not available for order to active duty by reason of extreme hardship and privation to dependents.

In order to establish appeal rights for IR category determinations, it is necessary for the employer to file a written request with the local board prior to the determination of a category.

The Employee Services office is currently submitting requests for category II-R determinations for technical graduate personnel. Our present records do not accurately reflect the number who will be affected by this action at the present time, however steps are being taken to obtain accurate military status information for all male employees.

Deferments (Category II-R determination requests)

Category II R requests (December)	4
Category II R pending	4
Category II R granted	0

Notices and forms have been mailed to supervisors of 127 C.P.D. non-exempt employees who are to be appraised during the month of January in accordance with the new Non-exempt Personnel Development Program. Appraisals should be completed and returned to this office by February 5th.

Duplicating

Orders on Hand (12-1-56)	79
Orders Received	730
Orders Completed	694
Orders on Hand (12-31-56)	115
Total Copies Produced	163,328
Embossed Signs Made	106
Verifax Copies Produced	1,102
Ozomatic Copies Produced	5,815

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In connection with the study on the cost of Xerox Developer, a representative from the manufacturer visited our duplicating plant and instructed the Xerox Operator on the use of this new developer. As a result of this meeting and with closer supervision of the operation, our production has increased from an average of 26 xerox masters to 315 masters per can of developer. The same can of developer is still in use and it is estimated that we will obtain some 800 masters from this can (1/2 pound) of developer before it is necessary to replace it. This new method of processing results in an increased production of 1200%, with a potential net increase of some 3000%, for each can of developer used. Moneywise, our cost of reproducing xerox masters (developer only) has been reduced from approximately \$1.00 each to approximately 8¢ each and a potential of 3¢ each.

Installation of the new telephone cable to the "B" Plant was completed on December 13th. Additional telephone service has been installed in eight offices and facilities are available for three more installations if needed.

Opening of the new 200-E mail room is still pending receipt of mail sorting trays. It now appears these trays will be received and installed about January 10th.

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	91	91

* Includes Level 3 Manager

B. Meetings

Weekly Level 4 staff meetings were held. Safety meetings were held for personnel in the various Operations. Health and Safety personnel participated in 4 additional safety meetings. Approximately 25 liaison meetings with counterparts in other departments were attended by personnel of Employee Relations Operation.

C. Safety

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

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D. Personnel Activities

R. E. Toczek visited a number of southwestern colleges and universities on a recruiting trip.

Fire Protection Operation conducted 19 outside and 70 inside fire drills. Classes were conducted with all shifts by members from RMU on proper uses of the tourniquet for injuries occurring in radiation zones.

A well attended Christmas party was held by the Employee Relations Operation on December 15, 1956, at the Officers' Club in North Richland.

END

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9 / 8 / 92