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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT
FOR

HW--67252-Del.

OCTOBER, 1960

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DS Lewis 8/20/92
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Compiled By
OPERATION MANAGERS
November 21, 1960

HANFORD ATOMIC PRODUCTS OPERATION
RICHLAND, WASHINGTON

Work performed under Contract No. AT(45-1)-1350 between
the Atomic Energy Commission and General Electric Company.

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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

OCTOBER, 1960

I. SUMMARY

A. RESPONSIBILITY

There were no changes in the responsibilities of the Chemical Processing Department during October.

B. PRODUCTION

Although production of plutonium nitrate from the separations plants was slightly below that forecasted for October, fiscal year-to-date production exceeds the corresponding commitment.

After performing a successful neptunium recovery campaign, which yielded 2.0 Kgs., eight strontium-90 recovery runs were completed in the Purex plant. An estimated 220 kilocuries of strontium-90 were segregated and stored for further decay of strontium-89 before final purification.

The production of UO_3 conformed to the operating schedule. Five carloads of powder were pre-shipped because of a threatened work stoppage at Hanford.

Unfabricated plutonium metal production was below that forecasted for October and fiscal year-to-date; however, all shipping commitments were met on schedule. Formal directions were received from the Atomic Energy Commission in October to cease the fabrication of Model 85 weapon parts, and to start preparation for the production of Model 81 weapon parts.

C. ENGINEERING

Strontium-90 recovery from the Purex high-level waste stream (IWW) has been below that expected. The cause for the low recovery has not been established. Diagnosis is difficult because of anomalies in the material balance, which show reasonable losses to the process waste stream concurrent with low yields in the product stream. Intensive efforts to resolve the problem are continuing.

As reported last month, gamma activity in the Purex process decreased approximately three-fold coincidentally with the processing of longer aged metal (approximately 200 days). Upon resuming the processing of shorter aged metal (approximately 100 days) in late October, gamma activities returned to those levels previously experienced with similarly aged metal. Both the plutonium and uranium products were within specifications all month.

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Approximately 60 percent of the nitrogenous degradation products in the Redox hexone inventory were removed by washing with five percent sodium hydroxide solution. Subsequent plutonium losses from the partitioning column (1B) were the lowest in several months.

The K-cell uranium oxide calciner operated under fully programmed control during October. A successful startup of the calciner was initiated remotely from the CPD General Manager's office, a distance of approximately four miles, to demonstrate the programmer capability.

The new RMC Button Line in Finished Products was placed in service on a full-time basis in October. Operation was satisfactory with the exception of Task III performance. Task III of the RMA Line was used while corrections were being made.

AEC Directive No. HW-478, Mod. #3, dated October 13, 1960, authorized an increase of \$1,321,000 for Purex Palm Recovery. Directive completion date is September 30, 1962 and beneficial use date is July 1, 1962.

The process design of a Higgins-type ion exchange contactor for third cycle plutonium decontamination at Redox was completed and transmitted to the Commission.

AEC Directive No. HW-521, dated October 10, 1960, authorized \$45,000 for the General Electric Company to perform Title I, interim Title II, and related management services for Birch Recovery at Redox. Design completion is scheduled for May 1, 1961.

W.K. Wae Ready

General Manager
Chemical Processing Department

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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

OCTOBER 1960

II. ACHIEVEMENTS

A. PRODUCTION OPERATION

October September

1. Production Statistics

a. Purex

Uranium nitrate produced (tons)	403.7	782.7
Average production rate during operation (T/D)	25	26
Total waste loss (%)		
Plutonium	0.43	0.45
Uranium	0.08	0.06
On-line efficiency (%)	86	100

b. Redox

Uranium nitrate produced (tons)	(71.5	40.1
Average production rate during operation (T/D)	(4.7 N	6
Total waste loss (%)	6.5	
Plutonium	0.56	1.16
Uranium	0.12	0.26
On-line efficiency (%)	56	38

c. Uranium Reduction

Normal UO ₃ loaded (tons)	602.80	667.2
Enriched UO ₃ loaded (tons)	33.57	0
Normal UO ₃ approved for shipment (tons)	601.39	643.0
Enriched UO ₃ approved for shipment (tons)	0	0
Normal UO ₃ shipped (tons)	797.8	545.8
Enriched UO ₃ shipped (tons)	0	0
Normal UNH backlog (tons U)	220.0	425.0
Enriched UNH backlog (tons U)	24	4.0

d. Plutonium Metal Processing

Input to Task I (batches)	190	329
Reduction yield (%)	96.7	97.5
Plutonium metal buttons produced (% of commitment)	72.9	125.5
Plutonium metal buttons shipped (% of commitment)	122.9	99.6
Product recovery output (% of schedule)	55.7	121.9
Product recovery backlog (Kg's)	268.0	239.8
Waste disposal (grams)	13	382

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October September

e. Plutonium Metal Fabrication

f. Waste Storage

Redox salt waste reserve (tons U)	2 646	2 721
Purex salt waste reserve (tons U)	24 109	24 516
Redox coating waste reserve (tons U)	18 952	19 027
Purex coating waste reserve (tons U)	41 280	31 687

g. Power

200-East 200-West

Raw water pumped (gpm)	9 149	5 119
Filtered water pumped (gpm)	1 231	1 007
Maximum steam generated (lbs./hr.)	277 000	122 000
Average steam generated (lbs./hr.)	165 940	81 741
Total steam generated (M lbs.)	123 461	60 816
Coal consumed (est. tons)	6 324	3 193

J. W. Warner
Manager - Production

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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

OCTOBER, 1960

II. ACHIEVEMENTS (Continued)

B. PUREX OPERATION

1. Operating Continuity

Processing was suspended on October 4, 1960 after a run period which started on August 25. A Birch recovery run was initiated on October 6 and completed on October 16 with a yield that was 40 percent greater than for any previous run. Normal processing at a 2.6 CF was started on October 18.

Rates were increased to 3.0 CF on October 20 and were maintained for the remainder of the period.

Waste losses were 22 percent and 44 percent below the nine-month average for plutonium and uranium, respectively. All products were within shipping specifications.

2. Processing Experience

All metal processed up to October 27 had a cooling period in excess of 200 days. The fission product waste from the processing of this material was segregated for the recovery of strontium-90. Gamma activities of the process streams were low during the processing of this material, with the uranium product having a gamma ratio less than 2.0 without silica gel treatment. Upon switching back to metal with a cooling time of approximately 100 days, the gamma levels throughout the plant returned to the previous levels, a factor of two to three higher. The plutonium product stream was well within specifications at all times.

Birch recovery from the backcycle stream amounted to approximately 86 percent of that present in the system. Process and equipment performance was excellent.

Rework of the recovered nitric acid, which had been stored in P-3 tank, was completed. The acid contained a relatively high uranium content and was reworked through the dissolvers and final uranium cycles only.

Eight runs for the recovery of strontium-90 from Purex high level LWW wastes generated while processing aged (200-day) metal were completed during the month. Failure of the E-2 centrifuge during the ninth run made revision of the flowsheet necessary in order to increase the production capacity with a single centrifuge. To

date the recovery is about 40 percent with an estimated 220 kilocuries segregated and stored for further decay of the strontium-89.

3. Mechanical Experience

The B-2 silver reactor showed signs of plugging and was taken out of service in September. Two broken studs were found on the vapor outlet flange of the reactor and delayed flushing until two "C" clamps could be installed. After flushing was completed remote gaskets were installed on both inlet and outlet vapor flanges. The dissolver was returned to service late in the month.

During the Birch run and the ensuing two-day outage the following work was accomplished:

- a) Both tube bundles in the second waste concentrator (F-6) were found to be leaking and were replaced.
- b) The fission product centrifuge (E-2) was replaced.
- c) The leaking reboiler in the nitric acid vacuum fractionator was replaced.
- d) The DOV on the 2A column (L-1) jetout jumper was replaced.
- e) The HSR jet jumper was replaced because of a bad steam leak at a wall nozzle.
- f) A steam trap jumper was installed in the canyon on the east tube bundle of the backcycle concentrator (H-4). This was a prototype jumper installed: 1) to determine if the operating efficiency could be improved; and 2) to establish the feasibility of installing other steam trap jumpers in the cells in case the trap pits should ever become inoperable. Operation of the trap jumper has been satisfactory; however, no significant improvement in efficiency has been noted.
- g) The 3WB (J-1) and IHXF (J-3) pumps were replaced on a preventive maintenance program. The J-1 pump was equipped with a new type of discharge head that was designed by FEO to reduce the problem of upper seal leakage.
- h) The float in the IO column (G-2) float jumper was again replaced.
- i) The HAF jumper was replaced because of erratic flow. The new jumper was made in two sections to allow replacement of the HAF pump without draining the HA column.
- j) The turbomixer G-7 to HAX pump jumper was replaced after one of the DOV's in the jumper had a broken stem.
- k) The resin in the plutonium ion exchange system was replaced.

4. Radiation Experience

Total iodine 131 emission during the period was only 4.84 curies, reflecting the processing of longer-cooled metal.

A total of twelve cases of skin contamination and eight cases of contaminated personal effects were experienced. All skin contamination was reduced to less than detectable.

Replacement of the reboiler unit of the acid fractionator (206-A) was accomplished at maximum personal dose rates of 3 rads/hr. including 400 mr/hr.

Work at the 241-A and 241-CR tank farm diversion boxes, in connection with storage of the strontium product, required an abnormally large amount of personnel exposure. Personnel dose rates up to 5 r/hr. were experienced.

5. Analytical Experience

A second plutonium composite exchange with the FPO analytical laboratory was completed. The results indicated an 0.8 percent bias of FPO results over Purex.

Analytical support of the Birch recovery program progressed satisfactorily. The Purex loadout value agrees with the value of the purified product within two percent.

Work on the high level work station was completed on October 7. Acceptance tests are in progress.

Strontium-90 content of the Purex dissolver metal solution was found to be 1.81 kc/ton of uranium by the Purex laboratory, which is in close agreement with the calculated value of 1.76 kc/ton uranium.

Acquisition of the DK-2 recording spectrophotometer has provided the means for investigating plutonium valence adjustment in rework solutions. The effects of ferrous sulfamate and nitrite additions to concentrated plutonium solutions can be determined.

Through application of the DK-2 recording spectrophotometer a method of determining fluoride in the plutonium ion exchange system has been developed. The method is applicable to both aqueous makeup and process stream samples.

6. Events Influencing Cost

The downtime necessary to replace an HAF pump was reduced from 24 hours to 4 hours by the installation of a revised jumper assembly which eliminates the need for draining the HA column prior to replacing the pump.

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P. R. Murray
Manager-Purex

RR McMurray:EAF:gt

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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

OCTOBER, 1960

II. ACHIEVEMENTS (Continued)

C. SPECIAL SEPARATION PROCESSING AND AUXILIARIES OPERATION

1. Operating Continuity

Operation of the Redox Plant on E-metal feed was resumed on October 10 following completion of a planned acid flush for critical mass control. Approximately eight kilograms of plutonium were recovered by the flush and reprocessed. E-metal processing continued as scheduled for the balance of the month.

2. Processing Operation

The routine six-month 60 percent nitric acid flush of the Redox Plant's processing equipment was completed during the first week of the month. Approximately eight kilograms of plutonium were recovered and reprocessed prior to the start of E-metal production on 10-10-60.

Concurrent with the processing of the 60 percent nitric acid flush approximately 14,000 gallons of UNH, with high gamma ratio, were returned to the process and re-ozonated to meet shipping specifications. This material had been stored since September pending an appropriate time for reprocessing.

Start-up on E-metal processing was very smooth and all process streams were well within shipping specifications. However, during the latter part of the month high gamma ratios required additional ozone treatment of the UNH and at month end the iron content of the final plutonium stream was running on the borderline to shipping specifications, occasionally trending out on the high side. Investigations are currently underway in an effort to resolve both of these problems.

A step forward in nuclear materials management was accomplished this month with the installation of a continuous sampler at the 216-S-5 weir box. The new sampler monitors, on a 24-hour basis, all coil condensate and cooling water from the Redox Plant's process concentrators and dissolvers routed to the 216-S-6 crib. Previous monitoring of this waste stream was by dip samples taken twice a week. Currently all waste streams leaving the Redox Plant are monitored by continuous or batchwise sampling.

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3. Mechanical Experience

The leaking east tube bundle flange gasket on the F-2 back-cycle concentrator was repaired using a special gauge ring and gasket, threaded with a Viton "O" ring. The installation is identical to that installed at the west tube bundle flange during September, and if successful, may save the cost of a new F-2 vessel.

On two occasions during the month, the brakes on the 60-ton hoist on the Redox Canyon Crane failed. Although no damage resulted, the serious potential involved resulted in the initiation of a preventative maintenance and inspection program of sufficient magnitude to assure safe operation. Work to date has included replacement of the brake linings and an oil seal on the right hand brake and adjustments to the shoes on the left hand brake. Subsequent inspection following this work indicates that it may also be advisable to replace the shoes and linings on the left hand brake. This is to be done at an early date.

Nine jumper replacements were made during the month, one of which was a reconditioned spare. Most significant was the F-2 to F-3 vent jumper installation. Two broken stud bolts on the F-2 tower flange required remote installation of a C-clamp on the flange before an adequate seal was obtained.

4. Waste Handling and Decontamination

Equipment valued at \$42,000 was received from the processing plants for decontamination, repair or inspection during the month. No shipments of repaired equipment were made because of other higher priority decontamination work.

A total of 436 man-hours was charged to the decontamination of railroad, automotive, and heavy equipment during the month. The following is a breakdown of the major items decontaminated:

<u>Item</u>	<u>Operation Charged</u>
Locomotives No. 3731 & 3732	Transportation
Flatcars No. 19030, 3611 & 19028	CFD
Well Cars No. 43, 45, & 39	"
Sedans No. 1A-840 & 1A-6358	Purex
Pickup No. 1C-195	FEO
Pickups No. 1C-169 & 1C-172	P&GM
Trucks No. 68-B4711 & 68-B4730	"
Power Wagon No. 1H-726	"
Regulated Motor Crane	"
Panel No. 1D-491	"
Truck 68-B5879	Elect. Dist.
Power Wagon No. 1H-715	" "
Sedans No. 1A-818, 1A-6339 & 1A-690	Patrol
Sedan No. 1A-687	RMO

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5. Radiation Experience

A breakthrough in the 233-S Concentration Building exhaust air filters (34 uc of plutonium in a 19 hr. period) occurred on 10-12-60. The plutonium emission was detected by the new alpha burst monitor which had been connected to the exhaust on 10-3-60 to give an early warning of filter failure. New filters were installed on 10-18-60 without incident. During the change-out the building exhaust air was routed through the underground filters. Inspection of the old filters which had been in service approximately 19 months, revealed breaks in the filter media up to 5 inches long.

The B-4 filter from the multipurpose dissolver incident (cf. this report for April, 1960) was buried on 10-27-60 with good radiation control. A new control method, which consisted of placing remotely retrievable deposition filters on the lid of the burial box and on the flatcar, was initiated to assure that the burial unit was free of contamination before leaving the Redox Plant. The dose rate from the B-4 filter was 1,500 mr/hr (unshielded) at 30 feet and 270 mr/hr through the box at 20 feet.

Minor particulate fission product emissions from the 291-S ventilation stack were detected on three different occasions during the month. As on previous occasions, the activity was associated with the emission of ammonium nitrate crystals, which were apparently caused by an air pressure drop to the dissolver vent jets resulting in an automatic switch to steam. The particles, ranging from 5,000 c/m to 10,000 c/m, were all contained in the 291-S stack area and were easily removed by water flushing and physical pick-up of the larger ammonium nitrate crystals.

6. Analytical Experience

Considerable analytical assistance was provided to Hanford Laboratories Operation personnel this month in their flow sheet development work for strontium-90 recovery in the Hot-Semi Works. However, fulfillment of all requests was hampered by operating difficulties with the 256 multi-channel energy analyzer which was out of service for approximately three weeks during the month.

for Manager - Special Separation
Processing and Auxiliaries

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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

OCTOBER, 1960

II. ACHIEVEMENTS (Continued)

D. FINISHED PRODUCTS OPERATION

1. Operating Continuity

In the Finished Products Operation the fabrication of Model 85 was stopped and pre-specification work on Model 81 was started as directed by the Atomic Energy Commission in Document HAN-76682.

Delivery requirements for unfabricated plutonium were met in spite of production being under schedule due to feed shortage. Plutonium Recovery output was only fifty-six percent of schedule because of processing difficulties. The production of UO_3 powder exceeded schedule.

2. Processing Operations

a. Plutonium Fabrication

Activities this month centered around preparations for the future production of Model 81. Numerous castings and machinings were made using the dimensions of the Model 85 and the metal specified for the Model 81. Reject rates were high but valuable experience and training resulted. This activity is to continue until firm specifications and schedules are established.

Equipment for the fabrication of Model 81 parts, to specifications as known at present, was installed during the last week of the month.

The cold treatment hood and the storage hood provided under Project CG-811 (Additional Fabrication Equipment) were placed in plutonium service during the month. The checking of the six new Gorton lathes was started by the factory representative and completion is expected early next month.

b. Plutonium Processing

The new RMC Line equipment provided under Project 734, was used for the production of unfabricated plutonium during the period. Operation proved satisfactory with the exception of the Task III Casting units, where hydraulic ram inadequacies were encountered. Task III of the RMA Line was used while corrections were made.

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Recovery operations were severely handicapped by processing difficulties which involved solids (plutonium oxide) formation in the system. A filter has been installed to remove this material and the system is returning to normal at the end of the month. The failure of a valve in a plutonium nitrate solution line resulted in contamination leaking through a glove port to the operating area floor. This made it necessary to shut down operations for two days for decontamination. On October 31, the D-1 slag and crucible dissolver failed due to corrosion. This dissolver had been temporarily repaired two months ago after a similar failure. It is to be replaced in November.

In order to reduce the backlog of recoverable wastes at a higher rate, the recovery operations were placed on a seven-day schedule on October 31.

c. Uranium Reduction

Uranium oxide production was satisfactory this month with schedules being exceeded by ten percent, in spite of a slight shortage of shipping containers. The Commission granted permission to pre-ship five carloads of powder because of the threatened work stoppage at Hanford.

3. Mechanical Experience

The plutonium fabrication equipment performed satisfactorily during the month. A considerable number of minor items concerned with startup of the new equipment on the RMC fabrication line were corrected.

The shift of the production of unfabricated plutonium from the RMA Line to the RMC Line was accomplished with a minimum of equipment difficulties. The only major item concerned the seals on the hydraulic system and the length of the rams on the same system. Temporary corrections have been made, and the problems referred to the project representative for final resolution.

Operation of the recovery equipment was satisfactory during the month with the exception of the plugging of lines and valves by solids. Installation of the filter late in the month corrected the problem.

The equipment in the uranium reduction plant functioned well, with no unscheduled outages.

4. Radiation Exposure

Radiation and contamination control statistics show control to be satisfactory.

The average daily emission of plutonium from the Z Plant stack has now been reduced to 12.4 μ Cu/day, which is normal. The relatively high emissions of the past two months have not resulted in any environmental hazards.

5. Analytical and Final Inspection Experience

	<u>September</u>	<u>October</u>
Number of Samples Received	1,151	1,234
Number of Determinations	13,183	11,608
Average Impurity, Buttons	1,347 ppm	1,621 ppm
Buttons Rejected	2.1%	3.3%
Average Purity, Fabricated Parts	98.7%	99.9%

 Manager - Finished Products

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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

October 1960

II. ACHIEVEMENTS (continued)

E. POWER AND GENERAL MAINTENANCE OPERATION

1. Operating Continuity

The only interruption of Power services that affected operating continuity of the prime production facilities was a partial electrical outage which occurred at 9:39 p.m. on October 12, 1960. The incident was caused by a hot switch on a feeder line and affected Buildings 283-W, 282-W, 231-Z, and the 241-T Tank Farm. The emergency generator took over the load during the outage, which lasted for nine minutes.

2. Inspection, Maintenance and Repair

A spare 50 hp liquid-solid-type centrifuge was prepared for service and sent to Purex Plant for use in the Strontium⁹⁰ separations process. Completed work included dimensional mock-up, run-in, and testing under hydraulic loads simulating process conditions.

Mock-up, leak test, lagging, and sheathing were completed on a vendor-fabricated tube bundle for Purex concentrators. Mock-up and leak test have been completed on a second tube bundle, and lagging and sheathing will follow.

Other services rendered to Purex during the month included mock-up, test, and run-in of a pump and agitator which were sent to the plant as replacement installations, and installation of a replacement re-boiler section on the vacuum fractionator of the acid recovery system in 206-A Building. The in-service unit, which had developed leaks in the tubes and head gaskets, was heavily shrouded with plastic and canvas, to control contamination, prior to removal from the building and transport to 2706-W for decontamination.

Fabrication and machining were completed on the inner shell of the filter unit for the Cerium¹⁴⁴ shipping cask, and this component is now at a specialty vendor's plant for placement of the sintered type 321 stainless steel filter medium.

Thirty-seven process jumpers were fabricated. Of these, twenty-seven were for Purex and twelve were for Redox.

Fabrication of the Redox Mark V Dissolver has continued, and this unit is now approximately 50 per cent complete. The neutron plug, inner shell and cone, crib section, steam coil, two spargers, and dunnage have been completed. Work is now in progress on the outer shell.

Work has continued on fabrication of a Redox D-12 Waste Concentrator, and this vessel is now about 35 per cent complete. The dunnage, main vessel cylinder, both reboiler canisters, and the 33" connecting lines have been completed at this time.

Three replacement plexiglass panels, two for the 24-B machining hood and one for the 9-A calciner-fluorinator hood, were installed in the 234-5 Building to improve visibility which had been impaired by corrosive discoloring of the plexiglass.

Fabrication of the first phase of the demonstration mock-up, which is full-scale dimension, for the new Plutonium Reclamation Facility at Z Plant has been completed under Project CAC-880. The mock-up, which has been set up in 277-W Building, includes a simulated barrier wall, typical vessels with means for remote handling, and an operating gallery with a glove box for containment of contamination during piping changes.

Installation of a revised and expanded security alarm system for 231-Z Building has been completed. Whereas the former system was actuated only by certain inner doors within the building, the new alarm provides coverage for all outside doors. The monitor is located in the Z Plant Badge House, and is provided with an audible alarm and light signal.

A high-vacuum coating unit was moved from 300 Area and installed in Room 5 of 231-Z Building for experimental plating work in connection with fuel element development. Necessary work included installation of power, water, and drain services, and overhaul of instrumentation and high-vacuum equipment.

Painting of power house stacks and breechings, in both 200-E and -W Areas, was completed, as was the steam line from the 284-W Building to the 271-U Building.

Conductivity meters, designed to give quicker and more uniform determinations, as well as closer control over blow-down quantity, are being test-operated in both 200-E and -W power houses, to obtain comparison data with previous method of determining boiler blow-down solid content.

For the last four days of this month, steam production per twenty-four hours in the 200-E Area has exceeded 6,000,000 pounds, with four boilers in service. This output is in excess of production at this season in any previous year.

Ventilation balance activities included:

- (a) Balancing air flows in the 232-Z Building;
- (b) Conducting ventilation survey of the 105-C Building;
- (c) Conducting fan curve tests on new Axivane Fan for the 105-F Building Confinement Program;

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- (d) Surveying ventilation systems and conditions in the 271-B and 291-B Buildings.
- (e) Conducting numerous humidity tests on high-efficiency filters, and visual inspections of shipments received for the IPD Confinement Program.

An inspection of the cables on the 40-ton canyon crane in the 202-A Building revealed that the main load line showed wear, fatigue, broken strands, and some flatness. A new cable was installed. This work was carried on under rigid SWP conditions and was accomplished without incident.

Successfully completed without incident was the burial of a defective B-4 filter, from the Redox canyon, in the number six industrial burial trench, 200-W Area. This equipment was buried in a prefabricated concrete box, 12'x 12'x 12', with five-inch-thick walls.

The periscope-type underground tank-scanning device was replaced with a closed circuit television viewing system, to improve interior scanning in the 104 tank in the 241-TY Tank Farm, 200-W Area. The television camera was inserted in the same riser which held the periscope. A temporary shelter, adjacent to the tank, houses the television receiver. The TV scanning lens is rotated with the use of a miniature reversible AC motor, and the same light source used with the periscope is used for this system.

A wooden burial box, 42' long, 11' wide, 10' high, was fabricated to house the 2-E Column scheduled for removal from the 202-A Building. The box was strengthened internally with channel iron framing. An inner plastic liner, covering the floor of the box and extending two feet up the walls, was inserted. The cover was built with a sloping roof to shed water.

P&GM and FEO representatives visited the University of Washington Hydraulics Laboratory in Seattle to observe demonstrations of equipment which will be used by Hill & Ingman, Consulting Engineering Company, in surveying the export water lines.

T. E. La Grange

Manager
Power & General Maintenance

TGL:ap

CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

October 1960

II. ACHIEVEMENTS (Continued)

F. Facilities Engineering Operation

1. Purex

a. Process Design & Development Engineering

Enriched Metal Dissolvers

Preliminary process designs have been completed for dissolvers capable of handling enriched metal in the existing Purex dissolver cells. Installation of two basic types of dissolvers was shown to be feasible; an annular dissolver wherein metal can be charged only by dumping and a multipurpose-type dissolver, wherein fuel can either be charged by dumping or by direct placement into the annulus, depending upon fuel length and configuration. Either dissolver type should be capable of performance at a capacity factor of 4.0 rate on natural, E-Metal, or overbore fuel as long as the dimensions do not impede slug distribution over the 10.5 inch annulus. Installation of the dump-type of annular dissolver would not affect other dissolver cell equipment. Installation of the multipurpose-type annular dissolver, however, would require alterations to the existing down-draft dissolver tower.

Purex Pump Development

The Purex Plant has been having increased pump failures as the plant grows older and the production require-

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ments become greater. In an effort to improve performance, a new style pump discharge head was installed on a pump that was put into J-1 position on October 12, 1960, where it has been performing in a satisfactory manner. A new head, which was designed and fabricated by CPD personnel, will control pump seal leakage better than present discharge heads by putting the seal lower in the tank where the leakage is less apt to escape from the tank. This will increase pump life by permitting the seals to wear to a greater degree before the pump must be repaired or buried.

A bid package for design and development of a deep well jet pump has been prepared. The procurement package is prepared in a manner that should encourage vendors to suggest alternates to the jet pump.

Minor revisions have been made to Savannah River Plant drawings to permit their use in procuring a prototype centrifugal pump that is suitable for Hanford use. Completely detailed drawings are being supplied as a part of a procurement bid package.

Waste Storage

The preliminary engineering study for the new Purex tank farm has been extended to determine the most economical tank size and tank farm layout incorporating the large volume concept similar to 241-A with the addition of a built-in leak detection system.

Flange Sealing Technique

Complete demonstrations were made with photographs of the new flange sealing techniques. Water was used as the criterion for confinement. The demonstration was performed on an in-line pump which was removed and replaced from between adjacent equipment in a

straight horizontal alignment. These operational-type demonstrations were performed on the 271-T mock-up unit, using full SWP protective attire including an air helmet.

b. Project Engineering

CGC-821 - Project Palm - Purex

Directive No. HW-478, Modification #3, dated October 13, 1960, authorized an increase of \$1,321,000 which increases the total authorized funds to \$1,400,000. Directive completion date is September 30, 1962 with beneficial use date of July 1, 1962.

Detail design work continues on schedule with an estimated 21 percent completion.

Procurement action has been initiated and five requisitions have been prepared. The remote process connector bids are being requested on alternates that include the requirements of Project Palm - Purex, Project Birch - Redox, Reliability Improvements - Purex, and NPR Projects. This is in order to develop quantity prices and possible savings in procurement methods.

CAC-881 - Emergency Water Supply, 241-A Tank Farm

On October 21, a contract award and notice to proceed was issued by the Commission to Cecil C. Hill for the general construction of the facilities. The awarding of this contract places all work on this project under contract. Drilling of the water supply well is in progress and estimated to be 25 percent complete.

CGC-895-Rev. #1 - Reliability Improvements - Purex

The title of this project is being revised from the previous title - "Expansion to 4.0 Capacity Factor - Purex" - to "Reliability Improvements - Purex". The change in title reflects the decision to provide

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reliability rather than to increase capacity factor to 4.0 at this time. A rough draft of the project proposal revision has been issued for comment.

CGC-909 - Strontium-90 Interim Storage Facilities

All work required for the transfer and storage of Strontium-90 in the CR Vault was completed October 12, 1960. The HLO waste truck unloading station will be on the south side of the 202-A Building to permit routing the waste into the canyon. In order to provide back-up containment of contamination, it is planned to provide an enclosing structure at the unloading point large enough to accommodate a low-boy trailer.

c. Manufacturing Engineering

Centrifuges

The spare G-4 centrifuge has been run in and all cell as-builts have been reviewed. The #E-2 centrifuge recently installed required alteration to correct improper orientation of hydraulic 3-way nozzles. The corresponding drawings, including the BPF, have been corrected.

Design of Equipment Burial Containers

Design was initiated during the month on burial containers for the following equipment: (1) E-2 centrifuge, (2) B-2 silver reactor, (3) HA and HS column cartridges, and (4) pumps and agitators for 244-CR. Recommendations were also provided to Purex for leak-proofing the E-2 column box.

2. Special Separations Processing

a. Process Design & Development Engineering

Birch Recovery

The process design of a Higgins-type ion exchange

contactor for third-cycle plutonium decontamination at Redox was completed and transmitted to the Commission. This work, issued as a scope revision, represents a change in the choice of ion exchange contactors from the pulse-bed unit in recent development work. Other items of equipment included in the original scope design of Redox Birch Recovery were not affected by the change in ion exchange contactor.

Plutonium to Ground

Six filters taken from the 233-S main exhaust filter in the Redox Plant were examined upon request for possible plutonium content. Examination indicated a possible presence of plutonium in excess of 100 grams. The filters have been diverted from the normal burial disposal and are being stored for eventual plutonium recovery.

Audio Amplifier for the Gas Mask Use

A prototype unit has been given the operating group for test under actual operating conditions. The first test is primarily to determine whether the audio output level of the present design is high enough.

NPR Fuel Reprocessing - Redox

Studies on the charging of NPR fuel to the Redox Mark V Dissolver were completed and the dissolver drawings revised and re-issued, to provide for adequate clearance in all fuel compartments. The original issue specified tolerances too lenient to assure complete charging of the annulus.

b. Project Engineering

CGC-913 - Project Birch - Redox

Directive No. HW-521, dated October 10, 1960,

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authorized the General Electric Company \$45,000 to perform Title I, interim Title II, and related management services. Design completion is scheduled for May 1, 1961.

c. Manufacturing Engineering

Dissolver Tower

A revised design has been completed and bid requests are out on the down-draft tower to be used with the Mark V dissolver.

Instrument Line Replacement

Underground instrument lines in plastic encasement between 202-S and 293-S have become embrittled and are failing in service and, due to the effect of heat, radiation, and oxidation in aging. Recommended to Redox for replacement is a commercially available 19-tube copper tube bundle for underground use and most suitable for use under these conditions.

3. Finished Products Operation

a. Process Design & Development Engineering

Metal Shear and Breaker Units

Modifications to the Metal Shear have been completed and tests were run using standard material. The only work now remaining on the Metal Shear is demonstration of its operation to Finished Products personnel.

An agreement was made during the month to complete installation of the Shell Breaker in Hood 40 BD. Accordingly, the additional parts which were needed for installation were fabricated in the 200-West Shop and the unit was moved to "Z" Plant. Installation is underway.

Button Line Improvement Program

Start-up experience with a central vacuum cleaning system installed on the C Button Line showed that the sintered stainless steel filter would plug quickly and could not be cleaned by a blow-back system. Functional purchase specifications have, therefore, been written for a micro-metallic rigidmesh square weave filter.

b. Project Engineering

CGC-811 - Additional Plutonium Fabrication Facilities - 234-5 Building

The fitters returned to work on October 3, following a 2-week walk-out. Acceptance testing is in progress on hoods, lines, and other process equipment.

CGC-813 - Pu Recovery from Contaminated Material - 234-5 Building

Directive No. HW-471, Modification #4, dated October 12, 1960, authorized an increase of \$100,000 which increases the total authorization to \$570,000 and extends the Project Completion Date to August 31, 1961.

CAC-880, Revision #1 - Plutonium Reclamation Facility - "Z" Plant

Title II detail design has been initiated. A project proposal revision (HW-66855) requesting total project authorization of \$2,900,000 was transmitted to HOC-AEC on October 31, 1960.

c. Manufacturing Engineering

Pressure Systems Survey

The survey of pressure vessels and relief devices at "Z" Plant, and 224-U Building, was completed. The report is being prepared for distribution.

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Glove Changing

In conjunction with RMU, motion picture films were taken of glove changes in Recuplex, the Button Line, and Fabrication for up-dating procedures and methods improvement.

4. General

a. Process Design & Development Engineering

Process Neutron Monitor Prototype

An order was placed with Bendix Corporation for a prototype instrument for use with BF_3 tubes as a neutron monitor. This instrument combines power supply, amplifier, and count rate readout in one chassis, and should not require a pre-amplifier. The instrument is of solid state design. Such an instrument will have several process monitoring applications, particularly in the new Pu Reclamation Facility.

Area Radiation Monitors

Design is nearly completed of a prototype logarithmic response area monitor based on HLO development. A commercial instrument for similar application is on loan to IPD for evaluation testing in that component. Another concept of instrument design is being reviewed with vendors for feasibility and prototype consideration. A high-level alarm instrument has been ordered from Nuclear Materials & Equipment Company for evaluation as a post-critical incident monitor.

Pre-Criticality Alarm

An investigation has been started on the possibility of using a neutron pulse source and neutron decay rate instrumentation as pre-criticality warning. A preliminary review indicates that the method may become a useful

supplement to present control methods and instruments.

b. Project Engineering

Project Cost Information (as of October 16, 1960):

Total Auth. Funds (13 active projects)	\$ 7,094,000
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Total Cost-to-date	4,320,000
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Committments and Open Work Releases	333,000
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Unencumbered Balance	2,441,000
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Costs Charged to Above Projects- 9/18 to 10/16/60	189,808
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Project CGC-854 - Conversion of Purex Anion Exchange Prototype to the Manufacturing Unit was completed.

Authorized Funds-\$95,500	Total Cost-\$89,523
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CGC-830 - NPF Reprocessing Facilities

The scope document covering the design criteria for reprocessing NPF metal solutions in Redox, was completed and issued for final approval. This document completes the scoping effort for the NPF Project.

CGC-897 - Fission Product Storage - "B" Plant

Scoping of Phase I precipitation, centrifugation, concentration, and storage equipment is well underway with preparation of the process flow diagrams and cell layout drawings. Present flowsheets indicate that all Phase I waste streams from "B" Plant can be returned to the Purex 271-A Tank Farm for volume reduction, within the self-boildown capability of the

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farm. Conceptual design has been started and space has been assigned, however, for a "B" Plant Waste Concentration System for Phase II or III operations.

H. P. Shaw, Manager
Facilities Engineering Operation
CHEMICAL PROCESSING DEPARTMENT

HP Shaw/CR Bergdahl/alr

cc: File (HPS)
File (WWC)

CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

OCTOBER, 1960

II. ACHIEVEMENTS (Continued)

G. RESEARCH AND ENGINEERING OPERATION

1. Purex Process Technology

a. Fission Product Recovery

Eight runs for the recovery of strontium 90 from Purex high level waste (IWW); generated while processing >200-day cooled irradiated uranium, were completed during the month. Chemical flowsheet conditions, which remained essentially unchanged in all runs, consisted of the following steps: (1) initial IWW clarification, (2) lead sulfate carrier precipitation of strontium and rare earths at pH 1.0 to 2.0, (3) carbonate metathesis, (4) nitric acid dissolution of the carbonate, and (5) oxalate precipitation of the lead, cerium and rare earths at pH 0.5 to 0.7. Thus the strontium remained in the supernatant solution.

Strontium recovery efficiency has not been as high as was obtained in the September test runs. To date the average overall recovery has been approximately forty per cent with an estimated 220 kilocuries of strontium 90 segregated and stored for further decay of the strontium 89. Based on preliminary analytical results, contamination of the product solution with barium, calcium and natural strontium appears to be low.

b. Solvent Extraction

Process decontamination performance, measured on feed material cooled >200 days, was excellent during the month. Gamma activity levels of the intercycle streams as well as that of the final uranium product continued to be four to five-fold lower than those experienced while processing 90 to 100 day material. All uranium product, except a few batches following startup, analyzed in the 1.0 to 1.5 gamma ratio range without silica gel treatment. The plutonium product continued to analyze $< 2.0 \times 10^{-11}$ G/AT after ion exchange processing.

After all the >200-day feed material (used for Sr 90 recovery) had been processed, 110 to 120-day cooled uranium feed was introduced into the solvent extraction equipment. Immediately

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the plant gamma activity levels rose and established equilibrium values approximately the same as those previously experienced using feed of comparable age. The gamma ratios of the uranium product batches leveled out in the 3.5 to 4.0 range. Production of uranium product with a gamma ratio of <2.0 required silica gel processing.

A sudden addition of nitric acid to the 2DF Tank dropped the 2D Column uranium loss from 6.0 to ~ 0.5 per cent. The accompanying column upset apparently momentarily unbalanced the plutonium equilibrium within the column, and a surge of plutonium (up to 150 ppb) appeared in the uranium product. Equilibrium was rapidly reestablished, but a total of seven uranium batches exceeded the 10 ppb plutonium specification.

Plutonium waste losses via the HA Column effluent (HAW) have ranged between 0.03 and 0.06 per cent which represent a three-fold reduction over those experienced while processing 90 - 100-day material at a higher processing rate (CF = 3.6 vs. the present CF = 3.0).

c. Neptunium Recovery

A run to isolate and decontaminate the 2.34 kg of neptunium accumulated in the system was made during the month. This accumulation represented only 62 per cent of the neptunium added to the solvent extraction system via recycle and virgin feed during the last processing period. Plant operation while using the standard ferrous sulfamate-hydrazine, reducing flowsheet was satisfactory with only 0.75 and 2.8 per cent of the neptunium recycled via the 2A and 2B Column wastes. Eighty-six per cent (2.00 kg) of the neptunium available for isolation was loaded out for further purification by ion exchange processing.

Neptunium recovery subsequent to the isolation run has generally been excellent, but a few sporadic high losses via the HA Column effluent have been experienced. These high losses have been attributed to rate adjustments in the HA Column sodium nitrite addition and the nitric acid addition to the top of the HA Column.

During the plutonium breakthrough into the uranium product, the neptunium loss in the uranium product also increased about five-fold. This increased neptunium concentration probably resulted from the sudden decrease in organic phase uranium saturation in the 2D Column.

d. Solvent Treatment

Recycle of the No. 1 System Solvent through the organic treatment equipment during the neptunium isolation run reduced the gamma activity to 500 - 1000 uc/gal from the 1500 - 2000 range. However, upon startup on the >200 -day cooled feed material, the gamma activity quickly climbed to and remained at 1500 uc/gal. Fission

product analysis showed 47 per cent of this gamma activity to be Zr-Nb. The change to 110 to 120-day cooled feed saw a factor of three increase in the equilibrium value of the solvent gamma activity.

e. Waste Treatment and Acid Recovery

In order to produce the minimum volume of waste for Sr 90 recovery processing, the IWW flow was maintained as closely to the flowsheet value (5.0 flows) as possible while processing the >200-day feed material. Considerable difficulty was encountered with plugged dip tubes in the No. 1 Concentrator until minor adjustments were made in the control point and the acidity of the HA Column effluent. Because all the high level waste (IWW) produced during the month was scheduled for Sr 90 recovery processing, no neutralized IWW, as such, was added to the underground storage tanks. Additions of other wastes to the underground tanks were 200, 140 and 615 gallons per ton of uranium processed for (a) IWW processed for strontium recovery, (b) cell drainage and (c) solvent washes, respectively. The high solvent wash volume reflects flushes made to the solvent treatment equipment during plant shutdown.

The concentrated effort to minimize the high level waste flow resulted in exceeding the capacity of the nitric acid absorber. As a result, approximately 35 per cent of the acid fed to the absorber was lost to the crib via the overheads. The value of the nitric acid lost plus the cost of neutralizing the overheads with calcium carbonate added an estimated \$15 per ton to the cost of uranium processed under these conditions compared to normal conditions. Also included in this figure is the cost of steam required to evaporate the additional dilution water.

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2. Redox Process Technology -

a. Dissolving

Since the volume of 47 percent nitric acid recovered in the 293-S Building can be most efficiently used in the A-2 and B-2 dissolver vessels which are equipped with downdraft towers, the use of recovered acid in the C-2 dissolver was suspended this month. In its stead, the use of 60 percent nitric acid in the C-2 dissolver decreased the time cycle for this dissolver to approximately 85 percent of the average time cycle for a 2-ton charge of E-metal with the dilute acid.

b. Solvent Extraction

Document HW-66230, "Redox Chemical Flowsheet HW-No. 6," was issued during the month. In this flowsheet the basic flow pattern of flowsheet HW-No. 5 (HW-38684) remains essentially unchanged. The most significant process differences are 1) the addition of the neptunium accumulation and removal cycles, which required that precycle (the co-decontamination cycle) be changed from acid-deficient to acidic operating conditions, and 2) the deletion of the permanganate head-end feed oxidation step.

Approximately 60 percent of the nitrogenous degradation products, found in the hexone inventory at the end of last month, have been removed by washing with aqueous five percent sodium hydroxide solution and water. However, the efficiency of removal is severely reduced by the lack of vigorous agitation in the wash tank (O-2). Despite this difficulty, which can be overcome by appropriate changes in operational procedures, the alkaline washing of the solvent (as discussed in last month's report) is being resumed on a periodic basis. It will be accompanied by continued thorough technological evaluation of the results.

The following changes in chemical composition were made in "cold" streams during the month:

- 1) Sodium dichromate was added to make the first cycle scrub (1AA) 0.01 M in dichromate ion.
- 2) The nitric acid content of the partition column scrub (1BS) was decreased from 0.30 M to 0.15 M.
- 3) The sulfamic acid content of the partition column extractant (1BX) and the third uranium cycle scrub (3DS) was increased from 0.05 M to 0.10 M.

The above chemical composition changes, together with the improved quality of the hexone, appear to have resulted in excellent column performance. Plutonium loss from the partition column (1B) to the third uranium cycle feed (F-4) and from the third uranium cycle extraction column (3D) to the final product (E-12) has been the lowest in several months.

c. Plutonium Ozonation

The addition of the sodium bismuthate liquid-phase oxidant to the plutonium stream during intercycle ozonation was stopped for 24 hours, on a test basis. The gamma ratio of the third plutonium cycle product increased by a factor of 5 to 7, but remained well within specifications.

One of the main objectives of the test was to determine if the ozonation step can be moved from its present position on the feed to the final plutonium cycle, to the product stream from that cycle. If this can be successfully done, the ozonator product stream free of hexone and bismuth, can then be fed directly to the L-3 final plutonium concentrator (made of titanium and tantalum), by-passing the L-2 stripper (stainless steel). If most of the iron, chromium, and nickel now appearing in the final plutonium product are coming from the corrosion of L-2, as suspected, such a process modification should make it possible to meet current plutonium specifications on metallic impurities. At month-end, arrangements are being made to take special samples at intermediate points in an attempt to determine the exact contribution of L-2 vessel corrosion to the problem.

d. Waste Sampling

In a continuing effort to improve nuclear materials management, a continuous sampler was installed at the 216-S-5 weir box early in the month. This sampler draws a gallon sample of coil condensate and cooling water, from the process concentrators and dissolvers routed to the 216-S-6 crib, over a 24-hour period. Previous monitoring of this waste stream was by dip samples taken twice each week at the weir box. Currently all waste streams leaving the 202-S Building are monitored by continuous or batch-wise sampling. Despite the fact that this new sampler does not necessarily provide a sample proportionate to stream flow, it is considered a step forward in the attempt to characterize the persistent problem of unexplained SS material "losses" (particularly uranium) in CPD.

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3. Finished Products Technology -

a. Uranium Reduction Operation

1. Concentration and Calcination

The submerged centrifugal test pump continued to demonstrate performance adequate for full production rates. Unexplained losses of pump suction, however, frequently resulted in low feed header pressure. The cause of this abnormal performance has not yet been determined.

2. Powder Handling

Entrainment of dust into the vent system of the mechanical conveyor load-out equipment (G-cell) was lowered substantially by removing the "air jet" calciner discharge valve to eliminate the source of air flow. Control of the calciner discharge rate with the hammermill screw feeder has been satisfactory.

b. Metal Finishing Operation

1. Recuplex

Flushing of a Task I - II Hood accumulation to the filtrate concentrator resulted in spread of PuO_2 throughout the solvent extraction system. Continuing high losses were prevented by filtering the extraction waste through a sintered stainless steel filter and recycling the accumulated solids to the slag and crucible dissolvers. The pump used in the filtration, a Model CF chem pump equipped with pile graphite tapered bearings and a hydroclone in the recirculation bearing lubrication system, was developed by the Hanford Laboratories Operation. Filtration of 6000 liters of the extraction waste, containing an estimated 0.5 percent solids at a rate of 15 liters per minute, provided an excellent test of the proposed use of this pump in the New Reclamation Facility. Performance of the pump has been highly satisfactory.

2. Task I, II, and III

A test vitreous enamel-lined platinum electrode magnetic flowmeter has been installed to measure and control the flow of oxalic acid to the precipitation reactor. Initial performance has been highly satisfactory.

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b. Metal Finishing Operation (Continued)

The air flow through the oxalate calciner and off-gas line was increased in an attempt to decrease the amount of dust and fumes evolved from the calciner inlet. Although dusting into the hood appears to have been eliminated, extended observation will be required to determine the best conditions for minimum plugging of the off-gas line.

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4. Process Chemistry -

a. Neptunium Purification

Five hundred forty-seven grams of neptunium as the oxide, contaminated with iron, was received from the DuPont Savannah River Plant for re-purification. The material was dissolved in nitric acid, combined with 94 grams of recycle and Redox material and 116 grams of material from Purex, and purified by anion exchange, using the new stainless steel column (6 inches x 7 feet). The operation of the stainless steel column was found to be satisfactory, in spite of inability to inspect resin condition and performance visually.

Difficulty was encountered for a second time in recovering plutonium from the waste effluent (containing hydrazine, plutonium(III), ferrous ion, and HNO_3) from a neptunium purification run. In the plutonium recovery process, the hydrazine and plutonium are oxidized with dichromate, the excess dichromate reduced with nitrite, and the resulting plutonium (IV) absorbed as the nitrate on an anion resin. In the course of this run, the resin (Dowex 2LK) degraded excessively and plugged the lines into the column. The column pressurized as the reaction continued. Removal of a plug from a pipe nipple at the top of the column permitted relief of the pressure. It is hoped that variation in the flowsheet, with elimination of the dichromate step, will avoid repetition of this behavior.

b. Analytical Assistance

A study was made of the colorimetric (orthophenanthroline) method for the determination of iron in plutonium nitrate samples. In this procedure, the iron and plutonium are reduced to the di- and tri-valent states, respectively, with hydroxylamine, and the ferrous-orthophenanthroline color developed and measured. It was found that for samples containing the higher plutonium oxidation states, the order of reagent addition is quite important, in that reduction of the plutonium to the tri-valent states does not occur at the pH of 4.5 which is used for color development. Consequently, addition of the plutonium to a solution of premixed buffer, reductant, and color reagents, leaves the plutonium in the tetra-valent state, which absorbs at the same light frequency as the ferrous complex, and gives high results. Hence samples which contain plutonium(IV,VI) must be reduced before the buffer and color reagents are added.

A study of the same method for iron in uranyl nitrate, in the 1-100 ppm range, revealed that although good results can be obtained throughout the allowable pH range of 3.3 to 3.7, sample and blank must both be buffered at the same pH within this range to give the desired accuracy.

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5. 234-5 Development -

a. Continuous Direct Calcination Of Plutonium Nitrate

Progress was made in the reduction of entrainment losses. A calciner cover having a two-inch in diameter settling column on the off-gas line was installed on the calciner. Entrainment losses with the new cover appear to be considerably less; only 146 g of powder were carried off for 498 g of product produced. This represents approximately a two-fold improvement.

b. Continuous Chlorination Of Plutonium Dioxide

The vibrating tube chlorinator was used to prepare over five kg of plutonium trichloride in support of the electrolytic reduction work. Chlorination was about 96 percent complete at 250 g/hr as plutonium.

The main fluid bed unit has been fabricated and is awaiting the addition of electrical wiring, insulation, and installation.

c. Continuous Electrolytic Reduction Of Plutonium Trichloride

The 10-hour run reported last month resulted in a yield of 525 grams, with a current efficiency of 60.3 percent. A metal density of 18.7 was obtained; chief product contaminants continue to be components of stainless steel resulting from corrosion of accessory hardware.

An attempt to restart the equipment after an overnight shutdown and cooling off was not successful.

d. Plutonium Nitrate Solution Concentration

A plutonium nitrate solution 253 g/l Pu in 3.5 M HNO_3 was successfully concentrated to a solution of 782 g/l Pu in 5.7 M HNO_3 . The concentration studies are associated with the preparation of highly-concentrated nitrate solutions for Critical Mass experiments. The solution was stable at room temperature.

V.R. Cooper
Manager

Research and Engineering

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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

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II. ACHIEVEMENTS (continued)

H. Financial Operation

1. Production Cost

A substantial part of the work on the Midyear Budget Review was completed in October. Manpower figures have been finalized. Preliminary budget amounts indicate that 2000 production budget will exceed the FY 1961 Revised Budget by the approximate amount of added Strontium-90 costs.

The quarterly equipment forecast was prepared and submitted to Contract Accounting on schedule. This forecast also serves as the basis for the Midyear Budget Review for Equipment Not Included in Construction Projects. Forecasted expenditures continue to exceed Financial Plan allocations. The O2 program allocation was increased from \$1,055,000 to \$1,805,000; however, it still falls short of the forecasted \$2,038,000. The O3 program allocation remains at \$300,000, \$117,000 short of the forecast.

The study for costing of Fission Products was completed and placed in effect in October, in order to properly cost the first hot runs of the Strontium-90 program.

The Decontamination Operation TME rate for intradepartment services was increased from 100% to 150%, and studies continued looking toward more closely reflecting in bookkeeping records the economic gains inherent in use of this service.

Essential Material turnover rate was 3.8 in September and 3.4 FYTD compared to 3.2 in August and 2.6 in FY 1960.

Spare Parts turnover rate was .40 in September and .43 FYTD compared to .43 in FY 1960.

Special Materials inventory was relieved of \$25,000 in October representing the cost of two platinum fluorinator tube liners which had been ruptured, contaminated and sent off-site for reclamation.

Changes in production schedule for Shapes resulted in the diversion of fabrication and final inspection efforts from production to start-up status. With October business, costs are being accumulated in a start-up account which is expected to continue until January, 1961.

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2. Personnel Accounting

Instructions relative to insurance coverage for employees engaged in foreign travel was reviewed with the Specialist - Benefit Plans, Relations Operation.

3. General Accounting

As of September 30, 1960 there were 13 active projects which had incurred costs of \$4,330,792 against authorized funds of \$5,723,000. Outstanding commitments totaled \$261,745.

During October AEC directives were received for two projects:

- (1) Authorized funds for CGC-821 Project Birch - Purex were increased from \$79,000 to \$1,400,000.
- (2) Project CGC-913 Project Birch - Redox was authorized with funds of \$45,000.

4. Auditing

An audit memorandum was issued covering CPD charges for telephone toll calls during the past three years. A review indicated a slight increase in charges when comparing 1958 to 1960.

Response to an audit survey of the need and utilization of financial reports has received favorable acceptance and comments. Currently, approximately 96 per cent of questionnaires have been returned and the preliminary analysis indicates a significant reduction in paper work will result. An audit report will be issued in November.

An audit program was prepared and field work was started in connection with an audit of duplicating services.

Procedure issued for taking a physical inventory of office equipment starting November 7 was reviewed. The inventory will be taken by CE&JO personnel. Audit test checks will be made by CPD.

An audit memorandum was issued to CPD management relating to the reimbursability provisions applicable to the use and control of winter-type clothing.

5. Measurements and Procedures

Instructions were issued during the month to all CPD section managers regarding the reporting of performance against 1960 goals and the establishment of 1961 goals. Work on both the Department performance rating for calendar 1960 and establishment of department goals for

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calendar year 1961 are well on schedule and there should be no problem in meeting Mr. W. E. Johnson's due dates of December 16 and December 2, 1960 respectively for these two reports.

J E McDonald
for Manager - Finance

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II. ACHIEVEMENTS (continued)

I. RELATIONS PRACTICES OPERATION

1. Salary Administration

The schedules and information guides for completion of the 1960 exempt appraisal program were issued to management.

Thirteen new or revised exempt positions were reviewed and recommendations made to appropriate management. One position audit was completed.

The Nonexempt to Exempt Ratio Report, and the Quarterly Salary Administration Data reports were issued.

2. Personnel Placement

During the month acceptances were received from two chemists to whom offers had been made and to a marine engineer to whom an offer was extended during the month. The Department was again unsuccessful in receiving an acceptance from an MTP graduate to whom a joint offer had been made by Chemical Processing Department and Fuels Preparation Department.

Two additional MTP trainee assignments were confirmed during the month with the MTP Field Representative in Ft. Wayne, Indiana, who was advised that Chemical Processing Department would accommodate a total of four trainees beginning next June.

In the Manufacturing Studies which began last month, the Chemical Processing Department has two employees participating along with the regular MTP trainees.

3. Wage and Benefits

Retirement papers were completed for one ROF'd employee who elected to exercise his vested rights. This employee's continuity of service was broken and he was given the option of a cash refund or applying for a pension under the provisions of the "vested rights" section of the Pension Plan.

Suggestion Plan activity continued at a below-average rate. Submissions were still down and no awards were made during the month.

4. Health, Safety and Radiation

The back injury sustained by an employee on October 21, 1960, has not been classified as yet. His long and recurring history of back trouble is undergoing close scrutiny. A careful diagnosis is being made as a basis for determining the extent to which the incident produced his present condition.

Quiz II of the Safety Bowl Contest has been completed by all contestants.

A meeting of the Protective Clothing Standards Group was held on October 27, 1960. Revision to Standards HWS-6300-S and HWS-6305-S covering men and women's coveralls respectively were approved with minor revisions.

To date, two incidents and an AEC informational flyer have been distributed to the applicable sections for action under terms of OPG 33.8. Action has been prompt and uniform in adoption of a position that best suits the respective situations.

5. Communication

The major activity during October was dissemination of information to employees with regard to current negotiations. Dissemination in printed form alone included seven special distributions of "mid-week" GE NEWS issues, nine Management News Bulletins, and five Headliners. There were five priority messages called out during the month.

Material and pictures for use in the GE NEWS and in the local and national press concerning Chemical Processing Department's Final Inspection component, and our Decontamination component, is now nearing the completion stage. The pictures have been taken and the draft story material is now going around for review and approval. The pictures for the "automation of calciners" feature have been taken, and the story material is now being prepared.

A rough draft of the revised booklet, "Living in the Tri-Cities" has been completed for, and approved by, Hanford Laboratories. The material will be polished, remaining pictures obtained, and a finished draft prepared and submitted for final art work. The booklet will be used in connection with HAPCO recruiting activities. The revision is being made by CPD as an assistance to HLO.

During October, five information meetings concerning contract negotiations were attended by 275 monthly salaried employees.

RB Britton
Manager
Relations Practices

RB Britton:lj

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III. PERSONNEL ACTIVITIES

A. FORCE SUMMARY

	<u>Monthly Salaried</u>		<u>Weekly Salaried</u>		<u>Total</u>	
	<u>9-30-60</u>	<u>10-31-60</u>	<u>9-30-60</u>	<u>10-31-60</u>	<u>9-30-60</u>	<u>10-31-60</u>
<u>Operation</u>						
General Manager's Group	10	10	1	1	11	11
Financial	12	13	13	12	25	25
Relations Practices	5	5	6	6	11	11
Research & Engineering	61	61	27	28	88	89
Facilities Engineering	65	64	21	21	86	85
Power & General Maintenance	40	42	235	236	275	278
Production	6	5	3	3	9	8
Special Separation Processing and Auxiliaries	48	48	214	214	262	262
Purex	49	51	214	213	263	264
Finished Products	<u>53</u>	<u>54</u>	<u>219</u>	<u>219</u>	<u>272</u>	<u>273</u>
Total	<u>349</u>	<u>353</u>	<u>953</u>	<u>953</u>	<u>1 302</u>	<u>1 306</u>

B. PERSONNEL CHANGES

There were no personnel changes during the month of October.

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C. TRIPS

<u>Visitor</u>	<u>To</u>	<u>Nature of Discussion</u>
<u>To other G.E. Components</u>		
C. W. Smith	General Engineering Laboratories Schenectady, New York	Cask Design (10/17/60)
L. B. Christopher	G.E. Accounting Services Crotonville, N.Y.	Advanced Accounting Seminar (10/17-21/60)
L. B. Christopher	G.E. Accounting Services Schenectady, N.Y.	Accounting & auditing procedures (10/24/60)
L. B. Christopher	Major Appliance Components Appliance Park, Louisville, Ky.	Accounting & auditing procedures (10/25-27/60)
M. L. Oldfather	General Engineering Laboratories Schenectady, New York	Engineering, design--NPF (10/27,28/60)
<u>To AEC and other AEC Contractors</u>		
B. F. Campbell V. R. Cooper	E. I. DuPont (SRP) Aiken, South Carolina	US-UK Interchange meeting on waste processing and disposal (10/3-5/60)
H. M. Jones	Mallinckrodt Chemical Co. Weldon Springs, Missouri	Electric precipitation and general instrumentation (10/3/60)
C. W. Smith	UCNC-ORNL, Oak Ridge, Tenn.	Shipping cask design (10/18,19/60)
<u>To General Industry</u>		
D. A. Snyder	Star Machinery Co. Seattle, Wash.	Vendor equipment and demonstration (10/3/60)
P. S. Kingsley	Consolidated Western Steel Co. San Francisco, Cal.	Resolve design questions on vessel fabrication (10/5/60)
A. W. Hildebrandt	Perine Machinery & Supply Co. Seattle, Wash.	Optical gaging (10/7/60)
P. S. Kingsley M. L. Short	Puget Sound Naval Shipyard Bremerton, Washington	Underwater cutting of stainless steel (10/17, 10/18/60)
P. E. Cunningham W. H. Koontz W. J. Richardson	Hill-Ingman Co., Seattle, Wash. Western Pneumatic Tube Kirkland, Washington	Testing of underwater camera(10/20,21/60) Testing of underwater camera(10/20,21/60)

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<u>Visitor</u>	<u>To</u>	<u>Nature of Discussion</u>
M. L. Oldfather	Vitro Engineering New York, N.Y.	NPF design (10/24-26/60)
L. B. Bradley	McCabe-Powers Co. Portland, Oregon	Application of TV camera
	Lee Hoffman, Inc. Portland, Oregon	" " " " (10/31/60)

To Conventions and General Meetings

R. B. Chitwood E. G. Pierick	Gatlinburg, Tenn.	Solid State Radiation Detectors Conference (10/3-5/60)
L. J. Battey D. E. Braden H. L. Caudill C. B. Foster D. McDonald C. W. Smith	Longview, Washington	AIChE Regional Meeting (10/7/60)
H. W. Stivers	Boston, Massachusetts	American Society - Civil Engineers meeting (10/10-14/60)
P. S. Kingsley	San Francisco, Cal.	National Association of Corrosion Engineers meeting (10/6-8/60)
W. G. Browne	Yakima, Washington	Methodist Men's Club to speak on "The Importance of Atomic Energy" (10/24/60)

D. VISITORS

<u>Visitor</u>	<u>From</u>	<u>Nature of Discussion</u>
<u>From AEC and Other AEC Operational Contractors</u>		
P. Ager D. Johnstone	AEC-ALO Albuquerque, N.M.	Plutonium fabrication and inspection (10/4/60)
S. Woodruff	AEC-Rock Flats Rocky Flats, Colo.	Plutonium fabrication and inspection (10/4/60)
W. H. Holstein M. H. Smith	E. I. DuPont Wilmington, Del.	Separations discussions (10/10-13/60)
S. D. Smiley	E. I. DuPont (SRP) Aiken, South Carolina	Separations discussions (10/10-13/60)

<u>Visitor</u>	<u>From</u>	<u>Nature of Discussion</u>
R. E. Blanco J. O. Blomeke J. J. Perona	UCNC (ORNL) Oak Ridge, Tenn.	Waste processing (10/3/60)
R. E. Blanco W. W. Davis	" "	Ion Exchange (10/5/60)
M. B. Saniter V. N. Rizzolo	AEC-SFOO San Francisco, Cal.	Scrap recovery and burial - Tour Purex (10/24/60)
E. F. Miller A. Perge	AEC-DOP, Washington, D.C.	Strontium-90, Production Planning
T. R. Workinger	AEC-OID, Washington, D.C.	" " " (10/26-28/60)
G. C. Davis	AEC-ORO Oak Ridge, Tenn.	Purex process and tour (10/28/60)
J. T. Thomas	UCNC-ORNL Oak Ridge, Tenn.	Critical Mass Data (10/26-27/60)
H. K. Clark	E. I. DuPont (SRP) Aiken, South Carolina	" " "

From General Industry

R. Evans J. Riehl	Mine Safety Appliance Co. Pittsburgh, Pa.	Humidity test on filters (10/12,13/60)
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From Other Government Agencies

K. Evans E. Hinchcliffe W. Saxby R. Steljas G. Shortridge	United Kingdom	General discussion of fabrication problems and techniques (10/6,7/60)
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From Colleges and Universities

G. W. Watt	University of Texas Austin, Texas	Waste management and fission products (10/19/60)
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IV. SAFETY AND SECURITY

Operation	Facil. Eng.	Finan.	Fin. Prod.	P&GM	Purex	SSP&AO	Prod.	Rel. Prac.	Res.& Eng.	Total CPD	Yr.to Date
Disabling Injuries										0	1
Serious Accidents										0	13
Medical Treatment											
Injuries	2		7	9	8	2				28	378
Radiation Occur.			8		2	7				17	175
Contam. Wounds			2**							2	9
Pu Depositions									1*	0	8
Fires									1	1	12
Security Violations									1	1	7

* Hood sweepings were received by an engineering assistant for preparation of plutonium metal powder. The sweepings were stated to contain some metal and some hydride besides some general debris from long accumulation. The package contents were poured into a flask and rinse added. No reaction occurred, so the flask was swirled by hand. Flames shot out of the flask for six inches and lasted for several seconds. Some boiled over but no damage was sustained.

** Pipefitter contaminated to 500 - 2,000 d/m when sprayed with hydraulic oil. Released after decontamination. Bioassay results pending.

Metal sliver punctured right index finger in hood work on feed pump. Bleeding induced. Surface contaminated to 40,000 d/m--blood smear 2,000 d/m. Surface contamination removed. Wound excised to reduce contaminant factor of 10 to 0.001 uc. Bioassay pending.

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V. REPORTS

A. PREPARED AND ISSUED

- HW-66104, Secret, "Expansion to 4.0 Capacity Factor - Purex Engineering Study", by E. Doud, dated October 28, 1960.
- HW-66203, Secret, "Redox Chemical Flowsheet HW-No. 6", by M. K. Harmon and D. T. Crawley, dated October 17, 1960.
- HW-66346, Secret, "Redox Birch Recovery, Design Scope, Revision #1", by H. E. Hanthorn, dated October 24, 1960.
- HW-66781, Unclassified, "Project CGC-830 - Plant Modifications for Re-processing Non-Production Reactor Fuels", by S. R. Bierman and W. A. Graf, dated October 24, 1960.
- HW-66850, Secret, "Redox Dissolver Incident, Comprehensive Report", by M. K. Harmon et al, dated September 13, 1960.
- HW-66855, Unclassified, Project Proposal CAC-880, Revision. "Plutonium Reclamation - 'Z' Plant", by L. W. Finch, dated October 26, 1960.
- HW-66916, Secret, "Design Scope of 'Z' Plant Plutonium Reclamation Facility - CAC-880", by D. E. Braden, dated October 17, 1960.
- HW-66952, Official Use Only, "Trip Report - Visit to Savannah River Plant and Oak Ridge National Laboratory, September 7 - 9, 1960", by T. R. McKenzie and H. C. Rathvon, dated October 20, 1960.
- HW-67006, Secret, "Scheduled Shutdown - Purex Plant", by J. H. Warren, dated October 4, 1960.
- HW-67053 RD, Secret, "Redox Plant Production Schedule - October, 1960", by D. McDonald, dated October 7, 1960.
- HW-67054 RD, Secret, "Purex Plant Production Schedule - October, 1960", by D. McDonald, dated October 7, 1960.
- HW-67055 RD, Secret, "UO₃ Plant Production Schedule - October, 1960", by D. McDonald, dated October 7, 1960.
- HW-67056 RD, Secret, "234-5 Plant Production Schedule - October, 1960", by D. McDonald, dated October 7, 1960.

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IIW-67079, Secret, "Essential Material Consumption, Purex, C.P.D., September, 1960", by J. E. Lentz, dated October 12, 1960.

IIW-67091 RD, Secret, "3rd and 4th Quarters FY 61 Forecast of Nuclear Material Requirements, Chemical Processing Department", by R. E. Roberts, dated October 12, 1960

IIW-67144, Secret, "Summary of CPD Discussions with British Visitors", by L. M. Meeker, dated October 18, 1960.

IIW-67191, Unclassified, "Review of Safety in the Chemical Processing Department", by L. M. Meeker and R. E. Tomlinson, dated October 25, 1960.

B. PREPARED FOR SIGNATURE AND ISSUANCE

IIW-66957, Secret, "Production - September, 1960", W. E. Johnson, dated October 3, 1960.

IIW-67099, Secret, "IIAPO Production Forecast, October 1, 1960 through June 30, 1962", W. E. Johnson, dated October 25, 1960.

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VI. PATENT SUMMARY

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>
A. W. Hildebrandt, Specialist, Non-Destructive Testing Control Operation, FPO	"Blind Hole or Slot, Sharp Edge Radius Determination Device"
K. K. Campbell, Planner Scheduler, SSP&AO	"A Mechanical Pin Puller For Remote Use"

W. J. MacCreedy
General Manager
Chemical Processing Department

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