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CHEMICAL PROCESSING DEPARTMENT MONTHLY REPORT

APRIL, 1961

MAY 22, 1961

[REDACTED]

HANFORD ATOMIC PRODUCTS OPERATION

RICHLAND, WASHINGTON

GENERAL ELECTRIC

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THE HANFORD ATOMIC PRODUCTS OPERATION

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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT
FOR

APRIL, 1961

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By Authority of LG-PR-2

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May 22, 1961

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HANFORD ATOMIC PRODUCTS OPERATION
RICHLAND, WASHINGTON

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CHEMICAL PROCESSING DEPARTMENT MONTHLY REPORT

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I. SUMMARY

A. RESPONSIBILITY

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

B. PRODUCTION

Production of plutonium nitrate from the separations plants was above the revised Forecast for April and equals that forecasted for the fiscal year-to-date.

Approximately 141 kilocuries of strontium-90 were isolated in the Purex plant and stored for further decay of strontium-89. To-date, an estimated 1190 kilocuries of strontium-90 have been recovered from Purex wastes.

The four casks of cesium-137 and one cask of strontium-90, loaded during March, were tested and subsequently turned over to the AEC for shipment to Oak Ridge National Laboratory on April 12, 1961.

The production of UO_3 was ten percent above the revised Forecast for April but slightly below that forecasted for the fiscal year-to-date.

Both plutonium metal button production and weapon component fabrication exceeded the revised Forecast, which reduced forecasted quantities for April by 34 percent and 64 percent, respectively. On a fiscal year-to-date basis, button output is slightly below that forecasted while weapon component fabrication slightly exceeds the Forecast.

C. ENGINEERING

Purex processing continued at a 25 ton per day rate until the scheduled shutdown on April 14, 1961 for equipment changes and to make a neptunium recovery run. Plutonium and uranium products met shipping specifications although the latter required silica gel treatment. Irradiated uranium processing was resumed on April 29, with the first production consisting of non-representative uranium feed for the recovery of plutonium for unclassified uses.

A low yield was realized from the Purex plant neptunium campaign because of an undetected loss to the waste system. The loss was caused by a flow restriction which developed during the run in the overflow line from the top of the plutonium decontamination column.

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The sieve plate cartridge in the Purex co-decontamination column scrub section, which contained both stainless steel and linear polyethylene plates, was replaced with a prototype cartridge containing only stainless steel sieve plates. The old cartridge was removed because the polyethylene plates had deteriorated.

Following replacement of the Redox organic distillation pot, gamma activity in Redox recovered hexone increased by a factor of 300, requiring extra work for decontamination of the uranium and plutonium products. Faulty steam traps on the still were replaced by mid-month, and the quality of both products rapidly returned to normal.

During the month it was determined that fabricated parts were undergoing dimensional changes after machining and gaging, and further investigation also disclosed that the condition is not unique to Hanford. This phenomenon and, to a lesser degree, a minor defect in gaging techniques, account for rejection of several fabricated parts. Although aggressive effort at Hanford successfully identified the problem, it has not yet defined a precise cause or solution. Defects in gaging techniques have been corrected. Pending full resolution of the problem, dimensions of fabricated parts have been altered to compensate for the expected changes.

The design for the proposed caisson-lateral leak detection system was revised to provide a combination of vertical wells and horizontal laterals for existing storage tanks containing self-boiling, highly radioactive liquid wastes. An engineering study revealed that a combination of three horizontal laterals beneath each tank and seven vertical wells equally spaced around each tank would provide the most desirable leak detection system.

Measurements of the distribution of cesium-137 and uranium in coating waste solution indicate that a meaningful ratio exists between the quantity of cesium-137 found in the solution and the total amount of uranium occurring in both the liquid and precipitate phases. This tracer type relationship was developed because of recognized deficiencies in methods of measuring uranium in coating waste solutions, particularly in the presence of solids. The new analytical method offers substantial potential for improving these uranium measurements.

P. H. Reinker

General Manager
Chemical Processing Department

CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

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II. ACHIEVEMENTS

A. PRODUCTION OPERATION

<u>1. Production Statistics</u>	<u>April</u>	<u>Fiscal Year To-Date</u>
<u>a. Percent of Forecast⁽¹⁾ Achieved</u>		
Separated plutonium nitrate	108.6	100.1
Separated uranium nitrate	94.7	99.1
Uranium oxide	109.8	97.9
Plutonium metal buttons	104.4	99.3
Fabricated parts	130.0	106.9
<u>b. Purex</u>	<u>April</u>	<u>March</u>
Uranium nitrate produced (tons)	360.76	560.72
Average production rate during operation (T/D)	23.4	28.5
Total waste loss (%)		
Plutonium	0.58	0.36
Uranium	0.35	0.16
On-line efficiency (%)	72.0	92.5
<u>c. Redox</u>		
Uranium nitrate produced (tons)	104.2	111.87
Average production rate during operation (T/D)	7.6	7.5
Total waste loss (%)		
Plutonium	0.26	0.17
Uranium	0.11	0.11
On-line efficiency (%)	69.1	67.0
<u>d. Uranium Reduction</u>		
Normal UO ₃ loaded (tons)	631.1	437.2
Enriched UO ₃ loaded (tons)	68.5	115.2
Normal UO ₃ approved for shipment (tons)	605.93	406.01
Enriched UO ₃ approved for shipment (tons)	48.67	95.61
Normal UO ₃ shipped (tons)	456.10	505.17
Enriched UO ₃ shipped (tons)	144.37	96.37
Normal UNH backlog (tons)	42	323
Enriched UNH backlog (tons)	88	57

(1) HW-69228, "HAPO Production Forecast", dated April 25, 1961.

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e. <u>Plutonium Metal Processing</u>	<u>April</u>	<u>March</u>
Input to Task I (batches)	214	215
Reduction Yield (%)	97.9	97.4
Product recovery output (Kgs)	69.5	46.4
Product recovery backlog (Kgs)	380.8	340.3
Waste disposal (grams)	758	1 050
	<u>200-East</u>	<u>200-West</u>
f. <u>Power</u>		
Raw water pumped (gpm)	8 260	4 003
Filtered water pumped (gpm)	1 004	898
Maximum steam generated (lbs./hr.)	290,000	160 000
Average steam generated (lbs./hr.)	150 000	87.615
Total steam generated (M lbs.)	107 813	63 083
Coal consumed (est. tons)	5 751	3 308

J. H. Warren
Manager - Production

CHEMICAL PROCESSING DEPARTMENT
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II. ACHIEVEMENTS (Continued)

B. PUREX OPERATION

1. Operating Continuity

Normal processing continued at a 3.0 CF rate until the scheduled plant shutdown on April 14. All plutonium and uranium were essentially removed from the dissolvers, tanks, and columns.

A neptunium recovery run was started on April 17 and ended on April 22. Loss of product through the 2A column vent line resulted in a low yield.

After equipment changes were completed, processing was resumed on April 29 on a production run of special metal for recovery of unclassified plutonium. Because of a severe burst of gamma activity during startup, recycling of uranium and plutonium was started on May 1 to lower gamma activity in the processing streams to acceptable levels.

All plutonium and essentially all uranium batches met shipping specifications. Waste losses were higher than normal due to reducing the building inventory to a minimum at month's end. Leakage of the 2DF pump contributed significantly to a high uranium loss.

2. Processing Operations

Operating experience during the period was relatively satisfactory. Product decontamination and solvent gamma activity were acceptable.

The 2D (second uranium cycle) extraction column developed a marked instability prior to the shutdown and required significant reduction in pulse frequency. Disintegration of the plastic sieve plates in the column was the probable cause of this behavior.

The use of hydrazine as a process reductant was tested in the partitioning cycle. No adverse results were noted.

During the shutdown magnesium hydroxide was tested as a washing agent in the #1 solvent system. This preliminary test revealed no difficulties.

A high loss of neptunium occurred during the recovery run. An undetectable loss of solvent through the vent line on the 2A (second plutonium cycle) column bled off a large portion of the

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neptunium inventory during the final phases of the processing. The vent system drains to the F-18 waste tank and thus the material was lost with fission product recovery wastes which were concurrently processed through this tank. Inspection after the run was completed showed that solvent splashing into the vent piping occurred at high solvent flow rates and high pulse frequencies similar to the operating conditions during the neptunium recovery run. Subsequently, the inlet distributor to the 2B (second cycle plutonium stripping) column was backflushed to the cell floor and sizable amounts of black solid material were removed. Further testing showed that the restriction that limited solvent flow into the 2B column had been removed by flushing. By removing this restriction the tendency for solvent to enter the 2A column vent line was also greatly reduced.

On shutdown the plant inventory of plutonium and uranium was reduced to a minimum by removing dissolver heels, emptying tanks, and stripping columns. Plutonium-rich wastes from the neptunium recovery run were segregated and stored in the F-13 waste tank for future rework.

Normal processing was resumed on April 29 on a special production run to produce unclassified plutonium.

A burst of gamma activity in the process occurred when the back-cycle stream was started. Recycle of the uranium and plutonium, beginning May 1, was necessary to reduce gamma levels throughout the process.

A cask containing approximately 29 kilocuries of Sr-90, which was previously loaded for HLO's High Level Cells, was reprocessed at Purex and combined with other material in the F-8 tank. Approximately 108 kilocuries of Sr-90 solution stored in 244-CR-003 tank were pumped to F cell and combined with the material in F-8 tank.

Three shipments totaling 34.7 kilocuries of Sr-90 were made to HLO. Six casks of strontium waste from HLO processing were received and unloaded to underground storage. The balance of the 244-CR-003 material, approximately 32 kilocuries, was added to 244-CR-002 tank. This will serve as feed to the Hot Semi Works.

Fission product processing runs yielded 141 kilocuries of Sr-90 which were stored in the 244-CR-003 tank. The total production of Sr-90 from Purex waste streams to date amounts to 1186 kilocuries.

The four STT casks containing Cs-137 and the HAP0-1A cask containing Sr-90 were tested and released for shipment to Oak Ridge National Laboratory on April 12.

3. Mechanical Experience

A prototype titanium tube bundle was installed in the H4 backcycle concentrator on April 17.

The F-6 nitric acid concentrator, which developed excessive air inleakage and could no longer be operated under vacuum, was flushed and removed from service. It was stored in the railroad tunnel extension. A new concentrator was installed on April 21.

The HA (co-decontamination cycle) column was chemically flushed and the scrub cartridge removed. The plastic sieve plates showed numerous radial cracks with some segments missing. A prototype stainless steel nozzle plate cartridge was installed on April 26.

The 244-CR-003 tank pump was replaced with a new unit due to excessive upper seal leakage.

The E-5 agitator failed in service on April 27 and was replaced.

The sump pump in the #7 pump pit failed and was replaced with a reconditioned unit.

Diversion box changes were made to route 244-CR-003 tank contents to 002 tank, and to route E-1 tank contents to 003 tank. Changes were made in the 252-C diversion box to route Hot Semi Works waste to 241-C-112 tank. Minor Construction forces completed installation of a proportional sampler on the 216-A-5 crib stream.

Failed equipment transfers included two burials at the industrial burial ground and one tunnel extension burial. The equipment involved was two tube bundles, two column cartridges, 83 cell jumpers and the F-6 acid concentrator.

Repairs and tests were satisfactorily completed on the spare G1-2 canyon pump.

4. Radiation Monitoring

The total radio-iodine 131 emission during April was 16.4 curies. The maximum seven-day emission equaled 10 curies, the CPD control limit.

There were eight Radiation Occurrences and seventeen cases of skin contamination.

A wooden "non-collapsible" burial box, containing 83 highly-contaminated process jumpers, collapsed as it was buried in the trench. Contamination from 10,000 c/m to 500 mrad/hr. was spread over an area approximately 400,000 square feet, generally within the burial garden.

Due to inadequate surveys of the railroad cars used to push the failed F-6 concentrator into the railroad tunnel extension, smearable contamination ranging in levels from 400 c/m to 20,000 c/m was spread to the railroad right-of-way from Purex to the west perimeter fence. Decontamination efforts were successful in removing or fixing the contamination.

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5. Analytical Experience

Improvements made in the RAC (remote analytical cave) equipment and methods made possible complete analysis of Purex dissolver solution for neptunium in 48 hours instead of 120 hours by the previous method.

All analytical requirements were met successfully in Hot Semi Works strontium tracer runs. Analytical methods were found to be adequate.

Calibration of the new 400-channel analyzer was completed. A one-week chemist coverage of days and swing shifts was used to complete the calibration work and to train personnel in the use of the analyzer.

6. Events Influencing Costs

Three employees in the Analytical Control Operation were re-activated after returning from extended personal illness.

Fresh nitric acid was lost from a storage tank to the chemical sewer through an open valve on the pump drain line. The value of the material lost is approximately \$12,900.

An overflow of the uranium transfer trailer resulted in a loss of 343 gallons of depleted uranium solution to a French drain.

E. R. Irish-
Acting Manager-Purex

ER Irish:EAF:gt

CHEMICAL PROCESSING DEPARTMENT
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II. ACHIEVEMENTS (Continued)

C. SPECIAL SEPARATION PROCESSING AND AUXILIARIES OPERATION

1. Operating Continuity

Processing operations in the Redox Plant were resumed on April 6, following a scheduled shutdown on March 29 for replacement of the leaking organic still pot (G-3). Processing continued as scheduled until April 28, at which time E-metal processing was discontinued and preparations were started for a neptunium recovery run during the first week of May.

2. Processing Operation

Replacement of the leaking G-3 organic still pot, which was started on March 29, was completed by April 1. Boil-off and checkout operations were subsequently completed and the new unit was placed in operation on 4-5-61. Since the G-3 installation had gone so well, two other equipment changes were attempted, i.e., (1) replacement of the D-14 backcycle concentrator thermohm, and (2) installation of a new jumper for the 3EU gamma monitor. However, both jobs developed complications and the startup of processing operations was delayed until 4-6-61.

The G-3 organic still operation was very unstable after the new pot installation and considerable operating difficulty was experienced during steam distillation of the recycled hexone. The gamma activity in the recovered hexone increased significantly and the high-activity organic extractant contaminated the final plutonium product stream so that the rework of solution containing approximately two kilograms of plutonium was required. The trouble was finally traced to faulty steam traps and after these were replaced on April 14, normal operation was again attained.

Although high gamma ratios were encountered in both the uranium and plutonium product streams as a result of the G-3 organic still difficulties, all production met shipping specifications. However, it was necessary to use periodic acid in the E-13 uranium product ozonator in addition to processing sixteen E-12 batches through the silica gel facility to reduce gamma ratios to shipping specifications. Product solution containing approximately two kilograms of plutonium was also reworked via

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the 2A extraction column in order to meet gamma ratio specifications.

A third cask car was assigned to the transporting of E-metal from the reactors to the Redox Plant this month. The charge to the Mark V multipurpose dissolver, containing a 3-4 ton heel, was subsequently increased from a nominal 5.4 tons to 8.1 tons. This increase in charge size plus approval to operate the dissolver on a 7 day per week basis instead of 5 days per week, as heretofore, removes the dissolver as a processing bottleneck.

Approximately 123 tons of UNH, with a high gamma ratio, were received from the Purex Plant and reprocessed through the silica gel system to reduce the gamma content to within shipping specifications. The silica gel bed was regenerated on 4-22-61, following completion of the Purex Plant's UNH reprocessing.

A practice evacuation was conducted for all facilities associated with the Redox Plant on 4-28-61 as part of the National Alert Program. Processing operations were not interrupted.

3. Mechanical Experience

The vacuum on the new G-3 organic still pot, installed during the first week of the month, was found to be very difficult to control after operations were resumed. The difficulty was traced to poor operation of the steam condensate traps and these were both replaced on 4-14-61. Subsequent operation has been satisfactory.

The coil in the H-4 metal solution oxidation tank, which had developed a small leak, was replaced without incident on 4-14-61.

The agitator in the H-10 coating waste receiving tank failed on 4-20-61, due to a bent shaft. A new agitator was installed on 4-22-61, and operation to date has been satisfactory. The failed unit was an original installation and had been in service for approximately 10 years.

A coil leak in the E-13 uranium ozonator vessel was confirmed this month and a new unit was installed on 4-29 and 4-30. In conjunction with this equipment changeout, the E-13 agitator and the E-13 pump were also replaced. The agitator had a malfunctioning top bearing and the pump was leaking at the seal. All of the removed equipment was transferred to the Redox Equipment Reclamation Facility for possible salvage.

4. Waste Handling and Decontamination

On April 3, 1961 the Redox Waste Handling and Decontamination

Operation went to a rotating 8 to 4 and 4 to 12 operating shift schedule for Process Operators, Radiation Monitors and Process Crane Operators. All personnel at this location had previously been assigned to a straight day shift schedule. However, the current work load plus the practical advantages of having some employees in the above-named classifications perform certain phases of the work at a time other than when mechanical maintenance employees were making equipment repairs, necessitated the rotating shift schedule. The special shift schedule will continue for approximately one month.

A shipment of thirty-nine (39) fifty-five gallon drums containing approximately three-fourths of a ton of depleted uranium dry waste from the Dow Chemical Company's plant at Rocky Flats, Colorado, was received and buried on 4-27-61.

Equipment valued at approximately \$106,000 was received from the processing plants for decontamination, repair or inspection during the month. Equipment valued at \$47,900 was returned to customers. A savings of approximately \$30,000 over the cost of new replacement equipment was realized through the equipment decontamination program during the month.

A total of 204 man-hours was charged to the decontamination of railroad, automotive, and heavy equipment. The following is a breakdown of the major items decontaminated:

<u>Item</u>	<u>Operation Charged</u>
Well Cars No. 36 & 40	CPD
Locomotives No. 31 & 32	Transportation
D-4 Caterpillar	Redox
Duplex Tractors No. 68C-4645, 68E-2960, 68E-2963 (for excess)	P&GM
International Caterpillar	P&GM
Caterpillar No. 63-12074	P&GM
Power Wagon No. 1H-4973	Transportation
Pickup Truck No. 1C-138 (for excess)	Redox
Panel Truck No. 1D-472 (for excess)	Redox
Load Luger	Redox

5. Radiation Experience

Eight skin contamination cases were recorded during the month. The maximum plutonium and fission product activity associated with the skin contamination cases was 5,000 d/m and 40,000 c/m, respectively. All skin contamination was readily reduced to non-detectable.

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Two of the three radiation occurrences reported during the month were significant. One was caused by a broken volumetric flask on the floor of the decontamination room in the 222-S Analytical Laboratory. Although no liquid was involved and the maximum floor contamination of 10,000 d/m was confined to a small area, the potential from the broken glass, which was contaminated to 1.5×10^6 d/m, was high. The other significant occurrence involved the difficulties experienced with the G-3 organic still in the 202-S Building. Inconsistencies in the condensate trap operation caused a 20 fold increase in the gamma radiation levels of the hexone transfer lines and storage tanks. This condition has been reduced to near normal operating levels by continuous flushing procedures.

Two contaminated equipment moves to the Redox Equipment Reclamation Facility were made during the month. The G-3 organic still pot, which had a leaking coil, was shipped on 4-4-61. A failed tube bundle from the H-4 metal solution oxidation tank and a waste concentrator condenser (D-11) were shipped on 4-18-61. Dose rates through the concrete transfer boxes at 53 feet were 350 mr/hr and 2 r/hr, respectively. Both equipment moves were completed without incident.

During the decontamination and movement of a Purex Plant J-5 pump at the 221-T Equipment Reclamation Facility the plutonium concentration of the canyon air reached chemox mask levels, and the canyon deck was generally contaminated to 5,000 d/m smearable at Sections 14 to 16 and 1,000 d/m smearable at Section 20. Personnel were evacuated from the canyon until the air condition improved. The canyon deck was subsequently decontaminated to less than 1,000 d/m smearable.

6. Analytical Experience

Experience gained over the past several months in providing analytical coverage to the Strontium-90 Flow Sheet Development Program permitted the formalizing and issuance of procedures for analytical control of the program. This work will benefit the Purex Laboratory in providing analytical coverage for the Hot-Semi Works recovery program, and copies of all applicable procedures are being provided for their use.

Chas. B. Drosruth

Manager - Special Separation
Processing and Auxiliaries

CHEMICAL PROCESSING DEPARTMENT
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II. ACHIEVEMENTS (Continued)

D. FINISHED PRODUCTS OPERATION

1. Operating Continuity

Fabrication operated on a normal schedule plus three overtime days. Plutonium Processing was scheduled down for one week when feed was not available, and one day because of the failure of the Recuplex supernate concentrator. Recovery operations were slowed for over two weeks by the processing of an accumulation of "hood floor" material from leaks and vessel failures. Uranium reduction operations were normal except for three days lost time on the processing of enriched material when the "G" calciner was damaged by a broken feed point.

2. Processing Operations

a. Plutonium Fabrication

All fabrication effort was directed toward the production of Model 81 assemblies. Yields this month were below those of March, being approximately the same as those in February.

Output was sharply affected, and deliveries fell behind schedule when it was decided to scrap all parts prepared during the first half of the month. This action resulted from discrepancies between on-site and off-site inspection. Parts which appeared to be acceptable on-site proved to be too small at the customer's plant. Appropriate changes have been made in the dimensions in fabrication during the latter half of the month. A small number of parts were dispatched to the customer's plant shortly after mid month, but no information concerning them had been received at month end.

The work load in the foundry operations continued to be heavy, and the recycle of plutonium scrap to recovery was very high. It has been necessary to store temporarily, significant quantities of this scrap in the old RMA Line in order to maintain continuity of operation.

In-plant and Multiplication Tests were conducted on several week ends as part of a program for reviewing critical mass aspects of plutonium melting.

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b. Plutonium Processing

The Button Line was idle for more than a week (scheduled) because no feed was available. Feed scheduling was critical all during the month, and mechanical difficulties on the last day prevented achievement of the production schedule.

The recovery operation spent more than half of the month processing the accumulation of floor material resulting from leaks and vessel replacements of the previous month. Normal operation with richer feeds took place satisfactorily during the latter half of the month.

The inventory of recoverable plutonium scrap was not improved. The principal problem was the accumulation of fabrication scrap.

c. Uranium Reduction

Uranium Reduction performed well this month, and the schedule for normal uranium oxide was met. The schedule for enriched material was 90 percent achieved when a broken feed point caused extensive damage to "G" Calciner. Repairs will be completed early in May.

3. Mechanical Performance

Equipment in the area of Plutonium Fabrication casting operated well except for failures due to manipulation error. In machining, only one significant failure occurred. This required the replacement of the female chuck on the lathe in Hood 41-M2.

In final inspection, the only significant difficulty involved the failure of the drive shaft bearing on the sweep gage in Hood 67G.

In Plutonium Processing, equipment operation was satisfactory with only routine maintenance required.

In Plutonium Recovery, the equipment continued to require excessive maintenance effort. The G-60 concentrator which failed during March was replaced during a scheduled shutdown. Significant downtime resulted from inoperative, erratic, and unreliable valves throughout the system. Two pump failures occurred during the month.

Plant forces continued work on the new Gorton lathes, but the X-Y attachment control difficulties have not yet been corrected. The significant obstacle appears to be the insensitivity of the slide control valve to the signal supplied by the amplifier.

Testing of the equipment for the new incinerator is being performed by Minor Construction personnel.

4. Radiation Experience

Radiation and contamination control statistics show general control to be satisfactory this month.

5. Analytical and Final Inspection Experience

	<u>March</u>	<u>April</u>
Number of Samples Received	1,388	1,835
Number of Determinations	14,071	20,631
Average Impurity, Buttons	1,236 ppm	1,331 ppm
Buttons Rejected	10.2 %	1.7 %

6. Control

As a result of information from Rocky Flats that many of the 8105 and 8106 components did not meet specifications, a study was initiated to determine gaging precision and accuracy, and the rate of apparent shrinkage of the parts. Tests showed that gaging was precise to ± 0.13 mils at the 95 percent confidence level, confirming earlier estimates. Installation of newly certified radius standards confirmed accuracy of measurements to within 20 millionths of an inch. The inconsistency of results between successive gagings of the same parts was found to result from an actual shrinkage of the parts as a function of time from date of casting. The precise mechanism of the change in dimensions is still undetermined, but it appeared that the major shrinkage was completed within two weeks from casting. Tests indicated that there was no apparent effect on dimensions attributable to storage in the shipping containers.

Arrangements were completed at mid month to revise the gaging technique slightly for 8105, 06 parts with respect to positioning the parts on the gage and thus enhance reproducibility. The customer is adopting the HAP0 methods.

W. J. Martin
Manager, Finished Products

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CHEMICAL PROCESSING DEPARTMENT
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II. ACHIEVEMENTS (continued)

E. POWER AND GENERAL MAINTENANCE OPERATION

1. Operating Continuity

There were no outages of Power services that affected operating continuity of the prime production facilities.

2. Inspection, Maintenance and Repair

A spare Purex concentrator was prepared for service and shipped to the Purex Plant on April 21. Preparations included blanking of ten spare nozzles with remoteable connector heads, halogen leak test, fabrication of three remoteable gauge-ring-gasket assemblies, and placement of holding racks on a railroad car.

Lagging and sheathing have been replaced on the one remaining spare Purex concentrator which was stripped to allow for special leak testing. This unit will be available for service as soon as special high-tensile-strength studs are delivered and installed on three flanges.

Fabrication and assembly of an all-stainless-steel sieve-plate cartridge was completed, and this unit was shipped to Purex for installation in the HA Co-decontamination Pulse Column. This change was made to eliminate problems associated with radiation break-up of polyethylene plates which were used in former cartridges.

Fabrication and assembly of the Prototype Sludge Sampler for Purex Tank Farms are about 98 per cent complete. Only minor assembly work remains to be done prior to testing.

All field work on the Formaldehyde Denitration Prototype for Purex has now been completed, and, with exception of six jumpers which are yet to be designed, all fabrication work for this program has been finished.

Mock-up, test, and minor repairs were completed on two vendor-fabricated, stainless-steel tube bundles for Purex concentrators. Lagging and sheathing are in progress, and the units will be placed in Spare Parts on completion of this work.

A spare De-entrainment Tower is being prepared for installation on the Redox F-2 Precycle Concentrator. Raschig rings have been placed in the tower. Required modifications are 50 per cent complete.

Three process agitators were made ready for service and shipped to Redox as replacements for failed equipment.

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Twenty-eight process jumpers were completed and made available for installation.

Fabrication of the Sheffield gauge hood and air lock was continued and has reached 80 per cent of completion. This equipment will be installed at 234-5 for inspection of finished plutonium shapes.

Installation of a vendor-fabricated hood and related equipment was completed in room 188 of 234-5 Building.

Installation of the Creep Hood has been completed in room 48, 231-Z Bldg.

Modification of ventilation systems on the Forging Press Hood and Impact Hood, in room 50 of 231-Z Building, has been completed. These changes provide for operation of these units, using a nitrogen atmosphere.

Three burial boxes of side-burial design were buried with the use of foam to suppress contamination. These boxes contained the L-Cell package, K-2 Column, and the J-2 Column. The L-Cell package and the J-2 Column were highly contaminated with plutonium, and posed some difficulty in the backfill operation. National Foman 2-1 foam was injected into the boxes while the backfilling operation was in progress. Constant monitoring on this job revealed no contamination spread.

A concrete box, ten feet wide, six feet high, and twenty feet long, was constructed for Purex and used for the burial of two concentrator tube bundles. The estimated weight of this box was twenty tons plus the tube bundles, 7 $\frac{1}{2}$ tons each, making a total of 35 tons. The box was pulled into the burial trench without difficulty, except the weight was too great for two dozers to pull without losing their traction. Approximately fifteen feet of trench was lost at the north end of the trench by not being able to pull the box to the previous backfill.

As a wooden burial box, containing 80 Purex jumpers and 2 column cartridges, was pivoted on the railroad car and moved down the unloading ramp, there was evidence of structural failure of the box. The box was pulled to its final resting place and backfilling started immediately, using three dozers and a 1201 Lima crane to cast backfill on the top of the box. Collapsing of the box spread a limited amount of contamination in a northwesterly direction from the burial site. Four General Maintenance people received skin contamination up to 20,000 c/m. All skin contamination was readily reduced to 100 c/m, and nasal smears were negative.

Excavation of a waste trench, 12 feet deep, 25 feet wide at the top, and 1,000 feet long, was completed in the 200 East dry-waste area, to be used by Purex.

Work for Redox during the month consisted of repairing the PR lift elevator cables. The cables were disconnected and backturns were removed. Cables on the ten-ton canyon crane were also checked and the backturns removed.

Work for the Waste Handling Operation during the month included the handling and burial of 39 fifty-five-gallon drums of depleted uranium from Rocky

Flats. Some of these drums weighed as much as 200 pounds, and required a crane and rigger crew to lower them into the trench. These drums were set into the trench in an upright position, to hold underground contamination to a minimum.

Third-party inspection was performed on the No. 1 boiler in 284-E Building. One soot-blower element was found pitted and was replaced. The boiler is in good condition.

Excessive vibration of the cone valve and piping in the 284-E raw-water inlet house has been evident for some time. Air bleed-lines were installed in the pipe transition downstream of the cone valve, to break up the water turbulence. Results were excellent.

During a preventive maintenance check in the 282-E Building, the oil in the motor bearings of the No. 1 raw-water pump was found to be excessively thick. An analysis showed heavy concentration of lead particles. The bearings on the motor were disassembled, and the babbitt bearings were found to be badly pitted. New-type babbitt bearings with heavier oil rings were installed, and will be checked frequently.

A tube leak in the front water wall header of No. 4 boiler in 284-E Building was repaired.

Ventilation balance activities included: final air balance on 105-KE Reactor Building; start of final balance on 105-KW Reactor Building; test of high-efficiency filter banks in PRTR Program; acceptance tests on new ventilation units at 190-KE&KW Buildings; ventilation services to facilitate removal of contaminated equipment and panels in Recuplex in the 234-5 Building.

3. General

On April 12, the Mail and Duplicating Unit moved its 200-E location from the 2701-M Building to 2713-E Building.

T. S. LaDreuth
 Manager
 Power & General Maintenance

TGL:ap

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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

APRIL, 1961

II. ACHIEVEMENTS (continued)

F. FACILITIES ENGINEERING OPERATION

1. Purex

a. Process Design and Development Engineering

Silica Gel Treatment

Preliminary process design work was completed and a summary report issued covering a full production scale silica gel facility for Purex. The new facility, estimated to cost in the order of \$100,000, would provide a silica gel column, feed pump, a regeneration tank, and associated piping and instrumentation. The piping arrangement would permit use of the new silica gel column in parallel or series with the existing facility.

Alpha Energy Analyzer

A sample holder and pre-amplifier for use with a silicon semi-conductor alpha detector has been developed and investigated initially by Hanford Laboratories. The silicon detector offers applications for discrimination of alpha energies and improved analytical measurements for Birch and other transuranic elements. This instrument, with modifications, is being evaluated for analysis of HAW stream samples, and also for possible application of this type of detector in an in-line installation. Two prototypes are being fabricated for use in the Purex laboratory in conjunction with the multichannel analyzer.

b. Project Engineering

CGC-821 - Project Palm - Purex

Information for the lump sum bid package has been compiled and transmitted to the Commission on April 18. Plant forces have been given an interim authorization for material procurement for 47 jumpers. Requisitions have been processed covering 56 items or groups.

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CAC-881 - Emergency Water Supply - 241-A Tark Farm

A Physical Completion Notice, dated April 28, has been issued.

c. Manufacturing Engineering

Titanium Reboiler

The titanium reboiler has been installed in the right hand tube bundle position of the H-4 concentrator. Operation, to date, has been at very low rates due to process requirements. Operation at high rates will begin in May, at which time data will be obtained to determine capabilities of the unit.

2. Special Separations Processing

a. Process Design and Development Engineering

Preliminary scope designs of NPR casks and cars have been completed. The number of casks and cars needed for shipment of NPR fuel from 100-N to Redox was determine to be 6 and 2, respectively, as compared with the earlier estimates of 8 and 3.

Leak Detection System

The proposed caisson-lateral leak detection system was revised to provide a combination of vertical wells and horizontal laterals adjacent to existing storage tanks containing self-boiling, highly radioactive liquid wastes. An engineering study revealed that a combination of three horizontal laterals beneath each tank, would provide the most desirable leak detection system.

3. Finished Products Operation

a. Process Design and Development Engineering

Gorton Lathes

Two lathes using feedback mixer and preamplifier units are in use with limited capabilities. Work is continuing with HLO personnel to develop a more satisfactory means of improving performance. Indications are that a relaxation of system requirements by a factor of approximately four times is necessary unless extensive redesign is accomplished.

Button Gamma Monitor

Fabrication has been completed of a monitor to measure button gamma radiation level in the RMC Line. Installation work is in progress.

Contamination Confinement

An intensive program of refining the basic operating technique used in flange sealing has been completed. This technique, which is a basic requirement for eliminating glove boxes in wet chemistry processes, is now ready for the second phase of development involving use with various solvents, saline, and acid solutions.

Button Line Improvement Program

All development work on the 6-inch continuous centrifuge has been indefinitely suspended. This decision was influenced by such factors as mechanical reliability problems, inability of the centrifuge to produce dry solids of standard material, and improvement in the existing vacuum filter operation.

The first monofilament linear polyethylene filter cloth has operated two months. This represents an increase of about 100% over the average life of the dynel cloth and about 250% over the best multifilament linear polyethylene cloth tested to date. A second monofilament cloth has been installed.

Recuplex Improvements

Detail design drawings for fabrication and installation of a prototypical air pulser on the Recuplex H-1 column have been completed.

Detail design drawings for fabrication and installation of a continuous slag and crucible dissolver in the existing Recuplex facility were completed. Fabrication is scheduled for completion the first week of May, 1961.

Recent failures of the Type 304L stainless steel tube bundle and recirculation loop of the Recuplex filtrate evaporator, after approximately two years of service, have necessitated an evaluation of material of construction for this evaporator.

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b. Project Engineering

CAC-880 - Pu Reclamation Facility - Z-Plant

A Work Authority, dated March 21, authorized General Electric Company an increase of \$1,190,000 for a total of \$1,390,000. Design work is now proceeding favorably toward schedule and cost deadlines.

CGC-912 - Waste Treatment Facility - Z-Plant

Directive No. HW-522, Mod. #1, dated April 10, authorized General Electric Company an increase in funds of \$505,000 for a total of \$575,000.

4. General

a. Process Design and Development Engineering

DO-51204 - Contaminated Equipment Repair Facility

Preliminary engineering has been started on this facility to determine the ventilation and architectural modifications to convert a portion of the 221-T Building canyon into a contaminated equipment repair facility.

b. Project Engineering

Project Cost Information as of 4-23-61:

Total Auth. Funds - 12 active projects	\$ 8,712,000
Total Cost-to-Date	5,328,000
Commitments and Open Work Releases	351,000
Unencumbered Balance	3,033,000
Costs charged to above projects (3-19-61 to 4-23-61)	134,349

CGC-830 - NPF Reprocessing

A Physical Completion Notice, dated April 17, has been issued.

CGC-897 - Fission Product Concentrates Storage System
200 East Area

A project proposal revision requesting a total of \$1,400,000 funds for the beneficial use of Phase I

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within 14 months after authorization has been prepared and submitted for approval. This proposed work includes reactivation of eight B-Plant cells, with the accompanying relocation, modification, and addition of equipment and services.

Manager

Facilities Engineering
Chemical Processing Department

HP Shaw:olc

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CHEMICAL PROCESSING DEPARTMENT MONTHLY REPORT

APRIL, 1961

II. ACHIEVEMENTS (Continued)

G. RESEARCH AND ENGINEERING OPERATION

1. Purex Process Technology -

a. Fission Product Recovery

After tests on the sealed HAPO IA Cask, loaded with 20,000 curies of purified Sr 90, indicated the equilibrium internal pressure and temperature to be 8 psig and 59° F (9° F above the ambient temperature), the IA Cask and four Shielded Transfer Tanks, each containing 30,000 curies of Cs 137 were shipped to Oak Ridge. Analyses of the IA Cask equilibrium gas samples showed 88 - 92 per cent hydrogen but less than 0.01 per cent oxygen which indicates the oxygen must remain in the solution.

During the month two strontium recovery runs, each processing 4000 gallons of current IWW, isolated 180,000 curies of Sr 90, which represents about sixty per cent overall recovery.

b. Solvent Extraction

Overall decontamination during the first portion of the month, which was a continuation of the March operating period, was excellent. All plutonium product met the specification of 2×10^{-11} ZrNb/AT after ion exchange processing, and the final uranium product gamma ratios, which ranged from 4.0 to 6.5 after solvent extraction, were reduced to 2.0 by silica gel treatment.

Plutonium waste losses via the HA Column effluent (HAW) averaged 0.03 per cent, which was considerably below the 0.1 per cent established over the past few months of operation.

The addition of hydrazine to the Partitioning Column extractant (IBX) was tested to establish its effect on the process. Substitution of hydrazine for sulfamic acid as a holding reductant for ferrous sulfamate would reduce the amount of sulfate in the subsequent process streams including the high level waste. In addition, the presence of hydrazine in the system duplicates the conditions to be experienced when

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continuous neptunium recovery is inaugurated. Observations made during the test as the concentration of hydrazine in the IBX was increased from 0.005 to 0.03 M included the following:

- (1) No effect was noted on either decontamination or waste loss performance.
- (2) Hydrazine, above the 0.005 detection limit, was not found in the plutonium stream from the Partitioning Column (IBP) until the concentration in the IBX reached 0.03 M. A proposed explanation is that the hydrazine is destroyed while converting Fe^{+++} to Fe^{++} , but this theory has not been confirmed.

Other items of interest to solvent extraction were as follows:

- (1) A reduction in the 2D Column processing capacity has been tentatively assigned to failure of the plastic plates in the zebra scrub section cartridge after 4 1/2 years of service.
- (2) During a scheduled shutdown the zebra cartridge in the HA Column scrub section was replaced (because of broken linear polyethylene plates) with an all-steel, nozzle-plate cartridge with six per cent free area.
- (3) Introduction of the backcycle waste stream into the HA Column, after startup, produced a severe gamma activity burst in the intercycle streams which necessitated recycle of cold uranium to the HA Column feed (HAF) in order to reduce the gamma activity throughout the plant.

c. Neptunium Recovery

Neptunium accumulation in the Backcycle Waste was normal during the uranium processing period except for a temporary loss to the final uranium product which reached ten per cent of neptunium in the virgin feed just prior to shutdown. As during March, the loss to the final uranium product was consistently two to threefold above the one per cent loss previously established.

A neptunium recovery run utilizing the standard hydrazine-ferrous sulfamate reducing flowsheet was made during the month to isolate and decontaminate the 1.3 kg neptunium inventory in the plant. Because of a restriction in the overflow line from the top of the 2A Column into the bottom of the 2B Column, 0.8 kg of neptunium were irretrievably lost to the underground storage tanks via the vessel vent system and the waste collection tank. The loss occurred during the final decontamination period of the run. Other phases of the operation were normal with 0.2 kg neptunium recovered for purification. The gamma activity to neptunium ratio of the loadout product was higher than normal because of the low neptunium concentration.

d. Solvent Treatment

Gamma activity of the No. 1 System solvent slowly decreased from 5 - 6000 uc/gal to about 3000 uc/gal at shutdown.

After the Batch Wash Tank (TK-G1) was flushed with five per cent oxalic acid - two per cent nitric acid to remove the MnO_2 , a test using $Mg(OH)_2$ in the Turbomixer (TK-G7) was conducted by recycling the solvent through the solvent treatment system. The purpose of the test was to evaluate operability of the equipment with respect to entrainment, disengaging time and equipment decontamination while using 1.0 M NaOH - 0.06 M $Mg(OH)_2$. Although no adverse effects were detected during the operation, tanks associated with the test were flushed with dilute acid prior to plant startup.

The gamma activity burst in solvent extraction system at startup increased the gamma activity of the solvent from 1800 to 90,000 uc/gal; thus temporarily overloading the capacity of the solvent treatment system to remove "do-bads". However, the solvent gamma activity returned to normal as processing of recycled uranium was undertaken.

e. Waste Concentration and Acid Recovery

Waste volumes sent to underground storage averaged 58, 275, 690 and 215 gallons per ton of uranium for neutralized high activity waste (IWW), neutralized IWW after treatment for strontium recovery, solvent washes and cell drainage, respectively.

The bottom temperature of Tank 241-A-101 as measured under approximately 30 inches of sludge rose rapidly from 130° C to about 190 - 200° C during the latter part of the month. Efforts to reduce the temperature by increased air to the recirculators and maintaining a higher liquid level in the tank are continuing at month end. Tank 101 has been used for the storage of current high level waste since October 1960 after the previously added waste had been allowed to "cool" 2 1/2 years.

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2. Redox Process Technology -

a. Dissolution

When a third cask car became available on a test basis for transporting irradiated uranium metal from the reactors to the Redox plant, the charge to the Mark V multipurpose dissolver, containing a 3-4 ton heel, was increased from a nominal 5.4 tons to 8.1 tons. The metal charged was dissolved in two cuts of approximately four tons each. The larger charge and cut size increased the dissolver capacity from its previous average of approximately 5.5 tons per day to slightly more than 7 tons per day.

Although this dissolution rate appears to be sustainable and is more than adequate for current Redox production, further changes in the operating variables (charge size, heel size, acid addition rate, etc.) will be made in an effort to determine the maximum dissolution rate. When this has been determined, dissolving procedures will be standardized to give the optimum rate consistent with existing needs and circumstances, and will be transmitted to operating personnel for routine use.

Preliminary testing of the dissolver off-gas monitoring system, consisting of a parallel installation of thermal conductivity and combustible gas analyzers preceded by a silica gel dryer, revealed that the thermal conductivity analyzer was unsuitable for the service due to rapid filament failure and difficulty in maintaining the extremely small sample flow required for the unit. The combustible gas analyzer demonstrated adequate durability and accuracy during tests on coating removal off-gas, and appears capable of monitoring hydrogen when the dryer is in service and hydrogen plus ammonia when the dryer is bypassed. Consideration is being given to replacement of the thermal conductivity analyzer with a second combustible gas analyzer to permit continuous monitoring of hydrogen and determination of ammonia by difference.

b. Solvent Extraction

Following replacement of the organic still pot (G-3) at the end of March, 1961, considerable operating difficulty was experienced during steam distillation of the recycled hexone. By April 12, the gamma activity in the recovered hexone had increased by a factor of 300 --- up to 30,000 microcuries per gallon. This high-activity organic extractant contaminated the final product plutonium stream so that rework of solution containing two kilograms of plutonium was required. The final product uranium stream, already out of gamma specifications because of extractable ruthenium contained in rework from cell sumps, was contaminated further with both ruthenium and zirconium-niobium. Ozone sparging to remove ruthenium followed by silica gel treatment to remove the zirconium-niobium, decontaminated the final uranium product stream to within the gamma specifications. The hexone still troubles

were traced to faulty steam traps and after the steam traps on the unit were replaced on April 13, satisfactory operation was again attained. The gamma activity of the hexone then decreased rapidly to normal, and final product streams again met gamma specifications.

c. Waste Storage

Analyses on the waste supernatant solution samples taken from the 101, 107, 108, and 114-SX high level waste storage tanks during March, 1961, were completed during the month. Since the supernatant solutions at 25 C contained approximately 50 volume percent crystallized solids, it was necessary to dilute the original samples with water, perform the analyses on the diluted samples, and compute the results as if the original samples had existed as solutions at 25 C. The following analyses were obtained:

<u>Analysis</u>	<u>Tank 101-SX</u>	<u>Tank 107-SX</u>	<u>Tank 108-SX</u>	<u>Tank 114-SX</u>
Specific Gravity	1.765	1.747	1.726	1.712
Free NaOH (g/l)	183	50.6	52.8	61.0
NO ₃ ⁻ (g/l)	374	536	518	505
NO ₂ ⁻ (g/l)	114	29.8	28.1	20.6
Cl ⁻ (g/l)	23	9	9	9
SO ₄ ⁼ (g/l)	0.5	0.3	0.3	1.1
R ⁺⁺⁺ (prob Al ⁺⁺⁺) (g/l)	90	32	31	46
Na ⁺ (g/l)	165	153	177	242
Gross Beta (uc/gal)	5.1x10 ⁶	3.7x10 ⁶	3.4x10 ⁶	3.3x10 ⁶
Gross Gamma (uc/gal)	5.4x10 ⁶	3.8x10 ⁶	3.5x10 ⁶	3.6x10 ⁶
Gamma Scan (uc/gal)	Cs137 5.6x10 ⁶ others not detectable	Cs137 3.9x10 ⁶ others not detectable	Cs137 3.5x10 ⁶ others not detectable	Cs137 3.5x10 ⁶ others not detectable
Sr ⁹⁰ (uc/gal)	3x10 ³	2.0x10 ⁴	6.1x10 ⁴	6.8x10 ⁴
Np ²³⁷ (g/gal)	<4.5x10 ⁻⁴	<1.5x10 ⁻⁴	<1.5x10 ⁻⁴	<1.5x10 ⁻⁴

Under the proposed program for further study of the wastes stored in the 241-SX Tank Farm, the waste supernatant solutions from the 107, 108, and 114-SX tanks will be pumped to an older tank farm for storage and to permit detailed study of the sludge remaining in these tanks. A core

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sample of the sludge will be taken for analysis. This program will provide: 1) additional storage space for Redox salt waste; 2) needed information on the composition, solubility, and mobility of the sludge; 3) a more positive means of controlling tank bottom temperatures.

3. Finished Products Chemical Technology -

a. Uranium Reduction Operation

1. Concentration and Calcination

The agitator of a calciner (G-cell) failed after 18 months of service. Actual on-stream time during this period was 4306 hours. The failure was attributed to fatigue of the blade bolts in one arm assembly. Damage to several other agitator assemblies, a feed point, and two thermowells was caused by the loose blade before the agitator could be stopped. The entire agitator is being reconditioned.

b. Metal Finishing Operation

1. Recuplex

The reactivity of plutonium skulls to oxidation has necessitated a prolonged passivation treatment with sodium hydroxide solution prior to dissolution. This passivation has not been entirely successful, and occasionally skulls ignite both during passivation and during dissolution. In order to avoid the potentially dangerous situation that develops when plutonium burns in an aqueous environment, provisions are being made to burn the more reactive skulls in air under controlled conditions. In addition to increasing the safety of the dissolution operation, the oxide product is adaptable to the ammonium-bifluoride fusion method for increasing the dissolution rate of oxides.

The ammonium-bifluoride fusion was tested successfully in four runs using existing skull dissolution equipment. Although rapid and complete dissolution was demonstrated, the test was terminated due to extended time cycles caused by the inadequate heating capacity of the present equipment. Modifications permitting higher heat input are planned.

The increased quantity of hood sump wastes, collected from recent equipment failures, is being processed with a non-reflux flow sheet. The new flow sheet has allowed this material to be processed at rates three to five times greater than is possible normally; however, prolonged operation would result in an excessively low effluent product concentration and an increase in the final product impurity content. The non-reflux flowsheet will be useful in processing large amounts of hood sump material during relatively short periods.

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2. Tasks I, II, and III

The omission of iodine from 13 metal reduction charges resulted in an average button density significantly lower than that of a similar number of charges made according to current standards (0.02 mols I_2 per mol Pu). The plutonium content of the slag and crucible, by neutron counter, increased to 33 grams per charge from 12 grams per charge. Although the results of this test are not entirely consistent with earlier no-iodine tests, it is concluded that it is advantageous to continue the use of iodine as a component of the metal reduction charge.

4. Finished Products Fabrication Technology

a. Fabrication Operation

(1) Foundry

The radiographic integrity of castings has not improved significantly. A reduction in the number of crack-like defects has been accompanied by a corresponding increase in the number of castings exhibiting general unsoundness.

The quality of briquetted turnings as determined by the quantity of oil given off during ingotting has improved markedly. This improvement is attributed to improved equipment and technique and should result in an improvement of the recycle metal quality.

(2) Metal Cutting

An equation for estimating surface finish on machined plutonium as a function of tool nose radius and feed per revolution was developed in cooperation with HLO - OR & SO personnel. Experimental results are in close agreement with calculated values when feed rates of 0.003 to 0.006 inches per revolution are used. When the feed rate is reduced to 0.001 inch per revolution the experimental results are better than the calculated values.

b. Secondary Standards and Gaging

Routine gaging and standards calibration service was performed. This included mold, crucible and shipping container inspection and gage block calibration.

A vibration analysis has disclosed that vibration in the laboratory ranges from 20 to 140 micro inches in amplitude at 2 to 40 cycles per second. The recommended vibration limits for secondary standards laboratories is less than 10 micro inches amplitude at less than 10 cycles per second.

c. G. E. 312 Computer Evaluation

An operational task force to carry out the test program was established. Personnel from Finished Products Operation, Facilities Engineering Operation and Research and Engineering Operation have been assigned to the task force. J. W. Kolb of FEO has been assigned responsibility for directing the effort.

The drum memory capacity has been increased from 16,000 words to 19,000 words. This will allow a more complete test with the extensive manual input that will be employed.

Writing, altering and de-bugging of programs is currently being carried out. Diagnostic routines to be used to detect faulty operation have been written.

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5. Process Chemistry

a. Redox Process Assistance

(1) Radioactive Contaminants in Recovered Hexone

To evaluate the health hazard involved in the event a disaster should occur and cause the spread of Redox process solutions over the environs, the normal radioactive nuclide content of recovered hexone (Tank O-2 material) was determined. No alpha emitters were found and the only beta-gamma emitter found was iodine-131.

(2) Use of Sodium Aluminate for Acid Adjustment

As part of a program to reduce the build-up of sodium nitrate (resulting from the neutralization of HNO_3 with NaOH) in the Redox process, sodium aluminate (NaAlO_2) was studied as a replacement for sodium hydroxide. Although the NaAlO_2 was found to be an effective neutralizing agent, the material tested left an insoluble residue, probably Al_2O_3 , which could not be dissolved under tolerable process conditions.

b. Thermobalance Studies of Plutonium Oxide Chlorination

During the month, studies were begun on the effect of PuO_2 particle size on the rate of conversion of PuO_2 to PuCl_3 with phosgene. The particle size distributions and the chlorination rates were compared for two samples - standard "high reactivity" PuO_2 and PuO_2 prepared by a fluid-bed run of about 14 hours residence time. In addition, the chlorination rate was measured on a sample of the 14-hour, fluid-bed product which had been ball-milled and screened to give particles less than 49 microns in diameter. As is shown in the following table, the reactivity was found to increase with decreasing particle size.

VARIATION IN PuO_2 CHLORINATION RATE WITH POWDER SOURCE -
CHLORINATION TEMPERATURE: 500 C

<u>PuO_2 Sample Type</u>	<u>% Particle Size Distribution, microns</u>			<u>Half-time for Initial Reaction Minutes</u>	<u>Chlorination Run</u>	
	<u>105-250</u>	<u>49-105</u>	<u>49</u>		<u>Duration, Hours</u>	<u>% Chlorina- tion Achieved</u>
Standard	1.0	81.2	16.4	11	3.8	97
Fluid-bed Product	80.0	18.8	0	304 ⁽¹⁾	9.5	44
Ball-milled Fluid-bed Product	0	0	100	22	4.0	79

(1) Half-time computed for the initial reaction rate which was the most rapid rate observed during the run. The reaction rate during the latter portion of the run was extremely slow, resulting in a total chlorination of only 44% in 9.5 hours of reaction at 500 C.

c. Analytical Assistance

A study was recently undertaken to verify current measurements made to determine the nuclear materials content of coating waste. Another object of the study was to evaluate the worth of measuring a caustic soluble, long-lived fission product such as cesium-137 as an index of the uranium and plutonium content of coating waste. Due to the caustic nature of coating waste, uranium and plutonium are presumed to exist as insoluble precipitates in coating waste along with any precipitated sodium aluminate. For the experimental work, two large volume samples (~40 milliliters) of Redox coating waste (H-10 tank material) were obtained and measurements were made for uranium and cesium-137 on both the solid and liquid phases. The analytical results are tabulated below.

REDOX COATING WASTE ANALYSESLiquid Phase

<u>Sample</u>	<u>Volume Milli- liters</u>	<u>U lb/gal</u>	<u>Cs-137 μc/gal</u>	<u>% Total⁽¹⁾ U</u>	<u>% Total⁽¹⁾ Cs-137</u>	<u>Cs-137/U μc/lb U</u>
H-6 & 7	41	3.3×10^{-4}	3.0×10^4	2.8	99.6	9.1×10^7
H-6	37	1.9×10^{-4}	3.1×10^4	1.3	99.4	1.6×10^8

Solid Phase

H-6 & 7	1.5	0.336	3.8×10^3	97.2	0.4	1.1×10^4
H-6	5	0.126	1.4×10^3	98.7	0.6	1.1×10^4

Total Sample - Sum of Both Phases

H-6 & 7	42	1.2×10^{-2}	3.0×10^4	100	100	2.5×10^6 ⁽²⁾
H-6	42	1.5×10^{-2}	3.1×10^4	100	100	2.1×10^6

(1) Percentage of total uranium and cesium in the entire sample - sum of both phases.

(2) Cs-137/lb U previously measured on dissolver solution composite samples was found to be 2.6×10^6 μc/lb U.

As is shown, about 99% of the cesium-137 was found in the liquid phase, whereas about 98% of the uranium was found in the solid phase. Total uranium assays of the large volume samples agreed well with normal laboratory samples and analyses. Total uranium values computed from cesium-137 values on the liquid phase using the

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cesium-137 to uranium ratio obtained from dissolver solution composites also agree quite well with measured total uranium values.

From the small fraction of cesium-137 found in the solid phase, it is concluded that the uranium present in the sludge was present as caustic precipitated UNH, rather than undissolved metal fines or oxides. From this test and a previous coating waste tank clean-out test, there is, as yet, no evidence of undissolved metal fines or uranium oxides in Redox coating waste. For future coating waste measurements, the cesium-137 value of the liquid phase appears to be an excellent index of uranium lost as caustic precipitated UNH.

A similar study was also made on the small volume (0.5 - 3 ml), normal laboratory samples. The data obtained agree well with data obtained on the large volume samples, demonstrating that present sampling and analytical methods for Redox coating waste losses are valid.

6. 234-5 Development -

a. Ion Exchange Recovery Of Plutonium From Sump Water

Reduction rate data were obtained and improved elution procedures were demonstrated.

The rate of reduction of Pu(IV) by ammonium bisulfite was tested with actual sump solution. A concentration of 0.1 M NH_4HSO_3 is required to achieve better than 90 percent reduction in one hour.

Elution tests with nitric acid were made, and demonstrated the absence of gassing. A test of three column volumes of 3 M HNO_3 plus 0.3 M sulfamic acid followed by three column volumes of 6 M HNO_3 plus 0.3 M sulfamic acid resulted in 75 percent elution. Carbonate solutions were relatively ineffective elutants. Tests with 1 M ammonium bisulfate attempted to reduce the large number of column volumes required by soaking the resin bed with a static layer of sulfate solution. No improvement resulted.

b. Electrolytic Reduction Of Plutonium Trichloride

An estimated rate of 85 g/hr was demonstrated.

A capacity run was made using pure feed. The operation was limited by resistance of the electrode connections. However, the cell demonstrated an instantaneous capacity of 85 g/hr instead of the 50 g/hr previously found.

Close following of flame-spraying has resulted in improved procedures which assure that the ceramic cells are not being damaged. Integrity of the nickel coat is assured.

c. Reduction Of Recuplex Waste Loss

Stripping studies have shown that carbonate is an effective agent.

The nitric acid distribution between Recuplex waste (CAW) and 25 percent dibutyl butyl phosphonate in carbon tetrachloride was measured. The distribution was also determined between solvent and nitric acid solutions of low concentration in the presence of plutonium. Unexpectedly, plutonium stripping was not observed at low acidities (less than 0.01 M). However, complete stripping was found with a single contact of 1 M Na_2CO_3 . No precipitation problems were seen.

Using data observed in Recuplex Operation, it is calculated that dibutyl phosphoric acid will not build up in the recovery column fast enough to cause any trouble.

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V. L. Cooper
Manager
Research and Engineering

CHEMICAL PROCESSING DEPARTMENT
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II. ACHIEVEMENTS (continued)

H. FINANCIAL OPERATION

1. Production Cost

Additional information, including supplementary schedules and narrative supporting Chemical Processing Department's revised budget for FY 1962 and budget for FY 1963, was forwarded to Contract and Accounting Operation for use in presenting HAPO budget requirements to the Commission.

Arrangements have been made to fund expected overruns in the O3 Production program from surplus amounts in O3 Research & Development and O3 Equipment allocations.

In a meeting sponsored by Nuclear Materials Management and CPD Finance, also attended by AEC and Purex representatives, it was determined that 11 of 29 S.S. material balance areas in CPD could be eliminated without endangering the validity of inventories or quality of cost reporting. HOO-AEC are taking appropriate action for Commission approval at the Washington, D. C. level.

A weekly summary of cost and financial information has been developed summarizing activities of the prior week and is being presented to the Manager CPD each Monday morning on 3" x 5" cards.

CPD's investment in inventories at March 31, 1961 compared with budgeted control balances at June 30, 1961 are shown below:

(amounts in thousands)	Balance <u>3-31-61</u>	Financial Plan <u>6-31-61</u>	Surplus (Deficit)
<u>Inventories</u>			
Essential Materials	\$ 856	\$ 777	\$(79)
Special Materials	64	83	19
Spare Parts & Standby	<u>1 715</u>	<u>1 846</u>	<u>131</u>
Gross Inventories	<u>2 635</u>	<u>2 706</u>	<u>71</u>

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(amounts in thousands)	Balance 3-31-61	Financial Plan 6-30-61	Surplus (Deficit)
<u>Reserves</u>			
Essential Materials	\$ 52	\$ 56	\$(4)
Spare Parts & Standby	<u>409</u>	<u>461</u>	<u>(52)</u>
Total Reserves	<u>461</u>	<u>517</u>	<u>(56)</u>
Net Investment	<u>\$2 174</u>	<u>\$2 189</u>	<u>\$ 15</u>

2. General Accounting

As of March 31, 1961, eleven active projects had incurred costs of \$5,240,543 against authorized funds of \$7,322,900. Outstanding commitments totaled \$220,718.

During April a directive was issued increasing the authorized funds for Project CAC-880 - Plutonium Reclamation Facility - Z Plant, to \$2,900,000. HOO-AEC issued a Work Authorization to G.E. for \$1,390,000 for our portion of the project.

Three Appropriation Requests, totaling \$23,258, were approved in April. These were:

<u>AR No.</u>	<u>Description</u>	<u>Operation</u>	<u>Amount</u>
47	Monitoring Equipment (Incinerator Building)	FPO	\$18,000
48	Portable Shielding Unit	Purex	3,718
45	Miscellaneous Equipment Tray	Purex	1,540

3. Personnel Accounting

Patent award forms were completed and forwarded to Schenectady for issuance of a share of stock to a CPD employee successful in winning an award. This is the first award earned by a CPD employee during the past two years.

Instructions were received from New York for implementation of the Modified Employee Product Purchase Plan. The plan provides for payment by the Company of discount amount by check to the employee for purchase of certain General Electric products. The present plan provides for discount to be allowed the employee by the dealer at time of purchase as a reduction of sales price. The new plan becomes effective May 19, 1961.

4. Auditing

A formal audit report was issued relating to an audit of CPD Motor Pool Operation.

Field work was completed in connection with an audit of Material and Package Passes. A formal report will be issued in the early part of May.

A schedule comparing routine Delegations of Authority in CPD, FPD and IPD was prepared and forwarded to section managers for consideration and comments. Comments have been returned and a summary is in preparation.

Cash counts were made of the local working fund twice during the month.

A procedure was suggested and will be implemented by the Specialist - Personnel Accounting starting May 1, whereby requests for deferment of vacation will be accumulated and submitted to the General Manager for approval in summary form on a monthly basis.

Two AEC auditors visited CPD during the month to review working papers of internal audits and to review our audit schedule for the balance of the audit year ending July 31, 1961.

5. Procedures

A new quarterly CPD Spare Parts tabulation was developed early this year and was received for the first time early in April. The tabulation is designed to make available to CPD groups the maximum and minimum, reorder, and usage status of each CPD spare part. This report should serve as an excellent tool for maintaining this sizeable inventory at minimum levels.

A new card form was developed for Research and Engineering Operation's Process Chemistry Operation which eliminates hand lettering and rubber stamping of approximately 22,000 Lab Standard cards, representing a savings of approximately 120 manhours.

Manager - Finance

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3. Wage and Benefits

One employee retired, one applied for optional retirement and one employee who resigned elected to exercise vested pension rights.

Comparisons of 19 Chemical Processing Department semi-technical jobs with similar jobs in other HAPD departments have been completed by Relations Operation. The Department jobs reconciled favorably with similar jobs in the other departments.

A review was made of the Process Operator and Utility Operator classifications to determine if the type of work being performed is appropriate for each classification. Generally, the current practice was found to be satisfactory. Specific problem areas were brought to the attention of management for correction.

Payroll status change papers were prepared for some 43 Department employees affected by Appendix "A" adjustments agreed upon in the recent contract negotiations.

Suggestion awards during the month included one for \$100 to a secretary in Research and Engineering. This is the largest award presented to date in the Research and Engineering Section. Suggestion activity is continuing the slow rate of increase started last December, as indicated in the tabulation below:

	1960 Ave/mo	March	April
Received	38	41	47
Adopted	14	20	17
Awards	\$298	\$2,985	\$375
Savings	\$1866	\$44,627	\$707

4. Health, Safety and Radiation

The Chemical Processing Department is currently conducting section audits to determine the extent of compliance with health and safety provisions of federal regulations under terms of the Walsh-Healy Public Contracts Act.

5. Communication

The news release concerning fission product recovery was completed and received Departmental approvals, and has been submitted to Relations Operation for final approvals and issuance.

Arrangements have been made with several Facilities Engineering men to author articles for ATOMICS and NUCLEONICS during 1961.

Feedback from participants in the General Manager's Information Meeting indicated enthusiastic interest in such meetings. Management meetings of this type are being held every two weeks with small groups of monthly salaried employees to enable them to become better acquainted with the General Manager of the Chemical Processing Department and to receive information about the activities of the Department.

RB Britton
 Manager
 Relations Practices

RB Britton:lj

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CHEMICAL PROCESSING DEPARTMENT
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III. PERSONNEL ACTIVITIES

A. FORCE SUMMARY

<u>Operation</u>	<u>Monthly Salaried</u>		<u>Weekly Salaried</u>		<u>Total</u>	
	<u>3-31-61</u>	<u>4-30-61</u>	<u>3-31-61</u>	<u>4-30-61</u>	<u>3-31-61</u>	<u>4-30-61</u>
General Manager's Group	11	11	1	1	12	12
Financial	13	13	13	13	26	26
Relations Practices	5	5	6	6	11	11
Research & Engineering	63	64	27	27	90	91
Facilities Engineering	65	64	22	22	87	86
Power & General Maintenance	39	38	237	237	276	275
Production	5	5	3	3	8	8
Special Separation Processing and Auxiliaries	49	49	216	217	265	266
Purex	54	54	210	213	264	267
Finished Products	<u>53</u>	<u>53</u>	<u>235</u>	<u>235</u>	<u>288</u>	<u>288</u>
Total	<u>357</u>	<u>356</u>	<u>970</u>	<u>974</u>	<u>1 327</u>	<u>1 330</u>

B. PERSONNEL CHANGES

Mr. D. R. Gustavson was appointed Manager-Project Engineering in the Facilities Engineering Operation to replace Mr. C. E. Kent who transferred to GE's General Engineering Laboratory in Schenectady, effective April 14.

Mr. William J. Gartin was transferred from Irradiation Processing Department to the position, Manager, Finished Products, effective April 15.

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C. TRIPS

<u>Visitor</u>	<u>To</u>	<u>Nature of Discussion</u>
<u>To Other G.E. Components</u>		
K. G. Grimm	General Electric Co. New York, N.Y.	Business Training Course (4/20/61)
	General Electric Co., Schenectady, N.Y.	General Financial Matters (4/21/61)
<u>To AEC and Other AEC Contractors</u>		
G. E. Wilbur	UCNC - ORNL Oak Ridge, Tenn.	Nondestructive testing (4/3/61)
R. L. Stevenson	Phillips Petroleum Co. Idaho Falls, Idaho	Meeting of Industrial Criticality Group (4/10-12/61)
L. M. Meeker	Dow Chemical Co.	Plutonium chemical processing (4/10-11/61)
M. J. Szulinski	Rocky Flats, Colo.	
A. W. Hildebrandt	Dow Chemical Co.	Dimensional inspection of weapon parts (4/13-15/61)
R. E. VanderCook	Rocky Flats, Colo.	
J. H. Warren	Lawrence Radiation Lab. Livermore, Calif.	Combined operations meeting (4/18/61)
C. T. Groswith	duPont (SRP)	Operations analysis
S. G. Smolen	Aiken, S. C.	4/22/61)
J. J. Courtney	Dow Chemical Co. Rocky Flats, Colo.	Plutonium accountability (4/23/61)
S. J. Beard	UCNC-ORNL	Fission product processing
S. G. Smolen	Oak Ridge, Tenn.	(4/27-28/61)
<u>To General Industry</u>		
R. C. Hollingshead	Lodge & Shipley Co. Cincinnati, Ohio	Machine demonstration (4/13/61)
H. H. Hopkins, Jr.	U.S. Bureau of Mines	Fluid bed chlorination; tungsten development (4/20/61)
M. J. Rasmussen	Albany, Oregon	
	Wah Chang Corp.	Tungsten and tantalum fabrication (4/21/61)
	Albany, Oregon	
	Oregon Metallurgical Corp., Albany, Oregon	Spin Casting of tungsten (4/21/61)
P. J. Wiater	Turco Products Co. Seattle, Wash.	Ultrasonic cleaning (4/26/61)

<u>Visitor</u>	<u>To</u>	<u>Nature of Discussion</u>
<u>To Conventions and General Meetings</u>		
C. R. Anderson R. E. Tomlinson	New York, N.Y.	American Standards Association meeting (4/5-7/61)
W. G. Browne	Science Fair, Pasco High School	Spoke on "The Importance of Atomic Energy" for the Speakers' Bureau (4/14/61)
R. S. Rosenfels	Toronto, Canada	American Ceramics Society (4/18/61)
W. G. Browne	Naval Reserve Corps Richland, Wash.	Spoke on "The Fabulous Three-Way Split" for the Speakers' Bureau (4/25/61)
R. B. Britton	San Francisco, Calif.	American Management Assoc. (4/26/61)

D. VISITORS

<u>Visitor</u>	<u>From</u>	<u>Nature of Discussion</u>
<u>From Other G.E. Components</u>		
J. Larsen L. Foley	General Electric Co. Mfg. Services Lab. Schenectady, N.Y.	Discuss Gorton Lathe Numerical Input Development Program. (4/19-20/61)
C. A. Hunt	General Electric Co. Western Representative Engineering Services	Plant Tour & Orientation (4/25/61)

From AEC and AEC Operational Contractors

B. L. Taber R. M. Girdler J. M. Hoffmann W. C. Rion, Jr.	E.I. duPont, Wilmington, Savannah River Plant Wilmington, Delaware " "	Discuss waste storage and waste concentration (4/4-7/61)
B. H. Bieler	Dow Chemical Co. Rocky Flats Plant Denver, Colorado	Ceramics development (4/13/61)
C. Wicklund W. H. Schmalhorst	Dow Chemical Co. Rocky Flats Plant	Casting and tantalum molds. Plutonium Fabrication Technology. (4/13/61)

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<u>Visitor</u>	<u>From</u>	<u>Nature of Discussion</u>
Richard Pehl Robert Dewitt	AEC - Washington AEC - San Francisco	Plant Tour (4/13/61)
R. Stone F. Minton W. Fisher	Division of Military Application, Wash., D.C. Albuquerque Operations Of.	Discuss Hanford plutonium fabrication capabilities and facilities (4/17/61)
Dr. J. Norcross Dr. T. Ely J. Nihemias John Kelly	AEC-Washington, D.C. Office of Health and Safety	Plant tour and orientation (4/19/61)
C. F. Metz G. L. Waterbury R. J. Jones M. T. Kelley R. P. Larsen J. T. Byrne	LASL, Los Alamos, N.M. Los Alamos, New Mexico Washington, D.C. ORNL, Oak Ridge, Tenn. ANL, Lemont, Illinois Dow Chemical Co., Rocky Flats Plant Phillips Petroleum Idaho Falls, Idaho	Attend AEC sponsored Measurements Evaluation Seminar. (4/25-26/61)
J. E. Rein		
J. T. Byrne	Dow Chemical Co. Rocky Flats Plant Denver, Colo.	Electrorefining (4/27/61)
<u>From General Industry</u>		
D. Roy	Texas Instrument Co. Houston, Texas	Tank Level Instruments (4/5/61)
Frank Morris	Turco Products Co. Wilmington, Calif.	Decontamination chemicals and methods (4/5/61)
Sheldon Dunning	Seattle, Wash.	Epoxy and other plastic compounds (4/13/61)
V. R. Roberts	Tracerlab Co., Richmond, Calif.	Radiation detection instruments (4/14/61)
R. H. Studebaker	Process Equipment Co. Tipp City, Ohio	Waste tank inspection system (4/26/61)
P. S. Otten	Griscom-Russell Co. Massillon, Ohio	Discussion of tube bundles. (4/27/61)
F. E. Berrett S. Lunt	W.P. Fuller Co. Seattle, Wash.	Application of protective coatings and paint. (4/28/61)

<u>Visitor</u>	<u>From</u>	<u>Nature of Discussion</u>
J. J. Greenen R. W. Worden	Johnson Wax Co. Seattle, Wash.	Discussion of floor care problem. (4/26/61)

From Colleges and Universities

Dr. R. W. Moulton	Univ. of Wash. Pullman, Wash.	Discuss solvent extraction. (4/28/61)
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IV. SAFETY AND SECURITY

Operation	Facil. Eng.	Finance	Fin. Prod.	P&GM	Purex	SSP&AO	Prod.	Rel. Prac.	Res. & Total		Yr. to Date
									Eng.	CPD	
Disabling Injuries										0	0
Serious Accidents						1				1	3
Medical Treatment											
Injuries	3			19	5	7			4	44	170
Radiation Occur.			6		8	3			1	18	81
Contam. Wounds			1*							1	9
Pu Depositions			1**							1	2
Fires					1	1			1	3***	4
Security Violations									1	1	5

* A process operator was working in a hood when he noticed a cut or puncture on his left thumb. Further observation showed a reddened area at the side of his thumb with a small puncture in the center. Approximately 500 d/m was found on the thumb which was easily cleaned. The whole-body monitor disclosed 3.7×10^{-4} μ c plutonium within the thumb; it was unnecessary to excise the wound.

** A process operator in 234-5 Building received a plutonium contaminated injury which required excising. Evaluation of the biological sampling results indicate a plutonium deposition of less than five per cent of the maximum permissible body burden.

*** R&E Fire: While using a glass blowing torch an employee sustained facial burns when the tube separated from the torch and escaping gas ignited. Damage amounted to \$10.

SSP&AO Fire: While the impact wrenches were being used in the canyon, the charging wrench was accidentally struck by the right-hand wrench causing damage to the electrical cable thus resulting in arcing and ignition of the cable insulation. Damage was about \$20.

Purex Fire: A temporary roof closure for a construction void in the tie-in for a new burial tunnel adjacent to the present Purex burial tunnel was partially destroyed by fire. Damage was \$200.00.

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V. REPORTS

A. PREPARED AND ISSUED

- HW-66346- Supp. 2, Secret, "Redox Birch Recovery Scope Design" -
Revision #2 - by J. R. LaRiviere, dated March 29, 1961.
- HW-68864, Official Use Only, Project Proposal, "Leak Detection,
High-Level Waste Tanks (241-A and 241-SX)" - by L. W. Finch,
dated April 19, 1961.
- HW-68997- RD, Secret, "Purex Plant Production Schedule - April, 1961" -
by D. McDonald, dated April 3, 1961.
- HW-68998- RD, Secret, "Redox Plant Production Schedule - April, 1961" -
by D. McDonald, dated April 3, 1961.
- HW-69001- RD, Secret, "UO₃ Plant Production Schedule - April, 1961" -
by D. McDonald, dated April 3, 1961.
- HW-69002- RD, Secret, "234-5 Plant Production Schedule - April, 1961" -
by D. McDonald, dated April 3, 1961.
- HW-69011, Unclassified, "Project CGC-897 - Title I Design - Fission
Product Storage in 'B' Plant" - by H. L. Caudill and
L. L. Zahn, dated April 3, 1961.
- HW-69063, Secret, "Chemical Processing Department FY 1962-63 Budget
Units, Costs, and Unit Costs" - by S. A. Spohr, dated
April 3, 1961.
- HW-69068, Secret, "In-Tank Solidification of Intermediate-Activity
Wastes" - by B. F. Campbell, dated April 3, 1961.
- HW-69077, Secret, "CPD Daily Production Reports for Period January 2,
1961 through March 31, 1961" - by R. E. Roberts, dated
April 4, 1961.
- HW-69078, Unclassified, "Enriched Metal Processing at Purex - Dissolver
Design Concept" - by W. A. Graf, dated April 12, 1961.

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HW-69089, Secret, "Essential Materials Consumption - Purex" - by J. E. Lentz, dated April 5, 1961.

HW-69153, Secret, "Request for Appropriation No. 61-CPD-34" - by A. E. Smith, dated April 5, 1961.

HW-69208, Official Use Only, "Revision to Budget Data Sheets for Hanford Fission Products Program" - by D. W. McKee, dated April 10, 1961.

HW-69222, Secret, "Scheduled Shutdown - Purex Plant" - by J. H. Warren, dated April 11, 1961.

HW-69223- RD, Secret (Rough Draft), "ZD-500 Ball Rod and Plug Rod Casting - November, 1960 through February, 1961" - by R. H. Bond, dated April 7, 1961.

HW-69236- RD, Secret, "Preliminary Study Mint Recovery Facilities" - by W. A. Graf, dated April 12, 1961.

HW-69339, Confidential, "G. E. Purchase Order HIK-888-60128 Master-Rotary Contour Gage 1708-10" - by A. E. Smith, dated April 21, 1961.

HW-69364, Secret, "Scheduled Shutdown - Redox Plant" - by J. H. Warren, dated April 25, 1961.

HW-69377, Secret, "Chemical Separation of Pu²⁴² from Am²⁴³-Cm²⁴⁴" - by P. H. Reinker, dated April 28, 1961.

HW-69384, Unclassified, "Trip Report: U. S. Bureau of Mines, Wah Chang Corporation, and Oregon Metallurgical Corp.; Albany Oregon - April 20 and 21, 1961" - by H. H. Hopkins, Jr. and M. J. Rasmussen, dated April 24, 1961.

HW-69385, Secret, "Plutonium 240 Determination" - by A. E. Smith and N. S. Wing, dated April 26, 1961.

HW-69757, Secret, "Separations Program - CPD" - by L. L. Zahn, dated April 20, 1961.

B. PREPARED FOR SIGNATURE AND ISSUANCE

HW-69050, Secret, "Production, March 1961" - by W. E. Johnson, dated April 3, 1961.

HW-69228, Secret, "HAPO Production Forecast - April 1, 1961 through December 31, 1962" - by W. E. Johnson, dated April 25, 1961.

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V. 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.

INVENTOR

T. K. Andrews, Power and General
Maintenance

TITLE

Remotely Operated Brake
Assembly.

P. H. Linder

General Manager
Chemical Processing Department

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**DATE
FILMED**

12 / 16 / 92