This document consists of
42 pages. Copy [REDACTED]

CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT
FOR

HW--77504

DE93 007068

DECLASSIFIED

By Authority of CG-PR-2

RM Item 8-20-92

By J. Tanaka 9-23-92

TL Phillips 9-28-92

Compiled By
OPERATION MANAGERS

May 21, 1968

HANFORD ATOMIC PRODUCTS OPERATION
RICHLAND, WASHINGTON

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

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

Received by OSTI

NOV 30 1992

[illegible]

DISTRIBUTION RESTRICTED TO U.S. ONLY

DECLASSIFIED

DECLASSIFIED

EW-77504

DISTRIBUTION

Copy Number

1	W. E. Johnson
2	H. M. Parker
3	E. D. Tibbals
4	J. E. Warren
5	W. S. Frank
6	K. G. Grimm
7	M. K. Farnon
8	T. G. LaFollette
9	F. R. McMurray
10	W. J. Gartin
11	H. P. Shaw
12	C. R. Bergdahl
13	General Electric Company, Palo Alto, California Attention: F. E. Crever, Manager Advance Planning Operation
14, 15, 16	Atomic Energy Commission, Richland Operations Office Attention: J. E. Travis, Manager
17, 18, 19	Atomic Energy Commission, Washington 25, D. C. Attention: F. P. Baranowski, Director Production Division
20	Extra
21	300 Files
22	Record Files

TABLE OF CONTENTS

Distribution	2
Table of Contents	3
Staff	4
I. Summary	5-6
II. Achievements	
A. Production Operation	A-1 Through A-3
B. Purex Operation	B-1 Through B-2
C. Redox Operation	C-1 Through C-3
D. Weapons Manufacturing Operation	D-1 Through D-2
E. Power and General Maintenance Operation	E-1 Through E-2
F. Facilities Engineering Operation	F-1 Through F-4
G. Research and Engineering Operation	G-1 Through G-9
H. Financial Operation	H-1 Through H-3
III. Personnel Activities	J-1 Through J-4
IV. Safety and Security	K-1
V. Reports Issued	L-1 Through L-3
VI. Patent Summary	M-1

DECLASSIFIED

DECLASSIFIED

EW-77504

STAFF

Vice President and General Manager, Atomic Products Division	L. R. Fink
General Manager, Hanford Atomic Products Operation	W. E. Johnson
General Manager, Chemical Processing Department	P. H. Reinker
Manager, Production	J. H. Warren
Manager, Purex	P. R. McMurray
Manager Redox	M. K. Harmon
Manager, Weapons Manufacturing	W. J. Gartin
Manager, Power and General Maintenance	T. G. LaFollette
Manager, Facilities Engineering	H. P. Shaw
Manager, Research and Engineering	W. S. Frank
Manager, Finance	K. G. Grimm
Manager, Employee Relations	R. B. Britton

CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

APRIL, 1963

I. SUMMARY

Production through April, as compared with the April 29, 1963 HAPO Production Forecast (HW-77320), is summarized below:

	<u>Percent of Forecast Achieved</u>	<u>Fiscal Year</u>
	<u>April</u>	<u>To Date</u>
Separated plutonium nitrate	97.0*	99.4
Separated uranium nitrate	63.7*	96.8
Uranium oxide	98.2	97.7
Plutonium metal buttons	96.7	97.0
Fabricated parts	119.1	103.3

Following the record output last month, when essentially all of the available normal uranium metal feed was processed, the Purex plant was shut down April 1 for scheduled maintenance and column flushing. Shortly after Purex startup on April 25, a leak developed on the ES first cycle scrub column, forcing a shutdown for the remainder of the month to replace the column. This unexpected column failure resulted in April production being below that forecasted for separated plutonium, separated uranium, and plutonium metal buttons.

The HAPO II-1 cask, containing 170,000 curies of strontium-90, was released for shipment on April 15. In addition, the HAPO I-B-1 cask, which was loaded earlier with 470,000 curies of strontium-90, was placed into the shipping buffer and is awaiting shipment.

The Purex neptunium purification system, Q-Cell ion exchange unit, was started on April 15 with feed from the neptunium recovery cycle in J-Cell. At month-end, "hot" operability tests were continuing.

After removing the titanium tube bundle from the Purex backcycle waste concentrator, it was examined and found to be plugged with siliceous low-solubility solids. A stainless steel replacement was inserted. Meanwhile, investigative analyses and tests are continuing on the titanium tube bundle.

Flowsheet changes were made at Redox during April which will reduce essential materials and waste tank storage space costs by \$18 and \$7, respectively, per ton of production. Resulting from plant tests, the scrub stream flow ratio to the 1A first cycle column was reduced by a factor of two; aluminum nitrate in the 1B partitioning column was reduced from 1.3 to 1.1 molar concentration.

*Variation was caused by the increase of "in process" uranium inventory at Purex.

[REDACTED]

DECLASSIFIED

DECLASSIFIED

EW-77504

In addition to regular E-metal processing, seven fractional-ton charges of natural uranium and two fractional charges of enriched uranium were processed individually through the Redox plant's conventional C-2 dissolver. These special dissolvings were made in conjunction with Hanford's long range program to determine conversion ratios more accurately.

In the Weapons Manufacturing Analytical Laboratory, the analytical work load reached an all-time high this month, with 23,531 analyses being performed. The previous record output by this group was 21,706 analyses, established in August, 1961.

Directive No. AEC-204, Modification No. 1, dated April 23, 1963, authorized a total of \$2,700,000 for design and construction of Project CAC-945, "New Waste Storage Tanks - Purex".

A proposed design of a prototype hexone recovery system at Redox was reviewed and determined to be both feasible and economically attractive. Detail design work has been started.

The Phase I contract on the Plutonium Reclamation Facility (Project CAC-880) is being closed out with exceptions, including some painting and minor design changes. The Phase II construction contractor started work on April 3, 1963.

P. H. Reinken

General Manager
Chemical Processing Department

CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

APRIL 1963

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	97.0 *	99.4
Separated uranium nitrate	63.7 *	96.8
Uranium oxide	98.2	97.7
Plutonium metal buttons	96.7	97.0
Fabricated parts	119.1	103.3
<u>b. Purex</u>		
Uranium nitrate produced (tons)	13.12	867.24
Average production rate during operation (T/D)	26.5	29.2
Total waste loss (%)		
Plutonium	2.2	0.38
Uranium	5.3	0.24
On-line efficiency (%)	6	95
<u>c. Redox</u>		
Uranium nitrate produced (tons)	184.23	20.50
Average production rate during operation (T/D)	7.2	5.6
Total waste loss (%)		
Plutonium	0.31	0.49
Uranium	0.21	0.27
On-line efficiency (%)	85	17.5
<u>d. Uranium Reduction (tons)</u>		
Normal UO ₃ loaded	482	513
Enriched UO ₃ loaded	122	22
Normal UO ₃ approved for shipment	491.06	494.29
Enriched UO ₃ approved for shipment	98.22	151.33
Normal UO ₃ shipped	689.47	445.33
Enriched UO ₃ shipped	98.28	151.41
Normal UNH backlog	107	557
Enriched UNH backlog	87	28

(1) HW-77320, HAPO PRODUCTION FORECAST, dated 4/29/63

* Variation was caused by the increase of "in process" uranium inventory at Purex.

DECLASSIFIED

e. Plutonium Metal Processing

	April	March
Reduction yield (%)	98.69	97.7
Product recovery output (Kgs)	166	76
Product recovery backlog (Kgs)	1 260	1 343
Waste disposal (grams)	251	327

f. Power

	<u>200-East</u>	<u>200-West</u>
Raw water pumped (gpm)	6 992	5 099
Filtered water pumped (gpm)	732	1 065
Maximum steam generated (lbs./hr.)	220 000	135 000
Average steam generated (lbs./hr.)	84 411	105 000
Total steam generated (M lbs.)	59 776	75 592
Coal consumed (tons)	3 128	3 850

Following the record output last month, when essentially all of the available normal uranium metal feed was processed, the Purex plant was shut down April 1 for scheduled maintenance and column flushing. Shortly after Purex startup on April 25, a leak developed on the HA first cycle scrub column, forcing a shut-down for the remainder of the month to replace the column. This unexpected column failure resulted in April production being below that forecasted for separated plutonium, separated uranium, and plutonium metal buttons.

J. H. Warren
Manager, Production

2. FISSION PRODUCT DATA

	<u>PUREX*</u> <u>RECOVERY</u>	<u>244-CR*</u> <u>INVENTORY</u>	<u>B-CANYON*</u> <u>INVENTORY</u>	<u>SEMIWORKS</u> <u>PRODUCTION</u>	<u>PRODUCT</u> <u>INVENTORY</u>	<u>PRODUCT</u> <u>IN CASK</u>	<u>PRODUCT</u> <u>SHIPPED</u>	<u>CUSTOMER</u> <u>REMARKS</u>
Sr-90 (Kilocuries)	...	565	...	50	2380	470	170	HAPO II-1 Cask 4-15-63
Cs-137 (Kilocuries)								
Ce-144 (Kilocuries)								

* Estimated figures based on Cs. calculations

HW-77504

DECLASSIFIED

CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

APRIL, 1963

II. ACHIEVEMENTS (Continued)

B. PUREX OPERATION

1. Operating Continuity

The plant was shut down 4-1-63 for scheduled maintenance and column flushing. Operation resumed on 4-25-63 for 42 hours until a process leak on the HS column (first cycle scrub) required plant shutdown for the remainder of the month to replace the column.

2. Processing Operation

All uranium and plutonium produced during the month was within specifications. During the shutdown period, rework solutions from Uranium Reduction and Weapons Manufacturing Operation were successfully processed. The first neptunium hot test run was completed during the week of 4-22-63 in the neptunium purification facility.

Strontium-90 recovery runs 59 and 60 were completed in Purex Head End and sent to storage.

Strontium Semiworks was cleared of rework material during a short purification run. Testing and modification work in E Cell storage facilities was completed.

The HAFO I-B-1 cask, loaded in December with 470,000 curies of Sr-90, was loaded into the shipping buffer and is awaiting shipment.

The HAFO II-1 cask containing 170,000 curies of Sr-90 was released for shipment to ORNL on 4-15-63.

A 200-gallon "bowling ball" cask was loaded at Purex with LWV for Hanford Laboratories waste calcination studies.

A waste routing was established and pumping was started from 105-C tank to provide emergency backup storage in the event of tank failure in 241-A Tank Farm.

3. Mechanical Experience

Major items completed during scheduled shutdown were:

1. A leaking HS column pulser was replaced with a reconditioned hot spare.

B-1

DECLASSIFIED

DECLASSIFIED

HW-77504

2. H4 (backcycle concentrator) tube bundles were replaced with two new stainless steel bundles when inspection and testing revealed a leak in the original stainless steel tube bundle and heavy scale deposits on the titanium bundle in service.
3. The A2 dissolver silver reactor was flushed and regenerated.
4. Boron raschig rings were installed in E Cell sump as an improved nuclear safety measure.
5. Chemical flushes of the extraction batteries, except for IBX and IBS columns, were completed.

After initial startup and discovery of the leak on the HS column, a spare column and new cartridge were installed.

Instrument air compressor #3 at 241-A Tank Farm failed and was rebuilt and returned to service.

4. Radiation Experience

Two Purex tube bundles were buried without incident, the concrete burial box reading 5 r/hr at 2". The total iodine 131 emission for the month was 0.76 curies. Maximum seven-day emission was 0.55 curies.

5. Analytical Experience

Methods for determining neptunium and technetium-99 on the DK-2 recording spectrometer were evaluated and placed in service along with revised methods for neptunium and plutonium by controlled potential coulometer.

6. Events Influencing Cost

CGC-930 - Secondary Containment of Dissolver Off-Gases - Redox and Purex
Acceptance of Purex portion of the project, with exceptions, was made on 3-28-63.

CGC-928 - Leak Detection - High Level Waste Tanks - Redox and Purex
Acceptance of the Purex portion of the project, with exceptions, was made on 4-16-63.

Manager-Purex

PR McMurray:JDMc:gt

CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

APRIL, 1963

II. ACHIEVEMENTS (Continued)

C. REDOX OPERATION

1. Operating Continuity

The Redox Plant went from a five to a seven-day-per-week operating schedule on April 1, and continued on this schedule through April 28. The additional manpower required to build four complete operating crews was obtained from the Purex Plant, which was down during this period. Performance of the plant was satisfactory.

The Uranium Oxide Plant operated very well throughout the month and the production and shipment of both depleted and enriched uranium was satisfactory.

2. Processing Operations

a. Redox Processing

E-metal production was satisfactory although equipment failures encountered during the month resulted in shutdown periods totaling approximately four days. The major equipment pieces which failed and required replacing included: 1) the precycle extraction column feed pump (F-7); 2) the 1A column backcycle jumper; 3) the 2D column feed pump (F-1).

All production for the month met shipping specifications and waste losses were maintained at or below normal levels. Approximately twelve tons of high sodium UNH, which had been in storage from previous production runs, were returned to the process and successfully reworked to meet customer specifications. Twenty-seven kilograms of bismuth contaminated plutonium were also reprocessed this month. Since the 3A and 3B columns, normally used for neptunium recovery runs, were available the plutonium was reworked through these columns. The final product solution contained less than 100 parts of bismuth per million parts of plutonium, well within shipping specifications.

Seven fractional-ton charges of natural uranium and two fractional charges of enriched uranium were processed through the conventional C-2 dissolver this month. These special dissolvings were made in conjunction with Hanford's long range program to more accurately determine conversion ratios.

DECLASSIFIED

b. Uranium Oxide Processing

The production and shipment of both depleted and enriched uranium oxide was satisfactory for the month although the depleted uranium nitrate calciners were down for short periods throughout the month due to a shortage of shipping containers.

3. Mechanical Experience

a. Redox Plant

Erratic performance of the F-7 metal solution feed tank pump was encountered this month, after a comparatively good operating period of nearly five months in which only one failure occurred. Three replacement units were installed in the F-7 position this month. Replacement time plus short periods of erratic operation accounted for approximately fifty-two hours of downtime. Efforts have been intensified to resolve the pump failures in this position.

b. Uranium Oxide Plant

The off-gas wet filter scrubber on the K-cell depleted uranium calciner was replaced during the last week of the month. The scrubbers on five of the six calciners in the Uranium Oxide Plant have now been replaced because of corrosion failure in the metal shell. The new filter scrubbers have several engineering design changes which should extend their useful life.

The G-cell enriched uranium calciner was shut down on three separate occasions during the month due to equipment failures in the uranium oxide powder handling system. Total downtime was approximately six hours. The failures involved: 1) a bag rupture; 2) a blow-ring malfunctioning; 3) a compressed air blower failure.

4. Waste Handling and Decontamination

Equipment valued at approximately \$97,000 was received from the processing plants for decontamination, repair, inspection or burial during the month. Equipment valued at approximately \$32,000 was returned to customers, representing a savings of approximately \$28,000 over the cost of new equipment.

Three off-site waste shipments were received and buried this month without incident. These included: 1) one hundred and nine fifty-five-gallon drums of depleted uranium waste from the Dow Chemical Co., Rocky Flats, Colorado; 2) one hundred and seventy-nine fifty-five-gallon drums and five wooden boxes of low level beryllium oxide waste from the Coors Porcelain Co., Golden, Colorado; 3) the contents of two one-ton shipping casks containing irradiated depleted uranium scrap from the Argonne National Laboratory, Argonne, Illinois.

5. Radiation Experience

Six skin contamination cases (maximum 40,000 d/m Pu) and five radiation occurrences were recorded in the Redox Operation during the month. All skin contamination was readily reduced to non-detectable and none of the radiation occurrences typified a significant loss of control.

The filters in the off-gas exhaust systems (both above and underground) in the 233-S Plutonium Concentration Building were all replaced this month. The filters in the above-ground system were changed because of a high differential pressure which indicated plugging. Those in the auxiliary underground system were changed when an increase in plutonium activity indicated a filter rupture.

6. Analytical Experience

Results from the second interchange of samples, in the Atomic Energy Commission's program for the investigation of radiation damage to reactor materials, were received and evaluated this month. Analytical results from the nine participating sites (eight American, one United Kingdom) showed all to be within 5 percent of the base values established by the Redox Analytical Laboratory. Since consensus prior to interchange indicated acceptance of 10 percent agreement, it is expected that these data will permit the over-all program to move more rapidly into the next phase which involves actual mapping of the flux spectrums of selected reactors.

CPHaster
for Manager - Redox

DECLASSIFIED

CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

APRIL, 1963

II. ACHIEVEMENTS (Continued)

D. WEAPONS MANUFACTURING OPERATION

1. Operating Continuity

The fabrication of plutonium weapon components was carried on without interruption during April, and shipping and delivery schedules were exceeded. The button line operated very well during the month, and production of unfabricated plutonium metal also exceeded schedule.

Recovery activities were limited to the dissolution of skull material and to the partial cleanout of the Recuplex concentrator vessel. The incinerator remained out of service during the month.

2. Processing Operations

a. Plutonium Fabrication

Information on plutonium fabrication activities is presented in Document HW-77584.

b. Plutonium Processing

Plutonium preparation activities utilizing Hood 9-A continued to be satisfactory. Virgin feed was limited but was augmented by a significant quantity of feed from recovered metallurgical scrap.

Failure of a thermowell in one of the reduction furnaces in Task III resulted in slag being discharged from the pressure vessel to the hood. This resulted in fire damage to two of the hood gloves, but there was no lost time or spread of contamination. As a result of the experience in this incident and a previous similar incident, it has been decided that the thermocouples should be removed from the furnaces. This is possible since neutron monitors now indicate the time at which the reduction reactions occur. Instrumentation is being modified so that control and recording is initiated by the neutron monitor.

Work continued on the removal of the hard polymer of plutonium which plugs the J-26A vessel (Recuplex concentrator). Approximately fifteen per cent of the material has been removed to date. Dissolution is slow and difficult because of the limited surface exposed. At month end, methods of mechanical breaking are being investigated in an effort to remove the material.

Repair of the incinerator was started late in the month by Minor Construction forces.

DECLASSIFIED

3. Mechanical Performance

The fabrication equipment required only normal maintenance during the month. The Maintenance-sponsored process test to evaluate tools with different relief angles has resulted in design changes based on the recommendations of Weapons Manufacturing Maintenance.

The plutonium processing equipment in Hood 9-A was satisfactory this month, but required considerable minor maintenance effort. The filters in the fluorinator off-gas systems required frequent attention. The primary filter required frequent brushing, and the secondary filter was occasionally blinded because of condensation in the housing. Both are being investigated at month end.

Installation of the backflushing system for the ion exchange columns was completed during the month. Also, a program to replace the regular electrical connectors in Hood 46 with a corrosion-resistant type was initiated during the month.

An improvement in the atmosphere in the "Can-Out" Hood in the final inspection facility was achieved by the installation of an additional 1-1/4" exhaust line. This assures that sufficient dry air is being drawn into this hood at all times. In addition, a new hygrometer installation was completed on this hood.

4. Radiation Experience

Radiation and contamination control statistics show control to be satisfactory during April. An upward trend in the number of positive nasal smears was experienced and all cases proved to be minor, with initial results indicating that there would be no deposition in any of the cases.

5. Analytical Experience

	<u>March</u>	<u>April</u>
Number of Samples Received	2,593	3,651
Number of Determinations	19,487	23,531*
Total Impurities, Buttons, Avg.	1,690 ppm	1,910 ppm
Buttons Rejected	0	4.96%
Pu ²⁴⁰ , Normal Buttons (By Neutron Count)	6.13%	6.10%
Pu ²⁴⁰ , Unclassified Buttons (By Neutron Count)	8.14%	0

*The analytical work load reached an all-time high this month with the reporting of 23,531 analyses. The large volume of support required for plant technology studies was the principal cause for the increased work load.

Installation of an X-ray diffractometer was completed during the month and calibration work is in progress. This equipment is to be used chiefly to determine the level of trace impurities in weapon-grade plutonium metal.

W. J. Martin
Manager
Weapons Manufacturing

CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

APRIL 1963

II. ACHIEVEMENTS (Continued)

E. POWER AND GENERAL MAINTENANCE OPERATION

1. Operating Continuity

There were no interruptions of steam, water or electrical services that affected continuity of operation of production facilities; however, the 200-West Area filter plant was valved out for a four-hour period to facilitate tie-in of a newly installed additional pump. During the outage, the administration area was fed from the general area high-tank. However, storage capacity of the process area high-tanks was not sufficient to sustain required pressures to production facilities. To supplement the high-tanks, a temporary connection was made with a fire hose from the filtered-water system to a fire-truck pumper, which in turn discharged into a nearby fire hydrant. Thus the production areas were supplied with required flows and pressures, and normal high-tank levels were maintained during the entire outage.

2. Inspection, Maintenance and Repair

A spare HS precycle stripping column, complete with cartridge, was pressure tested and dimensionally checked, on an emergency basis, to replace a similar unit which had failed in service at the Purex facility.

Also made ready for service on an emergency schedule was an HA precycle decontamination column, complete with cartridge, for the Purex facility. Inspection disclosed only a failed cartridge; however, attempts to remove the individual pieces of the cartridge were unsuccessful, thus necessitating replacement of the entire column.

Two concentrator tube bundles were leak tested and delivered to the Purex facility for installation during the scheduled shutdown.

Work required for the B-Plant Fission Product Recovery Plant is increasing in the Machine Shop. Several pH probe cells and sample carriers were made during the period covered by this report.

Eighteen cell pipe connectors were fabricated to meet requirements of the production plants, as indicated below.

Purex	12
Redox	<u>6</u>
Total	18

Fabrication and assembly of an H-4 oxidizer heating coil for the Purex facility was in progress at month's end. The details and design criteria

DECLASSIFIED

for this unit represent a considerable amount of developmental work. Fabrication is in accordance with new corrosion-resistant welding specifications.

Three F-7 presycle feed-tank pumps were made ready for service and delivered to the Redox facility as required for replacements for failed units. Cause of the pump failures is attributed to the presence of solids in the feed tank.

Piping services for F-cell at the 224-T Building were reactivated in connection with the preparation of the cell for use in the disassembly of plutonium-contaminated equipment. Recovery of plutonium is the primary objective.

Assistance is being provided a factory representative in the assembly and testing of an electron beam micro-analyzer which is being installed in Hanford Laboratories' 231-Z facility.

Third-party inspections were performed on the No. 1 boilers in the 200 East and West power houses. Official reports have not as yet been received; however, verbal reports indicated the units were "satisfactory for continued operation."

New safety showers were installed outside the battery rooms in both 200 Area power houses, as a precautionary measure.

The boiler efficiency of the 284-W power house was 2.4% higher than the year-to-date average. This increased efficiency is attributed to the Redox plant's being in production most of the month, resulting in a very favorable steam load.

The department's air-balance group conducted smoke tests on high-efficiency filters in the 1706-RER Building, for the Atomic Energy Commission. The tests were made with filters in place to determine filter and gasket integrity.

The ventilation systems in all 105 reactor buildings were checked and adjusted for compliance with confinement design criteria.

T. S. LaFollette
Manager
Power and General Maintenance

CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

APRIL 1963

II. ACHIEVEMENTS (continued)

F. FACILITIES ENGINEERING OPERATION

1. Purex

a. Process Design Engineering

Titanium Tube Bundle

Examination of the first tube bundle (titanium) installed in the H-4 Concentrator as a prototype in April 1961, was made by using closed circuit television and a remotely-operated 35 mm camera. The colored photographs were of excellent quality. Radiation levels were low enough for direct visual observation from thirty feet and for approximately one minute. Plugging of the lower section was evident. The heavy scale which was present has bridged between tubes in this part. Studies are underway to determine the chemical and physical characteristics of the scale.

b. Project Engineering

Projects CAC-928 and CGC-930 were completed on April 30, and were closed out.

CAC-945 - New Waste Storage Tanks - Purex

Directive AEC-204, Mod. #1, was issued on April 22, authorizing a total of \$2,700,000 for design and construction. The item of \$100,000 for CPFF Construction Service Contractor administration of the contract was deleted.

CAC-964 - Equipment Disposal - Purex

Directive HW-137, Mod. #1, was issued on April 23, for \$1,000,000. The Atomic Energy Commission has chosen to retain management of the project.

CAC-970 - Purex Essential Waste Routings System

Work Authority CAC-970, dated April 22, authorized \$3,000 to the General Electric Company for technical guidance of design. Directive AEC-218 was issued on April 12, for \$30,000. These are interim authorizations. Bovay Engineers started detail design on April 22.

DECLASSIFIED

2. Redox

a. Process Design Engineering

Concentrator Drawings

New drawings are being prepared for procurement of Redox concentrators. Drawing revisions include changes for improved process control.

"D" Cell Renovation

Shop work, including the mock-up for the D-13, D-14, and D-12 position liners, was essentially completed. The liners are to be installed during a building shutdown scheduled for May 3.

Hexone Recovery

The proposed design of the prototype hexone recovery system at Redox was reviewed and determined to be both feasible and economically attractive. Detail design work has been started.

Sludge Routing Facilities

Conceptual engineering was performed on facilities and routings for transfer of sludge from 241-A and 241-AX Tank Farms to "B" Plant for Sr-Cs extraction. The facilities will be of a strictly functional character and the necessary routings and tankage can be provided at a project cost of approximately \$2,000,000.

b. Project Engineering

CAC-101 - Redox 216-S-7 Crib Replacement

A project proposal requesting funds in the amount of \$110,000 to replace the Redox condensate crib was transmitted to REOC on April 19.

CAC-928 - Leak Detection - High-level Waste Tanks - Redox and Purex

The General Electric Company portion of the project was closed out as of April 30, with an indicated expenditure of \$67,000. The Work Authority authorized \$88,900. The supplier of the three-inch galvanized tubing for all laterals has agreed to replace them. The tube replacement started on April 30.

3. Weapons Manufacturing

a. Process Design Engineering

New Button Line

An engineering study report was completed on a new button line to be installed in the area presently occupied by the Recuplex Facility. The new facility would be remotely controlled and based on three basic process steps: (1) Direct continuous calcination of plutonium nitrate feed; (2) continuous chlorination in a fluid bed reactor; and (3) continuous electrowinning of the plutonium trichloride powder. The facility will have a capacity equal to that of the RMC Line and will cost an estimated \$2,000,000.

Miscellaneous Plutonium Processing Facility

An engineering study was started during the month on methods of installing necessary equipment in Room #179-B to satisfy customer requirements on specialty plutonium orders. Room #179-B already contains suitable equipment for precipitation, filtration, and calcination. It also has a flexible well-designed ion exchange unit. Preliminary arrangement drawings have been prepared showing how the following equipment could be added to the available space: fluorination and chlorination glove box, facilities for bomb reduction and button pickling, equipment for vacuum casting and electro-refining of metal, metal dissolving glove box, a small packaging lathe, and a special glove box for packaging and bag out.

Fabrication Area Expansion Scope

A proposed new facility for weapons fabrication in the 234-5 Building was described in HW-77339. The new facility is planned to include a new fabrication area in Rooms 198 and 202 and a new shop facility attached to the east end of the building. The primary equipment in the fabrication area will be casting, power-roll forming, and machining. The new shop facility can allow consolidation of the many small shop areas scattered throughout the building, including those located in Room 198. The estimated project cost of these facilities is \$2,650,000.

Auxiliary Weapons Production Shop Facilities

An engineering study was completed during the month on building modifications and equipment requirements to expand the existing tool and die shop and to install equipment for graphite fabrication in Building 272-W. This study also included providing additional equipment for 234-5 Building Tool Grinding Shop. The estimated project cost for these new facilities is \$840,000.

DECLASSIFIED

b. Project EngineeringCAC-880 - Plutonium Reclamation Facility-"Z" Plant

The Phase I contract is being closed out with exceptions, including some painting and minor design changes. The Phase II construction contractor started work on April 3.

Work is progressing on cell hood erection, piping, and instrumentation.

CAC-987 - Metal Stabilization Facility - 234-5 Building

Directive AEC-219, dated April 29, authorized \$240,000 for this facility.

Removal of Existing Recuplex Facility

An engineering scope for removal of the existing Recuplex facility and renovation of the Recuplex area has been issued. The cost has been estimated at \$280,000, including \$105,000 as expense.

4. Generala. Process Design EngineeringHanford Isotope Plant

Architectural, site plan, and ventilation drawings on the round building, Concept II, were issued for comment on April 16. Process flow diagrams and equipment layouts presented in 31 drawings were issued for comment on April 26.

The preliminary capital cost of the round building is estimated to be \$14,300,000, as compared with the estimated capital cost of 16 to 17 million dollars for the longitudinal canyon building in Concept I. Other alternates for building structure are under investigation to permit a reduction of capital cost, improve flexibility, or provide for future expansion.

b. Project EngineeringProject Cost Information - as of 4/21/63:

Total Authorized Funds-17 active projects	\$5,763,000
Total Cost-to-date	4,277,000
Commitments & Open Work Releases	594,000
Unencumbered Balance	892,000
Costs Charged to Above Projects *3/24/63 to 4/21/63)	162,000

HPShaw/WWC/alr

Manager, Facilities Engineering

CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

APRIL, 1963

II. ACHIEVEMENTS (Continued)

G. RESEARCH AND ENGINEERING OPERATION

1. Purex Process Engineering

(a) Solvent Extraction

The plant was shut down during the period April 2 through April 24 for planned maintenance activities, equipment flushing, etc. Solvent extraction operations were limited to rework and auxiliary runs of short duration which could be integrated with the scheduled outage activities.

About three tons of uranium (recovered from the concentrated organic following the IC Column flood at startup in February) were blended with about 12 tons of uranium waste from the UO₂ Plant and successfully recovered using the Final Uranium Cycle equipment. The instantaneous losses were generally negligible; however, the concentrated waste contained sufficient uranium to warrant segregation for hydrolysis and eventual rework. The solvent which was used during the February rework operation and subsequently segregated was also used during the April rework operation.

Following the uranium rework operation, all of the solvent extraction columns, except the IBX and IBS Columns, were flushed with decontaminating solutions to alleviate the instability experienced during the previous run period.

The plant was started up on "cold" feed on April 25 with no unusual difficulties. However, a leak was detected in the HS Column on April 26 and the plant shut down on April 27 to change out the column. In the attempt to retrieve the cartridge from the column, the upper support "spider" was noted to be loose from the cartridge. Subsequent inspection of the HA Column Scrub Cartridge indicated it also had lost its integrity. During the attempt to remove it, a portion of the cartridge fell back into the column and the entire HA Column required replacement.

The Neptunium Recovery Cycle was shut down at equilibrium Phase II (Decontamination) conditions on April 1. It was started up and switched to Phase III (Purging) conditions on April 15 and the 3BN Stream was diverted to the new Purification Facility in Q Cell. However, due to non-equilibrium startup conditions,

only about thirty-five per cent of the estimated amount in the solvent-extraction "package" was received in Q Cell. The Neptunium Recovery Cycle was operated again in April to recover the neptunium from the 3WB Stream prior to startup of the Solvent-Extraction System.

(b) Product Treatment

The Neptunium Ion Exchange Unit in Q Cell went "Hot" on April 15 by receiving 3BN material from the Neptunium Recovery Cycle - J Cell Package. "Hot" operability tests were in progress at the end of the month.

(c) Water Treatment

During the shutdown, the Nalco WBR (weak base) resin in the Demineralized Water No. 2 Anion Unit was replaced with Duolite A-30B. The new No. 3 Anion Unit containing Amberlite IR-45, has been connected for routine operations at the beginning of the next run period.

(d) Backcycle Waste Concentration

The E-H4 Backcycle Concentrator tube bundle was found to be essentially plugged with siliceous solids that appeared difficult to dissolve and apparently low in leachable plutonium. The unit was replaced with a stainless steel tube bundle until laboratory plant test and design studies are completed.

(e) Waste Treatment and Acid Recovery

Testing of sugar denitration continued satisfactorily with approximately 4500 lbs. of HNO_3 acid destroyed in two IWW waste batches. Low vessel vent vacuum and low feed acidity precluded collection of reliable data on efficiency and reaction time.

Analyses which were run by Hanford Laboratories on samples taken from the Process Condensate Stream (A-10 Crib) during the later part of March showed the Sr-90 level to be about 2×10^{-7} uc/ml and the Cs-137 level to be about 1×10^{-5} uc/ml. The levels are approximately 0.2 and 0.1 of the occupational 40-hour MPC limit for strontium-90 and cesium-137, respectively, and reflect single-stage concentration of the IWW Stream.

(f) Fission Products

The use of formaldehyde-treated IWW as feed interfered with routine strontium recovery operations. Pre-precipitation of fission products and sticky centrifuge bowl cakes were encountered due to low feed acidity.

About 100 kilocuries of strontium-90 previously lost by foaming in the Strontium Semiworks HCP Concentrator was reprocessed and blended with the purified product from the March run.

2. Redox Process Engineering

a. 1A Column Flowsheet Test

During the report period the 1AA scrub stream flow ratio was cut by a factor of two. Only a small reduction in decontamination across the column was noted (log df was reduced from 2.4 to 2.2), and this loss of decontamination was recovered in the rest of the process. This flowsheet change has resulted in essential material savings of \$9 per ton, and waste storage savings of \$3.50 per ton of production.

b. 1B Column Flowsheet Test

A flowsheet test of the 1B Column operation indicates that sufficient uranium decontamination of the plutonium is obtained at aluminum nitrate concentrations as low as 1.10 molar. With the present flowsheet, the 1B Column is operated at an aluminum nitrate concentration of 1.30 molar, and the 1BP product solution is diluted to a 1.10 M ANN concentration prior to the addition of the sodium dichromate oxidant. This is done in order to eliminate the possibility of plutonium (at the four or six valence) extracting and accumulating in an organic phase in the oxidizer tank. Operation of the 1B Column at a 1.10 M ANN concentration would eliminate the need for dilution, reduce the volume of 2AF feed solution, and result in essential material savings of \$9 per ton and waste storage savings of \$3.50 per ton.

c. Plutonium Rework

During the report period 27 kilograms of bismuth contaminated plutonium were processed through the 3A and 3B Columns. The 3A and 3B Columns are normally used for neptunium purification. Since no neptunium removal runs were made during the report period, these columns were available for plutonium rework. The decontamination factor for bismuth across the column was greater than 400, and the final product solution contained less than 100 parts of bismuth per million parts of plutonium.

DECLASSIFIED

3. Plutonium Process Engineering Operation

a. Button Line

The average button density was XX.32, with 5.3 percent rejects. Feed to the button line consisted of 48 percent Purax, 20 percent Redox, 28 percent dissolved oxidized skull solutions, and 4 percent eluant from the filtrate ion exchange process. The percentage of the feed plutonium in the oxalate filtrate was 3.8.

The bulk of the reject buttons was caused by high Fe, Cr, and Ni impurities in the metal. The high impurities were attributed to a sudden corrosion surge in the hood 9-A calciner (11 straight buttons were rejected). Feed samples taken (though not completely encompassing the high reject period) showed no high impurities.

A 100-mesh stainless steel strainer was installed in the plutonium nitrate feed line to remove solid particles from the system, such as resin fines, coagulated PuF_4 and PuO_2 particles, and siliceous particles. The lower powder let-down valve on the fluorinator was changed to a pneumatically-driven ball valve, and thus far has operated trouble-free. The calibration of a recently installed transmitting rotameter in the oxalic acid line drifted significantly, apparently due to corrosion of the stainless steel bob. Covering portions of the bob with teflon has minimized calibration drifting.

b. Oxalate Supernate Ion Exchange Facility

The yield across the ion exchange unit was 98.5 percent. All button line supernatants were processed through the facility. In addition, solutions from the J-26 A clean-out process in Recuplex and leach solutions from hood 227 were successfully processed through the facility. A back-flush system was installed which allows back-flushing to the feed tank system when the resin column becomes plugged.

c. Plutonium Oxide Dissolution

The prototype hood 42 teflon pot dissolvers began processing during the month. Dissolution of Hanford Laboratory burned skulls and fabrication burned skulls was excellent. Four to six-hour heating cycles netted an average of about one kg of dissolved oxide, with concentrations averaging over 200 g Pu/l. Dissolution efficiency decreased markedly when burned ingots were dissolved, concentrations varying from 40 to 140 g Pu/l. The oxide from burned ingots reacted like refractory oxides.

Although dissolution rates are higher than expected, additional studies are required before routine dissolution conditions are established. Present emphasis is being placed upon developing dissolution-dilution conditions which produce a more stable dissolver solution. The high fluoride and plutonium concentra-

tion produced in early runs are in the unstable region, that is, plutonium fluoride precipitates can form in the solution on standing.

d. Miscellaneous

Leaching of spilled resin and spent resin from the oxalate supernatant ion exchange facility was performed in the ultrasonic hood 227 leaching tray. Though leaching successfully removed up to 75 grams of plutonium per liter of resin, 4 to 12 contacts (4-liter batches of resin) were required before the resin could be discarded. The leach solution used was 0.5 M HNO_3 and 0.1 M HF.

e. Z-9 Crib

The sampling program was completed during the month. Eight sample points were successfully penetrated to 6-foot depths by the 2-foot split-tube drive sampler mechanism. Initial analytical results from two of the sample points indicate a 10 to 50-fold drop in plutonium concentration from the top layer to the bottom layer of soil.

f. In-Line Alpha Monitor

After less than three months exposure to 2 M HNO_3 , the scintillating glass in the in-line alpha monitor was found to have disintegrated. In subsequent corrosion tests by Hanford Laboratories, the glass devitrified within two weeks in 0.25 M to 4 M HNO_3 at 50° C. Preliminary tests indicate that the glass may still be suitable for use on organic streams in the Plutonium Reclamation Facility. Efforts are being made to obtain a scintillating glass that will resist nitric acid.

g. UO₃ Plant

Two carloads of E-metal UO₃ having a nominal sulfur content of 3300 ppm were produced at the request of National Lead Company of Ohio (Fernald) for test purposes.

Seven carloads of normal depleted UO₃ were produced at a powder bed temperature of 245° C at the request of Union Carbide Nuclear Company (Paducah). Two more carloads will be made before returning to the normal operating temperature of 270° C. Calciner operation was excellent at the lower temperature.

The K calciner control programmer was disconnected and the magnetic flowmeters were removed from the calciner feed lines early in the month. The programmer, which had been in service since early 1959, had fully demonstrated the feasibility of programmed control. Insufficient economic incentive exists at this time for converting all calciners to programmed operation.

DECLASSIFIED

4. Separations Chemistry Laboratory - J. F. Beaulieu

a. Purex Process Improvement

During January a batch of R cell solvent was contaminated during the recovery of uranium from storage Tk-P2 and Tk-301. It was set aside while cleaning procedures were investigated. When initially set aside (2-4-63) Pu retention values could be reduced from 2×10^9 c/m/gal to 5×10^8 by the use of carbonate-permanganate and/or $\text{Mg}(\text{OH})_2$ treatment. On 4/2/63 the solvent had improved a little through aging but cleaning procedures were only effective in reducing Pu retention from 2.7×10^9 to 2×10^8 . In view of the time involved and the small improvement possible using conventional cleaning procedures, further efforts to salvage the material are not recommended.

The inventory of R cell organic was contaminated with some of the stored organic during April to the extent of one part stored organic to six parts normal inventory. Pu retention values on this mixture can be reduced from 5×10^9 c/m/gal to 1×10^8 or slightly less by carbonate permanganate washes. It appears feasible to use this material in normal processing by diluting with an equal portion of fresh 30% TBP-Soltrol 170.

Continued investigations on Purex anion resin indicated no appreciable effect on prolonged chemical cycling with solutions of 0.7 M and 7 M HNO_3 . Radiation exposure produces a gold coloration of the beads at $1.7 \times 10^8 \text{R}$. At $4 \times 10^8 \text{R}$ the beads are red in the nitrate or chloride form and black or very dark red in the hydroxide form. Beads exposed to $7 \times 10^8 \text{R}$ show no visible physical change other than the color change.

Samples of the solid material which plugged up the H-4 titanium tube bundle were found to be insoluble in many laboratory reagents including water, 5% oxalic acid, 6 M HCl , 5 M HNO_3 . The material does dissolve in 30% HF to give a pale blue solution. The solid is also friable in 10% NaOH . Alternate flushes with caustic and water were recommended for cleaning the bundle.

b. Redox Process Improvement

Laboratory studies indicate that rare earths, including promethium, may be recovered by centrifugation of redox neutralized waste (D-8). Although recoveries of greater than 97% have been experienced in the laboratory, simulation of plant equipment and hold-up time indicates that 70% is a more realistic estimate.

c. Fission Product Process Improvement

In March potassium permanganate, hydrogen peroxide, and ammonium persulfate were tested as oxidizing agents for cerium. The work has been extended to include hydrogen peroxide concentrations as high as 1 molar, sodium bromate, potassium iodate and potassium periodate. At 25 C and nitric acid concentrations between 0.5 and 2 molar,

potassium permanganate was the only material capable of oxidizing cerium to Ce(IV) when it could be extracted into D2EHPA.

To help determine the best conditions for rare earth extraction in D2EHPA solvent, distribution ratios were determined for iron, cerium, and promethium at pH's ranging from 1 to 2.5. Hydroxyacetic acid, tartaric acid, citric acid, DTPA, and HEDTA were tried as complexing agents to keep iron from extracting. The hydroxyacetic acid, the tartaric acid, and the citric acid did not complex iron at the pH's tested. Both DTPA and HEDTA complexed iron at a pH of 2 inhibiting the extraction of iron into the organic phase while not substantially reducing the extraction of cerium and promethium.

d. Laboratory Improvement

An improved analytical method for promethium was provided the Redox Laboratory. In this procedure, a rare earth fraction was separated with a D2EHPA extraction cycle. An yttrium decontamination was achieved by stripping into 1.65 M HNO₃, then scrubbing the strip with fresh D2EHPA. Cerium was removed by oxidizing to valence IV with dichromate and extracting with TTA. Salts were removed from the promethium fraction by ion exchange. The final sample mount contained only short-lived praeseodymium-144 (17 min.) and the isotope of interest. Praeseodymium can be allowed to decay, or corrected for by absorber counts.

A 25% review of all analytical methods in the CPD master file was completed. During the course of the review, it was found that nine of the 52 methods had been updated during the past year, and minor changes were suggested in eight other procedures. Seven new analyses were received for review and approval.

An analysis for determining tartaric acid in radioactive waste samples was provided the Purex Laboratory. The tartrate hydroxyl groups are oxidized with periodic acid. By determining the periodic acid consumption, the tartaric acid concentration can be calculated.

REF ASSIGNED

5. Plutonium Chemistry Laboratory -a. PRTR Plutonium Processing

The first separation-conversion campaign for the recovery of high-exposure plutonium from PRTR fuel elements has been completed.

The separations processing of the fuel elements was done in the Redox plant, and 5,858 grams of plutonium were delivered as nitrate solution to Plutonium Chemistry Laboratory for conversion to plutonium dioxide. Isotopic composition was 74.7 percent Pu^{239} , 21.5 percent Pu^{240} , 3.42 percent Pu^{241} , and 0.44 percent Pu^{242} . The ruthenium activity in the Redox product was greater than anticipated; however, iron impurity was present only to the extent of 4,000 ppm. This plutonium was not put through the Redox anion-exchange final purification facility.

The plutonium nitrate solution was converted to plutonium dioxide via the Pu(IV) oxalate process in the new shielded facility. The nitrate feed solution and an oxalic acid-hydrogen peroxide solution were pumped into a precipitator vessel as separate streams by a duplex metering pump. Simultaneous valence adjustment and precipitation of Pu(IV) oxalate occurred. The oxalate slurry overflowed into the filter pan of a vacuum drum filter. Oxalate cake which accumulated on the filter drum was continuously scraped off into a stainless steel calcination pot. Filtrate passed through the filter drum and, thence, to filtrate storage vessels. When the calcination pot was filled with Pu(IV) oxalate, it was transferred remotely to a pot furnace for calcination--four hours at a powder temperature of 350 C. The resulting plutonium dioxide averaged about 85 w/c plutonium.

Product purity appears good. The first 1,800 grams returned to Hanford Laboratories had an average content of metallic impurities of 580 ppm. Analysis of the rest of the plutonium is still pending.

Filtrate losses were higher than anticipated. Since the oxalate-cake quality was consistently good, it is surmised that the high filtrate losses were due in part, at least, to the necessarily intermittent mode of operation of the precipitation-filtration complex; i.e., about two hours operation fills all four calcination pots. It is also possible that residence time in the precipitator vessel is too short for completion of valence adjustment, thus causing inefficient precipitation.

The filtrates from the conversion processing of the first 5 kg of plutonium were combined with the dilute plutonium nitrate solutions resulting from finishing of the Redox product concentrator. The combined solutions were concentrated by evaporation and then converted to plutonium dioxide again via the Pu(IV) oxalate process.

About 92 percent of the original ~~high~~ exposure plutonium has been

returned to Hanford Laboratories. Due to an unanticipated large demand for this plutonium for non-PRTR research purposes, the recovery of all available material is being considered. A cost study is now being done to determine the desirability of recovering a residual 448 g of plutonium.

Total-body exposures of operating personnel have been only moderate, whereas hand exposures have been very high. Compared to similar operations with regular production plutonium, hand exposure rates from high-exposure plutonium are much higher; e.g., 3 000 mr/hr in contact with Pu(IV) oxalate cake vs. 800 mr/hr previously experienced.

b. Chloride Waste Recovery

Processes are being developed to convert chloride-bearing waste to forms capable of being reprocessed in existing facilities.

Work on the Quick-Leach Process was completed. A report, HW-77369, "Plutonium Recovery By The Quick-Leach Process", was issued. The summary and conclusions follow:

"A quick-leach process is recommended for laboratory-type service operations on chloride-bearing plutonium wastes. This process is based on extensive experience in the Plutonium Chemistry Laboratory.

"The flow sheet and a detailed narrative of the flow sheet are presented. Recovery is 96 percent, liquid waste losses are 0.2 percent, and the residual plutonium (3.8 percent) is in chloride-free solids suitable for further processing.

"The quick-leach process consists of dilute hydrochloric acid leaches of the chloride-bearing wastes, followed by a concentrated chloride dissolution and, finally, a water wash. The resulting solutions are then combined and struck with oxalic acid to precipitate the chloride-free plutonium trioxalate. This oxalate is then calcined to the oxide for storage and further processing by conventional means. The refractory solids remaining are free of detectable chloride. The chloride is present in the aqueous waste along with the oxalate soluble-chloride soluble constituents present in the initial materials."

Prior to termination of the development work, attempts were made to substitute a nitric-hydrofluoric acid dissolution step for the concentrated hydrochloric acid dissolution of the leach residues. Up to seven dissolvings with HNO_3 -HF resulted in less plutonium dissolution than did three HCl dissolvings. Further, the nitrate solution was more dilute (due to a solubility limitation), and much more difficult to precipitate oxalate from than the chloride solution. Therefore, the hydrochloric acid dissolution was recommended instead of the nitric-HF dissolution.

DECLASSIFIED

BF/VASCH
for Acting Manager
Research and Engineering Operation

CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

APRIL, 1963

II. ACHIEVEMENTS (Continued)

H. FINANCIAL OPERATION

1. Production Cost

Required FY 1964-65 operating budget schedules were forwarded to Contract and Accounting Operation early in the month for consolidation.

Personnel estimates for calendar years 1963 through 1968 were furnished Contract and Accounting Operation in connection with long-range forecasts.

The following contingency maintenance requests and prototypes were processed during the month:

Contingency Maintenance

1. Incinerator renovation
2. B Plant Pipe Trench Welding
3. Steam line renovation work (2 requests)
4. Redox panelboard consolidation

Prototypes

1. Hexone recovery
2. Slag and crucible dissolver

Special requests and backcharges handled during the month included unclassified Pu metal shipment to Battelle and Pu nitrate to GE-APED; burial of 288 drums, 5 boxes and 2 casks for Dow Chemical, University of California, and Argonne National Laboratory. Slightly over 8 kgs of Pu scrap were received from Project Whitney and GE-APED for reclamation. Sixteen thousand five hundred and twenty-two grams of Project Whitney scrap were recovered during April.

CPD's investment in inventories at March 31, 1963 compared with budgeted amounts is as follows:

DECLASSIFIED

(in thousands)	Balance <u>3-31-63</u>	Control <u>Allocation</u>	Surplus <u>(Deficit)</u>
<u>Inventories</u>			
Essential Materials	\$ 790	\$ 825	\$ 35
Spare Parts & Standby	1 729	1 600	(129)
Special Materials	<u>100</u>	<u>103</u>	<u>3</u>
Gross Inventories	<u>2 619</u>	<u>2 528</u>	<u>(91)</u>
<u>Reserves</u>			
Essential Materials	61	58	3
Spare Parts & Standby	<u>579</u>	<u>481</u>	<u>98</u>
Total Reserves	<u>640</u>	<u>539</u>	<u>101</u>
<u>Net Investment</u>	<u>\$1 979</u>	<u>\$1 989</u>	<u>\$ 10</u>

2. General Accounting*

As of March 31, 1963, sixteen (16) active projects had incurred costs of \$4,150,882 against active funds of \$5,714,200. Outstanding commitments totaled \$372,104.

During April, Directive No. AEC-218 was received from the AEC and authorized \$3,000 for necessary assistance to the Architect-Engineer during design and to perform field surveys on Project CAC-97C, "Purex Essential Waste Routings System." This is an interim authorization.

During April there were eleven (11) appropriation requests approved which authorized expenditures of \$135,650, as follows:

<u>AR No.</u>	<u>Description</u>	<u>Section</u>	<u>Amount</u>
36056	Machine chucks & gages & shipping inserts (63)	WMO	\$43 000
36057	Inspection Gaging Equipment	WMO	38 750
36063	Alpha Coincidence Counters	WMO	13 000
36062	T.V. Equipment	Redox	8 500
36053	Deep Well Radiation Detection Unit	Purex	7 900
36060	Deep Well Radiation Detection Unit	Redox	7 500
36062	Abrasive - Blaster	P&GM	6 000
36059	Alpha Particulate Air Monitor	FEO	4 800
36058	Extended Range Recorder	WMO	3 600
36054	Buffer Car Working Platform	Purex	1 400
36055	Beta-Gamma Continuous Air Monitor	Purex	1 200

* Funding approvals only. May differ from costs stated in other sections of this report which include nonfund equipment transfers.

3. Financial Analysis

In collaboration with Engineering and Production personnel, preliminary operating and unit cost estimates for processing selected fission products to encapsulated power sources in proposed Hanford Isotope Plant were prepared. Further refinement of the data is scheduled prior to submission of a Hanford report to the Commission.

4. Personnel Accounting

A revision to HAP0's payment policy applicable to holiday time worked by exempt personnel was obtained.

Manager - Finance

DECLASSIFIED

CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

APRIL, 1963

III. PERSONNEL ACTIVITIES

A. FORCE SUMMARY

<u>Operation</u>	<u>Monthly Salaried</u>		<u>Weekly Salaried</u>		<u>Total</u>	
	<u>3-31-63</u>	<u>4-28-63</u>	<u>3-31-63</u>	<u>4-28-63</u>	<u>3-31-63</u>	<u>4-28-63</u>
General Manager's Group	11	11	2	2	13	13
Financial	13	13	13	14	26	27
Research & Engineering	64	65	30	29	94	94
Facilities Engineering	61	61	21	22	82	83
Power & General Maintenance	38	38	233	236	271	274
Production	6	6	4	4	10	10
Redox	56	57	238	233	294	290
Purex	63	64	259	261	322	325
Weapons Manufacturing	<u>48</u>	<u>49</u>	<u>221</u>	<u>223</u>	<u>269</u>	<u>272</u>
Total	<u>360</u>	<u>364</u>	<u>1 021</u>	<u>1 024</u>	<u>1 381</u>	<u>1 388</u>

DECLASSIFIED

C. IRIPS

<u>Visitor</u>	<u>To</u>	<u>Nature of Discussion</u>
<u>To Other G.E. Components</u>		
W. S. Frank	Crotonville, New York	Modern engineering course. (4/15-5/24/63)
R. W. Harvey A. C. Morgenthauer	Schenectady, New York	Work measurement programs. (4/18-19/63)
	Philadelphia, Penn.	Methods and work measurement. (4/23-24/63)
P. H. Reinker	Palo Alto, California	Laboratory programs. (4/23/63)
<u>To AEC and Other AEC Contractors</u>		
L. R. Michels H. P. Shaw	Division of Isotope Development Germantown, Maryland	Design status of the Hanford Isotope Plant. (4/16-19/63)
O. F. Beaulieu R. J. Kofced N. S. Wing	The Dow Chemical Co. Rocky Flats Plant Denver, Colorado	Analytical performance on standards programs. (4/15-18/63)
R. E. Olson	Livermore, California	IMOG meeting. (4/17/63)
R. J. Dal Ponte	The Dow Chemical Co. Rocky Flats Plant Denver, Colorado	Eddy current testing. (4/18-19/63)
R. C. Hollingshead	Burlington, Iowa	Attend IMOG meeting. (4/24-25/63)
R. E. Van der Cock	Los Alamos Scientific Lab. Los Alamos, New Mexico	Process review. (4/29-30/63)
A. E. Smith	Los Alamos Scientific Lab. Los Alamos, New Mexico	Discussion on reactor fuels. Process review and to attend FWIEG meeting. (4/29-5/2/63)
<u>To General Industry</u>		
G. P. Kesel	Northwest Copper Works, Inc. Portland, Oregon	Correction and assembly of vessels. (4/1/63)

C. TRIPS (Continued)

<u>Visitor</u>	<u>To</u>	<u>Nature of Discussion</u>
<u>To General Industry (Continued)</u>		
R. C. Hollingshead	Lodge & Shipley Cincinnati, Ohio	Power roll forming equipment. (4/26/63)
C. E. King	Boeing Company Seattle, Washington	Numerically controlled machinery. (4/19-20/63)
<u>To Conventions and General Meetings</u>		
M. E. Campbell	Los Angeles, California	Attend 144th Annual American Chemical Society Meeting. (4/1-5/63)
F. S. Stong	Seattle, Washington	American Electroplaters Society Meeting. (4/11/63)
T. G. LaFollette	Portland, Oregon	Metals and Minerals Conference. (4/23-26/63)
H. E. York R. C. Hollingshead	Chicago, Illinois	Attend the ASIME Tool exposition. (4/29-30/63)
<u>To Other Federal and State Agencies</u>		
P. H. Reinker R. E. Tomlinson	U. S. Congress Joint Committee on Atomic Energy Washington, D. C.	"202" Hearings. (4/2-4/63)

D. VISITORS

<u>Visitor</u>	<u>From</u>	<u>Nature of Discussion</u>
<u>From Other General Electric Components</u>		
C. K. Rieger R. L. Johnson L. B. Van Dyke, Jr. G. W. Marsh C. C. McMullan	New York, New York	Plant tours. (4/25/63)
L. R. Fink	Palo Alto California	Plant tours. (4/25/63)

D. VISITORS (Continued)

<u>Visitor</u>	<u>From</u>	<u>Nature of Discussion</u>
<u>From Other General Electric Components (Continued)</u>		
H. W. Gouldthorp	Philadelphia, Penn.	Plant tours. (4/25/63)
R. L. Gibson	Pittsfield, Mass.	" "
D. E. Craig	Schenectady, New York	" "
<u>From AEC and Other AEC Contractors</u>		
A. F. Perge	U.S. AEC Division of Operational Safety Washington, D. C.	Fission Products - Strontium Semisworks. (4/4/63)
T. H. Chilton	U.S. AEC	Plant tour.
R. M. Evans	Industrial Study Committee	(4/10/63)
R. M. Underhill		
A. B. Mercer		
E. J. Bloch		
<u>From General Industry</u>		
M. McGarty	Dow Chemical Company	Substitute Phenol (BAMEF)
R. Grinstead	Midland, Michigan	for solvent extraction. (4/24/63)
Paul Berner	Star Machinery Co. Seattle, Washington	Machine tools. (4/24/63)
Frank Hibbard	Ferdix Company San Francisco, California	Machine tools. (4/24/63)
J. J. Morris	Precision Engineering Co. Seattle, Washington	Vacuum blast equipment. (4/26/63)
<u>From Other Federal and State Agencies</u>		
Leon Wish	Naval Radiological Defense Laboratory San Francisco, California	U ₂ process. (4/2/63)

CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

APRIL, 1963

IV. SAFETY AND SECURITY

<u>Operation</u>	<u>FEO</u>	<u>Finance</u>	<u>WMO</u>	<u>P&GM</u>	<u>Purex</u>	<u>Redox</u>	<u>Frod.</u>	<u>Rel. Prac.</u>	<u>R&E</u>	<u>Total CFD</u>	<u>YTD</u>
Dis. Injuries											3
Ser. Accidents											0
Med. Treat. Inj.	2		13	7	7	4				33	153
Rad. Occur.			7		3					10	45
Contam. Wd.			3								7
Pu Dep.											4
Fires											2
Sec. Viol.			1*								6

*Fire - 4/12/63 - Damages: \$1,172.00 - The failure of a thermocouple permitted molten slag and burning reductant to spray from the reduction vessel into the hood.

DECLASSIFIED

CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

APRIL, 1963

V. REPORTS

A. PREPARED AND ISSUED

- HW-76025 PT 1, Official Use Only, "Chemical Processing Department - Hazards Review Task Force - Purex Neptunium Recovery and Purification Systems", dated April 1, 1963, by J. P. Duckworth, G. R. Kiel, C. M. Thomas and A. J. Waligura.
- HW-76269 REV, Unclassified, "Fire Fighting Criteria for 234-5 Building", dated April 12, 1963, by G. O. Ager and L. M. Knights.
- HW-76689, Unclassified, "Design Scope of Plants Stabilization Facilities - Chemical Processing Department", dated April 5, 1963, by D. E. Braden and H. W. Stivers.
- HW-76764, Secret, "Process Specifications for Operational Control - Purex Neptunium Purification Unit", dated April 8, 1963, by B. F. Judson and R. W. Lambert.
- HW-76925, Official Use Only, "Chemical Processing Department - Hazards Review Task Force Report - Strontium Semiworks", dated April 5, 1963, by M. D. Alford, S. J. Beard, H. L. Caudill and O. V. Smiset.
- HW-76993, Official Use Only, "Project Proposal - Redox 216-S-7 Crib Replacement (Project CAC-101)", dated April 12, 1963, by L. W. Finch.
- HW-77016, Unclassified, "B-Plant - Phase I - Information Manual", dated March 15, 1963, by W. C. Schmidt.
- HW-77116, Secret AWD, "Progress Report - Weapons Process Engineering - March 1963", dated April 3, 1963, compiled by Members of the Weapons Process Engineering Operation, Research and Engineering.
- HW-77152 RD, Secret, "Purex Plant Production Schedule - April 1963", dated April 5, 1963, by D. McDonald.
- HW-77153 RD, Secret, "Redox Plant Production Schedule - April 1963", dated April 5, 1963, by D. McDonald.
- HW-77154 RD, Secret, "UO₃ Plant Production Schedule - April 1963", dated April 5, 1963, by D. McDonald.
- HW-77155 RD, Secret, "234-5 Plant Production Schedule - April 1963", dated April 5, 1963, by D. McDonald.

DECLASSIFIED

DECLASSIFIED

FW-77504

- HW-77226 RD, Secret, "Chemical Processing Department - Budget for FY-1965 and Revision of Budget for FY-1964 - Plant Acquisition and Construction", dated April 10, 1963, by L. I. Zahn.
- HW-77228, Confidential, "Critical Mass Control Specification - Storage of Plutonium Solutions for Recovery - Pipe Gallery, 224-I Building", dated April 24, 1963, by R. J. Sloat.
- HW-77229, Unclassified, "Critical Mass Control Specification - Temporary Storage of Plutonium Solutions - 234-5 Building, Corridors 3, 5, 6, and 7", dated April 24, 1963, by R. J. Sloat.
- HW-77233, Secret, "Engineering Study - New Button Line - 234-5 Building", dated April 15, 1963, by R. A. Ciccarelli.
- HW-77234 RD, Official Use Only, "Chemical Processing Department - Budget for FY-1965 and Revision of Budget for FY-1964 - Plant Acquisition and Construction", dated April 10, 1963, by L. I. Zahn.
- HW-77239, Secret AWD, "Inspection Study - Envelope vs. Average", dated April 10, 1963, by L. L. McGregor.
- HW-77253, Secret AWD, "Proposed A-Line Process", dated April 12, 1963, by R. E. Van der Cook.
- HW-77339, Secret, "Engineering Study - Weapons Fabrication Facilities Expansion - 234-5 Building", dated April 30, 1963, by D. D. Wodrich.
- HW-77347, Confidential, "Critical Mass Control Specification - Hood 7-C, 234-5 Building", dated April 29, 1963, by R. J. Sloat.
- HW-77349, Unclassified, "Engineering Study Auxiliary - Weapons Production - 'Z' Plant dated April 30, 1963, by R. C. Hollingshead.
- HW-77360, Secret, "Purex - Redox Operation Study", dated April 26, 1963, by J. H. Warren.
- HW-77362, Unclassified, "SS Material Measurements for Neptunium in the Chemical Processing Department", dated April 11, 1963, by J. S. Buckingham.
- HW-77369, Unclassified, "Plutonium Recovery by the Quick-Leach Process", dated April 26, 1963, by M. H. Curtis.
- HW-77376, Unclassified, "Auditing Procedures", dated April 23, 1963, by L. M. Meeker.
- HW-77380, Unclassified, "Final Report - Chemical and Radiochemical Analyses of TK-241-A-103 Sludge", dated April 10, 1963, by T. R. McKenzie.
- HW-77475, Secret, "Trip Report - Criticality Control Discussions at Rocky Flats March 25, 26, 27, 1963", dated April 29, 1963, by C. L. Brown, G. R. Kiel and R. L. Stevenson.

HW-SA-2928, Unclassified, "New Neptunium Recovery Facility at the Hanford Purex Plant", dated March 1, 1963, by J. P. Duckworth and L. R. Michels.

B. PREPARED FOR SIGNATURE AND ISSUANCE

HW-77137, Secret, "Production - March 1963", dated April 1, 1963, by W. E. Johnson.

HW-77320, Secret AWD, "HAPO Production Forecast, April 1, 1963 Through December 31, 1964," dated April 29, 1963, by W. E. Johnson.

DECLASSIFIED

CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

APRIL, 1963

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>
J. J. Shefcik, Research and Engineering	A Novel Circulator Design For Evaporation By Hot Gas Sparging (EW-77534)

P. H. Reinke

General Manager
Chemical Processing Department

DECLASSIFIED

END

**DATE
FILMED**

3 / 18 / 93