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HW 76848

This document consists of
48 pages.

CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT
FOR

FEBRUARY, 1963

HW--76848

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HANFORD ATOMIC PRODUCTS OPERATION
RICHLAND, WASHINGTON

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I. SUMMARY

Production through February, as compared with the January 31, 1963 HAPO Production Forecast (HW-76221), is summarized below:

	<u>Percent of Forecast Achieved</u>	<u>Fiscal Year</u>
	<u>February</u>	<u>To Date</u>
Separated plutonium nitrate	83.9	98.2
Separated uranium nitrate	85.6	96.1
Uranium oxide	99.1	96.5
Plutonium metal buttons	72.6	99.1
Fabricated parts	100.2	101.2

Following the scheduled shutdown at Purex during January, processing was resumed on February 3, with the initial feed consisting of unclassified metal. Six days of outages were sustained during the run period, which was completed on February 18. After returning to regular production, a rate of 30 tons per day was achieved and maintained for the remainder of the month. Both the plutonium and uranium products met specifications, although part of the uranium required silica gel treatment. These difficulties resulted in February production being below that forecasted for separated plutonium, separated uranium, and plutonium metal buttons.

The HAPO II-1 cask, loaded with 170,000 curies of strontium-90, was released to the AEC on February 22 for shipment. The HAPO-I-B-2 cask, which was loaded with 90,000 curies of cerium-144, is currently undergoing tests before being released for shipment.

Following the completion of operability tests in the new Cesium Loadout Facility (Project CAC-950), four ORNL STT casks were loaded with a total of 200,000 curies of cesium-137. Overall recovery of the cesium-137 was in excess of 95 percent.

A Purex plant test of the use of sugar for nitrate destruction was completed during February. The acid concentration was reduced from 4.5 M to 0.70 M, the greatest reduction achieved to date.

During the latter part of January and early February, five neptunium stripping campaigns were made from the Redox accumulation system, yielding approximately 2600 grams of crude neptunium.

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Dissolution of the first irradiated fuel elements from Hanford's experimental Plutonium Recycle Test Reactor (PRTR) was satisfactorily completed in the Redox plant during late February. Three dissolving processes, in sequence, were required to dissolve the aluminum charging canister, the zirconium cladding, and the plutonium - aluminum alloy fuel element. Chemical processing of the PRTR material is planned for early March.

Direct calcination of plutonium nitrate has been demonstrated in excess of 500 grams of plutonium per hour. This was an instantaneous throughput rate in a two-inch diameter, laboratory scale screw calciner. Reactivity of the produced oxides was being tested at month end.

The process design criteria were virtually completed for Purex plant dissolution of standard overbore I&E fuel elements, both natural and enriched, and NPR fuel elements.

Work was started February 8 to prepare a modified design of the 241-A type high-level waste storage tank for use at Purex. Changes will include features to strengthen the walls, improved circulation, improved temperature controls, and a leak detection system.

A new button line is being scoped for the 234-5 Building, to be located in the present Recuplex space. The concept is based upon direct calcination, fluid bed chlorination, and electrowinning processes. The proposed installation would be so arranged that each major component could be operated independently.

P. H. Rinker

General Manager
Chemical Processing Department

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CHEMICAL PROCESSING DEPARTMENT
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II. ACHIEVEMENTS

A. PRODUCTION OPERATION

1. Production Statistics

a. Percent of Forecast⁽¹⁾ Achieved

	<u>February</u>	<u>Fiscal Year to Date</u>
Separated plutonium nitrate	83.9	98.2
Separated uranium nitrate	85.6	96.1
Uranium oxide	99.1	96.5
Plutonium metal buttons	72.6	99.1
Fabricated parts	100.2	101.2

b. Purex

	<u>February</u>	<u>January</u>
Uranium nitrate produced (tons)	405.62	9.36
Average production rate during operation (T/D)	22.0	0
Total waste loss (%)		
Plutonium	0.61	0
Uranium	0.36	0.04
On-line efficiency (%)	62.0	0

c. Redox

Uranium nitrate produced (tons)	108.16	214.78
Average production rate during operation (T/D)	8.8	7.3
Total waste loss (%)		
Plutonium	0.51	0.37
Uranium	0.34	0.23
On-line efficiency (%)	62.0	94.9

d. Uranium Reduction (tons)

Normal UO ₃ loaded	409	586.88
Enriched UO ₃ loaded	165	150.51
Normal UO ₂ approved for shipment	493.83	443.82
Enriched UO ₃ approved for shipment	101.10	100.32
Normal UO ₃ shipped	395.01	542.70
Enriched UO ₃ shipped	101.15	101.25
Normal UNH backlog	235	242
Enriched UNH backlog	23	52

(1) HW-76221, HAPO PRODUCTION FORECAST, dated 1/31/63.

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e. Plutonium Metal Processing

	<u>February</u>	<u>January</u>
Reduction yield (%)	97.2	99.1
Product recovery output (Kgs)	157.46	202.98
Product recovery backlog (Kgs)	1198.85	1327.98
Waste disposal (grams)	336	650

f. Power

	<u>200-East</u>	<u>200-West</u>
Raw water pumped (gpm)	8,730	4,430
Filtered water pumped (gpm)	1,010	914
Maximum steam generated (lbs./hr.)	220,000	155,000
Average steam generated (lbs./hr.)	178,000	117,000
Total steam generated (M lbs.)	119,460	78,364
Coal consumed (tons)	6,139	4,169

After being down for the entire month of January because of a lack of sufficiently aged metal feed and for maintenance repairs, the Purex plant did not achieve satisfactory operation until near mid-February because of mechanical failures. These difficulties resulted in February production being below that forecasted for separated plutonium, separated uranium, and plutonium metal buttons.

J. H. Warren
Manager, Production

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2. FISSION PRODUCT DATA

	<u>PUREX* RECOVERY</u>	<u>244-CR* INVENTORY</u>	<u>B-CANYON* INVENTORY</u>	<u>SEMIWORKS PRODUCTION</u>	<u>PRODUCT INVENTORY</u>	<u>PRODUCT IN CASK</u>	<u>PRODUCT SHIPPED</u>	<u>CUSTOMER</u>	<u>REMARKS</u>
Sr-90 (Kilocuries)	75	1200	-	-	1700(1)	470	170	ORNL	HAP0 II-1 Cask on 2-22-63
Cs-137 (Kilocuries)								HLO	For R&D work.
Ce-144 (Kilocuries)									

(1) Does not include 100,000 curies of rework material to be recycled.

*Estimated figures based on Cs. calculations.

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II. ACHIEVEMENTS (Continued)

B. PUREX OPERATION

1. Operating Continuity

The plant started at 2335 on 2-3-63 at CF 3.0 on unclassified metal. Six days of outages were sustained during the run period until 2-18-63. The switch to regular production was then completed and a CF of 3.6 was achieved and maintained for the remainder of the period.

2. Processing Operation

Plutonium and uranium within specifications were produced with silica gel treatment required on part of the uranium.

The continuous neptunium recovery package was started on 2-26-63.

Initial process test of LW denitration, using sugar reagent, was completed and results are being evaluated.

Instrumentation and control malfunctions in the LC Column (partition U stripping) required a shutdown of approximately three days shortly after startup.

Strontium Recovery Run #57 was started and completed through 57-S-2.

Operability tests were completed and the new Cesium Loadout Facility was used to load four STT casks with a total of 200,000 curies of Cs-137. Individual cask loadings were: #47 - 57,000; #48 - 48,000; #44 - 48,000; and #45A - 47,000 curies.

Released for shipment 2-22-63 was the HAPO II-1 cask loaded in January with 170,000 curies of Sr-90.

An HLO cask was loaded with 50,000 curies of Sr-90 in the strontium nitrate form for the Chemical Research Operation, HLO.

Cerium loadout of 90,000 curies in the HAPO I-B-2 cask was completed and readied for shipment. The small loadout was caused by agitator failure in the E-1 (Cask Feed) tank.

The 104-A and 106-A waste storage tank temperatures increased to approximately 225°C. By using additional portable compressors for supply to the air circulators and increasing the tank liquid level temperatures were reduced to less than 175°C by month's end.

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3. Mechanical Experience

The titanium tube bundles in F6 (Acid Concentrator) were replaced with stainless steel to permit higher concentrator flow rates.

The 2AF (Second Pu feed) jumper failed to pass flow and was replaced.

The E-1 (Cask feed) tank agitator failed and was replaced with a longer one.

The west crane 40-ton hook cable showed excessive wear during scheduled inspection and was replaced. Optic heads and lenses were replaced to restore excellent visibility to the system.

All relief valves on process and service equipment in the Purex plant were inspected and pressure tested.

The #2 air compressor at 241-A tank farm failed with damaged rotor blades. It was overhauled and returned to service.

4. Radiation Experience

The total iodine 131 emission for the month was 0.90 curies. The maximum seven-day emission was 0.50 curies.

5. Analytical Experience

Cesium and strontium analyses were made on a Purex recovered acid sample, using special method adaptations.

6. Events Influencing Cost

AR-26053, Powered 10-ton Swivel Crane Hook

Installation completed and accepted.

CAC-950, Cesium Loadout Facility

Facility was accepted with exceptions on 2-14-63.

CGC-897, Fission Product Concentrates Storage System - 200 E Area

Acceptance, with exceptions, made on 1-31-63.

Manager - Purex

FR McMurray:gt

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II. ACHIEVEMENTS (Continued)

C. REDOX OPERATION

1. Operating Continuity

The Redox and Uranium Oxide plants operated at satisfactory rates throughout the month. Processing operations were very satisfactory and no major equipment breakdowns were experienced.

Dissolution of the first irradiated fuel elements from Hanford's experimental Plutonium Recycle Test Reactor (PRTR), was completed during the month. Chemical processing of the feed is planned for early March.

2. Processing Operations

a. Redox Processing

The Redox Plant returned to a five-day week operation on February 4 after operating on a seven-day-per-week schedule during the month of January.

E-Metal processing was conducted as scheduled through February 19. On this date E-metal processing was discontinued and the balance of the month was used for accumulating and reworking waste solutions and acid flushing of the equipment prior to processing the first batch of PRTR fuel elements.

The first batch of Zircaloy-clad PRTR fuel elements was delivered to the Redox Plant on February 18. Dissolution of the first charge in the B-2 dissolver was started on February 19 and subsequently completed without incident. Three dissolving processes were required in sequence in order to dissolve the aluminum charging cannister, the zirconium cladding, and the plutonium-aluminum alloy fuel element. Chemical processing of the PRTR fuel element feed will not start until the early part of March, after the sixty percent nitric acid flush of the processing equipment has been completed.

During the latter part of January and early part of February, five neptunium stripping campaigns were made from the neptunium accumulation system. Approximately 2600 grams were loaded out and shipped this month to Separations Chemistry, Research & Engineering Operation, for final purification and isolation.

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Canyon cell jumper changes were completed on 2-16-63 to permit routing of reclaimed sodium nitrate, recovered from tank farm wastes, to the A-2 dissolver. Both of the multipurpose dissolvers are now routinely using reclaimed sodium nitrate as a hydrogen suppressant during the removal of the aluminum jackets from feed metal slugs.

b. Uranium Oxide Processing

The production of both depleted and enriched uranium oxide was satisfactory for the month. Installation and alignment of the new agitator in the M-cell depleted uranium calciner was completed on 2-21-63 and the unit was returned to service during the last week of the month.

3. Mechanical Experience

Processing equipment in the Redox Plant performed very well throughout the month and the mechanical efficiency was 100 percent.

Efforts to repair the leaking D-12 waste concentrator in-position were unsuccessful and preparations were being made at the end of the month to install a spare unit.

The PRTR fuel element storage tank was installed in the J-1 tank position in J-cell on 2-13-63. No difficulties were encountered and the unit was ready for the first PRTR element shipment on 2-18-63.

4. Waste Handling and Decontamination

Equipment valued at approximately \$96,000 was received from the processing plants for decontamination, repair, inspection or burial during the month. Equipment valued at approximately \$18,000 was returned to customers, representing a savings of approximately \$12,000 over the cost of new equipment.

5. Radiation Experience

Four radiation occurrences and four skin contamination cases were recorded during the month. The radiation occurrences were not significant and all skin contamination was readily reduced to non-detectable.

The dike around the Redox No. 2 cooling water swamp broke on 1-31-63 and the immediate desert area of approximately 50 by 400 yards was inundated. Radiation to 4000 c/m was general in the area. Repairs to the dike were completed on 2-4-63 and the ground contamination was subsequently fixed by blading the area and covering with additional soil.

Manager - Redox

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II. ACHIEVEMENTS (Continued)

D. WEAPONS MANUFACTURING OPERATION

1. Operating Continuity

All Weapons Manufacturing equipment, except the incinerator, functioned without significant interruption during the month. The incinerator was out of service during the entire period to permit study and evaluation of the damage discovered late in January.

2. Processing Operations

a. Plutonium Fabrication

Information on plutonium fabrication is presented in Document HW-76897 entitled "Chemical Processing Department, Weapons Manufacturing Operation, Z Plant Monthly Report, February, 1963" which is classified "Secret, Atomic Weapon Data, Production Rate and Stockpile Quantity Information."

b. Plutonium Processing

The production of unfabricated plutonium was satisfactory in spite of numerous minor mechanical failures. One lot of unclassified plutonium was processed without difficulty.

The dissolution of metallurgical scrap in the laboratory-type dissolvers continued at high rates, and the backlog of this material was reduced by thirty per cent during February.

3. Mechanical Performance

Fabrication equipment performed satisfactorily with the only significant maintenance problems involving the adjustment of the new bearings on Lathe M1 in HC-43 and the setting of the tracing controls on Lathe M2 in HC-41.

Plutonium processing equipment experienced frequent minor difficulties. Pump failures in Hood 7-C and corrosion of the resin-bed support screen in one of the ion exchange columns in Hood 46 were the two most troublesome items. In the latter case, the failure of the screen took place immediately after the resin had been replaced in the columns and there was no loss of plutonium. Additional screens and filters have been added to the entire ion exchange system to eliminate the possibility of plutonium loss in the future.

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3. Mechanical Performance (Continued)

Detailed study and evaluation of the damaged burner of the incinerator revealed that the design and construction of the equipment did not include the proper allowance for expansion. Engineering recommendations relating to repair and modification of the equipment have been received, and detailed drawings are being prepared at month end.

Renovation of Hood 9-A (Button Line equipment) has been completed, and transfer of plutonium processing from C-Line to A-Line is scheduled for early March. Renovation of Hood 9-B will proceed as soon as the reliability of Hood 9-A is proved.

Reactivation of Hood 42 (metal powder dissolvers) is in progress with teflon-lined dissolvers being installed.

4. Radiation Experience

Radiation and contamination control statistics showed rates that were significantly improved over the past period.

One case of possible plutonium deposition occurred when a craftsman breathed contaminated air which issued from a ruptured glove on a process hood in the room where he was working. Initial examination indicated that deposition, if any, will be in minor amount.

5. Analytical Experience

	<u>January</u>	<u>February</u>
Number of Samples Received	3,107	2,511
Number of Determinations	17,506	14,624
Total Impurities, Buttons	1,400 ppm	1,480 ppm
Buttons Rejected	4.6%	7.3%
Pu 240, Normal Buttons (by Neutron Count)	5.95%	6.16%
Pu 240, Unclassified Buttons (by Neutron Count)-----		7.82%

W. G. Gartin
Manager
Weapons Manufacturing

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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; however, raw water to the 200 Area reservoirs was valved off for a 30-minute period February 11, in order for the Irradiation Processing Department to perform draw-down tests of high-tanks in the 100-B Area.

2. Inspection, Maintenance and Repair

Special emphasis was placed on expediting fabrication of two stainless-steel trays required for the D-cell liner program at the Redox facility. The trays will line 24 inches of the wall and the entire floor under vessels D-13 (waste receiver) and D-14 (backcycle concentrator), to prevent further corrosion damage to the cell floor. Two new spare vessels are being altered to allow for the change in elevations created by the cell-liner installation.

An existing T-Plant contamination-regulated tank was altered for use in Redox as a storage basin for PRTR fuel elements. The vessel was mocked up with all associated new jumpers. Work included the adaptation of the tank to the locating pads in the canyon; removal of the tank top; and fabrication and installation of a rack within the tank. Installation of the tank in the cell has been completed.

New sample disposal and dilution hoods for the laboratory at the Purex facility are being fabricated and were 60% complete at month's end.

Satisfactory progress was made on the installation of instrumentation for Project CGC-928 (Leak Detection High-Level Waste Tanks, Redox and Purex). The work is complete at the 241-SX Tank Farm and 25% complete at 241-A.

Installation of the fifth Stokes casting furnace and associated equipment in the Weapons Manufacturing Operation's RMA Line is an estimated 90% complete. The perchlorethylene coolant system for the induction coils is complete, the airlock and conveyor hoods have been installed, and only minor work remains to be done on the ventilation system.

Nine lucite panels were made up and installed in hoods in the Weapons Manufacturing Operation as replacements for in-service panels that were no longer pervious to light.

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Progress continued on the fabrication of a spare loop for the Pu concentrator at the Redox facility. The new loop is being made of titanium pipe, and was 90% complete at month's end.

Twenty-eight cell pipe connectors (jumpers) were fabricated to meet the requirements of the Redox (12) and Purex (16) facilities.

No. 4 boiler in the 200-East Area Power House developed a noticeably short supply of combustion air at high boiler loads. Inspection disclosed that the draft-fan impeller blades were badly eroded by the hot gases and fly ash. Corrective measures included installation of all new impeller blades.

The existing CO₂ fire extinguishers located throughout the coal-conveyor systems in both the 200-East and West Area Power Houses were replaced with new and larger dry-chemical-type fire extinguishers.

Approximately 30,000 sq. ft. of ground area was covered with four inches of new soil to stabilize contamination carried out of Redox cooling-water pond No. 2 when the dike broke. The velocity of the water rushing through the break pulled particles of contamination off the bottom of the pond, which settled out over the flooded area. A twenty-inch overflow line was installed in the dike separating the No. 2 and No. 3 cooling ponds, to maintain a constant water level between the two.

At the request of the Redox Operation, procedures were prepared to facilitate a complete shutdown of the 202-S canyon ventilation system, to permit installation of a new charcoal filter in the canyon exhaust system.

The reproduction of multilith copies per day exceeded all previous records for the department's mail-and-duplicating component.

A sizable contribution, in the form of tool-&-die work, was made to the Irradiation Processing Department's 100-N Area organization during the month. Machined and assembled were two complex portable machine tools for cutting and resurfacing the internal seating surfaces of the Grayloc hubs located on the ends of the primary cooling-water tubes. A considerable amount of overtime was utilized in completing the work schedule.

The ventilation systems in all of Irradiation Processing Department's 105 Reactor buildings were checked for compliance with confinement criteria.

T. G. LaDolente

Manager
Power and General Maintenance

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CHEMICAL PROCESSING DEPARTMENT
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II. ACHIEVEMENTS (continued)

F. FACILITIES ENGINEERING OPERATION

1. Purex

a. Process Design Engineering

Sludge Removal and Waste Transfer

An engineering study was initiated of the facilities required for sludge removal from 241-A and 241-AX Tanks and transfer of waste between 202-A, 241-A, 241-AX, and 222-B.

Purex Waste Behavior

Synthetic Purex wastes NFW (Neutralized Formaldehyde Treated Wastes) were concentrated to approximately 35 g/T and placed in a 60⁶⁰ exposure chamber at an intensity of approximately 2.8×10^6 R/hr. for several months. The purpose of this test was to examine the physical changes caused by radiation.

241-AX Tank Design

Design work was started on February 8 to prepare a modified design of the 241-A-type bottom-supported, high-level waste storage tank. Modified designs will be prepared for improvement in circulation, temperature control, leak detection, material of construction, and sidewall load carrying capability.

Multipurpose Dissolver

The process design criteria covering dissolution of standard overbore I & E fuel elements, both natural and enriched, and NPR fuel elements in the Purex facility, were virtually completed. A rough draft, scheduled for completion by March 1, includes equipment design criteria, head-end solution routings, processing requirements (including Zirflex dissolution of Zr-2), and associated chemical make-up systems.

Waste Diverter

Test runs of simulated Purex formaldehyde-treated waste were continued in the mock-up waste diverter. The concentration was varied between 75 and 46 gallons per ton of uranium with 45 to 60 percent settleable solids, respectively.

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There was no indication of plugging or build-up of sludge in the diverter or piping during fourteen demonstration runs. A spigot-to-funnel closure employing baffles for entrainment separation, was used for these runs. This closure eliminated practically all splashing and spillage around the funnel; however, it appears to be more difficult to position accurately and to decontaminate.

b. Project Engineering

CGC-930 - Secondary Containment of Dissolver Off-gases - Redox and Purex

All concrete work is now completed. Instruments have been installed in the instrument shelter, and one of the three systems was put into active service. The other two are currently being tied-in to their respective filters.

CAC-950 - Cesium Load-out Facility - 241-C

Project CAC-950 - Cesium Load-out Facility - 241-C Building - was completed and closed-out on February 15, 1963. Minor exceptions are being completed.

2. Redox

a. Process Design Engineering

PRTR Fuel Element Storage Tank

Cell design drawings have been completed and issued. The tank has been installed and is operating satisfactorily.

"D" Cell Liners

The design of the liners for "D" Cell for D-13 and D-14 positions is complete. Four new jumpers will be required in the D-14 position. Drawings for these are completed and have been issued. Two devices for removal of the sludge from the cell floor have been designed and drawings issued. All the above drawings have been sent to the shop and fabrication has been started on these items.

L-2 Vessel

A new drawing was prepared and issued for alteration of the L-2 spare concentrator. Process and criticality requirements were included.

L-12 Concentrator

A new drawing was prepared modifying existing tower design. The modifications provide additional scrubbing of the gas to reduce chemical costs.

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Waste Tank Leak Detection System (Vertical Wells)

A new pre-amplifier was designed for Redox Monitoring for use with the vertical well leak detection system. This system requires a pre-amplifier that uses a high gain, silicone transistor to meet all demands. Temperature stability checks are presently being performed on various types of equipment to be used in the system. The writing of a specification for an automatic cable reel was started.

b. Project Engineering

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

The six cable reel installations in the SX Tank Farm are complete with minor exceptions. Two installations remain to be completed in the 241-A Farm.

3. Weapons Manufacturing

a. Process Design Engineering

New Button Line Scope

Several preliminary arrangement drawings have been prepared for a new button line based on direct calcination, fluid bed chlorination, electrowinning processes. These different arrangement drawings were prepared to evaluate the relative advantages of: (1) close coupling of the various process equipment vs complete separation; (2) the RMA Line location vs location in the Recuplex Area; and (3) totally enclosed conveyors such as tube conveyors vs glove box conveyors such as a flat conveyor. These studies have determined the merits of separating each of the major process equipment components in such a manner that operation of each unit would be independent of that adjacent to it. It is now planned to utilize Recuplex space for the New Button Line.

Hoods 227, 44, and 42

Installation of ultrasonic leaching equipment in Hood 227 has been completed. Design changes to the fusion hood (44) for the installation of a teflon-lined batch dissolver in place of the fusion process dissolver have been discontinued. Design has been completed for a heat exchanger for the batch dissolvers in Hood 42.

RMA Fabrication Line

Preliminary scoping studies have been started on a combination Floturn blank preparation and machining hood. Detailed design

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of the Floturn hydraulic system changes, required due to moving of existing hydraulic units to the new "A" Line mezzanine (Project CGC-984), is in progress.

380 KEV Gamma Measurement of Plutonium

A second examination of plutonium residues concealed within process equipment of the 232-Z Incinerator Building has been started. The initial survey which used the 400-channel gamma energy analyzer was made in February 1962, as one of the first comprehensive trial usages of 380 KEV gamma emission from Pu₂₃₉, as an index for plutonium measurement. A specially designed lead collimator capable of vertical movement over a six-foot range is being used with the present survey as a means of pinpointing residue locations more readily.

Incinerator

During an investigation into the cause of contamination around the incinerator unit, at least three cracks were discovered near the joints where the vertical flues are welded to the upper combustion chamber. Extensive engineering studies have revealed that the cracks were caused by physical restraints which prevented sufficient thermal expansion during the heating cycles. A decision was made to re-weld the cracked joints, to re-design the equipment so as to eliminate restraints, and to place the combustion chamber in a Zone IV Area. Detailed design drawings for doing this work are being prepared.

b. Project Engineering

CGC-912 - Waste Treatment Facility - "Z" Plant

A revised scope and a revised project proposal are being prepared.

CGC-978 - RMA Button Line Filtrate Handling Facility - "Z" Plant

This project was closed-out on schedule (February 15). Process instrumentation and pump improvement will be completed as exceptions to the project as soon as materials are procured.

CGC-983 - Plutonium Ingotting and Auxiliaries Facility-RMA Line-234-5 Building

Of the 28 drawings (new) required for this project, 27 have been issued for comment, and 22 of these have been approved for construction. Thirteen purchase requisitions have been issued for engineered equipment; eight purchase orders have been placed. Both design and construction phases are ahead of schedule.

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CGC-988 - Additional Plutonium Casting Facilities - RMA
Line - 234-5 Building

This project proposal was returned on February 7, without approval, to await delineation of the Commission total weapons program.

CGC-990 - Degreasing and Briqueting Facility - RMA Line -
234-5 Building

This project was also returned on February 7, without approval, to await delineation of the Commission total weapons program.

c. Manufacturing Engineering

Production Control Assistance-Fabrication

The machining data IBM-oriented card supplied to the Fabrication Plant supervision has been accepted as a routine form. An order has been submitted for establishment of the new form by Forms Control Operation.

4. General

a. Process Design Engineering

Leak Detection - Radioactive Waste Tanks

A revised cost estimate indicates that the "Data Gage" liquid level measuring instrument could be installed for approximately \$140,000 excluding project management, design and overhead costs. The system would instrument 95 tanks utilizing five remote field selectors and two read-out consoles. The estimated cost was based on a quotation from Texas Instruments to provide the equipment and a labor estimate for the wiring and installation by the labor service contractor. This estimate compares favorably with the steel tape electrode system.

Hanford Isotope Plant

Theoretical studies are underway on heat transfer relationships for pelletized, encapsulated SrTiO_3 , Cs glass, Pm oxide, and Ce oxide. Tentative pellet diameters have been established based on storage of capsules in a water basin with natural convection only. Tentative maximum diameters for SrTiO_3 and cerium oxide on this basis are about two inches and 0.5 inch, respectively. A preliminary review was made of the over-all packaging requirements and equipment scheduling. The process flow sketch for SrTiO_3 has been completed to the stage where equipment can be sized and processing space allocated.

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Phase II - Waste Management

The report which defines both project and research and development work to be performed under Phase II of the Waste Management Program has been completed and a draft copy is ready for comment and final issue. As scoped, Phase II will provide capability in "B" Plant for demonstrating packaging large quantities of waste and fission products in a variety of forms and container sizes.

Alpha Air Monitor

The possible applications to CPD of a high-sensitivity coincident-count alpha monitor for airborne plutonium concentrations are being investigated. The monitoring system was developed by HLO (HW-75384). Their tests indicate that it may eliminate the 24-hour waiting period now necessary for decay of beta radiation from natural alpha-beta isotopes in the air.

b. Project Engineering

Project Cost Information as of 2/17/63:

Total Authorized Funds - 16 active projects	\$5,760,000
Total Cost-to-date	3,909,000
Commitments and Open Work Releases	569,000
Unencumbered Balance	1,282,000
Costs Charged to Above Projects (1/20/63 to 2/17/63)	198,000

Manager
Facilities Engineering

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CHEMICAL PROCESSING DEPARTMENT
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II. ACHIEVEMENTS (Continued)

G. RESEARCH AND ENGINEERING OPERATION

11. Purex Process Engineering

(a) Feed Preparation

A weekly flush of the coating waste line to underground storage with five per cent caustic was initiated after start-up experience indicated that the recently established water rinse chaser for the coating wastes was not sufficient to keep the line from plugging. Secondary containment filters were placed in operation in the dissolver off-gas lines during the January outage.

(b) Solvent Extraction

Process performance was generally excellent during the month after continuous operation was established with plutonium losses averaging less than 0.04 per cent. Start-up of the plant was attempted initially on February 3. However, a severe flood in the IC Column, caused by instrument malfunctions, resulted in transfer of a gross quantity of organic to the ICU Concentrator and necessitated a shutdown to flush the organic from the system and recover the associated uranium. The second start-up on February 7 was interrupted by the failure of a flow control valve. The third start-up was completed successfully on February 8 with "hot" feed material of a nonrepresentative irradiation history. As a result of the numerous start-ups and shutdowns, two batches of concentrated waste (IWW) required segregating and were successfully reworked along with a batch of concentrated, hydrolyzed sump material. The plant was shut-down at equilibrium twice more during the month - once to permit segregation of product and rearrangement of concentrator tube bundles and once for replacement of a failed remote process line. Performance of the Final Plutonium Cycle was excellent the entire month with decontamination factors averaging about 3000 despite erratic acidity in the 2A Column associated with a malfunctioning flow controller. Performance of the Final Uranium Cycle was good. Plutonium contamination in the uranium product has remained near or below the analytic detection limit in spite of a temporary high carryover from the First Cycle during one of the start-ups. Decontamination performance has shown a two-fold improvement over the previous run period.

Neptunium accumulation in the Backcycle Waste System (3WB Stream) was improved over the past few months with losses averaging eight

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and five per cent via the First Cycle waste (HAW) and Final Uranium Cycle product (2EU) streams, respectively. The Continuous Neptunium Recovery System (J-Cell Package) was started February 25.

(c) Solvent Treatment

The last of the mixed diluent (Shell-2342, Soltrol-170) was introduced into the plant and a transition to all Soltrol-170 was started. The 3900 gallons of solvent (48 per cent TBP) which passed through the ICU Concentrator was stored for future reuse. Separations Chemistry tests indicate this solvent is comparable to plant solvent when butted with diluent to specifications and permanganate-carbonate washed.

(d) Waste Treatment and Acid Recovery

Following the February start-up, the maximum boil-off rate attainable in the IWW Concentrator, E-F6, was about 25 per cent less than during previous run periods. The capacity reduction was associated with newly installed titanium tube bundles and on February 16 and 17, the new bundles were interchanged with standard stainless steel tube bundles from the bypassed Waste Concentrator, E-F11. Following the change, E-F6 operation was capable of pre-February rates with single-stage acid recovery.

A plant test using sugar for nitrate destruction was completed. The free H ion concentration was reduced from 4.5 M to 0.70 M with a consumption of one mole of sugar per 18 moles of nitrate destroyed.

(e) Fission Products

The HAPO-IB-2 Cask was loaded with a cerium and rare-earth fraction for shipment to Oak Ridge National Laboratories. The first loading attempt was unsuccessful due to insufficient agitation to keep the cerium rare-earth sulfates suspended. After several attempts to transfer slurry to the cask, the vessel agitator was removed and replaced. With a new agitator in place, difficulty was experienced with lines plugging. Sufficient slurry was passed through the cask however to plug the filter. Calorimeter tests on the filled cask indicated a cask load of 90 kilocuries of Cerium-144.

A new cesium loadout station was placed in operation at C-Farm in 200-E Area on February 20, 1963. Start-up was uneventful except for minor mechanical difficulties with the feed pump and a flow instrument. Four ORNL SIT casks were each loaded with about 50,000 curies of Cesium-137 with overall recovery efficiencies in excess of 95 per cent.

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2. Redox Process Engineeringa. PRTR Dissolution

The dissolution of the first charge (two canisters containing 18 fuel elements) of PRTR fuels was completed during the report period. Three dissolving processes were required in sequence in order to dissolve the aluminum charging canister, the zirconium cladding, and the plutonium-aluminum alloy fuel element. The basic processes are tabulated below.

<u>Operation</u>	<u>Solution Used for dissolution</u>	<u>Time Cycle</u>
Canister dissolution	4 M NaNO_3 -0.4 M NaOH (initially) 19 M NaOH (incrementally)	8 hours
Zirconium cladding dissolution	0.34 M NH_3F -4 M NH_3NO_3	8 hours
Pu-Al alloy dis- solution (3 cuts)	1.0 M HNO_3 -0.003 M HgNO_3 (to initiate reaction) 13 M HNO_3 (added immediately (after reaction begins)	4 hours each
Pu-Al alloy (heel cut)	1.0 M HNO_3 -0.003 M HgNO_3	4 hours

The plutonium-aluminum alloy dissolution was quite rapid in the 1.0 M HNO_3 solution and during the early part of the 13.0 M HNO_3 addition period. Concentrations of hydrogen approached four percent in the diluted dissolver off-gas for short periods of time (about 15 minutes) during each cut except the heel cut. Hydrogen evolution rates can be better controlled by dissolving smaller quantities of metal during each cut. Only that portion of the elements which is covered by the initial 1.0 M HNO_3 and 0.003 M HgNO_3 solution is activated and dissolved in any one cut.

b. Sodium Nitrite Reductant Test

A plant test was made using sodium nitrite instead of ferrous sulfamate for valence adjustment of the anion exchange feed. This was done in order to eliminate iron from the plutonium feed solution and thus reduce impurities in the product solution. The conclusions of the test were:

- (1) Sodium nitrite was not a satisfactory reductant using continuous flow through the E-3 valence adjustment tank. There was not enough residence time to assure complete reduction, and 5 to 20 percent of the plutonium transferred out of the E-3 tank was still at the six valence.

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(2) There was no significant improvement in product purity.

c. Neptunium Recovery and Purification

During the latter part of January and early part of February, five HS Column neptunium strips were made. Data on these neptunium recovery operations are tabulated as follows:

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DATA ON FEBRUARY'S (1963) NEPTUNIUM RECOVERY OPERATION

Batch Number	% Yield (units stripped/units in accumulation)*	In E-1 (3AF Feed Tank)			% Yield across 3A Column	In E-4 (Neptunium Ozonator Tank)		
		γ /Np uc/gm	Pu/Np gm/gm	U/Np gm/gm		γ /Np uc/gm	Pu/Np gm/gm	U/Np gm/gm
1	29.2	1.8×10^5	1.3×10^{-2}	20 (before spin) 6 (after spin)**	97	1.3×10^4	1.3×10^{-2}	5
2	36.2	2.3×10^5	1.1×10^{-2}	9	81	1.3×10^4	1.8×10^{-2}	11
3	35.0	5×10^5	7×10^{-3}	5	82	1.1×10^4	1.1×10^{-2}	3
4	37.5	5×10^5	5×10^{-3}	5	91	2.3×10^4	1.6×10^{-2}	5
5	34.2	8.4×10^5	0.5		91	3.4×10^4	.26	4***
4 & 5		6.0×10^4	(?)	4	88	6.2×10^3	.26	4

* Yield - Stripping Operation. Only 1000 gallons of feed solution are processed during one stripping operation, which represents 20 to 40 percent of material in the accumulation cycle (depends upon F-1, F-2 and F-8 volumes). These yields represent essentially all of the neptunium fed to the 1S Column.

** Batch number 1 was given an acid deficient spin pass to reduce the uranium contamination.

*** Batches number 4 and 5 were combined in E-4, returned to E-1 and processed through the 3A and 3B Columns for additional decontamination. Because of inadequate flushing of E-1, the activity in the product solution was doubled by bringing E-4 into E-1. The df across 3A was 10 on the second pass but this only represented a factor of five better than previous E-4.

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3. Plutonium Process Engineering

a. Metal Finishing Operation

1. Button Line

The average button density was 19.31, with 1.9 percent rejects. Feed to the button line consisted of 37 percent Purex, 21 percent Redox, 40 percent dissolved oxidized skull solutions, and 2 percent eluant from the filtrate ion exchange process. The percentage of the feed plutonium in the filtrate was 2.9 percent.

A new blow-back off-gas filter system for the calciner has been successfully cold-tested using lead oxide as a stand-in. The unit consists of three filters in parallel, the cartridges being stainless steel frits. The blow-back mechanism is actuated once every minute and blows back for approximately one half second.

A test designed to reduce the nitride content of buttons has been performed. In the test, the reduction crucible was purged 11 times with argon rather than the normal three purges. The nitride in the test button was 80 ppm (normally greater than 450 ppm). On the basis of this initial test, additional increased-purge buttons will be made to provide sufficient low nitride content buttons for fabrication testing.

Tests designed to determine the optimum calcium charge added to the reduction bomb have been completed. These tests showed no increase in plutonium button density when the calcium charge was increased above 140 percent of the theoretical requirement. Hence, 40 percent excess calcium has been specified for routine reductions.

Preparations are being made for the start-up of hood 9-A early in March. Hood 9-A is being reactivated to permit maintenance activities in hood 9-B. New operating guides and critical mass specifications (HW-76553 and HW-76554) have been provided.

2. Oxalate Supernatant Ion Exchange Facility

The yield across the ion exchange unit was 97.3 percent. All button line supernatants were processed through the facility, however, increased throughputs through the button line curtailed processing of stored wastes (e.g., leach solutions) through ion exchange.

The resin from one of the columns was lost to the geometrically favorable waste tank (negligible plutonium present) due to corrosion of the bottom screen support. Inspection of the other screen supports showed no corrosion.

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3. Leaching Hood 227

Geometrically favorable ultrasonic leaching equipment replaced the geometrically unfavorable leaching system in the 227 hood. This equipment is used for leaching button line in-line filter cartridges, rags, and miscellaneous equipment. Tests with the ultrasonic equipment will include the above materials as well as special tests on neoprene gloves, plastic bags, and similar type wastes.

4. CAC-880 Plutonium Reclamation Facility

Tests on the air pulser used in Recuplex have been initiated in the 300 Area. Initial feasibility tests have shown that the air pulser is as good or better than a bellows type pulser. Tests indicate that the unit as established in the Recuplex process had many constrictions on the exhaust system of the air pulser leg, giving insufficient pressure differential between the pressure and the exhaust stroke. In Recuplex, a pressure slightly greater than the pressure exerted by the dynamic column "blew" the column. The unit, as installed in the 300 Area, could withstand a pressure greater than twice the column head pressure, at which point column mixing was excellent. Both installations, at pressures slightly greater than their respective column head pressures, gave poor mixing efficiency. Hence, it has been established that the air pulser can be an efficient pulsing mechanism for CAC-880.

5. Incinerator

A design basis flowsheet was issued (HW-76640) for the new leach hood to be used in conjunction with the incinerator facility.

6. Critical Mass

A conductivity probe has been placed on the inlet of the calciner hopper. Significant oxalate build-up in the hopper activates a red light on the panel board. A temporary conductivity probe has been installed in the ion exchange hood sump.

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4. Separations Chemistry Laboratory - O. F. Beaulieu

a. Purex Process Assistance

A sample of Permutit-SK was received from the vendor which had been modified to improve its thermal stability. The sample contained a considerable number of broken and deformed beads and exhibited a plutonium loading rate 3 to 5 times slower than the resin now in use.

The resin in use in N-cell (20-40 mesh Permutit-SK) was sampled twice a week during February and subjected to microscopic study. The following observations were made:

- (1) The initial sample appeared to be of fine quality with minor breakage visible. There was a significant amount of large beads of 10-20 mesh present which could indicate residual material in the sampler or in the column before adding the finer mesh material.
- (2) The large beads had disappeared by the time the sample was taken on the sixth day which might indicate a high attrition rate for large beads.
- (3) The bead size distribution was observed to shift toward the smaller bead sizes. Beads larger than 35 mesh had a high incidence of cracking or deformation leading to the conclusion that optimum bead size appeared to be from 35-50 mesh.
- (4) The color of the beads changed gradually from pale yellow to a golden color. The color change may be associated with softening of the beads.

b. Redox Process Assistance

The possibility of reducing hexavalent plutonium to the quadrivalent state in XAF (ion exchange unit feed) by sparging with NO_2 gas was evaluated in the laboratory. It was found that the kinetics of the system, which is 7 M in nitric acid, are too slow to be of practical use. Also the nitrogen oxides contained in the solution after sparging are such that considerable air sparging would be required before a suitable feed for use in the ion exchange unit would be available. It is feasible to use NO_2 as a reducing agent in dilute acid solution if desired. At temperatures above 50 C, hexavalent plutonium is rapidly reduced to the trivalent and quadrivalent state in a 0.5 M nitric acid solution by NO_2 sparging. This reduction is comparable to that obtained when using sodium nitrite.

c. Neptunium Purification

Two neptunium runs were completed during the month. The second run (#68) was shipped on waiver due to high Ru content which did not respond to special treatment. Tabulated data follows:

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	<u>Run 67</u>	<u>Run 68</u>	<u>Rerun 68</u>
Origin	Purex	Redox	Redox
Content	754 grams	980 grams	980 grams
Bed Preparation	13 col. vol. Reducing wash 17 col. vol. F.P. wash*	13 col. vol. Reducing wash 20 col. vol. F.P. wash	-- -- 20 col. vol. 8 <u>M</u> HNO ₃
DF's Pu	6400	57	1
Th	11	79	3
U	6330	-	88 total
ZrNb	638	2 x 10 ⁴	12
Ru	100	2.3 x 10 ⁴	2
Ru content	L2 uc/g Np	10 uc/g Np	6.1 uc/g Np

* 8 M HNO₃, 0.05 M N₂H₂, 0.01 M HF

d. Laboratory Assistance

1. A series of experiments were performed to determine the extent of organo-peroxide formation in Soltrol during hydrogen peroxide decomposition of citric acid. After five hours reflux at flowsheet conditions, the peroxide concentration in Soltrol was 0.005 M. In additional tests, the aqueous phase hydrogen peroxide concentration was varied from 0.9 to 1.5 M while nitric acid ranged from 1.0 down to 0.1 M, and the peroxide value in Soltrol was consistently 0.005 M. This low value was due, possibly, to the solubility of hydrogen peroxide in the organic rather than being representative of a true organo-peroxide formation.
2. Equipment for automatically cycling two different solutions through an ion exchange column was designed. This device was used to determine the effect of chemical attrition and osmotic pressure (bead swelling and shrinking) upon anion exchange resins. Permutit-SK 20-40 mesh has been tested in alternately high (7 M) and low (0.75 M) nitric acid concentrations for 500 cycles (equivalent to 54 operating days). The resin quality, as determined by microscopic examination with polarized light, was consistently very good through 250 cycles. At 500 cycles about 5% of the beads were pitted and showed some strain. This test will be continued to 1000 cycles.
3. The automatic alpha proportional counter was tested for reliability in a controlled environment (counting room) and an uncontrolled environment (laboratory bench). Five minute counts were taken repetitively over a sixteen hour period under both conditions. Statistical evaluation of the data showed the precision of the geometry at the 99% confidence level was $\pm 0.04\%$ at either location. A comparison of the observed standard deviation to the

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theoretical standard deviation showed virtually no difference; 621 counts vs. 673 counts, respectively.

4. A terphenyl-polyvinyltoluene crystal (2" d. x 2" h.) was used as a scintillation detector to accumulate a beta spectra on a multi-channel analyzer. Spectra of fair resolution were obtained for Pm^{147} , Ce^{144} - Pr^{144} , Tc^{99} , Sr^{90} - Y^{90} , and Sr^{89} . This technique adapts readily to guaranteeing mount purity for low energy beta emitters. A Pm^{147} mount, contaminated with five times its activity in Ce^{144} - Ce^{144} - Pr^{144} was resolved by spectrum stripping. This procedure will be adapted to a rapid process control analysis for Pm^{147} .

5. Thermobalance Studies

Plutonium dioxide samples from the Plutonium Chemistry Laboratory were received and chlorinated in the thermobalance (Sc-8; 6082, and 6083). Both samples were chlorinated to 100% in less than ten minutes. The first sample contained only 9.5% volatiles, but the second one contained 28.8% as usual.

6. Gas Chromatograph

Redox recovered hexone from the organic still (G-3) was recycled in a laboratory still in an attempt to concentrate the material which colors the hexone. The preparation of the "heavier-than-water" residue was completed in December.

Infrared analysis showed the organic residue contained carbonyl and nitrogen-containing groups. An analysis by gas chromatography showed the organic residue to be composed of eight major components. The first (lowest boiling component) appears to be acetone and the second very similar to hexone. From retention times it was determined that mesityl oxide is not present.

An initial attempt to separate the other components failed; additional techniques will be investigated.

7. The calibration of the Redox gamma analytical system in eight geometry positions was completed for the isotopes received to date. The 7090 computer programs and master matrices were rebuilt to accommodate the new data and the output was verified. AMI-1-3, AMI-4-6, and AMI-6-8 are now functioning and are in service.
8. Study of the characteristics and utility of a 3 x 1/4" NaI(Tl) scintillation detector has progressed to the point where calibration of the detector is possible. Calibrations are being made in three geometry positions for all available gamma emitters in the range of zero to 350 Kev. A computer program of the AMI series will be built and should be available for limited utilization in April. This system is expected to provide the means for analyzing low energy gamma emission from heavy metal and fission product

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isotopes. It will notably improve previous lab capabilities and permit analyses previously outside their capabilities.

9. A quick, easy, and direct method for the analysis of plutonium in the Redox PRTR dissolver solution has been developed using the X-ray fluorescence spectrometer. The sample is diluted and loaded into the sample cups in a high level cave, after which the sample cup is placed in the X-ray spectrometer. Yttrium is used as an internal standard. The first sample analyzed had a 10 r radiation level which did not seriously affect the analysis. Corrections were applied for the high background contributed by the sample. Pulse height discrimination was not necessary. The Pu concentration was not necessary. The Pu concentration range for the method is 0.03 to 0.5 g/l.

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5. Plutonium Chemistry Laboratory -

a. Direct Calcination Of Plutonium Nitrate

The two-inch diameter, laboratory-scale, screw calciner has been demonstrated at an instantaneous throughput rate in excess of 500 grams of plutonium per hour.

Three large-scale oxide preparation runs were made in the screw calciner this month. The screw was two-inch pitch with the chopper mounted immediately upstream from the outlet duct. The plutonium nitrate and ammonium sulfate solutions were metered into the head end of the calciner as separate streams by a piston-type duplex metering pump.

The first run, SC-8, was made with an $\text{SO}_4^{2-}/\text{Pu}$ ratio of only 0.05. Operation with this subnormal ratio of additive was similar to that previously observed with sulfate-free feed. There was no "sticking" on the screw flights, no "sealing" action due to scale buildup between the flight edges and the shell, and very uniform powder delivery rate. Throughput rate was 225 g Pu per hour at a feed concentration of 225 g/l Pu. An examination of the unit revealed the liquid-to-solid interface to be about four inches above the chopper entry. From this, one concludes that the maximum throughput rate with this feed would be about 280 - 300 g Pu per hour.

Run SC-9 was made with an $\text{SO}_4^{2-}/\text{Pu}$ ratio of 0.5 (normal additive ratio) where the plutonium stream was 225 g/l Pu and the additive stream was 350 g/l $(\text{NH}_4)_2\text{SO}_4$. Throughput rate was 225 g Pu per hour. Two hours' operation showed the typical high-sulfate operating conditions; i.e., gradual establishment of a flooded feed zone due to the formation of a seal of adherent scale between the flight edges and the shell, sticking of "mud" to the flights, and intermittent powder delivery due to dried "mud" detaching from the flight edges in large pieces. A leak in the new packing gland caused premature termination of the run.

Run SC-10 was made with 300 g/l Pu as nitrate solution and 350 g/l $(\text{NH}_4)_2\text{SO}_4$ with an $\text{SO}_4^{2-}/\text{Pu}$ ratio of 0.5. The flooded feed zone was established quickly at a 300 g Pu per hour feed rate. The expected sticking of "mud" to the flights and attendant intermittent powder delivery were not observed after feed zone flooding was fully developed. A very short liquid-to-solid zone of about three inches length was observed about half-way between the feed point and the chopper after four and one-half hours of very smooth operation. Apparently much of the drying is now occurring on the shell and/or screw under immersion! The resultant high-solids-content materials are moved out of the flooded zone by the screw and are then rapidly dried to loose powder and small agglomerates. No large lumps

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were observed; thus, the chopper may prove to be unnecessary.

The run was terminated with a high-rate "dash run" using the remaining 1200 ml of 300 g/l Pu feed at a nominal pumping rate of two liters per hour. During the 45 minutes of operation, only 480 g of Pu were collected as a calcine having an estimated 65 w/o Pu content. This discrepancy is due to the uneven flow as the feed was nearing exhaustion and to the residence time in the calciner unit. High-rate operation was very smooth, and post-run examination revealed no incipient plugging or other difficulties. From the position of the liquid-to-solid transition zone, one can extrapolate to a maximum throughput rate of about 700 g Pu per hour.

Reactivity testing of the "oxides" from these runs is proceeding. Future work will be pointed toward equipment which will produce a product of the required purity.

Corrosion of titanium and tantalum as possible materials of construction for a production calciner indicated that either would be satisfactory.

J. S. Frank

Manager
Research and Engineering

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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

FEBRUARY, 1963

II. ACHIEVEMENTS (Continued)

H. FINANCIAL OPERATION

1. Production Cost

A department review of preliminary estimates for the FY 1964-65 operating budget was held on February 28 with the Department Manager and section managers attending. Charted presentations of the main aspects of the budget were discussed.

Basic data for estimating assessments from other departments for the FY 1964-65 budget was forwarded to Contract Accounting on March 4.

Revised schedules of manpower requirements for FY 1964-65 budget were forwarded to Contract Accounting for consolidation.

At AEC-ALOO request, studies for determination of a detailed functional breakdown of weapons quality control costs was started.

Letters to the AEC were prepared requesting approval for work on Prototype Fabrication Oil Processing Facility and approval for Manufacturing Services (GE) to evolve a numerical input system for the Sheffield Contour Gauge.

Billings to Argonne and UCRL were made this month for costs of reclaiming Pu from scrap received for processing by the new Pu Recovery Facility.

Special requests for Pu handled during the month included separate tetrafluoride and dioxide shipments to Argonne, nitrate and metal shipments to NUMEC and metal to New Brunswick.

CPD's investment in inventories at January 31, 1962, compared with budgeted amounts is as follows:

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(in thousands)	Balance 1-31-63	Control Allocation	Surplus (Deficit)
<u>Inventories</u>			
Essential Materials	\$ 785	\$ 825	\$ 40
Spare Parts & Standby	1 752	1 600	(152)
Special Materials	99	103	4
Gross Inventories	<u>2 636</u>	<u>2 528</u>	<u>(108)</u>
<u>Reserves</u>			
Essential Materials	61	58	3
Spare Parts & Standby	<u>601</u>	<u>481</u>	<u>120</u>
Total Reserves	<u>662</u>	<u>539</u>	<u>123</u>
<u>Net Investment</u>	<u>\$1 974</u>	<u>\$1 989</u>	<u>\$ 15</u>

2. Auditing

An audit memorandum was issued relating to department vehicle usage during January for overnight trips to the 700-1100 areas. Generally, performance in this area was satisfactory. Exceptions noted were called to the attention of the appropriate managers.

Work in connection with the audit of management of capital assets is nearing completion. Indications are that performance in this area fully meets contractual requirements.

3. Measurements and Procedures

A concise machine tabulation of completed work order cost versus estimate has been developed for Production Cost. The tabulation presents data by foremen for all work orders over \$100 and includes dollar and percentage variation from estimate.

4. General Accounting*

As of January 31, 1963, sixteen active projects had incurred costs of \$3,723,546 against funds of \$5,714,200. Outstanding commitments totaled \$419,349.

During February three appropriation requests were approved authorizing an expenditure of \$111,300. These were as follows:

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<u>AR Number</u>	<u>Description</u>	<u>Section</u>	<u>Amount</u>
36035	Potentiometer	Purex	\$ 1 900
36036	Laboratory Equipment	Purex	60 000
36039	Waste Fabrication Oil Storage and Sampling	WMO	49 400

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

Manager - Finance

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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>1-31-63</u>	<u>2-28-63</u>	<u>1-31-63</u>	<u>2-28-63</u>	<u>1-31-63</u>	<u>2-28-63</u>
General Manager's Group	11	11	2	2	13	13
Financial	13	13	14	14	27	27
Research & Engineering	65	65	29	29	94	94
Facilities Engineering	62	62	22	22	84	84
Power & General Maintenance	37	37	240	236	277	273
Production	6	6	4	4	10	10
Redox	57	56	240	242	297	298
Purex	64	63	255	257	319	320
Weapons Manufacturing	<u>49</u>	<u>49</u>	<u>222</u>	<u>223</u>	<u>271</u>	<u>272</u>
Total	<u>364</u>	<u>362</u>	<u>1 028</u>	<u>1 029</u>	<u>1 392</u>	<u>1 391</u>

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C. TRIPS

<u>Visitor</u>	<u>To</u>	<u>Nature of Discussion</u>
<u>To Other G.E. Components</u>		
A. E. Smith	Pinellas Peninsula Plant St. Petersburg, Florida	To attend IMOG Steering Committee meeting. (2/5-6/63)
W. S. Frank	Engineering Services New York, N.Y.	Engineering Laboratories Managers Meeting. (2/27/63)
	Schenectady, N.Y.	Metallurgy and ceramics technology. (2/28-3/1/63)
<u>To AEC and Other AEC Contractors</u>		
W. J. Gartin	Sandia Base Albuquerque, New Mexico	Defense Atomic Support. (2/4-8/63)
H. H. Hopkins, Jr.	Argonne National Lab. Chicago, Illinois	Volatility processing. (2/19/63)
	Mounds Laboratory Miamisburg, Ohio	Viscosity of molten pu. (2/20/63)
O. F. Beaulieu	Los Alamos Scientific Lab. Los Alamos, New Mexico	Analytical chemistry of plutonium. (2/7/63)
	The Dow Chemical Co. Rocky Flats Plant Denver, Colorado	Plutonium analytical instrumentation. (2/8/63)
M. H. Campbell A. J. Waligura	Oak Ridge National Lab. Oak Ridge, Tennessee	Analytical Chemistry Division annual information meeting and fission products. (2/12-15/63)
J. R. LaRiviere L. R. Michels	EBR-II Facility Idaho Falls, Idaho	Design and Operation of Facility. (2/14-15/63)

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C. TRIPS (Continued)

<u>Visitor</u>	<u>To</u>	<u>Nature of Discussion</u>
<u>To General Industry</u>		
R. C. Hollingshead	Western Gear Works Seattle, Wash.	Machine Tool Design. (2/14-15/63)
G. P. Kesel	Allied Engineering Co. Alameda, California	Equipment for Pu Reclamation Facility. (2/14/63)
	Northwest Copper Works Portland, Oregon	Equipment for Pu Reclamation Facility. (2/15/63)
W. H. Sevier	Tectro Electronics Co. Spokane, Wash.	Graphic Panels for Pu Reclamation. (2/18/63)
D. D. Wodrich	Harwood Engineering Co. Walpole, Mass.	Acceptance Tests on 100,000 psi system. (2/25/63)
	Sheffield Corp. Dayton, Ohio	Controlled Atmosphere Laboratories. (2/27/63)
<u>To Conventions and General Meetings</u>		
P. R. McMurray S. J. Beard	Associated Industrial Fabricators Spokane, Wash.	Seminar - Industrial & Commercial Uses of Fission Products. (2/15/63)
H. H. Hopkins, Jr.	Chicago, Illinois	Plutonium Chemistry Seminar (2/18/63)

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D. VISITORS

<u>Visitor</u>	<u>From</u>	<u>Nature of Discussion</u>
<u>From Other G.E. Components</u>		
J. W. Morfitt	Nuclear Materials Oper. Idaho Falls, Idaho	Annual Nuclear Safety Review. (2/5-6/63)
<u>From AEC and Other AEC Operational Contractors</u>		
N. Stetson F. Dowling E. Miller	Division of Production Washington, D.C.	Potential Non-military uses of Hanford. (2/13/63)
R. W. Schaich	Oak Ridge National Lab. Oak Ridge, Tennessee	Fission product recovery and purification. (2/1/63)
A. D. Callihan	Oak Ridge National Lab. Oak Ridge, Tennessee	Annual Nuclear Safety Review. (2/5-6/63)
H. C. Paxton	University of Calif. LASL Los Alamos, New Mexico	Ditto above.
C. L. Schuske	Dow Chemical Co. Rocky Flats Plant Denver, Colorado	Ditto above.
J. A. Malstrom	AEC Operations Office Albuquerque, N. M.	Weapon Fact Sheet Kit. (2/13/63)
J. Long A. Williams K. W. Calkins	Dow Chemical Co. Rocky Flats Plant Denver, Colorado	Direct calcination. (2/13-14/63)
M. B. Calkins	Albuquerque Operations Office, QA Branch Albuquerque, N. M.	Quality control. (2/27/63)
Lt. Col. Falkner Lt. Col. Kahn Capt. Thomas Capt. Wassiac	DASA Field Command Albuquerque, N. M.	Quality control. (2/27/63)
B. E. Brown G. B. Sabine	Lawrence Radiation Lab. Livermore, Calif.	Design analysis. (2/13-14/63)

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D. VISITORS (Continued)

<u>Visitor</u>	<u>From</u>	<u>Nature of Discussion</u>
<u>From AEC and Other AEC Operational Contractors (Continued)</u>		
A. Williams	Dow Chemical Co. Rocky Flats Plant Denver, Colorado	Fabrication process. (2/15/63)
G. Spooner O. Sheldon	Dow Chemical Co. Rocky Flats Plant Denver, Colorado	Fabrication process development. (2/25-28/63)
<u>From General Industry</u>		
Robert Studebaker	Process Equipment Co. Tipp City, Ohio	Pneumatic Leak Detec- tion Probe. (2/12/63)
Frank Morris	Turco Products Co. Spokane, Wash.	Decontamination chemicals. (2/20/63)
Dr. K. Newman	Turco Products Co. Los Angeles, Calif.	Decontamination chemicals. (2/20/63)
C. E. Cashmore P. F. Krol	Steel & Alloy Newark, New Jersey	Crane demonstration. (2/20/63)

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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>Prod.</u>	<u>Rel. Prac.</u>	<u>R&E</u>	<u>Total CPD</u>	<u>YTD</u>
Dis. Injuries											0
Ser. Accidents											0
Med. Treat. Inj.			9	11	12	9				41	78
Rad. Occur.			2		8	4				14	27
Contam. Wd.											4
Pu Dep.											4
Fires				1*						1	1
Sec. Viol.					1		1			2	5

*Ashes fell from pipe of employee while he was cleaning the same, and ignited material on the floor. Damage - \$12.00.

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V. REPORTS

A. PREPARED AND ISSUED

- HW-74174, Unclassified, "Final Report - Liquid Level Gauging System for Radioactive Wastes Storage Facilities - 200-West Area and 200-East Area", dated March 1, 1963, by H. W. Stivers and F. S. Stong.
- HW-74494 REV, Confidential, "Critical Mass Control Specification - Storage of Plutonium-Bearing Dry Recovery Materials - Army Ammunition Storage Igloos T-101, T-102, and T-105", dated February 28, 1963, by R. J. Sloat.
- HW-76245, Secret, "1963 Revisions of Cesium-137 Index for Nuclear Materials Content of Coating Waste", dated February 1, 1963, by W. H. Zimmer.
- HW-76352, Secret, "Waste Management Program - Chemical Processing Department", dated February 25, 1963, compiled by R. E. Tomlinson.
- HW-76372, Secret, "Progress Report - Weapons Process Engineering - January 1963", dated February 5, 1963, compiled by members of the Weapons Process Engineering Operation.
- HW-76434, Confidential, "Z Plant Filtrate Ion Exchange Facility Revised Flowsheet", dated February 4, 1963, by C. J. Berglund
- HW-76448, Secret, "Quarterly Summary Report and Associated Data for 234-5 Building Final Product Shipped During the Fourth Quarter of Calendar Year 1962", dated February 4, 1963, by A. E. Smith.
- HW-76472, Unclassified, "Proposed Chemical Flowsheets for the Decladding and Dissolution of PRTR Pu-Al Fuel", dated February 5, 1963, by G. L. Hanson.
- HW-76488 RD, Secret, "Purex Plant Production Schedule - February 1963", dated February 7, 1963, by D. McDonald.
- HW-76489 RD, Secret, "Redox Plant Production Schedule - February 1963", dated February 7, 1963, by D. McDonald.
- HW-76490 RD, Secret, "UO₃ Plant Production Schedule - February 1963", dated February 7, 1963, by D. McDonald.

- HW-76491 RD, Secret, "234-5 Plant Production Schedule - February 1963", dated February 7, 1963, by D. McDonald.
- HW-76493 RD, Secret, "CPD Separations Costs for U-233 Production", dated February 6, 1963, by H. C. Rathvon.
- HW-76532, Unclassified, "Redox Plant Sampling Schedule", dated February 1, 1963, by R. E. Isaacson.
- HW-76553, Confidential, "Critical Mass Control Specification - Hood 9-A", dated February 20, 1963, by R. J. Sloat.
- HW-76554, Confidential, "Critical Mass Control Specification - Hoods 8, 9-C, 9-E, and 10 - RMA Line", dated February 20, 1963, by R. J. Sloat.
- HW-76605, Unclassified, "Supplementary Specifications for Storage and Processing of PRTR Pu-Al Fuel in the Redox Plant", dated February 18, 1963, by R. E. Isaacson.
- HW-76640, Unclassified, "Alternate Flowsheet and Bases for Equipment Specifications - New Leach Hood", dated February 25, 1963, by L. E. Bruns and R. Y. Lyon.
- HW-76615, Unclassified, "Equipment Dismantling Facility - Interim Report No. 1 - Use of 380 KEV Gamma Measuring Point Sources of Plutonium", dated February 19, 1963, by M. T. Slind and H. A. Moulthrop.
- HW-76687, Secret AWD, "Richland Plutonium Metal Forecast FY 1963 Thru FY 1965", dated February 21, 1963, by J. H. Warren.
- HW-76694, Confidential, "Product Inspection Manual Procedures", dated February 28, 1963, by R. B. Hershey.
- HW-76804 RD, Unclassified, "Annular Dissolvers Purex Facility", dated February 28, 1963, by S. R. Bierman.
- HW-76806 RD, Secret, "Forecast of CPD Nuclear Materials Requirements For Research and Development Projects", dated February 27, 1963, by R. E. Roberts.

B. PREPARED FOR SIGNATURE AND ISSUANCE

- HW-76440, Secret, "Production - January, 1963", dated February 1, 1963, by W. E. Johnson.

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VI. PATENT SUMMARY

All persons engaged in work that might reasonably be expected to result in inventions or discoveries advise that, to the best of their knowledge and belief, no inventions or discoveries were made in the course of their work during the period covered by this report, except as listed below. Such persons further advise that, for the period therein covered by this report, notebook records, if any, kept in the course of their work have been examined for possible inventions or discoveries.

INVENTOR

TITLE

NONE

P. H. Rinker

General Manager
Chemical Processing Department

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END

**DATE
FILMED**

4 / 13 / 93