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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT
FOR

HW-77138

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By Authority of CG-PR-2

MARCH, 1963

Compiled By
OPERATION MANAGERS

April 22, 1963

RM Iten 8-20-92
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HANFORD ATOMIC PRODUCTS OPERATION
RICHLAND, WASHINGTON

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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. E. 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	E. P. Shaw
Manager, Research and Engineering	W. S. Frank
Manager, Finance	K. G. Grimm
Manager, Employee Relations	R. B. Britton

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I. SUMMARY

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

	<u>Percent of Forecast Achieved</u>	
	<u>March</u>	<u>Fiscal Year To Date</u>
Separated plutonium nitrate	145.2	103.2
Separated uranium nitrate	150.5	101.7
Uranium oxide	107.6	97.6
Plutonium metal buttons	82.1	97.1
Fabricated parts	107.6	101.9

March production exceeded forecasted quantities of all products except plutonium metal buttons. Low button production was caused by: (1) mechanical difficulties associated with startup of the RMA Button Line equipment; (2) accumulation of solids in the ion exchange unit, which processes supernatants from the Button Line. At the Purex plant, the production of separated uranium exceeded the previous record monthly output, established in December 1962, by almost eleven percent.

Except for a three-hour shutdown to replace a leaking process jumper, the Purex plant operated continuously throughout March. Despite a reduced rate early in the month to resolve a first cycle column instability and high waste loss problem, the plant operated most of the period at 30 tons per day and established a new monthly production record. The uranium and plutonium products met specifications although about half of the uranium required silica gel treatment.

Fission product shipments during March included 130,000 curies of strontium-90, 90,000 curies of cerium-144, and 200,000 curies of cesium-137. In addition, the HAPD-I-B-1 cask, which was loaded earlier with 470,000 curies of strontium-90, is ready for shipment.

A two fold reduction in strontium losses was achieved in Purex Head End recovery runs as a result of a 100°C increase in centrifugation temperature to 75°C. The higher temperature was achieved with a new submerged transfer jet. A second improvement in strontium recovery involved the adoption of hydroxyacetic acid for complexing iron. This substitution, in place of the more expensive tartaric acid, is expected to reduce essential material costs for this phase of the process by approximately 50 percent.

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Strontium Semiworks successfully completed Purification Run No. 4, for a gain of 930,000 curies in the purified Sr-90 inventory.

Chemical processing of the first irradiated fuel elements from Hanford's experimental Plutonium Recycle Test Reactor (PRTR) was completed in the Redox plant on March 20. No difficulties were encountered, product recovery was excellent, and the final product solution met customer specifications.

In the 234-5 Building, plutonium processing activities were transferred from the "C" Line to the "A" Line. This change was made to permit needed renovation and modification of the more heavily shielded "C" Line.

Repairs to the incinerator will start as soon as approval of the Contingency Maintenance Request is obtained. Completion of this work is presently scheduled for June 1, 1963.

The Plutonium Reclamation Facility structure is essentially completed, and the Phase II contract was awarded on March 25 to Harter Industrial Contractors, Portland, Oregon. Since a Notice to Proceed was also issued the same date, the contractor is expected on-site in early April.

Equipment sizing for the Hanford Isotope Plant (HIP) has been virtually completed for the cesium purification, solvent wash, cerium-promethium separation, and the promethium purification steps. Tentative cell layouts have also been selected for the cesium, promethium, and the solvent wash processes. Architectural plans and sections on the round processing building are well underway. The round building appears to offer advantages in reducing concrete requirements and in simplifying the remote crane.

Detail design revisions for the new Purex waste storage tanks are 90 percent completed.

P. H. Reinke

General Manager
Chemical Processing Department

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II. ACHIEVEMENTS

A. PRODUCTION OPERATION

	<u>March</u>	<u>Fiscal Year to Date</u>
1. <u>Production Statistics</u>		
a. <u>Percent of Forecast⁽¹⁾ Achieved</u>		
Separated plutonium nitrate	145.2	103.2
Separated uranium nitrate	150.5	101.7
Uranium oxide	107.6	97.6
Plutonium metal buttons	82.1	97.1
Fabricated parts	107.6	101.9
b. <u>Purex</u>	<u>March</u>	<u>February</u>
Uranium nitrate produced (tons)	367.24	405.62
Average production rate during operation (T/D)	29.2	22.0
Total waste loss (%)		
Plutonium	0.38	0.61
Uranium	0.24	0.36
On-line efficiency (%)	95	62
c. <u>Redox</u>		
Uranium nitrate produced (tons)	20.50	108.16
Average production rate during operation (T/D)	5.6	8.8
Total waste loss (%)		
Plutonium	0.49	0.51
Uranium	0.27	0.34
On-line efficiency (%)	17.5	62.0
d. <u>Uranium Reduction (tons)</u>		
Normal UO ₃ loaded	513	409
Enriched UO ₃ loaded	22	165
Normal UO ₃ approved for shipment	494.29	493.83
Enriched UO ₃ approved for shipment	151.33	101.10
Normal UO ₃ shipped	445.33	395.01
Enriched UO ₃ shipped	151.41	101.15
Normal UNH backlog	557	235
Enriched UNH backlog	28	23

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

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e. Plutonium Metal Processing

	<u>March</u>	<u>February</u>
Reduction yield (%)	97.7	97.2
Product recovery output (Kgs)	76.39	157.46
Product recovery backlog (Kgs)	1,342.81	1,198.85
Waste disposal (grams)	327	336

f. Power

	<u>200-East</u>	<u>200-West</u>
Raw water pumped (gpm)	10,896	4,169
Filtered water pumped (gpm)	1,189	924
Maximum steam generated (lbs./hr.)	240,000	135,000
Average steam generated (lbs./hr.)	223,317	93,448
Total steam generated (M lbs.)	164,128	69,526
Coal consumed (tons)	8,461	3,708

March production exceeded forecasted quantities for all products except plutonium metal buttons. Low button production was caused by: (1) mechanical difficulties associated with startup of the RMA Button Line equipment; (2) accumulation of solids in the ion exchange unit, which processes supernatants from the Button Line. At the Purex plant, the production of separated uranium exceeded the previous record monthly output, established in December 1962, by almost eleven percent.

Manager, Production

2. FISSION PRODUCT DATA

	PUREX* RECOVERY	244-CR* INVENTORY	B-CANYON* INVENTORY	SEMIWORKS PRODUCTION	PRODUCT INVENTORY	PRODUCT IN CASK	PRODUCT SHIPPED	CUSTOMER REMARKS
Sr-90 (Kilocuries)	140	390		930	2500(1)	470	130	NYO HAPO II-2 Cask on 3-22-63
Cs-137 (Kilocuries)							200	ORNL 3-8-63
Ce-144 (Kilocuries)							90	ORNL HAPO I-B-2 Cask on 3-11-63

(1) Does not include 65 Kilocuries 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 Purex plant operated continuously through March except for a three-hour shutdown to replace a leaking jumper. Despite a First Cycle Column instability and waste loss problem early in the month Purex operated most of the period at 30 T/D to achieve a new monthly production record.

2. Processing Operation

All uranium and plutonium produced was within specifications; about half the uranium requiring silica-gel treatment.

The Neptunium Recovery System (J Cell Package) was shut down when it affected First Cycle Column operation through a common vent line in the aqueous addition piping. Neptunium recovery in the package was resumed after column stability improved. The accumulated neptunium was decontaminated for a later purification run.

Strontium Purification Run #4 was successfully completed in Strontium Semiworks for a gain of 930,000 curies in the purified Sr-90 inventory.

Cask shipments during the month included Sr-90, 130,000 curies; Ce-144, 90,000 curies; Cs-137, 200,000 curies. The HAP0 I-B-1 Cask, loaded in December with 470,000 curies of Sr-90, is still awaiting shipment.

Lower strontium losses in Purex Head End Recovery Runs were achieved through use of the new submerged high temperature jet for centrifuge feed. Hydroxyacetic acid as an iron complexant in place of the more expensive tartaric acid was also successfully tested in the strontium recovery run series.

By close control of airlift circulators and liquid levels, temperatures in 104-A and 106-A waste storage tanks were held in the 140°C and 125°C range during the month.

3. Mechanical Experience

A leak was detected on the HAP (First Cycle Product) jumper which was replaced within a three-hour shutdown. A process pump and

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waste concentrator feed jumper were replaced without process interruption.

A replacement program for temperature bulbs in 241-A waste tanks was completed to increase reliability of readings. All tanks now have original type bulbs.

The east crane (10-ton) hoist motor failed and was replaced.

The small 216-A-13 crib, receiving discharge water from 202-A air sample vacuum pumps, became saturated and was replaced in a new location.

Ventilation air supply to the 202-A Sample Gallery-PR Room area was increased by installing a larger driver sheave on the 2-A supply fan. A five-belt sheave was installed on the PR exhaust fan to correct belt slippage.

Preventive maintenance on the large #1 Joy air compressor in 202-A included replacement of valves and oiler.

4. Radiation Experience

The total iodine 131 emission for the month was 2.94 curies. The maximum seven-day emission was 0.92 curies.

5. Analytical Experience

Considerable effort was expended to more accurately measure the isotopic activity added to swamps and cribs from the Purex Recovered Acid System. Detection limits for cesium and strontium have been lowered appreciably and further modifications are in progress.

New alpha counting instruments have been installed and are being checked and evaluated.

6. Events Influencing Cost

AR-26056 - Portable Scanner for Cesium Loadout

The unit was received and accepted.

AR-26063 - Strontium Semiworks Air Compressor

Installation was completed and accepted.

CAC-950 - Cesium Loadout Facility

Final acceptance was made on 3-11-63.

P. R. McMurray
Manager-Purex

PR McMurray:gt

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II. ACHIEVEMENTS (Continued)

C. REDOX OPERATION

1. Operating Continuity

Processing of the first irradiated fuel elements from Hanford's experimental Plutonium Recycle Test Reactor (PRTR) was completed in the Redox Plant on March 20. No serious difficulties were encountered. Regular E-metal processing was resumed on March 25, and continued through the end of the month.

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

The first PRTR fuel processing campaign was successfully completed in the Redox Plant this month. Dissolution of the Zircaloy cladding of the fuel elements, using the Zirflex process, worked very smoothly considering that this was the first time it had been used in the production operations. The core material was subsequently dissolved and processed through the extraction columns using a minor modification of the current Redox flowsheet. No difficulties were encountered and the final product solution was within customer specifications regarding fission products and metallic impurities. Material balance calculations indicated 100.5 percent total plutonium recovery across this run. However, the recovery of PRTR plutonium was only about 95 percent, based on isotopic analyses of feed and product solutions which indicated a 5 to 6 percent dilution of the PRTR product with weapons-grade plutonium in the Redox Plant.

Processing of E-metal was resumed on 3-25-63, and except for a twenty-four-hour shutdown taken to replace a failed heat exchanger in the H-4 oxidizer, was continuous through month-end.

During the first week of the month a 57 percent nitric acid flush of the extraction columns, overflow lines, and associated vessels was completed. The flush was made to satisfy the 90-day inventory and nuclear criticality control requirements as well as to isolate the PRTR production from the regular E-metal production. Approximately 1800 grams of plutonium was recovered. Of this total, only 34 percent was picked up in the 2D column and overflow line, a significant reduction from the 80 percent recovery obtained in the same system during a similar flush in November, 1962. The

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acid concentration adjustments, which were made in the organic phase of the 2D column during this interim period, have apparently been effective in retarding deposition in this particular area.

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 not operated the last week of the month due to a lack of shipping containers.

3. Mechanical Experience

a. Redox Plant

Numerous equipment failures were encountered this month which reduced the mechanical efficiency to approximately 80 percent. The major equipment pieces which failed and required replacing included: 1) the D-12 salt waste concentrator which developed a weld leak in the jet-out well; 2) the F-8 precycle feed pump; 3) the 2D column feed pump; 4) the silver reactor and heater on the B-2 dissolver; 5) the coil-type heat exchanger in the H-4 metal oxidation tank.

Considerable trouble was also experienced this month with the optics on the 60-ton canyon crane. Three repaired optic heads had to be exchanged before satisfactory performance was obtained. Thorough investigation of the problem revealed no single fault in the respective optics, but they all failed after short service either from a faulty solenoid, shorting, or sticking.

Several equipment changes were made in the 233-S Product Concentration Building this month which should improve operating efficiency considerably. These included: 1) installation of new temperature control equipment on the I-3 and I-12 concentrators, which now provides automatic control of these concentrators; 2) installation of a new sight glass on the I-18 anion exchange contactor which permits full view of the resin push during operation of the unit; 3) installation of a screen between the backwash and resin section of the I-18 contactor to keep resin fines from plugging the inlet side of the backwash screen.

b. Uranium Oxide Plant

The off-gas wet filter scrubbers on three of the six calciners in the Uranium Oxide Plant were replaced with new units this month because of corrosion failure in the metal shell. In addition to the scrubbers, new downcomers were also fabricated and installed. The new filter scrubbers which are now being installed have several engineering design changes which should extend their useful life.

A new steam coil was fabricated and installed in the X-30 tank this month in preparation for replacing the steam jacket around this same tank during the July maintenance shutdown. Operation of the new steam coil to date has been very satisfactory.

4. Waste Handling and Decontamination

Equipment valued at approximately \$110,000 was received from the processing plants for decontamination, repair, inspection or burial during the month. Equipment valued at approximately \$42,000 was returned to customers, representing a savings of approximately \$29,000 over the cost of new equipment.

5. Radiation Experience

Radiation and contamination control was very satisfactory during the month, there being no radiation occurrences recorded.

There were two contaminated equipment transfers from the 202-S Canyon Building during the month. The maximum dose rate encountered was 2.5 r/hr at approximately fifty feet from the stainless steel equipment transfer box. Both equipment moves were completed without incident.

6. Analytical Experience

Assistance was provided to the Ceramic Fuels Research and Development Operation, Hanford Laboratories, by providing multi-channel analyses on a series of irradiated cobalt wires for induced gamma activity. The analytical data will be used as an aid in establishing the neutron flux levels of UO_2 and $UO_2.PuO_2$ fuels as produced in the Materials Testing Reactor operated by Phillips Petroleum, Arco, Idaho.

Multi-channel analyses were performed on test loop coupons and fuel element film solutions submitted by Coolant Systems Development, Hanford Laboratories, for studies being conducted to determine neutron planes in the KE reactor and isotopic elements discarded to the Columbia River.

An x-ray emission spectrometer was acquired this month from Separations Chemistry, Research and Engineering Operation. This instrument is expected to be a very useful analytical tool in providing non-routine analyses for a variety of special studies.

7. Events Influencing Costs

The Redox Operation's manpower was reduced by six during the month. Five chemical workers were released to fill existing openings at other locations and one plumber-steamfitter journeyman retired.

M. K. Harmon
Manager - Redox

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II. ACHIEVEMENTS (Continued)

D. WEAPONS MANUFACTURING OPERATION

1. Operating Continuity

The fabrication of plutonium weapon components was carried on without interruption. Production and shipping schedules were exceeded. The production of unfabricated plutonium was hampered by mechanical difficulties involving the RMA Button Line equipment and by solids accumulations in the ion exchange unit which processes the supernates from the line. The dissolution of skull material was curtailed by midmonth because of a high inventory of nitrate feed for the Button Line. The incinerator remained down awaiting the approval of funds for repair.

2. Processing Operations

a. Plutonium Fabrication

Information on plutonium fabrication is presented in Document HW-77208 entitled "Chemical Processing Department, Weapons Manufacturing Operation, Z Plant Monthly Report, March, 1963" which is classified "Secret, Atomic Weapon Data, Production Rate and Stockpile Quantity Information."

b. Plutonium Processing

The transfer of plutonium processing activities from the "C" Line to the "A" Line was accomplished early in the month. This was done to permit needed reactivation and modification of the more heavily shielded "C" Line and thus improve the long-range reliability of this equipment.

A partial solution to the problem of the plugging of the resin beds in the ion exchange unit resulted when a cracked in-line ceramic filter was discovered and replaced.

3. Mechanical Performance

Fabrication equipment functioned satisfactorily during the month with only normal maintenance required. In an effort to increase

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3. Mechanical Performance (Continued)

the life of form tools, a Maintenance-sponsored process test involving tools with different relief angles, is being conducted by the Fabrication Operation.

In the plutonium processing area plugged lines and fouled pumps, valves and instruments continue to present problems. In efforts to alleviate the difficulties, work is proceeding on the installation of a filter ahead the feed pump which transfers from Hood 7 (feed preparation) to Hood 9-A, and on a better control system for oxalic acid addition to Hood 9-A. These changes will result in better control of solids and improve the continuity of operation.

Work is in progress to install back-flushing facilities on the columns of the ion exchange unit.

The work necessary for the reactivation of Hood 42 (metal dissolution) was completed during March. Operation is to start when nitrate feed inventory is reduced next month.

The work of repairing the incinerator is to be assigned to Minor Construction (J. A. Jones) and will start as soon as approval of the Contingency Maintenance Request for \$56,000 is secured. Completion of repairs is presently scheduled for June 1, 1963.

4. Radiation Experience

Radiation and Contamination Control statistics show control to be normal and satisfactory during March.

One case of potential plutonium deposition occurred when a Maintenance man experienced low-level nasal contamination as a result of damage to a hard glove from contact with a hot calciner in Hood 9-B. Initial examination indicates that only minor deposition will result.

5. Analytical Experience

	<u>February</u>	<u>March</u>
Number of Samples Received	2,511	2,593
Number of Determinations	14,624	19,487
Total Impurities, Buttons, Avg.	1,480 ppm	1,690 ppm
Buttons Rejected	7.3 %	0
Pu 240, Normal Buttons (by Neutron count)	6.16%	6.13%
Pu 240, Unclassified Buttons (by Neutron Count)	7.82%	8.14%

W. J. Gustin
Manager
Weapons Manufacturing

CHEMICAL PROCESSING DEPARTMENT
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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 operations; however, the 241-SX Tank Farm was on raw-water reserve supply for a two-hour period March 13, as the result of a break in the six-inch raw-water line.

2. Inspection, Maintenance and Repair

Fabrication, testing and mock-up of the two Redox D-Cell liners is complete. The liners are to be installed in the D-13 (waste receiver) and D-14 (backcycle concentrator) positions to prevent further corrosion, which is endangering the vessel-locating pads. In that the liners are to be embedded in concrete, tests were conducted to determine the feasibility of pumping grout under the liners via distribution piping installed on the underside of the liners. The tests proved the technique feasible.

Special emphasis was placed on providing the Purex facility with assistance in readying the new Q-Cell Palm-purification facilities. The Q-5 waste tank was altered and repaired to correct vendor discrepancies, and the hot-cell hood front was altered and assembled in position.

Modifications and repairs to the Redox off-gas charcoal filter were completed. The faults in the bonding of the screen to the frame were sealed, and additional spacers were placed in the filter to assure adequate thickness of charcoal over the entire surface area.

Five of the PR (Product Receiver) cans, which were fabricated as a result of the Z-Plant criticality incident, were jacketed and shielded with lead shot for use as Birch product load-out containers at the Purex and Redox facilities.

A stainless-steel heating coil was fabricated on an emergency basis for the X-30 tank (100% UNH storage) at the Uranium Oxide Plant. Failure of the tank's heating jacket created the urgency for a submersible coil to prevent solidification of the UNH.

Installation of instrumentation for the tank farm leak-detection system (Project CGC-928) has been completed at all six locations.

Primary installation of the fifth Stokes casting furnace in the RMA Line at the Weapons Manufacturing Operation was completed. The hood has gone "hot" and is turning out blanks for the newly installed forming machine.

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Twenty-four cell pipe jumpers were fabricated to meet requirements of the Redox (16) and Purex (8) facilities.

Tests were completed to determine if impurities present in the 200 East Area sanitary-water system would adversely affect operation of the Purex extraction columns. The results of these tests (Document EW-75924) conclude that impurities exist in the 200 East Area water system which could be detrimental to the Purex Operation. The report recommends the addition of .2 ppm of potassium permanganate as a corrective measure. Equipment for feeding the solution at the settling basins has been installed. Further action is awaiting word from Purex management.

A third-party inspection was performed on No. 2 boiler in 200 East Area Power House March 19. Preliminary reports state the unit is "satisfactory for continued operation."

Total sanitary-water pump capacity in the 200 West Area is being increased from 4800 to 7800 gpm. The existing backwash pump at the filter plant is being replaced with a 3000-gpm steam-turbine pump recently removed from the East Area (282-E) pump house, in accordance with Document HW-75561 (Fire Protection and Sanitary Water Supply, 234-5 Exclusion Area and 200 West General). The move is designed to provide the necessary volume for fire protection and to meet maximum water demands in the 234-5 Area.

In furtherance of the 200 Area weed-control program, approximately 25 acres of ground in the West Area was sprayed with a soil sterilizer.

A new 48-inch tile crib was installed near the southwest corner of the Purex facility for use as an underground storage for waste cooling water from the sample gallery vacuum pumps. The original crib was no longer usable.

A jib-type crane was installed in the material storage yard adjacent to the 272-W Machine Shop for greater efficiency and safety in the handling of heavy materials.

A black-iron tank 8' x 10' x 5' high was fabricated and delivered to the Waste Handling and Decontamination Operation for use in underwater disassembly of failed contaminated equipment.

The Tool & Die Shop completed two master gauges for development work at Hanford Laboratories' 231-Z facility. The gauges, on which tolerances were held to ten-millionths and forty-millionths respectively, were for use as standards on the Sheffield gauging equipment.

An ultra-high vacuum system and electron-plating gun were installed in Hanford Laboratories' 231-Z facility for use in studying the plating characteristics of plutonium. The elimination of troublesome leaks and improvements in gas traps have resulted in a reliable ultra-high vacuum system capable of reaching vacuums not heretofore available in that particular laboratory. A GE model 514 partial pressure analyzer was added to the system to allow for the mass spectrographic analysis of residual gases left in the system.

The Department's ventilation balance group conducted smoke tests on the high-efficiency filters in Irradiation Processing Department's 105-H and 1706-KE buildings.

Effective March 14, responsibility for control of printed forms was transferred from Financial Operation to P&GM's Office Services component. Included with these responsibilities is design of new forms and modifications to existing forms.

T. G. LaFollette

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

Twelve preliminary engineering drawings for a Purex sludge removal and waste transfer facility in 200-East Area were completed. Comment prints of these drawings were submitted for a preliminary cost estimate.

E-6 Neutron Monitor

The electronic equipment in the Purex E-6 Neutron Monitor Jumper was shop-tested with a neutron source. The instruments indicated satisfactory operation, and the prototype jumper is available for Purex installation.

1 BXP Neutron Counter

A new detector package is being fabricated for the 1 BXP Neutron Counter in Purex. A plateau change was observed in that the plateau (amplifier gain vs count rate) had been shortened considerably on the upper end. Although the present system appears to be stable with the new plateau, the new detector package is being fabricated for prompt installation if monitoring of the present system indicates that it is deteriorating.

b. Project Engineering

CAC-945 - New Waste Storage Tanks - Purex

Detail design revisions, including modifications for improved structure and controls, are 90 percent completed. Sixty-five of the seventy-four tracings have been approved. Revision No. 3 of the project proposal, requesting authorization for four tanks based on the modified 241-AX Tank design, has been approved by RLOO-AEC.

CGC-964 - Equipment Disposal - Purex

Revision No. 1 of the project proposal requesting authorization was approved by RLOO-AEC on March 22, 1963.

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c. Manufacturing Engineering

UNH Transfer Study

An evaluation of the present transfer system for uranyl nitrate hexahydrate is being made, and most of the data analysis has been completed. Estimates of feasibility, and the operating costs of three alternatives, have been made for various rates of production. The project costs of the three alternatives are being estimated. This total study is aimed at confirmation of the present transfer system or determination of an improved method.

2. Redox

a. Process Design Engineering

Waste Tank Leak Detection System (Vertical Wells)

A system was designed and cost estimates made for a portable detection system to be used for probing the vertical wells. A new detector probe enclosure was designed for use with the system. Purchase specifications for the equipment were prepared. Both Redox and Purex are to be equipped with the system.

"D" Cell Renovation

Testing of newly-designed equipment and procedures was initiated, and results were satisfactory. Design of the liner for the D-12 position was completed. A mock-up run on grouting beneath a liner was made with satisfactory results. Fabrication of liners for D-13 and D-14 positions was essentially completed.

Cell Jumpers - E-1 Vessel

An improved vapor handling system was designed using three new jumpers for Vessel E-1. Drawings have been issued.

X-30 Tank - 224-U Building

A new insert-type coil tube bundle was designed and fabricated for the X-30 Tank in 224-U Building. Initial results indicate adequate capacity.

b. Project Engineering

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

All instrument cable reels have been installed and work is

complete except for a few minor punch-list items. Two deficiencies remain to be corrected: (1) The two fresh air supply blowers for the caissons do not perform satisfactorily. Contacts have been made with the vendor regarding this problem; and (2) the 3-inch galvanized tubing used in the laterals does not meet specifications with regard to thickness of the galvanizing. The supplier of the tubing will remove, re-galvanize, and re-install all tubes (4500' total).

3. Weapons Manufacturing

a. Process Design Engineering

New Button Line Scope

A concentrated effort was maintained during the month on preparation of scope material for a new button line. The following scope drawings were completed to the check print stage: equipment arrangement, process flow diagrams, calciner equipment, chlorination equipment, and electrowinning equipment. Drafting work has been started on the electrical drawing and on the electrowinning preparation hood.

RMC Button Line

Designs were completed for the fluorinator off-gas insulation assembly. Scope drawings on a new vacuum drum filter were approved and all the detail design drawings have been issued for comment. All tools that are planned to be tested for adaptation to use in this line have now been received.

Scope of New Fabrication Line

Scope work was initiated on a new fabrication line installed in Room 198 and the present crucible shop. A preliminary arrangement drawing was prepared and issued for comment. The scope will be based on the existing process using equipment similar to that on the RMA Fabrication Line.

Off-site Scrap Processing

Preliminary engineering flow diagram and equipment arrangement scope drawings were prepared for facilities for off-site scrap dissolution, chloride removal, and pulse column partitioning.

380 KEV Measurement of Plutonium - Incinerator Facility

A 380 KEV gamma radiation survey was made of the 232-Z incinerator building. Readings were taken at the same locations, as an initial survey, a year ago. No abnormally

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large depositions were observed. The incinerator, being open for repairs, was extensively monitored. Various methods of facilitating future surveys of the incinerator hood are being reviewed, and experimental tests using a collimated detector are being made. The possibility of probe wells is also being considered.

b. Project Engineering

CAC-880 - Plutonium Reclamation Facility - "Z" Plant

The facility structure is essentially completed, and minor repairs are being made on the process corridor walls. The Phase II contract was awarded to Harter Industrial Contractors, Portland, on March 25, 1963. A Notice to Proceed was also issued on that date, so that the contractor should appear on-site by April 8.

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

Design work for this project was completed on March 4, five weeks ahead of schedule. The three glove boxes are in place in the process area. The completion of the mold make-up hood (HA-20MB), is being expedited since this glove box will be of considerable help in preparing castings for the Floturn facility. Beneficial use of this glove box has been promised for the week of April 22.

CGC-996 - Power Roll Forming Facility - RMC Line - 234-5
Building

A preliminary project proposal requesting interim authorization of \$75,000 for procurement of a power roll forming machine and design of the facility, was transmitted to the AEC on March 19.

c. Manufacturing Engineering

Production Control Assistance-Fabrication

The final inspection data card was re-designed to facilitate key punching of inspection information, and the revised card was placed in service. Two weeks' experience with the card indicates that a few minor changes may be necessary before the card is routed to Forms Design for a permanent format.

The installation of the new data card in Final Inspection completes the cycle of supplying IBM-oriented forms for the following process steps: ingotting, casting, machining, and final inspection.

4. General

a. Process Design Engineering

Hanford Isotope Plant

Equiping sizing is virtually complete for the cesium purification, solvent wash, cerium-promethium separation, and the promethium purification steps of the process. Selection and sizing of equipment in the cesium and promethium packaging steps is underway. Tentative cell layouts have been selected for the cesium, promethium, and the solvent wash processes. Drafting has been started on the flow diagrams indicated above.

Architectural plans and sections on the round processing building are well underway. The round building appears to offer advantages in reducing concrete requirements and in simplifying the remote crane. Ventilation and electrical studies are being made.

Fission Product Shipping

The drawings for the HAPO-IB-3 Cask are completed and are awaiting checking and approval. The re-design of the HAPO-IB aluminum honeycomb cask container has been initiated.

b. Project Engineering

Project Cost Information-as of 3/24/63:

Total Authorized Funds - 16 active projects	\$ 5,760,000
Total Cost-to-date	4,114,000
Committed and Open Work Releases	529,000
Unencumbered Balance	1,117,000
Costs Charged to Above Projects	
2/17/63 to 3/24/63	205,000

 Manager
 Facilities Engineering

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CHEMICAL PROCESSING DEPARTMENT
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II. ACHIEVEMENTS (Continued)

G. RESEARCH AND ENGINEERING OPERATION

1. Purex Process Engineering

(a) Solvent Extraction

Process performance was generally good during the month except for a brief period when the First Cycle plutonium losses increased to about 0.3 per cent. During this period, mild HA Column instability and excess scrub section acidity upset normal column operation and caused a decrease in HA-HS Column decontamination efficiency. Both the waste loss and First Cycle decontamination performance had returned to normal levels by the end of the month.

Performance of the Final Plutonium Cycle was generally good during the month although decontamination performance was about two-fold below the previous month. The upward trend in activity of the product (2BP Stream) correlated with the decrease in plutonium losses from the First Cycle. Performance of the Final Uranium Cycle was excellent during the month with the zirconium-niobium decontamination performance improving by a factor of two. About half of the uranium product exceeded the shipping limit slightly and was processed through the Silica Gel Facility.

Neptunium accumulation in the Backcycle Waste System continued at the same high rate as the previous month except during a short period of high HA Column losses. The Continuous Neptunium Recovery System (J-Cell Package) was shut down at equilibrium early in the month when gassing in the 3AS Stream resulted in an "upset" in the HS Column. The difficulty was found to be due to venting of the HSS, HSR, and 3AS Addition Systems to a common vent header. Processing in the J-Cell Package was resumed on March 25 and the bulk of the neptunium in the plant was transferred into it by March 30. After decontamination, the Package was shut down at equilibrium pending "hot" startup of the Neptunium Purification Cycle.

(b) Product Treatment

At mid-month, push pressures in the Plutonium Ion Exchange Unit became excessive and approximately half of the resin was replaced without interruption of normal processing. The resin had been in use for 37 days, which was an improvement over past run periods.

(c) Waste Treatment and Acid Recovery

Early in March the nitrite addition to the tower of the IWW Concentrator, E-F6, was stopped and the nitrite addition to the IWF was doubled. The total nitrite addition to the concentrator was unchanged. An immediate four-fold reduction in the ruthenium activity in the acid absorber acid and distillate resulted. On March 19, the nitrite in the IWF was increased from 0.010 M to 0.013 M. The increase in nitrite was followed by a further reduction in ruthenium levels although non-standard F-Cell operation during plant shutdown prevented complete evaluation of the change.

Operation of the formaldehyde unit at flowsheet rates was demonstrated. An antifoam rate of about 100 ppm in the IWW stream was maintained to control foaming in the reactor. Efficiency of the reaction was 2.5 moles of acid destroyed per mole of formaldehyde, resulting in a nitric acid concentration of about 0.7 M in the treated waste. The gamma activity in the formaldehyde-recovered acid was a factor of 10 greater than normal recovered acid. Operation of the unit on a continuous basis has been hampered by plugging of the IWW line to the reactor and failure of a thermohm and IWW pump.

(d) Fission Products

Strontium recovery from Purex IWW was resumed. A new submerged transfer jet is being used which permits centrifugation at elevated temperature. Initial runs made at 75° C vice 65° C, which was the operating limit of the replaced jet, have shown a two-fold reduction in strontium losses. Hydroxyacetic acid is being used as an iron complexant in place of tartaric acid on a routine basis with satisfactory results. Use of hydroxyacetic acid in place of tartaric acid reduces the Purex strontium recovery process essential materials cost by 50 per cent.

About one megacurie of strontium-90 was recovered and purified at the Strontium Semiworks. Ninety per cent of the feed was Purex strontium crude and the remainder was rework accumulated from several sources. The product was well within the cerium and zirconium-niobium specifications and the calcium content was less than one weight per cent. Other product analyses have not been completed.

The amount of hydrogen peroxide used to decompose citric acid in the strontium product (HCP) was reduced from the ratio of 5 moles of peroxide per mole of citrate to a ratio of 3 to 1. Intermediate samples at a ratio of 2 to 1 were also obtained. It was concluded that 2 moles of hydrogen peroxide per mole of citrate is adequate for decomposition provided sufficient nitric acid is added during the reaction to maintain the solution acidity. Difficulty was experienced during the peroxide treatment with depletion of nitric acid and subsequent foaming of the product concentrator contents. Efforts to acidify the accumulated product resulted in some foam entering other vessels. Product solution after acidification showed normal precipitation characteristics.

2. Redox Process Engineering -

a. PRTR Dissolution

The remaining three charges of PRTR fuel elements were dissolved during the report period. (See February report for description of the dissolution operation for charge number 1.) Controlling the hydrogen concentration in the dissolver off-gas below the explosion limit (4 percent) was achieved on these three charges by using 430 gallons of 1.0 M HNO_3 acid (versus 560 gallons) to initiate the reaction. Reducing the volume of initial acid reduced the amount of metal dissolved and total amount of hydrogen evolved per cut. Data on hydrogen evolution during PRTR dissolution are tabulated below.

	Maximum Concentration of Hydrogen in the Dissolver Off-Gas (as percent)			
	Charge	Charge	Charge	Charge
	No. 1	No. 2	No. 3	No. 4
First cut	3.76	2.72	3.00	3.02
Second cut	3.76	3.44	2.84	3.44
Third cut	1.60	2.64	2.64	2.68
Heel cut	2.32	1.04	0.56	2.08

b. Solvent Extraction (PRTR Processing)

The PRTR plutonium solution was blended with uranium metal solution to produce a feed solution within the safe plutonium to uranium ratio. Except for an acid deficient precycle, the material was processed through the extraction columns using the current Redox flowsheet. In order to eliminate some of the potential for cross-contamination with weapons grade plutonium, the 233-S Anion Exchange equipment was by-passed and all process vessels were flushed with 57 percent nitric acid. The final product solution was within specifications regarding fission products and metallic impurities and was accepted for fabrication. The yield factor for this run was 101 percent. Calculations based on the predicted quantity and measured discards show that the PRTR material was contaminated with about 6 percent weapons grade plutonium. Since the recovery was nearly quantitative, a follow-up acid flush was omitted.

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c. Results of Acid Flush

A total of 1830 grams of plutonium was recovered during the 57 percent nitric flush of the extraction columns, overflow lines, and associated vessels prior to processing the PRTR fuels. 478 grams were recovered from the 2D Column and 136 were recovered from the 2D overflow line. This is similar with the deposition pattern observed at the time of the November flush (see November, 1962 report). The small quantity of plutonium found and removed from the 2D overflow system confirmed that maintaining the acid concentration in the organic phase of the 1A Column scrub section at 0.02 M HNO_3 or greater has been effective in retarding deposition in the 2D Column scrub section and overflow line.

3. Plutonium Process Engineering -

a. Metal Finishing Operation

1. Button Line

The average button density was 19.30, with 5.0 percent rejects. Feed to the button line consisted of 77 percent Purex, 18 percent dissolved oxidized skull solutions, and 5 percent eluant from the filtrate ion exchange process. The percentage of the feed plutonium in the filtrate was 4.8.

As expected, the change from the 9-B hood to the reconditioned 9-A hood (on March 7) for the filtration, calcination, and fluorination steps resulted in the production of several reject buttons before the system "leveled out". Almost all of the reject buttons were produced the first two weeks after 9-A start-up. Nine buttons were rejected for low density and one for impurities. Iron, chromium, and nickel were abnormally high in almost all reject buttons.

The third week of operation of the new 9-A system was excellent, the density of the buttons averaging 19.40.

2. Oxalate Supernatant Ion Exchange Facility

The yield across the ion exchange unit was 98.8 percent. All button line supernatants, as well as inner button line recycle (floor solutions, ion exchange filter leach solutions, spent resin leach solutions) were processed through the facility.

A broken ceramic filter cartridge led to column plugging troubles. The resin in all three columns was changed when column capacity limited button line rates.

3. Miscellaneous Leaching

PuF_4 to Pu reduction furnace pressure volume (PV) lids were test leached in the incinerator hood. The PV lids are made of black iron and contain highly reactive calcium and PuF_4 (possibly some PuO_2). The lids were leached in a 2-inch deep stainless steel tray covered with a nitrogen purged lucite hood. The solution acidity decreases from 5 to 1 M HNO_3 as the lids are introduced into the tray through a special neoprene slot in the lucite hood. First tests successfully leached the plutonium from the lids without incident. About 30 lids/hour can be leached in this manner.

Ultrasonic leaching in hood 227 has been under shakedown test for the past few weeks. Qualitative improvement in leaching has been noted. Quantitative testing is planned for the future.

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4. Z-9 Crib

Four of the eight Z-9 crib samples have been obtained at depths 0 - 2 feet, 2 - 4 feet, and 4 - 6 feet. The 2-foot split-tube drive sampler has successfully penetrated to 6-foot depths at all sample points thus far tried. Analytical results are not yet available on the samples.

5. Incinerator

A survey of the plutonium content of the incinerator process equipment was completed by personnel of Equipment and Instrument Development, Facilities Engineering, using 380 KEV gamma measurement techniques. A comparison of uncollimated 380 KEV gamma count rates at the identical locations of readings obtained on January 31, 1962, showed increases over those obtained during the earlier survey made shortly after start-up.

It is estimated that the incinerator chambers contain 260 grams of plutonium, with 166 grams in the secondary chamber, 52 in the primary chamber, and the remainder in the vertical flues. The exhaust line from the incinerator is estimated to contain 35 grams per foot where it leaves the hood, 15 grams per foot halfway between the incinerator and the wall of the scrubber cell, and one or two grams per foot near the scrubber. No build-up was detected in the scrubber tower. Measurements made on the bottom of the scrubber tank indicated that plutonium build-up could be no more than 10 g Pu per square foot of tank bottom area.

Readings were also made in the chopper hood, ash collection hood, and sorting hood. Additional readings with shielded probes less susceptible to nearby interfering sources will be required before quantitative measurements can be made in these hoods. The measurements made indicate build-up levels are acceptably low.

4. Separations Chemistry

a. Purex Process Assistance

Examination of Purex Permutit-SK resin samples continued during the month with determination of size distribution, percentage of broken beads, percentage of strained or deformed beads as determined by crossed polarizers, and photographic examination of some samples. The unused resin survives all of these inspections with no trouble. Line samples disclose instances of only partial change out of the resin and continuous subsequent deterioration of the beads. Results of the work to date can be summarized as follows for the February 11th to March 15th material.

Broken beads increased from 8% to 30%. Deformed beads increased from 10% to 40%. Optimum bead size may be 25 to 50 mesh rather than 20 to 40.

A method of securing a complete resin change rather than a partial one may be helpful as well as informative.

b. Redox Process Assistance

Solids appearing in some recent samples from the plutonium product stream have been analyzed in the laboratory and found to be primarily a compound of silica with some Ti and lesser amounts of Zn and Sn, and the usual presence of Fe, Cr, Ni, and Al detectable. The source of this new solid problem has not been determined as yet but investigation is continuing. The fission product content of the solids does not appear to be significant.

c. Neptunium Purification

A total of approximately 2500 units of purified neptunium were shipped during March. Both batches #69 and #70 were from Redox and required special processing either here or in Redox to permit meeting the revised ruthenium spec of < 10 uc Ru/g Np.

d. Fission Product Assistance

Two samples of strontium carbonate originating from material from SSW Tank 6 were examined for precipitate characteristics. One sample had received the citric acid treatment at 3 mols peroxide per mol of citric acid and the other at 2 mols/mol. Visual observation indicates that 2 mols/mol should be adequate to achieve a good precipitate.

Investigations were made to find an oxidant for cerium. Potassium permanganate, hydrogen peroxide, and ammonium persulfate and silver nitrate were tried with permanganate being the only one of the three that successfully oxidized cerium.

e. Laboratory Assistance

1. Two analytical methods have been developed for BAMBP (4 sec butyl - alpha methyl benzyl phenol) the extractant for cesium.

- (a) A bromination procedure was used to determine the molarity of the stock solution. Since two of the three bromination sites are filled on the phenol radical, a mol for mol relationship exists between bromine used and BAMBP in the sample. Successive analyses had a range of 0.4%.
- (b) A spectrophotometric procedure was based on the very specific BAMBP peak found at 279 mu. The molar extinction coefficient calculated for this peak was 2751, and it obeyed Beer's Law in the concentration region from 0.5×10^{-4} to 2.5×10^{-4} M BAMBP. Neither D2EHPA or Soltrol interfered with the analysis at the sample dilutions required in CCl_4 , so this method is applicable to plant solvent. This analysis agrees very well with the bromination analyses.
2. Concentrates prepared of Purex demineralized water sampled on 3/1/63 and 3/15/63 were of much darker color than similar concentrates made in the fall. In addition, solids (predominantly silica), which were not found in the earlier samples, were present in concentrations of 2-5 ppm.
 3. Analytical methods were recommended for measuring Redox neptunium product which is shipped to Purex. Provision was also made for preparation of a laboratory standard.
 4. Gamma calibrations of the 3x3" NaI(Tl) detectors at Redox have been completed for Np^{237} , Pa^{233} , As^{76} , Pr^{142} , $\text{Th}(\text{Pa})^{234}$, Ta^{182} , Np^{239} , and Pa^{233} . Thirty-nine gamma-emitting isotopes have now been calibrated. The 3x1/4" NaI(Tl) detector has been calibrated for 29 isotopes this month. Preparations are being made to form these data into a 7090 matrix to facilitate the quantitative analysis for these gamma-emitting isotopes in unknown mixtures.
 5. A Mettler M-5 micro balance has been installed in the Redox counting room and checked out by a Mettler representative. Its primary purpose will be to weigh the highly radioactive, irradiated wires which are being gamma-analyzed at the Redox laboratory. Because of the high gamma fields the balance is being operated behind a one-inch, lead glass shield, which greatly reduces the exposure to the operator and at the same time acts as additional heat shielding for the balance. The balance will be available for additional assignments that do not subvert the primary purpose.
 6. Two samples of PuO_2 (SC-8, 6084 and 6087) from the Plutonium Chemistry Laboratory were chlorinated on the thermobalance to approximately 100 per cent in less than 10 minutes and contained 17.7 and 16.8 per cent volatiles, respectively. Another sample (SC-8, 6082) which was reported last month to chlorinate to 100 per cent in less than 10 minutes, but which contained only 9.5 per cent volatiles, was rerun with the same results.

5. Plutonium Chemistry Laboratory -

a. Electrowinning Of Plutonium Metal

Recent runs have been concerned with the study of cell variables and their effect on cathode current efficiency. It was found that placing the cathode entirely below the anode improved the overall cathode current efficiencies to about 80 percent.

In order to explore the effect of anode-cathode relationship on cathode current efficiency, a ceramic cell of $MgO-TiO_2$ was outfitted with a tantalum plate on the bottom for the cathode. Thus the cathode was entirely below anode at all points. Run 3-3-8 was made with a graphite plate for the anode, whereas Run 3-3-9 used the graphite basket as the anode. Both runs functioned nicely. The only notable difference from previous performance of a tungsten cell was a slightly higher resistance; i.e., more voltage was required for a given amperage. The anode basket provided somewhat lower resistance than the plate, which could be accounted for by the fact that the effective anode area was higher. The cathode current efficiencies from these two runs were very good, ranging from 70 - 93 percent, at currents of 130 - 150 amperes. For a very short period in Run 3-3-9, a rate of about 400 g/hr was measured.

The high cathode current efficiencies experienced with the cathode entirely below the anode in these two runs supports the theory that it is chlorine contact with the product that contributed heavily to poor efficiencies. If valence state cycling or alkali metal liberation were predominant factors, the anode-cathode relationship would not be expected to make such a drastic change. These factors may still be playing a minor role.

Using the tungsten cell for a run (3-3-10) at a high current showed that if currents above 250 amps are used for this particular cell, some means of cooling the cell and surrounding environment is going to be necessary.

An attempt was made to operate at 300 amps, but the operating temperature soon surpassed 850 C and leveled out at 910. The hood panels soon became uncomfortably warm, so it was felt advisable to drop the amperage. The run was completed at 220 amps, which allowed an operating temperature of 850 C. It is felt that with the present equipment, 250 amps will be about maximum. This increased current density in the tungsten cell did not help the cathode current efficiency in this run. (An efficiency of 26 percent was measured.)

Preliminary results from sampling electrolytic metal for purity analysis show that iron, chromium, and nickel are the only troublesome elements present at this time. These ranged between 700-1200, 250-1000, and 50-250 parts per million of plutonium, respectively. All other elements were usually around 30 parts

or less. Three ingots were cast from metal produced this month and last. Two had a measured density of 19.3 and one had a density of 19.1. The high iron, chromium, and nickel in the product are probably caused by either corrosion of the stainless hardware in the top of the bell jar or by condensed impurities falling back into the cell from the top of the bell jar. The first will be dealt with by replacing the stainless parts. The second possibility may be solved by proper balance of sparge gases.

The high temperature caused by increased amperage points out the need for low amperage and high efficiency. This will continue to be emphasized. The immediate plans are to use a ceramic cell with graphite protection sleeve against the upper cell wall to protect the ceramic from gas corrosion. The cathode will be limited to the bottom of the cell. An attempt will be made to lower the resistance of this arrangement by increasing the cathode area up the side wall in small increments until a maximum throughput is achieved.

b. Leaching Of Plutonium From The 216-Z-9 Crib

Experiments were conducted on methods of leaching plutonium from the 216-Z-9 crib soil.

Document HW-77083, "Leaching Of Plutonium From The 216-Z-9 Crib", was issued. The summary and conclusions of this document follow.

"The composite sample of soil used for the recovery test contained 1.0 mg Pu per gram dry soil and 6.5×10^{-4} mg Am^{241} per gram of dry soil.

Concentrated acids (15.8 M HNO_3 , 10 M HCl , or 10 M H_2SO_4) remove most of the plutonium (49 - 72 percent measured) in less than one hour at room temperature, or in less than one-half hour at the boiling point. This amount represents the plutonium held on the surface of the soil. All of the plutonium can be leached by decomposing the soil with 15.8 M HNO_3 -0.1 M HF . Leaching is complete after one-half hour at the boiling point. Destruction of the soil using 1 M HF by itself is not satisfactory."

Manager
Research and Engineering

CHEMICAL PROCESSING DEPARTMENT
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II. ACHIEVEMENTS (Continued)

H. FINANCIAL OPERATION

1. Production Cost

Detailed cost schedules on Isotope Inventory and Weapons fabrication were submitted to the local AEC.

An Official Use Only document covering plutonium scrap recovery costs was prepared in collaboration with Weapons Manufacturing Operation. This catalog will be used by all AEC sites as assistance in funding for scrap recovery work to be done at Hanford and as a guide in the economics of recovering individual types of scrap.

In collaboration with Weapons Manufacturing Operation, a study detailing breakdown of fabrication quality control costs (requested by ALOO) was issued.

Contingency Maintenance Request MA-41 for incinerator modification and repair was submitted for Commission approval.

Special requests and backcharges handled during March included a shipment of unclassified plutonium to Monsanto, and a shipment off-site of laboratory samples of process intermediates for testing.

The rate schedule used for burial of offsite contaminated wastes was reviewed during the month. Prices quoted were found to be in line with current costs.

CPD's investment in inventories at February 28, 1962 compared with budgeted amounts is as follows:

(in thousands)	Balance 2-28-63	Control Allocation	Surplus (Deficit)
<u>Inventories</u>			
Essential Materials	\$ 838	\$ 825	\$ (13)
Spare Parts & Standby	1 732	1 600	(132)
Special Materials	99	103	4
Gross Inventories	<u>2 669</u>	<u>2 528</u>	<u>(141)</u>
<u>Reserves</u>			
Essential Materials	61	58	3
Spare Parts & Standby	601	481	120
Total Reserves	<u>662</u>	<u>539</u>	<u>123</u>
<u>Net Investment</u>	<u>\$2 007</u>	<u>\$1 989</u>	<u>\$ (18)</u>

2. Financial Analysis

A detailed operating cost estimate of B Plant Waste Management - Fission Product functions under Phase III conditions has been prepared. It is intended that this study serve as a planning guideline (subject to revision as warranted) during the approximately 3-year period prior to completion of facilities.

Separations costs have been developed under numerous alternate production conditions for inclusion in Hanford response to AEC-Washington's production study requests.

3. Personnel Accounting

Considerable work has been done during the month in the final phase of a proposed retitling of various exempt jobs.

4. General Accounting*

As of February 18, 1963, sixteen active projects had incurred costs of \$3,988,417 against funds of \$5,714,200. Outstanding commitments totaled \$407,227.

There were twelve Appropriation Requests approved during March, authorizing expenditures of \$260,800. Expenditures were approved for the following items:

<u>AR Number</u>	<u>Description</u>	<u>Section</u>	<u>Amount</u>
36048	Fission Product Shipping Cask	Purex	\$93 000
36040	Additional Leaching Hood 232-Z	WMO	53 000
36043	Milling Machine	P&GM	45 000
36038	400 Channel Analyzers	Redox	20 000
36047	Hand & Shoe Counters "B"	Purex	19 800
36042	291-B Stack Air Sampler System	FEO	7 500
36044	Alpha Detection Unit	Purex	3 250
36045	Alpha Detection Unit	Redox	3 250
36049	Gas Meters	WMO	4 900
36052	Sample Carriers "B"	Purex	4 800
36050	Count Rate Meters & Recorders	R & E	3 300
36051	Scintillation Detectors	R & E	3 000

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

5. Auditing

Audit work in connection with an audit of Management of Capital Assets was completed.

An audit memo was issued relating to a test check of Patent Agreements executed by department personnel.

Numerous contacts and follow-up activities were made during the month to clear up questionable items noted by AEC and C&AO auditors in their examination of Procurement, Contracting, Material and Package Passes, Cost and Work Order and Payroll Audits.

Manager - Finance

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CHEMICAL PROCESSING DEPARTMENT
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III. PERSONNEL ACTIVITIES

A. FORCE SUMMARY

<u>Operation</u>	<u>Monthly Salaried</u>		<u>Weekly Salaried</u>		<u>Total</u>	
	<u>2-28-63</u>	<u>3-31-63</u>	<u>2-28-63</u>	<u>3-31-63</u>	<u>2-28-63</u>	<u>3-31-63</u>
General Manager's Group	11	11	2	2	13	13
Financial	13	13	14	13	27	26
Facilities Engineering	62	61	22	21	84	82
Research & Engineering	65	64	29	30	94	94
Power & General Maint.	37	38	236	233	273	271
Production	6	6	4	4	10	10
Redox	56	56	242	238	298	294
Purex	63	63	257	259	320	322
Weapons Manufacturing	<u>49</u>	<u>48</u>	<u>223</u>	<u>221</u>	<u>272</u>	<u>269</u>
Total	<u>362</u>	<u>360</u>	<u>1 029</u>	<u>1 021</u>	<u>1 391</u>	<u>1 381</u>

B. PERSONNEL CHANGES

L. R. Michels was appointed Manager - Extraction Process Design, Process Design Engineering, Facilities Engineering Operation, effective March 15.

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C. TRIPS

<u>Visitor</u>	<u>To</u>	<u>Nature of Discussion</u>
<u>To Other G.E. Components</u>		
W. H. Kelso	Schenectady, New York Waterford, New York Syracuse, New York Detroit, Michigan	Maintenance practices. (3/16 - 22/63)
<u>To AEC and Other AEC Contractors</u>		
A. E. Smith R. E. Van der Cook	Los Alamos Scientific Lab. Los Alamos, New Mexico	Consultations on fabrication methods. (3/5 - 6/63)
A. E. Smith R. J. Dal Ponte	The Dow Chemical Co. Rocky Flats Plant Denver, Colorado	Product specification discussion. (3/7/63)
G. C. Oberg R. J. Dal Ponte	Sandia Corp. Livermore, California	To attend second day of IMOG Environmental Testing Subcommittee Meeting. (3/13/63)
G. C. Oberg R. J. Dal Ponte	Lawrence Radiation Lab. Livermore, California	Product specifications. (3/14/63)
P. H. Reinker	Sandia Base Albuquerque, New Mexico	Atomic Weapons Orientation. (3/11 - 15/63)
C. W. Smith	Martin Marietta Co. Baltimore, Maryland	Fission products. (3/15 - 18/63)
	Martin Marietta Co. Quehanna, Pennsylvania	Fission products. (3/19 - 20/63)
G. R. Kiel R. L. Stevenson	The Dow Chemical Co. Rocky Flats Plant Denver, Colorado	Critical mass control practices. (3/25 - 27/63)
<u>To General Industry</u>		
P. S. Kingsley	Portland, Oregon Los Angeles, California San Francisco, California Seattle, Washington	Reliability of fabricated equipment with off-site inspectors. (3/4 - 7/63)

C. TRIPS (Continued)

<u>Visitor</u>	<u>To</u>	<u>Nature of Discussion</u>
<u>To General Industry (Continued)</u>		
W. H. Sevier	Tectro Electronics Co. Spokane, Washington	Graphic panels - Project CAC-880. (3/20 & 25/63)
L. R. Michels	General Dynamics San Diego, California	Dynapak machine encapsu- lation of solids. (3/21 - 23/63)
R. C. Baker	Union Machine Works Seattle, Washington	Cell maintenance crane - Project CAC-880. (3/29/63)

D. VISITORS

<u>Visitor</u>	<u>From</u>	<u>Nature of Discussion</u>
<u>From Other G.E. Components</u>		
R. G. Barnes W. A. Graf	Palo Alto, California	Chemical processing and development. (3/5 - 6/63)
L. R. Fink	Palo Alto, California	Conferences and plant inspections. (3/15/63)
<u>From AEC and Other AEC Contractors</u>		
Dr. Glenn T. Seaborg	AEC, Washington, D. C.	Plant inspection. (3/15/63)
James T. Ramey	" "	"
A. R. Luedecke	" "	"
E. J. Bloch	" "	"
Arnold R. Fritsch	" "	"
Senator Henry M. Jackson	U. S. Senate Washington, D. C.	"
John T. Conway	Joint Committee on Atomic Energy, Washington, D. C.	"
Maj. Gen. Austin W. Betts	Director - DMA	Plant inspections;
Mr. Frank P. Baranowski	Director - Div. of Prod.	Military Liaison
Mr. Raymond G. Stone	DMA	Committee.
Capt. Alfred H. Higgs	DMA	(3/26/63)
Col. V. J. Gottschalk	DMA	"
Lt. Col. James H. Hill	Special Assistant to Commissioner Wilson	"

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D. VISITORS (Continued)

<u>Visitor</u>	<u>From</u>	<u>Nature of Discussion</u>
J. A. Kennelley, Jr. S. N. Robinson J. A. Fellows	Mallinckrodt Chemical Wks. Uranium Division St. Charles, Missouri	Inert strontium, electrolytic reduction. (3/27 - 28/63)

From General Industry

M. Selman	General Chemical Wilmington, Delaware	Chemical processing and development work. (3/5 - 6/63)
H. F. Richardson A. H. F. Litty	General Chemical Morristown, New Jersey	" "
P. Berner	Starr Machinery Seattle, Washington	Discussions on air brush equipment. (3/13/63)
F. P. Rogers, Jr. K. E. Birrell	Sheffield Corp. Dayton, Ohio	Discussion on gaging equipment performance. (3/14/63)

From Other Federal and State Agencies

Hon. Gerald W. Johnson, Chairman Brig. Gen. Walter B. Richardson Capt. Edward E. Conrad Col. Ola P. Thorne Col. Jack D. Warthman Col. Russell J. Nash Cdr. Margaret C. McCarty Cdr. James C. Gibson Lt. Col. Marvin L. Price	Military Liaison Committee	Plant Inspections. (3/26/63)
Brig. Gen. Douglas C. Polhamus Brig. Gen. John G. Zierdt Capt. Donald E. McCoy Capt. John K. Beling Capt. Vance M. Dawkins Lt. Col. Nicholas M. Masich Lt. Col. Howard C. Metzler Maj. Lloyd Stockton Lt. Col. Kenneth C. Jones	Department of Defense	Plant Inspections. (3/26/63)

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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				1***		1*				2	3**
Ser. Accidents											0
Med. Treat. Inj.			5	22	6	10				43	121
Rad. Occur.			3	1	3				1	8	35
Contam. Wd.											4
Pu Dep.											4
Fires											1
Sec. Viol.				1						1	6

DISABLING INJURIES

- *63-1 While stepping down from a value access platform, injured lost his footing, fell backwards, struck his back on adjacent vessel and incurred a complete fracture of the left 9th rib.
- **63-2 While operating a crawler type crane in drag-line service, the lift cable parted. A 1 1/4 in. length of 1/16 in. diameter wire was ejected from the cable with explosive force and embedded in the neck of the injured. (Retroactively classified effective 2/25/63)
- ***63-3 Injured was engaged in polishing the bottom of a hollow cylindrical piece rotating 532 rpm when his hand caught in a slot on the cylindrical side resulting in severe injury to his right wrist.

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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 Areas", dated March 1, 1963, by H. W. Stivers and F. S. Stong.
- HW-74289 REV, Confidential, "Critical Mass Control Specification - Task III - RMC Line", dated March 11, 1963, by R. J. Sloat.
- HW-74495, Confidential, "Critical Mass Control Specification - Storage of Plutonium-Bearing Materials - Army Ammunition Storage Igloos T-103, T-104, and T-106", dated March 25, 1963, by R. J. Sloat.
- HW-75970, Unclassified, "Identification of Acid-Insoluble Material In PuCl_3 ", dated December 29, 1962, by J. G. Michaelson and F. D. Fisher.
- HW-75971, Unclassified, "Preparation of Plutonium Oxychloride", dated December 29, 1962, by J. G. Michaelson and F. D. Fisher.
- HW-76055, Official Use Only, "Design Scope of the Waste Treatment Facility - "Z" Plant", dated January 14, 1963, by D. E. Braden.
- HW-76399, Unclassified, "Process Design Basis for Fabrication Oil Storage and Sampling Facility - 234-5 Building", dated February 13, 1963, by D. D. Wodrich.
- HW-76420, Secret, "Preliminary Project Proposal, Power-Roll Forming Facility - RMC Line - 234-5 Bldg., (Project CGC-996)", dated March 4, 1963, by M. N. Raile.
- HW-76530, Official Use Only, "Project Proposal, Revision #3, New Waste Storage Tanks - Purex (Project CAC-945)", dated March 1, 1963, by L. W. Finch.
- HW-76571, Secret, "Criticality Hazards Control Specifications - Redox Plant", dated February 13, 1963, by R. E. Isaacson.
- HW-76613, Unclassified, "Process Specifications, Revision I, Filtrate Ion Exchange Facility", dated March 1, 1963, by C. J. Berglund and R. J. Sloat.
- HW-76630, Secret, "Budget for FY 1965 and Revised Budget for FY 1964 - Separations R&D Program (02 50 10 15 1)", dated March 15, 1963, by W. S. Frank.

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- HW-76631, Secret, "Budget for FY 1965 and Revised Budget for FY 1964 - Plutonium Processing R&D Program (02 50 10 20 1)", dated March 15, 1963, by W. S. Frank.
- HW-76689 RD, Unclassified, "Scope of Plants Stabilization Facilities, CPD", dated March 5, 1963, by D. E. Braden and H. W. Stivers.
- HW-76812, Confidential, "Process Test 63-2-T", dated March 4, 1963, by W. F. Unzicker.
- HW-76813, Official Use Only, "Design Scope of the "Z" Plant Nitrogen Generation Facility", dated March 11, 1963, by D. E. Braden.
- HW-76842, Secret AWD, "Progress Report - Weapons Process Engineering", dated March 5, 1963, compiled by members of the Weapons Process Engineering Operation, Research and Engineering.
- HW-76852 RD, Secret, "Purex Plant Production Schedule - March 1963", dated March 5, 1963, by D. McDonald.
- HW-76853 RD, Secret, "Redox Plant Production Schedule - March 1963", dated March 5, 1963, by D. McDonald.
- HW-76854 RD, Secret, "UO₃ Plant Production Schedule - March 1963", dated March 5, 1963, by D. McDonald.
- HW-76855 RD, Secret, "234-5 Plant Production Schedule - March 1963", dated March 5, 1963, by D. McDonald.
- HW-76861, Secret, "Analysis of Brandy Nitrate Batch 68", dated March 5, 1963, by J. H. Warren.
- HW-76862, Secret AWD, "Analysis of Isotopic Exchange Samples 1631 and 1632", dated March 5, 1963, by O. F. Beaulieu.
- HW-76863, Secret AWD, "Analysis of Plutonium Sample XXVIII on Inter-plant Exchange Program", dated March 5, 1963, by O. F. Beaulieu.
- HW-76898, Confidential, "Critical Mass Control Specification - Storage of Plutonium in Vaults 173 and 175", dated March 15, 1963, by R. J. Sloat.
- HW-76907, Secret AWD, "Agenda for April PWIEG Meeting", dated March 11, 1963, by A. E. Smith.
- HW-76909, Confidential, "Trip Report - Rocky Flats Plant, January 7 and 8, 1963", dated February 15, 1963, by F. D. Fisher and R. S. Kingsley.
- HW-76920, Secret AWD, "Budget for FY 1965 and Revised Budget for FY 1964 - Proposal for R&D - General Weapons Development - 03-25-04-01", dated March 21, 1963, by W. S. Frank and A. E. Smith.

HW-76931, Confidential, "Critical Mass Control Specification for Dissolving Plutonium Oxide in Hood 42", dated March 20, 1963, by R. J. Sloat.

HW-76946, Unclassified, "Hydraulic Studies of a Waste Diverter", dated April 1, 1963, by E. Doud.

HW-76949, Secret AWD, "Thermal Coefficient of Expansion" dated March 15, 1963, by A. E. Smith.

HW-76983, Official Use Only, "Engineering Scope for Removal of Existing Recuplex Facility", dated March 29, 1963, by M. N. Raile and L. A. Berry.

HW-77054, Unclassified, "Reduction of Nitrogen Usage, 234-5 Building (Report #1)", dated March 13, 1963, by D. D. Wodrich.

HW-77083, Unclassified, "Leaching of Plutonium from the 216-Z Crib", dated March 25, 1963, by R. S. Kingsley.

HW-77103, Secret AWD, "Reply to EIVR 7, ALDREQ 373", dated March 28, 1963, by A. E. Smith.

HW-77115, Unclassified, "Sogenique Gage - EIVR 37", dated March 29, 1963, by A. E. Smith.

B. PREPARED FOR SIGNATURE AND ISSUANCE

HW-76839, Secret, "Production - February, 1963", dated March 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.

<u>INVENTOR</u>	<u>TITLE</u>
J. S. Crowder, Power and General Maintenance	An attachment for removing cuttings from a metal-cutting band saw.

J. H. Reinker

General Manager
Chemical Processing Department

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**DATE
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3 / 18 / 93