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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT
FOR

APRIL, 1965

RL-SEP--476-Del.

Compiled By
OPERATION MANAGERS

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HANFORD ATOMIC PRODUCTS OPERATION
RICHLAND, WASHINGTON

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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

APRIL, 1965

I. SUMMARY

April production, as a percent of the HAPO Production Forecast (RL-GEN-17), is summarized below:

	<u>April</u>	<u>Fiscal Year To Date</u>
Separated plutonium nitrate	108	105
Separated uranium nitrate	107	105
Uranium oxide	106	101
Plutonium metal buttons	102	102
Fabricated parts	120	101

April production exceeded forecasted quantities for all products. The output of separated plutonium nitrate exceeded the record high established in September, 1964, by 56 kg. Separated uranium nitrate production exceeded the previous record high (940.3 tons, established in October, 1964) by 186 tons. Uranium oxide production was equally impressive, surpassing the June, 1964, output of 935.3 tons by 184 tons.

Purex performance was excellent during April. With a time operated efficiency greater than 98 percent and an operating rate of 30 tons per day, uranium production exceeded the previous record high (867.2 tons, established in March, 1963) by almost 50 tons. Both products met specifications except for one batch of plutonium which was produced while reworking some waste.

In Purex Head-End, the fission product recovery equipment operated continuously during April, completing eighteen runs. Product recoveries totaled 670 kilocuries of strontium-90 and 2830 kilocuries of promethium-147, a new record high for each.

Four STT casks, loaded with 215 kilocuries of cesium-137, were shipped to Oak Ridge National Laboratory on April 26. Shipment from Hanford was delayed one week because of flood conditions in the Midwest.

Redox processing was interrupted on several occasions because of difficulties with acid control and the resulting loss of solvent quality, neptunium recovery, and precycle decontamination. Toward the latter part of April, however, performance improved to the extent that forecasted production was still exceeded, notwithstanding the earlier problems.

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The In-Tank Waste Solidification unit evaporated 184,650 gallons of waste during the month. Because of excessive pressure drop across the exhaust filter, however, it became necessary to reduce the input air flow to maintain the desired vacuum. Additionally, several intermittent outages were also required for water flushes of the filter to reduce the pressure drop.

About 18 grams of americium, recovered from plutonium scrap, have now been purified as the oxide. Although 99.6 percent purity was obtained, gross contamination by aluminum in the feed stock has thus far limited the quantity purified. The search continues for a simple and high capacity refining process.

A method has been developed for analyzing plutonium in aqueous solution, using calibrated glass filters to measure differential absorbance. Preliminary data indicate that the method has a precision equal to that of the classic ceric titration but is much faster and simpler.

AEC Directive No. 254 authorized \$250,000 for detail design of "Sludge Removal and Waste Transfer Facilities - 200 E Area" (Project CAC-169).

J. H. Warner
General Manager

Chemical Processing Department

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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

APRIL 1965

II. ACHIEVEMENTS

A. PRODUCTION OPERATION

1. Production Statistics

a. <u>Percent of Forecast⁽¹⁾ Achieved</u>	<u>April</u>	<u>Fiscal Year to Date</u>
Separated plutonium nitrate	108	105
Separated uranium nitrate	107	105
Uranium Oxide	106	101
Plutonium metal buttons	102	102
Fabricated parts	120	101
b. <u>Purex</u>	<u>April</u>	<u>March</u>
Uranium nitrate produced (tons)	909	807
Average production rate during operation (T/D)	30	30
Total waste loss (%)		
Plutonium	0.32	0.30
Uranium	0.24	0.29
On-line efficiency (%)	98	85
c. <u>Redox</u>		
Uranium nitrate produced (tons)	218	118
Average production rate during operation (T/D)	10	9
Total waste loss (%)		
Plutonium	0.44	0.32
Uranium	0.22	0.18
On-line efficiency (%)	72	92 *
d. <u>Uranium Reduction (tons)</u>		
Normal UO ₂ loaded	832	630
Enriched UO ₂ loaded	218	253
Normal UO ₂ approved for storage	866	602
Enriched UO ₂ approved for shipment	254	253
Normal UO ₂ shipped	0	0
Enriched UO ₂ shipped	203	253
Normal UNH backlog	581	504
Enriched UNH backlog	170	163

(1) RL-GEN-17 HAPG PRODUCTION FORECAST

* Includes Neptunium Processing

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f. Power

	<u>200-East</u>	<u>200-West</u>
Raw water pumped (gpm)	10 271	5 743
Filtered water pumped (gpm)	1 208	1 143
Maximum steam generated (lbs./hr.)	246 000	124 000
Average steam generated (lbs./hr.)	227 000	104 000
Total steam generated (M lbs.)	164 069	74 827
Coal consumed (tons)	8 169	3 697

April production exceeded forecasted quantities for all products. The output of separated plutonium nitrate exceeded the record high established in September, 1964, by 56 kg. Separated uranium nitrate production exceeded the previous record high (940.3 tons, established in October, 1964) by 186 tons. Uranium oxide production was equally impressive, surpassing the June, 1964 output of 935.3 tons by 184 tons.

Acting Manager, Production

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2. FISSION PRODUCT DATA (Kilocuries)

CS-137

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II. ACHIEVEMENTS (Continued)

B. PUREX OPERATION

1. Operating Continuity

The Purex Plant operated continuously except for a brief shutdown from 0500 hours to 1800 hours on April 4, 1965, to replace a failed J1 (concentrated waste backcycle) pump. Rates were maintained at a capacity factor of 3.6 and a new irradiated uranium processing record was achieved.

One neptunium purification run was completed yielding 998 grams. Two shipments, totaling 1908 grams of neptunium, were made.

The Purex Head End fission product recovery equipment operated continuously and eighteen runs were completed. Product recoveries for April, 1965, a new record, totaled 670 and 2830 kilocuries of strontium 90 and promethium 147, respectively. A comparison of one series of runs using an acid leach of the LW (high-level waste concentrate) solids with two comparable series without the acid leach revealed an approximate 50 percent improvement in overall fission product recovery due to leaching.

Processing at B Plant of the diluted fission product crude from the OC3 CR Tank was started on April 17, 1965. The first half of this material has been processed through the concentration, pre-centrifugation, sulfate precipitation and carbonate metathesis steps. The normal oxalate separation of the strontium from the rare earths was in progress at the end of the month.

Promethium processing at the Strontium Semiworks was completed on April 15, 1965 with the loadout of 125 kilocuries of promethium 147. The product solution also contained 26 kilocuries of cerium 144 and 17 kilocuries of strontium 90. Activities at the Strontium Semiworks during the remainder of the month involved preparations for processing strontium. These included cleanup and disposal of the degraded process solvent, cleanup of the remaining solvent for strontium use, comprehensive flushes of all vessels, including cold chemical makeup tanks, checkout of all samplers, and brief tests to define the flooding parameters of the solvent extraction columns. The feed solution for the strontium run was transferred from Tank 8-2 in B Plant to the OC2 CR Tank.

Excessive pressure drop across the Fiberglass filter in the In-Tank Waste Solidification Unit has necessitated decreasing the input air flow to maintain the desired vacuum in Tank 101-BY. Despite

the reduced air flow, it was necessary to shut down the unit several times during the month and flush the filter with water in order to reduce the pressure drop. The liquid drainage from the filter was found to foam quite readily. Samples of the supernatant liquid in Tanks 101-BY and 103-BY also exhibited significant foaming tendencies. An antifoam chemical has been ordered for addition to Tank 101-BY. Gallons of waste evaporated by the unit during April, 1965 totaled 184,650.

Coating waste transfers to 200 West Area storage tanks totaled 441,000 gallons in April, 1965.

2. Processing Operation

The ruthenium content of the uranium product was higher than normal during part of the month but was within shipping specifications. Plutonium product met specifications except for one batch produced during a waste rework attempt.

Two cesium casks were received and loaded with 112,000 curies of cesium 137. A sample cask was loaded with four gallons of centrifuged Purex LW (concentrated high level waste) solution. The four cesium casks (containing 215,000 curies of cesium 137) and the LW cask were shipped to the Oak Ridge Laboratory on April 26, 1965 after a week's delay due to the flood conditions in the Midwest.

3. Equipment Experience

The J1 (concentrated backcycle waste) process pump in the Purex canyon failed this report period causing excessive current on the drive motor and low pump output. This pump was a "Savannah River" type and had been in service approximately eight months. Replacement was made with a new standard canyon pump.

A faulty joint in one of the Purex canyon crane rails was repaired by welding and resurfacing. One additional crane rail support pad was also installed at the joint.

Load cable and mechanical inspections were completed on the Purex canyon west crane 10-ton hoist and the Purex canyon slave crane 40-ton hoist. This work was a preventive maintenance program item.

One of the Purex No. 2 Organic System supply pumps (R5-2), failed to meet pumping requirements making an overhaul necessary. The impeller, bearings, seals, and gaskets were replaced, returning the pump to normal operation. The second supply pump (R5-1) was also overhauled as a preventive maintenance measure to improve the dependability of the system.

The Purex U Cell (acid storage vault) vessel vent blower failed and was replaced with a reconditioned spare. The unit had been in service approximately two years. Failure was caused by corrosion and excessive vibration.

The Purex C3 dissolver tower, which had been replaced during the thorium run, was shipped to T Plant for decontamination and modification.

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Two failed Purex stainless steel tube bundles were buried and sixteen Purex canyon trench blocks were removed and buried. The number of trench blocks replaced through April, 1965 totaled 43.

Minor Construction forces found and repaired a leak in the line from Tank 216-A2 (Ammonia scrubber water catch tank) to the A-21 crib.

The differential pressure across the CWS filter in the vessel vent system in the B Plant canyon dropped significantly early in the month. The system was restored to normal operation with the installation of a new high efficiency filter.

Construction forces continued Phase II and Phase III work in the B Plant Canyon, Pipe Gallery, Operating Gallery and Chemical Makeup area. The excavation for the new exhausted canyon ventilation air filter building is approximately 75 percent completed. The new steam turbine, which will furnish backup power for the canyon exhaust ventilation fans, is in place but connections for operation have not been completed.

The Tank 105-A emergency pump pit project was completed on April 19, 1965. Soil samples were obtained near one end of the contaminated lateral to a depth of 65 feet (10 feet below tank bottom). No radioactivity was found in any of the samples. Moisture was noted in samples down to a depth of 52 feet but the soil samples from 52 feet to 65 feet were essentially dry.

The Oil sump jet in 241-CR Vault was replaced and transfer of the Oil sump flood material to the Oil Tank to Tank 103-A was completed.

All 241-A Tank Farm leak detection laterals and dry wells were monitored following the earth tremor on April 29, 1965. The liquid levels of all underground storage tanks were also checked. No significant changes were detected in any of the readings.

Pumps were installed in Tanks 103-A and 101-AX. The solution in the Tank 101-AX was pumped to Tank 103-AX and the solution in Tank 103-A was pumped to Tank 101-AX in order to prepare Tank 103-A to receive solution from Tank 105-A if it becomes necessary to lower the liquid level in that tank.

The instrument air compressor at the Strontium Semiworks failed and was repaired by replacing the piston and rings and reboring the cylinder wall.

4. Radiation Experiences

Iodine 131 emission from the Purex Plant was 12.41 curies for the month. Higher-than-normal emission rates were traced to low vacuum conditions in A and C dissolvers. The installation of new gaskets on the A dissolver charging chute and on the C dissolver off-gas jet suction line in the 293-A Building reduced the emission rates.

The radiation readings of the "hot spot" under the edge of Tank 105-A being monitored by a shielded probe in the No. 3 caisson lateral have

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remained constant at 10 - 20 R/hour over a distance of two feet.

5. Analytical Experience

Bulk samples of fission product crude from the Purex Head End recovery system were analyzed throughout the month. The Remote Analytical Cave in the Purex sample gallery was utilized for this analytical work. Analytical results from this special program helped demonstrate the improved fission product recovery associated with the nitric acid leaching of solids present in the Purex LWW (concentrated high level waste). Good correlation was obtained between routine strontium analytical results and the strontium analyses performed on the bulk samples. Routine promethium results were found to be biased high.

Extensive investigative effort was directed toward determining the parameters of the new thorium analytical procedure (TOPO (Tri-Octyl Phosphine Oxide) extraction method). Distribution ratios for thorium and uranium were determined. The effects of varied concentrations of TOPO, nitric acid, hydrochloric acid and contaminants were obtained. Two solvent systems were also investigated. The information will be used to more clearly define applications of the TOPO method for support of future thorium processing programs.

The X-Ray Fluorescence Spectrometer was delivered during the latter part of April, 1965. Installation is scheduled to start May 17, 1965 and will be performed by a service engineer.

Analytical assistance was provided to Weapons Manufacturing for the uranium 233 purification program. Process and final product samples were analyzed to determine the uranium, thorium, and protactinium content. Quality control data were supplied to support the analytical results.

Manager-Purex

WM Harty:MLM:gt

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II. ACHIEVEMENTS (Continued)

C. REDOX OPERATION

1. Operating Continuity

Operation of the Redox plant during the first part of the month was interrupted because of difficulties experienced in acid control and the resulting loss of hexone quality, neptunium recovery, and precycle decontamination performance. However, by mid-month an improvement in acid control was realized and plant performance during the latter part of the month was satisfactory.

The Uranium Oxide plant operated exceptionally well this month and a new UO_3 powder production record was achieved. The previous record of 935 tons, established during June 1964, was exceeded by approximately percent.

2. Processing Operations

a. Redox Processing

Redox processing activity was interrupted on six separate occasions during the month with the result that virgin E-metal on-line operating efficiency was limited to 72 percent. Approximately two days of downtime were taken for: 1) dilute acid flushing of the extraction columns to correct flooding conditions; 2) flushing of the 1A precycle column feed line to remove restrictions; 3) de-scaling of the G-3 organic still heat exchange system to improve its marginal performance. Production activity was diverted to total rework for approximately six days during the early part of the month, when an acid imbalance in the backcycle salt system caused high 1S extraction column waste losses.

Product waste losses, particularly for plutonium, were slightly higher than normal this month due principally to the inability to maintain a proper acid balance across the waste backcycle system. Installation of a sampler in the extraction column feed tank (F-8) during the early part of May, is expected to permit more optimum acid control of backcycle waste feed and thus return waste losses to lower levels.

b. Uranium Oxide Processing

To maintain inventories of depleted and enriched uranium feed solutions in proper balance, H-calciner operation was diverted to

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depleted uranium processing on 4-12-65. Operation of five calciners on depleted uranium feed and one on enriched is planned for the remainder of FY 1965.

The continuity of operations for depleted uranium oxide production, using five calciners, was exceptional this month and the expected production was exceeded.

Enriched uranium oxide production was slightly below expectations, due to: 1) a shortage of shipping hoppers; 2) lack of specification feed; 3) restrictions in the process air filter system. However, over-all plant performance was very satisfactory and a new UO_3 powder production record was achieved.

3. Mechanical Experience

a. Redox Plant

There were no process outages related to equipment problems this month and a 100 percent mechanical efficiency was achieved.

The Nash-Hytor compressor for the ozone air supply required emergency maintenance on 4-5-65, when the coupling slipped and caused misalignment of the drive head. The unit was repaired and returned to service in approximately 11 hours.

The 15 column feed pump (F-8), which was performing erratically during the last week of March, failed on 4-2-65 and was subsequently replaced. No lost processing time resulted from this change-out.

b. Uranium Oxide Plant

Total calciner downtime for mechanical difficulties this month was only 56 hours -- 45 of which occurred during the removal of caked powder from the X-11 ventilation ductwork.

4. Waste Handling and Decontamination

The Waste Handling and Decontamination Operation started to work the decontamination facilities on a two-shift basis (P-Q), effective April 19, 1965. Although all personnel to staff a two-shift operation are not in place, work commitments dictated the move at this time.

Radiation and liquid level readings for the three suspected leaking SX tanks (107-108-109) showed no great significant changes during the period. Slight radiation increases in laterals under the 108 and 109-SX tanks were experienced, with no measurable changes in liquid level. Since the radiation levels under the 108-SX tank continue to gradually increase and shift, it is planned to isolate this tank from the system to obtain a more accurate material balance on its contents. Continued close surveillance of all tanks is being maintained to permit timely action in the event that an active leak should develop.

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5. Analytical Experience[REDACTED]
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The Redox Analytical Laboratory provided: 1) priority krypton-85, 87 and 88 analyses on cooling water samples from the 100-D Reactor, IPD, to verify a suspected slug rupture; 2) special thorium-223 and thorium 230 analyses on a series of samples submitted by the Fuels Preparation Laboratory, IPD, in support of their quality control program for thorium fuel element fabrication; 3) uranium-238, uranium-233, and gamma isotopic analyses for the process control of the uranium-233 recovery program being conducted in the Weapons Manufacturing Operation; 4) thorium analyses on samples submitted by Battelle-Northwest Laboratory as part of their thorium dissolution studies, and uranium and strontium analyses on waste sludge samples for their study of composition and effects of various leaching agents.

R N M Callaghan

Manager - Redox

CHEMICAL PROCESSING DEPARTMENT
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II. ACHIEVEMENTS (Continued)

D. WEAPONS MANUFACTURING OPERATION

1. Operating Continuity

The fabrication of Model 1807 weapon components and Model 88-C weapon components was without significant interruption during the month. The production of unfabricated weapons-grade plutonium was at high rates, with only minor interruptions resulting from filter problems in the calciner off-gas system. Recovery operations were normal, with some delays caused by the above filter problems, which resulted in oxide solids in the button line supernates. The dissolution of slag and crucible fragments was curtailed because one of the slag and crucible dissolvers was inoperable during the month. The incinerator was out of service for one week as a result of mechanical failures. Waste-treatment facilities and americium-recovery equipment performed normally.

2. Processing Operations

a. Plutonium Fabrication

Information on plutonium-fabrication activities is presented in Document RL-SEP-489 (Atomic Weapon Data).

b. Plutonium Reduction

The production of unfabricated weapons-grade plutonium was high and the quality was good.

Approximately 77 kilograms of United Kingdom plutonium was received from the Rocky Flats plant during the month. This 10% Pu-240 material is to be blended to supply current orders for 8.2% Pu-240 metal and oxide.

c. Plutonium Reclamation

One hundred and sixty-two (162) kilograms of normal plutonium were delivered to the button line from the recovery facilities during the month.

One hundred and ten (110) boxes of waste were processed through the incinerator facility during the month.

The 06 slag and crucible dissolver operated well during the entire month. Three hundred and fifty-two cans, containing 27.5

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kilograms of plutonium, were processed. Repairs to the O4 dissolver continued through month-end.

One hundred and eighty-eight (188) grams of plutonium were returned to the main process stream from 66,000 liters of aqueous waste which was processed through the waste-treatment facility. Waste losses to the Z-1-A tile field increased slightly (to 222 grams) as a result of processing the filtrates which contained plutonium oxide solids. Also, 13.1 grams of americium were recovered and stored for future processing. Total americium recovered to month-end was 108.4 grams.

3. Mechanical Performance

The performance of the fabrication and final inspection equipment was satisfactory. The only significant repair items were the replacement of a vacuum pump on the Stokes furnace in Hood HA-19-B1 and the repair of the rotary table on the Gorton lathe in Hood HA-39.

The button line equipment operated satisfactorily except for the performance of the calciner off-gas filters and several failures of the filter cloth of the vacuum-drum filter.

The recovery equipment performed well except for the O4 dissolver and some of the process pumps. Repairs to the dissolver are being performed in the maintenance cell of the 236-Z canyon, where work is complicated and slow. It was necessary to replace two Chempumps and overhaul four others. The three Deauline pumps, which are replacements for Chempumps, have suffered bearing failures.

The ion-exchange column, which is manufactured from polyethylene, ruptured twice during the month. A stainless-steel replacement column is being fabricated in the GPD shops.

4. Radiation Experience

Radiation and contamination control statistics indicated satisfactory control.

One case of potential plutonium deposition was experienced when an operator incurred a puncture wound from a piece of wire in a process hood. The wound was successfully excised by the industrial physician, and no measurable deposition is anticipated.

5. Analytical Experience

Number of Samples Received	3,267
Number of Determinations	20,279

An analytical method for the determination of trace quantities of uranium has been established.

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The equipment for the determination of carbon in plutonium has been revamped. Improvements in accuracy and reliability were effected.

The analyses of the plutonium metal for the first portion of the French order were completed during April. The metal was well within specifications.

J H Smolen

Manager
Weapons Manufacturing

SG Smolen:ap

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II. ACHIEVEMENTS (Continued)

E. FINANCIAL AND SERVICES OPERATION

1. Production Cost Accounting

AEC-required schedules for the FY 1966-67 operating and inventory budgets were submitted to CA&AO for consolidation by April 23. Special manpower charting by program was prepared for local AEC Budget Division in order to aid in their analysis of the effect of program changes on personnel. Analysis of short and surplus personnel by craft for the budget period was submitted to CPD management. CPD staff budget review resulted in reduction of approximately \$1,200,000 from section estimates, including manpower reduction of approximately 15 for the budget period. The final manpower budget was down 55 employees (at June 30, 1967) from the preliminary submission. In total, the Revised FY 1966 budget is approximately \$750,000 lower than the original submission of a year ago.

Special Requests handled during the month included:

Bi-monthly shipments of Pu Nitrate to New Brunswick Lab
9 Kg Pu Metal to Battelle Northwest (for IPD)
1600 grams Pu Nitrate to GE - Vallecitos Atomic Lab
Materials to Battelle Northwest for testing
20 Kg Pu Metal to NUMEC
Measurement Evaluation Program - New Brunswick Lab
4 gal. Purex IWW to Oak Ridge

A directive was received from the Commission instructing us to immediately institute coding and reporting for breakdown of O2 R&D and O3 R&D costs by budget proposal detail. The AEC has asked that we report 10 months estimated and 2 months actual cost in this detail for FY 1965. Immediate measures were taken to disseminate new coding to the field and personal contact was made with the involved subsection managers.

A study requested by AEC Finance detailing FY 1964 waste management costs by plant and waste classification, i.e., high or low level, etc., was completed. This report supplements the one issued shortly after the end of FY 1964.

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2. General and Tax Accounting

During April, two work authorities were received from the AEC: Directive #EQT-021, Work Authority No. 1, Project CAC-171, Analytical Laboratory Ventilation Modifications - 234-5 Building, authorized \$9,000; Directive #AEC-254, Project CAC-169, Sludge Removal and Waste Transfer - 200 East Area, was issued on April 27, authorizing detail design in the amount of \$250,000. Work Authority #1 was issued to General Electric on April 30 for \$10,000 to provide assistance.

There were two emergency 02 Program appropriation requests and one 03 Program appropriation request issued during April. The approved appropriation requests are detailed as follows:

<u>AR No.</u>	<u>Description</u>	<u>Amount</u>
56054	Two Channel Recorder - A Farm	\$ 3 500
56063	Recording Equipment - 105-A Tank	6 600
56066	Fabricate Hood - 234-5 Building	<u>11 250</u>
Total		<u>\$21 350</u>

In addition, there were twenty (20) appropriation requests in various stages of approval at month end that are being held pending release of additional 02 general purpose equipment funds. Total estimated cost for these appropriation requests is \$232,545.

Approval was requested of RL00-AEC to transfer 212-R Metal Storage Building and service equipment from standby to in-service use status. These facilities are being used by IPD in a boring development program.

3. Business Information Systems

Communications System - The feasibility study of placing a communications and reporting system between the Redox Processing Plant and supporting laboratories is about complete. The type of equipment needed, input criteria, and output report requirements have been established. A high degree of interest in this system and future expansion of it has been expressed by Research and Engineering and by Purex. We plan to present the system during May.

General Accounting Manuals - A chart of accounts and a General Ledger and Cash Control Manuals draft have been prepared. The chart of accounts has been received by the AEC and tentatively accepted. An appropriation request has been prepared requesting the purchase of a Friden Auxiliary Accounting Keyboard for use in preparing Accounts Payable checks and pay warrant schedule. This device, used in con-

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junction with a flexowriter, will permit us to process data faster and in a more accurate manner than by manual means. The equipment will cost \$2,225 and will justify its purchase within twenty months.

Personnel Accounting - A separate computer system has been prepared and flow charted. This system, similar to the payroll system Battelle-Northwest uses, can now be modified to meet our needs as these needs become known.

R. G. Connell

Manager - Finance

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II. ACHIEVEMENTS (Continued)

F. FACILITIES ENGINEERING OPERATION

1. Purex

Purex Thorium Processing

A rough draft issue of the engineering study has been completed and is serving as the basis for the Architect-Engineer's design activities. The final engineering study is to be issued in four (4) parts. Part Four (Process Design) is scheduled for issuance about the middle of May. The following items have been added to the definitive list of work to be performed.

- a. Install a cation exchange column, either in "L" or "N" Cell to remove thorium contamination from the uranium product stream.
- b. Use 1% boron stainless steel rings instead of boron glass rings to poison the SLS and "N" Cell sumps.
- c. Furnish sampling and agitation capabilities in the design of the new 1-11 Tank.

Work was initiated on the engineering and design of a new Purex F-11 Vessel which is to be provided for the thorium processing campaign. The purpose of this 3-barrel tank is to demonstrate the mixing characteristics obtained by air sparging and to establish the optimum sparging rate. Materials required for construction are being selected.

Purex Processing Flexibility

Twenty-nine (29) more special jumpers were fabricated in the Chemical Processing Shops. A hydraulic analysis of the liquid flow system between the dissolver tower and the dissolver was completed. As a result of this study, the height of the overflow to the catch tank was increased. Repairs were planned for two (2) failed 2-inch lines in "C" and "E" Cells which were required for the flexibility project. It was decided to test the feasibility of using stainless steel as a liner material because 4-inch diameter Teflon (TFE) pipe cannot be extruded in 20-foot lengths. If the stainless steel liners are satisfactory, a method of repair for 4-inch lines will be available. Requests for stainless steel liners are out for bids.

Processing of 2% Enriched Uranium - Purex

Preliminary engineering designs have been completed. These de-

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signs have been integrated with NRD with respect to fuel element lengths, equipment, and the logistics of fuel element transfer from NRD to CPD.

Waste Storage Tank Leak Detection

Extensive instrumentation work is being done at the 105-A Waste Storage Tank to evaluate performance of the tanks. Special interest subjects are temperature profiles of laterals underneath the tank, high-level radiation probes, stress evaluation, tank bottom detector, and sludge temperature read-out. Equipment for these phases is being designed and tested for probable use in all waste storage tanks.

In-tank Solidification

Criteria have been issued for installation of the first unit of in-tank solidification equipment at the second tank site. Design was started for an air particulate monitor for the in-tank solidification stack at 241-BY Tank Farm.

Dissolver Interchange

A schedule is being prepared to show graphically the best method for Purex dissolver interchange. This graph is planned to show items of work and equipment status at any given time, thus indicating the optimum replacement schedule for three (3) metal dissolvers.

2. Redox

Redox Swamp Expansion

The three (3) swamp area ponds have a gross water surface area of approximately 890,000 square feet. At present, Redox flows in this area will be minimal for normal percolation rates in West Area. An area of 350,000 square feet adjacent to the present swamp area is being laid out for pond extension.

3. Weapons

Americium Recovery

A stainless steel column was designed and fabricated as a replacement for the polyethylene W-14 cation exchange column which failed apparently from faulty plastic welding.

234-5 Building Improvements

Engineering was completed for a control system for the optical comparator and for additional capacity to the RMA Line electric power system. Engineering was started on a magnetic flowmeter to replace

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the present manual manual controller of the flow of manganese nitrate to HC-7.

CAC-138 - Special Plutonium Contributing Facilities - "Z" Plant

This project proposal was returned without approval on April 6. The Atomic Energy Commission expects to interest private enterprise in providing capability for specialty plutonium products.

4. General

Radiation and Shielding Studies

Radiation dose rates and shielding determinations have been directed toward three (3) major programs; U₂₃₃ processing, neptunium-plutonium recovery, and technetium recovery. These investigations have progressed to the stage of establishing shielding materials and approximate thicknesses required for specific process equipment.

Project Cost Data

Project Cost Information as of 5/2/65:

Total Authorized Funds - 13 Active Projects	\$ 3 323 000
Total Cost-to-date	1 674 000
Commitments and Open Work Releases	873 000
Unencumbered Balance	776 000
Costs Charged to Above Projects-4/4/65 to 5/2/65	193 000

CGC-132-Rev. 1 - Prototype and Mock-up - Waste Management Packaging Equipment

Directive No. HW-555, Modification #1, dated April 30, 1965, authorized a deferral of the project completion date from April 15 to September 1, 1965.

CAC-169 - Sludge Removal and Waste Transfer Facilities-200-E Area

Directive AEC-254 was issued April 27, authorizing detail design in the amount of \$250,000.

AR-56056 - Waste Container - On-site Shipping Cask

The Appropriation Request requesting \$60,000 for a shielded cask, to be used in the existing well car, for transporting packaged high-level waste was approved on April 2, 1965.

Operating Continuity

Services of electricity, water, steam, equipment, and craftsmen were provided without interruption to production operations.

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Equipment Fabrication

Shops personnel continued fabrication of process equipment, notably the Purex items of multi-purpose dissolver, spare dissolver tower, F-6 demister, and the HS Column cartridge.

Improved Water Softener

A new Zeo-carb media was installed in the No. 3 and No. 4 water softeners in the 284-E Building. This will improve the quality of boiler feed water, increase the capacity of the softeners, and result in an decrease in costs on salt required to regenerate the softers.

Manager - Facilities Engineering

HPS/WWC/alr

CHEMICAL PROCESSING DEPARTMENT
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II. ACHIEVEMENTS (Continued)

G. RESEARCH AND ENGINEERING OPERATION

1. Separations Process Engineering

Purex

a. Neptunium Purification

During the April neptunium anion purification campaign, the concentration of thorium in the feed was measured at about 0.03 grams of thorium per gram of neptunium. Compared to the March campaign, this is a ten-fold decrease in thorium contamination, and reflects the gradual purging of thorium from the Purex 3WB system. A thorium arithmetic decontamination factor of 630 was achieved across the anion exchange process. The neptunium product met all specifications with respect to contaminants.

b. Solvent Quality

The plutonium retention value of the solvent (100) in the No. 1 Solvent Recovery System remained essentially constant at 3×10^8 alpha counts per minute per gallon, and the value for the No. 2 Solvent Recovery System (200) improved two-fold, to about 3×10^7 alpha counts per minute per gallon. Thus, the values for both systems are about three-fold above normal.

c. Waste Rework

Product-containing sludges being stored in the Waste Rework Tank F8 were treated with a solution of 8.0M HNO_3 and 0.5 g/l boron, near the boiling point, for a period of about eight hours, for the purpose of dissolving the solids. In an attempt to rework the dissolved product, the addition of less than 50 gallons of this solution to a 4000-gallon batch of dissolver solution resulted in a large increase in fission-product activity of the plant product streams. In the HSP stream, the activity peaked at about fifty-fold above normal levels, and the burst persisted for about 12 hours. The principal contaminant was ZrNb-95 , with the bulk of the activity following the plutonium product stream.

Redox

Because of difficulties in acid control and the resulting loss of hexone quality, neptunium recovery and Precycle decontamination

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performance have been erratic during the current operating period. The current Redox flowsheet specifies that the salt waste neptunium feed stream be acidified to 0.2M HNO_3 prior to its extraction processing in the HS Column. Control is based on analysis of the salt waste backcycle concentrator (D-14); the acid is added continuously between this concentrator and the downstream HS Column feed tank (F-8). If the feed acidity is too low, neptunium is lost to the waste stream (HSW); if the feed acidity is too great, degradation of the hexone extractant ultimately decreases process decontamination performance and also causes neptunium losses. Lack of a sampler on the F-8 vessel has precluded good control of this variable. Consequently, the installation of a sampler has been scheduled.

2. Fission Products Process Engineering

a. In-Tank Solidification

Operating rates of the in-tank solidification unit have been limited to about 65 per cent of design rate by a high pressure drop across the off-gas filter. Dew point measurements on the inlet gas stream to the filter indicate some condensation is occurring in the filter. Adding a small volume of heated air upstream of the filter is planned to raise the air stream temperature above its dew point.

The filter differential pressure was also observed to increase rapidly above its normal value following the addition of waste from another tank. Laboratory studies on samples drawn from the in-tank solidification unit and its feed tank indicate stable foams can be formed. Addition of an antifoam agent in concentrations of 50 - 100 ppm were shown to be effective in breaking the foam in the laboratory samples.

b. Tank Farms

Investigation of TK-105-A continued during the month. A dip sample taken from the tank contained 28 volume percent settled sludge which reduced to 14 volume percent when centrifuged. Fission product analyses on the sludge and supernatant solution show that the heat generation rate is about 14 watts per gallon of centrifuged sludge and 0.15 watt per gallon of centrifuged supernatant solution. These values indicate that, while the sludge must remain submerged to avoid excessive sludge temperatures, small quantities of supernatant solution escaping the tank would not produce excessive temperatures in the soil.

Additional soil samples were obtained to depths of 65 feet near one end of the contaminated lateral. This depth is approximately 10 feet below the tank bottom and at about the same elevation as the leak detection laterals. No radioactivity was found in any of the soil samples.

Several tanks in the West Area tank farms were sampled to evaluate the amount of tank space that could be retrieved by concentration in an evaporator. Laboratory boil-down tests proceeded smoothly with no foaming problems detected. On the average a concentration factor of 2 could be obtained without excessive solids formation. Extrapolation to operation of an evaporator would indicate that over three million gallons of space could be retrieved by concentrating the waste now held in thirteen tanks.

c. Fission Product Recovery

Processing steps were defined for a strontium-rare earth crude which was inadvertently contaminated with coating waste and thorium flush solutions. Laboratory studies indicated that a sulfate precipitation flowsheet similar to that used at Purex head end would remove aluminum and fluoride, and would reduce lead contamination sufficiently to permit a normal oxalate separation of rare earths from strontium. The sulfate precipitation has been completed on the first half of the contaminated crude in the plant. A double metathesis of the sulfate cake was found necessary due to the high lead content of the material. Losses to the sulfate waste were less than five percent based on waste supernatant analyses.

Processing of aged promethium at the Strontium Semiworks, was completed during the month with the final removal of sulfate introduced as per-sulfate during the cerium removal step. Overall decontamination factors for strontium, manganese, lead, iron and cerium were 5, 50, 500, 130 and 6, respectively. Over-all product recovery was low, about 30 percent, due to numerous flowsheet problems. The more important problem areas identified during the test runs include:

1. The interference of manganese with both strontium and rare earth solvent extraction;
2. The gradual radiolysis of chelating agents causing large amounts of rare earths to precipitate from solutions at a pH greater than about one.
3. The variability of solvent extraction kinetics for promethium with different chelating agents, and that cerium extraction proceeds at a much faster rate than for promethium.
4. The slowness of promethium extraction relative to that of cerium.

3. Plutonium Process Engineering

a. Prototype Continuous Plutonium Oxide and Plutonium Metal Dissolver

The teflon-lined, D-type, recirculating dissolver, provided with a heated acid inlet and a perforated plate to suspend solids above the acid inlet, has been operated for three weeks on low plutonium-content plutonium-aluminum alloys. Performance on the prescribed flowsheet has been good. The flowsheet calls for 8M HNO₃, 0.0033M Hg(NO₃)₂, and 0.3M HF. The alloys charged have contained two percent and seven percent plutonium, and the plutonium product concentration has been approximately 1.2 grams per liter.

A steam sparger has been installed on this dissolver following the initial unsuccessful attempts to dissolve plutonium oxide. The steam sparger facilitated the clean-out of undissolved solids from the dissolver. The steam sparger has had no effect on the dissolution of the Pu-Al alloys.

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b. Slag and Crucible Dissolver

The continuous slag and crucible dissolver (TK-06), equipped with a sparger used to keep solids in suspension, operated well during April. A total of 482 cans (352 in April) have been introduced to the dissolver since the last physical clean-out. On the basis of this encouraging data, process tests have been initiated to reduce dissolvent use and can dissolving time cycles. In a 152-can test, the dissolvent volume was reduced from 25 to 20 liters per can without experiencing detrimental effects. At the present time, a process test is in progress using both the 20-liter dissolvent volume per can and a 30-minute dissolving cycle is used in place of the 45-minute cycle used earlier.

4. Separations Chemistry Laboratory

a. Purex Solvent Treatment

An investigation into the permanganate treatment of Purex solvent has shown that the "permanganate demand" during organic cleanup varies significantly with the pH. In the presence of free nitric acid, pure solvent reacts with the permanganate and acid to increase the apparent "permanganate demand".

b. Route of Fluoride Ion in Fission Product Crude

Laboratory testing has indicated that fluoride ion cannot be adequately complexed with aluminum prior to the rare earth oxalate precipitation; the oxalate releases the fluoride ion by forming an aluminum oxide complex. Subsequent synthetic data shows the fluoride split to be up to 25 per cent in the cerium-rare earth fraction and the remainder in the supernate or strontium fraction.

c. Americium Purification

Approximately 18 grams of americium oxide have been purified to 99.6 per cent by cationic exchange on the Dowex 50W X 8 chromatographic columns using DTPA as elutant, followed by oxalate precipitation and calcination. An overall cycle time of about three weeks per batch was required. Impurities in the product included cerium - 2000 ppm, iron - 750 ppm, aluminum - 500 ppm, and magnesium - 200 ppm.

The presence of excessive quantities of aluminum in the crude column feed limited the amount of americium that could be loaded. A method for removing the aluminum by batch contacting the highly salted aqueous system with DBBP is being evaluated so that larger batches of americium can be purified.

d. Solubility of "High-Fired" PuO₂

The analysis of PuO₂ which has been subjected to high temperatures has been complicated by the inability to get the material into solution. This problem has now been resolved by a method in which the oxide is fused at 300° C for two hours with ammonium bi-fluoride; the flux is

then poured into an aqueous solution of aluminum chloride.

e. Differential Spectrophotometry

A method has been developed for analyzing plutonium in aqueous solution by using calibrated glass filters to measure the differential absorbance at 562 mμ by plutonium in a concentration range of 9 - 14 g/l. An estimated standard deviation on ten aliquots of a known standard was plus or minus 0.05 per cent. The work has been done in a chloride matrix resulting from dilution or dissolution with HCl. The method appears to have the precision of the ceric titration method and is much shorter and simpler.

f. Differential Thermal Analysis

A new technique has been devised for handling liquid samples with a greater sensitivity. In the past, liquids were suspended on glass beads and movement of the beads as the heat was increased caused many noise peaks seriously reducing the sensitivity. By absorbing the sample on acid-washed asbestos, a very low noise level is observed. Purex solvents from R and G cells were analyzed with no observable exotherms up to 300° C. TBP and Soltrol boil endothermally from 200 to 300° C (1 atm.). R cell solvent contained 1.6 v/o water. This is a factor of two higher than the laboratory solvent control.

5. Plutonium Chemistry Laboratory

a. U233 Purification Flowsheet

The U233 purification flowsheet for the current batch involves a thermal concentration step, an anion exchange step from chloride solution, a peroxide precipitation, and calcination to yield a U₃O₈ product.

Analytical results are now available for the first test run of the U233 flowsheet. Iron was >10,000 ppm in the feed, with total metallics >25,000. In the final oxide product iron remained at >10,000 whereas other metallics were negligible. Evidently no iron purification occurred over the peroxide step.

The anion absorption step from hydrochloric acid worked well and very low losses were encountered. Thorium was easily reduced to less than a tenth of one percent. The peroxide precipitation was carried out with very little loss, and purity was good except for iron.

Previous work with natural uranium indicated that good iron decontamination should be possible with peroxide precipitation, but repeated tests with U233 solutions failed to confirm these results. In order to obtain good iron decontamination, it was necessary to reduce the iron to the ferrous state. This was accomplished by adding hydroxylamine hydrochloride to the anion exchange feed solution. This reduced the Fe⁺³ to Fe⁺² which passed through the ion exchange column without loading. Emission specification analysis of the final oxide product indicated that the iron level was lowered from 10,000 to less than 100 ppm.

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A series of six runs were made using natural uranium to determine the effect of pH on the filterability of the peroxide precipitate. Although a quantitative estimate is difficult to make, it appears that a pH of about 1.5 is optimum for the strike and gives the most filterable precipitate. The peroxide obtained can be air-dried at ambient temperature to give a free-flowing powder.

R. E. Tomlinson

Manager
Research and Engineering

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III. PERSONNEL ACTIVITIES

A. FORCE SUMMARY

<u>Operation</u>	<u>Monthly Salaried</u>		<u>Weekly Salaried</u>		<u>Total</u>	
	<u>3-28-65</u>	<u>4-30-65</u>	<u>3-28-65</u>	<u>4-30-65</u>	<u>3-28-65</u>	<u>4-30-65</u>
General Manager's Group	10	10	1	1	11	11
Financial	22	34	30	44	52	78
Employee Relations	3	8	4	5	7	13
Research & Engineering	61	60	27	27	88	87
Facilities Engineering	94	90	201	198	295	288
Production	6	6	3	3	9	9
Redox	61	62	223	223	284	285
Purex	70	71	278	275	348	346
Weapons Manufacturing	<u>58</u>	<u>57</u>	<u>245</u>	<u>238</u>	<u>303</u>	<u>295</u>
Total	<u>385</u>	<u>398</u>	<u>1012</u>	<u>1014</u>	<u>1397</u>	<u>1412</u>

B. PERSONNEL CHANGES

R. V. Lawson transferred from HUPO effective April 1, as Manager - Purchasing, Finance and Services Operation.

Effective April 1, Z. W. Wood transferred from R&OH to Employee Relations Operation as Specialist, Union Relations and Salary & Wage Administration; R. W. Menard transferred from IPD as Specialist, Personnel Practices and Benefits; and G. E. Backman from Battelle-Northwest as Manager - Personnel Protection.

W. J. Gartin, Manager - Weapons Manufacturing, transferred to Manufacturing Operations and Quality Control Services, N. Y., effective April 30.

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C. TRIPS

<u>Visitor</u>	<u>To</u>	<u>Nature of Discussion</u>
<u>To Other GE Components</u>		
J. H. Warren	New York, N.Y.	CPD Relations. (4/13/65)
A. C. Morgenthauer	Portable Appliance Dept. Ontario, California	Present a paper at GE Western Region Methods and Work Measurement Conference. (4/13-14/65)
<u>To AEC and Other AEC Contractors</u>		
R. J. Sloat	Union Carbide	Uranium oxide engineering,
D. R. Gustavson	Paducah, Kentucky	technology, equipment design,
	Mallinckrodt Chemical Co.	and cost. (4/7/65)
	Weldon Springs, Missouri	Ditto above. (4/6/65)
	Argonne National Lab	
	Chicago, Illinois	Ditto above. (4/5/65)
J. S. Beard	Atomic Energy Commission	Attend promethium isotopic
J. H. Warren	Washington, D. C.	fuels program review meeting. (4/14/65)
R. J. Sloat	Dow Chemical Co.	Material specifications.
A. E. Smith	Rocky Flats Plant	(4/21-23/65)
R. E. Olson	Denver, Colorado	
R. C. Hollingshead	Albuquerque, New Mexico	Attend meeting of IMOG
R. A. Zinsli		Subcommittee. (4/22-23/65)
R. A. Zinsli	Dow Chemical Co	Quality Control.
	Rocky Flats Plant	(4/26/65)
	Denver, Colorado	
M. K. Harmon	US-AEC	Cost studies.
W. G. Smith	Germantown, Md.	(4/27-28/65)
<u>To General Industry</u>		
J. M. Pinkerton	Ex-Cell-O Corp.	Technical discussion.
	Detroit, Michigan	(4/7-9/65)

C. TRIPS (Continued)

<u>Visitor</u>	<u>To</u>	<u>Nature of Discussion</u>
<u>To General Industry (Continued)</u>		
J. S. Crowder	Linde Air Products Co. Seattle, Washington	Attend lecture and Demonstration of welding equipment at Am Welding Society Meeting. (4/15/65)
	Boeing Airplane Co. Seattle, Washington	Welding Methods and Techniques. (4/16/65)
<u>To Technical Society Meetings</u>		
O. F. Hill	American Chemical Society Detroit, Michigan	149th Annual Meeting. (4/4-7/65)

D. VISITORS

<u>Visitor</u>	<u>From</u>	<u>Nature of Discussion</u>
<u>From AEC and Other AEC Contractors</u>		
W. B. Lewis	Phillips Petroleum Co. Idaho Falls, Idaho	Nuclear Safety Review. (4/27/65)
D. R. Smith	University of California Los Alamos, New Mexico	Ditto above.
J. Thomas	Oak Ridge National Lab. Oak Ridge, Tennessee	Ditto above
Edward Kinderman Peter Butterfield	Stanford Research Institute	Accountability practices, tour of 222-S Laboratory. (4/27/65)
<u>From General Industry</u>		
R. H. Studebaker	Process Equipment Co. Tipp City, Ohio	Tests on Remote Welder in Waste Packaging Mock-up. (3/29 to 4/9 and 4/20-30/65)
W. Cockrell H. Soisson	Texas Nuclear Corp. Austin, Texas	Activation analysis. (4/2/65)
W. C. Botts J. E. Gingrich	Atomic International Los Angeles, California	Polonium processing and waste management. (4/6/65)

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D. VISITORS (Continued)

<u>Visitor</u>	<u>To</u>	<u>Nature of Discussion</u>
<u>From General Industry</u> (Continued)		
J. E. Schreiber	R. H. Brown & Co. Portland, Oregon	Noise problems with pumps. (4/6/65)
J. W. Dickinson	Linde Air Products Seattle, Washington	Service Welding equip- ment. (4/1 and 4/27-65)
Frank Morris	Turco Products Co. Spokane, Washington	Decontamination chemicals, with WH&DO supervision. (4/14/65)
Tom D'Muhala Leonard Robinson Bill Tedeschi	General Dynamics Chicago, Illinois	Decontamination chemicals and procedures with WH&DO supervision. (4/15/65)
R. D. Martin	Perine Machinery & Supply Co. Seattle, Washington	Machine Shop equip- ment. (4/30/65)
<u>From Other Government and State Agencies</u>		
G. Hagey	NASA Houston, Texas	Polonium processing and waste management. (4/6/65)
R. J. Thomas	Department of Defense Washington, D. C.	Tour 234-5 Building. (4/22/65)

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IV. SAFETY AND SECURITY

<u>Operation</u>	<u>General</u>	<u>Purex</u>	<u>WMO</u>	<u>FEO</u>	<u>Redox</u>	<u>R&E</u>	<u>Finance</u>	<u>Prod.</u>	<u>Empl. Rel.</u>	<u>Total</u>	<u>YTD</u>
Dis. Injuries										0	0
Ser. Accidents										0	1
Med. Treat. Inj.		18	11	10	9		1			49	175
Rad. Occurrences		2	5		4					11	39
Contam. Wds.			1							1	12
New Deposition Cases										0	0
Fires					1					1	1
Security Violations				1						1	5

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V. REPORTS

A. PREPARED AND ISSUED

HW-79219 REV2, Unclassified, "Product Specifications - Hanford Uranium Trioxide (from Depleted E-Metal) for Off-Site Shipment", by R. J. Sloat, dated April 1, 1965.

RL-SA-32, Unclassified, "Gas Chromatographic Analysis of Solvents Used in Reactor Fuel Reprocessing and Fission Product Recovery", by M. H. Campbell, dated April 23, 1965

RL-SEP-118, Unclassified, "Current Status of Hexone and Hexone Decomposition Products in the Redox Process", by C. A. Colvin, dated April 2, 1965

RL-SEP-232 L24, Secret, "Button Purity Data - Letter #24", by R. J. Sloat, dated April 16, 1965

RL-SEP-232 L25, Secret, "Button Purity Data - Letter #25", by R. J. Sloat, dated April 26, 1965

RL-SEP-232 L26, Secret, "Button Purity Data - Letter #26", by R. J. Sloat, dated April 28, 1965

RL-SEP-263, Unclassified, "Design Criteria, Purex Sludge Removal and Waste Transfer, 200-East Area", by J. W. Barnes, dated January 25, 1965

RL-SEP-270, Secret, "Analyses of Neptunium Batches - Purex No. 27 and 28", by M. K. Harmon, dated April 27, 1965

RL-SEP-314, Secret, "Budget Design Criteria, U-233 Fabrication, 'C' Fabrication Line, 234-5 Building", by R. C. Hollingshead, dated February 15, 1965

RL-SEP-366, Secret AWD, "Budget for FY 1967 and Revision of Budget for FY 1966 - Proposal for Process Development", by R. E. Tomlinson and A. E. Smith, dated March 31, 1965

RL-SEP-367, Secret AWD, "Budget for FY 1967 and Revision of Budget for FY 1966 - Proposal for Research and Development - General Weapons Development", by R. E. Tomlinson and A. E. Smith, dated March 29, 1965

A. PREPARED AND ISSUED (Continued)

- RL-SEP-368, Confidential, "Plutonium Blending Facility, 'Z' Plant, FY 1967 Budget Facility Description", by D. E. Braden, dated April 30, 1965
- RI-SEP-373, Secret, "Technetium Recovery and Storage at 224-B, Budget Design Criteria", by W. C. Schmidt, dated March 22, 1965
- RL-SEP-374, Secret, "Neptunium-Plutonium Recovery Facilities, 221-B, & 224-B Budget Design Criteria", by J. W. Barnes, dated April 15, 1965
- RL-SEP-380, Confidential, "Purex 4.0 Capacity Factor Expansion, Engineering Study", by J. R. LaRiviere and J. H. Nordahl, dated April 9, 1965
- RL-SEP-382, Secret, "Task Force Recommendations - Non-Boiling Waste Storage", by O. V. Smiset, L. W. Finch, G. L. Hanson, et al, dated March 29, 1965
- RL-SEP-383, Unclassified, "Forecasted Rates from U-233 in Fabrication Hoods", by H. A. Moulthrop, dated March 18, 1965
- RL-SEP-388, Secret, "Budget Design Criteria, U-233 Metal Reduction and Recovery Facility, 234-5 Building", by M. E. Borgeson and L. M. Meeker, dated March 26, 1965
- RL-SEP-391, Unclassified, "Project Proposal, REV1, Prototype and Mock-up Waste Management Packaging Equipment (Project CGC-132)", by L. W. Finch, dated April 7, 1965
- RL-SEP-394, Unclassified, "Critical Mass Control Specifications - 234-5 Building", by R. J. Sloat, dated April 2, 1965
- RL-SEP-397, Unclassified, "Chemical Flowsheets for the Decladding and Dissolution of PRTR 0.48 Percent PuO₂-UO₂ Fuel", by G. L. Hanson, dated April 8, 1965
- RL-SEP-404, Secret AWD, "Weapons Process Engineering Technology Report March 1965", compiled by members of the Research and Engineering Operation, Weapons Processing Engineering Operation, dated April 1, 1965
- RL-SEP-407, Secret AWD, "A-Line Product Characteristics - March 1965", by A. E. Smith, dated April 7, 1965
- RL-SEP-415, Secret AWD, "Critical Mass Control Specification Special Ingoting, HC-27", by A. E. Smith, dated April 21, 1965

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A. PREPARED AND ISSUED (Continued)

RL-SEP-417, Secret, "21a-5 Summary Analysis of Proposed Process Development Costs for FY 1967 and Revision of Budget for FY 1966", by R. E. Tomlinson and A. E. Smith, dated March 31, 1965

RL-SEP-424, Secret, "2% Enriched Uranium Metal Processing, Purex Engineering Study", by R. D. Ehrlich, dated April 16, 1965

RL-SEP-428, Secret, "Analyses of Neptunium Batch - Purex No. 27", by M. K. Harmon, dated April 2, 1965

RL-SEP-430, Unclassified, "New Scanning Technique for Isotopic Analysis of Plutonium", by C. S. Homi, dated April 16, 1965

RL-SEP-449, Secret, "Design Budget Criteria, Thorium Oxide Facility, U-Plant", by D. E. Braden, dated April 30, 1965

RL-SEP-433, Unclassified, "Critical Mass Control Specification - Recuplex Reception and Blending Hood Floor Clean-Out", by R. J. Sloat, dated April 23, 1965

RL-SEP-460, Secret AWD, "C-Line Quarterly Summary Report First Quarter Calendar Year 1965", by A. E. Smith, dated April 23, 1965

RL-SEP-466, Unclassified, "Supplemental Critical Mass and Chemical Hazards Control Specifications - Handling and Storage of Shippingport Reactor Blanket Fuel at T Plant", by G. L. Hanson and H.C. Rathvon, dated April 26, 1965

B. PREPARED FOR SIGNATURE AND ISSUANCE

RL-GEN-16, Secret, "Production - March, 1965", by W. E. Johnson, dated April 15, 1965

CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

APRIL, 1965

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

Lloyd R. Michels

Processes and Equipment For The Separation of Polonium From Irradiated Bismuth.

S. J. Beard
W. W. Schulz, Battelle-
Northwest

A Wash Treatment to Restore The Quality of Degraded D₂EHFA-THF Fission Product Extractants.

W. L. Godfrey

The Design of Remote Ion Exchange Equipment - Supplement to HWIR-1743

J. N. Warren

General Manager
Chemical Processing Department

DECLASSIFIED

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