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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT
FOR

RL-SEP--837-Del.

OCTOBER, 1965

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Compiled By
OPERATION MANAGERS

November 22, 1965

HANFORD ATOMIC PRODUCTS OPERATION
RICHLAND, WASHINGTON

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CHEMICAL PROCESSING DEPARTMENT
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I. SUMMARY

October production, as per cent of the HAP0 Production Forecast (RL-GEN-30), is summarized below:

	<u>October</u>	<u>Fiscal Year</u> <u>To Date</u>
Separated plutonium nitrate	111	102
Separated uranium nitrate	99	100
Uranium oxide	102	100
Plutonium metal buttons	107	102
Fabricated parts	100	99

October production equaled or exceeded forecasted quantities for all products.

Following the scheduled outage started near the end of last month, Purex resumed operation on October 3. Feed to the extraction columns consisted of blended rework solutions until October 11 when normal uranium processing was started. Except for twenty-five hours to replace equipment which had failed, performance was continuous at a rate of 23 tons per day.

In Purex Head-End, approximately 720 kilocuries of promethium-147 and 240 kilocuries of strontium-90 were produced. Processing time was limited to twelve days by a shortage of suitable feed material.

After thoroughly flushing the dissolving equipment in Purex B-cell, equipment removal was started so as to prepare for installation of the second annular dissolver. The first annular dissolver, installed in the Purex A-cell during August and September, was operated all month to study dissolution and operability characteristics.

One neptunium purification run was completed and yielded 805 grams of neptunium product. Neptunium shipments totaled nearly 1500 grams.

Two STT casks, loaded with 45 kilocuries of cesium-137, were released for shipment on October 18.

The off-gas filter was replaced on the In-Tank Solidification unit because of excessive differential pressure across the old filter. Because of this condition, operation had become intermittent, the rate had to be reduced severely, and shutdowns were required frequently to flush the filter.

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An acid flushing program, started in the Redox plant during September because of an unexplained variance in the plutonium inventory, was continued until mid-month. E-metal processing was then resumed on October 19 after measurements indicated that the plutonium account had been brought into balance.

Process tests conducted in the Strontium Semiworks indicated that the chemical flowsheets proposed for the waste processing in B-Plant were both efficient and controllable. Except for strontium, all recoveries and separations were better than 99 per cent effective. Laboratory data indicated that the strontium recovery of 75 per cent could be increased to 99 per cent by a small change in pH.

J. H. Warner

General Manager
Chemical Processing Department

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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

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II. ACHIEVEMENTS

A. PRODUCTION OPERATION

1. Production Statistics

a. <u>Percent of Forecast (1) Achieved</u>	<u>October</u>	<u>Fiscal Year to Date</u>
Separated plutonium nitrate	111	102
Separated uranium nitrate	99	100
Uranium oxide	102	100
Plutonium metal buttons	107	102
Fabricated parts	100	99
b. <u>Purex</u>	<u>October</u>	<u>September</u>
Uranium nitrate produced (tons)	389	506
Average production rate during operation (T/D)	22	23
Total waste loss (%)		
Plutonium	0.46	0.52
Uranium	0.22	0.23
On-line efficiency (%)	86 *	77
c. <u>Redox</u>		
Uranium nitrate produced (tons)	81	70
Average production rate during operation (T/D)	6	11
Total waste loss (%)		
Plutonium	0.75	0.54
Uranium	0.25	0.27
On-line efficiency (%)	41	22
d. <u>Uranium Reduction (tons)</u>		
Normal UO ₃ loaded	437	596
Enriched UO ₃ loaded	20	152
Normal UO ₃ approved for storage	457	596
Enriched UO ₃ approved for shipment	51	202
Normal UO ₃ shipped	0	0
Enriched UO ₃ shipped	51	253
Normal UNH backlog	142	192
Enriched UNH backlog	98	28

(1) RL-GEN-30, HAPO PRODUCTION FORECAST

* Includes rework processing

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e. Plutonium Metal Processing

	<u>October</u>	<u>September</u>
Reduction yield (%)	97	97
Product recovery output (kg)	84	83
Product recovery backlog (kg)	1 021	1 016
Waste disposal (grams)	1 776	326

f. Power

	<u>200-East</u>	<u>200-West</u>
Raw water pumped (gpm)	9 621	4 912
Filtered water pumped (gpm)	1 059	1 029
Maximum steam generated (lbs./hr.)	206 000	114 000
Average steam generated (lbs./hr.)	165 930	76 780
Total steam generated (M lbs.)	123 454	57 125
Coal consumed (tons)	6 163	2 857

October production equaled or exceeded forecasted quantities for all products.

Acting Manager, Production

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A-3

100 Kci of Pm-147 and 30 Kci of Sr-90 were transferred from the 003 CR vault inventory to Semiworks for process tests.

* Process test waste discard of 45 Kci Sr-90.

*** HAPO-IB-3 to ORNL

***** Two STT casks to ORNL.

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CHEMICAL PROCESSING DEPARTMENT
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II. ACHIEVEMENTS (Continued)

B. PUREX OPERATION

1. Operating Continuity

Purex Plant operation resumed on October 3, 1965 with a blended rework solution as feed. Hot feed operation started on October 11, 1965 and continued throughout the month except for two brief interruptions to make equipment replacements.

Operation of the fission product processing facilities at the Purex Head End and the Strontium Semiworks was satisfactory. There was limited processing activity at B Plant. Flow restriction problems and decreased loading efficiencies continued during cesium cask loading operations. One strontium cask was loaded and another shipped.

2. Processing Operations

a. Purex Processing

Plutonium product met specifications but uranium product gamma activity rose to 150 percent of specification at the end of the month.

One neptunium purification run, using Redox material, was completed, yielding 805 grams. Two shipments totaling 1497 grams were made.

Purex Plant operation resumed on October 3, 1965, using a blended rework solution of Redox plutonium product and Purex uranium as feed material. Rates were maintained at a capacity factor of 3.0. Hot feed operation started on October 11, 1965 at a capacity factor rate of 2.8 and continued throughout the month except for two brief interruptions. On October 14, 1965 a plant shutdown of approximately fourteen hours was necessary to replace the failed HAF (co-decontamination cycle feed) pump. A second outage of about eleven hours was required on October 23, 1965 to replace the failed HAW (co-decontamination cycle waste) control valve-jumper system. Plutonium solution from the Plutonium Reclamation Facility and the Redox Plant was processed as rework during the period of hot feed operation.

Metal dissolution and operability testing continued on A3, the new multipurpose annular dissolver.

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b. Purex Head End Processing

The Purex Head End fission product recovery equipment was operated twelve days to process all of the suitable feed material and produced an estimated 720 kilocuries of promethium-147 (two-year aged) and 240 kilocuries of strontium-90.

c. B Plant Processing

B Plant processing was limited to equipment flushes in Cells 11 and 12 and the necessary reduction of Tank 6-2 (rare earth crude) volume to enable combination with the Tank 6-1 (rare earth crude) material.

d. Strontium Semiworks Processing

The fourth promethium test run which demonstrated the Phase III solvent extraction flowsheet for simultaneous extraction of rare earths and strontium was completed at the Strontium Semiworks. The flowsheet co-extracts the strontium and rare earths in the HA column and selectively strips the strontium in the HC column. Greater than ninety-five percent rare earth recovery was achieved. The HC column partition was equally successful with a ninety-nine percent partition. Strontium loss in the HA column was approximately twenty-five percent and was attributed to a slightly lower than optimum feed solution pH. The fifth test run, a combination production and test run, was made to isolate 600-700 kilocuries of cerium-144 for off-site shipment and to optimize the HC column partition. The flowsheet performed well until recycle of the washed solvent was started. During the remainder of the run the HC column partition performed only marginally due to solids formation in the column. An estimated 650 kilocuries of cerium-144 and 125 kilocuries of promethium-147 were isolated.

The HAPO-II-2 cask was loaded with 150 kilocuries of strontium-90 on October 25, 1965. A previous loading attempt was discontinued after simultaneous precipitation of radioactively-inert salts during feed slurry preparation prevented loading. The cask contents were promptly unloaded and the cask reloaded.

e. Cesium Processing

Increasing processing problems encountered using the Tank 103C feed solution has led to a decision to replace the Tank 103-C contents with Tank 101-A supernatant solution for future cesium loadings. Equipment is being fabricated for these transfers.

f. Waste Management

Approximately 154,000 gallons of non-boiling waste storage space were recovered by the In-Tank Waste Solidification unit. After intermittent operation at severely reduced rates with frequent shutdowns due to the excessive off-gas filter differential pressure, the old filter was replaced with the existing spare during the period October 5, 1965 to October 13, 1965. Samples of the Fiberglas taken from the old filter showed extensive deterioration at the gas inlet. Periodic flushing of the new filter has been necessary to maintain satisfactory operating rates.

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Tank 112-B was emptied to Tank 101-AX, of which 58,000 gallons were moved into Tank 103-AX for boiloff during October, 1965.

3. Equipment Experience

The Purex D5 (feed solution transfer) pump was replaced when it failed to meet process pumping requirements. The motor was also drawing high amperage. Replacement was made with a new pump from the canyon ready rack.

The agitator in the Purex Tank U1 (recovered nitric acid storage tank) was restored to service following replacement of the short and long shafts, two bearings, one coupling and shaft seal. Repairs to the agitator were made because of excessive vibration as a result of the lower impeller coming loose.

The Purex U1-2 (recovered nitric acid transfer) pump motor failed as a result of an acid pipe leaking acid on the electrical junction box at the motor. The condition of the motor was also poor. The pipe leak was repaired and the motor was replaced with a new motor from spare parts.

Major repairs were made to the Purex east sample gallery exhaust fan. Acid corrosion had damaged the intake duct and part of the fan housing. The intake duct, impeller, shaft, and bearings were replaced and the interior of the fan housing repainted.

The Purex Number Two instrument air compressor was overhauled as part of the preventive maintenance program. The overhaul consisted of replacing the bearings, sleeves and seals. The unit was restored to service.

Six N cell (plutonium ion exchange unit) hood panels were replaced as part of a program to provide better working conditions in the N cell hood.

In attempting to remove the canyon wall connector head on a Purex annular dissolver jumper the impact nut was sheared off the screw. A device was designed and fabricated to push out the connector jaw holding pins and the head was successfully removed. When the replacement jumper installation was attempted the connector jaws on this jumper would not close. The jumper was removed to the hot shop, the old head cut off, and a new head installed. This head made up satisfactorily.

The 3WF (backcycle waste concentrator feed) control valve jumper failed and was replaced.

The Number One heater bank of the air circulator heater, 241-BY In-Tank Waste Solidification Unit, failed. The exact cause of failure is not known. The Number Two heater, which is an installed spare, was put into service and will be used until the Number One heater is repaired.

The Number One exhaust fan at the 244-CR vault was removed from service because of a broken rotor blade. Repairs were made and the fan returned to service.

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The HA column waste effluent control valve (HAW) failed after the fourth test run at the Strontium Semiworks. The alternate HA column waste routing (HAW-A) will permit completion of promethium flowsheet testing.

4. Radiation Experience

Iodine 131 emission was 11.19 curies for the month.

One box of failed jumpers was buried with excellent contamination control.

The Phase III flowsheet testing at the Strontium Semiworks resulted in higher-than-normal radiation levels in the Hot Shop work areas during column operation but returned to normal at the conclusion of the run. The measured radiation level at the fifty-two foot level of Dry Well 136 in the BX Tank Farm has increased by a factor of five since August, 1965. Active lines in BX Tank Farm were hydrostatically tested and showed no evidence of a leak. Adjacent storage tanks have shown no decrease in liquid level.

No significant changes occurred in the Tank 105-A lateral radiation readings or tank bottom bulge detectors.

5. Analytical Experience

Extraction tests for neptunium and plutonium in Purex 1WW (concentrated high level waste) using twenty-five percent dibutyl butyl phosphonate (DBBP) in normal paraffin hydrocarbon diluent were conducted in the Remote Analytical Cave. The purpose of the test was to evaluate the stability of the organic when subjected to a high radiation field. The results of the test were favorable and further study, varying other parameters, is being undertaken.

A safety review on X-ray exposure to personnel from the X-ray absorption photometer and the X-ray fluorescence spectrometer was made. It was determined that present safety devices were adequate to protect personnel from all primary radiation generated by the instruments.

A printer was received for the X-ray fluorescence spectrometer which will provide the means to perform calibration work in a much shorter time interval and also provide a printed record of the ratio of peak height to background counts. Investigative work is also underway to determine the minimum detectable limits for nickel, chrome, and iron impurities in uranium product solution.

A load lugger has been ordered for the Purex Laboratory for handling highly radioactive waste. Delivery date is estimated to be the first part of November, 1965.

Manager-Purex

WM Harty:MLM:gt

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II. ACHIEVEMENTS (Continued)

C. REDOX OPERATION

1. Operating Continuity

E-metal processing in the Redox plant was resumed on October 19, following completion of an extensive acid flushing program of the process equipment and the canyon ventilation system wind tunnel. At the termination of the flushing program, accountability measurements indicated that the plutonium product account was essentially in balance. Processing activity from plant startup through month-end was confined to virgin feed and was conducted at operating and mechanical efficiencies of 88 and 93 percent, respectively.

The Uranium Oxide plant operated satisfactorily throughout the month and the expected production of depleted uranium oxide was exceeded. However, enriched uranium production was below expectations because of the lack of E-metal feed.

2. Processing Operations

a. Redox Processing

The acid flushing program, started in September because of a large imbalance in the in-plant plutonium inventory, was continued during the first part of the month. The program included the regularly scheduled 57 percent nitric acid treatment of the processing equipment and extensive flushing of the cell ventilation system wind tunnel for dissolution and recovery of product entrained from vessels vented to that location. Approximately 1.6 kg was recovered by acid flushing of the solvent-extraction columns and associated equipment. A total of 6.5 kgs of plutonium, in 49,000 gallons of flush solution, was removed from the ventilation wind tunnel.

The extraction batteries were started up on October 16 to reclaim the product recovered from the system flushes. Virgin feed processing was resumed on 10-19-65, at a reduced rate, because of a low feed inventory and the necessity to evaluate the E-2 and E-4 ozonator performance. By month-end the plant was performing well at an 87 percent rate.

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The silver reactor bypass valving system failed to function properly during the metal coating removal procedure in the A-2 dissolver operation on 10-30-65. Shortly after the dissolver reached boiling temperature the silver reactor inlet and outlet temperatures rose to greater than 1000° F. and did not abate until the dissolver reaction was stopped and the dissolver cooled. Immediate survey of the environs indicated that no release of fission product contamination occurred. Instrument systems also confirmed that no contamination release occurred. Investigation to date indicates that only the silver reactor electric heater was damaged. However, the silver reactor and the off-gas filter are to be removed for inspection and testing prior to reactivation of the equipment.

b. Uranium Oxide Processing

Processing activity this month was confined almost exclusively to depleted uranium oxide production because of the lack of enriched uranium feed. Process and equipment performance was satisfactory and all product produced met customer specifications.

3. Mechanical Experience

a. Redox Plant

During the plant outage, taken to complete the equipment and wind tunnel flushing program, three major vessel replacements were made: 1) the 2D column feed tank (F-1) which had developed a leaking coil at September month-end; 2) the D-12 waste concentrator tower which had sustained shell corrosion to the point where in-leakage of air did not allow a satisfactory vacuum to be maintained on the concentrator system; 3) the D-10 waste concentrator receiver which was found to have a leaking coil during a routine testing procedure.

The 3A column feed tank pump (E-1) failed on 10-22-65 due to a leak at the shaft annulus in the pump base plate. A new pump was installed with no lost processing time resulting from the change-out. The failed pump had been in service for approximately one year.

New vent jumpers were installed on the E-2 and E-4 ozonator vessels prior to plant start-up on 10-19-65. The jumpers are equipped with demister sections and knock-out pots designed to prevent entrainment of product to the wind tunnel via the jet exhausters.

b. Uranium Oxide Plant

The M-calciner was shut down on 10-18-65 because of a hot bearing on the free end of the calciner shaft. Inspection revealed that

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the rotating raceway was rubbing against the bearing housing, evidently caused more expansion of the shaft than was originally anticipated. The raceway was repositioned at the calciner operating temperature and subsequent operation has been satisfactory.

4. Waste Handling and Decontamination

There were no significant changes in the radiation readings under the 107, 108 and 109-SX underground waste storage tanks during the month and no measurable loss of liquid was detected.

Equipment valued at approximately \$122,000 was received from customers for decontamination, repair, inspection or burial during the month. Equipment valued at approximately \$119,000 was returned to customers, representing a savings of approximately \$80,000, based on the cost of new equipment.

The M-130 cask, containing the fourth of seven shipments of assembled blanket fuel elements from Shippingport, Pennsylvania, arrived on-plant 10-11-65. The cask was unloaded and the fuel elements stored under water in the 221-U Canyon Building on 10-13-65.

Transloading of N-Reactor fuels to the Stanray (S-1) cask in the 221-U Canyon Building was completed on 10-21-65. Shipping preparations were completed on 10-22-65 and the first shipment of fuels left the Hanford Plant, bound for Nuclear Fuels Services, Inc., West Valley, New York, on October 23.

5. Radiation Experience

The coil leak in the F-1 partition cycle feed tank, which developed on 10-26-65, resulted in a small discharge of contaminated cooling water to the Redox swamp. No problems have or are expected to result from this discharge. However, as a precautionary measure, periodic surveillance of the swamp area has been increased from a weekly to a daily basis.

6. Analytical Experience

In addition to the routine analytical service provided to the Redox and Uranium Oxide operations, the following analytical services were provided to outside customers: 1) priority analyses on filter samples from the PRTR Operation for gamma energy analysis to supply information as to the nature and extent of a tube rupture; 2) cyanide analyses on non-boiling waste samples in support of a program to reclaim waste storage tank space; 3) bismuth analyses in support of a Po-210 flow-sheet evaluation study.

CW Melody
for Manager - Redox

CHEMICAL PROCESSING DEPARTMENT
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II. ACHIEVEMENTS (Continued)

D. WEAPONS MANUFACTURING OPERATION

1. Operating Continuity

The fabrication of Model 88-C weapon components was without significant interruption. The production of this model was discontinued during the month, and the production of replacement Model 104-C was started at month-end. The production of unfabricated plutonium was limited by the supply of feed and by the need to blend high-Pu-240 material into the stream. Recovery operations were curtailed somewhat by the outage of the incinerator, which is being rebuilt. The waste-treatment facilities and the americium-recovery equipment performed satisfactorily.

2. Processing Operations

a. Plutonium Fabrication

Information on plutonium-fabrication activities is presented in Document RL-SEP-847 (Atomic Weapon Data).

b. Plutonium Reduction

Button-line activity was normal during the month. Blending of the high-Pu-240 feed from Redox was started.

Ten (10) kilograms of plutonium oxide were shipped to Battelle-Northwest.

c. Non-Defense Plutonium Processing

The last major portion (approximately 60 kilograms as Pu oxide) of the non-defense order for Euratom, Karlsruhe, was packaged during the month. This completes the contract except for 35 kilograms as either metal or oxide to be taken at the buyer's option by January 1966.

d. Plutonium Reclamation

Eighty-four (84) kilograms of plutonium, as nitrate, were delivered to the button line from the recovery facilities during the month.

The incinerator furnace remained out of service, but sorting, leaching, and repackaging was continued. Twenty (20) boxes were processed through this facility.

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Seven hundred and eighty-one (781) cans, containing approximately twenty (20) kilograms of plutonium were processed through the slag and crucible dissolvers during the month. This increased rate of processing resulted in decreasing the backlog of stored slag and crucible cans in inventory for the first month since start-up of the 880 Facility.

Two hundred and seventy (270) grams of plutonium were returned to the main process stream from 81,172 liters of aqueous waste, which were processed through the waste-treatment facility. Also, 15.2 grams of americium were recovered and stored for further processing.

Clean-out of the Recuplex vessels was resumed and 1,200 grams of plutonium were recovered.

3. Mechanical Performance

Equipment in the button line, fabrication, and final inspection areas performed satisfactorily, with only routine maintenance activity required.

Recovery equipment, including the slag and crucible dissolvers, performed well during the month. Repairs to the ball-valve loading system of the Mark I (06) dissolver were accomplished in record time, with the vessel out of operation for only 48 hours as a result of this repair.

Fifteen (15) of the pumps in the recovery facility failed during the month. Two, both Chempumps, were beyond repair and were buried. The others were overhauled and returned to service.

Laboratory equipment performed satisfactorily except for the No. 1 (SU-8) mass spectrometer, where vacuum leaks and high-voltage problems, both associated with the sample carriage, kept the instrument out of service for the first three weeks of the month.

4. Radiation Experience

Radiation and contamination control statistics indicated good control during the month.

There were three cases of potential plutonium deposition. One involved positive nasal smears and two involved minor injuries, all while working in process hoods. All were cleaned and one excised to acceptable levels, and it is indicated that there will be no significant deposition.

5. Analytical Experience

Number of samples received	2,930
Number of determinations	11,475

for *L. J. Bruck*
Manager
Weapons Manufacturing

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CHEMICAL PROCESSING DEPARTMENT
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II. ACHIEVEMENTS (Continued)

E. FINANCE AND SERVICES OPERATION

1. Production Cost Accounting

Preparation of the FY 1966 Midyear Budget Review has been started. The Manpower Budget has been established for the Chemical Processing Department and contact with budget representatives in other Hanford segments regarding this midyear review has been established. This budget will include the changes required as of January 1, 1966, as a result of transfer from General Electric Company to Isochem Inc.

Operating costs at month end indicate that all programs with the exception of O3 Program Production are overrunning the AEC initial financial plan. This situation is not a new development but was recognized in July, 1965, and AEC assurance was obtained in August that our funding problem would be eliminated by increasing the next financial plan.

2. General and Tax Accounting

As of October 31, 1965, there were thirteen active projects. Following is a summary of current status of projects:

	<u>In Thousands</u>
Total Authorized Funds	\$3,213
Total Cost to Date	2,316
Commitments and Open Work Release	316
Unencumbered Balance	581
Costs Charged During October, 1965	90

During October, two work authorities were received from the AEC: Directive No. AEC-261, Work Authority No. 2, Project CAC-159, Geological and Hydrological Wells - FY 1965, for increase of funds to new total of \$2,500; Directive No. AEC-254, Work Authority No. 2, Project CAC-169, Sludge Removal and Waste Transfer - 200 East Area, for increase in funds to new total of \$60,000.

There were no construction completion and cost closing statements issued during October.

During the month all AR's were held up pending release of FY 1966 allocation for O2 Equipment.

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Purchase Orders and Contracts Placed During October, 1965.

	<u>No.</u>	<u>Value</u>
Formal Orders	234	\$247,792
Verbal Orders	104	4,521
Essential Materials Orders	<u>7</u>	<u>21,349</u>
Total	345	\$273,662

Included in the month's purchasing activity was one significant order for tube bundles. The order was placed with the Fansteel Metallurgical Corporation at a total cost of \$117,180.

4. Audit and Contract Reimbursements

A summary of reports furnished the AEC was developed with the assistance of all CPD sections. A review of these reports is currently under way to determine those that will be required after January 1, 1966.

We have continued to follow purchase requisitions placed on an emergency basis in an effort to minimize such requests. October data shows that 39 emergency purchase requisitions were placed, representing an improvement of approximately 30 percent over the two periods previously reported. Copies of these 39 requisitions will be forwarded to respective sections early in November.

RACornell
Manager - Finance

CHEMICAL PROCESSING DEPARTMENT
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II. ACHIEVEMENTS (continued)

F. FACILITIES ENGINEERING OPERATION

1. Purex

4.0 Capacity Factor Expansion - Purex

Scope of the Purex 4.0 Capacity Factor Expansion Project was firmed up to include items which improve control of process and critical mass. The Part I document of the design criteria (major items requiring procurement lead time) was issued for approval. The Part II design criteria (minor equipment and instrumentation) are being defined. One of the four monitors required for this project is the 2W Alpha Monitor which is similar to a unit now in operation. The other three systems must be capable of monitoring very low concentrations and must be portable. Some design verification work is being done to allow completion of design criteria.

Dissolver Inserts - Purex

A program has been formulated to provide technology for welding and fabricating boron stainless steel for use in dissolver inserts. The necessary B-SS alloy bars have been requisitioned.

241-B Retention Basin - Purex

Design was completed for installation of a bypass line to carry the in-tank solidification cooling water to the outlet of the retention basin. Cost estimates were made. Design was started on the emergency disposal line from the retention basin outlet to an open ditch.

"N" Cell Modifications - Purex

The Purex "N" Cell concentrator and cooler, both tantalum lined, were received from the vendor. All equipment is being pre-assembled in the Purex Storage Gallery before installation in the hood.

Thorium Project Equipment - Purex

Shop fabrication for the Thorium Extraction Program included six blank connectors, and one direct drive agitator which was tested and placed on standby. Shop work for the thorium project

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is now complete except for five jumpers which are awaiting minor design changes.

CAC-152-Rev. #1 - High-level Cell Addition - Purex Laboratory

A project proposal revision requesting total project funds in the amount of \$460,000 was transmitted to RLOO on October 11. The scope of work has been reduced to the shielded analytical cell and associated building addition.

CAC-181 - "B" Plant Modification for FPCE - Waste Management Integration Facility

A preliminary project proposal requesting authorization of \$45,000 for design of the "B" Plant hot pipe trench and cell modifications essential to the FPCE - Waste Management Integration was transmitted to RLOO on October 20.

2. Redox

Long-term Storage of UO_3 - Redox

A study is underway to determine the best way to store UO_3 for a period of approximately ten years. Consideration is being given to bulk storage in existing buildings and protective coatings for drums stored outside. A survey was made of unused buildings in the 100 Areas which may be used.

Air Tunnel Flushing - Redox

Three jumpers were designed and one jumper design modified for flushing the canyon air tunnel through the four-inch ports in "E" & "F" Cells. Methods of inspecting the air tunnel by using closed circuit television were studied. Available equipment could not be adapted. An Authorization Request has been prepared for funds to purchase a miniature camera that can be used through the four-inch ports.

3. Weapons Manufacturing

Button Lines

Completion of installation work for the new Plutonium Receiving Glove Box (HC-4), in Room No. 166, was delayed most of the month by the strike of labor service contractor personnel. Work was resumed near the end of the month.

Plutonium Reclamation Facility

Detail design was completed to improve performance of the following vessels in the Miscellaneous Treatment Room:

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New Pan Filter TK-68 for Glove Box #2

New Ash Dissolver TK-72 for Glove Box #3

New Condensers for all Glove Box Dissolvers

Ion Exchange

Mechanical design has been completed for Glove Box #HA-47, equipment for feed adjustment and product concentration, and load-out for the HA-46 Ion Exchange Facility. Electrical-instrument design is approximately 50 percent complete.

Plutonium Buy-back (Project CGC-180)

The Plutonium Buy-back Facility design criteria (RL-SEP-590) was approved by the Atomic Energy Commission and has been issued. Critical Mass Criteria, required to maintain geometrically favorable conditions in this facility, have been informally established. Detailed design will start on receipt of a project directive. The project proposal was transmitted to RLOO-AEC on October 4.

Special Processing Facility - Room #179-B

The engineering study was completed for processing U²³³ uranyl nitrate to oxide powder in the existing 234-5 Building (Room #179-B), glove box equipment. The project cost estimate for the required modifications and additions was \$55,000.

236-Z Magnetic Flowmeters

A new type magnetic flowmeter has been procured for installation and testing. The flowmeter (Foxboro) is teflon-lined and has a fused platinum electrode. The unit is expected to be more durable than types now in service.

4. General

Jumper Fabrication

Forty-one jumpers were fabricated during the month, of which eleven were fabricated on an emergency basis.

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Ventilation Service

The ventilation balance crew checked ventilation systems in all 105 reactor buildings for conformance with confinement design criteria.

Electrical Outage

An electrical outage occurred in the 200-West Area at 7:00 P.M. on October 4. The outage was caused by high winds which faulted Line No. 9, opening Breaker E8 and #9. The 282-, 283, 231, and 234-5 Badge Houses were affected by the outage. Power was restored at 7:40 P.M., and all buildings were back to normal by 7:53 P.M. The steam turbine pumps in 282-W and 283-W came on the line automatically and maintained raw and sanitary water continuity.

Polonium Studies

An engineering study on polonium separation and encapsulation facilities was completed and the results have been summarized in Document RL-SEP-772. Data are being gathered to complete equipment design and verify feasibility of the prepared flowsheet.

Waste Management

Title I design work for the Sludge Removal and Waste Transfer Facility has been revised under CPD-FEO direction to reduce capital expenditures to the limits of the present budget.

FPCE Integration - The design criteria document which covers the Hot Pipe Trench and Cell Modifications only was transmitted to the Commission on October 18. A draft document was started for design criteria for the FPCE Integration equipment.

Manager, Facilities Engineering

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II. ACHIEVEMENTS (Continued)

G. RESEARCH AND ENGINEERING OPERATION

1. Separations Process Engineering

Purex

a. Annular Dissolver

The first of the three new annular dissolvers was installed in September, and shakedown tests are in progress. A total of nineteen chargings of aluminum-clad irradiated natural uranium has been made. Principally, testing has consisted of varying charge, heel, and dissolution cut sizes. Thus far, a processing rate equivalent to approximately 3.6 CF has been attained. It is expected that increased capacity will result from increases in the heel-to-charge heel ratio in the dissolver.

Based on zirconium-niobium analyses, the fission product activity in the spent scrub water from the new ammonia scrubber is a factor of about 5,000 greater than for the scrubbers of the original pot-type dissolver system. Design studies and operating tests aimed at reducing the fission product activity in the ammonia waste solution are underway.

b. Neptunium Recovery at Purex

Neptunium losses via the solvent stream (3BW) from the Neptunium Recovery Cycle (J-Cell Package) stripping column, which are recycled to the 1BXF stream have increased steadily over the past several months, despite flowsheet adjustments aimed at correcting the problem. During the first two years of operation of this cycle, these losses were generally less than one per cent (based on neptunium input via the irradiated uranium feed). During the past six months, an approximately 20-fold increase has occurred. Since laboratory studies with plant samples show a normal neptunium distribution coefficient, it is postulated that the losses are caused by inefficient contacting of the phases, and that the inefficient contacting is related to deterioration of the wetting characteristics of the plastic coated plates.

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c. Wind-Tunnel Flush at Redox

Plutonium material balance calculations made during September indicated an "unaccounted-for" in-plant inventory of approximately 8 kg at the Redox Plant. Of this total, approximately 1.6 kg was recovered by acid flushing of the solvent-extraction columns and associated equipment. Because of recent operating experiences indicating the possibility of product losses via the Plutonium Ozonator (E-2 and E-4) vent systems, a program for flushing of the ventilation-system wind tunnel was initiated during October. Flush solutions of 2.5 per cent nitric acid - 1.0 per cent boric acid were introduced to the tunnel from various positions in the cells. A total of 49,000 gallons of flush solution resulted in the recovery of 6.5 kg of plutonium, of which about 5 kg was recovered from the vicinity of the E-Cell equipment. Analysis of several of the flushes originating near E-Cell indicated ratios of americium-241 to plutonium corresponding to recently separated plutonium (less than 3 months prior to the time of flushing). Based on the pattern of deposition and the apparent "age" of the product, it is believed that failure of the de-entrainment section of the E-2 Ozonator pot permitted discharge of entrained plutonium nitrate solution to the wind tunnel. New de-entrainment devices were added to both the E-2 and E-4 ozonator vent systems prior to the resumption of normal processing.

2. Fission Products Process Engineering

a. In-Tank Solidification

Performance of the in-tank solidification unit fiber glass filter, with respect to pressure drop, was reported last month to be deteriorating. Water and chemical flushes offered no permanent relief so the filter was replaced with a spare. Samples of the filter media from near the vapor inlet were found to be white and opaque in appearance. When disturbed, the glass fibers disintegrated into powder. Media samples taken from near the filter outlet were in good condition. Laboratory studies are underway to define the cause of the glass fiber deterioration.

The lower pressure drop of the new filter permitted higher air flow rates. These higher flows appeared to cause foaming within the underground waste tank. The back-pressure on the hot air circulator increased, the waste specific gravity as measured by the dip tubes apparently decreased, and radiation levels on the tank off-gas hood increased as did the pressure differential between the hood and the tank vapor space. Reduction in air flow, addition of an anti-foam agent and a water flush of the circulator restored normal operating conditions.

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Operation of the two prototype immersion electrical heaters, installed in the tank last month, continued to be satisfactory.

b. Tank Farms

There were no significant changes in the status of waste storage tank 105-A during the past month. The two bottom movement detection instruments installed in August have shown the bulged tank liner to be static.

c. Fission Product Recovery

Definition of the cesium cask loading problems was completed. Aluminum concentrations in the supernatant solution in excess of 2 g/l result in excessive aluminum precipitation in the as-received ammonium form ion exchange resin. Conversion of the resin to the sodium form would avoid the plugging problems, but would cause a 25 per cent decrease in the cesium capacity of the resin. Chemical treatment of the supernatant solution with ammonium sulfate, to remove aluminum, would result in a bulky gel precipitate that would prevent passage through the resin. Alternate waste supernatant solutions were evaluated as potential cesium cask feeds, and TK 101-A supernatant solution was shown to have excellent loading behavior.

An unsuccessful attempt was made to load a HAPO-II strontium cask using the modified loadout flowsheet for removal of decay daughter zirconium. In order to obtain a sufficient quantity of strontium for the loadout in a single precipitation, strontium product was concentrated to 1.8 M nitric acid, 0.3 M strontium and 4 M sodium. After addition of sodium hydroxide, potassium bicarbonate, and potassium carbonate, the resulting slurry was digested at elevated temperature. Upon cooling, bulk precipitation of sodium bicarbonate and sodium carbonate occurred preventing cask loading. The cask was subsequently successfully loaded using the normal hydroxide loadout procedure and a second batch of strontium product.

3. Plutonium Process Engineering

a. Button Line Decontamination Study

A study was made to determine the decontamination factor for impurities through the various stages of the plutonium reduction process in which plutonium nitrate is converted to plutonium metal. A knowledge of the impurity removal capability of each step of the process is desirable to enable prediction of product quality. The analytical work was done on the emission spectrophotometer. Major findings are summarized:

Aluminum, Cr, and Ti are reduced by factors of up to 500 across the oxalate precipitation-filtration step. Reduction of Fe, Be, Bi, Li, and Zn by factors of 20 to 100 is realized in most cases.

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Other impurities (B, K, Mg, Na, Ni, Mn, Cu, and Sn) are reduced by factors of 2 to 200, depending upon the concentration of the impurity in the feed; no reduction of Ca or Pb occurs across this step.

Across the calcination step (conversion of plutonium oxalate to oxide), Si, Zr-Nb⁹⁵, and Mg are reduced by a factor of 2 to 5, while the iron increases slightly, apparently due to corrosion. At relatively high concentration levels, some removal of Cu, Na, and Ca also occurs in the calcination step. Limited data indicates minor reduction of B, Ca, Zr-Nb⁹⁵, and Al during the conversion from oxide to fluoride. Corrosion probably accounts for the increase of Fe (3 - 30 ppm), Cu (2 - 5 ppm), Mn (3 - 30 ppm), Cr (3 - 30 ppm), and Ni (2 - 70 ppm).

The reduction of plutonium fluoride to plutonium metal removes K, Ca, Na, Sn, Pb, and Si (listed in order of decreasing removal). The MgO crucibles and sand used in the reduction significantly increased the Mg quantity in the product metal as compared with that in the fluoride. Arsenic, Cd, Ge, P, Tl, and V were reported as non-detectable in every case and were not listed. Silver was listed at less than 2 ppm.

b. Bank Tank Studies

Bank tanks, as employed in the Plutonium Reclamation Facility, are described as geometrically favorable tanks consisting of four pieces of 5-inch schedule 40 pipe, spaced 16 inches center to center, and of varying heights. These tanks are manifolded across the top and bottom. Pumps serve for both mixing (by recirculation) and pumping of the contents to solvent extraction columns. The first phase of bank tank mixing studies in the Battelle Northwest Laboratories has been completed. The study was done on a bank of four 4-foot high, 6-inch diameter glass vessels simulating the steel tanks in use in the production plant. The results are enumerated:

1. A 3/8-inch orifice in the recirculation line is required for efficient mixing of one and two-phase, non-reactive systems.
2. A 3/8-inch or 5/16-inch orifice in a present 4-foot high bank tank gives the following problems, especially in a two-phase system, and when pumping to a solvent extraction column:
 - a. With the tanks one-third empty, the inboard leg (tank closest to pump) begins to pull air.
 - b. A two-phase system can emulsify badly causing potential flooding problems in a solvent extraction column.

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- c. When pumping a two-phase system to a column, the weight factor reading was shown to be meaningless, since the instrument leg is only in one tank (the outboard) of the bank.
3. With 3/8-inch orifice in the recirculation line there is just barely enough pump pressure to offset the back pressure exerted by the solvent extraction column.
4. A 1/8-inch orifice placed in the recirculation line minimizes differences in the liquid level height of each tank in the bank.
5. When mixing reactive chemicals, such as ferrous sulfamate and sodium nitrite, in a bank tank with a 3/8-inch or 5/16-inch orifice, the following occurs:
 - a. Immediate violent reaction and foaming in the first two banks (inboard).
 - b. Some reaction in the third tank initially, getting more violent with time.
 - c. Poor mixing in the fourth tank, even after 30 minutes. About one hour is required to mix the entire contents, despite the violent reaction in the two inboard tanks.
6. With the present bank tank setup and a 3/8-inch orifice in the recirculation line, continued mixing of a two-phase system gives redistribution of phases. The organic gradually accumulates in the first two inboard tanks, some organic in the third, and little, if any, organic in the fourth tank. Hence, the differences in liquid level must gradually get larger with increased mixing time.
7. A new bank inlet and outlet system providing more efficient mixing of two-phase systems and improved mixing in reactive systems has been developed in the Battelle Northwest Laboratories. Liquid levels in tanks remain equal, and organic redistribution is minimized.
- c. Reclamation Flowsheet Change

The solvent extraction flowsheet salting strength was reduced to a minimum level. Earlier flowsheets incorporated sufficient salting strength so that plutonium recovery was limited only by mass transfer considerations. The salt reduction permits a 20 - 40 per cent increase in capacity, reduces the qualitative flooding potential and has not resulted in increased waste losses.
4. Separations Chemistry Laboratory
 - a. Process Improvement

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RCR Rework

Laboratory tests indicate the feasibility of reprocessing Z Plant supernate from the oxalate strike (RCR) in Purex without adverse effect on waste losses or column performance. Such recycle is desirable to remove uranium from the Z-Plant process system.

TBP Solubility

The carbonaceous analyzer was successfully used to determine the solubility of 30% TBP-Soltrol in aqueous solutions as a function of nitric acid concentration. TBP was found to be soluble to the extent of 0.36 ml TBP/liter of acid up to nitric acid concentrations of 4 M. At acidities up to 8 M, the solubility increased to only 0.55 ml/liter of acid. Soltrol was not noticeably soluble in the aqueous phase at either acid concentration.

Fiberglass Filters

Laboratory evaluation of filter media and simulation of operating conditions existing in the fiberglass filter downstream of the in-tank solidification equipment has led to the conclusion that entrained materials in the off-gas stream (mainly ammonium fluoride) have resulted in serious fiber degradation.

b. Americium Recovery

The americium solutions that were on hand have been successfully gathered together, precipitated as the oxalate, and calcined to remove sulfate ion. Americium material balances appear to be running close to 100%.

A preliminary solvent extraction step to separate americium from europium failed on a test basis. Additional testing, however, indicates that a pre-extraction with tri-iso-octyl amine will remove the interferences and permit satisfactory separation between americium and europium using D2EHPA.

Exposure levels have been significant during the work in the glove box in spite of efforts to shield the process equipment with lead and with the use of lead shielding on the outside of the hood. Transfer of some of this work to better shielded areas in the new miscellaneous hoods is being investigated.

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>9-30-65</u>	<u>10-31-65</u>	<u>9-30-65</u>	<u>10-31-65</u>	<u>9-30-65</u>	<u>10-31-65</u>
General Manager's Group	10	10	2	4	12	14
Finance & Services	38	38	47	48	85	86
Employee Relations	11	14	6	7	17	21
Research & Engineering	56	57	29	29	85	86
Facilities Engineering	94	95	199	200	293	295
Production	5	5	3	3	8	8
Redox	61	62	237	237	298	299
Purex	74	75	289	289	363	364
Weapons Manufacturing	<u>54</u>	<u>53</u>	<u>233</u>	<u>232</u>	<u>287</u>	<u>285</u>
Total	<u>403</u>	<u>409</u>	<u>1045</u>	<u>1049</u>	<u>1448</u>	<u>1458</u>

B. Zane D. Wood, Specialist -Union Relations and Salary and Wage Administration assumed the position of Manager - Union Relations and Salary and Wage Administration.

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C. TRIPS

<u>Visitor</u>	<u>To</u>	<u>Nature of Discussion</u>
<u>To Other G. E. Components</u>		
L. L. McGregor	Schenectady, N. Y.	Numerical Control 10-25-65
<u>To AEC and Other AEC Contractors</u>		
L. L. McGregor	Nevada Test Site	IMOG Sub Group
R. C. Hollingshead	Las Vegas, Nevada	10-11-65
O. F. Hill	Mound Laboratory	Polonium Processing
H. H. Hopkins	Miamisburg, Ohio	10-11-13-65
H. H. Hopkins	Oak Ridge Nat. Lab.	233-U Processing
	Oak Ridge, Tennessee	10-14-65
H. C. Rathvon	US-AEC	233-U Quality
A. J. Waligura	Germantown, Md.	10-14-65
W. G. Smith	US-AEC	Production Programs
	Germantown, Md.	10-18-22-65
G. C. Oberg	Bendix Corporation	IMOG Sub Group
	Kansas City, Mo.	10-19-21-65
OF Beaulieu	LASL	Pu-Sample Exchange
N. S. Wing	Los Alamos, N. M.	10-26-28-65
<u>To Conventions and General Meetings</u>		
S. T. Field	Detroit, Michigan	ASM Seminar
		10-15-65
H. S. Bjorklund	San Francisco, Cal.	ASLE-ASME Conference
		10-18-20-65
A. C. Morgenthauer	Los Angeles, Cal.	AP & ICS
		10-20-22-65
G. O. Ager	Chicago, Illinois	National Safety Congress, 10-21-65

D. VISITORS

<u>Visitors</u>	<u>To</u>	<u>Nature of Discussion</u>
<u>From AEC and Other AEC Contractors</u>		
H. Meyers J. Saltzman	US-AEC Washington, D. C.	Contamination Control 10-6-65
E. Rhoades J. Kern	Dow Chemical Company Rocky Flats, Colorado	Product Quality 10-8-65
M. E. Harris A. W. Williams	LRL Livermore, California	Special Work Orders 10-13-65
<u>From General Industry</u>		
George Dymmel	Nuclear Fuels Serv. Buffalo, N. Y.	Stanray Cask Loading 10-14-15-65
R. J. Schoofs R. B. Cuddeback	Linde Div. Union Carbide Corp. San Francisco, Calif.	Molecular Sieves 10-26-65
<u>From Foreign Governments and Agencies</u>		
Dr. Camille Beaudet	SERAI Brussels, Belgium	Cesium Processing 10-1-65
Pierre LeCorche Jean-Paul Trevetin Louis X. Talmont Rene J. Romano Jean P. LeClere Jean-Marie Reneaud Yves Fruchard	French CEA Staff	Nuclear Safety 10-21-22-65

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Operation:	General	Purex	WMO	FEO	Redox	R&E	Finance	Prod.	Empl. Rel.	Total	YTD
Dis. Injuries					1*				1	1	1
Ser. Accidents									0	0	3
Med. Treat. Inj.	8		11	9	8	1			37	37	409
Rad. Occurrences	4		3		4				11	11	101
Contam. Wounds			2						2	2	19
New Deposition Cases									0	0	1
Fires						1**			1	1	4
Security Violations			1						1	2	13

* A chemist in the Redox Analytical Laboratories incurred an X-Ray burn of the right middle and index fingers and right thumb. Prognosis by the Medical Department indicates this is a disabling injury. There has been no disability or time loss to date.

** On October 30, 1965 starting at 1:15 during an aluminum jacket dissolution in the A Dissolver, an Amonia - Hydrogen gas fire apparently burned within a portion of the off-gas system from the dissolver for a period of approximately three hours. The situation was eliminated by shutting down the dissolver thereby stopping the gas evolution.

*** G. O. Ager of Employee Relations attended the 1965 National Safety Congress Exhibition in Chicago the week of October 25.

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V. REPORTS

A. PREPARED AND ISSUED

RL-SA-43, Unclassified, "Administering Criticality Control in the Hanford Atomic Products Operation in Chemical Processing Department," by GR Kiel, KR Ridgway and RD Carter dated October, 1965.

RL-SA-53, Unclassified, "Plant Scale Demonstration of Promethium Recovery and Purification Processes," by GL Ritter and JS Buckingham, dated 9-16-65.

RL-SEP-121 REV 2, Unclassified, "Uranium Oxide Operation Feed Specification-Redox Enriched UNH Product," by RJ Sloat, dated 10-20-65.

RL-SEP-615, Unclassified, "Design Criteria - 216-A-37 Crib", by JW Barnes, dated August 3, 1965, Reproduced October 14, 1965.

RL-SEP-721, Official Use Only, "Project Proposal, Revision 1 - High Level Cell-Addition - Purex Laboratory (Project CAC-152)," by LW Finch, dated October 7, 1965.

RL-SEP-726, Official Use Only, "Project Proposal, Plutonium Buy-Back Facility - 234-5 Building (Project CGC-180)," by LW Finch, dated September 28, 1965.

RL-SEP-728, Unclassified, "Design Criteria - 'B' Plant Cell and Hot Pipe Trench Modifications - Cells 36 through 40", by HL Caudill, dated September 28, 1965. Reproduced October 18, 1965.

RL-SEP-737, Unclassified, "234-5 Building Diversification Survey - CPD Members", dated October 15, 1965.

RL-SEP-742, Confidential, "Scheduled Shutdown - Purex", September 24, 1965, MK Harmon.

RL-SEP-743, Unclassified, "Polystyrene PuO₂ Flowsheet and Start-up Procedure," by LE Bruns dated 9-29-65.

RL-SEP-744, Secret - AWD, "Inspection, Certification and Acceptance Forms," by AE Smith, dated 9-28-65.

A. PREPARED AND ISSUED (Continued)

- RL-SEP-746, Secret, AWD, "Weapons Process Engineering Technology Report," September 1965 - Compiled by Members of WPE - R&E - CPD, dated 9-30-65.
- RL-SEP-751, "U-233 Processing in 234-5 Building," by CW Nilsen, dated 10-1-65.
Secret
- RL-SEP-752, Official Use Only, "Preliminary Project Proposal, B-Plant Modifications for FPCE-Waste Management Integrated Facilities (Project CAC-181)," by CA Lyneis, dated October 14, 1965.
- RL-SEP-754, Unclassified, "Critical Mass Control Specification Recovery of PuO_2 from Polystyrene Cubes, 234-5 Building," by RJ Sloat, dated 10-6-65.
- RL-SEP-755, Secret, "Chemical Processing Department September Monthly Report", by J. H. Warren, dated October 22, 1965.
- RL-SEP-757, Unclassified, "Process Specifications for Separation of PuO_2 from Polystyrene," by LE Bruns dated 10-6-65.
- RL-SEP-760, Unclassified, "Critical Mass Control Specification - PR Room (Room 19), 236-Z Building," by RJ Sloat, dated 10-12-65.
- RL-SEP-762, Secret - AWD, "A-Line Product Characteristics - September 1965," by AE Smith, dated 10-12-65.
- RL-SEP-765, Secret - AWD, "Evaluation: FPT-64-21 - 1807 Surface "V" Flatness," by RE Van der Cook, dated 10-8-65.
- RL-SEP-768, Secret, "Analyses of Neptunium Batch - Purex No. 35" - by MK Harmon, dated 10-11-65.
- RL-SEP-769, Unclassified, "Supplemental Critical Mass and Chemical Hazards Control Specifications - Handling and Storage of N-Reactor Fuel at U-Plant," by GL Hanson and HC Rathvon, dated 10-12-65.
- RL-SEP-774, Secret - AWD, "A-Line Quarterly Summary Report - Third Quarter Calendar Year 1965," by AE Smith, dated 10-28-65.
- RL-SEP-775, Unclassified, "Test Conversion of Thorium Nitrate to Thorium Oxide - 224-U Building," by RJ Sloat, dated 10-22-65.
- RL-SEP-777 RD, Secret, CPD Daily Production Reports, 7-1-65 Through 9-30-65, by RE Roberts, dated October 15, 1965.
- RL-SEP-779, Confidential, "Polonium Purification and Encapsulation," by RE Felt and HH Hopkins, dated 10-22-65.

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A. PREPARED AND ISSUED (Continued)

RL-SEP-818, Unclassified, "Engineering Study - U²³³ Processing Facility -
234-5 Building - Room 179-B", by DE Braden, dated October 25, 1965.

RL-SEP-822, Secret, "Analysis of Neptunium Batch - Purex No. 37 - FG Kimble,
dated 10-25-65.

B. PREPARED FOR SIGNATURE AND ISSUANCE

RL-GEN-29, Secret, "Production - September, 1965", dated October 15, 1965,
by W. E. Johnson.

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VI. PATENT SUMMARY

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

INVENTOR

NONE

TITLE

J. N. Warren

General Manager
Chemical Processing Department

END

**DATE
FILMED**

4 / 20 / 93