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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT
FOR

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DECEMBER, 1965

Compiled By
OPERATION MANAGERS

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January 21, 1966

HANFORD ATOMIC PRODUCTS OPERATION
RICHLAND, WASHINGTON

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

By Authority of CG-PR-2

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TABLE OF CONTENTS

Distribution	2
Table of Contents	3
Staff	4
I. Summary	5-6
II. Achievements	
A. Production Operation	A-1 Through A-3
B. Purex Operation	B-1 Through B-4
C. Redox Operation	C-1 Through C-3
D. Weapons Manufacturing Operation	D-1 Through D-2
E. Finance and Services Operation	E-1 Through E-2
F. Facilities Engineering Operation	F-1 Through F-4
G. Research and Engineering Operation	G-1 Through G-7
III. Personnel Activities	J-1 Through J-3
IV. Safety and Security	K-1
V. Reports Issued	L-1 Through L-2
VI. Patent Summary	M-1

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MONTHLY REPORT

DECEMBER, 1965

I. SUMMARY

December production, as per cent of the HAPO Production Forecast (RL-GEN-30), is summarized below.

	<u>December</u>	<u>Fiscal Year To Date</u>
Separated plutonium nitrate	126	103
Separated uranium nitrate	119	101
Uranium oxide	97	95
Plutonium metal buttons	85	107
Fabricated parts	54	91

Uranium oxide and plutonium button production fell short of that forecasted because of feed shortages. The fabrication of weapon components at Hanford was terminated by the AEC.

Except for two brief outages caused by mechanical failures, Purex operated satisfactorily until December 22 when a planned outage of about eight days was taken to clean out the plant and to take a physical inventory of nuclear materials, essential materials, and equipment. Purex resumed processing on December 30.

In Purex Head-End, approximately 740 kilocuries of promethium-147 and 240 kilocuries of strontium-90 were produced.

Approximately 195,000 curies of promethium-147 were shipped to Battelle Northwest Laboratories on December 10. The HAPO-IB-1 cask, loaded with 430,000 curies of strontium-90, was released for shipment on December 13. Two STT casks were loaded with a combined total of 99,000 curies of Cs-137 and released for shipment to the Oak Ridge National Laboratory.

Two neptunium purification runs were completed during December yielding 1215 grams of neptunium product.

Redox suspended E-metal processing for twelve days to permit a thorough clean-out of process vessels before taking a physical inventory of nuclear materials on December 20. Operations were resumed on December 24, and equipment performed satisfactorily for the remainder of the month.

Off-gas filtration problems continued to plague the performance of the In-Tank Waste Solidification unit. With the failed Fiberglass filter being bypassed, high efficiency filters were used to decontaminate the off-gas

stream. Operation was both intermittent and at reduced rates. The equipment has been out of service since December 27, when the outer liner of the inlet air heater was found to be distorted.

The 242-T Waste Evaporator, which has been inactive for several years, was started on December 3 to reclaim storage space for non-boiling wastes. Except for two brief interruptions to repair leaks which developed during early operation, waste evaporation has been continuous at a rate slightly in excess of ten gallons per minute.

Ten test wells were drilled around the 115-SX underground waste storage tank to determine the distribution of the waste solution that leaked from this tank several months ago. The radioactivity, primarily radiocesium, appeared to have penetrated no more than fifteen feet below the tank bottom.

Dissolvers made of Corronel, a new Ni-Cr alloy, are now being used for dissolving plutonium oxides in boiling mixtures of concentrated nitric and hydrofluoric acids. These dissolvers have been in service for as long as four months and have shown no sign of failure. In contrast, the previously used dissolvers, which were Teflon-lined, had a life expectancy of about two months.

The reported carbon content of plutonium buttons has been decreased by a factor of two by cooling the sampling drill bit with argon gas instead of carbon tetrachloride.

The AEC authorized total funds for Project CGC-180, "Plutonium Buy-Back Facility - 234-5 Building".

Effective at 12:00 midnight, December 31, 1965, the General Electric Company transferred its Chemical Processing Department to Isochem Inc.

General Manager
Chemical Processing Department

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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

DECEMBER 1965

II. ACHIEVEMENTS

A. PRODUCTION OPERATION

1. Production Statistics

a. <u>Percent of Forecast⁽¹⁾ Achieved</u>	<u>December</u>	<u>Fiscal Year to Date</u>
Separated plutonium nitrate	126	103
Separated uranium nitrate	119	101
Uranium Oxide	97	95
Plutonium metal buttons	85	107
Fabricated parts	54	91

b. <u>Purex</u>	<u>December</u>	<u>November</u>
Uranium nitrate produced (tons)	425	211
Average production rate during operation (T/D)	22	20
Total waste loss (%)		
Plutonium	0.56	0.53
Uranium	0.26	0.30
On-line efficiency (%)	73	44

c. <u>Redox</u>		
Uranium nitrate produced (tons)	142	152
Average production rate during operation (T/D)	9	9
Total waste loss (%)		
Plutonium	0.47	0.52
Uranium	0.24	0.26
On-line efficiency (%)	53	58

d. <u>Uranium Reduction (tons)</u>		
Normal UO ₃ loaded	237	183
Enriched UO ₃ loaded	193	126
Normal UO ₃ approved for storage	237	183
Enriched UO ₃ approved for shipment	204	101
Normal UO ₃ shipped	0	0
Enriched UO ₃ shipped	204	101
Normal UNH backlog	366	170
Enriched UNH backlog	70	125

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

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f. Power

	<u>200-East</u>	<u>200-West</u>
Raw water pumped (gpm)	9 024	5 069
Filtered water pumped (gpm)	1 098	1 110
Maximum steam generated (lbs/hr)	236 000	160 000
Average steam generated (lbs/hr)	183 387	130 580
Total steam generated (M lbs)	136 440	97 152
Coal consumed (tons)	6 803	4 924

Uranium oxide and plutonium button production fell short of that forecasted because of feed shortages. The fabrication of weapon components at Hanford was terminated by the AEC.

Acting Manager, Production

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DECEMBER, 1965

2. FISSION PRODUCT DATA (Kilocuries)

[illegible]

Sr-90

Pm-147 (Unaged)

Pm-147 (Aged)

Cs-137

- (A) Revised on basis of new sample analysis.
- (B) Shipped to ORNL in HAPO-IB-1 on 12-14-65.
- (C) Equivalent to 145 kilocuries when aged 2 years; Shipped to ENW on 12-10-65.
- (D) Loaded in SIT casks 44 and 45A for shipment to ORNL.
- (E) Loaded in HAPO-II-1 cask.
- (F) Reworking, previously purified.
- (G) Process loss of 80.
- (H) Process loss of 20.

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MONTHLY REPORT

DECEMBER, 1965

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II. ACHIEVEMENTS (Continued)

B. PUREX OPERATION

1. Operating Continuity

Purex Plant operations continued until December 22, 1965 when a planned outage for maintenance and nuclear materials inventory was initiated. Plant operation resumed on December 30, 1965.

Operation of the fission product processing facilities at the Purex Head End and B Plant was satisfactory. Processing activity at the Strontium Semiworks included the loading of one strontium-90 cask and one promethium-147 cask. Two casks were loaded with cesium-137 at the Cesium Loadout Facility.

2. Processing Operations

a. Purex Processing

Plutonium product met specification except for two startup batches which contained a slight excess of uranium as an impurity.

Uranium product exceeded ruthenium specifications in several batches but came within limits at the end of the month.

Two neptunium purification runs were completed, yielding 1215 grams.

The processing of non-weapons grade feed material to produce plutonium for the SEFOR (Southwest Experimental Fast Oxide Reactor) project was completed on December 5, 1965 and the plant returned to processing regular feed material. Operation at a capacity factor rate of 2.8 on regular feed continued until the planned nuclear materials inventory and maintenance outage was initiated on December 22, 1965. Brief shutdowns were taken on December 8, 1965 and December 18, 1965 to replace a failed pump and jumper, respectively. Processing resumed on December 30, 1965 at a capacity rate of 2.8 on regular feed material.

b. Purex Head End Processing

Operation of the Purex Head End processing equipment recovered an estimated 740 kilocuries of promethium-147 and 240 kilocuries of strontium-90. Recovery operations were suspended on December 17, 1965 awaiting replacement of the 003 CR (fission product crude storage) transfer pump.

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c. B Plant Processing

Oxalate processing (separation of strontium from cerium and rare earths) was resumed in B Plant with the receipt of 3700 gallons of fission product crude solution from Tank 003 CR on December 2, 1965. Transfer of the second of three feed batches was made on December 29, 1965 after replacement of the 003 CR transfer pump. The rare earth crude solution in Tank 6-2 was combined with similar material in Tank 6-1 to provide rare earth storage for current processing.

d. Strontium Semiworks Processing

Strontium Semiworks activities consisted of cask loadings, B Cell decontamination work and construction of the Strontium Semiworks portion of the B Plant-to-Strontium Semiworks transfer system. The HAPO-IB-1 cask load was measured at 430,000 curies of strontium-90 and released for shipment to the Oak Ridge National Laboratory on December 13, 1965. The HAPO-II-1 cask was loaded with 170,000 curies of strontium-90 and released for shipment. A 200-gallon Battelle Northwest cask was loaded with the 195,000 curies of promethium-147 recovered from the promethium flowsheet tests and shipped to Battelle Northwest Laboratories on December 10, 1965.

e. Cesium Processing

Cesium loading was resumed on December 15, 1965 after transfer of 110,000 gallons of Tank 101-A supernatant liquid to Tank 103-C. Cesium casks 44 and 45A were loaded with 54,000 and 45,000 curies of cesium-137, respectively, and released for shipment to the Oak Ridge National Laboratory.

f. Waste Management

The In-Tank Waste Solidification Unit was operated intermittently at reduced rates, using high-efficiency filters on the exhaust discharge for decontamination of the off-gas stream. The pressure drop across the filter system enabled only four to five days operation before filter replacement was necessary. Evaporation rates of only two and one-half to three gallons per minute were achieved. A total of 72,000 gallons of storage space were recovered during this period. The unit has been shut down since December 27, 1965 when the outer liner of the inlet air heater was found distorted during heater replacement.

155,000 gallons of non-boiling waste from Tank 101-AX were evaporated in Tank 103-AX.

3. Equipment Experience

The Purex HAF (co-decontamination cycle feed) pump failed mechanically on December 8, 1965. Replacement was made with a new pump from Spare Equipment.

The agitator in Purex Tank F15 (concentrated high-level waste storage tank) failed and was replaced with a new slow-speed agitator (285 RPM) from Spare Equipment. The precise cause of failure is unknown at the present time.

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RL-SEP-913

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The Purex 3B (final neptunium strip) column cartridge was completely reconditioned. All stainless steel plastic-coated sieve plates were replaced with three-eighths inch fluorothene sieve plates and stainless steel trays were replaced as required.

The lead-lined sulphuric acid (for cation resin regeneration) dilution tank located in the Purex 211-A Building failed when a leak developed in the tank bottom. Replacement was made with a new tank from Spare Equipment.

Purex ventilation supply fans 3 and 3A were completely reconditioned, including sand blasting and painting of all internal surfaces. This work was a preventive maintenance program item.

Two Purex pulse generators (H2 co-decontamination column and the K3 final uranium strip column) each developed a leak in the lower head of the process cylinder. The failed machines were replaced with reconditioned, contaminated spares. The replacement generators were modified (by welding), eliminating two gasket connections that have caused most pulse generator failures.

Major repair work on the Number One Joy process air compressor at the Purex Plant was completed. This work consisted of replacing a cylinder sleeve in one high pressure stage of the compressor and reconditioning all loading and unloading valves in the machine.

The Lectrodryer Air Dryer, a major component of the Purex Plant instrument air system, was completely overhauled. Valves, steam heater, condenser, water trap, and drying media were reconditioned or replaced as required to place the unit in good condition.

The Purex HSR jet jumper (scrub solution transfer to the co-decontamination column) leaked and was replaced.

Modulating dampers were installed on the inlet of the three electric Purex canyon ventilation air exhaust fans.

Remote C-clamp repairs were made to stop a tube sheet flange water leak on the Purex C3 dissolver off-gas tower.

The transfer pump in Tank 003 CR failed when a leak developed between the pump mounting flange and electric drive motor. Replacement was made with a new pump from Spare Equipment. This pump had been in service approximately four and one-half years.

The HAW (HA column waste) line at the Strontium Semiworks was freed by mechanically prying the remote control valve open. Efforts to either rehabilitate the valve to limited service or replace it are underway.

4. Radiation Experience

Iodine-131 emission was 4.62 curies for the month.

A burial of failed Purex canyon equipment was accomplished on December 8, 1965 without contamination spread.

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Low-level contamination of the B Plant canyon deck occurred on December 3, 1965 during checkout of the Tank 6-2 sampler, removal of the Cell 6 blocks and sampler jumper replacement. On December 23, 1965 extensive low-level contamination of the canyon occurred during the transfer of the fission product crude solution from Tank 003 CR to B Plant when the receiving jumper in Cell 9 developed a small leak. The low-level contamination has been removed.

Considerable decontamination of the waste and feed (remote control) valve pit at the Strontium Semiworks was done to enable construction work of the B Plant-to-Strontium Semiworks transfer line.

Radiation levels in the laterals under Tank 105-A and the bottom liner bulge detectors indicate no change in tank status.

5. Analytical Experience

Development work was conducted to provide an americium-241 analytical method suitable for use on fission product and waste management solutions. Excellent americium-241 recoveries have been obtained from representative sample matrices as well as from a Purex dissolver solution sample matrix. Several method parameters have been determined and others are under investigation.

Manager-Purex

WM Harty:MLM:gt

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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

DECEMBER 1965

II. ACHIEVEMENTS (Continued)

C. REDOX OPERATION

1. Operating Continuity

E-metal processing in the Redox plant continued through December 12. At this time operations were suspended for twelve days to complete a thorough product cleanout of the processing vessels and associated equipment, preparatory to conducting the General Electric-Isochem SS material physical inventory on December 20, 1965. Virgin feed processing was resumed on December 24 and continued through month-end.

The Uranium Oxide plant operated satisfactorily during the month and the expected production of both enriched and depleted uranium oxide was exceeded. All processing was curtailed during the last part of the month, in preparation for the General Electric-Isochem SS material inventory which was taken on December 20. Inventory approval was received on December 29; however, because of the New Year's holiday and the normal weekend shutdown, operations were not resumed until January 3, 1966.

2. Processing Operations

a. Redox Processing

E-metal processing was discontinued December 12 and preparations were started for the General Electric-Isochem SS material physical inventory on December 20. These included: 1) accumulation of the in-plant neptunium inventory; 2) a concentrated nitric acid flush of process equipment to remove residual products; 3) accumulation of product heels in four vessels equipped for accountability sampling. Virgin feed processing was resumed on December 24 and except for a three-hour outage taken for an acid boil-up in the G-3 hexone still to improve steam coil heat transfer, was continuous through the end of the month. Plant performance during the two periods of E-metal processing was very satisfactory and was conducted at operating and mechanical efficiencies of 89 and 96 percent, respectively. Product waste losses were satisfactory and all product met specifications.

During the plant shutdown for the SS material inventory, the remaining two canisters of zircaloy-clad NPR 1.25 percent enriched uranium test fuel elements were charged to the B-2 dissolver and successfully dissolved. Special samples were taken and analyzed for product conversion data. The dissolved material was subsequently blended with regular E-metal for routine processing.

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RL-SEP-913

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The 242-T waste evaporator facility, which had been shut down for several years, was started up on December 3, 1965 to reclaim non-boiling waste storage space. Except for two brief interruptions to repair leaks which developed during startup, the evaporator has operated continuously throughout the period, for an on-line efficiency of 96 percent. An average boil-off rate slightly in excess of 10 GPM has been obtained in recovering 373,750 gallons of waste storage space. Process condensate has been well below the routine release limit for radionuclides discarded to ground.

b. Uranium Oxide Processing

The installation of test equipment in the 224-U Building, for the recovery of irradiated thorium as an oxide suitable for reactor recycle, was completed this month and two test runs were made. Results are currently under evaluation.

During the second thorium test run, one of the electric pot heating elements failed and the equipment is currently down for equipment modifications and heating element repair.

3. Mechanical Experience

a. Redox Plant

Testing of the long-awaited Nagle pump, of improved design, was completed this month and the new unit was installed in the 1S column feed tank (F-8) on 12-16-65. Improved pump performance in this position is expected since a similar pump installation in the 1A column feed tank (F-7) has operated trouble-free since August 14, 1964.

The E-2 ozonator tower was replaced on 12-21-65 with a higher capacity unit of improved design. The new unit was installed in an effort to resolve the tendency of the original tower to pressurize at normal maximum plant processing rates.

The chest-type heat exchanger on the D-14 backcycle concentrator developed a leak during the month and a new unit was installed prior to plant startup on 12-24-65. Operation of the new bayonet-type tube bundle has been satisfactory to date.

b. Uranium Oxide Plant

K-calciner was out of service most of the month for replacement of a fractured free-end jack shaft. The failure occurred despite the fact that no prior bearing seizure or other failure had been evident, which might have caused an overstress of the shaft. At month-end, a new jack shaft had been installed and the calciner main shaft was being realigned.

4. Waste Handling and Decontamination

The M-130 cask, containing the fifth of seven shipments of assembled blanket fuel elements from Shippingport, Pennsylvania, arrived on-plant

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12-13-65. The cask was unloaded and the fuel elements stored under water in the 221-U Canyon Building without incident.

The third loading of N-Reactor fuels into the Stanray (S-1) cask was successfully completed at U-Plant on 12-15-65 and departed Hanford on 12-16-65, bound for Nuclear Fuels Services, Inc., West Valley, N. Y.

The transfer of Shippingport fuel elements to Battelle-Northwest, for testing purposes, continued this month. To date, eight fuel elements have been removed from the storage basin at U-Plant and shipped to the 300 Area.

5. Radiation Experience

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.

Drilling of the ten test wells around the 115-SX waste storage tank, which leaked approximately 16 inches of sludge leach solution into the ground during pumping operations during March, was completed this month. Contamination up to a maximum of 5 rads/hr was detected in three distinct areas, indicating the possibility of multiple leaks. The activity, primarily radiocesium, appeared to have penetrated no more than 15 feet below the tank bottom.

6. Analytical Experience

The Redox Analytical Laboratory provided special services for a variety of programs this month, which included: 1) analysis of all product accountability tanks in the Redox and UO₃ plants in support of the Nuclear Materials inventories related to Isochem takeover on January 1, 1966; 2) process control analyses for the startup of the 242-T waste evaporator; 3) process control and accountability analyses on a two-run thorium nitrate conversion feasibility test in the UO₃ plant; 4) analytical support for an N-Reactor fuels special dissolution campaign in the Redox plant; 5) dissolution and analysis of 200 iron monitors for the Graphite Research and Development Operation, Battelle-Northwest Laboratory, and 6) process control support for an Am²⁴¹ purification run by the Separations Chemistry Laboratory, R&E.

R N M - Callaghan
Manager - Redox

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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

DECEMBER, 1965

II. ACHIEVEMENTS (Continued)

D. WEAPONS MANUFACTURING OPERATION

1. Operating Continuity

The program for the fabrication of weapon components at Hanford was concluded, and the last shipment of these parts was made at midmonth. Preparations for the layaway of fabrication and inspection were in progress at month-end. The production of unfabricated plutonium and the recovery of plutonium from scrap materials were interrupted for the taking and reconciling of nuclear materials inventories preparatory to the transfer of operations from the General Electric Company to Isochem Inc.

2. Processing Operations

a. Plutonium Fabrication

Information on plutonium-fabrication activities is presented in Document RL-SEP-921 (Atomic Weapon Data).

b. Plutonium Reduction

The button line processed normal weapons-grade plutonium during the month.

The following unclassified plutonium was also shipped:

4,010 grams, as metal, to Battelle-Northwest
1,978 grams, as oxide, to Battelle-Northwest
1,987 grams, as metal, to Euratom - Karlsruhe
594 grams, as metal, to Swiss Government

c. Plutonium Reclamation

Fifty-six (56) kilograms of plutonium, as nitrate, were delivered to the button line from the recovery facilities during the month. An additional six (6) kilograms were produced but were high in uranium content and will require reprocessing.

The incinerator furnace remained out of service, but sorting, leaching and repackaging were continued. Fourteen (14) boxes of waste were processed through the facility.

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Five hundred and twenty-eight (528) cans containing eight (8) kilograms of plutonium were processed through the slag and crucible dissolvers during the month.

Fifty-six (56) grams of plutonium were returned to the main process stream from 56,787 liters of aqueous waste processed through the waste-treatment facility. Also, 8.3 grams of americium were recovered and stored for further processing.

3. Mechanical Performance

The layaway of the fabrication equipment was initiated following satisfactory final operation during the early part of the month.

The button line equipment performed satisfactorily, with some down-time attributable to problems associated with the vacuum drum filter and the fluorinator vacuum system.

Recovery equipment performed satisfactorily, except for the corrosion failure of a line to the CA (solvent extraction) column. The slag and crucible dissolver were both maintenance-free during the month.

Two successful canyon entries were made: one to alter dissolver connectors in preparation for future installation of the Mark III (08) slag and crucible dissolver, and one to repair the line leak at the CA column.

Fourteen (14) pump failures were experienced in the recovery facility. Thirteen (13) were overhauled and returned to service. One, a Chempump, was beyond repair and was buried.

Laboratory equipment performed satisfactorily, with only minor repairs required.

4. Radiation Experience

Radiation and contamination control statistics indicated good control. There were no cases of potential plutonium deposition.

5. Analytical Experience

Number of samples received	2,695
Number of determinations	13,747

The reduced work load during the month was attributable to the elimination of fabrication work at Hanford. Four chemical analysts were transferred to other sections as a result.

SG Smolen
Manager
Weapons Manufacturing

SG Smolen:ap

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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

DECEMBER, 1965

II. ACHIEVEMENTS (Continued)

E. FINANCE AND SERVICES OPERATION

1. Production Cost Accounting

The FY 1966 Midyear Budget Review was completed and submitted to RLOO-AEC. The review indicated needs for \$22,734,000 in O2 Production funds. In the revised FY 1966 budget \$21,873,000 was requested. The bulk of the difference (about \$600,000) between the Midyear Review and the Revised Budget is absorption in O2 Program of overhead costs no longer accessible to the O3 Program due to the Fabrication shutdown. Most of the remaining difference is due to increased administrative cost caused by the transfer of CPD to Isochem Inc. Neither item was included in the revised FY 1966 submission, as they were to be covered by a general provision in the AEC budget.

2. General Accounting

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

In Thousands

Total Authorized Funds and Transferred Capital	
Property Authorizations	\$3,990
Total Cost-to-Date	2,635
Commitments & Open Work Releases	255
Unencumbered Balance	1,100
Costs Charged During December, 1965	200

During December, one Modification was received from the AEC: Directive No. EQT-029, Modification No. I, Project CGC-180, Plutonium Buy-Back Facility - 234-5 Building, authorizing total project funds in the amount of \$195,000.

There were no Construction Completion and Cost Closing statements issued during December.

During the month of December five Appropriation Requests were authorized in the amount of \$34,525. They were as follows:

<u>AR No.</u>	<u>Description</u>	<u>Amount</u>
66018	Electronic Work Benches	\$ 2,360
66020	Analytical Balance	1,365
66021	Master Slave Manipulator	3,000
66022	100 CFM Compressor & Housing	10,000
66023	Electric Immersion Heater	9,500
66011	Carbon Determination Analysis Equip.	8,300
<u>Total</u>		<u>\$34,525</u>

3. Purchasing

Purchase Orders and Contracts placed during December, 1965, included:

<u>Type</u>	<u>No.</u>	<u>Value</u>
Formal Orders	278	\$215,310
Verbal Orders	111	5,481
Essential Materials Orders	<u>8</u>	<u>55,606</u>
Total	<u>397</u>	<u>\$276,397</u>

Formal assignment of General Electric Company purchase orders and contracts to Isochem Inc. was accomplished during the month. Letters of notification to all affected vendors were mailed on December 31, 1965.

4. Business Information Systems

A meeting was held with Computer Sciences Corporation management to discuss current problems involving transmission of classified data. The solution of this problem is very important to Isochem in order for it to create new and improve existing business and technical mechanized systems.

RAC Connolly
Manager - Finance

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RL-SEP-913

CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

DECEMBER, 1965

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II. ACHIEVEMENTS (continued)

F. FACILITIES ENGINEERING OPERATION

1. Purex

Purex 4.0 Capacity Factor Expansion

Part I of the design criteria document was transmitted to the Atomic Energy Commission for approval. Preparation of Part II of the criteria is underway. A preliminary project proposal, requesting design and procurement of equipment and facilities required for operation of the Purex Plant at 4.0 capacity factor, was transmitted to RL00-AEC on December 10, 1965.

Purex F-5 Condenser

The modified condenser was installed in the F-5 position during the month. Performance to date has been excellent. The lower pressure drop of this unit has provided considerable relief in the F6-F5 vapor train. It is also apparent that a significant reduction in air in-leakage resulted from the new installation.

Co-product and Higher Enriched Fuels

Additional studies were made concerning the processing of fuels from the reactors for several cases, including a study of processing Douglas-United Nuclear fuel having enrichment above 2.1 percent. The design criteria document for processing 2.1 percent NRD co-product fuel was initiated.

"N" Cell Concentrator

The new tantalum "N" Cell Concentrator, E-N-6, has been received and assembled in the Purex storage gallery for testing. The performance of this unit appears to be very good. A design is now being prepared for a second unit which will be used as a spare for the new unit. The use of titanium is being considered for the spare unit because of our greater experience in titanium vessel fabrication.

Pulse Generators - Purex

Both short-stroke machines have been delivered by the vendor. They are being checked thoroughly for quality, performance, and dimension before being placed in spare parts storage.

In-tank Solidification

A new double filter unit of 2 - 4 filter-replacement packages was designed and fabricated to replace the "throw-away" units used for tests in the ITS stack. This unit is designed to permit continuous operation as one four-bank unit can be replaced while the other is in full operation.

Design and procurement are underway for a "Demister-Scrubber Filter" unit to act as a roughing unit ahead of the final stack filter.

CGC-124 - R. #2 - Increased Processing Flexibility - Purex

A project proposal Revision requesting (1) an increase of project funds in the amount of \$325,000, totalling \$2,625,000, and (2) a four-month extension of the project schedule was transmitted to RLOO-AEC on December 30, 1965.

2. Redox

Redox E-2 Ozonator

The new Redox E-2 Tower was installed on December 20, 1965, and tested by cold runs. According to these tests, stability and performance of the tower was significantly improved; and actual operation to date has confirmed the test results.

Nagel Pump

The Nagel pump ordered for use in Redox canyon was found to require additional column support. One pump was modified on-site with parts supplied by the vendor, and it is operating satisfactorily. The second was modified by the vendor before shipment.

3. Weapons

Button Lines - HA-46 and HA-47 Ion Exchange

The electrical-instrument design has been completed for feed adjustment, production concentration, and load-out equipment for the HA-46 Ion Exchange Facility. The mechanical detail design was completed in October 1965.

Recovery Facilities - Plutonium Reclamation

The mechanical design for the installation of uranium decontamination equipment, utilizing the existing CR Column, has been completed. Detail design was completed for a maintenance platform for the CA, CC, and CO Columns. The platform will be handled remotely by the process cell crane. The prototype ball valve charging mechanism has been mounted on the O8 Dissolver. Final adjustments and testing have been successfully completed.

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CGC-180 - Plutonium Buy-back Facility - 234-5 Building

Directive No. EQT-029, Mod. No. 1, dated December 7, 1965, authorized the total project. Detail design of the receiving and dispensing hood has been completed, thus bringing detail design to approximately 80 percent completion.

Building Services

Several changes have been made to the Model H-5 Nash Hytor Instrument Air Compressor Systems (291-Z Building), to improve the instrument air system reliability. The changes include installation of a pressure reducing valve in the compressor seal water supply branch header, and installation of check valves on each compressor case.

Plutonium Estimation-W-2 Column - 242-Z Building

The final W-2 Column scan of the bi-weekly series of scans which were started in September, 1965, was made on December 20, 1965. Reports were made after each scanning. The readings have indicated no significant change during that time in the amount and distribution of Pu 380-KEV gamma radiation level over the length of the column. The scanning schedule has been revised to obtain readings at intervals of not more than five weeks, and for a period of one year.

Low-level Waste Disposal

Development work was continued on methods of reducing low-level waste materials at "Z" Plant. The prototype punch and die set for the study of "spring back" in certain compressible materials (plastics, rubber, cloth, etc.) has been completed. Comparisons between baling methods and incineration are being made.

4. GeneralWaste Management ProgramPhase III

The Phase III criteria revision (No. 2) was transmitted to RL00-AEC for approval. This criteria revision includes (1) Cell and Hot Pipe Trench modifications for Cells 34 and 35, (2) a "B" Plant Cooling Water Diversion System, and (3) additional raw water pumping capacity in the 200-East Area.

FPCE Integration

The approved design criteria document which covers the Hot Pipe Trench and Cell Modifications for Cells 36 through 40, were issued.

242-T Evaporator

The facility was started, using "hot" feed, and it appears to be operating on a continuous basis without major problems. The rate of boil-off has averaged about ten gallons per minute.

Polonium

Two process flow sketches and a process flowsheet for solvent extraction have been completed. Two process flow sketches and a process flowsheet for the bismuth reduction and target element fabrication have been completed. An equipment list and capital estimate for the bismuth recovery facility was completed with an indicated cost of \$2.5 million. The Redox canyon modifications will cost approximately \$1.5 million additional.

Current planning includes possible removal of the RMA Line from the 234-5 Building and placing the encapsulation facilities there. Also, it is planned to encapsulate pure polonium metal instead of the gadolinium polonide. Cost estimates for the encapsulation facility indicate a range of \$3,000,000 to \$4,000,000.

Tube Bundles

A welding study was conducted to determine the problems associated with welding sixteen gage stainless steel tubing for fabrication of a tube bundle to be used for uranium service at Purex. Sample welds were made and evaluated and a reliable welding procedure was devised.

This study included test welding and evaluation of welded 304-L pipe instead of tubing and also re-annealing and corrosion testing of twelve gage 304-L tubing. Results are being evaluated to determine the extent of improvement in corrosion resistance.

Waste Storage Tank Study

Dr. Eben Vey of Illinois Technology and Research Institute (ITRI), was selected as the soils consultant for evaluation of lateral thrust effects of backfilled, layered, and compacted soils around the 200 Area Tank Farms. A document - "A Background for an Analysis of the Mechanical Properties of Separations Plants Tank Farm Soils" - (RL-SEP-875), was compiled, published, and forwarded to Dr. Vey for his proposal preparation.

Shops Fabrication

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

Manager Facilities Engineering

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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

DECEMBER 1965

II. ACHIEVEMENTS (Continued)

G. RESEARCH AND ENGINEERING OPERATION

1. Separations Process Engineering

a. Annular Dissolver (Purex)

The fission product activity in the spent scrub water from the new A-Cell ammonia scrubber (auxiliary to A-Cell annular dissolver installation) has continued at about the same level as previously reported. Whereas the spent-scrub water from the original Purex pot-type dissolvers was typically 100 $\mu\text{c/gal}$ in fission product activity, from the new installation the level is 100 to 500 fold higher. Data are based on analyses of samples taken from the waste line to the A36 Crib. In addition, two instances of considerably higher activity, with appreciable solids content, have been noted. Analyses of one sample indicate the following:

- 1) The solids appear to be uranium that has precipitated at the high pH of the solution (10.5).
- 2) The total fission-product activity in the supernatant liquid is about 2 curies per gallon. From the observed solids volume and their analyses, apparently the bulk of the activity was in the supernatant liquid.
- 3) From the analyses and the volumes of liquid transferred, it is estimated that roughly 5,000 curies of fission products, associated with 20 pounds of uranium, were transferred to A36 Crib in a volume of scrub water corresponding to the decladding of 16 tons of uranium in the A-Cell dissolver.

b. Protactinium Separation from Thorium Processing Test (Purex)

During the Purex test processing of 6 tons of irradiated thorium, in early 1965, a separation of protactinium-233 was effected by scavenging of thorium dissolver solution with MnO_2 formed by a reverse permanganate strike. The details and results of this processing effort were reported in January, 1965. Because of mechanical problems, only a small amount of the initially separated Pa was actually recovered for loadout into a cask. Subsequently, samples have been taken that have characterized the material recovered. Results are summarized below:

- 1) The cask contains an estimated 10 to 25 volume percent MnO_2 precipitate. The supernatant liquid is approximately 0.12 M in H_2SO_4 and in $MnSO_4$, and contains only trace amounts of uranium and thorium.
- 2) Approximately 6 grams of total uranium made up of 53 weight-percent U-238 and 47 weight-percent of U-233, are associated with the precipitate. The U-233 is contaminated with about 1 part U-232 per million parts U-233 (compared to an average of about 3 ppm for the U-233 product from the test run).

c. Redox Ozonator Tower

The Redox E-2 Ozonator is a tank on which a bubblecap contacting tower is mounted, with the lower end of the tower extending into the tank. During normal uranium-plutonium processing, the following functions are performed in this equipment:

- 1) Hexone is stripped from the entering 2BP and the vapors are condensed in the upper section of the tower; and
- 2) Ruthenium is removed from the stripped 2BP by contacting and circulating with ozone in the lower section of the tower and in the tank.

The original E-2 tower was installed in September, 1959, and operated satisfactorily until about September, 1964, at which time a tendency for pressurization at normal full capacity was noted. Subsequently, the condition became more serious and it became necessary to decrease plant rates about 20 percent in order to insure stable operation. Apparently, corrosion and collapse of tower internals caused restrictions. In addition, apparent failure of a stainless steel demister deentrainment section permitted the discharge of plutonium from this vessel into the Redox plant ventilation wind tunnel (see report for October, 1965).

To correct these problems, an ozonator tower of new design was installed on December 21, 1965. The new design included a change from Type 304 to Type 304-L stainless steel as the principal construction material and featured demister deentrainment pads of tantalum rather than the original stainless steel. Operation of the new tower has been satisfactory at normal maximum plant processing rates.

A flush of the failed tower with 57 percent HNO_3 - 1 percent H_2BO_3 , prior to its removal, picked up only 11 grams of plutonium.

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RL-SEP-913

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2. Fission Products Process Engineering

Process Technology Program

a. In-Tank Solidification

Off-gas filtration problems continued to plague the operation of the first in-tank solidification unit. The unit was maintained in limited operation by bypassing the deteriorated deep bed glass fiber filter located upstream of the condenser and installing high efficiency filters on the exhauster discharge. With the deep bed filter bypassed, the off-gas flows from the tank through a wire mesh deentrainer, a condenser, an exhaust blower and through high efficiency filters to a stack. Cesium-137 concentration in the process condensate increased to levels indicating 50 to 75 percent of the entrained materials entering the condenser leaves with the condensate. The amount of radioactivity in the condensate remained a factor of two below the targeted maximum concentration for routine operational release of 50 microcuries per gallon.

Battelle Northwest Laboratories have duplicated the observed glass fiber deterioration in laboratory scale equipment. Boiling sodium hydroxide solutions, including solutions free of fluoride ion, produce vapors that cause fiber deterioration apparently identical with the plant fiber deterioration. Other fibers chemically resistant to sodium hydroxide such as Teflon are being evaluated for this service. A seven-inch thick pad composed of Teflon fibers twenty microns in diameter and packed to a density of 18.9 lb/ft³ was shown to remove 80 and 90 percent of 0.3 micron particles at velocities of 200 and 60 ft/minute, respectively. The corresponding pressure drops through the pad were 5.5 and 1.5 inches of water.

An examination of the high watt density (150 to 450 watts/in²) prototype electric immersion heater revealed that overheating of the elements was the cause of its failure. No scale was found on the elements. The overheating probably occurred during the tank foaming problems reported in October. A resistance check of the low watt density (20 watts/in²) prototype immersion heater showed it to be in good condition.

b. Tank Farm Evaporator

The 242-T evaporator facility which has been shut down for several years was started up to reclaim non-boiling waste storage space. The unit has been changed from batch operation to continuous operation with recycle. In this mode of operation, evaporator concentrate is passed through two underground storage tanks in series where it cools, and much of the salt crystallizes and settles to the bottom of the tanks. The salt-depleted supernatant liquid is then recycled and blended with fresh feed in a third underground waste tank for return to the concentrator. Typical instantaneous boil-off rates have been in excess of

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RL-SEP-913

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10 GPM at a concentration factor of 4:1. Process condensate has been a factor of 10^3 to 10^4 below the targeted routine release limit (50 $\mu\text{c/gal}$).

c. Tank Farms

Ten test wells were drilled around the 115-SX waste storage tank which failed earlier this year; 50,000 gallons of sludge leach solution leaked into the ground while the tank was being emptied. Contamination was encountered in three distinct areas indicating the possibility of multiple leaks. The activity in the tank, primarily radiocesium, appeared to have penetrated no more than 15 feet below the tank bottom.

d. Fission Product Recovery

The waste storage tank (TK-103-C) used to feed the cesium shipping casks was partially refilled with Purex TK-101-A supernatant solution low in aluminum content. Two cesium casks were loaded with the new feed. No plugging problems were encountered and satisfactory loads were obtained.

3. Plutonium Process Engineering

a. Uranium Removal from Reclamation Facility Plutonium Product

Last month it was reported that increasing the hydroxylamine nitrate (HN) from 0.06 M to 0.2 M in the stripping solution (CCX) enhanced concentration of the uranium in the organic, which could then be discarded. Additional tests have demonstrated methods for reducing the associated plutonium losses. The flowsheet revision, following the normal build-up of uranium, includes first changing the CC column stripping agent CCX from 0.04 to 0.25 M hydroxylamine nitrate. This causes the plutonium concentration to drop 3-fold and the uranium to increase 30-fold in the CCW, the CC column organic effluent. The CO column organic scrub solution (COX) is then changed from 0.2 M HF - 1 M HNO_3 to 0.25 M HF, which causes greater than 90 percent of both the plutonium and uranium to transfer to this scrub solution. After adding a salting agent and a reducing agent, the aqueous scrub solution is then contacted in one of the "bank" tanks with a small amount of plant solvent. The solvent-bearing the uranium is discarded; the plutonium in the aqueous phase is recycled to the solvent extraction feed system when the normal flowsheet conditions are re-established. The entire uranium removal process takes about 20 hours.

b. Recovery of Plutonium from Recuplex Facility Residues

In the past few months, the deactivated Recuplex reception and blending facility has been thoroughly flushed and the plutonium recovered by processing the flush solutions through the CX column in the Plutonium Reclamation Facility (PRF). By

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alternately flushing with a mixture of TBP and DBBP in CCl_4 and with an aqueous solution of HNO_3 -HF, more than 99% of the plutonium has been removed from the hood floor and more than 80% from the geometrically favorable tanks. Efforts are continuing to remove the residual plutonium from the tanks. The aqueous and organic flush solutions are filtered through a 40-mesh screen before being transferred to the CX column, a vertical teflon-lined pipe packed with seven feet of polypropylene pall rings. The impurity-laden solvent is contacted countercurrently with a solution of nitric and hydrofluoric acids containing ferrous sulfamate. The aqueous effluent (CXP) is routed to the main solvent extraction system for plutonium concentration and purification. The aqueous flush solutions from Recuplex are also passed through the CX column for deentrainment of any organic phase and are routed to the main solvent extraction system. More than 98% of the plutonium in the flush solutions has been delivered to the main solvent extraction system in a relatively clean aqueous solution despite the extraneous materials in the flush solutions (dissolved gloves, rags, silica fines, DBP, MBP, etc).

c. Use of Corronel in the Miscellaneous Treatment (MT) Facility

A new Ni-Cr alloy, Corronel, has gradually replaced teflon-lined batch dissolvers in the Miscellaneous Treatment area. Electrical immersion heaters of Corronel originally placed in three teflon-lined batch dissolvers are still in service after 14 months of almost continuous use. Original teflon-lined equipment had a life of about 6 months, but thereafter only a 1-2 month life was achieved. It appears that currently-produced teflon-lined equipment is not compatible with frequent heating and cooling cycles in the proximity of the electrical heater. Teflon-lined equipment is still used as the top portion (away from the electrically heated immersion probe) of the batch dissolvers. No failures in Corronel tank dissolvers have occurred to date (longest has been in service 4 months).

d. Plutonium Oxide Dissolution

Plutonium dioxide to be reprocessed is normally dissolved batch-wise by batch dissolution with boiling acid (16 M HNO_3 - 0.6 M HF). Recently, some very impure oxide powder, grossly contaminated with aluminum and silaceous powders, resisted this treatment. Dissolution was greatly improved by blending with sodium fluoride powder sufficient to form 0.5 M NaF after adding the acid. The 20 runs prior to this treatment were interspersed with 18 clean-out runs (no oxide charged). The 20 runs following, using NaF, necessitated only 7 clean-out runs.

e. W-2 Column Plutonium Hold-Up Evaluation

The annular W-2 column in the Waste Treatment Facility is used to recover plutonium from the primary extraction column waste (CAW). The annulus is packed to a height of 10 feet with

DECLASSIFIED

RL-SEP-913

4 percent borated $\frac{1}{2}$ -inch polyethylene Raschig rings. Effluent from this column is routed to non-critically safe vessels before cribbing.

On August 11, 1965, it was reported that this column had a plutonium build-up of no more than 2,000 grams, as determined by a 385 KEV gamma scan. Tests conducted over a 4-month period showed that rigorous flushing with 0.1 M HNO_3 - 0.1 M HF and 1% Na_2CO_3 solutions would not dislodge the plutonium (only 115 grams recovered). Reduction of trace fission product activity (Zr-Nb) allowed refinement of the plutonium hold-up estimate to the 300 - 500 gram range. The mechanism for plutonium hold-up could be that of a DBBP- CCl_4 plutonium complex absorbed by the polyethylene rings. Such a mechanism has been shown for similar systems of a plastic containing an absorbed organic extractant. Elution from systems such as this are rate controlled and would explain the difficulty in stripping the plutonium from the rings with the methods used. It was concluded that the plutonium would not be removed by normal processing conditions, and critical mass control specifications were revised to acknowledge the presence of the fixed plutonium.

f. Argon-Cooled Sampling of Plutonium Buttons

The change to the use of argon gas as a coolant during sampling of plutonium buttons has resulted in roughly a factor of two reduction (to 100 ppm) in their reported carbon content. The relatively high values previously reported were due largely to contamination from the carbon tetrachloride used to cool the sample drill. Continued use of the argon-purged sampling procedure is planned.

4. Separations Chemistry Laboratory

a. Process Improvement

Decontamination During Neptunium Purification

Batch counter current extraction runs were completed during the month to determine the path of fission products under the proposed neptunium purification flowsheet for Redox (see the November 1965 report). The following results were achieved on the laboratory apparatus.

	<u>ZrNB Df</u>	<u>Ru Df</u>	<u>Np Loss</u>
Reducing cycle	10	2.7	0.5%
Acid deficient-oxidation cycle	1×10^4	400	1.5%

The 1.5% waste loss is associated with a recycle stream and will not be discarded as such. The experimental data indicate

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RL-SEP 913

that an improvement by a factor of 50 may be realized with the new flowsheet under plant conditions.

b. Americium Recovery and Purification

The removal of europium from the americium by solvent extraction techniques using D2EHPA has been completed. Approximately 39 grams of americium were obtained following the extraction, oxalate precipitation, and subsequent calcination. Product purity is 96.5% with the only significant impurity being inert cerium. An additional 15 grams of americium remains as the oxide from an earlier processing period. This material will be inspected for comparison to the present material. The purity of this material is 99+%, but it may be slightly more contaminated with fission product europium.

5. Plutonium Chemistry Laboratory

a. Recovery of Plutonium From Polystyrene

The procedure has been simplified and the burning time shortened. Air is introduced into the furnace by a distributor ring in order to promote burning down in the bed, and the stirrer has been eliminated. Time cycles went from 4-6 hours to $1\frac{1}{2}$ hours per batch of about 275 grams plutonium in about 16 cubic inches of polystyrene.

R. E. Tomlinson

Manager
Research and Engineering

CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

DECEMBER, 1965

III. PERSONNEL ACTIVITIES

A. FORCE SUMMARY

<u>Operation</u>	<u>Monthly Salaried</u>		<u>Weekly Salaried</u>		<u>Total</u>	
	<u>11-28-65</u>	<u>12-31-65</u>	<u>11-28-65</u>	<u>12-31-65</u>	<u>11-28-65</u>	<u>12-31-65</u>
General Manager's Group	10	10	4	4	14	14
Finance & Services	40	41	51	56	91	97
Employee Relations	14	15	6	6	20	21
Research & Engineering	59	60	29	28	88	88
Facilities Engineering	96	91	202	198	298	289
Production	5	5	3	3	8	8
Redox	62	62	238	239	300	301
Purex	74	75	292	290	366	365
Weapons Manufacturing	<u>52</u>	<u>51</u>	<u>231</u>	<u>222</u>	<u>283</u>	<u>273</u>
Total	<u>412</u>	<u>410</u>	<u>1056</u>	<u>1046</u>	<u>1468</u>	<u>1456</u>

B. PERSONNEL CHANGES

W. Watson, Jr., Specialist - Personnel Placement appointed Manager - Employment and Training, effective 12-27-65.

R. J. Sloat, Manager - Technological and Environmental Safety appointed Manager - Nuclear Materials, effective 12-27-65.

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C. TRIPS

<u>Visitor</u>	<u>To</u>	<u>Nature of Discussion</u>
<u>To AEC and Other AEC Contractors</u>		
J. B. Kendall S. M. Nielson G. F. Borsheim	E. I. duPont De Nemours & Co. Savannah River Plant & Lab Aiken, So. Carolina	Solvent extraction processing of thorium and anion exchange processing of high level wastes. (12/6,7,8/65)
J. B. Kendall S. M. Nielson G. F. Borsheim	Union Carbide Nuclear Co. Oak Ridge National Lab Oak Ridge, Tennessee	Same as above (12/9,10/65)
W. G. Smith O. F. Hill J. H. Warren	AEC - Washington, D.C.	Production Scheduling. (12/7/65)
J. W. Fillmore	Union Carbide Nuclear Co. Oak Ridge National Lab Oak Ridge, Tennessee	Quality control. (12/8-10/65)
R. E. Van Der Cook H. H. Hopkins W. P. Ingalls	AEC - Washington D.C.	Briefing for Po-210 thermo electric generators. (12/16,17/65)
<u>To General Industry</u>		
H. P. Shaw W. H. Dixon	Westlake Plastic Co. Philadelphia, Pa.	Shipping containers. (12/14-15/65)
	Summerill Tube Co. Pittsburgh, Pa.	Stainless Steel Tubing. (12/16/65)

D. VISITORS

<u>Visitor</u>	<u>From</u>	<u>Nature of Discussion</u>
<u>From Other Federal & State Agencies</u>		
Maj. W. J. Pobst	U. S. Air Force (AFTAC)	Purex process and tour. (12/2/65)
<u>From General Industry</u>		
J. Baumgartner	Lepel High Frequency Lab.	High frequency-heat treatment methods. (12/3-6/65)

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<u>Visitor</u>	<u>From</u>	<u>Nature of Discussion</u>
<u>From General Industry</u>		
Richard Martin	Perine Machinery Co. Seattle, Washington	Electrical discharge equipment. (12/17/65)
Paul Neumayer	Elox Corporation Tustin, California	Electrical discharge equipment. (12/17/65)

CHEMICAL PROCESSING DEPARTMENT

MONTHLY REPORT

DECEMBER, 1965

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	1
Ser. Accidents									0	0	4
Med. Treat. Inj.		11	9	10	5	1		3			492
Rad. Occurrences		3	4		16						144
Contam. Wds.											22
New Deposition Cases											1
Fires											4
Security Violations				1		1		1			16

DECLASSIFIED

DECLASSIFIED

RL-SEP-913

CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

DECEMBER, 1965

V. REPORTS

A. PREPARED AND ISSUED

- RL-SEP-320, Secret, "Process Bases and Specifications - Uranium-Plutonium Separations at the Purex Plant", SPE personnel, dated December 20, 1965
- RL-SEP-660, Unclassified, "Specifications and Standards for Operational Control of the Redox 241-SX Tank Farm", FPPE personnel, dated July 1, 1965
- RL-SEP-624, Confidential, "Design Criteria, Part I, Purex 4.0 Capacity Factor Expansion", by J. H. Nordahl, dated October 27, 1965
- RL-SEP-665, Official Use Only, "Project Proposal - Purex 4.0 Capacity Expansion (Project CGC-183)", by L. W. Finch, dated December 3, 1965
- RL-SEP-756, Secret, "Capacity Limitations of the Metal Handling System from the 100 Areas to Dissolver Solution", by A. C. Morgenthauer, dated December 27, 1965
- RL-SEP-849, Secret, "Engineering Study - Long-Term Uranium Oxide Storage", by D. D. Wodrich, dated December 2, 1965
- RL-SEP-868, Secret, "Analyses of Neptunium Batches - Purex No. 38 and 39", by M. K. Harmon, dated November 23, 1965
- RL-SEP-870, Official Use Only, "Project Proposal, Revision No.2 - Increased Processing Flexibility - Purex (Project CGC-124)", by L. W. Finch, dated December 6, 1965
- RL-SEP-871, Secret, "Semiannual Progress Report - 02 R&D", by O. F. Hill and R. E. Tomlinson, dated December 10, 1965
- RL-SEP-877, Secret AWD, "Weapons Process Engineering Technology Report - November 1965", compiled by members of WPE, dated December 1, 1965
- RL-SEP-880, Secret AWD), "Semiannual Progress Report - 03 R&D", by R. E. Tomlinson, dated December 1, 1965
- RL-SEP-882, Unclassified, "Status of Plant Operations - Chemical Processing Department", by M. K. Harmon, dated December 15, 1965

A. PREPARED AND ISSUED (Continued)

- RL-SEP-886, Unclassified, "Trip Report - Visit with Manufacturers of Remotely Controlled Railroad Locomotives", by D. D. Wodrich, dated December 6, 1965
- RL-SEP-888, Unclassified, "Impurity Removal by Plutonium Button Line Process", by R. L. Walser, dated December 13, 1965
- RL-SEP-891, Secret AWD, "Americium in Hanford Produced Plutonium", by A. E. Barber, dated December 9, 1965
- RL-SEP-892, Secret AWD, "Waiver of Sampling Schedule", by A. E. Smith, dated December 10, 1965
- RL-SEP-895, Unclassified, "W-2 Column Plutonium Hold-Up Evaluation", by L. M. Knights, dated December 15, 1965
- RL-SEP-898, Unclassified, "Long Range Transducer Evaluation", by L. L. McGregor, dated December 19, 1965
- RL-SEP-899, Secret AWD, "Trip Report - VISAM 247 and EVIR 37", by A. E. Smith, dated December 16, 1965
- RL-SEP-900, Official Use Only, "Foreign Travel Report - VISAM 222 and VISAM 247", by A. E. Smith, dated December 16, 1965
- RL-SEP-903, Unclassified, "Evaluation of Process Test BL-65-2 - Argon-Cooled Sampling of Plutonium Buttons", by R. L. Walser, dated December 22, 1965
- RL-SEP-911, Secret, "Polonium-210 Costs at Hanford", by O. F. Hill, dated December 29, 1965

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RL-SEP-913 DEL

CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

DECEMBER, 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

NONE

J. H. Warren

General Manager
Chemical Processing Department

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**DATE
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