ISO-365 - DEU

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT
FOR

JUNE 1966

ISO--365-Del.

DE93 006688

Compiled by
SECTION MANAGERS

DECLASSIFIED
WITH DELETIONS

By Authority of 100-442

The book of _____
 The book of _____
 The book of _____

ISOCHEM INC.
RICHLAND, WASHINGTON

Received by OSTI

NOV 30 1992

Work performed under Contract No. AT(45-1)-1851 between the Atomic Energy Commission and Isochem Inc.

(Item F-42)

**DECLASSIFIED
WITH DELETIONS**

MASPER

DISTRIBUTION RESTRICTED TO U.S. ONLY

UNCLASSIFIED

ISO-365

DEL

DISTRIBUTION

Copy Number

1	J. N. Judy
2	H. D. Gilbert
3	E. T. O'Sullivan
4	P. E. Reed - J. H. Warren
5	T. S. Weissmann
6	R. F. Campbell
7	R. A. Connell
8	L. I. Brecke
9	M. K. Harmon
10	R. W. McCullugh
11	G. H. Sahler
12	R. E. Smith
13	S. G. Smolen
14	C. R. Bergdahl
15	R. E. Tomlinson
16, 17, 18	U. S. Atomic Energy Commission, Richland Operations Office Attention: D. G. Williams, Manager
19, 20, 21	U. S. Atomic Energy Commission, Washington 25, D. C. Attention: F. P. Baranowski, Director Production Division
22	Records File

UNCLASSIFIED

DECLASSIFIED

TABLE OF CONTENTS

DISTRIBUTION	2
TABLE OF CONTENTS	3
STAFF	4
I. SUMMARY	5-6
II. ACHIEVEMENTS	
A. Production Planning Section	A-1 through A-3
B. Purex Section	B-1 through B-3
C. Redox Section	C-1 through C-4
D. Plutonium Finishing Section	D-1 through D-3
E. Financial Controls Operation	E-1 through E-3
F. Facilities Engineering Section	F-1 through F-3
G. Research and Engineering Section	G-1 through G-13
H. Employee Relations Operation	H-1 through H-3
I. Waste Management Section	I-1 through I-2
III. PERSONNEL ACTIVITIES	J-1 through J-3
IV. REPORTS ISSUED	K-1 through K-2
V. PATENT SUMMARY	L-1

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

UNCLASSIFIED

ISO-365

DEL

STAFF

President, Isochem Inc.	J. N. Judy
Vice President, Business Management	H. D. Gilbert
Vice President, Marketing	E. T. O'Sullivan
Vice President, FPCE	T. S. Weissmann
Vice President, Chemical Processing	P. E. Reed
Staff Assistant	T. A. McCoy
Manager, Manufacturing	J. H. Warren
Manager, Production Planning	M. K. Harmon
Manager, Purex	S. G. Smolen
Manager, Redox	R. W. McCullugh
Manager, Plutonium Finishing	L. I. Brecke
Manager, Facilities Engineering	H. P. Shaw
Manager, Research and Engineering	R. E. Tomlinson
Manager, Waste Management	R. E. Smith

UNCLASSIFIED

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

JUNE 1966

I. SUMMARY

June production, as percent of the Quarterly Forecast (ISO-213), is summarized below:

	<u>June</u>	<u>Calendar Year To Date</u>
Separated plutonium nitrate	111	103
Separated uranium nitrate	112	100
Uranium oxide	103	99
Plutonium metal buttons	136	108

The production of all products essentially equaled or exceeded forecasted quantities, both for the month of June and calendar year to date. Production of plutonium metal buttons exceeded forecast for the six-month period by eight percent due mostly to the recovery of more plutonium from the scrap backlog than had been anticipated.

Thorium processing continued in the Purex plant throughout the month at rates of 5 to 6 tons per day. Product quality continued to be excellent and only minor process interruptions were experienced. Downtime periods were caused by flooding of the H-3 column, a power outage, a plugged H-3 column cartridge, and failure of the H-A column feed pump.

The Redox plant operated at high rates throughout the month on aluminum-clad 94 fuels. Excellent production was achieved, the amount having been exceeded only twice during the past eight years. Except for an unscheduled power outage and one short outage to replace the D-14 backcycle waste pump, processing downtime was associated primarily with acid flushing of the solvent extraction columns to correct flooding conditions which were encountered at the high processing rates.

The Uranium Oxide plant was shut down on June 24, as scheduled, in order to complete several annual maintenance jobs and to give as many employees as possible a summer vacation. Operations are not scheduled to resume until July 18, 1966. This extended outage was allowed for in the Quarterly Production Forecast (ISO-213).

At the B-plant, oxalate processing of crude fission products resulted in the separation of approximately 460 kilocuries of promethium-147 and 60 kilocuries of strontium-90.

The HAPO IB-3 cask, containing 390 kilocuries of strontium-90, was shipped to ORNL on June 10. With the shipment of this cask, a total of 2.83 megacuries

~~SECRET~~
DECLASSIFIED

ISO-365 ~~SECRET~~

I. SUMMARY(contd.)

of strontium-90 was delivered to ORNL and Quehanna during FY-1966. Two STT casks, loaded with a combined total of 74 kilocuries of cesium-137 were shipped to ORNL on June 13.

The In-Tank Solidification unit recovered 132,000 gallons of waste storage space during June. An additional 137,000 gallons of waste storage space were also recovered by the 242-T waste evaporator during June, bringing its total recovered space to 1,413,000 gallons since start-up on December 3, 1965.

Tests were made to determine the feasibility of calcining thorium nitrate and densifying the thoria by the sol-gel process in the deactivated UO₃ plant calcination pots. The test runs were operationally successful. The dried gel was tested by DUN and found to have acceptable characteristics for reactor irradiation and subsequent dissolution for chemical processing.

In a Strontium Semiworks process test, the flow sheet proposed for extracting strontium and rare earths from Purex Zirflex wastes was found to provide stable and efficient operation.

The joint contractors met with the Union on the Appendix A problem on June 14, 17, 23, 24, 29 and 30. Little, if any, progress was made and no further meetings were scheduled at that time.

Vice President
Chemical Processing Division

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

JUNE 1966

II. ACHIEVEMENTS

A. PRODUCTION PLANNING

1. Production Statistics

a. <u>Percent of Forecast⁽¹⁾ Achieved</u>	<u>June</u>	<u>Calendar Year to Date</u>
Separated plutonium nitrate	111	103
Separated uranium nitrate	112	100
Uranium oxide	103	99
Plutonium metal buttons	136	108
b. <u>Purex</u>	<u>June</u>	<u>May</u>
Thorium nitrate produced (tons thorium)	130	17
Uranium nitrate produced (tons)	0	0
Average production rate during operation (T/D)	5	
Total waste loss (%)		
Thorium	0.5	
Uranium-233	0.8	
On-line efficiency (%)	89	
c. <u>Redox</u>		
Uranium nitrate produced (tons)	241	106
Average production rate during operation (T/D)	10	6
Total waste loss (%)		
Plutonium	0.28	0.69
Uranium	0.19	0.47
On-line efficiency (%)	84	54
d. <u>Uranium Reduction (tons)</u>		
Normal UO ₃ loaded	0	0
Enriched UO ₃ loaded	226	76
Normal UO ₃ approved for storage	0	0
Enriched UO ₃ approved for shipment	206	76
Normal UO ₃ shipped	0	0
Enriched UO ₃ shipped	201	161
Normal UNH backlog	64	74
Enriched UNH backlog	97	76

(1) ISO-213 QUARTERLY PRODUCTION FORECAST

[REDACTED] DECLASSIFIED

DECLASSIFIED

WITH DELETIONS

DECLASSIFIED

ISO-365

DEL

e. Plutonium Metal Processing

	<u>June</u>	<u>May</u>
Waste disposal (grams)	116	369

f. Power

	<u>200-West</u>	<u>200-East</u>
Raw water pumped (gpm)	8 905	5 878
Filtered water pumped (gpm)	938	1 059
Maximum steam generated (lbs/hr)	174 000	114 000
Average steam generated (lbs/hr)	142 000	87 984
Total steam generated (M lbs)	101 948	63 349
Coal consumed (tons)	5 018	3 194

The production of all products essentially equaled or exceeded forecasted quantities, both for the month of June and calendar year to date. Production of plutonium metal buttons exceeded forecast for the six-month period by eight percent due mostly to the recovery of more plutonium from the scrap backlog than had been anticipated.

Manager, Production Planning
Chemical processing division

DECLASSIFIED
WITH DELETIONS

DECLASSIFIED

ISO-365

DEL

2. FISSION PRODUCT DATA (Kilocuries)

INVENTORIES									
HEAD END	002-CR	003-CR	B-PLANT	SSW IN PROCESS	SSW PRODUCT	CASK	CONSIGN- MENTS	RECOVERY	SHIPMENT
0	2,670	0 (1)	1,000	75 (2)	930	0		0	300 (5)
0	0	0 (3)	16,560(6)	240 (4)	0	0		0	0
								134	74 (7)

Sr-90

Pm-147 (Unaged)

Pm-147 (Aged)

Cs-137

- (1) 80 KCi transferred to Semiworks for Phase III process tests.
- (2) 5 KCi waste loss from first Phase III process test.
- (3) 250 KCi transferred to Semiworks for Phase III process tests.
- (4) 10 KCi waste loss from first Phase III process test.
- (5) 390 KCi in HAPO IB-3 shipped to ORNL on 6-10-66.
- (6) Oxalate processing waste loss of 10 KCi.
- (7) STT Casks 45-A and 46 containing 36 KCi and 38 KCi, respectively, were shipped to ORNL on 6-13-66.

DECLASSIFIED

ISO-365

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

DEF

JUNE 1966

II. ACHIEVEMENTS (Continued)

B. PUREX SECTION

1. Operating Continuity

Thorium processing was continued throughout the month. Processing was interrupted several times for brief periods due to flooding of the H-3 column, a power outage, a plugged cartridge in the H-3 column and failure of the HA column feed pump.

2. Processing Operation

a. Purex Processing

Thorium processing continued at capacity factors ranging from 0.65 to 0.72. Several interruptions occurred, however, causing brief downtime periods.

On June 7, 1966 the plant was shut down when the H-3 column flooded and an unsuccessful attempt was made at this time to install a spare J7 cartridge in the H-3 column. The plant was restarted the same day using the regular H-3 cartridge but was forced down again on June 10, 1966 by a power outage. After special flushing, to clean gelatinous organic breakdown material from the H-3 column cartridge plates, the plant resumed processing on June 12, 1966.

The modified spare J-7 cartridge was later installed in the H-3 column during a brief outage on June 23, 1966. A final shutdown for the month was required on June 28, 1966 to replace the H1 (normal HAF) feed pump and DOV jumper to restore flow.

Product quality has been excellent for uranium-233 and satisfactory for thorium. Eight offsite shipments of uranium-233 were made during the month.

3. Equipment Experience

Acid Storage Vessel, 211-A Building

The sulfuric acid carbon steel storage vessel located in 211-A Building failed this month after approximately ten years of service. A replacement vessel was obtained from 100-N Area and installed on a new foundation near the 211-A Building. New associated piping was also installed. Work was performed by the J. A. Jones Company.

Hot Water Tank, 202-A Building

Replacement of the 202-A Building main hot water tank was completed this report period. The old hot water tank had been in service approximately eleven years. The size of the tank is 42 inches in diameter x 12 inches in length and is considered an unfired pressure vessel requiring Third Party Inspection. The replacement tank was fabricated according to code requirements.

Process Agitator

The R-8 process agitator failed mechanically this month when the impellers became loose on the shaft. The agitator was removed from the R-8 vessel, repairs made, and the unit reinstalled. The unit was returned to service and is operating satisfactorily.

Canyon Crane

The 10-ton rotating hook on the canyon east crane failed mechanically when the drive shaft became damaged. The unit was removed and replaced with a reconditioned, contaminated spare.

Tank Circulator, BY Tank Farm

The 10-inch pipe which supplies air to the 101 BY tank circulator ruptured within the tank, allowing the air to escape through the pipe and out through the pipe insulation to the atmosphere. The rupture in the pipe could not be repaired because of high radiation. As an alternate method of repair, a sheetmetal sleeve was installed around the air escape section of the pipe outside of the tank. This installation prevents the air from escaping to the atmosphere. The unit was returned to service and has performed satisfactorily.

Other equipment work at the Purex Plant included:

- a. Replacement and repair of several canyon jumpers.
- b. Installation of a failed, reclaimed nitric acid pump in U Cell with a reconditioned, contaminated spare.

4. Radiation Experience

Iodine-131 emission was 0.12 curies for the month. A small equipment burial from the railroad tunnel was completed with contamination control.

5. Analytical Experience

Counting Room modifications were completed during the month. Major instrument rearrangements have been made, including a place for the new liquid scintillation counter. This added space will provide the laboratory with more flexibility, better work flow and adequate equipment space for support of future work.

DECLASSIFIED

A new method has been established for the determination of thorium with the X-ray fluorescent instrument. The new procedure makes use of the dilumat. This piece of equipment, which automatically dispenses the internal standard used in the analysis, has reduced the analyst's time and has lessened radiation exposure to personnel.

A spectrum stripping method for removing interfering gamma isotopes from multi-channel analyzer scans has been established for the determination of curie values of fission products present in the thorium product samples. This was necessitated because of the interferences of thorium-228 and daughters (mainly bismuth-212, lead-212, and thallium-208) present in the thorium product.

Four new procedures for measuring iron, nickel, chrome, and aluminum, in highly radioactive fission product samples, were placed into service during the month to provide analytical support for the synthetic Zirflex Waste run at the Strontium Semiworks. The iron, nickel, and aluminum procedures require an organic extraction followed by a colorimetric determination. The chromium procedure requires a valence adjustment prior to the colorimetric analysis.

S. S. Smolen
Manager-Purex Section

SG Smolen:gt

DECLASSIFIED

DECLASSIFIED

ISO-365

DEL

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

JUNE 1966

II. ACHIEVEMENTS (Continued)

C. REDOX SECTION

1. Operating Continuity

The Redox plant operated satisfactorily throughout the month and the expected production was achieved. The mechanical and operating efficiencies were 95 and 89 percent respectively and the plant was on line 84 percent of the available time. Except for an unscheduled power outage on 6-10-66 and one short outage on 6-12-66 to replace the D-14 backcycle waste pump, processing downtime was associated primarily with acid flushing of the solvent extraction columns to correct flooding conditions which were encountered at the high processing rates.

The Uranium Oxide plant performed satisfactorily and the expected production was achieved. Because of the thorium run in the Purex plant, production was confined to 94 metal UNH feed from Redox. On June 27, the plant was shut down as scheduled in order to complete several annual maintenance jobs and to give as many employees as possible a summer vacation. Operations are not scheduled to resume until July 18, 1966. Current production forecasts were developed taking into account this extended shutdown period.

2. Processing Operations

a. Redox Processing

The Redox plant performed well and 94 metal processing was conducted at rates varying from 80 to 105 percent. The average for the month was approximately 100 percent. At the high processing rates some flooding in the solvent extraction columns was experienced and on three occasions during the month the columns were shut down for corrective 10 percent acid flushing.

On 6-20-66 high plutonium polymer was detected in two precycle feed batches. Both batches were returned to the H-4 tank for reoxidation and were subsequently processed without difficulty. The high plutonium polymer feed was apparently due to an acid deficient dissolver out.

Approximately twelve tons of UNH and 35 kilograms of plutonium

DECLASSIFIED

production, held in storage because they exceeded shipping specifications in gamma ratio and uranium content respectively, were satisfactorily blended into the current month's production. No out-of-specification material remained in product storage at month end and both product streams were running well within shipping specifications.

The 242-T waste evaporator operated satisfactorily and continuous until 6-20-66. At this time a restriction in the evaporator discharge line developed, and the facility was shutdown. The restriction was subsequently removed, and a new flushing tee for removal of solids within the line was installed. However, the shutdown was extended through month end when the bearings in the 116-TX transfer pump burned out. Startup is not expected before July 1.

During June, the equivalent of 137,156 gallons of underground non-boiling waste storage space was recovered, bringing the total to 1,413,156 gallons since startup on 12-3-65.

In an effort to improve evaporator throughput rates, currently limited by the heat dissipation capability of the underground waste storage tanks, a prototype underground waste tank cooler system was installed. The prototype unit forces the two underground waste concentrate tanks to act as cooling ponds by purging 2400 CFM of atmospheric air through each tank. To date the prototype unit has operated satisfactorily, and initial data collected indicate that the unit is removing about 2 million BTU's per hour.

b. Uranium Oxide Processing

With the Purex plant processing thorium, the UO_3 plant was able to keep up with the processing requirements by using only two calciners. Calciner operation was satisfactory throughout the month, and the expected production was achieved.

Approximately 100,000 gallons of thorium nitrate solution were received from the Purex plant and stored in the 241-WR vault. No major problems with the storage facility were encountered.

At the request of the AEC, a quantity of blended UNH solution was prepared from depleted normal and standard 94 UNH inventories and shipped to the NRD Fuel Section for use in downgrading scrap solution from coproduct fuel element fabrication. The uranium-235 content of the blended UNH approximated that of natural uranium, allowing the solution to be declassified.

Thorium oxide conversion test No. 6 was initiated this month using feed material from the current Purex plant campaign. Higher than expected radiation levels were encountered during the denitration step, forcing an indefinite postponement of the test to allow for additional "cooling" time.

~~SECRET~~

ISO-365

~~SECRET~~

3. Mechanical Experience

a. Redox Plant

Two canyon process pumps were replaced this month, namely: 1) the D-14 backcycle waste pump which developed a leak at the flange on the discharge jumper, 2) the E-5 (2A Column) feed pump because of a low delivery rate at the high processing rates.

Seven canyon cell replacement jumpers were installed including two flexible jumpers fabricated in the Redox Maintenance Shop. Jumper costs from the Facility Engineering Shop hit a long time low in that only five shop jumpers were required.

Inspection of the 200-foot ventilation stacks at T-Plant, U-Plant, and Redox, by the Boedecker Chimney Construction Co., was completed this month and the official report on structural integrity transmitted to the Facilities Engineering Section.

Three new fire detection systems were installed in the Redox plant this month as part of the overall program to bring the Redox plant up to the standard required as a number one fire risk. The new systems were installed in: 1) the 202-S canyon, 2) the 202-S east side electrical cable room and SWP lobby, 3) the 233-S Concentration Building.

b. Uranium Oxide Plant

The major maintenance work accomplished this month included: 1) conversion of J-calciner to 94 UNH service, providing a spare for the two calciners currently equipped to process 94 UNH, 2) inspection and repair of both powder loadcut scales by a commercial scale maintenance firm, 3) complete overhaul of the three depleted powder handling system exhausters, 4) sleeving of approximately 60 percent of the calciner thermowell risers which were found badly corroded, 5) installation of new steam coils in the UA Buffalo unit.

4. Waste Handling and Decontamination

Equipment valued at approximately \$7,000 was received from the processing plants for decontamination, inspection, repair or burial during the month. Equipment valued at approximately \$145,000 was returned to customers, representing a savings of approximately \$104,000 based on the cost of new equipment.

The seventh load of assembled blanket fuel elements from the Shippingport reactor, Shippingport, Pa., arrived on 6-29-66. The cask was unloaded and the fuel elements stored underwater at U-Plant without incident.

The eleventh loading of N-Reactor fuels into the Stanray (S-1) cask was completed on 6-17-66 and departed Hanford on 6-18-66 bound for Nuclear Fuels Services, West Valley, New York.

~~SECRET~~
C-3

DECLASSIFIED

5. Radiation Experience

The drilling of seven vertical monitoring wells (Hatch Drilling Co.) and three leak detection lateral channels (Bartun Drilling Co.) around and beneath the 105-SX tank was started on 6-14-66. This work is being done in preparation for the addition of Redox self-boiling process waste to the 105-SX tank. Maximum radioactive contamination detected on earth samples taken to date has been 10,000 c/m. Redox radiation monitoring personnel are providing coverage for this work.

6. Analytical Experience

The first group of samples to be submitted by the Critical Mass Physics Section, Battelle Northwest Laboratories, was received and analyzed this month. This work is in support of their criticality experiments.

Special characterization analyses were provided on a series of thorium nitrate samples taken during the Th²³²-U²³³ production run currently underway in the Purex plant.

All U²³³ samples received by the laboratory during this first Th²³²-U²³³ run at Purex have been composited and saved. In anticipation of the future needs for several isotopes available in this solution, the material was purified and the isotopes Th²²⁸ and Ra²²⁴, which are not commercially available, separated out. These isotopes were subsequently used to characterize the alpha energy spectra and their equilibrium mixtures, and to obtain a gamma energy calibration of Tl²⁰⁸, a gamma emitter with a 3.1 minute half life. Samples of the isotopes were provided the Purex laboratory for similar calibration work.

The Gilford Absorbance Measuring System was received, installed and calibrated for two plutonium concentration ranges. Its stability is significantly better than other instruments available to the laboratory and will be a significant asset.

R. H. McCallister
Manager - Redox

DECLASSIFIED

ISO-365

DEL

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

JUNE, 1966

II. ACHIEVEMENTS (Continued)

D. PLUTONIUM FINISHING SECTION

1. Operating Continuity

The button line operated a total of twelve days during the month, as regulated by the availability of feed. The plutonium recovery facilities operated continuously except in the case of the incinerator, which continued out of service for rebuilding.

2. Processing Operations

a. Plutonium Processing

Output of the button line was 204 kilograms of plutonium metal, all weapons grade.

Plutonium Processing personnel assisted the recovery effort by the processing of fabrication oil, the grinding of crucible fragments, and the packaging of liquid scrap for shipment to NFS.

No shipments were made to Dow, Rocky Flats, this month. A total of 55.8 kilograms of weapons-grade metal was delivered to Battelle-Northwest.

Nondefense shipments consisted of three deliveries (total 781 grams) of nitrate to GE-Vallecitos, and two deliveries (total 1024 grams) of metal to Parkwell Laboratory and NUMEC.

In addition, the following special deliveries were made: 114 grams of Np-237 metal from the Plutonium Chemistry Laboratory to Battelle-Northwest, and 53.2 grams of Am-241 oxide to the Oak Ridge National Laboratory.

Packaging was completed for the remaining increment of nondefense plutonium oxide (21 kilograms for the Germans) and of metal (8 kilograms for the French) to be delivered under the Euratom contract. Mr. Wilhelm Esser, of Euratom, Karlsruhe, witnessed the sampling and loading of the material.

b. Plutonium Reclamation

Seventy (70) kilograms of plutonium, as nitrate, were delivered to

SECRET

the button line from the recovery facilities during the month.

Sixteen hundred and sixty-two (1662) cans containing thirty-two (32) kilograms of plutonium were processed through the slag and crucible dissolvers.

The incinerator furnace remained out of service. The contents of three (3) boxes of waste was sorted, leached, and repackaged.

Two hundred and sixty-four (264) grams of plutonium were returned to the main process stream from 122,215 liters of aqueous waste processed through the waste treatment facility.

The recovery of plutonium from polystyrene cubes has been discontinued pending evaluation of observed combustion of carbon particles in the off-gas filters.

Seal-off of the Recuplex facility was completed and surveillance routines are in effect.

Processing of scrap materials from Battelle-Northwest, on a selected-lot basis, is continuing in the miscellaneous treatment facilities. Two runs have been completed and a third was in progress at month-end. Data accumulated to date indicates a BNW overstatement. Revised 101's have been issued.

Gram quantities of plutonium in incinerator ash, leached ash, CAX and CAF solutions, from the recovery facility, were transferred to Battelle-Northwest for process investigations.

3. Maintenance

The button line equipment performed satisfactorily except for feed-flow control problems which are scheduled for correction in early July.

The plutonium recovery equipment performed well except in the case of the numerous transfer pumps. Both the Mark II (04) and the Mark III (08) slag and crucible dissolvers operated without maintenance attention, and the Mark I (06) was repaired and is ready for service when needed. In the case of the pumps, the inability of the vendor to supply the proper grade of shaft seals resulted in extra maintenance. A total of thirty-five (35) of the pumps failed, of which thirty-one (31) were repaired and returned to service, and four (two Chempumps and two Deanlines) were buried.

Minor construction forces continued with the rebuilding of the incinerator furnace. They estimate completion for July 29 and are requesting an additional \$10,000 to cover extra costs.

The SU-13 mass spectrometer is out of service at month end, with repairs to the dummy rod removal system, the limit switches, and the vacuum system in progress.

~~SECRET~~ DECLASSIFIED

ISO-365

DEL

4. Radiation Experience

Radiation and contamination control statistics indicated good control.

There were no cases of potential plutonium deposition.

5. Quality Control

Average button impurity (TMI+C)	843 ppm
Average button Pu-240 content (WG) (as determined by neutron count)	6.32 %
Average button density	19.47 g/cc
Button line recycle to Reclamation	7.5 kg
Average impurities in Reclamation output (TMI)	1,535 ppm

6. Analytical Control

Number of samples	3,077
Number of determinations	5,471

The backlog of work for the mass spectrographs remains high because of mechanical problems with the instruments and demands of the Thoria program.

Manager
Plutonium Finishing

DECLASSIFIED

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

JUNE 1966

II. ACHIEVEMENTS (Continued)

E. FINANCIAL CONTROLS OPERATION

1. Budgets

Preclosing expenditure through June 30, 1966 compared with the AEC FY 1966 Financial Plan is given below in thousands:

	<u>02</u> <u>Production</u>	<u>02</u> <u>R&D</u>	<u>03 Shutdown</u> <u>and Standby</u>	<u>Isotopes</u>	<u>Total</u> <u>Operating</u>
Financial Plan 1/1/66 through 6/30/66	\$11,673	\$971	\$469	\$1,135	\$14,248
Less Actual Cost:					
Total through May	9,537	747	346	936	11,566
June*	<u>2,120</u>	<u>209</u>	<u>17</u>	<u>196</u>	<u>2,542</u>
Total Through June	<u>\$11,657</u>	<u>\$956</u>	<u>\$363</u>	<u>\$1,132</u>	<u>\$14,108</u>
Percent of Financial Plan Used	<u>99.86</u>	<u>98.46</u>	<u>77.40**</u>	<u>99.74</u>	<u>99.02</u>

*Preliminary Figures

**Shutdown and layaway of Recuplex and Weapons Fabrication facilities within the 234-5 Building were accomplished substantially below estimated costs.

2. General Accounting

As of June 30, 1966, there were thirteen active projects. Following is a summary of current status of projects:

	<u>In Thousands</u>
Total Authorized Funds and Transferred	
Capital Property Authorizations	\$4,825
Total Cost-to-Date	2,836
Commitments & Open Work Releases	401
Unencumbered Balance	1,588
Costs Charged During June, 1966	125

During June, one Work Authority was received from the AEC: Directive No. AEC-254, Work Authority No. I-2, Project CAC-169, Sludge Removal and Waste Transfer - 200 East Area, authorizing transfer of capital

DECLASSIFIED

ISO-365

100

equipment, amount \$23,180.

Construction Completion and Cost Closing Statements were issued during June on the following projects:

<u>Project No.</u>	<u>Project Title</u>	<u>Total Cost</u>
CAC-981	Fission Product Packaging Facility - B-Plant	\$ 50,000
CGC-132	Prototype & Mock-Up Waste Management Packaging Equipment	286,970
CGC-147	Log Radiation Monitors - 200 Areas	44,550
CAC-152	Purex Analytical Laboratory Additions	2,148
CAC-159	Geological and Hydrological Wells - FY 1965	2,472
CAC-162	B-Plant - Semiworks and Transfer System - 200 East Area	2,246
CGC-180	Pu Buy-Back Facility - 234-5 Building	179,907

During June the AR activity was as follows:

AR-66030	Supplemented to Include all Monitors in the Cells in Phase I	\$ 17,000
----------	---	-----------

Directive EQT-039, Modification 4 increased FY 1966 obligation for Capital Equipment not related to Construction to \$1,607,950.

The Isochem PAC budget for FY 1966 on General Plant work orders was reduced to \$125,000.

3. Business Information Systems

The feasibility study, discussed in last month's report for implementation of the proposed Isochem laboratory and process control system, has received preliminary approval from RLOO-AEC. Representatives of the RLOO-AEC toured the Redox Laboratory facility to acquire background knowledge and to become familiar with the type and way data will be processed.

A formal purchase order has been issued to the equipment manufacturer specifying lease agreement terms; currently, the estimated delivery date is one year. The vendor has been requested to assist in program definition and software development; this assistance is particularly applicable for the input/output routines for linking the data network with the central processor located in the Purex Exclusion Area.

Detailed work has been started on the system's definition. Calculation of transmission and throughput times are being derived to evaluate

[REDACTED]

the system's in use time.

The input to the ROX System (Redox Laboratory Communication System) continues to be edited by systems specialists before each weekly processing; output reports are reviewed weekly with Redox Processing personnel. Modifications have been made to log of calculations. A different sorting routine within drum storage eliminates double processing when a large number of cards are submitted.

RA Cornell

Manager - Financial Controls

DECLASSIFIED

ISO-365

DEL

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

JUNE 1966

II. ACHIEVEMENTS (Continued)

F. FACILITIES ENGINEERING SECTION

1. Purex

a. Purex Specialty Dissolver

The specialty dissolver will be located in the F-3 canyon position, primarily due to cell sump nuclear safety considerations. A reasonable cell arrangement for the specialty dissolver, the solution storage tank, and the relocated acid receiver tank, TK-F3 has been determined.

b. Acid Fractionator Building Lighting

The existing lighting fixtures have been damaged by corrosion making relamping impossible. Maintenance and operation of the facility is costly and hazardous without lighting. A new fixture has been designed for this facility. The fixture, as designed, can be relamped from the outside. Materials in contact with the corrosive atmosphere are stainless steel, glass, and neoprene, all of which resist corrosion in a nitric acid atmosphere.

c. IAP-606 - Purex Process Condensate Crib, 216-A-38

A project proposal requesting \$225,000 to provide a replacement crib for Purex process condensate was transmitted to RLOO on June 22, 1966.

d. Purex Input Measurement Facility - D-Cell

A comment draft of the project proposal was prepared to provide an in-line sample and analytical facility, capable of analyzing large volumes of high radioactivity dissolver solutions. The estimated cost is \$100,000.

e. IAP-605 - Purex Analytical Laboratory Modifications

Preparation of a project proposal draft was prepared for modifications to the Purex Analytical Laboratory. This project would provide a new hot laboratory room within the existing building and building additions for storage space and offices.

f. Purex Spare Concentrator Reboiler

The Concentrator Reboiler was received on the plant in good condition. Testing of this vessel is in progress.

2. Redox

a. Waste Management Analytical Laboratories - 222-S (ICP-604)

Design Criteria - Redox Analytical Laboratory Modifications for Waste Management, was approved by the Atomic Energy Commission and issued.

3. Waste Management

a. Waste Tank Evaluation

The field portion of the Illinois Institute of Technology (IIT) contract was started on June 13 and completed on June 20, 1966. The field work consisted of drilling horizontally from two landings within caisson #3 near SX-100 tank and from two landings within caisson #2 near A-106 tank. Soil samples, temperatures, and penetration tests taken every foot will be used to reconstruct the samples at IIT's soil laboratory. The mechanical properties data (i.e. modulus, triaxial shear, etc.) will be used by the consultant to make a judgment as to lateral earth pressures that can be expected around Hanford waste tanks. This information will then be used in the analysis of deformation and stress by computer methods.

b. CAC-176 - Rev. 2 - Second In-Tank Waste Solidification System-200 East Area

Preparation of a project proposal revision requesting total project funds has been initiated.

c. ICP-602 - Preparation of Waste Tank - 241-SX-105 for Redox Self-Boiling Waste

A letter advising RLOO that four new risers would be provided by the project was transmitted on June 28, 1966.

d. CAC-181 - Rev. 2 - B-Plant Modification for FPCE - Waste Management Integrated Facilities

The project proposal revision requesting interim funds in the amount of \$735,000 was transmitted to RLOO on May 6, 1966. This revision requested authorization of funds for total design and start of construction and procurement. RLOO has approved the proposal revision and forwarded it to Headquarters for release of funds. Directive AEC-265, Mod. 2, issued June 16, 1966, increased funds for design for a total of \$125,000.

~~SECRET~~ CLASSIFIED

ISO-365

DEI

e. Modifications of 219-S Facility for Cask Load-In

A project proposal requesting authorization of total project funds in the amount of \$120,000 was ready for approval. Approval was held in abeyance pending reappraisal by Battelle Northwest of their need to return high level wastes during the next 15 months.

f. In-Tank Solidification - Third ITS Unit

The detail design criteria for the third ITS system to be installed in the 200 West Area was transmitted to the AEC for approval.

4. General

a. Plant Chimneys

The contractor's inspection reports for all 200 East and West Area power and process plant chimneys, with the exception of the Purex stack, were reviewed and recommendations were presented. Inspection of the Purex stack will be deferred until a plant shutdown can be arranged.

b. Floodlighting - 241-A Tank Farm

Design has been completed to increase the floodlights in the 241-A tank farm. The existing fixture will be replaced with a new fixture employing a "Lucalox" lamp and an additional pole with four new fixtures will be added. The "Lucalox" lamp is a new light source which gives five times the light output per watt as the filament lamps.

Manager, Facilities Engineering Section

~~SECRET~~

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

JUNE 1966

II. ACHIEVEMENTS (Continued)

G. RESEARCH AND ENGINEERING SECTION

1. Separations Process Engineering

Purex

a. Thoria Dissolution and Feed Preparation

The thoria dissolution flowsheet was modified on June 2, 1966, to include a second addition of fluoride ion during each dissolution cycle. The first addition, to 0.025 M F⁻, is complexed with aluminum nitrate. After a two-hour interval of dissolving, a second 0.025 M addition is made which is complexed with the dissolved thorium. After the dissolution is completed, sufficient additional aluminum nitrate is added to bring the Al/F mole ratio up to 4. The effect of this change on the overall thoria dissolution rate has not been determined. A general improvement in dissolver performance and an observed reduction in the frequency that heel removal cuts are necessary at least partly results from increased experience in the utilization of the dissolver circulators.

During a seven-day period of good dissolver operation, the processing rate averaged 5.3 tons of thorium per day, total for two dissolvers. In terms of instantaneous dissolution rate during the dissolving portion of the total cycle, typical good rates of 400 pounds of thorium per hour have been attained, compared to at least 500 pounds per hour expected on the basis of semiworks investigations. The overall dissolver processing rate is limited by the thoria charge size, which is limited, in turn, by the volume of nitric acid that can be added for a cut. The addition of more than 2,800 gallons of HNO₃ to a dissolver results in flooding of the dissolver downdraft condenser tower when the air lifters are operating at normal air flow rates.

Iron analyses to date indicate, as a worst case, average coil corrosion rates in the dissolvers and in the Acid Boil-Off Tank C3 of about 5 mils/month. This value assumes that all the corrosion iron found comes from the vessel coils, and the dissolver and C3 vessel coil corrosion rates are equal. An additional data is obtained, more refined corrosion estimates will be made.

~~SECRET~~
G-1

DECLASSIFIED

DECLASSIFIED

ISO-365

DEL

On June 12, the condensate from the Acid Boil-Off Tank (TK-C3) was rerouted from the Vacuum Fractionator feed tank (TK-F3) to the LWW Concentrator feed (TK-F10). Prior to this change, the condensate stream had been introducing excessive quantities of fission products and protactinium in the recovered acid system. With the change, most of the acid will still be recovered, and the fission product content of the product acid will be reduced.

b. Solvent Extraction of Th-U233

Compared to the originally published flowsheet for thorium uranium solvent extraction (RL-SEP-650, "Process Bases and Specifications - Thorium U-233 Separations at the Purex Plant," dated July 26, 1965), variations have been required for the actual processing operation because:

- 1) The solvent-extraction feed (HAF) has been slightly dilute (1.4 M Th vice 1.5 M);
- 2) Dissolver capacity limitations have required that the solvent-extraction system be operated close to minimum practicable rates;
- 3) The acidities of the 2A and 3A Column extraction sections have been increased slightly in order to reduce uranium losses to the aqueous raffinates; and
- 4) The H_3PO_4 concentration in the 2D Column intermediate scrub (2DIS) has been increased three fold, to improve decontamination from protactinium.

The revised flowsheet is defined below. Also tabulated below are typical solvent-extraction waste losses and preliminary estimates of arithmetic decontamination factors. The accuracy of the DF values is limited at this time by gamma energy analytical problems associated with the presence of isotopes not encountered during normal U-Pu processing.

PUREX THORIUM FLOWSHEET

<u>Stream</u>	<u>Composition</u>		<u>Temp.* °C</u>	<u>Flow</u>
	<u>HNO₃ M</u>	<u>Th M</u>		
<u>Co-Decontamination & Partition Cycle</u>				
HAF	-0.10	1.40	30	100
HAX	Trace	-	30	800
HAS	1.0	-	(0.01 M H ₃ PO ₄)	120
HAO	0.06	0.113		210
HAX-HNO ₃	12.2	-		35
1BX	0.2	-		590
1BXF	0.179	0.152	30	1080
1BS	Trace	-	30	210
1CX	0.01	-		525
<u>Second Uranium Cycle</u>				
2AF	0.23	-	40	160
2AF-HNO ₃	12.2	-		35.1
2AX	Trace	-	30	57.0
2AS	0.3	-		19.9
2BX	0.01	-		37.0
<u>Third Uranium Cycle</u>				
3AF	0.07	-	30	42.1
3AF-HNO ₃	12.2	-		12.0
3AX	Trace	-	30	13.3
3AS	0.10	--		6.4
3BX	0.01	-		10.9
<u>Final Uranium Cycle (Vycor Bed, Cation Bed, Concentration)</u>				
Feed - 3BU	0.02			10.9
<u>Second Thorium Cycle</u>				
2DF-Fe	-	-(2.0 M Fe(SO ₃ NH ₂) ₂)		0.21
2DF	1.10	0.78	30	180
2DX	0.10	-	30	990
2DIS	5.0	-(0.18 M H ₃ PO ₄)		35
2DS	0	-		84
2EX	0.01	-		480
2TC	1.18	1.75		80

*Temperature ambient, unless otherwise noted.

~~SECRET~~

G-3

DECLASSIFIED

DECLASSIFIED

ISO-365

APPROXIMATE ARITHMETIC DECONTAMINATION FACTORS*

<u>Thorium</u>				
	<u>Pa</u>	<u>ZrNb</u>	<u>Ru</u>	<u>U</u>
Co-Decontamination & Partition Cycle	1.2×10^3	1.2×10^3	3×10^2	5×10^3
2nd Cycle	4	6	3	-
3rd Cycle	-	-	-	-
Cation Bed	-	-	-	-
Over-All	5×10^3	7×10^3	9×10^2	5×10^3
<u>Uranium-233</u>				
	<u>Pa</u>	<u>ZrNb</u>	<u>Ru</u>	<u>Th</u>
Co-Decontamination & Partition Cycle	2×10^5	3×10^7	4×10^2	2×10^3
2nd Cycle	70	15	2×10^3	35
3rd Cycle	>2	>4	>1.5	35
Cation Bed	-	-	-	>2
Over-All	$>3 \times 10^6$	$>2 \times 10^9$	$>1.2 \times 10^6$	$>5 \times 10^6$

* Values should be considered preliminary. Based on analytical methods that required further verification. See text.

SOLVENT-EXTRACTION WASTE LOSSES AND RECYCLE

<u>Column</u>	<u>Stream</u>	<u>Waste Losses, Percent</u>	
		<u>Th</u>	<u>U-233</u>
HA	HAW	0.25	0.1
LBX	LBXT	-	8.8 (Recycle)
	LBV	0.07	-
LBX	LBSU	17.0 (Recycle)	8.8 (Recycle)
	LBT	-	0.03
1C	1CW	-	0.5
2A	2AW	-	0.08
2B	2BW	-	0.07 (Recycle)
3A	3AW	-	0.015
3B	3BW	-	0.001 (Recycle)
2D	2DW	0.2	-
2E	2EW	0.05	-

DECLASSIFIED

ISO-365

DEL

Some solvent-extraction operating problems have been associated with the presence of solids, presumably thorium dibutyl phosphate (and/or thorium phosphate), in the processing equipment. The throughput capacity of the 1C Column (T-H3), marginal throughout the campaign, was further reduced by the accumulation of solids on the cartridge plates. Performance was improved by acid flushing on June 11, but on June 23, as a result of further flooding, the column cartridge was replaced with an available spare with improved stability characteristics. The replacement cartridge should permit operation with higher aqueous-to-organic flow ratio and, therefore, lower U-233 losses to the LCW stream.

When the 1C Column (T-H3) cartridge was removed, a section of plates, about 1/3 of the column, just below the center of the cartridge, was found to be almost plugged with a white gelatinous solid. Samples were sent to the Separations Chemistry Laboratory for identification and dissolution studies. The solids have the appearance and consistency of laboratory prepared thorium dibutyl phosphate. White solids similar to those observed in the LCW stream have also been observed in the 2BW and 2EW streams. The 2B, 2D, and 2E Columns have also shown periods of unstable operation believed to be the result of solids formation, as in the 1C Column. The temperatures of the HAF and 3AF streams have been reduced from 40° C to 30° C to reduce the possibility of thorium dibutyl phosphate formation. During the shutdown to replace the 1C Column cartridge, the 2D and 2E Columns were acid-flushed to improve their operability.

c. Solvent Treatment

Solvent quality has been excellent throughout the campaign, except during relatively short periods of loss of operational control of the No. 2 Solvent Treatment System. Current typical plutonium retention values for the 100 and 200 streams (recovered solvent for the No. 1 and No. 2 treatment systems, respectively) are compared to typical values experienced during normal U-Pu processing, in the tabulation below. The relatively high values shown for current 200 (compared to 100) apparently result from the problems of operational control.

	Pu Retention, Counts/min-gal.	
	<u>100</u>	<u>200</u>
Th Processing Campaign	2.5×10^5	$5-10 \times 10^5$
Normal U-Pu	$1-2 \times 10^7$	1×10^6

Loss of operational control of the No. 2 Solvent Treatment System has been associated with (a) internal recycle of solvent ("spinning") during a period of shutdown of the Second Thorium Cycle, and (b) attempts to reduce the HNO₃ concentration of the 20S stream. During the "spinning" operation, the return of the relatively high-acid 200 to the 2EW solvent washer (TK-R1)

DECLASSIFIED

~~DECLASSIFIED~~

ISO-365

~~SECRET~~

reduced the pH of the carbonate wash, apparently resulting in severe emulsification in the washer. The attempts to reduce 20S acidity two-fold, during normal operation of the solvent-extraction system, were intended to reduce the acidity of the 200 (and 2DX), thereby improving decontamination performance of the 2D Column (Second Thorium Cycle). However, emulsification in the 20 Column (T-R1) apparently resulted, and a return to normal 20S acidity was necessary. As a result of these instability problems, MnO₂ solids were observed in samples of recycle 20S toward the end of the month.

The overall solvent losses for the month of June averaged 411 gallons per day, as compared to 210 gallons per day average during previous experience with normal paraffin hydrocarbon diluent. In an attempt to reduce the losses from the 2EW solvent washer (TK-R1), the operating level in this vessel was increased. This change resulted in an approximately 10 percent reduction in losses.

d. U-233 Product Quality

The uranium-233 (UNH) product quality has generally been within all established goals. The only quality problem of practical significance has resulted from the pick-up of residual U-238 by the process streams. Thus, the first approximately 9.6 kilograms of U-233 product contained greater than the goal limit of 3.9 percent U-238. During the production of approximately the next 110 kilograms, the U-238 content of all U-233 product was within the goal limit and next batch progressively decreased to about 0.7 percent, the "background" level expected on the basis of the U-238 content of the thorium originally charged to the reactors.

For approximately 15 kilograms of the U-233 product, the boron concentration reached 2 ppm, compared to the goal limit of 1 ppm. However, because of the overall very low impurity content, this increased boron concentration was considered acceptable by the customer. On June 15, the Vycor glass bed, installed in the 3BU stream for protactinium removal, was bypassed. Subsequently, the boron content of the U-233 returned to <1 ppm. Also, the sodium and silicon contents of the product were reduced approximately by factors of 5 and 10, respectively, while the protactinium content was not affected. With this change, the approximate total metallic impurity content dropped from /400 to /250 parts per million parts of U-233, compared to the goal limit of 3,914 ppm. Other typical U-233 product quality data are shown in the following table:

~~SECRET~~
G-6

U-233 PRODUCT QUALITY

<u>Uranium Isotopes</u>	232	233	234	235	236	238
Concentration	ppm	Percent	Percent	Percent	Percent	Percent
Goal Level	8	95	2.5	0.5	0.1	3.9
Typical	4.6	97.5	1.0	0.02	0.01	1.5

<u>Other Radio-chemical Impurities</u>	Pu	Th	Np	ZrNb 95	Ru ¹⁰³ & RuRh ¹⁰⁶	Pa	Radia- tion*
Measurement	ppm	ppm	ppm	uCi/g	uCi/g	uCi/g	mr/hr
Goal Level (Max.)	1000	1000	300	2	2	8	-
Typical	1	100	100	0.1	0.5	5	30 to 50

* Surface of bare 3-liter bottle.

e. Thorium Product Quality

Currently available analytical results indicate that the thorium product contains higher-than-expected concentrations of protactinium, zirconium-niobium and ruthenium. Accurate evaluation, however, has been hampered by analytical problems resulting from inference by Th-234, Th-228 and daughter activities. All product has been acceptable for transport to storage via tank trailer. Radiation readings on the surface of the 3,000 gallon trailer have ranged from 50 to 250 mr/hour. The bulk of the readings have been near 50. Metallic impurities have averaged about one-third of goal levels, and the uranium contamination is also below goal level.

2. Fission Products Process Engineering

a. Process Flowsheets

The proposed waste management solvent extraction flowsheet (B-Plant flowsheet) was demonstrated to be effective with Zirflex Acid Waste (ZAW) when using an HEDTA complexant. The tests were carried out in the Semiworks where product recoveries for promethium, cerium and strontium were 75%, 93% and 95%, respectively. Americium and curium were also followed through the test; product recoveries were low, probably about 55%. Since the actual B-Plant equipment will be somewhat more efficient than the Semiworks facility, these recoveries are considered satisfactory. As can be seen in the following table, decontamination factors for the major metal impurities in the product streams were similar to the flowsheet performance reported on Purex Acid Waste (PAW) in the October, 1965 report.

DECLASSIFIED

ISO-365

DEL

Metal Impurity	Decontamination Factors	
	Strontium Fraction	Rare-Earth Fraction
Fe	>100,000	4,000
Pb	50	20
Al	> 13,000	120
U	> 120	> 36
Pu	> 320	> 100
Na	450	150
Ca	5.4	1.2
Cr	> 4,000	1,200
Ce	11,000	-
Pm	800	-
Sr	-	100
Zr-Nb	125	> 7.5

b. Underground Waste Storage Tank Cooler

The 242-T evaporator facility was altered from a batch to a continuous recycle operation (described in the December, 1965, report) to take advantage of the increased capacity and decreased down time inherent in this type of operation. The essence of the system, however, requires the evaporator bottom stream to cool and deposit solids before the supernatant solution is recycled and mixed with fresh feed to the evaporator. It was found that as experience and improvements allowed increases in the evaporator throughput rates, the heat dissipation capability of the underground waste tanks became capacity limiting.

A prototype underground waste tank cooler system was built in which the two underground waste concentrate tanks act as cooling ponds. Air is drawn through the vapor space of each tank at 2,400 cubic feet per minute. This system consists simply of a series arrangement of a blower, steam heater, and a bank of CWS filters; the steam heater prevents condensation in the filters.

The unit has been operating satisfactorily since start-up (June 14) with heat and water removal rates from one tank averaging 7.5×10^5 BTU/hour and 1.1 GPM, respectively, while the heat and water removal rates from the other tank have been oscillating between 2 and 6×10^5 BTU/hour and between 0.25 and 0.9 GPM, respectively. The reason for the erratic behavior in the latter tank has not yet been determined.

After two weeks' operation, radiation activity levels throughout the duct work, heater box and filter unit are only slightly above background. This activity has been determined to be Cs-137.

c. Cesium Load-Out

As reported last month, loading the cesium ion exchange shipping casks with thermally hot feed to prevent precipitation and screen plugging resulted in low loadings as would be expected. It has since been demonstrated that a one-to-one dilution of the feed with water will allow the shipping casks to be fully loaded at reduced temperatures without precipitation or plugging problems. Water dilution is considered an interim solution to the loading problem because of the undesirable increase in nonboiling waste volume.

3. Plutonium Process Engineering

a. Critical Mass Control

Duct work associated with the 234-5 Building exhaust ventilation system serving the calcining portion of the plutonium processing hood (9-B) was estimated to contain 3 to 4 kilograms of plutonium during a gamma survey in May. Cleanout of the duct work during the month of June yielded approximately 1,000 grams. Use of vibrational techniques on the duct work accounted for another 500 grams being removed from the filter boxes. A later survey indicated the possible presence of an additional 500 grams, although much of the duct work had been visually observed to be clean.

Cleanout of the 06 model continuous slag and crucible dissolver resulted in the recovery of approximately 2,025 grams of plutonium. This recovery is based on segregated processing through the Miscellaneous Treatment Facility. The hold-up in the dissolver had been estimated by means of a portable gamma energy analyzer to be 500 to 3,000 grams of plutonium.

b. Americium Purification

ISO-322, "Americium Purification Flowsheet #2 - DCEHPA Extraction," was issued as a basis for the design of facilities to be installed in hoods WT-3, WT-4, and WT-5 in the 242-Z Building. Concentration of the dilute americium nitrate crude solution by a factor of 10 is incorporated to reduce the number of extraction and strip batch contacts necessary. Detailed design of the facilities is in progress by the Hanford Engineering Services Division of the Vitro Corporation of America.

c. Thorium Oxide Test

Conversion of virgin thorium nitrate to thorium oxide by a modified sol-gel process has been conducted on a test basis in one of the agitated electrically-heated batch denitration pots at the 224-U Building during the last six months. Conditions for the five runs completed were essentially as outlined in RL-SEP-775, "Test Conversion of Thorium Nitrate to Thorium Oxide - 224-U Building."

DECLASSIFIED

ISO-365

Crystalline thorium nitrate was added to the denitration pot in run 1. Approximately 2 M thorium nitrate solution was used in the other runs. The solution in run 2 was added to the pot without any treatment, while the solutions in the last three runs were contacted with successively larger amounts of Purex solvent (30% TBP-soltrol). Foaming occurred during the concentration operation at a solution temperature of 140 - 150 C in runs which involved solvent contacts. Steam denitration proceeded without difficulty in all runs.

Satisfactory sols (>95% dispersion) were prepared in all runs when the steam denitrated oxide was transferred hot from the denitration pot to the sol tank. Approximately 1/3 of the oxide in run 5 was allowed to cool for 36 hours before attempting sol preparation. Dispersion dropped to ~4 percent. The oxide was reheated to 225 C in an attempt to regenerate its sol formation characteristics, but no increase in dispersion resulted.

Agitation during the final stages of the drying operation was varied on each run. The dried product from runs 1 and 2 contained a high percentage of fines. Product from runs 3, 3-A, and 5 contained some large granular particles.

Samples of the dried gel were transferred to the Douglas United Nuclear Fuels Engineering Analytical Laboratory for evaluation. Dense oxide was prepared by the laboratory for the evaluation. On the basis of results obtained at three test temperatures for runs 1 and 2, 1200 C was determined to be the optimum temperature to provide the desired range of values for particle density, compacted density, dissolution rate, surface area, off-gas volume, moisture content, and loss on ignition. Evaluation of samples from runs 3, 3-A, and 5 has not been completed, but the data presently available indicates that the batch denitration pots can be used to prepare dried gel suitable for conversion to dense oxide.

One hundred (100) gallons of thorium nitrate from the present Purex run have been diverted to the test facilities. Slight foaming occurred at 140 - 150 C during concentration. Completion of the test operations was deferred when high exposure rates were encountered due to the quantities of Pa-233 and Th-234 present.

4. Separations Chemistry Laboratory

a. Process Development and Improvement

Aluminum Dissolution Rates

Dissolution rates for aluminum have been determined in solutions containing excess caustic at two different temperatures.

At 80 C and 103 C the dissolution rate in Redox tank farm nitrate waste (0.5 M excess caustic) was 4.1 and 10.5 mg/cm²/min., respectively. In a prepared solution containing 1.5 M excess caustic, which is more representative of standard plant operation, the rates of dissolution at 80 C and 103 C were 11.3 and 21.0 mg/cm²/min., respectively.

Identification of Extraneous Material in Process Samples

Small quantities of entrained organic material present in the U-233 product stream from the Purex Plant were identified, by gas chromatographic techniques, as tributyl phosphate.

Samples of a white material removed from plate sections of the Purex extraction columns were identified, by differential thermal analysis, as predominantly thorium dibutyl phosphate. Contacting the solids with 10 M HNO₃ resulted in visible disintegration; this behavior indicates the presence of another constituent - perhaps thorium phosphate. The formation of thorium phosphate was demonstrated in the laboratory. When phosphoric acid was added to the scrub solution of a simulated thorium extraction column, precipitates were observed in the aqueous phase in the scrub section.

b. Analytical Development and Improvement

Calorimetric Rhodium and Palladium Method

A colorimetric analytical method for rhodium and palladium in the 5-30 microgram range has been demonstrated on standard solutions. The method uses N, N bis (3-dimethylaminopropyl) dithio-oxamide. The method has not yet been successfully applied to process samples.

Redox Gamma Detector Systems

The calibrations of the Redox "T" Detector (an anticoincidence guarded, NaI(Tl) well, gamma scintillation detector) have been entered into the MASMAT (Master Matrix) program. Data from this detector for fifty-three isotopes in ninety-one photopeaks and in three counting geometries can now be analyzed on the 7090 computer.

The "L" detector system (3 x 3 inch NaI(Tl) "L" detector and No. 216 analyzer) calibrations at Redox have been updated in the 7090 MASMAT (Master Matrix) program to include all calibrations of additional geometries for isotopes already calibrated in part and for all recalibrations. New isotopic calibrations have not yet been entered. The revised MASMAT contains forty-one isotopes in sixty-five photopeaks and ten counting geometries.

The "N" detector system (3 x 3 inch NaI(Tl) "N" detector and RIDL model 34-12b analyzer) calibrations at Redox have been updated in the 7090 MASMAT (Master Matrix) program to include all data

accumulated to date. This system is now calibrated for fifty-one isotopes in eighty-seven photopeaks and nine counting geometries. Input to this program consisted of 294 inches of IBM punched cards. This system will be ready for use as soon as the memory contents of the master matrices are proofread and corrected for detected errors.

Thorium by Gamma Energy Analyses

The daughters of Th-228 include gamma emitters that interfere with the measurement of radioactive impurities in thorium solutions by gamma energy analysis. A technique has been devised to overcome this interference by using a standard source of Th-228 as a reference. The unknown sample would be gamma analyzed using a 20 Kev/channel energy response. From this the amount of Tl-208 could be determined at the 2.615 or 3.198 Mev peaks. The amount determined would be related to count time for the same geometry and count accumulation of Tl-208 in the Th-228 (Tl-208 is one of the short-lived daughters in equilibrium with Th-228). This amount would be counted into the analyzer memory in the negative mode with the normal 10 Kev/channel response. The routine positive mode count of the unknown sample would then be made, and the net spectrum recorded would be used for the routine spectral analysis.

5. Plutonium Chemistry Laboratory

a. Neptunium Metal Preparation for BNW Metallurgical Studies

Approximately 3.5 liters of nitrate solution containing 123 grams of neptunium were processed to the metal. This conversion was accomplished by precipitating Np(IV) oxalate from solution; filtering, drying, and calcining the cake to NpO₂. The NpO₂ was then hydrofluorinated to NpF₄ and bomb-reduced to the metal with calcium. The button weighed 114 grams for a yield of 93%. Wastes were processed to the nitrate and will be returned to Purex after analyses for Np content.

After vacuum melting by Battelle, the impurities (expressed in ppm) were as follows: Pu, 400; U, 275; C, 164; Fe + Cr + Ni, 53; Al + Si, 51.

b. Plutonium Metal Fire Studies

Nine additional extinguishment tests were completed. Copper powder was unsuccessful (as contrasted with an earlier successful test). Lead metal was found to be undesirable due to a tendency to spew and erupt. Other tests were conducted with the burning plutonium in contact with a stainless steel plate. No alloying or other adverse effects were seen.

DEL

c. Thermal Concentration of Americium Crude Solution

A large-scale concentration run was made in the laboratory concentrator (9 liters capacity). A total of 38 liters of crude feed containing 8 grams of americium from the W-14 column product solution were concentrated by more than a factor of 10. Solution foaming occurred during boiling. The flowsheet was successfully modified by the addition of 150 ppm Antifoam B to the crude feed, and sparging the boiling solution with 2 to 8 CFH of air. Information was obtained on the physical constants of the crude (i.e., boiling point, etc.). Radiation exposure data for the handling of large quantities of americium were also obtained.

The americium concentrate was found to be compatible with the americium purification flowsheet. No emulsification tendency was found. The use of antifoam was not expected to affect the solvent extraction step, since Antifoam B is destroyed by heat or contact with concentrated acids.

d. Polystyrene - PuO₂ Cube Burning

The polystyrene-PuO₂ cubes used in critical mass studies performed by BNW are burned as the first step in recovering the plutonium. The production equipment for this step has been plagued with crucible breakage problems. Ceramic crucibles have failed to withstand the thermal shock; and metal crucibles made of stainless steel and Hastelloy X show signs of atmospheric corrosion.

One crucible of MgO coated on the outside with nickel aluminide was partially successful. Although the crucible cracked along its side, it did remain intact.

Other metal crucibles will be tested - one fabricated from Inconel 600 and another fabricated from Incalloy 800. Both of these metals are recommended for high temperature work.

R. E. Tenkinson

Manager
Research and Engineering

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

JUNE 1966

II. ACHIEVEMENTS (Continued)

H. EMPLOYEE RELATIONS

1. Education and Training

A Nuclear Safety Orientation Course has been arranged for presentation in early July to the Summer Technical Employees and new employees on the Technical Graduate and Business Training Programs to introduce nuclear safety to these people. The course will be presented in cooperation with Battelle Northwest Critical Mass Laboratories Personnel.

2. Technical Recruiting

All answers to open offers to new college graduates have been received. Of 58 offers made, we received 16 acceptances including two business graduates on the Financial Training Program.

Two plant visits were made by experienced personnel during June. However, at this point, no definite decision has been made as to whether an offer will be extended to these personnel.

Isochem, Battelle Northwest, and DUN represented the Hanford Atomic Project at the Richard B. Clarke Associates Minority Group Employment Center in New York City during the month. Approximately 50 Negro college graduates were interviewed during the two days at the Center. It is expected that Isochem will make at least one offer to a Negro college graduate with a degree in Chemistry. Most of the college graduates present had degrees in Business and Liberal Arts, with very few technical degrees represented.

3. Union Relations

There were three grievances filed during the month of June, of which one was processed at the step 2 level.

DECLASSIFIED

3. Union Relations (Continued)

The joint contractors met with the Union on the Appendix A problem on June 14, 17, 23, 24, 29 and 30. The Federal Mediation and Conciliation Service was in attendance at all meetings. Little, if any, progress was made; and, on June 30, the Union submitted a proposal which retained the 85 per cent of Davis-Bacon rate for crafts and asked for 6 1/2 per cent of payroll increase for other classifications. At this point, the FMCS stated that they had been unable to find any grounds for a solution to the problem, and no further meetings were scheduled at that time. Later, however, the FMCS did schedule a meeting for the week of July 4. In the meantime, ITT met separately with the Union, but apparently this yielded no lead to a solution.

4. Public information activities during the month of June were largely concentrated in the areas of promoting Isochem speakers relating progress and status of various Company programs. Seven news releases were distributed to local, regional, trade, science writers, and technical publications during the month. Isochem speakers represented the Company in three speaking engagements.

Isochem's representatives making presentations at the Regional American Chemical Society Meeting in Vancouver, B.C. were publicized. Photos and story received good placement in local media and were also released to Vancouver newspapers and other Northwest media. A Hanford speaker at the Nuclear Society meeting in Denver was publicized in releases which were distributed regionally and to the Denver Colorado media. A release about the FPCE Plant being described to the Nuclear Congress at Rome, Italy was given general and technical press distribution.

The story on nuclear pioneering at Redox Plant, successful completion of the first production run of zircaloy-clad reactor fuels, received very good placement and treatment in the Tri-City Herald. It was also released to regional, local, and technical media. The successful separation of uranium-233 by Purex was publicized in local media, and the story was released to metropolitan newspapers throughout the Northwest and to atomic energy and chemical and engineering publications.

The appointment of new Isochem Director F. A. Hopkins was released to local, regional, industry, and business publications. As a result of the publicity given the talk by S. F. Beard on May 25 at the sixth grade classes in Jefferson School in Richland, the parent firm, U. S. Rubber Company, requested additional information and photographs which were supplied for publication in the internal-external Company newspaper, Uniroyal World.

George Sahler
Manager - Employee Relations

DECLASSIFIED

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

JUNE, 1966

5. Personnel Protection

<u>Operation</u>	<u>Waste</u>				<u>Pu</u>		<u>Total</u>	<u>YTD</u>
	<u>General</u>	<u>R&E</u>	<u>FEO</u>	<u>Mgt</u>	<u>Prod.</u>	<u>Redox</u>	<u>Fin.</u>	
Disabling Injuries								2
Safety Investigation								4
Medical Treatment Injuries	1	1	11	3		5	8	34
Radiation Occurrences				3		1	6	13
Contaminated Wounds								74
New Deposition Cases								0
Fires			1		1			0
								5
								5
								7

Fire ISO 66-6, Facilities Engineering, 6-8-66

The trash in a Brooks Load Lugger was ignited. Probable ignition source was discarded smoking material. The loss was \$10.

Fire ISO 66-7, Manufacturing, 6-14-66

Sagebrush and dry grass were ignited by a burning ember from a trash burning pit. Twenty acres burned. The loss was \$20.

DECLASSIFIED

ISO-365

DEL

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

JUNE 1966

II. ACHIEVEMENTS (Continued)

I. WASTE MANAGEMENT SECTION

1. Operating Continuity

All fission products processing facilities operated satisfactorily throughout the month. Three cesium casks were loaded at the Cesium Loadout Facility. The remainder of the fission product crude feed was successfully processed through B-Plant.

2. Processing Operations

a. Head End

The Head End equipment continued to be operated for thorium processing.

b. B-Plant

Tank 003 CR fission product crude was pumped to B-Plant and the tank was flushed with water. Approximately 60 kilocuries of strontium and 460 kilocuries of promethium were separated by oxalate processing.

c. Semiworks

All currently scheduled production processing was completed. After flushing the processing equipment, the first of a scheduled series of seven process tests was completed. These tests, using fission product crude feed, are designed to demonstrate and optimize Phase III flowsheets for B-Plant operation.

d. Cask Loadings

The HAP0 IB-3 cask, containing 390 kilocuries of strontium-90, was shipped to ORNL on June 10. With the shipment of this cask, a total of 2.83 megacuries of strontium-90 was delivered to ORNL and Quehanna during fiscal 1966.

STT casks 45-A and 46 were loaded with a combined total of 74 kilocuries of cesium-137 and shipped to ORNL on June 13. The reduced loading in these casks was attributed to precipitation which occurred as the feed was cooled. By using a dilute feed,

however, a third cask was then fully loaded with 60,000 curies of cesium-137.

e. Waste Management

The In-Tank Solidification unit recovered 132,000 gallons of waste storage space.

The preheating of Tank 104-AX, the next tank scheduled to receive high-level waste from Purex, was augmented with a steam heater. While the prototype electric heater was effective with a small volume in the tank, this unit lacked sufficient heating capacity for a desired liquid level of about 660,000 gallons. The present temperature is 157°F versus 116°F at the end of May.

3. Equipment Experience

The heated air supply line to the ITS (In-Tank Solidification) unit air-lift circulator failed at a welded joint, located approximately six feet below the flange which connects to the tank riser. The failed line, which is a 10-inch stainless steel pipe surrounded by vermiculite to prevent excessive temperatures from reaching the concrete dome of the tank, was repaired by sealing the vermiculite chamber at the top.

4. Radiation Experience

A contamination spread to the 801-A Building, which contains instrumentation for waste storage tanks 101-AX and 103-AX, occurred on June 2 when removal of a block valve resulted in the venting of the air line from Tank 103-AX. About 20 gallons of solution were expelled, resulting in a radiation level of 400-500 rad/hr. within the small building. Intensive decontamination has reduced the radiation level 20-fold and these efforts are continuing.

Continuous monitoring of Tank 103-AX has indicated that the sludge temperatures have remained constant or decreased slightly.

There has been no significant change in the status of Tank 105-A, as indicated by radiation readings in the laterals underneath the waste tank and the bulge detectors for the bottom liner.

R. E. Smith

Manager, Waste Management

DECLASSIFIED

DECLASSIFIED

ISO-365
DEL

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

JUNE 1966

III. PERSONNEL ACTIVITIES

A. FORCE SUMMARY

<u>Section</u>	<u>Monthly Salaried</u>		<u>Weekly Salaried</u>		<u>Total</u>	
	<u>5-31-66</u>	<u>6-30-66</u>	<u>5-31-66</u>	<u>6-30-66</u>	<u>5-31-66</u>	<u>6-30-66</u>
General	2	2	1	1	3	3
Research & Engineering	60	56	33	33	93	89
Facilities Engineering	92	93	194	191	286	284
Manufacturing						
General	1	1			1	1
Waste Management	1	25	1	67	2	92
Production Planning	5	4	3	3	8	7
Redox	65	62	235	231	300	293
Purex	76	54	303	236	379	290
Plutonium Finishing	<u>45</u>	<u>44</u>	<u>198</u>	<u>193</u>	<u>243</u>	<u>237</u>
Total CPD	347	341	968	955	1315	1296
Corporate Offices and Business Management Division	<u>74</u>	<u>83</u>	<u>76</u>	<u>74</u>	<u>150</u>	<u>157</u>
Grand Total	<u>421</u>	<u>424</u>	<u>1044</u>	<u>1029</u>	<u>1465</u>	<u>1453</u>

Does not include 13 temporary Youth Opportunities Trainees or 24 summer employees.

B. PERSONNEL CHANGES

L. B. Bradley, Analyst - Procedures and Agreements appointed to Manager, Advertising and Product Promotion Reporting, Marketing Div., effective 6-16-

L. W. Roddy, Supervisor - Waste Handling appointed to Manager - Tank Farm Management, effective 6-16-66.

C. TRIPS

<u>Visitors</u>	<u>To</u>	<u>Nature of Discussion</u>
<u>To Conventions and General Meetings</u>		
A. G. Miller	University of B.C. (6-15 - 6-18)	Present paper at 21st Annual NW Regional Meeting-ACS
D. L. Anderson	Vancouver, B. C. (6-15, 16, 19)	ACHS Meeting
M. H. Campbell C. A. Colvin N. S. Wing	Vancouver, B. C. (6-16 - 6-17)	Present papers at 21st Annual NW Regional Meeting of the ACS
O. F. Hill	Pullman, Washington (6-20 - 6-24)	Attend meeting of American Society for Engineering Education
R. J. Sloat V. D. Donihee	Columbus, Ohio (6-12 - 6-15)	Attend Nuclear Materials Management Meeting
H. H. Hopkins, Jr.	Denver, Colorado (6-19 - 6-23)	Attend American Nuclear Society Meeting
R. D. Carter	Denver, Colorado (6-19 - 6-23)	Present paper at ANS meeting
W. Watson, Jr.	Pullman, Washington (6-20 - 6-23)	Attend ASEE Meeting
<u>To General Industry</u>		
W. H. Koontz	Portland, Oregon (6-2 - 6-3)	Arrange for transportating concentrator bottom section to Hanford
E. P. Thompson	Portland, Oregon (6-3)	Oversee loading of concentrator boiler
<u>To Colleges and Universities</u>		
W. Watson, Jr.	New York, New York (6-16 - 6-19)	Recruiting

DECLASSIFIED

DECLASSIFIED

ISO-365

C. TRIPS

<u>Visitors</u>	<u>To</u>	<u>Nature of Discussion</u>
<u>To AEC and other AEC Contractors</u>		
G. E. Backman	Baltimore, Md. (6-6 - 6-10)	Licensing of FPCE
W. N. Koop	Ft. Worth, Texas (6-25 - 7-1)	General Dynamics Corp.
P. W. Smith	Baltimore, Md. (6-3 - 6-9)	Licensing of FPCE

D. VISITORS

<u>Visitors</u>	<u>From</u>	<u>Nature of Discussion</u>
<u>From AEC and other AEC Contractors</u>		
F. P. Baronowski and party	Washington AEC (6-10)	Inspection of facilities
R. L. Fischer	Westinghouse Elect Corp. Bettis Atomic Power Lab Pittsburgh, Pa (6-15)	Uranium-233 & Purex Purex Plant tour
G. B. Pleat W. L. Lennemann	Washington AEC (6-10)	Toured Redox Lab and viewed 219-S.
<u>From General Industry</u>		
E. Forbes	Spartan Chemical Co. Toledo, Ohio (6-14)	Discussed radioactive equipment decontamination with WH&D management
C. B. Hockensmith	Randle-Brewer Co. Yakima, Washington (6-14)	"
<u>From Foreign Governments and Agencies</u>		
Wilhelm Esser	Euratom Karlsruhe, Germany	Witness packaging of oxide and metal

OFFICE OF THE DIRECTOR
J-3

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

DEL

JUNE 1966IV. REPORTSA. PREPARED AND ISSUED

- ISO-258, Official Use Only, "Chemical Processing Division, Budget for FY-1968 and Revision of Budget For FY-1967, Plant and Capital Equipment", L. W. Finch, June 13, 1966
- ISO-258, Sup. 1, Secret, "Chemical Processing Division Budget For FY-1968 and Revision of Budget For FY-1967, Plant and Capital Equipment", L. W. Finch, June 14, 1966
- ISO-323, Official Use Only, "Project Proposal, Purex Process Condensate Crib 216-A-38", L. W. Finch, June 22, 1966
- ISO-340, Unclassified, "Leak Tests on 2 and 3 Liter Polyethylene Bottles", E. R. Marx and D. A. Hoover, June 21, 1966
- ISO-144, Unclassified, "Facilities for Coupling the B-Plant and FPCE Programs - Design Criteria", H. L. Caudill, March 11, 1966
- ISO-295 1, Unclassified, "Design Criteria for a Third In-Tank Waste Solidification System", H. L. Caudill, May 27, 1966
- ISO-SA-21, Unclassified, Film Narrative, "Use of Plastics for Sealed Personnel Exit from Contaminated Enclosures", H. A. Moulthrop, July 7, 1966
- ISO-SA-19, Unclassified, "A Rapid Flamophotometric Analysis for Rhodium and Palladium Using Liquid-Liquid Extraction with Tricaprylyl Monomethyl Ammonium Chloride", M. H. Campbell, June 20, 1966
- ISO-227, Unclassified, "Criticality Hazards Control Specification - Storage in Room 183-A - Plutonium Chemistry Laboratory", R. S. Kingsley, June 21, 1966
- ISO-299, Unclassified, "Quarterly Report - Research Program for Recovery of Palladium, Rhodium, and Technetium (MFC-8) W. J. Guay, April - June 1966
- ISO-302, Unclassified, "Waste Limits - FY-1967 Isochem Inc.", R. J. Sloat, June 1, 1966

DECLASSIFIED

~~SECRET~~ DECLASSIFIED

ISO-365

DEL

A. PREPARED AND ISSUED (Continued)

ISO-319, Secret, "Supplemental Criticality and Chemical Hazards Control Specifications: Transportation and Storage of Uranium-233 Solutions Outside the Purex Plant", H. C. Rathvon and R. E. Van der Cook, June 3, 1966

ISO-320, Unclassified, "Recuplex Clean-Out - Final Status Report", L. M. Knights, June 6, 1966

ISO-322, Unclassified, "Americium Purification Flowsheet #2 - D2EHFA Extraction", R. Y. Lyon, June 10, 1966

ISO-326, Unclassified, "Critical Mass Control Specification - Temporary Storage and Handling of 30-Gallon Drums of Off-Site Waste", L. M. Knights, June 9, 1966

ISO-306 REV, Unclassified, "Safety Analysis Report and Hazards Review Chloride Processing in Hoods 42 and 43", L. E. Bruns, June 9, 1966

ISO-325, Secret, "Co-Product Demonstration Program", J. H. Warren, June 8, 1966

~~SECRET~~
K-2

DECLASSIFIED

DECLASSIFIED

ISO-365

DEL

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

JUNE 1966

V. 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

Wilbur J. Guay

Rhodium and Palladium Recovery by Adsorption
on Activated Carbon

Wilbur J. Guay

Rhodium Recovery by Precipitation as
Insoluble Potassium Rhodinitrite, or as
Insoluble Ammonium Rhodinitrite

Vice President
Chemical Processing Division

~~SECRET~~

END

**DATE
FILMED**

3 / 29 / 93