DECLASSIFIED
WITH DELETIONS

ISO--512-Del.

DE93 006691

ISO-512

This document consists of
46 pages. Copy No. [REDACTED]
of [REDACTED] series. Serial [REDACTED]

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT
FOR

1A-95908

SEPTEMBER, 1966

Compiled by
SECTION MANAGERS

October 21, 1966

ISOICHEM INC.
RICHLAND, WASHINGTON

DECLASSIFIED
WITH DELETIONS

By Authority of

CB-PK-2
DS [REDACTED] 10/2/92
DQ [REDACTED] 10/16/92
PRA Eick 10-16-92

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

(Item F-42)

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.

SIGNATURE AND DATE

Received by OSTI

NOV 30 1992

GROUP 1

DECLASSIFIED
WITH DELETIONS

Excluded From Automatic Down-
grading and Declassification.

MASTER

DISTRIBUTION RESTRICTED TO U.S. ONLY

DISTRIBUTIONCopy Number

1	J. N. Judy
2	H. D. Gilbert
3	E. T. O'Sullivan
4	P. E. Reed - J. H. Warren
5	R. F. Campbell
6	R. A. Connell
7	L. I. Brecke
8	M. K. Harmon
9	T. A. McCoy
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	File Copy - V. R. Chapman
23	Records File

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-2
C. Redox Section	C-1 Through C-4
D. Plutonium Finishing Section	D-1 Through D-2
E. Financial Control Operation	E-1 Through E-3
F. Facilities Engineering Section	F-1 Through F-4
G. Research and Engineering Section	G-1 Through G-8
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-5
IV. REPORTS ISSUED	K-1 Through K-2
V. PATENT SUMMARY	L-1

STAFF

President, Isochem Inc.	J. N. Judy
Vice President, Business Management	H. D. Gilbert
Vice President, Marketing	E. T. O'Sullivan
Vice President, FPCE	P. E. Reed
Vice President, Chemical Processing	P. E. Reed
Manager, CPD Services Section	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, Research and Engineering	R. E. Tomlinson
Manager, Facilities Engineering	H. P. Shaw
Manager, Waste Management	R. E. Smith

~~SECRET~~
CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

SEPTEMBER, 1966

I. SUMMARY

September production, as percent of the Quarterly Forecast (ISO-377), is summarized below:

	<u>September</u>	<u>Fiscal Year to Date</u>
Separated plutonium nitrate	101	101
Separated uranium nitrate	101	101
Uranium oxide	100	100
Plutonium metal buttons	101	101

With the start-up of the Plutonium Finishing line on September 2 and the four depleted uranium calciners on September 7, the last of the plant outages resulting from the July-August HAMTC work stoppage came to an end.

Performance of the chemical separations plants in September was satisfactory. The uranium processing rate in the Purex plant was limited to 22 to 25 tons per day due to the availability of only two dissolvers during the month. The new annular dissolver in C-cell did not get into operation until late in September. Less than three days of solvent extraction operating time were lost during the month.

Although a number of process difficulties interfered with the Redox performance early in the month, the problems were solved and the overall performance for the month was excellent.

Performance of the four depleted natural uranium calciners was erratic immediately following the start-up on September 7 due to the extended outage. However, they were performing well at month's end. The two depleted 94 uranium calciners performed well, but operation was interrupted on occasion by the lack of feed.

The production of plutonium metal was without significant interruption. The plutonium reclamation effort was hampered considerably by outages of the slag and crucible dissolvers for maintenance.

With outage time reduced to about two days, the In-Tank Solidification unit recovered approximately 165,000 gallons of tank space in September, for a total to date of about 2.66 million gallons. The 242-T Waste Evaporator was shut down most of the month for installation of new

DECLASSIFIED

DECLASSIFIED

ISO-512

DEL

waste routings, new pumps and modification of existing pumps. Thus, only 42,500 gallons of tank space was recovered, bringing the total non-boiling waste storage space recovered since start-up to 1.73 million gallons.

Only minor thorium contamination of the Purex process appeared following the return of the plant from thorium processing to normal uranium-plutonium processing. The initial plutonium product contained thorium in excess of specifications, but the thorium concentration decreased rapidly and all plutonium was successfully blended to meet specifications. Thorium contamination in the neptunium recovery unit made temporary changes necessary in the operating conditions to successfully decontaminate the neptunium and to reduce waste losses. The initial neptunium product required re-work for thorium removal.

Techniques were developed and unique color photographs were taken of the insides of underground storage tanks containing wastes near the boiling point. Thermocouples were installed on the four encased waste lines from the Purex plant and connected with a multipoint temperature recorder and alarm system; the data indicate that the design temperature of 150 F is exceeded with most steam jettings of waste solution through these lines.

The revised FPCE program to include recovery of promethium and americium from stored waste as well as from current Purex waste will require additional facilities in B-Plant.

Vice President
Plant Operations

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

SEPTEMBER 1966

II. ACHIEVEMENTS

A. PRODUCTION PLANNING

1. Production Statistics

a. <u>Percent of Forecast(1) Achieved</u>	<u>September</u>	<u>Fiscal Year to Date</u>
Separated plutonium nitrate	101	101
Separated uranium nitrate	101	101
Uranium Oxide	100	100
Plutonium metal buttons	101	101
b. <u>Purex</u>	<u>September</u>	<u>August</u>
Uranium nitrate produced (tons)	578	29
Average production rate during operation (T/D)	23	8
Total waste loss (%)		
Plutonium	0.37	0.22
Uranium	0.29	0.11
On-line efficiency (%)	92	12
c. <u>Redox</u>		
Uranium nitrate produced (tons)	221	3
Average production rate during operation (T/D)	9	-
Total waste loss (%)		
Plutonium	0.39	-
Uranium	0.12	-
On-line efficiency (%)	83	-
d. <u>Uranium Reduction (tons)</u>		
Normal UO ₃ loaded	461	0
Enriched UO ₃ loaded	172	85
Normal UO ₃ approved for storage	461	0
Enriched UO ₃ approved for shipment	201	40
Normal UO ₃ shipped	0	0
Enriched UO ₃ shipped	161	0
Normal UNH backlog	210	92
Enriched UNH backlog	126	84

(1) ISO-377, QUARTERLY PRODUCTION FORECAST

A-1

DECLASSIFIED

DECLASSIFIED
WITH DELETIONS

ISO-512

DEL

f. Power

	<u>200-East</u>	<u>200-West</u>
Raw water pumped (gpm)	10 650	6 970
Filtered water pumped (gpm)	1 105	1 123
Maximum steam generated (lbs/hr)	200 000	106 000
Average steam generated (lbs/hr)	165 450	83 700
Total steam generated (M lbs)	119 127	62 266
Coal consumed (tons)	5 936	3 150

With the start-up of the Plutonium Finishing line on September 2 and of the four depleted uranium calciners, initiated on September 7, the last of the plant outages resulting from the July-August HAMTC work stoppage came to an end. Overall performance of the processing facilities for September was satisfactory.

MK Harmon
Manager, Production Planning
Chemical Processing Division

DECLASSIFIED
WITH DELETIONS

_____

WAG-0100 HENLAND, WAG.

INVENTORIES

Sr-90
Pm-147 (Unaged)
Pm-147 (Aged)
Cs-137

DECLASSIFIED

~~SECRET~~
DECLASSIFIED

ISO-512

DEL

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

SEPTEMBER, 1966

II. ACHIEVEMENTS (Continued)

B. PUREX SECTION

1. Operating Continuity

Normal uranium processing continued during the first part of the month at a capacity factor rate of 2.8. A brief shutdown was required on September 10 due to a partial partitioning failure in the first partition cycle, and a 2½-day outage was experienced on September 19, requiring a jumper replacement and other building equipment repairs. After plant operations were resumed on September 22, a capacity factor rate of 3.0 was attained and remained constant through the end of the month.

2. Processing Operation

The shutdown periods experienced on September 10 and 19 were due to a partitioning failure in the J6 column and a jumper replacement in H Cell, respectively.

Plutonium and uranium product met specifications, except for one batch of plutonium during initial startup operations.

Two neptunium purification runs, including Redox-produced material, were completed. A total of 739 grams was shipped.

3. Equipment Experience

A twelve point temperature recorder was installed this report period to monitor the temperature of lines in the Purex Waste Encasement to the 241-A Tank Farm. The recorder was installed to help prevent future line failures in the encasement.

The load cable on the right hand auxiliary cell wrench on the west canyon crane was replaced. The old cable had been found damaged on an earlier crane inspection.

The new C3 multipurpose dissolver installation was completed and the dissolver placed in service after silver reactor regeneration.

The ten-ton rotating hook on the canyon crane was replaced this month with a "hot" spare unit. The spare unit replaced a failed rotating hook with the old style drive unit, and is a new improved model.

The J-7 cartridge was replaced with a repaired unit containing fluorothene plates in order to restore normal processing rates.

Other equipment work at the Purex Plant included:

- a. Replacement of the L-9 pump because of seal failure.
- b. Installation of a new shaft, seal, impeller, and bearing on the P-50 sulfuric acid pump in order to place the pump in good condition.
- c. Replacement of the left hand manipulator in the remote analytical cave in the sample gallery with a new spare. The old unit will be overhauled.
- d. Replacement of the left hand optics on the east and west cranes, with reconditioned hot spares. Failure was attributed to the solenoid.
- e. Installation of a new air cylinder on the downcomer Durco valve in N Cell.
- f. Installation and replacement of numerous jumpers as required.
- g. Reconditioning the laboratory exhaust fan by replacing the bearings.

4. Radiation Experience

Iodine-131 emission for the month was 0.25 curies.

A PR can was tipped over in the west end elevator, causing plutonium spread in the elevator and adjacent area. The area has been successfully decontaminated.

A routine burial was conducted on September 21.

5. Analytical Experience

The remaining equipment for the liquid scintillation counter was received and installed during the month. The equipment will allow the results to be programmed on a computer, thus resulting in manhour savings.

The laboratory request has been approved for the appropriation for a fluorescence spectrophotometer which will replace the existing shop-built instrument. The instrument will be used for determining trace amounts of uranium in process samples, and will be adaptable for the determination of other trace constituents such as aluminum and cyanide.

SG Smolen
Manager-Purex

SG Smolen:gt

DECLASSIFIED

DECLASSIFIED

ISO-512 DEL

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

SEPTEMBER, 1966

II. ACHIEVEMENTS (Continued)

C. REDOX SECTION

1. Operating Continuity

Processing activity in the Redox plant this month was confined exclusively to 94 metal processing. Although a number of processing interruptions occurred early in the month, plant performance during the last half of the month was particularly good and the expected production was exceeded by approximately three percent.

Depleted UNH processing in the Uranium Oxide plant was started on 9-7-66, after the Purex plant had resumed uranium-plutonium processing. All four depleted uranium calciners were subsequently put on-line and operated satisfactorily during the balance of the month. Operation of the two 94 metal UNH calciners was satisfactory and no equipment problems were experienced which adversely affected operating continuity. However, because of the need for reworking some 94 metal UNH feed at Redox, powder production for the month was slightly below expectations.

2. Processing Operations

a. Redox Processing

The Redox plant was committed to 94 metal processing during the entire month and the process functioned 83 percent of the time available, at operating and mechanical efficiencies of 94 and 92 percent, respectively.

Plant performance during the first part of the month was affected by both equipment and operating problems. Plant shutdowns were taken to replace; 1) a leaking gasket on the G-3 hexone still, 2) a leaking discharge jumper on the D-14 backcycle waste pump, 3) a mal-functioning steam trap on the LCU concentrator (F-5). During this period high plutonium wastes were also encountered, apparently due to plutonium polymer, and full rework processing was necessary. However, interference with virgin feed processing was minimal.

An increase in the ruthenium activity of the UNH product was detected on 9-21-66, and eight batches of UNH subsequently exceeded gamma shipping specifications. The increase in gamma activity was

caused by failure of the E-13 ozonator agitator and a malfunctioning E-13 temperature recorder-controller. The high gamma product is being reworked as processing conditions permit.

The 242-T waste evaporator was down most of the month for the installation of new waste routings, new pumps, and modifications to existing pumps. The new routings and pumps were installed to permit removal of the high specific gravity evaporator bottoms solution from the feed system and introduce fresh low specific gravity feed. This action was taken in an effort to alleviate some of the past line pluggage problems and effect a faster recovery of waste storage space. During the periods in which the evaporator was on-line (approximately 42 percent of the available time) the equivalent of approximately 42,500 gallons of underground nonboiling waste storage space was recovered, bringing the total to 1,730,656 gallons since start-up on 12-3-65.

b. Uranium Oxide Processing

Processing of depleted UNH from the Purex plant was resumed on 9-7-66. Initial calciner operation was erratic due to the extended period the units (4) had been down. However, stable calciner operation was achieved during the week of September 12, and continued through the end of the month. Approximately 20 hours of operating time were lost on 9-23-66 due to electrical and instrument problems in the X-28 bag tower structure.

The production of 94 metal uranium oxide was below expectations due to a lack of available specification feed. However, the required number of carloadings for the month was achieved. Shipments during the period were slightly behind schedule due to delayed receipt of flatcars. No equipment problems were experienced which adversely affected 94 powder production.

3. Mechanical Experience

a. Redox Plant

On 9-13-66 two canyon equipment failures occurred almost simultaneously, namely: 1) the motor on the E-13 ozonator agitator, 2) the tube bundle on the H-4 metal solution oxidizer, which developed a leak. Both units were replaced with no lost processing time. The failed agitator had been in service since 8-7-65 and the tube bundle since 11-6-65.

The gasket on the east tube bundle of the G-3 hexone still developed a significant leak on 9-10-66 and a new gasket was satisfactorily installed on 9-11-66.

DECLASSIFIED

DECLASSIFIED

ISO-512
DEL

The pogo pump in the E-2 plutonium ozonator failed and was replaced with a new unit on 9-6-66. However, satisfactory operation was not achieved until a new air supply jumper was installed on the pump. Subsequent operation has been satisfactory.

The new fan-shaft bearings for the 116-117 TX waste tank cooler blower arrived this month and the cooler was returned to service on 9-13-66. The cooler had been out of service for approximately three weeks pending arrival of the new bearings.

b. Uranium Oxide Plant

Extensive modifications to the product discharge piping from the ED-7 UNH concentrator were completed to reduce the possibility of flow restrictions and increase concentrator output. The work was completed on 9-23-66 and performance of the concentrator during the last week of the month was significantly improved.

Other major maintenance work accomplished this month included: 1) complete overhaul of the depleted powder handling system exhausters, 2) installation of new vent fan units on the 224-U Building roof, 3) replacement of piping in the X-19 calciner feed loop-header.

4. Radiation Experience

A sample of decayed vegetation and earth was taken from the spot of radioactivity reported by Battelle Northwest Regional Monitoring north of the 200 West Area perimeter fence. Two small pieces of fibrous vegetation were selected for analysis at the Redox Analytical Laboratory, one reading 50,000 cpm and the other (obviously a piece of bark from sage brush) reading 10,000 cpm. Using the wide beta counter and various density absorbers it was determined that the activity was essentially all Sr-Y (90).

On 9-21-66 numerous fine specks of radioactive contamination were detected along 23rd Street in the 200 West Area. Radiation monitoring service was provided for the decontamination work required to restore the area to normal status.

5. Analytical Experience

One hundred and fifty flux monitors of various composition were analyzed by gamma energy analysis for the Reactor Safeguards Experimental Unit, Battelle Northwest Laboratories. This program is a continuing study into the flux attained during test runs made in various reactors around the United States.

Two samples of fibrous vegetation, taken from a pocket of contamination detected in the ground north of the 200 West Area perimeter fence were analyzed by beta counting and gamma energy analysis. No gamma emitting isotopes were found, however, Sr-Y (90), pure beta emitters, were found in concentrations of 0.35 and 0.15 micro curies. Each piece was significantly less than one gram in weight.

Several earth samples, taken from the ground in the vicinity of the 241-TX tank farm, were analyzed by beta counting and gamma energy analysis. High Sr-Y (90) activity was detected with an apparent lack of any gamma activity.

Most of the gamma energy analyses on the seventy-three 200 East Area waste tank supernate samples, submitted during August, have now been completed and submitted for evaluation as input to the computer program (Secretary) for current cataloging of isotopes present. Quantities of cesium (137), cesium (134), and ruthenium-rhodium (106) were found in all samples. In some samples, antimony (125), cobalt (60), and cerium-praseodymium (144) was also detected.

RW McCullugh

Manager - Redox

RW McCullugh:HWM:sss

DECLASSIFIED

DECLASSIFIED

WITH DELETIONS

ISO-512

DEL

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

SEPTEMBER, 1966

II. ACHIEVEMENTS (Continued)

D. PLUTONIUM FINISHING SECTION

1. Operating Continuity

The production of plutonium metal was without significant interruption during the month. The plutonium reclamation effort was hampered considerably by outages of the slag and crucible dissolvers. The incinerator was out of service for the entire period.

2. Processing Operations

a. Plutonium Processing

The button line was operated on weapons-grade material.

Nondefense plutonium shipments were as follows: metal, 387 grams to Battelle-Northwest, 6 kilograms to Argonne National Laboratory, and 600 grams to Monsanto Chemical Corporation; fluoride, 1 kilogram to Argonne National Laboratory (two shipments); nitrate, 600 grams to Babcock and Wilcox; and oxide, 169 grams to Battelle-Northwest.

Two shipments of United Kingdom plutonium metal (166 kilograms total) were received during the month.

b. Plutonium Reclamation

Forty-nine (49) kilograms of plutonium, as nitrate, were recovered and delivered to the button line from the recovery facilities during the month.

Nine hundred and thirty-five (935) cans containing nineteen (19) kilograms of plutonium were processed through the slag and crucible dissolvers.

Two hundred and nineteen (219) grams of plutonium were returned to the main process stream from aqueous processed through the waste-treatment facility. Also, fifteen (15) grams of americium were recovered and stored for future processing.

DECLASSIFIED
WITH DELETIONS

Incinerator furnace repairs were completed by Minor Construction forces on September 27. Check-out and dry-out were in process at month-end.

3. Maintenance

The button line equipment operated well during the period, with only minor repairs and adjustments required.

The recovery equipment performed satisfactorily except for the slag and crucible dissolvers, all three of which suffered at least one major failure during the month. The Mark I (06) developed a leak in the condenser temperature line; the Mark II (04) required repairs to the proximity indicator, a leaking flange, and a plugged sparger; and the Mark III (08) leaked after removal of the Teflon liners.

Fifteen (15) of the recovery process pumps failed during the month. Thirteen (13) were repaired and returned to service. Two (both Chempumps) were beyond repair, and were buried.

A new system was installed for the control and resetting of the 291-Z emergency ventilation turbines from the 234-5 Building power control room.

4. Radiation Experience

Radiation and contamination control statistics indicated satisfactory control.

There were no cases of potential plutonium deposition.

5. Quality Control

Average Button Impurity (TMI+C)	613 ppm
Average Button Pu-240 Content (WG) (as determined by neutron count)	6.11 %
Average Button Density	19.38 g/cc
Button Line Recycle to Reclamation	6.8 kg
Average Impurities in Reclamation Output (TMI)	1,554 ppm

6. Analytical Control

Number of Samples	3,041
Number of Determinations	5,440

DECLASSIFIED

Manager

Plutonium Finishing

DECLASSIFIED

ISO-512

DEL

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

SEPTEMBER, 1966

II. ACHIEVEMENTS (Continued)

E. FINANCIAL CONTROLS OPERATION

1. Budgets and Cost Accounting

AEC funded costs of \$2,293,000 were incurred in September, up \$554,000 from August. Of the increase \$201,000 was for chemicals and coal in support of primary plant production; the remainder was associated with the resumption of normal production activities following the strike.

The following schedule compares the first quarter budget to actual in thousands.

	<u>02</u> <u>Production</u>	<u>02</u> <u>R&D</u>	<u>03</u> <u>Standby</u>	<u>Isotopes</u>	<u>Total</u> <u>Operating Cost</u>
Budget	\$5 972	\$431	\$ 60	\$ 517	\$6 980
First Quarter	<u>5 251</u>	<u>432</u>	<u>33</u>	<u>48</u>	<u>5 764</u>
Excess of Budget					
Over Actual	<u>\$ 721</u>	<u>\$ (1)</u>	<u>\$ 27</u>	<u>\$ 469</u>	<u>\$1 216</u>

Although total excess of budget over actual for the quarter rose \$71,000 to \$1,216,000, 02 Production surplus decreased \$232,000 while Isotopes surplus increased \$330,000. This resulted from a re-evaluation of the application of effort during the strike period, and in September, recognizing a general swing of work effort from Isotope production to Waste Management (02 Production).

2. General Accounting

As of September 30, 1966 there were fourteen active projects. The following is a summary of current status of projects:

	<u>In Thousands</u>
Total Authorized Funds and Transferred	
Capital Property Authorizations	\$4 865
Total Cost-to-Date	3 181
Commitments & Open Work Releases	300
Unencumbered Balance	1 384
Costs Charged During September, 1966	232

There were no work authorities or directives received from the AEC during the month of September, and no Construction Completion and Cost Closing statements issued.

AEC Directive EGT-055, Modification 2 was received increasing Isochem's authorization to incur FY 1967 obligations for capital equipment not related to construction to a total of \$486,000. Approximately 97 percent of the funds allocated have been spent or committed.

The following AR's were received in September:

76012	Shipping Cask Modification	\$27 000
76013	Temperature Recorders for Semiworks	4 900
76014	(After the fact) Magnet Control System for SU-8 Mass Spectrometer	5 500

The following AR's are being held for lack of funds:

76004	Air Conditioners for 801A, B & C; 102A & 105A	4 700
76010	Atomic Absorption Spectrophotometer	13 000
76011	High Temperature Vacuum Furnace	14 000
76013	Temperature Recorders for Semiworks	4 900
76014	Magnet Control System for SU-8 Mass Spectrometer	5 500

October allocation of funds for capital equipment is expected to be \$175,000.

3. Management Systems and Studies

Computer and Data Network

The acquisition proposal for the equipment is still being reviewed by the Richland Operations Office which in turn has requested a review by the Computer Sciences Corporation. Final committee action by the Richland Operations Office ADP Committee is expected by October 28.

Discussions with the Purex Laboratory personnel continue to define the analytical requirements of the proposed system.

Redox System

Processing of the ROX program was resumed the first week of September. The processing was again plagued by tape read-write malfunctions. Output from the system was not available for approximately 1-1/2 weeks until Computer Sciences Corporation resolved the problem. CSC indicates that the software and hardware failures have not been solved, but future problems will not cause delay of this magnitude.

DECLASSIFIED

ISO-512

DEL

Quality of the on-line system has been hampered during the month by equipment malfunctions. The problems have been defined, and the IBM Company has or is now solving these maintenance problems.

R. G. Connell

Manager - Financial Controls

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

SEPTEMBER, 1966

II. ACHIEVEMENTS (Continued)

F. FACILITIES ENGINEERING SECTION

1. Purex

ICE-601 - CoProduct Demonstration Processing Facilities - 200 West

Preparation of a project proposal revision, requesting total project funds has been initiated. The Commission was advised that this project was behind schedule (about six weeks) and that delay in ordering the needed boron stainless steel would further extend the schedule.

IAP-602 - Export Waste Line - 200 East Area

Directive AEC-275, dated September 21, 1966, authorized \$17,500 for design of the additional 24-inch water line as proposed in the project. The RLOO is negotiating with an off-site architect-engineer to perform the design.

Alpha Survey Instrument

The complete breadboard instrument has been demonstrated. Packaging as a prototype instrument is now in progress. The new high-voltage power supply is operating within tightly regulated limits using the improved transformer coil. Transformer specifications providing such information as core-gap, primary inductance and breakdown voltage can now be provided the vendor. Finished units by model number will be available. Operation of all the electronics system has been demonstrated with both the "poppy" and "Scintran" probe using both six feet and approximately 100 feet of cable on each probe. Power requirements have been reduced to an extent that a portable battery-powered unit is practical.

Atomic Absorption Flame Spectrometer

Progress on the installation of the atomic absorption spectrometer in Purex has been satisfactory. Considerable progress has been made in improving performance and operability of the instrument.

Pulse Generators

A visit was made to Atomics International in Canoga Park, California, on September 19 and 20 to review construction progress of two long

DECLASSIFIED

ISO-512

DEL

stroke pulse generator machines. These two machines would run smoothly at lower speeds, but vibrated badly when speeded up. Water hammer proved to be the trouble. It was decided to finish the testing at Hanford where better facilities were at hand.

Renovation of 291-A Exhaust Filter

Design is underway of a method to renovate the old fibreglass filter at 291-A by recirculating moist air through the filter bed. This will involve ductwork, steam piping and spray nozzles, fans, filters, and instrumentation to closely control the procedure.

Project CGC-172 - Replacement L-Cell Package

The package design is being reviewed in an attempt to bring the cost of the work within budgeted funds. Equipment ideas such as improved spare concept, minimum sampling concepts, minimum line flexibility concepts, and indicating and manual instrument and control concepts are being investigated.

Purex Waste Routings - 241-AX

When the failed encased line for organic wash waste transfer to the tank farm was repaired in July and August, thermocouples were installed on all four encased lines as well as the encasement interior and connected to a multipoint temperature recorder with alarm set for 150° F, the design temperature for the encased lines. Since that time, high line temperature alarms have been experienced nearly every time one of the tanks, TK E-1, E-2, F-16, F-18, G-8 or R-8 was jetted to underground storage.

As a temporary measure, it has been recommended that (1) the contents of the tanks be cooled as much as possible prior to jetting, and (2) jetting be terminated with a slight heel in the tank to prevent "gassing" of the jet. Detail design for a prototype TK-F-18 installation of a jet interlock with the weight factor was transmitted to Purex Processing. The use of pumps instead of jets is also being investigated.

2. Redox

Redox Multiproduct Capability - MFC-11

The Redox Multiproduct Capability study has progressed through the alternative study stage. Case studies of a hexone process, a TBP process, and a combination TBP - D₂EHPA process are being evaluated. It is currently planned that the study will discuss two of the alternatives in detail. Cost estimates, product surveys and safety analysis are proceeding as planned.

3. Waste Management

IAP-609 - Purex Tank Farm Vent System Expansion

The project proposal requesting total project funds of \$280,000 is ready for approval. Routing of the proposal for approval is held up pending the review of available FY 1967 General Plant project funds.

Cell 15 Layaway

Substantial progress was made on equipment preparation for layaway, with four major equipment pieces crated and ready for transfer to final storage in 2101-M. Completion of the layaway has now been set for November 1, 1966.

In-Tank Solidification - Third Prototype Unit

Design for the Third Prototype Unit was completed. Because of the deep sludge layer in TK-241-BY-101, another suitable tank is being considered. One of the 241-TX Farm tanks appears to be appropriate and electrical power is readily available.

TK-241-SX-105 Boiling Waste Storage

Project work for the conversion of 105-SX tank to Redox boiling waste storage has been completed. Due to a reduction in forecast storage requirements, installation of the spare A farm 24-inch circulator in the 105-SX center riser may be unnecessary.

Project CAC-160 (Sludge Removal) Piping

In light of the Purex waste line failure, the piping to be installed in CAC-169 project was reviewed. Some new lines will be modified to assure that damage due to pipe expansion will not occur at temperatures up to 220° F. A maximum pumping temperature for the solution will be selected for the old encased lines to be used in the project, and an interlock system will be installed to assure this temperature will not be exceeded.

Fission Product Processing - Project CAC-181 - FPCE Integration

The FPCE revised program objective to recover the promethium and americium from the stored waste as well as from the current Purex waste will require additional facilities in B-Plant. A preliminary review indicates the need for additional jumpers, three hot pipe trench lines, and 12,000 gallons of storage capacity.

Project CAC-144 - B-Plant Phase III

Cell 4 strontium concentrator for Phase I has been removed, and the

DECLASSIFIED

ISO-512

Del

Phase III concentrator is being installed. Jumpers have been defined which will allow operation of the Phase III concentrator using Phase I routings until Phase III routings become available. In this way, much down time which would have occurred during this change can be eliminated.

4. Plutonium and Uranium

Americium Purification and Conversion

Hanford Engineering Services is proceeding with detailed design of the new facility. Design was approximately 16% complete as of September 18, 1966.

Curium-244 CAGE Program

The cost estimate for facilities for the A-Plant portion of the program was revised resulting in about a 7% reduction. The revised figures are based upon additional information that was not originally available.

Pu-238 Scrap Recovery

A preliminary engineering study has been completed to determine equipment requirements and the cost of installing facilities for recovery of Pu-238 from combustible and non-combustible contaminated wastes generated at Mound Laboratory. As presently conceived, the facilities would be installed in Room 221 of the 234-5 Building.

ZPPR Program

The ZPPR project team from Argonne National Laboratory visited Hanford on September 20 and 21. A discussion was held concerning the construction schedule outlined in the Isochem proposal. ANL is interested in compressing the proposed schedule as much as possible. The program is being reviewed to determine to what extent the schedule can be compressed by considering alternative approaches to equipment utilization.

5. General

Pressure Vessel Inspections

A third party inspector from Factory Mutual inspected boilers and pressure vessels in the steam plants and other 200-East and 200-West Area buildings.

Manager - Facilities Engineering

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

SEPTEMBER, 1966

II. ACHIEVEMENTS (Continued)

G. RESEARCH AND ENGINEERING SECTION

1. Separations Process Engineering

Purex

a. Solvent Extraction

On August 29, two days after resumption of normal uranium-plutonium processing at the Purex Plant, the uranium losses to the 1CW and 2EW organic streams were up to a factor of 10 above normal values (approximately 0.02 percent vice 0.002 percent). This increase in waste loss corresponds with a 12-hour breakthrough in one of three anion exchange beds in the process water demineralizer system. The losses returned to normal values about 36 hours after the defective exchange unit was removed from service for regeneration.

Operation at a 2.8 C.F. and a pulse frequency of 37 cycles per minute showed that the 1C Column was near maximum capacity with the nozzle plate cartridge that was installed in August. A failed 2E cartridge was repaired by installing new three-quarter inch thick linear polyethylene plates. This cartridge was installed in the 1C Column on September 20. Subsequent operation indicates that this cartridge has a capacity equivalent to the original 1C Fluorothene (trademark - E. I. duPont deNemours & Company) sandwich cartridge (greater than 4.0 C.F.).

b. Post Thorium Run Product Contamination

The initial plutonium product contained up to 1900 ppm of thorium; however, only 15 percent of the plutonium produced during the first month of operation exceeded the thorium limit of 1000 ppm. The off-standard product was ultimately blended to specifications. Also, a maximum of 40 μ Ci of protactinium per gram of plutonium was initially observed. This decreased to 1 or 2 μ Ci per gram during the first two weeks of operation.

Buttons produced from this plutonium have shown a higher than normal radiation level. Since the concentration of ruthenium and zirconium-niobium has been below the normal level, it is

DECLASSIFIED

ISO-512

DEL

likely that the protactinium is contributing to the button radiation level. Some protactinium was also observed in the UNH product, but this rapidly dropped below detection limits. No product rework was required.

Several pounds of thorium have accumulated in the neptunium recovery equipment since start-up. This thorium has been interfering with the ion exchange purification of neptunium. Waste losses have been above normal. Also, the product purity and concentration have been less than desired. The product from one run has been unsuccessfully reworked; the other batch has been shipped on a waiver of specifications. Raising the temperature and acid concentration during loading was ineffective in reducing the losses or increasing product purity and concentration. According to the original development data, the purity and loss problems can be solved by reducing the batch size and loading rate while otherwise using the normal flowsheet.

c. Solvent Treatment

The NPH diluent process test continued. Solvent quality, as measured by plutonium retention analysis, was maintained at a high level throughout the month. the LOF metering system became plugged with manganese dioxide solids early in the month. During a temporary plant shutdown, both solvent treatment systems were flushed to remove accumulated manganese dioxide solids.

2. Fission Products Process Engineering

a. Waste Tank Inventory Computer Program

Evaluation of the capabilities of the computer program (Secretary) is continuing, and program modifications and refinements are being introduced as their need becomes apparent. At present, concentrations of the 27 radionuclides, elements, and chemical ions listed below may be included in the input data, and provision has been made for future expansion of the program.

1) Sr-89	7) Sb-125	16) Na	22) AlO_2^-
2) SrY-90	8) Cs-134	17) Rh	23) F^-
3) Y-91	9) Cs-137	18) Pd	24) Cl^-
4) Zr-95	10) CePr-144	19) Tc	25) NO_3^-
5) Nb-95	11) Pm-147	20) OH^-	26) CN^-
6) RuRh-106	12) Am-241	21) $\text{CO}_3^{=}$	27) pH

An "intertank transfer" subroutine is being incorporated into the program which will permit the updating of the sending or receiving tanks with a minimum of input data. By submitting

[REDACTED]

the date, sending tank, receiving tank and volume transferred, Secretary will calculate and print out an updated inventory and status report for any or all tanks involved in the transfers. A report describing the computer program in detail including the program's ability to perform an error analysis on its output information is being compiled and will be issued as ISO-489.

A supernate sampling project to provide initial conditions for the program has been initiated. To date, 44 tanks in East and West Area have been sampled, and most of the chemical analyses have been completed. At least two samples were taken from each tank - one at the surface and one a few feet above the sludge - in order to identify any stratification which might exist in the supernate. It appears that within experimental accuracy, the chemical composition of the supernate in any tank can be assumed to be homogenous.

b. Cerium-Promethium Separation

A process test was completed at the Semiworks demonstrating an improved D2EHPA solvent extraction flowsheet for separating cerium from rare earths using silver and persulfate for catalytic oxidation of cerium(III) to cerium(IV). A higher persulfate to silver mole ratio was used in this test than in previous tests to permit an 8-fold reduction in silver consumption. The reduction in silver, which represents the major chemical cost in this flowsheet, was made possible by substituting the more soluble sodium persulfate for potassium persulfate. The test also demonstrated the batch contact removal of sulfate from the rare-earth fraction. Previous sulfate precipitation problems were avoided by diluting the sulfate concentration to 0.6M and adding citric acid (0.05M) to complex the rare earths.

Approximately 90 percent of the cerium was removed from the other rare earths for a DF of 10. This is less than the decontamination factor goal of 100, but mechanical problems encountered during the run probably account for the low cerium removal efficiency. Promethium-147 apparent product recoveries were 60 percent across the Ce-Pm separation step and 87 percent across the sulfate removal batch contact step; however, measured waste losses were only 4 percent for the Ce-Pm separation step and one percent for the sulfate removal step. Promethium recoveries of 96 percent and 99 percent across these steps, respectively, are believed to be realistic since a promethium inventory analysis following the test located the missing promethium. Americium and curium followed the promethium throughout the run indicating that persulfate does not oxidize americium to an extractable valence state in the Ce-Pm separation step.

[REDACTED]

DECLASSIFIED

DECLASSIFIED

ISO-512

DEL

c. 241-TX Underground Waste Storage Tank Cooler

New fan-shaft bearings were installed in the tank cooler blower, and the blower returned to service on September 14. During the three weeks the cooler was down, the underground tanks heated approximately 15 F from the addition of hot evaporator concentrate. After the cooler was started up the temperatures dropped quickly and in a week had returned to approximately the temperatures recorded before the blower failed. At the time the blower was re-started, the evaporator was not operating and no transfers were being made into or out of the two underground evaporator bottoms receiver tanks (116 and 117-TX). As a result, it was possible to demonstrate the previously postulated floating salt layer formation. Thermal energy and water removal rates were high (2.4×10^6 Btu/hr and 3.2 GPM) as the cooler started up, but decreased rapidly to 0.8×10^6 Btu/hr and 1 GPM.

d. Underground Tank Inspection

Photographic techniques have been developed to obtain color pictures of the inside of underground storage tanks. Excellent results have been obtained in tanks which are near the boiling point and contain moderate radiation fields. The techniques are being extended to include inspection of the integrity of tank walls and liners, location of sludge deposits and movie pictures of air lift circulator operation.

e. West Area Ground Contamination

The previously reported ground contamination outside the West Area perimeter fence has been tentatively identified as coming from tumble weeds which grew in the area of the old 241-TX-154 diversion box spill. The area had been previously paved and about a year ago re-paved, but the tumble weeds are currently growing through the asphalt.

3. Plutonium Process Engineering

a. Plutonium Reclamation

Uranium contamination in the plutonium nitrate product from the Plutonium Reclamation Facility has been a significant operational problem requiring careful blending in the reduction process to assure specification grade plutonium metal. Two depletion runs were made and approximately 216 grams of uranium were removed from the system. There were three causes for the higher than normal uranium contamination:

1. The neutron monitors in the CC Column became unstable.

The amplifiers for this equipment were replaced, and a new calibration had to be made. Control of the plutonium inventory in the CC Column was very poor during the period, and uranium separation was affected.

2. The frequency of organic disposal was reduced, and higher DBP levels may have impaired uranium removal, particularly since the organic could not be carbonate washed to remove DBP due to leaks in the CR Column.
3. Because of a plug in the CO Column, some uranium depletion runs were not made on schedule. The CO Column plug resulted from plutonium fluoride precipitate (during stripping of the organic) which formed during the time control of the plutonium inventory in the CC Column was lost and CCW (organic) analyses jumped to a high of 12.1 g/l for a period of two shifts. Extensive flushing of the CO Column with ANN to complex the fluoride removed the plug.

Other unusual processing conditions are noted: All of the backlog of demister solutions has been successfully processed through the CX Column as a preliminary to solvent extraction. Twenty-four (24) cans of Purex material containing contaminated organic were processed without incident. A siege of equipment failures and recirculation loop pluggage was experienced in the slag and crucible continuous dissolvers. It was postulated that the plugging problem was due to a low acid feed rate, caused in turn by ANN crystals in the flow rate control instrument. The equipment was cleaned out before this theory could be confirmed. Finally, organic consumption has been reduced about 15 percent by extending its use before discard. A better criteria for organic disposal is required, and is contingent on repair of certain processing equipment.

b. Process Improvement

Organic solution which has been stripped with HF in the CO Column has been stored in contact with ANN to control corrosion. Laboratory tests showed that the amount of HF extracted into the organic to be less than 0.12 mg/l, thus making possible the elimination of the ANN. Two process improvements should be realized: (1) ANN crystals formation in the CAX orifice should be eliminated, and (2) aluminum carbonate will not be formed when washing the organic with carbonate is resumed.

Under process test PRF-66-8, nitric acid was substituted for caustic in the off-gas scrubber to reduce foaming and to prolong pump life. Foaming was reduced. Pump failures were reduced from 10 - 20/month to 3-4/month, but it appears that this may have been brought about by changing out the scrubber solution once every

DECLASSIFIED

ISO-512

DEL

24 hours, or whenever the scrubber tank weight factor indicated a large increase in volume. The cause and effect relationship is not clear. However, since the nitric acid is easier to reprocess than the caustic, its use is being continued.

c. Processing of Incinerator Ash Leach Solution

Tests in the Battelle Northwest Laboratories to characterize the contaminants in incinerator ash leach solution which cause flooding in solvent extraction were not fruitful. None of the many solutions and process test conditions studied resulted in flooding. This is inconsistent with production experience of a year ago, but confirms the situation of today; i.e., ash leach, when blended into the dilute feed stream (CAF) of the Reclamation Facility, is not now causing operating difficulty. Therefore, the test in a program was terminated with the proviso that if ash leach solution again causes a problem, new samples will be taken for characterization studies.

4. Separations Chemistry Laboratory

a. Determination of Lead in Vault Crudes

A new colorimetric method for the determination of lead in vault crude feed samples has been developed which uses dithizone in xylene for the color complex. The technique has been used to detect as low as one-half microgram of lead after removing interferences by masking with citrate and cyanide. Iron interference is removed by reduction with hydroxylamine hydrochloride.

b. Potential Source of Plutonium Polymer

Additional work in a search for possible sources of plutonium polymer in the Redox process resulted in the conclusion that the dichromate oxidation step in E-5 might be a possible contributor. The acidity in this tank is occasionally only slightly above the recommended level for the prevention of polymer. Laboratory tests have confirmed the known but not fully recognized fact that 14 moles of hydrogen ion are consumed during the reduction of 1 mole of dichromate. Loss of acid control during the oxidation step is thus possible and prior acid adjustments were recommended.

5. Plutonium Chemistry Laboratory

a. Americium-Curium Separation

As part of the study of curium processing in the 234-5 Building, an alternate method of americium-curium separation was scouted. This scheme is based on the oxidation of americium to the (VI) state, and extraction away from curium.

Americium was oxidized to Am(VI) in dilute nitric acid using silver catalyzed persulfate. The molar extinction coefficients for Am(III) and Am(VI) were calculated. The oxidation reaction was found to be first order with respect to Am^{+3} in the initial stages of the reaction. An initial first order rate constant of $2.06 \times 10^{-3} \text{min}^{-1}$ was calculated. An unexplained increase in the reaction rate of several orders of magnitude occurred after ~30% oxidation.

The extraction coefficient for AmO_2^{++} for 30 vol % DBBP-70 vol % CCl_4 was found to be 0.82, while the coefficient for Am^{+3} under the same conditions was found to be 0.081. Assuming that the coefficients for Am^{+3} and Cm^{+3} are about the same, the tenfold difference in extraction coefficients should offer a practical approach to the separation of these elements.

b. Americium Purification Development

The study of extraction variables continued using batch contactings. Contact time was varied over the range of two to six minutes. The longer times gave lower extraction coefficients, and a time less than two minutes may prove optimum.

Extraction coefficients increased from 6.9 to 10.2 as the concentration of complexing agent, DTPA, increased from 0.09 M to 0.182 M. The system also had better clarity at the higher DTPA concentration and less crud formed.

c. Plutonium Metal Fire Extinguishment

Two burnings were carried out in a standard storage can in a storage rack. Both burns were self-extinguishing with 96% and 76% of the metal oxidized. No physical damage of cans or rack occurred.

A hood atmosphere of 3% freon in air was shown to greatly inhibit ignition. The time of exposure to the igniting arc had to be increased fivefold before a fire could be maintained.

Freon 1301 (recommended by many authorities) failed to extinguish a plutonium fire. In fact, a vigorous reaction occurred, with excessive smoke, white heat, and temperature rising sharply.

d. Reduction Vessel Studies

Previous work showed that tantalum reduction vessels coated with Fiberfrax cement, calcium fluoride, and zirconia were unsatisfactory reusable vessel candidates. Failures occurred which precluded reuse.

DECLASSIFIED

ISO-512

DEL

A fluoride reduction was made in a standard silicon nitride pouring crucible. The reduction reaction was carried out successfully. However, the vessel did break and considerable salt penetration of the walls occurred. Other materials will be sought.

e. Lithium Aluminate Targets

Two slip-casting runs were performed for which the calcining temperatures had been 800 and 100 C, respectively. No differences in slip behavior were observed which could be attributed to this variable. The lower temperature will be used for near-term work.

Milling periods have now been varied over 3, 8, and 18 hours. As judged by handling characteristics, the best slip results from the longest milling time. This should also improve the fired density.

for *O. F. Phil*
Manager
Research and Engineering

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

SEPTEMBER, 1966

II. ACHIEVEMENTS (Continued)

H. EMPLOYEE RELATIONS

1. Union Relations

There were 8 grievances filed during the month of September of which 4 were processed at the Step 2 level.

Two of these grievances were of particular interest since they come as a result of the work stoppage.

- a. The Macy grievance protested the termination of two employees that were absent the week preceding the strike. One employee has since been rehired, but the second has not and the Union has been notified that we do not intend to rehire him. This case is particularly sensitive since the individual involved was Chief Steward for the Boilermakers.
- b. The other grievance involved a request by the Union to charge overtime worked during the strike. The Company notified the Union that it does not plan to list this overtime.

Wage increase for Nonunit Weekly-Salaried employees was approved by the Atomic Energy Commission and announced to employees. Revised progression schedules were forwarded to all supervisors with Weekly-Salaried independent employees. In this same area, the results of the Northwest Area Wage Survey were reviewed. The results showed that Isochem rates compare favorably to other employers in this area, with the exception of semi-technical employees. Correcting this situation was the subject of meetings with Section Managers and Laboratory Managers. It is expected that some short-term corrective action will be taken very soon.

2. Benefit Plans

Isochem's second death case occurred when Edwin P. Gubala, Separations Process Operator, died September 21, 1966. Death was caused by a coronary occlusion. Settlement of wages owed and benefit plans was started on September 23, 1966.

DECLASSIFIED

3. Education and Training

There were no training activities during the month. A meeting with the Martin Company was attended the last week of the month in Baltimore, Maryland. A considerable portion of this meeting was devoted to Education Training and Manpower Development. Information was brought back on a Martin sponsored workshop, concerned with subcontract pricing that will be held the last week in October. Space has been reserved for one Isochem employee to attend this workshop. Information on other training subjects discussed in this meeting is covered in a trip report now circulating.

4. Technical Recruiting

As an assist to the college recruiting efforts for the coming recruiting season, plans are underway to conduct ahead of recruiting visits to certain universities a seminar on Waste Management and Fission Products utilization. The first of these seminars will be presented at the University of Washington on October 18. Lynn Godfrey, an engineer with the Fission Products Process Engineering Subsection, will conduct the seminar before students from chemical engineering, mechanical engineering and chemistry. Arrangements have also been completed for Lynn to conduct a similar program at Brigham Young University and the University of Utah on October 24 and 25. A schedule has also been arranged for a similar presentation to be made on January 20 and 21, 1967, at Montana State University. An attempt will be made to also have this program scheduled at Washington State University and the University of Idaho prior to Isochem's spring return visit.

From the meeting attended with the Martin Company in Baltimore, it appears that there will be some cooperative effort on the part of Martin to help Isochem recruiting activities at the colleges they will visit. The division which appears to be the one offering the best change of cooperation is Martin's Denver Division.

5. The Improvement of Quality of Service to the Public received another big plus with the touring of the Seattle Times Medical and Science Editor through the 200 Areas and the B-Plant Waste Management facility on September 23. Isochem press release material had interested him in coming to Hanford to determine news feature material. A half-page feature in the Sunday,

[REDACTED]

October 2, issue of the TIMES resulted from the visit. The feature presented a positive review of the Hanford diversification program and Isochem's role in developing new and useful products from atomic energy. The contact achieved through this tour promises additional good, positive press relations for both the AEC and Isochem.

The Seattle press has published three feature items on Hanford and Isochem activities in the past six weeks.

Isochem speakers, talking about the development and diversification of the Hanford business, received good press coverage in Spokane, Butte, Montana and other regional newspapers and in the U.S. Rubber Company's UniRoyal World, which is distributed to nearly 60,000 employees throughout the world.

A fact sheet has been developed to assist Isochem representatives discuss the Hanford complex and Isochem's role here, and as an aid in press relations. It was first used by Contracts and Purchasing people at the National Procurement Conference in Seattle.

George Sahler
Manager Employee Relations

DECLASSIFIED

DECLASSIFIED

ISO-512

DEL

CHEMICAL PROCESSING DIVISION

MONTHLY REPORT

September 1966

<u>Operation:</u>	<u>General</u>	<u>R&E</u>	<u>FEO</u>	<u>Waste Mgt.</u>	<u>Prod.</u>	<u>Redox</u>	<u>Purex</u>	<u>Pu. Fin.</u>	<u>Total</u>	<u>YTD</u>
Dis. Injuries									0	2
Sig. Incidents									0	5
Med. Treat. Inj. 1	1		11	6		6	6	4	35	292
Rad. Occurrences						2	4	6	12	98
Contam. Wds.									0	6
New Dep. Cases									1	6
Fires									0	8

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

SEPTEMBER, 1966

II. ACHIEVEMENTS (Continued)

I. WASTE MANAGEMENT SECTION

1. Operating Continuity

The B-Plant processing facilities were down all month to allow construction forces to proceed with Phase III work. Except for five brief outages to flush the off-gas equipment and to install a pump, the In-Tank Solidification unit operated satisfactorily all month. Two cesium casks, one of which was loaded in August and the other in September, were shipped.

2. Processing Operations

a. Head End

The Head End equipment was used to process Purex acid waste, resulting in the recovery of 950 kilocuries of promethium-147 and 310 kilocuries of strontium-90.

b. B-Plant

Processing facilities remained shut down to allow construction forces to proceed with Phase III work. Following the extensive flushing last month, equipment removal from Cell 5 was started and completed. Contamination control was excellent. By the end of September, new equipment installations had been started.

c. Semiworks

The second of a scheduled series of seven process tests was completed and satisfactorily demonstrated a flowsheet for partitioning cerium from promethium. The decontamination factor for cerium was only 10, versus a goal DF of 100; mechanical problems during the test probably caused or contributed to the low efficiency. The second part of the test, to demonstrate the removal of sulfate from promethium product, was also successful. Measured waste losses were only 4 percent for the cerium-promethium separation and 1 percent for the sulfate removal step.

DECLASSIFIED

DECLASSIFIED

ISO-512 DEL

d. Cask Loadings

At the Cesium Loadout Facility, one STT cask was loaded with 60,000 curies of cesium-137. STT casks 45-A and 48, containing a combined total of 100,000 curies of cesium-137, were shipped to ORNL on September 12.

e. Waste Management

With total outage time reduced to about two days, the In-Tank Solidification unit recovered approximately 165,000 gallons of waste storage space. The boil-off rate averaged 3.8 gallons per minute. To date, this unit has reclaimed a total of 2.66 million gallons of waste storage space.

3. Mechanical Experience

The process tests scheduled at the Semiworks have been delayed because of failure of the P-14 organic pump and the inability to establish flow in the feed system to the HA solvent extraction column. Although a new organic pump has been prepared for installation to correct the first problem, efforts have been unsuccessful thus far in dislodging the feed line restriction with water pressure and back-flushing.

Failure of a temperature element in Tank 003CR was caused by high temperatures in the tank, which resulted in the deterioration of the insulation. The element then partially melted and adhered to the side of the thermowell, making it impossible to remove. A new unit was installed.

4. Radiation Experience

There was nothing significant to report.

O. J. Smith
for
Manager,
Waste Management

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

SEPTEMBER, 1966

III. PERSONNEL ACTIVITIES

A. FORCE SUMMARY

<u>Section</u>	<u>Monthly Salaried</u>		<u>Weekly Salaried</u>		<u>Total</u>	
	<u>8-29-66</u>	<u>9-30-66</u>	<u>8-29-66</u>	<u>9-30-66</u>	<u>8-29-66</u>	<u>9-30-66</u>
General	2	1	1	1	3	2
Research & Engineering	58	59	34	33	92	92
Facilities Engineering	91	63	185	19	276	82
Manufacturing						
General	1	1	-	-	1	1
Production Planning	4	4	4	4	8	8
Waste Management	27	33	107	115	134	148
CPD Services		33		183		216
Redox	59	51	230	197	289	248
Purex	51	51	189	184	240	235
Plutonium Finishing	<u>44</u>	<u>41</u>	<u>189</u>	<u>181</u>	<u>233</u>	<u>222</u>
Total CPD	337	337	939	917	1 276	1 254
Corporate Offices and Business Management Division	<u>84</u>	<u>83</u>	<u>77</u>	<u>73</u>	<u>161</u>	<u>156</u>
Grand Total	<u>421</u>	<u>420</u>	<u>1 016</u>	<u>990</u>	<u>1 437</u>	<u>1 410</u>

B. PERSONNEL CHANGES

T. A. McCoy - Staff Assistant, Chemical Processing Division - transferred 8-22-66 to Manager, CPD Services.

P. E. L. Nussbaum - Manager Shops, Facilities Engineering - transferred 9-1-66 to Manager Shops and Services, CPD Services.

DECLASSIFIED

DECLASSIFIED

ISO-512

DEL

M. L. Short - Manager, Waste Handling and Decontamination, Redox - transferred 9-1-66 to Manager, Special Services, CPD Services.

DECLASSIFIED

C. TRIPS

<u>Visitors</u>	<u>To</u>	<u>Nature of Discussion</u>
<u>To General Industry</u>		
W. L. Schick	Dean Brothers Pumps Indianapolis, Ind. (9/7 - 9/8)	Pump maintenance.
J. C. Willi	Atomics International Canoga Park, Calif. (9/19 - 9/20)	Investigate vibration problems during run-in of two pulse generators
D. D. Wodrich	Nuclear Fuels Services West Valley, N.Y. (9/27 - 9/30)	Review fuel jacket removal facilities.
R. J. Sloat	Nuclear Fuels Services, West Valley, N.Y. (9/28 - 9/29)	Technical discussion of neptunium recovery and separations processes.
<u>To AEC and Other AEC Contractors</u>		
G. E. Backman	US AEC Bethesda, Md. (9/6 - 9/9)	FPCE licensing meeting.
	Savannah River Plant Aiken, S.C. (9/12 - 9/14)	Meeting on minimum land requirements.
W. G. Smith	US AEC Germantown, Md. (9/6 - 9/8)	O2 Production scheduling meeting.
O. F. Hill	US AEC Washington, D.C. (9/16)	R&D discussions.
	Argonne National Lab Chicago, Ill	Discussions on fluoride volatility.
R. J. Sloat	Savannah River Plant Aiken, S.C. (9/13 - 9/14)	Discuss separations plant planning requirements.
	Oak Ridge National Lab Oak Ridge, Tenn. (9/15)	Discuss waste management.

DECLASSIFIED

DECLASSIFIED

ISO-512

DEL

To AEC and Other AEC Contractors (Continued)

R. J. Sloat	US AEC Washington, D.C. (9/16)	Discuss waste disposal practices.
H. A. Clark	US AEC Boston, Mass. (9/13 - 9/16)	9th Annual Air Cleaning Conference.
W. P. Ingalls	US AEC Boston, Mass. (9/13 - 9/16)	9th Annual Air Cleaning Conference.
J. D. Anderson	Oak Ridge National Lab. Oak Ridge, Tenn. (9/26 - 9/30)	Discuss fission products analyses, H1 Level cells and analytical equipment.
D. C. Nelson	Oak Ridge National Lab. Oak Ridge, Tenn. (9/26)	Discuss H1 Level cell arrangement.
	US AEC Gatlinburg, Tenn. (9/27 - 9/28)	Analytical Chemistry Conference.
	Savannah River Plant Aiken, S.C. (9/29)	Discuss H1 Level cell arrangement.
H. C. Rathvon	US AEC Germantown, Md. (9/21)	Joint AEC and Contractor meeting on thorium specification approval.

To Technical Society Meeting, Seminars, etc.

O. F. Hill	New York City (9/11 - 9/15)	152nd meeting of American Chemical Society.
W. C. Johnson	New York City (9/11 - 9/15)	152nd meeting of ACS - presented a paper.
W. Watson, Jr.	New York City (9/11 - 9/14)	152nd meeting of ACS - recruiting.
A. E. Smith	New York City (9/26 - 9/30)	Attended American Management Association course.
R. F. Campbell H. W. Paulson	Portland, Ore. (9/18)	Procurement counselling conference.

To Technical Society Meetings, Seminars, etc. (Continued)

W. Watson, Jr.	Martin Marietta Corp. Baltimore, Md. (9/27 - 9/30)	Attend Training and Recruiting meeting.

D. VISITORS

<u>Visitors</u>	<u>From</u>	<u>Nature of Discussion</u>
W. Voigt Deputy Director Division of Production	US AEC Headquarters (9/20)	Financial Tour of Purex
L. K. Hurst J. L. Lundmark A. B. Shuck F. W. Thalgott	Argonne National Lab. Chicago, Ill (9/20)	ZPPR ingotting with Plutonium Finishing Section personnel.
G. Pence F. A. Sojka	Lawrence Radiation Lab. Livermore, Calif. (9/22)	Operation and packaging of the 1 Mev X-ray machine.
O. D. Erlandson R. W. Lambert	General Electric Co. San Jose, Calif. (9/29 - 9/30)	Purex process.

DECLASSIFIED

ISO-512

DEL

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

SEPTEMBER, 1966

IV. REPORTS

A. PREPARED AND ISSUED

ISO-262 SUP, (Secret), Supplement to the Budget for FY 1968 and Revised Budget for FY 1967 R&D Program.
R. E. Tomlinson, 9-23-66.

ISO-443 (Secret), Isochem Inc. Sponsored Programs for Research and Development and Process Technology Support.
O. F. Hill, 8-29-66.

ISO-335 (Secret), Redox Chemical Flowsheet - HW No. 9.
A. L. Boldt, 9-6-66.

ISO-466 (Unclassified), Isochem Current Analytical Capabilities.
O. F. Beaulieu, J. W. Fillmore, G. L. Gurwell,
R. J. Kofoed, 9-3-66.

ISO-468 (Secret), Recovery of Pu-238 Scrap. J. H. Warren, 8-31-66.

ISO-477 (Secret), Nuclear Materials Review - Plutonium Finishing Section - Third and Fourth Quarters - FY 1966.
R. W. Doerr, 9-8-66.

ISO-479 (Unclassified), The Comparison Between Micro Q and Micro-curie Results from Gamma Energy Analyses at Purex.
J. M. Calkins, 7-1-66.

ISO-481 (Unclassified), Critical Mass Control Specifications - Low Pu-240 Material. L. M. Knights, 9-6-66.

ISO-483 (Unclassified), Critical Mass Control Specification for Transfer, Handling and Storage of U-233 In 224-T Building,
H. A. Moulthrop, 9-7-66.

ISO-493 RD (Secret), Curium-244 Production - Progress Report.
T. R. McKenzie and R. A. Watrous, 9-14-66.

ISO-494 (Secret), Chemical Flowsheets for Processing Irradiated Np-237 Target Elements at Purex. T. R. McKenzie, 9-16-66.

ISO-495 (Unclassified), Gamma Scintillation Spectrometry.
W. H. Zinner, 9-15-66.

A. PREPARED AND ISSUED (Continued)

ISO-503 (Secret), Analysis of Neptunium Batch, Purex No. 8-66,
M. K. Harmon, 9-20-66.

ISO-514 (Secret), Supplemental Data - UK Barter B Shipment 101-AAA-
HWA-1, V. W. Smith, 9-30-66.

ISO-515 (Unclassified), Spectrographic Determination of Trace Im-
purities in Plutonium, Uranium and Thorium.
N. S. Wing, 9-30-66.

ISO-SA-3 REV (Unclassified), Recovery of Uranium-233 from Irradiated
Thoria. H. C. Rathvon (Isochem Inc.), A. G. Blasewitz
(Battelle Northwest Lab.), and R. Maher, J. C. Eargle, Jr.
and A. E. Wible (du Pont, Savannah River Plant). May, 1966.

DECLASSIFIED

DECLASSIFIED

ISO-512

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

SEPTEMBER, 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

None

Vice President
Plant Operations

L-1

DECLASSIFIED

END

**DATE
FILMED**

3 / 18 / 93