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CHEMICAL PROCESSING DIVISION
MONTHLY REPORT
FOR

HAN-96091

OCTOBER, 1966

Compiled by
SECTION MANAGERS

November 21, 1966

ISOICHEM INC.
RICHLAND, WASHINGTON

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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-2
E. Financial Controls 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-4
I. Waste Management Section	I-1 through I-3
J. CPD Services Section	J-1 through J-2
III. PERSONNEL ACTIVITIES	K-1 through K-3
IV. REPORTS ISSUED	L-1 through L-2
V. PATENT SUMMARY	M-1

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STAFF

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Vice President, Business Management	H. D. Gilbert
Vice President, Marketing	E. T. O'Sullivan
Vice President, Plant Operations	P. E. Reed
Manager, Facilities Engineering	H. P. Shaw
Manager, Research and Engineering	R. E. Tomlinson
Manager, Manufacturing	J. H. Warren
Manager, Plutonium Finishing	L. I. Brecke
Manager, Production Planning	M. K. Harmon
Manager, CPD Services	T. A. McCoy
Manager, Redox	R. W. McCullugh
Manager, Waste Management	R. E. Smith
Manager, Purex	L. L. Zahn

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CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

OCTOBER, 1966

I. SUMMARY

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

	<u>October</u>	<u>Fiscal Year to Date</u>
Separated plutonium nitrate	128	114
Separated uranium nitrate	126	113
Uranium oxide	124	112
Plutonium metal buttons	102	101

October performance of the plant production facilities was outstanding. The Purex plant processed 915.2 tons uranium and thus exceeded the previous record of 908.5 tons established in April, 1965. In addition, 625.4 kilograms of plutonium were separated by Redox and Purex combined; this exceeded the previous record of 606.4 kilograms also set in April, 1965.

The Purex instantaneous process rate was limited to 25 tons per day the first 7 days of October while the regeneration of B-cell silver reactor was being completed. After three-dissolver operation was restored on October 8, the plant operated almost continuously throughout the remainder of the month at 30 tons per day.

The Redox plant successfully processed three types of feed during October. The last 94 enriched uranium from the five conventional production reactors that will be processed in Redox was charged to the dissolvers on October 9 and processing was completed on October 17. A special campaign of irradiated, highly depleted uranium was then started and was completed on October 25. At month's end, Redox was processing N-reactor fuels.

The Plutonium Finishing processes performed satisfactorily. Operation of the incinerator furnace was resumed in October after the unit had been out of service for more than a year for repairs.

Preliminary capital cost estimates were developed for a study of several processing schemes which could provide multiproduct capability for power-reactor fuel reprocessing in the Redox plant.

The Redox encased waste lines and line support system were inspected and found to be in good condition. This information suggests corrections that can be made to the Purex encased waste lines to prevent damage from thermal expansion.

A proposal for fabricating 40 percent of the ZPPR fuel elements requested for FY-1967 was presented for Argonne National Laboratory consideration.

Recently the hydrogen concentration in the off-gases from the Redox dissolvers has occasionally exceeded the lower flammable limits ($4.0 \pm 0.1\%$) while sodium nitrate recovered from high level waste storage tanks was being used to suppress hydrogen. Operating conditions have been adjusted so that the recovered sodium nitrate can still be used, while further studies are conducted to determine the cause of the off-standard behavior.

Vice President
Plant Operations

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CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

OCTOBER, 1966

II. ACHIEVEMENTS

A. PRODUCTION PLANNING

1. Production Statistics

a. <u>Percent of Forecast⁽¹⁾ Achieved</u>	<u>October</u>	<u>Fiscal Year to Date</u>
Separated plutonium nitrate	128	114
Separated uranium nitrate	126	113
Uranium oxide	124	112
Plutonium metal buttons	102	101
b. <u>Purex</u>	<u>October</u>	<u>September</u>
Uranium nitrate produced (tons)	915	578
Average production rate during operation (T/D)	30	23
Total waste loss (%)		
Plutonium	0.32	0.37
Uranium	0.23	0.29
On-line efficiency (%)	100	92
c. <u>Redox</u>		
Uranium nitrate produced (tons)	146	221
Average production rate during operation (T/D)	6	9
Total waste loss (%)		
Plutonium	0.30	0.39
Uranium	0.43	0.12
On-line efficiency (%)	70	83
d. <u>Uranium Reduction (tons)</u>		
Normal UO ₃ loaded	718	461
Enriched UO ₃ loaded	196	172
Normal UO ₃ approved for storage	718	461
Enriched UO ₃ approved for shipment	172	201
Normal UO ₃ shipped	0	0
Enriched UO ₃ shipped	121	161
Normal UNH backlog	433	210
Enriched UNH backlog	53	126

(1) ISO-377 QUARTERLY PRODUCTION FORECAST

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f. Power

	<u>200-East</u>	<u>200-West</u>
Raw water pumped (gpm)	10 632	6 227
Filtered water pumped (gpm)	1 153	1 079
Maximum steam generated (lbs/hr)	230 000	138 000
Average steam generated (lbs/hr)	200 000	99 685
Total steam generated (M lbs)	148 766	74 166
Coal consumed (tons)	7 441	3 711

October performance of the plant production facilities was outstanding. The Purex plant, by processing 915.2 tons uranium, exceeded the previous production record established in April, 1965 when Purex processed 908.5 tons. In addition, 625.4 kilograms of plutonium were separated by Redox and Purex combined; this exceeded the previous record of 606.5 kilograms set in April, 1965.

M. K. Harmon
Manager, Production Planning
Chemical Processing Division

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2. FISSION PRODUCT DATA (Kilocuries)

06-15

Pm-147 (Unaged)

Pm-147 (Aged)

Cs-137

[illegible]

(1) Adjustment of ^{140}KCi in Pm inventory because of recent analyses.

(2) STT Casks 44 and 46 containing 60 and 52 KCi shipped to ORNL on 10-10-66; Casks 45-A and 47 containing 60 and 49 KCi shipped on 10-28-66.

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CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

OCTOBER, 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 3.0. On October 7, the rates were increased over an eight-hour period to 3.6, and remained constant at that rate through the end of the month. The rate during the early portion of the month was limited, however, by having only the A and C dissolvers in operation while the B2 silver reactor was being flushed and regenerated.

2. Processing Operation

All plutonium and uranium product met specifications except for five batches of plutonium which were processed through the L Cell Package because of a temporary malfunction of the N Cell ion exchange unit.

The cooling time of metal feed was reduced to as low as 120 days for a one-week period to provide sufficient heat so that tank 104-AX would boil at the proper time. Seven days production of neutralized LWW was also sent directly to 104-AX instead of through the fission product recovery cycle as part of the 104-AX tank heat-up program.

N Cell was taken off the line twice during the month due to equipment malfunction. Production continued by processing plutonium through the L Cell Package.

Plugging of the 10F jumper was a constant problem during the latter part of the month and required frequent flushing to permit continuation of processing at a 3.6 capacity factor rate.

Two neptunium purification runs were completed. A total of 1946 grams was shipped.

A new production record was achieved this month by processing 915 tons of normal uranium. The new mark supersedes the previous high for one month made in April of 1965 by 6.65 tons.

3. Equipment Experience

The U1 and 2 acid pumps (Vertical Turbine Type) failed this report period when the upper shaft seals developed a severe leak. The pumps were removed and replaced with new pumps from Spare Equipment. The condition of the failed pumps would not permit reconditioning, so

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the 10 H.P. electric motors were removed for use in the pump repair program, and the pumps were taken to burial.

The 2-inch stainless steel pipe, located in the canyon wall between the Pipe Operating Gallery wall nozzle EG-52 and G Cell, failed. This pipe and wall nozzle were reclaimed by pulling a stainless steel flex through the failed pipe and using special adapters on each end.

The U2 acid agitator (15 H.P. Right Angle Drive) failed mechanically, causing high electric motor amperage and the unit became inoperative. The agitator was completely overhauled, replacing two shafts, two impellers, two bearings, the shaft seal, and the drive coupling, placing the unit in good condition. The unit was reinstalled and returned to service.

The L-10 process pump failed because of a severe leakage at the upper shaft seal. The failed pump was replaced with a new unit from Spare Equipment.

The chemical make-up agitator located in AMU 221-tank failed because of bad bearings. The unit was overhauled, replacing two bearings, the drive shaft and the shaft seal. The agitator was returned to service and is operating satisfactorily.

The load cable to the ten-ton hoist located on the canyon west crane was replaced. Need for this replacement was determined through the preventive maintenance inspection program.

Other equipment work at the Purex Plant included:

- a. Repair in the canyon to the feed jumper of the 10 column.
- b. Installation of a spare sampler jumper in the receiver tank for uranium product.
- c. Replacement of the DOV on the C3 acid system and replacement of a bearing on the No. 2 exhaust fan.

4. Radiation Experience

Iodine-131 emission for the month was 11.98 curies, which resulted from the processing of 120-day cooled metal. The peak release on a daily basis was 1.4 curies, which occurred on October 17. Stack emission was back to normal by the end of the month.

Some spread of plutonium contamination was experienced in the hot shop during the repair of a failed L9 pump. The plutonium contamination was contained within the boundaries of the shop and subsequent decontamination efforts have reduced the level of contamination back to normal.

5. Analytical Experience

Laboratory personnel are currently spending time at the Redox Laboratory to obtain information on analytical problems involved with the current Zirclad Fuel Element Processing Run. Information obtained will be used as a foundation to provide the Purex operation with the best possible analytical support for

[REDACTED]

the Zirclad demonstration run scheduled for early next year.

A new procedure has been placed into service for the determination of nitrite deficiency in Q Cell waste. The nitrite deficiency is determined by adding a known excess of nitrite to the sample and measuring the unreacted nitrite.

An aliquot of a sodium hydroxide essential material sample was submitted to Battelle-Northwest Laboratories for an independent check of our strontium determination. Excellent agreement was obtained between the laboratories. Our analyses showed less than 10 parts per million, as compared to Battelle's result of 9.8 parts per million.

Manager-Purex

LL Zahn:WCJ:gt

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ISO-563 DEL

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

OCTOBER, 1966

II. ACHIEVEMENTS (Continued)

C. REDOX SECTION

1. Operating Continuity

Processing operations in the Redox plant during October were concerned with the separation and decontamination of three diverse types of irradiated fuels, namely: 1) aluminum-clad 94 fuel, 2) aluminum-clad highly depleted non-weapons grade normal fuel, 3) zircaloy-clad N-Reactor fuel.

The last regular 94 metal scheduled for processing in the Redox plant was received and charged to the dissolvers on October 9. Final solvent-extraction processing was completed on October 17 and the balance of the month was used for the special fuel processing campaigns noted above. Plant performance during the normal and "special" processing campaigns was satisfactory and no significant delays due to mechanical or processing difficulties were encountered.

The Uranium Oxide plant operated very well throughout the month and the production of both depleted and enriched uranium oxide exceeded that expected.

2. Processing Operations

a. Redox Processing

The first part of the month was used to process the last of the normal 94 metal scheduled for the Redox plant. Dissolving of the metal feed was completed on 10-9-66 and final processing was terminated on 10-17-66. Processing rates during this production run were sustained at an average rate of 90 percent. Operating and mechanical efficiencies during this period were 87 and 97 percent, respectively.

The normal 94 metal production run was followed by a short "special" processing campaign using highly depleted non-weapons grade normal fuel (E-D metal) from Douglas-United Nuclear Corporation. The E-D metal was dissolved and processed through recovery by 10-28-66. Operational and mechanical efficiencies of 100 and 84 percent respectively were experienced during this "special" run. Product waste losses were maintained at nominal levels - 0.19 percent uranium and 0.11 percent plutonium.

Operating rates for the E-D metal processing were regulated to a 3.0 ton per day rate due to the high g/T ratio and capacity restrictions imposed by the plutonium extraction cycles. Although there were no interruptions in processing continuity during this period for operational or mechanical reasons, the reworking of approximately 4.5 tons of material was required in order to meet customer specifications for shipment.

During the final stages of E-D metal processing, the dissolution of zircaloy-clad fuels from General Electric Company's N-Reactor was started. Solvent extraction of the dissolved feed was started on 10-28-66, and continued through the end of the month.

Effective October 3, 1966 responsibility for operation of the 242-T Waste Evaporator was transferred to the Waste Management Section.

b. Uranium Oxide Processing

Processing in the Uranium Oxide plant was very satisfactory throughout the month and the expected production of both depleted and 94 metal uranium oxide was significantly exceeded.

All six calciners were on-line this month with only intermittent short outages taken to clean out the calciner off-gas piping and reack the agitator shafts.

On October 7, H-calciner was diverted from enriched to depleted UNH service in order to keep pace with the depleted UNH feed inventory. During the balance of the month processing was conducted with 5 calciners on depleted feed and one on enriched.

The last shipment of enriched uranium oxide powder to the National Lead Company, Cincinnati, Ohio was made on October 13. Subsequent shipments have been suspended pending the outcome of a work stoppage at National Lead.

3. Mechanical Experience

a. Redox Plant

Replacement of the radiation damaged viewing window in the 2-1 position of the Redox extraction column silo was successfully completed by the J. A. Jones Construction Company this month. Although radiation dose rates in the work area were high, the job was completed without incident. Salvaging of the undamaged glass panes from the old window will be attempted and if successful will be used to replace darkened panes on at least one other silo viewing window.

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With the concurrence of both Research and Engineering and Facilities Engineering personnel, modifications were made to the off-gas piping on A dissolver which essentially eliminates the use of the silver reactor. This action was taken to eliminate the need to fabricate an expensive reactor by-pass jumper which had failed. No risk of an I-131 release exists due to the age of the metal to be processed at Redox during the balance of the year.

b. Uranium Oxide Plant

Modifications to the product discharge piping from the ED-7 UNH concentrator were made this month which have essentially doubled the through-put rate of the unit. The modification work included: 1) the installation of sloping lines, 2) the elimination of bends in the piping, 3) the installation of steam tracer lines to avoid freeze-ups.

The cause of the unsatisfactory performance of the X-6-2 hammermill operation was resolved this month with the detection of small cracks between the ends of the powder retention screen and the mill housing. The cracks, which allowed the passage of unmilled powder, were repaired and the unit returned to service. All subsequent milled powder from the repaired unit has been of acceptable particle size.

4. Radiation Experience

The viewing window in the 2-1 position of the Redox extraction battery silo was successfully replaced without incident by J. A. Jones Construction forces this month. A major radiation problem was encountered when it was found necessary to remove four steel stop plates from the window encasement before the installation could be completed. Although a four inch lead and steel radiation shield had been remotely installed within the silo and behind the window, this was not adequate when it became necessary to remove the stop plates. By installing additional lead shielding after the window had been removed, the working dose rate for removal of the stop plates was reduced from approximately 15 R/hr to 2 R/hr at 12 inches. At this level, removal of the stop plates and final installation of the new window was completed and no contamination spread occurred.

Arrangements were made this month by the Facilities Engineering Section for uncovering and inspecting the underground waste line encasement from the 202-S Building to the underground waste tank farms at a point just west of the 204 area. The object of the inspection was to examine the pipe bends and determine if stresses had become excessive over the years due to the heating and cooling of the pipes. A maximum of 4 R/hr was measured directly over the encasement cover after the piping had been flushed and 40 mR/hr at grade level after excavation. When the encasement cover block was lifted the dose rate at grade level rose to 270 mR/hr. However, there was no contamination spread. It had

been previously determined, by swabbing through one of the encasement risers that only negligible smearable contamination amounting to a few thousand counts per minute was present in the encasement.

5. Analytical Experience

Concentration and isotopic distribution analyses were performed on composited samples of Redox dissolver solutions taken during the processing of E-D and NPR fuels. The E-D sample analyses were performed for Douglas United Nuclear, Inc., and the NPR for the General Electric Company.

Eight flux monitors submitted by the Battelle-Northwest Laboratory were analyzed by gamma energy analysis as part of the Foils Irradiation Program sponsored by the AEC. Using one of the copper foil flux monitors submitted, it was possible to calibrate additional geometry positions for the 311-N multichannel analyzer for the very short half-life Cu-64 (12.84 hour half-life).

Samples of Shippingport dissolver and waste solutions were submitted by the Battelle-Northwest Laboratory for the determination of zirconium and uranium concentrations, gamma activity, alpha total and alpha energy analyses.

Modification work on the Sharp Low Beta counting instrument was completed this month and the unit returned to service. The laboratory now has two total beta counting instruments with gas flow proportional counting accuracy and precision. In addition, the modifications included the installation of an alpha detection system. This system now standardizes the two beta counters and permits the units to count alpha independently or simultaneously with the beta.

R W McCullugh

Manager - Redox

RW McCullugh:HWM:sss

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CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

OCTOBER, 1966

II. ACHIEVEMENTS (Continued)

D. PLUTONIUM FINISHING SECTION

1. Operating Continuity

The production of plutonium metal was routine during the month. Plutonium-recovery operations were satisfactory except for plugging problems involving the slag-and-crucible dissolvers. The incinerator resumed burning operations on October 17, and has continued on an intermittent basis as manpower was available.

2. Processing Operations

a. Plutonium Processing

Button-line production consisted of weapons-grade plutonium exclusively.

Receipts of nondefense plutonium from off-site consisted of two transfers (152 kilograms total) of United Kingdom metal from Dow - Rocky Flats, and two kilograms of nitrate from NUMEC.

b. Plutonium Reclamation

Seventy-nine kilograms of plutonium, as nitrate, were recovered and delivered to the button line from the recovery facilities.

Fourteen hundred and thirty-two cans containing eleven kilograms of plutonium were processed through the slag-and-crucible dissolvers. Severe plugging of the dissolvers necessitated extensive flushing and rodding in place.

Two hundred and eighty-one grams of plutonium were returned to the main process stream from 132,124 liters of aqueous waste processed

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through the waste-treatment facility. Also, 6.6 grams of americium were recovered and stored for future processing.

Four boxes of combustible waste were processed through the rebuilt incinerator furnace, which was returned to service on October 17. Initial operation was interrupted because excessive amounts of plutonium reached the scrubber. Air flows were modified to correct the problem. At month's end, this equipment was performing satisfactorily, but was being operated only as manpower was available.

3. Maintenance

The button-line equipment performed well, with only minor delays resulting from problems with the hydrofluorinator vacuum system.

The recovery equipment performed satisfactorily. Both the Mark II (04) and Mark III (08) dissolvers were in service all month, with only minor repairs required. However, plugging by undissolved solids slowed their output. The Mark I (06) dissolver was repaired and a modified condenser section was installed. It is now ready for service when needed.

Thirty-four recovery process pumps failed during the month. Thirty-one were repaired and returned to service. Three (two Deanline and one Chempump) were beyond repair and were buried.

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)	605 ppm
Average Button Pu-240 Content (WG) (as determined by neutron count)	6.21 %
Average Button Density	19.43 g/cc
Button-Line Recycle to Reclamation	26.9 kg
Average Impurities in Reclamation Output (TMI)	1,866 ppm

6. Analytical Control

Number of Samples	3,034
Number of Determinations	5,166

L. J. Breck
Manager
Plutonium Finishing

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

OCTOBER, 1966

II. ACHIEVEMENTS (Continued)

E. FINANCIAL CONTROLS OPERATION

1. Budgets and Cost Accounting

Total costs in October amounted to \$2,502,000, the highest month thus far in the fiscal year. October costs were \$473,000 higher than the average monthly costs during the first quarter of the fiscal year. The \$473,000 increase over the first quarter average consists of \$203,000 in salaries and related benefit costs, \$130,000 in essential materials, \$58,000 in other materials, \$42,000 in H. W. Railroad costs, and \$40,000 in all other elements of cost.

Increased Purex production and complete return to normal operations account for the majority of cost increases.

Costs projected for the remainder of the fiscal year at the September-October level compare with the preliminary financial plan as follows:

(In Thousands)	02 <u>Production</u>	02 <u>R&D</u>	Isotope <u>Inventory</u>	03 <u>Standby</u>	<u>Other</u>	<u>Total</u>
Financial Plan	\$22 175	\$1 730	\$1 850	\$ 160*	\$1 635	\$27 550
Projected Costs	<u>24 214</u>	<u>1 730</u>	<u>600</u>	<u>160</u>	<u>1 635</u>	<u>28 339</u>
Surplus or (Deficit)	<u>\$(2 039)</u>	<u>\$ -0-</u>	<u>\$1 250</u>	<u>\$ -0-</u>	<u>\$ -0-</u>	<u>\$ (789)</u>

*Not formally approved.

In order to control costs within financial plan limitations, it will be necessary to:

- 1) Request transfer of \$1,250,000 from Isotope Inventory to 02 Production funding.

Reduce costs for the last eight months by \$789,000 or to an average level of about \$2,370,000 per month (as compared to October figure of \$2,502,000).

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We are of the opinion that the savings from Redox shutdown in the last half of FY 1967 will finance most of the apparent deficit. ZPPR blending work, with attendant costs of a minimum of \$124,000 is also planned on to provide financial plan relief.

2. General Accounting

As of October 31, 1966 there were fifteen active projects. Following is a summary of current status of projects:

	<u>In Thousands</u>
Total Authorized Funds and Transferred	
Capital Property Authorizations	\$4 866
Total Cost-to-Date	3 238
Commitments and Open Work Releases	277
Unencumbered Balance	1 351
Costs Charged During October, 1966	57

During October, one work authority was received from the AEC: Directive No. AEC-275, Work Authority No. I-1, Project IAP-601, Export Water Line-200 East Area, authorizing \$1,000 for technical guidance.

AEC Directive EQT-055, Modification 3 was received during October increasing Isochem's authorization to incur FY 1967 obligations of capital equipment not related to construction to a total of \$661,000. It also advises that they have allocated \$15,000 to BNW for Isochem-sponsored Research and Development programs.

The following AR's were received in October:

76015 - Refrigeration Air Conditioner for Instruments	\$ 1 860
76016 - Dissolver Off-Gas Temperature Control System	7 950
76017 - Marshall PT-Rh Wound Tabular Furnace	4 794

The following AR's are being held:

76004 - Air Conditioner for 801A, B&C; 102A & 105A	4 700
76010 - Atomic Absorption Spectrophotometer	13 000
76013 - Temperature Monitors at Semiworks	4 900
76016 - Dissolver Off-Gas Temperature Control System	7 950
76017 - Marshall PT-Rh Wound Tabular Furnace	4 794

Gross essential material inventories totaled \$2,963,000 at October 31 as compared to \$3,009,000 at September 30. This \$46,000 decrease was composed of a \$79,000 decrease in Chemicals and Coal, a \$20,000 increase in Spare Parts, and a \$13,000 increase in Special Materials. The Chemical and Coal inventory decreased primarily as the result of continued high production, coupled with processing of N area material in Redox. The Spare Parts costs of \$14,000 and a consumption of \$1,000 in precious metals accounted for the increase in Special Materials.

3. Management Systems and Studies

AEC Management Information System

Master file data for the Financial subsystem has been established. To date, Isochem has established beginning balances as of July 1, 1967 and has made available July, August, and September accounting changes. A new cross reference file coding system was devised and will be placed on the computer master file following the next processing of MIS.

On October 10, a meeting was held pertaining to the feasibility of integrating the MIS contract subsystem with our existing purchasing system. It was concluded that integration will be practical when and if the MIS system requirements become static.

Redox System

International Business Machines Corporation has successfully resolved the problems, mentioned in the last month's report, with the 1050 system. Operation has been satisfactory since corrective maintenance was performed. The earlier problems apparently resulted from damage caused by several electrical storms that shorted and destroyed certain machine components.

for
Treasurer

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CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

OCTOBER, 1966

II. ACHIEVEMENTS (Continued)

F. FACILITIES ENGINEERING SECTION

1. Purex

ICE-601 - Co-Product Demonstration Processing Facilities - 200 West

Preparation of a project proposal revision requesting total project funds is continuing.

IAP-607 - Purex Coil Water Diversion Facilities

Preparation of a project proposal requesting facilities for segregation of contaminated coil water from Purex tank coils has been abandoned because of limited FY 1967 "General Plant" funds.

CGC-124 - Increased Processing Flexibility - Purex

Project Proposal, Revision 3, requesting extension of the project completion date to May 1, 1967, was submitted to RLOO on Oct. 21, 1966.

Remotely Controlled Locomotive

A purchase order was placed with Atlas Car and Manufacturing Co. for the 30-ton, battery operated, remotely controlled locomotive. The price was \$97,110 and delivery is scheduled for July 5, 1967.

Atomic Absorption Flame Spectrometer

Installation of the atomic absorption flame spectrometer will not be completed as forecast. It was decided to change scrubber components from carbon steel to stainless steel in anticipation of using an acid scrubbing solution in place of a caustic solution. The scrubber components made of carbon steel were off-the-shelf items, whereas, a delivery date of twenty weeks was quoted for providing scrubber parts in stainless steel.

2. Redox

Redox Multiproduct Capability - MFC-11

Preliminary capital cost estimates were developed for several processing schemes which could provide multiproduct capability for

power-reactor fuel reprocessing in the Redox Plant. A Purex (all TBP) process employing air-pulsed, sieve-plate extraction columns was selected as being best suited to the objectives of the study. Conceptual EFD's for installing the TBP process in Redox are being prepared to define major equipment requirements.

3. Waste Management

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

A project proposal revision requesting total project funds in the amount of \$800,000 including \$35,200 for transferred capital property was transmitted to RLOO on October 19, 1966. All phases of the design have been evaluated for possible hazards. Recommendations for design changes and additions that will eliminate potentially hazardous conditions have been made.

Third Prototype Immersion Heater

The change in location from BY Tank Farm to TX Tank Farm for the installation of the third prototype immersion heater, required increasing the substation size at 241-TX. A 200 KVA bank will be installed, replacing the 75 KVA bank. This will provide the power required for the 140 KW heater and allow extra capacity for an anticipated increase in pumping load.

Radioactive Waste Handling and Storage - Redox Waste Encasement Inspection

A visual inspection of one bend in the Redox waste line encasement showed the general appearance of both the encasement interior and the piping to be in good condition. Most of the concrete spools supports were broken and one line had received dents when a broken spool became wedged between the pipes during expansion. The fact that the spool pieces were fractured indicates that high temperatures have been experienced by the pipelines. Yet, the pipelines have operated satisfactorily for 15 years at temperatures ranging from 175-212 F. Apparently the pipes have been able to obtain the needed deformation to accommodate thermal expansion through stress and column buckling action without flattening or rupturing the bends as was the case with the Purex waste lines.

Purex Waste Encasement Pipelines

The possibility of modifying the new Purex Waste Encasement Pipelines by removing the U-type support guides was evaluated. Based on the inspection of the Redox waste lines, it appears that removal of these supports will permit thermal expansion of the pipelines without failures in the bends. If the radiation

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reading can be reduced to the same level as that which existed at the time of the inspection, the estimated cost for removal of the guides at fifteen different locations is \$30,000

Sludge Removal and Waste Transfer Piping - Project CAC-169

As a result of the broken spools observed during the Redox waste line inspection, the use of spools supports proposed for the AR Vault project was reviewed.

221-B Cask Load-In and Load-Out Facilities

Preliminary design criteria have been prepared for the conversion of Cell 15 to a high-level waste cask load-in and load-out station. The proposed system provides for cask hookup and decontamination via remote manipulator. Based on these criteria, Cell 15 conversion and peripheral facilities are estimated to cost in excess of \$200,000.

4. PACE Budget FY 1968

Neptunium and Plutonium Recovery Facilities at the Semiworks

A Construction Project Data Sheet for FY 1968 was prepared and is awaiting approval prior to submission to RLOO. Total cost is estimated at \$600,000.

5. General

Welding and Fabrication Specifications

Review and updating of welding and fabrication specifications are continuing. A procedure for welding and fabrication of boron stainless steel was prepared.

ZPPR Program

A proposal for fabricating forty percent of the fuel elements requested for FY 1967 was presented to ANL representatives. The construction schedule for this program shows that it would take twelve months from the date of authorization of funds to complete construction. Additional study has been completed which is directed toward compressing the construction schedule. The results of this study are

presented in a document which is to be distributed for comment when a revised estimate is completed.

Alpha Job Shop

Study has been initiated to establish the basis for scoping the facilities required for a versatile job shop in the 234-5 Building for the preparation and encapsulation of alpha emitting isotopes. The facility would receive nitrate solutions of Po-210, Cm-244 and Cm-242, and Pu-238, convert them to a form suitable for use as heat sources, such as high-fired oxides or metal alloys, and encapsulate them in a variety of sizes and shapes of capsules.

Manager
Facilities Engineering Section

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CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

OCTOBER, 1966

II. ACHIEVEMENTS (Continued)

G. RESEARCH AND ENGINEERING SECTION

1. Separations Process Engineering

Purex

a. Solvent Extraction

The plant continued to process natural uranium fuel elements as the operating rate was increased from 2.8 to 3.6 C. F. The zirconium-niobium content in the product uranium stream increased as the cooling time for the feed decreased from about 180 days to 135 days. The increase was about proportional to the increase in feed activity. At this point, the zirconium-niobium content was about a factor of two below specification limits. The uranium product quality remained at this level until flow ratio adjustments were made in the HA Column to lower the abnormally high (0.3 percent versus 0.02 percent) plutonium waste losses in the HAW. The higher-than-normal aqueous-to-organic flow ratio lowered the waste losses but also decreased the zirconium-niobium DF. The zirconium-niobium content in the uranium product exceeded specifications by up to 20 percent for about one day. The material was blended into specifications. The high HAW losses occurred during the processing of in-plant plutonium product rework solutions. The plutonium product remained within specifications during the report period.

b. Solvent Treatment

The zirconium-niobium content in the 100 solvent stream increased as the feed activity increased, but the ruthenium content remained essentially the same. In contrast to prior experience with Soltrol-170, the plutonium retention analysis results remained near 1×10^7 counts per minute per gallon for both solvent systems.

c. Neptunium Ion Exchange

Two neptunium campaigns were completed during the month. The feed solution for these campaigns contained significantly less uranium, plutonium, and thorium than did the feed solutions for last month's campaigns. The fewer washes of the loaded resin

bed that were required resulted in improved product recovery. Consistent with the original development data, it was demonstrated that lowering the loading temperature from 50 to 40 C and the feed acid concentration from 8 to 7 M HNO_3 increased the thorium DF a factor of 10.

Redox

a. Hydrogen in Redox Off-Gas

Sodium nitrate recovered from salts in the high-level waste storage tanks has been routinely used for hydrogen suppression during the sodium hydroxide dissolution of aluminum cladding at the Redox Plant since 1963. Recent data obtained during plant decladding operations have shown that the hydrogen content of the off-gases has occasionally exceeded the lower flammable limit (4.0 ± 0.1 percent, by volume) while using this tank farm salt solution. With the same operating procedures except for the substitution of commercial sodium nitrate, the periods of high hydrogen content were not experienced. The data were obtained from continuous hydrogen and ammonia monitors installed for this purpose, and the compositions during periods of peak hydrogen evolution were confirmed by independent analyses of off-gas samples.

Further investigation is planned to determine the cause for this problem. Meanwhile, by adjusting the Redox operating procedures to control evolution rate and dilution, the tank farm nitrate can be used with safety.

2. Fission Products Process Engineering

a. In-Tank Solidification (ITS) Prototype Brink Deentrainer

The prototype Brink deentrainer described in the August report has operated for 50 days with relatively few operating problems. During the first 10 days of operation, the normalized differential pressure across the deentrainer bed increased from 0.072 in. $\text{H}_2\text{O}/\text{CFM}$ to 0.13 in. $\text{H}_2\text{O}/\text{CFM}$; however, the last 40 days of operation have yielded cyclic normalized differential pressures ranging between 0.093 and 0.14 in. $\text{H}_2\text{O}/\text{CFM}$. Based on a statistical analysis of the data for this latter period, 95% of the normalized differential pressure measurements fall in the range 0.119 ± 0.022 in. $\text{H}_2\text{O}/\text{CFM}$. During the last 40 days, the dose rate of 30 mr/hour at the surface of the Brink unit has not changed. The activity of the deentrained liquid has increased significantly, and brown particulate matter has accumulated in the bottom of the unit indicating that the unit is self-cleaning and functioning properly. The average Cs removal efficiency has been 98.5 percent.

b. 241-TX Underground Waste Storage Tank Cooler

The prototype underground waste tank cooler operated all month without incident. The average water and energy removal rates were 1.1 gpm and 0.9×10^6 Btu/hour, respectively. The off-gas filter radiation readings have increased from 100 mr/hour in August to 450 mr/hour, and the filter differential pressure has increased from 0.5 to 1.0 inch of water.

c. Cesium Load-Out

A sample of Decalso resin from each Oak Ridge STT II cask was analyzed to determine the quantity of cesium remaining on the resin after elution at Oak Ridge. The maximum amount of cesium remaining was found to be less than four percent of the normal 60 KCi load and was generally less than one percent. There appears to be nearly one gram of plutonium in each cask. Approximately 30 percent of the sample volume from two casks consisted of Decalso fines suspended on top of Decalso having normal size distribution.

Loading of the cesium casks continued using water dilution of the cesium feed to prevent precipitation problems encountered in previous cask loading operation. A water chiller was added to the system to cool the dilution water and permit a reduction in feed dilution from 1:1 to 3:1. Feed temperatures have been maintained below 32 C, and cask loads of 50-60 KCi of cesium-137 have been achieved.

3. Plutonium Process Engineering

a. Americium Recovery and Purification

Recovery of americium from Plutonium Reclamation Facility aqueous wastes has decreased from an average of 18 grams per month during the period February through July, 1966, to a current average of ~10 grams per month. The decrease can be attributed to a combination of factors, including lower plutonium throughputs, shorter age of scrap material processed, and excessive losses from the W-14 ion exchange column. On one or two occasions, it appears that the column was eluted to waste during the loading cycle. As yet, the mechanism which caused the premature elution has not been determined.

Detail design of the americium purification prototype is 53 percent complete. The facility will produce ~99.5 percent pure americium oxide product from crude americium nitrate by means of a batch solvent extraction flowsheet, using di(2-ethyl hexyl) phosphoric acid (D2EHPA) as solvent and diethylenetriamine penta acetic acid (DTPA) as an aqueous complexant.

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b. Process Improvement

Dissolution rates experienced with 3 percent plutonium - 97 percent aluminum alloys in the miscellaneous treatment TK-80 dissolver have been slow. Under Process Test PRF-66-11, the composition of the dissolvent was changed gradually from 8 M HNO_3 , 0.3 M HF , 0.003 M $\text{Hg}(\text{NO}_3)_2$ to 12 M HNO_3 , 0.7 M HF , 0.01 M $\text{Hg}(\text{NO}_3)_2$. Without any increase in dissolution time an increase in plutonium product concentration from 0.2 grams Pu/liter to 0.8 gram/liter resulted, with no operating problems being experienced. Further test work will explore the effect of the acid addition rate on plutonium throughput.

Recovery of plutonium from incinerator ash by leaching with nitric acid - hydrofluoric acid in the miscellaneous treatment TK-72 dissolver has been slow and plagued with line and filter pluggage problems. Under Process Test PRF-66-12, reduced leaching times and variations in residue treatment methods are being investigated. Preliminary results indicate that it may be possible to reduce the leaching time from 3 hours to 1 hour. Plugging tendencies are greatly reduced if the leached ash is rinsed with dilute nitric acid before transferring and filtering.

c. Plutonium Reclamation

Uranium contamination of the plutonium nitrate product from the Plutonium Reclamation Facility continued to be a problem during the month as a result of recurrent CC column cyclic flooding. Four product batches exceeded the 2000 ppm uranium specification. A 57 percent nitric acid flush of the column was made on October 17, 1966. Specification product was produced following the flush.

d. Waste Immobilization

Battelle Northwest Laboratory is studying the recovery of plutonium from Z-9 crib soil leach solutions with Plutonium Reclamation Facility extractant. No problems have been experienced with disengagement times or foaming. However, there has been some difficulty with leaching the plutonium from the soil.

e. Thorium in Buttons

Ten batches of plutonium nitrate, received from the Purex plant, were estimated to have the maximum thorium content ranging from 160 ppm to 1900 ppm parts plutonium. Buttons prepared from this material contained thorium, but below the analytical detectable limits of 400-800 ppm. Button specification for total impurities was met.

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f. Tantalum Lid for Pressure Vessel

In the reduction step leachable tantalum lids were studied under Process Test BL-66-1. The tantalum lid was placed directly on top of the MgO crucible, and the aluminum gasket - carbon steel lid assembly was placed in the normal position at the top of the pressure vessel. The amount of plutonium associated with the gasket-lid assembly was reduced so that the lids could be thrown away after neutron counting to check for plutonium. Analysis of the test data showed no significant changes in measured yields, button densities, or button impurity content. Use of the tantalum lid will allow direct discard of the aluminum gasket - carbon steel lid assembly, thus reducing the waste load to the Reclamation Facility.

4. Separations Chemistry Laboratory

a. Evaluation of Purex Diluent

Laboratory tests comparing the performance of Soltrol diluent with the new normal paraffin hydrocarbon (NPH) have been concluded. The work has disclosed that negligible degradation products are formed during processing with NPH compared to Soltrol. The organic solutions were evaluated by determining plutonium retention values (unstrippable plutonium held in the organic). This work indicated that NPH diluent yielded solvent satisfactory for reuse without permanganate treatment during the wash whereas Soltrol diluent required the use of permanganate to attain comparable purity.

b. Determination of Fluoride in Stored Waste

The pyrohydrolytic Amadec F colorimetric procedure for fluoride was investigated and adapted to the analysis of vault area feed samples during the month. A furnace temperature of 900-950 C was found to be necessary to secure reproducible results. It was also determined that tungstic acid (cheaper and more readily available) can be substituted for silico tungstic acid.

c. Dissolution of Litharge

Litharge has been successfully dissolved in stoichiometric quantities of nitric acid to yield a solution 0.125 molar in lead nitrate and having a pH of 4. Vigorous agitation and small particle size are necessary to secure reasonable dissolution times. The fact that an excess of nitric acid was not needed is a desirable process condition which minimizes waste volumes when the lead nitrate is used as a process chemical additive.

d. Analysis of Pu-239 in Solid Waste

An analytical method is being developed for determining the amount of plutonium in incinerator ash samples. The method

is based on the measurement of the 0.385 MEV gamma emission of Pu-239. Prepared samples are analyzed with the gamma detector and compared to similarly mounted plutonium oxide standard reference samples. Material which contains fluoride results in a distortion or interference at the 0.385 MEV level requiring that the comparison be made against PuF_4 standards. Further study to determine the nature of the interference is aimed at eliminating the need for a dual set of standards.

e. Substoichiometric Procedure for Uranium

An isotopic dilution technique using substoichiometric methods (known amount separated, but less than total quantity) and with U-233 as the spike has been developed for use on uranium solutions in the 0.1 to 0.5 g/liter range. The procedure is applicable to higher concentrations also by making appropriate dilutions. Repeated results fell within a range of 2% with improvement potentially possible through the use of improved counting equipment.

f. Atomic Absorption Development

The atomic absorption unit was primarily used for analytical support to the rhodium and palladium recovery program during the month. Quantitative analytical methods having a sensitivity of $\frac{1}{2}$ ppm were demonstrated for both rhodium and palladium in 2 M NH_4NO_3 , 3 M NH_4SCN -1.1 M NH_4OH , and 1.5 M NH_4OH using an air-acetylene flame.

5. Plutonium Chemistry Laboratory

a. Plutonium Fire Extinguishment

Special tests were conducted to determine the effectiveness of argon as an extinguishment on burning massive metal. In tests of regulated argon-air flows, applied to the burning material through the bonnet at a variety of argon-air ratios, the following results were obtained:

Argon 100%-air 0%, average temperature drop - $44^\circ/\text{min}$.

Argon 80%-air 20%, average temperature drop - $22.5^\circ/\text{min}$.

Argon 60%-air 40%, average temperature drop - $12^\circ/\text{min}$.

Argon 40%-air 60%, not effective.

Argon 20%-air 80%, not effective.

Argon 0%-air 100%, increase in temperature.

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In another test, the argon-air ratio was varied in the same manner, but starting with 100% air. Slightly lower rates of temperature drop were found.

It is concluded that 100% argon is highly effective, and 80% argon-20% air is moderately effective.

b. Lithium Aluminate Development

A solid casting test was performed with unmilled, calcined LiAlO_2 and a filter paper-lined plaster mold. The rod came free of the mold following air drying and a 60°C oven treatment. This indicates one way of solving the mold-casting reaction problem. The rod was successfully fired, and had no cracks.

Cold pressing tests were done to provide test specimens to compare with development samples. Calcined, screened powders were pre-compacted at 5 tons/in², broken up, and rescreened. Pellets were pressed at 6 ton/in², dried, and prefired at 800°C . Sintering at 1200°C resulted in all white bodies with smooth surfaces. Bulk density averaged 74% of theoretical. Further density increase will be sought.

c. Ash Recovery

Reincineration of ash in an oxygen atmosphere at 550°C for 2.3 hours was tested as a pretreatment to improve the filtration characteristics of leached ash. The combustion step resulted in 28% loss of weight. However, the ash still showed a surprising loss of 15% volatile material upon being heated to 1000°C .

Dissolution tests showed no effect on plutonium recovery. Filtration remained slow; however, a clear green filtrate resulted.

d. Low-Level Waste Processing

Samples of extraction wastes CAW and AAW were thermally concentrated to find the concentration limit resulting in a solid freezing at $>50^\circ\text{C}$. A CAW synthetic sample was concentrated to a bp of 148°C and resulted in a solid freezing at 55°C . A test with plant CAW gave bumping problems. At a bp of 138°C , the resulting solution solidified at 35°C . Showing contrasting behavior, the AAW was easily concentrated to a bp of 149°C and yielded a solid at 145°C . In all cases the distillate was close to background contamination level.

e. Rhodium, Palladium, and Technetium Recovery

Tests with actual plant supernatants have shown that the direct precipitation or carbon adsorption processes are ineffective

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at recovering fission product rhodium. The chemical species are apparently different from that formed in the synthetic studies.

Emphasis has shifted to an extraction technique based on the use of a column containing Aliquat 336 coated on an inert substrate. In one test, absorption of both rhodium and palladium occurred. The rhodium was eluted with ammonium nitrate. Further tests will define the behavior of palladium and of technetium.

O. F. Hill
for Manager
Research and Engineering

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CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

OCTOBER, 1966

II. ACHIEVEMENTS (Continued)

H. EMPLOYEE RELATIONS

1. Education and Training

A program with instruction by Battelle-Northwest personnel was started in Criticality Training. There are approximately 50 Isochem personnel participating in this extended program.

Computer Sciences Corporation offered programs in October in Introduction to Data Processing and Fortran Programming. Isochem has two people attending the Introduction to Data Processing section and five people attending the Fortran Programming.

One person from Contracts Administration attended a one-week workshop with the Martin Company, Denver, on Contract Pricing.

2. Technical Recruiting

The college recruiting schedule started this month with first visits to the University of Washington and Oregon State University. While the schedules at both schools were comparatively light, the quality of personnel interviewed was generally higher than encountered during the past recruiting seasons. From all indications to date, the competition for engineering graduates, particularly those who are more desirable, will be considerably more difficult this year than last and it is estimated that starting salaries in the Bachelor level for engineering graduates will be up approximately \$50 per month.

The Technical Graduate Manual is being rewritten to update and reflect changes in assignments available. We have received the go ahead for offering rotational assignments beginning the first of the year in Contracts Administration and Purchasing, Production Planning, Business Systems and Marketing and with FPCE personnel. The new manual will also reflect on its cover the new Isochem logotype.

To lend a new professional air, business cards have been obtained for all those persons who will be doing college recruiting this fiscal year.

3. Union Relations

There were 8 grievances filed during the month of October of which 3 were processed at the Step 2 level.

Meetings were held with the Union to discuss processing of potential arbitration cases. It appears that there is little possibility of an understanding on either the Sandon grievance (work done by an Instrument Development Technologist), or the Meyers grievance (Radiation Protection work performed by a Lab Assistant). In the latter case, an arbitrator has been selected and on the other one, steps are being taken to select one.

A meeting was held with the Union to discuss the installation of a new "Self Reader" Pencil program. So far installation of the program has proceeded without major problems.

4. Benefit Plans

Isochem's first Annual Golf Tournament was held on the Sham-na-pum Golf Course, Saturday, October 1, 1966. Eighty-four employees participated.

A Suggestion Plan Committee meeting was held Tuesday, October 25, 1966. Approval was given to pay a total of \$906 for three suggestions. The largest award amounted to \$550. This is the highest award paid to date under Isochem's Suggestion Plan.

5. Communications and Community Relations

Community Relations and Uranium Oxide Subsection are exploring the possibility of having wooden pallets used to stack drums of uranium oxide constructed locally as a "Boot Strap" or "employ-the-handicapped" project. Presently pallets are being constructed in the western part of the state, about 1,200 annually at \$5.50 per unit.

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5. Communications and Community Relations (Continued)

A successful United Crusade Campaign was conducted throughout the Company with more than \$29,500 pledged for the coming year. This represents approximately a 30 per cent increase above CY 1966, and reflects a 33 per cent increase in the number of employees participating. Isochem employees have been credited with showing the largest increase in giving among the Hanford contractors during the project-wide drive.

Communication support was provided the highly successful Lingo safety promotion contest which has been picked up by U. S. Rubber Company for possible use throughout the parent firm. U. S. Rubber Company also requested a photograph depicting Isochem Inc. being cited by Vice President Humphrey's office for participation in the Youth Opportunity Program. The picture is to be used in the Company-wide publication UNIROYAL World.

H.B. Lindberg Jr

Manager - Employee Relations

CHEMICAL PROCESSING DIVISION

MONTHLY REPORT

October, 1966

6. Personnel Protection

<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. 3			4	5	1	3	5	6	27	319
Rad. Occurrences				1		4	5	7	17	115
Contam. Wds.									0	6
New Dep. Cases									0	6
Fires									0	8

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CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

OCTOBER, 1966

II. ACHIEVEMENTS (Continued)

I. WASTE MANAGEMENT SECTION

1. Operating Continuity

Fission product recovery at the Purex Head End was curtailed for six days to allow extra amounts of self-heating Purex acid waste to be added to the 104-AX underground storage tank. The Semiworks did not operate due to contact maintenance work in B-Cell. There were no processing activities in B-Plant due to Phase III construction work. The 242-T Waste Evaporator and the In-Tank Solidification unit operated continuously. The latter required frequent flushing of the off-gas system.

2. Processing Operations

a. Head End (Purex)

Head End processing recovered 1440 kilocuries of promethium-147 and 480 kilocuries of strontium-90.

b. B-Plant Processing

Operation was curtailed due to construction work in Cell 5.

c. Semiworks

There has been no processing in the Semiworks during the month due to contact maintenance work required on the HA Column feed system.

d. Cask Loadings

Two cesium casks (45-A and 47) were loaded with 60,000 and 49,000 curies of cesium-137 and released to the A.E.C. on October 28, 1966, for shipment to ORNL.

Approximately 3.5 gallons of strontium-bearing solution was loaded at the Semiworks and delivered to Battelle Northwest Laboratories for magnesium removal studies.

e. Waste Management

A total of 59 truckloads (295,000 gallons) of contaminated water from N-Area was discarded to the A-9 underground crib.

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During most of the month dilute feed from the 104-TY and 107-T underground storage tanks was processed at 242-T. This has greatly improved performance. However, pumping of evaporator bottoms through overground lines continues to be a problem because of plugging. A definite schedule of alternate pumping and steaming through these lines has helped some to keep them open.

The In-Tank Solidification unit recovered 149,000 gallons of waste storage space in October, making a total of 2.81 million gallons reclaimed by this unit. Operation in the 101-BY underground storage tank is nearing completion. No more waste feed is being added and the liquid is being evaporated to a pre-determined level. At the conclusion, the concentrated supernate will be pumped to 105-BY for solidifying. Transfer of the In-Tank Solidification unit from 101-BY to 102-BY underground waste storage tank will get under way in early November.

Prototype sluicing of the 103-A underground storage tank was started in order to remove the remaining 30% sludge. An earlier sluicing program resulted in about 70% removal. Failure of the 103-A transfer pump motor halted the operation until replacement can be made.

Initial filling of the 241-AX-104 underground storage tank with current Purex acid waste was started on 9-9-66. This tank, which has been in the process of being gradually preheated with water contents for the past several months, is now considered to be boiling.

Receipt of Redox boiling waste in 105-SX underground storage tank was started on 10-10 after 112-SX had reached its hydrostatic limits.

3. Mechanical Experience

A major contact maintenance effort was expended at the Semiworks B Cell in replacing a rotameter in the feed line to the HA solvent extraction column, repairing leaks in the system and replacing radiation monitoring chambers. All weekly personnel exposure limits were utilized in the relatively high (2 Rad/hr) working levels. In addition, it was necessary to borrow instrument technicians and pipe-fitters from the 200-E and 200-W Shops and also Purex Section.

Certain areas in the 221-B pipe gallery at Cell 8 were contaminated as the result of a broken tubing fitting on a weight factor sensing line to the fission products storage tank. Contaminated lines were replaced and non-removable contamination was stabilized by painting. Other instrumentation sensing lines to Phase I tanks were leak-checked and repaired as necessary to prevent a recurrence of this incident.

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Three new heaters are being prepared for installation in the In-Tank Solidification unit. At the present time three of the four installed heater banks are not functioning at full power because of an open electrical circuit in one phase of each heater bank. The heater replacement will restore the unit to full power for 102-BY tank operation.

4. Radiation Experience

A spread of contamination to the area east of the TX farm occurred when wind carried dust from near the 153-TX diversion box where some hot jumpers had been stored. The source was covered with gravel and the spread east of TX farm was bladed under and the area seeded with rye to fix the contamination.

5. Events Influencing Costs

Nothing significant to report.

R.E. Smith

Manager
Waste Management

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

OCTOBER, 1966

II. ACHIEVEMENTS

J. CPD SERVICES SECTION

1. Power Operation

There were no interruptions of steam, water, or electrical services that affected continuity of production facilities.

The work was completed on installation of new lightning arrestors on Powerhouse stacks in both 200-E and 200-W Areas.

New refractory lining was installed in the No. 2 boiler in 284-E. A low fire was maintained in the boiler for two days for curing the refractory and the boiler was returned to service.

A third party inspection was made on the No. 2 boiler in 284-E and the No. 3 boiler in 284-W. Also, the instrument air receivers were inspected; the report shows the equipment in good condition.

The under bunker flight conveyer in 284-W was damaged during transfer of coal from one boiler to another. Repairs were made and the conveyer is available for use.

2. Shops Operation

Waste burial was delayed and more than 40 man-hours were lost when a crane borrowed by FSS from J. A. Jones could not be started because of dead batteries. The reliability of borrowed equipment is frequently uncertain and costly; management consideration is being given to possible improvement of the situation.

The first of four new increased capacity Purex concentrator tube bundles has been as-built, tested, and is ready for installation.

The uranium top section and the acid top section of the vendor-supplied three-piece concentrator for the Purex plant have been successfully mocked-up to the concentrator re-boiler section. Sheathing of the re-boiler section was started.

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Fabrication of the Purex Acid Fractionator is approximately 90 per cent complete. A decision regarding sheathing of the vessel is pending.

Modification of a slug bucket lifting yoke to increase its lifting capacity was completed for the Redox plant. This yoke will also be used to lift the cask car covers.

For the Waste Management Section, one shielded pump burial container was built, and fabrication of the stainless steel jumper storage pan and yoke were completed.

3. Special Services Operation

In addition to radioactive equipment decontamination and repair for Isochem, customer service work of this type was done for ITT/FSS, Battelle-Northwest, J. A. Jones, and Hatch Drilling Co.

Equipment valued at approximately \$98,000 was received from customers for decontamination, inspection, repair or burial. Equipment valued at approximately \$84,000 was returned to customers. This represents a saving of approximately \$70,000.

The Shippingport (PWR) reactor blanket fuel elements are stored in 221-T Building water pool cell awaiting chemical processing in the Redox plant. All remaining fuel assemblies were successfully "unlocked" this month and disassembled remotely. It will therefore not be necessary to install the planned under-water saw since cutting is not going to be required.

4. Radiation Experience

There were no radiation occurrences during the month.

Radioactive weeds found growing near the 154-T diversion box, were removed and buried and the area from which they were removed was seal-coated with tar.

[Signature]
for Manager, CPD Services

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

OCTOBER, 1966

III. PERSONNEL ACTIVITIES

A. FORCE SUMMARY

<u>Section</u>	<u>Monthly Salaried</u>		<u>Weekly Salaried</u>		<u>Total</u>	
	<u>9-30-66</u>	<u>10-31-66</u>	<u>9-30-66</u>	<u>10-31-66</u>	<u>9-30-66</u>	<u>10-31-66</u>
General	1	1	1	1	2	2
Research & Engineering	59	62	33	33	92	95
Facilities Engineering	63	63	19	19	82	82
Manufacturing						
General	1	1	-	-	1	1
Production Planning	4	4	4	4	8	8
Waste Management	33	35	115	120	148	155
CPD Services	33	32	183	185	216	217
Redox	51	49	197	194	248	243
Purex	51	51	184	184	235	235
Plutonium Finishing	<u>41</u>	<u>39</u>	<u>181</u>	<u>177</u>	<u>222</u>	<u>216</u>
Total CPD	337	337	917	917	1254	1254
Corporate Offices and Business Management Division	<u>83</u>	<u>83</u>	<u>73</u>	<u>76</u>	<u>156</u>	<u>159</u>
Grand Total	<u>420</u>	<u>420</u>	<u>990</u>	<u>993</u>	<u>1410</u>	<u>1413</u>

B. PERSONNEL CHANGES

R. A. Connell, Manager Financial Controls resigned effective October 29, 1966.

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ISO-563

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S. G. Smolen - Manager, Purex resigned effective October 14, 1966.

L. L. Zahn - Manager, Purex Processing promoted to Manager, Purex effective October 14, 1966.

C. W. Malody - Manager, Redox Processing reassigned to Manager, Purex Processing effective October 14, 1966.

C. B. Foster - Manager, Redox Deactivation reassigned to Manager, Redox Processing effective October 14, 1966

C. VISITORS

<u>Name</u>	<u>From</u>	<u>Nature of Visit</u>
W. J. Robertson	Mallinckrodt Chemical Works St. Louis, Missouri (10-5)	Thorium discussions.
T. Yakimchick G. Gazunis	USAEC Washington, D. C. (10-5)	Review 03 surveillance costs.
Dr. L. M. Keiberman	USAEC Washington, D. C. (10-7)	Tour Purex plant.
L. Short L. E. Strong	Nuclear Fuels Services Erwin, Tennessee (10-10)	View and discuss Purex N-cell anion exchange unit.
J. B. White	USAEC Albuquerque, New Mexico (10-12)	Discussion of UK plutonium shipment.
S. N. Milligan	USAEC Albuquerque, New Mexico (10-26)	Discuss disposition of 234-5 Building fabrication facilities.
D. R. Cartwright O. H. Willoughby	Dow Chemical Company Rocky Flats Plant Golden, Colorado (10-26)	Discussion of plutonium measurement methods and instrumentation.
G. Pashade	General Electric Company Portland, Oregon (10-26)	Arrange for removal of the 1-Mev X-ray machine.

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CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

OCTOBER, 1966

IV. REPORTS

A. PREPARED AND ISSUED

- ISO-SA-28, (Unclassified), "The Use of Neutron Detectors in Continuous Solvent Extraction Control," R. Y. Lyon, 10/7/66
- ISO-SA-29, (Unclassified), "Development of a Continuous Dissolver for Plutonium Scrap," C. A. Lorenzen, 10/7/66
- ISO-346, (Official Use Only), "Project Proposal, Revision 2, Second In-Tank Waste Solidification System, 200 East Area, Project CAC-176," L. W. Finch, 10/17/66
- ISO-437, (Unclassified), "Specifications and Standards, Cesium Loadout Facility, " Fission Products Process Engineering, 8/8/66
- ISO-505, (Secret), "The Recovery of Neptunium and Plutonium from Stored Sludge Wastes at the Semiworks," P. W. Smith, G. L. Ritter, 9/23/66
- ISO-510, (Secret), "Redox Essential Materials - Process Standards," A. L. Boldt, 9/28/66
- ISO-522, (Unclassified), "Technical Criteria for the Prevention of Criticality - CPD," R. E. Tomlinson, 10/14/66
- ISO-525, (Secret), "Packaged Strontium and Cesium Container Criteria and B-Plant Strontium and Cesium Production and Storage Limitations," P. E. Reed, 10/7/66
- ISO-528, (Unclassified), "Product Specifications - Hanford Uranium Trioxide (From Depleted E-Metal) for Off-Site Shipment," L. M. Knights, 10/17/66
- ISO-532, (Unclassified), "Critical Mass Control Specification - Calibration for Future Monitoring of the Incinerator," L. M. Knights, 10/12/66
- ISO-537, (Official Use Only), "Project Proposal, Revision 3, Increased Processing Flexibility - Purex, Project CGC-124," C. A. Lyneis, 10/20/66
- ISO-538, (Secret), "CPD Waste Status Summary, July 1, 1966, Through September 30, 1966," R. E. Roberts, 10/14/66

ISO-539, (Unclassified), "Trip Report - Thoria Specifications Appraisal Meeting, Germantown, Md., September 21, 1966," H. C. Rathvon, 10/18/66

ISO-540, (Secret), "Analyses of Neptunium Batch Purex No. 9/66," M. K. Harmon, 10/18/66

ISO-546, (Unclassified), "241-AX Tank Farm Waste Line Failure - Inspection and Testing," P. Hatch, M. E. Yates, 10/24/66

ISO-552, (Unclassified), "Quarterly Statistical Review," D. F. Shepard, 10/27/66

Undocumented, (Unclassified), "Trip Report - NFS Processing and Neptunium Recovery Discussions - September 1966," H. C. Rathvon D. D. Wodrich, 10/10/66

B. PREPARED FOR SIGNATURE AND ISSUANCE

ISO-377, (Secret), "Quarterly Production Forecast - July 1, 1966 through June 30, 1971," Compiled by the staffs of: Douglas United Nuclear, Inc; General Electric Company-HAPD; Isochem Inc.; Atomic Energy Commission-RL00, 10/12/66

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ISO-563

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CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

OCTOBER, 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

END

DATE
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