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CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

FEBRUARY, 1966

L. SUMMARY

February production, as per cent of the Quarterly Production Forecast (ISO-35), is summarized below:

	<u>February</u>	<u>Calendar Year</u> <u>To Date</u>
Separated plutonium nitrate	114	116
Separated uranium nitrate	112	110
Uranium oxide	138	124
Plutonium metal buttons	157	126

For the second consecutive month, the production of all products exceeded forecasted quantities.

Purex operated continuously through February 8, when a scheduled outage of eight days was taken to prepare the plant for E-metal processing. After completing these preparations, the processing of E-metal was started on February 16. Except for one brief outage to replace a failed pump, performance was highly satisfactory at a rate of 23 tons per day. Both products, plutonium and uranium, met specifications easily. The new diluent, normal paraffin hydrocarbon, which replaced Soltrol-170 in mid-February, performed excellently; however, an estimated three to six months of operation will be required to obtain a valid comparison of the two diluents.

Approximately 1260 kilocuries of promethium-147 and 210 kilocuries of strontium-90 were produced in the Purex Head-End. In the Strontium Semi-works, a strontium purification run yielded 910 kilocuries of specification product.

The HAPO-II-2 cask, loaded in January with 160 kilocuries of strontium-90, was released for shipment on February 4. Cask HAPO-1B-3 was also filled in January, and with 330 kilocuries of strontium-90 was released for shipment on February 21. Cask HAPO-II-1 was loaded this month with strontium-90, but the quantity has not been determined yet. Two STT casks, loaded with a combined total of 100 kilocuries of cesium-137, were shipped on February 7. Two additional STT casks were then loaded with a combined total of 120 kilocuries of cesium-137.

The excellent performance experienced last month at Redox continued until a scheduled shutdown was started on February 13. The remainder of the month was devoted to a neptunium removal campaign and to the dissolution of production quantities of N-Reactor fuels, which are scheduled to be processed in March.

At the beginning of the Redox neptunium campaign, a new flowsheet was tested in an effort to improve the decontamination of neptunium. By using ceric ammonium nitrate as a neptunium oxidant in an acid-deficient system, the flowsheet was designed to achieve much greater removal of ruthenium. The test was abandoned, however, after several ineffectual attempts to establish prerequisite conditions for a successful demonstration. At the end of the month, the neptunium run was being completed with a previously used flowsheet, employing standard solvent extraction and ruthenium volatilization techniques.

The process flowsheet for strontium purification uses citric acid as a buffering agent to maintain process efficiency. The citrates have to be destroyed and can be destroyed by radiolysis alone; however, this produces undesirable side reactions, which not only consume nitric acid but also form acid-insoluble precipitates. The problem was solved when it was found that the orderly destruction of citrates could be accomplished chemically with hydrogen peroxide. This concept was then successfully demonstrated in the Strontium Semiworks.

A plan has been developed which promises to reduce the analyses required on plutonium metal buttons by a factor of three. The plan is based upon the use of density as a purity indicator, with sufficient analyses programmed to provide data that will assure the continuing adequacy of product purity.

AEC Directive No. 244, Modification No. 1, authorized total funds of \$7,000,000 for Project CAC-144, "Waste Fractionization - B Plant".

AEC Directive No. 265 authorized interim funds of \$45,000 for design of Project CAC-181, "B Plant Modifications for FPCE - Waste Management Integrated Facilities".

Vice President
Chemical Processing Division

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CHEMICAL PROCESSING DIVISION MONTHLY REPORT

FEBRUARY 1966

II. ACHIEVEMENTS

A. PRODUCTION PLANNING SECTION

1. Production Statistics

a. <u>Percent of Forecast⁽¹⁾ Achieved</u>	<u>February</u>	<u>Calendar Year to Date</u>
Separated plutonium nitrate	114	116
Separated uranium nitrate	112	110
Uranium Oxide	138	124
Plutonium metal buttons	157	126
b. <u>Purex</u>	<u>February</u>	<u>January</u>
Uranium nitrate produced (tons)		
Natural	173	413
Enriched	225	0
Average production rate during operation (T/D)	23	23
Total waste loss (%)		
Plutonium	0.62	0.31
Uranium	0.21	0.24
On-line efficiency (%)	84	69
c. <u>Redox</u>		
Uranium nitrate produced (tons)	70	287
Average production rate during operation (T/D)	9	10
Total waste loss (%)		
Plutonium	0.51	0.31
Uranium	0.27	0.25
On-line efficiency (%)	27	90
d. <u>Uranium Reduction (tons)</u>		
Normal UO ₃ loaded	275	601
Enriched UO ₃ loaded	219	268
Normal UO ₃ approved for storage	280	601
Enriched UO ₃ approved for shipment	254	203
Normal UO ₃ shipped	0	0
Enriched UO ₃ shipped	203	203
Normal UNH backlog	61	162
Enriched UNH backlog	167	89

(1) ISO-35 QUARTERLY PRODUCTION FORECAST

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e. Plutonium Metal Processing

February January

Waste disposal (grams)

290

225

f. Power

200-East

200-West

Raw water pumped (gpm)

8 937

5 248

Filtered water pumped (gpm)

985

1 045

Maximum steam generated (lb/hr)

240 000

161 000

Average steam generated (lb/hr)

179 000

117 000

Total steam generated (M lbs)

120 040

78 621

Coal consumed (tons)

5 962

3 988

For the second consecutive month, the production of all products exceeded forecasted quantities..

M K Harmon

Manager, Production Planning
Chemical Processing Division

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FEBRUARY, 1966

2. FISSION PRODUCT DATA (Kilocuries)

INVENTORIES

HEAD END	002-CR	003-CR	B-PLANT	SSW IN PROCESS	SSW PRODUCT	CASK	CONSIGN- MENTS	RECOVERY	SHIPMENT
20	850	580	1,850(1)	0(5)	1,990	0(6)	-	210	490(2)
90	-	2,620	14,460		0	0		1,260	0
			1,650(3)	230					
						120(4)		120	100(7)

Sr-90

Pm-147 (Unaged)

Pm-147 (Aged)

Cs-137

- (1) Includes 670 KCi in process.
- (2) Includes 160 KCi loaded in HAPO-II-2 and shipped Quehanna on 2-4-66 and 330 KCi loaded in HAPO-I-B-3 and shipped ORNL on 2-21-66.
- (3) Decay loss of 40.
- (4) Loaded in STT's 44 and 45-A
- (5) Waste Loss of 90.
- (6) Waste Loss of 10.
- (7) Loaded in STT's 47 and 48 and shipped to ORNL on 2-7-66.

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CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

FEBRUARY, 1966

II. ACHIEVEMENTS (Continued)

B. PUREX SECTION

1. Operating Continuity

Purex Plant operations continued on normal metal through February 8, 1966 when a shutdown was made to prepare for E Metal processing. Operations resumed on February 16, 1966 using E Metal and continued through the end of the month.

Operation of the fission product processing facilities was satisfactory. Processing activity at the Strontium Semiworks included the completion of the strontium purification run and the loading of two strontium casks. Two cesium casks were loaded at the Cesium Loadout Facility.

2. Processing Operations

a. Purex Processing

Plant operation at a capacity factor rate of 2.8 continued through February 8, 1966 on normal metal. The plant was then shut down and prepared for E Metal processing which began February 16, 1966 and continued at a capacity factor rate of 2.8 throughout the report period, except for one brief outage February 24, 1966 to replace a failed HAF (co-decontamination cycle feed) pump.

Both uranium and plutonium products were well within specifications. Performance of the new diluent (normal paraffin hydrocarbon), which was moved into the plant in mid-February, 1966, has been excellent.

No neptunium purification runs or product shipments were made during February, 1966.

b. Purex Head End Processing

Operation of the Purex Head End processing equipment recovered 1260 kilocuries of promethium-147 and 210 kilocuries of strontium-90.

c. B Plant Processing

Four thousand gallons of fission product crude feed, containing 1710 kilocuries of promethium-147 and 670 kilocuries of strontium-90, were transferred from the 003-CR fission product crude storage tank to B Plant for oxalate processing.

The recently completed B Plant to Strontium Semiworks transfer line was used for the first time in transferring two batches of aged promethium crude feed (230 kilocuries) from B Plant to Strontium Semiworks for removal of strontium and non-radioactive inert materials. The new Strontium Semiworks diversion box was inspected after the transfer and showed no contamination or radiation problems.

d. Strontium Semiworks Processing

Strontium purification run 10 was completed, producing 910 kilocuries of specification strontium-90 product. The organic inventory was decontaminated; the aqueous makeup equipment, A Cell tanks and B Cell columns were flushed in preparation for promethium processing.

The HAPO-II-2 cask, loaded with 160,000 curies of strontium-90 in January, 1966, was shipped to the Oak Ridge National Laboratory on February 4, 1966. The HAPO-II-1 cask was loaded and is currently undergoing cake stabilization.

e. Cesium Processing

Cesium casks 47 and 48, loaded with 46,000 and 54,000 curies of cesium-137, respectively, during January, 1966, were shipped on February 7, 1966. Cesium casks 44 and 45-A were loaded with 60,000 curies of cesium-137 each and are ready for shipment.

One hundred fifty thousand gallons of supernatant liquid were transferred from Tank 101-A to Tank 103-C for use as cesium-137 feed. Previously the low quality cesium feed in Tank 103-C was moved to Tank 103-A for interim storage.

f. Waste Management

During February, 1966, 136,000 gallons of non-boiling waste storage space were recovered by the In-Tank Waste Solidification Unit. Tank 111-BY was emptied of supernatant liquid. This is the second 750,000-gallon tank emptied by the In-Tank Waste Solidification program. The new off-gas high-efficiency filter assembly which allows replacement of one filter bank while the other carries the off-gas stream enabled near-continuous operation at an average evaporation rate of five to six gallons per minute. Excessive differential pressure and radiation exposure levels required changing filter banks about twice weekly.

The In-Tank Waste Solidification unit was shut down on February 21, 1966 to install a de-entrainment vessel with Teflon pads in the off-gas system upstream from the high-efficiency filter. Installation of new overhead power cables to the inlet air heater was also completed. Initial performance of the unit after startup at the end of the month indicates excessive pressure drop across the new de-entrainer.

3. Equipment Experience

Redesigned dissolver-to-catch-tank jumpers, equipped with remote control valves, were installed on the Purex A and B Cell dissolver off-gas systems to isolate the dissolver vessels from the ammonia scrubber catch tanks and avoid bumping of dissolver solution to the catch tanks in the event of dissolver pressure surges.

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Comprehensive electrical inspection and repair work was completed on the Purex east canyon crane. This work consisted of repairing electric motors, motor starters, relays, switches, etc., and was a Preventive Maintenance Program item.

The Purex C dissolver charging chute was damaged by a slug bucket. The chute was removed and repaired in M Cell (maintenance cell).

Other equipment work at the Purex Plant:

- a. Four process pumps failed and were replaced.
- b. Three canyon jumpers failed; two were replaced, one was repaired.
- c. New thermohms were installed in two canyon tanks.
- d. Eleven canyon cell blocks (M Cell, Pool Cell, K9 block) were decontaminated and removed to the railroad cut for new bail installation and returned to the canyon. The pool cell block with a broken bail was removed after special support bars were welded on the broken bail during a canyon entry.

A new braking system for the B Plant G-12-2 (fission product recovery) centrifuge was installed and run in. This improvement is designed to protect against accidental damage due to reverse operation of the centrifuge.

A new 003-CR sump jet was installed and the collected drainage in the fission product crude storage vault was transferred to Tank 011-CR

4. Radiation Experience

Iodine-131 emission was 3.09 curies for the month.

Difficulty in loading the old Purex B3 dissolver tower for shipment to T Plant resulted in transfer box and railroad tunnel contamination which was successfully fixed or removed.

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

5. Analytical Experience

Two new analytical methods were instituted to support strontium purification processing. The first is for the determination of zirconium in purified strontium product solution; the second for the determination of calcium and magnesium in strontium feed and product solutions.

A new colorimetric procedure was issued for the determination of iron in uranium product solution. This procedure is being used for laboratory support of Purex E Metal processing.

S. G. Smolen
Manager-Purex

SG Smolen:MLM:gt

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

FEBRUARY 1966

II. ACHIEVEMENTS (Continued)

C. REDOX SECTION

1. Operating Continuity

E-metal processing in the Redox plant was discontinued at mid-month after the in-plant inventory of enriched uranium feed had been depleted. The balance of the month was used to: 1) conduct a neptunium recovery run, using a test flowsheet featuring the use of ceric ammonium nitrate as a neptunium oxidant in an acid-deficient system; 2) begin the dissolution of production quantities of N-Reactor fuels which are to be processed during March.

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

2. Processing Operations

a. Redox Processing

The processing of E-metal was terminated on February 13 and the balance of the month was used for a neptunium recovery run and the dissolution of N-Reactor fuels, Zircaloy-clad and 0.95 percent enriched, which are to be processed in March.

During the E-metal production run the plant operated at an average rate of 96 percent and the expected monthly production was exceeded by 32 percent.

One significant process upset occurred prior to shutdown, which required rework of several batches of salt waste. Investigation revealed that the H-4 oxidizer off-gas system was the primary contributor in that product entrained in vapors from the H-4 had cross-contaminated the salt waste. To correct this condition, a new H-4 de-entrainment vapor jumper, containing an 18-inch tantalum demister pad, has been fabricated and will be installed during March.

The neptunium recovery campaign was started, using a new flowsheet designed to improve solvent-extraction decontamination for ruthenium and featuring the use of ceric ammonium nitrate as a neptunium oxidant in an acid-deficient system. In the preliminary processing stages, including precycle and partition cycle treatment, the

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operation was conducted on an essentially unchanged, previously demonstrated flowsheet and no problems were encountered. However, attempts to use the new ceric-oxidized feed stream for the final decontamination cycles were unsuccessful, apparently because of cross-contamination with chromium from the equipment of the previous acid-reducing cycle. After several ineffectual attempts to establish conditions required for successful demonstration of the test flowsheet, it was abandoned. At month-end the neptunium campaign was being conducted on the previously demonstrated flowsheet, in which acid-dichromate solvent extraction and ozonation are used for ruthenium decontamination.

Concurrent with the neptunium recovery campaign, two test dissolutions of N-Reactor Zircaloy-clad fuels were successfully completed. Because of limited experience with Zirflex processing, dissolution was conducted under closely controlled conditions in order to evaluate processing capability, and the need for flowsheet variations or adjustments during the March production run.

The 242-T waste evaporator continued to operate satisfactorily. At month-end the equivalent of approximately 880,000 gallons of underground, non-boiling waste storage space had been recovered since startup on December 3, 1965. Evaporator operation was suspended for five days during the week of February 14 to allow the installation of larger valves and rotameters designed to increase capacity. An average boil-off rate in excess of 10 GPM was obtained following resumption of operations. Prior to these changes the boil-off rate had reduced to about 5 GPM due to the processing of heavier, specific-gravity feed.

b. Uranium Oxide Processing

The continuity of operations was adversely affected this month by the lack of a continuing feed supply from the primary plants. Depending on the available feed, three to six calciners were on the line at various times during the month. However, the expected production was achieved and all product produced met specifications.

The first enriched uranium feed solution from the Purex plant was received February 21 and conversion to the oxide was started on this same date. No problems were encountered and the final uranium oxide powder met specifications.

3. Mechanical Experience

a. Redox Plant

The D-14 backcycle waste pump was replaced on 2-17-66, when the electrical jumper to the pump shorted out and the jumper itself could not be removed. The pump and jumper were stored for future decontamination and repair.

The G-3 hexone still tube bundle gasket was replaced and the flange successfully sealed using a unique type remotely installed C-clamp receptacle, which anchors to the existing stud and nut cup on the vessel. This device has application on any of the installed canyon vessels where flange seals cannot be obtained because of failed vessel studs.

Larger rotameters, control valves and higher capacity steam traps were installed in the 242-T waste evaporator feed line, condensate and bottoms outlet line. The changes were made to remove the limitations imposed by the original equipment and thus permit sustaining a higher continuous rate of evaporation in the treatment of waste solutions having a lower boil-down ratio.

b. Uranium Oxide Plant

The two calciner jack-shafts and one main agitator shaft, which were sent offsite for straightening, have been returned, thoroughly checked for alignment and stored for future use. A savings of approximately \$16,000 was realized--based on the replacement cost of new shafts.

4. Waste Handling and Decontamination

Equipment valued at approximately \$150,000 was received from the processing plants for decontamination, repair, inspection or burial during the month. Equipment valued at approximately \$35,000 was returned to customers, representing a savings of approximately \$25,000 --based on the cost of new equipment.

The sixth load of assembled blanket fuel elements from Shippingport, Pa., arrived on 2-10-66. The cask was unloaded and the fuel elements stored under water on the same day and the cask released for the return trip on 2-11-66. Only two more shipments are expected.

Transloading of the fifth and sixth shipments of NPR fuels to the Stanray cask (S-1) was completed without incident on 2-4-66 and 2-27-66, respectively. Both shipments departed Hanford within 24 hours of loading completion, bound for Nuclear Fuels Services Inc., West Valley, N. Y.

A shipment of 127 fifty-five gallon drums and four boxes of classified waste was received by railroad car on 2-4-66 from the Dow Chemical Company, Golden, Colo. The material was buried 2-7-66 without incident.

5. Radiation Experience

The Hatch Drilling Co. started a 300-foot test well through the Z-7 waste crib on 2-14-66. The Redox Radiation Monitoring subsection is supplying radiation monitoring coverage for the work. At month-end, the well was at the 165-foot level. Radioactivity encountered in soil samples during the first 50 feet of drilling was measured at 2,000 c/m maximum; however, beyond the 50-foot level only background levels of 200 c/m were detected. The Z-7 crib is currently being

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used for the disposal of intermediate level wastes from Battelle Northwest Laboratory.

6. Analytical Experience

In addition to the routine analytical service provided to the processing plants in the Redox Section, the following special services were provided for customers: 1) gamma isotopic analyses on a series of americium product samples for the Separations Chemistry Laboratory, R&E; 2) bismuth analyses on a series of 15 samples received from the Bi-Po 210 chemical flowsheet development work being conducted by Battelle Northwest Laboratory; 3) cesium, fluorine and zirconium analyses on dissolver solution samples taken during the dissolution of N-Reactor Zircaloy-clad fuel elements in the Redox plant.

RWM Cullough
Manager - Redox

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CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

FEBRUARY 1966II. ACHIEVEMENTS (Continued)D. PLUTONIUM FINISHING SECTION1. Operating Continuity

The production of unfabricated plutonium was routine during the month. The button line was operated whenever feed was available. Plutonium recovery activities were without significant interruption except in the case of those involving the incinerator, which continued to be out of service for repairs.

2. Processing Operationsa. Plutonium Processing

The button line processed weapons-grade material during the entire period.

In order to improve the measurements reliability on the product coming to the button line from the recovery facility, a new feed-receiving hood (Hood 4) was placed in service on February 16.

The layaway of those facilities formerly used for weapons fabrication and inspection is proceeding satisfactorily.

b. Plutonium Reclamation

One hundred and twenty-one (121) kilograms of plutonium, as nitrate, were delivered to the button line from the recovery facilities during the month. Of this material, approximately twenty-four (24) kilograms were somewhat high in uranium content and required blending.

The incinerator furnace remained out of service, but some sorting, leaching and repackaging was conducted. Seven (7) boxes of waste were processed in this way.

Eight hundred and ninety-four (894) cans, containing twenty-eight (28) kilograms of plutonium, were processed through the slag and crucible dissolvers.

One hundred and ninety-two (192) grams of plutonium were returned to the main process stream from 83,592 liters of aqueous waste

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processed through the waste-treatment facility. In addition, thirty-six (36) grams of plutonium were salvaged by processing selected batches of 241-Z sump solutions through the W-1 columns in this facility. Also, 13.8 grams of americium were recovered and stored for future processing.

The cleanout of the Recuplex facility continued during the month, with neutron and gamma counts indicating that approximately 1600 grams of plutonium still remain in the SE hood.

A new tank (Tank 39) has been added to the CX organic cleanup system, in order to facilitate the processing of Recuplex clean-up solutions.

3. Mechanical Performance

The button line equipment performed satisfactorily, with only minor repairs required.

The recovery equipment performed satisfactorily, also. On February 3, the new Mark III (08) slag and crucible dissolver was placed in service when the lower ball valve operator on the Mark I (06) dissolver failed. The new vessel and the Mark II (04) performed satisfactorily for the balance of the month. The Mark I is being held as a spare. Eleven (11) recovery pumps failed during the month. All were successfully repaired and none were buried.

Shop fabrication work, related to the repair of the incinerator, was interrupted while approval of a \$16,000 Appropriation Request Supplement was sought. Management approval has been granted at month-end, and funds should be released in early March.

Laboratory equipment performed without any significant interruption. Repairs to the carriages of the mass spectrometers were complicated by faulty parts supplied by the vendor.

Replacement of the filters in Rooms 312 and 313 was delayed when on-site testing revealed that approximately 75 per cent of the filters failed to meet specifications. At month-end, sufficient satisfactory filters were on hand to permit the resumption of this work.

4. Radiation Experience

Radiation and contamination control statistics indicated good control. There were no cases where body deposition of plutonium is anticipated.

5. Analytical Experience

Number of Samples Received
Number of Determinations

2,523
4,286

L. J. Breche
Manager
Plutonium Finishing

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

FEBRUARY, 1966

II. ACHIEVEMENTS (Continued)

E. FINANCIAL CONTROLS OPERATION

1. Cost Accounting

Preparation of budgets for fiscal years 1967 and 1968 has begun. Management has been requested to provide estimated manpower, overtime, maintenance and J. A. Jones charges for these periods. Those responsible for estimations have been provided pertinent facility startup and shutdown dates. A revised production schedule also has been requested from the Production Planning Section.

2. General Accounting

As of February 28, 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	\$4 673
Total Cost-to-Date	2 919
Commitments & Open Work Releases	361
Unencumbered Balance	1 393
Costs Charged During February, 1966	172

During February, one Directive Modification and two Work Authorities were received from the AEC: Directive No. EQT-009, Modification No. 3, Project CGC-124, Increased Processing Flexibility - Purex, for increase in funds to a new total of \$2,680,000; Directive No. EQT-028, Work Authority No. I-1, Project CAC-176, Second In-Tank Waste Solidification System - 200 East Area, for increase in funds to new total of \$8,000; Directive No. AEC-265, Work Authority No. I-1, Project CAC-181, B-Plant Modifications for FPCE - Waste Management Integrated Facilities, authorized \$5,000.

There were no Construction Completion and Cost Closing Statements issued during February.

During the month of February there were no Appropriation Requests authorized. As of the end of the month, four new AR's and one Supplement were being held pending release of additional capital equipment funds. Total estimated cost of the AR's being held was \$128,150.

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3. Business Information Systems

The contents of the Redox Laboratory Communication System reports have met the system objectives; however, follow-up effort will be required to correct minor items. The output reports are being reviewed on a regular basis with Redox Process engineers and supervisors. The primary purpose of this review is to acquaint the personnel with the contents of the output reports and to review the significance of input errors. Tank transfer equations which were programmed into the computer have been modified; computer processed tank transfer data is now being verified against tank calibration data as a test for accuracy and completeness.

RA Connell

Manager - Financial Controls

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

FEBRUARY, 1966

II. ACHIEVEMENTS (continued)

F. FACILITIES ENGINEERING SECTION

1. Purex

4.0 Capacity Factor Expansion - Purex

Part II of the design criteria document RL-SEP-624) was issued for comment. All eight drawings were approved by project representatives.

Magnetic Flowmeter

On February 15, a new Foxboro magnetic flowmeter was installed in a Purex nitric acid line for the purpose of evaluation (as the January monthly report stated). The system was apparently working satisfactorily.

Design Criteria - Purex Coil Water Diversion

A design criteria has been completed for a new subheader to collect and monitor the discharge from the cooling coils of affected canyon vessels. The subheader also diverts flow to 216-A-10 Crib in the event of a coil failure and subsequent cooling water contamination.

In-tank Sludge Interface Measuring Instrumentation

Design of a cable reel for use in the in-tank sludge interface measuring system is now completed, and fabrication has been started.

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

Directive No. EQT-009, Modification No. 3, authorized an increase of project funds by \$380,000 (including \$55,000 for "B" Cell work) to a total of \$2,680,000; and extended the project schedule by four months. Technical assistance was continued for project installation and start-up, and for the interaction of this project and the FY-1966 Thorium Campaign. The "B" Cell dissolver installation was completed and placed in operation.

Design Criteria - 2.1 Percent NRD Co-product Fuel

A design criteria for the processing of the NRD Co-product fuel from the demonstration program has been completed. It has been determined that the demonstration fuel can be processed without the addition of a critically favorable centrifuge.

E-6 Concentrator - Purex

Experimental runs with water as the process solution have been

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started with the tantalum-lined E-6 Concentrator. Additional runs are planned with sodium nitrate solution.

2. Redox

Fuel Element Bucket Radiation Level

Instruments were obtained for installing a radiation recorder and alarm with detectors in the Redox railroad tunnel. This is a new system to detect a bucket of "green" fuel elements, and prevent their being loaded into the dissolver. Installation is scheduled to begin during March 1966.

3. Plutonium Finishing

Plutonium Reclamation

Design work is underway to improve the ventilation in 236-Z Chemical Make-up Room for carbon tetrachloride fume removal.

Design was started on equipment, layout, and service piping for a prototype installation of processing equipment for the Miscellaneous Treatment Hood No. 4.

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

Installation of the two new hoods was started by the service contractor. The 234-5 Building fire alarm system is being reviewed to provide design data for master boxes and annunciators.

Button Lines

Design has been started on settling vessels to be installed on the filtrate line coming off the vacuum drum filter. This vessel is intended to catch plutonium precipitate that has passed through the filter.

236-Z Building

Electrical and instrument design for the installation of the Uranium Decontamination Facility is complete. Three new modification drawings were made.

Americium Purification - "Z" Plant

The process flowsheet has been completed. Work on the engineering flow diagram has been initiated.

4. General

Export Water Line - 200-East Area

Design criteria were completed for a parallel export water supply line from 2901-Y to the 282-E Reservoir. The project proposal is being prepared.

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Air Conditioned Plastic Suits - Air Supply

Design has been completed on an emergency breathing air cart which permits successive use of breathing air cylinders, as needed, for personnel inside plastic suits in the event of failure in normal breathing air systems.

Approval has been given by the Hanford Occupational Health Foundation for the suits presently being used if a half mask is worn when working with plutonium.

Pneumatic Lateral Probe for Tank Farms

Design, fabrication, and testing are complete for the prototype of the new high-temperature probe. It has been successfully operated at temperatures exceeding 350°F. for periods up to one hour. Proper assembly of a miniature connector and re-evaluation has shown that this crimp-on connector integrity exceeds that of the cable. Therefore, the connector will allow an easy disconnect between the probe and the co-axial cable.

Improved Neutron Counting System

During the first few counting periods of operation in the 242-Z Building, a count rate drift of less than one percent has been observed. Further work is being done with the preamplifier to correct this low magnitude error.

Shop Fabrication

Twenty-two replacement jumpers were fabricated during the month, of which only three were made on an emergency basis. A drilling and tapping prototype unit for venting the bottom of large waste tanks was fabricated and tested satisfactorily. A carbon steel de-entrainment vessel was fabricated and installed in the off-gas stream at the 241-BY Tank Farm in an effort to trap the solids that are plugging the filers. The vessel is being modified to allow better flow.

Air Compressor - 284-E Building

The new Joy air compressor for the 284-E Building has been installed and tested by run-in. All components functioned according to specifications and the compressor is now in service.

Spare Parts Management System

Routine operation of the models and computer programs continues to be smooth and devoid of significant problems. Extensions in normal lead times, because of Viet Nam war-caused shortages, are beginning to appear on a few items. Custom item control of these items is being used to protect inventory.

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

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II. ACHIEVEMENTS (Continued)

G. RESEARCH AND ENGINEERING SECTION

1. Separations Process Engineering

Purex

a. Normal Paraffin Hydrocarbon Diluent

The hydrocarbon diluent used for the Purex Plant solvent (30 percent tributyl phosphate) was changed from Soltrol-170 to a normal paraffin type on a process test basis. The entire working volume of plant solvent was replaced. Soltrol-170 is an isoparaffin product of the Phillips Petroleum Company; the new diluent is NPH, a normal paraffin hydrocarbon product of the South Hampton Oil Company of Houston, Texas. The physical properties of the "as received" NPH were as follows:

Flash Point	161° F
Sp.G.	0.748 to 0.750, 60/60 F
Viscosity	1.35 to 1.43 Centipoises/25° C
Aromatics	Not Detectable
Olefins	0.1 - 0.2%
C10	3.0 - 3.5%
C11	29.0 - 30.0%
C12	27.9 - 28.6%
C13	23.3 - 24.8%
C14	14.4 - 14.9%

A meaningful and quantitative evaluation of the performance characteristics of the new diluent will require the accumulation of processing data over an estimated 3 to 6 months period. After only two weeks of operation with the new diluent, process performance has been excellent. Fission product activities in virtually all process streams, including the UNH product, have been several fold below the lowest "normal" levels. Solvent extraction column efficiencies and stabilities, particularly for the "C" type columns, are noticeably improved.

b. Annular Dissolvers

Operation of the second Purex plant annular dissolver, B3, was commenced during the month. The C Cell pot-type dissolver remains to be replaced.

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In order to reduce the fission product activity in the ammonia scrubber waste water discharged to the A-36 Crib, modifications have been made to both the A-Cell and B-Cell annular dissolver systems. In the case of the B-Cell dissolver, prior to its installation, the take-off point for the off-gas line to the dissolver tower was elevated from a point at the top of the annular section to a point on the full-diameter slug-charging chute. In addition, both the A and B-Cell systems were equipped with valves in the drain lines to the scrubber waste catch tanks, to prevent the addition of dissolver solution to the waste during uranium dissolution. As a result of the valve addition, the frequency of sporadic activity from the A-Cell system has been reduced.

Activity from the B-Cell system has been approximately ten-fold lower, apparently because of the improved de-entrainment resulting from relocation of the off-gas line. In addition, the operational stability of the B-Cell dissolver is improved; the sporadic activity bursts that have occasionally been noted with the A-Cell system have not occurred in the B-Cell system.

During February, approximately 12,000 curies of mixed fission product activity were discharged to the A-36 Crib from A Cell, apparently as a result of leaks through the drain-line valving or entrainment via the vent line from the scrubber waste catch tank. Approximately 90 percent of this activity was discharged in less than 10 percent of the waste liquid volume. Approximately 200 curies of activity were discharged from the B-Cell system.

The A Dissolver activity bursts are thought to be associated with periods of foaming during the dissolution operation. A prototype sonic defoamer has been fabricated for installation in the A Dissolver.

Redox

a. Redox Neptunium Campaign Process Test

During the February shutdown of normal Redox plant processing, a new flowsheet for campaign recovery of neptunium was tested. The new flowsheet was designed to improve solvent-extraction decontamination for ruthenium and featured the use of ceric ammonium nitrate as a neptunium oxidant in an acid-deficient system. Principal features of the complete flowsheet are summarized as follows:

- 1) The first two solvent-extraction cycles are essentially unchanged from those used in previous neptunium campaigns. In the first cycle, neptunium, plutonium and uranium are concentrated and partially decontaminated

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by co-extraction from a slightly acid aqueous phase. In the second cycle uranium and plutonium are extracted from an acid-deficient phase, using dichromate to oxidize the plutonium to the extractable hexavalent state; pentavalent neptunium remains in the aqueous phase.

- 2) The third cycle is an acid-reducing cycle especially designed to provide a feed stream free of interfering chromium for the subsequent acid-deficient, ceric-oxidized decontamination cycle. In this cycle, feed from the upstream partition cycle is treated with sodium nitrite to reduce the dichromate. The excess nitrite is then destroyed by boiling, and the neptunium is reduced to the extractable IV valence with ferrous sulfamate.
- 3) The fourth and fifth solvent extraction cycles employ ceric ammonium nitrate for neptunium oxidation to the VI valence state in an acid-deficient system. On the basis of laboratory development, ruthenium arithmetic decontamination factors of 150 and 30 were predicted for these cycles.

Performance of the first three cycles in the February campaign was as expected. In the acid-reducing (third) cycle, extraction column neptunium waste losses were approximately one percent, and neptunium was decontaminated with respect to ruthenium by a factor of two.

Attempts to use the ceric-oxidized solvent extraction cycles were not successful, however, apparently because the product stream was recontaminated with chromium picked up from the equipment. On the first attempt, the product from this cycle was approximately 0.04 M Cr(III) and 0.014 M Cr(VI). Oxidation of this amount of Cr(III) required an excessive amount of ceric ammonium nitrate to be added to the acid-deficient feed solution. A cerium-chromium precipitate was formed and the acid-deficiency was lost. The loss of acid-deficiency resulted in the evolution of approximately 3,000 curies of ruthenium from the solution in the Redox E-7 Tank over a period of a few hours. The Redox sand filter effectively sorbed the volatile ruthenium, and the evolution was checked by making this solution acid-deficient again. However, because of the relatively heavy concentration of solids in the feed, the original plans for its solvent-extraction processing were revised. After acid-flushing the upstream cycle concentration equipment, the acid-reducing solvent extraction processing was repeated in an attempt to provide a clean feed stream. However, the product stream again showed the presence of chromium and solids, primarily an iron-aluminum dichromate compound that accumulates in equipment handling acid-deficient Redox process solutions. Consequently, plans for continuing the test of the ceric flow-sheet during the current campaign were abandoned.

The neptunium campaign is being continued using the flowsheet previously used, in which acid-dichromate solvent extraction and ozonation are used for ruthenium decontamination.

2. Fission Products Process Engineering

a. In-Tank Solidification

The ITS unit has been operated most of the month with high efficiency filters on the exhaust outlet. This mode of operation has been satisfactory except for moisture and high radiation levels (about 3 rad) on the filter pads; however, the elements are contained in a chamber that permits replacement without shutdown. Near the end of the month, the ITS unit was shut down, and a Teflon deentrainer pad was installed on the condenser outlet to extend the life of the high efficiency filters. Plant performance data on the modified off-gas system are not yet available.

During the month of January, 1966, when the unit was not operated, the ITS tank cooled at a rate of 0.5 F per day at an average temperature of 170 F, thus confirming previous heat loss estimates of 100,000 Btu/hour for non-boiling underground waste tanks.

b. Citric Acid Destruction

A process test designed to define the conditions under which the orderly destruction of citric acid in the strontium product stream can be accomplished was completed successfully in the Semiworks. This was accomplished in the product concentrator by the uninterrupted addition of hydrogen peroxide concurrently with the semi-continuous addition of nitric acid such that the nitric acid content of the strontium concentrate was controlled in the range of 1 to 3 molar. Citrate can be destroyed by radiolysis alone, but undesirable side reaction products are generated, consuming nitric acid and forming acid-insoluble precipitates with strontium. The chemical destruction of citrate with hydrogen peroxide eliminates this problem, but careful control of nitric acid concentration is necessary to avoid periodic concentrator pressurizations from rapid denitration reactions. The significance of this test is that all of the critical parameters have now been identified and that satisfactory control of the operation has been demonstrated on a plant scale.

c. Redox Waste Tank Sludge Sampling Technique

Normal sludge sampling techniques are ineffective when sampling tanks in which the sludge layer of interest is

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overlain with a layer of sodium nitrate (e.g., SX tank farm). A method was developed and demonstrated wherein a guide tube and a water lance were used to dissolve a hole through the sodium nitrate layer. With the lower sludge layer thus exposed, a standard impact type sample head was lowered through the guide tube and approximately 100 ml of sludge was forced into the core barrel. All of the equipment used with the exception of the bottom sections of the guide tube and sample rod were successfully decontaminated and reclaimed for future use.

3. Plutonium Process Engineering

a. Incinerator Ash Dissolution and Filtration

Plutonium-bearing ash from the incinerator is normally leached in boiling nitric-hydrofluoric acid, filtered, and routed to the solvent extraction process for plutonium recovery. The effect of this type feed on extraction column performance has been poor, resulting in frequent flooding. A process test, aimed at clarifying the dissolved ash by coagulation of the suspended carbonaceous solids, was unsuccessful. The use of gelatin, separan, and glue as coagulants resulted in undesirably high disengaging times (from the organic extractant), ranging from four minutes to two days. Filtration rates were not enhanced, even with Dicalite. Additional clarification by centrifugation in a clinical centrifuge was unsuccessful in reducing the disengaging times to less than four minutes. As a result, the test was discontinued, and the problem was turned over to research personnel for further study.

b. Increased Capacity - Plutonium Reclamation Process

Efforts to reduce the backlog of plutonium-bearing scrap more rapidly have been intensified. The frequency of charging cans of slag and crucible to the continuous dissolvers was increased from one can every 45 minutes to one can every 35 minutes, with no adverse effect on extraction performance.

A new, longer dissolver (08), equipped with a clean-out port, was used to replace the 06 dissolver which had failed. It is performing excellently. A record of 80 cans charged per 24 hours was set the last week of February for the two dissolvers in service, and the total cans charged for the month was 894, also a record.

Plans have been laid for decreasing the amount of nitric acid used in the dissolvers and, hence, volume of solution routed to the extraction column, which is a limiting factor.

c. Plutonium Metal (Buttons) Sampling Plan

A statistical analysis of impurity data for 500 buttons, including 14 which recently had been randomly chosen for double sampling, was made. It was shown that a 66% reduction in analytical work would be permissible and still enable the meeting of the product specifications defined in CD-65-3531, titled "Plutonium Feed Metal Definition for Use in the Weapons Program". Density was shown to be a reliable indicator of purity. Accordingly, only 10% of the buttons, with a density greater than 19.40, would require analysis. A single sampling of buttons with a density between 19.30 - 19.39 and a double sampling of buttons with a density less than 19.30 would be required. Plans are being laid to replace the 100% inspection now in effect.

d. Ground Disposal of Liquid Wastes

Further tests in the Battelle Northwest Laboratories, aimed at careful reduction in the acidity of Plutonium Reclamation waste to thus enhance sorption of the plutonium by the soil, have been unsuccessful. Gross precipitation of the salts (principally iron, aluminum, and magnesium) occurred. Filtration of these slurries through soil columns showed that the plutonium could be gradually leached out. Accordingly, additional research efforts will be aimed at determining the effectiveness of high pH (10-12) treatment for quantitatively precipitating the plutonium, with a view toward storing the reduced volume of waste in a tank or pit. The use of chelating or other agents will be scouted also.

4. Separations Chemistry Laboratory

a. Process Improvement

Neptunium Acid-Deficient Extraction

Testing of ceric ion as an oxidant for neptunium followed by acid-deficient extraction of neptunium with hexone failed the process test due to the presence of chrome, both in solution and as a precipitate. A sample of the cruddy feed solution was inspected in the lab and the solids were identified as an iron-aluminum-dichromate material which is usually present in concentrators working with acid-deficient solutions.

Such solids act as a reductant, gradually reducing neptunium and ceric ions. A sample of plant material, after the solids were removed, responded well to ceric oxidation and subsequent neptunium extraction as long

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as sufficient excess ceric ion was added to oxidize and precipitate the chromium. Such procedure is not recommended for plant application due to the extra ceric addition initially increasing the potential for ruthenium oxidation and possible ceric chromate precipitate interference with column efficiency. The plant solution after solids removal still contained 0.011 M chromium (38% of the sample's total chromium). The recommended maximum chromium concentration is 0.002 M.

b. Analytical Development and Improvement

Analysis for Rhodium and Palladium

The first attempts to analyze process solution for Rh and Pd were defeated by the high levels of sodium which interfered with flame emission detection. This interference can now be overcome by use of either of two analytical methods which have been developed: (1) removal of the sodium by ion exchange on hydrogen form Dowex 50W x 8 resin, or (2) removal of the Rh and Pd on Dowex 1 x 8 anion resin followed by dissolution of the resin in a hot HNO_3 - H_2SO_4 mixture.

Zirconium Method

A method has been evaluated for the determination of zirconium in Redox head-end solution. The method permits a better estimate of the free and complexed fluoride ion so that aluminum requirements for complexing the fluoride can be calculated. The method consists of extracting the Zr in a 25 λ sample of feed from a 7 M HCl solution using 0.01 M TOPO in cyclohexane. The zirconium is then determined colorimetrically by the reaction with pyrocatechol violet in the organic phase. Addition of thiocyanate ion to the aqueous is required to hold back the U and Fe and aluminum is added to break up any zirconium fluoride complex. The procedure has been evaluated for concentrations of zirconium approximating .005 M where an accuracy of $\pm 7\%$ has been demonstrated on standards.

Segregation of Uranium Streams

A gamma counting technique was developed in the laboratory which permits rapid determination of the U-235 content of the uranium product stream. The method entails the measurement of the 0.184 Mev gamma from the U-235 on a multi-channel analyzer. The accuracy attained was $\pm 0.03\%$ on enrichment levels between 0.5 and 1.5%; this accuracy appears to be adequate for the detection of acceptable cut-off points between processing campaigns.

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5. Plutonium Chemistry Laboratory

a. U-233 Process

Two continuous peroxide precipitations were made with U-233 under the same conditions reported last month. Supernatant concentrations ranged from a low of 0.003 g/liter to a high of 0.3 g/liter. The recommended flowsheet will yield the lower value.

b. Neptunium Processing

The January campaign resulted in 2,100 grams of oxide by a concentration-direct calcining procedure. Silica gel treatment of the feed nitrate resulted in significant reduction of gamma radiation from "aged" neptunium.

Product purity was essentially that of the nitrate received from Purex, except for aluminum and lead. The first batch of product was high in aluminum resulting from testing the apparatus with aluminum nitrate; aluminum contamination is no problem since this material is used in a cryolite process. The lead apparently came from lead shielding used on the silica gel columns. Data are summarized in the following tabulation.

NPR NEPTUNIUM SUMMARY DATA - JANUARY RUN

<u>Component</u>	<u>Nitrate Feed</u>	<u>Shipped Oxide Product</u>			<u>Nitrate Feed</u>	<u>Shipped Oxide</u>
		<u>3709</u>	<u>3711</u>	<u>3712</u>		<u>3716</u>
TMI	11,750	12,250*	1,300	1,450	1,500	1,300
ppm Pu	100	22	120	310	560	300
ppm U	400	170	800	25	640	110
% H ₂ O	-	0.23	0.14	0.18	-	0.14
% Volatiles @ 1000°	-	0.37	0.42	0.48	-	0.27
% Np**	-	88.5	90.0	87.7	-	89.2
g/liter Np	24.6	-	-	-	35.7	
Np, g	1,343	277	705	256	929	863

* Includes 10,000 ppm of aluminum, a harmless contaminant, resulting from equipment testing.

** Analytical results; variations are within precision of method. The theoretical value, 88.1%, was assumed for material accounting purposes.

Plans are complete for a campaign in March to complete the 5 kg commitment. This material is to be used in a test irradiation in N-Reactor.

c. Rhodium-Palladium

In order to analyze the results of laboratory investigations for the removal of Rh from supernatant Purex waste solutions, a rapid colorimetric analysis for Rh has been developed. It involves formation of the red $\text{Rh}(\text{Cl})_6$ complex, and takes approximately one hour.

Direct precipitation of ammonium nitrito rhodate is being investigated in the first approach for recovering rhodium from the supernatant waste solution.

d. Americium Purification Flowsheet Compatibility and Waste Reprocessing

Studies are being conducted on the compatibility of the proposed D2EHPA purification flowsheet waste streams with the Americium Recovery Facility. A method of recovering residual americium from the waste streams is sought also.

The aqueous waste from the D2EHPA purification flowsheets was found to be compatible with the Americium Recovery Facility. The americium could be recovered by blending the waste with the Reclamation Facility raffinate (CAW) and processing through solvent extraction with dibutyl butyl phosphonate. Samples of synthetic neutralized CAW were spiked with 1 vol %, 10 vol %, and 25 vol % of the synthetic aqueous waste. This feed was then contacted with 30 vol % DBBP - 70 vol % CCl_4 . The organic was then stripped. The only noticeable effect of the synthetic purification flowsheet waste in the CAW was a three-fold increase of the Am E_q in the extraction coefficient in the 10 vol % run. No measurable effect was observed in the strip stage. Thus it was concluded that the purification flowsheet waste can be recovered by the DBBP solvent extraction process.

The purification solvent, however, cannot be routinely recovered in the Americium Recovery Facility.

It was predicted that a trace of D2EHPA in the 30 vol % DBBP - 70 vol % CCl_4 Americium Recovery Facility (ARF) extractant would disrupt the americium stripping. Some 30 vol % DBBP - 70 vol % CCl_4 was spiked with 10^{-6} , 10^{-5} , 10^{-4} , 10^{-3} , 10^{-2} , and 10^{-1} M D2EHPA. This organic was then contacted with americium-spiked neutralized synthetic CAW. The organic was then stripped with water. No noticeable effect was observed in either the extraction or strip stage with organic containing 10^{-6} to 10^{-3} M D2EHPA. The organic containing 0.1 M D2EHPA showed only a 25% increase in the americium stripping coefficients.

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The conclusion from this run was that no serious compatibility problem exists if trace quantities of D2EHPA were carried back to the Americium Recovery Facility.

The purification organic waste stream (0.4 M D2EHPA in NPH) should contain about 2% of the flow-sheet americium. An experiment was run to investigate the possible recovery of this americium by routinely recycling the stream to the Americium Reclamation Facility. One problem area involves the difference in specific gravities of the two organic streams involved (i.e., 0.4 M D2EHPA has an SpG of 0.79, while the 30 vol % DEBP - 70 vol % CCl₄ has an SpG of 1.4). The Americium Recovery Facility is designed around an organic heavy system. Thus a phase reversal could occur. Each purification cycle produces ~ 12 liters of 0.4 M D2EHPA-NPH which would represent a 1 volume percent dilution if recycled to the Americium Recovery Facility solvent.

Experimental dilutions of 0 (i.e., control experiment), 1, 10, and 25 volume percent 0.4 M D2EHPA-NPH were made. As expected, a phase reversal occurred in the 25 volume percent dilution run. Thus it is concluded that the Americium Reclamation Facility could accept trace quantities of the purification flowsheet solvent, but cannot be used to recover americium from the bulk organic waste stream.

R. E. Tomlinson

Manager
Research and Engineering

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

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II. ACHIEVEMENTS (Continued)

H. EMPLOYEE RELATIONS OPERATION

1. Union Relations

The HAMTC-Isochem contract was formally signed on 2-10-66. Five locals did not sign in what appeared to be an expression of dissatisfaction with the wage provisions of the contract. Locals that did not sign were the Millwrights, Boilermakers, Pipefitters, Radiation Monitors and Electricians. These groups had signed the DUN contract, which had identical wage provisions, and it is believed that the realization of the money settlement has been gradually building to the point where resistance finally crystallized during the Support Services negotiations. In recognition of the interdependence of the Hanford contractors, Isochem agreed to join with DUN and ITT-FSS in joint Appendix A meetings with the Union.

During February, 11 grievances were processed at the first step and 8 were discussed at step 2. Major points at issue were Radiation Monitor jurisdiction and assignment of Support Services personnel to operate equipment in Isochem areas.

2. Salary Administration

Performance appraisals of exempt employees were completed in February, preparatory to an exempt salary review in March. Approval has been obtained from the AEC for an interim salary increase allotment to cover those situations requiring early action.

3. Communications & Community Relations

An 18-page brochure describing the development of the chemical processing business at Hanford and the function of the Chemical Processing Division was developed as orientation material. It is planned to have the brochure available for off-site use in recruiting, as hand-out material with exhibits, by individuals in making personal contacts, and in answering requests for information.

There was considerable local and regional press coverage of the Board of Directors visit on February 15 and 16. Press releases were distributed on Isochem participation in the AEC's Waste Management Symposium which coincided with the visit of the Board of Directors. The Tri-City Herald provided good coverage of Isochem presentations.

3. Communications & Community Relations (Continued)

The AEC is planning to do a 25-minute color film about the Hanford complex. Shooting is to begin in April. A meeting was held February 28 with AEC and Isochem chemical processing and information people to discuss possible film sequences of chemical processing facilities. Contractor commercial activities will be mentioned in a brief section on diversification. The film will concentrate on peaceful application work.

A program for the scheduled release of information concerning Isochem activities, developments, and achievements has been developed for the trade and technical press. The program covers the remainder of this calendar year.

4. Education and Training

During February, seven Isochem employees attended sessions offered by Computer Sciences in Fortran programming.

A pilot program aimed at management and supervision in Isochem was begun with the first group consisting of laboratory managers and senior chemists in the laboratory. The first three sessions of this program were conducted by Dr. S. M. Bunin on the human relations aspects of communications.

A program planned primarily for relations personnel, but open to other interested persons in Isochem, was begun with sessions conducted after regular working hours. Pay practices and procedures, benefit plans and management, radiation fundamentals, and some considerations related to labor law and labor relations are the first subjects being covered.

5. Technical Recruiting

During February, 14 colleges and universities were visited. The total number of people interviewed to date is 278, including 61 for summer assignments. Thirty-two offers have been extended through February with six rejections of offers being received during the month primarily for attendance at graduate school and the secondary reason being to accept employment with an oil company. At the end of February, 20 offers were open.

During February the Isochem Technical Graduate Program lost one employee through a voluntary termination and re-employment with NRD, due to our lack of opportunity at this time for a metallurgist. An offer was also extended in this period to a chemical engineer from the Battelle Technical Graduate Program, with an acceptance received. The new Technical Graduate is presently on assignment in the Facilities Engineering organization. There are currently four people on the Isochem Technical Graduate Program.

6. Benefit Plans

Thirty-five employees were contacted, in regard to the Voluntary Accident Insurance Plan, for whom initial signups were inconsistent with the terms of Isochem coverage. All cases of inconsistency were satisfactorily resolved.

Isochem Group Insurance Claim Forms, Record of Physician's Services Card, and Statement of Claim for Accident and Sickness Disability Benefits were reviewed and returned to the Connecticut General Life Insurance Company for correction and final publication.

An audit was made of GE Optional Retirees who were still subject to coverage under both the GE and Isochem Group Insurance plans. Thirty-nine employees were interviewed and all but four canceled their GE Group Insurance in preference to Isochem's plan. Four employees refused to make a choice and are insisting on having duplicate coverage. This problem remained to be solved at the end of the month.

A booklet published by the Connecticut General Life Insurance Company entitled "Your Social Security" was distributed to exempt employees on 2-28-66 and was scheduled for distribution to weekly salaried employees with their paychecks later that week.

7. Personnel Protection

Radioactive Liquid Waste Disposal in January, 1966

In January, 1966, 82.7 million liters of contaminated liquid waste was discharged to the ground by cribs at the separations facilities. This cribbed waste contained 191 grams of plutonium, 131 kilograms of uranium and 50,594 curies of beta emitting fission products. Of this amount, 127 kilograms of uranium and 50,000 curies of the fission products were discharged to the 216-A-36 crib in the Purex multi-purpose dissolver scrubber wastes.

Open ponds and ditches in the 200 Areas received 1.38 billion liters of waste in January, 1966. This waste contained 2 grams of plutonium, 38.5 kilograms of uranium and 75 curies of beta emitting fission products.

George Sahler
Manager Employee Relations

CHEMICAL PROCESSING DIVISION
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8. Safety

	Business Management	Purex	Pu Finishing	FES	Redox	R&E	Prod.	Total	YTD
Disabling Injuries	0	0	0	0	0	0	0	0	1*
Safety Investigations	0	0	0	0	0	0	0	0	2
Medical Treatment Injuries	1	12	7	8	6	0	0	34	58
Radiation Occurrences	0	3	3	0	3	0	0	9	33
Contaminated Wounds	0	1	0	0	0	0	0	1	1
New Deposition Cases	0	0	0	0	0	0	0	0	0
Fires	0	0	0	0	0	0	0	0	1

*Business Management Division (January 11, 1966) - A clerk lost one day from work resulting from contusions to the back of the legs and abdominal region incurred in a fall down stairs in the Federal Building.

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III. PERSONNEL ACTIVITIES

A. FORCE SUMMARY

<u>Section</u>	<u>Monthly Salaried</u>		<u>Weekly Salaried</u>		<u>Total</u>	
	<u>1-31-66</u>	<u>2-28-66</u>	<u>1-31-66</u>	<u>2-28-66</u>	<u>1-31-66</u>	<u>2-28-66</u>
General	2	2	1	1	3	3
Manufacturing						
General	1	1			1	1
Redox	64	64	239	237	303	301
Purex	77	78	296	299	373	377
Plutonium Finishing	49	47	206	205	255	252
Production	6	6	3	3	9	9
Facilities Engineering	94	95	197	197	291	292
Research & Engineering	<u>65</u>	<u>65</u>	<u>34</u>	<u>35</u>	<u>99</u>	<u>100</u>
Total CPD	358	358	976	977	1334	1335
Corporate Offices and Business Management Division	<u>66</u>	<u>67</u>	<u>74</u>	<u>75</u>	<u>140</u>	<u>142</u>
Grand Total	<u>424</u>	<u>425</u>	<u>1050</u>	<u>1052</u>	<u>1474</u>	<u>1477</u>

B. PERSONNEL CHANGES

V. W. Smith, Manufacturing Engineer Weapons appointed to Manager - Plutonium Processing, effective 2-1-66.

L. I. Brecke, Manager - Plutonium Reduction & Fabrication appointed to Manager - Plutonium Finishing, effective 2-1-66.

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C. TRIPS

<u>Visitor</u>	<u>To</u>	<u>Nature of Discussion</u>
<u>To AEC and Other AEC Contractors</u>		
O. F. Hill A. J. Scott	US AEC Germantown, Md.	Commercial plutonium fuels, advanced concepts. (2/28-3/4/66)
<u>To General Industry</u>		
J. R. LaRiviere P. W. Smith	Martin Co. Baltimore, Md.	FPCE Plant design. (2/5-9/66)
R. A. Zinsli	Mallinckrodt Co. Anheuser-Busch Co. St. Louis, Mo.	Cost Improvement Programs (2/21/66)
	Ethyl Corp. Baton Rouge, La.	(2/23/66)
	American Potash Co. Los Angeles, Calif. U.S. Borax & Chem. Co Los Angeles, Calif.	(2/24/66)
	U.S. Borax Co. Boron, Calif.	(2/25/66)
G. E. Backman	Martin Co. Baltimore, Md.	FPCE Plant health physics. (2/28-3/4/66)
<u>To Conventions & General Meetings</u>		
A. J. Scott	Wright-Patterson AFB	AEC Symposium radioisotope applications. (2/15-17/66)

D. VISITORS

<u>Visitor</u>	<u>From</u>	<u>Nature of Discussion</u>
<u>From AEC and Other AEC Contractors</u>		
C. B. Bastin	US AEC Savannah River Op- erations Office Aiken, So. Carolina	Separations processes and plant tour. (2/14-15/66)
E. B. Sheldon J. F. Proctor	E. I. duPont Aiken, So. Carolina	" "

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D. VISITORS (Continued)

<u>Visitor</u>	<u>From</u>	<u>Nature of Discussion</u>
<u>From AEC and Other AEC Contractors (Continued)</u>		
H. I. Hull	E. I. duPont Wilmington, Delaware	Separations processes and plant tour. (2/18/66)
Schlea Lowe	E. I. duPont Aiken, So. Carolina	Promethium recovery. (2/22/66)
Stanley Yamamura David Lund	Phillips Petroleum Co. Idaho Falls, Ida.	Analytical standards. (2/24-25/66)
<u>Other Government and State Agencies</u>		
C. E. Crompton	N. Y. State Atomic and Space Development Authority.	Waste management. (2/22/66)

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IV. REPORTS

A. Prepared and Issued

- RL-SEP-927, Unclass., "Bibliography of Periodic Reports Issued by Weapons Process Engineering 1961 Through 1965", A. E. Smith, February 10, 1966.
- ISO-SA-5, Unclass., "Separating Trace Quantities of the Uranium-232 Daughters from Uranium-233", M. H. Campbell, February 17, 1966.
- ISO-34, Unclass., "Specifications for Purex Enriched UNH Product", L. M. Knights, February 16, 1966.
- ISO-40, Secret, "Polonium Processing", W. P. Ingalls and J. R. LaRiviere, January 21, 1966.
- ISO-61, Unclass., "Neptunium Extraction From an Acid Deficient Nitrate System Utilizing Methyl Isobutyl Ketone", C. A. Colvin, January 28, 1966.
- ISO-70, Secret, "Design Criteria - 2.1% Enriched Metallic Uranium Processing - Co-Product Demonstration Case", R. D. Ehrlich, January 31, 1966.
- ISO-83, Unclass., "Semi Quantitative Impurity Analysis of Americium Product Solutions and Plutonium Waste Streams", C. S. Homi, February 1, 1966.
- ISO-90, Secret AWD, "An Investigation Into the Causes of Variance Between Mass Spectrometer and Neutron Counting Determinations of Pu-240 Isotope in Pu Weapon Shapes", A. E. Barber, February 3, 1966.
- ISO-92, Unclass., "Americium Purification Flowsheet - D₂EHPA Extraction", C. W. Nilsen, February 7, 1966.
- ISO-99, Secret, "Isotopic Composition of Weapon Grade Plutonium", L. M. Knights, February 8, 1966.
- ISO-104, Secret AWD, "Evaluation of Shear Strength Measurement of Alloyed Plutonium Parts", A. E. Barber, February 8, 1966.
- ISO-110, Secret, "Proposed N-Reactor Fuel Dissolution Flowsheets", G. L. Hanson, February 10, 1966.
- ISO-112, Unclass., "Specifications and Operating Standards - Uranium Oxide Operation", L. M. Knights, February 16, 1966.

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A. Prepared and Issued (Continued)

ISO-118, Unclass., "Spectrographic Determination of the Rare Earths
In Thorium and Uranium", N. S. Wing, February 16, 1966.

ISO-124, Secret, "Initial Chemical Processing Campaign of N-Reactor
Fuels", M. K. Harmon, February 17, 1966.

ISO-125, Conf. AWD, "Improved Cemented Carbide Tools for Machining
Plutonium", R. E. Van Der Cook, February 21, 1966.

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

FEBRUARY, 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

None

Vice President
Chemical Processing Division

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