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CHEMICAL PROCESSING DIVISION
MONTHLY REPORT
FOR

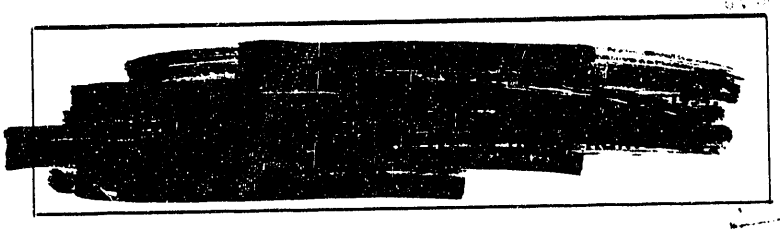
DECEMBER, 1966

Compiled by
SECTION MANAGERS

January 20, 1967

ISOCHEM INC.
RICHLAND, WASHINGTON

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



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I. SUMMARY

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

	December	Fiscal Year to Date
Separated plutonium nitrate	104	106
Separated uranium nitrate	93	102
Uranium oxide	95	104
Plutonium metal buttons	112	102

All production facilities performed satisfactorily during December and due to the relatively light schedules were shut down for the two Christmas holidays. During the shutdowns SS materials inventories, witnessed by AEC Richland Operations Office representatives, were completed at each facility except Redox. The Redox inventory will be taken late in January after most of the SS materials are removed from the processing equipment.

The Purex plant discontinued normal 94-metal processing on December 4. After a brief outage for plutonium segregation the plant was switched to the processing of 94 enriched uranium containing plutonium for the SEFOR program. This campaign started December 5 and was completed on December 21. The plant was shut down for the remainder of the month for an SS materials inventory and scheduled repairs.

The Redox plant started solvent extraction processing of Shippingport Reactor blanket fuel elements (PWR) on December 4 and completed the campaign on December 28. Plant performance during the period was satisfactory and no unusual difficulties were experienced during processing of the PWR fuel feed through the extraction system.

During the first pass of PWR material through the Redox precycle extraction batteries an americium-curium fraction was separated from the PWR feed and stored in a head-end feed tank for a planned recovery run during January.

Approximately 720 kilocuries of promethium-147 and 240 kilocuries of strontium-90 were produced in the Purex head-end. Two STT casks (No. 44 and No. 47) were loaded with a combined total of 120,000 curies of cesium-137 and ready for shipment at the end of the month.

The Semiworks was used this month to demonstrate D2EHPA solvent extraction flowsheets for acidified stored sludge waste and for current acid waste. HEDTA was the complexing agent for the acidified sludge run, and citric or

tartaric acid was the complexing agent for current acid wastes. Product recoveries were lower than desired, but this is attributed, in part, to the shorter extraction columns in the Semiworks (10 feet), compared to the B-Plant columns (14 feet).

Initial tests were conducted on a new concept of reduction vessel liners to reduce the amount of crucible material to be processed for plutonium recovery. Two containers are used inside the pressure vessel--a ceramic crucible for the reduction step, and a tantalum mold to receive molten metal and slag. The objective is to obtain a system in which the crucible life can be extended to several reduction cycles.

Plans for Program 02 capital budgeting through FY-1973 were developed and transmitted to RL-AEC on December 21, 1966.

A project proposal requesting a crib for the disposal of Battelle-Northwest liquid waste was transmitted to RL-AEC on December 6, 1966. Directive AEC-278, dated December 13, 1966 authorized the project.

Paul E. Reed
Vice President
Plant Operations

CHEMICAL PROCESSING DIVISION
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II. ACHIEVEMENTS

A. PRODUCTION PLANNING

1. Production Statistics

a. Percent of Forecast(1) Achieved	December	Fiscal Year to Date
Separated plutonium nitrate	104	106
Separated uranium nitrate	93	102
Uranium oxide	95	104
Plutonium metal buttons	112	102

b. Purex	December	November
Uranium nitrate produced (tons)	431	491
Average production rate during operation (T/D)	26	28
Total waste loss (%)		
Plutonium	0.26	0.56
Uranium	0.18	0.27
On-line efficiency (%)	65	74

c. Redox		
Uranium nitrate produced (tons)	14	69
Average production rate during operation (T/D)	1	4
Total waste loss (%)		
Plutonium	0.74	1.00
Uranium	0.59	0.48
On-line efficiency (%)	44	73

d. Uranium Reduction (tons)		
Normal UO_3 loaded	0	626
Enriched UO_3 loaded	472	40
Normal UO_3 approved for storage	0	626
Enriched UO_3 approved for shipment	458	51
Normal UO_3 shipped	0	0
Enriched UO_3 shipped	152	132
Normal UNH backlog	103	102
Enriched UNH backlog	249	275

(1) ISO-377, QUARTERLY PRODUCTION FORECAST

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e. Plutonium Metal Processing

	December	November
Waste disposal (grams)	295	311

f. Power

	200-East	200-West
Raw water pumped (gpm)	7 747	4 670
Filtered water pumped (gpm)	956	950
Maximum steam generated (lbs/hr)	244 000	152 000
Average steam generated (lbs/hr)	161 000	125 000
Total steam generated (M lbs)	119 903	83 077
Coal consumed (tons)	6 020	4 247

All production facilities performed satisfactorily during December and due to the relatively light schedules were shut down for the two Christmas holidays. During the shutdowns SS materials inventories, witnessed by AEC Richland Operations Office representatives, were completed at each facility except Redox. The Redox inventory will be taken late in January after most of the SS materials are removed from the processing equipment.

MK Harmon

Manager, Production Planning
Chemical Processing Division

DECEMBER, 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
Sr-90	0	2670	1270	1000	0 (1)	930	-	-	240	-
Pm-147 (Unaged)	0		3830	10110	60 (2)	0	-	-	720	-
Pm-147 (Aged)				6290						
Cs-137							120		120	120

(1) 20 K Ci loss from process tests.

(2) 40 K Ci loss from process tests.

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II. ACHIEVEMENTS (Continued)

B. PUREX SECTION

1. Operating Continuity

Processing of normal 94-metal continued until December 4, 1966. After a brief outage, during which plant cleanout was achieved, using cold feed, SEFOR 94-metal processing commenced at a capacity factor rate of 2.6. However, in order to accommodate higher plutonium levels, the rate was lowered to 2.4.

Processing continued until December 21, 1966, when the plant was shut down for inventory, scheduled maintenance, and repairs.

Prior to the scheduled shutdown, a three-hour outage was required on December 20, 1966, to replace the failed feed pump to the HA column.

2. Processing Operation

Production of scheduled SEFOR 94-metal was achieved and satisfactory plutonium segregation was made before and after the run.

Product quality was excellent for both plutonium and uranium and remained well within specifications.

Waste losses were acceptable, with uranium averaging 0.21 percent and plutonium averaging 0.25 percent of the respective monthly throughputs.

Two neptunium purification runs were completed, and two shipments were made during the month totaling 2011 grams.

3. Equipment Experience

Two Joy compressors were restored to use this report period by reconditioning the valve and oil lubrication system, and repacking each unit. Faulty relays were also replaced in the electrical system that controlled the automatic operation of these compressors.

The wheel shaft, wheel, two bearings and half coupling on the east crane main drive wheel assembly were replaced this month. The replacement was required because of a bad bearing and broken wheel shaft.

The jack shaft and two half flex couplings on the west crane main travel drive were replaced this month because of a crack in one-half of the flex coupling.

The canyon process pump H-1 failed when the pump could no longer meet the process flow requirements to the HA column. A replacement reconditioned spare pump from the ready rack was installed.

Numerous entries were made into L Cell to inspect and repair pipe leaks. An inspection of the cell was also conducted with a TV camera. A pin-hole leak was discovered in one Jamesbury valve on the crossover line between the L-3 and L-4 columns and another leak at the bottom flange on the L-4 tube bundle. The valve was replaced, and the tube bundle flange regasketed with a 1/4" thick teflon gasket. No other major leaks were detected.

Other equipment work at the Purex Plant included:

a. Replacement of lines T-146 and T-147 at Pump Pit 6 and the adjacent line, F-288, from outside the building wall to the 16-inch condensate header.

b. Cleaning and testing of ten, 480-volt breakers in the switchgear rooms.

c. Installation of a special pump to flush coating waste to underground storage, so that normal flow could be restored.

d. Miscellaneous maintenance work in N Cell; replacing a Durco valve linkage, replacing a solenoid valve electrical terminal block and installation of a primary filter system in the exhaust duct.

e. Installation of a new canyon jumper in the condenser vent jet steam supply, a repaired dissolver off-gas thermohm jumper, and a new jumper in the F-18 coil discharge.

4. Radiation Experience

Four canyon equipment burials were completed without contamination spread.

Iodine emission for the month was 0.32 curies.

5. Analytical Experience

A new chloride procedure was placed in service for use on the SEFOR plutonium product. The new procedure incorporates a precipitation step for plutonium removal, which replaces the longer and more complicated distillation method. The changes were based on 234-5 laboratory experience. The productivity on chloride analyses has improved with no apparent loss in accuracy or precision.

A new standard and referee computer program was placed in service December 20, 1966. This new program will allow the laboratory data to be placed directly on the computer cards, thus eliminating misplaced data. The new program will also substantially reduce the programming problems encountered under the old system. Computer time, as well as servicing man-hours, will be saved.

Manager-Purex

CHEMICAL PROCESSING DIVISION
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II. ACHIEVEMENTS (Continued)

C. REDOX SECTION

1. Operating Continuity

The first 80 hours of the month were used in preparation for processing the first PWR (Shippingport) blanket fuel elements and included 1) salt flushing of processing equipment 2) isolation of in-plant neptunium inventory and 3) buildup of PWR feed solution. The PWR processing was started in the precycle batteries on December 4 and was completed on December 28, 1966. The final neptunium campaign scheduled for the Redox plant was started on December 29, 1966 and is in progress at month end.

Plant performance during the PWR campaign was satisfactory. The americium-curium contents were separated from the PWR feed solution with the first pass through the columns and isolated to the feed storage tanks for subsequent processing. All products were within shipping specifications except the final plutonium flush material, which was above specifications in uranium content.

The Uranium Oxide plant operations continued satisfactorily throughout the month while processing 94 material. The total expected production for the month was achieved and was within customer specifications. All of the Redox NPR uranium was blended within isotopic specifications, with Purex 94 metal, which eliminated a segregated campaign for handling the NPR uranium.

2. Processing Operations

a. Redox Processing

Dissolution of the PWR (Shippingport) blanket uranium oxide fuel elements, started November 23, was completed on December 4, 1966. Dissolution of the zircaloy cladding was successfully achieved with three batches of zirflex solution (5.5 M ammonium fluoride - 0.5 M ammonium nitrate) per charge instead of the five batches originally proposed from laboratory tests. (ISO-595 "Proposed Redox Dissolution and Head End Flowsheets for PWR-1 (Shippingport) Blanket Fuel Elements", D. F. Davis, November 22, 1966, Unclassified). The measured losses of uranium and plutonium to zirflex waste were 0.53 percent and 0.65 percent respectively.

No unusual difficulties were experienced with the processing of PWR fuels through the extraction systems. The overall waste losses were well within the expected quantities and the product streams remained within specifications except for the final product clean-out flushes of the plutonium stream, approximately five kg plutonium high in uranium content. The processing rates were limited, however, to as low as 1.5 tons uranium per day due to the high plutonium to uranium ratio of the PWR fuels. The PWR materials were processed through the extraction system the second time for final plutonium and uranium separation. The first pass was required for the separation of americium-curium.

The Redox Processing operations were shut down late on December 23, 1966 to permit employees to observe the Christmas Holidays, December 24 and 25.

The dissolvers and the 293-S nitric acid recovery facility have been cleaned out in preparation for deactivation. The Redox area was changed from an Exclusion area to a Limited status at 1630 on 12-22-66. Controls were established as necessary to satisfy Security requirements.

b. Uranium Oxide Processing

Operations in the Uranium Oxide plant continued satisfactorily throughout the month. No normal depleted UNH was available for processing. The Redox NPR feed material was blended to isotopic specifications with standard 94-metal and with the operation of three calciners the expected production for the month was achieved. All production was within customer specifications. Three car loads of uranium oxide were shipped to NLO during December 1966.

The analytical work to determine the quantity and quality of stored thorium was completed and results show the material meets tentative customer specifications.

3. Mechanical Experience

a. Redox Plant

The F-7 precycle feed pump failed on 12/10/66 and was replaced with a rebuilt pump from WH&DO. The failed pump was a U. S. turbine type and had been in service for approximately four and one half months. No lost time resulted from the pump failure as the column operations were shut down to complete displacement flushing in the cell vessels.

The 2A column waste let-down valve to D-13 waste receiver failed on 12/23/66 and was replaced with a new valve and jumper assembly. Precycle processing was interrupted for approximately 10 hours for this change-out.

The UNH pump motor located in the 204 area pump house, failed early in the month and was repaired.

The 440 volt power supply to the canyon crane was lost when a flexible lead to the main trolley was separated. Temporary repairs were made by plant maintenance until a new flexible strap can be obtained.

b. Uranium Oxide Plant

Part of the sulphuric acid delivery line in the 271-U building was replaced with new piping. The old line had developed leaks and was hazardous to office personnel in the building.

Modifications of the UA Loadout room were completed to afford the capability of loading shipping containers via this system.

Modification and installation of the equipment to be used in conjunction with electric calciner pot 17, for the 210 UNT (uranyl nitrate trihydrate) program was completed.

4. Radiation Monitoring

Solvent sprayings of the canyon crane facilities during the month have reduced the radiation from auxiliary wrenches and hooks to canyon background levels. A detailed survey was made of the crane and facilities to identify areas where future cleaning will be the most effective in reducing the general radiation levels on the crane.

5. Analytical Experience

Analytical work was provided to complete Redox processing of the PWR (Shippingport) campaign and start of the neptunium and americium-curium recovery campaigns. In addition to routine analytical work the following special services were provided: 1) X-ray emission spectographic analyses of fuel element spacer coating material, for Radiation Protection Services, DUN Manufacturing, 2) a series of Am-Cm calculations on H-7 tank samples to determine the grams of Am-241, Cm-244, Cm-242 and Am-243 for the Separations Chemistry Laboratory, R&E, CPD and 3) analyses of seventeen samples for Am-241, GEA and H^+ in support of the continuing sludge leach program; lithium and sodium analyses on twenty-eight samples in support of the waste solidification program for BNW, Chemical Development, Material and Process Chemistry, 4) gamma energy analyses of 43 stack scrubber samples for Radiation Monitoring Operation, Redox, and 5) gamma energy analyses on five plutonium nitrate samples for Plutonium Finishing Section.

R W McCullough

Manager - Redox

CHEMICAL PROCESSING DIVISION
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II. ACHIEVEMENTS (Continued)

D. PLUTONIUM FINISHING SECTION

1. Operating Continuity

The production of plutonium metal was normal until December 21, at which time the button line was shut down for the Christmas holidays, the year-end inventory, and a cleanout in preparation for the processing of special plutonium. Operation was resumed on December 28. The plutonium recovery operations also were shut down for the holidays and for inventory. Additionally, recovery was slowed by the plugging of one of the slag-and-crucible dissolvers and by process problems caused by solids in ash-leach solutions.

2. Processing Operations

a. Plutonium Processing

Button line production was essentially all weapons-grade plutonium. At month-end, processing of plutonium from a test irradiation of depleted uranium was under way. This material, which is 24% Pu-240, will be processed to oxide.

b. Plutonium Reclamation

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

Eleven hundred and nine cans, containing eighteen kilograms of plutonium, were processed through the slag-and-crucible dissolvers.

Plugging of these dissolvers continued to be a problem. The jacketed heating section of the Mark III (08) was found to be filled with concrete-like solids, the removal of which is proving to be extremely difficult.

One hundred and fifty-six grams of plutonium were returned to the main process stream from 110,000 liters of aqueous waste processed through the waste-treatment facility. In addition, 15.6 grams of americium were recovered and stored for future processing.

Twenty-one boxes of waste were processed through the incinerator.

Removal of plutonium from PV (reduction pressure vessel) lids by mechanical means (needle gun) was started on December 28.

3. Maintenance

The button line equipment performed well during the period.

Recovery equipment performed satisfactorily except for the plugging of the Mark III (08) slag-and-crucible dissolver and leakage of the Mark I (06), both of which were out of service at month-end. Pump failures were reduced to twelve in December (eleven repaired and one, a Chempump, buried).

Normal deterioration of the nichrome woven-wire conveyor belt in the incinerator furnace necessitated replacement during December.

4. Radiation Experience

Radiation and contamination control statistics indicate good control.

One case of potential plutonium deposition occurred when a process operator incurred a puncture wound while cleaning the floor of a process hood. The wound was excised by the industrial physician. No internal deposition is anticipated.

5. Quality Control

Average Button Impurity (TMI+C)	703 ppm
Average Button Pu-240 Content (WG) (as determined by neutron count)	6.16 %
Average Button Density	19.44 g/cc
Button Line Recycle to Reclamation	22.4 kg
Average Impurities in Reclamation Output (TMI)	1,232 ppm

6. Analytical Control

Number of Samples	2,817
Number of Determinations	5,152

R. E. Olson FOR
Manager
Plutonium Finishing

CHEMICAL PROCESSING DIVISION
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II. ACHIEVEMENTS (Continued)

E. FINANCIAL OPERATION

1. Cost Accounting

December operating costs amounted to $2,615,000, approximately $90,000 above the previous fiscal year high attained in November. This increase is the net result of the following variances from November expenditure levels:

Increases:		
Spare Parts Reserve Adjustment	$110,000	
Purex Chimney Inspection	18,000	
Material Services	7,000	
Laundry Charges	5,000	
Hanford Railroad	6,000	
Data Processing	6,000	
Contract Fee	35,000	
Export Water Charges	3,000	
Increase in State Business & Occupation Tax	3,000	
Miscellaneous Charges from Federal Support Services	5,000	
Total Increases		$198,000
Decreases:		
Salaries and Continuity of Service	$ 38,000	
Essential Materials	14,000	
Travel and Living Expense	5,000	
Charges from J. A. Jones	32,000	
Charges from Battelle-Northwest	18,000	
Total Decreases		107,000
Net Increase in Cost From November		$ 91,000

Year-to-date program costs are as follows:

($ In Thousands)	02 Production	02 R&D	Isotope Inventory	03 Standby	Other	Total
July - December	$11,180	$892	$769	$67	$820	$13,728

2. Asset and Inventory Control

a. Projects

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

		$ in Thousands
Total Authorized Amount of 200 Area Projects		$15,364
Total Funds Authorized to Isochem Inc.		5,244
Total Cost to Date	$3,370	
Commitments & Open Work Balance	485	
Unencumbered Balance	1,389	
Total Funds Held and/or Authorized to Other Contractors by the AEC		$10,120

During December, two Work Authorities were received from the AEC. Work Authority No. I-1, Directive No. AEC-244, Project CAC-144, Waste Fractionization - B-Plant, authorizing increase of funds to $445,000 and transfer of capital equipment in the amount of $185,000; Work Authority No. I-1, Directive No. AEC-278, Project IAP-611, Replacement Crib 216-T-35, authorizing $1,000 for technical guidance and related services.

b. FY 1967 General Purpose Equipment

Isochem managed General Purpose Equipment for FY 1967 totaled $1,900,000. Of this total, we have allocated $65,000 to Battelle-Northwest. In addition, an allocation request to Battelle for $55,000 has been sent to RL-AEC for approval. The funds allocated to Battelle are to be used in support of Isochem's 02 sponsored R&D Program.

The total expenditures plus commitments made by Isochem against the FY 1967 budget through December are $768,202 or 40 percent of the anticipated FY 1967 expenditures.

The following AR's were issued in December:

76018	Controlled Atmospheric Welding Booth	$19,548
76020	EN-8 Condenser and EH-6 Demister	4,700
76021	Replace regular hook with rotary hook at 236-Z hoist	4,800

The following AR's are being held:

76004	Air Conditioners for 801-A, B&C; 102-A and 105-A	$ 4,700
76010	Atomic Absorption Spectrophotometer	13,000
76017	Marshall PT-RH Wound Tubular Furnace	4,794

3. Financial Planning and Management Statistics

a. AEC Management Information System

In November, RL-AEC imposed the additional Financial subsystem requirement that each contractor's master file balance within fund type, as mentioned in last month's report. To comply with this, it required approximately seven man-days effort to correct Isochem's account master file and structure modifications. Isochem funds were balanced for July, August, and September prior to the December 22nd deadline established by the Commission.

To eliminate this problem in future month's input, it is planned to incorporate the fund type codes into the existing contractor account codes, therein facilitating input balancing.

b. Cost Reduction Highlight Report

A special cost reduction report was issued to RL-AEC on December 22, 1966. This report highlighted particularly significant items that occurred in 1966 of a cost reduction nature.

The subjects covered in the report were as follows:

Unnecessary Insulation
Scrub Water Cooling
Waste Storage Space
Tank Reinforcing
Equipment Repairs
Standard Burial Coffins
Wooden Pallets

The items submitted will be reviewed along with those submitted by other contractors in the AEC complex, the best of which will be incorporated in Volume 2 of the AEC "Cost Reduction Abstracts" to be published the first part of 1967.

W. L. Smith

Treasurer

[redacted]

CHEMICAL PROCESSING DIVISION
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DECEMBER, 1966

II. ACHIEVEMENTS

F. FACILITIES ENGINEERING SECTION

1. Purex

Modification of the Purex 1-BS Column T-J4

Modification of the spare 8-inch 1-BS Column will be made on a prototype basis with the following objectives: (1) to increase the column capacity by replacing the present sieve plates with nozzles plates, and (2) provide process flexibility through the addition of spare distributors. Additional design features to be included are: (1) provision of a remote cartridge, and (2) addition of interface float instrumentation. If the modified column demonstrates a capacity greater than 4.0 C.F. as expected, the new 10-inch diameter 1-BS Column, which was designed for 4.0 C.F., will not be provided on Project CGC-183.

Atomic Absorption Flame Spectrometer

Redesign of the scrubber has been completed so that it can be fabricated on plant to speed up the installation. Items that must be procured have been ordered with some already received. Fabrication of all items except those pertaining to the scrubber are essentially complete with the exception of the quartz lenses. The lenses are being prepared by Battelle-Northwest.

Purex In-Line Monitors

Wiring is being installed to relocate the Purex in-line monitors from the pipe and operating gallery to the special air conditioned instrument room. It is anticipated that the work will be completed before the scheduled mid-February shutdown and the actual moving of the instruments will take place at that time.

Remote Locomotive

The Atlas Car and Manufacturing Company design drawings of the locomotive were received and approved for conformance with the specification. The General Electric Company is still working on the remote control design.

ICE-601, Rev. 1, CoProduct Demonstration Processing Facilities, 200 Areas

A project proposal revision, requesting total project funds in the amount of $535,000, was transmitted to RL-AEC on December 27, 1966.

IAP-606, Rev. 1, Purex Process Condensate Crib, 216-A-38

A project proposal revision requesting a one-half sized process condensate crib ($157,000) was transmitted to RL-AEC on December 12, 1966.

IAP-610, Purex Steam Condensate Crib, 216-A-37

A project proposal requesting $70,000 for a supplemental steam condensate crib was transmitted to RL-AEC on December 12, 1966.

2. Redox

MFC-11, Redox Multiproduct Capability

The reports on "Present Plant Description" and "Fitness of Present Plant" were completed. Capital cost estimates for the necessary modifications of the Redox chemical processing facility were received from Hanford Engineering Services.

Base Case (without waste fractionization)	$5,800,000
Waste Fractionization Alternate	2,200,000

A study of high level waste handling facilities has been completed. Capital costs of the alternatives are as follows:

Perpetual Care - Alkaline Waste Tank Farm	$3,100,000
Perpetual Care - Acid Waste Storage Vault	3,600,000
221-B Processing - Cross Country Transfer Line	1,800,000
221-B Processing Cask Transfer	800,000

The above costs do not include any modifications required at B-Plant to permit waste processing. If waste fractionization capability is included in the Redox flowsheet, product storage and loadout facilities will require a capital investment estimated at $1,200,000. Perpetual care storage would also be required, and, for either acid or alkaline waste the estimate is $3,600,000.

Np Recovery Cleanout and Am-Cm Recovery

Flowsheets have been developed for the three phases of this operation. The americium-curium product from Shippingport fuel

will, after processing, be loaded out in a 30-ton "bowling ball" cask belonging to Battelle. The cask will be modified so it can be placed in the F-O Cell position for this load out. A total of about 22 jumpers are required for the entire program.

3. Waste Management

IAE-607, Third In-Tank Waste Solidification System, 200 West Area

A project proposal requesting a third ITS unit to be located in the 241-TX Tank Farm is being reviewed against the total solidification needs.

IAP-609, Purex Tank Farm Vent System Expansion

The project proposal in the amount of $280,000 was transmitted to RL-AEC on December 27, 1966.

CAC-181, Rev. 3, B-Plant Modifications for FPCE-Waste Management Integrated Facilities

The project proposal revision requesting authorization of total project funds was in the comment stage at the end of the month. The estimated project cost is $2,450,000 including $107,000 for transferred capital property.

B-Plant Condensate Line Sr^{90} Monitor

Investigative tests must be performed in order to determine the feasibility of installing a Sr^{90} monitor on the B-Plant, Cell 15 concentrator condensate line. A Sr^{90} source holder is being fabricated. It is anticipated that needed measurements on the radiation levels from a Sr^{90} source can begin in mid-February. Plans are to set up a fume hood in the 224-T Building to provide a place to work with this and other sources.

4. Uranium

Enriched UO_3 Processing

A unitized calcination process has been proposed. Each unit would have a concentrated uranyl nitrate tank, fluid-bed calciner, off-gas scrubber, hammermill, storage hopper and associated auxiliary equipment. For the 3% enriched material, each unit has a rated capacity of 2.3 tons per day of uranium; the capacity at the 5% enriched level is 1.9 tons per day of uranium. Because of critical mass safety, the dimensions of equipment for the two enrichment levels are different. Flowsheets and equipment sketches have been submitted to Vitro-HES for a cost estimate.

5. General

ZPPR Program

Assistance has been provided to the Plutonium Finishing Operation in the preparation of additional information to be presented to Argonne National Laboratory personnel who are scheduled to be at Richland in January. Costs for fabrication of ZPPR fuel elements during Fy 1967 and through February 1968 have been estimated for several circumstances.

Shielding Determinations

Design of laboratory and semiworks facilities which may be used for transplutonium elements is requiring increased attention to shielding needs. A proposed alpha cell for the plutonium chemistry laboratory and a possible encapsulation facility for curium-244 are among current considerations. Work is also proceeding toward the development of a cylinder-source dose rate table using the modified ISOSHIELD Computer Code.

PACE Budget FY 1968-1973

Plans for Program 02 capital budgeting through FY 1973 were developed and transmitted to RL-AEC on December 21, 1966. The Commission was requested to return the results of the Washington review by the end of January 1967.

IAP-611, Replacement Crib, 216-T-35

A project proposal requesting a crib for the disposal of Battelle liquid waste was transmitted to RL-AEC on December 6, 1966. The project was estimated to cost $64,000. Directive AEC-278, dated December 13, 1966 authorized this project.

Alpha Survey Instrument

The prototype instrument is now complete and is being operationally tested. The case dimensions are approximately 8 inches high, 8 inches deep, and 10 inches wide. The instrumentation features solid-state construction including integrated circuits. There are no tubes even in the high-voltage power supply and regulator circuitry. Most of the circuitry is mounted on color coded plug-in circuit cards so arranged for maintenance that each major function is on a separate card. All integrated circuits and several key transistors are socket mounted for ease of testing without the requirement of soldering. All circuits are transient protected for increased reliability by newly developed circuits. Operation of the instrument is similar to that of existing

poppies. Increased cable lengths from instrument to probe may be used. Either a Scintran scintillation probe or a Poppy air proportional probe can be connected to the input.

Spare Parts Inventory Control

A review of no-usage parts is currently under way. Of 1,053 items reviewed, 423 are deletable. These items represent an inventory value of $27,000.

Manager - Facilities Engineering

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

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II. ACHIEVEMENTS (Continued)

G. RESEARCH AND ENGINEERING SECTION

1. Separations Process Engineering

Redox

a. Dissolution of PWR-1 Blanket Fuel Elements

A 13-ton lot of PWR-1 (Shippingport) blanket uranium oxide fuel elements was successfully dissolved in the two annular dissolvers at the Redox Plant starting November 23, and ending December 4. The Zircaloy-2 cladding was dissolved using three batches of Zirflex solution (5.5 M ammonium fluoride - 0.5 M ammonium nitrate) per charge instead of the five batches originally proposed. (See ISO-595, "Proposed Redox Dissolution and Head End Flowsheets for PWR-1 (Shippingport) Blanket Fuel Elements," D. F. Davis, November 22, 1966.) The measured loss of uranium and plutonium to the Zirflex waste and rinse solutions was 0.6 percent.

PWR-1 blanket fuel elements were charged by dumping into the two Redox annular dissolvers. A charge contained 5,900 pounds of UO_2 and 2,200 pounds of Zircaloy-2. The dissolver processing sequence was as follows:

a) Two Zirflex dissolutions of the Zircaloy cladding;
b) A deep water rinse;
c) A nitric acid leach of UO_2;
d) A third Zirflex dissolution;
e) A second deep water rinse; and
f) A second nitric acid leach of the UO_2 heel.

The use of the first two decladding steps was based on laboratory data which have indicated that more efficient decladding is attained by recharging fresh Zirflex solution after pitting of the cladding is accomplished with the initial charge of solution. The third decladding step is designed to remove the Zircaloy heel remaining after UO_2 dissolution. In actual practice, each decladding step dissolved approximately one-third of the total Zircaloy (2,200 lb) in a fuel element charge. The first nitric acid leach dissolved 90 percent of the UO_2 charged, and the heel leach dissolved the remaining 10 percent.

The fluoride in the dissolver (uranium) solution (5.7 pounds of fluoride per ton) amounted to a conversion of 0.9 percent of the UO_2 to UF_4 during Zirflex decladding. The original flowsheet had provided aluminum for complexing fluoride at a mole ratio of 3/1 in the dissolver solution, assuming 2 percent conversion of UO_2 to UF_4. Consequently, the actual mole ratio was greater than 6/1.

On the basis of the prior laboratory data, considerably more difficulty was expected in the decladding of the PWR fuels than was actually experienced in the plant. The laboratory data were obtained using PWR fuel-rod sections which had smooth, oxidized surfaces without imperfections in the oxide where chemical attack would be rapid. The actual PWR fuel elements charged at Redox were complete sub-assemblies with end tube sheets (Zircaloy) having relatively sharp corners and other surface irregularities where imperfections -- cracks and spalls -- in the oxide film would be expected. Recent pilot-plant data have confirmed the fact that the Zirflex reaction is rapid at such imperfections.

Also, on the basis of prior Zirflex processing experience and laboratory data, the conversion of UO_2 to UF_4 was about two-fold less than expected. This apparently resulted from the shorter period of exposure of the fuel core surfaces to decladding solution with a relatively high free fluoride concentration.

2. Fission Products Process Engineering

a. Waste Management Flowsheet Tests

The proposed Waste Management D2EHPA solvent extraction flowsheet for processing acidified stored sludge waste in B-Plant was tested in the Semiworks pulse column equipment. Strontium, promethium, cerium, and americium were co-extracted into the solvent in the compound extraction-scrub HA Column, and strontium was separated from the rare earths and americium in the HC Column using 0.03 M HNO_3 to selectively strip strontium from the solvent. The rare earths were stripped from the solvent batchwise with 3 M HNO_3. Hydroxyacetic acid (glycolic acid) was used for pH buffering and HEDTA was added for metal ion complexing in the HA Column. Product recovery efficiencies for promethium, cerium, americium, and strontium were 80, 90, 60, and 40 percent, respectively. Curium recovery was identical to americium. The low strontium recovery efficiency resulted from a below flowsheet extraction section pH which could not be corrected before feed for the run was exhausted. An increase in the extraction column pH and in the height of the extraction column (B-Plant is 14 feet versus 10 feet for Semiworks) should

result in improved product recoveries. Decontamination factors for the major metal impurities in the products were as shown below:

Metal Impurity	Decontamination Factors	
	Strontium Fraction	Rare-Earth Fraction
Fe	>400	>400
Al	> 50	> 10
Pb	40	50
Ca	1.4	1.4
Na	50	30
U	>1500	140
Pu	800	400
Sr	-	10
Ce	250	-
Pm	2000	-
Am	400	-
Cm	300	-

Two test runs were performed in the Semiworks to demonstrate the D2EHPA solvent extraction flowsheet for processing current acid waste (Purex Acid Waste). The flowsheets were similar to the flowsheet above, except that citric acid and tartaric acid were used as complexing agents in place of HEDTA. The flow ratios and metal impurity levels were somewhat different, reflecting the difference between current acid waste and acidified sludge waste feeds. Product recoveries and decontamination factors for the two runs are presented below:

Element	Product Recoveries Efficiency, %	
	Citrate Flowsheet	Tartrate Flowsheet
Pm	75	70
Ce	75	70
Am	80	60
Sr	70	70

Metal Impurity	Decontamination Factors			
	Citrate Flowsheet		Tartrate Flowsheet	
	Sr Fraction	RE Fraction	Sr Fraction	RE Fraction
Fe	> 2000	> 1500	> 2500	350
Al	> 70	> 50	> 80	> 70
Ni	> 70	> 40	> 70	> 40
Cr	> 80	> 50	> 200	> 60
Ca	1.3	1.5	1.5	1.4
Na	170	30	60	60
Sr	-	10	-	10
Ce	500	-	300	-
Pm	1000	-	700	-
Am	500	-	200	-
Cm	500	-	200	-

The recovery efficiencies should improve when using the taller B-Plant columns; however, some flowsheet adjustments may be necessary to achieve the goal recovery efficiency of 95 percent for strontium.

b. In-Tank Solidification (ITS)

Contrary to original expectations, laboratory studies with samples of the supernate in tank 105-BY following addition of the cement indicate that the liquid will not completely solidify upon cooling. Specific gravity measurements indicate that the ITS concentrate pumped into tank 105-BY from tank 101-BY was diluted with dilute nonboiling waste which had been left in tank 105-BY as a result of an inaccurate sludge level measurement.

3. Plutonium Process Engineering

a. Preparation of Uranyl Nitrate Trihydrate

Critical mass experiments, to be conducted in Battelle-Northwest Laboratories (at the request of National Lead Company of Ohio), require the preparation of uranyl nitrate trihydrate (UNT) from 2.1% U-235 enriched U_3O_8. This will be accomplished in the electrically-heated calciner pots at the UO_3 Plant by batch dissolution of the U_3O_8 in nitric acid, removal of the zirconium contaminant by filtration, and evaporation at 120 C with constant agitation. The granular UNT crystals will then be returned to Battelle for their experiments. Equipment has been overhauled, off-gas filters have been installed, and procedures are in place for the conduct of this work.

b. Process Experience - Plutonium Reclamation

Laboratory tests were made to determine the dissolution rate of aluminum-plutonium alloy in typical HNO_3-HF slag and crucible (S&C) dissolver solutions. These tests indicate a dissolution rate of 2.64 mg/cm^2/min in normal S&C solutions, and 5.31 mg/cm^2/min in normal S&C product solution adjusted to 0.0033 M mercuric nitrate. Calculations indicate that sufficient dissolution of aluminum can be accomplished in the S&C dissolvers, so as to provide a fluoride to aluminum ratio of 3 to 1, with a metal heel of approximately 1.2 kg. It appears that recovery of plutonium from this alloy could be expedited, and at the same time reduce ANN requirements. A process test will be prepared so that dissolution of aluminum-plutonium alloy can be tested on a production basis.

c. Plutonium Process Engineering

Laboratory tests were also run with ash in S&C dissolver solution. Earlier tests had indicated that an equilibrium

heel might build up in a continuous type dissolver with ash dissolving at the same rate as it was added. If such was the case, and the dissolving rate was sufficiently fast for an equilibrium heel that could be tolerated in the dissolver, it would be possible to add ash at a controlled rate while dissolving S&C material. However, these recent tests indicate that the dissolving rate for the ash residue is much too slow for this approach to be practical.

A process test is in progress to evaluate the extraction column operation at high L/V ratios (the ratio of aqueous to organic phase flow rates). The objective of the test is to obtain an over-all increase in the CA column feed throughput without increasing the potential for column flooding. The start-up L/V was approximately 2.5 for the CA column. To date, the CA column has operated satisfactorily at an L/V of 3.0 and 3.5. Operation at an L/V of 4.0 will also be tested. Increases in column capacity anticipated, above those presently attainable at an L/V of 2.5, are 6 percent for an L/V of 3.0, 12 percent for an L/V of 3.5, and 18 percent for an L/V of 4.0.

d. ICW Monitor for Americium

Instrumentation was installed on 12-6-66 to test monitoring of the ICW stream for americium breakthrough from the W-14 ion exchange bed during loading of the resin. The instrumentation included a thin crystal sensing probe and preamplifier mounted in the insert, and an amplifier, single channel analyzer, count rate meter, and a single point recorder located at the operator's table. The single channel analyzer was set at a threshold of 60 kev, with a 10 kev window to monitor Am-241. Initial data appeared to correlate well with ICW samples taken during a run. It appears that this instrument will be helpful in reducing americium losses and in reducing analytical costs.

4. Separations Chemistry Laboratory

a. Material Collected on York Mesh Filter

A sample of the solid material present in the air stream passing through the York mesh de-entrainment unit on the tank farm ITS unit has been investigated. Emission spectrographic analyses indicated the composition to be primarily oxides of iron, aluminum, silicon, calcium and magnesium. The solids composition would be anticipated from the nature of the tank contents. The material is largely insoluble and further study to determine methods of control is in progress.

b. Atomic Absorption Methods for Magnesium

The atomic absorption unit has been applied to the determination

of magnesium in the following materials (numbers in parenthesis indicate the sensitivity in ppm): 70% hydroacetic acid (0.07), 72% nitric acid (0.07), 30% hydrogen peroxide (0.07), 12 M hydrochloric acid (0.07), 19 M sodium hydroxide (0.4), sodium bisulfate (0.3), and lead nitrate (0.1).

c. Colorimetric Method for Total Antimony

A colorimetric method has been demonstrated which can be used to measure antimony at concentrations down to 0.5 ug/ml in acidified solution samples of waste sludge. The method consists of valence adjustment with ceric ion and extraction with trioctyl phosphine oxide. A colored complex is then developed with rhodamine B, extracted into benzene, and measured spectrophotometrically. Very little interference was encountered in the samples at the stated concentrations levels.

d. Cyanide Measurement in Tank Farm Waste

A rapid "go-no-go" method for cyanide at the 100 ppm level has been developed for use by the laboratories in evaluating the potential presence of cyanide at hazardous levels in tank farm waste samples. The method is based on the development of a color complex with picric acid with interference control based on ion exchange and DTPA masking techniques.

e. Revisions to Free Acid Method for UNH

Extensive revisions to the procedure for the determination of free nitric in UNH solution have been accomplished which cut the overall time requirement by a factor of three or more while giving an improved precision of ± 1% at the 0.2 lb per gallon level. This improvement was accomplished by using a larger sample, a longer ion exchange column, application of vacuum to the ion exchange column, and a more accurate burette unit.

f. Between Laboratory Comparisons

A series of nine plutonium nitrate product samples were analyzed under closely controlled conditions in both the Purex and Z-Plant laboratories using their respective approved procedures. Evaluation of the results showed no difference between recoveries on plant samples as compared to standards by the two laboratories. The observed difference between the two laboratories on a weight basis was less than 0.2%.

5. Plutonium Chemistry Laboratory

a. Reduction Vessel Studies

In support of studies to reduce the amount of slag and crucible material to be processed for recovery, tests were made of a new concept involving two containers inside the pressure vessel. The first consists of a ceramic crucible for the reduction step; the second is a tantalum mold to receive the molten metal and slag.

The first reduction test was made using a heavy-walled silicon carbide crucible positioned over an uncoated tantalum mold. Once the reduction had taken place, a calcium plug in the bottom of the crucible melted, dropping the molten charge into the tantalum mold. The silicon carbide crucible was undamaged. There was a slight wetting of the tantalum by the plutonium, but separation of the plutonium button was possible, and the slag was easily removed.

In other tests, crucible breakage problems were found. The tantalum receiver behaved well and metal-slag separation was good. Further tests will be aimed at developing the crucible-plug-slag parameters to extend crucible life to several reduction cycles.

b. Lithium Aluminate Development

Cold pressing Run 3-P was evaluated. This run had involved the following steps: (1) precalcining at 800 C for two hours and screening through a 48 mesh sieve; (2) mixing in 1% PVA in solution, followed by drying and screening through a 28 mesh sieve; (3) precompacting at 8 tons/in^2 and then screening through a 28 mesh sieve; (4) pressing at 10 tons/in^2; (5) prefiring at 800 C for two hours; and (6) sintering at 1300 C for two hours.

The results showed that double-pressed pellets with 1% PVA result in >84% theoretical density. In one pressing at step (4) above, 2.3% water was added to the dry mix; the resultant pellet density was 88%. Apparently the added water improved the pellet density. Comparing this run with the previous Run 2-P in which 21% water was added to the pressing mix (step 4), it is again seen that the presence of water results in higher densities. For Run 2-P, densities of 91% were obtained.

Diametral shrinkage was 9.5% and length shrinkage 8.5%.

c. Low-Level Waste Processing

Hydroxide precipitation studies are being carried out on low-level solvent extraction waste, AAW. The extent of removal of alpha activity at selected pH ranges is being examined.

[redacted]

When concentrated NH_4OH or NaOH are used, local precipitation occurs at once, and the entire mass tends to set up to a gel at pH 3 to 4. However, either sodium carbonate or ammonium carbonate can be used to raise the pH to the > 3 range without local precipitation. In one such test, the pH was then raised to 4.0 with NH_4OH. The resulting filtrate was clear and colorless. A DF of ≈100 was measured. Cake volume was half the original AAW volume.

An attempt to precipitate FeS with thioacetamide resulted in a suspension which filtered incompletely and showed no carrying of activity.

d. Rhodium, Palladium, and Technetium Recovery

Several substrates were evaluated for their capacity to absorb MTC (methyl tricaprylyl ammonium chloride). Activated or deactivated charcoal, silica gel, graphite felt, powdered graphite, and Kel-F were tested. None absorbed more MTC than 50 to 60 mesh diatomaceous earth, which absorbed 25 weight percent.

In an attempt to increase rhodium adsorption on a column of 25% MTC adsorbed on diatomaceous earth, the flow rate was decreased from 0.3 ml/min to 0.1 ml/min. No increase in rhodium recovery was noted.

In batch extraction tests lowering the pH of the supernatant waste from 9.5 to 7.9, increased the recovery of rhodium from 82 to 87%. However, lowering the pH of the supernatant waste from 10 to 8 did not increase rhodium recovery in a column run with MTC-diatomaceous earth.

e. Ash Recovery

A new analytical procedure has been developed for rapid determination of the effects of process variables. The procedure is based on gamma counting ash and residue.

Observations made this month, using the new analytical procedure, include:

- Plutonium recovery was not affected by dissolver agitation.

- Plutonium recovery was increased from 40 to 60 percent with an increase in dissolving time from 30 to 180 minutes. This result is contrary to earlier findings and may be due to differences in ash characteristics.

[redacted]

- Addition of 20 weight percent NaF to the ash increased recovery from 48 percent to 84 percent. Filtration time was reduced from 50 minutes to 5 minutes.

- Ignition of ash in oxygen followed by hydrofluorination at 550 C gave improved recoveries (to 80 percent) when leached with 0.9 M $Al(NO_3)_3$ - 0.2 M N_2H_4 - 1.0 M HNO_3. Filtration was good.

- Incineration of the ash at 800 C prior to leaching with 13 M HNO_3 - 0.05 M HF reduced filtration time, presumably due to destruction of unburned organic material in the ash. However, plutonium recoveries were reduced from 48 percent to 37 percent.

O. H. Hill
for Manager
Research and Engineering

CHEMICAL PROCESSING DIVISION
MONTHLY REPORT

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II. ACHIEVEMENTS (Continued)

H. EMPLOYEE RELATIONS

1. Employment & Training

The fall recruiting schedule for Isochem has been completed. Approximately 150 students were interviewed in the 23 schools visited. As a means of aiding the recruiting effort, programs were presented by two Isochem engineers at the Universities of Washington, Wyoming, Brigham Young, and Utah. Significant increases in the quality of personnel interviewed at these four schools were noted. Recruiting schedules in general, however, were somewhat lighter than was experienced last recruiting season.

Four offers have been extended so far to mid-term graduates. One acceptance from a chemist has been received and three rejections from the other offers were received. All indications point to the fact that in college recruiting this year the competition will be the keenest ever, and will definitely have the effect of forcing starting salaries upward another sizable amount.

2. Union Relations

As a result of meetings with the Union, which included a tour of the Instrument Development Lab, a settlement of the Sandon arbitration case appears to have been reached. The Union requested that the verbal understanding be put in writing and this was done on December 15, 1966.

The Wage Manual for bargaining unit employees has been completed and copies will be sent to supervisors of all Union-represented employees when Commission approval is obtained.

3. Communications & Community Relations

The revision of the chemical processing and diversification activities portions of the Hanford Capabilities brochure, which is being updated by the AEC, was given to the Commission per their new submittal date. The revision includes additional narrative and new photographs, a number of them just recently cleared by the Department of Defense, depicting Isochem operations and activities.

Assistance is being provided in the writing of cost reduction reports in news story style, for possible use in Cost Reduction Abstracts, a new AEC publication.

3. Communications & Community Relations (Continued)

A brochure in support of the Isochem IQ program has been developed and is now being reviewed prior to printing. The brochure will be distributed to all employees at the start of the Hanford Improvement Program in late January, 1967. The brochure incorporates a message from Dr. Judy, program philosophy and description, and includes photos of work locations and Isochem people on the job performing various occupations.

James Shute, who is with the New York State Office of Atomic and Space Development, has asked for photographs of Isochem operations, particularly those involved in isotope (fission products) recovery for use in multi-purpose exhibit.

4. Personnel Protection

WSEP Cask Loading - A Personnel Protection Investigation Report was completed as a basis for assuring safe loading of these casks. Cask shipments were resumed within two weeks.

RL-AEC Industrial Safety Inspection - The annual inspection by members of the local Health and Safety Division was completed during the month, and an inspection report will be issued soon. We are very much pleased with the inspectors' conduct of the audit and feel that a true picture of a sound industrial safety program in Isochem will be reflected in the report.

Computing Dose Rates from Irradiated Thoria - Isochem's responsibilities in handling the shipment of irradiated thoria fuel elements off plant requires good knowledge of the dose rates involved and shielding requirements. Use of the ISOSHIELD computer code together with some experimental data secured at DUN facilities allowed significant progress on this problem to be made during this month.

Computing Dose Rates from Cylindrical Isotopic Sources - A serious engineering need for radiation level information in the design of tanks and other equipment will be met at the completion of this program. Some work is needed in conjunction with Process Design Organization in order to complete this lengthy study.

AEC Request for Study of Land Requirements for Chemical Processing Facilities - An attempt to draw up meaningful and defendable criteria for reserving areas of land around Chemical Processing facilities is being made with the assistance of Battelle-Northwest. Three conditions of operations are being studied with the sole purpose of deciding the amount of land reservation that is necessary. The normal operating and most serious accident cases are rather straightforward and are being analyzed by Battelle-Northwest. The in-between condition of less serious accidents or nonstandard operation may result in "nuisance" contamination or radiation levels which cannot or should not be tolerated from an economic or public relations standpoint. Progress in the setting of criteria for these conditions is being made.

4. Personnel Protection (Continued)

Safety Review of B-Plant, Phase III - This print review has been completed. Special attention was given to the 276-B organic treatment facility and potential hazards. Continued close contact on safety items will be maintained.

Off-Job Safety Promotion - Instructions to supervisors on collection of information for measurement of off-job injuries and accidents have been sent out. The month of December is being used to work out the kinks in order to get a smooth flow of good information during the coming year. Preparation for the distribution of winter driving safety information to Isochem supervisors is completed and will act as the kick-off of the program.

A decision to strongly encourage Isochem supervision to enroll and attend the free Washington State Department of Labor and Industries First Aid Training courses was made by Isochem management. Promotional material has been prepared.

Representatives of Factory Mutual toured the CPD facilities for the purpose of discussing design of glove boxes for our use. Isochem representatives also participated in a Hanford-wide discussion with these people.

Schedules of 1967 emergency procedure tests were prepared and issued.

George Sahler
Manager - Employee Relations

CHEMICAL PROCESSING DIVISION
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Operation:	General	R&E	FES	Waste Mgt.	Prod.	CPD Serv.	Redox	Purex	Pu Fin.	Total	YTD
Dis. Injuries										0	2
Safety Invest.										0	7
Med. Treat. Inj.	1	1	1	2	1	11	3	7	4	31	374
Rad. Occurrences							1	2	1	4	132
Contam. Wds.									1	1	8
New. Dep. Cases									1	1	7
Fires										0	9

Motor Vehicle Accident ISO-66-13, Purex, 12-21-66
In backing to turn around, the right rear fender struck an indicator post resulting in damage to the fender. Repair cost was $75.

[redacted]

CHEMICAL PROCESSING DIVISION
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II. ACHIEVEMENTS (Continued)

I. WASTE MANAGEMENT SECTION

1. Operating Continuity

The B-Plant processing facilities were down all month to allow construction forces to proceed with Phase III work. Except for one brief interruption, the In-Tank Solidification unit operated continuously. The 242-T Waste Evaporator performance was satisfactory, although an outage of three days was required to replace the feed pump.

2. Processing Operations

a. Head End

During the first part of the month, Head End equipment was used to load three casks with sulfate-free IWW. With the earlier shipment of two casks, this completed the transfer of approximately 1600 gallons of sulfate-free IWW to Battelle Northwest Laboratories. The processing of Purex acid waste was then resumed on December 14, resulting in the recovery of 720 kilocuries of promethium-147 and 240 kilocuries of strontium-90.

b. B-Plant

Processing facilities remained shut down to allow construction forces to proceed with Phase III work in Cell 5.

c. Semiworks

The fifth process test, to demonstrate the solvent extraction of tartrate-complexed sludge from Purex acid wastes, was completed in early December. A gradual deterioration of flowsheet performance, evidenced by increased losses of promethium and strontium products, resulted in a temporary suspension of further tests pending laboratory investigation and recommendations.

d. Cask Loadings

Two STT casks (44 and 47) were loaded with a combined total of 120,000 curies of cesium-137. At the end of the month, both casks were ready for shipment.

e. Waste Management

The following summarizes the progress of the space recovery program for non-boiling wastes:

	Gallons Evaporated	
	December	To Date
In-Tank Solidification	94,000	2,974,000
242-T Waste Evaporator	218,000	2,450,000
Tank 101-AX (equipped with steam coil)	68,000	68,000
Total	380,000	5,492,000

The In-Tank Solidification operation was interrupted last month so that the equipment could be moved from Tank 101-BY to 102-BY. Since several weeks were required to preheat the contents of Tank 102-BY, the boil-off performance of the unit dropped appreciably. By the end of the month, however, the normal evaporation rate of five to six gallons per minute had been regained.

3. Mechanical Experience

The In-Tank Solidification unit was shut down briefly to allow repair of the high temperature trip circuit. Although several days were required to complete the work, outage time was minimized by using a temporary connection to keep the unit operating.

Repairs were required on the 200-East Area gantry crane when two coils burned on the trolley travel brake. The coils were rewound. In addition, new drive gears were installed on the main power cable reelite.

Other maintenance work included:

a. An overhaul of one of the three air compressors which provide cooling air to the 241-A and 241-AX Tank Farms.

b. The fabrication and installation of four special temperature probes for determining dome expansion in Tank 101-AX.

c. Replacement of the feed pump for the 242-T Waste Evaporator.

4. Radiation Experience

Three employees received penetrating radiation of 1.7, 0.7, and 0.3 rem, respectively, when a few milliliters of waste solution were expelled inadvertently from a cask containing high level radioactive liquid waste. Details of the accident are described in document ISO-616.

R. E. Smith

Manager
Waste Management Section

CHEMICAL PROCESSING DIVISION
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II. ACHIEVEMENTS (Continued)

J. CPD SERVICES SECTION

1. Power and Services

A planned electrical outage to the 282-E pump house was necessary to permit revisions on the electrical buss system so as to accommodate new switch gear and raw water pumps. During the outage, the 200-E Area raw water supply was maintained by the emergency steam turbine pump in 282-E.

An inspection of the busses and breakers in the 252-E substation revealed the need for immediate maintenance on one-half the substation. An outage was arranged for 284-E, 282-E and reduced electrical load at "B" plant. Repairs were made to the substation buss and breakers by electrical distribution during the day shift on 12/28/66. The Power House electrical load was maintained by the emergency generator during the outage.

2. Shops and Services

A scheduled practice evacuation was held in the 200 East Area on December 27, 1966. The Shops and Services Subsection personnel of 200 East usually participate in such programs when and as they receive notice. On this occasion no advance notice was received. As a result, the Shops personnel did not hear the evacuation signals and did not participate, indicating a need for the installation of signals in the Shops which are appropriately tied into the signal system.

This occurrence will bring forth action for corrective measures at an early date.

Manager - CPD Services

[redacted]

ISO-642

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III. PERSONNEL ACTIVITIES

A. FORCE SUMMARY

Section	Monthly Salaried		Weekly Salaried		Total	
	11-30-66	12-31-66	11-30-66	12-31-66	11-30-66	12-31-66
General	1	1	1	1	2	2
Research & Engineering	63	63	33	33	96	96
Facilities Engineering	63	62	18	20	81	82
Manufacturing						
General	1	1	-	-	1	1
Production Planning	4	5	4	4	8	9
Waste Management	35	35	121	121	156	156
CPD Services	31	31	189	188	220	219
Redox	47	45	193	193	240	238
Purex	51	51	185	186	236	237
Plutonium Finishing	39	37	175	173	214	210
Total CPD	335	331	919	919	1254	1250
Corporate Offices and Business Management Division	81	81	79	77	160	158
Grand Total	416	412	998	996	1414	1408

B. PERSONNEL CHANGES

None

[redacted]

C. VISITORS

Name	From	Nature of Visit
P. E. Johnson R. Edwards R. Merritt	Factory Mutual Research Corporation Norwood, Mass. (12/6/66)	To see the construction of glove boxes and hoods.
Paul W. Smith	Oak Ridge National Lab Oak Ridge, Tennessee (12/5 - 12/6/66)	Discuss experience in fission product processing.
D. E. Kilgore A. W. Larson	AEC San Francisco, Calif. (12-20-66)	Discuss SEFOR Nitrate.

[redacted]

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IV. REPORTS

A. PREPARED AND ISSUED

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B. PREPARED FOR SIGNATURE AND ISSUANCE

None

CHEMICAL PROCESSING DIVISION
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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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