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HW--72551

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CHEMICAL PROCESSING DEPARTMENT MONTHLY REPORT

JANUARY, 1962

FEBRUARY 21, 1962

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HANFORD ATOMIC PRODUCTS OPERATION

RICHLAND, WASHINGTON

GENERAL ELECTRIC

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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT
FOR

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HANFORD
81204

JANUARY, 1962

Compiled By
OPERATION MANAGERS

February 21, 1962

HANFORD ATOMIC PRODUCTS OPERATION
RICHLAND, WASHINGTON

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BY ALBERT G. PR

R. Steen 8-15-92

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I. SUMMARY

Production through January, as compared with the January 25, 1962, HAPO Production Forecast (HW-72354), is summarized below:

	<u>Percent of Forecast Achieved</u>	
	<u>January</u>	<u>Fiscal Year To Date</u>
Separated plutonium nitrate	96.4	99.6
Separated uranium nitrate	96.0	100.0
Uranium oxide	99.5	100.0
Plutonium metal buttons	107.8	122.5
Fabricated parts	93.4	95.9

January production of separated plutonium and uranium nitrate was below that forecasted because of mechanical difficulties in the Purex plant which extended the neptunium run period and subsequently delayed startup. The production of model 81 weapon components fell slightly below forecast because of a gauging discrepancy which developed, but was corrected, late in the month.

Following completion of the neptunium recovery run, the Purex plant resumed processing operations on January 16, 1962. Performance was below that expected because of instability of the final uranium cycle columns. The latter condition caused higher-than-normal uranium losses and insufficient decontamination of about 30 tons of uranium product.

Shipping capacity of the Shielded Transfer Tank (STT) was increased from 30,000 curies to 50,000 curies of cesium-137 per vessel by reducing the feed temperature during loading.

A recent laboratory study (HW-72259) has indicated that the neptunium-237 content is about thirty percent higher than previously reported in Hanford natural irradiated uranium.

A chemical savings, of \$4.60 per ton of uranium processed, was established for Redox during January. This savings resulted from a 28 percent reduction in the sodium nitrate used for decladding of aluminum jacketed fuel slugs. Hydrogen content of the off-gas (1 volume percent maximum) is considered safe at the reduced sodium nitrate level.

Active field work was started on Project CGC-885, "Reliability Improvements - Purex", on January 17, 1962.

The total funds of \$115,000 were authorized for Project CGC-948, "Strontium Storage and Waste Disposal - Hot Semiworks", on January 5, 1962. Detail design is proceeding ahead of schedule.

The Redox NPR fuel processing system was reviewed to determine the equipment necessary to test and develop operating procedures for zirflex processing. Initial capital expenditures will include: (1) provision of the existing Mark V Dissolver System for zirflex processing; (2) installation of the spare Mark V Dissolver for normal processing only; and (3) installation of receiving and storage facilities for ammonium fluoride.

The fixed-price contract for Phase II of Project CGC-912, "Waste Treatment Facilities - Z Plant", was awarded to the Tide Company of Tacoma, Washington. The Phase I fixed-price contractor completed all exceptions by January 2, 1962.

Two disabling injuries were experienced in the Department on successive days. On January 21, an employee swerved a pickup truck off the road to avoid hitting a coyote. He was hospitalized for five days for examination and treatment of internal injuries. The following day an electrician fell and injured his lower spine. Although he was not hospitalized, severe pain prevented his return to work for two days.

P. H. Reinker

General Manager
Chemical Processing Department

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II. ACHIEVEMENTS

A. PRODUCTION OPERATION

1. Production Statistics

a. Percent of Forecast(1) Achieved

	<u>January</u>	<u>Fiscal Year to Date</u>
Separated plutonium nitrate	96.4	99.6
Separated uranium nitrate	96.0	100.0
Uranium oxide	99.5	100.0
Plutonium metal buttons	107.8	122.5
Fabricated parts	93.4	95.9

b. Purex

	<u>January</u>	<u>December</u>
Uranium nitrate produced (tons)	313.29	678.87
Average production rate during operation (T/D)	21.05	24.1
Total waste loss (%)		
Plutonium	0.44	0.13
Uranium	0.27	0.10
On-line efficiency (%)	70.5	94.4

c. Redox

Uranium nitrate produced (tons)	152.52	88.68
Average production rate during operation (T/D)	8.2	10
Total waste loss (%)		
Plutonium	0.17	0.28
Uranium	0.11	0.19
On-line efficiency (%)	90.2	36.9

d. Uranium Reduction (tons)

Normal UO ₃ loaded	338.06	469.16
Enriched UO ₃ loaded	93.87	138.34
Normal UO ₃ approved for shipment	350.19	697.42
Enriched UO ₃ approved for shipment	93.52	144.10
Normal UO ₃ shipped	399.58	498.36
Enriched UO ₃ shipped	95.66	95.95
Normal UNH backlog	215	254
Enriched UNH backlog	115	57

(1) HW-72354, HAPO PRODUCTION FORECAST, dated 1/25/62

e. Plutonium Metal ProcessingJanuary December

Input to Task I (batches)	264	325
Reduction yield (%)	96.3	94.9
Product recovery output (Kgs)	139.46	198.67
Product recovery backlog (Kgs)	639.2	609.7
Waste disposal (grams)	1288	1136

f. Power200-East 200-West

Raw water pumped (gpm)	8 314	4 885
Filtered water pumped (gpm)	1 322	884
Maximum steam generated (lbs./hr.)	310 000	210 000
Average steam generated (lbs./hr.)	175 216	130 877
Total steam generated (M lbs.)	130 361	97 373
Coal consumed (tons)	7 154	5 385

January production of separated plutonium and uranium nitrate was below that forecasted because of mechanical difficulties in the Purex plant which extended the neptunium run period and subsequently delayed startup. The production of model 81 weapon components fell slightly below forecast because of a gauging discrepancy which developed, but was corrected, late in the month.

J. H. Warren
 Manager - Production

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II. ACHIEVEMENTS (Continued)

3. PUREX OPERATION

1. Operating Continuity

A neptunium recovery run began on 1-2-62. Completion of this run was delayed for 56 hours while a product transfer jet (2BP to J5) which failed on 1-4-62 was replaced, and for five days while repairs were made to the vessel vent reactor heater which failed on 1-10-62. The run was completed on 1-15-62. Recovery efficiency for this run was low due to losses to the sump through a loose flange in the product concentrator. This material has been collected and stored for recovery in the next run.

Normal operation was resumed on 1-16-62 at a CF of 3.0 and continued through the end of the month except for a 22-hour shutdown on 1-30-62 to replace the Backcycle Concentrator control jumper (3 WF). Attempts to raise the operating rate during this period were ineffective due to continued instability in the Second Uranium Decontamination Columns (2D and 2E). Incomplete stripping of organic during most of the run caused product losses to be higher than normal.

The instability of the Second Uranium Decontamination Cycle resulted in insufficient decontamination of approximately thirty tons of uranium produced during this period. All other material produced met specifications.

2. Processing Operation

Approximately 65 kilocuries of strontium 90 were recovered and transferred to the 003 CR vault tank. The HAPO II-1 cask was loaded with 110 kilocuries of purified strontium carbonate at the Hot Semiworks and is currently undergoing final leak testing prior to release to the AEC.

Four shielded transfer tanks (STT) were loaded with a total of approximately 200 kilocuries of cesium 137 and were released to the AEC for shipment to ORNL on 1-19-62. Increasing the loading from 30 to 50 kilocuries per STT was accomplished without incident.

A promethium recovery test run was attempted for research and development purposes. Promethium recovery was less than desired due to premature precipitation of the product during the run.

Four 200-gallon casks and one 500-gallon cask of miscellaneous waste

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from the 300 Area High Level Cells were unloaded and the waste transferred to underground storage. To make room for Purex coating waste, 138,000 gallons were transferred from the C Tank Farm to the BY Tank Farm.

3. Mechanical Experience

Three failed tube bundles were replaced, one in each of the two waste concentrators (F-6 and F-11) and one in the backcycle concentrator (H-4).

The Vessel Vent System steam heater (F-2) which had failed was replaced with a reconditioned spare on 1-10-62.

A reconditioned main drive wheel was installed on the cab end of the west crane when the drive wheel shaft broke during normal operation.

Contact maintenance was used to repair a loose flange on the product concentrator.

The stem of a 3" bypass valve in Trap Pit #2 broke during normal operation and was replaced. This work was seriously hampered by high radiation and contamination. Extensive work was done in Trap Pit #1 to stop leaks in lines from the three dissolvers.

Ten replacement jumpers and three for new routings were installed, including the replacement of the 2BP to J5 jet jumper which failed during the neptunium recovery run.

An overground transfer line was installed between two tanks (107 and 109) in the BY Tank Farm to permit additional transfers of coating waste to this farm from the C Tank Farm.

4. Radiation Experience

A spread of contamination occurred on 1-2-62 when water overflowed from H Cell and backed into the product purification and loadout areas. The water came from a raw water line to H Cell which was turned on inadvertently. The contamination was confined immediately and cleanup was prompt and thorough.

The total radio-iodine 131 emission was 0.7 curies for the period with a maximum seven-day emission of 0.3 curies. There were 11 Radiation Occurrences and 19 cases of skin contamination.

5. Analytical Experience

An ion exchange method for determining promethium content has been developed which is more reliable and less time consuming.

Manager-Purex

PR McMurray:RDP:gt

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CHEMICAL PROCESSING DEPARTMENT
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II. ACHIEVEMENTS (Continued)

C. SPECIAL SEPARATION PROCESSING AND AUXILIARIES OPERATION

1. Operating Continuity

Processing operations in the Redox Plant were resumed on 1-3-62, after an extended shutdown during the latter part of December for a neptunium recovery run and a sixty percent nitric acid flush of the processing equipment as a critical mass control measure. Subsequent operation was conducted as scheduled and the production for the month was achieved.

2. Processing Operations

E-metal processing was resumed on 1-3-62. Some difficulty was experienced during the initial startup period with plugged chemical addition and column backcycle lines, and several extraction column shutdowns were required before normal process flow rates could be established. During this same period the D-14 backcycle concentrator pump became very erratic and it was necessary to install a new unit on 1-6-62.

In spite of the operating problems encountered during startup, decontamination was good on the plutonium cycles. The uranium cycle decontamination suffered slightly and the first two uranium batches were out of specifications. This material was subsequently reworked to acceptable specifications.

The E-13 ozonator tank agitator, which is very important for good decontamination in the ozonator, failed on 1-22-62. As a result, approximately twenty UNH batches were out of specifications in gamma activity. This material, which is currently in storage, will be returned to the process for additional ozonation and blending to meet shipping specifications.

Included in this month's production was approximately 120 tons of special E-N load material from the H reactor. The test material was processed in three groups of approximately 40 tons each. In addition to the numerous metal solution samples taken, removal of the dissolver metal heel was required both before and after dissolution of each of the three groups of metal.

The control of I-131 emissions from the Redox stack was the problem of most concern during this period. Every control currently available to contain the I-131 discharge is now in use. The B-2 silver reactor was regenerated on 1-6-62, the

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caustic scrubber is in operation, mercuric nitrate is again being added as a suppressor, and the new activated charcoal cartridge in the H-4 metal solution oxidizer vent system is in service. However, to date these control procedures have not been consistently effective in maintaining the desired low levels (0.8 curies per week). Although the efficiencies and limitations of all the control procedures now in effect are being carefully evaluated for possible improvements, it may be necessary to go to longer feed metal aging time in order to attain the desired performance.

3. Mechanical Experience

Redox canyon agitator experience was unusual this month in that two replacements were necessary. The agitator in the metal solution blending tank (H-7) failed and was replaced with a new unit on 1-11-62. The exact cause of the failure is unknown, but it appeared to be in the gear box since the shaft and blades were intact but not rotating. The failed unit had operated for 2,132 hours since it was originally installed on 2-19-58.

The agitator in the E-13 ozonator tank also failed this month and apparently from the same cause as the H-7 agitator. It was replaced with a reclaimed unit on 1-24-62. The failed agitator had operated for 2,817 hours since it was originally installed on 4-30-61.

On 1-6-62, the pump in the backcycle concentrator tank (D-14) became inoperative because of a bearing seizure and a new unit was installed. The failed pump had operated for 2,348 hours since it was installed on 5-31-61.

4. Waste Handling and Decontamination

Equipment valued at \$86,000 was received from the processing plants for decontamination, repair or inspection during the month. Equipment valued at approximately \$25,000 was returned to CPD customers, representing a savings of approximately \$18,000 over the cost of new replacement equipment. In addition, a savings of approximately \$12,000 was realized on equipment reclaimed for Project CGC-897.

A total of 170 manhours was charged to the decontamination and/or repair of railroad, automotive, and heavy equipment. The following is a breakdown of the major items decontaminated:

<u>Item</u>	<u>Operation Charged</u>
Flatcar No. 3611	CPD
Power Forklift	FPO
Motor Crane No. 10-794	P&GM
Power Forklift	Transportation
Clamshell	IFD
Well Cars No. 37, 39, 40, 41, 43 & 45	CPD
(Removed drain lines and installed plugs)	

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5. Radiation Experience

The total I-131 emission from the 291-S stack during January was 8.76 curies. The average per day was 0.283 curies and the maximum for a 24 hour period was 1.06 curies. The plant's allotment of 0.8 curies per week was exceeded consistently in spite of using every control method currently available to contain the I-131 discharge. Control methods are being critically evaluated in an effort to reduce the discharge to the desired levels.

Five skin contamination cases (maximum 6,000 c/m) and four radiation occurrences were recorded during the month. All skin contamination was readily reduced to non-detectable. The most significant radiation occurrence involved nasal contamination of 1,500 c/m to a crane operator in the 221-T Canyon Building during the decontamination of highly contaminated equipment. Nasal irrigation performed in the field reduced the contamination to non-detectable. A subsequent whole-body count revealed no internal deposition.

On 1-18-62 an old vapor line, which had been removed from the now obsolete ruthenium scrubber, was removed from the Redox canyon and buried. Although this line had been stored for one year to allow ruthenium decay, sufficient activity still remained to give a reading of 2.8 r/hr at a distance of 50 feet from the concrete burial box. The burial was completed without incident.

6. Analytical Experience

Another series of samples for uranium analysis was submitted by the Coolant System Development Operation in conjunction with the test loop decontamination study. Large amounts of organic salts present in the samples prevented performance of uranium analysis by the routine X-ray photometric procedure. However, accurate results were obtained by use of a new instrument, the X-ray fluorescent spectrometer, currently undergoing tests by the Process Chemistry Operation.

A series of coating waste samples, resulting from PRTR flow sheet development studies by the Development and Corrosion Chemistry Operation, HLO, was analyzed for plutonium. Since the samples contained high concentrations of zirconium and ammonium fluoride, which cause interference in the determination of plutonium by normal organic extraction procedures, modifications of routine methods were necessary.

Analytical assistance is now being provided to Finished Products Chemical Technology, in support of their test program on uranium oxide powder. The test, which involves altering calcination variables, is designed to produce a powder which will have a higher degree of conversion to uranium fluoride and thus increase productivity at Paducah, Kentucky. The test program, which is expected to run for a year, will result in a nominal

increase in analytical work load.

7. Events Influencing Costs

The Redox Plant did not operate on the New Year's Holiday and only those people necessary to carry out miscellaneous work assignments were scheduled to work.

A significant reduction was made this month in the amount of sodium nitrate used for hydrogen suppression during the decladding of aluminum-jacketed slugs. At current chemical costs a savings of about \$4.60 per ton of uranium processed will be realized.

Chas. S. Smith
 Manager - Special Separation
 Processing and Auxiliaries

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II. ACHIEVEMENTS (Continued)

D. FINISHED PRODUCTS OPERATION

1. Operating Continuity

Continuity of operation in the Fabrication facilities was interrupted by feed shortages and mechanical problems in the casting operations and by gauging discrepancies in the machining and inspection operations. Unfabricated plutonium production was curtailed at mid-month because of feed shortages but returned to normal at month end. Recovery facilities operated at high rates until a scheduled shutdown at mid-month, after which mechanical and process problems severely limited production. Production of normal uranium oxide was curtailed by shortages of acceptable feed, while production of enriched material was slowed by a lack of shipping containers.

2. Processing Operations

a. Plutonium Fabrication

Information on plutonium fabrication is presented in Document HW-72657 entitled, "Chemical Processing Department, Finished Products Operation, Z Plant Monthly Report, January, 1962," which is classified, "Secret, Atomic Weapon Data, Production Rate and Stockpile Quantity Information."

b. Plutonium Processing

The preparation of unfabricated plutonium now includes a blending problem of significant proportions. The sharp rise in the Pu 240 isotopic content of the plutonium currently being separated by both the Purex and Redox plants requires that all batches of feed be analyzed by the mass spectrograph method. Precise blending is necessary in order to meet the specification which has been established for weapons grade plutonium.

During the scheduled shutdown of recovery operations at mid-month, a prototypical air pulser was installed as a replacement for the mechanical bellows type pulser on the H-1 (first solvent extraction) column. Following startup, numerous mechanical difficulties in this new equipment caused interruptions to production, but by the end of the month corrections were made. Use of this pulser should result in significant reductions in maintenance costs, and personnel exposure to maintenance personnel.

b. Plutonium Processing (Con't.)

A fire originating from welding slag occurred in the solvent extraction hood of the Recuplex facility on January 10, 1962. The fire was extinguished promptly and only five hours of operating time were lost. A complete investigation was made and a detailed report issued.

Operation of the incinerator using contaminated feed was initiated this month. Operation is on an intermittent basis, with a limited inventory, to permit full evaluation of all factors after each run. A flow sheet will be prepared after sufficient data are available. Operation to date has been generally satisfactory and material balance good. The intermittent, batch-type operation will continue for approximately thirty days.

c. Uranium Reduction

Operations were normal except for feed and container shortages, and one equipment failure resulting from inadvertent feeding of a calciner without the agitator operating. No mechanical damage resulted, but the calciner was out of service for three days.

3. Mechanical Performance

Operation of the fabrication equipment was satisfactory with only minor repairs being required. A new chuck for Model 1251 production was installed and machined to size in Lathe Hood HC-42-M2.

Operation of the plutonium preparation equipment was normal but was somewhat hampered by low fluorinator vacuum and reduction furnace hydraulic system difficulties. Corrections are in progress at month end. An inspection hole was drilled in one of the two horizontal product receiver tanks for Hood 6C. No plutonium build-up was revealed.

The recovery equipment continued to require considerable maintenance effort. The scheduled shutdown at mid-month to install the air pulser and to replace a lucite panel was used to advantage to perform maintenance on various instruments which are not available without such an extended outage.

Operation of the uranium reduction was normal except for the failure of the tube sheet gasket on the ED-2 concentrator. The concentrator was replaced with a repaired spare unit.

4. Radiation Experience

Radiation and contamination statistics reveal control to be normal and satisfactory.

4. Radiation Experience (Con't.)

One case of possible plutonium deposition was revealed when positive nasal smears on an operator followed a plastic bag failure during a sealing operation. Initial assay results show that deposition is less than five per cent of MPL.

5. Analytical Experience

	<u>December</u>	<u>January</u>
Number of Samples Received	2,524	1,695
Number of Determinations	18,703	17,093
Total Metallic Impurities, Buttons	697 ppm	923 ppm
Total Carbon Content, Buttons	485 ppm	390 ppm
Buttons Rejected	1.7%	6.5%
Pu 240, NRF (by neutron count)	7.12%	7.04%
Pu 240, Regular (by neutron count)	6.09%	6.19%

6. Safety Experience

A disabling injury was incurred on January 21 when a Power Operator, enroute from U plant to Z plant, swerved a pickup truck off the road to avoid hitting a coyote. The truck struck a cathodic protection rail which was imbedded in the ground on the edge of the shoulder of the road. The operator was hospitalized for five days for examination and treatment of internal injuries. He returned to his regular duties on January 31, 1962.

W. J. Hartman
 Manager,
 Finished Products

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II. ACHIEVEMENTS (Continued)

E. POWER AND GENERAL MAINTENANCE OPERATION

1. Operating Continuity

Steam, water and emergency electrical services were supplied the production plants, in quantities sufficient to sustain continuity of operation for the entire month.

2. Inspection, Maintenance and Repair

Installation of the hood addition in the Redox Final Plutonium Decontamination and Concentration Facility (233-S) was completed. The enlargement of this hood was necessary in order to house the ion-exchange contactor provided for in the Continuous Birch Recovery Project (CGC-913). Due to its 32' height, the hood was installed in prefabricated sections.

Necessary corrective alterations to the spare HS stripping column for the Redox Facility were complete at month's end. The pulse flange was relocated and as-built drawings were prepared in accordance with conventional procedure.

Erection of the columns in the Purex Continuous-Palm-Recovery J-Cell Package has been resumed following receipt of the columns from the vendor to whom they were returned for corrective welding alterations. The work is an estimated 50% complete at this time, and is considered to be no more than eight weeks behind schedule as a result of the necessity of returning the faulty columns to the vendor. Completion is presently scheduled for May 1, 1962.

Forty-one pipe jumpers were fabricated during the month to meet requirements as indicated below:

Palm Project, CGC-821	-	13 jumpers	
Birch Project, CGC-913	-	3 jumpers	
Purex Replacements	-	19 jumpers	- including 5 on emergency basis
Redox Replacements	-	6 jumpers	
Total		41 jumpers	

Two Purex concentrator tube bundles, #41 and #42, were leak tested, dimensionally checked for tolerances, insulated and placed in standby status.

Progress continued on the Pipe and Operating Gallery phase of the Purex Palm Project. Pipe prefabrication work is nearing completion,

and two of the twelve assemblies have been installed. Modification of existing overhead piping is in progress; however, slow delivery of project materials continues to impede progress of the work. The overall status of the work is approximately 65% complete. A revised completion schedule of May 1, 1962, has been established.

The aqueous makeup portion of the Purex Palm Project is progressing according to schedule. Included in this work is the installation of four new tanks and revisions to three existing tanks. Project material for the mechanical and piping portion of the job is on hand; however, slow delivery dates for electrical and instrumentation material will cause some delay. The work is an estimated 75% complete at this time, with final completion scheduled for April 30, 1962.

A 40" Byrd centrifuge from the T-Plant was modified for prototypic installation in the Purex Fission Products Recovery Facility. All work on the unit is complete, and run-in and operability tests were in progress at month's end.

At the 231-Z Building, special emphasis was placed on the modification of existing equipment and on making new equipment ready for operation in support of Hanford Laboratories Operation's Plutonium Carbide Development Program. Included were modifications to the Welding Hood to permit its use as a high-temperature facility for carburization of plutonium. The arc melt furnace, a new system installed by Minor Construction, is undergoing modifications which, when complete, will permit the system's use as a melt process similar to the operation in the welding hood. Modifications to the X-ray hood atmosphere-control system, which will permit the use of this hood for analyzing plutonium carbide, were complete at month's end.

Installation of a section of new 3" steam line, to replace the existing line to the 241-T Tank Farm, was completed during the month by an outside contractor. Justification for upgrading these lines was based on excessive heat loss and high maintenance costs of the original installation. The original line will be excessed.

The 272-Z Building has been made ready for disposal. The structure was excluded from the Z-Plant security enclosure by the erection of temporary fencing on the north, east and south sides. Removal of the building is in line with long-range plans to rid the 200 Areas of buildings and structures that no longer contribute to the progress of the work.

Assistance rendered other HAPO departments included the conducting of tests for the Irradiation Processing Department to determine the ability of demister pads to remove entrained moisture from an air stream. Results of the tests indicated the pads to be very effective.

T. S. LaFollette

Manager
Power and General Maintenance

TGL:ap

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CHEMICAL PROCESSING DEPARTMENT
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II. ACHIEVEMENTS (Continued)

F. FACILITIES ENGINEERING OPERATION

1. Purex

a. Process Design Engineering

Hot Semiworks Improvements

Purchase specifications were issued for pressure switches needed to inter-lock the sample gallery exhaust and supply ventilation fans and maintain the sample galleries positive in pressure with respect to the process cells. Process design work covering modification to "D" Cell for improved cask loadout operations was completed.

Process Concentrators

Process design work was completed on a concept of an air lift device to improve the overflow characteristics of the Purex E-F6 Acid Concentrator. The proposed system would be capable of continually withdrawing bottoms solution, thereby reducing the corrosive effect of accumulated corrosion products in E-F6. Features were included in the proposed design to permit sampling of E-F6 bottoms, a capability that does not exist at present.

Diversion Box Improvements

A process engineering study was completed, and means were devised, wherein all transfer functions between the Purex Building, and the Waste Tank Farms, the CR Vault, and "B" Plant could be accomplished without dependence upon the 151 and 152 Diversion Boxes. In addition, means were devised, with a single last entry into the 151 and 152 Diversion Boxes, wherein all existing routings could be supplied and all diversions, except that of the high-level wastes into the various 241-A waste tanks, could be made in the 202-A Building. The new diverter station planned in conjunction with the 241-AX Waste Tank Farm would expand the capability of routing waste to any of the six "A" tanks via 151 and 152 Diversion Boxes without need for jumper changes in the boxes.

Conceptual designs were completed for containment enclosures, maintenance, and ventilation systems for the 151 and 152 Boxes.

241-AX Process Design

The engineering flow diagrams, plot plans, and diverter drawings have been revised to reflect the currently planned routing of high-level, OWW, and coating wastes directly from the 202-A Building to the master diverter station and thence with high-level and OWW wastes going to the 241-AX Tank Farm diverter.

A diverter mock-up was completed and tested in 300 Area. A flow of 200 gpm of water through the system was demonstrated. No splashing or leak back flooding occurred. The diverter system seems to be inherently stable, hydraulically and resistant to plugging by granular solid particles.

Tank Farm Sludge Monitor

Design and drawings were completed for a sludge monitoring device to be installed in Tank 106-A. The device consists of three sample tubes which can be withdrawn separately as sludge forms in the tank.

b. Project EngineeringCGC-895 - Reliability Improvements - Purex

Active field work on this project was started on January 17, 1962.

CGC-948 - Strontium Storage & Waste Disposal - Hot Semiworks

Directive No. HW-531, Mod. #1, dated January 5, 1962, authorized the total funds requested - \$115,000.

Detail design, which was started on December 11, 1961, is 72 percent complete and is 9 percent ahead of schedule.

CAC-950 - Cesium Load-Out Facility - 241-C

Directive No. AEC-201, dated January 11, 1962, authorized \$19,000 for design. The Work Authority to the General Electric Company was issued on January 18, and Title II design was started by the Architect-Engineer on January 23, 1962.

2. Special Separations Processinga. Process Design EngineeringNPR Fuel Processing

The Redox NPR Fuel Processing Facilities, Project CGC-929 was reviewed to determine what equipment was necessary to demonstrate

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for interim operation, operating procedures on zirflex processing and to process PRTR fuel. Initial capital expenditures will include: (1) provision of the existing Mark V Dissolver system for zirflex processing including jumper installation for disposal of dissolver condensate wastes; (2) installation of the existing spare Mark V Dissolver equipment in "A" Cell, with provision for normal dissolving processes only; and (3) installation of receiving and storage facilities for ammonium fluoride.

D-12 Concentrator

A process engineering review was made of the feasibility of modifying the D-4 Tower for D-12 concentrator service. It was determined that the D-4 Tower is suitable for this new service, with minor modification and certain new appurtenances.

b. Project Engineering

CAC-928 - Leak Detection - High-Level Waste Tanks - 241-A and 241-SX

The contract for drilling 88 vertical monitoring wells in two tank farms was awarded to Hayden Drilling Company on January 11, 1962, with a bid of \$48,290. The contractor started active field work with two rigs on January 29, 1962.

To date, a contractor for drilling lateral monitoring holes has not been selected by the J. A. Jones Company. A meeting was held on January 24, 1962 to consider five proposals by interested contractors. As a result of the meeting, a re-submission of proposals was requested based on modifications to the permissible methods of drilling.

3. Finished Products

a. Process Design Engineering

Incinerator Building

A water spray nozzle has been designed and installed to control backfire on the incinerator feed belt. No backfires have occurred during operation of the nozzle. If the limitations that the water spray imposes on batch limits prove too restrictive, a prototype inert gas system which blankets the inlet to the combustion chamber with inert gas, has been scoped.

RMC Fabrication Line

Design is in progress to provide neutron shielding around the storage glove boxes HC-22SR and HC-45SR. This work is a priority item as radiation exposure is high in these areas.

RMA Fabrication Line

Engineering work was initiated to revise the process design basis for additional storage facilities to include neutron shielding. A decision was made during the month to submit a proposal for these facilities as rapidly as possible.

A document describing the process design basis for plutonium thermal treatment facilities was completed and issued. Studies are in progress to determine methods for revising the design basis to include neutron shielding on the thermal treatment equipment.

b. Project Engineering

CAC-880 - Plutonium Reclamation Facility - "Z" Plant

Design is the only active work being performed at this time. As of February 1, 1962, it is 97 percent complete as compared to 98 percent scheduled. Design completion date of March 1, 1962 will be met as the work is now planned.

A schedule based on a single construction contract is being made to ascertain the timing advantages, if any, of performing construction by this method, as compared to the original plan of a two-phase construction schedule. This new schedule will be completed and evaluated during February, 1962.

CGC-912 - Waste Treatment Facility - "Z" Plant

The Phase II fixed-price contract was awarded to the Tide Company, Tacoma, Washington, on January 12, 1962, for \$89,875. An initial meeting with the contractor was held on January 29th. Contract work is scheduled to be completed on July 24, 1962.

The Phase I fixed-price contractor completed all exceptions on January 2, 1962.

c. Manufacturing Engineering

Unit Cost Breakdown

A joint project with Financial Operation for costing the 1251 versus the 81 model was completed. Cost procedures and analyses were developed for each model in normal cost blocks. Proposed accounting procedures and the system will be installed for February cost accumulations.

4. General

a. Process Design Engineering

Fission Products Shipping

The design of the model buffer and cask for the Design Verification Test Program on the HAP0-I cask, has been completed. The University of Texas' revised proposal has been received and is in harmony with the overall program planning to date. Detail design of the HAP0-IV cesium-137 shipping system was completed. This cask is capable of containing about 500 gallons of cerium-laden decalco.

Emergency Duty Shelter Study

Work is in progress to define the scope of facilities required to meet the emergency duty shelter requirements set forth by the AEC. Included in the scope will be personnel shelters and process control instruments sufficient to maintain the plant in a safe shutdown condition during periods of high fallout activity following a bombing attack.

b. Project Engineering

Project Cost Information as of 1-21-62:

Total Auth. Funds - 14 active projects	\$ 11,358,000
Total Cost-to-date	6,521,000
Commitments and Open Work Releases	1,180,000
Unencumbered Balance	3,657,000
Costs Charged to above projects - 12-18 to 1-21-62	349,059

Manager - Facilities Engineering

HP Shaw:WWC:olc

CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

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II. ACHIEVEMENTS (Continued)

G. RESEARCH AND ENGINEERING OPERATION

1. Purex Process Technology

a. Fission Product Recovery

Four Shielded Transfer Tanks (STT's) were successfully loaded with a total of 200,000 curies of cesium-137. Cask loadings, which were previously 30,000 curies each, were increased to 50,000 curies each by reducing the feed temperature during the loading operation from 50° to 25° C. About 95 per cent of the cesium was removed from the feed solution by the Decalso in the cask and no indication of breakthrough was noted at the higher cask loadings.

Changes, which have been made in the strontium recovery flowsheet to improve the recovery efficiency and centrifuge operating conditions, include:

- (a) An initial centrifugation of the IWW to reduce the amount of precipitate and heat accumulated in the bowl during centrifugation of the sulfate precipitate.
- (b) The use of a water slurry to remove the metathesized sulfate cake (carbonate) from the centrifuge bowl and thus eliminate the foaming and heat of neutralization that occurred when 2 M HNO₃ was used for removal by dissolution.

b. Solvent Extraction

Startup, after the scheduled shutdown period, was uneventful and subsequent solvent extraction performance was satisfactory. A lower-than-last-month First Cycle decontamination performance was offset by improved performance in the Final Plutonium Cycle but not the Final Uranium Cycle. As a consequence, the gamma ratio of the final uranium product from solvent extraction ranged from 7 to 10 (a factor of 1.5 above that produced last month), but was still suitable for silica gel treatment.

After months of satisfactory operation at a low pulse frequency (about 35 cycles/min), a shift has occurred in the 2E Column performance and the uranium losses in the organic effluent have increased ten-fold. Attempts to reduce the losses by increased 2E Column extractant flow have had no significant effect while attempts to improve column efficiency by a higher pulse frequency resulted in column instability. The addition of 0.06 M HNO₃ to

the 2D Column scrub stream (normally a water stream) and increasing from 0.01 M to 0.03 M the nitric acid concentration in the 2E Column extractant has permitted a fifteen per cent increase in the operating pulse frequency. The higher pulse frequency reduced the high uranium loss by about a factor of two.

c. Neptunium Recovery

The neptunium isolation and decontamination run suffered two unscheduled shutdowns because of equipment failures during the isolation portion of the run. Although the recovery efficiency was good, an undetected equipment leak during the final concentration step reduced the overall recovery to 43 per cent vice a normal 90 per cent. The material that escaped during concentration was collected in the rework tank and will be available for reprocessing.

Despite high neptunium losses (ten per cent) to the final uranium product during the January operating period, overall accumulation was excellent (>85 per cent). A recent laboratory study (reported in HW-72259) indicates about a thirty per cent higher neptunium-237 content in natural irradiated uranium than previously reported. According to the new data, natural uranium irradiated in the Hanford reactors to 600 MWD/T contains 2.0 g/T Np-237 while at 800 MWD/T the concentration is 2.7 g/T.

d. Plutonium Concentration

Decontamination performance of the Plutonium Ion Exchange unit was excellent with record decontamination factors of 25 to 35 being attained during the month. However, mechanical operation was not as smooth as normal because excessively high pressures were required to move the resin.

e. Waste Management

Preliminary operability tests of the IWW Denitration Prototype, designed to demonstrate the formaldehyde destruction of nitric acid in the concentrated high-level waste (IWW), have shown that an induction period of about one minute exists between the time formaldehyde addition begins and the reaction starts. As yet smooth operation of the unit has not been attained because shortly after startup, operation of the equipment was temporarily halted to repair a serious IWW leak in the system.

During the month a small core sample (1-in. dia. by 3-in. long) was obtained from the hard sludge layer in the bottom of self-concentrating tank, TK-241-A-103. Wedging of the core in the sample tube prevented obtaining a larger sample of the 30-in. deep sludge. Another attempt will be made after a redesigned core bit is received on site.

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2. Redox Process Technology

a. Aluminum Jacket Dissolution

Sodium nitrate, in the ratio of 1.4 moles per mole of aluminum, has been routinely used for hydrogen suppression during the sodium hydroxide decladding of aluminum-jacketed slugs in the Redox plant. Laboratory data have indicated that adequate hydrogen suppression could be achieved with considerably less sodium nitrate. Monitoring of the dissolver off-gases with the recently installed combustible gas analyzer system during three decladding tests, which used one mole of sodium nitrate per mole of aluminum, revealed that the maximum hydrogen content of the off-gases during the dissolution was only one volume percent. As a result of these tests, the standard decladding procedure was changed to provide one mole of sodium nitrate per mole of aluminum; chemical costs were reduced by \$4.60 per ton of uranium processed at month-end. Further testing is planned, making use of the gas analyzer, to determine the minimum practical sodium nitrate to aluminum mole ratio.

b. Solvent Extraction

The previous tests have demonstrated that the partition column product stream (1BP-PuIII) was successfully oxidized in the extraction section of the second plutonium decontamination column (2A), using sodium dichromate; however, in the scrub stream (2AS) decontamination was adversely affected. A fourth test, completed last month, which introduced the sodium dichromate into the 2A Column as a separate stream, four feet below the feed point, provided adequate product decontamination, but oxidation was incomplete due to poor mixing in the aqueous phase. A fifth test, completed during January, added a more dilute sodium dichromate solution to the 2A Column four feet below the feed point in an attempt to improve aqueous phase mixing. Product decontamination was good; however, oxidation again was poor. Further evaluation will be required to determine whether column modifications will be required to make the flowsheet practical.

c. I-131 Control

Approximately 1.3 percent of the I-131 charged to the dissolver during the month was emitted to the Redox stack, mainly from the vessel vent off-gas system (J-5-A). The addition of 0.001 M mercuric nitrate to the dissolver solution has not been effective in reducing the I-131 emitted from this source to desired low levels.

The new jumper containing a 3-square foot by 8-inch deep bed of activated charcoal, installed in the metal solution oxidizer system (J-3) during December, 1961, has been ineffective in removing I-131 from the gas stream. Samples of the off-gas stream taken from the inlet and the outlet of the charcoal adsorber indicate negligible pickup of I-131. A possible explanation of the poor performance is the presence of a water vapor fog in

the gas stream which carries I-131 through the adsorber. Additional laboratory and plant testing are planned to determine why the efficiency falls so far below that indicated by available literature and laboratory studies. Meanwhile, efficient I-131 removal from the metal solution oxidizer off-gas stream has been accomplished by scrubbing the off-gases with 15 percent sodium hydroxide.

d. Waste Storage - 114-SX Sludge Dissolution Test

Following the transfer of the 114-SX tank supernatant solution during September, 1961, the tank was re-filled to a depth of 10 feet with tank farm condensate and a test was initiated to determine how well the sludge could be dissolved or slurried, using the in-tank air circulators. Approximately 80 percent of the initial sludge volume has now been dissolved. Re-use of the sodium nitrate solution, resulting from the sludge dissolution, for hydrogen suppression during aluminum jacket dissolution in the Redox plant is being investigated. Data from the test are tabulated below.

<u>Date</u>	<u>Sludge Depth, Inches</u>	<u>Sludge Temperature</u>	<u>Sludge Vol., Gallons</u>	<u>Percent Dissolved</u>
Initial	29.5	275 F	66,374	-
October 31, 1961	15.5	235 F	27,802	58
November 30, 1961	12.5	195 F	19,587	70
December 31, 1961	11.0	168 F	15,700	76
January 31, 1962	10.0	163 F	13,379	80

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3. Finished Products Chemical Technology

a. Metal Finishing Operation

1. Recuplex

The prototype air pressure actuated pulser was installed on the first extraction column (H-1). Visual examination of the column indicates mixing to be substantially different from that obtained with the near sine wave shaped pulse generated by the bellows pulser. Mixing is good, with a pulse leg pressure of 22 pounds per square inch and a frequency of 32 cycles per minute (a frequency of about 55 cycles per minute is required with the bellows pulser), and good mixing appears evident during a back stroke of significant velocity and amplitude. The flooding capacity of the column appears to be considerably higher than realized with the bellows pulser, however, actual flooding conditions have not yet been achieved. Extraction waste losses have been acceptable, however, current performance data are necessarily qualitative while the operating characteristics and parameters are being established. Equipment to determine the wave shape and pulse amplitude is being installed and tests to determine HTU values and flooding capacity are planned, following these early operability tests.

Piping changes were made to eliminate the erratic flow rate of solvent to and from the test organic HF wash column. The carbonate wash of the column effluent was replaced with an aluminum nitrate wash in an attempt to remove residual fluoride ion, yet retain sufficient TBP degradation products to maintain high extraction distribution coefficients (E_o/a) at the dilute end of the column. Initial performance was good, however, the plutonium concentration of the solvent increased sufficiently to result in the precipitation of PuF_4 in the HF wash column.

Polyvinyl chloride has shown excellent resistance to HF solutions and organic solvent as a material of construction for the organic HF wash column. However, two nozzles have been broken off the column by impact; and, although repairs have been effected, a stronger, less brittle material is desirable. Based on laboratory tests, polyester (glass laminations) column sections are being installed to determine the utility of this material.

2. Incineration

The incinerator was operated for 16 hours, burning contaminated cardboard, plastic, and rags. Rubber gloves and non-combustibles were processed through the leaching hood.

The incinerator off-gas scrubber solution (10% NaOH), containing slightly less than one percent of the total plutonium processed, was discarded after 11 hours of operation. The pressure drop across the off-gas filter increased from 0.60 to 0.75 inch of water during the 16 hour period.

Recovery of plutonium, based on the input values, has been excellent, with preliminary indications showing greater than 50 percent of the recovery taking place in the leaching hood.

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4. Process Chemistry

a. Purex Plant Assistance

Process Chemistry received a 4.72 g sample of the sludge core sample removed from Purex tank 103-A on 1-8-62. It had the appearance of "lava" with "crystals" imbedded in it. The sample was completely dry and appeared more compact than synthetic samples previously prepared.

Water at 90 C slowly disintegrated the sample and dissolved 67.4% of it. HCl (6N) at 90 C dissolved the remainder except for a white flocculent precipitate (probably hydrated silica) representing less than 4% of the total.

The P-2 Purex solvent containing Shell spray base which was removed and stored during the Soltrol run was sampled and subjected to routine wash procedures in the lab. The successful removal of activity and "do-bads" strengthened the decision to utilize this material by blending into the process as needed.

Laboratory contacts were made on out-of-spec UNH solution at Purex. Distribution ratios indicated that rework could be accomplished by blending rework to normal K-1 feed at a ratio of 1 to 4.

b. Redox Process Studies

1. Stability of Sodium Nitrite in 2.6 M HNO₃

Feed preparation for the L-18 anion exchange unit involves the reduction of hexavalent plutonium to the tetravalent state in 2.6 M nitric acid. Laboratory studies indicate that NO₂⁻ is sufficiently stable under the existing conditions to be used as the reductant.

A 0.02 M solution of sodium nitrite in 2.6 M nitric acid at 38 C slowly oxidized until 0.01 M NO₂⁻ remained at the end of 24 hours.

c. Hot Semiworks Plant Assistance

Distribution ratios for strontium and manganese on a synthetic solution similar to the solution in HSW remaining from an attempted promethium run were determined. Strontium E_a^o was 14.8 and manganese E_a^o was 0.14 at a pH of 3.4 using an equal volume of 0.368 M D2EHPA, 0.2 M TBP in E-2342 from an acetate buffered aqueous solution containing 0.081 M DTPA as complexing agent. No difficulty is anticipated processing this material in HSW.

d. Neptunium Purification

Two neptunium purification runs (Run 56 and 57) were completed during the month. Run 56 consisted of purifying 750 grams of neptunium recovered from the Redox plant contaminated with 102 grams of

plutonium, 0.05 curies of Zr-Nb and 3.51 curies of radoruthenium. Minor changes in processing procedures during the recovery of the neptunium in the Redox plant resulted in a significant decrease in solids in the crude product.

Run 57 was the purification of 780 grams of crude neptunium recovered from the Purex plant contaminated with 20 grams of plutonium, 0.45 curies of Zr-Nb, 3.38 curies of Th-234, and 0.02 curies of ruthenium. Ferrous nitrate and hydrazine were used as reducing agents in this run instead of ferrous sulfamate and hydrazine. Excellent plutonium removal was achieved with less than 8 column volumes of reducing wash 5.5 M HNO_3 , 0.1 M $\text{Fe}(\text{NO}_3)_2$ and 0.1 M hydrazine. Neptunium waste losses for run 57 were 0.95% with 0.31% being recycled, which compares favorably with losses of 0.71% and recycle of 0.75% for run 56.

Analyses of the purified neptunium nitrate shipped to Savannah River were as follows:

	Batch 56	Batch 57
SpGr	1.068	1.085
Np	33.32 g/l	38.4
Np(V)	100%	100%
HNO_3	0.98 M	1.02 M
Pu	9×10^{-5} g/g Np	9.6×10^{-6} g/g Np
U	2.4×10^{-4} g/g Np	2×10^{-5} g/g Np
Th	2.7×10^{-5} g/g Np	7×10^{-4} g/g Np
Zr-Nb	0.24 $\mu\text{c/g}$ Np	0.43 $\mu\text{c/g}$ Np
Ru	0.90 $\mu\text{c/g}$ Np	0.10 $\mu\text{c/g}$ Np
Pa-233	447 $\mu\text{c/g}$ Np	47.7 $\mu\text{c/g}$ Np
	on 1/4/62	on 1/26/62
TMI	4×10^{-4} g/g Np	--
SS weight	671	786
Shipped	1/8/62	1/29/62

e. Laboratory Assistance

1. An analytical procedure for diethylene triamine penta acetic acid (DTPA) in a 0.60 M sodium citrate solution matrix was developed for the Purex analytical control laboratory. Citrate in concentrations greater than 0.04 M masked the endpoint of the Flaschka titration method using Eriochrome Black T indicator. By using small sample sizes to observe this limit, satisfactory titrations were obtained.
2. Cation separation by ion exchange was used to determine the free acid concentration of uranyl nitrate solutions. This data will serve as a basis for a new UD-la equation, as well as a recheck for the empirical tables used to convert a pH measurement to free nitric acid in uranyl nitrate solutions. The procedure has been shown to have application to the analysis of nitrate, borate, and fluoride.

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3. Cesium Index

The validity of the cesium-137 as an index of the nuclear materials in coating waste was checked on Redox data from November 6, 1961, to January 23, 1962. Uranium concentration by direct analysis was compared to uranium concentration by cesium-137 analysis. The average ratio was 1:1.91. The ratio of the ranges in the direct method to those of the cesium method is approximately 20:1. Thus, the cesium-137 index method of calculating nuclear material in coating waste raises the value of the losses, which were known to be low, and reduces the uncertainty with which the losses are stated. The cesium-137 index was calculated for Purex and Redox in the following manner:

$$\frac{\text{Average '61 plant Pu/U}}{\text{Average '61 plant MWD/T}} + \frac{\text{Curies cesium-137}}{\text{MWD}}$$

These indexes and the recommended method of application review have been published.

Special Separation Process and Auxiliaries Operation is adopting this method February 1, 1962.

4. The nitric acid correction for plutonium by X-ray photometer has been compiled and published for the 222-S instrument. The correction was found to be a function of both nitric acid and plutonium concentration. Stated in terms of mils aluminum attenuated, divided by the normality of the nitric acid, the previous correction factor was 2.20. The present correction factors vary from a high of 2.19 at 21 g/l Pu in 5N HNO₃ to a low of 1.00 at 15 g/l Pu in 0.2N HNO₃.

Similar nitric acid corrections for plutonium are being prepared for the 202-A X-ray photometer.

f. Standards Program

Data for the year 1961 has been evaluated for precision on the 7090 and the results submitted to the laboratories for revision of the rerun limits. The summary report for 1961 has also been issued.

A statistics work book was compiled during January and will be distributed in February. It will cover the basic materials and procedures necessary for elementary statistical analysis.

5. 234-5 Development

a. Task I Studies

Several oxalate precipitation tests were made to determine separation factors.

Separation factors for gallium were determined for solutions initially 63 g/l Pu and 120 g/l Pu. Considerable variability was observed, but values of five or better were measured.

The separation factor for mercuric ion was found to be 18.

b. Reduction Of Carbon Impurity

Plutonium oxalate decomposition variables are under investigation.

A major reduction in the carbon content of the oxide should permit a lower level of carbon in the final metal. Ways of achieving this are being sought in tests employing steam metathesis of the oxalate, steam treatment followed by oxygen, or steam treatment with oxygen. To date, marginal results have been obtained with steam; but use of oxygen shows improvement.

c. Direct Calcination Of Plutonium Nitrate

Brief tests in the screw calciner resulted in a highly-reactive product.

Three plutonium nitrate feed stocks have been calcined at 225 C in the screw calciner facility. These tests employed feed having a sulfate-to-plutonium ratio of 0, 0.1, and 0.5. Reactivity tests in phosgene in a tube furnace at 450 C indicate that oxide from feed stock having no sulfate additive is chlorinated to the extent of 70 percent in 20 minutes and 80 percent in 60 minutes. The oxide from the feed stock with a sulfate-to-plutonium ratio of 0.1 was chlorinated to about 86 - 88 percent in 20 and 60 minutes. The feed stock with a sulfate-to-plutonium ratio of 0.5 yielded an oxide which chlorinated to 95 percent in 20 minutes and 100 percent in 60 minutes. Thermobalance tests of the reactivity of these same oxides indicate that the above degrees of chlorination are conservative.

d. Continuous Electrowinning Plutonium

A continuous process is being developed for winning plutonium metal by electrodeposition from molten chloride systems.

The series of test runs was continued this month with a control run, and a run with partly-chlorinated oxide as feed. The control run gave the usual problems that have appeared in the process recently, especially severe corrosion and the formation of conductive solids.

The run with high-oxide feed (20 percent oxide) exhibited no black solids and no corrosion. Although coalescence was good, conductive solids were

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still formed. The operating current was limited to 23 amps, instead of the usual 30, by severe foaming. This run had the highest efficiency of this series of runs, 40 percent, on a trichloride basis. The integrity of the cell appears related to the high oxide content in feed.

e. Electrorefining

Several plutonium electrorefining runs resulted in improved amperage and reduced power refinement.

Voltage and amperage characteristics were improved to the point that four volts gave 30 amps. This was done by changing the anode basket to a shallow cup which was placed in the bottom of the cell. With this arrangement, it is possible to stir directly above the anode pool. Cathode efficiency was 65 percent; anode efficiency was 100 percent.

One run tested a slotted anode basket and resulted in a cathode efficiency of 80 percent. This was the longest run to date, and produced 195 grams of metal over a seven-hour period.

One short run was made with a slotted graphite crucible for the anode to determine the electrical characteristics of a conducting anode basket. The amp-to-volt ratio was not as good as with the slotted magnesia cell, and the anode efficiency was only 60 percent instead of the usual 90 - 100 percent. No noticeable corrosion, or reaction with plutonium, was seen.

Product removal remains a major problem. Black solids are found plugging the drain tube.

f. Recovery Of Plutonium From Incinerator Ashes

A report with the above title was issued as HW-72285, Unclassified.

Plutonium dissolved from incinerator ash was subsequently shown to be present in solution in an extractable form.

g. Ceramic Development

A stabilized zirconia furnace base, identified as L-205, was fabricated to specifications by hand-tamping and sintering. It was delivered five days after a request from Plutonium Metallurgy Operation. This job was in support of custom fabrication.

H. S. Frank

Manager
Research and Engineering

CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

JANUARY, 1962

II. ACHIEVEMENTS (Continued)

H. FINANCIAL OPERATION

1. Production Cost

An additional \$175,000 in Pu metallurgy O3 R & D funds was received this month and allocated to HLO as free funds.

The department relinquished \$750,000 in O2 production funds to the AEC in consideration of an overaccrual of pension costs in CY 1961 of \$600,000, and an estimated Program surplus of \$150,000.

The budget call letter for FY 1963-64 budget was received indicating that AEC required submission one month earlier than prior years. This is an extremely tight schedule and will be most difficult to meet.

At AEC request, a study was made of historical shop costs and inventory requirements. The request was prompted by the offer of a private firm to operate the machine shops in the 200 areas.

Additional budget details on recuplex and buttons costs, including distribution methods, were provided the Commission in connection with Washington AEC's review of the Midyear Budget Review submission.

Meetings were held with field personnel on the use of cross reference work orders. This new system was placed into effect January 26 and results in more complete information on work orders requiring subcontracting within the department.

A costing system was placed into effect which segregates weapons costs between the two shapes currently being produced.

CPD's investment in inventories at December 31, 1961 compared with budgeted balances at that date is shown as follows:

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	<u>Balance</u> <u>12-31-61</u>	<u>Control</u> <u>Allocation</u>	<u>Surplus</u> <u>(Deficit)</u>
<u>Inventories</u>			
Essential Materials	\$ 796	\$ 880	\$ 84
Spare Parts and Standby	1 949	1 778	(171)
Special Materials	<u>269</u>	<u>268</u>	<u>(1)</u>
Gross Inventories	<u>3 014</u>	<u>2 926</u>	<u>(88)</u>
<u>Reserves</u>			
Essential Materials	56	58	(2)
Spare Parts and Standby	451	440	11
Special Materials	<u>150</u>	<u>153</u>	<u>(3)</u>
Total Reserves	<u>657</u>	<u>651</u>	<u>6</u>
<u>Net Investment</u>	<u>\$2 357</u>	<u>\$2 275</u>	<u>\$ (82)</u>

2. General Accounting

As of December 31, 1961 thirteen active projects had incurred costs of \$6,321,912 against authorized funds of \$11,236,400. Outstanding commitments totaled \$891,641.

During January two directives were received from the AEC:

(1) No. HW-531 - Mod. 1, increasing total authorization to \$115,000 on Project CGC-948 - Strontium Storage and Waste Disposal - Hot Semiworks; and (2) No. AEC-201, Project CAC-950 - Cesium Loadout Facility - 241-C, interim authorization for design only in the amount of \$19,000.

There were six appropriation requests approved during January, 1962, authorizing expenditures of \$19,689, as follows:

<u>AR No.</u>	<u>Description</u>	<u>Section</u>	<u>Estimate</u>
26029	Analog Computer	R&EO	\$ 7 000
26017			
Supp. #1	Coating Waste Transfer Fac.	Purex	3 576
26034	Potentiograph	R&EO	3 383
26030	Flame photometer	Purex	3 190
26033	216-A-30 Air Sampler	Purex	1 290
26032	Milling Machine (Freight only)	P&GM	<u>1 250</u>
	Total		<u>\$19 689</u>

3. Personnel Accounting

Final statistics for 1961 exempt employee appraisals were developed and submitted to the Department General Manager for his information. Salary review statistics were developed on two bases, one on a calendar year and another on a fiscal year running from October 1 to October 1.

Manager - Finance

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II. ACHIEVEMENTS (continued)

I. EMPLOYEE RELATIONS

1. Personnel Placement

A revised forecast was submitted to the Hanford Laboratories Operation for permanent placements off the Technical Graduate Program during fiscal year 1963 and 1964. The major change was an increase of five people in the number of chemists required by the Redox Operation in fiscal year 1963. The increased number of chemists will be needed for providing the trained people for the operation of the 100 N Analytical Laboratories by the Redox Control Operation.

Data were submitted to the Financial Section of CPD concerning recruiting and hiring activities for the fourth calendar quarter 1961 for subsequent transmittal to the Hanford Laboratories Operation. This completes a year's accumulation of similar data which should provide a more effective means of determining the cost per exempt hire at HAPO. This information in turn is transmitted to the Engineering Services in New York who will provide in the future a report summarizing this type of data received from throughout the Company.

The Specialist, Personnel Placement attended the annual Conference of the Western College Placement Association at San Diego, California. A two day recruiting trip was also made to Oregon State at the request of Manufacturing Services in New York City.

2. Communications

The Manager, Employee Relations and the Specialist, Union Relations have scheduled a series of Relation Information Meetings for first line supervisors of the Chemical Processing Department. The purposes of these meetings are to discuss policy, union relations items, current problems, and to identify problem areas needing attention.

RB Britton
Manager
Employee Relations

RB Britton

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III. PERSONNEL ACTIVITIES

A. FORCE SUMMARY

<u>Operation</u>	<u>Monthly Salaried</u>		<u>Weekly Salaried</u>		<u>Total</u>	
	<u>12-31-61</u>	<u>1-31-62</u>	<u>12-31-61</u>	<u>1-31-62</u>	<u>12-31-61</u>	<u>1-31-62</u>
General Manager's Group	10	10	1	1	11	11
Financial	14	14	15	15	29	29
Research & Engineering	67	68	26	27	93	95
Facilities Engineering	63	62	21	21	84	83
Power & General Maintenance	38	39	246	243	284	282
Production	5	5	4	4	9	9
Special Separation Processing and Auxiliaries	47	47	210	209	257	256
Purex	63	64	241	241	304	305
Finished Products	<u>55</u>	<u>56</u>	<u>263</u>	<u>263</u>	<u>318</u>	<u>319</u>
Total	<u>362</u>	<u>365</u>	<u>1 027</u>	<u>1 024</u>	<u>1 389</u>	<u>1 389</u>

B. PERSONNEL CHANGES

No personnel changes during January

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C. TRIPS

<u>Visitor</u>	<u>To</u>	<u>Nature of Discussion</u>
<u>To Other G.E. Components</u>		
P. H. Reinker	St. Petersburg, Fla.	Management Conferences. (1/2-5/62)
<u>To AEC and Other AEC Contractors</u>		
H. W. Crocker T. S. Soine	Los Alamos Scientific Lab., Los Alamos, N.M.	Electrorefining of Pu. (1/8-9/62)
H. H. Hopkins, Jr.	duPont Savannah River Plant, Aiken, S.C.	Electrowinning Pu from its oxide. (1/8-9/62)
M. H. Curtis	duPont Savannah River Plant, Aiken, S. C.	Electrowinning Pu from its oxide. (1/8/62)
M. H. Curtis	Argonne National Lab. Argonne, Illinois	Pyrochemical processing, molten salt chemistry. (1/9/62)
H. H. Hopkins, Jr.	Mallinckrodt Chem. Co. Weldon Springs, Mo.	Electrochemical recovery of uranium metal scrap. (1/10/62)
M. H. Curtis	Mallinckrodt Chem. Co. Weldon Springs, Mo.	Electrochemical recovery of uranium metal scrap. (1/10-11/62)
R. E. Van der Cook	Dow Chemical Co. Rocky Flats Plant Denver, Colorado	To attend IMOG Gage Sub- group meeting. (1/10-11/62)
R. E. Tomlinson	Dow Chemical Co. Rocky Flats Plant Denver, Colorado	Attend meeting on Plu- tonium Technology. (1/10/62)
W. J. Gartin J. H. Warren	Dow Chemical Co. Rocky Flats Plant Denver, Colorado	Plutonium scrap recovery and fabrication schedules (1/9-12/62)
M. H. Curtis	Ames Laboratory, Iowa State University Ames, Iowa	Pyrochemical processing, extractive metallurgy, molten salt chemistry, metal purification (1/12)
H. W. Crocker T. S. Soine H. H. Hopkins, Jr.	Dow Chemical Co. Rocky Flats Plant Denver, Colorado	Electrorefining of Pu, recovery and purification of Pu. (1/11-12/62)

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<u>Visitor</u>	<u>To</u>	<u>Nature of Discussion</u>
<u>To AEC and Other AEC Contractors (continued)</u>		
A. E. Smith	Sandia Corporation Albuquerque, N.M. Los Alamos Scientific Lab, Los Alamos, N.M.	To attend IMOG Steering Com- mittee meeting. (1/16/62) Consultation on Pu fabrica- tion and parts specifica- tions. (1/17/62) Ditto above (1/18/62)
	Dow Chemical Co. Rocky Flats Plant Denver, Colorado	
G. E. Wilbur	Los Alamos Scientific Lab, Los Alamos, N.M.	Radiography (1/16-18/62)
P. R. McMurray R. E. Smith	Oak Ridge Nat. Lab. Oak Ridge, Tenn.	Fission products FPD tour. (1/30/62)
M. J. Szulinski	Lawrence Rad. Lab. Livermore, Calif.	Discussions on scrap re- covery. (1/31/62)

To Other Federal & State Agencies

H. W. Crocker T. S. Soine	U.S. Bureau of Mines Boulder City, Nevada	Electrorefining of metals. (1/10/62)
H. H. Hopkins, Jr.	U.S. Bureau of Mines Reno, Nevada	Electrowinning. (1/18-19/62)

To Conventions and General Meetings

R. B. Britton	Seattle, Wash.	National Aviation Council. (1/14/62)
W. Watson	San Diego, Calif. Corvallis, Oregon	Western College Placement Assn. Conferences. (1/18-19/62)

D. VISITORS

<u>Visitor</u>	<u>From</u>	<u>Nature of Discussion</u>
<u>From Other G.E. Components</u>		
J. M. Gerhart	General Electric Co. Vallecitos Irradiation Services Operation Pleasanton, Calif.	Fission product tech- nology. (1/23/62)

<u>Visitor</u>	<u>From</u>	<u>Nature of Discussion</u>
<u>From AEC and Other AEC Operational Contractors</u>		
M. Smith V. Thayer	duPont Wilmington, Del.	Purex process. (1/17/62)
Dr. M. C. Kellogg	US-AEC Washington, D.C.	Purex Tour (1/11/62)
<u>From General Industry</u>		
Frank Morris	Turco Products Co. Spokane, Wash.	Decontamination chemicals. (1/4/62)
Dr. K. Newman	Turco Products Co. Wilmington, Calif.	Decontamination chemicals. (1/4/62)
H. A. Backstrom K. Carlson	Struthers Wells Co. Warren, Penna.	Titanium tube bundles. (1/4/62)
<u>From Colleges and Universities</u>		
Dr. E. N. Klemgard	Wash. State Univ. Pullman, Wash.	Consultations under Contract CA-310. (1/22/62)

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IV. SAFETY AND SECURITY

<u>Operation</u>	<u>Facil. Eng.</u>	<u>Finance</u>	<u>Fin. Prod.</u>	<u>P&GM</u>	<u>Purex</u>	<u>SSP&AO</u>	<u>Prod.</u>	<u>Rel. Prac.</u>	<u>Res.& Eng.</u>	<u>Total CPD</u>	<u>Yr. To Date</u>
Disabling Injuries			1*		1&					2	2
Serious Accidents											
Medical Treatment											
Injuries	2	1	13	16	6	8		1		47	47
Radiation Occur.	1		7		14	3				25	25
Contam. Wounds											
Pu Depositions											
Fires			1**							1	1
Security Violations	1							1		2	2

* An employee sustained contusion of the chest and abdominal bruises when the pickup he was driving collided with a cathodic protection rail on the shoulder of the road after he had swerved to avoid hitting a coyote which ran across his path. Two lost-time days were charged.

& An employee sustained contusions over the sacrum and a twisted left ankle when he tripped and fell backwards while descending from a stool, landing on the foot plate of a counting instrument. Nine lost-time days were charged.

** Hot metal or slag from electric welder fell on either an oily rag or a piece of plastic in bottom of hood, igniting same, then extending to plastic sleeve housing welding cable, then to rubber gloves. Damage - \$73.00.

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V. REPORTS

A. PREPARED AND ISSUED

- HW-71639 3 Secret, "Plutonium Monthly Report - December 1961", dated January 10, 1962, by A. E. Smith.
- HW-71880 Secret, "Process Design Basis for the Plutonium Treatment Facilities", dated January 11, 1962, by D. D. Wodrich.
- HW-72130 Secret, "Progress Report - Finished Products Fabrication Technology Operation - November 1961", dated December 28, 1961, compiled by Members of the Finished Products Fabrication Technology Operation, Research and Engineering.
- HW-72167 Secret, "Summary of US-UK Exchange Meetings at AWRE, Aldermaston, England", dated January 2, 1962, by A. E. Smith.
- HW-72204 Secret, "Purex Plant Production Schedule - January 1962", dated January 5, 1962, by D. McDonald.
- HW-72205 Secret, "Redox Plant Production Schedule - January 1962", dated January 5, 1962, by D. McDonald.
- HW-72206 Secret, "UO₃ Plant Production Schedule - January 1962", dated January 5, 1962, by D. McDonald.
- HW-72207 Secret, "234-5 Plant Production Schedule - January 1962 " dated January 5, 1962, by D. McDonald.
- HW-72242 Secret, "Plutonium Scrap Recovery", dated January 8, 1962, by J. H. Warren
- HW-72267 RD. Secret RD, "Rework of Delta Metal", dated January 8, 1962, by F. D. Fisher.
- HW-72268 Confidential, "Calcium Reduction of Plutonium Trichloride in a Fused Salt System", dated January 12, 1962, by G. A. Saltzman and T. S. Soine.
- HW-72279 Unclassified. "Test Program Guide Impact Absorption Design Verification Program at Balcones Research Center, University of Texas", dated January 10, 1962 by D. W. McLenegan and C. W. Smith.
- HW-72285 Unclassified, "Recovery of Plutonium from Incinerator Ashes", dated January 15, 1962, by M. J. Rasmussen and H. W. Crocker.
- HW-72365 Secret, "Problems Associated with Increase of Pu 240 Content in Plutonium", dated January 18, 1962, by L. M. Knights.

- HW-72394 Unclassified, "Trip Report: Electrowinning U. S. Bureau of Mines. Reno, Nevada", dated January 22, 1962, by H. H. Hopkins, Jr.
- HW-72298 Unclassified, "Purex Jets - Standards Groupings and Process Specifications", dated January 12, 1962, by L. L. Zahn.
- HW-72409 Secret, "Analysis of Plutonium Samples on Interplant Exchange Program", Dated January 23, 1962, by O. F. Beaulieu.
- HW-72515 Secret RD, "Midyear Budget Review Detail - Recovery and Preparation of Pu Metal", dated January 29, 1962, by B. M. Dobbs.
- HW-72539 Unclassified, "The Retention of Gaseous Iodine by Plasticized Organic Polymers", dated January 25, 1962, by C. A. Colvin.

B. PREPARED FOR SIGNATURE AND ISSUANCE

- HW-72153 Secret, "Production - December 1961", dated January 2, 1962, by W. E. Johnson.
- HW-72354 Secret "HAPO Production Forecast - January 1, 1962 thru June 30, 1967", dated January 25, 1962 by W. E. Johnson.

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VI. 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.

<u>INVENTOR</u>	<u>TITLE</u>
C. A. Colvin, Research and Engineering	The Retention of Gaseous Iodine By Plasticized Organic Polymers.

P. H. Reinker

General Manager
Chemical Processing Department

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