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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT
FOR

JUNE, 1961

Compiled By
OPERATION MANAGERS

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July 21, 1961

By Au

HANFORD ATOMIC PRODUCTS OPERATION
RICHLAND, WASHINGTON

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the Atomic Energy Commission and General Electric Company.

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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

JUNE, 1961

I. SUMMARY

Production through June, as compared with the April 25, 1961 HAP0 Production Forecast (HW-69228), is summarized below:

	<u>June</u>	<u>Percent of Forecast Achieved</u> <u>Fiscal Year</u> <u>To-Date</u>
Separated plutonium nitrate	129.6	101.5
Separated uranium nitrate	139.0	101.9
Uranium oxide	155.5	100.4
Plutonium metal buttons	92.5	95.3
Fabricated parts	63.5	73.0

Forecasted production for plutonium nitrate, uranium nitrate, and uranium oxide was exceeded, both for June and FY 1961. Plutonium metal button production was below that forecasted because of periodic feed shortages plus large quantities of metal recycled from plutonium fabrication. As reported last month, the production schedule for fabricated parts continued to be subordinate to development efforts directed at resolving the dimensional stability problem. During June, approximately fifty percent of the plutonium fabrication effort was devoted to development work directly related to this program.

Purex plant decontamination performance was unusually erratic during June, resulting from several temporary shutdowns and startups. A large part of the plutonium product did not meet gamma specification. Part of this material was reworked during June; the remainder is being held for future reprocessing, following completion of the neptunium recovery run which was started June 26.

Coincidental with boil-up tests on the Purex #2 Acid Concentrator, a large leak, from corrosion, developed in the trap jumper. The incident resulted in a low-level contamination spread, confined to the Purex exclusion area and immediate vicinity. Decontamination was prompt and effective.

The Redox E-metal dissolver was operated for half of June at a sustained rate of 6.34 tons of uranium per day. Record E-metal production was subsequently achieved, exceeding the previous record high for a one month period by 62 percent.

Emphasis was placed on reducing the scrap plutonium metal inventory. Additional dissolution equipment was installed, process improvements were adopted, and ten additional operators were assigned to the recovery operations.

The Invitation to Bid for the fixed-price construction of the Purex Palm Purification Facility was issued by the Atomic Energy Commission on June 22. Fabrication of jumpers and samplers for Palm extraction has been started.

Detailed design was started June 1 on a prototype continuous dissolver and fusion hood to be installed in the existing Recuplex facility. This equipment will pilot processes for the new Plutonium Reclamation Facility (Project CAC-880).

The Chemical Processing Department became eligible for a second successive HAPO General Manager's Safety Award on June 29, after accumulating approximately 3,781,000 man-hours since the last disabling injury on January 11, 1960.

for
General Manager
Chemical Processing Department

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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

JUNE 1961

II. ACHIEVEMENTS

<u>A. Production Statistics</u>	<u>June</u>	<u>Fiscal Year to Date</u>
<u>a. Percent of Forecast(1) Achieved</u>		
Separated plutonium nitrate	129.6	101.5
Separated uranium nitrate	139.0	101.9
Uranium oxide	155.5	100.4
Plutonium metal buttons	92.5	95.3
Fabricated parts	63.5	73.0
<u>b. Purex</u>	<u>June</u>	<u>May</u>
Uranium nitrate produced (tons)	580.36	694.95
Average production rate during operation (T/D)	25.3	25.6
Total waste loss (%)		
Plutonium	0.35	0.25
Uranium	0.10	0.09
On-line efficiency (%)	91.0	87.6
<u>c. Redox</u>		
Uranium nitrate produced (tons)	181.1	69.55
Average production rate during operation (T/D)	8.9	7.0
Total waste loss (%)		
Plutonium	0.19	0.19
Uranium	0.13	0.14
On-line efficiency (%)	90.4	45.7
<u>d. Uranium Reduction (tons)</u>		
Normal UO ₃ loaded	701.8	343.8
Enriched UO ₃ loaded	136.0	98.5
Normal UO ₃ approved for shipment	706.20	454.75
Enriched UO ₃ approved for shipment	143.06	96.75
Normal UO ₃ shipped	657.08	656.11
Enriched UO ₃ shipped	93.32	49.17
Normal UNH backlog	258	380
Enriched UNH backlog	109	48

(1) HW-69228, HAPO PRODUCTION FORECAST, dated April 25, 1961.

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e. <u>Plutonium Metal Processing</u>	<u>June</u>	<u>May</u>
Input to Task I (batches)	260	238
Reduction Yield (%)	99.05	98.89
Product recovery output (Kgs)	70.38	61.47
Product recovery backlog (Kgs)	496.1	446.1
Waste disposal (grams)	621	556
 f. <u>Power</u>	 <u>200-East</u>	 <u>200-West</u>
Raw water pumped (gpm)	9 088	4 597
Filtered water pumped (gpm)	1 162	999
Maximum steam generated (lbs./hr.)	210 000	140 000
Average steam generated (lbs./hr.)	159 647	73 191
Total steam generated (M lbs.)	114 945	52 698
Coal consumed (est. tons)	6 147	2 848

Forecasted production for plutonium nitrate, uranium nitrate, and uranium oxide was exceeded, both for June and FY 1961. Plutonium metal button production was below that forecasted because of periodic feed shortages plus large quantities of metal recycled from plutonium fabrication. As reported last month, the production schedule for fabricated parts continued to be subordinate to development efforts directed at resolving the dimensional stability problem. During June, approximately fifty percent of the plutonium fabrication effort was devoted to development work directly related to this program.

VR Chapman
for Manager - Production

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CHEMICAL PROCESSING DEPARTMENT
PUREX OPERATION

June, 1961

II. ACHIEVEMENTS (Continued)

B. PUREX OPERATION

1. Operating Continuity

Operating rates ranged from 3.0 to 3.3 CF. Normal processing was completed on 6-25-61.

Processing was interrupted three times during the run period. The first was a three-hour period on 6-11-61 when "hot" feed was off as a result of partitioning failure. There was a 12-hour shutdown on 6-16-61 to replace a defective HAF (co-decontamination cycle) feed pump. Cold uranium was recycled for 48 hours beginning 6-20-61 to reduce excessive plutonium concentration in the back-cycle system resulting from N cell ion exchange problems.

Nineteen batches of plutonium failed to meet gamma specifications and four uranium batches were above the purity limit for plutonium. Waste losses were normal.

2. Processing Operation

Approximately 40 percent of the plutonium batches were above the shipping limit for gamma activity because of operating problems in the N cell ion exchange unit and gamma bursts caused by processing interruptions. Most of this material was held for subsequent rework.

The ion exchange unit became inoperable on 6-11-61 because the resin would not push properly. The resin was replaced, a plugged top-hat screen and a resin-packed receiver were cleaned out. The unit was returned to service on 6-15-61. Plutonium was processed through the L cell package during this outage and was out-of-specifications. N cell operation was marginal following the outage. Because of high plutonium concentrations in the 3WB back-cycle system, which resulted from the low ion exchange capacity, "cold" uranium was recycled for two days beginning 6-20-61.

On 6-13-61, at the conclusion of a process test of hydrazine as a reductant, a partitioning failure was caused by insufficient reductant in the IBX stream. Processing of feed was stopped for three hours to permit corrective adjustments to maintain critical mass controls. Four batches of uranium containing excessive plutonium were produced and later reworked. Waste rework from the UO₃ Plant was reprocessed through the Final Uranium Cycle.

The tower on the F11 (#1 acid-waste concentrator) developed a restriction early in June. Hot water flushes during operation were of some benefit, but did not correct the restriction. The limited concentrator capacity caused reduced acid recovery and increased waste volumes. After shutdown the concentrator was flushed extensively with chemicals.

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Birch losses to the uranium product were two- to three-fold above normal. Deteriorated plastic plates in the 2D (final uranium extraction) column is considered to have caused this loss.

The silver reactors on A and B dissolvers were regenerated.

Fission product recovery activities consisted of seven carbonate runs, four oxalate runs and one concentration run, resulting in 85 kilocuries of Sr-90. The HAPO-1A cask was received from Oak Ridge on 6-20-61. After being reloaded with Sr-90 in the 300 Area High Level Cells, the cask was returned to Purex for pre-shipment checks.

3. Mechanical Experience

Two HAF (co-decontamination feed) pumps were replaced. One pump failed from mechanical seizure. The second failed because of excessive upper seal leakage.

A new vent jumper for the 2A (final plutonium extraction) column, designed to separate and return entrained liquid to the process, was installed.

Leaking condensate lines in the #2 trap pit from the F11 and F6 acid waste concentrators were repaired on 6-30-61. The trap jumper on the F6 west tube bundle developed a severe leak from corrosion on 7-1-61. A spread of low-level contamination to the exclusion area surrounding the plant resulted.

Following the shutdown, the N cell resin was replaced, and all distributor screens were inspected. The XAW and XAF screens had failed and were replaced. A new push probe was installed. An orifice and a screen were installed on the push tank discharge line.

The deep well turbine pump at the 293 Backup Facility, XC-2, which failed because of a broken shaft, was repaired and reinstalled.

The previously failed F5 fractionator was successfully decontaminated, repaired and converted to a nitric acid absorber.

Four silica-gel beds for final UNH decontamination were replaced when efforts to regenerate the beds were no longer successful.

Installation of a filter on the exhaust stack of the condenser vent building (241-A) was completed. This filter is intended to prevent potential contamination spread.

The process condensate stream was diverted to the 216-A10 crib on 6-26-61.

4. Radiation Experience

The total radioiodine 131 emission during the month was 25 curies. The maximum seven-day emission was 13.77 curies.

There were five Radiation Occurrences and eleven cases of skin contamination.

Two employees incurred injuries by objects contaminated with radioactive isotopes. One injury (plutonium contamination) required medical treatment.

5. Analytical Experience

The RAC (Remote Analytical Cave) facility was used to obtain information about the nature of the solids in the stored crude strontium product solutions. The solids were successfully dissolved by a caustic-carbonate metathesis treatment.

Studies were made of the high plutonium losses in the co-decontamination cycle. Sulfate ion concentration in the 3WB back-cycle stream was found to be high by a factor of two. Further tests indicated that high sulfate concentrations tended to decrease the distribution coefficient and cause the high plutonium waste losses.

The first samples from the Critical Mass Laboratory were received late in June.

6. Events Influencing Costs

The F5 fractionator with an original value of \$183,432 was converted to an acid adsorber at a cost of \$6,191.

The E4 centrifuge that failed on 6-19-61 was decontaminated, repaired, and converted to an E-2 unit. The unit originally cost \$69,653 and was repaired at a cost of \$27,345.

Five process operators transferred to other HAPO components during June and a similar number of utility operators were up-graded.

Phil Murray
Manager - Purex

PR McMurray:EAF:msw

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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 were conducted as scheduled throughout the month. Good performance was maintained in all areas of the process and a record E-metal production month was attained. A special run of low plutonium 240 material was processed and twelve shipping containers of the isolated material delivered to the Critical Mass Laboratories.

2. Processing Operations

Except for the normal week-end shutdowns E-metal processing was continuous throughout the month. With the repair and replacement of some "borderline" major equipment pieces during the past three months, the Redox Plant was able to maintain higher sustained production rates than has been possible for several months and a record 181 tons of E-metal was processed. To provide the metal for this production it was necessary to operate the new Mark V multipurpose dissolver on a seven day per week basis.

Approximately 200 tons of UNH, with a high gamma ratio, were received from the Purex Plant and reprocessed through the silica gel system to reduce the gamma content to within shipping specifications. The silica gel bed was regenerated on 6-15-61, after having processed 415 tons of high gamma uranium since its last regeneration on 4-22-61.

As presently foreseen, the ultimate Redox neptunium recovery flowsheet (Project CGC-913) will include the use of the 1S column as a "bottle" column in which neptunium will be removed either continuously or batchwise from the D-14 backcycle stream. During the last week of the month an in-plant test was made using this concept. The contents of the D-14 backcycle waste concentrator were pumped continuously into the 1S column where the neptunium was extracted in a counter-current organic stream. Approximately 52 percent of the neptunium originally present in D-14 was "bottled" in the 1S column, then drained to the G-5 vessel for future removal and purification. The test was reasonably successful and a total of 285 units of neptunium was separated.

3. Mechanical Experience

Nine jumpers were replaced in the 202-S Canyon during the month, three because of defective heads, two because of electrical

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malfunctioning, and four due to restrictions in the lines.

Four process pump replacements were made during the month and included the following:

<u>Pump</u>	<u>Date Replaced</u>	<u>Date Original Installation</u>	<u>Reason For Failure</u>	<u>Oper. Hours</u>
2A Column Feed Tank	6-5-61	7-28-60	Shaft Leakage	2,774
3A Column Feed Tank	6-10-61	6-22-58	" "	11,096
H-1 Metal Feed Tank	6-9-61	2-4-61	" "	49
Plutonium Ozonator Transfer Pump (E-2 pogo pump)	6-17-61	5-16-61	Broken Spring	473

A significant accomplishment in remote canyon cell maintenance work was made this month with the restoration of the jumper jet assembly between the C-2 dissolver and the H-9 metal solution storage tank. During a previous replacement attempt the hexagonal head on the jumper end connector had been broken off after it was tightened to the canyon wall nozzle. When this happened there was no way to loosen the connector with the canyon crane impact wrench and it was necessary to develop a method to remove the jumper without damaging the canyon wall nozzle. It was finally decided to burn through the connector by using tungsten electrodes and a heavy duty welding machine. A device to perform this operation was designed and built by the Redox Maintenance Shop and subsequently used by the crane operator to remotely remove the connector head. The actual work was completed in one hour and a new jumper jet assembly installed.

4. Waste Handling and Decontamination

Equipment valued at approximately \$30,000 was received from the processing plants for decontamination, repair or inspection during the month. Equipment valued at \$32,489 was returned to customers. A savings of approximately \$9,000 over the cost of new replacement equipment was realized through the equipment decontamination program during the month.

A total of 270 man-hours was charged to the decontamination of railroad, automotive and heavy equipment. The following is a breakdown of the major items decontaminated.

<u>Item</u>	<u>Operation Charged</u>
Gondola Cars No. 3652 & 4605	Purex
Well Car No. 42	CPD
Flat Cars No. 3610, 3612, 3613 & 3614	Purex
Flat Cars No. 3615 & 19028	WH&DO
Flat Car No. 19037	Redox
Motor Crane 17-T-19950	P&GM
Hydro Crane 17-T-5694	P&GM
Trailer 64-12613 (for excess)	P&GM
Pickup 1C-358	WH&DO

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5. Radiation Experience

Six skin contamination cases and three radiation occurrences were recorded during the month. Maximum levels were 5,000 d/m alpha and 3,000 c/m beta-gamma. All skin contamination was readily reduced to non-detectable.

There were two contaminated equipment moves from the 202-S Canyon Building during the month. On 6-13-61 four failed process pumps and one condenser were transferred to the Redox Equipment Reclamation Facility for salvage. The maximum dose rate encountered was 48 mr/hr at 53 feet from the concrete transfer box. On 6-19-61, a burial box containing miscellaneous failed equipment and contaminated waste was transferred to the burial grounds for disposal. The maximum dose rate encountered during this transfer was 10 mr/hr at 40 feet from the box. Both equipment moves were completed without incident.

Two new monitoring procedures for estimating personnel radiation exposure were initiated in the Special Separation Processing and Auxiliaries Operation this month. One of the procedures is general in nature and applicable to all exposure work in a primary separations plant. The second is specific, in that it covers work on the Redox Plant's crane maintenance platform only. Both procedures account for penetrating and low penetrating radiation in their relationship to the different exposure control limits for the "whole body", "skin", and extremities.

To improve Hanford's capabilities in the event of an emergency, the Radiation Protection Operation has issued Juno dose rate instruments to the Fire Department and instructed the crews in emergency monitoring up to 5 rads/hr. To familiarize Fire Department personnel with the use of the Juno under field conditions, special training was given to 35 firemen in the 221-T Equipment Reclamation Facility.

6. Analytical Experience

Operation of the auxiliary store in the 222-S Analytical Laboratory was discontinued by the plant Stores Operation this month. Available space has been allocated to the various tenant groups in the building to be utilized as stock rooms to satisfy individual needs.

The development of a procedure to determine aluminum in highly radioactive samples, where only micro amounts can be used for analyses, has permitted laboratory personnel to refine the calculation of the amount of caustic needed to neutralize process wastes before sending to tank storage. If it can be shown that an excess exists in present stored waste, a significant savings in caustic consumption may be realized from this refinement.

Receipt of a test lot of doorstep pipets made of polyethylene has resolved the supply problem for this equipment as mentioned in a

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previous report. These pipets are satisfactory in all respects, and judging from the cost of the initial test lot, will be cheaper than those made of saran.

7. Events Influencing Costs

Effective June 19, 1961 shift coverage in the power and ventilation group in the Redox Plant was reduced from two men to one. This move eliminated four Junior Power Operator assignments and upgraded the relief assignment to that of a Journeyman. A savings of approximately \$50,000/year will be realized.

Chas. S. Brown

Manager - Special Separation
Processing and Auxiliaries

CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

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II. ACHIEVEMENTS (Continued)

D. FINISHED PRODUCTS OPERATION

1. Operating Continuity

Approximately fifty percent of the fabrication output was directed to development work related to the dimensional stability problem. Unfabricated plutonium was produced as rapidly as feed was received from the primary plants. Recovery operations were improved this month and the schedule was met in spite of numerous minor outages of equipment. Uranium reduction facilities operated at near record levels until June 23, at which time the plant was shut down as scheduled.

2. Processing Operations

a. Plutonium Fabrication

Information on plutonium fabrication activities is presented in Document HW-70226, entitled "Chemical Processing Department, Finished Products Operation, Z Plant Monthly Report, June, 1961", classified "Secret, Atomic Weapon Data, Production Rate and Stockpile Quantity Information."

b. Plutonium Processing

The production of unfabricated plutonium was normal in June with all schedules being achieved. Product quality remains high.

Operation of the Recuplex columns continued to be interrupted by numerous equipment failures, but performance was better in June than in the two previous months.

Considerable effort was exerted during June to reduce the backlog of scrap plutonium metal. Ten additional Process Operators were assigned to the recovery operation to assist in the effort. The burning of plutonium skulls to obtain plutonium oxide progressed successfully, and dissolution time cycles were reduced significantly. Additional dissolution facilities were installed in the analytical laboratory and were operated by Recovery personnel. Plutonium solutions which could not be processed through the Recuplex extraction equipment were shipped to the Purex plant for ion exchange treatment. A prototype continuous slag and crucible dissolver was installed during the month. It will be activated early in July to dissolve plutonium oxide. Design work was started on additional dissolution facilities.

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c. Uranium Reduction

The uranium reduction facilities performed well during June. Schedules were achieved by the 23rd, at which time the plant was shut down as scheduled.

3. Mechanical Performance

Plutonium preparation, plutonium fabrication, and uranium reduction equipment all performed satisfactorily during June, requiring only routine maintenance and minor repairs.

Recovery equipment continued to require excessive maintenance effort to repair leaks, replace and repair valves, and to replace failed minor equipment. The D-2 slag and crucible dissolver, which had failed previously due to corrosion, was replaced with a prototype continuous dissolver.

4. Radiation Experience

Radiation and contamination control statistics indicate satisfactory control during the month.

5. Analytical Experience

	<u>May</u>	<u>June</u>
Number of Samples Received	1,521	1,739
Number of Determinations	15,118	16,180
Average Impurity, Buttons	1,522 ppm	1,630 ppm
Buttons Rejected	0.5 %	0.0 %

W. J. Garton
Manager,
Finished Products

CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

June 1961

II. ACHIEVEMENTS (continued)

E. POWER AND GENERAL MAINTENANCE OPERATION

1. Operating Continuity

Due to a breaker failure at Midway, a severe electrical bump was experienced in both 200 East and West areas at 7:15 p.m. on 6-19-61. Some ventilation equipment and compressors in the T, U, and B facilities stopped, but all were restarted. The electrical disturbance did not cause the emergency generators to come on the line.

2. Inspection, Maintenance and Repair

Inspection in our shop revealed leaks in the Woods metal expansion assembly of a Hanford Type II Strontium Cask. It was necessary to remove the faulty assembly and fabricate and install a modified assembly. Also, the buffer container for the cask was mounted and secured to a flatcar.

Three shielded silica gel vessels were fabricated for Purex on a rush basis. They were for use in the final uranium decontamination step.

Fabrication of a new tube bundle for the 100 per cent uranium concentrator at UO_3 facilities was completed and delivery made.

Two remote cartridges for the spare K-2 column were fabricated. One was a prototype, all-stainless-steel nozzle cartridge, and the other was the conventional zebra type (plastic and SS sieve plate) cartridge. The spare K-2 column with the prototype cartridge installed was shipped to Purex for installation during the current outage. The conventional cartridge will be held in the shops until the other cartridge has been evaluated.

A new fiberglass filter was fabricated and installed on the vent stack at the 241-A Condenser Building.

A carbon-steel liner was installed in a concrete tube-bundle burial box in order to make the box water-tight.

Four Redox and two Purex pumps were prepared for use and sent to respective buildings.

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A development-type discharge head for a rebuilt Purex pump was completed.

Forty jumpers were fabricated during the month. Eighteen of these were for Redox, including two emergency jumpers. The remainder (22) were Purex jumpers.

A modified centrifuge drive-head and motor were run in and made ready for delivery to Purex. The drive-head has a larger oil reservoir and a new type of oil pickup assembly.

The old batch-type dissolver in the Slag and Crucible Hood at Z-Plant was removed and replaced with a continuous dissolver. This work was accomplished by men actually entering the hood in special plastic suits. No contamination spread was encountered.

A titanium stripping section for the Redox L-3 final plutonium concentrator was fabricated. All welds were X-rayed, and the completed unit was halogen-tested for leaks.

The fabrication was completed of the double-wound tank coil for the Redox E-13 tank. The coil is to be installed in a reclaimed vessel now at T Plant.

The installation of the hood and appurtenances for the 5,000-T press in the 231 Building was completed, in addition to the installation of the ultra-high vacuum furnace, hood and associated equipment in Cell 5.

Two burial boxes for Redox and two boxes for Purex were constructed during the month. All were of different design.

Work in the 200 Area Tank Farms included installing a 52 foot thermohm probe in the 104 tank in the 241 SX Tank Farm, and a 35 foot pump in the 153 catch basin at the 241-TY Farm for rerouting waste material. The cover blocks on the 151-C and the 154-B diversion boxes and several jumpers were relocated for line flushing. Seven tank nozzle plugs were pulled and a supernate sampling device was lowered into tanks for sampling supernate.

Work for the Hot Semiworks, other than routine electrical and mechanical maintenance, included removing the cover-block from A-Cell three times during the month to repair the failed chemical pump and jumper. The cover-block on D-Cell was removed two times during the month to set and remove a ten-ton cask.

Third-party inspection was performed on the No. 2 boiler in 284-W and the No. 4 boiler in 284-E.

The 2901-E Hi-tank located near the 284-E Building was inspected, and the interior of the tank was in poor condition. This tank will be included in the contract package for renovation of interior surfaces.

Automatic fence and street lighting trips were installed on switch gear in the 284-E and 284-W Buildings. In case of an electrical outage, the fence and street lighting will automatically trip out to prevent any possibility of overloading the emergency generators.

Six connecting tubes from the front water-wall header to the side water-wall headers in the No. 5 boiler in 284-E Building were replaced. The front water-wall header has moved upward since the original installation of the boiler, and it was necessary to lengthen all six tubes by heating them and removing some of the curvature. The vendor has been contacted on the problem and will now supply these particular tubes with an additional 1/4" on each end.

On Monday, June 26, at 10:30 a.m., an emergency electrical power test was conducted in 200 East Area at the request of the Purex Operation.

Ventilation balance activities included: final air balance and acceptance tests in 105-KE, 105-KW, and 105-B Buildings on CGI-791 Confinement Program; final air balance started on 105-C Building; conducting nitrogen usage tests on new RMC Hoods in 234-5 Building, and adjusting controls to reduce nitrogen consumption; ventilation services for changing panels on hoods in recuplex in 234-5 Building; and, review of specifications for testing high-efficiency filters from several vendors for NPR Project.

T. S. LaFayette

Manager
Power & General Maintenance

TGL:ta

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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

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II. ACHIEVEMENTS (continued)

F. FACILITIES ENGINEERING OPERATION

1. Purex

a. Process Design and Development Engineering

Concentrator Tube Bundles

A capacity review of Purex concentrator tube bundles was completed. Improvements in design are needed to obtain longer service life in acid services and to permit an increase in the capacity of the uranium units for future requirements. Process design criteria covering the improved designs for both uranium and acid services were completed. These new designs are expected to permit, on a replacement basis, an increase in uranium concentrator capacity and service life of acid concentrators by utilizing the concept of boiling outside the tubes as successfully proven for E H⁴ prototype titanium tube bundle. This prototype continued its excellent performance in the Purex #H⁴ position, operating with a heat transfer coefficient of about 600 BTU/hour/°F. ft². The evaluation and a summary report have been completed.

Waste Tank Integrity

Several types of masonry diamond drilling equipment available at Hanford were inspected for the application of drilling concrete core samples from the domes of underground storage tanks. None of the available equipment is adequate for the job of taking core specimens. Diamond drilling equipment manufacturers are being interviewed for acceptable equipment to do this work. Testing and petrographic examinations are to be made on these cores to aid in determining the effects of the boiling waste vapors on the concrete dome.

b. Project Engineering

CGC-821 - Project Palm - Purex

Purification

The Invitation to Bid for the fixed-price construction for the purification facility was issued by the Atomic Energy Commission on June 22.

Palm Extraction

Fabrication of jumpers was started on June 23. Fabrication of samplers was started on June 26. Firm orders have been placed

for 57 items at about \$330,000; and nine requisitions representing an additional \$50,000 have been processed. These actions constitute about 97 percent of the required procurement.

CAC-925 - Purex 216-A-2 Crib Replacement

Bids for the construction of the crib were opened by the Commission June 28. Three bids were received, ranging from a low bid of \$13,995 to a high bid of \$14,800. The fair cost estimate was \$19,000. Site preparation and excavation for the underground waste line tie-in is underway.

c. Manufacturing Engineering

T-K2 Column Cartridge

Design and drawings were completed for an all stainless steel plate cartridge. It modifies existing designs to eliminate plastic plates. This unit is for remote installation.

Burial Trench Ramp Profile

As recommended in Radiation Occurrence Investigation Report (CPD 61-4) an unloading ramp profile was designed to minimize stresses on burial boxes.

2. Special Separations Processing

a. Process Design and Development Engineering

Bayonet Tube Bundle Condensate Disposal

Two jumpers have been designed for Redox to permit operability testing of the G-3 West Bayonet tube bundle. These jumpers, to be fabricated and installed for test purposes, will incorporate a back-pressure control valve for the concentrator tube bundle in place of the steam trap currently employed in that service. It is planned to assess the heat transfer steam consumption performance of the bayonet tube bundle to permit a reappraisal of the optimum condensate disposal system. All materials for fabrication of the two jumpers are on hand, and fabrication is expected to be complete by the end of July, 1961.

233-S Building Ventilation Improvements

The summary report covering the design of revisions to the 233-S Building exhaust ventilation system for improved containment characteristics and ease of replacement of filters has been completed. The proposed work includes (1) installation of parallel exhaust systems, (2) extension of the ductwork on the roof of 233-S Building to the new equipment, and (3) re-routing of the 233-S vessel vent system to permit discharge into the 202-S Building exhaust air tunnel.

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L-2 Stripper-Concentrator

A process design review of the Redox L-2 Stripper-Concentrator Vessel in both plutonium and Birch services was completed. It was determined that fabrication of a new L-2 vessel of titanium for plutonium service would not be justified because of the long procurement times involved. The existing stainless steel unit should be retained for the remaining period of plutonium service in L-2, and a new stainless steel design should be developed for use in exclusive Birch service to follow the Project CGC-913 conversion work. The new design suggested for exclusive Birch service was offered only on a replacement equipment basis since simpler equipment would suffice in this application.

3. Finished Products Operation

a. Process Design and Development Engineering

Button Line Improvements

The final development report on the 6-inch, critically-safe centrifuge has been prepared. Word was received during the month that the supplier has discontinued the manufacture of the linear polyethylene cloth which performed so well on the vacuum drum filter. A new procurement source is currently being investigated.

Continuous Dissolver and Fusion Hood Design

Detail design work started June 1 on glove boxes for skull burning, ammonium bifluoride fusion, and a continuous dissolver, all to be installed in the existing Recuplex facility. Electrical and instrument design is scheduled to be completed the latter part of July. This equipment will not only pilot new processes for CAC-880, but will also be useful in a program of recycling much higher loads from the metal fabrication line.

A control valve installation is being designed for the reception and blending hood to replace one of the existing horizontal column feed tanks. This system will be used for feeding solutions received from the continuous dissolver and fusion hood directly to the Recuplex columns.

Button Gamma Monitor

Operational testing started on a monitor to measure button gamma level in the RMC Line. The purpose of the monitor is primarily to reduce manual handling of buttons and attendant radiation exposure.

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RMA Fabrication Line

Scoping work was continued on defining equipment requirements for the RMA foundry area. Scope drawings were provided for foundry equipment layout in the "A" area, mold makeup and break-out hood, and the Kinney furnace modifications. These drawings and a written description of the facility were forwarded for use in preparing the project proposal.

New Facilities

Preliminary engineering work has been started on a new facility for receiving, storing, and blending nitrate solutions as may be needed to meet specifications on plutonium-240 content. Initial efforts are being directed at resolving the building arrangement philosophy and evaluating the relative advantages of three different tank shapes: round, annular, and slab.

b. Project Engineering

CGC-813 - Plutonium Recovery from Contaminated Materials - 234-5 Building

Testing with uncontaminated materials and equipment modification were continued. Improved feed handling, rates of combustion, and retention of ash in the incinerator were attained during the month.

CAC-880 - Plutonium Reclamation Facility - Z Plant

The information for bid package for the Phase I fixed-price contract was forwarded to the AEC June 29. This work covers the construction of the building and services. The installation of process equipment will be performed on a second contract.

CGC-912 - Waste Treatment Facility - Z Plant

The information for bid package for the Phase II fixed-price contract was transmitted to the AEC on June 30. This contract covers the installation of the process equipment. The Commission is considering a combination of this work with Phase I of CAC-880 into one fixed-price contract.

The contractor for Phase I of the Waste Treatment Facility started work at the site on June 14. Detail design has been completed.

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c. Manufacturing Engineering

Methods Analysis

More than 30 gauging operations in Final I inspection were filmed and have been reviewed. These films are being used both to develop "mr" control limits and to improve methods, cost control, and process control.

Motion pictures of a new skull oxidizing operation in Product Recovery were taken. A preliminary review was made to evaluate potential radiation exposure.

4. General

a. Process Design and Development Engineering

Waste Tank Leak Detection

The scope and design criteria document, HW-68661, was approved and issued. Preliminary mock-up tests for the pneumatic air system which motivates the GM tube through a 3" pipe beneath the self-boiling waste tanks have been successful. This air system can move the GM instrument through the tube at a rate of 30-40 feet per second with an air flow of about 50-75 cfm at a pressure of less than 2 psig. Design details are being studied which will permit the complete reclaiming of the pneumatic system should unforeseen difficulty arise during operation.

Line Voltage Monitor and Analyzer

Circuitry has been developed for an improved instrument for measuring transient noise on A.C. power circuits. Fabrication of a portable instrument is planned so that tests can be made in various CPD facilities where transient noise seems to be affecting equipment performance.

b. Project Engineering

Project Cost Information as of June 18, 1961:

Total authorized funds - 11 active projects	\$9,109,000
Total Cost-to-Date	5,348,000
Commitments and Open Work Releases	566,000
Unencumbered balance	3,195,000
Costs charged to above projects 5/21/61 to 6/18/61	111,132

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Projects dropped from active status during this period:

<u>Project No.</u>	<u>Authorized Funds</u>	<u>Total Cost</u>
CG-789	\$ 205,000	\$ 204,944
CAC-881	31,900	30,301

H. P. Shaw, Manager
Facilities Engineering Operation
CHEMICAL PROCESSING DEPARTMENT

HP Shaw/WWC/llg

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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

JUNE, 1961

II. ACHIEVEMENTS (Continued)

G. RESEARCH AND ENGINEERING OPERATION

1. Purex Process Technology - D. P. Johnson

a. Fission Product Recovery

Two strontium recovery runs were made during the month. The first run completed the 1.3 megacurie requirement for the SNAP 7 program. The crude product from the second run is being held in process tanks until storage tankage is available.

Samples of the aged strontium solutions being held in storage show that fine white solids have formed. Analysis indicates that as much as 40 per cent of the total strontium in the tank may be associated with the solids. A method of reclaiming the strontium from the solid that is compatible with the purification flowsheet is under investigation. Operation of the Hot Semiworks Purification Facilities has not been affected by the solids since there is sufficient strontium in solution to meet the feed requirements.

b. Solvent Extraction

Decontamination performance was unusually erratic during the month due to frequent gamma activity bursts. These bursts resulted from several temporary plant shutdowns and start-ups and large variations in the HA Column organic phase uranium saturation. In general, the decontamination performance of the First Cycle decreased gradually two to three-fold as the uranium saturation was reduced to control the HA Column effluent (HAW) neptunium and plutonium losses. The solvent extraction uranium product gamma ratio varied from four to eleven, but all uranium product was reduced to the ≤ 2.0 specification by silica gel treatment. A large part of the plutonium product did not meet the gamma specification because of erratic operation of the ion exchange unit. Part of the out-of-specification product was recycled to the HA Column feed and the remainder was stored in shipping cans for future recycle.

Plutonium waste losses via the HA Column effluent (HAW) were generally 0.1 - 0.2 per cent until mid-month at which time the loss increased sharply to 0.2 - 0.4 per cent with

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occasional peaks of 2.0 per cent. The plutonium loss was not effected by reducing the HA Column saturation, which indicated that inextractable plutonium was present in the HAW. At first the recycled plutonium was thought to be the source of the inextractable plutonium; however, process tests showed that it originated in the Backcycle Waste (3WB) System.

The uranium concentration in the plutonium product varied about 50 fold, but did not exceed the specification of 0.5 per cent. The variations were confirmed by analysis of the 2B Column product stream (2BP) but not by the 2A Column feed (2AF). To date no satisfactory explanation of this discrepancy has been found.

The testing of hydrazine as a reductant in the IBX (Partitioning) Column was terminated by replacing the hydrazine (0.05 M) with the flowsheet amount of sulfamic acid (0.034 M). Erratic 2A Column effluent losses complicated interpretation of the results, but the following observations were noted in addition to those reported last month:

- (1) Hydrazine (0.05 M) in the IBX Column reductant stream decreased the plutonium recycle via the IBS Column organic scrub stream (IBSU) about three-fold.
- (2) The 2A Column effluent (2AW) plutonium loss may have been affected slightly by the kinetics of the $N_2H_4-NO_2$ reaction. Decreasing the hold-up time in the 2A Column feed tank (2AF) from 40 to 20 minutes possibly increased the 2AW loss. However, no effect was noted upon increasing the hold-up time from 40 to 70 minutes. Duplication of the hold-up test without hydrazine had no effect on the 2A Column effluent (2AW) plutonium loss.

c. Neptunium Recovery

During the month, overall neptunium recovery by internal recycle was normal (about 75 per cent of the HAF neptunium). Wide variations in the neptunium loss to the HA Column effluent (HAW) and the neptunium reflux in the HA-HS Columns were controlled by decreasing the organic phase uranium saturation of the HA-HS Columns.

Neptunium loss to the final uranium product (2EU) gradually increased from 11 to 29 per cent of virgin feed as the neptunium level in the 2D Column feed (2DF) gradually increased about 2.5-fold. It is believed that this loss was caused by the deteriorated condition of the fluorothene plates in the 2D Column scrub cartridge.

At month end a neptunium recovery run was in progress to recover an estimated 2.2 kg of neptunium from the Backcycle Waste System.

d. Plutonium Concentration

Normal operation of the Plutonium Ion Exchange Unit was interrupted and the plutonium product was concentrated in the L Cell concentration package for four days while the resin was stripped and replaced. Prior to the shutdown resin pushing became extremely difficult. Inspection of the system revealed that resin was tightly packed in the top of the resin receiver.

Following start-up, a shortage of resin in the system made it impossible to maintain the proper interface level in the resin reservoir. As a result, control again became very erratic and the plutonium recycle in the XA Column effluent varied from 50 per cent to 100 per cent for four days. After adding about 20 volume per cent of 10 - 20 mesh resin (normal resin size is 20 - 40 mesh) the recycle was reduced to normal levels of $\frac{1}{2}$ per cent for the remainder of the run period. No ill effects were noted from the addition of the larger sized resin.

e. Solvent Treatment

Solvent quality was excellent during the report period with the gamma activity in the No. 1 Solvent System generally remaining at 2,000 to 2,500 uc/gal. while the ICW gamma activity ranged between 10,000 and 30,000 uc/gal. Solvent losses during the operating period averaged 0.36 per cent of the volume throughput.

f. Waste Treatment and Acid Recovery

Waste volumes sent to the underground storage tanks averaged 125, 320, 570, and 106 gallons per ton of uranium processed for neutralized high level waste (IWW), IWW after treatment for strontium recovery, solvent washes and cell drainage, respectively.

Starting about May 8, the pot vacuum in the IWW waste concentrator, which was installed August 1, 1960, began to decrease, necessitating a continual decrease in steam flow to avoid pressurization of the vessel. This condition gradually worsened until by the time of the plant shutdown on June 25, the total flow had been cut in half to about 15,000 lbs./hr. Reducing the steam flow required a reduction in dilution water added to the feed stream (IWF) and thereby resulted in high overflow (IWW) rates. Pressure checks around the system indicated that of the 50 inches of vacuum in the condenser vent system the greatest pressure drop (31 inches) was across the 7 bubble cap trays in the tower. Flushing of the tower with hot water on one occasion resulted in a temporary 30 per cent steam flow improvement; however, flushes in general did not delay the steadily decreasing capacity of the concentrator. Extensive tower flushes with 7 per cent NaOH - 2 per cent tartaric acid were initiated after plant shutdown.

The bottom sludge temperature of TK-241-A-101 decreased from the 204 - 206° C range of last month to 154° C after increasing the tank liquid level.

2. Redox Process Technology -a. Dissolving

Operation of the Mark V multipurpose dissolver, according to the standard procedure provided at the end of the previous month, was very satisfactory. An average sustained dissolution rate of 6.34 tons of uranium per day was measured during a 15-day period in which 12 dissolver charges and 30 dissolution "cuts" were made. A complete cleanout of the dissolver was made at month's end; this followed the dissolving of 256 tons of uranium metal since the previous cleanout on April 27, 1961, and removed a 1.6-ton metal heel. Based on the current method of computing uranium material balance and the cumulative total uranium removal, the heel had been calculated to be 3.4 tons. The discrepancy of 1.8 tons amounts to only 0.7 percent of the total dissolved in this period, and represents an excellent check on the previously determined nitric acid requirement (1.176 pounds of 100 percent HNO_3 per pound of uranium dissolved).

b. Solvent Extraction

Consideration is being given to the use of DIBAN (dibasic aluminum nitrate), in place of sodium hydroxide, for acid adjustment in the feed (3DF) solution for the third uranium extraction cycle. Its reaction with nitric acid produces aluminum nitrate directly in the solution thus giving a feed-scrub (3DFS) mixture and making possible the elimination of the separate salt scrub stream (3DS). Ferrous ion, one of the components of the 3DS stream, is needed, however, to effect the removal of residual plutonium from the uranium stream and assure a final uranium product meeting the specification of less than 10 parts plutonium per billion parts of uranium. Therefore an in-plant test was made of adding the ferrous ion to the system via the 3DA stream (demineralized water scrub) at the top of the 3D Column. No iron was detected in the final uranium product (indicating no aqueous entrainment) and the plutonium content of the uranium product remained unchanged at approximately one part per billion.

Currently the instantaneous processing capacity of the Redox plant (exclusive of dissolving) is believed to be limited by the solvent extraction capacity of the HA Column (precycle extraction). In starting a systematic program of identifying the limitations, however, this column was operated without difficulty at a sustained rate of 10 tons of uranium per day during the final week of June. This rate corresponds to a total throughput rate of about 1900 gallons per hour per square foot, sum of both phases, or approximately 90 percent of original design flooding capacity. This represents an increase in capacity of about 50 percent above that obtainable in this column on the former acid-deficient flowsheet. Further tests on rates and capacities are planned to define the precycle capacity and/or determine other process limiting equipment.

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An increase in uranium concentration from 1.25 M to 1.36 M in the LAFS (first decontamination cycle feed) stream was made possible by the previously discussed backcycle of waste from the 2A Column (second cycle plutonium decontamination) to the HA Column scrub stream (cf. this report for February, 1961). This allowed a reduction of both feed and extractant flows in the 1A Column for a given rate of production and thus corresponds to a potential capacity increase in this cycle of approximately 7 percent.

c. Neptunium Recovery

The present concept of the ultimate Redox neptunium recovery flow-sheet (Project CGC-913), includes the use of the HS Column as a "bottle" column in which the neptunium will be removed continuously or batchwise, from the internal accumulation and recycle stream (D-14), without interfering with normal plant operation. At month's end, this concept was successfully demonstrated in a five-hour-long in-plant test. The contents of the D-14 backcycled waste concentrator, containing approximately half of the total accumulated neptunium, were pumped continuously into the HS Column where the neptunium was extracted into a counter-current organic stream. This hexone stream then flowing upward through a stagnant, aqueous scrub stream containing ferrous ion reducing agent, was stripped of the neptunium which accumulated in the scrub section of the column. The raffinate, carrying approximately 8 percent of the neptunium in the feed as a "loss", was continuously returned directly to the D-14 vessel. In the course of the test, approximately 52 percent of the neptunium originally present in the D-14 concentrator was "bottled" in the HS Column, then later drained and stored in a different vessel for future removal and purification.

d. Waste Storage

Samples of waste supernatant liquid were taken from the 109, 110, 111, 112, and 115-SX storage tanks without incident. These samples will be analyzed extensively as a part of the program to characterize high-level stored waste.

Radiation profiles were obtained in a number of the storage tanks by means of a special probe as discussed in last month's report. Additional readings throughout the SX tank farm are planned, but modifications to the radiation probe will be required before satisfactory vertical traverses through the thermobulb risers can be made.

A chisel-pointed sludge thermocouple probe, positioned in the 108-SX tank, failed to penetrate the 36-inch-thick sludge layer to a depth of more than six inches. Repeated attempts to penetrate the solid layer which appeared to be extremely dense and hard, finally broke

or bent the bottom 30-inch-long section of the probe itself which was made of 16-gauge 0.75-inch-diameter stainless steel pipe, welded to 2-inch-diameter iron pipe. As could be expected under such circumstances, no temperatures higher than that of the supernatant liquid were observed. The probe will be raised for inspection, and a decision will then be made regarding redesign of the probe and resumption of the testing program.

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3. Finished Products Chemical Technology -

a. Uranium Reduction Operation

1. Concentration and Calcination

Detailed examination of the upper tube to tube sheet welds of the 60 to 100 percent UNH concentrator (ED-7), which failed during March, 1961, revealed severe corrosion effects in 17 of the 55 tubes. Attempts to repair the damage by grinding and rewelding all the tubes were abandoned when pressure testing revealed pin-hole leaks in 18 of the tubes, approximately 1/4-inch below the new welds. The material of construction was 304-L.

b. Metal Finishing Operation

1. Tasks I, II, and III

Tests for increasing processing rates through Tasks I and II (precipitation, calcination, and hydrofluorination) were temporarily suspended due to in-leakage of air through a defective bellows and a powder seal, diluting the HF such that the hydrofluorination yield decreased to an estimated 87 percent PuF_4 instead of 97 percent PuF_4 . The major effect of the increased oxide content of the metal reduction charge appears to be about a one percent decrease in metal yield.

The average impurity content of buttons produced in June appeared quite good. Average impurity content of buttons produced during January, May, and June, 1961, are presented in the following table. Metallic impurities, with vapor pressures sufficiently high to be vaporized at ingotting conditions (Ca, Mg, K, Na, etc.) are reported separately from those expected to be non-volatile (Fe, Ni, Cr, Mn, Cu, Al, etc.).

Average Impurity Content of Plutonium Buttons

	<u>Average Volatile</u> <u>Metallic</u>	<u>Average Non-Volatile</u> <u>Metallic</u>	<u>Carbon</u>
January	787 - 794 ppm	821 - 993 ppm	230 ppm
May	472 - 474 ppm	356 - 500 ppm	730 ppm
June *	544 - 550 ppm	192 - 271 ppm	364 ppm

NOTE: Lower values assume analytical values reported as "less than" are equal to zero.

Higher values assume analytical values reported as "less than" are equal to the number.

* Averages are for all analytical results received at time of reporting and include approximately 90 percent of production.

Button densities have increased, consistent with the decrease in impurities, and averaged 0.13 and 0.14 density units higher than the January average during May and June, respectively.

2. Recuplex

Hydroxylamine nitrate was again tested as a reducing agent in the stripping column (H-3). With a stripping solution (CCX) of 0.13 M HNO_3 and 0.04 M hydroxylamine nitrate, an excellent E o/a of 0.09 was obtained; however, a precipitate formed in the column, and stripping efficiency was markedly reduced. The brown precipitate (evident occasionally with other stripping agents) forms at a definite region of the column. Precipitation was alleviated and the favorable E o/a retained by the addition of 0.18 M H_2SO_4 to the stripping solution. Although the elimination of sulfate from the stripping solution does not appear promising, further tests will be made.

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4. Finished Products Fabrication Technology -

a. Fabrication Operation

1. Foundry

The quality of ingot metal from turnings has continued to improve. The improvement has resulted in an increase of 0.15 grams/cc in the average ingot density. This improvement is attributed to improved technique for briquetting and melting operations and the higher average density of turnings.

The average density of 05 and 06 components increased 0.06 grams/cc. This improvement is attributed to better quality feed material. The casting efficiency for 05 and 06 components decreased 19 percent. The percentage of castings rejected prior to machining increased, and the percentage of castings rejected during and after machining because of visible or radiographic defects increased. There was no change in the percentage of parts rejected without identified defects. The two-week hold between casting and final machining delays evaluation of casting quality. This delay is a contributing factor to the reduction of casting efficiency.

2. Metal Cutting

A shipment of off-standard grade 999 cutting tools was received on a recent order. These tools did not have acceptable tool life. When they were examined by the Metallurgical Products Department, it was found that the material supplied did not meet the grade specifications.

Platinum binder and binderless tungsten carbide cutting tools were evaluated as plutonium cutting tools. Neither of these grades were better than grade 999 for machining plutonium. The test tools cost three to 15 times as much as grade 999.

b. GE 312 Computer Test

Desk debugging of the computer program continued, and revision of flow diagrams, to update them in accordance with the latest listings and compile, was started. A delay of one month for on-line application of the computer resulted from: (1) major program logic change to accommodate the anneal cycle, (2) difficulties in compiling the new program into machine language, (3) limited access to the IBM 7090 main frame, and (4) the availability of personnel trained in compilation, programming, and coding. The new on-line application target date is August 1, 1961.

5. Process Chemistry -

a. Purex Process Assistance

1. Alternate Reductants for Plutonium Partitioning

Laboratory studies on the use of alternate reductants for plutonium in the plutonium partitioning cycle were continued.

Measurements of the oxidation rate of plutonium(III) to plutonium(IV) with nitrite ion from hydrazine stabilized plutonium(III)-ferrous ion solutions were made. Synthetic IBP solutions (plutonium partitioning cycle product solutions) containing hydrazine were treated with nitrite and the rates of plutonium(IV) build-up were measured. Oxidation to the tetravalent state was found to go essentially to completion [$>99\%$ Pu(IV)] in 124 seconds when excess nitrite was added.

Studies were also initiated on the use of a hydrazine stabilized solution of uranium(IV)-nitric acid as an alternate reductant. Extraction coefficients, E_a^O , for uranium(IV) in the HNO_3 -TBP-Shell Spray Base system were measured. Extraction coefficients in 30% TBP in Shell Spray Base at an organic saturation of 0.1 M U(IV) ranged from 1.9 (E_a^O) at 1.0 M HNO_3 up to 2.2 (E_a^O) at 7.0 M HNO_3 in the aqueous phase. Solubility of the U(IV)-TBP complex in the organic phase appeared to reach a maximum at about 0.2 M U(IV). Above this concentration in the organic phase, a two layer organic phase was formed. Preliminary tests of the mixing of uranium(IV) in 30% TBP-Shell Spray Base with plutonium(IV) in 30% TBP-Shell Spray Base showed little or no reduction of the plutonium(IV) by uranium(IV) in the organic medium.

2. Solvent Clean-up

Further comparisons on the effectiveness of magnesium hydroxide as compared to permanganate-carbonate for solvent washing were made. Samples of plant solvent taken during the period prior to the magnesium hydroxide plant test, during the test, and after the major plant gamma burst experienced on May 1, 1961, were tested in the laboratory. Zirconium, niobium-95 removal, the plutonium retention number, and the Zr, Nb-95 E_a^O were used as indices of solvent quality after treatment. In all cases, solvent quality as measured by these indices was equal to, or better, after magnesium hydroxide washing than after the standard permanganate-carbonate treatment.

b. Thermobalance Studies of Plutonium Oxide Chlorination with Phosgene

The effect of additives, added during the calcination of plutonium nitrate to PuO_2 , on the reactivity of PuO_2 toward chlorination to PuCl_3 with phosgene was studied. Plutonium oxide samples to which oxalic acid and ammonium sulfate had been added during calcination and which had been screened to give a uniform particle size were chlorinated on the thermobalance. For the samples to which oxalic acid had been added, little or no increase in reactivity was observed. The samples from the sulfate additions were found to be more reactive by a factor of about two than the oxalate samples. In addition, the per cent chlorination was found to increase as the amount of sulfate added during calcination increased. The oxalic acid appeared to be nearly completely volatilized during calcination, whereas about 75 per cent of the sulfate added appeared to remain after calcination.

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6. 234-5 Development - Plutonium

a. Ammonium Bifluoride Fusion Of Ash

Ammonium bifluoride fusion of ash to solubilize the plutonium content is under development.

In the first run, insufficient reactant was used and a low yield resulted. In the second run, a ratio of four grams per gram of ash was used and 97.6 percent of the plutonium was solubilized. Filtration of the resulting solution remains a problem due to fines in the ash.

b. Parameters In The Conversion Of Plutonium Nitrate To Plutonium Trichloride By A Direct Calcination - Fluid Bed Chlorination Process

A document, HW-69738, with the above title was issued during the month. The "Summary And Conclusions" follow.

"Variables in the direct calcination of plutonium nitrate to dioxide have been explored and the effects on reactivity determined. Reactivity was evaluated by chlorination rate in thermobalance and tube furnace tests. The significant effects are due to differences in the oxide particle shape, size, and density. These are influenced by variables such as residence time, temperature, chemical additives, and thermal cycling.

"Parameters for a continuous direct calcination process in an agitated bed reactor are presented, and include (1) sizing for minimum residence time, (2) temperature of 250 C, (3) agitator speed of 160 rpm to optimize particle size, (4) use of sulfate or oxalate additive, and (5) feed rate of two liters per hour.

"Fluidized bed chlorination parameters include (1) 500 C operation, (2) gas flow of 0.1 to 0.5 feet per second, (3) sizing to produce residence time of four hours, and (4) two stages with cooling between.

"Large-scale demonstration equipment is on hand and demonstration runs are expected during the next six months."

c. Continuous Dissolution Of Plutonium-Bearing Slag And Crucible Residues

This is the title of a document which is in process of issuance as a formal report, HW-69415. The "Summary And Conclusions" have been excerpted.

"Laboratory runs have demonstrated successful dissolution of plutonium-bearing slag and crucible residues. The plutonium recovery was quantitative."

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"Vigorous reaction during initial dissolution of each solids charge caused formation of large quantities of reaction foam. While the foam subsides in a few moments, the foam volume could easily result in a boilover from the dissolver. Charging of smaller batches more frequently could eliminate the problem.

"The experimental runs all exhibited the formation of a residual solids heel in the dissolver. Since heel dissolution is slow, periodic dissolver cleanout runs will be required to maintain a low heel volume. Any excessive solids heel buildup can be removed and dissolved in a lengthy batch treatment using 4 M HNO_3 or 6 M HCl . The residue in a 30-hour continuous run was eight percent by weight of the solids charged.

"It was determined that a 27.5 g/l IO_3^- concentration was required in the dissolver overflow solution to precipitate plutonium iodate. The iodate concentration in the continuous dissolver is much less than this value (<5 g/l): hence, formation of this inextractable precipitate should not be encountered.

"Dissolver overflow solution adjusted to solvent extraction feed specifications was contacted with 20 percent TBP - 80 percent CCl_4 . Four stages of extraction reduced the plutonium concentration in the aqueous feed to 0.003 g/l. Storage of feed material for five days did not affect the plutonium extraction. The presence of up to 0.08 M titanium or 0.3 M sulfate did not decrease the extractability of the plutonium."

d. Solvent Extraction Studies - DBBP

A document, HW-69910, "Studies Of Dibutyl Butyl Phosphonate As An Extractant For Plutonium From The Recuplex Waste Stream", was issued. The "Summary And Conclusions" follow:

"Extraction coefficients for plutonium in the CAW (~ 5 mg/l Pu) using 25 percent DBBP - 75 percent CCl_4 as an extractant ranged from 160 to 250, or approximately 10 times better than those for 20 percent TBP - 80 percent CCl_4 . The 25 percent DBBP consistently removed 94 to 96 percent of the plutonium waste from the CAW in one stage.

"Ninety volumes of CAW can be contacted with one volume of 25 percent DBBP - 75 percent CCl_4 before exceeding a plutonium waste loss of 0.1 mg/l. There was little difference between an organic of 25 percent or 35 percent DBBP by volume as an extractant. One hundred percent DBBP was not an effective extractant.

"The HNO_3 distribution curve for 25 percent DBBP - 75 percent CCl_4 was determined. A 0.7 M HNO_3 concentration was achieved in the organic phase after contacting CAW containing 2 M HNO_3 with 25 percent DBBP

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in 75 percent CCl_4 .

"Stripping plutonium from 25 percent DBBP with 0.001 M HNO_3 was ineffective. The most promising stripping agents were 5 percent Na_2CO_3 preceded by a 0.001 M HNO_3 scrub of the organic; or 5 percent Na_2CO_3 ; or 1 M HF . It was shown that the cause of the poor stripping with dilute nitric acid was the presence of organic degradation products.

"A preliminary flow sheet for a static DBBP column is presented.

"It is recommended that 25 percent DBBP - 75 percent CCl_4 be used as the extractant in the static backup column (CW column) for treating CAW in the Waste Treatment Facility. The extraction and stripping characteristics of DBBP should be studied further in a small-scale packed static column to define the optimum flow sheet conditions."

e. High-Exposure Plutonium

Special compound preparations are being performed in support of the PRTR program.

An additional 0.6 kg of plutonium as dilute nitrate solution from ORNL flushes was concentrated and converted to plutonium dioxide via an oxalate precipitation and calcination step. The plutonium consists of 17 percent Pu^{240} and is to be used by the Plutonium Metallurgy Operation, HLO, for fuel studies.

R. E. Tomlinson

Acting Manager
Research and Engineering

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II. ACHIEVEMENTS (continued)

H. FINANCIAL OPERATION

1. Production Cost

During June, supplementary budget data on fission products, weapons, and recuplex were provided HOO-AEC Finance, Budget and Production divisions for forwarding to Washington AEC, detailing the effect of changes in the budget after submission to the Commission.

A summary of changes and current status of the budget for items noted above are as follows:

- a. Fission Products - Negotiation with AEC Budget Division was completed with regard to the amounts to be considered as "B" plant Fission Products startup for FY 1962 and 1963.
- b. Weapons - FY 1963 budget was reduced to \$311,000 upon insistence of Department of Military Applications that only a one shift fabrication operation should be planned for that year.
- c. Recuplex - As a result of CPD representations made to Mr. Shepherd, AEC Production Cost Analysis Division Director, recuplex costs will be billed to customer users of these facilities rather than absorbed against Preparation of Pu Metal as in the past.

The above changes are effective July 1, 1961 and require fairly extensive budget rework for internal purposes.

In response to requests from HOO-AEC, work was started in May and continued in June on updating and revising of the Pu Scrap Reclamation Pricing Schedule (issued in March) in accordance with a new set of AEC instructions for categorizing scrap.

Elimination of 8 of the 29 nuclear balance areas and establishment of the improved method of determining equivalent production as recommended by the study group (study was reported in May) is to be made effective with July production.

CPD's investment in inventories at May 31, 1961 compared with budgeted balances at June 30, 1961 are shown below:

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(amounts in thousands)	Balance 5-31-61	Financial Plan 6-30-61	Surplus (Deficit)
<u>Inventories</u>			
Essential Materials	\$ 847	\$ 777	\$(70)
Spare Parts & Standby	1 700	1 846	146
Special Materials	80	83	3
Gross Inventories	<u>2 627</u>	<u>2 706</u>	<u>79</u>
<u>Reserves</u>			
Essential Materials	52	56	(4)
Spare Parts & Standby	<u>387</u>	<u>461</u>	<u>(74)</u>
Total Reserves	<u>439</u>	<u>517</u>	<u>(78)</u>
Net Investment	<u>\$2 188</u>	<u>\$2 189</u>	<u>\$ 1</u>

2. General Accounting

As of May 31, 1961, 13 active projects had incurred costs of \$5,493,547 against authorized funds of \$9,345,900. Outstanding commitments totaled \$389,449.

Five Appropriation Requests with a total value of \$55,726 were approved in June, which are listed as follows:

61-CPD-55	Multipurpose Transfer Box	Redox	\$40 000
61-CPD-57	Liquid Level Reels for Waste Tanks	Redox	7 000
61-CPD-56	Dissolver Off Gas Monitoring System	R & E	4 100
61-CPD-53	Power Hack Saw	P&GM	3 006
61-CPD-54	Power Hack Saw	P&GM	<u>1 620</u>
Total			<u>\$55 726</u>

Property records for all plant and equipment in the custody of CPD (both fixed and movable property) have now been mechanized with all reporting being accomplished by means of electronic data processing equipment.

3. Personnel Accounting

The report, 1961 National Survey of Professional and Scientific Salaries, was completed and forwarded to L. L. Weiss, Schenectady, in June for consolidation with the Company report.

4. Procedures

The one-man laboratory supplies store in 222-S Redox Laboratory building was closed in June as recommended from studies, with the resulting savings in salary costs of one employee.

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5. Singular Cost Studies

In collaboration with Research and Engineering and Production personnel, an estimate of processing costs involved in processing High Purity Pu-239 material in Redox plant was developed. This material is needed by the AEC Division of Research and the processing feasibility and cost estimate was requested by HOO-AEC.

A special cost study was performed involving various production plans as designated by the Combined Operations Group. Chemical separations capital and operating costs were developed with the assistance of Production personnel and furnished for use in the overall study.

Manager - Finance

CHEMICAL PROCESSING DEPARTMENT
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II. ACHIEVEMENTS (continued)

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I. RELATIONS PRACTICES OPERATION

1. Salary Administration

A program to review the level relationships of eighteen Chemical Processing Department exempt positions in the manufacturing function with other HAPO manufacturing departments and Relations Operation was completed. A recommendation to increase the levels of two CPD positions resulted from the joint study.

Consultation was provided in connection with reorganization plans in two sections. Evaluations of fifteen proposed or revised positions were made and HAPO relationships were confirmed for ten positions.

2. Personnel Placement

Five Manufacturing Training Program trainees reported to the Department during the month. Of these, three were transfers from other General Electric departments away from HAPO, coming here for their second year on the MTP Program. The sixth trainee for the Department is expected next month.

Due to increased recovery requirements for the Finished Products Operation, requisitions were received during the month for ten additional Utility Operators. Selections of these people have been made, and it is expected that all ten will be on the roll by the middle of July.

3. Wage and Benefits

One employee, an Instrument Technician from Purex Maintenance, retired during the month.

Fifteen CPD employees attended a pre-retirement contact meeting held in Building W-10. This is an annual meeting for those employees reaching age 59 during the year. Twenty three CPD employees were invited. Five brought their wives with them. The meetings were conducted by the benefits specialists from each department.

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Suggestion activity reflected a seasonable drop due to the vacation season. The backlog increased although submissions were down as shown in the following tabulation.

	1960 <u>Ave/mo</u>	1961 <u>May</u>	<u>June</u>
Received	38	39	30
Adopted	14	24	23
Awards	\$ 298.	\$ 285	\$ 500
Savings	\$1866	\$1035	\$1543
		71	83

4. Health, Safety and Radiation

Chemical Processing Department personnel qualified for a second successive HIAPO General Manager's Safety Award on June 29. Consecutive injury-free hours from January 12, 1960 total approximately 3,781,000 or 535 injury-free days.

5. Communication

The Automatic Calciner story has been approved by Oak Ridge, received all local approvals, and is scheduled for publication in the GE NEWS early in July. The Fission Product story has now received all HIAPO approvals and is also scheduled for release early in July.

Two abstracts of signed articles have been submitted to ATOMICS for consideration.

Wm Watson Jr. for

Manager
Relations Practices

RB Britton:lj

CHEMICAL PROCESSING DEPARTMENT
Monthly Report

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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>5-31-61</u>	<u>6-30-61</u>	<u>5-31-61</u>	<u>6-30-61</u>	<u>5-31-61</u>	<u>6-30-61</u>
General Manager's Group	11	11	1	1	12	12
Financial	13	13	13	13	26	26
Relations Practices	5	5	6	6	11	11
Research & Engineering	64	65	27	27	91	92
Facilities Engineering	65	67	22	25	87	92
Power and General Maintenance	37	38	241	242	278	280
Production	5	5	3	3	8	8
Special Separation Processing and Auxiliaries	49	50	216	216	265	266
Purex	55	55	213	214	268	269
Finished Products	<u>53</u>	<u>53</u>	<u>236</u>	<u>236</u>	<u>289</u>	<u>289</u>
Total	<u>357</u>	<u>362</u>	<u>978</u>	<u>983</u>	<u>1 335</u>	<u>1 345</u>

B. PERSONNEL CHANGES

During June, E. R. Irish transferred to Hanford Laboratories and was replaced as Manager, Processing, Purex Operation by R. W. McCullugh who came to CPD from FPD.

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C. TRIPS

<u>Visitor</u>	<u>To</u>	<u>Nature of Discussion</u>
<u>To Other G.E. Components</u>		
R. B. Britton	Chicago, Ill.	Employee relations matters. (6/5/61)
	Cleveland, Ohio	Employee relations matters. (6/6/61)
	Syracuse, N.Y.	Employee relations matters. (6/7/61)
	New York City, N.Y.	Employee relations matters. (6/8-9/61)
J. F. Kane	Nela Park, Cleveland, Ohio	Engineer's Lighting Confer- ence. (6/5-7/61)
	Syracuse, N. Y.	Closed circuit television. 6/8/61)
H. P. Shaw P. R. McMurray L. L. Zahn	New York City, N.Y.	Technological Hazards Council Meeting. (6/12-16/61)
C. E. King	Manufacturing Services Schenectady, N.Y. Louisville, Ky.	Welding processes. (6/19-20/61) Shop equipment maintenance. (6/21/61)
C. R. Anderson J. E. McDonald	APED, Palo Alto, Calif.	Advanced Engineering and Planning. (6/18-20/61)
R. E. Smith	Manufacturing Services Schenectady, N.Y.	Assistance to Hanford Programs. (6/26-27/61)
<u>To AEC and Other AEC Contractors</u>		
K. M. Harmon	U. S. AEC, Washington, D.C.	Attend meeting of the AEC Measurements Evaluation Seminar. (6/6-7/61)
	E. I. duPont de Nemours Savannah River Plant Aiken, S. C.	Discuss birch processing and specifications; discuss analytical methods - Purex process. (6/8 - 9/61)
A. E. Smith	Lawrence Radiation Labor- atory, Livermore, Calif.	To attend Inter-Agency Mech- anical Operations Group Steering Committee meeting. (6/6-7/61)

<u>Visitor</u>	<u>To</u>	<u>Nature of Discussion</u>
R. A. Schneider	Dow Chemical Co. Rocky Flats Plant Denver, Colorado	Attend annual meeting of the Institute of Nuclear Mtls. Management and discuss anal- ytical measurements. (6/12-15/61)
W. H. Zimmer	Argonne National Lab. Lemont, Illinois	Discuss Pu-U ratio methods by emission mass spectro- meter. (6/20/61)
R. E. Isaacson	E. I. duPont de Nemours Savannah River Plant Aiken, S. C.	Nuclear safety discussions and observation of nuclear safety control practices. (6/19-20/61)
	Oak Ridge National Lab. Oak Ridge, Tennessee	Ditto above. (6/21/61)
	Union Carbide Nuclear Co. Oak Ridge, Tennessee	Ditto above. (6/22-23/61)
	Los Alamos Scientific Lab. Los Alamos, New Mexico	Ditto above. (6/26-27/61)
	Dow Chemical Co. Rocky Flats Plant Denver, Colorado	Ditto above. (6/28-29/61)
<u>To General Industry</u>		
J. F. Kane	Reliance Electrical & Engineering Co., Cleveland, Ohio DuMont Laboratories, Clifton, New Jersey	Performance of motors. (6/7/61) Closed circuit television. (6/9/61)
W. H. Sevier	Pacific Steel Products Co. Seattle, Wash.	Conduct heat transfer test. (6/13/61)
R. H. Bond	Wah Chang Corp. Albany, Oregon U.S. Bureau of Mines Albany, Oregon	Tantalum Fabrication. (6/20/61) Ditto above.
W. H. Zimmer	Harshaw Chemical Co. Cleveland, Ohio	Visit Crystal Division. (6/23/61)

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Visitor

Nature of Discussion

To Conventions and General Meetings

N. S. Wing	Chicago, Illinois State College, Pa.	ASTM conference on mass spectrometry. (6/5-8/61) Mass spectrometry training, (6/9-16/61)
W. H. Zimmer	Case Institute of Tech. Cleveland, Ohio	Attend 14th annual summer symposium of Analytical Chemistry Division. (6/21-23/61)

D. VISITORS

Visitor

From

Nature of Discussion

From AEC and AEC Operational Contractors

L. N. Sparks	AEC, Washington, D.C. Division of Construction and Supply	Machine tool management. (6/5/61)
D. E. Elliott	IASL, Los Alamos, N.M.	Nondestructive testing. (6/7-8/61)
J. R. Humphrey	Lawrence Radiation Lab. Livermore, Calif.	Dry chemistry and reduction; conversion of Pu nitrate to metal. (6/7/61)
C. W. Showalter	U.S. AEC, Division of Production, Germantown, Md.	R&D Budget evaluations. (6/14/61)
J. A. Fellows	Mallinckrodt Chemical Weldon Springs, Missouri	Electrowinning and electrorefining. (6/16/61)
B. Blanke	Mounds Laboratory Dayton, Ohio	Processing problems. (6/20/61)
G. F. Quinn E. F. Miller R. A. Kohler F. R. Dowling W. K. Maher	AEC, Washington, D.C. Division of Production	Fission product program. (6/19/61)
C. Beck J. J. Di Nunno	U.S. AEC, Division of Licensing and Regulation Washington, D. C.	Nuclear and radiological safety for separations and fabrication plants. (6/21/61)

<u>Visitor</u>	<u>From</u>	<u>Nature of Discussion</u>
J. Kennelley W. Robertson	Mallinckrodt Chemical Weldon Springs, Missouri	Solvent extraction electro- winning, electrorefining and UO ₃ technology. (6/28-29/61)
E. B. Tremmel	U.S. AEC, Office of Indus- trial Participation Washington, D.C.	Waste treatment and fission product recovery plans. (6/29/61)
<u>From General Industry</u>		
Victor H. McCormick	Ingersoll-Rand Corp. Portland, Oregon	Air tools. (6/7/61)
James V. Ezell	Ingersoll-Rand Corp. Seattle, Wash.	Air tools. (6/7/61)
D. Fitzgerald	Bendix Corporation Cincinnati, Ohio	Neutron Monitoring. (6/7/61)
F. G. Seeberger, Jr.	Texas Instruments Houston, Texas	Waste Tank Monitoring. (6/14/61)
P. S. Otten	Griscom-Russell Co. Massillon, Ohio	Titanium Tube Bundles. (6/15/61)
E. E. Stephens	Bumstead-Wolford Co.	Titanium Tube Bundles. (6/15/61)
F. H. Vorhis	Pfaunder Company, Elyria, Ohio	Purex Tube Bundle. (6/16/61)
M. E. Johnson	Pittsburg Testing Lab. Seattle, Wash.	Core Drilling of Waste Tanks. (6/21/61)
Eustace Vynne	Cascade Distributors Seattle, Wash.	Ditto above.
R. S. Ebbert	General Automation Mfg. Inc., Troy, Michigan	Ditto above.
W. E. Bailey	Westinghouse Corp. Atomic Power Dept. Pittsburgh, Pennsylvania	UO ₂ .PuO ₂ mixed crystal preparation. (6/26/61)
W. B. Tarpley	Aeroprojects, Inc. West Chester, Pa.	Ultrasonic materials and applications. (6/27/61)

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<u>Visitor</u>	<u>From</u>	<u>Nature of Discussion</u>
D. L. Eaton	Thermoelectric Division General Instruments Corp. New Jersey	Discuss mixed fission products. (6/28/61)
H. H. Schrock	Ex-Cell-O Corp. Los Angeles, Calif.	Discuss requirements for new machine equipment. (6/28/61)
Paul Berner	Star Machinery Co. Seattle, Wash.	Ditto above.

From Foreign Government and Agencies

Jack Moore Maurice Ginniff	UK AEA, Windscale, Great Britain	Removal of radio-iodine from off-gas. (6/9/61)
L. C. Watson W. G. Mathers	Chalk River Plant Ontario, Canada	Discussed unclassified information on submerged combustion program. (6/19/61)
Pierre Cohen Jean Boudrez	French Atomic Energy Group Saclay, France	Ditto above.
M. K. Nair A. N. Singhal R. C. Wadhwa A. N. Prasad	Atomic Energy Establishment, India	Waste management for a fuel reprocessing plant. (6/29/61)

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IV. SAFETY AND SECURITY

Operation	Facil. Eng.	Finance	Fin. Prod.	P&GM	Purex	SSP&AO	Prod.	Rel. Prac.	Res.& Eng.	Total CPD	Yr. to Date
Disabling Injuries										0	0
Serious Accidents										1*	4
Medical Treatment											
Injuries			11	17	6	11				45	262
Radiation Occur.			'4		5	2				11	114
Contam. Wounds					2**					2	13
Pu Depositions										0	3
Fires										1***	6
Security Violations										0	5

* Investigation on this accident is not completed. No injuries resulted from this incident.

** An employee was collecting waste from the hood floor and sump through a hood glove when a piece of acid-eaten, channel-lock wrench penetrated the hood glove, the employee's surgeons glove, and punctured his hand. The wound disclosed detectable but less than 500 d/m plutonium contamination. Whole-Body Monitor and bioassay results are pending.

During repair work on the KC-2 pump, a Millwright received a puncture wound on his right index finger. Surveys revealed no detectable contamination.

*** Lightning struck causing a sheet grass fire southeast of "C" Area. Total damage amounted to less than ten dollars.

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V. REPORTS

A. PREPARED AND ISSUED

- IIW-66864 REV, Unclassified, "Technical Specifications for Solvent Extraction Columns in the New Plutonium Reclamation Facility CAC-880", by L. E. Bruns, dated June 26, 1961.
- IIW-66910, Confidential, "Studies of Dibutyl Butyl Phosphonate As An Extractant for Plutonium from the Reculplex Waste Stream", by R. S. Kingsley and H. W. Crocker, dated June 15, 1961.
- IIW-68661, Unclassified, "Proposed Leak Detection System for Existing Storage Tanks Containing Self-boiling Radioactive Wastes (Scope and Design Criteria)", by H. W. Stivers, dated May 25, 1961.
- IIW-69472, Official Use Only, "Leak Detection, High-level Waste Tanks - 241-A and 241-SX" - CAC-928 - Rev #1, by L. W. Finch, dated June 15, 1961.
- IIW-69517, Secret, "Purex Plant Birch Isolation Run - April 1961", by R. G. Geier and H. C. Rathvon, dated June 20, 1961.
- IIW-69519, Unclassified, "In-tank Solidification of Intermediate Activity Wastes, Design Criteria for Submerged Combustion Prototype Unit", by S. R. Bierman, dated June 16, 1961.
- IIW-69729, Unclassified, "Preliminary Design, Rev. #1 - Proposed Purex Equipment Burial Tunnel No. 2", by D. A. Snyder, dated June 20, 1961.
- IIW-69730, Secret, "Critical Mass Control Specification for Storing Plutonium Metal in Room 172, 234-5 Building", by L. M. Meeker, dated June 1, 1961.
- IIW-69731, Secret, "Critical Mass Control Specification for Plutonium Feed Storage Facility (HC-6)" by L. M. Meeker, dated June 1, 1961.
- IIW-69738, Secret, "Parameters in the Conversion of Pu Nitrate to Pu Trichloride by A Direct Calcination - Fluid Bed Chlorination Process", by M. J. Rasmussen, G. L. Stiffler, and H. H. Hopkins, Jr., dated May 21, 1961.

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- HW-69803, Secret, "CPD Monthly Report - May 1961" dated June 21, 1961.
- HW-69816, Secret, "Performance of Purex E-R4 Titanium and Stainless Thermosyphon Tube Bundles", by L. R. Michels, dated June 1, 1961.
- HW-69828, Secret, "Definite Scope of Additional Segregation Facilities for "E" Metal and NPR Uranium in the UO₃ Plant", by H. L. Caudill, dated June 2, 1961.
- HW-69829 1, Secret, "81-C Stability - 5/19/61 to 5/26/61" by A. E. Smith, dated June 2, 1961.
- HW-69829 2, Secret, "81-C Stability - 5/27 to 6/7/61" by A. E. Smith dated June 8, 1961.
- HW-69829 3, Secret, "81-C Stability - 6/8 to 6/14/61" by A. E. Smith dated June 16, 1961.
- HW-69829 4, Secret, "81-C Stability - 6/15 to 6/21/61" by A. E. Smith dated June 23, 1961.
- HW-69829 5, Secret, "81-C Stability - 6/22 to 6/28/61" by A. E. Smith dated June 20, 1961.
- HW-69834, Secret, "Hanford Delivery Schedule" by J. H. Warren, dated June 5, 1961.
- HW-69840, Secret, "Chapter 18 of Production Capacity Study No. 3", by J. H. Warren, dated June 9, 1961.
- HW-69867 RD, Secret, "Trip Report - Rocky Flats Plant, April 10 - 11, 1961" by L. M. Meeker and M. J. Szulinski, dated June 7, 1961.
- HW-69868, Secret, "Trip Report - Rocky Flats Plant and Los Alamos Scientific Laboratory - May 15-18, 1961" by A. E. Barber, dated June 12, 1961.
- HW-69872, Secret, "Essential Materials Consumption Purex - CPD - May, 1961", by J. E. Lentz, dated June 7, 1961.
- HW-69887 RD, Secret, "Redox Plant Production Schedule - June, 1961", by D. McDonald, dated June 9, 1961.
- HW-69888 RD, Secret, "Purex Plant Production Schedule - June, 1961", by D. McDonald, dated June 9, 1961.
- HW-69889 RD, Secret, "UO₃ Plant Production Schedule - June, 1961" by D. McDonald, dated June 9, 1961.

- IIW-69890 RD, Secret, "234-5 Plant Production Schedule - June, 1961" by D. McDonald, dated June 9, 1961.
- IIW-69895, Unclassified, "Present Practice in Reporting the Laboratory Standards and Referee Quality Control Program in the Chemical Processing Department", by M. J. Stedwell, C. W. Pollock, J. S. Buckingham, O. C. Mudd, dated June 8, 1961.
- IIW-69916, Secret, "HAP0 Button Density and Impurities", by L. M. Meeker, dated June 15, 1961.
- IIW-69959, Unclassified, "Process and Detail Design Criteria - Heat Transfer Coil Installations - CPD", by J. B. Fecht, dated June 16, 1961.
- IIW-69995, Confidential, "Scheduled Shutdown - Purex and UO₃ Plants", by J. H. Warren, dated June 19, 1961.
- IIW-69996, Secret, "Progress Report - Finished Products Fabrication Technology Operation, May 1961", by members of Finished Products Fabrication Technology Operation, Research and Engineering, CPD, dated June 19, 1961.
- IIW-70084, Unclassified, "Prototype Hood for Dissolution of Plutonium Skulls, Plutonium Metal, and for Leaching of Incinerator Ash", by L. E. Bruns and C. W. Nilsen, dated June 28, 1961.
- IIW-70088, Secret, "High Purity Pu-239", by J. H. Warren, dated June 23, 1961.
- IIW-70109, Unclassified, "Design Criteria for Revisions to 233-S Exhaust Ventilation" by W. A. Graf, dated June 25, 1961.
- IIW-70144, Unclassified, "Design Criteria for NPR Cask and Cask Car", by R. F. Jimenez, dated June 20, 1961.

B. PREPARED FOR SIGNATURE AND ISSUANCE

- IIW-69802, Secret, "Production - May 1961", by W. E. Johnson, dated June 1, 1961.
- IIW-69958, Secret, "HAP0 Production Forecast July 1, 1961 Through June 30, 1962", by W. E. Johnson, dated June 26, 1961.

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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.

INVENTOR

TITLE

James P. Duckworth, Research and
Engineering Operation

Annular Disengaging Sections For
Critically Limiting Solvent Ex-
traction Columns.

for
General Manager
Chemical Processing Department

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