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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT
FOR

OCTOBER, 1963

Compiled By
OPERATION MANAGERS

November 21, 1963

HANFORD ATOMIC PRODUCTS OPERATION
RICHLAND, WASHINGTON

Work performed under Contract No. AT(45-1)-1350 between the Atomic Energy Commission and General Electric Company.

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STAFF

General Manager, Atomic Products Division  J. F. Young
General Manager, Hanford Atomic Products Operation  W. E. Johnson
General Manager, Chemical Processing Department  P. H. Reinker
Manager, Production  J. H. Warren
Manager, Purex (Acting)  R. W. McCullugh
Manager, Redox  M. K. Harmon
Manager, Weapons Manufacturing  W. J. Gartin
Manager, Power and Crafts  T. G. LaFollette
Manager, Facilities Engineering  H. P. Shaw
Manager, Research and Engineering  W. S. Frank
Manager, Finance  K. G. Grimm
Manager, Employee Relations (Acting)  J. H. Warren
I. SUMMARY

Production through October, as compared with the October 25, 1963 HAPO Production Forecast (HW-79264), is summarized below:

<table>
<thead>
<tr>
<th>Product</th>
<th>Percent of Forecast Achieved</th>
<th>Fiscal Year to Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Separated plutonium nitrate</td>
<td>93.6*</td>
<td>97.7</td>
</tr>
<tr>
<td>Separated uranium nitrate</td>
<td>83.4*</td>
<td>94.5</td>
</tr>
<tr>
<td>Uranium oxide</td>
<td>99.9</td>
<td>100.0</td>
</tr>
<tr>
<td>Plutonium metal buttons</td>
<td>104.0</td>
<td>101.8</td>
</tr>
<tr>
<td>Fabricated parts</td>
<td>100.7</td>
<td>100.8</td>
</tr>
</tbody>
</table>

*The variation was caused by uncertainties in the uranium product inventory and transfer measurements.

October production met or exceeded forecasted quantities for uranium oxide, plutonium metal buttons and fabricated parts. Separated plutonium nitrate and separated uranium nitrate were slightly below forecast because of process and mechanical problems in the Redox plant.

The Purex plant operated continuously until October 27, when a scheduled shutdown was made to perform maintenance repairs, including the removal of the restriction in the final uranium decontamination cycle. Except for about 38 tons of uranium product, all plutonium and uranium products met specifications.

A ten-week extended run of the Purex plutonium ion exchange unit was completed in October. This period of satisfactory operations was sustained by changing resin intermittently, with sixty-five gallons of new resin being introduced in two-gallon increments.

With sugar being used to denitrate all Purex concentrated waste (IWW) during October, the overall consumption of sodium hydroxide was reduced 25 percent. Sugar was also substituted for sodium nitrite, in the feed to the waste concentrator, as a ruthenium suppressant. This substitution not only reduced the cost of essential materials and waste storage but also decreased the radioactivity in the Purex recovered acid and in the process condensate discarded to an underground crib.
The HAP0 II-2 and HAPO I-B-1 casks - both loaded last month with approximately 172,330 and 340,000 curies of strontium-90, respectively - were released to the Commission in October for shipment. The HAPO-II-1 cask was also loaded with about 140,000 curies of strontium-90 but shipment was delayed because of the strike at ORNL. Similarly, four STT casks were loaded with an estimated 189,000 curies of cesium-137 and an ORNL cask was loaded with approximately 49,000 curies of promethium-147, but all are being held because of the strike at ORNL.

During the loading of the four STT casks with cesium-137, the effluent was passed through a fifth cask for technetium-99 loading. Although the quantity recovered is still uncertain, preliminary estimates indicate about 1 kg.

Redox plant processing during October was limited to about 25 percent of the available time because of: 1) high product wastes, which required reprocessing; 2) a scheduled nitric acid flush of processing equipment, and 3) mechanical equipment repairs and replacements.

Concurrent with the Redox shutdown, which extended through the first twenty days of October, the following installations were made to improve operating efficiency, reliability, and safety: 1) a new prototype hexone recovery system; 2) necessary jumpers to allow parallel operation of the 1A and 1S precycle columns; 3) an off-gas vent system in H-cell and dissolver back-up filters in J-cell for improved containment; 4) a new plutonium (neutron) monitor in the waste stream from the L-18 ion exchange contactor.

A new titanium screw calciner, for laboratory study of continuous plutonium oxide formation from the nitrate, was started up during October. Three runs yielded a total of 1850 grams of PuO₂. Samples from each run will be used to determine oxide reactivity to chlorination.

Interim funds of $180,000 have been authorized to start construction of Project CAC-965, "In-Tank Waste Solidification - 200 East Area". The service contractor has been authorized to move into temporary construction facilities. Some engineered equipment has been ordered; the remainder is out for bid.

Of the projects pertaining to the 234-5 Building, design has been authorized for CAC-109, "Degreasing and Briquetting Facility"; CAC-110, "Additional Plutonium Casting Facility - RMA Line"; and CAC-118, "Process Waste Disposal Facility - Plutonium Reclamation Operations". Project Proposal CAC-115, "Arc-melting Facility - RMA Line", was transmitted to the AEC on October 4. Project CGC-968, "Additional Plutonium Storage Facilities", was closed out on October 15, with exceptions.

P.H. Reinker
General Manager
Chemical Processing Department
II. ACHIEVEMENTS

A. PRODUCTION OPERATION

1. Production Statistics

   a. Percent of Forecast (1) Achieved

<table>
<thead>
<tr>
<th>Product</th>
<th>October</th>
<th>Fiscal Year to Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Separated plutonium nitrate</td>
<td>93.6%</td>
<td>97.7%</td>
</tr>
<tr>
<td>Separated uranium nitrate</td>
<td>83.4%</td>
<td>94.5%</td>
</tr>
<tr>
<td>Uranium Oxide</td>
<td>99.9%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Plutonium metal buttons</td>
<td>104.0%</td>
<td>101.8%</td>
</tr>
<tr>
<td>Fabricated parts</td>
<td>100.7%</td>
<td>100.8%</td>
</tr>
</tbody>
</table>

   b. Pîrex

<table>
<thead>
<tr>
<th>Product</th>
<th>October</th>
<th>September</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uranium nitrate produced (tons)</td>
<td>453.56</td>
<td>621.29</td>
</tr>
<tr>
<td>Average production rate (T/D)</td>
<td>20.3</td>
<td>20.7</td>
</tr>
<tr>
<td>Total waste loss (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plutonium</td>
<td>0.36</td>
<td>0.35</td>
</tr>
<tr>
<td>Uranium</td>
<td>0.25</td>
<td>0.23</td>
</tr>
<tr>
<td>On-line efficiency (%)</td>
<td>88.7%</td>
<td>100%</td>
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</table>

   c. Redox

<table>
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<tr>
<th>Product</th>
<th>October</th>
<th>September</th>
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</thead>
<tbody>
<tr>
<td>Uranium nitrate produced (tons)</td>
<td>38.41</td>
<td>91.61</td>
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<tr>
<td>Average production rate (T/D)</td>
<td>7.4</td>
<td>6.2</td>
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<tr>
<td>Total waste loss (%)</td>
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<td></td>
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<tr>
<td>Plutonium</td>
<td>0.71</td>
<td>0.40</td>
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<tr>
<td>Uranium</td>
<td>0.29</td>
<td>0.17</td>
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<tr>
<td>On-line efficiency (%)</td>
<td>25</td>
<td>59</td>
</tr>
</tbody>
</table>

   d. Uranium Reduction (tons)

<table>
<thead>
<tr>
<th>Product</th>
<th>October</th>
<th>September</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal UO3 loaded</td>
<td>541</td>
<td>572</td>
</tr>
<tr>
<td>Enriched UO3 loaded</td>
<td>55</td>
<td>87</td>
</tr>
<tr>
<td>Normal UO3 approved for shipment</td>
<td>648.79</td>
<td>501.24</td>
</tr>
<tr>
<td>Enriched UO3 approved for shipment</td>
<td>50.80</td>
<td>152.30</td>
</tr>
<tr>
<td>Normal UO3 shipped</td>
<td>648.95</td>
<td>501.34</td>
</tr>
<tr>
<td>Enriched UO3 shipped</td>
<td>101.66</td>
<td>101.59</td>
</tr>
<tr>
<td>Normal UNH backlog</td>
<td>226</td>
<td>313</td>
</tr>
<tr>
<td>Enriched UNH backlog</td>
<td>120</td>
<td>137</td>
</tr>
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</table>

(1) HW-79264, HAPO PRODUCTION FORECAST, dated 10/25/63

*The variation was caused by uncertainties in the uranium product inventory and transfer measurements.
e. Plutonium Metal Processing

<table>
<thead>
<tr>
<th></th>
<th>October</th>
<th>September</th>
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<tbody>
<tr>
<td>Reduction yield (Kg)</td>
<td>98.24</td>
<td>97.36</td>
</tr>
<tr>
<td>Product recovery output</td>
<td>11</td>
<td>12</td>
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<tr>
<td>Product recovery backlog</td>
<td>138</td>
<td>1359</td>
</tr>
<tr>
<td>Waste disposal (grams)</td>
<td>241</td>
<td>250</td>
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f. Power

<table>
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<tr>
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<th>200-East</th>
<th>200-West</th>
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<tr>
<td>Raw water pumping (gpm)</td>
<td>11,820</td>
<td>5,018</td>
</tr>
<tr>
<td>Filtered water pumping (gpm)</td>
<td>1,280</td>
<td>1,243</td>
</tr>
<tr>
<td>Maximum steam generated (lbs./hr.)</td>
<td>198,000</td>
<td>140,000</td>
</tr>
<tr>
<td>Average steam generated (lbs./hr.)</td>
<td>181,000</td>
<td>82,700</td>
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<tr>
<td>Total steam generated (M lbs.)</td>
<td>130,773</td>
<td>61,531</td>
</tr>
<tr>
<td>Coal consumed (tons)</td>
<td>5,615</td>
<td>3,130</td>
</tr>
</tbody>
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October production met or exceeded forecasted quantities for uranium oxide, plutonium metal buttons and fabricated parts. Separated plutonium nitrate and separated uranium nitrate were slightly below forecast because of process and mechanical problems in the Redox plant.
II. ACHIEVEMENTS (Continued)

B. PUREX OPERATION

1. Operating Continuity

Operation was continuous at an average capacity factor of 2.5 until shutdown on October 27 for a planned outage.

B Plant processing started again on October 23 and was continuing at month's end.

2. Processing Operation

All plutonium and all but about 38 tons of uranium product produced was within specifications.

A neptunium purification run was conducted. Approximately 1.1 Kgs. were shipped on October 14.

Cask loadings and status are as follows:

<table>
<thead>
<tr>
<th>Cask</th>
<th>Quantity(App. ox.)</th>
<th>Destination</th>
<th>Status</th>
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</thead>
<tbody>
<tr>
<td>HL Pm</td>
<td>49 Kc Pm</td>
<td>ORNL</td>
<td>Loaded-Held on account of strike at ORNL.</td>
</tr>
<tr>
<td>STT's (4)</td>
<td>189 Kc Cs</td>
<td>ORNL</td>
<td>Loaded-Held on account of strike at ORNL.</td>
</tr>
<tr>
<td>HAFO II-1</td>
<td>140 Kc Sr</td>
<td>ORNL</td>
<td>Loaded-Held on account of strike at ORNL.</td>
</tr>
<tr>
<td>HAFO I-B-1</td>
<td>340 Kc Sr</td>
<td>ORNL</td>
<td>Loaded in Sept.-Released to AEC for shipment 10-18-63</td>
</tr>
<tr>
<td>HAPO II-2</td>
<td>170 Kc Sr</td>
<td>ORNL</td>
<td>Loaded in Sept.-Released to AEC for shipment 10-7-63</td>
</tr>
</tbody>
</table>

The HL 200-gallon bowling ball was loaded with LW and shipped to Hanford Labs. The 11-gallon cask was loaded with cesium feed from 103-C Tank and shipped to Hanford Labs.

Essentially all Purex LW was processed for Sr-90 recovery in the Purex Head End. Eighteen sulfate runs were completed.
The effluent from the four cesium casks, loaded during October, was passed through the technetium cask for technetium elution. The technetium cask has been moved to the Strontium Semiworks for elutriation.

Uranium and plutonium waste discard to underground storage were 0.20 percent (estimated) and 0.32 percent (estimated), respectively.

3. Equipment Experience

Significant work accomplished during the October outage included:

a. Replacement of 2DF (final uranium) pump with a screened intake unit.

b. 2D Column cartridge and feed point inspection and backflush.

c. Regeneration of C Cell and F Cell silver reactors.

d. Burial of failed B-2, H-3 Columns and two concentrator tube bundles.

e. Replacement of F-6 concentrator overflow jumper.

On October 9 the 40-ton hook on the east crane fell to the canyon deck. The hook was being raised to a full up position at the time and traveled through the upper limit switch control with the result that the cable severed. The only significant damage was to the cable itself which was replaced.

The concrete work on the tank bases at 2AI-AX Tank Farm was completed and work is proceeding on installing the steel tank bottoms. The forms are being built for the new AX Tank Farm diverter station.

Approximately 700 feet of tunnel and foundation on both sides of the new Purex burial tunnel have been poured. Pouring of the concrete structure for the new water-filled door is in progress.

_R W McCullagh_
Acting Manager-Purex

PW McCullagh gr

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B-2
II. ACHIEVEMENTS (Continued)

C. REDOX OPERATION

1. Operating Continuity

The first twenty days of the month were used to reprocess an accumulation of high-product wastes and perform a nitric acid flush of the processing equipment to satisfy the periodic inventory and nuclear criticality control requirements. Operations were resumed on virgin feed processing on October 21, but at an unduly restricted rate for the balance of the month, due to additional equipment and process difficulties.

The production of both depleted and enriched UO$_2$ was satisfactory for the month, although processing was curtailed on several occasions due to a shortage of shipping containers and railroad cars.

2. Processing Operations

a. Redox Processing

Virgin E-metal processing was conducted only 25 percent of the time available for extraction column operation. The remaining time was required for: 1) the scheduled nitric acid flush of the processing equipment; 2) processing of large volumes of high-product waste solutions collected from pre-nitric acid flush operations and from the cell sumps; 3) mechanical equipment repairs.

Equipment difficulties encountered during the month resulted in shutdown periods totaling approximately six days. The major problems involved were: 1) a plugged jet discharge line on the H-4 oxidizer vapor line; 2) replacement of the corrosion-failed L-12 plutonium concentrator; 3) a plugged let-down valve on the 1-A precycle column raffinate stream.

Thirty-four irradiated UO$_2$ fuel elements from the Plutonium Recycle Test Reactor (PRTTR) were successfully declad and dissolved this month in two dissolver charges.

The sampling of each "cut" of metal solution from a special 115-ton discharge from H reactor was started this month. This is being done to provide a representative composite sample of the entire load and subsequent additional analytical data for the over-all E-N loading program.
On 10-29-68, plutonium solution from the 2A column feed tank (E-5) was accidentally transferred into the neptunium solution in the E-4 tank and subsequently overflowed into the E-3 plutonium sampling tank. At month-end, the plutonium-neptunium mixture had been segregated and was ready for reprocessing.

b. Uranium Oxide Processing

The last of the iron-contaminated UO₂ which resulted from the corrosion of the concentrator demister, was successfully blended with October production.

3. Mechanical Experience

a. Redox Plant

The equipment failures encountered this month reduced the mechanical efficiency to approximately 50 percent. The major equipment pieces which required replacing included: 1) the L-12 plutonium concentrator; 2) the F-8 precycle feed pump; 3) the E-1 neptunium feed tank agitator; 4) the heat exchangers in the D-12 and D-14 waste concentrators; 5) the heat exchanger in the H-4 feed solution oxidizer tank.

The failed L-12 plutonium concentrator was made of stainless steel; its replacement was titanium which is expected to last at least five times as long as stainless steel.

Concurrent with the extended plant shutdown, a number of equipment installations were made to improve operating efficiency, reliability, and safety. These included: 1) a new prototype hexone recovery system which is expected to prove the feasibility of saving $50,000 - $60,000 worth of hexone annually; 2) the necessary jumpers to allow parallel operation of the 1A and 1B precycle columns; 3) the off-gas vent system in H-cell and dissolver back-up filters in J-cell for improved containment; 4) a new plutonium (neutron) monitor in the waste stream from the L-18 ion-exchange contactor.

b. Uranium Oxide Plant

Replacement of the jacket on the X-30 calciner feed tank (concentrated, depleted uranyl nitrate) was completed during the last week of the month. In recent months, the condition of this jacket had deteriorated to the point that its replacement was mandatory before the onset of winter weather.

4. Waste Handling and Decontamination

Equipment valued at approximately $46,000 was received from customers for decontamination, repair, inspection, or burial during the month. Equipment valued at approximately $104,000 was returned to customers, representing a savings of approximately $64,000 over the cost of new equipment.
5. **Radiation Experience**

During the last week of the month, it was determined that the ventilation filter system for the 233-S Building had failed and would have to be permanently taken out of service. This system was installed in 1957 as part of project CFC-692. Ventilation operation was switched back to the original (1955) underground CWS filter and emergency action was started to: 1) clean up plutonium contamination already spread; 2) provide interim prevention of additional spread; 3) get project action to provide a new filter facility; 4) divert the 233-S process vessel vent discharge into the 202-S Building system and away from the underground CWS filter.

6. **Analytical Experience**

The Analytical Laboratory provided customer assistance for a variety of projects which included: 1) special analyses during the flushing and cleaning of the primary loop at NRD; 2) control analyses for the processing of PRTR uranium oxide blanket fuels at Redox; 3) establishing a plutonium breakthrough point for a new soil column study; 4) continuation of the major studies (currently 9) being carried out by Research and Engineering, CFD, and Materials and Process Chemistry, HL.

Improvements within the laboratory included: 1) devising colorimetric procedures for the determination of copper, nickel, and chromium for specification water control analyses at NRD; 2) establishing procedures in standard written form for the determinations of dissolved oxygen, hydrazine, silicon, viscosity, flashpoint, sulfur, chloride, and sediment; 3) contributing to the study involving the substitution of aqua ammonia for lithium hydroxide for pH control in the primary loop at NRD.

[Signature]

Manager - Redox
II. ACHIEVEMENTS (continued)

D. WEAPONS MANUFACTURING OPERATION

1. Operating Continuity

Models 1807 and 74-C were fabricated during the month without significant interruption. Unfabricated plutonium production continued on a seven-day week schedule, but it was necessary to blend feed for control of isotopic content. Plutonium recovery activities included operation of the oxide dissolvers on a continuous basis and operation of the incinerator on day shift only.

2. Processing Operations

a. Plutonium Fabrication

Information on plutonium fabrication activities is presented in Document HW-79487 (Atomic Weapon Data).

b. Plutonium Reduction

Production rates on the button line were satisfactory during the month, and the schedule was exceeded. A large percentage of the production during the early part of the period exceeded the Pu240 content specification for weapons grade plutonium. This material was shipped to Dow Chemical Company, Rocky Flats, for blending at that site. Production during the latter half of the month consisted of "Unclassified Plutonium" for shipment to DuPont, Savannah River, for use in a special program there.

c. Plutonium Reclamation

Operation of the dissolvers for plutonium skull oxides was good, with 183 kilograms of plutonium being made available for button line feed.

The incinerator operated on an intermittent basis on day shift only during the month. Twelve boxes of waste were processed with recoveries being normal.

Pre-startup activities were continued in the new Reclamation Facility (Project CAC-880).
3. **Mechanical Performance**

The fabrication equipment performed well during the period with only minor maintenance required.

The incinerator burner belt failed on three occasions during the month and was finally replaced using an experimental belt made of Inconel.

4. **Radiation Experience**

Radiation and contamination control statistics revealed substantial improvement over the past two months.

Our minor injury was incurred during work in a process hood. The wound was excised and deposition is indicated as less than 1% MPEB. Hood glove failures resulted in one case of possible plutonium inhalation. Initial results in this case indicate that deposition, if any, will be low-level.

Complete revision of the Radiation Work Procedures for the 234-5 Building was made and approved. The new format of these procedures is designed for easier reading, less repetition and better understanding in the field.

5. **Analytical Experience**

<table>
<thead>
<tr>
<th>Number of Samples Received</th>
<th>October</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4,826</td>
</tr>
</tbody>
</table>

| Number of Determinations  | 23,813* |

*This represents a new record and resulted principally from high button production and requirements for extra analyses.

<table>
<thead>
<tr>
<th>October</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weapon Grade</td>
</tr>
<tr>
<td>Total Impurities, Buttons (Average)</td>
</tr>
<tr>
<td>Buttons Rejected for Impurities</td>
</tr>
<tr>
<td>Pu $^{240}$ Content</td>
</tr>
</tbody>
</table>

*Above weapons grade specification for Pu $^{240}$.

WJ Gartin:ph
II. ACHIEVEMENTS (Continued)

E. POWER AND CRAFTS OPERATION

1. Operating Continuity

There were no interruptions to steam, water or emergency electrical services to the production facilities during this report period.

2. Inspection, Maintenance and Repair

A stainless-steel steam jacket was prefabricated and installed in the X-30 (100% UNH) storage tank at the Uranium Oxide Plant. The originally installed carbon-steel jacket had developed a leak.

Fabrication of a spare D-12 waste concentrator for the Redox facility is in progress, and was approximately 35% complete at month's end.

A B-4 dissolver off-gas filter was fabricated, assembled and mocked-up as a spare for the Redox facility.

Concentrator tube bundle No. 45 was mocked-up and tested for installation at Purex.

In progress and 20% complete at month's end was the fabrication of an HC-30 waste oil hood for the Weapons Manufacturing Operation.

Two stainless-steel sample carts were fabricated for use in the movement of heavy "door stop" sampling equipment required in fission product recovery work in "B" Canyon.

Installation of the duct work, plenum chamber, and filter box was completed on the newly installed fume hood at the Purex laboratory. Tie-in to the existing ventilation system was made without the necessity of a shutdown.

Machining of the interior shell of the HAPO II-3 fission product shipping cask was completed. Following completion, the shell was shipped off-site for installation of the micro-filter screen.

Twenty-seven pipe jumpers were fabricated to meet plant requirements as follows:

<table>
<thead>
<tr>
<th>Location</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purex</td>
<td>9</td>
</tr>
<tr>
<td>Redox</td>
<td>14</td>
</tr>
<tr>
<td>East Area Tank Farms</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
</tr>
</tbody>
</table>
An experimental tank-air circulator was assembled in the 272-E Shop, where its effectiveness is to be determined for possible in-tank use at the new Purex Tank Farm.

A third-party inspection was completed on No. 5 boiler in the 284-E Power House. The unit was found to be "satisfactory for continued operation."

Provisions were made for receiving and storing eight one-ton chlorine cylinders near the 283-W water-treatment facility. Heretofore, chlorine used in 200 Area water treatment was hauled by truck from the 100 Areas. Henceforth this material will arrive in the 200 Areas via railroad freight.

A truck-loading facility was installed at the 211-U Tank Farm for use in the transfer of 400 tons of stored ANW to the Redox facility.

A small-scale tank, No. XL8B, was removed from the 221-U Building, and two 500-gallon-capacity stainless-steel tanks, Nos. 206 and 207, complete with agitators, were removed from 271-U for installation in the aqueous make-up operation in the 300 Area.

A highly contaminated pump from the 241-A Tank Farm was buried in the 200-East Dry-Waste Burial Garden on October 11. Fabrication of a special burial rack was necessary for handling the pump due to its 40' length. The burial was done on the evening shift to eliminate the possibility of contamination spread to construction forces working nearby. The job was completed without incident.

Assistance to other departments included the conducting of smoke tests on high-efficiency air filter installations in the Irradiation Processing Department's 117-D, B and KW Buildings.

Air balance work on the ventilation systems in the 105-N Reactor Building continued and was an estimated 50% complete at month's end.

Manager-Power and Crafts
II. ACHIEVEMENTS (continued)

F. FACILITIES ENGINEERING OPERATION

1. Purex

a. Process Design Engineering

E-1 Sampler

The in-line sampler for the E-1 Sampler position has been re-designed. The improvements facilitate taking of samples and flushing of the equipment, thus removing very high background spectra which mask a newly-introduced sample. This new equipment is being fabricated for installation with existing electronic portions which have been functioning satisfactorily.

HA Column Cartridge

Design was completed and drawings issued for the new cartridge for Purex HA Extraction Column. The upper and lower sections are combined into one long cartridge to fit the new 26-inch diameter column. This single cartridge is expected to be more efficient and adaptable to varied uses and conditions of maintenance.

Pipe Jumper

A jet-out jumper was designed for the overflow chamber of the Purex F-6 Concentrator. This installation is planned to improve operation of a badly corroded nozzle and to eliminate further damage to nozzles and dunnage.

b. Project Engineering

CAC-965 - In-tank Waste Solidification - 200-E Area

Directive No. EQT-004 (supersedes HW-544), dated October 8, authorized interim funds of $180,000, to start construction. Work Authorization CAC-965(1), dated October 11, authorized interim funds of $175,000 to the Company. This is an increase of $125,000 over the initial authorization which was for design only. The service contractor has been authorized funds to move into temporary construction facilities. Engineered equipment has been ordered and some is out for bid.
CAC-981 - Fission Product Packaging Facility - "B" Plant

Design progress is 13 percent complete. The design schedule was approved by the Commission on October 15. Completion is scheduled for September 1, 1964, based on availability of final prototype information by July 1, 1964.

2. Redox

a. Process Design Engineering

Hexone Recovery System

The hexone recovery system has been completely installed in the Redox Canyon. Cold side piping and instrumentation are being installed with complete start-up scheduled in two weeks.

New Flow Routings

Five new jumper drawings were issued for re-routing of the ion exchange waste stream through "E" and "F" Cells.

Survey of L-12 Concentrator for Plutonium

Gamma and neutron measurements were taken of sections of the L-12 Concentrator being removed from 233-S Building to see if any plutonium was held up or deposited in the vessel. None was found under conditions of measurement where amounts as little as one gram would be detected.

b. Project Engineering

CAC-101 - Redox 216-S-7 Crib Replacement

The contract for construction of the 216-S-9 Crib (S-7 replacement) was awarded and Notice to Proceed issued to Erven Construction Company on October 14. Initial layout work was started on October 24 and excavation has been started.

3. Weapons Manufacturing

a. Process Design Engineering

Button Line

The new vacuum drum filter designed as a replacement for
Hood HC-9B was tested and found to require further work. The existing vacuum drum filter will be continued in service by using polyethylene rather than paraffin inside the drum. The new filter will be modified and prepared for later installation.

Other design changes are being developed to incorporate with the filter installation.

Isostatic Press

The design scope was approved by the Company and the Commission and has been issued. A pre-award conference was held with the low bidder (Harwood Engineering Company) on October 7, to discuss the isostatic press specification. The purchase order was placed on October 16 with Harwood.

b. Project Engineering

CAC-109 - Degreasing and Briquetting Facility - RMA Line - 234-5 Building


CAC-110 - Additional Plutonium Casting Facility - RMA Line - 234-5 Building


CAC-115 - Arc-melting Facility - RMA Line - 234-5 Building

A project proposal for a high-temperature arc-melting facility to achieve effective plutonium alloying and resultant metal stability was transmitted to the Commission on October 4.

CAC-118 - Process Waste Disposal Facility - Plutonium Reclamation Operations - "Z" Plant

Directive No. AEC-226, dated October 17, authorized $52,500 for design and construction of the subject facilities. The Company was authorized $2,500 for technical guidance and other services.
This project was closed out on schedule (October 15), with exceptions - the main exception being the replacement of the manlift cylinder to provide faster up and down lift travel.

**c. Manufacturing Engineering**

**Cost Study - Weapons Quality Control Program**

The incremental cost analysis of the 1807 Model was completed. This included analysis of machining, inspection, partial salvage, re-work, and scrap handling of rejects from the machining as well as the inspection steps. A similar study was started for the 74-C Model.

**4. General**

**a. Process Design Engineering**

**Phase II - "B" Plant Packaging Prototype Work**

Construction of the mock-up was started on October 28 in the 200-West Area Shops. Procurement action is being expedited for the four major parts - packaging cell manipulator, material handling mechanism, air lock and decontamination chamber, and hot cell plug and sleeve.

Two potential vendors (Hamilton Standard and Alloyd Electronics Corporation) have made successful welds on the waste container neck and cap assemblies. The Hamilton Standard equipment has made two successful cuts to open the caps, and the Alloyd Electronics equipment performance is improving in their attempts to open the caps.

**Connector Drawings**

New drawings for electrical connectors have been issued for procurement. All electrical connectors, including five special units, are on seventeen drawings. For the standard assembly, eight drawings are needed for procurement versus thirty-five prior to this revision.
b. Project Engineering

Project Cost Information
as of 10/20/63:

Total Authorized Funds - 17 active projects
$ 4,150,000

Total Cost-to-date
3,052,000

Commitments & Open Work Releases
114,000

Uncumbered Balance
984,000

Costs Charged to Above Projects
(9/22/63 to 10/20/63)
121,000

Manager, Facilities Engineering

HPShaw/WWC/alr
II. ACHIEVEMENTS (Continued)

G. RESEARCH AND ENGINEERING OPERATION

1. Purex Process Engineering

(a) Solvent Extraction

A Purex process test was started to determine the effect of eliminating the feed adjustment step between the dissolver and the HA Column. Preliminary data indicate that the decreased acidity (0.5 M) and increased uranium concentration (1.9 M) permit improved decontamination performance without sacrificing product recovery in the First Decontamination Cycle.

The 2DF flow problem continued essentially unchanged during the month. Inspection of the tank at shutdown revealed a substantial quantity of sludge present. The 2DF pump suction inlet was screened to minimize flow restrictions during the next run period.

(b) Product Treatment

The plutonium ion exchange unit operated until the plant run period terminated and thus achieved a 10-week period of satisfactory operation. The extended run was made possible by changing 65 gallons of resin intermittently in two-gallon increments.

The October neptunium purification run in the ion exchange system was interrupted by loss of column resin to the waste tank. Extensive flush operations are underway.

(c) Waste Treatment

All the Purex IWW was denitrated with sugar during the month. Denitration coupled with improved control of the IWW concentrator reduced the overall sodium hydroxide consumption 25 per cent.

Sugar at a concentration of 0.001 M was substituted for 0.013 M NaNO₂ in the IWF as the ruthenium suppressant. No problems were encountered with foaming, plugging of the overflow line, rate of heat transfer, or jetting of the IWF concentrator. The substitution reduces the Purex plant costs associated with essential materials and waste storage by about $6 per ton. In addition, the ruthenium level in the IWF concentrator overheads was reduced about five-fold which decreased significantly the
amount of radioactivity sent to the Purex recovered acid system and to the A10 Unit receiving T-F5 acid absorber overheads.

An extensive sampling and analysis program was completed in which the radioactivity of the supernatants in the non-boiling 200-L Area storage tanks was found to be satisfactory for in-tank solidification. However, the sludge depths in several tanks will require equipment modifications to permit effective use of the available tank volumes.

3. Fission Products Processing

A series of process tests showed that the relatively low plant yields for strontium recovery cannot be directly attributed to (1) pH change due to radiolysis, (2) amount of cake in the centrifuge, or (3) radiation and heat level in the centrifuge.

About 67 tub volumes of cesium cask waste solution was processed through an ORNL SST cask containing a strong base anion resin (IRA-401). Preliminary analytical results from three independent sources differ markedly, but best estimates indicate an average technetium waste loss of 35 per cent and a loading of about 1000 grams. Elution of the technetium at the Strontium Semiworks is planned for early November.

Normal loading and drying of strontium in the HAPO-128 cask during the month resulted in a rate of pressure buildup that was acceptable, but substantially above normal. Gas analyses showed that the pressure increases were due to nitrate destruction. After treatment of the feed stock to reduce the alkaline metals and nitrate concentrations, the pressure buildup in the HAPO-128 cask subsequently loaded was normal.

The rare earth product from the August cerium separation process test was processed to remove bismuth and lead. Good separation was achieved by batch extracting the rare earths with D2EHPA from an aqueous phase containing 0.012 M DTPA at a pH = 2.5. The organic phase was washed with 0.05 M HEDTA solution at a pH = 2.5 to improve the lead and bismuth decontamination. No difference between DTPA and HEDTA was noted in the rare earth extractability. Arithmetic lead and bismuth decontamination factors greater than 50 were realized with essentially no promethium loss. The nitric acid rare earth strip solution was concentrated and steam stripped to a final volume of 15 liters at an acidity of 6.0 M HNO₃. The product solution was loaded into the ORNL TWA carrier and the remaining tank heel and flush solutions, comprising about 10 per cent of the Pr-147, were loaded into a 5-gallon HLO cask.
2. Redox Process Engineering

a. PRTP UO₂ Fuel Element Dissolution

Two charges of PRTP zircaloy-clad UO₂ fuel assemblies were successfully dissolved in the Redox B-2 dissolver. Sixteen fuel assemblies were dissolved in the first charge, eighteen in the second. The irradiation exposure of the fuel assemblies ranged from 0.6 to 99.8 MWD.

The aluminum canisters were dissolved with sodium hydroxide using sodium nitrate, recovered from salt waste, for hydrogen suppression; the zircaloy cladding was dissolved with 4M NH₄F - 0.34M NH₄NO₃. The maximum hydrogen content of the diluted off-gasses during the canister and cladding dissolutions was controlled below 2.5 percent.

Since UO₂ fines were expected in the zircaloy decladding waste, the waste solution was held in the dissolver without agitation for one hour after dissolution was completed to allow UO₂ fines to settle out. As a further precaution to limit the loss of UO₂ fines to decladding waste, the dissolver was not rinsed after this waste was removed. Prior to dissolution of the UO₂ core in 42 percent nitric acid, ANN was added to make the dissolving solution 0.4M ANN to complex residual NH₄F from the zircaloy dissolution and reduce dissolver corrosion.

Uranium losses to the canister and zircaloy decladding wastes averaged 1.38 percent; plutonium losses to these wastes averaged 0.70 percent. Solids were not observed in the decladding wastes.

b. L-12 Replacement

The stainless steel L-12 Concentrator started leaking and was replaced with a new titanium vessel with a tantalum reboiler and demister pad. The L-12 Concentrator is used to prepare a plutonium feed solution in 7-M nitric acid for the L-18 Plutonium Anion Exchange Contactor. The new concentrator is equipped with a tower containing sieve plates which reflux the acid back into the concentrator that would otherwise be boiled off.
3. Plutonium Process Engineering Operation
   
a. Bitton Line
   
   Bitton line operation was generally satisfactory during the month of October, with average button densities gradually increasing until they are now XX.XX. Failure of the vacuum drum filter agitator and poor vacuum allowed fine oxalate precipitate to pass through the filter, and an abnormally high recycle rate of 12.9 percent occurred in the week ending 10-21-63. Agitator repairs and the elimination of air leaks into the vacuum system have returned recycle values to their normal range of 2 to 4 percent.

   A contributing cause of recent high impurity levels in the buttons was discovered during examination and replacement of the sintered stainless steel calciner blow-back filter elements. During the past two months, these stainless steel filter elements had completely corroded away, so more suitable filter materials are needed. Hanford Laboratories personnel are cooperating in the investigative effort for finding a better filter material.

b. Incinerator

   Incinerator operation began on 10-8-63, but problems with belt stoppage required that the belt be shortened. The problems continued, so the belt was replaced with a nichrome V belt instead of the stainless steel belts that had been used in the past. Approximately 30 hours of burning during the month recovered about 0.65 kgs of plutonium. The off-gas scrubber solution was changed twice, with a plutonium content of 3.8 grams after six hours of burning and 3.0 grams after 13 hours of burning.

c. Nuclear Safety

   The vacuum drum filters for oxalate precipitate (hoods 9-A and 9-B) have a void space in the center of the drum that was filled with paraffin to prevent plutonium from entering this void. An inspection of the hood 9-B drum filter revealed that temperatures have been high enough to melt the paraffin and about 2/3 of the paraffin had leaked out. To eliminate this problem, a solid polyethylene shape is being fabricated to replace the paraffin in both the hood 9-A and hood 9-B filters.
4. Separations Chemistry Laboratory

a. Purex Process Improvement

Solvent cleaning with complexons (e.g. EDTA and DTPA) was found less effective than the standard carbonate-permanganate treatment used at Purex. The best decontamination with complexon was obtained using a 0.1M solution (pH 12) contact followed by a double carbonate wash.

Ion exchange resin evaluation by means of a physical strength test has been successfully adapted to a computer program. Data from the program will be used to determine resin serviceability and provide more reliable purchase specifications. Details are provided in HW-79355.

b. Redox Process Improvement

Thorium purification by hexone extraction was determined with both acidic and acid deficient feed solutions. While the thorium distribution ratio is highest, $E_g = 1.0$, in the acid system, as compared to a $E_g$ of 0.5 in the acid deficient system, the decontamination factors were 500 times greater for zirconium-95, niobium-95, and 6.5 times greater for ruthenium 103-106 in the acid deficient feed.

c. Fission Product Process Improvement

Rare earth product purification from lead and bismuth was accomplished using 0.05M HEDTA (pH 2.5) to complex these impurities. In presence of this complexant, the rare earth distribution ratio with semiworks solvent was 900, while those for lead and bismuth were 0.032 and 0.009, respectively.

Precipitating agents for rare earths were evaluated to find the best precipitate for loading a filter cask. Carbonate produced an unsatisfactory, hard-to filter precipitate. Rare earth oxalates were precipitates with 97 per cent yields and were easily filtered. The rare earth sodium double sulfate, formed at 40 C in the pH range of 3 to 5, was readily filtered with only a one per cent waste loss. Sulfate precipitation is recommended.

Acid reduction in rare earth concentrates was performed with both sugar and formaldehyde. While sugar would destroy nitric acid above two molar, the reaction was slow, requiring as long as 20 days to reach equilibrium. Formaldehyde rapidly destroyed nitric acid, even at concentrations less than 0.05M. This reaction was easily controlled up to nitric acid concentrations of 0.1M. Above this concentration, however, the reaction was extremely rapid and difficult to control. The ratio of moles acid destroyed per mole of formaldehyde average 1.6.

d. UO₂ Process Improvement

Installation of the small scale continuous pot calciner for UO₂ reactivity studies was completed. During shadedown runs, difficulty
was experienced in pumping 100 per cent UNH solution and feed point pluggage.

Nitric acid in condensates resulting from concentrating acid deficient UNH to a 100% solution was measured as a function of UNH concentration. The rate of acid evolution per ml of condensate increased linearly from an initial 2 mg/ml (0.035M) to 16 mg/ml (0.25M) at 92% UNH, and increased sharply to 25 mg/ml (0.40M) at 100% UNH.

Calcination of thorium nitrate was performed to observe the physical changes that occur during the course of the reaction. First evolution of nitrogen dioxide was noted at 165°C and the temperature had reached 400°C at the end of calcination. The molten concentrate went through four stages: liquid; heavy syrup; sticky mastic; soft dry solid. The solid was easily broken to a fine powder.

e. Laboratory Improvement

The 5-inch by 5-inch scintillation detector counting geometry has been established at two standard sample configurations. They are: a 1 x 1/2" clear-site vial containing 1.00 ml of liquid sample, stabilized with a cotton dental roll; and a 3 x 7/8" celluplastic vial containing 10.00 ml of liquid sample. Calibrations are over the range of zero to three MeV at the rate of 15 keV per channel. Nineteen isotopes have been calibrated.

The six digit serial numbering devices to be used in the identification of Tally Punch Tape data have been assembled and are being installed.

A separation for non-radioactive strontium and calcium from essential material sodium compounds was developed. Partition was achieved using a chelating ion exchange resin, Chelex-100, which was found to retain divalent cations while not adsorbing any monovalent cations. Divalent cations were completely retained on the resin between sample pH's of 3.8 and 12.0; however, at pH 2.0 or below, no adsorption occurred. Strontium and calcium were quantitatively eluted with a molar solution of hydrochloric acid. Carbonate interfered with the separation and had to be destroyed.

Samples of organic solvents used in plutonium metal processing were analyzed for water content. A spectrophotometric technique based on the absorption in the near infrared region was used. With the exception of lard oil, less than 0.01 g/l of water was found in any of the solvents. Lard oil contained between 0.01 and 0.2 g/l of water.

The effect of diverse ions on the americium analysis by liquid-liquid separation with D2EHPA reported earlier was determined. All elements normally occurring in CPD process solutions can be tolerated at the usual concentrations with the exception of ferric iron over 0.075M, calcium over 0.25M, and fluoride over trace concentrations. Fluoride interference can be eliminated by complexing with aluminum.

DECLASSIFIED
5. Plutonium Chemistry Laboratory -

a. Direct Calcination Of Plutonium Nitrate

A new titanium screw calciner has been started up to study the continuous formation of an oxide which is reactive to chlorination.

Several cold checkout runs were made using an ammonium sulfate feed. These runs indicated that the equipment would operate without any major difficulties. One minor problem with off-gas filter plugging was encountered, but this is not expected to be serious. A new filter unit is being designed and built, however, in case the plugging is more serious than expected.

Three runs were made in the equipment using plutonium nitrate feed, and a total of 1850 grams of PuO$_2$ were produced. The only difficulty encountered in these runs was in the last run in which ammonium sulfate solution was added to the feed. In this run there was a tendency for the screw to stick periodically. This could be remedied by reversing the rotation of the screw for a short period of time (1 - 2 seconds).

Run #1: Plutonium nitrate solution (152 g Pu/l) was fed at the rate of 1.25 liters per hour. The control temperature of the two calciner furnaces was 340 °C. During the period of operation the inlet zone furnace could not be maintained at the control temperature because of the high heat duty required to evaporate the water. The temperature of this furnace leveled out at 250 °C. The run was of four hours duration. A total of 780 grams of oxide product was collected. Analysis showed a Pu content of 74.4 percent, indicating that the product was not sufficiently decomposed and dried (PuO$_2$ - 89% Pu).

Run #2: This run was a two-hour run under identical conditions to Run #1. Approximately 450 grams of product were collected.

Run #3: Operating conditions were identical to Runs 1 and 2 except that ammonium sulfate solution was added to the feed at a sulfate-plutonium ratio of 0.1. A total of 2.75 liters of nitrate solution was fed (152 g Pu/l) and 600 grams of product were collected.

Samples of the product from each run have been taken for analysis and will also be used for thermobalance runs to determine oxide reactivity.

b. Fluidized Bed Chlorination Of Plutonium Oxide

Gas agitation in a fluidized bed is insufficient to overcome agglomeration; mechanical stirring is needed.

An attempt to operate a phosgene-fluidized bed at 350 °C in a 2" x 3' glass reactor was unsuccessful. Even though initially
the phosgene was flowing at 40 grams/minute, which is four to five times the quantity required to fluidize the oxide particles, the vigorous stirring was apparently not sufficient to overcome the agglomeration of particles. The solid particles began to adhere to one another 15 minutes after the phosgene flow commenced. At about the same time the bed temperature as indicated by the recorder-controller made a rapid climb to 440°C, then rapidly dropped off. The corresponding temperature at the top of and outside the glass reactor was 480°C. The reactor was vibrated continuously during the run. An attempt to break up the solid phase with additional argon gas flow did not work. The charge to reactor was 850 grams of less than 35 mesh line oxide. This is a static bed of about 8.5 inches in height.

Product powder from a fluid bed was placed in a one-inch diameter test tube to test for agglomeration at different temperatures. The powder was about 80 percent PuCl₄—the balance being mainly PuO₂. The solid was continuously agitated by argon gas introduced by a tube extending into the solid from above. The test tube was then heated by 50 degree increments and held at a given temperature for 15 minutes. The range of temperature was from room temperature to 500°C. Out of two trials, agglomeration as noted by visual examination occurred in only one case and that at 500°C. It appears, then, that below 500°C the localized heat of reaction between phosgene and plutonium dioxide is the main cause of agglomeration of the solid, but not the sintering of PuCl₄ resulting from external heat.

A two-inch reactor of metal with a mechanical stirrer has been built and is now being installed. It is presumed that continuous stirring will either prevent or minimize the agglomeration of particles so that stirred fluid bed feasibility can be demonstrated.

c. DBHP Extraction Of Plutonium

Flow sheet studies are in progress for support of the 912 recovery facility startup.

The loading characteristics of the experimental packed column indicate a definite concentration gradient exists along the column and the solvent in contact with the feed may load to capacity before the solvent further along the column begins to load. This behavior would seem reasonable if the organic solution had restricted mixing which, in the packed column, it has.

The extraction of loaded organic (25 percent DBHP in CCl₄) with 5 percent Na₂CO₃ has been checked out and four contacts with carbonate solution at L/V = 1 reduced the Pu content of the organic from 4.34 g/l to 0.004 g/l, with no evidence of polymer formation.

d. Americium Recovery

Experiments conducted on the extraction of americium into dibutyl butyl phosphonate (DBHP) show satisfactory extraction and stripping coefficients.

Americium distribution coefficients from CWL (recovery aqueous waste that has been through a DBHP plutonium scavenging column) neutralized to 0.5 M H⁺
were 24 in 30 \% \text{DBEP} - \text{CCl}_4 \text{ and } 0.69 \text{ in } 10 \% \text{DBEP} - \text{CCl}_4 .

Americium stripping distribution coefficients from 30 \% \text{DBEP} - \text{CCl}_4 \text{ were } 0.036 \text{ with } 1 \text{ M HF} \text{ and } 0.28 \text{ with } 0.1 \text{ M HNO}_3 .

No difficulty was encountered in either the 0.1 \text{ M HNO}_3 \text{ or } 1 \text{ M HF} \text{ stripping runs. However, a 5 percent Na}_2\text{CO}_3 \text{ run resulted in three phases—a clear aqueous phase, a clear organic phase, and a solid phase at the interface. The solid phase was found to contain all of the americium.} \text{ No further tests are planned with HF or Na}_2\text{CO}_3 \text{ as stripping agents.}

\[\text{F. J. Orlande}\]
Manager
Research and Engineering

DECLASSIFIED
II. ACHIEVEMENTS (Continued)

H. FINANCIAL OPERATION

1. Production Cost Accounting

The FY 1964 Midyear Budget Review was completed and discussed with CPD management at the Department General Manager's staff meeting on October 31. It appears that forecasted economies will only partially offset increased salary costs resulting from the recent wage increases either granted or scheduled to be given to nonexempt employees.

Average manpower for FY 1963 and estimated average manpower through FY 1966 were provided Contract and Accounting Operation for use in calculating charges against HAPO fee.

Personnel Accounting Services (New York) advised HAPO this month of an impending credit based on favorable Pension Trust earnings experience. Budget detail will be adjusted to reflect the effect of this credit.

Diversification studies cost will be accumulated by job and reported as a sub-detail of the manufacturing overhead account.

In order to more appropriately distribute major landlord costs (i.e., re-roofing, steam line replacement, hi-tank renovation), an Area Rehabilitation Account has been opened for such work in excess of $20,000, with distribution to be based on benefitting end-functions. Amounts will be entered as a separate line item on reports similar to the reporting of internal overhead. Previous distribution was through Manufacturing Overhead.

Cost studies during the month included the following:

Estimating pricing for Pu scrap recovery work for Argonne, LRL and Monsanto Chemical (the last for actual billing purposes).

Analyses of costs relating to placing Redox on a seven-day week for the next two months and the Button Line on a 21-shift schedule.

An analyses of FY 1963 "Quality Control and Assurance Costs of the Weapons Program", at AEC request.
Special requests processed for billing during the month included:

150 grams of Pu as metal to New Brunswick Laboratory
150 Kg's of Pu to duPont, Savannah River
Burials of contaminated materials for University of California and APED

CPD's investment in inventories at September 30, 1963, with budgeted amounts, is as follows:

<table>
<thead>
<tr>
<th>(in thousands)</th>
<th>Balance 9-30-63</th>
<th>Control Allocation</th>
<th>Surplus (Deficit)</th>
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</thead>
<tbody>
<tr>
<td>Inventories</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Essential Materials</td>
<td>$ 884</td>
<td>$ 815</td>
<td>$(69)</td>
</tr>
<tr>
<td>Spare Parts and Standby</td>
<td>1 669</td>
<td>1 615</td>
<td>(54)</td>
</tr>
<tr>
<td>Special Materials</td>
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<td>23</td>
</tr>
<tr>
<td>Yttrium</td>
<td>153</td>
<td>150</td>
<td>(3)</td>
</tr>
<tr>
<td>Gross Inventories</td>
<td>2 786</td>
<td>2 683</td>
<td>(103)</td>
</tr>
<tr>
<td>Reserves</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Essential Materials</td>
<td>42</td>
<td>59</td>
<td>(17)</td>
</tr>
<tr>
<td>Spare Parts and Standby</td>
<td>565</td>
<td>404</td>
<td>161</td>
</tr>
<tr>
<td>Yttrium</td>
<td>153</td>
<td>150</td>
<td>3</td>
</tr>
<tr>
<td>Total Reserves</td>
<td>760</td>
<td>613</td>
<td>147</td>
</tr>
<tr>
<td>Net Investment</td>
<td>$2 026</td>
<td>$2 070</td>
<td>$ 44</td>
</tr>
</tbody>
</table>

2. General Accounting

As of September 30, 1963, fourteen (14) active projects had incurred costs of $2,938,187 against the authorized funds of $3,712,600. Outstanding commitments totaled $145,079.

During October, six (6) work authorities were received from the AEC:

Directive No. AEC-172, Work Authority No. 6, Project CAC-980, Plutonium Reclamation Facility - Z Plant, for increase in funds to $1,660,000.

Directive No. EQT-004, Work Authority No. 1, Project CAC-965, In-Tank Waste Solidification - 200 East Area, for increase in funds to $175,000 and establishing AEC management.


Directive No. EQT-005, Work Authority No. 1, Project CAC-109, Degreasing and Briquetting Facility - RMA Line - 234-5 Building, authorized $4,000.


During the month two (2) appropriation requests for a total of $17,000 were processed.

3. Business Programs

In collaboration with Engineering and Production personnel, Chemical Processing Department developed operating cost estimates for:

SEFOR fuel element loading of co-precipitated Pu-U oxide.

U-233 test load and production alternates.

Tentative estimates for supplying certain types of plutonium to Euratom.

Recovery of Zr-Nb-95 at various annual rates.

Manager - Finance
III. PERSONNEL ACTIVITIES

A. FORCE SUMMARY

<table>
<thead>
<tr>
<th>Operation</th>
<th>Monthly</th>
<th>Salaried</th>
<th>Weekly</th>
<th>Salaried</th>
<th>Total</th>
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<tbody>
<tr>
<td>General Manager's Group</td>
<td>10</td>
<td>14</td>
<td>2</td>
<td>2</td>
<td>12</td>
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<tr>
<td>Research &amp; Engineering</td>
<td>66</td>
<td>67</td>
<td>30</td>
<td>67</td>
<td>97</td>
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<tr>
<td>Facilities Engineering</td>
<td>71</td>
<td>71</td>
<td>23</td>
<td>71</td>
<td>94</td>
</tr>
<tr>
<td>Power &amp; Crafts Operation</td>
<td>35</td>
<td>36</td>
<td>227</td>
<td>230</td>
<td>263</td>
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<tr>
<td>Production</td>
<td>6</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>10</td>
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<tr>
<td>Redox</td>
<td>63</td>
<td>63</td>
<td>223</td>
<td>222</td>
<td>286</td>
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<tr>
<td>Purex</td>
<td>69</td>
<td>70</td>
<td>259</td>
<td>258</td>
<td>328</td>
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<tr>
<td>Weapons Manufacturing</td>
<td>53</td>
<td>55</td>
<td>226</td>
<td>227</td>
<td>279</td>
</tr>
<tr>
<td>Total</td>
<td>389</td>
<td>391</td>
<td>1007</td>
<td>1009</td>
<td>1396</td>
</tr>
</tbody>
</table>

B. PERSONNEL CHANGES

C. T. Groswith, Consultant-Business Effectiveness, transferred to Irradiation Processing Department, in the same capacity, effective October 1, 1963.
## TRIPS

### Visitor | To | Nature of Discussion
--- | --- | ---
**To Other G.E. Components**

<table>
<thead>
<tr>
<th>Visitor</th>
<th>To</th>
<th>Nature of Discussion</th>
</tr>
</thead>
<tbody>
<tr>
<td>M. H. Curtis</td>
<td>Research Laboratory Schenectady, New York</td>
<td>Attend seminar. (10/4/63)</td>
</tr>
<tr>
<td>L. L. Zahn</td>
<td>San Jose, California</td>
<td>ASA Standard on shipping of irradiated fuel. (10/20 - 21/63)</td>
</tr>
<tr>
<td>R. W. Harvey</td>
<td>New York, New York</td>
<td>Accident Prevention Programs. (10/24 - 25/63)</td>
</tr>
</tbody>
</table>

### To AEC and Other AEC Contractors

<table>
<thead>
<tr>
<th>Visitor</th>
<th>To</th>
<th>Nature of Discussion</th>
</tr>
</thead>
<tbody>
<tr>
<td>W. S. Frank</td>
<td>Lawrence Radiation Lab, Livermore, California</td>
<td>Attend Joint Working Group (JWOG=22) mtg. (10/1 - 2/63)</td>
</tr>
<tr>
<td>A. E. Smith</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L. L. McGregor</td>
<td>Monsanto Research Corp, Miamisburg, Ohio</td>
<td>Attend seventh meeting of IMOG gage Subgroup. (10/3 - 4/63)</td>
</tr>
<tr>
<td>C. M. Walker</td>
<td>Monsanto Research Corp, Miamisburg, Ohio</td>
<td>Consultation and follow-up on metallurgical examination of special samples. (10/7 - 11/63)</td>
</tr>
<tr>
<td>L. M. Knights</td>
<td>Rocky Flats Plant Denver, Colorado</td>
<td>Inspect weapons components. (10/4/63)</td>
</tr>
<tr>
<td>O. F. Beaulieu</td>
<td>Savannah River Plant Aiken, S. Carolina</td>
<td>Sample exchange program spectrograph &amp; chemical analyses. (10/7 - 8/63)</td>
</tr>
<tr>
<td>C. S. Homi</td>
<td>Oak Ridge Nat. Lab. Oak Ridge, Tennessee</td>
<td>Discuss analytical methods for americium. (10/10/63)</td>
</tr>
<tr>
<td>N. S. Wing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R. H. Bond</td>
<td>Los Alamos Scientific Lab. Los Alamos, New Mexico</td>
<td>Discuss Pu recovery operations, nitride problems, americium. (10/14 - 15/63)</td>
</tr>
<tr>
<td>M. E. Borgeson</td>
<td></td>
<td></td>
</tr>
<tr>
<td>W. S. Frank</td>
<td>U. S. AEC</td>
<td>Attend waste management &amp; isotopes production meeting. (10/15 - 16/63)</td>
</tr>
<tr>
<td>P. H. Reinker</td>
<td>Germantown, Maryland</td>
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</table>
### TRIPS (Continued)

<table>
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<th>Visitor</th>
<th>To AEC and Other AEC Contractors</th>
<th>Nature of Discussion</th>
</tr>
</thead>
<tbody>
<tr>
<td>W. J. Gartin</td>
<td>Lawrence Radiation Lab.</td>
<td>Attend Pu Weapons Information Exchange Group (PWIEG) meeting. (10/15 - 16/63)</td>
</tr>
<tr>
<td>A. E. Smith</td>
<td>Livermore, California</td>
<td></td>
</tr>
<tr>
<td>R. E. Van der Cook</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. E. Barber</td>
<td>Dow Chemical Company</td>
<td>Follow-up on 74 shipment. (10/17 - 18/63)</td>
</tr>
<tr>
<td></td>
<td>Rocky Flats Plant</td>
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</tr>
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<td>Denver, Colorado</td>
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<tr>
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<td>Los Alamos, New Mexico</td>
<td></td>
</tr>
<tr>
<td>R. W. Harvey</td>
<td>Savannah River Plant</td>
<td>Accident Prevention Programs. (10/22 - 23/63)</td>
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<tr>
<td></td>
<td>Aiken, S. Carolina</td>
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<tr>
<td>R. J. Dal Ponte</td>
<td>Dow Chemical Company</td>
<td>Follow-up on 74 shipment &amp; 74 production discussions. (10/31/63)</td>
</tr>
<tr>
<td>A. E. Smith</td>
<td>Rocky Flats Plant</td>
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<tr>
<td></td>
<td>Denver, Colorado</td>
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</tbody>
</table>

| To General Industry     |                                  |                                                          |
| J. S. Crowder           | Bremerton Naval Air Station      | Vertical boring mill. (10/3/63)                         |
| R. W. Gooldy            | Seattle, Washington              |                                                          |

| To Conventions and General Meetings |                                  |                                                          |
| O. F. Beaulieu           | Gatlinburg, Tennessee            | Attend 7th Conference on Analytical Chemistry in Nuclear Technology. (10/8 - 10/63) |
| G. L. Gurwell            |                                  |                                                          |
| T. R. Garland            | San Diego, California            |                                                          |
### C. TRIPS (Continued)

<table>
<thead>
<tr>
<th>Visitor</th>
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<th>Nature of Discussion</th>
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</thead>
<tbody>
<tr>
<td>J. W. Barnes</td>
<td>Portland, Oregon</td>
<td>Attend AIChe Northwest Regional Meeting. (10/25 - 26/63)</td>
</tr>
<tr>
<td>D. E. Braden</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H. L. Caudill</td>
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<tr>
<td>R. C. Forsman</td>
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<tr>
<td>B. M. Johnson</td>
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<tr>
<td>R. W. Lambert</td>
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<tr>
<td>C. W. Nilsen</td>
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<tr>
<td>C. W. Smith</td>
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### D. VISITORS

<table>
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<tr>
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<td>From Other G.E. Components</td>
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<tr>
<td></td>
<td>San Jose, California</td>
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<tr>
<td>R. G. Barnes</td>
<td>Atomic Products Div.</td>
<td>Ion-exchange development. (10/28/63)</td>
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<td></td>
<td>Palo Alto, California</td>
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<th>From AEC and Other AEC Contractors</th>
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<tbody>
<tr>
<td>L. A. Dean</td>
<td>Union Carbide Nuclear Co.</td>
<td>UO3 Plant experience, specifications, analytical methods, and process. (10/21/63)</td>
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<tr>
<td>S. Bernstein</td>
<td>Nuclear Division</td>
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<tr>
<td></td>
<td>Paducah, Kentucky</td>
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<tr>
<td>JE Bowerbank, Jr.</td>
<td>Lawrence Radiation Lab.</td>
<td>Basic gaging philosophy discussion. (10/23 - 24/63)</td>
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<td></td>
<td>Livermore, California</td>
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<tr>
<td>L. Jobe</td>
<td>Phillips Petroleum Co.</td>
<td>Instrumentation. (10/29/63)</td>
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<td></td>
<td>Idaho Falls, Idaho</td>
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<tr>
<td>J. T. Byrne</td>
<td>Dow Chemical Co.</td>
<td>Discussions on Pu nitrate shipping equipment, cost accumulation, scheduling, analytical methods &amp; measurement procedures, Pu loadout and load-in facilities, electrowinning &amp; electrorefining. (10/29 - 31/63)</td>
</tr>
<tr>
<td>R. L. Delnay</td>
<td>Rocky Flats Plant</td>
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<tr>
<td>W. E. Domning</td>
<td>Denver, Colorado</td>
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### D. VISITORS (Continued)

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<td><strong>From AEC and Other AEC Contractors (Continued)</strong></td>
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<tr>
<td>N. Neumann</td>
<td>Mallinckrodt Chemical Co.</td>
<td>Thorium Oxide for U-233 program. (10/31/63)</td>
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<tr>
<td></td>
<td>St. Louis, Missouri</td>
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</tr>
<tr>
<td><strong>From General Industry</strong></td>
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</tr>
<tr>
<td>J. Ryan</td>
<td>St. Paul, Minnesota</td>
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<tr>
<td><strong>From Other Government and Foreign Agencies</strong></td>
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</tr>
<tr>
<td>L. A. Thiriet</td>
<td>Fontenay-aux-Roses, France</td>
<td></td>
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<tr>
<td>G. Sallier</td>
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<tr>
<td>J. E. Sauteron</td>
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<td>W. Stoll</td>
<td>NUKEM</td>
<td>Pu oxide specifications. (10/24/63)</td>
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<tr>
<td>G. Wirtz</td>
<td>Hanau, Germany</td>
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<tr>
<td>L. Kuchler</td>
<td>German Federal Ministry of Scientific Research</td>
<td>Purex and waste management processes. (10/24 - 25/63)</td>
</tr>
<tr>
<td>W. Meyer-Jungnick</td>
<td>Karlsruhe, Germany</td>
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<tr>
<td>U. von Knorre</td>
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<td>K. Palzer</td>
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<tr>
<td>A. Van den Bossche</td>
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### IV. SAFETY AND SECURITY

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<thead>
<tr>
<th>Operation</th>
<th>General</th>
<th>FDO</th>
<th>Finance</th>
<th>WMO</th>
<th>P&amp;C</th>
<th>Purex</th>
<th>R&amp;O</th>
<th>Prod.</th>
<th>R&amp;E</th>
<th>Total</th>
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<tr>
<td>Dis. Injuries</td>
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<td>1</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Ser. Accidents</td>
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<td>Med. Treat. Inj.</td>
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<td>9</td>
<td>5</td>
<td>3</td>
<td></td>
<td>35</td>
<td>415</td>
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<tr>
<td>Rad. Occur.</td>
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<td>1</td>
<td>1</td>
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<td>Pu Depositions</td>
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<td>2**</td>
<td>20</td>
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<tr>
<td>Fires</td>
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<td>6</td>
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<tr>
<td>Sec. Vio.</td>
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<td></td>
<td></td>
<td></td>
<td>4</td>
<td>20</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Disabling injury 63-6 = Carpenter lost tip of thumb in a jointer.

**Both of these cases were picked up on the routine bioassay program and cannot be associated with any known incident. One involved deposition of 1 percent MFBB, and the other 25 percent MFBB - the latter is under detailed investigation.
V. REPORTS

A. PREPARED AND ISSUED


HW-79354, Unclassified, "Reduction of Pu(VI) to Pu(III) and (IV) by Sodium Nitrite", dated October 28, 1963, by C. A. Polvin.


B. PREPARED FOR SIGNATURE AND ISSUANCE


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.

<table>
<thead>
<tr>
<th>INVENTOR</th>
<th>TITLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>C. W. Pollock, Research and Engineering</td>
<td>A Method for the Separation and Isolation of the Tributyl Phosphate and Petroleum Diluent of Purex Solvent by Extraction with Acid.</td>
</tr>
<tr>
<td>Clair F. Setbacken, Power and Crafts</td>
<td>An improved design for a motion Transducer. (A control device for precision machine tool operation.)</td>
</tr>
</tbody>
</table>

---

P. H. Reinker
General Manager
Chemical Processing Department