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HW 62593 DEL

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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT
FOR

OCTOBER, 1959

HW--62593-Del.

Compiled By
OPERATION MANAGERS

DE93 001779

November 20, 1959

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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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

OCTOBER, 1959

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PRODUCTION

Output of plutonium from the separations plants was less than that scheduled; however, year-to-date production exceeds the corresponding commitment by four per cent.

Purex completed a Palm recovery run which was the most successful to date.

Production of UO_3 met the commitment, and UO_3 shipments conformed to the established shipping schedule.

ENGINEERING

Normal Purex processing was complicated by two pump failures, failure of the HAW jumper and periodic overflow of the product saturated organic stream (HAP) into the vent system. Later investigation showed that the plastic plates in the HA column zebra cartridge had broken up into small fragments as a result of process conditions.

When Purex 1WW material was centrifuged and treated to recover cerium, the majority of the cerium remained in the 1WW centrifugate contrary to prior experience and only 14 per cent was recovered.

Performance of the prototype plutonium ozonator in the Redox plant has been encouraging, indicating that the sodium dichromate method can be routinely used and that adequate fission product decontamination of the uranium and plutonium products can be obtained.

During the last week of the month, test runs on an acid precycle flowsheet and a proposed internal recycle scheme for Palm recovery were initiated in the Redox plant.

Recuplex process and equipment modifications included a change in the solvent extraction feed preparation to minimize capability for buildup of plutonium concentrations, and installation of a safe-geometry bottom section on the stripping column.

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A joint meeting of CPD and HLO representatives was held to discuss the appropriate storage of Purex LWW wastes. At least six studies were planned for performance during the next twelve months, after which the design and scope criteria can be prepared.

The vendor of the tube bundle replacement for Purex concentrators agreed to prepare a proposal for each of two units, one titanium and one titanium-stainless steel. A contract package to cover each proposal was sent to the vendor, and final negotiations are scheduled for early November, 1959.

The conversion of Rexusplex to a manufacturing facility was completed on October 15, 1959.

Cost estimates for several alternative Palmolive processing schemes were developed for transmittal to the Commission. The following alternative facilities and estimated costs are included in the letter: 1) Virgin Palm Purification to the Nitrate at Purex - \$260,000; 2) Virgin Palm Purification and Conversion to the Oxide at Hot Semiworks - \$560,000; 3) Palmolive Separations, Olive Decontamination, and Palm Purification and Conversion to the Oxide at Hot Semiworks - \$1,470,000; and 4) Virgin Palm Purification, Oxide Conversion, and Fabrication at Hot Semiworks - \$884,000. The capabilities of the proposed Palmolive Facility were also evaluated.

In support of the MPF Reprocessing project, detailed process flow diagrams were completed for Sulfex decladding of Yankee elements and Zirflex decladding of Dresden elements. Work is now in progress on core dissolution flowsheets for both the Yankee and Dresden elements.

GENERAL

A low-pressure promotional campaign entitled "It's All in Your Head" was initiated during October. It was designed to increase participation in the Suggestion Plan.

STAFF

Vice President and General Manager, Atomic Products Division . . . L. R. Fink
General Manager, Hanford Atomic Products Operation . . . W. E. Johnson
General Manager, Chemical Processing Department . . . W. K. MacCready
Manager, Production Operation . . . J. H. Warren
Manager, Purex Operation . . . P. R. McMurray
Manager, Special Separation Processing & Auxiliaries . . . C. T. Groswith
Manager, Finished Products Operation . . . W. N. Mobley
Manager, Power & General Maintenance Operation . . . T. G. LaFollette
Manager, Financial Operation . . . K. G. Grimm
Manager, Facilities Engineering Operation . . . H. P. Shaw
Manager, Research & Engineering Operation . . . V. R. Cooper
Manager, Relations Practices . . . R. B. Britton

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CHEMICAL PROCESSING DEPARTMENT
NUMBER OF EMPLOYEES
OCTOBER 31, 1959

<u>OPERATION</u>	<u>EXEMPT</u>		<u>OTHER</u>		<u>TOTAL</u>	
	<u>9-30-59</u>	<u>10-31-59</u>	<u>9-30-59</u>	<u>10-31-59</u>	<u>9-30-59</u>	<u>10-31-59</u>
GENERAL MANAGER'S GROUP	10	10	1	1	11	11
PRODUCTION	7	7	4	4	11	11
PUREX	49	48	210	207	259	255
SPECIAL SEPARATION PROCESSING & AUXILIARIES	49	49	213	214	262	263
FINISHED PRODUCTS	54	55	227	221	281	276
POWER & GENERAL MAINTENANCE	44	44	253	250	297	294
FINANCIAL	13	13	11	11	24	24
FACILITIES ENGINEERING	66	68	21	21	87	89
RESEARCH & ENGINEERING	61	59	24	24	85	83
RELATIONS PRACTICES	<u>5</u>	<u>5</u>	<u>7</u>	<u>6</u>	<u>12</u>	<u>11</u>
TOTAL	358	358	971	959	1329	1317

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DECLASSIFIEDCHEMICAL PROCESSING DEPARTMENTPATENT SUMMARY
FORMONTH OF OCTOBER, 1959

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.

INVENTORTITLE

* R. C. Smith, Research and
Engineering

The Removal of Halogen Ions In
Chemical Processing Solutions
By Boil-Downs In Calcium And/Or
Magnesium Nitrate Systems

Theodore R. McKenzie, Research
and Engineering

The Preparation of Stable Ferrous
Nitrate in Nitric Acid Solutions

W. K. MacCreedy

General Manager
Chemical Processing Department

*Reported in September

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CHEMICAL PROCESSING DEPARTMENT
PRODUCTION OPERATION

OCTOBER, 1959

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I. RESPONSIBILITY

There were no changes in the responsibilities assigned to the Production Operation during October.

II. ACHIEVEMENT

A. Production Statistics

1. Purex

	<u>October</u>	<u>September</u>
Tons uranium processed	305.9	494.7
Average production rate during operation (T/D)	20.0	21.0
Total waste loss (%)		
Uranium	0.10	0.10
Plutonium	0.34	0.18
Average cooling time (days)	102	95
Minimum cooling time (days)	92	89
On-line efficiency (%)	57.0	84.0

2. Redox

Tons uranium processed	66.6	67.1
Average production rate during operation (T/D)	5.6	5.2
Total waste loss (%)		
Uranium	0.14	0.09
Plutonium	0.64	0.49
Average cooling time (days)	179	199
Minimum cooling time (days)	123	109
On-line efficiency (%)	54.1	61.5

3. 234-5

Batches input to Task I	180	250
Runs completed through Task III	171	266

Waste disposal (units)	424.0	365.89
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4. UO₃

	<u>October</u>	<u>September</u>	<u>To Date</u>
UO ₃ loaded (tons)	58.7 E	52.5 E	552.2 E
	488.5 N	510.5 N	35 335.9 N
UO ₃ approved for shipment (tons)	47.7 E	93.6 E	569.2 E
	503.0 N	500.3 N	35 319.0 N
UO ₃ shipped (tons)	93.6 E	0 E	521.5 E
	453.7 N	549.3 N	35 167.5 N
UNH backlog (tons)	32 E	38 E	
	118 N	290 N	

5. Power

	<u>200 East</u>	<u>200 West</u>
Raw water pumped (gpm)	8 586	4 195
Filtered water pumped (gpm)	905	860
Maximum steam generated (lbs/hr)	204 000	118 000
Average steam generated (lbs/hr)	131 000	86 423
Total steam generated (M lbs)	97 146	64 299
Coal consumed, est. (tons)	5 515	3 825

6. Waste Storage

	<u>October</u>	<u>September</u>
Salt waste reserve storage capacity-Redox	3 233	3 301
Salt waste reserve storage capacity-Purex	29 941	30 247
Coating waste reserve storage capacity-Redox	28 652	28 719
Coating waste reserve storage capacity-Purex	42 292	42 598

E. Reports and Documents

1. Prepared and Issued

HW-62163 RD Redox Plant Production Schedule, October, 1959
D. McDonald

HW-62164 RD Purex Plant Production Schedule, October, 1959
D. McDonald

HW-62165 RD UO₃ Plant Production Schedule, October, 1959
D. McDonald

HW-62166 RD 234-5 Plant Production Schedule, October, 1959
D. McDonald

HW-62249 Dry Atmosphere Hood - Prototype, August 24, 1959,
J. H. Warren

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HW-62250 Meeting of Classification Committee Chairmen and Representatives of Major Contractors, October 2, 1959, J. H. Warren

HW-62361 Essential Materials Consumption-Purex, Chemical Processing Department for September, 1959, J. E. Lentz

HW-62421 Chemical Processing Department Waste Status Summary for September, 1959, J. E. Lentz

HW-62483 Forecast of Nuclear Materials Requirements, Chemical Processing Department, October 23, 1959, R. E. Roberts

HW-62487 Scheduled Shutdown - Part of UO₃ Plant, October 26, 1959, J. H. Warren

HW-62552 Scheduled Shutdown - Purex Plant, October 29, 1959, J. H. Warren

2. Prepared for Signature and Issuance

HW-62151 Production - September, 1959, W. E. Johnson

HW-62389 HAPD Production Forecast, October 23, 1959, W. E. Johnson

III. ORGANIZATION AND PERSONNEL

A. Safety

There was one minor injury reported by Production Operation personnel during October, 1959.

B. Security

There were no security violations in the Production Operation during the month.

J. H. Warren
Manager - Production

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CHEMICAL PROCESSING DEPARTMENT
PUREX OPERATION

October, 1959

I. RESPONSIBILITY

There were no changes in the responsibilities of the Purex Operation during the month.

II. ACHIEVEMENT

A. Processing Experience

1. Production Experience

a) Production - Percent of Monthly Commitment

Uranium	61.2 Percent
Plutonium	56.3 Percent

b) Production Rates

10-1-59 to 10-6-59	Palm recovery run.
10-6-59 to 10-10-59	Flushing extraction columns.
10-10-59 to 10-11-59	Ran at 2.24 CF for four hours.
10-11-59 to 10-12-59	Shut down to replace HAW jumper.
10-12-59 to 10-15-59	Varying rates - 2.4 to 2.24 CF.
	HA column overflowed.
10-15-59	Shut down for 12 hours to replace HAF pump.
10-15-59 to 10-30-59	Varying rates because of poor HA column performance.
10-30-59	Shut down to replace HA column cartridge.

c) Operating Continuity

Uranium	57 Percent
Palm	17 Percent

d) Waste Losses

Uranium	0.10 Percent
Plutonium	0.34 Percent

e) Uranium Re-treated through silica gel. 309 tons.

2. Normal Processing

The first ten days of the month were utilized in conducting a Palm run. Approximately 90 percent of the initial Palm inventory in the

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3WB system was recovered and the remainder was returned to the system. The quantity recovered was the highest achieved to date in a single run and the quality was high.

Normal processing was started on 10-10-59 but was suspended four hours later due to a flow restriction in the HAW jumper. After replacing the DOV jumper production was started on 10-12-59. Following the startup approximately 4800 gallons of product-saturated organic (HAP) overflowed the HA column into the vent system and eventually to F-18. This was caused by a restriction in the HAP piping and was temporarily corrected by reducing rates from 2.4 CF to 2.24 CF. On 10-15-59 the HAP pump developed a serious leak which necessitated a twelve-hour outage.

Gamma activity of both streams was initially very high but rapidly declined until a heavy schedule of rework was started on 10-19-59. The plutonium product stayed in specifications, although the gamma activity was slightly higher than normal. All uranium product (309 tons) required silica gel treatment.

Performance of the HA column was erratic all during the run period and on several occasions organic overflowed into the vent system. Plugging increased to the point where it became necessary to shut down on 10-30-59. A later inspection of the HA column cartridge revealed all of the plastic plates to be broken into small pieces.

Waste losses for the month were 0.34 percent for plutonium and 0.10 percent for uranium. The waste losses were normal considering the large amount of flushing required.

3. Special Processing

During the first ten days of the month a majority of the extraction equipment was chemically flushed. This included: 1) HA - HS system; 2) the IBX and IC columns and the J2 and J3 tanks; 3) the J8 concentrator and K1 tank; 4) the 2A-2B system; and 5) the #1 organic system and the final plutonium ion exchange equipment. The resin was also replaced in the ion exchange column.

Following the startup, one batch of synthetic IWW, created during the Palm run, and one normal IWW batch were reworked. Approximately 630 units of plutonium and 555 pounds of uranium were recovered.

The product-bearing organic which overflowed the HA column into the vent system was collected and recovered. Part of it was reworked through the IBX tank and the remainder through the #1 organic system. In the latter case the plutonium and uranium were removed by washing and the washes sent to F-8 for reclaiming.

B. Radiation Experience

The total radio-iodine emission for the month was 12.7 curies, well below the Purex and CFD limits.

Purex incurred five Radiation Occurrences during the month. There were nine cases of skin contamination and four cases of personal effects contamination. All skin contamination was reduced to zero, although in one case it was five days before the last detectable plutonium contamination could be removed from an employee's forehead, originally contaminated to 2×10^6 d/m.

During the burial of two H-4 tube bundles on October 2 the railroad right-of-way from 202-A to the burial trench was contaminated, with readings up to 3 rads/hr at 18 inches. Approximately one-half of the contaminated area was cleaned up by month end.

Three plutonium contamination spreads occurred in the FR room during the month. The most serious spread resulted from a leak in the L-9 weight factor line. The major portion of the contamination has been removed or fixed.

C. Mechanical Experience

The J1 pump developed a leak and was replaced with a rebuilt pump.

During the partial shutdown the following work was performed:

- 1) Replaced two failed tube bundles in the F-6 east and H-4 west positions.
- 2) Replaced the pulser on the HS column with a long-stroke pulser used on the original J-2 column. The change was made in an effort to improve decontamination performance.
- 3) Replaced the F-12 pump used in the prototype IWW ion exchange system.
- 4) Replaced float in the G-2 column interface jumper.
- 5) Installed two new hood panels in N Cell.

Upper seal leakage was observed on the U-1-1 turbine pump after 15 months service. A new splined-shaft turbine pump was installed on 10-21-59 as a replacement and experimental unit. The pump is designed to contain upper seal leakage within the vessel, provide longer service life, and reduce repair costs.

The H-1 pump developed excessive upper seal leakage and was replaced on 10-15-59. The new pump has an improved discharge head. The failed pump, which was equipped with a floating conical seal designed to minimize upper seal leakage problems, had been in service six months. All replacement pumps currently being procured off-plant will include the HAPC designed discharge head.

D. Analytical Performance

Analytical methods have been developed and approximately 90 percent

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of the data accumulated for an attempt to determine neptunium input to the Purex plant.

Coulometer studies were carried on throughout the month. Data is being evaluated at this time in order to determine its value in providing E-5 plutonium and uranium accountability figures.

E. Improvement Experience

1. Process Tests and Revisions

None significant.

2. Inventions and Discoveries

Nothing to report.

F. Events Influencing Costs

The installation of the 216-A-21 crib stainless steel distributor was completed. Reclaiming this crib will save valuable tank space and/or the cost of a new crib.

G. Plant Development and Expansion

The Beneficial Use Date for CG-719-Additional Facilities for Purex Tank Farm Vapor Wastes was October 22, 1959.

H. Reports Issued

A document, HW-62284, Trip Report, "Visit to Argonne National Laboratory and Third Industrial Nuclear Conference - September 21-25, 1959" was issued by M. H. Campbell.

III. ORGANIZATION AND PERSONNEL

A. Safety

There were no disabling or near-serious accidents during October. Five medical treatment injuries were incurred.

B. Security

No security violations were reported.

C. Personnel Activities

All non-exempt personnel, excepting clerical personnel, have participated in simulated dry run evacuation tests from normal work locations. The test revealed that one evacuation route was blocked by a locked door. This was corrected. No other shortcomings were disclosed by the tests.

N. P. Nisick presented a speech entitled "Miracle in the Desert" before the Kappa Kappa Gamma sorority alumni on October 13.

Six exempt employees attended the AEC sponsored "Symposium on Reactor Fuel Reprocessing" in Richland.

D. Visitors

The following personnel visited Purex in October:

Representative Catherine May and her administrative assistant, John Knieval, on 10-29-59.

Roger Sutton, International Nickel Corporation, on 10-8-59.

Oliver S. Hulley, Consultant-Manufacturing Training and Education of General Electric Company's Manufacturing Personnel Development Services, on 10-6-59.

From Washington AEC - N. L. Dalsen - Attorney in Office of Chief Counsel F. F. Rutt, Chief of Contractor Personnel Branch-Organization & Personnel C. F. Chandler, Organization and Personnel - all on 10-6-59.

Dupont Company - W. H. Farrow, Engineer-Wilmington Process Section C. S. Otto, Engineer-Engineering Department, J. B. Roberts, Project Supervisor-Project Engineering Department, S.R.P., and S. D. Smiley, Area Superintendent-Separations Department, S.R.P., all on 10-5-59.

P. H. McMurray
Manager-Purex

PR McMurray:BAF:gt

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CHEMICAL PROCESSING DEPARTMENT
SPECIAL SEPARATION PROCESSING AND AUXILIARIES OPERATION
OCTOBER, 1959

I. RESPONSIBILITY

There were no changes in the scope of responsibility of the operation this month.

II. ACHIEVEMENT

A. Redox Processing Operation

A scheduled shutdown was taken during the first eleven days of the month for replacement of the H-4 metal solution oxidation tank which had developed a corrosion leak through the tank wall during September. The week of 10-5-59 was devoted largely to checking out the new equipment and decontaminating the 60-ton crane and the crane maintenance platform, which had become contaminated with ruthenium during the equipment change-out. Considering past experience with H-cell work, the replacement was comparatively successful.

Processing operations were resumed on 10-12-59 and continued as scheduled to the end of the month. The monthly production commitment was exceeded by 2.5% while operating at 54.2% of the total hours available for column operation. Continuous operation of the dissolvers was necessary to produce sufficient metal solution for the production commitment. The mechanical efficiency for the month was 63%, being affected significantly by the H-4 oxidizer change-out.

The prototype plutonium ozonator which was installed in the E-2 tank position in the Redox Plant during September has been functioning very reliably. This performance was sufficient to warrant another attempt at a dichromate head-end flowsheet. Consequently, all solvent extraction feed during the October production run was oxidized with sodium dichromate rather than potassium permanganate. Experience to date has been very encouraging, indicating that the sodium dichromate method can be routinely used and that adequate fission product decontamination of the uranium and plutonium products can be obtained. The continued success of the sodium dichromate treatment is expected to eliminate the deposition of ruthenium in the H-cell equipment, which has long been the cause of contamination in the Redox canyon when any of this equipment was disturbed.

During the last week of the month, test runs on an acid precycle flowsheet and a proposed internal recycle scheme for Palm recovery were initiated by the Redox Technology Operation. Although not all analytical results from the test runs are available, preliminary results are promising.

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The quality of both product streams was under satisfactory control during the month. No tail end treatment, other than the ozonation of five E-12 batches, was necessary on any of the UNH produced. All plutonium production was within shipping specifications.

Product waste losses during the month were normal, averaging 0.14% and 0.64% for uranium and plutonium respectively. Several D-9 waste batches were returned to the process as "catalytic-kill" solution during the operating periods.

During the shutdown period at the beginning of the month for the H-4 oxidation tank replacement, two nitric acid flushes were processed through the equipment in the 233-S Concentration Building. Approximately 1025 units of plutonium was recovered and returned to the process via head-end make up. During the shutdown period, the 1A and 1S columns were also used to process a quantity of waste material collected from flushes, sump wastes, and high D-9 wastes.

Iodine 131 emission to the 291-S stack totalled 6.21 curies for the month. The maximum emission for any 24 hour period was 0.84 curies.

B. Maintenance Operation

Replacement of the H-4 metal solution oxidation tank, which developed a corrosion leak through the tank wall during September, was comparatively successful considering past experience with H-cell work. However, one exception involved an attempt to remove the tube bundle which could not be freed from the vessel, due to the close clearances and the apparent expanding of the coil since the original installation. It was subsequently necessary to sacrifice the tube bundle with the H-4 tank at the time of its removal. The new tube bundle which was installed with the replacement H-4 tank has a greater clearance than its predecessor so that no difficulty is anticipated in future change-outs.

In conjunction with the above installation, a new H-4 to H-5 vapor line was also installed. The old vapor line was placed in a specially fabricated cradle and removed to J-cell for ruthenium decay prior to burial.

Piping changes were made this month to isolate the O-2 hexone storage tank in the 276 Building and to make a closed system between this tank and the canyon hexone system. The new piping arrangement eliminates the O-1 and O-3 tanks from the circuit, thus providing better inventory control and quick discernment of hexone diversion. Because of the double hazard, explosion from hexone and also radiation, each step had to be planned and executed with the utmost care. The work was completed without incident.

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Valves were installed in the dissolver vent lines this month to permit reverse flushing of the vent lines from the stack area to the dissolver cells. This was another step in the program to correct the occasional releases of contaminated particles or specks from the stack.

There were six replacement jumpers installed during the month, four of which were in connection with the H-4 tank installation. One of the latter was a thermohm jumper with improved type silicone rubber lead wires to withstand the high radiation levels present in H-cell. The thermohm elements are the regular Brown Instrument type.

C. Waste Handling and Decontamination Operation

1. Waste Handling

Redox Coating Waste Received (S Farm)	12,430 gallons
Redox Salt Waste Received (SX Farm)	80,955 gallons
Total Gallons Boil-Off Salt Waste	162,935 gallons
Waste Received at TX (From 221-U)	19,250 gallons

Pumping of the unscavenged TBP waste from the 106-TY tank continued this month and 204,187 gallons of waste was transferred to the 103-TY tank, leaving a heel of approximately 20,000 gallons in the tank. A thorough inspection of the inner tank lining is planned and will include: (1) Photographs of the tank interior, (2) inspection by periscope, (3) detailed photographing with a telephoto lens, if damage is indicated by standard lens, (4) inspection by closed circuit TV. Step (1) was completed this month and step (2) is scheduled for the early part of November.

2. Equipment Decontamination and Repair

a. Regulated Steam Pit

Three vehicles, one welding machine and several miscellaneous items were decontaminated at the regulated steam pit during the month. A total of 36 man-hours was charged to this operation.

b. Railroad Equipment

One hundred and twelve man-hours were charged to decontamination and operational coverage for repairs to equipment at Riverland. The work included overhaul of four well cars and one flatcar, painting of three well cars, and decontamination of one locomotive.

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c. 221-U Canyon

Decontamination and disassembly of three Redox pumps (F-1, E-5, F-7) was completed and rebuilding started.

One J-5 Purex pump was decontaminated, dismantled, and returned to the Purex Plant for re-assembly. One single tube corrosion test heat exchanger and one condensate drain line was also decontaminated and cut into small sections for submission to the 300 Area Metallurgy Laboratory for analysis. Decontamination of the D-5 agitator was started. Removal of the agitator shaft, which was jammed into the motor, was finally accomplished with a cutting torch.

Work for the Irradiation Processing Department included:

- (1) decontamination of 50 reactor pigtails for 100-D,
- (2) decontamination of three complete rear face assemblies for 100-B, and (3) decontamination of 40 sensitized stainless steel pigtails for 100-E, using a special process requested by the Reactor Technology Group.

d. 221-T Canyon Building

Minor Construction Forces completed removal of all piping, panelboards, and tanks in Sections 18, 19, and 20. The steam turbine in the 291-T Building was overhauled and re-activated.

D. Analytical Control Operation

The alpha energy analyzer associated with the 256 Channel Analyzer was placed in service this month and successfully used for analyzing neptunium oxide samples.

Rate of hydration on uranium oxide powder was studied this month at the request of the U-Plant Technology Operation. Data collected shows initial hydration is quite rapid (0.28% during first hour) and decreases progressively with time (0.06% during the fifth hour).

Considerable analytical assistance was given to the Reactor and Fuels Development Group, HLO, by providing special scale deposition studies on test coupons and special gamma activity and uranium concentration studies on both supernatant and solids of samples received. Approximately 600 man-hours were expended on work for this group.

E. Radiation Monitoring Operation

Five radiation occurrences were recorded during the month. Most significant was two cases of personnel skin contamination to a

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maximum of 40,000 c/m which occurred during the removal of the failed H-4 tank. However, all contamination was promptly and readily reduced to non-detectable.

High concentrations of contaminated air resulting from the change-out of the H-4 tank on 10-2-59, raised the level of contamination on the surfaces of the 60-ton canyon crane by a factor of ten. Repeated cleaning assaults have reduced the contamination on the catwalks and upper surfaces of the trolleys to near former status. Dose rates on the under side of the crane are still above normal levels and are proving difficult to reduce. Additional cleaning using the solvent spraying technique is planned.

One burial box containing miscellaneous failed and highly contaminated processing equipment was transported to the industrial burial grounds and buried without incident on 10-15-59. Dose rates from the box were 8.4 r/hr at 15 feet and 1.2 r/hr at 60 feet.

F. Improvement Experience

1. Process Tests and Revisions

Information related to this item is covered in the Research and Engineering portion of the Department report.

2. Invention or Discoveries

There were no inventions or discoveries of a patentable nature reported in the operation during October, 1959.

G. Events Influencing Costs

An engineering study was recently completed on Hammel-Dahl valves. As a result, future purchases will be in the direction of stock valves rather than special fabrications. Purchases will be made in complete units rather than in component parts. Initially, this may increase inventory costs however, because of the greater standardization and lower cost of purchasing shelf items the initial losses should be rapidly recovered. Other benefits to be gained besides greater economy are being able to take advantage of improvements and new models as the vendor perfects them, shorter delivery time and greater assurance of obtaining a useable valve.

H. Plant Development and Expansion

1. Preparatory Engineering

Because of the critical nature of the H-4 vessel a spare unit is to be fabricated by Plant Forces using on-site materials. Due to procurement problems and high costs as a result of both steel and

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fabrication strikes, the spare vessel will have a flat bottom design rather than the present dished bottom. Design and cost estimates for a titanium fabricated H-4 vessel are also being planned. This work is being done because of future Redox processing plans which are directed towards the use of an acid precycle flowsheet. Under these conditions the corrosion problems with an H-4 stainless steel tank will be significantly increased.

2. Design and Construction Liaison

CG-686, In-Line Monitoring Instruments

The new F-1 jumper was installed early in the month and has been performing as designed. A re-design of the 3EU sampler jumper has been delayed due to higher priority jumper work for the multi-purpose dissolver.

CG-772, Multi-Purpose Dissolver - Redox

Construction of the dissolver proper was started on 10-12-59. Jumper drawings, tower modification drawings and other related drawings are being completed on schedule. The tight schedule "ready for installation" by mid-February is still realistic.

CAC-812, Equipment Decontamination Building - 2706-W

Punch-list items are being cleaned up with only minor items to complete the main building. Roy Britton, contractor, was the successful bidder for the high pressure pump building addition. Work is expected to start early in November.

I. Reports Issued

No secret reports were issued by personnel of the operation during October, 1959.

III. ORGANIZATION AND PERSONNEL

A. Safety

There were no disabling injuries, serious accidents or injuries in the operation during October, 1959. Two medical treatment injuries were reported during the month.

B. Security

There were no security violations in the operation during the month.

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C. Personnel Activities

S. D. Smiley, J. B. Roberts, C. S. Otto, and W. H. Farrow, Jr., of the Du Pont Company visited the Redox Plant on 10-6-59. They were primarily interested in contamination problems and control, canyon ventilation, and our experience with TV.

Dr. Kenneth Newman of Turco Products Inc., visited the Redox Waste Handling and Decontamination Operation on 10-16-59, to discuss decontamination procedures and techniques.

G. H. Harnden, Engineering Administration Consultant, G.E. Office, Schenectady, N. Y., visited the Redox Plant on 10-27-59 to become familiar with the operation.

Mr. Tucky and Mr. Saddington, General Manager and Resident Director respectively, of the Windscale and Harwell Plants, England, visited the Redox Plant on 10-22-59 for a tour and general discussion relative to operation of the plant.

In conjunction with the Symposium on "Reprocessing of Atomic Fuels", held in Richland on October 20 and 21, 1959, forty people were conducted on a tour of the old 221-T Separations Plant. Using the canyon crane, a demonstration was given in procedures used for remote handling of processing equipment. The group included foreign visitors, private reactor operators, fuel fabricators, AEC and AEC-Contract personnel, and management and technical personnel associated with the nuclear industry.

Chas. B. Groswith

Manager - Special Separation
Processing and Auxiliaries

CT Groswith:sws

CHEMICAL PROCESSING DEPARTMENT
FINISHED PRODUCTS OPERATION
MONTHLY REPORT

OCTOBER 1959

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I RESPONSIBILITY

There were no changes during the month in the responsibilities assigned to the Finished Products Operation.

II ACHIEVEMENTS

A. Processing Operation

Production of unfabricated plutonium was 25% under forecast (HW-62389) and 28% below schedule (HW-62166) for the month, due to feed shortages caused by processing difficulties at the primary plants. Recovery (Recuplex) produced 86% of schedule (HW-62166) in spite of delays at the end of the scheduled shutdown for equipment replacement. The production of uranium oxide powder met the schedule (HW-62165). Shipping commitments for both plutonium and uranium were met. Two hundred ninety-four thousand, seventy-four (294,074) pounds of nitric acid were shipped to Purex from the U plant recovery facilities.

Operating difficulties at the primary plants with attendant feed shortage resulted in several days downtime for the button line early in the month. Several equipment modifications were made during this downtime. They involved the service vacuum header, and the off-gas system for the 9-A fluorinator tube. More than usual difficulties were encountered with low density product during October. These troubles are attributed to a combination of iron and aluminum.

A scheduled ten-day outage in Recuplex early in October for replacement of H-3 column disengaging section, and the H-3 column pulse plates was extended for two days due to mechanical difficulties. Upon completion of the work the system performed exceptionally well.

The Uranium Reduction plant continued to operate routinely. Failure of bearings in the gear reducer of the main drive of K calciner, resulted in a week's downtime for that unit. Installation of the new powder handling system in G cell is proceeding smoothly and should be ready for service in November.

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C. Maintenance Operation

Operation of the plutonium preparation equipment was generally satisfactory during the period. Advantage was taken of a scheduled shutdown to replace fluoride off-gas piping, a reactor feed pump, and the Task III sander valve (which was modified to permit the use of the RS-6 crucible).

Equipment in the plutonium fabrication area functioned unusually well, requiring a bare minimum of maintenance effort.

The product recovery equipment continues to give excessive trouble. H-11 and G-47 pumps both required replacement as did a ruptured H-2 column pulser bellows. During the scheduled shutdown a leaking J-1 vessel was replaced, and a new disengaging section were installed in the H-3 column together with new pulser plates and a new type capacitance probe for determining interface level. Leaking lines and valves continued to require excessive use of manpower and radiation exposure.

In the Uranium Reduction plant one major failure occurred during the period. The K calciner gear reducer drive pinnion bearings failed. Also, it was necessary to replace broken shear pins and remove the end of a broken feed point in the J calciner.

D. Control Operation

The average impurity content of plutonium buttons was 1404 ppm including a process average of 350 ppm carbon. Five buttons were rejected for high impurity, principally iron. The average purity for the 6506 and 6507 parts was 99.82%. Gauging acceptance was 81.5% and 77.2% for 6506 and 6507 parts respectively.

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D. Control Operation (Cont'd)

The reduced production caused a sharp drop in the Analytical and Final Inspection work load. Five thousand two hundred and ninety-eight analyses were made on 877 samples for the four-week period ending October 25. Personnel have been loaned out wherever possible. Special services of note include radiography of special weapon shapes and other metallurgy specimens, and evolution and measurement of chlorine from burning plastics, the latter in support of studies on the planned building incinerator.

There were 11 radiation occurrences, 33 skin contamination cases, and 4 cases of clothing contamination experienced in the Finished Products Operation. In addition there were 4 potential cases of internal plutonium deposition, 3 arising from contaminated minor injuries and one from air-borne contamination. Prompt treatment proved to be effective since no whole body deposition was revealed by the whole body counter.

Control of stack gas emission remains satisfactory and at lower levels from the preceding month. Z Plant averaged 13 microcuries plutonium per day and the U Plant averaged 3.3 microcuries uranium per day.

Significant was the completion of the calibration of the new aluminum capped finger ring film and its correlation to badge films as used in the 234-5 building. Controls on the make-up, issuance, processing, etc., of these rings have made them more dependable as hand dosimeters. A concerted effort has been made to achieve 100% acceptance and wearing of the rings with gratifying results. The new ring will provide a more useful evaluation of extremity exposure pending the development of more precise instruments. Also provided in October were stop watches for various craftsmen to assist them in estimating their hand exposure while on the job.

Work continued in support of research efforts to better define neutron flux and energy levels from various plutonium compounds and through different shielding media. The double moderated BF_3 neutron counter and associated shielding has been assembled, a PuF_4 neutron source calibrated and some experimental curves drawn. With the data anticipated, it is expected that better definition of actual neutron exposure to personnel will result, a knowledge needed for the years ahead when processing material of higher exposure level.

E. Improvement Experience

1. Process Tests and Revisions

Information relating to this item will be covered in the Research and Engineering portion of the Department report. Other information concerning Weapon Data will be covered in a separate report to be written at a later date.

2. Inventions or Discoveries

No inventions or discoveries of a patentable nature were reported during the month.

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F. Events Influencing Cost

Product specifications for plutonium being shipped to Dow at Rocky Flats have been changed to call for a material that is more costly to manufacture. Button costs will be increased approximately \$4,000 per month.

G. Plant Development and Expansion

1. Projects - Study, Scoping or Approval Phase

The following project is included in this phase of the Finished Products capital expenditure program.

- a. A project proposal is being circulated for approval requesting design funds for a new Plutonium Reclamation Facility.

2. Projects - Construction

Construction funds have been made available for the following projects. The work being conducted on the various projects is classed as detail design, procurement or installation.

CG-734, RMC Button Line
CG-734, Rev. 2, Additional Shielding RMC Button Line
CGC-811, Phase I and Phase II, Additional Fabrication Equipment
CG-723, Conversion of Recuplex to a Manufacturing Facility
CG-789, Additional Fire Protection, 234-5
CGC-843, Disposal of UO₃ Condensates
CGC-813, Pu Recovery from Contaminated Waste
CGC-826, Phase II, Vacuum System Improvements

The installation of high level radiation detection devices is complete at the 234-5 Building and the UO₃ plant. The funds are available from Appropriation Request, AR-59-CPD-32. Additional alarms or sirens are to be installed and funded from the original appropriation.

3. Projects - Completed

Capital expenditure project CG-767, Miscellaneous Improvements, UO₃ was accepted with exceptions during the month.

III ORGANIZATION & PERSONNEL

A. Organization Changes

No changes were made during the month.

B. Safety Experience

There were no disabling injuries or near-serious accidents experienced in the Finished Products Operation during the month. Eight medical treatment injuries occurred as compared to six in September.

B. Safety Experience (Cont'd)

An accidental energizing of one of the sirens of the excursion alarm system occurred on October 30 resulting in a brief, partial evacuation of the building. The alarm was accidentally tripped during the tie-in of additional sirens into the circuit.

Another partial evacuation took place when an interruption to the building ventilation balance occurred in the 234-5 building on October 30 when construction forces inadvertently shut off water to the instrument air compressors. The incident did not result in any spread of contamination as the emergency turbine-driven fans took over the ventilation and adequate pressure differentials were maintained within the building.

C. Radiation Experience

All significant information relative to radiation experience in the Finished Products Operation is carried in this report under Control Operation (Item II-D).

D. Security Experience

No security violations occurred during the month in the Finished Products Operation.

Agreement was reached among security, Facilities Engineering Operation and Finished Products Operation personnel relative to security fencing at the U Plant. A realignment of fencing was made necessary due to the construction program at U Plant for the power fuels processing program. Notification has been issued to all interested parties.

E. Personnel Activities

Two subsection managers are participating in the course entitled, "Introduction to Finance".

Fifteen supervisors attended the Relations Information Sessions conducted by Employee Relations.

F. Miscellaneous

L. M. Knights, Manager, Control, visited the Los Alamos Scientific Laboratory on October 8 and 9 to attend a meeting on the Measurement and Control of Plutonium Hazards.

L. I. Brecke, Manager, Fabrication, who represents the Finished Products Operation as a member of a committee, appointed by the AEC, to study glove boxes, visited Washington, D. C., on October 28 and 29. During the course of this meeting Mr. Brecke was appointed Chairman of the Glove Box Operation Subcommittee.

S. D. Smiley of the DuPont Company, Savannah River Plant, visited Z Plant on October 7 to discuss plutonium processing.

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F. Miscellaneous (Cont'd)

Dr. G. H. Tenney of the Los Alamos Scientific Laboratory visited the Final Inspection facility, Control Operation, on October 9, to consult on radiographic work.

Mr. E. Jukkala of the Dow Chemical Company, Rocky Flats Plant, spent a week in the 234-5 Building discussing operating and equipment problems with operating, engineering and technical groups.

Mr. L. I. Kennedy of the Gardner-Denver Company of Seattle, Washington, visited the Z Plant on October 20 to advise regarding the air hoist for use in the hood of the Sheffield gauge.

JJ Courtney

Acting Manager - Finished Products

JJ Courtney:JPT:jjh

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CHEMICAL PROCESSING DEPARTMENT
POWER AND GENERAL MAINTENANCE OPERATION

OCTOBER 1959

I. RESPONSIBILITY

There were no significant changes in responsibilities assigned the Power and General Maintenance Operation during the period covered by this report.

II. ACHIEVEMENT

A. Operating Continuity

There were no outages of steam, water or emergency electrical services that affected continuity of operation of the prime production facilities.

B. Inspection, Maintenance and Repair

Fabrication of two tube bundles for the Purex concentrator is two weeks ahead of schedule. Target completion date for the first unit is November 6, and for the second December 1.

Assembly of the remoteable sieve plate cartridge for the spare Purex HS Column was completed, and the unit was made available for service.

A 200 h.p. electric motor from the Purex Facility was repaired and returned to service. The drive motor to the process cells exhaust blower failed in service, necessitating extensive repairs which included straightening and building up (metalizing) the rotor shaft and installing new bearings.

Replacement of the lower SE panel in the Anion Exchange Hood at the Purex Facility was completed October 30. This replacement was necessitated by severe corrosion in the lower portion of the glove ports of the previously existing panel, which had been in service approximately three months. Evidence accumulated from an investigation of the failed glove ports, and of those stocked on the plant site, revealed excessive softness as compared to lucite, which has a Brinell hardness of 18 to 20. Further investigation disclosed that specifications for these ports allows "lucite, plexiglass or similar materials." Thus, the vendors had been permitted to furnish a softer plastic which is less resistant to HNO_3 . Lucite glove ports were procured for the new panel, and suitable provisions have been taken to tighten the specifications covering future procurement.

A total of 30 pipe jumpers were fabricated during the month, of which 21 were for the Purex Facility, 6 for Special Separation Processing and Auxiliaries, and 3 for the area tank farms.

Fabrication of a Multipurpose Dissolver for the Special Separation Processing and Auxiliaries Operation was started, and progress was an estimated 10 per cent of completion at month's end. Final completion is scheduled for February 1, 1960.

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An electric motor of special design, used in the operation of the optics in the "U" Canyon crane, was rewound and returned to service.

Installation of the powder conveyor unloading system in "G" cell of 224-UA Building is in progress and was approximately 50 per cent complete at month's end. Target completion date is November 13. The work is being done in support of Project CG-767 (Miscellaneous Improvements, UO₃ Plant).

Progress on the fabrication and installation of the Dry Atmosphere Hood and related equipment (Task 7) at the Finished Products Operation has advanced to 80 per cent of completion. Remaining to be done is the installation of instrumentation equipment, electrical services, and refrigeration equipment. The many intangible aspects of this particular project makes the forecasting of a realistic completion schedule impracticable at this time.

The installation of a 26" Vacuum Piping System to the Analytical and Development Laboratories at the Finished Products Operation was completed. The work was done in support of Project CG-826 (Vacuum System Improvements, 234-5) and included installation of demisters, trap sections, drain lines, etc., involving 13 radioactive tie-ins, which were completed without incident.

The Task 4 Furnace Hood at the 234-5 Facility was revised to facilitate access to, and maintenance of, the enclosed equipment. Included in the revision was a new front panel, containing additional and more conveniently located glove ports, and the rerouting of the duct systems connecting the Furnace Hood to the E-4 System.

Installation of the Electron Beam Furnace in Building 231-Z is essentially complete. The system, which is designed for production of high purity plutonium, is currently undergoing operability tests with nonradioactive metals. Pending completion of these tests is the final work of installing the hood panels and leak testing.

An experimental hood, designed for fire testing, was fabricated and installed in the Hanford Laboratories Operation's 231-Z Facility. The unit is equipped with temperature and pressure sensing and recording instrumentation, as well as other services normally supplied operating hoods. The equipment is designed to gather data that will determine the conditions under which various materials will ignite and/or support combustion within a hood.

A 6-foot diameter metal casing was sunk to a depth of 18 feet, in order to obtain a sample section of the 16-inch underground condensate line at the Purex Facility. Facilities Engineering personnel will test and examine the sample section and determine to what extent either electrolysis or galvanic corrosion has affected wall thickness. The shaft was capped with a removable cover and will be retained as a permanent access to the condensate line.

Assistance was rendered the Process Demonstration and Analysis Operation of HLO in modifying the 601-271-CR Building facilities. This work was

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in preparation for the planned study of "Mineral Bed Decontamination of Condensate Waste." Installed in the pump pit of Tank #417 in the 241-A Tank Farm was a Sampling Station from which samples will be taken for analysis in the 601-C Building.

The regular quarterly inventory of precious metals was completed on October 5. A slight overage was attributed to scale variation.

Assistance rendered other departments by the Operation's Ventilation Balancing personnel consisted of:

1. Checking the mechanical balance of all main exhaust fans in the 105-B, C, D, F and H Buildings, and issuing a report of the findings to IPD's Facilities Engineering Operation.
2. Conducting tests of the ventilation systems in the 105-KE Building, and submitting cost estimates for total rebalancing.
3. Completing the rebalancing of the systems in the 105 and 115-D Bldgs.

C. Improvements

Installed on the 200 East Area coal car shaker was a steel safety ladder and catwalk, to provide safer and easier access for servicing personnel. The structure was built in conformance with HAPO Architectural and Civil Standards.

Two-way radio communication was placed in service in the Operation's General Maintenance Component. Four radio-equipped vehicles, assigned to individual foremen, are providing radio contact with the Planner and Scheduler's Office, from which a relay is operated. Utilization of this equipment is providing improved contact with field foremen, increased flexibility, and faster, more effective customer service.

All work forces in the General Maintenance Component were consolidated in the 200 East Area during the month. Particular emphasis was placed on combining the 200 East and 200 West Areas heavy equipment units, which are now operating as a single unit under the direction of one foreman. Improved coordination and utilization of men and equipment is being experienced, and the General Maintenance work force has been reduced by a total of six people to date as a result of this pooling of manpower and equipment.

III. ORGANIZATION AND PERSONNEL

A. Safety and Security

The Operation incurred no disabling injuries during the month.

There were 12 medical treatment cases reported, which reflects an injury frequency rate of 2.69 per cent, a marked improvement over the previous month's 4.76 per cent.

There were no security violations reported.

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B. Personnel

P.E.L. Nussbaum and W. W. Wahl attended the Pacific Northwest Building Owners and Managers Conference held in Yakima, Washington, October 19 and 20.

P. E. Cunningham and O. R. Harris visited the coal mines of the N. P. Railway Co. at Roslyn, Washington, on October 2, to investigate the cause of high moisture content of coal being received on site.

T. G. La Follette / ovs

Manager-Power & General Maintenance

TGL:JFL:ap

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CHEMICAL PROCESSING DEPARTMENT
FINANCIAL OPERATION

OCTOBER, 1959

I. RESPONSIBILITY

There was no change in the responsibilities assigned to the Financial Operation during the month.

II. ACHIEVEMENT

A. Production Cost

The FY 1960 Midyear Budget Review will be forwarded to Contract and Accounting on Friday, November 6. The Financial Plan limitation placed on the 2000 Program has necessitated very close and careful analysis of section requirements due to the absence of any contingency factor. In each of the sections any unforeseen cost of five digit magnitude could overrun section budgets; however, for the department as a whole it is believed that we should be able to operate within allocated funds. Of major concern in this area are provisions for winter coal and spare part replacement, respectively at the mercy of the weather and equipment failure rates.

The CPD buildings and grounds maintenance study was completed and issued to concerned section and subsection management. The study was made to determine the adequacy of current financial coding and reporting for this type of activity, to increase the fund of data required for proper budget preparation and cost control, and to suggest cost control possibilities for management consideration.

The first quarter of FY 1960 costs of Redox have been recast into the Special Separation Processing and Auxiliaries Operation organizational structure. The FY 1960 budget has also been recast in connection with the Midyear Review. Much activity during the month centered around Midyear Review contacts and preparation.

Arrangements have been made to duplicate all CPD operating reports at the 200-E Duplicating office. This action was necessitated by lack of facilities in the 700 Area and our desire to issue reports as promptly as possible.

B. Personnel Accounting

Educational loans have been made to six CPD employees. Five of the loans made to date are for the education of dependents of CPD employees; one loan was made to a CPD employee who is now on an educational leave.

Service has been restored for one CPD employee who returned in September from two years in school. Restoration of service in this case required adjustment of continuity of service date by the full length of time absent from the payroll. If original absence had been due to illness or lack of work, six months of the period of absence would have been registered as credited service.

C. General Accounting

Arrangements were made with Facilities Engineering for a physical inventory of plant and equipment located in Buildings 221-U, 271-U, and 291-U. This inventory will be necessary prior to the transfer of custodial responsibility to Facilities Engineering. Preliminary planning for disposal of various equipment in these buildings has been started.

Commission concurrence with CPD's decision to capitalize the recently developed titanium tube bundles has been requested.

During October the following increases in authorized funds were received from the AEC:

CG-734	RMC Button Line - 234-5 Building from \$1,480,000 to \$1,845,000 to cover additional construction.
CGC-811	Additional Pu Fabrication Facilities - 234-5 Building from \$1,600,000 to \$3,500,000 for total project.
CAC-812	Equipment Decontamination Building - 2706-W from \$27,000 to \$29,000 to cover additional Design, Title III, and Management Services.

Five Appropriation Requests were approved in October for a total of \$167,475, broken down as follows:

<u>A.R. No.</u>	<u>Description</u>	<u>Operation</u>	<u>Amount</u>
60-CPD-6	Mass Spectrometer	FPO	\$ 96 875
60-CPD-4	Concentration, Purification, and Recovery Hoods for Critical Mass Program	R&E	40 000
60-CPD-3	PRTR Pu Preparation Hood	R&E	25 000
60-CPD-8	Capital Equipment Associated with Sheffield Gage	R&E	4 000
60-CPD-7	Ultrasonic Cleaner	Redox	1 600
			<u>\$167 475</u>

D. Auditing

A formal audit report was issued covering findings and recommendations relating to an audit of Timekeeping Practices. In our opinion, the activities audited were, with exceptions noted, satisfactory. Audit memorandums were issued to section managers as deemed appropriate and prompt administrative remedial action was taken.

A meeting was held with C&AO Property Management to review a proposed HAPO OPG relating to control of government materials furnished fixed price contractors.

E. Measurements and Procedures

The third quarter productivity reports for CPD, Special Separation Processing and Auxiliaries Operation and Purex Operation were prepared and issued.

The procedure study of the FEO material control group was reviewed with the Manager - Project Engineering who has requested clarification on certain points which will require further investigation.

III. ORGANIZATION AND PERSONNEL

- A. No medical treatment, disabling injuries, or security violations were experienced during the month.

A safety and security meeting for Financial personnel was held on October 21, 1959.

B. Reports Issued

HW-62365	CPD Cost and Production Analysis - September, 1959	KG Grimm
HW-62366	Redox Operation Cost and Production Analysis - September, 1959	FA Fieser
HW-62367	Purex Operation Cost and Production Analysis - September, 1959	FA Fieser
HW-62368	Finished Products Operation Cost and Production Analysis - September, 1959	FA Fieser
HW-62502	Special Separation Processing and Auxiliaries Operation Productivity Report - Nine Months Ended 9-30-59	FA Fieser
HW-62503	Purex Operation Productivity Report - Nine Months Ended 9-30-59	FA Fieser

- C. A course, "Introduction to Finance", was prepared and is currently being presented to selected subsection managers. This course is designed to better equip the managers in the area of finance as related to their functions. The length is five sessions covering eleven subjects, and the various managers and specialists within the Financial function are the instructors.

Acting Manager - Finance

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CHEMICAL PROCESSING DEPARTMENT
FACILITIES ENGINEERING OPERATION

October, 1959

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I. RESPONSIBILITY

There was no change during the month of responsibility and accountability assigned to Facilities Engineering.

II. ACHIEVEMENTS

PUREX OPERATION

A. Research and Development

Waste Disposal

A meeting was held on September 29 with representatives from CPD and HLO to discuss the type of interim storage for Purex LWW wastes. The participants concluded that there are now insufficient data to formulate a decision on the type of storage which would be most advantageous from the standpoint of over-all waste storage-fission product recovery. Several studies were formulated to obtain additional information. Basically, the studies included (1) a scope design of an interim storage tank for acidic LWW; (2) evaluation of the over-all waste solidification and fission product recovery programs; (3) determination of the quantity and characteristics of solids evolved in acid and neutralized LWW; (4) continue the development of waste solidification processes for acid and neutralized LWW with and without carbonate wash wastes; (5) continue corrosion studies on metals in acid and neutralized LWW; and (6) continue pilot plant studies of waste solidification and include neutralized LWW. The completion of these studies will defer the scope and design criteria until at least November 1960.

A method of cooling the liquid, acidic LWW wastes to prevent boiling during interim storage is being evaluated to incorporate replaceable cooling coils within a replaceable, variable-head, air-lift circulator. The primary advantages of this method, as compared to current methods of installing cooling coils of the sides and bottom of the container, are (1) increased cooling efficiency; (2) maintainable cooling system; (3) simplified piping arrangements and instrumentation control.

At present, two 32,000-gallon tanks are being considered for the first new containers for acid LWW wastes. One of these tanks could receive LWW wastes continuously from process for two or three months. This size of

container should adequately contain a representative sample of the waste solution from process. Also, the geometry of this structure will permit an evaluation of the parameters of the solids problems which can be incorporated into larger capacity tanks.

In-Line Photometer, HSP Stream

During the last shutdown, the sample cell was flushed, but the radiation level at the cell is still approximately 10 R/hour. It has not been possible to do enough maintenance work on the installation to put it into operation.

F-F6 Demister Installation

A target completion date for the Phase I installation was established as February 1, 1960. Procurement of the tantalum demister pad has been initiated. Additional studies were made on the Phase II Single-Stage Waste Concentration routings to permit by-passing of the E-F11 Concentrator System. Hydraulic design sketches were prepared defining the routing of E-F6 Concentrator overflow to TK-12 using either a gas lift or a jet with positive suction. Vendors have been contacted for recommendations on the necessary jet.

B. Process Technology

Titanium Tube Bundle

Process information was supplied on the relative surface area requirements for the five Purex Concentrators under current flowsheets. While the boilup requirements on the E-H4, E-J8, and E-K4 concentrator reboilers have changed somewhat recently, the requirements for E-F11 and E-F6 reboilers have remained about the same. Since the process specifications on a titanium reboiler which can be used as a universal spare in any concentrator are dictated by E-F11 and E-F6 requirements, previous titanium reboiler specifications are still valid under the above sparing philosophy.

As a result of discussions on October 1 with the vendor's representative and in recognition of the high cost of the titanium reboiler, it was decided that the first titanium reboiler should be sized specifically for duty in the E-H4 Concentrator, where corrosion resistance requirements under current flowsheets are the most severe. A reboiler sized for E-H4 would have less surface than for E-F11 and would, therefore, be less costly. Under the revised philosophy, the E-H4 reboiler would serve as a prototype unit on which heat transfer coefficient data on the "bent-tube" concept would be obtained. Process specifications were transmitted on a titanium bundle for E-H4 which would have adequate surface to assume the entire boilup duty (permitting shutdown of the companion stainless unit) if a

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coefficient of 500 BTU/hour/square foot/^oF could be realized.

The vendor has agreed to prepare two proposals, one for a titanium unit and one for a titanium-stainless steel unit, both sized for E-H⁴ use. A contract package to cover each proposal has been sent to the vendor. Further discussions and final negotiations are scheduled for November 2, 1959.

Alternate Spray Head

Design and drawings have been completed for an alternate spray line for centrifuge E-2. The original upper spray nozzle, which is bolted to the main vessel, failed. Nozzles have been inserted in a modified dip leg assembly. Drawings for a new jumper to the alternate location are also complete. Repair of the original nozzles would require removal and decontamination of the vessel.

Wash-Down Tank Modifications

Modification of drawings for conversion of a stainless steel burial capsule to a decontamination tank have been completed. The purpose of the unit is to minimize surface contamination of equipment to be removed from the building for burial or further decontamination.

High-Level Cave Design

Scope design was completed on a lead cave for high-level sample analyses for the Purex Laboratory Operation, to be located in the sample gallery.

Jumper Cutter

The vendor's preliminary drawing of the jumper cutter was received for review. Comments relating to achieving suitable workability of the unit were returned.

C. Plant Engineering

New Pipe Jumpers

Two new pipe jumper drawings have been prepared and approved for issue. These jumpers will divert condensate from concentrator F-9 to tanks F-8 or F-7. Previous diversion was to tank F-8 or F-10.

Lifting Yoke Redesign

Design and drawings have been completed for redesign of the jumper burial box yoke. The redesign features limited movement of the hooks for easier engagement and shortens head space for needed crane clearance.

Purex Canyon

Minor construction forces have started work on the Purex canyon damper installation.

Condensate Header

A section was cut from the 16-inch drain pipe condensate header and examined visually. There was apparently very little corrosion of the pipe wall; however, the sample was decontaminated and sent to the laboratory for closer examination.

D. Project Activities*

CGC-873 Fission Product Loadout Facility - Purex

A modified directive (HW-497, Modification 1, dated October 30, 1959) authorized the remaining \$56,000 of this project, thereby giving General Electric Company total project funds in the amount of \$66,000.

REDOX OPERATION

A. Research and Development

Pu Concentration Monitor, 3BP Stream

Calibration of this monitor by comparison with samples has proceeded very well, and the monitor is functioning satisfactorily. It is being used as an operating tool in process control.

B. Process Technology

Off-Gas Iodine Monitor

Arrangements are being completed to install a scintillation detector and single-channel energy analyzer in the 292-S Building. An attempt will be made to check for iodine 131 in the off-gas with a detector on the absorber tower. A transistorized instrument has been under development and test for this application.

H-4 Oxidizer Vessel

Drawing H-2-39980 for the H-4 Oxidizer Vessel was reviewed. Welds at flat heads and bottoms to shell, and at stiffeners to bottom were reduced with a savings of approximately \$255.00 being effected.

* Additional information on all Project Activities may be found in the Semimonthly Status Reports.

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C. Plant EngineeringDrawing Revisions

Ten drawings on process equipment and jumper revisions have been processed based on redesign of failed equipment or as-built information.

D. Project Activities*CG-686 In-Line Monitors

The Redox absorptiometer was placed in operation on the LAFS sampler, and functioned very well. However, at the present time, the sample radiation level which occurs with a new trial flowsheet is too high to permit operation.

CGC-830 Plant Modifications for Reprocessing Non-Production Reactor Fuels

A requisition for the 75-ton crane required for the Receiving Facility is being held pending information from the AEC regarding a crane that they believe is available in a closed Navy Yard. Definite information is expected during the first week of November.

The Design Criteria for the Fuel Element Storage Facility was transmitted to the Vitro Engineering Company for Title II design. A completion date of March 15, 1960 was specified for this phase of work.

FINISHED PRODUCTS OPERATIONA. Research and DevelopmentRMA Replacement

Information developed by the study group on a Z Plant Ten-Year Business Program has indicated a need for reviewing and revising the presently-planned work on the RMA Replacement. The ten-year capital expenditures program developed for the button lines defers the replacement of the RMA line for about two years. This delay allows time for development of process improvements and further development and testing of the equipment concepts already under study for the RMA Replacement. Equipment development and testing already underway is being reoriented according to the proposed changes in technology. Equipment improvements which might not be applicable to the RMA replacement because of proposed process changes will be directed toward near-future installation in the present button lines.

New Reclamation Facility

Detailed material balance calculations were completed for the process flow diagrams based on the flowsheet supplied by R&E for the new plutonium reclamation facility.

Radiation Studies

A study was made of Z Plant hand exposure similar to the study made last month for whole body exposure. Ring readings, time-operation studies, actual dose rate measurements, and theoretical calculations were used as bases for predicting the hand exposure to various isotopic contents which may be encountered in the future.

Weapons

A minor amount of follow-up has been required for the prototype dry atmosphere hood installation. A hot test of the mock-up transfer can square joint principle was performed on an inspection hood. Results were unsatisfactory, and the design is being reviewed for modification. The Sheffield Gage Hood is being constructed in the 200 West Shops. The Sheffield Gage proper has been transferred to Oak Ridge due to priority requirements. A replacement gage is scheduled for delivery in about six months.

Neutron Counters

Developmental breadboard model work was completed on the preamplifier and amplifier to be used in final inspection. Drawings have been completed for the instrumentation and are being routed for approvals. The amplifier design is also applicable to waste monitors, and one will be fabricated in the local shops for further tests and application.

For energy analysis, the double moderator neutron counter installation has been completed with the receipt and mounting of the polyethylene moderator cylinders. The equipment is in operation on experimental studies of neutron energies and shielding effectiveness.

For the incinerator project further general design considerations were reviewed on neutron counters for Project CGC-813. Information which had been obtained on the Hurst type fast neutron detector was forwarded to Instrument design.

B. Process Technology

Vacuum Drum Filter

The new critically-safe vacuum drum filter doctor blade did not fit the Hood H-9A installation. Actual hood dimensions were taken and a mock-up

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was made of the filter-calciner installation. A sheet metal model has been fabricated based on the new dimensions and will be tested for fit in Hood H-9A before a new assembly is made.

Distribution of Recuplex Costs

A revised system was developed for the equitable distribution of recovery costs. An evaluation of Recuplex process technology, in terms of interacting cost influence, was required as a basis for this determination. The approach has been integrated with operations management and is slated for consideration in the present mid-year budget review.

Task III Cutter Blades

The crucible cutter blades used in Task III have previously been cast from Hastelloy C. Recent usage experience resulted in depletion of spare parts stock, and three months delivery is estimated for blades as previously made. Two sets of blades were fabricated in the CPD shops to evaluate (1) machining the blades from stainless steel bar stock, and (2) fabricated (including welding) the blades from stainless steel sheet stock. Blades of each type are currently being installed in the RMA line for evaluation during operation.

C. Plant Engineering

Recuplex Tube Bundle

Sample weldments were made to duplicate the shell-to-tube sheet joint on the Recycle Concentrator Tube Bundle. The joints were found to shrink 1/16 inch across the weld and the tube sheet was dished 1/16 inch as a result of welding. Separate weldments were made using both the metal-arc and tungsten-arc processes. The shrinkage was nearly the same for each process. A slight amount of cracking occurred on the first pass. Cracks were repaired successfully. Details of the investigation and measures that should be taken in order to build the vessel to drawing requirements were forwarded to 328 Shops personnel. This investigation is especially pertinent since the 430 tube sheets have been finish-machined prior to assembly.

D. Project Activities*

CG-734 RMC Button Line

Several revisions were made or are planned to make the Hood HC-16CC crucible cutter operable: (1) larger different type vibrator; (2) cutter blade redesign; and (3) larger hydraulic cylinders. Approaches being taken to obtain a satisfactory slag and crucible grinder for Hood HC-17DC are: (1) the speed of the present grinder has been increased with testing in progress; (2) preliminary testing of an American Pulverizer Company

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laboratory-size hammermill indicates adequate performance; and (3) adaptation of a rock drill bit has been scoped.

Field progress is 97 percent complete as scheduled. Erection of maintenance platforms at hoods HC-7 and HC-9B has been completed. Installation of the HC-17 density balance is complete. Acceptance testing of HC-17P and HC-17SBB is in progress. Fabrication of plexiglas panels with glove ports is continuing. Verification of glass cutting techniques was made by the project engineer on a trip to visit glass vendors (Corning, Penberthy). As a result, a high degree of confidence is now felt in the planned on site shielding glass work.

CG-789 Additional Fire Protection - 234-5 Building

Detail design is 98 percent complete against a 100 percent completion scheduled. The bids were opened on October 14, and notice to proceed was issued to National Automatic Sprinkler Co., Portland, Oregon, on October 21.

GENERAL ACTIVITIES

A. Research and Development

NPR Supporting Work

Drawings covering the preliminary design of NPR transfer casks and cask cars, prepared under auspices of IPD to permit definition of the NPR 105-N Building transfer area, were forwarded to CPD for approval. A comprehensive review of the nuclear safety aspects of the cask was made by Advance Process Development. This review indicated that the cask would probably be sub-critical although experiments are needed to confirm its nuclear safety. Preliminary planning for the criticality experimental work is in progress; tentatively, the nuclear safety experiments would be completed in about 8 months. IPD personnel were advised informally that our approval of the subject drawings would be deferred pending the outcome of the above experiments.

Palmolive Studies

Cost estimates for several alternative Palmolive processing schemes were developed for transmittal to the Commission. The following alternative facilities and estimated costs are included in the letter: (1) Virgin Palm Purification to the Nitrate at Purex - \$260,000; (2) Virgin Palm Purification and Conversion to the Oxide at Hot Semiworks - \$560,000; (3) Palmolive Separations, Olive Decontamination, and Palm Purification and Conversion to the Oxide at Hot Semiworks - \$1,470,000; and (4) Virgin Palm Purification, Oxide Conversion, and Fabrication at Hot Semiworks - \$884,000. The capabilities of the proposed Palmolive Facility were also

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evaluated and the following nominal Palm throughput capabilities determined.

201-C Building Separations

1. Dissolution and Feed Preparation	520 Kgs/year
2. Solvent Extraction	280 Kgs/year
3. Ion Exchange	220 Kgs/year

276-C Building Fabrication

1. Wet Chemistry and Oxide Conversion	530 Kgs/year
2. Fabrication	3,200 Elements/year
HAPO Elements	400 Kgs/year
SRP Elements	120 Kgs/year

Seismic Survey

A geo-physics research team from Washington State University made ground motion and sound velocity studies of the HAPO area. These studies were undertaken to determine the feasibility of this type of preliminary exploration in defining the size and location of water mounds.

B. Process Technology

Waste Carton Monitor

Sketches have been completed of a waste carton monitor, using neutron counting to determine Pu content. The proposed design is being reviewed with the processing operation. In order to obtain experimental data to assist in the final design of this and other similar types of monitors, a large tank with an annular water moderator space has been fabricated. It is being set up in the Instrument Lab to measure sensitivity and to determine the response of the detectors to various physical arrangements of source, detector, and moderator.

Evaluation of Gamma Scintillation Monitor

The remote gamma scintillation monitor developed during 1958 is being evaluated as an instrument for detection of concealed plutonium deposits. The 26-inch vacuum piping in the 234-5 Building duct level was used for initial testing. It had been used on 200-feet of the 6-inch diameter piping in October 1958 and from readings obtained at least 10 Kg of plutonium was predicted as being deposited. Flushing during the past year has recovered 9 Kg of the concealed plutonium. 800-feet of previously unchecked duct level vacuum line showed 150-feet of it to not require flushing.

Detection of Plutonium in Process Equipment

Following the very favorable detection performance of the remote gamma scintillation monitor on the duct level vacuum lines, the instrument was further evaluated for use on process equipment.

The J-1 tank of Recuplex in 234-5 Building was selected for evaluation. This tank was being replaced with a new one after having been flushed for removal of plutonium. Readings with this detection instrument showed gamma emitting deposits in the bottom of this horizontal tank. Cross-checks with neutron monitors indicated appreciable plutonium to be present. The tank is being stored.

The potential need for a large area for disassembling process equipment as a means of positively confirming absence of concealed plutonium residues has led to a study of F Cell in 224-T for this purpose. The possibility of removing F and G Cells from layaway status for this purpose is being investigated.

Inspection and Handling of High-Efficiency Filters

Recommended procedures were prepared for on-site inspection and handling of high-efficiency space filters to ensure that these filters are in a condition to obtain maximum filtration when installed. These procedures were issued to the CPD plants and to the Project Engineering Operation, with the request to include the on-site inspection requirement on all future filter purchases.

Specifications

HWS-6151, Specification for Fabrication of Titanium Vessels and Components, was revised October 12, 1959 for use in the Griscom-Russell titanium re-boiler procurement program.

C. Plant Engineering

Utilization of Process Connector Components

Arrangements have been made to utilize the present stock of components to complete the sub-assemblies now required. Future orders will be placed with cognizance of this utilization and the remainders of each components.

D. Project Activities

Project cost information as of October 18, 1959:

Total authorized funds - 19 active projects	\$ 10,158,570
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Total cost-to-date	3,545,559
Commitments and open work release	691,167
Unencumbered balance	5,921,844
Costs charged to above projects 9-20-59 to 10-18-59	194,896

CGC-830 NPF Reprocessing

Detailed process flow diagrams for Sulfex decladding of Yankee elements and Zirflex decladding of Dresden elements were completed. They should be ready to issue for comment about November 2, 1959. These flowsheets include material balances, heat duties, flowrates, time cycles, etc.

The principal problem for the Sulfex process is the high dissolution rate and resulting high gas rates when the evolved H_2 is diluted below the explosive limit with air. It has been assumed that dissolution rates can be limited to 6 mils/hour average and a maximum of 10 mils/hour through control of H_2SO_4 concentration and temperature control. This has not been proven in pilot plant investigations yet where average rates as high as 25 mils/hour have been encountered with 4 M H_2SO_4 .

The principal problem for the Zirflex process is the NH_3 removal. A differential equation was developed to express the rate of ammonia buildup as a function of reaction rate and boilup rate. It was found that a boilup rate of 1.5 million BTU/hour (approximately 550 Ft^3 vapor/min) would be required to limit the maximum dissolved NH_3 concentration to 1 M for a 6 assembly charge of Dresden elements. This high boilup rate may cause foaming problems in our criticality safe dissolver concept.

This study indicated a need for more precise NH_3 -Zirflex solution equilibrium data and quantitative data on the effect of dissolved NH_3 on Zirflex reaction rates. The equilibrium data used was based on NH_3 - H_2O data and might be considerably in error because of the common ion effect of the NH_4F . The maximum allowable NH_3 concentration of 1 M was rather arbitrarily established and might be considerably in error.

The possibility of high U losses for Zirflex operation in the summer months was also uncovered. Uranium losses as soluble UF_4 have been based on solution temperatures of 70-75° F and it will be impractical to cool to this temperature when cooling water temperatures approach 70° F. Additional UF_4 solubility investigations at higher temperatures are also needed.

Work is now in progress on core dissolution flowsheets for both the Yankee and Dresden elements.

Equipment Development

New study drawings have been prepared for the mechanical cell. The new arrangement provides for isolation of the shear water from the other water

in the cell. This allows the cell water level to be lowered providing more working space for special disassembly operations and for the examination of dissolver debris.

A purchase order has been issued to Bird Machine Company for the performance of centrifugation tests using simulated power fuel slurries in a Bird laboratory centrifuge. Engineering data from these tests will be used to prepare purchase specifications for the final unit.

By agreement with Hanford Laboratories, further power fuel saw development will be concentrated on the reciprocating hack saw. Development of the cold saw and the friction saw will be dropped permitting the laboratory to spend more time on the development of specialty items for the mechanical cell.

III. ORGANIZATION AND PERSONNEL

A. Personnel

George Kligfield, Vitro Engineering Company, arrived October 6 to work in scoping assistance for the NPF Reprocessing Program. Marvin Kass left October 15 for New York where he will complete the 221-U Building ventilation scope assistance work he started here.

D. W. Morris, previously on loan from Redox, returned to his organization during the last week of October.

B. Safety and Security

The regular safety-security-health meetings were conducted for all FEO employees, and the Operation participated in the Fire Prevention Week Activities. There was one security violation.

C. Reports Issued

L. L. Zahn presented a paper entitled, "Receiving, Storage, and Mechanical Processing Operations at Hanford for Chemical Reprocessing of Power, Research, and Test Reactor Fuels", at the AEC Symposium October 20.

HW-55176, Pt. VII, "Index of CPD Crib Building Numbers - Design of CPD Radioactive Liquid Waste Disposal Sites", E. Doud, October 1959.

HW-61755, Pt. I, "Z Plant Radiation Study Interim Report #5 - Part I Possibilities for Reducing NPR Gamma Dose Rates". Part II Data on Gamma Shielding of Special Plutonium Samples", H. A. Moulthrop, October 22, 1959.

HW-59919, "Limitations for Existing Storage Tanks for Radioactive Wastes from Separations Plants", E. Doud and H. W. Stivers, October 22, 1959.

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HW-62234, "Titanium Reboiler for Purex H-4 Concentrator", L. K. Nichols, October 7, 1959.

HW-62457, "Palmolive Capabilities", W. K. MacCready, October 13, 1959.

Letter, J. T. Christy from H. P. Shaw, "Project CGC-772, Redox Multi-Purpose Dissolver, Non-Scope Revision, Neutron Absorber Plug", October 2, 1959.

Letter and Draft, "Symposium on Chemical Reprocessing of Power, Research, and Test Reactor Fuels Receiving, Storage, and Mechanical Processing Operations at Hanford", October 14, 1959.

Draft, "Mechanical Cell Criteria - CGC-830, October 16, 1959.

Letter, L. P. Bupp from H. P. Shaw, "Hot Semiworks Equipment", October 22.

Letter, G. Kligfield from L. L. Zahn, "Project CGC-830, NPF Reprocessing, Title I Assistance Work Assignment No. 1", October 29, 1959.

HW-61877, Rev. 1 - "Performance Criteria of a Titanium Reboiler for H-4 Purex Concentrator", October 13, 1959. Prepared by J. F. Kane.

Letter, "Handling, Inspection, Storage and Installation of High-Efficiency Space Filters", D. A. Snyder to Plant Maintenance Managers, dated October 22.

Group Utilization of Time Study - General Maintenance Operation, dated September 20, 1959, by A. C. Morgenthaler.

Group Utilization of Time Study - Shops Operation, dated September 20, 1959, by A. C. Morgenthaler.

Construction Status Chart, CG-772, issued October 26, 1959.

Task Force - 234-5 Equipment Costs (Rough Draft) dated October 29, 1959, by D. R. Gustavson.

HW-62533-RD, "CPD Project Authorizations Goal for FY-1960", by D. R. Gustavson, dated October 29, 1959.

"Measurement Report - Facilities Planning Operation", to C. E. Kent by D. R. Gustavson, dated October 23, 1959.

D. Invention Reports

Combination Trough Tray and Vertical Tube Dissolver for Enriched Power Reactor Fuels; R. W. McKee and W. A. Graf.

E. Trips and Visitors

Trips

L. L. Zahn visited the Metallurgical Products Department in Detroit on October 1 and 2 to discuss the development of suitable materials for the NPF Dissolving system.

E. O. Swain attended an Ad Hoc Committee meeting on glove box design in Washington, D. C., on October 27-30, 1959.

On October 16 through October 25, W. H. Roos made a trip to Chicago, Illinois and Nela Park, Cleveland, Ohio to attend the National Safety Congress and to exchange information with G. E. Lamp Department safety personnel.

G. P. Kesel visited the Corning Glass Works in Harrodsburg, Kentucky and the Penberthy Instrument Company of Seattle, Washington, on October 24th, 26th, and 27th, to discuss problems concerning the manufacture, cutting, handling, and protection of polished surfaces of lead glass to be utilized for shielding on Project CG-734.

Visitors

Mr. P. S. Otten, Griscom-Russell Company, Massillon, Ohio, October 1, 1959, for discussions on design and fabrication of titanium reboiler unit.

Mr. George Sherrerd of the Bird Machine Company visited HAPO on October 12, 1959, to discuss minor design changes, relating principally to prevention of liquid overflow into the solids discharge, to the critically-safe centrifuge.

E. Doud and other HAPO personnel discussed waste disposal with H. H. Moeken of Eurochemic October 16, 1959.

Messrs. H. E. Jacoly and L. H. Hollmeyer of the Chicago Bridge and Iron Company discussed waste evaporators with H. W. Stivers and E. Doud on October 22, 1959. E. Doud discussed waste storage tanks with Sam Smiley, et al of the duPont Company on October 6 and H. A. Moulthrop demonstrated flanged equipment bag-out procedures for Mr. Smiley on October 7.

Manager

Facilities Engineering

HP Shaw:WWC:al

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CHEMICAL PROCESSING DEPARTMENT
RESEARCH AND ENGINEERING OPERATION

OCTOBER, 1959

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PUREX PROCESS TECHNOLOGY -

Fission Product Recovery

Twenty-one hundred gallons of IWW (waste from processing 65 tons of uranium) were centrifuged and the solids leached with 6 M nitric acid for the recovery of cerium and rare earths. Adjustment of the leach liquor to 1 M sodium sulfate at 2.0 pH followed by digestion at 90°C precipitated about 75 per cent of the cerium. After centrifugation and washing with 1.0 M sodium sulfate at pH 1.0, the sulfate cake was leached with 6 M nitric acid, neutralized to pH 1.2 and a solution of 1.5 M sodium acetate and 6 per cent hydrogen peroxide was added until cerium peroxyacetate was precipitated from the solution containing 0.28 M acetate and 0.33 M peroxide. Upon completion of a 50°C digestion, the solution was centrifuged, the solids washed and then leached to recover >95 per cent of the cerium. Only 14 per cent of the cerium in the IWW was recovered because, contrary to previous experience, the majority of the cerium remained with original IWW centrifugate, which was discarded. Good ruthenium decontamination (DF = 260) but poor zirconium-niobium decontamination (DF = 1) was experienced. Although no separation from rare earths was experienced, this was probably due to poor control during the peroxyacetate precipitation step.

Solvent Extraction

Eighty-four per cent of the month was spent in normal irradiated uranium processing; the remainder of the time was used for neptunium recovery run plus extensive flushing of the solvent extraction columns. Typical performance data for the normal operating period are summarized below:

	<u>Log Decontamination</u> <u>Factor, dF</u>		<u>Instantaneous</u> <u>Loss, Percent</u>	<u>Recycle,</u> <u>Percent</u>	
	<u>Plutonium</u>	<u>Uranium</u>	<u>Plutonium</u>	<u>Plutonium</u>	<u>Uranium</u>
First	3.9	3.9	0.05	-	-
Final	3.6	2.6	-	2.2	11.0
Ion Exchange	0.5	-	-	3.5	-
Overall	8.0	6.5	0.05	5.7	11.0

Smooth operation of the plant was hampered by mechanical difficulties which, in addition to a critical pump and valve failure, included a restriction in the organic overflow line from the HA to the HS Column. While the latter did not significantly disturb the equilibrium of the plant, it did limit the plant capacity to CF = 2.3. Operation at higher rates resulted in overflow of the HAP into the waste collection tank via the vessel vent line. At month end, after the rate had been gradually reduced to CF = 2.0 by greater restriction of the line, the plant was shut down to inspect the HA Column scrub cartridge. The line restriction was thought to be broken pieces of polyethylene plates lodging in the organic overflow line.

Although both products greatly exceeded gamma specifications shortly after startup, the gamma activities of the intercycle and product streams declined rapidly, probably as a result of the extensive column flushing during the shutdown period. Rework of IWW plus HAP which had overflowed the HA Column during attempts to operate at rates above $CF = 2.3$ increased the gamma activity in the intercycle and final product streams. All the uranium product produced (Gamma ratio 2.5 to 5.5) required silica gel treatment to meet the <2.0 gamma ratio specification.

Decontamination of plutonium paralleled that of the uranium. A high initial gamma activity in the final product rapidly declined to within specifications, but then increased when IWW and HAP rework were added to the HAF and IBXF, respectively. Subsequently, rework of HAP had to be terminated because the continued high gamma activity in the intercycle streams produced plutonium product borderline with respect to G/AT specifications.

HA Column plutonium losses were somewhat erratic and averaged about two-fold higher than the normal 0.03 per cent. Peculiar operational behavior which appeared to be caused by intermittent flooding in the HA Column scrub section made smooth control of the column difficult and produced cyclic plutonium losses up to 0.2 per cent.

Sporadic high plutonium concentrations in the IBU at startup (up to 10 per cent versus a normal 0.3 to 0.4 per cent) gave indications of a tendency for loss of partitioning, but the condition rapidly corrected itself.

Other items of interest to solvent extraction during the month included:

- (a) Decontamination performance in the HS Column was not significantly affected over the 87 to 109 frequency range of the new, long-stroke pulse generator (0.70 inch column amplitude vice 0.53 inch).
- (b) Hot concentrated nitric acid flushes of all first cycle columns revealed no plutonium holdup. All first cycle equipment was also given cleanup and decontamination flushes.
- (c) A plutonium breakthrough into the uranium product was overcome by increasing the 2DF ferrous sulfamate addition to 250 per cent of flowsheet (0.12 flows) and a 25 per cent increase in the 2DS rate.
- (d) A caustic-tartrate flush was required to decontaminate the 2A Column upon completion of the neptunium recovery run.

Neptunium Recovery

Successful completion of the neptunium recovery run, patterned after the July 1959 run, produced 1370 grams of decontaminated neptunium. Minor flowsheet adjustments were necessary to maintain proper balance between nitric acid and uranium within the system. An organic phase uranium saturation of 42 per cent with about 20 per cent uranium recycle via the 2BP to the 2AF tank was established as an optimum condition. Despite the higher-than-normal neptunium concentration in the feed, the neptunium recycle to the 3WB via the 2AW and 2BW was only 1.4 and 2.8 per cent, respectively. Product decontamination with respect to fission products and metallic ions was adequate as shown by the following analysis:

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	<u>Np</u> <u>g/l</u>	<u>HNO₃</u> <u>M</u>	<u>Contaminants, Per Cent of Np</u>			<u>Gamma Activity</u> <u>uc/gal</u>
			<u>Pu</u>	<u>U</u>	<u>Fe</u>	
Load Out	34.8	9.4	0.34	148	26	7.0×10^4
First Flush	16.1	9.3	0.35	155	27	3.4×10^4

Neptunium loss via the HAW has been averaged only about 15 per cent since startup despite large quantities of both IWW and HAP organic rework and operational difficulties with the HA-HS Column system. The addition of nitric acid to the HA Column scrub section has apparently prevented large periodic refluxes of neptunium in the HA-HS Columns, which previously produced sporadic, high HAW neptunium losses. A 10-fold above normal neptunium loss to the 2DU stream was experienced at startup but rapidly declined to normal.

Plutonium Concentration

Both mechanical and process performance of the Plutonium Ion Exchange unit continued to be excellent during the run period. Sluggish resin pushing, experienced near the end of the last operating period, was corrected by the resin change. High radiation levels produced a gamma activity burst at the plant shutdown were reduced by nitric acid flushing.

Solvent Treatment

Operation of the No. 1 Solvent System at CF = 1.44 during the neptunium recovery run permitted recycle of about 90 per cent of the solvent through the system with a resultant decrease in solvent fission product gamma activity from 1500 to <300 uc/gal. A 6000 gallon fresh solvent makeup, which replaced the solvent lost to the waste collection tank as HAP, assisted in maintaining low solvent gamma activity and good solvent quality after startup; however, the solvent gamma activity rose steadily to 2500 uc/gal during rework of the overflowed HAP and IWW.

Oxalic-nitric acid, caustic tartrate and 25 per cent nitric acid flushes were used to remove residual MnO₂ from the solvent batch wash tank.

After solvent extraction rework of the overflowed HAP was terminated, the remaining 2000 gallons of HAP were water-stripped and carbonate-washed to remove the plutonium and uranium. The solvent was then recovered by processing it through the No. 1 Solvent Treatment System.

Waste Treatment and Acid Recovery

Satisfactory operation of the Waste Treatment and Acid Recovery equipment was experienced during the month. Waste transferred to the underground storage tanks averaged 48, 666 and 84 gallons per ton of uranium for neutralized IWW, solvent washes and cell drainage, respectively. Overall plutonium and uranium losses were 0.37 and 0.12 per cent, respectively. The high losses reflect forced discard of startup wastes because of a lack of available waste storage within the building plus extensive equipment flushing. Plutonium and uranium coating waste losses accounted for 19 and 10 per cent, respectively, of the overall losses.

Self-concentration continues in underground storage tanks 241-A-101, 102, 103 and 104 at boil-off rates of 2.5, 9.1, 1.0 and 8.4 gallons per minute, respectively.

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REDOX TECHNOLOGY OPERATION -Feed Preparation

All solvent extraction feed during the month was oxidized with sodium dichromate in place of potassium permanganate. The potassium permanganate method had long been the cause of contamination in the Redox canyon and equipment due to oxidation of the ruthenium to the volatile tetroxide. The tetroxide was readily reduced to the dioxide and deposited on the inside of the oxidizing vessel vent system although off-gas scrubbers were provided for its elimination to the waste system. Whenever any of this equipment was disturbed for maintenance or replacement the ruthenium tetroxide was easily dislodged and widely spread throughout cell and canyon. Consequently, it was very desirable to replace the potassium permanganate oxidation of feed solution with a method that does not volatilize ruthenium. This month's operation demonstrated that the sodium dichromate method can be routinely used and that adequate fission product decontamination of the uranium and plutonium products can be obtained. A table of comparisons of fission product decontamination is given in a later paragraph of this report.

The sodium dichromate oxidation procedure consists of:

- 1) adjustment of the dissolver solution to 0.1 M $\text{Na}_2\text{Cr}_2\text{O}_7$ and 0.2 M HNO_3 ,
- 2) a 30-minute boil-up,
- 3) adjustment to -0.2 M HNO_3 ,
- 4) a 3.5-hour digestion.

The length of time of the acid boil-up is kept short to restrict corrosion in the stainless steel vessel as much as possible. Three feed batches were oxidized on a trial basis under acid-deficient conditions without increased product losses in solvent extraction. It is planned to test the oxidation procedure further for possible complete elimination of acid solutions in the oxidation vessel.

Solvent Extraction

The extraction battery was operated for two weeks with no changes in the flowsheet used for potassium permanganate-oxidized feed. No changes were noted in the loss of uranium and plutonium product to the salt waste stream (HAW). All uranium and plutonium product was well within fission product specifications. In fact, all the plutonium was within fission product specifications after passing through three cycles and the prototype plutonium ozonator installed last month, and before the fourth and final cycle. Salt waste was processed in the HS Column concurrently with some of the above feed in the parallel HA Column with no adverse effects. The more successful operation with sodium dichromate-oxidized feed this time compared with that experienced in earlier tests is attributed to the excellent acid control in these recent runs.

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A test of the rate of reoxidation of pentavalent neptunium to hexavalent neptunium was conducted during the last week of the month to further check the feasibility of the proposed internal recycle scheme for neptunium recovery. To accumulate neptunium in the internal recycle system the first extraction cycle (HA Column) is operated on an acid flowsheet while the second extraction cycle (LA Column) is operated on an acid-deficient flowsheet. Hexavalent neptunium will be extracted into hexone under acid flowsheet conditions as shown by laboratory work and by two previous plant tests. The hexavalent form, however, is reduced to the inextractable pentavalent state under acid-deficient conditions. The acid-deficient LAW stream thus containing pentavalent neptunium flows to a concentrator and is then returned to the acidic HA Column in which the pentavalent neptunium must be reoxidized in order to be reextracted with the neptunium (and plutonium and uranium) in the new feed.

Although not all analytical results from the test runs are yet available, preliminary results indicate that the rate of reoxidation was sufficiently rapid to permit the use of this flowsheet. It is not desirable to acidify the contents of the LAW concentrator because of serious corrosion experienced with continuously boiling nitric acid and sodium dichromate solutions.

During the neptunium reoxidation test a considerable change occurred in the fission product decontamination pattern across the extraction battery as shown by the following tabulation of the average log decontamination factors across the extraction battery compared with the previously experienced patterns.

Cycle	Log Decontamination Factors					
	KMnO ₄ Feed Prep. & Acid-Def. Precycle		Na ₂ Cr ₂ O ₇ Feed Prep. & Acid-Def. Precycle		Na ₂ Cr ₂ O ₇ Feed Prep. & Acid Precycle	
	<u>U</u>	<u>Pu</u>	<u>U</u>	<u>Pu</u>	<u>U</u>	<u>Pu</u>
Feed Prep. & Precycle	3.1	3.1	2.8	2.8	1.3	1.3
Partition	1.9	2.1	2.5	2.7	2.2	2.6
3rd Uranium	1.8	-	1.4	-	2.3	-
2nd Plutonium	-	1.8	-	2.2*	-	2.6*
3rd Plutonium	-	0.7	-	0.5	-	0.7
Tail-End						
Ozonator	<u>0.4</u>	<u>-</u>	<u>0.3</u>	<u>-</u>	<u>1.2</u>	<u>-</u>
Total	7.2	7.7	7.0	8.2	7.0	7.2

* with ozonation

As can be seen from the table above, a considerable decrease in fission product decontamination across the precycle resulted from the use of the acid precycle flowsheet with sodium dichromate-oxidized feed. However, with the aid of the 2HP prototype plutonium ozonator and the uranium ozonator both products met fission product specifications. Two brief tests of the effectiveness of a liquid phase oxidant during ozonation were attempted during the acid precycle operation. A one-shot sodium bismuthate addition was made to give 0.001 M concentration of bismuthate in the plutonium solution in the prototype ozonator; this resulted in an arithmetic factor of three decrease in activity for a short period of time. Also one batch of uranium in the uranium ozonator received an addition of periodic acid (to give a final concentration of 0.00012 M) after initial ozonation had reduced the gamma ratio from 21.1 to 4.96 in three hours. However, the batch of uranium was ozone-sparged for another three hours before it was sampled again, making a good evaluation of effectiveness of periodic acid difficult. Nevertheless the ultimate amount of ruthenium removed is believed to have been substantially increased since the final gamma ratio was 0.32, representing an arithmetic decontamination factor of more than 60 in six hours.

During the acid precycle flowsheet operation it was noted that the extraction battery loss of plutonium and uranium product to the waste stream was reduced a factor of two compared to those experienced during operation with potassium permanganate and with sodium dichromate-oxidized feed on the acid-deficient flowsheet.

As expected, the solids found in the HAW stream and backcycle salt to HA Column during operation on the acid-deficient flowsheet, were not found during operation on the acid flowsheet. This fact will probably permit further backcycle of salt and consequent reduction in chemical consumption when the acid flowsheet is finally adopted.

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FINISHED PRODUCTS TECHNOLOGY -URANIUM CONVERSION OPERATIONProcess Performance

All UO_3 shipped met product specifications.

One thousand fifty one (1051) pounds of nitric acid per ton of uranium processed (99.7% of theoretical) were recovered at an average concentration of 47%. The high recovery efficiency is believed to be due to an inventory error in September which resulted in a recovery efficiency of 81.4% for that month.

The average operating rate of the calciners was 7.4 tons uranium per unit for each day on the line. The overall calciner operating efficiency was 93%.

Process Improvement

Condensate from the calciner off-gas cooler was rerouted directly to the product acid tank instead of the absorber. This change was made in an effort to improve the efficiency of acid recovery and to further define the variables of the calciner acid system.

The calciner and concentrator off-gas systems have been controlled by a single exhaust jet. Due to unsatisfactory performance caused by interaction of the systems, the concentrator off-gas piping has been revised to allow vacuum control with the spare absorber jet.

Failure of one of the test design feed points occurred late in the month, with some resultant agitator shear pin and blade damage. The feed point was one of the first units fabricated with a solid ring guide at the transition from 2 $\frac{1}{2}$ -inch to 1-inch pipe. Failure of the 1-inch pipe occurred just below the ring. Feed points built at a later date have axial guide bars instead of the solid ring.

METAL FINISHING OPERATIONRecuplex

Forty-four (44) runs, consisting of crucibles, fragments, powders, and clean-outs, were processed through the S & C Hood. Slurry losses to crib averaged 0.06% of the recovered plutonium.

The SE Hood processed 1740 liters per day at 79% operating efficiency, for an average instantaneous rate of 2210 liters per day. Waste losses to the crib averaged 0.0066 g/l (0.32% of the feed plutonium). SE columns were HF flushed at the first of the month to reduce impurity build-up.

Process and equipment changes were made in the solvent extraction feed preparation system to minimize the formation of a light phase organic capable of building up high Pu concentrations. The changes made were: (a) elimination of organic wash treatment air sparging, (b) improved ability to more completely separate phases, and (c) periodic washing of the SE feed tank contents with carbon tetrachloride (CCl_4).

During a scheduled shut-down, the corroded stripping column plates were replaced with a standard cartridge. A safe geometry bottom end section was also installed on the stripping column to improve nuclear safety and permit higher product concentrations.

The Roth pump for aqueous feed to the H-2 column was replaced after five years of service. The pump had gradually lost capacity and was limiting solvent extraction throughput.

A new type soft gasket material, Viton A, was placed in test service in the H-1 (extraction) column. This material expands slightly in the presence of CCl_4 but retains its strength.

New ceramic cartridge in-line filters are under test in the Recuplex process. To date, they have given excellent service and can be easily cleaned or backflushed. A new backflushing system of all in-line filters was put into service. The filters are backflushed to a critically safe tank where the flush solution is sampled before blending into slag and crucible dissolver charges. Previously, the in-line filters were flushed to the hood floors, which resulted in contaminated equipment and high radiation levels.

Task I - II

One hundred eighty (180) runs were processed with an average aqueous recycle of 6.84%.

The above normal recycle was due mainly to several KMnO_4 flushes performed in conjunction with filter cloth changes, leaks in the nitrate feed line, and cleaning in preparation for a one week shut-down for extensive maintenance.

Task III

Reduction yields averaged 97.8% and the density of acceptable buttons averaged 19.29 g/cc. Total impurities averaged 1280 ppm.

Eleven buttons were rejected. Six were density rejects (high aluminum) and five contained excessive iron and chromium.

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PROCESS CHEMISTRY -PUREX PROCESS ASSISTANCE

Purex process studies were concerned mainly with the preparation and stability of various ferrous ion solutions which might be used in the Purex 1BX (plutonium-stripping) stream. The following observations were made:

- 1) The stability of ferrous ion in current 1BX-type solutions was examined as a function of temperature and nitric acid concentration. For solutions containing 0.03 M ferrous sulfamate, 0.3 to 3.0 M nitric acid, and either 0.04 M sulfamic acid or 0.04 M hydrazine, no measurable change in ferrous ion occurred over a 48 hour period at room temperature. The rate of oxidation increased with temperature and nitric acid concentration, but even at 60 C and with 3 M HNO_3 , the ferrous ion half-life was greater than 10 hours. Under conditions of storage, hydrazine was more effective as a stabilizer than sulfamic acid, although it was slightly less effective in preventing ferrous oxidation by nitrite.
- 2) Preparation of ferrous nitrate by reduction of ferric nitrate with hydrazine was studied. At both 25 and 40 C, starting with solutions containing 0.03 M ferric nitrate, 0.3 M nitric acid, and 0.1 or 0.2 M hydrazine, an iron(II)/iron(III) ratio of three was obtained. The reaction was too slow for plant application, however, requiring several days to reach the point indicated.
- 3) It was found that a ferrous nitrate solution can be prepared by dissolving metallic iron in dilute nitric acid containing hydrazine. For example, in a qualitative test, iron granules gave 100% iron(II) upon dissolution at 25 C in 0.3 - 1.0 M HNO_3 and 0.1 M hydrazine. In another instance, enough cast iron dissolved in two hours to give 0.15 M Fe(II) . Greater concentrations can probably be achieved easily.

REDOX PROCESS ASSISTANCE

Critical mass control in the Redox Plant dissolvers requires complete dissolution of each E-metal charge. This has imposed severe limitations on the dissolver capacity, since the low acidity toward the end of the process gives a low dissolution rate. Consequently, the discovery by HLO personnel that the presence of ferric nitrate increases the rate of uranium dissolution at low nitric acid concentrations has aroused interest in its possible application in the Redox Plant. Laboratory studies have demonstrated the feasibility of a processing scheme in which iron metal would be added to the dissolver with the uranium charge. The iron would dissolve along with the uranium, its dissolution rate increasing as the acidity dropped. This would put the desired amount of ferric nitrate into solution toward the end of the dissolution, when the low acidity would permit its catalytic effect to show up. An estimate of the magnitude of the effect may be gained from the laboratory observation that the presence of 0.1 M ferric nitrate in 0.5 M HNO_3 and 1.5 M UNH increased the rate of uranium dissolution by a factor of 8.7.

The over-all utility of this scheme for preparing feed to the Redox Plant is doubtful, however, as long as an acid-deficient first cycle is run. If 0.1 M ferric nitrate is added to Redox HA column feed, a precipitate (probably ferric hydroxide) is formed unless the acid deficiency of the solution is less than 0.2 molar. Precipitate formation is also to be expected in the extraction section of the HA column if the feed is acid deficient. The precipitate, which may be easily dissolved in 10% nitric acid, does not carry plutonium, and does not appear to affect fission product decontamination.

NEPTUNIUM PROCESS STUDIES

Three hundred thirty grams of neptunium from dissolved metallurgical recycle material and 450 grams of neptunium from Union Carbide Nuclear Company, Paducah, Ky. were processed through the ion exchange, oxalate precipitation, and calcination equipment in run #18. Because of the low plutonium, uranium, and thorium content of this material (less than 10 grams total per 100 grams Np), it was possible to load the column with 60 grams of neptunium per liter of resin. Waste losses across the ion exchange step were less than one per cent. Reclaimable losses across the precipitation and calcination step were about three per cent, due, in part, to powder blowing out of the beaker during calcination. A new cover on the calcination vessel has reduced this source of loss.

In run #19, 1370 grams of neptunium from the Purex plant were purified in the new six-inch diameter, six-foot high ion exchange column. The new column contains approximately 30 liters of Dowex 1 x 4, 50 to 100 mesh, anion resin. As this material contained about 150 grams of uranium plus plutonium per 100 grams neptunium, the resin loading limit was only about 45 grams of neptunium per liter. Losses to recoverable waste were 11.3 per cent across ion exchange and 1.2 per cent across the precipitation and calcination steps. On two of the oxalate strikes, the yields were only 96-97%. The low yields were apparently due to partial oxidation of the neptunium in the ion exchange product to neptunium(V). In subsequent strikes, increasing the amount of hydrazine in the purified neptunium nitrate solution from 0.01 M to 0.05 M corrected the trouble. Over-all, unrecoverable waste losses for the processing period amounted to about 1.5 per cent.

Decontamination factors of 16 and greater than 2000 were obtained across the ion exchange step for Pa-233 and Zr-Mb, respectively. Exposure rates of the NpO_2 sent to Plutonium Metallurgy range from 2 to 5 mrep/hr/gm Np, as measured by a CP meter at 2".

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234-5 DEVELOPMENTDirect Calcination Of Plutonium Nitrate

An existing three-inch experimental continuous calciner has been obtained which will be used for pilot plant studies of the direct calcination of plutonium nitrate solutions. The unit is presently being prepared for installation in a laboratory hood. It is expected that the equipment will be ready for operation early in December.

Solubility Of Plutonium Trichloride

The solubility of plutonium trichloride in one molar hydrochloric acid at 24 C was found to be 800 g/l or 554 g Pu/l. The specific gravity of this solution was 1.756.

Fluidization Test

Plutonium oxide and plutonium tetrafluoride were readily fluidized with air in a small laboratory test apparatus. Further investigation of a fluidized bed halogenation process is in order.

Batch Reduction Of Plutonium Trichloride

The 700-gram size reusable crucible was used 12 times. Cracks in the bottom of the ceramic liner made it unsuitable for further reductions. A properly designed breakout tool will make this type of crucible suitable for production work.

The visual standards for PuCl_3 quality, developed last month, were used to classify several batches. The following table shows the comparison between estimated and actual values of the percentage of material insoluble in water.

<u>Estimated</u>	<u>Actual</u>
3	6
4	4
4	3
6	8
6	8
>8	13
>8	16
12	9
12	14
15	12
16	18
20	22

Reductions made with PuCl_3 containing 13 percent insolubles resulted in poor yields and densities.

Steam Oxidation Of Alpha Skulls

Plutonium skulls may be oxidized to a low temperature oxide with steam in an inert atmosphere.

The argon-steam atmosphere is passed slowly through the skull metal held between 150 and 250 C (vessel outside wall temperatures). The resulting oxide is a free-flowing powder which is easily soluble in 12.7 M HNO_3 - 0.2 M HF . From 94 to 100 percent of the oxide dissolves after only one hour's refluxing. Oxide formed by burning in air requires at least three separate dissolutions of from four to six hours each.

The highly-exothermic character of plutonium oxidation has made control of the reaction difficult in previous systems devised for the oxidation of alpha skulls. In the present system, the heat of reaction is -137 Kcal/mole, or about 46 percent less than the heat of burning in air of -252.87 Kcal/mole. This difference permits the formation of the low temperature oxide.

Oxidation of massive metal will be attempted next.

Chloride Content Of Plastic Bags

Plastic bags used at HAP0 for sealing out and covering contaminated materials and wastes analyze approximately 5.3 percent chloride ion. Further experimentation shows that essentially all of the chloride remains with the ash when these bags are burned with oxygen at temperatures up to approximately 750 and 900 F.

Mold Materials Testing

A small crucible of pure tantalum nitride was tested to determine potential value of this material for plutonium casting molds. The test was unsuccessful due to adhesion between crucible and metal, and due to chemical interaction that caused deterioration of the mold material and spalling of the crucible.

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ORGANIZATION AND PERSONNEL

Personnel

Effective October 1, 1959, L. K. Mudge completed his Tech. Grad. assignment with the 234-5 Development Operation.

Effective October 26, 1959, J. P. Martelli, Engineering Assistant, transferred from the Finished Products Operation to the 234-5 Development Operation.

Trips

R. S. Rosenfels attended the American Ceramic Society Regional Meeting in Seattle, Washington on October 15, 16, and 17, 1959.

W. H. Zimmer attended the Third Conference on Analytical Chemistry and Nuclear Reactor Technology at the Gatlinburg Conference, Gatlinburg, Tennessee from October 24, through October 28, 1959.

W. H. Zimmer visited P. R. Bell of the Oak Ridge National Laboratory, Oak Ridge, Tennessee on October 12 and 13, 1959 to discuss analytical chemistry and gamma scintillation spectroscopy. (Mr. Zimmer's attendance at the Gatlinburg Conference and his visit to ORNL was made at the request of the Manager, Process Chemistry.)

E. R. Irish visited Floyd Culler of Union Carbide Nuclear Company, Oak Ridge National Laboratory, Oak Ridge, Tennessee on October 12 and 13, 1959 to discuss the Annual Program Review.

E. R. Irish visited Steve Lawroski of the Argonne National Laboratory, Lemont, Illinois on October 14, 1959 to discuss separations processes.

E. R. Irish attended a meeting called by the Atomic Energy Commission in Washington, D. C. from October 26 through November 4, 1959.

A. E. Smith visited P. J. Jensen of the General Electric Company, Metallurgical Products Department, Detroit, Michigan on October 14, 1959 to obtain tool cutting bits.

A. E. Smith visited Mr. Sweeney of the DeVleig Machine Co., Detroit, Michigan on October 14, 1959 to discuss tool grinders.

A. E. Smith visited W. C. Mullin and J. B. Wilkie of the Pratt and Whitney Co., West Hartford, Connecticut on October 15, 1959 to review the 6-Coordinate Gage progress.

A. E. Smith visited tool engineers of the General Electric Company, Metallurgical Products Department, Detroit, Michigan on October 16, 1959 to discuss cutting tool grade program.

A. E. Smith visited Dr. Frank Foote of the Argonne National Laboratory, Lemont, Illinois on October 19, 1959 to discuss design concept and operating capability of plutonium fuel element facilities.

ORGANIZATION AND PERSONNEL

Visitors

W. H. Farrow and C. S. Otto of E. I. du Pont de Nemours, Wilmington, Delaware, and J. B. Roberts and S. D. Smiley of E. I. du Pont de Nemours, Aiken, South Carolina visited R. G. Geier on October 5, 1959 to discuss solvent treatment. They also visited E. R. Irish and B. F. Judson on October 7, 1959 to discuss the Palmolive program.

E. E. Jukkola of the Dow Chemical Company, Rocky Flats Plant, Denver, Colorado visited W. H. Swift on October 1, 1959 to tour Purex plant and discuss plutonium anion exchange. Mr. Jukkola also visited R. E. Smith and M. J. Stedwell on October 1, 1959 to discuss plutonium recovery and reduction techniques.

J. H. Crumley and A. Lyons of the Industrial Specialties Company, Seattle, Washington visited A. E. Barber on October 8, 1959 to demonstrate Mogul flame spray metallizing equipment.

A. J. Kaye and L. Sedgeley of the General Electric Company, Manufacturing Services Laboratory, Schenectady, New York visited R. E. Smith, A. E. Smith, R. M. Smithers, E. C. Wood and W. Harty on October 8, 1959 for equipment development discussions.

Mr. Weissenfluh of the Babcock & Wilcox Company, Lynchburg, Virginia visited R. G. Geier on October 19, 1959 to discuss waste disposal.

H. L. Hall and A. S. Jennings of E. I. du Pont de Nemours, Savannah River Plant, Aiken, South Carolina visited R. G. Geier and W. H. Swift on October 22, 1959 to discuss Purex solvent extraction, Palm recovery and Palmolive.

A. R. Irvin and E. L. Nicholson of the Union Carbide Nuclear Company, Oak Ridge, Tennessee visited R. G. Geier, G. C. Oberg and W. H. Swift on October 23, 1959 to discuss ion exchange and waste storage.

F. Maslan of the Brookhaven National Laboratory visited M. K. Harmon on October 22, 1959 to discuss separations concepts and tour Redox plant.

E. Miller of the Atomic Energy Commission, Washington, D.C. visited M. K. Harmon on October 27, 1959 to discuss Palm recovery technology.

K. Saddington and T. Tuohy of United Kingdom Atomic Energy Authority visited W. K. MacCready, C. T. Grosz, V. R. Cooper, and M. K. Harmon on October 22, 1959 to tour the Redox and T- Plants.

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Research and Engineering

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ORGANIZATION AND PERSONNEL

Inventions

Name

Title

T. R. McKenzie

The Preparation of Stable Ferrous
Nitrate in Nitric Acid Solutions

V. R. Cooper

Manager
Research and Engineering

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J-17

RELATIONS PRACTICES OPERATION
MONTHLY REPORT--OCTOBER, 1959

I. RESPONSIBILITY

There were no changes in responsibility during the month.

II. ACHIEVEMENT

A. Communication

At the request of the Speakers' Bureau, arrangements were made for a Purex man to give the talk "Miracle in the Desert" at a meeting of the Richland Kappa Kappa Gamma Sorority Alumni; and for the Manager, Research and Engineering to prepare a talk suitable for civic groups on "Power Fuel Processing." Plans call for this talk to be presented to the Richland Kiwanis Club some time in February or March. Assistance was also provided a man from the Financial Section in preparation of a talk for a joint meeting of the Benton City-Kiona Chamber of Commerce, and school faculty, on the subject of Better Business Climate.

Assistance was provided in the clearance of papers prepared by three Chemical Processing Department men for presentation at the Symposium on Power Fuels Reprocessing, held in Richland during the month, and arrangements were made with the Public Information Unit and the General Electric News for appropriate publicity concerning these speakers and their papers. Assistance was provided the Manager, Finished Products Maintenance, in preparation of a signed article on Finished Products Operation's maintenance program.

Some of the preliminary work with respect to the PBM sessions scheduled to start in January 1960 was completed during the month. This included selection of individuals to attend, tentative selection of the date for Session 0, and ordering of the necessary study guides, work kits, etc. In addition, arrangements were made for a Purex Analytical Control supervisor to take PBM with a class scheduled by Relations Operation and made up of Relations Operation people and Contract and Accounting people. This was done at the request of Relations Operation.

In cooperation with representatives from the various Chemical Processing Department sections, material was provided Relations Operation for use in preparing a 1946-59 Achievement Report for the HAPO General Manager.

A publicity schedule was developed for the Safety Program Council in connection with its November promotion contest called "Remember Safety".

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B. Salary Administration

One position determination (FLSA status) resulted in recommendation that the position would be nonexempt.

Consultation services relative to three promotions were provided with recommendations to the managers involved. A request for establishment of one new exempt position was submitted for approval following completion of reconciliation and evaluation.

As a result of revised position guides, two position audits were completed, and recommendations made to appropriate management.

C. Wage and Benefits

Four clerical and two secretarial jobs were reviewed and appropriate action taken.

The 1959 Good Neighbor Fund membership drive was completed. Forty-two of the 441 non-participants signed up. This brought Chemical Processing Department participation up to 70 per cent and added \$641 per year to the Good Neighbor Fund total.

A low-pressure promotional campaign entitled "It's All in Your Head" was initiated during the month. It is designed to increase participation in the Suggestion Plan. The campaign will end December 11.

D. Personnel Placement

In order to reduce the Fuels Preparation Department by one Boilermaker Journeyman it was necessary for the Chemical Processing Department to give an ROF notice to the low seniority Boilermaker Journeyman who was in this department.

Because of budget considerations the Power and General Maintenance Section found it necessary to reduce by one Light Truck Driver, two Servicemen, and one Ironworker Rigger Journeyman. These moves resulted from the layoff of an Ironworker Rigger Journeyman and three Servicemen from other departments because of lack of work.

The Department requirements for mechanical engineers continued to remain unfilled, although one formal written offer has been extended.

<u>EMPLOYMENT</u>	<u>EXEMPT</u>	<u>NONEXEMPT</u>	<u>TOTAL</u>
<u>Additions</u>	2	8	10
New Hires	1	2	3
Transfers from other components	1	6	7
<u>Removals</u>	1	15	16
Transfer to other components	1	11	12
Resigned	0	3	3
R. O. F.	0	1	1

	Requisitions Nonexempt	Request for Transfer Exempt	Applications Exempt
Number on Hand 10-1-59	7	5	
Number Received during month	1	0	2
Number Filled	3		
Number Closed Out			3
Number on Hand 10-31-59	5	5	0

E. Health, Safety, and Radiation

The 200 Area Evacuation Plan revision was completed and submitted as an OPG.

Six meetings were attended as part of the current audit of the Department safety meeting system, and the booklet, "Unaccustomed As I Am to -- Safety Meetings" was revised to include Nuclear Safety Training.

<u>Chemical Processing Department</u>	<u>October</u>	<u>September</u>	<u>Year to Date</u>
Disabling Injuries	0	0	0
Serious Accidents	0	1	4
Medical Treatment Injuries	28	42	327
Technical Overexposure Incidents	0	0	1
Radiation Occurrences	22	13	179
Contaminated Wounds	2	0	10
Fires	1	0	8
Security Violations	4	2	21

Two Finished Products employees sustained contaminated wounds to the hands while performing hood work in 234-5 Building. Maximum contamination to the wounds was 1000 d/m. Positive internal deposition of plutonium is improbable.

A subcontractor employee sustained a contaminated hand wound while working in Recuplex - S and E hood, 234-5 Building. A sliver of unknown material free of significant contamination was removed from the injured's finger.

III. ORGANIZATION AND PERSONNEL

The Specialist, Personnel Placement represented HAP0 in a recruiting effort at the University of Texas and Rice Institute during the month of October.

There were no medical treatment injuries in Relations Practices during October, and there were no security violations.

R. B. Britton
R. B. Britton, Manager
Relations Practices

END

**DATE
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12 / 22 / 92