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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT
FOR
JUNE, 1958

HW--56602-Del.

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Compiled By
OPERATION MANAGERS

July 22, 1958

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Authority of CB-PR-2
Robert M. Stan 4/23/92
DG Briggs 5/15/92
SP. Wells 5/15/92

HANFORD ATOMIC PRODUCTS OPERATION
RICHLAND, WASHINGTON

Handwritten:
J. P. W.
D. G. M. L. W.
5/15/93

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7	W. N. Mobley
8	T. G. LaFollette
9	K. G. Grimm
10	H. P. Shaw
11	V. R. Cocper
12	C. R. Bergdahl
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16 & 17	Atomic Energy Commission, Washington 25, D. C. Attention: E. J. Bloch, Director, Division of Production
18	Atomic Energy Commission, Washington 25, D. C. Attention: F. P. Baranowski, Chemical Processing Branch
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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

JUNE, 1958

GENERAL SUMMARY

PRODUCTION

Output of plutonium from the separations plants was 111% of the monthly commitment. The operation of Redox Plant was in accordance with the established schedules except for short outages for equipment flushing and minor replacements. Conversion of Purex Plant to two-cycle operation was completed and processing was resumed late in the month.

The production of UO_3 met the monthly commitment. At the request of HOO-AEC shipments of UO_3 were accelerated, and at the end of the shipping period on June 20, shipments were about 153 tons ahead of the previously established shipping schedule.

Deliveries of both buttons and shapes met the requirements of the current ALOO Delivery Schedule. Output of buttons slightly exceeded the monthly commitment while shape production was slightly less than that scheduled.

ENGINEERING

Decontamination of Purex Plant equipment retired in the course of shifting from a three to a two-cycle process, was satisfactorily accomplished by flushing with tartaric acid, oxalic acid, potassium permanganate, sodium hydroxide, ferrous ammonium sulfate, and nitric acid with varying sequence and temperature conditions.

During the startup phase, after the two-cycle flowsheet changes, the behavior of Np-237 was studied in the plant equipment. It was demonstrated that the Np accumulating in the second cycle waste can be separated from Pu and U. Separation from niobium was inadequate. The major fraction of the Np was held up in the co-decontamination cycle system due to reflux action - probably resulting from the instability of the VI oxidation state.

Waste volumes, as concentrated first cycle waste, under the two-cycle flowsheet, were measured at 37.5 gallons/ton of uranium - a new low value.

The stability of feed batches in the Redox Plant has been determined to be adequate for over-the-week-end storage. Holding the solution in an acidic condition following by reoxidation and adjustment to an acidic deficient state, will not measurably effect the waste loss in solvent extraction processing.

The steel liner in waste storage tank 113-SX was found to be bulged about four feet upwards of its normal position. Liquid between the concrete supporting structure and the steel liner appears to be the most plausible explanation for the observed condition. During the month, the liner returned to its normal position. The situation is under investigation with the objective of getting further data required to fully explain and understand the condition.

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The damage resistant nature of the new agitator design in the UO_3 Plant continued to be demonstrated. Despite several failed or damaged thermowells and feed points, there was no damage to the agitator system.

Studies on the formation of plutonium trichloride via reaction of plutonium oxide or plutonium oxalate with carbon tetrachloride or phosgene were continued. With phosgene the oxalate is more readily chlorinated than the oxide compound. The phosgene does not form insoluble or by-product organic compounds as does carbon tetrachloride.

Corrosion tests with phosgene over temperature range 400 - 600 C indicate that Hastelloy B and C are the most corrosion resistant (0.6 to 0.8 mils/month) materials examined to date. The noble metals (Pt, Au) and their alloys were severely attacked by phosgene.

Penetration of the crucible by the chloride slag continues to be a problem in the reduction of $PuCl_3$ to metallic plutonium. Coating the outside of the crucible with metallic nickel is the most promising solution disclosed to date.

Authorization for process development studies for the recovery of krypton and xenon from the Purex dissolver off-gas system was received from AEC during the month. The study will include the crude recovery and separation of krypton and xenon

Final design was completed and all drawings were approved and issued for the Purex LWV Pu Recovery prototype installation.

The results of the study to determine distribution of gamma radiation along the rear of the RMA Line and the amounts of radiation sustained by operators along the line were published (HW-56317).

The approval for proceeding with design of the Critical Mass Laboratory has been received from the AEC.

GENERAL

The HOO-AEC has completed their review of the budgets for FY 1959 and FY 1960 and the submission has been made to Washington. The CPD Financial Operation has not as yet received a copy of this document, however, informal information received indicates that the reductions made from the original CPD submission are in line, with minor variations, with those suggested by the HAPO General Manager.

These reductions in the original CPD operating budgets, contained in the HAPO submission to the local Commission, were analyzed and schedules prepared and distributed detailing the effect of the approximate \$950,000 reduction.

The decision of the arbitrator in the Claude Thompson grievance case (utilizing a Junior Power Operator to relieve a Power Chief Operator for lunch on a routine basis) was adverse to the Company position. The West Area Chief Power Operator is presently being relieved by a Journeyman Power Operator from the East Area steam plant.

Herbert Wykoff has been named by the FMCS to arbitrate the Graham grievance (assigning individuals to straight swing shift in the 200 W shops). The hearing is scheduled for September 8, 1958.

Personnel of Employee Compensation Operation spent most of two weeks in joint meetings with HAPO Salary and Wage Managers and W. R. Jacobson, New York Services Wage Consultant. These meetings were preliminary to an overall study of the HAPO nonexempt wage system.

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STAFF

Vice President and General Manager, Atomic Products Division . . F. K. McCune
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 O. C. Schroeder
Manager, Redox Operation 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 and Engineering Operation V. R. Cooper
Manager, Employee Relations Operation D. S. Roberts

CHEMICAL PROCESSING DEPARTMENT
NUMBER OF EMPLOYEES
JUNE 30, 1958

OPERATION	EXEMPT		OTHER		TOTAL	
	5-31-58	6-30-58	5-31-58	6-30-58	5-31-58	6-30-58
GENERAL MANAGER'S GROUP	10	10	1	1	11	11
PRODUCTION	7	7	3	3	10	10
PUREX	53	53	223	216	276	269
REDOX	63	63	261	265	324	328
FINISHED PRODUCTS	59	58	256	255	315	313
POWER AND GENERAL MAINTENANCE	43	42	225	229	268	271
FINANCIAL	20	19	46	44	66	63
FACILITIES ENGINEERING	73	72	23	23	96	95
RESEARCH AND ENGINEERING	65	65	23	23	88	88
EMPLOYEE RELATIONS	30	30	54	53	84	83
	423	419	1115	1112	1538	1531

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CHEMICAL PROCESSING DEPARTMENT

PATENT SUMMARY
FOR
MONTH OF JUNE, 1958

All persons engaged in work that might reasonably be expected to result in inventions or discoveries advise that, to the best of their knowledge and belief, no inventions or discoveries were made in the course of their work during the period covered by this report except as listed below. Such persons further advise that, for the period therein covered by this report, notebook records, if any, kept in the course of their work have been examined for possible inventions or discoveries.

INVENTOR

W. M. Swift

TITLE

Automatic Level and Center
Head

ACTING GENERAL MANAGER
CHEMICAL PROCESSING DEPARTMENT

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CHEMICAL PROCESSING DEPARTMENT
PRODUCTION OPERATION

JUNE, 1958

I. RESPONSIBILITY

There were no changes in the responsibility assigned to the Production Operation during June.

II. ACHIEVEMENT

A. Production Statistics and Reports

1. Purex Operation

	<u>June</u>	<u>May</u>
Tons uranium processed	45.2	358.0
Average production rate during operation (T/D)	9.91	16.7
Total waste loss (%)		
Uranium	0.21	0.05
Plutonium	2.36	0.24
Average cooling time (days)	110	89
Minimum cooling time (days)	101	73
On-line efficiency (%)	15.2	69.3

2. Redox Operation

	<u>June</u>	<u>May</u>
Tons uranium processed	206.43	161.06
Average production rate during operation (T/D)	231.53 9.1	9.0
Total waste loss (%)		
Uranium	0.15	0.24
Plutonium	0.28	0.44
Average cooling time (days)	106	95
Minimum cooling time (days)	96	84
On-line efficiency (%)	75.8	57.5

3. 234-5 Operation

	<u>June</u>	<u>May</u>
Batches input to Task I	118	331
Runs completed through Task III	104	235
Waste disposal (units)	754.37	685.61

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4. UO₃ Operations

	<u>June</u>	<u>May</u>	<u>To Date</u>
UO ₃ loaded (tons)	234.9	570.35	
UO ₃ approved for shipment (tons)	254.66	507.92	27,647.28
UO ₃ shipped (tons)	508.03	506.78	27,478.08
UNH backlog (tcns)	155	100	

5. Power

	<u>200 East</u>	<u>200 West</u>
Raw water pumped (gpm)	5,592	4,639
Filtered water pumped (gpm)	565	1,086
Maximum steam generated (lbs/hr)	150,000	96,000
Average steam generated (lbs/hr)	50,816	72,054
Total steam generated (M lbs.)	37,727	51,879
Coal consumed, est. (tons)	2,608	3,590

6. Waste Storage

	<u>Equivalent Tons U</u>	
	<u>June</u>	<u>May</u>
Salt waste reserve storage capacity-Redox	2,682	2,888
Salt waste reserve storage capacity-Purex	13,899	13,944
Coating waste reserve storage capacity-Redox	41,013	41,219
Coating waste reserve storage capacity-Purex	42,427	42,472

B. Production Planning and Scheduling

Laboratory study of the Redox 216-S-7 Crib (Redox process condensate and cell drainage) indicated that this facility has a minimum remaining life, with respect to Sr⁹⁰ and Cs⁻³⁷ adsorption, in excess of fifteen years. The estimate was based on soil column experiments simulating present conditions. Consequently, any future change in waste characteristics and/or discharge rates would invalidate the estimate. In view of this recent information, preparation of the project proposal for replacement of the 216-S-7 Crib was discontinued. It should be recognized, however, that other factors (fungus growth and possible channeling), impossible to evaluate in the laboratory, could have a pronounced adverse affect on crib life.

Early in June a suspected bulge in the bottom of the 113-SX waste storage tank was confirmed. Waste was diverted to another storage tank and continuous soundings of the 113-SX tank were made. By the week of June 17, the tank bottom had returned to its normal position; however the integrity of the vessel was in doubt. Prior to the discovery of this condition, the contents of the vessel had been boiling for about 2½ months. Although monitoring of fourteen adjacent wells in SX tank farm showed no contamination, no conclusive evidence was found to assure that the tank was not leaking. Tentative plans have been made to transfer the waste in the 113-SX tank to another waste storage tank.

C. Finished Products and Customer Liaison

Satisfactory progress is being made by Arthur D. Little, Inc., on the Fission Products Market Survey. Approximately one third (35%) of the project funds has been spent covering the initial phases of the survey and approximately 50 of the contemplated 100 contact interviews with various potential users of irradiation sources. Although results to date are not conclusive, limited technology and economics of comparative costs indicate commercial uses (mega-curie quantities of fission products or other large sources of irradiation) are at least 5 and probably 10 years away. Industry appears to be settling down to orderly R & D programs on uses of irradiation and sources.

A meeting was held with the Department of Defense and AEC-Production people on June 4, 1958, to establish their program for a classified survey within the D.O.D. This survey will be integrated with the Arthur D. Little survey by the AEC-Production people and General Electric-HAPO people.

A visit was made with the Isotopes Group at ORNL. In addition to a general discussion and tour of their facilities, a discussion on sealing sources was held. ORNL people have had excellent results in sealing sources, and feel confident that fission products can be safely contained. Access to the results of their recent customer questionnaires survey was extended to us.

At the request of the AEC, a study was initiated to answer technical questions concerning a Commercial Fission Products Recovery Program at Hanford. This data will be submitted to the AEC next month.

D. Essential Materials

The excess potassium permanganate which the AEC had in storage at Grand Junction, Colorado met CPD purchase specifications. Therefore the material was obtained and unloaded into the 275-EA warehouse. The unit price of this material is 17.90 cents per pound which compares very favorably with a price of 32.85 cents per pound on existing potassium permanganate.

A study was conducted to determine the coal consumed in CPD during FY 1956 and FY 1957 for the use of the HAPO internal financial auditors. It was found that 156,903 tons and 151,751 tons were consumed in FY 1956 and FY 1957, respectively.

In late May the storage capacity at Redox for UO_3 recovered acid was reached. A tie-in pipe from the storage tank to the 202-S Building has not been effected yet so no acid has been used in the Redox process. However, it is expected that it will be feasible to initiate consumption of UO_3 recovered acid in July; then routine hauling from the UO_3 plant to Redox can be resumed.

DECLASSIFIEDE. Reports and Documents1. Prepared and Issued

HW-56250 RD Redox Plant Production Schedule, June, 1958
D. McDonald

HW-56251 RD Purex Plant Production Schedule, June, 1958
D. McDonald

HW-56252 RD UO₃ Plant Production Schedule, June, 1958
D. McDonald

HW-56253 RD 234-5 Plant Production Schedule, June, 1958
D. McDonald

HW-56296 Essential Material Consumption - Purex - Chemical
Processing Department for May, 1958, M. A. Thress

HW-56320 Essential Material Area Report to Cost and
Purchasing - Production Operation - Chemical
Processing Department for May, 1958, M. A. Thress

HW-56357 Chemical Processing Department - Waste Status
Summary for May 31, 1958, R. E. Roberts

HW-56411 UO₃ Plant Shutdown, R. E. Tomlinson

2. Prepared for Signature and Issuance

HW-56221 Production May, 1958, W. E. Johnson

III. ORGANIZATION AND PERSONNELA. Force Summary

	<u>Beginning of Month</u>	<u>End of Month</u>
Exempt	7	7
Non-exempt	<u>3</u>	<u>3</u>
Total	10	10

B. Safety

There were no plant injuries incurred by Production Operation personnel during June, 1958.

C. Security

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

D. Visits

The following visits were made during the month by R. E. Tomlinson and L. M. Meeker to discuss the Fission Products Market Survey:

June 3 - Cambridge, Mass., Arthur D. Little, Inc. - M. Michaelis and survey team members

June 4 - Washington, D. C. - AEC-Production and DOD personnel

June 5 - Oak Ridge, Tenn., ORNL - J. H. Gillette.

R. E. Tomlinson

Acting Manager
Production Operation

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CHEMICAL PROCESSING DEPARTMENT
PUREX OPERATION

June, 1958

I. RESPONSIBILITY

The Analytical Control Operation assumed the responsibility for analyzing Purex essential materials on June 16. This function previously was performed by HLO.

II. ACHIEVEMENT

A. Processing Experience

1. Production Statistics

a. Production - Percent of Monthly Commitment

Due to the conversion to two cycle operation there was no commitment established for June.

b. Production Rates

June 1 through June 21	Shut down
June 22 through June 22	2.16 CF
June 23 through June 24	Shut down
June 25 through June 26	2.16 CF
June 27 through June 27	Shut down
June 28 through June 30	2.16 CF

c. Operating Continuity 15.2 Percent

d. Waste Losses

Uranium	0.21 Percent
Plutonium	2.36 Percent*

e. Product Recovered from Waste Streams by Reprocessing

Uranium	0 Lbs
Plutonium	0 Units

f. Product Retreated in Silica Gel

Uranium	0 Tons
---------	--------

* High waste loss is due to the short processing period and limited plutonium production during June, 1958.

2. Normal Processing

The major portion of the month was spent in converting the plant from a three cycle process to a two cycle process. After conversion the equipment was thoroughly tested during an attempted recovery of neptunium from the backcycled waste stream and during the follow-up plutonium recovery.

On June 22, processing of plutonium from the 3 WB backcycle was started but the HAW valve in the precycle column failed and it was necessary to complete the run using the HA column jetout routing. The jumper was replaced and processing of the recycled uranium enriched with plutonium from the L cell package flushes was started on June 24. The valve in the IBXF failed after only four hours of operation and processing was temporarily suspended. On June 27 the J-1 pump failed and replacement required an eleven hour shutdown. Operation was normal for the rest of the month, however, all plutonium produced was high in gamma activity and had to be recycled. Cause of the activity was attributed to residual downstream contamination from the previous run period in May, and to the breakthrough of activity during the attempted neptunium recovery program. Production was split between the L cell package and N cell.

Two cuts of metal were dissolved in C dissolver to test the C-2 prototype double-pass reactor on 72-day cooled material. The backup facility was operated during the second cut only. The emission rate was only 0.1 curie/day for both cuts, indicating excellent performance for the modified reactor.

Self concentration in tanks 241-A, 101, 102, and 103 continued at rates of 7.5, 6.4, and 1.5 gallons per minute, respectively.

3. Special Processing

Prior to the plant startup several cans of plutonium, which were high in gamma activity at the end of the last run period, were processed through the ion exchange facility. The processing was largely unsuccessful due to mechanical difficulties and unusual process conditions. The resulting waste was rerouted to the rework stream.

Since April, when the extraction batteries were converted to psuedo two cycle operation, the concentration of neptunium continued to build up in the waste backcycle stream. An untried flowsheet was developed to attempt the recovery of neptunium prior to the normal startup. Unfortunately the bulk of the neptunium refluxed in the HA and HS columns and was lost to waste when the columns were stripped and emptied. In addition, there was an activity breakthrough which resulted in the contamination of the L cell package and the PR room equipment. Although all equipment was flushed thoroughly before startup, all initial regular production was out of specification due to pickup of activity in the plutonium concentration and loadout equipment.

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During the shutdown, the HA and HS columns were given a "conditioning" carbonate flush. The IBX and IBS columns were flushed for the first time in fourteen months of operation.

B. Radiation Performance

The emission of iodine 131 from the 291-A stack totaled 0.58 curies for the month. The maximum during a seven-day period was 0.18 curies for the week ending June 19. The low readings are the result of the plant shutdown during most of the period. The emission of other radioisotopes from the 291-A stack was very low during the period. The average daily emission rate of plutonium and fission products was 1.3 microcuries and 2.6 millicuries, respectively.

Four radiation incidents were incurred during the month. Seven cases of skin contamination were recorded. The maximum levels involved were 20,000 d/m plutonium and 600 c/m fission products.

Radiation levels in the PR room and N cell increased significantly during the processing of the special neptunium runs through these areas. The maximum radiation intensities encountered were: 10 r/hr to valve inside L-10 hood; 5 r/hr on the L-10 hood panel; 500 mr/hr in the L-9 and L-10 aisleway; 2 r/hr on the L-11 panel; 500 mr/hr on the N cell hood. The radiation fields in the PR and N cell areas had returned to normal by month end.

Maximum dose rates encountered by Maintenance during the month were: 3 r/hr to change valves in the H-2 sampler pit; 2.5 rads/hr to change an impact wrench and from 6 to 750 mrad/hr to repair jumpers and the EA-2 heater.

Other maximum personnel dose rates encountered during radiation zone work were: 3.5 rads/hr to decontaminate in the canyon; 3 rads/hr to obtain 101-A and 103-A waste samples; 1 r/hr at 4 feet (250 r/hr over open riser) to obtain a temperature profile of the 103-A tank.

Contamination control during remote cell work in conjunction with two cycle conversion was good. Very little deck contamination resulted and general deck cleanup restored the canyon to an acceptable status.

Several contamination spreads occurred during the month in the PR area. A leaking L-11 specific gravity line resulted in contamination of the immediate area to 500,000 d/m and the adjacent areas to 40,000 d/m. Contamination in excess of 40,000 d/m leaked out of the L-9 and L-10 hood panels on several occasions when pumps sprayed liquid inside the hoods. The grossly contaminated areas were cleaned and/or sealed with plastic sheet or stripcoat to confine the contamination.

During the shutdown, manpower was used effectively in decontaminating all sampler hood fronts, all external surfaces in N cell and in reducing levels in R cell from 5,000,000 d/m to 5,000 d/m. The railroad right-of-way along 200 yards of track was cleaned to less than 6 mrad/hr.

C. Mechanical Experience

All cell work and the final phases of the cold side work associated with the two cycle conversion were satisfactorily completed ahead of schedule.

Modification of the F-2 caustic scrubber iodine gas monitor from a batch to a continuous in-line type of sampler was completed. Existing UNH in-line scintillation equipment in 203-A Building was removed and used for this installation. Additional instrumentation consisting of a differential analyzer was procured off-plant.

The fabrication and installation of a temperature profile thermohm assembly designed to provide temperature signals from ten varied levels in the 241-A-102 waste storage tank was completed on June 26. Two similar assemblies were installed in 101 and 103 tanks during the past eleven months.

A new type parallel-trap assembly was installed in the H-4 RH position in trap pit #4 on June 12. This arrangement, in which two 2-inch #126 Armstrong traps replace a single 3-inch compound trap, was first tried out in the K-4 RH position during March, 1958 and has performed satisfactorily to date. This change corrects a malfunction problem of long standing that frequently required steam by-passes to be opened, thus contributing to excessive steam consumption.

A new Wilfley centrifugal pump was installed in the P-12-1 position in the 211-A area on June 18, replacing the Pacific centrifugal pump which has proven unsatisfactory in nitric acid service due to mechanical seal failures.

Two of the deep-well type pumps in U-1 and U-2 tanks were overhauled during the June outage. Repairs consisted of replacement of the shaft, graphitar seals and bearings.

Scheduled repairs to the severely corroded internal surfaces of the 104 nitrate makeup tank in AMU were completed. Repairs consisted of sandblasting the internal surfaces, plug welding and grinding the numerous small pits which covered approximately thirty percent of the bottom area of the tank and brush painting the interior of the tank with "Phenoline".

Failure of the second J-1 pump was experienced on June 26. The unit was replaced with the original J-1 pump which failed on 5-3-56 and was subsequently overhauled. The recent failure was indicated by a sudden stop of pumping and high amperage.

D. Analytical Experience

A great deal of effort was put forth proving out methods for neptunium analyses. Satisfactory methods were developed for the various plant samples and personnel were trained to perform them.

During the outage the X-Ray photometer was completely overhauled. Following this overhaul the instrument performed exceptionally well for a limited period and then it was found necessary to purge the

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ionization chamber with argon to restore good performance. A permanent facility is being considered for periodic flushing of the chamber with argon.

The laboratory referee program was revised to bring it up to date with current needs and to correspond with two cycle operation.

E. Improvement Experience

1. Process Tests and Revisions

(For more detailed information on these and other items see the Research and Engineering portion of the CPD monthly report.)

The acidity of the XCX stream was increased from 0.75 M to 1.0 M to prevent the possibility of a plutonium polymer forming at the inlet of the N-6 plutonium concentrator.

2. Equipment Changes

A magnetic flow meter has been installed on the UNH loading line to serve as an internal check point for accountability purposes.

The N cell hood ventilation exhaust system was rerouted from the regulated shop exhaust system to the PR exhaust system as a means of ensuring adequate N cell ventilation in case of normal power outages.

3. Inventions and Discoveries

No inventions or discoveries were reported by Purex personnel during June, 1958.

F. Events Influencing Costs

The 293-A Building caustic scrubber was converted to an acid absorber. Estimated savings of \$35,000 annually in caustic consumption and nitric acid recovery are anticipated with no increase in iodine emission rates.

On June 16 the Analytical Operation took over from HLO the responsibility for analyzing essential materials. This change is expected to reduce Purex costs by \$4,800 per year.

III. ORGANIZATION AND PERSONNEL

A. Safety

There were no disabling injuries and only two medical treatment injuries in June. A serious accident occurred on June 30 when two men, who were trying to release the brake on a cask car, applied a 24" wrench to the brake wheel to get enough slack so the ratchet dog could be released. When the brake released it spun the wrench from the hands of the men and the wrench struck one of the men on the left jaw. There were no fractures and the man continued at work the next day.

B. Security

There was one security violation during June.

C. Persomel Activities

O. C. Schroeder visited San Jose, California, where he attended a seminar on Work Simplification under the leadership of W. T. Short of Manufacturing Services. Mr. Short also visited Purex on his return trip. He discussed the work simplification program with Purex managers on June 13.

N. P. Nisick attended a conference of the Health Physics Society in Berkeley, California

J. J. Jech accepted a position with the General Electric X-Ray Department and will terminate on July 11.

P. O. Jackson, who has been on loan from HLO to assist in setting up the 100 area reactor effluent analysis program in the Purex Analytical Control Laboratory, completed his assignment on June 30 and returned to HLO.

J. C. Glover transferred to Redox Operation on June 1. E. A. Foskett transferred from Relations and Utilities Operation to replace Mr. Glover on June 1.

Five Process Operators were sent to Redox in exchange for four Utility Operators in accordance with the ratio agreement.

J. J. Cihi of the Nuclear Development Corporation of America, White Plains, New York, visited the plant to study the use of remote connectors in process equipment installations.

Manager
Purex Operation

OC Schroeder:EAF:gt

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CHEMICAL PROCESSING DEPARTMENT
REDOX OPERATION

JUNE, 1958

I. RESPONSIBILITY

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

II. ACHIEVEMENT

A. Processing Operation

1. Production Rates and Operating Continuity

June processing operations were started at 0900 on 6-4-58 and maintained as per schedule except for short shutdown periods required to replace two product feed pumps, and for flushing of the columns to relieve flooding conditions. Production rates were maintained at 100% of nominal except for short periods prior to and following the shutdown periods, when rates were reduced to 90% and 80%. Processing operations were shutdown twice for pump replacements, the 2-A column feed pump on June 7, and the 3-A column feed pump on June 22. Three additional shutdown periods were required during the month to flush the precycle and partition columns with 10% nitric acid to relieve flooding conditions in the 2-D column. The five shutdown periods involved a total of 97 hours.

The monthly production commitment was exceeded by 3% while operating at 76% of the total hours in the month. The mechanical efficiency for the period was 84%.

All UNH produced during the month was within shipping specifications. Only five E-12 batches with excessive gamma activity required ozonation and/or silica gel treatment to meet shipping specifications.

All plutonium production was within shipping specifications on gamma ratio; however, 21 PR cans with higher than normal chromium content were reworked through the Recuplex process by the Finished Products Operation.

Product waste losses for the month were very good, averaging 0.15% and 0.28% for uranium and plutonium respectively. Four batches of waste collected in the D-9 tank were above discard limits on plutonium, but these were recovered via the H-4 feed make-up and oxidation procedure as "cat-kill" solutions.

Iodine-131 emission to the 291-S stack was well under control throughout the month averaging 0.53 curies per day. No uncontrolled high

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emissions occurred. During periods of solvent cleaning on the canyon crane and processing of metal with relatively low cooling periods, emission quantities of 1.0 to 1.6 curies per day were noted.

2. Equipment Experience

The silica gel column was regenerated during the first part of the month as the unit had begun to show signs of reduced efficiency. Over 500 units had been processed through the column since the last regeneration.

The reclaimed silver nitrate reactor, which was successfully flushed and regenerated by the Redox Waste Handling and Decontamination Operation was reinstalled on the C-3 dissolver on 6-17-58. Operation to date has been satisfactory. However, a complete evaluation over the next several months is planned in order to determine the feasibility of continuing with the silver reactor flush-out and regeneration program.

B. Maintenance Operation

Three pump failures occurred in the 202-S Canyon operation during the month. All units were replaced without incident and marks the first canyon rotating equipment failures since the F-1 feed pump was replaced early in April, 1958.

On June 2, the caustic recirculation pump on the H-5 ruthenium scrubber failed to produce the necessary head and was replaced. This was the first such replacement in the H-5 position since plant start-up. On June 9, the E-5 feed tank pump (2-A column feed) was replaced after having failed on June 7 because of a leaking seal. The failed unit had been operating since October 18, 1957. On June 22, the E-1 feed tank pump (3-A column feed) failed due to a leaking seal and was replaced on the same day after having operated since October 22, 1955.

C. Waste Handling and Decontamination Operation

1. Waste Handling

Redox Coating Waste Received (S Farm)	33,837 gallons
Redox Salt Waste Received (SX Farm)	198,080 "
Total Gallons Boil-Off Salt Waste	246,271 "
Salt Waste from SX Farm to U Farm	448,000 "
Waste Received at TX (221-U)	6,218 "

The transfer of 486,500 gallons of non-boiling salt waste from the 103-SX to the 101-U tank was completed this month. To increase the

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pumping rate the pump was raised from the tank and approximately 15 feet of suction hose removed. The work was completed without incident and the pumping rate was subsequently increased from 26 g/m to 50 g/m.

The leaking coating waste jumper in the 151-S diversion box was successfully removed this month and sent to the 221-U Canyon Building for decontamination and regasketing. The work was completed without incident and the jumper reinstalled. Pumping of the coating waste from the 107-S to the 107-U tank was subsequently completed.

2. Equipment Decontamination and Repair

a. Regulated Steam Pit

A total of eight vehicles and five pieces of heavy equipment were decontaminated during the month.

b. Railroad Equipment

A total of 132 man-hours was charged to this operation. The work included the decontamination of two locomotives, two well cars, and four casks. Repairs were made to three casks and operational coverage was provided for the Relations and Utilities Operation during their repair work on four well cars.

c. 221-U Building

Decontamination of a 40 inch "Bird" centrifuge was completed this month and the unit shipped to the Chemical Engineering Development Group of the Hanford Laboratories Operation. Present schedules indicate that the centrifuge will be used for approximately 18 to 20 months in the 321 Building, 300 Area, for development studies on fission product recovery. Transfer of the equipment was made on a loan basis.

Experimental work on the best methods for recovery of the UO_3 powder held up by the orlon filter bags in the Uranium Recovery Plant was completed this month. The nitric dissolution procedure, as recommended by the 222-S Analytical Laboratory, has been accepted as the most promising procedure, and an estimate for this work submitted to the Finished Products Operation.

The Redox Plant O-1 organic pump, which failed during routine operation on 5-30-58 due to a cracked bearing, was successfully decontaminated and returned to the Redox Maintenance Operation for repair. One Redox F-1 pump was also repaired, tested, and placed in spare equipment status.

3. Special Activities

As reported during May, unsuccessful attempts to install prototype removable circulators in the 113-SX tank led to the discovery that the tank bottom had buckled to a maximum height of approximately four

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feet above its normal position. Investigation by the Redox Technology Operation indicates the presence of liquid between the concrete shell and the liner to be the most likely cause of the displacement. Further investigation of this condition during June has revealed that the tank bottom has returned to essentially normal position in all quadrants of the tank. Extensive leak checks have been made, however, dry well checks have all been negative and tank electrode readings indicate no leakage. Well points were also driven to a depth of 50 feet on the northwest side of the tank and to a depth of 24 feet by the tank fill line. No evidence of ground contamination has been detected. However, as a precautionary measure, plans to route the salt waste to another tank are proceeding.

D. Analytical Control Operation

Responsibility for the complete analysis, as required by specifications, of all essential materials used in the Redox Operation was assumed by the laboratory this month.

The controlled mechanical feeders, which are to replace the hydrostatic feeders of waste streams to the soil columns recently set up in the laboratory, were received this month. Steadier operation and improved consistency should result from this change. As reported last month, this work is in preparation for taking over the soil testing program from the Chemical Effluent Technology Operation of HLO.

Refinements to present analytical control methods which were adopted this month included: a visual inspection of the L-16 sample as an aid to determining the proper procedure for analyzing the sample for plutonium; the deletion of the nitric acid spike in the hydrogen ion determination of the LAA and LSA feed streams since the upward revision of the acid content of these two streams in the Redox process, and the use of a wet mount sample absorbed in filter paper discs for gamma analysis.

E. Radiation Monitoring Operation

Radiation control in the Redox Plant was very good during the month with only four radiation occurrences recorded.

Replacement of the H-5 caustic recirculation pump on the ruthenium scrubber in the canyon increased contamination levels on the canyon crane by a factor of two on horizontal surfaces, however, no appreciable increase in dose rates occurred. Subsequent decontamination efforts using a solvent spray reduced the contamination levels to approximately those encountered prior to the H Cell work.

Utilizing aluminum foil and rubber matting for shielding, crane maintenance work was accomplished with dose rates of 2000 mrad/hour to re-hang the right hand auxiliary festoon to the junction box and 1000 mrad/hour to replace the left hand optic. Replacement of the brushes on a motor-generator set in the penthouse atop the crane cab was accomplished with dose rates of 250 mrad/hour.

The L-6 recirculation pump in the 233-S Building Greenhouse was regasketed this month utilizing the plastic man technique with excellent contamination control.

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. Inventions or Discoveries

There were no inventions or discoveries of a patentable nature reported in the Redox Operation during the month of June, 1958.

G. Events Influencing Costs

The budget report on "Equipment Not Included in Construction Projects" ending May 31, 1958 continues to demonstrate the soundness of the Redox budget in that 86 1/2% of the budget has either been spent or committed. At this point it appears that between 92 and 99% of the total budget of \$465,000 will either be spent or committed at the close of FY 1958. As experience continues to demonstrate the feasibility of a decontamination and repair program it becomes more apparent that the FY 1959 budget can be reduced considerably in the mid-year review. For example, the F-5 evaporator tank installed during the May shutdown would have required an immediate requisition for a replacement spare. However, since the replaced evaporator was sent to the 221-U Canyon Building for decontamination and repair, the need for ordering has been eliminated.

Considerable progress has been made in pump performance during the first six months of this calendar year, mainly because of improvements to the D-14 and F-1 pumps. Comparative costs show that \$107,000 was expended for pump replacements during CY 1957 as compared to \$30,694 for the first six months of CY 1958.

H. Plant Development and Expansion

1. Preparatory Engineering

Cask Car Contamination

A Contingency Maintenance Request in the amount of \$24,396 has been submitted to the AEC for final approval. The request provides funds for cask flushing devices which promise to be the best approach to reducing cask car contamination.

Inconcrete Piping

An extended usage test on plastic fluoroflex tubing was started this month. A pipe, shaped similarly to the Redox Plant inconcrete piping, was lined with fluoroflex tubing and placed under continuous steam pressure. Results to date have been very encouraging.

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Decontamination Building - Waste Handling and Decontamination Operation

The project proposal requesting funds for a new mobile equipment decontamination facility at the 211-U Area is circulating for approvals.

The final estimate was \$140,000 with a 2 1/2 year payout period.

2. Design and Construction Liaison

CG-648, Redox Auxilliary Iodine Removal and Nitric Acid Recovery

Project Engineering has issued work orders to plant forces for modifications to the oxygen analyzer and to the fail-safe system for the three way valves. The acid metering panel is now on site and installation is tentatively scheduled for July 7, 1958.

CG-772, "E" Metal Dissolvers - Redox

Revision 1 of the project proposal requesting construction funds was transmitted to the AEC on May 9, 1958. No approval action has been taken.

I. Reports Issued

- HW-56210 An Analysis of the Redox Sand Filter Data - May 29, 1958, C. E. Davis.
- HW-56266 Trip Report - Attendance and Presentation of Paper at 133rd National ACS Meeting - June, 1958, J. C. Langford.
- HW-56240 Trip Report - Mallinckrodt Chemical Company; Union Carbide Nuclear Company; and National Lead Company of Ohio - June, 1958, G. H. Winsor and R. A. Schneider.

III. ORGANIZATION AND PERSONNEL

A. Safety

There were no disabling injuries, serious accidents or incidents in the Redox Operation during June, 1958. Four medical treatment injuries were reported during the month.

B. Security

There were no security violations in the Redox Operation during the month of June, 1958.

C. Personnel Activities

Effective June 1, 1958 D. R. Koberg, Manager of Redox Radiation Monitoring Operation, accepted an assignment in the Hanford Laboratories Operation. The new assignment will be connected with the plutonium recycle test reactor now under construction. John Glover, formerly Specialist, Reports and Personnel, Purex Operation, replaced Mr. Koberg as Redox Radiation Monitoring Manager.

C. E. Davis, Radiation Analyst, Redox Radiation Monitoring Operation, accepted a position with the AEC at their Albuquerque Office, New Mexico, effective June 30, 1958.

A well attended party was held by the Redox Operation on June 13, 1958 at the Pasco Elks' Club.

On June 4, 1958, Dr. Kenneth Newman of the Turco Company, visited the Redox Waste Handling and Decontamination Operation to discuss decontamination problems. He is currently working on development of a solvent cleaning solution for effective decontamination of electrical motors.

C. T. Groszath, Manager of the Redox Operation, visited several General Electric Company plants during the period June 15 through June 26, 1958. The itinerary included: the Computer Department in Phoenix, Arizona; Appliance Park in Louisville, Kentucky; the Aircraft Nuclear Propulsion Department, the Jet Engine Department, and the Flight Propulsion Laboratory in Cincinnati, Ohio; the Heavy Military Electronic Equipment Department, and Electronics Park in Syracuse, New York; and the Manufacturing, Engineering, and Employee Relations Service Departments in New York City. The purpose of the trip was to study cost control programs, maintenance functions and problems, organizational structure and position descriptions of other General Electric plants and to consult on the placement and recruiting of personnel.

C. T. Groszath
Manager
Redox Operation

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CHEMICAL PROCESSING DEPARTMENT
FINISHED PRODUCTS OPERATION
MONTHLY REPORT

JUNE 1958

I RESPONSIBILITY

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

II ACHIEVEMENTS

A. Metal Finishing Operation

Delivery schedules for FY-1958 for unfabricated plutonium metal and for fabricated components were satisfied. Production for June was somewhat below schedule in both items.

Operating activities in the preparation of plutonium metal during June were erratic due to the smaller amounts of feed available which required intermittent operation of equipment. Periods of low feed availability were utilized in equipment maintenance and extensive hood housekeeping activities. Extreme equipment difficulties were experienced with the calciner electrical system, the drum filter and the offgas system. Redox was the main production feed source, and during the first part of the month button quality was affected by significant quantities of trace elements such as chromium, iron, nickel and aluminum. Since Product Recovery production did not quite reach the expected level, button production was only 98% of schedule for the month.

B. Product Recovery Operation

Recuplex operation production was somewhat less than scheduled but higher than May. A total of 53.4 Kg of plutonium was recovered from 40 slag and crucible dissolver runs, along with 55 charges from powder and metal dissolvers, in conjunction with recycle streams from Metal Finishing and Redox. The columns operated at 67.2% efficiency at 1750 liters per day instantaneous rate with column losses measured at 0.71% of throughput (.0103 g/l). Current backlog is 132 Kg.

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C. Uranium Reduction Operation

June production commitments were met without difficulty at the Uranium Reduction Operation and the process was shut down on June 20 for a two week vacation period. During June, 150,149 pounds of 100% Nitric Acid was sent to Purex and Redox. At month end there is a total of 155 tons of Uranium as UNH in storage at various sites awaiting processing through the Uranium Reduction Operation. Operations will be resumed on July 7.

D. Maintenance Operation

In Z Plant the maintenance problems consisted mainly of equipment failures in Hood 9B (continuous wet chemistry through fluorination) Task III (reduction casting) and Task IV (remelt casting). Also Recuplex lost a pulser bellows in each of its three solvent extraction columns.

The 26" vacuum system was drained and some plutonium was recovered. The D-6 drain system was inspected and declared satisfactory after the removal of some rags and other foreign material.

In the U Plant equipment failures were somewhat higher than in the previous three months. Three calciners experienced agitator shear pin failures. The powder handling system experienced failures of hammermills, rotary valves and filter bags. Other maintenance and improvement work was routine and satisfactory.

E. Analytical Control Operation

A total of 4204 determinations were performed on 1314 samples received during the month. About twelve percent of the analytical effort was directed toward the Plutonium Metallurgy program, analyzing plutonium-aluminum alloy samples.

F. Radiation Monitoring Operation

Fourteen radiation occurrences were documented in June. Further improvement on accumulated exposure to operators from an annual rate of 2.5 r to 2.4 r was noted in Z Plant. Considerable effort was made by operating forces in cleaning of Task I and Hood 9B in order to reduce the radiation levels. The average stack emission from the 234-5 Building for the month was only three microcuries per day, a reduction of almost a hundred fold since April.

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G. 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

One patent application, submitted by W. M. Swift, Plumber Steamfitter, Journeyman, in March was recorded. The invention involves an automatic level and center head which incorporates a square and rule.

H. Events Influencing Cost

The shutdown at the Uranium Reduction Plant along with the low production schedule for June will tend to show an unusually high unit cost for June. The shutdown tends to make this figure lower than it would have been had the plant continued to operate at very low rates.

I. Plant Development and Expansion

1. Projects: Study, Scoping or Approval Phase

As reported in May, Engineering studies are being conducted prior to scoping and preparation of project proposals for waste incineration and leaching, and for additional fire protection at the 234-5 Building.

Project scoping studies are being conducted for waste handling at the UO₃ Plant and for additional plutonium fabrication equipment for the 234-5 operation.

Project proposal awaiting approvals prior to detail design and construction are: CGC-800, Reduction of Radiation Exposure, RMA Line, 234-5 Building; CA-798, Cribs and Test Wells, 234-5 Building; CG-767, Rev. 2, UO₃ Improvements; Fabrication Equipment, 234-5 (for scope and design funds only).

2. Projects: Construction Phase

A total of six projects are in the construction phase for the Finished Products Operation. They are: CG-745, Fabrication Equipment; CG-734, RMC Button Line; CG-722, UO₃ Nitric Acid; CG-723, Conversion of Recuplex; CG-756, Fireproof Filter Replacement and CG-767, Rev. 1, Miscellaneous Improvements, UO₃ Plant. All of the projects are progressing in a satisfactory manner.

I. Plant Development and Expansion (Cont'd)

3. Projects: Completed

As reported earlier Project CG-691, Continuous Task I and II, has been approved with major exceptions. Work is progressing to satisfy these exceptions, and it is forecasted that the equipment will be operable in July.

III ORGANIZATION AND PERSONNEL

A. Organization Changes

F. R. Lohdefinck, Acting Supervisor, Product Recovery, was placed on a special accountability study for 234-5 Building. He was replaced by D. H. Underwood, Specialist Processing, from the Uranium Reduction Operation. T. B. Griffith, Specialist Processing, also from the Uranium Reduction Plant was assigned a special Maintenance Study Task Force. All the above assignments are temporary.

B. Safety Experience

No disabling injuries or near-serious accidents occurred during the month. Nine medical treatment injuries were experienced as compared to eight in May. The frequency rate increased from 1.35 to 1.99.

C. Radiation Experience

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

D. Security Experience

No security violations were experienced during the month.

E. Personnel Activities

Nothing significant to report.

W. N. Mobley, Manager
Finished Products Operation

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CHEMICAL PROCESSING DEPARTMENT
POWER AND GENERAL MAINTENANCE OPERATION

JUNE, 1958

I. RESPONSIBILITY

The responsibilities assigned the Power and General Maintenance Operation remained unchanged 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 plants during June.

B. Inspection, Maintenance, and Replacement

The design, development, and fabrication of a remotely controlled boring-drilling assembly was completed for use at the Purex Facility. Recent developments, however precluded its use in performing the specific task for which it was developed. The unit embodies a 1/6 HP motor which drives a 1 3/4" drill, but with a thrust exceeding 900 pounds. Although developed for a specific need, a minimum of modification can adapt the unit for other purposes.

Burial of a 52 foot long box containing a T-J2 column, and other contaminated equipment, was successfully accomplished. Exposure to personnel was held to a minimum notwithstanding high radiation levels present at the job site. The box weighed approximately 20 tons (gross) and contained miscellaneous equipment removed from the Purex canyon on Project CA-513-E (Purex Two Cycle Process).

New recording and transmitting equipment was installed at the meteorological station. Existing instruments, panels, etc., were removed and replaced with new wind direction, temperature, radiation, daylight, and dew point recorders. All signal wiring to the tower transmitter was replaced and eight new transmitters installed on the tower booms.

A clear plastic (Lucite) display case was fabricated at the request of the Hanford Laboratories Operation for use at the forthcoming Geneva Conference. A set of plastic dies and an anvil of the same material, and containing a dummy piece of metal, were placed in the case to be used in demonstrating a new method of pressing plutonium metal.

Other Lucite items fabricated during the month included a ventilation hood for the 231-Z Facility, also two glove hoods and an inert gas hood for use by the Finished Products Operation.

Installed during June were panels, glove ports, air ducts, and the necessary tools and holding fixtures for hot start-up of the 200 BR machining hood in the Finished Products Operation. Leak tests conducted by shop personnel indicated the unit could be expected to render satisfactory performance.

Lucite panels and stainless steel plates of improved design were installed on the Finished Products Operation's calcining and fluorinating hood (9A). The original lucite panels were of larger size with all lines and controls passing directly thru the lucite. Under this arrangement the loss of adequate seal might require replacement of an entire panel. The new design provides for smaller size lucite panels separated by stainless steel panels through which all controls and lines pass.

Final assembly and machining was completed on seven of the thirty plutonium fuel elements required to load the Test Reactor at Arco. Completed also was one of the shim-rod sections for the same project (MTR). The work is being performed by the Shops Operation under SWP conditions, critical mass safety controls, and accountability for fissionable material regulations.

The Tool and Die Shop continued to place emphasis on the meeting of work schedules for precision machining in support of Project "Quail" which is under the direction of Hanford Laboratories Operation. Limitations imposed by fluctuation in the volume of work required, and completion requirement dates, have necessitated the use of considerable overtime.

Fabrication and installation of a hood for inclosing the chemical feed pumps to the anion exchange unit, and related exhaust ducts, in the Purex Facility was completed on schedule.

Fabrication of four ammonia scrubbers for the Purex Facility was started June 4. Target date for completion of the first unit, including the necessary pipe jumpers, is July 15. Progress of the work is on schedule. The fabrication and "welding in" of the bubble caps for these units would have been extremely difficult if performed in accordance with the original design details. An improved design, overcoming the difficulties was approved at the request of the Shops Operation.

A prototype silver reactor and off-gas heater were fabricated and delivered to the Redox Facility in compliance with a requested completion date of June 30. Contained in the silver reactor was a cartridge which can be replaced remotely. Other work performed by the Shops Operation in support of the Redox Facility included fabrication of a standard silver reactor and heater which were an estimated 90% complete at month end.

A total of 18 replacement jumpers were fabricated -- 10 for Purex and 8 for Redox. Four process pumps were made ready, tested, and shipped -- 3 to Redox and 1 to 241-SX Tank Farm.

Sections of the sanitary water loop around the 2101 Building were isolated to permit several tie-ins prior to the installation of additional sprinkler systems in the building.

The semi-annual cleaning and washing of all sanitary water settling basins in 283 East and West Areas was completed.

P&GM-designed air diffusers, which permitted increased air flows at a reduced noise level, were installed in 1704-K and the building rebalanced.

The program for control of Russian Thistle continued with the spraying of 2-4,D on 6% of the ground area of the 200 East and West Areas or 250 acres. To date approximately 1550 acres in total have been sprayed.

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Emphasis is being placed on the development of an acceptable method for identifying HAP0 materials, with particular attention to the marking of stainless steels. Conclusions indicate the cost of establishing and maintaining a materials identifying program can well be justified by elimination of frequent excessing and scrapping of unidentifiable materials. The development of this program is continuing by the integrated efforts of Stores, P&GM, and FEO.

A. Safety and Security

B. Personnel Activities

J.H. Palmer attended the AEC and Contractors Safety and Fire Protection Conference June 24 - 25 in Germantown, Maryland. Mr. Palmer was introduced by the Chief of the AEC's Safety and Fire Protection Branch as the country's foremost expert on fire proof filters. He has been asked to prepare a variety of testing procedures to be applied to air filters for submission to the Underwriters Laboratory for approval. In this connection Mr. Palmer has been requested to attend a joint AEC -- Underwriters Laboratory Meeting in New York in September.

R.W. Harvey was recently elected Deputy Grand Knight of the Richland Council of Knights of Columbus.

Seven employee suggestions were received and the same number were deemed worthy of awards totalling \$110.00.

T. S. L. G. L. L. L., Manager
Power and General Maintenance Operation

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CHEMICAL PROCESSING DEPARTMENT
FINANCIAL OPERATION

June, 1958

I. RESPONSIBILITY

There were no significant changes in the responsibilities assigned to the Financial Operation during the month.

II. ACHIEVEMENT

A. Product Cost

The HOO-AEC has completed their review of the budgets for FY 1959 and FY 1960 and the submission has been made to Washington. The CPD Financial Operation has not as yet received a copy of this document, however, informal information received indicates that the reductions made from the original CPD submission are in line with minor variations, with those suggested by the HAPO General Manager.

These reductions in the original CPD operating budgets, contained in the HAPO submission to the local Commission, were analyzed and schedules prepared and distributed detailing the effect of the approximate \$950 000 reduction.

In order to assist in the analysis of routine maintenance work and to encourage the writing of specific orders for such work, rather than blanket orders, internal routine maintenance work orders were relieved from overrun control thereby simplifying field paper work in this area to an extent that should encourage placement of specific orders for individual units of work. Routine IBM tabulations will supplant some manual accumulations now being made and provide data in other cases where none is presently available.

Platinum and gold alloy crucibles rendered obsolete by the FY 1958 Task I and II process changes will be either buried or submitted for metal reclamation in early FY 1959. Burial, with appropriate marking, of approximately \$27 000 worth of gold and baker alloy too contaminated for reclamation will be made.

New operating statement formats were completed and orders placed for masters. The new forms will feature removal of noncontrollable costs from third and fourth level operating statements in accordance with Company responsibility reporting techniques.

Negotiations with the production operations were completed for standard billing of third level internal landlord costs, a further work simplification step.

Standard rates will be used in FY 1959 for the distribution of steam,

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raw water and sanitary water costs. Previous distribution of actual costs monthly was time consuming and introduced seasonal rate fluctuations destroying the correlation of dollar billing with demand. The change is effected with the concurrence of P&GM.

B. Personnel Accounting

Considerable discussion and much correspondence developed in regard to five employees of CPD, on temporary assignment in Idaho, and the applicability of withholding Idaho State income tax from their salaries.

Tax Accounting Service was contacted for an interpretation regarding the applicability of the Idaho State Tax to the CPD employees. In the opinion of the Tax Accounting Services' personnel, the Idaho tax was applicable and should be deducted from the salary of the CPD employees concerned since their term of employment in Idaho was to be for 90 to 120 days. This interpretation resulted in protests from the CPD employees concerned and resulted in a request for a final ruling in view of conflicting information concerning the applicability of the tax received from one of the employees concerned. As a result of this request, J. R. Snow, Specialist, State and Local Tax Accounting Services, reversed the decision previously received from his office and gave CPD Personnel Accounting Operation a ruling that if employed less than six months in Idaho, the employees pay would not be subject to State income tax. However, we were told to inform the employees concerned that theirs was not a clear-cut case and a possibility existed that at a later date they may have to pay the tax. The Manager of Employee Relations, Legal and the employees concerned were informed of this later ruling.

Statistics

1. Overtime Payments During Month

	<u>June</u>	<u>May</u>
Nonexempt	\$12 144*	\$17 014**
Exempt	<u>3 120</u>	<u>2 517</u>
	<u>\$15 264</u>	<u>\$19 531</u>

* Payments to nonexempt employees cover a four week period.

** Payments to nonexempt employees cover a five week period.

2. Gross Payroll

	<u>June</u>	<u>May</u>
Nonexempt	\$603 697*	\$ 752 755**
Exempt	<u>345 772</u>	<u>327 248</u>
	<u>\$949 469</u>	<u>\$1 080 003</u>

* Payments to nonexempt employees cover a four week period.

** Payments to nonexempt employees cover a five week period.

3. Pension PlanCalendar Year to Date
(January through June)

Number retired	3
Number who became eligible for participation	7
Number who elected to participate	7

4. Insurance Claims PaidCalendar Year to Date
(January through June)

Employee Life Insurance	4
Amount	\$52 777
Employee Weekly Benefit Claims Paid	141
Amount	\$10 759
Employee and Dependent Accident and Health Claims Paid	1 514
Amount	\$140 465

5. Suggestion Awards

Number of Awards	195
Total Amount of Awards	\$3 470

6. Preferential Rates

Number Added	0
Number Eliminated	0
Number Currently in Effect	56

7. Military Allowance Payments

Number	0
Amount	0

8. Participation in Benefit Plans

	Quarter Ending 6-30-58		Quarter Ending 3-31-58
	Number	%	%
Pension	1 517	99.3	99.8
Insurance - Personal Coverage	1 565	99.8	99.7
- Dependent Coverage	1 262	-	-
Stock Bonus Plan	937	61.2	58.4
Savings Plan	215	14.0	13.8
Good Neighbor Plan	941	61.5	61.9

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C. General Accounting

A meeting of the Supervisors - General Books of all HAPO components was held June 17 in the 200 East Area. The purpose of the meeting was to discuss FY 1958 closing, travel, and other mutual problems. Travel classification recommendations prepared by an appointed Task Force were accepted by General Books Supervisors and recommended to the Managers - General Accounting of all HAPO components for consideration. The recommendations concerned definitions and criteria for classifying travel for purposes of attending Off-site Courses and Trade and Professional Society Meetings.

FY 1959 control budget requests for attendance at Trade and Professional Society Meetings and Off-site Courses and Seminars were submitted to Contract Accounting on June 9, 1958.

Ninety-six voucher checks totaling \$347 952.87 were prepared by CPD during June, 1958. General Books issued forty-two of these checks totaling \$6 797.87. No checks for contamination of personal effects were issued.

A memorandum concerning the Federal Income Tax treatment of travel, living, and moving allowances or reimbursements paid to newly hired employees was forwarded to Level 3 Managers June 24, 1958.

The May General Ledger Trial Balance and Reports of Travel and Living Expense were delivered to Contract Accounting on schedule.

There were 22 active CPD projects with \$15 183 000 authorized funds as of May 31, 1958. Expenditures of \$10 253 000 and commitments amounting to \$827 000 have been incurred against these projects. Costs of \$239 000 were incurred during May.

Final cost closings were completed during June for CG-692 - Modifications to Redox 233-S Concentration Building - \$126 149, CG-720 - Modifications to Redox SWP Facilities - \$97 996, and CG-770 - Feed System and Powder Pick Up Modifications UO₃ Plant - \$111 796.

Directives received from the Commission in June authorized two projects - Additional Fire Protection, 222-S, \$27 000 and Reduction of Radiation Exposure, RMA Line, 234-5 Building (Engineering Study) \$30 000.

A revised Directive was received, changing the source of funding project CG-772 - "E" Metal Dissolvers to 2900 Equipment Not Included in Construction Projects.

D. Auditing

CPD Internal Auditors completed an assignment with the Traveling Auditors. During the period April 1, through June 23, 94 Internal Audit man days (exclusive of casual overtime) were expended on this assignment.

Field work was completed in connection with an audit of Servicing Cost records and routines. A formal report was issued June 24, 1958, covering findings and recommendations.

An examination was made of records supporting CPD employees' eligibility for the President's Safety Award as of June 6, 1958. No formal report will be issued covering this examination.

Audit follow-ups were made and formal reports issued covering the following:

1. Audit of CPD Administration of G. E. Suggestion Plan
2. Audit of Management of Capital Assets.

A summary report of audit work performed during FY 1958 in connection with CPD Physical Inventories was prepared and issued to the AEC.

A survey was made of the procedures followed and the accountability records maintained by the J. A. Jones Company in receiving, warehousing, disbursing and accounting for CPD project materials.

Work with Facilities Engineering personnel to strengthen controls of project materials is continuing. Currently a study is underway to determine the necessity and feasibility of establishing a project materials inventory account.

Discussions were held with Legal and Contract Administration to determine compliance with Prime Contract provision (payroll practice) involving the payment of isolation pay when overtime is worked and the payment of "E" time under certain conditions.

E. Procedures

Considerable time was spent in designing forms for the recording of maintenance time applied to the landlord function, and designing the system to be utilized by the Financial function to accumulate landlord costs.

A procedural study of the material control aspect of the Material Control group of Facilities Engineering Operation was initiated. This study was undertaken with an eye towards improving the control over materials issued by Minor Construction's White Bluffs warehouse to CPD projects.

F. Measurements

Cost and production analysis reports for Redox, Purex, and Finished Products, comparing actual costs and production with forecast, were prepared and issued to interested Level 3 Managers.

The productivity report for the second quarter of CY 1958 and CY 1958 to date, is being readied for issuance in July.

III. ORGANIZATION AND PERSONNEL

A. Safety and Security

A safety and security meeting for all Financial Operation personnel was held on June 30, 1958.

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No medical treatment or disabling injuries were experienced during the month.

No security violations occurred in June.

B. Reports Issued

HW-56222	CPD Operating Report - May, 1958	M. M. McDonald
HW-56305	Essential Material Inventory and Consumption Report - May, 1958	G. E. Dyreng
HW-56374	Purex Cost and Production Analysis - May, 1958	G. H. Temple
HW-56375	Redox Cost and Production Analysis - May, 1958	G. H. Temple
HW-56376	Finished Products Cost and Production Analysis - May, 1958	G. H. Temple
HW-56396	CPD Unit Cost Information - May, 1958	B. M. Dobbs
CLVI-397	CPD Cost and Production Analysis - May, 1958	K. G. Grimm
TS-RD	Product Cost Report - May, 1958	B. M. Dobbs

Manager - Finance

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HW-56602

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July 8, 1958

CHEMICAL PROCESSING DEPARTMENT
FACILITIES ENGINEERING OPERATION

June, 1958

I. RESPONSIBILITY

There were no significant changes in responsibilities assigned to the Facilities Engineering Operation during the month.

II. ACHIEVEMENTS

PUREX OPERATION

A. Research and Development

Rare Gas Recovery

Authorization for process development studies for the recovery of krypton and xenon from the Purex dissolver off-gas system was received from AEC during the month. The study will include the crude recovery and separation of krypton and xenon.

A request from the Atomic Energy Commission is under study concerning technical problems associated with the recovery of fission products from HAPD, including rare gas and other isotopes by commercial enterprises. The Commission suggested that the technical aspects and costs associated with three alternate cases be considered:

1. Commercial facilities immediately adjacent to the Purex or Rodox Production Plants.
2. Commercial facilities outside the Hanford barricade with:
 - (a) Pipeline transportation of rare gas
 - (b) Truck shipment of rare gas
 - (c) Rail shipment of rare gas
3. Bulk packaging of concentrated fission products at the existing operation's plants with shipment off-site for further processing.

1WW Pu Recovery Prototype

Final design was completed and all drawings were approved and issued for the Purex 1WW Pu Recovery prototype installation. Shop fabrication of all jumpers is proceeding on schedule. Detail design has been initiated on additions to the prototype facility which were not included in the original scope and detail design contract. These additions include a resin column pressure drop measurement, a resin level indicator, and a waste resin sampling device.

B. Plant Engineering

Ammonia Scrubber

Design for the Purex ammonia scrubber is complete, and the revised prints have been delivered to the shops for fabrication of the equipment. Fabrication of the "A" cell scrubber vessel and three jumpers is expected to be completed and the equipment delivered to Purex by July 15, 1958.

C. Project Activities*

CA-513-E - Two-Cycle Conversion

Installation of the two-cycle conversion facilities was completed in June with exceptions. Beneficial use of the facilities was obtained June 13, 1958.

Ion Exchange Prototype Alterations

Alterations for improved ventilation of the ion exchange prototype were complete for beneficial use on June 20, 1958. All work was completed on June 26, 1958. This work was done on a rush basis with a target completion date of June 23 and an estimated cost of \$21,000. The final cost of the work will be approximately \$12,000.

CG-647 - Acid and Iodine Recovery Facility

A proposal prepared jointly by Facilities Engineering and Research and Engineering was submitted for conversion of the Purex T-XB column

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* For complete information on projects, refer to the following reports:

Semimonthly Status Report
AEC-HOO Monthly Progress Report of
Construction Jobs

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of the 293-A Facility from a caustic scrubber into an auxiliary acid absorber, in series with the existing absorber, T-XA. The estimated total direct cost of the overall conversion is \$1,200. It is estimated that an overall operating cost savings of about \$35,000 per year could be realized by the conversion through elimination of present caustic consumption coupled with increased acid recovery.

REDOX OPERATION

A. Research and Development

Ammonia Removal Study

An engineering study is currently in progress on alternate methods for the removal of ammonia from the dissolver off-gas stream at Redox. Preliminary results of this study indicate the probable feasibility and economic incentive for combining the off-gas cooling tower and ammonia removal unit into a single vessel. Alternate methods for ammonia removal which are being considered include a by-pass system around the silver reactor for use during coating removal, and a separate ammonia scrubber installation.

B. Process Technology

Corrosion of Buried Piping

Two lengths of Fluoroflex-T plastic tubing of different diameters were tested by pulling them into sections of 2-inch pipe bent to the same patterns as the failed pipes in Redox. This was done in order to find the type of lubricant required on the tubing, the type of pulling device best suited for the work, and the characteristics of the tubing material. During the test, ends of the tubing were flared satisfactorily for gasket connections. One length of tubing was subjected to a live steam pressure of 100 psi for two weeks, with peak pressures up to 200 psi. At the end of this time, the tubing still had considerable tensile strength and elasticity and showed no signs of deterioration.

Additional shop tests are planned for the next two weeks, which will include full remote installations, duplicating the cell repair procedure.

C. Project Activities

CG-717 - Transfer Facilities for Non-Boiling Wastes

The Physical Completion Notice on Project CG-717 was issued as of May 29, 1958, with an indicated total cost of \$291,232. All work within the authorized scope was completed with the exception of the installation of the pump pit on Tank 104-SX.

FINISHED PRODUCTS OPERATION - Z PLANTA. Research and DevelopmentImprovements Task I and Task II

Efforts aimed at long range developments of the continuous Task I and II equipment have proceeded throughout the month. Progress and status of the various items associated with Hood H9 and Hood H7 are as follows:

1. A flow sheet was prepared of a system which would recirculate the fluorinator off-gas and condense out the water. It entirely eliminates the need for the present off-gas system.
2. Designs have been completed and all material requisitioned for the vacuum cleaning system to be installed in Hood H9A.
3. The Homalite CR-39 panel has been received and installed in Hood H9A. This material is expected to provide better service in the corrosive HF atmosphere experienced inside the hood.
4. A purchase order was placed for a closed circuit television set which is expected to reduce the need for the Zone 1 operator to enter the Zone 3 area in order to closely observe certain critical areas. The system consists of one camera, one control unit, and a monitor. The camera will be mounted in a fixed position over the calciner on the outside of the hood. The controls and monitor will be located on a panel in the operating gallery.

RMC Fabrication Facilities

Design scoping of additional RMC fabrication facilities has continued during the month. Scope drawings covering two alternate schemes for radiographing pieces have been prepared. Both of these alternates deal with the location of the cells on the northwest corner of the building. A third alternate scheme which locates the facility on the southwest corner of the building will be examined. This alternate seems to have more promise since location at this point will be more compatible with the normal material flow between the fabrication and assembly lines.

Studies have also been made to determine better ways of handling finished shapes in the cold storage hood designed for Project CG-745. One approach is being scoped and will be available for review during detail design of this hood.

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Z Plant Radiation Study

The scheduled data collection of this study is now essentially complete. Evaluation of the data to date has shown clean hood interiors to be necessary for low radiation levels. Because of this finding, an appreciable effort has been directed towards Hood 9A which is being completed under Project CG-691. Other phases of the study now being concluded have been concerned with: (1) more comprehensive knowledge of the neutron field throughout the process area and (2) greater use of the new 256 channel analyzer in the HLO Analytical Laboratory for determining the relative effects of process and shielding on the complex gamma spectrum of Z Plant process material.

The study of Hood 9A has been directed towards establishing the feasibility of maintaining a hood interior essentially free of radioactive residue. Investigation has included the possibilities of cleaning up process material which may be spilled at any location in the hood. A second concern has been the need for additional emphasis on confinement of the process material within the process equipment.

A magnesium oxide powder of minus 200 mesh was spread in various parts of the 9A Hood and then removed with a portable vacuum cleaner. The following conclusions and observations were made:

1. Vacuum cleaning is an effective method for removing dry powder.
2. The present design and layout of equipment within process hoods makes the routine cleaning of a hood difficult largely because of poor accessibility for vacuum cleaning equipment.
3. Cleaning of wet hood residues will require development of special manual tools.

B. Plant Engineering

RMA Line Radiation Study

The results of the study to determine distribution of gamma radiation along the backside of the RMA Line and the amounts of radiation sustained by operators along the line were published (HW-56317). As a result of the study, it was possible to define distribution of the radiation and estimate the amount of exposure received by operators at various work stations along the line. Areas in which to concentrate efforts to minimize the exposure problem are now clearly evident.

C. Project Activities

CG-691 - Improved Tasks I and II Facilities

The Physical Completion Notice on Project CG-691, with exceptions, was issued as of June 1, 1958, with an indicated total cost of \$943,000. The Physical Completion Notice included accruals of \$64,000 for exceptions and start-up items. Work on exceptions is under way, and hot tie-ins of Hood 9A are now scheduled for mid-July.

GENERAL ACTIVITIES

A. Research and Development

Critical Mass Laboratory

The approval for proceeding with design of the Critical Mass Laboratory has been received from the AEC. The laboratory is to be located in the 200-E Area adjacent to the existing Hot Semi-works facility. The design studies are progressing under the direction of the Hanford Laboratories Operation.

B. Process Technology

Waste Storage Tank 113-SX

An upward bulge of approximately four feet (3 feet above a horizontal plane) was detected in the Redox 113-SX tank when trying to install a prototype replaceable circulator through the riser in the pump pit. Additional readings indicated the bulge formed an approximate simple curve and each quadrant of the tank was raised about the same direction. The movement of the sidewalls, if any, was not detectable. There was about 460,000 gallons (electrode reading) of high level wastes at a maximum temperature of 236° F in the tank at the time the bulge was discovered.

Sometime during June 17 or 18, the east half of the tank bottom settled to about five inches above the original position of the bottom and the west half to about three inches above, with the sounding at the south 4-inch riser about 3/4 of an inch lower than the original bottom position.

No indications of a leak have been detected with present leak detection methods. It is planned to transfer the wastes from 113-SX to 103-SX to permit further evaluation of the tank.

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Photographing Interior of Tank 104-U

The mechanical operation of photographing the interior of a used high level waste storage tank was successfully accomplished with a remote control camera and positioning device. Forty-five exposures were taken of the ceiling and side walls of tank 104-U. The negatives lacked the desired detail for determining corrosion attack on the steel or concrete. It is planned to use this equipment on the Redox 113-SX storage tank after it is emptied.

C. Plant Engineering

Filming Amine Treatment of Process Steam

Corrosion test coupons have been installed at 202-A Building, 202-S Building, 284-E Building, and 284-W Building. These test coupons are intended to show the corrosion rates before the addition of a filming amine to the steam systems. Layout of the feed tank, pumps and piping for the boiler houses has been started.

Burial Boxes

The feasibility of economically designing and constructing burial boxes of steel instead of wood was discussed with representatives of three major northwest firms. Copies of a preliminary specification and drawings were supplied these firms for use in studying the problem. Comments have been requested from each company by July 23, 1958 for summarizing by FEO personnel.

D. Project Activities

Project Cost Information as of June 15, 1958:

Total authorized funds - Active Projects	\$15,084,000
Total cost-to-date	10,070,000
Commitments and Open Work Releases	1,225,000
Unencumbered Balance	3,789,000
Costs charged to above projects 5-18-58 to 6-15-58	228,000

Project CG-770 was dropped from active status during this period.

Authorized Funds	\$135,000	Total Cost	\$110,297
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CG-718 - Fission Product Isolation

The scope design of the isolation and packaging portion for the Cesium Recovery Pilot Plant, was completed and document HW-56108 issued. The issuance of this phase of the work completes the scope design for the subject project.

III. ORGANIZATION AND PERSONNELA. Personnel

Ronald F. Fleming reported to work on June 17, 1958, under the Relations and Utilities Summer Junior Program.

H. C. Copeland, Engineer, transferred to Plant and Industrial Engineering Operation, Irradiation Processing Department, on June 1, 1958.

B. Safety

Pertinent topics relating to safety while on vacation have been discussed in the regular monthly safety meetings.

C. Inventions

None

D. Reports Issued

HW-56154 Process Design Report, Purex 1WW Pu Recovery Prototype, by R. J. Pence, May 29, 1958.

HWS-6402 Process Development Specifications for Rare Gas Recovery Facility - Phase I Contract, by L. B. Bradley, May 29, 1958.

HWS-6250 Specifications for RMC Button Line Installation in 234-5 Building, Project CG-734, April 23, 1958, by J. R. Fritz.

HW-56317 Gamma Exposure to Operators on the Backside of the RMA Line, by V. P. Madsen and W. G. Ruff, June 4, 1958.

HW-56223 The Allocation of Recuplex Costs Between Metal Preparation and Metal Fabrication, by V. P. Madsen, June 3, 1958.

HW-56129 Project Proposal, Revision 1 - Reduction of Radiation Exposure, RMA Line, 234-5 Building (Project CGC-800), by D. A. Snyder, May 23, 1958.

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E. Trips

J. M. Gerhart discussed isotope separation processes and equipment as follows:

1. Conferred with Mr. G. R. Grove and Mr. E. A. Walker of the Mound Laboratories at Miamisburg, Ohio, on June 23 and 24.
2. Conferred with Mr. G. A. Garrett and Mr. S. A. Levine of the Oak Ridge Gaseous Division Plant at Oak Ridge, Tennessee on June 25.
3. Conferred with Mr. F. A. Zenz and Dr. P. Miller of the Walter Kidde Nuclear Laboratories, Inc., Garden City, Long Island, New York on June 26 and 27.

W. A. Graf and D. E. Braden attended the American Institute of Chemical Engineers' Meeting June 22 through the 28 in Philadelphia, Pennsylvania.

D. E. Braden also visited the Mixing Equipment Company, Rochester, New York, on June 19, 1958, and the Eastern Industries, Norwalk, Connecticut, on June 20, 1958, to discuss agitators.

W. A. Graf visited Savannah River June 30 and July 1, 1958, to discuss separations processes and equipment. He also visited Oak Ridge National Lab July 2, to discuss separations processes and equipment.

P. S. Kingsley attended the ASTM meeting in Boston, Massachusetts, June 22-25, 1958. He also visited the Resistoflex Co. in New York City on June 26 and 27, 1958, to discuss corrosion problems.

F. Visitors

Mr. R. E. Myers of Betz Laboratories visited the plant June 19, 1958 for consultation purposes on steam treatment.

W. T. Short, Manager of Methods and Time Standards Services, Manufacturing Engineering Services, visited CPD on June 13, 1958. The purpose of his visit was to better relate the application of the services his group provides (in maintenance productivity and work simplification areas) to CPD. Discussions were held with CPD management to gain common understandings and outline the services his group is able to offer CPD.

Manager
Facilities Engineering Operation

HP Shaw:FC:mh

CHEMICAL PROCESSING DEPARTMENT
RESEARCH AND ENGINEERING OPERATION

JUNE 1958

PUREX PROCESS TECHNOLOGY

Feed Preparation

Near the end of the month irradiated uranium with a cooling time range of 97 to 123 days was dissolved to form feed for the solvent extraction equipment. Despite the deletion of the mercuric nitrate (5×10^{-4} M) to the dissolver solution, radioiodine control has been excellent (≤ 0.1 curie per day) because of the longer cooling times.

After laboratory studies and plant tests proved radioiodine control in the Back-up Facility would not be significantly reduced and the absorption of oxides of nitrogen would be improved if the caustic scrubber were operated as a second nitric absorber in series, the conversion was made during the shutdown period. The second acid absorber produces five per cent nitric acid which is used as reflux in the first absorber to produce fifteen per cent acid which is increased in strength to fifty per cent by the acid vacuum fractionator.

Solvent Extraction

Flushes and conversion of the process equipment to the two-cycle process required the major portion of the month. The HC Column, replaced by the HA Scrub Column, HS, was decontaminated and held as a spare IC or 2E Column. Decontamination was accomplished by two alternate flushes of hot six per cent NaOH, one per cent tartaric acid and hot five per cent oxalic acid followed by 1.5 per cent KMnO_4 in 0.5 per cent NaOH and two percent $\text{Fe}(\text{NH}_4)_2(\text{SO}_4)_2$ in five per cent HNO_3 flushes. After these flushes were repeated radiation readings of 500 mr/hr and 10 to 40 mr/hr were obtained through the storage box for the interface location and remainder of the column, respectively.

Hot flushes of water, ten per cent caustic and five per cent HNO_3 were used to decontaminate the IA Column for burial. Radiation readings on this column were 4 mr and 1 mr at 30 and 130 feet, respectively.

Hot fifty per cent nitric acid flushes designed to establish the amount of plutonium holdup in the IBX, IBS, and 2B Columns proved the IBX Column had accumulated less than one gram in fourteen months while the IBS and 2B Columns contained two and seventeen grams, respectively.

Major conversion items included the following installations: (a) the HAO Tank, TK-J2, which provides for IBSU backcycle and also the addition of IOO to the scrub section of the HA Column, (b) the HS Column, which is a modified HC Column containing the same zebra cartridge as the HA Column scrub section, and is used as an organic continuous HAP scrub column, and (c) selected jumpers containing control instrumentation which are designed to permit an overall plant capacity factor of 3.2. These items, plus the previously installed 3WB backcycle of concentrated 2AW and 2DW plus XAW, constituted the two-cycle conversion.

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On June 15 a research and development type test was made using the plant solvent extraction columns in an attempt to segregate the 600 grams of neptunium-237 which had accumulated in the 3WB system after one month of operation. Although laboratory tests made in Mini mixer settlers indicated promising recovery, only ten per cent was segregated in the 2BP by the flowsheet shown below:

Np RECOVERY FLOWSHEET

<u>Stream</u>	<u>Flow</u>	<u>Temp. ° C</u>	<u>M HNO₃</u>	<u>M U</u>
HAF	100	35	8.0	0.2 - 0.6
ESS	16	25	2.0	-
HAX	100	35	(30% TBP)	
IBXF	142	35	~ 0.19	~ 0.22
IBX	30	25	0.1	(0.03 M FeSA)
IBS	35	35	(30% TBP)	
IBP	30	-	~ 0.70	-
2AF	40		4.0	-
2AX	20	35	(30% TBP)	
2AS	5	-	1.0	
2BX	8	-	0.10	

The major portion of the neptunium refluxed in the HA and ES Columns and was lost to waste during stripping and draining of these two columns. Satisfactory separation of neptunium from uranium and plutonium was demonstrated, but poor decontamination of the neptunium from niobium resulted from the operation. The short duration of the run (70 hours) and the abnormal fission product behavior of the 3WB prior to the shutdown may have been partially responsible for the poor decontamination performance. Only three grams of neptunium, of the 60 grams collected in the Final Plutonium Concentrator, were shipped when a full PR Can read 300 mr/hr as compared to a reading of 1 mr/hr for normal plutonium product. Chemical Research Operation plans to use the solution to further improve their neptunium purification techniques.

Upon completion of the neptunium recovery run, another off-standard operation was conducted to recover four to five kilograms of plutonium in the 3WE, mostly as a result of high XAW losses which occurred when the Ion Exchange Unit was operated during shutdown to decontaminate some concentrated plutonium solution. Although the HA Column was operated on a 2A Column flowsheet with a 2.0 M HNO₃ feed and a 1.0 M HNO₃ scrub, the decontamination was poorer than anticipated because of the short operation (14 hours) and the high fission product concentration in the feed.

Normal Solvent Extraction processing of irradiated uranium was delayed several times by mechanical failures, and once the plant was on the line, the residual high gamma activities throughout the plant resulting from the plant flushing and two recovery operations, caused several initial product batches of both plutonium and uranium to exceed gamma activity specifications. However, equipment flushing performed by continued operation brought both products into specifications by the end of the month.

Plutonium Concentration

During the conversion period the following major modifications were made to the Ion Exchange Unit to improve its operability:

- (1) The bed loading detector was moved from six inches above to fourteen inches below the XAF inlet to better control the XAW plutonium recycle.
- (2) The area of the XSW screen and the mesh of the XAW screen were increased to remove resin fines more readily from the system.
- (3) A new, more sensitive conductivity probe was installed in the XC Column to permit closer control of slip water and product separation.
- (4) The capacity of the XCX pump was increased.

When the unit was restarted after shutdown, the nitric acid concentration of the XCX was increased from 0.75 M to 1.0 M to minimize the possibility of plutonium polymer formation which could have been the cause of the plugging previously experienced in the concentrator overflow line. Plutonium recycle and resin movement experience with the new resin has been excellent. During processing of 2BP from the plutonium recovery operation, radiation readings as high as 500 mr/hr were experienced in the hood; however, after nitric acid flushing and processing normal 2BP, the readings rapidly returned to normal (≤ 6 mr/hr), except for the concentrator which reads 70 mr/hr at one spot.

Waste Treatment and Acid Recovery

Since startup, the Waste Treatment and Acid Recovery equipment has performed satisfactorily. By careful control of feed and concentrator conditions, the concentrated TWW has been held within twelve per cent of the flowsheet value of 37.5 gallons per ton during the three days of operation. No waste volume data nor waste loss data are available this month because of the short operating period prior to the end of the report period.

Self-concentration continues in Tanks 241-A-101, 102, and 103 at boil-off rates of 7.5, 6.4 and 1.5 gallons per minute, respectively. Samples of supernate were taken from TKs 101 and 103, and lowering a three-inch diameter, 1/8-inch-thick plate with a one-inch center hole established that the sludge density was sufficient in TKs 101 and 103 at 8 and 23 inches, respectively, to support the weight of the plate. The thicker sludge layer in TK-103 is probably due to a combination of the following: (a) lesser degree of agitation due to a lower boil-off rate, (b) settling which occurred during recent test periods when the recirculators were off, and (c) TK-103 contains about fifteen per cent more solids than TK-101.

~~DECLASSIFIED~~ REDOX TECHNOLOGY OPERATIONAcid Recovery and Iodine Removal

The efficiency of the acid recovery system averaged 78 percent, at an acid concentration of 50.2 percent, despite a seasonal increase in the 293-S cooling water temperature from 62 to 69 F. Material balances around the absorber and scrubber indicated that virtually all of the oxides of nitrogen escaping the absorber were being removed by reaction with the caustic in the scrubber, thus further confirming previous conclusions that unaccounted acid losses had been a result of an earlier oxygen deficiency in the absorber. Conversion of the caustic scrubber to a back-up absorber is to be completed as soon as scheduling of metal dissolution permits.

The emission of iodine-131 to the stack averaged 0.61 curie per day with the dissolvers operating 93 percent of the month, processing irradiated metal with an average cooling period of 102 days. Gas leaving the 293-S caustic scrubber contained an average of 0.001 curie per day, or less, while the caustic scrubbing solution averaged only 0.007 curie per day. Approximately 55 percent of the iodine-131 emitted came from the sand filter, the remainder by-passing the 293-S diversion valves, principally the B diversion valve. Installation of air-bleeds at the diversion valve inlets, to minimize leakage of radio-iodine past these valves, will be undertaken as the scheduling of metal dissolution permits. The source of the radio-iodine leaving the sand filter has not yet been determined.

A reclaimed Redox silver reactor was installed in the C-3 position on June 17 and functioned satisfactorily throughout the balance of the report period. Flushing of the reactor was accomplished at the 221-U building employing, successively, water, 2 M sodium thiosulfate solution (0.2 M alkaline), water, thiosulfate and three water flushes. Subsequently, the reactor was regenerated using 35 pounds of silver nitrate as a 6 molal solution. Preliminary tests indicated the reactor efficiency to be 99.8 percent despite the relatively light coating of silver nitrate on the Berl saddles. In comparison, new reactors, the saddles of which were coated with approximately 230 pounds of silver nitrate, had initial efficiencies of 99.4 percent declining to 96 percent within three months. The relatively poor performance of these latter reactors, which contained nearly twice the amount of silver nitrate used for earlier reactors, tends to confirm laboratory studies which indicated heavy silver nitrate coatings melted and flowed causing severe channeling of the gas stream.

Feed Preparation

In the course of evaluating the potential effects of the 5-day week operation, three oxidized, acidic feed batches were held at 50 C for periods ranging from 65 to 80 hours. Subsequent to reoxidation treatments, as outlined below, these HAF batches were adjusted to the proper acid-deficiency and processed through the extraction system with HAW (HSW) losses only 0.06 percent higher than normal.

Batch Number	Hours Held	Reoxidation		
		Location	Hours	Temperature
HE-44	80	H-4	2	Boiling
HE-45	72	H-1	5	80-85C
HE-46	65	G-5	13	80-85C

The relatively low losses sustained during this test indicate that it would be possible to activate the extraction system within a very few hours after the beginning of a 5-day week.

Extraction

The acidity of the HAS stream was increased from 0.1 to 0.2 M HNO_3 to minimize the potential for plutonium precipitation in the organic phase. HAP samples following this change indicated the plutonium to be stable for approximately 3 hours. Over an 18-hour period these samples remained clear and showed only an 8 percent decrease in plutonium concentration, whereas HAP samples, in equilibrium with HAS or 0.1 M HNO_3 displayed considerable precipitation and plutonium losses of 30 to 40 percent. Caustic consumption required for LAFS acidity adjustment indicates that the HAP acidity is currently comparable to that obtained in October 1957 prior to lowering the HAIS introduction point to the feed tee. There was no noticeable change in the precycle decontamination as a result of this change in HAS acidity.

Continued, periodic flooding of the 1A Column was experienced during the month with little benefit seen from cessation of the LAW recycle to the LAFS concentrator. Periodic flooding tests revealed (1) that flushing the 1A Column with 10 percent nitric acid effectively restored the column's processing capability and (2) that the decline in capability was rather rapid as processing continued. Analyses of one set of LAW flush samples showed small, but significant, quantities of iron present and also revealed that nearly 90 percent of the iron was removed by the initial acid flush. Conditions which may be contributing to formation of an iron-chromium-aluminum precipitate are still being evaluated. Some slight improvement was noted toward the end of June which might be attributed to the increase in sodium nitrate concentration in the LAFS as a consequence of the increased HAP acidity previously mentioned.

Uranium decontamination through the extraction cycles showed considerable improvement over preceding months with 88 percent of the 2EU batches meeting the specification for fission product activity. The improvement was attributed to operation of the uranium extraction columns with the interfaces below the midpoint of the scrub section. The 1A Column interface was held below the feed point for most of the report period without accelerating plutonium deposition.

Continued build-up of background activity in the glass-lined flow-cell of the HCP gamma monitor rendered the instrument useless until the end of the month at which time a fluorothene cell from the LEP monitor was installed.

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Over-all recoveries of plutonium and uranium for June averaged 99.72 and 99.85 percent, respectively, while the corresponding extraction system recoveries were 99.82 and 99.98 percent.

Equipment Experience

The 2AF pump, a multi-stage deep-well turbine type, failed after 3175 hours of operation as did the 3AF regenerative turbine pump after approximately 14,300 hours of service. A comparison of the lives of regenerative turbine and deep-well turbine pumps in intercycle service shows the former to have significantly better performance.

<u>Pump</u>	<u>Type</u>	<u>Hours</u>	<u>Apparent Cause of Failure</u>
2AF-1	Regenerative	19,300	Shaft failure or loose impellor.
2AF-2	"	9,100	Loss of capacity.
2AF-3	Deep-well	3,200	Leaking shaft seal.
2AF-4	"	2,770	Leaking shaft seal.
2AF-5	Regenerative	250	Probable shaft seizure due to lack of seal water.
2AF-6	Deep-well	3,175	Leaking shaft seal.
3AF-1	Regenerative	22,200	Shaft failure or loose impellor.
3AF-2	"	14,300	" " " " "
2DF-1	Regenerative	37,900	Original pump still in service.

The HAIS pump, number 14, has currently operated approximately 2,860 hours or about 25 percent longer than any of the previous pumps in that service. Since the nine pumps immediately preceding had an average life of only 405 hours, the relatively long life of the present pump provides conclusive evidence that the recycle of uranium to the HAIS concentrator, initiated at the time this pump was installed, provides an effective means of protecting the pump.

Waste Storage

The 107-SX sludge temperature, which had been reduced to a minimum of 293 F following the temperature rise of January and February, rose above 300 in May as the self-concentration factor exceeded 2.5. The tank contents were diluted to a self-concentration factor of 2.2 over a four-day period by the return of condensate from the condenser building and from 106-SX to determine how readily the sludge temperature could be controlled by dilution and circulation. By the end of the report period the sludge temperature had dropped from a maximum of 324 F to 312 F.

Unsuccessful attempts at the end of May to install prototype removable circulators in the 113-SX tank led to the discovery that the tank liner had been elevated to a maximum height of approximately 4 feet above its original position. Extensive

evaluation of material balances and temperature data indicates the presence of liquid between the concrete shell and the liner to be the most likely cause of the displacement. The liner returned to essentially normal position during June with a corresponding decrease in the liquid level within the tank. Investigation of the liner movement is being investigated extensively.

Determinations of apparent sludge levels by means of soundings with the liquid level reel were made for the first time in the SX tank farm during June. Tanks 108-SX and 114-SX, which have been circulated consistently since they were filled, showed sludge levels of 4 inches and 1 inch, respectively, while the 111-SX and 112-SX tanks, which were unagitated since May 26, 1958, revealed apparent sludge depths of 16 and 23 inches. The 107-SX tank, which had been unagitated for six weeks in April and May had a sludge level of only 2.4 inches after six weeks of circulation. The 112-SX tank is being circulated to determine the effect of circulation on the apparent sludge depth.

DECLASSIFIEDFINISHED PRODUCTS TECHNOLOGY OPERATIONURANIUM CONVERSION OPERATIONProcess Performance

Three containers of UO_3 failed to meet particle size specifications.

Nine hundred twenty-five (925) pounds of nitric acid per ton of uranium processed (88% of theoretical) were recovered at an average concentration of 48%.

The average operating rate of the calciners was 6.9 tons uranium per calciner for each day on the line.

Frequent difficulties with the bag filter blow ring drive prevented proper operation of the powder system.

Process Improvement

Failure of one calciner thermowell and bending of another was experienced during the month. No agitator damage resulted. The replacement thermowells have been further strengthened by an additional set of guide bars to prevent flexing in the flange weld.

Two feed points were bent during the month. One feed point was also found to have a large crack on the flat section of the steam jacket close to a weld. On K-cell, a feed point was bent and the support bracket damaged while attempting to remove the feed point.

Broken or deformed agitator shear pins were found in H, J, K, and L calciners. A complete change of pins was made in H and K calciners while only the broken ones were replaced in J-cell. Repair has not been started in L-cell. Stronger shear pin guards have been installed on three calciners.

Rates up to 9.4 tons uranium per day have been demonstrated in G-cell calciner, which has the modified feed point locations.

METAL FINISHING OPERATIONRecuplex

Forty runs, consisting of crucibles, fragments, powders, and clean-outs, were processed through the S & C Hood. Slurry losses averaged 0.12% of the recovered Pu.

The SE columns processed 1180 liters per day at 67% operating efficiency for an average instantaneous rate of 1750 liters per day. Waste losses to crib averaged 0.0103 g/L or 0.71% of the Pu processed. The low operating efficiency was caused by a series of major equipment failures (4 pulser bellows, stripping column interface controller gasket failure, and 2 pump failures).

PROCESS CHEMISTRY OPERATIONPROCESS ASSISTANCEPurex Process Studies

The laboratory work on the use of alternate reducing agents for plutonium-uranium partitioning in the Purex Plant has continued. Studies of the use of hydrazine as a plutonium reductant in the final uranium cycle were directed toward an explanation of the results of the recent plant test, in which the use of hydrazine in the 2DF stream was accompanied by a reduction in the Zr-Nb decontamination. The laboratory work to date favors the explanation that the unfavorable plant test results were caused by the hydrazine-containing solution dissolving Zr-Nb deposits from the process vessel walls, to give an extractable Zr-Nb species. Further studies have also been made of the use of uranium(IV), stabilized by hydrazine or by sulfamic acid, as the plutonium reductant in the 1B partition column. The tests, simulating 1B column operation, have shown that with 1BX containing 0.01 M uranium(IV) and 0.03 M hydrazine, the plutonium(III) is re-oxidized in the scrub section. With 1BX containing 0.02 M uranium(IV) and 0.04 M sulfamic acid, however, excellent plutonium-uranium partitioning was achieved. The uranium(IV) used in these studies was prepared by electrolytic reduction in a two-compartment cell, the electrodes separated by a semi-permeable membrane.

Neptunium Recovery in Purex

Distribution ratios of neptunium, plutonium, and uranium between Purex 3WB and 30% TBP-diluent were determined, as a help in developing a flowsheet for neptunium recovery in the Purex plant. Extraction coefficients for neptunium, plutonium, and uranium in 3WB samples made up to 4, 8, and 10.5 M HNO_3 were measured as: 0.7, 1.8, and 2.1, respectively, for Np; 5.3, 7.7, and 3.8 for plutonium; and 21, 14, and 4.4 for uranium. Successive extractions of 3WB diluted to 8 M HNO_3 showed that the E_a^O for Np stayed constant at ca. 1.8 as the concentration of the Np decreased from 5×10^7 c/m/gal to 6×10^5 c/m/gal. Other measurements, also in 8 M HNO_3 , were made at 25 and 50 C for varying nitrite concentrations (the aqueous was held at the extraction temperature for two hours after the sodium nitrite addition, prior to the extraction). It was found that at 25 C, NaNO_2 concentrations ranging from 0.001 M to 0.05 M were accompanied by neptunium E_a^O values ranging from 2.9 to 4.2, respectively, and plutonium E_a^O values ranging from 10.1 to 6.7. At 50 C the corresponding neptunium coefficients ranged from 2.3 to 1.0 and the plutonium coefficients from 12.0 to 8.0.

When Purex 3WB was actually processed for neptunium recovery in the Purex Plant, very poor separation of neptunium from Zr-Nb was achieved. Laboratory attempts to remove the fission product activity present in the 3WB by standard methods gave the following results: 1) treatment with silica gel, at a nitric acid concentration of either 1 M or 8 M, gave a D.F. of only four after four hours at room temperature; and 2) scavenging on MnO_2 formed by the autocatalytic reduction of 0.05 M KMnO_4 in one hour at 90 C

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gave a D.F. of only two. A neptunium extraction coefficient of 5.0 was measured for the solution which had been treated with permanganate.

Redox Process Assistance

Recent laboratory studies of the behavior of boron (added as boric acid) in the Redox solvent extraction system have shown the following: 1) hexone containing boron may be separated from boron by distillation of the water-hexone azeotrope; 2) boron remains in solution, up to concentrations of at least 4.7 g/l, during the concentration and neutralization of Redox D-9 waste; 3) the presence of 2 g/l boron does not affect fission product decontamination, or plutonium and uranium waste losses; and 4) boron distribution coefficients fall within the range of 0.017 to 0.033 throughout the range of conditions encountered in the Redox solvent extraction system.

ANALYTICAL ASSISTANCE

Alpha Counting Discs

In an effort to minimize alpha counting disc corrosion problems arising from the nitric acid corrosion of type 430 stainless steel discs, a large supply of type 347 steel discs has been obtained and placed in service. Initial tests indicate that the new discs, which are more resistant to nitric acid corrosion, do not require passivation and need only degreasing before use. It is also believed that the new discs will provide a more uniform counting surface and consequently minimize between-disc counting variations.

Alpha Scintillation Counting

Efforts to use the Alpha Scintillation Counter (ASC) as a direct current-counting instrument for the measurement of intense alpha activities have been successful. A Beckman micro-micro ammeter is used to measure the output of the ASC phototube. Alpha activity measurements (using electroplated sources) in the range of 1×10^5 to 3×10^6 d/m show a linear relationship between alpha activity and phototube output. In this range, stable meter readings and good reproducibility ($\pm 5\%$) are obtained. Current efforts are aimed at 1) determining the effects of beta radiation on the current counting system and 2) evaluating the application of the system to process sample measurements.

Spectrographic Analysis

High purity plutonium oxide has been prepared from plutonium nitrate for use as a sample diluent in the spectrographic determination of corrosion products in Redox and Purex final product plutonium solutions. The use of plutonium oxide as a diluent rather than uranium oxide (U_3O_8 was previously used as a stand-in matrix for plutonium because of the lack of high purity plutonium) provides a common matrix for dilution and consequently places the analysis on a sounder basis.

QUALITY CONTROL AND STANDARDS

During the month the quality control program for the Chemical Processing Department analytical laboratories was maintained as usual. The Purex laboratory and the Quality Control group have completed a review of the "Referee" program, and future precision statements for the Purex laboratory will be prepared on a sample rather than a method basis. This completes the change-over in the three analytical laboratories.

The Standards Laboratory continued the production of calibrated glassware and standard solutions. The calibration and checking of geometry discs for the alpha counters was in good control at month end.

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DECLASSIFIED234-5 DEVELOPMENT OPERATIONPreparation of Plutonium Trichloride

Over two kilograms of plutonium trichloride were prepared in support of the plutonium chloride conversion program.

Chlorination of plutonium oxide by carbon tetrachloride was studied further using a fritted glass reactor. A chlorination rate of 4 mm per hour was observed at 450 C at the center and a rate of 25 mm (full bed depth) per hour occurred at the edges next to the furnace.

By-products from use of carbon tetrachloride as a chlorinating agent at elevated temperature are reported to be chlorine, phosgene, C_6Cl_6 , C_2Cl_4 , C_2Cl_6 , CO_2 , and CO , depending on temperature and other chemicals present. During the chlorination of plutonium oxide, the off-gas carried by argon was run through a settling chamber, then through a cold trap at about -50 C. The condensate from the cold trap was warmed, and observations were made as follows:

1. A fraction distilled at 8 C, probably $COCl_2$.
2. There was some indication of a fraction at 16 - 18 C.
3. A fraction distilled at 22 C.
4. A yellow-colored component vaporized at 27 - 29 C.
5. The bulk of the liquid distilled at 74 - 75 C (that this was CCl_4 was confirmed by a specific gravity of 1.579).
6. Another fraction, of a yellow viscous liquid, remained. The volume of this was about 200 microliters.
7. Yet another fraction was a clear, wax-like film coating the trap walls after the carbon tetrachloride distilled. Its melting point is greater than 76 C.

Attempts to produce plutonium oxychloride by use of carbon tetrachloride and water vapor at 400 ± 25 C and also at 225 ± 25 C were unsuccessful. If oxychloride is an intermediate in the chlorination of plutonium dioxide, it is in small amounts. There has been no evidence of an intermediate chloride which resisted full chlorination.

Chlorination of plutonium oxide by phosgene showed that at 500 - 550 C, a hard cake is formed; at 350 - 400 C, the reaction was slow; and at 400 - 450 C, the chlorination was rapid. The rate of chlorination by phosgene is not as readily observed as with carbon tetrachloride where a definite color line is evident. With phosgene, penetration was deeper by a factor of two. It penetrated to a depth of 8 - 10 mm per hour, giving a bluish and cream-

colored cake. It is not known whether this was plutonium oxychloride rather than a mixture of plutonium oxide and plutonium trichloride. There was no difficulty in completing the chlorination later.

By-products from phosgene chlorination apparently are chlorine, hydrogen chloride, and carbon dioxide, with no tars or waxes.

Direct chlorination of plutonium oxalate by phosgene has been successful, first on the 2-gram, then on the 100-gram scale. The oxalate was dried for two to three hours at 90 - 135 C, then subsequently chlorinated by phosgene at 400 - 450 C. In three other attempts, each containing 100 - 150 grams of plutonium, there were no preliminary drying periods. The phosgene flow was started at about 100 C. The reaction temperature paused at 110 C while most of the water of crystallization left the starting material, $\text{Pu}(\text{C}_2\text{O}_4)_2 \cdot 6\text{H}_2\text{O}$. The temperatures at which chlorination was done were 400 - 450 C, 300 - 350 C, and 175 - 225 C. In each case, a temperature rise of about 50 C occurred due to the chemical reactions.

The resulting trichloride powder was much alike in the five batches. All products were free-flowing, light grey-blue powders of relatively low bulk density. That the oxalate is apparently more easily chlorinated than the oxide may be due to powder density, porosity after dehydration, or partial calcination of the oxalate.

Vibrating Tube Chlorinator

Preliminary testing of powder flow in the tube has been completed. Chlorination of cerium oxide and cerium oxalate to the trichloride will begin.

Corrosion tests were conducted by the Development and Corrosion Chemistry Operation in support of the plutonium trichloride program. At this time, the results are complete on platinum, gold, Baker 413, Hastelloy B, Hastelloy C, and Haynes 25 in a phosgene atmosphere at 400, 500, and 600 C. The noble metals were attacked severely by phosgene. Hastelloy B and Hastelloy C appear to be the most suitable for service in phosgene, with corrosion rates at 500 C of 0.6 and 0.8 mils/month.

Plutonium Chloride Reduction

Work continued on the problem of preventing the reduction charge and liner from sticking to the pressure vessel.

Three RS-4 standard magnesia reduction liners (about 9-1/2" x 3-1/4") were jacketed with nickel by flame-spraying. One was used in a plutonium trichloride reduction. The chloride slag penetrated the magnesium oxide portion of the crucible, but did not attack the nickel; and the inner magnesia layer kept the plutonium from alloying with the nickel outer coating. The crucible (coated with approximately one-sixteenth inch of nickel) remained intact when removed from the reduction vessel, except for cracks across the bottom caused by the expansion of the metal during cooling.

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In other experiments, a magnesia crucible densified by treatment with magnesium acetate and subsequent refiring did not contain the chloride slag which penetrated both crucible and the sand packing. The entire charge had to be soaked out of the reduction vessel. Yields on all reductions made this month, however, have exceeded 96 percent.

Analytical data indicate that plutonium trichloride as used here contains one-half to three-fourths of one percent water. Further tests and analyses are under way to verify these data. Reports from Los Alamos tend to verify that the tolerance for moisture in chlorides substantially exceeds the amount allowable for good fluoride reductions.

Plutonium trichloride stored in a desiccator over "Drierite" for 70 days has been reduced without pressure buildup.

Continuous Task III

Crucible materials intended for use in the electrolysis of plutonium trichloride were further investigated. Alumina, zircon, zirconia, and silicon carbide bonded with silicon nitride crucibles were tested with cerium(III) chloride, melt, and cerium metal in an argon atmosphere at 800 C for three hours. This mixture adhered to the crucibles in every case. The crucibles appeared undamaged. After breaking them, it was found that there was no penetration of the walls of the alumina crucible. There was slight penetration of the zircon crucible and almost complete penetration of the bottom of the zirconia crucible.

Work was started on obtaining melting point and solubility data on plutonium(III) chloride in the NaCl-KCl-BaCl₂ melt.

Installation of the electrolytic apparatus in Hood 31 has been started. Design and fabrication of small components for the reduction cell is well under way.

Recuplex

Attempts to strip DBBP solvent containing about three g/l plutonium from the recent Recuplex test showed this solvent to be much less strippable than expected from previous laboratory work. Successive strippings of this solvent with 0.05 M HAS - 0.05 M HNO₃ stripping solution resulted in E_g values of 6.80, 2.26, 1.27, and 1.07; whereas values ranging from 0.8 to 0.01 were expected. The high values are indicative of degradation products acting similar to DBP in the TBP system. The organic solutions may have undergone degradation since the plant test, but storage conditions should have been favorable.

When using fresh extractant and exiting H1 and H2 column aqueous phase, extraction coefficients of about 30 were found. Plant experience with TBP has indicated E_g 's of about 20 for these solutions.

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Shielded Button Line Prototype

The design criteria for the plutonium feed load-in room and associated equipment have been completed. Instrumentation requirements have been outlined.

The design criteria for the product handling hood has gone to the designers. A chemical flow sheet and flow diagram have been issued.

A cyclone-type powder trap is being fabricated from glass. This will shortly be completed and tested in the laboratory Task I hood. The filter mockup and cloth change mechanism have still not been completed, but are expected shortly. A new doctor blade assembly is being fabricated, which will make it possible to test powder containment methods.

The preliminary design of a combination calciner-chlorinator for converting plutonium oxalate to plutonium trichloride has been finished. The advantages of this design are the incorporation of two reactors into one unit, and minimization of powder containment problems.

Ceramic Development**DECLASSIFIED
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ORGANIZATION AND PERSONNEL

Personnel

K. J. Schneider transferred from the Redox Technology Operation to the Chemical Development Operation, Chemical Research and Development Operation, Hanford Laboratories Operation on June 1, 1958.

Professor L. E. Brownell was assigned to the Advance Process Development Operation on June 16, 1958 as a summer employee.

Trips

R. J. Kofoed and R. A. Schneider of the Process Chemistry Operation visited Dr. Andre Rochon of the Harvey Aluminum Company, The Dalles, Oregon on June 11, 1958 to inspect Baird Atomic Direct Reading Spectrometer.

B. F. Judson of the Advance Process Development Operation visited M. Michealis of the A. D. Little, Inc., Boston, Massachusetts on June 3, 1958; E. F. Miller of the Atomic Energy Commission, Germantown, Maryland on June 4, 1958; Dr. H. Roth of the Oak Ridge National Laboratory on June 5, 1958 to discuss Fission Product Market Survey.

W. G. Browne of the Advance Process Development Operation spoke before the Rotary Clubs in White Salmon, Wash. on May 13, 1958 and Ephrata, Wash. on June 26, 1958 on the subject of the importance of Atomic Energy.

H. M. Jones of Purex Technology Operation attended sessions at the ASME - Material Handling, New York, N.Y. on June 9, 10 and 11. Mr. Jones also visited Doug Lynch of Fisher & Porter Co., Hatboro, New Jersey on June 12 to hold instrument consultations.

E. R. Irish, Manager Purex Technology Operation presented a paper at the 1958 AEC and Contractor Safety and Fire Protection Conference, Germantown, Maryland on June 24 and 25, 1958.

Visitors

Mr. F. J. Foley and Mr. A. J. Kaye of the General Electric Company Manufacturing Services Laboratory, Schenectady, New York visited A. E. Smith, R. E. Smith and M. N. Raile on June 23 and 24, 1958 for consultation in connection with "Hands-Off" Program.

Inventions - None

V. R. Cooper, Manager
Research and Engineering Operation

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EMPLOYEE RELATIONS OPERATION
MONTHLY REPORT -- JUNE 1958

I. RESPONSIBILITY

There were no changes in responsibility during the month of June.

II. ACHIEVEMENT

FIRE PROTECTION OPERATION

A. Fire Responses

1. An accidental alarm was transmitted through Box #56 at 222-S building. Possible causes were the accidental jarring of auxiliary box or short in system.
2. A response was made to 271-U storage area where a transformer burned out in battery charger connected to battery operated fork lift was discharging smoke throughout the area. Fuses and cables were removed from batteries.
3. Responded to a grass fire in 200 East west of Purex which was probably caused by unattended fire in burning pit. Possibly a whirlwind carried embers from pit into dry cheat grass.
4. Responded to 2704-Z building to investigate smoke in building. Found overheated motor on air conditioner. Shut off motor and tagged "Do Not Operate".
5. Responded to grass fire 18 miles west on Sunnyside cutoff. Fire knocked down by Sunnyside Fire Department but small spot fires were left burning. One tanker was sent and these spot fires were extinguished.
6. Assisted both IPD and FPD in the extinguishment of one grass fire for each department.

B. Fire Extinguisher Service 200-East, 200 West, Batch Plant, BY Telephone Exchange, and Yakima Barricade.

During the month, 300 fire extinguishers were inspected, 2 installed, 3 delivered to new location, 10 seals broken and not reported, 30 were serviced, and 200 weighed.

There were 25 gas masks inspected, and 5 serviced; 18 hand lines were inspected.

Sprinkler systems were inspected in 272-W, 272-E, 277-U, and 277-S, and assistance was given in testing CO₂ bank at 234-5 hutment.

C. Training of Personnel in Other Operations

Fire Protection Operation personnel participated in six meetings with a combined attendance of 113. Instructions were given on the Back Pressure Arm Lift method of artificial respiration, and the operation, limitations, and construction of the Chemox Breathing Apparatus. A talk was given on the hazards of grass fires and their prevention. A fire extinguisher demonstration was given and the participants were given an opportunity to extinguish fires.

D. Services Performed for Other Operations

1. Burned a fire break for Power and General Maintenance.
2. Dismantled Chemox mask for display purposes for Redox.
3. Stood by with tanker for controlled burning for General Maintenance.

E. Training for Fire Protection Personnel

1. Two non-exempt people attended class "Dealing with People's Needs and Desires".
2. One non-exempt man attended personnel development class.

F. Civil Defense Rescue Squad Training

Training for Emergency Rescue Crews began May 16, 1958. Thirty people have attended these classes.

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EMPLOYEE COMPENSATION OPERATION

Revaluations of five exempt positions were completed during the month. Two Financial, one Analytical Laboratory and two Maintenance positions were involved.

New functional-organization charts were prepared and distributed. A new format, developed in coordination with other HAPO departments, utilized a more economical reproduction method and will permit further economies in future revisions.

Reconciliation discussion with IPD Salary Administration resulted in the reconciliation of three engineering positions.

With respect to Wage administration, most of two weeks during the month were spent in joint meetings with the HAPO Salary and Wage Managers and W. R. Jacobson, the New York Office Wage Consultant. These meetings were preliminary to an overall study of the HAPO nonexempt wage system with a view toward possible revision.

New classifications were established for two clerical type jobs during the month.

The job classifications in each of CPD's three Process Laboratories for Laboratory Assistants have finally been determined and grade levels established.

SUGGESTION PLAN

	<u>May</u>	<u>June</u>
Suggestions Received	70	44
Acknowledgements to Suggesters	89	42
Suggestions Pending Acknowledgement	2	4
Suggestions Referred to Operations for Investigation	89	42
Suggestions Pending Referral to Operations	2	4
Suggestions Completed and Closed	46	95
Adopted Suggestions Approved by Board	36	20
Adopted Suggestions Pending Approval by Board	23	28
Total Net Tangible Savings	--	\$2860.00
Total Cash Awards Paid During Month	--	575.00

As of the end of June \$3470.00 has been paid in awards in 1958 with total Net Tangible Savings of \$31,118.00. The average award for the 195 adopted suggestions is \$17.79 and the ratio of awards to savings is 11.2%.

	<u>May</u>	<u>June</u>
Total Number of Suggestions Outstanding to Operations at the end of the month	126	107

PARTICIPATION IN BENEFIT PLANS

	<u>May</u>	<u>June</u>
Insurance Plan	99.9	99.9
Pension Plan	99.4	99.4
Stock Bonus Plan	60.9	61.2
Good Neighbor Fund	61.4	61.5

A trip to Seattle for the purpose of talking to the General Electric Supply Company office was made during June in an effort to make more items available to our employees under the Employee Purchase Plan. Arrangements have been made with them which will make several items not presently available under the Purchase Plan available in the near future on a mail order basis.

The Specialist, Employee Benefits conducted one meeting on Employee Benefit Plans during June with 10 exempt personnel of CPD in attendance.

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UNION RELATIONS OPERATION

Of eleven grievances filed during the month, ten were concerned with questions of jurisdiction.

Four grievances were discussed at Step II.

In connection with the Wonacott Case (RMU jurisdiction) the Council informally advised the Company that it does not, at this time, intend to proceed to arbitration. However, the Council indicated that it would be willing to reopen discussion of the case in the hope that some agreement could be reached at a point short of arbitration. A meeting has been arranged for the first week in July. The original grievance in this case was filed 7/26/56.

The decision of the Rev. R. J. Carmody in reference to the Claude Thompson arbitration case was received during the month. In rendering his decision, adverse to the Company position, the arbitrator held that "to make the substitution (a Junior Power Operator for a Power Chief Operator) on a regularly scheduled and permanent basis, is to make the language of the Contract" in most cases "an ever-present opportunity for the unilateral decision of management to circumvent negotiated classifications." In compliance with the decision, a Journeyman Operator from 200 East Area is presently being used to relieve the Power Chief Operator in the 200 West steam plant. This arrangement is considered to be temporary and other alternative measures are being explored.

The Company and the HAMTC have agreed that Herbert Wyckoff, an attorney in Watsonville, California, will serve as arbitrator on the J. Graham Case. This case to be heard on 9/8/58 is concerned with approximately 10 to 12 employees who in January, 1958, were placed for 30 days on a straight swing shift (3:48 p.m. to 12:18 a.m.). The Union has contended that such an arrangement should have been negotiated with them. The Company disagrees on the basis that Article VII, Paragraph 6 of the GE-HAMTC Agreement permits such temporary shift. There is potentially, about \$2,500.00 liability in the event of a decision adverse to the Company.

[REDACTED]

UNION RELATIONS OPERATION

	<u>June</u>	<u>May</u>
Bargaining Unit Employees in CPD	823	823
Bargaining Unit Employees Utilizing Check-off	559	556
Percentage of Total Bargaining Unit Employees Utilizing Check-off.	67.9	67.6

Following is the grievance statistics summary for the month of June, 1958.

	<u>Unit</u>	<u>Nonunit</u>
Grievances received year to date	90	1
Grievances pending at Step II on 5-31-58	15	0
Grievances received during the month	11	0
Satisfactorily answered at Step I	4	0
Settled at Step I through expiration of 90-day time limit	4	0
Processed at Step II	4	0
Pending at Step II on 6-30-58	16	0
Pending at arbitration		
Active	4	0
Inactive	8	0

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PERSONNEL DEVELOPMENT AND PLACEMENT**DECLASSIFIED**

<u>A. Employment</u>	<u>Exempt</u>	<u>Non-Exempt</u>	<u>Total</u>
<u>Additions</u>	1	13	14
New Hires	0	2	2
Reactivates	0	3	3
Re-Hires	0	2	2
Re-Engages	0	2	2
Transfers from other components	0	4	4
Changes from Exempt to Non-Exempt	1	0	1
<u>Removals</u>	6	20	26
ROF	0	1	1
Illness	0	5	5
Leave of Absence	0	1	1
Transfer to other components	4	6	10
Resigned	2	6	8
Changes from Exempt to Non-Exempt	0	1	1
<u>Requisitions (Non-Exempt)</u>			
Number on hand at beginning of month		9	
Number received during month		9	
Number filled		16	
Number on hand at close of month		2*	

*These requisitions are for 1 Secretary and 1 Reproduction B reactivate.

Request for Transfer (Exempt)

Number on hand at beginning of month	20
Number received during month	0
Number transferred	0
Number closed out	0
Number on hand at close of month	20

Applications for Employment (Exempt)

Applications received during June	1
Hired	0
Closed out	1
Applications on hand	0
Open Requisitions	3

Service Pins

A total of 16 pins were issued as follows:

15 yrs. service	0 Male	0 Female
10 yrs. service	13 Male	2 Female
5 yrs. service	1 Male	0 Female

While other HAPO components declared an excess of approximately 19 crafts people in various job classifications during June, CPD did not declare any crafts people as excess.

One CPD Coal Handler was affected by the HAPO wide excess since he was the junior man in his seniority group. He would have been RCF'd except for the fact that he was accepted by and transferred to FPD to fill a Janitor opening in that department.

Man-specifications for two openings in Facilities Engineering were submitted to the Manufacturing Inventory for recommended candidates.

Two CPD exempt personnel were placed in AEC jobs through the efforts of the placement office.

Status - Personnel Development Program for Non-Exempt Employees

<u>Month</u>	<u>April</u>	<u>May</u>	<u>June</u>	<u>Total</u>
Number of appraisals scheduled	102	71	99	591
Number of appraisals delinquent as of 6-31-58	2	12	48	65

Correspondence

During June a total of 35 inquiries regarding CPD personnel were answered. They consisted of:

- 0 letter regarding record of employment
- 3 letters of inquiry regarding credit
- 32 letters regarding housing loans

Military Service Records

Records show that CPD has a total of 125 employees who are subject to military training through Selective Service or Armed Forces Reserve action.

	<u>Exempt</u>	<u>Non-Exempt</u>
Ready Reserve	13	13
Standby Reserve	15	6
Deferments Requested		1
Deferments Granted		0
Deferment Requests Pending		5

B. Personnel Training and Development

Participation in Training Courses

Exempt	62
Non-Exempt	235
G. E. Supervisory Selection Program - No. Completed	3
G. E. Supervisory Selection Program - Reevaluation	4
Technical Graduates on Rotation	5
Employees counseled in self-development	1
Films shown	6
OPG's Issued (2 new, 12 revised)	14

Twenty participants completed Dr. Conant's course "Understanding People."

All Level 3 Managers completed the course "Introduction to Finance" presented by the CPD Financial Operation.

Twenty-eight students completed the "Separations Process Fundamentals" course in GESNE evening school.

Three college juniors reported on June 16 and were assigned to Redox, Purex, and FEO.

CPD secretarial training is being offered to Level 4 secretaries, steno-typists and eligible clerks doing related work. The two session training course was presented to 15 CPD personnel in June.

C. Office Services

Duplicating

Total Multilith Copies Produced	147,139
Verifax Copies Produced	602
Xerox Masters Produced	308
Ozomatic Copies Produced	12,808

Mail

Total Pieces of Mail Handled	71,642
Registered Delivery	358
Library Mail, Pounds	494
Blue Prints (Pounds)	266

Addressograph

Instrument Charts Imprinted	8,832
Bulletins, OPG's, Etc.	9,130

Installation of acoustical board ceiling in 200-E Duplicating has been completed. Results are a marked decrease in the noise level and increased ventilation efficiency.

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COMMUNICATION**A. Statistics**

GE NEWS items	9
General Manager's Meetings with exempt employees	2
Management News Bulletins	4
Employee Headliners	2
Employee Location Records mailed out	16
Priority Messages	1

B. Comments on Statistics

Nine items were carried in the GE NEWS during the month. These included a picture and cutline of the selection committee for President's Award gifts; an attendance award story; a picture, cutline, and story about a CPD employee and his wife and their participation in the Employee Benefit Plans, as part of the promotion for the "Your Personal Share . . ." statement's distribution; a picture of a CPD scientist who received a degree through GE-NE work; a picture and cutline of the gifts available for the second President's Award; a picture and cutline describing the decontamination facilities at "U" Plant; a picture and feature story on a CPD employee who won a prize in a national safety council contest; and two suggestion award stories.

A priority message was sent out during the month on winning the second President's Safety Award.

C. Other Employee Communication Activities

A Round Table publication for June-July was prepared and distributed during the month.

Questions which are received on Round Table Evaluation Forms are being sent to the appropriate authority within the Department for answer. During the month four questions were received -- three were sent out for answer and one was answered by the Communication Specialist.

Re-prints of an article, "The Dangers of Assuming Too Much", were distributed to all CPD management.

A pamphlet prepared by HIO on fallout was distributed to all Department employees during the month.

Two posters, one on absenteeism and the other on keeping equipment in good repair, were distributed throughout CPD for posting on Department bulletin boards. The posters are part of the OPERATION UPTURN campaign.

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C. Other Employee Communication Activities - Cont'd.

Arrangements were made with representatives from Purex, Power & General Maintenance, Redox, and Finished Products Operation to provide tour guides for a visiting group of professors participating in the Summer Institute of Nuclear Energy being conducted by HLO. The tours will be conducted on June 30, July 3, July 9, and July 10.

The Upward Communication Report was prepared for the Manager - Employee Relations during the month.

D. Public Communication

The HAPO Speakers' Bureau has been notified that CPD will have four talks available for civic groups for the 1958-59 season. Two of these talks, "The Value of Science Training in High School" by E. R. Irish and "General Electric's Philosophy of Doing Right Voluntarily" by C. J. Sheeran, have been written, approved, and are ready for presentation. A third one concerning uranium recovery by H. F. Tew is in draft form and has been edited by Communication. The fourth talk is one that will be written by O. C. Schroeder and will be a general roundup of CPD's activities. This information has been supplied to the HAPO Speakers' Bureau so that the talks will be included in the Speakers' Brochure which is to be revised in July.

DECLASSIFIEDHEALTH AND SAFETY OPERATION

<u>Chemical Processing Department</u>	<u>June</u>	<u>May</u>	<u>Year to Date</u>
Disabling Injuries	0	0	0
Serious Accidents	1	0	2
Medical Treatment Injuries	41	41	286
Overexposure Incidents	0	1	3
Potential Overexposure Incidents	1	0	2
Radiation Occurrences	22	27	140
Fires	3	3	10
Security Violations	1	2	7

The Potential Overexposure Incident consisted of a puncture wound from an undetermined sharp object incurred by an operator in the 234-5 Recuplex area.

Damage and loss from the three fires was negligible. One fire resulted from spread following trash burning in a pit. Another was caused by an electrical short in a laboratory hood receptacle, and the third was a grass fire apparently caused by careless disposal of a lighted match or cigarette.

Programs

CPD achieved a second HAPCO President's Safety Award at midnight June 6, 1958 reflecting 455 days and approximately 4,000,000 man hours worked without a Disabling Injury. Awards were selected and exhibited in the various operations.

Bulletins and advice memorandums were issued to management on Bus Safety, Union-Management Safety Relations, and Mid-Year Accident Review.

During June the Safety Program Council directed emphasis to Hand and Foot Protection in support of the Department's second quarter Safety Program - Personal Protective Equipment. An information bulletin was issued; pay check envelopes featured the current program.

A "Safety Detector" device to stimulate interest in safety meetings, was fabricated and procured for the monthly Financial Operation safety meeting.

A letter was written to Paul W. Clymer, Supervisor of Safety, Washington State Department of Labor and Industries requesting that CPD be considered for the 1958 Washington State Award of Merit.

Preparation of CPD radiation Control Standards continued.

Nine safety messages were posted on the marquee boards.

Training and Education

The assault mask and fresh air masks were demonstrated to 38 employees of the Redox Operation.

A tour of Purex was conducted and a talk given on CPD radiation protection problems for AEC Radiological Physics personnel.

Advice and Counsel

- Redox - Increased frequency of back filling burial pits; operation of supervisory air pressure on 276-S fog system; no smoking zone in 276-S Building operating room; Hexone car Interstate Commerce Commission shipping regulations; construction materials and fire resistant rating requirements for storage in No. 2 blower room; reviewed proposal for 222-S sprinkler system.

- Purex - Paint vapors, ventilation, and explosion proof equipment considerations for coating interior of chemical tank 104; checking trap pits and pump pits for oxygen efficiency; door checks in 202-A auxiliary crane addition; outside valve hole cover protection.

- P & GM - Recommendations to improve the fire breaks around the 200-East perimeter fence and burning pit have been completed; efforts to achieve completion of the five-year flushing of the sprinkler systems in the 272-E, 272-W, and 277-W Buildings through the Landlord were continued; mosquito control programming in 200-West and 200-East the first week of July; control of contaminated waste burial for 200-West area; recommendations to narrow the intersection of 19th Street with Beloit, 200-West were completed; it was recommended that vehicle traffic parked south of the 200-West gate should not be permitted to enter the gate intersection during the period from 7:30 A.M. to 8:00 A.M. and the pedestrian congestion be controlled. The Landlord did not accept the recommendations. Notification of Fire Protection and Health and Safety when fire hydrants are taken out of service and returned to service.

- Facilities
- Engineering - Installation of Bestwall Gypsum board to meet fire resistant rating requirements; a dry chemical extinguishment system was recommended to be installed in 234-5 Building; safe operation of the 224-U Building steam cleaning station; reviewed blueprints for 200-West Powerhouse coal shaker.

- Employee
- Relations - Consultation with Communications Specialist on significance of Y-12 Nuclear Incident.

- R & UO - Recommendations made to Relations and Utilities Safety Operation to provide stairs to the ventilating fans on 2101 Building.

Inspection, Investigation and Audit

Inspections were made of 202-A Auxiliary Crane Addition, 271-U Canyon, and 202-S Operating Galleries.

Two inspections were conducted of the HLO metalurgy lab in the 234-5 Building with W. N. Mobley, O. Wick and R. H. Scott. On the second tour, a marked improvement was noted in housekeeping.

An inspection was made of the 231 Building in company with an HLO representative. Recommendations were made for placement of fire extinguishers.

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The annual inspection was made of the CO₂ system in the 234-5 contaminated waste storage hut.

A tour of 234-5 Building was made with H. Gilbert and J. P. H. Kelly of AEC, Washington, D. C. and Don Keigher of the local AEC Safety office.

An incident in which a Power and General Maintenance man fell through the deck of a "papered over" flat car was investigated; no injury occurred.

Investigated Serious Accident CPD 58-2; a slight injury occurred when a cotton glove worn by a 272-W machinist was caught in a mill cutter.

Investigation of Lafe Myers - alleged hernia - rejected.

Special investigation of 271-U Drum Handling Accident.

Special investigation of Bus Incident at 19th and Beloit.

Huntsmen welding shield model 411 approved for use in CPD.

The follow-up audit of Finished Products was completed.

Discussion of the Purex Audit with management was completed.

Reports Issued

Fire Reports - 271-U Electrical
 202-A Carton
 Purex Grass Fire
 Drum Handling Accident, 224-U
 Bus Incident - 200-West Area
 Potential Overexposure Incident CPD 58-2

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III. ORGANIZATION AND PERSONNEL

A. Meetings

Personnel in the Employee Relations Operation attended 90 meetings during the month. In addition to Safety, Security, Round Table, and Information meetings, these included:

Meetings with representatives of General Electric Supply Company in Seattle on the subject of the Employee Purchase plan.

Integration meetings with counterparts in other departments.

Meetings relative to the nonexempt compensation study.

Meetings of the CPD Operation Upturn Council.

HLO information meeting on developments in neutron monitoring.

Meeting of CPD radiation Monitoring Managers

Tri-City Safety Council

Mosquito Control Clinic sponsored by Public Health in cooperation with the State Department of Health

Step II grievance meetings and the Industrial Relations Council.

Meetings with representatives of the HAMTC.

B. Personnel Activities

Fire Protection Operation held 55 inside classes, and 59 outside drills, in which 13,060 feet of hose and 1,079 feet of ladders were used. There was 713 hours spent in training, which amounted to 13.5 percent of the time worked.

The Manager, Health and Safety, attended the AEC and Contractors Safety and Fire Protection Conference in Germantown, Maryland.

The Specialist, Technical Personnel Placement, visited the General Electric plant sites at Phoenix, Arizona, Louisville, Kentucky, Cincinnati, Ohio, New York and Syracuse, New York for placement recruitment conferences. It is felt that as a result of such visits the placement climates at other plant sites will be greatly improved.

D. S. Roberts

D. S. Roberts, Manager
Employee Relations

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