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HANFORD ATOMIC PRODUCTS OPERATION
RICHLAND, WASHINGTON

Work performed under Contract No. W-31-109-Eng-52 between the Atomic Energy Commission and General Electric Company

by J. P. Derrin
by M. W. K.
5/12/23

[REDACTED]

[REDACTED]

[REDACTED] the disclosure of its
[REDACTED] authorized person is prohibited.

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10	H. P. Shaw
11	S. G. Smolen
12	C. R. Bergdahl
13	M. G. Mass
14, 15 & 16	Atomic Energy Commission, Hanford Operations Office Attention: J. E. Travis, Manager
17 & 18	Atomic Energy Commission, Washington 25, D.C. Attention: E. J. Bloch, Director, Division of Production
19	Atomic Energy Commission, Washington 25, D.C. Attention: F. P. Baranowski, Chemical Processing Branch
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HW-57498

CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

SEPTEMBER, 1958

GENERAL SUMMARY

PRODUCTION

Output of plutonium from the separations plants during September exceeded the September and year-to-date commitments. High operating rates in both separations plants established a new monthly record for plutonium production which slightly exceeded the previous record established in July, 1958.

The production of UO_3 met the September commitment, and UO_3 shipments were in conformance with the established shipping schedules.

As a result of a change in the button and shape requirements which became effective during the latter part of August, the commitments of both products were revised to conform to the current ALOO Delivery Schedule. Output of both buttons and shapes exceeded the delivery requirements during September. Deliveries of shapes conform to the ALOO Schedule, while button deliveries are slightly in excess of the requirements of the Schedule.

ENGINEERING

Uranium product in the Purex plant during September was acceptable for shipment after silica gel treatment. This auxiliary step was necessary because of previously reported factors: polyethylene (cartridge fragment) particles tending to plug LBXF control valve, the bypassed HS column, and variations in flowsheet to define neptunium behavior.

Use of the secondary acid absorber in the Redox plant (a converted caustic scrubber) in September produced 47 per cent nitric acid. Insufficient data are available to date for overall evaluation of acid recovery, but all observations have been favorable.

In September, the Redox 1A column flooded for the first time since salt strength was increased via LAW recycle. Although more effort is indicated for improved LAW stability, this run exceeded past intervals of flood-free operation by as much as five times.

A 30 per cent increase in Recuplex extraction column instantaneous feed rates was experienced in September. Trial use of Mistron 25, a de-emulsifying agent, gave good dispersion at column feed rates which have resulted in emulsions under all prior conditions. Additional testing and experience are required to define optimum flowsheet and operating conditions.

Document HW-57498, published in September recommends the reduction process for plutonium trichloride.

The Air Products' Rare Gas processing study is well under way. Extensive calculations have been made on specific items of process equipment, and preliminary

flowsheets have been developed for the Case I and II alternates. The acetylene content in Hanford air has been recognized as a problem, and Air Products was requested to experimentally determine this concentration.

All work, including exceptions, was completed on Project CG-766, Additional Ventilation for Purex P & O Gallery, on September 12, 1958, and the Physical Completion Notice was issued as of that date.

During the month of August a design scope on additional RMC fabrication line facilities was virtually completed. The cost of the facility was indicated at \$2,130,000. Work is under way to determine the best method of utilizing the funds now available.

Work was completed on Project CG-756, Fire Resistant Exhaust Filters, Z Plant, and the Physical Completion Notice was issued as of September 6, 1958.

Work is proceeding on dissolver studies for the various enrichments of irradiated fuel elements to be processed. To date, only the positive circulating type dissolver system appears feasible for covering the entire enrichment range whether located at Redox or elsewhere.

A system for natural circulation dissolvers is being studied for feasibility but will require at least two different dissolver installations to cover the enrichment range.

Engineering work to define the receiving and storage facility needed for Power Fuels reprocessing has been expedited to permit a proposal to the AEC for funds.

GENERAL

Preliminary work has been started on the FY 1959 Midyear Budget Review. Requests were sent to all Level 3 and 4 operations for personnel estimates well before the budget call from Contract Accounting in order to allow ample time for preparation and review by all levels of CPD management.

A CPD Measurements Program Manual, outlining the history of measurements, development of CPD's program, purposes and uses of measurements, was prepared and distributed to interested Level 3 and 4 management.

Calculation guide sheets for use by employees in making comparisons of total compensation under Stock Bonus Plan versus Savings and Security Program during the period October 15, 1958 to January 15, 1961 were prepared.

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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. MacCreedy
Manager, Production J. H. Warren
Acting Manager, Parax Operation S. G. Smolen
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
SEPTEMBER 30, 1958

OPERATION	EXEMPT		TOTAL		TOTAL	
	8-31-58	9-30-58	8-31-58	9-30-58	8-31-58	9-30-58
GENERAL MANAGER'S GROUP	10	10	1	1	11	11
PRODUCTION	7	7	3	3	10	10
PUREX	51	51	215	215	266	266
REDOX	62	59	265	255	327	314
FINISHED PRODUCTS	58	58	254	252	312	310
POWER AND GENERAL MAINTENANCE	38	39	223	220	261	259
FINANCIAL	21	21	41	41	62	62
FACILITIES ENGINEERING	72	71	23	23	95	94
RESEARCH AND ENGINEERING	63	62	22	23	85	85
EMPLOYEE RELATIONS	30	30	52	51	82	81
	412	408	1099	1084	1511	1492

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CHEMICAL PROCESSING DEPARTMENT

PATENT SUMMARY
FOR
MONTH OF SEPTEMBER, 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

None

TITLE

None

J. H. Warner
ACTING GENERAL MANAGER
CHEMICAL PROCESSING DEPARTMENT

CHEMICAL PROCESSING DEPARTMENT
PRODUCTION OPERATION

SEPTEMBER, 1958

I. RESPONSIBILITY

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

II. ACHIEVEMENT

A. Production Statistics

1. Purex Operation

	<u>September</u>	<u>August</u>
Tons uranium processed	451.00	196.72
Average production rate during operation (T/D)	19.68	17.9
Total waste loss (%)		
Uranium	0.08	0.13
Plutonium	0.33	0.56
Average cooling time (days)	103	105
Minimum cooling time (days)	89	92
On-line efficiency (%)	93.5	52.0

2. Redox Operation

	<u>September</u>	<u>August</u>
Tons uranium processed	149.99	138.7
Average production rate during operation (T/D)	9.3	9.0
Total Waste Loss (%)		
Uranium	0.25	0.14
Plutonium	0.51	0.32
Average cooling time (days)	109	106
Minimum cooling time (days)	94	97
On-line efficiency (%)	54.0	49.7

3. 234mF Operation

	<u>September</u>	<u>August</u>
Batches input to Task I	310	255
Runs completed through Task III	221	174
Reduction Yield (%)	98.9	97.3
Waste disposal (units)	808.05	522.32

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4. UO₃ Operation

	<u>September</u>	<u>August</u>	<u>To date</u>
UO ₃ loaded (tons)	582.9	543.9	
UO ₃ approved for shipment (tons)	607.8	558.96	29,270.9
UO ₃ shipped (tons)	504.49	458.43	28,947.88
UNH backlog (tons)	269	142	

5. Power

	<u>200 East</u>	<u>200 West</u>
Raw water pumped (gpm)	10,438	4,955
Filtered water pumped (gpm)	992	1,074
Maximum steam generated (lbs/hr)	207,000	108,000
Average steam generated (lbs/hr)	175,524	77,514
Total steam generated (M lbs)	126,377	55,810
Coal consumed, est. (tons)	7,444	3,587

6. Waste Storage

	<u>Equivalent Tons U</u>	<u>September</u>	<u>August</u>
Salt waste reserve storage capacity - Redox	2,650		2,800
Salt waste reserve storage capacity - Purex	35,652		36,203
Coating waste reserve storage capacity - Redox	31,163		31,306
Coating waste reserve storage capacity - Purex	48,934		49,384

B. Production Planning and Scheduling

During August, 229,000 gallons of self concentration were realized at A-Farm as compared to 272,000 gallons of waste received. Temperature and liquid levels were controlled by adding 678,000 gallons of water to the three boiling tanks, bringing total water addition since February, 1957 up to 6,903,000 gallons. Self-concentration in A-Farm, since inception during July 1956, increased to 5,419,000 (76.3% of total Purex waste stored in A-Farm) as compared to 5,803,000 (41.6%) reclaimed at SX-Farm where self-concentration started in November, 1954. Water addition to SX tanks total 806,000 gallons to date.

Pre-heating of Tank 115-SX was started 9-1-58 by the addition of salt waste on top of 53,000 gallons of water. Waste continued to be received in 115-SX until the plant shutdown on 9-20-58 in preparation for a special accountability test. At month-end efforts were being made to unplug the 108-SX fill line so that the salt waste could be diverted to this receiver when processing resumed. At forecasted production rates, there is sufficient storage reserve (at 16 psig hydrostatic head) remaining in 108-SX to last until November or December, at which time fresh waste will be added to 115-SX. By gradually raising the temperature in 115-SX over a period of several months, the chance of jeopardizing the tank integrity by thermal shock will be minimized.

Since efforts to inspect the empty 110-SX tank by periscope were unsuccessful, no attempt was made to inspect 113-SX. Present plans are to check the 113-SX tank for a leak by adding water periodically. A pump will be installed for transferring the liquid in the event a leak is detected. Further efforts to monitor soil at depth will be made upon completion of another monitoring well. The contractor is scheduled to start drilling 9-29-58, and the job should be completed in three to four days. The well will be located northwest of 113-SX, about ten feet from the tank.

During the last six months of CY 1957, approximately 39% of the total curies discharged to ground in the 200 Areas originated from the Redox Plant. With cessation of the In-Farm Scavenging Program at the end of January, 1958, the disposal percentage rose to 98%. In line with Department policy to reduce the activity discharged to ground to a minimum, a study directed toward determining the feasibility of routing H-6 waste to the tank farm after concentration. The reduction in activity going to the S-7 Crib is tentatively estimated at about 75%.

A two-ton batch of selected tubes of solid slugs from DR reactor is being segregated by the Component Testing group at the 100-C Area and it is planned to charge this to a Redox dissolver early in October, 1958. These tubes were part of a production test for rupture studies, and were exposed to very close to the same level. The IPD Physics group agrees that the exposure of these slugs can be calculated accurately enough to make plutonium determinations at CPD worth while.

C. Finished Products and Customer Liaison

The fission products market survey continued as scheduled, with major efforts during the month by Arthur D. Little people toward preparation of the outline for the first report and making analysis of information obtained to formulate conclusions.

On September 8, 1958, concurrence of AEC was requested to extend the completion date for the Fission Products Market Survey until the end of December, 1958. This two months extension in time would not involve any additional funds for the survey, but would permit issuance of our report at the same time as the concurrent study being performed by the Arthur D. Little, Inc. for Emerson-AEC/OID. Basic information common to our study and the Emerson-AEC/OID study is being freely exchanged for both programs to make optimum use of all available information. Also, the time extension will allow inclusion of some indication of the potential market regarding military application. The military information, available from D.O.D. after November 1, 1958, will not be included as such in the Arthur D. Little, Inc. report due to its classified nature, however, the general impact of the potential classified market should be reflected in the overall picture to provide for industry the most realistic overall study possible.

Consideration is being given to the possibility of issuing a joint report for our study and the concurrent Emerson-AEC/OID study, covering

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the basic survey information common to both studies as Volume I. Separate reports, as Volume II, would be issued to include the specific information pertinent to the objectives of each study. Advantages to this appear to be in permitting more time and effort to be spent in preparing Volume I, and in obtaining better public acceptance through issuing the one report instead of two reports covering similar information. This will be explored further at our next meeting with Arthur D. Little, Inc.

A discussion of possible uses of fission products for military application was held with an APED representative. It appears that some potential applications do exist in the military areas which confirms our earlier discussions with representatives from the Martin Co., and bolsters our belief that the potential market for fission products will develop through the military (classified) uses.

D. Essential Materials

A study was made of various essential materials whose inventories appear abnormally high. It was recommended that the following materials formerly used in in-farm scavenging activities be excessed.

26,000 lbs. Calcium Nitrate	\$ 859
12,800 lbs. Nickel Sulfate	4,633
17,400 lbs. Sodium Ferrocyanide	2,777

Some concern has been felt about the high sodium chloride ion content in samples of liquid sodium nitrate from the Hedges plant of General Chemical Company. A 40% solution of sodium nitrate must have a sodium chloride content of 0.12% to be comparable to the specification on dry sodium nitrate. A typical Hedges sample analyzed 0.40% sodium chloride in a 41% solution. A higher chloride content impairs silver reactor efficiency and life extension. The General Chemical personnel have been informed that we require price quotations on liquid sodium nitrate which will meet our present specifications as well as price quotations on material comparable to their samples which were previously submitted.

All UO_3 recovered acid was transferred to Purex because the Redox facility does not as yet have a tie-in line from the acid storage tank to the 202-S Building.

E. Reports and Documents

1. Prepared and Issued

HW-57395 RD Redox Plant Production Schedule, September, 1958
D. McDonald

HW-57396 RD Purex Plant Production Schedule, September, 1958
D. McDonald

HW-57397 RD UO_3 Plant Production Schedule, September, 1958
D. McDonald

- HW-57398 RD 234-5 Plant Production Schedule, September, 1958
D. McDonald
- HW-57375 Essential Materials Consumption - Purex - Chemical
Processing Department for August 1958 M. A. Thress
- HW-57381 Essential Material Area Report to Cost and Purchasing -
Production Operation - Chemical Processing Department
for August, 1958, M. A. Thress
- HW-57550 Chemical Processing Department - Waste Status Summary
for August 31, 1958, R. E. Roberts
- HW-57555 Redox Plant Shutdown - September 19, 1958
R. E. Tomlinson
- HW-57627 Production Scheduling, R. E. Tomlinson
2. Prepared for Signature and Issuance
- HW-57327 Production, August, 1958, W. E. Johnson

III. ORGANIZATION AND PERSONNEL

A. Safety

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

B. Security

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

C. Visitor

On September 23, 1958, G. F. Kieger, APED, San Jose, California was here to discuss fission products and fission products market survey.

R. E. Tomlinson

Acting Manager
Production Operation

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CHEMICAL PROCESSING DEPARTMENT
PUREX OPERATION

September, 1958

I. RESPONSIBILITY

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

II. ACHIEVEMENT

A. Processing Experience

1. Production Statistics

a) Production - Per cent of Monthly Commitment

Uranium	122.5 Per cent
Plutonium	132.0 Per cent

b) Production Rates

8-29-58 at 1345 to 9-16-58 at 0400	2.04 to 2.64 CF rate based on IBX DOV capacity.
9-16-58 at 0400 to 9-18-58 at 0600	Down for replacement of IBXF valve, line flushing and installation of fine screen on IBXF pump inlet.
9-18-58 at 0600 to 9-23-58 at 1500	2.64 CF
9-23-58 at 1500 to 9-25-58 at 1230	2.40 CF
9-25-58 at 1230 to 9-29-58 at 0700	1.92 CF
9-27-58 at 0700 to 9-27-58 at 2115	Down for F7 pump replacement.
9-27-58 at 2115 to 10-5-58	1.92 CF

c) Operating Continuity

Plutonium	93.5 Per cent
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d) Waste Losses

Uranium	.06 Per cent
Plutonium	.33 Per cent

e) Product Retreated in Silica Gel 174 Tons

2. Normal Processing

Operation was continuous throughout the month, with the exception of two short outages: 1) for replacing the IBXF control valve jumper which became plugged, and 2) for replacing a failed F7 pump. Processing rates were extremely erratic during the early part of the month as they were based on the IBXF flow capacity. Rates were reduced in the latter part of the month due to lack of metal and iodine emission problem.

Optimum decontamination performance of the extraction batteries was sacrificed throughout the month in favor of obtaining data on Palm recovery. As a result, a large portion of all uranium produced required silica gel treatment or was reprocessed through the extraction columns. All uranium shipped from Purex was within specifications.

An attempted rework of 200 gallons of F8 material, (a combination of high wastes from the 20W containing large quantities of uranium, 2AW from the August Palm recovery and miscellaneous material from sumps and flushes) after six days of refluxing, resulted in an unusually large gamma activity burst in the product streams. The uranium product gamma ratio reached 12 and the plutonium G/AT rose to 17×10^{-11} . As a result, three batches of plutonium were reworked and the uranium product was processed through the silica gel facilities. An additional eighteen days of refluxing the F8 material hydrolyzed it to the point where it could be processed with only a minor process "bump", however only 800 gallons of the 2,000 gallons has been reprocessed.

Emphasis was placed on the control of acidity in the 3WB stream in an effort to stabilize the performance of the HA column. Nitric acid additions were made to J1 to control the HAW acidity at 2.25 M.

Extraction waste losses for the month were 0.14 and 0.04 per cent for Pu and U, respectively. The overall waste losses, which include HS column flushes, unusually high sump wastes and the normal coating waste, amounted to 0.33 and 0.08 per cent for Pu and U respectively.

Dissolver operation was normal during the month with all three dissolvers in service. A-3 dissolver operated with the newly installed ammonia scrubber unit; however, design deficiencies were disclosed upon startup. The hydraulics of the drain system restricted the scrubber effluent flow to about three or four gallons per minute, whereas at normal rates the effluent flow will be approximate twelve gallons per minute. On September 27, the scrubber was removed from A Cell and placed in M Cell for revision.

Self concentration in tanks 241-A-101, 102 and 103 continued at a rate of 5.2, 8.3 and 1.7 gallons per minute, respectively.

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3. Special Processing

Early in the month, seven kilograms of concentrated MR recycle from Finished Products Operation was processed via L11 to E6 at an accelerated rate. The start of this operation brought about an immediate rise in HAW Pu losses which average 0.3 per cent above normal. This addition plus some rework within the building resulted in operation of the Pu Ion Exchange Facilities in excess of 4.0 CF. At these rates, the Pu in the recycled XAW stream was higher than normal.

Two batches of LWV waste, containing approximately 300 units of Pu were segregated and reworked without incident. The high waste losses were the result of the August 29 startup and the rework of the Z Plant material mentioned above.

Approximately twelve tons of U were reworked through K Cell during the last three days of the month in order to reduce the gamma ratio below 2.0. Four tons of high gamma U were also recycled from K6 to H1 to facilitate the rework of plutonium.

During the September 16 to 18 outage, the G-1 tank was thoroughly flushed with acidic sodium nitrite, oxalic acid and sodium carbonate to remove MnO₂ buildup. The G-1 recirculation pump and tank packed section were being restricted by the buildup of solids.

B. Radiation Experience

The total monthly emission of iodine 131 was 41.2 curies. The maximum emission in a seven day period was 13.1 curies for the period ending September 10. The maximum emission in twenty-four hours was 3.7 curies on September 15.

Seven Radiation Occurrences were incurred during the month. Three were failure to comply with procedures, two were loss of control of contamination from Radiation Zones, one was skin contamination and one was a dose rate exceeding 6 mr/hr outside an established Radiation Zone.

Seven cases of plutonium skin contamination were incurred. The maximum level involved was 1.2 million d/m. The contamination (small area on employee's right knee) was reduced to less than 500 d/m with no apparent damage to the skin.

The J2 column, removed from the canyon during May '56 and placed on the storage siding, was buried at a maximum dose rate of 100 mrad/hr including 50 mr/hr at three feet.

The failed F6 and F11 tube bundles were buried at maximum dose rate of 2 r/hr at twenty-five feet for backfilling at the burial trench.

The failed R-5 pump was repaired at a maximum rate of 2 rads/hr including 400 mr/hr at four inches.

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Repair work on the F2 heater continued throughout the month. The maximum contamination level encountered was 475 mrad/hr at surface including 35 mr/hr at two inches from the baffle plates. The maximum dose rates encountered were 430 mrad/hr including 30 mr/hr during replacement of the end heads.

C. Mechanical Experience

The performance of the IBKF control valve was extremely erratic during the first part of the month and it finally plugged completely on September 16. At this time the valve jumper was replaced with a re-claimed spare, the screen on the J3 pump was replaced with a 1/16 inch mesh screen and the in-trench-piping was thoroughly flushed.

Safety devices were installed on the power circuits to the three electric off-gas heaters, located in A, B and C Cells, which automatically cut off the power and sound an alarm when the gas flow through the heaters drops below a safe level.

Temperature indicating devices complete with alarms, were installed on the cooling water outlets of both No. 1 and No. 2 Joy compressors to provide early warning alerts of abnormal temperatures.

Failure of the F7 canyon pump was experienced on September 27. A spare F10 series pump equipped with a floating conical slinger ring was installed as a replacement. The floating conical slinger ring was developed by HLO and installed as an experimental type for minimizing pump seal leakage. Seven failures of canyon pumps have been experienced to date, some of which were attributed to excessive seal leakage.

Damage to the R5-1-1 Wilfley centrifugal pump was sustained on September 25. Repairs involved replacement of the pump shaft, two bearings, mechanical seal assembly and governor assembly. The failure of the pump is believed to be the result of a retainer pin dropping out of the governor assembly, which would create a severe unbalanced condition.

Installation of four Jordan Radecon radiation chambers, spaced at 150' intervals east and west of the Purex canyon greenhouse, was completed. This system is designed to monitor radiation conditions in the canyon and alert personnel in the greenhouse to unusual radiation conditions.

The F2 steam heater for the off-gas iodine scrubber was decontaminated and repaired and made ready for installation in F Cell.

A new sodium nitrate tank was installed on September 3.

Minor Construction completed electrical work on the new canyon crane and all preparatory work for removal of the temporary barrier.

The U Cell recovered acid pumps continue to be a maintenance problem. A bad leak was detected around the top seal of the U2-2 pump on September 22 after returning the pump to service following an overhaul.

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D. Analytical Experience

The major effort this past month has been on the analytical support for the Palm program. Considerable relocation of work stations and changes of analytical methods for this material have been required. The unusually low concentrations of Palm in certain samples gives poor counting statistics and wide percentage fluctuations with minor numerical differences.

As an aid to the above program, the 256 channel pulse height analyzer has been received and is undergoing calibration. With the arrival of the alpha energy attachment, expected next month, strict purity control on Palm analyses can be maintained. The 256 analyzer will be used as soon as possible for the gamma analyses on the 100 Area effluent samples.

As of this month a new isotope correction factor control program was initiated with Process Chemistry setting the 95 per cent confidence level for reruns and 99.5 per cent confidence level for fliers to be discarded. The laboratory will use the 95 per cent C. L. limit for control purposes.

E. Improvement Experience

1. Process Tests and Revisions

Although minor flowsheet changes were made to improve final U and Pu cycle decontamination performance, the major efforts were directed toward Palm recovery technology. Three separate tests were conducted:

- a) The HAO flow was reduced from twenty-four to twenty-one flows and finally to zero flow for forty hours. The test results were clouded by the rework of F8 material which resulted in complete loss of Palm buildup. However, indications were that reduced flow favored buildup.
- b) Sulfamic acid, 0.03M, was added to the HAF to "kill" any excess nitrite in the feed. It was felt that nitrite was reducing Palm to an unextractable valence state. The sulfamic acid addition had an adverse effect and resulted in a further loss of Palm to the HAW.
- c) Sodium nitrite, 0.78 M, was added to J2 in an effort to adjust Palm valence to an unextractable state in the 3WB. To date this test is inconclusive.

Warming of tank 241-A-104 was completed on September 12. The tank temperature leveled off at 69° C after twenty-seven days of continuous recirculation of 154,000 gallons of water plus neutralized LWW from fifty-five tons of processed uranium. Within a period of two months a second addition will be made to increase the temperature and compensate for the decay of fission product activity.

2. Equipment Changes

The installation of a PRV to manually close the damper on the No. 2 sample gallery supply fan was completed on September 8. This control will be used only during emergency conditions to maintain D/P in the sample gallery.

F. Inventions and Discoveries

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

G. Events Influencing Cost

Approximately eighty cubic feet of Berl sandles were coated during the period. This represents a saving of \$15,000 under what it would have cost from an outside vendor.

The F2 steam heater was repaired and modified following extensive decontamination. The reclamation of this equipment saved \$25,593.

The month's relatively high production plus low maintenance costs resulted in favorable unit cost performance.

III. ORGANIZATION AND PERSONNEL

A. Safety

There were no disabling injuries or serious accidents during the month.

Personnel from A shift and day shift attended an Accident Prevention Course presented by W. H. Roos.

B. Security

There were no security violations in September.

C. Personnel Activities

Ninety-six per cent of all eligible Purex personnel have signed up for the Savings and Security Plan.

There were no contacts with the Servicing Department components of the Company.

Purex was visited by the following people:

- J. A. McCone - Chairman, Atomic Energy Commission
- J. K. Busby - Pennsylvania Power and Light Co.
- Admiral W. M. Fechteler - General Electric Representative, Washington
- E. J. Block - General Manager, AEC

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S. J. Smolen
Acting Manager
Purex Operation

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CHEMICAL PROCESSING DEPARTMENT
REDOX OPERATION

SEPTEMBER, 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

A change in scheduled production at August month end necessitated abandonment of the complete building cleanout which had been started in preparation for a controlled accountability run during September. Instead, the building was prepared for full production and started up on 8-31-58 on normal material to assist in attaining the quarterly production commitment for the department. Except for two shutdown periods, necessitated by restrictions in the waste discharge lines from the precycle and 2D columns, operations were continuous until 0540 on 9-19-58, at which time the production commitment was achieved. Processing operations were subsequently shutdown and remained down for the balance of the month in order to make complete building clean-out flushes in preparation for processing two controlled accountability runs.

The monthly production commitment was achieved while operating at 54% of the total hours in the month. The mechanical efficiency for the period was 89%.

All uranium and plutonium produced during the month was within shipping specifications, however, 7 batches of UNH with excessive gamma activity required ozonation and/or silica gel treatment to meet shipping specifications.

Product waste losses for the month averaged 0.25% and 0.51% for uranium and plutonium respectively. Product losses were under good control during normal processing, however, the overall monthly averages were influenced upward by the extensive flushing program and equipment changes made during the latter part of the month in preparation for processing of the controlled accountability runs, consisting of two complete pushes which have been earmarked for the program.

Iodine -131 emission to the 291-S stack was well under control throughout the month averaging 0.22 curies per day. No uncontrolled high emissions occurred.

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2. Equipment Experience

The A-2 dissolver, which experienced a coil failure after two years of operation, was replaced on 9-1-58. The replacement dissolver is approximately six inches larger in diameter and thus will accommodate a twelve ton charge of metal as compared to the previous nine. It is expected that the larger dissolver will significantly reduce time cycles in the metal dissolution operation.

The H-2 centrifuge was replaced on 9-22-58, after investigation revealed that the cause of the low pressure on the centrifuge bowl sprays was due to a leak in the in-cell piping. Installation of the new unit should minimize product waste losses, which had been on the increase due to ineffective cake washing.

B. Maintenance Operation

In general, the canyon equipment operated exceptionally well during the month. Jumper installations were lower than any other month this year in that only three were required, one of which was in connection with the installation of the H-2 centrifuge. Maintenance on the 60 ton canyon crane was also significantly low consisting of replacement of the one ton auxiliary hoist cable and hook and the electrical reelite for the left hand optic.

Investigation of the cause for the low pressure on the H-2 centrifuge bowl sprays indicated a failure either in the gasket or piping immediately above the centrifuge case. Consequently, the replacement centrifuge, which was installed on 9-22-58, was thoroughly checked for any weaknesses that could have caused this failure. However, nothing significant was found except possibly that the waste line flange nuts on top of the case were not tack welded. As a precautionary measure the flange nuts on the new unit were cinched down and tack welded.

Several changes were made on the new centrifuge, which was installed this month, in an effort to provide greater operating reliability. The remote tachometer was discarded in favor of the original non-removable tachometer. This is a much simpler unit and for this reason has proved to be far less susceptible to failure. Only one successful replacement has ever been made since the remote unit was initially adopted in February, 1954.

As a back-up instrument for the non-removable tachometer a low speed indicator was designed, fabricated, and installed. It is anticipated that this instrument will provide speed indications far more accurate than those obtained with the present tachometer and at the same time provide the necessary duality of equipment.

The L-3 product concentrator decontamination section was replaced on 9-30-58 because the unit had developed several small leaks and the cadmium shield was showing signs of corrosion. This was the first replacement since building startup and many obstacles had to be overcome. The position of the unit in the upper portion of the 233-S Building greenhouse, the weight of the unit (approximately 1200 pounds) and the gross contamination problem

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in this area made the installation difficult. In addition to the usual plastic man technique, numerous plastic lean-in windows had to be installed at various levels in the greenhouse. However, the job was completed without incident.

Conversion of the caustic scrubber, in the 293-S Iodine Removal and Nitric Acid Recovery Building, to a secondary acid absorber was completed this month. Operating experience over the past eleven months has shown that the caustic scrubber is not needed since 99.9% of the radioiodine which is not taken up in the dissolver silver reactors is absorbed in the primary acid absorber. The acid produced in the secondary system is used as make up water (actually 5% nitric acid) for the primary acid absorber. A savings in nitric acid and caustic amounting to approximately \$6.00/ton of uranium processed will be realized.

C. Waste Handling and Decontamination Operation

1. Waste Handling

Redox Coating Waste Received (S Farm)	21,846 Gallons
Redox Salt Waste Received (SX Farm)	143,666 "
Total Gallons Boil-Off Salt Waste	129,166 "
Waste Received at TX (221-U)	36,125 "

Investigation of the 113-SX tank bottom distortion continued this month. Daily electrode readings indicate that the tank bottom has remained static. However, since there has been considerable cyclic motion of the tank bottom during the past five months it is possible that the 113-SX tank has leaked. It is therefore necessary that the soil around and beneath the tank be examined for positive verification. A contingency maintenance request has been written to install a 12 foot diameter, 70 foot deep caisson vertically below the ground near the 113-SX tank. Five, 4 inch lined sleeves (drifts) will be drilled horizontally, about ten feet under the tank. Radiation monitoring during installation of the facility should detect any current leakage of waste. Future leakage can be detected by monitoring the 4 inch drifts with slightly modified existing instruments.

To determine what levels of ground contamination might be encountered during the sinking of the caisson mentioned above, digging of a 100 foot test well by the 113-SX tank was started on 9-30-58. This well should be completed by 10-8-58.

The Redox salt waste was diverted from the 115-SX to the 108-SX tank during the latter part of the month. This diversion was made on the recommendations of Design and Engineering personnel in order to provide a degree of control on the rapid thermal heating of a particular waste storage tank when hot wastes are added on a continuing basis.

A flow recorder and rotometer was installed on the waste addition line to the 114-SX waste storage tank. This installation will give better temperature control of the boiling tank and will also make it possible to more accurately measure gallons of boil-off each month. By installing additional rotometers other waste tanks can be tied into this system.

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2. Equipment Decontamination and Repair

a. Regulated Steam Pit

A total of six vehicles, three pieces of heavy equipment, and three miscellaneous items were decontaminated during the month.

b. Railroad Equipment

A total of 106 manhours was charged to this operation. The work included decontamination and operational coverage for repairs to well cars number 41, 44, 45, flatcar number 3615, and locomotive number 30.

c. 221-U Canyon

One hundred thirty-eight buckets of dummy slugs, used in the 100 Area reactors, were decontaminated and returned to the customer. A new conveyor, which was installed this month, has aided materially in the sorting of the dummy slugs.

Three Redox trap jumpers, one Purex A-D-4 agitator, and one Irradiation Processing Department pump, were successfully decontaminated, repaired, and returned to the customers. The IPD pump is valued at \$30,000 and it is estimated that approximately 170 man hours and 3,000 mrem exposure to personnel were saved by using the 221-U decontamination facilities.

D. Analytical Control

Plutonium results are now being reported in grams per gallon instead of counts per minute per gallon and pounds per gallon. These new units correspond more closely with units in use in the 234-5 Operation and their use facilitates plant plutonium accountability. Isotope correction factors are adjusted weekly for current material and these corrections, with range limit controls applied, are used by the laboratory in calculating analytical results. Previously the corrections were applied by SS Accountability.

Protoactinium ²³³ was found to be the major contaminant in neptunium product from the anion exchange column. This is significant as this element is the daughter of Np ²³⁷ and hence the cation exchange column purification step in the neptunium recovery process appears unnecessary.

E. Radiation Monitoring Operation

Thirteen radiation occurrences were reported during the month reflecting the sharpest deviation, from the monthly average of six, which has been experienced thus far in CY-1958. Four of the occurrences were skin contamination cases and one was the result of an employee exceeding the authorized estimated exposure limit. The remaining occurrences were minor contamination spreads or contaminated items found outside radiation zones.

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In all cases the cleanup of areas and equipment was readily accomplished. In an effort to reduce the upward trend of radiation occurrences, which was experienced this month, numerous round table discussions have been held at which the importance of following radiation work procedures has been re-emphasized.

Air contamination levels of 1.1×10^{-8} ucfp/cc were measured in the 202-S Building North Sample Gallery during the month. The source of contamination was traced to the spare sampler on the D-9 salt waste receiving tank. Removal of the canyon jumper on this sampler and subsequent decontamination of the surrounding area reduced the sample gallery air to a normal level.

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 September, 1958.

G. Events Influencing Costs

The budget report for "Equipment Not Included in Construction Projects" indicates that the first two months performance for FY-1959 is running considerably under budget forecasts. Expenditures through August total \$12,613, reflecting a monthly average of \$6,306. The Redox budget plus commitments permits a monthly expenditure of \$27,200. As predicted, the success of the Redox Waste Handling and Decontamination Operation in reclaiming failed equipment will have a significant bearing on the budgeted funds. With the success experienced in equipment reclamation to date, a downward revision in the midyear budget review may be necessary.

A satisfactory inspection of small tool handling, procurement, storage of equipment and general property management was completed by the AEC auditors this month.

Conversion of the caustic scrubber, in the 293-S Iodine Removal and Nitric Acid Recovery Building, to a secondary acid absorber will result in a savings of nitric acid and caustic amounting to approximately \$6.00/ton of uranium processed.

Reductions made this month in the amount of ANN solution added to the 2D extraction column will result in a savings of approximately \$20/ton of uranium processed.

H. Plant Development and Expansion

1. Preparatory Engineering

Plant Modifications for Reprocessing Non-Production Reactor Fuels

Funds in the amount of \$60,000 were requested in a preliminary project proposal for plant modifications necessary to process spent commercial reactor fuel elements. A recent request was made by the AEC to increase this request to \$1,000,000 with increased scope of the project.

CG-783, Additional Fire Protection, 222-S Building

Funds in the amount of \$6,300 have been released for the General Electric Company's portion of this project. Several contractors have visited the site for the purpose of observing installation conditions. Bid opening has been set for 10-1-58.

CAC-812, Equipment Decontamination Building, 2706-W

Funds have been authorized for the design of this facility. Detail design began this month and is scheduled for completion in October.

2. Design and Construction Liaison

Cask Car Contamination

Installation of flushing devices on the six process cask has been delayed by more urgent work. However, three of the casks are now 95% complete. The first car fitted with the modified casks will be shuttled between the Redox Plant and 100-H Area for shakedown and flush procedure development.

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

This project was officially closed out without exception on 9-25-58, after demonstration of satisfactory performance by the acid metering installation which was the only previous exception.

CG-772, "E" Metal Dissolvers - Redox

The AEC has deferred action on the request for construction funds until criticality tests now underway at Oak Ridge are completed.

I. REPORTS ISSUED

No secret reports were issued by Redox Operation personnel during the month of September, 1958.

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III. ORGANIZATION AND PERSONNEL

A. Safety

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

B. Security

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

C. Personnel Activities

R. V. Penfield, Analytical Chemist. Analytical Control Operation, terminated on 9-5-58 to return to school.

A. T. Sether, Radiation Analyst, Radiation Monitoring Operation, resigned on 9-26-58 to accept a position with the Atomic Energy Commission at Idaho Falls, Idaho.

P. E. Alley, Supervisor, Redox Radiation Monitoring Operation, transferred to a similar position in the Purex Operation effective 9-1-58.

F. A. Gregg, Process Operator in the Redox Waste Handling and Decontamination Operation, retired on 9-30-58.

Extensive efforts expended in review and discussion of the new General Electric Savings and Security Program were rewarded with 100% participation of all eligible personnel.

Plans for the five-day week operating schedule (X Y Z shifts) for the Redox Plant have been completed and the new schedule will be inaugurated on 10-6-58. The associated reduction of force will take place on 10-3-58.

CT Groswith
by [Signature]

Manager
Redox Operation

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CHEMICAL PROCESSING DEPARTMENT
FINISHED PRODUCTS OPERATION
MONTHLY REPORT

SEPTEMBER 1958

I RESPONSIBILITY

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

II ACHIEVEMENTS

A. Processing Operations

Delivery requirements for unfabricated plutonium were exceeded by 5% in September. Production exceeded schedule by 13%. The Recuplex facility recovered 68.2 kgs of plutonium during the month.

The performance of Hood 9-A (continuous Task I and II equipment) was very good since the correction of the powder movement problem and has operated essentially trouble free throughout the last three weeks of the month. Recycle has been generally less than 1%, and operating efficiencies have approached 100% at times during the period. Feed for the unit was in good supply and generally within good control.

The Recuplex facility operated satisfactorily through the month. The dissolvers processed 48 slag and crucible runs with an average waste loss of 0.53%. The solvent extraction columns operated at 84.3% efficiency with an average rate of 1960 l/day or an instantaneous rate of 2325 l/day. Column waste losses were 0.62% or 0.0065 g/l.

B. Fabrication Operations

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B. Fabrication Operations (Cont'd)

During the fabrication outage approximately 50 kgs of plutonium chips from the "quail" program were briquetted.

C. Uranium Reduction Operation

All production schedules were achieved. Fifteen tons of unmilled powder were shipped to UCNC at their request. Sulfur content and milling specifications were returned to normal after the test runs. There were 509,217 pounds of 100% nitric acid recovered representing a drop in absorber efficiency, the cause of which is not presently known. The cause for the under-accounting of uranium was critically studied and found to be due, in major part, to an incorrect calibration of the manometer on the receiving tank. A credit of 23,024 pounds is being recommended. Several agitator blade failures resulted in lost time in G, H, and J calciners.

D. Maintenance Operation

The maintenance experience in Z Plant during the past month was more favorable than in the past several months. Considerable effort was required to retune the vibrator fluorinator tube in Hood 9-A (new continuous Task I and II equipment). Powder movement is now satisfactory and operation during the last three weeks of the month was very good. Maintenance work involving the other tasks and the Recuplex facility was routine. In general area of 234-5 Building considerable difficulty was experienced with the 26" vacuum system due to corrosion. This system is now under study in an effort to determine what is necessary to insure greater reliability and to also increase capacity. A 300 KCVP X-Ray unit was installed in Room 306 for the Research and Engineering Operation, for test purposes. Activities involving the Hanford Laboratories consisted of the installation and maintenance of equipment in support of the Kinglet and U-233 programs.

In U Plant the maintenance activities during the month continued to be favorable. There were only two major calciner failures. One failure, on the G Calciner, involved damaged agitator blades, feed points and unloading weir. The other failure, on H Calciner, involved damaged agitator arms, blades and feed points. The calciner agitator arm failure on the present agitator assemblies (White Bluffs type) is a new development, during the past two months. Corrective action which involves strengthening the agitator arms at the weld joints by additional welding, is under way. The concentration equipment required considerable maintenance during the month as a result of plugged lines and valves. Three new fluidizing valves have been installed on H, J and L Calciners. The remaining three valves of this type have been fabricated and will be installed as production activity permits.

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E. Analytical Control Operation **WITH DELETIONS**

A total of 10481 determinations were performed on 1532 samples received during the month. The increase in the number of determinations was due to increased activity in the spectrography laboratory.

For a number of years it has been a practice for the spectrography laboratory to referee button samples by the carrier method on a ten percent basis in order to maintain internal control. However, this has not been a part of the Referee and Standards Program administered by the Process Control Operation. This month it was set up to run standards and to referee all types of samples under the Quality Control Program set up for the rest of the laboratory.

F. Radiation Monitoring Operation

Thirteen radiation occurrences were documented and thirteen cases of skin contamination were reported during the month.

Early in the month stack emissions were quite high resulting in an average of 77 micro curies/day. After changing Hood 9B primary and secondary filters, results dropped to a point where they are 10 micro curies/day at month end.

Although rotation of operators will be necessary to prevent certain employees from exceeding 3 r/year the average exposure per employee improved to a rate of slightly less than 2.3 r/year.

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

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

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H. Events Influencing Cost

The practice of charging expense portions of projects to Plant Equipment funds budgeted has been revised and henceforth they will be charged to operating expense. Thus, for projects CG-767 and 725 the UO₃ Plant will incur an unbudgeted expense of approximately \$80,000.

The laundry service normally provided for both beta-gamma radiation and alpha particle surveys of laundry. In the absence of any real plutonium contamination in the UO₃ Plant, the alpha particle survey was discontinued. Unit costs are thereby reduced from \$0.22 to \$0.10 per pound of clothing for an annual saving of \$14,400 to the Uranium Reduction Operation.

I. Plant Development and Expansion

1. Projects: Study, Scoping or Approval Phase

Engineering studies are essentially complete prior to project proposal presentation for waste incineration and leaching in the 234-5 Building, and replacement of the 216WR cribs for the Uranium Reduction Operation.

Project scoping studies are being continued for waste handling at the Uranium Reduction Plant, and for additional plutonium fabrication equipment for the 234-5 Building.

Project CGC-811 requesting design funds for additional fabrication facilities has been submitted to the Commission. Project CG-789, Rev. 2, Additional Fire Protection, 234-5 Building, is being routed for approvals within the General Electric Company.

2. Projects: Construction Phase

A total of eight 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, Fire-proof Filter Replacement; CGC-800, Reduction of Radiation Exposure, RMA Line; CA-798, Cribs and Test Wells 234-5; and CG-767, Rev. 2, UO₃ Improvements.

Project CG-723 will require a new proposal requesting additional funds to complete the scope of work.

3. Projects: Completed

The exceptions listed on the completion notice of Project CG-691, Continuous Task I and II, are being reviewed.

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DECLASSIFIEDIII ORGANIZATION & PERSONNELA. Organization Changes

The following temporary changes were effective September 1:

J. J. Courtney was assigned as Manager of what is now known as Processing Operations, which includes Metal Preparation, Product Recovery, and Plant Services.

L. I. Brecke was assigned as Manager of what is now known as Fabrication Operations, which includes all Plutonium Fabrication as well as preparations for startup and operation of the new fabrication line.

L. M. Knights was assigned as Manager of the Uranium Reduction Operation.

B. Safety Experience

No disabling injuries or near serious accidents occurred during the month. Five Medical Treatment Injuries were experienced as compared to seven in August. The frequency rate decreased from 1.28 to 1.09.

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

There were no security violations experienced during the month.

E. Personnel Activities

Participation in the new Savings & Security program is 100% for all employees not in bargaining units.

Approximately half of all employees in the Finished Products Operation attended the Accident Prevention sessions presented by the Health and Safety Operation.

F. Miscellaneous

During the month, W. N. Mobley attended a two-day Production Scheduling meeting at Albuquerque, New Mexico. P. B. Fisk spent three days at the Los Alamos Scientific Laboratory discussing radiograph techniques.

W. N. Mobley, Manager
Finished Products Operation

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CHEMICAL PROCESSING DEPARTMENT
POWER AND GENERAL MAINTENANCE OPERATION

SEPTEMBER 1958

I. RESPONSIBILITY

Responsibilities of the Power and General Maintenance Operation remained unchanged during the period covered by this report.

II. ACHIEVEMENT

A. Operating Continuity

Steam, water, and emergency electrical services were made available to the prime production facilities in sufficient quantities to sustain continuity of operations without interruption for the entire month.

B. Inspection, Maintenance, and Replacement

Fabrication of a prototypal dual-pass Silver Reactor for the Purex Facility is in progress with an estimated completion date of December 1. Progress was temporarily delayed awaiting chemical analysis and corrosion resistance tests on stainless steel plate, however, the results of these tests were satisfactory and the work has progressed 20% completion at month's end.

Completed in the Shops on September 29 was the final ammonia scrubber, of a group of four, fabricated for the Purex Facility. Operating experiences with the first unit indicated that the use of a seal trap in the 2" outlet line should be discontinued and this revision was effected on the final three units. Revision of the first unit will be effected following removal and decontamination during a planned shutdown.

Repair of a steam off-gas heater which had failed in the Redox Plant was successfully completed. The unit had been removed from service in "F" cell during September 57, however contamination was not reduced to a workable level until mid-August 58. Failure of the unit was attributed to a weld failure in the tube sheet of the heat exchanger.

Special emphasis is being placed on the fabrication of three stainless steel and two Hastelloy "B" vessels which are part of a prototypal cesium recovery system being developed by the Hanford Laboratories Operation.

Major repairs to a sulphuric acid tank from the Purex Facility were completed on schedule. Included in the repairs was the replacement of the original neoprene lining with lead, complicated by the presence of baffles on the interior of the tank.

Shop fabrication of the hood and equipment for the Degreasing and Briquetting Hood to be installed at 234-5 was completed ahead of schedule. If delivery schedule is met on vendor-supplied specialties the entire unit will be completed by October 9.

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Preparations are progressing for machining U-233 fuel elements. The work will be done in a separate room in the 272-W Building, so that adequate radiation and exposure controls may be established. Development of lead shielding for all steps in the Operation is in progress.

An open-top container, complete with lifting trunnions and lifting bail, for use as a contaminated scrap depository in the Purex canyon was completed from salvage pieces of 1/2" stainless steel.

A cadmium and paraffin absorber shield for determination of neutron count from waste cartons was completed for "Z" Plant.

During the month 21 replacement jumpers were fabricated -- 9 for 202-A, 10 for 202-S, and 2 for 241-SX Tank Farm.

A standby 40" centrifuge was delivered to Redox to replace a unit which developed a massive leak of undetermined origin at the point where the spray jet leg is flanged to the tank. The cause may be determined later following decontamination attempts at "U" Plant.

Assembly, mockup, and run-in were completed on four process pumps which were placed in standby. Also, an F-10 pump was completed and sent to Purex on an emergency basis.

Fabrication of an electrical off-gas heater, and a carbon steel burial capsule for the H-4 pipe coil were completed for Redox Facility.

Two burials were completed during the month for Purex. One involved disposal of the J-2 column in a specially prepared wooden whaler box. While being pulled into the trench one side of the box opened, due apparently to the unequalized strain by one of the tractors. Since the radiation level was low, covering with plastic and repairs were readily made. The other was the disposal of two defective tube bundles. Although the radiation level was high, requiring ten spacer cars between the contaminated equipment and locomotive, the burial was completed without incident.

Three burial boxes were completed for Redox -- two wooden boxes for disposal of tube bundles, and a concrete box for disposal of tank 109 (H-4 vessel) from the Redox canyon.

Inspection of the emergency electrical generating units in East and West Areas was completed by Mr. Culos of the Terry Turbine Company and Mr. Lott of the Allis-Chalmers Company. Finding the 200 East turbo-generator wheel out of balance and the shaft out of line, the unit was replaced and sent to G.E. Apparatus Service Shop in Seattle for correction.

Repair and rewinding of a 400 HP water pump motor from 282-E was completed. Failure of a babbitt bearing allowed the rotor to drop and caused the breakdown. The extra volume water demand was maintained however by immediate replacement with a motor from 282-W.

As consulting experts, J.H. Palmer and W.J. Richardson of the Power Engineering Operation, met with power and mechanical design engineers in the 700 Area to study the Reactor Containment Program. Principal

discussion centered on space filters for final filtration of exhaust gasses from the plants. Technical data will be supplied by this Operation to determine the filters required to implement the program.

III. ORGANIZATION AND PERSONNEL

A. Safety and Security

No disabling injuries were incurred by the Operation.

No breach of security was experienced.

B. Personnel Activities

O.R. Harris, Power Operation, was transferred on a temporary basis, to R&U for coal mine inspection.

Thirty-three craft people attended craft training sessions.

A.L. Henning and G.R. McMillan visited the G.E. Apparatus Service Shop in Seattle to witness the rebalancing and realignment of a turbo-generator wheel and shaft.

C. Employee Relations

During the month the J. Graham case went to arbitration. It was heard with Hubert Wyckoff as arbitrator. The arbitrator's opinion has not yet been received.

T. S. LaSalle, Manager
Power & General Maintenance Operation

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CHEMICAL PROCESSING DEPARTMENT
FINANCIAL OPERATION

SEPTEMBER, 1958

I. RESPONSIBILITY

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

II. ACHIEVEMENT

A. Product Cost

Operating reports were issued on September 10, 1958.

At the request of the Industrial Engineering Operation, an analysis was made of all department maintenance work performed during the past six months. The information accumulated will be used in connection with maintenance time and standard studies being conducted by the Industrial Engineering Operation. Product Cost is presently studying the possibility of the accumulation of greater maintenance detail on a routine basis in order to raise the general level of our services and to be able to answer this type of request more quickly and accurately.

At the request of various CPD managers the following cost analyses were prepared:

1. Review of instrument maintenance and calibration charges to CPD.
2. Review of decontamination charges to Purex.
3. Analysis of FPO maintenance work orders.
4. A comparative study of FY 1959 Purex maintenance expense with budget and FY 1958 actual.

The "average personnel" line in the operating reports will be eliminated, resulting in savings of the two to three man days previously needed to accumulate and calculate the necessary information. Product Cost will continue to report end of month personnel which is considered to be the more significant figure.

In response to the HAPO General Manager's request, manpower forecasts through December 31, 1959, were submitted during September.

Preliminary work has been started on the FY 1959 Midyear Budget Review. Requests were sent to all Level 3 and 4 operations for personnel estimates well before the formal budget call from Contract

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Accounting in order to allow ample time for preparation and review by all levels of CPD management.

Product Cost is attempting to achieve additional budget flexibility by giving recognition in the operating report to changes in current planning. An example of this new procedure is that while Fabrication Shutdown was not considered in the FY 1959 budget, the budget has now been altered to include this for display on the operating reports.

B. Personnel Accounting

Several years ago the AEC instructed General Electric at Richland to provide for a fast and accurate method of reconstructing the payroll in the event of a sudden local disaster. The procedure developed to accomplish this directive was off-site storage of pertinent payrolls and supporting data at a place mutually agreed upon which would provide proper sanctuary. The original site chosen for this storage was Iron Mountain in New York State until such time as General Electric became established at Arco, Idaho. Then the decision was made to establish off-site storage at this point because of its proximity to Richland.

Due to the fact that IBM electronic equipment, which employs magnetic tapes in accumulating payroll data, is now in use, it has been suggested and agreed to by all concerned that the tapes be used for storage instead of the bulky payroll records and the storage point changed to Syracuse, New York. Storage of tapes would also provide a much faster method of transfer to the off-site storage point than now when it is necessary to wait for printing, assembling and distribution of payroll forms.

Because of the changes effective October 1, 1958 (anticipated 3.48% "adder" adjustment to unit employees; 1% decrease in Pension contributions for the same group), it was necessary to work several of the payroll clerks one-half day on Saturday to prepare time cards in such a manner that the first two days of the week, September 29 and 30, would be computed at the old rates of pay, and rate of deduction for pension; and the balance of the week ended October 5 (October 1, 2 and 3) would obtain the new rates for those eligible. Actually, the process resembles the preparation of two payrolls with the end result blended into one check.

Statistics

1. Salary Payments

	<u>Overtime Payments</u>		<u>Gross Payroll</u>	
	<u>September</u>	<u>August</u>	<u>September</u>	<u>August</u>
Nonexempt	\$10 708*	\$15 548**	\$554 537*	\$ 705 358**
Exempt	2 634	3 558	342 514	347 803
Total	<u>\$13 342</u>	<u>\$19 106</u>	<u>\$897 051</u>	<u>\$1 053 161</u>

* Payments cover a four-week period

** Payments cover a five-week period

2. Pension PlanCalendar Year to Date
(January - September)

Number retired	5
Number who became eligible for participation	8
Number who elected to participate	8

3. Insurance Claims Paid

Employee Life Insurance	6
Amount	\$78 798
Employee Weekly Benefit Claims Paid	211
Amount	\$17 703
Employee and Dependent Accident and Health Claims Paid	2 049
Amount	\$199 793

4. Suggestion Awards

Number of Awards	256
Total Amount of Awards	\$4 275

5. Preferential Rates

Number added	0
Number eliminated	2
Number currently in effect	54

6. Participation in Benefit Plans

	Quarter Ending 9-30-58		Quarter Ending 6-30-58
	Number	%	%
Pension	1 476	99.4	99.3
Insurance			
Personal Coverage	1 526	99.8	99.8
Dependent Coverage	1 253	-	-
Stock Bonus Plan	909	60.9	61.2
Saving Plan	201	13.5	14.0
Good Neighbor Fund	917	61.5	61.5

C. General Accounting

During September, CPD Finance prepared 101 voucher checks totaling \$322,353.44. General Books issued 17 of these checks totaling \$2,384.29. No checks for contamination of personal effects were issued.

A special report was prepared for Contract Accounting which covered travel and living expenses incurred during FY 1958 by CPD employees visiting other G.E. plants, laboratories, offices, etc.

The August General Ledger Trial Balance and reports of Travel and Living Expense were delivered to Contract Accounting in accordance with a

revised schedule. It was necessary to set the Trial Balance due date back from 4:45 p.m. Friday, September 5, to 12:00 noon, Monday, September 8, since certain IBM services in connection with work order cost distribution were not received in an acceptable form until four working days after the original schedule.

As of August 31, 1958, expenditures and commitments of \$9,387,000 and \$906,000, respectively, had been incurred against active CPD projects with \$14,115,000 authorized funds.

A construction completion and cost closing statement was issued for Project CA-773, Interim Waste Crib - Purex, with a final cost of \$15,552.

Project authorizations received from the AEC during September were: an interim authorization of \$13,000 to provide design and management services for CAC-812, Equipment Decontamination Building 2706-W; an interim authorization of \$7,000 to perform preliminary design and prepare a revised project proposed for CGC-813, Plutonium Recovery from Contaminated Materials - 234-5 Building; and \$17,600 for IRC-241, Personnel Decontamination Facility - 200 West.

Six Appropriation Requests totaling \$36,584 were placed in process during September. Four were approved with a total accumulated value of \$23,768 and included: (1) Mechanical Draftsman and Hole Cutter (\$10,750); (2) Supplemental approval for inspection and gauging equipment 234-5 (\$4,000); (3) Primary filter box 234-5 (\$4,064); and (4) Drill and tap machine (\$4,954).

Plant and equipment general ledger account balances at August 31, 1958, were as follows:

<u>Account</u>	<u>Asset</u>	<u>Reserve</u>	<u>Net Book</u>
In Service	\$202 840 985	\$ 63 971 613	\$138 869 372
Held for Future Use	709 092	187 763	521 329
Not Used Nor Currently Useful	<u>111 743 054</u>	<u>111 743 054</u>	<u>-0-</u>
Total	<u>\$315 293 131</u>	<u>\$175 902 430</u>	<u>\$139 390 701</u>

An inventory of Redox installed plant and equipment taken by operating personnel was completed during the month.

D. Auditing

A formal audit report was issued in connection with the audit of Employment Administration and Practices.

An examination was made of the records supporting CPD's eligibility for safety awards.

Field work was started in connection with audits of Good Neighbor Fund, Material and Package Passes, and management of capital assets.

Twenty-two AEC Manual Chapters were received, reviewed and distributed.

E. Procedures

The compilation of data on the Work Simplification Study was completed during the month. Analysis of this data will be carried out for approximately the next two months.

An analysis of the paper work and paper flow of the Material Control Operation of FEO was begun.

Considerable effort was spent in assisting in the design of forms and procedures for the accumulation of maintenance data.

A meeting was held with the Manager - Data Processing at which justification for the acquisition of an IBM sorter was presented. The machine will permit Personnel Accounting personnel to level out some of the weekly peaks encountered in processing time cards and will also facilitate the use of a unit ticket system for cost accounting.

F. Measurements

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

A CPD Measurements Program Manual, outlining the history of measurements, development of CPD's program, purposes and uses of measurements, was prepared and distributed to interested Level 3 and 4 management.

Preliminary work in connection with the issuance of the annual measurements report was started.

III. ORGANIZATION AND PERSONNEL

A. Personnel Activities

L. B. Christopher, Manager - General Accounting, visited G.E. plants and offices at Schenectady, New York City, Cincinnati, Ohio, and Rome, Georgia, to review general accounting programs and techniques.

B. Safety and Security

A safety and security meeting for all Financial Operation personnel was held on September 26, 1958.

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

No security violations occurred in September.

C. Reports Issued

HW-57315	CPD Operating Report - August	M. M. McDonald
HW-57392	Essential Material Inventory and Consumption Report - August	G. E. Dyreng
HW-57443	August Unit Cost Information	B. M. Dobbs
HW-57461	Redox Cost and Production Analysis - August	G. H. Temple
HW-57462	Purex Cost and Production Analysis - August	G. H. Temple
HW-57463	Finished Products Cost and Production Analysis - August	G. H. Temple
CLVI-482	CPD Cost and Production Analysis - August	K. G. Grimm
TS - RD	Product Cost Report - August	B. M. Dobbs

Manager - Finance

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October 7, 1958

CHEMICAL PROCESSING DEPARTMENT
FACILITIES ENGINEERING OPERATION

September, 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 Processing

The Air Products' Rare Gas processing study is well under way. Extensive calculations have been made on specific items of process equipment, and preliminary flowsheets have been developed for the Case I and II alternates. However, the study is approximately three weeks behind schedule. This delay is due to a lack of definitive experimental data on the behavior of oxides of nitrogen in the system and uncertainties concerning the permissible concentration factors for acetylene, which govern the concentration of the Case I product. The acetylene content in Hanford air has been recognized as a problem, and Air Products was requested to experimentally determine this concentration. The entire study, including the G.E. Case III work is scheduled to be submitted to the AEC by November 17, 1958.

Palm Recovery

Preliminary flow and hydraulic diagrams, a cell arrangement drawing, and equipment calculations were completed for the canyon part of a continuous ion exchange process for recovery of neptunium from the Purex 2DW stream. However, on September 26 the decision was made to use a critically safe resin column and a batch operation instead of the previously planned continuous process. The change voids most of the design work done so far. Three advantages of the batch operation are as follows:

1. Flow rates are more adaptable to the size of the critically safe resin column.

2. Enables concentration of plutonium waste stream before back-cycling to the HA column.
3. Enables higher concentrations of neptunium in the feed to the resin column which results in increased recovery efficiency.

Purex 1WW Pu Recovery Prototype

Fabrication and installation of the Purex 1WW Recovery Prototype was essentially completed except for some minor P&O Gallery piping changes and instrument tie-ins. It is planned to start up operation of the prototype following the scheduled plant shutdown early in October.

In-Line Gamma Monitor, 2BP Stream

The 2BP plutonium stream in-line gamma monitor which is being installed on the CG-686 project was originally specified as a current measuring type which indicates total gamma activity. Recent studies have shown that considerably more positive and useful operating information would be given if the plutonium gamma activity was rejected in the instrument, and only the fission product activity observed. It is possible to make this change by using a pulse type amplifier and discriminator. The monitor will then provide a much better indication of decontamination in the Pu cycle. The cost differential is small and recommendations have been made for the change.

B. Plant Engineering

Purex Ammonia Scrubbers

The ammonia liquor drain problem has been resolved and modification of the scrubber and the drain jumpers is in progress. It is expected that the A-Cell equipment will be installed and ready for start-up following the scheduled plant shutdown early in October.

C. Project Activities*

CA-513-E - Expansion of 200 Area Facilities, Second Remote Crane

Construction Operation has completed all clean-up items except removal of the ventilation barrier and load performance tests on the crane. Removal of the barrier and subsequent testing of the crane has been deferred until after the Purex Plant shutdown, scheduled for early October.

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

Semimonthly Status Report

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AEC-HOO Monthly Progress Report of
Construction Jobs

CG-766 - Additional Ventilation for Purex P&O Gallery

All work, including exceptions, was completed on Project CG-766 on September 12, 1958, and the Physical Completion Notice was issued as of that date. This project was completed within the authorized funds and the directive completion date.

REDOX OPERATION

A. Plant Engineering

Ventilation - South Pipe Gallery

A study is being made to determine design costs for ventilation improvements in the south operating pipe galleries. Present ventilation is not adequate for summer cooling. The effort to date has been investigation of alternate methods of introducing new air flows into the galleries to establish a design base.

Dissolver Vessel

An engineering review has been completed of the original dissolver vessel drawings for spare parts procurement. Based on inspection results of a new type dissolver fabricated by construction forces, modifications were recommended. These include changes in materials, coil support brackets, and fabrication methods. Redox Operation has requested fabrication of the vessel on a rush basis with a minimum of premium effort.

B. Project Activities

CG-648 - Redox Plant Off-Gas Treatment Facilities

The acid control system installation was completed and checked out in early September. With the completion of this item of work, all physical exceptions on this project are now complete. Some as-built work remains.

MA-10 - 113-SX Tank Leak Detection System

This Contingency Maintenance Request for \$85,000 to provide access tubes for radiation sensing elements under the Redox 113-SX tank was approved by the HOO-AEC on September 25, 1958. Preliminary work on this project was started the same date.

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FINISHED PRODUCTS OPERATION - Z PLANTA. Research and DevelopmentChemical Processing and Reduction

The recent experience with the Poroloy filter media in Hood H-9A highlights the difficulties of the design of the present off-gas system. In addition to corrosion, trouble has been encountered with the formation of a crystalline-like glaze over the filter. Because of the generally unsatisfactory nature of the off-gas system, research and development efforts were expended during the month to develop alternate methods for filtering. A test setup was completed in the 300 Area to prototype the fluorinator off-gas banjo filter, and preliminary testing has been started. Also a purchase order has been issued for Hastelloy "C" Poroloy filters for an internal fluorinator off-gas filter. Both of these systems are designed so that all product entrained in the off-gas is automatically fed back into the tube, thereby eliminating the need for any added handling or recycling of the powder.

Weapons

During the month of August a design scope on additional RMC fabrication line facilities was virtually completed. The cost of the facility was indicated at \$2,130,000. During the latter part of September it appeared that the AEC would make \$1,600,000 available immediately from the \$3,500,000 in the FY 1959 construction budget. Work is underway to determine the best method of utilizing available funds to provide sufficient equipment to meet future production schedules and to provide some flexibility for fabricating shell-type weapon components.

Z Plant Radiation Study

The initial two-week history of Hood 9A start-up was summarized and issued as Interim Report No. 4 (HW-57358). Gamma measurements taken outside of the process hood and from six inches to one foot from the floor levels provide a representative evaluation of radiation from the process.

For the first three days of operation gamma radiation at this point varied from one to two mr/hour. This 2 mr/hour is the dose rate from normal flow of radioactive materials through process vessels and piping.

After six weeks of operation all interior surfaces of the hood appeared dirty even after cleaning. The relation of this buildup of radioactive material in the interior of process hoods to radiation outside the hood is reflected in the following gamma measurements taken on the upper section of Hood 9A.

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<u>Days After Start-Up</u>	<u>Mr/hour Through Plastic on Bottom of Hood Floor</u>	<u>Mr/hour at Check Point Outside of Hood Wall</u>	<u>Observed Condition of Hood Floor</u>
3	2-5	1-2	An occasional spot otherwise usually clean on floor
15	10-20	7	Approximately half of the surface looked dirty
50	40-45	12	All interior surfaces looked dirty after "cleaning"

Comparable gamma measurements were made on Hood 9B, which has been in operation for thirteen months. Here gamma readings through plastic on interior floor surfaces varied from 200 to 300 mr/hour with corresponding readings of 45 to 50 mr/hour outside of the hood.

In general it can be assumed that radioactive material dispersed within a process hood is the controlling factor of gamma radiation in Tasks I and II of the Z Plant. The gamma radiation inside the hood is shown to be approximately five times the radiation outside of the hood. The gamma radiation levels possible with complete confinement of radioactive material within the equipment can be twenty times less than that which results from general dispersion within the hood.

B. Process Technology

Chemical Processing and Reduction

Three drawings for a new J4 Product Loadout Tank and piping for Recuplex have been completed and are awaiting approval. The status of the design work being done to improve the Task III operation is as follows:

1. Three drawings have been completed and are awaiting approval for a new pickling system for Hood E-14P.
2. Purchase specifications for new sampling equipment for Hood E14-S have been prepared and transmitted to Finished Products Operation along with a letter describing the sampling system.
3. Five drawings have been completed and are awaiting approval for converting the present balance in Hood E15 to a density balance.

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C. Project Activities

CG-756 - Fire Resistant Exhaust Filters, Z Plant

Work was completed on Project CG-756 and the Physical Completion Notice was issued as of September 6, 1958. The indicated total project costs were \$172,142 - authorized funds were \$300,000. The filters were one-half of the originally estimated cost, thereby reducing the total project cost.

GENERAL ACTIVITIES

A. Research and Development

Power Reactor Fuels Reprocessing

Work is proceeding on dissolver studies for the various enrichments of irradiated fuel elements to be processed. To date, only the positive circulating type dissolver system appears feasible for covering the entire enrichment range whether located at Redox or elsewhere. This system requires some development activities on pumps, possibly valves, dissolution rates, and fumes control before the system can be considered acceptable.

A system for natural circulation dissolvers is being studied for feasibility but will require at least two different dissolver installations to cover the enrichment range. The lower range dissolver will depend on the fact that solutions below 2 per cent enrichment are critically safe and will require positive retention of fumes in the heterogeneous portion of the dissolver unit. This approach requires test work and study before it would be acceptable.

The second dissolver unit would be a combination of slabs and cylinders designed critically safe for a 5 per cent heterogeneous solution and might be limited to as little as 1/4 to 1/2 ton per day capacity on oxide type fuels.

Engineering work to define the receiving and storage facility needed for Power Fuels reprocessing has been expedited to permit a proposal to the AEC for funds. It is envisioned that the receiving and storage facility would be located at U-Plant without precluding the possibility of further mechanical processing and dissolving at other sites.

Criteria for Waste Storage

A draft of the process and operating criteria for storage of boiling

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wastes has been issued for comments. The proposed criteria are:

1. Heating of the tank should be gradual allowing a minimum of 60 days from ambient to boiling with a maximum increment of 80° F. within 60 days.
2. The temperature of the liquid and sludge should be held below 300° F.
3. The tanks should be filled to a maximum depth equal to a hydrostatic head of 10 pounds per square inch, or 2½ feet of water at 212° F.
4. Bumping should be minimized by continuous operation of at least one air lift circulator.
5. The concentration of the waste solution should be maintained below the solubility saturation point of the primary constituents.

B. Plant Engineering

Maintenance Management Program

Basic elements of an integrated maintenance management program are gradually being incorporated into practice in the General Maintenance Operation. The 200 West and 200 East area work order control units have been consolidated into one center in 200 East. A revised work order flow system is being put into effect, and General Maintenance customers have been notified and requested to cooperate in the new work order routing. A detailed work flow chart was prepared defining the responsibilities of the foreman, planner and schedulers. Work scheduling has been placed into effect on a weekly forecasting basis, and the necessary forms are being developed for analytical estimating purposes. A training schedule was worked out for planners and schedulers to emphasize basic concepts, controls, and procedures.

C. Project Activities

Project Cost Information as of September 21, 1958:

Total authorized funds - active projects	\$14,077,000
Total cost to date	9,545,000
Commitments and open work releases	1,888,000
Unencumbered balance	2,645,000
Costs charged to above projects	
August 17, 1958 to September 21, 1958	240,000

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III. ORGANIZATION AND PERSONNEL

A. Personnel

Margery B. Vale, secretary, was reactivated on September 11, 1958 and assigned to Process Design and Development Operation.

B. Safety

Safety performance continues to be satisfactory in all operations.

C. Inventions

None.

D. Reports Issued

HW-57208 RD Design and Operating Considerations for Off-Gas Systems in Nuclear Processing Plants, by L. R. Michels, August 29, 1958.

HW-57358 "Z" Plant Radiation Study Special Sampling Program, Interim Report No. 4 (covering the initial two weeks of Hood 9A operation), by H. A. Moulthrop, September 5, 1958.

HW-57386 A Compilation of Chemical and Physical Properties and Streams Encountered in the Chemical Processing Department, by R. F. Fleming, September 16, 1958.

HW-57569 RD Selected Properties of Plutonium and of Plutonium Nitrate Solution, by R. F. Fleming, September 24, 1958.

Letter Dr. H. M. Parker from H. P. Shaw, Design and Operating Consideration for Off-Gas Systems in Nuclear Processing Plants, September 12, 1958.

HW-46169 (Rev.) Engineering Study and Preliminary Design, Additional Fire Protection, 234-5 Building, by R. H. Sillettc, issued September 8, 1958.

Draft Issue Specifications and Design Criteria for Fire Protection Facilities, 234-5 Building, September 26, 1958.

MA-10 113-SX Tank Farm Leak Detection System, by F. B. Fecht, September 19, 1958.

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HW-57300 RD Post Acceptance Report - Expansion of 200 Area
Facilities, CA-513 (Parts A-D), Company Private,
by D. B. Hagen, September 5, 1958.

HW-57159 Weldability of Tungsten-Arc Cut Austenitic Stainless
Steel Plates, by G. A. Conner, September 26, 1958.

HW-57589 Proposed Powder Handling System for E-Metal - Building
224-UA, by J. F. Kane, September 25, 1958.

E. Trips

On September 11, 1958, D. W. McKee visited Northwest Copper Company, Portland, Oregon, to witness functional testing of hood equipment for Project CG-734.

L. R. Michels visited the Trexlertown, Pennsylvania, office of Air Products, Incorporated, on September 18, 1958, for continued liaison on Contract DDR-45.

J. R. Fritz visited several vendors of process equipment for Project CG-734 in the Portland, Oregon area on September 11, 1958.

F. Visitors

R. D. Myers, Betz Laboratories, Seattle, visited the plant on September 11, 1958 as a regular monthly visit on consultant contract.

J. Culos, Terry Steam Turbine Company, Hartford, Connecticut, visited the plant September 15 through 19, 1958 - Class "A" inspection on steam turbines.

D. R. Lott, Allis-Chalmers Company, Portland, Oregon, visited the plant September 15 through 19, 1958 - Class "A" inspection on two 750 KW generators.

F. P. Robinson, General Electric Company, Pasco, visited the plant September 29, 1958 for supervision of ACA motor installation.

M. P. Specht, Syntron Company representative, spent September 4, 5, and 8, 1958, at HAPO. Mr. Specht assisted in correcting some of the problems in the vibrating tube in the RMA Line at 234-5 Building.

Manager
Facilities Engineering Operation

HP Shaw:FC:mh

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CHEMICAL PROCESSING DEPARTMENT
RESEARCH AND ENGINEERING OPERATION
SEPTEMBER 1958

PUREX PROCESS TECHNOLOGY

Feed Preparation

Irradiated uranium with cooling times of 89 to 129 days was dissolved to form solvent extraction feed. Abnormal iodine releases to the atmosphere of approximately 1.7 curies per day were temporarily reduced when special samples indicated the major portion was originating in the vessel vent system, and 5×10^{-4} M mercuric nitrate was added to the head end vessels. Two subsequent peak emissions of 3.7 and 3.0 curies per day appeared to result from allowing the temperature of IWW to exceed 60° C while the solution was transferred from one tank to another. Some indications of reduced iodine releases were produced when the IWW Concentrator Condenser exit water temperature was reduced from 70° to 40° C by additional water flow. Repair of the steam heater and regeneration of the vessel vent silver reactor during the forthcoming shutdown are expected to curtail iodine releases and permit elimination of mercuric nitrate additions to the head end tanks.

Solvent Extraction

The solvent extraction system operated for 91 percent of the month at capacity factors ranging from 1.92 to 2.9 on the two-cycle flowsheet with the HS Column bypassed. Typical performance data for the system are summarized below:

Cycle	Log Decontamination Factor, dF		Instantaneous Loss, Percent	Recycle Percent	
	<u>Plutonium</u>	<u>Uranium</u>	<u>Plutonium</u>	<u>Plutonium</u>	<u>Uranium</u>
First	4.1	4.2	0.05	-	-
Final	3.1	2.3	0.01	1.2	6.0
Ion Exchange	>1.0	-	-	10.0	-
Overall	>8.2	6.5	0.06	11.2	6.0

The realization of optimum solvent extraction column decontamination performance was hampered during the month by two existing plant conditions. Partial plugging of the IBXF control valve with polyethylene plate fragments continued until the plant was shut down, the system flushed and a finer screen installed around the IBXF pump suction. Prior to this time variable production rates were tailored to the maximum IBXF flow with frequent backflushing of the valve required. Secondly, emphasis on neptunium recovery prompted operation of the solvent extraction equipment at flowsheet conditions designed to define neptunium behavior instead of promoting optimum decontamination.

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The result of these conditions plus other temporary upsetting influences produced uranium product with a gamma ratio range of three to four for most of the month. Treatment by silica gel was required to reduce the gamma activity, which was seventy percent zirconium-niobium - thirty percent ruthenium, to an acceptable value for shipment. Near the end of the month when the plant production rate was reduced to $CF = 1.92$ because of a shortage of adequately cooled uranium slugs, the additional processing capacity of the final uranium cycle was utilized to reprocess uranium product with a gamma ratio > 2.5 ; the resulting product had a gamma ratio of < 2.0 .

Except for three batches of plutonium which were reworked because of extremely high gamma activity resulting from the addition of some miscellaneous waste rework solution to the HAF, all plutonium batches were shipped to the 234-5 Building. Although three shipped batches slightly exceeded the recently revised specifications of 3.5×10^{-11} G/AT, these were accepted on a negotiated basis.

Plutonium and uranium losses were normal for the major portion of the month. During one short period when a shipment of dissolved plutonium scrap from the 234-5 Building was reprocessed, a temporary ten-fold increase in the HAW plutonium waste loss was experienced. An excessive 2BW plutonium loss resulted from the inadvertent use of sulfate-free 2BX in the 2B Column. Approximately 100 grams of plutonium were segregated in carbonate wash solution for future rework.

Other items of interest in solvent extraction were:

- a) Sustained operation of the plant at $CF = 2.9$ on a modified flowsheet was successfully demonstrated. Equipment performance was excellent, but the top interface IC Column appeared to be near its maximum capacity.
- b) Optimum 2A Column decontamination was achieved at a 2AS flow rate of 200 - 250 percent of flowsheet.
- c) IWW rework continued without any noticeable effect on either decontamination or waste losses. However, the addition to the HAF (1 to 19 ratio) of a miscellaneous waste rework solution which had insufficient reflux treatment (6.5 days of refluxing since last waste addition to the tank) produced a six- to eight-fold increase in the uranium and plutonium product gamma activities. After an additional 22 days of refluxing, the processing attempt was repeated, and increases in product gamma activities occurred to a much lesser degree but were still detectable.

Neptunium Recovery

Several tests were performed during the month in an attempt to define neptunium behavior in the process; however, no conclusive data were obtained on this

complex problem due to the generally unstable operation of the plant plus analytical difficulties. Because neptunium material balances were impossible to calculate, additional studies of the analytical methods have been undertaken. Test results and tentative conclusions drawn from the available data are as follows:

- a) Sulfamic acid addition to the HAF (0.03 M), to destroy the excess nitrite ion, has a deleterious effect on neptunium recovery.
- b) The HAO flow was varied from zero (IBSU routed to the IBXF Tank) to thirty percent flowsheet with an apparent accumulation of neptunium in the system.
- c) Although previous neptunium losses from the system appeared to correlate with HAO flows above thirty percent flowsheet, the flow was increased to sixty percent flowsheet with 0.015 M nitrite in the HAO without a definite loss of neptunium inventory.
- d) The addition of nitrite to the HAO (IBSU + HOO) stream has no adverse effect on neptunium accumulation in the process, but does not guarantee recovery.
- e) The addition of insufficiently hydrolyzed waste rework to the HAF has a deleterious effect on neptunium recovery.

Plutonium Concentration

Mechanical performance of the Plutonium Ion Exchange Unit was excellent during the month. During periods of high gamma activity in the 2BP which resulted from temporary solvent extraction system upsets, the XAS flow was increased up to 300 percent of flowsheet to provide additional Ion Exchange decontamination. Even so, some recycle of plutonium product was necessary, and the resultant increase in the 2BP plutonium concentration coupled with the higher XAS flow produced temporary high plutonium backcycle (> 50 percent) via the XAW. Based on 2BP plutonium concentration, the unit was operating at CF > 4.0. Preliminary plutonium analyses on XAW samples taken during different portions of the operating cycle varied by a factor of four, the highest concentration being just prior to the start of the resin push. Laboratory examination of solids which plugged the plutonium concentrator draw-off line have proved the material to be resin fines instead of plutonium polymer as originally suspected.

Solvent Treatment

The gamma activities of both No. 1 and No. 2 System solvents remained normal at approximately 1800 and 100 uc/gal., respectively. During the brief shutdown period the batch wash tank TK-G1, which is used for the potassium permanganate contact, was flushed to remove a buildup of MnO₂ in the system. Flushing once with ten percent acidic sodium nitrite followed by two five percent oxalic acid and one 2.5 percent sodium carbonate flushes reduced the aqueous recirculation pressure from 23 to 9 psig. The overall solvent loss

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during the month was 0.31 percent of the solvent throughput.

Waste Treatment and Acid Recovery

Performance of the Waste Treatment and Acid Recovery Systems was satisfactory except for failure of the IWF pump. An abnormal number of rate changes and concentrator jettings (segregation of waste for rework) precluded an accurate evaluation of efforts to obtain a flowsheet IWW flow.

Waste volumes sent to underground storage tanks during the month averaged 38, 321, 14 and 136 gallons per ton of uranium for neutralized IWW, solvent washes, centrifuge cleanouts and cell drainage, respectively. The coating waste volume sent to storage was 232 gallons per ton of uranium. Overall plutonium and uranium losses for the month were 0.32 and 0.08 percent, respectively. The standard value adopted for plutonium and uranium coating waste losses accounted for 24 and 34 percent, respectively, of the overall losses.

Self-concentration continues in Tanks 241-A-101, 102, and 103 at boil-off rates of 5.2, 9.2, and 1.6 gallons per minute, respectively. Samples of a black tarry substance taken from the liquid gauge pipes of the Tank Farm Crib, A-24, have been tentatively identified as a condensation product of diluent produced by its exposure to the elevated temperatures and high radiation fields within the underground storage tanks.

Analysis of a condensed vapor sample, taken downstream of the tank farm cyclone separator, showed decreases in the Cs-137, Sr-90, gross beta, total Ru, and Co-60 concentrations by factors of 9, 6, 5, 3, and 2, respectively, from those analyzed in a sample taken thirteen months ago. The two major factors contributing to this decrease are:

- a) a two-fold reduction in the individual tank boil-off rate, thus providing additional de-entrainment within the tank, and
- b) a fifty percent increase in vapor velocity through the cyclone separator which promoted increased cyclone efficiency.

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REDOX TECHNOLOGY OPERATION

Acid Recovery and Iodine Removal

Conversion of the caustic scrubber to function as a secondary acid absorber, circulating raw water as the scrubbing medium, was completed during the latter portion of the report period. The influent water flow was regulated by the weight factor controller of the secondary absorber, while the discharge of the resultant 10 percent of nitric acid was adjusted by the primary absorber specific gravity controller, to produce an acid concentration of 47 percent in the product stream leaving the primary unit. Insufficient data were available to permit determination of the over-all acid recovery; however, the appearance of the fumes leaving the stack indicate relatively low losses. There was no apparent change in the efficiency of iodine removal in the primary absorber since the iodine removal by the secondary absorber continued to average only 0.01 curie per day.

The emission of iodine-131 to the stack averaged 0.22 curie per day with nearly all this amount being discharged from the process air vent system via the sand filter. Evaluation of the performance of the A-3 prototype silver reactor was hampered by the high age of the metal being dissolved and by the necessity for replacing the failed A-2 dissolver. The limited data available indicated an efficiency for the prototype reactor of at least 99.8 percent and losses to the acid absorber system of 0.1 to 0.2 curie per day. Rigorous testing of the prototype reactor system will have to await the processing of "green" metal on a test basis, possibly during November.

Dissolution and Feed Preparation

The A-2 dissolver, which experienced a coil failure after two years of service, was replaced with a larger unit designed to employ the original jumpers. The new dissolver provides increases in crib and total cross-sectional areas of 36 and 25 percent, respectively, and will accommodate 12-bucket charges on a normal heel. It is anticipated that this dissolver alone will be capable of dissolving natural uranium fuel elements at rates approaching 85 percent of the Phase II instantaneous rate.

The over-all recoveries of plutonium and uranium for September, which averaged 99.49 and 99.75 percent respectively, were adversely affected by failure of the centrifuge bowl sprays and tachometer and by incomplete reoxidation of feed solution stored over a week-end. The centrifuge, number 9, was replaced during the month to minimize the losses resulting from the ineffectual cake washing.

Solvent Extraction

Continued operation of the 1A Column with the LAW salt strength maintained above 1.25 M in aluminum nitrate permitted the processing of 185 tons of uranium before the column flooded at 120 percent of the Phase II rate. Although this performance constitutes a five-fold increase in through-put over the worst previously

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encountered, plugging of some LAW valves and pipe-lines which had not been acid-flushed in the past six months, indicated that still further improvement in LAW stability may be desirable. Efforts to provide such improvement will be continued.

Recycle of approximately 25 percent of the HSW stream to the HATS concentrator was initiated during September without apparent adverse effect on the decontamination of the product streams. The recycle of HSW permitted a 20 percent reduction of salt usage in the 2DS stream (with resultant savings in chemicals and waste storage amounting to approximately \$15 per ton of uranium) at the "standard" processing rate of 120 percent of Phase II rate. Plugging problems subsequently encountered in the HAW and HSW pipe-lines will be investigated to determine whether they are directly related to the HSW recycle.

Waste Storage

The 115-SX waste storage tank was activated on September 1 following the addition of 54,000 gallons of water to minimize the thermal shock caused by the entrance of hot waste solution. Waste solution from the processing of approximately 140 tons of uranium was routed to the 115-SX tank to accomplish the initial warming of the tank. The volume received during this period, as measured in the tank, was about 0.75 percent less than that sent. In contrast, the comparable filling period for the 113-SX tank showed receipts in the tank approximately 30 percent in excess of the volume sent.

Continuous addition of water to the 114-SX waste storage tank, at a rate of three gallons per minute, was initiated on September 18. The water, which is injected through a 1/2-inch pressure sensing line at a point 42 inches above the tank bottom, has reduced the apparent sludge level (as measured 15 feet from the point of injection) from 14 inches to 1 inch over a three-week period. It is planned to transfer the point of injection to a similar pipe 33 feet from the point of measurement to obtain further information concerning the effects of water injection on sludge depth.

FINISHED PRODUCTS TECHNOLOGY OPERATIONURANIUM CONVERSION OPERATIONProcess Performance

All UO_3 produced met product specifications.

Eight hundred seventy nine (879) pounds of nitric acid per ton of uranium processed (83% of theoretical) were recovered. The cause of the low recovery is being investigated. The concentration of the recovered acid averaged 46%.

The average operating rate of the calciners was 7.21 tons uranium per unit for each day on the line. The overall calciner operating efficiency was 88.3%.

At the customer's request, the UO_3 milling test was discontinued. The micro-pulverizer mills were returned to normal operating conditions by increasing the mill speed from 5100 to 6000 rpm, and reducing the retention screen size from 5/32 inch to 1/8 inch holes. No discernible change in the particle size distribution of milled powder has been evident in laboratory testing.

Process Improvement

A flush of the sump waste tank (C-2) was performed. Addition of Dicalite #4200 diatomaceous earth filter aid to C-2 with agitation resulted in 3000 gallons of waste being filtered through 1/8 inch precoat at a rate of 5.5 gpm. This rate compares to 6.6 gpm through the present glass wool Ful-Flo filters. The test filter piping size prevents filtration at significantly higher rates because of high line losses. In addition to the reduced labor requirement in changing filters, filter aid filtration reduces material costs from \$35.00 per batch to about \$1.00 per batch.

METAL FINISHING OPERATIONRecuplex

Forty-eight (48) runs consisting of fragments, powders, crucibles, and clean-outs were processed through the S and C Hood. Slurry losses to crib averaged 0.53% of the recovered plutonium.

Past efforts to increase the capacity of the Recuplex system have resulted in limitations either in the dissolution step or in the solvent extraction columns. The use of a silica coagulation step following dissolution, with or without coagulating agents, has usually resulted in more frequent plugging of the 40 micron filter blocks. Elimination of the coagulation step resulted in limited solvent extraction capacity owing to silica induced emulsion formation and solids. A search for a deemulsifying agent revealed

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Mistron 25, recommended by the Hanford Laboratories Operation. Trial use of this material, a controlled particle size - high purity magnesium silicate, has permitted a thirty percent (30%) increase in the instantaneous feed rates to the extraction columns. The Mistron 25 is added to the plutonium feed in amounts of 50 - 100 ppm by weight of solution. The effectiveness of the Mistron 25 was illustrated where mixer - settler phase dispersion was obtained in the columns under pulsing conditions that normally give emulsion type dispersion. Additional testing will be done to define optimum flowsheet and column operating conditions.

The SE columns processed 1960 liters per day at 84% operating efficiency for an average instantaneous rate of 2325 liters per day. Waste losses averaged 0.0065 g/L or 0.62% of the feed plutonium.

Continuous Task I - II

Three hundred four (304) runs were processed with an average filtrate recycle of 2.97%.

Operation of the hydrofluorinator in the second continuous unit (Hood 9-A) continued to give erratic powder flow during the first part of the month. Considerable testing and adjusting was done before the powder could be made to flow freely. The angle of the vibrator to the tube was changed from 26° to 14°, the supporting leaf spring was replaced with a coil spring, and the vibrator was moved one inch closer to the tube.

Several failures, due to corrosion, have been experienced in the metal (Hastaloy C) Poroloy hydrofluorinator off-gas filters. An investigation is being made to determine the feasibility of fabricating a filter using a platinum alloy for the filter media instead of Hastaloy C.

Operation of the continuous filtrate decomposition unit (Hood 7-A) continued to be good. A new line from the J-4 tank was installed that eliminates the use of PR cans to transfer feed material from Recuplex.

PROCESS CHEMISTRY OPERATIONREDOX PROCESS STUDIESDissolution of Plutonium-Aluminum Alloy

It is probable that the MTR, plutonium-aluminum alloy fuel elements will be processed in the Redox Plant. This has given rise to questions as to the amount of hydrogen which will be evolved during the mercury-catalyzed dissolution of the alloy. Two experiments simulating the process were run, dissolving alloy turnings in a solution containing 1262 ml of 2 M UNH, 0.3429 gram mercuric nitrate, and 185.7 ml of 13 M HNO₃ per gram of plutonium. With an air flow rate through the dissolver of 320 ml per minute per gram of plutonium, the peak hydrogen concentration was measured as being only one volume per cent. The results indicate that hydrogen evolution should not be a source of hazard in the dissolution process.

Evolution of Chlorine from the Dissolvers

In studying possible mechanisms by which chlorine gets into the silver reactors, a brief investigation was made of the removal of chloride from 1 M, 5 M, and 13 M HNO₃, under simulated dissolver conditions. Starting with 0.009 M chloride, in the presence of uranium metal, 60 minutes distillation was sufficient to remove 98% of the chloride from the 13 M HNO₃ and 90 per cent from 5 M HNO₃. No chlorine evolution was noted from 1 M HNO₃.

PUREX PROCESS STUDIESPreparation of Uranium(IV) by Electrolytic Reduction

Laboratory work has continued on the electrolytic preparation of uranium(IV) for use as a partitioning agent in the Purex process. The studies, made with feed solutions containing 0.2 M UNH, 0.5 M HNO₃, and either sulfamic acid or hydrazine as a holding agent, have shown the following:

1) A semi-permeable membrane between the anode and cathode compartment of the electrolytic cell prevents the oxidation of the holding reductant and re-oxidation of the uranium(IV), resulting in higher current efficiencies and higher conversion rates; 2) current efficiency and conversion rate begin to fall off when the ratio of U(IV) to U(VI) exceeds one; 3) a mercury cathode gave the highest current efficiency, 50 per cent, and conversion rate, 15.25 per cent per ampere-hour. Lead, Hastelloy, tin, 347 stainless steel, titanium, and aluminum gave current efficiencies of 52, 31, 25, 22, and 20 per cent, with cathodic corrosion rates of 13.1, 0.86, 2.4, 0.14, 0.18, and 0.05 mg per ampere-hour and conversion rates of 13.5, 8.4, 7.4, 7.4, 7.3, and 7.4 per cent per ampere-hour, respectively.

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DECLASSIFIEDANALYTICAL ASSISTANCEAnalysis of Neptunium Oxide

Neptunium-237 oxide (NpO_2) prepared by the 234-5 Development Operation, was analyzed for total neptunium, plutonium, metallic impurities, and "powder density". The analytical methods used and significant observations made are described separately below.

1. Neptunium Assay

Total neptunium was determined by gravimetric ignition, X-ray absorption, and alpha counting methods. The ignition method consists of heating the oxide at 1000 C in an air atmosphere, cooling in a vacuum desiccator to prevent oxygen adsorption, weighing as NpO_2 , and correcting for non-volatile (metallic) impurities as determined by spectrographic analysis. For the X-ray absorption and alpha counting measurements, the oxide was dissolved in nitric acid (a very rapid reaction, similar to that of UO_3 or U_3O_8), and measurements were made on the resulting nitrate solution. Quantitative X-ray absorption measurements were made by comparison to pure standard solutions whose values were based on radioassay measurements. The relative X-ray absorption coefficient (mils of aluminum per gram per liter of metal) of neptunium, measured by the 222-S Analytical Laboratory Operation using these standards, agreed within 0.1% with the value predicted from the atomic number. A value of 6.4822 (mils Al/g/l metal) was obtained for neptunium as compared to established values of 6.198 and 6.695 for uranium and plutonium, respectively. Radioassay measurements on the final product material were made by a) determining the total alpha activity and correcting for the plutonium alpha activity ($\sim 3\%$) and b) by measuring the neptunium alpha activity after separation from plutonium by a TTA extraction. Conversion to weight units was based on a neptunium-237 half-life of 2.20×10^6 years, a 222-S Laboratory ASP geometry of 0.5025, and the assumption that all the neptunium was neptunium-237. The results obtained by the various methods are listed below in tabular form.

SUMMARY OF NEPTUNIUM OXIDE ASSAY VALUES

<u>Analytical Method</u>	<u>Total Neptunium Found (Wt. %)</u>		
	<u>Sample 1</u>	<u>Sample 2</u>	<u>Sample 3</u>
X-Ray Absorpt.	87.15	86.53	87.26
Grav. Ignition	87.69	87.69	87.55
Alpha Counting	88.05	88.22	88.94

Note: Ignition values based on a gravimetric factor of 88.11% for pure NpO_2 .

2. Metallic Impurities

The conventional carrier distillation method was used for the determination of metallic impurities present in the neptunium oxide. The oxide

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powder was found to contain less than 200 parts total metallic impurities per million parts neptunium. Quantitative estimations were obtained by comparison to standard films prepared from a uranium oxide matrix rather than a plutonium oxide matrix. This choice of matrix stems from initial observations of the manner in which certain impurities distilled away from the neptunium oxide matrix, indicating that this matrix is more similar to uranium oxide than to plutonium oxide.

3. True Density

The "powder density" was determined by measuring the volume of kerosene (Shell spray base) displaced by a given weight of the oxide. A value of 9.7 gms/cc was obtained by this method as compared to a value of 10.3 for Hanford UO_3 under the same conditions.

4. Plutonium

The plutonium content of the oxide was determined using the conventional TTA Extraction-Alpha Counting method after the oxide was dissolved in nitric acid. The separation procedure consists of extracting plutonium(IV) away from neptunium(V), using nitrite to adjust and maintain the elements in these respective valence states.

QUALITY CONTROL AND STANDARDS

During the month the Quality Control program for the Chemical Processing Department analytical laboratories was maintained as usual. Spectrographic standards were prepared and a "referee" program outlined to determine the accuracy and precision of the results reported by the 234-5 Spectrographic Laboratory.

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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234-5 DEVELOPMENT OPERATIONStatus of Plutonium Trichloride Process Development

A report with the above title was issued as HW-57498. The "Summary and Conclusions" of this report are as follows:

Plutonium trichloride can be readily prepared by chlorinating plutonium dioxide with phosgene at 450 C. Rate data in vibrating tube reactors are not available, but batch rate data indicate acceptable values. Plutonium trichloride can be reduced to metal in nickel-coated magnesia liners inside pressure vessels of current design. Yields and metal quality are satisfactory. The slag and crucible can be given a nitric acid boildown step to remove chloride. The resulting solution and siliceous residue can be treated by current Recuplex practice. (Flow sheets are included).

Excessive hydration of plutonium trichloride can be avoided in the Task II and III hoods by maintaining an atmosphere of dew point -13 C or better. Powder of thickness one-half inch has been exposed to this atmosphere for more than 100 hours with no adverse process effects in Task III. No heating in the mixer has been observed and no excessive bomb pressure resulted under these conditions.

Hastelloy B is an acceptable material for Task II reactors. The recovery still would require titanium. The chloride corrosion of stainless steel hoods in a controlled atmosphere is under investigation.

Preparation of Plutonium Trichloride

Phosgene at 500 - 550 C completely chlorinated thirty grams of high temperature oxide in four hours. The oxide, previously heated to 900 C, was chlorinated without difficulty. The success of this experiment implies possible application in two ways: (1) recovery of waste plutonium oxide may be simplified by dry chlorination replacing the boiling in mixed nitric plus hydrofluoric acids; and (2) analytical procedures may incorporate chlorination and chemical analysis after weighing plutonium dioxide ignited to 1050 C.

A batch chlorination was used to convert plutonium oxide waste to a soluble form for recovery. A single chlorination was approximately 50 percent effective.

Batch chlorinations, using phosgene gas as chlorinating agent, produced 1.7 kg (as Pu) trichloride. Removal of excess phosgene from the off-gas stream by means of an alcohol-dry ice trap permitted recycling unused chlorinating agent.

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DECLASSIFIED**SECRET**Plutonium Trichloride Reduction

Feasibility tests on the reduction of plutonium trichloride with calcium were completed with two additional 1400-gram reductions, and recommendations for the process were issued in HW-57498 published during the month. Purity of the last two buttons was satisfactory and yields were 95 and 97.5 percent.

The buttons have been returned to the laboratory for x-ray and casting because of low densities. The cause of the poor density is unexplained in view of the good purities obtained.

One additional test was made in the series of hydration studies of plutonium trichloride. A reduction was made of powder kept for 1350 hours (56+ days) in an atmosphere controlled at a -13 C dew point. There was no reaction or heat evolution during the mixing operation and the maximum pressure obtained at firing was 180 pounds. Obviously some moisture was picked up which resulted in a poor button and a low yield--72 percent--but this test indicated no danger in the reduction of powders exposed to even these long storage conditions.

A reduction was made of plutonium trichloride prepared by a low temperature chlorination (~200 C) with a mixture of carbon tetrachloride and water. Plutonium oxychloride might have been present although the chloride to plutonium ratio did not indicate it. There were no bad reduction characteristics.

Slag and Crucible Can Corrosion

Inspection of aluminum slag and crucible cans after four months' contact with slags from trichloride reductions showed slightly more pitting corrosion than is obtained with fluoride slags. It is doubtful that this corrosion will appreciably decrease slag and crucible can life.

Recovery of Plutonium From Chloride Slag and Crucible

Work is being done on an alternate recovery process involving the hydrolysis and precipitation of plutonium. The low acidity necessary for precipitation (pH 1 - pH 2) was obtained by distilling away both water and acid until essentially a molten salt remained, and then diluting back to a stable solution.

This slag and crucible recovery process has two major advantages: (1) it is possible to get rid of the major portion of the slag and crucible in the first step, thereby reducing the volume of solution processed in subsequent steps. For example, in an eight crucible dissolution, the volume is from 200 - 300 liters. In this process, the volume after the first step would be 20 - 25 liters, thus giving a ten-fold or better volume reduction. (2) All the plutonium is found with the insoluble siliceous residue rather than a portion on the residue and the rest in solution.

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The recovery process could consist of the following steps: (a) constant volume boildown to remove chloride, and help dissolve the MgO crucible and sand; (b) volume reduction boildown to distill away the acid (in one laboratory scale run the volume was reduced from an original 2.4 liters to 0.6 liters or by a factor of four); (c) dilution to original volume and filtering; and (d) discarding filtrate containing most of the soluble salts, and treatment of residue with 8 - 9 M HNO_3 , 0.1 - 0.05 M HF to recover plutonium.

In one run, a filtrate was obtained with less than 0.001 g/l plutonium. This is less than 0.02 percent of the plutonium charged. The rest must be with the insoluble residue.

A test with pH paper indicated that the pH of the diluted solution was somewhere between zero and two. More precise values will be known as soon as lab analyses are back.

The precipitate was muddy, but filtered easily. In one run, out of 330 grams of slag and crucible charged, 19 grams or 5.6 percent remained as insoluble siliceous residue, plutonium hydroxide, and plutonium oxide.

Recuplex Assistance

A series of dissolution experiments were made on Recuplex floor sludge. There are several kilograms of this material which analyzes from 25 - 50 grams of plutonium per kilogram. Concentrated sulfuric was the only reagent tested which appreciably dissolved the material.

The exothermic reaction, foaming of the reactants, and the danger to plexi-glass or hood gloves was discussed with Finished Products Technology personnel. A minimum free volume of five times the combined reacting materials is necessary for a safe reaction.

Tests were continued on demulsifying agents for Recuplex organic streams. Iso-chem "Defoamer 711" and Monsanto "PC-1244" were tested and found unsatisfactory.

Calcium Fluoride Slip Casting

Two more slip castings were performed with calcium fluoride according to the best information developed during 1957 when 23 castings were carried out.

During Run No. 24, trouble was experienced immediately after the start of ball milling. Upon combining calcined calcium fluoride powder, water, and Daxad in the ball mill jar with the Burundum cylinders, a spongy foam developed upon milling, which filled the entire jar. Additions of more Daxad up to a seven-fold excess failed to thin the slurry and permit milling. The Burundum cylinders remained held in the spongy mass. Addition of Kodak Photo-Flo, a wetting agent, broke the foam and produced an excessively thin slurry.

In Run No. 25, 0.5 percent Photo-Flo was introduced before the Daxad, and no

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foam or sponge developed. The run was successful in all respects.

No reason is known for the sudden appearance of foam in Run No. 24. It had never previously occurred. Based on observations thus far, it would be advisable to introduce wetting agent as a precautionary measure.

This work was in support of a paper "Slip Casting Of High Purity Calcium Fluoride Crucibles" to be presented at a General Engineering Laboratory meeting in Schenectady.

ORGANIZATION AND PERSONNEL

Personnel

M. J. Rasmussen who was on loan to the 234-5 Development Operation has been assigned permanently to this Operation.

P. W. Smith, Tech Grad was assigned to the Purex Technology Operation on September 29, 1958.

Trips

V. R. Cooper attended the Geneva Conference September 1 - 13, 1958 to present a paper entitled "Aqueous Processes for Separation and Decontamination of Irradiated Fuels".

W. C. Schmidt attended the American Institute of Chemical Engineering Meeting in Salt Lake City, Utah from September 22 through 24, 1958.

Visitors

D. E. Brater of the Union Carbide Nuclear Company, Oak Ridge, Tennessee visited R. E. Smith on September 26, 1958 to discuss uranium denitration.

J. E. Burch of the Pratt & Whitney Co., W. Hartford, Conn. visited A. E. Smith September 29 and 30, 1958 for discussions on 6-Coordinate Gaging System.

E. M. Shanks of the Oak Ridge National Laboratory and M. K. Twichell of the Union Carbide Nuclear Company visited V. R. Cooper, R. G. Geier and E. R. Irish on September 30, 1958 to discuss current separations technology and inspect the Purex plant.

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Visitors (Continued)

L. B. Werner of the Atomic Energy Commission, Division of International Affairs, Washington, D.C. visited E. R. Irish on September 2, 1958 to tour the Purex plant and become oriented on process.

F. M. Teetzel and R. L. Hodgson of the National Lead Co. of Ohio, Cincinnati, Ohio visited H. M. Jones on September 9, 1958 for an instrument tour.

Inventions

None

V. R. Cooper, Manager
Research and Engineering Operation

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EMPLOYEE RELATIONS OPERATION
MONTHLY REPORT - SEPTEMBER 1958

I. RESPONSIBILITY

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

II. ACHIEVEMENT

FIRE PROTECTION OPERATION

There were six fire responses during the month. Two were grass fires and one was an accidental alarm. The others were also minor in nature, a ballast burned out in a fluorescent fixture in 222-S; a fire in a hood in 234-5 building, and a fire where welding sparks ignited burlap which was covering a forced air heater.

During the month 300 fire extinguishers were inspected, 5 installed, 3 delivered to a new location, 10 seals broken and not reported, 49 serviced, and 200 weighed. Twenty-eight gas masks were inspected, and 3 serviced. Eighteen hand lines were inspected. Sprinkler systems in 272-W, 272-E, 277-U, 277-S, and 2101 M were inspected.

Various services were performed for other Operations. The Fire Protection Operation furnished standby with tanker for Morton Supply Company of Yakima while cutting steam line. Weeds were burned around safety board. Roads on Camden Avenue and on 10th Street, west of S area were flushed to remove contamination.

Classes were given on artificial respiration and extinguisher demonstration were given to personnel in 234-5 and 224-U buildings. Disaster Rescue work classes were held each Friday during the month.

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HEALTH AND SAFETY OPERATION

<u>Chemical Processing Department</u>	<u>September</u>	<u>August</u>	<u>Year to Date</u>
Disabling Injuries	0	0	0
Serious Accidents	1	3	8
Medical Treatment Injuries	42	34	402
Overexposure Incidents	1	1	5
Potential Overexposure Incidents	0	0	4
Radiation Occurrences	33	29*	228
Fires	3	3	18
Security Violations	0	0	9

*Corrected value

Comments on Statistics

The technical overexposure incident was caused by a small spot of coverall contamination picked up in the Redox railroad tunnel.

A Serious Accident occurred during a run of a prototype continuous plutonium dissolver, when a pressurization and fire resulted in the loss of a small section of plastic tubing, and two CWS type air filters in the hood exhaust system. There were no injuries and no contamination was emitted from the hood.

Programs

The Department's Safety Quiz program continued. Based on quizzes returned and comments, an unprecedented participation and degree of individual interest is being attained. Quiz cartoons were originated and issued on payroll check envelopes.

At midnight Sunday, September 21, 1958 the Department achieved its third President's Safety Award. This accomplishment represents 562 days, or approximately 4,750,000 man hours without a disabling injury. A program publicizing the achievement was developed and conducted through GE News, 200 East and 200 West badgehouses and by letter to employees' homes.

HAPD publicity for Fire Prevention Week was coordinated by the Specialist, Accident Prevention. Roving Reporter pictures, questions and answers, and pictures of Fire Protection Operation were obtained and publicized in the GE News. Information folders listing films available for use in safety meetings were prepared and distributed.

Safety Flash circulars concerning 200 East Area traffic control were distributed to private vehicles at 200 East and 200 West Area parking lots. Security Patrol was requested to patrol Route 4-S in front of 200 East Area at shift change.

On September 8, 1958, entrance to the perimeter road south of 200 West main gate was closed from 7:20 A. M. to 8:00 A.M. Congestion created by government vehicles entering the intersection when buses are clearing through the gate was eliminated.

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Redox Operation achieved one million man hours without a disabling injury on September 25, 1958. Suggestions and assistance were provided the manager of Redox on personal gifts.

Thirteen messages were posted on the marquee boards.

Training and Education

A special safety training program "Accident Prevention" was developed and conducted in the Purex, Redox and Power and General Maintenance Operations. Approximately 600 people attended. A favorable response to the program was received.

Advice and Counsel

Redox -	Interpretation of Radiation Protection Standards - cask car shipments from offsite; building construction codes for use of construction materials; testing of 804 tank flame arrestor; installation of a permanent ladder to outside steam valves.
Purex -	Relocation of gasoline tank for 241-A emergency air compressor; hazards of breathing argon and nitrogen gases; plans for oil and paint shop and storage; fire and sanitary water line tie-in to safety shower; proper eye protection for grinding wheels; alteration of doors between the regulated shop and hot shop lobby; suspension scaffolding to permit access to steam valve in service blower room; interim approvals for installation and use of an Argon cylinder in room 50, and P-10 gas cylinder in room 57 - 202-A Laboratory.
Finished Products -	Scope drawings for 234-5 contaminated waste facility incinerator; analysis of bulk carbon tetrachloride storage for Recuplex Operation.
P & GM -	Relocation of #5 boiler from 284-W Building to 300 Area; future manifold systems for oxygen and acetylene in 277 Shops; discharge line from pressure relief valves discharging in waste line traps; clean-up of Radiation Zones in shut-down plants.
Facilities Engineering -	Fire detectors and types of sprinkler systems for 234-5; fire door installation; proposed installation of a fume hood in the basement of 271-B; installation of Redox paint shop sprinkler protection; review of drawing No. SK 2-217907; location of the new waste handling decontamination facility in 211-U tank farm.
Employee Relations -	Two telephone lines were released by the Health and Safety Operation to reduce costs.
General -	Provided safety meeting advice and material to Electrical Distribution and Transportation Operations; Proposed flameproof clothing for welders and millwrights.

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Inspection, Investigation and Audit

Investigated fire in 222-S Ballast in Room 1-F
 Investigated fire in 291-A fan belts
 Investigation CPD Serious Accident 58-8 explosion in continuous plutonium
 dissolver in 234-5 building.

Inspections were made in 202-S, 222-S, 241-A, and 202-A buildings.

The 234-5 Follow Up Audit was completed and distributed.
 The Redox Follow-Up Audit and Waste Handling and Contamination Facility Survey
 was completed.
 Comparison of CPD Radiation Work Procedures was completed.

Reports Issued

Technical Overexposure Incident CPD 58-5
 CPD Serious Accident 58-8
 Accident Prevention Council Meeting Minutes
 Monthly Health, Safety and Security Performance

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DECLASSIFIEDCOMMUNICATIONA. Statistics

GE NEWS items	14
General Manager's Meetings with exempt employees	2
Management News Bulletins	10
Employee Headliners	3
Employee Location Records mailed out	15
Priority Messages	3

B. Comments on Statistics

Fourteen items from CPD were carried in the GE NEWS during the month. These included a picture and cutline of the CPD safety detector; a suggestion picture, cutline and story; three pictures of three CPD employees for inclusion in Savings & Security Program features; a picture and cutline of a Purex party for O. C. Schroeder; a story on the new speed limit for the 200-E intersection; three pictures and cutlines concerning the third President's Safety Award; a picture, cutline and story on a CPD woman employee selected by GenTrics to attend a preview of new automobiles in Detroit in October; a picture and cutline of the boiler being moved from 200-W Area to the 300 Area; a story on Redox reaching the million man-hour safety goal; a picture and cutline of a non-exempt employee who is moving to Vallecitos; and a service award story.

Three priority messages were sent out during the Month. They concerned O. C. Schroeder's appointment as Manager - Construction Engineering Operation; the HAMTC-GE agreement to defer October 1 wage increases; and CPD employees winning the third President's Safety Award.

C. Other Employee Communication Activities

Lists of questions for discussion were provided the Acting General Manager and the Manager - FPO, each of whom conducted a Management Information Meeting during the month. Meetings were held on September 9 and September 23.

Considerable time was spent during the month in communicating the Savings & Security Program. This included hand-out material to Operation representatives, Management News Bulletin and Headliner material, and Round Table material. Toward the end of the month Communication efforts for the Plan shifted to non-exempt, bargaining unit people.

A letter was sent to all Level 3 operations requesting the names of the people who should be receiving "TIS Briefs", and the revisions were provided the Manager - Technical Information.

The sixth and seventh OPERATION UPTURN posters were sent out during the month.

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C. Other Employee Communication Activities - Cont'd.

A letter congratulating CPD employees on achieving the third President's Safety Award was prepared and distributed to employees' homes.

All arrangements were made for a tour of UO_3 , Purex and Mockup for W. M. Fechteler (Adm.) on September 17, 1958.

Arrangements were made with the Manager - Personnel Accounting to distribute Good Neighbor Fund ballots to all employees with paychecks on September 26 and September 30.

In order to improve Company identification by Department employees, arrangements were made for employees to obtain cigarette lighters with the GE Monogram at a reduced cost. A total of 17 orders were received for 25 lighters.

A Round Table publication for October - November was prepared during the month for distribution on October 1, 1958.

D. Public Communication

Help was provided the Employee and Community Relations representative in making arrangements for the visit of officials from the Pennsylvania Power & Light Company.

A speech, "Safety is Everybody's Business", by the Manager - Health & Safety was reviewed and edited and copies provided to the HAPO Speakers Bureau.

The Manager - Research & Engineering was contacted about writing the copy for one of the advertisements to appear in the local high school papers this year. Subject of this ad will be chemistry as a vocation.

Ten items were provided Relations & Utilities for the annual Research & Engineering issue of the GE REVIEW. Although word has now been received that the REVIEW is being discontinued effective January 1, 1959, each author will be contacted about the possibility of expanding the item for publication in the trade or technical press.

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UNION RELATIONS OPERATION

Thirteen Step I grievances were received during September including one non-unit grievance. Seven grievances were jurisdictional in nature. One grievance was satisfactorily answered at Step I. Six were processed at Step II.

The G. M. Brown grievance has been settled, although formal notice of withdrawal of the arbitration demand has not been received. (Transfer of an employee etc, etc.) The case was resolved at a meeting with union representatives and the aggrieved employee.

The Graham arbitration case was heard on September 8. The union claimed that the Company had acted unilaterally in placing a group of employees on a straight swing shift for a period of thirty days, and demanded time and one half payment for all hours worked by such crew. The decision is expected in four to six weeks.

The Wonacott (potential) arbitration case was again reviewed with union representatives in one meeting held on September 5, in a further effort to resolve this jurisdictional problem, the grievance on which was dated 7/26/56. No appreciable headway was made since the union still contends that Monitoring personnel should have almost exclusive jurisdiction over various radiation control instruments.

Several meetings were held during the month with union representatives as well as maintenance supervision in an effort to conceive appropriate rules that will govern the performance of maintenance work. Litigation, promoted by the HAMTC, to force the Company to discontinue "farming out" of maintenance, as well as some fabrication work, is still pending. Considerable progress has been made in effectuating rules that safeguard the Company's position.

UNION RELATIONS OPERATION

	<u>September</u>	<u>August</u>
Bargaining Unit Employees in CPD	792	813
Bargaining Unit Employees Utilizing Check-off	565	570
Percentage of Total Bargaining Unit Employees Utilizing Check-off	72.1	70.1

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

	<u>Unit</u>	<u>Nonunit</u>
Grievances received year to date	122	2
Grievances pending at Step II on 8-31-58	12	0
Grievances received during the month	12	1
Satisfactorily answered at Step I	1	0
Settled at Step I through expiration of 90 day time limit	5	0
Processed at Step II	6	0
Pending at Step II on 9-30-58	14	1
Pending at arbitration		
Active	4	0
Inactive	7	0

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PERSONNEL DEVELOPMENT AND PLACEMENT**DECLASSIFIED**

A. <u>Employment</u>	<u>Exempt</u>	<u>Non-Exempt</u>	<u>Total</u>
<u>Additions</u>	1	10	11
New Hires	0	0	0
Reactivates	0	4	4
Re-Hires	0	1	1
Re-Engages	0	0	0
Transfers from other components	1	5	6
<u>Removals</u>	2	24	26
ROF	0	0	0
Illness	0	5	5
Leave of Absence	0	1	1
Retired	0	4	4
Transfer to other components	0	9	9
Resigned	2	5	7
<u>Requisitions (Non-Exempt)</u>			
Number on hand at beginning of month		7	
Number received during month		10	
Number filled		11	
Number on hand at close of month		6	
<u>Request for Transfer (Exempt)</u>			
Number on hand at beginning of month	13		
Number received during month	0		
Number transferred	0		
Number closed out	0		
Number on hand at close of month	13		
<u>Applications for Employment (Exempt)</u>			
Applications received during month	0		
Hired	0		
Closed Out	0		
Applications on hand at close of month	0		
Open Requisitions	2		

Service Pins

A total of 11 pins were issued as follows:

10 yrs. service	9 Male	0 Female
5 yrs. service	2 Male	0 Female

The employment picture for the Chemical Processing Department remained quite steady during September with no one being ROF'd. The greatest adjustment of forces occurred in the "Power" seniority group number five between CPD, IPD and FPD. These adjustments were made in order to fill openings in CPD for four Journeymen Power Operators. The net result of these adjustments was IPD lost four Miscellaneous Power Operators by ROF.

Approximately thirty-five CPD employees have been declared as excess due to Redox going to XYZ shift in October. Placement of these people is in progress.

Eleven CPD technical personnel were referred to four General Electric components outside HAPO for promotional opportunities. No reply has as yet been received.

Status - Personnel Development Program for Non-Exempt Employees

<u>Month</u>	<u>July</u>	<u>August</u>	<u>September</u>	<u>Total</u>
Number of appraisals scheduled	64	90	98	323
Number of appraisals delinquent 9-30-58	3	17	69	96

Correspondence

During September a total of 13 inquiries regarding CPD personnel were answered. They consisted of:

- 1 Letter regarding record of employment
- 1 Letter of inquiry regarding credit
- 11 Letters regarding housing loans

Military Service Records

Records show that CPD has a total of 118 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		0
Deferments Granted		0
Deferment Requests Pending		3

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B. Personnel Training and Development

Participation in Training Courses

Exempt	206
Non-Exempt	606
G.E. Supervisory Selection Program - No. Completed	1
G.E. Supervisory Selection Program - Revaluation	2
Technical Graduates on Rotation	3
Employees counseled in self-development	2
OPG's Issued (1 new, 9 revised)	10

Dr. Conant completed one group each in "Understanding People" and "Techniques of Interviewing."

College Juniors employed for the summer have returned to school.

Enrollment from CPD at the University of Washington is approximately 15. Exact figures will be available when University of Washington reports are complete.

A special showing of "Fuels Fabrication of Elements" and four British Calder Hall films attracted approximately 100 CPD people.

C. Office Services

Duplicating

Total Multilith Copies Produced	185,154
Ozomatic Copies Produced	14,694
Verifax Copies Produced	374
Xerox Copies Produced	385

Mail

Total Pieces of Mail Handled	63,712
Registered Deliveries	298
Library Mail, Pounds	254
Blue Prints, Pounds	233

Addressograph

Instrument Charts Imprinted	8,620
Bulletins, OPG's, Etc.	13,613

A Xerox toner tray which was manufactured on the Plant has been placed into service in 200 West Duplicating. This toner tray permits the reproduction of improved Xerox masters where photographs or heavy shading prevails in the original copy. Without this tray, it was not possible to reproduce very satisfactory copies from such material.

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EMPLOYEE COMPENSATION OPERATION

Studies of the proposed reorganization of one third and two fourth level components were completed. Recommendations were made regarding placement of functions to meet organizational concepts and regarding position levels.

Reconciliations of four positions with other HAPO Departments were completed.

Revaluation of one position was authorized.

Prepared calculation guide sheets for use by nonexempt individuals in making comparisons of total compensation under Stock Bonus Plan versus Savings and Security Program during the period October 15, 1958 to January 15, 1961.

Information concerning the effect of the Savings and Security Program on administration of exempt salaries was prepared and issued to managers.

Four secretarial jobs were reviewed for merit promotions during the month and warranted promotional action taken. Revised job descriptions for two other secretarial jobs were reviewed as well as two for clerical jobs and three for semitechnical jobs. Those for the secretarial and clerical were prepared for the purpose of bringing the applicable descriptions up to date. No changes in classification were required. Classifications were established for two of the semitechnical jobs with that for the third still under consideration.

Further study was made and several conferences attended relative to the proposed Lab Assistant promotions. Recommendations were made to management concerned.

Much time was spent working on various aspects of the compensation study -- testing the evaluation plan, preparation of a draft appraisal system, and other associated work.

SUGGESTION PLAN

	<u>August</u>	<u>September</u>
Suggestions Received	52	59
Acknowledgements to Suggesters	55	59
Suggestions Pending Acknowledgement	0	0
Suggestions Referred to Operations for Investigation	55	59
Suggestions Pending Referral to Operations	0	0
Suggestions Completed and Closed	68	49
Adopted Suggestions Approved by Board	30	19
Adopted Suggestions Pending Approval by Board	21	31
Total Net Tangible Savings	\$4002.41	---
Cash Awards Paid During Month	\$ 535.00	\$155.00

As of the end of September \$4430 have been paid in awards with a total of \$35,720.34 in Net Tangible Savings. The average award of the 268 adopted suggestions is \$16.53 (below criteria of \$27.27) and the ratio of awards to savings is 12.4% (below criteria of 16.1%).

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August September

Total Number of Suggestions Outstanding to Operations
at the End of the Month

111

110

AVERAGE AGE OF OPEN SUGGESTIONS

Participation in Benefit Plans

August September

Insurance Plan	99.8	99.8
Pension Plan	99.4	99.4
Stock Bonus Plan	61.3	60.9
Good Neighbor Fund	61.0	61.5

One employee F. W. Whitmere, a Chemical Process Operator in Redox Operation, who has been absent because of personal illness for several months, retired on optional retirement effective October 1.

The following employees retired on normal retirement effective October 1:

O. J. Oberg	Janitor	P&GM Operation
R. L. Johnston	Plumb.-Steamfitter Jrny.	P&GM Operation
R. T. Woolsey	Painter	P&GM Operation
F. A. Gregg	Chem. Proc. Operator	Redox Operation

At the request of management, four meetings were held with a total of 117 bargaining unit employees for the purpose of explaining and answering questions on the Savings and Security Program.

III. ORGANIZATION AND PERSONNEL

A. Meetings

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

Meetings with counterparts in other departments.

HAPO Radiation Protection information meeting

Tri-City Safety Council

Accident Prevention Council

HAPO Fire Prevention Publicity Committee

Meetings on connection with the new Savings and Security Program

Industrial Relations Council meetings

Pre-grievance meetings and Step II grievance sessions

Graham arbitration case hearing as well as the Council grievance on posting union information arbitration hearing.

B. Personnel Activities

Chief R. L. Fortune of Fire Protection Operation, attended the Pacific Coast and International Fire Chief's Convention at Los Angeles, California.

Captain J. E. Sherwood made a trip to Cornelius, Oregon, to inspect and approve, prior to painting, the tanks and equipment being built on the two new tank trucks which should be delivered early in October.

Fire Protection Operation held 46 inside classes, 49 outside classes, in which 13,900 feet of hose and 1,007 feet of ladders were used. The percentage of time spent in training was 12.7, amounting to 665 hours.

Health and Safety conducted Safety Meetings for Power and General Maintenance, Finished Products, Purex, Redox and Facilities Engineering Operations.

The Specialist, Safety and Fire Prevention conducted a meeting on Provision of Flame-protected Protective Clothing for welders and assistants in SWP Zones in conjunction with the Laundry Operation. Representatives from the Product Operations attended.

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C. Safety and Security

There two medical treatment injuries in Employee Relations Operation,
and no security violations.

D. S. Roberts

D. S. Roberts, Manager
Employee Relations

~~TOP SECRET~~

END

**DATE
FILMED**

9 / 8 / 92