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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT
FOR
FEBRUARY, 1958

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Compiled By
OPERATION MANAGERS

March 21, 1958

HANFORD ATOMIC PRODUCTS OPERATION
RICHLAND, WASHINGTON

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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

FEBRUARY, 1958

GENERAL SUMMARY

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PRODUCTION

Although equipment failures hampered the operation of Redox Plant, the primary plant production exceeded the schedules and established a new record high for the output of plutonium from the separations plants.

The monthly production of UO_3 was 123% of the official forecast. At the end of the shipping period on February 17, 1958, UO_3 shipments were approximately 84 tons ahead of the shipping schedule.

The production of unfabricated plutonium metal was 143% of the official forecast. No fabrication was scheduled for the month.

ENGINEERING

A violent chemical reaction occurred in the Purex A Cell silver reactor rupturing the vessel and discharging the coated ceramic packing onto the cell floor. The event occurred during the movement of solution from the dissolver to the blend tank, hence cannot be associated with a gas phase reaction. The exact cause remains unknown. It is hypothesized that metastable compounds such as silver nitrate-ammonia complexes or silver imide or azide spontaneously decomposed. The reactor had been regenerated by flushing with aqueous ammonia.

The total Purex Plant plutonium production was routed through the prototype anion exchange system. Operation was good. A 600 fold reduction in sulfate and 4 fold reduction in uranium was measured. The system is recycling two to three percent of the product to the IA Column.

The benefits of purer plutonium nitrate from the anion exchange system have been partially evaluated. Metallic plutonium from this material is reduced in principal impurities - down two fold for nickel, three for iron, and six for chromium. Radiation flux from metal is down by 50 percent.

The first processing of enriched uranium (0.94% U-235 in original fuel) was successfully executed in the Redox Plant.

The addition of boron as boric acid to the Redox and Purex dissolvers could by poisoning action be instrumental in increasing the safe loading capacity. Laboratory studies have demonstrated that boric acid will remain in solution during coating removal and dissolution steps. Its distribution coefficient in solvent extraction favors discharge with the first cycle waste stream.

The engineering study for installation of a prototype ion exchange unit on the Purex 1WW stream for plutonium recovery is essentially complete. An engineering flow diagram, SK-2-17796, and a cell arrangement drawing, SK-2-17797, have been issued for comment.

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Rescoping activities were initiated on the E metal dissolving equipment for Redox. The new equipment will be designed to process similar quantities of enriched materials up to .94% initial uranium²³⁵ content safely without special operating safeguards. These new dissolvers will be capable of processing fuel elements up to ten feet in length and eight inches square with cladding of either aluminum or zirconium.

It has been proposed that a fluid bed denitration unit be installed in the 224-U facility for use as a pilot plant. This unit will pilot the process which will be required for calcination of material of higher enrichments being considered in the power fuels reprocessing facilities.

A study has been completed which proposes the installation of a prototype bulk fission product preparation and packaging unit. This unit would be used for developing a method of capsulating the separations plant high activity wastes both for sale and/or for waste storage purposes. A calcination and packaging facility was proposed which could be used for cold studies and eventually hot runs to package a minimum number of sample sources for use in market survey work.

GENERAL

Budget activity included the following FY 1960 and Revised FY 1959 budget submissions:

- Automotive Equipment
- Photographic Equipment
- Audio and Visual Aid Equipment
- Office Equipment
- Special Material Inventories
- Personnel

Effective April 1, 1958, Personnel Accounting will mail employee salary checks to any bank designated by the employee, provided the employee has or starts an active account. Since this service will be conducted by mail it is expected to be somewhat slower than deposits made in Richland banks.

Application for the National Safety Council Award of Honor was approved.

A Superior Court has handed down formal judgment to the effect that the Wonacott grievance is arbitrable. Notice of appeal has been filed with the appropriate court by the Company.

STAFF

Vice President and General Manager, Atomic Products Division . . F. K. McCune
General Manager, Hanford Atomic Products Operation W. E. Johnson
General Manager, Chemical Processing Department W. K. MacCready
Manager, Production Operation J. H. Warren
Manager, Purex Operation O. C. Schroeder
Manager, Redox Operation C. T. Groswith
Manager, Finished Products Operation W. N. Mobley
Manager, Power & General Maintenance Operation T. G. LaFollette
Manager, Financial Operation K. G. Grimm
Manager, Facilities Engineering Operation H. P. Shaw
Manager, Research and Engineering Operation V. R. Cooper
Manager, Employee Relations Operation D. S. Roberts

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CHEMICAL PROCESSING DEPARTMENT
NUMBER OF EMPLOYEES
FEBRUARY 28, 1958

OPERATION	EXEMPT		OTHER		TOTAL	
	1-31-58	2-28-58	1-31-58	2-28-58	1-31-58	2-28-58
GENERAL MANAGER'S GROUP	10	10	1	1	11	11
PRODUCTION	7	7	3	3	10	10
PUREX	44	43	241	237	285	280
REDOX	53	53	283	276	336	329
FINISHED PRODUCTS	55	54	292	287	347	341
POWER AND GENERAL MAINTENANCE	43	43	234	236	277	279
FINANCIAL	21	21	46	45	67	66
FACILITIES ENGINEERING	75	75	22	22	97	97
RESEARCH AND ENGINEERING	63	64	23	23	86	87
EMPLOYEE RELATIONS	<u>29</u>	<u>29</u>	<u>53</u>	<u>52</u>	<u>82</u>	<u>81</u>
	400	399	1198	1182	1598	1581

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DECLASSIFIEDCHEMICAL PROCESSING DEPARTMENTPATENT SUMMARY
FOR
MONTH OF FEBRUARY, 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.

<u>INVENTOR</u>	<u>TITLE</u>
J. S. Buckingham	The Separation of Plutonium From Uranium With Electrolytically Reduced Uranium
C. W. Pollock	Quarternary Ammonium Phospho Molybdates

GENERAL MANAGER
CHEMICAL PROCESSING DEPARTMENT

CHEMICAL PROCESSING DEPARTMENT
PRODUCTION OPERATION

FEBRUARY, 1958

I. RESPONSIBILITY

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

II. ACHIEVEMENT

A. Production Statistics

1. Purex Operation

	<u>February</u>	<u>January</u>
Tons uranium delivered to storage	550.76	567.11
Average production rate per operating day (tons)	19.9	21.0
Average yield, %		
Uranium	98.4	98.3
Plutonium	99.7	101.0
Total waste loss, %		
Uranium	0.06	0.10
Plutonium	0.32	0.51
Average cooling time (days)	91	101
Minimum cooling time (days)	83	91
Percent operating time	99.7	88.0

2. Redox Operation

	<u>February</u>	<u>January</u>
Tons uranium delivered to storage	131.9	55.3
Average production rate per operating day (tons)	8.5	6.2
Average yield, %		
Uranium	96.7	102.1
Plutonium	98.5	89.5
Total waste loss, %		
Uranium	0.22	0.75
Plutonium	0.58	0.68
Average cooling time (days)	90	104
Minimum cooling time (days)	81	89
Percent operating time	55.7	28.6

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3. 234-5 Operation

	<u>February</u>	<u>January</u>
Batches completed through Task I	425	397
Batches completed through Task II	288	230
Runs completed through Task III	276	234
 Reduction yield, %	 98.0	 97.0
Waste disposal (units)	487.18	742.51

4. UO₃ Operation

	<u>February</u>	<u>January</u>	<u>To Date</u>
Uranium accepted (tons)	612.77	612.05	25,711.98
Uranium shipped (tons)	613.99	661.99	25,492.40
Average cooling time (days)	96	110	
Minimum cooling time (days)	87	95	

5. Power

	<u>200 East</u>	<u>200 West</u>
Raw water pumped, gpm	9,867	4,115
Filtered water pumped, gpm	1,022	780
Maximum steam generated, lbs/hr.	295,000	140,000
Average steam generated, lbs/hr.	209,725	104,930
Total steam generated, M lbs.	140,935	70,513
Coal consumed, est. (tons)	7,716	5,002

6. Waste Storage

	<u>Equivalent Tons U</u>	
	<u>Feb.</u>	<u>Jan.</u>
Salt waste reserve storage capacity - Redox	11,926	12,001
Salt waste reserve storage capacity - Purex	6,576	6,659
Coating waste reserve storage capacity - Redox	41,438	41,570
Coating waste reserve storage capacity - Purex	43,864	44,417

B. Production Planning and Scheduling

Production assumptions were developed to provide a basis for review of the FY 1959 Operating Budget and for formulating the FY 1960 operating budget. Because of the uncertainties presently associated with future reactor programs two sets of production data were provided for budget planning for comparison purposes. One set of conditions was identical to the official forecast, being reflective of existing long range plans of IPD for reactor operation. The other set of production data was developed from the basic, official forecast,

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except that all normal uranium was discharged at an average concentration considerably lower than assumed in the official forecast. This resulted in an arbitrary maximum uranium throughput and would tend to show the possible maximum financial needs of the Department.

An unofficial forecast based on recent ACRS operating limitations was prepared by the IPD. A review of the discharge data shows that with such limitations uranium processing requirements for CPD remain essentially the same as those appearing in the official forecast through FY 1960 and somewhat lower (7-8%) than the official forecast in FY 1961 and beyond. Plutonium production was reduced, however, by approximately 6%, 15% and 20% in FY 1959, FY 1960 and FY 1961, respectively.

During January the boil-off of Purex salt waste in Tanks 101-A and 103-A continued at a fast rate, resulting in a net decrease in storage of 17,000 gallons. Liquid level was maintained above the bottom circulators by adding 71,000 gallons of water to Tank 101-A and 168,000 gallons to Tank 103-A. Total water additions since last February have been 2,762,000 gallons. Self-concentration in Tank 101-A amounted to 297,000 gallons, discounting 106% of the waste received during January. Total self-concentration in A-Farm since inception during July, 1956 amounts to 4,086,000 gallons (79.8% of total Purex waste currently stored in A Farm) as compared to 4,961,000 gallons (37.8%) reclaimed at SX-Farm where self-concentration started in November, 1954. Water additions to SX tanks total 354,000 gallons to date.

Two waste studies were performed during the month for the purpose of predicting future waste storage requirements for the Department. The first assumed that reactor discharges from the central loading zones would be at forecasted (CLVI-246, "HAPO Production Forecast," January 24, 1958) MWD/ton averages after FY 1959. The second study was for budget purposes and assumed lower irradiation levels. Estimated need dates for each case are:

<u>Plant</u>	<u>Type Waste</u>	<u>Need Dates</u>	
		<u>Official Forecast</u>	<u>Budget Forecast</u>
Purex	Salt	11-1-65	10-1-64
Purex	Coating	8-1-65	8-1-64
Redox	Salt	11-1-65	4-1-63
Redox	Coating	1970	1970

The need date for a Purex salt waste tank farm was predicated on improvements anticipated from two-cycle conversion (7-1-58), i.e., waste volume reduction by a factor of 2-3 and corresponding increased tons of production per tank. Should the situation be adversely affected, by production changes or new technology which would place additional restrictions on tank capacity, supplementary storage would be required much sooner, possibly as early as 11-1-60 for Purex and 9-1-61 for Redox.

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The first draft of the Historical Waste Study was assembled and is currently being reviewed prior to possible modification and subsequent issuing.

The inventory of UO_3 Recovered Nitric Acid showed a sharp drop for the second consecutive month as a result of increased consumption by Purex. In addition to utilizing all of the acid produced in January, the inventory was reduced 55%. By mid-February the inventory at 224-U was exhausted and acid from current production only was available.

C. Essential Materials

Bulk purchases of propane for the Redox facility was continued and one tank car was received during the month. This represents a savings of \$510 compared to the old method of receiving small truck loads from local vendors. The accumulated savings since inception of this program in August, 1957 is \$3,061.

In early February the Purex plant increased its usage of silver nitrate, which made it necessary to expedite a shipment of this material by utilizing rail express shipment. By this method of transportation the shipment arrived at Purex before the supply became depleted.

Early in the month a request was received from Traffic Operation to prepare tank car USAX-17109 for possible liquid alum use. For several months the car has contained nitric acid as a back-up supply. Since the trucking of nitric acid is very reliable and since Purex plant can utilize UO_3 recovered acid, the car was emptied at Purex and is now ready for other use.

D. Statistics and Reports

Recent improvements in SS materials control procedures are reflected in the fact that the current BPID is within the statistical control limits. Uranium data shows that the Department is now experiencing the best control of uranium in CPD history; however, there is no evidence as yet that the continuous apparent loss of material has been stopped. Long-term experience indicates that a physical loss of both plutonium and uranium is being sustained, and such losses indicate that a positive error exists in either receipts or removals of materials in CPD. Both receipts and removals are suspected, the first by reason of significant differences between measurements in the Metal Solution Preparation areas of the separations plants and the IPD measurements, and the second by reason of large underages in the 234-5 Building.

At the request of the Chemical Processing Department the Operations Research and Synthesis Operation, HLO has undertaken a study, the objective of which is to define and delineate the CPD control system to determine the most effective means of meeting the requirements of

material accounting, process control, and specifications. The result of the study is expected to be a model of a control system upon which specific recommendations can be developed to meet CPD objectives. The scope of the study is such that one year has been scheduled for its completion.

E. Finished Products and Customer Liaison

Arthur D. Little, Inc., Cambridge, Mass. accepted our contract (Consultant Agreement - CA 176) to provide marketing research services for a fission products market survey. The survey was officially started on February 4th when General Electric and A. D. Little people met in Cambridge, Mass. to review the over-all objectives, to discuss pertinent items relating to the survey and to draw up the following tentative general schedule for the survey:

1. Literature survey and pilot run - 6 weeks
2. Preparation of primer - 2 weeks - end of March
3. First round of field interviews - 6 weeks - June 1st
4. Analysis of data - 4-6 weeks - July 15th
5. Second round of field interviews - 6 weeks - September 1st
6. Foreign inquiries - 2 weeks
7. Data analysis and final report - 5-6 weeks - November 1st

From this tentative schedule covering survey work for the next nine months, it appears that the first general information will be available towards the latter part of March.

All the proposed survey work is expected to be completed in November, with progress being reported on a monthly basis.

F. Reports and Documents

1. Prepared and Issued

HW-54910	Essential Material Area Report to Cost and Purchasing, Production Operation, Chemical Processing Department, for January, 1958 M. A. Thress
HW-54916	Chemical Processing Department - Waste Status Summary for January, 1958, R. E. Roberts
HW-54824 RD	UO ₃ Plant Production Schedule, February, 1958 B. F. Campbell
HW-54825	234-5 Plant Production Schedule, February, 1958 B. F. Campbell
HW-54826	Redox Plant Production Schedule, February, 1958 B. F. Campbell

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HW-54827 Purex Plant Production Schedule, February, 1958
B. F. Campbell

HW-54878 Essential Material Consumption - Purex - Chemical
Processing Department, for January, 1958
M. A. Thress

HW-54750 Waste Storage Requirements for Chemical Processing
Department, R. E. Roberts

HW-55102 Redox Plant Shutdown, J. H. Warren

CLVI-252 Official Quarterly Forecast - Chemical Processing
Department, January, 1958 through June, 1963
B. F. Campbell

CLVI-276 Production Assumptions for Operating Budget
Planning, V. R. Chapman

2. Prepared for Signature and Issuance

HW-54820 Production Report - January, 1958, W. E. Johnson

HW-55175 Correction to Document CLVI-246, W. K. MacCready

III. ORGANIZATION AND PERSONNEL

A. Force Summary

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

B. Safety

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

C. Security

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

J. I. Wanner
Manager
Production Operation

CHEMICAL PROCESSING DEPARTMENT
PUREX OPERATION

February, 1958

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I. RESPONSIBILITY

The Purex Operation accepted responsibility for the Prototype Ion Exchange unit on February 17. Several minor modifications will be required before the facility can be considered entirely satisfactory.

II. ACHIEVEMENT

A. Processing Experience

1. Production Statistics

a. Production - Percent of Commitment

Uranium	122.4 Percent
Plutonium	127.6 Percent

b. Production Rates

February 1 through February 10	2.6 CF
February 11 through February 28	2.4 CF

c. Operation Continuity 99.7 Percent

d. Waste Losses

Uranium	0.06 Percent
Plutonium	0.31 Percent

e. Product Recovered from Waste Streams by Reprocessing

Uranium	539 lbs.
Plutonium	415 units

2. Normal Processing

Operations were continuous throughout the month except for about two hours lost time when the precycle HA column feed pump kicked out. Waste losses for the month were 0.06 and 0.31 percent for uranium and plutonium, respectively, and represent the best performance at Purex to date. The quality of both products was excellent. A five- to ten-fold reduction in iron content of the plutonium stream was realized after all of the plutonium stream was routed through the ion exchange facilities on February 18.

The plutonium ion exchange unit was down early in the month for minor repairs and to install a jumper for continuous recycle of

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the waste stream back into the final plutonium cycle feed tank. Operation of the unit was resumed on February 10 at thirty-five percent of the building's production rate and increased to seventy percent on February 13. On February 18, all plutonium production was routed through the ion exchange equipment and the L Cell concentrator package was shut down.

Dissolving operations were conducted in only two of the three units the majority of the month. Early in the period, iodine breakthrough from the B and C reactors necessitated removing each unit from service for regeneration, and on February 13 an uncontrolled pressure reaction in A Cell damaged essential equipment pieces and the cell was down the remainder of the month. Optimum operating cycles were maintained in the two remaining dissolvers and production of dissolved metal was equivalent to extraction cycle rates. During the period, dissolving acid was switched from UO_3 -recovered acid to building-recovered acid when the inventory of the former acid was essentially depleted. The UO_3 -recovered acid was reserved for use as the scrub stream in the 2-D column of the final uranium cycle.

Building salt waste was diverted from underground storage tank 241-A-101 to 102 tank on February 28. Boiloff from the 101 tank peaked at 14 gpm, approximately 3 gpm greater than the peak rate from 103 tank. Accordingly, due to the high heat content of the waste it was considered advisable to change tanks temporarily and at a later date complete filling 101 tank.

A total of 96 trailer loads of UNH solution were delivered to 224-U Building during the month and 48 loads of recovered UO_3 acid were returned to Purex.

3. Special Processing

The improved performance in waste loss achieved during the month was largely due to the rework of the #2 acid waste (2WW) stream on a repetitive batch basis. Initially the waste was collected and digested at boiling temperature for four days prior to addition to batches of fresh feed. Later in the period the digestion time was reduced sufficiently to permit the introduction of 500 gallons of the waste to every other fresh feed batch. This rate of rework was equal to the rate of generation of the waste stream.

B. Radiation Experience

Radio-iodine emissions exceeded the permissible limit of six curies per week in each of the four seven-day periods in the month. The CPD permissible limit of ten curies per week was also exceeded in each of these periods. Total Purex emissions amounted to 28.26 curies. Regeneration of the silver reactors and continuous addition of mercuric nitrate to the dissolver solution to suppress iodine evolution was only moderately successful in controlling the daily emission rate. The processing of irradiated metal held in storage for short periods (82-84 days,

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is the only known variable which is suspected as a contributor to the increase in emissions.

Five radiation occurrences were incurred during the month. Two of the occurrences resulted from non-compliance with Radiation Work Procedures; two resulted from skin contamination (readily removed); and one was a result of an uncontrolled exposure rate (700 mr/hr.) outside of a radiation zone.

Ten cases of skin contamination were incurred, including the two radiation occurrences noted above. The maximum levels involved were 20,000 d/m plutonium and 30,000 c/m fission products. All contamination was readily removed.

Entries into L Cell were made by Maintenance to repair leaks between the L-3 and L-4 concentrators and to install a recycle line connecting the ion exchanger to the 2A column feed tank. Two cases of skin contamination (maximum of 5,000 d/m) were incurred, otherwise excellent contamination control was maintained.

The radiation levels one inch over the shallow water at the edges of the old B Plant and new Gable Mountain cooling water swamps have increased to a maximum of 4,000 c/m. This represents the first detection of contamination of the new swamp and a ten-fold increase at the old swamp. The results from regional monitoring swamp samples have remained constant for several months.

The emission of plutonium out the west sample gallery hood and the FR hood exhaust systems has increased. The daily emission rate out the west sample gallery and FR hood exhaust stacks was 1.3 and 21.2 micro-curies, respectively. The emission from these exhaust systems is very irregular. The cause of these emissions is being investigated.

C. Mechanical Experience

In anticipation of the chemical flowsheet requirements of two-cycle extraction operation the recovered acid piping system was modified to permit mixing of the plant-recovered and UO_2 -recovered acids for concentration in the vacuum fractionator. Flexibility was retained in that the two recovered acid streams can be used separately, as at present, or mixed for the proposed two-cycle operation. Four miscellaneous canyon two-cycle jumpers were also installed during the period.

Two threats to operating continuity occurred during the month. The precycle HA column feed pump drew high amps and kicked out on three occasions; however it was possible to resume operations promptly, except on one occasion when two hours time elapsed before pump operation was restored. No process difficulties resulted. The second threat to operations continuity was the result of a leak in the piping between the L-3 and L-4 plutonium concentrators which grew progressively worse. At this time the total plutonium stream flow was diverted through the prototype ion exchange unit and the L-Cell concentrator

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package was shut down and isolated. Following flushing operations, repairs were made by replacing the one-inch flanged tee assembly and valves. The concentrator package is now ready for operation as required.

The A dissolver reactor damaged in the incident of February 13, together with several jumpers, was removed from the cell and buried without incident. Replacement equipment is being fabricated by the Power and General Maintenance Operation. Design modifications to permit bypassing the reactor during the coating removal step are in progress, and it is expected that these modifications will delay use of the cell until about May 1, 1958.

The 200 H.P. electric drive motor connected to 291-A exhaust fan #3 was shut down for repairs on 2-10-58 for investigation of a high frequency whistling sound. Subsequent investigations revealed a defective inboard bearing. Three previous bearing failures were attributed to shaft misalignment which was corrected in October, 1957. The motor is performing satisfactorily following replacement of the defective bearing.

The fabrication and installation of a temperature profile thermohm assembly designed to provide temperature signals from ten varied levels in the 241-A-101 waste underground storage tank was completed on 2-15-58. A similar assembly was fabricated and installed in the 241-A-103 tank on July 26, 1957. Both are operating satisfactorily.

Replacement of a severely corroded 4" diameter steel flanged pipe outlet in the 8" waste underground tank vapor header located in the 241-A stack house was completed on 2-29-58. Repairs consisted of cutting off the corroded section of pipe and clamping a stainless steel flanged assembly over the opening and to the 8" vent header. Examination of the vent piping indicated that the corrosion was confined to the corroded section (heat area of the pipe) removed, with apparent indications that the corrosion resistant qualities of the steel pipe were affected by welding.

D. Analytical Experience

Numerous special analytical requests and a heavy routine analytical work load were effectively handled along with preparatory activities for taking over the analytical work for 100 Area effluent samples in April. A record low analytical rerun rate of 1.89 percent kept the duplication of work to a minimum. A month long test was conducted to determine the feasibility of reducing AmCm analyses on E-5 accountability samples from a batch basis to a monthly composite basis. These results are currently being evaluated.

A work order to modify the Purex Laboratory for handling 100 Area water effluent samples was issued and approved by the IPD customer. Approximately 50 percent of the maintenance work was completed by the end of the month. A review of the methods and the job classifications required for this analytical work was initiated and an equipment list has been compiled.

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(For more detailed information on these and other items see the Research and Engineering portion of the CPD monthly report.) In order to route the entire plutonium production through the ion exchange unit, it was necessary to reduce the ratio of aqueous to solvent in the 2B column to match the limited capacity of the ion exchange pump. For a short period of time, the 2B column was "pinched" too tightly and high 2BW plutonium losses resulted. Increasing the sulfate ion concentration in the 2BX stream relieved the situation and restored operations to normal. Approximately 320 units of product resulting from the period of upset were collected and stored in R5 tank for future rework.

2. Inventions and Discoveries

No inventions or discoveries were reported by Purex personnel during February.

F. Events Influencing Costs

The high production achieved during the month in the absence of unusual maintenance or materials expenses resulted in record low manufacturing unit costs for uranium and plutonium. The lower plutonium unit cost is a direct result of the increased concentration of the element in the irradiated metal processed.

The cost of fresh nitric acid per ton of uranium processed is up somewhat from the experience of the past three months. This increase is due to the necessity of using fresh acid instead of recovered acid since the inventory of UO_3 recovered acid was depleted during the month.

G. Plant Development and Expansion

Contractor work on the second remote crane (Project CA-513) was delayed four days (February 18 through February 21) to permit opening of A cell for equipment removal and burial as a result of the incident of February 13. Work on the remote crane was not permitted due to the radioactivity present when the cell is open.

H. Reports Issued

HW-55223 - Investigation Report - Purex Plant Silver Reactor Incident, by O. C. Schroeder, dated February 27, 1958.

III. ORGANIZATION AND PERSONNEL**A. Safety**

There were no disabling injuries or serious accidents at Purex during

February. A total of ten medical treatment cases were reported.

Depressurization tests of the canyon atmosphere were made to determine if additional vent controls are required. Results of the test dictate the addition of an interlock to shut off the exhaust fans upon failure of the supply fans. A bypass will be installed in this interlock system for flexibility of equipment maintenance, and as a means of starting the exhaust fans after an outage or in case the emergency turbine is not available.

B. Security Violations

There were no security violations reported during February.

C. Personnel Activities

On February 28, C. R. Miller, Analytical Chemist, terminated to seek employment elsewhere.

One chemist and three laboratory assistants are now training in 100 Area water effluent analytical methods at the 1706-KE laboratory.

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OC Schroeder
MANAGER
PUREX OPERATION

OC Schroeder:JCG:gt

SECRET

CHEMICAL PROCESSING DEPARTMENT
REDOX OPERATION

FEBRUARY, 1958

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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

Processing operations for the Redox Facility were maintained at nominal rates for the first seven days of the month. Operating continuity was interrupted on two occasions and lower than nominal rates were necessary for two periods, due to equipment failures. On 2-8-58 processing was shutdown and remained down for approximately 153 hours due to failure of the H-2 centrifuge. Operations were resumed on 2-14-58 but were reduced to 60% of nominal on 2-15-58 because of a leak which developed in the H-4 oxidizer tube bundle. This rate was continued until 2-19-58 when the leak became excessive, requiring a shutdown for repairs. On 2-21-58 processing was resumed at nominal rates. However, on 2-22-58 rates were reduced to 70% of nominal because of the failure of the F-7 feed tank pump. This rate was continued, using only the F-8 feed pump, until 2-26-58 when the monthly production commitment was achieved. Processing was then shutdown for repairs.

The mechanical efficiency for the periods during which the facility was scheduled to operate was 65%. The monthly production commitment was exceeded by 1.5% while operating at 59.23% of the total hours in the month.

All UNH produced during the month was within shipping specifications; however, 39, E-12 batches with excessive gamma activity were ozonated and processed through silica gel to meet shipping specifications. All Plutonium produced was within shipping specifications. Above normal waste losses were experienced during startups but came down to satisfactory levels after operations smoothed out. The above normal losses, amounting to 0.58% of the total plutonium produced and 0.22% of the total uranium produced, were attributed to inadequate oxidation of head-end feed material. 2.5 batches of waste were reworked.

A total of 16.6 curies of I^{131} was emitted during the month, of which 5.2 curies were emitted during the period 2-22-58 to

2-24-58. The high emission resulted when the dissolver off-gases were temporarily routed to by-pass the 293 iodine back-up facility after the nitric acid storage tank became filled to capacity. All three of the iodine silver reactors were re-generated this month, however, sample analysis indicate that the A-3 and B-3 reactor efficiencies are low. Corrective measures to be taken before dissolving operations are resumed may necessarily include replacement of the A-3 and B-3 units.

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Three of the initial six shipments of E-metal have now been processed through the Redox C-dissolver. Procedures for the transfer and processing of this material appear to be adequate and laboratory results on the samples taken are now being accumulated for evaluation.

The overhead crane and railroad tunnel contamination was again attacked during the latter part of February. An all out effort, using available plant forces, has resulted in good progress, helped greatly through the use of steam cleaners and detergents. However, much effort is still required and will be continued during future scheduled shut-down periods.

2. Equipment Experience

a. H-2 Centrifuge

The H-2 centrifuge which was installed on 1-14-58 failed on 2-7-58, due to a frozen bearing. It is believed that the bearing froze as the result of a lubrication failure since a considerable amount of oil was required to fill the lubrication reservoir; also, evidence of oil leakage was noted in the cell. The centrifuge was replaced on 2-11-58, with the unit which was delivered and installed in January and which failed due to faulty skimmers. This latter unit was decontaminated and repaired at the 221-U Canyon Building. The newly installed unit is currently performing satisfactorily.

b. H-7 Agitator

The H-7 metal blending tank agitator failed on 2-13-58. It

was replaced with a new agitator on 2-19-58. The failure was apparently due to a sheared coupling or gear shaft. It had been in service since 2-16-54.

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c. H-4 Tube Bundle

The H-4 oxidizer tube bundle, which had been in service since 7-11-57, developed a leak on 2-15-58. The leak was at a point about equal to the normal operating liquid level. Operations continued on a reduced production rate until 2-19-58, when the leak became excessive and it became necessary to replace the tube bundle with a new one. The old tube bundle was placed in a metal capsule and stored in J-7 cell for a decay period before removal to the burial garden.

d. F-7 Pump

The F-7 feed tank pump, which had been in service since 11-3-54 developed a serious leak. It was replaced with a new pump on 2-24-58.

e. H-3 Agitator

The H-3 cake slurry agitator, which had been in service since 11-7-55, failed on 2-3-58. A replacement has been procured and will be installed during the month end shut-down. Since the H-3 is a waste tank, processing was continued without agitation until the monthly production was met.

f. Iodine Reactors

The A-3, B-3 and C-3 iodine reactors were regenerated on 2-8-58 and 2-9-58. This was done as a precautionary measure since the production throughput for each of these reactors was nearing the maximum expected before reactor failure. However, sample analysis showed iodine passing through the A-3 and B-3 reactors following the regeneration, so it is planned to regenerate them again before further dissolving operations. Should regeneration be ineffective they will be replaced with new units.

g. L-3 Concentrator

A leak in the welded section on the lower loop of the L-3 recirculator required replacement of the bottom section of the loop on 2-14-58. The presence of high iron content in the L-6 samples indicates extensive corrosion which will shorten the life expectancy of the unit. Because of this, replacement of the lower loop is anticipated in the near future.

DECLASSIFIEDh. Other Canyon Equipment Replacements

<u>Equipment Piece</u>	<u>Date Replaced</u>	<u>Reason</u>
DG-29 power to D-2 agitator	2-5-58	Shorted to ground
Crane festoon cables	2-7-58	Loose from trolley
AC steam trap jumper G-3	2-9-58	Excessive leak
Crane optic	2-10-58	Would not operate
HG-25 lube jumper to H-2	2-12-58	H-2 centrifuge change-out.
HG-27 hydraulic jumper to H-2	2-12-58	" " "
HG-32 steam jumper for H-2 to H-3	2-12-58	" " "
B-3 reactrol unit	2-18-58	Burned out

B. Maintenance Operation

The experimental hollow shaft, 215 RPM direct drive agitator installed during January in the D-2 position, Building 202-S, experienced what seems to be another electrical failure in either the jumper or the wall connector. The power jumper has not as yet been removed to determine the exact trouble.

On 2-7-58, the H-2 centrifuge failed after having operated since January 14, 1958. The failure was apparently due to a faulty lubrication jumper which failed to provide oil to the main drive bearing. Replacement was made with the centrifuge which had failed in January and had been repaired, after it's removal, in the 221-U Canyon Building.

A troublesome difficulty was corrected on the 60 ton canyon crane festoon cables when the electrical crew was successful in installing bolts in the regular fastening clamp for these cables. Several unsuccessful temporary repairs had been attempted by using a rope to tie up the festoon. Radiation levels made this an exceedingly difficult job to perform.

C. Waste Handling and Decontamination Operation1. Waste Handling

Redox Coating Waste Received (S Farm)	15,132 gallon.
Redox Salt Waste Received (SX Farm)	154,202 gallon.
Total Gallons boiloff	180,900 gallon.
Waste Received at TX (221-U)	13,063 gallon.

2. Equipment Decontamination and Repaira. Regulated Steam Pit

A total of 7 vehicles and 10 pieces of equipment were decontaminated during the month. The total manhours

charged to this operation was 136.

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b. Railroad Equipment

A total of 365 manhours was charged to this operation. The work included decontamination of the railroad repair shop at Riverland, decontamination of locomotive No. 3330, decontamination of five flat cars and one gondola car, changing casks on car No. 36, decontamination and repair to trunions and lids on three casks, and installation of lids on well car No. 41.

c. 221-U Building

1. Finished Products Operation Equipment

The X-30-1 pump was shipped to 224-U for installation. One X-30-2 pump, for 224-U, was decontaminated and disassembled. Repair work on this pump is awaiting the arrival of new bearings.

2. Purex Operation Equipment

One A-D-4 agitator was decontaminated and repaired, however, run-in of the agitator has not been completed. Flat cars were papered for Purex burial boxes, the work being paid for by Project Engineering.

3. Redox Operation Equipment

Pump J-19-23-P was decontaminated and dismantled. The final testing and run-in of the J-19-19-P pump was completed with an approximate savings of \$4000 being realized. Decontamination and repair work to the H-2 centrifuge was done on a "crash basis" with an approximate charge of \$3000 for the work.

3. Miscellaneous Activities

- a. A total of 8 drums of chemicals (caustic, nitric, sulfuric) were sold to various customers during the month.
- b. Burial of the Redox H-2 centrifuge was accomplished without incident.

4. Redox Tank Farms

- a. Installation of valve manifolds on all SX Tanks was completed.
- b. One leaking jumper in the 241-S-151 diversion box was

successfully reimpacted and three jumpers were removed and transported to the 221-U Canyon Building for re-gasketing.

- c. A plug in the 241-SX-151 diversion box manifold jumper was found when attempts were made to divert the salt waste stream to the 115-SX tank. Attempts to remove the plug were unsuccessful and the waste was subsequently routed to the 113-SX tank on 2-7-58. Current plans are to remove the jumper and transport to the 221-U Canyon Building for unplugging.

D. Analytical Control Operation

1. Control Statistics

<u>Month</u>	<u>Samples</u>	<u>Determinations</u>
January	1513	4027
February	1971	5416

2. Building Maintenance

Principal 222-S building maintenance included replacement of the drive belts on one of the building vacuum pumps and a general overhaul of the tunnel gas detector.

3. Equipment Experience

A small ultrasonic cleaning vat was set up on an experimental basis to determine the applicability and efficiency of this method for decontamination and cleaning of laboratory sampling and analytical equipment. Results to date have equaled or exceeded expectations. Several cleaning materials, nitric acid, sodium bisulfate, and Turco detergent have been used with about equal results. Testing of procedures and cleaning materials will continue during the coming month.

Equipment consisting of oxygen - propane burning torches and a revolving dish holder was set up as a standby to the induction furnace for fusing and preparing the sodium fluoride melts in the procedure for analyzing for micro amounts of uranium.

The quartz reaction tube used in determining Fluoride in UO_2F_2 samples was redesigned to allow use of an inexpensive quartz ball and tube and to eliminate an expensive and difficult to make, glass to quartz bond. The resulting reaction tube is entirely quartz with greater resistance to stress and should result in less breakage.

4. Assistance to Process

The turbidimetric method for chlorides was refined to pro-

vide the Redox Research and Engineering Operation with quantitative measurements of the amount of chloride in Hedges nitric acid.

Sampling equipment and assistance were provided the UO_3 plant Research and Engineering Operation for sampling of calciner off gas during the period of ammonia addition to the process. The off gas samples were sent to the 300 area for mass spectrometer analysis for hydrogen and nitrogen compounds.

E. Radiation Monitoring Operation

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1. Radiation Occurrence Experience

Eight radiation occurrences were reported in the Redox operation this month. Three of these occurrences are worthy of comment. Two of the three involved uncontrolled air contamination in the South Operating Gallery of Building 202-S, with a maximum air concentration of 4.3×10^{-8} uc fp/cc. Automatic alarm systems alerted the problem in both cases and as a result personnel exposure was insignificant. In the third occurrence radiation levels up to 20 mr/hr were measured behind the Silo Operating Gallery panel when inadequately decontaminated organic solvent re-entered the 202-S Building piping. Again radiation instrumentation provided the initial discovery of the abnormal condition.

2. Personnel Exposure Experience

Decontamination work on the 202-S Building 60 ton crane continued this month and a significant reduction in specific work area dose rates was realized. Most impressive was the accomplishment reducing the contamination levels on the east catwalk by a factor of 3 to 10.

Radiation levels up to 500 mr/hr were measured on the base of the 293-S Building nitric acid absorber during the period when the "A" Dissolver silver reactor was known to be inoperative. Radiation levels up to 50 mr/hr were measured on the recovered nitric acid pipe lines in the North Sample Gallery of Building 202-S, during this period.

The H-2 centrifuge, repaired in the 221-U Plant Canyon, was decontaminated from 1500 mrad/hr surface, to 200 mr/hr at contact, before contact maintenance started. Three employees were authorized to receive 250 mrem exposure to repair the failed centrifuge on an emergency basis.

3. Other Contamination Experience

A shipment of Chalk River material was received this month

and incoming surveys of the casks revealed dose rates up to 200 mr/hr direct on the side of the casks. The trays in which the casks were placed were contaminated generally from 10,000 c/m to 200 mrads/hr with smearable contamination up to 40,000 c/m. The casks were decontaminated to less than 1000 c/m smears and a maximum of 20 mrads/hr direct reading on the casks.

The H-4 tube bundle leak allowed unknown quantities of radioactive material to be discharged to the 216-S-5 and 6 underground caverns. Dose rates up to 350 mr/hr were measured at the diversion weir box between the 216-S-5 and 216-S-6 caverns after the leak developed. No radiological problems are believed to be associated with the discharge of considerable amounts of radioactive materials to these caverns.

On 2-21-58, acid fumes were discovered coming from one of the process lines behind the "C" Dissolver panel board in the North Operating Gallery. The radiation survey of the colored fumes emanating from the line measured 500 mrads/hr. Cooling the C-2 Dissolver stopped the fuming and a followup survey failed to uncover any trace of contamination contributable to this condition. Air filter samples were a maximum 3.9×10^{-9} . A one hour caustic scrub air sample revealed considerable iodine contamination in the atmosphere, yet exposed employees' thyroids did not indicate any I^{131} deposition in the thyroid. The cause of the fuming condition has not definitely been ascertained.

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. Miscellaneous Improvement Items

To facilitate space for decontamination work in the 221-U Building Canyon, cell 13 equipment was removed and stored on the canyon dock.

The 221-U Building "Swimming Pool" was cleaned and decontaminated preparatory to installation of the underwater equipment from T plant. This facility will be utilized for inspection of the Redox H-4 tube bundle.

In the 222-S Building a Taylor Controller-Recorder has been installed in the counting room to reduce the variation of temperatures which affect the delicate instruments in that

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room. The problem of high background readings on the 5 fold counters has been solved by cleaning with the ultrasonic cleaning equipment.

Installation of manual valves in the lines to the inert gas control valves, in the 202-S Building, has made it possible to isolate the control valves for repair. Repair of the valves, through the preventative maintenance program, has reduced the gas leakage so that one gas generator now handles the load that formerly required two generators.

3. Inventions or Discoveries

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

G. Events Influencing Cost

Extensive decontamination efforts on the 60 Ton crane and the crane maintenance platform, in the 202-S Building, will result in higher laundry and supply costs for the period.

Loaned labor to other facilities outside of the Redox Operation amounted to 246 manhours.

Monthly internal Maintenance costs during the first seven months of FY-1958 shows a drop of approximately \$12,500 per month over the 1957 FY average. Monthly costs for external maintenance were slightly greater than those of 1957.

Spare Parts reductions during the month totaled \$2,273. This was mainly in parts for the optical system of the 60 Ton Redox crane which have shown no usage. It appears that these parts were construction "left overs".

H. Plant Development and Expansion

1. Preparatory Engineering

Cask Car Contamination

The project proposal for hinged lids on well cars is now circulating for approvals within CPD. The monorail and hoist, which is to be installed at the Redox tunnel door for removal of cask car lids, is now complete and ready for installation. Testing of the flushing heads, which were installed on the casks of well car No. 41 to flush out the casks, was initiated this month. Results at this writing have not been completely

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evaluated.

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222-S Laboratory Roof Fire Protection

Two meetings between AEC and CPD representatives were held relative to the AEC proposal that the automatic sprinkler system in the storage rooms on the second floor be eliminated from the proposed work. As a result the proposal has been withdrawn and a request for a feasibility study on a total automatic sprinkler system is to be made by the AEC.

Liquid Dichromate for Redox.

Approval of the work order was received and installation of the piping was started in mid-February by Plant Forces. Installation should be complete prior to April 1, the scheduled delivery date for tank truck liquid dichromate.

2. Design and Liaison

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

High radiation readings have prevented completion of exceptions in the 293-S Building. A summary of costs, including completion of the North Sample Gallery acid metering system, has been completed. The estimate approximates five thousand dollars surplus in addition to the seventy thousand already returned to the commission.

CG-686, In-Line Monitoring Instruments, Redox and Purex

The alpha monitor and console were received on 2-21-58. Installation is being scheduled to permit tie-in to the L-9 condensate header during the March shutdown.

CG-692, Modifications to Redox 233-S Concentration Building

All work on the building additions has been completed with minor exceptions. Functional tests performed on the exhaust system disclosed minor defects which are being corrected.

CG-722, Utilization of 224-U Acid at Redox

The facilities to permit receiving acid at the 204-3 tank via tank trailer are complete. The planning for utilization of this acid included metering devices to be installed by project CG-648. The completion of metering equipment to permit incremental acid additions was originally planned for Feb-

ruary, however a realistic date is now May 1. The equipment arrival on site is scheduled for April 1. If necessary, temporary instrumentation such as rotameters can be installed to permit usage from the 204-3 tank.

CG-772, "E" Metal Dissolvers, Redox

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Rescoping of the project was initiated this month to make provisions for the processing of long fuel elements, from power reactors, in the E metal dissolvers. New drawings have been issued for comment. The new scope stipulates that two critically safe vessels will be furnished for A and B cells, the first to be plant fabricated, the second to be contracted. Two down draft towers will be provided, one to spare all three Redox dissolvers. A new cost estimate is being obtained for preparation of a revised project proposal. The project engineer has been requested to allocate cold side work to the Redox Maintenance Operation and jumper fabrication to the Power and General Maintenance Operation. Work reviews will be submitted to this end.

I. Reports Issued

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

III. ORGANIZATION AND PERSONNEL

A. Safety

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

B. Security

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

C. Personnel Activities

On 2-18-58 Mr. Alfred K. Huse, representing the U.S. AEC, Brookhaven Laboratory, Long Island, New York, inspected the decontamination and remote maintenance techniques used in the 221-U Canyon Building. His interest was in connection with a Uranium Bismuth reactor being constructed by Contractors Babcock and Wilcox.

Humphrey Gilbert, Safety Engineer, Safety and Fire Protection

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Branch, Washington AEC Office, visited the 222-S Analytical Laboratory on 2-18-58. Mr. Gilbert was interested primarily in a review and appraisal of the project proposal related to the 222-S Laboratory roof fire protection.

A well attended party was held by the Redox Operation on February 14, 1958 at the Officers Club in North Richland.

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Chas. S. Groswith

Manager
Redox Operation

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CHEMICAL PROCESSING DEPARTMENT
FINISHED PRODUCTS OPERATION
MONTHLY REPORT

FEBRUARY 1958

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I RESPONSIBILITY

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

II ACHIEVEMENTS

A. Metal Finishing Operation

For the second consecutive month a new record high was established for the production of unfabricated plutonium, February production being 26% higher than that of any month in the history of the plant.

Feed was received routinely from Purex all month. Deliveries from Redox were initially scheduled to be completed by the middle of the month but equipment difficulties caused delays which shifted the production load into the latter half of the month. Very little material was received from recovery during the earlier part of the month due to the need of flushing some of the equipment. Delivery rates improved later in the month and approximately the amount of material scheduled had been received by month-end.

The quality of feed received from all sources was very good and processing performance was excellent. Only one button was lost due to the inability to satisfy density specifications. The ion exchange unit in Purex which processed only a part of the plutonium in that plant during January and early February started handling all of the plutonium in Purex during the last third of the month. This feed behaved particularly well during processing and produced metal of unusually good quality.

Operating efficiency for the month ranged to 81% and depended largely on the availability of feed. It was possible, therefore, to take advantage of time available to complete cleaning of certain contaminated areas and to conduct improvement repair work in order to further enhance operating dependability.

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A. Metal Finishing Operation (Cont'd)**DECLASSIFIED
WITH DELETIONS**B. Product Recovery Operation

In spite of considerable operating difficulty at the beginning and end of the month 61.3 Kgs of plutonium were returned to the main line stream during the month.

Recovery work started slowly this month due to the necessity for extensive cleanup in an effort to correct the continuing under-accounting. It was found that two conditions existed. (1) A slime had settled out (source unknown, but believed to be from oils) in some of the concentrated feed tanks. It was not getting to the columns or included in the inventories. (2) In the concentrator section, low acid strength, high temperature, and plutonium condition resulted in polymerization and precipitation of the plutonium throughout this section. This was not picked up in samples for assay but was transferred to the Metal Finishing Operation without credit.

Following the study of the above, work proceeded routinely until the last week of the month when a series of equipment failures and very unusual operating conditions were experienced. The H-1 extraction column pulser bellows failed twice, both of the small metal dissolvers (in Hoods 40 & 41) failed from corrosion, and the D-6 filter block (one of the two blocks used to filter dissolved crucibles) failed after only two months service. At month end, an unknown condition (presumably a high concentration of DBP from floor flushes, etc.) caused considerable fouling of the organic. Plutonium concentration in the organic ran as high as 2.5 g/l instead of the normal 0.1 g/l and was almost impossible to wash out. Two methods were employed. The first involved adding Ferrous salts in the strip solution going to H-3 column and effectively causing an additional washing of the organic in the column. Following this, treatment of the organic with Sodium Hydroxide and Sodium Carbonate completed the removal of plutonium. The organic containing the bulk of the DBP is being discarded at almost 200 liter/day rates, which is a factor of approximately 10 above normal operating condition.

The columns operated at 1910 liters/day instantaneous rates at an operating efficiency of 71.9%. Waste losses averaged 0.52%.

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DECLASSIFIED**B. Product Recovery Operation (Cont'd)**

Several minor changes were made to improve operability. A review of the critical mass for the Hood 41 dissolver pot showed that the batch limit charge-in value could be increased from 700 to 900 grams. As an assistance in prompt recovery of plutonium salts, the other metal dissolver (Hood 40) is being used to dissolve this type of material. A new screen was installed on the discharge side of the G-10 pump in parallel with the old so that lost time for cleaning of these screens would be eliminated. The high filtration times caused by the plugging of the D-6 and D-7 filters when processing straight powder runs has been reduced to normal by returning to the practice of mixing powders and reduction crucibles; while this reduces slightly the number of runs we can process, column operability is much improved.

Service activities proceeded on a routine basis. A new theoretical steam consumption chart has been developed for use in defining proper operational control of the ventilation equipment in 234-5 building. The back-up 26" vacuum pump failed from corrosion at month end and is being repaired. The dew point indicator control on the air going to the RMA Line gave some trouble and allowed the humidity to rise to a -30° from a normal -36° .

C. Uranium Reduction Operation

February was a good production month with few mechanical troubles occurring. Official production was 102% of schedule, and all shipping schedules were met easily. A total of 629,228 pounds of 100% nitric acid was recovered and shipped to Purex during the month. At month end a total of 225 tons of uranium as UNH is stored at the various plants awaiting processing through the Uranium Reduction Operation.

Following a trend that was started in December, and firmed in January, February was a routine operating month with no difficulty encountered which affected overall production. There was essentially no mechanical failures or troubles with the calciners during the month, and it was possible to schedule only those units to operate that were necessary to achieve the scheduled rate of production. The only problem of significance during the month was an acute shortage of shipping containers. On three successive weekends it was necessary to sharply curtail production due to this lack of containers. Double handling was necessary on a part of production due to this reason. The container problem has eased late in the month to a very great degree, and currently the operation is in good condition in this problem area.

Minor Construction forces removed the old prototype calciner from the building during February, and it will be possible to make needed improvements in the change room facilities in 224-U Building soon.

A sharp change will be noted in the following statistical sections of this report relative to calciner performance. The figures are

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C. Uranium Reduction Operation (Cont'd)

expressed on an hourly basis, and are more precise than previously reported data. All production figures are based on output rather than rotometer input calculations. Mechanical efficiencies are vastly improved due to increased mechanical reliability plus output improvement, making it possible to schedule units down for standby or for routine inspection and/or preventative maintenance. These latter factors do not count against mechanical efficiencies. Calciner data is as follows:

	(1) Hrs. Oper.	(2) Hours Scheduled Outage	(3) Hours Repair Work	(4) Hours Avail. (Total)	(5) Mech. Eff. ($\frac{142}{100}$) 4	(6) Tons Prod.	(7) T/Calc. Day
G	63:45	597:00	11:15	672	98.32%	18.12	6.84
H	661:50	--	10:10	672	98.43%	198.71	7.21
J	136:25	532:35	3:00	672	99.55%	36.58	6.44
K	450:05	82:50	139:05	672	79.30%	122.09	6.51
L	466:30	84:30	121:00	672	81.99%	132.30	6.60
M	426:00	246:00	--	672	100%	125.20	7.05
Totals	2204:35	1542:55	284:30	4032	92.94%	633.0	6.89

D. Maintenance Operation - Z Plant

The mechanical reliability of Hood 9B (continuous Task I and II) improved during the month. The principal difficulty involved the failure and replacement of the platinum lined Inconel fluorinator tube as a result of a rupture of the liner. No definite cause of failure has been determined to date. Another significant difficulty involved failures in the off-gas lines and fittings. Temporary relief has been obtained through the use of shop-machined Hastelloy fittings. Efforts are being made to obtain teflon pipe and fittings as possible replacements to combat the extremely corrosive conditions in this section of the system.

In Recuplex, the H-1 column pulser bellows failed and was replaced. The failed unit was a modified pulser unit fabricated in the 300 Area as a possible replacement for the original unit. The replacement unit ran only about 12 hours before failure, and it was necessary to make a second replacement.

The condenser on the dissolver pot in Hood 40, and the dissolver in Hood 41 both failed due to corrosion during the month. The small size of these vessels permitted repairs to be made by welding.

The maintenance work performed for the Plutonium Metallurgy Operation, H10, in 231 Building was mostly of a routine nature. Principle difficulty involved a low voltage condition and building instrumentation was affected. The condition will be corrected as soon as a shutdown of the building can be arranged.

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**DECLASSIFIED
WITH DELETIONS****D. Maintenance Operation (Cont'd)****UO₃ Plant**

Maintenance work performed on the calciners was less in February than during previous months. There were only 2 calciner failures which required cover removal. It was necessary to straighten two feed points and one thermowell. It was also necessary to replace two shear pins and one king pin.

Other non-routine maintenance in the building consisted of replacing the king pins and the hammers on X-25-1 and X-6 Hammer mills; overhaul of the X-11-1 and X-11-2 bag filter system; replacement of the X-30-1 UNH feed pump. C-2 waste filter was changed twelve times during the month.

The calciner improvement program is nearing completion. During the month, feed box piping and the improved type agitator blade assembly was installed in J Cell. The same revisions are in progress at month end on G Calciner. Work is also in progress to remove obsolete off-gas piping and Adams filters from all calciner cells.

E. Analytical Control Operation

A total of 13,331 determinations were performed on 1948 samples received in the Analytical Control Laboratory during the month. Of this number there were 11,481 spectrochemical determinations, reflecting the increase in production of buttons by the Metal Finishing Operation.

Sixteen percent of the total laboratory effort was directed to plutonium-aluminum alloy samples submitted by the Plutonium Metallurgy Operation.

F. Radiation Monitoring Operation

Nine radiation occurrences were documented in February as compared to nine in January. The breakdown for the various Operations is as follows: Metal Finishing - 3, Product Recovery - 1, Maintenance - 2, Uranium Reduction - 3, Radiation Monitoring and Analytical Control - 0.

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WITH DELETIONS**

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F. Radiation Monitoring Operation (Cont'd)

Seventeen cases of skin contamination were reported in February as compared to twenty-seven in January. The breakdown for the various Operations is as follows: Metal Finishing - 2, Product Recovery - 3, Maintenance - 7, Analytical Control - 1, Uranium Reduction - 4, and Radiation Monitoring - 0.

Radiation exposure to all operators in the 234-5 Building continued to be a major problem. The average exposure per operator per week this year to date was 63 mr. If this exposure accumulation rate continues through 1958 the average exposure per operator per year will be 3150 mr. Neutron exposure is not included in these exposure estimates. A good estimate of the total exposure is twice the gamma or 6,300 mrem per year. Decontamination efforts, special shielding projects, and rotation of operators will all be employed in controlling exposure.

Contamination control continued to be a problem in Task II where maintenance personnel were in the process of removing obsolete hoods. At month's end adequate contamination control had been exercised and only Hood 9 remained to be removed. Control in all other areas was superior to what it has been since hood 9B was put in operation.

The stack emission daily average during February was 180 uc plutonium compared to 275 uc in January. Hood 9B continues to be the primary source of these emissions.

The contamination status of the Uranium Reduction plant was comparable to that of the previous month. In general control was adequate, however, further improvement should be forthcoming with the improved operation of the calciners.

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.

H. Events Influencing Cost

In the Uranium Reduction Plant removal from the roll of one man in February should have some small effect on cost. Plans have been firmed for a two-week shutdown of the plant in late June for scheduling vacations. This plan will be of benefit to overall costs of the Uranium Reduction Operation during the calendar year.

DECLASSIFIED**H. Events Influencing Cost (Cont'd)**

Five Separations Utility Operators will be transferred from the Metal Finishing Operation to other locations at month-end. This reduction was made possible by the improved dependability in button preparation which permitted operations on a 15 shift per week schedule rather than the 21 shift per week schedule which has been in use since August.

I. Plant Development and Expansion**1. Project CG-691 - Improved Task I and II**

The improved multiple rotor powder handling valve installed last month improved the dependability of the continuous wet and dry chemical equipment significantly. Hoods 7-A and 9-A were prepared for moving into permanent location. All equipment and hoods in the old Task II area have been removed with the exception of the main hood which is in the process of being moved out at month-end.

2. Project CG-723 - Recuplex Conversion

The Process Design and Development group completed modifications to the filtrate concentration system requested by the using operation and scope revisions were issued. A manifold for providing steam purge from Recuplex instrument lines was installed by plant forces. Other work is being held pending the receipt of materials. The Construction Engineering Operation has completed field inspections and submitted estimates for review for the work to be done by them. Work releases are expected when materials arrive.

3. Project CG-734 - RMC Button Line

It was reported last month that a review was underway to determine whether equipment and design or the scope of the button line equipment should be changed as the result of recent new information regarding radiation. This review is continuing. Most of the innovations planned are concerned with providing additional barrier shielding, portable shielding, and improved arrangements for keeping the interior of the hoods clean. Fortunately, the changes came in the manner of additions and therefore didn't affect equipment design which is over 90% complete. Procurement can also proceed with a minimum of interference.

4. Project CG-745 - RMC Fabrication Line

A revised drawing schedule was prepared which reflects the completion of all comment drawings by April with the exception of a few electrical prints. The issuance of purchase requisitions was started. Facilities for use by construction forces doing the work are being provided.

5. Project CG-756 - Filter Replacement

Fire resistant filters have been installed in all filter rooms. Special filter boxes were installed to handle exhaust air from hoods where hydrogen fluoride is used.

DECLASSIFIEDI. Plant Development and Expansion (Cont'd)6. Capital Work Order - Safety, Oil and Paint Storage

An oil and paint storage area will be located south of the 234-5 Building. Materials have been ordered and pouring of the pad and erection of the building is scheduled during March.

7. Project Request - Waste Program

A project has been requested for the replacement of Crib #3 and associated test wells for Z Plant waste. The proposal will be presented for approval about mid March.

8. Project Request - Barrier Shielding

A project proposal requesting \$30,000 as design funds is being presented for approval to allow the scoping and design of additional Zone 1 to Zone 3 shielding on the RMA Line. This project is chargeable to the Equipment Not Included in Construction Project Budget.

9. Project CG-722 - Utilization of 224-U Acid at Purex and Redox

The detailed design for this project is complete. Construction schedules will be prepared and bid-package information submitted to the Commission for a fixed price contract of those portions that fall in this category.

10. Project CG-725 - UO₃ Plant Liquid Waste Handling Facilities

The Commission has been requested to return the project proposal without authorization. The project scope will be revised to reflect present technology.

11. Project CG-767 - Miscellaneous Improvements, UO₃

Revision 1 of the project proposal requesting construction funds for interim uranium segregation and improved feed points and thermowells has been presented for approval.

Revision 2 of the project proposal as scoped includes instrumentation, air sampling, and decontamination facilities. Consideration is being given to include "E" metal product segregation and a capacity increase by electrical change-outs to this portion of the project. A portion of this work has been scoped.

12. Project 770 - Feed System & Pick-up Bin Modifications, UO₃

This project was accepted by the Using Department without exceptions on March 3, 1958.

DECLASSIFIED**J. Reports Issued**

HW-55087 Chemical Processing Department, Finished Products Operation,
Z Plant Monthly Report, January 1958, by W. N. Mobley

III ORGANIZATION AND PERSONNEL**A. Organization Changes**

W. W. Kinney, Rotational Trainee, was assigned to the Metal Finishing Operation effective February 1.

N. M. Craft, Contact Engineer, Uranium Reduction Operation, resigned on February 28 to accept employment elsewhere. Mr. Craft's former duties are to be absorbed by others in the Uranium Reduction Operation, principally by the Analyst, Processing.

N. S. Wing, Supervisor, Analytical Control, was loaned to Research and Engineering on February 14 for approximately three months. D. C. Bowden, Analytical Chemist will be assigned as Acting Supervisor, Analytical Control for the period.

B. Safety Experience

No disabling injuries or near serious accidents occurred during the month. Thirteen medical treatment injuries were experienced during the month as compared with sixteen in January. The frequency rate decreased from 2.96 to 2.41.

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

One security violation involving an unlocked file cabinet was experienced during the month in the Uranium Reduction Operation. In order to prevent a recurrence, all classified material in that plant is to be stored in a single file cabinet.

E. Personnel Activities

During the month the last two sessions of the FFO Manager's Report to employees were held. All shifts in both plants have been covered. The information was well received and appreciated. No significant complaints or trends were revealed in the discussions which followed each of the meetings.

EXCLUDED

DECLASSIFIED**E. Personnel Activities (Cont'd)**

The training of Metal Finishing Operators for the production of a new model continues.

All employees with Top Secret clearance have attended a "Top Secret Workshop" conducted by both GE and AEC security representatives.

Various employees (about 25) both exempt and non-exempt, have attended the various training sessions available within CPD.

F. Miscellaneous

G. E. Backman, Manager, Radiation Monitoring Operation visited both the Savannah River and Rocky Flats plants during the month for the purpose of comparing and discussing all phases of radiation problems which are common to those plants and Hanford.

W. N. Mobley, Manager
Finished Products Operation

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CHEMICAL PROCESSING DEPARTMENT
POWER AND GENERAL MAINTENANCE OPERATION

FEBRUARY 1958

UNCLASSIFIED

I. RESPONSIBILITY

Responsibilities assigned this Operation remained unchanged during the period covered by this report.

II. ACHIEVEMENT

A. Operating Continuity

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

B. Inspection, Maintenance, and Replacement

Close liaison was maintained with the Purex and Redox Operations to expedite emergency requirements for pipe jumpers and other process equipment. Of particular significance was the integration of P&GM facilities with the requirements of the process plants in meeting emergency needs for A-Cell equipment at Purex, and coils, jumpers, agitators, pumps, etc., for Redox. Also included was the repair of a contaminated centrifuge and the rebuilding of a "spare" centrifuge for the Redox Facility.

Installation of a fluoroscope in the 221-B Building and an x-ray machine in 224-B Building was completed for the Radiographic Testing Operation. The x-ray machine was a portable design, however by changing the controls and rewiring, the unit was modified for permanent installation. The controls to the x-ray machine were located in an adjoining room, and an interlock system installed at the door as a precautionary measure in preventing exposure to operating personnel.

A burial box of unprecedented size, (52 feet long), containing a discarded HA column and associated pipe jumpers was removed from the Purex canyon and buried. Other burials of contaminated equipment included a silver nitrate reactor from the Purex Facility and a defective centrifuge from Redox. High radiation levels prevailed at the burial sites, however personnel exposure was held well within limits.

Undesirable atmospheric conditions developed in the office portions of the 271-T Building when that portion of the building was isolated from the operating gallery and canyon. The ventilation system was discharging 80,000 CFM air-flow to the office areas. The condition was corrected by reducing the fan speed which in turn reduced the air-flow to an acceptable 45,000 CFM.

The fabrication of pipe jumpers for Project CA-513-E (Expansion of 200 Area Facilities) is on schedule. A total of 58 units are involved of which 65% was complete at month's end. Other pipe fabrications included 14 jumpers for Redox and 10 for Purex as required for routine replacements of failed and damaged equipment.

Special emphasis was placed on the conversion of a standard laboratory hood in the Finished Products Operation to a sealed process type hood for use in the canning operation. Necessary modifications to adapt the unit to a canning hood included installation of fresh air and exhaust ducts, panels, glove ports, and shelving, which was accomplished under adverse conditions influenced by product radiation and contamination.

Among the principal activities of Tool and Die Shop personnel was the making of tools, gauges, and fixtures for the new machining hood for the Finished Products Operation. The work was an estimated 50% complete at month's end.

Modification of a spare T-H3 pulse column is now in progress. The unit is being adapted for use on Project CA-513-E which provides a 2-cycle process for the Purex Facility. The column is scheduled for completion in mid-April and is 10% complete at this time.

Fabrication of a container or "pump capsule" was completed during the month. The unit is designed for use in transporting contaminated pumps from the Redox Facility to the "U" Building for decontamination and repair.

A "Load Luger" type disposal unit, designed to handle contaminated dry waste, was completed by Shops personnel. This is an experimental idea which could make a very desirable contribution toward expediting removal of contaminated dry waste from the production facilities.

Assistance rendered the Irradiation Processing Department by ventilation balancing personnel included an emergency call to the 105-H Building. Adjustments were made to the building's ventilation system to control further spread of contamination from the reactor. The work was performed on a call-out basis.

Measurements of the output of the new exhaust fan at the 233-S Building disclosed the unit to be undersize and below design expectation. New and larger pulleys have been ordered which should provide acceptable fan output.

C. Improvement Experience

A lathe and tool grinder were removed, after long service in the 272-W Machine Shop, and replaced with similar units obtained from the 2101-M Building. The exchange was part of a continuing program to upgrade the quality of machine tools and thus enable the Shops to operate at a maximum degree of efficiency.

Final arrangements were completed by the AEC for disposal of Building No. TC-1, which served as a contractors' administrative headquarters during construction of the Purex Facility. Negotiations are in progress to have Hanford Laboratories Operation vacate the 272-Z Building (temporary structure adjacent to the 231 Facility) in order that arrangements for its disposal may be completed.

A reduction of \$7,800.00 was realized in unliquidated accumulated cost in the Shops Operation during January. The IME of this Operation has been reduced to a level unprecedented since September 1956.

Spare parts inventories were reduced by \$5,000.00 in the Power Operation during February.

III. ORGANIZATION AND PERSONNEL

UNCLASSIFIED

A. Safety and Security

No disabling injuries were incurred. The nineteen medical treatment cases reported reflect an injury frequency rate of 4.36.

No incidents were reported in which a breach of security was evident.

B. Personnel Activities

P.E.L. Nussbaum and R.W. Gooldy discussed tool development and machining problems with other G.E. Shops personnel in Schenectady, New York on February 11, 12, and 13.

Seven employee suggestions were submitted of which four were deemed acceptable.

The Operation attained its goal of having a craft training program for 1958 in progress by March 1.

 T. G. LaGrange, Manager
 Power and General Maintenance Operation

CHEMICAL PROCESSING DEPARTMENT
FINANCIAL OPERATION

February, 1958

I. RESPONSIBILITY

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

II. ACHIEVEMENT

A. Product Cost

The final draft of CPD Advice 5.3.9, "Authorization and Performance of Maintenance Work", was completed and issued for final review.

The forecast of the equipment funds expenditure pattern for FY 1958 was prepared and issued.

Budget activity included the following FY 1960 and Revised FY 1959 budget submissions:

- Automotive Equipment
- Photographic Equipment
- Audio and Visual Aid Equipment
- Office Equipment
- Special Material Inventories
- Personnel

Budget preparation is proceeding smoothly with all due dates for budget submissions being met.

Necessary coding adjustments due to shutdown of Waste Scavenging were completed. Fifteen expense codes were cancelled or altered.

Graphic forms designed to permit rapid presentation of a summary of current, FYTD, budget and financial plan comparisons to production management has been developed and will be issued in conjunction with the monthly analysis letters.

A study of CPD General Cost distribution was completed. Changes as recommended will be placed in effect July 1, 1958.

A special study and report of R&D manpower as requested by the General Manager was coordinated, assembled and transmitted through the Manager - Finance.

Final results of the physical inventory of essential materials, excluding coal, conducted January 31, 1958, disclosed an overage of \$2 876. The overage, representing 0.6% of the book value, was due primarily to

reporting incorrect month end balances of quantities on hand prior to the time of the physical count. Total value of materials inventoried was \$479 594.

At the request of R&U Financial Operation, a physical review of returnable containers charged to CPD was initiated during February. Although the review is still in progress preliminary field checks indicate that the majority of returnables are either in use or have been returned in the interim between the request and the field inventory.

B. Personnel Accounting

Effective April 1, 1958, Personnel Accounting will mail employee salary checks to any bank designated by the employee, provided the employee has or starts an active account. Since this service will be conducted by mail it is expected to be somewhat slower than deposits made in Richland banks.

Information received from Schenectady indicates, since a majority of the General Managers polled expressed approval, that during May employees will receive a statement informing them of their share in the General Electric Benefit Plans. All information will be as of December 31, 1957, and will be developed in Schenectady with the exception of life insurance and weekly sickness and accident insurance, which will be calculated locally.

Statistics

1. Number of CPD Employees

	<u>Monthly</u>	<u>Weekly</u>	<u>Total</u>
Employees at Beginning of Month	400	1 198	1 598
Additions and Transfers In	2	5	7
Removals and Transfers Out	(2)	(22)	(24)
Transfers from Weekly to Monthly	1	(1)	0
Transfers from Monthly to Weekly	(1)	1	0
Employees at the end of the Month	<u>399</u>	<u>1 182</u>	<u>1 581</u>

2. Overtime Payments During Month

	<u>February</u>	<u>January</u>
Nonexempt	\$8 752*	\$8 978**
Exempt	<u>1 816</u>	<u>2 297</u>
	<u>\$10 568</u>	<u>\$11 275</u>

*Payments to nonexempt employees cover a four week period.

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

3. Gross Payroll

	<u>February</u>	<u>January</u>
Nonexempt	\$599 637*	\$755 811**
Exempt	<u>320 336</u>	<u>317 474</u>
	<u>\$919 973</u>	<u>\$1073 285</u>

* Payments to nonexempt employees cover a four week period.

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

C. General Accounting

Effective March 1, 1958, General Books assumed the responsibility for posting all uninstalled equipment documents; this formerly was the responsibility of Property Accounting. During the last two weeks of February, the posting clerk trained for the assumption of this responsibility.

Ninety-three checks totaling \$271 484.55 were prepared by CPD during February, 1958. General Books issued twenty-six of these checks totaling \$5 041.46 which included one check for contamination of personal effects in the amount of \$10.45.

General Accounting was notified by the Traffic Operation that effective February 10, 1958, air travel transportation rates increased 4% plus \$1.00 per ticket.

Effective February 1, 1958, government cost transfers are being processed through IBM. Supporting detail is furnished with each run but only one second class invoice is issued to cover the entire month's activity. This procedure is the same as is used for accounts payable vouchers and store orders.

There were 26 active CPD projects with \$14 334 000 authorized funds as of January 31, 1958. Expenditures and commitments of \$9 480 000 and \$808 000, respectively, have been incurred against these projects. Cost of \$267 000 was incurred during January.

Project authorizations received from the AEC during February were \$18 500 for an engineering study and preliminary design for providing additional fire protection - 234-5 Building and \$60 000 additional funds for designing additional facilities for Purex tank farm vapor wastes.

CPD's first contingency maintenance request was forwarded to the AEC for approval during February. Funds in the amount of \$180 000 were requested to repair and strengthen the bails in the Purex cell blocks.

During the month a summary of the preliminary FY 1960 and Revised FY 1959 Plant Acquisition and Construction budget was distributed to Level III Managers and their budget representatives.

Activities relative to physical inventories of plant and equipment were as follows:

Facilities Engineering - Report issued.
Redox Analytical Control - Report issued.
Research and Engineering Process Chemistry - Physical count completed; reconciliation and report in progress.
Purex - Physical count in progress.

January and February tank farm depreciation accrual was made on the basis of final volume of waste stored as recently approved by the Commission. Retroactive adjustments will be made in March.

Conversion of spare equipment to IBM was completed.

D. Auditing

Field work in connection with an audit of Employee Benefit Plans was completed. Findings and recommendations are being summarized in preparation of report issuance in March.

An audit program was developed for examination of the records and routines of the Product Cost Operations. Field work was started February 12, 1958.

During the month 240 purchase requisitions were reviewed in order to ascertain whether or not the proposed expenditure was reimbursable and within the scope of the contract.

E. Procedures

The third meeting of the task force on work simplification and automation was held. Complete work distribution charts were presented for the entire Financial Operation. C. E. Thompson and J. H. Roberts attended this meeting and gave the Data Processing Operation's outlook.

The flow charting of the activities of the Financial Operation was begun in February. The objective of this will be to further simplify our systems and procedures. The completion of this phase of our study will assist in providing an answer to the question, "To automate or not to automate?"

The reconciliation of the four bond accounts was completed during the month and appropriate journal entries made to bring the General Ledger and the Personnel Accounting controls into balance.

F. Measurements

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

An intensive examination of the CPD Productivity measure was begun in an effort to ascertain if further refinements and/or improvements can be made, or are necessary, in order to establish a measure of maximum use to management.

III. ORGANIZATION AND PERSONNELA. Safety and Security

A safety and security meeting for all Financial Operation personnel was held on February 27, 1958.

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

There were no security violations experienced during the month.

B. Personnel Activities

T. E. Sparks, Manager - Auditing, visited Schenectady, New York; Louisville, Kentucky; Milwaukee, Wisconsin; and Chicago, Illinois, during the month to review internal audit programs and techniques.

C. Reports Issued

HW-54843 - CPD Operating Report - January 1958 - by M. M. McDonald

HW-54873 - Essential Materials Inventory and Consumption - by
S. R. Myers

HW-54956 - Redox Cost and Production Analysis, January 1958 - by
G. H. Temple

HW-54957 - Purex Cost and Production Analysis, January 1958 - by
G. H. Temple

HW-54958 - Finished Products Cost and Production Analysis, January
1958 - by G. H. Temple

HW-54959 - CPD Unit Cost Information, January 1958 - by B. M. Dobbs

CLVI-277 - CPD Cost and Production Analysis, January 1958 - by
B. M. Dobbs

CLVI-278 - Backup Data - CY 1958 Goals - by G. H. Temple

TS Rough Draft - Product Cost Report - by B. M. Dobbs

Acting Manager - Finance

DECLASSIFIED

March 7, 1958

CHEMICAL PROCESSING DEPARTMENT
FACILITIES ENGINEERING OPERATION

February, 1958

I. RESPONSIBILITY

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

II. ACHIEVEMENTS

PUREX OPERATION

A. Research and Development

Rare Gas Recovery

A survey of qualified gas processing firms in both the low temperature fractionation and hypersorption fields is being planned for the week of February 24. The purpose of the survey is to derive information which will permit a choice between low temperature processing and hypersorption and also to determine the firm in that field most qualified for our immediate needs.

The recent Arco meeting on rare gas recovery resulted in a tentative request from both HAPO and Savannah River for three different production cases:

Case I would involve bulk separation of impure krypton and xenon at the primary separations site with shipment of the impure mixture to ORNL for subsequent separation and purification.

Case II would involve bulk separation partitioning of krypton and xenon at the primary separations site with subsequent refining of krypton at ORNL and xenon at Mound Laboratories.

Case III would entail complete separation and purification of both isotopes at the primary separations site.

The AEC indicated its intention to make the site selection in October 1958 and to authorize the selected site to initiate final design in March 1959.

A gas sampling program is now in progress to define the composition of the 293-A gas discharge which will serve as the feed stream for the rare gas recovery facility.

Pu Recovery from LWW - Purex Prototype

The engineering study for installation of a prototype ion exchange unit on the Purex LWW stream for plutonium recovery is essentially complete. An engineering flow diagram, SK-2-17796, and a cell arrangement drawing, SK-2-17797, have been issued for comment.

Following completion of the design cost estimate and resolution of drawing comments, an engineering study report will be issued to provide a basis for detail design and to summarize cost and schedule estimates. Contingent upon on-site procurement and fabrication of equipment, and assuming on-schedule completion of current projects, the prototype unit should be installed and operating by the end of FY 1958.

Replacement Silver Reactor

A recommendation was made to the Purex Operation that a new silver reactor be procured which would incorporate the improvements suggested in document HW-51956, issued by Process Design and Development. The improved reactor would be interchangeable with present Purex standard reactors, although it would employ two four-foot packed sections instead of one eight-foot section, for improved utilization of silver nitrate regeneration solution. Work order requests have been issued and detailed design will be started immediately.

In-Line Photometer for Uranium

Arrangements are being made for the design and installation of a prototype uranium photometer on the HSP stream. The instrument sensing element is to be mounted in series with the gamma monitor which is being installed under Project CG-686.

In-Line pH Monitor

Definite planning of field prototype activity has started on a pH monitor for tank F-16. Work in HLO on an improved monitor has reached a promising stage of development. This pH monitor will have the electrodes directly in the tank in contrast to previous methods which require that a sample be taken and brought into the sample gallery. The electrodes will be in a "throw-away" head which will be detachable from the jumper which places them in the tank.

DECLASSIFIED

DECLASSIFIED**B. Plant Engineering****Steam Utilization**

Preliminary work has been completed in establishing steam requirements for the Purex Plant. A meeting has been planned with operating personnel to inform them of the plan and to obtain their cooperation in solving problems associated with unusual steam usage.

C. Project Activities***CG-647 - Acid and Iodine Removal Facility**

Early in February data were obtained on the performance of the Purex 293-A facility with respect to iodine recovery. The data indicates iodine decontamination which meets the requirements of the scope criteria. Approximately 75 percent of the iodine was found in the acid product and only 25 percent in the caustic, which leads to optimism for converting the caustic scrubber to an auxiliary acid absorber to improve acid recovery without sacrificing iodine decontamination.

REDOX OPERATION**A. Research and Development****E-Metal Dissolvers**

Rescoping activities were initiated on the E-metal dissolving equipment for Redox. The new equipment will be designed to process similar quantities of enriched materials up to .94% initial uranium²³⁵ content safely without special operating safeguards. These new dissolvers will be capable of processing fuel elements up to ten feet in length and eight inches square with cladding of either aluminum or zirconium.

The scope drawings have reached the comment stage with resolution of comments scheduled by March 10, 1958. Detailed design will be initiated on this equipment at that time without waiting for formal scope completion.

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

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

SECRET

DECLASSIFIED**B. Process Technology****Imbedded Piping Repairs**

Methods for repairs or replacement of corroded pipe in Redox canyon walls have been discussed with personnel of Linde Company, and the Resistoflex Corporation. Information obtained indicates that, if it is deemed necessary, holes can be burned through canyon walls for placing new stainless pipes or it may be possible to line existing pipes with a Teflon-Compound tubing called Fluoroflex-T.

C. Project Activities**CG-692 - Modifications to Redox 233-S Concentration Building**

All work on this project has been completed except for correction of minor deficiencies revealed in the functional testing of the ventilation system.

CG-722 - Utilization of 224-U Acid at Redox and Purex

Final tie-in to the 293-S acid header was made February 26, 1958. With this tie-in Redox now has beneficial use of project facilities to enable interim use of UO_3 recovered acid.

FINISHED PRODUCTS OPERATION - Z PLANT**A. Research and Engineering****Shielding Studies - RMA Lines**

Engineering studies were undertaken to evaluate a shielding barrier along the RMA button line and on portions of the RMA fabrication line. These studies are in response to a request by the Finished Products Operation for a project to reduce the radiation exposure along the RMA Line. As presently planned, the work will include three separate items. These are: (1) shielding along the Zone I - Zone III barrier, (2) a vacuum cleaning system inside the process hoods, and (3) a powder storage hood located near Hood 9-A. A work order was given to the Construction Engineering Operation to prepare the architectural scope of the barrier shielding. Information regarding the amount and location of the shielding has been received from Radiological Development and transmitted to CEO. This project is expected to have little or no effect on the Project CG-691 construction work that is presently underway.

DECLASSIFIEDPlatinum Liner Failure

The platinum liner used inside the H-9 vibrating tube failed during the month and required replacement. Alternate methods for re-designing this liner are now being studied. One new tube and liner is presently on order and it is hoped that most questions regarding the re-design of the liner can be resolved in time to incorporate the changes in the new liner. There have been at least three general theories to explain the liner failure. These are:

1. Failure due to different coefficients of expansion between the liner and the tube.
2. Pressure differential because of heating of air trapped between the tube and liner.
3. Pressure differential due to vacuum inside liner.

Radiation Sampling Program

Samples representing one batch of Z Plant feed from Purex were removed from each step to Tasks I and II process. Spectrographic analyses on these samples are being made in the Analytical Laboratories Operation, HLO. Simultaneous radiation data are being taken at intervals on identical large samples retained in the 234-5 Building.

During processing of this batch, hood radiations were obtained, both with the process equipment in full operation and with it essentially emptied. The correlation of these data which is now in progress will result in information of value to future radiological design.

B. Process TechnologyShielded Rubber and Plastic Gloves

The high percentage of x-ray and low energy gamma associated with the process material in Z Plant results in continuing demand for an effective shielded glove.

Two gloves containing lead compounds are being tested with radiation sources for relative effectiveness, and comparison is also being made with one of the zinc coated gloves now used in the 234-5 Building. One glove made by the Edmont Manufacturing Company is of lead impregnated plastic. The other of the type used at Rocky Flats and at Argonne is of neoprene lead compound.

DECLASSIFIEDC. Plant EngineeringSteam Requirement Study

At the request of the Product Recovery Operation a study has been made of the steam requirements for the 234-5 Building. A method of control, by use of a statistical chart, was recommended and adopted and is currently in use to indicate off-standard usage. The graph consists of a plot of outside wet-bulb temperature versus steam consumption as determined by the meter for a period of one hour. If the point falls within two control lines, the steam consumption is within standard. Points outside of the control lines are investigated for subsequent action. This method provides a day-to-day control of steam usage, thereby eliminating large losses which are discovered after the fact.

D. Advanced EngineeringBudget No. 660-12, Additional Fabrication Facilities

A budget study, document number HW-54748, was completed and issued during the month. In this study, it is recommended that \$4,700,000 be included in the FY 1960 construction budget to provide fabrication duality. This amount is in addition to the \$4,500,000 presently in the FY 1958 and FY 1959 budgets. The \$4,700,000 includes an allowance of \$3,000,000 for additional work required because of the body exposure problem.

FINISHED PRODUCTS OPERATION - UO₃ PLANTA. Research and DevelopmentFluid Calcination Equipment

It has been proposed that a fluid bed denitration unit be installed in the 224-U facility for use as a pilot plant. This unit will pilot the process which will be required for calcination of material of higher enrichments being considered in the power fuels reprocessing facilities.

Powder Seal Pot

A plastic model of the seal pot has been fabricated. Testing and evaluation of the model will begin upon the receipt of a sintered stainless steel plate which the vendor has promised to deliver on March 17, 1958.

B. Plant Engineering**DECLASSIFIED****Calciner Improvements**

Improvements to the calciner units, to increase heat input, which were recommended as an item for the FY 1960 Plant Acquisition and Construction Budget are being scoped and will be a part of requested additions to Project CG-767. This is being done to increase the production rate of the calciner units to meet revised forecasts in UO_3 production.

GENERAL ACTIVITIES**A. Research and Development****Hanford New Production Reactor Studies**

Chemical processing requirements were evaluated for five alternate cases encompassing current new production reactor variables critical from a separations standpoint. These variables were:

- power - 2400, 300, 400 MW (thermal)
- exposure - 2000 MWD/T
- initial enrichment - 0.84% U^{235}
- final enrichment - 0.62% U^{235}
- final Pu content - 1.48 and 1.64 kg per ton of uranium
- cladding - zirconium-2 and Al

The current E-metal dissolver concept under Project CG-772 provides means of exposing the entire annular crib so that long fuel elements may be charged directly. This would permit encapsulating the NPR fuel elements at the reactor site into an expendable canister which could be charged to the Redox dissolvers. Segregation of plutonium in the Redox and Z Plants would be maintained; no attempt would be made to segregate the uranium in the UO_3 Plant.

The total investment cost for all five alternates was estimated to be \$400,000 for the transportation facilities required between the reactor site and the Redox Plant. The total fixed operating costs were relatively constant at about \$4,700 per ton of uranium for all five alternates. The incremental operating costs were \$1,680 per ton of uranium for the aluminum-clad elements and \$1,790 per ton of uranium for the zirconium-clad fuel elements.

Document HW-54972 has been prepared transmitting the study results to Irradiation Processing Department for incorporation in the program report.

DECLASSIFIEDElectrical Connectors for Co-Axial Cable

Studies are planned on remotely installing co-axial cables through existing Purex and Redox conduit lines to cell connectors. The placement of new connector inserts in connector heads is also being investigated. Current development work in Maintenance Engineering now indicates the feasibility of remote installation. These connectors will be useable for radiation instruments, pH meters, and other application.

B. Process TechnologyPipe Bevelling Equipment

The use of the "Mechanical Draftsman" pipe bevelling machine and the Heliarc cutting unit was observed by Materials Engineering personnel during a recent visit to the laboratories of Linde Company, Newark, New Jersey. Excellent cuts were obtained on aluminum and austenitic stainless steel pipe. A detailed report on the possibility of using this equipment in Power and General Maintenance shops is presently in preparation and will be issued in the near future.

Enriched Uranium Processing

Three cases of varying production requirements and enrichment levels were studied from the standpoints of operating and capital cost as follows:

<u>Case</u>	<u>Natural Uranium</u>	<u>Total Production, Tons Per Year</u>	
		<u>Enrichment Level % U235</u>	
		<u>0.94%</u>	<u>1.25%</u>
I	5300	1800	0
II	5300	900	300
III-A	0	3000	0
III-B	0	0	3000

A rough draft has been prepared summarizing the results of the study. Case I, the FY 1960 budget assumptions alternate requires no expenditures beyond that provided by Project CG-772. Case II may also be processed in existing facilities as modified by CG-772 plus total mass control on solid metal present and the addition of neutron absorbing solutions during the dissolution cycle when processing the 1.25% enriched material. Case III-A requires new critically safe dissolvers be installed at the Purex Facility at an estimated cost of \$900,000. This installation at Purex plus a revised project CG-772 with two dissolvers at Redox would probably be capable of processing all the variations listed except III-B.

Case III-B is an individual case that could be handled by three new dissolvers of special design at Purex for an estimated \$900,000; however, these units would be very limited as to production capacity and type of fuel element processed.

Bulk Fission Product Isolation

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A study has been completed which proposes the installation of a prototype bulk fission product preparation and packaging unit. This unit would be used for developing a method of capsulating the separations plant high activity wastes both for sale and/or for waste storage purposes. A calcination and packaging facility was proposed which could be used for cold studies and eventually hot runs to package a minimum number of sample sources for use in market survey work.

The cost of the development program is estimated at \$44,000. The long-term gains which may result from such a program includes making a saleable product from a present "waste" stream and the possibility of reduced cost and improved safety in the non-marketable "waste" storage.

C. Plant Engineering

Preventive Maintenance - Landlord Properties

Establishment of the preventive maintenance system for landlord properties has been completed. Work has been initiated to develop engineered standard times for recurring routine preventive maintenance work. The first step, establishment of a work distribution pattern, is essentially complete. From this pattern priorities will be established for the industrial engineering effort in the areas where the economic return is greatest.

D. Project Activities

Project Cost Information as of February 16, 1958:

Total authorized funds - Active Projects	\$14,218,000
Total Cost-to-Date	9,446,000
Commitments and Open Work Releases	949,000
Unencumbered Balance	3,823,000
Costs charged to above projects from 1-19-58 to 2-16-58	270,000

Project CG-742 was dropped from active status during this period.

Authorized Funds \$135,000 - Total Cost \$127,373

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III. ORGANIZATION AND PERSONNEL**DECLASSIFIED**A. Personnel

J. S. Crowder, Senior Engineer, was transferred to Power and General Maintenance Operation effective February 1, 1958.

B. Safety

The many benefits that are gained from practicing safety in the home as well as on the job have been emphasized during the regular monthly safety meetings.

C. Inventions

None.

D. Reports Issued

HW-54724 RD Essential Materials Standard - Redox, A. C. Morgenthauer, January 31, 1958.

HW-54872 RD Steam Requirements - Redox Plant, A. C. Morgenthauer, January 31, 1958.

HW-54805 A Proposed Fluid Bed Denitration Unit for Use with Enriched Uranium, J. M. Gerhart, February 3, 1958.

HW-54890 A Proposal for Bulk Fission Product Isolation and Capsulating as a Dry Powder, J. M. Gerhart, February 10, 1958.

HW-54972 Letter A. B. Greninger from W. K. MacCready, Chemical Processing Requirements, HAPO New Production Reactor, February 13, 1958.

HW-55064 RD Preliminary Issue, Chemical Processing Department Budget for FY 1960 and Revision of Budget for FY 1959, Plant Acquisition and Construction (Data Sheets), D. R. Gustavson, February 21, 1958.

Document RD Separation Facilities Capacity Study - Enriched Metal Processing, W. A. Graf, February 19, 1958.

DECLASSIFIED**E. Trips**

G. A. Conner visited the Linde Company, Newark, New Jersey; the Resistoflex Corporation, Roseland, New Jersey; and Battelle Memorial Institute, Columbus, Ohio, February 4-11, 1958. A report on this trip was issued by G. A. Conner, February 24, 1958.

P. S. Kingsley and J. B. Fecht visited Washington State College on February 14 for the purpose of discussing the results obtained on the stud testing program, Contract DDR-10.

F. Visitors

F. H. Ames, Jr., Manager, Evendale Facilities Projects, General Electric Company, Cincinnati, Ohio, was here on February 26, 1958, to consult on project management problems.

Manager
Facilities Engineering Operation

HP Shaw:FC:mh

CHEMICAL PROCESSING DEPARTMENT
RESEARCH AND ENGINEERING OPERATION

FEBRUARY, 1958

DECLASSIFIED

PUREX PROCESS TECHNOLOGY

Feed Preparation

Irradiated uranium with exposure rates of 2.6 to 6.4 MW/T and "cooling" times of 81 to 103 days was prepared as solvent extraction feed. Despite the fact that the off-gas silver reactors were recently regenerated and mercuric nitrate is routinely added to the dissolver solution in the head end tanks to suppress iodine release from the vessel vent system, the radio-iodine stack emissions averaged 7.3 curies per week (8.6 maximum) during the month. Although the Purex goal of six curies per week (based on Purex processing sixty percent of the total production) was exceeded, the iodine control was considered good because the majority of the uranium dissolved ranged between 81 and 85 days "cooled", and Purex processed greater than eighty percent of the total production.

On February 13 a violent chemical reaction occurred inside the A-Cell silver reactor while the second cut was being transferred from the dissolver. The reactor and several jumpers were damaged beyond repair. It has been hypothesized that a rapid decomposition of silver-ammonia compounds formed either by the ammonium hydroxide flushing of the reactor or during coating removal caused the damage. An investigation of the incident and recommendations aimed at the prevention of future reactions were published in the document, "Investigation Report - Purex Plant Silver Reactor Incident" by O. C. Schroeder, Feb. 27, 1958, (confidential-undocumented). The recommendations included the following:

- (a) Eliminate the use of ammonium hydroxide for flushing of silver reactors.
- (b) Maintain a constant off-gas temperature to the reactors during both coating removal and dissolution.
- (c) Initiate a complete laboratory investigation program.
- (d) Install a bypass around the reactor for use during coating removal.

Solvent Extraction

Typical performance of the solvent extraction cycles which operated 100 percent of the month is tabulated below:

Cycle	Log Gamma Decontamination Factor, dF		Instantaneous Waste Loss, Percent	
	Uranium	Plutonium	Uranium	Plutonium
Precycle	3.7 ^(a)	3.7 ^(a)	(b)	0.07
Partition	2.3	1.8	(b)	0.13 (IBU = 0.05)
Final	1.0	2.8	0.003	0.04
Overall	7.0	8.3	-	0.24

- (a) Based on a calculated value of 2.5×10^8 uc/gal for HAF.
 (b) No uranium analysis.

The instantaneous plant production rate was reduced from CF=2.6 to CF=2.4 during the month. Decontamination performance of the plant was excellent, and all batches of plutonium and uranium products were well within specifications. Total rework of 2WW, which was collected in the boiling rework tank and cooled only to transfer into alternate HAF batches, has had no significant effect on either the HA Column or the overall decontamination. Adjustment of the HAF to 2.2 M HNO₃ (1.35 M uranium) appears to produce the best HA Column decontamination factor and provide optimum column stability. A reduction in the HAS nitric acid concentration from 2.0 M to 0.8 M increased the IAF gamma activity three- to four-fold and resulted in unstable HA Column operation. Although an increase to 1.0 M HNO₃ in the scrub re-established column stability, optimum decontamination was not restored until the acidity was returned to 2.0 M. Operation with the IOO at 40° C instead of 35° C produced no significant effect on the decontamination performance of the pre- and partition cycles.

The comparatively high (1.3 to 1.8) fission product gamma ratios of the final uranium product are being investigated in the laboratory. Analysis of the preliminary data indicates analytical method interference by radioiodine when gamma ratios are determined.

New all-time low plutonium and uranium waste losses (0.31 and 0.06 percent, respectively) for the three-cycle Purex Plant were established during February. Continuous 2WW rework assisted greatly in setting this record which was established despite column upsets in other sections of the plant. A near loss of plutonium partitioning occurred when purging a rotameter resulted in excessive sodium nitrite to the IAF tank. Temporary flowsheet adjustments of increased ferrous sulfamate in the IBX (from 0.03 M to 0.05 M) and the 2IF (from 0.014 M to 0.028 M) limited the peak IBU loss to 0.5 percent and successfully maintained the plutonium content of the uranium below specifications.

A temporary high plutonium loss to the 2BW was experienced when the 2B Column L/V was reduced stepwise from 0.61 to 0.33 to permit 100 percent processing of the 2BP in the prototype ion exchange unit (see Plutonium Concentration). Although the sulfate ion concentration was increased from 0.003 M to 0.02 M at the time the L/V reduction occurred, a further increase to 0.045 M accompanied by a nitric acid reduction in the 2BX from 0.15 M to 0.10 M was required to restore the normal (0.02 percent) 2EW losses. As additional insurance against further 2BW loss, the 2B Column L/V was raised to 0.37 by pinching back on the IBX flow and reducing the 2A Column flows. The solvent carbonate wash containing the plutonium from the 2BW was segregated and held for rework.

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DECLASSIFIEDPlutonium Concentration

During the first planned shutdown of the Ion Exchange Facility, the following modifications were made on the prototype plutonium anion exchange equipment: (a) rerouted the XAW stream to the IAF tank for recovery of plutonium, (b) revision of the XA Column sightglass to eliminate channeling along the glass, (c) modification of the slip water control from a probe to a timer for better segregation of slip water and XCP, and (d) installation of steam traps on the XCP Concentrator and XAF heater.

At startup 35 percent of the plant production was processed in the unit; this was increased stepwise to 100 percent on February 18. Performance of the unit has been excellent, and a resin check indicated no change in resin properties after the first sixteen days of operation. However, increasing the XCX nitric acid concentration from 0.6 M to 0.75 M to combat plutonium polymerization in the resin had no apparent effect on the two to three percent plutonium content of the XAW which is also insensitive to other process changes. Channeling studies in the laboratory are seeking a solution to this problem. Although low gamma activity analyses prevent accurate determination of gamma decontamination factors, data indicate >600 and >4 decontamination factors for sulfate and uranium, respectively.

Elimination of the nitric acid addition to the XCP prior to concentration decreased the final product nitric acid concentration from 7 M to 3 - 4 M at 200 grams per liter plutonium. A plutonium de-entrainment factor of 4×10^4 has been measured across the unpacked XCP Concentrator de-entrainment section.

When the entire plant production was routed through the anion exchange unit, L-Cell plutonium stripping and concentration equipment was shut down, flushed, repaired (leaks), and held in standby condition.

Solvent Treatment

Optimum performance of the No. 1 Solvent Treatment system was hampered by inadequate centrifuge cleanouts and buildup of MnO_2 in the batch-wash tank, EK-01. Both conditions contributed to the buildup of solids in the turbomixer tank, TK-G7; the former by carryover of solids, the latter by jet transfer of MnO_2 whenever the organic bypassed the IO Column to permit unplugging of the IOF pump suction. Overall performance improved after the turbomixer tank was emptied and flushed. Despite the difficulties experienced, the solvent quality remained good. Although a satisfactory solution to the problem of iodine interference in the fission product gamma activity determination has not been found, an inline gamma monitor has been installed on the IOO tank to assist in the evaluation of G-Cell process changes.

Solvent of the No. 2 Solvent Treatment System remained in excellent condition as determined by gamma and plutonium retention analyses. High plutonium losses in the 2BW resulted in 7000 gallons of carbonate wash solution, containing about 250 units of plutonium, being segregated for rework. Overall losses from both solvent systems amounted to a normal 0.3 percent of the solvent throughput.

DECLASSIFIEDWaste Treatment and Acid Recovery

A reduction in the HAF nitric acid concentration from 2.5 M to 2.2 M stabilized operation of the waste handling equipment; however, occasional erratic operation has still caused periodic higher-than-normal absorber overheads and IWW flows. Waste volumes sent to the underground storage tank 241-A-101 averaged 118, 275, 18 and 92 gallons per ton of uranium for neutralized IWW, solvent washes, centrifuge cleanouts and cell drainage, respectively. A coating waste volume of 215 gallons per ton of uranium continued to reflect the elimination of a flush from the coating removal procedure. Overall waste losses for the month were at a record low averaging 0.31 percent for plutonium and 0.06 percent for uranium. These all-time-low losses not only reflect good process control but also a satisfactory experience with IWW and 2WW waste rework. Coating waste losses for plutonium and uranium amounted to 11 and 18 percent, respectively, of the overall losses.

An extensive rework program conducted during the month recovered an estimated 540 units of plutonium and 620 pounds of uranium from IWW and 2WW. Continuous 2WW rework without an excessive HCW plutonium loss proved feasible when the 2WW was collected in a boiling tank which is cooled only to transfer 2WW into alternate batches of HAF.

Self-concentration in tanks 241-A-101 and 103 continues at boil-off rates of 16 and 4 gallons per minute, respectively. Although TK-101 contains only 69 percent of the terminal 10 M sodium ion concentration at the hydrostatic head limit, the routing of neutralized IWW for storage was changed to tank 241-A-102 because of the high specific heat and boil-off rate in TK-101. During the month the bottom bulb temperature of TK-101 increased to 306° F before dilution water reduced the sodium ion concentration from a calculated 8.5 to 7.3 M, and the temperature leveled off at 250° F (see Fig 1). The temperature of 240° F as measured by a new profile device installed in TK-101 correlates well with the bulb temperature. A radiation profile taken in TK-101 on February 18 gave no indication of a sludge layer in the tank.

After the sodium ion concentration in TK-103 was diluted to a calculated value of 8.3 M (laboratory analysis indicates ~ 9.3 M), the bottom temperature dropped from 500° F to 270° F (thermocouple) and 228° F (bulb) (see Fig. 2). Since the higher thermocouple temperatures occurred at a calculated sodium ion concentration of 8.8 M, 8.0 M Na⁺ concentration is currently considered to be the initial end-point for storage of waste in underground tanks. Additional waste may be added at a later date after some of the short-lived fission products have decayed.

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REDOX TECHNOLOGY OPERATION**DECLASSIFIED**Acid Recovery and Iodine Control

The acid recovery efficiency of the acid absorber improved to approximately 80 percent (up 3 percent from last month) while recovering nitric acid at a concentration of 51 percent. This improvement was evident despite the highly irregular dissolving schedule. The increased efficiency was primarily the result of (a) providing additional scrubbing at low liquid flow rates, made possible by last month's plugging of the weep holes in the top plate, and (b) better specific gravity control, made possible by last month's installation of a smaller trim in the absorber water supply valve as well as by the above-mentioned plugging of weep holes.

The iodine-131 emission to the stack averaged 0.45 curie per day (0.14 percent of the average available), with the exception of a three-day period when the total emission was 5.2 curies due to by-passing the iodine back-up facility temporarily.

Analyses of the radioiodine content in the caustic scrubber off-gases from the back-up facility during a four-day sampling period showed that less than 0.001 curie per day was passing through the scrubber. These data indicate that the vessel vent system and/or leakage through the back-up iodine facility by-pass valves are the only paths of escape of radioiodine to the stack. An intensive sampling campaign to determine the radioiodine contribution by the individual gaseous effluent streams from the plant to the total emissions to the atmosphere has been started.

Poor efficiency of the silver reactors throughout most of the month resulted in from 10 to as much as 200 curies per day of iodine-131 removed in the recovered acid, giving an absorber iodine-removal efficiency of 99.9 to 99.99⁺ percent.

A temporary failure in a silver reactor heater controller resulted in reactor inlet and outlet temperatures of 900 and 540°F, respectively, for a few minutes. Subsequent iodine-removal efficiency was poor (approximately 95 percent) but not significantly worse than before the incident.

Dissolving and Feed Preparation

In addition to the dissolving of normal production fuels, three charges of 172 pounds each of irradiated, slightly enriched (0.94 percent uranium-235) were dissolved, blended with regular production, and processed normally. These special, small charges are the first of a series of seven, being dissolved, sampled, and analyzed individually at the request of the Irradiations Processing Department, as part of their program to obtain more complete reactor conversion data for different types of fuel elements. This marks the first processing of enriched uranium in the Redox Plant.

Extraction

Backcycle of approximately 10 percent of the LAW stream to the LAFS Concentrator

was initiated during the month. No significant differences in 1A Column performance resulted from the revision. This extended re-use of salt permitted a reduction of salt usage in the 2DS stream equivalent to 6 flows of 2.5 M $\text{Al}(\text{NO}_3)_3$, with resultant savings in chemicals and waste storage of 21 dollars per ton of uranium. The increased uranium loss from the 2D Column (recycled to the 1AFS stream) as a result of the reduced $\text{Al}(\text{NO}_3)_3$ concentration in the 2DW stream is absorbed as recycle. Following is a summary of the 2D flowsheet and (recycled) waste loss data:

Flow Ratios				Waste "Losses", %	Concentration of Major Constituents		
2DF*	2DS	2DA	2DX				
79.4	33	15	230	0.25	2DF	2.6 M	$\text{UO}_2(\text{NO}_3)_2$
84.2	27	15	230	6.5	2DS	2.5 M	$\text{Al}(\text{NO}_3)_3$
82.1	27	15	280	3.7	2DA	water	
					2DX	"neutral" hexone	

* Includes increased flow due to recycle (78 flows with no recycle).

No tendency for plutonium deposition in the HA (HS) Column was observed during the month, primarily due to (a) the use of a minimum HAX (HSX) flow rate of 450 flow ratio at 60 percent of phase II instantaneous rate (each column), and (b) the maximum allowable plutonium concentration in the HAP (HSP) of 0.3 gram per gallon. As an additional aid to prevention of plutonium deposition, the acidity in the HA Column scrub section was maintained somewhat higher than normal by the continued use of neutral instead of acid-deficient HAS solution. A test using 20 flows of 1.8 M $\text{Al}(\text{NO}_3)_3$ as HAS solution was performed to determine the effect on HAP stream acidity. No detectable increase in acidity resulted. Moreover, since a decrease in HA Column decontamination performance resulted, the use of the normal 25 flows of 1.3 M $\text{Al}(\text{NO}_3)_3$ as HAS solution was resumed.

Decontamination

The unusual irregularity of operation due to numerous equipment failures during the month (cf. Equipment Experience, below) reduced decontamination of both the uranium and plutonium products. However, despite the operational difficulties, all uranium (after ozonation and silica gel treatment) and plutonium products met fission product activity specifications. Tail-end treatment of the uranium product was not necessary to meet activity specifications during the one period of "normal" operation.

The tested use of 20 flows of 1.8 M $\text{Al}(\text{NO}_3)_3$ instead of 25 flows of 1.3 M $\text{Al}(\text{NO}_3)_3$ in the HAS stream resulted in an additional decrease in HA Column decontamination. A quantitative evaluation of the effect was not attempted because of the numerous operational interferences, but a decrease in decontamination of approximately 50 percent was indicated.

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Lowering the HA, HS and LA Column interfaces from their normal positions about four feet below the top of the packing to about ten feet below the top of the packing, combined with increasing the acid-deficiency of the HAIS stream from -0.1 M to -0.2 M , appeared to improve over-all decontamination by about a factor of two.

The in-line 2BP gamma monitor continued to function satisfactorily during the month. Background activity in the glass-lined cell which replaced the original fluorothene cell did not increase significantly with continued use even though higher-than-normal gamma activity was present in the 2BP stream the majority of the time.

Product Recovery

Over-all product recoveries were 99.78 and 99.42 percent for uranium and plutonium, respectively. Nearly 40 percent of the total plutonium loss for the period occurred during the processing of one feed batch in which the plutonium was not adequately oxidized. This batch had been given the standard permanganate feed treatment several days prior to processing. This was followed by boiling after adjustment to 0.1 M dichromate ion just before processing. The HAW loss for this batch was approximately six percent. Normal HAW losses during the period averaged about 0.1 percent.

Equipment Experience

The HAIS backcycle pump has continued to operate satisfactorily during the month, presumably as a result of the continued recycle of uranium to the HAIS Concentrator. Thus far, the pump has had 1135 service hours, compared with an average of 405 service hours for the nine pumps immediately preceding it in that position.

The LAFS pump has operated a total of 2700 service hours to date, compared to an average of 670 hours for the ten pumps immediately preceding it in that position. This is the first LAFS pump with the open section above the liquid throttle bushing inside the tank; this permits all leakage past the bushing to be retained within the tank.

The new feed solution centrifuge failed during the month presumably due to a seized bearing after only 492 hours of operation. This was the first of the six failed centrifuges to fail for this reason. Other rotating equipment failures were the agitator in the Metal Solution Sample Tank (after 4860 service hours), the agitator in the Centrifuge Slurry Receiver Tank (after 400 service hours), and the HAF pump (after 19,200 hours of service).

The Head-End Oxidizer coil failed due to corrosion after 2250 boiling hours of operation. Comparison of the service lives of this and the three previously-failed removable heat exchangers in this position shows that the service life is approximately proportional to the thickness of the stainless steel from which they are fabricated.

Testing of Head-End processing revisions to reduce oxidizer corrosion rates is being planned. This testing will include continued reduction in acidity during

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part of the boiling period, reduction of boiling time in the presence of dichromate ion, and reduction of permanganate ion concentration.

The third Plutonium Concentrator recirculation loop failed due to corrosion at the weld connecting the feed inlet jumper to the reboiler loop after 250 days of operation. The location of failure and service life are the same as for the two previous failures. It is postulated that the failure is due to the action of a concentration cell at the point where the two streams of different composition meet.

Both (bayonet-type) tube bundles in the Organic Still reboiler indicated failure, presumably due to corrosion, after 880 days of total operation. These are the first heat exchangers in this service to fail.

Waste Storage

The calculated sodium nitrate concentration in the 107-SX Tank reached a maximum of approximately 11.9 M. At this point, return of condensate to the tank was started at a rate exceeding the self-concentration rate. Despite this, the sludge temperature which had previously been rising steadily, continued to rise at a rate of about 7°F per day. An increase of air to each of the three air-lift circulators from 15 cfm to 25 cfm and a subsequent further increase to 45 cfm had no immediate effect. However, the temperature reached a peak of 413°F and started declining when the tank contents had been diluted to a calculated sodium nitrate concentration of about 10.2 M. With the total volume of the tank contents maintained essentially constant, the sludge temperature dropped by about 100°F during the following ten days then remained nearly constant. Near month-end the air supply to the circulators was reduced to 10 cfm each and the calculated sodium nitrate concentration in the tank has been maintained at approximately 10.7 M by condensate return to the tank. The temperature has remained essentially unchanged. It is planned to define the maximum concentration at which the sludge temperature can be controlled and maintained with and without the use of circulators, by permitting gradual re-concentration in the 107-SX Tank.

At month-end, condensate is being returned to the 108-SX Tank to maintain the calculated sodium nitrate concentration at about 10.8 M. This is being done temporarily until better definition of the sludge temperature problem is available from the tests in the 107-SX Tank.

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FINISHED PRODUCTS TECHNOLOGY OPERATION**DECLASSIFIED**URANIUM CONVERSION OPERATIONProcess Performance

One carload shipment failed to meet the existing particle size specifications.

One carload of UO_3 was produced from feed containing about 1.34% ammonia and 1100 parts sulfur per million parts uranium. No operating difficulties were experienced. The hydrogen content of the off-gas was negligible, 0.02% by volume. Customer evaluation of this powder has not been completed.

Nine-hundred-thirty-five pounds of nitric acid per ton of uranium processed (89% of theoretical) were recovered at an average concentration of 49%.

Extension of the water seal leg on the concentrator seal pot has eliminated the frequent operator attention required during the past and has allowed greater flexibility in concentrator operation.

Continuous Calciners

Five calciner units are now equipped with strengthened shear pin agitator assemblies and reinforced feed injector pipes. Modification of the 100% UNH feed lot boxes has been completed on all six units. Failure of three calciner thermowells was experienced during the month, but no agitator damage resulted.

METAL FINISHING OPERATIONRecuplex

Fifty-four runs, consisting of crucibles, fragments, and powders, were processed through the SC Hood. Slurry losses to crib averaged 0.14% of the recovered Pu.

The SE column processed 1370 liters per day of feed at an operating efficiency of 72% for an average instantaneous rate of 1710 liters per day. Waste losses averaged 0.0066 g/L or 0.52% of the Pu processed.

The new design H-1 column pulser bellows failed after 4.5 months of operation. This is the longest period of service experienced to date for an H-1 bellows.

A neutron monitor installed inside the slurry receiver tank (D-11) was satisfactorily calibrated with plutonium solutions and solids. The calibration curve was in excellent agreement with the total quantity of plutonium added.

DECLASSIFIEDTask I - II

Four-hundred-twenty-five runs were processed with an average supernate recycle of 1.4% of the feed.

Two drum filter cloth changes were made during the month. The life expectancy of the Dynel cloth appears to range between 230 - 250 runs.

The fluorinator tube liner which failed during January was inspected for possible causes for failure. Two cracks which penetrated the liner were observed about midway through the tube length and on the bottom of the tube. The cracks travelled perpendicular to the tube axis and were about one inch and two inches in length. It is postulated that blistering of the liner and subsequent faulting from expansion and contraction caused the failure.

Task III

Processing of Purex anion exchange plutonium nitrate product from three-cycle solvent extraction has resulted in an improvement in button purity. The metallic impurities have been reduced by a factor of approximately 2 for nickel, 3 for iron, and 6 for chromium. The button radiation readings from fission products have been reduced by approximately 50%, assuming that 80 mr/hr come from the plutonium.

<u>Purex Product</u>	Average Metallic Impurities ppmp Plutonium			Average Button Readings <u>mr/hr</u>	Radiation From Fission Products <u>mr/hr</u>
	<u>Fe</u>	<u>Cr</u>	<u>Ni</u>		
L-Cell	619	74	97	142	62
Anion Exchange	206	12	54	111	31

PROCESS CHEMISTRY OPERATIONPROCESS ASSISTANCE**DECLASSIFIED**Purex Process Studies

In laboratory studies of the production of uranium(IV) by electrolytic reduction of uranyl nitrate-nitric acid-hydrazine solutions, current efficiencies as high as 65 per cent have been obtained with either platinum or stainless steel electrodes and either with or without a semi-permeable membrane separating the electrodes. Relatively high current efficiencies were obtained with uranium concentrations between 0.25 and 1.0 M and nitric acid concentrations between 0.4 and 1.0 M, the maximum occurring at 0.5 M UNH and 0.5 M HNO₃. The stainless steel electrodes appeared satisfactory, with the exception that evidence of corrosion of the cathode was noted.

Redox Process Studies

Indications that deposition of plutonium in the co-decontamination and partition cycles of the Redox Plant have occurred to the greatest extent in the organic overflow lines have been followed up with a laboratory program to study the stability of hexone solutions of plutonium and uranium. Organic phase samples simulating the Redox HAP stream (0.05 to 0.1 g/l plutonium and 0.4 to 0.9 M UNH in hexone) were allowed to stand in the dark, at 55 C, for several hours, and changes in the plutonium content were measured. Solutions which had previously been contacted with an acid deficient aqueous phase were found to permit marked deposition of the plutonium, while hexone solutions containing as little as 0.01 M HNO₃ were stable. Adjustment of the HAA (scrub) stream acidity to 0.2 M HNO₃ has been suggested as a means of preventing deposition in the plant. In glass-ware, the reaction rate is highly surface-dependent, although if the reaction runs long enough, a discrete precipitate forms.

The prospective use of boron (as boric acid) in the Redox dissolvers as a neutron absorber, to permit the processing of higher enrichment uranium, has initiated laboratory studies of the behavior of boric acid in the Redox process. To date, these studies have shown that up to 2 g/l boron as boric acid will remain in solution 1) in 60% HNO₃, 43% NaNO₃, and 50% NaOH at temperatures as low as 20 C; 2) during the coating removal step; and 3) during dissolution. Statements in the literature that boric acid will volatilize from hot acid solutions were checked, and it was found that loss of boron through volatilization would be negligible (less than one per cent during a dissolution). Preliminary studies of the behavior of boric acid in the Redox solvent extraction system have shown that it strongly favors the aqueous phase and should remain with the first cycle waste.

ANALYTICAL ASSISTANCEAnalysis of Nitrogen Oxides in Purex Dissolver Off-gas

Further laboratory tests were carried out to establish the efficiency of the

present analytical system (silica gel adsorption of the NO_2 followed by sulfuric acid-peroxide absorption of the NO) used to sample and separate NO_2 and NO . Silica gel was found to adsorb $\sim 99\%$ of the NO_2 passed through the bed and less than $\sim 1\%$ of the NO . Visual tests indicated that only a small fraction ($< 2\%$) of the NO is oxidized by oxygen during passage through the silica gel.

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QUALITY CONTROL AND STANDARDS

During the month the Quality Control program for the Chemical Processing Department analytical laboratories was maintained as usual, and 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 OPERATION**DECLASSIFIED**Plutonium Trichloride Conversion Program

One hundred and sixty grams of plutonium trichloride have been prepared using carbon tetrachloride vapor at 450 C. The quality of this product will be determined by analysis and by small-scale bomb reductions. Hydration rates are being studied in normal and in controlled atmospheres. The rate of hydration decreases with powder depth. At 3/8", this rate in laboratory air is about 0.1 percent weight increase per hour. Hydration ends with the hexa-hydrate. Present indications are that handling operations can be carried out in air of reduced humidity if the powder is at once put in containers with close-fitting lids.

Recuplex Extraction Column Emulsification and Stripping Column Precipitation

An extensive investigation was made of Recuplex extraction column emulsification, and precipitation in the stripping column. The extraction column troubles are related to large amounts of dispersed silica and TBP degradation products in the feed. The presence of silica in abnormal concentration is due to the high fluoride concentration in the feed, which hinders good coagulation and filtration. The presence of TBP degradation products was traced to the inadvertent storage of feed in contact with solvent.

The apparent presence of plutonium fluoride in the stripping column was related to a high fluoride concentration in the feed, and to increased fluoride extraction by the TBP degradation products. Similar precipitation was reproduced experimentally with a DBBP containing solvent. This observation suggests a study on conditions affecting the extraction of fluoride into TBP and similar solvents.

In a forthcoming letter, recommendations are made to increase the Al^{+++}/F^- ratio, to increase the flocculation time, and to prevent contact of feeds with solvent.

Can Dissolution For Recuplex

Untinned steel cans are readily dissolved in the 8 M HNO_3 - 0.3 M HF dissolver solution, leaving no residue except for seam sealing compound and lid gasket material. However, these materials dissolve after about 30 minutes of boiling.

A cold synthetic CAF solution was made up containing dissolved can, seal compound, and gasket material at much higher concentrations than would be encountered in Recuplex. This was contacted with simulated Recuplex solvent and the disengaging time found to be 15 - 20 seconds, an acceptable period.

Samples of this solution were then spiked with plutonium to 20 and 0.1 g/l and values of E_2 measured. For unsalted feed, the values are 0.6 and 0.7 for high and low plutonium concentration, respectively; with salted feed the values are 9.8 and 9.0. These agree quite well with accepted E_2 values.

DECLASSIFIEDPurification By Polymerization

At low acidities, insoluble plutonium polymer forms in plutonium nitrate solutions. Polymer formation was tested as a purification step by spiking a plutonium nitrate solution with 10,000 ppm each of Al, Cr, Cu, Fe, Mg, and Ni, and precipitating the plutonium as the polymer. After a thorough washing with water, a portion of the polymer was redissolved with nitric acid and submitted for spectrographic analysis. The decontamination factors were: Al 3300, Cr 40, Cu 1000, Fe 5, Mg 100, and Ni ca 100. Partial decontamination from calcium was obtained. Lower initial impurity levels resulted in considerably lower decontamination factors as expected.

Part of the polymer which appeared crystalline when dried was submitted to Plutonium Metallurgy for x-ray analysis. The resulting pattern corresponded quite closely to the dioxide, except that the entire pattern was greatly broadened and the peaks were very low, indicating the tendency toward an amorphous or extremely fine crystalline material.

Purification of Plutonium for Radiation Measurements

A plutonium metal button was received for special purification as a part of the radiation studies underway in the 234-5 Bldg. Special effort was made to bring all metallic impurities and particularly the U²³⁷ and americium to an extremely low level. This was accomplished by making four peroxide strikes and adding a holdback carrier for the U²³⁷ before the fluoride precipitation. The metal was available for the radiation study within 24 hours after the fluoride precipitation occurred. The fluoride was predried and had radiation dose rates taken within 16 hours of the precipitate formation. Total metallic impurities were ca 100 ppm before the fluoride precipitation.

Shielding for High Exposure Plutonium Processing

The shielding problem in processing high level plutonium is more severe than has been indicated previously. Early estimates have not given sufficient weight to the relatively small fraction of hard γ , which is more penetrating than was thought originally, with the result that the early shielding estimates are low. In a typical case, the dose rate through 1/4 inch of lead had been calculated as 11 mr/hr, whereas the revised calculations give a dose rate of 52 mr/hr. Along with this, preliminary results of a current radiation study indicate that surface dose rates from plutonium nitrate, oxalate, oxide, etc., are not significantly lower than that from the metal, as had been thought prior to the study.

SECRET

ORGANIZATION AND PERSONNEL

DECLASSIFIEDPersonnel

On February 15, 1958 Tyler S. Soine was placed on the exempt payroll from a Tech. Grad.

Trips

V. R. Cooper, Manager Research and Engineering Operation visited Frank Kerze, Jr. of the Atomic Energy Commission, Division of Reactor Development, Washington, D.C. on February 3 and 4 to hold discussions on the Geneva International Conference On Peaceful Uses of Atomic Energy.

B. F. Judson of the Advance Process Development Operation visited M. Michaelis of the A.D. Little Co., Boston, Massachusetts on February 4 and 5 to hold technical consultation on Market Survey. Mr. Judson also visited A. Perge and A. F. Miller of the Atomic Energy Commission, Division of Production, Washington, D.C. on February 6 and 7 to discuss fission products Market Survey.

W. C. Schmidt of the Purex Technology Operation visited W. F. Rehnke of the Olympia Welding Company, Olympia, Washington on February 20 to supervise packing of three special filters.

A. E. Smith of the Finished Products Technology Operation visited John Anderson, G. Tenney and M. F. Roy of the Los Alamos Scientific Lab. on January 27; Don Johnstone and P. Ager of the Atomic Energy Commission's Albuquerque Operations Office on January 29; P. H. Wormell of the Bendix Corp., Kansas City, Missouri on January 30; Henry Boppel of the Sheffield Corp., Dayton, Ohio on January 31; E. W. Bailey of the Union Carbide Nuclear Co., Oak Ridge, Tennessee on February 3; J. W. Wilkie of the Pratt & Whitney Company, W. Hartford, Conn on February 4; A. E. Wiles of the General Electric Company, Manufacturing Services Department, Schenectady, New York on February 5, 1958 for consultation on fabrication and inspection techniques to determine what technology exists within the industry.

Visitors

Wayne E. Fisher (ALOO) and James C. Campbell (RFAO) discussed the weapons duality program with members of the Finished Products Technology Operation on February 13.

Alfred K. Huse of the Atomic Energy Commission, BNL Area Office, Upton, Long Island, New York visited RE Tomlinson and WG Browne on February 18 to discuss remote maintenance techniques.

Inventions

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 th during the month of February, 1958 except as listed below. Such persons further advise that, for the period therein covered by this report, notebook records, if any, kept in the course of their work have been examined for possible inventions or discoveries.

INVENTORTITLE

J. S. Buckingham

The Separation of Plutonium From Uranium
With Electrolytically Reduced Uranium.

C. W. Pollock

Quaternary Ammonium Phospho Molybdates

V. R. Cooper, Manager
Research and Engineering Operation**DECLASSIFIED**

EMPLOYEE RELATIONS OPERATION
MONTHLY REPORT - FEBRUARY 1958

UNCLASSIFIED

I. RESPONSIBILITY

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

II. ACHIEVEMENT

FIRE PROTECTION OPERATION

A. Fire Responses

1. A ballast burned out in a fluorescent light fixture in the 222-S building and filled the room with smoke. Response was made and investigation revealed that the ballast was the source of smoke.

2. A propane tank was unloaded at the 2101-M building to be used as an air tank. A valve was opened on the tank and some of the odorant ran out on the ground, and was picked up by the ventilation system and spread throughout the building. Building was evacuated and Fire Protection personnel stood by until the building was declared safe to re-enter.

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

During the month 395 fire extinguishers were inspected, 5 installed or relocated, 3 delivered to new location, 12 seal broken and not reported, and 325 were weighed. There were 36 gas masks inspected, and 36 serviced, and 20 hand lines were inspected. The chemox masks in 200 West area were placed in plastic bags and canisters added where needed.

C. Training of Personnel in other Operations

Four classes were given on Artificial Respiration by Captain Perkins to a total of nine men. Evacuation Bus driver instructions were given to one man. A talk on fire fighting was given to patrol.

D. Training for Fire Protection Personnel

One fireman attended projectionist training school and one officer attended Part 1 of "Management Principles and Skills", training at 224-B Building.

E. New Fire Stations

Meetings were held during the month in regard to the building of new fire stations in the future.

COMMUNICATION**UNCLASSIFIED**A. Statistics

GE NEWS items	9
General Manager's meeting with exempt employees	1
Management News Bulletins	4
Employee Location Records mailed out	26

B. Comments on Statistics

Nine items were carried in the GE NEWS during the month. These included a feature story, pictures and cutlines about CPD's work simplification courses; a service pin award story; a suggestion award picture and cutline; a picture and cutline of a CPD author used in a feature on the AEC's civilian application program; a picture, story and cutline of a CPD employee's participation in a civic activity; a picture and story of a CPD engineer for the National Engineering Week Feature; a picture and cutline of CPD's plastics work; an attendance award story; and a "can you tell me" answer.

Four Management News Bulletins were prepared and distributed during the month.

The General Manager was furnished with a list of questions submitted for discussion by the men who attended the Management Information Meeting on February 27.

C. Other Employee Communication Activities

Questions which are received on Round Table Evaluation Forms are being sent to the appropriate authority within the Department for answer. During the month four letters were sent out.

A craft training booklet to be issued by Power and General Maintenance Operation was reviewed and edited.

Arrangements are being made to have a letterhead produced and printed for the CPD Personnel Development and Training Course bulletin.

The artwork for the CPD Headliner has been sent to Printing for pre-printing on duplimat masters.

Some additional information was provided the Manager - Employee Relations in connection with an alternate for the annual report to employees meeting.

Letters to some 130 office employees signed by the General Manager were typed and prepared for distribution. The letter discussed the HAMTC's campaign to unionize Hanford office employees.

An answer prepared for a rumor board question was reviewed at the request of the Manager - Purex.

A "can you tell me" question on disabling injuries was received from the Manager - Health and Safety, edited and forwarded to the GE NEWS editor.

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C. Other Employee Communication Activities Cont'd.

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Two issues of the Public and Employee Relations Service News were distributed to all CPD Level 3 and Level 4 managers and individual contributors.

Some information was provided Employee Communication, R & U, for inclusion in a report they are preparing on EC programs for 1958, 1959, and 1960.

Work continued on preparation of the Management Conference on Communication.

D. Public Communication

For a number of years the editors of INDUSTRIAL AND ENGINEERING CHEMISTRY have indicated an interest in an article about Hanford's chemical processing activities. The Manager, FEO has been contacted about the possibility of providing an author or authors to work with the staff of INDUSTRIAL AND ENGINEERING CHEMISTRY in preparation of a comprehensive article about the chemical separations process.

Six papers were approved and forwarded to Public Communication, R & U, for final approval during the month.

A news story concerning the Purex explosion, prepared by Press Relations, was reviewed, commented upon, and approved from a Communication standpoint, prior to release to the local papers.

Arrangements were made for the Manager - Press Relations, R & U, to give a short presentation at the General Manager's staff meeting on Thursday, February 20.

Arrangements are being made for two CPD men to participate on a panel of three to be interviewed by Pat Owens of the COLUMBIA BASIN NEWS. Subject for the interview will be the handling of waste materials.

A signed article by the Manager - Health and Safety, was reviewed, edited, and submitted to the NATIONAL SAFETY NEWS during the month.

An abstract of a signed article by two FEO engineers has been submitted to R & U for approval. The article will deal with economics in the spent fuel reprocessing business, and will eventually be submitted to NUCLEONICS for possible publication.

Most CPD Operations have responded to the Communication request for speakers to participate in the HAPO Speakers Bureau during 1958. Copies of the HAPO "canned" talks have been reproduced and are being furnished to the various operations. Arrangements were made during the month to provide a speaker from CPD for a Sunnyside PTA meeting in March.

PERSONNEL DEVELOPMENT AND PLACEMENT

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A. Employment

Exempt Non-exempt Total

Additions

New Hires	2	3	5
Reactivates	0	0	0
Re-Hires	0	1	1
Re-Engages	0	0	0
Transfers from other components	0	0	0
Changes from exempt to non-exempt	2	2	4
	0	0	0

	2	3	5
	0	0	0
	0	1	1
	0	0	0
	0	0	0
	2	2	4
	0	0	0

Removals

ROF	2	25	27
Deceased	0	6	6
Illness	0	0	0
Leave of Absence	0	5	5
Transfer to other components	0	0	0
Resigned	0	9	9
Changes from exempt to non-exempt	2	5	7
	0	0	0

	2	25	27
	0	6	6
	0	0	0
	0	5	5
	0	0	0
	0	9	9
	2	5	7
	0	0	0

Requisitions

Number on Hand 2/1/58	4
Number Received	5
Number Filled	5
Number on Hand 2/28/58	4

4
5
5
4

Request for Transfer (exempt)

Number on Hand 2/1/58	21
Number Received	0
Number Transferred	0
Number Closed Out	0
Number on Hand 2/28/58	21

21
0
0
0
21

Applications for Employment (exempt)

Applications received during February	0
Hired	0
Closed Out	0
Invited for Interviews	0
Applications on Hand 2/28/58	0

0
0
0
0
0

Open Requisitions

1

Service Pins

A total of 23 pins were issued as follows:

15 Yrs. service	0 Male	0 Female
10 Yrs. service	11 Male	6 Female
5 Yrs. service	5 Male	1 Female

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HW-55215-

DEL

Attendance Awards - Pass folders were issued to 24 persons for perfect attendance.

During February a total of 55 inquiries regarding CPD personnel were answered, consisting of letters of inquiry regarding credit and letters regarding housing loans.

During February nine Separation Utility Operators were declared excess and scheduled for ROF effective February 28. Of this number, three were placed in other jobs at HAPO; two as Engineering Assistants HIO, and one as a Stock & Tool Attendant with FPD. The remaining six were ROF'd.

CPD declared six craft personnel as excess during February. Two were placed in openings in R. & U., two had sufficient seniority to exercise their bumping rights according to the HAMTC agreement, and two were scheduled for ROF to be effective February 28. Before the effective date of ROF, one ROF was withdrawn due to an opening occurring in IPD, the other person voluntarily terminated rather than to accept an ROF in order to seek employment elsewhere and to obtain his Pension money.

An offer was extended to Dr. Lloyd E. Brownell of the University of Michigan for employment with the Research and Engineering Operation under the provisions of the summer program for professors. Dr. Brownell accepted the offer and will join the department in June.

Status - Personnel Development Program for Non-exempt Employees

<u>Month</u>	<u>January</u>	<u>February</u>	<u>Total</u>
No. of appraisals scheduled	113	93	206
No. of appraisals delinquent as of 3/3/58	14	53	67

Military Service Records

Records indicate that CPD has a total of 128 employees who are subject to military training through Selective Service or Armed Forces Reserve Action.

	<u>Exempt</u>	<u>Non-exempt</u>
Ready Reserve	17	13
Standby Reserve	14	6
Deferments Requested		0
Deferments Granted		1
Deferment Requests Pending		2

B. Personnel Training and Development

Participation in Training Courses

Exempt	364
Non-exempt	268

G.E. Supervisory Selection Program - No. Completed	4
G.E. Supervisory Selection Program - Revaluation	2
Technical Graduates on Rotation	6
Employees counseled in self-development	2
Films Shown	16
OPGs Issued (One new, twelve revised)	13

The course, "Separations Process Fundamentals", started as scheduled on February 3, in the GESNE. Sixty percent of the 41 registrants are chemical operators and Separations Chief Operators. The rest are supervisors, engineering assistants, and similar classifications.

One hundred and eighty exempt and sixty non-exempt CPD personnel completed a special top-secret workshop training on Security. This program was sponsored by the AEC-GE Security Control components.

C. Office Services

Duplicating

Total Copies Produced	148,992
Verifax Copies Produced	2,678
Embosograf Signs Made	75
Ozomatic Copies Produced	13,595

Mail

Total Pieces of Mail Handled	58,045
Registered Deliveries	354
Library Mail, Pounds	528

Addressograph

Instrument Charts Imprinted	8,712
Bulletins, O.P.G.'s, etc.	6,918

The Construction Engineering Operation requested that Office Services operating mail rooms in the various components at HAPC consider whether the delivery of unclassified prints through the regular mail service could be provided. Accordingly, on February 17, Office Services agreed to handle these prints subject to them being properly addressed and packaged to facilitate delivery without damage. One exception has been made in that the regular mail personnel will not handle rolled tracings, which has been agreed to by C.E.O. and proper instructions have been issued to the members of that operation.

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HEALTH AND SAFETY OPERATION

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<u>Chemical Processing Department</u>	<u>February</u>	<u>January</u>	<u>Year to Date</u>
Disabling Injuries	0	0	0
Serious Accidents	0	0	0
Medical Treatment Injuries	52	52	104
Overexposure Incidents	0	0	0
Potential Overexposure Incidents	0	0	0
Radiation Occurrences	25	22	47
Fires	0	1	1
Security Violations	0	0	0

Programs

A three-fold flier on Traffic Safety was developed and distributed for safety meeting information. Recommendations were made to improve traffic control on the plant highways. Arrangements were completed for a Vehicle Safety Check Lane as follow-up to the First Quarter Safety Program.

CPD Safety Highlights of 1957, an annual report in booklet form, was developed for distribution to all CPD employees.

Nine safety messages were posted on the marquee boards; Engineers Week was featured.

An application for the National Safety Council Award of Honor was approved. In qualifying for this award, CPD accumulated three million man hours without a Disabling Injury, from March 9, 1957 to February 7, 1958.

A committee was formed and gifts were selected for the President's Award.

Training and Education

The third series of four talks on Safety Philosophy and Accident Prevention was completed. Seventeen CPD people participated.

Fourteen operators, representing Purex, Redox, and Finished Products, completed the Fork Lift Training Program.

Four talks on CPD radiation protection goals and achievements were presented. These were a continuation of the Refresher Training Program for Radiation Monitoring monitors and journeymen.

Advise and Counsel

Redox - Additional fire protection for duct area and storage rooms - 222-S.
Amount of lighting needed and philosophy of defense as to "Black outs" - 202-S.
Safety meeting material for Waste Handling and Decontamination Operation.

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Purex - Argon Cylinder, flow regulator connection No. 580.
Checked No. 6 pump pit for oxygen efficiency.
Tying into breathing air piping system for laboratory air supply service.
Tygon tubing for fresh air mask service.
Convert oxygen manifold system for use with 10% Argon Methane - 202-A Lab.
Application of neoprene liquid coating to interior of Soda Nitrate make-up tank.
Scaffolding for working on telephone cable in the canyon crane gallery.

Finished Products - Welding on E-4 ventilation system - 234-5.
Checked pressurized equipment for cleaning hoods with acid solution - 234-5 Analytical Lab.
X-30 tank operation - ladder and filter clearance from trolley track.
Operation acceptance test of sprinkler system - room 304, 234-5.
Amount of lighting needed and philosophy of defense as to "Black-outs" - 224-II.
Safety meeting material for several meetings.

P & GM - Testing and inspection of sprinkler systems.
Insulation of Argon welding cylinders and installation of No. 580 connections between flow regulator and cylinder.
Additional water supply and permanent fire protection of 275-EA warehouse and main badgehouses in 200-East and 200-West.

Facilities Engineering - Reviewed Project CA-750 proposed office annex - 234-5.
Reviewed Project Proposal for permanent water mains and fire hydrants for 275-EA.
Reviewed Project CE-789 for study of 234-5 Building additional fire protection.
Safety meeting material for Project Operation.

Research & Engineering - CFD Evacuation Procedures and Principles review with Advance Process Development.
Information on fire properties of fiber glass plastic structural members for 234-5.

Employee Relations - Prepared proposed agenda for plutonium work restriction task force study.
Summarized employee exposure report package. Concurrence recommended.
Evacuation Procedure review for Fire Protection Operation.

HLO - Bioassay Information Request Cards returned. Consultation on results.
Consultation on content of AEC Radiological Physics training program for summer of 1958.

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R & U - Industrial Hygiene - Ventilation for 271-B Duplicating room.
Industrial Medical - Consultation of communications - unusual incidents.
Laundry Operation - Review of linen service proposed procedure.

Inspection, Investigation and Audit

Housekeeping inspection of 222-T and 224-T unoccupied spaces.

Welding operation on E-4 system - 234-5.

Inspection, barricade or railing for unloading dock - 202-S.

Inspection with AEC Washington and HOO representatives - 234-5 and 222-S.

Inspection of breathing air system - 224-U.

Inspection of sprinkler system - 234-5.

Sprinkler systems surveyed to determine procedure to be followed in flushing and testing - 272-E - 272-W - 277-W.

Investigated propane gas release - 2101 Building.

Audit - Research and Engineering in progress.

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Reports Issued

Accident Prevention Council Minutes.

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EMPLOYEE COMPENSATION OPERATION**UNCLASSIFIED**

A summary of our bases for reconciliation of positions was prepared and presented for consolidation with other departments for the development of a uniform reconciliation philosophy package. The various H.A.P.O. departments' Salary Administrators are cooperating in this effort.

A study and summary report of a proposed reorganization in one of the production components was completed.

Audits of three positions were completed.

A detailed study to summarize the functions of the component was completed as part of the current overall Employee Relations organization study. This is the first step in the coming H.A.P.O. wide Employee Relations Operation study.

Data was provided for bringing up-to-date personnel inventory and key personnel data sheets for four components.

The bi-monthly Employee Relations Operation Safety Meeting was sponsored by the Employee Compensation group.

Two secretarial jobs were reviewed during the month and warranted promotional action completed.

Job reviews were made during the month of twenty clerical jobs (19 Financial and 1 Employee Relations). The changes in job content which have occurred since the last review are not such as to require classification changes. However for record purposes the pertinent job descriptions are being revised to reflect any changes in duties which have occurred during this period.

In conjunction with Wage Representatives of the other H.A.P.O. components a proposal for a revised rate structure and administrative procedure for Engineering Assistant, Laboratory Assistant, and Technologist classifications was completed. Several meetings were held on this subject. The proposal is being prepared for issue to CPD management for their study and comment.

Preliminary work toward a proposal for a new Financial classification structure has been accomplished.

A proposed point evaluation plan for manual work has been received from Relations and Utilities and is under study.

A partial draft of information requested by the Manager of Personnel Practices in CEO for inclusion in a H.A.P.O. Employee Handbook has been prepared. This information will be completed by March 12, 1958.

Administratively papers were processed as listed in the statistical portion of this report. All discrepancies incident thereto were handled with supervision concerned.

ADDITIONS TO ROLL**UNCLASSIFIED**

	<u>EXEMPT</u>	<u>NONEXEMPT</u>
New Hires and Rehires	0	0
Reactivations	0	1
Transfers from Other Departments	2	2
Reassignments from Nonexempt to Exempt	0	0
Reassignments from Exempt to Nonexempt	0	0

REDUCTIONS FROM ROLL

Terminations	1	6
R.O.F.	0	6
Deactivations and Leaves	0	5
Transfers to other departments or divisions	0	9
Reassignments from Exempt to Nonexempt	0	0
Reassignments from Nonexempt to Exempt	0	0

CHANGE IN STATUS (No Salary Change)

Intra-Departmental Transfers	1	24
Reassignments - Title Change	1	0
Level Changes - Increase	1	0
Level Changes - Decrease	0	0
Location Change	1	0

CHANGE IN SALARY

Promotions	1	8
Demotions	0	3
Merits (Salary Review)	45	0
Merits (Interim)	0	0
Automatics	0	17
Temporary Reclassifications	0	2
Salary Adjustments	0	0

REQUISITIONS

0 5

SUGGESTION PLANJANUARY FEBRUARY

Suggestions Received	70	67
Acknowledgements to Suggestors	72	76
Suggestions Pending Acknowledgement	9	1
Suggestions Referred to Operations for Investigation	72	76
Suggestions Pending Referral to Operations	9	1
Suggestions Completed and Closed	44	44
Adopted Suggestions Approved by Board	39	53
Adopted Suggestions Pending Approval by Board	35	11
Total Net Tangible Savings	0	0
Total Cash Awards Paid During Month	0	0

As of the end of February there were a total of 99 suggestions which have been approved, audited, and are ready for payment totaling \$2,555.00 in awards.

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Total number of suggestions outstanding to operations at the end of the month:

<u>January</u>	<u>February</u>
150	153

PARTICIPATION IN BENEFIT PLANS

	<u>January</u>	<u>February</u>
Insurance Plan	99.8	99.8
Pension Plan	99.3	99.2
Stock Bonus Plan	57.5	58.1
Good Neighbor Fund	62.0	61.9

Two General Manager's Information Meetings were held during the month with a total of 41 supervisory, exempt, and Chief Operators in attendance.

One (Retired) employee of the Chemical Processing Department died during the month. This was William W. Ellis Sr. who retired from our rolls on June 1, 1957 under normal retirement. Matters relating to his life insurance and pension are being handled by this office.

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UNION RELATIONS OPERATION**UNCLASSIFIED**

The HAMTC and the Company have agreed upon the selection of the Rev. R. J. Carmody as arbitrator in the Claude Thompson grievance case. The grievance challenges the Company's right to relieve a Chief Power Operator for lunch periods with a Junior Power Operator. The date of the hearing has not yet been set, however.

The incidence rate of grievances remained approximately the same as in December and January. Seventy three per cent of the grievances filed during January represented jurisdictional questions.

The HAMTC has declared intent to arbitrate the Graham and Walker grievances. The former, involving a P-Q shift arrangement in the 200-West Shop, claims premium pay from January 27 through February 28. The Walker grievance concerns disciplinary action and deduction of holiday pay in a case where the employee was AWOL for four hours immediately preceding the New Year's Day holiday.

The formal judgment in the matter of the question of arbitrability of the Wonacott case was received from Superior Court during the month. The Legal Department has filed formal notice of appeal to the State Supreme Court.

	<u>February</u>	<u>January</u>
Bargaining Unit Employees in CPD	865	877
Bargaining Unit Employees Utilizing Check-Off	594	596
Percentage of Total Bargaining Unit Employees Utilizing Check-off	68.5	67.9

Following is the grievance statistics summary for the month of February, 1958:

	<u>Unit</u>	<u>Nonunit</u>
Grievances received year to date	36	1
Grievances pending at Step II on 1-31-58	14	0
Grievances received during the month	18	0
Satisfactorily answered at Step I	4	0
Settled at Step I through expiration of 90-day time limit	4	0
Processed at Step II	13	0
Pending at Step II on 2-28-58	11	0
Pending at arbitration	9	0

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III. ORGANIZATION AND PERSONNEL**UNCLASSIFIED**

A. Meetings

Personnel of the Employee Relations Operation attended over 90 meetings during the month of February. These included:

A meeting with Communication Specialists from IPD, FPD, HLO and representatives from R&U to discuss the HAPO-TV program. The format of the program will be somewhat similar to the 1957 version, and it is expected to be televised on the evening of March 22.

Wage Administrators Meeting

Salary Administrators Meeting

Employee Relations Operation Safety Meeting

AEC lecture on meetings at Rocky Flats and Washington, D. C. regarding fire protection of critical material facilities.

AEC representative and CPD engineers in relation to fire protection for 222-S Building

Safety Program Council

Information meeting of HAPO Radiation Monitoring Managers

Top-Secret workshops

Meetings of the Industrial Relations Council

Step II grievance meetings

Information, Round Table, Safety and Security meetings

B. Personnel Activities

One session of the Labor Relations Conference series was conducted.

A signed article on CPD's Safety Council system was submitted to the editor of the NATIONAL SAFETY NEWS.

William Scholz, Consultant-Communication and Group Relations visited Hanford during the month to discuss some of the current problems facing the Company and problem areas at Hanford. Scholz spent considerable time discussing the recent Atlantic City Meeting

The Specialist, Training presented a program in the 760 Building on CPD Process and functional activities to Financial accounting personnel from all Departments in HAPO.

B. Personnel Activities (continued)

The Specialist, Personnel Development, conducted Session No. 1 in the GENE course, Separations Process Fundamentals, being held in W-10. Other CPD personnel are also acting as instructors.

C. Training

In the Fire Protection Operation there were 28 outside drills, 62 inside drills in which 2,882 feet of hose and 164 feet of ladder were used.

During the month of February, 11.2 % of time was used for training.

D. Safety and Security

One medical treatment injury occurred in the Health and Safety Operation.

UNCLASSIFIED

D. S. Roberts

D. S. Roberts, Manager
Employee Relations

END

**DATE
FILMED**

9 / 17 / 92