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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT
FOR
FEBRUARY 1957

65144

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Compiled by
OPERATION MANAGERS

March 21, 1957

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HANFORD ATOMIC PRODUCTS OPERATION
RICHLAND, WASHINGTON

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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

FEBRUARY, 1957

GENERAL SUMMARY

PRODUCTION

Plutonium production exceeded the forecast for February, 1957. To provide a more uniform flow of feed material to the fabrication facility, operation of the separations plants was scheduled alternately between Purex and Redox plants. This method of operation also permitted the completion of planned maintenance at each of the plants during the down periods.

A capacity test of the final uranium cycle in Purex plant indicated that the extraction column becomes limiting at 25 T/D. Evaluation of the data collected during a test of a dual-pass silver reactor on one dissolver has not as yet been completed.

The relatively low forecast for the TBP Plant, which had been based upon final storage tank clean-out, was exceeded.

The production of UO_3 exceeded the forecast. Over-all production of UO_3 is now current with the commitments.

Although the schedule for the production of unfabricated plutonium metal was increased during the month at the request of HOO-AEC, the production of both unfabricated plutonium and fabricated cores met or exceeded the forecast.

ENGINEERING

Examination of the abnormal plutonium behavior in the Redox plant was continued in both plant and laboratory programs. Limited improvement was achieved by flowsheet changes in the plant, and extensive flushing during the February-March shutdown is aimed at improving performance as well as evaluating the significant plutonium deposition found to have accompanied the plutonium recycle. Laboratory tests have demonstrated the formation of a precipitate containing iron, aluminum, chromium, and up to 95 percent of the plutonium present when solutions are 0.3 molar acid-deficient but not when they are only 0.1 molar acid-deficient.

The proposed Phase II two-cycle Purex Plant flowsheet was prepared for budget studies and is being issued. Although several items are presented for development study, the technology of the flowsheet conditions specified is adequate so that this flowsheet can be used for scope of the Phase II project proposal. As the first step toward two-cycle Purex operation, the specifications for the Phase II HA Column were issued for project action. The column is to be built on-site for expediency. Capacity tests of the final uranium cycle demonstrated the adequacy of the major equipment (2D and 2E Columns and 2EU Concentrator) for Phase II operation.

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Construction of the plutonium cation exchange prototype facility at Purex is essentially completed and is expected to be ready for cold runs by mid-March. Hot operation of the laboratory-scale continuous ion exchange unit was started. The initial run demonstrated that flowsheet conditions can be met when the XC Column gassing problem is resolved.

A preliminary letter of scope definition on a replacement Purex HA Column was issued for purposes of initiating project proposal action. Preliminary column specifications were provided to assist in establishment of the project cost estimate.

A new process for the conversion of plutonium nitrate solutions to a dry powder suitable for reduction to metal appears very attractive for coupling to a cationic exchange process such as the prototype installation now almost complete at Purex.

Final acceptance of the Purex Acid fractionator was established on February 26, 1957. A physical completion notice is in preparation. Final maximum capacity tests are scheduled for the next Purex shut-down. A 7 percent underrun for the project is indicated.

The detailed design of the project proposal, CG-691 - Improved Task I and Task II Facilities, is complete, with all drawings approved. The acceptance test procedures remain to be completed.

A budget study was completed during the month on a fission product segregation plant. The study on Budget Item 659-024, New Separations Plant Design, was completed and the report (HW-48396) issued.

The study on Budget Item 659-025, on Power Fuel Reprocessing, was rewritten and issued in the light of AEC - published information, HAN-64110-1, on loads, enrichment levels, and "burn-ups" for the 1958-1965 fiscal year period.

GENERAL

A quarterly summary of Midyear Budget Data was prepared and issued to all Operations in the Department. Schedules for preliminary submission of manpower and overtime for the FY 1958 budget were prepared and issued to Contract Administration on schedule.

As part of the program to keep inventories within a reasonable level, arrangements were made to transfer approximately \$45,000 worth of BiPO_4 essential materials from inventory to standby. Work was also completed on the transfer of \$318,000 worth of TBP, BiPO_4 , Redox, and Finished Products spare parts from inventory to standby.

Twenty position reconciliations were completed with Flight Propulsion Laboratory of AGT Division in a meeting with their salary representative. In addition, three positions were reconciled with other HAPD Departments during the month. Approval was obtained for the use of hyphenated titles for Engineering

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Assistants, Technologists and Laboratory Assistants classifications and the necessary changes will be made during the month. The proposed plan for secretarial classifications was approved by the AEC. Ground rules and criteria for merit classifications are being completed and the changes to the new Secretarial Plan will be made as soon as possible. All rates for nonexempt personnel were adjusted, effective January 28, 1957, to reflect the 1.18% increase for the cost of living adder.

Two Annual Report to Employees meetings were conducted by the General Manager at the Chief Joseph Auditorium on February 12 and 13.

Vacation scheduling is the basis for numerous grievances in CPD. There were 28 grievances filed by members of the bargaining unit on this subject and one grievance by a nonbargaining unit employee. The Department took the position that vacation scheduling requires approval of the supervision involved and that it did not represent a matter over which the Union Relations group had proper jurisdiction.

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STAFF

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

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CHEMICAL PROCESSING DEPARTMENT
NUMBER OF EMPLOYEES
FEBRUARY 28, 1957

OPERATION	EXEMPT		OTHER		TOTAL	
	1-31-57	2-28-57	1-31-57	2-28-57	1-31-57	2-28-57
GENERAL MANAGER'S GROUP	10	10	1	1	11	11
PRODUCTION	6	7	4	4	10	11
PUREX	43	42	271	272	314	314
REDOX	53	49	292	284	345	333
FINISHED PRODUCTS	66	64	418	396	484	460
POWER AND GENERAL MAINTENANCE	43	44	288	290	331	334
FINANCIAL	21	21	51	53	72	74
FACILITIES ENGINEERING	77	76	32	30	109	106
RESEARCH AND ENGINEERING	73	71	25	26	98	97
EMPLOYEE RELATIONS	32	32	59	59	91	91
	424	416	1441	1415	1865	1831

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CHEMICAL PROCESSING DEPARTMENT

PATENT SUMMARY
FOR
MONTH OF FEBRUARY, 1957

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>
W. P. Ingalls	Device for Removal of Material from an Air-Tight Hood
C. R. Anderson	Hindered-Settling, Discrete-Pellet-Fuel-Bed Nuclear Reactor
J. S. Ledingham	Combustion Control Mechanism for Power House Boiler Instrumentation
R. H. Moore	Addendum to invention entitled, "A pyrochemical dissolution and head-end process for zirconium clad or aluminum canned fuel elements preliminary to solvent extraction processing," was filed February 7, 1957.

W. K. MacCready
 GENERAL MANAGER
 CHEMICAL PROCESSING DEPARTMENT

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CHEMICAL PROCESSING DEPARTMENT
PRODUCTION OPERATION

February, 1957

I. RESPONSIBILITY

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

II. ACHIEVEMENT

A. Production Statistics

Plutonium production in the separations plants exceeded the monthly commitment. The operation of the plants was alternated during the month to allow down periods in each plant of long enough duration to permit completion of planned maintenance. This method of operation also permitted a more uniform transfer of feed material to the fabrication facility.

Although the button production schedule was increased twice during the month at the request of HOO-AEC, the production of both shapes and buttons met or exceeded the commitments. Scrap recovery in the fabrication facility resulted in a slight reduction of the scrap account during the month.

The low monthly commitment for the TBP plant, which reflected final clean-up conditions of the metal removal program, was exceeded.

Production of UO_3 was 142% of the monthly commitment; however, this production was scheduled to offset the low production during January, 1957. The over-all production of UO_3 is current with production commitments.

1. Purex Operation

	<u>February</u>	<u>January</u>
Tons Uranium delivered to storage	284.0	300.98
Average production rate per operating day (tons)	12.7	12.2
Average yield, %		
Uranium	99.4	98.5
Plutonium	90.8	96.5
Total Waste Loss, %		
Uranium	0.22	0.30
Plutonium	1.11	1.29
Average cooling time (days)	125	120
Minimum cooling time (days)	91	114
Percent operating time	80.0	79.9

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2. Redox Operation

	<u>February</u>	<u>January</u>
Tons uranium delivered to storage	112.7	80.78
Average production rate per operating day (tons)	9.7	8.1
Average yield, %		
Uranium	111.8	99.9
Plutonium	117.0	88.6
Total Waste Loss, %		
Uranium	0.17	0.39
Plutonium	0.43	0.67
Average cooling time (days)	120	123
Minimum cooling time (days)	109	115
Percent operating time	41.4	30.6

3. 231

	<u>February</u>	<u>January</u>
Batches started	-	38
Batches completed	-	38
Batches awaiting processing	-	0
Average yield, %	-	93.3
Average purity, %	-	98.9

4. 234-5 Operation

5. UO₃ Operation

	<u>February</u>	<u>January</u>	<u>To Date</u>
Uranium drummed (tons)	285.62	104.41)	19,252.85
	225.50UA	249.99)	
Uranium shipped (tons)	469.50	565.53	19,131.76
Average cooling time (days)	126	129	
Minimum cooling time (days)	115	121	
Waste loss, %	0.01	0.01	

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6. TBP Operation

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	<u>February</u>	<u>January</u>	<u>To Date</u>
Tons received from Metal Removal	35.83	56.99	8,098.70
Tons shipped to UO ₃ Plant	28.12	30.84	7,817.32
Average production rate per operating day (tons)	3.99	2.83	
Average yield, %	89.39	91.62	
Total waste loss, %	4.30	1.47	
Percent operating time	43.80	47.39	

7. Power

	<u>200 East</u>	<u>200 West</u>
Raw water pumped, gpm	5,576	4,774
Filtered water pumped, gpm	624	1,108
Maximum steam generated, lbs/hr	228,000	289,000
Average steam generated, lbs/hr.	153,643	182,637
Total steam generated, M lbs.	103,248	122,732
Coal consumed, est. (tons)	7,239	8,386

8. Waste Storage

	<u>Equivalent Tons U</u>	
	<u>February</u>	<u>January</u>
Redox waste reserve storage capacity	3,493*	2,112
Purex waste reserve storage capacity	6,294	6,068

*Includes five tanks allocated from U Farm.

B. Production Planning and Scheduling Operation

Additional work was necessary to provide assistance to the Facilities Engineering Operation in developing further justification for the project proposal "Utilization of Recovered Acid from the UO₃ Plant."

A study was initiated to provide a detailed definition of the SF Accountability system currently in use in the Chemical Processing Department. The study will encompass the generation of source data in the plants and the methods and equipment used.

A study was conducted to develop a forecast based on an accelerated program for I and E slug processing. The study portions from each product department were consolidated for presentation to HOO-AEC.

The current Task III capacity in the fabrication facility is being investigated to determine time cycles, charge size, recycle rates, and the effect of varying production requirements.

B. Production Planning and Scheduling Operation (Continued)

A revised AEC shipping schedule for UO_3 was received on February 6, 1957. Integration of the new schedule³ with the current production forecast indicates that no production scheduling problem is anticipated. Beginning in March, 1953, UO_3 shipments have been scheduled to maintain a slight lead on the AEC schedule.

Close liaison was maintained with Facilities Engineering Operation and Hanford Laboratories Operation in a review of waste scavenging planning as it is related to FY 1959 budget items. Consideration is being given to tank farm facilities which may be used in the treatment of coating wastes with sodium silicate.

The maintenance required on metal shipping cask cars has necessitated the withdrawal from service of several cars during the month. Metal shipping schedules were not significantly affected by this activity.

C. Essential Materials

Discussions continue with the General Chemical Company concerning the unloading of chemical tank trucks at Purex Plant.

The feasibility and economy of a central warehouse for essential materials is under study. The problem was discussed with the CPD Landlord and a representative of Safety and Fire Operation; however, the requirements have not as yet been fully evaluated.

D. Reports and Documents

1. Prepared and Issued

HW-48091	Essential Material Consumption - January, 1957, TBP Plant, M. A. Thress
HW-48092	Essential Material Consumption - January, 1957, Purex Plant, M. A. Thress
HW-48093	Essential Material Report to Cost & Purchasing - January, 1957, M. A. Thress
HW-48094	Essential Materials Ordered, D. E. Peterson
HW-48095	Z Plant Production Schedule for February, 1957, B. F. Campbell
HW-48096	TBP- UO_3 Building Production Schedule for February, 1957, B. F. Campbell
HW-48097	Redox Plant Production Schedule - 2-5-57, D. McDonald

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D. Reports and Documents

1. Prepared and Issued (Continued)

HW-48098 Purex Plant Production Schedule - 2-5-57,
D. McDonald

HW-48144 Chemical Processing Department Waste Status
Summary for January, 1957, R. E. Roberts

HW-48383 UO₃ Plant Production Schedule Revised for
February, 1957, B. F. Campbell

HW-48384 Z Plant Production Schedule Revised for February,
1957, B. F. Campbell

2. Prepared for Signature and Issuance

HW-48424 Standby of Isolation Plant - 231-W Building,
W. K. MacCready, 2-13-57

HW-48425 Standby of Isolation Plant - 231-W Building,
W. E. Johnson, 2-13-57

XX-1865 Study of Accelerated I and E Program, W. E. Johnson,
2-25-57

III. ORGANIZATION AND PERSONNEL

A. Force Summary

	<u>Beginning of Month</u>	<u>End of Month</u>
Exempt	7	8
Non-exempt	4	4
Total	<u>11</u>	<u>12</u>

On February 1, 1957, R. E. Roberts was transferred from Purex Operation to Production Operation and was assigned the duties and responsibilities of Specialist - Waste Planning and Scheduling.

B. Safety

There were no plant injuries incurred by Production Operation personnel during February, 1957.

C. Security

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

D. Visits

W. K. MacCready and J. H. Warren visited Marketing Services of the General Electric Company in New York, Union Carbon and Carbide Company at Oak Ridge, and the du Pont Company at Savannah River during the month to discuss production and technical problems.

J H Warren
Manager

PRODUCTION OPERATION

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CHEMICAL PROCESSING DEPARTMENT
PUREX OPERATION

February, 1957

I. RESPONSIBILITY

There were no changes of responsibility within the Purex Operation.

II. ACHIEVEMENT

A. Processing Operation

1. Normal Processing

Following the scheduled shutdown in January, metal dissolving and feed preparations were resumed on February 5, and virgin feed was introduced into the extraction columns on February 6. Operations were continuous throughout the remainder of the month except for an emergency shutdown of seven hours duration on February 7. The on-line efficiency for the month was 80 percent. Product losses to waste were 1.11 percent and 0.22 percent for plutonium and uranium respectively. The 0.22 percent uranium waste loss is a record low for the Purex Operation. The uranium production commitment for the month was exceeded by nine percent.

Operating continuity was interrupted on February 7 when the organic in the #1 organic system was nearly depleted as a result of the loss of the aqueous seal in the G4 centrifuge. (Organic discharges out the aqueous port when the aqueous seal is lost.) Approximately seven hours were required to rebalance the organic supply tanks and establish the centrifuge seal, after which operations were resumed. The seal is now maintained by the continuous addition of a small flow of water to the centrifuge. Establishment of equilibrium conditions were further delayed, after startup, by the cross contamination of the final product streams. Inadequate isolation of the UO₃ recovered nitric acid header (contains up to 0.1 lb. uranium per gallon of acid) and the Purex recovered nitric acid header resulted in contamination of the plutonium stream with uranium. An upset in the partition cycle IBX column caused displacement of the column interface (containing plutonium) to the uranium stream, resulting in above normal plutonium content.

A period of instability, which was encountered midway in the month, was characterized by: (1) high plutonium waste losses in the pre-cycle HC column, peaking at 4.5 percent; (2) above normal gamma content of the plutonium product; and (3) organic appearing in the uranium product. The processing of certain in-plant rework is believed to be the cause of the high HC column losses. An unexpected shift in decontamination performance during February, likely attributable to acid washing of the recovered organic stream, resulted in ruthenium being the major source(almost 100 percent)

of the gamma activity in the plutonium product stream. Previously, the activity was predominately zirconium-niobium. The same activity shift was noted in the uranium product stream. Organic appeared in the uranium product stream as a result of a flood in the final uranium cycle 2E column during a capacity test. The organic phase was decanted off and the aqueous phase was routed to the UO_3 continuous calciners for normal processing.

At the start of the operating period the vacuum acid fractionator began routine concentration of nitric acid recovered in F Cell. Operator experience and techniques have improved to the degree that the acid produced is of the desired uniformity. The F5 unit in F Cell, formerly operated as an absorber-concentrator, is now operated as an absorber only, supplying 20 percent acid to the vacuum acid fractionator.

The boil-off rate from the 103-A self-concentrating waste storage tank has increased. During the month it was necessary to add water intermittently to maintain the liquid level above the low level air-driven circulators. One low level circulator partially plugged with salt during the month, however, the plug was easily removed by a flush with water under pressure.

Three tank trailer loads of UO_3 recovered acid were received during the month. On February 26, use of this acid in the intermediate scrub stream of the final uranium cycle 2D column was resumed.

2. Special Processing

As a result of the product cross contamination soon after startup, it was necessary to rework seven batches of plutonium and four batches of uranium within the plant. One batch of plutonium was also reworked as a result of the increase in the ruthenium activity.

The remainder of the out-of-specification UNH material produced and stored in previous months' operations was reprocessed through the final uranium cycle. No uranium rework backlog now remains.

B. Radiation Experience

1. Radiation Occurrences

Five radiation occurrences took place during the month. In one case the area in front of the PR loadout hood was contaminated to 1×10^5 d/m with plutonium during removal of waste material. Air-borne contamination was also encountered, but followup bioassay samples indicated only negligible body deposition of soluble plutonium. The remaining four occurrences include: a case of plutonium skin contamination of 30,000 d/m, which was readily decontaminated; plutonium contamination to 4×10^6 d/m outside of the L-11 catch tank enclosure when the sump overflowed; low level air-borne beta contamination and internal pipe contamination in the Pipe and Operating Gallery resulting from a leaky flange in the B dissolver

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jet steam line, and; contamination of 9000 c/m (source unknown) detected in the cab of a non-regulated pickup truck on a routine radiation survey.

2. Personnel Exposure

Nine cases of skin contamination, including the one mentioned above, occurred during the month.

Process sampling and sampler maintenance continued to be responsible for the major portion of potential exposure to higher level radiation. Typical of the experience encountered during the month was replacement of a valve diaphragm in the E-6 sample pit. The initial 3 r/hr. readings were reduced with water shielding to values approximating 500 mr/hr. at one foot. Specially fabricated extension tools and auxiliary shielding then permitted repair to take place well within acceptable exposure dose rates.

The right impact wrench on the remote canyon crane was repaired at a maximum dose rate of 4 rads/hr. including 1 r/hr. The maximum radiation level from the wrench was 23 rads/hr. at six inches.

Radiation readings at the top and sides of the 291-A exhaust filter by-pass pit increased gradually over a period of months to a maximum of 420 mr/hr. Concrete shielding blocks placed over the pit reduced the readings to 5 mr/hr.

Initial operation of the vacuum acid fractionator on recovered nitric acid produced a rapid radioactive buildup in the bottom of the unit. Dose rates increased to 800 mr/hr. at ten inches from the fractionator tower and 20 mr/hr. through the building entrance door, however, after continued operation, radiation levels dropped to 100 mr/hr. and 2 mr/hr., respectively, at the tower and door.

3. Contamination Experience

The program for removal of deck contamination and discard of un-serviceable equipment from the canyon, was accelerated during the month. Extraneous material was boxed for burial and the centrifuge shielding shroud was placed in the pool cell. Decontamination of the deck from A through D cells has progressed satisfactorily and numerous spot areas of high level radiation have been reduced from 20 rads/hr. to 1 rad/hr. The program will continue.

Plutonium contamination, loosened by operation and maintenance activities in the Pipe and Operating Gallery "white room" (scene of the L Cell package blow-back in February 1956) is being cleaned up in preparation for painting. When the smearable contamination has been removed or fixed by painting, normal entry into this room without respiratory protection will be permitted.

Decontamination of the E4 centrifuge, which failed during the run-in period this month, was begun in the decontamination cell (M). The radiation level has been reduced by a factor of 10; however, additional decontamination is required before repair work can proceed.

C. Mechanical Experience

For the second successive month a vessel agitator (D-4 tank) was found inoperative on February 19. (Only two agitator failures have been experienced at Purex to date). Visual inspection from the remote crane revealed a bent shaft and impeller. Since high radiation level precludes a detailed examination of this unit, the cause of the failure has not been determined. A replacement unit was installed on February 21.

The two vacuum acid fractionator feed pumps failed during the month because of corrosion of the carbon steel shafts and bearings. Deterioration of the internal pump seal gaskets permitted acid to contact the carbon steel parts. It is apparent that the gasket material supplied by the pump manufacturer is inadequate for acid service. Teflon gasket material was substituted and, following shaft and bearing replacement, one of the two pumps was returned to service.

A replacement centrifuge (E-4-OS#2) was installed in the E-4 position on February 2. After operating 23 hours of a scheduled 48-hour test period, the machine was shut down for a flush of the E Cell equipment with the fire fog sprays. Electrical checks immediately following this flush disclosed water in two electrical wall connectors, the centrifuge motor receptacle, and the power-to-motor jumper. The receptacles were restored to normal after repeated flushes with trichloroethene and blowing with air. The motor jumper was replaced with a spare. The centrifuge was restarted on February 18 but failed after nineteen hours of test operation. Investigation of the cause of failure and the repair of the unit, if feasible, will take place when the necessary decontamination of the exterior surfaces has been accomplished.

D. Analytical Control Operation

Several problems concerning the specification analyses on the UO_3 product produced from Purex material were encountered during the month. A problem of excessive iron contamination in the final uranium oxide was found to originate in the UO_3 Plant rather than in Purex. An extensive investigation of analytical methods was initiated to resolve the apparent discrepancy of plutonium values in uranium as reported by Redox and Purex Laboratories. Subsequently, a real discrepancy was found to exist between results obtained by the two different methods employed. The Process Chemistry group of the Research and Engineering Operation has been requested to evaluate both analytical methods.

Analytical support was given in evaluating the proposed acid-caustic decontamination treatment of organic in the #1 organic cycle equipment and in the identification of fission products responsible for the high activity levels observed in the final plutonium buttons produced from Purex products.

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

A capacity test of the Final Uranium cycle equipment was conducted, using normal feed material supplemented by out-of-specification uranium held in storage for this purpose. The 2E column was determined to be the limiting equipment component at a capacity factor of 3.0. A supplemental capacity test of the final uranium concentrator was made by addition of water to the unit. A capacity factor of 5.2 was indicated by the test.

Before startup, the equipment of the #1 organic system was flushed with a caustic-hydrogen peroxide solution in an effort to remove organic degradation products from the equipment surfaces. On startup, a three percent nitric scrub in the organic wash column (TG-2) was substituted for the usual five percent carbonate solution. This change has led to improved column stability, but decontamination efficiency is not materially affected.

Four charges of 90-day cooled metal (36 tons) were processed in the C dissolver without adverse results during dissolution, although an increase in radio-iodine emissions from the 291-A stack (ranging from 0.74 to a peak of 2.6 curies on the fourth day) did result. The test was designed to evaluate the efficiency of the dual-pass silver reactor. Final evaluation of the data collected is continuing.

On February 26, installation of electrical booster heaters on the A Cell dissolver off-gas piping was completed. Control of the off-gas temperature with the electrical heaters in operation satisfies the design criteria. Identical units are planned for the B and C dissolvers.

In order to reduce the plutonium losses in the dissolver coating waste solution, a double-rinse procedure was substituted for the normal single-rinse procedure, on a test basis. The first (high volume) dissolver rinse water was transferred to the F8 tank for reconcentration, then routed to the centrifuge feed tank (E3) for product recovery. The second water rinse was returned to the rinse tank (D-1) in a normal manner. The plutonium content in the succeeding coating waste solution was decreased by a factor of 10. Fabrication of a jumper is required before a routine procedure employing the double-rinse technique can be put into effect.

2. Inventions and Discoveries

None

G. Events Influencing Cost

Within the Product and Material Handling Operation all work not directly in support of operating continuity on shifts, along with the necessary people involved, was reassigned to the day shift. Savings by elimination of shift differential, 4-12 shift overlap payment, and all overtime safety meetings are calculated to be in excess of \$3,000 on an annual basis. Greater efficiency in manpower usage is also anticipated.

Inability to maintain a seal on the G4 organic centrifuge resulted in the loss of approximately 2000 gallons of organic (cost approximately \$1.15 per gallon) to the cell floor. The material was discarded since adequate means for rework is not available.

Over 9.5 Kgs. of recycle from the 234-5 Building were reprocessed during the month. Handling cost, plus the waste losses involved, brought the total cost of processing to an estimated \$9,700.

In addition to the rework of eight plutonium batches and four batches of UNH from current production, 71.6 tons of out-of-specification uranium on hand were reprocessed. Additional consumption of essential materials and services in reprocessing these materials increased product unit costs accordingly.

H. Plant Development and Expansion

Nothing to report.

I. Reports Issued

HW-48325 - Application of Critical Mass Document No. HW-44064 to the Purex Process - L. D. Gustafson, 2-5-57.

III. ORGANIZATION AND PERSONNEL

A. Safety

There were no disabling injuries and no serious accidents in February. Twelve medical treatment cases were reported during the month. A review of all Purex building safety rules was initiated to bring them into accord with the philosophy of the newly issued CPD General Safety Rules.

An irritating noise problem in the Analytical Control Laboratory was successfully solved by the installation of a flexible coupling between the vacuum pump and vacuum separator.

B. Personnel Changes

R. E. Roberts, Manager, Analytical Control Laboratory, Purex Operation, was transferred to the Production Operation as a Specialist, effective February 1, 1957.

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A. J. Waligura, Engineer I, Redox Process Technology, Research and Engineering Operation, was promoted to Manager, Analytical Control Operation, Purex Operation, effective February 1, 1957.

L. R. Duncan, Junior Chemist, Purex Analytical Control Operations, was transferred to the Chemical Research and Development Operation, Hanford Laboratories Operation, effective February 1, 1957.

Manager
Purex Operation

OC Schroeder:JCG:gt

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CHEMICAL PROCESSING DEPARTMENT
REDOX OPERATION

FEBRUARY, 1957

I. RESPONSIBILITIES

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

The Redox Facility was scheduled for a low production commitment during February. The facility exceeded the production commitment by 6.8% and achieved a mechanical efficiency of 77.4% during the period for which processing was scheduled. The actual on-line efficiency was 41% since the production commitments did not require full time processing. The relatively low mechanical efficiency resulted from the failure of two F-1 pumps during the normal processing period. Processing of the commitment was completed on 2-15-57, at which time processing was suspended for the remainder of the month and a routine column flushing program initiated.

All UNH produced during the month met shipping specifications although 5 batches had to be ozonated and processed through silica gel. Waste losses were higher than normal, but substantially lower than January. February plutonium waste losses were 0.32% versus a normal 0.25%. There were 38 batches of waste sent to the 241 Area, two of which were above the normal throw-away limits. Three batches of waste resulting from building clean-out were reworked through the 1-S column and concentrated for further blending with virgin feed.

During the early part of the month considerable difficulty was experienced in the control of I¹³¹ emissions from the 291-S stack. A total of 19 curies were emitted over a 5 day period. Although the silver reactors were regenerated, very little beneficial effect was noted. Following completion of processing, a program was initiated to ascertain the cause for the low efficiency (approx. 87%) versus a normal 99.9% for these reactors. At this writing results of this test program have not been fully evaluated.

As a result of the I¹³¹ problem, the C-2 dissolver was reactivated on 2-1-57. This dissolver had been holding for the arrival of special irradiated fuel elements from Chalk River. When

it became evident that the C-3 reactor was no more efficient than the other reactors, the charge in C-2 was completely dissolved and the unit was again flushed in preparation for receiving the Chalk River material.

Plugging of the vent line from the 3DF feed tank was again experienced this month. Investigation revealed that a crust of crystals had formed over the liquid in the tank. The apparent composition of this formation was $\text{Na}_2\text{U}_2\text{O}_7$. 60% nitric flushes of the 3DF tank have recovered approximately 1200 units of uranium to date and the flushing program was continuing at month end. Processing conditions in this area are currently being investigated in an effort to resolve this problem.

Following shutdown of the Head End process, a caustic-permanganate flush was made of the H-5 Pot (ruthenium scrubber). The flush was successful as indicated by the radioactivity of the flush material.

During the routine flush of the columns, an unusually high plutonium pick-up was obtained in the 2D-1B system. It now appears that the 10% HNO_3 flush picked up approximately 2000 units. The reason for this pick-up and the exact location from which the pick-up was made has not been determined. At the present time an additional 60% HNO_3 flush is contemplated. The recovered material is now being concentrated and will be blended with virgin feed when processing is resumed.

2. Equipment Experience

a. H-2 Centrifuge

On 2-1-57, it became evident that the hydraulic system on the H-2 centrifuge had failed and that skimming could no longer be done with the existing equipment. Replacement of this expensive piece of equipment has been postponed pending the investigation of changes in processing conditions which may circumvent the problem.

b. D-14 Backcycle Concentrator, Chemical Addition Seal Pot

On 2-1-57 a blow-back occurred on the newly installed D-14 seal pot resulting in a short duration increase in radiation levels in the north pipe gallery. The seals which were built into the seal pot were apparently inadequate to cope with the differential pressure experienced across the D-14 tower. To prevent similar occurrences, a blank was temporarily installed on one outlet of the seal pot and the unit is to be replaced during the March shutdown.

c. Left Hand Optic Festoon

On 2-13-57 the festoon cable to the left hand optic on the canyon crane failed. This was apparently due to a broken

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spring which allowed the cable to drag on the parapet wall and abrade to the point of failure. The cable was replaced and the unit restored to normal operation.

d. D-14 Backcycle Concentrator, Condensate Trap Jumper

On 2-6-57 and again on 2-13-57 the D-14 condensate trap jumper failed to operate properly when the trap stuck in the closed position. In both instances, shocking the trap with alternate flows of water, air and steam eventually unplugged the trap. However, on 2-20-57 this jumper was replaced as a preventive maintenance measure.

e. L-6 Pump Shaft Seal (Sampler Recirculation Pump)

On 2-6-57 the shaft seal on the L-6 pump had failed to the point that transfers to the L-6 tank could not be properly made. On 2-25-57 the seal was replaced and the unit returned to normal operating condition.

f. L-1 Pump (Feed to L-2 Stripper Column)

On 1-24-57 the L-1 feed pump in the 233-S Building failed. Replacement was deferred to the February shutdown by re-wiring the unit so that one of the two "Chempumps" in series would operate. Using the single pump and a spare transfer jet production rates were maintained. On 2-20-57 the "Chempump" unit was replaced with a Johnston turbine pump; however, the new pump was unable to produce the desired volume. This trouble was traced to the differential drop across the control valve. The control valve was subsequently replaced with a valve having a larger trim and the unit is now operating satisfactorily.

g. F-4 Agitator (2nd Cycle Uranium Concentrator - Tank Agitator)

The F-4 agitator failed on 2-7-57 due to a frozen or seized shaft. The unit was replaced on 2-17-57 with a new unit which is currently operating in a normal manner.

h. F-1 Pump (Partition Cycle Feed Pump)

On 2-7-57 the F-1 feed pump failed because of an excessive leak at the shaft seal. It was immediately replaced. However, the replacement unit failed after four days of operation due to a seized shaft. A second replacement was made with a salvaged D-14 pump which had been decontaminated and repaired in the 221-B Canyon Building. The rebuilt pump is currently operating in a satisfactory manner.

i. D-14 to D-12 Vapor Line

During the early part of the month, pot vacuums on the D-14 backcycle concentrator and the D-12 waste concentrator in-

icated a leak in the vapor system. On 2-7-57 process conditions were such that this vessel could be checked. It was found that the flexible bellows on the D-14 end of the vapor line had split around one of the convolutions on the Teflon-Neoprene bellows. A newly designed vapor line having a stainless steel bellows was installed on 2-20-57 with an immediate improvement in the D-14 and D-12 pot vacuum and boil-off rates.

j. D-12 to D-10 Jet

The dip leg in the D-12 waste concentrator vessel on the D-12 to D-10 jet could not be made up properly when the new D-12 pot was installed in January of 1956. As a result, a leak at the D-12 tank nozzle developed during subsequent processing. Investigation revealed that the dip leg was 1 3/4" too long. A new jumper was fabricated and installed on 2-20-57 and the unit is now operating satisfactorily.

k. Power Outage

On 2-10-57 Redox had a total power outage at 2115 and again at 2325. The duration was approximately 7 minutes. Columns and processing was crashed down, but immediately started following the restoration of power. The power outage was due to a grounded feed circuit at 224-UA and the subsequent switching which knocked out the circuit feed at Redox. No unusual process difficulty resulted from this incident.

l. H-8 and H-9 Metal Storage Tank Agitators

The agitators in the H-8 and H-9 tanks were placed in service for the first time since 1953 when it appeared sludge was building up in these tanks. Low level cut-offs were installed to prevent damage to the units should the liquid level fall below safe agitation limits.

m. L-3 Tube Bundle (Pu Concentrator Tube Bundle)

A routine check of the L-3 tube bundle on 2-19-57 revealed that this unit had developed a leak. On 2-25-57 the tube bundle was replaced with a new tantalum type tube bundle, which arrived on site during January. A check of the system indicates the newly installed unit is currently operating in a satisfactory manner.

n. G-3 Condensate Trap Jumper (Organic Still Condensate Trap)

A routine cell inspection during the month revealed that the G-3 tube bundle condensate jumper was leaking excessively at the trap. The jumper was replaced on 2-20-57.

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B. Product and Material Handling Operation

1. Process Waste Handling

Attempts to unplug the D-8 waste line between the 241-S-151 and the 241-SX diversion boxes were continued using a "go-devil" reamer which arrived on site this month. The reamer was pushed through the entire length of the line, but it now appears that the obstruction is located in the multiple valve jumper in the 241-SX diversion box between the wall four nozzle and the wall four valve. Because of the high radiation levels and the presence of a 90° bend in the multiple valve jumper, this condition presents a difficult problem. Studies are now being made on the feasibility of flooding the diversion box with water to reduce the radiation levels and increase the working time limits.

2. Bismuth Phosphate Plant Standby and Lay-Away

a. Standby Operations

All equipment in the 221-T and 221-B Canyon Buildings is in full standby pending receipt of an A.E.C. directive to permanently lay-away the Bismuth Phosphate Plants. The T Plant pipe trench at section 8 was inspected this month and no leaks were found.

b. Lay-Away

Lay-away work in the 224-B Concentration Building has been completed and the building and its equipment are ready to be placed on lay-away status.

With exceptions of some painting on agitator and centrifuge motors and lay-away treatment of the crane, the 224-T Concentration Building and operating equipment are ready to be placed on lay-away status.

C. Maintenance Operation

1. Operating Continuity and Equipment Maintenance

The facility operated at a mechanical efficiency of 77.4% during the period of scheduled operation. The relatively low mechanical efficiency was due to the failure of the F-1 feed pump which was replaced with a new assembly, which in turn also failed after a brief period of operation. A second replacement pump was not immediately available for installation and approximately three days were taken to ready a pump. The extended time was used for the second replacement as production schedules did not warrant performing the work on an overtime basis.

The present pump in the F-1 position is a former D-14 pump which was removed from service after a failure in that position, and

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subsequently repaired in the B Plant Canyon Building. This is the first of such equipment that has been so decontaminated and repaired for reinstallation. Operation to date has been satisfactory.

Canyon equipment replaced during the month included two F-1 feed tank pumps, one F-4 feed tank agitator, and five jumpers.

2. Inspection and Maintenance

A total of 229 inspection cards were issued during the month, of which 173 were returned by the respective foreman, together with 37 cards from previous months. At the present time, 95 inspection cards are outstanding.

An audio gage check of the nitric acid storage tank in the 222-S Building and the caustic storage tank in the 219-S Building indicated no apparent corrosion.

The shutdown during the latter part of the month afforded an opportunity for a general overhaul of the 60 Ton Canyon Crane. This included the replacement of the 10 ton cable, the reelite on the left hand optic, the right hand optic head, and the left hand impact wrench socket. A new 10 ton hook and sheave were also installed.

Twice during the month, the 233-S Building exhaust fans failed. The first outage occurred when a fragment of ice fell from the exhaust stack and shorted out the fan motor cable. The second occurred when the fan motor cable again shorted out during the testing of the emergency circuit. At this time the faulty cable was replaced and corrective action taken to prevent similar incidents. No air reversals or spread of contamination occurred as a result of the exhaust fan failure.

During the past few months a problem has developed with respect to in-concrete pipe leakage. To date there are six known in-concrete leaks in the steam lines leading to D and F Cells. Using a boroscope, a corrosion point was detected approximately three feet from the pipe gallery in one of the lines. Although the piping was thoroughly wrapped to prevent electrolytic action there may be some such action involved. The problem has been referred to the Facilities Engineering Operation for further study and corrective action.

D. Radiation Monitoring Operation

1. Radiation Occurrence Experience

Nine radiation occurrences were reported during the month reflecting a moderate improvement over the December and January experience. This total is particularly encouraging in light of the extensive maintenance work performed in radiation zones during the month. A review of the occurrences has shown a con-

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tinuing need for improved individual performance, and radiation topics and training programs currently in progress are emphasizing this part of the employees' responsibility in radiation work.

2. Personnel Exposure Experience

The 10 Ton and 1 Ton hoist cables on the canyon crane were replaced in average dose rates of 1 to 2 rads/hr at 8 inches with a maximum exposure of 6 rads/hr received while handling the 1 Ton hook. Prior to the cable change outs, considerable localized decontamination was accomplished on the crane, thereby improving personnel dose rates by a factor of 4 to 10.

3. Other Contamination Experience

Maintenance work performed in the 233-S Building greenhouse enclosure this month was accomplished with excellent contamination control through use of the plastic man technique. Replacement of the L-3 tube bundle and repair of the L-6 pump were performed with only a nominal 5000 d/m observed in the greenhouse room. The job was accomplished under difficult conditions and yet with no significant contamination spread. This quality performance in the 233-S Building greenhouse area is fast becoming the expected rather than the exception.

Activation of the water segregation program caused some surface contamination at the effluent disposal area with levels up to 200 mrad/hr at the effluent outlet and levels up to 10,000 c/m at the terminus of the ditch area. Plans are now being made to dike the general area and backfill some portions of this contaminated ground area. As best as can be determined, the contamination was washed out of the old Redox swamp culvert, and is not related to any current process problem.

An unusual steaming or fogging condition was observed this month in the ground test wells in the 241-SX tank farm and a follow-up investigation revealed that the test wells were free of contamination. Temperature readings obtained in each of the test wells indicated a maximum of 123°F at levels 10 to 50 feet below grade and distances approximately 25 feet from the side of the self-concentrating tanks. It is apparent that the fogging condition observed is related to an extremely saturated atmosphere in the well coming in contact with the cooler atmosphere at grade level. This phenomenon has never been knowingly observed before and gives some indication of the tremendous heat transfer that takes place between the self-concentrating tanks and the surrounding grounds.

E. Analytical Control Operation

1. Control Statistics

<u>Month</u>	<u>Samples</u>	<u>Determinations</u>
January	2210*	5576*
February	2163	5581

* Corrected

2. Building Maintenance

Principle 222-S Building maintenance included the installation of guards covering the wheels and rail on the doors to the multi-curie cells, repair of six leaking vacuum traps and a compressed air trap in the service tunnel, completion of the overhaul and balancing of the building exhaust fans, completion of the lagging on the heating coils of the building fresh air supply system, and repair of the automatic pressure switch on the freon cooling unit for the radioassay counting room.

3. Equipment Experience

Five days of down time were taken on the mass spectrometer during the month for replacement of the isotron source and required maintenance work on the regulation of the magnet current.

Five days of down time were also experienced with the gamma ray spectrometer during the month for the replacement of faulty electronic components.

4. Assistance to Process

Considerable investigative work into the validity of analytical results obtained on the plutonium content of UO_3 carloads was initiated when some material was found to be out of specifications. Standards of pure UO_3 and plutonium spiked solutions were analyzed during the investigation in order to verify the official method on the UO_3 powder. In addition numerous non-routine examinations of uranium products from the Purex and Redox Plants for plutonium content were also made. The Research & Engineering Operation is currently investigating possible discrepancies between the Purex and Redox analytical methods on UNH solutions and will shortly report their findings.

5. Analytical Procedures

It has now been established that the present standard analytical procedure, which requires that a sulfur correction be applied to UO_3 results, will introduce a low bias in the reported uranium content. Work instigated by the 222-S Analytical Laboratory, and verified by Research and Engineering Operation, has proven that the majority of the sulfur is in a form which is driven off by ignition and hence should be corrected for on an "after ignition" basis. With "pot" material from the UO_3 Plant the correction of 0.03% was within analytical limits and hence un-

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detected. However, "continuous calciner" material with relatively high sulfur content increases the correction factor applied by approximately 0.36%. Reporting of future UO_3 results is to be based on the revised procedure.

Method variations including handling of very large samples and special techniques to prevent cross contamination permitted determinations of radio strontium at very low concentrations and led to requests for service from Process Development, Chemical Effluents Technology, Hanford Laboratories.

Method variations and changes in reagent concentration in the determination of cesium in process wastes have improved recoveries on these analyses from 75% $\pm$ 8% to 91% $\pm$ 7%.

F. Improvement Experience

1. Process and Equipment

During the past nine months, pump failures in the F-1 position have resulted in an expenditure of \$56,756 in pump replacements. The principle cause of failure has been leakage in the upper seal. Two courses of corrective action are presently being taken in an attempt to correct this abnormal maintenance problem: (1) Glass bearings and seals are being made up by the 300 Area glass shop. This is based on the suspicion that the present graphite bearings and seals are being attacked by the F-1 solution. (2) A pump has been developed in which the upper seal is located down inside the tank so that any leakage which might develop would flow back into the tank. Promised delivery date on the first shipment of three pumps from the Peerless Company is March 15, 1957.

Recent tests by the Chemical Research and Development Operation of the Hanford Laboratories Operation indicate that the F-1 solution foams excessively during the pumping operation. If this condition exists in actual process, it is possible that the F-1 pump seal leaks could be attributed to foam in the tanks being forced out of a slightly worn seal which, under normal conditions, would be no problem. It would also help to explain why the double slinger rings, installed in the last two F-1 feed pumps to correct seal leaks, failed to have any affect. The use of an antifoam agent will be considered as a corrective measure if further experiments prove that foaming is a problem.

The increasing use of television for maintenance and repair of the 60-T crane has resulted in more efficient utilization of craftsmen. More ways are being discovered for utilizing this equipment with each job and improvements and refinements of a minor nature are being effected as they become apparent. An order was placed this month for a second variable focus lens for the lower camera. The high camera is already equipped with this type of lens and it has proved to be invaluable in bringing into closer focus those portions of the crane within the camera range.

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2. Inventions and Discoveries

There were no inventions or discoveries of a patentable nature reported in the Redox Operation during the month of February, 1957.

G. Events Influencing Costs

Unit cost figures for the month of February will be high due to the limited amount of feed material available for processing.

A budget review of plant equipment, not included in projects, revealed that a reduction of \$46,806 could be made on the 1957 budget with a good possibility that an additional reduction can be effected in the next six months.

On February 8, 1957, authorization was given to Spare Parts to place the T and B Plant spare equipment and spare parts in a standby status pending the decision of the Commission concerning the future of these plants. The value of the spare parts inventory is \$151,767 and the spare equipment inventory is \$145,748.

The recently completed hand tool inventory indicated an inventory value of \$22,902 for the Redox Facility. This includes the tool crib and craftsmen tool boxes in both the 202-S and 222-S Buildings.

A reduction of approximately \$2900 in Redox Spare Parts was realized this month by excessing unusable impact wrench parts, lifting bails, nozzle caps, and Devilbiss compressor parts.

A potential reduction in spare equipment inventory of approximately \$3,200 will be realized as a result of changing the maximum and minimum spares on the Redox crane impact wrenches from 12-6 to 9-6. The savings will be realized as the respective pieces of equipment are installed.

H. Plant Development and Expansion

1. Design Liaison, Construction Checking

Chemical Storage and Maintenance Equipment Facility (ER-2794)

An estimate of \$108,000 was received for construction of these two buildings, a cost of \$60.00 per square foot. Engineering and contingency accounted for 32% of the total. Since this estimate presents only a small chance of approval, the project is being held in abeyance until suitable alternates are found. Consideration is now being given to eliminating the chemical storage building by substituting a sheltered 276 dock, with sodium nitrate make-up in the now idle O-2-A tanks. Other considerations for paint and oil storage may reduce costs to the work order level.

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Cask Car Decontamination Facility (P-89)

The results of a test, conducted on metal shipments between the 105-DR and 202-A Plants, definitely indicate that cask and bucket washing prior to shipment decreases cask car contamination. The test and results are outlined in Industrial Engineering Report No. 95, prepared by Facilities Engineering. Since the adoption of this procedure will probably solve the cask car contamination problem, further activity on this project will be held in abeyance.

The necessity for immediate adoption of a washing procedure in all 105 Buildings cannot be over-emphasized. At this writing a means of direct cask flushing, within the well, is being studied as a means of reducing the man-hours otherwise required for clean shipments out of the 105 Buildings.

Sealing of the Silo Lights and Windows (P-99)

The scope design of the new type bazooka light is now firmed up with verbal concurrence of the electrical and fire inspection engineers. An informal request for an appropriation to perform this work is now in process.

Processing of Fuel Elements from Atomic Energy of Canada Ltd.

Design of buckets and aluminum liners to fit the "J" casks (used by 100 Areas for off-plant shipments) has been completed and fabrication is to begin during the first week of March. Although the "J" casks will require a new bucket design for charging the dissolvers, their use will permit larger shipments and thus expediting the program. The first shipment of Chalk River material is now expected to arrive on-site during March.

CG-621, Redox Contamination Control

Pending completion of the joint sealing in the craneway all minor exceptions will have been completed. Completion of the joint sealing will permit start-up and operational testing of the system. Installation of the canyon hose reel, which will permit impact washing of the canyon deck with the crane, was started this month.

CG-653, Waste Water Segregation

The back pressure on the dissolver coils, which has been attributed to an undersize pipe tunnel header, is to be relieved by utilizing a spare trench header and splitting each coil discharge between the two 3 inch headers. Project Engineering has issued work orders for three cell jumpers and one diversion box jumper to accomplish this objective. The project has been closed out with the above exception plus some needed parts for the swamp water proportional sampler. There was a \$30,000 under run of the approved funds.

CG-722, Recovered Acid Receiving Station - Redox

The project proposal is currently being reviewed by the AEC. \$5,000 in design money has been approved. Redox design is being held up pending change of scope to the preferred unused D-7 UNH pipeline installation. Scoping of the temporary 204-4 tank as a receiving station is now complete and estimates are currently being prepared.

I. Reports Issued

No secret reports were issued by Redox Operation personnel during the month of February, 1957.

III. ORGANIZATION & PERSONNEL

A. Safety

There were no disabling injuries, serious accidents or incidents in the Redox Operation during February, 1957.

On 2-15-57 a localized fire occurred in the west canyon entrance of the 202-S Building south pipe gallery as a result of some welding work being done by the Construction and Engineering Operation. The damage amounted to \$150. The welding work was being done under fire prevention measures which were thought to be adequate, with one workmen being assigned as fire watch throughout the job. However, a smoldering fire developed after the workmen had left the job. The incident was formally investigated.

An extensive safety program was undertaken in the 222-S Analytical Laboratory this month in an effort to reduce the minor injury frequency. A "Safety Monitor" program was adopted and a series of short informal type safety meetings was held to re-acquaint all personnel with laboratory rules and procedures. The "Safety Monitor" reviews selected portions of the laboratory rules in detail and provides general knowledge and reminders to other shift personnel by means of a review of procedure or by observation for unsafe practices and/or conditions during the performance of specific duties.

B. Security

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

C. Personnel Activities

Processing of a group of 15 Laboratory Assistants through the Supervisor Selection Program was started by the Employee Relations Operation this month. These people will provide a list of candidates for future Laboratory Leader openings.

The TBP shutdown has made possible the assignment of all laboratory chemists to day work. Although technically trained personnel

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are now at a minimum due to terminations and transfers, each one is being utilized fully on the technical aspects of the work. This permits the creation of greater job interest as well as aiding each in becoming more specialized in chosen fields.

Messrs. W. K. Davis, U. M. Staebler, and C. A. Woods, of the Division of Reactor Development, Atomic Energy Commission, Washington, D. C., visited the B Plant during the month to discuss the feasibility of using B Plant for processing spent power reactor fuels.

P. E. Lowry, M-1833-6736, Foreman BiPO_4 Mechanical Operation, transferred to the Power & General Maintenance Operation, on 2-1-57.

D. H. Swanson, M-12852-6760, Analytical Chemist, terminated on 2-21-57 to accept a position with the A.E.C. at Arco, Idaho, as a Chief of Accountability.

F. J. Guthrie, M-20133-6760, Analytical Chemist, terminated on 2-12-57 to accept a position as a metallurgist with the Boeing Aircraft Co. in Seattle, Washington.

C. A. Colvin, M-15260-6760, Analytical Chemist, transferred to the Research and Engineering Operation on 2-15-57.

M. R. Weiler, M-17421-6760, attended the Management Orientation course scheduled on February 15 and 18.

Chas. S. Swarth
Manager
Redox Operation

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CHEMICAL PROCESSING DEPARTMENT
FINISHED PRODUCTS OPERATION

MARCH 1957

I RESPONSIBILITY

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

II ACHIEVEMENT

A. Metal Finishing Operation

All fabrication activities were devoted to the preparation of a single model. Most of the plutonium processed came from either the Redox or Purex Plants. A small percentage of the assemblies fabricated were prepared from material from offsite which was returned for refabrication.

Unfabricated plutonium metal was also prepared from plutonium which originated principally from the Purex Plant. An unusually large amount of this type of material was produced and shipped offsite for fabrication at another plant. A small amount of unfabricated material was diverted for special programs at this site.

The general production load was heavier than normal during the month due to combination of higher requirements coming during a short month. Good progress was made, generally, in all production activities although interruptions due to equipment failures were somewhat more severe than normal. Most of the equipment problems which had adverse effects on overall efficiency of the operation were related to valve failures, leaks, and filter difficulties in the wet chemical equipment. Some processing difficulties caused higher fluorination rates in dry chemistry, but, fortunately, this trouble was of short duration.

Background radiation levels in the wet chemistry and dry chemistry operation were somewhat higher than normal during the early part of the month due to increased fission product content of the feed. The fission products were of such a nature that good decontamination was achieved in initial processing and the material produced was therefore well within shipping specifications with regards to penetrating radiation. This general problem of increased radiation in the plutonium feed could have developed in a serious exposure problem if allowed to continue indefinitely. Process changes in the primary plants during the month have resulted in a very significant improvement at month end.

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B. Product Recovery Operation

Thirty-two dissolver runs were made during the month. A 30% increase in batch size was made in each of twenty-one reduction crucible runs with only minor problems encountered. The processing of three very old and grossly contaminated fluoride powders seriously curtailed dissolver operation during the early part of the month in that the solution plugged the block filters. A hold-up vessel for dissolver heels was installed, and with minor exceptions is performing satisfactorily. The use of this vessel has shortened the drying time for the dissolvers with a reduction of several hours cut from the dissolving cycle for those runs which must be charged to a dry dissolver.

Solvent extraction performance was curtailed during the month for a number of reasons. The H-1 bellows failed twice, as did a number of key valves. The agitator of the feed makeup tank (G-9) bent during the month. An acid flush was initiated in an effort to recover unaccounted for plutonium. Normal recovery was halted for a short time in order to process approximately 13 Kg of off-standard Redox material. An operating error resulted in necessity to rework high waste.

The recovery of plutonium from metal scrap and from filter boat flushes proceeded routinely during the month, approximately 11 Kg being recovered from these accounts.

General operation of the 231 and 234-5 Buildings and associated power and ventilation equipment proceeded routinely during the month.

C. Maintenance Operation (Z)

In Task I maintenance activities were normal and a reduction in valve failures over previous months was noted. This is a result of the thicker polyethylene valve plugs recently installed in this Task. In Task II emphasis was placed on furnace maintenance with all corroded door latches being replaced and new door and furnace rings being installed. The DPI sensing unit in furnace #1 failed due to HF corrosion and was replaced. In Task IV difficulties were encountered with element windings and connector failures.

In Recuplex a holdup vessel was installed in the dissolver hood. Agitator shaft and bearings on the G-9 vessel were replaced. The H-1 bellows failed twice and were replaced twice using the original type bellows. The line from Hood 227 to Recuplex was rerouted to bypass the SNHT tank in Hood 5. The waste lines for the CAW tanks to the Recuplex crib became plugged during the sub-zero weather and required considerable purging with steam and hot water to keep them open.

C. Maintenance Operation (Z) (Continued)

In the Analytical Laboratory conduit and wiring in the wall and on hoods in Rooms 143 and 144 had to be replaced as a result of an acid spill which damaged them.

In the Metallurgy and Development Laboratories activity was high with considerable installation work being performed.

D. Analytical Control Operation

Activities in the Analytical Control Laboratory were normal throughout the month. Although the number of samples received was slightly less than in the previous month the actual number of determinations was greater.

Final Inspection activities for the February commitment were completed on schedule. The rejection rate for the month was 10%, the same as for the preceding month. Recommendations early in the month made it possible for the Metal Finishing Operation to reset machine tools to obtain optimum measurements for final acceptance of pieces.

The sample exchange program for plutonium nitrate between Rocky Flats and Hanford is being discontinued as a result of cessation of operations in the 231 Building. It is anticipated that only one more container will be analyzed as a check on past shipments of nitrate.

E. Metal Recovery Operation

Diminishing feed supplies resulting from final phase tank cleanout at Metal Removal Operation, and an excessive amount of Uranium Oxide Plant rework resulting from the flushing of X-1, X-2 and C-1 tanks (in addition to normal C-2 receipts) limited the production to 28.12 Tons. The gross production of 53.15 Tons includes 13.76 Tons of UO_3 rework and 4.47 Tons of out-of-specification Purex UNH, as well as some miscellaneous small items.

The remainder of the solidified UNH from KAPL, which was assigned to the Metal Recovery Operation for disposition, was dissolved in nitric acid and added to the feed system.

The waste plutonium solution from the Argonne National Laboratory neptunium extractions was disposed of to the waste system for underground storage.

No significant failures of process equipment occurred during the month.

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DECLASSIFIED**F. Metal Removal Operation**

Cleanout sluicing and jetting of heels was completed at U Tank Farm during the period. Sluicing of the 105-TX Tank was essentially completed at month end. This is the last tank to be sluiced at TX Farm. The process flush is scheduled to start early in March. A total of 30.4 Tons of Uranium was blended during the period. The major portion of this material came from the 105TX Tank and was accumulated there from the dual-sluicing program.

The 102-U Tank and the 101, 102, 106, 108, and 115 TX Tanks were inspected during the period and declared empty. Four tanks remain to be inspected for final writeoff.

Ditching and cribbing of waste was continued in the early part of the month. A total of 551,000 gallons was ditched, and 511,500 gallons cribbed. Operations were suspended during the latter part of the month due to lack of manpower.

G. Uranium Reduction Operation

Uranium oxide production for February was 102% of schedule. This production was 56% "pot" powder. Three trailer loads (8028 gallons) of recovered nitric acid were shipped to the Purex Plant. All nitric acid production was maintained within customer limit during the month.

At month-end 94 Tons of uranium were in process as UNH, including Purex inventory and tank heels at the Uranium Reduction Plant. During the month Uranium reduction work was seriously complicated by off-specification UNH. Organic-contaminated feed seriously limited plant flexibility. Pot room foaming and serious housekeeping problems resulted from occasional cross contamination in pot room feed.

Three continuous calciners produced during the major part of the month. A failure of the electrical lines to the 224-UA Building shut down all calciner operations on February 10. An average off-line loss of 10 days followed this power failure. The calciners G & H were carefully checked. They restarted without apparent damage after lumped powder had been removed from the beds.

The pot room calciners were shut down from February 4 to 13 to reserve feed for the continuous calciners. During the latter part of February pot room calcination was limited by foaming and resultant slow heat cycles to avoid excessive boil-over.

Reclamation of UO_3 powder from (wrecked) car #395 was completed during February. Dehydration of clean powder in the Luckey Pots was completed February 13. Solution of contaminated powder was completed at month end.

G. Uranium Reduction Operation (Continued)

Three cars of continuous calciner powder were out of normal production specification, however, they were accepted by the customer. Car UA-16 was accepted with 16 ppb plutonium, car UA-18 was accepted with 346 ppm metallic impurities (high iron), and car UA-19 was accepted with 96.7% material passing through 40 mesh screen (vs. 98% specified).

H. Maintenance Operation (U)

Tank farm maintenance for the month consisted of six pump moves, ten periscope moves, four sluice nozzle moves, five steam line to jet moves, and ten gantry crane moves. The above-normal number of changes were necessary due to tank inspection and cleanout prior to shutdown.

Maintenance in the Metal Recovery Plant was confined to pump overhauls to maintain sufficient operating spares for flushing prior to shutdown, thawing of frozen lines during cold weather, and continuing of layaway of equipment as it was made available by Operations. One 60 h.p. fan motor in the 291-U stack area failed and was replaced.

Maintenance in the Uranium Reduction Plant consisted of completion of regasketing of the ED-6 evaporator, regasketing of the inspection plates on the TD-4 fractionator, replacement of the agitator on one electric pot and deentrainment section on the second pot. The agitator on Luckey Pot #19 was lowered, super structure was realigned and doweled, and batch thermocouple and well were replaced. The transmission and drive motor on Pot #20 were replaced.

In the UA Building the covers were removed from the L Cell continuous calciner to remove caked powder from the bed. Plugged off-gas filters were replaced, feed valves and rotameters were removed and cleaned in G, H and K Cell calciners. The ACA drive motors were removed from J and M Cells to be sent to Spokane for repair. A repaired motor was installed on J Cell calciner. The bearings on the X-21-1 exhaustor were replaced.

I. Radiation Monitoring Operation

Nine radiation occurrences were documented in February as compared to fourteen in January. The breakdown is as follows: Metal Finishing - three, Product Recovery - two, Analytical Control - one, Metal Removal - two, and Maintenance (U) - one. None were experienced in Maintenance (Z), Radiation Monitoring, Metal Recovery and Uranium Oxide.

Twenty-three cases of skin contamination were reported in February as compared to sixteen in January. Nine cases occurred in Z Plant, eleven in the Tank Farms and three in the UO₃ Plant. In addition

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I. Radiation Monitoring Operation (Continued)

to these there were three cases in the Engineering and Development Laboratories. Seven of the cases occurred at one time in the 271-U Tank Farm when the 003 blend tank became pressurized and blew contaminated steam out of a four inch riser. All personnel working in the Tank Farm were contaminated to 6000 c/m. Ground contamination up to 10 rads/hr experienced in the immediate vicinity of the riser and the entire tank farm was contaminated from 1000 to 10,000 c/m. The contamination spread was well controlled and no secondary spreads resulted.

Thirty-one cases of uranium deposition have been discovered since the first of the year. While no cases were significant, the general situation surrounding these cases has been investigated and corrective action started to improve conditions and attitudes.

Background radiation levels around Task I and II above the RMA Line remained above normal through February. A reduction of the radiation levels was noted on castings and fabricated pieces.

Three special jobs; The disposition of several drums of plutonium containing waste; The recovery of several drums of uranium from the railroad incident in Idaho; The recovery of the uranium concentrate from KAPL, were completed with excellent contamination control in the U Plant during February.

The removal of the old RG Line was completed and construction forces have now started to work in this area. Contamination control was entirely satisfactory during the entire removal operation.

J. 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. Miscellaneous Improvement Items

In Recuplex, the time cycles for the dissolving equipment have been reduced significantly as a result of the installation of a holdup vessel (D-32) to temporarily contain the dissolver heels and thus shorten drying time for these vessels. Time cycles are reduced on those charges which require that the material, to be dissolved, be charged to a dry vessel.

In Recuplex, in order to lessen the possibility of batch size complications a specific gravity interlock control between solution make-up tank G-9 and solvent extraction

J. Improvement Experience (Continued)

2. Miscellaneous Improvement Items (Continued)

column feed tank G-10 was installed. This new device insures that the solvent extraction system will not continue to operate in the event that certain important chemicals are left out of the feed solution.

In the Uranium Reduction Plant, in order to prevent freezing of pot feed valves and to reduce high insulation repair costs several pots were fitted with revised deentrainment sections and a portion of the feed loop header was retraced and new removable feed valve insulation was installed.

3. Inventions or Discoveries

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

K. Events Influencing Cost

In Recuplex, revision of the limits for plutonium contamination of organic solution before washing is required, from 0.08 grams/liter to 0.13 grams/liter, has been adopted. This change results in fewer washes being required (two per week). These washes, when butted with the prescribed amounts of chemicals, would amount to 600 liters/week of internal recycle. The elimination of these washes thus saves over seven hours per week and increases the solvent extraction capacity of the Recuplex facility.

In the Uranium Reduction Plant, the power failure experienced on February 10 resulted in loss of production of three calciners for a period of ten days. It required the removal of caked powder from the calciner, inspection and rebidding of these pieces of equipment.

In the Uranium Reduction Plant, several incidents with UNH feed material caused increased costs, reduction in plant flexibility, and off-specification UO_3 during February. Cleanout of residual heels and organic from UNH storage and processing tanks was necessary in anticipation of TBP shutdown. Contamination of UNH storage tanks with organic from the Purex Plant made additional flushing mandatory. Preparation to backlog uranium recycle free of organic or particulate matter required flushing. These manipulations have required additional maintenance, have resulted in greater than normal impurities in product UO_3 , and greater than normal recycle to the TBP Plant.

In the Uranium Reduction Plant, an amount of uranium was lost while contaminated UO_3 was being dissolved from railroad ballasts

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K. Events Influencing Cost (Continued)

in improvised facilities. A leaking valve, line freeze-ups at the end of January and inadvertent opening of a pump drain valve resulted in a tank full of solution being irrecoverably lost on February 4. A complete report of this incident is covered in unclassified document No. HW-48464. The recovery of the material contained in railroad car #395 has been completed and the overall material balance indicates the loss to be 6,318 pounds of uranium.

L. Plant Development and Expansion

1. Project CG-691 - Improved Task I and II Project

The removal of RG Line equipment to burial has been completed by plant forces and the area released by RMU for construction activity. Minor Construction forces have started wall demolition work in the area.

The August 1st date for operation of the first unit appears to be tight but still realistic provided vendors can meet their promised dates on equipment now being fabricated.

2. Project CG-734 - RMC Button Line

The project proposal for the RMC Button Line has been approved by local AEC and was sent to Washington AEC on 2-7-57.

3. Mechanical Polisher - Mating Room

Fabrication of the mechanical polisher for the mating room was started. This polisher will permit cleaning and polishing work on the polar surfaces to be done with little hand exposure to the operator.

4. Recuplex

The project proposal for conversion of Recuplex to a Manufacturing facility has been approved by HDO and forwarded to AEC Washington.

A new design for Recuplex pulse generator bellows has been made and tested using water. A prototype assembly is available for operational testing.

5. Project CG-613 - UO₃ Expansion

Work has resumed on the construction of the maintenance facility following the receipt of the roofing and siding materials. The completion of this facility is expected about April 15, 1957.

L. Plant Development and Expansion (Continued)

5. Project CG-613 - UO₃ Expansion (Continued)

A power outage affecting both power lines to the 224-UA Building occurred on February 10, 1957, and resulted in the shutdown of calciners G, H, and K. The inspection of the calciners subsequent to the power outage revealed no apparent damage to the units.

Various items being undertaken by the project to improve the function of the continuous calciner equipment include:

- a. Revisions to the calciner pickup bin unloading lines.
- b. Distortion measurements for the calciner shaft seal housings.
- c. Replacement of the powder unloading system unloading line valves.
- d. Installation of a filter in the UNH loop header.
- e. Installation of capacitance type bin level indicators on a test basis as possible substitute for the indicators installed on the project.
- f. Installation of a deluge system on the secondary concentrators to prevent freeze up of the concentrators.

A test program has been instituted to determine a satisfactory replacement for the existing rotary valves in the powder unloading system.

6. Project CG-712 - Reduction of Air Borne Noxious Fumes - 224-U Building

The comment drawings on the structural and piping details have been issued. A take-off of required piping has been made and efforts are being made to locate materials on site to speed the installation. Construction work on this project will start about March 15, 1957.

7. Project CA-688 - Additional Waste Facilities, 216-BC Crib Area

The final Phase (Phase III) of this project was completed on February 12, 1957. The only exception to the acceptance of this project is the final test well.

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8. Project Proposal - Compressed Air and Venting Facility

The completion of the preparation of the project proposal is being delayed pending completion of the current budget studies by the Construction Engineering Operation. The issuance of the project proposal for approvals is expected shortly after March 4, 1957.

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

The detailed design was started on February 15, 1957, under advanced authorization as per directive HW-417. The project proposal was reviewed by the AEC on February 14, 1957, but was not approved. An answer to AEC questions relative to the project has been prepared and a further AEC review is scheduled for February 28, 1957.

10. Capital Work Order C-86052 - Installation of Product Rework Facilities

This installation is complete except for the tie-in to the process line.

11. Engineering Study - Redesign of Pot Agitators, Shafts, and Seals - 224-U Building

The approved prints of the redesigned calciner pot agitator, shafts and seals have been received. Future orders of spares will be from these prints.

M. Reports Issued

HW-48118 Exposures, Unloading Electric Pots, by R. E. Slater

HW-48504 Chemical Processing Department, Finished Products Operation, Z Plant Monthly Report, January 1957, by W. N. Mobley

III ORGANIZATION AND PERSONNEL

A. Organization Changes

Two Supervisors, (A. Motyka and P. J. Wiater) were interchanged between the Metal Finishing and Uranium Reduction Operations in order to increase the experience and flexibility of the overall organization.

R. E. Mitchell, Foreman, Maintenance, was assigned a crew of craftsmen whose specific duties involve maintenance activity relative to the Metallurgy and Development Laboratories located in the 231 and 234-5 Buildings.

B. Safety Experience

No disabling injuries occurred in the Finished Products Operation during the month. Two near-serious accidents were experienced. One involved the severing of the fleshy tip of a finger by a truck hood. The other involved a back strain from lifting a box weighing approximately 50 pounds. Nineteen medical treatment injuries were experienced this month as compared to fourteen in January. The frequency rate increased from 1.96 to 2.56.

A meeting was held with representatives of the 200-West Fire Department, Fire Prevention, and Ventilation Balancing to formulate a fire fighting plan for the 234-5 Building.

C. Radiation Experience

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

D. Security Experience

No security violations were experienced during the month.

E. Personnel Activities

Four exempt personnel had attended four sessions of the Professional Business Management course during the month. One chemist attended sixteen hours of Management Orientation.

Manager, Finished Products Operation

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CHEMICAL PROCESSING DEPARTMENT
POWER AND GENERAL MAINTENANCE OPERATION

FEBRUARY 1957

I. RESPONSIBILITY

There were no significant changes in the responsibilities assigned this operation.

II. ACHIEVEMENT

A. Operating Continuity

There were no outages of steam, water, or electrical services that affected continuity of operation. However, several potentially serious incidents occurred involving the area raw water supply. The single 24" raw water export line from the 200 East-West "Y" house was out of service for two hours as a result of frozen and ruptured vacuum breakers. One of the two 30" export lines from 100-D area "Y" house to the 200 East-West "Y" experienced a frozen and ruptured valve on the by pass line which resulted in a five hour outage. There was an ample supply of water in the reservoir to supply normal demands while repairs were being effected.

The power operation was confronted with the necessity of placing work of the coal crews on an emergency overtime basis to prevent curtailment of the 200 West steam load due to equipment failure. The supplying of coal to the bunkers was interrupted when it became necessary to remove from service a coal conveyor belt which had begun to separate due to fatigue. After repairs were completed, coal crews working on an emergency overtime basis replenished the low coal supply in the bunkers before a drop in the steam load occurred.

B. Inspection, Maintenance, and Replacement

In addition to performing routine ventilation balancing activities within CPD, the Power Operation's air balance crew completed the following work in the Irradiation Processing Departments:

1. A complete survey of existing air conditioning and ventilating facilities in the 105-H building. The survey is to be incorporated into the scope of a proposed project to remodel the ventilation system.
2. Balanced the ventilation system in the new 1706-KER building for the Construction Operation prior to its acceptance by Irradiation Processing.

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Close liaison with the prime operating plants was maintained. The repair of a grossly contaminated P-130 pump under emergency conditions for the Redox plant, and rendering assistance in evaluating failure of the third Purex head-end centrifuge, were among the principal items of accomplishment.

Emphasis was placed on the preparation of critical "spare" rotating equipment for use in the prime production facilities. Principal among the items made ready, and placed in stand-by status, were six agitators and two pumps for use in the Redox plant, and a centrifuge and two agitators for the Purex facility.

Progress continued on the shops portion of the work connected with Project CG-691 (Improved Task I and Task II 234-5). That portion of site preparation assigned the Shops Operation was completed with removal of the eight existing hoods in the old RG line. Fabrication of the first of two conveyor screws for the calciners was completed. Fabrication of the conveyor was started; however progress was held to an estimated 5% of completion due to difficulties encountered in off-site material procurement. Relief from this situation is expected in March.

The fabrication of 28 cell pipe jumpers, three off-gas heaters, a concentrator tube bundle, and the rewinding of ten electric motors were among the services rendered during the month to satisfy the immediate needs of the prime production plants.

Urgent demands of the Metallurgical Laboratory group for development work necessitated the continued operation of the Machine Shop and Tool and Die Shop on an overtime basis.

Radiation emanating from the 291-A stack filters was reduced from 450 mr per hour to less than 6 mr per hour. This was accomplished by shielding the exposed portion of the building's walls with an excess lot of high density concrete blocks and covering the roof with trench cover blocks which were rejected for use in the canyon.

Renovation and modification of equipment at the Hot Semi-Works continued in accordance with progress schedules. Remaining work consists primarily of modification to existing equipment in "A" and "B" cells which was an estimated 72% complete at month end.

A special lucite hood was fabricated for the Plutonium Metallurgical Operation at 231-Z building. Utmost care was required in the assembly of this hood in order to comply with the customer's very rigid specifications. The hood will house specially designed measuring equipment.

Falling icicles from the 2902 "U" high tank resulted in minor property damage. Necessary repairs consisted of replacing a steel member of the tank superstructure and replacing a damaged steam lateral support pole.

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The ground area surrounding the site had been roped off and steam lines disconnected to minimize property damage when the thaw came. Leaks at the intersection of the tank's bottom and sidewalls were responsible for the accumulation of icicles. Very difficult repairs to the tank are in progress at this time.

The stubbing of eleven steam lateral support poles during February marks the completion of a program started in November 1956 to combat sub-surface rotting. During this period a total of 114 poles in 200 East Area were stubbed.

C. Improvement Experience

Construction of a jig boring and comparator room in the 272-W Tool and Die Shop is in progress and was an estimated 60% complete at month end. AEC approval of funds for modification of the Boiler Shop in 277-W was received and field work is scheduled to start the week of March 11.

A comprehensive study of the future power requirements of the 200 West Area was completed by an outside power consult, Mr. Gustav Karla of Seattle. A detail report is being awaited.

III. ORGANIZATION AND PERSONNEL

A. Safety and Security

No disabling injuries were incurred. Twelve medical treatment cases were reported, which reflects a reduction of 55.56% over the previous month. This month's injury frequency rate was 2.26 as compared to 4.96 for the previous month.

No incidents were reported in which a lapse of radiation control was allowed to occur.

The operation experienced no security violations during the period covered by this report.

B. Personnel Activities

Twenty-nine power operators attended training sessions as part of the personnel development program. Subject matter covered in the training sessions was "Ventilation Practices and Procedures."

Ten employees submitted suggestions of which five were acceptable. Cash awards totaling \$155.00 were presented six employees for previous suggestions.

T. G. LeBreton, Manager
Power & General Maintenance Operation

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CHEMICAL PROCESSING DEPARTMENT
FINANCIAL OPERATION

February, 1957

I. RESPONSIBILITY

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

II. ACHIEVEMENT

A. Product Cost

A system of monthly inventory for frozen lunches was initiated during the month. A small discrepancy was noted and reconciled without difficulty.

In meeting with representatives from each of the three production operations, anticipated equipment expenditures for the balance of the fiscal year were determined and reconciled in an effort to adequately pro-rate available funds.

A CPD code book and work order procedure were prepared during the month and will be ready for issuance early in March.

The following special studies were undertaken and completed during the month:

1. Analysis of duplicating and printing costs.
2. Comparison of pay rates resulting from alternate fire platoon system proposals.
3. Review of Research Engineering liquidation rates and establishment of new rates with the concurrence of Research & Engineering.
4. Revision of overtime report to exclude Project Whitney overtime.
5. Analysis of authorizations for R & D work performed by Facilities Engineering Operation.

In cooperation with the Specialist, Procedures, systems work was completed on the new McBee design order ledger. The necessary forms have been ordered and the new system will be installed during April. Considerable added accuracy and reduced clerical effort are anticipated as a result of this improved system.

Cost reports were in the hands of Level 3 and 4 management by the 10th working day of the month, and analysis letters were issued by the 12th working day. New cost distribution and accumulation reports were designed and published on a trial basis for the Redox Operation. It is

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intended that these reports be issued for all production components in response to requests from operating supervision for further explanatory detail on cost distribution. The study for the U - Pu cost split for the Purex Operation was well under way at the end of the month.

A quarterly summary of Midyear Budget data was prepared and issued to all Level 3 managers. Schedules for preliminary submission of manpower and overtime for the FY 1958 budget were prepared and cleared with Management and issued to Contract Administration on schedule.

As part of the program to keep inventories within a reasonable level, arrangements were made to transfer approximately \$45,000 worth of BiPO₄ essential materials from inventory to standby and ultimately to excess. Work was also completed on the transfer of \$318,000 of TRP, BiPO₄, Redox, and Finished Products spare parts from inventory to standby in order to relieve the inventory of obsolete and excess material.

B. Personnel Accounting

HAMTC Article XI states in part, "Employees who are out on account of compensable accidents shall be paid an amount equal to the difference between the forty (40) hour weekly salary they otherwise would have received, including isolation pay where applicable, and the payments that they receive from Workmen's Compensation until such time as the disability payments are terminated by an order of the Department of Labor and Industries or by an order of the Superior Court."

Few employees realize that this is one more benefit offered by their Company to eliminate salary loss when injury has been job incurred. For example: The total temporary disability schedule allows an injured employee, who is married and has three children, the sum of \$165 per month (\$55 every ten days off the job). In addition to the lost time allowance, all medical and hospital bills are paid for under provisions of the Act. But, during a time of hospitalization or confinement at home, with a natural increase in expenses, the State's allowance, by itself, would scarcely cover expenses. General Electric pays not only the portion applicable to Workmen's Compensation, but the balance of the employee's full salary, excepting shift differential; until the injured has recovered and returned to work, or a settlement has been made. In a few isolated instances, such payments of full salary have been continued for more than two years. In these cases, even though payments in lieu of salary are extended beyond a twelve month period, the injured's continuity of service is broken on the expiration of the first year of absence.

At the present time three CPD employees are being paid in the manner described above. One has been paid since September 16, 1954, and the other two since June and December, 1956.

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Statistics:

1. <u>Numbers of CPD Employees</u>	<u>Monthly</u>	<u>Weekly</u>	<u>Total</u>
Employees at Beginning of Month	424	1 441	1 865
Additions and Transfers In	0	16	16
Removals and Transfers Out	10	40	50
Transfers from Weekly to Monthly	2	(2)	0
Transfers from Monthly to Weekly	0	0	0
Employees at End of Month	416	1 415	1 831
2. <u>Overtime Payments During Month</u>	<u>February</u>	<u>January</u>	
Non-exempt employees	\$16 578*	\$23 908*	
Exempt employees	4 103	3 144	
Total	<u>\$20 681</u>	<u>\$27 052</u>	
* Payments to non-exempt employees cover a four week period.			
3. <u>Gross Payroll</u>	<u>February</u>	<u>January</u>	
Non-exempt employees	\$682 854*	\$ 698 927*	
Exempt employees	307 530	305 011	
Total	<u>\$990 384</u>	<u>\$1 003 938</u>	
* Payments to non-exempt employees cover a four week period.			
4. <u>Pension Plan</u>	<u>February</u>	<u>CY to Date</u>	
Number retired	1	1	
Number who became eligible for participation	6	8	
Number who elected to participate	6	8	
Number who elected not to participate	0	0	
Replies not received	0	0	
5. <u>Insurance Claims Paid</u>	<u>February</u>	<u>CY to Date</u>	
Employee Life Insurance	1	2	
Amount	\$11,614	\$24,314	
Employee Weekly Benefit Claims Paid	37	50	
Amount	\$ 3,504	\$ 4,831	
Employee & Dependent Accident and Health Claims Paid	441	711	
Amount	\$33,742	\$55,568	
6. <u>Suggestion Awards</u>	<u>February</u>	<u>CY to Date</u>	
Number of Awards	28	68	
Total Amount of Awards	\$445	\$990	

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<u>7. Preferential Rates</u>	<u>February</u>	<u>CY to Date</u>
Number added	0	0
Number eliminated	0	0
Number currently in effect	58	-

<u>8. Number of Military Allowance Payments</u>	<u>February</u>	<u>CY to Date</u>
	0	0

C. General Accounting

The accrued costs for twenty-one closed projects were transferred to CPD from CEO on February 12, 1957. The General Accounting Operation will be responsible for these costs for all CPD projects. The present accrual amounts to \$83,303.65.

As of January 31, 1957, CPD had 40 active projects with total cost of \$12,874,264 and commitments of \$1,838,600 against \$21,426,200 authorized funds. New work approved during February was Tool and Die Shop Equipment for 272 W Building, \$11,800 and Purex Recycle Dock Shelter for \$10,000.

The Plant Acquisition and Construction Budget for FY 1959 is progressing on schedule and will be completed during March.

During February several meetings were held with Facilities Engineering personnel to clarify the various methods of accumulating and reporting costs. This is expected to be of value in avoiding misinterpretation of financial information and reports.

Depreciation expense charged to Product Cost in February amounted to \$1,105,688. This included an export water assessment of \$9,588 from IPD and a General Use assessment of \$91,515 from R & U.

During the month meetings were held with representatives for Redox, Purex, and BiPO₄ in an effort to obtain better control of Spare Equipment.

A special report of CPD facilities in Standby Status as of June 30, 1956 was submitted as requested by Contract Administration for consolidation and forwarding to AEC.

Revision of depreciation procedures, relative to process waste disposal facilities, are under joint study and discussion with AEC. It is to CPD's advantage that the problem be resolved at the earliest possible

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date, to allow for possible reserve adjustments and implementation of the new procedures prior to the close of FY 1957.

D. Auditing

The Manager-Auditing and his staff have continued at their assignment of assisting the Traveling Auditors while this group is at HAPO. Present estimates indicate this assignment will be completed in approximately six weeks.

Audit of CPD by the Traveling Auditors was started on the 25th of February.

E. Procedures

During February, the design of the McBee Keypunch system to be used for accumulating Engineering Costs was completed. This system, which has been ordered, with delivery expected in the first part of March, will permit accurate reporting in a minimum of time.

A detailed audit of the four savings bond accounts was initiated. As of February 28 the exempt Stock Bonus and Savings Bond accounts have been reconciled. Several procedural changes are being examined and tested for use in the Bond Account routines.

Forms design work has continued at a brisk rate. The conversion of engineering reports issued by the Project Cost Operation to ozalid foil masters has been completed. This conversion will eliminate the necessity for typing the operating reports.

F. Measurements

Production and costs estimates for FY 1959 were prepared and forwarded to the Contract Study group for inclusion in the current fee-type contract being developed.

III. Organization and Personnel

A. Organization

In order to achieve a better division of responsibility and promote improved accountability and service, the Product Cost Operation was re-organized. Supervisors of Cost Services-Product Components and Cost Services-Supporting Components have been set up to carry out these functions.

B. Safety

A safety meeting for all Financial Operation personnel was held during February.

No minor injuries were experienced during the month.

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D. Reports Issued

HW-48536 Secret "Chemical Processing Department Unit Cost Analysis
for January, 1957" by B. M. Dobbs

HW-48316 Secret "CPD Essential Material Inventory and Consumption
Report for the Month of January, 1957" by S. R. Myers

E. Personnel Activities

T. E. Sparks, Manager-Auditing, visited G. E. plants at Cincinnati,
Schenectady, Fort Wayne, and Lynn to discuss the various aspects of
the auditing activity.

Manager - Finance

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CHEMICAL PROCESSING DEPARTMENT
FACILITIES ENGINEERING OPERATION

February, 1957

I. RESPONSIBILITY

There were no changes in responsibilities in the Facilities Engineering Operation during the month of February.

II. ACHIEVEMENT

A. Purex Operation

Research & Development

An analysis report on the Purex In-Line Instrumentation program is being prepared. This report will show the effect of the proposed new two-cycle flowsheet and the sample gallery improvement program on the over-all in-line program. It is anticipated that this report will serve as the new basis for in-line instrumentation scope studies and will redirect the current research and development efforts on in-line instrumentation.

A proposed "independent" oiling system for Purex Plant centrifuge bearings was considered to be feasible by Bird Machinery Company. A contract for them to do the development work on a system of this type is in preparation.

Process Technology

A preliminary letter of scope definition on the replacement Purex HA Column was issued for purposes of initiating project proposal action. Preliminary column specifications were provided to assist in establishment of the project cost estimate. The new HA Column will incorporate desirable features of the new 2D Column, including increased product recovery and improved decontamination. Provision would be made in the column for future Purex process two-cycle stream routings.

Tests have continued in HLO of interface control instruments which might be applied to the proposed Purex Plant HA Column. A float type has been selected. Preliminary plans have been made for the design, fabrication, and installation of a prototype of a float instrument on the 1A Column.

A new process for the conversion of plutonium nitrate solutions to a dry powder suitable for reduction to metal appears very attractive for coupling to a cationic exchange process such as the prototype installation now almost completed at Purex. Plutonium trifluoride is precipitated

directly from the nitrate in an aqueous solution; after filtering and drying, the trifluoride power can be efficiently reduced to metal. A present Task I and II installation at Purex would eliminate the need for (1) further concentration of the cationic exchange product, with resultant metal contamination from corrosion, and (2) additional PR cans.

Preliminary sketches of a minimum service dissolver installation, located outside the 202-A Building, were completed. Estimates on this installation are to be compared to the previously estimated \$120,000 for an in-cell installation.

Advance Engineering

The study on Budget Item 659-011, Acid Fractionator Surface Condenser, was completed and the report (HW-48484) issued. This condenser will provide an inherent separation of process condensate and cooling water, which would in turn extend the life of the present 216-A9 Crib. Specific activity data are to be obtained shortly on the present contact condenser effluent as a function of vacuum fractionator capacity. Should the specific activity be low, the effluent could be routed to the Purex swamp through an existing chemical sewer tie-in, in which case the surface condenser project, requiring funds in the amount of \$125,000, could be deferred for FY-1959 budgetary action. In the event the specific activity is found to be too high to permit swamp disposal of condenser effluent, the condenser facility will be required by about December 1957.

The study on Budget Item 659-029, Increased Lag Storage, Purex, was completed and the report (HW-48522) issued. With the addition of two 100,000 gallon stainless steel storage tanks to the 203-A facility, Purex could process 75-day-cooled metal at a capacity factor of 4.0. The estimated cost for this additional storage capacity is \$600,000. A decrease in inventory of plutonium, amounting to \$15,000,000 (based on a cost of \$50 per gram), could be made by the Purex Plant processing 75-day-cooled metal.

Plant Engineering

Final design activity in the preparation of the design package for a contact-maintained L cell plutonium concentration package has progressed satisfactorily during the month. The target completion date is March 11, 1957.

Project Activities

CG-598 - Purex Acid Fractionator

Final acceptance of this facility was established on 2-26-57. A

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physical completion notice is in preparation. Final maximum capacity tests are scheduled for the next Purex shut-down. A 7 per cent under-run for the project is indicated.

CA-513-A - Purex Facility, Expansion of 200 Areas Facilities

The progress on the second crane order and the recent schedule review indicate project completion in June or July, 1958.

B. Redox Operation

Advance Engineering

The study on Budget Item 659-013, Processing of E Metal - Redox Plant, was completed and the report (HW-48491) issued. The study recommends budgeting \$800,000 for the construction of four new dissolvers and towers (one spare) and the replacement of the existing dissolvers. The dissolver design provides for a 9-inch annular metal crib in the 7-foot vessel, which will meet nuclear safety requirements when processing enriched uranium of 0.98% equivalent - U²³⁵. The dissolvers will provide adequate capacity to meet Phase III Redox rates (420 tons per month instantaneous).

Process Technology

Cask Car Contamination

The study of the effectiveness of slug and interior cask washing was completed and a report (HW-48084) issued. Tests indicated the removal of particles by washing substantially reduced subsequent contamination problems. Based on the tests, a program of slug and interior cask washing at the reactor loadout facilities was recommended.

Evaluation of Cask Car Projects

A report evaluating six proposed projects for reducing cask car contamination was issued.

Each proposal was intended to solve the same contamination problem. The report recommended the adoption of a hinged lid modification, also slug and cask interior washing proposals.

Plant Engineering

Cell Wall Electrical Connectors

A study is underway to determine a satisfactory means for reactivation of dead electrical wall connector heads in cell service. The basic

concept for this task is a complete rewiring of the wall head. Although the initial effort is directed toward Redox where a larger number of cases exists, the technique has application for future Purex use.

Redox F-1 Pump

Design has been completed and fabrication started on an F-1, Redox pump using glass bearings instead of carbon. The pump is a converted P-18-6-2 from TBP plant, originally supplied by Peerless Pump Company.

C. Finished Products Operation - Z Plant

Research and Development

Drafting work was continued on the preparation of a series of scope and study stage drawings relating to the new button line facilities. The scope and study stage drawings now being prepared are needed to firmly establish the overall space requirements, to prove the feasibility of a separated conveyor hood used with Task III, and to accurately evaluate shielding and radiation requirements. The completion of this work will permit rapid startup of detail design of the button line project shortly after project authorization.

Design and development effort for developing the scope for the new fabrication line facility was continued. A total project estimate for the new fabrication facilities was completed by the Estimating Operation in CEO. This estimate indicated a total project cost of \$1,600,000. Near the end of the month a flowsheet was received from Research and Engineering on the new fabrication line facility. The information on this flowsheet is presently being evaluated.

Advance Engineering

Two budget studies were completed during the month for the FY-1959 Plant Acquisition and Construction Budget. These two budget study reports contained the following two recommendations.

- (1) It was recommended that \$200,000 be included in the FY-1959 Construction Budget for the installation of equipment to increase the capacity of the Recuplex facility. Most of this money will probably be needed for the slag and crucible dissolver facility.
- (2) Since it appears that the new weapon shapes will render most of the RMA Line fabrication equipment obsolete, it was recommended that \$1,250,000 be included in the FY-59 budget to modernize the RMA Line and put it on the same technological basis as the RMC Line.

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Project Activities

CG-691 - Improved Task I and Task II Facilities

The detailed design of this project is complete, with all drawings approved. The acceptance test procedures remain to be completed.

Removal work in the BG area was essentially completed, with only miscellaneous items remaining to be removed. The area is ready for installation of hood frame H9B, which is due to arrive approximately 3-8-57, after being delayed by vendor procuring wrong-size Nelson welding studs.

Local shop fabrication continues satisfactorily on the calciner and conveyor components.

UO₃ Plant

Research and Development

An unscheduled power outage occurred in the UO₃ Plant during the month with three continuous calciners in operation. All available data pertaining to this unscheduled outage was collected and evaluated during the month. Since it appears that all the calciner troughs successfully withstood the effects of the outage, a report was prepared and issued in which it was concluded that the installation of emergency power in the 224-UA Building is not justified. It was also concluded that an automatic tie between the two principal electrical buses in the 224-UA Building should be installed instead of the present manual bus tie. Such an automatic bus tie may prevent future outages to part of the process equipment.

Advance Engineering

A budget study, No. 659-015 on modifications to the UO₃ Plant continuous calcining facility was completed and a report (HW-48339) issued during the month. This report contained a recommendation that funds in the amount of \$700,000 be budgeted in FY-59 in order to provide means for segregation and to insure continuity of operation of the continuous calcining facilities.

Research and Development

A flowsheet is expected from Research and Engineering during the month of March on a process for segregation of cesium from the Purex 1WW waste

stream. Preliminary studies have been started prior to receipt of the flowsheet in converting one of the BiPO₄ Plants to cesium recovery. Preliminary discussions were held with members of the Hanford Laboratories Operation on the development of a prototype isolation and packaging unit for use in a fission product segregation plant. Some of the tentative agreements reached with HLO are as follows:

1. A single product will be made, namely cesium chloride and it will be packaged in bulk containers. The development of this unit will not be carried out on a crash basis and initial schedules indicate that the completion and demonstration of the prototype will be scheduled for January 1, 1959.
2. The HLO will select and procure the manipulator to serve the prototype facility.
3. The exact location of this isolation and packaging facility will be established later when more details are available.

Advance Engineering

A budget study was completed during the month on a fission product segregation plant. In this study it was recommended that \$2,000,000 be included in the FY-1959 budget for the detailed design and construction for modifying and converting B Plant into a fission product segregation plant.

Project Activities

CG-613 - Hanford 4X Program - Metal Conversion Plant

The modification work in the 224-UA Building required to provide facilities for testing the rotary valves was completed February 27. Testing of the valves will be started immediately.

Installation and tie-in of the deluge water system to the ED-7 concentrator was completed February 22. The system has temporary controls installed which will permit its operation until a pressure switch, which is on order, is delivered.

Two capacitance probes have been procured and installed in the K cell collection bin for testing as level indicators to replace the installed mechanical type level indicators which have not functioned satisfactorily. As yet, sufficient data has not been obtained to establish the acceptability of these probes for this purpose.

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In order to improve the air flow balance at the 6 pickup hoppers on the product handling system, orifice plates have been installed. This appears to have eliminated the plugging of the system; however, because of the abrasive action of the powder, the predicted life of the orifice plates will be very limited. Further study to obtain a more extended life is underway.

D. General Activities

Research and Development

The structural evaluation and economic comparison of the proposed vertical and horizontal waste storage tanks are being made by Amman and Whitney under Consultant Agreement No. CA-147.

The design of an improved paneling for transparent walls of contamination enclosures has been further developed. In addition to hood cell construction for which this new approach to rigid contamination barriers was first devised the standard paneling is now adaptable to small hoods or other contamination enclosures.

Features of the improved design include:

1. Elimination of precision machining.
2. Elimination of all bolt or tap holes in the contamination barrier.
3. Air tight sealing of all panels.
4. Simplified construction.
5. Easy panel replacement.

Drawings detailing the construction of the improved barrier design are being prepared for issue.

Chemical Processing information, schedule and cost data, was transmitted to Irradiation Processing Department to be used in conjunction with reactor studies being made for the AEC Division of Reactor Development. The basis for the study was a new HAP0 graphite-moderated, water-cooled 1,000 MW (thermal) reactor optimized as a power producer and operating for a power demonstration period starting July 1, 1961 at a total exposure of 10,000 MWD/T and subsequently, as a production reactor, at a total exposure of 1,000 MWD/T.

Advance Engineering

The study on Budget Item 659-024, New Separations Plant Design, was completed and the report (HW-48396) issued. It was proposed that \$4,000,000 be provided for design of a new 300 ton per month separation plant to meet anticipated processing commitments arising from the weapons and atomic power programs by FY-1962. The plant initially would handle weapons - type fuel elements with enrichment up to 0.94 per cent U-235 equivalent, such that the capacity of subsequent solvent extraction steps need not be limited by nuclear geometry or uranium degradation considerations. Either a two-cycle Purex-type extraction process would be employed or the newer one-cycle process, depending on the outcome of flowsheet development. At a future date, fully enriched power reactor fuels could be processed, if necessary, by the remote replacement of the initial vessels with smaller diameter critically safe vessels. Design would be completed by January 1960. The projected construction completion date of the new facility would be November 1961, assuming procurement and construction funds were made available in FY-1960. The total project cost of the new facility would be about \$60,000,000.

The study on Budget Item 659-025, on Power Fuel Reprocessing, was re-written and issued in the light of AEC - published information, HAN-64110-1, on loads, enrichment levels, and "burn-ups" for the 1958-1965 fiscal year period. Based on the latter information, the addition of a Redox critically-safe dissolver facility will enable reprocessing of approximately one-third of the total load in the Redox solvent extraction battery without suffering degradation upon blending with normal HAP0 production. The reprocessing at Redox of additional portions, that is, higher enrichment levels, of the power reactor discharged fuels will be determined by degradation economics rather than processing capacity. The Redox solvent extraction battery has adequate capacity at Phase III rates to blend for critically-safe processing 70 per cent of the 1960-1965 power fuels up to and including the 10 per cent enrichment level. In summary, the Redox dissolver facility is probably a short range solution only; a complete new Chemical Processing Department facility with block segregation of varying uranium enrichment batches built into a design based on the highest enrichment level to be reprocessed appears to be the long range goal.

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The following FY-1959 budget item study on Additional Waste Disposal Facilities was completed:

659-004 Control of Underground Water

This study recommended that \$1,275,000 be budgeted for design and construction of cooling towers at Purex and Redox and for additional 24 inch and 18 inch carbon steel pipe lines to direct the flow of waste water into the ground at the most favorable locations.

Plant Engineering

On February 19, 1957 the third centrifuge in the E-4 position failed. It has been removed to M-cell for decontamination and inspection.

Detail drawings and purchase specifications are being prepared for the purchase of Purex spare agitators. The new units will duplicate present units as nearly as possible. The use of HAPO drawings will eliminate the need for detail design and development by vendors, thereby making a substantial saving in both, procurement time, and cost.

The office space study for FY-1959 budget preparation was completed. The conditions and problems in certain temporary office assignments were evaluated for a more permanent solution for service components of CPD. Renovation of 30,000 square feet in 2101-M for office space at a cost of \$400,000 was recommended.

A budget study report (HW-48080) has been issued, covering requirements and justification for an equipment examination facility to be included in the FY-1959 Budget. It is contemplated that this facility would be installed in the 221-T canyon and includes an inspection cell, with related tools and gear necessary to make complete inspections and some repairs on major equipment.

During February the first use of the Halogen-type H-1 leak detector was made in the 200-W shops in testing the first of two tantalum tube bundles

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received on the project for the Redox 233 concentrator building. This demonstration has shown the way for extensive use of this type of testing to speed up shop fabrication of vessels.

A preliminary study has been completed on the feasibility and approximate cost of converting a TD-24 International bulldozer to operate by radio-remote control for burial operations. It appears that such a conversion can be made for approximately \$8,000. Cost is estimated at \$4,000 for radio and hydraulic equipment and \$4,000 for engineering, drafting, and shop work.

Arrangements have been made for Materials Engineering to assist Stores Operation by providing technical recommendations concerning stainless steel being purchased for Stores stock. Because CPD is the primary HAPO consumer of stainless steel, it is believed that we should provide such recommendations although the steel may be used by other HAPO components.

Project Activities

CG-655 - Crib Methods Selection Tests

Construction Engineering Operation will complete the analysis of available crib data at the end of this month. Much of this work has consisted of developing work graphs of the available data and making calculations on unit dispersal rates.

A tentative agreement was obtained with the AEC on the proposed initial field test installation of one 5 foot diameter infiltrometer (type A) and three 14 inch diameter infiltrometers (type C) in the proposed Purex Master Crib Area. A letter to AEC requesting confirmation of agreement on initial field tests is being prepared. This is in accordance with AEC Directive No. HW-376.

IR-217 - Tool and Die Shop Equipment Room - 272-W Building (HW-47835)

Authorization for \$11,800 to construct an air conditioned room in the 272-W Maintenance Building to house an optical comparator and precision jig borer was received from the Commission, February 6, 1957.

III.

ORGANIZATION AND PERSONNEL

A. Organization

K. E. Kolb, A. R. Skaran and K. L. Sanborn, Engineers, terminated this month to accept employment elsewhere.

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B. Safety

There were no disabling injuries during the month and the medical treatment injury frequency rate continues to remain low.

C. Security

There were no security violations during the month of February.

D. Inventions

All persons in the Facilities Engineering Operation 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>Subject</u>	<u>Report of Invention</u>
C. R. Anderson	Hindered-Settling, Discrete-Pellet-Fuel-Bed Nuclear Reactor	February 8, 1957
W. P. Ingalls	Device for Removal of Material from an Air-Tight Hood	February 28, 1957

E. Reports Issued

HW-48084	Effectiveness of Slug Washing on Prevention of External Cask Car Contamination - Chemical & Irradiation Processing Department Joint Report, by A. C. Morgenthaller, January 28, 1957.
HW-48080	Budget Study for Equipment Examination Facility, by R. C. Tabasinske, January 30, 1957.
Unclassified	Evaluation of Cask Car Projects, by A. C. Morgenthaller, January 31, 1957.
HWS-6151	Titanium Fabrication Specification, by G. A. Conner and R. D. Switters, February 2, 1957.
Unclassified	Chemical Processing Department Office Facilities, by R. C. Corlett, February 11, 1957.

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HW-48500 RD Essential Materials Standard for the Redox Plant, January, February, March, 1957, by A. C. Morgenthaler, February 15, 1957.

Letter Feasibility of Remote Bulldozer Operation (to J. D. Goggin), by G. L. Davis, February 19, 1957.

Unclassified Time Utilization Measurements - Shop Operation, by P. J. Norderhus, February 26, 1957.

HW-48467 The Use of T Plant Canyon as a Decontamination Facility, by R. A. Kennedy, February 14, 1957.

HW-48395 FY-1959 Budget Study, 200 Areas Waste Storage Facilities, by H. W. Stivers, February 15, 1957.

HW-48139 Budget Item No. 659-003, FY-1959 - Plant Acquisition and Construction Budget, Scavenging Stored Wastes, by H. A. Moulthrop, February 1, 1957.

HW-47046 Additional Facilities to Handle Purex Tank Farm Vapor Wastes, by V. W. Wood, January 7, 1957.

HW-47087 Waste Tank Temperature Studies, by M. W. Cook and J. M. Gerhart, January 28, 1957.

HW-48317 Budget Item No. 659-002, FY-1959 Plant Acquisition and Construction Budget - Control of Underground Water, by V. W. Wood, February 8, 1957.

HW-48117 Recuplex Modifications - 234-5 Building, by C. F. Yuenger, February 4, 1957.

HW-48339 Modifications of Continuous Calcining Facility - Budget Study Report, by K. L. Sanborn, February 7, 1957.

HW-48382 Nitric Acid Recovery Uranium Reduction Plant, by H. G. Johnson, February 8, 1957.

HW-48502 Fission Product Segregation Budget Study Report, by J. M. Gerhart, February 15, 1957.

HW-48726 Modifications to the RMA Line - 234-5 Building - Budget Study Report, by J. W. Kolb, February 21, 1957.

HW-48336 Budget Study Report, FY-1959 Plant and Equipment Budget, Separations Plant Expansion, Budget Item No. 659-023, by L. R. Michels, February 6, 1957.

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HW-48396 Budget Study Report, FY-1959 Plant and Equipment Budget, New Separations Plant Design, Budget Item No. 659-024, by L. R. Michels, February 15, 1957.

HW-48474 Budget Study Report, FY-1959 Plant and Equipment Budget, In-Line Instrumentation Program, Redox and Purex, Budget Item No. 659-009, by R. N. Donelson, February 15, 1957.

HW-48484 Budget Study Report, FY-1959 Plant and Equipment Budget, Acid Fractionator Surface Condenser, Budget Item No. 659-011, by L. R. Michels, February 15, 1957.

HW-48499 Budget Study Report, FY-1959 Plant and Equipment Budget, Replacement Ventilation Filter, Budget Item No. 659-010, by W. A. Graf, February 15, 1957.

HW-48491 Budget Study Report, FY-1959 Plant and Equipment Budget, Processing of E Metal - Redox Plant, Budget Item No. 659-013, by W. A. Graf, February 18, 1957.

HW-48522 Budget Study Report, FY-1959 Plant and Equipment Budget, Increased Lag Storage, Purex, Budget Item No. 659-029, by J. R. LaRiviere, February 19, 1957.

Letter C. A. Lyneis from L. L. Zahn, "Project CG-653 - Redox Waste Water Segregation Rerouting Dissolver Cooling Water and Steam Condensate," February 8, 1957.

Letter L. L. Zahn from G. K. Carpenter, "Quantitative Summary of Redox Dissolver Characteristics," February 11, 1957.

Letter H. R. Kosmata from L. L. Zahn, "Power Demonstration Reactor Spent Fuel Processing Requirements," February 15, 1957.

Letter C. E. Kent from L. L. Zahn, "Replacement HA Column for Purex," February 21, 1957.

Letter C. T. Groswith from L. L. Zahn, "Final Design - Replacement Spare Dissolver of Increased Capacity, Redox Plant," February 25, 1957.

Letter O. F. Beaulieu from L. L. Zahn, "Status of Final Design Work Replacement L. Cell Package, Purex," February 26, 1957.

Letter D. R. Gustavson from E. O. Swain, "Budget Study for Recovery of Uranium from UO₃ Plant Wastes - Budget No. 659-016 D.O. #K-33446-P", January 31, 1957.

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Letter D. R. Gustavson from K. L. Sanborn, "Budget Study for Electric Pot Room Renovation - Building 224-U - Budget No. 659-018 D.O. #R-33448-P", February 6, 1957.

Letter H. P. Shaw from H. G. Johnson, "Emergency Power for 224-UA Building," February 22, 1957.

Trip Report Visit to Reliance Electric and Engineering Company, by R. C. Hollingshead, February 18, 1957.

HW-47088 The Design and Application of a Heat Transfer Analogue for Radically Symmetrical Problems, by M. W. Cook, January 30, 1957.

HW-47715 Informal Request, Equipment Removal and Relocation of Boiler Shop, 277-W Bldg., by D. H. Snyder, January 4, 1957.

Letter Support of justification, utilization of 224-U Acid at Redox and Purex (Project CG-722) dated February 25, 1957.

Letter Status of CG-613, Start-Up Items, by H. Radow and D. W. McKee, February 18, 1957.

HW-48132 Monthly Report, FEO, by H. P. Shaw, February 8, 1957

Unclassified General Manager's Monthly Project Report, by C. R. Bergdahl, February 28, 1957.

Unclassified Semimonthly Status Report, February 8 and February 21, 1957.

F. Trips

C. R. Anderson and P. S. Kingsley visited Washington State College on February 13, 1957, to discuss hydraulic classifiers.

C. R. Bergdahl attended the Winter General Meeting of the AIChE in New York City from January 21 through January 24, 1957.

R. C. Hollingshead visited the Bird Machine Company, Walpole, Massachusetts, January 28 - February 1 and Reliance Electric and Engineering Company, February 4, 1957 to discuss Purex centrifuges and motors.

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G. Visits

Mr. Gustav Karla of Karla Engineers, Seattle, visited Mr. G. L. Davis on February 25-28 to collect data for work on a 200-W steam plant study.

Two Blaw-Know engineers, Dr. H. B. Coats and Mr. Baczewski visited HAPO on February 21 to discuss experience with mechanical equipment in separations plants.

Mr. I. R. Compton, representative of Berkeley Division of Beckman Instruments, visited HAPO on January 31 to discuss the Berkeley digital to analog converter.

Manager,
Facilities Engineering Operation

HP Shaw:FC:mh

CHEMICAL PROCESSING DEPARTMENT
RESEARCH AND ENGINEERING OPERATION

February, 1957

ADVANCE PROCESS DEVELOPMENT

Cesium Recovery by Solvent Extraction

A solvent extraction process for the removal of cesium from Purex and Redox wastes was proposed for research and development demonstration. The proposed process employs dipicrylamine (2, 2', 4, 4', 6, 6' - hexanitrodiphenylamine) (or one of many similar compounds suggested) in nitrobenzene as the solvent. Other than clarification, pretreatment of the neutralized waste supernate is probably not required. Following extraction, the waste is returned to storage (or process) minus cesium-rubidium, but with its macro-composition unaltered. The organic extract containing cesium and rubidium is stripped with hydrochloric acid. The cesium and rubidium chlorides formed transfer to the aqueous phase for evaporation to dryness and packaging as a gamma source of high radio-isotope purity. The organic effluent from the stripping step is recycled directly to the extractor.

The process is applicable to Redox, Purex, Uranium Recovery, and Coating Removal alkaline wastes. For success, it requires a feed solution of high salting power which is alkaline. Under such conditions, the reagent, dipicrylamine, is highly selective in its reactions, forming tight, aqueous-insoluble, organic-soluble, inner complex salts with potassium, rubidium, cesium, and thallous ion. Moderately strong complexes with ammonium ion, and weak complexes with lithium, sodium, magnesium, and alkaline earths are also formed. The weak complexes can be scrubbed out with ammonium hydroxide, whereupon stripping yields an ammonium chloride-hydrochloric acid solution containing only cesium, rubidium, and (if present) potassium chlorides. Of these, only cesium, rubidium, and potassium yield non-volatile chlorides. The complexes are not stable in acid media, and the dipicrylamine is insoluble in aqueous acid solutions.

The process can operate on a small scale for demonstration purposes pending a market for cesium-rubidium sources, or it can operate on a scale such as to decontaminate current Purex and Redox wastes with respect to cesium. Details of the theory and potential application of this process are discussed in a report currently in preparation.

Decontamination Reagent

Sodium triphosphate, $\text{Na}_5\text{P}_3\text{O}_{10}$, is suggested as a complexing agent in neutral or slightly alkaline solutions to assist in the decontamination of surfaces. This material is formed by solid state reaction between equimolar quantities of sodium meta and pyrophosphates. With this reagent, soluble complexes are formed in alkaline hydroxide, phosphate, carbonate, borate, and ammonia

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solution with Li, Be, Mg, Ca, Sr, Ba, Zn, Cd, Fe^{+2} , Fe^{+3} , Co, Ni, Mn^{+2} , Cu, Pb, VO^{+2} , Al, Y, In, La, Ce, Pr, Nd, Ag, Hg, Ti, Zr, Sm, Tl, Bi, Sn^{+2} , Sn^{+4} , Th, and UO_2^{+2} . Freshly precipitated Ca, Sr, Ba, and Pb fluorides, Pb and Ag chromate, Pb and Ba sulfate, and uranyl ferrocyanide are dissolved by this reagent.

Contact Engineering

The impact of the Phase II, two cycle Purex flowsheet on the in-line chemical instrumentation program was evaluated, and those instruments not required by the new flowsheet were cancelled from the project. The construction of the BC crib area was completed, with the exception of the test wells. Completion of this project permits the disposal of the balance of the wastes generated by the metal recovery program.

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PUREX PROCESS TECHNOLOGY

Feed Preparation-

Four charges (36 tons) of 90-day "cooled" uranium were dissolved in the C Cell dissolver to test the iodine removal efficiency of the new prototype dual-pass silver reactor. Although the C Cell monitor did not indicate any change, radio-iodine emissions from the Purex stack increased approximately ten-fold above normal during the test. Additional tests of dissolving short "cooled" material are contemplated in order to evaluate reactor performance.

Solvent Extraction

Irradiated uranium with an exposure rate of 3.4 to 5.4 MW/T (436 to 750 MWD/T) and cooling times of 90 to 141 days was processed during the month. The Final Uranium Cycle rate was varied from CF = 1.44 to CF = 3.0 to accommodate reworking of off-standard uranium product. Typical performance of the solvent extraction cycles during the month is tabulated below:

Cycle	Log Decontamination Factor, dF		Instantaneous Waste Loss, Per Cent	
	Uranium	Plutonium	Uranium	Plutonium
Precycle	2.9	2.9	(b)	0.74
Partition	(a)	2.2	(b)	0.24 (IBU - 0.03)
Final	2.2	3.0	0.006	0.04
Overall	(a)	8.1	(b)	1.02

- (a) Recycle of uranium prevented calculation
(b) No uranium analyses.

On February 6 plant processing was started at CF = 1.44 under Purex Plant Flow-sheet III(1) conditions with the following exceptions:

- (a) The 2DF iron addition was increased to 130 per cent of flowsheet.
(b) Two per cent nitric acid was used as IOS in place of five per cent Na_2CO_3 .
(c) Fifty per cent HNO_3 was produced by the vacuum fractionator vice 60 per cent.

After only twelve hours of operation, following start-up, a complete plant shut-down resulted from the loss of organic which was traced to the loss of an aqueous seal in the organic centrifuge. Loss of the centrifuge seals appeared to be connected with the extensive flushing given the organic cell during the last shut-down because the centrifuge behavior closely paralleled seal difficulties

- (1) Included in HW-47712, "Process Specifications for Operational Control - Purex Plant", E. R. Irish, January 7, 1957.

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experienced during "cold" runs when the centrifuges were clean. Continuous addition of a small amount of water to the bowl solved the problem.

The second plant start-up, after an eight hour shutdown, was not as smooth as the first; however, neither the start-ups nor the subsequent rate adjustments produced nearly as large bursts of gamma activity in the intercycle streams as experienced in the past. Unstable operation of the IA and IBX Columns at $CF = 1.92$ was corrected by pulse frequency adjustments and increasing the IBXF temperature from 35° to $40^{\circ}C$.

Although processing one batch of waste rework (see Waste Treatment section for origin of rework solution) had no effect on plant operation, later continuous routine waste rework produced 5 to 7 (peaked to 3.2 per cent) and 2 to 3-fold (up to 0.6 per cent) increases in the HCW and IAW plutonium losses, respectively. The following flowsheet adjustments were made but neither reduced the HCW losses:

- (a) Addition of 0.0036 M Fe^{++} to the HCX (2.5 times the concentration used in January).
- (b) Addition of 0.015 to 0.02 M NaNO_2 to the HAF.

Upon completion of the waste rework, the HCW losses returned to 2 to 3-fold above normal (0.4 to 0.6 per cent), but some question as to the validity of the current HCW results exists because analyses of the carbonate waste solutions are a factor of two lower. Recent minor increases in the HCX nitric acid concentration (now up to 0.03 M) has produced an encouraging downward trend in both the HCW and IAW plutonium losses.

At start-up cross-contamination between the fresh and UO_3 recovered nitric acid headers resulted in excessive uranium contamination of the plutonium product which required recycling seven batches of plutonium to head end. Although no increase was noted in the 2AF gamma activity, a rising trend in plutonium product activity was noted during the period of waste rework. In an attempt to maintain the product within specifications while the remaining rework was purged from the system, the following steps were taken in order:

- (a) The 2A and 2B Column interfaces were displaced.
- (b) The IBXF temperature was reduced from 40° to $35^{\circ}C$.
- (c) The addition of Fe^{++} to the HCX was terminated.
- (d) Carbonate batch washing of IOO (about 20 per cent of the normal solvent throughput) was initiated to eliminate the effect of IOO acidity.
- (e) The temperature of the 2AF was increased from 40° to $50^{\circ}C$.

Immediately after peaking at five-fold above normal gamma content, the activity in the plutonium dropped rapidly; however, the decline occurred too early to be attributed to any of the above mentioned changes or the termination of waste rework.

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Concurrent with the problem of increasing plutonium activity, a shift (from 67 per cent Zr-Nb, 33 per cent Ru) to 100 per cent Ru in the product was noted, although no change in the fission product distribution (90 per cent Zr-Nb, 10 per cent Ru) was detected in the 2AF. Despite the termination of waste rework and an increase in the 2AF temperature from 40° to 50°C, the gamma activity of the plutonium has remained essentially 100 per cent ruthenium.

A capacity test of the Final Uranium Cycle was made, using Purex Plant Flowsheet III, by blending rework uranium into the 2IF Tank. Although the 2E Column capacity limited at CF = 2.9 (Phase II equivalent capacity factor of 3.9), the 2D Column and 2EU Concentrator capacities were determined by extrapolation of the data to be >4.5.

Cyclic flooding of the 2E Column during the capacity test produced uranium product containing up to one per cent organic; however, this material was satisfactorily processed in the continuous calciners.

Upon completion of the uranium rework the Fe⁺⁺ addition to the 2IF was reduced to flowsheet (from 130 per cent) and the use of UO₃ recovered acid for 2DIS was inaugurated. Neither of these changes have had a significant effect on the plutonium content of the uranium product.

All uranium product produced during the month was within specifications except for four initial batches which were reworked at Purex because they exceeded the plutonium specification as a result of a IBX Column upset at the end of the previous operating period. Simultaneously with the detected shift in plutonium activity, a change from 90-95 per cent Zr-Nb and 5-10 per cent Ru to 100 per cent Ru was noted in the uranium product. Again, as in the case of plutonium, no change in the fission product distribution in the feed (2IF) to the final cycle was revealed. The UX contribution to the uranium gamma ratio in the range of 1.42 to 1.93 was determined to be 0.26, the same as for gamma ratios in the range of 0.40-0.90.

A proposed flowsheet for Purex Plant two-cycle operation plus the advantages and necessary development areas is being documented in HW-47889, "Purex Plant Phase II Proposed Flowsheet", by W. H. Swift and E. R. Irish (Secret), February 1, 1957. "Specifications for the Organic-Continuous HA Column", by G. C. Oberg, (Confidential-Undocumented) February 28, 1957 have been issued.

Organic Treatment

Typical overall performance of both organic treatment systems is summarized below:

Organic Treatment System	Organic Activity, uc/gal				Average Decontamination Factor, DF
	Unwashed		Washed		
	Max.	Min.	Max.	Min.	
No. 1	2.8x10 ⁵	9 x 10 ³	5.6x10 ³	2.3x10 ³	6 (60(a))
No. 2	35	12	14	6	2

(a) During the period of waste rework.

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Loss of organic from the organic centrifuges (loss of aqueous seals) plus flooding in the 2E Column during the capacity test maintained the solvent loss at 0.47 per cent of the organic processed. Addition of fresh organic to replace the losses in the No. 1 Solvent Treatment System reduced the gamma activity of that solvent from 6500 uc/gal to 2300 uc/gal. Uncertainty still exists as to whether or not the increased decontamination factor during this operating period (6 compared to 3-5) in the No. 1 System results from the better solvent quality, the caustic-peroxide flush of the vessels, or the use of nitric acid in the IO Column. The change in washing agents may account for the increase in ruthenium content of the solvent from 10 to 50 per cent (iodine-free basis). A batch carbonate washing of the IOO, performed during part of the month, reduced the gamma activity in the solvent by an additional factor of two.

Waste Treatment

Processing of solvent extraction wastes in the Acid Recovery and Waste Treatment sections of the plant was normal during the month. Waste volumes of 161 and 571 gallons per ton of uranium were sent to the 241-A-103 Tank as neutralized IWW and solvent wash wastes, while 268 gallons per ton of coating wastes were stored at C Farm. Batch washing of organic plus frequent changes of carbonate and nitric acid solutions increased the solvent wash wastes by a factor of two. Overall waste losses for the month were 1.25 and 0.22 per cent for plutonium and uranium, respectively, thus reflecting the high plutonium losses experienced in the solvent extraction section. Plutonium and uranium coating removal waste losses were 0.10 and 0.08 per cent of the total production.

Approximately 4300 gallons of waste rework (containing about 1860 units of plutonium) consisting of blended IWW, centrifuge cleanout material and 2B Column flushes during shutdown, were concentrated by a factor of 4.3 over a one-day period prior to being reworked.

Self-concentration in Tank 241-A-103, which currently contains 40 per cent of the terminal 12 M sodium at the hydrostatic head limit, continues at a rate of about 6.5 gallons per minute. Water addition to the tank was started during the month in order to maintain the liquid level above the top of the recirculators. Three independent tests of turning off the air to the recirculators for 6, 8-1/2, and 9 hours each failed to develop any pressure surges within the tank. (The current sodium concentration in the tank is 6.6 M.)

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DECLASSIFIEDREDOX TECHNOLOGY OPERATIONFeed Preparation

The dissolvers were operated for 40 percent of the month processing metal having exposures ranging from 418 to 773 MWD/T at power levels of 3.3 to 5.3 MW/T. Despite metal cooling periods of 109 to 147 days the iodine-131 emission to the stack averaged 1.9 curies per day of dissolver operation. Silver reactor efficiencies, ranging from 88 to 96 percent and averaging 92.6 percent, were not improved appreciably by two-step regenerations given each of the reactors. Optimum use is being made of the limited amount of irradiated metal presently available for tests in the plant in evaluating factors affecting silver reactor efficiencies.

Permanganate treatment was used exclusively in preparing HAF batches, 60 percent of which contained rework solution from the cell sumps ranging from 10 to 20 volume percent. The rework material was predominantly LAFS solution accumulated as a result of pump leakage.

Complete failure of the centrifuge skimmer activating system necessitated substitution of five displacement washes for the three skimmed washes previously employed. No significant change in product losses resulted from the change in procedure; however, considerable fission product activity was leached from the centrifuge cake and returned to the oxidizer with the washes.

The continuous evolution of appreciable quantities of heat in the H-5 scrubber, from ruthenium gradually accumulated, caused pressurizations upon activation of the scrubber pump, after several hours without recirculation. An alkaline permanganate flush of the scrubber successfully removed the bulk of the ruthenium, as indicated by recirculation through the H-5 sampler, where readings of 34 R per hour were obtained through the sample box shielding at the peak of the removal.

Solvent Extraction

High MWD/T feed was processed at rates up to 120 percent of Phase II with two interruptions for replacement of failed LAFS pumps. Back-cycling of plutonium in the HAIS stream, encountered during January, continued at an average of 1.4 percent and a range of 0.2 to 4.7 percent. Simultaneous plutonium back-cycle in the LAW and 2AW streams averaged 1.3 and 0.9 percent and were believed to be contributing to the HAIS plutonium concentration. Temporary flowsheet changes in the 2A system including (1) increasing the 2AW aluminum nitrate concentration to 1.3 M, (2) raising the 2A Column extractant flow by 30 percent, and (3) doubling the acidity of the 2AX stream, reduced the 2AW losses to 0.3 percent, but fell far short of achieving normal 2A product recovery. Extensive flushing during the February-March shutdown is aimed at improving the extraction system performance as well as evaluating the significant product deposition found to have accompanied the plutonium recycle.

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Deposition of approximately 1500 pounds of uranium, as the nitrate and diuranate salts, inside the dome of the 2DF tank (F-4) was discovered during the replacement of a failed agitator. Laboratory analysis revealed the material to be 10 percent sodium diuranate and 90 percent uranyl nitrate, indicating that the batch-wise caustic butting of F-4, occasionally employed to regain control of the uranium cycle acidities, may have been the major cause of the deposition.

Frequent failures of the LAFS deep-well turbine pumps continued to impair the continuity of the plant operation with two failures occurring in February after operating periods of 457 and 78 hours, respectively. Since the deficiency appears to center in the failure of the pile-graphite bearings and liquid throttle bushing, procurement of a pump equipped with glass bearings is being expedited. Extensive foaming, encountered upon agitation of synthetic LAFS solutions, indicates the need for further evaluation of this tendency in plant solutions as a possible cause of the frequent failures.

Decontamination

A continuation of decontamination difficulties reported in January caused approximately 30 percent of the 2EU and 20 percent of the concentrated 3BP to exceed the gamma activity specification because of radio-ruthenium content. Ozonation and silica gel treatment of the blended, off-standard 2EU solution permitted all the uranium produced to meet specifications. Approximately 30 percent of the off-standard plutonium was reworked at Redox by blending it with metal solution in the feed preparation system. The balance of the off-standard material was successfully processed through Recuplex.

Waste Losses

The over-all recoveries for uranium and plutonium during the processing period were 99.87 and 99.73 percent. Approximately 60 units of plutonium and 50 pounds of uranium were sent to underground storage in the water and acid flushes which followed completion of the production schedule.

Waste Storage

Pressure surges up to 0.6 psig originating in the 241-SX-107 tank were observed at fairly regular intervals of approximately three days during the first half of the month. The 107-SX air-lift circulator was activated on February 18 (1) to minimize spread of contamination from the risers of SX-farm tanks, and (2) to demonstrate that the circulator would effectively prevent pressure surges. No pressure surges or abnormal temperature gradients have been recorded since the activation of the circulator.

FINISHED PRODUCTS TECHNOLOGY OPERATIONMETAL RECOVERY OPERATIONMetal Removal and Solvent Extraction

Feed shipments to the 241-WR vault consisted of slurry blends from tanks 102-U, 107-U, 101-TX, 102-TX, 105-TX, 106-TX, 107-TX, and 115-TX (minimum age 18 months). TXR and UR facilities supplied 84 and 16 per cent of the uranium, respectively, at an average uranium concentration of 0.06 pounds per gallon. Cleanout operations are essentially complete in all but two tanks. Three tanks require final inspection.

Uranium losses in the RAW, RCW and REW averaged 1.1, 2.1, and 0.2 per cent of the feed uranium, respectively. These waste losses, which are higher than normal, reflect start-up conditions and operating periods of short duration.

Waste Treatment

Approximately 510,000 gallons of "In-Plant" scavenged waste, batch 52, containing cobalt 60 concentrations less than 4×10^{-4} microcuries per milliliter (MPC) were transferred to the BC #6 crib and 550,000 gallons of "In-Plant" scavenged waste, batch 51, containing cobalt 60 concentrations greater than MPC, were transferred to the BC #14 trench.

URANIUM CONVERSION OPERATIONProcess Performance

A total of ten carloads of UO_3 were shipped during February. Of these, six were produced in the pots and the remainder in the continuous calciners. Six carloads failed to meet specifications. Carload Nos. 16-UA, 505-U, 508-U, and 509-U were reported ranging from 12 to 14 parts plutonium per billion parts uranium, compared to the specification of 10 ppb. Carload Nos. 19-UA, 505-U, and 507-U passed 96.7, 97.1 and 97.8 per cent through 40 mesh screen compared to the specified minimum of 98 per cent for particle size. The high Pu content remains unexplained since analyses indicate feed material received to be within specifications. The average total metallic impurity content was 181 parts per million parts of uranium compared to the specification of 250 ppm average.

The gamma activity ranged from 7 to 54 per cent of that of aged natural uranium. The reactivity ratio (9250 C reduction, 6000 C hydro fluorination) averaged 0.99 and 0.77 for pot and continuous-calciner product, respectively.

Continuous Calcination

Operation of the calciners was hampered considerably during the month by feed point pluggage and feed rotameter difficulties. This problem

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is being thoroughly investigated to determine and eliminate the causes. A power outage on February 10, resulting from the failure of a 13.8 KVA line necessitated a crash shutdown of the three calciners. No permanent damage to the calciners was evident upon a superficial examination.

The powder handling system gave very satisfactory operation after the installation of orifices in the pickup lines in H, J, K, and L, cells to balance air flows. The experimental three-inch rotary valve was modified by boring the top inlet to full size (2 inches) to permit unobstructed powder flow. Capacitance type bin-level indicators have been installed in one collection bin on an experimental basis. Initial results are promising but a full evaluation has not been made.

The off-gas system operation was fairly satisfactory during the month. Recurrence of sticking in the off-gas sectionalizing valves was evident in two cells late in the month. The off-gas filters in one cell were replaced after 478 hours, while the filters in another cell have given satisfactory service for 1,390 hours.

METAL FINISHING OPERATION

Recuplex

A total of 33 runs were processed through the SC hood including 19 Task III fragment runs, 6 Task IV crucible runs, 6 powder runs, and 2 cleanouts. The decrease in the number of runs from 80 in December 1956 to 30 in February, was attributed to; (a) increasing size of Task III run from 6 to 8 crucibles; (b) long filtration times when filtering powders, and (c) excessive solvent extraction down time. Comparing with runs six months ago, the 33 runs this month are equivalent to 45 runs under previous feed make up conditions since the neutron counter has permitted doubling the size of the powder runs, and Task III fragment runs have been increased from six to eight crucibles for test purposes.

The solvent extraction columns averaged 1440 liters/day feed rate at an operating efficiency of 73 per cent, or an instantaneous rate of 1960 liters/day. The waste loss averaged 0.0055 g/l or about 0.0025 g/l above the desired average. Low operating efficiency was attributed to; (a) two H-1 bellows failure, (b) flushing feed tanks, columns, and column intermediate tanks, and (c) column flooding. Higher than average waste losses were attributed to frequent column flooding and higher than normal reflux rates. Column flooding was caused by high specific gravity feeds and organic impurities.

Hydroxylamine sulfate (HS) was tested as a Pu wash for the organic, however the HS required too many contacts to remove the Pu and was discontinued pending further development work. The caustic-carbonate organic impurity wash was tested throughout the month and appeared to more completely remove the organic impurities.

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Results on Recuplex decontamination of Redox feeds was determined. Redox feed containing essentially Ru, was decontaminated by a D.F. of 45. This D.F. is an "equilibrium" D.F. or the decontamination factor obtained after several Redox batches had been fed to the columns.

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~~DECLASSIFIED~~PROCESS CHEMISTRY OPERATIONPROCESS ASSISTANCEPurex Process Studies

Plutonium loss to the Purex HCW (solvent waste) stream peaked at about three per cent during the weekend of February 16. The high loss is tentatively ascribed to degraded solvent introduced with Tk-F8 rework. Laboratory investigation showed that the plutonium was "unstrippable" ($E_a^0 = 3$) and rather difficult to remove by carbonate washing. Two successive 20-minute washes with 3% Na_2CO_3 at a volume ratio (aqueous/organic) of 0.2, or one wash at volume ratio of one were required to reduce the plutonium concentration by a factor of 100 or more. A carbonate wash simulating the present plant procedure ($A/O = 0.05$) reduced the plutonium concentration only by a factor of three. A sample of IOO plant solvent treated by the customary carbonate and nitric acid washes) taken at the same time contained 15 per cent of the plutonium found in the HCW. The plutonium content of the IOO was reduced 50 fold by one carbonate wash at a volume ratio of 0.05.

Batch contacts simulating the HC Column indicated that Task I recycle from the 234-5 Building was not responsible for the high plutonium losses described above. Three successive stripping contacts (two volumes HCX per volume solvent) of laboratory 30% TBP pre-equilibrated with the recycle in question were sufficient to reduce the plutonium concentration by a factor greater than 10^4 .

Since the middle of the month gamma scans of the uranium and plutonium product streams have shown the activity in each to be primarily ruthenium, rather than zirconium-niobium. A simulated 2A Column feed point contact, using plant solvent (IIIO) and feed (2AF) showed a ruthenium distribution ratio of 0.3, compared with 0.03 for zirconium-niobium. The ruthenium in the product (2AP) was responsible for 60 to 70 per cent of the total gamma activity compared with 18 per cent in the 2AF. The ruthenium in the IOO, a possible source of this relatively extractable ruthenium, contributed 40 per cent of the total gamma activity, an unusually high value.

Redox Process Studies

High plutonium waste losses were experienced more or less continually in the Redox 2DW stream during the month. As a result of laboratory tests, this has been attributed to the extremely low acidity in the 2D Column (as low as 0.3 M acid deficient), and the resultant formation of a precipitate containing iron, aluminum, chromium, and up to 95 per cent of the plutonium present. It has been shown that the difficulty should be prevented by maintaining the acidity at or above 0.1 M acid deficient.

The physical properties of an IABS (IA backcycle scrub) stream employing recycled wastes (0.055 M Mn(II) , 0.020 M Cr(III) , 2.75 M NaNO_3 , 1.75 M $\text{Al(NO}_3)_3$, 0.14 M Cr(VI) , -0.1 M H^+ , and 0.027 M Fe(III)) were determined as follows:

Freezing point:	ca.	30 C
Clear point:		38 C
Specific gravity:		1.43
pH:	ca.	1.4

No iron-aluminum-chromium precipitate was observed except at 0.1 M Fe(III).

Waste Scavenging Studies

The following scavenging procedure for removing cobalt 60, strontium 90, and cesium 137 was recommended for in-farm scavenging of stored TBP-Plant wastes:

1. Adjust the pH to 8.5 - 9.2 with HNO_3 .
2. Add Na_2S to 0.003 M, digest 30 to 60 minutes.
3. Add NiSO_4 to 0.0005 M, digest 10 minutes.
4. Add $\text{Na}_4\text{Fe}(\text{CN})_6$ to 0.0025 M.
5. Add NiSO_4 to 0.0025 M, digest 60 minutes.
6. If necessary for Sr-90 scavenging, add $\text{Ca}(\text{NO}_3)_2$ to 0.01 - 0.03 M before last digestion.

This procedure should reduce the Co-60 concentration of most of the stored waste tanks below the MPC value; however, significant variations in composition will require that the procedure be tested in the laboratory for each tank of waste before it is scavenged.

ANALYTICAL ASSISTANCE

Plutonium in Uranium Oxide

An investigation of the analytical methods used to determine the plutonium impurity level of UO_3 and of Purex uranyl nitrate product has been initiated. The study stems from the recent observations that the measured plutonium content may be two to three times higher for UO_3 than for the uranyl nitrate from which the UO_3 has been derived. The analytical methods are similar for the two sample types, both depending upon extraction of the plutonium with TTA and estimation of the extracted plutonium by alpha counting. Initial results indicate that the high values are the correct ones and that the observed discrepancies may result from the existence of the plutonium in the Purex uranyl nitrate solutions in a non-extractable form.

Plutonium Product Activity Studies

Investigations were continued into the origin of the high energy beta emitter (tentatively identified as yttrium-90) which is the source of the high beta radiation levels occasionally found in plutonium buttons. A beta counting procedure was established for the Purex analytical laboratory, which gives an index of the high energy beta content and the apparent beta half-life of plutonium product solutions. Results thus far are inconclusive, however. During the period that the analysis has been run, Y-90 has not been found in Purex plutonium product. At the same time, the beta radiation from buttons has been negligible.

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DECLASSIFIEDRuthenium by Distillation With Periodic Acid

A modified method for the determination of ruthenium has been established. The method uses periodic acid, rather than perchloric acid, to oxidize ruthenium to the volatile tetroxide.

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. Methods of preparation of organic falling-drop media (used in the determination of the specific gravity of process solutions) was studied, and a method involving weight make-up, rather than volume make-up, has been adopted. The composition of the heaviest medium was altered to make it stable at lower temperatures.

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234-5 DEVELOPMENT OPERATIONContinuous Oxalate Precipitation Unit

The second "cold" continuous precipitation was completed during the month. Cerous nitrate (50 g/l cerium) was used as feed material, and 1 M oxalic acid used as the strike solution. The precipitation and calcination throughput rate was 250 grams of cerium per hour. The wet cake was calcined to cerous oxide in the continuous calciner operating at 300 C. A residence time of approximately 20 minutes resulted in complete calcination. A minor modification of the rocker arm agitator blades was completed and the agitation now appears to be adequate. A control valve was installed on the upper filter drum section to permit better vacuum control for the cake washing operation.

Plutonium Polymer

The study of low acidity plutonium(IV) was discussed with Recuplex and Finished Products Technology personnel. The work indicated the favorable operation of the H-3 stripping column without a criticality problem due to plutonium polymer. Further data for more concentrated solutions was deemed desirable and experimental work has been started to furnish this information.

A meeting was held with Redox Technology personnel concerning the deposition of plutonium from their E-7 solution. An E-7 sample was studied spectrophotometrically and found to have a spectrum characteristic of polymeric plutonium. Depolymerization in 4 M HNO_3 slowly produced the plutonium(IV) spectrum.

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Ceramic Development

Crucibles are needed which will permit production and casting of pure metal without objectionable pickup of magnesium, iron, silicon, and other important impurities. Among the refractories of potential value are calcium oxide and calcium fluoride. Calcium fluoride crucibles have low thermal shock resistance. Their principal appeal lies in the fact that calcium fluoride can be obtained highly purified; the Baker and Adamson material on hand is very low in impurities.

Work on the slip casting of calcium fluoride has started. Although available publications do not give sufficient details to carry out the process, experimentation has resulted in a usable procedure including the following steps:

1. Calcine at 1200 C.
2. Crush, grind, and reduce to -48 mesh.
3. Ball mill wet for 16 hours. About 75 per cent of the total hydrochloric acid to be used as a deflocculant is added to the ball mill jar. This results in a much better yield of usable slurry. The water to dry matter ratio is such as to give a specific gravity of about 2.1.
4. Separate slurry, and adjust pH to about "4".
5. Slip cast, remove crucibles from molds, and dry carefully.
6. Sinter at 1100 C for one hour in a resistance furnace.

LCRS-4, LHS-125, and IRS-2 calcium fluoride crucibles of good quality were made and delivered to personnel in the 234-5 Development and Plutonium Metallurgy Operations. Difficulties still remain to be solved. Some of the crucibles made were blistered, and attempts to cast the RCDS-1901 shape resulted in cracked crucibles.

Another development has been the production of nine-inch, coarse mix, magnesium oxide chimneys without using hardened steel dies or other costly equipment. A simple twin sleeve mold was used, and the slightly-moistened mix was hand tamped. After drying, the chimneys were fired at 1760 C, then oxidize fired.

The nine-inch chimney is 3 3/4" O.D. with a 1/2" wall, weight about five pounds. A vertical crack usually develops at the bottom end during high firing. This is because of a slight radial swelling which occurs under the combination of high weight and plastic condition at the sintering temperature. Several usable chimneys were produced despite this difficulty, and it is felt that means can be found for eliminating the cracking should future interest arise.

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~~DECLASSIFIED~~Continuous Ion Exchange

The first "hot" run was performed in the laboratory continuous ion exchange apparatus. Due to mechanical problems and frequent periods of gassing, sustained operation under steady state could not be achieved. The main conclusion from this run is that if the gassing can be reduced, the flow sheet conditions can be met.

Six batches of feed composed of both stock solution and Purex 2BP, and totaling 130 liters, were run through the ion exchange columns over a period of 43 operating hours. Feeds were reduced with hydroxylamine salts, ascorbic acid, or combinations of these reagents. An unexpected problem was the slow reduction of plutonium(IV) by hydroxylamine sulfate. Ascorbic acid completed the reduction rapidly. A second problem was the slow precipitation of plutonium polymer in feed solutions which had been reduced with ascorbic acid. The feed inlet and waste outlet filters plugged and caused considerable down-time.

Dowex 50W-X8 resin was employed and flow rates were based on Purex Study Flow Sheet No. 2. It was found possible to reduce the slip water flow to 60 per cent of flow sheet. Flow conditions were equivalent to 70 per cent of the capacity anticipated for the Purex installation and were:

XAF	35.0 ml/minute
XCS	2.1
XAS	2.0
XCIS	5.0
XAX	2.0

Operation was on a 10-minute cycle of which 9.5 minutes were for solution flow and 0.5 minute for resin push. A typical feed composition was 2.86 g/l Pu, 0.25 M HNO_3 , 0.05 M ascorbic acid. Feed concentrations up to 8.3 g/l Pu were employed. The elutant was 6.3 M HNO_3 , 0.3 M sulfamic acid or semicarbazide.

Results showed a range of product concentration from 25 to 70 g/l. Loaded resin varied from 60 to 165 g/l and the waste loss averaged 0.04 g/l, or one per cent.

Autocatalytic gassing was present in the XC column subsequent to extra resin pushes which presumably pushed feed into the XC column. The gassing could not be completely eliminated after this occurrence. The resulting product contained plutonium(IV), as evidenced by the color of the product. This gassing resulted in less complete stripping of the resin in the XC column, and consequent high waste losses would then follow from the XA column. In spite of gassing, effective resin loading and product concentration were obtained.

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INVENTIONS

All Research and Engineering Operation personnel 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 February, 1957 except as listed below. Such persons further advise that, for the period therein covered by this report, notebook records, if any, kept in the course of their work have been examined for possible inventions or discoveries.

Inventor(s)Title

R. H. Moore

Addendum to invention entitled, "A pyrochemical dissolution and head-end process for zirconium clad or aluminum canned fuel elements preliminary to solvent extraction processing," was filed 2/7/57.

VISITORS AND BUSINESS TRIPS

R. D. Pierce, G. R. Winders and E. K. Burkholder of Babcock and Wilcox, Pittsburgh, Pennsylvania visited Hanford on 2-19-57 and 2-20-57 to hold technical discussions on plant operations.

H. B. Coats and K. C. Bacvewski of Blaw-Knox visited Hanford on 2-21-57 for the purpose of inspecting plant facilities and holding process discussions.

Kenneth Rohde of Phillips Petroleum Co. visited Hanford on 2-27-57 to discuss waste backcycle - process concentration.

Manager, Research and Engineering
CHEMICAL PROCESSING DEPARTMENT

RB Richards:jap

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EMPLOYEE RELATIONS OPERATION
MONTHLY REPORT FEBRUARY 1957

I. RESPONSIBILITIES

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

II. ACHIEVEMENT

FIRE PROTECTION OPERATION

A. Fire Responses

1. Construction Engineering -- Loss \$150.00
202-S Bldg.; 200 W Area - 6:41 PM - Feb. 15, 1957
Cutting operation with torch performed by minor construction personnel during the day shift, supposed cause, hot sparks or hot metal in workers' clothing that was left at the location. These later became ignited and spread to the other combustible material.

B. Fire extinguisher service 200-E, 200-W, 200-M, Batch Plant and Yakima Barricade

1. Fire Extinguishers

Inspected	415
Installed	10
Delivered to new location	5
Seals broken, not reported	20
Serviced	25
Weighed	275
2. Gas Masks

Inspected	40
Serviced	10
3. Hand Lines

Inspected	25
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C. Training of Other Operations

1. Class on artificial respiration given to 6 members of RMU, 202-S.
2. Chemox Gas Mask class given to 45 members of 222-S Bldg.

D. Services to Other Operations

1. 200-W Garage on February 27, 1957, washed down gasoline spill at the pumps.

PERSONNEL DEVELOPMENT AND COMMUNICATIONS

A. Measurement Statistics

Participation in Training Courses

Monthly Personnel

Process and Equipment Orientation	10	57
Non-Exempt Personnel Development	2	
PEM-I (enrolled)	36	
Management Orientation	6	
Projectionist Training	3	

Weekly Personnel

Non-Exempt Personnel Development	27	82
Process and Equipment	14	
Craft Training (Power)	31	
Projectionist Training	8	
Technologist Leader Training	2	

G.E. Selection Program - number completed	4
Technical Graduates on Rotation	1
Technicians in training	3
Management News Bulletins issued	3
GE NEWS Items	12
Priority Messages	1
OPG's Issued	12
Report to Employees - Meetings	2

B. Comments on Statistics

The priority message concerned the finding of feasibility for the disposal of Richland.

Issuance of Chemical Processing Department OPG's is now about 70% complete.

C. Employee Communications

The following material was provided the GE NEWS during February: An advance story and a followup, plus two pictures with cutlines concerning the General Manager's report to employees; a news story about a CPD speaker; a picture of the winning CPD photograph in the recent GE Photo Contest; two CPD promotion stories; a picture and cutline of the Signs of Life Contest; pictures and cutline material of three CPD engineers for use in an engineering feature; a news story and two pictures with cutlines concerning the anticipation of the department winning the Safety Council Award at midnight, March 1; a story of CPD attendance awards winners; a story on CPD Suggestion Award winners; and a story on a recent meeting of the National Secretaries Association.

Two Report to Employees meetings were held during the month. The meetings were conducted by the General Manager at the Chief Joseph Auditorium on the evenings of February 12 and 13.

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All entries from CPD for the recent GE Photo Contest were returned to the contestants during the month with a short letter thanking them for their participation.

D. Public Communications

Arrangements were made for three Technical men from CPD to participate as guides for the High School student tour held on Edison's Birthday.

Work was initiated and planning started for tours for Chemical Processing Department employees' families to be held after AEC approval is obtained.

E. Personnel Development

Revision of the Tech. Grad. assignment descriptions has been started. This information will be required for a new HAPG Guide Book.

Fifty sets of Manager Development, Guide Books and Work Books were received for distribution to Levels 3 and 4.

The following speakers participated in Management Orientation: D. S. Roberts, T. G. LaFollette, E. T. Walsh, C. J. Sheeran; W. K. MacGready substituted for W. E. Johnson.

Meetings are being scheduled as required with non-exempt people to assist in explaining the purpose and philosophy of the Non-Exempt Personnel Development Program.

Engineers in Research and Engineering and Facilities Engineering not currently listed in the Engineering Personnel Register are being supplied the necessary forms so that all will be included.

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HEALTH AND SAFETY OPERATION

<u>Chemical Processing Department</u>	<u>February</u>	<u>January</u>	<u>Year to Date</u>
Disabling Injuries	0	0	0
Serious Accidents	1	0	1
Medical Treatment Injuries	65	64	129
Overexposure Incidents	0	0	0
Potential Overexposure Incidents	0	0	0
Radiation Occurrences	23	31	54
Fires	0	2	2
Security Violations	3	2	5

Report of Serious Accident CPD #57-1 publicized injury to tip of right ring finger of employee in Finished Products Operation. Classification of injury was Medical Treatment.

Two potential lost time injuries (Wallace and Verduyn cases) were investigated and classified as non-work injuries; they will not be tabulated in the CPD rates.

Medical Treatment injuries increased slightly. Unsafe personal acts (lack of ordinary care) were the cause of 56 per cent of all injuries.

Three security violations were classified as unsecure repositories; two occurred in the Research and Engineering Operation.

Radiation Occurrences were reduced by 8 this month, due principally to improved administration control in the Uranium Oxide Operation. The most frequent cause of this months occurrences was procedure violation.

Department emission of I-131 exceeded the 10 curie/week goal three times due to operational difficulties in the Purex and Redox Operations.

Investigation of a fire in the Redox canyon emergency exit stairwell revealed Construction Operation to be responsible. Damage to walls, ceiling and metal doors was estimated to be \$150. Hot welding slag ignited protective clothing after personnel left the site.

Audits of the Uranium Oxide and Metal Recovery Operations were completed. Audit of the Power and General Maintenance Operation was started.

The monthly Health and Safety Orientation was conducted for 30 new CPD employees.

Preliminary plans were completed for selection, procurement and distribution of the Safety Council Award.

Arrangements were completed to provide a large safety record board at the Prosser and Yakima barricades; installation was started.

One hundred and ten embossographed signs denoting Emergency telephone numbers were provided for the Department.

New messages were posted on the two jumbo safety boards five times.

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A total of ten meetings were attended to maintain liaison and communications.

A total of ten meetings were conducted in the various fields of Health and Safety.
Total attendance was 262 people.

Counsel and advice was provided on the following items.

- GE Radiation Protection Conference - CPD and HLO personnel
- Future use of 275-EA Warehouse
- Additional fire control stand-pipe system - 234-5 Building
- Improved lighting fixture - 202-S Silo
- Disapproval of 202-S oil storage
- Approval of 233-S Building addition
- Welding procedure on sodium nitrate tank - 202-A Building
- High noise level 224-UA and 284-E
- Lack of adequate exhaust from welding booth - Hot Semi Works
- Packaging of Cobalt-Trifluoride - Vendor
- Gasoline fire hazard - 2713-E Building
- Trolley platform scaffold - Purex Ion-Exchange Prototype
- Lock and tag procedure - Uranium Oxide Operation
- Cyanide Bait Gun hazards and control - AEC, P&GM, R&UO
- Training on powder actuated hand tools - Vendor - P&GM
- Respiratory equipment for peroxide handling - Metal Removal Operation

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SALARY AND WAGE ADMINISTRATION

Twenty position reconciliations were completed with Flight Propulsion Laboratory of AGT Division on February 27th and 28th, as a result of meetings held on those dates with their representative, Salary Administrator G. F. Devereaux. The positions reconciled ranged through five of our Operations.

Reconciliation of three positions with other HAPO Departments was effected in conjunction with various organization efforts that are under study.

A revision to the Davis-Bacon minimum wage rate predetermination as of January 14, 1957 has been received. Changes resulting from this revision have been listed relative to CPD classifications and issued to personnel concerned.

Approval for the use of hyphenated titles for Engineering Assistants, Technologists and Laboratory Assistants classifications has been obtained through J. J. Tagen. The necessary classification changes for CPD will be effected during the month of March.

A review of the revised Expense Account clerical job was made, however, this job is still in process of evaluation. The grade and classification for Essential Materials clerical job in Redox was established. The Material Expeditor job in Power & General Maintenance was reviewed and it was determined that no classification change was warranted. The grade and classification for Visual Aids job in Power & General Maintenance was established. One job from General Books, Financial Operation is in process of review.

A new plan for determining secretarial grades has been approved by the AEC and distributed to all Departments and Operations. The CPD Wage Administrator has been working with Wage Administrators of HLO and IPD in the development of the criteria for merit reclassification within secretarial groups wherein two or more secretarial grades are permitted. At the same time, the Wage Administrators of CEO, FPD and R&U are in process of developing the ground rules for administration of the secretarial classifications. It is contemplated that both studies will be completed and ready for use during the early part of March.

A proposal for classifying and administering nonexempt Drafting and Design classifications was submitted by CEO to CPD Salary and Wage Administration and Facilities Engineering Operation for study and comment.

All rates for nonexempt personnel were adjusted effective January 28, 1957 to reflect the 1.18% increase for "cost of living" adder.

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

ADDITIONS TO ROLL

	<u>Exempt</u>	<u>Nonexempt</u>
New Hires and Rehires	0	3
Reactivations	0	6
Transfers from Other Departments	0	7
Reassignments from Nonexempt to Exempt	2	-
Reassignments from Exempt to Nonexempt	-	-

REDUCTIONS FROM ROLL

Terminations	6	12
R. O. F.	-	4
Deactivates and Leaves	1	-
Transfers to Other Departments or Divisions	3	16
Reassignments from Nonexempt to Exempt	-	2
Reassignments from Exempt to Nonexempt	0	-

CHANGES IN STATUS (NO SALARY CHANGE)

Intra-Departmental Transfers	5	32
Reassignments - Title Change	3	-
Level Changes - Increase	0	-
Level Changes - Decrease	0	-
Location Changes	7*	-

CHANGES IN SALARY

Promotions	9	19
Demotions	0	4
Merit - Salary Review	32	-
Merit - Interim	0	-
Automatics	-	40
Temporary Reclassifications	-	4
Salary Adjustments	-	-

REQUISITIONS

14 (for 14
people)

*Back-dated action.

UNION RELATIONS OPERATION

The Hanford Atomic Metal Trades Council secured a court order in Superior Court to force the Company into arbitrating the Wonnacott (Radiation Monitor jurisdiction) case. The Company has contended that this matter does not constitute an arbitrable issue, and the Council has chosen this action to force a showdown. The actual hearing in Superior Court will probably be scheduled during the month of March.

An arbitration hearing was held in Seattle on February 8, 1957 to determine whether or not the Company had properly reimbursed an employee who was called in to work on an emergency basis one hour in advance of his regular shift. The Company had paid the employee double time for the one hour worked, but the Union contended that the employee was entitled to a minimum of four hours pay for the hour worked. The arbitration panel consisted of C. J. Sheeran for the Company, W. H. Banta for the Union, and the Reverend R. J. Carmody the impartial arbitrator. A decision favorable to the Company was rendered on February 28, 1957 in which the arbitrator said "Mr. Gilstrap is not entitled to the equivalent of four hours straight time pay for his work from 6:42 to 7:48 a.m."

Vacation scheduling is the basis for numerous grievances in Chemical Processing Department. There were 28 grievances filed by members of the bargaining unit on this subject and one grievance by a nonbargaining unit employee. The Union took the position that the Company was being unnecessarily arbitrary in restricting the number of employees who would be permitted to schedule their vacations during the summer months. The Company contended that the anticipated work load for 1957 made it mandatory that only 50% of the groups involved could be permitted off during the three summer months.

The Company took the position that vacation scheduling requires approval of the supervision involved and that it did not represent a matter over which the Union Relations group had proper jurisdiction. Specifically, and in accordance with the GE-HAMTC Agreement, vacations must be scheduled at the discretion of Management.

Within the Chemical Processing Department, the check-off system, which pertains to the deduction of union dues from employees' pay checks, is as follows:

	<u>February</u>	<u>January</u>
Bargaining unit employees in C.P.D.	1040	1070
Bargaining unit employees utilizing check-off	653	660
Percentage of total bargaining unit employees using check-off	62.7 %	61.08 %

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Four Step II Grievance Meetings were held during the month. Following is the summary of grievance statistics for the month of February, 1957:

	<u>Unit</u>	<u>Nonunit</u>
Grievances received year to date	40	1
Grievances pending at Step II on 1-31-57	14	1
Grievances received during the month	33*	0
Satisfactorily answered at Step I	1	0
Settled at Step I through expiration of 90 day time limit	10	0
Processed at Step II	28*	1
Pending at Step II on 2-28-57	8	0
Pending at arbitration	1	0

* 27 grievances pertaining to vacation scheduling were received in one lot, and were processed at Step II as two grievances - one for Millwrights and one for Pipefitters.

PERSONNEL PRACTICES OPERATION

	<u>Exempt</u>	<u>Non-exempt</u>	<u>Total</u>
<u>Additions to Payroll</u>	0	16	16
New Hires	0	3	3
Reactivates	0	6	6
Re-hires	0	0	0
Re-engages	0	0	0
Transfers into C.P.D.	0	7	7
Promotions from non-exempt to exempt	0	0	0
<u>Removals from Payroll</u>	7	44	51
R.O.F.	0	4	4
Retired	0	2	2
Deceased	0	2	2
Illness	1	7	8
Leave of Absence	0	1	1
Home Responsibility	0	1	1
Better Self	1	0	1
Seek other Employment	0	2	2
Returning to School	0	1	1
Not Satisfied with Work	1	0	1
Another Job	4	6	10
Husband left Vicinity	0	1	1
To be Married	0	1	1
Transfers out of C.P.D.	0	16	16
Promotions from non-exempt to exempt	0	0	0

Requisitions for Personnel (Non-exempt)

Number on Hand End of January	18
Number received	10
Number filled	16
Number on Hand End of February	12

Requests for Transfer (Non-exempt)

Number on Hand End of January	154
Number received	6
Number transferred	9
Number on Hand End of February	151

During February no Service Recognition Awards were issued, however, there were 35 pass folders for perfect attendance. These were as follows:

One Year	12 Men
Two Year	3 Men
Three Year	5 Men
Four Year	6 Men
Five Year	4 Men
Six Year	2 Men
Seven Year	3 Men

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Eight inquiries in regard to credit references for C.P.D. employees were answered during the month.

The number of Utility Operators to be placed as the result of the forthcoming TBP closure has dropped to 40. During the month 18 LOW notices were issued to Utility Operators with the effective date being February 22, 1957. However, prior to that date 12 of the 18 were placed in other jobs at HAPO. Of the six remaining two voluntarily terminated, which left a total of four actual LOWs.

A letter was sent during February to the operating components advising that the ratio between Process Operators and Utility Operators should be adjusted. This will involve the downgrade of 20 Process Operators to Utility Operators effective March 4th.

Fifteen G. E. Supervisor Selection Tests were also administered during February.

Requests for Transfer (exempt)

Number on Hand End of January	22
Number this month	6
Number transferred	0
Number closed out	0
Number on Hand End of February	28
Number of Interview trips	0

Applications for Employment (exempt)

Applications received during Feb.	5
Hired	0
Closed Out	1
Invited for Interviews	3
Open Requisitions	3

Negotiations are currently in progress to loan one exempt person available from the Research and Engineering Operation to I.P.D. providing some assurance can be obtained from I.P.D. that the man will be placed permanently by the end of this current fiscal year. The present manpower ceiling in I.P.D. will not permit this.

Two Radiation Monitoring Supervisors, one from Redox and one from Purex, were proposed as candidates for an opening in I.P.D. leading to the position of Radiation Analyst.

A list of candidates with qualifications was given to the Manager, Analytical Control, Purox Operation for consideration in filling an opening for a Supervisor, Analytical Control.

Professor Homer H. Grant has accepted an offer extended to him for summer employment and will join the Department in early June, 1957.

<u>Suggestion Plan</u>	<u>January</u>	<u>February</u>
Suggestions Received	122	94
Acknowledgements to Suggestors	112	120
Suggestions Pending Acknowledgement	35	9
Suggestions Referred to Operations for Investigation	112	120
Suggestions Pending Referral to Operations	35	9
Investigations Completed and Closed	130	103
Adopted Suggestions approved by Board	64	45
Adopted Suggestions Pending Approval by Board	22	28
Total Net Savings	\$4,207.72	\$1,859.80
Total Cash Awards Approved by Board	1,980.00*	575.00

* This figure reflects awards of \$980 approved by C.P.D. Suggestion Board on which payment has not been made. Tangible savings relative to these pending awards have not been included in the above figures.

Total number of suggestions outstanding to Operations at the end of the month	216	207
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Award checks delivered to 3rd level managers amounted to \$575 during February.

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Richard G. Lesser - Specialist, Employee Benefit Planning in Employee Compensation Service has asked to borrow the films, sound slides, and narration used on the T.V. presentation of suggestions awards to Bruce Glenn and David Underwood for \$3070. This material is to be used in the East for publicity purposes. This matter has been turned over to Merle Mass for making the necessary arrangements for shipment of these articles to Mr. Lesser.

There were two employees retired from C.P.D. during February, namely: George Miles Overlander, Power and General Maintenance and Leonard A. Wallace, Power and General Maintenance. All matters pertaining to their retirement and benefits under the Benefits Plan were discussed thoroughly with them.

<u>Participation in Benefit Plans</u>	<u>January</u>	<u>February</u>
Insurance Plan	99.7	99.7
Pension Plan	98.4	98.8
Stock Bonus Plan	56.3	56.5
Good Neighbor Fund	63.4	63.8

During February there were three non-veterans removed from the C.P.D. rolls. Two were classified 1A and one was classified 1F-F.

C.P.D. now has a total of 78 non-veterans who are subject to military training through the Selective Service System.

The 78 non-veterans are classified as follows:

1A	13
2A	16
3A	31
4A	1
4F	9
4D	1
1S	1
1SH	1
No	5
Classification	

Total 78

Deferments

Deferments requested (February)	1
Deferments granted (February)	0
Deferment requests pending	3
Routine	2
Appeal	1

Standby Reservists Subject to Selective Service Actions

Category II-R Requests (February)	0
Category II-R Requests Pending	0
Category II-R Requests Granted	5

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Duplicating

Orders on Hand (2-1-57)	110
Orders Received	726
Orders Completed	780
Orders on Hand (2-28-57)	56
Total Copies Produced	162,557
Embosograf Signs Made	334
Verifax Copies Produced	1,292
Ozomatic Copies Produced	10,373

Satisfactory Xerox masters are still being produced from the same can of developer being used in the study. As of the end of February, the number of masters produced totals 1006 as compared to 26/can in the past. Very little, if any, deterioration of the developer has been noted. Thus it is conceivable that the total number of masters from a single can of developer could approximate 2000. It should be noted that during the period of this study, the amount of toner added to the developer has been insignificant and it would seem that one can of toner will last through three or four cans of developer. The study to date has reduced the cost of developing materials for producing Xerox masters from \$1 to about \$.025 each.

The study of telephone facilities in T Plant was completed during the month and the result forwarded to Relations and Utilities. The study shows that approximately 14 additional lines will be required in this facility within the coming year. Included in this estimate is the transfer of additional engineers from the 700 Area to 200 West. Along these lines a study was also made of the telephone facilities to be released as a result of the U Plant shutdown. It is expected that 14 lines will be made available after 8-1-57; however, geographic locations prevent extending these lines to T Plant without installation of a new cable. The matter is now under study by Relations and Utilities and it is expected that further action toward providing these additional facilities will be forthcoming within the next few months.

During the month a study was conducted aimed at improving mail service for the 200-East Area. As a result of this study, door to door deliveries were set up in 271-B and 2713-E serving all components in each building. The remaining buildings in 200-East have had door to door deliveries previously. In addition to the increase in the number of direct deliveries, two additional pick-ups and deliveries have been installed in 2704-E, 271-B, and 222-B making a total of four pick-ups and deliveries in these buildings.

During the month three pick-ups were obtained from Transportation to replace two power wagons and a jeep station wagon which were on loan from excess. In addition, one pick up was obtained from Metal Recovery which was assigned to Financial to replace a Power wagon which also had been obtained from Excess.

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III. ORGANIZATION AND PERSONNEL

A. MEETINGS

Seventeen meetings were held by Fire Protection Operation. These included Staff, Safety, Security and Round Table meetings.

Salary and Wage Administration personnel attended a total of 39 meetings during the month.

A Safety and Security meeting was held by Employee Relations Operation.

B. PERSONNEL ACTIVITIES

Fire Protection Operation Drills conducted within operation

Outside Drills	37
Inside Drills	58
Feet of hose used on drills	5,810
Feet of ladders used	287

Total man hours spent in training 509

The Specialist, Training spent the week of February 11 recruiting at South Dakota State, University of South Dakota and University of Minnesota.

The Specialists in Personnel Development and Communications attended meetings with their counterparts in other departments.

Two recruiting trips were made this month to the campuses of California Poly, USC, Cal. Tech., and UCLA by the Specialist, Technical Personnel Placement. While on the campus of Cal. Poly at San Luis Obispo, California, The Specialist, Technical Personnel Placement participated in a meeting with Senior and Junior Engineering students to explain HAPO's place in the General Electric Company.

Mr. C. H. Griffin, Consultant, Personnel Practices met with Employee Relations exempt personnel during February to discuss the services available to us from the Personnel Practices Community Relations Service.

During the month the specialists of the Personnel Practices Operation attended meetings with their counterparts in the other departments to discuss mutual problems.

C. SAFETY

There were no injuries, fires, or security violations in the Operation.

D. S. Roberts
D. S. Roberts, Manager
Employee Relations

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