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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT
FOR
JANUARY 1957

Compiled by
OPERATION MANAGERS

February 21, 1957

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HANFORD ATOMIC PRODUCTS OPERATION
RICHLAND, WASHINGTON

By Authority of.....

JUN 04 1992

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

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CHEMICAL PROCESSING DEPARTMENT
MONTHLY REPORT

JANUARY, 1957

GENERAL SUMMARY

PRODUCTION

The production of high exposure plutonium from the primary plants exceeded the forecast. Purex Plant was in operation until January 26, at which time the supply of adequately aged material became depleted. Two interruptions to operating continuity, which were of short duration, did not significantly affect output.

Redox Plant was down until January 21 to complete the removal of low exposure material from the plant. In addition, the installation of waste water segregation facilities and other maintenance items which could not be done while the plant was operating were completed. The processing of high exposure uranium began on January 21 and extended through month end.

Problems associated with the removal of residual uranium from storage became more acute and as a result the TBP Plant received enough feed to process and produce 36% of the forecast.

High December production of UO_3 and operating difficulties caused by sub-zero temperatures resulted in UO_3 production which was 51% of the January forecast; however, 70% of the material available for processing was produced.

Plutonium production met or exceeded the forecast covering fabricated cores, plutonium nitrate, and unfabricated plutonium metal. The production of plutonium nitrate from low exposure material has been completed and the Isolation Building has been placed on a standby status.

ENGINEERING

As an extension of the work reported last month, an improved pyrochemical dissolution and head-end process has been devised which employs the chlorides or bromides of bismuth as the fused solvent salt. The process is theoretically capable of effecting the dissolution of aluminum, zirconium, zircalloy, and stainless steel cladding materials with the volatilization of most of these cladding elements from the fuel. Both uranium and uranium oxide fuels can probably be handled.

Operation of the continuous calciners during the month was hampered by difficulties with the flow control system, the product handling system at the calciners, and off-gas filtration. Rotameters controlling the feed flow failed frequently. The cause and correction of these failures is being investigated and some improvement in operation has been achieved. Rotary valves continued to cause difficulty through jamming or reverse gas flow. The experimental three-inch valve operated satisfactorily with the exception that lumps formed in the collection bin caused frequent powder flow stoppage.

The off-gas filters in two cells were changed after 677 and 617 hours of operation. The pluggage of these filters was attributed to the lack of sufficient clean-up air pressure when the incoming air line froze. The filters in one cell continue to be satisfactory after 960 hours of operation.

A review of possible locations for a miniature service dissolver installation at the Purex Plant was completed.

As a result of the unfavorable experience with the Purex waste tank farm 216-A8 crib, the problem of disposal of liquid wastes from the vacuum fractionator was reviewed. Preliminary designs were prepared covering the immediate requirements, and long range facilities were delineated.

A fiscal year 1959 budget study HW-47843 was completed for consolidation of Redox Operations. It is anticipated that this consolidation of operations would result in an annual savings of \$103,000 by reducing the plant operating force.

Design and development efforts were continued in establishing the scope of the RMC Button Line. Design schedules and design costs were prepared for use in the project proposal for design of the RMC Button Line.

GENERAL

Effective January 1, 1957, the responsibility for accumulating and reporting costs on CPD construction projects was transferred from the Construction Engineering Operation to the Chemical Processing Department. Costs amounting to \$5,126,749, on 23 projects, were transferred to CPD on January 21. Detail project cost ledgers have been established and the accumulating and recording of costs is in progress.

As of December 31, 1956, authorization on active CPD projects totaled \$21,000,000 of which \$14,000,000 has been expended and committed.

The capital cost for the CPD Electrical Distribution System was transferred to Relations and Utilities prior to December closing. This transfer represents a net book value of \$3 million and was made in order to comply with decentralization policies.

Complete segregation of the six HAPO components became effective on January 1, 1957. This complete segregation will require rigid control of all master card files in order to insure prompt and correct payment of personnel.

Personnel Accounting is now reporting and paying payroll taxes to the Federal Reserve Bank, San Francisco, as a separate component. Prior to January 1, these taxes were reported and paid on a consolidated basis.

The CPD Salary Review was completed. As an aid to Managers completing the review, salary history cards were supplied for approximately 50% of the exempt people and first line salary differential information was presented. The organization directories for CPD were revised and issued as of January 1, 1957, the quarterly Salary Distribution report was compiled and issued.

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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. E. Roberts

CHEMICAL PROCESSING DEPARTMENT
NUMBER OF EMPLOYEES
JANUARY 31, 1957

OPERATION	EXEMPT		OTHER		TOTAL	
	12-31-56	1-31-57	12-31-56	1-31-57	12-31-56	1-31-57
GENERAL MANAGER'S GROUP	10	10	1	1	11	11
PRODUCTION	6	6	4	4	10	10
PUREX	42	43	273	271	315	314
REDOX	52	53	293	292	345	345
FURNISHED PRODUCTS	65	66	424	418	489	484
POWER AND GENERAL MAINTENANCE	43	43	293	288	336	331
FINANCIAL	21	21	53	51	74	72
FACILITIES ENGINEERING	77	77	32	32	109	109
RESEARCH AND ENGINEERING	76	73	25	25	101	98
EMPLOYEE RELATIONS	32	32	58	59	90	91
	424	424	1456	1441	1880	1865

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CHEMICAL PROCESSING DEPARTMENT

PATENT SUMMARY
FOR
MONTH OF JANUARY, 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>
C. R. Anderson	A Beryl Plus Fissionable Fuel Element for a Slurry Reactor
C. R. Anderson	A Slurry Heterogeneous Reactor
C. R. Anderson	An Aluminum Coated Fissionable Material Particulate Fuel Element for Slurry or Fluidized Bed Nuclear Reactors
C. R. Anderson	Selective Removal of Specific Exposure Level Heterogeneous Particulate Fuel Elements from a Slurry or Fluidized Bed Reactor System
C. R. Anderson	Pellet-Type Fuel for Nuclear and Nuclear Reactors using Pellet-Type Fuel
C. R. Anderson	Direct Reactor Power Level as a Function of Circulating Rate for a Liquid Fluidized Bed-Heterogeneous Particulate Fuel Nuclear Reactor
Reed Overson	Shaft seal for High Temperature Corrosive and Abrasive Resistant Service
R. H. Moore	A pyrochemical dissolution and head-end process for zirconium clad or aluminum canned fuel elements preliminary to solvent extraction processing.

W. K. Macready
GENERAL MANAGER
CHEMICAL PROCESSING DEPARTMENT

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CHEMICAL PROCESSING DEPARTMENT
PRODUCTION OPERATION

January, 1957

I. RESPONSIBILITY

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

II. ACHIEVEMENT

A. Production Statistics

With the cleanout of the Redox Plant early in January, chemical separation of low g/t material was completed and over-all commitments for this quality plutonium were met. Cleanout of the Isolation Plant (231-W), where low g/t plutonium has been prepared for off-site shipment as a nitrate solution, was started in preparation for placing the facility in standby.

Production commitments for high g/t plutonium were met with the major portion of this material being produced through the Purex Plant. After cleanout of the Redox plant early in January, processing of high g/t plutonium was resumed through Redox on January 21.

At month-end the 234-5 Building was current with production commitments. Because of the necessity for reprocessing several charges of high gamma activity, Redox plutonium nitrate through Recuplex, the scrap recovery program fell a little behind schedule.

TBP plant production was limited because of the near depletion of feed in the waste storage tank farms. Production from the UC_3 plant was below commitment mainly because the December commitment was exceeded, but in part due to mechanical difficulties with the continuous calciners during January.

1. Purex Operation

	<u>January</u>	<u>December</u>
Tons Uranium delivered to storage	300.98	279
Average Production Rate per operating day (tons)	12.2	14.6
Average yield, %		
Uranium	98.5	99.48
Plutonium	96.5	95.06
Total Waste Loss, %		
Uranium	0.30	0.50
Plutonium	1.29	0.77
Average cooling time (days)	120	114
Minimum cooling time (days)	114	100
Percent operating time	79.9	62.4

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2. Redox Operation

	<u>January</u>	<u>December</u>
Tons uranium delivered to storage	80.78	247
Average Production rate per operating day (tons)	8.1	9.7
Average yield, %		
Uranium	99.9	101.7
Plutonium	88.6	112.2
Total Waste loss, %		
Uranium	0.39	0.23
Plutonium	0.67	0.26
Average cooling time (days)	123	114
Minimum cooling time (days)	115	90
Percent operating time	30.6	82.2

3. 231

	<u>January</u>	<u>December</u>
Batches started	38	178
Batches completed	38	182
Batches awaiting processing	0	0
Average yield, %	93.3	94.7
Average purity, %	98.9	99.5

4. 234-5 Operation

5. UO₃ Operation

	<u>January</u>	<u>December</u>	<u>To Date</u>
Uranium drummed (tons)	249.99 UA	(327.48 UA	18,741.73
	104.41	(535.07	
Uranium shipped (tons)	565.53	677.02	18,662.26
Average cooling time (days)	129	120	
Minimum cooling time (days)	121	96	
Waste Loss, %	0.01	0.01	

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6. TBP Operation

	<u>January</u>	<u>December</u>	<u>To Date</u>
Tons received from Metal Removal	46.99	66.72	8,062.87
Tons shipped to UO ₃ plant	30.84	67.48	7,789.20
Average Production ³ rate per operating day (tons)	2.83	3.50	
Average yield, %	91.62	95.26	
Total Waste Loss, %	1.47	1.81	
Percent operating time	47.39	83.7	

7. Power

	<u>200 East</u>	<u>200 West</u>
Raw water pumped, gpm	5,654	4,052
Filtered water pumped, gpm	647	1,264
Maximum steam generated, lbs/hr.	228,000	270,000
Average steam generated, lbs/hr.	169,949	179,720
Total steam generated, M lbs.	125,881	133,712
Coal consumed, est. (tons)	7,867	8,479

8. Waste Storage

	<u>Equivalent Tons U</u>	
	<u>January</u>	<u>December</u>
Redox Waste reserve storage capacity	2,112	2,204
Purex Waste reserve storage capacity	6,068*	5,207

*Reflects greater self-concentration estimate.

Production statistics for calendar year 1956 were prepared in a graphical form for presentation to Washington AEC representatives on January 30, 1957. All graphs compiled for the presentation are being reproduced for retention in CPD files.

A narrative and graphical presentation of calendar year 1956 production was prepared for presentation in the General Manager's Report to Employees.

Two forecasts were developed and issued covering the allotment and distribution of nuclear materials in the Chemical Processing Department for the fourth quarter of fiscal year 1957. The forecasts include a five year estimate of the diversions of nuclear materials from production channels for Chemical Processing Department use.

The compiling of year-end data for 1956 was completed and forwarded for inclusion in the HAPO Annual Report for 1956. The final draft of the Chemical Processing Department portion of the Report was reviewed and approved.

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A. Production Statistics (Continued)

A series of production charts was developed and prepared for the General Manager of HAPO to present annual production data from 1947 through 1956 and monthly production data for the current year. Duplicate charts are being maintained in CPD Production Operation.

B. Production Planning and Scheduling Operation

Production planning and scheduling activities centered around the following:

1. A preliminary literature survey, conducted by a Planning and Scheduling Specialist in collaboration with a member of the Research and Engineering Operation on market possibilities for fission products, was completed. Based on this study, a letter was issued to the Commission outlining a proposed program for conducting a market survey during calendar year 1957.
2. A five year production forecast (XX-1834) for HAPO was prepared and issued.
3. A preliminary study of radioactive waste storage usage, in support of FY 1959 Construction Budget, was completed.
4. Several of the railroad cask cars were scheduled out of service for brief periods during the month for repairs. Two cars required repairs to well drain lines.
5. Assistance was given to Facilities Engineering Operation in the preparation of project proposals for "Utilization of Recovered Acid from UO_3 Plant" and "Redox Phase III."

C. AEC Liaison

The feasibility of fission product recovery and recommendations for a market survey to determine outlets for these products were discussed with E. J. Bloch, Director, Division of Production, Washington AEC, during his visit to Hanford, January 28, 29 and 30.

D. Essential Materials

Significant items accomplished relating to essential materials are as follows:

1. With one minor exception complete agreement has been reached between General Chemical Company and General Electric Company on unloading procedures to be followed at HAPO locations for Hedges chemical tank trucks.
2. An evaluation of the use of 30 gallon plastic-lined, non-returnable fibre drums in place of glass carboys for transport of ferrous sulfamate from suppliers to HAPO is being carried

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D. Essential Materials (Continued)

out. A savings of approximately \$300 will be realized on the March order for ferrous sulfamate in fibre drums, and future savings may be possible if these drums are found to be entirely satisfactory.

3. Receipt of 50% caustic soda in tank trucks was started on January 8. A savings of \$2.85 per ton 100% NaOH is being realized as a result of this method of transport from a local distributing plant.
4. During December the inventory of essential materials was reduced about \$31,000 to a value of \$1,268,731. Most of this reduction was related to planned depletion of TBP plant essential materials stocks in anticipation of the permanent shut down of the facility.
5. Stocks of nitric acid stored in the bismuth phosphate plants' storage tanks have been depleted by transfer to active plants.

E. Reports and Documents

1. Prepared and Issued

HW-47640	Chemical Processing Department Waste Status Summary for December 1956, D. E. Peterson
HW-47663	Essential Material Consumption - December, 1956, TBP Plant, M. A. Thress
HW-47664	Essential Material Consumption - December, 1956, Purex Plant, M. A. Thress
HW-47665	Essential Material Report to Cost & Purchasing Department, December, 1956, M. A. Thress
HW-47666	Essential Materials Ordered, D. E. Peterson
HW-47667 RD	TBP-UO ₃ Building Production Schedule, January 1957, B. F. Campbell
HW-47668 RD	Z Plant Production Schedule, January 1957, B. F. Campbell
HW-47669 RD	Redox Production Schedule, 1-3-57, D. McDonald
HW-47670 RD	Purex Plant Production Schedule, 1-3-57, D. McDonald
HW-47991 RD	Official Quarterly Forecast, 1-23-57, D. McDonald and B. F. Campbell

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2. Prepared for Signature and Issuance

HW-47988 Layaway of TBP Plant and Metal Removal Facilities,
January 23, 1957, W. K. MacCready

XX-1834 Production Forecast - February 1, 1957 through
June 30, 1962, W. E. Johnson

III. ORGANIZATION AND PERSONNEL

A. Force Summary

	<u>Personnel on Roll</u>	
	<u>Beginning of Month</u>	<u>End of Month</u>
Exempt	7	7
Non-Exempt	<u>4</u>	<u>4</u>
Total	11	11

B. Safety

There were no plant injuries incurred by Production Operation personnel during January.

J. H. Wanner

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CHEMICAL PROCESSING DEPARTMENT
PUREX OPERATION

January, 1957

I. RESPONSIBILITY

There were no changes of responsibility within the Operation.

II. ACHIEVEMENT

A. Processing Operation

1. Normal Processing

The extraction columns were started up on January 2, 1957. With the exception of two short emergency outages, operation was continued until January 26, when the supply of aged irradiated metal was exhausted. Initial feed rate was at a capacity factor of 1.92, however this was reduced to C.F. 1.44 on January 11 to avoid the accumulation of questionable plutonium product. On-line efficiency was 79.9 percent. The uranium production commitment for the month was met.

The emergency outage of January 5, caused by an electrical power interruption, was of approximately one hour duration. The January 9 outage, lasting approximately 13 hours, resulted from inadvertent depletion of the demineralized water supply.

Although the plutonium product during January met fission product specifications, the 234-5 Building encountered high radiation readings on the buttons formed from Purex material processed during the first part of the month. Indications are that a short half life soft gamma or hard beta emitter, unmeasured in normal specification analyses, caused the difficulty. The identity of the troublesome element has not been definitely established, however, button readings have returned to normal.

Waste loss for plutonium totaled 1.29 percent for the month. The abnormal loss was caused by the two emergency shutdowns and the accompanying startups, two upsets in the partition cycle (causing plutonium to enter the third uranium cycle) and a short period of high waste losses from the two precycle columns. The latter losses are believed to be the result of inextractable plutonium-phosphate complex returned to the process with recycle material. The 0.3 percent uranium waste loss experienced during the month was a record low for the Purex Operation.

2. Special Processing

During the period of high waste loss, a total of 1171 units of plutonium was isolated in the waste tanks and held for rework.

At month end 359 units of this material had been reworked. This marks the first successful recovery of plutonium from concentrated waste solution in the Purex Plant.

During the scheduled shutdown, a special caustic-peroxide flush was conducted in the #1 organic system to improve the organic quality and remove accumulated degradation products.

3. Equipment Experience

The small leak in the right hand tube bundle of the #2 waste concentrator (F-6) developed over several operating periods to a point where replacement of the bundle during the January outage was advisable. The unit was removed without difficulty and replaced with a similar 304 L stainless steel bundle. This was the first large concentrator tube bundle requiring replacement in the Purex Plant. Ten such bundles are in routine use.

A faulty interface capacitance probe in the A column of the final plutonium cycle and a leaking diaphragm valve in the concentrated plutonium stream in L cell were also replaced during this shutdown.

B. Product and Material Handling Operation

1. Normal Processing

Metal dissolution and feed preparation to sustain the extraction batteries at a capacity factor of 1.92 were easily maintained with three dissolvers and one clarification centrifuge. When the extraction battery feed rate was reduced to a 1.44 capacity factor, the A cell dissolver was shut down in preparation for heater and jumper changes associated with the first electrical booster heater installation on the off-gas line.

Dissolver capacity in excess of extraction battery demand made possible the reduction of dissolution rates to maximize off-gas temperatures. This in turn permitted more efficient silver reactor operation, and the resulting iodine discharge to the atmosphere was well below both daily and weekly limits.

2. Equipment Experience

The coating waste and organic waste transfer line to the 104-C tank in the 241-C area plugged completely and necessitated transfer of coating waste to 111-C tank. Until the line is unplugged and returned to service, each transfer of organic waste to the tank farm will require a diversion box jumper change.

The spare liquid-solid centrifuge was installed in the E-4 position in place of the unit which failed in July, 1956.

The agitator in the centrifuge slurry tank (E-1) failed during normal

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operation on January 27, and was replaced without incident. Frequent plugging of weight factor dip tubes and jets in the F-1 tank was experienced during the month. An inspection of the tank disclosed a quantity of precipitate and incrustation. During the scheduled outage, extensive flushing was performed to remove the solids buildup.

C. Radiation Monitoring Operation

1. Radiation Occurrence Experience

Six radiation occurrences were experienced in the Purex Operation during the month as follows:

One case of skin contamination (40,000 d/m) when a glove port glove failed; one case of uncontrolled dose rate outside of an established radiation zone when an instrument line in the pipe and operating gallery was contaminated internally to a level of 200 mr/hr; one case of personnel exposure to contaminated air without the benefit of respiratory protection when an unsatisfactory air condition developed in the sample gallery; and three cases of uncontrolled contamination spread. The first contamination spread occurred in the pipe and operating gallery when contaminated water was drained onto the floor; the second case occurred when steam condensate ran outside of the A-3 proportional sample pit radiation zone boundary; and the third case occurred in the Analytical Laboratory when a spill went undetected for a short time.

2. Personnel Exposure Experience

Fifteen cases of skin contamination were incurred in the Purex Operation during the month.

The inspection and repair of process cell equipment on the canyon deck accounted for a large portion of the higher personnel dose rates encountered during the month. Process jumpers contaminated to levels as high as 20 rads/hr at 18 inches were repaired and regasketed at a maximum dose rate to personnel of 3 rads/hr, including 1 r/hr. The inspection and repair of sampling equipment, including the replacement of valves, valve diaphragms, and falling-drop equipment, accounted for additional high personnel dose rates. Radiation levels up to 7 rads/hr, including 1.2 r/hr at six inches, were encountered. The maximum dose rate to personnel for this work was 4.4 rads/hr, including 400 mr/hr.

A failed E-4 centrifuge was removed from the 202-A Building at a maximum dose rate of 1.5 r/hr at two feet from the storage box.

3. Contamination Experience

A radiation survey in Trap Pit No. 2 revealed a radiation level of 20 mr/hr at the steam trap serving the right hand tube bundle of the F-6 waste concentrator. The contamination in this trap confirmed the

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suspected tube bundle failure.

Continued remote maintenance activities in the process cells, plus additional contact maintenance on highly contaminated process equipment on the canyon deck throughout the month has resulted in an additional accumulation of contamination on the canyon deck. Cleaning operations were in progress at month end. No increase in the low level contamination on the process cranes has been detected.

A blow-back into the E-1 sampling hood contaminated the inner surfaces of the hood to a maximum of 20 rads/hr at three inches. A blow-back into the sampling jet air line contaminated the line internally to a level of 20 r/hr at three inches and 100 mr/hr at six feet. Back-flushing has reduced the radiation level to 5 r/hr and 10 mr/hr respectively. Additional decontamination work is in progress.

D. Maintenance Operation

1. Electrical Outage

A momentary loss of all electrical power to the plant was experienced at 2:00 p.m. on January 5, when a maintenance electrician inadvertently operated two 2300 volt circuit breaker switches in the incorrect sequence. (Circuit breakers were being operated to isolate a section of the electrical system for maintenance purposes.) The emergency power circuit was activated automatically. Within five minutes all other circuits were returned to service by manual switching.

2. Demineralizer

The plant was shut down from 9:30 p.m., January 9, until 11:00 a.m. January 10, due to a shortage of demineralized water. Two factors were the direct cause of this unscheduled outage; 1) inability to complete repairs to a multi-port cam-operated valve in the demineralized water system within the expected time and; 2) unexpected loss of the reserve supply of demineralized water through a valving error during the repair period.

3. 291-A Exhaust Fan Motor #3

The 200 HP electric drive motor of the #3 exhaust fan at 291-A was taken out of service early in the month when unusual vibration and noise developed in the unit. Subsequent inspection revealed that excessive clearance between the bearing housings and outer race of the bearings caused the inboard bearing to fail. This condition was corrected by inserting bushings in the bearing housings to provide a proper bearing fit. The fan was returned to service January 14.

4. E-1 Agitator

The E-1 agitator failed during normal processing operations on January 27. Inspection disclosed a bent shaft and impeller. Although

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the exact cause of the failure was not determined it is assumed metal fatigue caused the shaft to bend slightly, creating an unbalanced condition and severe oscillation. A replacement unit was installed January 29. Of the 24 agitators installed in the canyon, this is the first failure experienced since hot operations were begun in January, 1956.

E. Analytical Control Operation

Routine analytical control in support of process was performed until the scheduled shutdown of January 26. From January 22 to 26, the X-Ray photometer used for the determination of plutonium and uranium in the final product samples was out of service. During this period calculations for the plutonium content were based on the alpha total count and calculations for the uranium content were based on the solution specific gravity. The X-Ray photometer is now repaired.

A series of forty-five samples of water from cask cars was analyzed at the request of Industrial Engineering as a part of a cask car contamination study.

F. Improvement Experience

1. Process Tests and Revisions

(For more detailed information on these items, see the Research and Engineering portion of the Chemical Processing Department report.)

In an effort to reduce the normal waste loss of the precycle C column, ferrous ion was introduced into the extractant stream on a test basis. No improvement was noted, and the addition was stopped.

As a result of the increased activity encountered at the 234-5 facility on buttons produced from Purex material, the intermediate scrub stream on the final plutonium cycle A column was restored to service in an effort to secure further decontamination. High waste losses in the column ensued, and the test was discontinued.

The use of recovered acid from the UO_3 process was initiated in the final uranium cycle D column, however, because of pump trouble and low acid concentration, it was necessary to suspend this operation. The duration of the test was sufficient to show that the operation of this cycle is not adversely affected when UO_3 Plant recovered acid is used.

Special loading and unloading test work was done in cooperation with 100 IR Area to measure the effectiveness of slug flushing and cask cleanout on cask car contamination. One cask car, No. 36, has been shuttling between Purex and IR under closely controlled conditions. Test results to date are encouraging.

2. Inventions and Discoveries

None

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6-5

G. Events Influencing Cost

The lack of available metal for processing resulted in low operating rates and on-line efficiency, which in turn caused higher-than-necessary unit conversion costs for the month.

The collection of 1171 units of plutonium in the waste stream and the eventual rework of a portion of this material prevented plutonium waste losses in excess of 1.29 percent for the month.

The successful use in Purex of recovered nitric acid from the UO_2 Plant (initiated on a test basis in January) answers the question of disposition of this acid when Metal Recovery operations are suspended. While the effect on Purex unit cost will not be known until the recovery and shipping charges have been established, the out-of-pocket essential material cost for fresh acid is substantially reduced. Recovery of residual uranium (approximately 0.1 lb/gallon of acid) will also be possible.

H. Plant Development and Expansion

Acid Vacuum Fractionator (Project CG-598)

Vessel calibration and functional testing of equipment associated with the acid vacuum fractionator were completed. Although difficulties with the automatic pH system, which controls neutralization of overheads, has not been resolved, the fractionator will start "hot runs" as scheduled, February 4. The neutralization system will be manually controlled until the necessary corrections are made to the pH system. Some construction "exception" items of minor nature are outstanding and will be completed at a later date by Minor Construction forces.

I. Reports Issued

No secret reports were issued by Purex Operation personnel during the month of January, 1957.

III. ORGANIZATION AND PERSONNEL

A. Safety

There were no disabling injuries and no serious accidents in January. Thirteen medical treatment cases were reported during the month.

B. Security

One security violation was experienced by the Purex Operation in January.

C. Personnel Activities

The duties and responsibilities of the positions of Day Shift Supervisor and Day Shift Process Chemist in the Analytical Control Operation were combined into the position of Supervisor-Laboratory Auxiliaries on

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January 1. Glen J. Fehling was assigned to this position.

George L. Gurwell, Shift Supervisor, Analytical Control Operation, was assigned to the Product and Material Handling Operation on January 25 for a three months training period.

Four Purex Operation Managers and Supervisors are attending the Professional Business Management I course, which began January 8.

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CHEMICAL PROCESSING DEPARTMENT
REDOX OPERATION

JANUARY, 1957

I. RESPONSIBILITY

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

II. ACHIEVEMENT

A. Processing Operation

1. Production Rates and Operating Continuity

The Redox facility was scheduled for a low production commitment for the month of January and for this reason the first 22 days of the month were devoted to acid flushing and the installation of necessary cell equipment as noted under "Equipment Experience". Feed to the I-A and I-S columns had been cut off prior to 1-1-57 and a flushing program consisting of water and 60% nitric acid was started. The 60% acid flush recovered only 114 units of plutonium indicating that the present process presents no critical mass problems. The 114 units of product recovered in the acid flush was discarded because it could not be economically reworked.

Cell work had progressed to a point that high MWD material was charged to the A & B dissolvers on 1-16-57. The C dissolver was held in reserve awaiting receipt of irradiated fuel elements from the Chalk River Plant of Atomic Energy of Canada Ltd.

Head end treatment of metal solution was started on 1-19-57 and feed was brought to the columns on 1-21-57 at a rate of 8. Except for a period of 12 hours when the process was shut down to change-out the G-5 to H-2 jet, which was slowly failing, processing was continuous from 1-21-57 until the end of the month. The mechanical efficiency for the period of scheduled operation was 95%. However, since extensive cell work was scheduled the early part of the month, the on-line efficiency was only 32%. The production commitment was exceeded by 5.6%.

There were 6 E-12 batches of final UNH production that were out of building specifications, however they were either ozonated or blended to produce a final product within shipping specifications. There were also 8 E-3 batches of final plutonium production that were out of building specifications. Two of these were reworked through E-4 and the others were shipped to the 234-5 Building as the gamma component was

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largely due to ruthenium which does not adversely affect the 234-5 process.

Waste losses during the month were higher than normal because processing of virgin feed material was limited and a large amount of cleanout material from the 231 Isolation Building and the Redox Operation sumps was processed. Also a total of 114 units of product, which was recovered during the performance of a 60% nitric acid flush, was discarded because it could not be economically reworked.

On start-up of the operation following the extended shutdown period, the material in the various sumps was collected in D-12 where it was concentrated prior to attempting rework. Subsequent waste samples of the feed containing this blended material were high indicating poor recovery. The inability to economically rework the waste streams encountered resulted in the disposal of approximately 190 units of product, which totaled with the flush material previously discarded represents 0.67% of the months plutonium production.

When the dissolving operation was started on 1-17-57, it became evident that the B-3 silver reactor was emitting I^{131} . The unit was immediately regenerated, however regeneration was only partially effective and the A and B dissolving operation continued to emit an average of 1.5 curies of I^{131} per day. On 1-29-57 the temperature of the reactors was increased from 375° to 395° with no beneficial effects. At month end, plans were being made to use the C-2 dissolver, which was being held in standby for the processing of special irradiated fuel elements from Chalk River, and regenerate the silver reactors on the A-2 and B-2 dissolvers.

2. Equipment Experience

a. Water Segregation(Project CG-653)

During the January shutdown, a total of 23 jumpers were installed in the canyon cells. These installations provided piping to allow waste water streams which could potentially become contaminated to be routed to underground cribs while allowing streams which would remain uncontaminated to be routed to the swamp. The system appears to be operating in a satisfactory manner although at this writing the building has not been operated at full capacity.

During the period when the above jumpers were being installed in the canyon, the raw water to the building was shut off so that water tie-ins could be made for the acid recovery building, and the canyon wash-down system on Projects CG-648 and CG-621 respectively.

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b. D-6 Condenser Installation

The D-6 condenser which has been recognized as being undersized for sometime was replaced with a larger unit. The replacement unit was formerly the F-3 condenser which had been replaced during January of 1956. The installation consisted of dunnage, condenser and eight jumpers. At this writing the new condenser is performing as anticipated.

c. F-2 Pot Change-Out

During the water segregation jumper installation in F Cell, it was found that the F-2 tower had to be removed to install a jumper. Since the removal of this tower represented a large portion of the work necessary to replace the F-2 pot which had been leaking since May, 1956, it was decided to replace the F-2 Pot. This was accomplished without incident and the removed pot was sent to the 221-T Canyon Building for possible salvage. During the reinstallation of jumpers on the F-2 pot it became evident that two of the jumpers were defective. The tube bundle trap jumper and the F-2 thermohm jumper were subsequently replaced.

d. Installation of Agitators in the H-8 and H-9 Tanks

Since 1953 there have been no agitators in the H-8 and H-9 metal solution storage tanks. Because recent evidence has indicated a silica sludge build-up from the dissolving operation in these tanks, the agitators were reinstalled this month. A salvaged and rebuilt agitator formerly in the E-12 tank was installed in H-8 and a new agitator was installed in H-9. The installation is essentially complete except for the power jumper to H-8 which is to be installed during the February shutdown.

e. D-1 to D-7 Jet

It had been previously recognized that the system whereby material could be jetted from the D-1 sump waste receiver to the D-9 waste sampling tank (an air blanketed tank) was potentially hazardous, due to the possibility of hexone vapors being present. To eliminate the hazard, special time consuming procedures were set up. However, this system was basically unsatisfactory, so an installation was made this month which allows the D-1 (sump waste material) to be jetted directly to the D-7 rework tank which has been provided with an inert gas blanket.

f. 2DF Feed Jumper

During the column flushing program, the first part of the month a leaking valve was detected in the 2DF feed jumper. A new feed jumper was installed together with a new

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electrical jumper to the rotameter which was found to have a section of the flex tubing broken. Subsequent operation has been satisfactory.

g. 3DW Let-Down Valve

During the November, 1956 shutdown provisions were made to replace the 10W jumper with a 10W backcycle jumper having a one quarter inch trim in both valves. However, at this same time the 3DW valve was found leaking. Since no replacement was immediately available, the 10W backcycle jumper was installed in the 3DW location. During the January shutdown, this valve was moved to its proper location and a new 3DW jumper, with the proper three-eighths inch trim in both valves, was installed. Concurrent with this installation the leaking 3DW sample jumper was also replaced.

h. 2DX Rotameter

The 2DX rotameter which failed several months ago was replaced with a new unit and the standard or test rotameter, which had been used since the failure of the original 2DX rotameter, was taken out of service.

i. G-5 to H-2 Jet

The jet which transfers oxidized metal solution from G-5 to the H-2 centrifuge failed this month due to plugged dip legs. All efforts to unplug the dip legs were unsuccessful so on 1-29-57 the process was shut down for a jet replacement. The new installation is now operating satisfactory.

j. H-1 to F-7 Jumper

Following the building start-up on 1-22-57, the valve in the jumper from the H-1 feed preparation tank to the F-7 feed tank was found to be frozen in the closed position. All efforts to open the valve failed and the unit was replaced.

k. Iodine Monitor Units

The dissolver off-gas iodine monitoring units, which were taken out of service during October, 1956 for equipment modification and improvements, were returned to the Processing Operation this month. Operation of the units has been improved; however, some flooding of the scrubber section has been noted. Improvement in operating techniques is expected to resolve this problem.

l. Shutdown Cell Work - General

During the extended shutdown this month, 46 new jumpers and 4 major pieces of equipment were installed, thus necessitating work in all canyon cells. Both the left and right

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hand wrenches on the crane failed during cell work and were replaced. On 1-23-57 the burial box containing all of the discarded equipment was buried. The entire operation was completed without incident and there was no increase in the radiation levels on the crane.

B. Product & Material Handling Operation

1. Production and Operating Continuity

Due to the extended 202-S Building shutdown, operations in the 233-S Building were also shut down from 1-2-57 through 1-22-57. During this shutdown period, extensive decontamination work was carried out in the 233-S Building pipe gallery. The contamination is a carry-over from the Redox Plant contamination incident of June 18, 1956. Most of the surfaces in the gallery have now been decontaminated to the point that paint may now be used to cover the fixed contamination. With painting and some additional decontamination work behind the instrument panels it is expected that normal operations may be resumed in this area without the need for SWP clothing and masks.

Processing in the 233-S Building was resumed on 1-23-57. Handling of UNH was normal during the remainder of the month, except for the first two E-12 batches after start-up. These two batches were ozonated in E-13 to produce a final product which was within shipping specifications. A total of 1,055,000 pounds of UNH were received in storage and 531,000 pounds were shipped to the 224-U Building.

2. Equipment Experience

The L-1 concentrator feed pump failed on 1-24-57. Replacement has been deferred to coincide with a scheduled 202-S Building shutdown in February. During the interim period operations will be continued by using a spare transfer jet.

The unloading installation for receiving sodium hydroxide deliveries by tank trucks instead of tank cars was completed this month. Several tank trucks of caustic have now been received from the Pennsylvania Salt Manufacturing Co. and the new unloading station has operated satisfactorily.

One of the heaters in the propane storage tanks burned out during the month and it was necessary to by-pass the PRV on several occasions to maintain propane feed to the generators. The heater has now been repaired and normal operation restored.

3. Process Waste Handling

The D-8 waste stream was diverted from the 241-SX-112 to the 241-SX-108 tank on 1-2-57, when the 241-SX-112 tank reached maximum filling capacity.

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Several more unsuccessful attempts to unplug the D-8 waste lines between the 241-S-151 and the 241-SX diversion boxes were made this month. Preparations are now being made to attempt unplugging the lines with a "go-devil" reamer. Bids for the reamer have now been received and procurement has been initiated.

4. Bismuth Phosphate Plant Standby and Lay-Away

a. Standby Operations

Activities in the Bismuth Phosphate Standby Plants consisted primarily of equipment run-ins and water transfers, routine inspections, minor maintenance, steam cleaning of canyon and cell equipment, and continuing with the lay-away procedure. One man was assigned to the Riverland Roundhouse for the entire month to follow rail car maintenance in regulated areas. Outside crews were engaged to remove tumble weeds from the B and T Exclusion Areas and environs and to repair and replace radiation barricade rails and fences in both areas.

b. Lay-Away

With exceptions of some minor decontamination work in the cells, blanking of face ducts and air passages between the regulated and non-regulated areas, and final shut-off of service lines, lay-away of the 224-T Concentration Building is complete. The 224-B Concentration Building is complete with the exception of some blanking between areas and the shut-off of service lines. Lay-away of both buildings is expected to be complete by the end of February.

Lay-away of the 221-B Canyon Building is now approximately 75% complete and the 221-T Canyon Building approximately 30% complete.

c. Equipment Decontamination

One F-2 pot was received into the T Plant Canyon from Redox for decontamination and inspection. A leak in the pot coil will be repaired if sufficient radiation and contamination reduction can be accomplished.

Two tube bundles, which were previously brought in from Redox for gasket removals, were hydrostatically tested. One of the tube bundles leaked badly and was discarded. The other tested satisfactorily and the unit will be re-gasketed and held as spare equipment.

C. Maintenance Operation

1. Operating Continuity and Equipment Replacement

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The facility operated at a mechanical efficiency of 95% for the period of scheduled operation. (1-21 thru 1-31-57).

During the January shutdown, facilities were provided for segregation and separate disposal of the Redox process cooling water and steam condensates. Jumpers installed in the canyon included 23 water segregation, 9 D-Cell, 2 F-Cell, and 12 miscellaneous jumpers for a total of 46. Three diversion box jumpers were also installed in connection with the water segregation program.

2. Inspection and Maintenance

A total of 196 inspection cards were issued during the month, of which 142 were returned by the respective foreman, together with 78 cards from previous months. At the present time, only 56 inspection cards are outstanding.

The L-1 concentrator feed pump in the 233-S Building failed on 1-24-57. This is a submerged type pump with two pump units in series. By isolating one of the two motors, it was found that the pump would deliver at approximately an 8 ton/day rate. On this basis, operations have continued by using the L-1 transfer jet, with the partially failed pump as back-up equipment. A replacement unit is to be installed during the scheduled February shutdown.

An attempt to repair the stack flush sampler was made on 1-17-57. This required entering the 191 tank vault and tightening the pipe flanges in the suction line. A stack flush was subsequently made on 1-26-57, but no sample was obtained. Since the extreme cold weather may have prevented the sampler from functioning properly, further work on the sampler has been postponed pending more favorable weather conditions.

Efforts were continued this month toward improving the physical characteristics of the inert gas supply. The filters were again removed, inspected, and cleaned. A Logan Aridifier was also installed in the inert gas high pressure supply line along with a series of sample outlets so that samples can now be taken from the line at various locations. These corrective steps have been taken in an effort to resolve the moisture and oil problems associated with the maintenance of rotameters and PRV's in the inert gas system.

By using a General Electric Vibration Balancer and an Oscilloscope, the 222-S Building exhaust fans were balanced and excessive vibration reduced in these units. Cooling coils were also installed in the oil reservoir bearings during the overhaul of the fans.

The extensive scale inspection and overhaul program, which was initiated in an effort to further reduce essential material consumption, was completed this month. All tank scales in both

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the 202-S and 233-S Buildings have now been overhauled and re-calibrated.

Raw water lines were installed this month from the main header in the North Pipe Gallery to A, B, C, and D Cells as part of the water segregation installation.

D. Analytical Control Operation

1. Control Statistics

<u>Month</u>	<u>Samples</u>	<u>Determinations</u>
December 1956	3297	7622
January 1957	2691	5983

2. Building Maintenance

Principle 222-S Building maintenance included the replacement of wet filters in the four air supply units, change of dry filters in the No. 1 and No. 2 air supply units, installation of an oil separator on the vacuum pump exhaust, and overhaul of the No. 1 building exhaust fan.

3. Waste Disposal

4,533 gallons of 222-S Laboratory waste were transferred to the 202-S Building for storage. 3,550 gallons of low level 222-S Laboratory waste and 65,000 gallons of low level 300 Area Laboratory waste were sent to the 216-SL crib. 450,000 gallons of 222-S Building retention waste were transferred to the swamp.

4. Equipment Experience

No down time was experienced with the mass spectrometer during the month, thus completing fifty-two consecutive days of trouble free operation.

Use of an ultrasonic cleaning apparatus has resulted in good progress on the plugging problem and subsequent cleaning of sieve test screens used in the particle size determination of UO_3 powder. Further study and application of this cleaning method is planned.

5. Assistance to Process

At the request of the Redox Technology Operation, samples of fluid from various points in the inert gas system were analyzed in an effort to determine possible causes of corrosion. Although sulfates and halides were found to be negligible, appreciable amounts of nitrate and low pH (acidic) material were present, with the samples of the blow down from the high pressure receiver showing the largest amounts. Since this can

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account for corrosion in the inert gas system, results have been forwarded for evaluation and further work to determine the source of the nitrate ion is now in progress.

As an aid to the Finished Products Technology Operation in determining operating variables in the continuous UO_3 calciner, a considerable number of samples from the calciner bed were analyzed. This work load is expected to continue for several weeks.

A request for determination of U-235 content on enriched uranium by the Hanford Laboratory Operation necessitated special handling. In order to avoid "memory" effects on the mass spectrometer which would tend to invalidate results obtained on routine samples, a dilution technique of combining known amounts of enriched and depleted material was placed in use. This practice insures operation of the instrument at nearly constant values and eliminates the necessity of maintaining and utilizing individual "sources" for various levels of enrichment.

6. General

Better accuracy and precision have been obtained in the determination of "caustic factors" on Redox wastes by the adoption of a reverse strike procedure in place of the standard direct neutralization with caustic. The new procedure is essentially plant practice reduced to a laboratory scale.

Assistance on the calibration of micro pipets was provided to the Standards Laboratory (Process Chemistry Operation) during the month. This was made possible by the relatively light work load and enabled the Standards Laboratory to work off the majority of a back log of work which accumulated during their relocation move from the 234-5 Building to the 222-S Building.

E. Radiation Monitoring Operation

1. Radiation Occurrence Experience

Eleven radiation occurrences were reported during the month, reflected continued performance below previous months other than December, 1956. Five of the occurrences reflected deviations from established procedures, and two resulted from inadequate surveys of the work station or equipment involved. The necessity of following established procedures and the importance of the individual's responsibility in radiation work is being re-emphasized to all employees in radiation training meetings.

2. Personnel Exposure Experience

There were two instances of localized uncontrolled exposure, each related to coverall spot contamination. In both cases, the personnel dose rates of 300 to 500 mrad/hr were measured and could have caused technical over exposures, except for the

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prompt discovery of the overall contamination. The maximum exposure to a localized area was determined to be 150 mrad.

Inadequate ventilation control in the 233-S Building caused average air contamination levels of 8.4×10^{-13} uc Pu/cc (mask level 20.0×10^{-13}) in the operating gallery for a 24 hour period, with lesser, yet positive, levels in the change room and the loadout room. This air contamination occurred when extensive cleaning was being done in the 233-S Building Pipe Gallery and green house room. However, no significant personnel exposure is believed to have occurred. The critical air balance problem in this building plus the excessive traffic during decontamination very probably caused air reversals through portions of the building. Door control signals have been recommended to minimize the problem in the future.

3. Other Contamination Experience

Decontamination work and related control during the building shutdown was extensive and successful. Specifically, the 233-S pipe gallery contamination levels were lowered generally by a factor of 10, with only a few areas still contaminated to levels $> 10,000$ d/m smears. The wall and piping is still contaminated to levels up to 4×10^6 d/m. Even though this level appears high, this represents the first time a finite survey measurement could be obtained, representing a remarkable achievement in decontamination.

Deposition samples on the crane surfaces showed a total average contamination deposition of 15,000 c/m for the entire process shutdown. The shutdown included at least two entries into every process cells, and involved many process equipment changes. Excellent adherence to cell work procedure was the one principal reason for such satisfying experience.

Deposition samples around the 291-S stack continued to reveal minor amounts of particulate fallout. Our past history of winter-time stack problems substantiates a belief that the present condition is one which can be expected. To further justify our complacency, however, we are pursuing possible causes, and are determining the contaminant, in order to compare this winter's observations with previous years.

F. Improvement Experience

1. Process & Equipment

Two special dissolutions of I & E and solid fuels were made in the Redox Plant during January for the Irradiation Processing Department. The dissolvings were made to determine by special analysis, the conversion ratio of I & E fuels as compared to a special "control" push of two stringers of normal slugs. No

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difficulties were encountered in dissolving or sampling the test material.

Remotely controlled air operated valves were installed on the chemical header tanks located on the 8th level of the Silo. This will enable the process operators to control the filling of chemical addition tanks from K panel board on the 7th level without the assistance of a second operator on the 8th level.

2. Inventions and Discoveries

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

G. Events Influencing Costs

During the January shutdown, a total of 29 jumpers were fabricated by the shop as expense items so the budget for external maintenance costs will appear excessive. This expense represents the majority of the planned cell work for January, February and March.

Unit cost figures for the month of January will be higher than those attained in previous months due to the limited amount of feed material available for processing and the scheduled shutdown for the installation of new equipment.

Spare parts inventory was reduced by approximately \$15,000 with the removal of assorted connector parts which have been in an inactive inventory status due to some of the components being obsolete. These are to be sorted and salvagable parts combined with usable connector components left over from the Redox Phase II and III Projects. It is expected that from \$6,000 to \$7,000 worth of connectors can be obtained in this manner. Two obsolete spare jumpers are also to be excessed for an additional reduction of \$2,200.

One of the two L-3 tantalum tube bundles from the Fan Steel Corp. arrived on site this month. It was necessary to issue a stock adjustment request to place the equipment in Spare Parts and this will mean that inventories will be temporarily increased by approximately \$5,500. At the present time a spare 304-L tube bundle is to be maintained until the new tantalum units have been proven satisfactory. It is quite possible that future experience will show that a stainless steel backup spare will be all that is required in this service.

Delivery of sodium hydroxide by tank truck from the Pennsylvania Salt Company's storage site in Pasco, Washington was started this month. This change from tank car to tank truck delivery will result in an annual saving of approximately \$10,000 for the Redox Operation.

H. Plant Development and Expansion

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1. Design Liaison, Construction Checking

CG-653, Waste Water Segregation

Beneficial use was realized January 22, 1957 with the start-up of concentrators sending essentially the full condensate stream from the 202-8 Building out via the new condensate routing. Physical completion of project work was accomplished January 25, 1957. Currently, Redox Operation Process personnel are checking to determine whether corrections are necessary to the condensate routing from the dissolvers. Three additional jumpers might be required if calculations indicate that orificing cooling water lines will not improve a back pressure problem between cells.

CA-539, Additional Waste Storage - 241-SX

Instrument calibration and checkout has proceeded slowly. All specific gravity instrumentation is in operation on tanks 107 through 115 with the exception of 109 where a dip tube is plugged. The temperature scanner needs some additional work before it can be put to use. The differential pressure is inoperative due to the need for vendor information on transducers, where a pneumatic signal is converted to electrical. A letter has been written to the Project Engineering group requesting the full time consultation service of the Construction Engineering Designer in the field, until this instrument panel is in acceptable working condition.

CG-621, Redox Contamination Control

Project proposal, Revision 3, has been signed by the Commission. This revision proposes cancellation of the E-13 vessel and gamma monitor, cancellation of H Cell equipment replacement and the closing out of the project on December 31, 1956 with exceptions as follows: minor testing, painting, water tie-ins, sealing of craneway joints and hose reel installation on the canyon wash-down facilities. During the January shutdown, the water tie-ins were made for the canyon wash-down facilities. Completion of the joint sealing in the craneway will permit start-up and operational testing of the system.

CG-635, Stack Particulate Sampler

All work is complete on this project and close-out has been made. Project cost came to the authorized \$40,000.

CG-722, Recovered Acid Receiving Station - Redox

The project proposal is being reviewed by the CPD Manager for approval. It is proposed that the Redox Operation will start using recovered acid in mid-March by utilizing the 204-4 tank as a receiving station and transferring by pump through the unused D-7 UNH line to the dissolver section.

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

The North Sample Gallery recovered acid header design is being expedited to allow installation to start February 12th with an estimated 30 days to completion. The 293-S structure is being readied for equipment installation. Interior painting and the transite instrument shed are complete.

CG-717, Waste Pumping Facilities - 241 SX

This project proposal for transferring non-boiling Redox waste to the U Tank Farm has been approved by the AEC and a directive received. A possible delay is foreseen from the assignment of stainless pipe procurement to a fixed price contractor rather than to G.E. Detailed design will begin this month.

I. Reports Issued

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

III. ORGANIZATION AND PERSONNEL

A. Safety

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

A new procedure for unplugging instrument lines was developed this month and issued over the signatures of the operation managers. This will standardize the practices on all shifts and provide a positive tool to bring about enforcement.

Elimination of a possible fire hazard was accomplished by the substitution of ethylene glycol for isopropyl alcohol in a freezing mixture routinely used in the 222-S Laboratory. A health hazard from nitrobenzene vapor was also eliminated when evaluation revealed the applicability of dibutylphthalate as a substitute reagent in a chloride analysis.

B. Security

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

C. Personnel Activities

A new college level course for Radiation Monitors was started in the G. E. School of Nuclear Engineering, and the turnout has been outstanding with approximately 20% of the total available monitors attending the course. This turnout represents their interest in self-development and growth in the General Electric Company.

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C. T. Groswith, D. R. Koberg, D. W. Morris, and R. P. Knight, started the 20 week course in Professional Business Management on January 7.

J. E. Lee and D. W. Morris attended Practical Business Writing Course No. 1 on January 18.

C. E. McMahon, attended the Management Orientation Course scheduled on January 11 and 14.

Plant down time during the month permitted significant time and effort of the 222-S Laboratory personnel to be devoted to training in various phases of activity. Although some time was expended in housekeeping and viewing educational movies available, the major portion was devoted to analytical methods, procedures and techniques; instrumentation theory and operating principles; safety hazards and techniques; radiation exposures, handling methods and procedures; general chemistry and purposes of procedures; general chemistry and flows in processes. All training meetings involved lectures, demonstrations and included question and answer periods.

A. W. Ford, Process Operator assigned to T Plant, died of a heart attack on 1-21-57.

C. T. Groswith
Manager
Redox Operation

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CHEMICAL PROCESSING DEPARTMENT
FINISHED PRODUCTS OPERATION

JANUARY 1957

I RESPONSIBILITY

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

II ACHIEVEMENT

A. Metal Finishing Operation

In the 231 Building the processing of low MWD/T plutonium was completed during the month and the material which was isolated and loaded in the PR cans was shipped offsite. The cell equipment was flushed and cleaned and at month end it is in standby status. Production employees were transferred to new assignments elsewhere in the plant.

In the 234-5 Building fabrication of one model from plutonium produced at the Savannah River Plant was completed during the month and no more work on this particular model will be done unless production schedules are changed to indicate additional requirements in the future. The overall schedule for this particular model was exceeded by 1.5% and all this material has been shipped. Another model plus unfabricated plutonium metal were prepared from plutonium originating in the Purex Plant. Schedules were met in both cases without resorting to overtime. Also a small amount of unfabricated metal was diverted for use in special work at HAFO.

Production activities generally progressed satisfactorily during the month. Some difficulty was experienced in the early part of the month due to the fact that the feed from the Purex Plant contained more than normal amount of fission product and radiation levels increased in the process equipment as well as in the metal produced. Fortunately, corrective action was taken in the Purex Plant and later in the month the radiation returned to a more normal level.

Equipment performance was generally satisfactory except during the last week of the month when numerous difficulties were experienced in Task II. While some delays were experienced, the overall progress of the work for January was not seriously affected.

B. Product Recovery Operation

Essentially all of the backlog of fluoride powders was eliminated by month end. Recovery work was interrupted at mid-month to decontaminate approximately 32 kg of plutonium from the Purex Plant, thus accounting, in part, for the

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B. Product Recovery Operation (Continued)

drop to 60 in runs charged to the dissolver as compared to 80 in December. Overloading of the system with plutonium disturbed distribution ratios and it affected extraction stages, and this, coupled with impurities from solids build-up on the column walls, caused relatively high waste losses and the necessity to rework. On January 28, the Recuplex facility was shut down in order to flush out the solid "crud" with sodium hydroxide and nitric acid. During the progress of this flush the sub-zero weather caused a freeze-up of the outside drain lines from the waste tanks and caused two days lost time. Instantaneous throughput rates averaged 1856 liters/day and operating efficiency was 75% for the month.

The metal recovery facilities (Hoods 40 and 41) proceeded routinely with the recovery of approximately 22 kg of plutonium metal scrap being fed back to the main production stream.

A six-inch water main and the forty-pound instrument air line just outside the 291-Z were broken on January 29. The reason for this difficulty was due to the fact that originally, improper construction practice and improper materials were used in the installation of these lines. During the month it was discovered that the fifty foot vent stack on the 231 Building was corroded severely at one portion. Temporary repairs were made to strengthen the stack and a permanent repair is scheduled for the coming month.

C. Maintenance Operation (2)

In Task I, alteration of the valves by replacing the standard 1/8 and 1/16 inch plugs with $\frac{1}{4}$ inch thick plugs has resulted in more reliable operation and increased life expectancy. Also in this task, the dip tube assembly in Unit #4 SNCT Tank failed due to corrosion of the stainless steel tube, and was replaced. In Task II numerous difficulties were experienced involving limit switches, differential pressure indicator and temperature controls. Also in this task all six of the large lucite panels on the front of Hood 9 were replaced because the former panels were etched and discolored, and were severely limiting visibility. In Task III, two bellows failures were experienced. In Task IV, difficulty was encountered with faulty heating elements. Also in Task IV, a second modified lift assembly was installed in order to permit bearing changes without removal of the assembly from the hood. In Task V, a failure of the bellows in the balance was experienced. In Task VII, the detector unit from the X-gas analyzer has been removed and returned to the vendor for repairs. Coating Unit #8 was removed from the RMA Line and transferred to the Metallurgy Operation, Hanford Laboratories Operation.

In Recuplex a new slurry dissolver tank and piping system has been installed in the Slag and Crucible Hood.

D. Analytical Control Operation

Activities in the Analytical Control Laboratory were normal throughout the month.

Schedules on finished parts through Final Inspection were met and material for a portion of next month's commitment is on hand for early completion. Rejection rates on total parts received increased from 7% in December to 10% this month.

Samples received in December analyzed in January, under the sample exchange program between Rocky Flats and Hanford indicate that methods and analyses are well within control. Results checked those of Rocky Flats within less than 1%.

E. Metal Recovery Operation

Continually declining feed supply resulting from final tank cleanout in the Metal Removal Operation, an excessive amount of uranium oxide rework, and adverse weather conditions limited production to a net of 30.8 tons (36.2% of goal) in the Metal Recovery Operation. Gross production was 41.6 tons, which included 11.8 tons of rework material from 224-U. There were four process pump failures during the month, however none of these had an adverse effect on overall production, but the sub-zero weather during the last half of the month did. During the time that the plant was down on the week-end during sub-zero temperatures, the 291-U fan equipment became erratic and one motor failed. The evaporator condensate lines and the caustic header to the building became frozen. Caustic unavailability for neutralization of waste resulted in the shutdown of the process. This did not hinder the Metal Removal Operation's activities but it effectively reduced the Metal Recovery Operation's net production by 17 tons (the 2nd cycle inventory at month-end). Of these 17 tons, about 50% were uranium oxide operation rework.

F. Metal Removal Operation

Clean-out sluicing was completed in the 103-T, 107-TX, 108-TX and the 105-U tanks during the period. Tanks currently being sluiced are the 107-U and the 106-TX. Heel jet cleanout of the 115-TX tank is also in progress. Recovery rates have been very low during the period with a total of only 42 tons being recovered. Operational and maintenance work has been hampered due to adverse weather conditions.

Due to the failure of the 001-UR Tank on 12-31-56, it was necessary to utilize the 001-UR Vault as the accumulator for sluicing at the UR Farm. It was also necessary to install an overground line to the 107-U tank for sluicing

F. Metal Removal Operation (Continued)

due to failure of the original sluicing line. The 101, 102, 103, 105 and 106 U Tanks were inspected during the period. All were empty with the exception of the 102-U Tank which will require a few days of cleanout sluicing. It is estimated that 7 to 10 tons remain in this tank.

Ditching of TBP non-cribbable scavenged waste was continued until No. 13 was filled to capacity. Adverse weather conditions have hampered further cribbing activities.

G. Uranium Oxide Operation

Uranium oxide production for January was 70.6% of the commitment (after compensating for the over-production beyond the December commitment). At the end of January, 21% of the original commitment had not been achieved primarily because of severely cold weather during the entire latter half of the month.

At month-end only 135 tons of uranium remained in the backlog. Less than 100 tons of this was available for calcining due to the fact that a portion of the Purex material required rework at that plant.

The pot rooms were shut down during the first part of January. The Luckey Pots started on January 12 but were shut down again on January 18 when the pot room loop header became frozen. On January 23 the pot room resumed operation on 60% feed. As more pots and feed of higher concentration became available, the pot room came up to normal production during the last days of the month.

Four continuous calciners were conditioned for operation during January and averaged about two calciners per day on the line from January 3 on. The J calciner was removed from operation on January 21 for acceptance test disassembly and measurement coincident with investigation of overheating and bearings. The G calciner achieved an 8 ton rate for several days during the month. Extremely cold weather conditions aggravated calciner problems relating to distortion, rotameter and feed point freeze-ups, and powder handling.

Specifications for car U-502 were waived by customer when total metallic impurities in the uranium were about 4% above limit.

H. Maintenance Operation (U)

In the tank farms seven pump moves were made during the month. Two jets and nine jumpers were installed. The extremely cold weather caused line breakage and required installation of two temporary lines. Frozen air lines

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H. Maintenance Operation (U) (Continued)

and condensate in storage tank periscopes required above average maintenance to instrument equipment. One Nagle sludge pump was dropped in the 102-T tank during the process of raising it preparatory to moving it to a new location.

In the 221-U Canyon Building four pumps failed during the month and five pumps were repaired as replacement spares. One idler wheel bearing on the 75 ton crane was replaced. Modification of the 310 tank and pump was completed permitting the reclamation of contaminated UD_3 . Sub-zero temperatures during the latter part of the month required continuous maintenance of frozen lines. Three ACA pulse generator motors were rebrushed and a bearing was replaced on a fourth motor.

In the 224-U Building all flanges in the X-1 and X-2 storage tanks were regasketed. Gas-fired calciner pots #19 and #20 were given Class A inspections and overhauled. The D-2 and D-7 evaporators were unplugged as well as the pot room loop header. Vacuum leaks were corrected in the EA-2 and the TA-1 cooler and tower. Five electric pot agitators were repaired. The heating element feed cables on three electric pots were replaced with thermo plastic coated wire. Pilot light assemblies on the Luckey Pots were repaired. The modification to the shower room and the wash room was completed.

In the 224-UA Building the calciner cover was removed from the G Cell unit for removal of "chunks" of powder. Valves and rotameters in all calciner feed boxes required removal and repacking. Replaced one bearing on the J Cell calciner and the oil seals on the other J Cell calciner bearing. Replaced the 150 h.p. ACA motor on G Cell unit. Replaced fume vent filter in J Cell and repacked calciner shaft cells. The bulk container scales required more than average maintenance during the month.

I. Radiation Monitoring Operation

Fourteen radiation occurrences were documented in January as compared to fifteen in December. The breakdown is as follows: Metal Finishing Operation - 0, Product Recovery Operation - 2, Analytical Control Operation - 1, Maintenance (Z) - 0, Radiation Monitoring - 0, Metal Removal Operation - 1, Metal Recovery Operation - 0, Uranium Oxide Operation - 3, and Maintenance (U) - 7.

Sixteen cases of skin contamination were reported in January as compared to nineteen cases in December. Four cases occurred in Z Plant, seven in the 224-U Building, one in the 221-U Building, and four in the Tank Farms. One of the cases occurred in Recuplex when an operator contaminated a finger to 1×10^6 d/m with plutonium bearing TBP- CCl_4 solution.

I. Radiation Monitoring Operation (Continued)

As in the past, difficulty in decontamination was experienced, however, the contamination was removed to less than 500 d/m in two days.

Radiation exposure increases in sections of the RM Line and on plutonium buttons, that occurred because of a change in contaminants of Purex feed have made it necessary to set dose rates for certain individual operations. Prior to this, definite exposures had been set for each particular operation and had eliminated the need for monitoring except for an occasional routine check. At the writing of this report exposure rates in Task I and II are still relatively high.

Contamination control has been excellent during the removal of the old RG Line, no incidents of any kind have occurred.

The lucite panel change on Task II was completed during the month with excellent contamination control. Task II probably offers the highest contamination potentiality of any location in the 234-5 Building. Good planning and careful workmanship resulted in a well executed job.

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 the Product Recovery Operation a new procedure was developed for the handling of scrap alpha phase metal which heretofore had been passivated in caustic solution in the Hood 41 dissolution vessel. This passivation is now carried in small beakers in the hood. This new procedure allows smaller amounts of caustic solution to be used numerous times and thus minimizes the amount of caustic solution to be neutralized and later recovered in Recuplex.

In the Uranium Oxide Operation, the Luckey Pot covers and the off-gas systems were regasketted and jets for inducing stack draft were installed and improved fume conditions have resulted.

A gross test-weight container, weighing 13,882 pounds was provided during the month and a procedure established to assure the accuracy of all containers by closely referring to this standard weight before they are released for shipment. This procedure should reduce variance and will provide evidence to support our weight data if variances are noted by the customer.

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J. Improvement Experience (Continued)

2. Miscellaneous Improvement Items (Continued)

Minor improvements included increased jet capacity on TA-1 equivalent to TA-3, revision of the calciner building powder exhaust header, and segregation of the sulphuric acid addition line to X-30 feed tank, from the inlet feed stand pipe to eliminate a freezing hazard.

3. Inventions or Discoveries

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

K. Events Influencing Cost

In the Metal Finishing Operation the work force in the 231 (Isolation) Building was gradually reduced during the month as the work of placing this facility in standby status progressed. At month-end six operators have been transferred to new assignments. The two remaining operators as well as the supervisor will be moved to new assignments early in the coming month.

In the Metal Recovery Operation the limited production caused unit cost to increase further during the month.

In the Metal Removal Operation the large number of equipment movements necessary to complete the Metal Removal program, and the extremely cold weather made it necessary to work considerable overtime during the period in order to assure maximum possible feed supply to the Metal Recovery Operation.

In the Uranium Oxide Operation severe low temperature weather conditions during the last half of the month caused considerable hardship on Uranium Oxide operating and maintenance forces and absorbed a great portion of the maintenance effort. As a secondary result of freezing much of the poor calciner performance can be attributed to low strength feed and insufficient air for adequate "bumping". These conditions were related to freeze-up of equipment.

Five tank trailer truck loads of Uranium Oxide recovered nitric acid were shipped to the Purex Operation January 4 through 16. These were the first of such transfers. The latter two of these shipments were below Purex specifications. More rigid controls will prevent recurrence.

L. Plant Development and Expansion

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

Approval of total project funds of \$700,000 was received from the AEC. The removal of the RG Line equipment by plant

I. Plant Development and Expansion (Continued)

1. Project CG-691 - Improved Task I and II Facilities (Continued)

forces is progressing satisfactorily. Removal of the hoods proper is scheduled to start the first week in February.

2. Project CG-734 - RMC Button Line

The project proposal for the RMC Button Line has cleared the General Electric Company and is now being studied by the local AEC. The main Task I and II hood and equipment will be supplied from Project CG-691. Estimated cost of this project is \$1,500,000.

3. Filter Replacement

A design order has been issued to Facilities Engineering for preparation of a project proposal to replace existing exhaust filters in Z Plant with fire resistant filters. It is also anticipated to install one additional filter box for HF exhaust and replace four corroded filter boxes.

4. Conversion of Recuplex to a Manufacturing Facility

The project proposal to convert Recuplex to a manufacturing facility is being reviewed by the AEC.

5. Water Pickling

Approval has been received for procurement and installation of ultrasonic and filtering equipment for Task III. This equipment will use water in place of nitric acid for pickling buttons which will reduce waste losses and corrosion of equipment.

6. Recuplex Improvements

Make-up tank G-23 in room 337 (Chemical Preparation Area) has been converted to the solvent system supplying the solvent extraction process. This additional tank gives each solvent used an individual make-up source which adds flexibility to the process and saves material and time.

Piping at the top of column H-1 has been arranged to accommodate sludge removal directly from the interface to waste. Previously this sludge was removed by overflowing H-1 to pump tank H-11 and processing through column H-2 before being sent to waste. A savings of operating time and waste loss reduction should result from this modification.

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L. Plant Development and Expansion (Continued)

7. Project CG-613 - UO₃ Expansion

The exceptions to the work assigned to Construction Operations were completed and this portion of the project completed on January 17, 1957. Work remaining includes startup items to be completed on work orders from Project Operations. K Cell calciner was placed in operation on January 3, 1957, and the L Cell calciner is expected to be in operation by about February 1, 1957.

The major items interrupting the continuity of operations in cells G, H, J, and K are plugging of the rotary valves in the powder unloading system, inoperability of the calciner collection bin high level alarms, plugging of the calciner off-gas filters, and plugging of the calciner feed points.

The design and procurement for the deluge system for the 100% UNH concentrators is in progress, with a beneficial use of this system expected early in March.

Work on the construction of the Maintenance facility has been delayed due to an extended delivery date for siding and roofing materials. Construction work is expected to resume during the first week of February 1957.

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

Detailed design is in progress with the design being concentrated on stack locations and piping so the piping installation may be initiated with a minimum of delay. Comment drawings should be completed by February 15, 1957.

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

The finishing excavation of the six ditches included in the final phase of this project will be completed during the last week of this month. The painting and the testing of the piping installation is being delayed due to adverse weather conditions. Project completion is expected during the second week in February 1957.

10. Project Proposal - Compressed Air and Venting Facility

A project proposal is being prepared by Construction Engineering to provide compressed air and venting facilities for U Area, completely independent of existing facilities in the 221-U Building, as required following the layaway of the 221-U Building.

L. Plant Development and Expansion (Continued)

11. The project proposal is awaiting approval by the General Manager, General Electric, prior to submission to the AEC.

12. Capital Work Order C-86052 - Installation of Product Rework Facilities - Oxide Operation

A capital work order in the amount of \$4,850 has been issued to Construction Operations to provide a product rework facility for the 224-UA Building. The design shop prints have been issued to Construction Operations.

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

The prints of the redesigned calciner pot agitator, shafts, and seals are being revised following receipt of print comments from Finished Products Operation and are scheduled for issue during the week ending February 3, 1957.

M. Reports Issued

HW-48061 Revision to Recuplex Column Aqueous Waste Limits, January 29, 1957, by L. M. Knights

HW-48073 Recuplex Operation, January 31, 1957, by L. M. Knights

HW-47995 Determination of Neutron Counting Constants for Models 191, 201, and 251, January 25, 1957, by R. E. Isaacson

HW-47918 Chemical Processing Department, Finished Products Operation, Z Plant Monthly Report, December, 1956, January 1, 1957, by W. N. Mobley

III ORGANIZATION & PERSONNEL

A. Organization Changes

In the Product Recovery Operation one (1) supervisor (R. W. Ritchey) resigned to accept employment elsewhere. He was replaced temporarily by a supervisor (D. D. Deming) released from the Uranium Oxide Operation.

Also in the Product Recovery Operation one (1) supervisor (W. A. Crossman) is on sick leave for approximately three (3) months as a result of an off-plant injury. He has been replaced by a supervisor (M. C. Jacobs) who is on loan from the Research and Engineering Operation.

In the Analytical Control Operation one (1) supervisor (P. B. Fisk) was added for training purposes in the Final Inspection facility.

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A. Organization Changes (Continued)

In the Uranium Oxide Operation two (2) supervisors, D. D. Deming and R. E. Olson were released from temporary assignment. Deming was assigned to the Product Recovery Operation (see above) and Olson was returned to his former assignment, as Contact Engineer with the Maintenance Operation (U).

The two (2) supervisors (R. C. Alstatt and J. F. Newland) were interchanged between the Metal Recovery and Uranium Oxide Operations to increase experience and flexibility.

B. Safety Experience

No disabling injuries or near serious accidents occurred in the Finished Products Operation during the month. Fourteen (14) medical treatment injuries were experienced compared with twenty-three (23) during December. Frequency rate decreased from 2.57 to 1.96.

A complete review of all chemicals handled in the Finished Products Operation was made and a report issued covering the types of hazards and the recommended handling procedures. This will be included in the Safety Engineer's Study.

C. Radiation Experience

All significant information relative to radiation experienced 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

Power Operators in the Finished Products Operation are attending a series of educational lectures conducted by the Power and General Maintenance Operation. In addition to this the Finished Products Operation has adopted a positive plan for preparing Journeyman Power Operators for advancement. These men are assigned to work with the Chief Power Operator one day each time they rotate to day shift.

Four exempt personnel are attending the Professional Business Management course. One Engineer has attended instruction classes relating to the IBM 650. A Laboratory Leader has attended a course in Report Preparation.

Two grievances were received during the month. One involved employment practice and the other involved chemical damage to personal clothing.

Manager, Finished Products Operation

CHEMICAL PROCESSING DEPARTMENT
POWER AND GENERAL MAINTENANCE OPERATION

JANUARY 1957

I. RESPONSIBILITY

Responsibility for the function of supplying instrument charts and stamping identification data thereon for the Chemical Processing Department was transferred to the Office Services Operation January 28.

II. ACHIEVEMENT

A. Operating Continuity

There were no outages of steam, water, or electrical services that affected continuity of operations.

B. Inspection, Maintenance, and Replacement

Equipment requirements for the scheduled January shutdown of the Redox facility were met sufficiently early to permit installation to start ahead of schedule. Included among these requirements were modifications to the water segregation pumps and to the D-6 jumpers and dunnage, and the preparation of an F-2 concentrator, an A-106 agitator, and several miscellaneous jumpers.

Preparation of equipment items required for the scheduled January shutdown of the Purex facility met timing requirements. Included among the requirements were the run-in and modification of an E-4 centrifuge, an F-1 agitator, and an F-6 tube bundle; and the fabrication of an L-1 probe. Also provided at month end for installation in "A" cell were an auxiliary electrical heater and associated pipe jumpers.

The contaminated Nagle pump repair program was completed. The third and final pump was repaired and is being held as a spare for the tank farm program of the Finished Products Operation.

The maintenance and operation of air conditioning systems in the process buildings became increasingly difficult as a result of low temperatures prevailing in late January. Ice and frost build-up at fan intakes and dry filters were unusually severe. Power Operation's air balance crew gave assistance to the prime operating facilities in maintaining critical supply fan operation. Other activities of the air balance crew included rebalancing the air conditioning system in the 115 building, 100-D Area, where long-standing difficulties in temperature control and contamination spread were corrected. It is conservatively estimated that the Irradiation Processing Department will realize a reduction in steam consumption of 5000# per hour as a result of this ventilation rebalancing work.

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Inventory of the 200 East Area coal supply was reduced 20,000 tons (from 56,000 to 36,000 tons). The latter figure is considered an adequate supply for a normal three months' operation of the Chemical Processing Department. In effecting this inventory reduction, the base of the coal pile was reduced in circumference. Thus the distance over which coal must be moved during storage and reclaiming operations will be shortened. The feasibility of this inventory reduction was based on variations between the actual and forecasted steam loads to the Purex facility.

Means were developed by instrument technicians of this operation which will enable boiler operators to change the fuel-air ratio without affecting the automatic setting of the Hagan boiler controls in the 200 East power house. These developments provide boiler operators with complete control of air flow under any operating conditions. Heretofore, operators were confronted with acute problems in maintaining proper fuel-air ratios in the firing of boilers. These problems were attributed to variables, such as the burning characteristics of different grades of coal, fuel moisture content, changes in atmospheric conditions, etc., all of which would necessitate changes in fuel-air relationship. Changes of air flow required the service of an instrument mechanic. This service was not provided on the night shifts or on week ends; consequently, boiler operators were frequently forced to abandon instrument control and resort to manual operation. Changes in air flow can now be accomplished through instrumentation without the aid of an instrument mechanic.

A burial of contaminated equipment was successfully completed at the 200 West industrial burial garden on January 23. The burial followed the conventional procedure and consisted of miscellaneous process equipment and component parts removed from the 202-S canyon. At a critical time during the operation an incident occurred involving the separation of a 3/8" cable. The resulting situation was quickly cleared up and the operation brought to a successful conclusion. Personnel exposure was held to a minimum during the entire operation.

A twenty-five foot monorail, complete with chain hoist, was installed on the east side of the 272-W Shops. Among the advantages gained by the installation were:

1. The elimination of safety hazards involved in manual lifting during the movement of steel stocks from the storage racks to the fabrication shops.
2. Elimination of the need for a crane and operator for lifting the heavier stocks.

Services rendered the prime operating facilities by the Shops Operation included the fabrication of 62 pipe jumpers, 23 flushing heads, 2 agitators, and 5 equipment burial boxes. Progress continued on the fabrication of five electric off-gas heaters for the Purex facility.

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The Tool and Die Shop and Machine Shop operated on an overtime schedule during the entire month in an effort to meet the demands of the Metallurgical Laboratory group for development work. Suitable progress was realized. However, the tight work schedule necessitated the jobbing out of a portion of the work to other shop facilities at HAPO.

C. Improvement Experience

The work sampling study, which has been in progress for two months in the 272-E and 272-W Shops, was completed. The data are currently being correlated and evaluated by Industrial Engineering. It is anticipated that subsequent analysis by P&GM management will pinpoint areas where changes and modifications in practices and procedures may improve overall job efficiency.

An industrial engineering study was initiated in the Shops Operation to determine the optimum organization required for a planning and scheduling function which will operate with a higher degree of effectiveness.

A complete review of the P&GM spare parts inventory is being conducted with the cooperation of Relations & Utilities personnel. This review involves a look at every item currently set up to determine precisely what spares are available for equipment for which this operation has operating responsibility.

III. ORGANIZATION AND PERSONNEL

A. Safety and Security

There were no disabling injuries reported during the month.

The injury frequency rate based on 27 reported medical treatment cases was 4.96 for the month.

There were no incidents reported in which a lapse of radiation control was evident.

No security violations were reported during the period covered by this report.

B. Personnel Activities

Personnel development courses were attended by twenty-seven power operators during the month. The subject matter covered in these training sessions was "Ventilation Practices and Procedures."

Thirteen employee suggestions were submitted, of which eight are undergoing further evaluation for possible adoption.

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

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CHEMICAL PROCESSING DEPARTMENT
FINANCIAL OPERATION

January, 1957

I. RESPONSIBILITY

Effective January 1, 1957, the Financial Operation assumed the responsibility of accounting for Chemical Processing Department construction projects.

On January 21, 1957, all records associated with Chemical Processing Department projects were transferred from Construction Engineering Operation to the Financial Operation, Chemical Processing Department.

II. ACHIEVEMENTS

A. Product Cost

Considerable progress was accomplished in January relating to the adjustment of liquidation rates for Power and General Maintenance, the Engineering components, and servicing elements within the production operations. With four months experience under reorganization, it is now felt that rates may be set in such a manner as to minimize under and over liquidations of cost for the remainder of the year.

Audit and revision of the special bookkeeping and reporting for the Engineering operations continued during January. Several improvements in procedure were made and a number of misunderstandings were corrected. Materials necessary for institution of a McBee Key-Sort system (for distribution and analysis of Engineering cost) were ordered. It is expected that installation of this system will result in better records, additional control information and faster reporting. A change-over is scheduled for March or April, depending upon arrival of the equipment.

In cooperation with the Specialist, Procedures, an additional fifty pages of reports were placed on the ozomatic process to avoid typing and checking of duplimat masters. Product Cost is now using one typist, and half of the time of another clerk-typist, where the report typing operation previously required three typists.

Expenditures for Equipment Not Included in Construction Projects were reported in detail for each individual item of equipment for the first time in January and field response to this additional information indicates that this improvement should be continued for future reporting.

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

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1. Analysis of Design Order overruns for Facilities Engineering Operation.
2. Study for the Finished Products Operation to determine cost savings relating to the use of new UO₃ shipping containers.
3. Establishment of unit cost graphs for use by the Measurements Specialist in comparing actual and forecasted unit costs.
4. Feasibility study on the possibility of assuming the responsibility for essential material procurement by CPD rather than Relations and Utilities Operation.
5. Preparation and issuance of secret rough draft December Unit Cost Information for W. E. Johnson's consolidated report.
6. Verification of Financial Operation's calculations on HW-47786, Oxide Operations (concerning the cost of alternative methods of producing UO₃).

Other events of interest during the month included negotiations with Irradiation Processing Department, Relations and Utilities Operation, and Hanford Laboratories Operation which resulted in the chargeback of approximately \$6,000 in incorrect charges.

To date, incorrect charges in the amount of approximately \$90,000 have been returned to the billing departments. Approximately a third of these have affected the Research and Development program and placed us in a much more favorable position with regard to our total Research and Development budget.

The master schedules for preparation of the revised FY 1958 budget were received from Contract Administration. Calls for estimates on manpower and equipment were issued by the Budget group.

B. Personnel Accounting

The major activity during the month centered around preparation of information and statistics for Chemical Processing Department's first salary review.

Complete segregation of the six HAPO components became effective on January 1, 1957. This complete segregation will require rigid control of all master card files in order to insure the prompt and correct payment of personnel.

An increase in Social Security Tax from two percent to two and one-quarter percent was reflected in pay checks delivered January 4, 1957.

Under the 1956 amendment the rates of tax for employees and for the company on taxable wages paid during subsequent years will be:

1957 - 59	2.25%
1960 - 64	2.75%
1965 - 69	3.25%
1970 - 74	3.75%
1975 and subsequently	4.25%

Personnel Accounting is now reporting and paying payroll taxes to the Federal Reserve Bank, San Francisco, as a separate component. Prior to January 1, these taxes were reported and paid on a consolidated basis.

The total amount paid, for January, including employers share of Social Security taxes, was \$174,474.48.

The year end job of reviewing total purchases made by participants in the Stock Bonus Plan, was completed during the month. This screening process is required to assure that no overpurchases have occurred. During any 52 week year, deductions of not more than \$520.00, by a weekly paid employee, or \$525.00, by a monthly paid employee, may be made.

Statistics:

1. <u>Number of CPD Employees</u>	<u>Monthly</u>	<u>Weekly</u>	<u>Total</u>
Employees at Beginning of Month	425	1 468	1 893
Additions and Transfers In	2	10	12
Removals and Transfers Out	3	37	40
Transfers from Weekly to Monthly	0	0	0
Transfers from Monthly to Weekly	0	0	0
Employees at End of Month	424	1 441	1 865
2. <u>Overtime Payments During Month</u>	<u>January</u>	<u>December</u>	
Non-exempt employees	\$23 908*	\$20 339*	
Exempt employees	3 144	3 432	
Total	<u>\$27 052</u>	<u>\$23 831</u>	
* Payments to non-exempt employees cover a four week period.			
3. <u>Gross Payroll</u>	<u>January</u>	<u>December</u>	
Non-exempt employees	\$ 698 927	\$ 702 458	
Exempt Employees	305 011	314 733	
Total	<u>\$1 003 938</u>	<u>\$1 017 091</u>	
* Payments to non-exempt employees cover a four week period.			
4. <u>Pension Plan</u>	<u>January</u>	<u>CY to Date</u>	
Number retired	0	0	
Number who became eligible for participation	2	2	

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	<u>January</u>	<u>CY To Date</u>
Number who elected to participate	2	2
Number who elected not to participate	0	0
Replies not received	0	0
 5. <u>Insurance Claims Paid</u>	 <u>January</u>	 <u>CY To Date</u>
Employee Life Insurance	1	1
Amount	\$12,700	\$12,700
Employee Weekly Benefit Claims Paid	13	13
Amount	\$ 1,327	\$ 1 327
Employee & Dependent Accident and Health Claims Paid	270	270
Amount	\$21 826	\$21 826
 6. <u>Suggestion Awards</u>	 <u>January</u>	 <u>CY to Date</u>
Number of Awards	40	40
Total Amount of Awards	\$ 545	\$ 545
 7. <u>Preferential Rates</u>	 <u>January</u>	 <u>CY to Date</u>
Number added	0	0
Number eliminated	(1)	(1)
Number currently in effect	58	-
 8. <u>Number of Military Allowance Payments</u>		
	0	0

C. General Accounting

Effective January 1, 1957 the responsibility for accumulating and reporting costs on CPD construction projects was transferred from Construction Engineering Operation to Chemical Processing Department. Costs amounting to \$5,126,749, on twenty-three projects, were transferred to CPD on January 21. Detail project cost ledgers have been established and the accumulating and recording of costs is in progress.

As of December 31, 1956, authorization on active CPD projects totaled \$21,000,000 of which \$14,000,000 has been expended and committed.

Chemical Processing Department data was submitted to Contract Administration for consolidation and forwarding to AEC in the Annual Industrial Fire Program and Experience Report. The report concerns replacement cost of facilities subject to damage by fire or explosion. For Chemical Processing Department, this replacement cost is \$284 million after excluding the waste system, sitework, general grading, roads, walks, paved areas, and sanitary sewer systems.

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A review of Spare Equipment Held in Storage is nearing completion. This will result in a January transfer of most of our spare equipment to separate sub-accounts within each process code. It will also serve as a starting point for reviews with the process custodians. It is intended that these reviews will aid the custodians in preparing their In-Service Spare Equipment Authorization Cards as called for in CPD Advice 8.10.1.

The dismantlement of the Blaw-Knox Pipe Shop, now in progress, will improve the appearance of the Purex area. This building was listed for disposal by Minor Construction in August of 1956, following completion of their requirements for the structure.

The capital cost for the CPD Electrical Distribution System was transferred to Relations and Utilities prior to December closing. This transfer represents a net book value of \$3.0 million and was made in order to correct an oversight made by Relations and Utilities at the time of decentralization.

An audit of the CPD Working Fund and related activities for the four month period ending December 31, 1956, was completed by the Chemical Processing Department Internal Audit Staff. All audit recommendations have been adopted.

D. Auditing

The audit of the S. S. Accountability Operation in Chemical Processing Department was completed. A rough draft report outlining the findings of the audit was prepared and is currently being discussed with the interested parties.

An audit of cash control, within Chemical Processing Department, was completed. All recommendations in the audit report were accepted.

Effective January 28, 1957, the Manager - Auditing and his staff were loaned to the Traveling Auditors to assist in conducting the audit of HAPO. It is expected that this assignment will be for the entire twelve week period the Traveling Auditors are at HAPO.

E. Procedures

A comprehensive study of Product Cost Operation, (begun in December) was carried on throughout January. This study was directed toward a method of graphing unit costs, and integrating the data required to issue Facilities and Research Engineering statements.

Since the Engineering Statements are issued by both Cost Accounting and General Accounting, the progress in integrating the accumulating and reporting has been slow, but progress is being made.

The responsibility for issuing unit cost graphs has been transferred from Costs to Measurements. An official master of a graph form was designed and turned over to the Specialist - Measurements for use in this area.

F. Measurements

Graphic and narrative presentation of unit costs for FY 1950 through the first six months of FY 1957 was prepared for use during the January 30th visit of AEC Production personnel from Washington, D. C.

The major effort during the month centered around the preparation of the CPD Measurements Report for CY 1956. Information was received from all CPD components and consolidated into the report issued, as scheduled, on January 31, 1957.

III. ORGANIZATION AND PERSONNEL

A. Safety and Security

A safety meeting, for all Financial personnel, was held during the month.

There were no minor injuries or security violations experienced during the month.

B. Reports Issued

HW-47742 Secret "CPD Essential Material Inventory and Consumption Report - December, 1956" by S. R. Myers

HW-47826 Secret "Unit Cost Analysis for December" by B. M. Dobbs

Manager - Finance

CHEMICAL PROCESSING DEPARTMENT
FACILITIES ENGINEERING OPERATION

January, 1957

I. RESPONSIBILITY

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

II. ACHIEVEMENT

A. Purex Operation

Process Technology

A review of possible locations for a miniature service dissolver installation at the Purex Plant was completed. Such a unit would be used to obtain true samples of solutions of experimentally irradiated fuel elements, in conjunction with the development programs of the Fuel Preparations Department and Irradiation Processing Department calling for the measurement of the lattice neutron economy of new types of fuel elements. Two alternates for the miniature service dissolver were considered; one within the Purex canyon in the F17 position, the other outside the 202-A Building within an underground vault. Based upon a preliminary comparison the in-canyon installation appeared more attractive. This remote, in-cell installation was estimated to cost \$120,000. Further work is planned on the outside installation alternate to define its cost and to permit a more definitive comparison with the inside installation.

The Titanium Tube Bundle-Prototype was assembled using new titanium tubes and tube facing sheets. This assembly is regarded as experimental pending several months of actual service.

Advance Engineering

The study on Budget Item 659-008, Pu Recovery From Purex 1W, was completed and the study report HW-47920 issued. The study design included two batch-operated ion exchange units and a product receiver mounted together in a package and located in the F9 canyon position. In order to provide a reasonably low flow rate and still maintain nuclear safety criteria, each of the two exchange units consists of two parallel exchange columns. The receiver is also designed for nuclear safety. The F9 location was chosen as having the best available services. This work would be justified on the basis of reducing plutonium waste losses. At a production rate of 700 tons per month, an exposure level of 500 MWD/T, and an estimated increase in

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Plutonium recovery to 99.55% through waste backcycling, 13 kilograms of Plutonium will be recovered per year. The expenditure estimated at \$200,000 will allow an annual savings of \$638,000, resulting in a payout period of approximately four months.

A preliminary study of a Purex Phase II Expansion to an instantaneous capacity of 1,000 tons per month was completed as preparation for a formal fiscal year 1959 budget study. The total project cost estimate derived from this work was \$3,000,000. This work had as its basis a preliminary issue of the proposed Purex Plant two-cycle flowsheet.

Plant Engineering

Final preparation of a design package for a modified contact maintained L cell plutonium concentration equipment has progressed satisfactorily during the month. The engineering flow diagrams have been approved by appropriate personnel and will serve as the basis for the remainder of design work.

As a result of the unfavorable experience with the Purex waste tank farm 216-A8 crib, the problem of disposal of liquid wastes from the vacuum fractionator was reviewed. Preliminary designs were prepared covering immediate corrective action and long range facilities for further improvement of waste disposal from the vacuum fractionator were delineated. The immediate installation for which preliminary designs were completed would consist of:

- a. A new surface condenser installed within the vacuum fractionator enclosure. The surface condenser would provide inherent separation of condensed fractionator overheads and cooling water such that the disposal of the former radioactive waste may be handled separately from the latter non-radioactive waste.
- b. A 6" line to route effluent raw water from the surface condenser to the 30" effluent cooling water header directly east of the 202-A Building.
- c. A tie-in for used cooling water from the coils or tanks, TK-U1 and U2, into the above 6" line within the fractionator enclosure.
- d. Removal of the present contact condenser and rerouting of the present 6" water supply to the new surface condenser.

The total project cost of the above installation was estimated to be \$117,000.

The long range facilities needed, either singly or in combination, should the vacuum fractionator crib 216-A9 fail would be:

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- a. A new crib in the 200 West Area where the underground strata are considered more favorable for disposal of wastes.
- b. Piping modifications to permit pumping of vacuum fractionator condensate through existing inter-area lines to the above new 200-West Area crib.
- c. Replacement of the present fractionator jets and contact type condensers with service type units to further reduce the volume of cribbed waste.

Project Activities

CA-513-E - Purex Facility. Expansion of 200 Areas Facilities

The bid package for Lump Sum Contract work for the structural addition for the second crane is essentially complete.

Current liaison information indicates the second crane will not be delivered until December 1, 1957. This compares to a required date and a promised date in the order of September 1, 1957 for shipping by the vendor. Prospects of improving the delivery date do not appear good since the vendor is currently working at near capacity on other orders.

CG-716 - 241-AX Tank Farm

It is proposed to design a new Purex waste storage tank farm, 241-AX. The proposed tank farm will provide additional waste storage facilities with a capacity for 6 to 10 million gallons.

Work on the preparation of project proposal, revision 1, was completed and the proposal is being routed for approvals. The approvals were being delayed to examine (a) whether it should be a 6 million or 10 million gallon tank farm, and (b) whether or not the need date demands proposal action at this time. Both of these factors are influenced by the new flowsheet being prepared for Purex.

B. Redox Operation

Research and Development

Coordination of the design and installation of the pH In-Line Monitor in the Redox Plant is being accomplished in cooperation with Hanford Laboratories Operation. Installation of the pH monitor is nearing completion and operating tests are being conducted.

Advance Engineering

A fiscal year 1959 budget study HW-47843 was completed for consolidation of Redox Operations by moving E, F, and G cell

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control equipment to a central location at which the column operations are controlled. This consolidation of operations would result in an annual savings of \$103,000 by reducing the Plant operating force. The cost of making the changes necessary for consolidation was estimated to be \$170,000, and the pay-off period, accordingly, 1.7 years.

Completion of a preliminary nuclear safety review by Hanford Laboratory Operation personnel has permitted continuation of the preliminary design activity for Redox dissolvers capable of handling 0.94% equivalent of U235 enriched uranium at the instantaneous Phase III rate of 420 tons per month. Conceptual designs indicate that such a program is feasible and process design and layout work is proceeding to define the dissolver installation.

Plant Engineering

Process design work was completed for a replacement spare Redox dissolver capable of greater capacity than the presently installed units. This work is to serve as the basis for a final design package being prepared for procurement of a replacement spare unit. The capacity increase of the new dissolver design was achieved by increasing the volume of the dissolver and slug crib to permit larger dissolver charges to be used.

Project Activities

CG-643 - Capacity Increase, Phase III

All field work previously authorized has been completed. Design scope is complete for this project. Design for the total project is 81 per cent complete.

Project proposal, revision 2, will request authorization of total project funds in the amount of \$795,000. This project proposal is in the final stages of preparation.

CG-653 - Cooling Water Disposal Modifications

Work was physically completed January 25, 1957, on Project CG-653 and it was closed out with an underrun of approximately \$30,000. Initial operating experience after installation of the condensate cooling water jumpers from the dissolvers to a common discharge header indicated that the header may not have sufficient capacity to carry full cooling water flow from two dissolvers without causing a back pressure too high to allow condensate flow from the third dissolver. The dissolvers are operating satisfactorily on a reduced cooling water flow. The condition can be alleviated by the utilization of an existing spare header to carry the flow from one dissolver. This will require design installation of two jumpers which will be done on project funds if the current study shows the need for it.

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C. Finished Products Operation - Z Plant

Research and Development

Design and development efforts were continued in establishing the scope of the RMC Button Line. Design schedules and design costs were prepared and transmitted to the Project Engineering Operation for use in the project proposal for design of the RMC Button Line. Process and engineering flow diagrams are now being prepared for inclusion in a scope document. A rough draft of this document is approximately 50 per cent complete. Also, work was started during the month to establish the radiation shielding requirements for the new button line.

In conjunction with the scoping work for the RMC Button Line, a study stage layout drawing, SK-2-6480, was prepared to assist in evaluating the hood cell design as proposed in document HW-47022. Since this hood cell appears to be most adaptable to the wet and dry chemistry processes, the hood cell was laid out for the Task I and Task II equipment. A final evaluation of this hood cell design has not been made but the over-all height considerations appear to be the limiting factor.

Design scope efforts on a second metal fabrication line in the 234-5 Building were accelerated during the month. Information on design schedules and costs were prepared for use by the Project Engineering Operation in a project proposal for this new fabrication line.

Machine shop work on a transfer can designed to eliminate the plastic bag when transferring material from one hood to another was completed. Some preliminary cold testing of this can was performed which indicated the need for some minor modifications to improve its convenience of operation. These modifications are now being made in the shops.

Advanced Engineering

A budget study was started during the month to examine the need for additional Recuplex facilities for FY 1959. This study indicates that the capacity of the slag and crucible dissolvers is not sufficiently high to guarantee production commitments beyond FY 1959 and that money should be included in the FY 1959 budget for a capacity increase. A rough draft of a budget study report was prepared and issued for comments. A cost estimate for the required additions to the Recuplex facility has been requested.

Project Activities

CG-691 - Improved Task I and Task II Facilities

A directive increasing project authorization to \$700,000 was received on January 14, 1957.

It is estimated that the over-all detail design on this project is 94 per cent complete. Exclusive of acceptance test procedures and review of vendor quotations it is estimated that the detail design is 97 per cent complete. All of the mechanical and architectural drawings have been issued to the field and only minor amounts of electrical and instrumentation work remain to complete the design.

Plant Forces are continuing to dismantle and remove parts of the EC Line for burial. Shop fabrication of the calciner screw conveyor is continuing.

UO₃ Plant

Process Technology

A study was completed during the month to determine if the calciner off gas system has sufficient capacity when the continuous calciners are operating at CG-613 scope rate. It was found that, with present air leakages into the calciner, jet J-A-3 does not have capacity to handle the load imposed by the calciners and still have adequate allowances for pressure drop across the Adams filters. It was determined that this jet would allow satisfactory operation if supplied with 150 pound steam instead of the present 125 pound steam. A report was issued to the Project Engineering Operation with recommendations for increasing the capacity of jet J-A-3.

The Finished Products Operation initiated work during the month to install the tumbling equipment recommended to them as a method for cleaning UO₃ Plant filter bags. Additional sketches were prepared to assist in the installation.

A study was completed during the month of evaluating the possible effects of an unscheduled power outage at the 224-UA Building and a report containing the results of this study was issued. It was concluded that the calciners will be likely to withstand the effects of a sudden loss of electrical power. Secondary effects of a power outage such as the formation of a cake on the inner trough walls or the formation of gross agglomerates in the bed may be more serious insofar as damage to the trough is concerned if subsequent startup procedures are not satisfactory.

Advanced Engineering

The budget study work on the UO₃ Plant waste recovery system was essentially completed during the month. The need for a facility for processing liquid wastes are immediate. A method for utilizing the existing facilities with minor modifications to process these wastes has been developed. A report describing this waste facility is ready for issue.

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Budget studies on modifications to the continuous calciners and on the UO_2 Plant acid recovery system were nearly completed by the end of the month. The budget study for the calciners was prepared and issued for comments and a cost estimate has been received.

Plant Engineering

Material and Manpower Utilization Study - 224-U Building

An Interim Report on progress in the Metal Reduction Operation was submitted. The report covered such items as the SWP lobby layout revisions, a recommendation for the temporary size of the shift and day crews to operate the building under the present conditions, and comments on the benefits to be gained from planning and scheduling between operations and maintenance groups.

Project Activities

CG-613 - Hanford AX Program, Metal Conversion Plant

The ACA motors with loose commutator bars are being repaired and tested in accordance with instructions from the factory. Pending repairs, the motors are being run to maintain calciner production. Written permission to operate them without jeopardizing the warranty was received from the vendor.

CG-712 - Reduction of Air-Borne Noxious Fumes, 224-U Building

Design activity is being concentrated on stack locations and piping so that installation may be started with a minimum of delay. Comment drawings on the piping will be available by February 15, 1957. Efforts are being directed to secure stainless steel materials on site in order to expedite construction.

D. General Activities

Research and Development

Tentative plans have been made in cooperation with Hanford Laboratories Operation to install neutron detectors in the plants for prototype tests. Laboratories will supply equipment for a counter tube type of installation and a scintillation detector is being fabricated in the 300 Area shops.

Drawings for a prototype co-axial electrical connector for all jumpers has been completed. An order has been given the 300 Area shops to fabricate samples for test. The units are designed to fit inside a standard electrical connector housing.

A review of plant operating experience has indicated that additional development work may be required on connector housing before completely satisfactory jumper assemblies can be obtained. The principal problem is that of moisture accumulation in the connector housing.

Consultant Agreement No. CA-147, Prime Contract No. W-31-109-ENG-52 between Ammann and Whitney, Consulting Engineers, and General Electric relative to waste storage tank design was accepted and signed by all participating personnel on January 7, 1957.

The concept of a hood cell type of contamination enclosure for low radiation level processes was further developed with the design of a standard paneling for construction of the enclosure walls. An effort has been made to decrease the cost of contamination enclosures by simplifying the fabrication work while adapting the structure to more efficient contamination control, including simplified panel changing. The panel arrangement is shown on Scope Drawing SK-2-2197, Sheets 1 - 7.

A prototype fresh air helmet has been fabricated from transparent plastic for use within plastic suits and is currently awaiting test by Industrial Hygiene personnel of the Hanford Laboratories. If approved the helmet would replace the conventional assault mask for specific applications where improved visibility and extended usage on critical inspection work may warrant.

The final rough draft of the Titanium Fabrication Specification HW-6151 was completed and circulated for comments. The original issue as a firm specification is expected to be completed shortly.

Process Technology

The Redox D-14 pump that failed September 24, 1956 has been disassembled and examined in the T Plant canyon to determine cause of failure. The immediate cause was found to be seizure of the liquid throttle bushing. Other parts were in workable condition. The section of shaft that had seized with the bushing has been cut out and sent to the radiometallurgical laboratory in an effort to determine the cause.

A study of the possibility of shipping irradiated unenriched uranium from the 100 areas to the 200 areas without water in the cask and wells has been completed and a report is in preparation. Although this data indicates that under normal conditions fire does not appear to be a problem, other considerations make it undesirable to ship slugs dry.

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Tests have been completed to evaluate the effect of washing cask interiors and external slug surfaces prior to shipment of metal to the 200 areas. Correlation of the wash test results with control tests awaits receipt of analytical data.

Advance Engineering

A fiscal year 1959 budget study (HW-48023) was completed covering the design of chemical processing facilities required in conjunction with the Redox Plant to permit reprocessing of power reactor fuel elements. A demand for separations capacity of 1-1 1/2 tons a day is expected by 1961 and of about twice that amount by 1965. It was estimated that approximately 70% of this material could be processed through Redox if it were blended with depleted uranium material from Hanford reactors. A separated dissolver facility would be required however to process the enriched power reactor fuel elements through the metal solution state. The design cost for the dissolver facility was estimated to be \$750,000, and the total project cost for the facility, \$15,000,000.

The first of two spare Purex Plant off-gas heaters has been modified and tested in accordance with the recommendations of the Equipment Design and Development group. The joint between the steam head and tube sheet has been redesigned so it is a welded joint instead of bolted and gasketed. This change was made to prevent gasket leakage which has developed on at least one other unit of this type.

Project Activity

CG-655 - Crib Methods Selection Test

A work order was issued to the Construction Engineering Operation to analyze the recorded data and evaluate the performance of existing cribs. An engineer from Construction Engineering Operation started this work on January 23, 1957.

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

The proposed work involves modifications and additions to the Redox, Purex, and UO_3 Plants, and at the 241-WR Vault, to permit flexible utilization of all nitric acid recovered in the UO_3 process.

Project proposal, revision 1, and the Plant and Equipment Analysis Report received the required approvals and were transmitted to the Project Budgets Operation on January 28, 1957.

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III. ORGANIZATION AND PERSONNEL

A. Organization

L. A. Hedenstrom and J. E. Stafford were transferred from non-exempt to the exempt roll as Engineering Designers (a newly established exempt position) effective February 1, 1957.

Effective January 21, L. K. Roberts, Draftsman 3, transferred to the Fuels Preparation Department as a Metal Handler. Mr. Roberts had previously been a Metal Handler and accepted a recall on seniority basis.

The critical scarcity of secretarial help was relieved by addition to the Project Engineering payroll of Mary Charvet, Geraldine Simmons, and Marlys Scofield.

B. Safety

The recognition of individual safety responsibility by each member of the operation has been emphasized in our regular monthly safety meetings. The acceptance of this responsibility is reflected in good safety morale and satisfactory safety performance.

C. Security

One security violation was reported for the month. This violation occurred in the Engineering Administration Operation on January 7, 1957.

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	A Beryl plus Fissionable Fuel Element for a Slurry Reactor	January 21, 1957
C. R. Anderson	A Slurry Heterogeneous Reactor	January 21, 1957

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<u>Inventor</u>	<u>Subject</u>	<u>Report of Invention</u>
C. R. Anderson	An Aluminum Coated Fission-able Material Particulate Fuel Element for Slurry or Fluidized Bed Nuclear Reactors	January 3, 1957
C. R. Anderson	Selective Removal of Specific Exposure Level Heterogeneous Particulate Fuel Elements from a Slurry or Fluidized Bed Reactor System	January 11, 1957
C. R. Anderson	Pellet-Type Fuel for Nuclear and Nuclear Reactors using Pellet-Type Fuel	January 16, 1957
C. R. Anderson	Direct Reactor Power Level as a Function of Circulating Rate for a Liquid Fluidized Bed-Heterogeneous Particulate Fuel Nuclear Reactor	January 5, 1957
Reed Overson	Shaft seal for High Temperature Corrosive and Abrasive Resistant Service	January 7, 1957

E. Reports Issued

HW-48132 Monthly Report, Facilities Engineering Operation
Issued January 8, 1957.

Unclassified Survey of Properties in the 200 Areas Under
Custodianship of Power & General Maintenance,
By G. B. Smyth, January 7, 1957

Unclassified Progress Report, 224-U Industrial Engineering
Studies, by V. P. Madsen, December 28, 1956.

HW-47217 "Installation of a Surface Condenser for the
Purex Vacuum Nitric Acid Fractionator", by
L. R. Michels, January 9, 1957.

HW-47709 "Particles Found in Lubricating Oil of Purex
Test Centrifuge Drive Head", by A. R. Skaran,
January 4, 1957.

HW-47902 (Unclassified) Budget Item No. 659-002 - FY1959
Plant Acquisition and Construction Budget - Crib
Replacements and New Cribbs - Budget Study Report,
by V. W. Wood, January 25, 1957.

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- HW-48031 "Feed Concentration Uranium Reduction Plant", H. G. Johnson, January 28, 1957.
- Letter "Recommendation for Increasing Capacity of Jet J-A-3", J. M. Gerhart and H. G. Johnson to C. A. Lyness, January 15, 1957.
- Letter "A Study of the Possible Effects of a Power Failure at Building 224-UA", K. L. Sanborn to C. A. Lyness, January 11, 1957.
- Letter "SK-2-2195; Centrifuge Drivehead Oil System", by R. C. Hollingshead, January 24, 1957.
- Letter "Project CG-643 - Redox Phase III Capacity Increase - Completion of Scope Design", C. A. Lyness from L. L. Zahn, January 10, 1957.
- Letter "Surface Condenser Installation - Purex Vacuum Fractionator", O. C. Schroeder from J. B. Fecht, January 16, 1957.
- Letter "Process Design Miniature Service Dissolver - Purex Plant", R. E. Tomlinson from J. B. Fecht, January 16, 1957.
- HW-47843 "Budget Study Report, FY-1959 Plant and Equipment Budget, Consolidation of 202-S Operation, Budget Item No. 659-014", by G. K. Carpenter, January 24, 1957.
- HW-48023 "Budget Study Report, FY-1959 Plant and Equipment Budget, Redox Dissolver Facility for Reprocessing Power Fuels, Budget Item No. 659-025", by D. E. Braden, January 25, 1957.
- HW-47920 "Budget Study Report, FY-1959 Plant and Equipment Budget, Pu Recovery from Purex 1WW, Budget Item No. 659-008", by R. M. Donelson, January 28, 1957.

Construction Status Chart, Revision 2, Redox Railroad Tunnel Ventilation Barrier (Project CG-624), dated January 24, 1957, was issued to A.E.C.

Construction Status Chart, Revision 1, Back-Up Radiiodine Removal Facilities, Purex (Project CG-647), dated January 25, 1957, was issued to A.E.C.

Construction Status Chart, Revision 1, Auxiliary Radiiodine Removal and Nitric Acid Recovery Facilities, Redox (Project CG-648), dated January 25, 1957, was issued to A.E.C.

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Letter

W. E. Johnson from W. K. MacGready, "Financial Basis, FY-1958 Plant Acquisition and Construction Budget, Chemical Processing Department", dated January 25, 1957.

HW-45156

"Project Proposal, Revision 1, Utilization of 224-U Acid at Redox and Purex (Project CG-722)" dated December 5, 1956, by D. A. Snyder.

HW-45652

"Project Proposal, Revision 1, Conversion of Recuplex to a Manufacturing Facility (Project CG-723)" dated December 5, 1956, by D. A. Snyder.

HW-47112 RD

"Plant and Equipment Analysis Report, Utilization of 224-U Acid at Redox and Purex (Project CG-722)" dated December 5, 1956, by D. A. Snyder

HW-47697

"Project Proposal, RMC Button Line, 234-5 Building (Project CG-734)", dated January 5, 1957, by R. C. Baker.

HW-47705

"Informal Request, Purex Recycle Dock Shelter (IR-218)", dated January 4, 1957, by L. W. Finch.

HW-47835

"Informal Request, Tool and Die Shop Equipment Room, 272-W Building (IR-217)", dated January 16, 1957, by L. W. Finch.

HW-47996 RD

"Assumptions for Preparation of Plant Acquisition and Construction Budget for FY-1959, Chemical Processing Department", dated January 25, 1957, by D. R. Gustavson.

Bid Package, "Crane, Request for Fixed-Price Contract Action", dated January 30, 1957, from C. A. Lyness to A.E.C.

Semimonthly Status Report, Facilities Engineering, Chemical Processing Department, dated January 15, 1957.

Semimonthly Status Report, Facilities Engineering, Chemical Processing Department, dated January 28, 1957.

F. Trips

Mr. J. F. Kane accompanied F. P. Robinson of the G.E. Apparatus Sales Division of Pasco, and W. Spellman of the A.E.C., Hanford Operations Office, to the G.E. service shop in Spokane on January 8, 1957 for the purpose of determining the cause of the ACA motor malfunctioning.

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Mr. G. A. Conner visited Fansteel Corp., Chicago, Illinois, Linde Air Products Company, and Air Reduction Company labs in New York and New Jersey from January 4-19 to discuss and study the welding of titanium, tantalum, zirconium, and molybdenum.

Mr. G. L. Davis visited Seattle to consult with Bouillon & Griffith, and Karla Engineers regarding possibilities of having them perform consulting services in the steam generation field, on January 21, 1957.

H. A. Moulthrop attended the 13th Annual Technical Conference of the Society of Plastics Engineers in St. Louis, Missouri on January 16, 17, and 18. He also visited the J. A. Callanan Company and the Fabrico Corporation of Chicago and the VisKing Corporation of Terre Haute, Indiana.

G. Visits

Mr. F. P. Robinson of the G.E. Apparatus Sales Division of Pasco visited the project on December 27, 1956 and January 9, 1957, to investigate commutator and brush trouble on ACA motors at 224-UA Building.

Mr. W. E. L. Smith, Engineering Assistance Group, the du Pont Company, Savannah River Project, visited HAP0 on January 21-24, 1957 and discussed materials selections, fabricating procedures, equipment experience, and failures and their causes with personnel of all major HAP0 operations.

[Signature]
Manager
Facilities Engineering Operation

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CHEMICAL PROCESSING DEPARTMENT
RESEARCH AND ENGINEERING OPERATION

January - 1957

ADVANCE PROCESS DEVELOPMENT

Pyrochemical Processes

As an extension of the work reported last month, an improved pyrochemical dissolution and head-end process has been devised which employs the chlorides or bromides of bismuth as the fused solvent salt. The process is theoretically capable of effecting the dissolution of aluminum, zirconium, zircalloy, and stainless steel cladding materials with the volatilization of most of these cladding elements from the fuel. Both uranium and uranium oxide fuels can probably be handled.

Briefly, the proposed process consists of the dissolution of the fuel and cladding elements in molten bismuth bromide (or chloride). Molten bismuth separates, and volatile halides are distilled. An assist from the free halogen is used (if required) to control the oxidation state of the cladding element, assure an adequate dissolution rate of the cladding, and to dissolve oxide fuels (if present). A dissolver operating temperature of approximately 300-400 C is employed. Excess solvent is distilled at about 450 C from the decanted solution for recycle to the dissolver, and the fuel element bromide (or chloride) is oxidized to UO_2 or U_3O_8 with oxygen, steam, or metal oxide to liberate the halogen. The latter is used to convert the separated bismuth metal to bismuth halide for recycle. Finally, the uranium and plutonium oxides are dissolved in nitric acid.

This process has the following advantages over that proposed earlier:

- (1) Bismuth metal is less corrosive than zinc or cadmium.
- (2) A maximum operating temperature of less than 500 C can be employed throughout, i.e., 300-400 C lower than previously possible. This results in a marked reduction in corrosion and in energy requirements.
- (3) The kinetics of the gas-solid phase oxidation are certain to be better than the kinetics of the solid-solid phase oxidation proposed earlier.
- (4) All other advantages of the previous process are retained.

It has also been found that the pyrochemistry of the halides is sufficiently well known to permit an extension of the proposed dissolution and head-end process to yield a complete pyrochemical process for UF_6 production. Plutonium could be continuously separated from the uranium processing steps as a halide-free oxide carried in barium oxide. These oxides could be dissolved in nitric acid for final decontamination by solvent extraction, ion exchange, or other

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processes. The nitric acid solution would be partially decontaminated (estimated $DF > 10^2$) from the troublesome fission products, zirconium-niobium and ruthenium.

Economics of Hanford Fuel Cycle

A study was made of the costs of processing uranium through the Hanford fuel cycle, with the objective of defining those factors which determine optimum over-all performance. While the best available economic data were used, some off-site data were necessarily sketchy. Based on these studies, the following conclusions were reached:

1. Hanford controlled operating costs (excluding depreciation) make up about 61 per cent of the current over-all fuel cycle costs; about six per cent are associated with Fuels Preparation Department, about 37 per cent with Irradiation Processing Department, and about 19 per cent with Chemical Processing Department. Since irradiation costs contribute the largest portion to the over-all fuel cycle costs, more detailed studies of this operation are required to define optimum operating conditions.
2. Increases in reactor power (accomplished without large cost or production efficiency penalties) offer greater reductions in plutonium unit cost than increases in integrated exposure (MWD/T).
3. At a constant reactor power level and efficiency, increasing integrated exposure above the 400-600 MWD/T level markedly reduces plutonium production rate without greatly affecting unit costs.
4. Minimum plutonium unit costs calculated without depreciation occur at approximately 100 MWD/T higher than similar costs including depreciation, but with some sacrifice in plutonium production.

Contact Engineering

In the Purex plant, the vacuum fractionator has successfully passed its cold shakedown tests, and the unit is essentially ready to be placed in hot operation. The adequacy of the prototype silica gel unit as a backup for the proposed two cycle operation was reexamined, and the decision was reached that minor additions and modifications would suffice to meet requirements. A review of the technology of Purex flowsheets and waste self-concentration led to the prediction that a new tank farm for self-concentrating wastes would not be needed for at least five years.

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PUREX PROCESS TECHNOLOGY -Solvent Extraction

Irradiated uranium with an exposure rate of 3.3 to 5.7 MW/T (414 to 815 MWD/T) and cooling times of 109 to 147 days was processed during the month. A plant processing rate of $CF = 1.92$ was maintained essentially from start-up on January 2 until January 11. On January 11 the production rate was reduced to $CF = 1.44$ in order to reduce the backlog of Purex plutonium product that yielded buttons of high exposure rates. The reduced processing rate was maintained until the plant was shut down on January 26 because of a lack of properly aged metal. Typical performance for the solvent extraction cycles during the month is tabulated below:

<u>Cycle</u>	<u>Log Gamma Decontamination Factor, dF</u>		<u>Instantaneous Waste Loss, Per Cent</u>	
	<u>Uranium</u>	<u>Plutonium</u>	<u>Uranium</u>	<u>Plutonium</u>
Precycle	3.4	3.4	--	0.35
Partition	1.8	1.4	--	0.28 (IBU=0.07)
Final	2.4	3.7	0.06	0.07
Overall	7.6	8.5	--	0.70

On January 9, 234-5 Building personnel reported high surface dose rate readings (up to 6 rads/hr) on buttons prepared from Purex plutonium product, although none of the batches had exceeded gamma specifications. Normal production at $CF = 1.92$ continued while the following Purex information was scrutinized for possible clues: (a) plutonium fission product gamma analyses, (b) external radiation readings on PR cans and sampler tanks, and (c) any indication of off-standard operation caused by changed process variables; namely, increased feed and organic temperatures and increased carbonate concentration in the solvent treatment cells. When button readings failed to decline after several days of operation, and information was not available as to the source of the high radiation, the Purex production rate was reduced, all temperatures except HAF and IAF were reduced, and the sodium carbonate concentration of the solvent treatment scrub was reduced from 5 to 2-1/2 per cent. Trial processing of a batch in 234-5 Building several days later produced satisfactory buttons. A total of four batches were processed through Recuplex during the period of high button readings, although none of the batches exceeded fission product gamma specifications.

Originally the high dosage rates from the buttons were thought to stem from particulate matter in the Purex product; however, filtration through a 1-2 micron filter in the laboratory reduced the activity by only ten per cent. Subsequent investigations indicated the presence of a beta emitter. Although UX was suspected, scattered laboratory data failed to show any relationship between UX analyses and button activity readings. Latest information confirms the presence of a short half-life (60-70 hours) beta emitter, probably Yttrium 90. Investigation of the problem is continuing.

Simultaneously with the rate reduction and process changes, high plutonium HAW losses (factors up to 100 over normal losses) developed and persisted in spite of corrective action taken, i.e., increased pulse frequency and organic flow.

While the uranium losses remained approximately normal, the plutonium losses, subsequently determined to have been caused by inextractable plutonium in the HAW ($E^0/a = 0.06$, normal $E^0/a = 2-3$), declined to normal over a five day period. Available information now points to a possible organic phase in one of the Purex plutonium batches as the source of the waste loss difficulty. Prior to production of Batch 6, the 2BP controller failed and allowed organic to flood the plutonium stripper. Eleven per cent waste losses were experienced at Task I when Batch 6 was processed, and the plutonium in the waste supernate was recycled to the Purex Plant for recovery. The high plutonium losses in the plant followed addition of this recycle to the process.

For the most part, gamma activity throughout the plant remained normal and relatively stable. Start-ups, after two brief shutdown periods, resulted in inter-cycle activity increases of three to five fold, but all uranium and plutonium product remained within specifications. Failure of the IBXF rotameter to control properly caused displacement of the IBX Column interface into the ICU on two different occasions, and plutonium and gamma activity in the 2DF increased by factors of three and five to ten, respectively. Even so, the gamma ratio of the uranium product usually remained less than one and no uranium required silica gel treatment during the month.

Tests conducted in the solvent extraction equipment during the month produced the following results:

- (a) Addition of 0.0015 M Fe^{++} to the HCX had no appreciable effect on HCW and IAW plutonium losses.
- (b) Reduction of ferrous sulfamate in the 2DF from 100 to 75 per cent of flowsheet did not produce any uranium batches exceeding the specification of 10 ppb of plutonium in uranium; however, a two to four-fold increase occurred in the number of batches exceeding 6 ppb.
- (c) Reduction of the 2AF temperature from 50° to 40°C and the 2AX temperature from 40° to 35°C decreased the 2BW plutonium losses by a factor of three. Concurrently, the 2AW losses increased a similar amount.
- (d) Addition of water as 2AIS at flow rates as low as 12.5 per cent of the 2AS caused 2AW waste losses in excess of 0.5 per cent.
- (e) Use of UO_3 recovered acid in the 2DIS had no deleterious effect on the Final Uranium Cycle performance.

Planned Purex Plant tests for the next six months were documented in HW-47817, "Purex Test Program, January through June 1957", by E. R. Irish, January 15, 1957 (Confidential).

Plutonium Concentration

Although running material balance calculations indicated a large buildup in the plutonium concentration package, operation continued normal throughout the month. Flushes, after shutdown, removed approximately 25 per cent of a normal day's production, and no solids problem was discovered. Hydrostatic testing

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of the stripper and concentrator tube bundles revealed no leakage in either system.

Construction of the prototype continuous ion exchange unit for plutonium concentration is essentially complete for cold runs which are expected to start about March 1. However, all the instrumentation may not be installed at this time. Tank and pump calibrations are now complete with operability tests on the various valves currently in progress.

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	3.6x10 ⁵	1.5x10 ⁴	2.2x10 ⁴	5.3x10 ³	3-5
No. 2	26	17	20	9	2

IO Column emulsion difficulties plus the loss of interface control in both 2D and IO Columns increased the solvent loss to 0.52 per cent of the organic throughput.

In spite of the carbonate flush given the equipment during the December shutdown, IO Column operation was hampered by emulsification during the latter part of the run period, apparently as a result of accumulated cruds. As a result, low frequency operation was required which produced poor decontamination ($DF < 2$). During periods of high HCW activity, however, batch washing with IOS in the IOO tanks yielded an additional decontamination factor of five.

Following the plant shutdown the entire IO solvent system was flushed with a solution of twenty per cent caustic and two per cent hydrogen peroxide, a mixture which had been effective in dispersing cruds found in a 20W sample. An additional dilute nitric acid flush was used to prepare the equipment for two per cent nitric acid as IOS during the next run period.

In order to establish demonstrated conditions when the source of high button readings was being investigated, washed organic temperatures in both systems were reduced to 35°C and the carbonate scrub concentrations decreased from 5 to 2-1/2 per cent.

Waste Treatment

Performance of the Waste Treatment and Acid Recovery Systems was satisfactory during the month. Waste volumes (including a portion of the December flushes) sent to 241-A Tank Farm averaged 275, 293, and 172 gallons per ton of uranium for neutralized IWW, carbonate washes and cell drainage and flushes, respectively. Overall waste losses for the month were 1.3 and 0.30 per cent for plutonium and uranium, respectively, thus reflecting the high plutonium losses experienced in

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the solvent extraction section. Plutonium and uranium coating removal waste losses were reduced and accounted for only 0.08 and 0.06 per cent of the overall losses, respectively.

Approximately 4700 gallons of concentrated IWW (containing 607 units of plutonium) from the period of high HAW losses were set aside for waste rework. After laboratory tests indicated a normal $E^{O/a}$ for plutonium in the IWW, about 55 per cent of the volume was successfully reworked prior to plant shutdown by centrifuging and blending with dissolver solution to make HAF. The success of this rework operation over previous attempts is probably a direct result of keeping organic out of the waste concentrators by decanting in the concentrator feed tanks. Such a procedure is possible because the present flowsheet eliminates water addition, which requires agitation, to the concentrator feed tanks. Demonstrated rework of IWW without a process upset has given impetus to the consideration of 2WW recycle.

After boil-up tests and operation on "cold" 20 per cent acid feed, the Vacuum Acid Fractionator is ready to produce concentrated nitric acid at the start of the February run period.

Self concentration in Tank 241-A-103, which currently contains 33.6 per cent of the sodium content required to fill the tank to the hydrostatic head limit with 12 M sodium, reduced the liquid volume by 69,000 gallons during the month (in addition to the operating waste added to the tank). Based on the present Purex flowsheet and the best available production forecasts, a five year life has been predicted for the 241-A Tank Farm, if the hydrostatic head limitation is observed.

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REDOX TECHNOLOGY OPERATIONFeed Preparation

The dissolvers were down for two weeks during the installation of jumpers to route the cooling water to an underground disposal area. Dissolution of high (603 to 750) MWD/T metal was then carried out with metal cooled 115 to 130 days. Although one of the two silver reactors then in active use was given a one-shot regeneration early in the operations, the iodine-131 emission to the stack averaged 0.77 curie per day and regeneration of the second reactor was in progress at month end.

In the down-draft dissolver, two-cut dissolution of nine-bucket charges was tested with the high MWD/T (more reactive) metal. Time cycles equivalent to 235 per cent of Phase II for three down-draft units were indicated but not firmly established.

A uniform permanganate feed treatment was employed in all but the two batches in which KMnO_4 concentrations were adjusted upward. About 30 per cent of the HAF batches contained rework in quantities ranging from 15 to 50 per cent by volume. The rework solutions included approximately 2650 gallons of LAFS from the concentrator leakage left from the December operation, and approximately 4000 gallons of concentrated salt waste reprocessed for plutonium recovery.

Solvent Extraction

During the shutdown, most of the solvent-extraction equipment and auxiliaries were flushed with 60 per cent nitric acid for the first time in over three months. The total plutonium pick-up of less than 120 units demonstrated that significant plutonium deposition does not occur under normal flowsheet conditions. Also, the acid flushes of the HA and HS Columns contained less than 10 per cent as much gamma activity as the corresponding flushes in September.

It may be concluded that accumulation of solids in these columns was reduced by the increase in LAW acidity which was inaugurated in October to eliminate precipitation in the LAW backcycle (HAIS) equipment.

The equipment changes made during the three-week shutdown of the solvent-extraction system included replacement of the LAFS concentrator and installation of jumpers for segregation of potentially contaminated cooling water from concentrators.

High MWD/T metal was processed at rates up to 120 per cent of Phase II with one interruption in processing occasioned by waste rework operations. Several temporary flowsheet adjustments for the HA and HS Columns were made during the processing of the HAF batches containing the salt waste rework. Other temporary flowsheet adjustments were made for critical mass and process control when more

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than 4 per cent of the plutonium was found to be backcycling in HAIS. (Since the HAW and HSW plutonium losses averaged only approximately 0.1 per cent, recovery of the HAIS plutonium was satisfactory.) The latter adjustments included a 70 per cent increase in the concentration of dichromate in the 2AF and 1AFS which may have effected a subsequent 50 to 60 per cent reduction in HAIS plutonium concentration. Higher-than-normal plutonium concentrations in the LAW and 2AW streams were indicated by spot samples taken when the HAIS concentration was high. Investigation of this unusual process condition is being continued.

Decontamination

Approximately 3 per cent of the 3BP and 15 per cent of the 2EU produced during the month exceeded gamma activity specifications because of ruthenium activity. Two of the off-standard uranium batches met specifications after ozone treatment for ruthenium volatilization and the activity of the third is to be reduced by ozonation and silica gel treatment. During concentration, the off-standard 3BP was segregated for later rework.

The inadequate ruthenium decontamination resulted from (1) reduced ruthenium volatilization during feed preparation, (2) oversalting of the HA and HS Columns, (3) excessive variations in the acidity of process streams attendant on process and rate changes, and (4) accidental control of HSX at almost double the flow-sheet value for an 18-hour period. Item (1) was caused by rapid reduction of the permanganate, due to failure to make adequate allowance for the reducing potential of the reworked salt waste solution added to the feed solution. Item (2) occurred when processing HAF with high salt content while LAW backcycle had to be continued for recovery of its significant plutonium content mentioned above.

Waste Losses

Approximately 130 pounds of uranium and 113 units of plutonium were sent underground in the acid flushes which followed completion of the low MWD/T processing program. Excluding these losses, over-all recoveries were 99.69 and 99.82 per cent for plutonium and uranium, respectively. The relatively poor recoveries reflect the adverse effects of two start-up operations, and of temporary interruptions in the backcycle of LAW and 2AW. The temporary diversions of LAW and 2AW to the waste receiver tank permitted sampling of these streams in the investigation of the unusually high plutonium concentration in HAIS. These diversions which were inadvertently excessively protracted, were a major factor in the collection of about 60 units of plutonium in 4000 gallons of salt waste which were consequently reworked as explained above.

Waste Storage

Seven pressure surges were recorded in the 241-SX Waste Storage Tank Farm between January 15 and the end of the month with an average frequency of one pressurization every 50 hours. Maximum pressures of 0.3 to 0.6 psig were recorded in the

vapor spaces of Tanks 101, 107, and 109, and in the condenser building vent and vapor headers during each of these pressurizations. The amount of head liberated during each surge was estimated from condensate flow data as 6 to 10 million Btu.

Thermocouple readings indicate that the pressure surges originated in Tank 107 and were transmitted to the other tanks via the vapor header. It was found that each pressurization reduced the temperature differential between the 2-foot and the 8-foot level in this tank from about 14 degrees F to zero. The temperature gradient returned to its previous maximum in approximately 48 hours.

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DECLASSIFIEDFINISHED PRODUCTS TECHNOLOGY OPERATIONMETAL RECOVERY OPERATIONMetal Removal

Feed shipments to the 241-WR vault consisted of slurry blends from tanks 103-T, 107-TX, 108-TX, 115-TX, 105-U, 106-U, and 107-U (minimum age 17 months). TXR and UR facilities supplied 78 and 22 per cent of the uranium, respectively, at an average uranium concentration of 0.09 pounds per gallon. Cleanout operations were essentially completed in four tanks (tanks require final inspection), which leaves only five other tanks for final cleanout operations.

Solvent Extraction

Solvent extraction uranium losses in the RAW, RCW, and REW averaged 0.1, 0.5, and 0.1 per cent of the feed uranium, respectively. Start-ups and shutdowns caused by the XYZ shift operation did not materially increase the losses. The over-all process loss calculated on a new feed uranium basis was 1.1 per cent.

The gamma activity of the first cycle product averaged 4000 per cent of that of aged natural uranium (ANU). The second cycle product gamma activity averaged 150 per cent ANU and decreased from an average of 190 per cent ANU during December. The decrease in gamma activity in the second cycle is primarily due to improved scrubbing conditions during second cycle startups.

Uranium, contained in sludges that were stored in the 321 Building waste tanks, was processed through the solvent extraction system without incident. Previous laboratory studies with feeds made from this material had given stable emulsions when processed in a pulse column under simulated RA Column conditions.

Waste Treatment

Approximately 0.7 million gallons of "in plant" scavenged waste (batches 33 and 50) containing cobalt-60 concentrations greater than 4×10^{-5} microcuries per milliliter (0.1 MPC) were transferred to the BC No. 13 trench on a specific retention basis.

URANIUM CONVERSION OPERATIONProcess Performance

A total of 11 carloads of uranium trioxide were shipped during the month. Of these, five were produced in the pots and the remainder in the continuous calciners. All UO_3 shipped was within specifications with the exception of two carloads. Carload 500 was shipped with 97.4% passing 40 mesh screen compared to the specification of 98% minimum, and carload 502 was shipped with a total metallic impurity (TMI) of 365 parts per million parts of uranium compared to the specification of 350 ppm maximum. The average TMI was 185 ppm.

uranium compared to the specification of 250 ppm for a ten car average. The high impurity content was due to high iron content received from the Metal Recovery Plant. The gamma activity ranged from 13 to 55 per cent of aged natural uranium with an average of 25.

The high temperature reactivity ratio (925° C reduction and 600° C hydrofluorination) averaged 0.99 and 0.84 for pot and continuous material, respectively. A test shipment of 4 cars of continuously calcined material produced with an average sulfur content of 2168 parts per million parts uranium, had a tentative average low temperature reactivity (590° C reduction and 410° C hydrofluorination) of 1.22. The reactivity of the continuous material produced with a sulfur content of 985 ppm averaged 1.12. Additions of sulfur (as sulfuric acid) were erratic during the early part of the month, however, the addition system appears to be satisfactory after recent modifications.

Continuous Calcination

Operation during the month was hampered by difficulties with the flow control system, the product handling system at the calciners, and off-gas filtration. Rotameters controlling the feed flow failed frequently. The cause and correction of these failures is being investigated and some improvement in operation has been achieved. Rotary valves continued to cause difficulty through jamming or reverse gas flow. The experimental three-inch valve operated satisfactorily with the exception that lumps formed in the collection bin caused frequent powder flow stoppage. The off-gas filters in two cells were changed after 677 and 617 hours of operation. The pluggage of these filters was attributed to the lack of sufficient clean-up air pressure when the incoming air line froze. The filters in one cell continue to be satisfactory after 960 hours of operation.

METAL FINISHING OPERATION

Task I

Neutron counting techniques to determine the plutonium content of Task I supernatants for critical mass control are being investigated. This study is directed toward the reduction of solution transfer time cycles by eliminating the waiting period for radio-assay results. The solutions checked to date have ranged from 0.13 to 0.35 g/l Pu by radio-assay while the concentrations calculated from the neutron measurements ranged from 0.29 to 0.51 g/l Pu for an average difference of 0.14 g/l higher than that determined by the radio-assay method. Each sample was counted on three different occasions with a reproducibility of 0.2 g/l. At these plutonium concentrations, the maximum deviation of a Task I supernatant volume would be ± 6 grams. Further work is planned with higher plutonium concentrations.

Recuplex

A total of 58 powder and 2 fragment-type runs were processed through the SC hood. Almost all of the runs processed were "off-standard" material, i.e., hood cleanouts, special development laboratory fragments

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and powders, metallurgical laboratory wastes, high calcium content powders, etc. Flowsheets were altered to fit as many of the conditions as possible, however, the "off-standard" materials led to many long filtration times, high slurry losses, high extraction column waste losses, and considerable build-up of siliceous material on the walls of the glass extraction columns. The following permanent flowsheet changes were made on powders during the month: (a) The NaF addition on Task III type powders was increased from 1 to 2 lbs., (b) the ANN addition was increased from 100 to 140 liters on all types of powder runs, and (c) the amount of filter aid was reduced 50 per cent for all powder runs. The increased NaF reduced Task III slurry losses, the higher ANN concentration aided coagulation of fines, and the reduced filter aid lowered slurry losses and filtration times.

The SE hood averaged 1685 liters per day feed to the columns at a 87 per cent operating efficiency, giving an instantaneous rate of 1937 liters per day. Owing to the nature of the feed, the columns were troubled with high extraction waste losses throughout the month. It was necessary to recycle 141 g of Pu contained in 5 out of 37 waste batches. The waste loss to the crib was 0.54 per cent of the feed.

About 31 kg. of Purex product were processed in Recuplex for further decontamination of short half-lived high energy beta emitter which was causing higher than normal plutonium button radiation readings. A decontamination factor of 2 to 5 was realized which produced a product suitable for Task I processing.

The critical mass control specification for the H-3 Column operating condition was reviewed and the product concentration limit raised tentatively from 75 to 125 g/l. At this new level the product can be sent directly to Task I without prior concentration.

PROCESS CHEMISTRY OPERATIONPROCESS ASSISTANCEPurex Process Studies

Laboratory studies in support of the Purex process were chiefly concerned with waste loss and solvent problems. In the waste loss investigations, it was found that the high plutonium losses to the Purex HAW during the early part of January were caused by the presence in the aqueous phase of "inextractable" plutonium, with a distribution coefficient (E_a^O , from either 1 or 2 M HNO_3 into 30 per cent TBP) of only 0.2. Concentration of the waste for rework, by evaporation, converted the plutonium to an "extractable" form, with a distribution coefficient (from 1.3 M HNO_3) of 2.2. In an investigation of the consequences of processing plutonium oxalate filtrate (recycle from Task I, 234-5) in Purex, a filtrate sample was extracted as received with three successive, double volume portions of 30 per cent TBP. (The acidity of the aqueous phase was maintained at 1.1 M HNO_3 throughout the series of extractions.) The measured distribution coefficient (E_a^O) decreased from 1.3 on the first contact to 0.6 on the third, the final aqueous phase containing three per cent of the plutonium in the feed.

In studies of Purex solvent problems, the following observations were made:

- 1) The plutonium in a sample of HCW taken January 9 was found to be "unstrippable", only 75 per cent of it being removed by three successive contacts with fresh 0.01 M HNO_3 (aqueous/organic volume ratio = 1.25). The plutonium distribution ratio, E_a^O , increased from 1.7 on the first contact to 3.3 on the last. Another aliquot of the HCW was allowed to stand for 20 days, after which time the ratio for distribution of the plutonium into either 0.1 M HNO_3 or into 0.1 M HNO_3 - 0.005 M ferrous sulfamate was found to be 0.3. Apparently most of the plutonium in the HCW had become strippable during the storage period. It also is evident that the five minute contact with the reducing agent did not improve the plutonium strippability.
- 2) The aforementioned HCW contained an unusually high gross gamma activity (2.5×10^4 microcuries per gallon), which was not reduced by contacting with 0.01 M HNO_3 . Solvent washes were made with three per cent Na_2CO_3 , ten per cent NaOH , and 0.1 M KMnO_4 in three per cent Na_2CO_3 . The carbonate, caustic, and permanganate washes reduced the gamma activity by factors of 2.5, 5, and 10, respectively. Three successive permanganate washes reduced the activity by a factor of 28 and gave solvent which, after being contacted with a high-activity aqueous solution, could be returned to its original low level by washing with carbonate. After the permanganate wash, the solvent contained MnO_2 which required removal by centrifugation and/or a water or acid wash.
- 3) Examination of a sample of interfacial "crud" from the Purex second cycle solvent treatment system showed that although it was not affected by nitric acid, it could be completely dissolved in 2% HF , 20% HNO_3 . It was also

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found that it could be dispersed effectively by warm (50-60 C) 2% H₂O₂, 10-15% NaOH.

Redox Process Studies

The feasibility of using Redox D-9 waste (containing low concentrations of chromic nitrate) for the reduction of permanganate in the Redox head-end process was demonstrated in laboratory experiments using synthetic waste and dissolver solutions.

Cobalt-60 Scavenging Studies

Laboratory studies of methods for removing cobalt-60 from stored TBP-Plant wastes were resumed, with attempts to improve the metal-sulfide scavenging procedure. Testing of waste samples from Tanks 102-C, 107-C, and 109-BX showed that the precipitation of iron-II or cobalt-II sulfide will reduce the cobalt-60 level to something less than MPC (4×10^{-4} microcuries per ml). Addition of sulfide and iron or cobalt to give a nominal concentration of greater than 0.002 M, with the solution at pH 9, reduced the cobalt-60 content of the Tank 102-C sample to 8×10^{-5} μ c/ml. The procedure was further improved by digestion of the solution, before addition of the cation, with the sulfide or with a reducing agent such as hydroxylamine. The results obtained with the samples from Tanks 107-C and 109-BX were less favorable, the cobalt-60 content being reduced only to $2-3 \times 10^{-4}$ μ c/ml.

ANALYTICAL ASSISTANCE

Plutonium Assay Studies

In considering the problems which may arise in processing irradiated metal from off-site at HAPO, the need became apparent for a reliable, direct assay for plutonium in dissolver solution. A macro-scale method has been developed. The method consists of 1) chemical separation of the plutonium from the bulk of the uranium, by lanthanum fluoride precipitation; 2) metathesis of the fluoride precipitate to the hydroxide; 3) dissolution of the hydroxide; and 4) coulometric titration of the plutonium in the resulting solution. The results from ten analyses made on synthetic dissolver solution had a standard deviation of 0.8 per cent and a recovery of 100.6 per cent. Efforts to adapt the micro-scale procedure devised by Carson, Gile, and Vanderwater (HW-34040, "Coulometric Determination of Plutonium") to routine use are also underway.

Further work on the chemical assay of plutonium by ceric sulfate titration has shown that in the titration of iron standards, the apparent normality of the ceric sulfate is a function of the titration time. Carrying out the titration over a 20 minute period gave an apparent ceric sulfate normality about one per cent smaller than the value obtained in a five minute titration.

An alternate procedure, using the x-ray photometer, has been worked out for the rough determination of plutonium in plutonium oxalate filtrate samples. The working curve covers the range from 4.86 to 14.89 g/l plutonium, the range which is of chief interest for critical mass control in the filtrate-handling system of Task I.

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Identification of Plutonium Button Activity

The source of the high radiation levels occasionally found in plutonium buttons has been tentatively identified as yttrium-90 (65 hour half-life, 2.24 Mev beta). This conclusion is based upon the following observations:

- 1) Shortly after packaging, two skulls from the casting of high-activity buttons gave a dose rate, at the surface of their cardboard container, of 1.6 R/hr. The shielding provided by 1/16 inch thick Pyrex glass was enough to reduce the dose rate to 0.4 R/hr. Ten days after these measurements, the surface reading (no shielding) had dropped to 0.3 R/hr.
- 2) Gamma scans of the above material, made at the end of the ten day period, showed the gamma radiation to be due solely to plutonium and zirconium-niobium, with no energies above 1.0 Mev. Beta scans showed a beta component with an energy between 2.0 and 2.3 Mev, and rough beta decay curves indicated a 45 to 74 hour half-life.

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 resumed production of calibrated glassware and standard solutions.

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DECLASSIFIED234-5 DEVELOPMENT OPERATIONContinuous "Kill" of Reduced Plutonium Solutions

Plutonium nitrate solutions containing either semicarbazide or sulfamic acid may be oxidized and safely concentrated by the continuous "kill" technique.

Plutonium nitrate solutions reduced with semicarbazide for use as product from ion exchange columns have been reoxidized and concentrated by a factor of five in a continuous kill experiment. Feed solution was 6 M HNO_3 , 0.05 M semicarbazide and 11-50 g/l Pu. Although the oxidation reactions would not be considered safe in a large batch heating, they are easily controlled when the nitrate-semicarbazide mixture is slowly and continuously added to a boiling solution. Very little foaming is encountered. The plutonium concentrate is clear, stable, and free from precipitates.

Plutonium-sulfamic acid solutions tested in a continuous "kill" experiment were found equally safe and controllable.

Continuous Ion Exchange

A hydraulic ram mechanism has been installed for resin movement in the laboratory scale continuous ion exchange columns. This refined version replaces the earlier crude hydraulic ram mechanism installed for rough testing only. It has all the necessary features for simple and trouble-free operation and has proved entirely satisfactory as a means of moving the resin.

Several attempts have been made at setting up a suitable conductivity probe and controller for slip water separation. The Photoswitch Level Controller originally obtained for the purpose proved insufficiently sensitive. A Thyatron relay controller developed for the purpose is at present unsatisfactory in that it uses a d-c signal at the conductivity probe with resultant polarization. An Industrial Instrument Company Solu-Bridge controller designed for the expected conditions at the conductivity probe is at present being tested. This controller should prove satisfactory for the purpose. A screened slip water conductivity probe is being designed for use with this controller.

The solution pumps to the ion exchange equipment have been provided with recirculation lines to their corresponding head bottles. This was found necessary to eliminate air-locking of the pumps and to minimize heating of liquid in the pumps.

Difficulties were encountered in the use of Saran-bodied process solution valves. An air pocket between the valve body and Teflon diaphragm, when in lines communicating directly to the columns, acts as a cushion. Much of the pressure applied for resin movement is absorbed by this cushion and, as soon as the pressure is removed, the cushion pushes the resin backward in the columns. The effect was eliminated by rearranging the lines to provide no air pockets between the valves and the columns.

Dowex 50W-X8 resin for use in the ion exchanger has been extracted with 6 M HCl to remove iron. The latter is known to cause auto-catalytic oxidation and gassing in the presence of acid and hydroxylamine, which will be tested in the ion exchange equipment.

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Precautions are being taken to prevent back-up of plutonium into the cold feed lines. Each line has been provided with a small check valve. In addition, a housing has been made by means of which the cold feed lines can be monitored by a neutron counter of the type now used in Recuplex. The one from Recuplex will be used in the initial start-up with plutonium.

A general purpose ion exchange scavenging column is being prepared for use in the ion exchange hood. All waste streams will be routinely run through this column to pick up small amounts of plutonium; thereby simplifying waste disposal. A vacuum transfer system is being assembled to facilitate simple transfer of all product and waste streams within the hood.

Sulfate in Task I Feed

If PR cans containing sulfate are allowed to stand, precipitation may occur. A sample of Purex product 146 g/l Pu and 6 M HNO_3 was made 0.8 M SO_4^{2-} by addition of ammonium sulfate, and split into two parts. One was held at room temperature and the other refluxed for approximately six hours. After standing for nearly a week, no precipitation has occurred. Previous results were based on solutions of uncertain composition.

New Continuous Precipitation Unit

The first "cold" continuous precipitation was completed during the month. Cerous nitrate solution (50 g/l cerium) was used as feed material, and 1 M oxalic acid used as the strike solution. The resulting oxalate cake was calcined to cerous oxide in the continuous calciner operating at 300 C. The precipitation and calcination throughput rate was approximately 250 grams of cerium per hour. Approximately 15 minutes residence period is required in the calciner for complete calcination. The equipment operated satisfactorily except for inadequate slurry agitation. A minor modification of the rocker arm agitator blades will be made to increase the agitation in the precipitation pan.

Continuous Hydrofluorination Unit

A plastic (teflon and fluorothene) rotary feed valve has been installed on the continuous hydrofluorinator. The valve replaced the inconel feed screw assembly which had been contaminating the plutonium tetrafluoride with corrosion products.

Permanent Mold Casting

Three castings have been made using a 3/8" I. D. ceramic tube to direct the plutonium metal from the pouring crucible directly into the desired side of the copper mold. This reduces the amount of ceramic recovery, as the diverting crucible then becomes a safety crucible and is reused. The decrease in turbulence and the more direct flow of metal into the molds should stop cold shut formation. Two of the castings have good surfaces; the third casting poured prematurely and is not a good test.

One pour with the mold temperature increased about 75 C also shows improved metal surfaces. Checks are being made on this metal for copper pick-up.

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The second and third buttons have been transferred to Plutonium Metallurgy for remelt and sampling, making a total of 900 grams to date.

Analysis of metallic impurities in the second button were as follows, in parts per million: Al 5, 8; B <2; Ca 3; Cr <2; Cu 5; Fe 170, 360; Mg 10; Mn <2, 5; Na 5; Ni <5; P <100; Pb 5; Si 5; Ag, As, Be, Bi, Cd, Ge, K, La, Li, Mo, Ti, V, and Zn not detectable. With the exception of iron, impurities were very low.

To determine if the source of iron impurity has been the reduction vessel, the next two reductions will be made in a stainless steel reduction vessel using calcium oxide crucibles of high purity.

A typical analysis of a fluoride powder after drying, in parts per million, is as follows: Ag 2 to not detectable; Cr <2; Cu 2; Fe <50; K 5; Mg 2; Mn <2; Na 100; Ni <10; P <100; Pb 5; Si 10; As, B, Bi, Cd, Ge, Li, Mo, Ti, V, and Z not detectable. Aluminum, calcium, beryllium, and lanthanum are not determined due to difficulty associated with determination on fluoride powders.

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 January, 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)

R. H. Moore

Title

"A pyrochemical dissolution and head-end process for zirconium clad or aluminum canned fuel elements preliminary to solvent extraction processing.

VISITORS AND BUSINESS TRIPS

J. U. Shepardon, R. H. Burr, K. J. Caplan and F. N. Anderson of Mallinckrodt visited Hanford on 1-22-57 to discuss the processing of enriched materials.

Duane Barney of KAPL visited Hanford on 1/18/57 for the purpose of touring Purex Plant and discussing process.

Manager, Research and Engineering
CHEMICAL PROCESSING DEPARTMENT

RB Richards:khs

CHEMICAL PROCESSING DEPARTMENT
EMPLOYEE RELATIONS OPERATION
January 1957

I. RESPONSIBILITY

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

II. ACHIEVEMENTS

FIRE PROTECTION OPERATION

A. Fire Responses

1. South of 283-W Building, 200-W area. - 9:30 P.M. January 14, 1957.
Outside fire in collection of coal dust, probable cause, spontaneous ignition, or results of previous weed burning. Loss -- nil.
2. 2701-U, 200 W Area - 10:00 P.M. January 29, 1957
Rags burning outside of door. Fire out on arrival of apparatus.
Probable cause discarded smoking material. Loss - Nil
3. Blaw-Knox Pipe Shop 200-E Area, 2:25 P.M. January 2, 1957
Private contractors -- Morton Supply Company, Yakima, Washington
Accidental alarm - Mr. Morton accidentally transmitted alarm, by pulling alarm box thinking it to be disconnected.
4. Open area west of 241 TX tank farm 200 W Area -- 2:32 A.M.
January 26, 1957.

Broken power line arcing on the ground - Loss - Nil.

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

1. Fire extinguishers

Inspected	395
Installed	7
Delivered to new location	5
Seals broken not reported	12
Serviced	25
Weighed	350
2. Gas masks

Inspected	28
Serviced	5
3. Hand lines

Inspected	18
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SALARY AND WAGE ADMINISTRATION

The CPD Annual Salary Review was completed on schedule.

The position, "Chief, Fire Protection", was removed from a fixed rate status and established as a normal exempt position by authorization of an applicable revision to "Appendix B" of the prime contract. This move, effective January 1, 1957, was made in conjunction with other departments in HAPO.

The non-exempt positions, Design I and II, were changed to exempt status, effective February 1, 1957. These changes were also made in conjunction with other HAPO departments. Accompanying these changes the level of the position "Supervisor, Drafting", was raised one level, effective February 1, 1957.

The data that was accumulated to show the pay differences that existed between our first line supervisors and their crew members was presented to the applicable third level operations for their assistance in completion of the Annual Salary Review.

New organization directories for CPD, revised as of January 1, 1957, were prepared and distributed on schedule.

The CPD quarterly Salary Distribution Report was compiled and issued during the month.

The preparation of individual salary history charts for exempt personnel was continued and are 50% complete. Those charts which were considered to be of greatest value for the salary review; that is those for the Engineering components, were completed.

A new Davis-Bacon minimum wage rate predetermination as of January 14, 1957, has been received. In this connection a listing of those rates which have changed since the comparative study, made December 5, 1956, of Davis-Bacon and CPD classifications has been prepared and issued to CPD personnel concerned.

A comparison of the CPD weighted averages of pertinent classifications with the Northwest Area Wage Survey data has been prepared as of January 21, 1956. In order to present a more accurate comparison, the CPD rates were converted to those in existence at HAPO on August 5, 1956, the date of the survey. The meaning of this study and what, if any, action should be taken to adjust CPD classification rates is in process of determination.

In conjunction with the Wage Administrator of HLO the title study relative to Engineering Assistants, Technologists, and Laboratory Assistants, in progress during December, 1956, has been revised and resubmitted on January 25, 1957, to the HAPO Managers of Employee Relations.

Grades and classifications were established for one clerical job in Purex Maintenance, one semi-technical job in Finished Products - Analytical Control, and for seventeen Financial jobs, during January, 1957. One job from Product Cost is still in process of evaluation and establishment.

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

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ADDITIONS TO ROLL

	<u>Exempt</u>	<u>Non-Exempt</u>
New Hires and Rehires		4
Reactivations	2	4
Transfers from Other Departments		3

REDUCTIONS FROM ROLL

Transfers to Other Departments or Divisions	3	11
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CHANGES IN STATUS (NO SALARY CHANGE)

Intra-Departmental Transfers	1	33
Reassignments	2	
Location Changes	1	

CHANGES IN SALARY

Promotions		26
Demotions		17
Automatics		37
Temporary Reclassifications		1
Salary Adjustments (Gen'l. Adj. on Firemen)	10	

REQUISITIONS

1	12
	12(Personnel)

UNION RELATIONS OPERATION

Progress of the T.B.P. Plant shutdown and placement of Chemical Workers in other positions at HAPO was the subject of several contacts with Union representatives during the month. It was possible to correct several misunderstandings and also to give the Union information on placement of people who are in "layoff" status. During the past three months, thirteen of the employees in the subject Seniority Group have terminated voluntarily and twenty-five employees have been offered, and have accepted jobs elsewhere in HAPO.

The Wonacott Arbitration Case (Radiation Monitoring Jurisdiction) has been the subject of correspondence and discussion with the HAMTC during the past month. The Company sent the union a letter describing what the Company considers to be the jurisdiction of this group and the Union expressed general concurrence. Certain minor issues are still being reviewed.

The HAMTC continues to indicate its desire to process an increasing number of grievances at the arbitration level.

C. J. Sheeran has been designated as the Company representative on an arbitration panel. The arbitrator is Rev. R. J. Carmody of Seattle University. The panel members met in Seattle on January 30, 1957.

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

	<u>Unit</u>	<u>Nonunit</u>
Pending at Step II on 12-31-56	17	0
Grievances received during January	7	1
Satisfactorily answered at Step I	1	0
Settled at Step I through expiration of 90 day time limit	6	0
Processed at Step II	4	0
Pending at Step II as of 1-31-57	14	1
Pending at arbitration	1	0

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>Jan.</u>	<u>Dec.</u>
Bargaining unit employees in C.P.D.	1070	1085
Bargaining unit employees utilizing check-off	660	662
Percentage of total bargaining unit employees using check-off	61.08	60.1

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HEALTH AND SAFETY OPERATION

<u>Chemical Processing Department</u>	<u>January-57</u>	<u>December-56</u>	<u>Total-1956</u>
Disabling Injuries	0	0	0
Serious Accidents	0	3	6
Medical Treatment Injuries	64	66	335
Overexposure Incidents*	0	0	1
Potential Overexposure Incidents*	0	1	4
Radiation Occurrences	31	33	152
Fires	2	1	4
Security Violations	2	3	6

*New Nomenclature per revised HAPO Radiation Protection Standard 6.4.

Overexposure Incidents—those which produce an overexposure or a change in an employee's radiation tolerance (i.e. permanent work restriction.)

Potential Overexposure—those in which an overexposure or change in radiation tolerance was narrowly averted. These concepts correspond to the Class II and Class I Radiation Incidents of former years.

The number of Medical Treatment Injuries and Radiation Occurrences showed no appreciable decrease. Lack of ordinary care was the prevailing cause of injuries.

Two fires of negligible loss were extinguished and will be reported by the Fire Protection Operation.

Emissions of I¹³¹ were reduced to normal until the end of the month, when Redox exceeded the weekly goal.

A comprehensive audit program for all Chemical Processing Department components was developed; the Uranium Reduction and Metal Recovery Plants audit was started.

CWS Filters were replaced with non-combustible MSA Ultra-Air type filters in 222-S Laboratory hoods where fire potential exists.

A department wide Practice Evacuation was called on January 18, 1957. Recommendations to improve efficiency of the plan were reported to all components.

A Health and Safety Orientation program was developed for new hires and transfers to Chemical Processing Department; monthly meetings were scheduled.

Two jumbo safety boards were procured from Irradiation Processing Department; arrangements were completed for installation at the Prosser and Yakima Barricades. These boards will show total days without a lost time injury for all HAPO components.

The 1957 first quarter Safety Program, "Signs of Life" is in progress. Initially 1600 entry blanks were distributed; an additional 200 entry blanks were recently requested by the components.

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A Chemical Processing Department Accident Prevention Committee of non-exempt people, providing broad department representation, was formulated. The first meeting was held on January 9, 1957.

The fire fog system in the silo sample gallery and hexone head tank enclosure and the rate of rise system in 276-S were tested with satisfactory results.

Planning and scheduling of advanced First Aid and Basic Rescue Training refresher programs was completed. Non-exempt people will receive 16 hours instruction and training.

A total of seven meetings were conducted:

- 1 - Permissible exposure limits - Power and General Maintenance
- 1 - Radiation protection problems - Air Force SWP Officers, Los Alamos Industrial Hygienist
- 4 - Evacuation procedures - Power and General Maintenance, Project Engineering, Redox, Purax
- 1 - Accident Prevention - All Chemical Processing Department component representatives - non-exempt

One issue of the Health and Safety bulletin, "As We See it", publicized the Safety Award.

Counsel and Advice was provided on the following items:

- Proposed development laboratory addition - 234-5
- Recovery of plutonium in sand paper by charring - 234-5
- Project to replace CWS Filters - 234-5
- Scope prints of welding manifold and service piping - 277-U
- Field tests of "Scottoramic" assault mask - Hanford Laboratories Operation
- Exposure reporting and HAPO Radiation Protection standard revision.
- Testing of portable loudspeakers, emergency public address - AEC Security
- Revision of HAPO Accident Prevention Standards - all HAPO safety representatives
- Improve roads, walks, parking facilities, landscaping - 2704-E
- Calking joints in outside walls, high elevation, 202-S
- Alteration to grey MSA assault mask cannister
- Welding practice on organic piping - 202-A
- No eye protection requirement, special hood analysis, 234-5 Development Lab

There were no reports issued.

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PERSONNEL DEVELOPMENT AND COMMUNICATIONS

A. Measurement Statistics

Participation in Training Courses		
Monthly Personnel		125
Process and Equipment Orientation	33	
Non-Exempt Personnel Development	22	
PEM-I (enrolled)	36	
Practical Business Writing - I	14	
Practical Business Writing - II	9	
Special Hazards	10	
Management Orientation	1	
Weekly Personnel		73
Analytical Procedures	8	
Technologist Leader Training	3	
Projectionist Training	4	
Special Hazards	19	
Craft Training (Power Operators)	39	
G.E. Selection Program - number completed		3
Attendance at Films		15
Films reviewed		1
Technical Graduates on Rotation		2
Technicians in Training		6
Management News Bulletins issued		6
GE News Items		12
Employee News Letters (HAPO)		2
OPG's issued		19
Bulletin Board notices prepared		1
Priority Messages		2

B. Comments on Statistics

The program to acquaint supervision with the operation of the new Non-Exempt Personnel Development Program is now complete.

A slightly modified version of the OPD Process and Equipment Orientation was presented to 33 exempt personnel of the 100-K Area.

The two priority messages concerned the litigation between the HAMTC and GE, and a disabling injury in Relations and Utilities.

C. Employee Communications

Communication-Specialists in HLO, R & U, IPD, and OPD prepared material for a booklet on Radiation Protection at Hanford. Copies of this material was duplicated and given to the OPD Health and Safety people for use at their first orientation meeting. Booklets should be printed and ready for distribution within the next two months.

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The GE NEWS carried several items from OPD during the month. These included a story about the Report to Employees meetings; a picture and cut-line of the OPD photo contest winner; a feature story on a OPD employee; two news stories on suggestion award winners and a picture and cut-line about a new pumper truck for the OPD fire department; a picture and cut-line on the first quarter safety program; a picture and cut-line concerning a OPD's patent award winner; an obituary; a Can You Tell Me answer; a picture of a \$100 suggestion award winner; and a short feature article and a picture of a OPD secretary.

The OPD entries for the GE Photo Contest were turned into Employee Communications, R & U. OPD was represented by 70 entries.

A report on the HAPO 5-Year Relations Program was compiled for the General Manager.

D. Public Communications

OPD approvals were obtained for a news release prepared by Press Relations concerning the Uranium Recovery Program.

A candidate from OPD was furnished Public Communications to be considered for advertisement to show how GE people at Hanford participate in civic affairs.

Two sources for proposed news stories for national publicity purposes were called during the month. Both sources have asked that the stories be delayed until March.

Two specific inquiries from Press Relations, regarding TBP shutdown, and cold weather damage were looked into and answered.

E. Personnel Development

Two groups of eighteen exempt people started the twenty-week course in Professional Business Management.

Meetings were conducted with Glenn Jones of Washington State College, Jack Cooney of Columbia Basin College and W. G. Allen of the Richland Adult Evening School to discuss the courses offered by their respective institutions.

The Specialist, Training assisted W. G. Allen in development of a Trade Arithmetic course for inclusion in the Adult Education courses.

Names on the Manufacturing Personnel Inventory have been reconciled with the Manufacturing Personnel Services Section. The Engineering Personnel Register and the Employee Relations Manpower Inventory are currently being worked on.

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PERSONNEL PRACTICES OPERATION

	<u>Exempt</u>	<u>Non-exempt</u>	<u>Total</u>
<u>Additions to Payroll</u>	4	11	15
New Hires	0	4	4
Reactivates	2	4	6
Re-hires	0	0	0
Re-engages	0	0	0
Transfers into C.P.D.	0	3	3
Promotions from nonexempt to exempt	2	0	2
<u>Removals from Payroll</u>	7	33	40
Leave of Absence	0	1	1
Personal Illness	0	5	5
Home Responsibility	0	1	1
Resigned, other employment	1	5	6
Returned to School	0	1	1
Deceased	0	1	1
Retirements	0	0	0
Transferred out of C.P.D.	6	11	17
Promotions from nonexempt to exempt	0	2	2
L.O.W.	0	6	6

There are still 60 Utility Operators to be placed as the result of the forth-coming T.B.P. closure. L.O.W. notices are being prepared for 18 low-seniority Utility Operators. These notices will be given the first week of February so that manpower adjustments can be accomplished as scheduled by operation management on February 22. The ratio between Process Operators and Utility Operators in Seniority Group 4 was adjusted during January, resulting in the downgrade of 15 Process Operators to Utility Operators.

Requisitions for Personnel (Non-exempt)

Number on Hand End of December	23
Number received	12
Number filled	17
Number on Hand End of January	18

Requests for Transfer (Non-exempt)

Number on Hand End of December	149
Number received	13
Number transferred	8
Number on Hand End of January	154

During January no Service Recognition Awards were issued, however, there were 36 pass folders for perfect attendance. These were as follows:

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One Year	8 Men	
Two Year	6 Men	
Three Year	9 Men	
Four Year	4 Men	
Five Year	5 Men	1 Woman
Six Year	3 Men	

Seven inquiries in regard to employment and credit references of various employees within C.P.D. were answered during the month. Also four telegrams granting permission to make offers of employment to two Separations Process Operators, one Crane Operator, and one Separations Chief Operator were sent. All these requests were from the North American Aviation, Atomic International Division, Los Angeles, California.

During January three tests were administered and the results forwarded to the operation managers. These tests consisted of one craft trainee and two G. E. supervisor selection tests.

Requests for Transfer (Exempt)

Number on Hand End of December	21
Number this month	1
Number transferred	0
Number closed out	0
Number on Hand End of January	22
Number of Interview Trials	0

Applications for Employment (Exempt)

Applications received during Jan.	1
Hired	0
Closed Out	0
Invited for Interviews	0
Open Requisitions	2

Only three persons remain unplaced from the original list of thirteen from the Research and Engineering Operation, and of these persons, two will be definitely considered for job openings occurring in other departments in approximately six months. At a meeting held with the managers of the Finished Products, Purex, and Redox Operations an agreement has been reached to divide the remaining grade level eight and below personnel available from Finished Products among these three plants on a training basis. This will provide continuing jobs for these people, mainly non-technical, and will provide available replacements in the event of exempt losses in the near future due to transfers or resignations.

An interview visit was made to Richland the latter part of the month by Dr. Homer Grant, Head, Industrial Engineering Department, University of Southern California. Dr. Grant was interviewed by the Purex and Facilities Engineering Operations relative to summer employment in the C.P.D.

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C.P.D. has a total of 81 non-veterans who are subject to military training through the Selective Service System.

During the month of January, there were three non-veterans removed from the C.P.D. rolls. Two were classified 1A and one was classified 2A.

The 81 non-veterans are classified as follows:

1A	15
2A	16
3A	31
4A	1
4F	9
4D	1
1S	1
1F-F	1
No	5
Classification	

Total 81

Deferments

Deferments requested (January)	1
Deferments granted (January)	2
*Deferment requests pending	2
Routine	1
Appeal	1

* One technical graduate, whose appeal to a 1A classification was at state board level has transferred to HLO.

Deferments (Category II-R determination requests)

Category II-R Requests (January)	1
Category II-R Pending	5
Category II-R Granted	0

Notices and forms have been mailed to supervisors of 108 C.P.D. non-exempt employees who are to be appraised during the month of February. These forms should be completed and returned by March 5th.

Of the 127 appraisals to have been completed during the month of January, only 27% have been returned to this office as of this date. The remainder are due back by February 5th.

Duplicating

Orders on Hand (1-1-57)	115
Orders Received	846
Orders Completed	851
Orders on Hand (1-31-57)	110
Total Copies Produced	216,913

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Embosograf Signs Made	378
Verifax Copies Produced	834
Ozomatic Copies Produced	7,510

Study is continuing on increased production from Xerox Developer. The total number of Xerox masters from the same can of developer used in the study has reached 651 as of the end of January and is still producing satisfactorily. It is evident now that our goal of 800 masters per can of developer was conservative and it appears that we may exceed this figure by several hundred, perhaps by as much as 300 to 400 masters. Developer cost per master has been reduced from \$1.00 each to .038 each at the end of January and represents a production increase of some 2,500% per $\frac{1}{2}$ pound can of developer.

A survey of telephone facilities in "T" Plant has been initiated and the results will be forwarded to Relations & Utilities for study of equipment required to provide future communication needs in this facility

The new mail room for 200-E was opened on January 10, 1957. Installation of this mail room means that 200-E mail is now delivered direct to 200-E instead of 200-W and results in earlier delivery to addressees in 200-E. It is planned to further increase the efficiency of mail deliveries and pickups in both 200-E and 200-W by installing more door to door deliveries and possibly an additional delivery and pickup in each area.

On January 24th, Office Services acquired the small addressograph machine formerly assigned to 200-W Power and General Maintenance. Addressograph plates have been ordered to set up our own addressograph service for C.P.D. In taking over this addressograph equipment Office Services assumed the responsibility for providing some 500 addressographed instrument charts per day for use in the processing facilities in C.P.D.

Office Services completed co-ordinating information pertaining to C.P.D. automotive and heavy equipment requirements for FY 1959 and revision of budget for FY 1958. The requirement budgets will be submitted to Relations and Utilities Transportation for further action.

Suggestion Plan

	<u>December</u>	<u>January</u>
Suggestions Received	68	122
Acknowledgements to Suggestors	73	112
Suggestions Pending Acknowledgement	26	35
Suggestions Referred to Operations for Investigation	73	112
Suggestions Pending Referral to Operations	26	35
Investigations Completed and Closed	80	130
Adopted Suggestions Approved by Board	47	64
Adopted Suggestions Pending Approval by Board	35	22
Total Net Savings	\$32,916.79	\$4,207.72
Total Cash Awards Approved by Board	3,765.00*	1,980.00*

* These figures reflect awards of \$2,990.00 approved by C.P.D. Suggestion Board which are at Financial Operation for audit or pending approval of the A.E.C. Tangible savings listed above do not include \$25,837.46 of net tangible savings to be realized from these suggestions which are pending.

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Total number of suggestions outstanding to Operations at the end of the month

<u>December</u>	<u>January</u>
224	216

Award checks amounting to \$1,000 were delivered to Level 3 managers during January.

One pre-retirement interview was held during January.

Participation in Benefit Plans	<u>December</u>	<u>January</u>
Insurance Plan	99.7%	99.7%
Pension Plan	98.3	98.4
Stock Bonus Plan	55.6	56.3
Good Neighbor Fund	61.2	63.4

III. ORGANIZATION AND PERSONNEL

A. Personnel Activities

The weekly staff meetings of Level 4 continued to be held during the month. Level 5 staff meetings were held in the various components.

The Manager, Employee Relations, attended bi-weekly meetings of the Employee Relations Managers of HAPO.

The Specialist, Training presented a talk and demonstration on CPD activities to 33 exempt personnel in 1704-K, 100-K area on January 28.

Meetings during the month with their counterparts in other departments were attended by the Communications Specialist, Salary and Wage Administration personnel, Personnel Practices' employees, and Union Relations representatives.

In addition to the meetings specifically mentioned, employees of Employee Relations Operation attended 52 other meetings.

Most of the Employee Relations exempt personnel had an opportunity during January to meet with Mr. Rebucci of Public and Employee Relations Services to discuss the Employee Relations Manpower Inventory.

Health and Safety Operation held one safety meeting in which other Employee Relations components participated. Fire Protection Operation held eight safety meetings to enable all 44 of their people to attend.

Two specialists in Health and Safety attended "Business Writing and Reports".

Fire Protection Operation conducted a demonstration on artificial respiration for ten employees of Radiation Monitoring at the 234-5 building. A fire prevention lecture on flammable liquids, and fire extinguisher demonstration was given to 31 employees of 202-S building.

The Manager, Personnel Practices, participated in a recruiting visit to the campus of Iowa State College during the month.

B. 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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