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MONTHLY REPORT

HANFORD ATOMIC PRODUCTS OPERATION

57852

FOR

DECEMBER 1954

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Compiled By
DEPARTMENT MANAGERS

January 25, 1955

RICHLAND, WASHINGTON

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MONTHLY REPORT
HANFORD ATOMIC PRODUCTS OPERATION

DECEMBER 1954

GENERAL SUMMARY

PRODUCTION OPERATIONS

A net production of 426 tons of acceptable canned slugs was achieved during the month. The production was 101 percent of the official forecast and established a new production record, eleven tons greater than the previous record in October.

The monthly reactor input plutonium production, which established a new record over the previous high in September, was 108 percent of the official forecast, while the input production for the quarter was 105 percent of the forecast.

Redox and T Plant monthly productions were 256 and 122 percent of the official forecast respectively. The higher than forecasted production in Redox was attributed to the postponement of the conversion to the low ngs program from December to January.

ENGINEERING TECHNOLOGY

Valuable technical data were obtained in a series of tests conducted prior to startup of the KW reactor. Preliminary analysis of these data indicate that the cold, clean reactivity of the reactor will be about 200 ih less than that predicted. Also, reactivity absorbed by the water was determined to be about 600 ih versus a predicted value of 400 to 500 ih.

A continuous eight-day operability test with the continuous UO_3 calcinator produced satisfactory results.

Beneficial use of the 105-KW Reactor facility was accomplished at 12:01 A.M., December 6, 1954.

PERSONNEL AND SERVICES

A new monthly report for reporting project costs was placed in effect on all projects which have authorized funds of $50,000 or over. This report reflects the cost compared to the official estimate for each feature of work and will enable those responsible for a project to ascertain at a glance any phase of the work which may be indicated to be costing more than planned.

Authorization was received from the Commission (Reimbursement Authorization 238) for HAPO to utilize the new Company salary plan effective January 1, 1955.

There were no major injuries in either the plant or community operations. For the first time, the plant received the State's Award of Merit for Safety Performance from Governor Langlie.

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STAFF

General Manager, Atomic Products Division	F. K. McCune
General Manager, Hanford Atomic Products Operation	W. E. Johnson
Counsel	G. C. Butler
Manager, Finance	D. M. Johnson
Manager, Employee and Public Relations	C. N. Gross
Director, Radiological Sciences	H. M. Parker
Manager, Engineering	A. B. Greninger
Manager, Manufacturing	J. E. Maider
Operations Research Study	B. F. Butler

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HANFORD ATOMIC PRODUCTS OPERATION
NUMBER OF EMPLOYEES
DECEMBER 31, 1954

	EXEMPT		OTHER		TOTAL	
	12-31-54	11-30-54	12-31-54	11-30-54	12-31-54	11-30-54
Counsel	3	3	2	2	5	5
Operations Research Study	6	6	1	1	7	7
Special Study	4	4	3	3	7	7
Employee & Public Relations						
General	9	9	1	1	10	10
Salary & Wage Adm.	11	11	12	12	23	23
Personnel Practices	14	14	39	36	53	50
Education & Training	7	7	44	45	51	52
Emp. Comm. & Pub. Rel.	10	9	41	40	51	49
Union Relations	5	5	2	2	7	7
Aux. Oper. & Plant Prot.	120	120	812	817	932	937
Community	84	84	328	332	412	416
Health & Safety	55	55	195	197	250	252
Engineering Department						
Engineering Adm.	34	34	90	90	124	124
Advance Engineering	11	10	1	1	12	11
Design	179	177	123	123	302	300
Project	237	245	153	156	390	401
Pile Technology	225)	400	147)	239	372)	639
Separations Technology	169)		90)		259)	
Manufacturing Department						
General	15	15	7	7	22	22
Reactor	292	289	1 332	1 294	1 624	1 583
Separations	281	283	1 363	1 358	1 644	1 641
Metal Preparation	102	102	534	525	636	627
Transportation	42	42	445	448	487	490
Purchasing & Stores	56	56	214	214	270	270
Electrical Utility	16	16	73	74	89	90
Financial Department						
General	9	9	3	3	12	12
Budgets & Measurements	4	4	4	3	8	7
Contract Cost	23	23	94	95	117	118
General Accounting	9	10	66	69	75	79
Property Accounting	16	16	45	44	61	60
Auditing	15	15	2	2	17	17
S. F. Accountability	8	8	24	21	32	29
Personnel Accounting	9	9	54	54	63	63
Procedures & Computing	26	27	56	54	82	81
Radiological Sciences Department						
Records & Standards	28	28	152	151	180	179
Biophysics	55	55	66	66	121	121
Biology	34	33	36	35	70	68
Engineering	6	6	1	1	7	7
Adm. & Communications	4	4	5	5	9	9
Grand Total	2 233	2 243	6 660	6 620	8 893	8 863

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AREA PERSONNEL DISTRIBUTION
DECEMBER 31, 1954

	100-B AREA	100-D AREA	100-F AREA	100-H AREA	100-K AREA	101 AREA	200-E AREA	200-W AREA	300 AREA	700-1100-3000 AREA AND PLANT GENERAL	TOTAL
Engineering Department											
Exempt	25	65	-	14	36	-	68	63	272	312	855
Other	14	33	2	59	13	-	19	31	214	219	604
Total	39	98	2	73	49	-	87	94	486	531	1 459
Manufacturing Department											
Exempt	68	57	67	64	39	-	36	256	101	116	804
Other	287	322	306	218	214	-	207	1 205	534	675	3 968
Total	355	379	373	282	253	-	243	1 461	635	791	4 772
Financial Department											
Exempt	-	-	-	1	-	-	1	2	5	110	119
Other	-	-	-	2	2	-	-	12	12	320	348
Total	-	-	-	3	2	-	1	14	17	430	467
Employee & Public Relations											
Exempt	21	7	8	11	9	-	4	16	11	228	315
Other	52	49	88	50	74	11	32	118	112	888	1 474
Total	73	56	96	61	83	11	36	134	123	1 116	1 789
Radiological Sciences											
Exempt	2	-	34	-	-	-	2	19	56	14	127
Other	5	-	40	-	-	-	9	17	170	19	260
Total	7	-	74	-	-	-	11	36	226	33	387
General											
Exempt	-	-	-	-	-	-	-	-	-	13	13
Other	-	-	-	-	-	-	-	-	-	6	6
Total	-	-	-	-	-	-	-	-	-	19	19
Total Exempt	116	129	109	90	84	-	111	356	445	793	2 233
Total Other	358	404	436	329	303	11	267	1 383	1 042	2 127	6 660
GRAND TOTAL	474	533	545	419	387	11	378	1 739	1 487	2 920	8 893

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MANUFACTURING DEPARTMENT

DECEMBER, 1955

METAL PREPARATION SECTION

A net production of 426 tons of acceptable canned slugs was achieved during the month. The production was 101 percent of the official forecast and established a new production record, eleven tons greater than the previous record in October. The high production was accomplished primarily through the start-up on December 10 of an additional shift canning line which permitted an average daily canning production of nearly 6000 slugs. The production for the last quarter was 105 percent of official forecast.

The canning yield for December was 83 percent as compared to 85 percent in November with the lower yield being attributed principally to an increase in the welding and poor bond reject categories.

The shortage of bare metal continued to be a major problem. An inventory equivalent to two to three days supply continued to complicate the efficient scheduling of inspection, transformation and outgassing of bare metal prior to canning. In some cases it was not possible to outgas all lots prior to canning, and this contributed to an increase in the poor bond rejection rate.

The canning of eight-inch cored slugs was started early in the month but was curtailed on December 15 following a rupture of a slug during the canning process. Apparently moisture introduced into the slug prior to canning had vaporized when the slug was submerged in a molten metal bath, causing the uranium plug to be blown out. Investigation on revised canning methods continued at month end with no acceptable cored slugs having been produced during the month.

No autoclave failures occurred during the month.

A total of 5151 acceptable C slugs were canned during the month with a yield of 91 percent.

REACTOR SECTION

The monthly reactor input plutonium production, which established a new record over the previous high in September, was 108 percent of the official forecast, while the input production for the quarter was 105 percent of the forecast.

The reactor time operated efficiency was 81.6 percent in December. This relatively low efficiency was the result of unusually long scheduled outages for the charge-discharge operation, the continuation of the C Reactor pigtail outage started in November, and downtime resulting from tube leak testing programs at B, D, and F Reactors.

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The monthly plutonium output production, 144 percent of the forecast, was the result of greater than forecast discharges of low concentration material from C Reactor and high concentration material at other reactors. The higher than forecast output production generally resulted from and compensated for the low November output caused by low C Reactor operating efficiency and higher concentration goals for the other reactors during that month. Tonnages of low and high concentration material discharged during the month were 298 and 80 respectively.

Maximum established reactor power levels, excluding enrichment burnout, were increased a total of 370 megawatts: 65 at B Reactor, 85 at C Reactor (four only for plutonium), 170 at D Reactor and 50 at F Reactor. The unusually small portion of the total increase at C Reactor attributable to plutonium is due to the charging of thorium at this reactor since the last increase in maximum established level. At B, D, and F Reactors, the increase was partially due to the seasonal decrease in inlet water temperature. In addition, at B Reactor the increase was attributed to a high flattening efficiency and increased exit water temperature limits permitted by a revised process standard. At D Reactor, increased exit water temperature limits permitted by a revised process standard and increased permissible helium concentrations to control graphite temperatures contributed to the increase. At F Reactor, the increase over that resulting from inlet water temperature was due to continued high flattening efficiency. At C Reactor, increased temperature limits and the movement of 30 "C" metal columns from the third to the fourth lattice unit resulted in the increase.

Three slug failures occurred during the month; two eight-inch regular failures, one each at C and H Reactors, and one J metal failure at DR Reactor. The J and one regular failure were discharged during scheduled outages. Reactor outage time required for removal of December slug failures was 31.5 hours.

Nine reactor scrams occurred during December. Six of these, at DR, F, and H Reactors were caused by normal Panellit system variables. One scram at C Reactor resulted from a No. 2 Beckman trip, and was caused by the controller trip setting drifting downward. This scram resulted in a B Reactor scram through the safety circuit inter-tie. H Reactor was scrammed once by a high pressure trip on recirculation test tube 0961-H when an air operated valve closed due to failure of a solenoid. Total outage time resulting from these scrams was 32.3 hours, 29.5 of which were attributable to the B Reactor scram where insufficient reactivity precluded recovery.

Process tube leak testing was done at B, D, and F Reactors during December. As the result of an abnormally high water collection rate, a total of 185 tubes were hydrostatically tested during a scheduled outage at B Reactor and one leaking tube was found and corrected. Because of abnormally high water collection rates, all tubes at D Reactor were tested during a scheduled outage. Thirty-five nozzle leaks, two Van Stone flange leaks and one tube leak were found and corrected. All tubes at F Reactor were tested during a scheduled outage because of high collection rates. One gasket leak and five Van Stone flange leaks were found and corrected. When water collection rates at F Reactor remained abnormally high, a check of all rear nozzles during a subsequent outage revealed 35 to be loose. By month end, the collection rate at B Reactor was normal, and the collection rate at D Reactor indicated a trend toward normal. Operating experience, since the

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last F Reactor outage, was insufficient to indicate whether all leaks of this reactor had been corrected. Leak testing programs involved approximately 115 hours of outage time during the month.

Considerable horizontal rod work was done during December. A new type half-rod was installed in each of the DR and H Reactors. Two of the new thimbleless rods were installed in F Reactor. A stuck rod was repaired at B Reactor. At C Reactor, gas seals were replaced on four rods and ten rods were flushed with chromic acid to achieve exit water pressure gains of 5 psi.

The tritium production program continued throughout the month with an input production of 84.1 percent of forecast. The tritium production was low because of higher than forecast production during previous months resulting in earlier than scheduled discharges. During the month 126 J-N bearing tubes at DR and five at C Reactor were discharged and loaded with uranium, leaving a month-end balance of 412 and 75 tubes at DR and C respectively.

The U-233 input production was 95.3 percent of forecast because of the low operating efficiency at C Reactor. Thirty-six tubes with enriched thorium loading (J-Q) were discharged and recharged with J-Q slugs. At month end 320 J-Q tubes were being irradiated, 160 tubes each at C and H Reactors.

The Reactor Section assumed responsibility for the operation of KW Reactor and Water Plant facilities in 100-K Area at 12:01 A.M. December 6, 1954, and by the end of the month pre-start-up activities were nearly completed.

SEPARATIONS SECTION

The Redox and T Plant monthly production was 256 and 122 percent of the official forecast respectively. At the Redox facility, the higher than forecasted production was attributed to the postponement of the conversion to the low ngs program from December to January. New production records were established this month at both of the plants. The quarter productions for Redox and T Plants were 152 and 112 percent of forecast respectively.

A rate of 8 tons per day was maintained at Redox until December 10 when the plant was shut down for 60 hours to replace the E-12 agitator, two H cell sample jumpers, and make repairs to the H-7 agitator. Following start-up on December 12, the rate was gradually raised to 9 tons per day and this peak rate was successfully sustained for 36 hours. It was necessary to reduce to 8 tons on December 16 and to 7 tons on December 29 principally of solution emulsification in the 1A column. This condition was attributed to a carry-through of silica from the dissolvers. A short outage was used on December 23 to water flush the column; however, only a slight and temporary improvement resulted. The decontamination ratio of the uranium product was within specification the entire month.

The continuity of operations at the T Plant was maintained throughout the month with little lost time for mechanical or operating difficulties. Some operating time was lost due to special flushes required to maintain adequate product accountability. The third extraction unit was activated on December 13.

The TBP Plant remained shut down until December 18 for the completion of mechanical work started in November for the conversion to series operation. Following the

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completion of this project work, the plant experienced a number of equipment failures, during start-up, which resulted in only a very limited amount of production (12.5 tons) being achieved during the month. Feed to the first cycle was started December 18, but was discontinued on December 20 when the waste to storage pump motor failed. Operation was started on the second cycle on December 22 and resumed on the first cycle December 23 and continued until December 25 when the plant was shut down because of a jumper failure in the waste pump off line. The jumper failure resulted in the discharge of waste to the floor of the cell containing the waste receiver tank, causing damage (as yet not entirely determined) to the cell equipment. A companion tank was converted to a waste receiver and at month end the building was ready to resume operation.

The UO_3 plant monthly production was 84 percent of the official forecast and the quarter production was 110 percent of forecast. The month's production was limited by the low amount of feed material available. A total of nine cars of powder was shipped.

The 234-5 monthly production for the small and large shapes was 85 and 400 percent respectively. Of the smaller model, only that number necessary to fulfill the quarterly commitment was fabricated. Of the large model, the commitment for both the month and the quarter was exceeded due to the high Redox production mentioned above. The commitments for the unfabricated pieces and the nitrate were also met. The Isolation Building exceeded the previous production record by 13.8 percent.

The East Area evaporator was shut down during the month. The West Area evaporator was in operation with a volume reduction of 55 percent, the feed being bismuth phosphate first cycle waste.

Metal waste removal was halted because of the TBP shutdown and activities were confined to heel dissolving in a number of nearly empty tanks. Essentially all aged material (three years and older) in underground storage has been removed except for the small amounts in the heel category.

GENERAL

Personnel

Total on Roll December 1, 1954	4723
Net Increase	50
Total on Roll December 31, 1954	4773

J. E. MAIDER, MANAGER
MANUFACTURING DEPARTMENT

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MANUFACTURING DEPARTMENT

PATENT REPORT SUMMARY
FOR
MONTH OF DECEMBER, 1954

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

INVENTOR	TITLE
C. E. Frantz, Metal Preparation Section	Impulse Reset Indicator
C. R. Anderson, Separations Section	HW-34065 - Removal of Ruthenium from Plutonium and/or Uranium Product Solution by Ozone Sparging Without Catalyst.

J. E. MAIDER, MANAGER
MANUFACTURING DEPARTMENT

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MONTHLY OPERATING REPORT

DECEMBER 1955

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January 5, 1955

MANUFACTURING DEPARTMENT
METAL PREPARATION SECTION
December, 1954

I. RESPONSIBILITY

There was no change in responsibility during this period.

II. ACHIEVEMENT

A. Operating Experience

1. Statistics

	December	November	Year to Date
Acceptable Pieces Canned (8")(Tons)Gross	426	415	3416
Acceptable Pieces Canned (8")(Tons)Net	426	414	3393
Canning Yield (8")(%)	83	85	81
Total Acceptable Pieces Canned (Tons)Gross	426	415	3546
Total Acceptable Pieces Canned (Tons)Net	426	414	3521
Total Acceptable Pieces Canned (% of Forecast)	101	105	97
Autoclave Frequency (8")(No./M)	.00	.04	.01
J-3 Slugs Canned (pieces)	0	0	35964
N Slugs Canned (pieces)	0	0	33177
Chem. 10-66 Canned (pieces)	393	261	9546
C-4 Slugs Canned (pieces)	4918	1523	7105
Special Request (man hours)	300	508	6925
305 Routine Tests (man hours)	0	356	3620
305 Special Tests (man hours)	180	168	8449
Average Steam Generated (M lbs/hr)	59.5	42.8	
Maximum Steam Generated (M lbs/hr)	77.0	68.0	
Total Steam Generated (M lbs)	45,300	30,800	
Coal Consumed (Tons)	2,906	1,816	
Sanitary Water from 3000 Area (million gals)	54.3	54.7	
Total Water from 3000 Area (Avg.Rate-GPM)	1,216	1,266	

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2. Activities

A net production of 426 tons of acceptable finished slugs was achieved during the month. This establishes a new production record, eleven tons greater than the previous record established in October. The high production is primarily attributed to the start-up of an additional canning line on December 10, bringing the total number of line-shifts in operation to six. Three of the six line-shifts were operated on a full relief basis permitting an average daily canning production of nearly 6000 slugs.

The production of eight-inch cored slugs was started this month but was curtailed on December 15 following a rupture of one of the slugs during the canning process. Apparently moisture had been introduced in the slug chamber prior to canning and vaporized when the slug was submerged in a molten metal bath causing one uranium plug to be blown out and displacing a large quantity of AlSi. Revised process sequence and substitution of aluminum plugs in place of uranium were tested. Further investigations were continuing at month-end with no acceptable cored pieces being produced during the month.

The shortage of bare metal continued to be a major problem. An inventory equivalent to two or three days' supply continued to complicate the efficient scheduling of inspection, transformation and outgassing of bare metal prior to processing through canning. In some instances it was impossible to outgas material prior to canning and this contributed to an increase in the poor bond rejection rate. The curtailment of the cored slug program also complicated the metal shortage as it has at least temporarily prevented the use of approximate 50 tons of metal. The resumption of this program and the return of approximately 29 tons of canning rejects supplied the KW reactor for start-up purposes should alleviate the metal problem.

Final shipments to the KW reactor during the month completed the delivery of 485 tons requested for start-up. It is planned to ship an additional 485 tons during January for the initial charge and start-up of KE reactor.

No autoclave failures occured during the month.

As-received quality of Fernald-cast uranium slugs continues to show a slight improvement in both rod-heat-treated and slug-heat-treated material. This trend is attributed to an improved inspection now being utilized by Fernald. Local outgassing of the slugs is effective in reducing the reject rate for poor bonds ("porosity") in the AlSi braze by approximately 40%. Production experience and analyses of received materials indicate that the hydrogen concentration in heat-treated uranium can be significantly reduced by a proper selection of furnace and heating medium. Fernald is being requested to use the old furnace and chlorid salt in heat treating future shipments from Hanford.

3. Special Operations

The transformation and outgassing of uranium slugs continued during the month. Short metal supply continued to complicate efficient scheduling of material through these operations. In some cases it was not possible to outgas all lots.

A total of 540 enriched uranium-aluminum alloy fuel slugs, which had been hot pressed canned in July of this year, were tested with the Sonobond equipment and all acceptable pieces were then welded and transferred to storage. The total acceptable pieces was 416.

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3. Special Operations - continued

A total of 5151 "C" slugs were canned by the "C" process during the month with a yield of 91%. At month-end, hot press canning of "C" slugs had started and it is planned to continue this process through most of January. An inventory of 3504 finished "C" slugs is currently on hand.

A total of 510 thorium slugs were canned by the "C" process with a yield of 77%. Three hundred ninety-three acceptable finished slugs were shipped to reactor completing current thorium needs.

A total of 1870 lead cadmium slugs were canned by the "B" process with a canning yield of 93 percent. An inventory of 3207 finished slugs is currently on hand and it is planned to can 2000 slugs per month through May, 1955.

4. Schedule Variation

Acceptable canned slug production was 101 percent of forecast. This is the third consecutive month that production commitments have been surpassed.

B. Equipment Experience

1. Operating Continuity

The canning line efficiency remained at a high of 93 percent during the month despite several operating complications stemming from construction activities, new equipment shakedown, and a below-minimum metal inventory.

The air supply to the 313 building was interrupted due to freezing of condensate in a low spot in the main air header within the 303 area. A profile was run on all air lines within the area and re-grading or additional traps were provided to assure proper condensate collection.

2. Inspection, Maintenance and Replacements

Four poppet-type air switches were fabricated and installed on the production lines. Twenty-three additional units are being fabricated. These will replace the cone-type switches in the canning lines. The fabrication cost of the poppet switches is approximately the same as the cost of repair of the cone switches.

Salt bath heat treating facilities were moved into the new canning area on December 14. Following a brief run-in period, these facilities operated on a trouble-free basis.

Temperature gradients as high as eight degrees were found to exist at the interface of the duplex furnaces when the temperature control was governed by AlSi temperature. Because of these high gradients, a modification was made to control the temperature from the lead portion of the bath and a recorder was added for the AlSi temperature.

Installation was started on a new one-inch pulse column in the canyon of the 321 building. All of the necessary equipment associated with this column is being fabricated on-site.

2. Inspection, Maintenance and Replacements - continued

The condensate pumps at the Power House have been a source of continual trouble since they were installed. The chief difficulties have been with bearings. The most recent attempt at correction of this problem has been to install Cutlass rubber bearings which have performed satisfactorily during almost the entire month of December and show no signs of early failure.

C. Improvement Experience

1. Production Tests

PT-313-47MT "Cored Slugs from Extruded Blanks and Rolled Rods" (HW-33189) The canning of cored slugs by the lead dip process was started on December 15 and was interrupted after canning approximately 850 slugs as a result of an eruption in the duplex bath. This difficulty resulted from moisture entering a slug core through a defective end plug weld during a previous operation. Since this hazard had been recognized, sufficient safeguards had been established to avoid injury of personnel and only minor damage to equipment resulted. Immediately thereafter a program was established to evaluate proposed process changes which would assure that the slug cores were free of moisture when canned. It was also decided to expedite the development of aluminum and uranium plugs which could be substituted for welded uranium plugs and either be pressed or crimped into the ends of the slugs just prior to canning. In addition, the production test is to be further supplemented by processing quantities of cored slugs by the unbonded "C" process.

Two test runs of approximately 250 slugs have indicated cored slugs may be processed free of moisture and with a minimum of surface oxidation by first outgassing, then pickling, welding end plugs into cores in an inert gas (helium) hood and canning. In addition, a test was run using aluminum plugs pressed into tapered counterbores. Examination of the cores after canning indicated AlSi had entered 20 of the 48 cores processed. This further emphasized the need for a non-destructive test to detect AlSi in the cores. Fuel Technology is currently investigating possible test methods. Subsequent examination of the slugs canned using aluminum plugs indicated AlSi had gained entry into three cores through defective welds.

It is currently planned to make an extended production run early in January using the above outlined procedures for welded uranium plugs and canning by the lead-dip process. It is anticipated that the entry of AlSi into the cores can be minimized through further development of uranium welding techniques and more stringent inspection standards. In addition, a number of slugs containing known amounts of AlSi will be immediately subjected to thermal-cycling tests to determine the relative amounts of AlSi that can be tolerated in the cores without adversely affecting slug integrity during irradiation.

To date a total of 14,500 cored slugs machined from alpha rolled stock have been received. Fernald has been requested to reduce fabrication rates to approximately 1000 slugs per week until current processing difficulties are eliminated. The severe internal radial cracks observed in the October alpha extruded hollow rods have been attributed to quenching procedures at Adrian. This condition was not apparent during the machining of rods extruded in November.

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2. Process Tests and Revisions

Bench tests of the ultrasonic can wall bond detector were completed. The machine reliably detected various types of poor bonding and confirmed results on samples processed through the frost test. This equipment should result in assuring product of improved quality. Additional development is necessary to facilitate operation of the equipment and easier maintenance. Production testing of the prototypic model is scheduled for the immediate future.

Due to the added welding and autoclave capacity in finishing, it has become possible to increase production and more efficiently utilize manpower in the canning operation. On December 10, the canning personnel required to operate two lines on a full relief basis were able to start operating three lines on a minimum relief basis and thereby produce an additional 600 slugs per shift.

Nitric fumes are now being exhausted much better at the slug pickle station due to the installation of air shielding equipment. The equipment consists primarily of a hinged vertical panel between the spare nitric tank and the degreaser to prevent stray drafts from blowing fumes away from the tanks, and two metal vent shields which cover the air ducts over the spare nitric tank when it is not in use, thus increasing the draft over the hot tank.

3. Inventions and Discoveries

Personnel in the Metal Preparation Section engaged in work which might be expected to result in inventions or discoveries have reported that no inventions or discoveries were made during the period covered by this report except the following:

C.E. Frantz Impulse Reset Indicator

D. Events Influencing Costs

1. Labor Variance

A decrease in unit cost for December is estimated at .008 per unit. Production increased slightly and yields dropped slightly over the previous month.

2. Material Variance

Material unit costs are expected to decrease approximately .006 per unit under the previous month as a result of a reduction in material used for production test work.

3. Other

Direct labor and I.M.E. unit costs will decrease slightly over the previous month.

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E. Plant Expansion

1. Project Status

Project CA-514 "Expansion of 300 Area Production Facilities"
Total funds authorized for the project remain at $5,085,000. Project costs plus commitments total $3,674,800 as of December 19, 1954. Overall design is 99% complete and construction is 73% complete. A new cost estimate and a revised project proposal are being prepared. The new estimated cost of the project is $6,200,000. The 313 Building Addition is complete except for minor items. Modification of the Existing 313 Building is 56% complete. Three more heating and ventilating units were installed; however, the majority of the duct work is yet to be completed. Permanent lighting and telephone lines were installed for the new offices in the old building. A trench was excavated and poured in preparation for the temporary move of the cap, can and sleeve cleaning facilities.

Installation of Process Equipment is 58% complete. Difficulty has been encountered with the automatic quench machines. A re-designed unit has been fabricated and is ready for testing. Penetration etch basket liners still present a problem in finding a material which will withstand the processing baths. Efforts continue in a search for a satisfactory collet liner for the automatic cut-off machines. A combination brass and phenolic collet liner is being supplied by the vendor and should be received the first part of January. A combination nylon and phenolic liner which was fabricated in the machine shop has operated for 1000 cycles and appears favorable. Five welders are now in service in the new building. The sixth welder, a Hanford-fabricated unit is being modernized to use an air cylinder and other modifications. A DC welde. is being retained in the old building for use on cored slugs. The new autoclaves in the 313 building were assembled from two sections which left a weld bead that interfered with the slug baskets. These welds were ground off by using a special jig which eliminated the necessity of a man working inside the autoclave. Upon completion of the grinding operation, the autoclaves were hydrostatically tested.

The General and Supporting Facilities are 77% complete. Modifications of the 3706, 3707-A and 3707-B buildings are 40% complete. Painting has been started in the 3706 building.

Project CG-610 "Replacement of the 313 Building Roof"
Project authorized funds total $55,000. Scoping and preliminary design are complete. Construction will be scheduled to coincide with related work on Project CA-514.

Project CA-590 "Fly Ash Collection Equipment-384 Building"
The revised project proposal is in routing for approval signatures.

Project CA-601 "General Grounds Improvement-300 Area"
A revised proposal has been prepared covering only the work applicable to the Manufacturing Department. The proposal is expected to be routed for approval during the first part of January with submission to the Atomic Energy Commission by the latter part of January.

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2. Plant Engineering

The original rack carriers and slides for the first penetration etch machine were of copper alloy. To prevent flaking off of the copper and possible deposit on the slug jackets through the process solution, the racks were chrome-plated. They are now being evaluated.

The pressure release system on the autoclaves has been isolated from the drainage system and check valves installed so that one autoclave cannot exhaust into another unit. This piping change has been tested and accepted. The remainder of the autoclaves, 20 units, have been received and are being installed.

F. Significant Reports Issued

1. Routine

Number	Title	Author	Date
HW-34121	Monthly Cost Report, Metal Preparation Section, November, 1954	HS Krider	12-16-54
HW-34048	Monthly Report, Metal Preparation Section, Process Sub-section	EW O'Rorke	12-7-54

2. Non-Routine

HW-33990	Status Report on Non-destructive Devices for Fuel Element Inspection	CJ Hale	12-3-54
HW-33991	Status Report of Accuracy Tests on Automatic Indexing and Facing of Slugs Canned by the "F" Process	DS Dixon	12-3-54
HW-34049	Fabrication History of Uranium Slug Cores, C,K,L,M,N,P, and Q Lots	SM Gill	12-7-54
HW-34094	Monthly Report-New Fuel Element Production Program, November, 1954	WA Blanton	12-10-54
HW-34099	Factor Weights for Canned Slugs	RE Olson & GX Beard	12-13-54
HW-34182	Quality Control-Uranium Slug Cores	SM Gill	12-20-54
HW-34197	General Analytical ProgramI,Sample Identity, Mallinckrodt Chemical Works	PR Anderson	12-21-54
HW-34198	General Analytical Program I,Sample Identity, National Lead Company	PR Anderson	12-21-54

III. PERSONNEL

A. Organization

No change.

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B. Force Summary

	Start of Month	End of Month	Net Change
Section General	2	2	0
Operations	205	207	+2
Power & Maintenance	325	328	+3
Process	84	86	+2
Projects & Personnel Development	12	13	+1
Section Total	628	636	+8

C. Safety Experience

There were no major or sub-major injuries during the month.

On 4-12 shift, December 15, a near-serious incident occurred due to the minor explosion of a cored slug during the canning process. Apparently moisture had been introduced in the hollow chamber of the slug prior to canning. Within a few seconds after the slug was submerged in the molten metal of the duplex furnace, sufficient pressure developed within the chamber to blow a uranium plug off one end. No one was injured although several inches of molten metal were displaced from the furnace. A protective hood, designed to contain the displaced metal should an eruption occur, had been provided. In addition, operators had been instructed to stand away from the furnace while the slugs were submerged and preheated in the bath. Further cored slug production was temporarily curtailed pending a complete investigation of the causes of this incident.

A near-serious incident took place at the pickle line when a hook on an electric one-half ton hoist carrying a basket of slugs (approximately 500 pounds) came loose allowing the load to drop about one foot to the dryer. No one was injured and no damage was done. An investigation was conducted and a more suitable method of fastening the hook to the hoist is to be designed.

D. Radiation Experience

No exposures in excess of 200 mrads were reported during the month.

In keeping with recommendations made by the Radiation Monitoring Unit following a study of radiation conditions, process shoes are no longer required for material handling personnel.

During the heat treating of slugs in a bath of molten salt for either slug transformation, or for the removal of hydrogen, a small amount of uranium is removed from the slugs. This accumulates in the molten salt and is carried out as the hot slugs are removed from the bath. As these heated slugs are placed in the quench baskets, particles of uranium-bearing salt cool and drop to the floor. This contamination has been recognized and is controlled with protective clothing. In order to reduce the amount of this low level contamination present in the area, steps were taken to design equipment which would contain the salt spatters and eliminate water on the floor. A new quench tank was designed and this has proved satisfactory in preventing excessive contamination of surrounding floor area.

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E. Personnel Activities

1. Visits and Visitors

E.W. O'Rorke and T.D. Naylor visited the Harvey Aluminum Company, Lincoln Foundry and the Hunter-Douglas Company in Los Angeles to discuss specifications and fabrication of process materials.

David Taylor visited the A.E.C. installation in Idaho Falls to inspect a Thompson Surface Grinder for possible application to our production facilities.

2. Meetings

Thirty-two Safety and Security meetings and forty-eight Round Table and Information meetings were held for exempt and non-exempt members of the Section. Four Section training program meetings were held for exempt employees. Sixteen exempt personnel attended four Training and Development Programs (W-10).

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MANUFACTURING DEPARTMENT
REACTOR SECTION
MONTHLY REPORT
DECEMBER, 1954

I. RESPONSIBILITY

The Reactor Section assumed responsibility for the operation of KW Reactor and Water Plant facilities in 100-K Area at 12:01 a.m. on December 6.

II. ACHIEVEMENT

A. Operating Experience

Reactor time operated efficiency was 81.6 per cent in December, slightly higher than the 81.0 per cent efficiency in November. The relatively low December efficiency resulted from a large amount of scheduled outage time, including an abnormally high amount of charge-discharge time and continuation of the C Reactor pigtail outage, and from process tube leak testing programs at B, D, and F Reactors. In spite of this low efficiency, a record high total input production was achieved, exceeding the previous record established in September, 1954, by 3.4 per cent.

Plutonium input production exceeded forecast by 7.7 per cent primarily as the result of significant increases in operating levels as noted below. Mint input production was 84.1 per cent of forecast, because higher than forecast production during previous months resulted in earlier than scheduled discharge of J-N tubes. Thorium input production was 95.3 per cent of forecast due to the low operating efficiency at C Reactor resulting principally from the pigtail replacement outage. Production charged to the Mint program at C and DR Reactors was 1.8 and 15.7 per cent, respectively. Production charged to the J-Q program at C and H Reactors was 8.0 and 8.3 per cent, respectively.

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A. Operating Experience (Continued)

Output production was approximately 144 per cent of forecast, as the result of greater than forecast discharges of low concentration material at C Reactor, and production concentration material at other reactors. As noted last month, November output production was below forecast because a very low operating efficiency at C Reactor prevented achievement of goal concentration in low concentration material, while at other reactors material was retained in the reactors longer than scheduled in anticipation of increased goal concentrations. Discharge of this "hold-over" material in addition to scheduled discharges caused output production to greatly exceed forecast.

Effective December 1, 1954, goal concentration was increased from base goal plus 125 megawatt days to base goal plus 175 megawatt days except at D Reactor, where a pilot concentration program of base goal plus 300 megawatt days is in progress, and at C Reactor, where the low concentration program is in progress. Tonnages of low and production concentration material discharged during December were approximately 298 and 80, respectively. Approximately 33 tons of metal were discharged at essentially base goal plus 300 megawatt days concentration. The total of 378 tons discharged represents a new record high tonnage for one month, exceeding the previous record established in October, 1954, by 3.6 per cent.

Maximum established reactor power levels, excluding enrichment burnout, were increased a total of 370 megawatts, 65 at B Reactor, 85 at C Reactor (four only for plutonium), 170 at D Reactor and 50 at F Reactor. The unusually small portion of the total increase at C Reactor attributable to plutonium is due to the charging of thorium at this reactor since the last increase in maximum established level. At B, D, and F Reactors, the increase was partially due to the seasonal decrease in inlet water temperature. In addition, at B Reactor the increase was attributed to increased temperature limits permitted by Process Standard 105-A-040, "Process Tube Outlet Water Temperature Limits - Trip-Before-Instability," and a high flattening efficiency. At C Reactor, operation under Process Standard 105-A-040 and movement of 30 "C" metal columns from the third to the fourth lattice unit permitted the increase. At D Reactor, increased temperature limits permitted by Process Standard 105-A-040, and increased permissible helium concentrations to control graphite temperatures contributed to the increase. At F Reactor, the increase was due in part to continued high flattening efficiency.

Three slug failures occurred during the month, two eight-inch regular failures, one each at C and H Reactors, and one J metal failure at DR Reactor. The J and one regular failure were discharged during scheduled outages. Reactor outage time required for removal of December slug failures was 31.5 hours.

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A. Operating Experience (Continued)

1. Statistics

	B	C	D	DR	F	H	Total or Average
Reactor Time Operated Efficiency (%)	87.3	65.0	71.9	90.6	81.8	93.3	81.6
Reactor Outage Time (Hrs)							
Plutonium Production	94.8	257.9	201.2	44.1	135.4	49.1	782.5
Special Irradiations and tests	-	2.5	8.0	26.0	-	1.0	37.5
	94.8	260.4	209.2	70.1	135.4	50.1	820.0
Reactor Unscheduled Outage Time (Hrs)	29.5	61.6	37.2	0.3	0.2	2.0	130.8
Metal Discharged (Tons)	68.3	77.8	60.1	24.2	94.6	52.6	378
Water Quality (ppm Iron)							
Raw Water - Average	0.06	0.05	0.05	0.05	0.04	0.06	
Raw Water - Maximum	0.09	0.06	0.06	0.06	0.07	0.08	
Process Water - Average	0.004	0.006	0.006	0.003	0.005	0.006	
Process Water - Maximum	0.005	0.009	0.008	0.005	0.005	0.008	
Water Pumped (MM Gals)							
Bldg. 190 to Reactor	1955	2696	1982	1759	1795	2192	12379
Bldg. 182 to 200 Areas					19	357	376
Bldg. 181		5264		4439	2177	2877	14757
Steam Generated (MM Lbs)		171		227	142	120	660
Coal Consumed (Tons)		10268		14231	8557	8265	41321

2. Activities

Operation at all reactors, except C, was limited by temporary "trip-before-instability" outlet water temperature limits as specified in Process Standard 105-A-040, "Process Tube Outlet Water Temperature Limits - Trip Before Instability." C Reactor was limited by graphite temperature limits. D Reactor avoided graphite temperature limits as the result of Reactor Section - Pile Technology agreement to temporarily increase helium atmosphere from 40 to 60 per cent at D Reactor.

C Reactor, which was shut down November 27 for the pigtail replacement outage, remained down until December 7. The major work accomplished during this outage included the replacement of all rear pigtails, and the reorificing of 466 tubes. Smaller orifices in these tubes have resulted in improved water economy (a flow reduction of approximately 2500 gpm), and a better flow distribution. During this outage, 10 tubes were borescoped to determine the extent of damage due to slug cocking and chattering. Four of the tubes showed little damage, and six were damaged to such an extent that they were replaced.

During December, subsequent to Reactor Section acceptance of the KW Reactor, the following start-up activities were in progress:

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A. Operating Experience

2. Activities (Continued)

1. Functional checks of all equipment.
2. Reactor loading to dry critical for tests. Dry critical was attained at 423 tubes.
3. Dry coefficient testing. A negative coefficient due to graphite heating of 0.5 - 1.0 ih/degree was obtained.
4. Reactor loading to wet critical for tests. Wet critical was attained at 807 tubes, but submersion of two front-to-rear test holes resulted in loss of 84 inhours. By extrapolation, wet critical neglecting the test holes was determined as 734 tubes.
5. Reactivity tests of single and blocks of tubes, including a number of combinations of materials used in plutonium and isotope production.
6. Establishment of a small rectangular pile to test scram transients and strengths of control elements. Single unshadowed control elements were determined to be worth the following, reactivity-wise: vertical rod - 128 ih, steel balls - 126 ih, and boron balls - 175 ih.
7. Completion of full reactor loading.
8. Wet coefficient testing.

Charge-discharge activities associated with major special irradiation programs included the discharge, without recharging Mint material, of 126 J-N tubes at DR Reactor, and five J-N tubes at C Reactor, leaving a month-end balance of 412 and 75 J-N tubes in DR and C Reactors, respectively. At C Reactor, 36 J-Q tubes were discharged and recharged with J-Q material. At month-end, 320 J-Q tubes were under irradiation, 160 tubes each at C and H Reactors.

Removal of excess refrigeration equipment from Building 189-F was completed in December.

The following table indicates activities during December associated with special irradiations other than the Mint and J-Q programs noted above:

	Tubes Charged	Tubes Discharged	Casks Shipped
Production Tests	41	31	4

B. Equipment Experience

Nine reactor scrams occurred during December. Six of these, at DR, F, and H Reactors were caused by normal Panellit system variables. One scram at C Reactor resulted from a No. 2 Beckman trip, and was caused by the controller trip setting drifting downward. This scram resulted in a B Reactor scram through the inter-tie. H Reactor was scrammed once by a high pressure trip on recirculation tube 0961-H (Production Test

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B. Equipment Experience (Continued)

105-506-E "Recirculation Studies") when an air operated valve closed due to failure of a solenoid. Total outage time resulting from these scrams was 32.3 hours, 29.5 of which was attributable to the B Reactor scram where insufficient reactivity precluded recovery.

Process tube leak testing was done at B, D, and F Reactors during December. As the result of an abnormally high water collection rate, 185 tubes were hydrostatically tested during a scheduled outage at B Reactor. One tube leak was found and corrected. During a scheduled outage, and based on abnormally high water collection rates, all tubes at D Reactor were tested. Thirty-five nozzle leaks, two Van Stone flange leaks and one tube leak were found and corrected. All tubes at F Reactor were tested during a scheduled outage based on high collection rates. One gasket leak and five Van Stone flange leaks were found and corrected. When water collection rates at F Reactor remained abnormally high, a check of all rear nozzles during a subsequent outage revealed 35 to be loose. By month end, the collection rate at B Reactor was normal, and the collection rate at D Reactor indicated a trend toward normal. Operating experience since the last F Reactor outage was insufficient to indicate whether all leaks had been corrected. Leak testing programs involved approximately 115 hours of outage time.

Horizontal rod work during December included:

1. At B Reactor, repair of No. 7 rod which stuck when approximately half way withdrawn as the result of binding in the sandwich wall.

2. At C Reactor, flushing of ten rods with chromic acid to remove sediment. Pressure gains of five psi in the exit water were achieved by the flush. In addition, gas seals on rods Nos. A, 2, 12, and 14 were replaced in an attempt to reduce gas losses. Limited subsequent operation has prevented evaluation of the success of this effort.

3. At DR Reactor, replacement of No. 2 rod with a new type half-rod.

4. At F Reactor, installation of standard new type rods in channels Nos. A and 4.

5. At H Reactor, installation of a new type half-rod in channel No. 14.

During December, the capacity of "C" elevators at B, D, and F Reactors was increased from 6,000 to 8,000 pounds through modification, including addition of counterweights, by representatives of the Haughton Elevator Company.

A leak in an expansion joint weld in the steel effluent line at F Reactor occurred approximately 200 yards from the building. It was repaired later in the month during an outage.

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B. Equipment Experience (Continued)

Reliability checks of Panellit systems at all operating reactors during December revealed 65 faulty trips as detailed below:

	High Trips	Low Trips	Other	Total
B Reactor	1	1	*2	4
C Reactor	5	5	**1	11
D Reactor	6	2		8
DR Reactor	5	1		6
F Reactor	17	7		24
H Reactor	9	3		12
Totals	43	19	3	65

* One gage rubbing, and one gage loose connections.
** One high and low trip.

December performance improved over November when 77 faulty trips occurred during checks at four reactors.

C. Improvement Experience

The most significant Production and Process Tests are reported below, together with other items of "Improvement" significance.

PT-105-7-MR (Irradiation of High Quality Production Uranium Slugs)
PT-105-539-E (Slug Exposure at a Concentration of 900 MWD/Ton)
Both of these tests continued at H Reactor during December without incident.

PT-MR-105-24 (High Rate Water Treatment at Post CG-558 Flows)
An average filtration rate of 6.1 gpm per square foot and 12 hour filter runs, with mild floc penetration of the filter beds occurring at about 10 hours, were satisfactorily maintained during December.

PT-105-506-E Suppl. C (Recirculation Studies)
Operation of recirculation tube 0961-H, a zirconium tube under evaluation, continued during December with one reactor scram resulting from a high pressure Panellit trip caused by failure of a solenoid controlling an air operated valve which isolates the retention tanks when the tube is on process water.

PT-105-562-A (Slug Evaluation at Increased Levels for Tritium Production)
Irradiation of the remaining 10 tubes under this test at C Reactor continued without incident in December.

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C. Improvement Experience (Continued)

PT-105-567-A (Preliminary Irradiation of J-Q Columns)
PT-105-579-A (Quantity Irradiation of J-Q Columns)
Irradiation of the 12 remaining test J-Q columns at H Reactor continued in December without incident. At C Reactor, 36 J-Q tubes were discharged and recharged with J-Q material. At month end, 320 J-Q tubes, 160 each at C and H Reactors are under irradiation.

Two revised Process Standards - Reactor were approved and issued during December. These were Standards titled "Process Tube Outlet Water Temperature Limits - Trip-Before-Instability," and "Power Level Monitoring-Flux Monitors." The first Standard revised temporary tube outlet tempersture limits for C, H, KE and KW Reactors based upon changed operating conditions at these reactors. The second Standard respecifies the required flux monitor sensitivity to insure that there is continued indication of neutron flux level during shutdown periods, and permits circuit modifications which will cause a reactor shutdown only if power failure to components reduces the number of operating neutron flux monitors to less than two.

A new steam cleaning device for decontamination was demonstrated in the H Reactor inner rod room with significant initial success. Spot radiation levels were reduced from four or five r per hour to less than 100 mr per hour. Further testing of the equipment at other locations is planned.

A Sampson Alpha Meter was field tested during December as a possible replacement for the Ryerson electroscope in measuring beta activity. Definite advantages over the Ryerson were demonstrated, including ease of use, greater reliability, and simplicity of maintenance. Procurement of additional instruments for use at all reactors has been requested.

Personnel in the Reactor Section engaged in work which might be expected to result in inventions or discoveries have reported that no inventions or discoveries were made during the period covered by this report.

D. Events Influencing Costs

During December, Reactor Section costs were adversely affected by several factors including continued high maintenance costs for process tube leak testing and horizontal rod work, and increased coal costs of approximately $36,000 resulting from a 10.3 per cent increase in steam generation requirements as compared to November primarily due to seasonal steam demand. The C Reactor rear pigtail outage, while not changed to irradiation costs, did affect Reactor Section unit costs by contributing to the relatively low time operated efficiency of the reactors.

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D. Events Influencing Costs (Continued)

Beneficially affecting Reactor Section costs was the new record input production which was achieved in spite of the relatively low efficiency, and was 16.7 per cent above the November production. In addition, a large decrease in maintenance work associated with slug failures also improved costs.

Preliminary estimates indicate that both plutonium irradiation and total irradiation unit costs will be approximately 10 per cent below November costs, and will approach the record low unit costs established in September, 1954.

December Reactor Section charges to the expansion program continued to increase as additional manpower was added for the staffing of 100-K facilities, and as preparations for start-up of KW Reactor and Water Plant progressed.

E. Plant Development and Expansion

1. Project Status

The most significant Reactor Section project activity is reported below. Further details concerning projects may be found in the report, "Status of Reactor Section Projects, Informal Requests and Budget Items," F. A. R. Stainken to J. H. Warren, dated December 20, 1954.

CA-512 (100-K Facilities)

Construction completion percentages for the K Reactors and Water Plants estimated by the AEC as of December 17 are:

KW Reactor	99.9 up 0.1
KE Reactor	97.3 up 4.3
General Facilities	95.5 up 0.2
KW Water Plant	99.9 no change
KE Water Plant	98.0 up 2.5

KW Reactor and Water Plant were accepted as "ready-for-use" by the General Electric Company at 12:01 a.m. December 6, 1954. Start-up tests were in progress throughout the month. Full pile loading was completed December 29, and start-up is scheduled for January 5, 1955. Aluminum header to nozzle connectors of the latest design have been installed on the KW Reactor front face to replace temporary connectors.

Work on KE Reactor is progressing satisfactorily, and as of December 17, acceptance tests were approximately 50 per cent complete. The dynamic flow test was satisfactorily completed December 16, without unusual difficulty. Temperature monitor sensing elements were not installed during the dynamic flow test in view of previous difficulties encountered at KW Reactor during a similar test.

Installation of redesigned Building 190 pumps in the KE and KW Water Plants was completed during December as the result of more rapid than anticipated procurement of pump casings.

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E. Plant Development and Expansion

1. Project Status (Continued)

CA-431 (100-C Plant)

Replacement of C Reactor neoprene covered rear face pigtails with aluminum connectors, which began November 29, was completed on December 3. Testing was satisfactorily completed December 4, and acceptance papers were signed. Improvement of the horizontal rod procurement problem continued during December. Reynolds Metals Company has produced five acceptable full length extrusions. Completion of the order by early summer is anticipated by the Purchasing Section.

CG-558 (Reactor Plant Modification for Improved Production)

Scope design for Project CG-558 (Reactor Plant Modification for Increased Production) is estimated to be 96.9 per cent complete. Design criteria for 100-F Area, the only area not yet approved, were recommended to the Design council for approval. The purchase order for pressure monitor gages for Project 558, has been placed with the Panellit Company, and includes replacement gages for B, D, DR, F and H Reactors.

Twenty additional horizontal rod extrusions were shipped from Alcoa for a total of 49 acceptable extrusions now at Pacific Oerlikon. With this number of extrusions available, scheduling of the first horizontal rod outage in late January appears feasible. The boron-carbide ring vendor has informed the Engineering Department that he may be forced to withdraw from his contract with the order only 40 per cent complete unless additional funds can be provided. The Engineering Department is writing a letter to the AEC recommending increased funds so that ring production may continue.

2. Plant Engineering

A number of engineering and development studies were active in the Section during December. The studies are, in general, aimed at decreasing costs and/or increasing production. Details are given in document HW-34292. Several items of interest are reported below.

All insulating material required for experimental acoustic insulation of the suction and discharge pipes in one basement bay of Building 190-C has arrived. Installation of the material is scheduled early in January. Preliminary sound level measurements have been taken in this bay during full flow operation

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E. Plant Development and Expansion

2. Plant Engineering (Continued)

using the Octave-band analyzer and sound level meter. Intensity and frequency measurements of vibration wares emanating from bearing caps on No. 8 Building 190-C pump unit have been obtained to be compared with similar data which will be taken subsequent to realignment of the unit.

Development of a combination push-pull machine which simultaneously exerts a pushing force on the front and a pulling force on the rear of a process tube is in progress. Application of forces of 5500 pounds in compression and 7500 pounds in tension freed a tube stuck in graphite when the same forces applied separately did not move the tube. Application of this equipment on reactor tubes is planned.

In the program for tube replacement without nozzle removal, detail shop drawings are being made and equipment will be fabricated as soon as possible to permit comprehensive full-scale mock-up tests of the proposed method. A Production Test is being prepared to authorize reactor testing following successful mock-up tests.

F. Significant Reports

1. Routine

Monthly operating reports issued for November were:

HW-33962-A	Reactor Section	J. H. Warren	12/7/54
HW-34077	Operations Sub-Section	R. O. Mehann	12/1/54
HW-34019	Process Sub-Section	O. C. Schroeder	12/1/54
HW-33976	Projects and Personnel Development	F. A. R. Stainken	12/1/54
HW-33999	Radiation Monitoring Sub-Section	P. C. Jerman	12/3/54
--	Maintenance Sub-Section	E. E. Weyerts	12/3/54
HW-33986	Power Sub-Section	J. C. McLaughlin	12/3/54

Other routine reports issued during December included:

HW-34200	"Monthly Progress Report, Reactor Section Expansion, December, 1954"	J. P. Langan	12/22/54
--	"Status of Reactor Section Projects, Informal Requests, and Budget Items."	F. A. R. Stainken	12/20/54
HW-33985	"Reactivity Balance and Associated Data - Period November, 1954."	A. P. Vinther	12/1/54

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F. Significant Reports

2. Non-Routine

HW-33993	"Preliminary Considerations of Factors Involved in Raising Reactor Tube Outlet Temperatures to 120°C"	A. K. Hardin	12/3/54
HW-33833	"Conditions For Setting Panellit Gages"	K. W. Hess	11/18/54
HW-33996	"An Improved Method of Process Tube Installation"	G. O. Amy J. E. Robb	12/31/54
HW-34220	"Calibration of Process Water Flowmeters at 100-B"	D. L. Moore G. E. Turner	12/23/54
HW-33709	"Final Report - Process Test MR-105-21, Allowing B Reactor Operation With Restrictive Trip-Before-Boiling Limits"	K. W. Hess D. L. Moore	11/8/54
Official Use Only	"Process Change Authorization RP-1, Temporary Gas Concentration Limit for D Reactor"	O. C. Schroeder	12/7/54
Official Use Only	"Slug Rupture Limit Based on Slug Core Behavior"	O. C. Schroeder	12/23/54

III. PERSONNEL

A. Organization

There were no appointments made in the Reactor Section during December.

Operations Sub-Section supervisory personnel for KE Reactor were transferred to 100-K Area on December 6, and Chief Operators were transferred December 27. The remaining operators will be transferred in January. Power Sub-Section KE Water Plant facilities were fully staffed as of December 13.

B. Force Summary

	Beginning of Month	End of Month	Net Change
Section General	7	2	0
Operations	357	364	/ 7
Maintenance	578	596	/ 18
Projects & Personnel Development	37	40	/ 3
Power	482	487	/ 5
Process	62	60	- 2
Radiation Monitoring	76	79	/ 3
Section Total	1594	1628	/ 34

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C. Safety Experience

There were no Major or Sub-Major Injuries in the Reactor Section during December.

D. Radiation Experience

One Class I Radiation Incident, No. 396, occurred ir the Reactor Section during December. On December 3, at C Reactor a welder who was working on the No. 1 Experimental Level proceeded to the top of the reactor to search for equipment without authorization or radiation monitoring escort. This incident is described in detail in document HW-34069.

E. Personnel Activities

At month end, 15 employees are receiving on-the-job training for engineering or supervisory assignments in the Section; nine of these are on assignment under the rotational training program.

On December 8, O. C. Schroeder addressed the weekly meeting of the Pendleton, Oregon, Rotary Club, while on December 9, he addressed a Ladies' Night meeting of the Hermiston, Oregon, Rotary Club. Subject of both talks was reactors, supplemented by showings of the film "A Is For Atom."

One article for magazine publication, and one paper for subsequent presentation have been prepared by Reactor Section personnel. "Electrical Engineering" magazine has confirmed their plans to publish an article submitted by C. B. Wagner. The article is expected to appear in the January issue under the title "Reactor Maintenance Problems." An article titled "Hanford Heat Recovery System" has been submitted for release by S. L. Nelson. If approved, this article will be presented at the April Nuclear Engineering Conference at the University of California.

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Richland, Washington
January 7, 1955

MANUFACTURING DEPARTMENT
SEPARATIONS SECTION
DECEMBER, 1954

I RESPONSIBILITY

Responsibilities of the Separations Section were unchanged during the month of December.

II ACHIEVEMENT

A. Operating Experience

1. Statistics

a. Bismuth Phosphate Operations

	December		November	
	Normal	Acid Wash	Normal	Acid Wash
Charges started in Canyon Bldgs.	92	1	81	1
Charges completed in Conc. Bldgs.	90	1	80	1
Special charges - Conc. Bldgs.	11		7	
Charges completed-Isolation Bldg.	418		379	
Average Waste Losses, %	4.01		3.57	
Special charges-Isolation Bldg.	32		54	
Material Balance, %	108.2		99.8	
Yield through Process, %	104.2		96.24	
Average cooling time (days)	100		102	
Minimum cooling time (days)	88		73	

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b. Redox Operations

	December	November
Equivalent charges started	315.2	277.8
Charges completed	320.8	288.5
Tons Uranium delivered to storage	215.6	183.0
Average Production Rate per operating day, Tons	7.6	7.1
Average Daily Operating Rate for the month, Tons	7.0	6.1
Average yield, %		
Uranium	97.6	96.8
Plutonium	102.6	104.1
Total Waste Loss, %		
Uranium	0.37	0.80
Plutonium	0.66	0.67
Average cooling time, days	116	145
Minimum cooling time, days	69	107
Percent down time	9.0	14

c. 234-5 Operations

Batches completed through Task II	168	152
Runs completed through Task III	166	149
Reduction yield, RM	97.3	98.2
Waste Disposal, units	2.1	1.8

d. UO_3 Operations

	December	November	To Date
Uranium drummed, Tons	269.95	230.45	8210.56
Uranium shipped, Tons	325.79	241.65	8210.56
Average cooling time, days (Redox)	121	145	
Minimum cooling time, days (Redox)	74	113	
Waste loss, %	0.1	0.04	

e. TBP Operations

	December	November	To Date
Tons received from Metal Removal	20.50	59.20	4719.25
Tons shipped to UO_3 Plant	12.84	64.88	4571.73
Average Production Rate per operating day, Tons	4.18	4.42	
Average Daily Operating Rate for the month, Tons	0.41	2.17	
Average yield, %	96.61	99.48	
Total Waste Loss, %	4.74	1.32	
Ratio Waste Volume Returned to Volume removed	1.17	1.28	
Percent Down Time	[illegible]	1.55	

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f. Power

	200 East	200 West
Raw water pumped, gpm	1 668	6 783
Filtered water pumped, gpm	555	876
Steam generated, lbs/hr	60 253	163 832
Maximum steam generated, lbs/hr	71 225	217 675
Total steam generated, M lbs.	45 828	121 892
Coal consumed, tons (est.)	3 041	7 676

g. Waste Storage

	Equivalent Tons U	
	December	November
Metal Waste reserve storage capacity-T Plant	660	427
1st Cycle reserve storage capacity-T Plant	517	718
Metal Waste reserve storage capacity-B Plant	1095	917
1st Cycle reserve storage capacity-B Plant	74	74
Redox Waste reserve storage capacity	1406	1554

2. Activities

a. Redox Processing

A rate of 8 tons/day was experienced until December 10, 1954, when the plant was shutdown for a period of sixty hours for replacement of the E-12 agitator, repairs to the H-7 agitator, repairs to the H-7 agitator power jumper, and replacement of the H-4 and H-1 sampler jumpers.

Following startup on the 12th, rates were gradually raised to 9 tons/day with the peak rate being sustained for 36 hours. It was necessary to reduce the rate to 8 tons/day on December 16, and to 7 tons/day on December 29, 1954, due to an emulsification in the 1A column apparently caused by the carry through of silica from the dissolvers. A seven hour outage was taken on December 23, 1954, to water flush the 1A column; however, only slight temporary improvement was experienced.

Excellent performance was experienced in the quality and yield of the two product streams throughout the month in spite of the 1A extraction column difficulties. Late in the period two dichromate oxidized test batches were processed to provide material for tail-end ozonization testing in the Hot Semi-Works. These two runs resulted in higher waste losses and higher radiation levels on the final streams, due to the carry over of ruthenium, niobium and zirconium normally removed by the permanganate step.

b. Metal Recovery

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1) TBP Processing

The TBP Plant remained down until 12-18-54 for series change-over. First cycle was started, but second cycle was delayed due to feed rotameter difficulties on the RDF stream. However, on December 20th the motor on the WR-001 process waste pump failed forcing a shutdown of the building. The second cycle was started on the 22nd and the first cycle resumed on the 23rd, but on the 25th the process was again shut down when a flexible jumper installed on the pump-off line of the replaced WR-001 pump failed on or about 12-24-54 resulting in the discharge of the pump-off wastes to the WR vault cell floor. The level of liquid surrounding the WR-001 tank in conjunction with the emptying of the vessel combined to float the vessel in the cell, apparently causing its rupture. One of four available feed tanks identical in size, WR-002, was converted to a waste receiver and at month end the building was ready to resume operation.

2) UO_3 Processing

UO_3 Plant operation was normal. Production was limited by the amount of feed available. Radiation levels at the pots were the lowest experienced during the year even though 43 tons of 83-day and 50 tons of 70-day Redox material were processed. Luckey pot #20 operated all month except while briefly down for the replacement of the agitator motor which failed.

The tank truck trailer containing 60% UNH from the UO_3 Plant overturned enroute to the 321 Building on 12-30-54. Approximately 3.37 tons equivalent uranium spilled. At month-end action had been initiated by the Separations Technology Section to reclaim the spilled material.

3) Waste Metal Removal

The removal of residual amounts of sludge and supernatant from 104-BX was continued until 12-24-54 when removal operations were transferred to 105-BX in anticipation of demands by series start-up in TBP.

Essentially all aged material (3.1 years minimum) has been removed from the tank farms except for possibly small heels remaining in some of the tanks. It is forecasted that at a rate of 200 tons per month TBP will be able to operate a full year before the age of the uranium feed becomes one year or less.

c. Isolation and Metal Fabrication Processing

Both the Isolation and Metal Fabrication Buildings operated with a minimum of production interruptions during December. The product output of the Isolation Building exceeded the previous production record established in November by 13.8 percent.

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d. T Plant Processing

Although the continuity of operations were not seriously affected by either mechanical or operating difficulties, some process time was lost due to special flushes required to maintain adequate product accountability. Approximately 1300 units were recovered, increasing the overall T Plant material balance since start of production of low enriched material from 99.3% to 101%. Production exceeded the previous record by 16 percent.

The third extraction unit was completed and activated on December 13, increasing productivity through this cycle.

3. Special Operations

a. Waste Evaporators

Evaporation of T Plant first cycle waste in 242-T Waste Evaporator proceeded satisfactorily after the prolonged shutdown to effect coil replacement. The 242-B facility has been shutdown.

Evaporator	Feed Gallons	Bottoms Gallons	Concentrate Gallons	% Volume Reduction
242-B	0	0	0	0
242-T	275 000	122 375	152 625	55.5

b. Plutonium Recovery, Metal Fabrication

Recovery of skulls continued at a satisfactory level during most of the period, however, it was necessary to curtail operations for short intervals due to the scarcity of empty recycle cans. There was no powder recovered during the period since this operation has been curtailed to assist the Redox Plant in reducing the number of variables introduced into their process.

4. Schedule Variance

Plutonium production exceeded established schedules. In Redox a record one month production figure of 215.6 tons of processed uranium exceeded the previous high by 12.6 percent. In addition, T Plant exceeded previous production record by 16 percent.

In the Isolation Building, production exceeded the previous high by 13.8 percent. All commitments were met in Metal Fabrication.

Uranium recovery production exceeded quarterly commitments, even though the December production was less than scheduled, due to operating difficulties experienced in TBP Plant. A total of 9 carloads of UO_3 powder was shipped in December.

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B. Equipment Experience

1. Operating Continuity

Redox downtime totaled 64 hours to effect replacements of the E-12 (uranium storage) agitator and H-4 and H-1 (metal solution) sample jumpers, and repairs to the H-7 agitator power jumper.

TBP Plant down time totaled 670 hours due to change over to series operation, and difficulties encountered during run-in and start-up.

There were no equipment failures in either the Isolation or Metal Fabrication Buildings which affected continuity of operations.

In T Plant, the continuity of operations was not significantly affected by mechanical difficulties. Approximately 40 hours were lost however due to reworking of high wastes and special flushes to recover product build-up and clean out of the F-10 (final product) tank.

2. Inspection, Maintenance and Replacement

a. Final Uranium Product Storage Tank Agitator - Redox

The final uranium product storage tank (E-12) agitator failed on December 10, 1954. The source of mechanical failure was apparently in the gear drive, possibly caused by running the agitator with too low a liquid level in the tank. When it was found that the pump discharge jumper could not be installed due to interference with the new agitator, a new jumper had to be designed and fabricated to match the design of the new agitator before the plant could be placed in operation.

b. 60 Ton Crane - Redox

Major repairs were made to the 10 ton hoist when faulty festoon cables caused the brakes to become inoperative, permitting the sheave block to roll into the frame work of the crane after the power was cut off. The outer plate on the block was damaged and required replacement. Five, seven conductor, festoon cables were installed in the hoist circuit to replace two faulty 16 conductor cables. Better service is looked for from the much more flexible seven conductor cable.

Other repairs of less major proportions made during the month included left hand optic repairs and work on the 10 ton hoist brakes.

c. Waste Receiver Tank - Metal Recovery

The waste receiver (WR-001-1) waste pump failed mechanically on December 20 and was replaced. Improper orientation of the

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discharge nozzle required fabrication of a flexible substitute jumper. While the jumper held initially, the rubber hose eventually became disconnected from the nozzle, allowing process waste to be discharged into the WR vault cell floor. The level of the liquid surrounding the WR-001 tank in conjunction with the emptying of the vessel combined to float the vessel in the cell, apparently causing its rupture. The WR-002 tank, identical in size, was converted to a waste receiver and at month-end operations were ready to be resumed.

C. Improvement Experience

1. Process Tests and Revisions

a. Uranium Decontamination - Redox

Continued operation with lowered interfaces on the 2D and 3D columns gave excellent decontamination control during the month. All product UNH was well within shipping limits with the exception of three batches resulting from two dichromate oxidized head-end test batches to provide material for tail-end ozonization testing in the Hot Semi-Works. Decontamination was adequate to permit reduction of the 3D and 3A scrub flow ratios to bring them into balance with the 2D salt requirements thus taking full advantage of the first stage backcycle flowsheet. Performance also permitted elimination, on a test basis, of scavenging in the head-end oxidation step in an effort to reduce the amount of ruthenium emitted via the sand filter to the stack.

On December 29, 1954, the 1A interface was lowered approximately three feet into the scrub section to determine whether the improvement noted in the 2D and 3D columns could be achieved in the 1A column also. There is insufficient data at month end for evaluation.

b. 1A Extraction Column - Redox

Difficulty has been experienced throughout the month in the operation of the 1A (Extraction) column due to a local emulsion accompanied with intermittent flooding at the base of the column. The emulsion formation has been attributed to a high silica concentration in the feed from silica carry through from the dissolvers and metal solution storage tanks. The column was water flushed on the 10th and 23rd of the month with little effect. During the January scheduled outage, dissolver clean outs, head-end flushes, and a chemical flush of the 1A column will be scheduled in an effort to remedy this condition. At this time, the 1S column will be equipped for operating in parallel with 1A, permitting either column to be flushed independently without shutting down the process.

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c. Backcycle Improvements - Redox

Reduction in both the third uranium and third plutonium cycles flow ratios were made possible by the excellent decontamination experience during the month. This decreased the amount of aluminum nitrate backcycled to the 2D second cycle column to exactly the correct amount required for the 2D scrub stream. The additional reduction in essential materials usage will permit realization of a total savings of approximately $270/ton of uranium processed for this first stage of the backcycle program. Neutralized salt waste sent to 241-S was reduced to 2139 gallons per ton vs 3017 gallons per ton during the previous month without backcycle.

d. Series Operations - TBP

The processing of remaining three year minimum age feed material was begun on a modified HW #6 flow sheet for two short periods during the latter part of the month. More scrub and organic solvent was used than specified by the HW #6 flow sheet to reduce waste losses until optimum flow conditions are determined. The duration of the operations were short due to the limited capacity of one feed concentrator and its inability to supply concentrated feed to the first cycle and to mechanical failures in the WR vault waste system.

The waste loss and product decontamination during this short operating period were very good.

e. Pot Caking - UO_3

There has been considerable pot caking during the month with the amount of cake varying between 10% and 40% and with a few charges producing as much as 75% and 90% cake. On 12-10-54, pot #8 caked severely with much black cake and powder being in evidence, however spectrographic analysis of a sample of the cake showed no excessive metallic impurities.

Several anti-caking tests were run during the month, but none showed very promising results. Six charges were made to pot #3 using 0.05 Wt. % sulfamic acid and two (2) gallons of 60% HNO_3 as additive. The first five charges produced excellent powder, but the sixth charge caked badly. An anti-caking test using urea was made in three pots on 12-7-54. There was no evidence of severe caking in any of the three pots, and the time cycle for each pot was reduced by about 1.5 hours. The tests were discontinued until more information could be obtained on the formation of ammonium nitrate in large enough quantity to be explosive. Subsequent analytical results revealed that the reactivity of the powder was lowered appreciably. On 12-15-54, a test using pot #2 with its modified agitator and 0.08 Wt. % sulfamic acid additive lasted for three runs. The test was discontinued after the second and third runs caked severely.

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All pot caking and reactivity studies have been suspended in the production building until a firm statement can be obtained from Paducah as to their actual need for improved reactivity. Laboratory investigation is continuing work to find a good anti-caking agent.

f. Waste Scavenging

Waste scavenging continued during the very limited TBP operation this month. While conclusive observations have not been attainable due to the limited production, the procedures for improving the Sr^{90} decontamination developed by Manufacturing, Engineering and Radiological Sciences at their December meeting are being followed.

2. Inventions or Discoveries

C. R. Anderson submitted a report of invention on Removal of Ruthenium from Plutonium and/or Uranium Product solution by Ozone Sparging Without Catalyst - HW-34065.

D. Events Influencing Costs

December total expenditures for the Separations Section are expected to reflect an increase of approximately seven percent over November expenditures.

The increase in December's cost is the result of the increased essential materials requirements associated with the record production attained by the Redox and T Plants and increased labor costs associated with the additional personnel acquired during the month for training prior to the staffing of the new Separations facilities.

Return to the backcycle of the third uranium cycle salt waste stream to the second uranium cycle has permitted a savings in essential material in Redox of approximately $270/ton.

E. Plant Development and Expansion

1. Project Status

a. Project CA-513-A - Purex

Overall project completion advanced 6.7 percent during the last monthly period with the "Ready for Operation" date still being estimated as September 1, 1955. Some portions of the plant such as 211, 203 and the vaults are expected to be ready for calibration, flushing and testing in February.

In the future all requests for changes or additions to the Purex design will be handled by the Project Section, as detail design changes and not as revision requests. Design Section will not

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be involved except to assist the Project Section as requested. The changes requested in the Decontamination Cell and to the Recycle Hood will be handled in this manner.

Two types of gaskets have been tested for the Purex concentrator tube bundle flanges in two tests on each gasket. The solid teflon gasket was successful in both tests, and the gasket of asbestos with a thin teflon sheath did not hold in the first test but did in the second. Tests are yet to be run on a teflon impregnated asbestos cloth gasket. A decision on gasket material will be reached after these tests.

Percolation rate testing of various Purex cribs is essentially complete. The percolation rates vary quite widely from 26 gal/(day)(sq. ft.) to approximately 400 gal/(day)(sq. ft.) depending upon location. It is planned to review the size of the Purex cribs with respect to adequacy at design rate and at rates above design rate. Capacity testing of all Purex cribs not tested to date is also planned as part of the startup operational tests.

A thorough water flush of the concentrators failed to dislodge any appreciable foreign material such as chips, filings, etc. It is not planned to open these units for further cleaning of the tower trays.

Lummus Company has been awarded the contract to design and fabricate the Purex vacuum acid fractionator (Project CG-598). The original basis for the design of this facility was 2.0 times the Purex design rate; however, the Project Proposal called for a design basis of 2.5 times Purex design rate to assure adequate capacity.

b. Project CG-551, 234-5 Expansion

Shop testing of the Task III equipment was completed and dismantling started. Removal of the old, highly contaminated Task III equipment is expected to start about January 24, 1955. Work is progressing on schedule on the Final Inspection Facilities.

c. Project CG-535, Redox Expansion, Phase II

1) Waste Concentrator System

Insulation and sheathing of the D-12 pot and tower have been completed. The steam jumpers have not been insulated and will not be done since the system may be installed during the January shutdown.

2) 233-S Concentration Building

Testing and flushing of piping in the control room and process cell are now 80% complete. Continuity and drop-out tests of

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instrument piping were started on December 28, 1954, and about 15% of the lines have been checked. Ready-for-use date of February 1, 1955 appears feasible.

3) ANN Storage Tank

The ANN storage tank was accepted and can be placed in operation when needed.

4) Silica Gel Treatment

Construction of the concrete portion of the Silica Gel cell is about 30% complete. The waste line encasement has been poured except for one section and the 240-S-152 diversion box is about 30% complete. Ready-for-use date of March 1, 1955 appears feasible.

d. Project CG-588, Ammonia Scrubbers, Redox

All work on this project was suspended, awaiting the results of rerouting the dissolver jet vents into the 291-S stack breeching. This work is scheduled to be complete January 15, 1955.

e. 4X Program - Project CG-603

Directive No. HW-338, Modification No. 1, dated December 3, 1954, was issued by the AEC authorizing the General Electric Co. to proceed with the T Plant modifications, reactivation of B Plant and minor modifications to other buildings and plants associated with the bismuth phosphate process to provide goal capacity for the processing of 4X material. A work release, dated December 10, 1954, was issued by the Minor Projects Sub-Section and minor construction forces moved into B Plant and began temporary construction work on 12-13-54. Preliminary testing work being conducted by plant forces was essentially complete except for a few minor items including audiogauging the HF tanks.

Disposal of waste associated with the 4X Program, particularly scavenged waste disposal to cribs was reviewed with Radiological Sciences, Design Engineering and Separations Section personnel. It appears that the scope of work should cover current TBP as well as stored TBP and first cycle waste.

The third extraction cycle (Section 10) at T Plant was completed and accepted for use.

One cask car was ordered to provide enough cars for the Separations Section to adequately cover commitments as known at this time.

2. Manufacturing Engineering

a. Standards

The revised labor standard for the 231 Operations Unit was

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completed. Revised labor standards for the TBP and 224-T Operations Unit are being discussed with plant supervision. The sampling schedules for the 202-S and 231 buildings were reviewed and a revised analytical service standard was issued for the 231 Operations Unit.

b. Work Simplification and Cost Reduction

The second series of the Work Simplification Round Tables is 80% complete for the 31 conferees involved. Six conferences, totaling 108 manhours of conferee time, were conducted. A total of 48 operations or procedures are under study for improvement.

An analysis of the office records and reports used by the maintenance units of the Power and Maintenance Sub-Section was continued. Study effort was directed towards the work order control system and associated records.

The study of cask car contamination continued. Manually opened well lids are being designed for installation on one car. A test program, using the modified car and revised procedures which will eliminate or circumvent potential contamination source, is in the planning stage.

c. Engineering Assistance

Shipment has been made on all component parts of the industrial television equipment for Redox with delivery scheduled by the first of the year. Testing and assembly will begin at that time.

Site preparation and ventilation control for the Task III, 234-5, installation has been successfully carried on without incident by careful hand manipulation and policing of this area. Tests were conducted on blanking off of pre-heat coils of the 8 supply units of the 234-5 building to improve anti-freeze protection. Findings indicate that a small savings in steam consumption can be expected. A recommendation to discontinue spray water heaters was accepted in 202-S, and put into effect. A saving of steam and better relative humidity control was effected.

d. Property Management

A meeting was held with representatives from the Stores and Electrical Utilities Sections and the AEC in order to clarify problems associated with occupancy of the 2101-M Building. Discrepancies in requests for space allocation were resolved, and overall plans for building occupancy will be offered for approval as soon as all Sections present final plans.

Property Disposal Requests have been processed for the 2713-WA (Old Spare Parts Warehouse) and the "Old U-Plant Badge House"; however, the AEC has requested that a study be made to determine the feasibility of salvaging these buildings. This has not been

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done previously because all available information gained from past experience in the plant indicates that salvage of such buildings is uneconomical.

F. Reports Issued

1. Routine

Number	Title	Author
HW-34330	Separations Section Redox Plant Sub-Section Monthly Report - December 1954	R.T. Jessen
HW-34296	Separations Section Metal Recovery Plant Sub-Section Monthly Report - December 1954	V.R. Chapman
HW-34323	Separations Section T Plant Sub-Section Monthly Report - December 1954	C.T. Groswith
HW-34273	Separations Section B Plant Sub-Section Monthly Report - December 1954	T. Prudich
HW-34334	Separations Section Z Plant Sub-Section Monthly Report - December 1954	W.N. Mobley
HW-34282	Separations Section Analytical Control Sub-Section Monthly Report - December 1954	L.M. Knights
HW-34295	Separations Section Radiation Monitoring Sub-Section Monthly Report - December 1954	A.R. Keene
Official Use Only	Separations Section Projects & Personnel Development Sub-Section Monthly Report - December 1954	O.V. Smiset
Official Use Only	Separations Section Power & Maintenance Sub-Section Monthly Report - December 1954	C.P. Cabell
HW-34250	Monthly Progress Report, Plant Expansion, Projects & Personnel Development Sub-Section Separations Section, December 1954	F.A. Hollenbach
HW-34027	Essential Material Consumption for Redox Plant, November 1954	G.E. Cooper
HW-34026	Essential Material Consumption for TBP Plant, November 1954	G.E. Cooper
HW-34166	Tests for Dry Shipping of Low MWD/T Metal	B.F. Campbell
HW-33903	Cask Car Requirements for the 4X Program	R.A. Yoder
HW-33811	Essential Material Area Report to Cost and Purchasing, November 1 to November 30, 1954	G.E. Cooper
HW-34025	Essential Material Consumption for T Plant Month of November 1954	G.E. Cooper
HW-34028	Essential Materials ordered December 1 to December 31, 1954	G.E. Cooper
HW-33904	Separations Section Waste Status Summary for November, 1954	D.E. Peterson
HW-34052	Waste Tank Scheduling for B and T Plants	D.E. Peterson
HW-34199	Separations Process Council Minutes	O.V. Smiset

2. Non-Routine

None	Analytical Service Standards for the 231 Bldg., Manufacturing Engineering Report No. 15	R.H. Silletto

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2. Non-Routine (Continued)

Name	Title	Author
HW-33581RD	Basic Information for Direct Labor Standards 234-5 Operations Unit, Manufacturing Engineering Report No. 10	R.S. Himmelright
HW-34085	Radiation Incident, Class I, Number 395	W.G. Westover
HW-34244	Radiation Incident, Class I, Number 402	R.N. Donelson
HW-34247	Radiation Incident, Class I, Number 403	W.G. Westover
HW-34248	Radiation Incident, Class I, Number 404	W.G. Westover
HW-34249	Radiation Incident, Class I, Number 405	R.N. Donelson
HW-34080	Analytical Control Quality Report	L.M. Knights By M.J. Rasmussen
HW-34133	Bismuth Phosphate Material Balance and "F" Factor	M.J. Rasmussen By C.G. Hough
HW-33973	Gamma Ratio, Disc Ratio, and Cooling Time Calculations of Redox UNH Material	R.B. Abrams
HW-34188	Recovery of TBP Plant Off-Standard Organic Solvent	T.R. Workinger
HW-34065	Removal of Ruthenium from Plutonium and/or Uranium Product Solution by Ozone Sparging without Catalyst - Report of Invention	C.R. Anderson
HW-33952	Final Report - Evaluation of CO_2 as a Replacement in Helium in the Machining, Briquetting, and Recovery Hoods in the 234-5 Building	E.G. Pierick
None	Letter - Product Inventory and Scheduling	M.N. Raile
HW-34276	Standard Physical Data for Calculation of Steam Standards for Precipitation Separations Process, December 1, 1954	W.G. Browne By A.E. Barber
HW-34224	F Factor Determinations	C.T. Groswith By W.G. Browne
HW-34066RD	B Plant Waste Disposal	S.G. Smolen

III PERSONNEL

A. Organization

There were no significant organization changes in Separations Section in December.

B. Force Summary

	Start of Month	End of Month	Net Change
Section General	2	2	0
Redox Plant Sub-Section	229	232	+3
Metal Recovery Plant Sub-Section	275	278	+3
Z Plant Sub-Section	185	183	-2
T Plant Sub-Section	205	206	+1
B Plant Sub-Section	19	26	+7

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	Start of Month	End Month	Net Change
Power & Maintenance Sub-Section	333	333	0
Projects & Personnel Development	77	77	0
Analytical Sub-Section	162	158	-4
Radiation Monitoring Sub-Section	147	149	+2
Section Total	1634	1644	+10

C. Safety Experience

There were no major injuries in the Separations Section in December. One sub-major injury was incurred on December 14 when an Iron-Rigger Journeyman caught his index finger and second great finger in the power rolls during a plate forming operation. At the close of the month the Section had operated 430 days without a lost time injury for an accumulated exposure hour total in excess of 4 million man hours. For the year there were no major injuries, but there were five sub-major injuries.

D. Radiation Experience

Five Class I radiation incidents occurred and included: (1) uncontrolled exposure to two employees who performed work in a radiation zone without required monitoring (No. 402); (2) exceeding the operating limit for batch size control in the C-4 tank (224-T Building) by 50% (No. 405); (3) personnel exposure to air-borne plutonium contamination during transfer of process material in the 234-5 Building (No. 404); (4) spread of plutonium contamination in the 231 Building (No. 395); and (5) loss of batch size control in special processing of F-10P material (No. 403).

The emission of radioactive particulates from the Redox stack continued sporadically, with low level deposition occurring on the ground around the Redox stack. Activity levels in the condenser vent stream, which discharges directly to the stack after filteration in J cell, increased markedly by a factor of 500. The cause was related to the backcycle operation which permitted better vacuum on the D-12 waste concentrator. Air in-leakage into D-12 is causing high air contamination in the condenser vent stream which is filtered by the failed J-6 filter. This filter is scheduled for replacement in January, 1955.

E. Personnel Activities

1. Personnel Programs and Training

G.E. Selection Program evaluation was completed for six Maintenance and two Operations Unit personnel. Twelve supervisors completed Conference Leading Training, fifteen completed Supervisors Safety Training program, and twenty-nine exempt and Chief Operators attended the first Purex Training program. Seventy-seven non-exempt personnel attended training programs which included Process and Equipment, Radiation Monitoring, Instrument, Safety and Security Orientation.

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2. Manufacturing Department Leadership Conference

On December 11, the Unit Heads and above attended the Manufacturing Department Leadership Conference and took part in the discussions of "The Development of Men."

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January 4, 1955

ELECTRICAL UTILITY SECTION

MONTHLY REPORT

December, 1954

ACHIEVEMENT

Operating Experience

Power Statistics (see attached sheet for details)

Plant Contract

Probable time of December Peak Demand	December 14, 9-11 a.m.
Probable Peak Demand for December	115,000 KW *
Comparative Peak Demand for November.	113,227 KW
Billing Demand.	116,767 KW
Date Billing Demand Established	May 28, 1954

Test Power Contract

Effective December 1, the test power metering point was moved to 100-KE.

x x x x

No adverse conditions were reflected from the BPA system during the month.

x x x x

Although several periods of high winds prevailed during the month, operating experience on the system was excellent. The only case of trouble was a blown fuse in the security fence lighting circuit in the 300 Area.

Equipment Experience

Full advantage was taken during area down periods for performing power factor and high voltage D.C. preventive maintenance checks on cable, breakers, and bushings.

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The automatic tap changing mechanism on one of the two 1000 KVA 105-H transformers was inspected and serviced. With well over a 100,000 operations, it was found in good condition.

Events Influencing Costs

Overtime hours expended were approximately 2.8% of total regular hours worked.

x x x x

December attendance was 98.3%.

x x x x

Process power demands previously predicted for December were revised to suit current schedules. BPA power billing will be made on the previously established billing demand instead of the much greater Contract demand figure.

x x x x

Alert attention was given to power consumption in 100-KE and KW in order to most advantageously apply the power contract rates. Savings were accomplished by transferring loads between KW and KE to suit prevailing system conditions. A saving of $6000 to $7000 on the test power bill is estimated.

x x x x

Effective January 1, 1955; the responsibility for maintenance and normal operation of the Richland-Benton 115 KV line, the 3000 Area tie substation and a portion of Richland primary substations was transferred to the BPA. Responsibility for blackout of Richland and North Richland will rest with the Richland Electrical Unit and the North Richland AEC Community Management. Emergency switching on the above facilities will be performed as requested by the BPA Dispatcher. Maintenance on the line and substations was up-to-date with the facilities in good repair.

x x x x

Plant Development and Expansion

Arrangements were made with the Reactor Section to take 13.8 KV lines supplying 181-B, 190-B, and 105-B out of service on January 4, 5, and 6 while 100-B is down. During this period Minor Construction forces will perform work related to CG-558.

x x x x

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A study is being made relative to the suitability of a portion of the 2101 Building for use as a headquarters for the Section.

x x x x

In cooperation with Engineering, design planning of the third 230 KV line from Midway was begun.

x x x x

On December 3, a meeting was held at the BPA Portland office to discuss proposed 230 KV and 13.8 KV fault tests. H. A. Carlberg, E. P. Peabody, S. M. Rhyneer, several BPA people, and the writer were in attendance. Details of the discussion which took place are outlined in a report written by E. P. Peabody dated December 7, 1954. Plans are going forward toward utilization of the BPA test equipment and some engineering service.

x x x x

Stock piling of materials and equipment for emergency needs was a subject of discussion with representatives of the Engineering Department. In consideration of procurement time of essential items and probabilities associated with such emergencies, only transformer and circuit breaker high voltage bushings were deemed to warrant a recommendation for additional off-site coverage.

x x x x

ORGANIZATION AND PERSONNEL

Force Summary

	December
Exempt personnel	16
Dispatchers	5
Electricians	12
Linemen	23
Substation Operators	29
Secretary	1
Stenographer	1
Clerk	1
Storekeeper	1
Draftsman	1
	90

No change during the month.

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Safety Experience

Two minor injuries were reported during the month.

Radiation Experience

No over exposures occurred.

Personnel Activities

L. H. Holden attended the Sixth Annual Governor's Industrial Safety Conference at Olympia on December 2 and 3.

ELECTRICAL UTILITY SECTION

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POWER STATISTICS
ELECTRICAL UTILITY SECTION
FOR MONTH ENDING DECEMBER 31, 1954

	ENERGY - MW HRS.		MAXIMUM DEMAND-KW		LOAD FACTOR-%	
	Last Month	This Month	Last Month	This Month	Last Month	This Month
230 KV System						
A-2 Out (100-B)	26000	25950	45400	46300	79.5	75.3
A-4 Out (100-D)	14770	15840	24600	24700	83.4	86.2
A-5 Out (100-H)	9940	11320	15150	16500	91.1	92.2
A-6 Out (100-F)	8700	8560	14300	14200	84.5	81.0
A-7 Out (100-KW)	4128	2880	21000	9000	27.3	43.0
A-8 Out (200 Area)	5810	6240	9700	9800	83.2	85.6
A-9 Out (100-KE)	-	5808	-	46000	-	17.0
TOTAL OUT	69348	76598	130150**	166500**	74.0	61.8
MIDWAY IN	70283	77698	124800*	143,200*	78.2	72.9
115 KV System						
BB1-S3 (Tie)	2286	2538	4545*	4545*	69.8	75.0
Richland	10526	12546	25600*	27520*	57.1	61.3
BB3-S4 Out (300 Area)	2272	2416	4240*	4360*	74.4	74.5
TOTAL OUT	15084	17500	34385**	36425**	60.9	64.6
66 KV System						
B9-S11 Out (100-K)	366	288	960	800	52.9	48.4
B7-S10 Out (W.Bluffs)	288	360	878	1102	45.5	43.9
Hanford Out	49	58	300**	300**	22.7	26.0
TOTAL OUT	703	706	2138**	2202**	45.6	43.1
HANFORD IN	706	749	1800*	1800*	54.4	55.9
Project Total						
230 KV Out	69348	76598	130150**	166500**	74.0	61.8
115 KV Out	15084	17500	34385**	36425**	60.9	64.6
66 KV Out	703	706	2138**	2202**	45.6	43.1
TOTAL OUT	85135	94804	166673**	205127**	70.9	62.1
230 KV In	70283	77698	124800*	143200*	78.2	72.9
115 KV Out	15084	17500	34385**	36425**	60.9	64.6
66 KV In	706	749	1800**	1800**	54.4	55.9
(1)TOTAL IN	86073	95947	160985	181425**	74.2	71.1

(1) Includes 100-KE metered test power Average Power Factor - 230 KV System 89.7

*Denotes Coincidental Demand

**Denotes Non-Coincidental Demand

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MANUFACTURING DEPARTMENT
PURCHASING AND STORES SECTION
MONTHLY REPORT - DECEMBER 1954

I - Responsibility

No changes.

II - Achievement

Beginning December 27, 1954 active screening of Kaisers' excess stocks started with a view to buying some of these excess stocks at 50% of acquisition value. It appears that large supplies of general hardware, plumbing and electrical items are available. The use of these materials will reduce procurement costs and will make utilization of government owned materials possible.

Through negotiations with the rail carriers the rate on Aluminum Sulphate from the San Francisco area to the Project has been reduced, which based on our present requirements would effect a savings of approximately $9,900 per year.

As a result of our proposal to the rail carriers the rate on Phosphoric Acid from Newark and South Gate, California has been reduced, which based on our yearly requirements would effect a savings of $2,760.

Although closing two Area Stores has added extra work in Central Stores, store orders are being filled promptly and delivery achedules are being maintained.

Material received during the last 10 days of December was unusually heavy and overtime was required to handle the backlog which was building up and to restore Receiving operations to a current basis.

The 100-B and 100-D Area Stores have been closed for one month and no real problems have arisen that would indicate but what the field is getting satisfactory service.

Seven warehouses in the Excess Yard were released to A.E.C. on December 31, 1954 as they were no longer needed in our excess operation.

The York Refrigeration equipment in 189-F and 186-D Buildings was dismantled and prepared for shipment. The material amounted to 11 carloads.

Although the number of back orders remained fairly constant the number of line items out of stock increased. Unusual demands, such as the establishment of shops in 100-K Area, have influenced this upward trend. However, this increase is considered temporary.

Status of Essential Material Contracts being processed:

a. Aluminum Nitrate Monahydrate - Supplemental contract approved by the Commission and in force.

b. Nitric Acid - General Chemical Div., Allied Chemical & Dye Corp. - supplemental contract prepared and sent to the vendor for approval.

c. Liquid Chlorine - Approved by the Commission and in force.

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Stores Sub-Section

	Inventory Account		
	General Supplies		Spare Parts
Store Orders processed	30,190		1,154
Value of issues by store order	$296,421		$62,274
Value of cash sales	$ 340		
Value of payroll deductions	$ 2,014		
Total Value of disbursements	$298,775		$62,274
Line items in account	28,114		25,490
Back orders on hand	370		274
Out of stock items	243		191
Percent of line items out of stock	.9		.7
Shipments received		6,236	
Receiving Reports Issued		5,287	
Excess Material & Equipment			
Received		$ 82,235	
Issued for project use		$ 3,408	
Shipped off-project		$961,882	
Revenue from scrap & surplus sales		$ 8,937	
Requisitions Screened		2,271	
Items Furnished		384	

Purchasing Sub-Section

Requisitions	On Hand 11-30-54	Received	Placed	On Hand 12-31-54
General Supplies Unit	520	1,913	1,862	571
Process Equipment Unit	205	443	358	290
Essential Material Unit	17	47	52	12
A.E.C.	258	479	488	249
Total	1,000	2,882	2,760	1,122

Number of Purchase Orders Placed	HW	HWC	Total
General Supplies Unit	1306	314	1620
Process Equipment Unit	255	76	331
Essential Material Unit	38	-	38
Local Purchase	25	1	26
Total	1624	391	2015

Value of Purchase Orders Placed	HW	HWC	Total
General Supplies Unit	$ 321,982.76	$ 206,538.30	$ 528,521.06
Process Equipment Unit	339,582.29	969,395.45	1,308,977.74
Essential Material Unit	861,742.95	-	861,742.95
Local Purchase	232.77	1.25	234.02
Total	$1,523,540.77	$1,175,935.00	$2,699,475.77

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Purchasing Sub-Section (Cont.)

Purchase Order Alterations Issued	HW	HWC	Total
Number	100	75	175
Gross Value	60,428.64	41,453.74	101,882.38

Expediting	HW	HWC	Total
Orders on hand 11-30-54	1,709	383	2,092
Orders received	1,653	393	2,046
Orders completed	1,535	357	1,892
Orders on hand 12-31-54	1,827	419	2,246

III - Organization and Personnel

Force Summary:	11-30-54	12-31-54	Change
Employees on roll	271	267	-4

Safety Experience: There were six minor injuries during the month which was an increase of two over November 1954.

The Manufacturing Administration personnel attended the Safety and Security Meetings held by the Purchasing Sub-Section. This arrangement will continue.

Radiation Experience: It appears that there is inadequate radiation control in the handling of returnable containers. This problem is being studied to insure that containers are monitored prior to pick-up by Transportation and subsequent off-site shipment to vendors.

Personnel Activities: Mr. K. H. McDermotts from the Evandale Plant and Mr. W. Call from Arco were visitors for two days. These men reviewed our inventory and excess procedures for possible adoption at their locations.

Meetings at Unit and Sub-Section levels are continuing for information and discussion purposes.

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TRANSPORTATION SECTION
MONTHLY REPORT
December 1954

Transportation Section personnel forces decreased from 491 to 486 by one transfer in, three reactivations - personal illness, four terminations, three transfers out, and two deactivations - personal illness.

The new Consolidated Transportation Facility is considered to be complete except for the correction of deficiencies principally in the heating and drainage systems. The body repair and paint shops were activated on December 20. This completed the movement of all primary functions to the new headquarters. Total moving costs will approximate $17,000.

Completed the submission of data for the FY 1955 Midyear Budget Review. The revised operating budget totals $4,194,698, which is a reduction of $143,587 over the FY 1955 Budget.

Submitted budgetary information to the Manufacturing and Engineering Departments on Plant and Equipment Projects for FY 1956 and FY 1957.

Participated in discussions with representatives of the Financial Department on the new IBM procedures and required changes in the work order control system. Furnished procedural information to Section personnel on cross orders, referral work orders, work requests, etc.

Physical inventories of Automotive and Heavy Equipment Parts (0420-931), Railway Equipment Parts (0420-932), and Antifreeze (0420-933) were completed on December 14, 15, and 16 as scheduled. Reconciliations are still in progress. All railway equipment parts have been transferred to the custody of the Stores Sub-Section at the new facility except for a few large items which are stored at Riverland.

Furnished information regarding the types of measurements now being used. This was in connection with a general survey by the Budgets and Measurements Section of the Financial Department.

Established several objectives or goals for 1955 which should contribute to more effective performance and improved relationships.

Attended meetings on December 6 and 9 with departmental representatives relative to landlord administration and the establishment of revised reporting and accounting practices. The new cost system for the Consolidated Transportation Facility is being developed to be operative on January 3, at which time full landlord responsibilities will be assumed from the Administration Area Maintenance Sub-Section. Budgeted operating funds of $27,166 for the last half of FY 1955 have been transferred from the Employee and Public Relations Department to the Manufacturing Department.

The Richland, Kennewick, and Pasco Post Offices returned the 21 units of HO equipment which were furnished to them for the Christmas Season. These vehicles were made available at the request of the C[redacted]ission from November 29 through December 30, 1954.

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Transportation Section

The Request for Appropriation on upgrading automotive and heavy mobile equipment has been approved. This request totals $424,100 and provides funds for 169 replacement units. The upgrading program was initiated in 1953 with the objective of improving the over-all fleet by obtaining newer models or units in better condition as replacements for less serviceable equipment. This is accomplished by cost transfer between governmental agencies subject to equipment availability and economic considerations. This practice obviates the need for additional funds that would otherwise be required.

Forty-seven tool kits have been procured and placed in service for non-area mechanical personnel. This program provides all mechanics with government owned hand tools, whereas such tools have heretofore been only furnished in the manufacturing areas. This required an initial investment of $17,000 and annual replacement costs are estimated at $2,000. This policy has obvious advantages and is consistent with plant practice in supplying work tools to craftsmen.

An unusual incident occurred on December 30 at 10:10 A.M. when a trailer overturned on the 200-East hill. A tank containing process materials was mounted on the trailer and was being moved from the 200-West Area to the 300 Area. No personal injuries were sustained but the tank contents spilled on the roadway. Further information will be made available following the formal investigation on January 4.

Cooperated with the Internal Audit Unit in a physical inventory of plant owned railroad equipment on December 8. Furnished information and general assistance for a report on the management of capital assets. Considerable effort was devoted to a second report on the audit of motor pool operations which is to be completed in January.

Arrangements have been completed for the establishment of the 1171 Building Motor Pool on January 3 (sub pool of the 700 Area Motor Pool). Twenty-seven automotive vehicles currently assigned to the Transportation Section will be transferred to the motor pool and dispatched on trip tickets.

Commercial rail traffic during December decreased by 10.82% over November as receipts of coal and construction materials were below normal. The following recapitulation indicates the distribution of commercial cars handled:

Carload Movements -	Loads In	Empties In	Loads Out	Empties Out
General Electric Company	1035	19	20	1057
AEC	2	0	0	2
AEC - Kaiser (cement)	1	0	0	1
Blaw Knox	15	0	0	16
Gaasland Construction Co.	0	1	1	0
Kaiser Engineers	1	0	0	2
U. S. Army	19	0	0	17
	1,073	20	21	1,095

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Transportation Section

Railroad process service during December increased by 19.71% over November and now virtually demands train crew operations on all shifts seven days a week.

Nine special movements of vessels from the 272-E Shop to the Purex Facility were made for Blaw-Knox during the month. This work was begun on November 9 and will continue into January.

Total car movements including process service totaled 2,683 in December compared to 2,889 in November; 2,763 in October; 2,649 in September; 2,293 in August; 1,361 in July; 2,667 in June; 3,110 in May; 2,267 in April; 2,482 in March; 2,624 in February; and 2,545 in January.

The Plant Bus System transported 6.48% fewer passengers in December than in November. Patronage of the shuttle service is approximately 55% greater than at the former Terminal. The following statistics indicate the magnitude of service rendered:

Passenger Volume	144,528
Revenue - Bus Fares	$ 7,226.42
Earnings - Transit Advertising (November)	$ 108.70
Bus Trips	6,698
Bus Miles - Passenger Carrying	191,109
Passenger Miles	5,051,592

Special bus service was provided on December 7 for a tour of the Plant Areas by a Power Study Group.

Effective December 20 accommodations were made available on a rental basis to the Minor Construction Sub-Section for operating 17 buses out of the Terminal at the new Consolidated Transportation Facility.

The Richland Bus System Transported 3.9% more passengers in December than in November.

The first and last scheduled runs (7:00 A.M. and 7:00 P.M. - Monday through Friday) were discontinued on December 1 in the interest of economy since patronage was extremely low. No unfavorable aspects have resulted from this curtailment.

The following statistics indicate the volume of services rendered:

Total Passengers Including Transfers	12,990
Revenue - Bus Fares	$ 790.19
Earnings - Transit Advertising (November)	$ 4.94
Bus Trips	1,041
Bus Miles - Passenger Carrying	5,517
Passenger Miles	32,275

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Transportation Section

Off-Plant chauffeured automobile trips (Company business and/or official visitors) totaled 137 which were rendered to the following locations:

Benton City, Washington	9
Grandview, Washington	4
Hinkle, Oregon	8
Kennewick, Washington	24
Pasco, Washington	49
Pendleton, Oregon	10
Prosser, Washington	3
Richland Y, Washington	1
Sunnyside, Washington	5
Walla Walla, Washington	1
West Richland, Washington	13
Yakima, Washington	10

The following tabulation indicates in gallons the volume of fuel distribution during December:

	Gasoline	Diesel Fuel	50 Cetane	Kerosene	White Gas
Stock at Start of Month	63,300	24,885	7,000	5,725	284
Received During Month	110,800	12,200	32,600	2,470	106
Disbursed During Month	123,615	19,980	37,300	5,595	50
Stock at End of Month	50,485	17,105	2,300	2,600	340

The following tabulation indicates the volume of equipment maintenance activities during December by type of service and number of jobs:

Motor Overhauls	44
Class A Inspections and Repairs	89
Class B Inspections and Lubrications	1022
Weekly Inspections - Fuel Trucks and Off-Plant Vehicles	27
Semimonthly Inspections - Buses	163
Monthly Inspections - Railroad Rolling Stock	7
Other Routine Maintenance Repairs and Service Calls	1911
Accident Repairs and Paint Jobs	28
Tire Repairs	398
Wash Jobs	331
	4,020

The following tabulation indicates the number of HO mileage vehicles in service during November and the utilization of each type:

Code	Type	No. of Units	Total Mileage
1A	Sedans	338	514,416
1B	Buses	127	203,111
1C	Pickup Trucks	435	210,286
1D	Panel,Carryall,Sta.Wagon	164	136,856
1G	Jeeps	2	409
1H	Power Wagons	50	20,430
68 Series	Trucks	215	77,669
		1,331	1,163,177

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Transportation Section

Forty-eight units of contaminated HO equipment were cleaned during the reporting period at the 269-W Building.

Fourteen White buses were obtained from Construction and made ready for evacuation service as replacements for older model International units. Seventeen other units of miscellaneous heavy mobile equipment were also acquired and serviced for upgrading purposes or additions for the 100-K Area.

Completed the dismantling and loading of York Refrigeration equipment in the 100-D and 100-F Areas for off-plant shipment which was begun in November. This involved ten carloads of material and required about 1,500 man-hours.

The program of decontaminating grounds in the 200-West Area continued in progress during December and required 200 tons of asphaltic pre-mix, 30 tons of MC 3 asphaltic material, 800 cubic yards of crushed aggregate, and 600 man-hours.

Maintenance of Plant roads during December required 836 man-hours; production of road aggregate materials and railroad ballast 577 man-hours.

The following tabulation indicates in tons the volume of asphaltic material handled during December for road maintenance:

	MC 3	MC 5
Stock at Start of Month	43.14	23.89
Received During Month	0	0
Used During Month	0	0
Stock at End of Month	43.14	23.89

The following tabulation indicates the volume of mineral aggregate and pre-mix material handled in December for road maintenance:

	3/4" to 0 Pre-mix Tons	¼" to 0 Pre-mix Tons	5/8" Chips Cu.Yd.	1/4" Crushed Rock Cu.Yd.	3/4" Crushed Rock Cu.Yd.	2" to 3/4" Railroad Ballast Cu.Yd.
Stock at Start of Month	408	440	2,089	1,283	812	1,130
Made During Month	0	0	0	0	0	1,775
Used During Month	0	67	314	0	41	1,050
Stock at End of Month	408	373	1,775	1,283	771	1,855

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ENGINEERING DEPARTMENT

DECEMBER 1954

PILE TECHNOLOGY SECTION

Technical experimental tests in progress for nearly three weeks in connection with the KW Pile startup provided important practical and basic pile physics information. All tests proceeded smoothly and significant information was obtained from each test with no more than normally expected operational complications; these tests were the culmination of nearly a year of planning and organizing. Considerable detailed analysis will be required to obtain the maximum technical information, but preliminary results are available of sufficient accuracy for operational application. The following results are of particular interest and importance:

The cold clean reactivity of the KW Pile will be about 200 ih below that predicted; this throws considerable question on the validity of exponential pile measurements for this type of determination, particularly because the extrapolation from the previously normalized C Pile lattice was quite small. Reactivity absorbed by the water was determined to be about 600 ih compared to a predicted value of 400-500 ih. The dry pile temperature coefficient test indicated a strongly negative graphite temperature coefficient somewhat greater in magnitude than the measured negative metal temperature coefficient. The observed graphite effect was relatively linear over the temperature range to 165 C with a corresponding metal temperature of 200 C. A single central VSR was determined to have a value of 128 ih in a small rectangular loading, about 3/4 of the value of the same channel filled with boron steel balls. A steel ball column gave about the same value as the VSR.

Examination of slugs from twenty-three tubes of C metal from the C Pile revealed seriously damaged slugs in seven charges with indications that over half the tubes have been operating with the slugs in mechanical contact with the tube. This "chattering" phenomenon had been previously observed to be the cause of a leaking process tube of C metal from the C Pile but was thought at the time to be an isolated case. These recent observations confirm recommendations to reduce water flow velocities as much as possible and carefully charge the C columns to minimize slug cocking. Continued work is programmed to better define the cause of the chattering and serve as a test of improved loading techniques or slug designs.

Outlet temperature of the H in-pile recirculation facility was increased to 200 C. Examination of slugs previously exposed to 180 C showed moderate corrosion attack. Several corrosion tests were conducted in mock-up loops at temperatures up to 260 C, using aluminum jacketed slugs in aluminum or zirconium tubes. In general corrosion rates were surprisingly low, even under boiling conditions. A slug rupture test was conducted in ELMO-4 at 250 C; after four hours the slug ruptured and bulged a heavy wall stainless steel pipe, completely blocking water flow.

An apparent uranium grain refinement resulting from the outgassing treatment

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given FMPC rod transformed uranium has been observed at Hanford. The standard outgassing step (610 ± 10 C for 4.8 minutes) results in a slight refinement, to a depth of approximately 1/16th inch. At temperatures from 610 to 655 C and for times of 4.8 to 15 minutes, various degrees of completion of refinement are observed. Grain refinement of the entire slug similar to that produced by small alloy additions takes place when the slug is heated at 650 C for 12 minutes. Grain size measurements of such samples show refinement of the outer periphery from the original .09 - .11 mm to .04 - .05 mm and in the center from the original .1 - .2 mm to .07 - .08 mm. The refined grains appear far more equi-axed and uniform than the grains of normally processed material.

A new instrument, the profilometer, was recently put into use for visual examination at 25X magnification of the surface contour of irradidated slugs. It is giving substantially improved data on warp and distortion. From measurements of 450 irradiated triple-dip canned fuel elements an increase in warp and surface distortions is observed with exposure. Pieces which warped over 20 mils were those in the region of highest flux and core temperature gradient. At 800 MWD/T, 67 percent of the slugs in this position of the tube (just downstream from center) were warped greater than 20 mils.

The last two tubes of a 35 tube charge of hot-pressed canned, diffusion closure (no fusion weld) "J" slugs charged in February, 1954, were discharged at an exposure of about 1200 MWD/AT (about 25 percent burnout). No failure occurred in any of the 35 tubes of this material or in tubes of unbonded or Al-Si bonded "J" slugs irradiated over a range up to 1200 MWD/AT simultaneously for comparison.

Four more capsules containing a uranium-magnesium fuel material were discharged from the MTR on December 20, 1954. These capsules have accumulated an exposure of approximately 5000 MWD/T. They are now being shipped to Hanford for port-irradiation examination. Two of the 10,000 MWD/T exposure capsules are scheduled to be discharged from the MTR the middle of February.

SEPARATIONS TECHNOLOGY SECTION

Redox capacity and decontamination performance was excellent throughout the month. Recoveries of uranium and plutonium were approximately 99.7 and 99.4 percent, respectively. An instantaneous production rate of nine tons per day was demonstrated for a 36-hour period. The conversion to series operation in the Uranium Recovery Plant was completed during the month and short term operation proved satisfactory.

The 16-inch diameter by 8-foot long continuous UO_3 calcinator was operated for a period of 184 hours to produce approximately 12,000 pounds of UO_3 at an average rate of 70 pounds of UO_3 per hour. No caking in the bed or in the paddles occurred during the operation. The reactivity of the powder remains low in the range of 0.54 to 0.75. Conversion of the Hot Semiworks to the Purex Process is approaching completion and it is expected that cold shakedown runs will start during January.

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Studies are continuing on variables influencing the effectiveness of scavenging cesium and strontium from waste supernates. Improved scavenging can be obtained through control of pH, ferrous iron content, etc. It has been found that sodium nitrite in small amounts will effectively suppress the evolution of ruthenium in the Purex acid concentrator.

DESIGN SECTION

In general, Design Section effort by major components for the month remained unchanged from November. Distribution was approximately as follows:

Design Development Programs	27%
1952 Hanford Expansion Program	18%
Reactor Plant Modification for Increased Production	16%
4X Program	9%
1706-KER - Recirculation Facilities	5%
Other Projects and Design Orders	25%

Detailed design work started on Project CA-586, First Capacity Increase - 230 KV.

Total design for Project CG-558, Reactor Plant Modification for Increased Production, advanced to 54.4% complete. Scope design is 99.5% and detailed design 47.7% complete.

Major design effort was concentrated on the 190-B Building annex in order to complete a bid package for lump-sum construction in January 1955. Design is proceeding on the basis of revised vendor information on the 190 Building pumps, drive units and crane. Secondary or "back-up" instrumentation has been deleted from the scope of the project. Present scope includes replacement of existing gages which may eliminate need for "back-up" instrumentation. Total design for CG-600, 100-C Alterations is 63% complete, based on design scope 100% and detailed design 50% complete.

Design scope revisions to 1706-KER Recirculation Facilities were approved. These changes include a reduction in installed pumping capacity and some reduction in system reliability without affecting usefulness of the facility for planned test programs. Total design is 73% complete.

4-X Program design activity continued on schedule. AEC authorizations for Projects CG-603, CG-613 and CG-614 were received during the month. Status of design progress is as follows:

	Design Scope	Detailed Design
CG-599 - 4X Program - 100 Area	75%	60%
CG-603 - 4X Program - Bismuth Phosphate Plants	97%	32%
CG-613 - 4X Program - Metal Conversion Plant	50%	.5%
CG-614 - 4X Program - 300 Area	70%	-

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Detailed designs for condensers and vapor manifold system for nine tanks at the Redox 241-SX Tank Farm were completed as scheduled. Design scope changes have required redesign of the manifold system which has been rescheduled for completion during January 1955.

PROJECT SECTION

At the end of the month construction completion status of major projects was as follows:

Project No.	Title	Completion Scheduled	Completion Actual
CG-496	Recuplex	94%	87%
CA-512	100-K Area Facilities		
	KW - Water Plant	100	99.9
	Reactor and Building	100	99.9
	KE - Water Plant	100	99.3
	Reactor and Building	100	98
	General Facilities	100	98.1
CA-513	Purex Facilities, Part "A"	99	92
CA-514	300 Area Expansion	90	73
CG-535	Redox Capacity Increase, Phase II	91	90
CA-546	Fuel Element Pilot Plant	--	45
CG-558	Reactor Plant Modifications	3	3

Inspection was completed on 164 orders, which with 104 newly assigned orders leaves the total number requiring inspection at 525.

Beneficial use of 105-KW Reactor was accomplished at 12:01 A.M. December 6, 1954. With minor modifications in progress, the KW Water Plant was officially turned over to Manufacturing Department during the month. Present construction work in the KW Area consists of about $30,000 in work orders. Replacement of the six secondary pumps in 190-Kw Building was completed, and all pumps were run at low flow. At 105-KE, the Dynamic Flow Test was completed for the Reactor and Water Plant. Acceptance testing was about 65% complete. Installation of #3 and #4 secondary pumps was begun in 190-KE Building, thus completing the placement of secondary pumps. In 165-KE Building, load tests on all three turbine-generator sets were completed. The 151-KE Substation has been energized and is supplying test power. A visual inspection was made of other buildings and facilities, and a "Completion List" prepared.

Shipment of Purex vessels and engineered equipment progressed to completion except for 18 vessels, six agitators, and one pulse generator. Of total major vessels and equipment received, 65 pieces have been installed. Current status of the 1206 required process jumpers was 970 fabricated and 904 tested. Of the required 194 electrical jumpers, 190 have been fabricated. In 202-A Building, piping was about 85% complete; electrical work was 90% complete; heating and ventilating supply was 95% complete, and exhaust 92%. Instrumentation was about 90% complete in the Head End Control Room, and about 60% complete in the Central Control Room. Construction forces completed the 211-A Chemical Tank Farm, the 291-A Stack, the road and street lighting

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systems, and the steam distribution systems.

ORGANIZATION & PERSONNEL

Total on Roll, December 1, 1954	1,475
Accessions	18
Separations	33
Total on Roll, December 31, 1954	1,460

Effective December 15, 1954, the Project Section was reorganized into six Sub-Sections as follows: Project Auxiliaries, Inspection, Minor Construction, Project Engineering, Reactor Projects, and Separations Projects. Effective this same date, the Technical Section was reorganized into two Sections--Pile Technology and Separations Technology. Principal organizational components within these two sections are as follows: Pile Technology--Physics Research Sub-Section, Metallurgy Research Sub-Section, Pile Materials Sub-Section, Pile Engineering Sub-Section, and Fuel Technology Sub-Section; Separations Technology--Chemical Development Sub-Section, Chemical Research Sub-Section, Plant Processes Sub-Section, Analytical Laboratories Unit, and Technical Shops Unit.

A. B. GRENINGER, MANAGER
ENGINEERING DEPARTMENT

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ENGINEERING ADMINISTRATION SECTION

DECEMBER 1954

During the month, agreement was reached with the Atomic Energy Commission for the payment of page costs for papers published in scientific and technical journals by HAPO authors. Under the agreement a sum of $800 will be designated to cover both the payment of page costs and the purchase of reprints.

The 300 Area Duplicating group has been requested to reproduce the 300 File Copy of all internal HAPO reports on translucent paper so that additional copies may be cheaply and quickly reproduced by Ozalid when needed. Duplicating will destroy the reproduction masters after three days, thus eliminating the handling of the masters by Classified Files. Duplicating is further being asked to extend this system to its Area offices in the belief that Plantwide application of this technique will greatly simplify the Classified Files operation.

During the month the following major contract activities were handled:

1. Special Agreement No. G-49 between General Electric and the University of California at Los Angeles covering the use of University-owned seam welder was returned by the University for revision. The revised document was sent to the University for execution November 26.

2. Approval has been received from the Commission to award the printing of the Hanford Works Official Telephone Directory to General Telephone Directory Company at Long Beach, California, the second low bidder. A contract (Special Agreement No. G-50) is being prepared for execution.

3. Special Agreement No. G-51 between General Electric and Haughton Elevator Company providing for the modification of "C" elevators in 100-B, D and F Areas was executed by Haughton Elevator Company, December 1. Conformed copies have been distributed.

4. On October 21, 1954, Mr. C. W. Weeks, Community Manager for General Electric, wrote to the Commission requesting approval to enter into a contract with Wheeler and Russell covering the appraisal of certain Commission and non-Commission properties in Richland. Mr. Weeks has negotiated a firm price with Wheeler and Russell and the Commission has approved price. Information from Community concerning certain changes in the appraisal work has been forwarded several times revising the original scope of work and the agreement is in process of preparation.

5. Modification No. 1 to Special Agreement No. G-32 between General Electric and Givens, May and Milliken for the license to use certain movie film was returned by the Contractor for rewriting due to a reduction in the cost of the license. The modification was rewritten on December 22 and is now being reprocessed for approval.

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6. Modification No. 5 to Subcontract No. G-107 between General Electric and The Swedish Hospital covering an exchange of radiological information was sent to the Hospital for execution December 6.

7. Modification No. 1 to Lease Agreement No. L-1 between General Electric and Northwest Utilities Group covering a change of location of office space was completely executed December 28. Conformed copies have been distributed.

8. Special Agreement No. G-52 between General Electric and the GESA Federal Credit Union providing for payroll deduction from members of the Credit Union was transmitted to the Commission for approval December 23.

9. Special Agreement No. G-53 between General Electric and the HAPO Federal Credit Union providing for payroll deduction from members of the Credit Union was transmitted to the Commission for approval December 23.

10. Special Agreement No. G-54 between General Electric and Leiter Hockett, a diver from the City of Seattle, covering the inspection of effluent line from 107-B Building was executed December 22. Conformed copies have been distributed.

R. J. Schier

R. J. SCHIER, MANAGER
ENGINEERING ADMINISTRATION SECTION

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PILE TECHNOLOGY SECTION
MONTHLY REPORT

DECEMBER, 1954

VISITORS & TRIPS

D. L. Francis visited HAPO from ANP, Cleveland, Ohio, December 6-15, to consult on ANP tests.

R. C. Mann visited HAPO from ANPD-GE, Arco, December 27-29, to discuss design problems on experiments Hanford is going to conduct.

E. Hayes and J. Woodhouse from the duPont Company, Savannah River Plant, visited HAPO, December 13-15, to discuss thorium.

E. Zebroski from Stanford Research Institute visited HAPO on December 17 to describe service available from SRI.

F. W. Albaugh, J. J. Cadwell and O. J. Wick visited the University of California, Livermore, California, December 6-7, to discuss Hanford assistance to Whitney Project.

G. W. Anthony visited ORNL, December 1-17, for instructions on Oracle computing machine.

A. G. Blasewitz spent December 1-2 at Chalk River, Ontario, Canada; December 6-7 at KAPL, Schenectady; December 9-10 at BMI, Columbus, Ohio; and December 13 at Ames Institute for Atomic Research, Ames, Iowa, discussing fuel element technology.

T. W. Evans visited Phillips Petroleum Co. (MTR), Idaho Falls, Idaho, to discuss metallurgical experiments, December 6-11.

S. S. Jones attended a Heat Transfer Meeting at Columbia University, New York City, December 16 and 17.

W. T. Kattner spent December 13-17 at the duPont Company, Savannah River Plant, and December 17-20 at the National Lead Company of Ohio, Cincinnati, discussing uranium technology.

G. A. Last visited the University of Utah, Salt Lake City, December 6 and 7, to recruit technical personnel.

G. M. Muller presented a paper at the meeting of the American Physical Society and American Mathematical Society held on December 29 and 30 at Oakland, California.

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Pile Technology Section

W. J. Ozeroff spent December 1-3 at Rice Institute, Houston, Texas, recruiting technical personnel.

J. W. Riches visited National Lead Company, Fernald, Ohio, December 8-10, duPont at Savannah River Plant, December 14-17, and Bridgeport Brass at Adrian, Michigan, December 20-22, to consult on metallurgy of uranium.

M. J. Sanderson spent December 1-3 at Atomic Energy of Canada, Ltd., Chalk River, and December 6-7 at KAPL, discussing fuel element technology.

W. R. Smith visited General Dynamics Corporation, New London, Connecticut, December 6-10, to advise Purex Engineering on welding design of acid concentrators.

N. O. Strand visited Babcock & Wilcos, at Akron, Alliance and Barberton, Ohio, on December 9-10, to discuss high temperature, high pressure apparatus loops; December 13-14 at Westinghouse Atomic Power Division, Pittsburgh, to obtain data on high temperature mechanical properties of Zircalloy-II; December 15 at Superior Tube Company, Norristown, Pa. to consult on the fabrication of zirconium process tubes; and December 16-17 at Bridgeport Brass, Bridgeport, Conn. to consult on the manufacture of KER process tubes and zirconium fuel element cans.

J. T. Stringer spent December 8 at National Lead Company, Fernald, Ohio, on a conducted tour; presented a paper at AEC Information Meeting held at Cincinnati, Ohio, December 9-10, and attended an AIChE Meeting in New York, December 12-15.

W. P. Wallace spent December 13-14 at Westinghouse Atomic Power Division, Pittsburgh, December 15 at Superior Tube Company, Norristown, Pa. and December 16-17 at Bridgeport Brass Company, Bridgeport, Conn. discussing zirconium process tubes and cans.

P. D. Wright visited Bridgeport Brass Company, Adrian, Michigan, on December 13-24 to observe uranium extrusion.

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Pile Technology Section

ORGANIZATION & PERSONNEL

The Technical Section was reorganized on December 15, 1954 and the Pile Technology and Separations Technology Sections were established. The November statistics have been reconstructed for comparison purposes.

Personnel totals are as follows:

	November 30	December 31
Administrative	2	2
Pile Engineering	98	94
Pile Materials	59	59
Fuel Technology	115	108
Physics Research	33	35
Metallurgy Research	71	70
Contact Engineering	4	4
Total	382	372

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PILE ENGINEERING SUB-SECTION

PROCESS TECHNOLOGY

Power Level Limitations

The operating limit at DR Pile during December, 1954 was 95 C outlet temperature. C, F, and H Piles were similarly limited by Manufacturing to a 100 C outlet temperature. B Pile was limited by a lack of reactivity.

Process Specification Changes

Revised Process Specification 12.00, "Properties of Process Tubes," was approved. The revisions pertain to the allowable pressures for K Pile process tubes and also changes the allowable tube temperature during reactor shutdown.

Revised Process Specification 55.00, "Rate of Control Rod Withdrawal During Startup," was approved. This revision returns the specification to its more conservative form regarding horizontal rod withdrawal.

Revised Process Specification 56.00, "Process Radiation Monitoring Instruments," has been approved. A new section has been added to permit operation of the K Piles until their process radiation monitoring systems can be revised. Pre-cold-startup linear amplifier settings were also changed.

Process Tube Leaks

At both D and F Piles water leaks into the pile occurred, both of about 80 - 100 gallons per day. D Pile shut down on 12-21-54 and pressure tested all process tubes. Tubes 3980-D was found leaking and replaced. Several tubes would not hold pressure until the rear nozzle was tightened. Three of the loose nozzles were removed and cracked Van Stone flanges were found on two of them. The water collection rate has since dropped to nearly normal.

F Pile shut down on 12-9-54 and pressure tested all process tubes. No tube leaks were found. Several rear nozzles were tightened. Water collection rates remained high during the subsequent operating period. The pile was shut down again on 12-27-54. The thermal loop was pressure tested but no leaks were found. Thirty-five loose rear nozzles were tightened. Nozzle flange nuts on four nozzles were marked to determine if they are turning loose during operation.

C Slug Chattering at C Pile

Persuant to the slug and tube change caused by the C slug chattering in tube 0460 C, the following investigations have been made:

Twenty-eight C metal tubes were discharged, including one that had given rupture indications. Five tubes were left empty and borescoped. Of these, three showed serious damage from slug chattering and were replaced. The metal from seventeen of the remaining tubes was examined, and sixty-four pieces were found with evidence of chattering. Some of the remaining higher burnout C-metal charges were reluctant or impossible to back-seat. Two of these tubes were removed.

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During the C Pile shutdown of December 31, 1954, six tubes which had been charged with C-metal were borescoped but no damage was noted.

A change in C slug characteristics is being developed as a solution to the problem for future charges.

C Pile Front Pigtail Failure

At approximately 8:00 a.m., 12-13-54, a split in the front pigtail of tube 3666 C was noted. At 10:22 a.m. on 12-13-54, the pile was shutdown to change the pigtail. The pigtail was removed and pressure tested at approximately 600 psig for two hours with no increase in the size of the split noted. The pigtail is now being examined metallurgically. This is the third front pigtail failure at C Pile.

C Pile Reactivity

During December, 30 C columns were moved from the third lattice unit from the edge of the pile to the fourth lattice unit. Considerably more reactivity was gained from this relocation than was expected. Normally 1-1/2 - 2 inhours of reactivity gain per column is expected, but approximately four inhours per tube were gained from each of these tubes. This additional reactivity was absorbed in the control rods during the subsequent operating period, and with this amount of excess reactivity held in the rods, pile control was very inflexible for a time. At a subsequent shutdown, a change in flattening was made which corrected the difficulties.

Replacement of C Columns with Enriched Uranium

A study is being made to determine the technical feasibility and economics of replacing U-235 alloy, "C slugs", used for spike enrichment with enriched uranium. The results of preliminary calculations prove very attractive with savings in the order of $250,000 per pile per year possible. In addition the over-all Pile production should be increased about 1 - 2 per cent since some Pu will be produced in the enriched uranium pieces, whereas potentially productive power is now lost to the C-metal columns.

Rupture Rate vs. Tube Power

In an effort to clarify the rather anomalous results that have been published regarding the effect of tube power on rupture rates, a correlation has been attempted using all rupture data with exposures below 600 MWD/T vs. geographical location of the tubes in the piles. Cleavage failures are plotted separately from other failures. Non-representative data, such as the recent ruptures from H were not used. If concentric circles were drawn on a front face map for each pile, tube powers would vary from the highest in the center to nominal values in the outer circules. By proper weighting the rupture rates can be secured for each comparative power grouping. The following conclusions were made:

1. Cleavage failures occur in the highest power tubes.
2. The maximum tube power is probably more important than the equilibrium tube power. This was concluded from the preponderance of cleavage failures occurring on the near side as contrasted to far. The near side tubes during start-up transients might reach powers higher than equilibrium.

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3. No significant variation with tube power could be detected for other failures, although the fringe tubes appear slightly higher than the central.

The data from this study will be issued in a document.

Ruptured Slugs

Two normal uranium slug failures occurred during the month. One of these was a cap failure of a "B" lot, rod transformed and lead-dip canned, piece at H Pile, at an exposure of 812 MWD/T. The other failure occurred in a "B-W" lot piece at C Pile, at an exposure of 242 MWD/T. This piece was stuck in the tube and has not yet been inspected. The "W" suffix shows that this B lot piece was Zyglo inspected and was determined to have fewer than the average number of uranium surface defects.

One ruptured Al-U^{235} alloy, J metal piece was discharged from DR Pile. This piece had a split in the jacket wall.

Production Test 105-539-E

Under the authority of this production test, 150 tubes of "A" lot metal (smooth surfaced, triple-dip canned) and 150 tubes of "B" lot metal (smooth surfaced, rod transformed, lead-dip canned) were scheduled for irradiation to high exposure at H Pile, so that comparative rupture rates might be established for the two types. The failure at H this month occurred in one of the tubes under this test, and was the first one which could not be attributed to abnormal operating conditions. This was a cap failure. It was similar in appearance to the PT-25-M cap failures, which disclosed no penetration of the weld.

Thin Wall vs. Thick Wall Jacketed "J" Slugs

It has been noted that while a substantial amount of the J metal canned in 1954 was canned in thick wall jackets, 24 of the 26 failures to date have been incurred by the pieces canned in thin-wall jackets. Consequently a study of the performance of 1954 canned "J" metal at DR Pile was initiated in the hope that relative performance of slugs canned in the two manners might be determined. The investigation disclosed that the thick jacketed pieces are at lower exposures, having been charged later. More important is the fact that they were, in nearly all instances, charged in the fringe areas of the pile where slug powers and slug surface temperatures are lower. Since high powers and temperatures are thought to make a large contribution to the failure of this metal, a lower rupture rate would be expected for metal charged in fringe regions. Therefore, although an increase in jacket thickness would be expected to improve rupture resistance, and though the successful irradiation of about ten tubes of thick jacketed slugs to 100 MWD/tube, one to 125 MWD/tube and one to 150 MWD/tube in the C Pile central zone indicates satisfactory performance at high powers, it is doubtful that relative performances of the two types of slugs can be determined from present operating experience.

Irradiation of New Fuel Slugs

Cored Slugs - Production Test 105-570-A - This production test authorizes the irradiation to failure of 4 tubes of cored-uranium lead-dip slugs and 4 tubes of standard control slugs at both high and lower tube powers. Four tubes charges at C Pile have

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operated for four months (550-600 MWD/T) without incident. The four tubes charged in F Pile September 14, have reached 400-425 MWD/T without incident.

Mechanically Bonded Slugs - Point Pressure Closure - Production Test 105-575-A - Two tubes each containing two 4" mechanically-bonded, point-pressure-welded slugs centered with normal uranium pieces were charged in D Pile. One tube scheduled for 200 MWD/T has been discharged. Post-irradiation examination has been completed and no evidence of diffusion or interaction between can and core could be found. The remaining tube, scheduled for 600 MWD/T, is currently at 530 MWD/T and will be discharged late in January.

Powder Metallurgy Slugs - Production Test 105-576-A - This test authorizes the exposure of 5 control tubes at C Pile, 10 control tubes at F Pile, and about 40 supplementary tubes at F Pile. Two ruptures will be incurred in C Pile, and all slugs in F Pile will be discharged at normal goal exposure, 675-775 MWD/T. The C Pile tubes have operated without incident for two months and have reached 320-370 MWD/T. The second control tube was discharged from C Pile at 369 MWD/T on December 10 and is awaiting examination.

Unbonded Slugs - Production Test 105-578-A - This production test authorizes the irradiation to failure of "C"-process-canned solid and cored uranium slugs, and of nickel plated "C"-process-canned solid uranium slugs. A total of 16 tubes were charged during December and 5 of them will be irradiated to rupture.

Hot-Press-Canned Slugs - Production Test 105-577-A - This production test authorizes the irradiation of solid slugs with fusion and diffusion welds, cored slugs with fusion welds, and control slugs. Fifteen tubes were charged, and four of these will be irradiated to rupture. Current exposure is about 400 MWD/T.

Unbonded Slugs - Point Pressure Closure - Production Test 105-580-A - A total of eight 4" pieces, spaced with normal slugs, were charged in three tubes during September and are to be irradiated to 200, 400, and 675 MWD/T for metallurgical examination. A fourth tube, containing 4 unbonded cored enriched pieces centered by 18 unbonded cored pieces and solid aluminum dummies will be charged in January and irradiated to rupture. Post-irradiation examination of the tube irradiated to 200 MWD/T shows the slugs to be in good condition.

Development Tests 105-582-A, 105-581-A, and 105-592-A, Irradiation of IQS-7, 8, and 9 Metal - The metal under these tests came from rods which were rolled from ingots which differed slightly from the ingots from which standard production metal rods were rolled. Pre- and post-irradiation measurements will be obtained. No ruptures are anticipated. All 16 tubes were charged in H Pile on November 26. About 13,000 supplementary slugs were charged as standard production material. Nearly 1/3 of them had to be used in December to meet a production commitment. The remainder will be irradiation to normal high goal exposure at time of discharge (725-800 MWD/T).

Unbonded and Mechanically Bonded Point-Closure Slugs - Production Test 105-584-A - This production test authorizes the irradiation of unbonded and mechanically bonded slugs with point closure and lead-dip canned slugs for comparison. Three tubes of each of the three canning methods were charged in C Pile on December 19. Irradiation will continue until one rupture has occurred in each of the three types of metal.

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Production Quantities of Cored Slugs - Production Test 105-591-A - This test authorizes charging and irradiation of production quantities of cored slugs (both extruded and drilled) until 100 and 300 Area process specifications have been issued. The first cored rods arrived and October. They are being machined and canned. Charging is planned for January.

Irradiation of Extruded Cored Slugs - Evaluate Process Development - Development Test 105-588-A - This test authorizes charging three control tubes for metallurgical inspection from each month's supply of cored slugs received at HAPO during the development period of cored slug production. One tube of extruded cored slugs, already available, was charged November 5. Equal numbers of drilled cored slugs, when available, will be charged in the same tubes. Exposure will be limited to 900 MWD/T and no slug failures are expected.

Irradiation of Extruded Cored Slugs - Evaluate Performance by Irradiation to Rupture - Production Test 105-590-A - This test authorizes 4 tubes of extruded cored slugs and 4 tubes of standard production metal to be charged in C Pile. (The 4 tubes of standard production metal will probably be dropped from the test to spare two ruptures.) Irradiation will continue until both types of metal experience two ruptures.

Uranium Silicon Alloy - Production Test 105-586-A - This test authorizes the irradiation of silicon alloy solid slugs from ingots (1 tube) and from Dingots (4 tubes) also silicon alloy cored slugs (3 tubes). The four tubes from Dingot stock will be irradiated until two ruptures occur. Standard production metal (4 tubes - 2 ruptures) will serve as control. The cored slugs will be irradiated to 900 MWD/T. One tube of preliminary metal was charged into B Pile on December 6 and will be irradiated to 900 MWD/T.

Internally and Externally Cooled Slugs - Production Test 105-587-A - This test authorizes irradiation of 7 tubes of I and E slugs in C Pile. Three tubes will be discharged at exposures up to 1200 MWD/T. Four tubes will be irradiated until 2 ruptures occur. It is planned to measure outlet water temperatures in the core and in the annulus. The first tube was charged on January 2.

Manufacture of Other Products

Preliminary Irradiation of J-Q Columns - Production Test 105-567-A - A third scheduled discharge of one column from the H Pile J-Q block loading will be made soon at about 110 MWD/tube.

A second revision to the exposure plans for the remaining eleven columns is necessary to meet AEC requirements, and Supplement A (revised) will be issued in January. It is planned that ten tubes will be exposed to about 175 MWD/tube.

Quantity Irradiation of J-Q Columns - Production Test 105-579-A - There are now 160 J-Q columns in H Pile and 160 J-Q columns in C Pile under this test. Exposure revisions at the request of the Commission have resulted in many changes to the original test and Supplement A. These have been recalled and replaced by a revised test, HW-33170.

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PILE PHYSICS

KW Pile Startup Experimental Program

The major portion of the experimental program authorized for the KW Pile startup was completed during the month, the full pile loading and associated tests proceeding at month's end. Except for occasional operational complications arising from the non-routine nature of the tests and from the taking over of new facilities, the program proceeded smoothly with significant information obtained from each of the tests. Physics personnel from the Physics Research Sub-Section and from other units in Pile Technology assisted in carrying out the tests. Although considerable analysis effort will be required before the final data are published, approximate results to sufficient accuracy for operational application are given below:

Dry Critical Data - Approximate Results

Cylindrical loading at dry critical		423 tubes
Dry Radial Buckling		71.7 micro-bucks
Longitudinal Buckling, dry		11.5 micro-bucks
Relation between reactivity and buckling		23 ih/ub
Radial Augmentation Distance		63 cm.

Wet Critical Data - Approximate Results

Cylindrical loading at wet critical, dry reflector		734 tubes*
Wet Radial Buckling		46.1 ub
Longitudinal Buckling, wet		11.8 ub
Radial Augmentation Distance		63 cm
Relation between buckling and reactivity		23 ih/ub
Reactivity absorbed by water	approx.	600 inhours

*Following the establishment of a wet critical cylindrical loading of 807 tubes, it was discovered that the two large front-to-rear test holes inside the loading pattern were completely filled with water. The reactivity effect of the water in these test holes was determined by pile period measurements, and the 807 figure was corrected using the observed ih/ub ratio. The wet critical buckling figure given above also checked closely in the case of the wet rectangular loading with a wet reflector.

K Pile Reactivity Status

The cold, clean reactivity of the K Piles as indicated by wet critical buckling measurements is approximately 750 inhours. The reactivity loss due to cooling water is approximately 100 inhours greater than anticipated and the reactivity of the dry lattice is about 100 inhours lower, yielding a cold clean reactivity for the wet pile approximately 200 inhours lower than predicted on the basis of exponential pile studies. Some enrichment in addition to the original 20 kg of U-235 in the form of C slugs may be required in order to operate at allowable tube power limits. The present location of the enriched ring, in the eighth lattice unit from the reflector, will provide approximately 2400 effective tubes provided that sufficient reactivity is available for a few light flattening columns.

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Dry Pile Temperature Coefficient Test

A significant negative reactivity effect due to graphite heating in a dry K lattice containing green natural uranium was observed during the dry temperature coefficient test. At the end of the test only 10 inhours remained out of approximately 250 inhours excess reactivity available at the start of the test. The maximum graphite temperature reached was approximately 165 C (base temperature was 12 C) with a maximum metal slug temperature of 200 C. The maximum tube expansion observed was slightly under one inch, whereas the tube expansion limit for the test had been set at 1.2". Detailed analysis and weightings will be required in order to give the exact coefficient; however, preliminary indications were that the observed graphite effect was somewhat greater in magnitude than the also-negative metal temperature effect and was relatively linear over the temperature range covered by the test.

Under-Moderated Effect Observation

In the dry lattice it was observed that the loss of a single column produced a reactivity gain of approximately 3 inhours in the small dry pile whereas the loss of two adjacent columns produced a loss of slightly more than one inhour. These results indicate that the K lattice is sufficiently under-moderated to cause a significant change in the conversion efficiency of surrounding columns when a single column is removed from the dry lattice.

Single-Column Reactivity Measurements

A large number of flattening, poisoning, and enrichment materials were tested in single column reactivity measurements in the small wet cylindrical loading. Preliminary results showed good agreement with measurements made during C Pile startup and indicated that nominal reactivity values employed in the older piles would be almost directly applicable to K Pile when corrected for relative tube weightings (by the ratio 2004 to 3220).

Block Reactivity Measurements

Reactivity and lattice cell flux measurements were obtained on a number of loadings tested in a 9-tube block in the center of the small wet cylindrical loading. These included natural uranium, J-N, J-Q, Ike-N, Ike-Q, wet core hollow slugs, and dry core hollow slugs. Measurements were made on each of these lattices to estimate the effect of water loss relative to that in a natural uranium loading. Preliminary results were as follows:

Loading	Initial Wet Reactivity Relative to Green Natural Uranium	Reactivity Effect of Water Loss Relative to Green Natural Uranium
J-N, 3.8" N's	approx. 3-4% δ k higher	approx. 50% greater
J-Q, 6.0" Q's	approx. 1/2% δ k higher	nearly twice as great
Hollow slugs:		
Dry core, std. O.D., .5" I.D.	approx. 1/3% δ k lower	approx. the same
Wet core, 1.41" O.D., .44"I.D.	equivalent	approx. the same

Because of the reduced numbers of Ike slugs and of nickle-plated hollow slugs available, additional analysis will have to be done before even approximate results can be obtained for Ike-N, Ike-Q, and nickle-plated hollow slug loadings.

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Lattice cell flux traverses were taken through most of the enriched loading configurations in the 9-tube block tests as well as in natural uranium by Physics Development Unit personnel. Analysis of these traverses will yield lattice constants necessary for determining conversion ratios.

Vertical Control Column Tests

The following relative control element strengths were observed in the wet-reflector rectangular wet pile of 30 lattice unit width and of height varying from 30 to nearly 40 lattice units:

Single central VSR	128 ih
Steel ball column (same channel)	126 ih
Boron Steel ball column (same channel)	175 ih

Calculations of total pile control system effectiveness will be performed soon, and recommendations based on the above data plus scram transient information obtained during the same tests will be forwarded regarding the choice of either the present steel balls or the more expensive boron-steel balls in the K Pile safety system.

KE Startup Planning

Detailed planning for the KE Pile experimental loading program is well underway in conjunction with Reactor Section. The instrumentation arrangements at KW pile startup will be largely duplicated at KE; because of the limited technical testing, however, other features of the KE startup will be greatly simplified compared to the KW arrangements and procedures.

Pile Safety Studies

IBM calculations on the power excursion expected following loss of water pressure were completed, and the results were plotted in time for the meeting of the Advisory Committee on Reactor Safeguards early this month. A written report giving the detailed bases and methods of calculations will be prepared as soon as startup work permits.

Reactivity Transient Studies

Plans are being developed to monitor the long term reactivity transient at the KW Pile following startup and to make periodic measurements of the graphite temperature coefficient of reactivity during the interval in which plutonium is building up prior to the time the metal reaches goal exposure. Recent calculations by personnel of the Physics Research Sub-Section indicate that plutonium itself will eventually be a large contributor to the graphite temperature coefficient, particularly at high exposure levels.

The approach currently under investigation is that of periodically measuring the graphite coefficient at constant pile power level by temporarily varying the pile gas composition and thus the effective graphite temperature. If this approach can be feasibly followed, the measurements can be made at little cost to production.

Assistance has been given to the Process physicists in setting up a program board for obtaining data using the Production Accounting IBM machine should it be shown that the allowable frequency will yield information to sufficient accuracy.

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HEAT TRANSFER

Cooling-by-Boiling Studies

Activities during the month were concentrated on planning for future tests, analyzing past data and disseminating information. The most immediate future tests will be performed at 1500 psi in order to obtain additional information on the effect of pressure on steam quality at burnout. Off-site attempts to correlate burnout data were investigated, but continued, negative results were obtained. To assist the many people who are utilizing the data obtained on the mock-up, a compilation of these data was issued as "Summary of Data on Boiling Flow from the 189-D Tube Mock-ups," C.R. McNutt, HW-34150, 12-15-54.

Equipment Procurement and Installation

Installation of the new generator itself was completed. However, one vendor failed to ship a specific component of the electrical bus, and thus completion of the bus system has been delayed. This component is now on the plant and the installation should be completed in January.

Equipment necessary to permit modification of the mock-up to withstand 1500 psi has been collected, and this modification will start early in January. The data procured from tests with this equipment will be very beneficial; however, due to equipment limitations, only a portion of the necessary data will be obtainable.

Continued efforts are being directed toward procurement of better heater and process tubes. Progress is being made, but further efforts are necessary.

Steam Power Loss at B, D, F, DR, and H

Experimental tests have been performed on the full scale process tube mock-up to study the effect of steam power loss at the B, D, F, DR, and H Piles. These tests indicate that such steam losses would definitely not result in slug melting for tube outlet temperatures below 115 C. Additional analyses are needed to confirm this belief, but it is anticipated that these analyses will not only do so but will also show that higher outlet temperatures are safe.

Higher Outlet Temperature Operation

Studies are being continued to evaluate the practicality of relaxing the panellit trip limits. The trips are presently set on a so-called "trip-before-instability" concept. Literally, this implies that each panellit is set to trip before unstable flow is established in the tube. Basically, the criteria is that the panellit should trip the safety circuit in time to prevent slug melting; it is known that use of the "trip-before-instability" concept will result in trip-in-time-to-prevent-melting for most cases of abnormal tube flow. However, experimental evidence has been accumulated which indicates that the use of the trip-before-instability concept leads to undue conservatism. Since permissible Δ t's based on panellit settings may limit pile power levels in the near future, these studies are being accentuated.

As higher tube outlet temperatures are reached, new problems may be introduced in the effluent piping. For example, steam-water flow through that piping might lead to pressure fluctuations which could damage the piping or significantly disturb the flow through the tube. These problems are also receiving high priority study.

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Hydraulics Laboratory Studies

An investigation was made of the effects of partial plugging of the K Pile venturis. Such plugging was encountered due to extrusion of teflon gasket material into the throat when construction forces plugged the second pressure tap during installation of the venturis on the pile. It was found that a maximum flow decrease of about 1 per cent could be expected, and the effect on panellit readings would be small. Greater effects would result from the plugging except for the fact that most of the teflon material is rapidly washed away under normal flow conditions.

An experimental study was made to determine the tube flow increases which would result if the pigtails purchased as a part of Project CG-482 were installed on H Pile. It was found that this increase would be about 2 per cent. Since it appeared that such an increase would not justify installation of the pigtails, a closer determination of the actual pile flow increase was not made. This information was reported as "Pressure Drop-Flow Characteristics of Project CG-482 H Pile Outlet Pigtails," H.H. Greenfield, HW-34006, 12-3-54.

Slug Studies

Plans have been made to install a thermocouple probe in the dummy section of a C Pile tube to be charged with internally and externally cooled tubes. This probe will be used to measure the effluent temperature from each flow channel and thus to verify the basic assumptions used in calculating expected heat flow distribution.

Loss of Pile Coolant

A study of the effects of loss of cooling water to an entire pile is being completed. The primary emphasis has been placed on determining the time-sequence of events that would follow the water loss. Cases for water loss during equilibrium operation and at 30 seconds, 30 minutes and 24 hours after shutdown are being considered.

Miscellaneous Problems

The graphite temperatures to be expected adjacent to the "A" test hole at H when the hole is loaded with the KAPL-120 device were calculated.

Several brief, informal studies have been made for people outside the Unit. The temperature distribution of a cored slug being irradiated in C Pile was estimated. Similar temperature distribution studies were made for the case of over-sized slugs. Calculations were made to determine the temperatures in slugs canned in anodized cans. Finally, a short investigation was made of the temperatures to be expected in slugs having very poor bonds over 15 - 25 per cent of the slug surface area.

An investigation was made for Manufacturing personnel to determine the number of slugs which could be carried in casks of sizes other than those of the present ones. It is expected that the use of different-sized casks could lead to significant economic savings.

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PHYSICS DEVELOPMENT

Prototype Physical Constants Test Reactor

The graphite components for the Prototype Physical Constants Test Reactor were satisfactorily layed up in the 189-D Building in preparation for pre-startup testing of the mechanical components. The vertical safety system has been installed, with the exception of circuitry, and will be tested early next month. The control system will also be installed and tested. The remainder of the mechanical components will be completed and tested where warranted prior to the February 1 target date for 305-B occupancy.

The design of the reactor was reviewed in detail to ensure that each design decision was the best which could have been made when primary emphasis is placed on safety of operations; the primary concern here is the consequences accompanying gross failure of equipment and/or procedure. The only major modification which will result is the elimination of limit switches as the mechanism for varying the speed of the reactor face along its travel in completing the reactor assembly. The three magnetic clutches (for driving at fast, intermediate and slow speeds) will receive their power from sliding contractors on "power strips" which extend only over the appropriate distance of travel.

Basic metallurgical difficulties have developed in the fabrication of Pb-U^{235} matrix foils for the "driver rod" fuel elements. Alternate fabricating techniques are now being explored by Metal Controls corporation personnel in collaboration with ORNL metallurgists and some change in specifications may be required. This difficulty will probably result in fuel availability being the factor determining the startup date for the reactor. The "leveling slug" and control rod fuel elements - Al-U^{235} alloy - are being fabricated at Oak Ridge and are on schedule.

Slug Rupture Detection

It was mutually agreed by Hanford and Radiation Counter Laboratory personnel to extend the delivery dates on the initial spectrometer units for CG-578 and 579 about two months to permit more adequate development and testing by the vendor. The first unit will be delivered March 15 and the full pile installation at H Pile will be made during May, 1955. The first turret assembly has been delivered and is now being tested.

Technical, Manufacturing, and Radiological Sciences are in agreement that the gamma monitor, as presently designed, will serve to monitor the rate of fission product release to the river. The calibration of spectrometer response in terms of fission product concentration is continuing as a cooperative effort between Technical and Radiological Sciences personnel.

The gamma monitor on the fuel element irradiation facility at the Materials Testing Reactor has performed satisfactorily. The first rupture in this facility was detected giving a full scale signal.

Document HW-34002, "Incipient Rupture Detection," R.S. Paul, was issued discussing the sensitivity of rupture detection devices to certain corroding materials which might be placed in thin layers between the slug can and an inner "sweater". This arrangement could give warning that the can had been penetrated prior to any actual

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attack on the uranium itself. The study indicated that most materials corroded too slowly or possessed radiations which are difficult to detect in the presence of normal backgrounds; uranium itself appeared to be the best choice for this thin sacrificial layer from a rupture detection viewpoint.

K Pile Startup

All Unit personnel have participated in the KW pile startup activities which were conducted throughout the major part of the month. The instrumentation monitoring the approaches to critical performed adequately as did the instrumentation and techniques employed in post-critical measurements. The only significant failure was in BF_3 proportional counters which were adversely affected by a high flux environment during certain phases of the tests.

Numerous measurements of neutron distributions in the lattice were completed satisfactorily to yield conversion ratio, fast effect, resonance escape probability and thermal utilization for fuel and target slug loadings of interest to Hanford in the 7.5 inch lattice. Attempts were made to evaluate parameters of particular significance wet and dry and, also, at elevated graphite temperatures. These data are now being analyzed.

The instrumentation for KE startup, scheduled early in February, is presently being developed; it will be quite similar to that employed at KW for the most part.

High Specific Power Irradiations

Reactivity and neutron traverse techniques have been employed in the Test pile to develop the conditions which would obtain as highly enriched fuel elements are irradiated in the Hanford piles. An assembly proposed by the ANP group at Evandale was studied as was an assembly proposed by a KAPL group in support of SAR development.

The ANP element consisted of 900 grams of U-235 placed in thin concentric cylinders spaced to permit forced air cooling. The fuel assembly is about thirty inches long and three inches O.D. A tentative analysis of the data show that the assembly will produce about 130 KW per foot of length when loaded in the center of C Pile. About 10 per cent of this energy will be absorbed in the graphite within one lattice unit of the assembly; this rate of energy dissipation in the graphite is about four times that from an equivalent length of centrally located uranium in C Pile and will require special provision for graphite cooling.

A similar study was made on an element designed by the KAPL group for the SAR program; the analysis of these data has not yet been completed. Both studies were made at the request of the Special Irradiations Unit.

Reactor Safety Project

North American Aviation personnel report that the major portion of the mechanical problems associated with the laboratory development phases of a "tamper-proof" in-pile safety fuse have been solved. Present efforts are directed toward the actual fabrication of an assembly which will contain $B^{10}F_3$ at 2000 psi in the triggered state and at 160 psi in the expanded state. Laboratory tests will ascertain the integrity of the assembly at elevated temperatures and over extended periods of time.

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The initial tests of this assembly in a radiation field are scheduled to be made in the Materials Test Reactor at Arco late next month. These tests will involve moving the assembly at constant speed through a flux which increases exponentially with position to simulate a rising period; attempts will be made to time the response of the element with respect to the flux increase.

The initial in-pile tests to ascertain the stability of the element to radiation damage are scheduled for Hanford in April. The timing and justification for this phase of the program is being reviewed by the Atomic Energy Commission prior to allocating the necessary funds. A series of Test pile experiments is planned for January to evaluate the effectiveness of the latest model of the fuse.

Test Pile - Routine Tests

Regular metal testing proceeded routinely. Sixteen Mallinckrodt billet egg lots yielded TDS values ranging from 10 to 14; ten Fernald billet egg lots yielded TDS values ranging from 12 to 18. Fifty heats of "C" slugs were tested giving dih values ranging from +7.47 to +8.24 with the average at 7.81.

EQUIPMENT DEVELOPMENT

Charging and Discharging Studies

Alterations to the nine tube flow mock-up were completed during the month and tests will now begin on the equipment for segmental discharge. Three different expanding splines have been received from vendors and these in addition to a special hold slug will be tested.

The changes made to the charging machines last summer are now being modified to replace the electrical controls to permit the use of coated perfs. One machine at C Area was modified utilizing mechanical linkages but this is being eliminated in favor of pilot operating valves to provide better and safer action.

Fabrication of equipment for the new charging and discharging flow mock-up has been started in the shops. The facility is designed for testing components and operations under high-pressure, high-temperature conditions.

No progress was achieved on the development of a method for segregating ruptured slugs due to the press of other work.

Horizontal Rod Studies

Engineering assistance was provided to Maintenance forces during installation of several of the replacement horizontal rods. These rods are being installed in anticipation of the scheduled shutdown to replace rods that are presently inoperative. At month's end it has been established that the seals which were ordered for these rods are incorrect. The design is such that severe galling or complete jamming of a rod is possible. Recommendations that these seals be changed have been made. All of the seals installed on the development rods continue to function satisfactorily.

The ribbed sphincter seal installed in June, 1954 on the "A" rod at C Pile was examined early this month. Although apparently in good condition in every respect, the seal leaked after being put back on the pile and was replaced. Several original sphincter seals were also examined and found badly damaged by the radiation. These were replaced with modified VSR seals.

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Vertical Rod Studies

The final report on the functional test of the K Pile vertical safety rods has been completed in rough draft form and is being circulated for comments.

The built-up washer seal on VSR 16C continues to operate satisfactorily.

The project proposal for a new Test Tower is being revised for re-submission to the AEC.

Supplemental Control

Document HW-33925, "Re-Assessment of Disaster Control Systems," was issued during the month. Preliminary tests on the rate of water flow through a section of VSR slot with rod and 3X Balls in it were run to determine the extent of water distribution from the hole. Preliminary results indicate that this may be a feasible method of introducing water into the moderator. Additional tests will be run.

A sample of a poison spline fabricated from 63S aluminum tubing and amphorous boron was irradiated at H Pile to obtain activity information. Shielding requirements were found to be quite large and decay periods rather long. Efforts are now being directed toward the use of 2S aluminum tubing which will be thrown away after one use. Samples of these splines using both amphorous boron and boron carbide as poisons are presently being irradiated at H Pile.

Process Tube Assembly and Piping

Flexure testing continued during the month on production samples of KE Pile pigtails. Some experimental 62S aluminum connectors have been fabricated by the vendor and these will be tested in the near future.

Construction of the thermal loop for high-pressure, high-temperature testing of flanges and tube joints was held up pending qualification of procedure and performance welding specifications for ASME code work.

No additional progress is reported on the program to establish maximum allowable tube pressures this month because of higher priority work. Four short samples of extruded and drawn zirconium process tubing were hydrostatically pressure tested to failure at room temperature. These samples were from the same tube but had been subjected to different heat treatments. Bursting pressures of these short samples indicated ultimate stresses in the range of 120,000 to 140,000 psi or approximately five times the strength of present aluminum process tubing tested under comparable conditions.

Equipment is being designed to test a venturi tube as the primary element for measuring steam quality in a boiling tube. These tests will be scheduled on the Heat Transfer Unit's equipment during tests to establish boiling curves.

Assistance was rendered to construction personnel on the evaluation of the K Pile Thermohm units. Several of the bulbs have been calibrated for vibration and will be installed and tested during the flow tests at KE Pile. A simulated flow test is scheduled on the 189-D K tube flow mock-up to obtain data on the affect of flow rates on the severity of vibration.

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Physical Constants Testing Reactor

The stationary section of the moderator has been laid up in the 189-D Building and the installation of mechanical components and test core assemblies is progressing satisfactorily. The main drive rack for the movable face is also being installed. Drawings for the flux leveling mechanism and boral shield are in process. Building construction is estimated to be one month behind schedule.

Other Engineering Development Work

Assistance was provided to K Pile start-up crews in the measurement of process tube expansion during dry temperature coefficient tests.

Bids were received and reviewed for the television equipment and instrumentation for the 105 B installation.

Additional rubber samples have been forwarded to the Special Irradiations Unit for exposure in the piles. These samples include new formulations and compounds not previously tested and some new gasket material being evaluated for Separations Technology.

Drafting work on the ruptured slug removal saw is now almost complete. Shop work is expected to start by the middle of January.

Several modifications were made this month to the core borer and several test cores were satisfactorily obtained. Further work is required to improve the seals and incorporate the temporary hydraulic and vacuum systems in the control panel.

Additional modifications are being made to the graphite mining equipment and when completed, the apparatus will be tested in the laboratory.

SPECIAL IRRADIATIONS

Statistical analyses are in progress to determine the uncertainty in the monitored exposure received by the slugs in a single process channel (Bluenose 0706-84). Plans are also being formulated for allocating the total exposure to individual slugs. This allocation will be based on a weaseling process.

Design activities in support of the KAPL-120 loop are essentially complete. Requisitions for all major components have also been submitted. Preparations for removal of the in-pile tube continue. The removal cave is now being installed on the X-1 level and the "concrete bathtub" into which the tube will be pulled for sampling is being built.

Prototype SIR and SAR fuel elements enclosed in a stainless steel vessel with NaK (KAPL 119) have been irradiated in the 305 Test pile to determine flux perturbations caused by these elements in a Hanford pile. Results of this study have been obtained and sent to appropriate KAPL personnel. Experimental fuel element sample cans are also being fabricated for mock-up studies. These studies will determine the degree of tube bowing that can be tolerated when these 40" long elements are charged in a standard process tube.

Activation studies are in progress to estimate the radioactivity of slugs composed of canned beryllium nitride after a one-year irradiation. The purpose of these irradiations (ORNL 184) will be to determine whether or not beryllium nitride can be

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discharged and recharged in much the same fashion that P-10 metal is handled presently. This technique in the handling of beryllium nitride would permit high concentration of the carbon-14 production to be built up.

Special thorium metal was discharged from tubes 2374 and 2379 in B Pile after reaching a desired exposure of approximately 1200 MWD/AT (DPI 103). The purpose of these irradiations was to determine dimensional stability of thorium slugs for the Savannah River Reactors.

A series of tests have been conducted in the 305 Test Pile to determine the feasibility of testing GE-ANP fuel elements for an aircraft-type reactor in a special facility in C Pile. Studies in the test pile were aimed at determining power generation in the ANP fuel elements, reactivity effects of the facility and elements, and the degree of gamma heating in the surrounding graphite. Preliminary results indicate that power generation in these elements would be approximately one third of that desired. Also it is estimated that the gamma heating would be approximately three times as much as a J-N pair under similar conditions. This amount of heating would probably be excessive unless special provisions for cooling were provided.

Preparation of experimental equipment pertinent to the study of reactions between pile gas impurities and zirconium alloys (HAPO 105) has been completed. The experiment will be charged in F Pile at the first shutdown in January. In a second portion of these studies one of a series of zirconium samples exposed to pile atmosphere in the center of H Pile was discharged and sent to the Radiometallurgy Laboratory for examination.

An experimental assembly for studying the effects of pile radiations on thermocouples (HAPO 156) has been completed. This assembly will be charged in the Snout I facility at H Pile upon completion of other work now in progress in that facility.

Trial runs have been made with the experimental equipment installed in the Snout I facility at H Pile to determine the cross section of neptunium-240. Some difficulties with satisfactory operation of this experiment have been experienced. It is estimated that actual attempts to make this measurement can be made in January.

As a portion of the KW Pile startup program, flux studies were made to determine experimentally rise factors for the new lattice spacing. Evaluation of the data obtained from these studies is now in progress.

Liaison in support of experimental facilities in the K Piles has continued. All facilities in KW Pile have been accepted. In KE Pile considerable time has been spent in giving assistance in support of achieving satisfactory operation of the pneumatic facility. This facility is acceptable now with only minor exceptions. The operation and performance of the facility with carriers of different materials was also determined.

Acceptance testing of the instrumentation for the water supply system at the C Pile test holes has been carried on over an extended period. Considerable difficulty has been experienced by Project personnel in achieving a workable system.

A mock-up for solving problems relative to charging and discharging new experimental facilities in the KE and KW Piles has been completed in the 189 D Building. Flow information for some of the new facilities has also been obtained.

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Pile Engineering Sub-Section [redacted]

Isotope production continues as scheduled. Extended assistance has been given in support of numerous research and development programs in the performance of in-pile irradiations.

P. H. Reinker

Manager, Pile Engineering
ENGINEERING DEPARTMENT

PH Reinker:mbs

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PILE MATERIALS SUB-SECTION

PILE GRAPHITE STUDIES

Effect of Helium on D Pile Distortion - PT 105-546-E

At month's end, the production test had received final approval and is now being issued. D Pile was shutdown on December 12 and 13 in preparation for the test. Vertical height traverses were taken from both front and rear faces on the center-top tube as well as both near and far top fringe tubes. Relaxation of Process Specification 31.01b to permit operation at 500 C maximum graphite temperature and up to 60 per cent helium concentration was granted in order to obtain a smooth transition from operation at outlet water temperatures of 95 to operation at 105 C. The production test relaxes the maximum outlet water temperature to 115 C on the basis of slug and tube corrosion (Process Specification 15) but does not permit exceeding the instability limit (Process Specification 11).

Graphite conditions since the December 13 shutdown have varied from 50 to 55 per cent helium with indicated maximum graphite temperatures of 460 to 480 C. Power levels have varied from 1010 to 1060 MW with a maximum outlet water temperature of 105 C.

Considerable water collection has occurred and finally necessitated a shutdown on December 21-25 for leak testing. No apparent loss of reactivity was detected during the high water collection period. A subsequent heat cycle after December 25 startup resulting from an attempt to raise power necessitated a shutdown on December 29. It is planned that power levels will be raised on or after January 4 to reach outlet water temperatures of 110 C. If predictions are accurate, this power level increase will result in a helium concentration of about 60 per cent at maximum graphite temperatures of 500 C.

Operation of C Pile at Higher Graphite Temperature - PT 105-548-E

A final rough draft of this production test has been prepared and is being circulated within the Manufacturing Department for their information and comment. Informal concurrence with the test procedures, objectives, and justification have been received from components of the Reactor Section.

Further shakedown runs appear necessary before the follower furnace for out of pile graphite oxidation study can be readied for use in conjunction with the above test. Full sized graphite bars, approximately 4" x 4" x 12", have been weighed and are ready for charging into the D test hole. Laboratory type samples are being prepared for monitoring oxidation rates as well as physical property changes.

In preparation for the full size bar loading, ten bars were discharged from the D test hole on December 2. The bars are currently stored on the X level of C Pile awaiting transfer to 300 Area for laboratory examination.

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Graphite Burnout Monitoring Program - PT 105-532-E (HW-29739 - 10/25/[illegible])

Samples were discharged from channel 4165-H and 2577-H on December 20. Initial measurements indicate burnout rates of less than 0.5%/1000 days for small diameter (0.426 inch) samples and 0.15%/1000 days for large diameter samples (1.25 inches). The exposure period was from July 17, 1954 until December 20, 1954; a total of 137 effective days. The helium concentration varied from 30 per cent to 50 per cent while exposure temperature was in the range of 415-470 C. These data are comparable to those previously reported.

Data obtained from samples exposed in channel 2577-H are erratic and the samples are being desiccated to obtain constant weights.

A summary of loadings at each pile for graphite burnout monitoring is shown below.

Pile and Tube Number	Date Charged	Expected Discharge
B - 3461	9-21-54	January 1955
C - 1960	10-27-54	January 1955
D - 3478	8-18-54	January 1955
DR - 0965	10-19-54	February 1955
DR - 2577	11-17-54	February 1955
F - 1075	9-15-54	January 1955
F - 3580	9-15-54	January 1955
H - 4165	12-20-54	April 1955
H - 2577	12-20-54	April 1955

An interim report on this production test has been prepared and will be issued within a week.

Pile Distortion

In addition to the vertical height traverses taken at D Pile, traverses have been obtained at F Pile on December 14 and at H Pile on December 20. All center traverses continue to show a decrease in elevation. The center portion of the top center tube at H Pile, 4674-H is now approximately 0.5 inch below lay-up elevation.

There is some indication that the front fringe zone of F Pile may have annealed since the last measurement was made. Attempts to correlate front face graphite temperatures with distortion trends are continuing.

PILE COOLANT STUDIES

Production Tests

The four tubes at C Pile operating at high outlet water temperatures under PT 105-519-E operated satisfactorily and without incident this past month at an average outlet temperature of 106 C. It is planned to raise the outlet water temperature to 115 C during the next month.

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The far side of D Pile has operated throughout the month without incident under PT 105-542-E which authorizes 0.5 ppm of sodium dichromate in the water to one-half pile. This test has now been in effect for six months.

A supplement to PT 105-539-E has been written to authorize the exposure of 300 tubes of A and B lot metal at 105-H until three ruptures are incurred in each group. This supplement is being circulated for approval signatures.

Two 63-S, 72-S, clad, process tubes have been installed in F reactor under PT 105-543-E. Seven more 63-S, 72-S clad, tubes are available for immediate installation by the Manufacturing Department, two at 105-D, two at 105-F and three at 105-H. These seven tubes were tested with the sonizon instrument during the month to ascertain pre-exposure wall thicknesses. Additional information on 63-S tube in-pile performance can be obtained from three unclad 63-S tubes still in H Pile from PT 105-313-14-M and presently loaded with aluminum dummies. One of these tubes will be removed and examined, and a supplement will be written to PT 105-543-E authorizing the recharging of the remaining two tubes with production material.

Corrosion Monitoring

Eleven process tubes were examined during the month. Except for five tubes removed from C Pile which had been severely damaged by C metal chattering, no new or unusual corrosion was observed.

Twenty-three charges of C metal discharged from 105-C reactor were examined. Nineteen of the twenty-three charges showed evidence of having chattered in the process tube and of the nineteen damaged charges, nine contained slugs which had been severely damaged. Ruptured slugs were found in seven of these charges. It is postulated that to produce slug chattering of C metal it is necessary to first cock the slug and then have a water velocity high enough to cause the slug to flutter or chatter. In the flow laboratory it has been previously demonstrated that low density slugs are easily cocked by allowing the slugs to wash down against the end cap when the water is turned on. This method cocks the upstream pieces more readily than the downstream pieces; a fact that supports the in-pile observation which showed that the most severe damage occurred in the upstream half of the charge. To minimize C metal chattering it was recommended that the C metal columns be splined forward and then seated on the rear end cap before start-up, and the flow to the C metal tubes in the pile be reduced as much as possible.

Water collection rates at D and F Piles have increased greatly in the last few weeks. Water removed at the gas driers increased from approximately 30 pints/day to 80 gallons/day at D and 100 gallons/day at F. Since no reactivity loss was coincident with the water leakage, it is assumed that the leaks are not located in the active zone. At D Pile, where three rear nozzles were removed for Van Stone flange inspection, two of the three Van Stones were cracked and leaking. After putting rubber bands behind the Van Stone flanges next to the gun barrel and regasketing the nozzles, these tubes did not leak under a 100 psi pressure test. The cause of these leaks is attributed to pitted or split Van Stone flanges. The modified borescope will be used to examine rear Van Stone flanges at D and F Piles to determine their condition.

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Laboratory Corrosion Studies

The test of various aluminum alloys that hold promise as possible tube materials is continuing in the 105-D flow laboratory minitube mock-ups. Corrosion data at 115 and 135 C are being obtained on the following alloys: 61-S, 63-S, 56-S, 66-S, A54-S, Lurium 5, Lurium 10, M-257, M-276, and M-329.

After 44 days of operating time, data from the test to determine the effect of large and small grain aluminum on aluminum corrosion have confirmed the data reported last month, obtained at operating times of 20 and 36 days. After 44 days at 110 C the small grain aluminum jackets continued to corrode ten times faster (0.95 mils/mo) than the large grain jackets (0.09 mils/mo).

Another laboratory test on the effect of grain size on aluminum corrosion has been started. Slugs obtained from the Fuel Technology Sub-Section were canned under conditions which should make differences in aluminum grain size the only variable. These slugs have been exposed to 110 C process water for 15 days. The first set of data from this test will be available after 20 days of operation.

WATER PLANT DEVELOPMENT

Recirculation Studies

The in-pile loop at 100-H operated at 180 C until discharge of the aluminum jacketed slugs in the zirconium tube. The slugs were exposed for 78 days and showed some evidence of pitting attack, possibly due to contact with the zirconium tube. The similar load of slugs was recharged and is now operating at 200 C outlet temperature, with a short run of fourteen days scheduled at that temperature. An investigation was begun to evaluate various techniques for lowering pH in the loop water to reduce aluminum corrosion rates at the higher temperatures. A study of the activity from the by-pass deionizer showed that the primary sources of activity in the resin are sodium and copper.

ELMO-2 was discharged after 70 days operation at 185 C, using aluminum slugs in a zirconium tube. The slugs were in good condition and after electrolytic cleaning showed corrosion rates of less than one-half mil per month. The zirconium tube appeared to have been cleaned during the test; no corrosion effects were apparent. Aluminum dummy slugs exposed for six days in 260 C recirculating water showed a weight gain of 1 mg/cm^2. The slug surface appearance was similar to a black anodized coat.

Development of apparatus for sampling high temperature, high pressure systems continued in cooperation with the Chemistry Unit and off-site vendors. Fabrication of a high pressure conductivity cell was completed. Procurement of two vendor fabricated loops continued; delivery is expected during the second quarter of 1955.

A slug rupture test was conducted in ELMO-4 at 250 C. A slug with a hole drilled through the jacket failed in four hours and visibly bulged a heavy wall stainless pipe, completely blocking the water flow. Analysis of the loop water is now in progress.

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Construction of the 1706-KER Recirculation Facility was resumed and excellent progress was noted in concrete and structural phases of the facility. A final design of the KER process tube was obtained following a trip to Westinghouse Atomic Power Division for zirconium strength data and a series of conferences at Superior Tube Company and Bridgeport Brass Company. Continued study of back-up safety features for the KER loops is in progress.

Boiling Studies

No in-pile boiling tests were conducted this month. Present high specific power of slugs in the H Loop limits allowable steam quality to the extent that little useful data can be obtained. Primary effort in the future will be directed toward modification of a single pass in-pile system of 1706-KE for boiling studies. Use of a fringe zone tube and increased pressures will permit sufficient effluent steam qualifies for test purposes.

Boiling loop KLMO-3 has been refitted with a process tube following the ruptured slug experiment, and various methods of decontaminating the loop are under study. The simulated boiling test using 40 per cent steam quality at 190 C was discharged after 18 days operation. The aluminum jacketed slugs were in excellent condition and showed a corrosion rate of about one-fourth mil per month.

Flow Laboratory

Operation of the five in-pile tubes at 105-D Flow Laboratory continued. Tests at pH 7.0, 6.6, and 6.2, with 2.0 ppm dichromate proceeded satisfactorily; film formation rates are small, and no purging has been required. Correlating mock-up tests at pH 7.0 and 6.6 and 120 and 150 C showed continued significant improvement in corrosion rates as pH is reduced. Steel coupon corrosion tests are in progress at pH 7.0 and 6.6 with 2 ppm dichromate and 90 C. Visual examination shows the coupons to be in good condition after two weeks' exposure.

Construction of 1706-KE Semi-Works continued. All major equipment items are on site and are being installed. Acceptance tests of the facility are scheduled during February, 1955.

Plant Tests

Slugs discharged from the low pH (7.3) at 100-F showed corrosion rates one-third to one-half of those to be expected in normal process water. Slugs concurrently exposed on the side of the pile using normal process water exhibited normal corrosion rates.

GRAPHITE AND MATERIALS DEVELOPMENT

Controlled Temperature Irradiation of Graphite - DT 105-538-E

One 20 C and two 80 C graphite irradiations have been completed. The physical expansions of the various graphites which were measured are listed in Table I.

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Table I
Controlled Temperature Graphite Irradiations

Graphite Type	No. of Samples	Physical Expansion, % Change in Length 60 MD/CT at 20 C	60 MD/CT at 80 C	120 MD/CT at 80 C
KC	1	0.04	0.03	0.06
CSF	1	0.04	0.02	0.05
SGBF	1	0.03	0.02	0.03
#4 Korite Coke	4	-0.02	-0.03	-0.03
Pitch Coke	2	0.05	0.00	0.05

It appears that the expansion rate of graphite irradiated at 80 C is one-half to three-fourths that at 20 C. Further exposure of these samples is scheduled when the snout facility is again available. Possible damage mechanism explanations will be attempted when C_o measurements are completed.

Effect of Pile Operation On Graphite, PT 105-1-P

During construction of the piles, samples of the various graphites which were used were taken for irradiation evaluation. Cold test hole exposures of the CSF traverse samples now indicate a second increased rate of expansion above 2200 MD/CT. The first increase appeared at 900 MD/CT. Whether the rate increased gradually over the entire exposure period or changed abruptly near 900 and 2200 MD/CT cannot be determined yet. Contrary to this observation the CSGBF samples, also from pile materials, have not demonstrated this increasing rate of expansion up to exposures of 1500 MD/CT. These results should not be evaluated in terms of graphitization temperature alone because the effect may be due to the specific raw materials in each case. A series of samples to investigate this point are being irradiated.

Variation in Graphite Physical Properties with Graphitization Temperature
(Samples fabricated at Battelle Memorial Institute)

A second exposure period has been completed on a series of Texas coke graphites with varying graphitization temperatures ranging from 1800 C to 2700 C. Up to a total exposure of 1000 MD/CT at irradiation temperatures below 40 C measurements indicate that dimensional instability is almost independent of graphitization temperature. If this result can be confirmed, then it will be possible in future procurement efforts to alter graphitization temperature in order to attain a specific desired thermal conductivity or to attain improved nuclear purity.

C Pile Uncooled Test Hole

Construction of the sample containers and retrieving cave is near completion. The facility will be available in approximately two months.

High Temperature Irradiation Facility

The preliminary design of the facility to be installed in the L42 position of the MTR has been completed and drawings prepared. Concurrence in the design

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details will be sought in discussions with MTR personnel scheduled for the first week in January. Control equipment is now on order with the exception of recording wattmeters which were eliminated in order to reduce costs.

Pile Graphite Sampling Device

Laboratory testing of the modified core borer for sampling pile graphite showed it to be satisfactory and ready for use in conjunction with PT 105-537-E that will go into F Pile on January 10.

Thermal Annealing of Damaged Graphite

Low temperature X-ray measurements up to 300 C are being continued on damaged graphite to determine the annealing kinetics. Various methods are being applied to the analysis of the data so far obtained. An enclosure for the samples is being constructed which will permit high temperature X-ray measurements in an inert atmosphere in the neighborhood of 1000 C.

Infra-red Spectrum of Radiation - Damaged Graphite

A preliminary infra-red investigation of graphite is being made to search for useful absorption bands. It is expected that undamaged graphite will be opaque to infra-red radiation out to quite long wavelengths. However, there is reason to hope that damaged graphite will be transparent at somewhat shorter wavelengths in the experimentally accessible region of the spectrum. Such a discovery may prove to be a valuable research and monitoring tool.

Dimensionally Stable Graphite (Samples fabricated at Battelle Memorial Institute)

Measurements on No. 4 Korite coke-standard pitch graphite, pitch impregnated to give a density of 1.6 g/cc, indicate an expansion of 0.1 per cent after low temperature irradiation of 900 MD/CT. CSF graphite, when subjected to the same exposure conditions for the same exposure period, exhibits an expansion of 0.5 per cent. Previous results on No. 4 Korite coke- Korite pitch graphite of density 1.24 g/cc indicated about 0.1 per cent expansion at this exposure. These results suggest that only a slight variation, if any, in dimensional stability is caused by altering the binder and raising graphite density.

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FUEL TECHNOLOGY SUB-SECTION

FUEL COMPONENT DEVELOPMENT

Quality Control

A program was established to provide a quality control sampling of uranium slugs processed at HAPO. It is particularly pertinent that with the present production commitments, several different sources of uranium are employed. Preliminary data from this program have indicated differences in hydrogen contents from various uranium sources as discussed below, but so far have shown no gross differences in the chemistry or texture of the heat treated material.

Ingot Quality Studies

Additional slugs from the ingot quality studies employing pickled and non-pickled derbies have been canned. Pile charging by the lot system is planned. These will be studied after irradiation if it is pertinent to do so at that time. Uranium from dingot sources is continuing to be evaluated here. The hydrogen content of such material remains high and should be reduced in production material. Reactivity tests continue to show that dingot material has substantially higher reactivity than other sources of production uranium.

Hydrogen in Uranium

Considerable effort is underway with Fernald to avoid hydrogen pickup in the rods heat treated in their new furnace. On the basis of HAPO's experience in heat treatment that a chloride salt results in less hydrogen pickup than a carbonate salt, Fernald is presently charging their old furnace with the chloride. Other work at Fernald and more particularly at MCW is directed to achieve low hydrogen content in uranium prior to rolling and heat treatment. Action taken at MCW includes; improvement of vacuum practice, and removal of water from furnace charges.

Extrusion of Uranium

Investigations conducted during the development extrusion in December demonstrated that the water quench as the tube leaves the die was severe enough to cause thermal stress failure at the lead - end of the rod. Reducing the severity of the quench (which had been increased in October) consistently produced rods free of any end cracking and of acceptable grain structure. These results were confirmed by the successful extrusion of 32 rods to fulfill the December pilot lot commitment. Inspection of hollow slugs extruded at Adrian during the months of October and November indicated the occurrence of radial cracks in some of the slugs. No cracking has been observed prior to this material except in lead - end crops. A total of 3424 slugs were machined from rods extruded in October and November.

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Of these, 826 (24 percent) were rejected for metal quality reasons. The percentage rejected for cracks is not known but re-inspection is underway. During this period, 35 percent of slugs from rolled rod were rejected for metal quality reasons.

Uranium Alloys

Uranium - 3.5 a/o chromium, 1.5 a/o silicon and .5 a/o titanium ingots have been prepared and are awaiting extrusion in January at Adrian, Michigan by Bridgeport Brass. Other binary alloys are under laboratory study.

Jacketing Components and Process Tubes

The contract being considered between HAPO and the Aluminum Company of America for the development of the extrusion tube reducing forming technique for the manufacture of process tube from more difficultly worked alloys has been cancelled because of budget restrictions.

Cans and caps of the high purity aluminum - magnesium alloys (trade name, Lurium S - 0.5 percent magnesium, and Lurium 10 - 1.0 percent magnesium) were received from Alcoa (who fabricated the components from material ordered by HAPO from the Fromson-Orbon Company). Preliminary inspection indicates a general poor surface quality. No other data have been obtained. Alcoa reported they had difficulty during the fabrication with tool breakage. They also indicated the same difficulty with a quantity of components of the XD50S alloy ($\sim$ 0.75 Mg. - Al) which was ordered by HAPO. These materials together with the 63S aluminum are being investigated as alloys having improved corrosion resistance over the standard M-261 or M-329 (Alcoa designation) Hanford component alloys.

Alpha Phase Grain Refinement

It was observed during the course of study of the outgassing employed at Hanford that slight grain refinement (to a depth of approximately 1/16th inch) occurred on the periphery of slugs given the standard treatment (610 C $\pm$ 10 C for 4.8 minutes). At temperatures from 610 to 655 C and for times of 4.8 to 15 minutes various degrees of completion of the refinement were observed. Grain refinement of the entire slug occurred when heated at 650 C for 12 minutes. Grain size measurements of such samples show refinement of the outer periphery from the original .09 - .11 mm. to .04 - .05 mm. and in the center from the original .1 - .2 mm. to .07 - .08 mm. It is further pertinent to note that the refined grains appear far more equi-axed than grains of normally processed material. During other investigations it was observed that the grain refining phenomena is independent of the quenching rate from the annealing temperature. It would appear then that the high alpha anneal could easily be incorporated in production procedure if other metallurgical properties prove to be favorable.

Heat Treatment of Uranium

Equipment is being set up to heat treat enough material by induction heating to compare this material with the salt bath heat treated material. A heat treating

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rate of 20 linear inches of uranium rod per minute is possible with the 200 KW TOCCO unit. More extensive and rapid heat treating rates may be possible with refinement of the electrical circuitry.

Uniskanning

Data are currently being collected to provide design information to simplify scaling up of the uniskanning process. The roll frame being employed utilizes resistance strain gages to measure roll forces, uses stroboscopic photography to follow the metal flow, and also permits the inclining or canting of the roll axes so additional information can be gathered about this variable. The uniskanning of various materials including austenitic and ferritic stainless steel, gray cast iron, brass zirconium, zircaloy-2, and cold rolled steel is being carried on to study the crystal structure resulting from the uniskanning process.

FUEL ASSEMBLY DEVELOPMENT

Status of Production Canning

About 80 percent of the uranium slug cores lead dip canned in December were uranium cast and rolled at Fernald. About half of this uranium was heat treated in rod form in carbonate salt at Fernald, the balance in slug form in chloride salt at Hanford. As has been necessary in the past several months, all slugs have been outgassed in chloride salt to mitigate braze layer porosity except those of Fernald metal heat treated in chloride salt.

The "C" process producing unbonded slugs was used for production of "C" alloy enrichment slugs.

Fabrication of Dip Canned Cored Slugs

Production of dip canned, cored slugs was started this month. Production was interrupted, however, after canning about 850 slugs following two slug failures in the duplex bath - the latter of these causing a severe eruption of the bath metal. These are undoubtedly due to inclusion of process solution in the core of the slug. A revised schedule of operations in which the ends of the cored slug are sealed after last contact with process solutions is being tried. This involves welding the end plugs into the core in a helium atmosphere to avoid oxidation. Such slugs can be lead dip canned directly after welding. Because it is likely that slugs with gross amounts of Al-Si in the cores will fail in the piles, processing techniques, inspections, and non-destructive test methods are currently being developed to assure that lead-dip canned, cored slugs sent to the piles will not contain large amounts of Al-Si.

Hot Press Canning

One tube of hot pressed, nickel-plated, diffusion bonded, solid fuel elements was discharged from C Pile as scheduled at an exposure level of about 300 MWD/T. These slugs will be visually inspected. Exposure levels of seven other tubes

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of similar material was about 400 MWD/T at the end of the month.

One hot pressed piece similar to those being irradiated at C Pile (except for being four inches in length rather than eight inches) was discharged from the MTR at Arco at an exposure of approximately 700 MWD/T. It had been operating at a specific power of about 50 KW/ft. Visual examination revealed no changes in the appearance of the piece.

Exposure level of four tubes of hot pressed, nickel-plated, diffusion bonded, cored fuel elements (externally cooled only) was about 400 MWD/T at the end of the month.

One tube of hot pressed, nickel-plated, diffusion bonded, hollow fuel elements (internally and externally cooled) was charged into C Pile January 2 for scheduled exposure to 400 MWD/T. Principal data to be obtained from exposure of this tube will be the temperature rises in the cooling water from the tube and the annulus of the column of slugs.

The last two tubes of a 35 tube charge of hot pressed canned, diffusion bonded, diffusion closed (no fusion weld) "J" pieces charged in February, 1954, have been discharged at an exposure of about 1200 MWD/AT (at about 25 percent burnout). No failure occurred in any of the 35 tubes of this material or in the Al-Si bonded and unbonded tubes of "J" pieces irradiated simultaneously.

The 16-unit gang press for producing hot pressed fuel elements has been assembled and operated to press aluminum dummy pieces. Operation was generally satisfactory. The temperature control system for the die block and the temperature distribution within the die block appears adequate. The gang press is currently being held in stand-by condition. Design and fabrication of the loading and handling system, the die preheat furnace, and the quench tank have been interrupted pending further development principally of cored and unbonded fuel elements.

A portion of the data on internally and externally cooled fuel elements obtained during the K Pile start-up tests has been made available. Unplated fuel elements of similar configuration to those charged in C Pile gave no change in pile reactivity when compared to standard production material. The effect on reactivity of the nickel plate is not available at this time.

A double acting punch which hot works the cap and can during the hot pressing operation shows considerable promise for making cap to can closures superior to those previously obtained in hot pressing. Furthermore, it is indicated that such closures may be obtainable with much less critical can and cap preparation procedures. Samples of such closures are currently being evaluated to determine the reproducibility of the operation and performance in accelerated corrosion tests.

Preliminary investigations of a process for hot press canning insulated fuel elements is being done using cans with anodized interiors. Successful diffusion welded closures have apparently been obtained with these anodized cans by hot

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working of the cap and can with the double acting punch described above. A degreasing operation was the only surface preparation given to the cap and can.

Cold Closure Canning

Cup dimensions and die sizes for producing nominal eight-inch long fuel elements by the cold point closure method have been established. Five 1.336 inch diameter solid uranium cores, 8.4 inch long have been successfully sized into aluminum cups. Additional cups of the proper dimension have been ordered. Design of a rotating sizing die table for use on the sizing press has been completed.

Uranium Machining

A series of tests were performed on drilling 3/8 inch holes through eight-inch uranium cores at temperatures of 300 C to 450 C to confirm the expectation that drilling at raised temperatures was much easier than at room temperature. The best drilling conditions from the standpoint of drill wear and general drilling characteristics were obtained at a temperature of 400 C with a drill speed of 20 rpm and a machine feed of .011 inches per revolution. The tests proved the ability of cobalt drills to withstand the high temperatures and the loads imposed.

Fuel Element Pilot Plant

The Phase II, interior construction portion of the Fuel Element Pilot Plant is 97 percent complete. Acceptance testing of equipment, ventilation, lighting, etc., is expected to start December 27, and be completed during January, 1955.

The Pilot Plant project is currently being revised to incorporate the following change of scope: (1) the deferment of the semi-works equipment, (2) the installation in the Pilot Plant of pre-irradiation measurement equipment (Building 305-A), and the 3706 Building laboratory plating equipment, and (3) additional office space.

FUEL EVALUATION

Thermal Cycling Studies (Woodsplitter)

The temperatures attained within an internally-externally cooled bare uranium slug during thermal cycling were measured with thermocouples to obtain a radial temperature distribution. Dimensions of the slug were 8.4 inches long by 1.41 inches O.D. by 0.437 inch I.D. At a specific power of 150 KW/ft uranium and a cooling water flow of 30 gpm, the maximum temperature of 400 C was achieved approximately midway between the inner and outer slug surface and the gradient was parabolic. At about the same specific power and water flow, the maximum temperature achieved in a solid slug was 660 C.

In connection with a statistical analysis of relationships between the quality of bare uranium slugs as classified by the MIZ-2 and by their performance in the woodsplitter, it was observed that 10 slugs of the same classification exhibited a three-fold variance in the number of cycles-to-failure, and the values were

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fairly evenly distributed over this range. A 90 percent confidence limit band for the median value of cycles-to-failure was +20% - 15% for 20 samples and broadened as the number of samples decreased to a +100% - 30% for only two samples. This provides a rough guide for test planning. Evaluation of individual test data should be made to confirm adequacy of the following in each case until better bases are available:

(1) There is little to be gained in accuracy of results by using over 20 samples.

(2) Results from 5 to 10 samples are probably adequate for most tests, with 90 percent confidence limits at about +35% -20% from the observed median.

(3) Data from less than five samples should be used with caution, since median value of cycles-to-failure might be as much as two-fold in error.

Status of Lead Dip Canned Uranium

About 800 tubes of B-lot slugs (lead dip canned rod heat treated) are in the 600 to 900 MWD/T exposure range and an additional 400 tubes are at 500 to 600 MWD/T. B-lot slugs have sustained two failures, a side failure in 105-C at 190 MWD/T and a cap failure in 105-H at 810 MWD/T. Irradiation experience on slug heat treated material (L and N lots) is meager with about 700 tubes charged in B, D, and H Piles in November and December. At this level of experience, the following temporary comparisons may be made:

(1) In number of slugs and severity, the B-lot irradiation experience is equal to or greater than that of the 25-M production test. The exception to this is the high tube power (700-800 KW/tube) which the 25-M material experienced in C Pile. (One-half of the thirty-six 25-M failures occurred in C Pile.)

(2) The high failure rate of 25-M has not been repeated. B-lot performance appears roughly comparable to production test 7-M (also rod heat-treated), and to groups 9, 10 and 11 and triple dip material.

Deformation of Irradiated Slugs

The compilation of data for statistical analysis of the irradiation behavior of triple-dip slugs from PT-10-M was completed this month. These data are being used primarily to determine the numbers of slugs needed to significantly detect given changes in slug dimensions and warp.

A preliminary inspection of warp and diameter data from Profilometer measurements show an increase in warp and distortion with exposure. A summary of the data is given in Table I. Bumping is arbitrarily defined in these data as the difference between the maximum and minimum diameters read on a given slug. Warp measurements show the amount of deflection of the center of the slug from a straight line contacting the two ends.

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TABLE I

EFFECT OF PILE EXPOSURE
ON WARP AND BUMPING OF TRIPLE-DIP 8 INCH SLUGS (PT-10-M)

Tube Exposure	Slug Position*	No. of Slugs Measured	% Slugs Warped >20 mils	% Slugs Warped >30 mils	% Slugs Warped >40 mils	% Slugs With Diameter Differences >15 mils	Max. Δd Measured (mils)	Max. Warp Measured (mils)	% of Total Measured With Δd >15 mils	% of Total With Warp >20 mils
400	1-10	30	0	0	0	3	20	13		
400	11-21	33	0	0	0	0	13	18	1	0
400	21-32	33	0	0	0	0	13	15		
600	1-10	50	0	0	0	0	18	18		
600	11-21	55	5	2	0	16	29	32	7	2
600	21-32	55	2	0	0	4	30	21		
800	1-7	39	15	0	0	13	26	24		
800	8-13	33	12	3	0	30	23	39		
800	14-19	30	23	7	7	23	25	42	12	16
800	20-25	54	24	9	4	7	19	46		
800	26-32	54	6	0	0	6	17	30		

* Slug # 1 is farthest downstream

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By comparing the data with a plot of the intensity of radiation measured on each slug, it was found that pieces which warped over 20 mils were those which experienced the highest flux and the greatest difference between the uranium core and surface temperatures. This maximum occurs just downstream from the center. At 800 MWD/T, 67 percent of the slugs at position 13, 14, and 15 were warped greater than 20 mils. The section of the tube where slugs appear most likely to bump is downstream of center in regions where the uranium surface temperatures are greatest. However, these measurements may reflect non-uniform corrosion of the aluminum jackets rather than or as well as bumping.

The distortions were not severe enough to indicate operational problems up to 800 MWD/T and 600 KW/tube. To further study this type of material, its breaking strength will be measured and additional slugs which experienced higher powers will be examined. Comparable examination has begun on rod transformed lead-dip material. Preliminary data show this type of slug more prone to warp than 10-M pieces, but less apt to exhibit bumping.

105-C Metal Examination Facility

Fabrication and shop testing of the slug cleaner has been completed. The slug cleaner is for removal of oxides and water film from the slug jacket surfaces, to permit accurate examination. This equipment will operate on a timer-controlled cycle and use a hot five percent phosphoric acid - three percent chromic acid cleaning solution.

The slug packager, which will be used to seal bare and broken slugs in crimped aluminum tubing preparatory to transfer to the 200 Areas, has been fabricated.

Fabrication of the cartridge crane has been completed. This crane is a simple mechanism for handling slug cartridges in the storage area.

TESTING METHODS

MIZ-1 - Eddy Current Penetration Detector

During the month 1354 fuel elements were tested with the new MIZ-1, Model 2 by Metal Preparation Section personnel. The resulting 31 rejects were not re-checked for penetration due to difficulty with the operation of the "Penetrator".

The new MIZ-1 is used daily in the 313 Building for spot checking production fuel elements. The first truck of fuel elements (60 fuel elements per truck) canned by each of the three lines at the beginning of every shift is tested; thereafter at least three fuel elements from every truck are spot checked by MIZ-1.

In order to reduce instability caused by vibration of wiring in the balancing system, a new more rugged balance box is being fabricated by the Electronic Shop.

Operation of the switching system for opening and closing the rejection circuit while the fuel element is beneath the probe, has been temporarily modified to stop false reject signals caused by switch failure until the new switching

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mechanism has been tested and installed.

MIZ-4 - Nickel Plating Thickness Measurement

The thickness of the nickel plating samples used last month in laboratory tests of a new eddy current device, MIZ-4, were measured by micrometer and found to lie between 0.2 to 1.3 mils. The data, originally plotted using estimated thickness based on electroplating information, were re-plotted using the actual thickness measurements. The new data indicated that the MIZ-4 instrument readings are more linear with respect to thickness than shown by the original curve. Design data are available so that an instrument of this type may be fabricated with a minimum of additional development work.

Power Loss in Proposed Woodsplitter Coil Shield

Calculations of power loss in a proposed safety jacket for the woodsplitter coil, (200 C recirculating coolant test equipment) were made. Under full load conditions about 5000 watts would be dissipated in a cyclindrical non-magnetic stainless steel shield having an inside diameter of 12 inches, length of 17 inches and a thickness of 3/8 inch.

Ultrasonic Unbond Test

An objectionable feature of the Sonobond, from the view point of normal production slugs, is its sensitivity to small voids in the Al-Si layer. In an effort to reduce the large number of slugs which the instrument rejects for this reason, a count rate circuit has been developed and evaluated. While the counters previously used totalized the void areas over the entire area of the slug, the count rate circuit delivers an output pulse whose amplitude is a function of the size of the unbond area.

In testing some 800 slugs with this modification, 22 percent were rejected by the Sonobond while 1/2 percent were rejected by the frost test. Stripping of 20 of the Sonobond rejects--frost test accepts revealed void areas both smaller and larger than one square centimeter.

A new instrument has been completed by the Electronic Shop and is being checked out in preparation for its use in the 313 Building.

Mechanical Development

The design of an Automatic Dual Test Conveyor, formally referred to as the "Cabinet Conveyor", is well underway. Detailed drawings are being made of the cabinet, containing the sink for the underwater testing gear, the instrument panel, and the sliding racks for the electronic equipment. Detailed drawings of the conveyor should be complete by the end of the month.

To expedite fabrication of the Automatic Dual Test Conveyor the motor, the gears, and rubber drive rolls have been ordered. The pneumatic cyclinders will also be ordered as soon as the reject mechanism design is well established.

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Fuel Technology Sub-Section

A new cam actuated MIZ-1 switch has been completed and looks more reliable in respect to accurate timing of the MIZ-1 alarm suppression than the present one, but final tests have yet to be made.

MIZ-2 - Eddy Current Crack and Inclusion Detector

Final alignment of the MIZ-2 instrument has been completed; the new coil has been mounted on a wheel-type conveyor, and the equipment has been moved to the 313 Building for preliminary tests. The equipment appears to be quite stable in operation and an attempt will be made to classify a large quantity of production slugs.

A statistical evaluation has been received on the segregation of "Zyglo-Perfect" slugs. Samples from this test were run to failure in the woodsplitter and examined chemically and metallographically. According to the data there is a significant correlation between the MIZ-2 (crack and inclusion detector) classification of these samples and the number of cycles to failure in the woodsplitter. This correlation is unexpected, since the material tested was pre-selected as the best visual quality available. MIZ-2 distinctions were small and not expected to be significant. There is also a significant correlation between the MIZ-2 classification and the carbon and iron content of the samples.

Sonic Test Instruments

An instrument for automatically measuring the internal friction of a uranium sample through the exponential decay of its resonant vibration has been breadboarded. At present there appears to be some serious bugs in its operation which must be ironed out before evaluation can be done.

Sonic Testing

A pile test was initiated last month to compare the stabilities of the extreme circle four slugs segregated by sonic techniques. This required the testing of 2000 circle four slugs of which 210 were originally retained. These were further eliminated until a final total of 112 slugs were kept for pile testing. These final slugs were then completely measured by sonic methods and will be tested by MIZ-2 before being canned. It is interesting to note that one slug was quite different from the others and showed the characteristics of a slow quench. The slug adjacent to it as indicated by the slug numbering system appeared to be normal circle four material.

Twelve slugs that were given different time and temperature anneals were checked before and after annealing. The results indicate that the different anneals given this material did not affect the orientation.

COATINGS AND CORROSION

Flow Cup Laboratory

The 40 C and 60 C data from the Flow Cup Laboratory were analyzed by D. W. Gaylor of the Statistics Unit. He concluded that the only significant difference be-

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tween alloys shown at 40 C and 60 C was that 24S aluminum was worse than the other alloys by a factor of two or three.

During the next month, the Flow Cup Laboratory will be dismantled and all useable equipment will be transferred to 300 Area. Fundamentally, the Flow Cup Laboratory was built to study differences between alloys and combinations of alloys, and these differences are very small. Over half of the effort went into galvanic studies, but results have shown that galvanic phenomena between aluminum alloys were not important in our systems.

Thermogalvanic Corrosion

Report HW-29067, Thermogalvanic Corrosion of Aluminum, was reissued as a formal report. The only revisions were a more explicit proof of the existence of thermogalvanic potentials as a necessary consequence of quantum statistics, and a generalized diffusion equation to indicate a possible mechanism for galvanic currents.

The Effects of Copper Contamination in Diversey Cleaner

Currently the new facilities for cleaning caps and cans are equipped with a bronze rail and a number of bronze yokes, employed for supporting the baskets containing the caps and cans during the cleaning operation. There exists the possibility that vapors from the various solutions might condense on the bronze and eventually drip into the cleaning solutions, thereby introducing copper contamination. Tests have been conducted on aluminum samples which have been cleaned in Diversey 514 cleaner of known copper contamination. After ten minutes of cleaning the aluminum samples were covered with large localized areas of thinly deposited copper. This film was not removed by rinsing in flowing hot water. Accelerated corrosion testing of the aluminum samples in 1 N sodium chloride resulted in pitting attack on the areas bordering the copper deposits. If the aluminum samples are heat treated at 600 C for ten minutes, the copper diffuses into the aluminum. Nitric acid etching of the heat treated samples results in simple pitting attack. Heat treated specimens exposed to the accelerated corrosion test exhibited severe localized pitting and etching attack in the areas where copper was deposited. These studies are being continued.

High Temperature Corrosion Studies

Samples of 24S aluminum, Al-Si, and zirconium are being exposed to demineralized

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of 24S aluminum to 350 C distilled water. After one week of exposure there are points at the sample edges and in lines along the direction of rolling where areas of rapid corrosion occur. Overall weight gains remain low after two weeks.

Rupture Behavior of Unbonded Slugs

A discussion of certain aspects of the corrosion behavior of perforated bonded and unbonded slugs has been written. It is proposed that the pile behavior of such slugs be studied before irradiating large numbers of unbonded slugs.(1)

Undercutting Tests

Undercutting tests have continued throughout the month. Slugs from SEP, BMI, and KAPL have been run as well as pieces canned at HAPO using varying surface treatments, storing environments, and pressing conditions. The variations which have shown evidence of markedly affecting undercutting are uranium quality, depth of uranium etch, and amount of bonding. Pieces received from SEP and KAPL have shown on the whole more resistance to undercutting than slugs from BMI and HAPO. This is probably due to better uranium quality and to the uranium surface treatment. Both SEP and KAPL use an electropolish on the uranium before nickel plating.

Undercutting tests of zirconium-canned slugs were run in demineralized water at 175 C. Each piece tested had two 1/16 inch diameter holes drilled through the can into the uranium. A bonded piece was exposed for 22 hours without showing any signs of undercutting. An unbonded piece, after four hours' exposure, was undercut, blistered, and split over the entire slug. Another unbonded piece was completely torn apart after 16 hours' exposure. Two additional unbonded pieces were exposed to steam at 175 C for 16 hours. These pieces were completely torn apart and some fragments of the zirconium cans were found to be cracked and extremely brittle. The reaction of water with the uranium generated large volumes of hydrogen, which reacted with the zirconium to form hydride. Some portions of the fragmented can were analyzed for hydrogen to give the results shown in Table II.

TABLE II

H_2 CONTENT IN ZIRCALLOY 2 JACKETS

Sample	Autoclaving System	Temperature	Time	H_2 Wt %
1	Steam	170 C	40 hrs.	0.53
2	Water	170 C	4 hrs.	0.04

(1) J. A. Ayres, E. A. Evans, Proposed Production Test to Determine Rupture Behavior of Unbonded Slugs, HW-34149, 12-15-54.

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The accelerated attacks of the zirconium by hydrogen probably resulted from the high local temperatures and/or pressures. This problem is being studied further to determine the rates which might be expected and to evaluate the potential damage to zirconium jackets or tubes during pile operation.

Anodizing Studies

Anodic films formed in electrolytes in which the film is insoluble are non-porous. The thickness of such films is directly proportional to the applied voltage, 14 Å/volt. Such films are quite thin, of the order of 0.01 mil, and are referred to as barrier layer films. The films formed in electrolytes in which the film is soluble consists of a very thin barrier layer and a much thicker porous layer which provides abrasion resistance. Hunter and Fowle have recently described a method for measuring the thickness of the barrier layer portion of porous film by determining the potential at which anodizing commences; i.e., an appreciable current flows, in an electrolyte in which the anodic film is insoluble.(2)

The effectiveness of high temperature water seals in improving the corrosion resistance of anodic films is attributed to the plugging of film pores by hydrated alumina. We have applied the method of Hunter and Fowle to the problem of measuring the extent of plugging of pores by sealing standard alumilite and oxalic acid anodic films. Anodizing potentials indicate a 50 to 20 fold increase in barrier layer thickness as a result of sealing at 170 C for 24 hours. The resulting barrier layer thickness depends on sealing time and temperature but is apparently independent of the film type, that is, whether sulfuric, oxalic, or sulfamic acid films.

Electroplating Onto Zirconium

Zirconium cans, sleeves and wafers were plated with nickel or copper after a light etch. A nominal thickness of 0.00025 inch of nickel and copper were deposited at 50 amp/sq ft and 50 C in the Thompson nickel bath and Unichrome copper both respectively.

The successful deposition of nickel or copper on zirconium depends on the completeness of the surface treatment of the base metal. For zirconium, a two bath etchant has been developed and tried during the last six months. The composition of the baths are as follows:

Bath A	NH_4F	18 g/l
	HF	6cc/l
Bath B	HF	20cc/l

When the samples are degreased and then immersed in Bath A for one minute and Bath B for one-half minute an average thickness of 0.0002 inch of zirconium is removed. Subsequent copper or nickel plating on this etched surface gives good mechanical bonding.

(2) Hunter and Fowle, Determination of Barrier Layer Thickness of Anodic Oxide Coatings, J. Electrochem. Soc., 101 No. 9 481 (1954).

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Fuel Technology Sub-Section

Anodic Etching Procedure

The preliminary investigation of the lifetime of the phosphoric-hydrochloric acid anodic etchant was completed and reported.(3) On the wafer scale, the etchant bath was effective for a throughput of three square feet of uranium per liter of etchant without regeneration. The effective capacity of the 1:1 nitric acid stripping solution is estimated at between one and two square feet per liter without regeneration. The average loss in weight incurred by the wafers during anodizing and stripping corresponded to about 66 grams per square foot, or 22 grams per eight-inch slug.

A brief experiment with four-inch slugs confirmed the orders of magnitude of the data obtained with wafers.

Recovery of Electrolytic Etch Solution

A report covering the preliminary development of a procedure for recovering the electrolytic etch solution by the addition of oxalic acid has been issued.(4) Two test cells have been fabricated to permit further studies of this process. Eight-inch pieces will be etched, plated, and canned, and then examined to determine the effect of continued use and recovery of the etch bath.

Porosity of Electroplates

A memorandum(5) was prepared, based upon a literature survey, pointing out the extreme variation of estimates of porosity of nickel plates. Factors affecting porosity were listed, and the importance of a realistic estimate of the surface area of etched uranium was indicated.

Roughness of Uranium Surface as Determined by the Rate of Solution in 1:1 Nitric Acid

Fairly consistent data on a wafer scale show an average corrosion rate for unetched uranium in cold 1:1 HNO_3 of about 0.16 gram per square foot per minute. Wafers that were previously anodized and stripped, then exposed to 1:1 HNO_3 were more severely corroded, at an average rate of about one gram per square foot per minute.

Current Efficiency Studies

A preliminary study of the factors affecting the cathode efficiency was completed and reported.(6) Conditions were established for obtaining current efficiencies of 96 percent or better.

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(3) E. C. Pitzer, Y. B. Katayama, W. C. Budke, Anodic Etching Procedure for Uranium; Useful Lifetime of Baths Without Regeneration, HW-34118, 12-14-54.

(4) W. B. Kerr, A Process for Recovery of Electrolytic Etch Solutions, HW-34208, 12-22-54

(5) E. C. Pitzer, Porosity of Nickel Plates, HW-34225, 12-23-54, Confidential - Undocumented.

(6) E. C. Pitzer, Y. B. Katayama, Current Efficiency Studies: Electrodeposition of Nickel Upon Uranium from the Modified Thompson Bath, HW-34193, 12-21-54.

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Fuel Technology Sub-Section

Nickel Plating of Uranium

A total of 44 uranium pieces were plated in the 3706 Building facilities. The distribution of these pieces was: hot press canning studies and development, eight pieces; corrosion studies, eight pieces; plate thickness studies, 28 pieces; and plating rack development studies, eight pieces.

In addition to the plating activities, 12 canned pieces were anodized as part of the anodizing process evaluation.

Service Electroplating

Approximately six operator days and one and one-half engineer days were expended in brass plating program controller valve cores for use in the new 313 Building manufacturing facilities. An alkaline bath of zinc, copper, and potassium cyanides was used for this plating operation.

Disposal of Spent Cyanide Solution

The accumulation of cyanide solutions from the brass plating and nickel stripping activities requires a method for their disposal. A brief literature survey shows that disposal by oxidation with hypochlorite is a well accepted method. This method has been adopted.

Pilot Plant

Drawings of the automatic plating machine as proposed by Hanson-Van Winkle-Munning Company were reviewed and discussed with their representative. The design was approved after minor modifications.

Combined Point Closure Plus Hot Pressing

Twelve four-inch slugs are being nickel plated and canned by the point closure process for shipment to the Wilmington laboratories of the du Pont Company to determine whether they are amenable to hot pressing by the du Pont fluid bonding method.

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PHYSICS RESEARCH SUB-SECTION

During the month of December the major portion of the Physics Staff assisted in the start-up experiments of the K-W Pile and in the analysis of some of the data. In consequence, there is relatively little progress to report in the regular work in Physics.

Lattice Physics

A new method of calculation has been devised for obtaining the temperature dependence of η and the buildup of various isotopes in uranium. This method explicitly takes into account not only the dependence of the spatial distribution of neutrons of varying energies upon their energy but also the fact that each isotope will have its own characteristic spatial distribution within a slug. Since a great deal of numerical work is required, no results are yet available.

Nuclear Physics

One of the important constants characterizing a fissionable nucleus is ν, the number of fast neutrons produced per fission. The accepted (see BNL-250) values of this constant for U-233, U-235, and Pu-239 are 2.54 ± 0.04, 2.46 ± 0.03, and 2.88 ± 0.04 respectively. These values are appropriate for thermal energy neutrons. As the energy of the neutrons rises into the one-tenth mev region and beyond, ν increases substantially and this fact is actually the basis for the feasibility of fast breeding. However, it has been believed that in the thermal and near thermal energy regions, say from 0 to 1 or 2 electron volts, where most fission events occur in thermal piles, the value of ν is constant for all three isotopes. This matter is of importance in devising means for calculating the temperature coefficients of reactivity of thermal reactors. It was accordingly decided to settle the point with an experiment at the Hanford neutron spectrometer facilities. This experiment has been started and some preliminary results are available. What was measured was the ratio of ν at 0.10 electron volts to ν at 0.29 electron volts for U-235. This ratio should, of course, be unity if ν is constant. The experimental value, however, appears to be about 1.03 ± 0.01. Further experimentation is needed to improve the accuracy and extend the energy range of these measurements. It is not possible at present to say what effect this energy variation will have on the variation of pile reactivity with temperature. In addition to its importance in pile physics, this measurement is of great interest in the theory of the fission process.

Physics Problems Connected with Plant Operation

The information available on the criticality of plutonium solutions has been examined in order to determine "safe" cylinder diameters for highly concentrated solutions. The preliminary results are that the smallest "safe" diameter is just under eight inches and that this occurs for a plutonium-water mixture such that the ratio H/Pu is about 25. Since it would be desirable to check these results experimentally, some consideration has been given to a possible experimental program.

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Physics Research Sub-Section

INVENTIONS

The following invention reports were submitted in December, 1954:

Inventor(s)	Title
G. W. Stuart	Single Reactor Load for P-10 and 23 Production (HW-30839)
G. W. Stuart	A Fuel Element for Optimum Hanford 23 Production (HW-31727)
R. K. Cole G. W. Stuart	A Reactor Fuel Element (HW-32109)

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METALLURGY RESEARCH SUB-SECTION

Irradiation Effects

In an effort to determine the relationship existing between preferred crystallographic orientations and dimensional stability of uranium metal during irradiation, sixty-four cylindrical specimens have been given exposures ranging from 130 to 512 MWD/AT. (8.8 to 35.4 x 10^{19} nvt assuming a 2.3 rise factor in the flux) To date, forty-eight of these samples have received visual examination and physical measurements. In all cases, those uranium pieces which possessed a predominate (010) type of orientation increased in length and decreased in diameter, the increase in length ranging from 5 to 85 percent. Further investigation has shown that in cases where a duplex (110), (010) type of orientation exists with the (110) predominating, the dimensions have remained essentially unchanged, except for varied amounts of surface roughening. Samples which possessed a high (110) or (100) type of orientation increased in diameter and decreased in length; however, these changes could be due to errors in measurement caused by surface roughness. Further studies, such as metallography, density determinations, and x-ray diffraction on selected samples, are planned in an effort to determine the mechanism responsible for the observed behavior.

Specimens of zirconium and molybdenum have been exposed in the MTR to determine the effects of irradiation on the crystal structure of these metals. X-ray diffraction examinations have been made of molybdenum samples that have received fast flux exposures of 6.5 x 10^{17} and 6.5 x 10^{18} nvt. Crystallographic damage has been found to be present as indicated by a broadening of the diffraction lines, and, as would be expected, the magnitude of this broadening is proportional to the exposure. A study of the diffraction line shapes will be made to determine the type of damage which is present. The existence of a change in unit cell dimensions, which would be indicated by a shift in diffraction peak positions, has not been definitely established at the present time.

A series of hardness testing experiments were conducted with wafer sized samples from irradiated uranium slugs to determine the annealing characteristics of uranium exposed to 449 MWD/T. A single wafer was vacuum annealed at 400 C for thirty-five hours with approximately seven hardness determinations being made across the diameter after every five hours at temperature. The original average hardness values remained essentially constant until 20 hours had elapsed when a decrease of five points Rockwell G was then observed. The lower value has persisted through an additional 25 hours of anneal.

Metallurgical Techniques

Sonic wave excitation of the natural frequency of uranium slugs has been proposed as a means of determining the preferred orientation of fuel elements by the Materials Testing Unit. A comparison of x-ray analysis of preferred orientation and experimentally determined natural frequencies shows a positive correlation. As an aid to this program, a theoretical investigation of the natural longitudinal and torsional vibration characteristic of an orthorhombic uranium crystal was undertaken. A consideration of the aeolotropic elastic relations for uranium indicates that the torsion of an orthorhombic crystal can be expressed in terms of two of the elastic shearing constants and that the longitudinal vibration can be

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expressed in terms of a single elastic modulus. Hence, the theoretical investigation indicates that a measure of preferred orientation should be detected by determining the natural frequencies of a uranium bar. The theoretical determination of the natural vibration frequencies of polycrystalline uranium bars, however, is extremely difficult. Thus, it appears most promising to determine these frequencies experimentally and correlate these results with x-ray data in order to develop a suitable non-destructive testing instrument for measuring preferred crystallographic orientations in uranium bars.

Laboratory preparations and associated evaluation of diffusion couples required for use in ascertaining the effect of time, temperature and irradiation on the overall diffusion characteristics of U-Al and Zr-Mg systems have continued. A Zircaloy-2 capsule containing a Zircaloy-2 cup and housing a U-Al-U-Al-U sandwich resting in 6.3 cc of NaK has been assembled. About 4000 pounds force was applied to the sandwich by means of an integral threaded ram before final welding of the cap to the capsule. The final assembly which contained 40 percent free space for NaK expansion has been bubble tested, radiographed, water autoclaved for 100 hours at 170 C, radiographed again, and packaged for shipment to the MTR. Preliminary vacuum and inert atmosphere diffusion annealing experiments on a Zr-Mg capsule proved fruitless, as the Mg at a temperature of 600 C sublimed excessively and deposited on the colder sections of the furnace tube. Laboratory diffusion annealing studies on U-Al couples are also continuing.

Since the proper microscopic preparation and examination of fuel element components may provide valuable information relative to the effect of irradiation as revealed by microstructures, techniques such as cathodic vacuum etching, replication, and optical and electron microscopy are being applied to specimens of various histories as an aid in the evaluation and interpretation of possible radiation effects in test specimens. Replicas of beta heat treated, alpha rolled, and ingot uranium have been examined. Unambiguous microstructural characteristics are being determined and established. The correlation of the surface structure revealed by cathodic vacuum etching with the preferred orientation present in an alpha rolled specimen of uranium is continuing.

The thermal stresses which would arise at the junction between the cross headers and riser of B-Pile were calculated for a proposed increase to 130 C in the exit coolant temperatures. By allowing for the movement of the riser as a cantilever beam, calculated stress levels were well on the safe side. Due to the possibility of neglecting some constraint or dynamic condition, an additional experimental check on this investigation will be made by applying strain gages to the junction of the cross header and riser.

The inert atmosphere, evacuable glove box designed for use in assembling irradiation capsules requiring an inert atmosphere has been successfully used. The facility has been evacuated and filled with argon that has been purified by a system composed of (a) a drierite tower, (b) a NaK bubbler, and (c) two zirconium chip furnaces held at 600 C and 400 C, respectively. During operation the argon is constantly recirculated through the purification train and introduced into the box through the gas-cooled welding torch. Welds that have been made on 13 Zircaloy-2 assemblies are excellent, exhibiting only a very slight tarnish. The weld areas did not show any localized corrosion in 100-hour autoclave tests in 170 C water. Analytical samples of the NaK used in seven of the above capsules

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have been taken; analysis of these samples is currently in progress. Samples of the argon have been taken at intervals throughout operation and are routinely analyzed by mass spectrometry. In order to establish the mutual reactivity of NaK, uranium and Zircaloy-2 at elevated temperatures, two capsules, each containing NaK and a uranium sample with a surface that has been metallographically characterized, are being heated at 300 C and 500 C, respectively, for a period of 18 days.

Fuel Elements

Irradiation of the two remaining four-inch, mechanically bonded fuel elements canned by the room temperature, point closure technique continued during the month. These pieces were charged into the central zone of D-Pile under the authorization of PT-105-575-A and to date have reached an exposure of approximately 750 MWD/T. Increased pile power levels during the month have raised the maximum specific power of these pieces to about 42 kw/ft. Discharge is scheduled for January 24, 1955, at which time they will have reached an exposure of approximately 900 MWD/T.

Unbonded slugs canned by the room temperature, point closure technique are being irradiated to determine their rupture resistance and to check the hypothesis that an unbonded fuel element should give improved performance under Hanford conditions. The production test authorized the irradiation of two unbonded solid slugs to 200 MWD/AT, two to 400 MWD/AT, and four to 625-750 MWD/AT. As previously reported, the two 200 MWD/AT slugs were successfully irradiated in C-Pile at specific powers of about 47 kw/ft and 9 kw/ft. These slugs showed no evidence of non-uniform heat transfer as viewed in the basin. The slugs are scheduled for Radiometallurgy examination as soon as time permits. The 400 MWD/AT slugs and the 625-750 MWD/AT slugs were charged in H-Pile in September and have accumulated exposures of 360 MWD/AT. The in-pile test also authorizes irradiation of a tube charge of 36 unbonded cored natural slugs and four unbonded enriched slugs to rupture. These slugs have been fabricated and will be charged in C-Pile during January, 1955.

The use of cored slugs with welded end plugs requires counterboring the core to form a seat for the plugs, fabrication of small diameter plugs, and sealing and welding the plugs. A faulty weld in this slug will then permit acid from the pickling bath to accumulate in the core. If any major accumulation of liquid is not detected, the slug will fail in the autoclave or the pile. It is proposed that cored slugs be fabricated in three pieces; a central cored section (not counterbored), and a solid uranium disk at each end. The components would be less expensive to fabricate and would be easily pickled, dried, and inspected before canning. One such slug has been successfully canned by the room temperature, point closure technique. A production test will be written to irradiate a small number of these slugs to rupture.

Fuel elements consisting of four-inch uranium slugs, solid and cored, insulated from the aluminum jackets with one to four mils of aluminum oxide and with zirconium wafers on the ends, have been canned using the cold closure technique. Irradiation of these slugs will provide data on the behavior of uranium under irradiation at high temperature. A production test has been drafted which provides for irradiation of 12 slugs, each pair operating under the following conditions:

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Metallurgy Research Sub-Section

Uranium	Geometry	Insulation	Uranium Surface Temp.	Max. Temp.
Natural	Solid	1 mil	171 C	490 C
Natural	Solid	3 mil	230	560
Natural	Cored	3 mil	240	520
Natural	Cored	4 mil	290	570
Enriched	Cored	3 mil	305	695
Enriched	Cored	4 mil	460	950

Additional reactivity tests conducted by M. V. Davis, Physics Development Unit, Pile Engineering Sub-Section, have been made on a uranium-magnesium fuel element of Hanford dimensions. This fuel element was fabricated from uranium shot recovered from Mallinckrodt uranium reduction bombs and contained 63 volume percent normal uranium. Measurements indicate this slug to have a K of 0.994, with a corresponding conversion ratio of 0.79. If enriched with 2.0 grams of 235 per 8" slug to give an infinite K of 1.07 for high burnup application, a conversion ratio of 0.718 would be obtained. A 54 volume percent slug would require 2.12 grams 235 enrichment per 8" slug to give an infinite K of 1.07, with a corresponding conversion ratio of 0.69. Document HW-33918 entitled, "Reactivity and Conversion Ratio Associated with Uranium Pellet Slugs," by M. V. Davis, Pile Engineering, is being issued as a separate report on the details of this reactivity study.

Two mechanically bonded slugs irradiated in H-loop to a calculated exposure of 170 MWD/AT were examined and no evidence of warping or bumping observed. A slight pitting attack was observed on the sides of both slugs. The cap end of one slug was mechanically removed with considerable difficulty. Visual examination of the cap and uranium indicated that very little, if any, diffusion had occurred between the aluminum and uranium. The cap from the other slug was removed with the uranium attached. Samples obtained from this cap and the cap from a previously examined mechanically bonded slug, which had received an exposure of approximately 308 MWD/AT, have been mounted for metallographic examination of the aluminum-uranium interface.

Fuel Materials

In order to evaluate the performance of prototype fuel elements containing uranium-magnesium as a fuel material, two fuel elements, 0.880 inch in diameter, 4.0 inches long, have been prepared for irradiation in the MTR. The two fuel elements were clad in a 0.023 inch zirconium can and have a heliarc weld closure. Irradiation of these specimens is scheduled to begin in the Materials Test Reactor on January 3, 1955. It is planned to have the specimens discharged after 5000 MWD/T exposure. Approximately 140 days will be required to complete this irradiation. Prior to shipment to the MTR, the clad fuel elements were tested for 120 hours in an autoclave in 100 psi steam to insure adequate closure had been formed at the cap end of these specimens.

Four more capsules containing a uranium-magnesium fuel material were discharged from the MTR on December 20, 1954. These capsules have accumulated an exposure of approximately 5000 MWD/T. They are now being shipped to Hanford for post-irradiation examination. Two of the 10,000 MWD/T exposure capsules are scheduled to be discharged from the MTR the middle of February.

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Metallurgy Research Sub-Section

The shot tower facilities at White Bluffs have been completed and several attempts at shotting uranium have been made. Uranium is melted under a cover flux of barium chloride and poured into a magnesia crucible which has a 25-mil orifice in the bottom. The crucible is then pressurized with argon and the metal falls 100 feet into an oil bath. A very limited amount of uranium shot has been obtained. Most of the particles formed are spheres with small tails attached and some of the metal freezes in the form of wire. The shape of the particle formed at the orifice is dependent upon the velocity at which it is ejected. Finer pressure control is necessary to achieve the optimum. It is felt that the surface tension of the oxide which is formed on the particles prevents them from spheridizing. Purification of the entire atmosphere of the shot tower to the degree of perfection required to eliminate oxide formation would be a difficult task. There is no oxide problem with copper, and hence, copper shot was easily formed by these means. It was possible to control the particle size by varying the velocity at which the metal was ejected from the orifice. Work on the shot tower has been temporarily discontinued due to inclement weather.

As previously reported, an experiment has been designed in which sixteen UO_2 filled capsules will be irradiated at two different flux levels for two different times to determine the effect of flux, exposure, oxide density, and 235/238 ratio on the performance of oxide fuel materials. Two batches of UO_2 have been prepared having 0.69 and 1.38 percent U-235. Portions of these batches have been pressed into a biscuit and have been sintered at about 2000 C for approximately 1 1/2 hours. Diametral shrinkage of about 16 percent occurred on sintering. The sintered oxide was crushed and ball milled in preparation for packing into Zircaloy capsules. Weighed amounts of the four types of oxide were introduced into Zircaloy capsules and compressed at 60,000 psi. A mechanical seal of the capsule plug was made by forcing the 0.505" diameter capsule through a 0.500" diameter sizing die. Final seal will be made by heliarc welding. The capsules will be ready for irradiation in the MTR by January 1, 1955. The flux levels and exposure levels for this special irradiation are as follows:

Flux level	4.5×10^{13} nv	- 9×10^{13} nv
Exposure	18 days	36 days

Following irradiation the specimens will be returned to HAPO for post-irradiation examination and evaluation.

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Zirconium Metallurgy

Samples of arc-melted Bureau of Mines zirconium, fabricated to six initial cold-work levels ranging from 0 to 50 percent reduction in area, have been irradiated in water-cooled, central zone process tubes of a Hanford reactor to exposures of 190, 490, and 780 MWD/AT. The tensile properties, hardness and microstructure of the material are being determined to gain information on the extent of radiation damage. Tests of the 12 tensile samples and 12 wafers receiving the lowest exposure were completed in Radiometallurgy facilities. Increases in yield strength ranging from 50 percent for initially annealed material to 10-12 percent for material with 50 percent initial cold work were determined. Increases in the ultimate strength were in the order of 10 percent with an accompanying decrease in ductility. Hardness was found to increase approximately 30 percent in initially annealed material. The increase was less for samples with more initial cold work and was approximately 10 percent for samples with 50 percent cold work. Work is continuing on samples of the second exposure. Hardness results are very nearly the same as those of the first exposure, indicating that saturation of damage may have been reached. The tensile properties of samples from this exposure that have been tested to date are also very nearly the same as after the initial exposure.

The study of reaction rates of zirconium and Zircaloy-2 in air has continued. Weight gain and length increase are being used as criteria for determining the dependence of reaction rates on several parameters: temperature, air velocity, degree of cold work, and physical form. Recent work has shown that specimens of rolled rods at 500, 600, and 700 C (930, 1110, and 1290 F) gain weight at the same rates as the rolled sheet specimens previously examined, and that the rates depend only on the chemical composition and the temperature. At 700 C a weight increase

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of one mg/sq.cm. of the original area of a piece of zirconium is attained in one hour; at 600 and 500 C (1110 and 930 F) the same increase is found after about 200 and 300 hours, respectively. For Zircaloy-2, the same weight gain is attained in about one hour at 700 C, eight hours at 600 C, and ninety hours at 500 C. Observations of sheet specimens at 600 and 700 C have demonstrated that length increase is also dependent only on composition and temperature. Although definite conclusions await further tests, it appears that this phenomenon, like the weight gain, proceeds slowly during an induction period, the length of which depends on the temperature; the rate of increase then becomes a linear function of time. Results to date, however, do not indicate a definite correlation of length increase and weight gain.

A limited number of tests on zirconium and Zircaloy-2 are confirming the belief that a properly designed slow bend test on notched specimens measures notch brittleness as well as, if not better than, a Charpy impact test. The high order of dimensional accuracy required of Charpy impact specimens and conventional notched bend test specimens is not required of bend test specimens notched by a new method. The new notching method has reduced sensitivity to specimen geometry several fold. If reproducibility is to be expected of Charpy impact tests, the specimens must be precision ground to within ± 0.002 inch of the specified dimension and ± 0.16 degree of a right angle between adjacent sides. The slow bend test lends itself better to the present study of zirconium embrittlement than does the Charpy impact test; therefore, an effort has been made to determine if this type of specimen is also sensitive to specimen geometry. The notch bend test previously used has been improved by reducing the length of test specimen free to bend from two to 0.2 inches and by placing the notch midway between the two specimen grips instead of next to a grip. The angle of bend at fracture appears to be the best criterion for establishing the temperature of transition from brittle to ductile failure, failure being defined as the instant that the bending moment starts to decrease while the specimen is still bending. A method of notching that maintained a constant thickness of metal between the root of the notch and the opposite side of the specimen was erroneously chosen as one that would be least sensitive to variations in specimen thickness. Test results on specimens so notched were extremely sensitive to geometry as shown by tests on Zircaloy-2 wherein the fracture angle varied as the fifth power of the thickness of metal under the notch and inversely as the fourth power of the specimen thickness. These exponents were nearly independent of testing temperature up to 300 C (572 F). Simply by making notches of constant depth, regardless of the specimen thickness, coupled with an increase in the radius of the root of the notch, a constant fracture angle was obtained for a given temperature even though the specimen thickness was varied 25 percent. The bending moment at fracture on these specimens was proportional to the square of the thickness (on unnotched specimens the bending moment required to give a certain angular diffraction is proportional to the cube of the specimen thickness). Annealed Zircaloy-2 sheet material containing the as-received amount of hydrogen (about 20 ppm) showed a transition from brittle to ductile type of failure at 200 C (392 F). Addition of 100 ppm hydrogen shifted the transition temperature to 310 C (590 F). The change in fracture mechanism is revealed by a change in slope of a plot of fracture angle against testing temperature.

Zircaloy-2 specimens which gained weight at 650 C (1202 F) in the 100-F Pile atmosphere at a rate slightly less than would be expected out of pile in the same atmosphere were previously reported to be free of surface scale. The surface of these specimens had the appearance and luster of a fresh metal until they were tested in bending and an adherent layer of scale broke from the specimens. One of these in-pile specimens which had gained 16.5 mg/cm^2 absorbed 7.3 ft.lbs of work when it was

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bent through a fixed angle. Two identical unirradiated specimens absorbed 6.5 and 7 ft. lbs., and a specimen that had gained 26.8 mg/cm^2 in CO_2 ex-pile absorbed 3.1 ft. lb. The fact that the in-pile specimen retained its toughness indicates that little if any oxide or oxygen diffused beyond the surface of the specimen at the exposure temperature of 650 C (1202 F).

Uranium Reduction Studies

Material is being assembled and is being fabricated to complete the internally heated electrorefining and comminuting electrolysis cell to investigate the feasibility of producing particulate uranium by electrolytic methods. The cell will use uranium anodes. This electrolytic reduction method is being studied as an alternate to the several mechanical means of producing shot from massive metal that is suitable for inclusion in a matrix type fuel element. The concrete lid for this cell is being constructed as is also the heater and busbar system. An alternative to the use of uranium anodes is the use of an anode of uranium oxides and carbon. During electrolysis the chlorine liberated at this anode as a result of electrolyzing the chlorides of the fused salt bath may react with the anode to yield uranium chlorides. These uranium chlorides will dissolve in the fused salt bath. Uranium is thus fed to the cell as oxide rather than metal. The cathodic product is the same in either case, i.e., particulate, dendritic uranium metal. Several experiments have been performed aimed at the problem of producing a suitable oxide and carbon electrode. Small electrode segments of suitable electrical conductivity and mechanical strength characteristics, measuring one-half to one inch long and one-half inch in diameter, have been fabricated from UO_3 and carbon, using ordinary tar as a binder. The production of successful electrodes is dependent on the calcining and firing techniques employed. Tests of electrodes such as these will follow the completion of tests in the internally heated cell using uranium anodes.

A second line of research being pursued has for its goal the production of uranium anodes by casting molten uranium into the desired form. The molten uranium would be produced by the electrolysis of a uranium oxide solution in calcium fluoride at temperatures above the melting point of uranium. Small scale experiments have demonstrated the solubility of U_3O_8 in CaF_2 and electrolysis of such solutions for periods of 15 minutes at 10 amperes has been possible. The experimental technique is crude and inadequate, but results have been encouraging. Small spheres about 1.5 mils in diameter have been isolated in small number.

Experimentation has continued to determine the feasibility of reducing several of the intermediate salts that can be prepared and isolated from UNH solutions. Bomb reductions of the dehydrated salts, $UCaF_6$ and $UNaF_5$, using calcium and magnesium have been completed. Metallic yields were 93 and 86 percent, respectively. From previous experience with the reductions of uranium salts containing iron impurities it was expected that the iron concentration of the uranium metal produced may be quite high. The metal is being analyzed at the present time for total iron content. The magnesium reductions of $UCaF_6$ yielded fine uranium metal in the form of spheres approximately one to three mils in diameter. Difficulties arose in cleaning up the metal because of the low solubility of MgF_2 in solvents that will not dissolve uranium. The investigation is continuing to determine if it may be possible to produce larger particles during the reduction process which would make it possible to crush the slag and break it away from the uranium particles thus eliminating the need for dissolving the slag.

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Radiometallurgy Examination

Laboratory work was resumed on two chromium-uranium alloy slugs preparatory to metallographic study of this irradiated alloy. The two slugs, one ruptured and one warped, were from a pile test to evaluate the 0.4 percent chromium alloy and were discharged in February, 1954. A mold for the purpose of replicating the warped slug was made and both slugs were sectioned to obtain metallographic samples. A crack was observed in the uranium alloy of the "warped" slug.

One rupture and one incipient slug failure were examined to determine if an unusual operating condition at 100-H resulted in beta-phase heating of the uranium in one zone of the pile. The slugs were from two of 17 H-Pile tubes from which ruptures were discharged in October. From the information obtainable by hardness testing coupled with annealing studies on samples from the slugs, it was concluded that the uranium did not reach beta-phase temperatures for a sufficiently long period to affect the hardness.

Can wall thickness measurements were made on wafers from both ends of an eight-inch slug exposed to pile process water for a period of 245 days. The average thickness was 39 mils with a maximum of 42 mils and a minimum of 34 mils. These values are in the same range as those previously obtained from six other slugs. A comparison of these values with the specified wall thickness of 0.045 ± 0.005 inch indicates a corrosion rate of less than one mil/month.

Length and dish measurements were made on an eight-inch unruptured slug from a production test to evaluate the effect of irradiation on uranium slugs heat treated in the rod form (PT-313-105-25M) and which had been recanned prior to charging. The slug had received an exposure of 780 MWD/T. The axial length was 8.331 inches, which is within the specified pre-irradiation length of 8.325 ± 0.010. The average length at the periphery was 8.363 inches with a maximum of 8.380 and a minimum of 8.347. The minimum and maximum lengths were found at points 180° removed from each other. Both ends were dished; the base end 22 mils and the cap end 10 mils. Previous examination of the slug had revealed no evidence of necking down or other signs of incipient failure at either end.

Radiometallurgy Facilities

The metallographic cell alterations were completed and the cell utilized in making metallographic examinations of radioactive materials. Studies of the grinding rate of the two lapmaster units showed that coarse grinding on the plastic lap was still too slow and that the coarse abrasive tended to produce a convex surface on the sample.

The cathodic etcher has been installed in the metallographic cell and is in the process of being tested for placing in continuous use. Unirradiated uranium has been etched without any difficulties. An irradiated powder compact uranium sample has also been etched to reveal a microstructure. The total process of etching each sample required two hours. This time can be reduced to one hour when a new roughening pump is installed.

The power supply and frequency generator for ultrasonic cleaning of metallographic sample mounts was received during December. Tests with locally assembled transducers gave unsatisfactory results in the 400 Kc range. A transducer designed to match the generator has been ordered and is expected in January.

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The high temperature tensile testing unit which is being fabricated off-site for the tensile testing of preformed samples at elevated temperatures requires greater than normal clearance between the heads of the 60,000# tensile machine. Investigation disclosed that the Tinius Olsen tensile machine available in the Radiometallurgy Building would not work satisfactorily under these circumstances. A Baldwin-Southwork tensile machine, which can be successfully modified, was obtained from Physical Metallurgy and is being moved from the 326 Building to the Radiometallurgy Building. This tensile machine will have to be shielded and calibrated after installation to permit the examination of irradiated material.

Installation of the electrical resistivity measuring apparatus has been completed and the equipment is available for resistivity measurements on radioactive material over a temperature range of 20-100 C.

Separation Plant Corrosion

A program to determine the corrosivity of 2WW Purex waste acid concentrate by quantitative, semi-quantitative, and qualitative methods upon type 304L, 347, and 312 stainless steel and type A-55 titanium under heat transfer conditions is in progress. Preliminary data, of quantitative and semi-quantitative nature, on the effect of corroding surface temperature upon the corrosion rate of type 304L stainless steel exposed to boiling synthetic 2WW Purex waste acid concentrate have been collected. These data have been compared and in both cases the corrosion rate increased as the temperature of the corroding surface increased, but in both cases the preliminary nature of these data precluded the establishment of the manner in which the corrosion rate depends on temperature. For comparable test times of 22 days and surface temperatures of 115 to 155 C, the corrosion rates of the type 304L stainless steel tested quantitatively ranged from 0.0021 to 0.0192 inch penetration per month, and the rates of the type 304L stainless steel tested by semi-quantitative methods ranged from 0.0011 to 0.0036 inch penetration per month. Chemical analysis of the 2WW solutions used for these tests were made and they show that the chromium ion concentrations in both tests are of the same magnitude and that the nitric acid concentrations of the quantitative test are approximately 50 percent by weight while the semi-quantitative test had nitric acid concentrations of approximately 42 percent by weight. A combination of higher nitric acid concentration and lower solution volume to specimen area ratio may account in part for the higher corrosion rates in the quantitative test.

As a preliminary screening test in the continued search for suitable bearing materials to be used in submerged process lubricated pump bearings, three grades of Borolite bearing materials were subjected to total immersion in boiling 65 percent nitric acid and examined visually following this exposure. The three Borolite materials examined were Moly Nickel Boride, Chromium Nickel Silicide #1101, and Zirconium Boride. Prior to exposure, the specimens were polished and passivated in 20 percent nitric acid at 60 C. The Moly Nickel Boride specimen reacted vigorously with the passivating solution and formed a heavy, porous layer of corrosion product on the surface of the specimen. The sample of Zirconium Boride was rapidly dissolved by the boiling 65 percent nitric acid. The specimen of Chromium Nickel Silicide has successfully withstood the chemical attack of boiling nitric acid for two 48-hour boiling periods. Since the Moly Nickel Boride is rapidly attacked by both 20 percent nitric acid at 60 C and boiling 65 percent nitric acid with the concurrent formation of a heavy layer of corrosion product which would affect its use as a bearing, and since the Zirconium Boride is rapidly dissolved, both of these

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materials have been removed from the testing program and tentatively discarded as potential bearing materials for use in process lubricated bearings at HAPO. The preliminary evaluation of the Chromium Nickel Silicide is continuing and will be reported at a later date.

Welding Development

Since the greatest number of failures in piping occur in weld joints, several types of weld joint designs are being investigated for making the root pass in stainless steel pipe joints by the TIG, tungsten inert gas, process. Current emphasis is being placed on two joint designs; the "GE" joint, conceived at the Welding Laboratory of the Turbine Division of General Electric Company, and the "EB" consumable insert joint developed by the Electric Boat Division of the General Dynamics Corporation. Both of these joints, though more costly in preparation than an ordinary bevel joint, may result in savings through better weld quality, decreased difficulty in making the root pass, and through decreased inspection costs. The weld penetration can be determined from the outside of the pipe subsequent to making the root pass, obviating the removal of the joint to determine the degree of penetration. It appears as if the "GE" joint will be the most economical joint to make and will require the least precision for fit-up. Before either type joint can be used in the field, it is considered that welders will require instruction and training in their use.

Plutonium Metallurgy

A plutonium-uranium bond having a tensile strength of 19,400 psi has been obtained by vacuum casting unalloyed plutonium at 900 C onto electrolytically polished, cathodic vacuum etched uranium at 450 C. A second specimen made by the same technique had a tensile strength of only 420 psi. Visual examination of the bonding surfaces of this specimen revealed the presence of oxide particles, evidently entrained in the molten plutonium at the time of casting. The low strength is attributed to the presence of these oxide particles.

A mechanical bond having a tensile strength of 9300 psi was produced by pressing delta stabilized plutonium into an anodically roughened surface of uranium at a temperature of 290 C. The increased plasticity of plutonium at this temperature permitted it to flow into the voids in the uranium to a much greater extent than in previous tests conducted at 110 C. The best strength obtained at the lower temperature was 1500 psi.

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Project Representation

Project CA-512-R

Agreement was reached on changes in Beckman circuitry to improve instrument performance by changing scramming function from recorder to amplifier and to minimize spurious scrams by utilizing alarm circuits instead of scram circuits for common types of instrument failure.

Project CG-558

Scoping of this project is essentially complete at the present time.

Project representatives were unable to reach agreement regarding front nozzles and pigtails and requested advice from the Design Council. Manufacturing proposes alternatives to the planned installation of new Van Stone type nozzles of low flow resistance. Basis for opposition to the Van Stone type nozzle is the forecast near future installation of new type front and rear nozzles and process tube closures which will lessen downtime required for tube removal and replacement by eliminating the requirement of nozzle removal. This predicted future development would facilitate tube replacement due to increased effluent temperatures and thus permit maximum exploitation of high effluent temperatures with process tubes of relatively short service lives.

Design Section Liaison

Studies have been pursued to determine the economic potential of useful recovery of heat from hot effluent streams by utilizing two small heat exchangers in series to increase the thermodynamic potential of the heat recovered. Preliminary results show that the method may be practical.

A study was completed to determine the economic potential of in-pile boiling as applied to dual purpose reactors with fixed electric output. By assuming technical feasibility of securing moderate bulk effluent steam quality (20% or more by weight) at maximum heat fluxes of 30 to 50 kw/ft in the Special Studies reactor geometry, a lowering of power costs during single purpose operation of about 0.6 mill/kwh is assignable to in-pile boiling. Much of the gains arise from reductions in fuel cost. Economic analysis was based on methods used by the Special Studies group for the same reactor operated with liquid phase flow.

Efforts to use ANL boiling burnout data as a basis for applying boiling parameters to pile design proved fruitless. Using limited HAPO boiling heat transfer data, continuing efforts are being made to apply experimental results to pile process design. Variations of tube flow resistance with individual tube steam quality changes cause complicating effects which make process

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calculations quite tedious. Key to the economic application of in-pile boiling appears to lie in determining the surface heat flux rate required for achieving bulk effluent qualities near 25 weight percent.

A report on the feasibility of semi-works scale conversion of a portion of KW reactor to provide 50,000 kw of electric power was issued as HW-33885.

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Separations Technology Section

VISITORS AND BUSINESS TRIPS

J. R. Weisler, Mound Laboratories of Monsanto Chemical Company, Dayton, Ohio, visited Hanford 12/28/54, seeking spare solvent extraction equipment which might be available for transfer from Hanford.

R. E. Smith visited the National Lead Company, Fernald, Ohio to attend the Feed Materials Meeting December 8th through December 10th.

E. M. Kinderman visited the Radiation Laboratory, University of California, Berkeley, California, December 28th through December 30th, consulting on heavy element chemistry.

ORGANIZATION AND PERSONNEL

The Technical Section was reorganized on December 15, 1954 and the Pile Technology and Separations Technology Sections were established. The November statistics have been reconstructed for comparison purposes.

	November	December
Plant Processes Sub-Section	48	49
Chemical Development Sub-Section	83	83
Chemical Research Sub-Section	64	65
Contact Engineering Unit	4	4
Analytical Laboratories Unit	33	32
Technical Shops Unit	28	29
Total	260	262

Plant Processes Sub-Section: M. E. Broan, Secretary B, transferred into the Sub-Section from Pile Technology on 12/13/54.

Chemical Development Sub-Section: One technical graduate-rotational was permanently assigned to the Sub-Section this month.

Chemical Research Sub-Section: W. W. Marshall was reactivated on 12/21/54; Bernice B. Lish, Lab. Asst. A transferred from the Analytical Laboratories Unit into the Sub-Section on 12-13-54; Anne C. Jirus, Secretary B, transferred from Fuel Technology into the Sub-Section on 12-15-54; H. C. Carney, Engineer terminated on 12-15-54; and S. J. Walter, Lab. Asst. A terminated on 12-20-54.

Analytical Laboratories Unit: Bernice B. Lish, Lab. Asst. A transferred from the Unit to the Chemical Research Sub-Section on 12/13/54.

Technical Shops Unit: Laura W. Burn, General Clerk, transferred into the Unit from Applied Research on 12/15/54.

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Summary

The Redox Plant was operated during the month with permanganate Head-End oxidation of IAF and three Uranium and three Plutonium Cycles. An instantaneous processing rate of nine tons uranium per day was demonstrated for an extended period, but the production rate was limited for most of the month at eight tons uranium per day because of local flooding in the IA Column. In spite of this difficulty, uranium and plutonium decontamination and recoveries were consistently superior to those previously demonstrated. Back-cycle of the aluminum nitrate from the 3D and 3A Columns to the 2D Column was demonstrated, and flowsheet adjustments thereby permitted resulted in savings of $270 per ton of uranium processed.

Feed Preparation

Redox dissolvers were charged with uranium having an average pile exposure of 611 (499 to 677) MWD/T and "cooled" and average of 130 (77 to 190) days.

The permanganate Head-End treatment procedure using chromic nitrate as the reductant was employed for IAF oxidation throughout the month. On December 16, the concentration of potassium permanganate used for the sacrifice and oxidation periods was reduced by a factor of two, to 0.01 M $KMnO_4$. No significant effect on process performance was experienced, but the instantaneous capacity of the Head-End step was thereby increased from 9.3 to 10.9 tons uranium per day. On December 20, the use of manganese dioxide scavenging was discontinued in order to reduce the quantity of radioruthenium vented to the air exhaust system during centrifugation.

Solvent Extraction

Uranium and plutonium decontamination factors have been consistently superior to those previously reported. The following table summarizes performance achieved during the month:

Cycle	Gamma Decontamination Factors (dF)	
	Uranium	Plutonium
Head-End First Cycle	4.0	3.9
Second Cycles	2.6	2.5
Third Cycles	0.5	1.5
Over-all	7.1	7.9

Uranium and plutonium recovery were also excellent at approximately 99.7 and 99.4 per cent, respectively.

An instantaneous production rate of nine tons uranium per day was demonstrated for 36 hours. However, the rate was limited to eight tons uranium per day because of local flooding of the IA Column, probably a result of the high silicon content of the IAF. A hydrofluoric-nitric acid cleanout of the dissolvers is scheduled for January in order to reduce the silicon content of IAF. As an expedient, to permit continued operation, the IA Column was water flushed on December 10 and 23.

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Several modifications to the Uranium Cycle Flowsheets were made to incorporate the back-cycle of aluminum nitrate from the 3DW and 3AW to the 2D Column:

(1) 3DW back-cycle was instituted on November 29;
(2) the 3D Column flow ratios were reduced on December 1, when 3AW back-cycle was started;
(3) the composition of 2DA was changed on December 3 to include 0.01 M $Fe(NH_4SO_4)_2$ and 0.01 M NH_2SO_3H because of an indication of inadequate plutonium decontamination from the uranium in the 2D Column;
(4) the nitric acid in the 3DA was discontinued in order to permit a simplification in 2DA-3DA makeups which previously were performed in the same tank; and
(5) after adequate demonstration of the satisfactory performance of 3DW-3AW back-cycle, the 3D Column flow ratios were further reduced on December 20 to put the 3DW and 3AW in balance with the aluminum nitrate requirements of the 2D Column.

The over-all reduction in essential materials and waste storage requirements achieved as a result of these flowsheet changes amount to a savings of approximately $270 per ton of uranium processed.

The flowsheet in use at month end is summarized below:

(1) Flow Ratios (relative to 1AF = 100)

1AF:1AA:1AX:1BX:1BS:1CX = 100:115:400:30:100:140
2DFS:2DA:2DX:2EX = 147:25:300:120
3DF:3DS:3DA:3DX:3EX = 82:50:20:300:120

(2) Solution Specifications

1AF	2 M UNH, 0.2 M HNO_3-deficient, 0.1 M $Na_2CR_3O_7$, Pu
1AA	2 M $Al(NO_3)_3$, 0.2 M HNO_3-deficient, 0.01 M $Na_2Cr_2O_7$
1AX,2DX,3DX	Neutral hexone
1BX	1.3 M $Al(NO_3)_3$, 0.05 M HNO_3, 0.05 M NH_2SO_3H, 0.05 M $Fe(NH_4SO_4)_2$
1BS	0.075 M HNO_3 in hexone
1CX,2EX,3EX, 3DA,1CX	Demineralized water
2DFS	1.4 M UNH, 1.1 M $Al(NO_3)_3$ back-cycled, 0.2 M HNO_3-deficient, 0.003 M $Fe(NH_4SO_4)_2$
2DA	0.5 M HNO_3, 0.01 M NH_2SO_3H, 0.01 M $Fe(NH_4SO_4)_2$
3DF	2.5 M UNH, 0.2 M HNO_3-deficient
3DS	2.5 M $Al(NO_3)_3$, 0.3 M HNO_3-deficient, 0.005 M NH_2SO_3H, 0.003 M $Fe(NH_4SO_4)_2$.

The 2D and 3D Column interfaces are both being controlled automatically (at the top of the scrub section but out of the large disengaging sections) by use of new instruments measuring the total static pressures above the bases of the columns. By means of air switches, the former interface control instruments are put into service for startup and shutdown operations. Instrumentation is currently being installed to permit automatic control of the 1A Column interface in a similar location. However, because of the occasional local flooding at the base of the 1A Column, static pressure control would be

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unsatisfactory. Therefore, the IA Column interface is to be controlled by an instrument measuring the differential pressure across the scrub section. It will also be equipped for interface control by the former instrument for startup and shutdown operations. Testing of the lowered IA Column interface position is being delayed until the new instrument is installed.

The Plutonium Cycle flowsheet currently in use for normal IAF is summarized below. Critical mass control limits necessitated frequent adjustments in flow ratios to compensate for high plutonium concentrations in the 2AF.

(1) Flow Ratios (relative to IAF = 100)

2AF:2AS:2AX:2BX:2BP Butt = 32:20:35.7:7.1:7.8
3AF:3AS:3AX:3BX = 14.9:14.9:23.9:9

(2) Solution Specifications

2AF	1.3 M $Al(NO_3)_3$, 0.1 M HNO_3, 0.02 M $Na_2Cr_2O_7$, Pu
2AS,3AS	1.3 M $Al(NO_3)_3$
2AX,3AX	0.5 M HNO_3 in hexone
2BX,3BX	0.04 M HNO_3
2BP Butt	2.5 M $Al(NO_3)_3$

Stack Activity

Depositions of large "hot" particles (primarily iron and calcium nitrates) around the stack were significantly reduced during the month. Apparently this reduction was the result of extensive water flushing of the ventilation ductwork, primarily the vent jet discharge plenum, downstream of the filters. However, slight local ground contamination has been found on several occasions in the form of "hot" droplets of water, apparently formed near the breeching of the stack (because of condensation caused by the lower outside temperatures recently experienced) and blown out with the ventilation air. It is believed that the ruthenium contained in these droplets is a portion of the small daily emissions from the process. As an expedient, the humidity of the ventilation air has been reduced to a dew point of approximately 55 F. The process emission of ruthenium has also been significantly reduced since December 20 by elimination of manganese dioxide scavenging of IAF. Quantitative data on the beneficial effect of these changes are not yet available.

URANIUM RECOVERY PROCESS TECHNOLOGY

Metal Removal

Three tank farms produced about 86 per cent of the gross feed uranium processed through the solvent extraction TBP Plant. For each ton of new uranium processed, a net 4130 gallons of stored waste were removed, using an additional 4460 gallons of sluicing water. A summary of feed source, age, and irradiation history is given below.

Tank	Fraction	Age (a)	Ave. MWD/T (b)
104-C (c)	0.213	31	582
104-BX	0.574	40	371
101-104-TX	0.213	39	459

(a) Estimated minimum age since pile discharge, months.
(b) The average MWD represents the weighted average pile exposure for the metal in the cascade.
(c) Tank 104-C contains supernatant from Tanks 111 and 112-BY.

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Shutdown of the TBP Plant for conversion to two-cycle operation restricted operation of the tank farms to final cleanout of Tank 104-BX during the same period.

Feed Preparation

Routine acidification, using about 15,220 pounds of 100 per cent nitric acid per ton of uranium, followed by an average 70 volume per cent boil-off, gave 3.9 M titratable nitric acid in tank farm feed. Concentration and acification of the RCU (1.35 M U and 2.0 M HNO_3) for second cycle feed was started, using the section 8 intercycle evaporator as an evaporator-stripper combination, and continuous addition of nitric acid to the 14-2 (RDF butt) tank.

Waste Handling

Scavenged waste amounting to approximately 8500 gallons per ton of feed uranium and containing about 2.4 per cent of the new feed uranium at an average pH of 8.8, was returned to storage for settling in 110-BY. Approximately 400,000 gallons of scavenged waste supernatant from 107-BY, containing about 1700 curies of Sr^{90}, were cribbed. Data from samples obtained from 108-BY indicate that the supernatant contains an average of 0.2 microcuries of Sr^{90} per milliliter and can be cribbed. The heels remaining in Tanks 110 and 107-BY, after cribbing of the supernatant, were transferred to the sludge storage tank 105-BY. It is expected that the residual Sr^{90} may be removed by subsequent scavenging after the tank farm scavenging facilities are installed. Of the 1,500,000 gallons of scavenged waste produced and stored in Tanks 110 and 107-BY, approximately 540,000 gallons of sludge and supernatant containing high concentrations of Sr^{90} remain in storage, to give about 36 volume per cent of the waste produced compared to an average of about 32 volume per cent for waste concentration. $Cesium^{137}$ concentrations of about 0.02 microcuries per milliliter were maintained in the waste supernatant.

Recent laboratory data indicate that the high Sr^{90} concentrations are likely due to the presence of lower than normal ferrous ion concentrations in the solvent extraction wastes. In order to insure that ferrous ion is more stable in future solvent extraction waste, the sulfamic acid concentration in the RDIS was increased by a factor of two above HW No. 6 flowsheet values.

About 29,800 gallons of low activity waste, containing 0.14 per cent of the new feed uranium were routinely cribbed for each ton of new uranium processed.

Solvent Extraction

Two short periods of operation were carried out under modified TBP HW No. 6 flowsheet (HW-29466) conditions, using 20 volume per cent TBP in hydro-carbon diluent as the organic phase and dual scrub RA and RD Columns. The nominal flow rates, expressed as per cent of HW No. 6 flowsheet rates, used for the startup were:

Cycle	RAF, RDF	RAS, RDS	RAIS, RDIS	RAX, RDX	RCX, REX	RIOS, RIIOS	RIOOS, RIIOOS
First	90-95	125	100	115	60	150	100
Second	85-90	100	100	140	90	150	[illegible]

Other departures from flowsheet included:

(a) the use of RCX and REX at 55 C, giving an average operating temperature of about 50 C throughout the solvent extraction battery; and

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(b) two-stage solvent washing on both lines, using three weight per cent sodium carbonate as ROS.

Operating periods of two and one days for the first and second cycles, respectively, indicate that at the startup conditions employed, over-all solvent extraction losses at steady state are less than 0.2 per cent of the feed uranium. A two cycle dF of 4.3 gave one REU batch containing 140 per cent ANU gamma activity. When steady state two cycle operation is established, more significant decontamination data will be obtained. One cycle plutonium decontamination was adequate to reduce the RCU plutonium concentration to about five parts per billion parts of uranium. Preliminary data show that the RCU and REU nitric acid concentrations are 0.1 and 0.2 pounds per pound of uranium, respectively. RDX rate decreases are planned to decrease the latter and prevent excessive UO_3 Plant evaporator corrosion.

Solvent Handling

Solvent treatment in both cycles consisted of two successive three weight per cent sodium carbonate contacts as was routine in A Line prior to conversion.

Project CG-562 (Change-over to Two Cycles)

The plant was shut down November 18, 1954, to complete the change-over to two cycle operation. At the end of the report period, each line had been operated individually for a short time, and complete series operation startup was in progress.

General Equipment

The intercycle evaporator package unit (E-8-1, T-8-4, E-8-5, and associated dunnage) was replaced, due to a leak in the evaporator (E-8-1) steam chest.

The RAF evaporator (Section 7) cell 13 was inspected and all mild iron equipment was found to be externally corroded. This severe corrosion will make it necessary to replace several jumpers, and is believed to be the result of steam and nitric acid vapors escaping from the seal pots during periods of excessive pressure. Currently planned changes include (1) improving cell ventilation by extending the air duct into the tunnel and directing flow down the tunnel, (2) improving seal-pot-vent to vent-duct connection, (3) installation of a temperature sensing device in the seal pot vent, and (4) installation of pressure indicators on evaporator (E-7-1) and cooler tank (Tk-7-2).

The RAF evaporator, E-6-1, appears to be limited by steam trap operation. New Wright-Austin steam traps have been ordered and will be installed on a test basis.

Tests to determine the cause of organic phase buildup in RAF tank (19-6) were completed. Recommendations were made to prevent the carryover of organic mist from the RD (19-8) column to the RDF (19-6) feed tank, by installing a deentrainment section and orifice in the (19-8) vent line.

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Waste pump (P-001-2) failed and was replaced with a thirteen stage Byron-Jackson Company pump with Neoprene bearings and bronze impellers. Pump installation and plant startup were delayed by undersize bolt holes in the pump flange and difficulty in making up the discharge jumper.

URANIUM CONVERSION PROCESS TECHNOLOGY

An average production rate of 56 per cent of the nominal design capacity, for electric and gas heated pots, was sustained. Major production curtailments were due to lack of

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feed. All of the uranium processed during the report period originated from the Redox plant. Total metallic impurities, fission product gamma activity, and plutonium in product UO_3, respectively, averaged 119 parts per million parts of uranium, 116 per cent of aged natural uranium gamma, and less than five parts per billion parts of uranium. All carloads were processed using 0.05 weight per cent sulfamic acid as the reactivity improvement additive, which gave an average reactivity of 1.11 as compared to last month's 1.18. Inadvertent additions of 0.03 instead of 0.05 weight per cent sulfamic acid to some pots and the nature of the feed (100 per cent Redox) were contributing factors to this lower reactivity.

Further anti-caking tests included the addition of two gallons of nitric acid per pot with the 0.05 weight per cent sulfamic acid, and use of a new type additive, urea. Nitric acid additions were unsuccessful in reducing the caking problem and additions of 0.2, 0.4, and 0.6 weight per cent urea reduced the time cycle 20 per cent, but no reactivity improvement was noted. Tests have been conducted on Pot No. 2, which has a new liner and a standard agitator modified by removal of the cross brace and installation of a peripheral stiffening ring. Using this combination, less caking was experienced at the standard 0.05 weight per cent sulfamic acid; however, use of 0.08 weight per cent resulted in severe caking which stalled the agitator.

Routine Luckey Pot average heating cycles showed an increase of about 1.3 hours over last month's cycles. Reasons for this were pilot flame failures (to a minor extent), automatic shut-off of the burners caused by excessive pot skin temperatures, and reduced heat transfer coefficients from side-wall buildup.

A study was made to more accurately determine the concentration (within one or two per cent) of the pot feed UNH and to determine better ways to control it. Results have been published in document HW-34168.

The T-A-1 53 per cent absorber test continued throughout the month. The results of the tests indicated that acid suitable for Purex dissolvers (above 42 weight per cent nitric acid) could be made with a few revisions, namely, recycling a portion of the E-A-2 Gas Cooler acid back through the Cooler to insure consistently good E-A-2 absorption and cooling efficiency, and diverting the T-D-4 Fractionator 20-25 per cent acid to the T-A-1 absorber to establish an improved L/V between the purge and feed plates. The tests included introduction of the Cooler Acid into the fourth plate of the absorber and, during the last week, into the sixth plate of the absorber.

Equipment highlights included testing the new type agitator in electric pot No. 2, and overhauling the X-11-1 furnace ventilation system. The umbrella-type agitator test has shown it to have sufficient strength to withstand severe caking, and initial unloading tests indicate that it is possible to unload the pot while the agitator is in motion. The shutdown of the X-11 unit put a severe load on the ventilation system, restricting the unloading to single pots.

Nitric acid recovery operations, using the 53 per cent test arrangement, led to recovery of ca. 925 pounds of 100 per cent nitric acid per ton of uranium calcined. The acid was returned, along with 0.58 per cent of the uranium calcined, to tank farm blending operations. The recovery of only 925 pounds of acid out of a possible 1200 pounds of acid may not be a true figure, since it is based on spot analyses and upon the flow integrator which may be in error.

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BISMUTH PHOSPHATE PROCESS TECHNOLOGY

New Equipment

The three spare off-gas fiberglas filters were tested and accepted. At a velocity of ten feet per minute, the differential pressures were 1.93, 1.79, and 1.97 inches of water, as compared to the empirical value of 1.82 inches of water for a filter of this design.

Production Test 221-T-18 - "Scavenging of First Cycle Waste"

In the initial phase of the test, first cycle waste was scavenged with a nickel ferrocyanide precipitate and mixed with untreated coating waste in the common underground storage tank, 101-TY. Three separate samples of the 101-TY tank taken three feet below the liquid surface at approximately one week intervals showed the Sr^{90} concentration to be 7.0 to 8.0 uc/ml, and the Cs^{137} concentration to be 0.25 uc/ml or less in the supernatant liquor, considerably above cribbing limits. On the other hand, four samples of first cycle waste, neutralized and scavenged, taken from the 15-8 tank (First Cycle Waste Neutralizer) showed the Sr^{90} concentration to be only 0.1 to 0.3 uc/ml and the Cs^{137} concentration to be only 0.003 to 0.03 uc/ml. In accordance with verbal approval to crib the supernatant liquid of scavenged first cycle waste only, jumpers are now being fabricated to isolate it from the coating waste.

Production Test 221-T-19 - "Reduction of Time Cycle in the Dissolver Section"

This test has been approved for immediate investigation. It is believed that the dissolution times of uranium can be reduced by adding extra acid to the Dissolver and dissolving to a higher acid content in the dissolver solution. The test provides that dissoving will be stopped at 1.9 M UNH-4.0 M HNO_3 content. The 0.5 M $SO_4^=$ concentration at the extraction step will be provided by sodium sulfate instead of the sulfuric acid normally used, and the dissolver solution will be diluted with water to give a 0.5 M UNH-1.0 M H^+ concentration at the extraction step.

Over Batch Size, F-10-P Tank

On November 29, the bottom valve on the F-10-P tank was removed and analysis of a sludge sample indicated that it contained 108 units of product. The sludge was scraped into a four quart bucket and removed to 231 Building for product recovery. The material was dissolved in boiling nitric acid-aluminum nitrate solution, and a total of approximately 1290 units of product was recovered. Cylindrical tanks with agitators were being engineered to replace the flat pancake type tank and, as a result of this incident, the design of this vessel has been referred to the Physics Research Sub-Section for criticality evaluation. An investigation of the incident was held and recommendations which were made to prevent recurrence of a similar incident included (1) any material containing plutonium of uncertain content is to be handled as pure plutonium with a limit of 400 units of material per batch, and (2) all plutonium bearing materials are to be processed or transferred only in containers which have had batch limits assigned to them.

Z PLANT PROCESS TECHNOLOGY (ISOLATION, PURIFICATION AND FABRICATION)

Isolation Building (Task I)

The free swinging Teflon scraper which was installed at the end of the agitator shaft in the P-1 precipitator tank, cell 2, has improved slurry transfers and reduced product

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hold-up in the tank. Visual observations indicate that fewer solids remain in the tank at the end of the slurry transfer step, while data collected from clean-outs show a 50 per cent reduction of the plutonium hold-up. The scraper agitates the slurry throughout the entire transfer step, whereas previously this was not accomplished with slurry volumes less than about five liters.

A uranium purification factor of about 100 was realized from processing high uranium content (five to seven per cent) 3 BP solution through a single peroxide strike. On the other hand, a purification factor of about 1000 is realized from processing the material through two peroxide strikes. This step is employed only when abnormal quantities of uranium are known to exist in the 3 BP solution.

The liquid nitrate product specification revisions which were made to simplify the data sheets and to consider applicable specifications on a lot basis are acceptable to the major customer site. It has been indicated that a specification on hydrogen ion concentration is more pertinent than a product concentration specification and that a plutonium concentration to hydrogen ion concentration ratio ≥ 33 is most desirable. An analysis of available data indicates that, under present operating conditions, this is always realized when the product concentration is ≥ 375 grams per liter. Reduction of the amount of acid used for cake dissolution will increase the ratio for a given product concentration, thereby causing lower product concentrations to satisfy the ratio requirements.

Hydrofluorination (Task II)

Based upon fluoride powder color, 39 per cent of the runs entering Task II required rehydrofluorination. This compares to 26.1 and 40.5 per cent for October and November, respectively. Double batches accounted for 90 per cent of the runs processed. Equipment inadequacies probably masked all process test results obtained during this period. Tests made by Manufacturing Department Process personnel and Engineering Department Design and Technical personnel on a new filter boat showed that gas leakage around the boat liner is great enough to prevent passage of process gases through the filter cake, causing hydrofluorination in most cases to be accomplished by diffusion of process gases into the filter cake.

A furnace door was blown from a furnace when a new bank of hydrogen fluoride cylinders was put on the line. The force to blow the furnace door off probably resulted from a hydrogen explosion, since the cylinders were not purged to remove the hydrogen before they were put on the line. This is the first door that has blown out since the purging procedure was instituted in the spring of 1953.

Reduction (Task III)

The average reduction yield was 98.4 per cent as compared to 98.5 and 98.3 per cent for October and November, respectively. Further analysis of production data has shown that rough and spongy buttons are definitely associated with blue (Pu III) fluoride powders. Since the heat of reaction realized from reducing blue powders is less than that realized from reducing pink (Pu IV) fluoride powders, more calcium and iodine are required for blue powders to make blue and pink fluoride powder reductions thermally similar.

The major process difficulty has been "boilovers" during reduction. While the exact cause for these has not been determined, the laboratory has found that air in the bomb contributes to frothing or splattering during firing. Leak rates for the Task III equipment have been very poor, which strongly indicates that these boilovers are caused by equipment failures.

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IN-LINE INSTRUMENTATION

Since the improved quality of uranium produced under the modified 2D Column operating conditions at the Redox Plant has lessened the need for continuous gamma monitoring of the 2DU stream, the monitoring apparatus was placed in service on the 1BU stream to aid first cycle process performance investigations. To date, the monitor record has shown satisfactory correspondence with laboratory analyses of Tank F-1 samples, and recorded activity peaks have reflected known upsets in the 1A Column. The extreme versatility of the current type gamma scintillations monitor is demonstrated by the fact that electronic modifications or collimation were not required to adapt the monitor to a new use involving a 20 to 100-fold increase in sample activity.

The background radiation level of the first cycle product gamma monitor at U Plant was reduced by a factor of ten, and the installation of a lead collimator and redesigned sample cell completed the conversion of the unit for use with higher activity solutions.

For more effective monitoring of column feed streams, the U Plant Process Unit has recommended the transfer of uranium photometer units from their present locations on the Concentrated Feed Receivers to the Centrifuge Catch Tanks, Tks-14-2 and 14-7.

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234-5 DEVELOPMENT

Filtration of Bismuth Phosphate Product (F-10-P) Solutions

Laboratory studies of the filtration of F-10-P solution have shown that the hold-up of plutonium by the filter (caused by the presence of solids in the solution and averaging about seven per cent of the plutonium processed) may be greatly reduced by increasing the acidity of the solution. In the filtration of synthetic F-10-P, equivalent to fifteen runs in the 231 Building, the hold-up from a solution containing 4.65 M HNO_3 was only three per cent as great as the hold-up from a solution containing 2 M HNO_3.

Hydrofluorination and Reduction Studies

Recent work on the conversion of "blue" plutonium fluorides to pink, plutonium(IV) fluoride has demonstrated the dependence of the reaction rate upon the temperature. Conversion of samples from a plant run at temperatures of 400, 500, and 600 C gave first order rate constants of 0.0048, 0.023, and 0.14 minutes, respectively. In studying the effect of oxygen concentration upon the hydrofluorination of plutonium(IV) oxide, at 500 C, samples of oxide were treated with gas streams containing 9, 40, and 80 volume per cent oxygen. All samples were converted to plutonium tetrafluoride, the reaction rates being, approximately, inversely proportional to the oxygen concentration.

The continuous hydrofluorination reactor has been successfully tested, at throughputs greater than 300 kilograms of plutonium per month (24 hour operation, 30 days per month), for the calcination of dried plutonium(IV) oxalate (the monohydrate) and the hydrofluorination of plutonium(IV) oxide. The latter operation yielded pink, powdery plutonium fluoride (bulk density, 1.8 g/cc PuF_4) which was reduced to metal, in two batches, with yields of 98.2 and 98.9 per cent. In an attempt to hydrofluorinate the dried oxalate directly, the partially converted oxalate caked on the reactor tube wall, and the off-gas line became plugged with oxalic acid. In these runs, entrainment of plutonium in the off-gas stream averaged about 0.02 per cent of the material processed.

Ceramics

In ceramics development, it was determined that the addition of a small amount of sodium hydroxide to low viscosity, slow casting, poor releasing batches of magnesia slip that did not require acid deflocculation produced a satisfactory casting slip. When sodium hydroxide was added to the slip, the viscosity increased, and the slip became very slightly thixotropic, which is desirable.

Nickel Carbonyl Coating

In contrast to results obtained by the Manufacturing Process Engineering Unit, runs made in the experimental coating unit indicate that circulation of process gas during coating has greater effect on coating rate than the coating temperature. The preheat temperature and piece temperature at the time of nickel carbonyl admission also appear to have a greater effect on coating rate than the controlling temperature. Data collected from four runs which show these results are tabulated below:

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Control Temperature	Preheat Temperature	Piece Temperature At Start Of $Ni(CO)_4$ Admission	Blower	Coating Rate minute
125	175	160	On	1.29
100	175	145	On	1.18
100	175	100	Off	0.08
100	100	100	On	0.50

The coating distribution improves as the controlling temperature and piece temperature at the start of the nickel carbonyl admission are lowered, suggesting that lower temperatures are more conducive to the application of uniform coats.

Recuplex Investigations

In recent studies of the corrosion of type 309 SCb stainless steel in the Recuplex slag-and-crucible dissolving system, it was shown that (a) metal in the vapor phase was corroded less rapidly when it was held at 140 C, a temperature high enough to prevent condensation, than when it was permitted to attain normal reflux temperatures (2.3 vs 6.0 mils per month), and (b) reduction of the solution temperature from 117 C, the boiling point, to 110 C reduced the corrosion rate from 14.5 to 8.3 mils per month.

Work on the preparation of oxalate supernatant solution for solvent extraction has shown that the addition of 0.3 M H_2O_2 to the killed supernate reduces the plutonium(VI) to a mixture of plutonium(III) and (IV) within one-half hour. The subsequent addition of 0.3 M $NaNO_2$ then produced the desired plutonium(IV) in about 20 minutes.

Further investigation has been made of the higher than expected E_a° values which have been measured for the dilute region of the Recuplex stripping column. The results of two batch counter-current solvent extraction runs, made with one minute and fifteen minute equilibrations, indicate that the effect is caused by the presence of plutonium complexing agents in washed TBP and not the slow attainment of equilibrium, as previously thought.

Vinyon 120-N filter cloth was tested for use in the Recuplex aluminum nitrate solution filter. Filtration rates were found to be comparable with those for the best of the papers tested (Sparkler grades "V" and "C"), and the cloth has the added advantage of being suitable for back-washing.

Recuplex Construction

Construction of the Recuplex facilities in Rooms 221 and 337 of the 234-5 Building is approximately 89 per cent complete (based on the increased construction requirements resulting from recently authorized revisions). Modification of nine process vessels for increased nuclear safety has been initiated. Location of glove ports on the process hood panels has started.

Procurement has been initiated for ten stock item centrifugal pumps from Eastern Industries, Inc. The pumps are to be tested as substitutes for the in-line pumps fabricated by Chempump Corporation. The potentially short service life of the latter has made it advisable that they be used only in systems where packing-gland leakage cannot be tolerated.

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Separations Technology Section

CHEMICAL DEVELOPMENT SUB-SECTION

PUREX DEVELOPMENT

On December 25, the preparation of the Purex Technical Manual was approximately 66% complete.

Equipment Development

Pulse Generator Development. A Purex-Plant pulse generator installed on the 321-Building prototype HA Column (standard cartridge) has accumulated 125 hours of satisfactory, intermittent operation pulsing HAX.

Instrument Development. A Purex Hammel-Dahl valve being tested in 321 Building showed excessive hysteresis at low loading pressures. This is apparently due to friction of the Dahl seal against the valve stem.

The interface control difficulties due to emulsion formation in the lower 5-in.-diameter section of the prototype 2A Column have been overcome by installing the capacitance probe in a 3-in.-diameter, 32-in.-high external chamber connected: (a) at the bottom to the lowest point of the beaver-tail disengaging box, (b) at the 10-in. level to the highest point of the beaver tail, and (c) at the top, through a 1/4-in.-diameter orifice, to a point 6 in. below the top of the 5-in.-diameter column section. With this set-up the interface level within the external chamber is not over 3/4 in. different from the interface level in the beaver tail.

Submerged Combustion

The 1,000,000 Btu./hr., propane-burning, submerged combustion unit was placed in operation. As received, the fire-detection eye (heat-and-light-sensitive cell) was only 2 in. from the burner head and was damaged by the high temperature. Relocating the eye 6 in. from the burner head corrected the difficulty. The unit was operated for 50 hours evaporating a solution of 32% $NaNO_3$ in water. Performance was as follows:

SUBMERGED COMBUSTION

Solution: 32% $NaNO_3$ in water

Propane Burned, Lb./Hr.	Excess Air, %	Evap. Temp., °F.	Water Evap'd, Lb./Hr.	Efficiency, % of Heat Used in Heating and Evaporation of Water
61.2	0	204	910	84
32.7	43	187	537	90

Liquid entrainment in the vapor was determined using sodium ion as the tracer. The sodium D.F. from liquid to vapor was 3.3×10^2 two feet above the liquid surface, where the vapor velocity was 0.6 ft./sec., and 1.2×10^3 at the top of the 12-ft.-high, unpacked stack (vapor velocity 20 ft./sec.).

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Materials Testing

The corrosion rate of a Type 309 Cb stainless-steel heat-transfer surface (inside surface of a 1-in.-O.D. tube 6 ft. long) was obtained in boiling 60% nitric acid at 75°C. (reduced pressure) and at 120°C. (atmospheric pressure). In the following table the previously reported corrosion rates of Types 347 and 304 L stainless steel under similar conditions are included for comparison.

Boiling Temp. of Acid, °C.	Temp. of Steam, °C.	Corrosion Rate of Stainless Steel, In./Mo.		
		304 L	309 Cb	347
75	116	0.001	0.0015	0.003
120	150	0.005	0.021	0.014

Kel-F elastomer was irradiated to 10^8 rads. There was no noticeable effect on any physical property (elasticity, tensile strength, swelling by solvent, etc.).

Flexing tests, carried out on irradiated sections of a Teflon bellows, indicate that Teflon bellows are unsatisfactory for reciprocating service after receiving irradiation above 10^5 roentgens.

HOT SEMIWORKS PUREX STUDIES

Conversion to Purex

Rearrangement of A Cell equipment by Minor Construction forces to permit the former Acid Fractionator to be used as the No. 1 Acid Concentrator has been essentially completed, along with the in-line sampling installation. The waste self-concentration tank is 98% complete and lacks only the receipt and installation of one instrument controller, and hydrostatic testing. The remote-type sampler is being constructed in the shop and is approximately 75% complete.

The acid fractionator, being installed by plant forces, is 95% complete. This equipment has presently been converted for continuous ozone sparging tests and installation as an acid fractionator will not be completed until these tests are finished.

Calibration of the different equipment by Technical personnel is progressing on schedule.

REDOX DEVELOPMENT

Process Chemistry

De-Entrainment in U Cycle Organic Streams. In recent laboratory tests, a 5-in.-diameter solid-bowl centrifuge has been used to demonstrate successfully the continuous de-entrainment of aqueous phase from organic uranium streams. As much as 0.3 volume per cent aqueous phase was completely removed with a holdup of 3 minutes at only 10 G (e.g., 10 times gravity), and up to 4.5 volume per cent entrainment was completely removed in 5 minutes at approximately 13 G.

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HOT SEMIWORKS REDOX STUDIES

Tail-end ozonization studies to remove radio-ruthenium in nominal 50-gallon scale batch sparging equipment were concluded during this period, with the completion of Run No. 17. Decontamination factors calculated on ruthenium analyses made by a distillation method indicate a continuing ruthenium removal up to D.F.'s of 10-fold or higher. Distillation ruthenium analyses also indicate a short induction period, of approximately 30 minutes.

Optimum conditions for batch operation appear to be 1% ozone concentration in air, sparging at a volume ratio of 1 cu.ft./min. of gas per 4 volumes of liquid charge maintained at an operating temperature of 90° ± 5°C. These conditions result in satisfactory ruthenium removal with a reasonable batch cycle time, and without excessive requirements for ozone.

URANIUM RECOVERY DEVELOPMENT

Process Chemistry

Miniature Pulse Column Development. Recent laboratory pulse-column studies have suggested that a phenomenon such as "back-mixing" in the scrub section may be responsible for poor fission-product decontamination and poor reproducibility from test to test, employing a miniature pulse column. It has been found that this can be circumvented by replacing the normal scrub section plate cartridge with one comprised of alternate sections of stainless-steel sieve plates and organic-wet packing (shredded fluorothene). This results in improved scrub-section decontamination which essentially duplicates U.R. Plant column decontamination performance. Unless otherwise specified this technique will be used in future Process Chemistry Laboratory scouting and plant assistance work.

Calcination of UNH. A series of runs made in a 4-in.-diameter laboratory calcination pot has proved the feasibility of using this equipment to study the effects of additives to the feed solution. Distinct differences were noted in the caking tendencies of UNH feeds with and without sulfamic acid from the standpoints of side-wall cake and agitator seizure. Indications were noted of an improvement in reactivity and a reduction in time cycle, upon the addition of urea, although no change in caking tendencies was seen. One UO_3 Plant pot charge was processed in 224-U Building with 0.5 weight per cent of urea (U basis). Although the urea did not alter the reactivity of the UO_3, it apparently decreased the calcination time cycle by approximately 20%.

Reactivity. Using the reactivity apparatus in the laboratory and the test conditions standard for UO_3, a sample of UNH was simultaneously calcined and reduced, and was then hydrofluorinated. Its conversion was determined and found to have been almost quantitative, the sample analyzing 98.5% UF_4 corresponding to a reactivity ratio of about 1.45.

Continuous Calcination

The 16-inch diameter by 8-foot long semi-plant-scale agitated trough type continuous denitrator was operated for a period of 184 hours to produce

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approximately 12,000 pounds of UO_3, at an average rate of approximately 70 pounds of UO_3 per hour. Three feed points were used with powder temperatures at the feed points in the range of 270 to 325°C., and with the powder discharging at approximately 450°C. The agitator speed was 38 to 42 rpm. During operation drive requirements increased from a low value, with plant UO_3, to approximately 12 horsepower after 158 hours of operation and decreased to approximately 9.5 horsepower at the termination of the run. During this period the nature of the powder was changing to a material typical of the powder produced previously in the 4-in. diameter continuous calciner unit. After 60 hours of operation, 1.5 to 2 pounds of UO_3 per hour were collected from the off-gas as dust. Prior to this period, operation with Plant UO_3 as initially charged into the trough resulted in dust loading as high as 11 pounds per hour.

No caking in the bed or in the paddles occurred during operation. Some lumping did occur, however, on the side of the reactor, by splatter from the feed points. Although these lumps were generally relatively soft and were easily crushed by the agitator, one lump caused several agitator paddles to be bent. The reactivity ratio of the powder produced, after equilibrium was attained, ranged from 0.54 to 0.75. The run was shut down and re-started several times due to difficulties with the high dust loading and shaft seal leakage.

Prior to this run, extreme drive power requirements were encountered due to caking of the powder in two runs when it was attempted to operate the equipment at lower feed point temperatures and slower agitation speeds. However, the 184-hour running period without caking has demonstrated that this type of continuous calcination equipment can be operated successfully. A design specification letter for plant-scale continuous calcination equipment is being issued to the Design Section as the basis for the current UO_3 Plant expansion project.

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CHEMICAL RESEARCH SUB-SECTION,

WASTE TREATMENT

Continued study of strontium decontamination during nickel ferrocyanide scavenging of Uranium Recovery waste indicates that the phosphate normally present in RAW is necessary to achieve good strontium removal (DF >75). In the absence of phosphate, as could occur during rework processing, strontium removal by ferrous compounds is negligible; removal by ferric compounds, while better, is still inadequate to produce cribbable supernate. When phosphate is present, strontium removal as a result of neutralization and nickel ferrocyanide scavenging or neutralization only is somewhat better when the iron in RAW is present as ferrous than when as ferric. In either case, maximum decontamination in the pH range 7 to 10.5 is obtained at ca. pH 9. After passing through a minimum near pH 10, good strontium removal is again obtained at pH 11 or higher. Unfortunately however, such high pH's are not suitable for scavenging since cesium decontamination is poor at pH's higher than 10.

Desorption of strontium on prolonged contact of sludge with supernate obtained by neutralization and nickel ferrocyanide scavenging of a plant sample of RAW was found to be small or negligible over the pH range 8 to 11, either at room temperature or 55°C, and for times up to two weeks. Iron was present in this sample largely as ferrous. Further studies of strontium desorption as a function of the ratio of ferrous to ferric iron in the waste solution are in progress. The effect of the radiation field present in plant-scale volumes of sludge will also be investigated.

Preliminary work on the use of polyphosphate deflocculants to reduce the settled volume of sludges produced on treatment of aqueous wastes show some promise. Sludge volumes less than half those of corresponding controls have been obtained after eight days' settling by the addition of one weight percent of sodium tripolyphosphate or tetrasodium pyrophosphate to synthetic Uranium Recovery RAW prior to neutralization and nickel ferrocyanide scavenging. Studies on the effect of these and similar additives on ultimate sludge volumes as well as on decontamination obtained will be made.

PUREX

Suppression of ruthenium volatilization in Purex nitric acid recovery has been shown to apply at lower nitrite concentrations than previously reported and under conditions simulating higher acid recovery and shorter hold-up times in the #1 acid concentrator of HW#3 Flowsheet. Specifically, distillate samples from an 8 M HNO_3 - 1.5 M $NaNO_3$ - 0.01 M $NaNO_2$ solution gave qualitative indication (radiation meter, quantitative analyses pending) that ruthenium did not volatilize in the time interval 2 to 24 hours after starting distillation. Thus, the suppressing action of the nitrite ion is faster than the reaction causing ruthenium volatilization, as desired. Earlier results had indicated no volatilization during the first two hours even in the absence of nitrite and suppression of volatilization by nitrite after 20 hours.

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The foregoing studies have all been conducted in a closed system apparatus, viz., an Othmer equilibrium still, for convenience in operation and interpretation. A glass apparatus has been designed and constructed to permit lab-scale study of the effect of adding nitrite ion or nitrogen oxide gases during continuous recovery of nitric acid.

Preliminary results indicate that urea also suppresses ruthenium volatilization from distilling 8 M HNO_3 - 1.5 M $NaNO_3$. The effect of urea was investigated because of urea's promise in reducing nitrite damage to solvents. The presence of urea in IWW might be expected to interfere with the use of nitrite for suppressing ruthenium volatilization. Instead, it tentatively appears to be a possible substitute for nitrite.

Additional data have been obtained on the chemical decomposition of Purex solvent at 35°C. With an initial aqueous phase of composition 2.4 M HNO_3, 0.8 M UNH, 0.02 M $NaNO_2$, little attack on the solvent is observed with up to 800 hours exposure. However, when the initial aqueous composition was 6.0 M HNO_3 and 0.05 M $NaNO_2$, simulating 2A conditions, a marked effect was noticed at 330 hours. Extraction rates for uranium had decreased, as indicated by the extraction rate test, and "C" contact uranium distribution values of ca. 0.06 were measured indicating an unusable solvent. A "C" contact uranium distribution value of <0.01 is required to insure low losses in the "A" columns. These tests were performed on carbonate washed solvent, so the results indicate long term effects which are expected to build up in a recirculating solvent.

The chemical stability of the Purex solvent (30 percent TBP diluent systems) to nitric and nitrous acid attack at 50 and 70°C is under investigation. At the higher temperatures both nitrite and higher acidity strongly increase the rate and severity of the attack. Thus, more solvent decomposition is to be expected in the extraction section of the HA column, with its higher acidity and radiation dose rate, than in the scrub section. Soltrol-170 diluent appears to have the best resistance as judged by "C" contacts; however, in the absence of nitrite, insured by the presence of urea, Shell Diluent appears adequately stable at 70°. In those cases in which considerable attack was observed, it was found that the concentration of surface active materials was building up more rapidly than the concentration of complexing agents, as evidenced by the relative changes in "C" contact values and dispersion times.

Irradiation of 30 percent TBP-Spray Base samples of process composition is continuing. A dose of 10^8 R results in badly degraded solvent with an extraction rate ratio of 0.56 (normal 1.0) and a "C" contact uranium distribution value of 0.5. A dose of 10^6 R on the other hand was without effect. An experiment is under way to test the possible increased effect of radiation damage at elevated temperatures.

The entrainment of aqueous phase in a Purex type organic stream has been briefly investigated by use of a pulsed stirrer of the type employed for dispersion studies. Entrainment in 20 to 30% TBP-hydrocarbon after formation of an aqueous-continuous dispersion was only 0.02 to 0.03 percent, measured 20 or 30 seconds after agitation

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was stopped. The addition of irradiated tributylphosphate, the use of recovered (carbonate washed) RCW, or of nitrite degraded solvent did not raise the amount of entrained aqueous phase more than 30 to 50 percent. These experiments were performed in a one-inch diameter vessel with an 0.2 M UNH, 0.2 M KNO_3 aqueous phase. Larger effects resulted from an organic continuous dispersion. After 20 seconds settling time the entrainment was often 10 to 20 times higher than with aqueous continuous systems. Thus, factors which favor organic continuous dispersions will increase entrainment. Among the more important of these is the presence of solid surfaces such as the laboratory stirrer (or column packing) that have become partially hydrophobic through adsorption of organic films. Raising the temperature from 25 to 50°C visibly increases the coalescence and settling rate; however, after 30 to 50 seconds little difference in the entrainment is observed.

Room and elevated temperature pulse column flooding runs were made with a high viscosity oil as the continuous phase. These runs tested and proved the flooding correlation equation which can be used to predict the effect of temperature, through the change in physical properties. A slight change in the correlation was made in light of the increased viscosity range studied. The correlation now describes the results of 285 runs with an average deviation of 13.5 percent. A formal report completing this study was in preparation at month end.

A survey of chloride ion behavior in acid recovery systems was made, and a program was outlined to determine the path conclusively and provide a solution to this recurrent problem. It was calculated that 90 percent of the chloride fed to an acid recovery operation will ultimately appear in the feed to the vacuum fractionator. For this reason, some knowledge of the reduced pressure vapor-liquid equilibrium for Cl^- ion in nitric acid systems is imperative. The fate of dissolved carbon tetrachloride is also unknown. Adequate corrosion data are completely lacking due primarily to the complex chemical equilibria involved in this system. Corrosion should be studied in a continuous flow acid recovery system duplicating plant thermal, chemical and velocity conditions. A one-cap-per-tray distillation tower was proposed, and calculations were made to show that the necessary data could be obtained for both atmospheric and vacuum operation.

THOREX

The effect of a number of variables on head-end protactinium removal by manganese dioxide scavenging have been established at tracer protactinium concentrations. Protactinium decontamination increases with increasing manganese dioxide concentration and is much lower with preformed than with coformed manganese dioxide, as might be expected. Further, protactinium decontamination decreases with increasing thorium concentration (especially above 1.0 to 1.3 M Th), with increasing nitric acid concentration (especially above 2 to 3 M HNO_3) and with increasing fluoride concentration. Digestion of the manganese dioxide at room temperature appears to be optimum, and digestion for more than five minutes or centrifugation for more than ten minutes at 700 G does not improve protactinium removal. Tentative flowsheet conditions consisting of 1 M Th - 1 M HNO_3 - 0.03 M HF feed solution scavenged with 0.05 M MnO_2 gave tracer level protactinium decontamination factors averaging 130 in twelve separate determinations.

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Preliminary results on a solution derived from highly irradiated thorium (2×10^{11} vs. 4×10^{6} Pa γ c/m/ml for tracer studies) indicate serious interference with manganese dioxide scavenging of protactinium. The initial decontamination factor was ca. 13 under essentially the same conditions described above where tracer decontamination factors of ca. 130 were obtained. Further, the manganese dioxide completely dissolved within a few days. Methods for preventing this apparent radiation effect are under intensive investigation.

The effect of phosphate on protactinium extractability into 50% TBP-Amsco was investigated applying a successive batch extraction-scrub procedure to a fluoride-free tracer in 4 M HNO_3 - 0.01 M H_3PO_4. The observed protactinium distribution values can be simply interpreted assuming two protactinium species, an organophilic form having a distribution coefficient of 3.4 and a 90 percent abundance, and a hydrophilic species with a distribution coefficient of 0.24 and a 10 percent abundance. Equilibrium between these two species is apparently very slow at room temperatures. Extraction study of another tracer solution prepared similarly except for a lower acid concentration (6 M vs. 9 M HNO_3) had previously indicated a distribution coefficient of 0.15 under the same extraction conditions and no evidence for more than one species.

Extraction-scrub experiments were also conducted in the absence of phosphate on the above tracer solution (prepared electrolytically in 9 M HNO_3), a similarly prepared tracer solution in 16 M HNO_3, and on a tracer prepared by fluoride-catalyzed nitric acid dissolution. At least two species appear to have been present in each case, with the predominant one favoring the organic phase with a distribution coefficient of 4 to 5. Future efforts will be concentrated on the organophilic species since they will limit plant decontamination.

Investigation of the effects of dibutylphosphate formation in the Thorex system has been initiated. Preliminary results indicate a low solubility of the Th-DBP compound in representative aqueous or tributylphosphate solutions (in the order of 10^{-4} M). The insoluble compound tends to concentrate at the aqueous-organic interface, suggesting possible crud difficulties. The presence of DBP also increases protactinium extractability into tributylphosphate; study of the stripping of the Pa-DBP species is planned.

The extractability of protactinium, uranium, and thorium were all found to be low in 2-nitropropane, a solvent which had been suggested as having heavy element extracting possibilities and which is reported to be stable in nitric acid.

FLUREX PROCESS

Additional laboratory runs on the Flurex process have shown that the stirring rate is the most critical variable in the reduction step at the mercury cathode. Current efficiencies (based on the product composition of sodium uranic pentafluoride) of 98 to 105 percent have been obtained in runs made with the new stirring conditions. The efficiencies above 100 percent are explained by the

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formation of some disodium uranic hexafluoride in the product. Tests showed no significant air oxidation of the reduced salt in experiments in which a vigorous stream of air was passed through a typical catholyte containing a large amount of suspended salt. Bomb reduction tests have been disappointing on the sodium salt; there seems to be present appreciable amounts of volatile matter that prevent formation of a coalesced metal button. The potassium salt will be prepared in the next series of experiments in an attempt to find a suitable material for efficient bomb reduction operation.

HEAVY ELEMENT CHEMISTRY

The preliminary tests of the equipment for the Np-239 experiment have been completed, and the equipment found to be satisfactory. The chemistry of the experiment has been confirmed, and it is evident that adequate decontamination and recovery of neptunium from the initial irradiation of depleted uranium can be achieved in the time allowed. No severe radiation hazards appear to exist in the experimental arrangement or procedure. The depleted uranium is scheduled to be charged into the pile (100-B) on January 6, 1955, and the neptunium formed in the initial irradiation will be charged into 100-H on or about January 14, 1955.

ISOTOPE SEPARATION

Work on the new type fission counter using gas scintillation was continued. It is anticipated that instruments of this type will be of great value for plutonium-240 analyses resulting from the isotope separations program. The operation of the instrument depends upon the emission of ultraviolet light that occurs when the ions formed by bombardment of the argon with alpha and fission fragments recombine. Severe poisoning of the argon has been observed in the first model; this is attributed to the emission of organic vapors from the phosphor-plastic binder that lines the chamber in this model. Since ultraviolet light is the active transmitting agent, a quartz liner is being tested to see if this reduces the poisoning. If this is satisfactory, a final model can be designed for routine use.

Experiments were carried out this month to determine the migration rates of tetravalent and hexavalent plutonium through cation exchange resin membranes in order to determine parameters for operation of the proposed ionic still for the separation of isotopes by electrolysis through ion exchange resin membranes. The migration rates were found to be highly acid-dependent, falling off rapidly with increasing acid content. At a pH of 2.6 to 3.1, the rate for plutonyl ion was about 80 percent that of uranyl ion, and about three times greater than for tetravalent plutonium. Marked polymerization of tetravalent plutonium ion occurs at this pH, and hence, the ion is not suitable for use in the still since long times of electrolysis are needed. It may be possible, however, to operate the still with plutonium(IV) present with plutonyl ion, and so obtain a chemical exchange of isotopes that may enhance or augment the over-all isotopic separation.

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Mass spectrometric analyses of the samples resulting from an attempt to separate tin isotopes by electrolysis of fused stannous chloride indicate that no separation was achieved. Tin was chosen for a plutonium "stand-in" in this experiment because of its wide range in isotopic composition, the applicability of the mass spectrometer for isotopic analyses, and the existence of a stannous salt with suitable physical properties. However, considerable experimental difficulty in working with tin was experienced, and work with tin has been abandoned in favor of copper. Previous work by Klemm of the Max Planck Institute has shown that a large separation of copper isotopes was obtained in the electrolysis of fused cuprous chloride. Activation analysis will be used to determine the isotopic content of the samples; it possesses sufficient sensitivity, precision, and accuracy to enable a critical evaluation of the fused salt electrolysis apparatus and technique for subsequent plutonium isotope separation experiments.

The thermal diffusion run which employed the pure uranium-tributylphosphate complex as a feed was stopped after 45 days. Marked feed decomposition had occurred, and no separation of uranium isotopes could be detected using the gamma discrimination analytical method.

Isotopic analyses have been obtained that indicate that no separation of isotopes of uranium occurred in two solvent extraction experiments using tributylphosphate in carbon tetrachloride extractant from hydrochloric acid solutions of uranium(IV) chloride. These analyses confirm an anticipated separation factor which was calculated by statistical mechanical methods. The mathematical theory has been applied to the selection of other solvent systems that offer (theoretically) better separation factors.

ANALYTICAL DEVELOPMENT

Analytical development was completed on the gamma counting method for uranium-235 determination, and a report is being prepared. The method was applied to several samples of significance to the isotopic separations program during the month.

A re-evaluation of the method being used to purify uranium samples prior to isotopic analysis on the mass spectrometer proved that the procedure is quite adequate for even the most impure samples encountered to date. Spectrographic analyses showed that samples of uranium seriously contaminated with phosphorus, lead, silicon, tin, and zinc are purified to a satisfactory degree.

In response to 200 Areas control laboratory interest, studies of the application of alpha scintillation counters for AT determinations in high β and γ fields were carried out, and useful ranges and specifications for the procurement of adequate equipment were prepared.

In the study of ion exchange in conjunction with spectroscopy for water analysis, spectrographic parameters were improved with a gain in speed and sensitivity, the cause of erratic results for iron in water was traced to electrode contamination, corrected, and a better ion exchange column was designed.

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The standard sample program included 40 determinations from 100, 200 and 300 Area service laboratories. These included synthetic 100 Area "alum recovery samples" for iron and aluminum; RAW samples for uranium; F-10-P samples for nitric acid, plutonium, total alpha, and specific gravity; and 300 Area uranium recovery samples for uranium. The average recovery of the RAW standards was about 20 percent low, confirming a previous test. Some results on the scrap uranium recovery solutions were slightly high. Particularly commendable were the excellent results on the F-10-P samples which were submitted as "blind" standards from the "T" plant.

Design activities included preparation of as-built diagrams and of a service and instruction manual for the light scattering microphotometers being fabricated for use in the pile water control laboratories. Design was started on a turbidity monitor for the bismuth phosphate plants to be applied to the bismuth phosphate cake dissolution steps. An engineering evaluation of an inexpensive counting rate meter was made, and the results were distributed to interested persons.

IN-LINE ANALYSIS

Most of the in-line analysis activity was devoted to final assembly, calibration, installation and testing of equipment. During the month the uranium polarographic monitor was delivered to the Hot Semi-Works, and the electrical wiring for the entire in-line analysis program was completed. Many units have been installed and tested in the plant at the month's end, and the remainder are ready for installation except one chassis of the uranium photometer console and the gamma photometer sensing unit, both of which are being fabricated at present. Arrangements for an MTR irradiation of additional thulium sources for gamma photometry and other planned research have been made, and four sources have been shipped to Arco.

The gamma spectrometer console has been put into service in the Hot Semi-Works and connected to an auxiliary gamma scintillation counter installed in C gallery as a manual counter for miscellaneous process samples. It is now being used to monitor radioruthenium in uranium solutions during studies of tail-end decontamination by ozonation. A new calomel electrode design for in-line pH monitors which incorporates part of a commercial calomel electrode in conjunction with the porous glass salt bridge has been designed, and units are ready for field tests. The design simplifies fabrication of the pH probes and is likely to reduce unit cost and maintenance. Tentative instruction and maintenance manuals for the Hot Semi-Works in-line pH and polarographic monitors have been prepared and distributed, and a formal report describing the in-line gamma monitoring system for the Hot Semi-Works has been issued as document HW-33901.

Other studies in support of the in-line analysis programs include developmental work on solutions for standardization of uranium photometers on organic streams, experiments which determined optimum optical parameters for the in-line turbidity unit, and calibration of the Hot Semi-Works recycled organic color monitor in terms of equivalent uranium color. A study of the effects of radiation darkening of the optical components of the in-line photometers was initiated. The darkening of the glass parts by a gamma dosage of 10^7 R was sufficient to indicate that the useful life of the uranium photometers on the HAF stream may be less than a week. The possibility of reducing the dosage rate of the unit by draining the sample for the major part of the time between readings is being explored.

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DECONTAMINATION AND WASTE DISPOSAL

Activities of Laboratory Services may be summarized as follows:

One million gallons of "retention" level waste was processed to ground in the 300 Area.

Ninety-five thousand gallons of "cribbing" level waste was transported to 200 West Area for discharge to 200 SL cribs. Increase in volume of "cribbing" level waste has caused a storage problem on week ends. The 15,000-gallon storage capacity normally kept open for week ends has proved inadequate on several occasions causing overflow of waste into the tank pits. Another review of crib waste sources is being made with the objective of reducing waste volumes on week ends. Personnel of Laboratory Services are not available for waste processing during week-end periods.

A slug cutoff "gunk catcher" and several cell trap filters from the Radiometallurgy Building were concreted at the 300 North burial ground. Survey readings on these units prior to concreting were approximately 500 rads/hr at surface.

A small fire was experienced in the Radiochemistry Building on December 21. The fire occurred in one of the filter canopies housing a C.W.S. filter. It was apparently caused by hot metal shavings when a small hole was drilled in the duct above the filter during the installation of pressure drop venturi tubes. The building was evacuated, and the fire was extinguished by the Fire Department. Damage was confined to the filter and canopy and was estimated at about $100.

All other decontamination, laundry and building service functions were accomplished in a routine manner.

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Separations Technology Section

ANALYTICAL LABORATORIES

General Chemical Laboratory

Significant changes in the work load during the month included analysis of samples in support or uranium isotope separation studies; a considerable increase in volume from UO_3 pilot plant studies; and a shift from uranium to thorium samples in support of research activities.

A blood serum sample received on an emergency basis was successfully analyzed for sodium and potassium content. A flamephotometric method was used.

Larvae and algae were analyzed for arsenic by a volatilization method reported in the literature in September 1954. The method is much more rapid and quantitative then the older classical methods.

Radiochemical Laboratory

At present the Plutonium Fission Counter is located in a room adjacent to the Fission Product counting room. When fission counting is performed there is an adverse and unsteady effect of radiation from the Ra-Be bug upon the BGO, the Gamma Spectrometer and especially the Gamma Scintillation counter backgrounds. The possibility of relocating the fission counting facility is being explored.

Thirteen completed irradiations from "E" test hole, "F" pile were received. The irradiated specimens were used to increase the number of available standard gamma scans and thus increase the usefulness of the Gamma Spectrometer.

Spectrochemical Laboratory

The arc-spark source enclosure for radioactive samples, referred to in previous reports, has been subjected to further tests. Serious current leakage through joints in the insulating shield was noted. The shield is being redesigned to eliminate joints in an attempt to correct this problem.

Mass Spectrometer Laboratory

The General Electric Analytical Mass Spectrometer was moved from the 108-B Bldg. to the 325 Bldg. Installation of this instrument is 90% complete. The glass pipe joint connecting the mercury diffusion pump to the cold trap was eliminated by making a solid glass to glass connection, after two unsuccessful attempts to install the pump resulted in breaking the joint. Start-up is now proceeding. Final operation will be contingent upon electronic stability and vacuum conditions.

Low yields in the preparation of UF_6, prior to isotopic evaluation, have been a source of trouble. Satisfactory yields have been obtained since allowing a very small leakage of gas through the sample valve during the fluorination reaction.

Water Quality Laboratory

The Bathophenanthroline procedure for the determination of iron in 100 Area process water does not produce satisfactory results. No further work on this procedure is anticipated at this time. It should be noted, however, that this reagent is extremely sensitive to iron ion.

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Work volume statistics for the Analytical Laboratories are as follows:

	November		December*	
	Number of Samples	Number of Detn's.	Number of Samples	Number of Detn's.
Research & Development				
Applied Research	1274	2381	1194	2549
Pile Technology	120	1447	163	682
Fuel Technology	111	1081	27	404
Separations Technology	291	637	421	781
Process Assistance	35	374	177	662
Other Customers	98	1427	63	327
Total	1929	7347	2045	5405

* Note: Work volume statistics for the month of December do not reflect the recent Technical reorganization. The breakdown was made to conform with the previous organization as determined by end function cost codes.

TECHNICAL SHOPS UNIT,

The activities of the Technical Shops formerly in the Fuel Technology Sub-Section proceeded routinely throughout the month.

INVENTIONS

All Separations Technology Section 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 December, 1954 except as listed below. Such persons further advise that, for the period therein covered by this report, notebook records, if any, kept in the course of their work have been examined for possible inventions or discoveries.

Inventor(s)	Title
Roy Ko, Chemical Research Sub-Section	The Electrodeposition of Americium and Curium from Acid Solution.
Roy Ko, Chemical Research Sub-Section	The Electrodeposition of Uranium and Neptunium from Acid Solution

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R. B. Richards
Manager, Separations Technology
ENGINEERING DEPARTMENT

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MONTHLY REPORT
DESIGN SECTION

VISITORS AND BUSINESS TRIPS

J. F. Cage of the General Electric Company, Guided Missiles Department, Schenectady, New York visited Hanford December 2 and 3, 1954 to discuss gas filled pump motors.

R. L. Tower of the Tower Equipment Company, Mercer Island, Washington visited Hanford December 13th through 18th to investigate pressure and temperature monitor difficulties at 100-K Reactors.

H. C. Donelson of the Tower Equipment Company, Mercer Island, Washington visited Hanford December 13 through 31st to make repairs on pressure monitor gages for 100-C Reactors.

M. Jordan Nathason and John M. Bell of the Jordon Electronic Manufacturing Company, Inc., Pasadena, California visited Hanford December 14th through 17th for consultation on radiation detection equipment.

M. F. Parr of the Foxboro Company, San Francisco, California visited Hanford December 14th through 31st to calibrate power calculators.

L. P. Sharts of the L. H. Butcher Company, Seattle, Washington visited Hanford December 15, 1954 to discuss anodizing of aluminum.

C. S. Slenning of the Minneapolis-Honeywell Regulator Company, Philadelphia, Pennsylvania visited Hanford December 16, 1954 to inspect instruments for the Purex Facility.

Bailey Stubenrauch of the Electric Steel Foundry Company, Portland, Oregon visited Hanford December 21, 1954 to discuss fabrication of stainless steel cans.

R. C. Mann of the General Electric Company, Idaho Falls, Idaho visited Hanford December 27th and 28th to discuss proposed installation of 105-C Irradiation Facility for the ANP Department of the General Electric Company.

E. P. Peabody visited the Bonneville Power Administration, Portland, Oregon, December 2, 1954 to discuss future HAPO electrical system fault tests.

W. L. Pearl visited the Aerojet General Corporation, Azusa, California, December 2nd and 3rd to discuss uranium-water reaction problem.

H. J. Bellarts visited Walker Hydraulic Duplicator Company, Bay City, Michigan; Monarch Lathe Company, Sidney, Ohio; American Tool Company, Cincinnati, Ohio and the L. T. L. Company, Rockford, Illinois December 4th through 11th to inspect special process equipment.

C. A. Pursel visited Columbia University, New York City, December 16th and 17th to attend symposium on heat transfer.

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R. A. Huggins visited General Electric Company, Schenectady, New York December 14, 1954 to investigate reactor materials, and December 16th and 17th visited Bridgeport Brass Company, Bridgeport, Connecticut to investigate manufacture of zirconium pressure tubes.

E. O. Swain visited Dow Chemical Company, Rocky Flats Plant, Boulder, Colorado, December 6, 1954; University of California, Los Alamos, New Mexico December 7th; and E. I. duPont deNemours & Company, Savannah River Plant, Aiken, South Carolina on December 9, 1954 to discuss and inspect plutonium isolation, purification and fabrication facilities.

P. W. Swartz visited The Valley Iron Works, Yakima, Washington, December 13, 1954 to inspect prototype turret for Project CG-578.

L. C. Koke visited the Byron Jackson Company, Los Angeles, California, December 16th and 17th for consultation on special pumps.

ORGANIZATION AND PERSONNEL

Personnel Statistics:

	November 30			December 31		
	Exempt	Non-Exempt	Total	Exempt	Non-Exempt	Total
Design Management	1	1	2	1	1	2
Process Engineering Sub-Section	69	14	83	70	13	83
Design Planning Unit	16	12	28	16	13	29
Design Engineering Sub-Section	84	10	94	84	10	94
Design Drafting Unit	8	86	94	8	86	94
Total Section Personnel	178	123	301	179	123	302
Technical Graduates (Rotational)	-	5	5	-	4	4
TOTAL	178	128	306	179	127	306

Accessions - 4

Separations - 4

GENERAL

Design Section engineering and drafting effort for December was distributed approximately as follows:

	Engineering Man Months Expended	Drafting Man Months Expended	% of Section Effort
1952 Expansion Program	33.5	11.2	18.0
Reactor Plant Modification for Increased Production	22.7	18.2	15.8
4X Program	13.2	9.9	9.0
Design Development	54.3	10.6	26.5
1706-KER Recirculation Facilities	8.0	5.9	5.4
Other Projects and Design Orders	32.5	33.6	25.7
	164.2*	89.4*	100.0

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*Equivalent man months expended includes 1.8 months of engineering and 0.4 man months of drafting overtime. Approximately 2.5% of the Section personnel worked a six-day week, primarily in support of the final construction phase for the 100-K Reactor Plant.

The Design Drafting Unit production for the month was 307 new drawings, five charts and graphs, and 398 drawing revisions.

DESIGN DEVELOPMENT

Statistics:

The total number of engineering and drafting man months expended on research and development during December was distributed as follows:

	Engineering		Drafting	
	Man Months	% of Total	Man Months	% of Total
Metallurgical Design Development	1.9	3.5	1.5	14.2
Reactor Plant Design Development	22.3	41.1	2.0	18.9
Separations Plant Design Development	20.7	38.1	3.9	36.8
Chemical Processing and Reduction Design Development	0.9	1.6	0.2	1.9
234-5 Design Development	2.0	3.7	2.4	22.6
Engineering Standards and Materials Development	6.5	12.0	0.6	5.6
	54.3	100.0	10.6	100.0

Metallurgical Design Development

The process equipment and plant study layout for the cold closure canning technique was completed. Information obtained in preparing the layout was used in arriving at estimates of total equipment, building and operating costs. Preliminary layout drawings have been completed for a cold closure press and a special finishing machine for production use on the cold closure method. Preparation was started on a recommendation report for a development program on this equipment.

Reactor Plant Design Development

A report was issued discussing the design of alterations to minimize operational inconvenience and potential hazards due to the positive neutron temperature coefficient when using long-exposure fuel elements. Various proposed alternates were considered in developing data for the report.

Reports were issued giving results of studies on a water treatment facility for a reactor utilizing a recirculated cooling medium and on the design problems of cooling the front and rear biological shields of a reactor operating at higher temperatures.

Preliminary results were issued in a report of a study on the stability of a reactor when operating with boiling water. Factors of design were given which could decrease the effect of oscillation in power level or coolant flow rate in a fail-safe lattice.

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The preliminary work on power recovery from existing reactors was continued. Associated with this is an investigation into the transfer of power from generators with large inertia after the generators lose prime moving torque. A study of the feasibility of power recovery from the 100-K Reactor was started, taking into consideration higher outlet temperature and pressurization of the rear face and effluent lines.

An independent evaluation was made and a document was issued on the savings which might be realized by the installation of continuous charge-discharge equipment on existing Hanford reactors. Testing was started on the effectiveness of ultrasonics in decontaminating fuel element dummies when utilizing various solutions. Other development studies included consideration of: process tube removal equipment; mechanized handling, sorting and conveying of slugs and dummies in the reactor discharge area and storage basin; completion of successful testing of a "hot" ball separator for removal of irradiated 3X System balls from the system.

Separations Plant Design Development

Work was concentrated on Redox contamination studies and separations waste problems. A summary report was issued on in-cell ozonization facilities which could be installed within six months after project authorizations. Preliminary work is proceeding on the scope of an outside ozonization facility, to handle Redox product only, which could be built in 18 to 20 months after authorization. However, provisions will be made for possible future expansion to handle TBP and Purex materials.

A document was issued summarizing recommendations for improvements to the Redox Plant inert-gas system. The ultimate aim is a leak-free system such that the inert-gas vent system could be operated under either positive or reduced pressure.

Studies were started on the possibility of future conversion of existing plants for use with a Thorex process or the construction of a new plant for use with either a Purex or Thorex process. The studies are to present preliminary estimates of the engineering feasibility, cost, and timing for these facilities for use in program planning and budget preparation.

Alterations are being made to the in-line alpha monitor to prepare it for installation in the Hot Semiworks in January. Work continued on the problem of cathodic protection for stainless steel waste lines.

Chemical Processing and Reduction Design Development

All work on present improvements to the Task II off-gas system was completed and the results were reported in a letter issued during the month. Shop fabrication was continued on a vertical replacement type hydrofluorination furnace for Task II.

234-5 Design Development

Work was continued on study drawings, which are essentially completed, delineating two alternate methods for improving the present RMA Line conveyor system. Work was started on a casting storage hood which will replace several individual storage hoods now being used.

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Engineering Standards and Materials Development

Cost to date for development of engineering standards for the current fiscal year is $43,716.

Work on standards and studies during the month is as follows:

a. The preparation of a new standard specification for Austenitic stainless steel pipe was advanced 30% during the month to 65% complete.

b. Revision of B-33, Piping Systems, Standard Identification Code is 95% complete, an advance of 5% during the month.

c. Work was started on the preparation of a new standard specification for reinforcing steel and is 50% complete.

d. A new electrical engineering standard, HWS-8000-S, "Standard Specification for Motor Control Centers", is being prepared. This specification and the design instructions which will accompany it are 90% complete.

e. Study is being made of possible future designs to reduce industrial noises which might be harmful to operating personnel. An initial report summarizing the information collected to date has been issued.

DESIGN PROJECTS

Statistics:

Design engineering and drafting effort of the Section on projects for the month of December was expended in the following categories:

	Engineering		Drafting	
	Man Months	% of Total	Man Months	% of Total
1952 Expansion Program	33.5	30.5	11.2	14.2
4X Program	13.2	12.0	9.9	12.6
Reactor Plant Modification for Increased Production	22.7	20.6	18.2	23.1
1706-KER Recirculation Facilities	8.0	7.3	5.9	7.5
Other Design Projects	8.7	8.0	5.6	7.1
Misc. Design Orders	23.8	21.6	28.0	35.5
	109.9	100.0	78.8	100.0

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CA-512 - 100-K Area Facilities

Design activities on 100-K Reactor Facilities consisted mainly of preparation of construction as-builts and design liaison with the field. Design liaison was reduced when the 105-KW Reactor Plant was turned over to the Manufacturing Department on December 6, 1954. The "O" ring seals were redesigned, the high pressure helium storage facility plug valves are being returned to the vendor for re-working of the seats, and a surge tank will be installed to provide a more stable pressure to the suction side of the helium compressor.

Detail design for the 1706-KER was resumed on a modified scope which forms the basis of the $2,440,000 cost estimate. The approved changes involve a reduction in installed pumping capacity and some reduction in system reliability but with little effect on the usefulness of the facility for test purposes. Twenty-eight drawings were issued for approval and design was advanced 4% during the month to 71% complete.

CA-513 - Purex Separations Facility

Design of the revisions to the condenser design for the Purex Tank Farm is 100% complete. The work in connection with design of the ammonia scrubber and jumpers is approximately 85% complete. Purchase requisitions for the scrubber were prepared while drawings for jumpers, water supply and all arrangements have been issued for comment. One drawing was prepared indicating a proposed modification to the Purex ventilation after-filter. Investigation of the tank farm effluent waste crib problem revealed low percolation rates in the existing crib area. Exploratory test holes were dug to determine the best site for a crib. An elongated crib was specified in a document issued at the end of the month.

CA-514 - 300 Area Expansion

Detail design of the 300 Area Expansion Program is 100% complete. The remaining work consists of revisions, design changes and field liaison. Design of the electronic equipment for the ultrasonic bond test equipment was completed during the month.

CA-539 - Additional Waste Storage Facilities

Design was completed to provide a vapor manifold system for the nine tanks at the 241-SX Redox Tank Farm which were not provided with a vapor system as part of the CA-539 construction contract. Design scope changes have required redesign of the manifold which has been rescheduled for completion during January 1955.

CG-558 - Reactor Plant Modification for Increased Production

Total design of modifications to existing reactor plants for increased production is 54.4% complete, an increase of 7.2% during the month. Detail design and design scope were advanced 6% and 2.6%, respectively, during the month to 47.7% and 99.5% complete.

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Major effort was concentrated on the 190-B Building annex in order to complete a bid package for lump sum construction in January 1955. Design is proceeding on the basis of revised vendor information on the 190 Building pumps, drive units and crane. Because of reduced space requirements, it was possible to lower the roof level. The design work necessary to lower the building and to modify the floor system to accomodate process piping has been extensive. Secondary or "back-up" instrumentation was deleted from the scope of the project. Present scope includes replacement of existing gages which may eliminate the need for "back-up" instrumentation.

Design criteria for the 100-F Area modifications to provide continuous process water flow of 71,000 GPM were completed and approved by the Design Council. Detail design continued on the 181, 183 and 105 Buildings and on the effluent systems.

CG-574 - Hanford 3X Program - Irradiation

Detail design is approximately 98% complete, an advance of 16% during the month. Nine drawings were approved for fabrication of buckets and handling equipment.

CG-578 - Effluent Water Monitoring Improvements, 100-D, B, DR, F and H Areas

Detail design was advanced 6.5% during the month to 74% complete. Of a total of 68 drawings, 38 are approved, 19 are issued for comment and two are ready for checking. Of 12 requisitions which are necessary, eight are 100% complete and four are 80% complete.

CG-579 - Effluent Water Monitoring Improvements, 100-C Area

Design was advanced 22% during the month to 25% complete. Of a total of 25 drawings, 12 are ready for checking. Of a total of 11 requisitions contemplated, four are 100% complete and three are 80% complete.

CA-586 - First Capacity Increase - 230 KV System

Authorization was received during the month and detail design was started on the addition to the 230 KV system. Preliminary investigation was made of the proposed line route and terminal points. Design is 2% complete.

CG-596 - Central Mask Washing Station Building 2723-W - Separations

Detail design of the facilities for a central mask washing station in the 200-W Area was advanced to 99% complete, an increase of 64% during the month.

CG-598 - Purex Vacuum Fractionator

Work on detail design in connection with a vacuum fractionator for Purex is inactive pending negotiation of a purchase contract for a "design and fabricate" package for the fractionator and associated tankage.

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CG-599 - Hanford 4X Program - 100 Areas

The scope work is being held in abeyance pending the determination of firm information. Bucket loading studies are in progress by the Manufacturing Department and the results will determine the number of buckets and cask cars required.

CG-600 - 100-C Alterations

Detail design was advanced 24% during the month to 50% complete. Five drawings were issued for comment and one drawing is approved. A purchase requisition for pumps and the electrical portion of the specification were issued for comments.

CG-603 Hanford 4X Program - Bismuth Phosphate Plants

Scope design for the Bismuth Phosphate Plants is 97% complete and detail design is 32% complete, an advance of 2% and 7%, respectively. The cribs for the project were relocated in the 200-E Area because of recent information with respect to underground drainage conditions. A review of the central air monitoring systems proposed for the plants was completed and it was concluded that such systems could not be justified. The scope document on the "T" Plant first cycle waste scavenging was issued.

A drawing schedule was issued during the month and shows that a total of 275 drawings are anticipated of which approximately 120 are for pipe jumpers. Of these drawings, 35 were completed and approved and about 10 drawings were issued for comment. In addition, approximately 20 jumper drawings were ready for comment. Revision of 92 existing "B" Plant drawings to the as-built condition was completed.

CA-612 - Alteration of Building 713 for Electronic Data Processing Machine

Detail design of alterations to the 713 Building for installation of an electronic data processing machine is approximately 40% complete. Design is being expedited to prepare a bid package for a lump sum contract. Approximately 12 drawings are required.

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

Scoping of the expansion of the Metal Conversion Plant is approximately 50% complete, an advance of 25% during the month. Detail design was also started during the month. Work is being done on the preparation of specifications, layout of the 224-U Building, the design layout for the continuous calciner and the design of the furnace controllers. A tentative list of drawings was made to estimate the magnitude of the work.

CG-614 - Hanford 4X Program - 300 Area

Design scope of the 300 Area portion of the 4X Program is 70% complete, an advance of 30% during the month. A study was made to determine the equipment needed for a conveying system between the furnace and component preparation area. Two induction furnaces will be installed in the material recovery area for recovery and conditioning of canning bath bonding material. The electrical demands may be met by adding fans to existing transformers and a study shows the present parking facilities to be adequate. Consideration of installing mechanical conveying equipment between the

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quench station and the cut-off machines has resulted in a decision against it and in favor of the use of carts. The carts will provide complete flexibility of operation and provide lag storage if desired.

D.O. 100754 - Modification of the 189-D Process Tube Mock-Up

Detail design was advanced 5% during the month to 100% complete.

D.O. 100757 - "As-Built" Area Maps

Drafting is continuing on the revision of Hanford Maps to bring them up-to-date and is approximately 66% complete, an increase of 6% during the month. There are 308 drawings started out of 400 total which includes 68 electrical and 240 civil drawings started.

D.O. 100825 - Silica Gel Tail-End Treatment - Redox Phase II (CG-535)

Design of the facility is 100% complete, an advance of 3% during the month.

D.O. 100890 - Yakima River Pump Station and Feeder Line

Design was advanced 25% during the month to 75% complete on the facilities to provide water for the Wellsian Way Recharge Basin.

D.O. 100916 - (CG-587) TBP Waste Scavenging

One drawing was revised to show four additional cribs for the TBP waste scavenging facilities.

D.O. 100930 - Graphite Hot Shop and Storage Facility - 3730 Building

Detail design of the renovation and addition to Building 3730 for use as a hot shop is 100% complete, an advance of 10% during the month.

D.O. 100946 - Foxboro Dewcel Moisture Monitoring System (CG-583)

Detail design of a moisture detection system for the 100 Areas was advanced 10% during the month to 70% complete.

D.O. 100963 - Floor Loading Stress Survey, 325 Building

Additional work is being done to check the structural adequacy of the floor for a cave.

D.O. 101015 - Dejacketing and Ultrasonic Equipment, 105-C Building (CG-589)

Design of a slug stripper and ultrasonic grain size determinator was advanced to 80% complete, an increase of 25% during the month. Of 37 required drawings three are approved and 28 are in the comment stage.

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D.O. 101036 - Moisture Monitoring System, 105-C Building (CG-584)

Detail design of a Foxboro dewcel moisture monitoring system to be installed at the 105-C Building was advanced 35% during the month to 70% complete. Six drawings were issued for comment.

D.O. 101041 - Additional Air-Drying Facilities, Building 234-5

The project project proposal for additional air-drying facilities for the 234-5 Building was completed and forwarded to the AEC.

D.O. 101045 - Discharge Area Television Viewer, 105-B (CG-593)

Bids were reviewed for the monorail equipment and the closed circuit television chain. Design remains at 56% complete pending receipt of certified vendor information.

D.O. 101052 - Redox Stack Sampler - Project Proposal

The Radiological Sciences Department was notified of the advisability of limiting the project to the minimum required for immediate safety of plant and personnel and pending decision of the extent of the project for Redox contamination control. Further work will be held up until a reply is received.

D.O. 101063 - Alum-Activated Silica Water Treatment Facility, Phase II - Project Proposal

Work is continuing on the preparation of design scope for Phase II of the alum-activated silica water treatment facilities and a scope document is scheduled to be issued in January 1955.

D.O. 101102 - Induction Heating Fuel Testing Facility - 314 Building

Design of the test facility is approximately 80% complete. Of six scheduled drawings, two have been issued for comment and four are being prepared. The purchase specifications for the work coils and balancing coils have been prepared.

D.O. 101117 - Installation of Additional Generating Capacity, 189-D Building

Work on the installation of additional generating equipment is delayed pending receipt of additional information from the vendor of the DC metering facility.

D.O. 101051 - Carbon Dioxide System - Building 234-5

The project proposal was completed and submitted to the Manufacturing Department for approval. At their request, further work was stopped pending results of tests on the requirement for inert gas in Task V.

D.O. 101125 - Installation of Acid Feed Equipment - 100-B, C, D, DR, F & H (CG-616)

Preliminary design criteria and drawings for this proposed installation was issued for comment. A letter project proposal requesting interim design funds was completed and submitted to the AEC.

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D.O. 101141 - Drawings and Specifications for Evaporators

Design was started and is 98% complete on the preparation of vessel drawings, and associated materials and fabrication specification for off-site fabrication of vessels for 200 Area canyon service.

D.O. 101145 - Phase II Particle Problem Animal Exposure Equipment (CG-572)

Detail design was started on alterations to the 141-F Building.

D.O. 101147 - FY 1956 and FY 1957 Plant and Equipment Budget

A target schedule for preparation of the FY 1956 and FY 1957 Plant and Equipment Budget was developed. Letters were issued to responsible departments requesting the submission of construction budget reason sheets. Work was started on the preparation of required construction budget data sheets. The Design Section submission of the budget is scheduled to be issued February 25, 1955.

D.O. 101153 - Redox Tunnel Ventilation Barrier

Work was started on the preparation of a project proposal for the Redox railroad tunnel covers and is scheduled to be submitted to the Financial Department in January.

D.O. 101159 - 2 DU Coalescer - Separator Unit

Design was started and completed on a 2DU coalescer - separator unit, supporting facilities and connecting jumpers.

D.O. 101160 - Stockpiling Special Materials for Emergency Replacement

A list was prepared of equipment and material required to be stockpiled for repair of damage due to possible enemy action.

D.O. 101155 - Die Pattern for Swaging Equipment

Design was completed on development of possible die patterns for the swaging equipment. A scope drawing of proposed office layout was requested.

Design Work Completed During December

D.O. 101008 - Panellit Tracing Modification, 105-C
D.O. 101016 - Crane Hook Radiation Shields, 202-S
D.O. 101017 - Technical "As-Built" Drawings
D.O. 101018 - Review of Instrument Design (CG-496)
D.O. 101024 - Revise Drawings - 274-W Building
D.O. 101069 - Shop Drawings - Thermal Test Reactor - Graphite
D.O. 101078 - Television Installation Drawings, 202-A
D.O. 101084 - Transfer Jet Connector G-5 to H-2, 202-S
D.O. 101113 - Drop Pan, 202-S
D.O. 101116 - Variable Jumper, 153-TY Diversion Box
D.O. 101124 - Jumper U-7 to L-2 and L-3, 154-UX

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D.O. 101126 - Laboratory and Instrument Shop, 105-KW
D.O. 101135 - Start-Up Detail Design - Hot Semiworks Conversion (CA-513-D)
D.O. 101138 - Diversion Box Jumpers
D.O. 101140 - Jumper Design - 202-S
D.O. 101157 - Jumper Design, 121-T Diversion Box

INVENTIONS

All persons in the Design Section 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:

Inventor	Subject
E. Hollister	Special Finishing Machine for Machining Cold Closure Fuel Elements
L. L. Zahn	Some patentable features may be included in a design proposal now in rough draft form entitled "Continuous Fluid Calciner".

RH Beaton

Manager, Design
ENGINEERING DEPARTMENT

RH Beaton:HDT:md

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ENGINEERING MAN MONTHS

PROCESS ENGINEERING SUB-SECTION

Description	Backlog Start of Mo.	Work Sch'd Dur. Mo.	Time Spent Dur. Mo.	% of Total Effort	Backlog End of Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	FY 1956 And Later	Total
1952 Exp. Program*	70.8	20.0	19.5	27.0	71.3	15	13	10	8	6	5	14.3	71.3
CG-558	20.2		3.8	5.4	16.4	4	3	2	2	2	2	1.4	16.4
4X Program	37.6	4.0	3.6	5.1	38.0	4	5	5	5	5	4	10.0	38.0
Reactor D&D	175.6		19.9	28.2	155.7	22	22	24	25	25	25	312***	455.0
Sep. D&D	125.2		17.8	25.4	107.4	18	18	18	18	18	18	240***	348.0
Met. D&D	12.1		1.7	2.4	10.4	2	2	2	2	2	2	30***	42.0
234-5 D&D	13.5		0.4	0.7	13.1	1	1	1	1	2	2	18***	26.0
Weapons D&D	7.6		0.7	1.0	6.9	1	1	1	1	1	1	12***	18.0
Other Proj. & Misc.	25.7	2.0	3.2	4.7	24.5	4	5	5	5	5	5	60**	89.0
Anticipated Fut. Work							1	3	4	5	6	120	139
TOTALS		26.0	70.7	100.0		71	71	71	71	71	70	817.7	1242.7

DESIGN ENGINEERING SUB-SECTION

1952 Exp. Program*	86.1	15	19.2	24.6	81.9	17	13	11	10	9	8	13.9	81.9
CG-558 & 600	277.2****		17.9	22.9	259.3	19	19	19	19	19	19	145.3	259.3
CG-578 & 576	14.1		1.2	1.5	12.9	2	2	2	2	2	1	1.9	12.9
CG-586	20.0		.4	.5	19.6	1	2	2	3	2	2	7.6	19.6
CG-598	23.4		.1	.1	23.3	1	3	4	5	5	3	2.3	23.3
4X Program	85.5	20.0	8.0	10.2	97.5	12	15	16	14	13	11	16.5	97.5
D.D. PGM'S Other Proj's	81.3		10.0	12.8	71.3	9	9	10	10	12	13	168***	231
Minor & Misc.	86.1	20.0	21.4	27.4	84.7	17	14	12	12	11	11	103.7**	180.7
Ant. Future Work							1	2	3	5	10	436	457
TOTALS		55	78.2	100.0		78	78	78	78	78	78	895.2	1363.2

Present Total Backlog is distributed over the five engineering branches in terms of man months as follows:

	Authorized Projects FY 55 & FY 56	Anticipated Future FY 55 & FY 56	Totals
Arch. & Civil	161	88	249
Mechanical	287	144	431
Electrical	149	75	224
Instrument	227	109	336
Standards	82	41	123
TOTALS	906	457	1363

*Includes 1706-KER Recirculation Facilities
**Includes Minor & Miscellaneous Work for FY 1956
***Anticipated FY 1956 D&D Funds
****Adjusted Backlog

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MONTHLY NARRATIVE REPORT - DECEMBER, 1954

PROJECT SECTION

I. SUMMARY

A. ORGANIZATION AND PERSONNEL

Effective December 15, 1954, Project Section was reorganized from four to six Sub-Sections as follows: Project Auxiliaries, Inspection, Minor Construction, Project Engineering, Reactor Projects, and Separations Projects. Following is a summary of personnel changes in Project Section during the month:

	November 30, 1954	December 31, 1954	Net Change
Employees on Payroll	396	391	-5
Tech. Grad. - Rotational	7	5	-2

The end-of-month status involved these changes:

	Project Section	Tech. Grad. - Rotational
Payroll Additions	1	
Payroll Removals	1	
Transfers into Section	1	
Transfers from Section	6	2
Transfers within Section	7	

B. SCOPE OF ACTIVITIES

At the end of the month construction completion status of major projects was as follows:

Project No.	Title	Completion Scheduled	Completion Actual
CG-496	Recuplex	94%	87%
CA-512	100-K Area Facilities		
	KW - Water Plant	100	99.9
	Reactor and Building	100	99.9
	KE - Water Plant	100	99.3
	Reactor and Building	100	98
	General Facilities	100	98.1
CA-513	Purex Facilities, Part "A"	99	92
CA-514	300 Area Expansion	90	73
CG-535	Redox Capacity Increase, Phase II	91	90
CA-546	Fuel Element Pilot Plant	-	45
CG-558	Reactor Plant Modifications	3	3

C. CRAFT LABOR

No serious jurisdictional disputes or construction labor problems were reported.

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D. SAFETY AND SECURITY

Nine regular meetings for discussion of safety, security, and health topics were attended by about 275 personnel. Five Monday morning tool-box meetings and two mass safety meetings were conducted in the field for service contractor personnel. Two Safety and Special Hazards Orientations were given to new and re-hired construction employees. Three special hazards meetings were held during the month. Contaminations of shoes and hands were discovered on three cases and were successfully decontaminated. One other pair of contaminated shoes could not be decontaminated. As of December 19, 1954, Minor Construction forces have completed 1,556,597 manhours without a lost-time injury. One recent injury is being investigated.

E. HIGHLIGHTS

Project Auxiliaries Sub-Section

The Sub-Section was reorganized into five Units, Field Surveys, Engineering Files, Reproduction, Project Control and Estimating. The personnel functions were continued. Reproduction output increased slightly to a total of 325,610 square feet for the 24 working days. A revised procedure was initiated for return and transfer of classified originals and reproducibles. Estimating completed 18 estimates, of which 10 were for project proposals. Field Surveys completed its off-site assistance to the Inspection Sub-Section, as well as other survey work at Hanford. This Unit received from A.E.C. an $80,000 work order for assistance on a re-survey of Richland.

Inspection Sub-Section

Inspection was completed on 164 orders, which with 104 newly assigned orders leaves the total number requiring inspection at 525. The evaluations under the Corrosion Testing Program have decreased to a total of 187 samples, and they were about equally distributed between the two laboratories. There have been increased requests for inspection of material ordered for operating departments at Hanford. Work was begun on a revision of the Inspection Manual. Upon its organization on December 15, 1954, the Inspection Sub-Section was composed of three local Units, Inspection Records, Material Requirements, Engineering Inspection, and seven Off-Site Inspection Units.

Minor Construction Sub-Section

Effective December 15, 1954, the Minor Construction functions were organized into a Sub-Section with the following six Units: Construction Facilities; Special Safety Practices; Field Office; 100 Area Field Construction; 200 Area Field Construction; and 300 Area and General Field Construction. Completed work consisted of 10 work orders and one informal request. The Sub-Section received assignments of work on CG-603, Third Extraction Cycle "T" Plant, CG-608, Redox Crane Viewing Room, and 15 work orders. Minor Construction now has been authorized $7,191,992, of which $4,173,732 has been expended or committed. The buses for Minor Construction forces began operating from Consolidated Transportation Facilities on December 20, 1954.

Project Engineering Sub-Section

This Sub-Section was organized to continue functions previously assigned to Minor Project Sub-Section, except for Minor Construction Work. Work was done on 44 project items, three informal requests, and miscellaneous engineering requests. The Sub-Section completed

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assigned work on CA-441, Solvent Building; CG-556, X-Level Flow Control - 105-C; CG-594, 221-T Building Roof Repair; IR-185, Heating #1 and #2 Warehouses - White Bluffs; and two engineering requests. The Sub-Section accepted initial assignments of work on CA-586, First Capacity Increase - 230-KV System, and ER A-3113, Water Supply Source - 300 Area. Important projects now in progress include: Recuplex Installation, Activate Task I RMA Line, Expansion of 300 Area Production Facilities, Fuel Element Pilot Plant, Reactor Plant Modification, Effluent Water Monitoring Improvements, and Hanford 4X Program.

Reactor Projects Sub-Section

Beneficial use of 105-KW Reactor was accomplished at 12:01 A.M. December 6, 1954. With minor modifications in progress, the KW Water Plant was officially turned over to Manufacturing Department during the month. Present construction work in the KW Area consists of about $30,000 in work orders. Replacement of the six secondary pumps in 190-KW Building was completed, and all pumps were run at low flow. At 105-KE, the Dynamic Flow Test was completed for the Reactor and Water Plant. Acceptance testing was about 65% complete. Installation of #3 and #4 secondary pumps was begun in 190-KE Building, thus completing the placement of secondary pumps. In 165-KE Building, load tests on all three turbine-generator sets were completed. The 151-KE Substation has been energized and is supplying test power. A visual inspection was made of other buildings and facilities, and a "Completion List" prepared. At 1706-K Building, one transformer and the switchgear were placed. All pumps have been set in the building.

Separations Projects Sub-Section

Negotiations are being conducted with Electric Boat Company on engineering features of the two spare concentrators. Shipment of Purex vessels and engineered equipment progressed to completion except for 18 vessels, six agitators, and one pulse generator. Of total major vessels and equipment received, 65 pieces have been installed. Total installations to date in 202-A were: 136 vessels, all centrifuges, 23 agitators, 10 pumps, 9 pulse generators, and 258 process jumpers. Current status of the 1206 required process jumpers was 970 fabricated and 904 tested. Of the required 194 electrical jumpers, 190 have been fabricated. In 202-A Building, piping was about 85% complete; electrical work was 90% complete; heating and ventilating supply was 95% complete, and exhaust 92%. Instrumentation was about 90% complete in the Head End Control Room and about 60% complete in the Central Control Room. Construction forces completed the 211-A Chemical Tank Farm, the 291-A Stack, the road and street lighting systems, and the steam distribution systems.

F. MONTHLY REPORT OF INVENTIONS AND DISCOVERIES

All persons in the Project Section engaged in work that might reasonably be expected to result in inventions or discoveries advise that, to the best of their knowledge 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 notebooks and records, if any, kept in the course of their work, have been examined for possible inventions and discoveries.

NONE

J. S. McMahon, Manager - Projects

December 31, 1954

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II. STATISTICAL AND GENERAL

A. SIGNIFICANT ASSIGNMENTS

1. Initial Reporting

CA-586 - First Capacity Increase - 230-KV System

Scoping and design are being managed by the Design Section. A Work Authority dated December 16, 1954, has been received, and it provides $1,100,000 for leasing the existing 230-KV transmission line from the Bonneville Power Administration. It is expected that the lease rate will be $19,000 per year. The Directive completion date was August 1, 1956.

ER A-3113 - Water Supply Source - 300 Area

Work Order #C-51781 was received from Plant Engineering Section, Manufacturing Department. Preparation of the informal request, cost estimate, and back-up data was scheduled for starting during early January, 1955.

2. Final Reporting

CA-441 - Solvent Building

Construction progressed 1% to completion. The project has been closed out with exceptions, and information for the Physical Completion Notice is being assembled.

CG-556 - X-Level Controlling and Recording Equipment

Construction progressed 6% to completion. The project has been accepted by the Technical Section with the exceptions of minor instrument installations, painting, and clean-up. Information for the Physical Completion Notice has been issued.

CG-594 - 221-T Building Roof Repair

The project is being closed with with an exception for three minor leaks which will be repaired as soon as weather permits. Information for the Physical Completion Notice is being assembled.

IR-185 - Heating #1 and #2 Warehouses - White Bluffs

Construction progressed 5% to completion. The work was closed out on December 7, 1954, with an indicated underrun of about $2000. Information for the Physical Completion Notice has been issued.

ER A-1220 - Minor Construction Fabrication Shops Study

The final report has been issued, and the work order for the study was closed out as of December 10, 1954.

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ER A-3112 - Stock Piling Special Material for Emergency Replacement

The purpose of this engineering request was for preparation of recommendation and listing concerning the stock-piling of special materials and equipment for emergency replacement for the 300 Area Production Facilities and the 234-5 Building. The report covering these phases has been completed and submitted for incorporation into the final report.

3. Current Projects

CG-496 - Recuplex Installation - 234-5 Building

Design had been completed previously; over-all construction progressed 1% to a total of 87%. A revised construction schedule based on the total estimated cost of $1,928,000 is being prepared. Work was continued on pressure testing, instrument calibration, installation of load-out station, electrical work and insulation. Vessels requiring modification are being removed.

CA-512 - 100-K Reactor Facilities

100-KW and 100-KE Water Plants

Over-all design of water plants remained at 99.8% complete. The construction completic status of KW remained at 99.9%; KE progressed 1.9% to a total of 99.3%; General Facilities were 98.1% complete.

The KW Water Plant was accepted for operation with specific exceptions. The replacement of secondary pumps in 190-KW Building was completed, and all the pumps were run at low flow. Modification of the overflow weir at 107-KW Retention Basin was completed, and tests were satisfactory at 174,000 gpm. Motor oil heaters and thermostats were installed in all six river pumps at 181-KW Building.

Acceptance testing was continued throughout the KE Water Plant. The 181-KE River Pump House was considered complete except for minor items relating to the bearing systems and cooling systems. In 165-KE Building load tests were completed on all three turbine-generators. Visual inspections were made of the 165-KE Building, 166-KE Oil Storage, 151-KE Substation, and the 167-KE Tunnel. A "Completion List" was prepared. Insulation of steam piping was essentially completed.

A visual inspection of the 190-KE Building was made, and a "Completion List" was prepared. The final two secondary pumps were set in place, and installation was started. The motor for backwash pump #2 failed and was repaired. A temporary connection of the revised dichromate injection system was made for testing. The 10,000 HP motor #1 was being tested to investigate unusual noises.

The 183-KE Filter Plant was completed except for such minor items as painting and furniture installation. A leak in Basin #4 is being repaired. Acceptance tests on equipment were completed except for minor items.

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Work was continued on general outside facilities and the area. The 151-KE Substation has been energized and is supplying test power. Modification of the 107-KE overflow weir was completed.

At Building 1706-K, one transformer and the switchgear were set in place. All pumps have been set in the building. Flushing and hydro-testing of water lines was continued. Installation of filter instrument panels was started. Construction at 1706-KER consisted of excavation, placing concrete, and installation of drainage pipe.

100-KW and 100-KE Reactor Facilities

Construction status of KW Reactor remained at 99.9%; KE progressed 2.7% to a total of 98%. Beneficial use of 105-KW Reactor was accomplished at 12:01 A.M., December 6, 1954. Present construction work consisted of about $30,000 in work orders.

The Dynamic Flow Test was completed during the month, and acceptance testing was about 65% complete. Structural work consisted of small concrete placements, painting, and installing building hardware. Work was continued on instrumentation and monitoring systems throughout the 105-KE Building and the reactor.

The horizontal rods have been run-in under power and give evidence of being acceptable. The final raising and lowering of vertical safety rods was completed. Final preparations are being made for testing of the Ball Third Safety System.

The new "pigtail" connectors have been installed on the outlet face, and on about 50% of the inlet face. The poison column ball valves were given an operation check run.

An operation run has been made on process tube charging machines, and the poison column charging machines have been run. "C" Elevator has been run, and exceptions are being corrected.

A Project Committee meeting was held December 16, 1954, to discuss modification to radiation type monitoring system and gamma monitoring of reactor effluent. However, final decisions were delayed to a future meeting.

Delivery of replacement "pigtail" connectors was accomplished, bringing the total of aluminum connectors to over 14,000.

CA-513-A - Purex Facility

The design work was continued on design changes, assistance to vendors, "as-built" drawings, and related detailed design. Negotiations are being conducted with the Electric Boat Division, General Dynamics Corporation, concerning engineering features of the two spare concentrators for Purex. No references to price have been made.

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Construction for the over-all project progressed 7.2% to a total of 92.4%, as compared to 99% scheduled. The portions of Purex completed during the month were 211-A Chemical Tank Farm, 291-A Stack, the road and streetlighting systems, and the steam distribution system. The 283-E Filter Plant Addition was 99.9% complete, and work was concluded except for repair or replacement of two sanitary water disposal pumps. Construction of the 241-A Waste Disposal Facility was 98% complete, and it has been estimated that remaining construction items can be completed during January, 1955.

Within 202-A Building, piping work was completed in the Hot Pipe Trench, including the adjustment of slopes. Over-all completion of piping work was 85% complete. Electrical work was about 90% complete. All control and instrument wiring has been pulled into the Head End Control Room. The heating and ventilation system was 95% complete for supply to the Canyon, and 92% complete for the exhaust system. Over-all heating and ventilating systems for 202-A were 93% complete. Instrumentation wiring was about 90% complete in the Head End Control Room and about 60% complete in the Central Control Room. Tubing was completed in the Head End, and 95% complete in the Central Control Room. Calibration of instruments located in the Pipe and Operating Gallery was about 90% complete.

Installations of major equipment including 38 vessels, have brought the total installation in 202-A to 136. All centrifuges have been installed, as have 23 agitators, 10 pumps, 9 pulse generators, and 258 process jumpers. Of the 1206 process jumpers required, 970 have been fabricated and 904 tested. Of the 194 electric jumpers required, 190 have been fabricated. Shipment by the vendor has been accomplished for all major Purex vessels and equipment, except for 18 vessels, 1 pulse generator, and 6 agitators.

In 203-A Storage, work was continued on fabrication and installation of pipe hangers. Doors and building hardware are being installed, and the tank basin is being Amercoated.

At 272-E Mock-Up Building, 70 pieces of major vessels and equipment have been completed and delivered to the 202-A Building, and 28 pieces of equipment are now in process.

General outside facilities were about 88% complete, and general outside utilities were 99.9% complete. Temporary construction was 92% complete.

CA-514 - 300 Area Expansion Program - Production Facilities

Design completion status remained at 99%; construction progressed 1.5% to a total of 73.5%. A new cost estimate totalling $6,200,000 has been prepared. The increase was required by escalation of labor costs, increased cost of material and equipment, and increased cost of retiring existing equipment.

Minor Construction forces have set the motor control center and have started the power cable rack.

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Installation of process equipment proceeded slowly, following the failure of coating for the penetration etch baskets. Minor Construction was requested to fabricate a teflon tray from solid stock. The electroplated brass carriers, slides, and other parts have been returned from the vendor and are being re-assembled.

Renovation of 3706 Building was continued in all phases. Radiation clean-up has been completed.

CG-535 - Redox Capacity Increase - Phase II

Over-all design had been completed previously; construction progressed 6% to a total of 90%. Procurement was 99% complete. The physical completion date for the 211-S Facility was established as December 23, 1954, and a final inspection was conducted.

The anticipated beneficial use date for the 233-S Facility remained as January 21, 1955. Process and instrument piping was essentially completed. Installation of heating and ventilating control systems is awaiting arrival of additional equipment. Concrete was being placed for the 205-S Facility.

CA-546 - Fuel Element Pilot Plant

The status of design was revised downward slightly to 58%; construction progressed 3% to a total of 45%. The contractor has requested additional funds and extension of time. The proposed schedule is based upon starting of acceptance tests during the last week of January, 1955. A review is being made of work on the electroplating facilities. Design work has been deferred, and deferment charges are being estimated.

CG-558 - Reactor Plant Modification for Increased Production

Construction progressed 2% to a total of 3%. At 100-B Area, the 13.8 KV river pump line was completed. Work progressed on the Effluent Line piping from 105 to 107-B. The lump sum contractor has completed underwater excavation for the outfall line and is laying sections of welded pipe out into the river. Concrete structures are 50% complete. At 100-DR Area, work was continued on installation of ventilation equipment in the north vent room addition, and on erection of the south vent room addition. The south process pipe tunnel tie-in was completed, and work was started on the north tie-in.

Three major problems have been encountered in obtaining horizontal control rods for this project. They concern sintered rings, extrusions for the rods, and seal rings. It now appears that some parts must been re-designed.

B. OTHER ASSIGNMENTS

CG-187-D-II - Redox Production Plant

Design progressed 7% to completion; construction progressed 2% to a total of 27%. Schedules have been revised to indicate the current status of construction.

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Improvement work to the Sample Gallery was essentially completed during the month; only a small amount of painting and final inspection remained.

CA-187-D-III - Redox Cooling Water Disposal Basin

Design had been completed previously; construction progressed 1% to completion. This project is being held open in order to observe operation of the cribs for several months. The dike between the chemical waste ditch and the old swamp area has been completed. Following calibration by Plant Forces, the flowmeters are operating.

CA-431-C - Metal Examination Facility - 105-C

Design had been completed previously; construction progressed 6% to a total of 69%. A revised construction schedule has been submitted and has been used as the basis for these completion percentages. A request has been submitted for an extension of time to May 1, 1955. The equipment for Basin #1 has been installed, and installation of piping and electrical lines was progressing. The equipment for Basin #2 is being installed. Work on the monorail was nearing completion.

CA-532 - Fiscal Year 1954 Water Tank Replacements

Design had been completed previously; construction progressed 12% to a total of 81%. Work on the tanks consisted of painting Tanks 2902-E and W, erection of Tank 1902-D, and preliminary work for erection of the new tank in F Area. Underground water lines in 100-D and F Areas were essentially completed. Progress to date indicated that work may be completed by January 31, 1955, except for outside painting which has been delayed by inclement weather.

CA-533 - Hanford Works Official Telephone Exchange

Design had been completed previously; over-all construction progressed to a total of 27%; compared with 54% scheduled completion. The first equipment installer arrived from the vendor on December 21, 1954.

CA-539 - Additional Waste Storage Facilities for Redox

Work Authority CA-539 (7) was issued on December 10, 1954; this authorized initiation of design for a vapor manifold system for 241-SX Tanks 105-115 inclusive.

CG-543 - Replace Sanitary Tile Fields 200-West Administration Area

With design completed, the project proposal has been authorized by the AEC, and a work release is to be issued in early January, 1955.

CA-544 - Central Distribution Headquarters

Work was suspended to await a decision on the use of 101-M Building.

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CA-548 - Reactivate Project Proposal for New VSR Test Tower

With scoping and preliminary design completed, the report has been prepared in rough draft for issue in January, 1955.

CG-549 - Activate Task I, RMA Line - Building 234-5

Design had been completed previously; construction progressed 24% to a total of 63%. A revised construction progress schedule is being prepared.

The major Task I components are being permanently located in Room 232 of the 234-5 Building. Piping was completed in all hoods except for tie-ins. The filter boat has been modified. Vessels and equipment are being installed as they are received.

CG-551 - Expansion of 234-5 Building Facilities

Design had been completed previously; construction progressed 3% to a total of 78%. The hood line mock-up was 90% dismantled, and was scheduled for moving by January 8, 1955. Task II revisions and the maintenance portion of Part B were complete. Plastering of walls was essentially completed, and painting was started. The ventilation duct and electrical power have been installed.

CA-555 - Graphite Hot Shop and Storage Building

Design had been completed previously. A review of the project cost is being prepared and will be included when design and specifications are sent to AEC.

CG-562 - Waste Metal Recovery Plant Modifications

Design had been completed previously; construction progressed 21% to a total of 74%. The 221-U facilities were placed in series operation on December 18, 1954, thus completing the contemplated work. The possible addition of solvent segregation facilities will be determined by operating experience for the next several months.

CA-566 - Building for Prototype Physical Constants Test Reactor

Design had been completed previously; construction progressed 29% to a total of 98%. Plant Forces completed tie-in work on December 15, 1954. The contractor and the AEC are expediting the procurement of materials for the fire alarm systems.

CG-572 - Particle Problem Animal Exposure Equipment

Design had been completed previously. Phase I construction was completed except for four punch list items, and a final inspection has been held. The total completion for Phases I and II was estimated at 31% completed.

CG-574 - Irradiation

Scoping and design are being managed by the Design Section. Construction remained at about 10% complete. Work was delayed by higher priority work and by changes in

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design of the "J" casks.

CG-576 - General Improvements to Laboratory Area - 300 Area

On the basis of the modified Directive, both detailed design and construction were revised downward to 25% complete. A work release is being prepared to authorize completion of construction work in Room 42B, 326 Building. All other work is being scheduled according to a priority list established by the Technical Section.

CG-578 - Effluent Water Monitoring Improvements, 100-B, D, F, DR and H Areas

Scoping and design are being managed by Design Section. Construction began and progressed to 1% complete. The first turret is being installed in 100-H Area, and is to be tested under actual operating conditions for one month. Delivery dates for the spectrometers have been revised for first delivery about March 15, 1955.

CG-579 - Effluent Water Monitoring Improvements - 100-C Area

Scoping and design are being managed by Design Section. No work was accomplished during the month.

CG-585 - Oxidizer Off-Gas Treatment, Redox

Design had been completed previously; construction progressed 2% to completion. The project is to be closed out with two commited work orders which provide for burial of contaminated equipment and for a spare J-3 filter.

CG-587 - TBP Waste Scavenging

Scoping and design are being managed by Design Section. Construction progressed 1% to a total of 98%. A work order has been issued to Plant Forces for installation of a chemical unloading device. Minor Construction work was completed except for a small amount of backfill and installation of a radiation barricade fence. These items are to be completed after completion of the four additional cribs.

CG-588 - Ammonia Scrubbers, Redox

Design is being managed by Design Section. The performance of further work is to be determined by operating results of jet vents which are being extended to the Redox stack breeching. Operating results are to be observed until about February 1, 1955.

CG-589 - Dejacketing and Ultrasonic Equipment - 105-C Building

Design progressed 15% to a total of 95%. Most of the drawings have been issued for comment. The first work order has been issued for modifications to the trailer to be used for transporting caustic and acid solutions.

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CA-590 - Fly Ash Collection Equipment, Building 384

With preliminary design completed, the revised project proposal is being routed for approvals.

CG-592 - Laboratory Supply Space, 3706 Building

Work on this project still depends upon the outcome of a study of an alternate method of handling Caption 10 laboratory stores.

CA-595 - Car Pullers 184 Building Coal Yard - 100-B, D, F, and H Areas

With design completed, the AEC is now preparing the bid assemblies.

CA-596 - Central Mask Washing Station, Building 2723-W

Design is being managed by the Design Section, and has been delayed by higher priority work.

CG-599 - Hanford 4X Program - 100 Area

Scoping and design are being managed by Design Section. A requisition has been issued for one cask well car. Total procurement to date consists of this car and the 600 stainless steel buckets.

CG-600 - 100-C Alterations

Scoping and design are being managed by Design Section. Excavation has been completed for the 66" effluent line from the existing distribution box to the 107-C Basin.

CA-601 - 300 Area General Improvement Program

With preliminary design 85% complete, Revision #1 to the project proposal is being prepared.

CG-602 - Remote Sampling - Hot Semiworks

Design had been completed previously; construction progressed 15% to a total of 50%. Work has been stopped pending approval of a request for $10,000 additional funds. A revised construction schedule is being prepared. Shop fabrication was continued.

CG-603 - Hanford 4X Program - Third Extration Cycle "T" Plant

Scoping and design are being managed by Design Section. This project was expanded to include work on "B" Plant formerly authorized under project CG-597. Advance ordering of materials was continued. Testing work by Plant Forces was essentially complete. A field release was issued to Minor Construction on December 13, 1954, and temporary construction was started on that date. The first

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work scheduled was re-gasketing of the canyon trench and cell jumpers, to be started in early January, 1955.

CG-605 - Installation of Additional Generating Capacity - 189-D

Design had been completed previously; construction progressed 13% to a total of 99%. Installation of the D.C. busway was completed with the exception of a few load fittings.

CG-608 - Redox Crane Viewing Room

Scoping and design are being managed by Design Section. Construction consisted of shop fabrication and was about 1% complete. Temporary construction facilities are being moved in.

CG-610 - Replacement of 313 Building Roof

This work is being scheduled to coincide with related work on Project CA-514, 300 Area Production Facilities.

CG-611 - Mobile Laboratory

Further work is awaiting authorization by AEC.

CA-612 - Alterations of 713 Building for Electronic Data Processing Machine

Scoping and design are being managed by Design Section, which also prepared the project proposal. Additional design funds have been authorized, but authorization of construction funds must be accomplished in Washington, D.C. The project proposal establishes a beneficial use date of April 29, 1955; however, the delay in authorization procedures has delayed procurement of critical equipment.

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

Scoping and design are being managed by Design Section. This project was formerly part of CG-597 - UO_3 Plant. Several scope drawings have been issued.

CG-614 - Hanford 4X Program - 300 Area

Scoping and design are being managed by Design Section. A directive has been issued for $130,000 to be divided as follows: $25,000 for Design Section, $5,000 for Project Section, and $100,000 for procurement. A revised project proposal including construction is being prepared by Design Section.

CA-615 - (ER A-758) - Mechanical Maintenance Shop Centralization - 100 Areas

With preliminary design completed, the project proposal has been transmitted to the Financial Department for review and approval before transmittal to AEC.

IR-181 - Temperature Control Improvement - 108-F Building

Design has been completed previously; construction progressed 20% to a total of

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70%. Installation of the steam supply and condensate piping was completed. Thermostatic control lines are being installed.

IR-183 - Study of Classified Scrap Disposal Problem - 300 Area Library

The informal request has been approved by the AEC, with the assignment of work to Minor Construction.

IR-184 - Tocco Induction Heating Unit, 314 Building - 300 Area

With design 90% complete, a work order is being processed to 300 Area Maintenance for installation of the new work station and supporting facilities.

* * * * * * * * * * *

The following studies and Engineering Requests, involving preparatory work and scoping of future projects, were active during the month.

ER A-761 - Decontamination Facilities, First Aid Station - 100-H and 200-W Areas

A scoping estimate for the proposed layout of the decontamination facilities has been requested.

ER A-764 - Fire Station Addition

With preliminary design 20% complete, the Separations Section has continued the investigation of analternate plan. A decision is expected in early January, 1955.

ER A-765 - Painting Water Plant Structures - 100-DR Area

Issuance of the study was delayed until January, 1955, because of higher priority work.

ER A-1217 - 186-D Building Renovation

The project proposal is being routed for approval signatures.

ER A-2749 - Sheltered Welding Manifolds - 200 Areas

With scoping 60% complete, the Separations Section has furnished additional information regarding the contemplated change in scope.

ER A-2751 - Removal of Task I and II R.G. Line

The project proposal is being reviewed by the Manufacturing Department.

ER A-2756 - FY-1955 Water Tank Replacements - 100-200 Areas

Additional progress on the project proposal was delayed by higher priority work.

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ER A-3111 - Vacuum Furnace Modifications - 314 Building

The project proposal is being routed for approval signatures.

C. RELATED FUNCTIONS

Inspection workload included additional orders from operating departments at Hanford. The completion of 164 orders and the receipt of 104 new orders for items requiring inspection left a net total of 525 orders which require inspection. Personnel of Materials Unit are processing almost 600 orders divided as follows: General Electric, 500; Blaw-Knox, 51; and Kaiser Engineers, 42.

The workload for the Corrosion Testing Program has decreased to a total of 187 samples which were divided almost equally between the two laboratories.

Inspection work was essentially completed on 100-K equipment. Some work was begun on orders for the Reactor Modification Program.

With shipment of Purex vessles and equipment approaching completion, the emphasis on inspection has shifted to spare units and replacement parts. Inspection personnel are assisting the AEC with inventories and other procedures related to disposal of salvage and scrap.

Following is a resumé of inspection activities during the month:

Item	Number
Total orders on hand requiring inspection	525
Cumulative number of orders assigned to inspectors	469
Number of orders assigned to inspectors this month	83
New orders received by Inspection during the month	104
Orders completed	164
Total requisitions for engineered equipment transmitted for Expansion Program	31
Total orders of engineered equipment placed for Expansion Program	17

At the end of December there had been transmitted 3269 Expansion Program requisitions for engineered equipment, and 3228 orders placed.

Reproduction output increased slightly to a total of 325,610 square feet. The working period was 24 days, including 90 hours overtime. The largest orders processed during the month were 5,417 prints for 100-K Area, 3,480 prints for Recuplex, and 2,093 prints for Reactor Modification Program.

Estimating completed 18 estimates during the month. The completed estimates comprised the following: project proposal - 10, fair cost - 2, and scope - 6.

Field Surveys completed work on four orders at Hanford and also the off-site assistance to the Inspection Sub-Section. This Unit received an AEC work order for $80,000 to assist on a re-survey of Richland. Additional work amounting

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to $5,400 was authorized for the Reactor Modification Program.

D. CRAFT LABOR

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ADVANCE ENGINEERING SECTION

MONTHLY REPORT

DECEMBER, 1954

A complete rough draft of the Hanford Atomic Products Operation Annual Report has been prepared.

Calculation of isotope yields during prolonged irradiation is being extended to determine the effect of various neutron energies, as affected by various temperatures at which the graphite moderator might operate.

Incentives for the possible production of uranium-233 by irradiation of an alloy of thorium and uranium-235 have been examined.

W. K. Woods

ADVANCE ENGINEERING
ENGINEERING DEPARTMENT

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EMPLOYEE AND PUBLIC RELATIONS DEPARTMENT

SUMMARY - DECEMBER, 1955

PERSONNEL PRACTICES SECTION

The number of applicants interviewed in December was 1,800 as compared with 1,999 for November. In addition, 242 new applicants applied by mail. Open, nonexempt, nontechnical requisitions increased from 533 at the beginning of the month to 656 at month end. One hundred and three employees were added to the roll and 72 removed during the month. Separations rate increased from .51% for fiscal month of November to .72% for fiscal month of December. These rates when converted to annual basis are 5.32% and 7.51% respectively. During December, 47 new requests for transfer to other type work were received by Employment, and 31 transfers were effected. Attendance recognition awards were distributed to 203 employees in December, including 46 who qualified for four-year awards.

Three employees retired during the month and three employees died. One hundred and fifty-six visits were made to employees confined to Kadlec Hospital, and 68 checks were delivered to employees confined at the hospital or at home. At month end, participation in the Pension Plan was 98.1%, in the Insurance Plan 99.4%, and the Employees Savings and Stock Bonus Plan 49.5%. At month end there were 889 registered under Selective Service and 813 military reservists were on the roll. Since August 1, 1950, 379 employees have terminated to enter military service, of which 133 have returned, 23 have not claimed re-employment rights, leaving 223 still in military-leave status.

Eighty-six adopted suggestions were approved for awards in December, resulting in cash awards totaling $1,285 with a total net savings of $8,446.86.

EMPLOYEE COMMUNICATIONS AND PUBLIC RELATIONS SECTION

The News Bureau issued 44 news releases during the month, nine of which were especially planned for national publicity purposes and were sent to the Schenectady News Bureau. Four manuscripts were approved for release during the month, and arrangements were made for one speech and one film to be delivered before public groups. The Community Newsletter was written and distributed to community leaders in Pasco, Kennewick and Richland. Three Management NEWS Bulletins were developed and distributed to all exempt personnel during the month. The December Health Bulletin and Safety Bulletin were also prepared and distributed.

The display featuring the plastic man and picture tour of Hanford placed in the Inland Empire Industrial Exposition at Spokane Coliseum was accompanied by a member of the Section who answered questions and distributed 1500 copies of GE's "Adventures Inside the Atom" booklet, and several hundred Hanford fact sheets. Several thousand people saw the display.

A total of 335 photographic assignments were completed this month, and 16,275 prints were produced.

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Employee and Public Relations Summary

SALARY AND WAGE ADMINISTRATION SECTION

Reimbursement Authorization No. 238, authorizing HAPO to operate under the Company salary plan beginning January 1, 1955, was received from the Hanford Operations Office of the AEC.

Authorizations for all positions in the new Company salary plan were received from top Management. All salaries falling outside the ranges of the new salary levels were reviewed by Department Managers and adjusted in accordance with the rules of the new salary plan.

The analysis and a summary report of the salary survey made in California in October was completed. Analysis of a similar survey of firms in the northwest was begun.

UNION RELATIONS SECTION

There were 34 unit grievances and 2 non-unit grievances received this month, 11 of the unit grievances and 1 of the non-unit grievances were processed at Step II, as compared to 7 last month.

Indications of efforts on the part of the Hanford Atomic Metal Trades Council to organize employees classified as Laboratory Assistants and Engineering Assistants were prevalent during December and steps have been taken to oppose encroachment into this area of technical activity. HAMTC representatives of the Operating Engineers and Chemical Workers have approached field supervision claiming jurisdiction over the operation of certain equipment in the 1706-KE Water Studies Semi-Works. It appears that the work in question is strictly technical in nature and should be assigned to Engineering Assistants.

A special form is being developed to convey to supervision pertinent union relations information including reports of certain grievances processed at Step II which are of general interest.

After many months of study, a procedure for upgrading in the stenographic and secretarial categories was completed and included as part of a Step II answer to a grievance regarding the filling of a Secretary "A" job.

Two negotiating meetings were held with the Material Expediters and Take-off Men during the month. Union demands continue to be exorbitant.

EDUCATION AND TRAINING SECTION

Three Rotational Trainees were permanently placed during the month of December.

Oregon State College has indicated acceptance of our studies in the Nuclear School of Engineering toward an MS Degree.

The Atomic Energy Commission has approved our proposal to make our evening study program available to Camp Hanford soldiers and to teachers in the Richland schools, subject to detailed arrangements so that our costs are not increased.

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Employee and Public Relations Summary

HEALTH AND SAFETY SECTION

There were no major injuries in either the plant or community operations. For the first time, the plant received the State's Award of Merit for Safety Performance from Governor Langlie.

The average daily census at Kadlec Hospital increased slightly from 60.2 to 60.6 as compared with 64.8 a year ago.

AUXILIARY OPERATIONS AND PLANT PROTECTION

A new type security clearance known as "L" has been instituted by the AEC which can be secured in a much shorter period of time. All HAPO positions are being reviewed to determine which ones may be filled with "L" cleared personnel.

Security violations continued at a low level with a slight reduction of total violations compared with November.

A complete physical inventory was made of all office furniture in use at HAPO. This is the first such inventory that has been made since 1950 and was necessitated by transfer of accountability from Financial to Employee and Public Relations Department.

COMMUNITY SECTION

Two disastrous fires occurred during the month of December, one a prefab residence at 1208 Wright Avenue and the other at the Uptown Thrifty Drug Store.

ORGANIZATION AND PERSONNEL

Total on roll December 1, 1954	1789
Accessions	22
Separations	27
Total on roll December 31, 1954	1784*

*Total includes 37 Rotational Trainees.

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Employees and Public Relations

PERSONNEL PRACTICES

General

During calendar year 1954, ten luncheon meetings were held by the General Manager with segments of the Management Information Group. In addition, there were 21 luncheon meetings with 441 supervisors and other exempt people in attendance.

Employment

	November, 1954	December, 1954
Applicants interviewed	1,999	1,800

446 of the applicants interviewed during December were individuals who applied for employment with the Company for the first time. In addition, 242 applications were received through the mail.

	November, 1954	December, 1954
Open Requisitions		
Exempt	1	--
Nonexempt	533	656

Of the 533 open, nonexempt, nontechnical requisitions at the beginning of the month, 212 were covered by interim commitments. Of the 656 open, nonexempt, nontechnical requisitions at month end, 346 were covered by interim commitments. During December, 63 new requisitions were received requesting the employment of 181 nonexempt, non technical employees.

	November, 1954	December, 1954
Employees added to the rolls	136	103
Employees removed from the rolls	63	72
NET GAIN OR LOSS	+ 73	+ 31

Separation Rate:

Fiscal Month November, 1954		Fiscal Month December, 1954	
Male	Female	Male	Female
.28%	1.55%	.44%	1.98%

Over-all Separation Rate:

Fiscal Month November, 1954	Fiscal Month December, 1954
.51%	.72%

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Employee and Public Relations

PERSONNEL PRACTICES

During December, 6 employees left voluntarily to accept other employment and 11 left to enter military service.

Transfer Data

Accumulative total of requests for transfer received since 1-1-54	663
Number of requests for transfer received during December	47
Number interviewed in December, including promotional transfers	56
Transfers effected in December, including promotional transfers	31
Transfers effected since 1-1-54 including promotional transfers	491
Transfers effected in December for employees being laid off	3
Number of stenographers transferred out of steno pool in December	4
Transfer requests active at month end	280

ADDITIONS TO THE ROLLS

	Exempt	Nonexempt	Community Firemen	Total
New Hires	3	79	--	82
Re-engaged	-	--	--	--
Reactivates	3	17	--	20
Transfers	1	--	--	1
TOTAL ADDITIONS	7	96	--	103

TERMINATIONS FROM THE ROLLS

	Exempt	Nonexempt	Community Firemen	Total
Actual Terminations	14	28	--	42
Removals from rolls(deactivates)	2	26	--	28
Transfers	2	--	--	2
TOTAL TERMINATIONS	18	54	--	72

GENERAL

	11-1954	12-1954
Photographs taken	240	203
Fingerprint impressions	176	155

PERSONNEL SECURITY QUESTIONNAIRES PROCESSED

	11-1954	12-1954
General Electric cases	110	193
Facility cases	32	16
TOTAL	142	209

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Employee and Public Relations

PERSONNEL PRACTICES

The success that Schenectady has had in determining the best candidates for craft trainees indicated a need for our using such tests as the Wonderlic Personnel Test, Mechanical Comprehension, and the D. A. T. Numerical Ability Test. In order to properly determine the best candidates for any craft trainee position, these tests were used during the month on three prospects.

Local activity plus those pending by mail would indicate satisfactory progress relative to operators in process. As of the end of the year, we had a total in process for operators, all areas, of 245 and a need for delivery this coming quarter of 12 for Metal Preparation, 31 for Separations, and 2 for Reactor, making a total of 45. Additional needs of 190 for Separations, plus the possibility of 15 for Reactor and 12 for Metal Preparation or a total of 217, should be met without any difficulty due to the time element involved.

An advertisement for Production Operators was inserted in the Spokesman Review and Spokane Chronicle for December 12, 13, and 14. To date we have had approximately 200 inquiries to which applications have been sent, and through which we have put in process approximately 60.

Personnel Records and Investigation

INVESTIGATION STATISTICS

	11-1954	12-1954
Cases received during the month	238	294
Cases closed	99	94
Cases found satisfactory for employment	190	142
Cases found unsatisfactory for employment	37	43
Special investigation conducted	18	17
Cases closed before investigation completed	16	32

PERFECT ATTENDANCE RECOGNITION AWARDS

Total one-year awards to date since January 1, 1950	4920
One-year awards made in December for those qualifying in November	44
Total two-year awards to date since January 1, 1950	2605
Two-year awards made in December for those qualifying in November	56
Total three-year awards to date	1358
Three-year awards made in December for those qualifying in November	57
Total four-year awards to date	490
Four-year awards made in December for those qualifying in November	46

SERVICE RECOGNITION

Total Service Recognition Pins presented to date	4344
Five-year Service Recognition Pins presented during December to exempt personnel	6
Five-year Service Recognition Pins presented during December to non-exempt personnel	13

During December, 12 people whose continuity of service was broken while in an inactive status were so informed by letter.

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PRIVACY ACT MATERIAL REMOVED

Employee and Public Relations

PERSONNEL PRACTICES

Employee Services

The following contacts were made with employees during the month:

Employee contacts made at Kadlec Hospital	156
Salary checks delivered to employees at Kadlec Hospital	57
Salary checks delivered to employees at home	11

At month end, participation in the Benefit Plans was as follows as compared with last month's participation:

	November	December
Pension Plan	98.0%	98.1%
Insurance Plan	99.3%	99.4%
Savings and Stock Bonus Plan	49.7%	49.5%

Fourteen letters were written concerning deceased employees and their families during December, regarding payment of monies from the Company and answering questions.

Three employees died during the month, namely:

Engineering	12-15-54
Emp. & Public Relations	12-13-54
Manufacturing	12-18-54

Since September 1, 1946, 159 life insurance claims have been paid totaling $1,029,013.

Three employees retired during the month of December, namely:

Clarence D. Sandiland	W-7200	Normal Retirement
Ora E. Phares	W-8270	Normal Retirement
Esther S. Evans	W-7376	Normal Retirement

During December 24 letters were written concerning retirement and retired employees providing information of a general or specific nature. To date 327 employees have retired at Hanford, of which 168 are continuing their residence in this vicinity.

A total of 84 new employees attended Orientation Programs given by members of this group during the month of December. Of this number 100% have signed to participate in the Pension Plan, 100% have signed to participate in the Insurance Plan and 94% have signed to participate in the Good Neighbor Fund.

1211745

PRIVACY ACT MATERIAL REMOVED

Employee and Public Relations

PERSONNEL PRACTICES

Employee Services

On December 1 about 45 HAPO people participated in an informal discussion with R. C. Reed and his associate, James Duncan, of the Employee Benefits Procedures Section, Schenectady, concerning administration of some of the Company's benefit plans. This informal conference met with very good success as was indicated by a desire by the participants to continue the discussion throughout most of the day.

A total of 22 employees contacted this office during the month to discuss problems related to their work. While there were exceptions, the majority of requests made to the Women's Advisor involved problems related to benefits or job classifications of which the women either had no understanding or an insufficient amount of information on the policy under discussion. Because misunderstanding had arisen due to failure to study established policy determining these cases, a reference to or a study of the Organization and Policy Guide with the employees was sufficient help for those concerned.

This office held an hour and a half information meeting in the 100 H Area covering the principal Employee Benefit Plans. There was a total of 60 people in attendance. A member of this group also conducted a meeting in the 300 Area for the Manufacturing Department and discussed insurance and pension plans. Approximately 57 employees attended this meeting.

Military Reserve and Selective Service

Statistics with respect to employees who are members of the military reserve are as follows:

Number of reservists on the rolls		813
Number of Reservists classified in Category A	115	
Number of Reservists classified in Category B	85	
Number of Reservists classified in Category C	63	
Number of Reservists classified in Category D	550	
Number of Reservists for whom delays have been requested		45
Number of Reservists classified in Category B	3	
Number of Reservists classified in Category C	2	
Number of Reservists classified in Category D	40	
Delays requested (including renewal requests)		114
Delays granted		106
Delays pending		0
Delays denied		5
Delays requested recalled		3

The statistics with respect to employees registered under Selective Service are as follows:

Employees registered	889
Employees registered who are veterans	372
Employees registered who are non-veterans	517

Employee and Public Relations

PERSONNEL PRACTICES

Employee Services

Deferments requested to date (including renewals)		1406
Deferments granted		1128
Number of employees for which deferments have been requested		117
Number of employees classified in Category B	0	
Number of employees classified in Category C	1	
Number of employees classified in Category D	116	
Deferments denied and appealed at state levels		10
Deferments denied and appealed at local levels		1
Deferments denied and held pending appeal at national level		2
Deferments denied by local board and not appealed		18
Deferments denied by state board and not appealed		57
Deferments denied at national level (by General Hershey's office)		2
Deferments denied at national level (by President)		5
Deferments requested, employees later reclassified		0
Deferments pending		21

Military terminations since 8-1-1950 are as follows:

Reservists		120
Selective Service System		254
Female Employees Enlisted		5
	TOTAL	379

Employees returned from military service:

Reservists		64
Selective Service		69
	TOTAL	133

Known number not claiming reemployment rights 23

Number of employees still in military-leave status 223

121747

EMPLOYEE AND PUBLIC RELATIONS DEPARTMENT

WORKMEN'S COMPENSATION AND SUGGESTION PLAN

Suggestion Plan	November	December	Total Since 7-15-47
Suggestions Received	434	272	15621
Acknowledgements to Suggesters	419	309	
Suggestions Pending Acknowledgement	73	36	
Suggestions Referred to Depts. for Investigation	493	385	
Suggestions Pending Referral to Departments	102	63	
Investigations Completed and Suggestions Closed	211	151	
Suggestions Adopted - No Award	3	2	
Adopted Suggestions Approved by Committee for Award	88	86	
Total Net Cash Savings	$29,327.51	$8,446.86	
Total Cash Awards	$ 3,305	$1,285	
Total Suggestions Assigned to Field for Investigation	752	795	
Total Number Suggestions Outstanding to Departments	739	771	

The highest award for the month was paid to an employee in the Separations Section for his suggestion pertaining to an improved method of taking electrode readings on the waste tanks in the 241-S tank farm. The award was $195 and was an additional award resulting from a revaluation of the suggestion after it had been in use for six months. He previously received a $5 award, making a total of $200. Savings in material and labor resulted from adoption of this suggestion.

A Suggestion Plan Conference was held on December 2 in Richland and was attended by approximately 50 HAPO people who are associated in Suggestion Plan work in some capacity. A representative of the Atomic Energy Commission was also in attendance. Speakers included R. C. Reed, Consultant, Employee Benefits Procedures, Schenectady; James Duncan of Mr. Reed's Staff; J. J. Huffmire, Secretary, Suggestion Board Large Steam Turbine Division, Schenectady; John R. MacKenzie of the General Electric Legal Staff, New York; and W. D. Smyth, Secretary, HAPO Suggestion Board.

On December 6 the same group spoke before West Coast representatives at a similar conference in Oakland, California.

Life Insurance

Code information which is known only to Home Office Life Underwriter's Association has been furnished 50 insurance companies and investigation agencies during the month of December, 1954. This is in accordance with an arrangement with the Underwriters whereby employees on this project might be insured on the same basis as those working elsewhere.

Insurance Statistics

Claims reported to Department of Labor and Industries	November, 1954 Long Forms	Short Forms
	34	316
	December, 1954 Long Forms	Short Forms
	35	379

Total Since September, 1946 - 23,532

1211748

PRIVACY ACT MATERIAL REMOVED

WORKMEN'S COMPENSATION AND SUGGESTION PLAN

Insurance Statistics (Continued)

Claims reported to Travelers Insurance Co.	November, 1954	December, 1954
	9	* 10

Total Since September, 1946 - 922

*Of the claims reported to Travelers Insurance Company during the month of December eight were property damage and two were bodily injury claims.

Workmen's Compensation

-- Date of Injury: 1-29-53; Employer:
Nature of Injury: Sacro-iliac Strain.

received a 20% permanent partial disability award ($1200) and appealed from an order closing his claim with allowance for treatment to February 11, 1954. After hearings on the matter the Board published their "Decision and Order" on December 10, 1954 ordering that the claim be remanded to the Department with direction to reopen for medical treatment and such further action as may be indicated.

-- Date of Injury: 12-5-52;
Employer: ; Nature of Injury: Back Strain.

filed claims with the Department of Labor and Industries for four back injuries sustained in September, 1952, December, 1952, April, 1953, and July, 1953

PRIVACY ACT MATERIAL REMOVED

WORKMEN'S COMPENSATION AND SUGGESTION PLAN

Liability Insurance (Continued) -3-

the Demurrers to the original Complaints has not been signed by Judge Horrigan as it was necessary to change the orders originally forwarded to the judge. The original order was defective in that it did not contain language permitting the plaintiffs to amend their Complaints.

In November we communicated to the Commission Travelers' recommendation to settle the case for not more than $7500. We have since been advised by the Commission that they do not believe that settlement in that amount is indicated. From all indications it appears that the case will go to trial. Depositions of both the ambulance driver and attendant were taken at the request of plaintiff.

General

On December 2 and 3 Clyde T. Fitz attended the First Westcoast Noise Symposium in Los Angeles. Mr. Fitz and Dr. P. A. Fuqua attended this conference with the objective of obtaining information which would be of value in assisting counsel in the conduct of Appeal Board hearings on loss of hearing cases which will be heard during January. The information has been transmitted to HAPO counsel.

1211750

PRIVACY ACT MATERIAL REMOVED

Employee and Public Relations
PERSONNEL PRACTICES

Technical Recruitment

Results of fall recruiting of BS/MS candidates may be summarized as follows:

Field	Offers Extended	Offers to be Extended	Offers Accepted	Offers Rejected	Estimated Mid-Year Requirements
Engineering:					
Chemical	12	1	1		20
Mechanical	13	--	1	1	20
Electrical	11	--	2		10
Chemistry	8	--	3		16
Physics	5	--		1	6
Metallurgy	1	1			10
TOTALS	50	2	7	2	82

Twenty-seven experienced drop-in candidates were interviewed in the office. Four experienced candidates were signed on HAPO rolls, six candidates visited Richland, three offers were made and two will be extended shortly; one rejection to an earlier offer was received.

During December HAPO representatives participated in GE campus PhD recruiting at the University of Wisconsin, University of Texas, Rice, and the University of Utah. This brings to 26 the number of schools visited by HAPO representatives for the annual fall company-wide PhD recruiting. In addition, several PhD candidates have been interviewed by Hanford representatives during the course of BS/MS recruiting on campuses not regularly visited by the PhD recruiting teams. As a result of the fall campus recruiting, 366 PhD interview blanks have been forwarded to HAPO, of which 217 were received during December. This is more than three times the 119 blanks received to the end of December in 1953. During December one PhD reported for work, and three PhD's visited HAPO for employment interviews.

During the month there were 15 terminations; 9 left to enter military service, 2 transferred to other GE locations, 2 left for other jobs, and 2 left for other reasons.

121151

Employee and Public Relations Department

EMPLOYEE COMMUNICATIONS AND PUBLIC RELATIONS

During the month of December, the News Bureau issued 44 news releases. The breakdown by category, distribution and content was as follows:

Subject	
Pay and Benefits	3
Employment Services	11
Good Will	3
Technology & Research	12
Safety and Fire	2
Real Estate	1
Administration and Legal	1
Richland, Hanford Protection	2
Education and Library	5
Health, Medicine	1
Plant Services	1
Organization Changes	2
Total	44

Distribution	
Hanford	30
West Coast Area	5
National	9

Content	
Information	4
Pictures	5
Short	28
Long	5
Features	2

National publicity releases sent for distribution by the Schenectady News Bureau with carbon copies to N. P. Jackson included: a short feature with pictures concerning demonstration of a toy train adapted for use in research by GE scientists at Hanford for release just prior to Christmas; two versions of a release concerning the use of a flexowriter at Hanford; long and short stories about the new transportation center here at Hanford with pictures; a photo and caption concerning the lead brick cave used at Hanford; a picture with caption illustrating a fiberglass filter development; pictures and a cutline concerning special maintenance given pressure gages used on Hanford reactors; photo release about Hanford's double diffraction X-Ray spectrometer; background information on the Hanford heat recovery system including an up-to-date version of the basic news releases distributed from Hanford, two signed articles by R. T. Jaske, three photos previously released from Hanford and a schedule of new photographs that have been taken will also be sent; and glossy prints of the photographs distributed by NEA with the "Atomic Funeral" story.

Procedures were further developed for using the Company's General News Bureau facilities to obtain increased national publicity during the trip of the Section Manager to New York City and Schenectady early during the month.

A photo of our plastic man and cutline were sent to Schenectady for use in the Scholastic Insert.

The 1955 GE Calendar contains a painting on a Hanford subject. The Calendar artist used photographs, both black and white and color, supplied by this Section, to paint the picture, which appears on the November page.

A list of 405 firms in Chicago from which Hanford has made purchases was sent to N. P. Jackson's office at Schenectady for use in a story to appear in the Sunday edition of a Chicago newspaper.

1211752

Employee and Public Relations

An information release concerning HAPO's Rotational Training Program was sent to the Schenectady office for use in the Company's 1954 Annual Report.

A feature and pictures were sent to Aloe Company regarding Kadlec Hospital and use of their products at Hanford. A shorter version also was given to the Walla Walla UNION-BULLETIN for possible use in their Progress Edition.

Copies of releases and other informational material on Hanford were sent to THIS IS AMERICA, INC., Los Angeles, California, for use on the TV series, "Your Town."

A release concerning the latest Engineering Department organization changes was sent to approximately 95 home town papers and college papers of the men concerned.

A roundup of GE's 1954 activities at Hanford was furnished for the SPOKESMAN REVIEW Annual Progress Edition at their request.

Eleven requests for information concerning atomic energy were received. Two Hanford fact sheets, a Richland community fact sheet, a clipping booklet, a comic book, and a "Seven Wonders of the World" fact sheet were sent to each requester.

A request from a reader was received through the Schenectady office for information on the "Fishing for Science" item about Hanford in the NEWS DIGEST. Three pictures and a write-up concerning our Radiological Sciences Department's boat were sent to him.

A special picture release of F. J. McKinnon receiving the Hanford safety award from Governor Arthur B. Langlie was given to the two local papers, the SPOKANE CHRONICLE and the YAKIMA HERALD only.

The General Manager's 1955 New Year's message was released to the Tri-City HERALD and the Columbia Basin NEWS at their request.

Arrangements were made through Engineering Department for AEC to grant an annual budget to be used for payment of page costs. Three authors now writing for publications that require page costs have been notified. Technical Information Unit will administer the budget.

N. P. Jackson requested information about six articles that could be written at Hanford for the July issue of the GE REVIEW and which will be devoted exclusively to atomic energy. Nineteen topics were sent to Mr. Jackson. Some of these are now being declassified. We asked that about eight topics be selected after which we will furnish rough outlines of those requested.

Approval was obtained for the OIL AND GAS JOURNAL to print as a signed article Carl Bennett's paper "Statistical Control of Chemical Processes."

1211753

Employee and Public Relations

The following speech and magazine article manuscripts were approved this month:

"Gastro-Intestinal Absorption of Plutonium. III. Comparision Between Rat and Pig," by M. H. Weeks for publication in RADIATION RESEARCH.

"Radiation Protection in the Atomic Energy Industry--A Ten-Year Review," by H. M. Parker, for presentation as a lecture at the meeting of the Radiological Society of North America at Los Angeles, California, on December 7, 1954.

"Least Squares Estimation of Nonlinear Parameters for a Function Defined Implicitly" by J. L. Jaech for publication in JOURNAL OF MATHEMATICS AND PHYSICS.

"Labeling Plants and Animals with Radioisotopes for Ecological Studies" for presentation at the AAAS Meetings in Berkeley, California, December 26 through 31, 1954.

The following speeches were arranged during the month:

Presentation or Submission Date	Subject and Organization	Author
January 13, '55	"Here's Hanford" movie will be introduced and shown to the Walla Walla Rotary Club	W. A. Halteman
January 20, '55	"Human Relations" talk will be presented to the Sacajawea PTA in Richland	V. J. Byron

The talk in Los Angeles by H. M. Parker was sent by telegram to T. C. Sullivan in Los Angeles and a shorter version to Roger Hammond in Schenectady. It also was sent to the daily and local newspaper mailing lists.

A meeting was held with the Richland Superintendent of Schools, Principal of Columbia High, and the teacher who plans the social sciences curriculum for the high school to propose that HOBSO be included in certain high school courses. Part of HOBSO was presented by a member of the Training and Development Unit and was well received. Work with the school people is continuing to incorporate HOBSO in the local curriculum in much the same way that it has been used in Baltimore, Maryland and elsewhere.

A display featuring the plastic man and the picture tour of Hanford was placed in the Inland Empire Industrial Exposition at Spokane Coliseum. A member of this Section who installed the display stayed with it during the three-day exposition, answered questions, and distributed 1500 copies of "Adventures Inside the Atom," booklet and several hundred fact sheets. Interest in the display was intensified by the appearance of the plastic man in a commercial for the GE Theater over KXLY-TV the night before the exposition started and use by the station of a Hanford-produced slide inviting viewers to attend the GE-HAPO exhibit at the exposition.

1211754

Employee and Public Relations

Arrangements were made for a social studies group from Carmichael Jr. High School, composed of students, a teacher, and three or four parents, to tour Richland's sewage disposal and water supply facilities.

The December Community Newsletter, which contained appropriate Christmas greetings and illustrations, was sent to community leaders in Pasco, Kennewick and Richland.

Assistance was given the Richland Junior Chamber of Commerce in a local home Christmas lighting contest. The contest is sponsored nationally by GE at Nela Park and the Richland winner will be entered in the national competition.

A tentative plan was set up for the presentation of the Certificate of Health Maintenance to HAPO. The ceremony will take place Tuesday, February 1, and Department Managers and HAMTC representatives will be invited to attend.

Subjects emphasized in GE NEWS lead and feature stories during December included: promotion of employees from nonexempt to exempt rank and four transfers at other GE locations; organization announcements; safety and security; contest winners of the plant-wide health slogan contest; GE-Jaycee sponsored home lighting contest; the work simplification course conducted in Separations Section; and AEC policy banning bidding by dependents of employees was reviewed.

Major Benefit Plan information published in the GE NEWS during the month included: suggestion award winners; employee purchase plan provisions; observance of Christmas and New Year holidays; and effect of the new Social Security law on GE Pension Plan contributions. Two inserts were distributed in two separate GE NEWS issues, one on the "Mobile Maid" and the other on "TV Christmas."

A review of all GE NEWS costs reveal a per copy cost of approximately eight cents.

A classified personnel recruiting advertisement for 100 Production Operators was prepared and placed in the Spokane newspapers.

Twenty-five thousand reminder cards for attachment to area film badges, pointing out correct way to wear personnel meters, were completed through Central Printing for Radiological Sciences.

Revision of the booklet setting forth the Nucleonics Employee Good Neighbor Fund constitution and by-laws was completed and placed in production.

An Employee News Letter signed by the General Manager with a copy of the grievance procedure booklet, "Gotta Grievance," were mailed to the homes of all non-exempt employees. Advance copies of the letter and booklet, along with a copy of the "Handling Grievances" booklet, were sent to all exempt employees at plant addresses. The latter booklet was revised and produced during the month.

Three Management NEWS Bulletins were developed and distributed to all exempt personnel during December.

1211755

Employee and Public Relations

Approximately 300 copies each of the following Company-produced booklets were distributed through information racks during the month: "Man Made Magic," "Adventures In Electricity #5," and "Story of the Turbine."

The December Health Bulletin and Safety Topic pamphlets were produced and distributed and the January issues were placed in production.

Employee and Public Relations Department information was edited, approvals obtained, and submitted for use in the 1954 HAPO report to the AEC.

Ten movie projection engagements were met during December, with showings to approximately 260 employees. In addition Elliott Service Company posters were placed throughout the plant on a weekly basis, Sheldon-Claire and Suggestion Box posters on a bi-weekly basis, GE photo news service posters on a monthly basis, and posters announcing four GE Theater programs were posted during the month.

Commercial artwork included: one editorial cartoon; two full page photo layouts; artype lettering concerning the plastic man exhibit; revision of "picture tour" and development of a large GE signature to accompany special display; layout and final artwork for the January health and safety topic; page layouts for approximately one-half of the "Radiation and Your Job," booklet, and layouts and final art work for the GE School of Nuclear Engineering catalog cover; sketches for Christmas letters to GE Pensioners and for the December Community Newsletter, and for a message to 300 Area employees; poster work included layout and art work for a GE School of Nuclear Engineering poster and three layouts for Radiation information poster series.

Meetings were held with representatives of the Atomic Energy Commission, General Electric and representatives of this Section to determine steps to be taken in correcting discrepancies in the developing and processing of film by Telefilm, Inc., the contracting studio.

The HAPO-produced color motion picture "Here's Hanford" was telecast as a feature of Christmas Day program on KIMA-TV in Yakima. This showing provided television audiences in Eastern Washington an opportunity, for the second time, to see the film, which also is presently being considered for national distribution under overall Company sponsorship. The film will be made available for other regional telecasts when it has been revised with Company public relations content.

A visit to radio and television stations in Yakima was made by two members of this Section. Following extensive discussions with the Manager and Program Director of KIMA-TV we were offered a monthly 30-minute "preference time" public service spot. Beginning January 29, the "Hanford Science Forum" can be telecast every other month as a "live" studio show at Yakima. In alternate months either a show similar to "Inside Hanford" or a "30 for the Month" program can be telecast. Whether film or "live", this is an exceptional offer and plans are underway to make maximum use of the 30-minute, featured spot once every month.

Public address systems were installed by Radio Maintenance in Carmichael Junior

121175b

Employee and Public Relations

High School for the report to be given by the General Manager to all Supervisors on January 25 and 26. Tests are underway for perfecting the newly installed system.

Graphics December assignments were distributed as follows:

	Percent
General Administrative (Includes Operations Research)	4%
Employee and Public Relations	8
Engineering	33
Manufacturing	25
Financial	6
Radiological Sciences	10
Atomic Energy Commission	14
	100%

	November	December
Total assignments completed	46	54
Total assignments backlog	61	48

A series of 30 visual aids were prepared on a rush basis for Technical Section personnel to use in their presentation to the Advisory Committee on Reactor Safeguards. The work included preparation of eight plates on "Disaster Control Systems"; 16 plates on water loss, time sequence, safety controls and power tube ratios; five comparison tables; and one large schematic flow chart.

Graphics work to be used in technical publications consisted of the following: Completed 21 plates of charts, photo mounting and tables for document HW-33602 titled "Metallurgy Unit Quarterly Report"; 11 plates for document HW-32410 titled "Identification and Characterization of Explosive Residue Produced by Dissolution of Uranium-Zirconium Alloys"; and four figures for document HW-33871 titled "Analysis of Shutdown-Water Flow at K Pile". Work has started on three plates for document HW-34040 titled "The Coulometric Determination of Plutonium"; two figures for document HW-33757 titled "Fabrication and Canning of Cored Material Uranium Slugs"; and seven figures for document HW-29667 Rev., titled "Thermogalvanic Corrosion of Aluminum". Nine illustrations, electrical diagrams, and charts on sub-surface dispersion of liquid wastes were prepared for Process Design. Additional work for them included development of two illustrations on water purification and four charts on steam and water flow for 1953 and 1954.

Six large visual aid illustrations of the 200-E and 200-W Area Tank Farms are being prepared for study and talks to be conducted the first week in January.

Five lecture aids on unit cost and production were prepared on a rush basis for the Manufacturing Department Manager.

Four flow charts and one colored visual aid of the KW Glycol Heat Exchanger were prepared for future use in a presentation at the University of California on Nuclear Engineering.

Two perspective views of the newly designed "Tip-off" unit used on discharge nozzles of the pile were prepared as aids to the vendors. Vendors have experienced difficulty in visualizing the extremely unusual shape of this unit by blueprint drawings alone.

Employee and Public Relations

One large six-foot lecture aid flow chart of the Purex process was completed this month in time for the Separations Section start-up of operator training. A request is in back-log for another large flow chart of the same process.

Four illustrations and two charts were prepared for a publication on "Tritium Detection."

The last of a series of 70 charts were completed this month for document HW-32965 titled "Study of Frequency Components of Industrial Noises at HAPO".

Full scale production was put into effect the last week of this month in revising and redrawing all charts for the Organization Directory and Functional Organization Charts.

Airbrush perspective illustrations in color were prepared on the following: three perspectives of the Purex Building and Facilities, two perspectives on the 105-K Building and one perspective of the overall 100-K Area. The illustrations of the Purex and 105-K Buildings are to be framed and issued to Engineering management. The 100-K Area illustration was prepared for the Manager, HO, AEC.

The HO, AEC Manager's large 7' x 8' Hanford Area aerial photo mosaic was completed and re-hung on the wall of his office. As the photos were taken in 1948, all new areas were brought up-to-date by transferring data from plot plans to proper scale and painted, using photo retouch colors. Area boundaries were plotted to proper coordinates and air-brushed on in transparent color.

Current information was posted to the Payroll Statistics Charts and to the 26 HAPO Cost Chart masters. Copies were secured, gathered, bound and issued.

The 105-K model has been completely repaired and shipped to the 100-KW Area for operator training purposes.

The Purex overall building model and the Purex section model were shipped to the 200-W Area to be used in operator training programs.

Graphics Statistical Summary

	Charts or Graphs	Illustrations	Other
Report Material (Includes Technical Publications)	68	10	24
Technical or Scientific Illustrations		14	
Mechanical Art (Flow charts, schematics, maps, etc. - not for publication)	6	2	20
Lecture Material (Includes plates for slides)			25
Posters and Embossograph Signs			232
General (Posting of current data, assembly, revisions, etc.)	26	2	1
	100	28	302

Total plates completed - 430

1211758

Employee and Public Relations

A total of 335 photographic assignments were completed this month, and 16,275 prints were produced, of which 5,896 were "A" and "B" employee identification photographs. A total of 10,379 were area and news, a new high in this particular category. The average per month is approximately 5,000 prints, whereas 10,379 photographic prints represent one of the busiest months since December, 1953. The increase is due to year-end report making and increases in news picture requirements.

Motion picture film exposed for the month was: 1,600 feet, 16mm (b&w) film for 100-K Construction; 900 feet, 16mm (b&w) film for Television for Employee Communications and Public Relations Section; 1,400 feet, 16mm (b&w) for Purex Construction.

See attached Statistical Report for Photography Unit.

1211759

PHOTOGRAPHY UNIT
MONTHLY REPORT
DECEMBER, 1954

	2" X 2"	2" X 4"	4" X 5"	5" X 7"	8" X 10"	8½" X 11"	11" X 14"	N E G.	35mm Color Slides	35mm (B&W) Slides	3¼" X 4" Color Slides	3¼" X 4" (B&W) Slides	16mm M.P. Film
EMPLOYEE & PUBLIC RELATIONS													
COMMUNITY													
Library				22	42			35	7				
Commercial & Residential					10			5					
Fire			23		127			62					
Police			40		7			61					
EMPLOYEE COMM. & PUBLIC RELATIONS		36			38								
Audio-Visual Comm.			83	26	61			78					3,900ft.
Employee Comm.			15		46	104	10	60	44		2		
G. E. News		40	32	30	147			247					
Public Comm.		98	60	42	366			85		1			
HEALTH & SAFETY													
Hospital Admin.									4				
PERSONNEL PRACTICES													
Employment	830							166					
Technical Recruitment			10					4					
AUXILIARY OPERATIONS & PLANT PROTECTION													
Security & Patrol	2,289	2,677			36	2		33					
Landlord Functions					4			4					
ENGINEERING													
ADVANCED ENGINEERING						720							
DESIGN			11			64		26					
ENGINEERING ADMINISTRATION													
Technical Information						589		4					
PROJECT			6			872		93					

(Continued)

12117160

PHOTOGRAPHY UNIT MONTHLY REPORT DECEMBER, 1954	2" X 2"	2" X 4"	4" X 5"	5" X 7"	8" X 10"	8½" X 11"	11" X 14"	N E G.	35mm Color Slides	35mm (B&W) Slides	3¼" X 4" Color Slides	3¼" X 4" (B&W) Slides	16mm M.P. Film
ENGINEERING (Con't.)													
TECHNICAL													
Applied Research			70	12		628		102					
Fuel Technology			34		2	2,173		300				2	
Pile Technology			39		33	269		123			4	2	
Separations Technology			3			291		31					
FINANCIAL													
PROPERTY ACCOUNT.						323							
MANUFACTURING													
METAL PREPARATION						83		13					
Instrument & Develop. Shop						42		31					
REACTOR					12	300		38			8		
SEPARATIONS					16	178		79					
PROCESS					3	169		29					
RADIOLOGICAL SCIENCES				2	29						2	7	
BIOLOGY				15	8	45		2				1	
BIOPHYSICS			10		10	95		22		14			
RADIOLOGICAL RECORDS & STANDARDS			1,217	14		267		22					
A.E.C. SAFETY			12		156			39					
A.E.C. SECURITY	100							20					
TOTALS	3,219	2,851	1,665	163	1,153	7,214	10	1,814	55	15	16	12	3900ft.

	OCTOBER	NOVEMBER	DECEMBER
TOTAL ASSIGNMENTS	282	319	335
TOTAL NEGATIVES	2,043	1,853	1,814
TOTAL PRINTS	11,720	12,237	16,275

Employee and Public Relations

UNION RELATIONS

Union Relations - Operations Personnel

Indications of efforts on the part of the Hanford Atomic Metal Trades Council to organize employees classified as Laboratory Assistants and Engineering Assistants were prevalent during December. While we have not established the fact that such efforts have reached alarming proportions, we have taken affirmative steps to actively oppose HAMTC encroachment into the area of technical activity.

One group meeting has been held with area supervision to discuss the ramifications of a representation election and to advise them regarding appropriate discussions they might hold with their employees. At the same time we are preparing information to be made available to supervision to enhance their effectiveness in this regard.

In the event the Council is able to obtain a sufficient showing of interest to support a petition for an election, we plan to withhold our consent and seek the National Labor Relations Board's dismissal of the petition on the basis that the employees involved do not constitute an appropriate unit for collective bargaining with production and maintenance employees.

There is some evidence that HAMTC representatives of the Operating Engineers and Chemical Workers will endeavor to claim jurisdiction over the operation of equipment such as pumps, filters, valves, and chemical addition equipment in the 1706-KE Water Studies Semi-Works. O. E. Greager was assured by letter from this office on December 6 that we will not concede the jurisdiction of an experimental facility to the HAMTC. A representative from this office also met with appropriate supervision in the field to discuss this matter. It is intended that Engineering Assistants will be assigned to the work in question.

Plans were made to modify the reports of grievances processed at Step II to include other pertinent union relations information of interest to supervision. The revised reports will not necessarily describe the disposition of all grievances processed at Step II but will give more thorough treatment to those which are felt to be of general interest. A special form with a letterhead is being developed for this purpose and the first such report will be distributed during January. Comments from supervision are being solicited.

After many months of study, a procedure for upgrading in the Stenographer and Secretary categories was completed and included as part of a Step II answer to a group of girls who had utilized the grievance procedure to protest the manner in which a Secretary "A" job had been filled some time ago. The relief sought by the girls was the establishment of a procedure that could be administered more uniformly. It is felt the aforementioned procedure accomplished their objective.

Negotiating meetings were held with the Material Expediters and Take-Off Men on December 7 and December 14. The more significant demands by the union pertain to jurisdiction and pay grades. During the most recent meeting, the union asked

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UNION RELATIONS

that the sixteen men involved be divided into five classifications, ranging from Grade 19 through Grade 26. Such a demand is ridiculous and the union was so advised during the discussion. The individuals involved are presently classified as Material Expediters, Grade 15, and Take-Off Men, Grade 17. There are no jobs anywhere in the bargaining unit as high as Grade 26. Only four classifications reach the Grade 24 level. Although no further meetings were scheduled, it is expected the discussions will be resumed early in January.

Grievance Statistics:

A total of thirty-six (36) grievances were received and four (4) Step II grievance meetings were held during the month. A breakdown of the grievances received and processed follows:

	ALL DEPARTMENTS				
	HAMTC	HGU	BSEIU	Total Unit	Total Nonunit
Received this month	31	3	0	34	2
Received this year	315	47	2	364	31
Step I					
Pending November 30	5	0	0	5	0
Settled this month*	29	1	0	30	1
Settled this year	214	15	1	230	25
Pending December 31	4	0	0	4	0
Step II					
Pending November 30	14	0	0	14	1
Settled this month**	4	0	0	4	2
Settled this year	97	33	1	131	8
Pending December 31	10	2	0	12	1
Arbitration					
Pending November 30	4	0	0	4	
Settled this month	0	0	0	0	
Settled this year	0	0	0	0	
Pending December 31	5	0	0	5	
Total settled this month	33	1	0	34	3
Total settled this year	311	48	2	361	33

*Grievances brought to Step II prior to October 1, 1954, but never processed by the union are, for the purpose of this report, considered settled at Step I.

**Grievances which the union formally indicated their intention to submit to arbitration but have taken no further action since October 1, 1954, are, for the purpose of this report, considered settled at Step II.

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Employee and Public Relations

UNION RELATIONS

BY DEPARTMENTS

	Received This Mo.	Received This Year	Settled Step I* This Mo.	Settled Step I* This Year	Settled Step II** This Mo.	Settled Step II** This Year
Manufacturing						
Reactor - Unit	15	133	16	97	0	40
Nonunit	0	5	0	4	1	1
Separations - Unit	11	82	9	54	3	25
Nonunit	1	5	0	2	0	1
Metal Preparation - Unit	2	36	2	22	0	8
Transportation - Unit	2	23	2	14	1	10
Stores - Unit	1	5	0	3	0	2
Electrical Utilities - Unit	0	1	0	0	0	1
Employee & Public Relations						
Community - Unit	0	11	0	6	0	2
Hospital - Unit	0	2	0	1	0	1
Nonunit	0	1	0	1	0	0
Aux. Ops. & Plant Protection- Unit	3	60	1	25	0	35
Nonunit	0	2	0	1	0	1
Telephone - Unit	0	3	0	2	0	1
Nonunit	0	1	0	0	0	1
Emp. Comm. & Pub. Rel. - Nonunit	0	1	0	0	0	0
Radiological Sciences - Unit	0	8	0	7	1	2
Nonunit	0	7	0	5	0	0
Engineering - Nonunit	0	5	0	7	0	2
Financial - Nonunit	1	4	1	3	0	1

*Grievances brought to Step II prior to October 1, 1954, but never processed by the union are, for the purpose of this report, considered settled at Step I.

**Grievances which the union formally indicated their intention to submit to arbitration but have taken no further action since October 1, 1954, are, for the purpose of this report, considered settled at Step II.

BY SUBJECTS

Unit	Manufacturing This Mo.	Manufacturing This Year	Emp. & Pub. Relations This Mo.	Emp. & Pub. Relations This Year	Radiological Sciences This Mo.	Radiological Sciences This Year	Engineering This Mo.	Engineering This Year	Financial This Mo.	Financial This Year
Discrimination	0	2	0	2	0	0				
Jurisdiction	12	116	0	20	0	5				
Health-Safety-Sanitation	6	22	0	5	0	0				
Hours of Work	1	12	1	29	0	0				
Overtime Rates	3	28	1	3	0	0				
Holidays	2	7	0	0	0	0				
Sick Leave	2	8	0	1	0	0				
Vacations	1	1	0	0	0	0				
Seniority	0	20	0	2	0	1				
Grievance Procedure	0	3	0	0	0	0				
Wage Rates	4	34	0	3	0	1				
Miscellaneous	0	27	1	11	0	1				

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UNION RELATIONS

BY SUBJECTS (Cont'd.)

	Manufacturing		Emp. & Pub. Relations		Radiological Sciences		Engineering		Financial	
	This Mo.	This Year	This Mo.	This Year	This Mo.	This Year	This Mo.	This Year	This Mo.	This Year
Nonunit										
Health-Safety-Sanitation	0	0	0	0	0	0	0	1	0	0
Overtime Rates	0	4	0	1	0	2	0	0	0	0
Vacation	1	1	0	0	0	1	0	0	0	0
Seniority	0	1	0	0	0	0	0	0	0	0
Continuity of Service	0	1	0	2	0	0	0	0	0	0
Leave of Absence	0	1	0	0	0	0	0	0	0	0
Wage Rates	0	1	0	1	0	3	0	3	0	1
Work Assignment	0	1	0	0	0	0	0	0	0	2
Miscellaneous	0	0	0	1	0	1	0	1	1	1

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Employee & Public Relations

SALARY & WAGE ADMINISTRATION

1. Paper work accompanying the reorganization of the Engineering Department was completed.

2. Reimbursement Authorization No. 238, authorizing HAPO to operate under the Company salary plan beginning January 1, 1955, was received from the Hanford Operations Office of the AEC.

3. Authorizations for all positions in the new Company salary plan were received from top management. All salaries falling outside the ranges of the new salary levels were reviewed by Department Managers and adjusted in accordance with the rules of the new salary plan.

4. New structural and functional organization charts were completed as of January 1, 1955.

5. The analysis and a summary report of the salary survey made in California in October was completed. Analysis of a similar survey of firms in the Northwest was begun.

6. Conversations were held with representatives of the Sandia Corporation relating to salaries and wages in the plant of that AEC contractor.

7. The review of laboratory assistant jobs which has been under way for several months was completed. Study of the method of review and modification of the existing wage rate plan continued.

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Employee and Public Relations Department
Education and Training Section

The report of the Education and Training Section is submitted as follows:

ROTATIONAL TRAINING PROGRAM

Present Assignments	Last Month	This Month
Department		
Engineering		
Pile Technology	8	6
Separations Technology	5	4
Design	5	4
Project	7	6
Manufacturing		
Metal Preparation	2	3
Separations	4	2
Reactor	5	8
Transportation	1	1
Radiological Sciences		
Biology	0	0
Records and Standards	1	0
Bio-Physics	1	2
Financial		
Procedures and Computing	1	1
TOTAL	40	37

Permanent Placements

There were three placements off the Program, as follows:

Separations Technology	1
Records and Standards	1
Separations	1

It is anticipated that seven placements will be accomplished during January and that placements will continue at a high rate for the next several months.

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Employee and Public Relations Department
Education and Training Section

Selective Service

Nine technically trained men were lost to the armed forces due to selective service. All except one were former members of the Rotational Training Program. Six of the nine enlisted for Officer Candidate School rather than wait to be drafted. In addition to these nine, one former trainee was recalled to active duty due to advanced military training commitments in college.

Since September 1953 there have been 47 technically trained men lost to the armed forces due to selective service. As noted previously, most of these are former trainees from the Program. While the losses this month have been higher than average, it is anticipated that both enlistments and number lost to the draft will decrease substantially in the next few months due to reduced quotas being called for by the armed forces.

Rotational Program Assignments

An orientation booklet for all new trainees, listing information on the duties to be performed on each rotational assignment, is being prepared for issuance early next month. The number of assignments now total 84 compared to 38 available assignments when the Program was established in 1950.

SCHOOL OF NUCLEAR ENGINEERING

Fall Semester

The participation of students continues high as evidenced by withdrawals of around 10 % of those who started the term.

Approvals

All of our graduate courses conducted this fall have been approved by the appropriate departments and the new instructors have been approved by the Board of Regents of the University of Washington.

Visits

On December 16, H. C. Mayer and D. W. McLenegan met in Moscow with members of the University of Idaho College of Engineering faculty and the Graduate Dean about our proposal to offer an M.S. in Nuclear Engineering. The members were interested in this idea and will study it further to see how and when they might be able to offer this degree. At present all the necessary courses for the degree are offered in Richland so that project employees could easily attempt the curriculum if approved by the affiliated schools.

On December 17, H. C. Mayer and D. W. McLenegan met with the Graduate Dean of the State College of Washington and interested Engineering and Science faculty members to discuss the possibility of an M.S. in Nuclear Engineering. The reaction was generally favorable, and the subject will be studied actively by appropriate faculty members looking toward a prompt decision.

Employee and Public Relations Department
Education and Training Section

Spring Semester

The new courses to be offered in the Spring Term now have reached a total of six graduate courses.

Operations Research
Colloid Chemistry
Nuclear Metallurgy
Analog Computers
Radiobiology
Electronic Data Processing

TRAINING

HOBSO II was presented November 30, December 3, with an attendance of 20 supervisory personnel. This program covers the effects of war-time economy, government controls, and post-war economy.

PMS-Dinner Meeting was held Wednesday evening, December 1 at the Desert Inn for Groups #74, 75, 76, with 49 in attendance. The General Manager was the principal speaker at the meeting.

Supervisor's Accident Prevention Program was held December 1 in 300 Area and December 8 in the 200-West Area, with an attendance of 25 supervisors. These four-hour meetings give supervisors an opportunity to discuss the many facets of accident prevention and how they as supervisors can develop their employees' awareness of the desirability of performing their jobs safely.

Effective Human Relations Group #23 completed conference three on December 15, with 13 supervisors attending. These conferences deal primarily with actual human relations case studies. Cases are presented through various films, records, and written background. Group discussion is conducted on prepared cases as well as on cases presented by supervisors attending the conference.

Conference Leading was conducted December 20 in 200-West Area, with 12 supervisors participating. This program is directed toward stimulating interest in learning the techniques of leading group discussions.

At the request of supervision of Central Stores Unit, a member of Training gave a talk on "Why of Human Relations" to 12 non-exempt and exempt Stores employees on November 26.

Four members of Training on December 1 attended a conference on Employee Benefit Plans conducted by the Manager of Employee Benefit Procedures of General Electric Schenectady Office.

A member of Training on December 2 attended the Hanford Suggestion Conference conducted by the Manager of Employee Benefit Procedures and assisted by a member of the Legal Service Division, New York, and the Secretary of Suggestion Plan, Schenectady, New York.

Moving of training material in 744 Building to W-10 Building was completed December 7.

Employee and Public Relations Department
Education and Training Section

On December 15, a member of Training presented an appreciation version of HOBSO I to the Superintendent of Richland Public Schools, Principal of Columbia High School, and the teacher of psychology of Columbia High School.

Rearrangement of PMS, Effective Human Relations, and Conference Leading material in W-10 files has been completed this month.

A member of Training gave a talk on "Why of Human Relations" Wednesday night, December 22, at a dinner meeting of the Richland Lions Club, with 30 members present.

Training Representatives have spent a greater part of the month continuing work on program development, revisions, scheduling, and planning for the coming year.

Transcripts on program attendance, educational background, and industrial service on all exempt personnel of the Engineering Department were completed December 10 for a study by the Manager of Education and Training Section.

During the month the following requests were made from various sections and units:

Program Attendance Transcripts:	256
Business English Reference Sources:	13
PMS Analysis Pads	3
"How You Really Earn Your Living" and HOBSO II Booklets:	65

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EMPLOYEE & PUBLIC RELATIONS DEPARTMENT
HEALTH & SAFETY SECTION
DECEMBER 1954

General

Personnel Changes

Eight additions and ten deletions resulted in a decrease to 250.

Employee Relations

Employee attendance at 28 meetings was 240.

Visits

Dr. Fuqua attended the first West Coast Noise Symposium in Los Angeles.
Dr. Scudder and Dr. Norwood attended a meeting of the State Heart Association in Spokane in which the problem of placement of the individual with heart disease in industry was discussed.
Dr. Sachs and Mr. McKinnon attended the Governor's Annual Safety Conference in Olympia. Dr. Sachs spoke on "The Human Element in Safety Programs" while Mr. McKinnon acted as chairman of one of the sectional meetings.

Industrial Medicine

Medical examinations decreased from 1017 to 890 while dispensary treatments increased from 4772 to 4847.
Sickness absenteeism was 1.58% as compared with 1.69% for November while total absenteeism was 2.24% as compared with 2.52%. Total absenteeism for the year was 2.35%.
The health topic for the month was Dental Care.
Four hundred employees submitted health slogans, the winning slogan being "Work Today Toward a Healthier Way."

Safety & Fire Prevention

There were no major injuries in either the plant or community group. The plant sustained one sub-major injury.
There were 295 minor injuries in the plant and 25 in the community. Eight fires were reported in the plant with an estimated loss of $85.
For the first time the plant received the State's award of merit for safety performance from Governor Langlie.

Kadlec Hospital

The average daily census increased slightly from 60.2 to 60.6 as compared with 64.8 a year ago. This is the first time for some six months that the census has not been below the budget estimate. This will improve the financial picture.

Public Health

Incidence of communicable disease dropped 15%. Of the 325 contacts by social service counselors, two-thirds were in the field of family relationships.

Costs-November

	Oct.	Nov.	Nov. Budget
Industrial Medicine	$44,645	$44,818	$47,530
Public Health (Oper.)	9,593	9,484	10,525
Kadlec Hospital (Net)	21,934	28,658	18,000
Hospital Expense Credits	1,775	2,165	2,000
Safety & Fire Prevention	21,433	22,550	23,250
Total-Health & Safety	$99,380	$107,675	$101,305

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General

Costs (Continued)

The net cost of operating the Health & Safety Section before charges were assessed to various departments was $107,675, about $8,000 more than the October cost and some $6,000 above the budget. The extremely low and unpredicted patient load at Kadlec accounts for this.

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HEALTH & SAFETY SECTION

DECEMBER 1954

Industrial Medical Services

The total number of examinations decreased from 1017 to 890. The total number of dispensary visits increased from 4772 to 4847. General Electric employees sustained two sub-major injuries and no majors. Contractor employees sustained one sub-major and no majors. The number of non-occupational visits was up 273 and the number of occupational visits was down 188 as compared to the previous month. Newly established dispensary services in the 100K area received 137 visits only during the month.

There was one information meeting for staff physicians held during the month. Dr. Fuqua attended the first West Coast Noise Symposium held in Los Angeles on December 2 and 3. This was a meeting of some 500 people directly concerned with the problem of noise in industry.

Doctors Norwood and Scudder attended a one day meeting in Spokane sponsored by the Washington State Heart Association. The problem of employees and applicants for employment with heart disease was the topic for discussion.

Amended complaints have been filed in the Superior Court in the County of Franklin in the Milo Riste and Curtis Swearingen cases. Department of Labor hearings for alleged hearing loss due to noise exposure were scheduled for January 25 and 26.

Consideration was given as to the desirability of establishing dispensary services in the Transportation Section's bus lot and garage facility. It may be possible to divide services between this location and the 700 Area location should space become available.

The Health Activities Committee met on December 16th and the topic on dental health for the coming month of January was presented. Material on this subject was prepared for distribution to all employees. Sickness absenteeism was 1.58% for the month and 2.35% for the year for all causes.

The net cost incurred for November amounted to $36,452, a decrease of only $25 when comparison is made with the previous month. Minor fluctuations occurred within the individual categories of expense, but these were largely offsetting upon each other.

Costs-Operations

	Nov.	Oct.	Increase (Decrease)
Salaries	$33,963	$34,166	$ (203)
Continuity of Service	3,057	3,075	(18)
Laundry	254	278	(24)
Utilities, Transportation, Maintenance	3,410	3,542	(132)
Supplies and Other	5,163	4,719	444
Total Gross Costs	45,847	45,780	67
Less: Revenue	1,029	1,135	(106)
Expense Credits	8,366	8,168	198
Net Cost of Operation	$36,452	$36,477	$ (25)

121773

Industrial Medical Services (Continued)

Costs-Operations (Continued)

At the end of five months' operation, expenses are $20,400 less than budgeted last spring. This is attributable to lower than estimated salaries and continuity of service costs. If comparison is made between actual costs and FY 1955 Midyear Review only recently completed, a much closer relationship between actual and budget is reflected (an underrun of only $1,000 exists at the present time.) All future comparisons will be made with the FY 1955 Midyear Review.

121774

HEALTH & SAFETY SECTION

DECEMBER 1954

Industrial Medical Services (Continued)	November	December	Year to Date
Physical Examinations			
Operations			
Pre-employment	98	79	1056
Rehire	18	10	280
Annual	317	282	3159
Interim	200	139	1985
A.E.C.	29	42	385
Re-examination and recheck	230	144	2415
Termination	58	70	957
Sub-total	950	766	10237
Contractors			
Annual	32	53	247
Pre-employment	13	49	602
Recheck	15	17	301
Termination and Transfer	7	5	304
Sub-total	67	124	1454
Total Physical Examinations	1017	890	11691
Laboratory Examinations			
Clinical Laboratory			
Government	117	121	1600
Pre-employment, Termination, Transfer	1253	1409	18732
Annual	1705	1578	17299
Recheck (Area)	987	725	9825
First Aid	7	2	76
Clinic	333	336	4379
Hospital	3711	3492	49289
Public Health	1	0	4
Total	8114	7663	101204
X-Ray			
Government	26	20	216
Pre-employment, Termination, Transfer	200	206	2440
Annual	566	482	5666
First Aid	61	69	944
Clinic	190	147	2462
Hospital	233	203	3258
Public Health	2	7	110
Total	1278	1134	15096
Electrocardiographs			
Industrial	71	53	842
Clinic	0	2	14
Hospital	33	27	378
Total	104	82	1234

1211775

HEALTH & SAFETY SECTION

DECEMBER 1954

Industrial Medical Services (Continued)	November	December	Year to Date
First Aid Treatments			
Operations			
New Occupational Cases	300	375	4669
Occupational Case Retreatments	1233	1343	15652
Non-occupational Treatments	2975	2789	31148
Sub-total	4508	4507	51469
Construction			
New Occupational Cases	48	68	842
Occupational Case Retreatments	146	200	2460
Non-occupational Treatments	70	72	733
Sub-total	264	340	4035
Facility Operators	0	0	149
Total First Aid Treatments	4772	4847	55653
Major Injuries			
General Electric	0	0	5
Contractors	0	0	0
Total	0	0	5
Sub-Major Injuries			
General Electric	0	2	19
Contractors	1	1	6
Total	1	3	25
Absenteeism Investigation			
Calls Made	2	2	42
Employee Personal Illness	2	2	34
No. absent due to illness in family	0	0	1
No. not at home when call was made	0	0	7

121176

HEALTH & SAFETY SECTION

DECEMBER 1954

Kadlec Hospital

The average daily adult census increased from 60.2 to 60.6 as compared with 64.8 a year ago. This represents an occupancy percentage of 55.6, broken down as follows: Mixed Service (Medical, Surgical and Pediatrics) 55.2; Obstetrical Service 57.1. The minimum and maximum daily census ranged as follows:

	Minimum	Maximum
Mixed Service	21	70
Obstetrical Service	4	17
Total Adult	27	81

The average daily newborn census increased from 10.1 to 12.0 as compared with 13.7 a year ago.

Nursing hours per patient per day:

Medical, Surgical, Pediatrics	3.99
Obstetrical	3.87
Newborn	3.00

The ratio of inpatient hospital employees to patients (excluding newborn) for the month of November was 2.48. When newborn infants are included, the ratio is 2.13.

The net expense for the operation of Kadlec Hospital for November was $28,658, as compared to $21,934 for October. Summary is as follows:

Kadlec Hospital net expense $28,658
This is an increase of approximately $6,700 due to a very low patient census in November. While gross costs decreased $3,300 and expense credits increased $400, revenue loss more than offset these figures by dropping $10,400.

Following is a summary of employee relations meetings held in the Health and Safety Section during December.

	Meetings	Attendance
Hospital	20	178
Industrial Medicine	3	13
Public Health	4	36
Safety & Fire Prevention	1	13
Total	28	240

121777

Hospital Unit (Continued)	November	December	Year to Date
Kadlec Hospital			
Average Daily Adult Census	60.2	60.6	70.0
Medical	17.7	17.2	19.6
Surgical	20.0	17.9	27.2
Pediatrics	12.6	13.5	11.1
Mixed	50.3	48.6	57.9
Obstetrical	9.9	12.0	12.1
Average Daily Newborn Census	10.1	12.0	11.7
Maximum Daily Census:			
Mixed Services	76	70	99
Obstetrical	15	17	21
Total Adult Census	87	81	116
Minimum Daily Census:			
Mixed Services	31	21	20
Obstetrical Service	4	4	4
Total Adult Census	38	27	27
Admissions: Adults	480	448	6290
Discharges: Adults	477	457	6301
Medical	130	119	1660
Surgical	185	162	2561
Pediatrics	88	84	995
Mixed	403	365	5216
Obstetrical	74	92	1085
Newborn	70	82	969
Patient Days: Adult	1805	1879	25592
Medical	532	534	7168
Surgical	600	555	9939
Pediatrics	378	419	4061
Mixed	1510	1508	21168
Obstetrical	295	371	4424
Newborn	303	372	4263
Average Length of Stay: Adults	3.8	4.1	4.1
Medical	4.1	4.5	4.3
Surgical	3.2	3.4	3.9
Pediatrics	4.3	5.0	4.1
Mixed	3.7	4.1	4.1
Obstetrical	4.0	4.0	4.1
Newborn	4.4	4.5	4.4
Occupancy Percentage: Adults	55.2	55.6	64.2
Medical	47.8	46.5	53.0
Surgical	62.5	55.9	85.0
Pediatrics	66.3	71.1	58.4
Mixed	57.2	55.2	65.8
Obstetrical	47.1	57.1	57.6
Newborn	38.8	46.2	45.0

(Occupancy Percentage based on 109 adult beds and 26 bassinets.)

1211778

Hospital Unit (Continued)	November	December	Year to Date
Kadlec Hospital (Continued)			
Avg. Nursing Hours per Patient Day:			
Medical, Surgical, Pediatrics	4.09	3.99	
Obstetrics	5.95	3.87	
Newborn	3.56	3.00	
Avg. No. Employees per Patient (excluding newborn)	2.13		
Operations: Major	57	53	864
Minor	81	54	992
E.E.N.T.	29	55	668
Dental	3	0	14
Births: Live	69	83	970
Still	2	1	10
Deaths	5	4	54
Hospital Net Death Rate	.55%	.37%	.37%
Net Autopsy Rate	40.0	25.0	46.3
Discharged against advice	0	2	24
One Day Cases	151	140	1803
Admission Sources:			
Richland	73.7	73.9	72.4
North Richland	12.3	9.2	12.3
Other	14.0	16.9	15.3
Admissions by Employment:			
General Electric	68.5	66.5	67.8
Government	3.1	2.7	3.1
Facility	2.9	7.4	5.3
Contractors	18.8	12.5	17.7
Schools	.8	2.0	1.3
Others	5.9	8.9	4.8
Hospital Outpatients-F.A.	574	558	6786
Recovery Bed Patients-F.A.	0	0	71
Physical Therapy Treatments			
Clinic	315	227	3476
Hospital	74	124	1030
Industrial: Plant	235	238	2487
Total	624	589	6993
Pharmacy			
No. of Prescriptions Filled	2452	2710	51618
No. of Store Orders Filled	477	493	5226

1211779

Hospital Unit (Continued)	November	December	Year to Date
Kadlec Hospital (Continued)			
Patient Meals			
Regulars	2590	2883	39583
Children under 8	609	857	5336
Specials	1021	729	13039
Softs	531	432	8689
Tonsils	68	86	1192
Liquids	122	105	1885
Surgical Liquids	62	110	1192
Total	5003	5202	70916
Cafeteria Meals			
Noon	1716	1688	21261
Night	368	359	4004
Total	2084	2047	25265

HEALTH & SAFETY SECTION

DECEMBER 1954

Public Health Unit

A 15 per cent reduction in the number of communicable diseases reported during the month was noted. The lowered incidence was general, most diseases showing a lower count. Ringworm fell off from 36 to 13; scarlet fever from 20 to 15; chickenpox from 61 to 49. One exception was mumps which increased from 20 to 24 cases.

A slight drop in number of field visits was recorded, due primarily to the lowered communicable disease rate. Another factor was the holiday season. Not many requests for service are made during the busy holiday season.

The health officer attended an industrial safety conference in Olympia, at which he presented a paper, "The Human Element in Safety Programs."

The health officer and health educator are aiding in the planning of a clinic on community health problems to be held in Pasco this spring. This state-wide conference will deal with the topic, "Strengthening Family Life." Mr. Seymour Standish, Executive Secretary of the State Health Council, visited the unit in connection with this program.

Miss Julia Anderson, of the University of Washington, conferred with the health officer and nursing supervisor regarding the evaluation of a student nurse who completed her field training here this month.

Mr. Peterson and Miss Fink of the State Health Department staff held a meeting here with unit personnel to explain new mark sense codes used in recording activities. The new procedure has simplified reporting procedures, and will result in more efficient processing of monthly reports.

A conference was held with Mr. Orchard, Director of the Special Education Program in the Richland Schools regarding the progress of youngsters in the program.

A hearing clinic was held, under the direction of Dr. H. L. Cahn, with nine youngsters seen. At a regularly scheduled Handicapped Clinic, 11 youngsters were seen by Dr. Platner.

During December, problems of family relationships required a large proportion of the social service counselors' time. Of a total of 325 contacts made during the month, 210 were in this category, 109 being concerned with difficulties between parents and their children and 101 with marital discord. Direct assistance with personal problems was given in 84 instances, 41 to children, 24 to adolescents, and 19 to adults. Physical and mental illness accounted for 22 contacts.

Because of financial pressures of the holidays and the fact that the counselors acted as agents for various community service clubs who wanted to help needy families, there was an increase in the number of contacts concerning economic need. There were nine contacts in this area.

121178

Public Health Unit (Continued)

Twenty-five field inspections were made in food handling establishments. Preparations are being made for regrading of restaurants based on inspection by representatives of the State Health Department. Improvement was noted in cleaning stove hoods. This was brought about by joint inspections with a representative of the fire department.

Sterilization process of new water lines in 100-D and 100-F was supervised. Samples were negative for coliform bacteria and lines were put into service. Samples are being collected regularly in the 200-E Purex after lines have been chlorinated. Bacteriological results have been satisfactory.

Two citations were issued to parties collecting garbage from food establishments for hog feeding. This is contrary to law unless permit has been issued by the State Agriculture Department.

Bacteriological results of milk and water samples continued to be satisfactory.

1211782

HEALTH & SAFETY SECTION

DECEMBER 1954

Public Health (Continued)	November	December	Year to Date
Education			
Pamphlets distributed	11,206	11,988	139,399
News Releases	16	6	177
Staff Meetings	1	1	14
Classes	8	3	147
Attendance	140	13	3,315
Lectures & Talks	10	6	69
Attendance	507	224	2,960
Films Shown	9	9	118
Attendance	286	996	4,993
Community Conferences & Meetings	52	25	362
Radio Broadcasts	9	9	107
Immunizations			
Diphtheria	2	1	78
Diphtheria Booster	0	89	333
Diptusses Booster	0	0	2
Tetanus	0	1	77
Tetanus Booster	0	3	246
Pertussis	0	1	54
Pertussis Booster	0	3	245
Smallpox	2	43	231
Smallpox Revaccination	0	93	684
Tuberculin Test	0	5	30*
Immune Globulin	1	7	802
Other	0	0	4
Social Service			
Cases carried over	101	107	1,153
Cases admitted	27	17	212
Cases closed	21	15	189
Remaining case load	107	109	1,176
Activities:			
Home Visits	12	9	91
Office Interviews	343	316	3,638
Conferences	61	39	550
Meetings	12	14	109
Sanitation			
Inspections made	95	104	1,569
Conferences held	3	10	163
Bacteriological Laboratory			
Treated Water Samples	254	175	2,450
Milk Samples (Inc.cream & ice cream)	34	41	427
Other bacteriological tests	422	461	6,330
Total	710	677	9,207

*Total includes 3 not reported in September.

121783

HEALTH & SAFETY SECTION

DECEMBER 1954

Public Health (Continued)	November	December	Year to Date
Communicable Diseases			
Chickenpox	61	49	467
German Measles	4	10	69
Gonorrhea	0	0	1
Impetigo	0	3	10
Influenza (U.R.I.)	0	0	4
Infectious Mononucleosis	0	0	1
Infectious Hepatitis	0	0	15
Measles	4	3	1,390*
Meningitis	0	0	2
Mumps	20	24	85
Pinkeye	0	4	10
Poliomyelitis	1	0	5
Ringworm	36	13	84
Roseola	1	2	16
Scabies	0	2	3
Scarlet Fever	20	15	107
Streptococcal Infections-Throat	0	1	5
Syphilis	0	0	1
Tuberculosis	0	0	2
Whooping Cough	1	0	70
Total	148	126	2,346
Total No. Nursing Field Visits	555	524	7,284
Total No. Nursing Office Visits	91	78	1,042

*Total includes 1 not reported in April.

1211784

COMMUNITY SECTION

DECEMBER 1954

ORGANIZATION AND PERSONNEL:

	BEGINNING OF MONTH		END OF MONTH	
	Exempt	Nonexempt	Exempt	Nonexempt
Community Administration	1	1	1	1
Maintenance & Renovation Unit	9	145	9	144
Police Unit	16	30	16	28
Commercial & Residential Property Unit	8	24	8	24
Fire Unit	66	0	65	0
Transfer Study	1	1	1	1
Community Operations Administration	1	1	1	1
Electrical Unit	5	16	5	15
Engineering Unit	7	4	7	4
Water & Sewerage Utilities Unit	5	18	5	18
Library Unit	4	8	4	9
Public Works & Recreation Unit	7	40	7	38
	130	288	129	283

	Exempt	Nonexempt
Additions to Payroll	0	3
Transfers In	0	0
Removals from Payroll	1	2
Transfers Out	1	5

Net Decrease 6

1211785

MAINTENANCE AND RENOVATION UNIT

December, 1954

	Exempt	Nonexempt
Employees - Beginning of the month	9	145
New hires	0	1
Reactivated from illness leave	0	1
Transfers out	0	1
Leave of absence due to illness	0	2
Employees - End of month	9	144

121178b

INTERIOR PAINT REPORT - FY 1955

FOREMAN	PAINTERS	TRUCK DRIVERS	TOTAL
R. A. Chambliss	20	1	21
D. W. Lukins	20	1	21
M. E. Tappan	20	1	21
Total	60	3	63

TYPE UNIT	NO. UNITS SCHEDULED	COMPLETED THIS MONTH	COMPLETED TO DATE	BALANCE TO BE PAINTED
A	134	16	30	104
B	158	29	59	99
C	8	0	0	8
D	0			
E	23	2	2	21
F	52	3	7	45
G	0			
H	92	9	16	76
K	2	0	0	2
L	13	0	0	13
M	1	0	0	1
Q	3	0	1	2
R	1	1	1	0
S	1	0	0	1
T	3	1	3	0
U	21	2	10	11
V	79	8	29	50
Y	96	32	61	35
Z	6	4	5	1
1BP	95	6	21	74
2BP	459	55	128	331
3BP	304	46	100	204
Tract	16	1	1	15
1BR Apt.	10	0	1	9
2BR Apt.	0			
W-13 Apt.	2	0	0	2
Total	1579	215	475	1104

5 Units added.

Est. MH B. F.	11,702	Actual MH B. F.	11,896
Est. MH This Month	9,417	Actual MH This Month	9,572½
Total Est. MH	21,119	Total Actual MH	21,468½

1211787

PLUMBING SHOP

FOREMAN - F. L. ELSENSOHN

JOB DESCRIPTION	NO. COMPLETED
Electric water heaters replaced	16
Laundry trays replaced	9
Shower stalls replaced	1
Miscellaneous plumbing work orders completed	19
Plumbing for floor and sink linoleum replacement	64
Cleared major sewer stoppages caused by tree roots	62
Loaded and hauled dirt to fill holes, and broke up and hauled away blacktop walks at location where prefabs had been removed	9
Completely repaired radiators in dormitories	44
Worked on service orders	118.4 hours

Excavated all sewer lines for cleaning out of roots, and backfilled.

Made routine steam inspection once each week in Government owned commercial buildings, apartments and dormitories.

SERVICE ORDER CREW

FOREMAN - L. F. CARPENTER

The following is a status report on service orders:

A.	On hand at the beginning of the month	372
B.	Received during the month	2030
C.	Completed during the month	2245
D.	On hand at the end of the month	157

E. A total of 223.3 hours was spent on work orders.

G. Backlog of service orders by craft:

Electrical	23
Plumbing	107
Carpentry	27
Total	157

1211788

RENOVATION AND LABOR CREW

FOREMAN - B. C. BAIN

The following services were performed during the month:

Vacant houses renovated	24	
Trash pickups	23	
Minor carpenter repairs to housing units	20	
Minor carpenter repairs to dormitories	13	
Painted interiors of pumphouses	2	rooms
Painted interiors at the Community House	2	rooms
Minor painting jobs in renovated houses	10	

Provided weekly service of delivering linens and janitorial supplies to occupied dormitories.

Provided weekly pickup and delivery of laundry from various General Electric Company units to Richland Laundry and Dry Cleaners.

MECHANICAL SHOP

FOREMAN - Z. H. MAYBERRY

The following services were completed during the month:

A. Millwright Crew:

Furnace service orders	222
Routine furnace inspections	130
Weep tubes for prefabs	4000
Shear pins replaced in stokers	5
Oil tanks replaced	2

B. Sheetmetal Crew:

Fabricated shower stalls	30
Installed shower stalls	17
Repaired or replaced closet door tracks in ranch house closets	48
Repaired ranch house bathroom window ledges	24
Replaced smoke pipes	14
Installed gutters	23
Repaired metal ladders	12
Prefab door keepers	60

C. Labor Crew:

Tree removal orders	88
Top soil fills made	2
Trash removal orders	7
Coal deliveries to vacant houses in Renovation	14
Excavated for oil tank inspection	9

1211789

LINOLEUM AND CARPENTER SHOP

FOREMAN - R. M. MARTIN

Replaced bath wall tile	9	
Repaired bath wall tile	2	
Replaced bath floor linoleum	4	
Repaired bath floor linoleum	3	
Replaced utility room floor linoleum	2	
Repaired utility room floor linoleum	1	
Replaced living room linoleum	1	
Repaired living room linoleum	2	
Replaced dining room linoleum	1	
Replaced kitchen floor linoleum	46	
Repaired kitchen floor linoleum	4	
Replaced hall linoleum	2	
Replaced steps linoleum	33	
Replaced sink top linoleum	62	
Repaired sink top linoleum	2	
Replaced work bench linoleum	2	
Jack and shim	3	
Repaired porches	2	
Replaced broken sinks	4	
Sash balances	3	
Chempoints	129	
Paint touch ups	79	
Repaired exterior doors	3	
Interior house repairs	160	
Weepholes	50	
Repaired siding	2	
Repaired walls	5	
Sidewalk forms	1	
Repaired roofs	8	
Repaired ceilings	2	
Replaced floor linoleum - Medical-Dental Bldg.	2	rooms

1211790

COMMUNITY SECTION
RICHLAND POLICE DEPARTMENT
MONTHLY REPORT
DECEMBER 1954

ORGANIZATION

	Exempt	Non-Exempt
Employees - Beginning of Month	16	30
Transfers In	0	0
Transfers Out	0	2
New Hires	0	0
Terminations	0	0
Total - End of Month	16	28

GENERAL

The annual Christmas party for the members of the School Patrol was held on December 23 at the Community House. This Christmas party is sponsored by the Police Department and the Police Athletic League each year as a special treat to the boys and girls of the School Patrols of Richland and North Richland. The party this year was attended by approximately 350 members of the School Patrol.

Richland participated in the President's "SD" Day which was highly publicized by our department and all civic organizations as well. A perfect "Safe Driving" Day record for Richland was marred by one traffic accident occurring late in the afternoon.

Detective L. M. Linkous of this department spoke before the students of Columbia High School on December 8 on the subject of "Crime and Preventive Measures in Richland".

Richland traffic accident experience for 1954 was greatly improved over 1953. Increased traffic volumes along major arterials to the extent of approximately 7½ per cent resulted in 249 motor vehicle accidents which was an increase of 6 over the previous year; however, injuries were reduced from 46 to 37 and fatalities from two to zero. The Police Department was pleased with the final results and it is hoped that vehicle accidents will be greatly reduced during 1955.

1211791

TRAFFIC	1954 Nov.	1954 Dec.	1953 Nov.	1953 Dec.	1954 Total For Year	1953 Total For Year
Reportable accidents	32	20	20	29	249	243
Property damage accidents	28	18	18	27	216	207
Injury accidents	4	2	2	2	33	34
Total persons injured	7	2	2	2	37	46
Fatal accidents	0	0	0	0	0	2
Accidents-daylight hours	20	9	10	16	167	162
darkness	12	11	10	13	82	81
Accidents-business district	9	5	7	8	75	83
residential "	20	11	10	16	136	124
other "	3	4	3	5	38	36
Accidents investigated	23	17	13	20	166	165
Criminal complaints filed	18	13	10	17	124	130
Violations contributing to accidents:						
Negligent driving	8	6	6	8	52	39
Fail. to yield r.o.w.	11	4	3	9	75	83
Following too closely	4	2	4	4	40	36
Drunk driving	1	2	1	1	6	10
Pedestrian violation	0	0	0	0	7	3
Inattention to driving	0	0	1	0	7	6
Reckless driving	0	1	0	3	6	7
Speeding	0	0	0	0	1	8
Unsafe speed	0	0	1	0	21	4
Improper backing	2	0	2	1	10	20
Disregarding stop sign	1	0	2	0	2	8
Hit and run	1	0	0	0	2	1
Improper passing	1	0	0	1	2	3
Improper turn	2	0	0	0	3	2
Failure to signal	0	0	0	1	2	1
Wide right turn	0	2	0	0	3	1
Improper parking	0	0	0	1	1	1
Bicycle violation	0	1	0	0	4	3
Asleep at wheel	0	0	0	0	0	2
Defective equipment	1	1	0	0	3	2
Dog in street	0	0	0	0	0	3
Debris in street	0	0	0	0	1	0
Wind	0	1	0	0	1	0
North Richland:						
Reportable accidents	14	9	9	5	106	92
Property damage accidents	14	7	8	4	92	78
Injury accidents	0	2	1	1	14	14

Richland	1954 Nov.	1954 Dec.	1954 Ave. Per Accident Nov.	1954 Ave. Per Accident Dec.	1953 Ave. Per Accident Nov.	1953 Ave. Per Accident Dec.
Accident Property Damage	$11,708.65	$9,477.50	$365.90	$473.88	$244.50	$285.86

121192

TRAINING

Advance training for Richland Police members at the Small Arms Range for the period in Field Instruction was as follows:

38 Caliber Revolver ½ Hour
Total number of men reporting at the range 10
Number of men fired over the Army-L course 10

Qualifications on the Army-L course as follows:
Marksman 4 40% Sharpshooter 2 20%
Expert 3 30% Unqualified 1 10%

ACTIVITIES	November		December	
	Richland	North Richland	Richland	North Richland
Bank escorts and details	3	5	2	4
Bicycles impounded	4	1	2	0
Bicycle violations, other	0	0	2	0
Bicycles registered	25	0	42	0
Children lost or found	9	0	7	5
Complaints investigated	24	2	25	9
Deaths reported	0	1	2	1
Dog, cat, loose stock complaints	12	1	6	0
Dogs, cats, reported lost or found	17	2	8	1
Doors, windows found open in facilities	27	10	27	10
Emergency messages delivered	18	87	20	90
Fires investigated	10	2	14	3
Guns registered	5	0	9	0
Law enforcement agencies assisted	3	0	8	0
Letters of inquiry	214	0	134	0
Miscellaneous escorts	2	1	2	2
Persons injured by dogs	0	0	0	0
Plant departments assisted	23	0	45	1
Prisoners processed through Jail	17*	9	21*	5
Private individuals assisted	15	3	29	2
Property lost or found	27	2	19	3
Records inquiries	80	0	75	0
Reports processed through Records	216	102	239	141
Street lights out reported to Electrical	211	25	242	20
Traffic safety meetings (Dec.attendance 2475)	5	0	8	0
Total	967	253	988	297

MONTHLY ...PORT
RICHLAND POLICE DEPARTMENT
(RICHLAND - NO. RICHLAND)
DECEMBER 1954

OFFENSES	KNOWN		UNFOUNDED		CLEARED OTHER*		CLEARED ARREST	
	Rich.	No. Rich.	Rich.	No. Rich.	Rich.	No Rich.	Rich.	No. Rich.
PART I								
1. Criminal Homicide								
a. Murder & Non-Neg. Mans.								
b. Mans. by Negligence								
2. Rape								
3. Robbery								
4. Aggravated Assault								
5. Burg.-Break. & Entry	5	-	-	-	-	-	1	-
6. Larceny Over $50.00	6	2	1	-	-	-	2	-
Under $50.00	13	6	-	-	5	-	3	-
7. Auto Theft	-	-	-	-	-	-	-	-
TOTAL PART I CASES	24	8	1	-	5	-	6	-
PART II								
8. Other Assaults	2	1	-	-	-	-	2	1
9. Forgery & Counterfeit	1	-	-	-	-	-	1	-
10. Embezzlement & Fraud	5	-	-	-	1	-	1	-
11. Stolen Prop:Buy:Rec.	-	-	-	-	-	-	-	-
12. Weapons:Carry:Poss.	-	-	-	-	-	-	-	-
13. Prostitution	-	-	-	-	-	-	-	-
14. Sex Offenses	1	-	-	-	-	-	1	-
15. Offenses Ag. Fam & Child	-	-	-	-	-	-	-	-
16. Narcotics	-	-	-	-	-	-	-	-
17. Liquor Laws	-	-	-	-	-	-	-	-
18. Drunkeness	3	1	-	-	-	-	3	1
19. Disorderly Conduct	-	-	-	-	-	-	-	-
20. Vagrancy	4	1	-	-	-	-	4	1
21. Gambling	-	-	-	-	-	-	-	-
22. Driving While Intoxicated	6	3	-	-	-	-	6	3
23. Viol. Rd. & Dr. Laws:								
Fail. to Stop & Identify	3	-	-	-	-	-	-	-
Speeding	15	12	-	-	2	-	13	12
Stop Sign	18	7	-	-	2	1	16	6
Reckless Driving	6	1	-	-	-	-	6	1
Right of Way	5	1	-	-	-	-	5	1

121194

OFFENSES	KNOWN		UNFOUNDED		CLEARED OTHER*		CLEARED ARREST	
	Rich.	No. Rich.	Rich.	No. Rich.	Rich.	No. Rich.	Rich.	No. Rich.
PART II								
Negligent Driving	13	9	-	-	2	-	11	9
Defective Equipment	7	2	-	-	7	1	-	1
Illegal Passing	1	-	-	-	-	-	1	-
24. Parking	8	69	-	-	5	12	3	57
25. All Other Traff. Viol.	16	5	-	-	1	-	15	5
26. All Other Offenses:								
Mal. Mischief	-	1	-	-	-	-	-	-
Vandalism	3	1	-	-	-	-	-	1
Bike Violations	4	-	-	-	4	-	-	-
Public Nuisance	7	-	-	-	-	-	7	-
Lewdness	1	-	-	-	1	-	-	-
Family Disturbance	1	-	-	-	1	-	-	-
Car Prowl	1	-	-	-	-	-	-	-
Pickup for Outside Agency	-	1	-	-	-	-	-	1
Obscene Phone Call	3	-	-	-	-	-	-	-
Molesting	1	-	-	-	-	-	-	-
Damage to Property	1	-	-	-	1	-	-	-
Contr. to Delinq. of Minor	1	-	-	-	-	-	1	-
27. Suspicion	2	-	-	-	1	-	-	-
TOTAL PART II CASES	139	115	-	-	28	14	96	100
PART III								
28. Missing Persons	4	-	-	-	4	-	-	-
Lost Persons	7	2	-	-	7	2	-	-
Lost Animals	4	1	-	-	3	-	-	-
Lost Property	45	-	-	-	32	-	-	-
29. Found Persons	-	-	-	-	-	-	-	-
Found Animals	3	-	-	-	-	-	-	-
Found Property	43	2	-	-	48	-	-	-
TOTAL PART III	106	5	-	-	94	2	-	-

1211795

OFFENSES	KNOWN		UNFOUNDED		CLEARED OTHER		CLEARED ARREST	
	Rich.	No. Rich.	Rich.	No. Rich.	Rich.	No. Rich.	Rich.	No. Rich.
PART IV								
30. Fat.M.V.Tr. Acc.								
31. Pers.Inj.M.V.Tra.Acc.	2	2						
32. Prop.Dam.M.V.Acc.	18	7						
33. Other Traffic Acc.								
34. Public Accidents)								
35. Home Accidents)	No Accurate Statistics Kept							
36. Occupational Acc.)								
37. Firearms Accidents	-	-						
38. Dog Bites	-	-						
39. Suicides	-	-						
40. Suicide Attempts	-	-						
41. Sud. Death & Bod. Found	-	1						
42. Sick Cared For	-	-						
43. Mental Cases	-	-						
TOTAL PART IV	20	10						
COMPOSITE TOTALS								
PART I,II,III,IV CASES	289	138	1	-	127	16	102	100

G-28-6

*Cases listed under "Cleared Other" are those cleared by various means other than arrest, such as: order from prosecutor, juvenile probation officer or other situations in which a mutual agreement is obtained. They are definitely "cleared" cases and differ from the arrest column only in that there was no arrest.

Property reported stolen	Richland	$2,775.04
Property reported stolen	No. Rich.	$ 311.00
Property recovered	Richland	$2,572.14
Property recovered	No. Rich.	---

1211796

MONTHLY REPORT — RICHLAND POLICE DEPARTMENT — JUVENILES INVOLVED — DECEMBER

OFFENSES	NO. CASES	JUVENILES	SEX	7	8	10	11	13	14	15	16	17
RICHLAND												
Larceny	6	10	M		1	1	2	1			3	2
		7	F						2	2	3	
Burglary	1	3	M						1			2
TOTALS	7	20			1	1	2	1	3	2	6	4
NORTH RICHLAND												
Vandalism	1	2	M	2								
TOTALS	1	2		2								

Cgc-7

121797

RICHLAND POLICE DEPARTMENT
NORTH RICHLAND JUSTICE COURT CASES
DECEMBER 1954

VIOLATIONS	NO. OF CASES	NO. OF CONV.	NO. OF FORF.	CASES CONT.	CASES DISM.	SENT. JAIL	SENT. SUSP.	LIC. REV.	CASES ORIG. PREV. MONTH	BAIL FORF	FINES	FINES SUSP.
DEFECTIVE EQUIP	1	1								$	$ 5.00	$
EXPIRED VEHICLE LICENSE	2		2							20.00		
NO VEHICLE REG CERTIFICATE	2	1	1							5.00	5.00	
NO DRIVERS LICENSE	6	4							1		20.00	10.00 (2)
NEGLIGENT DRIVING	4	4									67.50	10.00 (1)
NEGLIGENT DRIVING, LIQ INV	4	4									127.50	
RECKLESS DRIVING	4	2			2				1		60.00	25.00 (1)
RECKLESS DRIVING, LIQ INV	1	1									32.50	
DRUNK DRIVING	4	3		1				3	1		182.50	
SPEEDING	13	3	8	1					1	85.00	32.50	
ILLEGAL PASSING	1		1							10.00		
FAIL. TO OBSERVE STOP SIGN	6	2	3	1						30.00	10.00	
ILLEGAL PARKING	66	4	44							231.00	15.00	3.50 (1)
FOLLOWING TOO CLOSE	1	1									7.50	
FAIL. TO YIELD RIGHT OF WAY	2		2							40.00		
VIOLATION FINANC. RESP. ACT	1			1								
RESISTING OFFICER	1	1									50.00	
PUBLIC INTOXICATION	1		1							15.00		
VAGRANCY	1	1				1						
BOOTLEGGING	1	1				1						
TOTALS	122	33	62	4	2	2		3	4	$436.00	$615.00	$48.50 (5)

1 RECKLESS DRIVING AMENDED TO NEGLIGENT DRIVING
1 SPEEDING - UNABLE TO LOCATE PERPETRATOR

18 ILLEGAL PARKING - DID NOT APPEAR
2 NO DRIVERS LICENSE - UNABLE TO LOCATE PERPETRATOR

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1211798

12117 99

GBB-9

RICHLAND POLICE DEPARTMENT
RICHLAND JUSTICE COURT CASES
DECEMBER 1954

VIOLATIONS	NO. OF CASES	NO. OF CONV.	NO. OF FORF.	CASES CONT.	CASES DISM.	SENT. JAIL	SENT. SUSP.	LIC. REV.	CASES ORIG. PREV. MONTH	BAIL FORF.	FINES	FINES SUSP.
DEFECTIVE EQUIPMENT	3	3							3	$	$13.50	
INVALID VEHICLE LICENSE	5	2	3							25.00	12.50	
IMPROPERLY DISPLAYED VEH LIC	1	1									7.50	
NO VEHICLE REG CERTIFICATE	1	1								10.00		
NO DRIVERS LICENSE	17	12	4	1					1	27.50	55.50	23.50 (5)
NEGLIGENT DRIVING	9	5	2						2	65.00	94.70	25.00 (2)
NEGLIGENT DRIVING, LIQ INV	5	2	2	1						100.00	75.00	
RECKLESS DRIVING	6	5	1						1		130.00	27.50 (1)
RECKLESS DRIVING, LIQ INV	1	1									37.50	
INATTENTION TO DRIVING	2		2							40.00		
DRUNK DRIVING	6	4		1	1			4			235.00	
SPEEDING	13	5	7	1					1	66.00	40.00	5.00 (1)
ILLEGAL PASSING	2	1	1							15.00	7.50	7.50 (1)
FAIL. TO DIM LIGHTS	1	1									5.00	
FAIL. TO OBSERVE STOP SIGN	13	5	6	1	1				2	50.00	27.50	5.00 (1)
ILLEGAL PARKING	6		4	2						14.00		
FOLLOWING TOO CLOSE	2	1	1							15.00	17.50	
FAIL TO STOP & IDENTIFY	1				1							
FAIL TO YIELD RIGHT OF WAY	6	1	5							85.00	15.00	
THROWING DEBRIS FROM CAR	1	1									12.50	
RESISTING OFFICER	1	1									10.00	
ILLEGAL WAY ON ONE WAY STREET	1	1									7.50	
ILLEGAL DISPOSAL OF GARBAGE	1				1							
PUBLIC INTOXICATION	3	2	1							12.50	30.00	
PUBLIC NUISANCE	7	4	3			2				55.00	30.00	
VAGRANCY	4	4				2					35.00	
PETIT LARCENY	2	2									20.00	
GRAND LARCENY	1	1				1						
FIRST DEGREE BURGLARY	1	1				1						
THIRD DEGREE ASSAULT	3	1		2							100.00	
DESTRUCTION OF GOV'T PROPERTY	1	1									27.50	
TOTALS	126	68	42	9	4	6		4	10	$580.00	1046.20	93.50 (11)

1 ILLEGAL PARKING - DID NOT APPEAR 1 1ST DEGREE BURGLARY AMENDED TO PETIT LARCENY 2 NEG DRVG - DID NOT APPEAR

COMMERCIAL AND RESIDENTIAL PROPERTY UNIT
COMMUNITY SECTION
December, 1954

PERSONNEL - COMMERCIAL & RESIDENTIAL PROPERTY UNIT:

	December Exempt	Non-Exempt
Beginning of Month	8	24
End of Month	8	24
Net Change	0	0

PERSONNEL - COMMERCIAL AND NONCOMMERCIAL FACILITIES:

	Commercial		Noncommercial		Total	
	Richland	North Richland	Richland	North Richland	Richland	North Richland
November	1,628	174	120	1	1,748	175
December	1,635	165	120	1	1,755	166
Net Change	+7	-9	0	0	+7	-9

SUMMARY OF ROUTINE ITEMS PROCESSED:

	Commercial		Noncommercial		Total		
	Richland	North Richland	Richland	North Richland	Richland	North Richland	Total
Work Orders	34	21	3	0	37	21	58
Back Charges	0	0	0	0	0	0	0
FY Work Orders	788	298	34	0	822	298	1120
FY Back Charges	35	1	4	0	39	1	40

CONTRACTS AND NEGOTIATIONS:

A. Commercial:

1. Leases:

a. A. P. Thorsness - a ground lease in connection with the construction and operation of an automotive service station, tune-up garage and hamburger stand to be located at the southeast intersection of Williams Boulevard and Goethals Drive.

b. Dr. Otho Simms - a lease of space in the Medical-Dental Building for the practice of medicine.

c. Dr. R. J. Whisler - a lease of space in the Medical-Dental Building for the practice of dentistry.

d. Austin Wilhite and Mary Duncan - a lease of space in the government-owned building located at 94 Lee Boulevard for the operation of a business for the sale of marine supplies.

2. Supplemental Agreements:

a. New City Cleaners - to provide for a new rent and to make certain other changes in connection with lease renegotiation.

b. Dr. C. E. Liddington - to provide for a re-assignment of space in the Medical-Dental Building and adjustment of rental.

c. Pleiss-Davis, Inc. - to provide for a change in the scope of activities to be conducted in Warehouse 1125-3 to provide for sale and repair of used furniture.

d. O. W. Coudem - to provide for a change in the scope clause, adjustment of rental and certain other changes in connection with the operation of Skip's Drive Inn on Stevens Drive.

3. Business Development:

a. Invitations to bid were mailed to 46 prospective Lessees in connection with leasing 3 sites located in the plot of land at the southwest intersection of Wright Avenue and Van Giesen Street. Proposals received will be opened and read January 5, 1955.

b. Invitations to Bid were mailed to 30 prospective Lessees in connection with leasing the space in the government-owned building at 615 George Washington Way. This is the second request for proposals on this space.

c. 7 proposals were received in answer to our Invitation to Bid in connection with leasing the space in the government-owned building at 615 George Washington Way. These were opened and read December 28, 1954.

d. The bid of Tidewater Associated Oil Company was accepted in connection with leasing the plot at the northwest intersection of Lee Boulevard and Goethals Drive.

e. The bid of C. D. McGuinness was accepted in connection with leasing a portion of the plot at the southeast intersection of Lee Boulevard and Wellsian Way. He proposes to operate an auto sales agency.

f. The bid of Tidewater Associated Oil Company was accepted in connection with leasing the plot located on George Washington Way and Newton Street.

121801

B. Non-Commercial:

1. Lease:

Richland Junior Chamber of Commerce - to provide for the construction and operation of a club house in connection with the activities of the Chamber of Commerce.

GENERAL:

A. Commercial:

1. Carl Geer opened a business for the sale of used furniture and appliances in the Automatic Laundry Co. Building, Uptown Business District.

2. The Prudential Insurance Company opened for business in the Richland Development Co. Building, Uptown Business District.

3. N. P. Taylor, subleasing from L. G. Cook, opened for business, d/b/a Taylor's Automotive Service.

4. Uptown Cleaners, subleasing space from J. F. Gerdes, 294 Williams Boulevard, opened for business.

5. R. H. Weiss Terminated his sublease with the Richland Development Co., Uptown Business District.

6. Prudential Insurance Company terminated their sublease with the Automatic Laundry Company, 243 Symons Street, Uptown Business District.

7. Dr. Ray V. Rose terminated his lease in the Medical-Dental Building and opened for business in the Medical Arts Building.

8. The government-owned building 1125 Warehouse has been assigned to the Community Section for leasing purposes.

9. The appraisal work performed by independent appraisers, Hugh Russell and Everett Wheeler, under Agreement G-38, as modified, has been completed. Nineteen additional sites are being appraised preparatory to lease award or lease renegotiation.

B. Non-Commercial:

1. The government-owned building and plot of land occupied by the Richland Lutheran Church was sold to the Church on December 16, 1954.

COMMERCIAL PROSPECTS:

Inquiries were received during the month concerning the establishment of the following types of enterprises in Richland.

Tavern	Department Store
Service Station	Cocktail Lounge

121802

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COMMERCIAL & RESIDENTIAL PROPERTY UNIT - COMMUNITY SECTION December, 1954

SUMMARY OF OCCUPANCY AND EXPANSION STATUS:

A. Commercial:

	NOVEMBER			DECEMBER		
	Richland	North Richland	Total	Richland	North Richland	Total
1. Number of Government-owned Buildings	40	8	48	47	8	49
a. Number of Prime Lessee Businesses	37	10	47	37	10	47
b. Number of Sublessee Businesses	17	0	17	17	0	17
c. Total Businesses in Government-owned Buildings	54	10	64	54	10	64
2. Doctors and Dentists in Private Practice	35	0	35	35	0	35
3. Number of Privately-owned Buildings	69	6	75	69	6	75
a. Number of Prime Lessee Businesses	45	5	50	45	5	50
b. Number of Businesses operated by Sublessees	110	0	110	112	0	112
c. Total Businesses in Privately-owned Buildings	155	5	160	157	5	162
4. Privately-owned Buildings under Construction	4	2	6	4	2	6
5. Total Number of Businesses in Operation	209	15	224	211	15	226

Cgc-4

SUMMARY OF OCCUPANCY AND EXPANSION STATUS:

B. Noncommercial:

		NOVEMBER			DECEMBER		
		Richland	North Richland	Total	Richland	North Richland	Total
1. Government-owned Buildings							
a. Churches		2		2	1		1
b. Clubs and Organizations		5		5	5		5
c. Government Agencies		2		2	2		2
	Total	9		9	8		8
2. Privately-owned Buildings							
a. Completed and in Use		10	2	12	10	2	12
b. Under Construction		6	0	6	6	0	6
	Total	16	2	18	16	2	18
3. Church Plots and Buildings in Private Ownership		2		2	3		3
4. Pasture Land Permits		105		105	105		105

Cgc-5

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COMMERCIAL AND RESIDENTIAL PROPERTY UNIT

TENANT RELATIONS

PROGRESS REPORT

	Orders incomplete as of November 30	Orders issued 11-30 to 12-30	Total orders Incomplete as of December 30, 1954
Service orders	553	2244	354
Work orders	598	571	694
Service charges		246	

Principal work order loads

	Incomplete as of November 30, 1954	Incomplete as of December 30, 1954
Laundry tub replacement	37	44
Tileboard bathroom	11	6
Kitchen floor linoleum	92	80
Kitchen cabinet linoleum	29	116
Shower stall	14	17

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139 alteration permits were issued, as compared to 134 issued in November.

Install atuomatic washer	17	Install automatic dryer	38
Convert to oil	5	Basement excavation	3
Remove laundry trays	2	Install TV antenna	59
Install outlets	2	Remove utility shelves	1
Sand & refinish floors	1	Remove broom closet	2
Install air conditioner	2	Install 220 v heater	1
Install fan in kitchen	1	Install patio	1
Install incinerator	1	Install partitions	2
Install sink	1		

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857 inspections were made, as compared to 881 in November.

Alterations permits	79	Basement	3
Bathroom	1	Doors	4
Fill	2	Floors	4
Laundry tubs	11	Linoleum	202
Paint	101	Porch & steps	11
Range & refer recall	21	Screens	4
Shower stalls	10	Sink	6
Toilet seats	4	Trees	10
Walls	6	Yard	2
Renovation rechecks	31	Dormitories	145
Miscellaneous	8	Cancellations	66
Renovations	67	Shows (new tenants)	59

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COMMERCIAL AND RESIDENTIAL PROPERTY UNIT

TENANT RELATIONS

TENANT STORES

Merchandise Issued	Total Amount
Shades	461
Reflectors	18
Drip tray	11
Meat tender	6
Ice trays	11
Hydrator glass	2
Furniture delivery	21
Furniture recall	31
Refer parts	6
Range parts	0
Cooker pots	0
Space heaters	2
Door stops	18
Caulking compound	1
Grass seed	4
Furnace shaker	2

RECALL AND DELIVERY OF RANGES AND REFRIGERATORS -- MONTH OF DECEMBER

	DELIVERY		RECALLED	
	REFERS	RANGES	REFERS	RANGES
1Br.	0	0	0	0
2Br.	0	0	1	1
3Br.	1	1	2	0
A	5	2	7	9
B	0	0	2	3
E	0	1	0	0
F	0	0	2	3
H	0	0	1	2
Q	0	0	0	1
V	1	0	0	1
Y	1	1	1	2
Total	8	5	16	22

Excess: 2 ea. TA refers and 3 ea. GE ranges and 9 AB ranges.

IN WAREHOUSE:

TA refers	14
GM refer 7'	1
GM refer 6'	1
SC ranges	22
GE ranges	13
GM range	1
Refer SO 82	2

121180b

COMMERCIAL & RESIDENTIAL PROPERTY UNIT
RESIDENTIAL LEASES
DECEMBER 1954

Dormitories:

	Beds available	Vacant beds	Occupied beds
Men	477	50	427
Women	381*	56**	325*
Total	858*	106**	752*

*This includes 2 beds used for Dorm Offices
**This includes 8 vacant beds in Dorm M-13

WAITING LISTS

	Single Rooms	Double Rooms
Men	0	0
Women	1	0

The following Dormitories are in Stand-By condition:

W 21	50 beds	W 15	50 beds
W 17	50 beds	M 7	39 beds
W 16	50 beds		

Total Beds 239

RESIDENTIAL LEASING

CANCELLATIONS		ALLOCATIONS	
Voluntary terminations	10	Houses allocated to new tenants	35
ROF	0	Exchanged houses	10
Discharge	1	Moves (within Richland)	20
Transfers	4	Turnovers (divorce,death,schools)	0
Retirement	2	Wherry house move to G.E.house	0
Move off project	13		
Divorce	1	Total leases signed	65
Death	1	Total cancellations	66
Move to Wherry house	0	Houses assigned "As Is"	28
Military Service	3	Houses sent to "Reno"	33
Not Eligible	1	Applications pending	275
Total	36		

1211807

RICHLAND HOUSING

HOUSING UTILIZATION AS OF MONTH ENDING DECEMBER 31, 1954
HOUSES OCCUPIED BY FAMILY GROUPS

	Convem	A&J	T	Pre Cut	Ranch	Pre Fab	Dorm Apt.	A&J Apt.	2BR Apt.	4th Hsg.	Tract	Total
G. E. Employees	2229	257	10	387	847	1127	10	54	61	202	37	5221
Comm. Fac.	90	17		28	59	50		5	4	8	2	263
AEC	64	29		19	53	15		4	3	12	3	202
Other Gov't	7	2			3	1						13
Post Office	6				2	8				1	3	20
Schools	64			7	11	45			1	1		129
Comm. Activities	11			2	6	4					1	24
Med. Facilities	4	17			3	1				3		28
Chas. T. Main	2			2	3	3				2		12
Kaiser Eng.	6	7			7	2						22
J. A. Jones	2	2			2							6
Blaw-Knox	3	2		2	2							9
Minor Const.					1			1				2
Not Certified	6			2		4					1	13
Total	2494	333	10	449	999	1260	10	64	69	229	47	5964
Assigned Leases Written				1						1		2
Assigned Leases Not Written	1					6			1			8
Available for Assignment	5				1	10						16
TOTAL	2500	333	10	450	1000	1276	10	64	70	230	47	5990

	Begin Month	Moved In	Moved Out	End of Month	Diff
Conventional Type	2492	+18	-16	2494	+2
A&J Type	332	+2	-1	333	+1
"T" Type	10			10	
Precut Type	450	+2	-3	449	-1
Ranch Type	1000	+8	-9	999	-1
Prefab Type	1264	+22	-26	1260	-4
Dorm Apts.	10			10	
A&J Apts.	64	+2	-2	64	
2BR Apts.	70		-1	69	-1
Fourth Housing	230	+2	-3	229	-1
Tracts	47			47	
Total	5969	+56	-61	5964	-5

1211808

COMMUNITY SECTION
RICHLAND FIRE DEPARTMENT
MONTHLY REPORT

December 1954

Organization and Personnel	Exempt	Non-Exempt
Employees beginning of Month	66	0
Transfers In	0	0
Transfers Out	1	0
Terminations	0	0
New Hires	0	0
End of Month	65	0

Fire Protection		Richland	North Richland
Fire Loss (Estimated)	Government	$ 2,060.00	$ 0
	Personal	3,296.36	0
	December Total	$ 5,356.36	0
	Year's Total	$14,572.09*	$7,304.39**

*Loss Figure not yet available for December 27, 1954, Thrifty Drug Store Fire
** " " " " " " August 6, 1954, North Richland Drug Store Fire

	Richland	North Richland
Response To Fire Alarms	44	21
Investigation of Minor Fires & Incidents	4	1
Ambulance Responses	24	0
Inside Schools or Drills	28	14
Outside Drills	11	5
Safety Meetings	8	3
Security Meetings	4	1
Alarm Boxes Tested	216	92

The first of two disastrous fires occurred on the morning of December 4, when a residential fire at 1208 Wright resulted in fatal burns for two small children and critical burns for their mother. While property damage in excess of the estimated $4,700.00, government and personal loss, has been experienced before, this is the first time fatalities have resulted from any Richland fire since the start of the project.

The second disastrous December fire occurred shortly after midnight on December 27, when fire suddenly involved the Uptown Thrifty Drug Store, its spread materially assisted by cellotex ceiling, resulting in serious damage to the building and

contents. Extra alarms brought in a total of five on-shift fire companies, one off-shift company and the manning of three reserve companies with off-shift personnel. A total of sixteen men, six officers and ten firemen, were called in from off-shift. The fire was confined to the interior of the Drug Store - no damage resulting to the adjoining theatre or grocery store, and considerable stock is salvageable. A substantial portion of the loss is covered by insurance and the firm is planning to renovate for re-opening.

Fire Marshal's Activities

A total of 181 Richland and 3 North Richland buildings were inspected, resulting in 72 hazard reports being submitted. Inspection of fire extinguishers totaled 382, with 6 installed, 4 relocated, 3 recharged, and 2 removed - while 47 fire hose standpipes received inspection and service.

Investigated reason why the new sprinkler system actuated fire alarm system in 713 Building. A leaking valve caused the alarm and AEC Safety was advised of recommended correction.

Fire Marshal arranged for and assisted AEC and school officials in locating failure in fire alarm system in Chief Joseph School.

Investigated fire at 1208 Wright; assisted school maintenance with installation and tests of a new sprinkler alarm valve in Jason Lee School to replace the defective valve which caused frequent fire alarms due to water main pressure surges.

Helped 705 Building Safety Chairman map plans for a Christmas Safety Program for building employees.

Serious grease conditions in exhaust systems of two eating establishments, creating a fire hazard to the building, resulted in Management being requested to make immediate clean-up.

Assisted AEC and Community Electrical in making final acceptance inspections and tests of fire alarm and sprinkler systems at the new Transportation Tank Farm.

Arranged with Tenant Relations to have furnace repaired at 1308 Perkins following coal gas explosion.

Prepared and submitted news releases on Christmas Safety to two local newspapers and the Works News.

Attended Richland Traffic Control Committee Meeting.

Conducted special inspections of office Christmas decorations and provided extra fire extinguishers where needed.

Requested repairs to raceway cover and inspection of electrical wiring at 1008 Wright following damage due to leaking hot water tank.

Assisted school maintenance in relocating an auxiliary fire alarm box in Lewis and Clark School.

1211810

Assistant Fire Marshal investigated possible cause of fire in the Uptown Thrifty Drug Store which involved entire building and contents.

Inspected propane gas delivery truck for safe operation in North Richland Trailer Camp.

Assisted the Jaycee's with plans for their annual "Operations Torch" where the city's Christmas trees are collected and burned with ceremonies in the city park.

COMMUNITY OPERATIONS SUB-SECTION
RICHLAND ELECTRICAL UNIT
MONTHLY REPORT
DECEMBER 1954

ORGANIZATION AND PERSONNEL	Exempt	Non-Exempt
Employees Beginning of Month	5	16
Transfers In	1*	
Transfers Out		1*
Terminations	1	
Total End of Month	5	15

* Promotion Within Unit

SYSTEM MAINTENANCE AND OPERATION

Outside Lines

Poles set and transferred	5
Anchors set and guys installed	2
Street lights repaired and steel mast arms installed	2
Street lights relamped - Mercury Vapor	20
Street lights relamped - 6000L and 4000L, 1100 Area	171
Street lights relamped - 6000L and 4000L, 700 Area	15
Flood lights relamped, 1100 Area	12
Flood lights relamped, 700 Area	1
Stack lights relamped, 700 Area	1
Primary line footage added	0
Primary line footage removed	400 ft.
Transformer KVA added	15
Transformer KVA removed	5
Net transformer KVA installed	10
New services installed - residential	0
New services installed - commercial	1
Temporary services installed and removed	2
Scheduled outages - primary	6
Scheduled outages - secondary	5
Unscheduled outages - primary	2
Unscheduled outages - secondary	2
Standby and escort	0
High voltage tree trimming	91
Low voltage tree trimming	10
Services removed - commercial	2

TRAFFIC SIGNALS

Relamping	3
Operational failures	0
Installations	1
Removals	0

| 2 | 1 | 8 | 2

RICHLAND ELECTRICAL UNIT

Routine maintenance checks	32
Routine check R. R. signal at Van Giesen	4
Total signals in operation - automatic	19
Total signals in operation - manual	3
Total signals in operation - flasher	3

PUBLIC WORKS ELECTRICAL MAINTENANCE

Electrical motors checked and serviced - irrigation	0
Electrical motors checked and serviced - water	89
Electrical motors checked and serviced - sewage	78

FIRE DEPARTMENT TEST AND MAINTENANCE

Inside circuit and equipment checks	5
Outside circuit checks	5
Inside faults repaired	0
Outside faults repaired	0
New circuits placed in operation	0
New boxes placed in operation	0

SUBSTATIONS

Main feeder and tie breaker checks - BB1-S1	5
" " " " " " - BB1-S2	5
Secondary and pad located stations - checked jumpers, cutouts, grounds and general condition	25

METERING - OPERATION, MAINTENANCE, CONSUMPTION AND REVENUE

Voltage and load checks	2
Meters tested - customer's requests	2
New meters shop tested	6
Stock meters tested	32
Faulty meters replaced or repaired	2
Overloaded meters replaced	6
Damaged meters and covers	2
Residential read-ins	117
Residential read-outs	137
Residential disconnects	10
Residential reconnects	10
Meters resealed	2

Consumption and Revenue:

	No. of Meters	KWH	Revenue
Residential - Schedule 1	6984	4,758,368	$49,747.89
Commercial - Schedule 2	392	3,183,178	27,147.88
Totals	7376	7,941,546	$76,895.77

1211813

RICHLAND ELECTRICAL UNIT

COMMENTS

TRAFFIC SIGNAL SYSTEM:

Arrangement and Maintenance - Moved signal at Stevens and Bypass to conform to intersection relocation.

Changed relay coils to railroad signal to correct primary voltage drop.

Changed flasher timing to accommodate all Richland signals to Christmas traffic.

FIRE PROTECTION SYSTEM:

Arrangement and Maintenance - Disconnected auxiliary loop at Bulk Plant, Central Transportation at request of Fire Chief due to ground on system left by contractor. Also disconnected box 4113 at same location to permit corrections by contractor. Reconnected on following day.

Fire alarm circuit No. 8 at Central Transportation was placed in service at 10:15 a.m., 12-1-54.

OUTSIDE LINES AND STATIONS:

Arrangement and Maintenance - Installed temporary service to Elvrum Construction Company at Williams and Goethals.

Connected temporary Christmas lighting at twelve locations in Uptown Shopping Area. Uptown Merchants will be billed for connection, disconnection and consumption.

Disconnected primary line to 1131 Area and removed two sets of fused switches and primary metering.

Disconnected ten customers for delinquent bills and reconnected same after payment.

Connected and disconnected four paint busses used by painters in residential areas.

Connected permanent service to Nazarene Church and set new demand meter.

Connected one television amplifier to electrical system.

Repaired service at 1002 Abbot - insulator pulled off house.

Removed unused poles and cable as requested by Telephone Section in 1125 Warehouse Area.

Checked load and voltage to station service transformer to Banks 3 and 4 at BB1S2.

Installed cable and messenger east of 720 Building for Telephone Section, set two poles and removed unused underground cable.

Reconnected four transformer stations from Delta to Wye circuit to reduce voltage to bus heating system.

RICHLAND ELECTRICAL UNIT

Installed 60' radio tower for Telephone Section - on top of 703 Building.

Removed service and meter to burned house at 1208 Wright. Reinstalled on 12-22-54, requested by Housing.

Connected temporary service to supply Christmas lighting on Knight Street.

Electrical fire in conduit in building at 1604 Jadwin caused loss of power to one apartment.

Repaired service connection at 365 Wright, due to loose connection at service entrance, left in this manner by contractor.

Repaired loose service wires at 1934 Hetrick, due to board loose on house.

STREET LIGHTING:

Installed new mercury vapor light at Stevens and Bypass, and Stevens and Coast.

Installed switch bypass to lighting at Stevens and Bypass.

Installed 15 kva CC Regulator to #1600 station in 6th Housing to supplement existing station capacity, and arranged the combination to be operated by same controls.

Replaced five street light luminaires broken by vandals during month. Usual relamping.

SEWAGE TREATMENT AND DISPOSAL:

Electrical Maintenance - Disconnected and removed No. 1 sludge pump at No. 1 plant, and replaced worn bearings.

Disconnected circulating motor at No. 1 plant - will be reinstalled following maintenance check and repair.

WATER SYSTEM:

Electrical Maintenance - Disconnected supply to four sanitary wells on Wellsian Way, due to contractor working on new water mains.

Arranged series of short outages to all sanitary wells to provide working clearances for painters to paint well houses and service mast arms.

Repaired 480 volt service to well No. 4 on Wellsian Way because of contractor breaking wires with crane while unloading pipe, after being warned of hazard by Electrical Superintendent earlier in day.

UNUSUAL INCIDENTS:

Removed service to burned prefab at 1208 Wright.

Meter reader bitten on leg by dog at 410 Douglass. Treated at First Aid. Registered complaint with owner and notified police.

RICHLAND ELECTRICAL UNIT

Pipe contractor on Wellsian Way ran through four wire 480 volt service to well with crane, breaking wires and threatening high voltage supply to SW part of Richland.

D & C pickup ran into pole at Central Transportation gas pump, breaking wires to high voltage area lighting.

Columbia High School suffered casualty to power supply when high voltage pot-heat fitting to underground portion of circuit to transformer vault developed bad connection and opened up causing short circuit to line 21, resulting in loss of power to 1184 Building and some houses due to blown fuse to 21-X-187. Air Circuit Breaker No. 21 opened and immediately reclosed restoring power to remainder of circuit immediately. School was out from 3:00 p.m. to 4:45 p.m. when it was restored temporarily, pending final repairs on scheduled outage 12-23-54. The defective part was found in Spare Parts.

Vandals damaged meter at McMurray Lift Station - reported to Richland Police.

INTERFERENCE CHECKS:

Checked 5th Housing Area at customer's request and found defective heating pad near 388 Wright.

UNSCHEDULED OUTAGES:

Blown transformer fuse in rear of 205 Abbot.
Columbia High School pothead short circuit blew fuse to 21-X-187 and tripped breaker.

SCHEDULED OUTAGES:

To 41-X-106 to rearrange lines and remove switches.
To distribution transformers 1407, 1408, and 1409, also switch 23-X-65 to accomplish transfer of equipment to pole replacements.
To distribution transformer 1184 to check tap settings and voltage.
To distribution transformer 3827 to check circuits for loose connection.
To four sanitary well stations to de-energize supply for safety clearances for painters.

CALL-OUTS:

Blown transformer fuse in rear of 205 Abbot - 2 men.
Disconnect burned prefab at 1208 Wright - 1 man.
Blown transformer fuse at Assembly of God Church - 2 men.
De-energize Thrifty Drug in Uptown Area because of fire - 2 men.

COMMUNITY OPERATIONS SUB-SECTION
ENGINEERING UNIT
MONTHLY REPORT
DECEMBER 1954

PERSONNEL:	Exempt	Non-Exempt	Total
Employees Beginning of Month	7	4	11
Transfers In	0	0	0
Transfers Out	0	0	0
Terminations	0	0	0
Total End of Month	7	4	11

BUILDING PERMITS ISSUED IN DECEMBER:

1. W. W. Chamberlain - Garage - 710 Stanton Ave.
   1 Sign Permit

NEW MUNICIPAL CONSTRUCTION STARTED IN DECEMBER:

NONE

NEW PRIVATE CONSTRUCTION STARTED IN DECEMBER:

1. W. W. Chamberlain - Garage - 710 Stanton Ave.

PRIVATE CONSTRUCTION COMPLETED IN DECEMBER:

NONE

ENGINEERING JOBS COMPLETED IN DECEMBER:

C-0547 - Design, Title III Inspection, Catskill & Rainier Avenue.

I 91044 - Sketch, Review, and Legal Description, Tidewater Associated Oil Company.

G-01001 - Guthrie Avenue Sidewalk - Gilmore to Goethals.

G-01002 - Improvements to Medical Arts Building, Service Drive.

G-01011 - Intersection Change-Over, By-Pass & Stevens Drive.

G-02165 - Parking Facilities, Kadlec Hospital.

G-03577 - Improvements to Existing Street, Geo. Washington Way.

121817

STATUS OF ENGINEERING UNIT PROJECTS:

ESR I-90624 - Title III Services, Storm Drain, G. W. Way - 99% complete. Final closure pending on negotiations being administered by A.E.C.

ESR I-90604 - Inspection 24" Sanitary Sewer, Swift Boulevard - 99% complete. Final closure pending on negotiations being administered by A.E.C.

G-03570 - Replace Raw Water Line #5 Well to Lee Boulevard - Contractor started construction Dec. 6, 1954. 45% complete.

G-01004 - Installation of Fire Insulated Fire Alarm Wire - To be finished as locations furnished by Fire Department.

G-01005 - Sewer and Water Lines to Richland Heights Baptist Church - 90% complete. Concrete lining of irrigation ditch to be completed.

G-02171 - Automatic Bar Screens Sewage Lift Station - To be readvertised in January 1955. No bids received at first advertising.

G-02176 - Comfort Station, Sewage Lift Station - Chlorination Station, Riverside Park - Design 99% complete.

G-02182 - 6" Water Main, Stevens Drive, Kadlec Hospital to Central U. P. Church - Project 99% complete.

STATUS OF ACTIVE ENGINEERING SERVICE REQUESTS:

I 90234 - Inspection, Bauer-Day Housing - Materially complete. Question remains on final surveying and monumenting of intersection.

I 90594 - "As Builts" General, Part II - New funds allocated. Starting on new assignment.

I 90634 - Kadlec Hospital Grounds Improvements - Project 99% complete.

I 90914 - Utility Lines, Legal Descriptions and Diagrams for Churches - 95% complete.

I 91014 - Retirement of Separate Irrigation System - Design work in progress.

I 91024 - Retirement of Irrigation Canal - Design delayed temporarily by other work.

STATUS OF WORK ORDERS:

All new work requests will be shown by work order number.

C-0554 - Expansion of Riverside Park North of Lee Blvd. - Preliminary planning started.

C-11439 - Catholic Church Sewer Easement - 95% complete.

C-11443 - Plat & Legal Description on Church of Jesus Christ of Latter Day Saints - 95% complete.

C-11448 - Northwest Corner Lee Boulevard and Goethals Drive (Tide Water Associated Oil) - 75% complete.

121818

STATUS OF WORK ORDERS: (Cont.)

C-70524 - Pauls, Inc. - 80% complete.

C-70588 - Legal Description Plot at Southwest Corner Goethals & Williams - 95% complete.

C-70589 - Legal Description Plot of Land on Southeast Corner Goethals & Williams - 95% complete.

C-70590 - Legal Description of Plot at Southeast Corner Knight & Stevens - (Continental Oil Co.) - 95% complete.

C-70591 - Legal Description of Plot West of By's Burgers - 95% complete.

C-70592 - Legal Description of Plot Southeast Corner Knight & Stevens -(Frances S. Taylor) - 95% complete.

C-70608 - Study & Sketch for Utility Lines for "Rose Garden" - 90% complete.

C-70667 - Murphy Motors, Inc. - 90% complete.

C-70682 - Heavy Industrial Area - 95% complete.

C-70684 - Approval "As Built" Plans - Parcell's Service Station - Duportail and Hartford - Deferred for other work.

C-70698 - Legal Description of Plot of Land on Lee Boulevard (Charles D. McGuinness) 75% complete.

C-70699 - Southeast Intersection of Lee & Wellsian Way (Colin Bleiler) - 75% complete.

C-89516 - Legal Description on Newton & G. W. Way (Tide Water Associated Oil) - 5% complete.

BUILDINGS UNDER CONSTRUCTION:

NOTE: All ESRs for Plans, Specifications, and Inspections were closed as of July 1, 1954. This type of work is now indicated by job title only, the expense of which is lumped and charged against routine expense code "Plans and Specifications". Buildings on which final acceptance has not been made include:

First Baptist Church (Richmond and Raleigh Streets) - 92% complete. No progress this month.

Assembly of God Church - 97% complete. Work progressing slowly.

Alteration Permits - an open active file.

Television Antennae - An open active file.

Plans, Specs., Inspections, Grace Bacon Roller Rink - 98% complete. No progress this month. Open for business.

1211819

BUILDINGS UNDER CONSTRUCTION: (Cont.)

Plans, Specs., Inspections, Church of Nazarene Addition - 85% complete. Work progressing slowly.

Plans, Specs., Inspections, Richland Heights Baptist Church - 99% complete. Work progressing slowly. Building occupied.

Plans, Specs., Inspections, Richland Baptist Church, G.W.W. - 99% complete. No progress this month. Building occupied.

Plans, Specs., Inspections, Christ of King Parish (Catholic) - 80% complete. Work progressing nearly as scheduled. Portion of school occupied.

Plans, Specs., Inspections, Central U.P. Church - 85% complete. Work progressing nearly as scheduled.

Plans, Specs., Inspections, Walsh Tire Shop - 99% complete. Final inspection to be made. Open for business.

Plans, Specs., Inspections, Parcell Service Station (Duane & Lee) - 98% complete. Work progressing according to schedule.

Plans, Specs., Inspections, Couden Drive-In (Stevens & Knight) - 99% complete. Final inspection to be made. Open for business.

Plans, Specs., Inspection, Bus Depot Service Station - 99% complete. Open for business. Final inspection to be made.

Plans, Specs., Inspection, Wells Radio and T.V. Storage Building - 99% complete. Final inspection to be made.

Plans, Specs., Inspection, Carnation Company - Addition to Existing Loading Dock - 99% complete. Final inspection to be made.

Plans, Specs., Inspection, Thorsness Drive In - SE corner of Goethals & Williams - 50% complete. Work progressing according to schedule.

121820

COMMUNITY OPERATIONS SUB-SECTION
PUBLIC WORKS & RECREATION UNIT
MONTHLY REPORT
DECEMBER 1954

ORGANIZATION AND PERSONNEL	Exempt	Non-Exempt
Employees Beginning of Month	7	40
Transfers Out	0	2
Transfers In	0	0
New Employees	0	0
Terminations	0	0
Total End of Month	7	38

ROADS AND STREETS

Davison Road, from Saint Road south 2060' to end of existing surfacing, was re-shaped and aligned, and re-surfaced with approximately 300 CY of 3/4" minus gravel.

Park Road, from Davison Road to a point 500' east, was graded and re-shaped.

The private road to Tract House K 777 was graded and shaped at request of Commercial and Residential Properties Unit.

Sweeping of streets in the Richland Village Housing Addition was started on a back-charge basis, but completion has been held up due to freezing of mud in gutters.

Approximately 25 dead cherry trees were removed from the north side of Van Giesen street just west of Kadlec Road to eliminate low hanging limbs which were a hazard to traffic and to allow for proper grading of the shoulder.

Burning of weed growth and general clean-up of shoulders and ditches along major roads has been continued as weather permitted.

Both sand spreaders are ready for service and 4 tons of rock salt are on hand for ice control work.

Routine seasonal maintenance was continued on all facilities.

PARKS AND PUBLIC GROUNDS

The area between Bradley Road and Riverside Park, adjacent to the boat ramp, has been graded and bumper logs have been installed to provide a parking lot at this site.

Pruning of all trees and shrubs has been completed.

Removal of leaves from lawn grass areas was completed.

Burning of weeds and general clean-up of shelterbelts and open areas was continued.

General maintenance of all facilities was continued.

121821

PUBLIC WORKS & RECREATION UNIT

RECREATION

General

A Doll Show, sponsored by the Women's Auxiliary of American Legion Post #71, was held at the Community House on December 16, 17, 18th., 1954.

A Christmas party for the School Boy Patrol, sponsored by the Richland Police Unit, was held at the Community House on December 23, 1954.

Extensive Christmas Decorations were placed throughout the Community House through the co-operative efforts of the Hi-Spot Club, the Projecteers, and the American Legion Auxiliary with co-ordinating work by the Recreation group.

Attendance Statistics - December 1954

	No. of Sessions	Youth	Adults	Sub-Total
A. Community House				
Adult Table Tennis League	3		124	124
Arts & Crafts Class	6	128	9	137
Ballroom Dancing	3	26	6	32
Elementary Movies	3	510	37	547
Elementary Square Dancing	3	497	42	539
Fencing	4	3	34	37
Games Room (Open Play)	21	1 553	146	1 699
Junior Square Dancing	2	158	21	179
Minnesingers	4	288	8	296
Photography Class	3	8	3	11
Tumbling	3	33	6	39
Allied Arts Assn.	1		5	5
Youth Christmas Parties	3	498	97	595
Doll Show	3	250	355	605
Hi-Spot	8	2 700	41	2 741
Int. Folk Dancers	3		43	43
Junior Sportsmen Club	1	23	2	25
Junior Stamp Club	2	12	4	16
Richland Rod and Gun Club	2	27	238	265
Y-Supper Club	3	4	82	86
Youth Council	1		19	19
Miscellaneous Bookings	36	495	844	1 339
Total Community House	118	7 213	2 166	9 379
B. Parks & Playgrounds				
Archery - Columbia High School	3	90	6	96
School Activities - Columbia	16	3 360	112	3 472
Total Parks & Playgrounds	19	3 450	118	3 568

121822

C. Summary

	No. of Sessions	Youth	Adults	Sub-Total
Community House and Parks and Playgrounds total for December 1954.	137	10 663	2 284	12 947
Calendar Year to Date				371 324

SANITATION

Collections were continued according to schedule, and per established policy those routes normally scheduled for collection on December 24th. and 31st. (which were observed as holidays) were picked up on the following Mondays.

Total weight of waste material collected and disposed of during the month was 1,270 tons.

1211823

COMMUNITY OPERATIONS SUB-SECTION
WATER AND SEWERAGE UTILITIES UNIT
MONTHLY REPORT
DECEMBER 1954

ORGANIZATION AND PERSONNEL

	Exempt	Non-Exempt
Employees Beginning of Month	5	18
Transfers Out	0	0
Transfers In	0	0
New Employees	0	0
Terminations	0	0
Total End of Month	5	18

DOMESTIC WATER

Norman operations were continued throughout the month.

Operation of all wells in the Richland well field was discontinued on December 2 to facilitate installation of the new raw water collection header on Wellsian Way. Immediately previous to this shutdown, the storage reservoirs at 1182 area were drained, inspected, and refilled. Approximately fifteen cubic yards of sand was found at the raw water entrance of the north reservoir. However, these reservoirs were found to be in good condition.

A 1 1/2" and a 3/4" water meter with meter boxes were installed in the new service lines to the A. P. Thorsness property at Goethals and Williams.

Canal water was shut off to the 3000 Area percolation basin on December 2, but with continuous operation of wells in this area, the underground water table was rapidly depleted and it became necessary to return water to the basin on December 29. With the water shut off to this percolation basin, we had an opportunity to check the production of water from this area without recharge. Indications are that the probable maximum production without recharge is 3.5 MGD. We endeavored to use the 3000 F Well, but with the McNary pool at its present low level we were unable to produce water at any rate satisfactorily from this well.

1211824

DOMESTIC WATER

	Well Production	Av. Da. Prod.	Total Consumpt.	Av.Da. Consumpt.
Richland	1,800,000	58,000	93,770,000	3,024,800
North Richland	123,790,000	3,993,200	41,073,000	1,324,900
Columbia Field	66,064,000	2,131,000		
300 Area			54,261,000	1,750,300
TOTAL	191,654,000	6,182,200	189,104,000	6,100,000

Maximum Daily Production was 7,966,600 gallons on 12-1-54.

Maximum Daily Consumption was 7,299,000 gallons on 12-27-54.

SEWERAGE SYSTEM

Normal operations were continued throughout the month. Approximately 45,000 gallons of sludge was pumped to the drying beds during December.

Routine maintenance and overhaul work was completed on No. 1 Sludge Pump and No. 3 Recirculating Pump at the Number I Sewage Treatment Plant.

Several stoppages were cleared during the month in the sewage collection system. Some of these were caused by the tree root growth into the sewer mains; others were caused by foreign materials in the sewers. Part of the stoppages were located by the routine sewer flushing program which is about 30% complete.

SEWAGE

Plant No. 1	Total Flow	33,410,000	Av. Daily Flow	1,077,000
Plant No. 2		72,882,000		2,351,000
Total		106,292,000		3,428,000

IRRIGATION SYSTEM

Winterizing of irrigation pumping and distribution systems was completed on December 4.

Water was shut out of the canal system on December 2 and cleaning work throughout the canal system was continued. Water was turned into the canal again on December 29 and shut off on December 31 as the canal became plugged with tumble weeds during a high wind.

1211825

COMMUNITY OPERATIONS SUB-SECTION - RICHLAND PUBLIC LIBRARY
MONTHLY REPORT
December 1954

ORGANIZATION AND PERSONNEL

	EXEMPT	NON-EXEMPT
Employees - Beginning of Month	4	7
Transfers In	0	0
Transfers Out	0	0
New Hires	0	½
Terminations	0	0
End of Month	4	7½

GENERAL

Circulation

Books	15,884
Magazines	541
Pamphlets	66
Records	1,111
Inter-Library Loans	30
Grand Total	17,632

Current Book Stock

Books added this month	749
Books withdrawn this month	0
Grand Total	33,439

Registration

Adult	142
Juvenile	33
Total	175
Total Registered Borrowers	18,370

121182b

Community Operations
Library Unit

Children's Story Hour Attendance	606 (431 pre-school; 175 elementary school)
Meetings in North Hall	19

A special tree trimming Christmas party given for elementary school age children on Saturday, December 18, was attended by 105 children. 120 pre-school children attended the special Christmas story hours held on Tuesday and Wednesday mornings, December 21 and December 22.

A High Fidelity show sponsored by the Mid-Columbia Symphony was held in the North Hall of the Library on Saturday, December 4. The Mid-Columbia Symphony cooperated with the Library in including a short discussion on record care in their program.

1211827

AUXILIARY OPERATIONS AND PLANT PROTECTION SECTION

MONTHLY REPORT - DECEMBER 1954

ORGANIZATION AND PERSONNEL

Number of employees on payroll:

	Beginning of Month	End of Month	Increase	Decrease
Staff	2	2		
Administration Area Maintenance	102	103	1 (a)	
Security and Patrol	494	496	2 (b)	
Fire Protection	135	135		
Office	121	118		3 (c)
Telephone	77	78	1 (d)	
TOTALS	931	932	4	3

NET INCREASE: 1

(a) - Administration Area Maintenance

3 - New Hires
1 - Transfer out
1 - Termination

(b) - Security and Patrol

3 - New Hires
1 - Reactivated
1 - Transferred out
1 - Termination

(c) - Office

5 - New Hires
1 - Reactivated
6 - Transferred
3 - Deactivated

(d) - Telephone

2 - New Hires
1 - Transferred out

1211828

FIRE PROTECTION UNIT

Fire Responses

Construction	8	Loss ---
HAPO	7	Loss $ 85.00
Army	1	Loss ---
Private	2	Loss $200.00
TOTALS	18	$285.00

Safety and Security Meetings

Number of Security meetings	12
Number attending meetings	83
Number of Safety meetings	24
Number attending meetings	163

Drills Held during December

Outside drills held	83
Inside drills held	147

24,340 feet of fire hose and 245 feet of ladders used for drill purposes during December.

Fire Protection Unit officers held 34 classes on fire extinguishers which were attended by 315 area Patrolmen.

General fire truck HO-68D-5552 was received by the Fire Protection Unit on December 28, 1954.

Fire Extinguishers

Inspected	1,659
Installed or relocated	4
Tested	478
Delivered to new locations	14
Seals broken and not reported	12
Serviced	712
Weighed	788

Gas Masks

Inspected	16
Serviced	9

1211829

OFFICE SUB-SECTION

Plant Mail Unit

Inter-office and postal mail hit new highs both in weight and volume during the month with special assignments and rush mail loads being very heavy.

The annual distribution of GE calendars, log books, and diaries, plus 54 separate Organization and Policy Guide distributions, safety bulletins, health bulletins, monograms, and GE Review, added to the quantities of incoming postal mail such as calendars, samples, holiday greetings from vendors and individuals to the Company, totaled a record month.

Addressograph work was also heavy due to the above; however, total volume was not up since other work decreased slightly and many departments delayed work until after January 1, 1955, cooperating with the mail system during the rush season.

The GE News file was completely reviewed and revised by Public Relations and one new file added for GE Review to be mailed off-site to service men (former GE people) interested or educated in the engineering field.

Types and Pieces of Mail Handled	November	December
Internal	4,355,317	4,519,930
Postal	79,271	87,401
Special	2,494	2,079
Registered	10,145	10,611
	4,447,227	4,620,021
Total Postage used	$3,202.03	$3,000.23
Total teletypes handled	2,340	2,446
Total store orders handled	722	742

Addressograph	November		December	
Type of List	Number of Runs	Total Copies	Number of Runs	Total Copies
Plant name list	111	146,563	112	153,352
Housing list	12	59,961	14	42,130
Payroll List	9	22,983	10	31,494
Total new plates	3,265		3,280	
Total corrected plates	2,645		1,362	
	5,910		4,642	

1211830

Printing Unit

Orders for unusually large quantities of printed copies were completed during the month as follows:

100,000 copies of Terms & Conditions for AEC
582,500 copies, form G-88-DS "Don't Say It-Write It."
30,000 copies, form W-224-DS Work Log and Time Sheet
20,000 copies of Safety Bulletin Letterheads
45,000 copies, form D-670-DS Permit Authorization
36,000 copies, Red Border Cover Sheets
50,000 copies, form G-1532.2-D second page, GE White Letterhead
25,000 copies, form G-1532.1-D first page, GE White Letterhead
42,000 Purchase Order Terms for AEC
25,000 Badge Posters

Thirty-six HW-Secret orders were completed during the month as well as one Top Secret order for AEC after necessary clearance was obtained for one employee who handled this order.

Work Completed	November	December
Orders received	395	319
Orders completed	425	333
Average orders on hand	72.2	71.4
Copies printed	1,360,661	1,865,499
Negatives masked	429	508
Negatives processed	514	600
Photo copy prepared	194	292
Litho plates processed	516	568

Stenographic Unit

The work load was inconsistent throughout the month; fairly light the first of the month and very heavy later in the month. It was impossible to fill all loan requests for vacation and sick relief.

Five new employees were assigned to the Stenographic Unit in December; four stenographers and one stenographer-typist. Six transfers were effected during the month, eighteen temporary assignments were made and seventy-eight work assignments accomplished in the Unit against fifty-five different cost codes.

The larger assignments handled throughout the month were typing duplimats for Radiation Monitoring Manual of Standard Practices for Reactor Section, copies of Job Descriptions for Salary Administration, rough drafts and duplimats for Purex technical manual, dittos for Minor Construction and typing Manufacturing Cost monthly reports. Other "rush" jobs were handled for AEC, Special Studies Group, Security, Reactor - Process, Separations Section, Stores, and Administration Planning. All work was current at month's end.

1211831

Breakdown of Hours	November	December
Holiday and Vacation time		64
Dictation and transcription	3	
Meeting time	5	8.5
Absentee time	36	24
Machine transcription	6.5	25.5
Letters	9	4.5
Rough drafts	69.5	41
Dittos, duplimats and xerography	357	347.5
Miscellaneous	392.5	306.5
Training time	273	270.5
Unassigned time	94	36
Total	1,245.5	1,128
Employees on loan to other units	1,438.0	1,184
Grand total	2,683.5	2,312

Duplicating Unit

A rearrangement of equipment layout in the Duplicating office located in 3760 Building, 300 Area, made it possible to reduce the amount of floor space required. It was, therefore, possible to release two offices urgently needed by Technical Section at this location. The rearrangement does not materially impair working efficiency, and will result in a $500.00 annual saving in rental charges.

A discussion held with the Reactor Section landlord resulted in an agreement to move the Duplicating office located in 1704-H Building, 100-H Area, to 1709-H Building. The move will provide a location more accessible to personnel in 100-D and 100-F Areas who require duplicating service. It will also provide additional working and storage space, making it possible to handle requests for collating and stapling at this location.

A study made of the feasibility of duplicating one file copy of each classified document reproduced at HAPO on vellum was completed and the procedure adopted. When copies of documents are required subsequent to the original reproduction, these vellum file copies will be used as masters and copies reproduced by the oxalid process. It will, therefore, be possible for each duplicating office to destroy multilith masters rather than return them to Classified Files. Workloads handled by Plant Mail and Area Files personnel should also be substantially reduced.

The number of copies reproduced by all Duplicating Unit offices this month reflects a continued increase in production. The figure for the period involved (883,780 copies) is higher than that reported for either of the two previous months. Particularly noticeable is the steady increase in orders handled by the recently established 100-K Duplicating Office.

1211832

Duplicating Unit (Contin)

	November	December
Orders received	3,384	3,390
Orders completed	3,302	3,378
Orders on hand	139	134
Offset Plates	14,569	14,146
Offset Copies	842,985	883,780
Verifax Masters	2,920	2,924
Verifax Copies	10,613	9,282
Ditto masters	306	281
Ditto copies	4,355	4,730
Xerox plates	1,669	1,647
Ozalid masters	31	
Ozalid copies	70	

Office Equipment Unit

Office Equipment Unit completed a physical inventory of Capital Office furniture in service. The inventory was taken by use of a preprinted inventory work sheet for each building. Controls were established for all movements of furniture during the time of inventory. This system proved very satisfactory in establishing an accurate count. Thirty-seven man days were required to complete the counting and checking of every building on plant site.

A stock record card will be made for each caption item and a current balance will be recorded to maintain an up to date inventory of furniture on plant site.

AEC has requested that GE maintain accountable records on all AEC Operations and Contractors office furniture and machines located in 300, 3000, 1100 and 700 Areas. The transfer of those items currently recorded on AEC Financial records has been completed on those items located on inventory.

One appropriation request was issued and approved for special machines and furniture.

Seventeen drafting tables were excessed as surplus.

Office Furniture

The expendable office furniture inventory account 93 was valued at $22,760. on November 30, or a 3.2 months supply.

The following is a detail of number of pieces of furniture handled:

Item	Issued	Received	Salvaged
Bookcase	20	1	0
Blackboard	3	0	0
Chairs	426	246	66
Costumers	39	3	6
Card File	7	5	0
Cabinets	37	42	33
Desks	77	50	8
Tables	66	63	1
Daveno	4	0	0
Miscellaneous	286	86	11
	965	496	125

1211833

Office Furniture (Contin.)

There were 95 service orders and three work orders issued for minor maintenance during the month. Future repairs of cushion type chairs will be made by replacing spring type cushions with foam rubber. The life of foam rubber cushions will exceed metal springs.

Procurement specifications for swivel chairs have been changed to foam rubber instead of spring type cushion for future purchases.

Office Machines

Total number of machines on hand on the 20th of December was 4,933 or a reduction of 164. Kaiser Engineers excessed 106 machines during the month.

At the request of Property Management and Payroll Section, time attendance recorders were assigned to Office Equipment Unit for inventory control, procurement, issue and maintenance on a plant wide basis.

Office Machine Repair Unit

During December, the 100-K Shop was assigned an additional mechanic making a total of two, and one panel truck was reassigned from 700 Area for use in performing office machine maintenance for all 100 Areas from this location. This is expected to substantially reduce travel time of mechanics.

One Verifax Printer, type I was received and inspected. This machine will be installed in the Duplicating office in the 300 Area, 3760 Building.

During the month, all miscellaneous office equipment and time clocks stored in the 722-R hut was either excessed or brought into the 722-C Building. All stock office machines are now stored in 722-C Building.

Instrument Maintenance of a routine nature consisted of 363 hours.

The following non-routine instrument work was performed during December, 1954:

One time clock was relocated in the Central Stores Building.
Seven wall clocks were repaired.
Two M-Scopes repaired.
Two Microscopes repaired.
Rebuilt one Thermo relay for Ozalid equipment in the 760 Building, Reproduction Unit.

A routine maintenance order to cover repairing of Micro-Film equipment operated by the AEC located in 712 Building was also received during the month.

Repair tickets were processed as follows:	November	December
	625	600

1211834

ADMINISTRATION AREA MAINTENANCE SUB-SECTION

AEC-114 New Transportation Facilities: Property transfer papers listing six exceptions to be cleaned up by the contractor prior to final payment were signed December 22, 1954.

The Commission has engaged Sound Construction Company to saw trenches in the concrete bus loading and unloading lanes in an attempt to drain off the standing water which accumulates after a rainfall.

CA-606 Additional Office Space - Central Stores Warehouse: Still under consideration by AEC, who have requested further information.

IBM operation was moved from 722-A and other buildings to 713 Building.

Steps are being taken to move Graphics Unit model room to vacant space in 723 Laundry, to clear space in 713 Building for construction work to be done on Project CA-612.

Plans are in progress for moving Manufacturing Cost Unit from 717-A Building to 722-A Building formerly occupied by IBM. A portion of 717-A is to be assigned to Photography Unit, to correct hazardous operating conditions now encountered in 69-X.

Preliminary work has been started on rearrangement of 770-A Building to house Employee Communications and Public Relations Section, and to provide additional needed space in 705 Building for Personnel Practices Section.

Inter-Contractor Transfer Order was processed to transfer six Excess Yard warehouse buildings to AEC, for subsequent transfer to Army.

Warehouse 1125 was transferred to Commercial and Residential Property Unit, to be leased to private business.

Plant and Equipment Transfers were made on equipment in the 1131 and 729 Areas to supply requirements of other areas. Property disposal reports are in process of preparation, looking toward sale and removal of facilities in these areas.

Six Hauserman partition office installations were made during the month.

Purchase requisition was issued for Hauserman partitioning, as approved on Appropriations Request 55-S-4.

General Maintenance

Remodeling work was done on 700 Area safety board, and statistics were brought up to date.

Concrete foundations and floors were poured for relocation of two 614 Buildings from 3000 Area to Richland Barricade and Transportation Area for Radiological Sciences.

Hauserman partitions were installed for rearrangement of office space in 760, 713 and 722-A Buildings. Buildings 722-A is being repainted and renovated for future occupancy.

A loading dock was constructed at Central Stores.

General Maintenance (Contin)

Excess Shipping continued to utilize services of two carpenters in preparing materials for shipment.

Interior of 19 offices and two restrooms were repainted.

Miscellaneous office furniture was touched up, and 100 folding chairs were spray painted.

Bulletin board in 700 Area was painted with Christmas message.

Silk screen work was done on 25 posters.

Routine inspection and repair of fire alarms was completed.

Monthly electrical inspections and overhaul of electric lift trucks at Central Stores was completed.

Several receptacle circuits, outlets and buzzer systems were installed in 700 Area and in 1170 and 1171 Buildings.

Burned out motor on combustion blower for hot air furnace at 1171 Building was replaced, and fire-eye and other electrical controls were repaired.

Twelve new Kimstarts were installed in area buses and 20 circuits at 1171 Area were repaired.

Installed four new hot plates and repaired three existing plates at 747 Building.

A muffle furnace was installed at 747 Building.

Laundry equipment in 723 Building was disconnected and piping cut loose in preparation for excessing.

Lock changes on doors at 105 KW were completed and locksmith has started changing locks at 105 KE. Locks on perimeter gates were repaired. Five vault doors in 234-5 Building were repaired.

Six door closers were overhauled in the 700 Area.

Shaft and bearings for domestic well pump were fabricated and the impeller was balanced.

Men's restroom at 713 Building was enlarged.

Air and water lines were extended for additional service outlets at 1171 Building.

Water and drain lines were installed for three Dynometers in Transportation Shops.

Repair of #3 boiler at 784 Heating Plant was completed.

Replaced nipples in ten steam radiators and repaired four Spence "E" valves and pilots.

Fabricated and installed tank and hood in 744 Building.

General Maintenance (Contin)

Defroster units are being fabricated and installed in 22 Transportation buses.

Maintenance shift coverage was established at Transportation Heating Plant to reduce overtime in adjustments and repairs to hot air heating system, until such time as factory representatives are able to correct the installation for automatic operation as designed.

Building Services

Janitor and floor service work was normal for the month. Absenteeism was lower than during previous months.

Steam Operation

At the beginning of the month, Nos. 1 and 2 boilers were in service, No. 4 in reserve and No. 3 approaching completion of major overhaul.

On November 30, No. 4 boiler was also placed in service to help carry the increasing heating load.

On December 2, No. 3 boiler was put on the line to permit withdrawal of the No. 2 unit for minor overhaul, which was completed near the end of the month.

At the close of the month, Nos. 1, 3 and 4 boilers were in service, with No. 2 in reserve.

The quantity of steam generated at the 784 Plant was 13.2% greater than for the same period of the previous year.

Some trouble was experienced with the oil burner at the Central Stores Heating Plant, necessitating repair of the fuel tube. It was also necessary to check and adjust several electrical controls to correct erratic operation.

Coal consumed: 1,988.70 net tons.

Steam generated:	28,319.1 M. lbs.
Steam leaving plant:	24,656.1 M. lbs.
Steam delivered:	22,275.3 M. lbs.
Total water softened:	3,678,900 gallons
Total soft water sent to Kadlec Hospital:	74,820 gallons
Total soft water sent to 784 Heating Plant:	3,614,080 gallons

TELEPHONE SUB-SECTION

General

Made a special study of the practicable ways of providing telephone service to the Purchasing, Stores and Accounts Payable Units should all three eventually be located at the existing Central Storea Area. Results of the study were submitted to the Superintendent, Administration Area Maintenance.

1211837

Telephone Sub-Section, General, (Contin)

In November, status of the official telephone directory was reported; in the meantime, the Atomic Energy Commission approved awarding the printing job to the General Telephone Directory Company, second low bidder. The necessary agreement with the General Telephone Directory Company is being prepared by the Contract Supervisor and it is estimated that a new official directory will be available about February 15.

Construction of the new Official exchange building, No. 706, was 68% complete on December 23. This was 4% lower than scheduled. By December 31, the Stromberg-Carlson Company, equipment supplier for the new exchange, had a foreman and six installers in Richland to begin installing the exchange equipment.

There were two minor injuries in the Sub-Section during the month.

Commenced assignment of official exchange telephone numbers to existing telephones now served from the Richland exchange.

Plant Telephone Operations

The Plant Telephone Unit assumed responsibility during the month for maintenance of PBX and PAX telephone systems in the 221-T, 221-U, and 202-S Buildings, work previously performed by area electricians. The preliminary report included 234-5 Building, however, this was in error as the Telephone Sub-Section has not yet received a covering work order for performing maintenance work on the 234-5 Building PAX system.

At the 100-K Area, 45 PBX stations and extensions serving field construction offices were relocated from inside the area fence to various locations outside the exclusion area.

Approximately 50 manhours were expended in the 105-C Building making changes in the building distribution system to eliminate induction between plant dial system circuits and building intercommunicating circuits.

Trunk service to the Blaw-Knox PBX switchboard in 200-E area was partially interrupted on December 6, as a result of a water hose being accidentally turned on a group of cable protectors in the 202-A Building. The grounded cable conductors were cleared by opening the protector springs and recommendations were made to Blaw-Knox personnel for repairing the water-damaged parts.

The two ringing machines serving the 300 Area exchange were replaced with reconditioned machines from surplus stock.

A 30-line crash alarm system was installed in the 300 Area exchange to serve the Metal Preparation Section.

Commercial Telephone Operations

An inventory of manholes, underground conduit and underground cable in service in the Richland exchange distribution system was completed and the resulting information was furnished to the Plant Accounting Unit.

An extensive survey of Richland outside plant facilities was completed and necessary maintenance instructions issued to the Commerical Telephone Unit Foremen. Remedial action was started to eliminate the conditions discovered in the survey.

Commercial Telephone Operations (Contin)

Four telephone instruments were lost (condition beyond repair) in the Uptown Thrifty Drug Store fire.

Engineering nine minor jobs relating to outside plant improvement and expansion.

Discontinued Army leased line, L-9818 and established a new line, L-9760.

Completed job of relocating one set of Pasco trunk cable loading coils from a pole near Goethals to manhole No. 7.

Installed in the Richland exchange a 707-pair tip cable to serve a tie cable to be installed between the Richland and Official exchanges.

Installed a 225-pair tie cable in the Richland exchange between main and intermediate distributing frames for carrying certain trunks and special circuits to the Official exchange.

Began an inspection of telephone instruments in all business establishments in Richland to check for general appearance, dial speed, cords and the appropriate locations. To date, 36 dials have been readjusted, 4 cords replaced and three receiver caps replaced.

Removed cable and poles that formerly served a project warehouse near Wellsian Way.

Planned a 1A key equipment installation for the Davis Furniture Company.

Contacted manager of Uptown Thrifty Drug Store following their fire and offered Telephone Sub-Section assistance in providing temporary telephone service as they might desire.

Completed preparatory work in connection with the change of 70-80 business telephone numbers effective with issuance of July 1955 Richland Directory.

Radio System Operations

Completed the installation of a 65 foot antenna supporting tower on the roof of the 703 Building and installed on it antennas that serve radio stations KGB-513 and KEB-886. This change greatly improved the radio coverage of the above stations.

Installed two loud speakers in the auditorium of the Carmichael Junior High School and made tests to determine best method of providing public address service for Company meetings.

Two new mobile transmitter-receivers were received and installed in fire trucks for the Richland Fire Unit.

Installed temporary public address equipment in the Chief Joseph School cafeteria for a Company meeting held December 7, 1954.

Installed temporary public address equipment in the Central Stores building for a meeting held on December 22, 1954.

Recorded Science Forum radio programs on the following dates: December 1, 8, 15, 22 and 29.

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Radio System Operations (Contin)

Two radio station outages occurred during the month: KKE-624, Station No. 11 (300 area Patrol) was out of service for 36 minutes on December 20 due to a broken microphone switch and KKE-624, Station No. 9 (100-F Patrol) was out of service from 1:30 PM, December 26 to 9:30 AM, December 27 due to tube failure. The difficulty was not reported to Radio Maintenance Unit until 8:10 AM, December 27, 1954.

Statistical Data	At 20th of December	Change From Previous Month	Change From Year Ago
Residential Subscribers	6,054	- 7	≠304
Business Subscribers	484	≠ 2	- 3
Paystation Telephones	71	≠ 1	≠ 6
Official Subscribers:			
Richland Exchange	993	≠ 9	≠ 8
North Richland Exchange	237	- 6	≠ 9
Process Area Exchanges	1,830	≠17	≠111
		≠16	≠435

New Service Requests Received during the Month:

For Residential service:	70
For Business service:	5
TOTAL	75

Backlog of Service Requests:

For new residential telephones	280	
For new business telephones	2	
		282
For residential outside moves	23	
For ousiness outside moves	2	
		25

Service Orders Processed:

In connection with residential and business service	292
In connection with official service	270
	562

Total number of service orders prepared during period from December 21, 1953 through December 20, 1954:

Residential & Business:	4,314
Official:	4,124
TOTAL	8,438

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Facilities - Installed, In Service and Available:

	Exchange Lines			Party Lines
	Installed	In Service	Available	Available
Richland	4,050	3,983	67	335
North Richland	600	439	161	93
Process Areas	2,050	1,728	322	--
	6,700	6,150	550	428

Radio Stations:

[redacted]

"The Case of the Smokeless Chimney" was shown at two meetings, each with an average attendance of 15 employees.

GE Security Bulletin No. 89, entitled "Reporting Losses" was issued December 20.

One hundred posters bearing the slogan "In Today's World" which were furnished by the Department of Defense, Washington, D. C., were posted in the plant areas during the reporting period; 1,100 leaflets bearing the same slogan as the posters were also distributed to employees during the month.

Organization and Policy Guide No. 15.21 entitled "Government Material, Classified Document and Contraband Passes" was issued December 1, revising the present Material and Package Pass procedure.

The "Data Report on Spouse" program, started November, 1954, is now 98.75% complete with 689 reports on employees having been transmitted to the Atomic Energy Commission at the close of December, 1954.

On December 7, 1954, the Atomic Energy Commission advised the Hanford Atomic Products Operation Security Office of the new "L" type security clearance and requested that a survey be made of all HAPO positions to determine those that would fall within this category. It was necessary to contact all department and section managers throughout the organization. At the end of this reporting period, the survey was 80% complete.

Ninety-six employees of the General Electric Company received a "Q" security orientation talk from either a representative of the Plant Protection Services Unit or a Patrol Supervisor during the month of December, 1954.

Statistical Report of Security Patrol Activities

	100-B	100-D	100-F	100-H	100-K	200-W	300
Pat Searches	90	90	55	13	0	0	0
Escorts	9	34	8	34	33	11	57
Ambulance runs	2	2	9	1	0	2	7
Passes issued:							
One day temporary	72	18	0	3	1	61	57
Travel	0	0	0	0	0	0	130
Red Tag	160	155	91	19	0	304	59
Telephonic	0	0	0	0	0	0	12
Supervisor's Post contacts	363	259	268	226	284	859	517

Other Security Patrol Activities (computed by hours): 300 & 700

Security File Check	159.5	267.5	200.7*	467.6*	399	552	2,220
Building Check	345	77			399	552	720

*In the 100-F and 100-H Areas, the Security File Check and Building Check are combined into one figure.

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Arrest Report

Violation	Number of Violations	Cont. Cases from Nov.	Cases Cleared	Pending	Fined
Speeding	1	1	1	1	1
No Driver's License	1	1	1	1	1
Illegal Passing	1	0	1	0	1
TOTAL	3	2	3	2	3

Citation Tickets issued:	3
Warning Tickets issued:	27
Verbal Warnings	0

Patrol Training Activities

676 Patrolmen received classroom instruction during the reporting period. Two different courses of instruction were conducted.

231 Patrolmen received firearms training during the month of December.

Patrol Post Changes

On December 17, 1954, the 105-KE Vehicle Gate post was discontinued.

General

On December 5, 1954, at 12:01 AM, the 105-KW Area was transferred from construction to operations at which time operations assumed control of the 105-KW Exclusion Area. Health badges are now utilized.

The Security Field Inspection Group assisted during the plant tour of the areas and monitored conferences and meetings held during the visit of the Reactor Safeguard Committee on December 6 and 7, 1954.

During the month of December, the "Burman Shave" type signs in the plant areas were changed, and the new slogans are:

"Less Talk
By You and Me
May Help Prevent
World War III --
S E C U R I T Y"

"Life Is
Too Short
To Take A
Long Chance --
S E C U R I T Y"

Security Administration

Daily Badge Log Entries	4,252
"Q" Clearances	96
Formal "P" clearances issued	36
"P" Approval Clearances issued	20
Category Access granted	43
Category Access withdrawn	25
Category Access revised	26
Number of photos for "A" badges	880
Number of photos for "B" badges	2,126
Number of persons rephotographed	17

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HANFORD ATOMIC PRODUCTS OPERATION
General Electric Company
Richland, Washington

REPORT OF VISITORS FOR PERIOD ENDING DECEMBER 31, 1954

Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data Class.	Restricted Data Unclass.	Areas
EMPLOYEE AND PUBLIC RELATIONS DEPARTMENT							
I. Visitors to this Works							
M. A. McCutchan Sandia Corporation White Sands, New Mexico	Wage and salary administration survey	J. J. Tagen	12-13-54	12-14-54		X	700-703
T. L. Daniel Sandia Corporation White Sands, New Mexico	Wage and salary administration survey	J. J. Tagen	12-13-54	12-14-54		X	700-703
R. T. Othmer Ames Laboratory Ames, Iowa	Interview	F. Clagett	12-27-54	12-28-54		X	700-
II. Visits to other Installations							
D. W. McLenegan to: Aircraft Nuclear Propulsion Cincinnati, Ohio	Engineering and personnel discussions	D. R. Shoults D. P. Johnson	12-1-54	12-2-54	X		
D. W. McLenegan to: Knolls Atomic Power Lab. Schenectady, New York	Engineering and personnel discussions	F. E. Creaver V. D. Nixon F. Hornby	12-8-54	12-10-54	X		
ENGINEERING DEPARTMENT - ENGINEERING ADMINISTRATION SECTION							
I. Visitors to this Works							
C. K. Bauer U. S. Atomic Energy Commission Washington, D. C.	Employment interview	C. G. Stevenson	12-17-54	12-18-54	X		700-703

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Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data Class.	Unclass.	Areas
ENGINEERING DEPARTMENT - ADVANCE ENGINEERING SECTION							
I. Visitors to this Works							
O. B. Falls, Jr. General Electric Company Schenectady, New York	Physics consultation, neutron spectrometer inspection, reactor physics	P. F. Gast	12-14-54	12-15-54	X		300-XXX 100-D 105 202-A; 105-KW
H. W. Huntley General Electric Company Schenectady, New York	Physics consultation, neutron spectrometer inspection, reactor physics	P. F. Gast	12-14-54	12-15-54	X		300-XXX 100-D 105 202-A; 105-KW
B. R. Prentice General Electric Company Schenectady, New York	Physics consultation neutron spectrometer inspection, reactor physics	P. F. Gast	12-14-54	12-15-54	X		300-XXX 100-D 105 202-A; 105-KW
T. M. Snyder General Electric Company Schenectady, New York	Physics consultation neutron spectrometer inspection, reactor physics	P. F. Gast	12-14-54	12-15-54	X		300-XXX 100-D 105 202-A; 105-KW
J. W. Weil General Electric Company Schenectady, New York	Physics consultation, neutron spectrometer inspection, reactor physics	P. F. Gast	12-14-54	12-15-54	X		300-XXX 100-D 105 202-A; 105-KW
II. Visits to other Installations							
J. R. Triplett to: Oak Ridge National Lab. Oak Ridge, Tennessee	Oracle calculations	R. A. Charpie	12-9-54	12-15-54	X		
W. K. Woods to: Columbia University New York, New York	Review of Reactor Heat Transfer Program	T. B. Drew	12-16-54	12-17-54	X		
ENGINEERING DEPARTMENT - DESIGN SECTION							
I. Visitors to this Works							
J. F. Cage, Jr. General Electric Company Schenectady, New York	Discuss pumps for process loops	E. P. Peabody	12-1-54	12-3-54	X		100-B 105-B; 105-KE, KW 100-F 105

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Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data Class.	Unclass.	Areas
II. Visits to other Installations							
R. A. Huggins to: Knolls Atomic Power Lab. Schenectady, New York	Advanced reactor piping system	V. D. Nixon	12-14-54	12-14-54	X		
R. A. Huggins to: Bridgeport Brass Co. Bridgeport, Connecticut	Obtain information on fabrication methods of zirconium tubes	R. M. Treco	12-15-54	12-17-54	X		
R. A. Huggins to: Superior Tube Company Norristown, Pennsylvania	Obtain information on fabrication methods of zirconium tubes	H. W. Cooper	12-15-54	12-17-54	X		
W. L. Pearl to: Aerojet General Corp. Azusa, California	Discuss uranium water reaction	G. McRoberts	12-2-54	12-3-54	X		
C. A. Pursel to: Columbia University New York, New York	Attend panel discussion on heat transfer and fluid flow	A. J. Bendler T. B. Drew	12-16-54	12-17-54	X		
E. O. Swain to: Rocky Flats Laboratory Denver, Colorado	Inspect developments in Pu isolation, purification and fabrication	I. B. Venable B. Weidenbaum	12-6-54	12-10-54	X		
E. O. Swain to: Los Alamos Scientific Lab. Los Alamos, New Mexico	Inspect developments in Pu isolation, purification and fabrication	R. D. Baker	12-6-54	12-10-54	X		
E. O. Swain to: E. I. du Pont de Nemours Svannah River Plant Augusta, Georgia	Inspect equipment for Pu isolation, purification and fabrication	R. M. Gridler S. E. Bakes	12-6-54	12-10-54	X		

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ENGINEERING DEPARTMENT - PROJECT SECTION

I. Visitors to this Works

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Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data Class.	Restricted Data Unclass.	Areas
R. C. Mann Aircraft Nuclear Propulsion Cincinnati, Ohio	Consultation on equipment in Purex Control Room	G. C. Gabler	12-27-54	12-29-54	X	202-A	

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ENGINEERING DEPARTMENT - PILE TECHNOLOGY AND SEPARATIONS TECHNOLOGY SECTIONS

I. Visitors to this Works

D. L. Francis Aircraft Nuclear Propulsion Cincinati, Ohio	Represent ANP on tests	J. A. Berberet R. L. Dickeman	12-6-54	12-14-54	X	100-B 105-C 100-D XXX 100-H XXX 300-L 303; 700	
E. E. Hays E. I. du Pont de Nemours & Co. Savannah River Plant Augusta, Georgia	Discussion on target metal experiences at Hanford	R. B. Richards D. F. Snoeberger	12-13-54	12-16-54	X	100-D 105 300-L 303 700	
R. R. Lee Aircraft Nuclear Propulsion Cincinnati,Ohio	Discuss proposed experiments	J. A. Berberet	11-29-54	12-24-54	X	100-B 105-B, 105-C 100-H 105; 105-KW 300-L 303; 700	
R. C. Mann Aircraft Nuclear Propulsion Cincinnati, Ohio	Discuss design problems on experiments Hanford is going to conduct	J. A. Berberet	12-27-54	12-29-54	X	100-B 105-C 100-F XXX; 105-KW 300-L 303; 700	
D. M. Wilsey All States Employee Schenectady, New York	Instrumentation work on in-pile water loop	G. E. Wade	8-31-54 12-31-54	12-31-54 5-1-55	X	100-B 105-B, 105-C 100-D XXX 100-F XXX 100-H 105; 105-KW 300-L XXX	
J. C. Woodhouse E. I. du Pont de Nemours & Co. Savannah River Plant Augusta, Georgia	Discussion on target metal experiences at Hanford	R. B. Richards D. F. Snoeberger	12-13-54	12-16-54	X	100-D 105 300-L 303 700	
E. L. Zebroski Stanford Research Institute Palo Alto, California	Discuss reactor technology and fuel element testing	O. H. Greager	12-17-54	12-17-54	X	300-L XXX 700	

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Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data Class.	Restricted Data Unclass.	Areas
F. W. Albaugh to: Whitney Project Livermore, California	Consultation on Hanford assistance to Whitney	K. Copenhagen M. Harris	12-6-54	12-7-54	X		
F. W. Albaugh to: Radiation Laboratory University of California Berkeley, California	Consultation on nuclear constants and radio-chemistry techniques	G. T. Seaborg	12-7-54	12-7-54	X		
G. W. Anthony to: Oak Ridge National Lab. Oak Ridge, Tennessee	Instruction on how to operate Oracle computing machine for HAPO physics	R. A. Charpie	11-17-54	12-17-54	X		
J. A. Ayres to: Atomic Energy of Canada Chalk River, Ontario, Canada	Discuss fuel element technology and coatings and corrosion problems	D. Langmuir	12-1-54	12-3-54	X		
J. A. Ayres to: Battelle Memorial Inst. Columbus, Ohio	Discuss fuel element technology and coatings and corrosion problems	H. R. Nelson J. R. Keeler	12-6-54	12-7-54	X		
A. G. Blasewitz to: Atomic Energy of Canada Chalk River, Ontario, Canada	Discuss fuel element technology	D. Langmuir	11-30-54	12-3-54	X		
A. G. Blasewitz to: Knolls Atomic Power Lab. Schenectady, New York	Discuss fuel element technology	J. F. Flagg	12-6-54	12-8-54	X		
A. G. Blasewitz to: Battelle Memorial Inst. Columbus, Ohio	Discuss fuel element technology	H. R. Nelson	12-8-54	12-10-54	X		
A. G. Blasewitz to: Ames Laboratory Ames, Iowa	Discuss fuel element technology	F. H. Spedding	12-10-54	12-14-54	X		
J. J. Cadwell to: Whitney Project Livermore, California	Consultation on Hanford assistance to Whitney	K. Copenhagen M. Harris	12-6-54	12-7-54	X		

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Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data Class.	Restricted Data Unclass.	Areas
J. J. Cadwell to: Knolls Atomic Power Lab. Schenectady, New York	Arrange for forthcoming fuel element conferences	C. E. Weber	12-20-54	12-22-54	X		
T. W. Evans to: Phillips Petroleum Co. Idaho Falls, Idaho	Consultation on metallurgical experiments in Material Test Reactor	W. W. Hickman	12-6-54	12-11-54	X		
S. S. Jones to: Columbia University New York, New York	Attend heat transfer meeting	T. B. Drew	12-16-54	12-17-54	X		
E. M. Kinderman to: Radiation Laboratory University of California Berkeley, California	Consultation on heavy element chemistry	A. Ghiorso S. G. Thompson	12-28-54	12-30-54	X		
W. T. Kattner to: E. I. du Pont de Nemours Savannah River Plant Augusta, Georgia	Discuss uranium technology	T. C. Evans	12-14-54	12-17-54	X		
W. T. Kattner to: National Lead Company Fernald, Ohio	Discuss uranium technology	J. M. Ciborski	12-17-54	12-20-54	X		
W. J. Ozeroff to: Whiteney Project Livermore, California	Consultation on Hanford assistance to Whitney Project	K. Copenhagen M. Harris	12-6-54	12-7-54	X		
J. W. Riches to: National Lead Company Fernald, Ohio	Consultation on metallurgy of uranium	J. M. Ciborski	12-8-54	12-10-54	X		
J. W. Riches to: E. I. du Pont de Nemours Savannah River Plant Augusta, Georgia	Consultation on metallurgy of uranium	B. W. Dunnington	12-14-54	12-17-54	X		

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Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data Class.	Restricted Data Unclass.	Areas
J. W. Riches to: Bridgeport Brass Co. Bridgeport, Connecticut	Consultation on metallurgy of uranium	R. M. Treco	12-20-54	12-22-54	X		
M. J. Sanderson to: Atomic Energy of Canada Chalk River, Ontario, Canada	Discuss fuel element technology	D. B. Langmuir	11-30-54	12-3-54	X		
M. J. Sanderson to: Knolls Atomic Power Lab. Schenectady, New York	Conference regarding metallurgical off-site program	D. White	12-2-54	12-7-54	X		
R. E. Smith to: National Lead Company Fernald, Ohio	Attend meeting on feed materials	G. W. Wunder	12-8-54	12-10-54	X		
W. R. Smith to: General Boat Division General Dynamics Corporation New London, Connecticut	Advise Purex engineering on welding design of acid concentrators	N. McIntyre	12-6-54	12-10-54	X		
N. O. Strand to: Babcock & Wilcox Alliance and Akron, Ohio	Discuss high temperature, high pressure apparatus loops	D. A. Plunket	12-9-54	12-10-54	X		
N. O. Strand to: Westinhouse Atomic Power Pittsburgh, Pennsylvania	Discuss high temperature, high pressure loops to btaon high temperature zirconium strength data	F. Forscher	12-13-54	12-15-54	X		
N. O. Strand to: Bridgeport Brass Co. Bridgeport, Connecticut	Firm up design for KER process tubes and disouss fabrication problems	R. S. French	12-16-54	12-17-54	X		
N. O. Strand to: Superior Tube Company Norristown, Pennsylvania	Discuss fabrication of standard size, type for standard type zirconium tubes	H. W. Cooper	12-15-54	12-16-54	X		

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Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data Class.	Unclass.	Areas
J. T. Stringer to: National Lead Company Fernald, Ohio	Attend AEC Information meeting	G. Wunder	12-8-54	12-10-54	X		
W. P. Wallace to: Westinghouse Atomic Power Pittsburgh, Pennsylvania	Discuss zirconium process tubes and tubes	F. Forscher	12-13-54	12-14-54	X		
W. P. Wallace to: Superior Tube Company Norristown, Pennsylvania	Discuss zirconium process tubes and cans	E. W. Cooper	12-15-54	12-15-54	X		
W. P. Wallace to: Bridgeport Brass Co. Bridgeport, Connecticut	Discuss zirconium process tubes and cans	R. M. Treco	12-16-54	12-17-54	X		
O. J. Wick to: Whitney Project Livermore, California	Consultation on Hanford assistance to Whitney Project	K. Copenhagen	12-6-54	12-7-54	X		
P. D. Wright to: Bridgeport Brass Co. Adrian, Michigan	Observe uranium fabrication and extrusion	G. T. Murray	12-13-54	12-24-54	X		
MANAGEMENT							
I. Visitors to this Works							
O. B. Falls, Jr. General Electric Company Schenectady, New York	Consultation on reactor physics, and fuel element technology on Hanford reactors	W. E. Johnson	12-13-54	12-16-54	X		
H. W. Huntley General Electric Company Schenectady, New York	Consultation on reactor physics, and fuel element technology on Hanford reactors	W. E. Johnson	12-13-54	12-16-54	X		
B. R. Prentice General Electric Company Schenectady, New York	Consultation on reactor physics, and fuel element technology on Hanford reactors	W. E. Johnson	12-13-54	12-16-54	X		

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CONFIDENTIAL

Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data Class	Restricted Data Unclass	Areas
T. M. Snyder General Electric Company Schenectady, New York	Consultation on reactor physics, and fuel element technology on Hanford reactors	W. E. Johnson	12-13-54	12-16-54	X		
J. W. Weil General Electric Company Schenectady, New York	Consultation on reactor physics, and fuel element technology on Hanford reactors	W. E. Johnson	12-13-54	12-16-54	X		
II. Visits to other Installations							
W. E. Johnson to: U. S. Atomic Energy Comm. Washington, D. C.	Consultation on Hanford Program with AEC	C. D. Luke	12-9-54	12-10-54	X		
OPERATIONS RESEARCH STUDY SECTION							
I. Visits to other Installations							
P. M. Thompson to: Rand Corporation Santa Monica, California	Use Rand computing equipment and discuss mathematical formulations	J. D. Madden M. L. Jancosa W. Orchard-Hays D. M. Fort	12-13-54	12-31-54	X		
RADIOLOGICAL SCIENCES DEPARTMENT							
I. Visitors to this Works							
N. S. Hall Division of Biology & Medicine U. S. Atomic Energy Commission Washington, D. C.	Discuss certain phases of biology program	H. A. Kornberg F. P. Hungate	12-3-54	12-7-54	X	100-F XXX 300-L XXX	
W. C. Jordan Bendix Corporation Kansas City, Missouri	Discuss health physics instrumentation	W. C. Roesch	12-8-54	12-10-54	X	105-KW 300-L XXX	
MANUFACTURING DEPARTMENT							
I. Visitors to this Works							

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Name - Organization	Purpose of Visit	Person Contacted	Arrival	Departure	Restricted Data Class.	Restricted Data Unclass.	Areas
R. G. Baxter E. I. du Pont de Nemours & Co. Savannah River Plant Augusta, Georgia	Maintain records and review methods for issuing reports	E. W. O'Rorke	12-6-54	12-10-54	X	300-E 303	

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RADIOLOGICAL SCIENCES DEPARTMENT

DECEMBER 1954

Forty-three informal, 13 Class I and one Class II radiation incidents were recorded; none affected the tolerance status of an individual.

The general trend of ruthenium particle contamination has been a small intensification near the Redox plant and a small reduction off-site.

Research studies on ruthenium continue to indicate that some phases of the hazard are as much as 100 times as severe as was believed at the start of the program.

Early attempts to trap particles in furrows and the like have not been conspicuously successful.

Impending problems of excessive P^{32} disposal to the river are discussed.

New data on unfavorable ground water movement north of the 200-E Area have led to a change in plans for waste disposal.

Some notes are given on national committee attitudes on radiation control legislation.

A brief review of the year's work is included in this December issue.

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RADIOLOGICAL SCIENCES DEPARTMENT

DECEMBER 1954

Organization

The month end force of 387 included 39 supervisors, 88 engineers and scientists, 21 clerical, and 239 other personnel.

Number of Employees on Payroll	
Beginning of Month	385
End of Month	387
Net Increase	2

General

There were 43 informal, 13 Class I and one Class II radiation incidents for an unusually high monthly total. However, none of the incidents was believed to have major significance.

Some confusion arises in the reporting of these incidents because the "bad" ones (Class II) are so frequently described here as not of major significance. It is a logical corrollary to question the value of reporting informal incidents at all. The main function of such reports is admittedly for educational purposes in promoting effective control. An additional value was demonstrated this month when an informal incident of last July was found to involve the imperfect healing of a minor cut with evidence of residual contamination at the site and of deposition of plutonium in bone. Without the careful study involved in the informal incidents, reconstruction of this or more serious late findings would be impeded or even made impossible.

As the operation grows older, there is an increasing incidence of cases of internal deposition, some of which may be developing without a specific radiation incident. Analyses and action required for contamination cases is so different from that involved in external radiation cases that it is desirable to segregate them in the records. For this and other reasons the classification system is shortly to be changed.

In a December meeting of the Radiological Society of North America, two items were of particular interest to this operation.

1. There has been a complete about-face by the National Committee on Radiation Protection and by the associated committees of the principal radiological societies in the matter of radiation control legislation. Such legislation is now being strongly advocated. Some very critical management problems will undoubtedly develop from this. A major problem will be an anticipated conflict between state legislation and federal regulation vigorously supported by some branches of the AEC.

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Radiological Sciences Department

General (Continued)

2. There has recently been an international recalibration of basic radiation standards which has shown quite surprising defects in so-called standard air chambers. This means that our local secondary standards are less reliable than has been believed heretofore, the errors probably amounting to as much as 3 per cent. An almost equal error is found to exist in radium calibrations where the best value for the defining constant is found to be 8.2 or 8.25 r per mg hour at 1 cm and with 0.5 mm Pt filter. The value used by this writer since 1932 has been 8.4. None of these changes is sufficient to affect the working practices at this location, because the attempted standards of calibration have probably been somewhat more stringent than is strictly necessary in protection work. All these standards are to be closely scrutinized in the current year.

A visit to the almost completed new radiochemistry laboratory at the University of California, Berkeley, was extremely profitable. The laboratory is virtually identical with a pre-atomic energy era laboratory in that all furniture is plain wood, floors and walls do not have expensive smooth finishes, and there is no king-size ventilation system. This arises because the technique of doing work in the essentially sealed Garden boxes, which constitute miniature hot laboratories within the laboratory, has been further advanced. Within the past year the construction cost of and operating time in these boxes have both been reduced by a factor of 5 or better. A re-evaluation of hot laboratory practices at this location, where the Garden boxes are not always favorably received, seems to be in order.

An acute problem with respect to P^{32} disposal to the Columbia River faces the organization. Currently we are reporting that the consumption of 30-35 lbs. of whitefish per week, as available at Priest Rapids, is the permissible limit. In this, we have taken the liberty of using what we believe to be more reasonable uptake and deposition parameters than are given in the "official" sources. The "official" value would be about 8 lbs. per week. In the presence of definitive legislation this position would be untenable; it has been quite legitimately questioned as is. Now if the predicted increase of P^{32} with K reactor operation is applied, the permissible intake would fall to less than 2 lbs. per week. This would clearly necessitate closure of the fishing or removal of the P^{32} at source.

We are persuaded that our less conservative value is sound for adults, However, it is entirely plausible that much higher uptake will occur in the growing bones of children, and it would be inappropriate to push the situation to its formal limit. We have asked for a deferment of the resolution of the problem until certain local researches have been completed.

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Radiological Sciences Department

General (Continued)

These include:

1. A determination of uptake of P^{32} from fish tissue containing P^{32} in comparison with present data from feedings of active phosphate. There is a real possibility that uptake is less in circumstances simulating the actual exposure hazard.

2. A determination of the relative uptake in young growing bone and in adult bone to estimate the additional hazard in children.

3. Experiments simulating possible transfer to infants from the mother's milk.

Beginning in 1955, new methods of reporting the activities of the department will be used. In future reports, the style will be to give brief accounts of radiological sciences matters of key interest, with more general explanation of what policies, incidents or research findings mean to the Hanford Operation. The preceding paragraphs are representative of this method. In addition, a two or three page tabulation of such data as regional monitoring figures will be included for record purposes.

This new approach will lose the work accounting and credit feature to the individual sections and units. Since these are internally valuable, an additional report entitled "Radiological Sciences Monthly Section Reports" will be filed. This will be made up of work reports from the sections, issued as one document for administrative convenience.

In December, ten cash awards for suggestions went to department members. Since there are only 260 eligible members, this represents a lively interest in the improvement of the department's work and working conditions by its own personnel.

Inventions

All persons engaged in work that might reasonably be expected to result in inventions or discoveries advise that, to the best of their knowledge and belief, no inventions or discoveries were made in the course of 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.

INVENTION	INVENTOR
None	None

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Radiological Sciences Department

In brief review of the year's activities, protection performance as measured by total incidents was virtually unchanged from 1953. It is quite surprising that since 1952 the frequency of Class I incidents has remained unchanged while the frequency of both the more and the less serious categories has approximately doubled.

The year has revealed a considerably greater number of internal deposition cases than was previously known. There are now 101 employees (or former employees) with demonstrable plutonium deposits; of these, 40 have deposits in excess of 1% of the permissible limit, and 16 have deposits in excess of 10% of the permissible limit. None of the cases of local origin is known to have a deposit in excess of the limit. Of the positive cases, about 60% are associated with known incidents. The remainder probably includes some cases referable to minor incidents not recorded as such, together with an increasing number due to "normal" accumulation. That these are now recognizable is a combination of the expected slow increase as the plants continue to operate with the striking improvements in detection limit. Careful analyses will be needed in the next few years to determine at what point, if any, a further restriction on plutonium handling may be required.

Recognition of similar situations with respect to fission product and uranium depositions is of equal importance; at the present time, there is one case of Sr^{90} deposition in the lung in questionable status because of the difficulties of interpretation.

Some conventional work load factors compared with 1953 are:

Item	Percent Increase
Manpower	4
Gamma pocket chambers read	6
Slow neutron pocket chambers	9
Beta-gamma film badges	4
Fast neutron film badges	5
Plutonium bioassays	11
Fission product bioassays	8
Uranium bioassays	(-9)
Tritium bioassays	(-12)
Calibrations	37
Laboratory samples	7
Counting room samples	3

Overall exposure to external radiation has been well controlled. As measured by the index for gamma radiation, the average annual exposure was 0.2 r, as it was in 1953. Three percent of the exposed individuals exceeded 1 r, compared with 5 per cent in 1953, and only 0.05 per cent exceeded 3 r, compared with 0.07 per cent in 1953. The annual bogey is 3 r (or equivalent if there are other radiations). The average of the 10 highest annual exposures was 4 r. This index reached its highest value for the 10 years of operation.

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Radiological Sciences Department

The outstanding problem of the year was the excessive ruthenium contamination within the Redox Plant and the repetitive releases of ruthenium to the atmosphere, which grossly contaminated portions of the reservation, and since August spread to the surrounding communities. Although it is not believed that any significant injury has occurred or will develop later, this possibility cannot be dismissed until many further research studies have been completed. In any case a sensitive public relations position will persist. To date, the local studies have demonstrated that radio-ruthenium is decidedly more hazardous than is indicated in "official" sources. Permissible concentration in drinking water should probably be at least 100 times smaller than is currently written.

Considerable attention has also been given to Columbia River contamination, of which the already mentioned whitefish problem is only one phase. In general, the future outlook in this area is worse than it was a year ago. Recalculation of hazard on a basis of exposure of the intestinal tract has altered the apparent risk. Individual isotopes can be 1,000 times more hazardous for this target than for body deposition. This dual aspect hazard will lead to the need for two completely different sets of activity monitors for the river. At year end, this topic was being actively developed.

In summary, it appears that the general control of radiation hazards has responded well to the demands of increased production at the site. More and more, it is suspected that long term effects of obscure or minor hazards may be ferreted out in the second decade of operation, and require the highest order of skill in detection, evaluation, and supporting research.

RADIOLOGICAL ENGINEERING

Construction of Phase I, Project CG-572, Particle Problem Animal Exposure Equipment, at Building 1705-F, was completed; detailed design of Phase II facilities at 141-F was started.

On the basis of recent confirmation of significant ground water movement between Gable Mountain and 200-E Area toward the Columbia River, it was recommended that TEP and B Plant ground disposal of high salt content scavenged wastes containing significant quantities of long-lived fission products be made in areas south and west of 200-E, rather than in the northern portion of this area as previously planned. Studies were initiated to determine the feasibility of improving crib life by use of ion exchange media prior to release, and of providing safe ground storage of old waste sludges by use of clay linings for disposal sites.

Further study of P^{32} formation rates in reactor effluent showed good correlation with the bulk water temperature increase across the reactors. Extrapolation to future operating conditions indicated a probable release of 170 curies P^{32} per day, as compared with 40 curies per day in the first half of 1954 and about 5 curies per day in 1945.

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Radiological Sciences Department

RADIOLOGICAL ENGINEERING (Continued)

Preliminary studies of problems of disposal of batches of coolant from a re-circulating coolant reactor system indicated that due to the probable complete disintegration of rupturing fuel elements at high coolant temperature, direct disposal to the river would not be possible, disposal to a crib near the river would be questionable due to the long time required to reduce the hazard by radioactive decay, and that waste stream decontamination facilities would probably be required.

RADIOLOGICAL RECORDS AND STANDARDS

Radiation Monitoring Unit

General Statistics

	November	December	1954 Total
Special Work Permits	550	511	6,425
Routine and Special Surveys	1,629	1,772	19,342
Air Samples	1,858	1,836	18,357
Skin Contamination	3	11	182

A military aircraft pilot parachuted to the ground near White Bluffs and his plane subsequently crashed near the 200 North Area on December 2, 1954. The particulate contamination at the point of the crash was one particle per 300 square feet. Security, ordnance, and salvage forces were monitored intermittently during investigation of the crash and clean-up of the debris. No personnel or equipment contamination occurred. This incident has prompted a study of what could happen, and what could be done to control the situation, if a falling object struck one of several vulnerable spots in the process areas.

Research work with thorium in several parts of the operation resulted in occasional unsatisfactory air conditions requiring the use of respiratory equipment. Research with Fe^{55} resulted in minor contamination spread at the Biology Laboratory. Monitoring was a difficult problem for both materials, and permissible limits were not completely resolved.

Ground, equipment, and personnel surveys in connection with the particulate contamination problem were continued throughout the month. One thousand fifty-eight vehicles were surveyed and eighty-eight of these were found to have particulate contamination. One thousand seven hundred sixteen persons were surveyed with portable meters and four of these had particulate contamination in the clothing and two on the skin. The scintillation doorway monitor at the 200 West gatehouse was in operation a part of the month but did not detect any case of particulate contamination.

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Radiological Sciences Department

Radiation Monitoring Unit (Continued)

Changes in protective clothing specifications and in the methods of purchasing cloth items of protective clothing resulted in substantial dollar savings.

Radiological Standards

Radiation Incidents

Type	November	December	1954 Total
Informal	20	43	287
Class I	4	13	76
Class II	2	1	20

The Class II incident was the technical overexposure of a laboratory worker in the Radiochemistry Building resulting from handling samples without monitoring. The Class I incidents included: three involving plutonium contamination, three where work was attempted without proper monitoring, two involving the failure to wear personnel meters, a uranium explosion, a fire in a hood filter and two incidents where the batch size was exceeded, and a road accident of a tank trailer loaded with VNH.

Bioassay samples taken subsequent to an informal incident reported in July which involved a puncture wound and associated plutonium contamination of a Maintenance mechanic indicated significant internal plutonium deposition. Reinvestigation of the case revealed that the puncture wound had not completely healed and appeared to contain foreign matter under the skin surface. Industrial Medical attempted to remove this foreign matter late in December and the material removed was slightly contaminated. This incident may be up-graded to a Class I incident at a later date.

Total approved claims for reimbursement of contaminated personal effects amounted to 112 for the year, at a cost of about $1,300. The formal procedure for handling these cases has worked smoothly and has contributed to good employee morale in process areas.

Exposure Records

Personnel Meters, and Records and Photometry

	November	December	1954 Total
Gamma Pencils read	249,562	244,386	2,766,976
Potential overexposures	14	17	150
Confirmed overexposures	0	0	2
Slow neutron pencils read	1,324	1,712	15,526
Potential overexposures	0	2	6
Confirmed overexposures	0	0	0
Beta-gamma film badges processed	42,303	40,919	461,600
Potential overexposures	21	38	568
Confirmed overexposures	0	1	4
Fast neutron badges processed	680	648	6,349
Potential overexposures	1	0	6
Confirmed overexposures	0	0	1
Lost readings (all causes)	70	69	2,005

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Radiological Sciences Department

Bioassay

Plutonium Analyses

	November	December	1954 Total
Samples assayed	864	748	9,063
Results above detection limit*	43	21	304
Resamples assayed	40	27	426
Results above detection limit*	18	2	135
Maximum d/m/sample	1.47	0.96	2.60

*Detection limit was 0.05 d/m.

Fission Product Analyses

	November	December	1954 Total
Samples assayed	847	640	9,754
Results above 10 c/m/sample	0	0	69

Uranium Analyses

Results of 454 samples processed this month are tabulated below. The total number of samples processed in 1954 was 3,811.

	Following Exposure /ug/liter			Following Period of no Exposure /ug/liter		
Sample Description	Maximum	Average	Number Samples	Maximum	Average	Number Samples
Metal Preparation	21.7	3.0	126	19.5	2.8	109
UO_3 Plant	32.5	4.3	50	13.9	3.0	41
Technical	20.8	5.9	20	14.1	3.6	14
Special Incidents	80.7	6.3	64	---	---	---

High results on samples taken after special incidents are under study.

Tritium Analyses

	Activity Density (/uc/cc x 10^3)			
	0-5	5-10	>10	1954 Total
Number of Samples	13	1	0	1942

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Radiological Sciences Department

Bioassay (Continued)

Thyroid Checks

All thyroid checks reported were below the warning level.

Hand Score Summary

There were 44,790 alpha and 49,981 beta scores reported. About 0.008% of the alpha and none of the beta scores were above the warning level. Decontamination of all reported high cases was attempted and was successful.

Calibrations

The bi-weekly battery check for CP and Juno meters which was started about two months ago was terminated because of excessive costs. It is believed that the new source check established in the field plus an extra calibration test will guarantee adequate performance of these instruments while in use.

Number of Routine Calibrations

	November	December	1954 Total
Fixed Instruments	93	165	1,036
Portable Instruments	3,931	3,987	41,769
Personnel Meters	14,668	7,619	177,366
Total	18,692	11,771	220,171

BIOPHYSICS

Regional Radiation Measurements

Regional Monitoring

The general findings are summarized in the following table:

Sample Type and Locations	Activity Type	Average Activity Density /uc/cc	Trend* Factor
Drinking Water and Related Materials			
Benton City Water Co. Well	alpha	1.6×10^{-8}	--
Richland, N. Richland, Benton City Wells	alpha	$(<0.5 \text{ to } 1.4) \times 10^{-8}$	--
100 Areas	beta	$(2.8 \text{ to } 8.9) \times 10^{-7}$	--
Pasco, Kennewick, McNary Dam	beta	$(<0.5 \text{ to } 3.5) \times 10^{-7}$	--
Backwash Solids - Pasco Filter Plant	beta	5.5×10^{-2} /uc/g	+2
Backwash Liquids - Pasco Filter Plant	Beta	3.6×10^{-7}	--
Sand Filter - Pasco Filter Plant	beta	2.0×10^{-4}/uc/g	+10
Anthracite Filter - Pasco Filter Plant	beta	2.4×10^{-4}/uc/g	--

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Regional Monitoring (Continued)

Sample Type and Locations	Activity Type	Average Activity Density /uc/cc	Trend* Factor
Other Waters and Related Materials			
300 Area Wells #1, 2, 3	alpha	No Sample	--
300 Area Well #4	alpha	No Sample	--
Well #4 measured as uranium	U	No Sample	--
Other Wells on the Reservation	beta	($<$0.5 to 5.0) x 10^{-7}	-2
Columbia River - Hanford Ferry	beta	2.1 x 10^{-5}	--
Columbia River - below reactors	beta	1.3 x 10^{-5}	--
Columbia River - Patterson to McNary	beta	4.6 x 10^{-7}	--
Columbia River - shore mud	beta	(0.2 to 1.2)x10^{-4} /uc/g	--
Raw Water - Operating Areas	beta	($\leq$0.05 to 1.4) x 10^{-6}	--
Reactor Effluent Retention Basins to River	beta	12,000 to 17,000 /uc/sec/reactor (3.2 to 5.8) x 10^{-3}	--
Reactor Effluent Retention Basins to River	alpha	$<$0.03 /uc/sec/reactor $<$5 x 10^{-9}	--
I^{131} in farm wastes to river	I^{131}	27 /uc/day 7.7 x 10^{-7}	-- --
I^{131} in Columbia River - Hanford	I^{131}	1.5 x 10^{-7}	--
Atmospheric Pollution			
Gross Alpha Emitters	alpha	($<$0.4 to 1.5) x 10^{-14}	+3
Gross Dose Rate - Separations Areas	beta - gamma	0.4 to 2.2 mrad/day	--
Gross Dose Rate - Residential Areas	beta - gamma	0.8 to 1.3 mrad/day	--
Active Particles - Separations Areas	beta	(1.0 to 1.6) x 10^{-12}	--
I^{131} Separations Areas	I^{131}	($\leq$0.4 to 9.8) x 10^{-13}	--
I^{131} Separations Stacks	I^{131}	$<$1.4 curies/day	--
Ruthenium - Separations Stacks	$Ru^{103,106}$	$<$0.03 curie/day	--
Rare Earths + Yttrium - Separations Stacks	beta - gamma	No Samples	--
Active Particles - Wash., Idaho, Oregon, Montana	--	0.08 to 0.37 ptle/m^3	--
Active Particles - HAPO	--	0.04 to 0.19 ptle/m^3	-2
Tritium(as oxides) - Reactor Stacks	T	1.8 curies/day	--

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Radiological Sciences Department

Regional Monitoring (Continued)

Sample Type and Locations	Activity Type	Average Activity Density μc/cc	Trend* Factor
Vegetation			
Environs of Separations Areas	I^{131}	($\leq$0.3 to 4.6) x 10^{-5} μc/g	--
Residential Areas	I^{131}	3 x 10^{-6} μc/g	--
Eastern Washington and Oregon	I^{131}	3 x 10^{-6} μc/g	-5
Non-Volatile Beta Emitters - Wash. and Oregon	beta	(0.9 to 1.2)x 10^{-4} μc/g	--
Alpha Emitters - Separations Areas	alpha	(3.6 to 7.1) x 10^{-7} μc/g	--
Alpha Emitters - 300 Area	alpha	2.3 x 10^{-7} μc/g	+3

* The trend factor shows the n-fold increase (+) or decrease (-) from last month, where values of n less than 2 will not be noted.

Regional Monitoring

General increases were noted in the concentration of I^{131} on vegetation in the vicinity of the separation areas. Ground surveys during the month showed ruthenium particle frequencies in off-project locations surrounding the project to be in the range of one particle per 3,000 to 10,000 square feet with maximum particle dose rate observed being 100 mrads/hr.

Radio-Analysis Laboratory

The laboratory completed 15,110 analyses with an annual total of 60,753. Counting Room measurements totaled 58,567, with 211,472 for the year.

The radioactive isotopes in the effluent water from the zirconium tube in the recirculating loop of 100-H reactor were found to be composed of approximately 60 per cent Na^{24}, 25 per cent Mn^{56}, and 10 per cent Cu^{64} as measured 4 hours after the water left the tube.

Radiation Measurement Evaluation

General increases occurred in the activity of reactor effluents to the river from 100-B, 100-D, 100-DR, and 100-F areas during the fourth quarter of 1954. Evaluations were completed of current data defining the magnitude and extent of particulate ground contamination detectable by portable instrument surveys in the 200-W Area. Integration of graphical analysis charts tracing the pattern of deposition during the last two months showed that there has been an estimated average of 5 x 10^6 particles, representing 2 to 4 curies of radioactive material on the ground within one mile of the Redox stack during this period.

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Radiological Sciences Department

Synoptic Meteorology

Type of Forecast	Number Made	Percent Reliability
8 Hour Production	93	82.5
24 Hour General	62	86.6
Special	64	92.2

Temperatures averaged 34.0° F which was 1.7° above normal. Precipitation totalled 0.35 inch which was less than half the monthly normal. The installation of a new wind instrument in the 1100 Area was completed on December 30.

Experimental Meteorology

Preliminary experiments indicated wide variability in the particle retentive efficiencies of various surfaces. The natural, grass-covered surface (used as a control) and the rock-covered surface were about equally efficient, but the furrowed surface was much less efficient and the surface protected by a snow fence was considerably more efficient than the control surface. This experiment will be repeated under drier conditions.

Six hundred and ninety forecasts of wind direction at various sites on and near the HAPO reservation were made using the Wind Predictor. A verification of 73.4 per cent was obtained.

Earth Sciences

Significant contamination of the ground water beneath the 216-S crib was detected. Analyses of the water showed the isotopes to be at least 93% Ru^{106} - Rh^{106} with the remainder apparently Ru^{103}. No evidence of Cs or Sr has been found in the sediment or water samples. This indicates that more than 100,000,000 liters of low salt waste containing 200,000 curies of beta-gamma emitters and more than 200 grams of plutonium have been effectively decontaminated by the soil of all fission products other than ruthenium.

Soil column studies with TBP-RAW wastes scavenged with nickel ferrocyanide demonstrated that those wastes at pH of about 9 were decontaminated of Sr by the soil on the order of several hundred times more effectively than comparable wastes at a pH of about 8. Close pH control in the scavenging process is clearly necessary.

Industrial Hygiene

A plastic air-supplied hood intended for use as a substitute for air-supplied masks was studied to evaluate its protective features. Penetration of contamination and undesirable safety features prompted a conclusion that this hood should not be used in hazardous atmospheres.

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Industrial Hygiene (Continued)

Analysis of data obtained from air samples during the last Pacific nuclear tests was made to determine the relationship of spherical particles and cloud fall-out. All samples collected at the stations in Richland, Portland, Oregon, and the Pacific test site were counted, radioautographed, and subjected to electron microscopy. Occasional spheres were found at each station but no correlation existed with nuclear tests. It had been hoped that a recognizable correlation would exist and could be used as a practical tool for distinguishing between local emissions and nuclear weapon debris.

A study was made of the temperature and airflow conditions in Company buses at the request of Industrial Medical since it had been suggested that inadequate heating and limited air movement may have been causing excessive absenteeism from illness. Measurements indicated that certain modifications in the heating and ventilating systems may improve this condition. Transportation is undertaking changes on an experimental basis for further evaluation.

Methods

A total of 155 ruthenium-containing particles was calibrated by the gamma ray spectrometer. This completed the ruthenium activity and Ru^{103}-Ru^{106} ratio determinations on all particles requested for the investigations by the Biophysics and Biology Sections.

Fabrication and assembly of a prototype of the total beta monitor for reactor cooling water was completed; component testing proceeded satisfactorily. Advantages of this instrument over the competing models are economy and the absence of hydraulic mechanisms.

A spectrophotometric procedure was devised for determining as little as 0.03 ug of thorium. Application would be to biological fluids in the Bioassay Laboratory.

A solvent extraction procedure for Zr^{95} and Zr^{97} in reactor cooling water showed promise in preliminary tests; final testing of two high-yield procedures for determining As^{76} in reactor cooling water was also completed.

Columbia River Studies

During the month the first phase of radiochemical and hydrological work on ten river cross-sections between 100-B and McNary Dam terminated with the planned initial operation of 100-KW.

Physics

Data on the efficiency of moderated slow neutron detectors versus thickness of paraffin or lucite moderator are being gathered for various neutron energies to permit design of new instruments with better fast neutron dosimetry properties.

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Radiological Sciences Department

Physics (Continued)

An extrapolation chamber especially designed for measuring the dose rate from particles or small beams of beta rays was used to make accurate measurements of the dose rate from a typical ruthenium particle.

Construction of an extrapolation chamber in which the extrapolation is done by varying the gas pressure instead of moving the electrodes was nearly completed; this chamber will be used for calibrations for low energy radiations such as those from plutonium.

The polonium-boron neutron source of the Calibrations Unit was calibrated against the radium-beryllium standard by the water tank method. The results agreed with earlier methods of comparison. The earlier methods had been subject to criticism because it was not known that they allowed adequately for the difference in the energy spectra of the sources; the water tank method is theoretically almost completely independent of such energy differences.

Instrument Development

Wide-angle detectors applied to the doorway monitor materially increased the sensitivity of the monitor to radioactive sources approaching and leaving the plane of the doorway.

A model of one channel of the hand and shoe counter designed for simultaneous measurement of alpha and beta-gamma components was fabricated and tested with satisfactory results. The instrument will be designed to replace both the present four-fold and five-fold counters with substantial savings in initial cost and upkeep.

All radiotelemetering network model building for the Control Station system was completed; model assembly of the Data Station units continued.

BIOLOGY

Aquatic Biology

Highlights of the Columbia River Survey

Activity densities of river organisms at Hanford were essentially the same as in November. The flesh of whitefish collected below the reactors was 30% to 50% lower in radioactivity than during November, but for fish caught at Priest Rapids the average was the same as last month. Midge larvae collected from the bottom of McNary Reservoir had only about one-fourth the activity density observed last month; this seasonal decline reduced their level of radioactivity to that found a year ago.

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Radiological Sciences Department

Highlights of the Columbia River Survey (Continued)

Organism	Location	Sample Type	Activity Density (/uc/g) November	Activity Density (/uc/g) December
Minnows (Shiner)	Hanford	Average	2×10^{-3}	2×10^{-3}
		Maximum	4×10^{-3}	3×10^{-3}
Whitefish Flesh	Hanford vicinity	Average	7×10^{-4}	4×10^{-4}
		Maximum	1.5×10^{-3}	1×10^{-3}
	Priest Rapids	Average	2×10^{-4}	2×10^{-4}
		Maximum	1×10^{-3}	6×10^{-4}
	Ringold	Average	--	2×10^{-4}*
		Maximum	--	2×10^{-4}
Plankton	Hanford	Average	3×10^{-2}	3×10^{-2}
Midge larvae	McNary Dam (composite)	Average	1×10^{-3}	2×10^{-4}
	(Wash. side)	Average	2×10^{-3}	5×10^{-4}
	(Oregon side)	Average	6×10^{-4}	1×10^{-4}

*Represents only two specimens.

Effluent Monitoring

The mortality of chinook salmon eggs subjected to various concentrations of area effluent water was significantly high in 10% strength effluent. While the 25% mortality suffered by this lot was about twice that of the controls, it is appreciably lower than noted in previous years, probably as a result of improved temperature control of experimental conditions.

Biology Control Unit

Waterfowl frequenting the 200 West Area "U" Swamp accumulated contamination to average activity densities of 2×10^{-2} /uc/g in muscle tissue and 1×10^{-2} /uc/g in the liver tissue. Apparently the major contaminant is cesium. Rodent thyroid activity densities decreased, with a similar decrease in fission product contamination in feces. The mean activity densities of rabbits from five sampling stations near the Separations Areas was 5×10^{-3} /uc/g of the thyroids and 3×10^{-5} /uc/g of feces.

Additional positive findings of radioactive particulate contamination in rabbit lungs were made by autoradiographs. Animals were collected near the Meteorology Tower and northwest of 200 West Area. Other laboratory services followed the routine pattern.

Experimental Animal Farm

Toxicology of I^{131}

There was no significant change in thyroid metabolism in any group of sheep compared with results of last month or one year ago.

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Radiological Sciences Department

Irradiation of Pig Skin with Radioactive Particles

Twelve sites on three pigs were exposed to radioactive particles mounted between lucite discs and mica. Exposures ranged from 200 to 12,000 microcurie-hours. Results varied from a slight erythema at the lowest exposure to severe inflammation and necrosis at the high levels. Reactions set in at considerably lower exposure than in the earlier series. This will lead to a careful reconsideration of the extent of human experimentation that may be appropriate.

Metabolism

Plutonium Absorption and Metabolism

Preliminary results indicated that gastro-intestinal absorption from a pH 1 solution of Pu (IV) nitrate may be as much as 20 times greater than absorption from similar pH 2 or pH 4 solutions.

Fission Product Absorption and Metabolism

Forty days after the end of a 90-day chronic feeding period, ruthenium concentration in the bone of rats was higher than in any other tissue. Loss of ruthenium from the bone is now occurring very slowly, strongly suggesting that bone will prove to be the critical organ instead of kidney, which is currently used as the critical organ in MPC estimations. If this is confirmed, there will be justification for a marked reduction in the MPC for radioactive ruthenium. This is the first time that this laboratory has been able to reproduce the disturbing British reports on retention of ruthenium in bone.

Early results on gastro-intestinal absorption of "ruthenium particles" indicated absorption of about 1/100 of that observed when soluble ruthenium is fed, the values for individual particles varying widely. One instance of substantial retention of ruthenium particles beyond 72 hours was observed.

Maximum total percutaneous absorption of ruthenium from particles was 0.1%. The next highest figure was 0.002%. Other animals absorbed less than 0.0005%.

Tritium Absorption and Metabolism

Rats chronically exposed to tritium oxide at levels varying by a factor of 25, and with dosage rates as high as 30 rads per day, showed no significant variation in bound tritium content of total carcass, pelt, or small intestine, contrary to previous indications.

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Radiological Sciences Department

Pharmacology and Experimental Therapeutics

Three hundred mice are being intratracheally injected with either barium sulfate, dibenzanthracene, water, or $Pu(OH)_4$.

To compare tumor inducing action of "ruthenium particles" with a known carcinogen, rabbit ears were exposed to the two materials. Signs of early tumor formation have appeared on ears exposed to the carcinogen.

Plant Nutrition and Microbiology

Plant Nutrition

In nutrient solution studies a concentration factor of 0.10 was obtained for Ba^{140}. Addition of carrier increased the concentration factor to as much as 0.31. Soil studies gave a concentration factor of 0.32 for sandy and 0.13 for silty clay soils. These values are all in the range of those obtained for strontium and indicate that Ba^{140}, like $Sr^{89,90}$, is one of the more important fission products in plant uptake.

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FINANCIAL DEPARTMENT MONTHLY REPORT
DECEMBER, 1954

The midyear budget review for the fiscal year 1955 was formally transmitted to the Atomic Energy Commission on December 17 as secret document HW-34178. Work has begun on the FY 1957 and revised FY 1956 budgets, which are scheduled to be submitted to the Commission on April 1.

A report summarizing Manufacturing plant area square feet was submitted in compliance with a request from the Manager - Manufacturing Plant Utilization Services in Schenectady.

Discussions were held with local AEC and representatives of the AEC Controller's Office relative to depreciation, capitalization and other plant and equipment accounting practices.

The annual physical inventory of railroad and automotive parts which are in the custody of the Transportation Section was taken on December 15, 1954. Work is still in progress in reviewing custodial records and procedures and analyzing source documents and other data to determine final amounts and reasons for variances. Final arrangements were made during the month with Stores personnel for taking the annual physical inventory of automotive and heavy equipment parts which are in the custody of Stores and which are warehoused in the new transportation facility. This inventory is scheduled to begin on January 13.

Considerable work is involved in the segregation of scrap into the various categories required by the Commission. A study was made of the problems involved and recommendations submitted to AEC Property Management which, if adopted, will materially reduce the number of categories into which various types of metals must be segregated.

The Bonneville Power Administration took over the Richland-Benton Switch 115-KV line and the Thayer, Stevens and North Richland substations as of midnight, December 31, 1954.

Project proposals and informal requests approved by Department Managers and the General Manager for transmission to the AEC during the month amounted to $521,354. Appropriation requests approved during the month amounted to $820,979.

During the past two months a complete review of the Accounts Payable Unit's operating procedures has been completed and a substantial number of revisions and refinements were made. Largely as a result of this review, personnel was reduced from 31 on November 1 to 26 on December 31.

The gross accounts receivable balance as of December 31, 1954 was $290,054, approximately $5,000 less than that as of December 31, 1953, in spite of an increase in total billings of nearly $500,000, the total for the year being $7,409,982.

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A report which has been submitted to the Commission each month since the prime contract between the AEC and General Electric was amended as of June 1, 1953 to provide for a fixed overhead allowance, entitled "Summary of Disbursements," covered expenditures of $5,941,682 for November, as follows:

Payrolls and Payroll Deductions Disbursed	$3 901 353
Material (including payments on requirements contracts) and Freight	2 079 236
Subcontracts and Agreements	56 604
Advances for Traveling and Living Expense	66 305
Miscellaneous Payments	204 976
Gross Disbursements	$6 308 474
Less: Revenue	366 792
Net Disbursements	$5 941 682

In preparing this report, disbursements were analyzed, classified, and summarized to disclose the nature of all of the expenditures made by HAPO. This included a review of each of 285 items which comprise "Miscellaneous Payments" to establish their propriety.

The Contract Reimbursements group handled 22 inquiries on reimbursement problems during December, more than a third of them coming from personnel outside the Financial Department. It was noted that several approval requests had been directed to the Commission without prior review by the Contract Reimbursements group in accordance with CPG 05.4 ("Work or Expenditures Which Require AEC Reimbursement Authorization or Letter Approval"), and the attention of the authors of these letters was called to the provisions of the guide. This guide was also reviewed and suggestions made for changes in connection with a proposed revision.

The Procedures and Computing Section has begun intensive and detailed studies on programming for the 702 computer. Block diagrams of the present payroll system, as it will be computed on the 702, were completed. A system of flow charts to be used in converting present punched card processes to 702 programming was developed and distributed. Classes have been initiated to instruct procedural analysts in the complexities of the new equipment.

Two Flexowriters arrived on December 15 and assembly of this equipment was begun. One of these will be used in the Plant Accounting Unit and the other in the Stores Sub-Section.

A new monthly report for reporting project costs was placed in effect on all projects which have authorized funds of $50,000 or over. This report reflects the cost compared to the official estimate for each feature of work and will enable those responsible for a project to ascertain at a glance any phase of the work which may be indicated to be costing more than planned.

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The Manufacturing Operating Report issued in December contained recast fiscal year-to-date costs for the three additional sections in the department. Consolidations were made to provide total costs of the reorganized department from the beginning of this fiscal year.

The Reactor Section Financial Representative was assigned the additional responsibility of providing cost assistance and advice to the Electrical Utilities Section which was recently transferred to the Manufacturing Department.

A basic set of charts covering all Manufacturing Department inventories was prepared and will be issued monthly hereafter. These charts illustrate inventory balances at the end of previous fiscal years, each month during the current fiscal year, and budget balances for future periods. Inventories charted include General Supplies, Spare Parts, Stainless Steel, Special Materials, Essential Materials and Work in Process.

A schedule of waste removal rates applicable to commercial facilities has now been approved by the Commission. This is of great importance to the Community Section because it eliminates the necessity of making cost estimates based on varying volumes of waste per facility for inclusion as part of the facility lease. Facility operators in the future will pay a set rate based on the actual volume of waste removed. It is difficult to determine at this time whether this will produce more or less revenue to the community since the operators will now have a greater incentive to control their volume than they have had in the past.

The difficulties in obtaining qualified personnel for the SF Accountability Section and procuring proper security clearances for them have been surmounted, and it is anticipated that reorganization of the Section into five units, three of which will function in the metal preparation, reactor and separations areas, respectively, will be completed by February 1. Assignment of employees to the appropriate units in the new organization has been accomplished.

The controlling factor indicated by SF Accounts has been found to be primarily an analytical problem. The Depleted Uranium accounts, particularly for Redox, showed discrepancies which require further investigation. In contrast, the Normal Uranium accounts were influenced by accounting problems associated with the reprocessing of cored slugs.

The SF Measurements Unit has contributed several improvements to SF material control in the form of tank calibrations, dissolver bed control, and other key measurement points. These have been accepted by operating personnel.

A model physical inventory control procedure for SF material has been tried out in the Redox operation with successful results. Controls of a similar pattern can now be applied to other processes and should materially improve the over-all inventory record status.

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Numerous security problems have been succesfully reconciled by the SF Accountability Section to less restrictive procedures without the loss of satisfactory control. Similar reductions in the work load have been accomplished with respect to SF materials held by technical groups.

Detailed reports for the Financial Department appear on succeeding pages, as follows:

Summary of Cash Disbursements, Receipts and Advances	I - 5
Auditing Section	I - 6
Budgets and Measurements Section	I - 7
Contract Cost Section	I - 8 through I - 11
General Accounting Section	I - 12 through I - 18
Personnel Accounting Section	I - 19 through I - 21
Procedures and Computing Section	I - 22 through I - 24
Property Accounting Section	I - 25 through I - 31
SF Accountability Section	I - 32 through I - 33
Personnel and Organization Statistics	I - 34 through I - 35

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SUMMARY OF CASH DISBURSEMENTS, RECEIPTS AND ADVANCES

A summary of cash disbursements and receipts (excluding advances of $6,000,000 and $6,175,000, respectively, by the Atomic Energy Commission) for the months of December and November, 1954, is shown below:

Disbursements	December	November
Payrolls (net)	$3 555 047	$2 903 373
Materials and Freight	1 475 047	1 597 432
Payments to Subcontractors	559 926	538 409
Payroll Taxes	535 896	646 613
United States Savings Bonds	226 389	193 672
Group Insurance Premium	145 170	143 739
Pension Plan - Employees' Portion	113 307	87 243
Travel Advances to Employees	47 159	66 305
All Other	91 689	131 688
Total	6 749 630	6 308 474
Receipts		
Rent	135 938	122 467
Electricity	64 507	70 687
Hospital	61 890	62 162
Telephone	49 538	61 036
Sales to AEC Cost-type Contractors	12 553	4 009
Sundry Accounts Receivable	12 319	15 944
Bus Fares	8 209	8 399
Refund of Travel Advances to Employees	7 488	14 947
Refunds from Vendors	6 777	2 512
Other	3 721	4 629
Total	362 940	366 792
Net Disbursements	$6 386 690	$5 941 682

Outstanding advances as of December 31 and November 30, 1954 were as follows:

	December	November
Cash in Bank - Contract Accounts	$1 859 010	$2 245 700
Cash in Bank - Salary Accounts	15 000	15 000
Total	$1 874 010	$2 260 700

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AUDITING SECTION
MONTHLY REPORT - DECEMBER, 1954

Reports were issued for the completed audits listed below:

Timekeeping Practices
Tools, Protective Clothing and Equipment
Termination Clearance Procedure
Records and Procedures, SF Accountability - 200 Areas

Letter reports were issued for reviews of the following:

Physical inventory of General Supplies
Proposed cancellation charges on Letter Order No. HWC 6069, Udylite Corporation (design of electroplating facilities)

At month-end, reports were being prepared for audits of:

Motor Pool Operations
Cost Accounting
Management of Capital Assets
Receiving and Inspection
Excess, Salvage and Scrap (audit started in December)

Field work was performed on the following audits started during the month:

Classified Files
Photographic Equipment and Operations
Accounts Receivable - Safety Shoes, AEC Cost-Type Contractors, Equipment Sales to Facilities, Loans to Employees, and Sundry
Accounts Receivable - Kadlec Hospital
Accounts Receivable - Rent

Follow-ups were made to determine the extent of compliance with recommendations made as a result of the audits listed below:

Work Orders
Procurement and Control of Reference Materials
Richland Community Council Fund
Telephone Usage

As of December 15, 1954, J. D. Ryan transferred to Auditing Section from Property Accounting Section.

Two employee information meetings of exempt employees were held during the month.

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BUDGETS AND MEASUREMENTS SECTION
MONTHLY REPORT - DECEMBER, 1954

Budgets

An additional employee was assigned on a permanent basis to aid budget preparation, perform analyses, and assist on bogey-preparations. The staff is now considered complete.

The FY 1955 Midyear Budget Review was submitted to the Manager - Finance for discussion with other HAPO management on December 10. Formal transmittal to the Commission was handled through secret document HW-34178 on December 17.

Plans were immediately started on the forthcoming FY 1957 and Revised FY 1956 budgets which will be due to the Commission on April 1, 1955.

Measurements

A program for inventory of existing HAPO measurements was developed and gotten underway. The strengths and weaknesses expected to be revealed from this survey will determine areas of concentration in the future.

In addition, considerable effort was devoted to accumulation of statistics relative to human relations factors such as grievances, personnal turnover, suggestions submitted, etc., to determine if measurable forecasts and controls can be established.

An outline of history and purpose of the Measurements Project within the Company and plans for HAPO was prepared for distribution to all department and section managers and is currently being reviewed by the Manager - Finance.

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CONTRACT COST SECTION
MONTHLY REPORT - DECEMBER 1954

At the request of the 700 Area Landlord, arrangements were made to move the Manufacturing Cost Unit from the 717-A Building to the 722-A Building on January 15. Because employees were reluctant to move, a slight personnel problem arose. This was resolved by assurance that the new location will have some advantages and working conditions will be improved.

A comprehensive report on measurements utilized by the Manufacturing Department was completed for each Section. These Section reports will be consolidated and forwarded to the Budgets and Measurements Section early in January.

During the month, several discussions were held with representatives of the Design Section with respect to a contemplated change in reporting of Research and Development costs. Under the proposed change, a supplemental report will be issued showing Design Development's costs by Units rather than Development programs; thereby aiding interested individuals who are responsible for certain phases of Design Development work. It is anticipated that the first report of this nature will be issued during January, 1955, covering December, 1954 and first six months of FY 1955.

As detail expenses vary considerably in the Financial and Radiological Sciences Departments, it was decided to use separate cost report forms for each department in the future in place of the one form utilized in the past. These forms were designed and will be used for the December cost report.

Employee and Public Relations Cost Unit

The Midyear Budget Review which was completed during the month was used on November cost reports issued by Plant Activities Cost Group and will be used on December reports for all Employee and Public Relations Department activities.

Due to the continuing low patient-day census at Kadlec Hospital, it still appears that it will be extremely difficult to complete the fiscal year within the budget provisions. Therefore, every possible avenue for further cost reduction is being explored. Items now under consideration include a reduction in amounts charged for financial services as well as some reduction in the monthly accrual to cost which is credited to the reserve for bad debts.

The manager of the Employee and Public Relations Department has authorized a procedural study of hospital records and procedures to determine what further cost reductions might be accomplished. This study may involve Accounts Receivable work at the hospital, and to a lesser extent, Cost Accounting procedures, if initial investigations by the study group indicate that expansion of their study into this field might prove productive.

Consideration is currently being given to assigning budgeting responsibility for all Community Program construction activities, including Kadlec Hospital, to the Community Cost Group. This assignment would also include accounting for all construction work in progress costs on all Health and Safety Section

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projects. This will place no significant additional burden on the Community Cost Group and should result in better control of Community Program construction budgeting and cost.

A work order procedure for Employee and Public Relations - Plant Activities Cost Group was completed during the month. This procedure is in accordance with existing O.P.G.'s and includes recommendations set forth in a recent audit report.

Engineering Cost Unit

The following Appropriation Requests were approved by the General Manager during December for equipment in connection with heat transfer and water plant studies:

55-E-15	$117,690	Heat Transfer Equipment
55-E-28	$ 35,000	Forced Circulation Water Loop
55-E-29	$ 86,000	Experimental Water Loop

Costs incurred in connection with above equipment during FY 1955 will be transferred from Research and Development to Plant and Equipment in Progress.

Work continued on recasting the FY 1955 Midyear Budget Review to give effect to the organizational changes within the Technical and Project Sections. Reports for December will reflect Midyear Budget Review amounts without organizational changes. Reports for January will show a recast of actual costs for the first six months of this fiscal year plus the Midyear Review Budget as adjusted to give effect to the organizational changes of December 15, 1954.

The Atomic Energy Commission effected a credit to all active projects for North Richland Camp Cost and General Indirect Construction Expense. These credits result from over-accruals through application of a standard rate for these items. A credit for North Richland Camp Cost was previously applied to active projects during May, 1954 in the amount of $500,000. General Electric projects received $47,149 of this credit. Additional credit for North Richland Camp effected in December was also for $500,000 of which General Electric projects received $70,477. The credit for General Indirect Construction Expense was also for $500,000 of which General Electric projects received $76,210.

Round Table discussions were held for all members of the Unit during December.

General and Consolidations Cost Unit

Submission of FY 1955 Midyear Budget Review was completed during the month and work is progressing satisfactorily on the quarterly breakdown of this budget which will be issued early in January. All cost reports for the month of December will include Midyear Budget Review figures.

Considerable difficulty was experienced in preparing consolidated HAPO reports due to the recent organizational changes, with the resultant necessity of recasting previous months' costs.

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A cost closing schedule for the 3rd quarter of FY 1955 was issued during December to provide a basis for future work scheduling. In addition, nine pages of cost code revisions, necessitated primarily by the Engineering Department reorganization, were issued.

A meeting was held with the various unit heads of the Biophysics Section, Radiological Sciences Department, to review the cost and unit cost report to help them understand the reports more clearly.

A new cost report was prepared for the Biology Section and costs were recast both for November and year-to-date. This report segregates the costs between Research and Development and Protection of Plant and Personnel and makes further identification by elements of cost. An analysis was made on the monthly rental rates for heavy equipment used by the Biology Section. It was found that considerable overcharges had been made.

Manufacturing Cost Unit

Round Table discussions were held in December with all members of the Manufacturing Cost Unit located in the 717-A Building. The meetings proved quite successful and many of those attending expressed opinions that this type of meeting should be held at least once a month or when there is sufficient information available to make the meeting interesting.

Budget activity included the final Midyear Review submission to the Budgets and Measurements Section, and breaking out monthly detail to be shown on operating reports for the balance of this fiscal year.

A request was made to Computing to make a listing of personnel who are authorized to approve Work Orders in a form that could be distributed to department and section managers for their review. This machine listing will eliminate at least two days' typing by the cost unit.

A revised Manpower Distribution Report was drawn up for the use of Metal Preparation Section operating units. This report will replace two reports previously used. A procedure is being prepared to standardize the use of this report in all operating units of the section.

In the Metal Preparation Section, expense codes were assigned to each major piece of equipment used by the Power Operation Unit. Studies are now under way to identify, by expense code, each major piece of equipment within the Metal Preparation Section. This is a return to a coding system developed several years ago but which was not completely utilized due to problems of organization which have since been resolved.

In the Separations Section, a review of the distribution of electricity charges and shift electricians cost was made and revised allocations which will reflect present operating conditions were prepared. A series of overtime control charts were prepared for the Manager of Separations Section to assist him in ascertaining the most effective utilization of overtime within the Section. An informal meeting was conducted with Maintenance foremen to improve their understanding of the work order and cross order procedures.

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Activities in connection with 100-KW startup were increased this month. Arrangements were made to easily obtain accurate essential material inventories prior to startup; cost codes, expense accounts and landlord codes were established; information meetings with 100-KW personnel were held to distribute code information and outline procedures.

An audit of the Reactor Section frozen lunch procedure was performed as it appears that a more detailed procedure, better education and tighter controls are necessary.

The Work Order group worked in conjunction with personnel in the Procedures and Computing Section on problems connected with the new work order procedure which were not foreseen prior to its adoption on December 1.

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GENERAL ACCOUNTING SECTION
MONTHLY REPORT—DECEMBER, 1954

ADMINISTRATIVE PLANNING

A total of 73 new or revised organization and policy guides were published during December. Of these, 56 were organization guides and the balance, 17, were instructions or policies guides.

Two of the latter were revised General Manager issues: 04.4, Assignment of Landlord Responsibilities; and 05.1, Plant and Equipment Appropriations. Four were Manager - Finance issues: one of them, 04.5.3, Control of Laid-up Facilities, was a new issue and the balance revisions. Seven guides were issued by the Manager - Employee and Public Relations. Two guides were issued by the Manager - Manufacturing; and one guide, 21.5, Excess, Salvage and Scrap, was a joint issue of the Manager - Finance and the Manager - Manufacturing.

At the month's end, 23 additional OPG's were being reproduced and had not yet been distributed.

Approval was received from the General Manager to eliminate the two separate OPG distribution lists. Henceforth all OPG's will be distributed to the same list.

Four complete books of OPG's were distributed to individuals newly placed on the distribution list, and a total of 360 extra copies of OPG's were sent to individuals requesting them.

A report was issued summarizing AEC transmittals received during November.

Two Office Letters, No. 204, Christmas Day and New Year's Day Holidays; and No. 205, Federal Social Security Tax Deductions and Contributions to the General Electric Pension Plan, were processed.

ACCOUNTS PAYABLE UNIT

The following is a summary of accounts payable volume during the calendar year 1954:

	Total	Monthly Average
Vouchers recorded—		
Number	49 921	4 160
Amount	$45 840 965	$3 820 100
Freight bills paid—		
Number	17 624	1 468
Amount (included above)	$3 935 867	$327 990
Cash discount earned	$60 594	$5 050
Number of employees—		
Beginning of year	34	
End of year	26	

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ACCOUNTS PAYABLE UNIT (Continued)

During the last two months a comprehensive review has been completed of all operating procedures and substantial revisions and refinements were made. These have included, but were not limited to (1) complete revision of the "flow of work," (2) elimination of the discount control clerk, assigning this responsibility to individual invoice auditors, (3) discontinuance of checking vendors' statements, and (4) transfer of the function of compiling project commitment data to Engineering Cost Unit.

Primarily as a result of the foregoing, personnel has been reduced from 31 at November 1 to 26 at December 31, 1954.

Active contracts being handled by Accounts Payable at December 31, 1954 numbered 16 and payments during the month amounted to $54,262. Commitments at December 21 amounted to $738,404 on these contracts. These figures exclude requirements contracts, on which disbursements amounted to $500,639 in December.

Statistics for December are given below, along with those for November, included for comparative purposes.

Accounts Payable:	December	November
Balance at beginning of month	$ 764 224	$ 835 498
Vouchers entered	2 937 840	3 118 977
Accrual for inventories	26 719	50 085
Cash receipts	6 777	2 512
	3 735 560	4 007 072
Less:		
Vouchers paid	2 968 194	3 211 461
Reversal of accruals	50 085	31 387
	3 018 279	3 242 848
Balance at end of month	$ 717 281	$ 764 224
Other Statistics:		
Number of vouchers recorded	3 801	4 301
Number of checks issued	2 570	2 668
Number of freight bills paid	1 687	1 679
Amount of freight bills paid	$329 790	$353 711
Number of Purchase Orders Received	2 113	1 943
Amount of Purchase Orders Received	$2 735 700	$2 349 281
Amount of cash discount earned	$4 834	$5 931

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ACCOUNTS RECEIVABLE UNIT

The gross accounts receivable balance at December 31, 1954 was $290,054, approximately $5,000 less than December 31, 1953 in spite of an increase in total billings of nearly $500,000 in 1954. Total charges to accounts receivable during the year amounted to $7,408,982, and collections aggregated $7,413,831. Four types of receivables accounted for the majority of charges during 1954: Rents, $4,776,386; electricity, $834,982; services rendered at Kadlec Hospital, $827,392; and telephone, $622,432.

This month the net receivable balance increased $15,000. This was due to an increase in electricity billings in the amount of $28,000, which were higher in December than any month since meters were installed.

In connection with audit of termination procedures, and in conjunction with Internal Audit and Community personnel, arrangements were completed during the month for revision to accounts receivable procedure in presentation of final bills to electricity subscribers. The revised procedure provides for advising the terminating employee, where applicable, of final charges due for electricity consumption, and collecting such charges at the time the terminee clears through accounts receivable. This replaces our former procedure of mailing all final electricity bills.

Accounts written off as uncollectible during 1954 amounted to $9,089. Of the write-off total, $4,006 was applicable to Community type accounts, and $5,083 to Kadlec Hospital accounts. The percentage of accounts written off in relation to total charges booked as Accounts Receivable during 1954 amounted to .061 of 1% of Community type accounts, and .614 of 1% of Kadlec Hospital accounts.

Accounts at collection agencies at December 31, 1953 totaled 140 and amounted to $11,294. At December 31, 1954, 258 accounts were in the hands of collection agencies, and amounted to $18,341. The type and amount of accounts at collection agencies at December 31, 1954, may be segregated as follows: Kadlec Hospital, $10,193; telephone, $2,999; sundry, $2,302; rents, $2,176; and electricity, $671.

The age of all accounts at December 31, 1954, the percentage of such accounts to total receivables balance, and comparisons to like figures at December 31, 1953, may be summarized as follows:

	Total Balance	Current	30 to 90 Days	90 Days	Agency Accounts
December, 1954	$290 054	$186 775	$37 069	$47 869	$18 341
	100%	64%	13%	17%	6%
December, 1953	294 903	174 218	63 243	46 148	11 294
	100%	59%	21%	16%	4%

ACCOUNTS RECEIVABLE UNIT (Continued)

Disconnect notices were mailed to 228 telephone subscribers during the month, and the service of 31 subscribers was disconnected due to non-payment of bills. During the month 377 delinquent notices, and 121 final notices were mailed to electricity customers. The service of 12 customers was suspended due to non-payment of bills; however, these accounts were promptly paid and service restored.

The general ledger balance of Accounts Receivable - Kadlec Hospital decreased $8,411 during the month resulting in a balance of $93,798 at December 31, 1954. The present balance is $900 lower than the previous low balance of $94,700 at January 31, 1949.

Statistics for Accounts Receivable activities are given below:

Account	Balance 11-30-54	Net Charges	Collections	Balance 12-31-54	Number of bills issued during month
Kadlec Hospital:					
Active	$ 90 801	$ 59 184	$ 66 380	$ 83 605	1 287
Collection Agencies (99 Accounts)	11 408		1 215	10 193	
Sundry:					
Active	28 531	9 384	11 629	26 286	471
Collection Agencies (159 Accounts)*	8 458	380	690	8 148	
Telephone	33 852	52 676	50 545	35 983	6 872
Electricity	28 521	93 363	65 079	56 805	4 316
Equipment sales to Facilities (L Account)	23 732		349	23 383	
Rent	30 382	398 984	403 682	25 684	6 856
Sales to Cost-type Contractors	17 616	13 350	12 553	18 413	27
Safety Shoes	1 770	2 074	2 759	1 085	439
Loans to Employees (4 Accounts)	489		20	469	
Sub-total	275 560	$629 395	$614 901	290 054	20 268
Reserve for bad debts	31 262			28 743	
General Ledger Balance	$244 298			$261 311	

*Includes all utility and rental accounts.

12-1-83 ab

CONTRACT REIMBURSEMENTS

The November "Summary of Disbursements," transmitted to the Commission through the Chief of its Finance Division, covered disbursements totaling $5,941,682 as follows:

Payrolls and Payroll Deductions Disbursed	$3 901 353
Materials (including payments on requirements contracts) and Freight	2 079 236
Subcontracts and Agreements	56 604
Advances for Traveling and Living Expense	66 305
Miscellaneous Payments	204 976
Gross Disbursements	$6 308 474
Less: Revenue	366 792
Net Disbursements	$5 941 682

In preparing this report, a review was made of each of 285 items which comprised miscellaneous payments to establish their propriety, while all other disbursements were analyzed, classified, and summarized to disclose the nature of all of the expenditures made by HAPO during the month.

The revision of Financial Department authorizations continued and at the close of the month a new schedule was ready for issuance early in January. Administrative assignments included obtaining, editing and correlating Financial Department material for the functional and alphabetical sections of the plant telephone directory. General revisions were necessary because of the reorganization of the Department on November 1 and the change of employees' locations.

Seven approval letters, written in accordance with OPG 05.4 ("Work or Expenditures which Require AEC Reimbursement Authorization or Letter Approval"), were received from the Commission, as well as a "related services" approval letter, obtained in accordance with OPG 06.6 ("Approvals Required for Work Incidental to or Related to that Authorized by the Prime Contract"). Several approval requests had been directed to the Commission by departments other than Financial without prior review by the Contract Reimbursements group and the attention of the authors was called to the provisions of OPG 05.4

This group handled 22 inquiries on reimbursement problems during the month. More than a third of these came from personnel outside the Financial Department.

Organization and Policy Guide 05.4 was reviewed and suggestions made for changes in connection with a proposed revision.

1211887

GENERAL BOOKS UNIT

The balance of open advances from the A.E.C. decreased during December from $2,260,700 to $1,874,010. In order to maintain bank balances at approximately $2,000,000, in compliance with the Commission's request, $6,000,000 was advanced in December to cover estimated disbursements of $6,225,000. Actual disbursements for December exceeded the estimate by $150,000.

During December, the budget for travel and living expenses incurred by employees attending meetings of technical and professional societies was completed and is now being reviewed.

Further studies were made on the initiation of a procedure which would permit the works cashier to make cash disbursements for travel advances to employees and for refunds of overpayments on accounts receivable items. A procedure was prepared and is currently being reviewed by all interested personnel and is expected to be in operation in January.

A revision of form No. A-75-DS, a pocket-size travel and living expense record, has been drafted, approved and a supply is now being printed.

A suggestion was received and adopted from an employee of General Books Unit which will reduce the overtime work which has been necessary to receipt payments received by mail. This suggestion provides for the handling of this work by General Books personnel other than the cashier's office. No additional personnel will be required and a saving of approximately 50 - 60 overtime hours per month is anticipated.

Statistical data for December and the previous month, included for purposes of comparison, follows:

	December	November
Advances from A.E.C.		
Balance at beginning of month	$2 260 700	$2 027 383
Advances received from A.E.C.	6 000 000	6 175 000
Other cash receipts	362 940	366 791
	8 623 640	8 560 174
Less disbursements	6 749 630	6 308 474
Balance at end of month	$1 874 010	$2 260 700
Advances requested for subsequent month	$5 400 000	$6 000 000
Travel Advances to Employees		
Balance at beginning of month	$ 64 020	$ 70 506
Advanced to employees	47 452	67 398
	111 472	137 904
Less:		
Travel, living and conference expenses reported by employees	49 588	58 937
Cash refunded by employees	7 489	14 947
	57 077	73 884
Balance at end of month	$ 54 395	$ 64 020

CC-1171

GENERAL BOOKS UNIT (Continued)

	December	November
Outstanding Travel Advances to Employees		
Current	$ 45 014	$ 58 284
Outstanding over 30 days	9 381	5 736
Total	$ 54 395	$ 64 020
Travel, Living and Conference Expenses		
Travel and living expenses		
Off-site inspectors	$ 22 750	$ 20 816
Others	25 113	37 613
	47 863	58 429
Conference expenses	1 725	508
Total	49 588	58 937
Less:		
Expenses for trips which included attendance at Association Island conferences, temporarily transferred to Undistributed Costs	$ -0-	$ (14 245)
Expenses transferred to A.E.C.	-0-	285
Expenses charged to other G.E. components and carriers	1 938	2 142
Living expenses in excess of $9 per diem	1 074	(771)
Conference expenses	1 725	508
	4 737	(12 081)
Amounts determined to be payable by A.E.C.	$ 44 851	$ 71 018
Number of expense reports submitted by employees	244	293

PERSONNEL ACCOUNTING SECTION

MONTHLY REPORT

Participants in the General Electric Employees Savings and Stock Bonus Plan were given statements indicating the maturity value of bonds which they purchased in 1949 under the Plan, and which were still on deposit with the Company in December, 1954. Each participant was requested to surrender the custody receipts for the bonds to the Company so that the bonds, the stock bonus, and a check for the accumulated income may be delivered to them early in 1955.

Two hundred eighty Employee Sale Certificates were issued under the Employee Purchase Plan in December. This is a significant increase over the one hundred seventy-four certificates issued during November.

Pay day for nonexempt employees was changed from Friday to Thursday during the Christmas and New Year's weeks. Office Letter No. 204 was issued indicating the dates the Christmas and New Year's holidays were to be observed and setting forth the special arrangements for distribution of salary checks during the holiday weeks.

Approval of the AEC-HOO was received in December authorizing the granting of a six-month increase to Business Graduates hired early in 1954.

Reimbursement Authorization No. 238 was issued by the AEC-HOO on December 22, 1954 approving reimbursement of salaries paid to exempt employees under the new Salary Plan effective January 1, 1955.

Quarterly Wage and Salary report was forwarded to the AEC indicating the number of employees in each nonexempt classification at November 30, 1954 and the weighted average rates paid for each classification.

Section Managers were provided with lists of employees who had not taken all of their 1954 vacations as of November 30, 1954.

A round-table discussion with nonexempt employees was conducted by each unit supervisor in the sectuin during the month.

1211890

STATISTICS

Personnel Accounting Section

Number of HAPO Employees	Total	Monthly Payroll	Weekly Payroll
Changes during month			
Employees on payroll at beginning of month	8 863	2 288	6 575
Additions and transfers in	103	7	96
Removals and transfers out	(73)	(19)	(54)
Transfers from weekly to monthly payroll		5	(5)
Transfers from monthly to weekly payroll		(4)	4
Employees on Payroll at end of month	8 893	2 277	6 616

	December		November	
Overtime Payments During Month	Number	Amount	Number	Amount
Weekly Paid Employees	6 755	$104 400-a)	5 743	$ 87 640-b)
Monthly Paid Employees	378	33 827	404	37 844
Total	7 133	$138 227	6 147	$125 484

Number of Changes in Salary Rates and Job Classifications	December	November
Temporary Changes	107	84
Retroactive Changes	22	24
Normal Changes	927	833
Total	1 056	941

Gross Payroll Paid During Month	December	November
Engineering	$ 845 081	$ 799 113
Manufacturing	2 723 485	2 184 984
Other	1 335 702	1 111 994
Total	$4 904 268-a)	$4 096 091-b)

(a- Payments to weekly paid employees are for five week periods.
(b- Payments to weekly paid employees are for four week periods.

Employee Benefit Plans	Number Participating		Percent Participation	
Participation in Benefit Plans at Month End	December	November	December	November
Pension Plan	7 956	7 957	98.1%	98.0%
Insurance Plan				
Personal coverage	8 835	8 799	99.4	99.3
Dependent coverage	6 254	6 212	-	-
U. S. Savings Bonds				
Stock Bonus Plan	4 399	4 408	49.5	49.7
Savings Plan	1 156	1 150	13.0	13.0
Both Plans	5 011	5 017	56.3	56.6

1211891

	December	November
Pension Plan		
Number retired	1	0
Number who became eligible for participation	34	39
Number who applied for participation	32	37
Number who elected not to participate	2	2
Replies not received	0	0
Insurance Plan - Number of Claim Payments		
Employee life insurance	3	0
Employee accident and health insurance	427	436
Dependent accident and health insurance	375	414
Total	805	850
Good Neighbor Fund		
Number participating	6 296	6 279
Percent of participation	70.8%	70.8%
Suggestion Awards		
Number of awards	88	92
Total amount of awards	$1 285	$3 305
Preferential Rates		
Number (eliminated) or added	3	(1)
Number currently in effect	561	558
Number of Military Allowance Payments	3	6
Number of Payroll Deductions - Other than Taxes		
Barracks rent	5	6
Dormitory rent	531	534
Good Neighbor Fund	13 535	10 830
Hospital	527	466
House rent	5 078	5 092
Insurance	8 933	8 893
Pension	30 900-a)	25 200-a)
Safety shoes	534	533
Savings Bonds	19 095	15 539
Trailer space	136	142
Union dues	2 025	2 016
Other	174	115
Total	81 473	69 366

(a- Approximate number rounded to nearest hundred.

1211892

PROCEDURES AND COMPUTING SECTION
MONTHLY REPORT -- DECEMBER, 1954

GENERAL

The move of Computing machinery and personnel to the 713 Building was physically completed on December 9, 1954. All personnel of the Section, with the exception of Records Operations, is now located in the 713 Building.

The two Flexowriters arrived on December 15, 1954 and assembly of this equipment was begun on December 20.

Messrs. C. B. Poland and C. E. Thompson returned from the programming training course for the 702 Electronic Data Processing Machine at Poughkeepsie, New York on December 13, 1954. Conversion of existing IBM applications to the 702 has begun.

PROCEDURAL ANALYSIS

Forms Control reviewed 360 orders for forms during December covering 836,810 forms; 10 orders, amounting to 12,050 forms were rejected; 95 new forms were designed.

Intensive and detailed studies have begun on programming for the702 Computer. Classes were initiated to instruct Procedural Analysts in the complexities of this new equipment. Block diagrams of the present payroll system, as it will be computed by the 702 were completed.

A system of flow charts to be used for converting present punched card processes to 702 programming was developed and distributed. These flow charts will graphically display the logical, step by step, machine program through use of standard symbols.

Two IBM Technical Representatives are assisting in the preparation and schooling being conducted.

Employee & Public Relations Department

Exempt salary codes were revised, introducing a new 4 digit name code in place of the 5 digit code previously used. An IBM printed alphabetical listing was substituted for a card index system previously maintained by Salary Administration. This listing serves as a code record for assigning name codes to new exempt employees. Work is being done on a new card form to meet requirements of the new salary plan, with the change over scheduled in January 1955.

A preliminary survey was made of Kadlec Hospital records and an estimate of the cost to make a procedural analysis of clerical functions was developed and forwarded to the Manager - Employee and Public Relations for approval.

Engineering Department

A procedure was prepared and work initiated for making an inventory report of Research and Development documents for Classified Files.

With the concurrence of supervisors in Classified Files, Security, and Patrol Units, procedures were altered to combine inventory runs with certificates of destruction for excess copies. Work on panel wiring to accomplish these changes is 80% complete.

1211893

Initial steps were taken to prepare the Classified Files block diagrams for conversion to 702 programming.

Financial Department

Two consecutive four-day work weeks, combined with many requests for special year-end reports and changes in Social Security and pension rates, resulted in a heavy work load during the month.

Extensive changes were made to existing procedures and panel wiring to calculate new tax and pension deductions for Payroll. The new 1955 rates will be effective on checks dated January 7, 1955.

Effective with December cost reports, IBM reports on work order cost distribution were altered to provide a weekly cost-to-date report as well as an overrun report.

Special requests received from the Financial Department during the month included:

1. Prepare two vacation notice cards for each nonexempt employee showing name, payroll number, organization code, and eligibility date.

2. Change insurance rates of exempt employees according to rates of pay in effect January 1, 1955.

3. Prepare and verify withholding exemption certificates (Form W-4). Reproduce payroll master records to include corrected exemptions and provide necessary statistical compilations as requested.

4. Prepare procedures for listing paid-up insurance deductions.

5. Prepare procedures for summarizing and computing nonexempt wage rates by classification.

6. Provide procedures for calculating deductions for General Electric Stock Bonus Plan for year 1954.

The above procedures were completed and work is progressing on completion of these special reports.

Development of a Flexowriter test program was begun for use by Plant Accounting in compiling plant record unit history forms. The tape produced by the Flexowriter will be converted to punched cards for processing on IBM equipment.

A study was instituted to review and recommend retention periods for Financial records. A rough draft retention schedule was completed and submitted for approval of format. Studies will begin with cost records and IBM reports.

Manufacturing Department

Physical Inventory procedures were completed for Central Stores to print reports listing value of Standby Materials by caption and inventory account. A missing tag report will also be issued, showing numbers of inventory tags not given to IBM for processing.

A master file routine for Store Order and Work Order authorizations was developed for approval by Central Stores and Manufacturing Cost.

121894

RECORDS OPERATIONS

Quantity of Records received, processed, and stored:

Employee and Public Relations Department	26	Standard	Storage	Cartons
Engineering Department	8	"	"	"
Financial Department	123	"	"	"
Manufacturing Department	10	"	"	"
Radiological Sciences Department	15	"	"	"
	182			

Twelve cartons of records were destroyed.

NUMERICAL ANALYSIS

Report is included in Secret Document HW-34147-W.

COMPUTING OPERATIONS

During the month of November the following non-routine assignments were completed for customers:

Financial	15
Employee & Public Relations	6
Manufacturing	9
Engineering	14
Staff	1
Radiological Sciences	1
Operations Research	2
TOTAL	48

1211895

PROPERTY ACCOUNTING SECTION
MONTHLY REPORT - DECEMBER 1954

Plant Accounting Unit

In compliance with a request from the Manager-Manufacturing Plant Utilization Services, Schenectady, a report summarizing Manufacturing plant area square feet was forwarded. The report shows:

(In thousands of square feet)

Manufacturing Plant Area Reported at July 1, 1954		4,474
Additions:		
New Construction	473	
Remeasurement of Existing Facilities	38	
Warehouses and Shop Transferred from AEC	25	
Administration Area Space Vacated by AEC	3	
Total Additions		539
Deletions:		
Sale of Existing Facilities	9	
Transfer to AEC of Vacated Area in North Richland	71	
Unoccupied Tract Houses Behind the Barricade (Subject to AEC Disposition)	6	
Additional Area Assigned to Community Operations	3	
Total Deletions		89
Manufacturing Plant Area at January 1, 1955		4,924

Discussions were held with local AEC and representatives of the AEC Controller's Office relative to depreciation, capitalization and other plant and equipment accounting practices.

Segregation, inventorying and procedures applicable to the Community Telephone System are approximately 90 percent completed. The completion of inventories for Medical facilities and proposed capitalization policy, meeting the requirements of Uniform Hospital Statistics and Classification of Accounts, is scheduled for January 21, 1955. The inventory of these properties is being coordinated by Plant Accounting and the work accomplished by hospital personnel.

Project unitization reports were completed and distribution made for the following projects during the month:

CA-364	Aquatic Biology Laboratory Building 146-FR, 100-F	$492,637
CG-538	Redox Waste Line to 241-U Tank Farm	141,741
CG-564	Installation of Additional Ball 3X Equipment, 105-C Building	45,916

1211896

Plant Accounting Unit - continued

Unitization of 100-K Area is progressing satisfactorily with completion estimated at April 30, 1955. The unitization activities for the Purex facilities is well under way and at the end of December, six Blaw-Knox employees were engaged in the activities. The estimated completion of the unitization report is tentatively set at September 30, 1955. In connection with this work, weekly meetings are held with representatives of Blaw-Knox, AEC and GE in attendance. Currently, two Plant Accounting employees are assisting in this program. The detail work in connection with this unitization is programmed to reduce time and cost by use of the Flex-o-writer, with the possibility of an immediate application to an IBM system.

The unitization of Pile Modification (CG-558) is progressing in four areas. Plant Accounting personnel assigned to this activity are keeping current with the unitization as construction progresses. Completion of the unitization report will follow shortly after the physical completion of each area.

The reconciliation of the small tools inventory has been delayed due to lack of information from Minor Construction. This reconciliation and necessary adjustments will be completed during January.

Inventories of railroad rolling stock were taken during the month in conjunction with Transportation and Internal Audit personnel and was completed late in the month. Inventory reconciliations will be completed in January.

Reconciliation of Spare Equipment Held in Storage account has been temporarily delayed due to scheduling change in the IBM run of the physical inventory and further delayed due to a number of rechecks on the inventory cards. Verification of the IBM run to Kardex records maintained in Stores will be completed early in January and the reconciliation completed later in that month.

Work is progressing satisfactorily on the aging of sub-accounts which are under or over depreciated and not specifically covered in the current depreciation study. Work in connection with this review will be completed at the end of February.

Plant and Equipment Values at December 31, 1954 are:

	(In Thousands)		
	ASSET	RESERVE	NET
Completed Plant and Equipment	$737,239	$295,730	$441,509
Construction Work in Progress	37,240		37,240
Total Cost Recorded (GE Books)	774,479	295,730	478,749
AEC and Other Contractor Costs			
Land and Land Rights	5,476		5,476
Construction Work in Progress-1)	193,296		193,296
Total	$973,251	$295,730	$677,521

(In Dollars)	This Month	Last Month
(1-Kaiser	$120,350,470	$119,293,585
Blaw-Knox	49,408,684	45,340,620
AEC	23,536,384	22,018,342

1211897

Plant Accounting Unit - continued

A grievance concerning lack of heat in the 101 Plant Accounting offices was submitted during the month by 19 people in the Unit. The grievance was settled at Step One level.

The addition of one steno-typist increased Plant Accounting personnel to 41, comprising 7 exempt and 34 non-exempt.

Inventory Accounting Unit

The annual physical inventory of railroad and automotive parts in the custody of Transportation Section was taken as scheduled on December 15, 1954. Work is still under way in reviewing custodial records and procedures and analyzing source documents and other data to determine final amounts and reasons for any variances as disclosed by the physical inventory.

Final arrangements were made during the month with Stores personnel for taking the annual physical inventory of automotive and heavy equipment parts which are in Stores' custody and which are warehoused in the new Transportation Facility. This inventory is scheduled to begin on January 13, 1955.

All the designated control custodians for special materials, in compliance with Organization and Policy Guide 04.10, conducted a quarterly physical inventory of special materials as of November 30, 1954, and reported the results of their inventory to Inventory Accounting by December 10, 1954. Reconciliation of the individual reports with accounting records disclosed only minor discrepancies which are being investigated so that necessary adjustments can be made to custodial records.

A round table discussion was held on December 30, 1954. Except for two employees who were on vacation, all personnel were in attendance.

Following is a summary showing inventory account balances for the months of November and December 1954, together with the amount of change:

	(In Thousands) Book Balance 11/30/54	12/31/54	Increase (Decrease)
Current Inventories			
General Supplies	$ 1,539	$ 1,588	$ 49
Fuel and Lubricants	65	70	5
Essential Materials	3,498	3,660	162
Total Current Inventories	5,102	5,318	216
Special Materials	1,410	1,410	0
Spare Parts	2,873	2,915	42
Standby	48	48	0
Excess Materials	658	449	(209)
Total Inventories - Gross	10,091	10,140	49
Less: Spare Parts Inventory Reserve	(664)	(664)	0
Standby Inventory Reserve	(12)	(12)	0
Excess Inventory Reserve	(394)	(157)	(237)
Total Inventories - Net	$ 9,021	$ 9,307	$ 286
As a Memo: Excess Equipment	$ 1,161	$ 519	$ (642)
Excess Equipment Reserve	(823)	(171)	(652)

1211898

Inventory Accounting Unit - continued

Employees in Inventory Accounting at December 31, 1954, aggregated 13, comprising 4 exempt and 9 non-exempt. Following is a summary of personnel changes during the month:

	Exempt	Non Exempt	Total
Employees at beginning of month	4	8	12
Transfers in from Accounts Payable Unit	1	1*	2
Transfers out to Internal Audit Section	(1)	0	(1)
Employees at end of month	4	9	13

*Replacement for employee who is resigning in January 1955.

Property Management Unit

A decision has been reached by the Commission as to the equipment to be retained upon the termination of the current expansion. The plan calls for the retention of (a) special 105 Building jigs and erection tools, both here and at Bremerton; (b) special jumpers and welding jigs and erection tools for Purex; (c) the Batch Plant, aggregate plant, and associated equipment; (d) the machinery and equipment in the 2101 Building; (e) a contingency reserve pool of approximately 300 pieces of automotive and construction equipment; and (f) the White Bluffs machine shop will be held intact under Minor Construction and a decision reached as to its disposition upon completion of the Blaw-Knox contract.

The Commission has promulgated a change to the Controller's Manual which changes our current definition of Standby inventory and Spare Parts inventory. A series of conferences have been held with interested management and the Commission to arrive at a satisfactory solution to the problems involved. The matter is still under study.

Considerable work is involved in the segregation of scrap into the various categories required by the Commission. A study was made of the problems involved and recommendations submitted to AEC Property Management which, if adopted, will materially reduce the number of categories into which various types of metals must be segregated.

The Bonneville Power Administration took over the Richland-Benton Switch 115-KV line and the Thayer, Stevens and North Richland substations as of midnight, December 31, 1954.

Sixty-six requests for the disposal of property were investigated, processed and approved during the month.

1211899

Appropriations Unit

Project proposals and informal requests which were processed by Appropriations Unit and directives issued by the Commission during the month of December are shown in the following list:

Hanford 4X Program

CG-603 - Bismuth Phosphate Plants

Project proposal requesting $3,500,000 (including $39,000 previously authorized for the "T" Plant) for design, procurement and physical performance of work for the scope of work which is known to be required for the reactivation and for modification of the bismuth phosphate plants and design and procurement of critical materials, at such time as the need is established for those items of potential work yet under study was forwarded to the AEC November 18, 1954. Directive dated December 3, 1954, authorized $3,500,000.

CG-613 - Metal Conversion Plant

Preliminary project proposal requesting an interim authorization of $340,000 for design and procurement of critical materials for the Metal Conversion Plant portion of the 4X Program was approved by the Commission December 2, 1954.

CG-614 - 300 Area

Preliminary project proposal requesting an interim authorization of $130,000 for design and procurement of critical materials for the 300 Area portion of the 4X Program was approved by the Commission December 10, 1954.

CG-496 - Recuplex Installation - Building 234-5

Project proposal requesting additional funds in the amount of $328,000 (total project funds requested $1,928,000) to complete the installation of the Recuplex facility was forwarded to the Commission November 16, 1954. Directive dated December 10, 1954, approved an interim authorization of $1,650,000.

CG-539 - Additional Waste Storage Facilities for Redox

Project proposal revision requesting an increase of $274,654 over the previously authorized $3,300,000 for construction of a vapor manifold system and certain minor improvements, in addition to requesting GE management responsibility for this project, was forwarded to the Commission December 27, 1954.

CG-576 - General Improvements to Laboratory Area Buildings

Project proposal dated February 23, 1954, requesting $265,000 to correct inadequacies of the Laboratory Area facilities was returned unapproved by the AEC June 23, 1954, as it was felt many of the proposed items did not measure up to the current criteria of "essentiality". After discussions held between GE and AEC representatives, a revised proposal was prepared and resubmitted to the AEC requesting $230,000 (including $60,000 previously approved for improvements to Building 326) to correct inadequacies of the Laboratory Area facilities and was approved by the Commission December 10, 1954.

1211900

Appropriations Unit - continued

CA-586 - First Capacity Increase - 230 KV System

Project proposal dated May 4, 1954, requested $1,390,000 (GE $65,000) to supplement the existing 230 KV electrical transmission system with an additional line, including necessary breakers and terminal equipment, from the Bonneville Power Administration Midway Substation to the Hanford Production Areas. This proposal, which included the acquisition through Government transfer of an existing 230 KV line built and energized in 1949 by the Bonneville Power Administration, was returned by the AEC July 20, 1954, for further consideration. The Commission requested a detailed review of the operating procedures, the design scope and the leasing of the existing BPA line rather than purchase.

A proposal revising only those items which had changed since the submittal of the original proposal and requesting $1,500,000 (GE $92,000) for the work described in the original proposal was forwarded to the Commission for approval November 1, 1954. Directive dated November 26, 1954, authorized AEC $1,100,000 for this project with the stipulation the 230 KV line be acquired by lease instead of purchase. Work Authority dated December 9, 1954, authorized GE $92,000.

CG-602 - Remote Sampling Equipment - Hot Semiworks

Revision to the project proposal, dated December 27, 1954, requesting an increase of $10,000 to the funds previously authorized was forwarded to the AEC December 29, 1954.

CA-606 - Additional Office Space - Central Stores Warehouse

Project proposal requesting $125,000 (GE $10,000) for building modifications required to consolidate Purchasing, Stores, Accounts Payable and Inventory Accounting activities in one central location was forwarded to the AEC for approval November 3, 1954. Letter from D. F. Shaw to W. E. Johnson dated December 21, 1954, requested additional information in regard to the justification which is to be discussed at a meeting on January 4, 1955, in Mr. Shaw's office.

On January 5, 1955, a meeting was held in D. F. Shaw's office for the purpose of furnishing information requested by the Commission. In the discussion that ensued the Commission expressed a reluctance to convert the warehouse space to use as office space because they felt that in the near future additional warehouse space would probably be required. The Commission maintained that office space in the 101 Building (3000 Area) presently being used by GE personnel could continue to be used beyond July, 1955, the date tentatively set for the Army taking over the North Richland facilities.

Also, the Commission stated that the 2101 Building could continue to be used for the storage of spare equipment since no graphite machining appeared likely in the foreseeable future.

CA-607 - Additional Records Storage Facilities - 712 Building

Project proposal requesting $96,000 (GE $11,000) for increasing the Hanford record storage space by constructing an addition to the existing 712 Building was forwarded to the Commission October 22, 1954.

211901

Appropriations Unit - continued

CG-611 - Mobile Laboratory for Environmental Monitoring

Project proposal requesting $26,000 to provide mobile laboratory facilities for monitoring environmental samples in the field was forwarded to the Commission November 12, 1954.

CA-612 - Alteration of Building 713 for Electronic Data Processing Machine

This project proposal requests funds in the amount of $171,000 for modifications to the 713 Building necessary to accommodate installation of the 702 Electronic Data Processing Machine. Work Authority dated December 20, 1954, authorized GE an increase of $8,300 over the previously authorized $6,000 for a total of $14,300 to carry on the design work.

CG-616 - Installation of Acid Feed Equipment

Request for interim authorization of $15,000 for the design and initiation of design for the installation of acid feed equipment in the 100-B, C, D, DR, F and H Areas was forwarded to the Commission December 28, 1954.

CG-617 - Additional Air-Drying Facilities - Building 234-5

Project proposal requesting $42,000 for the design, procurement and installation of additional air-drying facilities in Building 234-5 was forwarded to the Commission December 23, 1954.

12 1902

Organization problems encountered temporary delays which are expected to be resolved by February 1, 1955. Separations Area activities continued the revisions of the SF accounting system for TBP and UO_3 processes on schedule. Further progress was delayed by the temporary postponement of the personnel transfer from Manufacturing. Similar delays were encountered in the establishment of the SF Reactor Area Unit.

Normal Uranium

Normal Uranium activities centered on the activation of a new canning line, reduction of Technical holdings of sludge in process with preliminary preparations made for off plant shipment, and in the recycle of cored slugs. Moisture problems and AlSi penetration of the weld appear to be the cause of the present cored slug problem.

Overall controls continue in a high degree of efficiency with Material Over or Under Accounted For only a small fraction of the throughput.

Depleted Uranium

The Standard SF accounting system now being installed is under its first "dry" run at TBP and UO_3. This system is directed towards uniform methods of SF accounting and has additional advantages in that equalization of work load, and a firmer control on adjustments is provided.

Concurrent development of material for evaluation has made significant contributions to Redox Physical Inventory Manual requirements with approximately 75% of the assignment accomplished.

Several SF Measurement problems have been reevaluated for purposes of definition. SF Separations Area has now turned these over to SF Measurements Unit for final determination.

Redox "Source Data" records have been indexed and reviewed by GE Security for classification decision. The procedures have been firmed up with storage period extended to conform with the recommendations of GE Internal Audit.

A major problem has been raised as the result of Classified Files' retroactive decision to extend control to "S" documents. Application of their decision will be restricted to "Blue Data Sheets" and to "Comprehensive Data Sheets" insofar as SF Accountability is involved. The "S" series of documents are issued by Manufacturing-Separations Operations.

Waste Losses for Redox, TBP and UO_3 presented a major SF measurement problem. Analytic difficulties resulted in systematic bias on the low side. Adjustment for fiscal year to date amounted to approximately 20-25% of the previous reported underage.

Redox dissolver heels have been a continuing SF Measurement problem and are now under cooperative review. New calibration tables for H-7, E-3, and E-12 which are key measurement points have been approved and should improve source data originating at these points.

Due to the distance involved, transportation of material from Redox to UO_3 has been under question. Further checks may be warranted and the installation of a receiving tank at UO_3 is under consideration.

Inventory verification of the Technical Sub-Sections progressed on schedule.

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SF Accounting

The reorganization of the SF Accountability Section included the transfer of the Consolidated Material Balance Report to the SF Accounting Unit. This transfer was completed during December. In addition to the transfer, improved security control was established and approved by AEC Security.

A major SF Accounting problem was developed by the reorganization of the Technical Section. The problem is under investigation having as its objective a standard reporting form for use by the Engineering Department.

Personnel

One weekly roll personnel was transferred by Manufacturing at the time of the assumption of service functions in 234-5 Bldg. In addition, the SF Accounting Unit filled a Secretary "C" vacancy and the SF Reactor Area Unit obtained one employee by transfer from Technical.

Requests To Ship - Transfer, etc.

Fourteen Requests were processed during the month with one unusual incident acknowledged as due to error by Receiver. Reconciliation effected.

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FINANCIAL DEPARTMENT PERSONNEL AND ORGANIZATION

DECEMBER, 1954

	Current Month	Prior Month
Personnel Changes During Month		
Employees at beginning of month	466	466
Additions and transfers in	7	6
Removals and transfers out	(6)	(6)
	467	466
Personnel by Unit at Month-End		
General	10	10
Auditing Section	17	17
Budgets and Measurements Section	8	7
Contract Cost Section		
General and Consolidations Cost Unit	11	11
Engineering Cost Unit		
General	5	5
Design Cost	6	7
Project Cost	15	15
Technical Cost	11	11
Employee and Public Relations Cost Unit		
General	2	2
Plant Activities Cost	10	10
Community Cost	6	6
Medical Cost	3	3
Manufacturing Cost Unit		
General	2	2
Financial Representatives	7	7
Budgets and Control	17	18
Reports and Records	19	19
Analysis and Studies	3	3
	117	119
General Accounting Section		
Accounts Payable Unit	27	30
Accounts Receivable Unit	21	22
General Books Unit	19	19
Administrative Planning	3	2
Contract Reimbursements	5	5
	75	78
Personnel Accounting Section		
Payroll Planning and Analysis Unit	7	7
Weekly Payroll Unit	18	18
Monthly Payroll Unit	12	12
Benefit Plans Accounting Unit	11	11
Payroll Reports Unit	7	7
Weekly Payroll Records Unit	8	8
	63	63

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	Current Month	Prior Month
Procedures and Computing Section		
Computing Operations Unit	24	24
Numerical Analysis Unit	10	11
Procedural Analysis Unit	15	15
Scheduling Unit	25	23
Records Unit	8	8
	82	81
Property Accounting Section		
Appropriations Unit	5	5
Inventory Accounting Unit	12	12
Plant Accounting Unit	40	39
Property Management Unit	4	4
	61	60
SF Accountability Section		
Reactor Area - SF Accountability Unit	1	1
Separations Area - SF Accountability Unit	11	11
Metal Preparation Area - SF Accountability Unit	7	6
SF Accounting Unit	6	4
SF Measurement Unit	7	7
	32	29
Rotational Trainees	2	2
	467	466

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PROCEDURES & COMPUTING SECTION
MONTHLY REPORT - DECEMBER 1954

GENERAL

The move of Computing machinery and personnel to the 713 Building was physically completed on December 9, 1954. All personnel of the Section, with the exception of Records Operations, is now located in the 713 Building.

The two Flexowriters arrived on December 15, 1954 and assembly of this equipment was begun on December 20.

Messrs. C. B. Poland and C. E. Thompson returned from the programming training course for the 702 Electronic Data Processing Machine at Poughkeepsie, New York on December 13, 1954. Conversion of existing IBM applications to the 702 has begun.

PROCEDURAL ANALYSIS

Forms Control reviewed 360 orders for forms during December covering 836,810 forms; 10 orders, amounting to 12,050 forms were rejected; 95 new forms were designed.

Intensive and detailed studies have begun on programming for the 702 Computer. Classes were initiated to instruct Procedural Analysts in the complexities of this equipment. Block diagrams of the present payroll system, as it will be computed by the 702 were completed.

A system of flow charts to be used for converting present punched card processes to 702 programming was developed and distributed. These flow charts will graphically display the logical, step by step, machine program through use of standard symbols.

Two IBM Technical Representatives are assisting in the preparation and schooling being conducted.

Employee & Public Relations Department

Exempt salary codes were revised, introducing a new 4 digit name code in place of the 5 digit code previously used. An IBM printed alphabetical listing was substituted for a card index system previously maintained by Salary Administration. This listing serves as a code record for assigning name codes to new exempt employees. Work is being done on a new card form to meet requirements of the new salary plan, with the change over scheduled in January 1955.

A preliminary survey was made of Kadlec Hospital records and an estimate of the cost to make a procedural analysis of clerical functions was developed and forwarded to the Manager - Employee and Public Relations for approval.

Engineering Department

A procedure was prepared and work initiated for making an inventory report of Research and Development documents for Classified Files.

With the concurrence of supervisors in Classified Files, Security, and Patrol Units, procedures were altered to combine inventory runs with certificates of destruction for excess copies. Work on panel wiring to accomplish these changes is 80% complete.

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PROCEDURAL ANALYSIS (continued)

Initial steps were taken to prepare the Classified Files block diagrams for conversion to 702 programming.

Financial Department

Two consecutive four day work weeks, combined with many requests for special year-end reports and changes in Social Security and pension rates, resulted in a heavy work load during the month.

Extensive changes were made to existing procedures and panel wiring to calculate new tax and pension deductions for Payroll. The new 1955 rates will be effective on checks dated January 7, 1955.

Effective with December cost reports, IBM reports on work order cost distrubution were altered to provide a weekly cost-to-date report as well as an overrun report.

Special requests received from the Financial Department during the month included:

1. Prepare two vacation notice cards for each nonexempt employee showing name, payroll number, organization code, and eligibility date.

2. Change insurance rates of exempt employees according to rates of pay in effect January 1, 1955.

3. Prepare and verify withholding exemption certificates (Form W-4). Reproduce payroll master records to include corrected exemptions and provide necessary statistical compilations as requested.

4. Prepare procedures for listing paid-up insurance deductions.

5. Prepare procedures for summarizing and computing nonexempt wage rates by classification.

6. Provide procedures for calculating deductions for General Electric Stock Bonus Plan for year 1954.

The above procedures were completed and work is progressing on completion of these special reports.

Development of a Flexowriter test program was begun for use by Plant Accounting in compiling plant record unit history forms. The tape produced by the Flexowriter will be converted to punched cards for processing on IBM equipment.

A study was instituted to review and recommend retention periods for Financial records. A rough draft retention schedule was completed and submitted for approval of format. Studies will begin with cost records and IBM reports.

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Manufacturing Department

Physical Inventory procedures were completed for Central Stores to print reports listing value of Standby Materials by caption and inventory account. A missing tag report will also be issued, showing numbers of inventory tags not given to IBM for processing.

A master file routine for Store Order and Work Order authorizations was developed for approval by Central Stores and Manufacturing Cost.

RECORDS OPERATIONS

Quantity of records received, processed, and stored:

Employee and Public Relations Department	26	Standard	Storage	Cartons
Engineering Department	8	"	"	"
Financial Department	123	"	"	"
Manufacturing Department	10	"	"	"
Radiological Sciences Department	15			
	182			

Twelve cartons of records were destroyed.

NUMERICAL ANALYSIS

Work on procedures for processing data from KW reactor is nearing completion. During the first two months of operation of this reactor, individual tube flows, powers, exposures and reactivity residuals are to be computed in the Computing Unit machine facility. Approximately ten pressure maps and 135 temperature maps are to be processed during the two-month period. The temperature maps will be in the form of perforated tapes made on the KW Flexowriter. Approximately 2.5 hours are required to transcribe information from a single tape to punched cards, using the tape-to-card converter. A documented report will be issued for each temperature map processed.

Operating limits for D reactor are presently being calculated. In order to increase the production of this reactor, it was decided to raise the allowable outlet temperature and operate the reactor under "trip before instability" limits. These limits differ from the previously calculated "trip before boiling" limits, in that boiling is allowed if it does not reach the point at which a stable flow through the tube is restricted by buildup of back pressure. The calculations involve the processing of panellit gage readings to yield individual tube flows and trip "sensitivities". The actual limits are being read from a graph of sensitivities, since there has not been time to render this graphical relation into analytical form. The formulation of the problem in its present scope is almost identical to that of the earlier boiling limits problem. Calculations pertaining to the reorificing of D reactor were completed this month. There is a possibility that a post reorificing analysis may be made.

Using data from the discharge file at 100-H production scheduling, an analysis was made of the exposure and average power of certain types of metal. Average powers were calculated by dividing the accumulated exposure by the number of effective days the charge was in the pile. A frequency distribution was then made for each metal type, showing the number of tubes falling within a given interval of power and exposure. Metal types studies to date include 3M, 6M, 7M, 18M, 19M & 24M. This work is being done to investigate the effect of metal type on slug rupture.

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NUMERICAL ANALYSIS (continued)

Further study was made of the data resulting from the Project Bluenose single column experiment. It appears that the data on the outlet temperature of the tube is in error, due to incorrect calibration. The flow data is also being subjected to a statistical test to determine whether the deviations noted in this variable are a result of a drifting, hence incorrectly calibrated, recording instrument. From this investigation it will be decided how much of the calculation must be repeated.

An extensive revision of weather tower data is presently being made to make possible a comprehensive analysis and summary of data accumulated since 1950. Variables which will enter into this analysis include temperature, wind speed, and wind direction as a function of tower height; and a quantity called stability, which is a measure of the vertical temperature gradient, important in forecasting air movements. Work is also being done on a closely associated problem, that of the analysis of wind persistency, or the tendency of wind speed or direction to maintain the same value over a period of time. Data for this analysis was taken from the routine wind study procedure, and is being tabulated to count "runs" of given wind speeds at intervals of one hour.

In support of calculations to be carried out on the ORACLE computer at Oak Ridge National Laboratory, a table of factors used in determining the effective absorption cross section of plutonium was prepared. These factors had been calculated previously offsite, but were believed to be in error. The present table was prepared to correct the error and to extend the original table. The calculations consisted of a series of numerical integrations of plutonium cross-sections weighted by the corresponding Maxwellian distributi The results are reported in HW-34162.

Work on the preparation of multiple collision density tables this month consisted of the calculation of the second collision density function $\pi_2(X,T)$ for $X = 1.00$ and 20 values of T. The attempt to interpolate this function was unsuccessful as the calculated points were subject to considerable computational error, and did not fall on a smooth curve. Attempts are being made now to smooth this data, so that the calculation of the third collision density function may proceed. Using results obtained previously, a table of slug blackness was prepared for a number of values of uranium capture cross-section.

Additional calculations were completed on the unsteady state temperature of a slug in a runaway pile. Parameters allowed to vary were the time between pile shut down and loss of coolant, and the time after loss of coolant that the temperature is desired. A total of 432 cases were calculated.

Upon the return of C. E. Thompson of the Numerical Analysis, who has been attending an IBM Symposium on the 702 Calculator in Poughkeepsie, work was started on the development of an assembly program for use with the 702 Calculator. This assembly program is a technique for allowing the programmer to code problems in abbreviated and more convenient notation, and turn over to the 702 the task of interpreting the abbreviated coding and preparing the equivalent coding in language intelligible to the machine. This assembly routine is being developed for use by members of both the Procedural and Numerical Analysis Units. Provision will be made for automatically inserting in a program a variable number of subroutines, the number and type depending on the particular application. Work on the development of basic subroutines in scientific calculations is presently being carried out by members of the Numerical Analysis Unit.

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COMPUTING OPERATIONS

During the month of December the following non-routine assignments were completed for customers:

Financial	15
Employee & Public Relations	6
Manufacturing	9
Engineering	14
Staff	1
Radiological Sciences	1
Operations Research	2
TOTAL	48

Service charges for the month amounted to $50,434.94. Services, by customer, were as follows:

	Computing Operations	Computing Scheduling	Total	Percenta
Atomic Energy Commission	$ 127.02	$ 140.64	$ 267.66	1 *
Operations Research Study	137.14	34.52	171.66	1 *
Employee & Public Relations	605.66	139.23	744.89	2
Engineering	9 730.25	3 688.20	13 418.45	25
Engineering - Projects	432.84	46.65	479.49	1 *
Manufacturing	816.31	374.01	1 190.32	2
Financial	24 579.84	9 036.09	33 615.93	67
Radiological Sciences	357.96	188.58	546.54	1
	$36 787.02	$13 647.92	$50 434.94	100

* Less than 1%

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OPERATIONS RESEARCH STUDY

MONTHLY REPORT
DECEMBER, 1954

The following is the month end summary of personnel:

	As of 11-30-54			As of 12-31-54			Net Change		
	Ex	Non-Ex	Total	Ex	Non-Ex	Total	Ex	Non-Ex	Total
General	1	1	2	1	1	2	0	0	0
Operations Research Analysts	5	0	5	5	0	5	0	0	0
TOTAL	6	1	7	6	1	7	0	0	0

Mr. P. M. Thompson visited the RAND Corporation of Santa Monica, California on December 13 and 14 to use the RAND Corporation computing equipment and discuss the mathematical formulations on the production planning operations research program.

Production Planning

On November 29 and 30 the first large computer test run was made on the Operations Research Production Planning program on the IBM 701 computer at the RAND Corporation, Santa Monica, California. A dynamic linear programming problem stated in a 99 x 213 matrix was solved in six and one-half hours. A few minor errors were found in the input data and to be certain of the correctness of the final answers, the problem was rerun on December 13 and 14 at RAND; this time taking seven hours. The second computer run produced a two year production plan by quarters, using assumptions previously agreed upon with the Manufacturing Department. This plan will be subjected to detailed examination by the Manufacturing Department, the Financial Department, and Operations Research Study personnel. Preliminary examination of the results indicate that efficient and effective production planning can be obtained rapidly, and that important financial information can be obtained in the process.

Plans are now being made with the Manufacturing Department and the Financial Department to give some of their personnel extensive exposure to the mathematical planning methods developed in this operations research program to enable them to make use of this managerial tool. Meanwhile mathematical and computational research and development to improve the methods and to prepare for running production plans on the IBM 702 computer that will be installed at HAPO next June is continuing.

One of the most important results of computing these first plans was the recognition of the importance of the assumptions regarding the terminal conditions that are necessary when devising a production plan for a finite period. Certain improvements have been made in the mathematical model that is being used to insure that reasonable terminal conditions will exist at the end of the planning period. These changes will be tested in another computer run in January. Our experience has also shown the importance of extremely thorough error-locating or "editing" routines. Procedures have now been developed for use on our punched card machines that should locate

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readily the kinds of errors that can appear in the thousands of items of input data for these large problems. From what we can learn the problem of errors in input data is a serious one for everyone solving large linear programming problems.

It now appears that Hanford will make significant theoretical and operational contributions to the methodology of solving large linear programming problems. Two theoretical questions that have arisen in connection with this problem are presently under investigation. The first is concerned with developing an algorithm which will reduce to a minimum the number of iterative cycles necessary to achieve an optimal solution to a linear programming problem, while the second is concerned with obtaining a complete listing of all optimal solutions in the event there are alternates of equal value available. Methods have been developed to accomplish both these tasks, but further study is required to determine the amount of computational effort involved.

Production Control

In cooperation with the Manufacturing Department, it has been decided to have data from KW startup processed by the Computing and Procedures Section of the Financial Department in such a fashion that comparatively exact tube powers, and consequently tube exposure, can be obtained. This will provide the opportunity for confirming on a large scale the degree of improvement in present exposure calculations which is advisable from a control viewpoint. The usefulness of many possible auxiliary calculations can also be more completely justified. In the meantime, extensive study of a smaller amount of data previously obtained by the Manufacturing Department is being continued.

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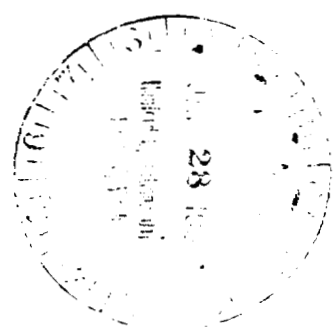
JAN 23 1955
700 AREA
CLASSIFIED FILES



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