Route List

1. ~~WD Norwood~~
2. ~~DE Lauder~~
3. EM Parker (saw this copy 1-16-48)
4.
5.

[redacted]

FILE [redacted]

DATE 12/31/47

SUBJECT Rough Draft H.I. Section Rept. for Month of December 1947

TO WD Norwood

FROM EM Parker

[redacted]

WD Norwood
DE Lauder
EM Parker

WDNorwood 1/15/48
DEL 1/15/48

DECLASSIFIED

December 31, 1947

c.1 - WD Norwood - DH Lauder
HM Parker

Classification Cancelled (Change) to declassified
By Authority of RLO-CG-4
by W.A. Snyder
on 4-4-91

THIS DOCUMENT CONSISTS OF 16 PAGES

[redacted]

MEDICAL DEPARTMENT

DECEMBER 1947

GENERAL

Mr. Leon C. Pullen, Jr. joined the medical staff as hospital administrator.

There was no record of general body radiation overexposure this month, nor was there any evidence of occupational disease or injury as a result of radiation.

The probable origin of the active specks has been determined, and engineering steps to try to correct the condition have been started.

H. M. Parker was an active member of a national group which met in Boston to discuss present and proposed radiological definitions. He also visited the laboratories at M. I. T. and Harvard Medical School.

Mr. Souder, Hospital Consultant for A. E. C., visited the project and offered helpful advice in formulating final plans for additional medical facilities for Richland and North Richland.

Dr. Herman Smith, Hospital Consultant from Chicago, also spent several days working on the final plans for medical additions.

Projects covering additional medical facilities for Richland and North Richland were approved, and actual work of moving the Pasco Air Base medical unit to North Richland was started.

Absenteeism due to sickness increased slightly. Respiratory infections was the monthly health topic.

The average daily hospital bed census was 79, which compares with 72 for [illegible]. Clinic visits increased [illegible] over the previous month.

Contagious disease increased 100%. Mumps accounted for a large part of this [illegible]

[redacted]

[redacted]

Medical Department

HEALTH INSTRUMENT SECTION

Organization

The composition and distribution of the force as of 12/31/47 was as follows:

	100-B	100-D	100-F	200-W	200-E	300	700	P.G.	Total
Supervisors	0	1	3	7	3	12	4	0	30
Engineers	1	4	6	11	13	5	1	0	41
Others	0	11	15	51	22	47	8	5	159
Clerical	0	0	0	0	0	2	3	0	5
Total	1	16	24	69	38	66	16	5	235

This represents an increase of 69 people, or 42% in the past year.

General

The origin of the particulate contamination in the Separations Plant areas is believed to be established. Engineering steps to correct the condition have been initiated. The investigations of age and other properties of the radioactive particles have now been assigned lower priority. It has been deemed advisable to continue the biological tests on the exposure of animals to this form of radiation.

H.M. Parker visited Boston, Mass., to take part in conferences on new radiological units. He also visited the laboratories at M.I.T. and Harvard University Medical School. P.L. Eisenacher visited the test station on Mount Rainier and made special measurements in the Swedish Hospital, Seattle, Wa.

Annual Summary

A reduction in the number of principal overexposures and potential overexposures was noted this year. Twenty-nine Class 1 incidents and two Class 2 incidents were reported and investigated. One of the Class 2 incidents concerned an H.I. inspector with an apparent exposure of 5 rep, according to the film badge. This film was unevenly darkened, representing very local exposure only. No cause was found. The other incident showed a finger exposure of 300 mr, due to improper handling of a Pile discharge operation. Although listed as a technical overexposure, this amount of radiation on the fingers, when not repeated, is certainly inconsequential. As far as general body exposure to penetrating radiation is concerned, all employees have received more exposure in the annual X-ray [illegible] than in the course of a year's work in the [illegible].

During the year, 1,[illegible] pencils were read. The [illegible] included [illegible] [illegible] the significant reading was between [illegible] and [illegible] mr. None of [illegible]

readings above 280 mr, of which only one (the H.I.inspector referred to above) was confirmed. There were 60 substandard readings due to lost or damaged pencils, and 23 of these coincided with lost badge readings. This was a sharp increase over the previous year, occasioned at least in part by the progressive wear on the fragile pencils. This is the first year in which better pencil performance has been reported from locations other than Hanford. The obsolete stock is to be replaced in the near future. In all, one record in 2500 has shown a potential high reading, but all except 24, or one in 26,000, have been denied by associated badge readings.

The number of film badges processed was 279,396. This included 1211 readings between 100 and 300 mrep, and 22 above 300 mrep. These occurred predominantly in the 300 Area uranium handling program, and represent a considerable increase over the 1946 figures. Defective films of all classes totaled 1,048, a dismal increase in view of last December's statement that "improper manipulation by various mechanisms has now been largely eliminated". Two major accidents, one by storage in a damp place, and the other by a dark room error, accounted for 939 defective results.

Other yearly totals of interest showed 841,161 items monitored in the Plant Laundry, which is now overloaded, and 742,832 recorded hand counts. Approximately one in 490 hand counts exceeded the warning limits. This is a real improvement over previous figures, due to increasing awareness of and action on the problem throughout the Plant. There were, however, 101 cases in which there was no recorded attempt to effect decontamination, and 4 cases in which the attempts were incompletely successful.

Thyroid checks for accumulation of I^{131} fell to 4,610. This service is tied to the medical recheck system, which has been reduced in frequency. Since there has been no positive result from the inception of the thyroid check, there is no objection to this reduction of tests. Of the 4,137 tests for plutonium in urine, no positive result has been confirmed in the 74 required rechecks.

In review, it again appears reasonably certain that there has been no significant general body exposure, and no serious ingestion or inhalation of active material. There is a remote possibility of damage arising from the recently found particulate contamination, but no evidence that such has occurred. Hand exposure, considered a potential source of trouble last year, has been better controlled.

The service work of the organization has been maintained at about the same technical standard with an overall load increase of 20 - 30%. The increases were concentrated in the second half of the year. Rather slow progress has been made in extending the types of service offered, and in keeping pace with improvements in the art. This is largely due to the inadequacies of the H.I. Development force. Unless corrected, this will eventually reduce the margin by which the local H.I service is more effective than that of most other Project locations. The proposed biological program, with the exception of fish studies, has similarly made poor progress in 1947.

The training of new personnel in H.I. functions has improved greatly, and two sessions of formal training have been completed. A reasonably good lecture [redacted] been prepared for this activity.

[redacted]

Medical Department

OPERATIONAL DIVISION

100 Areas

Work Permit Summary

	November	December	1947 Total
100-B	118	86	1900
100-D	867	831	8950
100-F	218	274	2994
Total	1063	1891	18344

Retention Basin Effluent

The activity of the water leaving the Retention Basins was as follows:

	100-B	1947 Average	100-F	1947 Average
Power level	275	205	275	215
Average beta dosage-rate (mrep/hr)	0.5	0.5	0.7	0.5
Average gamma dosage-rate (mr/hr)	1.4	1.2	1.6	1.3
Average total dosage-rate (mrep/hr)	1.9	1.7	2.3	1.8
Average integrated dose in 24 hrs. (mrep)	46	42	55	44
Maximum integrated dose in 24 hrs. (mrep)	53	53	60	79

A leak in the F Area effluent line between the Pile Building and the Retention Basin was discovered on the last day of the month. The leak had broken ground in a bubbling action but was absorbed in the surrounding sand. Readings of 6.5 mrep/hr were obtained directly over the break.

100-B Area

All work here was of an incidental nature.

100-D Area

The storage basin was emptied to allow replacement of the entrance plates and chute linings which had caused pile-ups of discharged metal in the chutes. As the water level dropped, the metal slugs were discovered in the "A" chute and were recovered with only a slight exposure to personnel.

During the removal of process tube #976, a maximum personnel exposure rate of 300 mr/hr was experienced about 10 feet out. As [illegible]

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Medical Department

Several air filter samples were taken in the machinery room and adjacent areas with a maximum concentration of 2×10^{-4} µc/liter reported. Half-life studies of this sample showed two components, one with a half-life of about 15 minutes; the other, a half-life of about 66 minutes. High airborne contamination in this location is sporadic and unexplained. It seems to be the same contamination routinely observed in the storage area, transfer area and sample rooms.

Van Stone inspection continued under nominal exposure levels with the chief hazard still that of contamination. Two instances of coverall contamination occurred when rear face tubes were opened, but no personnel contamination was reported.

Radioactive gas was prevalent over the front face of the pile and in the work area during the greater part of the month. The source of the gas is undoubtedly the bellows of tube 3067 which still shows a very bad leak. The condition was aggravated during high winds, but was somewhat improved by the operation of an additional exhaust fan.

Returned casks and cask boxes continued to show some contamination. A maximum reading of 1.5×10^{5} d/m was reported on one cask due principally to polonium. Readings on the outside of boxes were generally low.

Significant sources of fast neutrons were reported during the month as follows:

Experimental Level	"F" hole - right side	34 mrem/hr
Experimental Level	"E" hole - right side	12.8 mrem/hr
Top of pile	At rail next to rod 37	23 mrem/hr

100-F Area

The ionization chamber in the "A" experimental hole was replaced by the Instrument Department with little difficulty. The old chamber showed very little activity when removed, but the inside steel and masonite plug read 300 mr/hr at 6 to 8 feet. Personnel exposure rates up to 2 roentgens per hour were reported while the plug was being shielded, but total exposures did not exceed 50 mr. Pieces of masonite fell away from the plug as it was removed from the hole, and dropped to the levels below. These pieces were later recovered and disposed of as contaminated waste.

[illegible]

[redacted]

Medical Department

During the regular discharge operation on tube 4153, four dummy pieces lodged on the 10' catwalk and were pushed into the basin by means of a long pole. Personnel exposure was very slight.

During work on the thermocouple conduit line at the 0' level on the rear face three persons received contamination to their personal clothing, part of which was confiscated for decontamination. One man showed some contamination on his hair but this was removed by a shower. No other body contamination was detected.

The #2 horizontal rod was inspected in a maximum dosage rate of 2 roentgens per hour 6 feet from the rod tip. The resultant dose to personnel was less than 50 mr. Surface contamination to the extent of 2 rep per hour was observed on the floor under the #9 rod in the inner rod room.

A fast neutron survey of tubes 1682 and 1686 on the front face of the pile showed a dosage rate of 120 mrem/hr. These tubes were empty except for grooved steel pieces in each end. Additional shielding reduced the readings to normal levels. A slow and fast neutron survey of the horizontal expansion joints on the front face of the pile showed no positive readings.

200 Areas, T and B Plants

General Statistics

	November			December			1947
	T	B	Total	T	B	Total	Total
Special Work Permits	276	415	691	364	401	765	8809
Routine & special surveys	370	326	696	343	348	691	[illegible]
Air monitoring samples	376	420	796	353	454	807	5979
Thyroid checks	157	172	329	164	175	339	[illegible]

Canyon Buildings

The 17-1 agitator in the T Plant failed during the month and was interchanged with equipment from 18-1. An air sample taken during this work showed a result of 1.4 x 10^{-9} μg Pu/cc. Considerable product contamination was encountered during repair work of the 17-1 agitator in cell 18 B but was well controlled. High levels of [illegible] were encountered for short periods [illegible] [illegible] 17-1 [illegible], and [illegible] [illegible]

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Contamination between the 13 L cell blocks in the B plant which resisted normal decontamination efforts with acid was significantly reduced when a small piece of paper was discovered and removed. A dosage rate of 35 rep per hour was reported on the paper. Exposure-rates up to 3 rep per hour were reported on decontamination of sampling equipment.

Central Laboratory

A total of 540 non-regulated items was found contaminated on surveys by Technical and H. I. personnel. About 8 μg Pu was involved. There were 82 floor spots and 4 pairs of contaminated shoes reported. Seven instances of skin contamination occurred.

Concentration Building

Repair work on the old E-2 centrifuge was continued in the B plant and the E-4 dip tube was repaired. Gross product contamination of protective equipment occurred on both jobs but no skin contamination occurred. Two leaks in the E-1 and E-4 vent line, due to corrosion gave rise to localized product contamination.

Incidental maintenance and inspection work in the T plant resulted in protective clothing contamination but no skin contamination was found.

Stack Area

In the T plant a section of the #2 fan inlet duct was removed for inspection purposes. Particles found on the inside of the removed piece were quite similar to those picked up in the surrounding area. Visual inspection of the inside of the black iron duct showed the protective paint was gone and iron rust had coated the surface. Small patches of this rust were gone, evidently flaked off in the air stream.

The B plant #1 fan and duct work was removed and replaced with one of stainless steel construction. A short visual inspection of the open tunnel was made and a reddish brown rust was observed on the side walls and bottom. Damage rates at the [illegible] were materially reduced when the tunnels were washed with water. [illegible] contamination occurred at various stages of the work [illegible] point skin contamination resulted from [illegible] valve [illegible] the hose used to wash the tunnels. [illegible] was readily [illegible]. A survey of 77 [illegible]

[redacted]

Medical Department

The Isolation Building

Air Monitoring

There were 252 spot air samples taken, of which 250 were below 10^{-11} µg Pu/cc. The high result of 5×10^{-11} µg Pu/cc was obtained in cell 4. Sixty-three Little Sucker samples run continuously by shifts, and 15 Big Sucker samples of the [illegible] exhaust system were taken. No significant result was obtained.

Surface Contamination

A total of 279 non-regulated items was found contaminated on surveys by Technical, H. I., and "S" Department personnel. No item above 20,000 d/m was found. Twenty-three cases of floor contamination, and 14 of skin contamination were reported.

Gamma Radiation

P.R. Container	17.5	mr/hr (maximum)
Process Hood	9	mr/hr (maximum)
S.S.	.5	mr/hr (maximum)

The 300 Area

General Statistics

	November	December	1947 Total
Special Work Permits	81	173	1222
Routine & special surveys	170	244	1469
Smear samples	115	93	1974
Air monitoring samples	185	133	[illegible]

Metal Fabrication Plant

Fifty-eight spot air samples were taken as follows:

	No. Taken	Above [illegible] µg U/cc	Maximum Concentration	Location
Extruder Building	30	[illegible]	[illegible] µg U/cc	[illegible]
Chip Recovery	15	[illegible]	[illegible] µg U/cc	[illegible]
[illegible]				
Oxide Burner	10	[illegible]	[illegible] µg U/cc	[illegible]

The oxide burner operation was moved [illegible]

[redacted] Department

Retention Pond

Site Survey samples showed the following maximum results for this period:

Location	alpha	beta
Water, Inlet	496 ± 16 d/m/liter	2.5 x 10^{-3} µc/liter
Water, N.W. corner	140 ± 12 d/m/liter	9.6 x 10^{-5} µc/liter
Mud, Inlet	486 ± 6 d/m/g	2.5 µc/kg
Mud, N.W. corner	178 ± 8 d/m/g	1.5 µc/kg

Technical Building

Sixty-two air samples were taken and results were all below 2 x 10^{-11} µg Pu/cc. No contamination was found on 166 pairs of shoes checked.

Laundry, Decontamination and Hand Counting

A total of 182,535 items was monitored in the Plant Laundry, including 78,699 alpha checks. Also included were 82,733 coveralls, 41,642 gloves, 37,618 overshoes, and 3,606 shocks and jackets.

Twenty Big Bunker and 69 spot air samples had as the high result 2.2 x 10^{-11} µg Pu/cc obtained on two separate occasions; behind the washer, and in the folding area.

There were 31883 alpha hand checks, and 43,130 beta hand checks recorded. About 0.1% of the alpha, and about 0.1% of the beta scores were above the warning levels. No attempt at decontamination was recorded in 9 instances of alpha contamination. Where decontamination was attempted it was successful in all cases.

[redacted]

Medical Department

PERSONNEL METERS

Pencils	100-B 100-D	100-F	RAW 200	200-W	300	Total	1947 Total
Total pencils read:	11,918	13,514	32,143	34,964	31,098	123,637	[illegible]
No. of single readings: (100 to 200 mr)	53	64	86	65	83	351	4,084
No. of paired readings: (100 to 200 mr)	0	0	0	1	0	1	80
No. of single readings: (Over 200 mr)	166	148	272	71	201	858	9092
No. of paired readings: (Over 200 mr)	0	1	4	2	3	10	105
Paired readings lost:	2	1	1	1	0	5	[illegible]

No significant pencil result of over 100 mr was confirmed by the badge result. Investigation of lost readings showed no possibility of an over-exposure.

Badge Survey, Construction Areas

	105 DR	241-BX	10A	Total	1947 Total
Badges Processed	2,152	445	14	2,611	14,830
No. of readings (100 to 500 mrep)	0	0	0	0	116*
No. of readings (Over 500 mrep)	0	0	0	0	87*
Lost Readings	0	0	0	0	13*

* 241-BX Construction

Badges

	100-B	100-D	100-F	200-E	EXP. 200N	200-W	300	Total	1947 Total
Badges Processed:	2,695	4,471	4,889	4,510	476	6,072	5,149	28,282	2[illegible]9,306
No. of readings: (100-500 mrep)	0	2	1	15	0	0	80	98	1,211
No. of readings: (Over 500 mrep)	0	0	0	0	0	1	0	1	22
Lost readings:	1	1	1	2	0	2	1	8	1,[illegible]

The one result of over 500 mrep was due to fogged film, pencils showed no exposure. Five lost readings were due to badges lost in the [illegible], one when film was lost in processing, one was exposed to x-ray, and [illegible] defective film. Where investigation [illegible] found.

[illegible] of radioactive [illegible]

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Medical Department

CONTROL AND DEVELOPMENT DIVISION

Water Monitoring

Two hundred and twenty-seven samples of drinking water were taken during the month. The maximum alpha contamination was found in the 300 Area samples with a high value of 10 dis/min/liter. Other positive samples of 2 dis/min/liter were obtained at Benton City and White Bluffs. Nine large samples of about 10 liters were obtained from Richland, White Bluffs, and the 3000 Area. The maximum alpha activity on a Richland sample was 10 dis/min/liter after ether extraction. Other values ranged from 1 to 7 dis/min/liter. There were no samples that gave beta activity as high as 5×10^{-5} µc/liter.

Eight test well samples were taken, with no positive results for alpha or beta activity.

Sixty six samples were taken from the Columbia River with no alpha result as great as 2 dis/min/liter. The maximum beta reading was 1×10^{-3} µc/liter from a Hanford sample. Eleven samples were taken from the Yakima River with no positive result for either alpha or beta activity.

Atmospheric Monitoring

The Integrons and C Chambers indicated average dosage rates as follows:

Location	Integrons (mrep/24 hrs) November	December	1947 Average	C Chambers (Mrep/24 hrs) November	December	1947 Average
100-B	0.7	0.7	0.50	0.3	0.3	0.32
100-D	0.4	0.7	0.73	0.3	0.4	0.38
100-F	1.3	3.1	1.00	0.3	0.4	1.35
200-W	0.2	0.5	0.68	0.4	0.5	0.43
200-E	0.4	0.6	1.38	0.5	0.7	0.55
Riverland	1.4	0.6	1.92	---	---	---
Hanford	1.5	1.2	1.06	---	---	---
300 Area	1.3	0.4	1.45	0.4	0.4	0.39
700 Area	0.8	<0.1	1.06	---	---	---
Kennewick	<0.1	0.1	[illegible]	---	---	---
Pasco	<0.1	<0.1	0.44	---	---	---
Benton City	<0.1	<0.1	0.47	---	---	---

[illegible] monitoring stations have been set up in the [illegible] Area and readings started at the end of December. The maximum alpha [illegible] reading [illegible] was [illegible] µc/liter in the [illegible] Area. [illegible]

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Medical Department

Land and Vegetation Contamination

Vegetation contamination remains at approximately the same levels as for the past few months.

Location	Average for November	$\mu g\ I^{131}$ per kg. December Maximum	Average	1947 Average
North of 200 Areas	0.05	0.30	0.05	0.12
Near the 200 Areas	0.29	2.40	0.24	0.52
South of 200 Areas	0.06	0.56	0.10	0.16
Richland	<0.04	0.13	0.05	0.11
Pasco	0.05	0.24	0.05	0.07
Kennewick	< 0.04	0.24	0.05	0.07
Benton City	< 0.04	0.13	0.06	0.08
Richland "Y"	< 0.04	0.13	0.07	0.08
Hanford	0.08	0.14	0.05	0.15

Well Drilling

Eight wells located at distances of 18 and 28 feet from the 241-B #3 crib and one foot from the crib were completed during the month. No significant contamination was detected on field checks taken at 5 foot intervals.

Four samples were taken from water table at the 361-B-1 well which confirmed positive values found there last month, the results were from 6.6×10^{-3} to 1.13×10^{-2} μc/liter. Positive results for alpha activity were also obtained for the first time indicating from 10 to 20 dis/min/liter. This contaminated well is located 500 feet east of the 361-B drywell. Two other wells located 500 feet north and 30° west and 475 feet south and 30° west of the dry well are being drilled, they are now at depths of 210 and 190 feet respectively.

Four soil samples were taken from about 20 feet beneath the 241-B, #3 crib and no significant contamination was found.

Bio-Assay

Three hundred and ninety samples were analyzed for plutonium. Fourteen resamples were necessitated by low spike results. All resamples up to December 1 have been completed with no result greater than 0.6 dis/min. [illegible] samples were collected and analyzed for fission products. All samples were less than 20 [illegible]. The [illegible]

[illegible]

[redacted]

Medical Department

The bulk of the work on the fluorophotometer has been in development of the other extraction process. In addition 30 human samples have been analyzed for the Technical Department.

Biological Monitoring

Weekly checks are being made with a GM probe on the rabbits which are kept in cages in the 291-F Area. To date there is no evidence that any active particles have been inhaled or ingested. However two readings slightly over background were obtained on feet. One rabbit escaped from its cage and was at liberty for 12 days during which time it fed on grass and Russian thistle near the stack. Four days after it was captured it was sacrificed. Feces had activity of about 0.15 μc/kg, the thyroid had about 6 μc/kg, kidney 0.01 μc/kg and bone 0.05 μc/kg. No activity was found in the muscles and there was no positive alpha activity in any of the samples.

A number of rabbits are being used in control experiments with active specks. Three rabbits had their trachea cannulated and a speck blown toward the lungs. Only one of the three actually lodged in the lung, the other two eventually being eliminated in the feces. Four rabbits have subcutaneous implants on their backs, one side with an active particle and the other side with an inactive speck for control purposes. Four have had testicular implants between the testis proper and the epididymus. Two had inactive specks for controls. Four surface contact implants on the ears have proven unsatisfactory and other methods will be tried.

Several of the experimental rats being given active 100-F Area effluent water are ill at this time. One of the males which was near death was sacrificed and the tissues were analyzed. Although it had received undiluted effluent water no measurable radioactivity had accumulated.

Fish Laboratory

Studies on the effect of exposing chinook salmon to concentrations of area effluent water ranging from one part effluent to five parts river water to one part effluent to two-hundred fifty parts river water have been continued. All of the eggs in the various lots hatched during the month and the young fish are now developing satisfactorily although those in the 1:5 dilution are starting to show signs of being adversely affected. The residual chlorine in the pre-pile process water and in the water from the retention basin when the pile is shut down for an extended period of time, is lethal to the young fry in a few hours.

[redacted]

Medical Department

Examination of spawned out salmon and of nesting areas in the Columbia River indicate that the spawning of these fish in this section of the river was successful.

The adult rainbow trout being held in the half strength 107 basin water are approaching maturity and some may spawn next month. Quantitative sampling of the algae on the bottom of the Columbia River continues and has been augmented by preliminary studies on the amount of activity accumulating in higher aquatic plants and bottom dwelling animals.

Facilities are now being installed which will make further studies on the accumulation of radioactive materials in aquatic organisms possible.

Methods Development

The age of the active strontium in particles from the 200 Area has been determined by accurate measurements of the buildup of Y^{90} from Sr^{90} and by measurements of the total Y^{90} activity in equilibrium with a strontium sample. Specks picked up from the ground gave ages of 130 days, approximately 220 days, and 260 days. Specks from the East Area stack gave a value of 170 days. The filter from the stack and from the tunnel gave values of 100 days and 30 days respectively. These values were not corrected for scatter or for absorption in the counter window. A rough distribution curve for speck size was obtained by making individual determinations of the major and minor axes of the particle with a microscope. The most probable speck was such that the product of the major and minor axes (MM Area) would be 0.05-0.1 MM^2. There was a positive correlation of activity with size for specks of MM Area greater than 0.05 MM^2. For specks of MM Area < 0.05 MM^2 there was no correlation between activity and size. Several other radio and chemical analyses have been run to correlate with speck analyses. An attempt is being made to obtain a method for extraction of uranium and plutonium from the routine water samples. Using nitric acid as the salting out agent, yields of approximately 50% have been obtained with ether and about 30% with tributyl phosphate. The program on counter calibration has given back scattering values from an aluminum [illegible] for cobalt (0.3 mev), [illegible] for [illegible] (1.7 mev) and [illegible] approximately [illegible] mev). These values are higher than [illegible] by [illegible] and [illegible] [illegible]

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Medical Department

Instrument Development

The portable neutron meter "Neut" has been found to be capable of detecting about 16 fast neutrons/cm^{-2} sec with a reasonable time constant and satisfactory stability. It is felt that, without major changes, this minimum can be reduced to about 10 n/cm^{2} sec which seems to be the maximum practicable sensitivity.

A probe-type C.P. meter equipped with a fish pole has been found satisfactory by the Survey Group. Range changing is done by substituting units consisting of the ion chamber, input resistor and electrometer tubes. Slight mechanical design changes will enable this one instrument to cover the same range as 5 Victoreen survey meters.

A C.P. circuit for cell monitoring was completed and calibrated, but no opportunity for trial in the field has presented itself.

The constant water monitor was completed and tested in the field. Average basin water gives about 500 c/m above a 400 c/m background. This result was obtained with individual streams of water flowing past the G.M. tube. Operation with a complete curtain of water is practicable but has not yet been studied.

A pair of Raytheon CK570 AX electrometer tubes in a Zeus circuit were at least as stable as Victoreen tubes and were more sensitive than one Zeus by a factor of 1.3.

A prototype of a twin channel scale-of-eight scaler with plug-in sections (high voltage supply, B+ supply, scalers, output amplifiers) was constructed, tested and found to be satisfactory. This unit is intended for use in remote monitoring stations.

Five grain films being checked as fast neutron monitors were exposed to a Po-Be source through different thicknesses of paraffin and an experimental absorption coefficient was obtained which is consistent with the calculated coefficient for paraffin. Films were also exposed to Ra-Be neutrons from a source contained in a lead pot and consistent results were obtained here also although the gamma radiation was rather high.

One thin walled glass G.M. counter has been run through the greater part of its life to the point where the plateau has deteriorated to an unsatisfactory level. Chi Square tests have been taken during the life, but even at its present advanced age the statistics are apparently still satisfactory. Other statistical measurements are being made on counter room data and from some of the hand and foot counters.

[redacted]

Medical Department

Calibrations

The routine calibrations were:

RADIUM CALIBRATIONS	Number of Calibrations		
	November	December	1947 to Date
Fixed Instruments:			
Gamma	483	538	6,745
Portable Instruments:			
Alpha	46	66	640
Beta	43	74	594
Gamma	382	452	5,097
X-ray	--	--	33
Neutron	2	3	38
Total	473	595	6,402
Personnel Meters:			
Beta	819	581	7,905
Gamma	8,433	8,741	100,144
X-ray	8,389	6,606	92,667
Neutron	14	11	159
Total	17,655	15,939	200,875
GRAND TOTAL	18,611	17,072	214,022