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GENERAL

Since some of the new research at Mound Laboratory will involve tritium health physics personnel have started assembling data on the biological effects permissible concentrations and methods of detection of various tritium compounds. Proper monitoring procedures and design criteria will be established in the near future.

SURVEY GROUPS

Statistics

Air monitoring samples (polonium)	4 034
Air monitoring samples (other)	2 648
Wipe Samples	17 602
Routine and special surveys	654

Laboratories - "T" Area

Several minor incidents, each of which led to the spread of polonium contamination occurred in November

November 5 - Faulty technique in handling a condenser containing 1.5 curies of polonium caused a considerable amount of contamination in the distillation research laboratory T-247. A delay in notifying health physics personnel about the accident also allowed some tracking of material into the corridors and adjoining rooms. Major surface contamination was removed immediately but the thorough cleaning required several days to accomplish. Fortunately personnel exposure was limited and no excessive urine counts resulted from this incident.

November 8 - A continuation of the T-247 incident was reported on Sunday when troopers assigned to the "T" Area reported contamination of shoes and hands. An investigation showed that someone had inadvertently emptied contaminated waste from T-247 into an open drum on the "T" Building dock where it was picked up by the troopers on their rounds. The areas which had been contaminated were closed to traffic until early Monday morning when decontamination was effected.

November 19 - In the process of making necessary repairs on glove-port hoods in T-61 a water valve was turned on by mistake. Before the error was discovered, water had overflowed from a contaminated hood onto the floor of the room. The contamination was confined to a small area in front of the hoods and was removed without excessive difficulty.

There were 11,210 wipe samples collected in "T" Area laboratories during November. Due to the incidents reported above, 4.6 per cent of these were greater than 500 d/min/40 in².

Laboratories - "G" Area

Two lines of hoods used in the actinium program were removed during November - the north line in R-145 and the south line in R-147. Six trash boxes were required to package the wood and other material for shipment to Oak Ridge for burial. The other two lines of hoods in these rooms are being torn out at the present time.

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On October 28 the stopper from a bottle containing a solution of polonium was dropped on a lab bench and fell to the floor. The resulting contamination was tracked over most of the floor area of the laboratory and scattered "hot" spots were found on the furniture and equipment. There was no spread of contamination beyond the confines of the room in which the incident occurred. Air levels were somewhat higher than normal on this day but were well below our accepted maximum permissible concentration.

A summary of the results of wipe samples collected in the "G" Area laboratories and analyzed for polonium shows

"R" Building	- 4,553 wipe samples taken with 0.9 per cent greater than 500 d/min/40 in ²
"B" Building	- 1,494 wipe samples taken with none greater than 500 d/min/40 in ²
Laundry (hot side)	- 345 wipe samples taken with 1.7 per cent greater than 500 d/min/40 in ²

AIR SAMPLING

The following table summarizes the results of air samples collected and analyzed for polonium during November

SAMPLING LOCATION		NO OF SAMPLES	PER CENT ABOVE 1 000 D/M ³ N/M ³	AVERAGE D/M ³ N/M ³
"T" BLDG.	CLEAN	111	0	9
	LOW RISK	1,180	1.4	272
	HIGH RISK	462	34.0	13,974
	EXHAUST SYSTEMS	212	0	8
"R" BLDG	LOW RISK	920	0.1	8
	HIGH RISK	23	0	6
	EXHAUST SYSTEMS	263	0	7
"B" BLDG	LOW RISK	369	0	37
	HIGH RISK	26	0	40
	EXHAUST SYSTEMS	138	0	5
"H" BLDG	CLEAN LAUNDRY	23	0	30
	HOT LAUNDRY	69	2.9	120
	EXHAUST SYSTEMS	46	0	8
"WD" BLDG	LOW RISK	144	2.1	90
"HH" BLDG	HIGH RISK	17	17.6	90
OTHER		31	0	35

MAXIMUM PERMISSIBLE CONCENTRATION 1 000 D/M³ N/M³

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A large number of air samples were collected in the radium-actinium areas. These samples were given an alpha count immediately after collection. Recounts taken at intervals indicated that a large portion of the activity present on the samples consisted of daughter products of the radon isotopes.

The following table gives the results of these samples based upon initial count and corrected for decay loss during sampling and counting time.

LOCAT ON	CLASSIFICATION	NO OF SAMPLES	MAXIMUM*	AVERAGE*
P 102	LOW RISK	23	16.4	6.7
R 103	LOW RISK	23	11.8	5.4
R 106N	LOW RISK	23	13.3	7.5
R 106E	LOW RISK	22	13.5	5.6
R 108	LOW RISK	23	10.6	8.3
R 109	LOW RISK	46	30.9	5.2
R 110	LOW RISK	23	14.1	6.0
R 111	LOW RISK	23	13.0	7.2
R 112	LOW RISK	23	12.6	5.7
P 113	LOW RISK	23	28.2	6.4
R 114E	LOW RISK	23	8.7	4.8
R 115	LOW RISK	13	8.0	3.9
P 120	LOW RISK	23	11.5	5.9
R 122	LOW RISK	23	10.1	5.5
R 123	LOW RISK	46	37.9	12.8
P 125A	LOW RISK	23	10.2	6.0
R 127	LOW RISK	23	11.8	5.9
R 129	LOW RISK	23	46.4	28.1
R 130	LOW RISK	23	9.4	3.5
R 131	LOW RISK	23	13.3	8.0
P 133	LOW RISK	23	11.2	5.8
R 134	LOW RISK	23	14.0	6.2
P 137	LOW RISK	46	90.6	11.9
P 140	LOW RISK	23	11.7	5.5
R 142E	LOW RISK	23	74.2	8.5
R 145	LOW RISK	23	14.6	7.7
P 147	LOW RISK	23	28.3	15.7
P 149	LOW RISK	23	13.4	5.7
P 151	LOW RISK	23	152.8	15.7

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LOCATION	CLASSIFICATION	NO OF SAMPLES	MAX MUM*	AVERAGE*
R 152	LOW RISK	23	14 0	6 3
R 156	LOW RISK	23	8 7	3 3
R 159E	LOW RISK	23	14 5	7 0
R 159W	LOW RISK	23	15 1	6 9
R 161	LOW RISK	23	21 0	11 9
R 162	LOW RISK	23	12 6	6 2
R 163	LOW RISK	23	12 7	6 1
R 165	LOW RISK	23	12 9	4 7
R 166	LOW RISK	23	25 0	6 4
R 167	LOW RISK	46	22 6	8 9
R 168	LOW RISK	23	168 7	23 4
R 169	LOW RISK	23	12 2	6 2
R 171	LOW RISK	23	13 7	6 0
R 173	LOW RISK	23	13 9	5 5
P 177	LOW RISK	23	12 5	5 0
R 179	LOW RISK	23	13 4	4 4
P 181	LOW RISK	23	16 3	6 9
R 182	LOW RISK	23	7 7	4 2
R PLENUM	LOW RISK	23	14 7	5 5
R (SUPPLY AREA) PENTHOUSE	LOW RISK	46	21 3	8 9
P 202	LOW RISK	22	5 5	2 7
P 208	LOW RISK	22	10 6	5 2
R CORR DOR 2A	LOW RISK	45	17 8	11 8
P CORR DOR 106	LOW RISK	23	14 4	8 3
R CORR DOR 117	LOW RISK	23	18 5	8 9
R CORR DOR 127	LOW RISK	23	13 9	8 1
R CORR DOR 137	LOW RISK	23	21 9	10 5
R CORR DOR 140	LOW RISK	23	20 2	9 7
R CORR DOR 142	LOW RISK	23	36 6	10 0
R CORR DOR 159	LOW RISK	23	15 1	7 7
R CORR DOR 167	LOW RISK	23	20 7	10 5
R CORR DOR 169	LOW RISK	23	18 9	8 3
R CORR DOR 170	LOW RISK	23	63 6	12 9
R 125B	HIGH RISK	23	252 5	45 1
P 119	HIGH RISK	23	1 165 3	705 7

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LOCATION	CLASSIFICATION	NO. OF SAMPLES	MAXIMUM*	AVERAGE*
R 121	HIGH RISK	23	698.4	439.5
R 128	HIGH RISK	22	5,003.4	2,805.6
R 132	HIGH RISK	23	105.0	42.1
R 135	HIGH RISK	23	271.7	128.6
R 141	HIGH RISK	23	32.6	14.6
R 143	HIGH RISK	22	209.3	132.1
R 144	HIGH RISK	23	341.2	191.2
R 146	HIGH RISK	23	100.6	55.1
R 148	HIGH RISK	23	869.8	212.1
R 150	HIGH RISK	23	62.6	34.5
R CORRIDOR BY 140	HIGH RISK	23	138.3	86.7
R CORRIDOR BY 151	HIGH RISK	23	436.7	130.1
R 221	HIGH RISK	23	10.0	4.2
GP-1A-AREA ABOVE CAVE	LOW RISK	22	17.0	8.9
GP 1A SOUTH END	LOW RISK	45	59.5	14.3
GP 1A NORTH END	LOW RISK	45	26.5	12.5
AIRLOCK #1 GP-1A	LOW RISK	23	21.6	6.7
AIRLOCK #2 GP-1B	LOW RISK	45	23.6	10.8
SOUTH END GP-1B	LOW RISK	45	28.4	12.6
CENTER GP-1B	LOW RISK	45	30.7	16.9
NORTH END GP-1A	LOW RISK	45	21.0	10.1
FILTER BANK EXHAUST GP 1A AREA	HIGH RISK	23	751.1	264.0
BEH ND CAVE - SOUTH GP 1A, AREA	HIGH RISK	20	640.9	443.6
BEHIND CAVE NORTH GP 1A	HIGH RISK	23	22,152.0	4,463.0
AIRLOCK #3 GP-1A	HIGH RISK	22	27.1	13.1
A RLOCK #4 GP	HIGH RISK	23	494.2	227.6
GP-BREEZEWAY	LOW RISK	10	37.8	18.8
GP-EQUIPMENT RM.	LOW RISK	5	19.1	11.7
GP-JANITOR RM.	LOW RISK	5	57.5	38.6
H 135	LOW RISK	23	30.0	12.5
B 102	LOW RISK	23	21.5	9.4
B 108	LOW RISK	23	30.9	14.2
B 109	LOW RISK	23	30.3	11.7

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LOCATION	CLASSIFICATION	NO OF SAMPLES	MAXIMUM*	AVERAGE*
B 109A	HIGH RISK CORRIDOR	22	24.5	10.1
R BLDG FILTER BANK	EXHAUST SYSTEM	264	9.2	5.0

*MULTIPLY ALL VALUES BY 10^{-10} TO OBTAIN $\mu\text{C}/\text{CC}$

Samples of the type reported above are recounted at intervals for a period of 20 - 30 days. Information from these counts makes it possible to estimate the concentration of long-lived material in the air. These results, of course, come too late to assist materially in preventing exposure. For this reason, if the initial counts are significant, personnel are required to wear respiratory protection.

Following is a summary of such an analysis of samples collected in October.

LOCATION	AREA CLASSIFICATION	SAMPLING DAYS	MAXIMUM*	AVERAGE*
GP 1B	LOW RISK	22	0.9	0.2
GP 1A	LOW RISK	22	0.8	0.2
GP AIRLOCK	LOW RISK	22	0.4	0.1
GP AIRLOCK	HIGH RISK	22	0.2	0.1
GP 1AB	HIGH RISK	22	6.3	2.4
GP EXHAUST DUCT	HIGH RISK	22	0.6	0.2
GP EXHAUST	TO STACK	22	2.3	0.4
R 109	LOW RISK	22	0.2	0.07
R CORRIDORS	LOW RISK	22	0.2	0.07
R 120	LOW RISK	22	0.1	0.03
R 122	LOW RISK	22	0.4	0.1
R 123	LOW RISK	22	0.2	0.07
R 129	LOW RISK	25	0.1	0.1
R 130	LOW RISK	25	0.1	0.11
R 137	LOW RISK	25	0.7	0.3
R 145	LOW RISK	22	2.2	0.4
R 147	LOW RISK	22	0.2	0.07
R 161	LOW RISK	22	0.1	0.03
R 118	HIGH RISK	22	50.7	4.2
R 121	HIGH RISK	22	11.4	1.6
R 125A	HIGH RISK	22	0.3	0.1
R 125B	HIGH RISK	22	0.8	0.2

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LOCATION	AREA CLASSIFICATION	SAMPLING DAYS	MAXIMUM*	AVERAGE*
R 128	HIGH RISK	22	17.5	2.8
R 132	HIGH RISK	22	0.4	0.1
R 125	HIGH RISK	22	15.5	0.8
R 136	HIGH RISK	25	3.3	0.7
R 143	HIGH RISK	22	32.1	2.2
R 144	HIGH RISK	22	24.1	2.6
R 146	HIGH RISK	22	41.9	2.3
R 148	HIGH RISK	22	88.7	2.6
R 150	HIGH RISK	22	2.3	0.6
R 160	HIGH RISK	22	281.3	19.9
R CORRIDOR SOUTH	HIGH RISK	22	11.4	3.6
R CORRIDOR NORTH	HIGH RISK	22	15.5	0.7

*MULTIPLY ALL VALUES BY 10^{-12} TO OBTAIN $\mu\text{C}/\text{CC}$

PERSONNEL MONITORING

Bioassay

A total of 462 urine samples were analysed for polonium content during the month. Two hundred and seventy-eight of the specimens analysed were submitted by operating area personnel and the remainder by the non-operating area personnel. During the period covered by this report one of the two employees who have not been permitted to work at their usual work because of high urine counts, has been permitted to return to his old job. The other employee is still restricted from his usual work because his average urine count is as yet above the permissible level. One specimen analysed this month yielded a count of 54 d/m/50 ml. A follow-up specimen on this employee yielded a count of only 4 d/min/50 ml so no restrictive action was required. All other samples gave results considerably less than the maximum permissible of 24 d/min/50 ml.

A total of 29 control samples for the polonium assay were processed.

Urine sampling for the actinium bioassay program continues as a routine function with 45 specimens being analysed for radium content.

Pocket Chambers

Total number read	8 275
Number of single readings	
(30-100 mr)	85
(100-200 mr)	4
(over 200 mr)	8

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Number of paired readings

(30-100 mr)	8
(100-200 mr)	1
(over 200 mr)	0

Film Meters

Regular

Total number processed 451

Number of readings

(50-150 mrep)	17
(150-300 mrep)	1
(300-600 mrep)	0
(over 600 mrep)	0

Visitors

Total number processed 615

Number of readings

(50-150 mrep)	3
(150-300 mrep)	0
(over 300 mrep)	0

Neutron Films

Total number processed 60

Number of readings

(0-100 mrem)	60
(100-300 mrem)	0
(over 300 mrem)	0

SITE SURVEYS

Eighteen off-area air samples were collected downwind from Mound Laboratory. The highest count recorded was 10.6 dpm m^{-3} of air. This sample was taken at Spring Valley on November 9, 1953.

Results of the mud, water, and vegetation samples collected during the month are as follows:

SAMPLES	NO. COLLECTED	MAXIMUM VALUE	AVERAGE VALUE
WATER	24	$3.3 \times 10^{-7} \mu\text{C/cc}$	$5.4 \times 10^{-8} \mu\text{C/cc}$
MUD	11	$4.71 \times 10^{-4} \mu\text{C/gm}$	$7.52 \times 10^{-5} \mu\text{C/gm}$
VEGETATION	18	$9.9 \times 10^{-8} \mu\text{C/gm}$	$1.9 \times 10^{-8} \mu\text{C/gm}$

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The maximum mud samples was collected on November 9 1953 at the location where the plant effluent enters the Miami River The maximum water sample was collected at the same location but on November 2 1953 The maximum vegetation sample was collected at Bloomington Ohio on November 9 1953

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Personnel

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Personnel

Section Chief	1
Supervisors	3
Ass t Health Physicists	3
Chemists	3
Laboratory Assistants	3
Custodial Supervisor	1
Health Surveyors	6
Decontamination Workers	18
Total	38

Survey

Allocation of Time in Man-Months

Bioassay	4
Film meters	13 $\frac{1}{2}$
Pocket meters	$\frac{3}{4}$
Mud water and vegetation	$\frac{1}{2}$
Laundry monitoring	1
Surveys "T" Area	4
Surveys "G" Area	6
Custodial and Decontamination	
"T" Area	11
"G" Area	8
Administration	1
Total	38

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