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UNITED STATES
ATOMIC ENERGY COMMISSION

Refer to File No. AEGR-1

P. O. Box 288, Station 43
Rochester 7, New York
May 22, 1947

H-7401 eng-49

NY

The Commanding Officer
Marion Engineer Depot
Marion, Ohio

Dear Sir:

Subject: REPORT OF RADIATION SURVEY

Transmitted herewith, in duplicate, is a report of the radiation survey made at your installation April 17, 1947 by Messrs. Russell Hayes and Ellery Storm of the Rochester Project, United States Atomic Energy Commission.

In line with paragraph 2 of recommendations, your installation may continue to request film badges and forward them to this office for monitoring. Reports on those film badges will be sent to you in the same manner as before.

This office is taking steps to ascertain the actual cost involved per film badge monitored and will arrange for billing your office on Form 1080 for the cost of this work.

Very truly yours,

ATOMIC ENERGY COMMISSION

R. S. PEARSON
Administrative Assistant

1 Incl.:
Rpt., in dup.

cc: N.Y. Oper. Off., attn: Mr Hayner w/cpy incl.
Director's Office w/cpy incl.
R. Hayes w/cpy incl.

REPORT OF RADIATION SURVEY - MARION ENGINEER DEPOT

On April 17, 1947, Russell Hayes and Ellery Storm made a trip to the Marion Engineer Depot, Marion, Ohio, at the request of the Commanding Officer; to survey and measure the radiation hazards resulting from the storage of a large number of metascopes. Dr. Mary Banning of the University of Rochester had made a complete survey in May 1946, of the metascopes stored at the nearby Ordnance Plant, and had made recommendations pertaining to the storage and working conditions. Since that time, all of the metascopes from the Ordnance Plant and several thousand additional ones received from various war theaters have been stored at the Engineer Depot.

The hazard which results from the use of a radium compound in the foil of the metascopes, is one of gamma radiation, since construction of the instrument shields other radiation. These instruments were manufactured by two different companies; one type using 1/4 milligram of radium, the other 1/10 of this amount. At the Engineer Depot, these metascopes are stored in two wooden buildings, several hundred feet from each other, and several hundred feet from any other building at the depot. A fence, twenty-five to thirty feet away, encloses each building and the entrance is locked. Each of these buildings is used only for the storage of metascopes, and it is not necessary to enter either building except when a shipment is received, or for purposes of inventory or inspection. Inside the buildings, the metascopes in wooden cases, fifty to a case, are stacked in tiers two to seven cases high on both sides of the building, with an aisleway three to five feet through the center. At some locations the tiers are two cases deep, at other points only one case deep; so that the intensity measurements taken along the aisleway of each building vary. Another reason for the non-uniformity in the aisle measurements, is the fact that the cases of higher radium content metascopes are sometimes stored together, sometimes mixed with the other cases, and sometimes grouped opposite to each other in the aisle.

The instruments used for taking measurements were a Victoreen 263 (Geiger tube type), and a Rochester portable detector of the ionization type. Measurements were taken to simulate actual conditions when cases are carried in or out of the buildings, and then others were taken to complete the overall radiation conditions. Air samples were also taken in each building to check the possibility of a strong radon atmosphere. The measurements obtained are included with this report.

Discussion

You will note that the intensity of radiation in both storage buildings varied at different points along the aisleway between the cases, for the reason given previously. As more cases are added or removed, these readings will also change. Using the highest intensity reading of 3.8 roentgens per/8 hrs. as a basis, would allow a man to work in the building only twelve minutes. However, this reading was taken at a unique position and is not representative of true working conditions. The two badges worn by Ellery Storm and myself in the afternoon, had at least an hour's exposure while we were working around the cases of metascopes. These showed 0.05 roentgens or half tolerance. The badges worn by workers handling metascopes, so far have not given any indication of an exposure near the daily tolerance figure, because

the working time has been limited, and the workers have a healthy respect for radiation. Consequently, they do not linger in storage buildings.

Recommendations

1. Work involving the carrying of cases into the building from outside or vice versa, should be limited to an hour. If it is necessary to station a man inside the building, this time should be limited to fifteen minutes.

2. Film badges with an accurately kept data sheet should be continued. From such information, it might be necessary to cut down the time allowed for some particular job; or it might allow additional time for same.

3. Inasmuch as the labor with metasopes is not one performed every day, or even every week, the tolerance figure of 0.1 roentgens per day can be exceeded if there is a particular need. Our present tolerance figure is 0.1 roentgens per day or 0.7 roentgens per week. The 0.7 roentgens per week could be received in one day if no more were received in that particular week. However, it is well to be on the conservative side, unless there is particular reason.

4. The present storage is safe as far as any hazard at the fence surrounding those two buildings.

5. Samples of room air were taken to determine if any radon, a radioactive gas from the disintegration of radium, was present. All samples were negligible. This was to be expected as the metasopes were designed to eliminate this hazard.

6. It was mentioned that the present building on T 308 might be moved, and the concrete floor used for some other purpose. This floor should be safe from any contamination, since all metasopes are packed in wooden cases, and there is no radon hazard.

7. If a new building is to house the present metasopes stored in T 308, exposure to personnel could be cut down if the aisles through the center were larger, and also if the higher radium content metasopes (Samson) were not placed opposite each other in the aisle.

Russell Hayes

RESULTS OF MEASUREMENTS

T 308

	<u>Gamma Radiation</u> <u>roentgens/8 hrs.</u>
Inside doorway entrance outer room	.048
At doorway along centerline of room, about 4 ft. high - cases on both sides	0.3
Four feet inside	0.98
Eight feet inside	0.75
Twelve feet inside	1.4
End wall	1.6
Five feet high against surface of case which was stacked in storage	0.5
Against case surface 5.5 cu. ft. box	0.75
" " " 3.3 " " "	2.3

T 509

At surface of lead box containing foils	0.25
At doorway entrance	0.05
Ten feet in from door - along center of aisle, cases on left only	0.17
Twenty feet in from door - cases on both sides	0.17
Center of bldg., c.ses of silica gel on right	0.17
Ten feet from end, Samson cases on both sides	2.55
At surface of case (stacked) Electronic	0.63
Samson	3.8

Miscellaneous Results

At surface of small opened cardboard carton containing twelve metascope	0.8
One single Samson Metascope at surface	0.6
One single Electronic Metascope at surface	0.23
One case in outside room, center surface	1.3
6" away	0.5

Miscellaneous Results (cont'd)

One case in outside room

12" away 0.3

18" away 0.1

Outside T 308 - at wall next to cases 0.26

At fence line - north side 0.0016

Badge Results

Gamma Radiation
roentgens

Badge No.

Wearer

521

Hayes

0.05

520

Storm

0.05

Above badges worn two and one-half hours, of which at least one hour was actually spent in buildings housing the metasopes.

Badge #522 was placed on 5.5 cu. ft. case for thirty minutes.

0.05 roentgens

Badge #523 was placed on 3 cu. ft. case for thirty minutes.

0.18 roentgens

Air Sample Results

Flask #

Building

Radon
micromicrocuries/liter

30

T 308

Less than 3

31

T 308

" " 3

32

T 509

" " 3