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MEDICAL INDUSTRIAL HAZARDS SECTION

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J. J. Nickson, Section Chief
J. E. Rose, Associate Section Chief

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REPORT FOR MONTH OF NOVEMBER 1945

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| 1. R. S. S. | 7. L. H. H. | 13. J. E. R. |
| 2. L. O. J. | 8. J. G. H. | 14. E. R. R. |
| 3. R. S. S. (X) | 9. A. H. D. | 15. Chicago Technical File |
| 4. J. E. W. | 10. S. L. W. | 16. Clinton Central File |
| 5. E. Z. M. | 11. K. S. C. | 17. J. J. M. (2) |
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Human Studies Project

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To: Dr. R. S. Stone

From: Dr. J. J. Nickson

Subject: Monthly Summary for Section E-III

241 MLH 3300 Building and Equipment Surveys for Alpha Activity

In general the amount of alpha activity handled in the New Chemistry area has increased considerably during the past month. This is in large measure due to the acquisition of cyclotron or pile bombarded samples of thorium, plutonium and protactinium. With the increase in the potential contaminants there has been a corresponding increase in the contamination of many of the rooms in the filtered air section. This has been particularly so for rooms 10, 11, 13 and 33 through 37. By and large the cleanup of known activity is reasonably prompt but unfortunately recontamination recurs rather promptly.

120 centrifuge surveys were done during the past month. 13 centrifuges were found to have counts of greater than 500 per minute on survey. Without exception the centrifuges in question were located in the rooms listed above as presenting the worst alpha contamination problem.

250 air surveys for alpha activity were done. The highest value obtained was 87% of the maximum permissible level of 5×10^{-16} grams plutonium per cc of air. This value was obtained in room 35 on November 2nd. Immediate area survey showed extremely high levels of alpha activity. Unfortunately the person doing the work was not wearing a respirator. Face and nose counts showed respectively 109 and 55 alpha counts per minute. Clothing survey showed diffuse contamination over his shirt and trousers running from 12,000 to 30,000 d/m.

With the exception of the above readings none of the air samples gave values which exceeded the maximum permissible level of alpha activity in air.

For some time in the past we have been conducting monthly determinations of the air flow in the hoods at the various sites. Particular emphasis has been laid on the New Chemistry area because of the large amounts of plutonium and other alpha active materials handled in this building. The surveys are done with a Taylor anemometer. The hoods are usually surveyed without altering the openings found at the time of survey. For the

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For The Atomic Energy Commission

H. F. Canale

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This latter figure has been more or less arbitrarily chosen as the minimum velocity acceptable for hoods in which plutonium or other alpha active materials are being handled. The usual chemical figure is 70 feet per minute. It is recognized that the results of these surveys cannot be interpreted too rigidly as there are too many complicating factors, particularly the relation of the survey instrument size to the size of the hood opening. However, even with this limitation the surveys have been of great value in detecting otherwise unnoted major changes in air flow in hoods.

The problem of alpha contamination in the West Stands centers around the solvent extraction work which is currently focused on the squash court in this area. On October 11, 1945 an explosion involving approximately 300 mg of plutonium occurred in room 9. A plutonium solution destined for the above mentioned columns was being agitated and heated over a water bath. The solution was blown out of its container producing a mist which heavily contaminated the entire room. Fortunately the operating personnel had noted that the reaction was out of hand and had left the room. The alpha activity on the floor, walls etc, ranged from 5,000 to 200,000 alpha d/m. The room was washed down over night after which the readings ranged from 6,000 to 10,000 d/m. The cleanup squad, wearing assault masks and protective clothing were able to satisfactorily decontaminate the room. Curiously enough an air sample taken one-half hour after the accident showed but 60% of the maximum permissible level for plutonium in air.

241 MLH 3310 Building and Equipment Surveys for Beta Radiation

241 MLH 3320 Building and Equipment Surveys for Gamma Radiation

Work with high level beta and gamma activity has continued in filtered air section of New Chemistry. This activity is associated with targets and slugs imported from Berkley, Hanford or Clinton. The activities from bombarded material may exceed 200 200 r/hr. Until very recently facilities for handling such activities were grossly inadequate. Within the last few weeks the completion of the hot lab in room 12 provides an area in which such activities can be handled with reasonable safety.

West Stands activities have centered around the "pilot plant stage" in the solvent extraction process currently underway in the squash court in the West Stands. In testing this apparatus solutions of recently bombarded Clinton slugs have been used. Beta and gamma activity has run as high as 600 mr/hr. The slugs have been dissolved in room 217, West Stands, under rather inadequate conditions. Particularly troublesome has been the problem of the transfer of the active solutions from Room 217 to the squash court. Up to the present time this transfer has been accomplished with grossly inadequate carriers with resulting over-exposure to operating personnel. This situation has been

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discussed with Dr. Seaborg who has agreed to remedy it in the future. The shielding on the solvent extraction column in the West Stands is fortunately excellent. Once the solutions are in the columns the work by and large can continue without over-exposure to operating personnel.

The problem of decontamination in the West Stands is a difficult one. The operating personnel do not seem to find time to decontaminate any area other than ones in which they are currently working. This situation has been discussed repeatedly with the administration of the chemistry division but without appreciable effect. At the present time and for some time in the past the entire building is more or less diffusely contaminated with beta and gamma activity. This is particularly true for rooms 9 and 217. It is hoped that the press of current work will shortly permit of more adequate decontamination activity.

241 MLH 3340 Survey of Personnel for Alpha Activity

1000 alpha hand counts were scheduled during the month. 1576 or 82% of the number scheduled were recorded. 12 or 8% of the number were above the permissible level of 300 counts per minute. As before, decontamination of above tolerance hand activities has not been a problem. Scrubbing with soap, water and a scrub brush has in all instances removed the activity. The surveys were done with a modification of the Simpson-Proportional counter. The instrument has proven very satisfactory for this purpose. Within the past month a sufficient number have been obtained to supply all areas on the project.

Laboratory coats from personnel in New Chemistry and West Stands are routinely monitored for alpha activity. Approximately forty coats are monitored each week. During the past month, 25 coats or roughly 15% were found to have above 1000 alpha d/m per 115 square centimeters.

241 MLH 3350 Personnel Monitoring for Beta Radiation

241 MLH 3360 Personnel Monitoring for Gamma Radiation

3250 pocket meter readings were recorded during the month ending 11-15-45. Sixteen readings greater than 0.1r for any one day were obtained. Of these 11 were valid readings in the opinion of the surveyor. Eight were from Mr. Seaborg's section, two from Mr. Zinn's section and one from Mr. Cole's section.

2117 films were developed during the month ending 11-15-45. Fifty-seven overexposures were recorded. (Note: An overexposure here is defined as a reading which exceeds 0.4r for a one week period. Twenty-eight of these readings were films which were supposed to monitor total body exposure. Of these thirteen exceeded 0.6r. The highest reading obtained was 1.6r. This value

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was obtained on a worker in the West Stands. The reading represents a shield reading and hence presumably represents exposure to gamma radiation. The distribution of the thirteen high readings was as follows. Argonne - 7; West Stands - 4; New Chemistry - 2; The hand exposure can best be summarized by persons. Mr Gilbreath in the West Stands, 4.5r to the right wrist during the month. Mr. Post, 3.25r of the right wrist. Other individuals who wore wrist badges had an average of less than 0.6r per week for the month ending 11-15-45.

Of interest are three readings obtained on Mr. [REDACTED], Mr. [REDACTED] and Mr. [REDACTED]. These three men work under Mr. Seaborg, normally in the New Chemistry building. On November 1st they spent an afternoon at Argonne doing an experiment involving the use of the CP-5 machine. The three men were exposed to slow neutrons during this work. Insofar as the survey of the work area could determine, no over-exposure would be involved in the experiment. However, the wrist badges for the three individuals uniformly showed greater darkening under the shield than under the window, indicating a slow neutron exposure to the hands. The total body films were not similarly blackened. No data on total body slow neutron exposure, unfortunately, is available.

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