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OAK RIDGE NATIONAL LABORATORY
OPERATED BY
CARBIDE AND CARBON CHEMICALS COMPANY
A DIVISION OF UNION CARBIDE AND CARBON CORPORATION

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August 11, 1953

U. S. Atomic Energy Commission
Post Office Box E
Oak Ridge, Tennessee

Attention: Mr. Kenneth Knowlton

Subject: SUMMARY OF INFORMATION EXCHANGED AT HARWELL AND LONDON, ENGLAND; COPENHAGEN, DENMARK; AND STOCKHOLM, SWEDEN DURING JULY, 1953

Gentlemen:

All discussions in the above-named countries were in Area 2 and for the most part were unclassified, except for restrictions imposed by public relations.

A. Harwell Visit (July 6 and 7, 1953):

At Harwell I visited with Dr. W. G. Marley, director of the Health Physics Division, with Dr. Katharine Williams, director of the Medical Division, and with other members of their divisions as well as with members of the divisions of Biology, Operations and Chemistry. One of the most instructive parts of my Harwell visit was a detailed review by Messrs. E. H. Burns and E. J. Hunter of the radioactive waste disposal system in use at Harwell and a tour of the "hot laboratories" of the Chemistry building conducted by Dr. Spence. Many of the problems of disposal of liquid and gaseous radioactive waste, laboratory contamination and decontamination, confining enclosures for work with radioactive material, protective clothing, the radioactive particle problem, personnel monitoring, neutron instrumentation, etc. are identical to those problems of first concern in our own laboratories, and it was very helpful to observe in some cases new methods of attacking these problems and was reassuring to find that in many cases (often by trial and error) they had adopted methods very similar to those that are current in our own laboratory.

In my lecture on "Applied and Research Health Physics Program at Oak Ridge" I discussed the new J. C. Hurt film badge in use at CMRL and our radiation exposure records. I discussed our radioactive liquid waste and development program under E. J. Hunter, with particular emphasis on the open pit liquid waste disposal method. I mentioned briefly the objectives

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and results of our ecological study program under L. A. Krumholz. I discussed in considerable detail the neutron instrument and experimental work of R. H. Ritchie, G. S. Hurst and his group, and the theoretical calculations of J. Neufeld and W. S. Snyder. They were interested in the airborne particulate contamination studies of E. C. Struxness and his group and indicated they had made some related studies. I described the airborne uranium prospecting equipment developed by F. J. Davis and his group, and pointed out his interesting observation that the build-up factor as measured with his airborne scintillation counters seems to vary as the 1st power of the distance from the ground. I described some of the experiments and results (of G. S. Hurst, T. E. Bortner, W. G. Stone, R. D. Birkhoff, et al) on the measurement of W (ev/ip), electron attachment coefficient, stopping power, and scattering of ionizing particles. Several questions were asked relative to my discussion of the neutron film dose meter developed by J. S. Cheka, the use of ferro-electric materials by H. K. Richards to measure radiation dose, the element distribution in the human body as determined by I. M. Tipton using spectrographic and neutron activation analysis, and our health physics training program under the direction of E. E. Anderson. The extent of my discussion with others at the Harwell laboratory is indicated by the outline as follows:

Wednesday, 8th July.

11 a.m. - Discussion with Dr. W. J. Marley.

11.45 a.m. - Discussion on the control of contamination in active areas. (Messrs. H. J. Dunster, D. V. Becker, K. J. Bennallack, H. S. Smith)

1 p.m. - Lunch

2 p.m. - Discussion of medical problems. Urine testing, determination of body burden of Pu, f.p's. etc. Wound contamination. (Dr. Katharine Williams, Dr. Graham, Dr. Butterworth)

4.15-6 p.m. - Discussion on fast neutron hazards, fast neutron measurements, tolerances, operational problems. (Dr. Marley, Messrs. H. S. Smith, H. J. Dunster, D. V. Becker, H. C. Stewart, A. E. Clare, Miss K. M. Flew)

Thursday, 9th July.

9 a.m. - Lecture on Applied and Research Health Physics Programme at Oak Ridge. (Dr. Karl Morgan)

10.45 a.m. - Atmospheric diffusion. Gamma-ray scattering in air. Deposition of activity in rainfall from the atmosphere. (Mr. H. C. Stewart)

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11.15 a.m. - Experiments on the deposition of aerosols by turbulent diffusion, analogy with heat. Permissible level of I-131 over grassland. (Mr. A. C. Chamberlain)

11.45 a.m. - Discussion on tolerances. (Mr. Chamberlain and Dr. Marley)

12.30 p.m. - Biological effects of active material from pile accidents. (Dr. Marley, Messrs. Chamberlain, T. M. Fry)

1 p.m. - Lunch

2 p.m. - Effluent problems, incinerators, waste disposal. (Mr. R. H. Burns and Mr. E. J. Duncker)

3 p.m. - Dusts, filters, hazards of U mining. (Mr. W. G. Bembridge)

3.30 p.m. - Biological testing of effluent. Personnel monitoring. (Dr. I. A. Dyson)

4.30 p.m. - Dr. Spence - Radiochemistry Building.

B. Visit in London with Dr. Walter Binks, Director, Radiological Protection Service and Secretary, International Commission on Radiological Protection (July 10, 1953):

My discussions here were entirely unclassified and limited to a review of the report I was to present to the International Commission on Radiological Protection on the subject of "Maximum Permissible Internal Dose." Dr. Binks pointed out the differences in this report and the presently accepted dose levels used in Great Britain. This discussion with Dr. Binks and the discussions on this subject I had the previous day with Drs. W. S. Marley and A. C. Chamberlain paved the way for later agreements between the United States and Great Britain representatives at the Copenhagen Conference relative to maximum permissible internal dose levels.

C. Discussions at Copenhagen, Denmark (July 13-19, 1953):

I attended a number of meetings with the Internal Dose Committee (of which I am chairman) and with the Units Committee, the External Dose Committee, the Waste Disposal Committee and the Main Committee. All these discussions were unclassified (except for reasons of public relations) and the outcome of these meetings is scheduled to be published in reports in the spring of 1954. I am enclosing a copy of my preliminary report on Internal Dose with an outline of the changes to be made before this report is published.

[redacted]

D. Visit with the Atomic Energy Company in Stockholm, Sweden (July 28-31, 1953):

Here I gave a lecture on the unclassified portions of our program in Health Physics research at CRNL. Dr. Sigvard Ehlund, director of the Atomic Energy Company, conducted me on a tour through the underground reactor building, which is 70 to 130 feet below the surface and carved out of solid granite rock. There are two shafts leading to the underground laboratory, which is shaped in the form of a cross with the reactor being assembled at the center of the cross. The framework of the reactor was already in place, and I gathered from the discussion I had that the uranium, heavy water and graphite blocks are ready for the assembly. Some of the reactor shielding was in place and much of the auxiliary equipment was installed. The reactor will probably not reach criticality before late winter 1954 and they plan to operate it at essentially zero power for some time until a series of experiments are completed. From all I could observe the reactor should be capable of safe operation from the standpoint of radiation hazards -- this in spite of the fact that it is located in the suburbs of the city of Stockholm.

A discussion was held with Drs. Ehlund and Larsson relative to the radiation safety of a 20 to 30 MW reactor they are planning to build near Stockholm (they showed me the exact location they have in mind, but I cannot reveal this because I was asked not to indicate its location until a public announcement is made. They indicated no objection to my stating it would be located in the general area of Stockholm and near the sea). They were particularly interested to know what would be the probable safe distance to the nearest private house and to the nearest village and whether or not direct sea disposal of radioactive liquid waste was satisfactory. The distances they proposed to the nearest private house and to the nearest village seemed to be satisfactory, but I suggested modifications in their liquid waste disposal system. In particular, I suggested a series of open pits with the liquid seeping from one to the other and the liquid from the last stage would be pumped to the sea. If the pits were properly located, most of the radioactive material would be rather permanently fixed deep in the soil where it could be permanently under observation and control. This method of disposal would be relatively inexpensive, and would avoid, on the one hand, the problems of vulnerable underground storage tanks, and, on the other, the international complications of feeding radioactive contaminants to the marine life.

I spent a short time visiting in the various laboratories. Dr. Rolf Björnerstedt showed me the radiation detection instruments in use and under development and the equipment of the high voltage laboratory.

Very truly yours,

Original Signed By
E. S. MORGAN

Emil S. Morgan, Director
Health Physics Division

ESMorgan
Encl. - report of International Internal Dose Committee

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