

MEETING HELD AT A.E.R.E., HARWELL ON 8TH JULY, 1953.

Present:- Dr. Karl Z. Morgan, Oak Ridge, Tennessee.  
 Dr. W. C. Marley, A.E.R.E.  
 Dr. K. Williams, A.E.R.E.,  
 Dr. Graham, M.O.S. Factory, Windscale,  
 Dr. Dutterworth, M.O.S. Factory, Springfields,  
 Surgeon Lieut. Hughes, R.N.

Dr. Williams drew attention to a Chalk River Report 'CREL-529, Hazard due to beta radiation from fission products deposited on the ground after an atomic explosion'. In this paper there is a foot-note stating that the Medical Research Council in England have already adopted a tolerance of 900 rep. of beta particles for the exposure of large areas of skin, such as the face and hands, as an extreme emergency tolerance.

Dr. Marley stated that the Medical Research Council had agreed to a wartime single exposure of a dose of 25 r. gamma radiation together with a total body beta dose of 50 rep. When only the face and hands are considered the beta dosage associated with 25 r. total body gamma radiation could be raised to 300 rep. In an extreme emergency a single exposure could be 75 r. total body gamma radiation plus 900 rep. beta radiation to the face and hands only.

Dr. Karl Morgan in reply to a question by Dr. Williams stated that in practice for an atomic trial the ratio of betas to gammas was  $\approx 100$  or more. He stated that erythema had occurred. He said that he hoped we would not follow too closely what they have done and would profit by the mistakes that they had made. He also stated that the American Handbook on the effects of Atomic Weapons contained ~~so many inaccuracies that it would be wise not to follow this handbook.~~ With regard to the relative importance of beta-ray dosage and gamma-ray dosage, he said that the gamma-ray dosage could be taken as coming from a mean distance of 3 metres and the beta-ray dosage from 1 metre for a man kneeling on the ground. He stressed the importance of areas of water on account of the selective absorption of some of the fission products and, in particular, soft water was of importance. In actual practice, he said that a limited area of the skin, such as the face and hands, could not be taken in planning procedures since often men strip to the waist wear little or no clothing and that it would be wise to plan for total body beta radiation and not to include a factor for limited areas of skin. He assumed that the men would be wearing footwear with thick soles.

He also stressed the importance of selective absorption by different materials, ~~when there is no indication of any gamma-ray dosage the hazard from the beta-ray dosage could still be high.~~ On the decks of ships there was selective absorption by ropes, resins, paint, rust and other materials and after the ship had been hosed down, in spite of the reduction of the gamma dose, the beta dose still remained high. He said that in view of what had been found he considered that men sleeping on deck might receive a very high beta-ray dosage when there was no indication from gamma-ray measurements of any hazard.

Dr. Morgan also mentioned that the configuration of the ground, the type of soil and the vegetation are factors which must be considered in making any assessment of the hazard. Dr. Marley suggested that disturbance of the surface layers of the soil might be effective in reducing the beta-ray dosage, but in actual practice Dr. Morgan did not think that this would be the case.

Other subjects were touched upon and Dr. Morgan promised to send details of some of their analytical methods for estimating radioactive substances in urine. In reply to a question from Dr. Dutterworth, he said that the hazard from enriched uranium would be a radioactive hazard rather than a toxic one and related to the presence of  $U^{234}$ .

In their tests on estimation of plutonium in urine no great fluctuations in the day to day values of excretion had been found. In their routine tests they regard any urine analysis figure for plutonium as being a indication of a state of equilibrium. If the figure is above the estimated maximum permissible body burden, the tests are repeated until successive tests show a levelling off. They use the formula given in the Handbook for estimating the maximum permissible body burden.

There was some discussion on the metabolism of radioactive substances as complexes and not as individual elements. Dr. Williams asked whether in fact there might not be different absorption ratios for different compounds.

Wound contamination was briefly discussed, but a satisfactory alpha wound probe is not available yet and negative results should be disregarded. In each case the circumstances of the accident should be considered.

Katharine Williams,  
Principal Medical Officer.

9th July, 1953.