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HEALTH PHYSICS DIVISION

K. Z. Morgan, Director

QUARTERLY PROGRESS REPORT

For Period Ending July 20, 1951

Date Issued

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Human Studies Project

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QUARTER ENDING JULY 20, 1951

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PERMISSIBLE INTERNAL DOSE - RADIOISOTOPES

PREVIOUS INVESTIGATION AND CALCULATIONS

Preliminary calculations of maximum permissible concentration (MPC) of radioactive isotopes in air, food, and water have been made on ten alpha emitters and twenty-eight beta-gamma emitters, using whatever data were available in the literature.

A thorough literature search revealed, however, that very little data had been developed regarding "critical body organs," normal concentration of various chemical elements in critical organs, the fraction of chemical elements inhaled, ingested, or absorbed through the skin that reaches the critical organ, and the biological half-life of the elements in the critical organs. These data, along with already available information regarding the energy and physical half-lives of the radioisotopes in question, are necessary in making calculations regarding maximum permissible concentrations.

Efforts have been directed toward obtaining these data by (1) publicizing the need for answers to specific questions among other Atomic Energy Commission laboratories and (2) ORNL sponsorship of research along these lines.

UNIVERSITY OF TENNESSEE RESEARCH AND DEVELOPMENT SUBCONTRACT

A research and development subcontract has been formalized with the University of Tennessee for the university to determine spectrographically the concentration of trace elements in human tissues and organs. Treatment of other subjects pertinent to this program is planned for the near future.

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PUBLICATIONS AND SPECIAL REPORTS

PUBLICATIONS

1. R. A. Lauderdale and A. H. Emmons, "Decontamination of Small Volumes of Radioactive Water," *Nucleonics*, **8**, No. 5, 21-26 (May 1951). Also *J. Am. W. W. A.* (May 1951).

2. R. D. Birkhoff, "Distribution of Energy Loss of Electrons in Aluminum," *Phys. Rev.*, **82**, 3, 448 (May 1, 1951).

3. J. Turkevich and H. H. Hubbell, "Low-Angle X-Ray Diffraction of Colloidal Gold and Carbon Black," *J. of Am. Chem. Soc.*, **73**, 1 (January 1951). (Work done earlier at Princeton University. H. H. Hubbell now at ORNL.)

4. B. J. Spinrad, G. H. Goertzel, and W. S. Snyder, "An Alignment of Monte Carlo Solution of the Transport Problem," *Math Series* **12**, Bureau of Standards (June 11, 1951).

5. O. R. Placak, "The Radioactivity Problems in Water Supplies," *Proceedings of the Inservice Training Course in Water Works Problems*, School of Public Health, University of Michigan (May 1951).

6. K. Z. Morgan, "Quantitative Limits of Permissible Exposure of Personnel (Internal and External)," *Manual of Lectures*, Inservice Training Course in Radiological Health, University of Michigan, School of Public Health (February 5-8, 1951).*

7. K. Z. Morgan, "Historical Sketch of Radiation Protection Experience and Increasing Scope of Radiation Protection Problems," *Manual of Lectures*, Inservice Training Course in Radiological Health, University of Michigan, School of Public Health (February 5-8, 1951).*

8. G. S. Hurst, "A Proportional Counter Method of Measurement of Fast-Neutron Dose," C. F. 51-4-122 (April 27, 1951).

9. E. O. Klema and R. H. Ritchie, "Preliminary Results on the Determination of Thermal Neutron Flux in Water," C. F. 51-4-103 (April 24, 1951).

10. F. P. Cowan and R. A. Love, Brookhaven National Laboratory, and L. B. Farabee, ORNL, "Health Physics and Medical Aspects of a Strontium^{90} Inhalation Incident," AECU-1169.

11. V. I. Knobf, "Studies of Radioactivity in Fish from White Oak Lake and the Clinch River," ORNL-1031 (July 9, 1951).

12. C. P. Straub and P. N. Hensley, "Experimental Jar Test Laboratory Stirring Device," ORNL-965 (May 1951).

13. E. E. Anderson, "Units of Radiation and Radioactivity," *Manual of Lectures*, Inservice Training Course in Radiological Health, University of Michigan, School of Public Health (February 5-8, 1951).*

**Manual of Lectures*, Inservice Training Course in Radiological Health, published May 1951.

14. E. E. Anderson, "Basic Principles of Radiation Protection," *Manual of Lectures*, Inservice Training Course in Radiolocical Health, University of Michigan, School of Public Health (February 5-8, 1951).*

SPECIAL REPORTS

1. C. P. Straub, "Radioactive Materials and Their Effects on Environmental Health," presented at Annual Meeting of Georgia Public Health Association, May 17, 1951.

2. O. R. Placak, "Disposal of C^{14} in Garbage," preliminary report to the Subcommittee on Waste Disposal and Decontamination.

3. K. Z. Morgan, "Maximum Permissible Concentrations of Radioisotopes in the Air, Water, and in the Human Body," preliminary report to the Subcommittee on Internal Dose (May 16, 1951).

4. Conrad P. Straub, "Experimental Water Treatment Plant. IV-Removal of Iodine (I^{131})," (April 30, 1951).

5. C. P. Straub, T. W. Brockett, and Robert Stepp, "Experimental Water Treatment Plant. V-Removal of Fission Products" (May 1, 1951).

6. C. P. Straub, "Water Decontamination. II-Studies on W-6 Tank Wastes" (May 2, 1951).

7. C. P. Straub, T. W. Brockett, and Robert Stepp, "Water Decontamination. III-Studies on Ce^{144}, Y^{91}, and I^{131}" (May 3, 1951).

8. C. P. Straub, and D. Pecsok, "Water Decontamination. IV-Mixed Fission Products, Factorial Experiment" (May 29, 1951).

9. C. P. Straub and D. Pecsok, "Laboratory Studies with Adsorbents. I-Variable Activity Concentration and Mixing Time. W-6 Tank Waste" (May 4, 1951).

10. C. P. Straub, D. Pecsok, and T. W. Brockett, "Laboratory Studies with Adsorbents. II-Bentonitic Montmorillonite Clay. Variable Radioactivity and Adsorbent Concentrations. W-6 Tank Wastes" (June 2, 1951).

11. C. P. Straub and D. Pecsok, "Laboratory Studies with Adsorbents. Variable Adsorbents. Effect of Salinity and Acidity. W-6 Tank Wastes" (June 3, 1951).

12. C. P. Straub, "Disposal of Radioisotopes. A Method of Evaluating Potential Hazards" (April 14, 1951).

13. R. J. Morton, "Problems of Control and Disposal of Radioactive Waste Materials," Public Health Engineering Conference, College of Engineering, University of Florida (March 29, 1951).

**Manual of Lectures*, Inservice Training Course in Radiological Health, published May 1951.

14. T. H. J. Burnett, "Hazards from Released Activated Sodium" (February 8, 1951).

15. T. H. J. Burnett, "Shielding Estimate - LITR Irradiation 'Bomb' " (February 20, 1951).

16. T. H. J. Burnett, "Comparative Dosage Study: Ra vs. MsTh." (The above reports are recorded here because they were not previously reported.)

17. M. A. Churchill, "Investigations of Water Movement in White Oak Creek and Lake," TVA Hydraulic Data Branch (June 22, 1951).

18. D. M. Davis and J. C. Hart, "Aerial Surveying with Light Aircraft for Radioactive Contamination on the Ground" (June 30, 1951).

19. E. J. Kuna, "A Radioautographic Study of X-10 Area - December 3, 1950 through January 5, 1951" (June 13, 1951).

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