

INTERIM REPORT
 QUARTERLY PROGRESS REPORT

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Contract Program or Project Title: Dosimetry and Biotransport Models to Implement ALARA

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Author(s), Affiliation and Address: D. C. Kocher, L. M. McDowell-Boyer, M. T. Ryan, and G. G. Killough
 Health and Safety Research Division*

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NRC Individual and NRC Office or Division to Whom Inquiries Should be Addressed: Mr. Frank Swanberg, Jr.
 Chief, Branch of Health and Environmental Research
 Division of Safeguards, Fuel Cycle, and Environmental Research

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 Washington, D. C. 20555
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*Oak Ridge National Laboratory
 Oak Ridge, Tennessee 37830
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 Department of Energy

QUARTERLY PROGRESS REPORT

INTERIM REPORT

NRC Research and Technical
 Assistance Report

QUARTERLY PROGRESS REPORT
FOR JANUARY-MARCH, 1980

DOSIMETRY AND BIOTRANSPORT MODELS TO IMPLEMENT ALARA
(FIN/189A No. B0188)

Health and Safety Research Division
Oak Ridge National Laboratory

PRINCIPAL SCIENTISTS: G. G. Killough and D. C. Kocher

OBJECTIVE:

To implement current dosimetry and environmental transport models and associated data bases to calculate realistic estimates of radiation doses to the general public, with the view of meeting particular needs of the NRC as the Commission develops capabilities to implement dose limits which satisfy the requirement "as low as reasonably achievable" (ALARA).

PROGRESS IN JANUARY-MARCH, 1980:

Task 1a. Preparation of supplementary report on SFACTOR computer code (D. E. Dunning, Jr.)

The report SFACTOR: A Computer Code for Calculating Dose Equivalent to a Target Organ per Microcurie-Day Residence of a Radionuclide in a Source Organ - Supplementary Report, ORNL/NUREG/TM-85/S1, by D. E. Dunning, Jr., J. C. Pleasant, and G. G. Killough, has completed technical and administrative review. Publication of the report within two months is anticipated.

Task 1b. Maintenance of INREM-II and SFACTOR codes (M. T. Ryan, D. E. Fields, D. E. Dunning, Jr.)

In order to maintain and continually update the INREM-II and SFACTOR computer codes and to facilitate calculation of internal dose conversion factors other than those already published in ORNL/NUREG/TM-190, Vols. 1 and 2, we are establishing on the computer a user-oriented radiation dosimetry information system. The system consists of an interactive computer code called PREREM, files of nuclear decay data, metabolic models, and dosimetric S-factors, and the INREM-II computer code. The files may be easily updated and expanded as new information becomes available, such as age-dependent metabolic models and S-factors. The PREREM code allows the user to generate output from the INREM-II code with a minimum of required input if default values of input from the various files are satisfactory. To date, the PREREM code has been developed in working form, the nuclear decay data file has been prepared giving the half-life and decay branching fractions to radioactive daughter products for about 500 radionuclides, and the metabolic model and S-factor files are in preparation.

Task 1c. Nuclear decay data and external dosimetry (D. C. Kocher)

The manuscript Radioactive Decay Data Tables: A Handbook of Decay Data for Application to Radiation Dosimetry and Radiological Assessments has been delivered to the Technical Information Center of the Department of Energy and is currently in press. Publication early this summer is still anticipated. At the request of S. Acharya, a brief report is being prepared which summarizes the decay data in the form of a table of average energies per decay for each of the different radiation types (alpha particles, electrons, and photons) for the approximately 500 different radionuclides in the data base.

The revision of the external dose-rate factor code DOSFACTER involving calculation of electron dose-rate factors for skin for immersion in contaminated air and water and exposure to a contaminated ground surface has been completed. Revision of the organ dose-rate factors for photons is awaiting results from K. F. Eckerman and G. D. Kerr. A paper entitled "Dose-Rate Conversion Factors for External Exposure to Photons and Electrons" has been accepted for presentation at the American Nuclear Society meeting in Las Vegas, Nevada, on June 8-12, 1980. D. C. Kocher has been invited to give the lecture entitled "External Dosimetry" at the Health Physics Society Summer School in Seattle, Washington, on July 14-18, 1980.

Task 2d. Testing of computer program and sensitivity analysis for terrestrial food-chain models (L. M. McDowell-Boyer, J. C. Pleasant, and G. G. Killough)

Seasonal aspects of cattle management practices as they effect the dynamic behavior of radionuclide transport through the beef and dairy pathways to man have been investigated, and submodels have been formulated for incorporation into the time-dependent terrestrial food-chain model. Methods for estimating radionuclide transfer to meat and milk based on available metabolic data for cows have been considered for use when transfer coefficients are not available in the literature. A model for resuspension of radionuclides from the soil into the atmosphere has been outlined for incorporation into the food-chain model, based on a review and evaluation of empirical resuspension models available in the literature.

The report RAGTIME: A Fortran IV Implementation of a Time-Dependent Model for Radionuclides in Agricultural Systems - First Progress Report, NUREG/CR-1196, by L. M. McDowell-Boyer, J. C. Pleasant, and G. G. Killough, has completed technical and administrative review and is currently in press. The paper "Dynamic Modeling of Radionuclides in Terrestrial Food Chains," by L. M. McDowell-Boyer and G. G. Killough, has been accepted for presentation at the American Nuclear Society meeting in Las Vegas, Nevada, on June 8-12, 1980.

BUDGET AND TECHNICAL MANPOWER EXPENDITURES (FY 1980):

<u>Reporting Period</u>	<u>Project Costs, \$</u>	<u>Technical Support, Man-months</u>
January-March, 1980	55,358	9.2
Total to Date	132,089	20.8
Estimated Cost to Completion	220,000	

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