

INTERIM REPORT
QUARTERLY PROGRESS REPORT

ACCESSION NO. _____
ORNL/HASRD-84

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

Subject of this Document: Technical Progress

Type of Document: Quarterly Progress Report for April-June, 1980

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Date of Document: June 30, 1980

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Prepared for
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555
Under Interagency Agreement DOE #40-550-75
NRC FIN No. B0188

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Oak Ridge, Tennessee 37830
operated by
Union Carbide Corporation
for the
Department of Energy

QUARTERLY PROGRESS REPORT

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INTERIM REPORT
NRC Research and Technical
Assistance Report

QUARTERLY PROGRESS REPORT
FOR APRIL-JUNE, 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 for "reasonably achievable" (ALARA).

PROGRESS IN APRIL-JUNE, 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*, NUREG/CR-1523, ORNL/NUREG/TM-85/S1, by D. E. Dunning, Jr., J. C. Pleasant, and G. G. Killough, was published during this quarter, thus completing this task.

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

The interactive computer code PREREM, developed for the purpose of manipulating data files and computer programs required for the calculation of internal dose, has undergone extensive testing and de-bugging. A laboratory report documenting the computer code is in preparation.

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

The report *A Radionuclide Decay Data Base - Index and Summary Table*, NUREG/CR-1413, ORNL/NUREG-10, by D. C. Kocher, was published during this quarter. The manuscript "Decay Schemes for Radionuclides of Potential Importance in the Nuclear Fuel Cycle," by D. C. Kocher, was submitted for publication in *Nuclear Science and Engineering Journal*.

Revised organ dose-rate factors for external exposure to photons were received from K. F. Eckerman and G. D. Kerr, and are being incorporated into the DOSFACTOR computer code. The paper "Dose-Rate Conversion Factors for External Exposure to Photons and Electrons," by D. C. Kocher was presented at the June meeting of the American Nuclear Society in Las Vegas, Nevada. The manuscript "Dose-Rate Conversion Factors for External

Exposure to Photon and Electron Radiation from Radionuclides Occurring in Routine Releases from Nuclear Fuel Cycle Facilities," by D. C. Kocher, was published in the April 1980 issue of *Health Physics Journal*. The manuscript "Electron Dose-Rate Conversion Factors for External Exposure of the Skin," by D. C. Kocher and K. F. Eckerman, was submitted for publication in *Health Physics Journal*.

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

A model for resuspension of radionuclides from the soil into the atmosphere with subsequent deposition onto food crops has been incorporated into the RAGTIME computer code. Preliminary testing of the model has been performed to determine the appropriateness of the particular formulation used to describe the resuspension pathway. Effects of the variation in feed intake by cattle as a function of age and season are being investigated for inclusion in the existing submodels of the RAGTIME code describing age distribution in a representative cattle herd and radionuclide concentrations in cattle feeds.

L. M. McDowell-Boyer presented a description of the models used in the RAGTIME computer code at a workshop on radionuclide transport modeling at Colorado State University in April. The paper "Dynamic Modeling of Radionuclides in Terrestrial Food Chains," by L. M. McDowell-Boyer and G. G. Killough, was presented at the June meeting of the American Nuclear Society in Las Vegas, Nevada. The report, *RAGTIME: A Fortran IV Implementation of a Time-Dependent Model for Radionuclides in Agricultural Systems - First Progress Report*, NUREG/CR-1196, ORNL/NUREG/TM-371, by J. C. Pleasant, L. M. McDowell-Boyer, and G. G. Killough, was published during this quarter.

BUDGET AND TECHNICAL MANPOWER EXPENDITURES (FY 1980):

<u>Reporting Period</u>	<u>Project Costs, \$</u>	<u>Technical Support, Man-months</u>
April-June, 1980	31,161	3.8
Total to Date	142,160	24.6
Estimated Cost to Completion	220,000	

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