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INTERIM REPORT

QUARTERLY PROGRESS REPORT

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Author(s), Affiliation and Address: G. G. Killough, D. C. Kocher, and L. M. McDowell-Boyer
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

This document was prepared primarily for preliminary or internal use. It has not received full review and approval. Since there may be substantive changes, this document should not be considered final.

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*Oak Ridge National Laboratory
Oak Ridge, Tennessee 37830
operated by
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for the
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QUARTERLY PROGRESS REPORT

INTERIM REPORT

NRC Research and Technical
Assistance Report 7909240774

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QUARTERLY PROGRESS REPORT
FOR APRIL-JUNE, 1979

DOSIMETRY AND BIOTRANSPORT MODELS TO IMPLEMENT ALARA
(189 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 APRIL-JUNE, 1979:

Publications. The report Estimates of Internal Dose Equivalent to 22 Target Organs for Radionuclides Occurring in Routine Releases from Nuclear Fuel-Cycle Facilities, Vol. 2, NUREG/CR-0150v2, ORNL/NUREG/TM-190v2, by D. E. Dunning, Jr., et al., has completed review and is being sent to press. A second 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, by D. E. Dunning, Jr., et al., has been prepared and is undergoing technical review for publication as an ORNL/NUREG document. This report contains supplementary information on the estimation of the alpha component of dose to endosteal cells and bone marrow from sources of activity in skeletal tissues; corrections for the tables of the original report are included.

"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, has been reviewed by Health Physics and is undergoing revision for resubmission. A laboratory report of the same title and author has been published as NUREG/CR-0494, ORNL/NUREG/TM-283. This report is an expanded version of the journal article and includes documentation of the computer code which was used to produce the dose-rate conversion factors.

The report A Dynamic Model of the Global Iodine Cycle for the Estimation of Dose to the World Population from Releases of Iodine-129 to the Environment, NUREG/CR-0717, ORNL/NUREG-59, by D. C. Kocher was revised following technical review and is now in the final stages of internal administrative review.

Terrestrial Food-Chain Model. The computer code described in the previous quarterly report has been expanded to include holdup compartments for foodstuffs leaving the several terrestrial pathways before it reaches man. This arrangement permits the user to prescribe the holdup as a mean residence time for material in the compartment and in the case of decay chains permits a realistic ingrowth of daughter products during storage and processing. Testing of the code indicates that good numerical accuracy is being obtained from the GEAR integration package for ordinary differential equations.

Nuclide Decay Schemes. As of July 1, 1979, our data base contains current information for 576 decay schemes in machine-readable form.

Special Request. On May 21, 1979, internal dose conversion factors calculated with INREM II for a list of 45 radionuclides were provided in response to a special request from Sandia Laboratory through NRC.

STATUS OF CURRENT SUBTASKS:

Task 1: INREM II and SFACTOR codes

a. Preparation of supplementary report on SFACTOR computer code.

This milestone, which had been postponed for reasons explained in the previous quarterly report, will be met with the publication of the draft 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, by D. E. Dunning, Jr., et al., which is now undergoing technical review as indicated in the PROGRESS section.

All other Tasks are on schedule or ahead of schedule. N.B.: Task 3 was postponed until FY80 at the request of NRC.

BUDGET AND TECHNICAL MANPOWER EXPENDITURES (FY 1979):

<u>Reporting Period</u>	<u>Project Costs, \$</u>	<u>Technical Support, Man-months</u>
April-June, 1979	7,817	5.3
Total to Date	105,118	12.0
Estimated Cost to Completion	88,882	

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