UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

AUG 3 1978

MEMORANDUM FOR: Harold R. Denton, Director
Office of Nuclear Reactor Regulation

FROM: Saul Levine, Director
Office of Nuclear Regulatory Research

SUBJECT: RESEARCH INFORMATION LETTER #34 - NUCLEAR DECAY DATA FOR RADIONUCLIDES OCCURRING IN ROUTINE RELEASES FROM NUCLEAR FUEL CYCLE FACILITIES

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This memorandum transmits a tabulation[1/] of nuclear decay data for 240 radionuclides which might be expected to occur in routine releases of effluents from nuclear fuel cycle facilities. This work was performed by the Health and Safety Research Division of the Oak Ridge National Laboratory under the direction of the Environmental Effects Research Branch of RES.

Research Request NRR 78-5, "Confirmatory Research Programs in Radiation Dose Estimation," stated that NRR staff estimations of radiation exposure to man must be based on a well documented data base and dose estimation methodology. Calculation of radiation doses from exposure to radionuclides requires data on the energies and intensities of the atomic and nuclear radiations emitted during the decay process. Most of the data set values in ORNL/NUREG/TM-102 were taken from the journal Nuclear Data Sheets or from the Evaluated Nuclear Structure Data Files, both prepared by the Nuclear Data Project at Oak Ridge National Laboratory. For a few radionuclides, the energies and intensities were evaluated from experimental results published in the open literature.

For each decay data set, the table contains data on atomic and nuclear radiation of the following types: auger (K-, L-shell); X-ray (Kα1, Kα2, Kβ, L); β-; β+;α;γ; and c.e. (K-, L-,...shell). The table lists all radiations with intensity greater than the low-intensity limit of 0.1 per 100 disintegrations. Immediately following the listings for α, β, and γ radiations, a comment gives the number of radiations omitted because of the intensity cutoff, the average energy of the omitted radiations, and their summed intensity. For those nuclei which decay by positron emission, a comment gives the maximum possible intensity of the annihilation radiation.

1/ Nuclear Decay Data for Radionuclides Occurring in Routine Releases from Nuclear Fuel Cycle Facilities, ORNL/NUREG/TM-102

In each table the first column lists the radiation by type. The second and third columns give the energy (in keV) and intensity (particles or photons per 100 disintegrations of the parent nucleus). The last column gives the equilibrium absorbed-dose constant in units of g-rad/μCi-h.

The nuclei are listed in order of increasing mass number. Within a given mass number, the order is by increasing atomic number. The first entry in each table gives the title of the decay data set and the recommended half-life for the parent nucleus.

We recommend that the values presented in ORNL/NUREG/TM-102 be used by your staff in calculating annual doses to man from routine releases of reactor effluents. If you have any questions with regard to this report, please contact Dr. Judith D. Foulke (427-4358).

Saul Levine

Saul Levine, Director
Office of Nuclear Regulatory Research

Enclosure: ORNL/NUREG/TM-102

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Original Signed by
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Enclosure: ORNL/NUREG/TM-102

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