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U.S. ATOMIC ENERGY COMMISSION

REGULATORY GUIDE

DIRECTORATE OF REGULATORY STANDARDS

REGULATORY GUIDE 8.8

ACCEPTABLE CONCEPTS, MODELS, EQUATIONS, AND ASSUMPTIONS FOR A BIOASSAY PROGRAM

A. INTRODUCTION

Section 20.108, "Orders Requiring Furnishing of Bioassay Services," of 10 CFR Part 20, "Standards for Protection Against Radiation," states that the Atomic Energy Commission may incorporate provisions in any license requiring bioassay measurements as necessary or desirable to aid in determining the extent of an individual's exposure to concentrations of radioactive material. As used by the Commission, the term bioassay includes in vivo measurements as well as measurements of radioactive material in excreta.

B. DISCUSSION

Analytical work involved in the planning and conduct of a bioassay program includes (1) determination of the conditions under which bioassays should be required; (2) selection of measurement techniques and quality control criteria, measurement frequency, and program participants; (3) specification of actions to be taken based on measurement results, with action points; and (4) interpretation of measurement results in terms of the location of radioactive material in the body, the quantity present, the rate of elimination, and the resulting dose or dose commitment. To be acceptable, any analysis of this nature requires technically sound concepts, models, equations, and assumptions.

The International Commission on Radiological Protection (ICRP) has included among its publications reports which contain guidance on the protection of personnel from intake of radioactive materials. Several of these reports make recommendations which can be applied to bioassay measurements:

ICRP Publication 2, Report of ICRP Committee II on Permissible Dose for Internal Radiation (1959)

ICRP Publication 6, Recommendations of the ICRP, 1962, Supplement to ICRP Publication 2 (1964)

ICRP Publication 9, Recommendations of the ICRP (1966)

ICRP Publication 10, "Evaluation of Radiation Doses to Body Tissues from Internal Contamination Due to Occupational Exposure," A Report by Committee 4 (1968)

ICRP Publication 10A, "An Assessment of Internal Contamination Resulting from Recurrent or Prolonged Uptakes," A Report by Committee 4 (1971)

ICRP Publication 12, "General Principles of Monitoring for Radiation Protection of Workers," A Report by Committee 4 (1969)

Commission licensees often make reference to these publications when interpreting and reporting bioassay measurement results.

The concentrations of radioactive material in air and water that appear in 10 CFR Part 20, Appendix B, are based on concepts, models, equations, and assumptions adopted by the ICRP. Therefore a precedent exists for the acceptability of these as applied to bioassay analyses necessitated by Commission requirements.

C. REGULATORY POSITION

It is expected that Regulatory Guides to be issued by the Commission will indicate concepts, models, equations, and assumptions acceptable to the Regulatory staff for bioassay analyses that are necessitated by Commission requirements. For radionuclides not covered by a Regulatory Guide on bioassay, the basic internal dosimetry concepts of the ICRP and the models, equations, and assumptions derived from these concepts in ICRP Publications 2, 6, 9, 10, 10A, and 12 are acceptable to the Regulatory staff.