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U.S. ATOMIC ENERGY COMMISSION

REGULATORY GUIDE

DIRECTORATE OF REGULATORY STANDARDS

REGULATORY GUIDE 6.3

DESIGN, CONSTRUCTION, AND USE OF RADIOISOTOPIC POWER GENERATORS FOR CERTAIN LAND AND SEA APPLICATIONS

A. INTRODUCTION

Manufacture or use of a radioisotopic power generator containing byproduct, source, or special nuclear material is an activity requiring a license pursuant to §30.3, "Activities Requiring License," of 10 CFR Part 30, §40.3, "License Requirements," of 10, CFR Part 40, or § 70.3. "License Requirements," of 10 CFR Part 70. This regulatory guide presents guidelines acceptable to the Regulatory staff for the safe design, construction, and use of radioisotopic power generators (other than those capable of being carried on or used at close proximity to the person) intended for use at defined locations on land and on or under the sea. In addition, guidance is provided for the preparation of a safety assessment report to be submitted as part of the information required by §30.32 for applications concerning byproduct material, by §40.31 for applications concerning source material, or by §70.22 for applications concerning special nuclear material to demonstrate that the applicant's proposed program is adequate to protect health and minimize danger to life or property.

B. DISCUSSION

The increase in the development and production of certain types of radioisotopic power generators and their proposed use in international waters created a need for the formulation of internationally acceptable recommendations governing the health and safety aspects of their construction and use. Accordingly, the International Atomic Energy Agency and the European Nuclear Energy Agency jointly established a Working Group to study the health and safety problems associated with such devices. In 1970, that Working Group produced the document, "Guide to the Safe Design, Construction and Use of Radioisotopic Power Generators for certain Land and Sea Applications," which was published as IAEA Safety Series No. 33.[1] Safety Series No. 33 sets forth basic safety goals for the design, construction, and use of generators and, in Appendix III, provides suggested format and contents of a safety assessment report to be used to demonstrate that these safety goals have been met.

C. REGULATORY POSITION

1. The guidelines set forth in IAEA Safety Series No. 33[1] for the safe design, construction, and use of radioisotopic power generators (other than those capable of being carried on or used at close proximity to the person) intended for use at defined locations on land and on or under the sea are generally acceptable, as supplemented by the following:

a. The requirements of 10 CFR Parts 20 and 71 with respect to basic safety standards and the transport of radioactive material should be followed in lieu of IAEA Safety Series No. 9 and No. 6.

b. In addition to the precautions stated in Section 2.3.3, "General Physical Security," periodic determinations of fuel capsule integrity should be performed. Site specific factors such as temperature and accessibility should be taken into account in selecting test frequency and method.

c. In addition to the provisions in Section 2.3.4, "Radiological Protection," records of installation, test, repair, and maintenance activities should be maintained.

d. In lieu of the reference to ISO standards in Section 2.8, "Exterior Marking," the outer surface marking should include the radiation symbol prescribed by §20.203(a) of 10 CFR Part 20.

[1] Copies may be obtained from the IAEA Sales Agent (UNIPUB, Inc., P.O. Box 433, New York, New York 10016).

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Published guides will be revised periodically, as appropriate, to accommodate comments and to reflect new information or experience.

Copies of published guides may be obtained by request indicating the divisions desired to the U.S. Atomic Energy Commission, Washington, D.C. 20545, Attention: Director of Regulatory Standards. Comments and suggestions for improvements in these guides are encouraged and should be sent to the Secretary of the Commission, U.S. Atomic Energy Commission, Washington, D.C. 20545, Attention: Chief, Public Proceedings Staff.

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10. General

e. In lieu of the thermal test prescribed in Section 2.3 of Appendix I, the capsule should be heated in air to a temperature of 800°C or to its maximum operating temperature (whichever is higher) and that temperature should be maintained for a period of 30 minutes before being allowed to cool.

f. In lieu of the limit prescribed in Section 2.6 of Appendix I, the sensitivity of the leakage detection should be 10^{-8} (STP) cm^3/sec.

2. The suggested format and contents of a Safety Assessment Report set forth in Appendix III of IAEA Safety Series No. 33 are generally acceptable for demonstrating that the applicant's proposed program is adequate to protect health and minimize danger to life or property, as supplemented by the following:

a. In addition to the radioactive fuel properties listed in Section 2.2.1 of Appendix III, the report should include the maximum amount of fuel in grams and curies and pertinent data on radioisotopic impurities.

b. In addition to designating the person or organization to be responsible for certain activities in accordance with Section 2.8.1 of Appendix III, the report should describe pertinent radiation protection training and other experience of individuals assigned those responsibilities.

c. A request for the treatment of any information provided in the safety assessment report as proprietary should be submitted in accordance with the provisions of 10 CFR 2.790.