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REGULATORY GUIDE

DIRECTORATE OF REGULATORY STANDARDS

REGULATORY GUIDE 3.23

STABILIZATION OF URANIUM-THORIUM MILLING WASTE RETENTION SYSTEMS

A. INTRODUCTION

Section 20.105, "Permissible Levels of Radiation in Unrestricted Areas," of 10 CFR Part 20, "Standards for Protection Against Radiation," prohibits, except as authorized by the Commission pursuant to Section 20.105(a), the use of licensed materials in such a manner as to create in any unrestricted area, radiation levels which, if an individual were continuously present in the area, could result in his receiving a dose (1) in excess of two millirems in any one hour or (2) in excess of 100 millirems in any seven consecutive days. Section 20.106, "Concentrations in Effluents to Unrestricted Areas," generally prohibits the use of licensed material in such a manner as to release to an unrestricted area radioactive material in concentrations which exceed the limits specified in Appendix B, Table II of Part 20. This regulatory guide describes the principal stabilization, maintenance, and long-term control criteria acceptable to the Regulatory staff that should be considered in connection with the construction and use of tailings retention systems at uranium and thorium mills containing radioactive materials in concentrations exceeding those specified in Appendix B of 10 CFR Part 20.

B. DISCUSSION

The milling of uranium and thorium ores results in the production of large quantities of liquid and solid wastes (tailings) which contain radioactive materials in concentrations in excess of those specified in Table II of Appendix B, 10 CFR Part 20. As these wastes are generated during milling operations, they generally are stored in earth dam retention systems located near the mill. These systems range in size from a few acres to

more than 100 acres containing millions of tons of tailings. When milling operations are terminated, the waste liquids gradually evaporate or are treated and released leaving dry solid tailings in a condition such that erosion by wind is likely. Solid waste tailings generally contain less than 0.05 percent uranium or thorium. However, they also contain nearly all the radioactive daughters which were initially in the ore. Average external radiation levels at the surface of unstabilized tailings piles resulting from these radioactive daughter products generally exceed the 2 mr/hr external radiation limit specified in §20.105 of 10 CFR Part 20 for unrestricted areas. Furthermore, concentrations of airborne radon and other radioactive materials around inactive systems may exceed the limits specified in Appendix B as a result of wind erosion.

In order to limit exposures to individuals to external radiation and airborne radioactive materials to "as low as practicable" and to prevent imprudent uses of tailings, such as in construction, inactive tailings systems should be stabilized and controlled to limit access to the area. The stabilized system should also be examined from time to time on a regular frequency to ensure the integrity of the stabilized system. Subcommittee N46-7 of American National Standards Committee N46, Nuclear Reactor Fuel Cycle, under the sponsorship of the American Institute of Chemical Engineers, has developed a standard which provides general criteria on stabilization, control, maintenance, and inspection of inactive retention systems for wastes resulting from the milling of uranium and thorium ores. This standard was approved by the American National Standards Committee N46 and its Secretariat. It was subsequently approved and designated ANSI N313-1974 by the American National Standards Institute on June 20, 1974.

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C. REGULATORY POSITION

The requirements and criteria included in ANSI N313-1974, "Stabilization of Uranium-Thorium Milling Waste Retention Systems,"* on stabilization, control, maintenance, and inspection of inactive retention systems for wastes resulting from the milling of uranium and thorium ores are generally acceptable to the Regulatory staff in determining whether satisfactory arrangements have been made by applicants and licensees for stabilizing, controlling, and maintaining inactive tailings retention systems.

D. IMPLEMENTATION

The purpose of this section is to provide information to applicants and licensees regarding the Regulatory staff's plans for utilizing this regulatory guide.

Except in those cases in which the applicant proposes an alternative method for complying with specified portions of the Commission's regulations, the method described herein will be used in the evaluation of license applications or renewal applications filed after January 1, 1975.

If an applicant whose application for an initial license or license renewal is filed on or before January 1, 1975, wishes to use this regulatory guide in developing submittals for applications, the pertinent portions of the application will be evaluated on the basis of this guide.

*Copies may be obtained from the American National Standards Institute, Inc., 1430 Broadway, New York, New York 10018.