



# REGULATORY GUIDE

## DIRECTORATE OF REGULATORY STANDARDS

### REGULATORY GUIDE 6.5

## GENERAL SAFETY STANDARD FOR INSTALLATIONS USING NONMEDICAL SEALED GAMMA-RAY SOURCES

### A. INTRODUCTION

Section 20.101, "Exposure of Individuals to Radiation in Restricted Areas," of 10 CFR Part 20, "Standards for Protection Against Radiation," provides that, subject to certain enumerated exceptions, no licensee shall possess, use, or transfer licensed material in such a manner as to cause any individual in a restricted area to receive a dose in excess of the limits specified therein. Paragraph (c) of §20.1 provides that licensees, in addition to complying with the requirements set forth in Part 20, should make every reasonable effort to maintain radiation exposures as far below the limits specified in Part 20 as practicable.

This guide describes general safety practices which are acceptable to the Regulatory staff as methods for nonmedical users of sealed gamma-ray sources to comply, in part, with the above Commission regulations. Basic to this general safety standard are the use of appropriate equipment, ample shielding, and safe operating procedures.

### B. DISCUSSION

American National Standards Institute Subcommittee N43-5 has revised National Bureau of Standards Handbook 93, "Safety Standard for Non-Medical X-Ray and Sealed Gamma-Ray Sources," and the revised standard, designated ANSI N543-1974<sup>1</sup> and now entitled "General Safety Standard for Installations Using Non-Medical X-Ray and Sealed Gamma-Ray Sources," was approved by the American National Standards Institute in 1974. The standard provides recommendations for appropriate

equipment, shielding, and operating procedures. Contained in appendixes to the standard are guidance and extensive data for use in determination of shielding barrier thicknesses for installations using X-ray equipment or sealed sources of cobalt-60, cesium-137, or iridium-192.

### C. REGULATORY POSITION

The requirements and recommended practices contained in ANSI N543<sup>1</sup> are acceptable for the construction and use of installations using sealed gamma-ray sources for nonmedical purposes subject to the following:

1. Table 1 of ANSI N543 lists maximum permissible dose limits. In lieu of those listed limits, the user of this guide should refer to the dose limits prescribed by 10 CFR Part 20, "Standards for Protection Against Radiation." Every reasonable effort should be made to maintain radiation exposures as far below these limits as practicable.
2. The words "Caution" and "Danger" may be used interchangeably on warning signs.
3. Paragraph 3.1.7 of ANSI N543 implies that doses of 2 millirems in any one hour and 100 millirems in any seven consecutive days are absolute limits imposed by the Commission for exposures in unrestricted areas. The user of this guide is directed to §20.105(a) of 10 CFR Part 20 which provides that, under certain conditions, the Commission will approve dose limits greater than 2 millirems in any one hour and 100 millirems in any seven consecutive days.
4. Paragraphs 3.2.5 and 3.4.3 of ANSI N543 imply that a dose rate of 5 millirems per hour is the only

<sup>1</sup>Copies may be obtained from the American National Standards Institute, Inc., 1430 Broadway, New York, New York 10018.

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criterion for determining a radiation area. The user of this guide is directed to §20.202(b)(2) of 10 CFR Part 20 which provides that dose levels of either 5 millirems in any one hour or 100 millirems in any 5 consecutive days may be used to determine a radiation area.

5. In addition to the rate of exposure provisions in paragraph 3.3.3 of ANSI N543, the user of this guide is directed to the requirements of 10 CFR 20.105, "Permissible Levels of Radiation Exposure in Unrestricted Areas." The requirements of §20.105 should also be considered when applying Appendix B of ANSI N543, "Determination of Gamma Ray Shielding Barrier Thicknesses."

6. Paragraph 6.5.2 of ANSI N543 permits the use of a suitable lock in place of an interlock for a temporary exposure room. The user of this guide should comply with the specific provisions of §§20.203(c)(2)(iii) and 20.203(c)(4) of 10 CFR Part 20 if he elects to use a lock in place of an interlock.

7. Paragraph 7.2 of ANSI N543 lists changes which require a radiation protection resurvey or reevaluation by a qualified expert. A resurvey or reevaluation should also be performed when a change in radiation source may have adversely affected radiation protection.

8. Paragraph 8.4.6 of ANSI N543 recommends consideration of the guidance provided in ANSI N13.6-1966(R1972), "American National Standard Practice for Occupational Radiation Exposure Records Systems." The user of this guide should also consider Regulatory Guide 8.7, "Occupational Radiation Exposure Records Systems," which provides an acceptable definition of "bioassay" and notes that records must be maintained in accordance with §20.401 of 10 CFR Part 20.

9. Appendix A of ANSI N543 provides guidance for planning shielding where adequate occupancy data are not available or when complete installation use data are not available. Persons using the occupancy factors and use factors in Appendix A for planning purposes should make appropriate observations and records to substantiate use of factors less than 1.