

ANSI/HPS N43.7-2007

American National Standard

**Safe Design and Use of Self-Contained,
Dry Source Storage Irradiators (Category I)**

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Preface

(This preface is not a part of American National Standard ANSI/HPS N43.7-2007, Safe Design and Use of Self-Contained, Dry Storage Gamma Irradiators (Category I.)

The 1950s and 1960s can be characterized as the research era for radionuclide applications. Based on this research, a number of commercial gamma irradiators started operation in the early 1960s. Their number has been increasing, and source storage capacity of individual irradiators has reached the multi-megacurie range.

Gamma irradiators are used for a variety of purposes in research, industry, and other fields. Typical uses are:

1. Sterilization or microbial reduction in medical and pharmaceutical supplies and consumer products.
2. Microbial reduction and disinfestation of food products.
3. Radiation effects studies.
4. Chemical and polymer synthesis and modifications.
5. Insect eradication through sterile male release programs.

The number and types of irradiators supporting these and other applications are continually growing. Source requirements for any particular irradiator may vary from a few curies to several million curies. Irradiator designs can be many and varied to suit individual needs; therefore, it is essential to establish basic criteria to ensure a high standard of radiation safety in the design and use of irradiators, but in a way that does not unnecessarily restrict the logical use and growth of radionuclide applications.

This standard sets forth basic safety standards recommended in irradiator design and use. Its use by regulatory authorities, relative to the review of radionuclide applications, is encouraged. This standard is an industry consensus and does not take precedence over applicable federal or state regulations.

Because of the variety of designs, four general categories of irradiators have been established to facilitate preparation of standards. Separate standards establish the criteria to be used in the design, fabrication, installation, use, and maintenance for each irradiator category.

The categories are as follows:

Category I: Self-contained, dry source storage irradiators (American National Standard ANSI/HPS N43.7). An irradiator in which the sealed source is completely contained in a dry container constructed of solid materials, the sealed source is shielded at all times, and human access to the sealed source and the volume undergoing irradiation is not physically possible in its designed configuration.

Category II: Panoramic, dry source storage irradiator (American National Standard ANSI/HPS N43.10). A controlled human access irradiator in which the sealed source is contained in a dry container constructed of solid materials, and the sealed source is fully shielded when not in use; the sealed source is exposed within a radiation volume that is maintained inaccessible during use by an entry control system.

Category III: Self-contained, wet source storage irradiator (American National Standard ANSI/HPS N43.15). An irradiator in which the sealed source is contained in a storage pool (usually containing water), the sealed source is shielded at all times, and human access to the sealed source and the volume undergoing irradiation is physically restricted in its designed configuration and proper mode of use.

Category IV: Panoramic, wet source storage irradiator (American National Standard ANSI/HPS N43.10). A controlled human access irradiator in which the sealed source is contained in a storage pool

(usually containing water) and the sealed source is fully shielded when not in use; the sealed source is exposed within a radiation volume that is maintained inaccessible during use by an entry control system.

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