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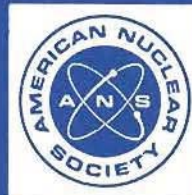
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ANSI/ANS-55.1-1979

**id radioactive waste processing system  
for light water cooled reactor plants**

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**American National Standard  
for Solid Radioactive Waste Processing System  
for Light Water Cooled Reactor Plants**

**Secretariat  
American Nuclear Society**

**Prepared by the  
American Nuclear Society  
Standards Committee  
Working Group ANS-55.1**

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**Abstract**

This standard establishes minimum requirements and provides recommendations and guidelines for the design, construction, and performance with due consideration for operation of solid radioactive waste processing systems for commercial nuclear power reactors. Design requirements and recommendations as well as quality requirements are presented. Various process steps and alternate methods of handling and disposing of input quantities of solid radioactive waste are discussed along with sizing, capacity, arrangements, and redundancy of the system. Instrumentation and control requirements are also provided, as well as operating guidance, to assure that the performance, safety, and operational objectives of this standard are met.

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## Foreword

(This Foreword is not a part of American National Standard for Solid Radioactive Waste Processing System for Light Water Cooled Reactor Plants, ANSI/ANS-55.1-1979)

A major aspect of nuclear power plant operation is management of the solid radioactive waste generated as a by-product of commercial nuclear power. The development of facilities and equipment to handle and process solid radioactive waste has provided the nuclear industry with the capability to assure that shipments of radioactive solid wastes are within applicable regulatory requirements.

It is the purpose of this standard to establish uniform practices and minimum requirements for design, construction, and performance, with due consideration for operation of solid radioactive waste processing systems, to reduce radiation exposures to operating personnel and to reduce the probability of releases of radioactivity from accidents. It is not the intent of this standard to develop a "standard system" for processing solid radioactive waste; it is clearly recognized that there is a wide variety of systems and equipment in use and others are continually being developed.

A number of designs, concepts, operating system histories, and practices were reviewed in preparation of this standard. In addition, applicable Nuclear Regulatory Commission (NRC) Regulatory Guides were considered in the development of this standard. It is not intended that this standard should limit the development or application of alternate methods of processing provided that such alternate methods meet the design and performance requirements of this standard.

Various quantities of solid radioactive waste are generated by operation and maintenance activities and are dependent upon several factors, including design conditions, type of equipment, equipment arrangements, and operating philosophy. The origin (input sources), the normal expected (averages) and maximum (short-term) quantities, method of handling, processing, and disposing of these wastes are the subjects of this standard.

The requirements of this standard consider that the solid radioactive waste processing systems are operated on a level commensurate with other facility operations. This standard establishes the minimum quality requirements for the design, construction, and performance of the system.

This standard employs a technique using a discrimination device called "boxing." This technique indicates those statements which are nuclear safety related. The term "nuclear safety" includes those requirements that are felt by the writing group to arise from official and implied NRC policies (including regulations, regulatory guides, branch positions, the Standard Review Plan, and past practice on applications) *as well as* other requirements the group believes are related to nuclear safety. Non-nuclear safety related requirements include the following types of needs as they exclusively apply to areas not considered to be nuclear safety related: conventional safety, equipment reliability, plant availability, good engineering practice, and contractual (commercial) requirements.

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# Solid Radioactive Waste Processing System for Light Water Cooled Reactor Plants

## 1. Scope

This standard sets forth design, construction, and performance requirements with due consideration for operation of the Solid Radioactive Waste Processing System for light water-cooled reactor plants for design basis inputs. For the purpose of this standard, the Solid Radioactive Waste Processing System begins at the interface with the liquid radioactive waste processing system boundary, at the inlets to the spent resin, filter sludge, evaporator concentrate, and phase separator tanks. All radioactive or contaminated materials, including spent air and liquid filter elements, spent bead resins, filter sludge, spent powdered resins, evaporator and reverse osmosis concentrates, and dry radioactive wastes shall be processed in appropriate portions of the solid radioactive waste system. The system terminates at the point of loading the filled drums and other containers on a vehicle for shipping off-site to a licensed burial site. The Solid Radioactive Waste Processing System is not a safety class system as defined by American National Standard Nuclear Safety Criteria for the Design of Stationary Pressurized Water Reactor Plants, N18.2-1973/ANS-51.1 and its revision, N18.2a-1975/ANS-51.8, Sections 2.2 and 2.3. [1,2]<sup>1</sup>, and the similar draft standards for boiling water reactor plants.<sup>2</sup> The provisions contained in this standard, therefore, shall take precedence over the aforementioned standards.

The product resulting from the solid radioactive waste processing system will meet the criteria imposed by standards and regulations for transportation and burial.<sup>3</sup>

<sup>1</sup>Numbers in brackets refer to corresponding numbers in Section 11, References.

<sup>2</sup>"Nuclear Safety Criteria for the Design of Stationary Boiling Water Reactors", proposed American National Standard N212 trial use and comment, May 1975. Correspondence should be sent to: Mr. W. D. Gilbert, General Electric Company, Atomic Power Equipment Department, 175 Curtner Avenue, San Jose, California 95125.

<sup>3</sup>See Appendix 1 for additional information.

## 2. Definitions

**2.1 Limitations.** The definitions given below are of a restricted nature for the purposes of this standard.

### 2.2 Glossary of Terms

**container.** The primary containment receptacle in which the solidified wastes are contained.

**dewatered.** Liquid or slurry wastes that have had excess water removed.

**encapsulation.** To cover and surround an object with solidification agent.

**free liquid.** Uncombined liquid not bound by the solid matrix of the solid waste mass.

**homogeneous.** Of uniform composition; the waste is uniformly distributed throughout the package.

**normalized inputs.** Those average annual quantities generated on a per day basis prorated to the design basis values noted in Tables 8-2 and 8-3 which are for a single 3800 MWt unit.

**shall, should, and may.** The word "shall" is used to denote a requirement; the word "should" to denote a recommendation; and the word "may" to denote permission, neither a requirement nor a recommendation. The Solid Radioactive Waste Processing System shall be designed, constructed, and operated in accordance with the requirements of this standard, but not necessarily with its recommendations.

**short-lived isotopes.** Radionuclides with half lives less than eight days.

**slurry wastes.** Liquid radioactive wastes of high insoluble content (greater than 0.1 percent solids by weight).

**solidification agent.** Material which, when