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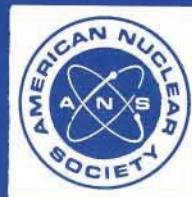
**WITHDRAWN**

April 9, 1990  
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liquid radioactive waste  
processing system for  
light water reactor plants

an American National Standard

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

Secretariat  
**American Nuclear Society**

Prepared by the  
**American Nuclear Society  
Standards Committee  
Working Group ANS-55.6**

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**Abstract** This standard sets forth minimum design, construction and performance requirements, with due consideration for operation, for Liquid Radioactive Waste Processing Systems for light water reactor plants, for routine operation including design basis fuel leakage, and other design basis occurrences. Design requirements and recommendations, as well as quality requirements, are presented. Various methods of treating and disposing of input quantities of liquid radioactive waste are discussed along with sizing, capacity, arrangement and redundancy of the systems. Instrumentation and control requirements are 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 Liquid Radioactive Waste Processing System for Light Water Reactor Plants, ANSI/ANS-55.6-1979.)

This standard supersedes the American National Standard for Liquid Radioactive Waste Processing System for Pressurized Water Reactor Plants, N199-1976, (ANS-55.2) and the American National Standard Liquid Radioactive Waste Processing System for Boiling Water Reactor Plants, N197-1976 (ANS-55.3)

A major aspect of nuclear power plant operation is management of the liquid radioactive waste generated as a by-product of nuclear power. Various quantities of liquid radioactive waste are generated by operation and maintenance activities and are dependent upon several factors including design conditions, type of equipment, equipment arrangement and operating philosophy. The development of facilities and equipment to handle and process liquid radioactive waste has provided the nuclear industry with the capability to maintain releases of radioactive material in liquid effluents 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 liquid radioactive waste processing systems. Adherence by system designers to the criteria contained in the standard will enable the operator; (a) to control, to regulatory levels, radiation exposures to operating personnel, (b) to assure a low probability of accidental release of radioactivity from the system, and (c) to control system releases of radioactivity, during and following design-basis inputs, as low as is reasonably achievable. It is not the intent of this standard to develop a "standard system" for processing liquid radioactive waste; it is clearly recognized that there is a wide variety of systems and equipment now in use and others continually being developed.

A number of designs, concepts, operating system histories and practices were reviewed in preparation of this standard. In addition applicable U.S. Nuclear Regulatory Commission (NRC) regulatory guides were considered in the development of this standard.

The requirements of this standard consider that the Liquid 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 operation 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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# Liquid Radioactive Waste Processing System for Light Water Reactor Plants

## 1. Scope

This standard sets forth minimum design, construction and performance requirements, with due consideration for operation, of the Liquid Radioactive Waste Processing System for light water reactor plants for design basis inputs. It is applicable for routine operation including design basis fuel leakage and other design basis occurrences.

For the purpose of this standard, the Liquid Radioactive Waste Processing System begins at the interfaces with the reactor coolant pressure boundary and points of discharge in lines from other systems (including the steam generator blowdown system downstream from the outermost containment isolation valve), or at those sumps and floor drains provided for liquid waste with the potential of containing radioactive material; it terminates at the point of controlled discharge to the environment, at the point of interface with the waste solidification system, and at the point of recycle back to storage for reuse. The Liquid Radioactive Waste Processing System is not a "safety system" nor does it contain components that are "Safety Class." The requirements of this standard take precedence over requirements set forth in American National Standard Safety Criteria for the Design of Stationary Boiling Water Reactor Plants, ANSI/ANS-52.1-1978 [1]<sup>1</sup>, American National Standard Safety Criteria for the Design of Stationary Pressurized Water Reactor Plants, Sections 2.2 and 2.3, N18.2-1973 (ANS-51.1), [2], and American National Standard Revision and Addendum to Nuclear Safety Criteria for the Design of Stationary Pressurized Water Reactor Plants N18.2-1973, N18.2a-1975 (ANS-51.8) [3] wherein the definitions of "safety system" and Safety Classes are found. Planned revisions of ANS-52.1 and ANS-51.1/51.8 will delete requirements related to the scope of this standard and reference this stan-

dard for such requirements.

This standard does not include the reactor coolant cleanup system, condensate cleanup systems, the fuel pool cleanup system, sanitary waste system, any nonaqueous liquid system, or controlled area storm drains. It should be noted that the Liquid Radioactive Waste Processing System serves other functions such as maintaining chemical purity for reuse. These functions may place additional requirements and limitations on the processing systems which are outside the scope of this standard.

## 2. Definition

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

### 2.2 Glossary of Terms

**chemical wastes.** Liquid radioactive wastes having high conductivity, variable insoluble solids content, variable radioactivity content and not containing soaps, detergents, oils or similar organic materials.

**crud.** Insoluble particulate materials in the process streams.

**controlled area.** That portion of a nuclear facility, including outside yard areas, enclosed equipment, systems, and facilities which may contain radioactive material by definition or design. Controlled area does not normally, but may temporarily, include portions of secondary system areas of the plant.

**decontamination factor (DF).** The ratio of the concentration of the radioactive material in the influent stream to its concentration in the effluent.

**decontamination wastes.** Liquid radioactive wastes generated by decontamination of radioactive plant components, equipment and

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