

American Nuclear Society

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**November 19, 1999
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**gaseous radioactive waste processing
systems for light water reactor plants**

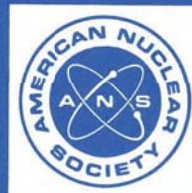
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ANSI/ANS-55.4-1993

**American National Standard
for Gaseous Radioactive Waste Processing
Systems for Light Water Reactor Plants**

Secretariat
American Nuclear Society

Prepared by the
**American Nuclear Society
Standards Committee
Working Group ANS-55.4**

Published by the
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American National Standard

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Foreword

(This foreword is not a part of American National Standard for Gaseous Radioactive Waste Processing Systems for Light Water Reactor Plants, ANSI/ANS-55.4-1993, but is included for information purposes only.)

Management of the gaseous radioactive waste generated as a by-product of nuclear power plant operation constitutes a major management responsibility. Quantities of gaseous radioactive waste generated during operation are dependent upon several factors including design conditions, type of equipment, equipment arrangements, and operating philosophy.

The purpose of this standard is to establish uniform practices and minimum requirements for design, construction, and performance, with due consideration for operation, of gaseous radioactive waste processing systems. The standard sets forth design, construction, and performance requirements for acceptable gaseous 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 unplanned release of radioactivity from the system; and (c) to control system releases of radioactivity to levels as low as reasonably achievable.

In accordance with ANS policy to maintain standards on a five year basis, the standard was revised to update its contents and to reflect changes in industry practices. Members of Working Group 55.4, and their affiliations at the time of their approval of this standard, were as follows:

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Gaseous Radioactive Waste Processing Systems for Light Water Reactor Plants

1. Scope and System Description

1.1 Scope. This standard sets forth minimum design, construction, and performance requirements, with due consideration for operation, for gaseous radioactive waste processing systems (GRWPS) for light water reactor (LWR) plants. It is applicable for routine operation, design basis fuel leakage, and other design basis occurrences.

1.2 System Description. For the purpose of this standard, the boiling water reactor (BWR) GRWPS begins at the point of discharge from the main condenser air removal equipment, the main condenser mechanical vacuum pump, and the turbine steam packing exhaust. For pressurized water reactors (PWRs), the GRWPS begins at the point of discharge from the volume control tank, the reactor coolant drain tank, the reactor coolant gas stripper, the boron recycle holdup tank, the pressurizer relief tank, and the boron recycle evaporator. The systems terminate at the point of introduction into the plant exhaust.

The components of the GRWPS are nonnuclear safety related and the system is classified as Nonnuclear Safety (NNS) as defined in Section 3.3 of American National Standards for Nuclear Safety Criteria for the Design of Stationary Boiling Water Reactor Plants, ANSI/ANS-52.1-1983 (R1988) [1],¹ and Nuclear Safety Criteria for the Design of Stationary Pressurized Water Reactor Plants, ANSI/ANS-51.1-1983 (R1988) [2].

2. Definitions

charcoal adsorption system. A processing system incorporating activated charcoal at ambient or reduced temperatures for adsorption and decay of radioactive gases.

clean steam. Steam generated by the vaporization of non-radioactive demineralized water.

cover gas. Gas in liquid storage tanks pressurized to prevent in-leakage of air.

¹ Numbers in brackets refer to corresponding numbers in Section 7, References.

cryogenic adsorption systems. Processing systems utilizing an adsorbent at cryogenic temperatures for separation or adsorption and decay of radioactive gases.

cryogenic distillation units. Equipment employing cryogenic temperature distillation for separation of noble gases from waste gas streams.

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

gas stripper. Degassing equipment to remove dissolved gases from liquids.

high efficiency particulate air filter (HEPA). A disposable dry-type filter having minimum efficiency of 99.97 percent for 0.3 micrometer particles.

pressurized gas storage tank system. A system using tanks, operating at pressures above 1.5 atmospheres absolute, for the hold-up of gaseous radioactive waste prior to release or reuse.

recombiner. Equipment designed to accomplish the controlled reaction of hydrogen and oxygen by catalytic or thermal means.

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.

standard cubic foot (SCF). As used in this standard, an amount of gas occupying one cubic foot at a temperature of 60°F and a pressure of one atmosphere (absolute).

3. Criteria

This standard establishes minimum requirements for the design and construction of the GRWPS to achieve the performance, safety, and operational objectives specified in this section.