

# American Nuclear Society

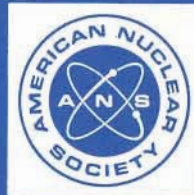
**WITHDRAWN**

October 27, 1997  
ANSI/ANS-59.51-1989

**fuel oil systems for  
emergency diesel generators**

**an American National Standard**

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**ANSI/ANS-59.51-1989**  
**Revision of**  
**ANS-59.51-1976 (N195)**

**American National Standard**  
**Fuel Oil Systems for**  
**Emergency Diesel Generators**

Secretariat  
**American Nuclear Society**

Prepared by the  
**American Nuclear Society**  
**Standards Committee**  
**Working Group ANS-59.51**

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Approved October 27, 1989  
by the  
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## **American National Standard**

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This standard was developed under the procedures of the Standards Committee of the American Nuclear Society; these procedures are accredited by the American National Standards Institute, Inc., as meeting the criteria for American National Standards. The consensus committee that approved the standard was balanced to assure that competent, concerned, and varied interests have had an opportunity to participate.

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Comments on this standard are encouraged and should be sent to Society Headquarters.

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## Foreword (This Foreword is not a part of American National Standard Fuel Oil Systems for Emergency Diesel Generators, ANSI/ANS-59.51-1989.)

This standard is applicable to light water reactor nuclear power plants and is the first in a series of standards sponsored by the LWR Criteria Management subcommittee (MC-1) intended to cover the design of auxiliary systems that support the operation of emergency diesel generator units. Other standards in this series being developed by this working group are listed below:

Proposed Standard	Subject
ANS-59.52	Lubricating Oil Systems
ANS-59.53	Starting Air Systems
ANS-59.54	Combustion Air Systems
ANS-59.55	Coolant Systems

This standard interfaces with American National Standard Criteria for Diesel-Generator Units Applied as Standby Power Supplies for Nuclear Power Generating Stations, ANSI/IEEE 387-1984. The scope of IEEE 387-1984 includes "The fuel oil system from the fuel oil day tank to the engine, including filters and strainers between the day tank and the engine." However, no fluid system or component performance or design criteria are specified in that standard. To address these fluid system requirements, this revision to ANSI/ANS-59.51 includes in its scope instrumentation and control functions, piping, and piping components between the day tank and the diesel engine terminal connections. Based on discussions with the Working Group chairman for IEEE 387, it was agreed that the intent of IEEE 387 is to address only the overall qualifications and boundaries of the diesel generators auxiliary systems and not the specific performance or design criteria which should be addressed in ANSI/ANS-59.51-1989.

The purpose of this standard and the related standards under development is to provide guidance to nuclear plant owners, designers, manufacturers, regulatory authorities, and operators in the design of reliable onsite power systems. The reliability of the fuel oil system shall be considered when satisfying the overall reliability requirements of the diesel generator units. This is especially important if fuel oil systems have components that are shared between reactor units, where consideration is given to the application of the single failure criterion.

This standard was initially approved and issued by the American Nuclear Society in April 1976 and has been completely revised to conform to American Nuclear Society Nuclear Power Plant Standards Committee (NUPPSCO) Policy 2.5, "Format Guide for Systems Criteria Standards." Also, this standard has been revised to conform to the latest revisions of American National Standards Nuclear Safety Criteria for the Design of Stationary Pressurized Water Reactor Plants, ANSI/ANS-51.1-1983 (R1988) and Nuclear Safety Criteria for the Design of Stationary Boiling Water Reactor Plants, ANSI/ANS-52.1-1983 (R1988) and to resolve comments from previous ballots issued in 1982 for reaffirmation, in 1985 for withdrawal and in 1986 for reaffirmation. The NRC's proposed "station blackout" rule that appeared in the Federal Register/Vol. 51, No. 55/Friday, March 21, 1986 has also contributed to a renewed interest in this standard.

U.S. Nuclear Regulatory Commission, Regulatory Guide 1.137, "Fuel-Oil Systems for Standby Diesel Generators," endorsed ANSI N195-1976/ANS-59.51 as providing an acceptable method for complying with the pertinent requirements of General Design Criterion 17 of Appendix A to 10CFR Part 50, subject to some clarifications and additional requirements. This revision has considered and incorporated where appropriate these clarifications and additional requirements.

This revision to the standard has been prepared by Working Group ANS-59.51 of the American Nuclear Society, which was reformed in 1986 and had the following membership as of 1989:

R. E. Fortier, Chairman, <i>Stone &amp; Webster Engineering Corporation</i>	C. L. Ray, Jr., <i>Duke Power Company</i>
W. J. McFarland, <i>Philadelphia Electric Company</i>	E. B. Tomlinson, <i>U.S. Nuclear Regulatory Commission</i>
S. M. Peterson, <i>Cooper Nuclear Station</i>	N. A. Traeger, <i>Colt Industries - Fairbanks Morse Engine Division</i>

ANS-59.51 had been under the management of ANS-30, ANS-50, and ANS-3 subcommittees. In 1985, this standard was placed under the management of MC-1 subcommittee. It was under MC-1 that a working group was reformed in 1986 to prepare this revision.

MC-1, LWR Criteria Management Committee, had the following membership at the time of the standard's approval:

W. H. D'Ardenne, Chairman, <i>General Electric Company</i>	H. G. O'Brien, <i>Tennessee Valley Authority</i>
E. J. Borella, <i>Ebasco Services, Inc.</i>	H. C. Shaffer III, <i>Yankee Atomic Electric Company</i>
R. Fortier, <i>Stone &amp; Webster Engineering Corporation</i>	D. J. Spellman, <i>Advanced Technology Engineering Systems, Inc.</i>
J. C. Glynn, <i>U.S. Nuclear Regulatory Commission</i>	R. C. Surman, <i>Westinghouse Electric Corporation</i>
P. Hepner, <i>Combustion Engineering, Inc.</i>	E. W. Swanson, <i>Babcock &amp; Wilcox Company</i>
D. G. Keith, <i>Bechtel Power Corporation</i>	
S. A. Nass, <i>Duquesne Light Company</i>	

The American Nuclear Society's Nuclear Power Plant Standards Committee (NUPPSCO) had the following membership at the time of its release of this standard:

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M. D. Weber, Secretary

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T. J. Sullivan	Institute of Nuclear Power Operations
C. D. Thomas	Yankee Atomic Electric Company
W. T. Ullrich	Philadelphia Electric Company
G. P. Wagner	Commonwealth Edison Company
G. L. Wessman	Consultant
G. J. Wrobel	Rochester Gas & Electric Corporation

\*Affiliation at time of balloting

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# Fuel Oil Systems For Emergency Diesel Generators

## 1. Introduction

**1.1 Scope.** This standard provides functional, performance, and design requirements for the fuel oil system for diesel generators that provide emergency onsite power for light water reactor nuclear power plants. This standard addresses all mechanical equipment associated with the fuel oil system, but does not include that portion of the fuel oil system which is factory assembled, engine mounted, and supplied by the diesel generator manufacturer. Also, it includes the instrumentation and control functional requirements. It excludes motors, motor control centers, switchgear, cables, and other electrical equipment used in the operation of the fuel oil system, except to define interface requirements.

**1.2 Purpose.** The purpose of this standard is to define those features of fuel oil systems required to ensure an adequate fuel supply to emergency diesel generators and to provide performance and design criteria that ensure sufficient fuel is available for supply to the emergency diesel generators under all plant conditions.

## 2. Definitions

Applicable definitions as stated in American National Standards Nuclear Safety Criteria for the Design of Stationary Pressurized Water Reactor Plants, ANSI/ANS-51.1-1983 (R1988) and "Nuclear Safety Criteria for the Design of Stationary Boiling Water Reactor Plants," ANSI/ANS-52.1-1983 (R1988) shall be utilized for this standard [1, 2].<sup>1</sup> The following definitions shall also be applicable to this standard:

**design basis events.** Postulated events used in the design to establish the performance requirements of structures, systems and components as defined in the plant Safety Analysis Report.

**emergency diesel generator.** A diesel generator unit designed in accordance with American National Standard Criteria for Diesel Generator

Units Applied as Standby Power Supplies for Nuclear Power Generating Stations, ANSI/IEEE 387-1984 and installed to provide a standby power supply in accordance with American National Standard Criteria for Class 1E Power Systems for Nuclear Power Generating Stations, ANSI/IEEE 308-1980 [3,4]. The diesel generators provide standby electric power to comply with the pertinent requirements of Title 10, "Energy," Code of Federal Regulations, Part 50, Appendix A, "General Design Criteria 17, Electric Power Systems" [5].

**fill line.** Those components, including piping, valves, and filters used to provide a means to replace fuel oil into the supply tank.

**fuel oil subsystem.** That portion of the fuel oil system which supplies fuel to a single diesel generator unit.

**fuel oil system.** The set of equipment including pumps, tanks, piping, valves and fill and vent lines required to supply fuel to the emergency diesel generators installed in a nuclear power plant. As used here "system" includes the fuel oil equipment for all of the diesel generators for a nuclear unit.

**minimum diesel generator capacity.** The minimum electrical output from the diesel generator(s) to ensure the operation of the minimum plant equipment required to prevent unacceptable consequences for any design basis event including the capacity to power the nuclear safety related systems and components.

**protected area.** An area encompassed by physical barriers to which access is controlled.

**shall, should, and may.** The word "shall" is used to denote a requirement; the word "should" is used to denote a recommendation; and the word "may" is used to denote permission, neither a requirement nor a recommendation.

**tanks.** All tanks used to support diesel generator operation; where used without modifiers, it includes

<sup>1</sup>Numbers in brackets refer to corresponding numbers in Section 7, References.