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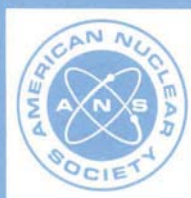
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**design criteria for consolidation
of LWR spent fuel**

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**American National Standard
Design Criteria for Consolidation
of LWR spent fuel**

Secretariat
American Nuclear Society

Prepared by the
**American Nuclear Society
Standards Committee
Working Group ANS-57.10**

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American National Standard

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Foreword

(This Foreword is not a part of American National Standard Design Criteria for Consolidation of LWR Spent Fuel, ANSI/ANS-57.10-1987.)

This standard provides design criteria for the equipment and systems comprising the rod consolidation process for commercial light water reactor (LWR) spent fuel assemblies. The criteria are applicable to wet and dry, and horizontal and vertical consolidation concepts.

The standard does not include storage of the spent nuclear fuel either prior to performing consolidation or upon completion of the process. There is a section in the standard which identifies interface considerations of the process with the facility or installation in which consolidation will take place.

The rod consolidation process is intended to produce canisters filled with full length fuel rods that have been removed from spent nuclear fuel. The process removes those components that maintain rod spacing and, thereby, allow the individual fuel rods to be reconfigured into a close packed array. This will result in more efficient spent fuel management.

The standard is intended to be consistent with the requirements of the regulations in Title 10, "Energy," Code of Federal Regulation, Parts 50 "Domestic Licensing of Production and Utilization Facilities," and 72 "Licensing Requirements for the Storage of Spent Fuel in an Independent Spent Fuel Storage Installation (ISFSI)."

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Design Criteria for Consolidation of LWR Spent Fuel

1. Scope

1.1 Introduction. This standard is intended to be used by: a) those involved in specifying the requirements for the equipment and systems necessary to consolidate LWR spent nuclear fuel (rod consolidation), b) the designer of consolidation equipment and systems to define the minimum requirements and, c) regulatory agencies in their evaluation of applications to perform the process of rod consolidation.

This standard continues the set of similar American National Standards on the subject of spent nuclear fuel storage and handling.¹ The similar standards are: Design Criteria for an Independent Spent Fuel Storage Installation (Water Pool Type), ANSI/ANS-57.7-1981 [1];² and Design Criteria for an Independent Spent Fuel Storage Installation (Dry Storage Type), ANSI/ANS-57.9-1984 [2].

1.2 Scope. This standard provides design criteria for the process of consolidating LWR spent nuclear fuel in either a wet or dry environment. The process can be performed either horizontally or vertically. The process utilizes the equipment and systems used to perform consolidation, handle fuel rods and nonfuel-bearing components as well as handle broken fuel rods. This standard also contains requirements for facility or installation interfaces, nuclear safety, structural design, thermal design, accountability, safeguards, decommissioning, and quality assurance.

The standard is not concerned with the storage of the spent fuel either before or after the consolidation process. These areas are covered in the following American National Standards:

(a) Design Requirements for Light Water Reactor Spent Fuel Facilities at Nuclear Power Plants, ANSI/ANS-57.2-1983 [3];

¹Similar Standards as defined in American National Standards Institute Executive Standards Council-525, "ANSI Guide to Resolving Similar/Duplicate Standards Problems."

²Numbers in brackets refer to corresponding numbers in Section 7, References.

(b) Design Criteria for an Independent Spent Fuel Storage Installation (Water Pool Type) ANSI/ANS-57.7-1981 [1]; and

(c) Design Criteria for an Independent Spent Fuel Storage Installation (Dry Storage Type) ANSI/ANS-57.9-1984 [2].

1.3 Limits of Application. This standard applies to the process of rod consolidation. The process is intended to be performed at commercial LWR nuclear power plants, reprocessing facilities or other installations which receive, store or dispose of LWR spent fuel. Other limits of application are that the spent nuclear fuel to be consolidated is commercial LWR fuel and has a minimum of one year cooling after discharge from the reactor core.

1.4 Overall Design Consideration. This standard is based on the following overall considerations which reduce the potential hazards during the rod consolidation process:

(a) short lived high specific activity radio-nuclides, particularly those of Iodine and Xenon are no longer present in significant quantities due to the minimum one year cooling time after discharge from the reactor core,

(b) very little remaining radioactivity is in a dispersible form,

(c) decay heat is greatly reduced due to the minimum one year cooling time after discharge from the reactor, and

(d) nuclear reactivity is reduced due to burnup.³

1.5 Format of Standard. For purposes of presentation, the rod consolidation process has been divided into seven subfunctions:⁴

(a) End Fitting Removal

(b) Rod Removal

(c) Rod Array Configuration

(d) Consolidated Rod Packing

³Most fuels decrease monotonically in reactivity with burnup; certain fuels initially increase in reactivity during the first cycle, then decrease.

⁴Six of these subfunctions comprise the separate unit operations which are performed and which are depicted in Figure A-1, Rod Consolidation Process Illustrative Flow Diagram, of Appendix A.