U.S. NUCLEAR REGULATORY COMMISSION

December 1981

REGULATORY GUIDE

OFFICE OF NUCLEAR REGULATORY RESEARCH

REGULATORY GUIDE 3.49
(Task FP 806-6)

DESIGN OF AN INDEPENDENT SPENT FUEL STORAGE INSTALLATION (WATER-BASIN TYPE)

A. INTRODUCTION

Subpart F, "General Design Criteria," of 10 CFR Part 72, "Licensing Requirements for the Storage of Spent Fuel in an Independent Spent Fuel Storage Installation," presents the general design criteria that are applicable to an independent spent fuel storage installation (ISFSI). This regulatory guide provides guidance acceptable to the NRC staff for use in the design of an ISFSI of the water-basin type that will comply with these general design criteria.

B. DISCUSSION

Group 57.7 of Subcommittee ANS-55 (Fuel and Waste Management) of the American Nuclear Society has developed a standard, ANSI/ANS 57.7-1981, "Design Criteria for an Independent Spent Fuel Storage Installation (Water-Pool Type)."[1] It was approved for publication by the American National Standards Institute on February 19, 1981. The standard defines the design criteria for a water-basin-type independent spent fuel storage installation.

C. REGULATORY POSITION

ANSI/ANS 57.7-1981 is acceptable to the NRC staff for use in the design of an ISFSI that uses water pools as the mode of storage subject to the following:

1. ANSI/ANS 57.7-1981 makes reference for design input of siting parameters to a companion standard, ANSI/ANS 2.19-1981, "Guidelines for Establishing Site-Related Parameters for Site Selection and Design of an Independent Spent Fuel Storage Installation (Water-Pool Type),"[1] which has not been endorsed by the NRC. Until ANSI/ANS 2.19-1981 is endorsed by the NRC, the users of ANSI/ANS 57.7-1981 should seek guidance from the NRC staff on siting parameters that are used as design input.

2. Section 7 of ANSI/ANS 57.7-1981 lists the codes and standards that are referenced in this standard. Endorsement of ANSI/ANS 57.7-1981 by this regulatory guide does not constitute an endorsement of the referenced codes and standards.

3. ANSI/ANS 57.7-1981 includes a number of appendices. Endorsement of this standard by this regulatory guide does not constitute an endorsement of these appendices.

4. The design should conform to all "shall" statements of the standard, not only to those shown in "boxes."

5. Section 1.3(d) states that the normal water level of the storage pool can be at or near final design grade level. This is acceptable, however, the water level for in-storage radiation shielding should be at or below grade. This means that the normal water level of the storage pool may exceed the water level of the radiation shielding.

6. In Section 2.1.4.1, the statement that " . . . the designer may exclude such events as criticality, total loss of pool water, and dropped cask as Design Event IV possible events" is misleading. If these events are not considered, the justification for not considering them should be presented in the design documentation, such as the Safety Analysis Report

7. Section 5.3 uses the term "forced cooling." The NRC staff interprets this term to mean circulation of the pool water through heat exchangers, not controlled flow through individual storage rack channels. The term implies that the storage pool water will be circulated through a heat exchange device to provide continuous cooling. Experience indicates that continuous forced cooling may not be necessary.

8. In addition to meeting the requirements of Sections 5.3 and 6.3.2.7, provisions should be made for the use of portable cleanup devices for areas within the storage pool in which contaminated particulate material could be deposited.

[1] Copies may be obtained from the American Nuclear Society, 555 North Kensington Avenue, La Grange Park, Illinois 60525.

These areas may include the pool corners or other areas where flow is reduced. Over long periods of time, these areas could become contamination sources that could increase the water radioactivity when disturbed.

9. Section 5.9.3 requires that the process system, effluent, and area radiation levels be monitored for direct radiation and gaseous and airborne particulate activity for Design Events I and II. Such monitoring should also be done for Design Event III, which is defined as an event that can reasonably be expected to occur once during the lifetime of the installation. This type of event could cause significant increases in direct radiation or airborne particulate activity that must be immediately detected and monitored throughout the course of the event.

10. If supply air for the unit subsystem is drawn from the main building ventilation subsystem as permitted by paragraph 6.6.2.2.3, methods to prevent the backflow of potential contamination (e.g., dampers or high-efficiency particulate air filtration) from the unit subsystem to the main building subsystem during partial loss-of-power occurrences or other abnormal conditions should be provided.

11. In addition to meeting the requirements of Section 6.6.4.2, the design should use containerized or modulized filters wherever possible. The use of this type of filter reduces individual exposure to radiation during maintenance operations.

12. In addition to meeting the requirements of Section 6.7.2, the design should include provisions for an equipment decontamination area and a personnel decontamination area. Both areas will be needed to support operations and help minimize radiation exposures of personnel.

13. In addition to the instrumentation required by paragraph 6.9.2.3.5, instrumentation should be provided to detect and annunciate high airborne radioactivity levels. This requirement should be met by the installation of continuous air monitors in those areas of potentially high airborne radioactivity.

14. In addition to the requirements of Section 6.11, the physical security system should include alarm systems or other means to detect intrusions.

15. In the first sentence of Section 6.11.1.1, instead of "... with commercial codes and standards," the following should be used: "... with commercial and Federal Government codes and standards."

16. In Section 6.11.2, the term "industrial sabotage" should be interpreted to mean "radiological sabotage."

17. In Section 6.11.3.1, the equipment used to handle casks containing spent fuel and spent fuel assemblies should be considered vital equipment. Spent fuel in pools whose configuration is susceptible to successful sabotage should also be considered vital and should be protected as vital equipment in accordance with the provisions of 10 CFR Part 73.50.

18. Section 6.11.3.2 requires that gates normally used for admittance of vehicles to the protected area be provided with a remote control capability. The NRC does not require but only recommends this capability for vehicle gates. Also in this section, the term "remote control capability" should be interpreted to mean "remote locking/unlocking capability" or "remote opening/closing capability."

19. The central alarm station required by paragraph 6.11.3.4 should be "hardened" as described in NUREG/CR-0543, "Central Alarm Station and Secondary Alarm Station Planning Document."[2]

20. In addition to the references to Title 10, "Energy," in Section 7, the applicant should refer to 10 CFR Part 72, "Licensing Requirements for the Storage of Spent Fuel in an Independent Spent Fuel Storage Installation."

D. IMPLEMENTATION

The purpose of this section is to provide information to applicants and licensees regarding the NRC staff's plan for using this regulatory guide.

Except in those cases in which the applicant or licensee proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the staff will use the methods or practices described herein in the evaluation of the design of a water-basin-type independent spent fuel storage installation after January 1982.

[2]NUREG/CR-0543 is available for inspection or copying for a fee at the U.S. NRC Public Document Room, 1717 H Street NW., Washington, D.C. Copies may be purchased through the NRC/GPO Sales Program, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, or from the National Technical Information Service, Springfield, VA 22161.

VALUE/IMPACT STATEMENT

1. ACTION

1.1 Description

Group 57.7 of Subcommittee ANS-55 (Fuel and Waste Management) of the American Nuclear Society has developed a standard, ANSI/ANS 57.7-1981, "Design Criteria for an Independent Spent Fuel Storage Installation (Water-Pool Type)."

1.2 Need for Action

The construction and operation of a water-basin-type independent spent fuel storage installation (ISFSI) are being considered by various organizations within the nuclear industry. A need for guidance concerning the design of these facilities has been identified. Standard ANSI/ANS 57.7-1981 provides design criteria for an ISFSI of the water-basin type. A document that addresses the acceptability of ANSI/ANS 57.7-1981 to the NRC staff is desirable at this time.

1.3 Value/Impact of Action

1.3.1 NRC

Guidance is needed by the NRC staff to evaluate the design of pool-type ISFSIs. The document provides exceptions and supplements to ANSI/ANS 57.7-1981 that provide this guidance.

1.3.2 Other Government Agencies

The guidance may be applicable to TVA.

1.3.3 Industry

The guidance may be applicable to industry during the design of new facilities. The document also provides the NRC exceptions to the ANSI standard.

1.3.4 Workers

The principle as applied to maintaining occupational exposure to radiation as low as reasonably achievable is addressed.

1.3.5 Public

The protection of the health and safety of the public and the environment is addressed in the document.

1.4 Decision on the Action

The document follows established NRC practice of endorsing national standards.

2. TECHNICAL APPROACH

The document endorses the February 1981 version of ANSI/ANS 57.7-1981, which presents the design criteria for an ISFSI.

3. PROCEDURAL APPROACH

Procedurally, the choices for making this information available are through the following publications:

- Regulation
- NUREG-series report
- Branch position paper
- Regulatory guide

As the matter is not a requirement or the only way of meeting a requirement, it is not an appropriate subject for rulemaking action. As regulatory positions are stated, it would be inappropriate to publish this material as a NUREG-series report. This material could be published as a branch position paper, but it was considered more appropriate to use the more formal procedural approach represented by a regulatory guide.

4. STATUTORY CONSIDERATIONS

4.1 NRC Authority

Section 72.15, "Contents of Application; Technical Information," of 10 CFR Part 72 requires that applications to store spent fuel in an ISFSI contain a Safety Analysis Report. The Safety Analysis Report contains information concerning the design of the ISFSI. The guide addresses the NRC views on the standard.

4.2 Need for NEPA Assessment

The guide is not a major action, and hence does not require an environmental impact statement.

5. RELATIONSHIP TO OTHER EXISTING OR PROPOSED REGULATIONS OR POLICIES

None.

6. SUMMARY AND CONCLUSIONS

A regulatory guide endorsing ANSI/ANS 57.7-1981 should be published.

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NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

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