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American National Standard Guidelines for Establishing Site-Related Parameters for Site Selection and Design of an Independent Spent Fuel Storage Installation (Water Pool Type)

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American Nuclear Society

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Working Group ANS-2.19

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Foreword

(This Foreword is not a part of American National Standard Guidelines for Establishing Site-Related Parameters for Site Selection and Design of an Independent Spent Fuel Storage Installation (Water Pool Type) ANSI/ANS-2.19-1981.)

This standard is one of a set of two standards prepared for an Independent Spent Fuel Storage Installation. The set of American National Standards includes:

Guidelines for Establishing Site-Related Parameters for Site Selection and Design of an Independent Spent Fuel Storage Installation (Water Pool Type), ANSI/ANS-2.19-1981, and

Design Criteria for an Independent Spent Fuel Storage Installation (Water Pool Type), ANSI/ANS-57.7-1981.

The purpose of this standard, ANS-2.19, is to provide guidelines for establishing site-related parameters to be considered in site evaluation, and in the design, construction, and operation of an independent spent fuel storage installation (ISFSI). This installation provides storage of spent light water reactor (LWR) fuel that has been aged a minimum of one year after discharge from the reactor core in a water basin type structure. Such an installation may be independent of both a nuclear power station and a reprocessing facility or located adjacent to these facilities in order to share selected support systems. The information generated through the use of this standard may be used in the preparation of Safety Analysis Reports (SARs) and in accordance with Environmental Reports (ERs) for an ISFSI.

The user of this standard is encouraged to concentrate his evaluation on those site-related parameters which are required for the actual site selection, design, and safety analysis of the storage installations at a specific site. The guidelines also include a discussion of quality assurance as related to the site-related aspects of a project.

The parameters considered necessary in this guideline for site selection and design of an ISFSI include those required: to establish flooding potential, to evaluate the geotechnical characteristics, to derive the design earthquake, and to derive the design windspeed. This standard does not restrict or limit the use of alternative approaches or innovations for (1) assessing the site-related parameters or (2) assessing parameters other than those identified in this guideline.

The application of these parameters to the selection of a site for an ISFSI is at the discretion of the user. Selection of the appropriate parameters for design and operation monitoring is, to a large extent, site-dependent. The content of this standard is the result of cooperative efforts between Working Group ANS-2.19 and ANS-57.7.

Working Group ANS-2.19, in concert with Working Group ANS-57.7, decided that the level of natural hazards that should be considered in the design should be tested with respect to radiological risk. To this end, a study was prepared which evaluated the radiological risk associated with various low probability external events. For each type of event considered, conservative fuel damage estimates were made, based on an installation constructed in accordance with the design requirements of ANS-57.7-1981 for events of each type which could result in forces greater than that for which the installation was designed. In each case, estimated fuel damage was converted to site boundary dose which was then combined with the probability of occurrence of the event which could cause this damage, to produce radiological risk (Rem/year) for each event. Estimated risks for each (beyond design) event were summed to provide an estimate of the accumulative risk associated with each type of

event. The study showed that the conceptual design approach, site selection criteria, and the level of design event was a radiological risk that is two to three orders of magnitude below that of a nuclear power plant. It should be understood that a site specific accident analysis should be performed to verify the validity of the site selection and design approach.

Working Group ANS-2.19 was formed under Subcommittee ANS-2, "Site Evaluation," of the American Nuclear Society Standards Committee at a meeting held in Denver, Colorado, on April 6, 1978. The first meeting of the working group was held in Sun Valley, Idaho, on May 22-25, 1978. At this meeting, a scope, outline, and Draft 1 of the standard were developed.

Working Group ANS-2.19 of the Standards Committee of the American Nuclear Society had the following membership:

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Contents

Section — Page

1. Scope . . . 1

2. Purpose . . . 1

3. Definitions . . . 1

4. Natural and External Man-Made Hazards . . . 3
   - 4.1 Hazards . . . 3
   - 4.2 Hazards to be Considered in Site Selection . . . 4
   - 4.3 Hazards to be Considered in Design . . . 4
   - 4.4 Hazard Combinations . . . 4

5. Flooding Parameters . . . 4
   - 5.1 Flooding Potential . . . 5
   - 5.2 Precipitation Flooding . . . 5
   - 5.3 Surge and Seiche Flooding . . . 6
   - 5.4 Tsunami Flooding . . . 7
   - 5.5 Flooding from Wave Action . . . 7
   - 5.6 Dam Failure Flooding . . . 8
   - 5.7 Other Flood-Causing Conditions . . . 8

6. Geotechnical Parameters . . . 9
   - 6.1 Regional Geology . . . 9
   - 6.2 Seismology . . . 11
   - 6.3 Site Geology . . . 12
   - 6.4 Ground Water . . . 13
   - 6.5 Contaminant Transport Analysis . . . 14
   - 6.6 Foundation Engineering . . . 14
   - 6.7 Earthwork Engineering . . . 15
   - 6.8 Observation and Control . . . 15
   - 6.9 Site Exploration Methods . . . 15
   - 6.10 Testing . . . 15

7. Extreme Wind Parameters . . . 16
   - 7.1 Determination of Design Level Extreme Windspeed . . . 16
   - 7.2 Selection of a Data Base Representative of a Site . . . 16
   - 7.3 Winds at a Standard Level . . . 16
   - 7.4 Deriving the Extreme Windspeed . . . 17

8. Quality Assurance . . . 17
   - 8.1 Quality Considerations for Site-Related Parameters . . . 17
   - 8.2 Quality Assurance for Specialty Services . . . 17

9. References . . . 17

Tables
- Table 1 Natural and Man-Made Hazards . . . 19
- Table 2 Characterization of Events for Hazard Combinations . . . 22
- Table 3 Conditions Which Should be Considered in Determining Flooding Conditions Due to Wave Action . . . 23
- Table 4 Conditions Which Should be Considered in Determining Flooding Conditions Due to Hydrologic Dam Failures . . . 24

Table 5 Methods Which may be Used in Dating Faults 25
Table 6 Information to be Included in Descriptions of Soil and Rock Stratigraphic Units 26
Table 7 Physical Properties of Soil and Rock 27
Table 8 Strength Characteristics of Soil and Rock 28
Table 9 Compressibility Characteristics of Soil and Rock 29
Table 10 Dynamic Properties of Soil and Rock 30
Table 11 Characteristics to be Considered in the Evaluation of Borrow Material 31
Table 12 Characteristics to be Considered in the Evaluation of Aggregate Materials 32
Table 13 In Situ Testing of Soil and Rock 33

Figures

Figure 1 Physiographic Regions and Provinces of the United States 10

Guidelines for Establishing Site-Related Parameters for Site Selection and Design of an Independent Spent Fuel Storage Installation (Water Pool Type)

1. Scope

This standard presents guidelines for establishing site-related parameters for site selection and design of an independent spent fuel storage installation (ISFSI). This installation provides storage of spent light water reactor (LWR) fuel that has aged a minimum of one year after discharge from the reactor core in a water basin type structure. Such an installation may be independent of both a nuclear power station and a reprocessing facility, or located adjacent to these facilities in order to share selected support systems. Aspects considered include flooding, geology, seismology, ground water, foundation engineering, earthwork engineering, and extreme wind conditions. These guidelines identify the basic site-related parameters to be considered in site evaluation, and in the design, construction, and operation of the ISFSI.

2. Purpose

The purpose of this standard is to provide guidelines for establishing site-related parameters to be considered in site selection and in the design, construction, and operation of an ISFSI whose design criteria meet the following requirements:

The spent fuel to be stored:

(1) is only commercial LWR UO_2 fuel

(2) is only whole spent fuel or canned whole spent fuel

(3) has aged a minimum of one (1) year after discharge from the reactor core.

The normal water level of the storage pool shall be at or near final design grade level.

The underlying rationale for the guidance provided by this standard is based on the following:

(1) short-lived radionuclides are no longer present in spent fuel that has decayed for more than one year since reactor shutdown, and

(2) the storage of spent fuel is a low hazard potential activity. Very little of the radioactivity present is available in a dispersible form and there is no mechanism present to cause the release of radioactive materials in significant quantities from the installation.

The basis for the selection of the parameters included in this standard is a review of siting and design considerations for the type of an ISFSI described in Section 1, "Scope", and designed in accordance with American National Standard Design Criteria for an Independent Spent Fuel Storage Installation (Water Pool Type) ANSI/ANS-57.7-1981.[1] [1] The user shall make a determination as to the applicability of the parameters presented in this standard. The standard does not address environmental considerations such as archeology, population distribution, wildlife ecology, and current land use, or the county and state regulations. The impact of such items should be considered during the site selection process. Selection of the appropriate parameters for design and operation monitoring is, largely, site-dependent. The design levels were established by Working Group ANS-57.7. The methods presented in this standard to develop the various site-related parameters are consistent with these design levels.

The information generated through the use of this standard is applicable for use in the preparation of Safety Analysis Reports (SARs) and Environmental Reports (ERs) for an ISFSI.

3. Definitions

aircraft impact. Accidental impact of an aircraft into a safety related structure system or component such that the resulting missile, fire, or smoke could affect the ability of the independent spent fuel storage installation to perform its intended function.

[1] Numbers in brackets refer to corresponding numbers in Section 9, "References."