# American Nuclear Society

**WITHDRAWN**

standard for determining design basis flooding at power reactor sites

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# American National Standard Standards for Determining Design Basis Flooding at Power Reactor Sites

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# Foreword

(This foreword is not a part of the American National Standard, Standards for Determining Design Basis Flooding at Power Reactor Sites, N170-1976/ANS-2.8.)

The purpose of this document is to specify standards for determining design basis flooding at power reactor sites. This Standard was prepared by Working Group ANS-2.8 of ANS-2 Subcommittee, Site Evaluation, of the American Nuclear Society Standards Committee. The directive to the Working Group was as follows: "Guidelines are to be developed to establish design basis flooding at Power Reactor Sites as a result of river, stream, seismically-induced dam failure, surge, seiche, and/or wave action flooding. Methodology will be described for evaluating the worst site-related flood at a nuclear power plant caused by either a probable maximum flood on streams and rivers and any dam failures resulting therefrom; a seismically-induced dam failure flood; a probable maximum surge and seiche flood; and any attendant wind-generated wave activity associated with these events, or caused by a reasonable combination of less severe events."

This Standard covers material that meets the requirements of section 2.4, Hydrologic Engineering, of the "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants," Regulatory Guide 1.70, Revision 2, September 1975, issued by the Regulatory Staff of the Nuclear Regulatory Commission (NRC). This Standard does not cover requirements of said Regulatory Guide on the following Standard Format 2.4 sections:

(1) Probable Maximum Tsunami Flooding
(2) Low Water Considerations
(3) Dispersion, Dilution, and Travel Times of Accidental Releases of Liquid Effluents in Surface Waters
(4) Ground Water
(5) Technical Specifications and Emergency Operation Requirements

Before preparing the Safety Analysis Report (SAR) Section 2.4, Hydrologic Engineering, for the licensing of nuclear power plants, the applicant should be aware of hydrologic work which has been done by others in the area of interest. Almost invariably, much work can be saved by utilizing all or parts of studies by local, State, and Federal agencies. Such information as dimensioned or dimensionless unit hydrographs, loss rates, lag times, historical floods, geologic and groundwater data, etc., may be obtained from such sources. Sometimes the probable maximum flood has already been derived at the site or at a point near enough to be transposed.

The prime source of such information is the Corps of Engineers. Other Federal agencies which may have useful data are the Bureau of Reclamation, Soil Conservation Service, Weather Service, Geological Survey, Tennessee Valley Authority, Environmental Protection Agency, Federal Power Commission, and the Nuclear Regulatory Commission. Most states have one or more agencies which are concerned with various aspects of water resources. Power companies, particularly those with hydropower capacity, are another source, as are municipal or regional water-supply organizations. Safety Analysis Reports for other nuclear plants in the area may also provide useful information. It is also profitable to discuss the specific site in detail with the hydrology staff of the NRC prior to starting preparation of Section 2.4. In such discussions, the scope of work can often be reduced and methodologies and procedures can be agreed upon, which will save many man-hours and dollars, both for the applicant and for the NRC staff.

The first ANS-2.8 meeting was held on July 17, 1973, in Los Angeles, California. At this meeting it was confirmed that a standard was required to develop guidelines for determining design basis flooding at power reactor sites. The scope of this proposed standard was discussed and it was also decided to review the NRC "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants", Revision 1, October, 1972 as it applies to flooding at power reactor sites. During the second meeting on August 14, 1973, review of the NRC Standard Format on flooding was initiated. The third meeting was held on September 12 and 13, 1973. At this meeting a final review of the NRC Standard Format was performed and a proposed revision of the

NRC Standard Format on flooding recommended by ANS-2.8 was forwarded to the NRC. Also, at this meeting action was taken on preparing a draft standard. The working group was divided into two subgroups—one on river and stream flooding, and the other on surge, seiche, and wave action flooding. These two groups were to prepare draft standards on the respective flooding and then the two sections would be combined and properly integrated as one standard. A fourth meeting was held on November 15 and 16, 1973, for continued preparation of draft standard. The fifth ANS-2.8 meeting was held on January 16 and 17, 1974. The NRC Regulatory Guide 1.59 "Design Basis Flooding for Nuclear Power Plants" August 1973, and its Appendix A were reviewed, further preparation of a draft standard was performed and Mr. John Riedel, Chief of the Hydrometeorology Branch of the National Weather Service and Mr. Dwight Nunn, Consultant to the NRC, were present to answer questions raised by ANS-2.8 members on hydrometeorology. The sixth meeting was held on March 12 and 13, 1974, to continue preparation of the draft standard.

During the seventh meeting held on June 4 and 5, 1974, the first review was performed of the entire standard containing both river and stream flooding, and surge, seiche, and wave action flooding.

This draft was considered Draft 1 and during the review deficient areas in the standard were determined. The eight meeting was held on July 31, 1974, for further review and modifications to Draft 1. The ninth meeting was held on August 29, 1974 to review Draft 1, Revision 1, dated August 1974. The tenth meeting was a special meeting held on September 19, 1974, in order to review and rewrite the combined events section of the standard. The revised standard, Draft 1, Revision 2, dated September 1974, was to be issued for special review and comment to 25 selected experts in the hydrologic flood area covered by the standard.

The eleventh meeting was held on December 11, 12, and 13, 1974, to review comments recieved from the outside expert reviewers on the September draft standard. This draft, as modified by review of comments, was unanimously accepted by the ANS-2.8 members and therefore became Draft 2 dated December 1974. It was forwarded to ANS-2 and ICONS (Information Center on Nuclear Standards) members for review and comment.

A special task team met with NRC staff members in Bethesda, Maryland, on April 24, 1975, to reconcile certain differences in the standard. The twelfth meeting was held on May 28 and 29, 1975, to review comments received by ANS-2 and ICONS members. The draft was modified and unanimously accepted as Draft 2, Revision 1, dated May 1975, to be forwarded to ANS-2 members for their ballot. That draft was unanimously accepted by the ANS-2 members.

The thirteenth meeting was held on October 6, 1975, to review the ANS-2 ballots which contained comments. Appropriate comments were unaminmously approved by ANS-2.8 members for incorporation into Draft 3, January 1976 and forwarded to the N-18 committee for its ballot.

The fourteenth meeting was held on June 15, 1976, to review the N-18 ballots and comments. The members of ANS-2.8 unanimously approved appropriate comments and incorporated them into Draft 4, August 1976. This draft was submitted to ANSI's Board of Standard Review for final approval.

This Standard was developed by Working Group ANS-2.8 of the American Nuclear Society which had the participation of the following members during the period it prepared and approved the Standard:

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The American National Standards Committee N18, Nuclear Design Criteria, had the following membership at the time it reviewed and approved this Standard:

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