U.S. NUCLEAR REGULATORY COMMISSION

STANDARD REVIEW PLAN

OFFICE OF NUCLEAR REACTOR REGULATION

2.4.1 HYDROLOGIC DESCRIPTION

REVIEW RESPONSIBILITIES

Primary - Hydrologic & Geotechnical Engineering Branch (HGEB)

Secondary - None

I. AREAS OF REVIEW

The areas of review under this SRP section are:

1. Identification of the interface of the plant with the hydrosphere.

2. Identification of hydrologic causal mechanisms that may require special plant design bases or operating limitations with regard to floods and water supply requirements.

3. Identification of surface and groundwater uses that may be affected by plant operation.

The review of Section 2.4.1.1 (Site and Facilities) of safety analysis reports (SAR) consists of comparing the independently verified or derived hydrologic design bases (see subsequent sections of 2.4) with the critical elevations of safety-related structures and facilities. The review of SAR Section 2.4.1.2 (Hydrosphere) requires identification of the hydrologic characteristics of streams, lakes (e.g., location, size, shape, drainage area), shore regions, the regional and local groundwater environments, and existing or proposed water control structures (upstream and downstream) influencing the type of flooding mechanisms which may adversely effect safety aspects of plant siting and operation.

II. ACCEPTANCE CRITERIA

Acceptance criteria for this SRP section relate to the following regulations:

A. General Design Criterion 2 (GDC 2) as it relates to structures, systems, and components important to safety being designed to withstand the effects of hurricanes, floods, tsunami, and seiches.

B. 10 CFR Part 100 as it relates to identifying and evaluating hydro. features of the site.

To meet the requirements of the hydrologic aspects of GDC 2 and 10 CFR Par. , the following specific criteria are used:

1. The description and elevations of safety-related structures, facilities, and accesses thereto should be sufficiently complete to allow evaluation of the impact of flood design bases. Site topographic maps must be of good quality and of sufficient scale to allow independent analysis of pre- and post-construction drainage patterns. All external plant structures and components should be identified on site maps. Data on surface water users, location with respect to the site, type of use, and quantity of surface water used are required.

   The information presented in SAR Section 2.4.1.2 forms the basis for subsequent hydrologic engineering analysis. Therefore, completeness and clarity are of paramount importance. Maps must be legible and adequate in coverage to substantiate applicable data. Inventories of surface water users must be consistent with regional hydrologic inventories reported by applicable state and federal agencies. The description of the hydrologic characteristics of streams, lakes, and shore regions must correspond to those of the United States Geologic Survey (USGS), National Oceanic and Atmospheric Administration (NOAA), Soil Conservation Service (SCS), Corps of Engineers, or appropriate state and river basin agencies. Descriptions of all existing or proposed reservoirs and dams (both upstream and downstream) that could influence conditions at the site must be provided. Descriptions may be obtained from reports of the USGS, United States Bureau of Reclamation (USBR), Corps of Engineers, and others. Generally, reservoir descriptions of a quality similar to those contained in pertinent data sheets of a standard Corps of Engineers Hydrology Design Memorandum are adequate. Tabulations of drainage areas, types of structures, appurtenances, ownership, seismic and spillway design criteria, elevation-storage relationships, and short- and long-term storage allocations must be provided.

2. Appendix A, "Hydrologic Engineering Site Visits," to this SRP section details the purposes and procedures of the site visit. The site visit serves to acquaint the reviewer with the site and to provide an independent confirmation of the hydrologic characteristics of the site and adjacent environs.

III. REVIEW PROCEDURES

The information presented in SAR Section 2.4.1.1 is generally amenable to independent verification through cross-checks with other SAR sections and chapters, available publications relating to hydrologic characteristics of the site region, and by site visits. The review procedure consists of evaluating the completeness of the information and data by sequential comparison with information available from references. Based on the description of the hydrosphere (e.g., geographic location and regional hydrologic features) potential site flood mechanisms are identified. Subsequent SAR sections addressing the mechanisms are cross-checked to assure that data and information required therein for review and substantiation are available.

An important facet of the review procedure for this and other SRP sections in hydrologic areas is the site visit. The site visit provides the principal technical reviewer with independent confirmation of hydrologic characteristics of the site and adjacent environs. The site visit is discussed in Appendix A to this SRP section.

IV. EVALUATION FINDINGS

For construction permit (CP) reviews, findings will consist of a brief general description of the site with respect to the general hydrosphere as required by 10 CFR Part 100 and GDC 2, and of the offsite uses of surface water. For operating license (OL) reviews, findings will consist of the same material, updated as required for new information available since preparation of the CP findings. The hydrologic description for each plant site is unique. The review verifies that sufficient information has been provided and will support conclusions of the following type, to be included in the staff's safety evaluation report:

> The proposed site for the ABC Nuclear Plant is located about 26 miles SSE of XYZ City on the southwest bank of the DEF River at about river mile 152. Plant grade will be at about elevation 220 feet above mean sea level (MSL).
>
> Significant hydrologically related plant features include the river intake structure, the natural draft cooling towers, mechanical draft nuclear service cooling towers (these are redundant towers and serve as the ultimate heat sink), and various groundwater wells.
>
> The staff concludes that the requirements of General Design Criterion 2 and 10 CFR Part 100, with respect to general hydrologic descriptions, have been met. This conclusion is based upon the following:
>
> The applicant has provided sufficient information pertaining to the general hydrologic characteristics of the site including descriptions of water bodies, water control structures, and water users.

V. IMPLEMENTATION

The following is intended to provide guidance to applicants and licensees regarding the NRC staff's plans for using this SRP section.

Except in those cases in which the applicant proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the method described herein will be used by the staff in its evaluation of conformance with Commission regulations.

Implementation schedules for conformance to parts of the method discussed herein are contained in the referenced regulatory guides and NUREGs.

VI. REFERENCES

Because of the geographic diversity of plant sites and the large number of hydrologic references, no specific tabulation is given here. In general, maps and charts by the USGS, NOAA, Army Map Service (AMS), and Federal Aviation Administration (FAA); water-supply papers of the USGS; River Basin Reports of the Corps of Engineers; and other publications of state, federal and other

regulatory bodies, describing hydrologic characteristics and water utilization in the plant vicinity and region, are referred to on an "as-available" basis. Other SRP sections in the hydrology area (2.4.2 through 2.4.14) contain references that are to be used in evaluating the hydrologic description of the site.

1. 10 CFR Part 50, Appendix A, General Design Criterion 2, "Design Bases for Protection Against Natural Phenomena."

2. 10 CFR Part 100, "Reactor Site Criteria."

3. Appendix A, SRP Section 2.4.1, "Hydrologic Engineering Site Visits," attached.

4. Regulatory Guide 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants."

APPENDIX A
STANDARD REVIEW PLAN SECTION 2.4.1
HYDROLOGIC ENGINEERING SITE VISITS

I. PURPOSES

The purposes of hydrologic engineering site visits are as follows:

1. Acquaint the reviewer with general site and regional hydrologic characteristics and topography.

2. Confirm the applicant's general appraisal of the site/plant hydrologic interfaces.

3. Review specific hydrologic engineering problem areas with the applicant, his engineers, and his consultants.

The site visit objectives will have been achieved if, in addition to viewing pertinent hydrologic features, the reviewer has had the opportunity to discuss specific questions and concerns with the applicant's hydrologic engineers, and is assured that the questions and concerns are understood. In addition, generally acceptable techniques and procedures necessary to respond to staff concerns should be discussed.

II. PROCEDURES

Questions or items of staff concern are to be developed by the Hydrologic Engineering Section reviewer and discussed in detail with the Section Leader 7-14 days before the scheduled site visit. For any unscheduled site visit (which may be necessary to resolve issues or prepare for hearings), similar questions or items of staff concern should be prepared at least 3 days prior to such site visit and also discussed in detail with the Section Leader.

Areas of overlap or interfaces with reviewers in other areas (such as geology, foundation engineering, auxiliary and power conversion systems, mechanical engineering, effluent treatment systems and structural engineering) should be coordinated before questions or items of staff concern are finalized.

The Section Leader will discuss any unusual or potentially controversial areas of concern with the Chief, HGEB, prior to transmittal of the questions or items of staff concern to the Project Manager. Transmittal will be forwarded by memo route slip through the Section Leader.

Site visits are generally to consist of a detailed reconnaissance of site areas and environs with the applicant and technical counterparts, discussions of questions (or items of staff concern), discussions of acceptable methods of analysis, and a general summarization of the areas discussed and conclusions reached.

Normally, a small group composed of the staff reviewer and licensing project manager (LPM) should meet with an applicant representative responsible for responding to staff questions and the applicant's technical advisor. For

verbal summarization during the site visit, the recommended method is the applicant or his technical advisor summarize the discussions to as understanding.

III. TRIP REPORT

A trip report on a site visit should be prepared within 5 days of the revi return. The report is to be as brief as possible and should summarize the t and the areas of discussion and should list the participants in technical discussions.