

# Proposed - For Interim Use and Comment



## U.S. NUCLEAR REGULATORY COMMISSION DESIGN-SPECIFIC REVIEW STANDARD FOR mPOWER<sup>TM</sup> iPWR DESIGN

### 2.4.10 FLOODING PROTECTION REQUIREMENTS

#### REVIEW RESPONSIBILITIES

**Primary -** Organization responsible for the review of issues related to hydrology

**Secondary -** None

#### I. AREAS OF REVIEW

In this section of the Design-Specific Review Standard (DSRS), the locations and elevations of structures, systems, and components (SSCs) important to safety and those of structures and components required for flood protection of SSCs important to safety are compared with design-basis flood and groundwater conditions. Flood protection measures due to flooding and high subsurface hydraulic head affecting surface or subsurface SSCs important to safety need to be considered in plant design or in emergency procedures.

This section is part of Chapter 2 of the DSRS, which discusses the site characteristics that could affect the safe design and siting of a plant. The staff reviews information presented by the applicant for a design certification (DC), early site permit (ESP), or combined license (COL) concerning hydrologic setting of the site as they relate to safety-related or risk-significant SSCs important to safety. This DSRS section applies to reviews performed for each of these types of applications. These reviews are based on information and analysis presented in the applicant's final safety analysis report (FSAR). The U.S. Nuclear regulatory Commission (NRC) staff's review and findings are described in the appropriate section of the final safety evaluation report (FSER).

The staff reviews the locations and elevations of all SSCs important to safety to identify the SSCs exposed to flooding. The specific areas of review are as follows:

1. SSCs Important to Safety Exposed to Flooding or High Subsurface Hydraulic Head
2. Type of Flood Protection. The staff reviews the type of flood protection (e.g., "hardened facilities," sandbags, flood doors, bulkheads, dewatering system, etc.) provided to those SSCs important to safety that are exposed to floods.
3. Emergency Procedures. The emergency procedures needed to implement flood protection activities and warning times available for their implementation are reviewed by the organization responsible for the review of issues related to plant emergency procedures. The technical specifications related to the emergency procedures needed to ensure adequate flood protection of the plant are reviewed by the organization responsible for the review of issues related to technical specifications.

4. Consideration of Other Site-Related Evaluation Criteria. The potential effects of seismic (including the effects of potential land subsidence) and non-seismic information on the postulated flooding protection for the proposed plant site are reviewed.
5. Additional Information for Title 10 of the Code of Federal Regulations (10 CFR) Part 52 Applications. Additional information will be presented depending on the type of application. For a COL application, the additional information is dependent on whether the application references an ESP, a DC, both, or neither. Information requirements are prescribed within the "Contents of Application" sections of the applicable Subparts to 10 CFR Part 52.

### Review Interfaces

Other DSRS and Standard Review Plan (SRP) sections interface with this section as follows:

1. Sections 2.4.0 and 2.4.2 - 2.4.9 address specific flood-producing phenomena and design-basis flood levels
2. The identification of structures and equipment important to safety that should be protected against the effects of flooding is performed under DSRS Section 3.4.1, "Internal Flood Protection for Onsite Equipment Failure."
3. The review of the design of seismic Category I structures that may affect plant flooding protection requirements, is performed under DSRS Section 3.4.2, "Analysis Procedures."
4. The review to ensure that adverse environmental conditions will not preclude the safety function of the ultimate heat sink is performed under DSRS Section 9.2.5, "Ultimate Heat Sink."
5. The staff's review related to flooding from local probable maximum precipitation is described in DSRS Section 2.4.2; that related to probable maximum flood (PMF) in streams and rivers is described in DSRS Section 2.4.3; that related to dam failure scenarios is described in DSRS Section 2.4.4; that related to effects of storm surges and seiches including probable maximum windstorm is described in DSRS Section 2.4.5; that related to tsunami hazards is described in DSRS Section 2.4.6; that related to ice hazards is described in DSRS Section 2.4.7; that related to channel diversions is described in DSRS Section 2.4.9; and that related to groundwater is described in DSRS Section 2.4.12.
6. For DC applications and COL applications referencing a DC rule or DC application, review of the site parameters in the Design Control Document (DCD) Tier 1 and Chapter 2 of the DCD Tier 2<sup>1</sup> submitted by the applicant is performed under SRP Section 2.0, "Site Characteristics and Site Parameters." Review of site characteristics and site-related design parameters in ESP applications or in COL applications referencing an ESP is also performed under SRP Section 2.0.

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<sup>1</sup> Additional supporting information of prior DC rules may be found in DCD Tier 2 Section 14.3.

## II. ACCEPTANCE CRITERIA

### Requirements

Acceptance criteria are based on meeting the relevant requirements of the following Commission regulations:

1. 10 CFR Part 100, as it relates to identifying and evaluating hydrologic features of the site. The requirements to consider physical site characteristics in site evaluations are specified in 10 CFR 100.20(c).
2. 10 CFR 100.23(d) sets forth the criteria to determine the siting factors for plant design bases with respect to seismically-induced floods and water waves at the site.
3. 10 CFR Part 50, Appendix A, General Design Criterion (GDC) 2 as it relates to consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area, with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated.
4. 10 CFR 52.17(a)(1)(vi), for ESP applications, and 10 CFR 52.79(a)(1)(iii), for COL applications, as they relate to identifying hydrologic site characteristics with appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area and with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated.
5. 10 CFR 50, Appendix A, GDC 44 as it relates to providing an ultimate heat sink for normal operating and accident conditions.

### DSRS Acceptance Criteria

Specific DSRS acceptance criteria acceptable to meet the relevant requirements of the NRC's regulations identified above are set forth below. The DSRS is not a substitute for the NRC's regulations, and compliance with it is not required. Identifying the differences between this DSRS section and the design features, analytical techniques, and procedural measures proposed for the facility, and discussing how the proposed alternative provides an acceptable method of complying with the regulations that underlie the DSRS acceptance criteria, is sufficient to meet the intent of 10 CFR 52.47(a)(9), "Contents of applications; technical information." The same approach may be used to meet the requirements of 10 CFR 52.17(a)(1)(xii) and 10 CFR 52.79(a)(41), for ESP and COL applications, respectively.

Appropriate sections of the following documents are used by the staff for the identified acceptance criteria:

Regulatory Guide (RG) 1.29 identifies seismic design bases for safety-related SSCs.

RG 1.59, as supplemented by current best practices, provides guidance for developing the flood design bases.

RG 1.102 describes acceptable flood protection to prevent the safety-related facilities from being adversely affected.

1. SSCs Important to Safety that are Exposed to Flooding or High Subsurface Hydraulic Head. To meet the requirements of GDC 2, 10 CFR 52.17, and 10 CFR Part 100, identification of all SSCs exposed to flooding or high subsurface hydraulic head is needed. This identification should be consistent with site characteristics identified by the staff during review of other FSAR sections with respect to flood water surface elevations and high subsurface hydraulic head, static and dynamic forces, and coincident wind-induced waves and runup.
2. Type of Flood Protection. To meet the requirements of GDC 2, 10 CFR 52.17, and 10 CFR Part 100, an evaluation of the applicant's proposed flood protection measures is needed. This evaluation should assess the adequacy of protection provided to the SSCs important to safety that are exposed to flooding and high subsurface hydraulic head and should be consistent with site characteristics identified in other FSAR sections.
3. Emergency Procedures. To meet the requirements of GDC 2, 10 CFR 52.17, and 10 CFR Part 100, a listing of proposed emergency procedures is needed. The estimated warning time required to implement each of these procedures should be provided.
4. Consideration of Other Site-Related Evaluation Criteria. To meet the requirements of GDC 2, 10 CFR 52.17, and 10 CFR Part 100, an assessment regarding the potential effects of site-related proximity, seismic (including the effects of potential land subsidence), and non-seismic information on the postulated flooding protection is needed. The assessment should be sufficient to demonstrate that the applicant's design bases appropriately account for these effects.

#### Technical Rationale

The technical rationale for application of these acceptance criteria to the areas of review addressed by this DSRS section is discussed in the following paragraphs:

1. Compliance with GDC 2 requires that nuclear power plant structures, systems, and components important to safety be designed to withstand the effects of natural phenomena such as earthquake, tornado, hurricane, flood, tsunami, and seiche without loss of capability to perform their safety functions. The criterion further specifies that the design bases for these structures, systems, and components shall reflect the following:
  - A. Appropriate consideration of the most severe natural phenomena historically reported for the site and its surrounding area, with sufficient margin for the limited accuracy, quantity, and time period in which the historical data have been accumulated;
  - B. Appropriate combinations of the effects of normal and accident conditions with those of the natural phenomena; and
  - C. The importance of the safety functions to be performed.

The first specification was adopted in recognition of the relatively short history available for severe natural phenomena (e.g., flooding) on the North American continent and, consequently, the potential for underestimating the severity of a natural phenomenon

based solely on probabilistic considerations. This problem is avoided by the use of a deterministic approach that considers the practical physical limitations of those phenomena contributing to the severity of the event in order to assess the design basis event. The application should evaluate the various site characteristics (flood, erosion and deposition, forces on structures, etc.) in Section 2.4 of the application with the understanding that these can result from different design-basis events. These data are then used during reviews conducted for a COL or ESP application to specify flood design or protection requirements for nuclear power plant components, thereby ensuring the capability of these components to continue functioning as required. GDC 2 is imposed to ensure that portions of the facility designated as important to safety will continue functioning to maintain the plant in a safe condition.

This criterion is applicable to DSRS Section 2.4.10 because it specifies the hydrologic phenomena that are addressed by this section. In general terms, it also specifies the level of conservatism that should be used to assess the severity of these phenomena for the purpose of determining the design bases (or protection) requirements for structures, systems, and components important to safety.

For applications pursuant to 10 CFR Part 52, meeting the applicable requirements of 10 CFR 52.17 and 10 CFR 52.79 that correspond to GDC 2 provides a level of assurance that the most severe hydrologic site characteristics have been identified; whether GDC 2 is met with respect to the adequacy of the associated design bases will be evaluated pursuant to other DSRS sections.

2. Section 100.20(c) of 10 CFR Part 100 requires that physical characteristics of a site (including seismology, meteorology, geology, and hydrology) be taken into account when determining its acceptability for a nuclear power reactor.

To satisfy the hydrologic requirements of 10 CFR Part 100, the applicant's FSAR should contain a description of the surface hydrologic characteristics of the site and region, as well as an analysis of the area's flood potential. The description should be sufficient to assess the acceptability of the site for a nuclear power plant of the proposed design. In addition, it may be necessary to assess the potential of those hydrologic characteristics to influence the design of SSCs important to safety and to define any special flood protection requirements necessary to address those potential events.

Meeting this requirement provides assurance that structures, systems or components important to safety are designed to withstand, or are protected against, the effects of potentially severe flooding.

### III. REVIEW PROCEDURES

The procedures outlined below are used to review ESP applications and COL applications that do not reference an ESP to determine whether data and analyses for the proposed site meet the acceptance criteria given in Subsection II of this DSRS section. As applicable, reviews of COLs include a determination on whether the content of technical specifications related to hydrology-related site characteristics are acceptable and whether the technical specifications reflect consideration of any identified unique conditions.

These review procedures are based on the identified DSRS acceptance criteria. For deviations from these acceptance criteria, the staff should review the applicant's evaluation of how the

proposed alternatives provide an acceptable method of complying with the relevant NRC requirements identified in Subsection II.

1. In accordance with 10 CFR 52.47(a)(8),(21), and (22), for new reactor license applications submitted under Part 52, the applicant is required to (1) address the proposed technical resolution of unresolved safety issues (USIs) and medium- and high-priority generic safety issues (GSIs) that are identified in the version of NUREG-0933 current on the date 6 months before application and that are technically relevant to the design; (2) demonstrate how the operating experience insights have been incorporated into the plant design; and, (3) provide information necessary to demonstrate compliance with any technically relevant portions of the Three Mile Island requirements set forth in 10 CFR 50.34(f), except paragraphs (f)(1)(xii), (f)(2)(ix), and (f)(3)(v). These cross-cutting review areas should be addressed by the reviewer for each technical subsection and relevant conclusions documented in the corresponding FSER section.
2. SSCs Important to Safety that are Exposed to Flooding or High Subsurface Hydraulic Head. The staff compares locations and elevations of the surface or subsurface SSCs important to safety to identify those SSCs that may be exposed to flooding or high subsurface hydraulic head, consistent with the site characteristics related to the highest flood water surface elevation with coincident wind-wave action and the highest subsurface hydraulic head that were determined during the staff's review of the applicant's FSAR, Sections 2.4.2 through 2.4.7, 2.4.9, and 2.4.12. For SSCs important to safety that are exposed to floods and high subsurface hydraulic head, a detailed analysis of static and dynamic forces, erosion potential, sedimentation, and other causes that may endanger the function of these SSCs should be included. To assess the design bases that are proposed for flooding protection, the staff considers all flooding mechanisms and their individual characteristics and interactions with the SSCs important to safety.

Intake structures, due to their nature, are always flooded, that is, they are located below the water surface. An intake structure important to safety, if one is used, should be provided with flooding protection. The staff will review location and elevation of the intake important to safety to determine the degree of desired flooding protection. Hydrostatic and hydrodynamic forces, impact forces from dynamic effects of floods, erosion and sediment deposition during floods, and any other effects that may lead to loss of functionality of the intake should be considered. "Hardened" protection, as described by RG 1.59, is recommended for flooding protection of an intake important to safety.

3. Type of Flood Protection. The staff reviews the applicant's proposed flooding protection measures with respect to the flooding design bases. If flood protection is required, the type of flood protection ("hardened facilities," sandbags, flood doors, bulkheads, dewatering system, etc.) is reviewed. The staff should use the recommendations of RG 1.102 to determine the adequacy of flood protection from static and dynamic effects of floods including effects from high subsurface hydraulic heads. If there is evidence of potential structural effects from flooding including effects from high subsurface hydraulic head, the staff requests that review of structural adequacy of flood protection be performed by the organization responsible for structural and mechanical design.
4. Emergency Procedures. The staff reviews the applicant's proposed emergency procedures. Where the site is not "hardened," that is, where emergency action is

needed, sufficient warning time estimated by analysis of the design-basis flood, should be shown to be available to shut down the plant safely or implement emergency procedures. The staff should interpret “hardened” flood protection (as discussed in RG 1.59 for facilities identified in RG 1.29) to mean “almost always in place.”

The environmental conditions likely to prevail during all potential flooding events including the severity of the controlling event are reviewed to establish the minimum warning time available for implementation of emergency procedures. The physical parameters such as rate-of-rise (of river or lake levels), flood wave travel time due to dam break, tsunami wave travel time from the source, as well as evaluation (based on experience and engineering judgment) of flood warning and tsunami wave monitoring networks, provide the staff with an independent estimate of available time. This data is provided to organizations responsible for the review of issues related to plant emergency procedures for their independent evaluation of the warning time required to implement shutdown and flood protection measures. If the likely environmental conditions are such that the emergency procedures can be carried out, they will be considered acceptable.

An appropriate item in the plant Technical Specifications should be provided in cases where emergency procedures are required to ensure adequate flood protection. For those plants for which shutdown (if recommended under RG 1.59, Position 2) and installation of protective measures is required in the event of a major flood, the procedures for carrying out these measures are reviewed by the organization responsible for the review of issues related to technical specifications for compatibility of available and required times as established above. The technical specifications should reference an emergency plan which allows for the orderly installation of required flood protection.

5. Consideration of Other Site-Related Evaluation Criteria. Subpart B of 10 CFR Part 100 describes site-related proximity, seismic (including the effects of potential land subsidence), and non-seismic evaluation criteria for power reactor applications. The staff's review will include evaluation of pertinent information to determine if these criteria are appropriately used in postulation of flooding protection at the proposed plant site.
6. Review Procedures Specific to 10 CFR Part 52 Application Type
  - A. ESP Reviews: Subpart A to 10 CFR Part 52 specifies the requirements and procedures applicable to the Commission's review of an ESP application for approval of a proposed site. Information required in an ESP application includes a description of the site characteristics and design parameters of the proposed site. The scope and level of detail for reviewing data parallel those used for a COL review.

In the absence of certain circumstances, such as a compliance or adequate protection issue, 10 CFR 52.39 precludes the staff from imposing new site characteristics, design parameters, or terms and conditions on the ESP at the COL stage. Accordingly, the reviewer should ensure that all physical attributes of the site that could affect the design basis of SSCs important to safety are reflected in the site characteristics, design parameters, or terms and conditions of the ESP.
  - B. Standard DC Reviews

DC applications do not contain general descriptions of site characteristics because this information is site-specific and will be addressed by the COL applicant. However, pursuant to 10 CFR 52.47(a)(1), a DC applicant must provide site parameters postulated for the design. Site parameters associated with this DSRS section are reviewed, as applicable, to verify that:

- i. The postulated site parameters are representative of a reasonable number of sites that have been or may be considered for a COL application;
- ii. The appropriate site parameters are included as Tier 1 information. This convention has been used by previous DC applicants. Additional guidance on site parameters is provided in SRP Section 2.0;
- iii. Pertinent parameters are stated in a site parameters summary table; and
- iv. The applicant has provided a basis for each of the site parameters.

- C. COL Reviews: For a COL application referencing a certified standard design, NRC staff reviews that application to ensure that sufficient information is presented to demonstrate that the characteristics of the site fall within the site parameters specified in the DC rule. If there are site parameters associated with this DSRS section and if the above condition for these parameters has not been met (i.e. the actual site characteristics do not fall within the certified standard design site parameters), the COL applicant will need to demonstrate by some other means that the proposed facility is acceptable at the proposed site. This might be done by re-analyzing or redesigning the proposed facility.

For a COL application referencing an ESP, NRC staff reviews the application to ensure the applicant provides sufficient information to demonstrate that the design of the facility falls within the site characteristics and design parameters specified in the ESP as applicable to this DSRS section. In accordance with 10 CFR 52.79(b)(2), should the design of the facility not fall within the site characteristics and design parameters, the application shall include a request for a variance from the ESP that complies with the requirements of 10 CFR 52.39 and 10 CFR 52.93.

In addition, long-term environmental changes and changes to the region resulting from human or natural causes may have introduced changes to the site characteristics that could be relevant to the design basis. In the absence of certain circumstances, such as a compliance or adequate protection issue, 10 CFR 52.39 precludes the staff from imposing new site characteristics, design parameters, or terms and conditions on the ESP at the COL stage. Consequently, a COL application referencing an ESP need not include a re-investigation of the site characteristics that have previously been accepted in the referenced ESP. However, in accordance with 10 CFR 52.6, "Completeness and Accuracy of Information," the applicant or licensee is responsible for identifying changes of which it is aware, that would satisfy the criteria specified in 10 CFR 52.39. Information provided by the applicant in accordance with



10 CFR 52.6(b) will be addressed by the staff during the review of a COL application referencing an ESP or a DC.

For a COL application referencing either an ESP or DC or both, the staff should review the corresponding sections of the ESP and DC FSER to ensure that any ESP conditions, restrictions to the DC, or COL action items identified in the FSERs are appropriately handled in the COL application.

For a COL application referencing either an ESP or DC or both, the staff has issued additional guidance for review of COL items that cannot be resolved prior to issuance of the license in Interim Staff Guidance 015 (ISG-015). A COL applicant must provide all information in the COL application that is necessary for the staff to make the findings required to issue the license. Therefore, it may be necessary for the staff to partially close certain COL action or information items noted in an ESP or a DC, or both. The staff should identify the remaining portion of the COL items associated with information that is not necessary to issue the license as post-licensing commitments.

#### IV. EVALUATION FINDINGS

The review should document the staff's evaluation of site characteristics against the relevant regulatory criteria. The evaluation should support the staff's conclusions as to whether the regulations are met. The reviewer should state what was done to evaluate the applicant's FSAR. The staff's evaluation may include verification that the applicant followed applicable regulatory guidance, performance of independent calculations, and/or validation of appropriate assumptions. The reviewer may state that certain information provided by the applicant was not considered essential to the staff's review and was not reviewed by the staff. While the reviewer may summarize or quote the information offered by the applicant in support of its application, the reviewer should clearly articulate the bases for the staff's conclusions.

The reviewer verifies that the applicant has provided sufficient information and that the review and calculations (if applicable) support conclusions of the following type to be included in the staff's FSER. The reviewer also states the bases for those conclusions.

##### 1. COL Reviews

The following statements in the FSER should be preceded by a summary of the site characteristics and parameters used for the plant:

As set forth above, the applicant has presented and substantiated information relative to the flood protection measures important to the design and siting of this plant. The staff has reviewed the available information provided and for the reasons given above, concludes that the identification and consideration of the flood protection measures is acceptable and meets the requirements of 10 CFR Part 50, Appendix A, GDC 2 and 10 CFR Part 100.20(c), with respect to determining the acceptability of the site.

The staff finds that the applicant has considered the appropriate site phenomena in establishing the flood protection measures for SSCs important to safety. The staff has generally accepted the methodologies used to determine the flood protection measures, as documented in FSERs for previous licensing actions. Accordingly, the staff concludes that the use of these methodologies results in design bases containing margin

sufficient for the limited accuracy, quantity, and period of time in which the data have been accumulated. The staff concludes that the identified design bases meet the requirement(s) of 10 CFR Part 50, Appendix A, GDC 2 and 10 CFR 100.20(c), with respect to establishing the design basis for SSCs important to safety.

## 2. ESP Reviews

The following statements in the FSER should be preceded by a summary of the site characteristics and design parameters to be included in any ESP that might be issued for the proposed site:

As set forth above, the applicant has presented and substantiated sufficient information pertaining to the flood protection measures at the proposed site. Section 2.4.10, "Flooding Protection Requirements," of the Design-Specific Review Standard for mPower™ Integral Pressurized Water Reactor (iPWR) Design, provides that the site FSAR should address the requirements of 10 CFR Parts 52 and 100 as they relate to identifying and evaluating flood protection measures at the site. Further, the applicant considered the most severe natural phenomena that have been historically reported for the site and surrounding area while describing the flooding protection requirements at the site, with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated. The staff has generally accepted the methodologies used to determine the severity of the phenomena reflected in these site characteristics, as documented in FSERs for previous licensing actions. Accordingly, the staff concludes that the use of these methodologies results in site characteristics containing sufficient margin for the limited accuracy, quantity, and period of time in which the data have been accumulated. In view of the above, the site characteristics previously identified are acceptable for use in establishing the design bases for SSCs important to safety, as may be proposed in a COL application.

Therefore, the staff concludes that the identification and consideration of the flooding protection requirement site characteristics set forth above are acceptable and meet the requirements of 10 CFR 52.17(a)(1)(vi), 10 CFR 100.20(c), and 10 CFR 100.21(d).

In view of the above, the staff finds the applicant's proposed site characteristics related to flooding protection requirements for inclusion in an ESP for the applicant's site, should one be issued, acceptable.

## 3. DC Reviews

The following statement in the FSER should be preceded by a list of the applicable site parameters used for the plant:

The NRC staff acknowledges that the applicant has selected the site parameters referenced above for plant design inputs (a subset of which is included as Tier 1 information) and agrees that they are representative of a reasonable number of sites that have been or may be considered for a COL application. Flood protection measures are site-specific and will be addressed by the COL applicant. This should include the provision of information sufficient to demonstrate that the design of the plant falls within the site parameters specified by the siting review.

## V. IMPLEMENTATION

The staff will use this DSRS section in performing safety evaluations of mPower™ DC, COL, or ESP applications submitted by applicants pursuant to 10 CFR Part 52. The staff will use the method described herein to evaluate conformance with Commission regulations.

Because of the numerous design differences between the mPower™ and large light-water nuclear reactor power plants, and in accordance with the direction given by the Commission in SRM- COMGBJ-10-0004/COMGEA-10-0001, "Use of Risk Insights to Enhance the Safety Focus of Small Modular Reactor Reviews," dated August 31, 2010 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML102510405), to develop risk-informed licensing review plans for each of the small modular reactor (SMR) reviews including the associated pre-application activities, the staff has developed the content of this DSRS section as an alternative method for mPower™-specific DC, COL, or ESP applications submitted pursuant to 10 CFR Part 52 to comply with 10 CFR 52.47(a)(9), "Contents of applications; technical information."

This regulation states, in part, that the application must contain "an evaluation of the standard plant design against the Standard Review Plan (SRP) revision in effect 6 months before the docket date of the application." The content of this DSRS section has been accepted as an alternative method for complying with 10 CFR 52.47(a)(9) as long as the mPower™ DCD FSAR does not deviate significantly from the design assumptions made by the NRC staff while preparing this DSRS section. The application must identify and describe all differences between the standard plant design and this DSRS section, and discuss how the proposed alternative provides an acceptable method of complying with the regulations that underlie the DSRS acceptance criteria. If the design assumptions in the DC application deviate significantly from the DSRS, the staff will use the SRP as specified in 10 CFR 52.47 (a)(9). Alternatively, the staff may supplement the DSRS section by adding appropriate criteria in order to address new design assumptions. The same approach may be used to meet the requirements of 10 CFR 52.17 (a)(1)(xii) and 10 CFR 52.79 (a)(41), for ESP and COL applications, respectively.

## VI. REFERENCES

1. 10 CFR Part 50, Appendix A, GDC 1, "Quality Standards and Records."
2. 10 CFR Part 50, Appendix A, GDC 2, "Design Bases for Protection Against Natural Phenomena."
3. 10 CFR Part 50, Appendix A, GDC 44, "Cooling Water."
4. 10 CFR Part 100, "Reactor Site Criteria."
5. American National Standard Institute/American Nuclear Society-2.8-1992, "Determining Design Basis Flooding at Power Reactor Sites." Historical Technical Reference.
6. "Coastal Construction Manual," Report Number FEMA 55, Federal Emergency Management Agency, Jessup, MD, 2003.
7. "Coastal Engineering Manual," Report Number EM 1110-2-1100, U.S. Army Corps of Engineers, Coastal and Hydraulics Laboratory - Engineer Research and Development Center, Waterways Experiment Station - Vicksburg, Mississippi (2006).

8. "Design Standards No. 3, Canals and Related Structures," Chapter 2 of "General Design Information for Structures," Bureau of Reclamation, U.S. Department of the Interior, April 1962.
9. Final Interim Staff Guidance ESP/DC/COL-ISG-015, "Post-Combined License Commitments." January 21, 2010. Accession Number: ML093561416.
10. RG 1.29, "Seismic Design Classification."
11. RG 1.59, "Flood Design Basis for Nuclear Power Plants."
12. RG 1.102, "Flood Protection for Nuclear Power Plants."