



U.S. NUCLEAR REGULATORY COMMISSION

STANDARD REVIEW PLAN

2.4.9 CHANNEL DIVERSIONS

REVIEW RESPONSIBILITIES

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

Secondary - None

I. AREAS OF REVIEW

Chapter 2 of the Standard Review Plan (SRP) 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 construction permit (CP), operating license (OL), design certification (DC), early site permit (ESP), or combined license (COL) concerning hydrological setting of the site as they relate to safety-related structures, systems, and components (SSC). This SRP section applies to reviews performed for each of these types of applications. The staff's review and findings are described in the appropriate section of the safety evaluation report (SER).

In this section of the applicant's safety analysis report (SAR), the geohydrologic design basis is developed to ensure that the plant and essential water supplies will not be adversely affected. This review includes stream channel diversions away from the site (which may lead to loss of safety related water) and stream channel diversions towards the site (which may lead to flooding). Additionally, in such an event, the applicant needs to show that alternate water supplies are available to safety-related equipment.

Revision 3 - March 2007

USNRC STANDARD REVIEW PLAN

This Standard Review Plan, NUREG-0800, has been prepared to establish criteria that the U.S. Nuclear Regulatory Commission staff responsible for the review of applications to construct and operate nuclear power plants intends to use in evaluating whether an applicant/licensee meets the NRC's regulations. The Standard Review Plan is not a substitute for the NRC's regulations, and compliance with it is not required. However, an applicant is required to identify differences between the design features, analytical techniques, and procedural measures proposed for its facility and the SRP acceptance criteria and evaluate how the proposed alternatives to the SRP acceptance criteria provide an acceptable method of complying with the NRC regulations.

The standard review plan sections are numbered in accordance with corresponding sections in Regulatory Guide 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants (LWR Edition)." Not all sections of Regulatory Guide 1.70 have a corresponding review plan section. The SRP sections applicable to a combined license application for a new light-water reactor (LWR) are based on Regulatory Guide 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition)."

These documents are made available to the public as part of the NRC's policy to inform the nuclear industry and the general public of regulatory procedures and policies. Individual sections of NUREG-0800 will be revised periodically, as appropriate, to accommodate comments and to reflect new information and experience. Comments may be submitted electronically by email to NRR_SRP@nrc.gov.

Requests for single copies of SRP sections (which may be reproduced) should be made to the U.S. Nuclear Regulatory Commission, Washington, DC 20555, Attention: Reproduction and Distribution Services Section, or by fax to (301) 415-2289; or by email to DISTRIBUTION@nrc.gov. Electronic copies of this section are available through the NRC's public Web site at <http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr0800/>, or in the NRC's Agencywide Documents Access and Management System (ADAMS), at <http://www.nrc.gov/reading-rm/adams.html>, under Accession # ML070730434.

The specific area of review are as follows:

1. Historical Channel Diversions: The staff reviews historical channel migration phenomena including cutoffs, subsidence and uplift.
2. Regional Topographic Evidence: The staff reviews regional topographic evidence which suggests that future channel diversion may or may not occur (used in conjunction with evidence of historical diversions)
3. Ice Causes: The staff reviews thermal causes of channel diversion such as ice jams (coordinate review with that of SAR Section 2.4.7). These diversions may result from downstream ice blockages that may lead to flooding from backwater, or they can be upstream ice blockages that can divert the channel away from the intake.
4. Flooding of Site Due to Channel Diversion: The staff reviews the potential for forces on safety-related facilities or blockage of water supplies resulting from channel migration induced flooding (flooding not addressed by hydrometeorological induced flooding scenarios in other sections).
5. Human-Induced Causes of Channel Diversion: The staff reviews the potential of channel diversion from human-induced causes (i.e., land-use changes, diking, channelization, armoring or failure of structures).
6. Alternate Water Sources: The staff reviews alternate water sources and operating procedures (coordinate review with that of SAR Section 2.4.11.6).
7. Consideration of Other Site-Related Evaluation Criteria: The staff reviews the potential effects of seismic and non-seismic information on the postulated worst-case channel diversion scenario for the proposed plant site.
8. Additional Information for 10 CFR Part 52 Applications: Additional information will be presented dependent 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 SRP sections interface with this section as follows:

1. The identification of safety-related structures and equipment that should be protected against the effects of flooding is performed under SRP Section 3.4.1, "Flood Protection."
2. The review of the design of seismic Category I structures to design for the effects of flooding, including that which could result from channel diversions, is performed under SRP Section 3.4.2, "Analysis Procedures."
3. The review to ensure that adverse environmental conditions, including freezing, will not preclude the safety function of the ultimate heat sink is performed under SRP Section 9.2.5, "Ultimate Heat Sink."

4. The staff is responsible for providing the site characteristics and other hydrogeologic parameters related to channel diversions at or near the site to the organization responsible for review of the SSC potentially affected by the channel diversion to ascertain whether these effects are properly considered in the mechanical or structural design basis for the plant.
5. 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 2¹ 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 Section 2.0.

The specific acceptance criteria and review procedures are contained in the referenced SRP sections.

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 hydrological features of the site. The requirements to consider physical site characteristics in site evaluations are specified in 10 CFR 100.10(c) for applications before January 10, 1997, and in 10 CFR 100.20(c) for applications on or after January 10, 1997.
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 the site.
3. 10 CFR Part 50, Appendix A, General Design Criterion (GDC) 2, for CP and OL applications, 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, General Design Criterion (GDC) 44, for CP and OL applications, as it relates to providing an ultimate heat sink for normal operating and accident conditions.

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

SRP Acceptance Criteria

Specific SRP acceptance criteria acceptable to meet the relevant requirements of the NRC's regulations identified above are as follows for the review described in this SRP section. The SRP is not a substitute for the NRC's regulations, and compliance with it is not required. However, an applicant is required to identify differences between the design features, analytical techniques, and procedural measures proposed for its facility and the SRP acceptance criteria and evaluate how the proposed alternatives to the SRP acceptance criteria provide acceptable methods of compliance with the NRC regulations.

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

Regulatory Guide 1.27 describes the applicable ultimate heat sink capabilities.

Regulatory Guide 1.29 identifies seismic design bases for SSC important to safety.

Regulatory Guide 1.59, as supplemented by best current practices, provides guidance for developing the hydrometeorological design bases.

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

1. Historical Channel Diversions: To meet the requirements of GDC 2, GDC 44, 10 CFR 52.17, and 10 CFR Part 100, a complete history of channel diversions at and in the vicinity of the site is needed. A thorough listing of types of phenomena (landslides, channel erosion, breached dikes, etc.), locations and durations of these events, and descriptions of hydrogeological characteristics accompanying these events should be included. This description should be sufficient to establish the history of channel diversion in the vicinity of the site (this review includes the site and adjacent watersheds displaying similar channel characteristics).
2. Regional Topographic Evidence: To meet the requirements of GDC 2, GDC 44, 10 CFR 52.17, and 10 CFR Part 100, a description of regional topographic evidence as it relates to channel diversions is needed. This description should be accompanied by data where possible and should be sufficient to make an assessment of the possibility of channel diversion near the site that may affect SSC important to safety.
3. Ice Causes: To meet the requirements of GDC 2, GDC 44, 10 CFR 52.17, and 10 CFR Part 100, estimates of the most severe ice-induced channel diversion are needed. These estimates should be consistent with the estimates in the applicant's SAR Section 2.4.7 (Ice Effects).
4. Flooding of Site Due to Channel Diversions: To meet the requirements of GDC 2, GDC 44, 10 CFR 52.17, and 10 CFR Part 100, estimates of the most severe channel diversion induced forces on SSC important to safety are needed. These estimates should be sufficient to demonstrate that SSC important to safety can withstand these forces without loss of their ability to function. A description of mitigation measures for flooding from channel diversions should be provided, and it should be demonstrated that these measures are consistent with the Commission's regulations regarding performance of SSC important to safety.

5. Human-Induced Causes of Channel Diversion: To meet the requirements of GDC 2, GDC 44, 10 CFR 52.17, and 10 CFR Part 100, an assessment of the potential for human-induced channel diversions, in the vicinity of the site (e.g., land-use changes, diking, channelization, armoring or failure of such structures) is needed. An assessment of high and low water levels during channel diversion should be provided.
6. Alternate Water Sources: To meet the requirements of GDC 2, GDC 44, 10 CFR 52.17, and 10 CFR Part 100, assessments of alternate water sources and operating procedures are needed. These assessments should be consistent with SAR Section 2.4.11 (Low Water Considerations) and with SAR Section 2.4.14 (Technical Specifications and Emergency Operation Requirements).
7. Consideration of Other Site-Related Evaluation Criteria: To meet the requirements of GDC 1, GDC 2, 10 CFR 52.17, and 10 CFR Part 100, a description of the potential effects of site-related proximity, seismic, and non-seismic information on the postulated worst-case channel diversion scenario for the proposed plant site is needed. This description 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 SRP 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 GDC further specifies that the design bases for these structures, systems, and components shall reflect the following:
 - A. Appropriate 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 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.

Channel diversion has the potential for causing flooding or low surface water level at certain nuclear power plant sites, thus adversely affecting sources of water required for cooling the proposed plant. Accordingly, GDC 2 requirements are imposed to ensure that components and structures associated with the ultimate heat sink will continue to function, thereby keeping the plant in a safe condition.

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 SRP sections.

2. Compliance with GDC 44 requires that a system be provided to transfer heat from structures, systems, and components important to safety. The system is to function under normal and accident conditions, assuming a single failure.

GDC 44 applies to SRP Section 2.4.9 because the ultimate heat sink for the plant can consist of complex water sources, including necessary retaining structures (e.g., ponds or rivers with dams) and the associated canals and conduits connecting these sources with the nuclear power plant. The earthwork, consisting of dams and canals, should be constructed in a manner that ensures the integrity of the cooling water system and its safety function. In addition, it should be shown that channel diversion caused by severe natural phenomena cannot cause loss of the heat sink or result in flooding in excess of the design basis.

Meeting these requirements provide a level of assurance that, given the most severe natural phenomena capable of causing channel diversions or realignment, an adequate and dependable source of cooling water can be maintained.

3. Sections 100.10(c) and 100.20(c) of 10 CFR Part 100 require that physical characteristics of a site (including seismology, meteorology, geology, and hydrology) be taken into account to determine the acceptability of a site for a nuclear power reactor.

Channel diversion or realignment, posing the potential for flooding or adversely affecting the supply of cooling water for the plant, is one of the many natural phenomena specified in 10 CFR 100.10(c) and 10 CFR 100.20(c) that should be considered in designing the plant to accommodate the characteristics of a proposed site.

Meeting this requirement provides a level of assurance that the plant is not vulnerable to flooding or to loss of cooling water that could be caused by channel diversion resulting from severe natural phenomena.

III. REVIEW PROCEDURES

The reviewer will select material from the procedures described below, as may be appropriate for a particular case.

The procedures outlined below are used to review CP applications, 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 SRP section. For reviews of OL applications, these procedures are used to verify that the data and analyses remain valid and that the facility's design specifications are consistent with these data. As applicable, reviews of OLs and 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 SRP 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. Historical Channel Diversions: Applicable literature describing historical occurrences of channel diversions in the region is reviewed to determine if additional protection should

be considered in the design of safety-related facilities. Publications of the United States Geologic Survey (USGS), the U.S. Army Corps of Engineers (USACE), USACE Engineer Research, National Cooperative Highway Research Program (NCHRP) of the Transportation Research Board, State highway departments and other sources are used to identify the history and potential for channel diversions in the region. For any channel diversion events, historical water-flow variations should be noted, as well as the volume of any blocking materials with respect to the channel geometry.

The phrase “channel diversions” is not commonly used in the literature, so the reviewer should also search for “channel migration,” “channel geomorphology,” “physical hydrology,” and initiating events such as “landslides” and “levee breaks” or “breaches.”

Channel history and potential for diversions is reviewed for the following three areas:

- A. Upstream, and generally above-bank, due to geologic, seismic, or topographic change, e.g., caused by hillslope failure or earthquakes
 - B. Upstream (or downstream) and within the bank, and due to erosion, deposition or channel migration, e.g., loss of a revetment, or alluvial channel meander changes
 - C. Upstream (or downstream) and within the bank and due to thermal causes such as ice-jams.
2. Regional Topographic Evidence: Regional topographic evidence which suggests that future channel diversion may or may not occur is used in conjunction with evidence of historical diversions. The reviewer studies elevation relief of topographic maps along with geologic maps to qualitatively determine candidate locations where geologic or human-induced events increase the likelihood of channel diversions.

Evaluate the channel geographic layout (meanders), cross-section (width and depth), profile (slope), discharge (velocity and energy), and material (bed, bank, and suspended).

If considered necessary, identify the most likely types of channel diversion conditions and the potential impact on plant design of each type. For each type of condition, preliminary independent conservative estimates of the “worst case” should be made qualitatively.

The USACE and the NCHRP have provided methods of predicting channel migration. USGS and state departments of natural resources provide databases of landslide mapping. The Federal Emergency Management Agency (FEMA) has completed a riverine erosion hazard area mapping study. The reviewer needs to consider the possibility the channel could divert by blockage or as a result of uplift or subsidence. The reviewer needs to consider potential diversions that can result from gradual progressive causes, or from quick catastrophic change.

If the applicant’s assessment of channel diversion effects is comparable to the staff’s preliminary bounding analysis, the staff should concur with the applicant’s assessment. If the preliminary bounding analysis indicates the two are not comparable, the staff’s analysis should be repeated using more realistic techniques. If the two remain

non-comparable then the staff should analyze data and methods used by the applicant and use alternative techniques of analysis.

3. Ice Causes: Estimates of the most severe ice-induced channel diversion should be consistent with the applicant's estimates in SAR Section 2.4.7 (Ice Effects). Flow available under the most severe channel diversion should be sufficient to meet safety-related water supply requirements.

If ice blockage of the river or estuary is possible, it should be demonstrated that the resulting water level in the vicinity of the site has been considered in establishing the flood (e.g., from diverted channel of an ice dam) and water supply design bases (e.g., low water downstream of ice jams). If this water level could adversely affect the intake structure, or other safety-related facilities, it should be demonstrated that an alternate safety-related water supply will not also be adversely affected.

4. Flooding of Site Due to Channel Diversions: If flooding to a degree greater than that described in the PMF section is possible, potential impact forces on the safety-related intakes should be a consideration in the design bases. Also, the erosive forces and dynamic loading should be included in the structural design bases.
5. Human-Induced Causes of Channel Diversion: In addition to naturally migrating channels, the potential exists that human-induced reasons (e.g., land-use changes or the diking, channelizing, armoring, and subsequent failure of such structures) could initiate or exacerbate geomorphologic channel changes. The potential for human-induced channel diversions in the vicinity of the site is qualitatively evaluated, as it relates to channel diversions. The USACE and the NCHRP have provided methods of predicting channel migration near structures when rivers are channelized.
6. Alternate Water Sources: The staff reviews availability of alternate sources of safety-related water supply to the plant according to recommendations of Regulatory Guide 1.27. Assessment of alternate water sources and operating procedures is also addressed in SAR Section 2.4.11 (Low Water Considerations). Review of this SAR section should be coordinated with SAR Section 2.4.11.
7. Consideration of Other Site-Related Evaluation Criteria: 10 CFR Part 100 describes site-related proximity, seismic, and non-seismic evaluation criteria for power reactor applications. Subpart A to 10 CFR Part 100 addresses the requirements for applications before January 10, 1997, and Subpart B is for applications on or after January 10, 1997. The staff's review should include evaluation of pertinent information to determine if these criteria are appropriately used in postulation of worst-case channel diversion scenario at the proposed plant site.
8. Review Procedures Specific to 10 CFR Part 52 Application Type
 - A. Early Site Permit 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 of review of data parallel that used for a CP 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 early site permit 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 early site permit.

- B. Standard Design Certification 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 SRP 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. Combined License Reviews: For a COL application referencing a certified standard design, NRC staff reviews that application to ensure 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 SRP section and if the above condition for these parameters has not been met (ie. 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 early site permit as applicable to this SRP 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 early site permit 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 FSEER to ensure that any early site permit conditions, restrictions to the DC, or COL action items identified in the FSEERs are appropriately handled in the COL application.

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 safety analysis report. 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 safety evaluation report. The reviewer also states the bases for those conclusions.

1. Construction Permit, Operating License, and Combined License Reviews

The following statements 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 channel diversion effects 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 potential for channel diversion is acceptable and meets the requirements of 10 CFR Part 50, Appendix A, General Design Criteria 2 and 44 and 10 CFR Part 100 [10 CFR 100.10(c) or 10 CFR 100.20(c), as applicable], with respect to determining the acceptability of the site.

The staff finds that the applicant has considered the appropriate site phenomena in establishing the design bases for SSCs important to safety. The staff has generally accepted the methodologies used to determine the potential for channel diversion is reflected in these design bases, as documented in safety evaluation reports 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, General Design Criteria 2 and 44 and 10 CFR 100.10(c) [or 10 CFR 100.20(c)], with respect to establishing the design basis for SSCs important to safety.

2. Early Site Permit Reviews

The following statements 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 ESP site:

As set forth above, the applicant has presented and substantiated sufficient information pertaining to the identification and evaluation of channel diversions at the proposed site. Section 2.4.9, "Channel Diversions," of NUREG-0800, Standard Review Plan, provides that the site safety analysis report should address the requirements of 10 CFR Parts 52 and 100 as they relate to identifying and evaluating channel diversions affecting 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 hydrologic interface of the plant with 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 safety evaluation reports 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 or CP application.

Therefore, the staff concludes that the identification and consideration of the channel diversion 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 channel diversions for inclusion in an ESP for the applicant's site, should one be issued, acceptable.

3. Design Certification Reviews

The following statement 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. Channel diversion effects 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 SRP section in performing safety evaluations of DC applications and license applications submitted by applicants pursuant to 10 CFR Part 50 or 10 CFR Part 52. Except when the applicant proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the staff will use the method described herein to evaluate conformance with Commission regulations.

The provisions of this SRP section apply to reviews of applications submitted six months or more after the date of issuance of this SRP section, unless superseded by a later revision.

VI. REFERENCES

1. 10 CFR Part 50, Appendix A, General Design Criterion 1, "Quality Standards and Records."
2. 10 CFR Part 50, Appendix A, General Design Criterion 2, "Design Bases for Protection Against Natural Phenomena."
3. 10 CFR Part 50, Appendix A, General Design Criterion 44, "Cooling Water."
4. 10 CFR Part 52, "Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants."
5. 10 CFR Part 100, "Reactor Site Criteria."
6. EM 1110-2-1418 "Engineering and Design Channel Stability Assessment for Flood Control Projects", U.S. Army Corps of Engineers, CECW-EH-D Washington, DC 20314-1000, 31 October 1994.
7. FEMA Riverine Erosion Hazard Areas (REHA) Mapping Feasibility Study, 1999
http://www.floodmaps.fema.gov/fhm/ft_reha.shtml <http://www.msc.fema.gov>
8. NCHRP Web-Only Document 67 (Project 24-16) Methodology for Predicting Channel Migration, National Cooperative Highway Research Program, Transportation Research Board, August 2004.
9. Regulatory Guide 1.27, "Ultimate Heat Sink for Nuclear Power Plants."
10. Regulatory Guide 1.29, "Seismic Design Classification."
11. Regulatory Guide 1.59, "Flood Design Basis for Nuclear Power Plants." Historical Technical Reference.
12. Regulatory Guide 1.102, "Flood Protection for Nuclear Power Plants."
13. Regulatory Guide DG-1145, "Combined License Applications for Nuclear Power Plants (LWR Edition)."
14. USGS Landslide Hazard Map
http://www.ngdc.noaa.gov/seg/hazard/slideset/39/39_slides.shtml

15. WES Stream Investigation and Streambank Stabilization Handbook, U.S. Army Corps of Engineers, 1997. <http://chl.erdc.usace.army.mil/Media/2/8/7/StreambankManual.pdf>

PAPERWORK REDUCTION ACT STATEMENT

The information collections contained in the Standard Review Plan are covered by the requirements of 10 CFR Part 50 and 10 CFR Part 52, and were approved by the Office of Management and Budget, approval number 3150-0011 and 3150-0151.

PUBLIC PROTECTION NOTIFICATION

The NRC may not conduct or sponsor, and a person is not required to respond to, a request for information or an information collection requirement unless the requesting document displays a currently valid OMB control number.
