



U.S. NUCLEAR REGULATORY COMMISSION

STANDARD REVIEW PLAN

2.2.1-2.2.2 IDENTIFICATION OF POTENTIAL HAZARDS IN SITE VICINITY

REVIEW RESPONSIBILITIES

Primary - Organization responsible for the review of site hazards

Secondary - None

I. AREAS OF REVIEW

The staff reviews information presented by the applicant pertaining to the identification of potential hazards in the site vicinity. The review focuses on potential external hazards or hazardous materials that are present or may reasonably be expected to be present during the projected lifetime of the proposed plant. The purpose of this review is to evaluate the sufficiency of information concerning the presence and magnitude of potential external hazards so that the reviews and evaluations described in SRP Sections 2.2.3, 3.5.1.5, and 3.5.1.6 can be performed.

Chapter 2 of the SRP discusses the site characteristics that could affect the safe design and siting of the plant. The staff reviews information presented by the applicant for a construction permit (CP), design certification (DC), early site permit (ESP), or combined license (COL) concerning the identification of potential hazards in the site vicinity. This SRP section applies to reviews performed for each of these types of applications. The review covers the following specific areas:

Rev. 3 - [Month] 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 the Regulatory Guide 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants (LWR Edition)." Not all sections of the standard format have a corresponding review plan section. The SRP sections applicable to a combined license application for a new light-water reactor (LWR) will be based on Regulatory Guide 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition)," until the SRP itself is updated.

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 draft or active 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 # [MLxxxxxxx](#).

1. The locations of, and separation distances to, transportation facilities and routes, including airports and airways, roadways, railways, pipelines, and navigable bodies of water.
2. The presence of military and industrial facilities, such as fixed manufacturing, processing, and storage facilities. This area of review includes onsite storage facilities, such as compressed or liquid hydrogen, liquid oxygen, and propane storage facilities.
3. 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

The listed SRP sections interface with this section as follows:

1. For CP, ESP, COL, and DC applications Control room habitability following the release of toxic gases or vapors is reviewed under SRP Section 6.4.
2. For DC and COL applications referencing a DC rule or application, review of the site parameters in the Design Control Document (DCD) Tier 1, Chapter 2 of the DCD Tier 2, and the supporting information in DCD Tier 2 Section 14.3 submitted by the applicant is performed under SRP Section 14.3.1, "Site Parameters (Tier 1)."

II. ACCEPTANCE CRITERIA

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

Requirements

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

1. For CP, ESP and COL applications the acceptance criteria are based on 10 CFR 100.20(b)⁽¹⁾, which requires that the nature and proximity of man related hazards (e.g. airports, dams, transportation routes, military and chemical facilities) be evaluated to establish site parameters for use in determining whether plant design can accommodate commonly occurring hazards, and whether the risk of other hazards is very low. For CP applications, the acceptance criteria are also based on 10 CFR 50.34(a)(1)(i) as it relates to site evaluation factors identified in 10 CFR 100.
2. For ESP applications, the acceptance criteria are based on meeting the relevant requirements of 10 CFR 52.17(a)(vii) as they relate to the factors to be considered in the evaluation of sites which require the location and description of any industrial, military, or transportation facilities and routes, and of 10 CFR 52.17(a)(ix) as it relates to the compliance with 10 CFR 100.

(1) For CP applications before January 10, 1997, the equivalent requirements are identified in 10 CFR 100.10.

3. For COL applications, the acceptance criteria are based on meeting the relevant requirements of 10 CFR 52.79(a)(1)(iv) as they relate to the factors to be considered in the evaluation of sites which require the location and description of industrial, military, or transportation facilities and routes, and of 10 CFR 52.79(a)(1)(vi) as it relates to the compliance with 10 CFR 100.

SRP Acceptance Criteria

Specific SRP acceptance criteria acceptable to meet the relevant requirements of the NRC's regulations identified above are as follows for each review described in Subsection I of 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 to evaluate how the proposed alternatives to the SRP acceptance criteria provide acceptable methods of compliance with the NRC regulations. The applicant should ensure that:

1. Data in the safety analysis report (SAR) adequately describe the locations and distances from the plant of nearby industrial, military, and transportation facilities and that such data are in agreement with data obtained from other sources, when available.
2. Descriptions of the nature and extent of activities conducted at the site and in its vicinity, including the products and materials likely to be processed, stored, used, or transported, are adequate to permit identification of the possible hazards cited in Subsection III of this SRP section.
3. Sufficient statistical data with respect to hazardous materials are provided to establish a basis for evaluating the potential hazards to the plant or plants considered at the site.

Technical Rationale

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

1. Onsite or nearby facilities that could pose a risk to safe reactor operation include (1) onsite storage such as the use of compressed or liquid hydrogen and propane and (2) industrial, transportation, or military facilities that could involve the use of hazardous materials (e.g., oil or toxic chemicals) or pose other risks (e.g., a barge collision with an intake structure or an airplane crash at the site). On the basis of the information provided in SRP Sections 2.2.1-2.2.2, potential accidents regarded as design-basis events are determined and reviewed under SRP Section 2.2.3. Design-basis events on site or in the vicinity of the nuclear plant are defined as accidents with a probability of occurrence on an order of magnitude of 10^{-7} per year, with potential consequences sufficiently serious to affect the safety of the plant to the extent that 10 CFR Part 100 guidelines could be exceeded. If unfavorable physical characteristics exist, the proposed site may be found acceptable if the facility design includes appropriate and adequate engineering safeguards to compensate for the observed deficiencies. Regulatory Guide 1.91 provides guidance for evaluating postulated explosions on transportation routes near nuclear plants.

Meeting these requirements provides assurance that the plant has adequate protection and can operate with an acceptable degree of safety in the event of an accident caused by the presence of hazardous materials or activities on site and/or at nearby industrial, military, or transportation facilities.

III. REVIEW PROCEDURES

The staff will select and evaluate 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 or a DC. These procedures are used 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 of whether the content of technical specifications related to the identification of hazards in the site vicinity is acceptable and whether the technical specifications reflect consideration of any identified unique conditions.

For deviations from these specific acceptance criteria, the staff should review the applicant's evaluation of how the proposed alternatives to the SRP criteria provide an acceptable method of complying with the relevant NRC requirements identified in Subsection II of this SRP.

1. The staff will review the site and its vicinity for the presence of transportation facilities and routes, including airports and airways, roadways, railways, pipelines, and navigable bodies of water. The staff will evaluate the data provided in the SAR to confirm that the report adequately describes the locations of, and distances to, industrial, military, and transportation facilities in the vicinity of the plant and that the information provided is in agreement with data obtained from other sources, when available. The staff will verify the distance from nearby railroad lines to determine whether the plant is within the range of a "rocketing" tank car, where National Transportation Safety Board Railroad Accident Report, "Southern Railway Company, Train 154, Derailment with Fire and Explosion, Laurel, Mississippi, January 25, 1969," October 6, 1969 (reference 5) establishes as 350 meters (383 yards), with the range for smaller pieces extending to 500 meters (547 yards). Project 485, Aircraft Considerations, Pre-application Site Review, Boardman Nuclear Plant, October 1973 (reference 10) may also be used to evaluate the risk posed by nearby military aviation.
2. The staff will review the site and its vicinity for the presence of industrial activities, such as fixed manufacturing, processing, and storage facilities. The review should include all identified facilities and activities within 8 kilometers (5 miles) of the plant. The reviewer should be especially alert to any potentially hazardous activities in close proximity to the plant because an extensive variety of activities can have damage potential at ranges under about 1 kilometer (0.62 miles). Facilities and activities at distances greater than 8 kilometers (5 miles) should be considered if they have the potential for affecting plant safety-related features.
3. The staff will review the specific information relating to types of potentially hazardous material used, stored, or transported in the vicinity of the site—including distance, quantity, and frequency of shipment—to eliminate as many of the potential accident situations as possible by inspection, based on past review experience. References 1 and 2 identify safe separation distances for explosives, and References 3 and 4 include similar information for toxic chemicals. The staff may use Reference 7 as an example of an acceptable risk assessment for pipeline hazards, Reference 9 for cryogenic fuels, and Reference 8 for tank barge risks.

The staff should determine whether bulk storage is present on site. For example, hydrogen and oxygen may be used in boiling-water reactors for controlling oxygen concentration in the reactor coolant, properly operating the off-gas system, and suppressing corrosion and corrosion product release in the condensate and feedwater

system. The staff may use Reference 15 for guidance to assess hazards associated with the storage and use of these materials. Propane may also be used on site in the incineration of low-level radioactive waste (e.g., dry combustible waste or contaminated oil). Reference 16 contains appropriate review guidance for assessing the risk associated with the storage and use of propane.

4. The staff will review information from sources other than the SAR whenever available and should use it to check the accuracy and completeness of the information submitted in the SAR. This independent information may be obtained from sources such as U.S. Geological Survey maps and aerial photographs, published documents, contacts with State and Federal agencies, and other nuclear plant applications (especially if the plants are located in the same general area or on the same waterway). The staff should also obtain information during the site visit and subsequent discussions with local officials (see SRP Section 2.1.1 for additional guidance regarding site visits). To the extent that definitive information is available, the staff should also consider future potential hazards over the proposed life of the plant.
5. Potential accidents are identified that cannot be eliminated from consideration as design-basis events because the consequences of the accidents, if they occur, could be sufficiently serious to affect plant safety-related features. The reviewer will assess such potential accidents in detail, using criteria provided in SRP Sections 2.2.3, 3.5.1.5, or 3.5.1.6, as appropriate.
6. 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 the review parallel that used for a CP review.

In the absence of 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 staff 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 on 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 or ESP applicant. Pursuant to 10 CFR 52.47(a)(1), a DC applicant must provide postulated site parameters. However, the identification of potential hazards in site vicinity is not applicable for this area of review.

C. Combined License Reviews

For a COL application referencing a certified standard design, the staff reviews the application to ensure sufficient information was presented to demonstrate that the characteristics of the site fall within the site parameters specified in the DC rule. Should the actual site characteristics 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, the staff reviews the application to ensure that the applicant provided sufficient information to demonstrate that the design of the facility falls within the site characteristics and design parameters specified in the early site permit. 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. The requirements of 10 CFR 52.39 preclude the Commission from changing or imposing new site characteristics, design parameters, or terms and conditions on an ESP, unless the change is necessary to assure adequate protection of the public health and safety or to bring the permit or site into compliance with the Commission's regulatory requirements in effect when the permit was issued. Consequently, the staff's review of a COL application referencing an ESP should 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 unresolved items, commitments, assumptions, and differed issues identified in the FSERs are appropriately handled in the COL application.

7. For existing plants, or others at the CP or COL stage when the COL references an ESP and only if it is required by 10 CFR 52.39, the staff will review nearby industrial, military, and transportation facilities and transportation routes for any changes or additions identified by the applicant that may affect the safe operation of the plant. If these changes alter the data or assumptions used in previous hazard evaluations or demonstrate the need for new ones, the staff will perform the appropriate evaluations.

IV. EVALUATION FINDINGS

The staff verifies that the information submitted by the applicant regarding the identification of potential hazards in the site vicinity is accurate and complete and contains sufficient detail to enable the performance of the reviews described in SRP Sections 2.2.3, 3.5.1.5, and 3.5.1.6.

The review should document the staff's evaluation of site characteristics with regards to the relevant regulatory criteria. The evaluation should support the staff's conclusions as to whether the regulations are met. The staff 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 staff 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 staff may summarize or quote the information offered by the applicant in support of its application, it should clearly articulate the bases for its conclusions.

The staff 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 staff also states the bases for those conclusions.

1. Construction Permit 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 to establish an identification of potential hazards in the site vicinity. The staff has reviewed the information provided and, for the reasons given above, concludes that the applicant has provided information with respect to identification of potential hazards in accordance with the requirements of 10 CFR 100.20(b) and 10 CFR 50.34(a)(1)(i) for CPs, and 10 CFR 52.79(a)(1)(iv) and 10 CFR 52.79(a)(1)(vi) for COLs for compliance evaluation. The nature and extent of activities involving potentially hazardous materials that are conducted at nearby industrial, military, and transportation facilities have been evaluated to identify any such activities that have the potential for adversely affecting plant safety-related structures. Based on an evaluation of information in the SAR as well as information that the staff independently obtained, the staff has concluded that all potentially hazardous activities on site and in the vicinity of the plant have been identified. The hazards associated with these activities have been reviewed and are discussed in Sections 2.2.3, 3.5.1.5, and 3.5.1.6 of this SER.

2. Early Site Permit Reviews

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

As set forth above, the applicant has presented and substantiated information to establish the identification of potential hazards in the site vicinity. The staff has reviewed the information provided and, for the reasons given above, concludes that the applicant has provided information with respect to identification of potential hazards in accordance with the requirements of 10 CFR 52.17(a)(vii) and 10 CFR 52.17(a)(ix) for compliance evaluation. The nature and extent of activities involving potentially hazardous materials that are conducted at nearby industrial, military, and transportation facilities have been evaluated to identify any such activities that have the potential for adversely affecting plant safety-related structures. On the basis of an evaluation of information in the SAR as well as information independently obtained by the staff, the staff has concluded that all potentially hazardous activities on site and in the vicinity of the plant have been identified. The hazards associated with these activities have been reviewed and are discussed in Sections 2.2.3, 3.5.1.5, and 3.5.1.6 of this SER.

3. Design Certification Reviews

The identification of potential hazards in the site vicinity is site-specific and will be addressed by a COL applicant.

V. IMPLEMENTATION

The staff will use this SRP section in performing safety evaluations of design certifications and license applications submitted by applicants pursuant to 10 CFR Part 50 or 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 docketed six months or more after the date of issuance of this SRP section, unless superseded by a later revision.

VI. REFERENCES

1. Department of the Army Technical Manual TM5-1300, "Structures to Resist the Effects of Accidental Explosions," June 1969.
2. Regulatory Guide 1.91, "Evaluation of Explosions Postulated to Occur on Transportation Routes Near Nuclear Power Plant Sites."
3. Regulatory Guide 1.78, "Assumptions for Evaluating the Habitability of a Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release."
4. Regulatory Guide 1.95, "Protection of Nuclear Power Plant Control Room Operators Against an Accidental Chlorine Release."
5. National Transportation Safety Board Railroad Accident Report, "Southern Railway Company, Train 154, Derailment with Fire and Explosion, Laurel, Mississippi, January 25, 1969," October 6, 1969.
6. Regulatory Guide 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants," and DG-1145, "Standard Format and Content of Combined License Applications for Nuclear Power Plants (LWR Edition)."
7. NUREG-0014, "Safety Evaluation Report, Hartsville Nuclear Plants A1, A2, B1, and B2," April 1976, Docket STN 50-518.
8. Safety Evaluation of the Beaver Valley Power Station, Unit No. 2, November 9, 1976, and Supplements, Docket 50-412.
9. Safety Evaluation Report, Hope Creek Generating Station, Units 1 and 2, Supplement No. 5, March 1976, Dockets 50-354 and 50-355.
10. Project 485, Aircraft Considerations, Preapplication Site Review, Boardman Nuclear Plant, October 1973.
11. 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities."
12. 10 CFR Part 52, "Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants."
13. 10 CFR Part 100, "Reactor Site Criteria."
14. 10 CFR 100.10 and 10 CFR 100.20, "Factors To Be Considered When Evaluating Sites."
15. NRC Staff Safety Evaluation Report (July 1987), in Electric Power Research Institute Report NP-5283-SR-A, "Guidelines for Permanent BWR Hydrogen Water Chemistry Installation—1987 Revision."

16. Safety Evaluation Relating to the Operation of a Mobile Volume Reduction System, Commonwealth Edison Company, Dresden Station, Unit Nos. 2 and 3, August 13, 1986, Dockets 50-237 and 50-249.

PAPERWORK REDUCTION ACT STATEMENT

The information collections contained in the draft 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.

SRP Section 2.2.1-2.2.2
Description of Changes

This SRP section affirms the technical accuracy and adequacy of the guidance previously provided in (Draft) Revision 3, dated June 1996 of this SRP. See ADAMS accession number ML052070220.

In addition this SRP section was administratively updated in accordance with NRR Office Instruction, LIC-200, Revision 1, "Standard Review Plan (SRP) Process." The revision also adds standard paragraphs to extend application of the updated SRP section to prospective submittals by applicants pursuant to 10 CFR Part 52.

The technical changes are incorporated in Revision 3, dated [Month] 2007:

Review Responsibilities - Reflects changes in review branches resulting from reorganization and branch consolidation. Change is reflected throughout the SRP.

I. AREAS OF REVIEW

1. Made minor changes for clarity. They do not reflect any new staff positions.
2. Made changes to address CPs, OLs, DCs, ESPs, and COLs that these SRP sections will cover.

II. ACCEPTANCE CRITERIA

1. Made updates to include the regulatory requirements of 10 CFR Part 52 to reflect ESP, DC, and COL applications.

III. REVIEW PROCEDURES

1. Made minor updates for clarity and to include the regulatory requirements of 10 CFR Part 52 to reflect ESPs, DC, and COL applications.

IV. EVALUATION FINDINGS

1. Made minor updates to include the regulatory requirements of 10 CFR Part 52 to reflect ESP, DC, and COL applications.

V. IMPLEMENTATION

1. Made minor changes improve clarity.

VI. REFERENCES

1. Added references to 10 CFR Part 52 and 10 CFR Part 100.