U.S. NUCLEAR REGULATORY COMMISSION

STANDARD REVIEW PLAN

OFFICE OF NUCLEAR REACTOR REGULATION

2.2.1 - 2.2.2 IDENTIFICATION OF POTENTIAL HAZARDS IN SITE VICINITY

REVIEW RESPONSIBILITIES

Primary - ~~Siting Analysis Branch (SAB)~~Civil Engineering and Geosciences Branch (ECGB)[1]

Secondary - ~~None~~Materials and Chemical Engineering Branch (EMCB)[2]

I. AREAS OF REVIEW

The site and its vicinity are reviewed for location and separation distance with respect to industrial, military, and transportation facilities and routes. Such facilities and routes include air, ground, and water traffic, pipelines, and fixed manufacturing, processing, and storage facilities~~.~~, including onsite storage facilities for compressed or liquid hydrogen, liquid oxygen, and propane.[3] The review focuses on potential external hazards or hazardous materials that are present or which may reasonably be expected to be present during the projected lifetime of the proposed plant. The purpose of this review is to establish the information concerning the presence and magnitude of potential external hazards so that the reviews and evaluations described in ~~SRP~~ Standard Review Plan (SRP)[4] Sections 2.2.3, 3.5.1.5, and 3.5.1.6 can be performed.

The EMCB reviews toxic gasses and explosions as its secondary review responsibility for this SRP section.[5]

Review Interfaces

The ECGB will coordinate other branch evaluations with the overall review to identify potential hazards in the vicinity of the site, as follows:[6]

Control room habitability with respect to toxic chemicals is reviewed ~~in SRP Section 6.4~~ [7]by the ~~Accident Evaluation Branch (AEB)~~Plant Systems Branch (SPLB)[8] as part of its primary review responsibility for SRP Section 6.4.[9]

For areas of review identified as part of the primary responsibility of other branches, acceptance criteria and methodologies necessary for these reviews are contained in the referenced SRP section of the corresponding primary review branch.[10]

II. ACCEPTANCE CRITERIA

10 CFR ~~Part 100 §~~[11] 100.10 requires that site acceptance be based on the consideration of factors relating to the proposed reactor design and the characteristics peculiar to the site. One of the factors involves the use characteristics of the site environs. In accordance with 10 CFR ~~Part 50, §~~50.34, the applicant is required to submit in the preliminary and final safety analysis reports (PSAR and FSAR) information needed for evaluating these factors. Guidelines for specific information requirements are described in Chapter 2, Sections 2.2.1 and 2.2.2 of Regulatory Guide (RG) 1.70.[12]

The information submitted by the applicant is adequate and meets the 10 CFR ~~Part 50, §~~50.34 and 10 CFR ~~100, §~~100.10 requirements and RG 1.70 guidelines if it satisfies the following criteria:

1. Data in the ~~SAR~~ safety analysis report (SAR)[13] adequately describe the locations and distances of industrial, military, and transportation facilities in the vicinity of the plant, and is 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~~nearby facilities~~,[14] including the products and materials likely to be processed, stored, used, or transported, are adequate to permit identification of possible hazards 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 hazard to the plant.

Technical Rationale

The technical rationale for application of acceptance criteria for the evaluation of potential accidents is discussed in the following paragraphs:[15]

Compliance with 10 CFR 100.10 requires that evaluation of reactor sites include factors related to proposed reactor designs as well as to characteristics peculiar to individual sites. Through its design, construction, and operation, a reactor should reflect an extremely low probability for

accidents that could result in release of significant quantities of radioactive fission products. In addition, the site's location and engineered features included as safeguards against the hazardous consequences of an accident should ensure a low risk of public exposure. When determining the acceptability of a site for a reactor, the use characteristics of the site environs (including those in the exclusion area and the low population zone) should be considered.

Onsite or nearby facilities that could pose a risk to safe reactor operation include (1) onsite storage and 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 Section 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 of about 10^{-7} per year or greater and with potential consequences serious enough to affect the safety of the plant to the extent that 10 CFR Part 100 guidelines could be exceeded. Where 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. RG 1.91[16] provides guidance for evaluating postulated explosions on transportation routes near nuclear plants.

Meeting these requirements provides assurance that the plant is adequately protected and can be operated 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.[17]

III. REVIEW PROCEDURES

Selection and emphasis of various aspects of the areas covered by this review plan will be made by the reviewer on each case. The judgment of the areas to be given attention during the review is to be based on an inspection of the material presented, the similarity of the material to that recently reviewed on other plants, and whether items of special safety significance are involved.

The following procedures are followed:

1. The reviewer should be especially alert, in the construction permit (CP) or early site permit stage of[18] review, for any potentially hazardous activities in close proximity of the plant since the variety of activities having damage potential at ranges under about 1 kilometer can be very extensive. All identified facilities and activities within 8 kilometers (5 miles) of the plant should be reviewed. Facilities and activities at greater distances should be considered if they otherwise have the potential for affecting plant safety-related features. At the operating license (OL) or combined license (COL)[19] stage, most hazards will already have been identified. Emphasis should be placed on any new information. At the operating license or COL[20] stage, any analyses pertaining to potential accidents involving hazardous materials or activities on site and[21] in the vicinity of the plant will be reviewed to ensure that results are appropriate in light of any new data or experience which is then available. Facilities which are likely to either produce

or consume hazardous materials should be investigated as possible sources of traffic of hazardous materials past the site.

2. Information should be obtained from sources other than the SAR wherever available, and should be used 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 (USGS) maps and aerial photos, published documents, contacts with State and Federal agencies, and from other nuclear plant applications (especially if they are located in the same general area or on the same waterway). Information should also be obtained during the site visit and subsequent discussions with local officials. (See ~~Standard Review Plan~~ SRP[22] Section 2.1.1 for further guidance with regard to site visits.) To the extent that definitive information is available, future potential hazards over the proposed life of the plant should be reviewed.

3. The specific information relating to types of potentially hazardous material, including distance, quantity, and frequency of shipment, is reviewed to eliminate as many of the potential accident situations as possible by inspection, based on past review experience. At the operating license or COL[23] stage, nearby industrial, military, and transportation facilities and transportation routes will be reviewed for any changes or additions which may affect the safe operation of the plant. If these changes alter the data or assumptions used in previous hazards evaluations or demonstrate the need for new ones, appropriate evaluations will be performed.

   For pipeline hazards, Reference 7 may be used as an example of an acceptable risk assessment. For cryogenic fuels, Reference 9 may be used, and for tank barge risks, Reference 8. For military aviation, Reference 10 may be used. Safe separation distances for explosives are identified in References 1 and 2, and for toxic chemicals, References 3 and 4 should be consulted.

   The distance from nearby railroad lines is checked to determine if the plant is within the range of a "rocketing" tank car which, from Reference 5, is taken to be 350 meters with the range for smaller pieces extending to 500 meters.

   The reviewer should determine whether bulk storage of liquid or compressed hydrogen and liquid oxygen is present on site. Hydrogen and oxygen may be used in BWRs for the control of oxygen concentration in the reactor coolant, for proper operation of the offgas system, and to suppress corrosion and corrosion product release in the condensate and feedwater system. Reference 13 may be used for guidance to assess hazards associated with the storage and use of these materials.

   The reviewer should determine whether bulk storage of propane exists on site. Propane may be used for incineration of low-level radioactive waste (dry combustible waste or contaminated oil). Reference 14 contains appropriate review guidance to assess the risk associated with the storage and use of propane.[24]

4. Potential accidents which cannot be eliminated from consideration as design basis events because the consequences of the accidents, if they should occur, could be serious enough

to affect plant safety-related features, are identified. Potential accidents so identified are assessed in detail, using criteria in ~~Standard Review Plan~~ SRP Sections 2.2.3, 3.5.1.5, or 3.5.1.6, as appropriate.

For design certification reviews, the above review procedures are used to verify that the design as set forth in the standard SAR (including inspections, tests, analyses, and acceptance criteria (ITAAC); site interface requirements; and COL action items) meets the acceptance criteria given in subsection II.[25]

IV. EVALUATION FINDINGS

The reviewer verifies that the information submitted by the applicant is in accordance with 10 CFR ~~Part 50, §~~50.34 requirements and within RG 1.70 guidelines such that compliance with 10 CFR ~~Part 100, §~~100.10 can be evaluated. The information is sufficiently complete and adequate if it can support conclusions of the following type, to be used in the staff's safety evaluation report (SER):[26]

> The applicant has provided information in the SAR on potential site hazards in accordance with the requirements of 10 CFR ~~50, §~~50.34 and Regulatory Guide 1.70. The nature and extent of activities involving potentially hazardous materials which are conducted at nearby industrial, military, and transportation facilities have been evaluated to identify any such activities which have the potential for adversely affecting plant safety-related structures. Based on evaluation of information contained in the SAR, as well as information independently obtained by the staff, it is concluded that all potentially hazardous activities on site and[27] in the vicinity of the plant have been identified. The hazards associated with these activities have been reviewed and are discussed in Sections _____ and _____ of this SER.

If the activities are identified as being potentially hazardous, the evaluations described in ~~Standard Review Plan~~ SRP Sections 2.2.3, 3.5.1.5, and 3.5.1.6 are performed with respect to the inherent capability of the plant or special plant design measures to prevent radiological releases in excess of the 10 CFR Part 100 guidelines.

For design certification reviews the findings will also summarize, to the extent that the review is not discussed in other SER sections, the staff's ITAAC evaluation, including design acceptance criteria (DAC), site interface requirements, and COL action items that are relevant to this SRP section.[28]

V. IMPLEMENTATION

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

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

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

VI. REFERENCES

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."

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, Docket 50-354 and 50-355.

10. Project 485, Aircraft Considerations, Preapplication Site Review, Boardman Nuclear Plant. October 1973.

11. 10 CFR ~~Part 50, §~~50.34, "Contents of Applications; Technical Information."

12. 10 CFR ~~Part 100, §~~100.10, "Factors to Be Considered When Evaluating Sites."

13. NRC Staff Safety Evaluation Report (July 1987) contained in Electric Power Research Institute (EPRI) Report NP-5283-SR-A, "Guidelines for Permanent BWR Hydrogen Water Chemistry Installation - 1987 Revision."[29]

14. Safety Evaluation Relating to the Operation of a Mobile Volume Reduction System, August 13, 1986, Commonwealth Edison Company, Dresden Station, Unit Nos. 2 and 3, Docket Nos. 50-237 and 50-249.[30]

SRP Draft Section 2.2.1
Attachment A - Proposed Changes in Order of Occurrence

Item numbers in the following table correspond to superscript numbers in the redline/strikeout copy of the draft SRP section.

Item	Source	Description
1.	Current primary review branch and designation	Changed PRB to ECGB.
2.	Current secondary review branch and designation	Changed SRB to EMCB.
3.	Integrated Impact No. 533	Revised AREAS OF REVIEW to include onsite storage facilities for liquid or compressed hydrogen, liquid oxygen, and propane.
4.	Editorial modification	Defined "SRP" as "Standard Review Plan."
5.	Editorial addition	Added a brief description of EMCB's secondary review responsibility because this SRP section now has an SRB.
6.	SRP-UDP format item	Added "Review Interfaces" and lead-in paragraph under AREAS OF REVIEW.
7.	Editorial change	Moved reference to SRP Section 6.4 to end of sentence.
8.	Current review branch name and designation	Changed review interface to SPLB.
9.	Editorial change	Moved reference to SRP Section 6.4 to end of sentence.
10.	SRP-UDP format item	Added standard language to follow the designation of review interfaces.
11.	Editorial correction	Provided correct format for citing references to Title 10 of the Code of Federal Regulations (global change for this section).
12.	SRP-UDP format item	Regulatory Guide 1.70 needs to be updated, as noted in Form IPD 7.0 No. 2.2.1-2.
13.	Editorial modification	Defined "SAR" as "safety analysis report."
14.	Integrated Impact No. 533	Explained that the site itself must be included in an investigation of the nature and extent of possible hazards.
15.	SRP-UDP format item	Added "Technical Rationale" and lead-in paragraph to ACCEPTANCE CRITERIA.
16.	SRP-UDP format item	Regulatory Guide 1.91 needs to be updated, as noted on Form IPD 7.0 No. 2.2.1-1.
17.	SRP-UDP format item	Added technical rationale related to 10 CFR 100.10.
18.	SRP-UDP format item	Added "or early site permit."

Item	Source	Description
19.	SRP-UDP format item	Added "or combined license (COL)."
20.	SRP-UDP format item	Added "or COL."
21.	Integrated Impact No. 533	Explained that the site itself must be included in an investigation of the nature and extent of possible hazards.
22.	Editorial modification	Used initialism introduced in item number 4 above for "Standard Review Plan" (global change for this section).
23.	SRP-UDP format item	Added "or COL."
24.	Integrated Impact No. 533	Added review procedures for onsite storage and use of hydrogen, oxygen, and propane.
25.	SRP-UDP format item	Added paragraph to REVIEW PROCEDURES describing design certification reviews.
26.	Editorial modification	Introduced "SER" as initialism for "safety evaluation report."
27.	Integrated Impact No. 533	Explained that the site itself must be included in an investigation of the nature and extent of possible hazards.
28.	SRP-UDP format item	Added paragraph to EVALUATION FINDINGS describing design certification reviews.
29.	Integrated Impact No. 533	Added the NRC Staff Safety Evaluation Report on EPRI NP-5283-SR-A to REFERENCES.
30.	Integrated Impact No. 533	Added the NRC Staff Safety Evaluation Report on the Mobile Volume Reduction System to REFERENCES.

Integrated Impact No.	Issue	SRP Subsections Affected
533	Incorporate review procedures to include staff positions on the storage of liquid hydrogen, liquid oxygen, and propane.	I; II.2; III.1 & 3; IV; VI.13 & 14