U.S. NUCLEAR REGULATORY COMMISSION

STANDARD REVIEW PLAN

OFFICE OF NUCLEAR REACTOR REGULATION

9.5.2 COMMUNICATIONS SYSTEMS

REVIEW RESPONSIBILITIES

Primary - ~~Power Systems Branch (PSB)~~Instrumentation & Controls Branch (HICB)[1]

Secondary - None

I. AREAS OF REVIEW

The ~~PSB~~HICB[2] review of the communication system is limited to that portion of the system used in intra-plant and plant-to-offsite communications during transient, fire and accident conditions. The system is reviewed with respect to the following considerations: capability of the system and related plant design features to provide effective intra-plant ~~communications~~ and ~~effective~~[3] plant-to-offsite communications during normal plant operations and during transient, fire, and accident conditions, including loss of offsite power.

Review Interfaces[4]

In the review of the communication system, the ~~PSB~~HICB[5] will coordinate evaluations of other branches that interface with the overall review of the system as follows:

1. The Emergency Preparedness ~~Licensing~~and Radiation Protection Branch (PERB)[6] verifies that the offsite communication system provided will satisfy emergency plan requirements for accident conditions, including notification of personnel and implementation of evacuation procedures as part of their primary review responsibility for SRP Section 13.3.

2. The ~~Procedures and Test Review~~Quality Assurance and Maintenance Branch (HQMB)[7] determines the acceptability of the preoperational and startup tests as part of their primary review responsibility for SRP Section 14.~~0~~2[8].

3. The review for fire protection is coordinated and performed by the ~~Chemical Engineering~~Plant Systems Branch (SPLB)[9] as part of its primary review responsibility

USNRC STANDARD REVIEW PLAN

Standard review plans are prepared for the guidance of the Office of Nuclear Reactor Regulation staff responsible for the review of applications to construct and operate nuclear power plants. These documents are made available to the public as part of the Commission's policy to inform the nuclear industry and the general public of regulatory procedures and policies. Standard review plans are not substitutes for regulatory guides or the Commission's regulations and compliance with them is not required. The standard review plan sections are keyed to the Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants. Not all sections of the Standard Format have a corresponding review plan.

Published standard review plans will be revised periodically, as appropriate, to accommodate comments and to reflect new information and experience.

Comments and suggestions for improvement will be considered and should be sent to the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Washington, D.C. 20555.

for SRP Section 9.5.1. This review includes review of the availability of communications systems during remote shutdown operations.[10]

4. The review of the adequacy of communications systems with respect to security requirements is coordinated and performed by the Safeguards Branch (PSGB) as part of its primary review responsibility for SRP Section 13.6.[11]

5. The review of the adequacy of control room communications systems and features related to their effectiveness to support reliable human performance, including evaluation with respect to the criteria specified in NUREG-0700 (Reference 1), is performed by the Human Factors Assessment Branch (HHFB) as part of its primary review responsibility for SRP Section 18 (proposed).[12]

For those areas of review identified above ~~that are part of the primary review responsibility of other branches~~as part of the review under other SRP sections[13], the acceptance criteria and review procedures are contained in the referenced SRP sections.

II. ACCEPTANCE CRITERIA

Acceptability of the design of the communication system, as described in the applicant's safety analysis report (SAR), is based in part on the degree of similarity of the design with that for previously reviewed plants with satisfactory operating experience. There are no general design criteria or regulatory guides that directly apply to the safety-related performance requirements for the design and use of the communication system during normal plant operations and transient conditions. The ~~PSB~~HICB[14] will use the following criterion to assess the system design capability: the communication system is acceptable if the integrated design of the system and related plant features[15] will provide effective communication between plant personnel in all vital areas during normal plant operation and during the full spectrum of accident or incident conditions (including fire) under maximum potential noise levels.

III. REVIEW PROCEDURES

The information provided in the SAR pertaining to the design of the communication system and related plant features[16] will be evaluated to determine that intra-plant communication equipment needed in vital areas during recovery actions from transient, fire or accident conditions is provided in a manner compatible with the proper operation of other plant equipment[17]. Material will be selected and emphasized from this SRP section as may be deemed appropriate for a particular case.

A.[18] The design basis, design criteria, system description sections, and the analyses that demonstrate the effectiveness of the system when maximum plant noise levels are being generated during incident and accident conditions are reviewed to verify that the communication system will function effectively. Engineering judgment is used in conjunction with a comparison of the system capabilities with equipment and communication systems provided for previously approved plants. The ~~PSB~~HICB[19] will accept the communication system if a statement in the SAR commits the applicant to perform a functional test under conditions that simulate the maximum plant noise levels being generated during the various operating conditions, including fire and accident conditions[20], to demonstrate system capabilities.

B. The reviews which follow are conducted for new applications considering the applicant's analysis of specific communications needs, including the security communications requirements, upon which the design is based.[21]

1. The reviewer verifies that effective communication will not be impeded by problems of transmission through thick concrete walls, high-noise areas, personnel use of protective equipment, too few communication lines/channels, or interference with or from other electronic or electrical equipment.[22]

2. The reviewer verifies the adequacy of any plant features needed to alert personnel in high noise environments to use the communications systems as well as any plant features needed to shield communications from high noise environments. The reviewer also verifies the adequacy of any special equipment facilitating communications with personnel using protective equipment (e.g. respirators, underwater diving equipment).[23]

3. In cases where design bases and/or design criteria for independence between specific communications systems are proposed, the reviewer verifies the adequacy of proposed measures assuring that such systems will be implemented in accordance with the design criteria.[24]

4. Where wireless communications systems are proposed, the reviewer verifies that the applicant has addressed the following items:[25]

   a. A frequency allocation plan has been established such that there will be an adequate number of communications channels with no interference between channels/systems.[26]

   b. Adequate coverage will exist to facilitate needed communications with plant and offsite personnel.[27]

   c. Communications equipment to be used will be compatible with the electromagnetic interference (EMI) and radio frequency interference (RFI) design measures taken for the design and/or qualification of plant electronic, electrical, and computer equipment such that there will be no interference between wireless communications systems and other plant equipment. The applicant's consideration of the potential for interference should be based upon definition of the worst-case electromagnetic emissions from the communications equipment, including the type, magnitude, frequency content, and locations. The applicant should consider all potential uses of the communications equipment including maintenance activities.[28]

   d. The communications system will be protected from the EMI/RFI effects of other plant equipment to the extent that clear communications can be maintained.[29]

   e. There will be adequate equipment testing and field measurements where necessary to demonstrate effective communications.[30]

For standard design certification reviews under 10 CFR Part 52, the procedures above should be followed, as modified by the procedures in SRP Section 14.3 (proposed), to verify that the design set forth in the standard safety analysis report, including inspections, tests, analysis, and acceptance criteria (ITAAC), site interface requirements and combined license action items, meet the acceptance criteria given in subsection II. SRP Section 14.3 (proposed) contains procedures for the review of certified design material (CDM) for the standard design, including the site parameters, interface criteria, and ITAAC.[31]

IV. EVALUATION FINDINGS

The reviewer verifies that sufficient information has been provided and that the ~~his~~[32] review supports conclusions of the following type, to be included in the staff's safety evaluation report:

> The communication system includes all components for intra-plant and plant-to-offsite communications. The scope of review of the communications system for the _____ plant included verification that offsite equipment is capable of providing for notification of personnel and implementation of evacuation procedures, and verification that onsite communications are adequate in the event of an emergency.
>
> The basis for acceptance of the communication system in our review was conformance of the design, design criteria, and design bases to staff positions and industry standards, and the ability of the systems to provide effective communications between plant personnel in all vital areas during the full spectrum of accident or incident conditions under maximum potential noise levels.
>
> The staff concludes that the design of the communications system conforms to the staff's criteria and industry standards and is therefore acceptable.

For design certification reviews, the findings will also summarize, to the extent that the review is not discussed in other safety evaluation report sections, the staff's evaluation of inspections, tests, analyses, and acceptance criteria (ITAAC), including design acceptance criteria (DAC), site interface requirements, and combined license action items that are relevant to this SRP Section.[33]

V. IMPLEMENTATION

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

This SRP section will be used by the staff when performing safety evaluations of license applications submitted by applicants pursuant to 10 CFR 50 or 10 CFR 52.[34] 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~~ communication systems.[35]

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.[36]

VI. REFERENCES

~~None.~~1. NUREG-0700, "Guidelines for Control Room Design Reviews," September 1981.[3738]

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 PRB names and abbreviations	Editorial change made to reflect the current SRP Section 9.5.2 PRB name and abbreviation for the Instrumentation & Controls Branch.
2.	Current PRB names and abbreviations	Editorial change made to reflect the current SRP Section 9.5.2 PRB abbreviation for the Instrumentation & Controls Branch.
3.	Editorial, **Integrated Impact 385**	Combined descriptions of intra-plant and plant to offsite reviews to eliminate redundancy. Also modified text to reflect reviews of the potential for communications system/equipment interference with the proper operation of other plant equipment (especially electronic and digital computer equipment) and vice-versa. It should also be noted that detail is to be added for reviews of the adequacy of plant features associated with high noise areas (e.g. noise-canceling devices, sound isolation booths, means of alerting personnel in high noise areas, etc.) which may not be communications systems per se.
4.	SRP-UDP format item	Added Review Interface subsection of Areas of Review to be consistent with SRP-UDP required format so that reviews performed by other PRBs are detailed in their own subsection. Editorial changes also made to add number/paragraph format for each review interface with another PRB consistent with SRP-UDP required format
5.	Current PRB names and abbreviations	Editorial change made to reflect the current SRP Section 9.5.2 PRB abbreviation for the Instrumentation & Controls Branch.
6.	Current PRB names and abbreviations	Editorial changes made to reflect the current SRP Section 13.3 PRB name and abbreviation.
7.	Current PRB names and abbreviations	Editorial changes made to reflect the current SRP Section 14.2 PRB name and abbreviation.
8.	Editorial	The correct SRP Section for review of preoperational and startup testing is currently SRP Section 14.2.
9.	Current PRB names and abbreviations	Editorial changes made to reflect the current SRP Section 9.5.1 PRB name and abbreviation.

Item	Source	Description
10.	**Integrated Impact 386**	Added clarification of the review interface to reflect an apparent new position or clarification of existing position in the SER documenting the staff's review of the ABWR application for design certification. To address a PRB comment related to Integrated Impact 386 [see October 10, 1995 Memorandum to R.W. Borchardt from J.S. Wermiel (TAC-M92845)], revised to reduce the specificity of the stated review interface so that it covers all remote shutdown operations (under whatever conditions may necessitate remote shutdown) and is not limited to operations in the event of a main control room fire.
11.	**Integrated Impact 385**	Added a numbered review interface, reflecting the appropriate PRB and SRP Section (per SRP-UDP format requirements) for review of communications systems for security.
12.	Potential Impact 25695, SRP-UDP Integration of Human Factors-Related Issues	Added review interface reflecting review of the adequacy of control room communications systems to support reliable human performance. It should be noted that a proposed new section (18) covering this review has been developed under the SRP-UDP.
13.	SRP-UDP format item	Revised to cover interfaces with other sections rather than branches, similar to the standard text used under SRP-UDP format.
14.	Current PRB names and abbreviations	Editorial change made to reflect the current SRP Section 9.5.2 PRB abbreviation.
15.	**Integrated Impact 385**, Editorial	Added text to accommodate reviews of the adequacy of plant features associated with high noise areas.
16.	**Integrated Impact 385**, Editorial	Added detail for reviews of the adequacy of plant features associated with high noise areas.
17.	**Integrated Impact 385**, Editorial	Added text to reflect reviews of the potential for communications system/equipment interference with the proper operation of other plant equipment (and vice-versa) and of measures taken to address such interference mechanisms as radio frequency interference (RFI) and electromagnetic interference (EMI).
18.	Editorial	Added outline style numbering to improve organization and presentation of the Review Procedures.
19.	Current PRB names and abbreviations	Editorial change made to reflect the current SRP Section 9.5.2 PRB abbreviation.

Item	Source	Description
20.	Editorial	Changed condition to conditions to improve grammar.
21.	**Integrated Impact 385**	Added Review Procedures to reflect new review details applicable to new plants, for determining the adequacy of communications systems, based upon the staff's review of the EPRI Utility Requirements Document which is documented in the EPRI Evolutionary Plant FSER. As indicated in the integrated impact, the staff applied acceptable EPRI proposed requirements to the review of communications systems proposed for the CE System 80+ design certification application. The added text summarizes the staff's application of the EPRI requirements in a review procedure.
22.	**Integrated Impact 385**	Added Review Procedures to reflect new review details for determining the adequacy of communications systems, based upon the staff's review of communication systems as documented in Evolutionary Plant FSERs.
23.	**Integrated Impact 385**	Added Review Procedures to reflect new review details for determining the adequacy of communications systems, based upon the staff's review of communication systems as documented in Evolutionary Plant FSERs.
24.	**Integrated Impact 385**	Added Review Procedures to reflect new review details for determining the adequacy of communications systems, based upon the staff's review of communication systems as documented in Evolutionary Plant FSERs.
25.	**Integrated Impact 385**	Added Review Procedures to reflect new review details for determining the adequacy of wireless communications systems, based upon the staff's review of communication systems as documented in Evolutionary Plant FSERs.
26.	**Integrated Impact 385**	Added text to reflect new review details for determining the adequacy of wireless communications systems, based upon the staff's review of communication systems as documented in Evolutionary Plant FSERs.
27.	**Integrated Impact 385**	Added text to reflect new review details for determining the adequacy of wireless communications systems, based upon the staff's review of communication systems as documented in Evolutionary Plant FSERs.

Item	Source	Description
28.	**Integrated Impact 385**	Added text to reflect new review details for determining the adequacy of wireless communications systems, based upon the staff's review of communication systems as documented in Evolutionary Plant FSERs.
29.	**Integrated Impact 385**	Added text to reflect new review details for determining the adequacy of wireless communications systems, based upon the staff's review of communication systems as documented in Evolutionary Plant FSERs.
30.	**Integrated Impact 385**	Added text to reflect new review details for determining the adequacy of wireless communications systems, based upon the staff's review of communication systems as documented in Evolutionary Plant FSERs.
31.	SRP-UDP Guidance, Implementation of 10 CFR 52	Added standard paragraph to address application of Review Procedures in design certification reviews.
32.	Editorial	Deleted a gender-specific pronoun.
33.	10 CFR 52 Implementation	Standard change made to Evaluation Findings to address design certification reviews.
34.	SRP-UDP Guidance, Implementation of 10 CFR 52	Added standard sentence to address application of the SRP section to reviews of applications filed under 10 CFR Part 52, as well as Part 50.
35.	Editorial	There are no regulations specified, thus discussion of evaluation of conformance with specified regulations was changed to evaluation of communications systems.
36.	SRP-UDP Guidance	Added standard paragraph to indicate applicability of this section to reviews of future applications.
37.	Potential Impact 25695, SRP-UDP Integration of Human Factors-Related Issues	Added reference for review of the adequacy of control room communications systems to support reliable human performance.
38.	SRP-UDP Reference Verification	Although Revision 1 of this NUREG was published in February 1995 as NUREG-0700, Revision 1, "Human-System Interface Design Review Guideline," the SRP-UDP did not identify any staff position directing use of Revision 1. This SRP section thus reflects use of Revision 0 (not the latest revision) pending identification of a staff position (or other basis supporting a Type I change) regarding use of Revision 1.

SRP Draft Section 9.5.2

Attachment B - Cross Reference of Integrated Impacts

Integrated Impact No.	Issue	SRP Subsections Affected
385	Modify the SRP to reflect review of the adequacy of communications systems and plant design features to support effective communications.	Areas of Review (including Review Interface 4), Acceptance Criteria, Review Procedures, and Evaluation Findings; subsections I through IV.
386	Modify the SRP to reflect review of the availability of communications systems during remote shutdown operations.	Areas of Review, subsection I, Review Interface 3.