

4. EMERGENCY LIGHTING

4.1 Illumination Levels

QUESTION

What is the requisite intensity level for emergency lighting for egress routes and areas where shutdown functions must be performed? What are the bases for determining these levels of lighting?

RESPONSE

The level of illumination provided by emergency lighting in access routes to and in areas where shutdown functions must be performed is a level that is sufficient to enable an operator to reach that area and perform the shutdown functions. At the remote shutdown panels the illumination levels should be sufficient for control panel operators. The bases for estimating these levels of lighting are the guidelines contained in Section 9.5.3 of the Standard Review Plan, which are based on industry standards (i.e., Illuminating Engineering Society Handbook). Where a licensee has provided emergency lighting per Section III.J Appendix R, we would expect that the licensee verify by field testing that this lighting is adequate to perform the intended tasks.

"ADEQUATE" = ILLUMINATION LEVEL (IESNA Hdbk)
DURATION OF ILLUMINATION (III.J)

N-8



U.S. NUCLEAR REGULATORY COMMISSION
STANDARD REVIEW PLAN
OFFICE OF NUCLEAR REACTOR REGULATION

9.5.3 LIGHTING SYSTEMS

REVIEW RESPONSIBILITIES

Primary - Power Systems Branch (PSB)

Secondary - None

I. AREAS OF REVIEW

The PSB reviews the normal and emergency or supplementary plant lighting systems. The systems are reviewed with respect to the following considerations: (1) the capability of the normal lighting system(s) to provide adequate lighting during all plant operating conditions and (2) the capability of the emergency lighting system to provide adequate lighting during all plant operating conditions, including fire, transients and accident conditions, and the effect of the loss-of-offsite power on the emergency lighting system.

The review for lighting requirements for fire protection is coordinated and performed by the Chemical Engineering Branch as part of its primary review responsibility for SRP Section 9.5.1. The acceptance criteria and review procedures for the fire protection review are contained in the referenced SRP section.

II. ACCEPTANCE CRITERIA

Acceptability of the design of the normal and emergency lighting systems, as described in the applicant's safety analysis report (SAR), is based in part on the degree of similarity of the systems design with those 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 lighting system. The PSB will use the following criteria to assess the systems design capability: (1) the normal lighting system(s) is acceptable if the integrated design of the system(s) will provide adequate station lighting in all areas, from offsite power sources, required for normal plant operation, control and maintenance of equipment and plant access routes; (2) the emergency lighting system(s) is acceptable if the integrated design of the system(s) will provide adequate emergency station lighting in all areas, from onsite power sources, required

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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 fire fighting, control and maintenance of safety-related equipment, and the access routes to and from these areas; and (3) the lighting systems designs will be acceptable if they conform to the Illuminating Engineering Society (IES) Lighting Handbook as related to systems design and illumination levels recommended for industrial facilities.

III. REVIEW PROCEDURES

The information provided in the SAR pertaining to the designs of the normal and emergency lighting systems is evaluated to determine that the lighting in normal plant areas and in vital areas and essential passageways to and from these areas is adequate. Engineering judgment, in conjunction with a comparison to equipment and lighting systems provided on previously approved plants, is used as a basis for determining acceptability.

IV. EVALUATION FINDINGS

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

The normal and emergency lighting systems include all components necessary to provide adequate lighting during normal and emergency plant operating conditions. The scope of review of the lighting systems provided for the _____ plant included assessment of the systems designs, adequacy of the normal and emergency power sources, and verification of adequate lighting during fire, transient, and accident conditions.

The basis for acceptance of the normal and emergency lighting systems was conformance of the design, design criteria, and design bases to staff positions and industry standards and the ability of the emergency lighting system to provide adequate station lighting in all vital areas from onsite power sources during the full spectrum of accident and/or transient conditions and to the access routes to and from these areas.

The staff concludes that the design of the lighting system conforms to the applicable staff positions and industry standards and is therefore acceptable.

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.

VI. REFERENCES

1. Illuminating Engineering Society Lighting Handbook.



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Library Holdings

Title	Lighting handbook : reference & application /
Edition	8th ed.
Publisher	New York, N.Y. : Illuminating Engineering Society of North America, c1993, 1995.
Description	xi, 989 p. : ill. ; 29 cm. + 1 computer disk (3 1/2 in.)
ISBN	0879951028
Subjects	Electric lighting--Handbooks, manuals, etc.
Other Authors	Rea, Mark Stanley, 1950- Illuminating Engineering Society of North America.
Variant Title	IES lighting handbook.

Library Holdings

Location	Call Number	Status
NRC MAIN REFERENCE	REF TK4161 .I45 1993 c. 1	In Library.

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J. *Emergency lighting.* Emergency lighting units with at least an 8-hour battery power supply shall be provided in all areas needed for operation of safe shutdown equipment and in access and egress routes thereto.