

NORTHEAST UTILITIES



THE CONNECTICUT LIGHT AND POWER COMPANY
WESTERN MASSACHUSETTS ELECTRIC COMPANY
HOLYOKE WATER POWER COMPANY
NORTHEAST UTILITIES SERVICE COMPANY
NORTHEAST NUCLEAR ENERGY COMPANY

General Offices • Selden Street, Berlin, Connecticut

P.O. BOX 270
HARTFORD, CONNECTICUT 06141-0270
(203) 665-5000

July 18, 1985

Docket No. 50-423
B11614

Director of Nuclear Reactor Regulation
Mr. B. J. Youngblood, Chief
Licensing Branch No. 1
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Reference: (1) B. J. Youngblood to W. G. Council, Issuance of Safety Evaluation Report, Millstone Nuclear Power Station, Unit No. 3 (NUREG-1031), dated August 2, 1984.

Gentlemen:

Millstone Nuclear Power Station, Unit No. 3
Functional Capability of Emergency Lighting
(SER Open Item No. 15)

In Reference (1) Section 9.5.3.3, the NRC Staff identified the DC emergency lighting system for Millstone Unit No. 3 as inadequate and therefore unacceptable. On March 12, 1985 Northeast Nuclear Energy Company (NNECO) met with the NRC Staff to present our position and discuss the status of this issue. At this meeting NNECO and the NRC agreed that the following information should be provided by NNECO in order to close this SER item:

- 1) Increase the illumination level at manned work stations to 10 foot-candles (FC) as requested by the NRC Staff.
- 2) Detail compliance with the Illuminating Engineers Society (IES) Handbook and define the measurement methodology.
- 3) Define "high" hazard and "slight" hazard used for the design of the lighting systems.

The purpose of this submittal is to provide the above information and to further define and revise NNECO's position regarding illumination levels at Millstone Unit No. 3.

The Standard Review Plan (SRP) recognizes that there are no regulations or Regulatory Guides which directly apply to the performance requirements for lighting systems. However, SRP criteria referencing the IES Handbook were used in the Millstone Unit No. 3 lighting design.

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The Millstone Unit No. 3 emergency lighting system design is based on the guidance provided by SRP 9.5.3 and the IES Handbook and provides sufficient illumination for safe shutdown control areas and safe personnel access to those areas. The Millstone Unit No. 3 lighting system design is based upon sound lighting design principles applied by experienced lighting designers.

The IES Handbook is routinely used as a guide for design, not only for nuclear power plants, but for all manner of public, commercial and industrial lighting systems. It should be pointed out that the IES Handbook and Transactions on Nuclear Power Plant Lighting serve only as a guide and give considerable design latitude with regard to illumination levels. The effectiveness of lighting system designs is determined by the ability of persons to function in the environment created, not whether the illumination level matches some rigidly specified value. An effective design does not require that all locations within an area, or all surfaces of a hazard be illuminated to the levels recommended by the handbook. Therefore, it is not valid to use design illumination values as an absolute measure of satisfactory design. The IES Handbook, in fact, states that deviations are expected and these levels are not to be interpreted as requirements for regulatory minimum illuminance levels.

Areas Requiring DC Emergency Lighting

Emergency DC lighting is qualified by the IES as the most reliable source of lighting when both normal and essential AC lighting are lost. It is reserved for areas where a ready reliable source of illumination is considered to be critical in order to operate electrical components and systems that are essential to emergency reactor operation or shutdown.

The following criteria have been developed by the IES for determination of which areas require the reliability of DC lighting.

- (a) Areas where operators should have sufficient illumination while maintaining safe plant operations and where the loss of normal and essential lighting could hamper their ability to function quickly and safely.
- (b) Areas where operators must have sufficient illumination while maintaining the plant in a safe hot shutdown condition following a control room evacuation.
- (c) Normal routes of travel to accomplish the above functions.

Areas at Millstone Unit No. 3 where the reliability of DC lighting may be needed for operators to perform plant operations and shutdown operations during an emergency condition are: the control room (CB-9), diesel generator buildings (EG-3 and EG-4), switchgear rooms (CB-1 and CB-2), and normal routes of travel to these areas.

Hazard Analysis

In the IES transaction "Nuclear Power Plant Lighting" (Table II), referenced in Section 9 of the IES Handbook, high hazards are considered to be "at rotating machinery, at power distribution equipment, at harsh chemical areas, at hot steam piping, at radioactive areas, and at fuel pools." NNECO interprets that it was not the intent of the IES to include enclosed or protected equipment as high hazards. NNECO considers high hazards to be rotating machinery with exposed rotating components, exposed power distribution equipment, harsh chemical areas, uninsulated hot steam pipes, or hazards that pose a threat of serious injury or loss of limb. These hazards will be illuminated to 2 FC at the hazard. Also, stationary protrusions into the access/egress pathways to safe shutdown control areas, such as cable trays and pipes, which are within the space envelope of the normal person, as defined by the Human Factors Branch of Northeast Utilities, will also be treated as a hazard and illuminated to 2 FC.

The IES transaction (paragraphs 3.2.1 and 3.3) discusses general plant pedestrian areas such as stairs, walkways and passages. When other defined obstructions such as intersections; doors; stairs; abrupt changes in direction of path; changes in elevation; or other conditions of a similar nature, are present in the pathways used for access to safe shutdown areas, NNECO interprets these areas to be slight hazard, general plant pedestrian areas in accordance with IES Transaction Table II definition and paragraphs 3.2.1 and 3.3. The illumination level for these slight hazard areas will be .5 FC minimum at the center point of the hazard. NNECO considers clean, straight passages and hallways as being nonhazard areas.

It should be noted, that at Millstone Unit No. 3 while doing tests of the emergency lighting system on the control building stairwells which are presently lighted to .5 FC average maintained without hazard illumination being considered, construction workers safely traversed these stairwells for several hours carrying material, passing a high concentration of personnel and utilizing the security key system. During the test there were no incidents of any type of accidents or complaints by the construction workers. This clearly demonstrates the effectiveness of the present system to allow individuals to function in the environment created.

During an emergency situation, battery powered portable lighting units are used by operations and fire brigade personnel. A reasonable amount of credit should be given for the versatility and effectiveness of portable lighting. A random test of a portable unit taken from Millstone Unit No. 2 demonstrated that our portable lighting units lumin output over an eight hour period far exceeds a fixed DC emergency lighting unit. Besides being a more efficient luminaire, the portable DC unit offers versatility in respect to aiming which is needed for the case of illuminating unexpected hazards and for close inspection of objects, such as valve ID tags. It is NNECO's position that portable lighting can provide an equivalent or better level of lighting with more flexibility for individuals use than a fixed lighting system could. The IES transactions clearly recognize the credibility and acceptability of the use of portable lighting to supplement fixed DC units.

Emergency Illumination of Other Plant Areas by DC Lighting

Other access/egress pathways and task areas identified via the Fire Protection Evaluation will be illuminated by silhouette lighting. The adequacy of this lighting will be verified by field walkdown to be sufficient to allow the operators to access the task areas and perform the intended tasks. This approach is consistent with NRC guidance contained in Generic Letter 85-01, Section 4.1.

Summary of Illumination Levels for Emergency DC Lighting for Millstone Unit No. 3

- o Manned work stations listed below will be illuminated to 10 FC maintained average at the panel surface.

Main Control Board, CB-9
Auxiliary Shutdown Panel, CB-1
Transfer Switch Panel, CB-1 and CB-2
Fire Transfer Switch Panel, CB-2
Generator Circuit Breakers, CB-1 and CB-2
Emergency Generator Panels, EG-3 and EG-4

- o Access/egress routes between manned work stations will be illuminated to .5 FC average maintained.
- o Slight hazards (as defined on page 3 of this letter) will be illuminated to .5 FC minimum at the center point of the hazard.
- o High hazards (as defined on page 3 of this letter) will be illuminated to 2 FC at the center point of the hazard.

The Millstone Unit No. 3 lighting system design is based upon sound lighting design principles applied by experienced lighting designers. The design not only reflects the knowledge and skill of the designers, but incorporates the guidance and the expertise provided in the IES Handbook.

NNECO concludes that the emergency lighting system for Millstone Unit 3 includes all components necessary to provide adequate lighting during emergency plant operating conditions. Our basis for acceptance of the emergency lighting system is conformance of the design, design criteria, and design bases to industry standards and the ability of the emergency lighting system to provide adequate station lighting in all vital areas from on-site power sources during the full spectrum of accident and/or transient conditions and to the access routes to and from these areas. NNECO's position is that the design of the lighting system conforms to the applicable staff positions and industry standards and is therefore acceptable.

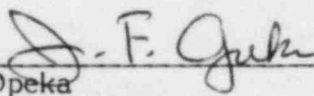
NNECO requests a meeting with the appropriate representatives of the Power Systems Branch, Human Factors Branch and Licensing Branch of the NRC during the week of July 29, 1985 to discuss and resolve this issue. If you have any

questions regarding the information contained herein, please contact our licensing representative directly.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY,
et. al.

BY NORTHEAST NUCLEAR ENERGY COMPANY
Their Agent

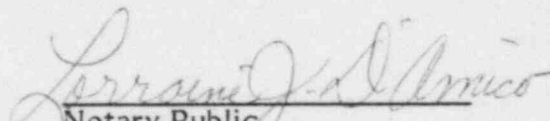


J. F. Opeka
Senior Vice President

cc: Ms. E. L. Doolittle, NRC Project Manager
Mr. R. J. Eckenrode, Human Factors Engineering Branch
Mr. Robert J. Giardina, Power Systems Branch
Mr. Dom Tondi, Human Factors Engineering Branch
Mr. A. R. Ungaro, Power Systems Branch

STATE OF CONNECTICUT)
) ss. Berlin
COUNTY OF HARTFORD)

Then personally appeared before me J. F. Opeka, who being duly sworn, did state that he is Senior Vice President of Northeast Nuclear Energy Company, an Applicant herein, that he is authorized to execute and file the foregoing information in the name and on behalf of the Applicants herein and that the statements contained in said information are true and correct to the best of his knowledge and belief.



Notary Public

My Commission Expires March 31, 1988