CRITERION 503

EMERGENCY LIGHTING SYSTEMS

SIGNATURES

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RECORD OF REVISIONS

Revision No.	Date	Description
0	8/27/98	Initial Issue. Reformatted to support LIR 230-05-01 (replaces 3.9-502, Rev. 0).
1	10/26/01	This revision includes the addition of a Table of Contents, the use of Basis statements in Sections 6 and 7; further clarification based on the new criterion 101 Writer's Guide as well as the incorporation of ORPS & NRC lessons learned 1/1/95 to 6/2000.

TABLE OF CONTENTS

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1.0 PURPOSE

The primary purpose of this unit emergency lighting equipment maintenance document is to reduce hazards to life and property that can result from failure or malfunction of emergency lighting systems in LANL facilities.

This document addresses the requirements of LIR 230-05-01(Ref 10.1), "Operations and Maintenance Manual."

Implementation of these requirements and recommendations satisfies DOE Order 430.1A (Ref. 10.2), "Life Cycle Asset Management," Attachment 2 "Contractor Requirements Document," Paragraph 2, sections A through C, which in part require UC to "…maintain physical assets in a condition suitable for their intended purpose" and employ "preventive, predictive, and corrective maintenance to ensure physical asset availability for planned use and/or proper disposition." Compliance with DOE Order 430.1A is required by Appendix G of the UC Contract.

2.0 SCOPE

The scope of this Criterion includes the routine inspection, testing and preventive and predictive maintenance of emergency lighting systems. This document establishes minimum requirements for the operation, maintenance, and repair of unit emergency lighting systems in accordance with ANSI/NFPA 70, National Electrical Code, and NFPA 101 Life Safety Code. (Ref. 10.6, 10.7) **Note**: Battery maintenance for central station emergency lighting system is covered in Criterion 511. (Ref. 10.11) This Criterion does not address corrective maintenance actions required to repair or replace equipment.

3.0 ACRONYMS AND DEFINITIONS

3.1 Acronyms

CFR	Code of Federal Regulations
DOE	Department of Energy
LIG	Laboratory Implementing Guidance
LIR	Laboratory Implementing Requirement
LPR	Laboratory Performance Requirement

NFPA	National Fire Protection Association
O&M	Operations and Maintenance
PPE	Personal Protective Equipment
PP&PE	Personal Property and Programmatic Equipment
RP&IE	Real Property and Installed Equipment
SSC	Structures, Systems, and Components
UC	University of California

3.2 Definitions

Cleaning. Removing accumulated dirt and other contaminants from lamps, reflectors and lenses.

Emergency Lighting. Illumination of means of egress (corridors, stairways, etc.) or other areas in a building that require illumination during any loss of normal electrical power.

Functional Testing. Checking that unit emergency lighting fixture batteries, charger, and lamps operate properly.

Inspecting. Checking unit emergency lighting fixtures to verify that it is physically intact, securely mounted, directional lamps are properly aimed, lighting distribution is not blocked.

Unit Emergency Lighting Equipment. Unit emergency lighting equipment consists of: (1) a rechargeable battery, (2) a battery charging means, (3) one or more lamps mounted on the unit or terminals for one or more remote lamps, (4) a relaying device arranged to energize the lamps automatically upon failure of the supply to the unit equipment. The most common examples of unit emergency lighting equipment are (a) wall-mounted, two-lamp incandescent units and (b) battery/inverter/ballast units in ceiling mounted fluorescent fixtures, and (c) internally illuminated exit signs. (NFPA 70 Section 700-12e). (Ref. 10.6)

4.0 RESPONSIBILITIES

4.1 FWO-Systems, Engineering and Maintenance (SEM)

4.1.1 FWO-SEM is responsible for the technical content of this Criterion and assessing the proper implementation across the Laboratory.

4.1.2 FWO-SEM shall provide technical assistance to support implementation of this Criterion.

4.2 Facility Manager

4.2.1 Responsible for operations and maintenance of institutional, or Real Property and Installed Equipment (RP&IE) under their jurisdiction, in accordance with the requirements of this document.

4.2.2 Responsible for operations and maintenance of those Personal Property and Programmatic Equipment (PP&PE) systems and equipment addressed by this document that may be assigned to the FM in accordance with the FMU-specific Facility/Tenant Agreement.

4.3 Group Leader

4.3.1 Responsible for operations and maintenance of those Personal Property and Programmatic Equipment (PP&PE) systems and equipment addressed by this document, which are under their jurisdiction.

4.3.2 Responsible for system performance analysis and subsequent replacement or refurbishment of assigned PP&PE based on sound Life Cycle Analysis techniques and system-specific performance requirements.

5.0 PRECAUTIONS AND LIMITATIONS

5.1 Precautions

This section is not intended to identify all applicable precautions necessary for implementation of this Criterion. A compilation of all applicable precautions shall be contained in the implementing procedure(s) or work control authorization documents. The following precautions are intended only to assist the author of a procedure or work control document in the identification of hazards/precautions that may not be immediately obvious.

5.1.1 Dispose of unit emergency lighting fixture batteries in accordance with the requirements of LIR 404-00-03. (Ref. 10.8)

5.1.2 Work should be performed within the requirements of LIR 402-600-01, Electrical Safety. (Ref. 10.12)

5.2 Limitations

The intent of this Criterion is to identify the minimum generic requirements and recommendations for SSC operation and maintenance across the Laboratory. Each user is responsible for the identification and implementation of additional facility specific requirements and recommendations based on their authorization basis and unique equipment and conditions, (e.g., equipment history, manufacturer warranties, operating environment, vendor O&M requirements and guidance, etc.). Nuclear facilities and moderate to high hazard non-nuclear facilities will typically have additional facility-specific requirements beyond those presented in this Criterion. Nuclear facilities shall implement the requirements of DOE Order 4330.4B (Ref. 10.3) (or 10 CFR 830.340, Maintenance Management, when issued) as the minimum programmatic requirements for a maintenance program. Additional requirements and recommendations for SSC operation and maintenance may be necessary to fully comply with the current DOE Order or CFR identified above.

6.0 REQUIREMENTS

Minimum requirements that Criterion users shall follow are specified in this section. Requested variances to these requirements shall be prepared and submitted to FWO-SEM in accordance with LIR 301-00-02 (Ref. 10.4), "Variances and Exceptions to Laboratory Operations Requirements," for review and approval. The Criterion users are responsible for analysis of operational performance and SSC replacement or refurbishment based on this analysis. Laws, codes, contractual requirements, engineering judgment, safety matters, and operations and maintenance experience drive the requirements contained in this section.

6.1 Operations Requirements

6.1.1 A functional test shall be conducted on every required battery-powered emergency lighting system at 30-day intervals for a minimum of 30 seconds. An annual test shall be conducted for 1-1/2 hour duration. Equipment shall be fully operational for the duration of the test. Written records of visual inspections and tests shall be kept by the owner for inspection by the authority having jurisdiction.

Exception: Self-testing/self-diagnostic, battery-operated emergency lighting equipment that automatically performs a minimum 30 second test and diagnostic routine at least once every 30 days and indicates failures by a status indicator shall be exempt from the 30 day functional test, provided a visual inspection is performed at 30 day intervals.

Basis: ANSI/NFPA 101 Section 7. 9. 3. (Ref. 10.7)

6.1.1.1 Battery powered exit signs require testing as prescribed by 6.1.1 Self illuminated exit signs need only to be visually inspected every 30 days.

Basis: ANSI/NFPA 101 Section 7.10.9.

6.2 Maintenance Requirements

No requirements beyond those stated in Section 5.2, Limitations.

7.0 RECOMMENDATIONS AND GOOD PRACTICES

The information provided in this section is recommended based on acceptable industry practices and should be implemented by each user based on his/her unique application and operating history of the subject systems/equipment.

7.1 Operations Recommendations

O&M requirements are specified in NFPA 101, Life Safety Code. (Ref. 10.7)

7.2 Maintenance Recommendations

7.2.1 Annually

7.2.1.1 Verify aim of lamps along the means of egress.

Basis: IESNA recommendation (Chapter 29 of Handbook). (Ref. 10.10)

7.2.1.2 Clean fixtures annually. (See Criterion 501) (Ref. 10.13)

8.0 GUIDANCE

8.1 Operations Guidance

N/A. Emergency lighting systems covered by this criterion operate automatically during loss of normal power events.

8.2 Maintenance Guidance

8.2.1 Provided it has been reviewed and approved by FWO-SEM, information on maintaining emergency lighting systems may be found in the JCNNM Maintenance Operating Instruction; MOI 41-10-002 (Emergency Light Inspection and Repair). (Ref. 10.9)

9.0 REQUIRED DOCUMENTATION

Maintenance history shall be maintained for (electric motors) to include, as a minimum, the parameters listed in the Table 9-1 below:

Table 9-1 Documentation Parameters

MAINTENANCE HISTORY DOCUMENTATION PARAMETERS				
PARAMETER	**ML 1**	**ML 2**	**ML 3**	**ML 4**
Maintenance Activities				
Repair / Adjustments	**X**	**X**	**X**	**X**
PM Activities	**X**	**X**	**X**	
Equipment Problems				
Failure Dates	**X**	**X**		
Failure Root Cause	**X**	**X**		
Inspection Results				
Inspection Date	**X**	**X**	**X**	
SSC Condition	**X**	**X**	**X**	
Inspection Logs	**X**	**X**		

Basis: Documentation of the parameters listed in Table 9-1 above satisfies the requirements of LPR 230-07-00, Criteria 2, (Ref. 10.5) which states; "Maintenance activities, equipment problems, and inspection and test results are documented."

Note: Retain written records of monthly inspections of each unit emergency lighting fixture for one year.

Retain written records of annual inspections of each unit emergency lighting fixture as long as the fixture is installed.

10.0 REFERENCES

10.1 LIR 230-05-01.0, Operation and Maintenance Manual.

10.2 DOE O 430.1A, Attachment 2 "Contractor Requirements Document" (Paragraph 2, Sections A through C), a requirement of Appendix G of the UC Contract.

10.3 DOE Order 4330.4B, Maintenance Management Program, Section 3.4.9.

10.4 LIR 301-00-02.0, Variances and Exceptions to Laboratory Operation Requirements.

10.5 LPR 230-07-00.0, Maintenance History, Performance Criteria [2].

10.6 ANSI/NFPA 70, National Electric Code

10.7 ANSI/NFPA 101, Life Safety Code

10.8 LIR 404-00-03.1, Hazardous and Mixed Waste Requirements for Generators.

10.9 MOI 41-10-002, Emergency Light Inspection and Repair.

10.10 IESNA, Lighting Handbook, Chapter 29.

10.11 O&M Criterion 511 Rev. 0, Batteries.

10.12 LIR 402-600-01.1, Electric Safety.

10.13 O&M Criterion 501 Rev. 0, Interior Lighting Systems.

11.0 APPENDICES

None.