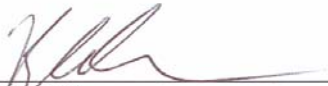
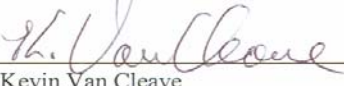
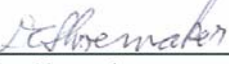
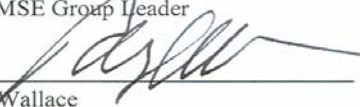


**CRITERION 602**

**ELEVATORS, DUMBWAITERS, AND LIFTS**

**SIGNATURES**

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**RECORD OF REVISIONS**

<b>Revision No.</b>	<b>Date</b>	<b>Description</b>
0	12/17/98	Initial Issue
1	1/13/2006	<p>This revision includes:</p> <ul style="list-style-type: none"><li>• The addition of a table of contents</li><li>• Update references to DOE O 430.1B</li><li>• Update references to DOE O 433.1</li><li>• Updated elevator code references throughout document</li><li>• Updated definitions to be consistent with ASME A17.1 and ASME A18.1</li><li>• Updated references to FMD and FM-MSE</li><li>• Included information on specific periodic testing and inspection intervals as Attachment A</li><li>• Expanded references of ASME A17.1 and A18.1 to show some specific requirements</li><li>• Clarified applicability of current version of Code over previous versions</li><li>• Clarified roles of the AHJ</li><li>• Removed elevator listings from the document and left as separate reference available through the AHJ</li><li>• Added section on maintenance records requirements from A17.1</li><li>• Added section on operations requirements for trapped personnel in an elevator.</li></ul>

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**CRITERION 602****ELEVATORS, DUMBWAITERS, AND LIFTS****1.0 PURPOSE**

The purpose of this Criterion is to establish the minimum requirements and best practices for operation and maintenance of elevators, dumbwaiters, and lifts at LANL.

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

Implementation of this Criterion satisfies DOE Order 430.1B (Ref 10.2) for the subject equipment / system. DOE Order 430.1B "Real Property Asset Management," Attachment 2 "Contractor Requirements Document," Paragraph 5, which in part requires UC to "...maintain real property assets in a manner that promotes operational safety, worker health, environmental compliance, property preservation and cost-effectiveness while meeting the program missions." Compliance with DOE Order 430.1B 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 elevators, dumbwaiters, and lifts. This Criterion does not address actions required for alteration, repair or replacement of equipment.

**3.0 ACRONYMS AND DEFINITIONS****3.1 Acronyms**

<b>AHJ</b>	Authority Having Jurisdiction
<b>ASME</b>	American Society of Mechanical Engineers
<b>CFR</b>	Code of Federal Regulations
<b>DOE</b>	Department of Energy
<b>LIG</b>	Laboratory Implementing Guidance
<b>LIR</b>	Laboratory Implementing Requirement
<b>LPR</b>	Laboratory Performance Requirement
<b>O&amp;M</b>	Operations and Maintenance
<b>PPE</b>	Personal Protective Equipment

<b>PP&amp;PE</b>	Personal Property and Programmatic Equipment
<b>RP&amp;IE</b>	Real Property and Installed Equipment
<b>SSC</b>	Structures, Systems, and Components
<b>UC</b>	University of California

## 3.2 Definitions

**ASME Code.** The American Society of Mechanical Engineers Safety Code for Elevators and Escalators establishes Recommended Rules for the Care and Operation and also the Rules of Safety governing the Design, Fabrication and Inspection of Elevators, Dumbwaiters and Lifts. (References 10.5, 10.6 and 10.7)

**Capacity.** The load that the equipment is designed and installed to lift at rated speed (also known as rated load).

**Corrective Maintenance.** The repair of defective, failed, or malfunctioning units, or equipment to restore their intended function, or design condition. This form of maintenance does not result in a significant extension of a unit's expected useful life.

**Dumbwaiter.** A hoisting and lowering mechanism with a car of limited size which moves in guide rails and serves two or more landings that is used exclusively for carrying materials.

**Elevator.** A hoisting and lowering mechanism, equipped with a car, that moves within guides and serves two or more landings and is classified for freight or personnel per ASME A17.1 (Ref. 10.5).

**Formally Removed From Active Service.** Unused units de-energized, modified as required by code for installation (Ref. 10.5), locked and tagged out of service with permanent "Out of Service" signs installed at each access point, and removed from the active list.

**Frequent Use.** The continuous, daily, or weekly use of a unit within its design parameters.

**Material Lift.** A hoisting and lowering mechanism normally classified as an elevator, equipped with a car which moves within a guide system installed at an angle of greater than 70 deg from the horizontal, serving two or more landings for the purpose of transporting materials which are manually or automatically loaded or unloaded.

**Platform Lift.** A hoisting and lowering mechanism intended for the transportation of a mobility impaired person only. The device shall have a limited vertical travel, operating speed, and platform area. Operation shall be under continuous control of the user/attendant. The device shall not penetrate more than one floor. A full passenger enclosure on the platform shall be prohibited.

**Preventive Maintenance.** All systematically planned and scheduled actions performed for the purpose of preventing failure.

**Sensitive Material.** Items whose consequences of damage or destruction could lead to severe ramifications far beyond the damage, or loss of the specific item itself.

**Unit.** In the context of this criterion, a unit refers to an elevator, dumbwaiter, or lift.

## **4.0 RESPONSIBILITIES**

### **4.1 FM-Maintenance Support & Engineering (MSE)**

**4.1.1** FM-MSE is responsible for the technical content of this Criterion and monitoring the applicability and the implementation status of this Criteria and either assisting the organizations that are not applying or meeting the implementation expectations contained herein or elevating their concerns to the director(s).

**4.1.2** FM-MSE shall provide technical assistance to support implementation of this Criterion.

### **4.2 Maintenance Manager**

**4.2.1** Responsible for 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 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 Responsible Division Leader (RDL)**

**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 the operation of all Real Property and Installed Equipment (RP&IE) under their jurisdiction, in accordance with the requirements of this document.

**4.3.3** Responsible for system performance analysis and subsequent replacement or refurbishment of assigned PP&PE.

### **4.4 Authority Having Jurisdiction (AHJ)**

**4.4.1** The AHJ for Elevators, Dumbwaiters and Lifts is the Point of Contact (POC) for Mechanical Chapter of the LANL Engineering Manual

- 4.4.2** The AHJ is responsible for providing a decision on a specific technical question regarding national, state and local codes and DOE orders.
- 4.4.3** The AHJ is responsible for reviewing and concurring with the requirements of this criterion where required by ASME A17.1 (Ref. 10.5).
- 4.4.4** The AHJ shall maintain a list of the code in force for each elevator, dumbwaiter and lift.

## **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.

### **5.2 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 433.1 (Ref. 10.3) 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.

The regulations that govern inspection, repairs, and maintenance may be different depending on when a unit was installed. This criterion, therefore, cannot cite each requirement. The owner, or owner's designee, must become familiar with the provisions of the referenced regulations that apply to each specific unit under his/her jurisdiction. FM-MSE can provide assistance with this effort

## 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 FM-MSE 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 judgement, safety matters, and operations and maintenance experience drive the requirements contained in this section.

### 6.1 Operations Requirements

**6.1.1** Operation, inspection, testing, maintenance, and repair of elevators, dumbwaiters and material lifts shall conform to the requirements of the current revision of ASME A17.1 (Ref. 10.5) for the following sections:

- Section 5.10 - Elevators Used for Construction
- Section 8.1 – Security
- Section 8.6 – Maintenance, Repair, and Replacement
- Section 8.7 – Alterations
- Section 8.9 – Code Data Plate
- Section 8.10 – Acceptance Inspections and Tests
- Section 8.11 – Periodic Inspections and Tests

For other sections, use the applicable section of the Code at the time of installation or the Code effective as applicable to and for each alteration. For all alterations, the applicable section of the Code effective at the date of each alteration. The AHJ shall maintain a list of the applicable codes in force for each elevator and dumbwaiter.

**6.1.2** Operation, inspection, testing, maintenance, alteration and repair of platform lifts shall conform to the requirements of the current revision of ASME A18.1 (Ref. 10.8).

**6.1.3** In the event passengers become trapped in an elevator, to assure the safety of the passengers and the personnel performing the evacuation, only trained and qualified personnel shall perform the evacuation following the guidance in ASME A17.4 (Ref. 10.7). In elevators with phones a sign instructing passengers to call the Emergency Operations Center (EOC) at 7-6211 shall be provided, in equipment with a call button, the call button shall be programmed to call the EOC. The EOC will contact the trained elevator personnel (during normal working hours) or Los Alamos Fire Department (during non-working hours or when an injury is involved). Upon completion of the evacuation, the elevator must be taken out of service, until a qualified technician examines the equipment, makes repairs as necessary, and deems it safe to return to service.



**6.1.4** Control of access to keys and equipment is required to be restricted per section 8.1 of the current code (Ref. 10.5). This includes maintaining custody of keys for access to groups as follows:

Group 1 Restricted to Elevator Personnel Only (trained in proper elevator maintenance and operations procedures)

Group 2 Authorized Personnel Only

Group 3 Emergency Operations personnel only

**6.1.5** A Code Data Plate is required for elevators, dumbwaiters and material lifts (but not platform lifts) listing the Code to be used for inspections and tests per section 8.9 of the current code (Ref. 10.5). This plate shall be in plain view, securely attached to the main line disconnect or on the controller. The plate shall be of material and construction that letters and figures stamped, etched, cast or otherwise applied to the face shall remain permanently and readily legible.

## **6.2 Maintenance Requirements**

### **6.2.1 Inspections**

Inspections are required at intervals at least as frequent as those defined in Appendix A – Periodic Inspection and Testing Intervals. Inspections are also required for initial acceptance following unit installation or alteration.

These inspections are performed by a person authorized by the AHJ and with the certification as an inspector per the current revision of ASME QEI-1 (Ref. 10.9). The inspections will be performed in accordance with the requirements of the applicable revision of the Codes ASME A17.1 and A18.1 (Ref. 10.5 and 10.7) and the guidance of the current revision of ASME A17.2 (Ref. 10.6).

### **6.2.2 Periodic Tests**

Periodic testing is required at intervals at least as frequent as those defined in Appendix A – Periodic Inspection and Testing Intervals. This testing is conducted by personnel qualified to perform such service and in the presence of a person authorized by the AHJ and with the certification as an inspector per the current revision of ASME QEI-1 (Ref. 10.9).

### **6.2.3 Preventative Maintenance**

A Preventive Maintenance program that augments the Periodic Inspection and Testing listed in sections 6.2.1 and 6.2.2 shall be in place to ensure cleaning, lubricating and adjusting applicable components at least annually and at more frequent regular intervals based on equipment age, condition, and accumulated wear as well as the design, usage and environmental conditions of the equipment. This Preventive Maintenance program is conducted by personnel qualified to perform such service.

**6.2.4 Firefighters' Emergency Operation**

All elevators provided with firefighters' emergency operation shall be subjected monthly to Phase I recall by use of the key switch, and a minimum of one-floor operation on Phase II as described in section 8.6.10 of the Code (Ref. 10.5). A record of findings shall be available to elevator personnel and the authority having jurisdiction.

**6.2.5 Repairs**

Repairs to units shall be made as soon as practical. Abnormal functioning or equipment defects discovered during operation, inspection, maintenance, or testing shall be reported to the unit's owner or Maintenance Manager as soon as possible. All potentially hazardous conditions disclosed through general observation, or inspection shall be corrected before use of the affected unit can resume.

**6.2.6 Units Not in Service****6.2.6.1 Removal from Active Service**

Unused units may be de-energized, modified as required by code for installation (Ref. 10.5), locked and tagged out of service with permanent "Out of Service" signs installed at each access point, and removed from the active list. Such units, when formally removed from active service as described above, are not required to receive inspections, maintenance, or testing until there is a need to use them.

**6.2.6.2 Reactivation**

Units formally removed from active service are required to receive inspection, maintenance, and possibly testing, as identified below, before they can be used again, or returned to active service.

- Proposed use will be within six months of last certified inspection; exercise the unit before use (operate unit through two top to bottom cycles, open and close access). Correct all deficiencies before using unit.
- Proposed use will be beyond six months of last certified inspection; conduct a certified inspection. Perform maintenance as dictated by inspection findings.

**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**

**7.1.1** Successful facilities have had in place a work order for use in emergencies so that call-outs may be initiated for elevator personnel to assist in the removal of persons from malfunctioning elevators.

**7.2 Maintenance Recommendations**

**7.2.1** The Site Service Subcontractor has available a number of step by step checklists that meet and often exceed the requirements for maintenance and testing from this criteria. These checklists are available as PMI 40-25-003 *Elevator Maintenance, Repair and Testing*.

**8.0 GUIDANCE****8.1 Operations Guidance**

**8.1.1** If an elevator is used infrequently, (less often than every 2 years) consider placing the elevator out of service until needed. However, also realize that planning a return to service must be done well in advance.

**8.1.2** There are some freight elevators designed to take single piece loads up to 120% of capacity at reduced speed. This can only be done with proper planning and inspections. Also there are Code prerequisites for using freight elevators in this mode. Check with the AHJ and/or FM-MSE if this option is to be considered.

**8.2 Maintenance Guidance**

**8.2.1** Maintenance of high traffic elevators with no backup system often requires maintenance to be performed in off hours. This should be factored into any maintenance budgeting to avoid surprises.

**9.0 REQUIRED DOCUMENTATION**

Maintenance history shall be maintained for elevators, dumbwaiters and lifts to include, as a minimum, the parameters listed in the Table 9-1 below:

**Table 9-1 Documentation Parameters**

<b>MAINTENANCE HISTORY DOCUMENTATION PARAMETERS</b>				
<b>PARAMETER</b>	<b>ML 1</b>	<b>ML 2</b>	<b>ML 3</b>	<b>ML 4</b>
<b>Maintenance Activities</b>				
Test of Firefighters' Emergency Operation	X	X	X	X
Repair / Adjustments	X	X	X	X
PM Activities	X	X	X	X
<b>Equipment Problems</b>				
Failure Dates	X	X	X	X
Failure Root Cause	X	X		
<b>Inspection Results</b>				
Inspection Date	X	X	X	X
SSC Condition	X	X	X	X

**9.1 Code Maintenance Documentation Requirements**

**9.1.1** Maintenance records shall document compliance with section 8.6 of ASME A17.1 (Ref. 10.5) and shall include records on the following:

- description and dates of maintenance tasks performed
- description and dates of examinations, tests, adjustments, repairs and replacements
- description and dates of call backs (trouble calls) or reports to elevator personnel by any means, including corrective action taken
- written records of the findings on the monthly check of firefighter's emergency recall operation.

**9.1.2** The maintenance records shall be available to the elevator personnel for the unit in question.

**9.1.3** Up-to-date wiring diagrams detailing circuits of all electrical protective devices and critical operating circuits shall be made available in the units' equipment or machinery room per section 8.6.1.6.3 of code (Ref. 10.5).

**10.0 REFERENCES**

The following references, and associated revisions, were used in the development of this document.

**10.1** LIR 230-05-01, Operation and Maintenance Manual.

- 10.2** DOE O 430.1B, Real Property Asset Management.
- 10.3** DOE O 433.1, Maintenance Management Program for DOE Nuclear Facilities.
- 10.4** LIR 301-00-02.0, Variances and Exceptions to Laboratory Operation Requirements.
- 10.5** ASME A17.1, Safety Code for Elevators and Escalators.
- 10.6** ASME A17.2, Guide for Inspection of Elevators, Escalators and Moving Walks.
- 10.7** ASME A17.4, Guide for Emergency Personnel.
- 10.8** ASME A18.1, Safety Standard for Platform Lifts and Stairway Chairlifts.
- 10.9** ASME QEI-1, Standard for the Qualification of Elevator Inspectors.

**11.0 APPENDICES**

Appendix A: Periodic Inspection and Testing Intervals

**Appendix A:  
Periodic Inspection and Testing Intervals (months)**

Equipment Type		Periodic Inspections		Category 1 Periodic Test		Category 3 Periodic Test		Category 5 Periodic Test	
Ref A17.1	Description	Reference <sup>1</sup>	Interval	Reference <sup>1</sup>	Interval	Reference <sup>1</sup>	Interval	Reference <sup>1</sup>	Interval
8.11.2	Electric Elevator	8.11.2.1	6	8.11.2.2	12	None	N/A	8.11.2.3	60
8.11.3	Hydraulic Elevator	8.11.3.1	6	8.11.3.2	12	8.11.3.3	36	8.11.3.4	60
8.11.5.4	Electric Dumbwaiters	8.11.2.1	12	8.11.2.2	12	None	N/A	8.11.2.3	60
8.11.5.4	Hydraulic Dumbwaiters	8.11.3.1	12	8.11.3.2	12	8.11.3.3	36	8.11.3.4	60
8.11.5.5	Electric Material Lifts and Dumbwaiters with Automatic Transfer Devices	8.11.2.1	12	8.11.2.2	12	None	N/A	8.11.2.3	60
8.11.5.5	Hydraulic Material Lifts and Dumbwaiters with Automatic Transfer Devices	8.11.3.1	12	8.11.3.2	12	8.11.3.3	36	8.11.3.4	60
Ref A18.1	Description	Reference <sup>2</sup>	Interval	Reference <sup>2</sup>	Interval	Reference <sup>2</sup>	Interval	Reference <sup>2</sup>	Interval
Sect. 2, 3 or 4	Vertical or Inclined Platform Lift, Inclined Stairway Chairlift	10.2.2	6	10.3.1	12	10.3.2	36	10.3.3	60

<sup>1</sup> References in Elevator Table are to Section Numbers in the current version of ASME A17.1 Safety Code for Elevators and Escalators (Ref

<sup>2</sup> References in Platform Lift Table are to Section Numbers in the current version of ASME A18.1 Safety Standard for Platform Lifts and Stairway Chairlifts