Grading Standards

prepared by the
Configuration Management Office

January 28, 1994

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

Los Alamos

NATIONAL LABORATORY

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

MASTER

JR

**This document was produced by
the Los Alamos Configuration Management Office.**

Authors:

Gary Cort
Steve Donahue
Joe Frank
Brad Perkins
Jon Wrye

Editing:

Geana Garrett

Design Credit:

Gloria Sharp

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

Configuration Management Office	Grading Standards	FOS-5.2.1-001.001 Page 1 of 5
---------------------------------------	--------------------------	--------------------------------------

1.0 PURPOSE

This document describes the grading methodology used by the organization to determine the required levels of configuration management for all controlled elements that are part of the facility and its operation.

2.0 INTRODUCTION

2.1 Philosophy

The most difficult aspect of any system of formal operations regards making determinations of how much formality is appropriate. One can apply the same level of formality to every aspect of the operational environment, but this generally yields unsatisfactory results. At one extreme, comprehensive formal operations applied to everything usually results in operational gridlock. On the other hand, complete lack of formality across the board breeds chaos.

To address this thorny issue, we have based the graded approach on a philosophy of pragmatism that extends existing approaches beyond their current bounds. Where prior approaches have relied upon assignment of static, risk-based grading levels to systems, structures, and components, this new methodology emphasizes the importance of the associated processes (e.g. steady state operation, emergency operation, and change processes.) No longer is the grade determined solely by the attributes of the item, but by a dynamic combination of item characteristics and operational issues.

The result is a flexible grading system that more accurately reflects the overall operational environment. Prior conventional approaches to grading culminate in the assignment of risk, leaving the accountable manager to infer the appropriate level of formal operations in a vacuum. The CMO strategy, however, goes one step further, resulting in an unambiguous specification of the level of formality that should be applied.

2.2 Goals

We have two specific goals for the grading methodology described in the remainder of this document:

- identify which items, processes, and information should be incorporated into facility baselines as controlled elements; and
- specify the level of formality that should be applied to activities that employ or impact these controlled elements.

2.3 Technical Approach

We base the CMO grading methodology on a multidimensional approach that provides a formal mechanism for determining the level of formal operations that should be applied to activities that involve controlled elements. This strategy goes well beyond conventional approaches that merely assign a risk level to a system, structure, component, process, or item of information. It considers operational factors in addition to the usual static, risk-based

Information Copy

grades. Together, the risk-based information and the operational factors combine to determine a more realistic grade on which to base the formal operations requirements for the associated elements and activity.

The grading methodology integrates tightly with the configuration management element of Reference 1. Consequently only those operations that directly or indirectly involve one or more controlled elements are subject to formal operations. This provides a simple yet comprehensive mechanism for specifying the scope of the formal operations effort. Therefore, through the configuration management discipline (specifically the configuration identification effort), grading provides the front-end, formal support that determines the level of intensity with which formal operations will be applied to all other aspects of facility management.

This multidimensional approach specifies the necessary *intensity* of formal operations based upon the determination of two independent quantities: the risk-based *importance* of the associated controlled element and the *impact* of the proposed activity on that element. This approach acknowledges the inseparable nature of the controlled elements and the operations performed on, by, or around them.

Of the three quantities introduced above, the importance level is the most conventional. The accountable line manager uses a qualitative risk assessment methodology to assign an importance level to every controlled element, based upon the element's relative role in supporting the facility's mission and keeping the facility safe and environmentally benign. Each row of the grading matrix of Table 1 represents a distinct importance level. Section 3.1.1.1 describes the meaning of each importance level.

The impact level provides the second essential dimension of the grading methodology. It furnishes the manager with a mechanism for characterizing the scope of an activity and the ramifications to the associated controlled element of performing the activity. This approach acknowledges the fact that operations may dramatically change the overall risk profile of the facility, even when precisely the same controlled elements are involved.

Each column of the grading matrix in Section 3.1 represents a distinct impact level. Section 3.1.1.2 describes the meaning of each impact level.

For example, a moderate risk element operated in emergency mode may result in higher overall risk (and therefore a need for more intensive formal operations) than operating a high risk component under normal circumstances. The impact level gives the manager the flexibility to incorporate such practical operational realities into the grading system.

The intensity level represents the overall risk-based grade assigned to the combination of a controlled element and an activity. It translates into the level of formal operations that is necessary to ensure that the activity is performed in a manner that is safe, environmentally benign, and supportive of the overall mission of the facility.

The grading matrix of Table 1 indexes intensity levels by importance and impact. Section 3.1.1.3 describes the meaning of each intensity level.

Information Copy

3.0 STANDARDS

3.1 Grading the Configuration Management Element

This section describes how to apply the grading methodology to the configuration management element of Reference 1. The principal activities that affect the impact dimension are the specification, evaluation, and application of changes to controlled elements.

All of the requirements specified in Sections 5.2.1 through 5.2.3 of Reference 1 apply to all controlled elements regardless of the graded approach used.

3.1.1 Grading Matrix

Table 1 summarizes the grading approach. The first column specifies the relevant importance levels. The top row specifies the impact levels.

Table 1: Intensity Levels Referenced to Importance and Impact

		Impact		
		Minor	Local	Global
Importance	Critical	Medium	High	High
	Serious	Low	Medium	High
	Minimum	Low	Low	Medium

3.1.1.1 Importance Levels. The graded approach supports the following importance levels for controlled elements: critical, serious, and minimum. The importance level assigned to a controlled element is the highest importance level assigned to that element in any of the nine evaluation categories. The evaluation categories are: radiological damage, toxicological damage, industrial safety, environmental damage, property loss, facility availability, cost effect, reputation, and commitments. The importance thresholds for each of the above categories are presented in Appendix A. The importance levels assigned to controlled elements in each category are determined using the results of a failure mode and effects analysis.

3.1.1.2 Impact Levels. The graded approach supports the following impact levels for any change activity performed on a given configuration management element: minor, local, and global. These levels are defined below:

3.1.1.2.1 Minor Impact. A change activity is considered to have minor impact if the specified change has only a cosmetic effect on the associated controlled element. The specified change must not have any substantive effect on function, meaning, policy, or intent of the subject controlled element. Furthermore, the effect of the change must be restricted to the subject controlled element.

Information Copy

3.1.1.2.2 Local Impact. A change activity is considered to have local impact if it is not a minor-impact change and if its effects are restricted to only one baseline.

3.1.1.2.3 Global Impact. A change activity is considered to have global impact if it affects more than one baseline.

3.1.1.3 Intensity Levels. This section describes the level of formality required in meeting the configuration management requirements specified in Section 5.2.1 through 5.2.3 of Reference 1. The graded approach supports the following intensity levels for the configuration management element: high, medium, and low. These levels are defined below:

3.1.1.3.1 High Intensity. This level requires the maximum degree of formal operations. For the configuration management element, this means

- change requests, work authorizations, and implementation evaluations must be approved by the accountable line manager;
- the organization's primary configuration control board (CCB) must analyze change requests, evaluate implementations, and make recommendations to the accountable line manager; and
- the configuration management process must be documented using the forms specified in Section 4.0, Appendixes, of References 2, 3, 4, and 5.

3.1.1.3.2 Medium Intensity. This level requires an intermediate degree of formal operations. For the configuration management element, this means

- the accountable line manager or a manager or supervisor under the authority of the accountable line manager must approve change requests, work authorizations, and implementation evaluations;
- the organization's primary configuration control board or a subordinate configuration control board must analyze change request, evaluate implementations and make recommendations to the accountable line manager; and
- the configuration management process must be documented using the forms specified in Section 4.0, Appendixes, of References 2, 3, 4, and 5.

3.1.1.3.3 Low Intensity. This level requires the least degree of formal operations. For the configuration management element, this means

Information Copy

Configuration Management Office	Grading Standards	FOS-5.2.1-001.001 Page 5 of 5
---------------------------------------	--------------------------	--------------------------------------

- the accountable line manager or a manager or supervisor under the authority of the accountable line manager must approve change requests, work authorizations, and implementation evaluations;
- the organization's primary configuration control board or a subordinate configuration control board must analyze change request, evaluate implementations and make recommendations to the accountable line manager; and
- the activity will be documented but there is no requirement to employ the forms specified in Section 4.0, Appendixes, of References 2, 3, 4, and 5 to document the configuration management process.

4.0 REQUIRED RECORDS

None

5.0 REFERENCES

1. FOR-001 *Integrated Formal Operations Plan*.
2. FOP-5.2.2-001 *Task List for Configuration Control: Change Processing*.
3. FOP-5.2.2.5-001 *Task List for Configuration Control: Variance Processing*.
4. FOP-5.2.1-001 *Task List for Configuration Identification*.
5. FOS-5.2.2-001 *Configuration Control Board (CCB) Standards*.

6.0 APPENDIXES

Appendix A: *Importance Thresholds for Evaluation Categories*

7.0 ATTACHMENTS

Attachment 1: *Document Improvement Questionnaire*

Information Copy

1.0 IMPORTANCE THRESHOLDS FOR EVALUATION CATEGORIES

The following tables specify the threshold values for four importance levels. There is one table for each evaluation category, each with the same four importance levels: Critical, Serious, Minimum, and None.

Table 1: Radiological Damage

IMPORTANCE LEVEL	DESCRIPTION OF THRESHOLD
CRITICAL	Exposure > 500 mrem offsite, OR >10 rem onsite to indirect workers, OR > 100 rem onsite to direct workers.
SERIOUS	Exposure >1 mrem offsite, OR >1 rem onsite to indirect workers, OR >10 rem onsite to direct workers.
MINIMUM	Exposure >0 mrem and <1 mrem offsite, OR >1 mrem onsite to indirect workers, OR >1 rem onsite to direct workers.
NONE	No radiological consequences.

Table 2: Toxicological Damage

IMPORTANCE LEVEL	DESCRIPTION OF THRESHOLD
CRITICAL	Exposure > ERPG-2 offsite, OR > ERPG-3 onsite.
SERIOUS	Exposure > ERPG-1 offsite, OR > ERPG-2 onsite to indirect workers, OR > ERPG-3 onsite to direct workers.
MINIMUM	Exposure <ERPG-1 offsite, OR > ERPG-1 onsite to indirect workers, OR > ERPG-2 onsite to direct workers.
NONE	No toxicological consequences.

Information Copy

Grading Standards**Table 3: Industrial Safety**

IMPORTANCE LEVEL	DESCRIPTION OF THRESHOLD
CRITICAL	Serious injuries offsite, OR Death to one or more workers.
SERIOUS	Mild injuries offsite, OR Serious onsite injury to one or more workers.
MINIMUM	Minor onsite injuries to one or more workers.
NONE	No injuries.

Table 4: Environmental Damage

IMPORTANCE LEVEL	DESCRIPTION OF THRESHOLD
CRITICAL	Severe ecological damage; extensive offsite cleanup effort; long term effects; condemnation of onsite area.
SERIOUS	Ecological damage; minor offsite cleanup effort, no long term effects, large onsite cleanup effort.
MINIMUM	No offsite ecological damage, mild onsite damage, no long term effects, moderate onsite cleanup effort.
NONE	No environmental or ecological damage.

Table 5: Property Damage

IMPORTANCE LEVEL	DESCRIPTION OF THRESHOLD
CRITICAL	Severe damage to offsite or facility property. (> \$1M)
SERIOUS	Damage to offsite or facility property. (> \$100k, but < \$1M)
MINIMUM	Damage to offsite or facility property. (< \$100k)
NONE	No damage to property.

Information Copy

Table 6: Facility Availability

IMPORTANCE LEVEL	DESCRIPTION OF THRESHOLD
CRITICAL	Extended shutdown or permanent loss of facility mission or functions.
SERIOUS	Minor shutdown, major enhancements necessary, potential loss of mission function.
MINIMUM	Minor shutdown, minor delay for restart, minimal jeopardy for permanent shutdown.
NONE	No consequences to facility availability.

Table 7: Cost Effect

IMPORTANCE LEVEL	DESCRIPTION OF THRESHOLD
CRITICAL	Programmatic costs severe, significant costs associated with lost operation and lost personnel time. Possible major implementation of strict controls, major facility enhancements, significant increase in staffing.
SERIOUS	Programmatic costs high, lost operation time and lost personnel time, personnel may be reassigned. Possible enhancement of controls, assessments, increased one time costs.
MINIMUM	Short term loss of operation, no significant lost personnel time. Limited changes to operations/configuration of process/structure.
NONE	No significant incurred lost operation or personnel time. No effect to program controls.

Information Copy

Table 8: Reputation

IMPORTANCE LEVEL	DESCRIPTION OF THRESHOLD
CRITICAL	Severe damage to Laboratory image, irreparable damage to facility reputation, no further ability to gain research or operation funding.
SERIOUS	Damage to Laboratory reputation, severe damage to facility reputation, difficulty obtaining additional funding, customers likely to go elsewhere.
MINIMUM	No damage to Laboratory reputation, some damage to facility reputation, future funding may be more difficult to obtain, customers may go elsewhere.
NONE	No effects to Laboratory or facility reputation.

Table 9: Commitments

IMPORTANCE LEVEL	DESCRIPTION OF THRESHOLD
CRITICAL	Severe impact to the organization's mission resulting from failure to fulfill regulatory, DOE, or Laboratory-wide commitments (Federal and State laws, DOE Orders, Director's Policies, Laboratory-wide procedures, etc.).
SERIOUS	Significant impact to the organization's mission resulting from a failure to fulfill formal (written) commitments to customers. (Contracts, other agreements, etc.).
MINIMUM	Only temporary, minimal impact within the organization resulting from a failure to fulfill internal commitments (policies).
NONE	No commitments or commitments that have a negligible impact to the mission when not fulfilled.

Information Copy

DOCUMENT IMPROVEMENT QUESTIONNAIRE

	Excellent	Good	Fair	Poor	N/A
Accuracy	☐	☐	☐	☐	☐
Clarity	☐	☐	☐	☐	☐
Consistency	☐	☐	☐	☐	☐
Completeness	☐	☐	☐	☐	☐
Level of Detail	☐	☐	☐	☐	☐
Organization	☐	☐	☐	☐	☐
Relevance	☐	☐	☐	☐	☐
Usefulness	☐	☐	☐	☐	☐
Understandability	☐	☐	☐	☐	☐
Examples	☐	☐	☐	☐	☐
Figures	☐	☐	☐	☐	☐
Index	☐	☐	☐	☐	☐
Lack of Editorial Errors	☐	☐	☐	☐	☐
Page Layout	☐	☐	☐	☐	☐
Overall Quality	☐	☐	☐	☐	☐

The best feature of this document is _____

The worst feature of this document is _____

I found the following errors in this document:

Page Description

Additional comments or suggestions to improve this document:

Information Copy

Name (Optional)	Organization	Telephone	Mail Stop	Percent of Document Read