



NOT MEASUREMENT
SENSITIVE

DOE-STD-1073-93-Pt.2
November 1993

DOE STANDARD

GUIDE FOR OPERATIONAL CONFIGURATION MANAGEMENT PROGRAM

Including the Adjunct Programs of
Design Reconstitution and
Material Condition and Aging Management

PART II



U.S. Department of Energy
Washington, D.C. 20585

AREA CMAN

This document has been reproduced directly from the best available copy.

Available to DOE and DOE contractors from the Office of Scientific and Technical Information, P.O. Box 62, Oak Ridge, TN 37831; (615) 576-8401.

Available to the public from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Rd., Springfield, VA 22161.

Order No. DE94005408

CONTENTS

FOREWORD	i
GLOSSARY	ix
ACRONYMS	xv
BIBLIOGRAPHY	xvii

PART I

CHAPTER 1 OPERATIONAL CONFIGURATION MANAGEMENT PROGRAM PRINCIPLES

1.1 Program Objective	I-1
1.2 Functional Model	I-3
1.3 Program Criteria	I-4
1.3.1 Program Management Element	I-4
1.3.2 Design Requirements Element	I-7
1.3.3 Document Control Element	I-8
1.3.4 Change Control Element	I-9
1.3.5 Assessments Element	I-10
1.3.6 Design Reconstitution Adjunct Program	I-11
1.3.7 Material Condition and Aging Management Adjunct Program	I-13
1.4 Graded Approach	I-15
1.4.1 Introduction	I-15
1.4.2 General Process for Graded Approach	I-15
1.4.3 General Application of Graded Approach	I-24
Appendix I-A CM Program Interfaces	I-A-1
Appendix I-B Background Material and Concepts for Operational Configuration Management	I-B-1

PART II

CHAPTER 2 IMPLEMENTATION GUIDANCE FOR OPERATIONAL CONFIGURATION MANAGEMENT

2.1 Program Management Element	II-1
2.1.1 Program Planning	II-1
2.1.2 Interfaces	II-8
2.1.3 Databases	II-9
2.1.4 Configuration Management Procedures	II-11
2.1.5 Specific Application of Graded Approach: Program Management Element	II-15
2.2 Design Requirements Element	II-15
2.2.1 Establishment of Design Requirements and Design Basis	II-17
2.2.2 Assignment of SSC Grades	II-24
2.2.3 Fully Developed Element	II-29
2.2.4 Specific Application of Graded Approach: Design Requirements Element	II-29
2.3 Document Control Element	II-29
2.3.1 Initial Development Activities	II-29
2.3.2 Fully Developed Element	II-34

2.3.3	Specific Application of Graded Approach: Document Control Element	II-38
2.4	Change Control Element	II-39
2.4.1	Initial Development Activities	II-39
2.4.2	Fully Developed Element	II-43
2.4.3	Specific Application of Graded Approach: Change Control Element	II-48
2.5	Assessments Element	II-48
2.5.1	Initial Assessments	II-48
2.5.2	Post-Implementation Assessments	II-54
2.5.3	Ongoing Assessments	II-55
2.5.4	Specific Application of Graded Approach: Assessments Element	II-59

**CHAPTER 3
IMPLEMENTATION GUIDANCE FOR DESIGN RECONSTITUTION**

3.1	Program Plans and Procedures	II-61
3.1.1	Design Reconstitution Program Plan	II-61
3.1.2	Design Reconstitution Action Plan	II-65
3.1.3	Design Reconstitution Program Governing and Implementing Procedures	II-65
3.2	Identification and Retrieval of Design Information	II-66
3.2.1	Identification and Retrieval of Source Documents	II-67
3.2.2	Extraction of Design Information	II-70
3.3	Evaluation, Verification, and Validation of Design Information	II-70
3.3.1	Verification of Design Information	II-71
3.3.2	Technical Validation of Design Information	II-71
3.3.3	Release of Verified and Validated Design Information	II-71
3.3.4	Correlation of Design Basis to Design Requirements	II-73
3.3.5	Technical Management Review of Design Information	II-73
3.4	Resolution of Discrepancies	II-74
3.5	Regeneration of Missing Critical Design Information	II-76
3.5.1	Regeneration of Design Requirements	II-76
3.5.2	Regeneration of Design Basis	II-78
3.6	Preparation and Issuance of Design Information Summaries	II-78
3.6.1	Pilot Design Information Summary Program	II-78
3.6.2	Design Information Summary Format and Content Guide	II-78
3.6.3	Design Information Summary Layout Guide	II-79
3.6.4	Design Information Summary Users' Guide	II-80
3.6.5	Final Verification of Design Information Summaries	II-80
3.6.6	Issuance of Design Information Summaries	II-80
3.6.7	Field Validation of Design Information Summaries	II-80
3.6.8	Maintenance and Control of Design Information Summaries	II-81
3.7	Specific Application of Graded Approach: Design Reconstitution	II-82

**CHAPTER 4
IMPLEMENTATION GUIDANCE FOR MATERIAL CONDITION AND AGING MANAGEMENT**

4.1	Preliminary MCA Phase	II-85
4.1.1	Component Screening	II-85
4.1.2	Aging Degradation Mechanism Evaluations	II-87
4.1.3	Estimation of Facility Remaining Lifetime	II-87
4.1.4	Feasibility of Continued Operations and Extended Operations	II-87
4.1.5	MCA Program Plan	II-88
4.2	Detailed MCA Phase	II-88

4.2.1	MCA Action Plan and Procedures	II-88
4.2.2	Final Identification of Life-Limiting Components	II-89
4.2.3	Detailed Aging Degradation Evaluations	II-91
4.2.4	Determination of Facility Remaining Lifetime	II-95
4.2.5	Feasibility of Continued Operations and Extended Operations	II-98
4.3	Life Extension Techniques	II-99
4.4	Ongoing MCA Phase	II-99
4.4.1	Degradation Trending	II-100
4.4.2	Application of Life Extension Techniques	II-101
4.5	Specific Application of Graded Approach: MCA Adjunct Program	II-101
Appendix II-A	Design Control	II-A-1
Appendix II-B	Examples of Design Information	II-B-1
Appendix II-C	Conduct of Walkdowns	II-C-1
Appendix II-D	Content of Design Information Summaries	II-D-1

FIGURES

CHAPTER 1

Figure 1–1	Operational Configuration Management: Basic Relationships	I–2
Figure 1–2	Operational Configuration Management Program: Elements and Functions	I–5
Figure 1–3	Operational Configuration Management: Implementation Considerations	I–17
Figure I–A–1	Relationship of a DOE CM Program to the Life of a Facility	I–A–5
Figure I–B–1	Design Process	I–B–4
Figure I–B–2	Assessments Element	I–B–14
Figure I–B–3	Remaining Lifetime and Desired Lifetime	I–B–18

CHAPTER 2

Figure 2–1	Program Management Element: Overall CM Program Development and Implementation	II–2
Figure 2–2	Program Management Element: Management Actions for Program Planning	II–3
Figure 2–3	Program Management Element: Directives, Plans, and Procedure	II–13
Figure 2–4	Design Requirements Element: Top-Level Development Flowchart	II–16
Figure 2–5	Establishment of Design Requirements	II–18
Figure 2–6	Design Requirements Element: CM Equipment Database	II–23
Figure 2–7	Design Requirements Element: Assignment of System-Level Grades	II–25
Figure 2–8	Design Requirements Program: Assignment of Component-Level Grades	II–27
Figure 2–9	Interfaces with the Fully Developed Design Requirements Element	II–30
Figure 2–10	Document Control Element: Top-Level Development Flowchart	II–31
Figure 2–11	Document Control Program: Document Control Functions	II–33
Figure 2–12	Document Control Program: Document Control and Tracking	II–36
Figure 2–13	Change Control Program: Top-Level Development Flowchart	II–40
Figure 2–14	Change Control Program: Change Control Functions	II–41
Figure 2–15	Change Control Program: Design Envelope Review Process	II–44
Figure 2–16	Assessments Program: Vertical Slice Methodology	II–49
Figure 2–17	Assessments Program: Horizontal Slice Methodology	II–51
Figure 2–18	Comparative Procedures Review	II–53

CHAPTER 3

Figure 3-1	Design Reconstitution Program: Implementation Overview	II-62
Figure 3-2	Design Reconstitution Program: Sample Schedule	II-64
Figure 3-3	Design Reconstitution Program: Design Information Identification and Retrieval	II-68
Figure 3-4	Design Reconstitution Program: Evaluation of Extracted Design Information	II-72
Figure 3-5	Design Reconstitution Program: Discrepancy Resolution Process	II-75

CHAPTER 4

Figure 4-1	MCA Implementation Process	II-86
Figure 4-2	Final Identification of Life-Limiting Components	II-90
Figure 4-3	Detailed Aging Degradation Evaluations	II-93
Figure 4-4	Identification of Aging Degradation Mechanisms	II-94
Figure 4-5	Identification of Material Condition Measurements	II-96
Figure 4-6	Final Determination of Facility Remaining Lifetime	II-97