DOE/EIS-0236-S4

National Nuclear Security Administration

Final Complex Transformation Supplemental Programmatic Environmental Impact Statement

Volume I
Chapters 1 - 4

COMPLEXtransformation

National Nuclear Security Administration
U.S. Department of Energy

October 2008

COVER SHEET

RESPONSIBLE AGENCY: U.S. Department of Energy, National Nuclear Security Administration

TITLE: Final Complex Transformation Supplemental Programmatic Environmental Impact Statement (Complex Transformation SPEIS, DOE/EIS-0236-S4)

CONTACTS:

For further information on this SPEIS, write or call:

Theodore A. Wyka
Complex Transformation
SPEIS Document Manager
Office of Transformation, NA-10.1
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585
1-800-832-0885, x63519

For general information on the DOE *National Environmental Policy Act* (NEPA) process, write or call:

Carol Borgstrom, Director
Office of NEPA Policy and Compliance, GC-20
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585
(202) 586-4600
or leave a message at 1-800-472-2756

ABSTRACT: The National Nuclear Security Administration (NNSA), an agency within the Department of Energy, has the responsibility to maintain the safety, security, and reliability of the United States' nuclear weapons stockpile. This Complex Transformation Supplemental Programmatic Environmental Impact Statement (SPEIS) analyzes the potential environmental impacts of reasonable alternatives to continue transformation of the nuclear weapons complex to be smaller, and more responsive, efficient, and secure in order to meet national security requirements. The current Complex consists of sites located in seven states (California, Missouri, Nevada, New Mexico, South Carolina, Tennessee, and Texas). This SPEIS evaluates alternatives that would restructure special nuclear materials manufacturing and research and development facilities; consolidate special nuclear materials throughout the Complex; consolidate, relocate, or eliminate duplicative facilities and programs and improve operating efficiencies; and identify one or more sites for conducting NNSA flight test operations.

COOPERATING AGENCIES: The Department of the Air Force and the U.S. Army Garrison White Sands are cooperating agencies in the preparation of this Complex Transformation SPEIS.

PUBLIC COMMENTS: The Draft Complex Transformation SPEIS was issued for public review and comment on January 11, 2008. Comments on the Draft SPEIS were requested during a period of 90 days following publication of the U.S. Environmental Protection Agency's (EPA's) Notice of Availability in the *Federal Register*. Twenty public hearings to solicit comments on the Draft SPEIS were held during the public comment period. Prior to the end of this comment period, NNSA extended the public comment period by 20 additional days, until April 30, 2008. All comments received during the comment period were considered during preparation of the Final SPEIS. Late comments were also considered, to the extent practicable.

The Final SPEIS contains revisions and new information based in part on comments received on the Draft SPEIS. Vertical change bars in the margins indicate the locations of these revisions and new information. Volume 3 contains the comments received during the public comment period on the Draft SPEIS and NNSA's responses to the comments. NNSA will use the analysis presented in this Final SPEIS, as well as other information, in preparing the Record(s) of Decision (RODs) regarding Complex Transformation. NNSA will issue one or more RODs no sooner than 30 days after the EPA publishes a Notice of Availability of this Final SPEIS in the *Federal Register*. This document and related information are available on the Internet at www.ComplexTransformationSPEIS.com.

DOE/EIS-0236-S4

Final Complex Transformation Supplemental Programmatic Environmental Impact Statement

Volume I

Chapters 1 - 4

October 2008

Prepared by:

National Nuclear Security Administration
U.S. Department of Energy

National Nuclear Security Administration

TABLE OF CONTENTS

Volume I – Chapters 1 through 4
Volume II – Chapters 5 through 15 and Appendices A through G
Volume III – Comment Response Document, Chapters 1 through 3

Cover Sheet

Volume I
Chapters 1 through 4 i
List of Figures xx
List of Tables xxvii

Volume II
Chapters 5 through 15 and Appendices A through G ix
List of Figures xxiv
List of Tables xxxiv

Volume III
Comment Response Document, Chapters 1 through 3 xix
List of Figures xxvi
List of Tables xlvii

Acronyms and Abbreviations xlviii
Chemicals and Units of Measure lvii
Conversion Chart lix
Metric Prefixes lx

VOLUME I – CHAPTERS 1 THROUGH 4

CHAPTER 1: INTRODUCTION 1-1
1.0 Introduction 1-1
1.1 Complex Transformation 1-3
1.1.1 Maintaining Nuclear Deterrence 1-4
1.1.2 Security for Nuclear Weapons and Special Nuclear Materials 1-4
1.1.3 Proposed Approach to Transformation of the Complex 1-5
1.2 The Nuclear Weapons Complex Today 1-5
1.2.1 Nuclear Weapons 1-7
1.3 Introduction of the Alternatives 1-7
1.3.1 Restructure SNM Facilities 1-8
1.3.2 Restructure R&D and Testing Facilities 1-8
1.3.3 No Action Alternative 1-8
1.4 Relevant History—Evolution of the Complex After the Cold War 1-9

1.5 NEPA Strategy for This Supplemental PEIS 1-11
1.5.1 Decisions Regarding the Complex Transformation 1-11
1.5.2 Relevant NEPA Documents 1-11
1.5.2.1 Completed NEPA Analyses 1-11
1.5.2.2 Ongoing NEPA Analyses 1-17
1.6 Public Participation 1-19
1.6.1 Scoping Process 1-20
1.6.1.1 Summary of Major Scoping Comments 1-20
1.6.2 Public Comments on the Draft SPEIS 1-21
1.6.2.1 Major Comments Received During the Public Comment Period on the Draft Complex Transformation SPEIS 1-22
1.6.2.2 Major Changes From the Draft Complex Transformation SPEIS 1-24
1.7 Organization of This Complex Transformation Supplemental PEIS 1-27

CHAPTER 2: PURPOSE AND NEED 2-1
2.0 Purpose and Need for Agency Action 2-1
2.1 National Security Policy Considerations 2-2
2.1.1 Presidential Directives Through 1996 and Pubic Law 103-160 2-3
2.1.2 Nuclear Posture Reviews (NPR) 2-3
2.1.3 Proposed Comprehensive Test Ban Treaty 2-5
2.1.4 Treaty on the Nonproliferation of Nuclear Weapons 2-5
2.1.5 Moscow Treaty 2-6
2.1.6 Nuclear Weapons Stockpile Plans (NWSPs) 2-6
2.1.7 Presidential Directives After 1996 and Public Law 109-163 2-7
2.2 Safety, Security, and Reliability of the U.S. Stockpile 2-8
2.2.1 Stockpile History 2-8
2.2.2 Historical Data and the Smaller, Aging Stockpile 2-8
2.3 Purpose and Need for NNSA Action 2-10
2.3.1 Responsiveness of the Nuclear Weapons Complex Infrastructure 2-10
2.3.2 Laboratory Technical and Industrial-Base Capabilities 2-11
2.3.3 Adequate Production Capacity for a Smaller Stockpile 2-11
2.3.3.1 Production Capacity Planning Assumptions 2-12
2.3.3.2 Technical Considerations for Pit Production Capacity Planning 2-12
2.3.3.3 Technical Considerations for Secondary Assembly Component (i.e., Canned Subassembly) Production Capacity Planning 2-13
2.3.4 A Smaller Infrastructure Footprint for More Cost-Effective Operations 2-14
2.3.5 Enhanced Security for Special Nuclear Materials 2-14
2.4 Proposed Actions 2-14
2.4.1 Restructure SNM Facilities 2-14
2.4.2 Restructure R&D and Testing Facilities 2-17

2.5 Reliable Replacement Warhead 2-18
2.5.1 RRW Status 2-18
2.5.2 RRW and the Proposed Actions and Alternatives 2-18
2.5.3 RRW and Nuclear Testing 2-19
2.5.4 RRW and the Stockpile 2-20
2.5.5 RRW and Complex Transformation 2-20
2.5.6 RRW and the Evaluation of Pit Production Capacity 2-21
2.5.7 RRW and the Use of Radioactive and Hazardous Materials 2-21
2.5.8 Summary 2-21
2.6 Programmatic Impacts of Smaller Stockpiles 2-22
2.6.1 Defining a Smaller Stockpile 2-22
2.6.2 Capability-Based Capacity 2-22
2.6.3 Potential Effects on the Proposed Actions and Alternatives 2-23

CHAPTER 3: ALTERNATIVES 3-1
3.0 Overview 3-1
3.1 Development of Reasonable Alternatives 3-1
3.1.1 Restructure SNM Facilities 3-2
3.1.2 Restructure R&D and Testing Facilities 3-5
3.2 Overview of Potentially Affected Sites and Existing Missions 3-7
3.2.1 Los Alamos National Laboratory 3-7
3.2.2 Lawrence Livermore National Laboratory 3-8
3.2.3 Nevada Test Site 3-9
3.2.4 Tonopah Test Range 3-10
3.2.5 Pantex Plant 3-10
3.2.6 Sandia National Laboratories 3-11
3.2.7 White Sands Missile Range 3-12
3.2.8 Savannah River Site 3-12
3.2.9 Y-12 3-13
3.3 Programmatic No Action Alternative 3-15
3.3.1 Limitations of the Existing Complex 3-17
3.4 Programmatic Alternative 1: Distributed Centers of Excellence 3-20
3.4.1 Consolidated Plutonium Center 3-20
3.4.1.1 CPC Operations 3-22
3.4.1.2 CPC Facility Requirements 3-24
3.4.1.3 CPC Transportation Requirements 3-28
3.4.1.4 Phaseout NNSA Plutonium Operations and Remove Category I/II SNM from LANL 3-29
3.4.1.5 Candidate Sites for a CPC 3-30
3.4.1.6 Los Alamos CPC Alternatives 3-31
3.4.2 Uranium Processing Facility at Y-12 3-39
3.4.2.1 UPF Construction 3-40
3.4.2.2 UPF Operations 3-41

3.4.3 Upgrade Existing Enriched Uranium Facilities at Y-12 3-42
3.5 Programmatic Alternative 2: Consolidated Centers of Excellence..... 3-44
3.5.1 Consolidated Nuclear Production Center Option 3-46
3.5.1.1 Consolidated Uranium Center 3-46
3.5.1.2 Assembly/Disassembly/High Explosives Center..... 3-50
3.5.1.3 Transport of Plutonium and HEU to a CNPC..... 3-54
3.5.1.4 Site-Specific Features Relevant to a CNPC..... 3-54
3.5.2 Consolidated Nuclear Center Option 3-60
3.6 Programmatic Alternative 3: Capability-Based Alternative 3-63
3.6.1 Capability-Based Alternative for Production Facilities..... 3-64
3.6.1.1 Capability-Based Alternative for LANL 3-64
3.6.1.2 Capability-Based Alternative for Pantex 3-65
3.6.1.3 Capability-Based Alternative for Y-12..... 3-66
3.6.1.4 Capability-Based Alternative for SRS 3-67
3.6.2 No Net Production/Capability-Based Alternative 3-68
3.6.2.1 No Net Production/Capability-Based Alternative at LANL..... 3-69
3.6.2.2 No Net Production/Capability-Based Alternative at LLNL 3-69
3.6.2.3 No Net Production/Capability-Based Alternative at NTS and TTR 3-69
3.6.2.4 No Net Production/Capability-Based Alternative at Pantex..... 3-70
3.6.2.5 No Net Production/Capability-Based Alternative at SNL/NM 3-70
3.6.2.6 No Net Production/Capability-Based Alternative at SRS 3-71
3.6.2.7 No Net Production/Capability-Based Alternative at Y-12 3-71
3.6.3 Further Stockpile Reductions..... 3-72
3.6.3.1 Distributed Centers of Excellence Alternative 3-72
3.6.3.2 Consolidated Centers of Excellence Alternative 3-74
3.6.3.3 Capability-Based Alternatives 3-75
3.7 Category I/II SNM Consolidation Alternatives 3-76
3.7.1 No Action Alternative..... 3-77
3.7.1.1 Lawrence Livermore National Laboratory 3-77
3.7.1.2 Pantex..... 3-78
3.7.1.3 Los Alamos National Laboratory..... 3-80
3.7.2 Transfer Category I/II SNM from LLNL to Other Sites and Phase-out Operations Involving Category I/II quantities of SNM at Superblock.. 3-81
3.7.3 Transfer Category I/II SNM from Pantex Zone 4 to Zone 12 3-83
3.8 High Explosives R&D 3-85
3.8.1 Alternative 1—No Action Alternative..... 3-86
3.8.1.1 Lawrence Livermore National Laboratory 3-86
3.8.1.2 Los Alamos National Laboratory..... 3-88
3.8.1.3 Pantex Plant 3-89
3.8.1.4 Sandia National Laboratories/NM 3-90
3.8.1.5 NTS 3-91

3.8.2 HE R&D SPEIS Alternatives 3-91
3.8.2.1 HE R&D Minor Reduction/Consolidation Alternatives 3-91
3.8.2.2 HE R&D Major Reduction/Consolidation Alternatives 3-96
3.9 Tritium R&D 3-100
3.9.1 Tritium R&D No Action Alternative 3-101
3.9.1.1 Lawrence Livermore National Laboratory 3-101
3.9.1.2 Los Alamos National Laboratory 3-101
3.9.1.3 Savannah River Site 3-102
3.9.1.4 Sandia National Laboratories/NM 3-103
3.9.2 Consolidate Tritium R&D at SRS Alternative 3-103
3.9.3 Consolidate Tritium R&D at LANL Alternative 3-104
3.9.4 Reduce Tritium R&D in Place Alternative 3-104
3.10 NNSA Flight Test Operations for Gravity Weapons 3-105
3.10.1 No Action Alternative 3-106
3.10.2 Upgrade of Tonopah Test Range Alternative 3-107
3.10.3 Campaign Mode Operation of TTR 3-108
3.10.4 Transfer to WSMR Alternative 3-110
3.10.4.1 Siting Locations 3-111
3.10.5 Transfer to NTS Alternative 3-112
3.11 Hydrodynamic Testing 3-113
3.11.1 No Action Alternative 3-114
3.11.1.1 Hydrotesting Facilities at LLNL 3-114
3.11.1.2 Hydrotesting Facilities at LANL 3-115
3.11.1.3 Hydrotesting Facilities at Pantex, SNL/NM, and NTS 3-117
3.11.2 Action Alternatives 3-118
3.11.2.1 Downsize-in-Place Alternative 3-118
3.11.2.2 Consolidation at LANL 3-119
3.11.2.3 Consolidation at NTS–A Next Generation Alternative 3-120
3.12 Major Environmental Test Facilities 3-122
3.12.1 No Action Alternative 3-122
3.12.1.1 Environmental Test Facilities at LANL 3-124
3.12.1.2 Environmental Test Facilities at LLNL 3-124
3.12.1.3 Environmental Test Facilities at SNL/NM 3-124
3.12.1.4 Environmental Test Facilities at NTS 3-125
3.12.2 Downsize in Place Alternative 3-126
3.12.3 Alternative to Consolidate ETF Capabilities at One Site (NTS or SNL/NM) 3-127
3.12.4 ETF Pantex Option 3-129
3.13 Sandia National Laboratories, California (SNL/CA), Weapons Support Functions 3-130
3.13.1 No Action Alternative 3-130
3.13.2 Move Activities to SNL/NM 3-134
3.14 Potential Changes at Alternative Sites 3-135

3.14.1 Los Alamos National Laboratory 3-135
3.14.2 Lawrence Livermore National Laboratory 3-135
3.14.3 Nevada Test Site 3-136
3.14.4 Pantex Plant 3-136
3.14.5 Sandia National Laboratories/NM 3-137
3.14.6 Savannah River Site 3-137
3.14.7 Tonopah Test Range 3-137
3.14.8 Y-12 3-138
3.14.9 White Sands Missile Range 3-138
3.14.10 Sandia National Laboratories/CA 3-138
3.15 Alternatives Considered but Eliminated from Detailed Study 3-139
3.16 Comparison of Impacts 3-147
3.16.1 Land Use for Programmatic Alternatives 3-147
3.16.2 Impacts on Complex Facilities for Programmatic Alternatives 3-148
3.16.3 Impacts on Complex Facilities for Project-Specific Alternatives 3-148
3.16.4 Employment Under the Programmatic Alternatives 3-149
3.16.5 Transportation Under the Programmatic Alternatives 3-149
3.16.6 Accidents and Malicious Acts in Programmatic Alternatives 3-150
3.16.7 Infrastructure Demands for the Programmatic Alternatives 3-151
3.17 Preferred Alternatives 3-152
3.17.1 Preferred Alternatives for Restructuring SNM Facilities 3-152
3.17.2 Preferred Alternatives for Restructuring R&D and Testing Facilities. 3-153

CHAPTER 4: AFFECTED ENVIRONMENT 4-1
4.0 Introduction 4-1
4.1 Los Alamos National Laboratory 4-1
4.1.1 Land Use 4-3
4.1.2 Visual Resources 4-7
4.1.3 Site Infrastructure 4-8
4.1.4 Air Quality and Noise 4-11
4.1.5 Water Resources 4-19
4.1.6 Geology and Soils 4-27
4.1.7 Biological Resources 4-32
4.1.8 Cultural Resources 4-38
4.1.9 Socioeconomic Resources 4-40
4.1.10 Environmental Justice 4-44
4.1.11 Health and Safety 4-54
4.1.12 Transportation 4-57
4.1.13 Waste Management 4-58
4.2 Lawrence Livermore National Laboratory and Sandia National Laboratories/California 4-63
4.2.1 Land Use 4-63
4.2.2 Visual Resources 4-67

4.2.3 Site Infrastructure....4-68
4.2.4 Air Quality and Noise....4-70
4.2.5 Water Resources....4-75
4.2.6 Geology and Soils....4-83
4.2.7 Biological Resources....4-88
4.2.8 Cultural Resources....4-100
4.2.9 Socioeconomic Resources....4-103
4.2.10 Environmental Justice....4-107
4.2.11 Health and Safety....4-114
4.2.12 Transportation....4-118
4.2.13 Waste Management....4-122
4.3 Nevada Test Site....4-130
4.3.1 Land Use....4-131
4.3.2 Visual Resources....4-132
4.3.3 Site Infrastructure....4-134
4.3.4 Air Quality and Noise....4-135
4.3.5 Water Resources....4-139
4.3.6 Geology and Soils....4-148
4.3.7 Biological Resources....4-155
4.3.8 Cultural Resources....4-159
4.3.9 Socioeconomic Resources....4-160
4.3.10 Environmental Justice....4-164
4.3.11 Health and Safety....4-172
4.3.12 Transportation....4-174
4.3.13 Waste Management....4-175
4.4 Tonopah Test Range....4-180
4.4.1 Land Use....4-180
4.4.2 Visual Resources....4-182
4.4.3 Site Infrastructure....4-183
4.4.4 Air Quality and Noise....4-184
4.4.5 Water Resources....4-186
4.4.6 Geology and Soils....4-188
4.4.7 Biological Resources....4-194
4.4.8 Cultural Resources....4-198
4.4.9 Socioeconomic Resources....4-198
4.4.10 Environmental Justice....4-202
4.4.11 Health and Safety....4-210
4.4.12 Transportation....4-211
4.4.13 Waste Management....4-213
4.5 Pantex Plant....4-216
4.5.1 Land Use....4-216
4.5.2 Visual Resources....4-220
4.5.3 Site Infrastructure....4-221

4.5.4 Air Quality and Noise 4-222
4.5.5 Water Resources 4-224
4.5.6 Geology and Soils 4-232
4.5.7 Biological Resources 4-234
4.5.8 Cultural Resources 4-241
4.5.9 Socioeconomic Resources 4-243
4.5.10 Environmental Justice 4-246
4.5.11 Health and Safety 4-254
4.5.12 Transportation 4-257
4.5.13 Waste Management 4-258
4.6 Sandia National Laboratories/New Mexico 4-263
4.6.1 Land Use 4-263
4.6.2 Visual Resources 4-265
4.6.3 Site Infrastructure 4-265
4.6.4 Air Quality and Noise 4-266
4.6.5 Water Resources 4-271
4.6.6 Geology and Soils 4-274
4.6.7 Biological Resources 4-276
4.6.8 Cultural Resources 4-280
4.6.9 Socioeconomic Resources 4-282
4.6.10 Environmental Justice 4-285
4.6.11 Health and Safety 4-294
4.6.12 Transportation 4-297
4.6.13 Waste Management 4-298
4.7 White Sands Missile Range 4-302
4.7.1 Land Use 4-302
4.7.2 Visual Resources 4-307
4.7.3 Site Infrastructure 4-308
4.7.4 Air Quality and Noise 4-308
4.7.5 Water Resources 4-310
4.7.6 Geology and Soils 4-314
4.7.7 Biological Resources 4-316
4.7.8 Cultural Resources 4-322
4.7.9 Socioeconomic Resources 4-324
4.7.10 Environmental Justice 4-328
4.7.11 Health and Safety 4-336
4.7.12 Transportation 4-337
4.7.13 Waste Management 4-340
4.8 Savannah River Site 4-341
4.8.1 Land Use 4-341
4.8.2 Visual Resources 4-343
4.8.3 Site Infrastructure 4-343
4.8.4 Air Quality and Noise 4-344

4.8.5 Water Resources 4-347
4.8.6 Geology and Soils 4-352
4.8.7 Biological Resources 4-354
4.8.8 Cultural Resources 4-357
4.8.9 Socioeconomic Resources 4-358
4.8.10 Environmental Justice 4-362
4.8.11 Health and Safety 4-373
4.8.12 Transportation 4-375
4.8.13 Waste Management 4-378
4.9 Y-12 Site 4-383
4.9.1 Land Use 4-383
4.9.2 Visual Resources 4-385
4.9.3 Site Infrastructure 4-388
4.9.4 Air Quality and Noise 4-389
4.9.5 Water Resources 4-392
4.9.6 Geology and Soils 4-396
4.9.7 Biological Resources 4-398
4.9.8 Cultural Resources 4-402
4.9.9 Socioeconomic Resources 4-404
4.9.10 Environmental Justice 4-408
4.9.11 Health and Safety 4-415
4.9.12 Transportation 4-418
4.9.13 Waste Management 4-420

VOLUME II – CHAPTERS 5 THROUGH 15 AND APPENDICES A THROUGH G

CHAPTER 5: ENVIRONMENTAL IMPACTS 5-1
5.0 Environmental Impacts 5-1
5.1 Los Alamos National Laboratory 5-3
5.1.1 Land Use 5-4
5.1.2 Visual Resources 5-13
5.1.3 Site Infrastructure 5-15
5.1.4 Air Quality and Noise 5-19
5.1.5 Water Resources 5-31
5.1.6 Geology and Soils 5-38
5.1.7 Biological Resources 5-44
5.1.8 Cultural Resources 5-50
5.1.9 Socioeconomic Resources 5-54
5.1.10 Environmental Justice 5-62
5.1.11 Health and Safety 5-63
5.1.12 Facility Accidents 5-70
5.1.13 Transportation 5-85

5.1.14 Waste Management 5-86
5.2 Lawrence Livermore National Laboratory 5-98
5.3 Nevada Test Site 5-99
5.3.1 Land Use 5-99
5.3.2 Visual Resources 5-103
5.3.3 Site Infrastructure 5-105
5.3.4 Air Quality and Noise 5-108
5.3.5 Water Resources 5-119
5.3.6 Geology and Soils 5-127
5.3.7 Biological Resources 5-130
5.3.8 Cultural Resources 5-136
5.3.9 Socioeconomic Resources 5-140
5.3.10 Environmental Justice 5-145
5.3.11 Health and Safety 5-146
5.3.12 Facility Accidents 5-152
5.3.13 Transportation 5-162
5.3.14 Waste Management 5-163
5.4 Tonopah Test Range 5-173
5.5 Pantex Plant 5-174
5.5.1 Land Use 5-174
5.5.2 Visual Resources 5-178
5.5.3 Site Infrastructure 5-179
5.5.4 Air Quality and Noise 5-182
5.5.5 Water Resources 5-190
5.5.6 Geology and Soils 5-196
5.5.7 Biological Resources 5-198
5.5.8 Cultural Resources 5-202
5.5.9 Socioeconomic Resources 5-203
5.5.10 Environmental Justice 5-207
5.5.11 Health and Safety 5-208
5.5.12 Facility Accidents 5-213
5.5.13 Transportation 5-221
5.5.14 Waste Management 5-222
5.5.15 Impacts Associated with Closing and D&D of Pantex Facilities 5-230
5.6 Sandia National Laboratory/New Mexico 5-234
5.7 White Sands Missile Range 5-235
5.8 Savannah River Site 5-236
5.8.1 Land Use 5-236
5.8.2 Visual Resources 5-241
5.8.3 Site Infrastructure 5-243
5.8.4 Air Quality and Noise 5-246
5.8.5 Water Resources 5-258
5.8.6 Geology and Soils 5-264

5.8.7 Biological Resources 5-268
5.8.8 Cultural Resources 5-273
5.8.9 Socioeconomic Resources 5-276
5.8.10 Environmental Justice 5-281
5.8.11 Health and Safety 5-282
5.8.12 Facility Accidents 5-289
5.8.13 Transportation 5-300
5.8.14 Waste Management 5-301
5.9 Y-12 National Security Complex (Y-12) 5-311
5.9.1 Land Use 5-311
5.9.2 Visual Resources 5-317
5.9.3 Site Infrastructure 5-319
5.9.4 Air Quality and Noise 5-321
5.9.5 Water Resources 5-333
5.9.6 Geology and Soils 5-337
5.9.7 Biological Resources 5-340
5.9.8 Cultural and Paleontological Resources 5-343
5.9.9 Socioeconomic Resources 5-344
5.9.10 Environmental Justice 5-349
5.9.11 Health and Safety 5-350
5.9.12 Facility Accidents 5-355
5.9.13 Transportation 5-365
5.9.14 Waste Management 5-367
5.9.15 Closure and D&D of the Production Facilities at Y-12 5-376
5.10 Complex-Wide Transportation Impacts 5-378
5.10.1 No Action Alternative 5-378
5.10.2 Distributed Centers of Excellence Alternative 5-382
5.10.3 Consolidated Centers of Excellence Alternative 5-385
5.10.4 Capability-Based Alternatives 5-389
5.10.5 Waste Shipments 5-389
5.11 NOT USED 5-392
5.12 Consolidating Category I/II Special Nuclear Material 5-392
5.12.1 Remove Category I/II SNM from LLNL 5-392
5.12.2 Impacts of Phasing Out Category I/II SNM Operations from LLNL Superblock 5-395
5.12.3 Impacts of Transferring Category I/II SNM from Pantex Zone 4 to Zone 12 5-397
5.13 Project-Specific Analysis of HE R&D 5-403
5.13.1 HE R&D Minor Downsizing/Consolidation Alternatives 5-404
5.13.2 HE R&D Major Consolidation Alternatives 5-411
5.14 Project-Specific Analysis of Tritium R&D Alternatives 5-441
5.14.1 Consolidate Tritium R&D at SRS Alternative 5-441
5.14.2 Consolidate Tritium R&D at LANL Alternative 5-444

5.14.3 Reduce Tritium R&D In-Place Alternative 5-445
5.15 Project-Specific Analysis of NNSA Flight Test Operations..... 5-446
5.15.1 No Action Alternative—Continue Operations at TTR 5-447
5.15.2 Upgrade of Tonopah Test Range Alternative 5-448
5.15.3 Campaign Mode Operation Alternative..... 5-448
5.15.4 Transfer to WSMR Alternative..... 5-450
5.15.5 Transfer to NTS Alternative 5-464
5.15.6 Transportation..... 5-466
5.16 Project-Specific Analysis of Hydrodynamic Testing 5-467
5.16.1 No Action Alternative..... 5-467
5.16.2 Downsize-in-Place Alternative 5-468
5.16.3 Consolidation at LANL Alternative..... 5-470
5.16.4 Consolidation at NTS..... 5-477
5.17 Project-Specific Analysis of Major Environmental Test Facilities 5-480
5.17.1 Introduction..... 5-480
5.17.2 No Action Alternative..... 5-480
5.17.3 Downsize-in-Place Alternative 5-481
5.17.4 Consolidate ETF Capabilities at One Site (NTS or SNL) Alternative..... 5-486
5.18 Project-Specific Analysis of Sandia National Laboratories, California (SNL/CA) Weapons Support Functions 5-507
5.18.1 No Action Alternative..... 5-507
5.18.2 Consolidate SNL/CA Weapons Support Functions to SNL/NM..... 5-507
5.19 Tritium Production in Tennessee Valley Authority Reactors..... 5-508
5.20 Impacts of the Preferred Alternatives 5-511
5.20.1 Restructuring SNM Facilities 5-511
5.20.2 Restructuring R&D and Testing Facilities..... 5-535

CHAPTER 6: CUMULATIVE IMPACTS 6-1
6.1 Methodology and Analytical Baseline..... 6-1
6.2 Potentially Cumulative Actions 6-1
6.2.1 Global Nuclear Energy Partnership (GNEP) 6-2
6.2.2 Consolidation of Nuclear Operations Related to Production of Radioisotope Power Systems..... 6-2
6.2.3 Yucca Mountain Repository 6-3
6.2.4 Plutonium Disposition 6-4
6.3 Cumulative Impacts by Relevant Site..... 6-5
6.3.1 Cumulative Impacts at LANL..... 6-6
6.3.1.1 Pu-238 Cumulative Impacts..... 6-6
6.3.2 Cumulative Impacts at NTS..... 6-7
6.3.2.1 Socioeconomics 6-7
6.3.2.2 Human Health..... 6-7
6.3.2.3 Transportation..... 6-8
6.3.3 Cumulative Impacts at Pantex 6-10

6.3.4 Cumulative Impacts at SRS 6-11
6.3.4.1 Construction 6-11
6.3.4.2 Operations 6-12
6.3.4.3 Electricity 6-12
6.3.4.4 Water Use 6-12
6.3.4.5 Socioeconomics 6-12
6.3.4.6 Human Health 6-12
6.3.4.7 Waste Management 6-13
6.3.5 Cumulative Impacts at Oak Ridge Reservation (Y-12 Location) 6-13
6.3.5.1 Pu-238 Cumulative Impacts 6-13
6.4 Cumulative Impacts of Major Nuclear-Related Facilities in New Mexico… ... 6-14
6.4.1 Description of WIPP and NEF 6-15
6.4.1.1 Description of WIPP 6-15
6.4.1.2 Description of NEF 6-16
6.4.2 Cumulative Impacts 6-18
6.4.2.1 Socioeconomic Resources 6-19
6.4.2.2 Utilities 6-19
6.4.2.3 Health and Safety 6-24
6.4.2.4 Transportation 6-24
6.4.2.5 Waste Management 6-25
6.5 LLNL Site 300 Open-Air Detonation Experiments 6-26

CHAPTER 7: UNAVOIDABLE ADVERSE IMPACTS 7-1

CHAPTER 8: RELATIONSHIP BETWEEN SHORT-TERM AND LONG-TERM USES 8-1

CHAPTER 9: IRREVERSIBLE AND IRRETRIEVABLE RESOURCE COMMITMENTS 9-1
9.1 Land 9-1
9.2 Energy 9-1
9.3 Material 9-2
9.4 Water 9-3

CHAPTER 10: COMPLIANCE, REGULATORY REQUIREMENT, PERMITS 10-1
10.0 Introduction 10-1
10.1 Purpose 10-1
10.2 Background 10-3
10.3 Federal, Environmental, Safety & Health Statutes, Regulations, Orders, and Agreements 10-3
10.4 State Environmental, Safety & Health Requirements 10-3
10.5 Alternative-Specific Information 10-20
10.5.1 Additional Requirements 10-20

10.5.1.1 Los Alamos Site Alternative 10-20
10.5.2 Nevada Test Site Alternative (NTS) 10-21
10.5.3 Pantex Site Alternative 10-23
10.5.4 Savannah River Site (SRS) Alternative 10-24
10.5.5 Current Capacity Limitations at WIPP 10-24
10.6 Compliance History 10-25
10.6.1 Los Alamos Site Alternative 10-25
10.6.2 Lawrence Livermore National Laboratory 10-26
10.6.3 Nevada Test Site Alternative 10-29
10.6.4 Tonopah Test Range (TTR) 10-30
10.6.5 Pantex Alternative 10-31
10.6.6 Sandia National Laboratory 10-32
10.6.7 Savannah River Site Alternative 10-33
10.6.8 Y-12 Complex 10-34

CHAPTER 11: INDEX 11-1

CHAPTER 12: REFERENCES 12-1

CHAPTER 13: GLOSSARY 13-1

CHAPTER 14: LIST OF PREPARERS 14-1

CHAPTER 15: DISTRIBUTION LIST 15-1

APPENDIX A: ALTERNATIVES A-1
A.1 Consolidated Plutonium Center (CPC) A-1
A.1.1 CPC Operations A-2
A.1.1.1 Material Receipt, Unpacking, and Storage A-3
A.1.1.2 Feed Preparation A-3
A.1.1.3 Manufacturing A-4
A.1.1.4 Plutonium Research and Development A-5
A.1.1.5 Plutonium Pit Surveillance A-5
A.1.2 CPC Facility Requirements A-6
A.1.3 CPC Transportation Requirements A-7
A.1.4 Differences Between a CPC and the Rocky Flats Plant A-10
A.1.4.1 Building Design A-10
A.1.4.2 Fire Control A-10
A.1.4.3 Waste Management and Material Control A-11
A.1.5 Above Ground Versus Below-Grade or Bermed CPC A-11
A.2 Uranium Processing Facility (UPF) at Y-12 ..... A-12
A.2.1 UPF Construction A-13
A.2.2 Traffic Planning and Parking A-14
A.2.3 Site Preparation and Facility Construction A-14
A.2.4 Security Considerations A-15

A.2.5 UPF Operations A-15
A.2.6 Utility and Safety Support Systems A-17
A.2.7 Upgrades to Existing Enriched Uranium Facilities at Y-12 ..... A-18
A.3 Consolidated Nuclear Production Center A-20
A.3.1 Consolidated Uranium Center (CUC) A-24
A.3.2 Assembly/Disassembly/High Explosives Center (A/D/HE Center) A-25
A.3.2.1 Operations Conducted at the A/D/HE Center A-25
A.4 A/D/HE Center at NTS A-27
A.5 Consolidation of Category I/II SNM A-29
A.5.1 No Action Alternative A-29
A.5.1.1 Lawrence Livermore National Laboratory A-29
A.5.1.2 Los Alamos National Laboratory A-33
A.6 High Explosives R&D A-36
A.6.1 No Action Alternative A-36
A.6.1.1 Lawrence Livermore National Laboratory A-36
A.6.1.2 Los Alamos National Laboratory A-38
A.6.1.3 Pantex Plant A-41
A.6.1.4 Sandia National Laboratory/New Mexico (SNL/NM) A-43
A.7 Tritium R&D A-45
A.7.1 Tritium R&D No Action Alternative A-45
A.7.1.1 Lawrence Livermore National Laboratory A-45
A.7.1.2 Los Alamos National Laboratory A-46
A.7.1.3 Savannah River Site A-47
A.7.1.4 Sandia National Laboratories/New Mexico (SNL/NM) A-48
A.8 NNSA Flight Test Operations A-48
A.8.1 No Action Alternative A-51
A.8.2 Upgrade of Tonopah Test Range Alternative A-53
A.8.3 Campaign Mode Operation of TTR A-55
A.8.4 Transfer to WSMR Alternative A-58
A.8.4.1 Existing WSMR Capabilities A-60
A.8.4.2 Siting Locations A-62
A.8.5 Transfer to NTS Alternative A-64
A.8.5.1 Construction Requirements A-67
A.8.6 Transportation A-69
A.8.6.1 Removal of Weapons From the stockpile A-69
A.8.6.2 Transport of JTAs to Air Force Installations To Be Loaded Onto Test Aircraft A-69
A.8.6.3 Transport of JTAs From Test Site To Pantex A-69
A.9 Hydrodynamic Testing A-69
A.9.1 No Action Alternative A-71
A.9.1.1 Hydrotesting Facilities at LLNL A-71
A.9.1.2 Associated Support Facilities A-75
A.9.1.3 Hydrotesting Facilities at LANL A-76
A.9.1.4 Hydrotesting Facilities at Pantex, SNL/NM, and NTS A-79
A.9.2 Action Alternatives A-79
A.9.2.1 Downsize in Place Alternative A-79

A.9.2.2 Consolidation at LANL A-80
A.9.2.3 Consolidation at NTS – A Next Generation Alternative A-82
A.10 Major Environmental Test Facilities A-82
A.10.1 No Action Alternative A-83
A.10.1.1 Environmental Test Facilities at LANL A-84
A.10.1.2 Environmental Test Facilities at LLNL A-89
A.10.1.3 Environmental Test Facilities at Sandia National Laboratory A-95
A.10.1.4 Environmental Test Facilities at Nevada Test Site A-128

APPENDIX B: ENVIRONMENTAL IMPACT METHODOLOGY B-1
B.1 Land Resources B-1
B.1.1 Description of Affected Resources and Region of Influence (ROI) B-1
B.1.2 Description of Impact Assessment B-1
B.2 Visual Resources B-1
B.2.1 Description of Affected Resources and Region of Influence B-1
B.2.2 Description of Impact Assessment B-2
B.3 Site Infrastructure B-2
B.3.1 Description of Affected Resources and Region of Influence B-2
B.3.2 Description of Impact Assessment B-2
B.4 Air Quality and Noise B-2
B.4.1 Nonradiological Air Resources B-2
B.4.1.1 Description of Affected Resources and Region of Influence B-2
B.4.1.2 Description of Impact Assessment B-3
B.4.2 Radiological Air Resources B-4
B.4.2.1 Description of Affected Resources and Region of Influence B-4
B.4.2.2 Description of Impact Assessment B-4
B.4.3 Noise B-4
B.4.3.1 Description of Affected Resources and Region of Influence B-5
B.4.3.2 Description of Impact Assessment B-5
B.5 Water Resources B-5
B.5.1 Surface Water B-5
B.5.1.1 Description of Affected Resources and Region of Influence B-5
B.5.1.2 Description of Impact Assessment B-6
B.5.2 Groundwater B-6
B.5.2.1 Description of Affected Resources and Region of Influence B-6
B.5.2.2 Description of Impact Assessment B-6
B.5.3 Floodplains B-7
B.6 Geology and Soils B-7
B.6.1 Description of Affected Resources and Region of Influence B-7
B.6.2 Description of Impact Assessment B-7
B.7 Biological Resources B-8
B.7.1 Description of Affected Resources and Region of Influence B-8
B.7.2 Description of Impact Assessment B-8

B.7.2.1 Terrestrial Resources B-8
B.7.2.2 Wetlands B-9
B.7.2.3 Aquatic Resources B-9
B.7.2.4 Threatened and Endangered Species B-9
B.8 Cultural and Archeological Resources....B-9
B.8.1 Description of Affected Resources and Region of Influence B-9
B.8.2 Description of Impact Assessment....B-10
B.9 Socioeconomics B-10
B.10 Environmental Justice....B-11
B.11 Health and Safety....B-12
B.11.1 Description of Affected Resources and Region of Influence B-12
B.11.2 Description of Impact Assessment....B-13
B.11.3 Occupational Safety B-13
B.12 Accident Analysis B-14
B.12.1 Description of Affected Resources and Region of Influence B-14
B.12.2 Description of Impact Assessment....B-14
B.12.3 Terrorist Attacks B-16
B.12.3.1 Assessment of Vulnerability to Terrorist Threats....B-16
B.12.3.2 Terrorist Impacts Analysis....B-18
B.12.3.3 Mitigation of Impacts from Potential Terrorist Attacks B-19
B.13 Transportation....B-23
B.13.1 Description of Affected Resources and Region of Influence B-23
B.13.2 Description of Impact Assessment....B-23
B.13.2.1 Incident-Free Transportation Impacts....B-23
B.13.2.2 Transportation Accidents....B-25
B.13.2.3 Traffic Impacts....B-26
B.14 Waste Management....B-26
B.14.1 Description of Affected Resources and Region of Influence B-26
B.14.2 Description of Impact Assessment....B-26
B.15 Cumulative Impacts B-27

APPENDIX C: HUMAN HEALTH AND ACCIDENTS....C-1
C.1 Radiological Impacts on Human Health....C-1
C.1.1 Radiation and Radioactivity....C-1
C.1.1.1 What Is Radiation?....C-1
C.1.1.2 How Is Radiation Measured?....C-3
C.1.1.3 How Does Radiation Affect the Human Body?....C-3
C.1.1.4 What Are Some Types of Radiation Dose Measurements? C-4
C.1.1.5 What Are Some Sources of Radiation? C-5
C.1.2 Radioactive Materials in This SPEIS....C-6
C.1.2.1 What Are Some Sources That May Lead to Radiation Exposure?....C-6

C.1.2.2 How Is Radiation Exposure Regulated? C-7
C.1.2.3 Data Sources Used To Evaluate Public Health Consequences From Routine Operations C-8
C.1.3 Methodology for Estimating Radiological Impacts C-9
C.1.4 Risk Characterization and Interpretation of Radiological Data C-10
C.1.5 Risk Estimates and Health Effects for Potential Radiation Exposures to Workers C-12
C.1.5.1 NNSA's Radiation Protection Program C-12
C.2 Hazardous Chemical Impacts To Human Health C-13
C.2.1 Chemicals and Human Health C-13
C.2.1.1 How Do Chemicals Affect the Body? C-13
C.2.2 How Does DOE Regulate Chemical Exposures? C-14
C.2.2.1 Environmental Protection Standards C-14
C.2.2.2 Regulated Occupational Exposure Limits C-15
C.2.2.3 Department of Energy Regulation of Worker Safety C-15
C.3 Accidents C-15
C.3.1 Introduction C-15
C.3.1.1 Assessment of Vulnerability to Terrorist Threats C-20
C.3.2 Safety Design Process C-21
C.3.3 Consequence Analysis Methodology C-22
C.3.3.1 Analysis Conservatism and Uncertainty C-24
C.3.3.2 Mitigation Measures C-24
C.3.3.2.1 Emergency Response and Protective Actions C-24
C.3.3.2.2 High Efficiency Particulate Air Filtration C-25
C.3.3.3 Chemical Releases C-25
C.4 Radiological Accident Scenarios-CPC C-26
C.4.1 Postulated Accidents C-27
C.4.2 LANL Alternative C-33
C.4.2.1 Greenfield CPC and Upgrade Alternative C-33
C.4.2.2 50/80 Alternative C-33
C.4.3 Nevada Test Site Alternative C-35
C.4.4 Pantex Site Alternative C-36
C.4.5 Savannah River Site Alternative C-37
C.4.6 Y-12 Alternative C-38
C.4.7 Chemical Accident Frequency and Consequences – CPC C-38
C.5 Radiological Accident Scenarios – CUC C-40
C.5.1 Accident Scenarios C-40
C.5.2 Estimated Health Effects C-44
C.5.3 Involved Worker Impacts C-49
C.5.4 CUC Chemical Accident Frequency and Consequences C-50
C.6 Accident Scenarios—A/D/HE Center C-51
C.6.1 Radiological Accident Scenarios C-51
C.6.2 Chemical Accident Scenarios C-57

C.7 Transportation Radiological Accidents.....C-59

APPENDIX D: SUMMARY OF PUBLIC SCOPING COMMENTS D-1
D.1 Public Scoping Process D-1
D.2 Issue Identification and Comment Disposition D-2
D.3 Scoping Process Results D-6

APPENDIX E: ADDITIONAL PROJECT DETAILS.....E-1
E.1 Introduction E-2
E.2 History of Activities E-2
E.3 Los Alamos National Laboratory E-4
E.4 Sandia National Laboratory.....E-7
E.4.1 Surface Water Monitoring E-8
E.4.2 Groundwater Monitoring E-9
E.5 Communities along the Rio Grande E-13
E.5.1 City of Albuquerque Drinking Water Supply Project (CABQ and USBR 2004).....E-14
E.5.2 U.S. Forest Service Buckman Water Diversion Project (USFS 2004)..E-16
E.5.3 City of Española Drinking Water Project (BOR and CE 2002) E-18
E.6 Conclusion.....E-18
References specific to Appendix E E-20

APPENDIX F: PROJECT NOTICES F-1

APPENDIX G: NEPA DISCLOSURE STATEMENT G-1

VOLUME III – COMMENT RESPONSE DOCUMENT, CHAPTERS 1 THROUGH 3

COMMENT RESPONSE DOCUMENT, CHAPTER 1: PUBLIC COMMENT PROCESS 1-1
1.1 Introduction..... 1-1
1.2 Public Hearing Format..... 1-3
1.3 Organization of this Comment Response Document..... 1-4
1.4 How to Use this Comment Response Document..... 1-5
1.5 Major Comments Received During the Public Comment Period on the Draft Complex Transformation SPEIS 1-5
1.6 Major Changes from the Draft Complex Transformation SPEIS..... 1-7

COMMENT RESPONSE DOCUMENT, CHAPTER 2: COMMENT DOCUMENTS 2-1

COMMENT RESPONSE DOCUMENT, CHAPTER 3: COMMENT SUMMARIES AND RESPONSES..... 3-1

List of Figures

VOLUME I – CHAPTERS 1 THROUGH 4

CHAPTER 1

Figure 1-1 Nuclear Weapons Complex Sites and Current Major Responsibilities 1-2
Figure 1-2 Simplified Modern Nuclear Weapon 1-7
Figure 1.6-1 Public Involvement Process 1-19
Figure 1.6-2 Public Hearing Locations and Dates 1-22

CHAPTER 2

Figure 2-1 Policy Perspective of the Stockpile Stewardship Program and Complex Transformation 2-4
Figure 2-2 Transition to the New Triad 2-11

CHAPTER 3

Figure 3.1-1 Programmatic Alternatives 3-4
Figure 3.1-2 Alternatives to Restructure R&D and Testing Facilities 3-6
Figure 3.3.1-1 Facility Construction History within the Current Complex 3-18
Figure 3.3.1-2 Footprint Reductions in the Complex Due to Mission Changes 3-18
Figure 3.3.1-3 Possible Footprint Reductions in the Complex Due to Mission Changes ... 3-19
Figure 3.4.1-1 Generic Layout of a CPC 3-26
Figure 3.4.1-2 Los Alamos CPC Reference Location 3-32
Figure 3.4.1-3 NTS CPC Reference Location 3-32
Figure 3.4.1-4 Pantex CPC Reference Location 3-33
Figure 3.4.1-5 SRS CPC Reference Location 3-33
Figure 3.4.1-6 Y-12 CPC Reference Location 3-34
Figure 3.4.1-7 TA-55 site plan showing the Proposed CMRR and Manufacturing Annex Facilities 3-36
Figure 3.4.2-1 Artist's Rendering of the UPF Adjacent to the HEUMF 3-39
Figure 3.4.2-2 Proposed Location of a UPF at Y-12 3-40
Figure 3.5.1-1 Generic Layout of the CNPC 3-48
Figure 3.5.1-2 Los Alamos CNPC Reference Locations 3-55
Figure 3.5.1-3 NTS CNPC Reference Locations 3-56
Figure 3.5.1-4 Pantex CNPC Reference Location 3-58
Figure 3.5.1-5 SRS CNPC Reference Location 3-59
Figure 3.5.1-6 Y-12 CNPC Reference Location 3-60
Figure 3.5.2-1 Generic Layout of the CNC 3-62
Figure 3.7-1 Location of Superblock (Building 332) and Decontamination and Waste Treatment Facility (DWTF) at LLNL 3-77
Figure 3.7-2 Pit Storage at Pantex 3-78
Figure 3.7-3 Typical Storage Igloos at Pantex 3-79
Figure 3.7-4 Simplified Illustration of a pit with AL-R8 storage container 3-79
Figure 3.7-5 Major Technical Areas (TAs) at LANL, including TA-55 3-81
Figure 3.8-1 The LLNL HEAF 3-86

Figure 3.8-2 Relevant Zones at Pantex for HE R&D 3-89
Figure 3.8-3 Explosive Component Facility (ECF); SNL/NM Bldg 905 3-90
Figure 3.8-4 SNL/NM Technical Areas 3-91
Figure 3.8-5 New Construction Location for LANL Consolidation Alternative 3-96
Figure 3.8-6 Location for New HE R&D Facility at LLNL 3-97
Figure 3.9-1 LLNL Tritium Facility 3-101
Figure 3.9-2 Aerial Photo of the WETF 3-102
Figure 3.9-3 Aerial Photo of SRS Tritium Facilities 3-102
Figure 3.10-1 Location of TTR and NTS 3-107
Figure 3.10-2 HTM Upgrade Alternative 3-108
Figure 3.10-3 Location of White Sands Missile Range 3-111
Figure 3.10-4 Potential Flight Test Target Locations at NTS 3-112
Figure 3.11-1 Locations of B801, B812, B850, and B851 at Site 300 3-114
Figure 3.11-2 The Contained Firing Facility at the LLNL Site 300 Building 801 Complex 3-115
Figure 3.11-3 TA-15 at LANL 3-116
Figure 3.11-4 The DARHT at LANL 3-117
Figure 3.11-5 Potential Locations of “CFF-Like” Replacement Facility at LANL 3-120
Figure 3.12-1 Photos of Building 334, Hardened Engineering Test Building (left to right): view of environmental test facilities bay and view of INRAD bay 3-124
Figure 3.12-2 Drop Tower Facility at SNL/NM 3-125
Figure 3.12-3 The U1a Complex Environmental Test Facility at NTS 3-126
Figure 3.13-1 SNL/CA Weapons Support Facilities 3-131

CHAPTER 4

Figure 4.1-1 Location of LANL 4-2
Figure 4.1.1-1 TAs and Key Facilities at LANL 4-3
Figure 4.1.1-2 Generalized Land Use at LANL 4-5
Figure 4.1.5-1 Number of Exceedances of NPDES Outfall Effluent Limits Over the Past 12 Years 4-24
Figure 4.1.5-2 Illustration of Geologic and Hydrologic Relationships in the Los Alamos Area, Showing the Three Modes of Groundwater Occurrence 4-26
Figure 4.1.6-1 Mapped Faults in the LANL Area 4-30
Figure 4.1.9-1 Region of Influence for Socioeconomic Impacts at LANL 4-41
Figure 4.1.9-2 Trends in Population for LANL ROI, 1990-2005 4-43
Figure 4.1.10-1 Potentially Affected Counties Surrounding LANL Environmental Justice ROI 4-44
Figure 4.1.10-2 Minority Population – Census Tracts with More than 50 Percent Minority Population in a 50-Mile Radius of LANL 4-46
Figure 4.1.10-3 Low-Income Population – Census Tracts with More than 50 Percent Low-Income Population in a 50-Mile Radius of LANL 4-47
Figure 4.1.10-4 Location of New Mexico Indian Pueblo Reservations 4-48
Figure 4.1.12-1 LANL Regional Highway System and Major Roads 4-59
Figure 4.2-1 Livermore Site, Site 300, and SNL/CA 4-64
Figure 4.2.1-1 Livermore Site Surrounding Land Use 4-66
Figure 4.2.1-2 Site 300 Surrounding Land Uses and Land Use Designations 4-67

Figure 4.2.5-1 Livermore Valley Surface Water Features 4-75
Figure 4.2.5-2 Location of Subbasins and Physiographic Features of the Livermore Valley 4-82
Figure 4.2.6-1 Location of the Major Faults Adjacent to the Livermore Site and Site 300 4-87
Figure 4.2.9-1 Region of Influence for LLNL and SNL/CA 4-104
Figure 4.2.9-2 Trends in Population for LLNL ROI, 1990-2005 4-106
Figure 4.2.10-1 Potentially Affected Counties Surrounding LLNL Environmental Justice ROI 4-107
Figure 4.2.10-2 Minority Population–Census Tracts with More than 50 Percent Minority Population in a 50-Mile Radius of LLNL 4-109
Figure 4.2.10-3 Low-Income Population–Census Tracts with More than 50 Percent Low-Income Population in a 50-Mile Radius of LLNL 4-110
Figure 4.2.10-4 Location of Tribes in Relation to LLNL and Site 300 4-111
Figure 4.2.12-1 Regional Transportation Network with Traffic Counts 4-118
Figure 4.3-1 Location of NTS 4-130
Figure 4.3.1-1 Land Use at NTS 4-133
Figure 4.3.4-1 Annual Climatological Wind Rose Patterns at 11 NTS MEDA Stations from Wind Data Gathered, 1984 to 2004 4-137
Figure 4.3.5-1 Basin and Range Physiographic Province and Great Basin Hydrologic Province 4-141
Figure 4.3.5-2 Closed Hydrographic Subbasins on the NTS 4-142
Figure 4.3.5-3 Natural Water Sources on the NTS 4-143
Figure 4.3.5-4 Groundwater Subbasins of the NTS and Vicinity 4-145
Figure 4.3.5-5 Areas of potential groundwater contamination on the NTS 4-146
Figure 4.3.6-1 Topography at NTS and Vicinity 4-149
Figure 4.3.6-2 Major Fault Systems and Historic Earthquakes in NTS Region 4-150
Figure 4.3.7-1 Distribution of Plant Alliances on the NTS 4-157
Figure 4.3.8-1 Prehistoric Petroglyph from Fortymile Canyon on NTS 4-160
Figure 4.3.9-1 Region of Influence for Socioeconomic Impacts at NTS 4-161
Figure 4.3.9-2 Trends in Population for NTS ROI, 1990-2005 4-163
Figure 4.3.10-1 Potentially Affected Counties Surrounding NTS Environmental Justice ROI 4-164
Figure 4.3.10-2 Minority Population – Census Tracts with More than 50 Percent Minority Population in a 50-Mile Radius of NTS 4-166
Figure 4.3.10-3 Low-Income Population – Census Tracts with More than 50 Percent Low-Income Population in a 50-Mile Radius of NTS 4-167
Figure 4.3.10-4 Location of Tribes within Vicinity of or with Interest in NTS 4-168
Figure 4.3.12-1 Roads in the Vicinity of NTS 4-176
Figure 4.4-1 Location of the TTR 4-181
Figure 4.4.6-1 Clean Slate 1, 2, and 3 4-192
Figure 4.4.9-1 Region of Influence for Socioeconomic Impacts at TTR 4-200
Figure 4.4.9-2 Trends in Population for TTR ROI, 1990-2005 4-201
Figure 4.4.10-1 Potentially Affected Counties Surrounding TTR Socioeconomic ROI 4-202
Figure 4.4.10-2 Minority Population – Census Tracts with More than 50 Percent Minority Population in a 50-Mile Radius of TTR 4-204

Figure 4.4.10-3 Low-Income Population – Census Tracts with More than 50 Percent Low-Income Population in a 50-Mile Radius of TTR 4-205
Figure 4.4.10-4 Location of Tribes within Vicinity of or with Interest in TTR 4-206
Figure 4.4.12-1 Roads in the Vicinity of TTR 4-212
Figure 4.5-1 Location of the Pantex 4-217
Figure 4.5.1-1 Generalized Land Use at Pantex and Vicinity 4-218
Figure 4.5.1-2 Principal Features of Pantex 4-219
Figure 4.5.5-1 Drainage Basins, Playas, and Outfalls at Pantex Plant 4-226
Figure 4.5.9-1 Region of Influence for Socioeconomic Impacts at Pantex 4-243
Figure 4.5.9-2 Trends in Population for the Pantex ROI, 1990-2005 4-245
Figure 4.5.10-1 Potentially Affected Counties Surrounding Pantex Environmental Justice 4-246
Figure 4.5.10-2 Minority Population – Census Tracts with More than 50 Percent Minority Population in a 50-Mile Radius of Pantex 4-248
Figure 4.5.10-3 Low-Income Population – Census Tracts with More than 50 Percent Low-Income Population in a 50-Mile Radius of Pantex 4-249
Figure 4.5.10-4 Location of Tribes within Vicinity of or with Interest in Pantex 4-250
Figure 4.5.12-1 Roads in the Vicinity of Pantex 4-259
Figure 4.6-1 Location of SNL/NM 4-264
Figure 4.6.4-1 Locations of the 15 Facilities at SNL/NM that Provided Radionuclide Release Inventories in 2004 4-270
Figure 4.6.5-1 Conceptual Diagram of the Underlying Groundwater System at SNL/NM 4-273
Figure 4.6.6-1 Regional Faults at KAFB 4-276
Figure 4.6.7-1 Vegetation Types at SNL/NM 4-278
Figure 4.6.9-1 Region of Influence for Socioeconomic Impacts at SNL/NM 4-283
Figure 4.6.9-2 Trends in Population for the SNL/NM ROI, 1990-2005 4-284
Figure 4.6.10-1 Potentially Affected Counties Surrounding SNL/NM Environmental Justice 4-286
Figure 4.6.10-2 Minority Population – Census Tracts with More than 50 Percent Minority Population in a 50-Mile Radius of SNL/NM 4-288
Figure 4.6.10-3 Low-Income Population – Census Tracts with More than 50 Percent Low-Income Population in a 50-Mile Radius of SNL/NM 4-289
Figure 4.6.10-4 Location of New Mexico Indian Pueblo Reservations 4-290
Figure 4.6.12-1 Major Roads at SNL/NM 4-300
Figure 4.7-1 Map of White Sands Missile Range 4-303
Figure 4.7.1-1 Map of White Sands Missile Range showing Defense Threat Reduction Agency Test Beds 4-304
Figure 4.7.1-2 Land Use in the Vicinity of White Sands Missile Range 4-306
Figure 4.7.6-1 Tectonic Map of Southern New Mexico and Texas 4-316
Figure 4.7.7-1 Major Vegetation Types on White Sands Missile Range 4-318
Figure 4.7.7-2 Springs Near Defense Threat Reduction Agency Test Beds on White Sands Missile Range 4-319
Figure 4.7.9-1 Region of Influence for Socioeconomic Impacts at WSMR 4-325
Figure 4.7.9-2 Trends in Population for the WSMR ROI, 1990-2005 4-327

Figure 4.7.10-1 Potentially Affected Counties Surrounding WSMR Environmental Justice ROI 4-328
Figure 4.7.10-2 Minority Population – Census Tracts with More than 50 Percent Minority Population in a 50-Mile Radius of WSMR 4-330
Figure 4.7.10-3 Low-Income Population – Census Tracts with More than 50 Percent Low-Income Population in a 50-Mile Radius of WSMR 4-331
Figure 4.7.10-4 Location of New Mexico Indian Pueblo Reservations 4-332
Figure 4.7.12-1 Roads in the Vicinity of White Sands Missile Range 4-339
Figure 4.8-1 Location of SRS 4-342
Figure 4.8.5-1 Water Resources at SRS 4-348
Figure 4.8.9-1 Region of Influence for Socioeconomic Impacts at SRS 4-359
Figure 4.8.9-2 Trends in Population for the SRS ROI, 1990-2005 4-361
Figure 4.8.10-1 Potentially Affected Counties Surrounding SRS Environmental Justice .. 4-362
Figure 4.8.10-2 Minority Population – Census Tracts with More than 50 Percent Minority Population in a 50-Mile Radius of SRS 4-364
Figure 4.8.10-3 Low-Income Population – Census Tracts with More than 50 Percent Low-Income Population in a 50-Mile Radius of SRS 4-365
Figure 4.8.10-4 Location of Tribes within Vicinity of or with Interest in SRS 4-366
Figure 4.8.12-1 Roads in the Vicinity of the SRS 4-377
Figure 4.9-1 Location of the Y-12 Site 4-384
Figure 4.9.1-1 Y-12 Site Map 4-387
Figure 4.9.9-1 Region of Influence for Socioeconomic Impacts at Y-12 4-405
Figure 4.9.9-2 Trends in Population for the Y-12 ROI, 1990-2005 4-407
Figure 4.9.10-1 Potentially Affected Counties Surrounding Y-12 Environmental Justice 4-408
Figure 4.9.10-2 Minority Population – Census Tracts with More than 50 Percent Minority Population in a 50-Mile Radius of Y-12 4-410
Figure 4.9.10-3 Low-Income Population – Census Tracts with More than 50 Percent Low-Income Population in a 50-Mile Radius of Y-12 4-411
Figure 4.9.10-4 Location of Tribes within Vicinity of or with Interest in Y-12 4-412
Figure 4.9.12-1 Roads in the Vicinity of ORR 4-420

VOLUME II – CHAPTERS 5 THROUGH 15 AND APPENDICES A THROUGH G

CHAPTER 5

Figure 5.12-1 Zone 4 and Zone 12—Pantex 5-397
Figure 5.13-1 New Construction Location–LANL Consolidation Alternative 5-411
Figure 5.13-2 Location for New HE R&D Facility at LLNL 5-418
Figure 5.13-3 Zone 11 and Zone 12 at Pantex 5-427
Figure 5.13-4 SNL Technical Areas 5-430
Figure 5.13-5 NTS Location for HE R&D Facility 5-438
Figure 5.15-1 Average Annual Salaries of TTR Workforce 5-455
Figure 5.15-2 Percentage of TTR-Employee Dependents at Certain Stages of Schooling System 5-456
Figure 5.15-3 Types of TTR Employee Housing 5-458

Figure 5.15-4 Potential Housing Changes with Transfer of Operations–TTR 5-459
Figure 5.15-5 CNRSA Percent Age Distribution, 2007 5-460
Figure 5.15-6 Percent Employment by Occupation in Tonopah Compared to the ROI, 2007..... 5-461
Figure 5.17-1 Location of New Facilities for Consolidation at NTS 5-494

CHAPTER 6

Figure 6.4-1 Location of WIPP in Eddy County, New Mexico 6-15
Figure 6.4-2 Location of the National Enrichment Facility 6-17
Figure 6.4-3 Location of All Four Major Facilities Addressed 6-18

APPENDIX A

Figure A.1.2-1 Generic Layout of a CPC A-8
Figure A.2-1 Artist's Rendering of the UPF Adjacent to the HEUMF A-13
Figure A.2-2 Location of the UPF Relative to Other Buildings at Y-12 ..... A-16
Figure A.3-1 Generic Layout of the CNPC A-23
Figure A.4-1 NTS CNPC Reference Location A-28
Figure A.5.1-1 Decontamination and Waste Treatment Facility at LLNL A-30
Figure A.5.1-2 Location of Building 332 and the DWTF at LLNL A-31
Figure A.5.1-3 Location of Waste Management Areas at LLNL A-32
Figure A.5.1-4 Major Technical Areas at LANL, including TA-55 Plutonium Facility Complex A-34
Figure A.5.1-5 Plutonium Facility at TA-55 ..... A-35
Figure A.6.1-1 The LLNL HEAF A-37
Figure A.6.1-2 Chemistry Area at Site 300, providing scale up of formulation and synthesis of HE A-38
Figure A.6.1-3 A portion of the Process Area at Site 300 ..... A-38
Figure A.6.1-4 LANL Technical Areas A-39
Figure A.6.1-5 Relevant Zones at Pantex for HE R&D A-42
Figure A.6.1-6 Explosives Component Facility (ECF); SNL/NM Bldg 905 ..... A-43
Figure A.6.1-7 SNL/NM Technical Areas A-44
Figure A.7.1-1 LLNL Tritium Facility within Superblock A-45
Figure A.7.1-2 Aerial Photo of the WETF A-46
Figure A.7.1-3 Aerial Photo of SRS Tritium Facilities A-47
Figure A.7.1-4 Neutron Generator Production Facility at SNL/NM A-48
Figure A.8.1 Location of TTR and its proximity to NTS A-49
Figure A.8-2 HTM Upgrade Alternative A-54
Figure A.8-3 Location of WSMR A-59
Figure A.8-4 Potential Flight Test Sites at NTS A-65
Figure A.8-5 CP-40 includes administrative areas and a high bay that would be useful for personnel and assembling test hardware A-66
Figure A.8-6 CP-20 is an ideal facility for housing the electronics for the Flight Test Program A-66
Figure A.9-1 Locations of B801, B812, B850, and B851 at Site 300 Building 801 Complex A-72
Figure A.9-2 The Contained Firing Facility at the Building 801 Complex A-73

Figure A.9-3 TA-15 at LANL A-77
Figure A.9-4 The DARHT at LANL. A-78
Figure A.9-5 Potential Locations of "CFF-Like" Replacement Facility at LANL A-81
Figure A.10-1 Location of LANL ETFs A-86
Figure A.10-2 Building 334 in Superblock at LLNL A-91
Figure A.10-3 Build. 834 Complex and Build. 836 Complex at Site 300 ..... A-93
Figure A.10-4 Building 836 Complex at LLNL A-95
Figure A.10-5 ETF Facilities at SNL/NM A-96
Figure A.10-6 Sandia Pulsed Reactor A-101
Figure A.10-7 Low Dose Rate Gamma Irradiation Facility A-106
Figure A.10-8 25-Foot Centrifuge A-112
Figure A.10-9 Sled Track Facility A-116
Figure A.10-10 Mobile Laser Tracker A-119
Figure A.10-11 Mobile Instrument Unit A-119
Figure A.10-12 Mechanical Shock Facility Pneumonic Actuator and Sled Track A-120
Figure A.10-13 Vibration-Acoustics and Mass Properties Facility A-122
Figure A.10-14 Mobile Guns Complex A-124
Figure A.10-15 DAF at NTS A-129
Figure A.10-16 U1a Complex at NTS A-130

APPENDIX D

Figure D.1-1 NEPA Process D-1
Figure D.1-2 Public Scoping Meeting Locations and Dates D-2

APPENDIX E

Figure E.1-1 Geographic Layout of Streams, Mountain Ranges and Communities Along the Rio Grande E-3
Figure E.3-1 Major Liquid Release Sources at LANL E-5
Figure E.4-1 Map of SNL E-8
Figure E.4-2 Conceptual Diagram of Groundwater Systems Underlying KAFB E-10
Figure E.5-1 Map of Paseo del Norte Diversion Structure for the CABQ Drinking Water Supply Project E-15
Figure E.5-2 Map of Proposed Buckman Water Diversion Project E-17

VOLUME III – COMMENT RESPONSE DOCUMENT, CHAPTERS 1 THROUGH 3

COMMENT RESPONSE DOCUMENT, CHAPTER 1

Figure 1.1-1 Public Hearing Locations and Dates 1-2

List of Tables

VOLUME I – CHAPTERS 1 THROUGH 4

CHAPTER 3

Table 3.2.1-1 Current Major Missions–LANL 3-8
Table 3.2.2-1 Current Major Missions–LLNL 3-8
Table 3.2.3-1 Current Major Missions–Nevada Test Site 3-10
Table 3.2.5-1 Current Major Missions–Pantex 3-11
Table 3.2.6-1 Current Major Missions–SNL 3-12
Table 3.2.8-1 Current Major Missions–Savannah River Site 3-13
Table 3.2.9-1 Current Major Missions–Y-12 3-14
Table 3.4-1 Land Requirements—CPC Alternatives 3-22
Table 3.4.1-1 Dimensions for the CPC 3-25
Table 3.4.1-2 CPC Construction Requirements 3-27
Table 3.4.1-3 CPC Operations Annual Requirements 3-28
Table 3.4.1-4 CPC Operations Annual Waste Volumes 3-28
Table 3.4.1-5 Origins, Destinations, and Material Shipped to Support the CPC 3-29
Table 3.4.1-6 Phaseout of NNSA Plutonium Operations at LANL 3-30
Table 3.4.1-7 Construction Requirements for the Los Alamos Upgrade Alternative 3-36
Table 3.4.1-8 Los Alamos 50/80 Alternative Construction Requirements 3-38
Table 3.4.1-9 Los Alamos 50/80 Alternative Annual Operating Requirements 3-38
Table 3.4.1-10 Los Alamos 50/80 Alternative Waste Volumes 3-38
Table 3.4.2-1 UPF (based on a HEUMF) Construction Requirements and Estimated Waste Volumes 3-41
Table 3.4.2-2 UPF Annual Operation Requirements and Estimated Waste Volumes 3-42
Table 3.4.3-1 Construction Data for Upgrading Existing Uranium Facilities 3-43
Table 3.5-0 Schedule for Consolidated Centers of Excellence Facilities 3-45
Table 3.5-1 Land Requirements to Operate a CNPC 3-45
Table 3.5-2 Land Requirements to Operate a CNC 3-45
Table 3.5-3 Land Requirements for CUC 3-46
Table 3.5.1-1 CUC Construction Requirements and Estimated Waste Volumes 3-49
Table 3.5.1-2 CUC Annual Operation Requirements and Estimated Waste Volumes 3-50
Table 3.5.1-3 Land Requirements for A/D/HE Center 3-51
Table 3.5.1-4 A/D/HE Construction Requirements 3-51
Table 3.5.1-5 A/D/HE Operation Requirements and Estimated Waste Volumes 3-53
Table 3.5.1-6 Origins, Destinations, and Material Shipped to Support the CNPC 3-54
Table 3.5.1-7 A/D/HE Center Construction Requirements at NTS 3-57
Table 3.5.2-1 Alternative Configurations of the CNC 3-61
Table 3.6.1-1 Annual Operation Requirements and Estimated Waste Volumes for the Capability-Based Alternative at Pantex Compared to the No Action Alternative 3-66
Table 3.6.1-2 Annual Operation Requirements and Estimated Waste Volumes for the Capability-Based Alternative at Y-12 Compared to the No Action Alternative 3-67

Table 3.6.1-3 Annual Operation Requirements and Waste Volumes for the Capability Based Operations Alternative at SRS Compared to Other Tritium Activity Levels 3-68
Table 3.6.3.4-1 Annual Operation Requirements at Pantex for a No Net Production/Capability-Based Alternative 3-70
Table 3.6.3.7-1 Annual Operation Requirements for the Y-12 No Net Production/Capability-Based Alternative 3-72
Table 3.7-1 Category I/II SNM at LLNL 3-82
Table 3.7-2 Construction Requirements for New Zone 12 Pit Storage Facility 3-84
Table 3.8-1 HE R&D Alternatives 3-92
Table 3.10.3-1 Options for the Campaign Mode Operation of TTR 3-109
Table 3.12-1 ETFs at LANL, SNL/NM, LLNL, and NTS 3-123
Table 3.12-2 ETF Closures for the Downsize in Place Alternative 3-126
Table 3.12-3 ETF Closures for the NTS Consolidation Alternative 3-127
Table 3.12-4 ETF Closures for the SNL Consolidation Alternative 3-129
Table 3.16-1 Comparison of Environmental Impacts Among Programmatic Alternatives 3-155
Table 3.16-2 Summary of Impact Comparison of SNM Consolidation: Transfer SNM from LLNL 3-180
Table 3.16-3 Summary of Impact Comparison of SNM Consolidation: Transfer SNM from Pantex Zone 4 to Zone 12 3-181
Table 3.16-4 Summary of Impact Comparison of Tritium R&D Alternatives 3-182
Table 3.16-5 Summary of Impact Comparison of HE R&D Alternatives 3-183
Table 3.16-6 Summary of Impact Comparison of Flight Testing Alternatives 3-185
Table 3.16-7 Summary of Impact Comparison of Hydrodynamic Testing Alternatives 3-186
Table 3.16-8 Summary Comparison of Major Environmental Test Facilities Alternatives 3-187

CHAPTER 4

Table 4.1.2-1 BLM Visual Resource Management Rating System 4-7
Table 4.1.3-1 LANL Site Infrastructure 4-8
Table 4.1.4-1 Ambient Air Monitoring for Particulate Matter 4-13
Table 4.1.4-2 Emissions of Criteria Pollutants 4-14
Table 4.1.4-3 Operation Permit Emission Limits 4-14
Table 4.1.4-4 Annual Average Background Concentration of Radioactivity in the Regional Atmosphere 4-16
Table 4.1.4-5 Range of Annual Airborne Radioactive Emissions from LANL with Sampled Stacks from 1999 through 2005 (curies) 4-17
Table 4.1.5-1 Selected Water Quality Data for Radioactive Liquid Waste Treatment Facility Effluent in 2005 4-20
Table 4.1.5-2 Surface Water and Sediment Contamination Affected by LANL Operations 4-22
Table 4.1.6-1 Summary of Movement on Faults of the Pajarito Fault System 4-31
Table 4.1.7-1 Protected and Sensitive Species 4-35
Table 4.1.9-1 Labor Force Statistics for the ROI and New Mexico 4-42

Table 4.1.9-2 Income Information for the LANL ROI, 2004 4-42
Table 4.1.9-3 Historic and Projected Population 4-42
Table 4.1.9-4 Housing in the LANL ROI, 2000 4-43
Table 4.1.10-1 Demographic Profile of the Potentially Affected Counties Surrounding LANL, 2000 4-45
Table 4.1.10-2 Population and Employment Estimates for Native American Populations within the Vicinity of or With Interest in LANL, 2000 4-49
Table 4.1.10-3 Level of Educational Attainment by Native American Populations within the Vicinity of or With Interest in LANL, 2000 4-50
Table 4.1.10-4 Income and Poverty Level Estimates for Native American Populations within the Vicinity of or With Interest in LANL, 2000 4-51
Table 4.1.10-5 Housing Characteristics for Native American Populations within the Vicinity of or With Interest in LANL, 2000 4-52
Table 4.1.10-6 Comparison of Human Health Analyses of Radioactive Contamination Including Special Pathway Analysis from 1999 and 2008 LANL SWEIS 4-52
Table 4.1.10-7 Comparison of Total Minority, Hispanic, American Indian, and Low-Income Population and Average Individual Annual Doses 4-53
Table 4.1.10-8 Summary of Ingestion Pathway Doses for Offsite Resident, Recreational User, and Special Pathway Receptors 4-54
Table 4.1.11-1 Radiological Exposures of LANL Workers 4-56
Table 4.1.11-2 Highest Individual Doses to Los Alamos National Laboratory Workers (rem) 4-56
Table 4.1.12-1 Los Alamos National Laboratory Main Access Points 4-57
Table 4.1.12-2 Average Weekday Traffic Volume in the Vicinity of NM 502 and State Road 4 4-58
Table 4.1.12-3 New Mexico Traffic Accidents in Los Alamos and Nearby Counties, 2005 4-58
Table 4.1.13-1 Los Alamos National Laboratory Waste Types and Generation 4-62
Table 4.2.3-1 Baseline Characteristics for LLNL and SNL/CA 4-69
Table 4.2.4-1 Nonradioactive air emissions, Livermore Site and Site 300, 2006 4-72
Table 4.2.5-1 Drinking Water Maximum Contaminant Levels and Livermore Site-Specific Threshold Comparison Guidelines for Radioactive Stormwater Constituents 4-78
Table 4.2.7-1 Species of Special Interest to Federal and State Resource Agencies Known to Occur at the Livermore Site and Site 300 4-96
Table 4.2.9-1 Labor Force Statistics for the ROI and California 4-105
Table 4.2.9-2 Income Information for the LLNL and SLN/CA ROI, 2004 4-105
Table 4.2.9-3 Historic and Projected Population 4-105
Table 4.2.9-4 Housing in the LLNL ROI 4-106
Table 4.2.10-1 Demographic Profile of the Potentially Affected Area Surrounding LLNL and SNL/CA, 2000 4-108
Table 4.2.10-2 Population and Employment Estimates for Native American Populations within the Vicinity of or With Interest in LLNL, 2000 4-112
Table 4.2.10-3 Level of Educational Attainment by Native American Populations within the Vicinity of or With Interest in LLNL, 2000 4-113

Table 4.2.10-4 Income and Poverty Level Estimates for Native American Populations within the Vicinity of or With Interest in LLNL, 2000 4-114
Table 4.2.10-5 Housing Characteristics for Native American Populations within the Vicinity of or With Interest in LLNL, 2000 4-114
Table 4.2.11-1 Calculated Radiation Doses to the General Public from Normal Operations at LLNL Main Site, 2005 (Committed Effective Dose Equivalent) 4-115
Table 4.2.11-2 Calculated Radiation Doses to the General Public from Normal Operations at Site 300, 2005 (Committed Effective Dose Equivalent) 4-116
Table 4.2.12-1 Daily Traffic Volumes in the LLNL and SNL/CA Vicinity 4-119
Table 4.2.12-2 Three-Year Accident Rates for Roads Adjacent to the Livermore Site, Site 300, and SNL/CA (1999 through 2001) 4-121
Table 4.2.13-1 Livermore Site Waste Management Facilities and Capacities 4-123
Table 4.2.13-2 Routine Hazardous and Radioactive Waste at LLNL, FY 2004–2006 4-125
Table 4.2.13-3 Routine Hazardous and Radioactive Waste at SNL/CA, FY 1996-2000 4-125
Table 4.2.13-4 Routine Nonhazardous Waste in FY 2006, Livermore Site and Site 300 4-126
Table 4.2.13-5 Nonroutine Nonhazardous Waste in FY 2006, Livermore Site and Site 300 4-127
Table 4.2.13-6 Total Nonhazardous Waste Sent to Landfills in 2006 4-129
Table 4.3.1-1 NTS Land Use Zones 4-131
Table 4.3.2-1 BLM Visual Resource Management Rating System 4-134
Table 4.3.3-1 Baseline Characteristics for NTS 4-135
Table 4.3.4-1 NTS Nonradiological Annual Air Emissions 4-137
Table 4.3.4-2 Radiological atmospheric releases from NTS for 2005 4-138
Table 4.3.9-1 Labor Force Statistics for ROI and Nevada 4-162
Table 4.3.9-2 Income Information for the NTS ROI, 2004 4-162
Table 4.3.9-3 Historic and Projected Population 4-162
Table 4.3.9-4 Housing in the NTS ROI, 2000 4-163
Table 4.3.10-1 Demographic Profile of the Potentially Affected Counties Surrounding NTS, 2000 4-165
Table 4.3.10-2 Population and Employment Estimates Native American Populations within the Vicinity of or With Interest in NTS, 2000 4-169
Table 4.3.10-3 Level of Educational Attainment by Native American Populations within the Vicinity of or With Interest in NTS, 2000 4-170
Table 4.3.10-4 Income and Poverty Level Estimates for Native American Populations within the Vicinity of or With Interest in NTS, 2000 4-171
Table 4.3.10-5 Housing Characteristics for Native American Populations within the Vicinity of or With Interest in NTS, 2000 4-171
Table 4.3.11-1 Estimated Radiological Dose to the General Public from NTS Operations, 2006 4-173
Table 4.3.11-2 Radiation Doses to Workers from Normal NTS Operations in 2005 (Total Effective Dose Equivalent) 4-173
Table 4.3.12-1 Traffic Volume at the Main Access Road to NTS 4-174
Table 4.3.12-2 Nevada Traffic Accidents in Clark and Nearby Counties, 2002 4-175
Table 4.3.13-1 Annual Routine Waste Amounts 4-177

Table 4.4.2-1 BLM Visual Resource Management Rating System 4-183
Table 4.4.3-1 Baseline Characteristics for TTR 4-184
Table 4.4.5-1 Water Rights Status for Hydrographic Basins at the TTR 4-188
Table 4.4.7-1 Specific Plants and Characteristics of Basic Vegetation Types at TTR 4-194
Table 4.4.7-2 Federal and State Listed Species Occurring within Nye County and having the Potential to Occur at TTR 4-195
Table 4.4.9-1 Labor Force Statistics for ROI and Nevada 4-199
Table 4.4.9-2 Income Information for the TTR ROI, 2004 4-199
Table 4.4.9-3 Historic and Projected Population 4-200
Table 4.4.9-4 Housing in the TTR ROI 4-201
Table 4.4.10-1 Demographic Profile of the Potentially Affected Area Surrounding TTR, 2000 4-203
Table 4.4.10-2 Population and Employment Estimates for Native American Populations within the Vicinity of or With Interest in TTR, 2000 4-207
Table 4.4.10-3 Level of Educational Attainment by Native American Populations within the Vicinity of or With Interest in TTR, 2000 4-208
Table 4.4.10-4 Income and Poverty Level Estimates for Native American Populations within the Vicinity of or With Interest in TTR, 2000 4-209
Table 4.4.10-5 Housing Characteristics for Native American Populations within the Vicinity of or With Interest in TTR, 2000 4-210
Table 4.4.13-1 TTR RCRA Regulated Hazardous Waste Shipped Off-site, 2006 4-213
Table 4.4.13-2 Non-RCRA Regulated Hazardous or Toxic Waste Shipped Off-site, 2006 4-214
Table 4.4.13-3 Recycled Regulated Hazardous or Toxic Waste Shipped Off-site, 2006 4-214
Table 4.4.13-4 Waste Capacities at TTR, 2006 4-214
Table 4.5.2-1 BLM Visual Resource Management Rating System 4-220
Table 4.5.3-1 Baseline Characteristics for Pantex 4-221
Table 4.5.4-1 Average Pantex Radiological Atmospheric Emissions in Curies 4-223
Table 4.5.5-1 Annual Stormwater Results (metals), 2005 (mg/l) 4-227
Table 4.5.5-2 Groundwater Monitoring Results From the Perched Aquifer System 4-231
Table 4.5.5-3 Groundwater Monitoring Results From the Ogallala Aquifer System 4-232
Table 4.5.7-1 Rare or Federal and State Listed Species Potentially Occurring at Pantex 4-239
Table 4.5.9-1 Labor Force Statistics for ROI and Texas 4-244
Table 4.5.9-2 Income Information for the Pantex ROI, 2004 4-244
Table 4.5.9-3 Historic and Projected Population 4-244
Table 4.5.9-4 Housing in the Pantex ROI, 2000 4-245
Table 4.5.10-1 Demographic Profile of the Potentially Affected Area Surrounding Pantex, 2000 4-247
Table 4.5.10-2 Population and Employment Estimates for Native American Populations within the Vicinity of or With Interest in Pantex, 2000 4-251
Table 4.5.10-3 Level of Educational Attainment by Native American Populations within the Vicinity of or With Interest in Pantex, 2000 4-252
Table 4.5.10-4 Income and Poverty Level Estimates for Native American Populations within the Vicinity of or With Interest in Pantex, 2000 4-253

Table 4.5.10-5 Housing Characteristics for Native American Populations within the Vicinity of or With Interest in Pantex, 2000 4-254
Table 4.5.11-1 Radiation Doses to the Public from Normal Pantex Operations in 2004 (Total Effective Dose Equivalent) 4-256
Table 4.5.11-2 Radiation Doses to Workers From Normal Pantex Operations in 2005 (Total Effective Dose Equivalent) 4-256
Table 4.5.12-1 Texas Traffic Accidents in Nearby Counties, 2001 4-258
Table 4.5.13-1 Waste Volumes Generated at Pantex (yd^3) 4-261
Table 4.6.3-1 Baseline Characteristics for SNL/NM and KAFB Site 4-266
Table 4.6.4-1 Average Annual Wind Speed, Temperature, and Precipitation Minimum and Maximum Values for SNL/NM 4-267
Table 4.6.4-2 Criteria Pollutant Results as Compared to Regulatory Standards, 2005 4-269
Table 4.6.4-3 Summary of Radionuclide Releases from the 15 NESHAP Sources in 2004 4-269
Table 4.6.4-5 Peak Attenuated Noise Levels (in decibels [dBA]) Expected from Operation of Construction Equipment 4-271
Table 4.6.7-1 Threatened and Endangered Species Potentially Occurring at KAFB 4-279
Table 4.6.8-1 Known Prehistoric and Historic Archaeological Sites by Land Owner 4-281
Table 4.6.9-1 Labor Force Statistics for ROI and New Mexico 4-283
Table 4.6.9-2 Income Information for the SNL/NM ROI, 2004 4-284
Table 4.6.9-3 Historic and Projected Population 4-284
Table 4.6.9-4 Housing in the SNL/NM ROI, 2000 4-285
Table 4.6.10-1 Demographic Profile of the Potentially Affected Area Surrounding SNL/NM, 2000 4-286
Table 4.6.10-2 Population and Employment Estimates for Native American Populations within the Vicinity of or With Interest in SNL/NM, 2000 4-291
Table 4.6.10-3 Level of Educational Attainment by Native American Populations within the Vicinity of or With Interest in SNL/NM, 2000 4-292
Table 4.6.10-4 Income and Poverty Level Estimates for Native American Populations within the Vicinity of or With Interest in SNL/NM, 2000 4-293
Table 4.6.10-5 Housing Characteristics for Native American Populations within the Vicinity of or With Interest in SNL/NM, 2000 4-294
Table 4.6.11-1 Radiological Dose Reporting, 2005 4-296
Table 4.6.11-2 Average, Maximally Exposed Individual (MEI) and Collective Radiation-Badged Worker Doses 4-296
Table 4.6.11-3 Comparison of Nonfatal Injury/Illness and Lost Work Day Case Rates 4-296
Table 4.6.12-1 Daily Gate Traffic Estimates for SNL/NM Activities at KAFB 4-297
Table 4.6.12-2 New Mexico Traffic Accidents in Bernalillo and Nearby Counties, 2005 4-298
Table 4.6.13-1 Waste Generated and Shipped By the HWMF in 2005 4-301
Table 4.7.2-1 BLM Visual Resource Management Rating System 4-308
Table 4.7.7-1 Federal and State Listed Species Potentially Occurring at WSMR 4-320
Table 4.7.9-1 Labor Force Statistics for ROI and New Mexico 4-325
Table 4.7.9-2 Income Information for the WSMR ROI, 2004 4-326
Table 4.7.9-3 Historic and Projected Population 4-326
Table 4.7.9-4 Housing in the WSMR ROI, 2000 4-327

Table 4.7.10-1 Demographic Profile of the Potentially Affected Area Surrounding WSMR, 2000 4-329
Table 4.7.10-2 Population and Employment Estimates for Native American Populations within the Vicinity of or With Interest in WSMR, 2000 4-333
Table 4.7.10-3 Level of Educational Attainment by Native American Populations within the Vicinity of or With Interest in WSMR, 2000 4-334
Table 4.7.10-4 Income and Poverty Level Estimates for Native American Populations within the Vicinity of or with Interest in WSMR, 2000 4-335
Table 4.7.10-5 Housing Characteristics for Native American Populations within the Vicinity of or With Interest in WSMR, 2000 4-336
Table 4.8.3-1 SRS Site Infrastructure Characteristics....4-344
Table 4.8.4-1 2005 Criteria Pollutant Air Emissions 4-345
Table 4.8.4-2 National Ambient Air Quality Standards and 2005 Background Ambient Air Concentration....4-346
Table 4.8.7-1 Listed Federal- and State-Threatened and Endangered Species that Occur or May Occur at the SRS, South Carolina 4-356
Table 4.8.9-1 Labor Force Statistics for ROI, South Carolina, and Georgia 4-359
Table 4.8.9-2 Income Information for the SRS ROI, 2004....4-360
Table 4.8.9-3 Historic and Projected Population 4-360
Table 4.8.9-4 Housing in the SRS ROI, 2000....4-361
Table 4.8.10-1 Population in Potentially Affected Counties Surrounding SRS, 2000 4-363
Table 4.8.10-2 Population and Employment Estimates for Native American Populations within the Vicinity of or With Interest in SRS, 2000....4-368
Table 4.8.10-3 Level of Education Attainment by Native American Populations within the Vicinity of or With Interest in SRS, 2000 4-369
Table 4.8.10-4 Income and Poverty Level Estimates for Native American Populations within the Vicinity of or With Interest in SRS, 2000....4-371
Table 4.8.10-5 Housing Characteristics for Native American Populations within the Vicinity of or With Interest in SRS, 2000....4-372
Table 4.8.11-1 Radiation Doses to the Public from Normal SRS Operations in 2004 (Total Effective Dose Equivalent) 4-374
Table 4.8.11-2 Radiation Doses to Workers from Normal SRS Operations in 2005 (Total Effective Dose Equivalent) 4-375
Table 4.8.13-1 Annual Routine Waste Generation from SRS Operations (m^3)....4-380
Table 4.8.13-2 Waste Management Facilities at SRS....4-381
Table 4.9.2-1 BLM Visual Resource Management Rating System 4-386
Table 4.9.3-1 Baseline Characteristics for Y-12 Site....4-388
Table 4.9.4-1 Comparison of Baseline Ambient Air Concentrations with Most Stringent Applicable Regulations and Guidelines at Y-12/Oak Ridge Reservation 4-391
Table 4.9.5-1 Surface Water Surveillance Measurements Exceeding Tennessee Water Quality Criteria at Y-12, 2004 4-394
Table 4.9.7-1 Federal and State Listed Species Potentially Occurring at the ORR....4-400
Table 4.9.7-2 Vascular Plant Species Listed by State or Federal Agencies, 2005....4-401
Table 4.9.9-1 Labor Force Statistics for ROI and Tennessee 4-405
Table 4.9.9-2 Income Information for the Y-12 ROI, 2004....4-406

Table 4.9.9-3 Historic and Projected Population 4-406
Table 4.9.9-4 Housing in the Y-12 ROI, 2000 4-407
Table 4.9.10-1 Demographic Profile of the Potentially Affected Area Surrounding Y-12, 2000 4-409
Table 4.9.10-2 Population and Employment Estimates for Native American Populations within the Vicinity of or With Interest in Y-12, 2000 4-413
Table 4.9.10-3 Level of Educational Attainment by Native American Populations within the Vicinity of or With Interest in Y-12, 2000 4-414
Table 4.9.10-4 Income and Poverty Level Estimates for Native American Populations within the Vicinity of or With Interest in Y-12, 2000 4-415
Table 4.9.10-5 Housing Characteristics for Native American Populations within the Vicinity of or With Interest in Y-12, 2000 4-415
Table 4.9.11-1 Calculated Radiation Doses to Maximally Exposed Individuals from Airborne Releases during 2004 4-416
Table 4.9.11-2 Calculated Collective Effective Dose Equivalents from Airborne Releases during 2004 4-417
Table 4.9.11-3 Potential Radiological Impacts to the Public Resulting from Normal Operations at Y-12 4-417
Table 4.9.11-4 Y-12 Radiological Worker Annual Individual and Collective Radiation Doses 4-418
Table 4.9.12-1 Existing Average Daily Traffic Counts on the ORR Serving Y-12 4-418
Table 4.9.13-1 Waste Generation Totals by Waste Type for Routine Operations at Y-12 4-421
Table 4.9.13-2 Waste Management PEIS Records of Decision Affecting Oak Ridge Reservation and Y-12 4-422

VOLUME II – CHAPTERS 5 THROUGH 15 AND APPENDICES A THROUGH G

CHAPTER 5

Table 5.1.1-1 Potential Effects on Land Use at the Proposed Sites 5-4
Table 5.1.1-2 Major LANL Technical Areas and Associated Facilities 5-5
Table 5.1.3-1 Annual Electrical Requirements for Construction of CPC, CUC, and the A/D/HE Center at LANL 5-16
Table 5.1.3-2 Annual Site Infrastructure Requirements for Operation of the CPC, CUC, CNC, A/D/HE Center and the CNPC at LANL 5-17
Table 5.1.4-1 Estimated Peak Nonradiological Air Emissions for CPC – Construction 5-20
Table 5.1.4-2 Incremental Concentrations for CPC Upgrade Alternative – Construction 5-20
Table 5.1.4-3 Annual Nonradiological Air Emissions for the CPC—Operations 5-21
Table 5.1.4-4 Criteria Pollutant Concentrations for CPC—Operations 5-22
Table 5.1.4-5 Annual Radiological Air Emissions for CPC at LANL—Operations 5-23
Table 5.1.4-6 Annual Doses Due to Radiological Air Emissions from CPC Operations at LANL 5-23

Table 5.1.4-7 Peak and Attenuated Noise Levels Expected from Operation of Construction Equipment 5-24
Table 5.1.4-8 Criteria Pollutant Concentrations for CNC Operations at Los Alamos 5-26
Table 5.1.4-9 Annual Doses Due to Radiological Air Emissions from CUC and CNC Operations at LANL 5-27
Table 5.1.4.10 A/D/HE Center Construction—PM_{10} Inputs 5-28
Table 5.1.4-11 Annual Nonradiological Air Emissions, A/D/HE Center—Operations 5-28
Table 5.1.4-12 Criteria Pollutant Concentrations for CNPC—Operations 5-29
Table 5.1.4-13 Annual Radiological Air Emissions for A/D/HE Center Operations 5-30
Table 5.1.4-14 Annual Doses Due to Radiological Air Emissions from A/D/HE Center Operations at LANL 5-30
Table 5.1.5-1 Potential Changes to Water Resources from the Construction of the CPC, CUC and A/D/HE Center at LANL 5-31
Table 5.1.5-2 Water Requirements for Operation of the CPC, CUC and A/D/HE Center 5-31
Table 5.1.9-1 Socioeconomic Impacts from Peak Construction – CPC 5-54
Table 5.1.9-2 Socioeconomic Impacts from Operations: All Facilities/Alternatives 5-55
Table 5.1.9-3 Socioeconomic Impacts from Peak Construction — Upgrade Alternative 5-56
Table 5.1.9-4 Socioeconomic Impacts from Peak Construction — 50/80 Alternative 5-58
Table 5.1.9-5 Socioeconomic Impacts from Peak Construction — CUC 5-59
Table 5.1.9-6 Socioeconomic Impacts from Peak Construction — A/D/HE Center 5-61
Table 5.1.11-1 Injury, Illness, and Fatality Estimates for Construction of the CPC Alternatives, CUC, and A/D/HE Center at LANL 5-64
Table 5.1.11-2 Annual Radiological Impacts on the Public from CPC Alternatives, CNC, and CNPC Operations at LANL 5-65
Table 5.1.11-3 Annual Radiological Impacts on CPC, CNC, and CNPC Workers at LANL from Operations 5-66
Table 5.1.11-4 Injury, Illness, and Fatality Annual Estimates for Normal Operations of the CPC, CNC, and CNPC at LANL 5-67
Table 5.1.12-1 CPC Radiological Accident Frequency and Consequences at LANL 5-73
Table 5.1.12-2 Annual Cancer Risks for CPC at LANL 5-74
Table 5.1.12-1a Radiological Accident Frequency and Consequences—50/80 Alternative 5-75
Table 5.1.12-2a Annual Cancer Risks for the 50/80 Alternative 5-75
Table 5.1.12-3 Greenfield CPC and Upgrade Alternative Chemical Accident Frequency and Consequences at LANL 5-76
Table 5.1.12-4 50/80 Alternative Chemical Accident Consequences at LANL 5-77
Table 5.1.12-5 CUC Radiological Accident Frequency and Consequences at LANL 5-79
Table 5.1.12-6 Annual Cancer Risks for CUC at Los Alamos, TA-55 5-79
Table 5.1.12-7 Potential Accident Consequences — CUC at Los Alamos, TA-16 5-80
Table 5.1.12-8 Annual Cancer Risks for CUC at LANL, TA-16 5-80
Table 5.1.12-9 Consequences and Frequency of CUC Chemical Accidents, Los Alamos 5-81
Table 5.1.12-10 A/D/HE Center Radiological Accident Consequences at LANL 5-82
Table 5.1.12-11 Annual Cancer Risks for A/D/HE Center Accidents at LANL 5-82

Table 5.1.12-12 A/D/HE Center Chemical Accident Frequency and Consequences 5-84
Table 5.1.14-1 Annual Routine Waste Generation from LANL Operations 5-87
Table 5.1.14-2 Construction Waste Generation from CPC Alternatives 5-89
Table 5.1.14-3 Operational Waste Generation from CPC Alternatives 5-89
Table 5.1.14-4 Total Waste Generation from Construction of the CUC 5-90
Table 5.1.14-5 Annual Waste Generation for CNC Operation 5-91
Table 5.1.14-6 A/D/HE Center Construction Waste 5-92
Table 5.1.14-7 Annual CNPC Operations Waste Generation 5-93
Table 5.3.1-1 Potential Effects on Land Use at the Proposed Sites 5-99
Table 5.3.3-1 Electrical Requirements—Construction of CPC, CUC, and A/D/HE Center 5-106
Table 5.3.3-2 Electrical Requirements—Operation of CPC, CUC, CNC, A/D/HE Center, and the CNPC at NTS 5-107
Table 5.3.4-1 Estimated Peak Nonradiological Air Emissions for CPC—Construction 5-109
Table 5.3.4-2 Annual Nonradiological Air Emissions for the CPC—Operations 5-110
Table 5.3.4-3 Criteria Pollutant Concentrations for CPC—Operations 5-111
Table 5.3.4-4 Annual Radiological Air Emissions for CPC at NTS—Operations 5-112
Table 5.3.4-5 Annual Doses Due to Radiological Air Emissions from CPC Operations at NTS 5-112
Table 5.3.4-6 Peak and Attenuated Noise Levels from Construction Equipment 5-113
Table 5.3.4-7 Criteria Pollutant Concentrations at NTS Boundary for CUC and CNC Operations 5-115
Table 5.3.4-8 Annual Doses Due to Radiological Air Emissions from CUC and CNC Operations—NTS 5-116
Table 5.3.4-9 A/D/HE Center Construction—PM_{10} Impacts 5-117
Table 5.3.4-10 Annual Nonradiological Emissions, A/D/HE Center—Operations 5-117
Table 5.3.4-11 Criteria Pollutant Concentrations at NTS for CNPC—Operations 5-118
Table 5.3.4-12 Annual Radiological Air Emissions for A/D/HE Center Operations 5-118
Table 5.3.4-13 Annual Doses Due to Radiological Air Emissions from A/D/HE Center Operations—NTS 5-119
Table 5.3.5-1 Potential Changes to Water Resources from the Construction of the CPC, CUC and A/D/HE Center—NTS 5-120
Table 5.3.5-2 Potential Changes to Water Resources from the Operation of the CPC, CUC and A/D/HE Center—NTS 5-120
Table 5.3.9-1 Socioeconomic Impacts from CPC Construction 5-141
Table 5.3.9-2 Socioeconomic Impacts from Operations 5-142
Table 5.3.9-3 Socioeconomic Impacts from CUC Construction 5-143
Table 5.3.9-4 Socioeconomic Impacts from A/D/HE Center Construction 5-144
Table 5.3.11-1 Injury, Illness, and Fatality Estimates for Construction of the CPC, CUC, and A/D/HE Center—NTS 5-147
Table 5.3.11-2 Annual Radiological Impacts on the Public from CPC, CNC, and CNPC Operations—NTS 5-148
Table 5.3.11-3 Annual Radiological Impacts on CPC, CNC, and CNPC Workers at NTS from Operations 5-149

Table 5.3.11-4 Injury, Illness, and Fatality Annual Estimates for Normal Operations of the CPC, CNC, and CNPC at NTS 5-150
Table 5.3.12-1 CPC Radiological Accident Frequency and Consequences—NTS 5-155
Table 5.3.12-2 Annual Cancer Risks for CPC—NTS 5-155
Table 5.3.12-3 CPC Chemical Accident Frequency and Consequences—NTS 5-157
Table 5.3.12-4 CUC Radiological Accident Frequency, Consequences, and Risks—NTS 5-158
Table 5.3.12-5 Annual Cancer Risks for CUC—NTS 5-158
Table 5.3.12-6 CUC Chemical Accident Frequency and Consequences—NTS 5-159
Table 5.3.12-7 A/D/HE Center Radiological Accident Consequences—NTS 5-160
Table 5.3.12-8 Annual Cancer Risks for A/D/HE Accidents—NTS 5-161
Table 5.3.12-9 A/D/HE Center Chemical Accident Frequency and Consequences—NTS 5-162
Table 5.3.14-1 Waste Volumes Generated—NTS 5-164
Table 5.3.14-2 CPC Construction Wastes—NTS 5-164
Table 5.3.14-3 CPC Annual Operational Wastes—NTS 5-165
Table 5.3.14-4 CUC Construction Wastes—NTS 5-167
Table 5.3.14-5 Annual CNC Operational Waste—NTS 5-168
Table 5.3.14-6 A/D/HE Center Construction Waste—NTS 5-170
Table 5.3.14-7 Annual CNPC Operational Wastes—NTS 5-171
Table 5.5.1-1 Potential Effects on Land Use at the Proposed Sites 5-174
Table 5.5.1-2 Summary—Pantex No Action Alternative Facilities 5-176
Table 5.5.3-1 Electrical Infrastructure Requirements for CPC and CUC Construction 5-180
Table 5.5.3-2 Electrical Infrastructure Requirements for CPC and CUC Operation 5-181
Table 5.5.4-1 Estimated Peak Nonradiological Air Emissions for the CPC Construction 5-183
Table 5.5.4-2 Annual Nonradiological Air Emissions for the CPC—Operations 5-184
Table 5.5.4-3 Criteria Pollutant Concentrations at Pantex for CPC—Operations 5-184
Table 5.5.4-4 Annual Radiological Air Emissions for the CPC at Pantex—Operations 5-185
Table 5.5.4-5 Annual Doses Due to Radiological Air Emissions from CPC Operations at Pantex 5-186
Table 5.5.4-6 Peak and Attenuated Noise Levels Expected from Operation of Construction Equipment 5-186
Table 5.5.4-7 Criteria Pollutant Concentrations, CUC and CNPC—Operations 5-189
Table 5.5.4-8 Annual Doses Due to Radiological Air Emissions from CUC and CNPC Operations—Pantex 5-190
Table 5.5.5-1 Potential Changes to Water Resources from the Construction of the CPC and CUC—Pantex 5-192
Table 5.5.5-2 Potential Changes to Water Resources from Operation of the CPC and CUC—Pantex 5-193
Table 5.5.9-1 Socioeconomic Impacts from CPC Construction 5-204
Table 5.5.9-2 Socioeconomic Impacts for All Alternatives—Operations 5-204
Table 5.5.9-3 Socioeconomic Impacts from CUC Construction 5-206

Table 5.5.11-1 Injury, Illness, and Fatality Estimates for Construction of a CPC and CUC—Pantex 5-208
Table 5.5.11-2 Annual Radiological Impacts on the Public from the CPC and CNPC Operations—Pantex 5-209
Table 5.5.11-3 Annual Radiological Impacts on CPC and CNPC Workers at Pantex from Operations 5-211
Table 5.5.11-4 Injury, Illness, and Fatality Annual Estimates for Normal Operations of the CPC, CNC, and CNPC—Pantex 5-211
Table 5.5.12-1 CPC Radiological Accident Frequency and Consequences—Pantex 5-215
Table 5.5.12-2 Annual Cancer Risks for CPC—Pantex 5-215
Table 5.5.12-3 CPC Chemical Accident Frequency and Consequences—Pantex 5-217
Table 5.5.12-4 CUC Radiological Accident Frequency and Consequences—Pantex 5-218
Table 5.5.12-5 Annual Cancer Risks for CUC—Pantex 5-218
Table 5.5.12-6 CUC Chemical Accident Frequency and Consequences—Pantex 5-219
Table 5.5.12-7 Potential Consequences of A/D/HE Accidents—Pantex 5-219
Table 5.5.12-8 Annual Cancer Risks for A/D/HE Accidents—Pantex 5-220
Table 5.5.12-9 Chlorine Accident Frequency and Consequences—Pantex 5-221
Table 5.5.14–1 Annual Waste Volumes Generated—Pantex 5-223
Table 5.5.14-2 Waste Generation from CPC Construction—Pantex 5-224
Table 5.5.14-3 CPC Annual Operational Waste Generation—Pantex 5-225
Table 5.5.14-4 Waste Generation from CUC Construction—Pantex 5-227
Table 5.5.14-5 Annual Wastes Generated by the Operation of Facilities—Pantex 5-228
Table 5.5.14-6 Annual Wastes Generated for the No Action Alternative and the Capability-Based Alternative—Pantex 5-229
Table 5.5.15-1 Impacts from Closure and D&D—Pantex 5-231
Table 5.8.1-1 Potential Effects on Land Use at the Proposed Sites 5-237
Table 5.8.1-2 Savannah River Site No Action Alternative Facilities 5-238
Table 5.8.3-1 Electrical Infrastructure Requirements for Construction of CPC, CUC, and the A/D/HE Center—SRS 5-244
Table 5.8.3-2 Electrical Infrastructure Requirements for Operations of the CPC, CUC, A/D/HE Center, CNC, and the CNPC—SRS 5-245
Table 5.8.4-1 Estimated Peak Nonradiological Air Emissions for the CPC—Construction 5-247
Table 5.8.4-2 Annual Nonradiological Air Emissions for the CPC—Operations 5-248
Table 5.8.4-3 Criteria Pollutant Concentrations at SRS Boundary for CPC—Operations 5-249
Table 5.8.4-4 Annual Radiological Air Emissions for the CPC at SRS—Operations 5-250
Table 5.8.4-5 Annual Doses Due to Radiological Air Emissions from CPC Operations—SRS 5-250
Table 5.8.4-6 Peak Noise Levels Expected from Construction Equipment 5-251
Table 5.8.4-7 Criteria Pollutant Concentrations at SRS for CUC and CNC — Operations 5-252
Table 5.8.4-8 Annual Doses Due to Radiological Air Emissions from CUC and CNC Operations—SRS 5-254
Table 5.8.4-8a A/D/HE Center Construction — PM_{10} Impacts 5-255

Table 5.8.4-9 Annual Nonradiological Air Emissions, A/D/HE Center—Operations 5-256
Table 5.8.4-10 Criteria Pollutant Concentrations at the SRS Site Boundary for the CNPC—Operations 5-256
Table 5.8.4-11 Annual Radiological Air Emissions for A/D/HE Center—Operations 5-257
Table 5.8.4-12 Annual Doses Due to Radiological Air Emissions from A/D/HE Center Operations—SRS 5-258
Table 5.8.5-1 Potential Changes to Water Resources from the CPC, CNC, and CNPC—SRS, Construction 5-259
Table 5.8.5-2 Changes to Water Resources from CPC, CNC, and CNPC–Operations 5-261
Table 5.8.9-1 Socioeconomic Impacts from Construction of Greenfield CPC 5-277
Table 5.8.9-2 Socioeconomic Impacts from Operations, All Facilities/Alternatives 5-278
Table 5.8.9-3 Socioeconomic Impacts from Construction of the CUC 5-279
Table 5.8.9-4 Socioeconomic Impacts from Construction of the A/D/HE Center 5-280
Table 5.8.11-1 Injury, Illness, and Fatality Estimates for Construction of the CPC, CUC, and A/D/HE Center—SRS 5-283
Table 5.8.11-2 Annual Radiological Impacts on the Public from CPC, CNC, and CNPC Operations—SRS 5-284
Table 5.8.11-3 Annual Radiological Impacts on CPC, CNC, and CNPC Workers at SRS—Operations 5-285
Table 5.8.11-4 Injury, Illness, and Fatality Annual Estimates for Normal Operations of the CPC, CNC, and CNPC—SRS 5-286
Table 5.8.12-1 CPC Radiological Accident Frequency and Consequences—SRS 5-291
Table 5.8.12-2 Annual Cancer Risks for CPC—SRS 5-292
Table 5.8.12-3 CPC Alternative Chemical Accident Frequency and Consequences—SRS 5-293
Table 5.8.12-4 CUC Radiological Accident Frequency and Consequences at SRS 5-295
Table 5.8.12-5 Annual Cancer Risks for CUC—SRS 5-295
Table 5.8.12-6 CUC Chemical Accident Frequency and Consequences—SRS 5-296
Table 5.8.12-7 A/D/HE Center Radiological Accident Consequences—SRS 5-298
Table 5.8.12-8 Annual Cancer Risks for A/D/HE Center Accidents—SRS 5-298
Table 5.8.12-9 A/D/HE Center Chemical Accident Frequency and Consequences—SRS 5-299
Table 5.8.14-1 Annual Routine Waste Generation from SRS Operations (m^3) 5-302
Table 5.8.14-2 Total Waste Generation from CPC Construction—SRS 5-302
Table 5.8.14-3 Annual Waste Generation from Operations of the CPC—SRS 5-303
Table 5.8.14-4 CUC Construction Wastes at SRS 5-305
Table 5.8.14-5 Annual CNC Operational Waste—SRS 5-306
Table 5.8.14-6 Total Waste Generation from Construction of the A/D/HE Center 5-307
Table 5.8.14-7 Annual Waste Generation from Operations at SRS—CNPC 5-309
Table 5.9.1-1 Potential Effects on Land Use at the Proposed Sites 5-312
Table 5.9.1-2 Y-12 Major Facility Overview 5-313
Table 5.9.3-1 Electrical Requirements for Construction of a CPC, UPF, and A/D/HE Center—Y-12 5-319

Table 5.9.3-2 Electrical Requirements for Operation of the CPC, UPF, and CNPC—Y-12 5-320
Table 5.9.4-1 Estimated Peak Nonradiological Air Emissions—CPC Construction 5-323
Table 5.9.4-2 Estimated NAAQs Concentrations at Y-12 – CPC Construction 5-323
Table 5.9.4-3 Annual Nonradiological Air Emissions for the CPC—Operations 5-324
Table 5.9.4-4 Criteria Pollutant Concentrations at Y-12 Boundary—CPC and UPF 5-325
Table 5.9.4-5 Annual Radiological Air Emissions—CPC Operations 5-326
Table 5.9.4-6 Annual Doses Due to Radiological Air Emissions from CPC and UPF Operations—Y-12 5-327
Table 5.9.4-7 Peak and Attenuated Noise Levels Expected from Operation of Construction Equipment 5-328
Table 5.9.4-7a A/D/HE Center Construction — PM_{10} Impacts 5-329
Table 5.9.4-8 Annual Nonradiological Air Emissions—A/D/HE Center Operations 5-330
Table 5.9.4-9 Criteria Pollutant Concentrations at Y-12 Boundary—CNPC Operations 5-331
Table 5.9.4-10 Annual Radiological Air Emissions for A/D/HE Center Operations 5-331
Table 5.9.4-11 Annual Doses Due to Radiological Air Emissions from A/D/HE Center Operations and a CNPC—Y-12 5-332
Table 5.9.5-1 Potential Changes to Water Resources from Construction of a CPC, UPF, and A/D/HE Center—Y-12 5-334
Table 5.9.5-2 Potential Changes to Water Resources from Operation of the CPC UPF, and CNPC—Y-12 5-334
Table 5.9.9-1 Socioeconomic Impacts: Construction of the CPC, UPF, or Y-12 Upgrade 5-345
Table 5.9.9-2 Socioeconomic Impacts from Operation of Facilities 5-346
Table 5.9.9-3 Socioeconomic Impacts from Construction of A/D/HE Center 5-348
Table 5.9.11-1 Injury, Illness, and Fatality Estimates for Construction of the CPC, UPF, and A/D/HE Center—Y-12 5-350
Table 5.9.11-2 Annual Radiological Impacts on the Public from CPC, UPF, Y-12 Upgrade, and A/D/HE Center Operations—Y-12 5-351
Table 5.9.11-3 Annual Radiological Impacts on CPC, UPF, and A/D/HE Center Workers at Y-12 from Operations 5-353
Table 5.9.11-4 Injury, Illness, and Fatality Annual Estimates for Normal Operations of the CPC, UPF, and CNPC—Y-12 5-353
Table 5.9.12-1 CPC Radiological Accident Frequency and Consequences—Y-12 5-357
Table 5.9.12-2 Annual Cancer Risks for CPC—Y-12 5-357
Table 5.9.12-3 CPC Chemical Accident Frequency and Consequences—Y-12 5-359
Table 5.9.12-4 UPF or Upgraded Facilities, Radiological Accident Frequency and Consequences—Y-12 5-360
Table 5.9.12-5 Annual Cancer Risks for UPF or Upgraded Facilities—Y-12 5-360
Table 5.9.12-6 Chemical Accident Frequency and Consequences of UPF or Upgraded Facilities—Y-12 5-362
Table 5.9.12-7 A/D/HE Center Radiological Accident Consequences—Y-12 5-363
Table 5.9.12-8 Annual Cancer Risks for A/D/HE Center Accidents—Y-12 5-363
Table 5.9.12-9 A/D/HE Center Chemical Accident Frequency and Consequences—Y-12 5-365

Table 5.9.14-1 Waste Generation Totals by Waste Type for Routine Operations—Y-12 5-367
Table 5.9.14-2 Total Waste Generation from CPC Construction—Y-12 5-368
Table 5.9.14-3 Waste Generation from Construction of the UPF 5-369
Table 5.9.14-4 Waste Generation from Operations of CPC and UPF—Y-12 5-371
Table 5.9.14-5 Annual Waste Generation from Construction of the A/D/HE Center—Y-12 5-373
Table 5.9.14-6 Annual Waste Generation from Operations of the CNPC—Y-12 5-374
Table 5.9.14-7 Annual Radiological Wastes Generated by Y-12 for the No Action Alternative and the Capability-Based Alternatives 5-375
Table 5.9.15-1 Y-12 Plant D&D Estimates 5-377
Table 5.10-1 Annual Radiological Transportation Impacts—No Action Alternative 5-381
Table 5.10-2 Annual Nonradiological Transportation Impacts—No Action Alternative 5-382
Table 5.10-3 Annual Radiological Transportation Impacts—DCE Alternative 5-383
Table 5.10-4 Annual Estimated Impacts Due to Handling and Stops—DCE Alternative 5-383
Table 5.10-5 Annual Nonradiological Transportation Impacts—DCE Alternative 5-383
Table 5.10-6 Impacts of Transporting LANL Programmatic Materials 5-384
Table 5.10-7 Impacts of Transporting LANL Surplus Materials to SRS 5-384
Table 5.10-8 Impacts of Transporting LANL Surplus Materials to Y-12 & SRS (Option 2) 5-384
Table 5.10-9 Impacts of Transporting LANL Excess Materials to Y-12 & SRS 5-385
Table 5.10-10 Impacts of Transporting LANL Excess Materials to SRS 5-385
Table 5.10-11 Impacts of Transporting LANL Excess Materials to Y-12 5-385
Table 5.10-12 Radiological Transportation Impacts Associated with the One-Time Transportation of Pits and HEU to the CNPC Site 5-386
Table 5.10-13 Estimated Impacts Due to Handling and Stops—CNPC Alternative 5-386
Table 5.10-14 Nonradiological Transportation Impacts—CNPC Alternative 5-387
Table 5.10-15 Annual Radiological Impacts for CNC (A/D/HE Center at Pantex) 5-387
Table 5.10-16 Annual Radiological Impacts for CNC (A/D/HE Center at NTS) 5-388
Table 5.10-17 Annual Nonradiological Transportation Impacts—CNC Option (Pantex as A/D/HE) 5-388
Table 5.10-18 Annual Nonradiological Transportation Impacts—CNC Option (NTS as A/D/HE) 5-389
Table 5.10-19 Number of LLW Drums and Shipments 5-390
Table 5.10-20 Health Impacts Due to LLW Transportation (in LCF) 5-390
Table 5.10-21 Nonradiological Health Impacts Due to LLW Transportation 5-390
Table 5.10-22 Health Impacts Due to LLW Transportation (in LCF) 5-391
Table 5.10-23 Nonradiological Health Impacts Due to LLW Transportation 5-391
Table 5.10-24 Health Impacts Due to TRU Waste Transportation 5-391
Table 5.12-1 Risks of Transporting LLNL Non-Waste Category I/II Materials 5-394
Table 5.12-2 Risks of Transporting LLNL Programmatic Category I/II Materials to NTS for Interim Storage Followed by Transportation to LANL 5-394

Table 5.12-3 Risks of Transporting TRU Wastes from LLNL to INL and INL to WIPP 5-394
Table 5.12-4 Consequences of Bounding Accident at Superblock with MAR of 40kg and MAR of 16kg 5-396
Table 5.12-5 Radiological Impacts of Handling Zone 4 Pits 5-401
Table 5.12-6 Operational Requirements for Zone 12 Storage Facility 5-402
Table 5.12-7 Demolition and D&D of Existing Storage Facilities 5-402
Table 5.13-1 HE R&D Alternatives 5-403
Table 5.13-2 Operational Changes at LLNL Site 300 —Alternative 2b 5-405
Table 5.13-3 Construction Data at LLNL—Alternative 2b' 5-408
Table 5.13-4 Operational Changes at LLNL—Alternative 2b' 5-408
Table 5.13-5 Construction Requirements at LANL—Alternative 3a 5-412
Table 5.13-6 Annual Operational Requirements at LANL—Alternative 3a 5-412
Table 5.13-6a SNL HE R&D Annual Air Emissions (in Pounds Based on 2006 Data) 5-417
Table 5.13-7 Construction Requirements at LLNL— Alternative 3b 5-419
Table 5.13-8 Operational Requirements at LLNL for Alternative 3b 5-419
Table 5.13-9 Construction Requirements at Pantex—Alternative 3c 5-424
Table 5.13-10 Operational Requirements at Pantex— Alternative 3c 5-425
Table 5.13-11 Construction Requirements at SNL—Alternative 3d 5-430
Table 5.13-12 Operational Requirements at SNL—Alternative 3d 5-431
Table 5.13-13 Construction Data at Pantex for Consolidating LANL & LLNL HE R&D at Pantex—Alternative 3g 5-436
Table 5.14-1 Reductions at LANL from Tritium R&D Phase Out 5-443
Table 5.15-1 TTR No Action Annual Operational Requirements 5-447
Table 5.15-2 D&D Associated with TTR Operations—No Action Alternative 5-448
Table 5.15-3 TTR Annual Operational Requirements—Campaign Mode 5-449
Table 5.15-4 WSMR Construction Requirements 5-450
Table 5.15-5 WSMR Operational Requirements 5-451
Table 5.15-6 2003 and 2005 Employment by Sector (%) 5-453
Table 5.15-7 Summary of Workforce Residence 5-454
Table 5.15-8 Summary of Community Involvement—TTR Employees 5-455
Table 5.15-9 School Characteristics in Tonopah 5-457
Table 5.15-10 Housing Characteristics in Tonopah 5-457
Table 5.15-11 Home Sales Statistics for Tonopah, 2001-2006 5-458
Table 5.15-12 Number and Percent of Tonopah Population, Age 25 and Older by Highest Level of Educational Attainment, 2000 5-461
Table 5.15-13 Comparison of Key Characteristics of TTR and Non-TTR Household Respondents 5-462
Table 5.15-14 Comparison of Education Levels of TTR and Non-TTR Household Respondents 5-462
Table 5.15-15 Comparison of Estimated Monthly Expenditures for TTR Households and Non-TTR Households 5-462
Table 5.15-16 D&D Associated with Transfer of Flight Testing—TTR 5-463
Table 5.15-17 Construction Requirements—NTS 5-464
Table 5.15-18 Operating Requirements—NTS 5-464

Table 5.16-1 Impacts of Facility Closures for the Downsize-in-Place Alternative 5-469
Table 5.16-2 Impacts of Facility Closures—LANL Consolidation Alternative 5-472
Table 5.16-3 Construction and Operation Impacts of a CFF-Like Facility—LANL..... 5-472
Table 5.16-4 Potential Impacts from Accidents at a CFF-Like Facility 5-477
Table 5.16-5 Construction and Operational Requirements-Consolidation at NTS..... 5-478
Table 5.17-1 ETF Closures Downsize-in-Place Alternative 5-481
Table 5.17-2 Impacts from ETF Closures—Downsize-in-Place Alternative..... 5-482
Table 5.17-3 ETF Closures—NTS Consolidation Alternative 5-487
Table 5.17-4 Environmental Impacts from ETF Consolidation at NTS Alternative 5-488
Table 5.17-5 Annular Core Research Reactor (ACRR) Sited within the DAF PIDAS 5-493
Table 5.17-6 Annular Core Research Reactor (ACRR) Sited at NTS U1a Facility 5-495
Table 5.17-7 Building 334-Like Facility Sited at NTS DAF 5-496
Table 5.17-8 Building 334-Like Facility Sited at NTS U1a Complex..... 5-497
Table 5.17-9 Aerial Cable Test Facility Sited at Area 12 T Tunnel Complex Surface Area..... 5-498
Table 5.17-10 Building 834 Complex Sited at NTS DAF Facility 5-499
Table 5.17-11 Building 834 Complex Sited at NTS U1a Facility 5-499
Table 5.17-12 Underground Sled Track Complex—NTS..... 5-500
Table 5.17-13 Facilities to Close for ETF Consolidation at SNL Alternative 5-503
Table 5.17-14 Closure Impacts Resulting from ETF Consolidation at SNL Alternative..... 5-503
Table 5.20-1 Closure Impacts Resulting from ETF Consolidation at SNL 5-540

CHAPTER 6

Table 6.3.2-1 Potential Cumulative Transportation Impacts 6-9
Table 6.3.3-1 Radiological Transportation Impacts Associated with the Transportation of Pits from Pantex to the CNPC Site 6-10
Table 6.3.3-2 Radiological Transportation Impacts Associated with the One-Time Transportation of 34 Tons of Plutonium from Pantex to SRS..... 6-10
Table 6.3.3-3 Radiological Transportation Impacts Associated with the One-Time Transportation of up to 94 Metric Tons of Plutonium from Pantex to SRS 6-11
Table 6.3.4-1 Cumulative Waste Generation–SRS 6-13
Table 6.4-1 Cumulative Impacts of Major Nuclear Facilities in New Mexico..... 6-21
Table 6.4-2 Cumulative Health Impacts in New Mexico from Major Nuclear Facilities..... 6-24
Table 6.5-1 Expected Annual and Per-Test Emissions 6-27

CHAPTER 9

Table 9.2-1 Irreversible and Irretrievable Construction Commitments 9-2
Table 9.2-2 Irreversible and Irretrievable Operation Commitments..... 9-2

CHAPTER 10

Table 10.4-1 Federal Environmental, Safety & Health Statutes, Regulations, and Orders..... 10-5

Table 10.4-2 Selected Department of Energy Orders 10-12
Table 10.4-3 Agreements with Federal and State Environmental Regulatory Agencies..... 10-12
Table 10.4-4 State Environmental, Safety & Health Requirements..... 10-14

APPENDIX A

Table A.1-1 Land Requirements for CPC Alternatives A-2
Table A.1.2-1 Dimensions for the CPC A-7
Table A.1.3-1 Origins, Destinations, and Material Shipped to Support the CPC..... A-9
Table A.1.3-2 Numbers of Shipments per Year for the CPC..... A-9
Table A.3-1 Land Requirements to Operate a CNPC* A-22
Table A.3-2 Land Requirements to Operate a CNC* ..... ……A-22
Table A.8-1 TTR No Action Annual Operational Requirements A-52
Table A.8-2 D&D Associated with TTR Operations-No Action Alternative..... A-53
Table A.8-3 Options for the Campaign Mode Operation of TTR..... A-55
Table A.8-4 TTR Annual Operational Requirements-Campaign Mode A-57
Table A.8-5 WSMR Construction Requirements A-62
Table A.8-6 Construction Requirements for NTS Alternative A-67
Table A.8-7 Operation Requirements for NTS Alternative A-68
Table A.10-1 ETFs at LANL, LLNL, Sandia, and NTS A-84
Table A.10-2 K Site Environmental Test Facility..... A-87
Table A.10-3 Component Test Facility..... A-88
Table A.10-4 Thermo-Conditioning Facility A-88
Table A.10-5 Pulsed Intense X-Ray Facility with Sled Track (PIXY)..... A-89
Table A.10-6 Data Table for Building 334 ..... A-92
Table A.10-7 Data Table for Building 834 Complex..... A-94
Table A.10-8 Data Table for Building 836 Complex..... A-95
Table A.10-9 HERMES III & RHEPP..... A-97
Table A.10-10 Saturn and SPHINX..... A-98
Table A.10-11 Annular Core Research Reactor and Sandia Pulsed Reactor..... A-100
Table A.10-12 Sandia Pulsed Reactor..... A-101
Table A.10-13 Radiation Metrology Laboratory A-102
Table A.10-14 Gamma Irradiation Facility..... A-104
Table A.10-15 Low Dose Rate Gamma Irradiation Facility..... A-106
Table A.10-16 Auxiliary Hot Cell Facility A-108
Table A.10-17 Model Validation and System Certification Test Center..... A-109
Table A.10-18 Centrifuge Complex..... A-110
Table A.10-19 29-Foot Centrifuge..... A-112
Table A.10-20 Complex Wave Test Facility A-113
Table A.10-21 Light Initiated High Explosive Facility A-114
Table A.10-22 Sled Track Facility..... A-115
Table A.10-23 Aerial Cable Test Facility A-117
Table A.10-24 Radiography Building and Non-Destructive Test Facility A-117
Table A.10-25 Photometrics/Data Acquisition Complex A-120
Table A.10-26 Mechanical Shock Facility..... A-121
Table A.10-27 Vibration-Acoustics and Mass Properties Facility A-122

Table A.10-28 Mobile Gun Complex A-124
Table A.10-29 Thermal Test Complex A-125
Table A.10-30 Electromagnetic Environmental Complex A-127
Table A.10-31 SNL/CA Environmental Test Complex A-127
Table A.10-32 Device Assembly Facility A-129
Table A.10-33 U1a Complex A-130

APPENDIX B

Table B.9-1 Candidate Sites' Region of Influence B-11

APPENDIX C

Table C.1-1 Exposure Limits for Members of the Public and Radiation Workers C-8
Table C.1.4-1 Nominal Health Risk Estimators Associated With Exposure to 1 Rem of Ionizing Radiation C-11
Table C.3-1 Source Documents Reviewed for Applicable Accident Scenarios C-18
Table C.4-1 Postulated CPC-Related Facility Radiological Accidents C-29
Table C.4-2 Postulated CPC-Related Facility Chemical Accidents C-30
Table C.4-3 CPC Radiological Accident Frequency and Consequences at LANL C-33
Table C.4-4 Annual Cancer Risks for CPC at LANL C-33
Table C.4-3a CPC Radiological Accident Frequency and Consequences at LANL for the 50/80 Alternative C-34
Table C.4-4a Annual Cancer Risks for CPC at LANL for the 50/80 Alternative C-35
Table C.4-5 CPC Radiological Accident Frequency and Consequence – NTS C-35
Table C.4-6 Annual Cancer Risks for CPC – NTS C-36
Table C.4-7 CPC Radiological Accident Frequency and Consequences – Pantex C-36
Table C.4-8 Annual Cancer Risks for CPC – Pantex C-36
Table C.4-9 CPC Radiological Accident Frequency and Consequences – SRS C-37
Table C.4-10 Annual Cancer Risks for CPC – SRS C-37
Table C.4-11 CPC Radiological Accident Frequency and Consequences-Y-12 ..... C-38
Table C.4-12 Annual Cancer Risks for CPC – Y-12 ..... C-38
Table C.4-13 Chemical Accident Frequency and Consequences at Los Alamos C-39
Table C.4-14 Upgrade 80 Chemical Accident Frequency and Consequences C-39
Table C.4-15 Chemical Accident Frequency and Consequences at NTS C-39
Table C.4-16 Chemical Accident Frequency and Consequences at Pantex C-39
Table C.4-17 Chemical Accident Frequency and Consequences at SRS C-40
Table C.4-18 CPC Chemical Accident Frequency and Consequences at Y-12 ..... C-40
Table C.5-1 Potential CUC Accident Scenarios C-41
Table C.5-2 Source Term (Ci) Released to the Environment Following a Uranium Metal Criticality (1.0×10^{18} fissions) C-43
Table C.5-3 Source Term (Ci) -- Uranium Solution Criticality (3.28×10^{18} fissions) C-44
Table C.5-4 Estimated Direct Radiation Dose From an Unshielded Criticality Accident C-44
Table C.5-5 Uranium Operations Accidents C-45
Table C.5-6 CUC Radiological Accident Frequency and Consequences at Los Alamos, TA-55[a] C-45
Table C.5-7 Annual Cancer Risks for CUC at Los Alamos, TA-55 ..... C-46

Table C.5-8 Potential Accident Consequences – CUC at Los Alamos, TA16[a] C-46
Table C.5-9 Annual Cancer Risks for CUC at Los Alamos, TA-16.....C-47
Table C.5-10 CUC Radiological Accident Frequency, Consequences, and Risks at NTS C-47
Table C.5-11 Annual Cancer Risks for CUC at NTS C-47
Table C.5-12 CUC Radiological Accident Frequency and Consequences at Pantex C-48
Table C.5-13 Annual Cancer Risks for CUC at Pantex.....C-48
Table C.5-14 Potential Accident Consequences – CUC at SRS.....C-48
Table C.5-15 Annual Cancer Risks for CUC at SRS.....C-49
Table C.5-16 UPF or Upgraded Facilities, Radiological Accident Frequency and Consequences at Y-12.....C-49
Table C.5-17 Annual Cancer Risks for CUC at Y-12.....C-49
Table C.5-18 Chemical Accident Frequency and Consequences at Los Alamos.....C-50
Table C.5-19 Chemical Accident Frequency and Consequences at NTS.....C-50
Table C.5-20 Chemical Accident Frequency and Consequences at Pantex C-50
Table C.5-21 Chemical Accident Frequency and Consequences at SRS C-51
Table C.5-22 Chemical Accident Frequency and Consequences at Y-12 .....C-51
Table C.6-1 Representative A/D/HE Accident Source Terms.....C-53
Table C.6-2 Potential Consequences of A/D/HE Accidents at LANL C-54
Table C.6-3 Annual Cancer Risks for A/D/HE Accidents at LANL C-54
Table C.6-4 Potential Consequences of A/D/HE Accidents at NTS C-54
Table C.6-5 Annual Cancer Risks for A/D/HE Accidents at NTS C-55
Table C.6-6 Potential Consequences of A/D/HE Accidents at Pantex C-55
Table C.6-7 Annual Cancer Risks for A/D/HE Accidents at Pantex.....C-55
Table C.6-8 Potential Consequences of A/D/HE Accidents at SRS.....C-56
Table C.6-9 Annual Cancer Risks for A/D/HE Accidents at SRS.....C-56
Table C.6-10 Potential Consequences of A/D/HE Accidents at Y-12.....C-56
Table C.6-11 Annual Cancer Risks for A/D/HE Accidents at Y-12 .....C-57
Table C.6-12 Chlorine Accident Frequency and Consequences at LANL C-58
Table C.6-13 Chlorine Accident Frequency and Consequences at NTS C-58
Table C.6-14 Chlorine Accident Frequency and Consequences at Pantex.....C-58
Table C.6-15 Chlorine Accident Frequency and Consequences at SRS.....C-58
Table C.6-16 Chlorine Accident Frequency and Consequences at Y-12 .....C-59
Table C.7-1 Results of RADTRAN Accident Runs for a Single Shipment C-60

APPENDIX D

Table D.2-1 Comment Bin List..... D-3
Table D.3-1 Scoping Documents Received D-6
Table D.3-2 Summary of Campaigns 1, 7, and 15..... D-7
Table D.2-2 Summary of Scoping Comments D-12

APPENDIX E

Table E.2-1 Upper and Middle Rio Grande Dams and Reservoirs E-4
Table E.3-1 Surface Water and Sediment Contamination Attributed to LANL Operations.....E-6
Table E.4-1 ER Project Groundwater Monitoring Results from Calendar Year 2006....E-12

VOLUME III – COMMENT RESPONSE DOCUMENT, CHAPTERS 1 THROUGH 3

COMMENT RESPONSE DOCUMENT, CHAPTER 1

Table 1.1-1 Public Hearing Locations, Attendance, and Number of Comments 1-2
Table 1.1-2 Document Submission Overview 1-3
Table 1.3-1 Issue Codes and Categories 1-9
Table 1.3-2 Index of Attendees at Public Hearings..... 1-14
Table 1.3-3 Index of Attendees at Public Hearings Providing Comments 1-27
Table 1.3-4 Index of Commentors, Private Individuals 1-30
Table 1.3-5 Index of Commentors, Organizations and Public Officials 1-58
Table 1.3-6 Index of Commentors, Multiple Signatory Documents 1-61
Table 1.3-7 Campaign Comment Documents 1-67
Table 1.3-8 Comments Sorted by Summary Code..... 1-68

ACRONYMS AND ABBREVIATIONS

A/D	Assembly/Disassembly
A/D/HE	Assembly/Disassembly/High Explosives
AC and MC	Analytical Chemistry and Materials Characterization
ACE	Altamont Commuter Express
ACHP	Advisory Council on Historic Preservation
ACRR	Annular Core Research Reactor
AEC	Atomic Energy Commission
AFB	Air Force Base
AF&F	Arming, Fuzing, and Firing
ALARA	as low as reasonably achievable
ALCM	Air-Launch Cruise Missile
ALOHA	Aerial Location of Hazardous Atmospheres
AQCR	Air Quality Control Region
ARF	airborne release fraction
ASER	annual site environmental report
ATEC	U.S. Army Test Evaluation Command
BA	Biological Assessment
BAAQMD	Bay Area Air Quality Management District
BACMs	Best Available Control Measures
BEA	Bureau of Economic Analysis
BEEF	Big Explosives Experimental Facility
BEIR	Biological Effects of Ionizing Radiation
Bison-m	Biota Information System of New Mexico
BLM	Bureau of Land Management
BLS	Bureau of Labor Statistics
BMAP	Biological Monitoring and Abatement Program
BMPs	Best Management Practices
BNM	Bandelier National Monument
CA	Composite Analysis
CAA	*Clean Air Act*
CAIRS	Computerized Accident/Incident Reporting System
CAMU	corrective action management unit
CASSC	California Species of Special Concern
CAUs	Corrective Action Units
CD-0	critical decision on mission need
CEQ	Council on Environmental Quality
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act*
CFF	Contained Firing Facility
CFR	Code of Federal Regulations
CGTO	Consolidated Group of Tribes and Organizations
CHS	Center for Homeland Security
CIF	Consolidated Incineration Facility
CMR	Chemistry and Metallurgy Research

CMRR	Chemistry and Metallurgy Research Building Replacement Project
CNC	Consolidated Nuclear Center
CNPC	Consolidated Nuclear Production Center
CNPS	California Native Plant Society
Complex	nuclear weapons complex
Complex Transformation SPEIS	Complex Transformation Supplemental Programmatic Environmental Impact Statement
COPCs	contaminants of potential concern
CPC	Consolidated Plutonium Center
CRT	Cargo Restraint Transporter
CSAs	Canned Subassemblies
CUC	Consolidated Uranium Center
CWA	*Clean Water Act*
CWL	chemical waste landfill
CY	calendar year
D&D	Decontamination and Decommissioning
DA	design agency
DAF	Device Assembly Facility
DARHT	Dual Axis Radiographic Hydrodynamic Test
dB	decibel
dBA	A-weighted decibels
DAF	Device Assembly Facility
DCE	Distributed Centers of Excellence
DCGs	Derived Concentration Guidelines
DHHS	U.S. Department of Health and Human Services
DHS	U.S. Department of Homeland Security
DoD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOI	U.S. Department of the Interior
DOT	U.S. Department of Transportation
DP	Defense Programs
DPE	data processing equipment
DR	damage ratio
DTC	Developmental Test Command
DTRA	Defense Threat Reduction Agency
DTSC	Department of Toxic Substances Control
DU	Depleted Uranium
DWPF	Defense Waste Processing Facility
DWTF	Decontamination and Waste Treatment Facility
DX	Dynamic Experimentation
EA	Environmental Assessment
ECF	Entry Control Facility
EDE	effective dose equivalent
EE	Energy Efficiency and Renewable Energy
EFPC	East Fork Poplar Creek
EH	Office of Environment, Safety and Health

EIS	Environmental Impact Statement
EM	Environmental Management
EMAC	Ecological Monitoring and Compliance Program
EOA	expanded operations alternative
EODU	Explosive Ordinance Disposal Unit
EOL	End-of-Life
EOS	Equation of state
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
ERPG	Emergency Response Planning Guideline
ESL	Effects Screening Level
ETB	Engineering Test Bay
ETF	Environmental Test Facility
ETTP	East Tennessee Technology Park
EU	enriched uranium
EWTF	Explosives Waste Treatment Facility
FBI	Federal Bureau of Investigation
FE	facilities engineering
FGZ	fine-grain zone
FLAME	Fire Laboratory for Accreditation of Models and Experiments
FM	Farm-to-Market Road
FMD	Fissile Materials Disposition
FONSI	Finding of No Significant Impact
FPPA	*Farmland Protection Policy Act*
FTE	Full Time Employee
FWHM	Full Width at Half Maximum
FXR	Flash X-Ray
GCD	Greater Confinement Disposal
GIF	Gamma Irradiation Facility
GPD	gallons per day
GPS	Global Positioning System
GSA	General Services Area
GTS	Gas Transfer System
GWPP	groundwater protection program
HAN	hydroxylamine nitrate
HANDSS-55	“handling and segregation system for 55-gallon drums”
HANMF	H-Area New Manufacturing Facility
HAPs	Hazardous Air Pollutant
HE	High Explosives
HEAF	High Explosives Application Facility
HEPA	high-efficiency particulate air
HETB	Hardened Engineering Test Building
HEU	Highly Enriched Uranium
HEUMF	Highly Enriched Uranium Materials Facility
HEWTF	High Explosives Wastewater Treatment Facility
HI	Hazard Index

HLW	high level radioactive waste
HPS	Hantavirus Pulmonary Syndrome
HQ	Hazard Quotient
HR	Human Resources
HSC	Hazardous Materials Spill Center
HTM	High-Tech Mobile
HVAC	heating, ventilating, and air conditioning
HWDU	Hazardous waste disposal units
HWMF	hazardous waste management facility
HWSU	Hazardous Waste Storage Unit
HWTPF	Hazardous Waste Treatment and Processing Facility
HYDEC	hydride/dehydride casting
I	Interstate Highway
ICD-9-CM	International Classification of Disease, 9th Revision, Clinical Modification
ICRP	International Commission on Radiological Protection
IFF	Identification, Friend or Foe
IH	Industrial Hygiene
INEEL	Idaho National Engineering and Environmental Laboratory
INRAD	intrinsic radiation
IOM	Institution of Medicine
IPT	Integrated Project Team
ISCORS	Interagency Steering Committee on Radiation Standards
ISCST	Industrial Source Complex Short Term
ISD	Independent School District
ISM	Integrated Safety Management
ISMS	Integrated Safety Management System
ITRD	Innovative Treatment Remediation Demonstration
IWQPs	Inland Water Quality Parameters
JTA	Joint Test Assemblies
KAFB	Kirtland Air Force Base
KCP	Kansas City Plant
KCRIMS	Kansas City Responsive Infrastructure Manufacturing and Sourcing
KTF	Kauai Test Facility
LAC	Los Alamos County
LANL	Los Alamos National Laboratory
LANL SWEIS	Site-Wide Environmental Impact Statement for the Continued Operation of the Los Alamos National Laboratory
LANSCE	Los Alamos Neutron Science Center
LB/TS	Large Blast Thermal Simulator
LCF	latent cancer fatality
LDRGIF	Low Dose Rate Gamma Irradiation Facility
LLNL	Lawrence Livermore National Laboratory
LLW	low level waste
LOS	Level of Service

LPF	leak path factor
M&O	Management and Operations
MACCS	MELCOR Accident Consequence Code System
MACCS2	MELCOR Accident Consequence Code System Version 2
MACs	maximum allowable concentrations
MAR	material at risk
MBTA	*Migratory Bird Treaty Act*
MC&A	Material Control and Accountability
MCL	maximum contaminant level
MDC	maximum detectable concentration
MDL	maximum detection limit
MEI	maximally exposed individual
MEK	methyl ethyl ketone
MLLW	mixed low level waste
MOX	Mixed Oxide
MPF	Modern Pit Facility
MPF EIS	Modern Pit Facility Environmental Impact Statement
mrem	millirem
MRTFB	Major Range and Test Facility Base
MSGP	Multi-Sector General Permit
MVAs	motor vehicle accidents
MVM	million vehicle miles
MWDU	Mixed Waste Disposal Unit
NAAQS	National Ambient Air Quality Standards
NAFB	Nellis Air Force Base
NC	numerically controlled
NCRP	National Council on Radiation Protection Measurements
NDA	nondestructive assay
NDEP	Nevada Division of Environmental Protection
NE	Office of Nuclear Energy
NECI	Northeast Center Impact Area
NEP	Nuclear Explosive Package
NEPA	*National Environmental Policy Act*
NESHAP	National Emission Standards for Hazardous Air Pollutants
NEST	Nuclear Emergency Search Team
NGPF	Neutron Generator Production
NHP	National Hydrotesting Program
NHPA	*National Historic Preservation Act*
NMAAQS	New Mexico Ambient Air Quality Standards
NMAQCR	New Mexico Air Quality Control Regulations
NMED	New Mexico Environment Department
NMWQCC	New Mexico Water Quality Control Commission
NN	Nonproliferation and National Security
NNSA	National Nuclear Security Administration
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent

NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPR	Nuclear Posture Review
NPS	National Park Service
NPT	Nuclear Nonproliferation Treaty
NPTEC	Nonproliferation Test and Evaluation Complex
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSO	Nevada Site Office
NSTec	National Security Technologies
NTS	Nevada Test Site
NTTR	Nevada Test and Training Range
NWS	National Weather Service
NWSM	Nuclear Weapons Stockpile Memorandum
NWSP	Nuclear Weapons Stockpile Plan
OB/OD	Open Burn/Open Detonation
OEPG	Office of Environmental Policy and Guidance
ORNL	Oak Ridge National Laboratory
ORPS	Occurrence Reporting and Processing System
ORR	Oak Ridge Reservation
OSHA	Occupational Safety and Health Administration
OST	Office of Secure Transportation
OUs	operable units
PA	Performance Assessment
PAAA	*Price-Anderson Amendments Act*
Pantex	Pantex Plant
PCBs	polychlorinated biphenyls
pCi/L	picocuries per liter
PDCF	Pit Disassembly and Conversion Facility
PF-4	Plutonium Facility, Building 4
PHERMEX	Pulsed High Energy Radiation Machine Emitting X-Rays
PHETS	Permanent High Explosive Test Site
PIDAS	Perimeter Intrusion Detection and Assessment System
PIXY	Pulse Intense X-Ray
PMDA	Plutonium Management and Disposition Agreement
POLs	petroleum, oils, lubricants
PPE	personal protective equipment
ppy	pits per year
PQL	practical quantitation limit
PSD	Prevention of Significant Deterioration
PSRs	Potential release sites
Pu	Plutonium
PUREX	Plutonium-Uranium Extraction Process
QASPR	Qualification Alternatives to Sandia Pulsed Reactor
R&D	Research and Development
RANT	Radioassay and Nondestructive Testing

RCRA	*Resource Conservation and Recovery Act*
rem	roentgen equivalent man
REOP	Real Estate Operating Permit
RF	respirable fraction
RFI	RCRA facility investigation
RIMSII	Regional Input-Output Modeling System
RLWTF	Radioactive Liquid Waste Treatment Facility
RMWMF	Radioactive and Mixed Waste Management Facilities
ROD	Record of Decision
ROGs/POCs	reactive organic gases/precursor organic compounds
ROI	Region of Influence
RRF	respirable release fraction
RRW	Reliable Replacement Warhead
RWMC	Radioactive Waste Management Complex
RWMS	Radioactive Waste Management Site
S.C.	South Carolina State Highway
SAAQS	State Ambient Air Quality Standards
SASN	Silver acetylide-silver nitrate
SCDHEC	South Carolina Department of Health and Environmental Control
SEAB	Secretary of Energy Advisory Board
SEIS	Supplemental Environmental Impact Statement
SFNF	Santa Fe National Forest
SGT	Safeguards Transporters
SHIST	Seismic Hardrock in Site Test
SHPO	State Historic Preservation Office
SJVUAPCD	San Joaquin Valley Unified Air Pollution Control District
SMR	standardized mortality rate
SNF	Spent nuclear fuel
SNL	Sandia National Laboratories
SNL/NM	Sandia National Laboratories/New Mexico
SNL/CA	Sandia National Laboratories/California
SNM	Special nuclear material
SPEIS	Supplemental Programmatic Environmental Impact Statement
SRARP	Savannah River Archaeological Research Program
SREL	Savannah River Ecology Laboratory
SRS	Savannah River Site
SS&C	sand, slag and crucible
SSM	Stockpile Stewardship and Management
SSM PEIS	Final Programmatic Environmental Impact Statement for Stockpile Stewardship and Management
SSO	Sandia Site Office
SSP	Stockpile Stewardship Program
SST	Safe Secure Trailers
STP	Site Treatment Plan
STS	Stock-to-Target Sequence
SVOC	Semi-volatile organic compound

SWEIS	Site-Wide Environmental Impact Statement
SWSC	Sanitary Wastewater Systems Consolidation
SWTF	Solid Waste Transfer Facility
T&E	Threatened and Endangered
TA	Technical Area
TA-55	Technical Area 55
TBF	Terminal Ballistics Facility
TBP	tributyl phosphate
TCEQ	Texas Commission on Environmental Quality
TCP	Traditional Cultural Property
TECC	Transportation and Emergency Control Center
TEDE	Total Effective Dose Equivalent
TEF	Tritium Extraction Facility
TLD	Thermoluminescent dosimeter
TNRCC	Texas Natural Resource Conservation Commission
TPCB	Transurance Pad Cover Building
TPDES	Texas Pollutant Discharge Elimination System
TRAGIS	Transportation Routing Analysis Geographic Information System
Trinity NHL	Trinity Site National Historic Landmark
TRU	transuranic
TRUPACT-II	Transuranic Package Transporter
TSCA	Toxic Substance Control Act
TSD	Transportation Safequards Division
TSP	total suspended particulates
TSPI	Time Space Positioning Information
TTR	Tonopah Test Range
TVA	Tennessee Valley Authority
UC	University of California
UPF	Uranium Processing Facility
US	United States
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USC	United States Code
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geologic Survey
USPHS	United States Public Health Service
UXO	unexploded ordnance
VOC	volatile organic compound
VPP	Voluntary Protection Program
WAC	Waste Acceptance Criteria
WCRRF	Waste Compaction, Reduction, and Repackaging Facility
WEF	Waste Examination Facility
WETF	Weapons Engineering Tritium Facility
WFO	Work for Others
WIPP	Waste Isolation Pilot Plant

WSMR	White Sands Missile Range
WSRC	Washington Savannah River Company
WTG	Weapons Test Group
WVDP	West Valley Demonstration Project
WWTF	Wastewater Treatment Facility
XTF	Cross-wind Fire Facility
Y-12	Y-12 National Security Complex

CHEMICALS AND UNITS OF MEASURE

Bq	Becquerel
C	Celsius
Ci	curie
cm	centimeters
CFC	chlorofluorocarbons
CO	carbon monoxide
dB	decibel
dBA	decibel A-weighted
DCE	1, 2-dichloroethylene
DNA	deoxyribonucleic acid
F	Fahrenheit
ft	feet
ft^2	square feet
ft^3	cubic feet
ft^3/s	cubic feet per second
g	grams
gal	gallons
ha	hectares
hr	hour
in	inches
kg	kilograms
km	kilometers
km^2	square kilometers
kV	kilovolts
kVA	kilovolt-ampere
kW	kilowatts
kWh	kilowatt hours
L	liters
lb	pounds
m	meters
m^2	square meters
m^3	cubic meters
m/s	meters per second
mg	milligram (one-thousandth of a gram)
mg/L	milligrams per liter
MGD	million gallons per day

MGY	million gallons per year
mi	miles
mi^2	square miles
mph	miles per hour
mrem	millirem (one-thousandth of a rem)
MVA	megavolt-ampere
MW	megawatt
MWe	megawatt electric
MWh	megawatt hour
NO_2	nitrogen dioxide
NOX	nitrogen oxides
O_3	ozone
Pb	lead
PCB	polychlorinated biphenyl
pCi	picocurie (one-trillionth of a curie)
pCi/L	picocuries per liter
PM_{10}	particulate matter (less than 10 microns in diameter)
ppb	parts per billion
ppm	parts per million
ppbv	parts per billion by volume
rem	roentgen equivalent man
s	seconds
SO_2	sulfur dioxide
T	short ton
t	metric tons
TCA	1, 1, 1-trichloroethane
TCE	trichloroethylene
yd^3	cubic yards
yr	year
µCi	microcurie (one-millionth of a curie)
µCi/g	microcuries per gram
µg	microgram (one-millionth of a gram)
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
$\mu g/m^3$	micrograms per cubic meter

CONVERSION CHART

To Convert Into Metric			To Convert Into English		
If You Know	**Multiply By**	**To Get**	**If You Know**	**Multiply By**	**To Get**
Length					
inch	2.54	centimeter	centimeter	0.3937	inch
feet	30.48	centimeter	centimeter	0.0328	feet
feet	0.3048	meter	meter	3.281	feet
yard	0.9144	meter	meter	1.0936	yard
mile	1.60934	kilometer	kilometer	0.62414	mile
Area					
square inch	6.4516	square centimeter	square centimeter	0.155	square inch
square feet	0.092903	square meter	square meter	10.7639	square feet
square yard	0.8361	square meter	square meter	1.196	square yard
acre	0.40469	hectare	hectare	2.471	acre
square mile	2.58999	square kilometer	square kilometer	0.3861	square mile
Volume					
fluid ounce	29.574	milliliter	milliliter	0.0338	fluid ounce
gallon	3.7854	liter	liter	0.26417	gallon
cubic feet	0.028317	cubic meter	cubic meter	35.315	cubic feet
cubic yard	0.76455	cubic meter	cubic meter	1.308	cubic yard
Weight					
ounce	28.3495	gram	gram	0.03527	ounce
pound	0.45360	kilogram	kilogram	2.2046	pound
short ton	0.90718	metric ton	metric ton	1.1023	short ton
Force					
dyne	0.00001	newton	newton	100,000	dyne
Temperature					
Fahrenheit	Subtract 32 then multiply by 5/9ths	Celsius	Celsius	Multiply by 9/5ths, then add 32	Fahrenheit

METRIC PREFIXES

Prefix	Symbol	Multiplication Factor		
exa-	E	1 000 000 000 000 000 000	=	10^{18}
peta-	P	1 000 000 000 000 000	=	10^{15}
tera-	T	1 000 000 000 000	=	10^{12}
giga-	G	1 000 000 000	=	10^{9}
mega-	M	1 000 000	=	10^{6}
kilo-	k	1 000	=	10^{3}
hecto-	h	l00	=	10^{2}
deka-	da	l0	=	10^{1}
deci-	d	0.1	=	10^{-1}
centi-	c	0.01	=	10^{-2}
milli-	m	0.001	=	10^{-3}
micro-	µ	0.000 001	=	10^{-6}
nano-	n	0.000 000 001	=	10^{-9}
pico-	p	0.000 000 000 001	=	10^{-12}
femto-	f	0.000 000 000 000 001	=	10^{-15}
atto-	a	0.000 000 000 000 000 001	=	10^{-18}