

Chapters 1 through 10 Appendices A through H

Draft Environmental Impact Statement for the Proposed Consolidation of Nuclear Operations Related to Production of Radioisotope Power Systems



U.S. Department of Energy
Office of Nuclear Energy, Science and Technology
Washington, DC 20585

**AVAILABILITY OF
THE DRAFT CONSOLIDATION EIS**

For additional information or for copies of this Draft EIS,
contact:

Timothy A. Frazier, EIS Document Manager
NE-50/Germantown Building
Office of Nuclear Energy, Science and Technology
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-1290
Telephone: 1-800-919-3706
E-mail: ConsolidationEIS@nuclear.energy.gov

This document is available on the Office of Nuclear Energy, Science and Technology's
Website (<http://consolidationeis.doe.gov>) for viewing and downloading.



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Locations: Oak Ridge National Laboratory (ORNL), Tennessee; Los Alamos National Laboratory (LANL), New Mexico; and Idaho National Laboratory (INL) (formerly known as Idaho National Engineering and Environmental Laboratory), Idaho.

For additional information or for copies of this draft environmental impact statement (EIS), contact:

Timothy A. Frazier, EIS Document Manager
NE-50/Germantown Building
Office of Nuclear Energy, Science and Technology
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-1290
Telephone: 301-903-9420, or leave a message
at 1-800-919-3706
E-mail: ConsolidationEIS@nuclear.energy.gov

For general information on the DOE National Environmental Policy Act (NEPA) process, contact:

Carol M. Borgstrom, Director
Office of NEPA Policy and Compliance
Office of Environment, Safety and Health
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-1290
Telephone: 202-586-4600, or leave a message
at 1-800-472-2756

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Abstract: DOE and its predecessor agencies have been producing radioisotope power systems (RPSs) for over 35 years for Government national security and space exploration missions. The RPS is a unique technology used in situations that require a long-term, unattended source of heat and/or supply of electrical power in harsh and remote environments. These systems are reliable, maintenance free, and capable of producing heat or electricity for decades. The plutonium-238 in these units serves as the source for generating heat and electricity. The nuclear infrastructure required to produce an RPS is comprised of three major components: (1) the production of plutonium-238; (2) the extraction, purification, and encapsulation of plutonium-238 into a usable fuel form; and (3) the assembly, testing, and delivery of RPSs to Federal users. Currently, DOE RPS production operations exist or are planned to exist at three geographically separate and distant sites: ORNL, Tennessee; LANL, New Mexico; and INL, Idaho, which is the No Action Alternative. DOE is now proposing to consolidate RPS nuclear production operations at a single site. Following the events of September 11, 2001, special nuclear materials require storage at a higher level of security than could feasibly be afforded separately. This consolidation would be consistent with DOE's approach to consolidating nuclear materials, increasing their security, and reducing risks associated with their transportation. The *Consolidation EIS* evaluates the potential direct, indirect, and cumulative environmental impacts associated with each of the alternatives. The Proposed Action, and Preferred Alternative, is to consolidate all RPS nuclear operations at the Materials and Fuels Complex (formerly known as Argonne National Laboratory-West), now a part of INL. A second alternative, the Consolidation with Bridge Alternative, would utilize existing facilities at ORNL and LANL on an interim basis for the production of plutonium-238, followed by consolidation at INL. All alternatives,

including the No Action Alternative, assume that RPS assembly and testing would be conducted at an existing facility at INL.

Public Comments: In preparation of this Draft EIS, DOE considered comments received from the public during the scoping period (November 16, 2004, to January 31, 2005). Comments received after the close of the comment period have been considered to the extent practicable. Locations and times of public hearings on this document will be announced in the *Federal Register* in June 2005. The Public Hearings will be held in Oak Ridge, Tennessee; Los Alamos, New Mexico; Jackson, Wyoming; Fort Hall, Idaho; Idaho Falls, Idaho; Twin Falls, Idaho; and Boise, Idaho. Comments on this Draft EIS will be accepted for a period of 60 days following publication of the Environmental Protection Agency's Notice of Availability in the *Federal Register* and will be considered in the preparation of the Final EIS. Any comments received after the 60-day period will be considered to the extent practicable for the preparation of the Final EIS.

TABLE OF CONTENTS

TABLE OF CONTENTS

Chapters 1 through 10 Appendices A through H

Cover Sheet	iii
Table of Contents	vii
List of Figures	xviii
List of Tables.....	xx
Acronyms, Abbreviations, and Conversion Charts	xxvii

Chapter 1 Introduction and Purpose and Need for Agency Action

1.1 Purpose and Need for Agency Action.....	1-1
1.2 Background	1-1
1.3 The Proposed Action and Scope of the Environmental Impact Statement.....	1-4
1.4 Decisions to Be Supported by the Consolidation EIS	1-5
1.5 Related National Environmental Policy Act Reviews.....	1-6
1.5.1 <i>Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement</i> (DOE/EIS-0287).....	1-6
1.5.2 <i>Finding of No Significant Impact and Final Environmental Assessment for the Future Location</i> <i>of the Heat Source/Radioisotope Power System Assembly and Test Operations Currently</i> <i>Located at the Mound Site (DOE/EA-1438).....</i>	1-6
1.5.3 <i>Final Programmatic Environmental Impact Statement for Accomplishing Expanded Civilian</i> <i>Nuclear Energy Research and Development and Isotope Production Missions in the United</i> <i>States, Including the Role of the Fast Flux Test Facility (DOE/EIS-0310).....</i>	1-7
1.5.4 <i>Final Environmental Impact Statement for the Treatment and Management of Sodium-Bonded</i> <i>Spent Nuclear Fuel (DOE/EIS-0306).....</i>	1-8
1.5.5 <i>Advanced Mixed Waste Treatment Project Final Environmental Impact Statement</i> (DOE/EIS-0290).....	1-8
1.5.6 <i>Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos</i> <i>National Laboratory, Los Alamos, New Mexico (DOE/EIS-0238)</i>	1-8
1.5.7 <i>Final Waste Management Programmatic Environmental Impact Statement for Managing</i> <i>Treatment, Storage, and Disposal of Radioactive and Hazardous Wastes (DOE/EIS-0200)</i>	1-9
1.6 Public Participation and Scoping	1-10
1.7 Organization of this Environmental Impact Statement	1-13

Chapter 2

Project Description and Alternatives

2.1	Nuclear Operations Related to Production of Radioisotope Power Systems.....	2-1
2.2	Alternatives to Be Evaluated.....	2-6
2.2.1	No Action Alternative	2-9
2.2.2	Consolidation Alternative (Preferred Alternative).....	2-10
2.2.3	Consolidation with Bridge Alternative	2-11
2.2.4	Alternatives Considered and Dismissed	2-12
2.2.4.1	Consolidation of Radioisotope Power Systems Nuclear Production Operations at Sites Other than Idaho National Laboratory	2-12
2.2.4.2	Consolidation of Radioisotope Power Systems Nuclear Production Operations Using Existing Facilities at Idaho National Laboratory	2-14
2.2.4.3	Proposed New Road	2-16
2.3	Description of Facilities	2-16
2.3.1	Existing Facilities	2-16
2.3.1.1	Radiochemical Engineering Development Center	2-16
2.3.1.2	Advanced Test Reactor	2-19
2.3.1.3	High Flux Isotope Reactor	2-21
2.3.1.4	Plutonium Facility at the Los Alamos National Laboratory	2-22
2.3.1.5	Fuel Manufacturing Facility	2-23
2.3.1.6	Assembly and Testing Facility	2-23
2.3.2	New Consolidated Nuclear Operations Facilities	2-25
2.3.2.1	Plutonium-238 Facility	2-25
2.3.2.2	Support Building	2-28
2.3.2.3	Radiological Welding Laboratory	2-28
2.3.2.4	New Road	2-29
2.4	Construction Requirements	2-31
2.5	Summary of Environmental Consequences Analyzed in the Environmental Impact Statement.....	2-32
2.5.1	Introduction	2-32
2.5.2	Construction Impacts	2-32
2.5.3	Operations Impacts	2-33
2.5.4	Transportation Risks	2-34
2.5.5	Preferred Alternative	2-34
2.5.6	Key Environmental Findings	2-34

Chapter 3

Affected Environment

3.1	Introduction.....	3-1
3.2	Idaho National Laboratory	3-3
3.2.1	Land Resources	3-3
3.2.1.1	Land Use	3-3
3.2.1.2	Visual Resources	3-7
3.2.2	Site Infrastructure	3-8
3.2.2.1	Ground Transportation	3-8
3.2.2.2	Electricity	3-9
3.2.2.3	Fuel	3-9
3.2.2.4	Water	3-10
3.2.3	Geology and Soils	3-10
3.2.3.1	Geology	3-10
3.2.3.2	Soils	3-15

3.2.4	Water Resources	3-15
3.2.4.1	Surface Water	3-15
3.2.4.2	Groundwater	3-19
3.2.5	Air Quality and Noise.....	3-23
3.2.5.1	Air Quality.....	3-23
3.2.5.2	Noise.....	3-27
3.2.6	Ecological Resources.....	3-29
3.2.6.1	Terrestrial Resources	3-29
3.2.6.2	Wetlands	3-31
3.2.6.3	Aquatic Resources	3-32
3.2.6.4	Threatened and Endangered Species	3-33
3.2.7	Cultural Resources.....	3-33
3.2.7.1	Prehistoric Resources.....	3-35
3.2.7.2	Historic Resources.....	3-35
3.2.7.3	Traditional Cultural Properties	3-36
3.2.8	Socioeconomics.....	3-37
3.2.8.1	Regional Economic Characteristics	3-37
3.2.8.2	Demographic Characteristics.....	3-37
3.2.8.3	Housing.....	3-38
3.2.8.4	Local Transportation.....	3-39
3.2.9	Human Health Risk	3-39
3.2.9.1	Radiation Exposure and Risk.....	3-39
3.2.9.2	Chemical Environment	3-41
3.2.9.3	Health Effect Studies	3-42
3.2.9.4	Accident History.....	3-42
3.2.9.5	Emergency Preparedness and Security	3-43
3.2.10	Environmental Justice	3-43
3.2.11	Waste Management and Pollution Prevention.....	3-45
3.2.11.1	Waste Inventories and Activities.....	3-45
3.2.11.2	Transuranic Waste	3-47
3.2.11.3	Low-Level Radioactive Waste.....	3-47
3.2.11.4	Mixed Low-Level Radioactive Waste	3-47
3.2.11.5	Hazardous Waste	3-48
3.2.11.6	Nonhazardous Waste	3-48
3.2.11.7	Waste Minimization	3-48
3.2.11.8	Waste Management PEIS Records of Decision	3-48
3.2.12	Environmental Restoration Program	3-49
3.3	Los Alamos National Laboratory	3-51
3.3.1	Land Resources	3-54
3.3.1.1	Land Use.....	3-54
3.3.1.2	Visual Resources	3-57
3.3.2	Site Infrastructure	3-57
3.3.2.1	Site Ground Transportation	3-57
3.3.2.2	Electricity	3-58
3.3.2.3	Natural Gas.....	3-59
3.3.2.4	Water	3-60
3.3.3	Geology and Soils.....	3-60
3.3.3.1	Geology	3-60
3.3.3.2	Soils	3-63
3.3.4	Water Resources.....	3-64
3.3.4.1	Surface Water	3-64
3.3.4.2	Groundwater	3-66
3.3.5	Air Quality and Noise.....	3-68
3.3.5.1	Air Quality.....	3-68
3.3.5.2	Noise.....	3-71

3.3.6	Ecological Resources.....	3-73
3.3.6.1	Terrestrial Resources	3-73
3.3.6.2	Wetlands	3-75
3.3.6.3	Aquatic Resources	3-76
3.3.6.4	Threatened and Endangered Species	3-76
3.3.7	Cultural Resources.....	3-79
3.3.7.1	Prehistoric Resources.....	3-79
3.3.7.2	Historic Resources	3-79
3.3.7.3	Traditional Cultural Properties	3-80
3.3.8	Socioeconomics.....	3-80
3.3.8.1	Regional Economic Characteristics	3-80
3.3.8.2	Demographic Characteristics	3-81
3.3.8.3	Housing.....	3-82
3.3.8.4	Local Transportation.....	3-82
3.3.9	Human Health Risk	3-83
3.3.9.1	Radiation Exposure and Risk.....	3-83
3.3.9.2	Chemical Environment	3-85
3.3.9.3	Health Effects Studies.....	3-85
3.3.9.4	Accident History.....	3-86
3.3.9.5	Emergency Preparedness and Security	3-86
3.3.10	Environmental Justice	3-87
3.3.11	Waste Management and Pollution Prevention	3-89
3.3.11.1	Waste Inventories and Activities	3-89
3.3.11.2	Transuranic Waste	3-89
3.3.11.3	Low-Level Radioactive Waste.....	3-89
3.3.11.4	Mixed Low-Level Radioactive Waste	3-91
3.3.11.5	Hazardous Waste	3-91
3.3.11.6	Nonhazardous Waste	3-91
3.3.11.7	Waste Minimization	3-92
3.3.11.8	Waste Management PEIS Records of Decision	3-92
3.3.12	Environmental Restoration Program	3-92
3.4	Oak Ridge National Laboratory	3-93
3.4.1	Land Resources.....	3-95
3.4.1.1	Land Use.....	3-95
3.4.1.2	Visual Resources	3-97
3.4.2	Site Infrastructure	3-97
3.4.2.1	Site Ground Transportation	3-97
3.4.2.2	Electricity	3-98
3.4.2.3	Fuel.....	3-99
3.4.2.4	Water	3-99
3.4.3	Geology and Soils.....	3-100
3.4.3.1	Geology	3-100
3.4.3.2	Soils	3-102
3.4.4	Water Resources	3-103
3.4.4.1	Surface Water	3-103
3.4.4.2	Groundwater	3-106
3.4.5	Air Quality and Noise.....	3-107
3.4.5.1	Air Quality	3-107
3.4.5.2	Noise.....	3-112
3.4.6	Ecological Resources.....	3-112
3.4.6.1	Terrestrial Resources	3-112
3.4.6.2	Wetlands	3-113
3.4.6.3	Aquatic Resources	3-115
3.4.6.4	Threatened and Endangered Species	3-116

3.4.7	Cultural Resources.....	3-117
3.4.7.1	Prehistoric Resources.....	3-117
3.4.7.2	Historic Resources.....	3-118
3.4.7.3	Traditional Cultural Properties	3-118
3.4.8	Socioeconomics.....	3-118
3.4.8.1	Regional Economic Characteristics	3-119
3.4.8.2	Demographic Characteristics.....	3-119
3.4.8.3	Housing.....	3-119
3.4.8.4	Local Transportation.....	3-120
3.4.9	Human Health Risk	3-121
3.4.9.1	Radiation Exposure and Risk.....	3-121
3.4.9.2	Chemical Environment	3-123
3.4.9.3	Health Effects Studies.....	3-124
3.4.9.4	Accident History.....	3-124
3.4.9.5	Emergency Preparedness and Security	3-124
3.4.10	Environmental Justice	3-125
3.4.11	Waste Management and Pollution Prevention.....	3-127
3.4.11.1	Waste Inventories and Activities	3-127
3.4.11.2	Transuranic Waste	3-131
3.4.11.3	Low-Level Radioactive Waste.....	3-132
3.4.11.4	Mixed Low-Level Radioactive Waste	3-132
3.4.11.5	Hazardous Waste	3-133
3.4.11.6	Nonhazardous Waste	3-133
3.4.11.7	Waste Minimization	3-134
3.4.11.8	Waste Management PEIS Records of Decision	3-134
3.4.12	Environmental Restoration Program	3-135

Chapter 4 Environmental Consequences

4.1	No Action Alternative.....	4-2
4.1.1	Land Resources	4-2
4.1.1.1	Land Use.....	4-2
4.1.1.2	Visual Environment.....	4-2
4.1.2	Site Infrastructure	4-2
4.1.3	Geology and Soils.....	4-3
4.1.4	Water Resources.....	4-4
4.1.5	Air Quality and Noise.....	4-5
4.1.5.1	Air Quality.....	4-5
4.1.5.2	Noise.....	4-6
4.1.6	Ecological Resources.....	4-7
4.1.7	Cultural Resources.....	4-7
4.1.8	Socioeconomics.....	4-7
4.1.9	Public and Occupational Health and Safety	4-8
4.1.9.1	Construction and Normal Operations	4-8
4.1.9.2	Facility Accidents	4-10
4.1.9.3	Transportation.....	4-13
4.1.9.4	Emergency Preparedness	4-14
4.1.10	Environmental Justice	4-17
4.1.11	Waste Management and Pollution Prevention.....	4-18
4.1.11.1	Waste Management	4-18
4.1.11.2	Waste Minimization and Pollution Prevention	4-21
4.1.12	Environmental Restoration Program	4-21

4.2	Consolidation Alternative.....	4-21
4.2.1	Land Resources	4-22
4.2.1.1	Land Use.....	4-22
4.2.1.2	Visual Environment.....	4-23
4.2.2	Site Infrastructure	4-23
4.2.3	Geology and Soils.....	4-25
4.2.4	Water Resources.....	4-27
4.2.4.1	Surface Water	4-27
4.2.4.2	Groundwater	4-28
4.2.5	Air Quality and Noise.....	4-29
4.2.5.1	Air Quality.....	4-29
4.2.5.2	Noise.....	4-31
4.2.6	Ecological Resources.....	4-32
4.2.6.1	Terrestrial Resources	4-32
4.2.6.2	Wetlands	4-33
4.2.6.3	Aquatic Resources	4-33
4.2.6.4	Threatened and Endangered Species	4-34
4.2.7	Cultural Resources.....	4-34
4.2.8	Socioeconomics.....	4-35
4.2.9	Public and Occupational Health and Safety	4-36
4.2.9.1	Construction and Normal Operations	4-36
4.2.9.2	Facility Accidents	4-37
4.2.9.3	Transportation.....	4-42
4.2.9.4	Emergency Preparedness	4-43
4.2.10	Environmental Justice	4-43
4.2.11	Waste Management and Pollution Prevention.....	4-44
4.2.11.1	Waste Management	4-44
4.2.11.2	Waste Minimization and Pollution Prevention	4-47
4.2.12	Environmental Restoration Program	4-47
4.3	Consolidation with Bridge Alternative.....	4-47
4.3.1	Land Resources	4-48
4.3.1.1	Land Use.....	4-48
4.3.1.2	Visual Environment.....	4-48
4.3.2	Site Infrastructure	4-48
4.3.3	Geology and Soils.....	4-48
4.3.4	Water Resources.....	4-49
4.3.4.1	Surface Water	4-49
4.3.4.2	Groundwater	4-49
4.3.5	Air Quality and Noise.....	4-49
4.3.5.1	Air Quality.....	4-49
4.3.5.2	Noise.....	4-50
4.3.6	Ecological Resources.....	4-51
4.3.7	Cultural Resources.....	4-51
4.3.8	Socioeconomics.....	4-51
4.3.9	Public and Occupational Health and Safety	4-52
4.3.9.1	Construction and Normal Operations	4-52
4.3.9.2	Facility Accidents	4-56
4.3.9.3	Transportation.....	4-62
4.3.9.4	Emergency Preparedness	4-63
4.3.10	Environmental Justice	4-63
4.3.11	Waste Management and Pollution Prevention.....	4-64
4.3.11.1	Waste Management	4-64
4.3.11.2	Waste Minimization and Pollution Prevention	4-65
4.3.12	Environmental Restoration Program	4-65

4.4	Cumulative Impacts.....	4-65
4.4.1	Past and Present Actions at Idaho National Laboratory	4-67
4.4.2	Reasonably Foreseeable Actions at Idaho National Laboratory	4-67
4.4.3	Cumulative Impacts at Idaho National Laboratory.....	4-70
4.4.3.1	Land Resources.....	4-71
4.4.3.2	Site Infrastructure	4-71
4.4.3.3	Geology and Soils.....	4-71
4.4.3.4	Air Quality.....	4-73
4.4.3.5	Ecological Resources.....	4-73
4.4.3.6	Cultural Resources.....	4-73
4.4.3.7	Socioeconomics	4-74
4.4.3.8	Public Health and Safety	4-75
4.4.3.9	Occupational Health and Safety	4-76
4.4.3.10	Transportation.....	4-77
4.4.3.11	Waste Management	4-78
4.5	Mitigation Measures	4-79
4.6	Resource Commitments.....	4-80
4.6.1	Unavoidable Adverse Environmental Impacts	4-80
4.6.2	Relationship between Local Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity	4-81
4.6.3	Irreversible and Irretrievable Commitments of Resources	4-81

Chapter 5 Applicable Laws, Regulations, and Other Requirements

5.1	Introduction.....	5-1
5.2	Background	5-1
5.3	Applicable Federal Laws and Regulations	5-3
5.4	Applicable Executive Orders	5-11
5.5	Applicable U.S. Department of Energy Regulations and Orders	5-14
5.6	State Environmental Laws, Regulations, and Agreements	5-14
5.7	Radioactive Material Packaging and Transportation Regulations	5-14
5.8	Emergency Management and Response Laws, Regulations, and Executive Orders.....	5-19
5.8.1	Federal Emergency Management and Response Laws.....	5-19
5.8.2	Federal Emergency Management and Response Regulations	5-20
5.8.3	Emergency Response and Management Executive Orders	5-21
5.9	Consultations with Agencies and Federally-Recognized American Indian Nations	5-21

Chapter 6	
References	6-1

Chapter 7	
Glossary.....	7-1

Chapter 8	
Index.....	8-1
 Chapter 9	
List of Preparers.....	9-1
 Chapter 10	
Distribution List	10-1
 Appendix A	
Overview of the Public Participation Process	
A.1 Public Scoping Comments.....	A-1
 Appendix B	
Environmental Impact Methodologies	
B.1 Land Resources	B-1
B.1.1 Land Use.....	B-1
B.1.1.1 Description of Affected Resources	B-1
B.1.1.2 Description of Impact Assessment	B-1
B.1.2 Visual Resources	B-2
B.1.2.1 Description of Affected Resources	B-2
B.1.2.2 Description of Impact Assessment	B-2
B.2 Infrastructure.....	B-3
B.2.1 Description of Affected Resources.....	B-3
B.2.2 Description of Impact Assessment	B-3
B.3 Noise.....	B-4
B.3.1 Description of Affected Resources.....	B-4
B.3.2 Description of Impact Assessment	B-4
B.4 Air Quality.....	B-5
B.4.1 Description of Affected Resources.....	B-5
B.4.2 Description of Impact Assessment	B-6
B.5 Geology and Soils.....	B-7
B.5.1 Description of Affected Resources.....	B-7
B.5.2 Description of Impact Assessment	B-7
B.6 Water Resources	B-10
B.6.1 Description of Affected Resources.....	B-10
B.6.2 Description of Impact Assessment	B-10
B.6.2.1 Water Use and Availability	B-11
B.6.2.2 Water Quality	B-11
B.6.2.2.1 Surface Water Quality	B-11
B.6.2.2.2 Groundwater Quality.....	B-12
B.6.2.3 Waterways and Floodplains.....	B-12
B.7 Ecological Resources.....	B-12
B.7.1 Description of Affected Resources.....	B-12
B.7.2 Description of Impact Assessment	B-13

B.8	Cultural Resources.....	B-13
B.8.1	Description of Affected Resources.....	B-13
B.8.2	Description of Impact Assessment	B-14
B.9	Public and Occupational Health and Safety.....	B-15
B.9.1	Description of Affected Resources.....	B-15
B.9.2	Description of Impact Assessment	B-15
B.10	Transportation	B-16
B.10.1	Description of Affected Resources.....	B-16
B.10.2	Description of Impact Assessment	B-16
B.11	Socioeconomics.....	B-17
B.11.1	Description of Affected Resources.....	B-17
B.11.2	Description of Impact Assessment	B-17
B.12	Waste Management	B-17
B.12.1	Description of Affected Resources.....	B-17
B.12.2	Description of Impact Assessment	B-19
B.13	Cumulative Impacts.....	B-19
B.13.1	Regulations and Guidance	B-19
B.13.2	Approach to Cumulative Impacts	B-21
B.13.3	Uncertainties.....	B-21
B.13.4	Selection of Resource Areas for Analysis	B-21
B.13.5	Spatial and Temporal Considerations.....	B-22
B.13.6	Description of Impact Assessment	B-22
B.14	Environmental Justice	B-23
B.14.1	Description of Affected Resources.....	B-23
B.14.2	Description of Impact Assessment	B-24
B.15	References.....	B-25

Appendix C

Evaluation of Radiological and Hazardous Chemical Human Health Impacts from Routine Normal Operations and Accident Conditions

C.1	Introduction.....	C-1
C.1.1	Radiological Impacts on Human Health.....	C-1
C.1.1.1	Nature of Radiation and Its Effects on Humans	C-1
C.1.1.2	Health Effects	C-6
C.2	Methodology for Estimating Normal Operation Radiological and Hazardous Chemical Impacts	C-10
C.2.1	GENII Computer Code, a Generic Description	C-10
C.2.1.1	Description of the Code	C-10
C.2.1.2	Data and General Assumptions.....	C-11
C.2.1.3	Uncertainties.....	C-13
C.2.1.4	Radiological Releases During Routine Normal Operations.....	C-14
C.2.1.5	Occupational (Worker) Health Impacts	C-15
C.2.1.6	Impacts of Exposures to Hazardous Chemicals on Human Health.....	C-16
C.3	Accident Analysis.....	C-16
C.3.1	MACCS2 Code Description	C-16
C.3.2	ALOHA Code Description	C-18

C.3.3	Radiological Accident Scenarios.....	C-20
C.3.3.1	Neptunium-237 Target Processing Accident Scenario Selection and Description	C-21
C.3.3.2	Purification, Pelletization, and Encapsulation Accident Scenario Selection and Description	C-25
C.3.3.3	Accident Scenario Summary	C-27
C.3.4	Radiological Accident Impacts.....	C-27
C.3.5	Chemical Accidents.....	C-31
C.3.5.1	Chemical Accident Scenario.....	C-31
C.3.5.2	Impacts	C-32
C.4	References.....	C-34

Appendix D

Evaluation of Human Health Effects of Overland Transportation

D.1	Introduction.....	D-1
D.2	Scope of Assessment.....	D-1
D.2.1	Transportation-Related Activities.....	D-1
D.2.2	Radiological Impacts	D-1
D.2.3	Nonradiological Impacts.....	D-2
D.2.4	Transportation Modes.....	D-2
D.2.5	Receptors	D-2
D.3	Packaging and Transportation Regulations	D-2
D.3.1	Packaging Regulations	D-2
D.3.2	Transportation Regulations.....	D-3
D.4	Transportation Impact Analysis Methodology.....	D-4
D.4.1	Transportation Routes	D-6
D.4.2	Radioactive Material Shipments.....	D-7
D.5	Incident-Free Transportation Risks.....	D-10
D.5.1	Radiological Risk	D-10
D.5.2	Nonradiological Risk.....	D-11
D.5.3	Maximally Exposed Individual Exposure Scenarios	D-12
D.6	Transportation Accident Risks and Maximum Reasonably Foreseeable Consequences.....	D-12
D.6.1	Methodology	D-12
D.6.2	Accident Rates.....	D-12
D.6.3	Accident Severity Categories and Conditional Probabilities.....	D-13
D.6.4	Atmospheric Conditions	D-14
D.6.5	Radioactive Release Characteristics.....	D-15
D.6.6	Acts of Sabotage or Terrorism.....	D-15
D.7	Risk Analysis Results	D-15
D.8	Conclusions.....	D-19
D.9	Long-Term Impacts of Transportation.....	D-19
D.10	Uncertainty and Conservatism in Estimated Impacts	D-19
D.10.1	Uncertainties in Material Inventory and Characterization.....	D-20
D.10.2	Uncertainties in Containers, Shipment Capacities, and Number of Shipments	D-21
D.10.3	Uncertainties in Route Determination	D-21
D.10.4	Uncertainties in the Calculation of Radiation Doses	D-21
D.11	References.....	D-22

Appendix E

Relationship to Nuclear Weapons and the U.S. Nuclear Weapons Complex

E.1	Neptunium-237 and Plutonium-238 Proliferation Risks	E-1
E.1.1	Designations for Nuclear Materials	E-1
E.1.2	Neptunium-237	E-2
E.1.3	Plutonium-238	E-2
E.1.4	Summary	E-3
E.2	Non-Defense National Security Plutonium-238 Applications.....	E-3
E.3	Relationship of Plutonium-238 to the DOE Plutonium Nuclear Weapons Complex	E-3
E.4	Idaho National Laboratory, Plutonium-238, and the DOE Nuclear Weapons Complex.....	E-4
E.5	References.....	E-5

Appendix F

Preliminary Floodplain/Wetland Assessment

F.1	Introduction.....	F-1
F.2	Proposed New Road.....	F-2
F.3	Nature and Extent of the Flood Hazard, Floodplain, and Associated Wetlands.....	F-3
F.4	Floodplain/Wetland Impacts from the Proposed New Road Construction	F-6
F.5	Conclusion	F-7
F.6	References.....	F-9

Appendix G

Federal Register Notices	G-1
---------------------------------------	------------

Appendix H

Contractor Disclosure Statement.....	H-1
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LIST OF FIGURES

Chapter 1

Figure 1–1	Current Locations of U.S. Department of Energy Nuclear Operations Supporting Radioisotope Power System Production	1-1
Figure 1–2	Radioisotope Power Systems: Radioisotope Thermoelectric Generator and Radioisotope Heater Unit.....	1-2
Figure 1–3	National Environmental Policy Act Process for the <i>Consolidation EIS</i>	1-11

Chapter 2

Figure 2–1	Nuclear Infrastructure to Produce Radioisotope Power Systems.....	2-2
Figure 2–2	No Action Alternative Intersite Transportation	2-8
Figure 2–3	Consolidation Alternative and Consolidation Period of the Consolidation with Bridge Alternative Intersite Transportation	2-8
Figure 2–4	Bridge Period of the Consolidation with Bridge Alternative Intersite Transportation.....	2-9
Figure 2–5	Oak Ridge Reservation Site	2-17
Figure 2–6	Radiochemical Engineering Development Center Facility Layout.....	2-18
Figure 2–7	Idaho National Laboratory Site.....	2-20
Figure 2–8	Fuel Manufacturing Facility Location within the Zero Power Physics Reactor Complex.....	2-24
Figure 2–9	Proposed Radioisotope Power Systems Consolidation Facilities at the Materials and Fuels Complex.....	2-26
Figure 2–10	Proposed New Plutonium-238 Facility at the Materials and Fuels Complex (Conceptual)	2-27
Figure 2–11	Proposed New Radiological Welding Laboratory.....	2-29
Figure 2–12	New Road Alternative Routes.....	2-30

Chapter 3

Figure 3–1	Idaho National Laboratory Vicinity	3-4
Figure 3–2	Land Use at Idaho National Laboratory and Vicinity	3-6
Figure 3–3	Major Geologic Features of Idaho National Laboratory	3-11
Figure 3–4	Lithologic Logs of Deep Drill Holes on Idaho National Laboratory	3-13
Figure 3–5	Surface Water Features at Idaho National Laboratory.....	3-16
Figure 3–6	Extent of Tritium and Strontium-90 Plumes within the Snake River Plain Aquifer at the Idaho National Laboratory.....	3-21
Figure 3–7	Vegetation Association at Idaho National Laboratory.....	3-30
Figure 3–8	Location of the Materials and Fuels Complex and the Fort Hall Indian Reservation	3-44
Figure 3–9	Potentially Affected Counties near the Materials and Fuels Complex.....	3-44
Figure 3–10	Los Alamos National Laboratory Vicinity.....	3-52
Figure 3–11	Technical Areas of Los Alamos National Laboratory.....	3-53
Figure 3–12	Land Use at Los Alamos National Laboratory.....	3-55
Figure 3–13	Geology and Hydrogeology of the Española Portion of the Northern Rio Grande Basin.....	3-61
Figure 3–14	Major Faults at Los Alamos National Laboratory	3-62
Figure 3–15	Surface Water Features at Los Alamos National Laboratory.....	3-65
Figure 3–16	Los Alamos National Laboratory Vegetation Zones.....	3-74
Figure 3–17	Location of Technical Area 55 and Indian Reservations Surrounding Los Alamos National Laboratory.....	3-87
Figure 3–18	Potentially Affected Counties Surrounding Los Alamos National Laboratory.....	3-88
Figure 3–19	Oak Ridge Reservation Vicinity	3-94
Figure 3–20	Generalized Land Use at Oak Ridge Reservation and Vicinity	3-96
Figure 3–21	Stratigraphic Column for the Oak Ridge National Laboratory	3-100
Figure 3–22	Geologic Cross Section of the Oak Ridge National Laboratory	3-101
Figure 3–23	Surface Water Features in the Vicinity of Oak Ridge National Laboratory	3-104

Figure 3–24	Distribution of Plant Communities at the Oak Ridge Resrvation	3-114
Figure 3–25	Location of Oak Ridge National Laboratory and Indian Reservation Surrounding Oak Ridge Reservation	3-126
Figure 3–26	Potentially Affected Counties Near Oak Ridge National Laboratory	3-126

Appendix A

Figure A–1	National Environmental Policy Act Process for the <i>Consolidation EIS</i>	A-1
------------	--	-----

Appendix D

Figure D–1	Overland Transportation Risk Assessment	D-5
Figure D–2	Analyzed Truck Routes.....	D-8

Appendix F

Figure F–1	New Road Alternative Routes.....	F-3
Figure F–2	Surface Water Features, Wetlands, and Flood Hazard Areas at Idaho National Laboratory	F-4
Figure F–3	Alternate Road Routings and Impact on the Floodplains of the Big Lost River	F-6

LIST OF TABLES

Chapter 2

Table 2-1	Current Locations and Quantities of Plutonium-238 and Neptunium-237 Available and Usable Inventory and Program Requirements	2-6
Table 2-2	Infrastructure Comparison Among Alternatives	2-7
Table 2-3	Summary of Environmental Consequences of Alternatives.....	2-36

Chapter 3

Table 3-1	General Regions of Influence for the Affected Environment	3-2
Table 3-2	Idaho National Laboratory Sitewide Infrastructure Characteristics	3-8
Table 3-3	Modeled Ambient Air Concentrations from Idaho National Laboratory Sources	3-24
Table 3-4	Air Pollutant Emissions at Idaho National Laboratory in 2004	3-24
Table 3-5	Comparison of Modeled Ambient Air Concentrations from the Advanced Test Reactor Sources with Most Stringent Applicable Standards or Guidelines	3-26
Table 3-6	Prevention of Significant Deterioration Increment Consumption at Craters of the Moon Wilderness (Class I) Area by Existing (1996) and Projected Sources Subject to Prevention of Significant Deterioration Regulation	3-27
Table 3-7	Prevention of Significant Deterioration Increment Consumption at Class II Areas by Existing (1996) and Projected Sources Subject to Prevention of Significant Deterioration Regulation at Idaho National Laboratory	3-27
Table 3-8	Radiological Airborne Releases to the Environment at Idaho National Laboratory in 2003	3-28
Table 3-9	Listed Threatened, Endangered, and Special Status Species of Idaho National Laboratory.....	3-34
Table 3-10	Distribution of Employees by Place of Residence in the Idaho National Laboratory Region of Influence in 1997	3-37
Table 3-11	Demographic Profile of the Population in the Idaho National Laboratory Region of Influence.....	3-38
Table 3-12	Income Information for the Idaho National Laboratory Region of Influence	3-38
Table 3-13	Housing in the Idaho National Laboratory Region of Influence	3-39
Table 3-14	Sources of Radiation Exposure to Individuals in the Idaho National Laboratory Vicinity Unrelated to Idaho National Laboratory Operations.....	3-40
Table 3-15	Radiation Doses to the Public from Normal Idaho National Laboratory Operations in 2003 (total effective dose equivalent)	3-40
Table 3-16	Radiation Doses to Workers from Normal Idaho National Laboratory Operations in 2003 (total effective dose equivalent)	3-41
Table 3-17	Populations in Potentially Affected Counties Surrounding the Materials and Fuels Complex in 2000	3-45
Table 3-18	2004 Waste Generation Rates and Inventories at Idaho National Laboratory	3-45
Table 3-19	Waste Management Facilities at Idaho National Laboratory	3-46
Table 3-20	Waste Management PEIS Records of Decision Affecting Idaho National Laboratory	3-49
Table 3-21	Los Alamos National Laboratory Sitewide Infrastructure Characteristics.....	3-58
Table 3-22	Air Pollutant Emissions at Los Alamos National Laboratory in 1999.....	3-70
Table 3-23	Nonradiological Ambient Air Monitoring Results.....	3-70
Table 3-24	Modeled Ambient Air Concentrations from Los Alamos National Laboratory Sources	3-71
Table 3-25	Airborne Radioactive Emissions from Los Alamos National Laboratory in 2003	3-72
Table 3-26	Protected and Sensitive Species of Los Alamos National Laboratory	3-77
Table 3-27	Distribution of Employees by Place of Residence in the Los Alamos National Laboratory Region of Influence in 2003.....	3-80
Table 3-28	Demographic Profile of the Population in the Los Alamos National Laboratory Region of Influence	3-81
Table 3-29	Income Information for the Los Alamos National Laboratory Region of Influence.....	3-82
Table 3-30	Housing in the Los Alamos National Laboratory Region of Influence.....	3-82
Table 3-31	Sources of Radiation Exposure to Individuals in the Los Alamos National Laboratory Vicinity Unrelated to Los Alamos National Laboratory Operations.....	3-83

Table 3–32	Radiation Doses to the Public from Normal Los Alamos National Laboratory Operations in 2003 (total effective dose equivalent)	3-84
Table 3–33	Radiation Doses to Workers from Normal Los Alamos National Laboratory Operations in 2003 (total effective dose equivalent)	3-84
Table 3–34	Populations in Potentially Affected Counties Surrounding Los Alamos National Laboratory in 2000	3-88
Table 3–35	2003 Selected Waste Generation Rates and Inventories at Los Alamos National Laboratory	3-89
Table 3–36	Selected Waste Management Facilities at Los Alamos National Laboratory	3-90
Table 3–37	Waste Management Programmatic Environmental Impact Statement Records of Decision Affecting Los Alamos National Laboratory	3-93
Table 3–38	Oak Ridge National Laboratory Sitewide Infrastructure Characteristics	3-98
Table 3–39	Comparison of Modeled Ambient Air Concentrations from Oak Ridge Reservation Sources with Most Stringent Applicable Standards or Guidelines, 1998	3-109
Table 3–40	Comparison of Modeled Ambient Air Concentrations from Sources at the Radiochemical Engineering Development Center and High Flux Isotope Reactor with Most Stringent Applicable Standards or Guidelines	3-110
Table 3–41	Radiological Airborne Releases to the Environment at Oak Ridge National Laboratory in 2003	3-111
Table 3–42	Endangered, Threatened, and Special Status Species of the Oak Ridge Reservation	3-116
Table 3–43	Distribution of Employees by Place of Residence in the Oak Ridge Reservation Region of Influence, 2003	3-119
Table 3–44	Demographic Profile of the Population in the Oak Ridge Reservation Region of Influence	3-120
Table 3–45	Income Information for the Oak Ridge Reservation Region of Influence	3-120
Table 3–46	Housing in the Oak Ridge Reservation Region of Influence	3-120
Table 3–47	Sources of Radiation Exposure to Individuals in the Oak Ridge National Laboratory Vicinity Unrelated to Oak Ridge National Laboratory and Oak Ridge Reservation Operations	3-121
Table 3–48	Radiation Doses to the Public from Oak Ridge Reservation Normal Operations in 2003 (total effective dose equivalent)	3-122
Table 3–49	Radiation Doses to Workers from Oak Ridge National Laboratory Normal Operations in 2003 (total effective dose equivalent)	3-123
Table 3–50	Populations in Potentially Affected Counties Surrounding Oak Ridge National Laboratory in 2000	3-127
Table 3–51	2003 Waste Generation Rates and Inventories at Oak Ridge Reservation and Oak Ridge National Laboratory	3-128
Table 3–52	Waste Generation Rates at the Radiochemical Engineering Development Center and High Flux Isotope Reactor	3-128
Table 3–53	Waste Management Capabilities at Oak Ridge Reservation	3-129
Table 3–54	Waste Management PEIS Records of Decision Affecting Oak Ridge Reservation and Oak Ridge National Laboratory	3-135

Chapter 4

Table 4–1	Annual Incremental Infrastructure Requirements Associated with Operating Existing Facilities Under the No Action Alternative	4-3
Table 4–2	Annual Incremental Water Use and Wastewater Generation Associated with Operating Existing Facilities Under the No Action Alternative	4-4
Table 4–3	Incremental Oak Ridge National Laboratory Air Pollutant Concentrations Associated with Operating Existing Facilities Under the No Action Alternative	4-5
Table 4–4	Incremental Radiological Impacts on the Public of Facility Operations Under the No Action Alternative	4-8
Table 4–5	Incremental Radiological Impacts on Involved Workers of Facility Operations Under the No Action Alternative	4-9
Table 4–6	Incremental Hazardous Chemical Impacts on the Public around Oak Ridge National Laboratory Under the No Action Alternative	4-10
Table 4–7	Plutonium-238 Purification, Pelletization, and Encapsulation Annual Accident Consequences at Los Alamos National Laboratory Under the No Action Alternative	4-12

Table 4–8	Plutonium-238 Purification, Pelletization, and Encapsulation Annual Accident Risks at Los Alamos National Laboratory Under the No Action Alternative	4-12
Table 4–9	Incremental Waste Management Impacts of Operating the Radiochemical Engineering Development Center at Oak Ridge National Laboratory Under the No Action Alternative	4-19
Table 4–10	Incremental Waste Management Impacts of Operating the Plutonium Facility at Los Alamos National Laboratory Under the No Action Alternative	4-21
Table 4–11	Annual Utility Infrastructure Requirements for New Construction Under the Consolidation Alternative	4-24
Table 4–12	Annual Infrastructure Requirements for Facility Operations Under the Consolidation Alternative	4-25
Table 4–13	Geologic and Soil Resource Requirements for New Construction Under the Consolidation Alternative	4-26
Table 4–14	Annual Water Use and Wastewater Generation Associated with Operating Facilities Under the Consolidation Alternative	4-28
Table 4–15	Incremental Idaho National Laboratory Air Pollutant Concentrations Associated with Operating Facilities Under the Consolidation Alternative	4-30
Table 4–16	Incremental Radiological Impacts on the Public of Facility Operations at Idaho National Laboratory Under the Consolidation Alternative	4-36
Table 4–17	Incremental Radiological Impacts on Involved Workers of Facility Operations at Idaho National Laboratory Under the Consolidation Alternative	4-37
Table 4–18	Target Processing Accident Consequences at Idaho National Laboratory Under the Consolidation Alternative	4-39
Table 4–19	Target Processing Annual Accident Risks at Idaho National Laboratory Under the Consolidation Alternative	4-39
Table 4–20	Plutonium-238 Purification, Pelletization, and Encapsulation Annual Accident Consequences at Idaho National Laboratory Under the Consolidation Alternative	4-40
Table 4–21	Plutonium-238 Purification, Pelletization, and Encapsulation Annual Accident Risks at Idaho National Laboratory Under the Consolidation Alternative	4-40
Table 4–22	Chemicals of Concern Used in the Plutonium-238 Facility at Idaho National Laboratory Under the Consolidation Alternative	4-41
Table 4–23	Chemical Accident Impacts at Idaho National Laboratory Under the Consolidation Alternative	4-42
Table 4–24	Estimated Target Fabrication and Post-irradiation Processing Waste Generation Compared to Idaho National Laboratory Sitewide Waste Generation Under the Consolidation Alternative.....	4-45
Table 4–25	Estimated Plutonium Purification, Pelletization, and Encapsulation Waste Generation Compared to Idaho National Laboratory Sitewide Generation Under the Consolidation Alternative	4-46
Table 4–26	Estimated Radioisotope Power System Production Total Waste Generation Compared to Idaho National Laboratory Sitewide Generation and Waste Disposition for the Consolidation Alternative	4-46
Table 4–27	Incremental Radiological Impacts on the Public from Operation of Facilities Under the Consolidation with Bridge Alternative (2007 to 2011).....	4-53
Table 4–28	Incremental Radiological Impacts on the Public from Operation of Facilities at Idaho National Laboratory Under the Consolidation with Bridge Alternative (2012 to 2047)	4-54
Table 4–29	Incremental Radiological Impacts on Involved Workers from Operation of Facilities Under the Consolidation with Bridge Alternative (2007 to 2011).....	4-55
Table 4–30	Incremental Radiological Impacts on Involved Workers from Operation of Facilities Under the Consolidation with Bridge Alternative (2012 to 2047).....	4-55
Table 4–31	Incremental Hazardous Chemical Impacts on the Public around Oak Ridge National Laboratory Under the Consolidation with Bridge Alternative (2007 to 2011)	4-56
Table 4–32	Target Processing Annual Accident Consequences Under the Consolidation with Bridge Alternative	4-58
Table 4–33	Target Processing Annual Accident Risks Under the Consolidation with Bridge Alternative	4-58
Table 4–34	Plutonium-238 Purification, Pelletization, and Encapsulation Annual Accident Consequences Under the Consolidation with Bridge Alternative.....	4-59

Table 4–35	Plutonium-238 Purification, Pelletization, and Encapsulation Annual Accident Risks Under the Consolidation with Bridge Alternative	4-60
Table 4–36	Chemicals of Concern Used in Target Processing Under the Consolidation with Bridge Alternative	4-60
Table 4–37	Chemical Accident Impacts at Idaho National Laboratory and the Radiochemical Engineering Development Center Under the Consolidation with Bridge Alternative.....	4-61
Table 4–38	Incremental Waste Management Impacts of Operating the Radiochemical Engineering Development Center at Oak Ridge National Laboratory Under the Consolidation with Bridge Alternative	4-64
Table 4–39	Incremental Waste Management Impacts of Operating the Plutonium Facility at Los Alamos National Laboratory Under the Consolidation with Bridge Alternative	4-64
Table 4–40	Activities Included in the <i>Spent Nuclear Fuel EIS</i> Assessment of Cumulative Impacts	4-68
Table 4–41	Additional Onsite Actions Included in the <i>Idaho High-Level Waste and Facilities Disposition Final EIS</i> Assessment of Cumulative Impacts.....	4-69
Table 4–42	Cumulative Land Use Impacts at Idaho National Laboratory.....	4-71
Table 4–43	Cumulative Site Infrastructure Impacts at Idaho National Laboratory	4-72
Table 4–44	Cumulative Geologic Material Requirements at Idaho National Laboratory.....	4-73
Table 4–45	Cumulative Air Quality Impacts of Criteria Pollutants at Idaho National Laboratory.....	4-74
Table 4–46	Cumulative Population Health Effects of Exposure to Contaminants in Air at Idaho National Laboratory.....	4-75
Table 4–47	Cumulative Health Effects on the Idaho National Laboratory Worker.....	4-76
Table 4–48	Cumulative Truck Transportation Impacts	4-77
Table 4–49	Cumulative Waste Generation at Idaho National Laboratory	4-78
Table 4–50	Irreversible and Irrecoverable Commitments of Resources for Construction and Operation of the New Radioisotope Power Systems Nuclear Production Facility and Road at Idaho National Laboratory.....	4-82

Chapter 5

Table 5–1	Applicable DOE Orders and Directives	5-15
Table 5–2	Applicable State Environmental Laws, Regulations, and Tribal Agreements	5-16

Appendix A

Table A–1	Public Scoping Meeting Locations, Dates, and Attendance	A-1
Table A–2	Public Scoping Issues and Responses	A-2

Appendix B

Table B–1	Impact Assessment Protocol for Land Use and Visual Resources.....	B-2
Table B–2	Bureau of Land Management Classification of the Visual Resources	B-2
Table B–3	Impact Assessment Protocol for Infrastructure	B-3
Table B–4	Impact Assessment Protocol for Noise	B-5
Table B–5	Impact Assessment Protocol for Air Quality	B-7
Table B–6	Impact Assessment Protocol for Geology and Soils	B-8
Table B–7	The Modified Mercalli Intensity Scale of 1931, with Generalized Correlations to Magnitude, Earthquake Classification, and Peak Ground Acceleration.....	B-9
Table B–8	Impact Assessment Protocol for Water Use and Availability	B-11
Table B–9	Impact Assessment Protocol for Water Quality.....	B-11
Table B–10	Impact Assessment Protocol for Ecological Resources	B-14
Table B–11	Impact Assessment Protocol for Cultural Resources	B-15
Table B–12	Impact Assessment Protocol for Socioeconomics	B-18
Table B–13	Impact Assessment Protocol for Waste Management.....	B-19
Table B–14	Selection of Resource Areas for Cumulative Impact Analysis	B-21
Table B–15	Regions of Influence for Resource Areas Evaluated in the Cumulative Impact Analysis	B-22
Table B–16	Indicators of Cumulative Impacts	B-23

Appendix C

Table C-1	Exposure Limits for Members of the Public and Radiation Workers	C-6
Table C-2	Nominal Health Risk Estimators Associated with Exposure to 1 Rem of Ionizing Radiation.....	C-7
Table C-3	GENII Parameters for Exposure to Plumes (Normal Operations)	C-13
Table C-4	Normal Operation Incremental Radiological Releases	C-14
Table C-5	Neptunium-237 Target Preparation Accident Source Terms	C-22
Table C-6	Target Dissolver Tank Failure Source Terms	C-23
Table C-7	Plutonium-238 Ion Exchange Explosion Accident Source Terms	C-24
Table C-8	Beyond-Design-Basis Earthquake Accident Source Terms	C-25
Table C-9	Accident Scenario Source Term and Frequency	C-26
Table C-10	Accident Scenario Location for Each Alternative.....	C-27
Table C-11	Target Processing Accident Consequences Under the Consolidation Alternative at Idaho National Laboratory.....	C-28
Table C-12	Target Processing Annual Accident Risks Under the Consolidation Alternative at Idaho National Laboratory.....	C-28
Table C-13	Plutonium-238 Purification, Pelletization, and Encapsulation Accident Consequences Under the Consolidation Alternative at Idaho National Laboratory	C-29
Table C-14	Plutonium-238 Purification, Pelletization, and Encapsulation Annual Accident Risks Under the Consolidation Alternative at Idaho National Laboratory	C-29
Table C-15	Target Processing Accident Consequences Under the Consolidation with Bridge Alternative at Idaho National Laboratory and Oak Ridge National Laboratory	C-29
Table C-16	Target Processing Annual Accident Risks Under the Consolidation with Bridge Alternative at Idaho National Laboratory and Oak Ridge National Laboratory	C-30
Table C-17	Plutonium-238 Purification, Pelletization, and Encapsulation Accident Consequences at Los Alamos National Laboratory and Idaho National Laboratory Under the Consolidation with Bridge Alternative.....	C-30
Table C-18	Plutonium-238 Purification, Pelletization, and Encapsulation Annual Accident Risks at Los Alamos National Laboratory and Idaho National Laboratory Under the Consolidation with Bridge Alternative.....	C-31
Table C-19	Chemicals of Concern Used in Plutonium-238 Processing.....	C-31
Table C-20	Chemical Accident Impacts at Idaho National Laboratory and the Radiochemical Engineering Development Center at Oak Ridge National Laboratory	C-33

Appendix D

Table D-1	Offsite Transport Truck Route Characteristics	D-7
Table D-2	Summary of Material Shipments Per Year	D-11
Table D-3	Risk Factors per Shipment of Radioactive Material	D-16
Table D-4	Risks of Transporting Radioactive Materials.....	D-17
Table D-5	Estimated Dose to Maximally Exposed Individuals During Incident-Free Transportation Conditions.....	D-18
Table D-6	Estimated Dose to the Population and to Maximally Exposed Individuals During Most-Severe Accident Conditions.....	D-18
Table D-7	Cumulative Transportation-Related Radiological Collective Doses and Latent Cancer Fatalities (1943 to 2047).....	D-20

ACRONYMS, ABBREVIATIONS, AND CONVERSION CHARTS

ACRONYMS, ABBREVIATIONS, AND CONVERSION CHARTS

AEI	areas of environmental interest
ALARA	as low as is reasonably achievable
ALOHA	Areal Locations of Hazardous Atmospheres
ATR	Advanced Test Reactor
BEIR	Biological Effects of Ionizing Radiation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CEQ	Council on Environmental Quality
CFA	Central Facilities Area
CFR	<i>Code of Federal Regulations</i>
CHEMTREC	Chemical Transportation Emergency Center
CIRRPC	Committee on Interagency Radiation Research and Policy Coordination
CITRC	Critical Infrastructure Test Range Complex (formerly Power Burst Facility)
CPP	Chemical Processing Plant
DARHT	Dual Axis Radiographic Hydrodynamic Test
dB	decibel
dBA	decibels A-weighted
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EA	environmental assessment
EBR	Experimental Breeder Reactor
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
ERPG	Emergency Response Planning Guideline
ETTP	East Tennessee Technology Park
FDF	Fluorinel Dissolution Facility
FDPF	Fluorinel Dissolution Process and Fuel Storage Facility
FEMA	Federal Emergency Management Agency
FFTF	Fast Flux Test Facility
FMF	Fuel Manufacturing Facility
FONSI	Finding of No Significant Impact
FR	<i>Federal Register</i>
FY	Fiscal Year
HEPA	high-efficiency particulate air (filter)
HEU	high enriched uranium
HFIR	High Flux Isotope Reactor
HLW	high level radioactive waste
HVAC	heating, ventilating and air conditioning
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiological Protection
INEEL	Idaho National Engineering and Environmental Laboratory

INL	Idaho National Laboratory (formerly Idaho National Engineering and Environmental Laboratory)
INTEC	Idaho Nuclear Technology and Engineering Center
ISCORS	Interagency Steering Committee on Radiation Standards
LANL	Los Alamos National Laboratory
LCF	latent cancer fatality
LLNL	Lawrence Livermore National Laboratory
LOC	level-of-concern
MCL	maximum contaminant level
MEI	maximally exposed individual
MFC	Materials and Fuels Complex (formerly Argonne National Laboratory-West)
MCL	maximum contaminant level
MMI	Modified Mercalli Intensity
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
NCRP	National Council on Radiation Protection and Measurements
NEHRP	National Earthquake Hazards Reduction Program
NEPA	National Environmental Policy Act
NI PEIS	<i>Programmatic Environmental Impact Statement for Accomplishing Expanded Civilian Nuclear Energy Research and Development and Isotope Production Missions in the United States, Including the Role of the Fast Flux Test Facility</i>
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMSA	New Mexico Statutes Annotated
NNSA	National Nuclear Security Administration
NPDES	National Pollutant Discharge Elimination System
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPH	natural-phenomena hazards
NRC	U.S. Nuclear Regulatory Commission
NRF	Naval Reactors Facility
NTS	Nevada Test Site
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Reservation
OSHA	Occupational Safety and Health Administration
PEIS	Programmatic Environmental Impact Statement
PIDAS	Perimeter Intrusion and Detection Assessment System
PM ₁₀	particulate matter less than or equal to 10 microns in aerodynamic diameter
ppm	parts per million
PSD	prevention of significant deterioration
rad	radiation absorbed dose
RAP	Radiological Assistance Program
RCRA	Resource Conservation and Recovery Act
REDC	Radiochemical Engineering Development Center
rem	roentgen equivalent man

RESRAD	residual radiation
RfC	reference concentration
RHU	radioisotope heater units
RLWTF	Radioactive Liquid Waste Treatment Facility
ROD	Record of Decision
ROI	region of influence
RPS	radioisotope power system
RTC	Reactor Technology Complex (formerly Test Reactor Area)
RTG	radioisotope thermoelectric generator
RWL	Radiological Welding Laboratory
RWMC	Radioactive Waste Management Complex
SFM	special fissionable material
SM	source material
SMC	Specific Manufacturing Complex
SNL	Sandia National Laboratories
SNM	special nuclear material(s)
SPERT	Special Power Excursion Reactor Test
SRS	Savannah River Site
SSPSF	Space and Security Power Systems Facility
SST/SGTs	Safe, Secure Trailer/Safeguards Transports
TA	technical area
TAN	Test Area North
TDEC	Tennessee Department of Environment and Conservation
TEDE	total effective dose equivalent
TEEL	Temporary Emergency Exposure Limits
TRA	Test Reactor Area
TRAGIS	Transportation Routing Analysis Geographic Information System
TRANSCOM	Transportation Tracking and Communications System
TRU	transuranic waste
TVA	Tennessee Valley Authority
U.S.C.	<i>United States Code</i>
UFSF	Unirradiated Fuel Storage Facility
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WAG	waste area group
WERF	Waste Experimental Reduction Facility
WROC	Waste Reduction Operations Complex
WIPP	Waste Isolation Pilot Plant
Y-12	Y-12 Plant
ZPPR	Zero Power Physics Reactor

CONVERSIONS

METRIC TO ENGLISH			ENGLISH TO METRIC		
Multiply	by	To get	Multiply	by	To get
Area					
Square meters	10.764	Square feet	Square feet	0.092903	Square meters
Square kilometers	247.1	Acres	Acres	0.0040469	Square kilometers
Square kilometers	0.3861	Square miles	Square miles	2.59	Square kilometers
Hectares	2.471	Acres	Acres	0.40469	Hectares
Concentration					
Kilograms/square meter	0.16667	Tons/acre	Tons/acre	0.5999	Kilograms/square meter
Milligrams/liter	1 ^a	Parts/million	Parts/million	1 ^a	Milligrams/liter
Micrograms/liter	1 ^a	Parts/billion	Parts/billion	1 ^a	Micrograms/liter
Micrograms/cubic meter	1 ^a	Parts/trillion	Parts/trillion	1 ^a	Micrograms/cubic meter
Density					
Grams/cubic centimeter	62.428	Pounds/cubic feet	Pounds/cubic feet	0.016018	Grams/cubic centimeter
Grams/cubic meter	0.0000624	Pounds/cubic feet	Pounds/cubic feet	16,025.6	Grams/cubic meter
Length					
Centimeters	0.3937	Inches	Inches	2.54	Centimeters
Meters	3.2808	Feet	Feet	0.3048	Meters
Kilometers	0.62137	Miles	Miles	1.6093	Kilometers
Temperature					
<i>Absolute</i>					
Degrees C + 17.78	1.8	Degrees F	Degrees F - 32	0.55556	Degrees C
<i>Relative</i>					
Degrees C	1.8	Degrees F	Degrees F	0.55556	Degrees C
Velocity/Rate					
Cubic meters/second	2118.9	Cubic feet/minute	Cubic feet/minute	0.00047195	Cubic meters/second
Grams/second	7.9366	Pounds/hour	Pounds/hour	0.126	Grams/second
Meters/second	2.237	Miles/hour	Miles/hour	0.44704	Meters/second
Volume					
Liters	0.26418	Gallons	Gallons	3.78533	Liters
Liters	0.035316	Cubic feet	Cubic feet	28.316	Liters
Liters	0.001308	Cubic yards	Cubic yards	764.54	Liters
Cubic meters	264.17	Gallons	Gallons	0.0037854	Cubic meters
Cubic meters	35.314	Cubic feet	Cubic feet	0.028317	Cubic meters
Cubic meters	1.3079	Cubic yards	Cubic yards	0.76456	Cubic meters
Cubic meters	0.0008107	Acre-feet	Acre-feet	1233.49	Cubic meters
Weight/Mass					
Grams	0.035274	Ounces	Ounces	28.35	Grams
Kilograms	2.2046	Pounds	Pounds	0.45359	Kilograms
Kilograms	0.0011023	Tons (short)	Tons (short)	907.18	Kilograms
Metric tons	1.1023	Tons (short)	Tons (short)	0.90718	Metric tons
ENGLISH TO ENGLISH					
Acre-feet	325,850.7	Gallons	Gallons	0.000003046	Acre-feet
Acres	43,560	Square feet	Square feet	0.000022957	Acres
Square miles	640	Acres	Acres	0.0015625	Square miles

a. This conversion is only valid for concentrations of contaminants (or other materials) in water.

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
deca-	D	10 = 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