

State Implementation Plan Revision
Adoption of Regional Haze Strategies in Oregon

**Oregon Regional Haze Plan
for Implementing
Section 308 (40CFR 51.308)
of the Regional Haze Rule**

**Adopted by the Environmental Quality Commission
June 19, 2009**

Revised December 9, 2010

State of Oregon
Department of Environmental Quality
811 SW Sixth Avenue
Portland, OR 97204-1390

Table of Contents

ACKNOWLEDGEMENTS AND SUMMARY	i
Acknowledgements	i
Executive Summary.....	i
CHAPTER 1: INTRODUCTION	7
1.1 Overview of Visibility and Regional Haze	7
1.2 Oregon Class I Areas.....	8
1.3 Background on the Regional Haze Rule	8
1.4 Summary of the Regional Haze Rule	9
1.5 Other Programs to Address Visibility Impairment.....	10
1.5.1 Prevention of Significant Deterioration for New Sources.....	10
1.5.2 Phase I Visibility Rules óthe Oregon Visibility Protection Plan.....	10
1.5.3 Best Available Retrofit Technology (BART).....	10
1.5.4 The Grand Canyon Visibility Transport Commission.....	11
1.5.5 The Western Regional Air Partnership.....	12
1.6 Purpose of this Document	13
1.6.1 Mandatory Federal Class I Areas Addressed in this SIP.....	13
1.6.2 Columbia River Gorge National Scenic Area	13
CHAPTER 2: OREGON REGIONAL HAZE SIP DEVELOPMENT AND CONSULTATION PROCESS	15
2.1 Federal Land Manager Consultation	15
2.2 State Consultation.....	15
2.3 Tribal Consultation.....	15
CHAPTER 3: INTRODUCTION TO OREGON CLASS I AREAS.....	16
3.1 Mt. Hood Wilderness Area.....	17
3.2 Mt. Jefferson Wilderness Area	18
3.3 Mt. Washington Wilderness Area	19
3.4 Three Sisters Wilderness Area	20
3.5 Diamond Peak Wilderness Area.....	21
3.6 Crater Lake National Park	22
3.7 Mountain Lakes Wilderness Area	23
3.8 Gearhart Mountain Wilderness Area.....	24
3.9 Kalmiopsis Wilderness Area	25
3.10 Strawberry Mountain Wilderness Area	26
3.11 Eagle Cap Wilderness Area.....	27
3.12 Hells Canyon Wilderness Area	28
CHAPTER 4: TECHNICAL INFORMATION AND DATA RELIED UPON IN THIS PLAN	Error! Bookmark not defined.
4.1 The WRAP and Technical Support	Error! Bookmark not defined.

6 0 3 0 3 " Y T C R " E q o o k v v . g . g . ø . u . " . c . p . f . " Y . q . t . m . i . t . q . w . u	
4.1.2 WRAP TSS.....	32
4.2 IMPROVE Monitoring.....	32
4.2.1 Background on IMPROVE Monitoring	32
4.2.2 Formula for Reconstructed Light Extinction.....	34
4.3 Oregon IMPROVE Monitoring Network.....	35
4.3.1 MOHO1	36
4.3.2 THSI1	36
4.3.3 CRLA1	36
4.3.4 KALM1	37
4.3.5 STAR1	37
4.3.6 HECA1	37
4.4 Oregon Regional Haze Monitoring Commitments.....	37
CHAPTER 5: BASIC PLAN ELEMENTS.....	40
5.1 Natural Sources of Visibility Impairment	40
5.2 Human-Caused Sources of Visibility Impairment	40
5.3 Deciview Measurement.....	40
5.4 Baseline and Current Conditions.....	41
5.5 Natural Conditions.....	41
5.6 Reasonable Progress Goals.....	41
5.7 Uniform Rate of Progress	42
5.8 Long-Term Strategy	43
5.9 BART	43
CHAPTER 6: BASELINE AND NATURAL VISIBILITY CONDITIONS, AND UNIFORM RATE OF PROGRESS	45
6.1 Northern Cascades óMt. Hood Wilderness Area	46
6.2 Central Cascades óMt. Jefferson, Mt. Washington, and Three Sisters Wilderness Areas.....	48
6.3 Southern Cascades óCrater Lake National Park, and Diamond Peak, Mountain Lakes, and Gearhart Mountain Wilderness Areas.....	52
6.4 Coast Range óKalmiopsis Wilderness Area.....	56
6.5 Eastern Oregon óStrawberry Mountain Wilderness and Eagle Cap Wilderness	58
6.6 Eastern Oregon/Western Idaho óHells Canyon Wilderness Area.....	61
CHAPTER 7: POLLUTANTS CAUSING VISIBILITY IMPAIRMENT IN OREGON CLASS I AREAS.....	64
7.1 Northern Cascades - Mt. Hood Wilderness Area	67
7.2 Central Cascades óMt. Jefferson Wilderness, Mt. Washington Wilderness, and Three Sisters Wilderness Areas	69
7.3 Southern Cascades óCrater Lake National Park, Mountain Lakes Wilderness, and Gearhart Mountain Wilderness Areas	71
7.4 Coast Range - Kalmiopsis Wilderness Area	73
7.5 Eastern Oregon óStrawberry Mountain Wilderness and Eagle Cap Wilderness	75
7.6 Eastern Oregon/Western Idaho - Hells Canyon Wilderness Area.....	77

CHAPTER 8: EMISSION SOURCE INVENTORY	80
8.1 Oregon Statewide Emissions	80
8.1.1 SO ₂ Emissions	81
8.1.2 NO _x Emissions.....	82
8.1.3 VOC Emissions	83
8.1.4 Organic Carbon Emissions	84
8.1.5 Elemental Carbon Emissions.....	84
8.1.6 PM Fine Emissions.....	85
8.1.7 Ammonia Emissions.....	86
8.2 Regional Emissions	87
8.2.1 Regional Emissions Comparison to Neighboring States.....	87
8.2.2 Regional Off-Shore Marine Emissions	92
8.2.3 Role of Ammonia Emissions in Visibility Impairment.....	95
CHAPTER 9: SOURCE APPORTIONMENT AND REGIONAL HAZE MODELING ...	97
9.1 Overview	97
9.1.1 Source Apportionment Analysis óPSAT and WEP.....	97
9.1.2 Regional Haze Modeling óCMAQ.....	98
9.2 Major Source Categories Contributing to Haze in Oregon	100
9.2.1 PSAT Regional Contribution to Sulfate on 20% Worst Days.....	101
9.2.2 PSAT Regional Contribution to Nitrate on 20% Worst Days.....	107
9.2.3 WEP Potential Contribution to OC on 20% Worst Days.....	113
9.2.4 WEP Potential Contribution to PM Fine on 20% Worst Days.....	117
9.2.5 WEP Potential Contribution to PM Coarse on 20% Worst Days.....	121
9.3 CAMQ 2018 Projected Visibility Conditions	124
9.3.1 CMAQ Modeling Breakdown by Pollutant for 20% Worst Days.....	125
CHAPTER 10: BEST AVAILABLE RETROFIT TECHNOLOGY (BART)	
EVALUATION.....	133
10.1 Overview of BART Process in Oregon.....	133
3 2 0 4 " " F g v g t o k p eligible' Sources i..q.p.ø.u." D.C.T.V.....	134
10.2.1 Extent of BART-eligible Source Emissions.....	137
10.3 Summary of BART Modeling.....	138
10.3.1 Description of the Modeling Protocol	139
10.3.2 Summary of Oregon BART Modeling Results	142
10.3.3 Summary of Interstate Modeling Results from BART-eligible sources	145
10.3.4 BART Modeling in the Context of the Regional Haze Rule.....	146
10.4 Summary of Oregon BART Control Determination Process	147
10.4.1 Option to take a Federally Enforceable Permit Limit	147
10.4.2 Summary of BART Control Determination for PGE Boardman plant	149
10.5.1 PGE Boardman 2020 Closure and Visibility Improvement	157
10.5.2 FEPL Source Visibility Improvements	158
3 2 0 8 " " Q t g i q.p.ø.u." D.C.T.V." t.w.n.g.....	159
CHAPTER 11: REASONABLE PROGRESS GOAL DEMONSTRATION	160

11.1	Overview	160
11.2	Steps in Demonstrating Reasonable Progress	160
11.3	Summary of Four-Factor Analysis	162
11.3.1	Rationale and Scope of the Four-Factor Analysis	163
11.3.2	Identification of Point and Area Sources for the Four-Factor Analysis	164
11.3.3	The Four-Factor Analysis	166
11.3.4	Conclusions from the Four-Factor Analysis	172
11.3.5	Identification of Additional Emission Reductions	173
3 3 0 6 " " F g v g t o k p c v k q p " q h " T g c u q p c d n.g." R.t. 173		
11.4.1	Affirmative Demonstration the RPGs for 20% Worst Days	174
11.4.2	20% Reduction in Emissions from Anthropogenic Sources	176
11.4.3	Major Reductions in Mobile Source Emissions by 2018	179
11.4.4	Additional Emission Reductions Expected by 2018 due to the Long-Term Strategy	181
11.4.5	Long-V g t o " U v t & v ħ ÷ ħ ħ ã ß ħ ħ p " C p c n { k.p.i.18D c l q t "	

CHAPTER 12: LONG-TERM STRATEGY..... 182

12.1	Overview of the LTS	182
12.2	Overview of the LTS Development Process	182
12.3	Summary of all Anthropogenic Sources of Visibility Impairment Considered in Developing the LTS.	183
12.3	Summary of Interstate Transport and Contribution.....	184
12.3.1	Other State Class I Areas Affected by Oregon emissions	184
12.3.2	Oregon Class I Areas affected by Other States	185
12.3.3	Estimated International and Global Contribution to Oregon Class I Areas	187
12.4	Summary of Interstate Consultation.....	187
12.5	Technical Documentation.....	188
12.5	Required Factors for the LTS	188
12.5.1	Emission Reductions Due to Ongoing Air Pollution Programs	188
12.5.2	Measures to Mitigate the Impacts of Construction Activities	193
12.5.3	Emission Limitations and Schedules of Compliance	193
12.5.4	Source Retirement and Replacement Schedules	193
3 4 0 7 0 8 " " " " G p h q t e g c d.k.n.k.v...{"...q.h." Q.t.g.i.q.p. 200		
12.6	Additional Measures in the LTS.....	200
12.6.1	Evaluation of Non-BART Sources and BART-eligible Sources	200
12.6.2	Evaluation of Prescribed Burning Contribution to Haze and Possible Controls	202
12.6.3	Evaluation of the Contribution from General Outdoor Open Burning.....	205
12.6.4	Evaluation of the Contribution from Rangeland Burning	206
12.6.5	Efforts to Address Offshore Shipping	206
12.7	Projection of the Net Effect on Visibility.....	206

CHAPTER 13: CONSULTATION AND FUTURE COMMITMENTS..... 208

13.1	Federal Land Manager Consultation	208
13.2	State Consultation and Coordination.....	209
13.2.1	Summary of State Consultation Process.....	210

13.2.2	Consistency with Neighboring State SIPs	210
13.2.3	Oregon and Other State Emission Reductions Obligations.....	210
13.3	Tribal Consultation	211
13.4	Commitment to Future 308 Plan Revisions.....	211
13.4.1	Comprehensive 10-Year Plan Revisions	211
13.4.2	5-Year Progress Reports.....	212
13.5	Determination of Plan Adequacy	212

Table of Figures

Figure 1.1-1	Class I Areas in Pacific Northwest	7
Figure 3-1	Map of Oregon Class I Areas	16
Figure 3.1-1	Map of Mt. Hood Wilderness Area	17
Figure 3.2-1	Map of Mt. Jefferson Wilderness Area.....	18
Figure 3.3-1	Map of Mt. Washington Wilderness Area.....	19
Figure 3.4-1	Map of Three Sisters Wilderness Area.....	20
Figure 3.5-1	Map of Diamond Peak Wilderness Area	21
Figure 3.6-1	Map of Crater Lake NP.....	22
Figure 3.7-1	Map of Mountain Lakes Wilderness Area.....	23
Figure 3.8-1	Map of Gearhart Mountain Wilderness Area	24
Figure 3.9-1	Map of Kalmiopsis Wilderness Area.....	25
Figure 3.10-1	Map of Strawberry Mountain Wilderness Area.....	26
Figure 3.11-1	Map of Eagle Cap Wilderness Area	27
Figure 3.12-1	Map of Hells Canyon Wilderness Area	28
Figure 4.2.1-1	Picture of an IMPROVE Monitoring Site	33
Figure 4.2.1-2	IMPROVE Sampler Modules	33
Figure 4.3-1	Map of Oregon IMPROVE Sites	36
Figure 5.7-1	Example of How Uniform Rate of Progress is Determined	42
Figure 6.1-1	MOHO1 Uniform Rate of Progress.....	47
Figure 6.1-2	Mt. Hood Wilderness Area (Hickman Butte vista) Worst Days Baseline and Natural Conditions.....	47
Figure 6.1-3	Mt. Hood Wilderness Area (Hickman Butte vista) Best Days Baseline Conditions	48
Figure 6.2-1	THSI1 Uniform Rate of Progress	49
Figure 6.2-2	Mt. Jefferson Wilderness Area (Three Fingered Jack vista) Worst Days Baseline and Natural Conditions.....	49
Figure 6.2-3	Mt. Jefferson Wilderness Area (Three Fingered Jack vista) Best Days Baseline Conditions.....	50
Figure 6.2-4	Mt. Washington Wilderness Area (Black Butte vista) Worst Days Baseline and Natural Conditions.....	50
Figure 6.2-5	Mt. Washington Wilderness Area (Black Butte vista) Best Days Baseline Conditions.....	51
Figure 6.2-6	Three Sisters Wilderness Area Worst Days Baseline and Natural Conditions	51
Figure 6.2-7	Three Sisters Wilderness Area Best Days Baseline Conditions	52
Figure 6.3-1	CRLA1 Uniform Rate of Progress	53
Figure 6.3-2	Crater Lake National Park Worst Days Baseline and Natural Conditions	53

Figure 6.3-3 Crater Lake National Park Best Days Baseline Conditions..... 54

Figure 6.3-4 Diamond Peak Wilderness Area (Wolf Mountain Vista) Worst Days Baseline and Natural Conditions..... 54

Figure 6.3-5 Diamond Peak Wilderness Area (Wolf Mountain Vista) Best Days Baseline Conditions..... 55

Figure 6.3-6 Gearhart Mountain Wilderness Area Worst Days Baseline and Natural Conditions 55

Figure 6.3-7 Gearhart Mountain Wilderness Area Best Days Baseline Conditions 56

Figure 6.4-1 KALM1 Uniform Rate of Progress 57

Figure 6.4-2 Kalmiopsis Wilderness Area (Quail Prairie) Worst Days Baseline and Natural Conditions..... 57

Figure 6.4-3 Kalmiopsis Wilderness Area (Quail Prairie) Best Days Baseline Conditions 58

Figure 6.5-1 STAR1 Uniform Rate of Progress..... 59

Figure 6.5-2 Strawberry Mountain Wilderness Area (Dixie Butte) Worst Days Baseline and Natural Conditions..... 59

Figure 6.5-3 Strawberry Mountain Wilderness Area (Dixie Butte) Best Days Baseline Conditions..... 60

Figure 6.5-4 Eagle Cap Wilderness Area (Point Prominence) Worst Days Baseline and Natural Conditions..... 60

Figure 6.5-5 Eagle Cap Wilderness Area (Point Prominence) Best Days Baseline Conditions 61

Figure 6.6-1 HECA1 Uniform Rate of Progress 62

Figure 6.6-2 Hells Canyon Wilderness Area (Mt. Howard) Worst Days Baseline and Natural Conditions..... 62

Figure 6.6-3 Hells Canyon Wilderness Area (Mt. Howard) Best Days Baseline Conditions.... 63

Figure 7-1 Map of Oregon IMPROVE sites..... 64

Figure 7-2 Light Extinction by Pollutant Species for Oregon Class I Areas 20% Best Days (2000-2004) 65

Figure 7-3 Light Extinction by Pollutant Species for Oregon Class I Areas 20% Worst Days (2000-2004) 66

Figure 7.1-1 Mt. Hood IMPROVE Site óAverage Pollutant Species Contribution to 20% Best and 20% Worst Days Baseline (2000-2004) 67

Figure 7.1-2 Mt. Hood IMPROVE Site óMonthly Average Pollutant Species Variation for All Days Sampled During the Baseline Period (2000-2004) 67

Figure 7.1-3 Mt. Hood IMPROVE Site óPollutant Species Variation for All Days Sampled in 2004 68

Figure 7.1-4 Mt. Hood IMPROVE Site óBaseline Worst Day Aerosol Composition Compared to Visibility Improvement Needed by 2018 & 2064 68

Figure 7.2-1 Three Sisters IMPROVE Site óAverage Aerosol Composition 20% Best and 20% Worst Days Baseline (2000-2004) 69

Figure 7.2-2 Three Sisters IMPROVE Site óMonthly Average Pollutant Species Variation for All Days Sampled During the Baseline Period (2000-2004) 69

Figure 7.2-3 Three Sisters IMPROVE Site óPollutant Species Variation for All Days Sampled in 2004 70

Figure 7.2-4 Three Sisters IMPROVE Site óBaseline Worst Day Aerosol Composition Compared to Visibility Improvement Needed by 2018 & 2064 70

Figure 7.3-1 Crater Lake IMPROVE Site óAverage Aerosol Composition 20% Best and 20% Worst Days Baseline (2000-2004)	71
Figure 7.3-2 Crater Lake IMPROVE Site óMonthly Average Pollutant Species Variation for All Days Sampled During the Baseline Period (2000-2004)	71
Figure 7.3-3 Crater Lake IMPROVE Site óPollutant Species Variation for All Days Sampled in 2004	72
Figure 7.3-4 Crater Lake IMPROVE Site óBaseline Worst Day Aerosol Composition Compared to Visibility Improvement Needed by 2018 & 2064	72
Figure 7.4-1 Kalmiopsis IMPROVE Site óAverage Aerosol Composition 20% Best and 20% Worst Days Baseline (2000-2004)	73
Figure 7.4-2 Kalmiopsis IMPROVE Site óMonthly Average Pollutant Species Variation for All Days Sampled During the Baseline Period (2000-2004)	73
Figure 7.4-3 Kalmiopsis IMPROVE Site óPollutant Species Variation for All Days Sampled in 2004	74
Figure 7.4-4 Kalmiopsis IMPROVE Site óBaseline Worst Day Aerosol Composition Compared to Visibility Improvement Needed by 2018 & 2064	74
Figure 7.5-1 Starkey IMPROVE Site óAverage Aerosol Composition 20% Best and 20% Worst Days Baseline (2000-2004)	75
Figure 7.5-2 Starkey IMPROVE Site óMonthly Average Pollutant Species Variation for All Days Sampled During the Baseline Period (2000-2004)	76
Figure 7.5-3 Starkey IMPROVE Site óPollutant Species Variation for All Days Sampled in 2004	76
Figure 7.5-4 Starkey IMPROVE Site óBaseline Worst Day Aerosol Composition	77
Compared to Visibility Improvement Needed by 2018 & 2064	77
Figure 7.6-1 Hells Canyon IMPROVE Site óAerosol Composition 20% Best and 20% Worst Days Baseline (2000-2004)	78
Figure 7.6-2 Hells Canyon IMPROVE Site óMonthly Average Pollutant Species Variation for all days sampled During the Baseline Period (2000-2004)	78
Figure 7.6-3 Hells Canyon IMPROVE Site óPollutant Species Variation for All Days Sampled in 2004	79
Figure 7.6-4 Hells Canyon IMPROVE Site óBaseline Worst Day Aerosol Composition Compared to Visibility Improvement Needed by 2018 & 2064	79
Figure 8.2.1-1 SO ₂ Emissions óOregon vs. Regional, 2002 & 2018	88
Figure 8.2.1-2 NO _x Emissions óOregon vs. Regional, 2002 & 2018.....	89
Figure 8.2.1-3 VOC Emissions óOregon vs. Regional, 2002 & 2018	89
Figure 8.2.1-4 OC Emissions óOregon vs. Regional, 2002 & 2018	90
Figure 8.2.1-5 EC Emissions óOregon vs. Regional, 2002 & 2018.....	90
Figure 8.2.1-6 PM Fine Emissions óOregon vs. Regional, 2002 & 2018.....	91
Figure 8.2.1-7 Coarse PM Emissions óOregon vs. Regional, 2002 & 2018.....	91
Figure 8.2.1-8 Ammonia Emissions óOregon vs. Regional, 2002 & 2018.....	92
Figure 9.2.1-1 Northern Cascades óMt. Hood Wilderness Area PSAT Sulfate.....	102
Figure 9.2.1-2 Central Cascades óMt. Jefferson Wilderness, Mt. Washington Wilderness, and Three Sisters Wilderness Areas PSAT Sulfate.....	103
Figure 9.2.1-3 Southern Cascades óCrater Lake National Park, Mountain Lakes Wilderness, and Gearhart Mountain Wilderness Areas PSAT Sulfate	104
Figure 9.2.1-4 Coast Range óKalmiopsis Wilderness Area PSAT Sulfate	105

Figure 9.2.1-5 Eastern Oregon óStrawberry Mountain Wilderness and Eagle Cap Wilderness PSAT Sulfate	106
Figure 9.2.1-6 Eastern Oregon/Western Idaho óHells Canyon Wilderness Area PSAT Sulfate	107
Figure 9.2.2-1 Northern Cascades óMt. Hood Wilderness Area PSAT Nitrate	108
Figure 9.2.2-2 Central Cascades óMt. Jefferson Wilderness, Mt. Washington Wilderness, and Three Sisters Wilderness Areas PSAT Nitrate	109
Figure 9.2.2-3 Southern Cascades óCrater Lake National Park, Mountain Lakes Wilderness, and Gearhart Mountain Wilderness Areas PSAT Nitrate.....	110
Figure 9.2.2-4 Coast Range óKalmiopsis Wilderness Area PSAT Nitrate	111
Figure 9.2.2-5 Eastern Oregon óStrawberry Mountain Wilderness and Eagle Cap Wilderness Figure PSAT Nitrate.....	112
Figure 9.2.2-6 Eastern Oregon/Western Idaho óHells Canyon Wilderness Area PSAT Nitrate	113
Figure 9.2.3-1 Northern Cascades óMt. Hood Wilderness Area.....	114
Figure 9.2.3-2 Central Cascades óMt. Jefferson Wilderness, Mt. Washington Wilderness, and Three Sisters Wilderness Areas.....	114
Figure 9.2.3-3 Southern Cascades óCrater Lake National Park, Mountain Lakes Wilderness, and Gearhart Mountain Wilderness Areas	115
Figure 9.2.3-4 Coast Range óKalmiopsis Wilderness Area	116
Figure 9.2.3-5 Eastern Oregon óStrawberry Mountain Wilderness and Eagle Cap Wilderness	116
Figure 9.2.3-6 Eastern Oregon/Western Idaho óHells Canyon Wilderness Area	117
Figure 9.2.4-1 Northern Cascades óMt. Hood Wilderness Area.....	118
Figure 9.2.4-2 Central Cascades óMt. Jefferson Wilderness, Mt. Washington Wilderness, and Three Sisters Wilderness Areas.....	118
Figure 9.2.4-3 Southern Cascades óCrater Lake National Park, Mountain Lakes Wilderness, and Gearhart Mountain Wilderness Areas	119
Figure 9.2.4-4 Coast Range óKalmiopsis Wilderness Area	119
Figure 9.2.4-5 Eastern Oregon óStrawberry Mountain Wilderness and Eagle Cap Wilderness	120
Figure 9.2.4-6 Eastern Oregon/Western Idaho óHells Canyon Wilderness Area	120
Figure 9.2.5-1 Northern Cascades óMt. Hood Wilderness Area.....	121
Figure 9.2.5-2 Central Cascades óMt. Jefferson Wilderness, Mt. Washington Wilderness, and Three Sisters Wilderness Areas.....	122
Figure 9.2.5-3 Southern Cascades óCrater Lake National Park, Mountain Lakes Wilderness, and Gearhart Mountain Wilderness Areas	122
Figure 9.2.5-4 Coast Range óKalmiopsis Wilderness Area	123
Figure 9.2.5-5 Eastern Oregon óStrawberry Mountain Wilderness and Eagle Cap Wilderness	123
Figure 9.2.5-6 Eastern Oregon/Western Idaho óHells Canyon Wilderness Area	124
Figure 9.3.1-1 Glideslope by Pollutant on 20% Worst Days for Northern Cascades óMt. Hood Wilderness Area	127
Figure 9.3.1-2 Pollutant Breakdown on 20% Worst Days for Central Cascades óMt. Jefferson Wilderness, Mt. Washington Wilderness, and Three Sisters Wilderness Areas	128
Figure 9.3.1-3 Glideslope by Pollutant on 20% Worst Days for Southern Cascades Region..	129

Figure 9.3.1-4 Glideslope by Pollutant on 20% Worst Days for Coast Range óKalmiopsis Wilderness Area	130
Figure 9.3.1-5 Glideslope by Pollutant on 20% Worst Days for Eastern Oregon óStrawberry Mountain Wilderness and Eagle Cap Wilderness Areas	131
Figure 9.3.1-6 Glideslope by Pollutant on 20% Worst Days for Eastern Oregon/Western Idaho óHells Canyon Wilderness Area	132
Figure 10.2-1 Map of Oregon BART-eligible Sources	137
Figure 10.4.2-1 Map of 14 Class I Areas Impacted by PGE Boardman	150
Figure 12.5.5-1 Oregon Anthropogenic Fire Sources	195
Figure 12.6.2-1 Crater Lake IMPROVE Site óPollutant Species Variation for All Days Sampled in 2004	203

Table of Tables

Table 1.2-1 Oregon Class I Areas	8
Table 4.3-1 Oregon IMPROVE Monitoring Network	35
Table 6-1 20% Best and Worst Days Baseline, Natural Conditions, and Uniform Rate of Progress Goal for Oregon Class I Areas.....	46
Table 7-1 IMPROVE Monitor Aerosol Composition	65
Table 1.2-1 Oregon Class I Areas	8
Table 4.3-1 Oregon IMPROVE Monitoring Network	35
Table 6-1 20% Best and Worst Days Baseline, Natural Conditions, and Uniform Rate of Progress Goal for Oregon Class I Areas.....	46
Table 7-1 IMPROVE Monitor Aerosol Composition	65
Table 8.1.1-1 Oregon SO ₂ Emission Inventory ó2002 & 2018.....	81
Table 8.1.2-1 Oregon NO _x Emission Inventory ó2002 & 2018.....	82
Table 8.1.3-1 Oregon VOC Emission Inventory ó2002 & 2018.....	83
Table 8.1.4-1 Oregon Organic Carbon Emission Inventory ó2002 & 2018	84
Table 8.1.5-1 Oregon Elemental Carbon (EC) Emission Inventory ó2002 & 2018	85
Table 8.1.6-1 Oregon Fine Particulate Matter Emission Inventory ó2002 & 2018	85
Table 8.1.6-2 Oregon Coarse Particulate Matter Emission Inventory ó2002 & 2018	86
Table 8.1.7-1 Oregon Ammonia (NH ₃) Emission Inventory ó2002 & 2018	87
Table 8.2.2-1 Commercial Marine Vessel Types and Uses	93
Table 8.2.2-2 2002 Emissions for Ocean-going Shipping Emissions by State.....	93
Table 8.2.2-3 2002 Emissions for Columbia River Ocean-going Vessels by Port	94
Table 9.3-1 CMAQ Modeling Results for 20% Worst Days and 20% Best Days for Oregon Class I Areas.....	125
Table 9.3.1-1 Pollutant Breakdown on 20% Worst Days for Northern Cascades óMt. Hood Wilderness Area	127
Table 9.3.1-2 Pollutant Breakdown on 20% Worst Days for Central Cascades ó.....	128
Mt. Jefferson Wilderness, Mt. Washington Wilderness, and Three Sisters Wilderness Areas	128
Table 9.3.1-3 Pollutant Breakdown on 20% Worst Days for Southern Cascades Region.....	129
Table 9.3.1-4 Pollutant Breakdown on 20% Worst Days for Coast Range óKalmiopsis Wilderness Area	130
Table 9.3.1-5 Pollutant Breakdown on 20% Worst Days for Eastern Oregon óStrawberry Mountain Wilderness and Eagle Cap Wilderness Areas	131

Table 9.3.1-6 Pollutant Breakdown on 20% Worst Days for Eastern Oregon/Western Idaho 6 Hells Canyon Wilderness Area	132
Table 10.2-1 List of 10 BART-eligible Sources in Oregon	135
Table 10.2-2 List of Sources Determined not to be BART-eligible.....	136
Table 10.2.1-1 Oregon BART-eligible Source Emissions (2005 actual, tons/year)	138
Table 10.3.2-1 BART-Eligible Source Modeling Results.....	143
Table 10.3.2-2 BART-Eligible Sources with FEPLs	144
Table 10.3.3-1 BART source impacts in Oregon from other States	146
Table 10.4.2-1 Overview of the PGE Boardman Plant	149
Table 10.4.2-2 Summary of Class I Area Visibility Impacts from PGE Boardman Plant	151
Table 10.4.2-3 BART Proposal by PGE	151
Table 10.4.2-4 Summary of Control Options Evaluated for PGE Boardman	152
Table 10.5.1-1 Emission Reductions and Visibility Benefits from BART and 2020 Closure for PGE Boardman	157
Table 10.5.1-2 Summary of Class I Area Visibility Improvements from BART and 2020 Closure, including DEQ Option 3, for PGE Boardman	158
Table 11.3.2-1 Oregon Share of Modeled Sulfate and Nitrate in 2018 - 20% Worst Days	165
Table 11.3.2-2 Oregon Largest Source Categories	166
Table 11.3.3-1 Summary of NO _x Control Options for External Combustion Boilers (Industrial Wood/Bark Waste)	168
Table 11.3.3-2 Summary of NO _x Control Options for Cement Manufacturing	170
Table 11.4.2-1 WEP Projected Emission Contributions of Individual Pollutants by 2018 URP c u " c p " K p f k e c v q t " q h " ÷ T.g.c.u.q.p.c.d.n.g.ö."R.t.q177t g u u 0	
Table 11.4.2-2 CMAQ Projected Reduction in Ammonium Sulfate by 2018 URP as an K p f k e c v q t " q h " ÷ T.g.c.u.q.p.c.d.n.g.ö."R.t.q.i.t.g.u.u.0178	
Table 11.4.2-3 CMAQ Projected Reduction in Ammonium Nitrate by 2018 URP as an K p f k e c v q t " q h " ÷ T.g.c.u.q.p.c.d.n.g.ö."R.t.q.i.t.g.u.u.0179	
Table 11.4.3-1 Mobile Source Emission Reductions in Oregon from 2002 to 2018	179
Table 12.5.1-1 Proximity of Oregon Class I Areas to PM ₁₀ Nonattainment/Maintenance Areas	192

Appendices

- Appendix A: Oregon Emission Inventory by County
Appendix B: Class I Area Visibility Impairment Supplemental Information
Appendix C: WRAP Technical Support Summary
Appendix D: Supplemental BART Information:
1. DEQ 2008 BART Report for the Boardman Power Plant
2. ERG Technical Memorandum #2
3. G R C ø u " D C T V " T w n Guidelines for BART Determinations
4. Oregon BART Modeling Protocol
5. EPA Guidance on Federally Enforceable Permit Limits (FEPL)
6. DEQ 2010 BART Report for the PGE Boardman Plant
7. DEQ 2010 BART Report addendum
- Appendix E: Oregon 2010 BART Rules
Appendix F: Oregon Visibility Protection Plan and Oregon Smoke Management Plan
Appendix G: Oregon Regional Haze SIP Consultation and Coordination
Appendix H: State of Oregon Clean Air Act Implementation Plan

Oregon Regional Haze Plan Reference Materials

Oregon DEQ Information and Documents

Available at the DEQ Regional Haze website:

<http://www.deq.state.or.us/aq/haze/index.htm>

See other documentation in the Appendices Section of this document

Applicable Western Regional Air Partnership (WRAP) Reports and Documents

Available at the WRAP website:

<http://www.wrapair.org/>

or at the WRAP TSS website:

<http://vista.cira.colostate.edu/tss/>

Other Reference

1. G R C ø u " T g i regulations (64 Federal Register 35714), July 1, 1999.
2. G R C ø u " T g i k q p c n " J c | g " T g i w n c v k q p u " chpology I w k f g n k (BART) Determinations: Final Rule (70 Federal Register 39104), July 6, 2005.

ACKNOWLEDGEMENTS AND SUMMARY

Acknowledgements

Major assistance in preparing this implementation plan was provided by the Western Regional Air Partnership (WRAP) and its forums and committees, who provided Oregon and other western states with much of the policy and technical support information needed to meet the requirements of Section 308 of the Regional Haze Rule. Special thanks to the following staff:

- Pat Cummins, WRAP Co-Director
- Tom Moore, C k t " S w c n k v { " R t q i t c o " O c p c i g t . " Y g u v g t
- Lee Gribovicz, WRAP Air Quality Project Manager
- Lee Alter, IOC Staff Support
- Don Arkell, State Caucus Coordinator/Visibility Program Coordinator with WESTAR
- Bob Lebens, WESTAR

Principal Author: Brian Finneran, DEQ Air Quality Division

Principal Contributors: Mark Fisher, DEQ Eastern Region
Phil Allen, DEQ Air Quality Division
Jeffrey Stocum, DEQ Air Quality Division
Chris Swab, DEQ Air Quality Division

Contractor Assistance: Cassie Archuleta
Joe Adlhoch
Air Resource Specialists, Inc.
Fort Collins, CO

This document comprises the State of Oregon's State Implementation Plan submittal to EPA under Section 308 of the Regional Haze Rule (40 CFR 51.308). Adoption of the Oregon Section 308 Regional Haze Plan (herein referred to as the Oregon Regional Haze Plan) amends the State of Oregon Clean Air Act Implementation Plan, OAR 340-200-0040. See Appendix H for the complete citation of this rule. Other appendices at the end of this document provide additional information related to the strategies, including Oregon administrative rules associated with this plan, reference material (technical analysis and reports) prepared by the WRAP, and other documentation.

Executive Summary

Regional haze is air pollution that travels long distances and reduces visibility in scenic areas. The haze that affects visibility in Oregon comes from motor vehicles, power plants, industrial and manufacturing processes, forestry, agricultural and other open burning, as well as natural sources such as wildfire and windblown dust. The federal Clean Air Act contains requirements to protect and improve visibility in national parks and wilderness areas in the country. In 1977 Congress designated certain national parks and wilderness areas as "Class 1 areas," where

visibility was identified as an important value. Currently there are 156 Class 1 areas in the country. Oregon has 12 Class 1 areas, including Crater Lake National Park and 11 wilderness areas.

To address the problem of regional haze the Environmental Protection Agency (EPA) adopted the *Regional Haze Rule* in 1999. This rule requires states to adopt regional haze plans to incrementally improve visibility in all Class 1 areas, including Oregon, over the next 60 years. It focuses on improving Class 1 area visibility on the haziest days (the worst 20 percent) and ensuring no degradation on the clearest days (the best 20 percent). The first regional haze plan o w u v " k p e n w f g " ð TI gq cc un qu pö c" d* nT gR "IR+ t" qh iq tt g" uguc e j " E n c u u " K " m p q y p " c u " v j g " ð 4 RFGs are interim goals that represent incremental " " visibility improvements, d c u g f " q p " c " e c n e w n c v k q p " P)h The " ð w p k h q first regional haze plan describes the progress anticipated in reaching the 2018 URP milestone for each Class I area, for the 20 percent worst and best days, based on projections of emission reductions and visibility improvements from regional haze control strategies during this first planning period.

Best Available Retrofit Technology (BART) is a key part of the federal Regional Haze Rule, and the central focus of regional haze plans that states are developing. It applies to certain older industrial facilities that began operating before 1977 when federal Prevention of Significant Deterioration (PSD) rules were adopted to protect visibility in Class I areas when permitting new industrial facilities. Under BART, these older facilities must now evaluate their visibility impact in Class I areas, and if found to be significant, conduct an evaluation of new pollution controls, and install them within five years.

V j k u " f q e w o g p v " k u " Q t g i q p ø u " T g i k q p c n " J c | g " R n c p " plan are as follows:

- É History and regulatory background of the Regional Haze Rule, and geographical f g u e t k r v k q p " q h " g c e j " q h " Q t g i q p ø u " 3 4 " E n c u u " I
- É A comprehensive review and technical assessment of visibility conditions in each of Q t g i q p c n " R n c p " u v c v g u " e c w u k p i " j c | g . " c p f " c " r t q l g date of 2018. See Chapters 6 through 9.
- É F G S ø u " g x c n w c v k g q n p k " i q k h d " n v g g ö p " p ö s d w C t e m i r e r e t r o f i t p f " controls on the power plant, and reduce emissions at four other facilities to below the visibility impact level considered to be significant. See Chapter 10.
- É ð T g c u q p c d n g " R t q i t g u u " I q c n u ö " g s I l e a, w h i c h k u j g f " d show improvements in visibility for the haziest or worst days (but less than the first URP milestone for 2018) and no visibility degradation for the clearest or best days. See Chapter 11.

DEQ will take to address major sources of haze over the next 10 years, and commitments for future plan updates and revisions.

Summary of the efforts by DEQ to consult and coordinate with other States, Tribes, and Federal Land Managers on the regional haze strategies contained in this plan. See Chapter 13.

The major elements of this plan are the BART evaluation, Reasonable Progress Goals, and the Long-Term Strategy.

Best Available Retrofit Technology evaluation

The primary result of the BART evaluation in Chapter 10 was the outcome of the BART determination for the PGE Boardman coal-fired power plant. DEQ evaluated 10 BART-eligible sources, and found that the PGE Boardman plant had by far the greatest visibility impact in Oregon. As a result, DEQ adopted BART requirements for the PGE Boardman plant that contain a 2020 closure date for the plant, at the request of PGE. Prior to this date, PGE would install BART controls, and meet emission limits in 2011, 2014, and 2018, that will reduce total emissions by 48%. After 2020, all emissions from the plant, or approximately 25,500 tons per year of primarily sulfur dioxide (SO₂) and nitrogen oxide (NO_x), would be eliminated. Both the emission reductions from the interim BART controls and from plant closure would provide significant visibility benefits to 14 Class I areas impacted by the Boardman plant, including the Columbia Gorge National Scenic Area. In addition, the complete elimination of all emissions after 2020 would greatly contribute to meeting the long-term goals of the plan. For a full description of the BART determination, see Chapter 10.

Also as part of the BART evaluation, DEQ found four other BART-eligible sources that had BART sources. DEQ determined these sources could take a federally enforceable permit limit to lower their emissions below the significance level. Sources that take an enforceable permit limit are not subject to further evaluation for BART controls, however as BART-eligible sources, they can be re-evaluated as part of a more comprehensive review of industrial emissions under the reasonable progress requirements for making visibility improvements. This re-evaluation of all BART-eligible sources is part of the Long-Term Strategy described below.

Reasonable Progress Goals

In establishing RPGs for each Class I area, DEQ relied upon emission projections and regional modeling work conducted by the Western Regional Air Partnership (WRAP). The WRAP *Technical Support System* or TSS website provided considerable technical information in determining the RPGs, and is referenced in the Appendices section of the plan. The RPGs in 2018, based on the URP calculated for each Class I area (see Chapter 6) that represents a presumptive goal for the first regional haze plan. In cases where the RPGs do not meet the

URP goal for 2018, States are required to explain the reasons for the slower progress, additional controls that were considered for this first plan, and what future actions that will be taken to ensure the 60-year objective of the Regional Haze Rule will be met.

Y j k n g " v j g " T R I u " h q t " Q t g i q p ø u " E n c u u " K " c t g c u " o g g
clearest or best days, they do show a slower rate of progress for the haziest or worst visibility
days, and do not meet the 2018 URP milestones in most areas. The reasons for this, as
described in Chapter 11, are summarized below:

É F G S ø u " c p c n { u k u " q h " g o k u u k q p u " f c v c . " u q w t e g " c
supports the finding that the contribution of natural sources, such as wildfire and
windblown dust, is the primary reason for slower progress in achieving the 2018
o k n g u v q p g " k p " Q t g i q p ø u " E n c u u " K " c t g c u 0

É Similar to the contribution of natural sources, DEQ believes marine vessel emissions are also affecting progress in making visibility improvements. These emissions are estimated to be currently half of the statewide SO₂ emissions and one-third the statewide NO_x emissions. This contribution to visibility impairment is significant, especially in Western Oregon Class I areas. Current DEQ authority to regulate offshore shipping emissions is limited. The plan identifies future work that is needed to address this significant source of emissions.

É F G S ø u " c p r o j e c t e d u i k i b i l i t y i m p r o v e m e n t s f r o m s u l f a t e a n d n i t r a t e i m p a c t s i n
Oregon Class I areas shows about a 20 percent reduction in these pollutants by the 2018
milestone. Given the strong association of these pollutant species to anthropogenic
sources, DEQ believes this is a more realistic indicator of reasonable progress. If natural
sources are excluded, this 20 percent reduction in sulfates and nitrates corresponds to the
same percent reduction that is represented by the 2018 milestone.

É Mobile sources (mostly cars and trucks) are the largest anthropogenic source of emissions in Oregon. By 2018 more than half of these emissions are projected to decrease due to numerous federal emission standards that are c n t g c f { " ð q p " v j g " d q q m u ö . " in Oregon that will reduce these emissions. DEQ believes this major reduction supports the demonstration that RPGs are reasonable based on the considerable progress being made reducing this large source of emissions.

É F G S " e q p f w e - H g é v q t ð H p w n { u k u ö " c u " t g s w k t g f " w p f
evaluate other large sources of emissions (non-BART sources) that could be reduced or controlled to improve visibility by 2018. Using this analysis DEQ did not find any controls that were reasonable to pursue at this time. However, as noted above, the BART controls for the PGE Boardman power plant will result in a 48% reduction in emissions prior to 2018, followed by the complete elimination all emissions after 2020. Overall, this represents a total emission reduction of approximately 25,500 tons per year. Although not a direct result of the four- h c e v q t " c p c n { u k u . " v j k u " f q g u " t g r emission reduction that is significant, and will provide noticeable visibility improvements in 14 different Class I areas. Based on the preliminary information obtained from the

four-factor analysis, DEQ has proposed in the Long-Term Strategy of the plan to further evaluate non-BART industrial sources for possible new controls in the next five years to make additional visibility improvements by 2018.

Long-Term Strategy

Chapter 12 of this plan is the Long-Term Strategy, which describes on-going rules and programs that are expected to provide visibility improvements, and identifies new measures that DEQ has committed to evaluate by the next plan update in 2013. The two primary commitments are to evaluate possible visibility improvements from non-BART industrial sources not included in the BART review, and Class I area smoke impacts from forestry burning. These represent the two greatest areas where potentially significant visibility benefits could be realized.

The evaluation of non-BART sources will include a re-evaluation of the BART-eligible sources. Starting in 2009, DEQ will develop a comprehensive guidance document through a stakeholder process for evaluating visibility impacts from non-BART industrial sources. A DEQ report will be prepared by 2013 that summarizes (1) the development of this guidance; (2) results of applying the guidance to non-BART sources and BART-eligible sources; (3) any potential new controls for sources, (4) proposed rulemaking needed and schedule for adopting new rules, (5) estimated timeline for installing any new controls; and (6) estimate of the expected visibility benefits.

The evaluation of forestry burning will consist of an analysis of smoke impacts from forestry burning on visibility, for the haziest or worst days at each Class I area in Oregon. Where this burning it is found to cause significant visibility impacts, DEQ plans to work with state forestry and federal land managers to identify new smoke management controls to protect visibility.

Other new measures in the Long-Term Strategy included an evaluation of the contribution from residential open burning and rangeland burning, and further assessment on the contribution of marine vessels and possible regulatory actions that could be taken.

Columbia River Gorge National Scenic Area Visibility

The Columbia River Gorge National Scenic Area was created by Congress in 1986. While it was not designated as a Class I area, it will receive significant visibility benefit under the Q t g i q p " T g i k q p c n " J c | g " R n c p " f w g " v q " k v u ø " r t q z k o Wilderness in Oregon. The Gorge was included with other Class I areas in the visibility modeling analysis of BART sources, and the requirement for five-year updates to Oregon Regional Haze Plan will include similar analysis and tracking of visibility improvements for the Gorge.

The National Scenic Area Act of 1986 requires the protection and enhancement of the scenic, natural, cultural, and recreational resources of the Gorge, while at the same time supporting the local economy. The Columbia River Gorge Commission (CRGC) has responsibility to administer the National Scenic Area Act. In 2001, the CRGC determined that in order to

protect air quality in the Gorge, the CRGC would rely on Oregon DEQ and the Washington Southwest Clean Air Agency to develop an air quality strategy for the Scenic Area. The state agencies studied air quality and visibility and the emission sources that contribute to haze in the Gorge. Because many of the same problems that affected haze in the Gorge are the same problems that affect haze across the western region, much of the visibility efforts under the regional haze program will ultimately benefit the Gorge. Therefore, as part of the federally mandated five-year regional haze plan update, DEQ will track visibility conditions in the area and provide a separate follow up with the CRGC to provide a progress report on conditions in the Gorge. See Section 1.6.2 of this plan for more information.

CHAPTER 1: INTRODUCTION

1.1 Overview of Visibility and Regional Haze

Good visibility is essential to the enjoyment of national parks and scenic areas. Visibility impairment occurs as a result of the scattering and absorption of light by particles and gases in the atmosphere. This affects the clarity and color of what we see. Without the effects of air pollution, natural visual range is approximately 140 miles in the West and 90 miles in the East. However, over the years, air pollution in many parts of the United States has significantly reduced the range that people can see. In the West, the current range is 35-90 miles, and in the East, only 15-25 miles.

Regional haze is air pollution that is transported long distances and reduces visibility in national parks and wilderness areas. The pollutants that create this haze are sulfates, nitrates, organic carbon, elemental carbon, and soil dust. Human-caused haze sources include industry, motor vehicles, agricultural and forestry burning, and windblown dust from roads and farming practices.

The federal Regional Haze Rule requires states to improve visibility over the next 60 years in 156 national parks and wilderness areas in the country. In 1977, Congress designated all wilderness areas over 5,000 acres and all national parks over 6,000 acres as mandatory federal Class I areas for protection under the Clean Air Act. Figure 1.1-1 shows the Class I areas located in Oregon and Northwest.

Figure 1.1-1 Class I Areas in Pacific Northwest



1.2 Oregon Class I Areas

Oregon has 12 specially designated Class I areas, including Crater Lake National Park and 11 wilderness areas. These areas are listed in Table 1.2-1, and are the focus of this Regional Haze Plan. A description of each Class I area is provided in Chapter 3 of this report.

Table 1.2-1 Oregon Class I Areas

Class I Area	Acreage
Mt. Hood Wilderness	47,160
Mt. Jefferson Wilderness	107,008
Mt. Washington Wilderness	52,516
Three Sisters Wilderness	285,202
Diamond Peak Wilderness	52,337
Crater Lake	183,315
Mountain Lakes Wilderness	23,071
Gearhart Mtn. Wilderness	22,809
Kalmiopsis Wilderness	179,700
Strawberry Mtn. Wilderness	69,350
Eagle Cap Wilderness	360,275
Hells Canyon Wilderness	131,133*

* Oregon portion only. Total acreage is 214,944

1.3 Background on the Regional Haze Rule

In 1977, Congress amended the Clean Air Act to include provisions to protect the scenic vistas and a national visibility goal:

The prevention of any future, and the remedying of any existing impairment of visibility in mandatory class I Federal areas which impairment results from man-made air pollution. (Section 169A)

To address this goal, the 1990 amendments to the Clean Air Act established requirements to study regional haze. They gave EPA the authority to establish visibility transport commissions and promulgate regulations to address regional haze. The 1990 amendments also established a visibility transport commission to investigate and report on regional haze visibility impairment in the Grand Canyon National Park and nearby Class I

Protection Plan in October 1986 (see Section 1.5.2). The 1990 amendments to the Clean Air Act established requirements to study regional haze. They gave EPA the authority to establish visibility transport commissions and promulgate regulations to address regional haze. The 1990 amendments also established a visibility transport commission to investigate and report on regional haze visibility impairment in the Grand Canyon National Park and nearby Class I

areas. A summary of the work of the Grand Canyon Visibility Transport Commission is provided in Section 1.5.4.

1.4 Summary of the Regional Haze Rule

To address the problem of long range transport of regional haze and to meet the national goal of reducing man-made visibility impairment, the Regional Haze Rules were established in 1999, to be known as the Regional Haze Rules. These rules can be found in 40 Code of Federal Regulations, Volume 64, July 1, 1999, pages 35714-35774.

The objective of the rules was to improve visibility over the next 60 years (by 2064) in all 156 Class I areas in the country. The rules require States to adopt a regional haze State Implementation Plan (SIP) that focuses on improving the haziest days (the worst 20%) and protecting the clearest days (the best 20%). Each SIP will provide a comprehensive analysis of natural and human-caused sources of haze in each Class I area, and contain strategies to control sources and reduce emissions that contribute to haze. The SIP must also address the transport of haze across state boundaries.

The Regional Haze Rule provides two paths for adopting regional haze SIPs. The submittal of a SIP under 40 CFR 51.308 is the primary path. The other part of the rule is 40 CFR 51.309, and is an option for nine western states - Arizona, California, Colorado, Idaho, Nevada, New Mexico, Oregon, Utah, and Wyoming. These states can choose to follow Section 309 and adopt specific regional haze strategies related for the 16 Class I areas of the Colorado Plateau, based on recommendations developed by the Grand Canyon Visibility Transport Commission (see Section 1.5.4 below). Section 309 applies only until 2018. Under 40 CFR 51.309, Oregon choose not submit a Section 309 plan for this SIP submittal.¹

Two of the primary components of the Regional Haze Rule are requirements to address Best Available Retrofit Technology (BART) and Reasonable Progress Demonstration (RPD). Improving visibility by a 2018 milestone for each Class I area. The BART requirements address certain larger industrial sources that began operation before the adoption of the 1977 Prevention of Significant Deterioration Rules (see Section 1.5.1). Chapter 10 of this Plan describes the BART review and evaluation in detail. The demonstration of reasonable progress requires setting goals for the 20% worst and best days in each Class I area, based on an evaluation of how BART and other regional haze strategies will reduce emissions and improve or protect visibility. Chapter 11 of this Plan describes the Reasonable Progress Demonstration in detail.

¹ In 2003, Oregon did submit to EPA a Section 309 Regional Haze Plan, to primarily address the contribution of Oregon emissions to visibility impacts in the Colorado Plateau. This plan, along with other 4 other state plans submitted under Section 309, were disapproved by EPA due to a lawsuit regarding the BART requirements in Section 309. [For more information see *Center for Energy and Economic Development v. EPA*, no. 03-1222, * F 0 E 0 " E k t 0 " F E D 0 0 " 3 G R T C 0 2 0 0 6 to resubmit their 309 plans. The Department decided not to resubmit the plan, due to the optional nature of Section 309, the fact that Oregon is only a minor contributor to visibility impacts in the Colorado Plateau, and that a Section 308 plan is required in 2008 regardless under the Regional Haze Rule.

The Department developed the Oregon Visibility Protection Plan in 1986, in response to the 1977 Clean Air Act Amendments Phase I rules, as described in Section 1.5.2 below.

Additional information on the Regional Haze Rule is available at <http://www.deq.state.or.us/aq/haze/index.htm>.

1.5 Other Programs to Address Visibility Impairment

1.5.1 Prevention of Significant Deterioration for New Sources

The 1977 Clean Air Act Amendments established Prevention of Significant Deterioration (PSD) requirements, which protect air quality (and visibility) from air pollution from new major industrial sources, and major modifications of existing sources. Included in the PSD rules were requirements to protect visibility in national parks, national wilderness areas, national monuments and national seashores. The PSD program sets specific increments or limits on the maximum allowable increase in air pollution in certain airsheds, and a preconstruction permit review process for new or modifying major sources that allows for careful consideration of control technology, consultation with FLMs on visibility impacts and public participation in permitting decisions.

1.5.2 Phase I Visibility Rules of the Oregon Visibility Protection Plan

The Oregon Visibility Protection Plan in October 1986. This visibility plan contains short and long-term strategies for making reasonable progress toward the national goal, related to addressing reasonably Class I areas through visibility monitoring and control strategies. This plan incorporates PSD requirements for visibility protection from new or modified major stationary sources, and if necessary, applying BART to existing stationary sources if certified as causing reasonably attributable visibility impairment. The plan includes (a) the mitigation of visibility impairment within the Mt. Hood and Central Oregon Cascade wilderness areas through short and long-term control strategies for forest prescribed burning and Willamette Valley agricultural field burning, and (b) mitigation of impairment in the Eagle Cap Wilderness and Central Oregon Cascades resulting from agricultural field burning.

1.5.3 Best Available Retrofit Technology (BART)

Under Section 169A(b)(A) of the Clean Air Act, Congress established Best Available Retrofit Technology (BART) requirements for major stationary sources in operation within a 15-year period before adoption of the 1977 R U F " t w n g u 0 " W p f g t " G R C ø u " T õ R j c u g " F could be required for sources that were certified by the Federal Land Manager as causing reasonably attributable visibility impairment in a Class I area. W p f g t " G R C ø u " õ R j c u g " F haze rules, new BART rules were included that automatically triggered a review process for all pre-1977 sources. The review process included criteria for determine BART eligibility, modeling of visibility impacts, and evaluating the need for controls. (The BART review process is described in detail in Chapter 10 of this Plan.) In evaluating controls, the BART rules

require taking into consideration the costs of compliance, the energy and non-air quality environmental impacts of compliance, any existing pollution control technology in use at the source, the remaining useful life of the source, and the degree of improvement in visibility which may reasonably be anticipated to result from the use of such technology.

1.5.4 The Grand Canyon Visibility Transport Commission

The 1990 Clean Air Act Amendments created the Grand Canyon Visibility Transport Commission (GCVTC). The GCVTC was given the charge to assess the currently available scientific information pertaining to adverse impacts on visibility from potential growth in the region, identify clean air corridors, and recommend long-range strategies for addressing regional haze for Class I areas on the Colorado Plateau. The GCVTC completed significant technical analyses and developed recommendations to improve visibility in the 16 Class I areas on the Colorado Plateau. These 16 Class I areas are as follows: Arches National Park, Black Canyon of the Gunnison Wilderness, Bryce Canyon National Park, Canyonlands National Park, Capital Reef National Park, Flat Tops Wilderness, Grand Canyon National Park, Maroon Bells Wilderness, Mesa Verde National Park, Mt. Baldy Wilderness, Petrified Forest National Park, San Pedro Parks Wilderness, Sycamore Canyon Wilderness, Weminuche Wilderness, West Elk Wilderness, Zion National Park.

The GCVTC found that visibility impairment on the Colorado Plateau was caused by a wide variety of sources and pollutants. A comprehensive strategy was needed to address all of the causes of regional haze. The GCVTC submitted these recommendations to EPA in a report dated June 1996 for consideration in rule development. These recommendations were:

Air Pollution Prevention. Air pollution prevention and reduction of per capita pollution was a high priority for the Commission. The Commission recommended policies based on energy conservation, increased energy efficiency and promotion of the use of renewable resources for energy production.

Clean Air Corridors. Clean air corridors are geographic areas that provide a source of clean air to the 16 Class I areas of the Colorado Plateau. For these areas, the Commission primarily recommended careful tracking of emissions growth that may affect air quality in these corridors, and ultimately the 16 Class I areas.

Stationary Sources. For stationary sources, the Commission recommended closely monitoring the impacts of current requirements under the Clean Air Act and ongoing studies. It also recommended regional targets for SO₂ emissions from stationary sources, starting in 2000. If these targets are exceeded, a regional cap and market-based emission trading program should be implemented.

Areas In and Near Parks. The Commission's research and modeling showed that a host of sources adjacent to parks and wilderness areas, including large urban areas, have significant visibility impacts. However, the Commission lacked sufficient data regarding the visibility impacts of emissions from some areas in and near parks and wilderness areas. In general, the models used by the Commission were not readily applicable to such areas. Pending further

studies of these areas, the Commission recommended that local, state, tribal, federal, and private parties cooperatively develop strategies, expand data collection, and improve modeling for reducing or preventing visibility impairment in areas within and adjacent to parks and wilderness areas.

Mobile Sources. The Commission recognized that mobile source emissions are projected to decrease through about 2005 due to improved control technologies. The Commission recommended capping emissions at the lowest level achieved and establishing a regional emissions budget, and also endorsed national strategies aimed at further reducing tailpipe emissions, including the so-called 49-state low emission vehicle, or 49-state LEV.

Road Dust. The Commission's technical assessment indicated that road dust is a large contributor to visibility impairment on the Colorado Plateau. As such, it requires urgent attention. However, due to considerable skepticism regarding the modeled contribution of road dust to visibility impairment, the Commission recommended further study in order to resolve the uncertainties regarding both near-field and distant effects of road dust, prior to taking remedial action. Since this emissions source is potentially such a significant contributor, the Commission felt that it deserved high priority attention and, if warranted, additional emissions management actions.

Emissions from Mexico. Mexican sources are also shown to be significant contributors, particularly of SO₂ emissions. However, data gaps and jurisdictional issues made this a difficult issue for the Commission to address directly. The Commission recommendations called for continued bi-national collaboration to work on this problem, as well as additional efforts to complete emissions inventories and increase monitoring capacities. These matters should receive high priority for regional and national action.

Fire. The Commission recognized that fire plays a significant role in visibility on the Plateau. In fact, land managers propose aggressive prescribed fire programs aimed at correcting the buildup of biomass due to decades of fire suppression. Therefore, prescribed fire and wildfire levels are projected to increase significantly during the studied period. The Commission recommended the implementation of programs to minimize emissions and visibility impacts from prescribed fire, as well as to educate the public.

Future Regional Coordinating Entity. Finally, the Commission believed there was a need for an entity like the Commission to oversee, promote, and support many of the recommendations in their report. To support that entity, the Commission developed a set of recommendations addressing the future administrative, technical and funding needs of the Commission or a new regional entity. The Commission strongly urged the EPA and Congress to provide funding for these vital functions and give them a priority reflective of the national importance of the Class I areas on the Colorado Plateau.

1.5.5 The Western Regional Air Partnership

The GCVTC recognized the need for a long-term organization to address the policy and technical studies needed to address regional haze. The Western Regional Air Partnership

(WRAP) was formed in September 1997 as the successor organization to the GCVTC. The WRAP is made up of western states, tribes and federal agencies. The states are Alaska, Arizona, California, Colorado, Idaho, Montana, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming. The WRAP is assisting these states by developing the policy and technical work products needed for their regional haze SIPs. The WRAP established stakeholder-based technical and policy oversight committees to assist in managing the development of regional haze work products. See Section 4.1 of this plan for more information on the WRAP. See also WRAP web site at <http://www.wrapair.org>.

1.6 Purpose of this Document

The Oregon Regional Haze Plan has been prepared to meet the requirements of the Federal Regional Haze Rule, Section 40 CFR, Part 51, Section 308. It contains strategies and elements related to each requirement of this federal rule. The appendices (citation) at the end of this document provide additional information related to the strategies, including citations of new Oregon administrative rules associated with this plan, and the reference material (technical analysis and reports) prepared by the WRAP.

T g n c v k q p " v q " v j g " Y T C R ø u " T g i k q p c n " V g e j p k e c n " U w

The Y T C R Technical Support System (TSS) was the source for the majority of key technical information and data used in the Oregon Regional Haze Plan. The WRAP TSS can be found at <http://vista.cira.colostate.edu/tss/>. See Chapter 12, Section 12.2, for more information on specific WRAP reports and project. Appendix C has additional information on the WRAP TSS.

1.6.1 Mandatory Federal Class I Areas Addressed in this SIP

The Regional Haze Rule under 40 CFR 51.308 requires states to address visibility protection for regional haze i p " Q t g i q p ø u " E n c u u " K " C t g c u 0 " V j g u g " c t g c u depicted in Figure 1.2-1.

1.6.2 Columbia River Gorge National Scenic Area

As mentioned earlier, the Regional Haze Rule is applicable to federal Class I areas only. While the Columbia River Gorge National Scenic Area is not a Class I area, it was designated a National Scenic Area by Congress in 1986. The National Scenic Area Act of 1986 requires the protection and enhancement of the scenic, natural, cultural, and recreational resources of the Gorge, while at the same time supporting the local economy.

The Columbia River Gorge Commission (CRGC) has responsibility to administer the National Scenic Area Act. As part of an amendment to the National Scenic Area Management Plan, the CRGC recognized that a Class I designation is not appropriate for the Gorge. However, the CRGC did recognize that air quality degradation can jeopardize those resources, and that in order to protect air quality in the Gorge, the CRGC would rely on state air quality agencies to develop an air quality strategy for the Scenic Area.

Oregon DEQ and the Washington Southwest Clean Air Agency (SWCAA) have been working with the CRGC since 2001 to study air quality and visibility in the Gorge, and the emission sources that contribute to haze in the Gorge. The study also included a projection of future visibility conditions in the Scenic Area. The study results identified that haze in the Gorge was caused by many different sources and haze reduction would need to result from the cumulative effect of numerous emission reduction activities.

Because many of the same problems that affected haze in the Gorge are the same problems that affect haze across the western region, much of the visibility efforts under the regional haze program will ultimately benefit the Gorge. The Columbia River Gorge Scenic Area is situated between two Class I areas (Mt. Hood and Mt. Adams) and the Gorge will benefit from Oregon and will not be expected to be on the same reasonable progress glide path as the Class I areas, visibility in the Gorge can be measured against the nearby Class I areas. This comparison will continue visibility improvement.

Additionally, as part of the federally mandated five-year regional haze plan update, DEQ will include in these updates a description of visibility benefits to the Gorge, as the result of the effort to make reasonable progress in improving Class I area visibility over the next 60 years. Once this Regional Haze Plan SIP is submitted to EPA, DEQ will follow up with the CRGC to provide a progress report on conditions in the Gorge. DEQ will identify whether Gorge visibility conditions are showing continued improvement, similar to but not on the same glide path as conditions in the Class I areas. If visibility in the Gorge is not improving or showing a downward trend, then DEQ will reassess its Gorge strategy and potentially identify new strategies to ensure continued visibility improvement in the Gorge.

CHAPTER 2: OREGON REGIONAL HAZE SIP DEVELOPMENT AND CONSULTATION PROCESS

The Oregon Regional Haze Plan was developed through a process of consultation with other States, Tribes, state and federal natural resource agencies, EPA, and major stakeholders and the general public. The following is a brief summary of the consultation requirements under the Regional Haze Rule. Chapters 13 and Appendix G contains a full description of the consultation process identified below, in developing the Oregon Regional Haze Plan.

2.1 Federal Land Manager Consultation

The Regional Haze Rule requires consultation between the State and FLMs related to development and implementation of regional haze plans. States need to provide FLMs and opportunity to comment at least 60 days prior to holding a public hearing on a proposed plan or plan revision. States also need to provide FLMs an opportunity to comment on the five-year progress reports and other developing programs that may contribute to Class I visibility impairment.

2.2 State Consultation

Also required under the Regional Haze Rule is state-to-state consultation to develop coordinated regional haze strategies. Regional haze by definition is the long-range transport of air pollution, and as such includes identifying interstate transport issues. This requirement is to be reasonably anticipated to contribute to visibility impairment in a Class I area in another State or States.

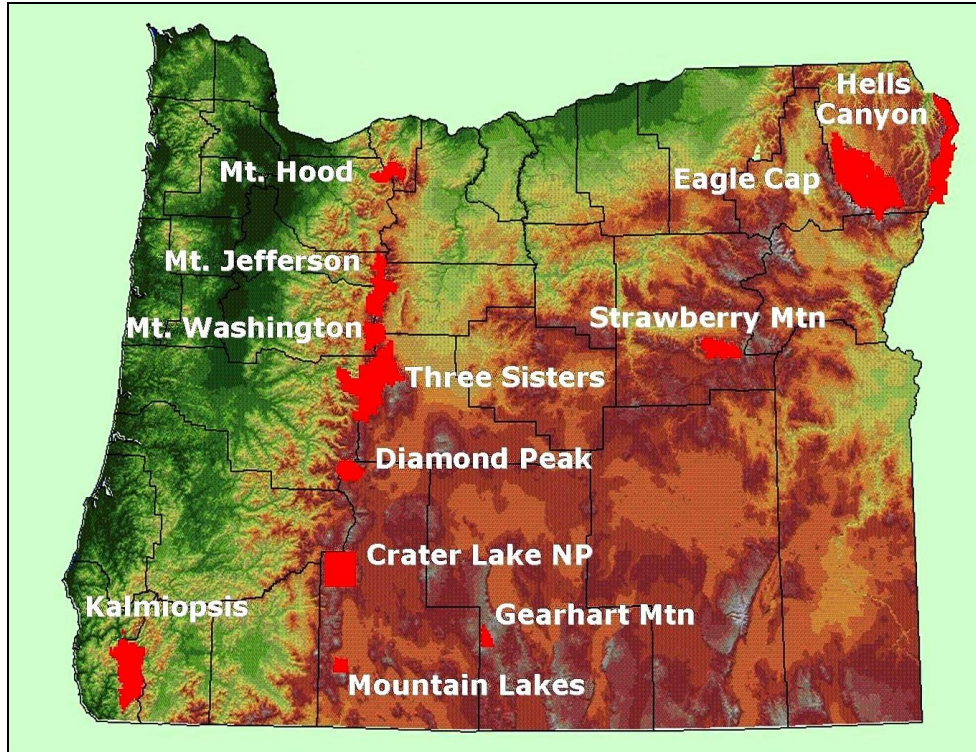
2.3 Tribal Consultation

Although tribal consultation is not required under the Regional Haze Rule, the Department views this as an important part of the consultation process, and actively pursued this during the development of the regional haze plan. Like the State consultation process above, consultation with Tribes involved reviewing major emission sources and regional haze strategies to address visibility issues.

CHAPTER 3: INTRODUCTION TO OREGON CLASS I AREAS

This chapter provides a map and description of the size, elevation, location, and other features of Oregon Class I Areas.

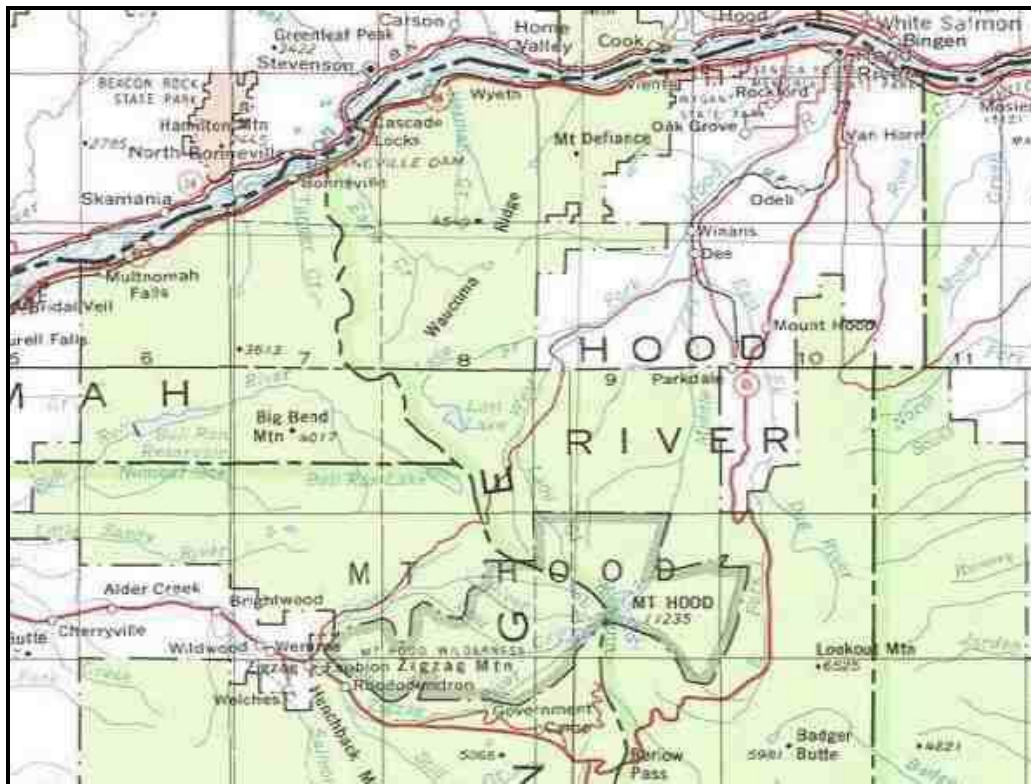
Figure 3-1 Map of Oregon Class I Areas



3.1 Mt. Hood Wilderness Area

Figure 3.1-1 presents a map of the Mt Hood Wilderness, which spans 47,160 acres on the slopes of Mt Hood in the northern Oregon Cascades. Wilderness elevations range from 3,426 m (11,237 ft) on the summit of Mt Hood down to almost 600 m (2,000 ft) at the western boundary. It is almost adjacent to the Portland Oregon metropolitan area; the westernmost boundary is about 20 km east of the Portland Oregon suburb of Sandy and 40 km from the heavily populated metropolitan center, elevation 100 m (300 ft). Visitation to the Mt. Hood Wilderness Area is approximately 50,000 visitors a year, primarily between May and October. Most visitors come from the Portland/Vancouver area that has a population of approximately 2 million.

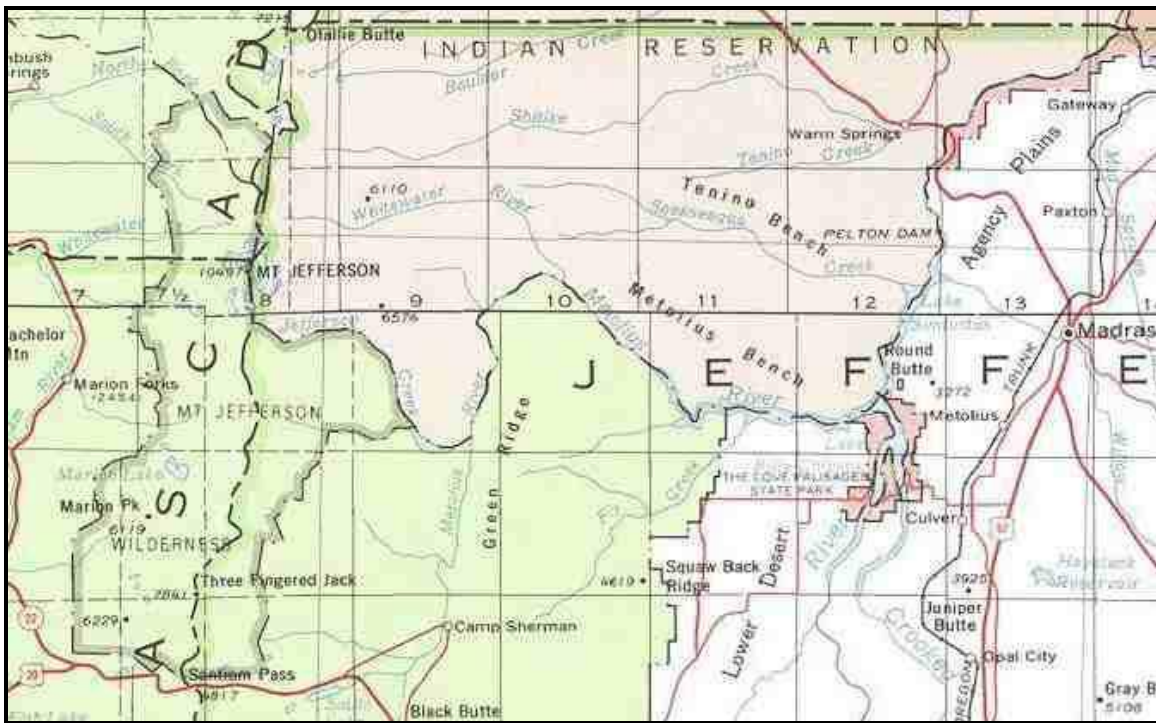
Figure 3.1-1 Map of Mt. Hood Wilderness Area



3.2 Mt. Jefferson Wilderness Area

Figure 3.2-1 presents a map of the Mt. Jefferson Wilderness Area, which occupies 107,008 acres on the crest of the Cascade Range in central Oregon. Its southern boundary is a few km north of the northern boundary of the Mt Washington Wilderness and it extends 40 to 50 km north along the Cascade crest. West of the crest, it consists primarily of the eastern side of the North Santiam River headwaters basin that connects to the Willamette Valley source region near Salem Oregon, 100 km (60 mi) to the west. East of the crest it occupies the western slopes of the Metolius River drainage that connects eastern slopes with Deschutes River in eastern Oregon. The highest Wilderness elevation is 3,200 m (10,497 ft) at the summit of Mt Jefferson in the northern part of the Wilderness. Lowest Wilderness elevations are near 1,000 m (3,000 ft) along the western boundary in the North Santiam headwaters basin and along the eastern boundary in the Metolius River basin.

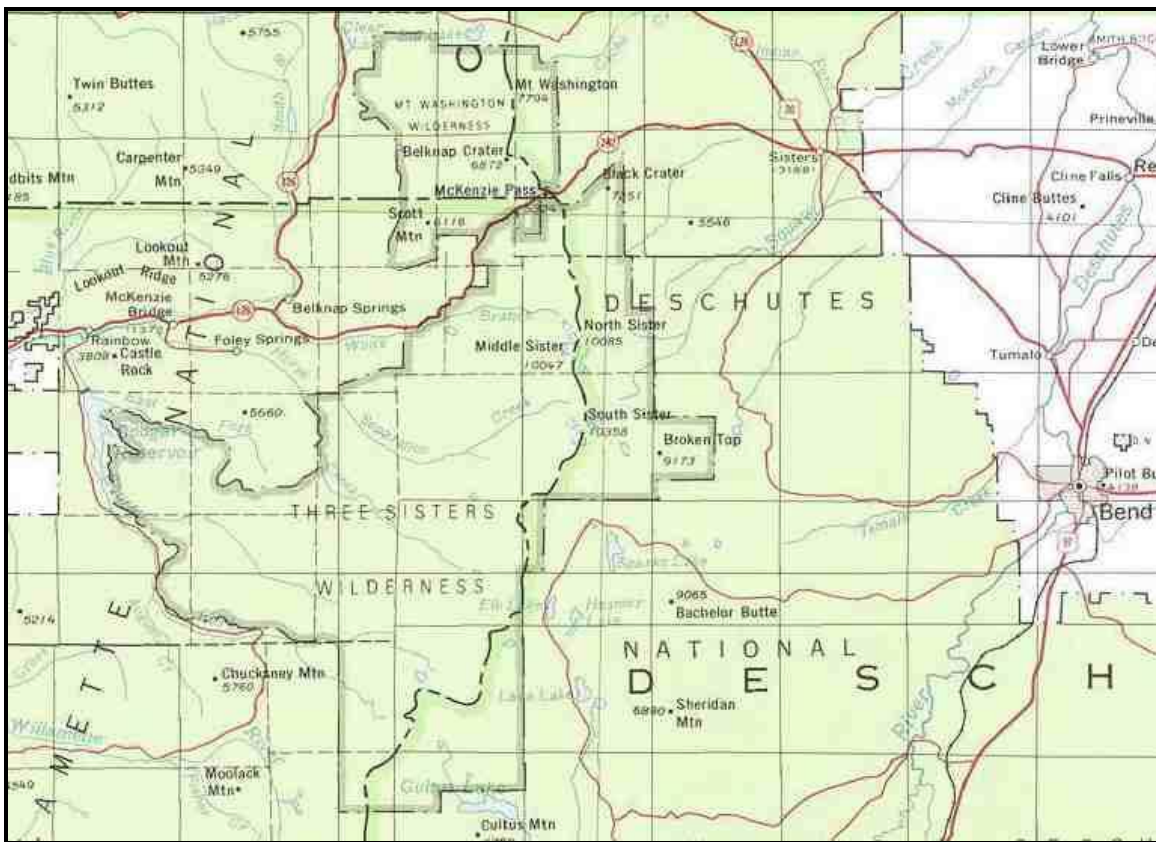
Figure 3.2-1 Map of Mt. Jefferson Wilderness Area



3.3 Mt. Washington Wilderness Area

Figure 3.3-1 presents a map of the Mt. Washington Wilderness Area, which occupies 52,516 acres on the crest of the Cascade Range in central Oregon. Like the Three Sisters Wilderness that it borders to the south, it includes headwaters tributaries of the McKenzie River that flow west into the Willamette Valley near Eugene and connect the Wilderness with that source region. On the east side eastern slopes of the Cascades descend to the Deschutes River near Bend. The highest Wilderness elevation is 2,376 m (7,794 ft) at the summit of Mt Washington. Lowest elevations are near 900 m (3,000 ft) in the upper headwaters basin of the McKenzie River.

Figure 3.3-1 Map of Mt. Washington Wilderness Area



3.4 Three Sisters Wilderness Area

Figure 3.4-1 presents a map of the Three Sisters Wilderness Area, which consists of 285,202 acres abrest the crest of the Cascade Range in central Oregon. It includes headwaters tributaries of the McKenzie River that flow west into the Willamette Valley near Eugene and connect the Wilderness with that source region. On the east side streams flow east to the Deschutes River near Bend. The highest crest elevation is 3,158 m (10,358 ft) at the summit of the South Sister. Lowest elevations are near 600 m (2,000 ft) where the South Fork of the McKenzie River exits the Wilderness on the west boundary. This is about 500 m (1,600 ft) above the Willamette Valley at Eugene 70 km (40 mi) west.

Figure 3.4-1 Map of Three Sisters Wilderness Area



