

CONTENTS

EXECUTIVE SUMMARY	E-1
ACRONYMS, ABBREVIATIONS AND TERMS	ix
LIST OF FIGURES	xvi
LIST OF TABLES	xxii
ACKNOWLEDGEMENTS	xxvi
CHAPTER ONE: OVERVIEW	1-1
1.1 Background	1-1
1.2 Regional Haze Rule	1-1
1.3 Organization of Washington’s Foundational Regional Haze State Implementation Plan	1-2
CHAPTER 2: FOUNDATIONAL REGIONAL HAZE STATE IMPLEMENTATION PLAN DEVELOPMENT	2-1
2.1 Regional Planning	2-1
2.2 Western Regional Air Partnership	2-2
2.3 Consultation	2-2
CHAPTER 3: PRIMER ON VISIBILITY	3-1
3.1 Natural Sources of Visibility Impairment	3-1
3.2 Human Caused Sources of Visibility Impairment	3-1
3.3 Emissions	3-2
3.4 The Interagency Monitoring of Protected Visual Environments Equation and Measuring Visibility Impairment	3-2
3.5 The Revised Interagency Monitoring of Protected Visual Environments Equation and Measuring Visibility Impairment	3-4
3.6 Baseline Conditions	3-5

3.7	Natural Conditions	3-5
3.8	Uniform Rate of Progress	3-5
CHAPTER 4: MONITORING VISIBILITY IN WASHINGTON’S MANDATORY CLASS I AREAS		4-1
4.1	Washington’s Mandatory Class I Areas	4-1
4.1.1	Olympic National Park	4-3
4.1.2	North Cascades National Park	4-3
4.1.3	Glacier Peak Wilderness	4-3
4.1.4	Alpine Lakes Wilderness	4-4
4.1.5	Mount Rainier National Park	4-4
4.1.6	Goat Rocks Wilderness	4-4
4.1.7	Mount Adams Wilderness	4-5
4.1.8	Pasayten Wilderness	4-5
4.2	Visibility Monitoring of Washington’s Mandatory Class I Areas	4-5
4.2.1	Olympic Interagency Monitoring of Protected Visual Environments Site: OLYM1	4-6
4.2.2	North Cascades Interagency Monitoring of Protected Visual Environments Site: NOCA1	4-8
4.2.3	Snoqualmie Pass Interagency Monitoring of Protected Visual Environments Site: SNPA1	4-9
4.2.4	Mount Rainier Interagency Monitoring of Protected Visual Environments Site: MORA1	4-10
4.2.5	White Pass Interagency Monitoring of Protected Visual Environments Site: WHPA1	4-11

4.2.6	Pasayten Interagency Monitoring of Protected Visual Environments Site: PASA1	4-12
CHAPTER 5: BASELINE AND NATURAL CONDITIONS IN WASHINGTON'S MANDATORY CLASS I AREAS		5-1
5.1	Olympic National Park	5-2
5.2	North Cascades National Park and Glacier Peak Wilderness	5-6
5.3	Alpine Lakes Wilderness	5-11
5.4	Mount Rainier National Park	5-15
5.5	Goat Rocks Wilderness and Mount Adams Wilderness	5-20
5.6	Pasayten Wilderness	5-24
CHAPTER 6: EMISSION INVENTORIES		6-1
6.1	Emission Inventory Development	6-1
6.2	Emission Inventory Scenarios	6-2
6.3	Base Case Inventories	6-2
6.4	Typical-Year Baseline Inventories	6-3
6.5	Reasonable Progress Inventories	6-3
6.6	Emission Inventories for Washington's Regional Haze State Implementation Plan	6-4
CHAPTER 7: WESTERN REGIONAL AIR PARTNERSHIP MODELING		7-1
7.1	Overview	7-1
7.2	Regional Haze Modeling	7-1
7.3	Model Performance	7-2

7.4	Source Apportionment Analysis Using Particulate Matter Source Apportionment Technology and Weighted Emissions Potential	7-4
	7.4.1 Particulate Matter Source Apportionment Technology	7-4
	7.4.2 Weighted Emissions Potential	7-5
	7.4.3 Differences between Particulate Matter Source Apportionment Technology and Weighted Emission Potential	7-8
	CHAPTER 8: SOURCE APPORTIONMENT OF WASHINGTON'S MANDATORY CLASS I AREAS AND WASHINGTON'S IMPACTS ON OUT-OF-STATE MANDATORY CLASS I AREAS	8-1
8.1	Olympic National Park	8-1
	8.1.1 Sulfates	8-1
	8.1.2 Nitrates	8-4
	8.1.3 Organic Mass Carbon	8-6
8.2	North Cascades National Park and Glacier Peak Wilderness	8-9
	8.2.1 Sulfates	8-10
	8.2.2 Nitrates	8-12
	8.2.3 Organic Mass Carbon	8-14
8.3	Alpine Lakes Wilderness	8-17
	8.3.1 Sulfates	8-17
	8.3.2 Nitrates	8-19
	8.2.3 Organic Mass Carbon	8-24
8.4	Mount Rainier National Park	8-24
	8.4.1 Sulfates	8-24
	8.4.2 Nitrates	8-26
	8.4.3 Organic Mass Carbon	8-28

8.5	Goat Rocks Wilderness and Mount Adams Wilderness	8-30
8.5.1	Sulfates	8-31
8.5.2	Nitrates	8-33
8.5.3	Organic Mass Carbon	8-35
8.6	Pasayten Wilderness	8-37
8.6.1	Sulfate	8-38
8.6.2	Nitrates	8-40
8.6.3	Organic Mass Carbon	8-42
8.6.4	Elemental Carbon	8-44
8.7	Summary of In State Source Contributions of Nitrates and Sulfates	8-47
8.8	Summary of In-State Dominant Source Contributions of Organic Mass Carbon	8-49
8.9	Other Mandatory Class I Areas Impacted by Washington Emissions	8-49
CHAPTER 9: REASONABLE PROGRESS GOALS FOR WASHINGTON'S CLASS I AREAS		9-1
9.1	Introduction	9-1
9.2	Most Impaired Days	9-1
9.2.1	Olympic National Park, WA — OLYM1	9-1
9.2.2	North Cascades National Park, WA and Glacier Peak Wilderness, WA — NOCA1	9-7
9.2.3	Alpine Lakes Wilderness, WA — SNPA1	9-16
9.2.4	Mount Rainier National Park, WA — MORA1	9-19
9.2.5	Goat Rocks Wilderness, WA and Mount Adams Wilderness, WA — WHPA1	9-23
9.2.6	Pasayten Wilderness, WA — PASA1	9-26

9.3	Least Impaired Days	9-30
9.3.1	Olympic National Park, WA — OLYM1	9-30
9.3.2	North Cascades National Park, WA and Glacier Peak Wilderness, WA — NOCA1	9-31
9.3.3	Alpine Lakes Wilderness, WA — SNPA1	9-32
9.3.4	Mount Rainier National Park, WA — MORA1	9-33
9.3.5	Goat Rocks Wilderness, WA and Mount Adams Wilderness, WA — WHPA1	9-34
9.3.6	Pasayten Wilderness, WA — PASA1	9-35
9.4	Summary	9-36
CHAPTER 10: LONG TERM STRATEGY FOR VISIBILITY IMPROVEMENT		10-1
10.1	Introduction	10-1
10.2	Overview of Washington’s Long-Term Strategy	10-1
10.3	Plans for Further Controls on Visibility-Impairing Pollutants	10-7
10.4	Factors Involved in the Long-Term Strategy	10-9
10.5	Development of Washington’s Long-Term Strategy	10-14
10.6	Summary	10-15
CHAPTER 11: BEST AVAILABLE RETROFIT TECHNOLOGY		11-1
11.1	Overview	11-1
11.2	Best Available Retrofit Technology–Eligible Sources in Washington	11-2
11.3	Washington-Oregon-Idaho Best Available Retrofit Technology Modeling Protocol	11-6
11.4	Summary of Washington Best Available Retrofit Technology Modeling Results	11-6

11.4.1	Sources that Did Not Meet the Best Available Retrofit Technology Eligibility Criteria	11-7
11.4.2	Sources that Met the Best Available Retrofit Technology Eligibility Criteria	11-8
11.5	Summary of Best Available Retrofit Technology Engineering Analysis	11-14
11.5.1	Intalco, BP Cherry Point Refinery, Port Townsend Paper Co, and Weyerhaeuser Co-Longview	11-14
11.5.2	Tesoro Marketing and Refining	11-15
11.5.3	Lafarge North America	11-16
11.5.4	TransAlta Centralia Generation, LLC	11-16
11.6	Visibility Improvement Due to Best Available Retrofit Technology Implementation	11-17
CHAPTER 12: CONTINUING PLANNING PROCESS FOR REGIONAL HAZE		12-1
12.1	Monitoring Strategy	12-1
12.2	Statewide Emissions Inventory Updates	12-3
12.3	Periodic Reports	12-3
12.4	Determination of State Implementation Plan Adequacy	12-4
12.5	State Implementation Plan Revisions in 2018 and Later	12-5
12.6	Continuing Interstate Coordination and Consultation	12-5
12.7	Continuing Consultation with the Federal Land Managers	12-6
12.8	Tribal Consultation	12-6
Chapter 13:	Summary	13-1
13.1	National Visibility Goal	13-1
13.2	Washington's Foundational State Implementation Plan	13-1
13.3	Long-Term Challenges and Issues	13-2

REFERENCES

R-1

- APPENDIX A: Western Regional Air Partnership Consultation Process
- APPENDIX B: Federal Land Managers Comments and Ecology's Response to Comments on the Regional Haze State Implementation Plan
- APPENDIX C: Additional Interagency Monitoring of Protected Visual Environments Information
- APPENDIX D: Washington Substitutions
- APPENDIX E: Mandatory Class 1 Area Summary Tables
- APPENDIX F: Four Factor Analysis
- APPENDIX G: Technical Support System Road Map
- APPENDIX H: Best Available Retrofit Technology Modeling Protocol
- APPENDIX I: Ecology Alcoa Analysis
- APPENDIX J: Best Available Retrofit Technology Process Guidance-Washington Specific
- APPENDIX K: Public Notices and Comments and Ecology Response
- APPENDIX L: Best Available Retrofit Technology Technical Support Documents and Compliance Orders
- APPENDIX M: Model Performance Evaluation