

Chapter 11 Best Available Retrofit Technology

This chapter discusses the application of Best Available Retrofit Technology (BART) in Washington for sources that cause or contribute to visibility impairment in any mandatory Class I Area.

11.1 Overview

The Regional Haze Rule (RHR)¹ requires the installation of BART controls on a specific set of existing stationary sources. This involves identification of:

- BART-eligible sources
- Sources subject to BART (an engineering analysis)
- Determination of BART controls

A BART-eligible source is one which meets the following three criteria:

1. Contains an emission unit from one of 26 source categories identified in the Clean Air Act (CAA) and regulations.
2. The emission unit was in existence on August 7, 1977; however, not in operation before August 7, 1962 or the emission unit was in operation prior to August 7, 1962 and was reconstructed between August 7, 1962 and August 7, 1977.
3. The potential emissions from all the emission units are currently 250 tons per year or more of a visibility-impairing air pollutant.

Each BART-eligible source must be evaluated to determine if the source causes or contributes to visibility impairment at one or more mandatory Class I Areas. The Environmental Protection Agency (EPA) guidelines directed that states review Sulfur Dioxide (SO₂), Nitrogen Oxides (NO_x) and Particulate Matter (PM) emissions in determining whether sources cause or contribute to visibility impairment. States may use their best judgment to determine whether volatile organic compounds or ammonia emissions are likely to have an impact on visibility in an area.

A 1.0 Deciview (dv) change is equal to a generally perceptible change in visibility to most people. A single BART-eligible source that is responsible for a 1.0 dv change or more is considered to “cause” visibility impairment. The threshold for “contribute to” can vary between states. The limit of perceptible change is 0.5 dv. In the preamble to the 2005 Final RHR Amendments, the EPA indicates that the threshold for “contribute to” that is used for BART applicability should be no higher than 0.5 dv.

For the BART modeling conducted in Washington, Ecology chose 0.5 dv as the threshold for contributing to visibility impairment because it is the limit of perceptible change. This is consistent with neighboring states Idaho and Oregon, with whom Washington developed the three-state BART Modeling Protocol. More information on the BART Modeling Protocol is presented in Section 11.3 and Appendix H.

¹ 40 CFR 51.308(e)

Each BART-eligible source in Washington was required to model its actual emissions to determine whether the emissions from the BART-eligible emission units caused or contributed to visibility impairment. BART-eligible sources whose modeled emissions caused or contributed to visibility impairment were “subject to BART.” Sources identified as subject to BART are required, through a BART engineering analysis, to identify what types of controls, if any, should be placed on the source. The results of this analysis form the basis for a determining what BART controls must be installed.

The RHR requires states to consider the following factors in the analysis used to determine BART:

1. The technology available,
2. The costs of compliance,
3. The energy and non-air quality environmental impacts of compliance,
4. Any existing pollution control equipment in use at the source,
5. The remaining useful life of the source, and
6. The degree of improvement in visibility which may reasonably be anticipated to result from the use of such technology.

Upon determination of BART, each source is required to install and operate BART as expeditiously as practicable, but in no event later than 5 years after approval of the State Implementation Plan (SIP).

11.2 Best Available Retrofit Technology–Eligible Sources in Washington

The BART-eligible sources were identified using the methodology in the *Guidelines for BART Determinations under the RHR* or “Guidelines” found in 40 CFR 51, Appendix Y.

The Western Regional Air Partnership (WRAP) assisted Washington in evaluating which of the thousands of sources in Washington might be BART-eligible. WRAP contracted with the Eastern Research Group (ERG) to evaluate the potential BART-eligible sources in each state within the WRAP to provide the list of potentially BART-eligible sources to the states to make final determinations of BART-eligibility. ERG prepared a report for WRAP called *Identification of BART-Eligible Sources in the WRAP Region*. The study identified over 117 facilities in Washington that reported actual emissions of NO_x, SO₂, or Course Particle Matter (PM₁₀) above 100 tons and were identified in the National Emission Inventory as being in one or more of the 26 BART source categories.

In this study WRAP worked with Ecology staff to review Washington sources under the three BART-eligibility criteria. Out of this review, 29 sources were identified as needing more in-depth review to determine BART-eligibility. These 29 sources were categorized as:

1. Definitely BART-eligible
2. Likely BART-eligible
3. Potentially BART-eligible
4. Clearly not BART-eligible, and

5. Do not know.

Ecology then took ERG’s final list for Washington and evaluated in detail the “likely,” “potentially,” and “do not know” sources list to determine which if any were BART-eligible. Staff reviewed historical written reports such as compliance reports, inspection reports, source test reports, Notice of Construction applications and permits, Air Operating Permit support documents, National Pollutant Discharge Elimination System (NPDES) permit Fact Sheets, and for many facilities, U.S. Geological Survey (USGS) Mineral Reports. Additional information having to do with exact dates in 1962 or 1977 for specific emission units was acquired directly from each source.

Out of the 29, a total of 15 sources were actually BART-eligible. Table 11-1 lists these 15 facilities and Figure 11-1 indicates their locations. These 15 sources were required to demonstrate whether their emissions caused or contributed to visibility impairment in one or more mandatory Class I Areas. If the source chose not to model its emissions, Ecology assumed the source was subject to BART. The 14 sources that did not meet the BART-eligibility criteria are listed in Table 11-2.

Table 11-1 Best Available Retrofit Technology-Eligible Sources in Washington

BART-Eligible Source	BART Category
Graymont Western US INC ² (Tacoma)	Lime plants
TransAlta Centralia Generation, LLC	Fossil fuel-fired steam electric plants with a heat input greater than 250 MMBtu per hour
Longview Fibre Co - Longview	Kraft Pulp Mills
Weyerhaeuser Co - Longview	Kraft Pulp Mills
Fort James Camas LLC (now Georgia Pacific Corporation - Camas)	Kraft Pulp Mills
Goldendale Aluminum	Primary Aluminum Ore Reduction Plants
Port Townsend Paper Co	Kraft Pulp Mills
Simpson Tacoma Kraft	Kraft Pulp Mills
Lafarge North America (Seattle)	Portland Cement Plants
Intalco (Ferndale)	Primary Aluminum Ore Reduction Plants
Alcoa Wenatchee Works	Primary Aluminum Ore Reduction Plants
BP Cherry Point Refinery (Ferndale)	Petroleum Refineries
Tesoro Refining and Marketing (Anacortes)	Petroleum Refineries
Puget Sound Refining Company	Petroleum Refineries
Conoco-Philips Company (Ferndale)	Petroleum Refineries

² This source is located within the boundary of the Puyallup Indian Reservation but regulated by the local air quality agency under the terms of the Puyallup Tribe of Indians Settlement Act of 1989, 25 U.S.C. 1773.

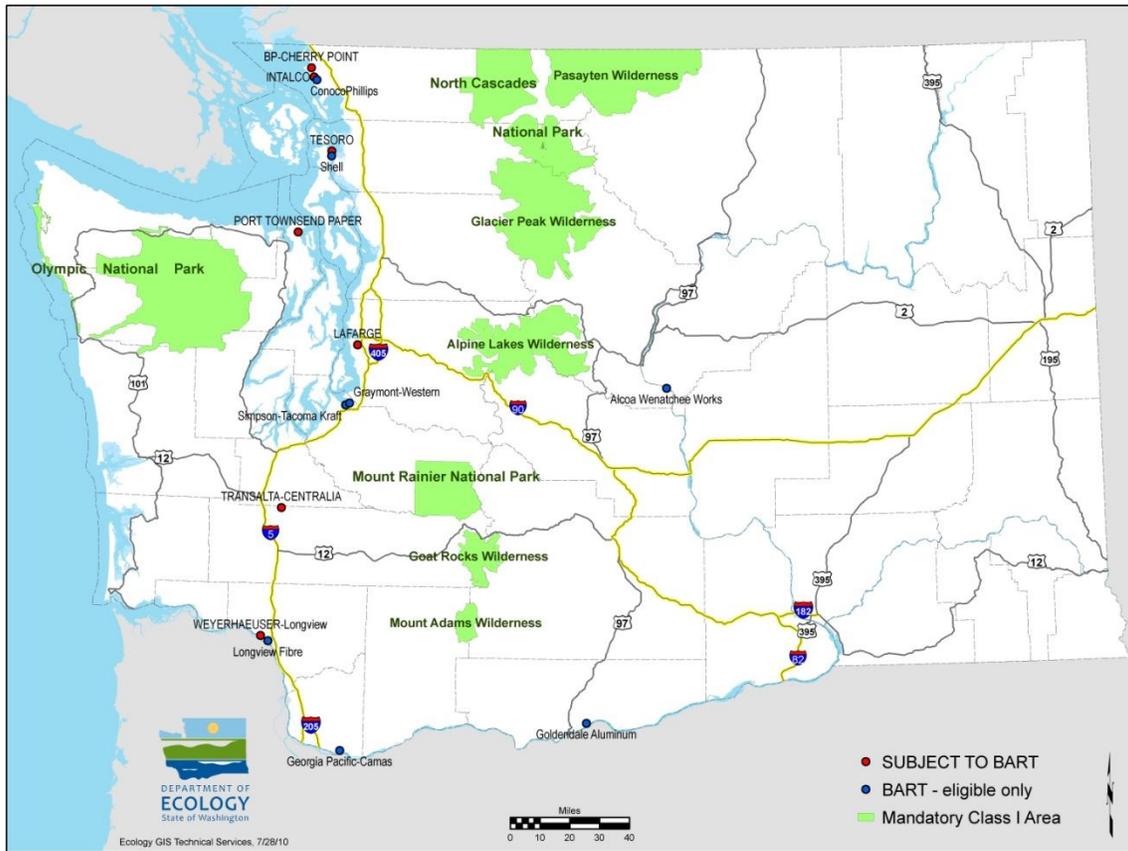


Figure 11-1 Locations of Best Available Retrofit Technology-Eligible Sources and Sources Subject to Best Available Retrofit Technology

Table 11-2 Sources that Did Not Meet the Best Available Retrofit Technology-Eligibility Criteria

Source and Location	Reason(s) this source was not BART-eligible
Prodicta LLC, Kennewick	The age-eligible units have a potential to emit of less than 250 tons per year for any visibility-impairing pollutant.
Boise Cascade – Wallula, Wallula	One boiler started operation before August 7, 1962. All other boilers at this source were replaced after 1979.
General Chemical Corporation, Anacortes	The age-eligible units have a potential to emit of less than 250 tons per year for any visibility-impairing pollutant.
U.S. Oil & Refining Company, Tacoma	Only one small process heater remains from the age-eligible time frame, but does not have qualifying emissions.
University of Washington Power Plant & Hospital, Seattle	The only age and size qualifying boiler has a potential to emit of less than 250 tons per year for any visibility-impairing pollutant.
BF Goodrich Kalama Inc, Kalama	The units that were age-eligible have a potential to emit of less than 250 tons per year for any visibility-impairing pollutant.
Kaiser Aluminum Mead Works, Mead	This source shutdown in 2001, most equipment was sold off, and it is no longer in operation.
Kimberly-Clark Corporation, Everett	This is a sulfite pulp mill. Source does not fall under any of the 26 source categories for BART. Also, the natural gas boiler heat input capacity is limited to less than 250 million BTU/hour.
Vanalco Inc, Vancouver	This source is no longer operating. The units that were age-eligible have a potential to emit of less than 250 tons per year for any visibility-impairing pollutant.
Ash Grove Cement Company (E Marginal), Seattle	There are no emission units at this source from the age-eligible timeframe.
Kaiser Aluminum & Chemical Corporation (Trentwood), Spokane	This is a secondary aluminum facility. Source does not fall under any of the 26 source categories for BART. There are no emission units at this source from the age-eligible timeframe. No boiler over 250 million BTU/ hour input.
Vaagen Brothers Lumber, Colville	Wood-fired boiler with no fossil fuel capability. Source does not fall under any of the 26 source categories for BART.
Birmingham Steel Corporation - West Seattle (now called Nucor Steel), Seattle	There are no emission units at this source from the age-eligible timeframe.
Simmons Densified Fuels Inc, Yakima	This source makes wood pellet fuel. Source does not fall under any of the 26 source categories for BART.

11.3 Washington-Oregon-Idaho Best Available Retrofit Technology Modeling Protocol

Ecology worked with the states of Oregon and Idaho in concert with EPA Region 10, the U.S. Department of the Interior Fish and Wildlife Service, U.S. Department of the Interior National Park Service, and the U.S. Department of Agriculture Forest Service to develop a unified protocol for the states and individual companies to use for modeling. The final protocol was based on a number of other BART modeling protocols and modified by local experience with the complex topography of the three states. The BART Modeling Protocol addresses both BART exemption modeling and BART determination modeling. The former addresses whether a source causes or contributes to visibility impairment in any Class I Area; the latter, visibility improvement from potential controls. A copy of the protocol can be found in Appendix H.

The protocol developed utilized the California Puff Model (CALPUFF) model version 6.0, level 060331. The meteorological data file was generated from prognostic, 12 km gridded data for 2003, 2004, and 2005. The prognostic data files provided to the contractor to produce the modeling file contained missing data. The missing data was filled in by the contractor running Meteorological Mesoscale 5 (MM5) in prognostic mode. The 12 km gridded meteorological data was processed through California Meteorological Model (CALMET) to produce a 4 km gridded data set. The resulting meteorological data file was provided to all of the companies in the three states for their use in modeling for BART purposes.

The three state modeling protocol contained a few specific deviations from the modeling protocols developed by most organizations for their regional haze modeling. Specific differences utilized were:

- Use of three years of 4 km resolution gridded meteorological input data based on prognostic meteorological modeling
- Only meteorological site cloud cover observations were used, all other site measurements were not included
- Use of 4 km topographical data
- Establishment of a 17 ppb ambient ammonia concentration
- Use of both the 98th percentile delta deciview value per year and for the 3 year period of modeling for evaluating whether a source would cause or contribute to visibility impairment

11.4 Summary of Washington Best Available Retrofit Technology Modeling Results

Ecology requested the 14 operating BART-eligible sources listed in Table 11-1 to provide evidence using the regional modeling protocol that their BART-eligible emission units did not cause or contribute to visibility impairment. Goldendale Aluminum was no longer operating so Ecology did not request modeling evidence. If a company did not provide the appropriate evidence, Ecology assumed that the facility was subject to BART and would be required to

submit a BART Engineering Analysis. Ecology relied on modeling done by EPA Region 10 for Goldendale Aluminum which had not operated since spring 2001.

Eight of the facilities also used an hourly ozone data file developed by the State of Oregon and one of Oregon's BART-eligible facilities. Two of the facilities located near the Canadian border amended the ozone data file with ozone monitoring data from British Columbia.

BART-eligible sources responsible for a 0.5 dv change or more in visibility at any mandatory Class I Area are subject to a full BART engineering analysis to determine what, if any, BART controls must be installed. BART-eligible sources that do not cause or contribute to visibility impairment at a threshold greater than 0.5 dv are exempt from BART.

11.4.1 Sources that Did Not Meet the Best Available Retrofit Technology Eligibility Criteria

The modeled visibility impact of each source on mandatory Class I Areas within 300 km was used to determine which of the 14 BART-eligible sources were not subject to BART. Eight sources modeled below the 0.5 dv threshold for contributing to visibility impairment and were not required to perform a BART engineering analysis. The maximum annual 8th high dv value for the three year period of 2003 through 2005 and the maximum modeled visibility impact for each facility are shown in Table 11-3 below along with the corresponding impacted Class I Areas.

Ecology accepted the use of refinements to the three-state modeling protocol for the BART exemption modeling of Alcoa Wenatchee Works. This particular BART-eligible aluminum smelter is located on the east side of the Cascade Range in a constricted, canyon-like section of the Columbia River Valley near Wenatchee. Terrain in this region is complex. Elevations vary from 200 meters (m) elevation mean sea level (MSL) in the vicinity of the smelter to 2500 m elevation at some peaks within the Alpine Lakes Wilderness.

Initial modeling runs using the 4-km grid resolution specified by the three-state Modeling Protocol raised questions about the impacts of the Alcoa aluminum smelter on Alpine Lakes Wilderness, the only impacted mandatory Class I Area. Close examination of the surface wind fields showed numerous locations where the modeled wind directions did not reflect the effects of the topography. Alcoa Wenatchee Works believed that the apparent errors in the wind field were due to unresolved features of the complex terrain and proposed an alternative meteorological data file utilizing a finer grid size than the 4-km grid size specified by the three-state modeling protocol. A 0.5-km grid size was proposed to better characterize the topographical setting of the facility and the narrow mountain valleys and elevation changes that the emissions from the plant would encounter to impact the Alpine Lakes Wilderness.

Comparing the results of the 0.5-km modeling with the 4-km modeling shows that the finer grid spacing did not produce large changes in the magnitude or timing of the highest impacts, but did show an important difference in the spatial location of impacts between the 4-km grid and the finer grid. Impacts occur at the eastern and southern boundaries of Alpine Lakes Wilderness during the winter for both the 4-km and 0.5-km grid spacings. Impacts occur at the western

boundary, which is west of the Cascade Crest, only at the 4-km grid spacing. Appendix I discusses Ecology's acceptance of the use of the finer gridded meteorological data and the use of an alternate version of CALPUFF.

Table 11-3 Sources Not Required to Perform a Best Available Retrofit Technology Engineering Analysis

Source Information		Maximum Visibility Impact Information				
Facility Name	# of BART-Eligible Units	dv value to determine if source is subject to BART (8th highest day's dv)	Location of impact on 8th highest day	Day and year 8th highest dv value occurred	Maximum dv impact on any one day in 3 year period	Location (within 300 km) of maximum impact for the 3 yr period
Alcoa Wenatchee Works	12	0.379	Alpine Lakes	354, 2004	0.845	Alpine Lakes
Conoco-Phillips	8	0.424	Olympic NP	324, 2005	0.901	Olympic NP
Fort James Camas LLC (now Georgia Pacific-Camas)	4	0.434	Mt Hood	270, 2004	1.106	Mt Hood
Goldendale Aluminum ³	2	0.22	Mt Adams	Not Available	0.31	Goat Rocks
Graymont Western US Inc	1	0.166	Mt Rainier NP	49, 2005	0.644	Mt Rainier NP
Longview Fibre Co - Longview	6	0.46	Mt Hood	138, 2003	1.031	Mt Hood
Puget Sound Refining Company	9	0.454	Olympic NP	348, 2005	1.246	Olympic NP
Simpson Tacoma Kraft	3	0.463	Mt Rainier NP	174, 2004	1.81	Mt Rainier NP

11.4.2 Sources that Met the Best Available Retrofit Technology Eligibility Criteria

Seven BART-eligible sources modeled above the 0.5 dv visibility impairment threshold and were subject to a full BART engineering analysis. These facilities are listed in Table 11-4. The table also lists the maximum annual 8th highest day for the 2003 to 2005 modeled period and the maximum dv impact modeled at any Class I Area within 300 km of the source along with the impacted mandatory Class I Areas.

³ Goldendale Aluminum impact modeling was done by EPA Region 10 utilizing the Modeling Protocol. Because the Goldendale Aluminum plant had not operated since 2001, the company was not requested to perform its own modeling. The plant is currently in the process of being dismantled.

Table 11-4 Sources Subject to Best Available Retrofit Technology

Source Information		Maximum Visibility Impact Information				
Facility Name	# of Units Subject to BART	dv value to determine that the source is subject to BART (8th highest day's dv)	Location of impact on 8th highest day	Day and year 8th highest dv value occurred	Maximum dv impact on any one day in 3 year period	Location (within 300 km) of maximum impact for the 3 yr period
BP Cherry Point Refinery	26	0.901	Olympic NP	53, 2005	2.108	Olympic NP
INTALCO Aluminum Corp - Ferndale	19	2.363	Olympic NP	57,2003	4.672	Olympic NP
Tesoro Refining and Marketing Co	12	1.722	Olympic NP	342, 2005	2.932	Olympic NP
Port Townsend Paper Co	4	1.18	Olympic NP	98, 2004	1.97	Olympic NP
Lafarge North America	2	3.16	Olympic NP	95, 2004	6.99	Olympic NP
TransAlta Centralia Generation, LLC	3	5.548	Mt Rainier NP	57, 2003	9.928	Olympic NP
Weyerhaeuser Co - Longview	3	0.973	Mt Rainier NP	177, 2004	2.146	Mt Rainier NP

Tables 11-5 through 11-12 shows more detailed visibility impact modeling information results for the facilities subject to BART. These tables are taken from Section 3 of the Technical Support Document for each BART determination. These tables include the modeled impact of the BART-eligible units at each facility on all Class I Areas within 300 km of the facility, even when the 98th percentile values are below the 0.5 dv contribute to visibility threshold. When the modeled impact for the 98th percentile value is above the 0.5 dv contribute threshold, the value is shaded.

BP Cherry Point Refinery

BP Cherry Point Refinery is a petroleum refinery located near Ferndale, WA. More detailed evaluation of the modeling results indicates that the primary pollutant affecting visibility is NO_x, especially during the wintertime.

Table 11-5 BP Cherry Point Refinery

Mandatory Class I Area	Visibility Criterion	Modeled Impact
Alpine Lakes Wilderness	Max 98% value (max. annual 8th high)	0.294
	3-yrs Combined 98% value (22nd high)	0.260
Glacier Peak Wilderness	Max 98% value (Max annual 8th high)	0.290
	3-yrs Combined 98% value (22nd high)	0.248
Goat Rocks Wilderness	Max 98% value (Max annual 8th high)	0.122
	3-yrs Combined 98% value (22nd high)	0.110
Mt. Adams Wilderness	Max 98% value (Max annual 8th high)	0.083
	3-yrs Combined 98% value (22nd high)	0.082
Mt. Rainier National Park	Max 98% value (Max annual 8th high)	0.279
	3-yrs Combined 98% value (22nd high)	0.222
North Cascades National Park	Max 98% value (Max annual 8th high)	0.370
	3-yrs Combined 98% value (22nd high)	0.365
Olympic National Park	Max 98% value (Max annual 8th high)	0.901
	3-yrs Combined 98% value (22nd high)	0.842
Pasayten Wilderness	Max 98% value (Max annual 8th high)	0.215
	3-yrs Combined 98% value (22nd high)	0.196

Intalco

Intalco is a primary aluminum smelter located near Ferndale, WA. Intalco is predominantly a source of SO₂ from the smelting of aluminum.

Table 11-6 Intalco

Mandatory Class I Area	2003		2004		2005	
	Modeled 98 th Percentile (deciview)	Number of Days Exceeding 0.5 dv	Modeled 98 th Percentile (deciview)	Number of Days Exceeding 0.5 dv	Modeled 98 th Percentile (deciview)	Number of Days Exceeding 0.5 dv
Alpine Lakes Wilderness Area	1.244	36	0.965	37	0.881	23
Goat Rocks Wilderness Area	0.500	8	0.579	10	0.317	3
Glacier Peak Wilderness Area	1.161	37	1.156	38	0.736	23
Mount Adams Wilderness Area	0.456	7	0.472	6	0.357	2
Mount Rainier National Park	0.843	22	1.052	26	0.629	15
North Cascades National Park	1.376	65	1.395	56	1.138	32
Olympic National Park	2.363	59	1.858	53	2.136	45
Pasayten Wilderness Area	0.866	30	0.871	33	0.659	13

Tesoro Refining and Marketing

Tesoro Refining and Marketing is primarily a source of SO₂ and NO_x from the combustion of fuels in refining the petroleum to final products.

Table 11-7 Tesoro Refining and Marketing

Mandatory Class I Area	Visibility Criterion	Modeled Impact
Alpine Lakes Wilderness	Max 98% value (8 th high)	0.917
	3 years combined 98% value (22 nd high)	0.810
Glacier Peak Wilderness	Max 98% value (8 th high)	0.908
	3 years combined 98% value (22 nd high)	0.847
Goat Rocks Wilderness	Max 98% value (8 th high)	0.293
	3 years combined 98% value (22 nd high)	0.281
Mt. Adams Wilderness	Max 98% value (8 th high)	0.255
	3 years combined 98% value (22 nd high)	0.228
Mt. Rainier National Park	Max 98% value (8 th high)	0.712
	3 years combined 98% value (22 nd high)	0.643
North Cascades National Park	Max 98% value (8 th high)	1.001
	3 years combined 98% value (22 nd high)	0.915
Olympic National Park	Max 98% value (8 th high)	1.722
	3 years combined 98% value (22 nd high)	1.399
Pasayten Wilderness	Max 98% value (8 th high)	0.497
	3 years combined 98% value (22 nd high)	0.497

Port Townsend Paper Co

This is a kraft pulp mill located near Port Townsend on the northeast corner of the Olympic Peninsula.

Table 11-8 Initial Modeling Results at Port Townsend Paper Co

Mandatory Class I Area	Max. 98% value (8 th high) for 2003	Max. 98% value (8 th high) for 2004	Max. 98% value (8 th high) for 2005
Alpine Lakes Wilderness Area	0.264	0.281	0.313
Glacier Peak Wilderness Area	0.226	0.238	0.258
Goat Rocks Wilderness Area	0.137	0.128	0.134
Mount Adams Wilderness Area	0.128	0.124	0.105
Mount Rainier National Park	0.272	0.231	0.211
North Cascades National Park	0.196	0.248	0.236
Olympic National Park	1.767	1.983	1.919
Pasayten Wilderness Area	0.120	0.147	0.123

After initial modeling, Port Townsend Paper Co. re-evaluated the actual emissions used in the model. More accurate emission rates were developed and utilized that better reflected the actual emissions at the plant. The details of this process are contained in the BART analysis submitted by Port Townsend Paper Co. The re-evaluation resulted in some small reduction in the modeled actual emission rates. Only the effects on Olympic National Park were evaluated since this was the only Class I Area that had a modeled visibility impact above the 0.5 dv threshold.

Table 11-9 Impacts on Olympic National Park Using More Accurate Emission Rates

Visibility Criterion	dv Value
Max Annual 98% value (8 th high)	1.500
3 Years Combined 98% value (22 nd high)	1.306

Based on the modeling performed, the Port Townsend Paper Co. facility causes visibility impairment in Olympic National Park. Emissions from the plant do not cause or contribute to visibility impairment at any other Class I areas. Analysis of the modeling results indicates that:

- SO₂ and NO_x each contribute about 40% of the modeled visibility impact
- NO_x impacts dominate during the winter
- SO₂ impacts dominate during the summer

Lafarge North America

This cement plant is located in Seattle, WA in the central Puget Sound and as a result its emissions affect many Class I Areas. Visibility impairment from Lafarge comes primarily from NO_x and SO₂, both of which result from the combustion of fuel to make cement.

Table 11-10 Lafarge North America 3-Year Visibility Impacts

Mandatory Class I Area	Visibility Criterion	Modeled Impact
Alpine Lakes Wilderness	Max 98% value (Max annual 8th high)	2.07
	3-yrs Combined 98% value (22nd high)	2.06
Glacier Peak Wilderness	Max 98% value (Max annual 8th high)	1.62
	3-yrs Combined 98% value (22nd high)	1.43
Goat Rocks Wilderness	Max 98% value (Max annual 8th high)	0.92
	3-yrs Combined 98% value (22nd high)	0.85
Mt. Adams Wilderness	Max 98% value ((Max annual 8th high)	0.78
	3-yrs Combined 98% value (22nd high)	0.76
Mt. Hood Wilderness	Max 98% value(Max annual 8th high)	0.65
	3-yrs Combined 98% value (22nd high)	0.62
Mt. Rainier National Park	Max 98% value(Max annual 8th high)	2.04
	3-yrs Combined 98% value (22nd high)	1.78
North Cascades National Park	Max 98% value (Max annual 8th high)	1.48
	3-yrs Combined 98% value (22nd high)	1.27
Olympic National Park	Max 98% value (Max annual 8th high)	3.16
	3-yrs Combined 98% value (22nd high)	2.96
Pasayten Wilderness	Max 98% value (Max annual 8th high)	0.82
	3-yrs Combined 98% value (22nd high)	0.72

TransAlta Centralia Generation, LLC

TransAlta Centralia Generation is a coal-fired power plant located east of Centralia, WA. This is the largest source of NO_x in the state. Due to its large quantity of emissions, tall stacks, and location, its NO_x emissions affect all Class I Areas within 300 km of the plant.

Table 11-11 TransAlta Centralia Generation, LLC

Mandatory Class I Area	Visibility Criterion	Modeled Impact of Control Scenario 2: Flex Fuel
Alpine Lakes Wilderness	Max 98% value (Max annual 8th high)	3.564
	3-yrs Combined 98% value (22nd high)	2.994
Glacier Peak Wilderness	Max 98% value (Max annual 8th high)	2.403
	3-yrs Combined 98% value (22nd high)	1.905
Goat Rocks Wilderness	Max 98% value (Max annual 8th high)	3.676
	3-yrs Combined 98% value (22nd high)	3.108
Mt. Adams Wilderness	Max 98% value (Max annual 8th high)	2.646
	3-yrs Combined 98% value (22nd high)	2.591
Mt. Hood Wilderness	Max 98% value (Max annual 8th high)	2.346
	3-yrs Combined 98% value (22nd high)	1.997
Mt. Jefferson Wilderness	Max 98% value (Max annual 8th high)	1.399
	3-yrs Combined 98% value (22nd high)	1.267
Mt. Rainier National Park	Max 98% value (Max annual 8th high)	4.318
	3-yrs Combined 98% value (22nd high)	4.225
Mt. Washington Wilderness	Max 98% value (Max annual 8th high)	1.323
	3-yrs Combined 98% value (22nd high)	0.872
North Cascades National Park	Max 98% value (Max annual 8th high)	1.852
	3-yrs Combined 98% value (22nd high)	1.486
Olympic National Park	Max 98% value (Max annual 8th high)	3.192
	3-yrs Combined 98% value (22nd high)	2.991
Pasayten Wilderness	Max 98% value (Max annual 8th high)	1.287
	3-yrs Combined 98% value (22nd high)	0.999
Three Sisters Wilderness	Max 98% value (Max annual 8th high)	1.333
	3-yrs Combined 98% value (22nd high)	0.993

Weyerhaeuser Co-Longview

This source is an integrated pulp mill producing kraft, thermomechanical, and recycled pulp and paper. The primary BART-eligible emission units at this facility are combustion sources, mostly sources of NO_x and to a lesser extent SO₂.

Table 11-12 Weyerhaeuser Co - Longview

Mandatory Class I Area	Max. 98% value (8 th high) for 2003	Max. 98% value (8 th high) for 2004	Max. 98% value (8 th high) for 2005	3-years combined 98% value (22 nd high)
North Cascades National Park	0.127	0.223	0.227	0.218
Glacier Peak Wilderness Area	0.214	0.287	0.206	0.248
Olympic National Park	0.470	0.654	0.638	0.583
Alpine Lakes Wilderness Area	0.274	0.513	0.398	0.400
Mount Rainier National Park	0.540	0.973	0.572	0.595
Goat Rocks Wilderness Area	0.384	0.535	0.457	0.457
Mount Adams Wilderness Area	0.433	0.440	0.436	0.440
Mount Hood Wilderness Area	0.725	0.677	0.628	0.689
Mount Jefferson Wilderness Area	0.440	0.375	0.287	0.367
Mount Washington Wilderness Area	0.303	0.345	0.229	0.289
Three Sisters Wilderness Area	0.340	0.361	0.257	0.291
Diamond Peak Wilderness Area	0.203	0.224	0.148	0.192

11.5 Summary of Best Available Retrofit Technology Engineering Analysis

A full BART engineering analysis was completed by each company for each facility determined to be subject to BART. The companies utilized the criteria in the EPA BART Guidance in 40 Code of Federal Regulations (CFR) Part 51, Appendix Y which Ecology provided to the companies with annotations. The annotations were included to assist the companies with providing the correct information to Ecology. The annotated version is included in Appendix J. The companies used this information and proposed their determination of appropriate BART controls for each BART-eligible emission unit at their facilities.

Ecology evaluated the company produced analyses and proposed BART controls for each emission unit. Emission limitations for BART were established by Ecology on a case-by-case basis taking into consideration all 6 factors specified in 40 CFR 51.308(e)(1)(11)(A):

1. The technology available,
2. The costs of compliance,
3. The energy and non-air quality environmental impacts of compliance,
4. Any pollution control equipment in use or in existence at the source or unit,
5. The remaining useful life of the unit, and
6. The degree of improvement in visibility which may reasonably be anticipated to result from the use of control technology.

Each of the draft BART determinations was subject to a public comment period and hearing. A copy of the public notices, comments received, and Ecology's response to those comments is included in Appendix L. Copies of the final BART determination technical support documents and compliance orders issued to each company are included in Appendix L.

The designated BART controls, associated emission limits and compliance deadlines are enforceable regulatory orders issued under Washington law. The requirements of these orders will be incorporated into their respective Air Operating Permits as required by the state Air Operating Permit regulation. These emissions reductions cannot be used as credits in the determination of net emission increase in determining the applicability of Prevention of Significant Deterioration.

All plants required to reduce emissions will have installed BART controls by the end of 2015 under terms of their regulatory orders. The end of 2015 is assumed to be the 5 years after the RH SIP is approved.

11.5.1 Intalco, BP Cherry Point Refinery, Port Townsend Paper Co, and Weyerhaeuser Co-Longview

For Intalco, BP Cherry Point Refinery, Port Townsend Paper Co, and Weyerhaeuser Co-Longview the control measures identified by Ecology as appropriate BART controls are either already installed and in operation on the emission units subject to BART or will be installed and operating by the end of 2015. For control equipment currently installed, much of the equipment was recently installed to account for requirements of:

- New source review Best Available Control Technology (BACT),
- Recently issued federal Maximum Achievable Control Technology (MACT), or
- Recent federal Consent Decree requirements.

11.5.2 Tesoro Marketing and Refining

Tesoro Marketing and Refining (Tesoro) is a petroleum refinery with many process heaters fueled by refinery fuel gas and in a few cases also with fuel oil. Tesoro identified three heaters or groups of heaters for which replacement of the original conventional design burners with new low or ultra low NO_x burners was both technically and economically feasible. One heater, which is subject to BART, will have controls installed by 2015. The BART required heater burner replacement will reduce plant NO_x emissions by 62 tons per year.

Due to time needed for the design approval process and the major maintenance cycle at the refinery, Tesoro does not plan to replace the other two heaters until 2018. All of this is detailed in the Technical Support Document for the TESORO BART Determination in Appendix L.

In addition to the installation of ultra low NO_x burners, one unit with the capability to burn fuel oil is taking a limitation on the usage of fuel oil in that heater to reduce the emissions of NO_x, SO₂ and particulate matter. Additional information is available in the BART determination.

Other recent emission reduction projects at the plant are being recognized as part of BART. The primary projects are the installation of a wet gas scrubber on the carbon monoxide boilers/catalyst regenerator system and improvements to the efficiency of the refinery fuel gas system to remove sulfur from the fuel gas. The installation of the wet scrubber system on the Fluid Catalytic Cracking Unit (FCCU) Catalyst Regenerator/CO Boiler system reduced particulate emissions from this system to the rate required by the MACT, and SO₂ emissions by 90% (to a 25 ppm annual average).

The SO₂ reduction at this unit reduced plant wide emissions by at least 30%. A new refinery gas sulfur content limitation reduced the allowable maximum day sulfur content to 1,000 ppm from the previous 10,000 ppm level, and required installation of a continuous refinery gas sulfur monitoring system. The refinery gas system modifications reduced the daily average sulfur content of the refinery gas to 70 – 100 ppm from over 2,000 ppm previously. The emission reductions resulting from the changes were included the baseline emissions modeled by the facility.

Table 11-13 Tesoro Emission Reductions Due to BART

	Pre-BART, tons per year	Post-BART, maximum day rate, tons per year
NO _x	2002	1847.5
SO ₂	3816 ⁴	3781.7
PM/PM ₁₀	137	103

⁴ The reductions from the refinery gas system modifications are already reflected in the Pre-BART SO₂ annual calculation.

11.5.3 Lafarge North America

Lafarge North America (Lafarge) operates a wet process cement kiln in the Duwamish industrial area of Seattle. The primary polluting equipment at the plant is the cement kiln and its associated clinker cooler baghouses. There are numerous material handling baghouses at the plant that are part of the BART-eligible facility.

The existing particulate controls installed at the plant are determined to be BART. These controls meet the regulatory requirements for dry materials handling issued by the local air agency which is more stringent than state rule. Most units are limited to 0.05 grain/dscf, while a few are limited to 0.10 grain/dscf. The wet process cement kiln is fired by a number of materials including petroleum coke, coal, natural gas, tire derived fuel, waste oil, and tank bottom oil.

Sulfur dioxide comes from the burning of sulfur containing fuels such as coal and heavy fuel oil. The alkaline cement clinker tends to remove SO₂ from the combustion gases and has been a primary method of control for a number of years. As BART for SO₂, Lafarge proposed, and Ecology accepted, to install a dry sorbent injection system using lime to reduce SO₂ emissions. This system will produce calcium sulfate as a byproduct. Calcium sulfate is currently purchased for use in producing the final cement product.

Nitrogen oxides come from the burning of fuel. A number of methods for reducing NO_x from this plant were investigated. Lafarge proposed, and Ecology agreed, that the installation of selective noncatalytic reduction using urea or ammonia injected at approximately the midpoint of the kiln constitutes BART. Ecology also determined that based on the available information, that if the company chose and were able to meet other emission limitation requirements, that mid-kiln firing of whole tires could also meet the NO_x emission limitation.

In Spring 2010 the Environmental Protection Agency (EPA) issued a consent decree in federal court to Lafarge North America. The consent decree required emissions reductions for the Lafarge North America facilities across the nation. The requirements of the consent decree that are applicable to the Seattle facility are reflected in the emission controls and BART requirements for the facility.

Table 11-14 Lafarge BART Emission Limits and Reductions Due to BART

	Pre-BART, tpy	Post-BART, maximum day rate, tpy
NO _x	2172.5	1303.5
SO ₂	570	427.5
PM/PM10	253	253

11.5.4 TransAlta Centralia Generation, LLC

TransAlta Centralia Generation, LLC (TransAlta-Centralia) operates a two unit, pulverized coal fired power plant near Centralia, Washington. Each unit of the plant is rated at 702.5 MW net output. Operation of a coal fired power plant results in the visibility impairing emissions of PM, SO₂ and NO_x.

As part of the approval of the Washington State Visibility SIP in 2002, EPA Region 10 determined that particulate and SO₂ controls installed as part of a 1997 Reasonably Available Control Technology (RACT) determination issued by the state's local air agency met the requirements for BART and constituted BART for those pollutants. EPA specifically did not adopt the NO_x controls in the RACT order as BART.

Ecology determined that BART for NO_x emissions is the current combustion controls combined with the completion of the Flex Fuels project and the use of a sub-bituminous coal from the Powder River Basin (PRB) or other coal that will achieve similar emission rates. This change results in a 20% reduction of NO_x emissions from the baseline period emission rate to a new emission limitation of 0.24 lb/MMBtu on a 30 day average. The use of low sulfur PRB coal also reduces SO₂ emission by about 60% from the same period. The controls have been installed and have met the emission limitation since October 1, 2009.

Table 11-15 TransAlta-Centralia BART Emission Limits and Reductions Due to BART

	Pre-BART, 0.30 lb/MMBtu, tpy*	Post-BART, 0.24 lb/MMBtu, tpy*
NO _x	18555	14844

*Tons per year emissions based on an 85% capacity factor

11.6 Visibility Improvement Due to Best Available Retrofit Technology Implementation

Since visibility improvement resulting from BART occurs in different Class I Areas, or parts of Class I Areas, on difference days it is not possible to “add up” the modeled improvement expected by each facility. Consistent with the BART modeling protocol, Ecology evaluated the visibility improvement on the 22nd highest day over the three year period that was modeled and the reduction in the number of days above the 0.5 dv threshold over the 3 year period modeled. Table 11-16 shows the reduction in deciview impact on the 22nd highest day over the three year period at all mandatory Class I areas within 300 km of each plant. Table 11-17 then shows the reduction in number of days in the 3 year period above 0.5 dv at each of the mandatory Class I Areas.

Modeling does show that there will be visibility improvement at all Class I Areas within 300 km of each source because of the required BART emission controls. Modeling also shows that BART will improve visibility in all mandatory Class I Areas in Washington and many in Oregon that are more than 300 km away. The projected visibility improvements are shown in Table 11-17.

Table 11-16 Projected Visibility Improvement on the 22nd Highest Day over the 3 Year Modeling Period Due to Implementing Best Available Retrofit Technology

Mandatory Class I Area	Intalco	BP Cherry Point Refinery	Tesoro Refining and Marketing ⁵	Lafarge North America	Port Townsend Paper Co	TransAlta Centralia	Weyerhaeuser Longview
North Cascades NP	0	0	0.173	0.468	0	0.726	0
Pasayten Wilderness	0	0	0.112	0.261	0	0.483	-
Glacier Peak Wilderness	0	0	0.172	0.527	0	0.717	0
Olympic National Park	0	0	0.374	1.022	0	1.033	0
Alpine Lakes Wilderness	0	0	0.170	0.745	0	1.352	0
Mt. Rainier NP	0	0	0.101	0.645	0	1.264	0
Goat Rocks Wilderness	0	0	0.047	0.318	0	1.106	0
Mt Adams Wilderness	0	0	0.043	0.282	0	1.037	0
Mt Hood Wilderness	-	0	-	0.236	-	0.833	0
Mt Jefferson Wilderness	-	-	-	-	-	0.621	0
Mt Washington Wilderness	-	-	-	-	-	0.542	0
Three Sisters Wilderness	-	-	-	-	-	0.545	0
Diamond Peak Wilderness	-	-	-	-	-	-	0

“- “ means that the area was more than 300 km from the source

⁵ Includes effect of proposed reasonable progress limits

Table 11-17 Reduction in Number of Days above 0.5 dv over 3 year Modeling Period Due to Implementing Best Available Retrofit Technology

Mandatory Class I Area	Intalco Aluminum	BP Cherry Point Refinery	Tesoro Refining and Marketing ⁶	Lafarge North America	Port Townsend Paper	TransAlta Centralia	Weyerhaeuser Longview
North Cascades NP	0	0	42	97	0	69	0
Pasayten Wilderness	0	0	12	46	0	59	-
Glacier Peak Wilderness	0	0	34	112	0	73	0
Olympic National Park	0	0	30	81	0	38	0
Alpine Lakes Wilderness	0	0	35	73	0	71	0
Mt. Rainier NP	0	0	13	69	0	43	0
Goat Rocks Wilderness	0	0	2	38	0	60	0
Mt Adams Wilderness	0	0	2	37	0	58	0
Mt Hood Wilderness	-	0	-	22	-	48	0
Mt Jefferson Wilderness	-	-	-	-	-	41	0
Mt Washington Wilderness	-	-	-	-	-	38	0
Three Sisters Wilderness	-	-	-	-	-	37	0
Diamond Peak Wilderness	-	-	-	-	-	-	0

“-“ means that the area was more than 300 km from the source

⁶ Includes effect of proposed reasonable progress limits