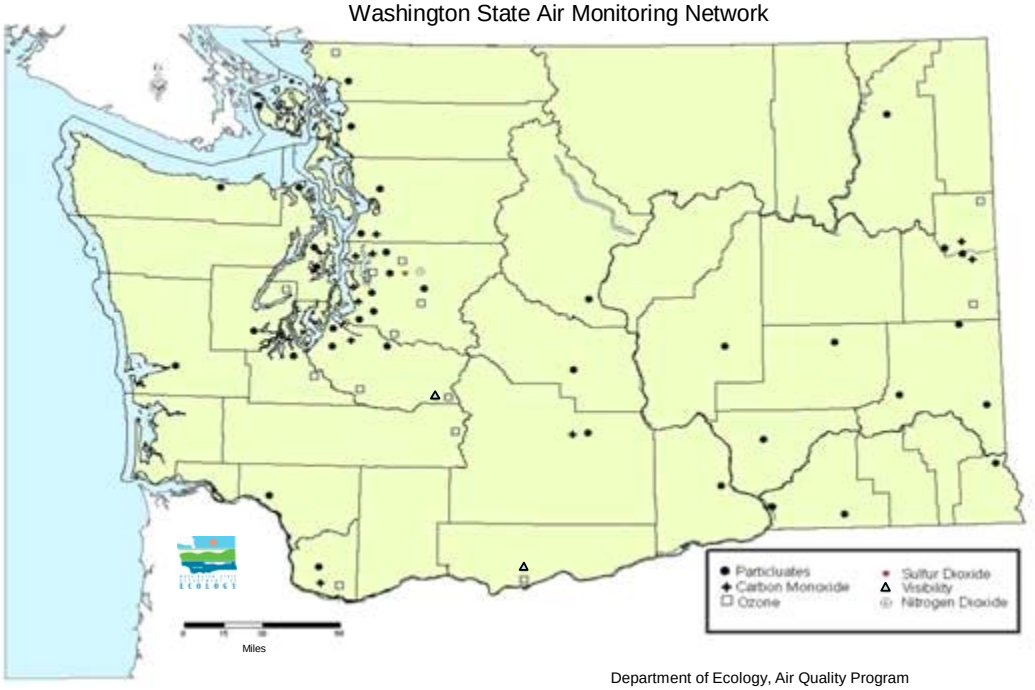
Washington State Air Monitoring Network



Department of Ecology, Air Quality Program

1999 - 2002 Air Quality Data Summary

January 2004

Publication Number 04-02-002

Department of Ecology,

Air Quality Program

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Air Quality Website:

http://www.ecy.wa.gov/programs/air/airhome.html

If you need this information in an alternate format, please contact Tami Dahlgren at (360) 407-6800. If you are a person with a speech or hearing impairment, call 711, or 1-800-833-6388 for TTY.

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Air Quality Standards

Pollutant	National Primary	National Secondary	Washington State
Total Suspended Particulates			
Annual Geometric Mean	No Standard	No Standard	60 µg/m^3
24 - Hour Average	No Standard	No Standard	150 µg/m^3
Lead (Pb)			
Quarterly Average	1.5 µg/m^3	1.5 µg/m^3	No Standard
Particulate Matter (PM_{10})			
Annual Arithmetic Mean	50 µg/m^3	50 µg/m^3	50 µg/m^3
24 - Hour Average	150 µg/m^3	150 µg/m^3	150 µg/m^3
Particulate Matter ($PM_{2.5}$)			
24-Hour	65 µg/m^3	65 µg/m^3	65 µg/m^3
Annual Arithmetic Mean	15 µg/m^3	15 µg/m^3	15 µg/m^3
Sulfur Dioxide (SO_2)			
Annual Average	0.03 ppm	No Standard	0.02 ppm
24 - Hour Average	0.14 ppm	No Standard	0.10 ppm
3 - Hour Average	No Standard	0.50 ppm	No Standard
1 - Hour Average	No Standard	No Standard	0.40 ppm [A]
Carbon Monoxide (CO)			
8 - Hour Average	9 ppm	9 ppm	9 ppm
1 - Hour Average	35 ppm	35 ppm	35 ppm
Ozone (O_3)			
1 - Hour Average	0.12 ppm	0.12 ppm	0.12 ppm
8 - Hour Average [B]	0.08 ppm	0.08 ppm	No Standard
Nitrogen Dioxide (NO_2)			
Annual Average	0.053 ppm	0.053 ppm	0.05 ppm

Primary standards are listed in this table as they appear in the federal regulations.

[A] 0.25 not to be exceeded more than two times in any seven consecutive days.

[B] Eight-hour ozone standard went into effect on September 16, 1997. Implementation is limited.

- ppm = parts per million
- µg/m^3 = micrograms per cubic meter
- Ambient concentrations are rounded using the next higher decimal place to determine whether a standard has been exceeded. The data charts in this report are shown with unrounded numbers.
- Details of the National Standards are available in 40 CFR Part 50, available on-line at: http://www.access.gpo.gov/nara/cfr/waisidx_99/40cfr50_99.html

Stations Where the Standard was Exceeded

Particulate Matter (PM_{10}) (24-hour standard = 150 µg/m^3)

There was one exceedance of the PM_{10} standard during **1999**, recorded at Colville.
The other high values occurred because of natural events and are not considered exceedances.

Station #	Location	Date	Reading	Natural Event
530650004	Colville, County Courthouse	01/30/99	205 µg/m^3	NO
530050002	Kennewick, Metaline	09/23/99	184 µg/m^3	YES
530050002	Kennewick, Metaline	09/25/99	306 µg/m^3	YES
530630016	Spokane, Ferry	09/25/99	343 µg/m^3	YES
530711001	Wallula, Worden Farm	06/23/99	297 µg/m^3	YES

There was one exceedance of the PM_{10} standard during **2000**, recorded at Colville.
The other high values occurred because of natural events and are not considered exceedances.

Station #	Location	Date	Reading	Natural Event
530711001	Wallula, Worden Farm	08/10/00	215 µg/m^3	YES
530650004	Colville, County Courthouse	02/18/00	263 µg/m^3	NO
530050002	Kennewick, Metaline	06/21/00	227 µg/m^3	YES
530050002	Kennewick, Metaline	07/31/00	230 µg/m^3	YES

There was one exceedance of the PM_{10} standard during **2001**, recorded at Colville.
The other high values occurred because of natural events and are not considered exceedances.

Station #	Location	Date	Reading	Natural Event
530650004	Colville, County Courthouse	02/27/01	255 µg/m^3	NO
530050002	Kennewick, Metaline	03/13/01	347 µg/m^3	YES
530050002	Kennewick, Metaline	09/25/01	284 µg/m^3	YES
530630016	Spokane, Ferry Street	09/25/01	260 µg/m^3	YES
530631017	Spokane, Rockwood	09/25/01	211 µg/m^3	YES
530710005	Walla Walla, Fire Station	09/25/01	182 µg/m^3	YES
530050002	Kennewick, Metaline	10/23/01	267 µg/m^3	YES

There was one exceedance of the PM_{10} standard during **2002**, recorded at Colville.
The other high values occurred because of natural events and are not considered exceedances.

Station #	Location	Date	Reading	Natural Event
530650004	Colville, County Courthouse	02/13/02	175 µg/m^3	NO
530710005	Walla Walla, Fire Station	05/02/02	169 µg/m^3	YES
530050002	Kennewick, Metaline	08/16/02	186 µg/m^3	YES
530711001	Wallula, Worden Farm	09/29/02	197 µg/m^3	YES

Stations Where the Standard was Exceeded (cont.)

Carbon Monoxide (CO) (8-hour standard = 9 ppm)

There was one exceedance of the CO standard during **1999**, recorded at one station in Vancouver.

Station 530110010	Vancouver, 4th Plain Blvd	01/05/99	9.5 ppm

There were no exceedances of the CO standard in 2000, 2001 or 2002.

Ozone (O_3) (8-hour standard = 0.08ppm)

There was one exceedance of the 8 hour Ozone standard during **2000**, recorded at one station in Enumclaw. There were no exceedances of the Ozone standard in 1999, 2001 or 2002.

Station 530337001	King County, Enumclaw	06/28/00	.086 ppm

There was one exceedance of the 8 hour Ozone standard during **2001**, recorded at one station in Enumclaw. There were no exceedances of the 8-hour Ozone standard for 1999 or 2002.

Station 530330023	King County, Mud Mountain	08/11/01	.091 ppm

Site Changes

Particulate Matter (PM_{10})	Dis. = Discontinued Est. = Established
Seattle, Harbor Island	Dis. 01-01-99
Bellingham, Iowa Street	Dis. 02-26-99
Seattle, South Park	Est. 01-06-99
Seattle, South Park	Dis. 05-13-99
Yakima, YVCC	Dis. 08-31-99
Bellevue, Bellevue Way	Dis. 10-03-99
Sea Tac South	Dis. 06-10-99
Sea Tac North	Dis. 06-10-99
Tacoma, NE 54th	Dis. 09-30-99
Yakima, S4th St	Est. 04-21-00
Tacoma, E 11th St	Dis. 12-27-00
Yakima, Garfield	Dis. 10-23-01
Marysville JHS	Dis. 09-30-01
Puyallup, So Hill	Dis. 09-30-01
Longview City Shop	Dis. 03-31-01
Bothell Avenue	Dis. 09-30-01
Wallula Port	Est. 11-13-02
Burbank School	Est. 12-20-02

Carbon Monoxide (CO)	
Bellevue, Broadway	Dis. 07-01-99
Seattle, Beacon Hill	Est. 01-27-00
Seattle, Georgetown	Est. 01-01-00
Hazeldell, NE Hwy 99l	Dis. 03-22-01
Yakima, Courthouse	Dis. 03-29-01
Spokane, Gonzaga	Dis. 04-24-01
Seattle, James Street	Dis. 02-28-01
Seattle, Corson Avenue	Dis. 08-31-02

Nitric Oxide (NO), Nitrogen Dioxide (NO_2), Oxides of Nitrogen (NOx)	
Sea Tac North	Dis. 06-10-99
Seattle, Corson Avenue	Est. 02-01-00
Seattle, Beacon Hill	Est. 11-02-01
Seattle, Corson Avenue	Dis. 08-16-02

Ozone (O_3)	
Yelm FS	Dis. 10-01-99
Seattle, Beacon Hill	Est. 05-03-00
Lewis Co., Packwood Lake	Dis. 09-30-00
Yelm, Millroad	Est. 05-01-01
Belfair, E Campus Dr.	Est. 05-05-02
White Pass US Hwy 12	Est. 07-17-02

Site Changes (cont)

Sulfer Dioxide (SO_2)

Tacoma, NE 54th	Dis. 09-30-99
Tacoma, Alexander Ave	Dis. 09-30-99
Seattle, Duwamish	Dis. 09-30-99
Anacortes, Bartholomew	Dis. 09-30-99
Anacortes, March Pt.	Dis. 09-30-99
Bellingham, Chestnut St.	Dis. 09-30-99
Seattle, Beacon Hill	Est. 01-27-00

Meteorological

Bellingham, Iowa Street	Dis. 02-26-99
King Co., North Bend	Est. 05-07-99
Yakima YVCC	Dis. 08-31-99
Sea Tac South	Dis. 06-10-99
Sea Tac North	Dis. 06-10-99
Port Angeles, Marine View Drive	Est. 12-28-99

Nephelometer

Bellingham, Iowa Street	Dis. 02-26-99
Lynnwood, 59th	Dis. 05-10-99
Sea Tac South	Dis. 06-10-99
Sea Tac North	Dis. 06-10-99
King County, North Bend	Est. 05-07-99
Shelton, Mt. View Drive	Est. 01-18-01
LaCrosse, Hill Street	Est. 07-19-02
Redmond City Hall	Est. 01-19-02
Stevenson Co. Courthouse	Est. 06-13-02
Lewis County Vader	Est. 07-08-02
Rosalia, S. Josephine Street	Est. 06-19-02
Bellevue, Bellevue Way	Est. 04-29-02
Towal Road Highway 14	Est. 07-13-02
Enumclaw, Mud Mountain	Est. 09-01-02
Aberdeen, N. Division	Est. 08-16-02
Chelan, W. Woodin Avenue	Est. 09-15-02
Leavenworth, Sherbourne	Est. 10-10-02
Twisp, Glover Street	Est. 10-01-02

Site Changes (cont)

Nephelometer cont.

Okanogan, Second Avenue S.	Est. 11-01-02
Wenatchee, Hwy 207	Est. 10-10-02
Mt. Vernon, NWAPA	Est. 08-07-02
South Mountain	Est. 09-30-02

Federal Reference Method (FRM) ($PM_{2.5}$)

Yakima, YVCC Knob Hill	Dis. 08-31-99
Bellevue, 305 Bellevue Way	Dis. 10-03-99
Colfax, South Oak	Est. 01-01-00
Mt. Vernon, LaVenture	Est. 01-01-00
Centralia, Centralia College	Est. 01-01-00
Port Angeles, Daishowan	Est. 01-01-00
Port Townsend, San Juan Ave.	Est. 01-01-00
Pullman, Dexter Ave.	Est. 01-01-00
Ritzville, W. Alder	Est. 10-02-00
Cheney, Turnbull Slough	Est. 10-03-00
Cheney, Turnbull Slough	Dis. 12-01-00
Bellevue, 504 Bellevue Way	Est. 11-02-00
Yakima, South 4th	Est. 05-06-00
Walla Walla, South 12th	Est. 01-31-01
Centralia, Community College	Dis. 03-20-01
Shelton, Mt. View Drive	Est. 05-24-01
Port Angeles, Stevens M School	Dis. 01-26-01
Port Townsend, San Juan Avenue	Dis. 03-26-01
Mt. Vernon, Laventure School	Dis. 02-02-02
Colville, S. Oak	Dis. 04-30-02
Stevenson Co Courthouse	Est. 06-19-02
Lewis County Vader	Est. 07-07-02
Aberdeen, N. Division	Est. 08-16-02
Ritzville Co. West Alder	Dis. 06-25-02
Walla Walla, S. 12th	Dis. 06-07-02
Pullman, Dexter Avenue	Dis. 06-25-02
Puyallup, So. Hill	Dis. 12-31-02
Tacoma, Alexander Avenue	Dis. 12-31-02

Site Changes (concluded)

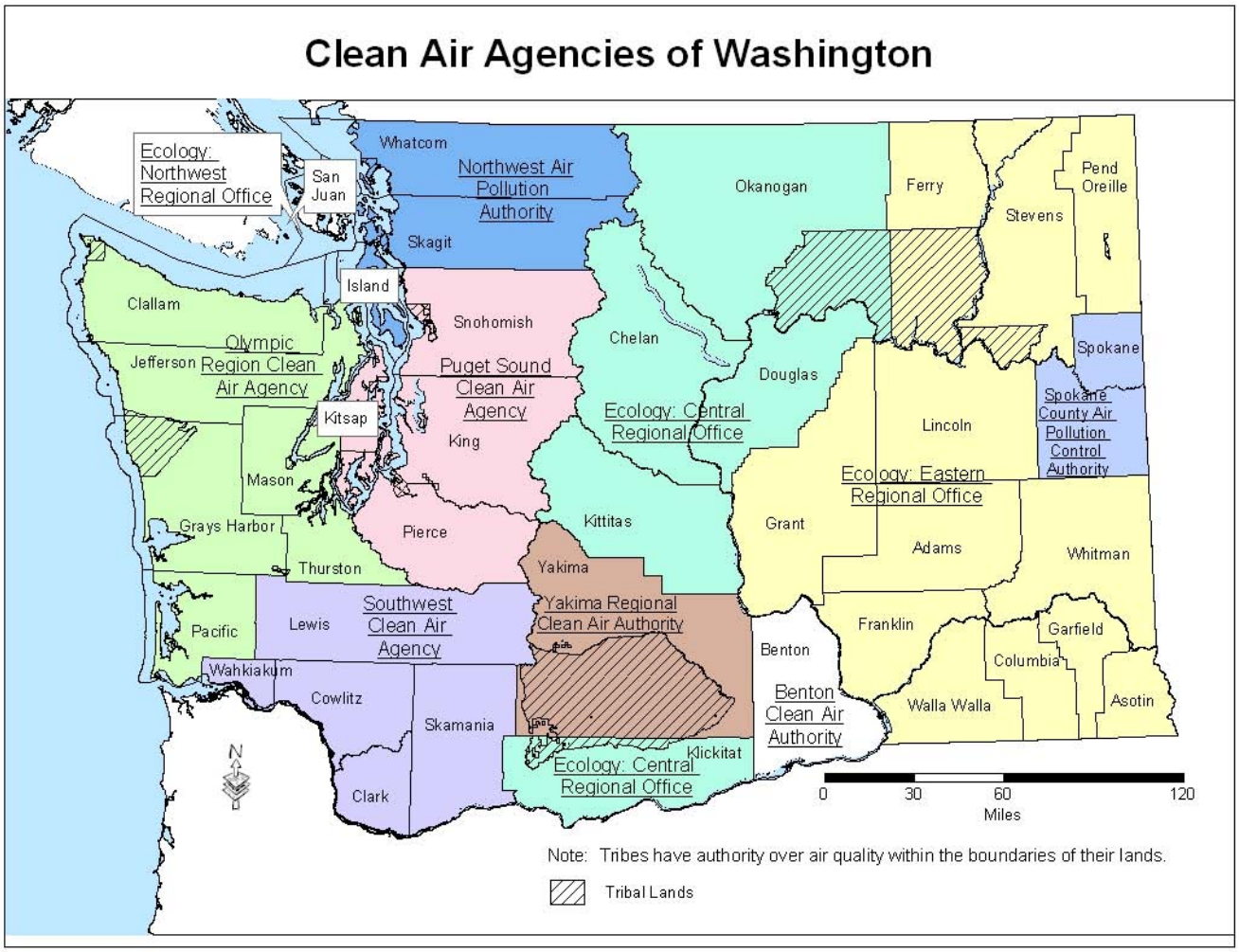
TEOM Continuous $PM_{2.5}$

Issaquah, W. Sunset TPM_{10} & $TPM_{2.5}$	Dis. 03-22-99
Seattle, South Park	Est. 01-06-99
Kennwick, Metaline TPM_{10} & $TPM_{2.5}$	Est. 05-07-99
Lynnwood, 59^{th} Place $TPM_{2.5}$	Dis. 05-10-99
Seattle, Beacon Hill	Est. 12-10-02

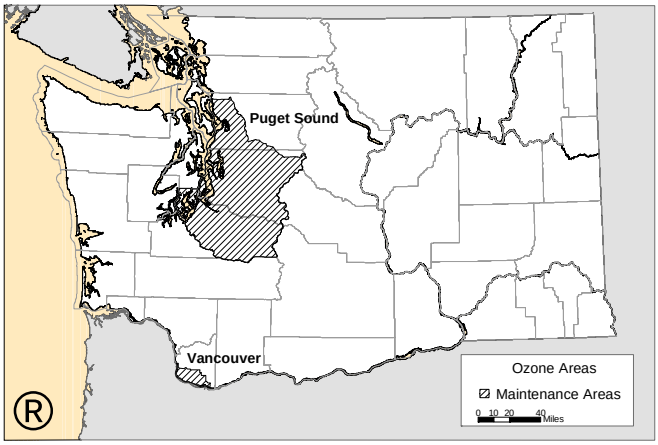
Lead

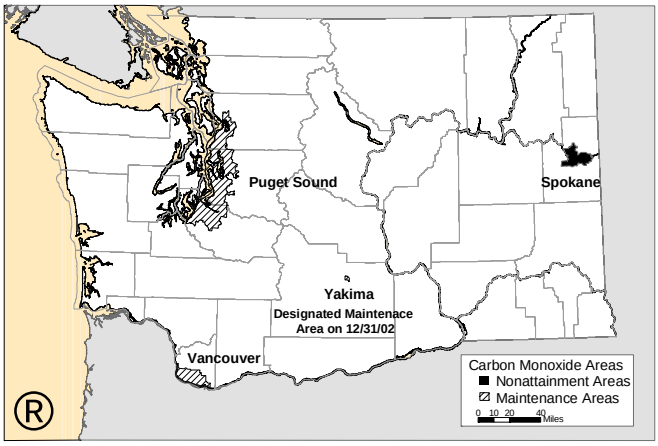
Seattle, Harbor Island	Dis. 10-01-99

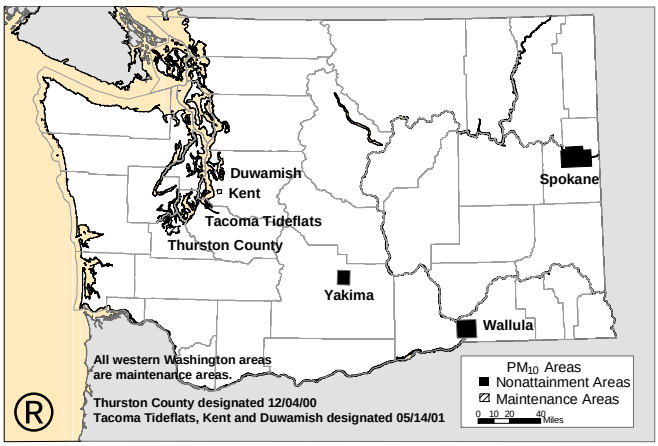
Air Quality Agencies



Nonattainment and Maintenance Areas







Monitoring Site Locations

Ecology's air monitoring network is established with the intent of determining air quality in areas of the state that have experienced comparatively high levels of air pollution. The number and location of monitors may change each year based on changing conditions in an area (see "Site Changes" on page 4). The data on pages 15-124 is organized by geographic area for the purposes of this report. This table identifies which counties and monitoring sites are located in which geographic areas.

County	Area	Site No.	Location
Asotin	Eastern	530030004	Clarkston, 13th St & Portway
Benton	Eastern	530050002	Kennewick, 5929 W Metaline
Chelan	Central	530070006	Wenatchee, 600 Alaska St
Clark	Southwest	530110009	NE 164 Street
Clark	Southwest	530110010	Vancouver, 2101 E 4th Plain Blvd
Clark	Southwest	530110011	Vancouver, 1500 SE Blairmount Dr
Clark	Southwest	530110013	Vancouver, 8205 East 4th Plain Blvd
Clark	Southwest	530110016	Vancouver, 7701 NE Highway 99
Cowlitz	Southwest	530150006	Longview, 254 Oregon Way
Cowlitz	Southwest	530150013	Woodland, 2800 Dike Road
Cowlitz	Southwest	530150014	Castle Rock, 549 S Silver lake Rd
King	Puget Sound	530330004	Bellevue, 504 Bellevue Way NE
King	Puget Sound	530330010	Issaquah, 20050 SE 56th
King	Puget Sound	530330015	Bellevue, 8th & 108th Ave NE
King	Puget Sound	530330017	North Bend, 42404 SE North Bend Way
King	Puget Sound	530330019	Bellevue, 2421 148th NE
King	Puget Sound	530330020	Sea Tac, 2501 S. 150th
King	Puget Sound	530330021	Seattle , 8025 10th Ave S, South Park
King	Puget Sound	530330022	Sea Tac, 2401 S 192nd
King	Puget Sound	530330023	Mud Mountain, 30525 SE Mud Mountain Road
King	Puget Sound	530330024	Lake Forest Park, 17171 Bothell Way NE
King	Puget Sound	530330025	Seattle, 310 NE Northgate Way
King	Puget Sound	530330027	Redmond, NE 45th
King	Puget Sound	530330032	Seattle, Corson Avenue
King	Puget Sound	530330051	Seattle, 5th & James St
King	Puget Sound	530330057	Seattle, 4752 E Marginal Way
King	Puget Sound	530330077	Seattle, 1424 4th Avenue
King	Puget Sound	530330080	Seattle, Charleston St & 15th Ave S
King	Puget Sound	530330087	Seattle, 1307 Northeast 45th
King	Puget Sound	530331003	Bellevue, 622 Bellevue Way NE
King	Puget Sound	530332004	Kent, Central & James
King	Puget Sound	530337001	Enumclaw, 31002 Enumclaw-Chinook Pass Rd
Kitsap	Puget Sound	530351005	Meadowdale, 725 Blackbird Dr. NE
Lewis	Southwest	530410003	Packwood Lake, SE of Hwy 12
Pierce	Puget Sound	530530012	Mt. Rainier, Jackson Visitors Center
Pierce	Puget Sound	530530021	Tacoma, 27th St NE & 54th Ave NE

Monitoring Site Locations (concluded)

Pierce	Puget Sound	530530031	Tacoma, 2301 Alexander Avenue
Pierce	Puget Sound	530530032	Tacoma, 1101 Pacific Avenue
Pierce	Puget Sound	530531004	Tacoma, 2316 E 11th St
Pierce	Puget Sound	530531008	Pack Forest, .6 m N of La Grande on Hwy 7
Pierce	Puget Sound	530531018	Puyallup, 86th & 128th St SE
Skagit	Northwest	530570012	Anacortes, 1224 Bartholomew Ave
Skagit	Northwest	530571003	Anacortes, Rt 2 Box 710
Snohomish	Puget Sound	530610004	Lynnwood, 44th Ave W & 196th St W.
Snohomish	Puget Sound	530610012	Everett, Broadway
Snohomish	Puget Sound	530610016	Everett, Hoyt Ave. & 26th St.
Snohomish	Puget Sound	530610018	Lynnwood, 20935 59th Place
Snohomish	Puget Sound	530611007	Marysville, 1605 7th Street
Spokane	Spokane	530630001	Cheney, Turnbull Slough
Spokane	Spokane	530630016	Spokane, E 3530 Ferry
Spokane	Spokane	530630040	Spokane, N. 1226 Hamilton St.
Spokane	Spokane	530630043	Spokane, N 1227 Division
Spokane	Spokane	530630045	Spokane, W 1002 Riverside
Spokane	Spokane	530630046	Spokane, E. 9814 Green Bluff Rd.
Spokane	Spokane	530630047	Spokane, N. 4601 Monroe St.
Spokane	Spokane	530630048	Spokane, 3rd Ave. & Washington N.
Spokane	Spokane	530630049	Spokane, 3rd Ave. & Washington S.
Spokane	Spokane	530631017	Spokane, Rockwood
Spokane	Spokane	530632002	Millwood, City Hall
Stevens	Eastern	530650004	Colville, 215 S Oak
Stevenson	Southwest	530590002	County Jail
Thurston	Coastal	530670002	Yelm, 709 Mill Rd SE
Thurston	Coastal	530670011	Lacey, 909 Sleater Kinney Rd SE
Thurston	Coastal	530670013	Lacey, 1900 College St SE
Walla Walla	Eastern	530710005	Walla Walla, 200 S 12th
Walla Walla	Eastern	530711001	Wallula, Worden Farms
Whatcom	Northwest	530730007	Bellingham, Iowa Street
Whatcom	Northwest	530730011	Bellingham, Chestnut Street
Whatcom	Northwest	530730015	Bellingham, Yew Street
Yakima	Eastern	530770005	Sunnyside, 16th & Harrison
Yakima	Eastern	530770009	Yakima, South 4th
Yakima	Eastern	530770011	Yakima, 612 N 6th Ave
Yakima	Eastern	530770012	Yakima, Knob Hill Rd & 16th
Yakima	Eastern	530771002	Yakima, North 1st St

Central Area

Particulate Matter (PM_{10})

PM_{10} Annual Arithmetic Means ($\mu g/m^3$)

Station	Location	1994	1995	1996	1997	1998	1999	2000	2001	2002
530070006	Wenatchee	24*	24	24	27	22	17	22	22	21
530710003	Wallula, Port									13
530710006	Burbank Sch.									16

* Average based on less than 12 months of data.

PM_{10} for 1999 - 2002 ($\mu g/m^3$)

Station	Location	1st High		2nd High	
	1999	Conc.	Date	Conc.	Date
530070006	Wenatchee, Columbia Sch	47	02/02	44	09/21
	2000				
530070006	Wenatchee, Columbia Sch	51	02/18	49	11/20
	2001				
530070006	Wenatchee, Columbia Sch	112	11/09	73	02/27
	2002				
530070006	Wenatchee, Columbia Sch	51	11/04	50	01/17
530710003	Wallula Port	23	11/28	23	12/25
530710006	Burbank School	25	12/25	6	12/28

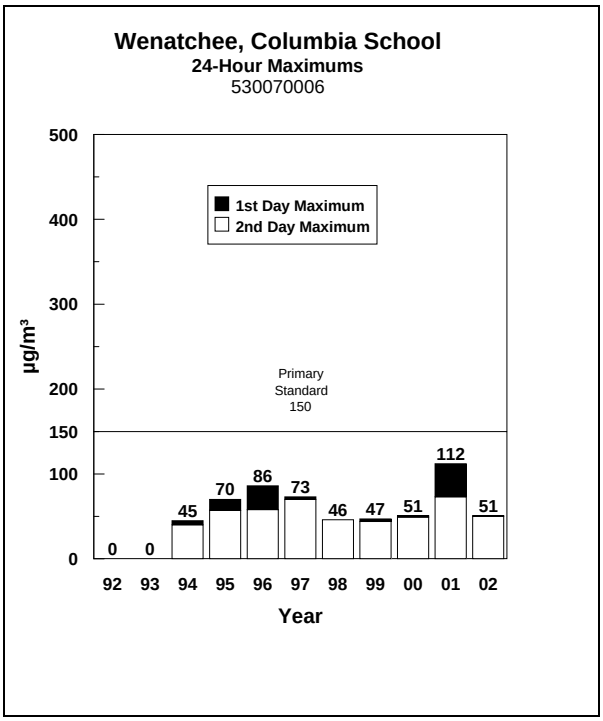
PM_{10} for 1999 - 2002

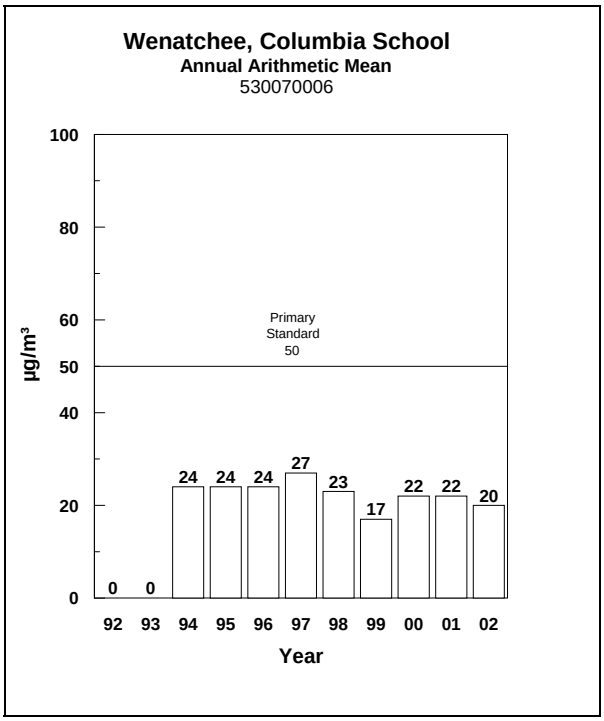
Station	Location	Period of	Sampling		% Valid
	1999	Record	Freq.	#Samples	Data
530070006	Wenatchee, Columbia Sch	Jan-Dec	1/3,1/6	45	60
	2000				
530070006	Wenatchee, Columbia Sch	Jan-Dec	1/3,1/6	85	94
	2001				
530070006	Wenatchee, Columbia Sch	Jan-Dec	1/3,1/6	90	89
	2002				
530070006	Wenatchee, Columbia Sch	Jan-Dec	1/3,1/6	76	87
530710003	Wallula Port	Nov-Dec	1/6	16	100
530710006	Burbank School	Nov-Dec	1/6	2	100

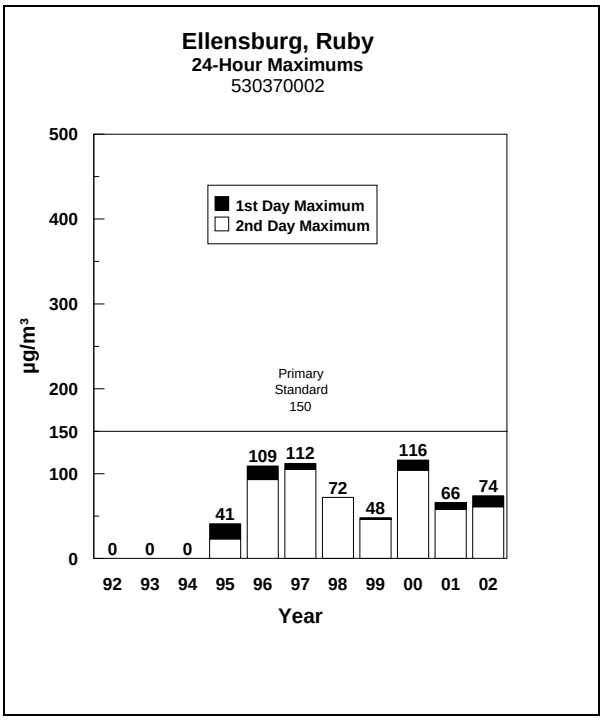
Conc. = Concentrations Freq. = Frequency

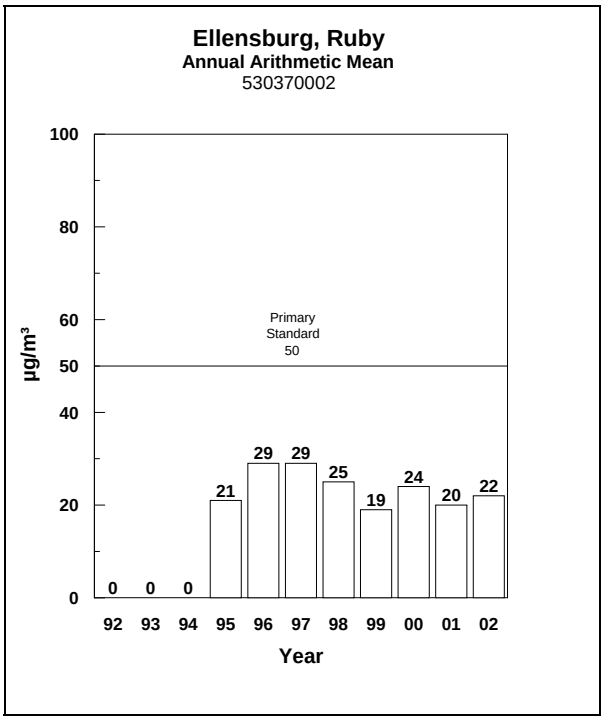
Central Area (cont)

Particulate Matter (PM_{10})



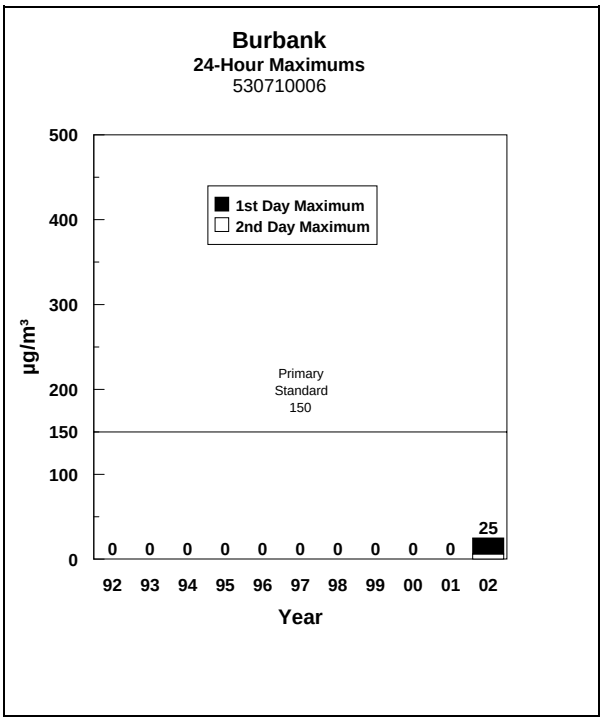


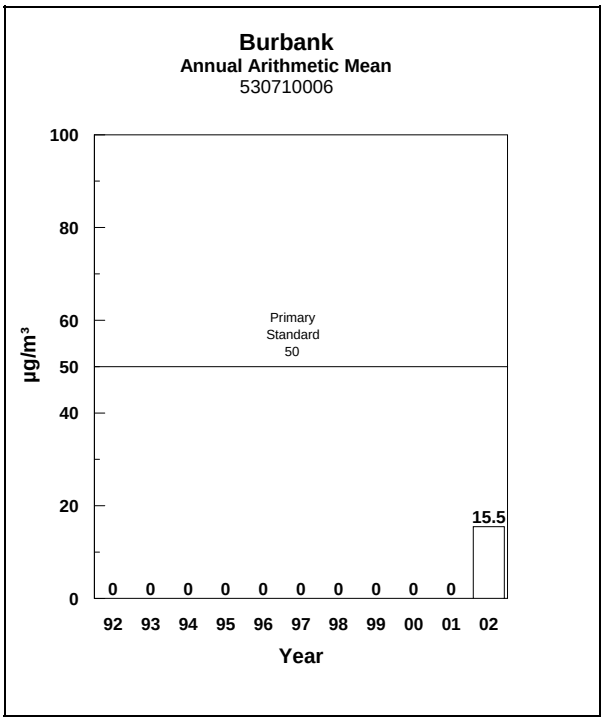




Central Area (cont)

Particulate Matter (PM_{10})





Central Area (cont)

Particulate Matter ($PM_{2.5}$)

$PM_{2.5}$ Annual Arithmetic Means ($\mu g/m^3$)

Station	Location	1995	1996	1997	1998	1999	2000	2001	2002
530050002	Kennewick, Met					6.9	8.4	6.9	6.4

* Average based on less than 12 months of data.

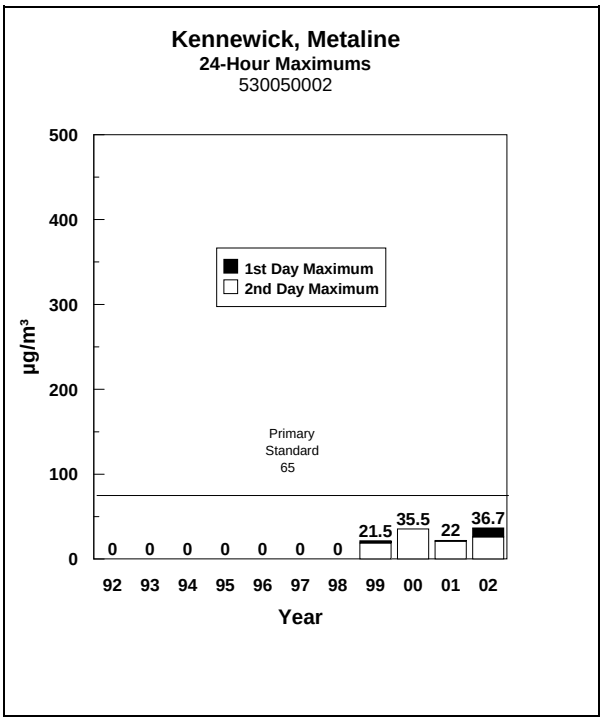
$PM_{2.5}$ for 1999 - 2002 ($\mu g/m^3$)

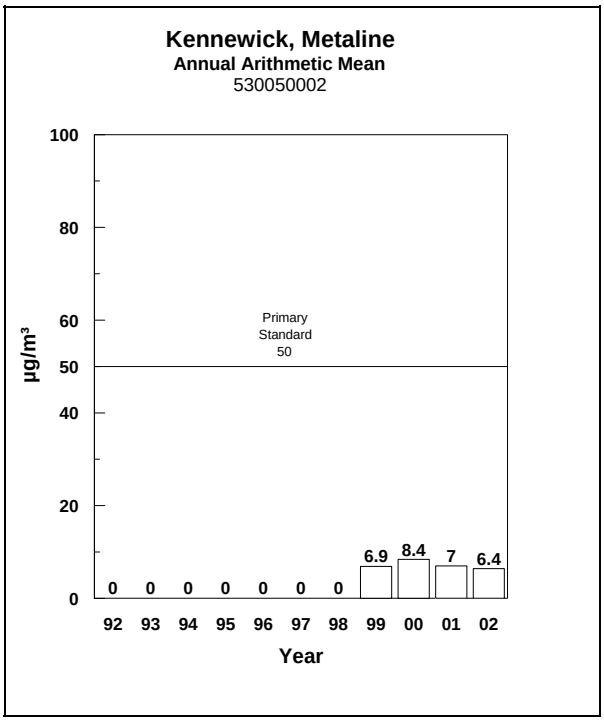
Station	Location		1st High Conc.	Date	2nd High Conc.	Date
530050002	Kennewick, Metaline	**1999**	21.5	03/13	19.0	10/21
530050002	Kennewick, Metaline	**2000**	35.5	10/26	25.5	11/20
530050002	Kennewick, Metaline	**2001**	22	01/04	21	01/10
530050002	Kennewick, Metaline	**2002**	36.7	11/04	26	11/07

$PM_{2.5}$ for 1999 - 2002

Station	Location		Period of Record	Sampling Freq.	#Samples	% Valid Data
530050002	Kennewick, Metaline	**1999**	Jan-Dec	1/3	58	48
530050002	Kennewick, Metaline	**2000**	Jan-Dec	1/3	102	84
530050002	Kennewick, Metaline	**2001**	Jan-Dec	1/3	107	87
530050002	Kennewick, Metaline	**2002**	Jan-Dec	1/3	116	95

Conc. = Concentrations Freq. = Frequency





Central Area (cont)

Ozone

1-Hour Ozone for 1999 - 2002 (ppm)

Station	Location	1st Conc.	1 - Hr Max High Date	2nd Conc.	High Date	2nd Day Conc.	High* Date
	1999						
530390003	Wishram	.079	05/24	.079	07/10	.079	07/10
	2000						
530390003	Wishram	.081	06/04	.079	06/04	.074	08/23
	2001						
530390003	Wishram	.086	08/10	.083	08/10	.078	08/12
	2002						
530390003	Wishram	.073	07/22	.071	06/26	.071	06/26
530410007	White Pass	.073	08/14	.072	07/23	.071	07/23

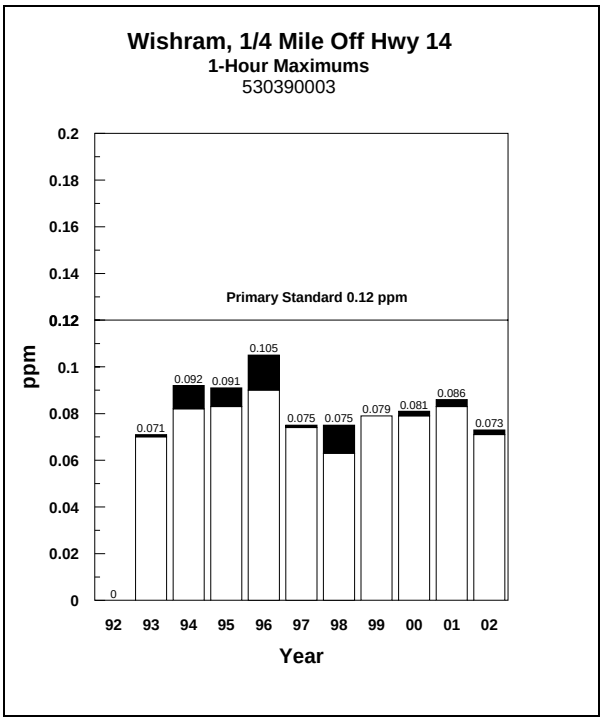
* 2nd Day High = Second day with the highest 1-hour average.
Conc. = Concentrations Max=Maximums

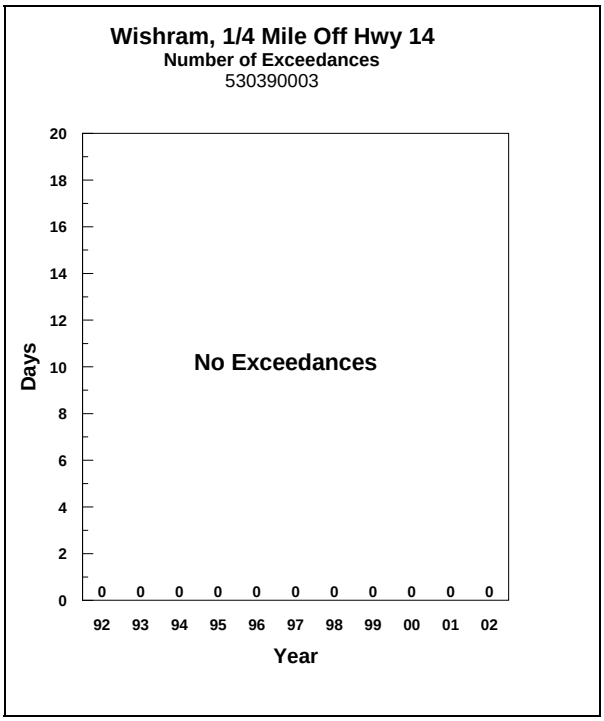
Ozone for 1999 - 2002

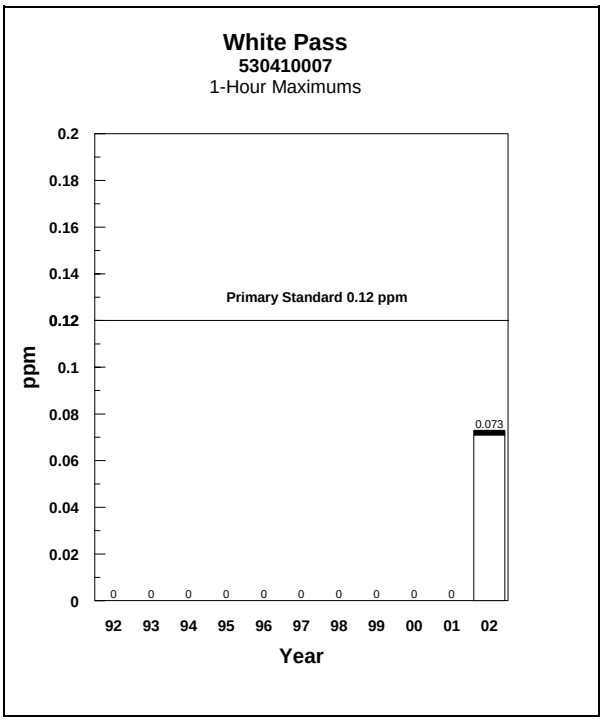
Station	Location	Period of Record	# Hours	# Days	% Valid Data
	1999				
530390003	Wishram	May-Sept	3637	152	99
	2000				
530390003	Wishram	May-Sept	3436	143	94
	2001				
530390003	Wishram	May-Sept	3620	151	98
	2002				
530390003	Wishram	May-Sept	3212	134	87
530410007	White Pass	July-Sept	1544	64	75

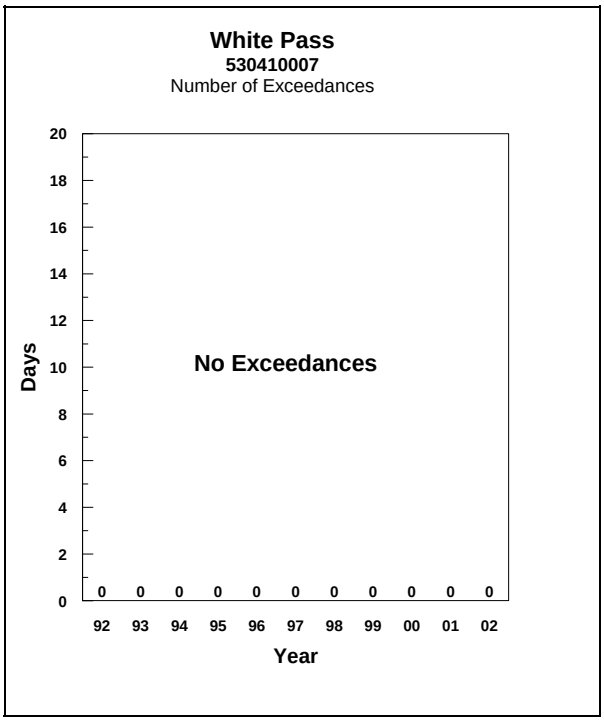
Central Area (concluded)

Ozone









Coastal Area

Particulate Matter (PM_{10})

PM_{10} Annual Arithmetic Means ($\mu g/m^3$)

Station	Location	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
530670013	Lacey	26	27	19	19	16	18	15	14	15	16	16

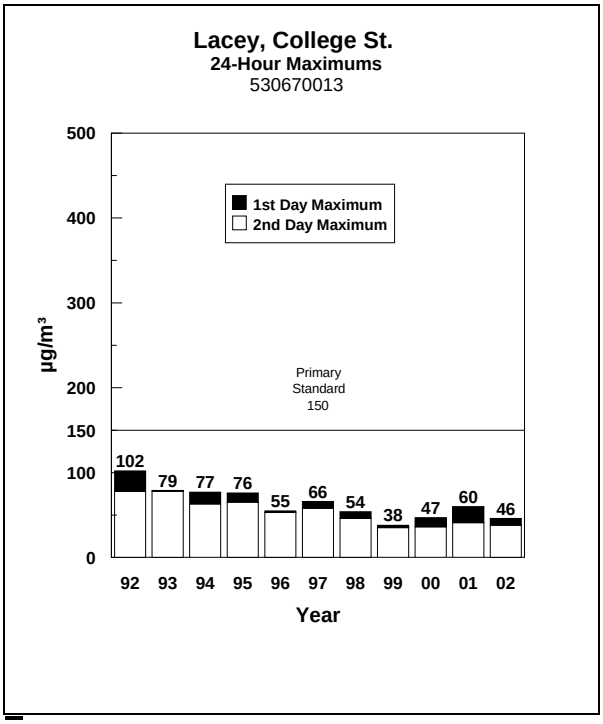
PM_{10} for 1999 - 2002 ($\mu g/m^3$)

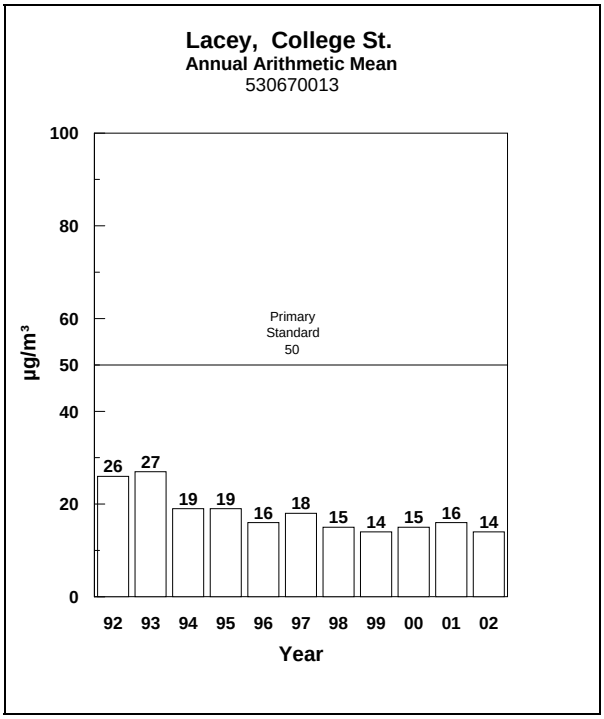
Station	Location		1st High Conc.	Date	2nd High Conc.	Date
530670013	Lacey, College St.	**1999**	38	11/02	35	10/21
530670013	Lacey, College St.	**2000**	47	11/20	36	02/18
530670013	Lacey, College St.	**2001**	60	12/25	41	01/07
530670013	Lacey, College St.	**2002**	46	11/04	38	03/03

PM_{10} for 1999 - 2002

Station	Location		Period of Record	Sampling Freq.	# Samples	% Valid Data
530670013	Lacey, College St.	**1999**	Jan-Dec	1/6	60	100
530670013	Lacey, College St.	**2000**	Jan-Dec	1/6	60	98
530670013	Lacey, College St.	**2001**	Jan-Dec	1/6	62	100
530670013	Lacey, College St.	**2002**	Jan-Dec	1/6	60	98

Conc. = Concentrations Freq. = Frequency





Coastal Area (cont)

Particulate Matter ($PM_{2.5}$)

$PM_{2.5}$ Annual Arithmetic Means ($\mu g/m^3$)

Station	Location	1994	1995	1996	1997	1998	1999	2000	2001	2002
530670013	Lacey, College St.						9.2	10.3	9.6	9.5
530450004	Shelton Mt View								7.0	6.2
530410006	Centralia College							9.0	11.3	
530090009	Pt. Angeles							11	13	

$PM_{2.5}$ for 1999 - 2002 ($\mu g/m^3$)

Station	Location		1st Conc.	Date	2nd Conc.	Date
530670013	Lacey, College St	**1999**	53.3	01/03	31.9	11/02
530670013	Lacey, College St	**2000**	46.3	11/17	41.5	11/20
530670013	Lacey, College St	**2001**	45.6	12/24	40.8	01/07
530670013	Lacey, College St	**2002**	49.1	07/04	41.2	11/04
530450004	Shelton, Mt View	**2001**	26.9	12/25	19.6	12/30
530450004	Shelton, Mt View	**2002**	16.2	02/13	13.6	01/29
530410006	Centralia College	**2000**	34.6	11/20	24.2	02/18
530410006	Centralia College	**2001**	26.3	01/07	19.2	02/12
530090009	Port Angeles, Stevens Sh	**2000**	33.3	02/18	25.5	02/06
530090009	Port Angeles, Stevens Sh	**2001**	27.4	02/12	22.4	02/18

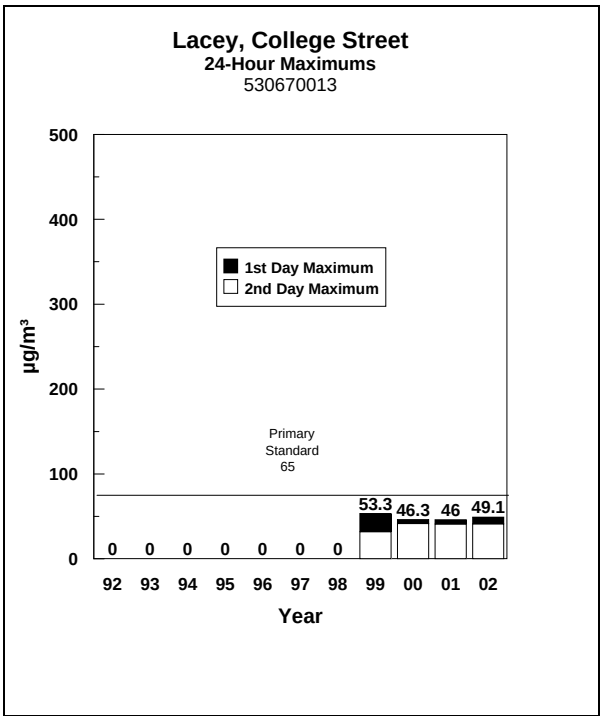
$PM_{2.5}$ for 1999 - 2002

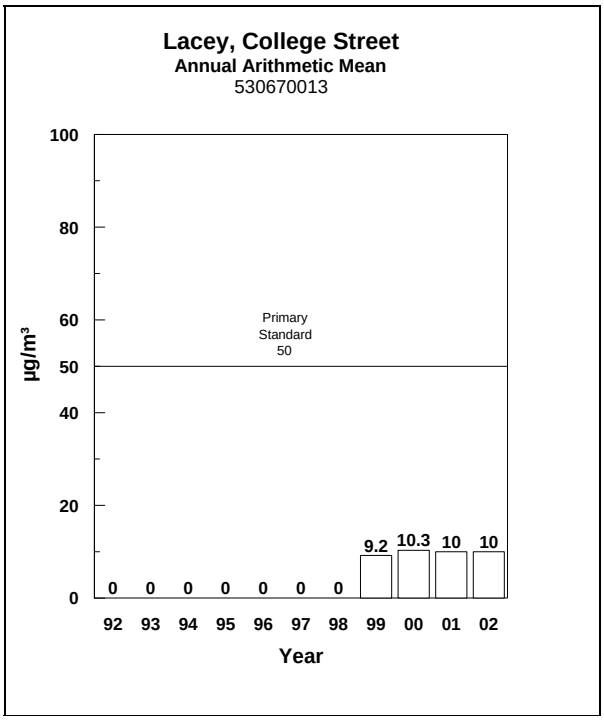
Station	Location		Period of Record	Sampling Freq.	#Samples	% Valid Data
530670013	Lacey, College St	**1999**	Jan-Dec	1/3	111	92
530670013	Lacey, College St	**2000**	Jan-Dec	1/3	121	91
530670013	Lacey, College St	**2001**	Jan-Dec	1/6	62	100
530670013	Lacey, College St	**2002**	Jan-Dec	1/3	121	99
530450004	Shelton, Mt View	**2001**	Apr-Dec	1/6	41	100
530450004	Shelton, Mt View	**2002**	Jan-Aug	1/6	37	100
530410006	Centralia College	**2000**	Jan-Dec	1/6	55	92
530410006	Centralia College	**2001**	Jan-Dec	1/6	14	93
530090009	Port Angeles, Stevens Sh	**2000**	Jan-Dec	1/6	60	98
530090009	Port Angeles, Stevens Sh	**2001**	Jan-Mar	1/6	15	100

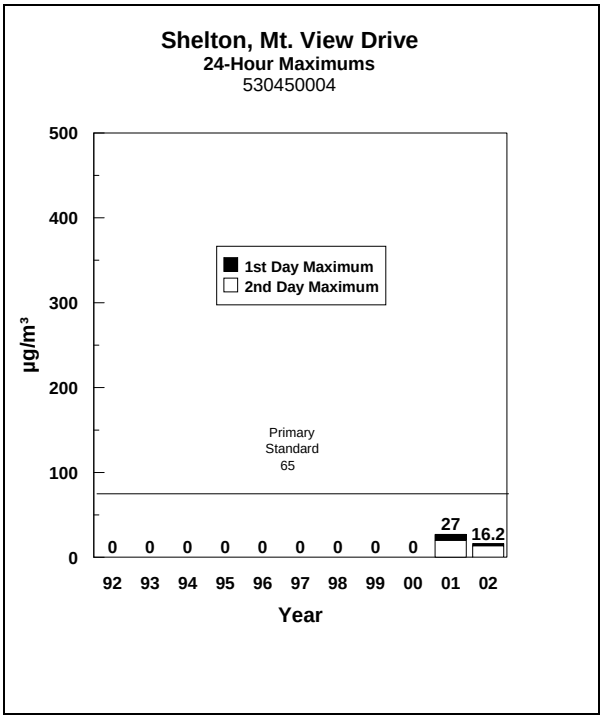
Conc. = Concentrations Freq. = Frequency

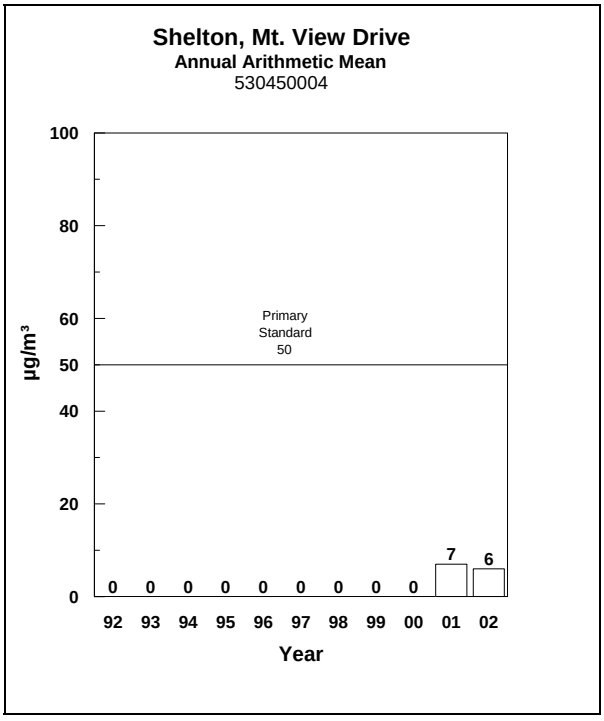
Coastal Area (cont)

Particulate Matter ($PM_{2.5}$)



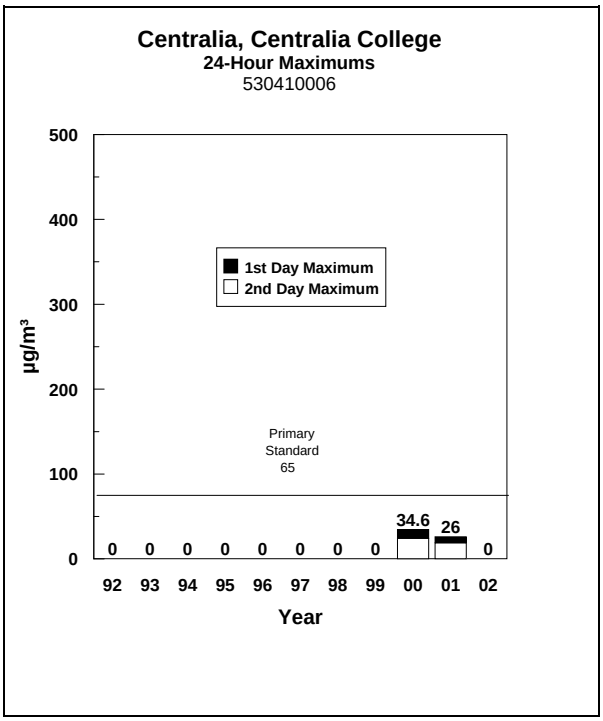


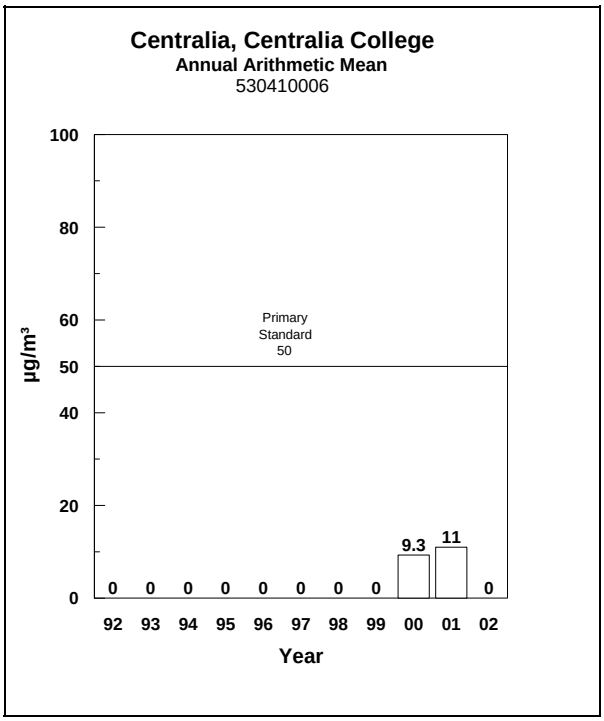


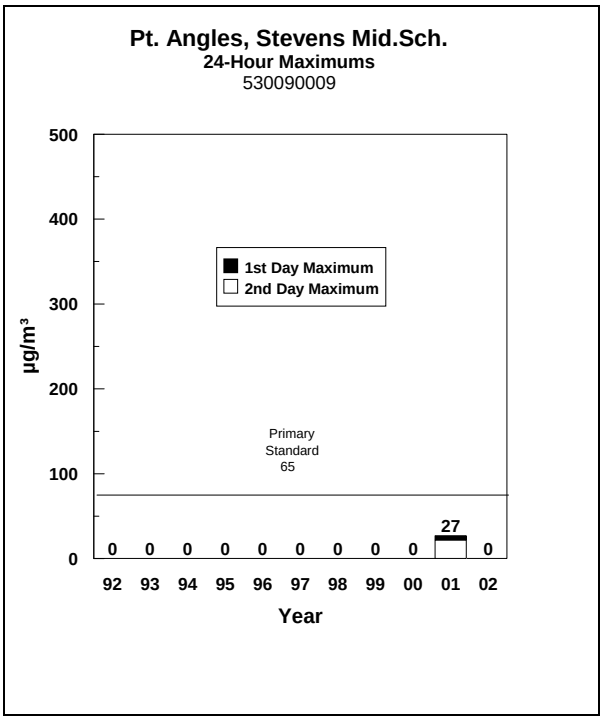


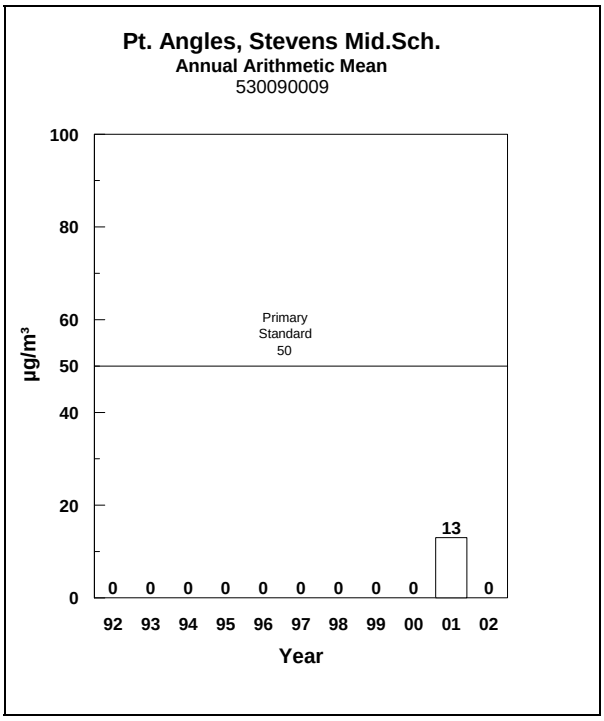
Coastal Area (cont)

Particulate Matter ($PM_{2.5}$)









Coastal Area (cont)

Carbon Monoxide

Carbon Monoxide for 1999 - 2002 (ppm)

Station	Location	1-Hr Max 1st Conc.	1-Hr Max High Date	1-Hr Max 2nd Conc.	1-Hr Max High Date	8-Hr Max 1st Conc.	8-Hr Max High Date	8-Hr Max 2nd Conc.	8-Hr Max High Date	2nd Day Conc.	2nd High* Date
	1999										
530670011	Lacey	7.3	01/03	7.3	10/21	5.1	01/03	4.8	12/28	4.8	12/28
	2000										
530670011	Lacey	10.4	11/15	8.5	11/22	6.6	11/15	6.4	11/15	5.4	01/29
	2001										
530670011	Lacey	7.4	12/22	7.4	01/26	4.81	12/22	4.6	12/24	4.6	12/24
	2002										
530670011	Lacey	5.3	02/15	5.1	02/15	3.52	01/14	3.38	02/15	3.38	02/15

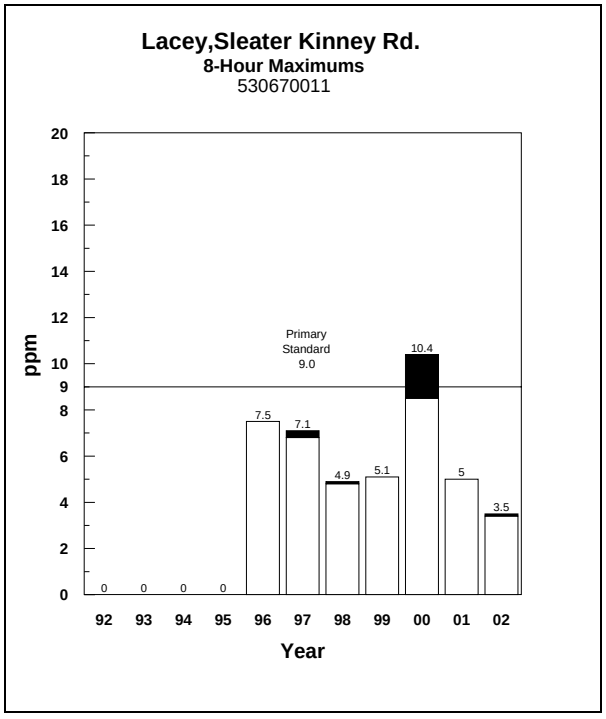
* 2nd Day High =Second day with the highest 8-hour average.
Conc. = Concentrations Max = Maximums

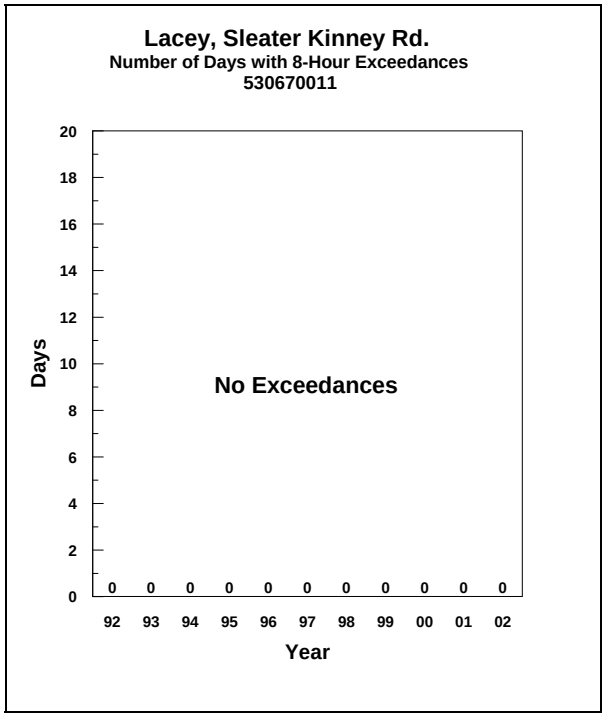
Carbon Monoxide for 1999 - 2002 (ppm)

Station	Location		Period of Record	# Hours	# Days	% Valid Data
530670011	Lacey	**1999**	Jan-May, Oct-Dec	5700	238	99
530670011	Lacey	**2000**	Jan-Dec	4783	199	99
530670011	Lacey	**2001**	Jan-Mar	4995	208	98
530670011	Lacey	**2002**	Jan-Mar	2665	111	92

Coastal Area (cont)

Carbon Monoxide





Coastal Area (cont)

Ozone

1-Hour Ozone for 1999 - 2002 (ppm)

Station	Location	1st Conc.	1 - Hr Max High Date	2nd Conc.	High Date	2nd Day Conc.	High* Date
	1999						
530670002	Yelm	.080	06/14	.076	07/10	.076	07/10
	2000						
530670002	Yelm	.086	06/27	.084	06/27	.079	06/04
	2001						
530670002	Yelm	.087	08/12	.081	08/12	.072	05/26
	2002						
530670002	Yelm	.086	06/25	.083	06/25	.076	07/23
530450005	Belfair	.084	07/10	.083	07/10	.075	06/13

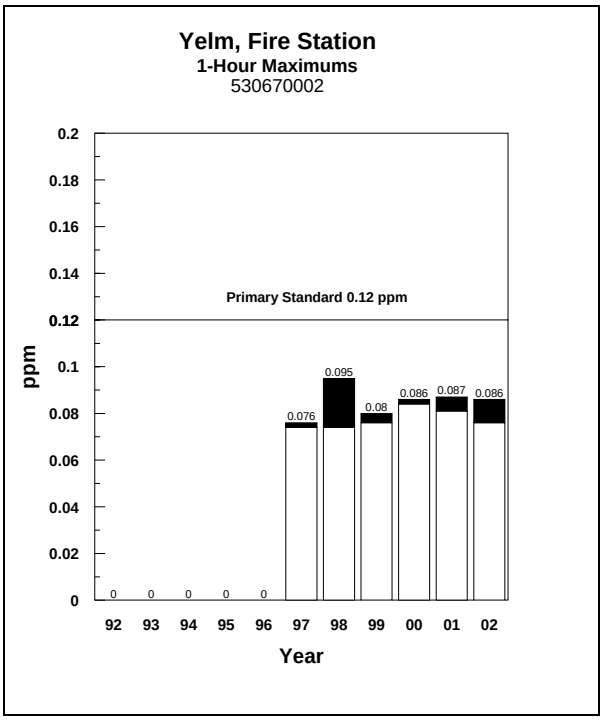
* 2nd Day High = Second day with the highest 1-hour average.
Conc. = Concentrations Max=Maximums

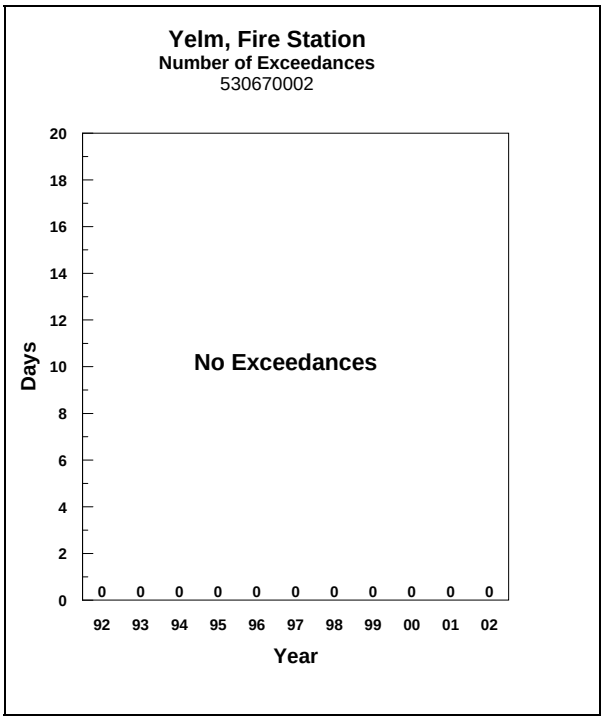
Ozone for 1999 - 2002

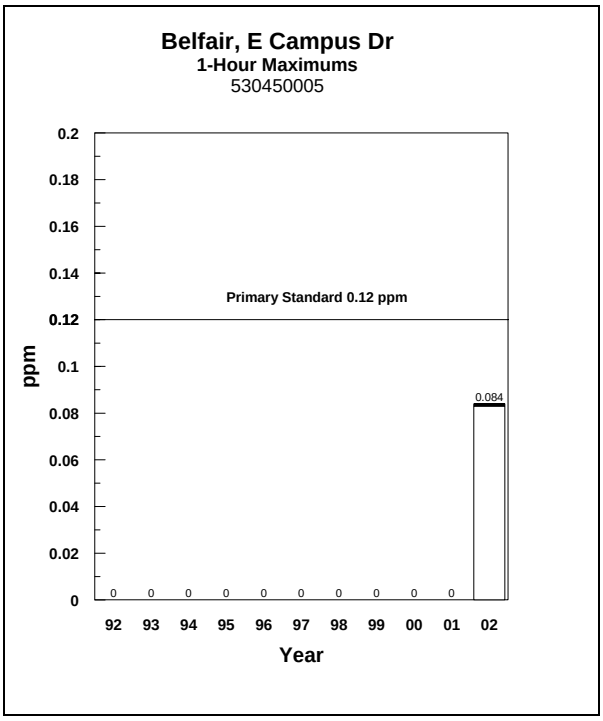
Station	Location	Period of Record	# Hours	# Days	% Valid Data
	1999				
530670002	Yelm FS	May-Sept	4008	167	99
	2000				
530670002	Yelm FS	May-Sept	3633	151	99
	2001				
530670002	Yelm FS	May-Sept	3569	149	97
	2002				
530670002	Yelm FS	May-Sept	3397	142	92
530450005	Belfair E Campus Dr	May-Sept	3470	145	94

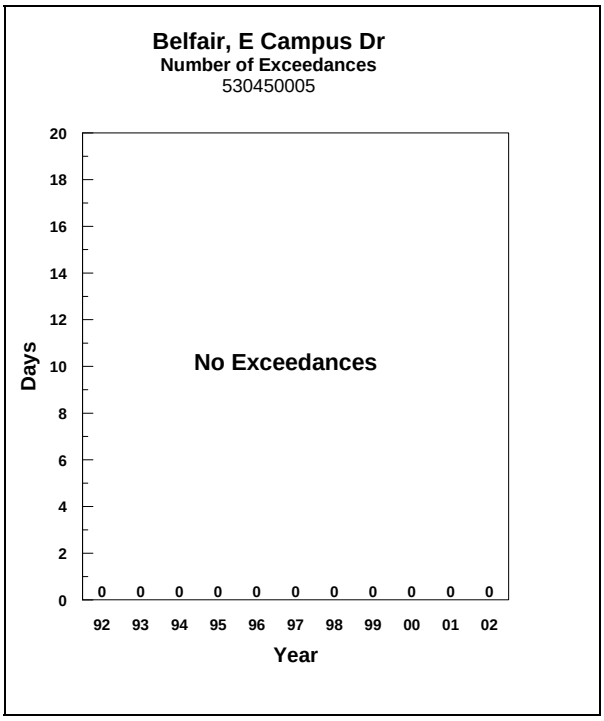
Coastal Area (concluded)

Ozone









Eastern Area

Particulate Matter (PM_{10})

PM_{10} Annual Arithmetic Means ($\mu g/m^3$)

Station	Location	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
530030004	Clarkston		43*	37	30	32	37	29	32	27	28	27
530050002	Kennewick			15*	18	21	20	18	22	24	25	23
530650004	Colville					69*	56	30	27	31	37	42
530711001	Wallula	35	38	37	28	34	38	42	40	32	29	35
530710005	Walla Walla	28	28	24	22	27*	31	24	25	24	26	25

* Average based on less than 12 months of data.

PM_{10} for 1999 - 2002 ($\mu g/m^3$)

Station	Location	1st High		2nd High	
	1999	Conc.	Date	Conc.	Date
530030004	Clarkston, STP	89	10/21	82	07/29
530050002	Kennewick, Metaline	306	07/31	184	06/21
530650004	Colville, County Courthouse	205	01/30	60	02/14
530711001	Wallula, Port	297	06/23	91	07/11
530710005	Walla Walla, FS	87	01/24	71	08/25
	2000				
530030004	Clarkston, STP	101	01/19	59	09/27
530050002	Kennewick, Metaline	230	07/31	227	06/21
530650004	Colville, County Courthouse	263	02/18	137	03/10
530711001	Wallula, Port	215	08/10	126	06/29
530710005	Walla Walla, FS	117	04/12	108	08/11
	2001				
530030004	Clarkston, STP	143	12/27	94	12/15
530050002	Kennewick, Metaline	347	03/13	284	09/25
530650004	Colville, County Courthouse	255	02/27	153	02/06
530711001	Wallula, Port	109	07/12	99	06/30
530710005	Walla Walla, FS	182	09/25	103	09/07
	2002				
530030004	Clarkston, STP	123	03/09	96	04/08
530050002	Kennewick, Metaline	186	08/16	149	05/02
530650004	Colville, County Courthouse	175	02/13	133	02/16
530711001	Wallula, Port	197	09/29	134	05/02
530710005	Walla Walla, FS	169	05/02	124	11/07

Conc. = Concentrations

Eastern Area (cont)

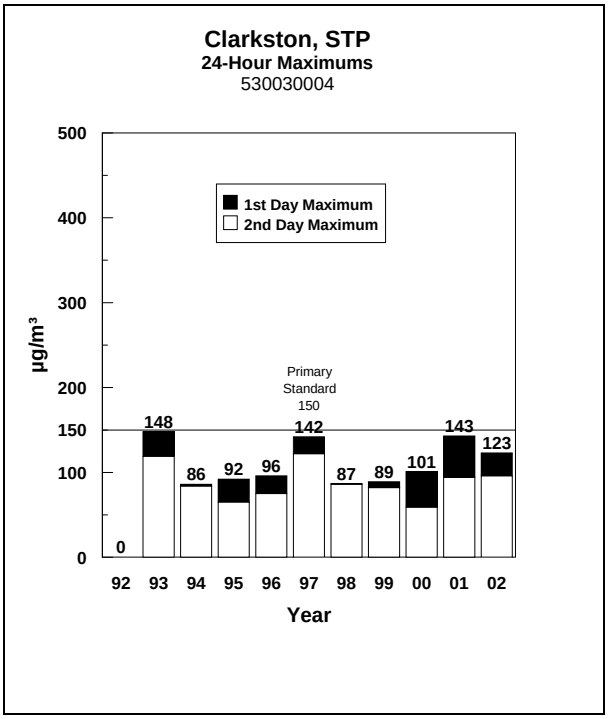
Particulate Matter (PM_{10})

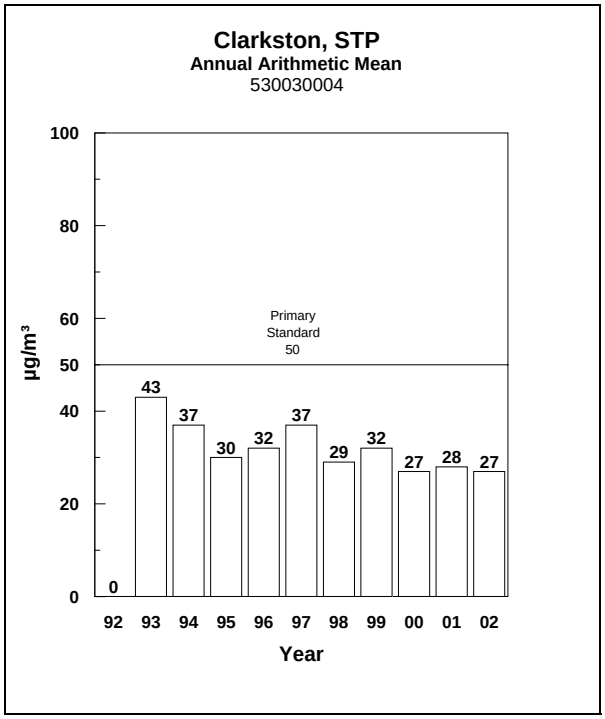
PM_{10} for 1999 – 2002

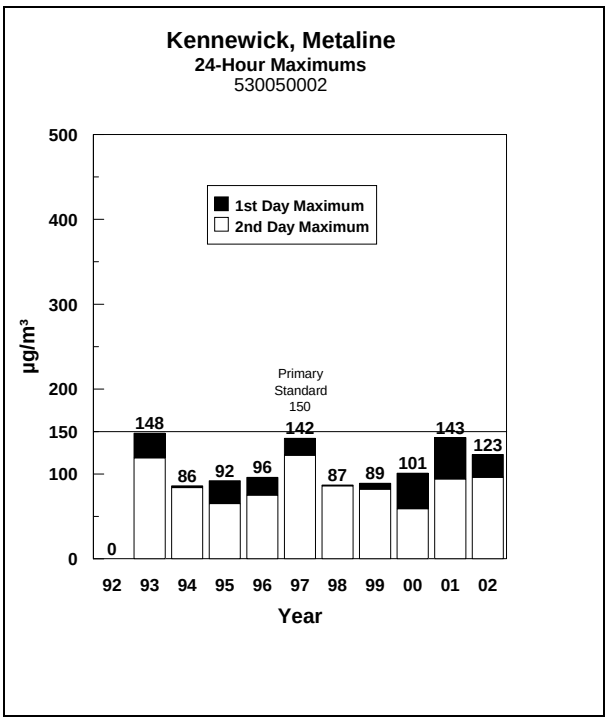
Station	Location	Period of	Sampling		% Valid
	1999	Record	Freq.	# Samples	Data
530030004	Clarkston, STP	Jan-Dec	1/6	56	93
530050002	Kennewick, Metaline	Jan-Dec	1/1	309	85
530650004	Colville, County Crthse	Jan-Dec	1/3	101	83
530711001	Wallula, Port	Jan-Dec	1/6	54	90
530710005	Walla Walla, FS	Jan-Dec	1/3	104	100
	2000				
530030004	Clarkston, STP	Jan-Dec	1/6	59	97
530050002	Kennewick, Metaline	Jan-Dec	1/1	325	89
530650004	Colville, County Crthse	Jan-Dec	1/3	108	89
530711001	Wallula, Port	Jan-Dec	1/6	61	97
530710005	Walla Walla, FS	Jan-Dec	1/3	103	94
	2001				
530030004	Clarkston, STP	Jan-Dec	1/6	54	88
530050002	Kennewick, Metaline	Jan-Dec	1/1	311	85
530650004	Colville, County Crthse	Jan-Dec	1/3	116	95
530711001	Wallula, Port	Jan-Dec	1/6	59	97
530710005	Walla Walla, FS	Jan-Dec	1/3	97	80
	2002				
530030004	Clarkston, STP	Jan-Dec	1/6	59	96
530050002	Kennewick, Metaline	Jan-Dec	1/1	338	92
530650004	Colville, County Crthse	Jan-Dec	1/3	122	100
530711001	Wallula, Port	Nov-Dec	1/6	16	100
530710005	Walla Walla, FS	Jan-Dec	1/3	108	88

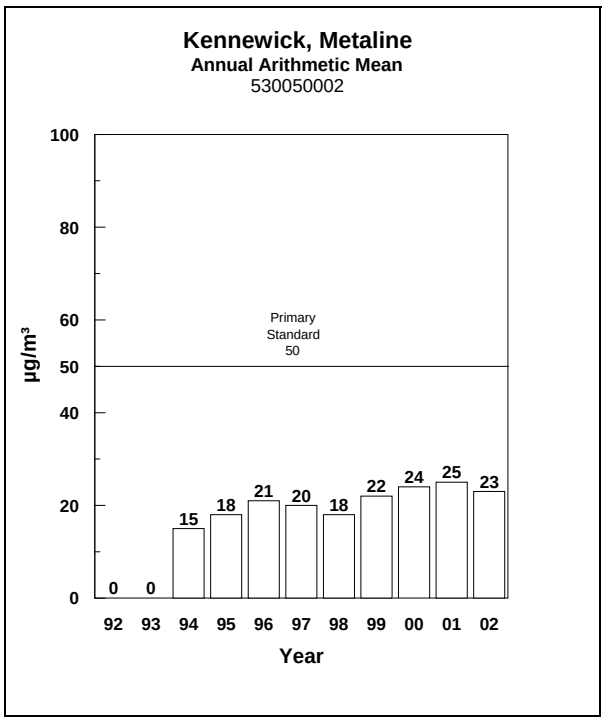
Eastern Area (cont)

Particulate Matter (PM_{10})



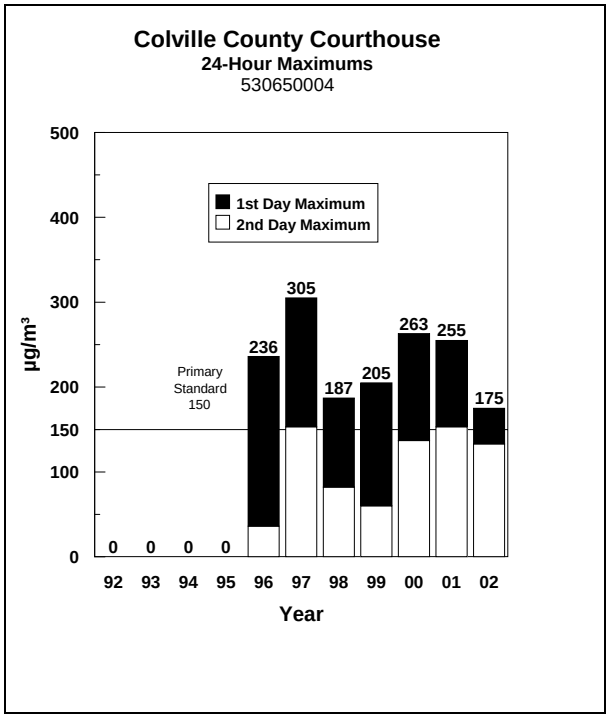


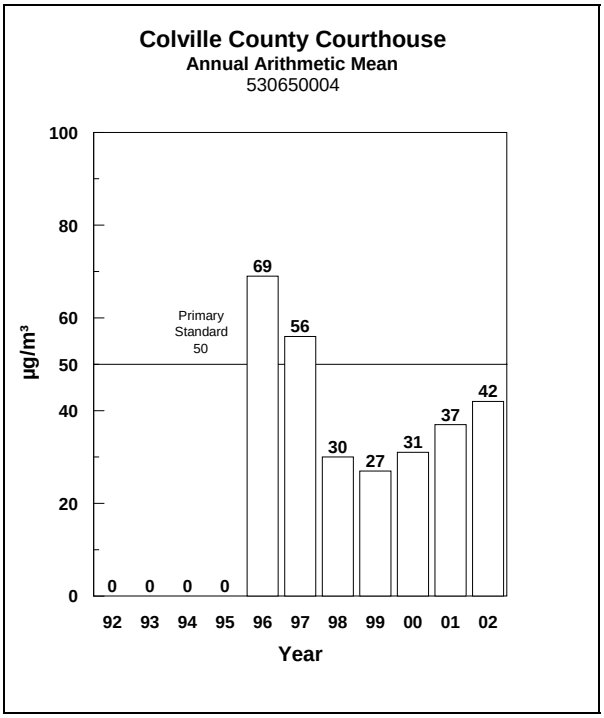


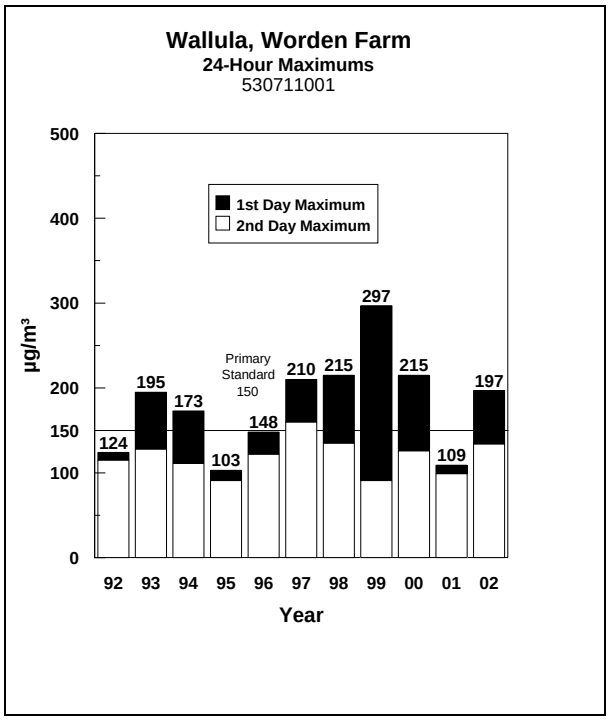


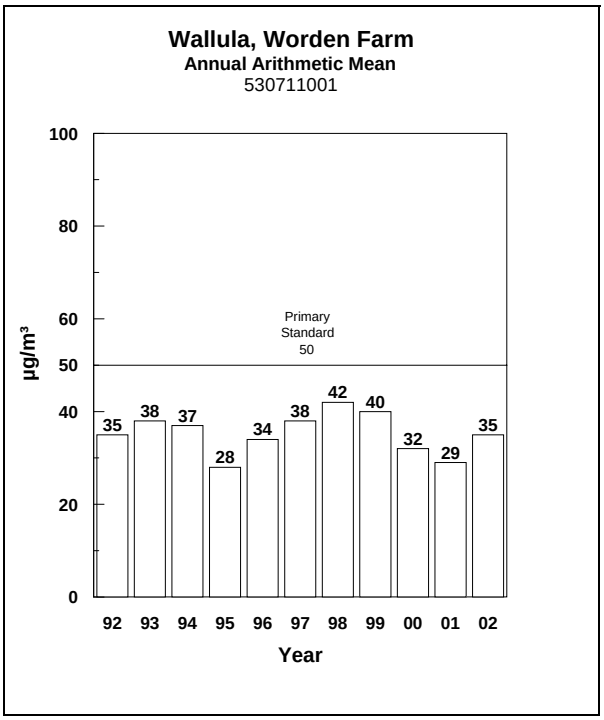
Eastern Area (cont)

Particulate Matter (PM_{10})



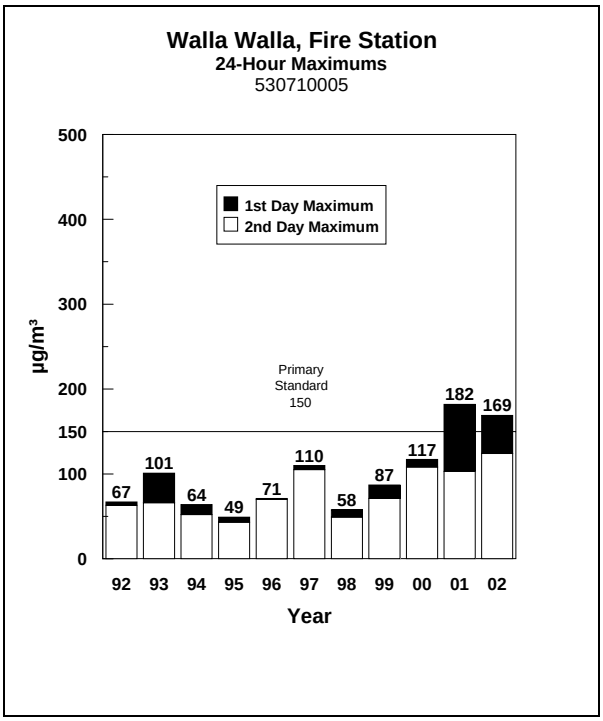


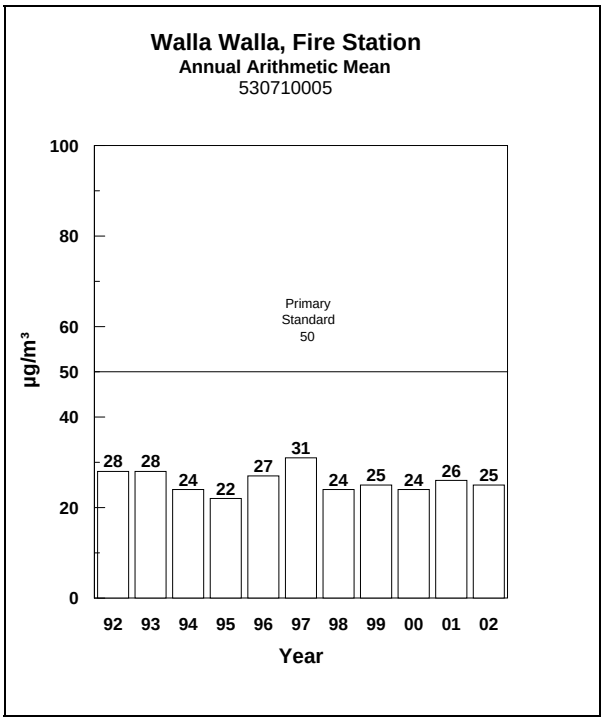




Eastern Area (cont)

Particulate Matter (PM_{10})





Eastern Area (cont)

Particulate Matter ($PM_{2.5}$)

$PM_{2.5}$ Annual Arithmetic Means ($\mu g/m^3$)

Station	Location	1994	1995	1996	1997	1998	1999	2000	2001	2002
530010003	Ritzville, West Alder							10.9	6.5	4.5
530650004	Colville, Co Crthse								8	11.9
530650009	Chewelah, Clay St								9	9.3
530710005	Walla Walla FD								7	7.2

$PM_{2.5}$ for 1999 - 2002 ($\mu g/m^3$)

Station	Location	1st High		2nd High	
	1999	Conc.	Date	Conc.	Date
	NA				
	2000				
530010003	Ritzville, West Alder	22.0	11/02	19.0	11/14
	2001				
530010003	Ritzville, West Alder	13.6	01/19	13.6	11/09
530650004	Colville, Co. Crthse	26.5	12/19	23.6	08/17
530650009	Chewelah, Clay St	32.2	11/09	21.3	08/17
530710005	Walla Walla FD	22.0	11/03	19.0	11/09
	2002				
530010003	Ritzville, West Alder	10.8	05/02	8.0	06/13
530650004	Colville, Co. Crthse	20.0	02/13	19.9	02/01
530650009	Chewelah, Clay St	16.6	01/02	15.8	02/13
530710005	Walla Walla FD	18.4	03/03	17.6	01/02

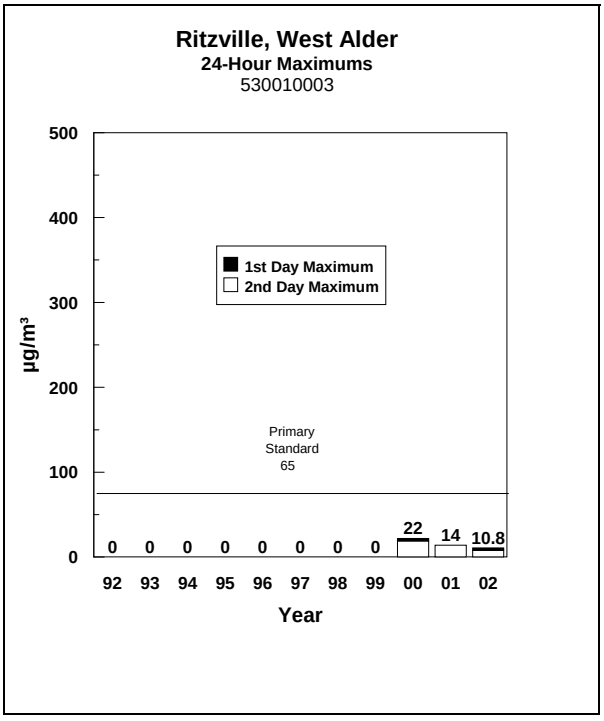
Conc. = Concentrations

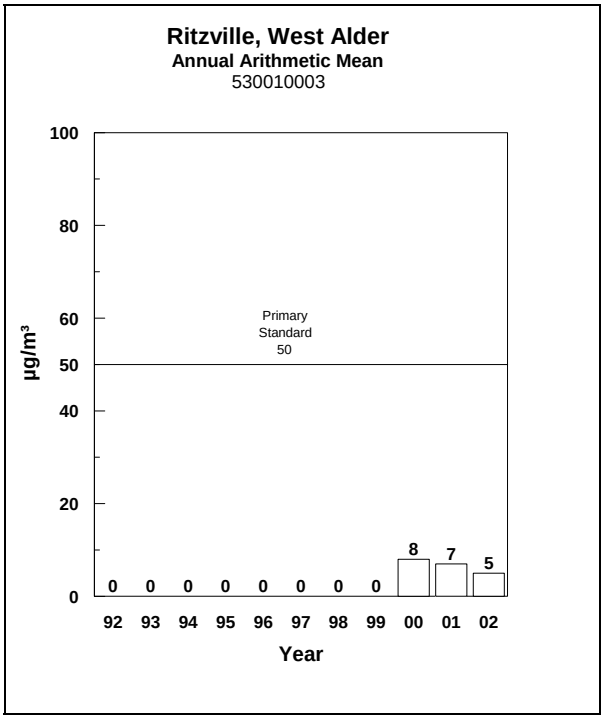
Eastern Area (cont)

Particulate Matter ($PM_{2.5}$)

$PM_{2.5}$ for 1999 - 2002

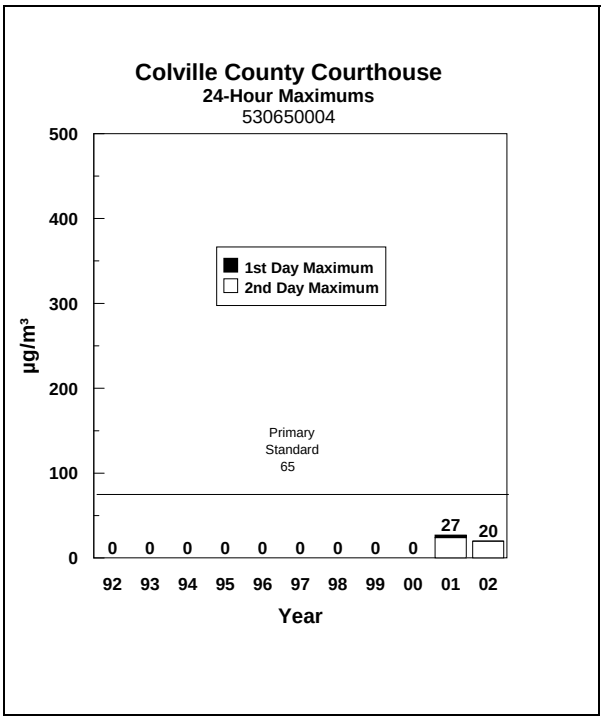
Station	Location	Period of Record	Sampling Frequency	#Samples	% Valid Data
	1999				
	NA				
	2000				
530010003	Ritzville, West Alder	Oct-Dec	1/6	11	92
	2001				
530010003	Ritzville, West Alder	Jan-Dec	1/6	56	91
530650004	Colville Co. Courthouse	Apr-Dec	1/6	41	89
530650009	Chewelah, Clay St	Apr-Dec	1/6	39	92
530710005	Walla Walla FD	Feb-Dec	1/3	42	91
	2002				
530010003	Ritzville, West Alder	Jan-Jun	1/6	30	100
530650004	Colville Co. Courthouse	Jan-Apr	1/6	20	100
530650009	Chewelah, Clay St	Jan-Apr	1/6	20	100
530710005	Walla Walla FD	Jan-May	1/3	20	74

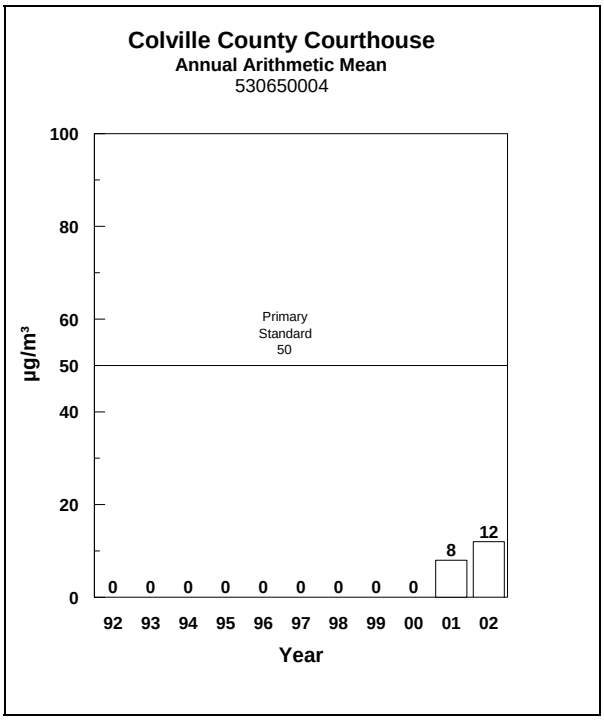


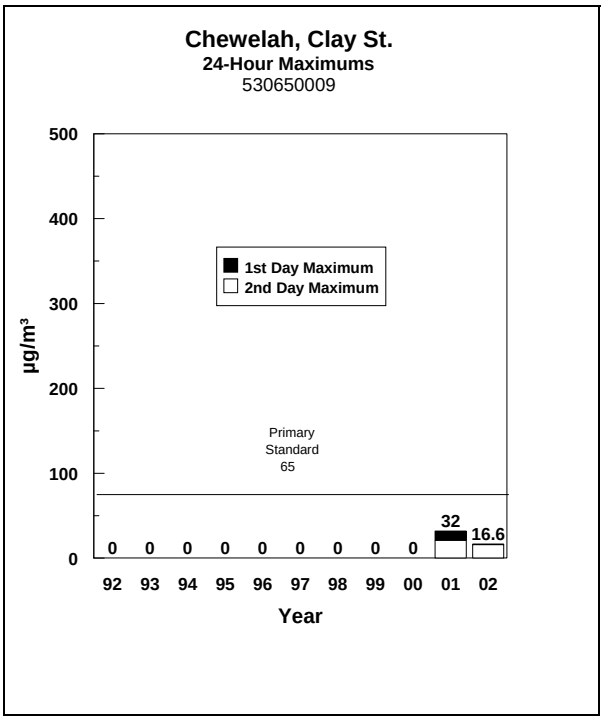


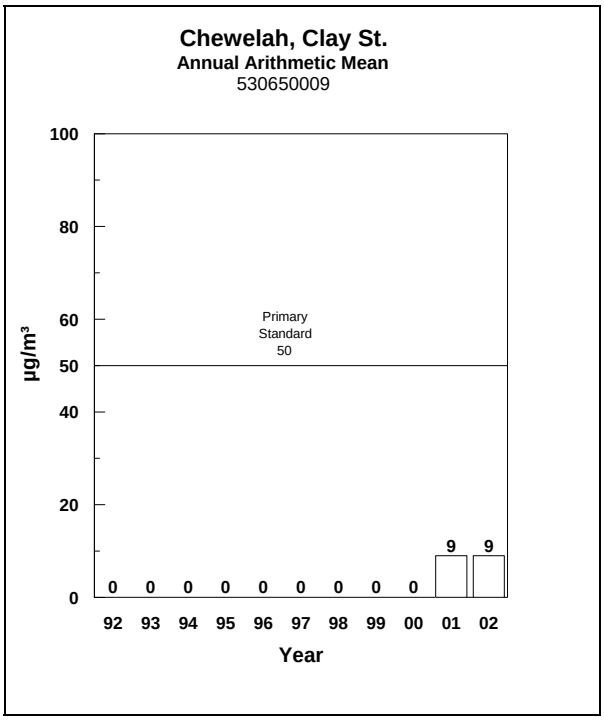
Eastern Area (concluded)

Particulate Matter ($PM_{2.5}$)









Northwest Area

Particulate Matter (PM_{10})

PM_{10} Annual Arithmetic Means ($\mu g/m^3$)

Station	Location	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
530730007	Bellingham, Iowa St.	18*	21	18*	16	15	16	13	15			
530730015	Bellingham, Yew St								14*	15	12	13

* Average based on less than 12 months of data.

PM_{10} for 1999 - 2002 ($\mu g/m^3$)

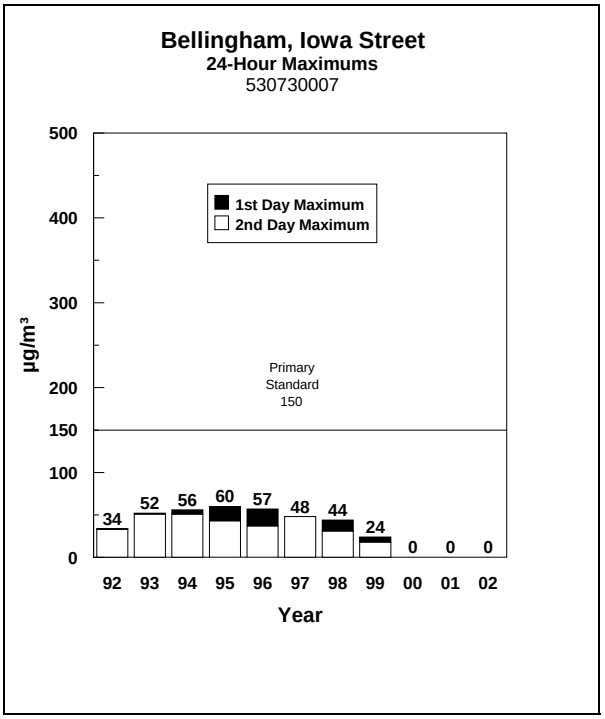
Station	Location	1st High		2nd High	
	1999	Concentration	Date	Concentration	Date
530730007	Bellingham, Iowa St.	25	09/15	22	04/18
530730015	Bellingham, Yew St	31	10/21	26	06/11
	2000				
530730015	Bellingham, Yew St	33	04/12	29	11/20
	2001				
530730015	Bellingham, Yew St	26	11/09	26	12/27
	2002				
530730015	Bellingham, Yew St	36	06/13	26	10/17

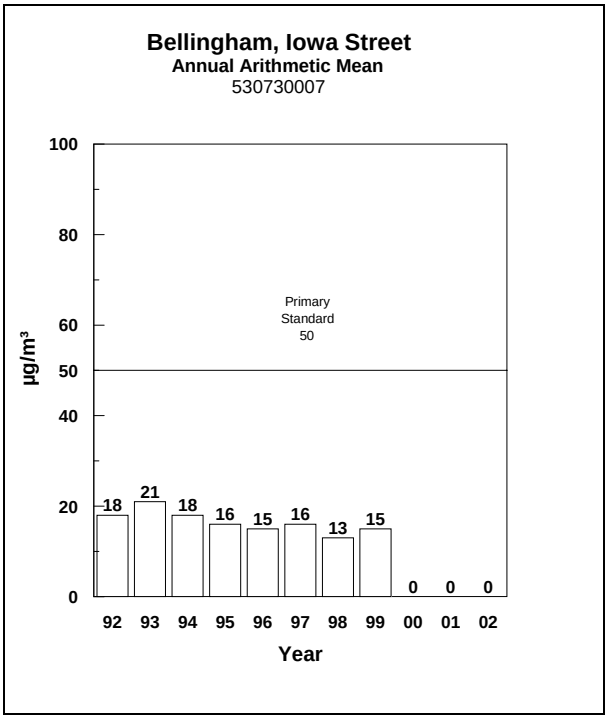
PM_{10} for 1999 - 2002

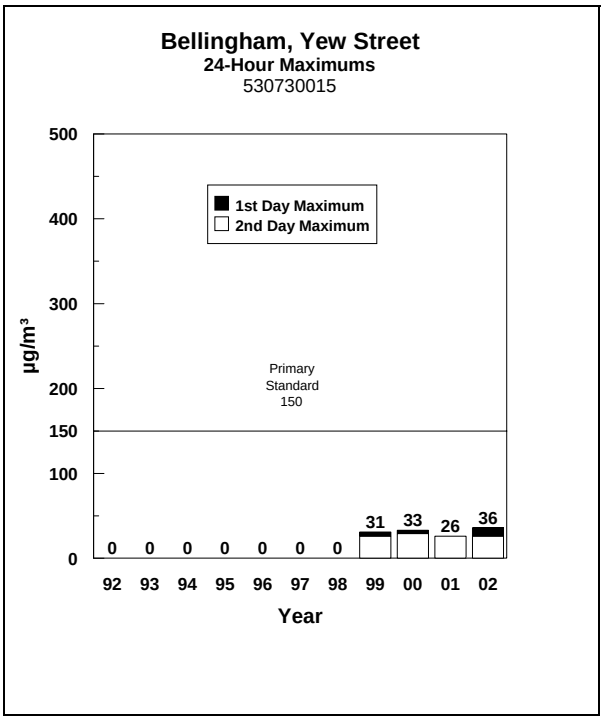
Station	Location	Period of	Sampling		% Valid
	1999	Record	Frequency	# Samples	Data
530730007	Bellingham, Iowa St.	Jan-Dec	1/6	6	100
530730015	Bellingham, Yew Street	Mar-Dec	1/6	51	100
	2000				
530730015	Bellingham, Yew Street	Jan-Dec	1/6	61	100
	2001				
530730015	Bellingham, Yew Street	Jan-Dec	1/6	60	98
	2002				
530730015	Bellingham, Yew Street	Jan-Dec	1/6	61	100

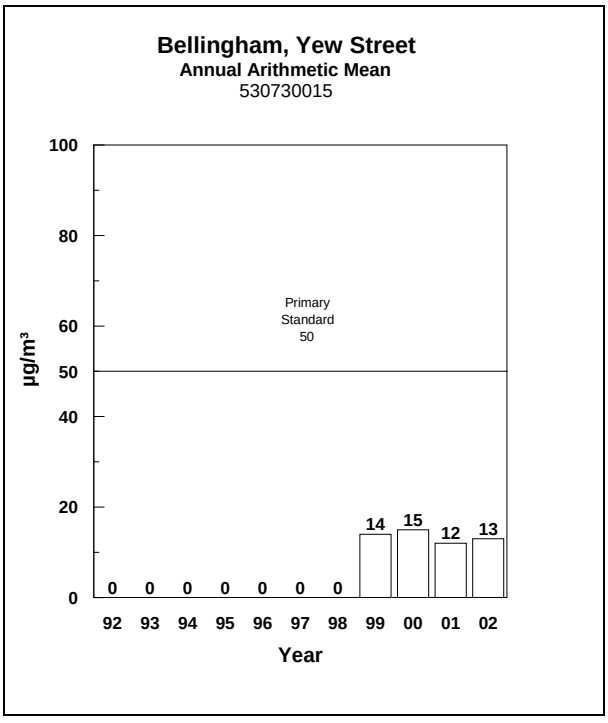
Northwest Area (cont)

Particulate Matter (PM_{10})









Northwest Area (cont)

Particulate Matter ($PM_{2.5}$)

$PM_{2.5}$ Annual Arithmetic Means ($\mu g/m^3$)

Station	Location	1994	1995	1996	1997	1998	1999	2000	2001	2002
530090009	Pt. Angeles, Stevens						13.0*	10.9	12.8	
530310003	Pt. Townsend, San Juan							9.1	8.9	
530730015	Bellingham, Yew Street						8.1	8.4	7.3	7.8

Average based on less than 12 months of data.

$PM_{2.5}$ for 1999 - 2002 ($\mu g/m^3$)

Station	Location	1st High Concentration	Date	2nd High Concentration	Date
	1999				
530090009	Pt. Angeles, Stevens	21.8	11/02	20.5	10/21
530730015	Bellingham, Yew Street	25.2	12/29	24.5	03/04
	2000				
530090009	Pt. Angeles, Stevens	33.3	02/18	25.5	02/06
530310003	Pt. Townsend, San Juan	22.0	11/02	19.0	11/14
530730015	Bellingham, Yew Street	25.6	11/11	24.3	11/17
	2001				
530730015	Bellingham, Yew Street	23.7	01/12	20.5	01/16
	2002				
530730015	Bellingham, Yew Street	26.0	10/26	24.9	11/04

Northwest Area (cont)

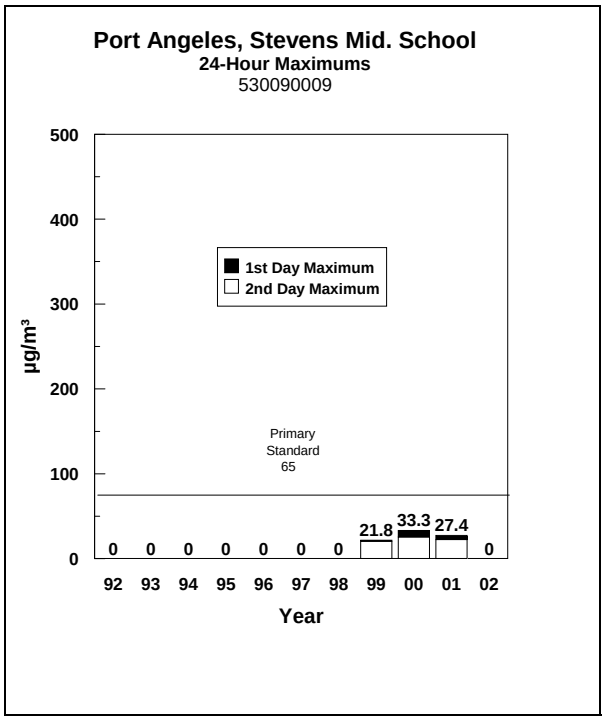
Particulate Matter ($PM_{2.5}$)

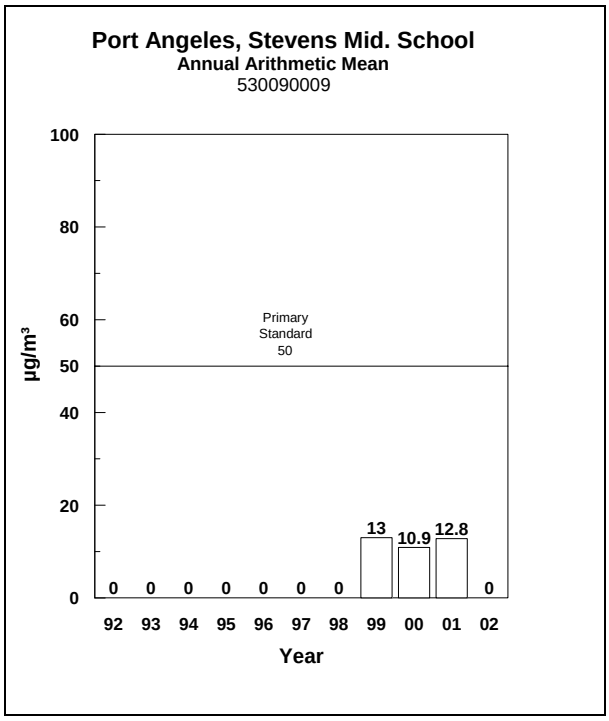
$PM_{2.5}$ for 1999 - 2002

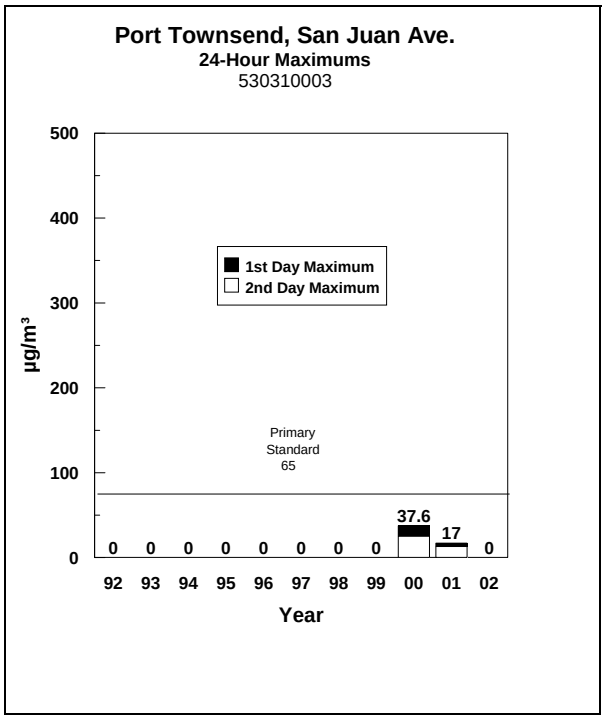
Station	Location	Period of Record	Sampling Frequency	# Samples	% Valid Data
	1999				
530090009	Pt. Angeles, Stevens	Jul-Dec	1/6	27	93
530730015	Bellingham, Yew Street	Jan-Dec	1/3	96	87
	2000				
530090009	Pt. Angeles, Stevens	Jan-Dec	1/6	60	98
530310003	Pt. Townsend, San Juan	Jan-Dec	1/6	58	97
530730015	Bellingham, Yew Street	Jan-Dec	1/3	110	90
	2001				
530730015	Bellingham, Yew Street	Jan-Dec	1/3	117	95
	2002				
530730015	Bellingham, Yew Street	Jan-Dec	1/3	122	100

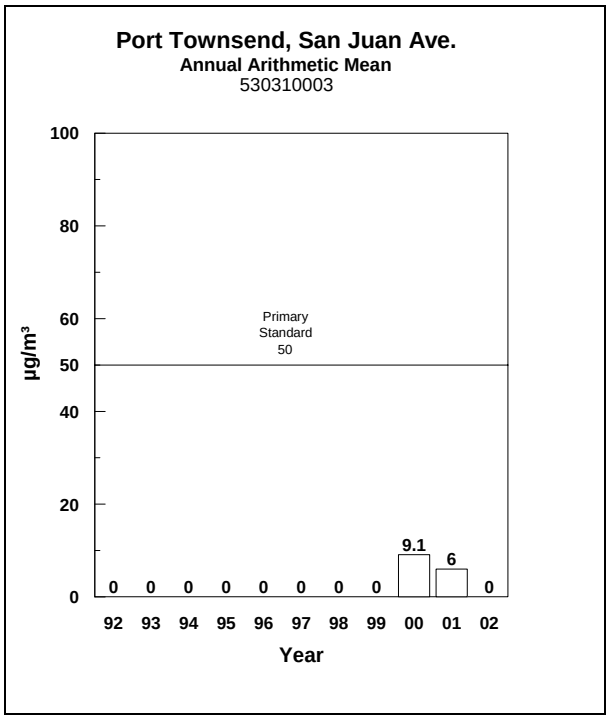
Northwest Area (cont)

Particulate Matter ($PM_{2.5}$)



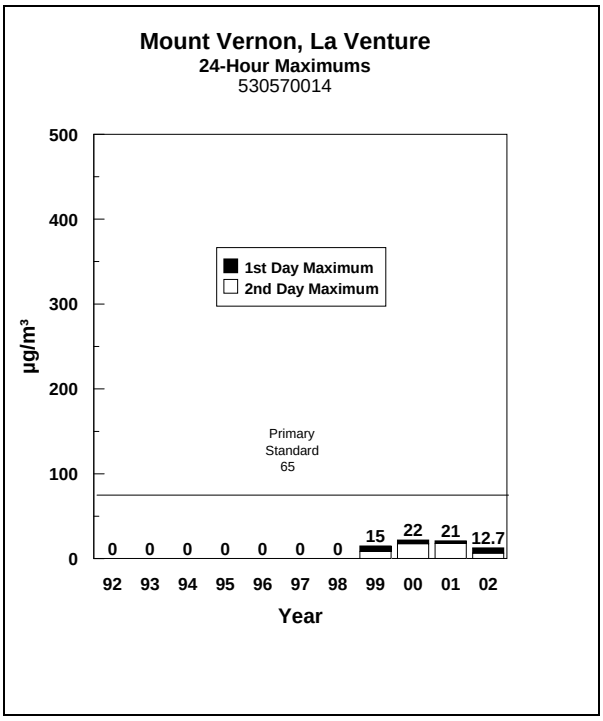


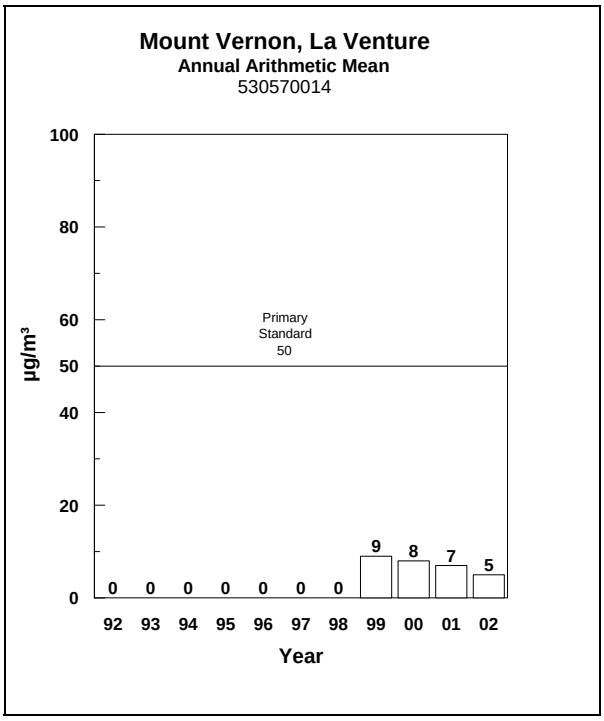




Northwest Area (cont)

Particulate Matter ($PM_{2.5}$)





Northwest Area (cont)

Sulfur Dioxide

Sulfur Dioxide for 1999 2002(ppm)

Station	1999 Location	1-Hr 1st	Maximum Date	2nd	#1Hr Date	>.40	3 Hr Max Conc.	Date	#3 Hr >.50	24-Hr Conc.	Max Date	#24 >.10	Hr >.14	Ann Mean
530570012	Anacortes, MP	.063	06/12	.06	01/02	0	.0597	06/12	0	.028	06/12	0	0	.006
530571003	Anacortes, Bar	.121	03/19	.108	03/19	0	.1123	03/19	0	.036	03/19	0	0	.006
530730011	Bellingham,	.051	05/15	.047	08/29	0	.0343	04/09	0	.016	03/26	0	0	.007

Conc. = Concentrations Ann. = Annual Max = Maximum

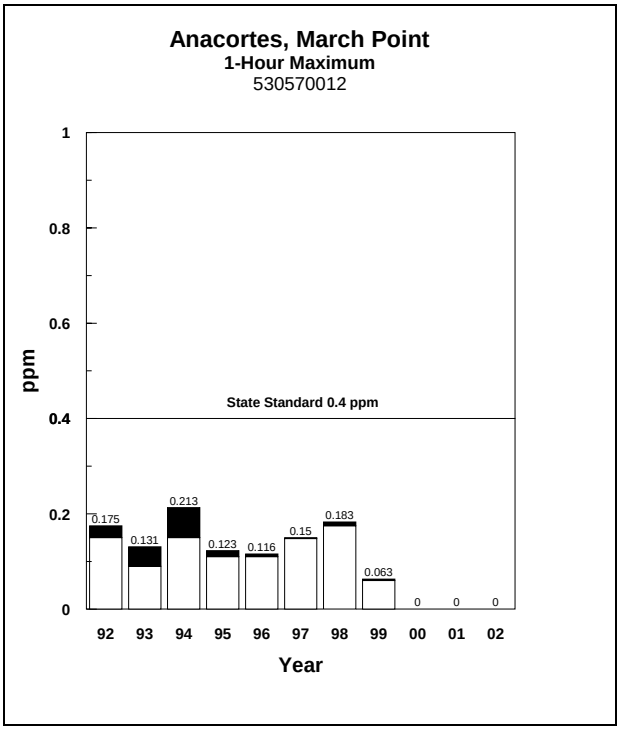
Sulfur Dioxide for 1999 2002

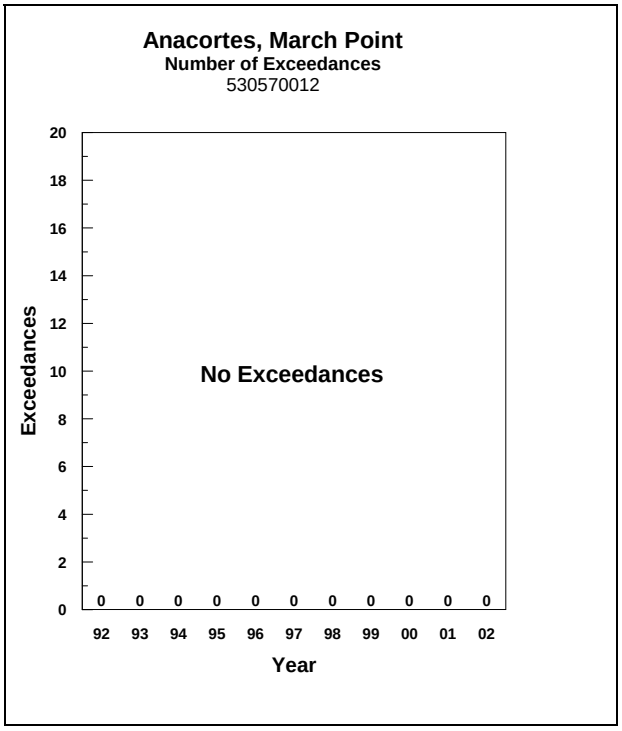
Station	1999 Location	Period of Record	# Hours	# Samples	% Valid Data
530570012	Anacortes, March Point	Jan-Sept	5940	248	91
530571003	Anacortes, Bartholomew	Jan-Sept	6463	269	99
530730011	Bellingham, Chestnut St.	Jan-Sept	4618	192	71

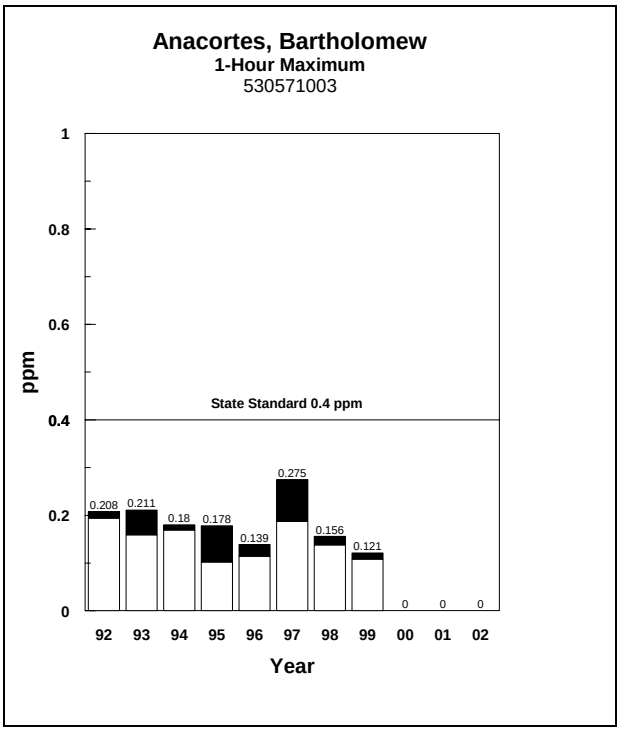
Note: No Sulfur Dioxide reported for Year 2000/2002 as none of these areas were being monitored.

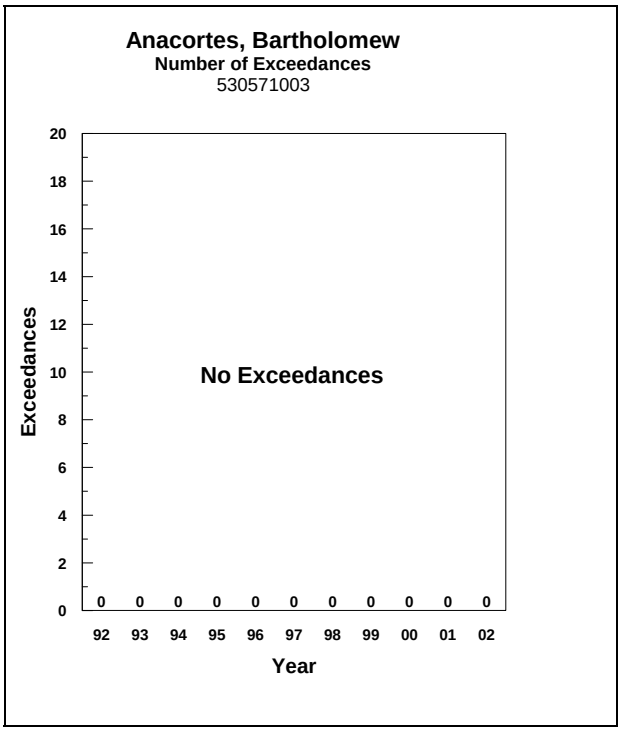
Northwest Area (cont)

Sulfur Dioxide



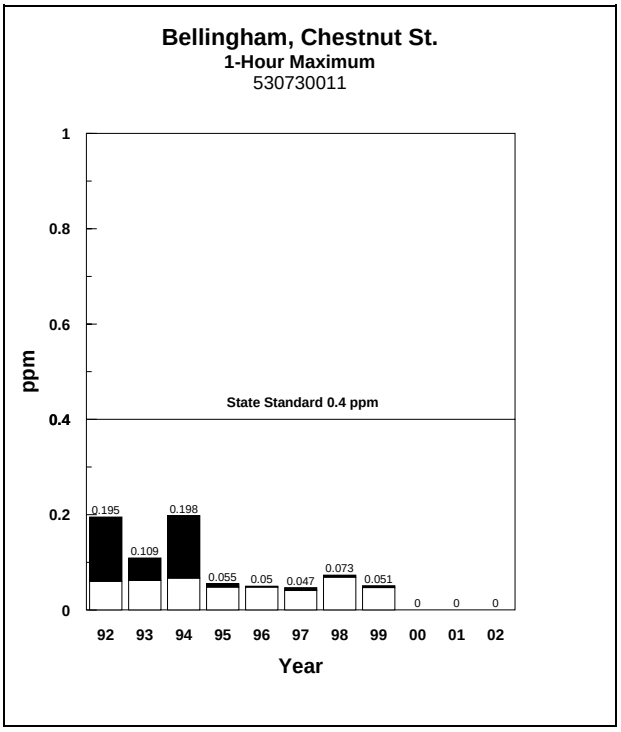


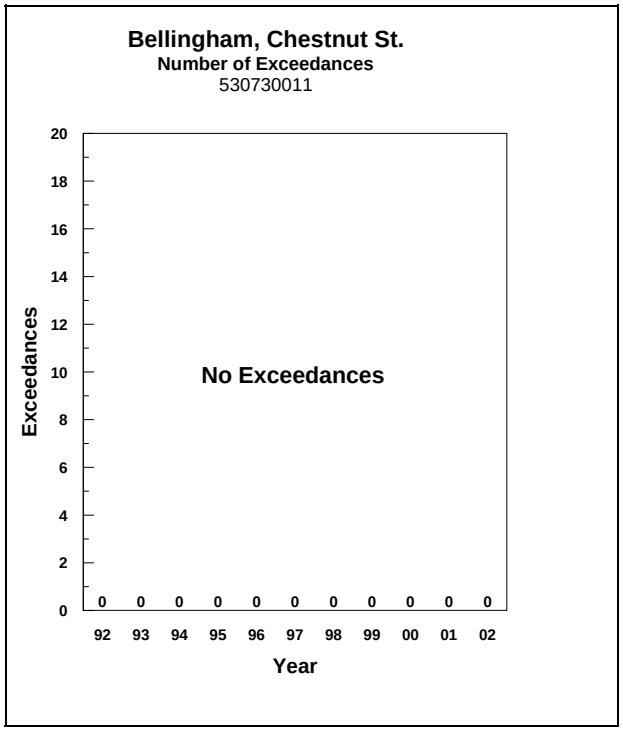




Northwest Area (concluded)

Sulfur Dioxide





Puget Sound Area

Particulate Matter (PM_{10})

PM_{10} Annual Arithmetic Means (μgm^3)

Station	Location	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
530330004	Bellevue, Bellevue Wy	23	20	18	16	16	17	15	12	27		
530332004	Kent, Central & James	33	28	25	23	23	23	20	18	20	28	18
530330024	Lk. Forest Park	26	28	20	20	21	19	15	18*	17*	14	
530330057	Seattle, Duwamish	38	35	28	28	27	31	25	23	27	23	23
530330020	SeaTac, North							15*	11*			
530330021	Seattle, South Park							15*	17*			
530330022	SeaTac, South							15*	10*	23		
530351005	Kitsap, Meadowdale	23	23	20	20	17	17	13	15			
530531018	Puyallup, South Hill	29	24	20	19	23	20	15	17			
530530031	Tacoma, 11th Street	36	33	27	27	25	27	20	23*	28	20	21
530531004	Tacoma, 54th Ave. NE	35	26	23	18	18	20	18	21	25		
530530021	Tacoma, Alex. Ave.	31	28	23	26	23	27	21	18			
530610018	Lynnwood, 59th Place			22*	16	15	16	12	12*			
530611007	Marysville, J.H.S.	26	27	21	22	19	19	15	16	20	16	

* Average based on less than 12 months of data.

Puget Sound Area (cont)

Particulate Matter (PM_{10})

PM_{10} for 1999 - 2002 (μgm^3)

Station	Location	1st High		2nd High	
	1999	Concentration	Date	Concentration	Date
530330004	Bellevue, Bellevue Way	89	10/21	82	07/29
530332004	Kent, Central & James	51	10/21	51	12/29
530330024	Lake Forest Park	34	12/26	31	10/21
530330057	Seattle, Duwamish	53	050/6	53	10/20
530330020	Sea Tac, North	21	03/07	19	05/24
530330021	Seattle, South Park	29	05/06	28	03/19
530330022	Sea Tac, South	20	04/24	19	03/19
530351005	Kitsap Co., Meadowdale	34	11/02	33	01/24
530531018	Puyallup, South Hill	53	02/11	43	10/21
530530031	Tacoma, Alexander Ave.	52	10/21	40	07/05
530531004	Tacoma, 11th Street	50	06/11	42	09/03
530530021	Tacoma, 54th Ave. NE.	72	09/21	61	09/22
530610018	Lynnwood, 59th Place	27	03/07	25	01/24
530611007	Marysville Jr.HS	42	10/21	35	09/21
	2000				
530332004	Kent, Central & James	34	01/19	22	01/13
530330024	Lake Forest Park	40	02/18	34	04/12
530330057	Seattle, Duwamish	73	04/12	66	09/27
530531018	Puyallup, South Hill	46	02/18	45	11/20
530530031	Tacoma, Alexander Ave.	67	11/20	57	04/12
530531004	Tacoma, 11th Street	68	11/20	58	04/12
530611007	Marysville Jr.HS	47	02/18	47	11/14
	2001				
530332004	Kent, Central & James	50	11/04	44	02/03
530330024	Lake Forest Park	34	02/12	29	01/20
530330057	Seattle, Duwamish	71	11/04	57	02/13
530530031	Tacoma, Alexander Ave.	98	05/02	68	11/04
	2002				
530332004	Kent, Central & James	50	11/04	44	02/13
530330057	Seattle, Duwamish	73	11/09	71	12/27
530530031	Tacoma, Alexander Ave.	58	12/27	53	11/09

Puget Sound Area (cont)

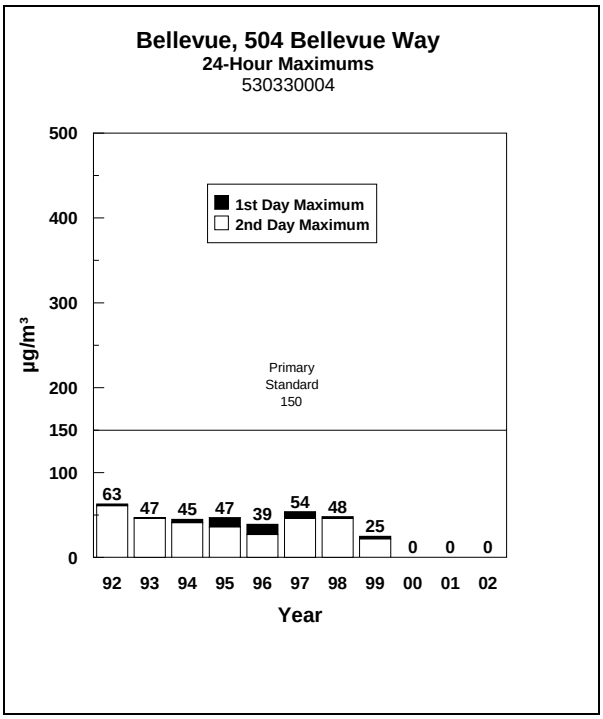
Particulate Matter (PM_{10})

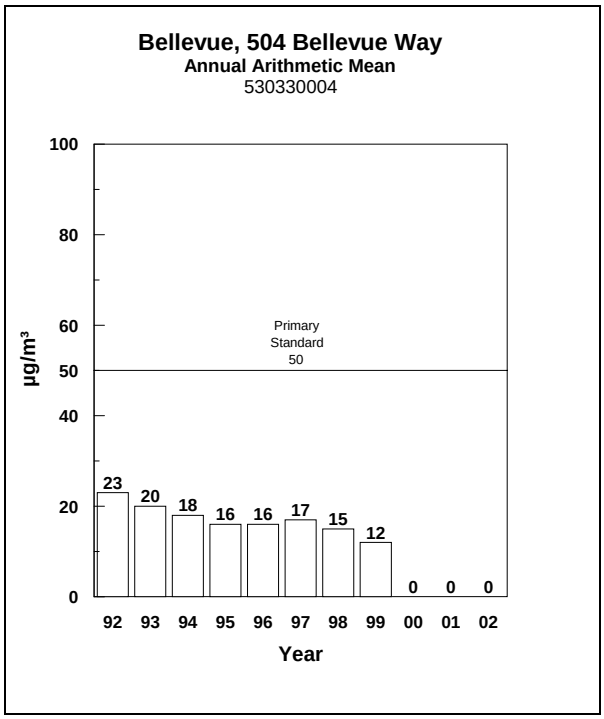
PM_{10} for 1999 - 2002

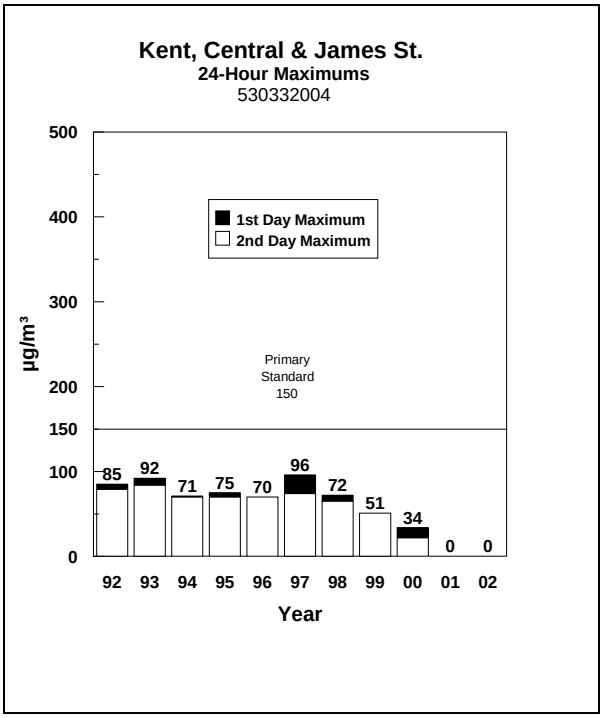
Station	Location	Period of Record	Sampling Frequency	# Samples	% Valid Date
	1999				
530330004	Bellevue, Bellevue Way	Jan-Dec	1/6	42	91
530332004	Kent, Central & James	Jan-Dec	1/6	52	87
530330024	Lake Forest Park	Aug-Dec	1/6	25	100
530330057	Seattle, Duwamish	Jan-Dec	1/6	60	100
530330020	Sea Tac, North	Jan-May	1/6	24	96
530330021	Seattle, South Park,	Jan-May	1/6	22	100
530330022	Sea Tac, South	Jan-June	1/6	23	88
530351005	Kitsap Co., Meadowdale	Jan-Dec	1/6	56	93
530531018	Puyallup, South Hill	Jan-Dec	1/6	60	100
530531004	Tacoma, 11th Street	Jan-Dec	1/6	58	97
530530021	Tacoma, 54th Ave. NE	Jan-Sep	1/6	44	98
530530031	Tacoma, Alexander Ave.	Jan-Dec	1/6	50	83
530610018	Lynnwood, 59th Place	Jan-May	1/6	21	100
530611007	Marysville Jr.HS	Jan-Dec	1/6	58	97
	2000				
530332004	Kent, Central & James	Jan-Jan	1/6	5	100
530330024	Lake Forest Park	Aug-Dec	1/6	57	93
530330057	Seattle, Duwamish	Jan-Dec	1/6	61	100
530531018	Puyallup, South Hill	Jan-Dec	1/6	60	98
530531004	Tacoma, 11th Street	Jan-Dec	1/6	61	100
530530031	Tacoma, Alexander Ave.	Jan-Dec	1/6	59	97
530611007	Marysville Jr.HS	Jan-Dec	1/6	51	98
	2001				
530332004	Kent, Central & James	Feb-Dec	1/6	52	96
530330024	Lake Forest Park	Jan-Dec	1/3	45	98
530330057	Seattle, Duwamish	Jan-Dec	1/6	55	90
530530031	Tacoma, Alexander Ave.	Jan-Dec	1/6	60	98
	2002	Period of			
530332004	Kent, Central & James	Jan-Dec	1/6	61	100
530330057	Seattle, Duwamish	Jan-Dec	1/6	61	100
530530031	Tacoma, Alexander Ave.	Jan-Dec	1/6	60	98

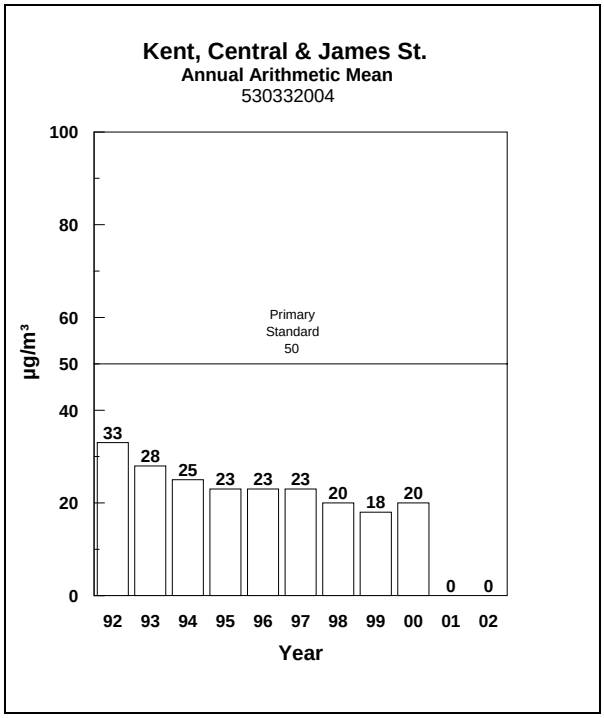
Puget Sound Area (cont)

Particulate Matter (PM_{10})



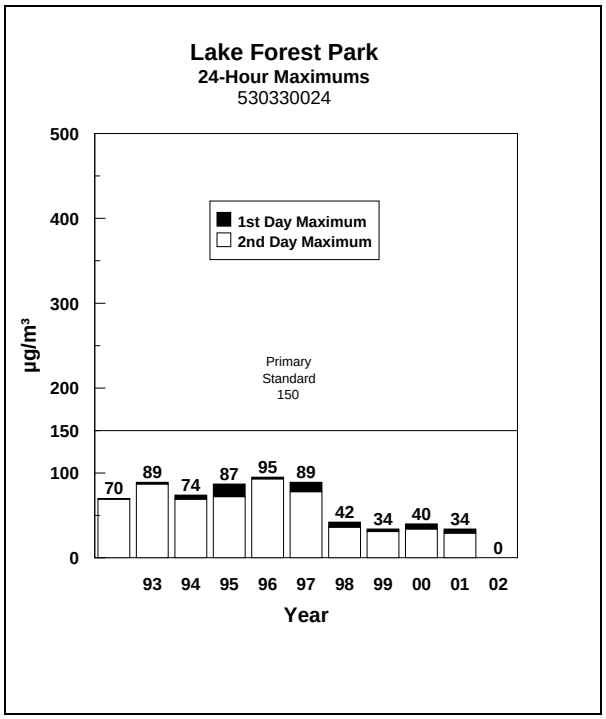


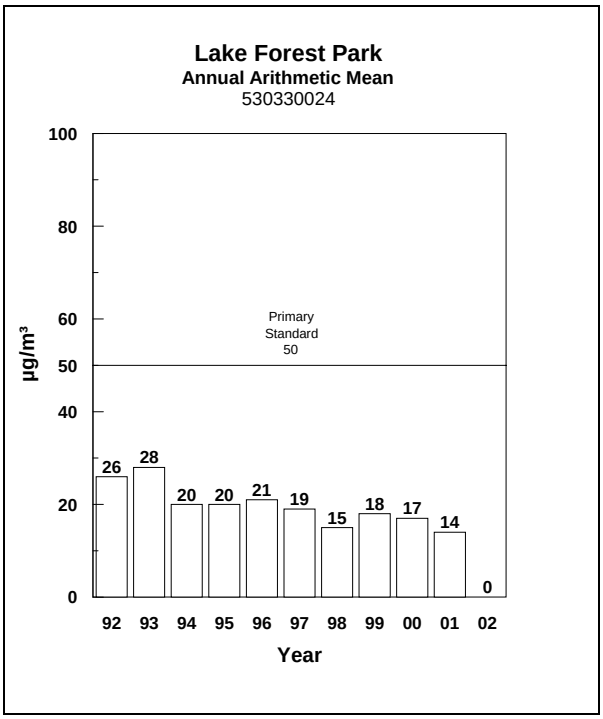


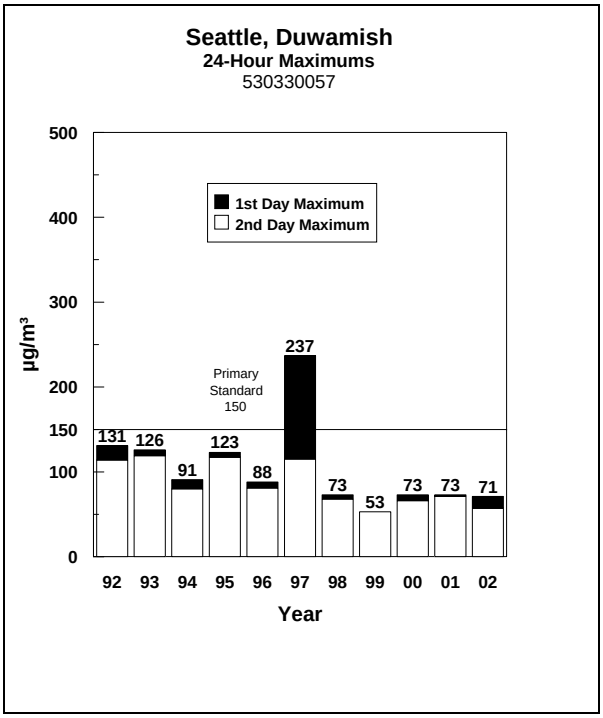


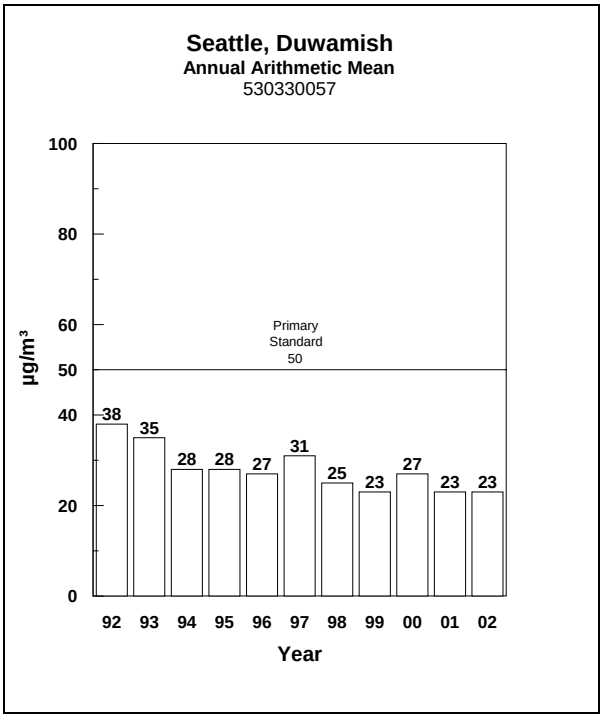
Puget Sound Area (cont)

Particulate Matter (PM_{10})



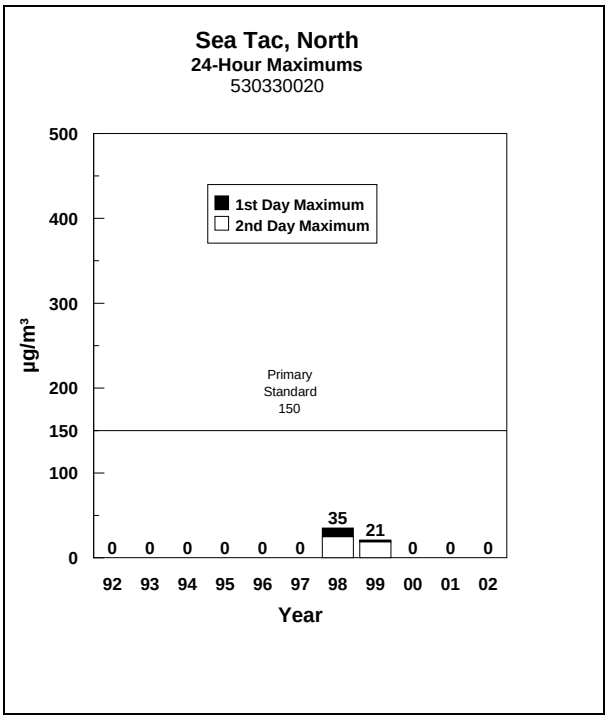


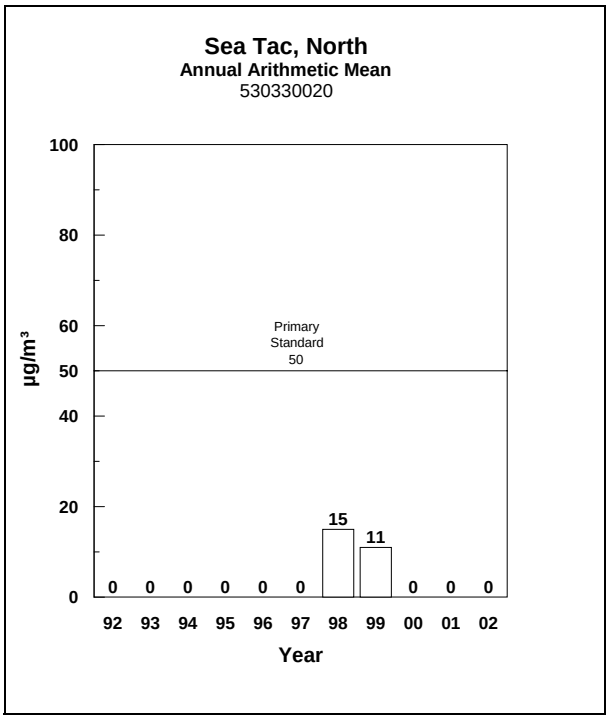


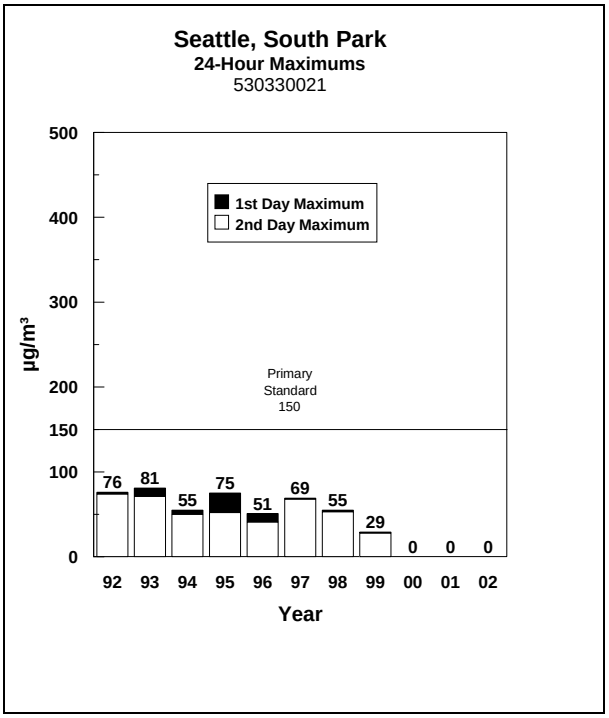


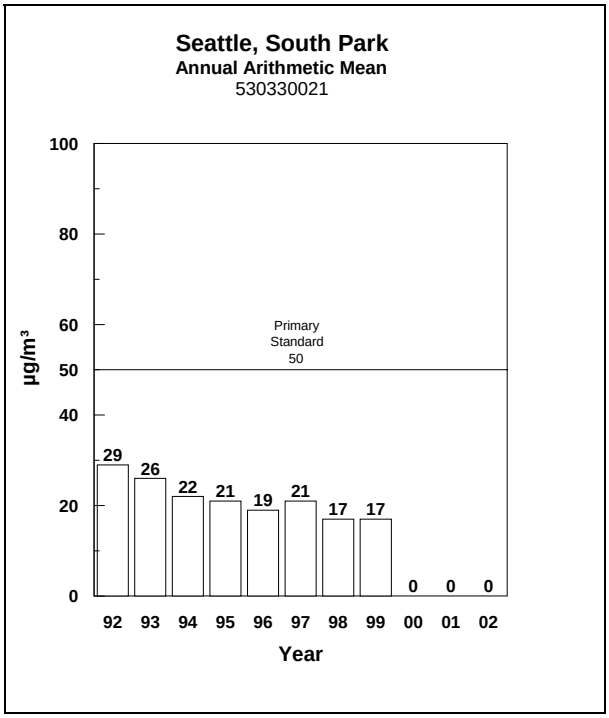
Puget Sound Area (cont)

Particulate Matter (PM_{10})



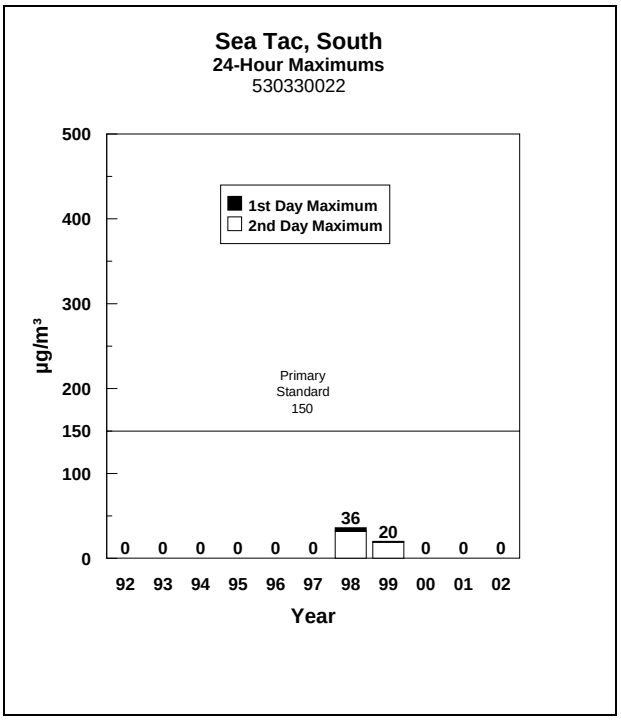


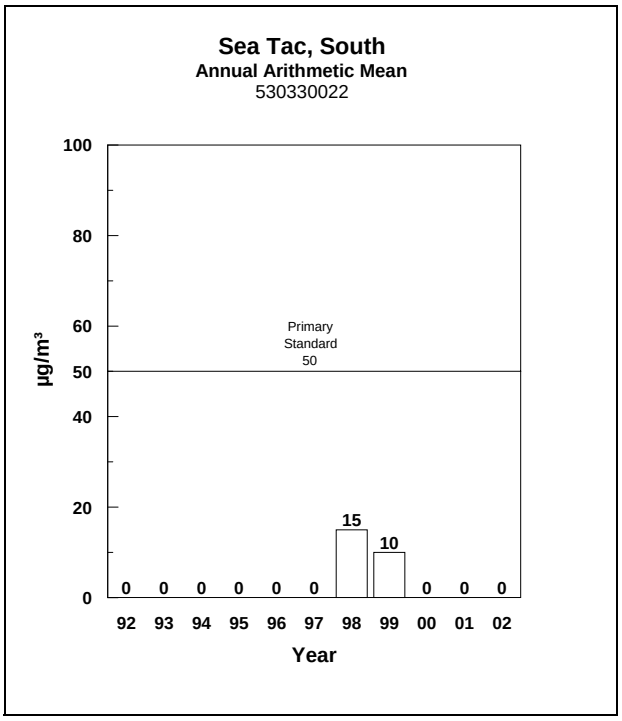


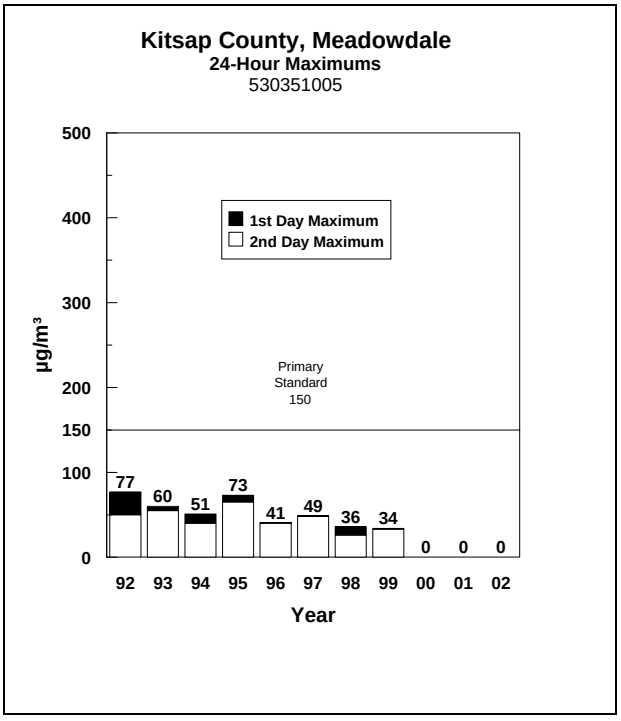


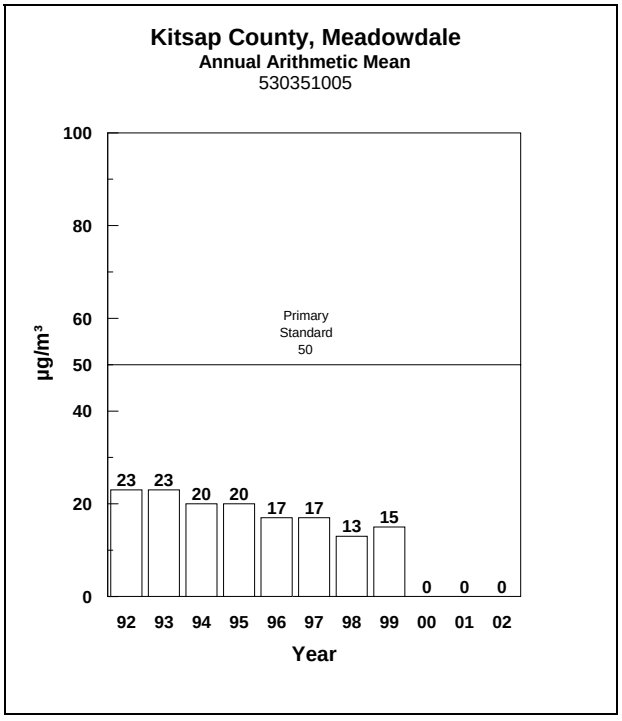
Puget Sound Area (cont)

Particulate Matter (PM_{10})



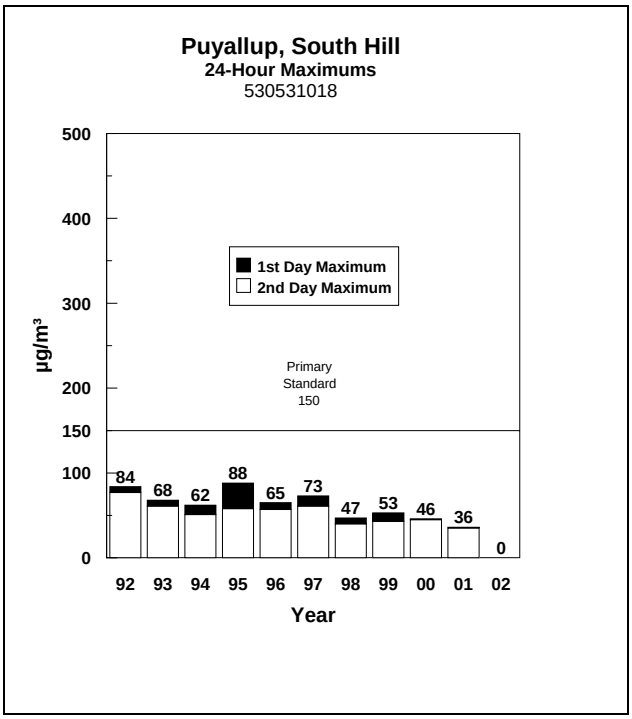


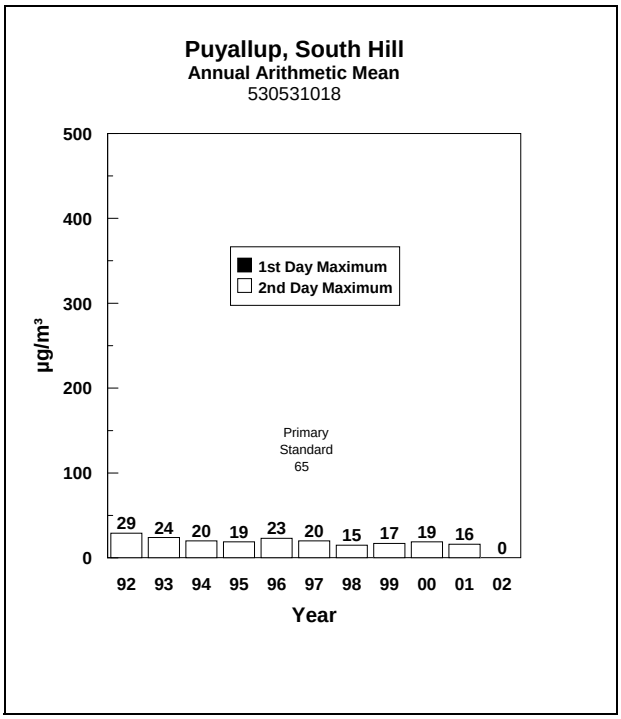


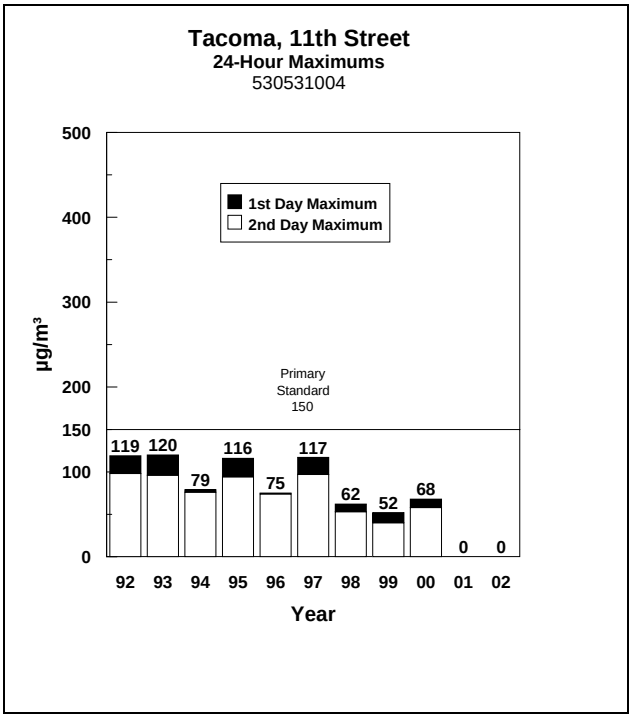


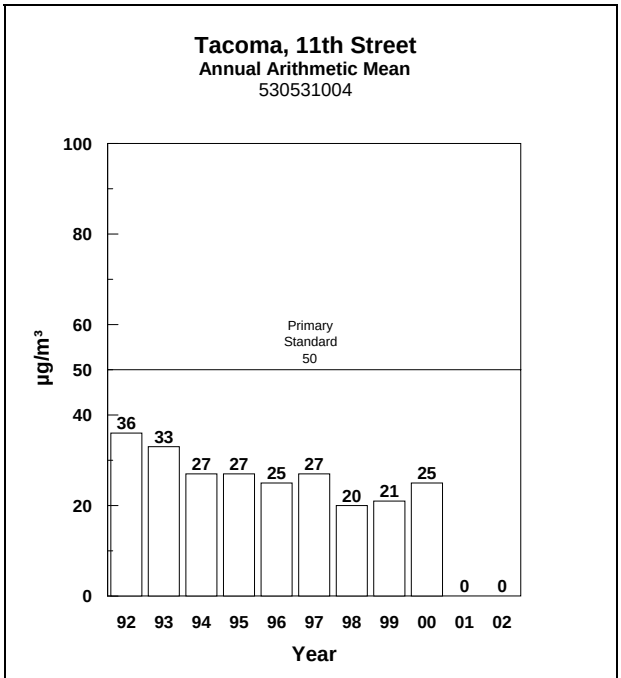
Puget Sound Area (cont)

Particulate Matter (PM_{10})



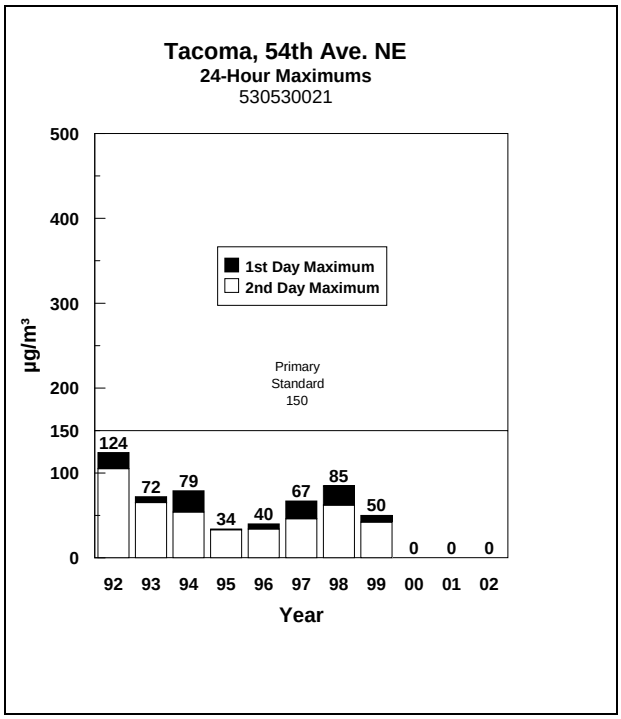


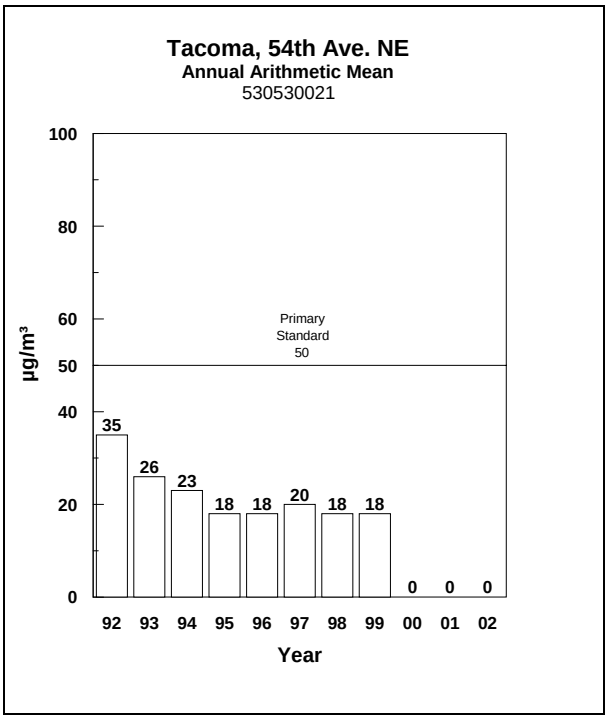


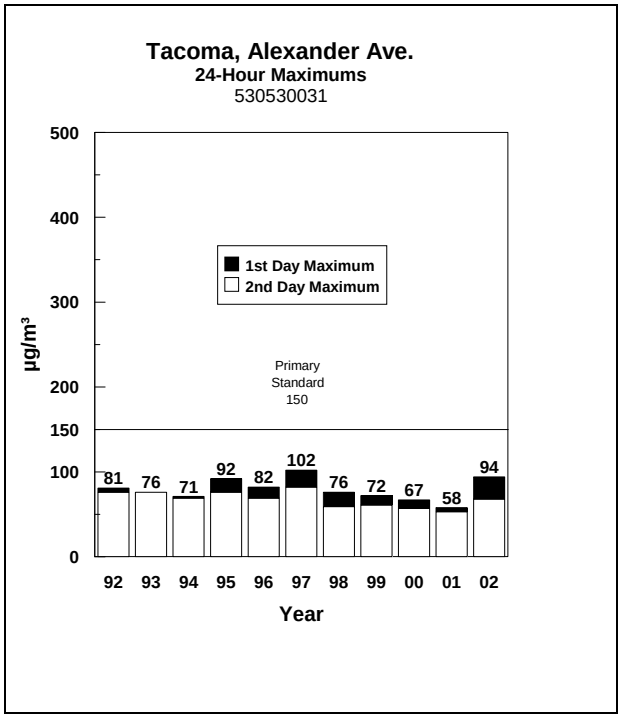


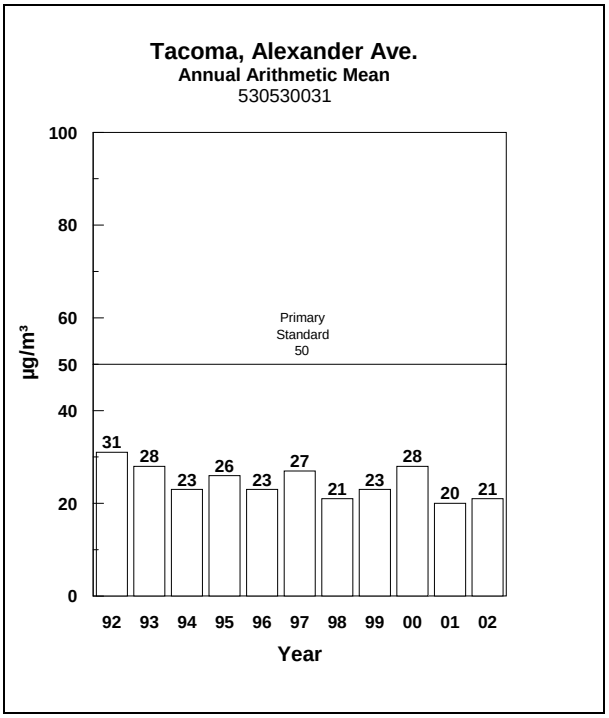
Puget Sound Area (cont)

Particulate Matter (PM_{10})



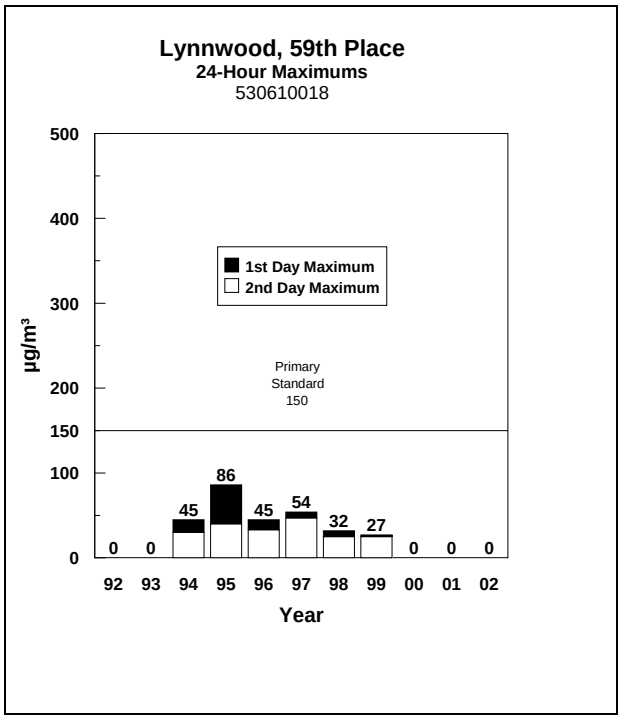


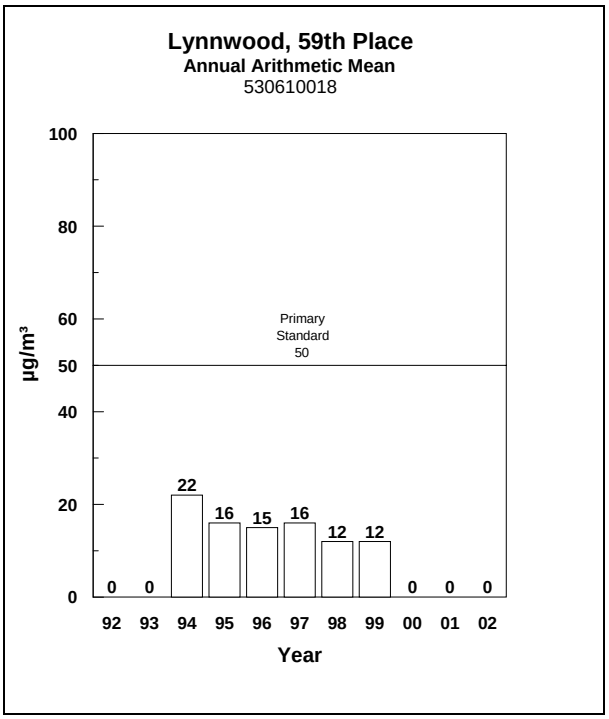


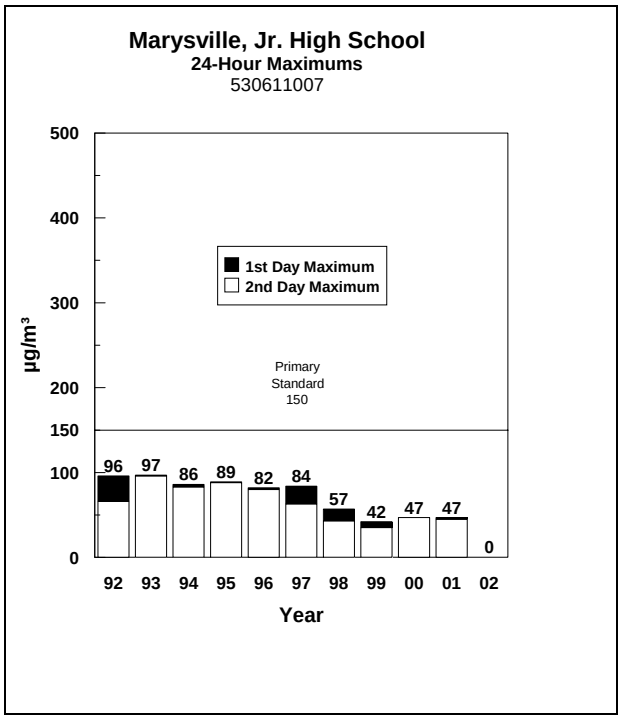


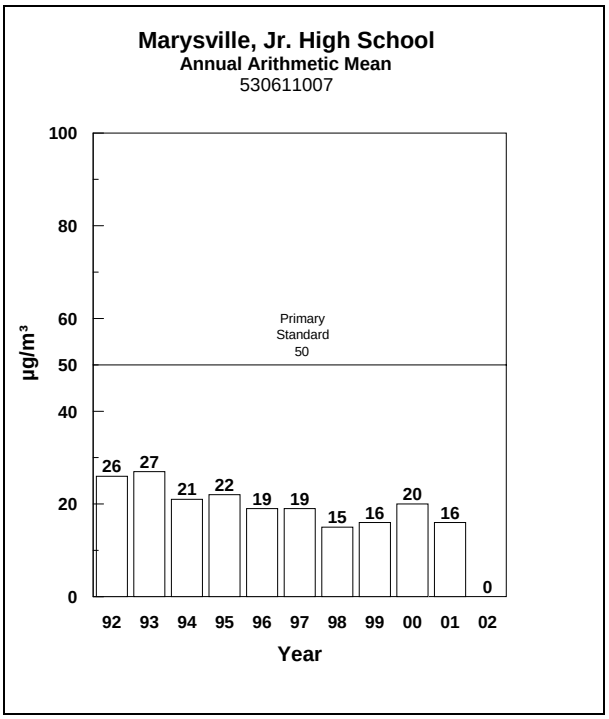
Puget Sound Area (cont)

Particulate Matter (PM_{10})









Puget Sound Area (cont)

Particulate Matter ($PM_{2.5}$)

$PM_{2.5}$ Annual Arithmetic Means ($\mu g/m^3$)

Station	Location	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
530330017	North Bend, USFS								6.3	5.7	5.5	5.7
530330021	Seattle, South Park								10.3	11.9	10.6	10.3
530330024	Lake Forest Park								9.3	14.2	11.2	10.8
530330027	Redmond, NE 85th								9.6*	9.4	7.5	7.9
530330033	Kent, Smith Street									16.0*	17.6	
530330037	Bellevue, 305 Bell. Wy									15.7*	8.6	8.1
530330004	Bellevue, 504 Bell. Wy								8.5			
530330057	Seattle, Duwamish								11.5	12.7	11.4	11.3
530330080	Seattle, Beacon Hill								8.8	9.1	8.5	8.7
530332004	Kent Central & James								10.9	9.9*	9.9	9.9
530530029	Tacoma, So L Street								13.8*	13.0	11.3	10.5
530530031	Tacoma, Alex. Ave								11.2	12.8	11.1	10.1
530531018	Puyallup, South Hill								9.7	12.1	10.8	10.1
530610005	Lynnwood, 212th								11.4*	12.2	9.3	10.1
530611007	Marysville, JHS								10.2	12.8	11.3	11.3

* Average based on less than 12 months of data.

Puget Sound Area (cont)

Particulate Matter ($PM_{2.5}$)

$PM_{2.5}$ for 1999 ($\mu g/m^3$)

Station	Location	1st High		2nd High	
	1999	Concentration	Date	Concentration	Date
530330017	North Bend, USFS	22.8	01/03	20.7	09/17
530330021	Seattle, South Park	57.5	01/04	39.9	01/05
530330024	Lake Forest Park	42.6	12/29	25.7	10/21
530330027	Redmond, NE 85th	27.0	12/29	20.5	09/15
530330004	Bellevue, 504 Bell. Way	23.6	01/03	23.5	03/16
530330057	Seattle, Duwamish	56.1	01/04	51.5	10/22
530330080	Seattle, Beacon Hill	27.2	10/21	27.1	12/30
530332004	Kent Central & James	39.5	07/05	38.6	01/03
530530029	Tacoma, So L Street	43.9	10/22	37.8	12/04
530530031	Tacoma, Alexander Ave	59.6	01/04	52.9	01/05
530531018	Puyallup, South Hill	49.6	01/04	46.6	01/03
530610005	Lynnwood, 212th	27.4	12/29	25.3	10/21
530611007	Marysville, JHS	54.7	01/03	36.4	12/29

$PM_{2.5}$ for 1999

		Period of	Sampling		% Valid
	1999	Record	Frequency	# Samples	Data
530330017	North Bend, USFS	Jan-Dec	1/3	93	92
530330021	Seattle, South Park	Jan-Dec	1/1	357	98
530330024	Lake Forest Park	Jan-Dec	1/3	95	97
530330027	Redmond, NE 85th	Aug-Dec	1/3	45	90
530330004	Bellevue, 504 Bell. Way	Jan-Sep	1/3	84	92
530330057	Seattle, Duwamish	Jan-Dec	1/1	346	95
530330080	Seattle, Beacon Hill	Jan-Dec	1/3	121	85
530332004	Kent Central & James	Jan-Dec	1/3	117	95
530530029	Tacoma, So L Street	Oct-Dec	1/1	85	96
530530031	Tacoma, Alexander Ave	Jan-Dec	1/1	85	96
530531018	Puyallup, South Hill	Jan-Dec	1/1	350	96
530610005	Lynnwood, 212th	Oct-Dec	1/3	30	100
530611007	Marysville, JHS	Jan-Dec	1/3	115	95

Puget Sound Area (cont)

Particulate Matter ($PM_{2.5}$)

$PM_{2.5}$ for 2000 ($\mu g/m^3$)

Station	Location	1st High		2nd High	
	2000	Concentration	Date	Concentration	Date
530330017	North Bend, USFS	18.7	10/27	16.0	11/11
530330021	Seattle, South Park	45.5	11/21	42.5	11/20
530330024	Lake Forest Park	41.8	12/11	35.1	11/14
530330027	Redmond, NE 85th	33.6	12/09	25.1	12/11
530330033	Kent, Smith Street	43.7	11/17	39.0	12/29
530330037	Bellevue, Bellevue Way	33.1	12/29	32.4	11/20
530330057	Seattle, Duwamish	46.9	11/21	43.7	11/22
530330080	Seattle, Beacon Hill	31.1	10/26	29.1	12/29
530332004	Kent Central & James	27.0	07/05	21.8	01/19
530530029	Tacoma, So L Street	70.2	12/06	61.9	11/12
530530031	Tacoma, Alexander Ave	46.1	11/20	44.3	12/06
530531018	Puyallup, South Hill	41.7	12/05	36.9	11/20
530610005	Lynnwood, 212th	36.7	11/11	34.9	11/14
530611007	Marysville, JHS	44.8	12/05	42.8	11/11

$PM_{2.5}$ for 2000

	2000	Period of Record	Sampling Frequency	# Samples	% Valid Data
530330017	North Bend, USFS	Jan-Dec	1/3	108	89
530330021	Seattle, South Park	Jan-Dec	1/1	351	96
530330024	Lake Forest Park	Jan-Dec	1/3	114	93
530330027	Redmond, NE 85th	Jan-Dec	1/3	114	93
530330033	Kent, Smith Street	Feb-Dec	1/3	111	100
530330037	Bellevue, 305 Bell. Way	Nov-Dec	1/3	16	80
530330057	Seattle, Duwamish	Jan-Dec	1/1	356	97
530330080	Seattle, Beacon Hill	Jan-Dec	1/1	340	93
530332004	Kent Central & James	Jan	1/3	9	100
530530029	Tacoma, So L Street	Jan-Dec	1/1	348	95
530530031	Tacoma, Alexander Ave	Jan-Dec	1/1	362	99
530531018	Puyallup, South Hill	Jan-Dec	1/3	111	91
530610005	Lynnwood, 212th	Jan-Dec	1/3	119	98
530611007	Marysville, JHS	Jan-Dec	1/3	119	98

Puget Sound Area (cont)

Particulate Matter ($PM_{2.5}$)

$PM_{2.5}$ for 2001 ($\mu g/m^3$)

Station	Location	1st High		2nd High	
	2001	Concentration	Date	Concentration	Date
530330017	North Bend, USFS	17.8	02/12	16.1	08/11
530330021	Seattle, South Park	49.2	11/10	39.8	11/11
530330024	Lake Forest Park	44.7	12/30	42.2	01/28
530330027	Redmond, NE 85th	23.4	11/09	18.5	12/30
530330033	Kent, Smith Street	39.4	01/28	32.4	01/16
530330037	Bellevue, Bellevue Way	32.0	12/30	30.9	11/09
530330057	Seattle, Duwamish	46.8	11/10	42.6	11/08
530330080	Seattle, Beacon Hill	37.9	11/10	35.7	11/11
530332004	Kent Central & James	38.9	12/30	36.7	11/09
530530029	Tacoma, So L Street	60.0	11/10	52.6	11/09
530530031	Tacoma, Alexander Ave	42.1	01/07	41.4	12/26
530531018	Puyallup, South Hill	42.1	12/30	38.9	01/28
530610005	Lynnwood, 212th	39.5	12/30	38.4	11/09
530611007	Marysville, JHS	43.2	11/09	40.1	01/07

$PM_{2.5}$ for 2001

	2001	Period of Record	Sampling Frequency	# Samples	% Valid Data
530330017	North Bend, USFS	Jan-Dec	1/3	117	95
530330021	Seattle, South Park	Jan-Dec	1/1	349	95
530330024	Lake Forest Park	Jan-Dec	1/3	118	96
530330027	Redmond, NE 85th	Jan-Dec	1/3	110	90
530330033	Kent, Smith Street	Jan-Feb	1/3	12	92
530330037	Bellevue, 305 Bell. Way	Nov-Dec	1/3	119	97
530330057	Seattle, Duwamish	Jan-Dec	1/1	352	96
530330080	Seattle, Beacon Hill	Jan-Dec	1/1	349	95
530332004	Kent Central & James	Jan-Dec	1/3	109	96
530530029	Tacoma, So L Street	Jan-Dec	1/1	351	96
530530031	Tacoma, Alexander Ave	Jan-Dec	1/1	360	98
530531018	Puyallup, South Hill	Jan-Dec	1/3	120	98
530610005	Lynnwood, 212th	Jan-Dec	1/3	120	98
530611007	Marysville, JHS	Jan-Dec	1/3	122	100

Puget Sound Area (cont)

Particulate Matter ($PM_{2.5}$)

$PM_{2.5}$ for 2002 ($\mu g/m^3$)

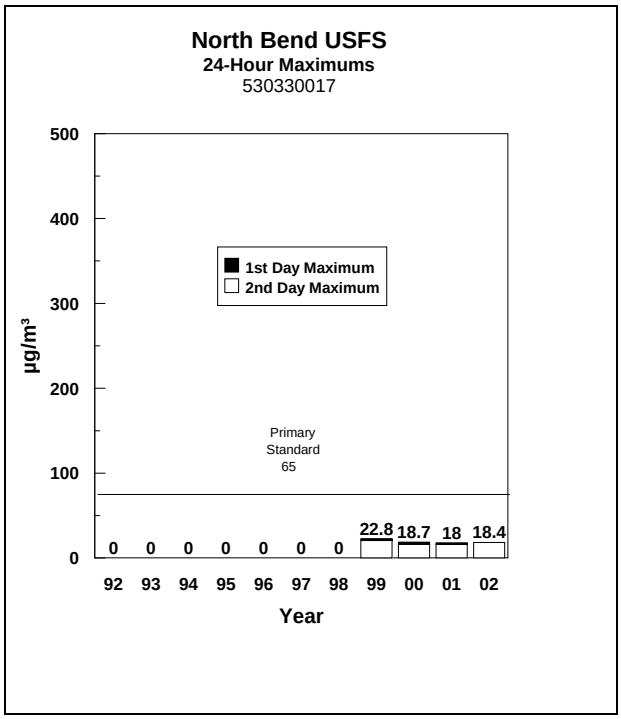
Station	Location	1st High		2nd High	
	2002	Concentration	Date	Concentration	Date
530330017	North Bend, USFS	18.4	11/22	18.4	11/25
530330021	Seattle, South Park	46.6	11/27	39.1	11/02
530330024	Lake Forest Park	39.2	11/04	35.1	11/01
530330027	Redmond, NE 85th	24.7	10/26	23.5	11/04
530330037	Bellevue, Bellevue Way	25.3	10/20	24.9	10/26
530330057	Seattle, Duwamish	44.7	11/27	44.4	11/04
530330080	Seattle, Beacon Hill	31.1	11/27	31.0	11/04
530332004	Kent Central & James	38.3	11/28	36.3	11/04
530530029	Tacoma, So L Street	60.7	11/04	55.8	11/03
530530031	Tacoma, Alexander Ave	38.0	11/28	34.2	12/09
530531018	Puyallup, South Hill	38.4	11/28	37.3	11/04
530610005	Lynnwood, 212th	48.2	11/04	41.5	11/01
530611007	Marysville, JHS	45.3	11/28	44.4	11/25

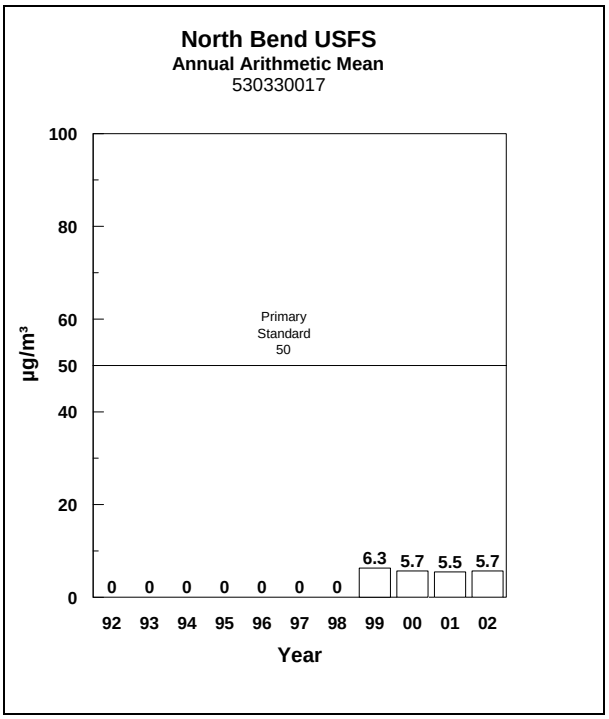
$PM_{2.5}$ for 2002

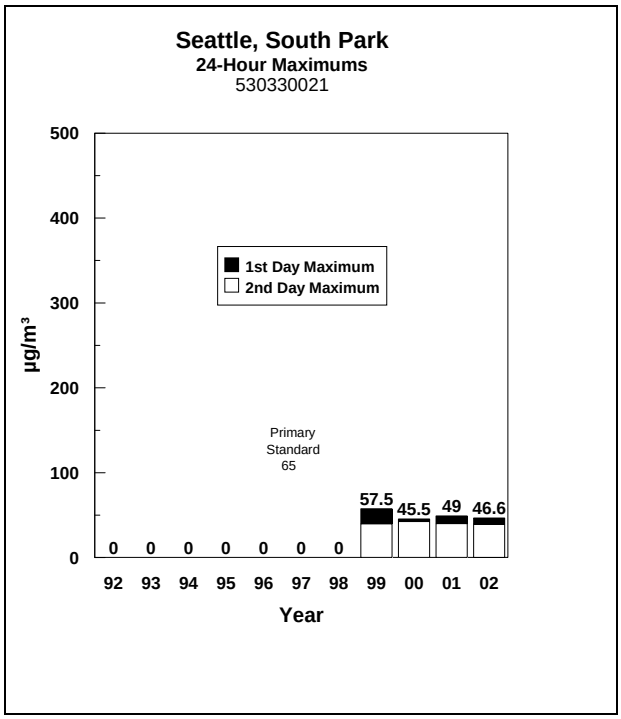
		Period of	Sampling		% Valid
	2002	Record	Frequency	# Samples	Data
530330017	North Bend, USFS	Jan-Dec	1/3	117	96
530330021	Seattle, South Park	Jan-Dec	1/1	343	94
530330024	Lake Forest Park	Jan-Dec	1/3	116	95
530330027	Redmond, NE 85th	Jan-Dec	1/3	117	96
530330037	Bellevue, 305 Bell. Way	Nov-Dec	1/3	117	96
530330057	Seattle, Duwamish	Jan-Dec	1/1	357	98
530330080	Seattle, Beacon Hill	Jan-Dec	1/1	354	97
530332004	Kent Central & James	Jan-Dec	1/3	122	100
530530029	Tacoma, So L Street	Jan-Dec	1/1	350	96
530530031	Tacoma, Alexander Ave	Jan-Dec	1/1	345	95
530531018	Puyallup, South Hill	Jan-Dec	1/3	120	98
530610005	Lynnwood, 212th	Jan-Dec	1/3	120	98
530611007	Marysville, JHS	Jan-Dec	1/3	121	99

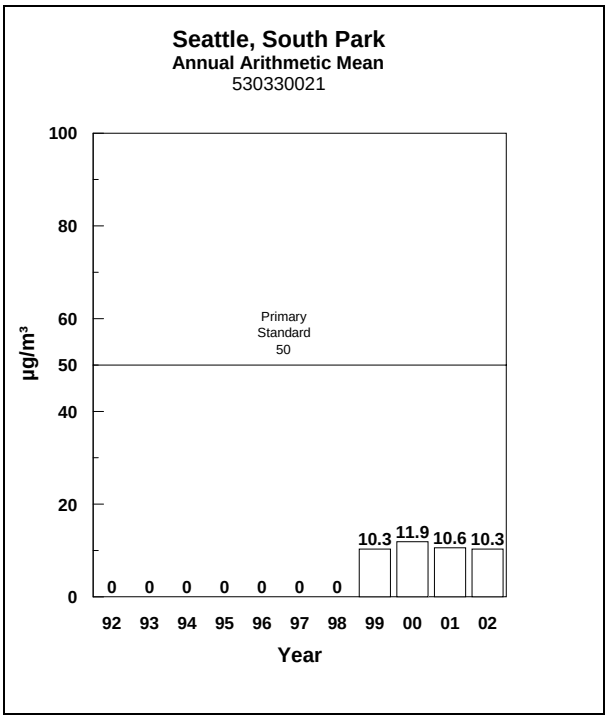
Puget Sound Area (cont)

Particulate Matter ($PM_{2.5}$)



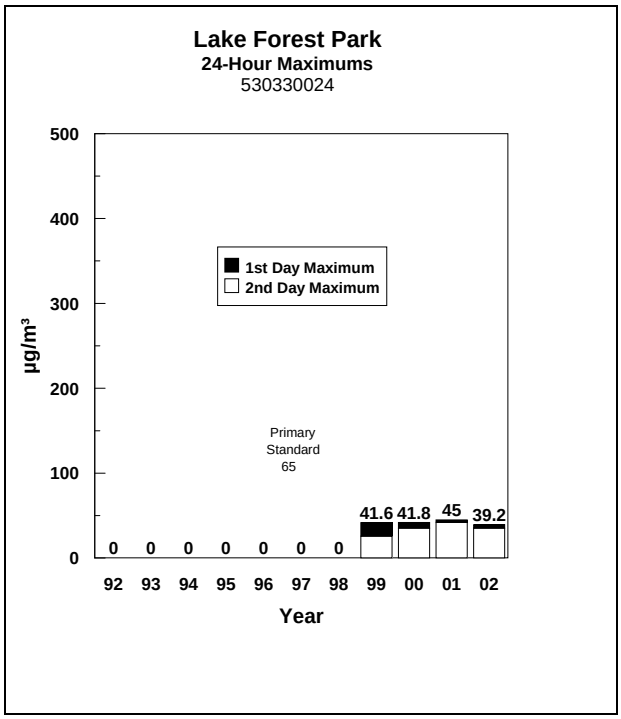


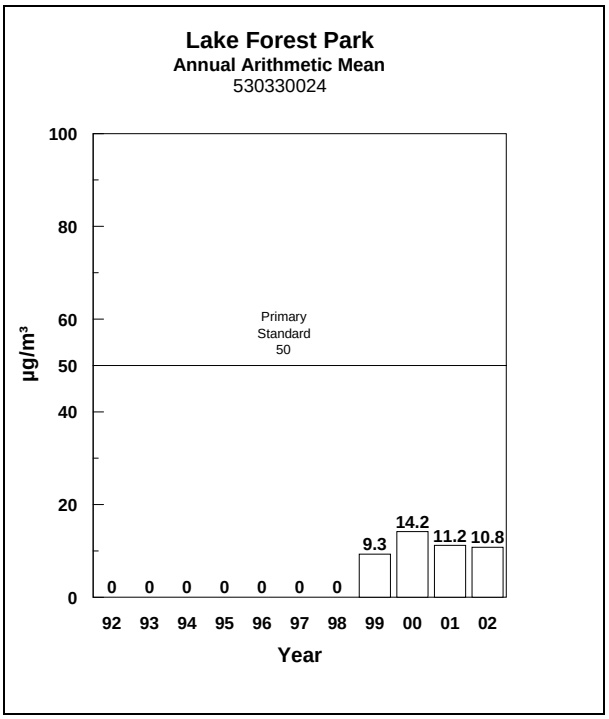


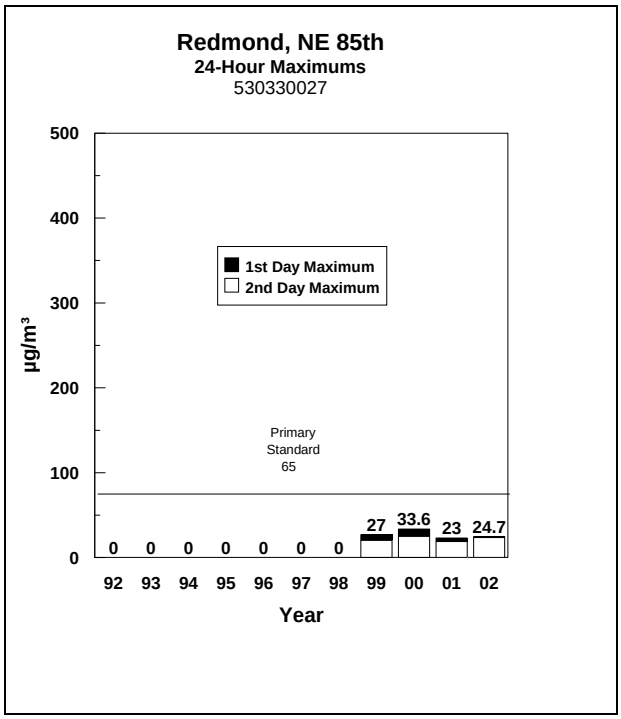


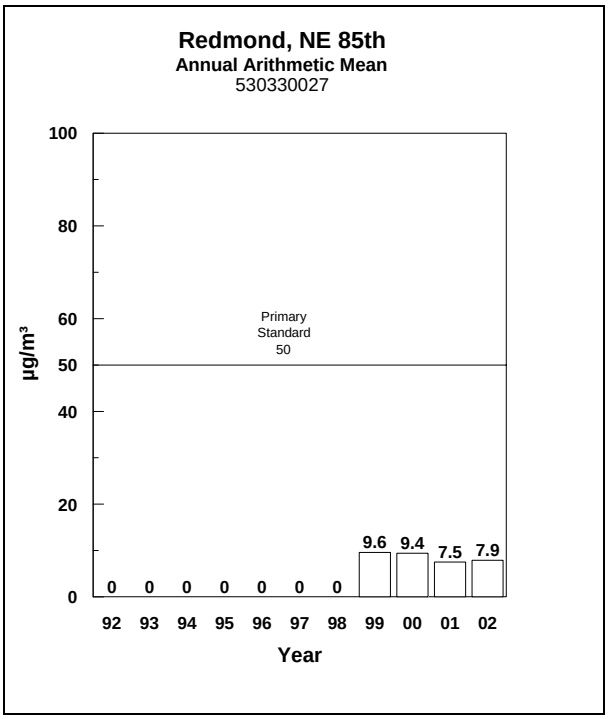
Puget Sound Area (cont)

Particulate Matter ($PM_{2.5}$)



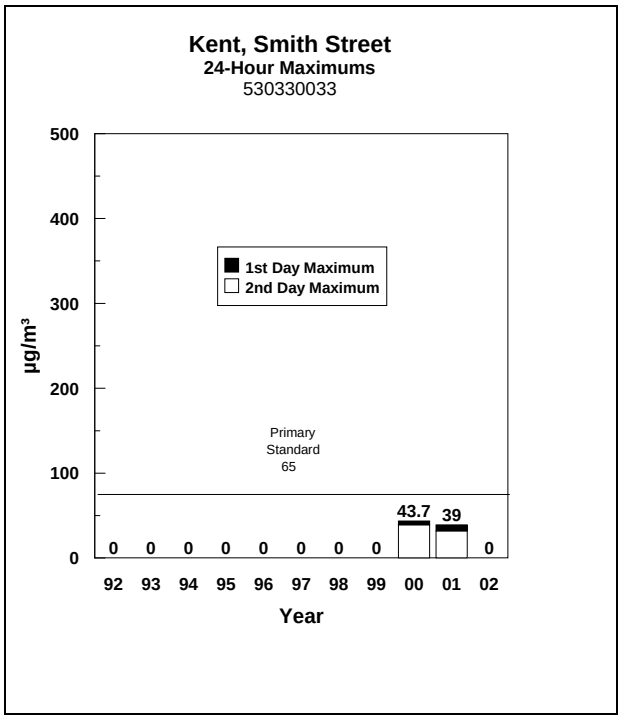


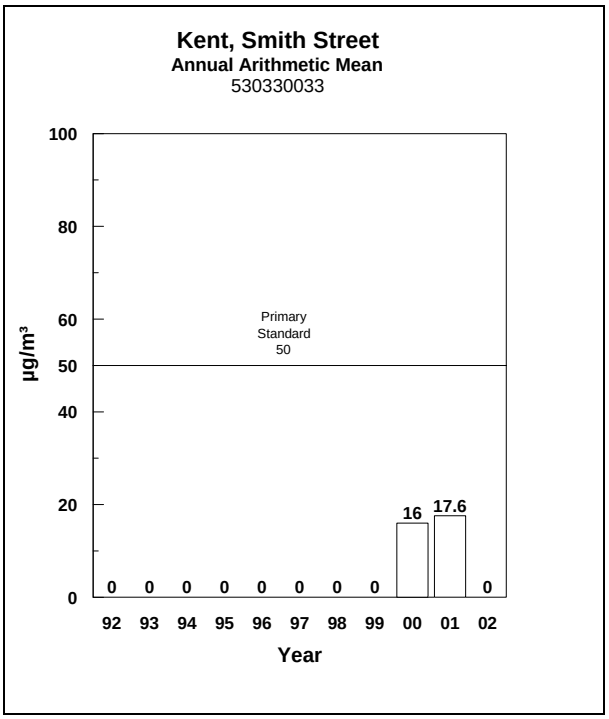


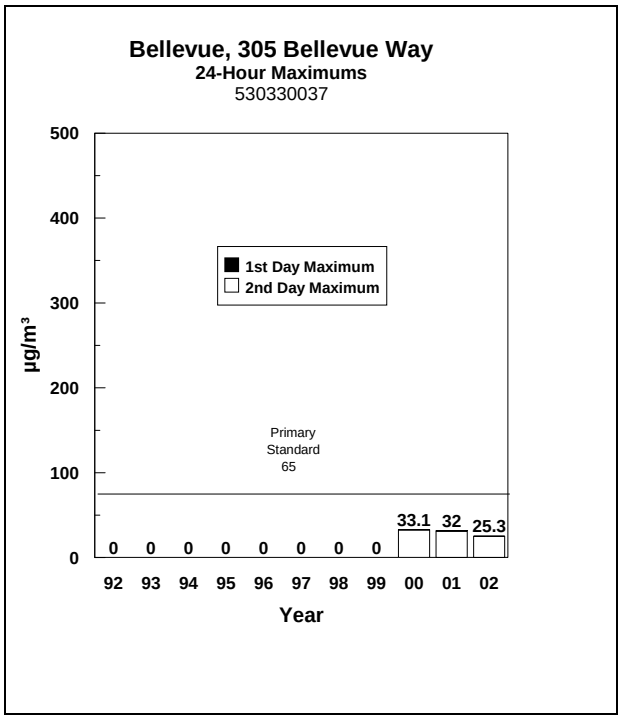


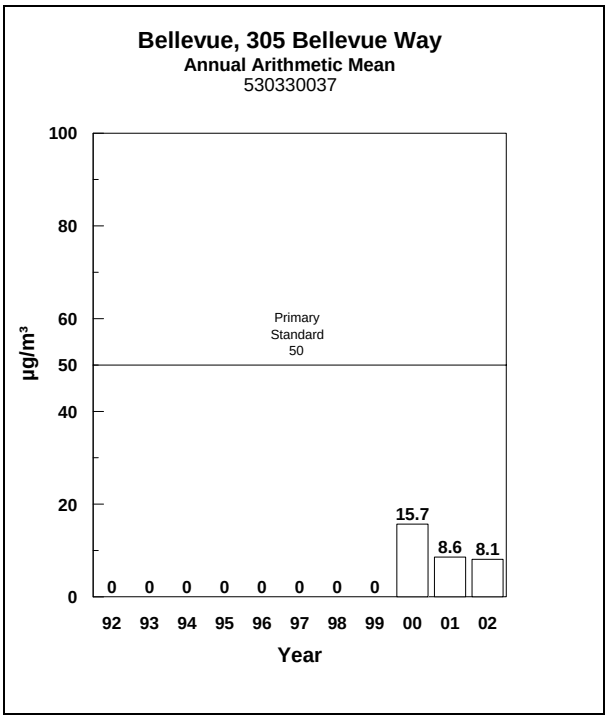
Puget Sound Area (cont)

Particulate Matter ($PM_{2.5}$)



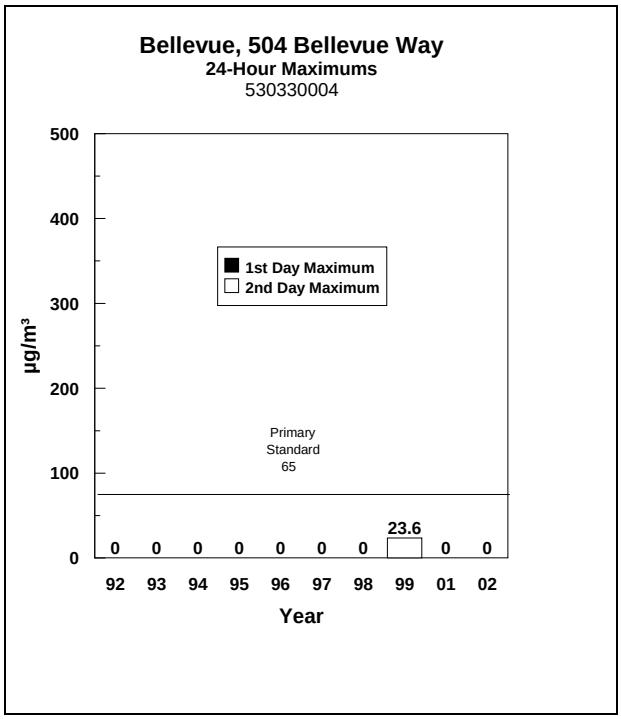


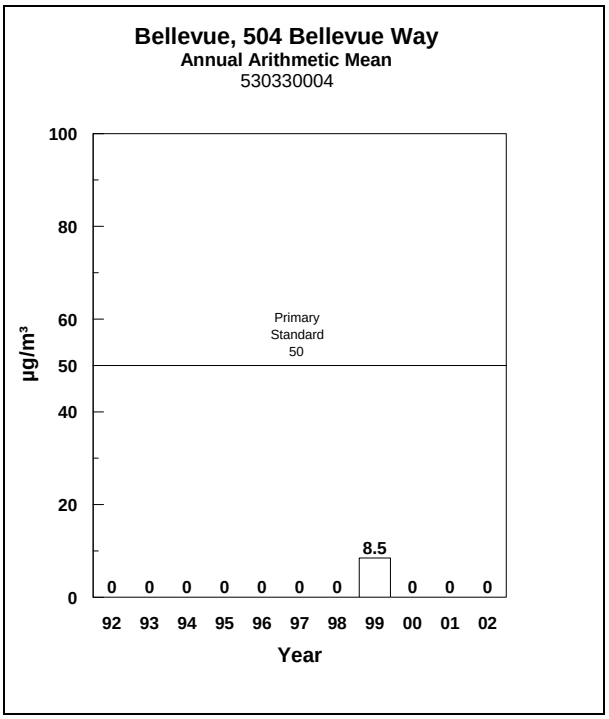


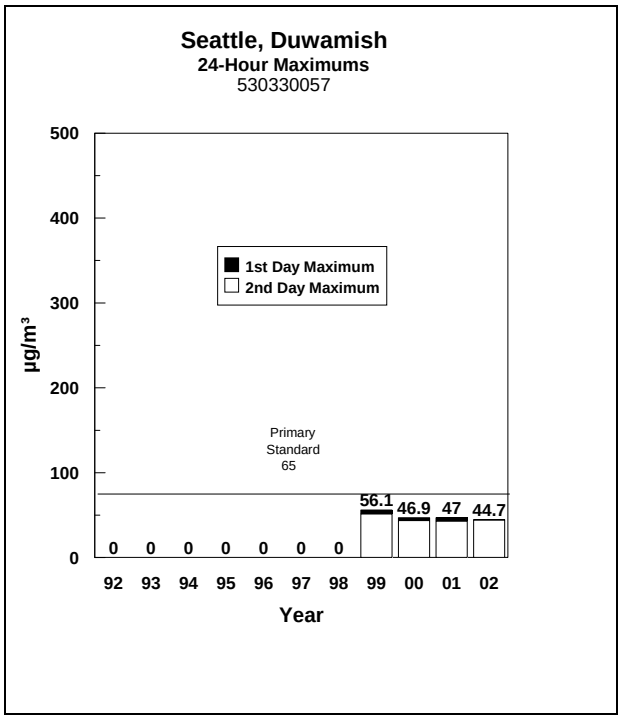


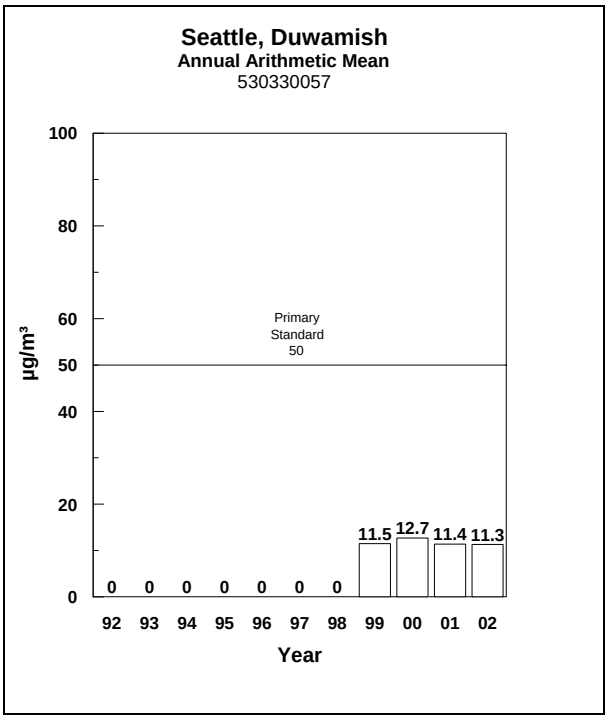
Puget Sound Area (cont)

Particulate Matter ($PM_{2.5}$)



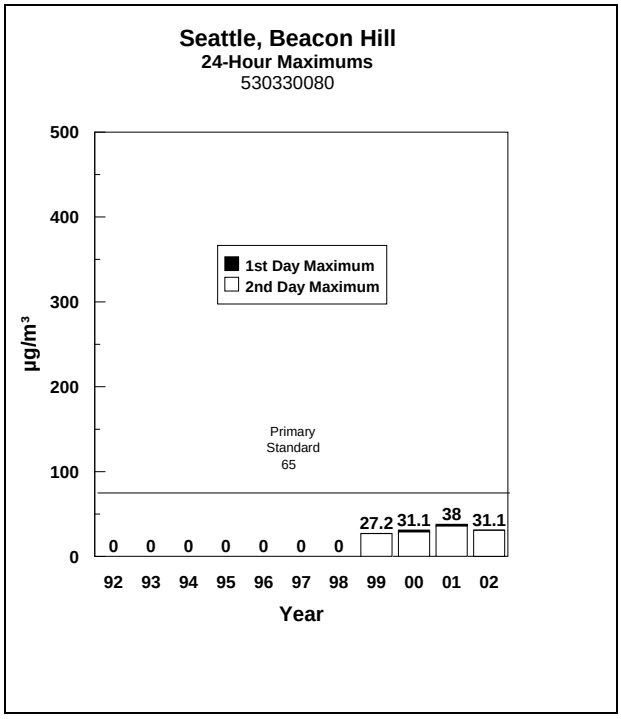


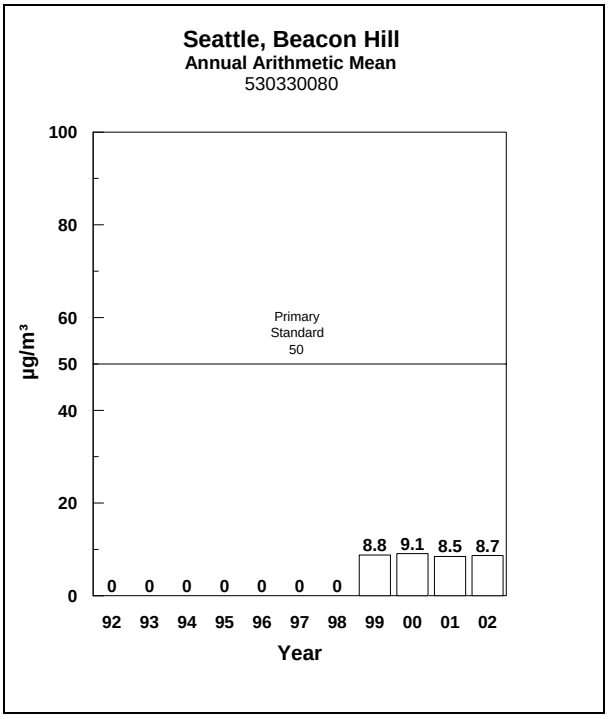


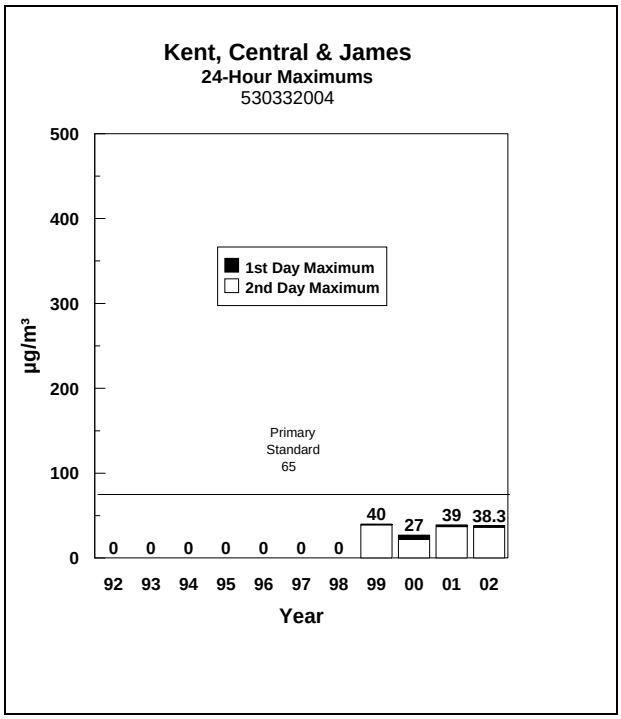


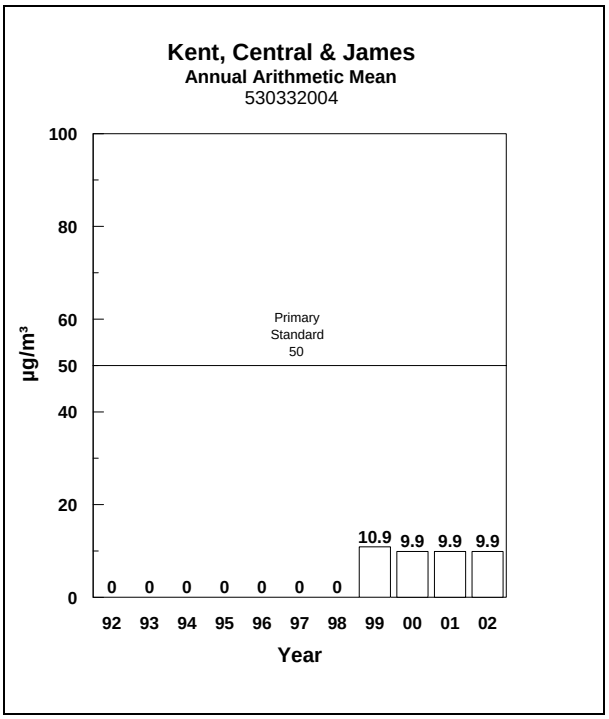
Puget Sound Area (cont)

Particulate Matter ($PM_{2.5}$)



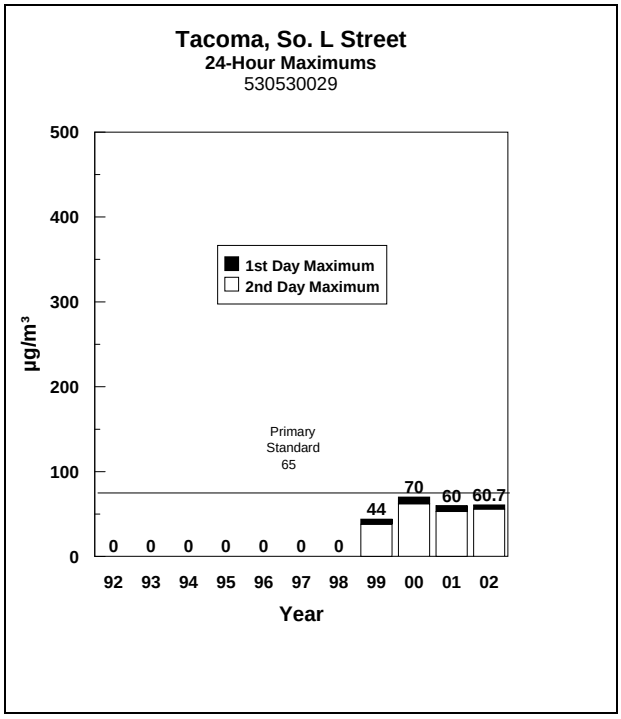


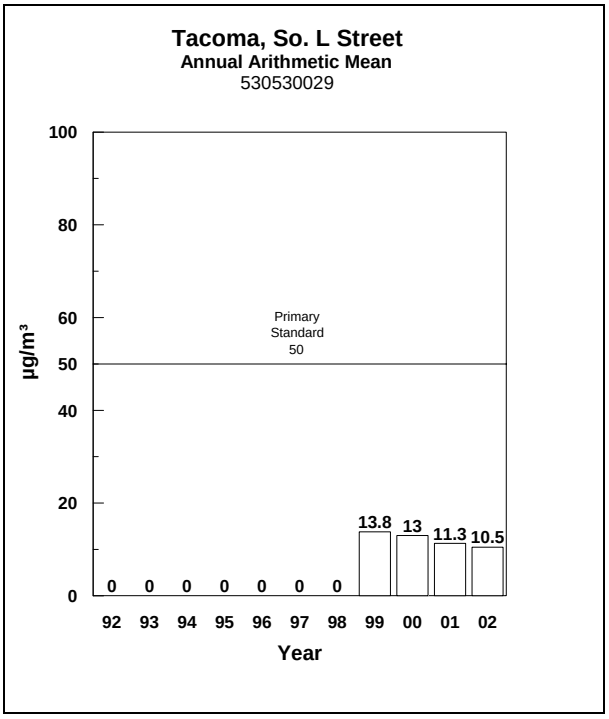


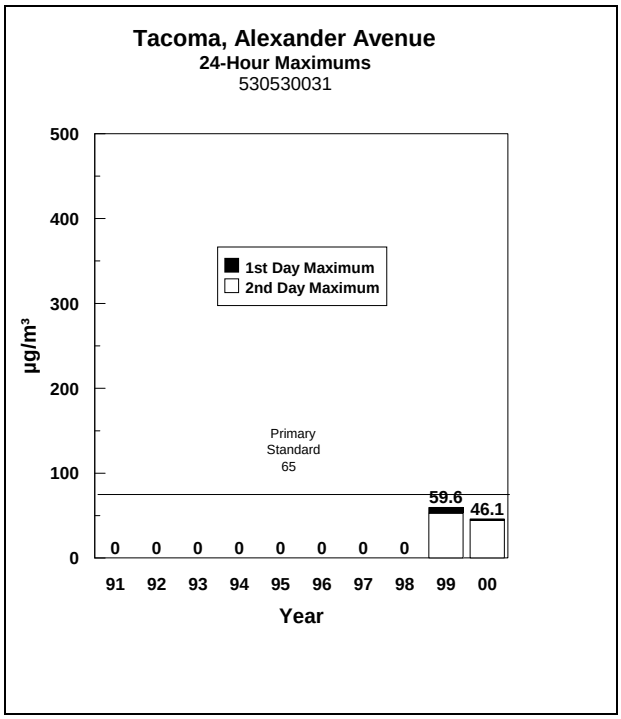


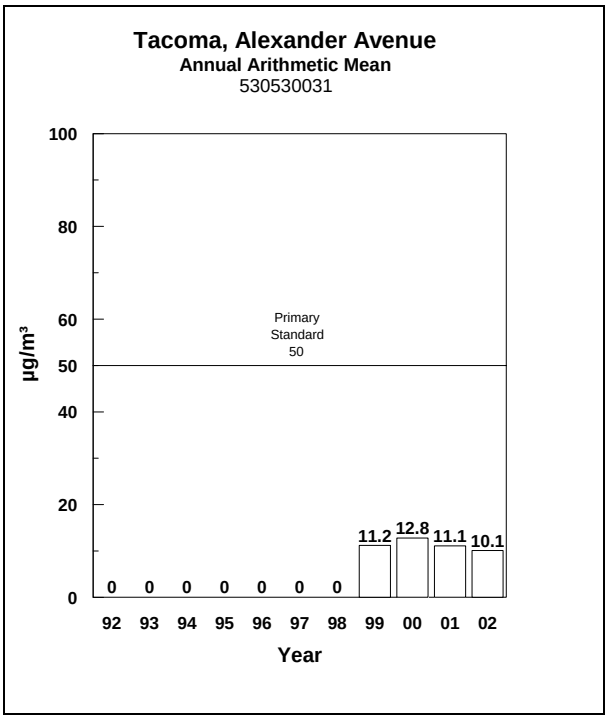
Puget Sound Area (cont)

Particulate Matter ($PM_{2.5}$)



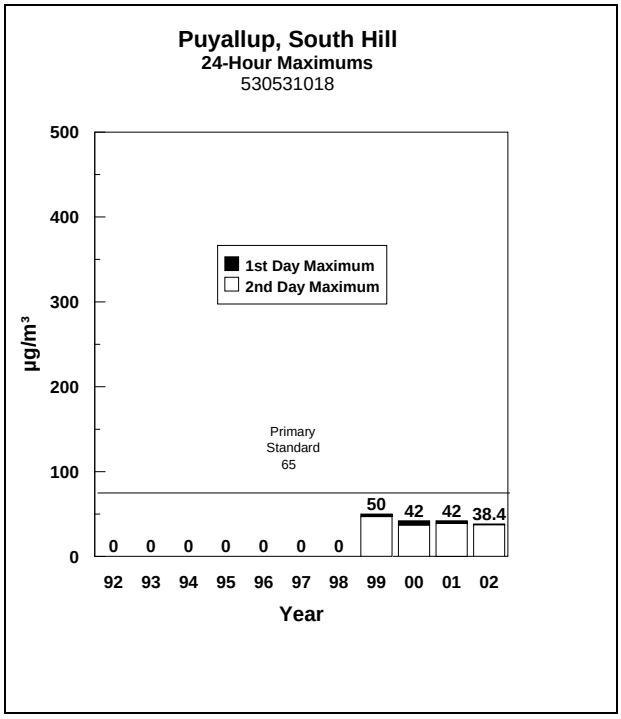


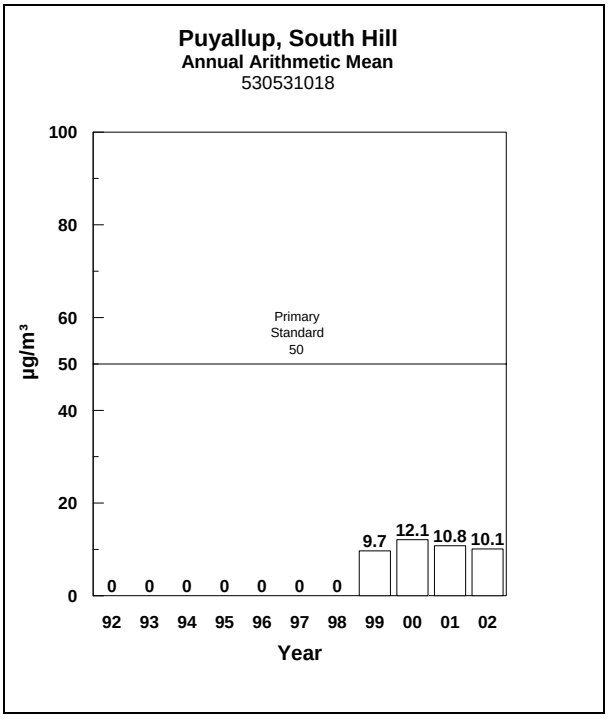


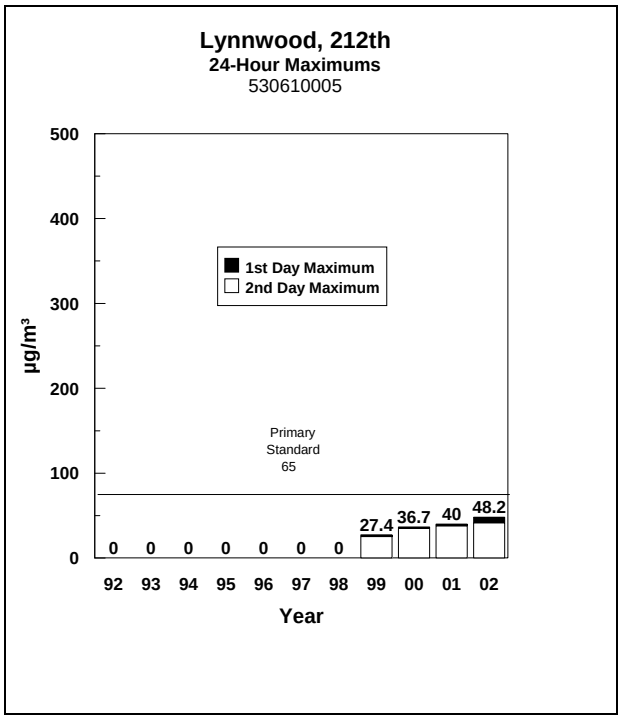


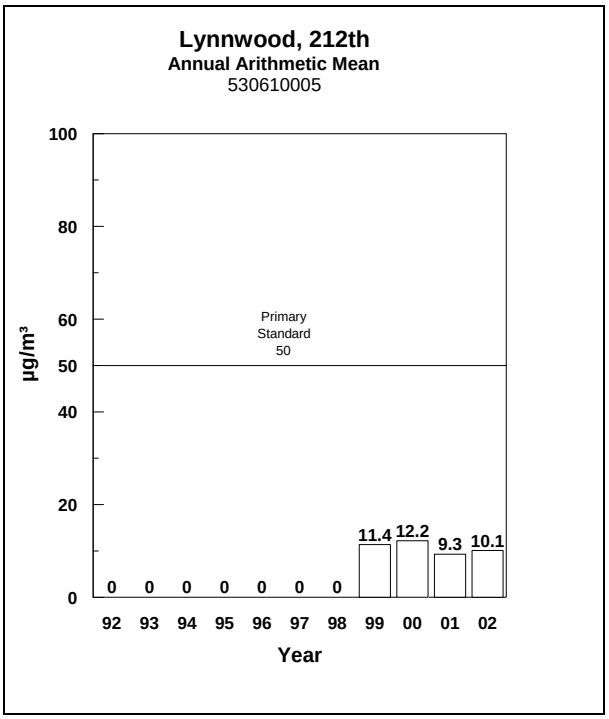
Puget Sound Area (cont)

Particulate Matter ($PM_{2.5}$)



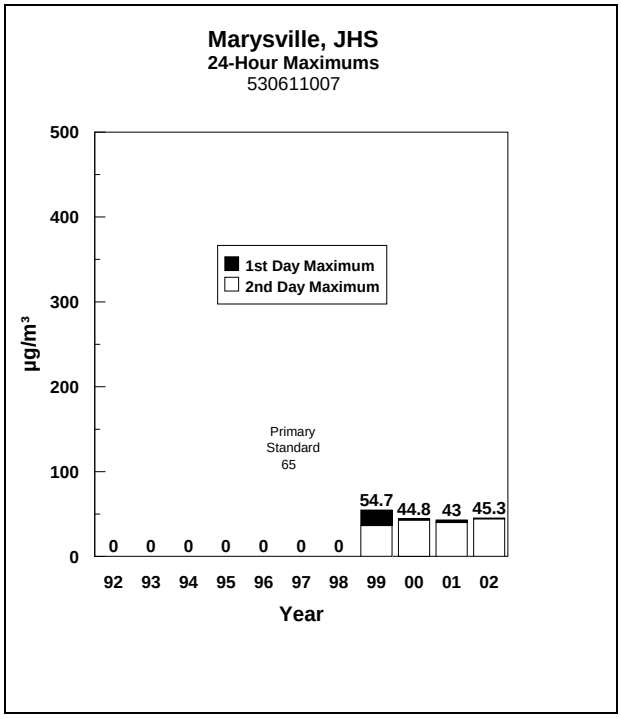


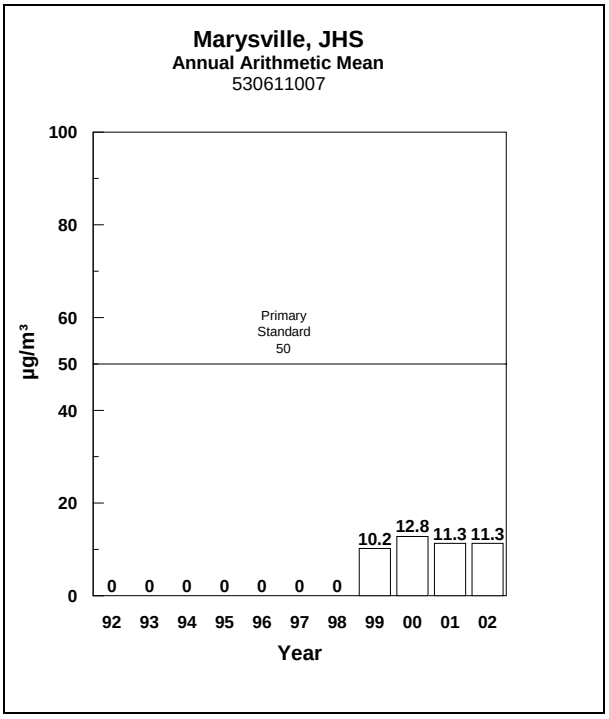




Puget Sound Area (cont)

Particulate Matter ($PM_{2.5}$)





Puget Sound Area (cont)

Sulfur Dioxide

Sulfur Dioxide for 1999 – 2002 (ppm)

Station	Location	1-Hr	Maximum		#1Hr		3 Hr Max		#3 Hr	24-H	Max	#24	Hr	Ann
	1999	1st	Date	2nd	Date	>.40	Conc.	Date	>.50	Conc.	Date	>.10	>.14	Mean
530330057	Seattle, Duwam.	.117	07/10	.075	04/02	0	.074	07/10	0	.021	07/10	0	0	.0057
	2000													
530330080	Seattle, Bea Hill	.059	08/05	.039	08/05	0	.0437	08/05	0	.0126	08/05	0	0	.0032
	2001													
530330080	Seattle, Bea Hill	.048	01/20	.037	09/13	0	.0286	01/20	0	.0133	03/07	0	0	.0037
	2002													
530330080	Seattle, Bea Hill	.078	09/12	.049	09/12	0	.0416	09/12	0	.0156	09/12	0	0	.0027

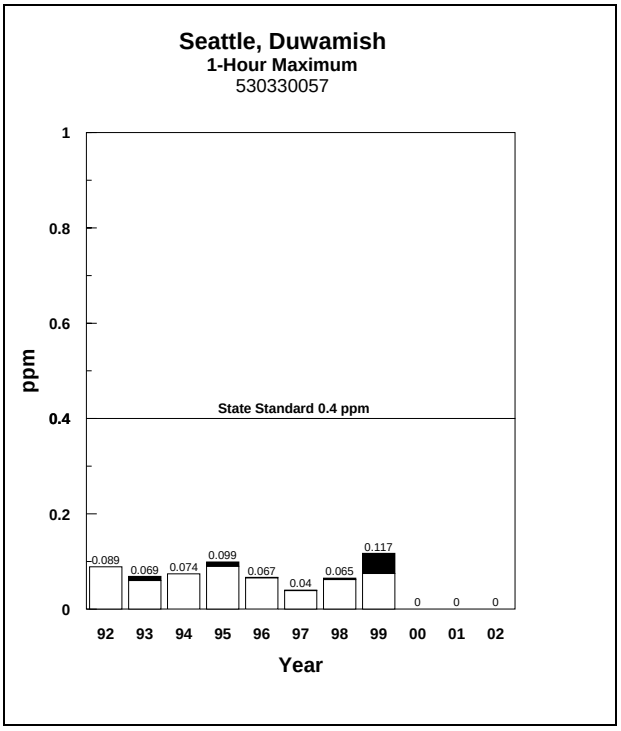
Conc. = Concentrations Ann. = Annual Max = Maximum

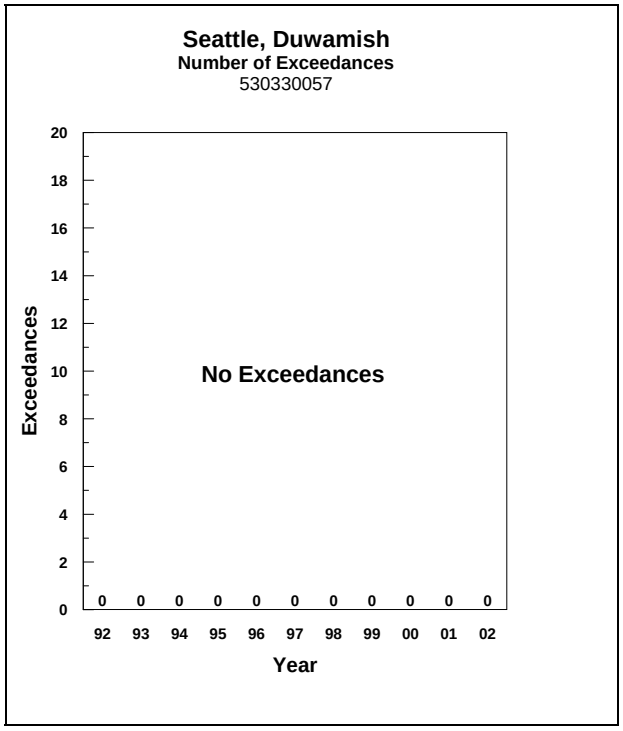
Sulfur Dioxide for 1999 - 2002

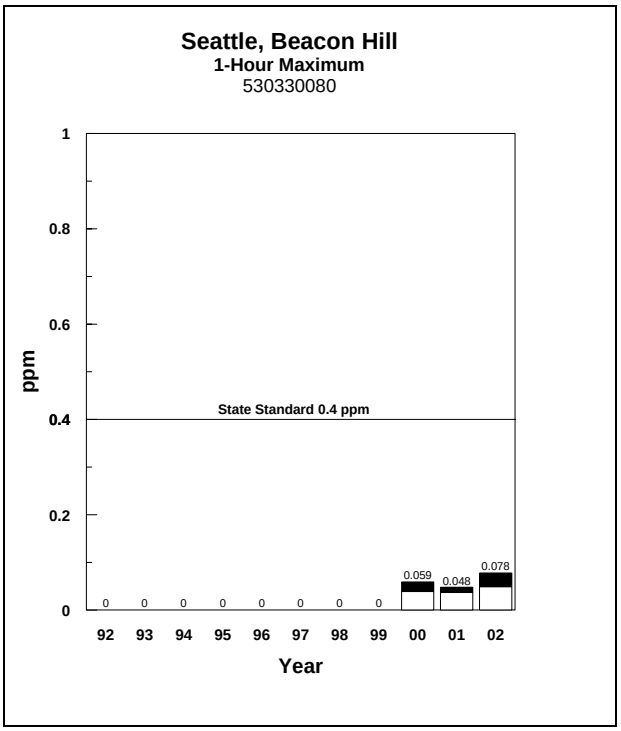
Station	Location	Period of			% Valid
	1999	Record	# Hours	# Samples	Data
530330057	Seattle, Duwamish	Jan-Sept	6489	270	99
	2000				
530330080	Seattle, Beacon Hill	Feb-Dec	6785	283	88
	2001				
530330080	Seattle, Beacon Hill	Jan-Dec	8245	344	94
	2002				
530330080	Seattle, Beacon Hill	Jan-Dec	8654	361	98

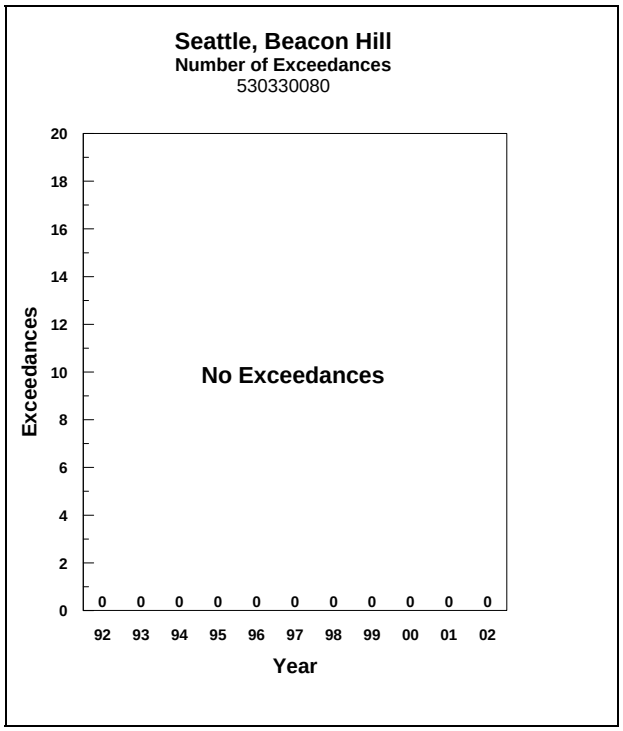
Puget Sound Area (cont)

Sulfur Dioxide









Puget Sound Area (cont)

Carbon Monoxide

Carbon Monoxide for 1999 (ppm)

Station	Location	1st	1-Hr High	Max 2nd	High	8-Hr 1st	Max High	2nd Day	High	2nd Day	High
	1999	Conc.	Date	Conc.	Date	Conc.	Date	Conc.	Date	Conc.	Date
530331003	Bellevue, Broadway	3.1	02/14	3.0	02/14	1.9	02/14	1.9	02/14	1.9	02/15
530330015	Bellevue, NE 8th & 108th	8.4	12/28	8.1	01/05	5.2	12/28	5.0	12/28	5.0	12/29
530330019	Bellevue, 148th & 24th	9.6	12/28	8.8	12/28	6.5	12/28	6.4	12/28	6.1	12/29
530330087	Seattle, NE 45th	10.3	07/24	8.6	10/20	7.0	10/22	6.9	10/23	6.9	10/23
530330077	Seattle, 4th & Pike	16.1	09/07	15.6	09/07	6.0	09/07	6.0	09/08	6.0	09/08
530330025	Seattle, Northgate	7.2	10/22	6.8	10/22	4.9	10/23	4.8	10/23	4.6	10/22
530330051	Seattle, James St.	7.8	11/15	6.6	12/26	4.6	10/23	4.6	10/22	4.6	10/22
530530032	Tacoma, Pacific Ave.	11.0	10/22	11.0	12/28	7.5	10/22	7.4	10/22	6.6	12/28
530610012	Everett, Broadway	7.7	01/05	6.2	01/05	5.1	01/05	5.0	01/05	4.4	10/22
530610004	Lynnwood, 44th Ave. W	10.9	09/07	8.7	09/07	5.8	10/22	5.8	10/23	5.8	10/23

* 2nd Day High = Second day with the highest 8-hour average.
Conc. = Concentrations Max = Maximum

Carbon Monoxide for 2000 (ppm)

Station	Location	1st	1-Hr High	Max 2nd	High	8-Hr 1st	Max High	2nd Day	High	2nd Day	High
	2000	Conc.	Date	Conc.	Date	Conc.	Date	Conc.	Date	Conc.	Date
530330015	Bellevue, NE 8th & 108th	8.6	11/20	8.1	11/20	6.0	11/20	5.9	11/20	4.9	11/21
530330019	Bellevue, 148th & 24th	8.7	11/20	8.6	11/20	6.3	11/20	6.3	11/27	6.3	11/27
530330087	Seattle, NE 45th	8.3	11/20	8.1	11/28	5.2	01/29	5.2	11/20	5.2	11/20
530330077	Seattle, 4th & Pike	5.5	11/21	5.2	11/21	4.0	11/21	3.9	11/21	3.6	10/05
530330025	Seattle, Northgate	6.6	020/8	6.3	11/21	4.8	11/21	4.6	11/21	3.9	01/29
530330051	Seattle, James St.	6.1	12/06	5.6	11/20	4.1	12/06	4.1	12/06	3.8	11/21
530530032	Tacoma, Pacific Ave.	7.8	11/22	7.7	11/21	6.4	11/22	6.3	11/22	5.5	11/21
530610012	Everett, Broadway	10.5	02/04	7.0	01/17	6.1	02/04	5.9	02/04	4.8	01/28
530610004	Lynnwood, 44th Ave. W	8.0	11/21	7.9	11/21	7.0	11/21	6.9	11/21	5.7	02/06

* 2nd Day High = Second day with the highest 8-hour average.
Conc. = Concentrations Max = Maximum

Carbon Monoxide for 2001 (ppm)

Station	Location	1st Conc.	1-Hr High Date	Max 2nd Conc.	High Date	8-Hr 1st Conc.	Max High Date	2nd Day Conc.	High Date	2nd Day Conc.	High Date
	2001										
530330015	Bellevue, NE 8th & 108th	6.9	11/09	6.5	11/09	4.66	11/09	4.66	11/09	4.66	11/09
530330019	Bellevue, 148th & 24th	8.1	11/09	8	11/09	5.1	11/09	4.95	01/02	4.95	01/02
530330087	Seattle, NE 45th	9.5	11/09	8.8	11/07	6.47	11/07	6.47	11/09	6.47	11/09
530330077	Seattle, 4th & Pike	5.0	11/09	4.8	11/10	4.03	11/09	3.15	01/07	3.15	01/07
530330025	Seattle, Northgate	5.7	11/08	5.6	01/02	3.45	01/02	3.21	01/27	3.21	01/27
530330051	Seattle, James St.	5.4	01/22	5.2	01/02	3.52	01/02	3.37	01/22	3.37	01/22
530530032	Tacoma, Pacific Ave.	5.8	11/09	5.4	11/09	5.0	11/09	3.86	11/10	3.86	11/10
530610004	Lynnwood, 44th Ave. W	7.6	11/09	7.5	11/09	6.57	11/09	5.22	01/27	5.22	01/27

* 2nd Day High = Second day with the highest 8-hour average.
Conc. = Concentrations Max = Maximum

Carbon Monoxide for 2002 (ppm)

Station	Location	1st Conc.	1-Hr High Date	Max 2nd Conc.	High Date	8-Hr 1st Conc.	Max High Date	2nd Day Conc.	High Date	2nd Day Conc.	High Date
	2002										
530330015	Bellevue, NE 8th & 108th	6.2	11/04	5.4	11/04	4.15	11/27	3.52	12/06	3.52	12/06
530330019	Bellevue, 148th & 24th	6.6	11/04	6.6	11/27	4.0	11/27	4.0	11/27	4.0	12/06
530330087	Seattle, NE 45th	7.5	11/02	7.0	10/17	5.61	11/02	4.98	11/04	4.98	11/04
530330077	Seattle, 4th & Pike	5.9	08/31	4.8	11/18	3.38	11/02	3.16	11/29	3.16	11/29
530330025	Seattle, Northgate	5.1	11/04	4.9	11/04	3.55	11/02	3.36	02/04	3.36	02/04
530530032	Tacoma, Pacific Ave.	9.8	11/04	9.3	02/15	5.93	11/04	4.47	11/27	4.47	11/27
530610004	Lynnwood, 44th Ave. W	6.2	11/04	6.2	11/27	5.0	11/02	4.23	01/09	4.23	01/09

* 2nd Day High = Second day with the highest 8-hour average.
Conc. = Concentrations Max = Maximum

Puget Sound Area (cont)

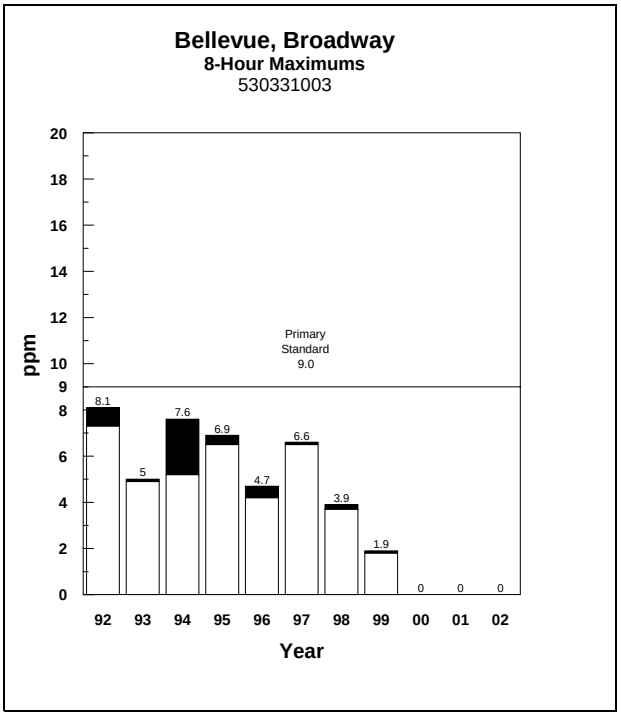
Carbon Monoxide

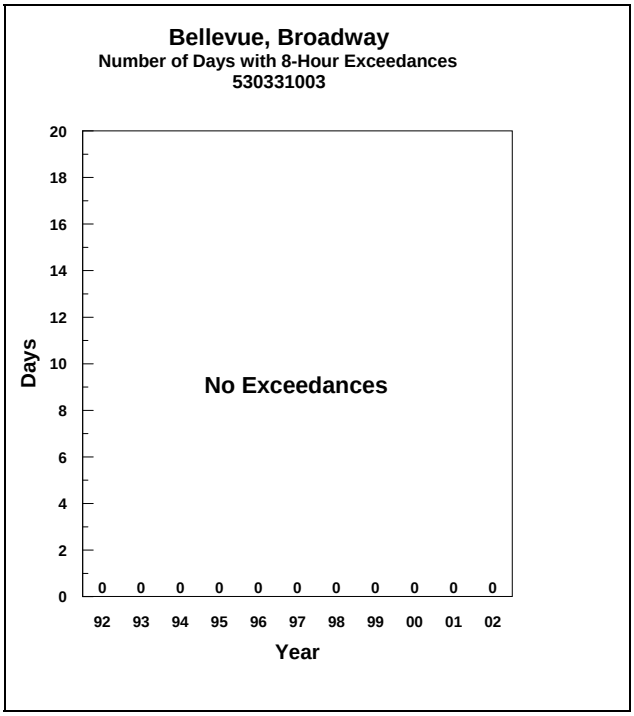
Carbon Monoxide for 1999 - 2002

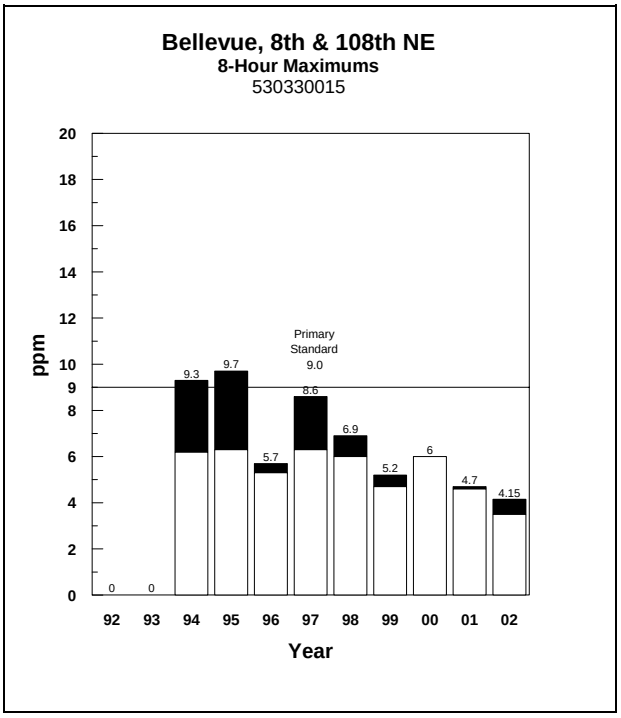
Station	Location	Period of Record	# Hours	# Days	% Valid Data
	1999				
530331003	Bellevue, Broadway	Jan-Jun	4163	173	96
530330015	Bellevue, NE 8th 108th	Jan-Dec	8703	353	99
530330019	Bellevue, 148th & 24th	Jan-Dec	8704	363	99
530330087	Seattle, NE 45th	Jan-Dec	8705	363	99
530330077	Seattle, 4th & Pike	Jan-Dec	8708	363	99
530330025	Seattle, Northgate	Jan-Dec	8663	361	99
530330051	Seattle, James Street	Jan-Dec	8701	363	99
530530032	Tacoma, Pacific Ave.	Jan-Dec	8509	355	99
530610012	Everett, Hewitt Ave	Jan-Dec	8682	362	99
530610004	Lynnwood, 44th Ave. W	Jan-Dec	8709	363	99
	2000				
530330015	Bellevue, NE 8th 108th	Jan-Dec	8450	352	96
530330019	Bellevue, 148th & 24th	Jan-Dec	8713	363	99
530330087	Seattle, NE 45th	Jan-Dec	8706	363	99
530330077	Seattle, 4th & Pike	Jan-Dec	8658	361	98
530330025	Seattle, Northgate	Jan-Dec	8686	362	99
530330051	Seattle, James Street	Jan-Dec	8702	363	99
530530032	Tacoma, Pacific Ave.	Jan-Dec	7608	317	87
530610012	Everett, Hewitt Ave	Jan-Mar	2257	94	99
530610004	Lynnwood, 44th Ave. W	Jan-Dec	8712	363	99
	2001				
530330015	Bellevue, NE 8th 108th	Jan-Dec	8342	348	95
530330019	Bellevue, 148th & 24th	Jan-Dec	8681	362	99
530330087	Seattle, NE 45th	Jan-Dec	8598	358	98
530330077	Seattle, 4th & Pike	Jan-Dec	8480	353	96
530330025	Seattle, Northgate	Jan-Dec	8000	333	91
530330051	Seattle, James Street	Jan-Feb	1366	57	96
530530032	Tacoma, Pacific Ave.	Jan-Dec	8366	349	95
530610006	Everett, Broadway	Apr-Dec	6081	253	92
530610004	Lynnwood, 44th Ave. W	Jan-Dec	8681	362	99
Station	Location	Period of Record	# Hours	# Days	% Valid Data
	2002				
530330015	Bellevue, NE 8th 108th	Jan-Dec	8103	338	92
530330019	Bellevue, 148th & 24th	Jan-Dec	8680	362	99
530330087	Seattle, NE 45th	Jan-Dec	8702	363	99
530330077	Seattle, 4th & Pike	Jan-Dec	8689	362	99
530330025	Seattle, Northgate	Jan-Dec	7340	306	83
530530032	Tacoma, Pacific Ave.	Jan-Dec	5486	229	94
530610004	Lynnwood, 44th Ave. W	Jan-Dec	8376	349	95

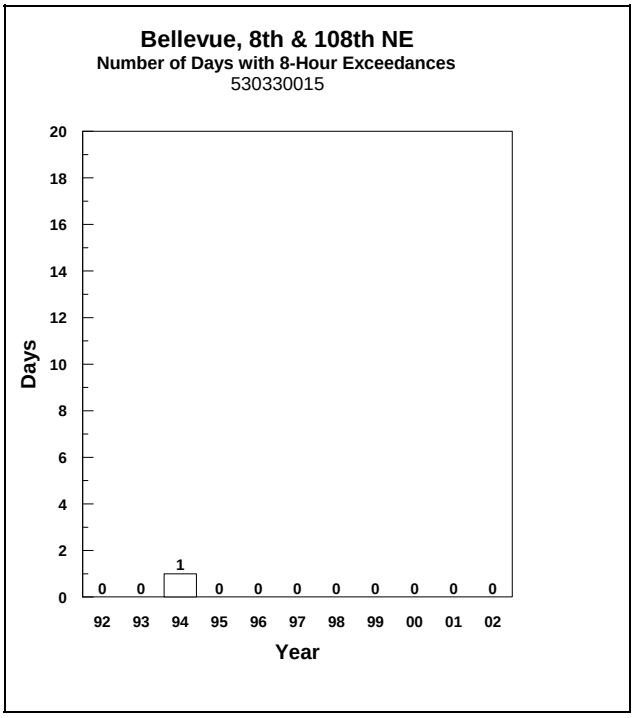
Puget Sound Area (cont)

Carbon Monoxide



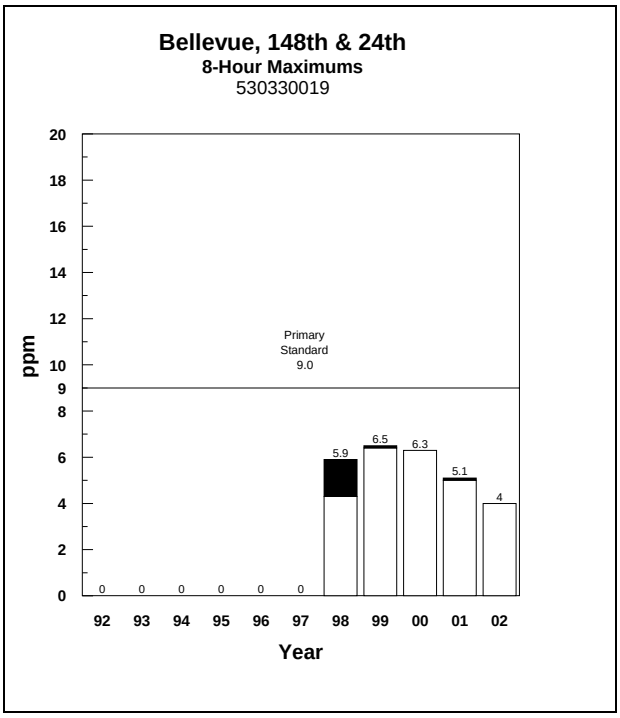


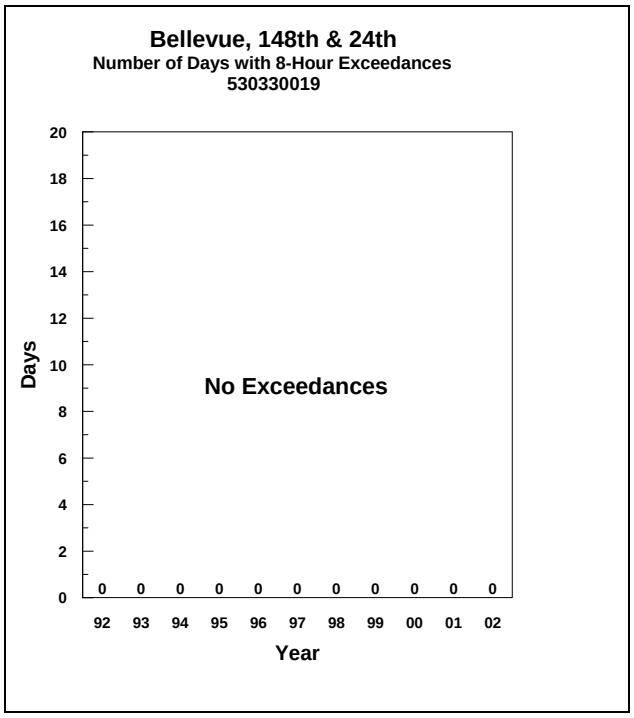


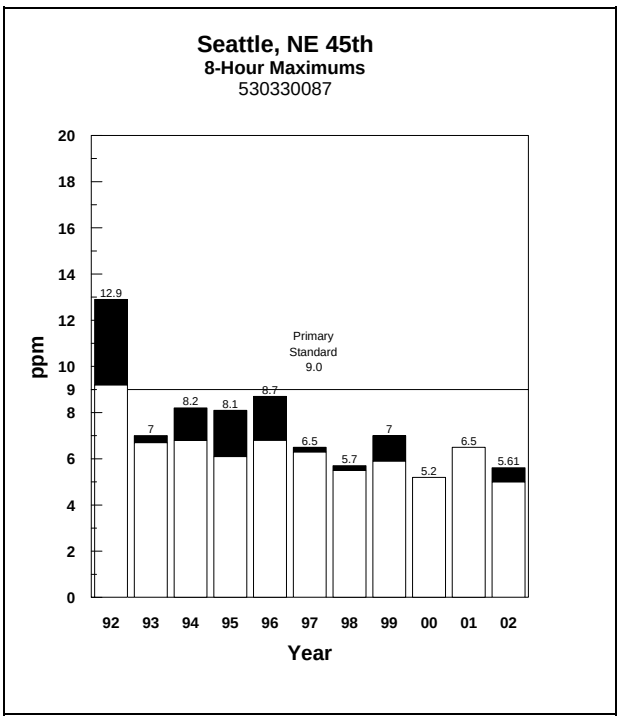


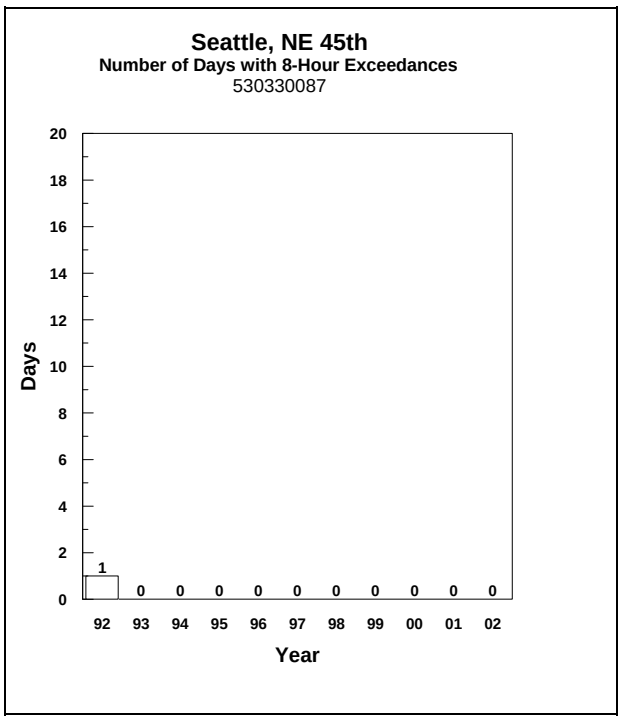
Puget Sound Area (cont)

Carbon Monoxide



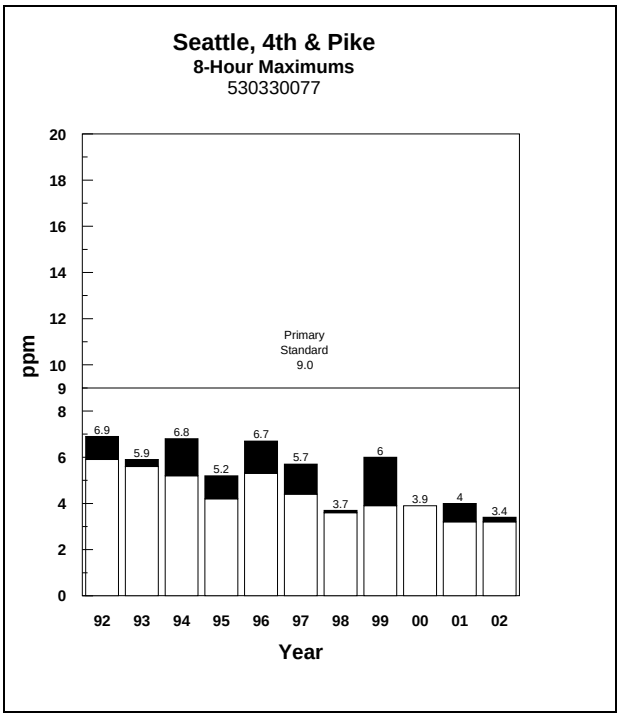


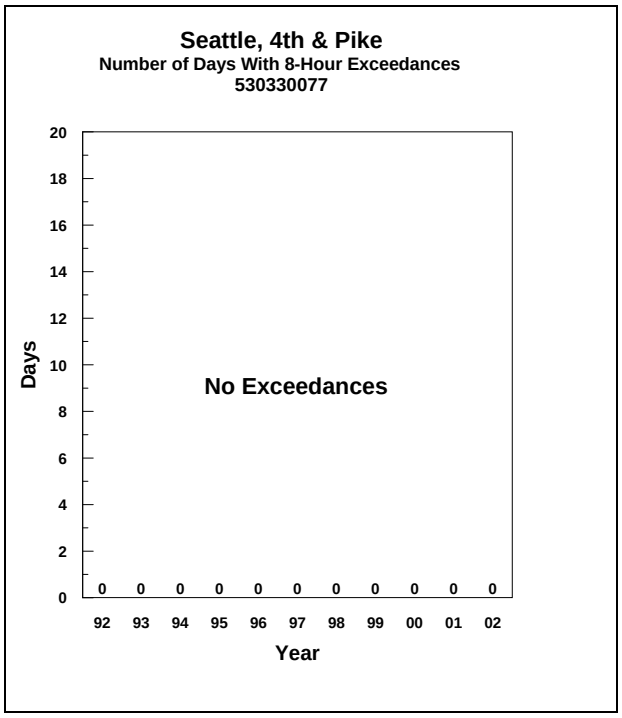


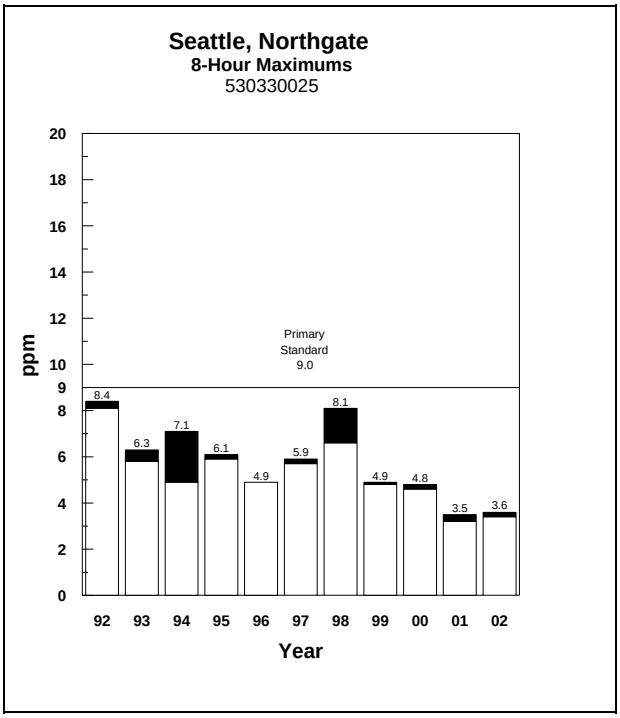


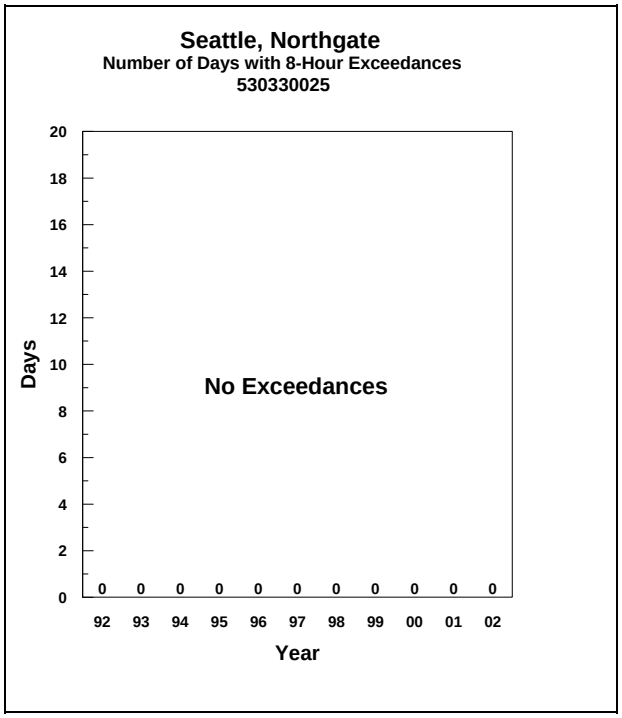
Puget Sound Area (cont)

Carbon Monoxide



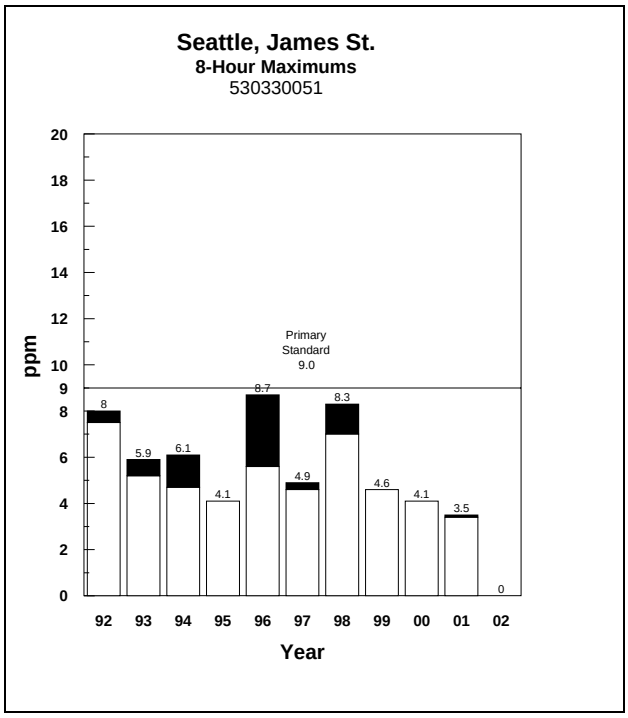


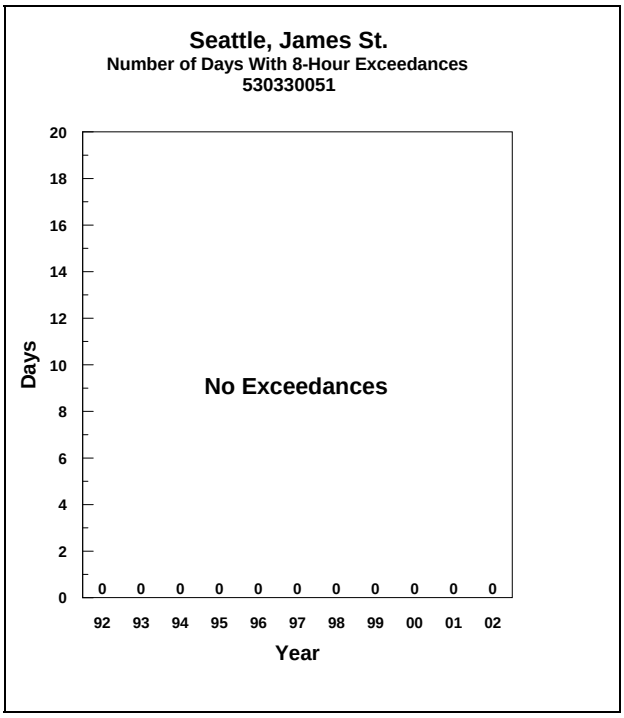


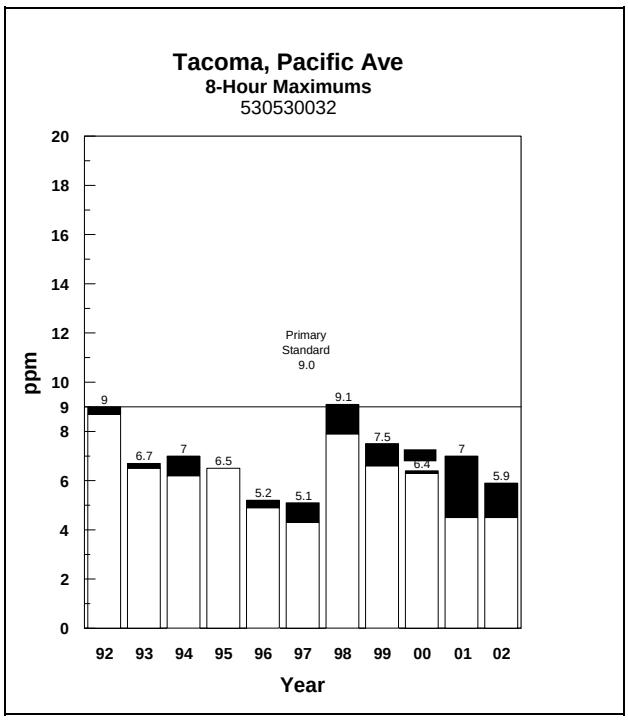


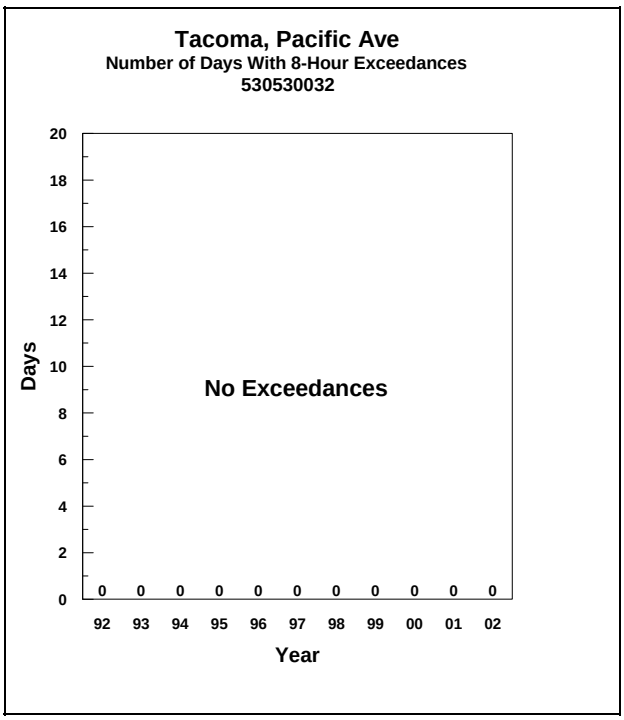
Puget Sound Area (cont)

Carbon Monoxide



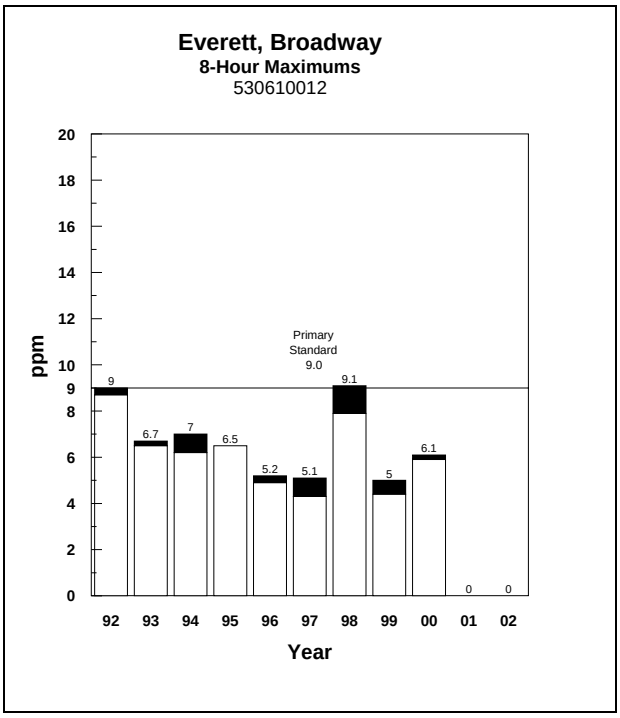


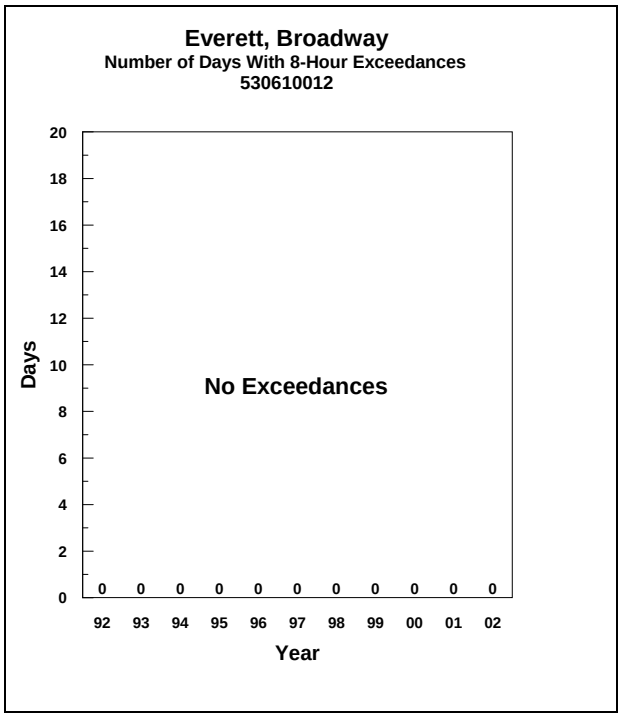


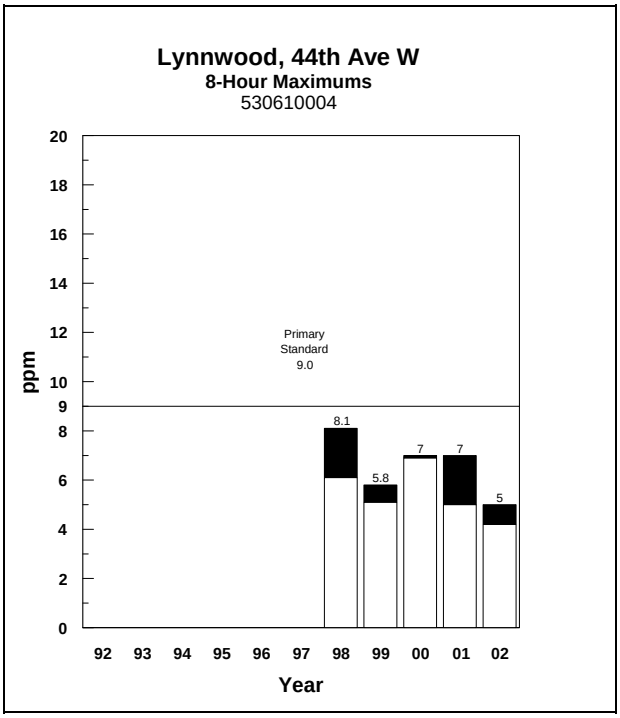


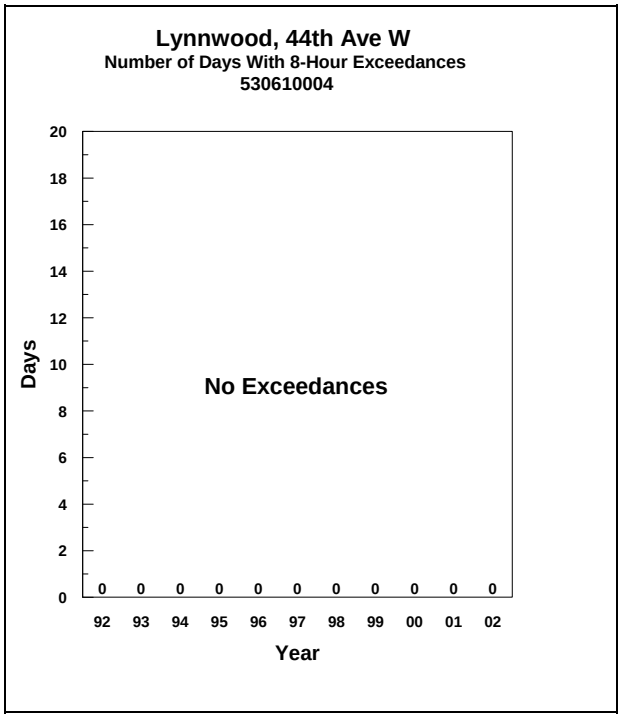
Puget Sound Area (cont)

Carbon Monoxide









Puget Sound Area (cont)

Sulfur Dioxide

Sulfur Dioxide for 1999 (ppm)

Station	Location	1-Hr 1st	Max. Date	2nd	#1 Hr Date	3-Hr >.40	Max Conc.	Date	#3Hr >.50	24-Hr Conc.	Max Date	#24 >.10	Hr >.14	Ann Mean
1999														
530330057	Seattle, Duwmsh	.117	07/10	.075	04/02	0	.074	07/10	0	.021	07/10	0	0	.006
530530021	Tacoma 54th Ave NE	.066	03/11	.064	04/01	0	.046	09/22	0	.024	09/22	0	0	.005
530530031	Tacoma, Alex Ave	.078	04/23	.067	05/20	0	.056	05/20	0	.022	05/20	0	0	.006
530610016	Everett, Hoyt Ave.	.124	04/29	.054	04/24	0	.045	04/29	0	.012	09/13	0	0	.004
2000														
530330080	Seattle, Beacon Hill	.059	08/05	.039	08/05	0	.0437	07/10	0	.0126	08/05	0	0	.0032
2001														
530330080	Seattle, Beacon Hill	.048	01/20	.037	09/13	0	.0286	01/20	0	.0133	03/07	0	0	.0037
2002														
530330080	Seattle, Beacon Hill	.078	09/12	.049	09/12	0	.0416	09/12	0	.0156	09/12	0	0	.0027

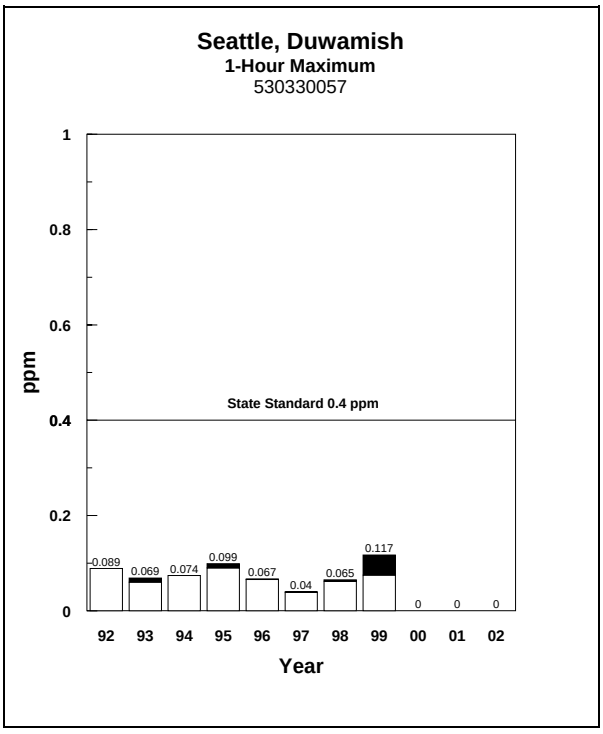
Conc. = Concentrations Max = Maximum Ann. = Annual

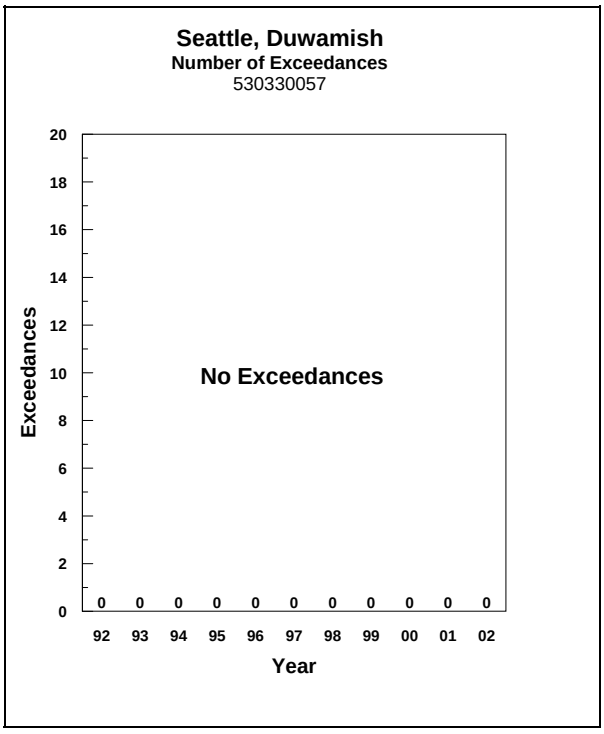
Puget Sound Area (cont)

Sulfur Dioxide

Sulfur Dioxide for 1999 - 2002

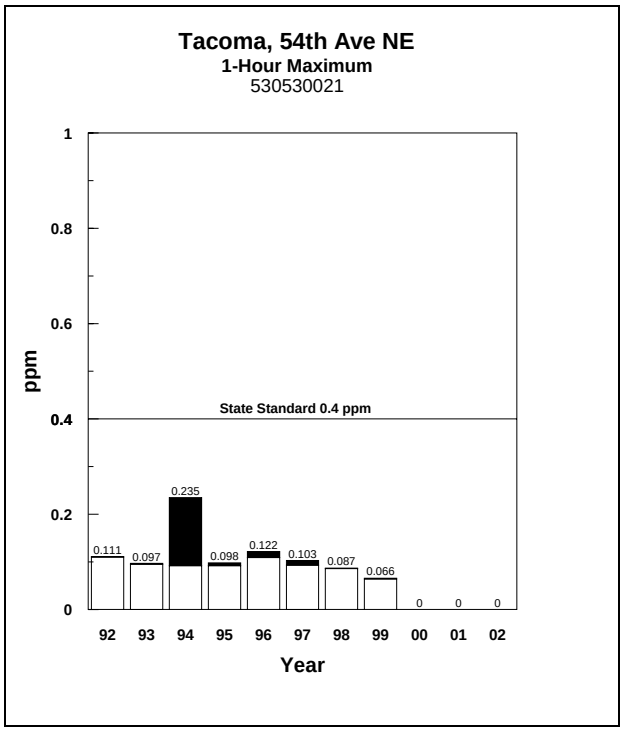
Station	Location	Period of Records	# Hours	# Days	% Valid Data
	1999				
530330057	Seattle, Duwamish	Jan-Sep	6489	270	99
530530021	Tacoma, 54th Ave. N.E.	Jan-Sep	6493	271	99
530530031	Tacoma, Alex Ave.	Jan-Sep	6454	269	99
530610016	Everett, Hoyt Ave.	Jan-Sep	5940	248	91
	2000				
530330080	Seattle, Beacon Hill	Feb-Dec	6785	283	88
	2001				
530330080	Seattle, Beacon Hill	Jan-Dec	8245	344	94
	2002				
530330080	Seattle, Beacon Hill	Jan-Dec	8654	361	98

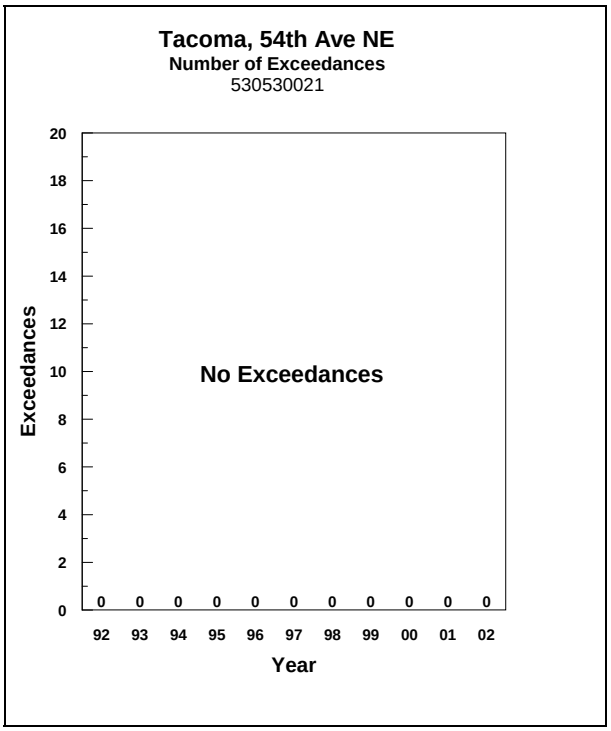


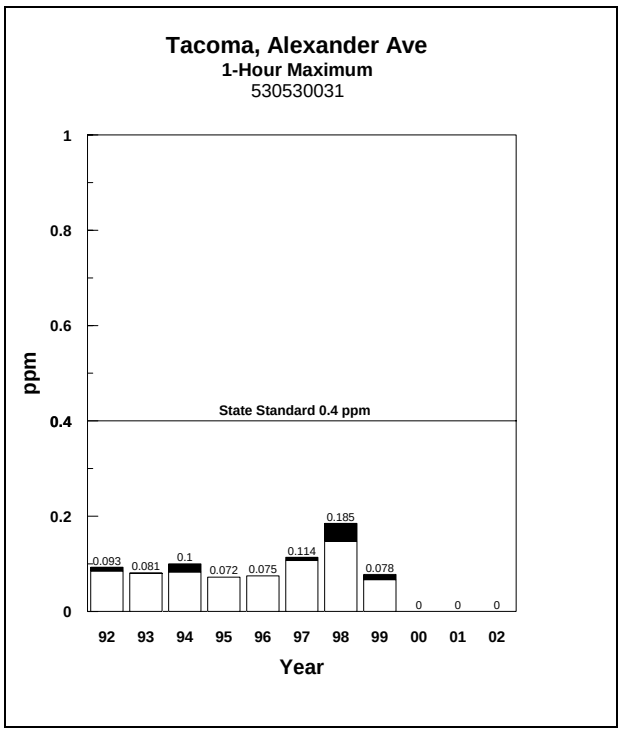


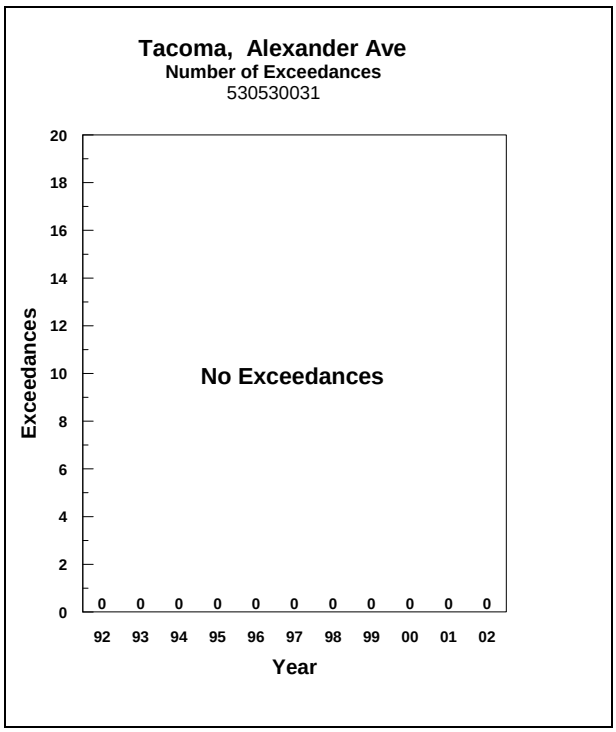
Puget Sound Area (cont)

Sulfur Dioxide



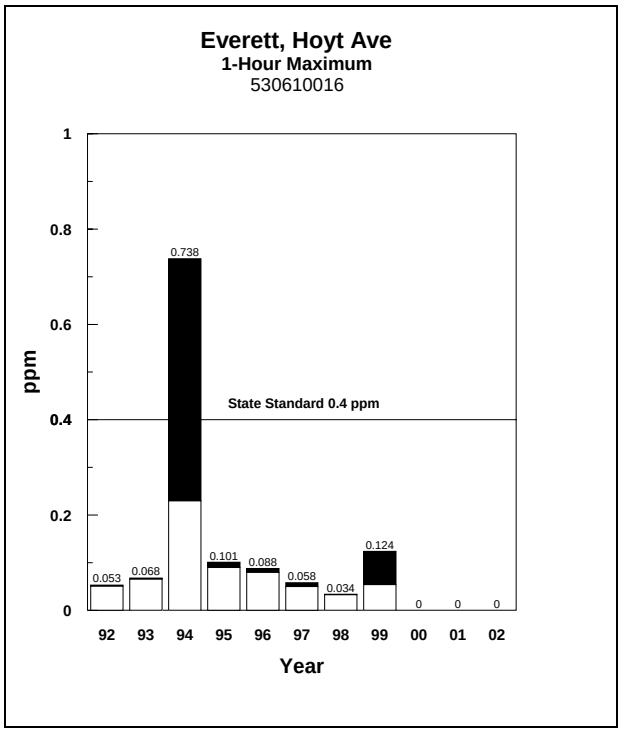


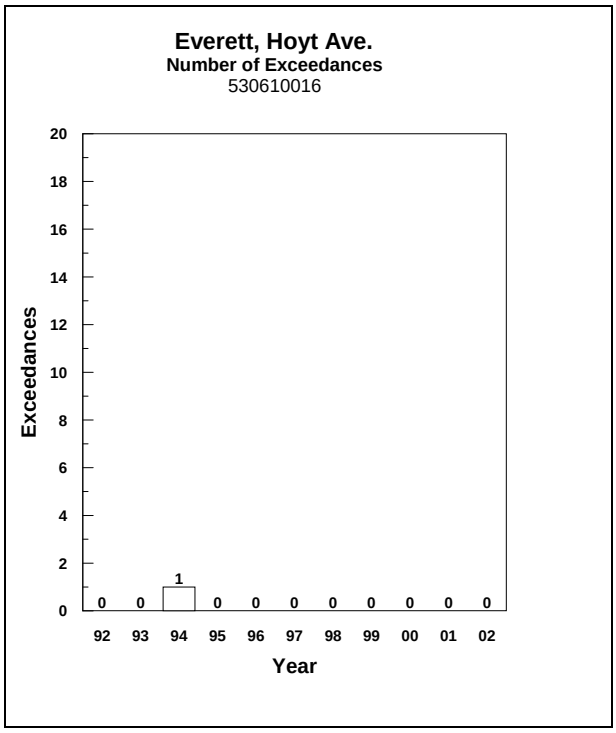


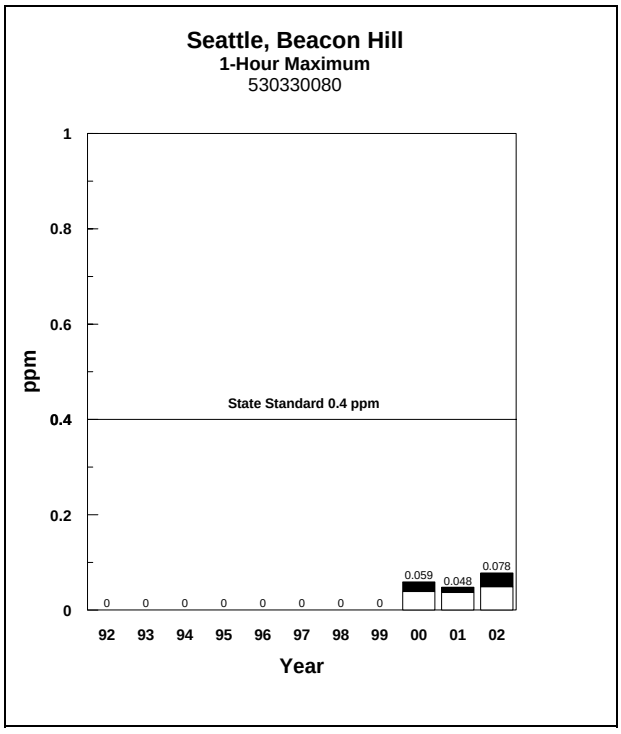


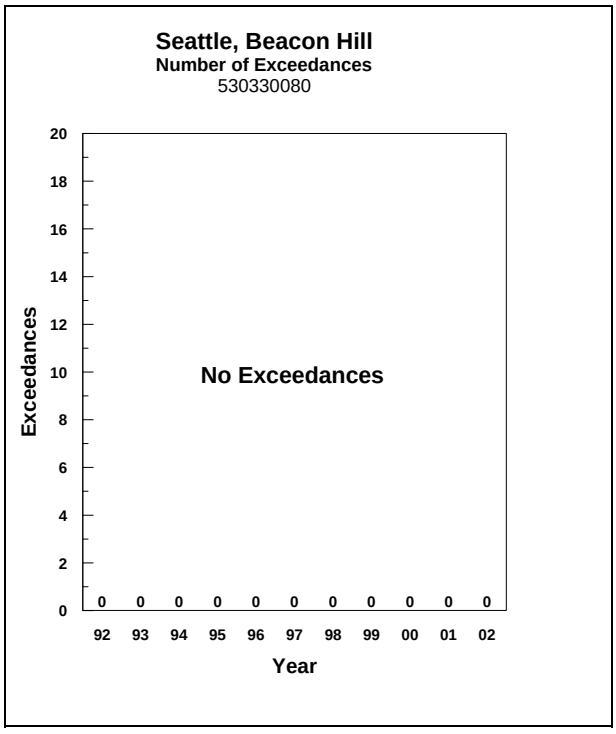
Puget Sound Area (cont)

Sulfur Dioxide









Puget Sound Area (cont)

Nitrogen Dioxide

Nitrogen Dioxide for 1999 - 2002 (ppm)

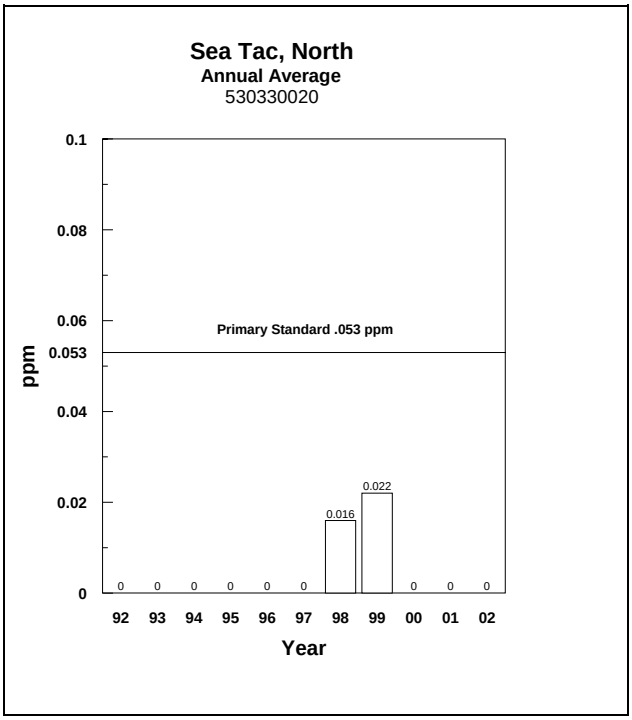
Station	Location			Max 24		Annual
	1999	Max 1 Hr	Date	Hr	Date	Average
530330020	Sea Tac. North	.061	05/05	.034	04/23	.022
530330022	Sea Tac. South	.057	05/26	.031	04/14	.014
530330080	Seattle, Beacon Hill	.076	12/06	.045	09/14	.019
	2000					
530330080	Seattle, Beacon Hill	.074	06/03	.049	09/26	.020
530330032	Seattle, Corson Avenue	.086	12/12	.049	11/21	.021
	2001					
530330080	Seattle, Beacon Hill	.068	12/24	.044	08/10	.020
530330032	Seattle, Corson Avenue	.086	12/26	.045	12/26	.022
	2002					
530330080	Seattle, Beacon Hill	.071	06/13	.039	06/13	.019
530330032	Seattle, Corson Avenue	.070	02/14	.041	05/13	.019

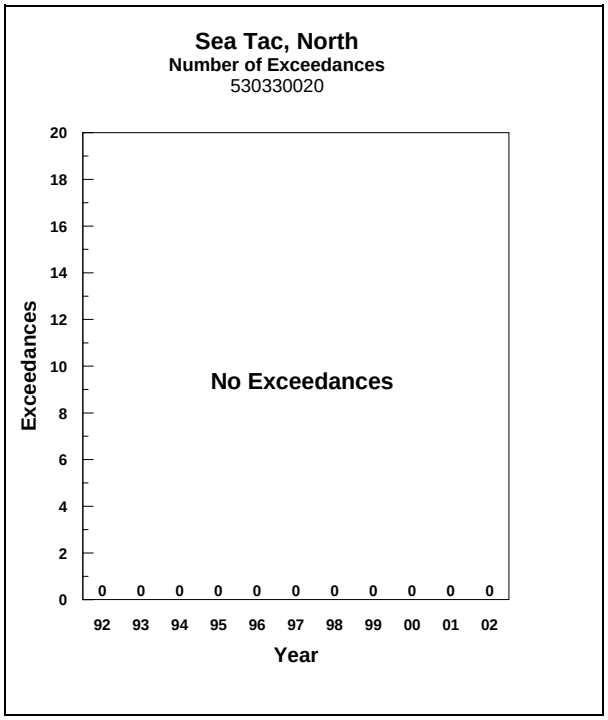
Nitrogen Dioxide for 1999 - 2002

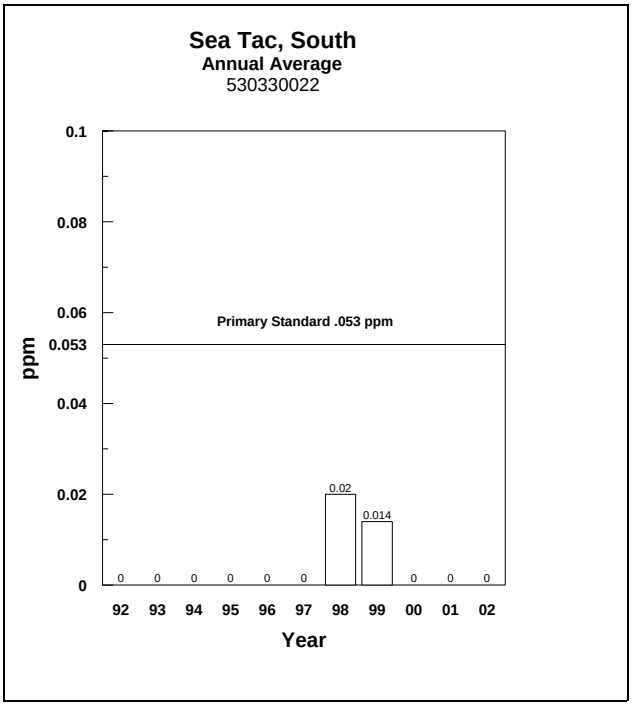
Station	Location	Period of			% Valid
	1999	Record	# Hours	# Days	Data
530330020	Sea Tac. North	Jan-May	3294	137	90
530330022	Sea Tac. South	Jan-May	3517	147	92
530330080	Seattle, Beacon Hill	Jan-Dec	8007	334	91
	2000				
530330080	Seattle, Beacon Hill	Jan-Dec	7407	309	84
530330032	Seattle, Corson Avenue	Feb-Dec	6665	278	83
	2001				
530330080	Seattle, Beacon Hill	Jan-Dec	8183	341	93
530330032	Seattle, Corson Avenue	Jan-Dec	8125	339	92
	2002				
530330080	Seattle, Beacon Hill	Jan-Dec	7521	313	85
530330032	Seattle, Corson Avenue	Jan-Dec	5350	223	97

Puget Sound Area (cont)

Nitrogen Dioxide

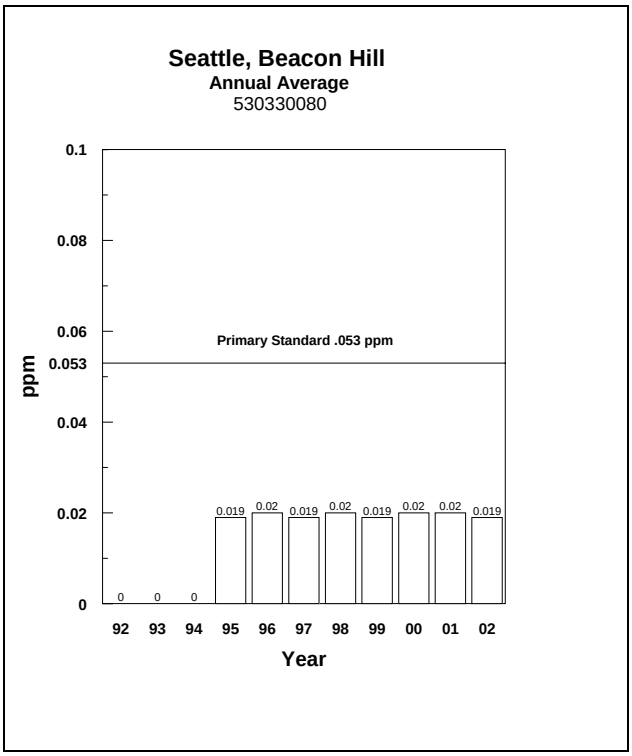


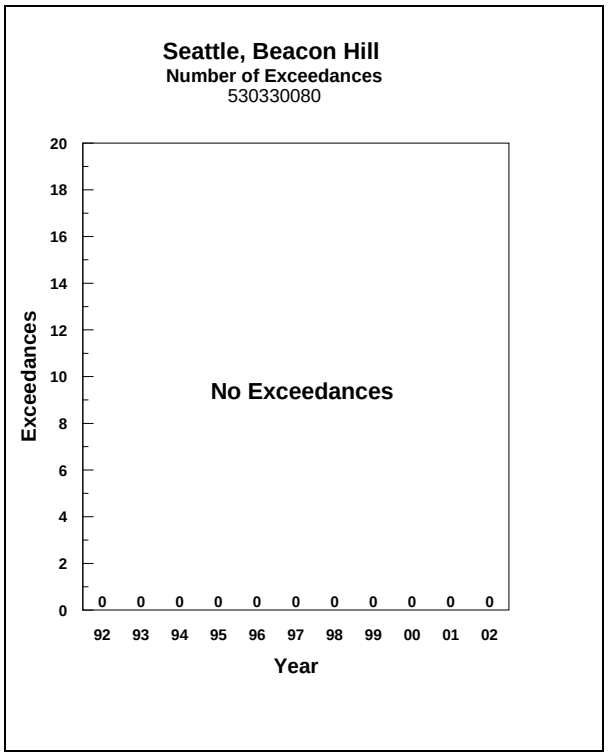


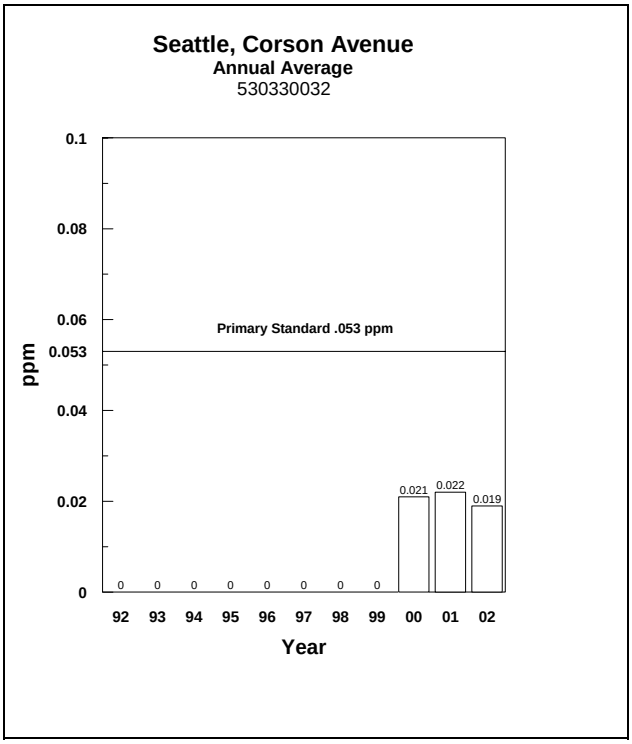


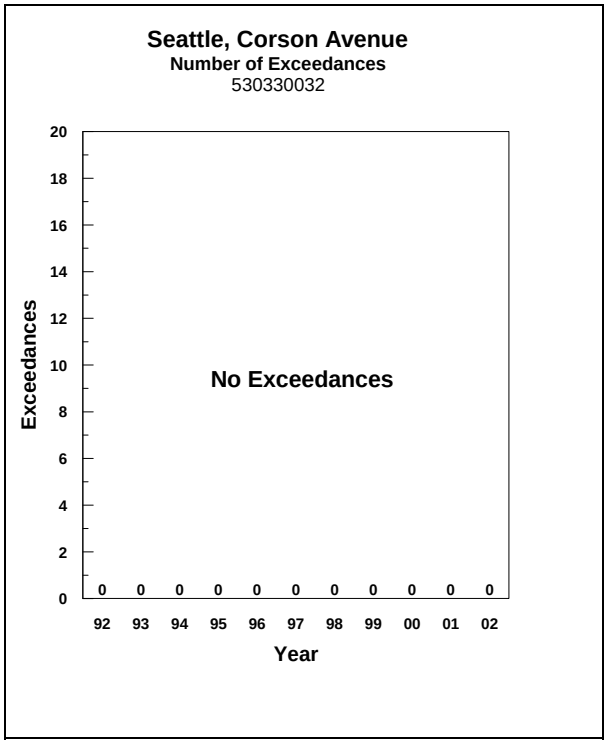
Puget Sound Area (cont)

Nitrogen Dioxide









Puget Sound Area (cont)

Ozone

1-Hour Ozone for 1999 - 2002 (ppm)

Station	Location	1st Conc.	1 - Hr High Date	Maxs. 2nd Conc.	High Date	2nd Day Conc.	High* Date
	1999						
530330010	King Co., Lake Samm.	.073	06/14	.071	06/14	.067	07/10
530337001	King Co., Enumclaw	.106	07/10	.101	07/10	.088	07/28
530330017	North Bend, No. Bend Way	.083	07/27	.079	07/27	.076	07/09
530330023	King Co., Mud Mountain	.110	07/10	.099	07/10	.091	07/28
530330080	Seattle, Beacon Hill	.058	06/12	.054	06/12	.051	07/06
530531008	Pierce Co., Pack Forest	.096	07/10	.093	07/10	.079	06/14
530530012	Pierce Co., Jackson Center	.104	07/10	.102	07/10	.085	07/27
	2000						
530330010	King Co., Lake Samm.	.094	06/27	.093	06/27	.080	06/28
530337001	King Co., Enumclaw	.102	06/28	.099	06/28	.095	06/04
530330017	North Bend, No. Bend Way	.095	06/28	.094	06/28	.090	06/27
530330023	King Co., Mud Mountain	.110	06/28	.099	06/28	.095	06/04
530330080	Seattle, Beacon Hill	.059	06/03	.057	05/15	.057	05/15
530531008	Pierce Co., Pack Forest	.083	06/04	.081	06/04	.079	06/03
530530012	Pierce Co., Jackson Center	.082	06/04	.075	06/04	.075	08/23
	2001						
530330010	King Co., Lake Samm.	.079	08/12	.077	08/12	.069	07/03
530330017	North Bend, No. Bend Way	.081	08/10	.079	08/10	.077	05/22
530330023	King Co., Mud Mountain	.108	08/12	.105	08/12	.088	08/09
530330080	Seattle, Beacon Hill	.059	08/11	.058	05/12	.058	05/12
530531008	Pierce Co., Pack Forest	.098	08/12	.096	08/12	.086	08/10
530530012	Pierce Co., Jackson Center	.085	06/20	.082	06/20	.081	08/10
530530028	Pierce Co., Graham	.091	08/12	.084	08/12	.075	06/20
	2002						
530330010	King Co., Lake Samm.	.080	07/10	.075	07/10	.071	07/22
530330017	North Bend, No. Bend Way	.097	07/10	.094	07/10	.092	07/23
530330023	King Co., Mud Mountain	.099	07/22	.093	07/23	.093	07/23
530330080	Seattle, Beacon Hill	.053	05/16	.053	06/12	.053	06/12
530531008	Pierce Co., Pack Forest	.088	06/25	.087	06/13	.087	06/13
530530012	Pierce Co., Jackson Center	.088	07/10	.081	07/10	.076	07/11
530530028	Pierce Co., Graham	.087	07/10	.086	06/13	.086	06/13

* 2nd Day High = Second day with the highest 1-hour average.
Conc.= Concentrations Maxs.= Maximums

Puget Sound Area (cont)

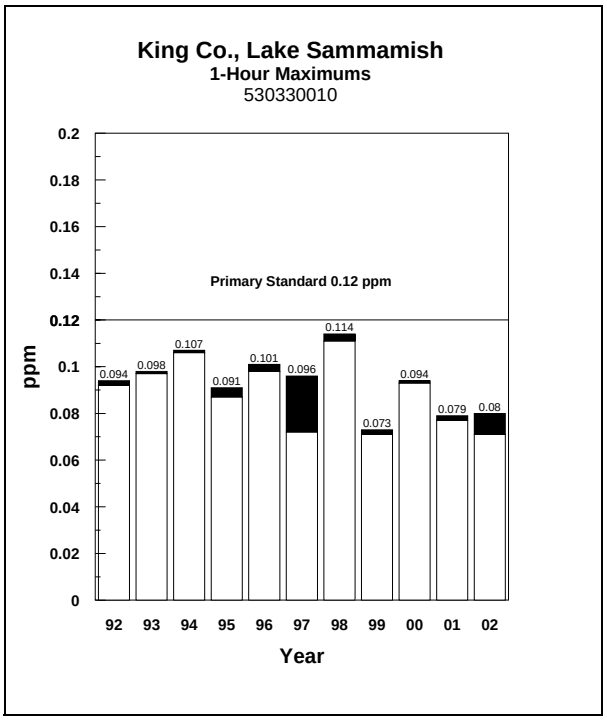
Ozone

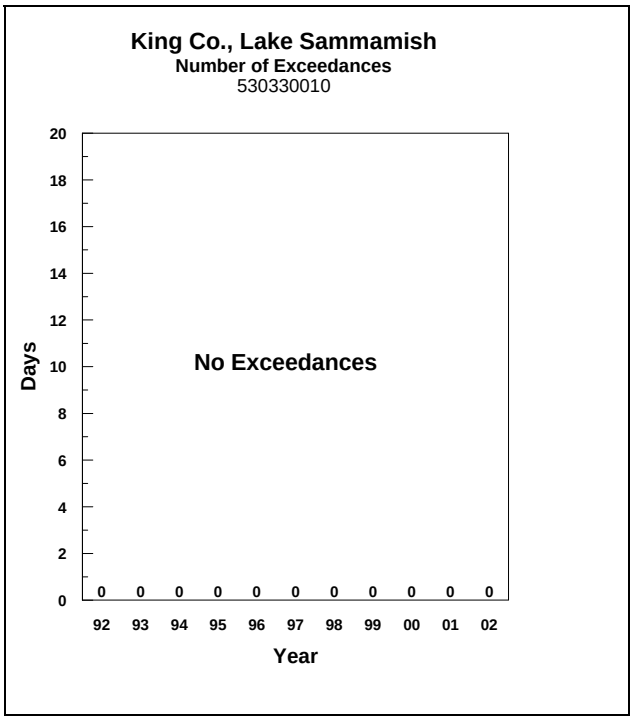
Ozone for 1999 - 2002

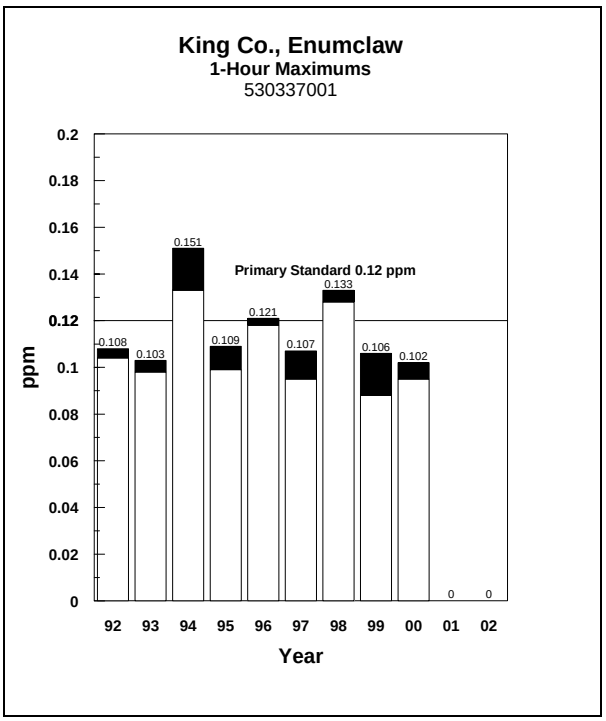
Station	Location	Period of Record	# Hours	# Days	% Valid Data
	1999				
530330010	King Co., Lake Samm. Wy	May-Sep	3636	152	99
530337001	King Co., Enumclaw	May-Sep	3400	142	93
530330017	North Bend, No. Bend Way	May-Sep	3620	151	99
530332023	King Co., Mud Mountain	May-Sep	3635	151	99
530330080	Seattle, Beacon Hill	May-Sep	3619	151	99
530531008	Pierce Co., Pack Forest	May-Sep	3617	151	99
530530012	Pierce Co., Jackson Center	Jan-Dec	8651	360	99
	2000				
530330010	King Co., Lake Samm. Wy	May-Sep	3636	152	99
530337001	King Co., Enumclaw	May-Sep	3632	151	99
530330017	North Bend, No. Bend Way	May-Sep	3623	151	99
530332023	King Co., Mud Mountain	May-Sep	3591	150	98
530330080	Seattle, Beacon Hill	May-Sep	3468	145	94
530531008	Pierce Co., Pack Forest	May-Sep	3616	151	98
530530012	Pierce Co., Jackson Center	Jan-Dec	8586	358	9
	2001				
530330010	King Co., Lake Samm. Wy	May-Sep	3633	151	98
530330017	North Bend, No. Bend Way	May-Sep	3613	151	98
530332023	King Co., Mud Mountain	May-Sep	3626	151	98
530330080	Seattle, Beacon Hill	May-Sep	3573	149	97
530531008	Pierce Co., Pack Forest	May-Sep	3375	141	91
530530012	Pierce Co., Jackson Center	Jan-Dec	7821	326	89
	2002				
530330010	King Co., Lake Samm. Wy	May-Sep	3646	152	99
530330017	North Bend, No. Bend Way	May-Sep	3641	152	99
530332023	King Co., Mud Mountain	May-Sep	3047	127	97
530330080	Seattle, Beacon Hill	May-Sep	3295	137	89
530531008	Pierce Co., Pack Forest	May-Sep	3578	149	97
530530012	Pierce Co., Jackson Center	Jan-Dec	8151	340	93

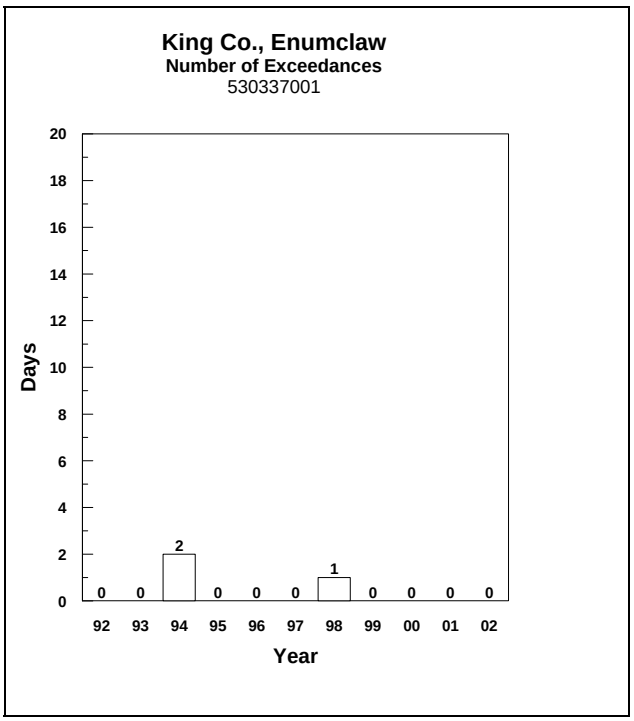
Puget Sound Area (cont)

Ozone



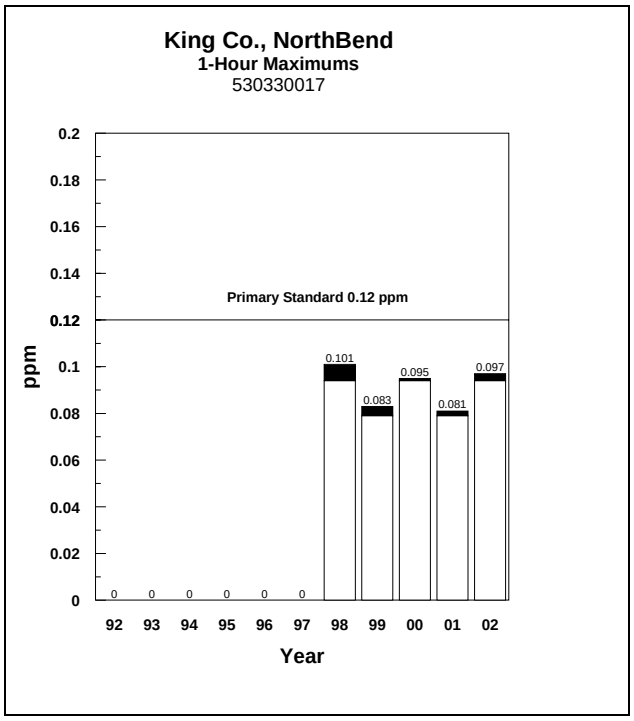


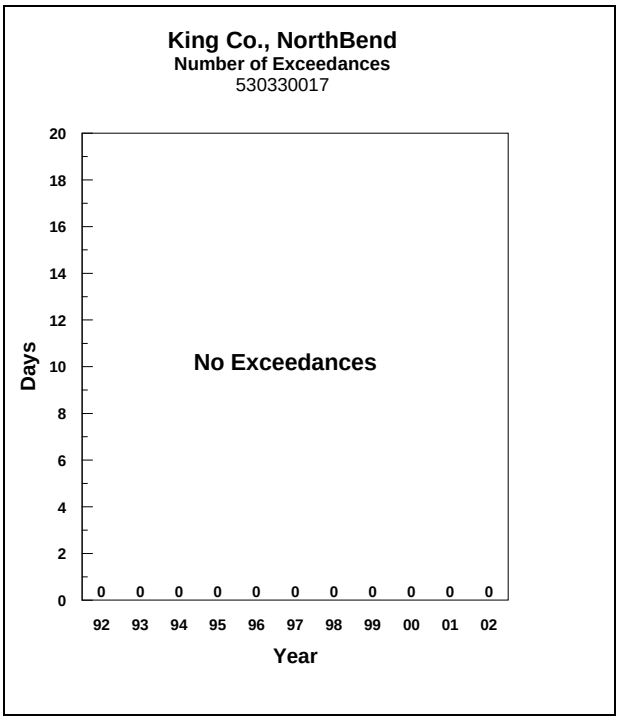


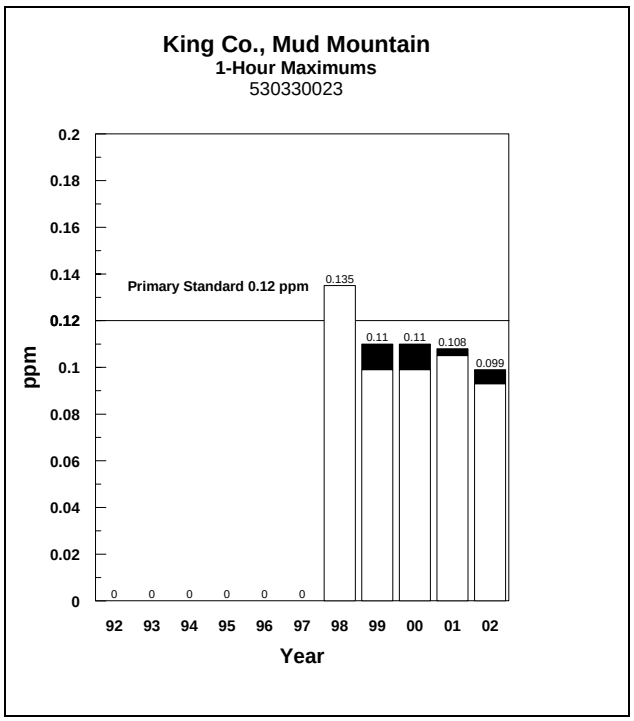


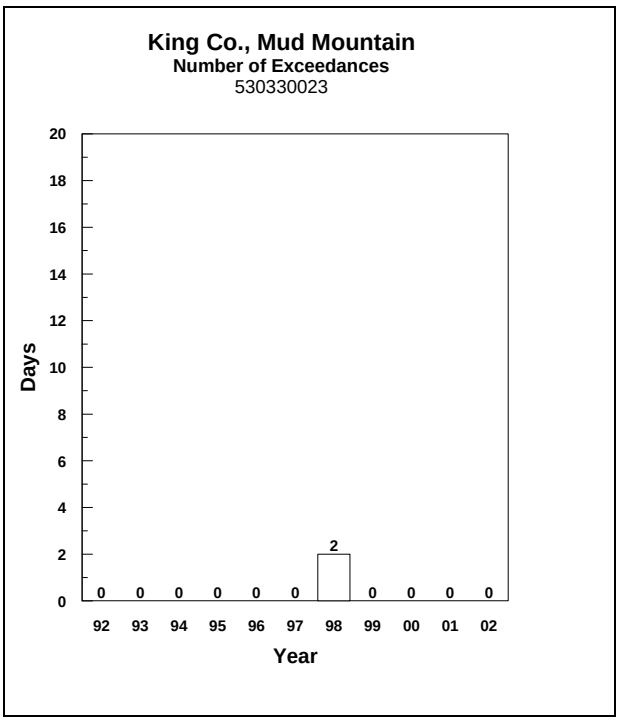
Puget Sound Area (cont)

Ozone



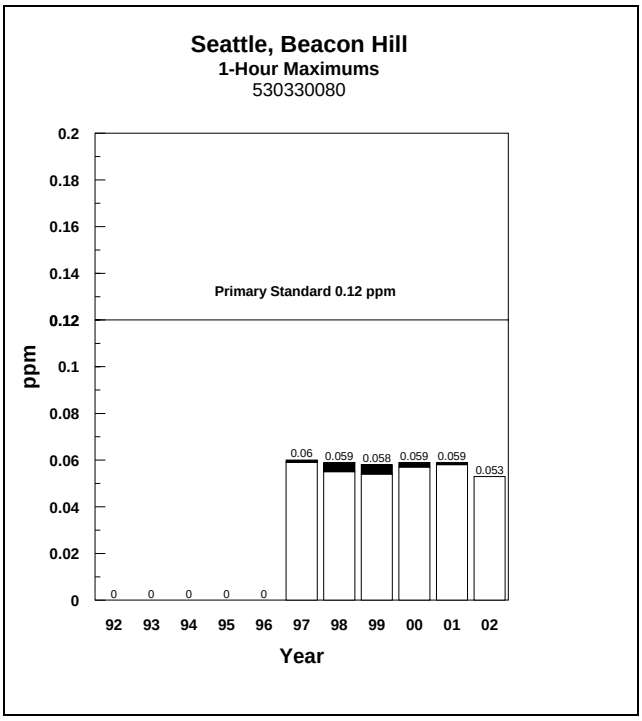


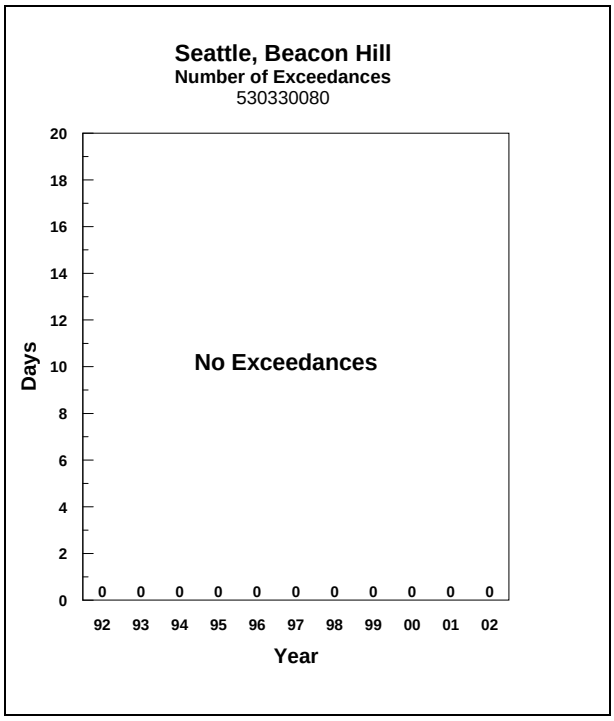


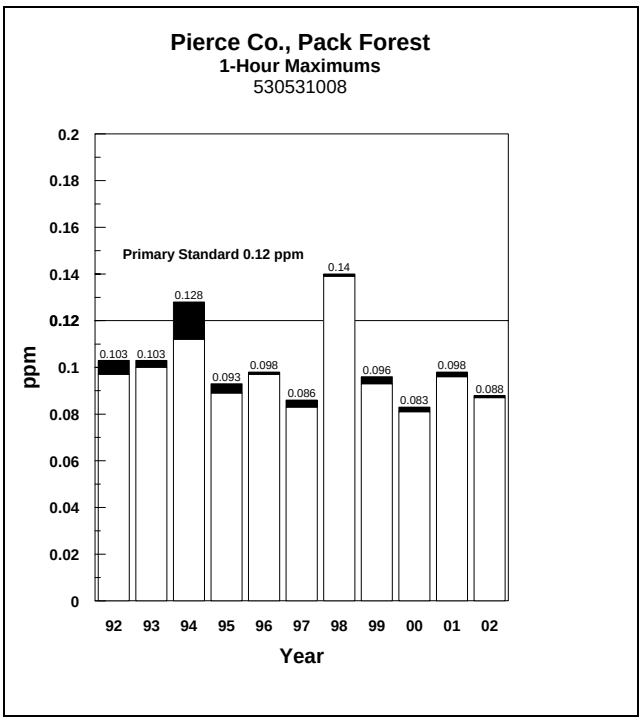


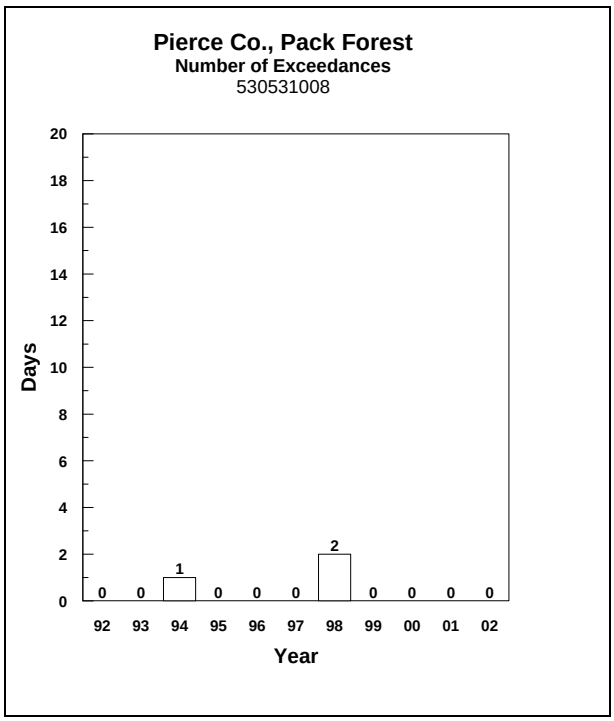
Puget Sound Area (cont)

Ozone



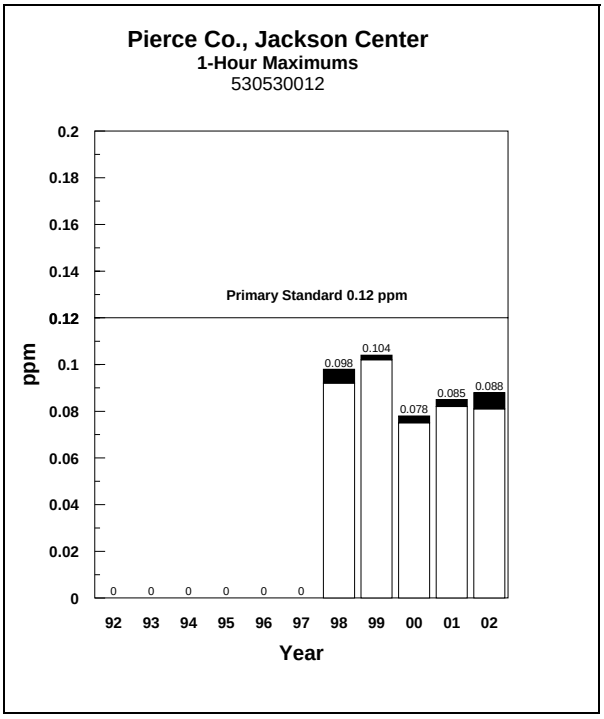


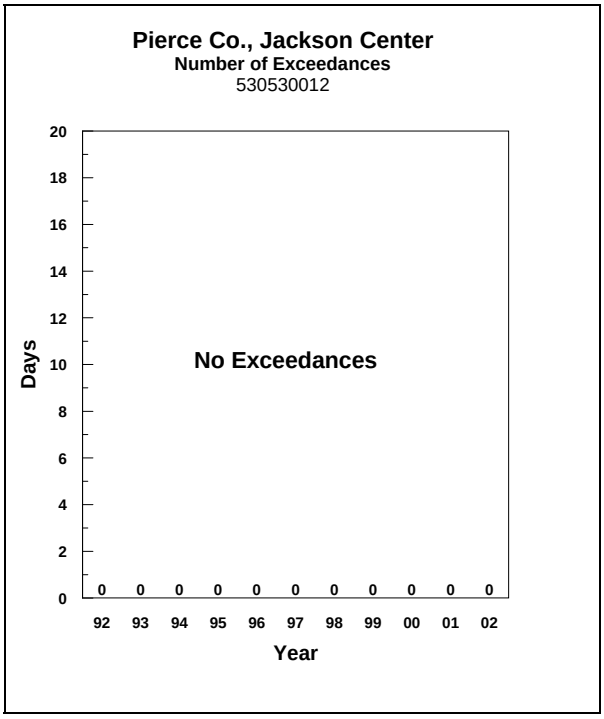




Puget Sound Area (concluded)

Ozone





Southwest Area

Particulate Matter (PM_{10})

PM_{10} Annual Arithmetic Means ($\mu g/m^3$)

Station	Location	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
530110013	Vancouver 4th Plain	23	22	22	17	17	19	14	16	16	16	17
530150006	Longview, City Shops	27	24	25	22	20	23*	19	20	21	22	

* Average based on less than 12 months of data.

PM_{10} for 1999 - 2002 ($\mu g/m^3$)

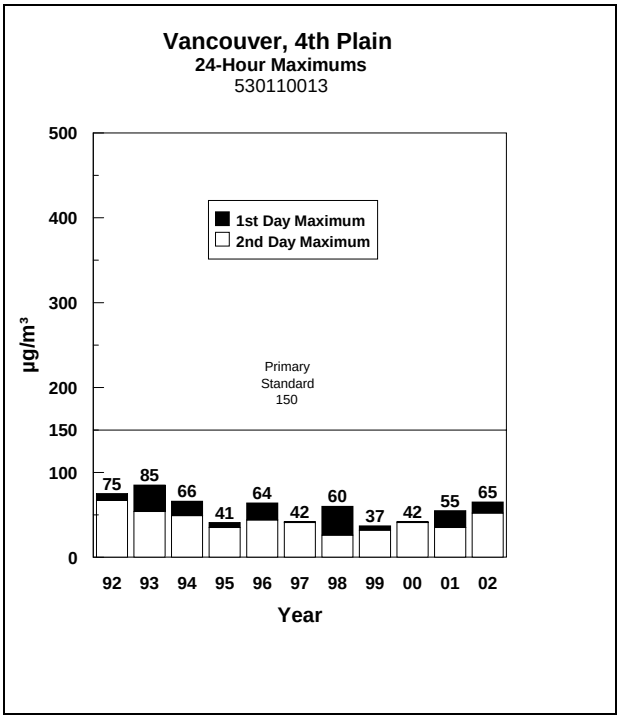
Station	Location	1st High		2nd High	
	1999	Concentration	Date	Concentration	Date
530110013	Vancouver 4th Plain	37	12/26	32	01/24
530150006	Longview, City Shops	45	10/21	38	09/21
	2000				
530110013	Vancouver 4th Plain	42	02/18	41	11/20
530150006	Longview, City Shops	65	02/18	49	11/20
	2001				
530110013	Vancouver 4th Plain	55	11/09	35	10/04
	2002				
530110013	Vancouver 4th Plain	65	11/04	52	11/28

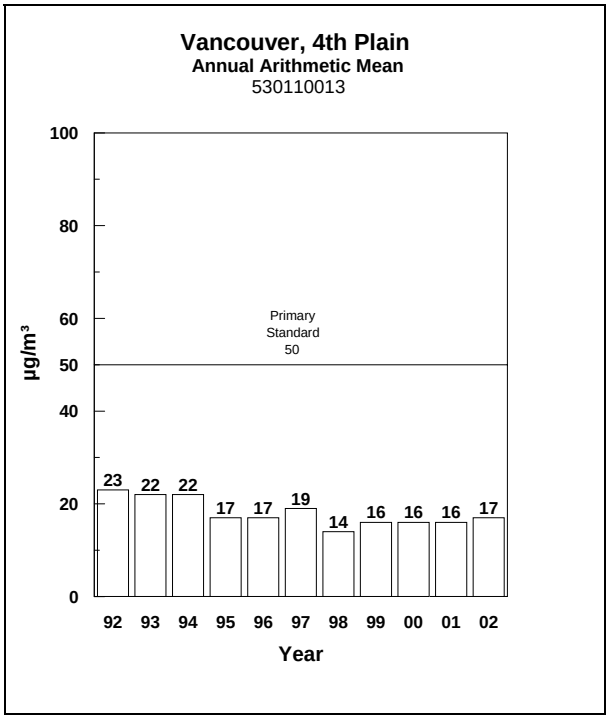
PM_{10} for 1999 - 2002

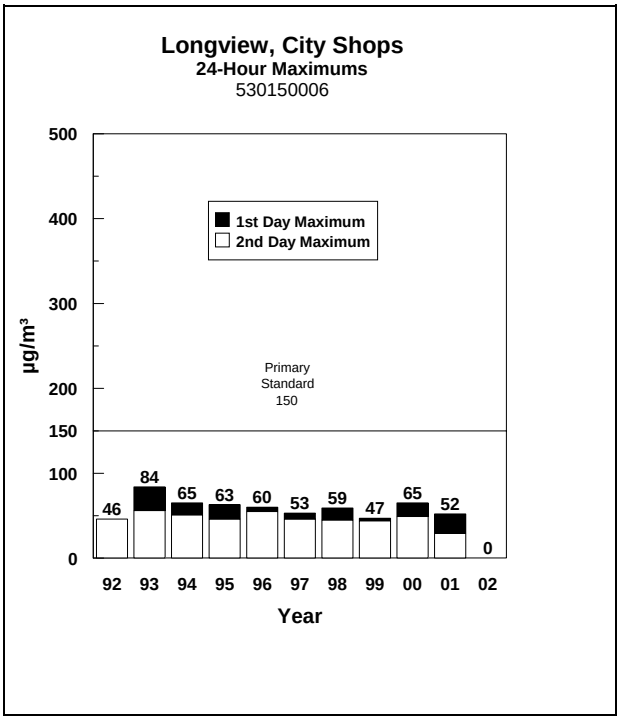
Station	Location	Period of	Sampling		% Valid
	1999	Record	Frequency	# Samples	Data
530110013	Vancouver 4th Plain	Jan-Dec	1/6	57	95
530150006	Longview, City Shops	Jan-Dec	1/6	60	100
	2000				
530110013	Vancouver 4th Plain	Jan-Dec	1/6	60	98
530150006	Longview, City Shops	Jan-Dec	1/6	61	100
	2001				
530110013	Vancouver 4th Plain	Jan-Dec	1/6	61	100
	2002				
530110013	Vancouver 4th Plain	Jan-Dec	1/6	61	100

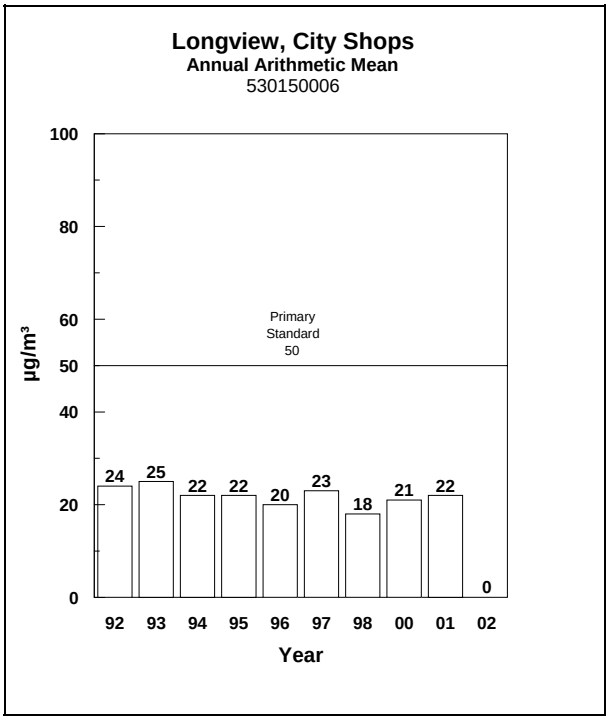
Southwest Area (cont)

Particulate Matter (PM_{10})









Southwest Area (cont)

Particulate Matter ($PM_{2.5}$)

$PM_{2.5}$ Annual Arithmetic Means ($\mu g/m^3$)

Station	Location	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
530110013	Vancouver, 4th Plain								9.4	10.8	9.6	9.9
530150015	Longview, Olympic Sch										8.9	9.6
530110020	Camas, City Hall										6.9	6.4
530590002	Stevenson, County Jail											7.2

$PM_{2.5}$ for 1999 - 2002 ($\mu g/m^3$)

Station	Location	1st High Conc.	Date	2nd High Conc.	Date
	1999				
530110013	Vancouver, 4th Plain	37.7	12/26	33.8	12/23
	2000				
530110013	Vancouver, 4th Plain	48.8	11/17	42.7	11/11
	2001				
530110013	Vancouver, 4th Plain	45.5	11/09	35.8	01/16
530150015	Longview, Olympic School	48.2	12/30	42.0	11/09
530110020	Camas, City Hall	16.8	11/09	14.0	11/03
	2002				
530110013	Vancouver, 4th Plain	57.2	12/01	47.1	11/04
530150015	Longview, Olympic School	23.4	02/13	21.4	01/14
530110020	Camas, City Hall	12.8	01/14	9.7	04/20
530590002	Stevenson, County Jail	24.6	11/16	24.5	11/28

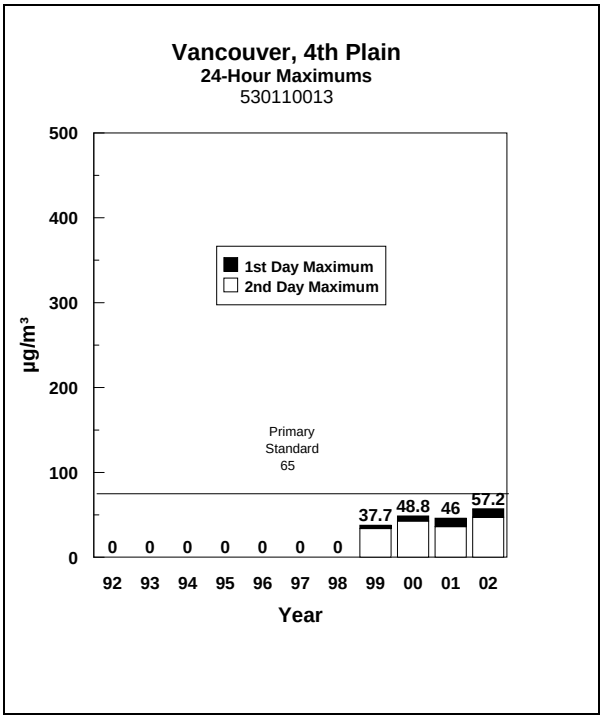
$PM_{2.5}$ for 1999 - 2002

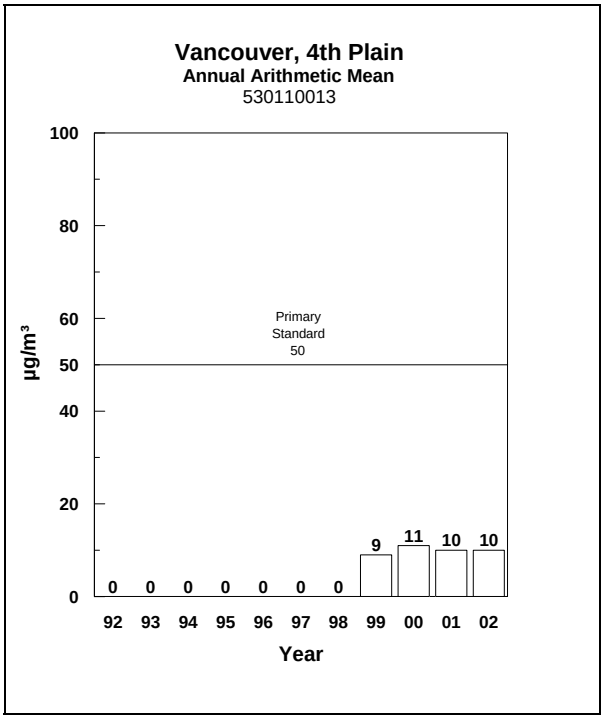
Station	Location	Period of Record	Sampling Freq.	# Samples	% Valid Data
	1999				
530110013	Vancouver, 4th Plain	Jan-Dec	1/3	94	78
	2000				
530110013	Vancouver, 4th Plain	Jan-Dec	1/3	115	94
	2001				
530110013	Vancouver, 4th Plain	Jan-Dec	1/3	119	97
530150015	Longview, Olympic School	Apr-Dec	1/6	47	100
530110020	Camas, City Hall	Apr-Dec	1/6	45	100
	2002				
530110013	Vancouver, 4th Plain	Jan-Dec	1/3	121	99
530150015	Longview, Olympic School	Jan-Dec	1/6	23	100
530110020	Camas, City Hall	Jan-Dec	1/6	23	100

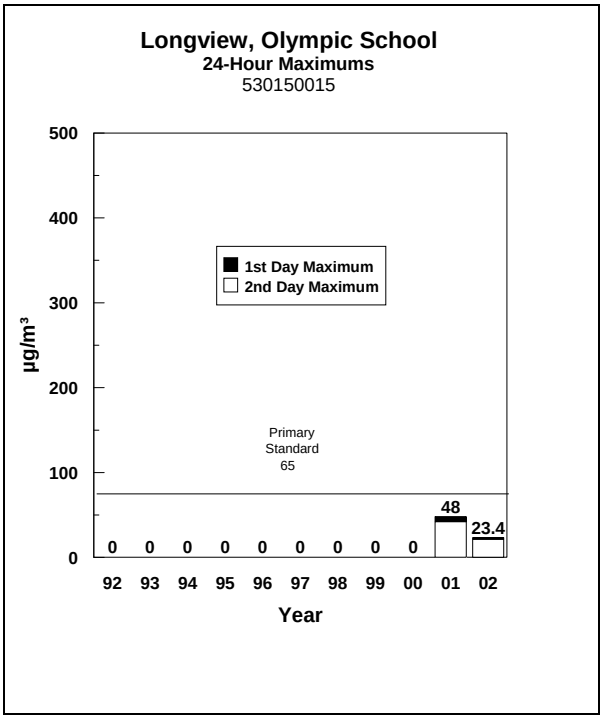
Conc. = Concentrations Freq. = Frequency

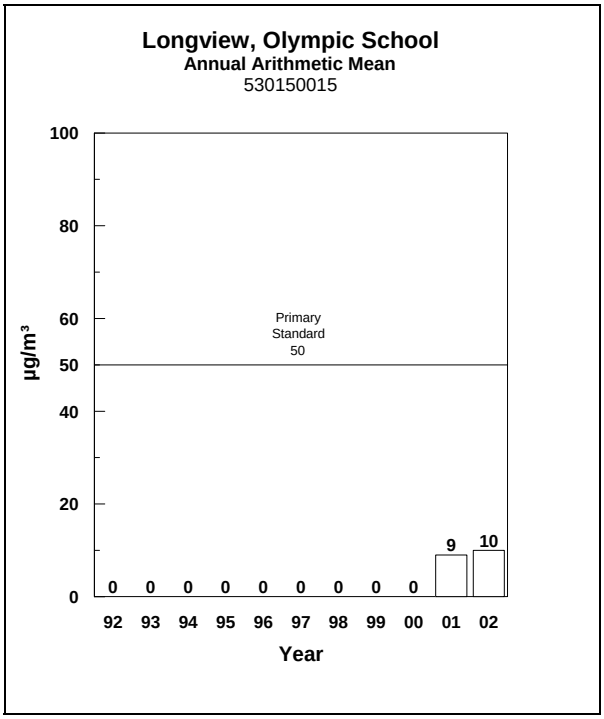
Southwest Area (cont)

Particulate Matter ($PM_{2.5}$)



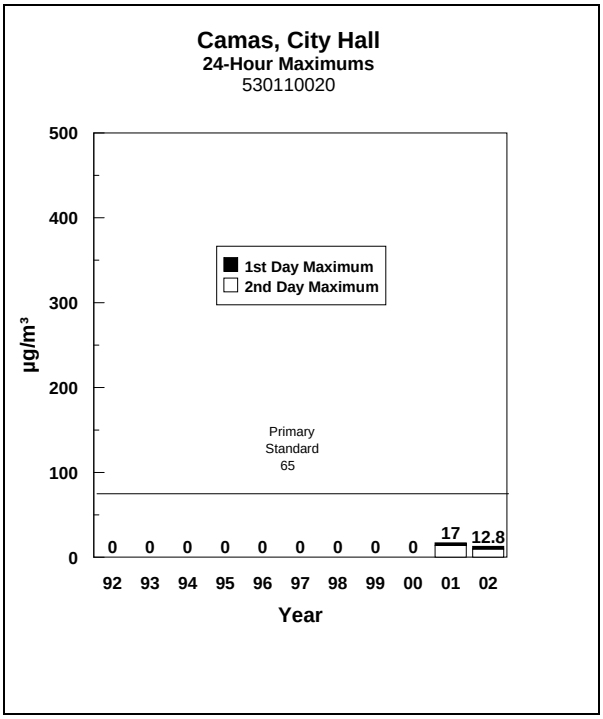


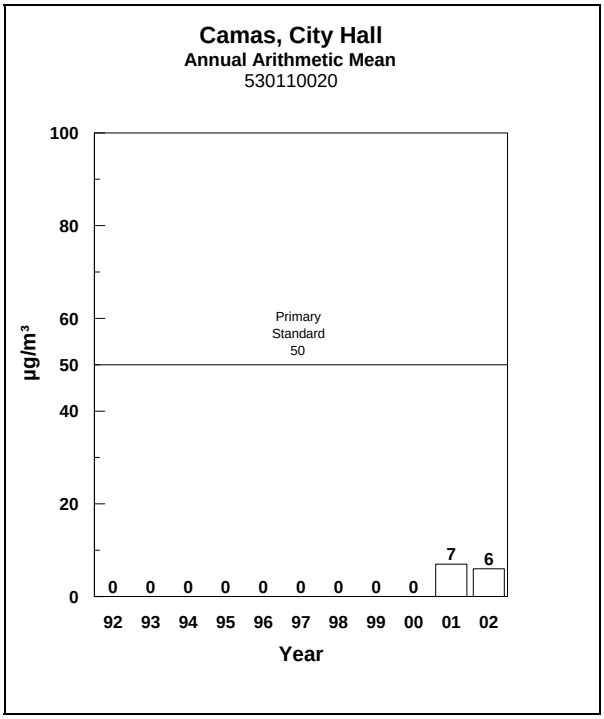




Southwest Area (cont)

Particulate Matter ($PM_{2.5}$)





Southwest Area (cont)

Carbon Monoxide

Carbon Monoxide for 1999 – 2002 (ppm)

Station	Location	1st Conc.	1-Hr High Date	Max 2nd Conc.	High Date	8-Hr 1st Conc.	Max High Date	2nd Conc.	High Date	2nd Day Conc.	High* Date
	1999										
530110016	Vancouver, Hazel Dell	7.9	01/05	7.1	01/05	6.5	01/05	6.5	01/06	6.5	01/06
530110010	Vancouver, 4th Plain	13.5	01/05	12.9	01/05	10.1	01/06	9.9	01/05	9.9	01/06
	2000	1st Conc.	1-Hr High Date	Max 2nd Conc.	High Date	8-Hr 1st Conc.	Max High Date	2nd Conc.	High Date	2nd Day Conc.	High* Date
530110016	Vancouver, Hazel Dell	5.7	12/06	5.2	02/18	4.1	11/15	4.0	11/15	4.0	02/18
530110010	Vancouver, Atlas Cox	8.7	11/15	8.4	01/18	6.7	11/15	6.7	11/15	6.2	01/18
	2001	1st Conc.	1-Hr High Date	Max 2nd Conc.	High Date	8-Hr 1st Conc.	Max High Date	2nd Conc.	High Date	2nd Day Conc.	High* Date
530110016	Vancouver, Hazel Dell	4.8	01/06	4.6	01/12	3.48	01/16	3.22	01/06	3.22	01/06
530110010	Vancouver, Atlas Cox	9.1	11/07	8.0	02/12	5.9	11/07	4.66	11/09	4.66	11/09
	2002	1st Conc.	1-Hr High Date	Max 2nd Conc.	High Date	8-Hr 1st Conc.	Max High Date	2nd Conc.	High Date	2nd Day Conc.	High* Date
530110010	Vancouver, Atlas Cox	8.1	11/26	7.2	11/26	5.88	11/26	5.66	11/25	5.66	11/25

* 2nd Day High – Second day with the highest 1-hour average.
Conc. = Concentrations Max = Maximum

Southwest Area (cont)

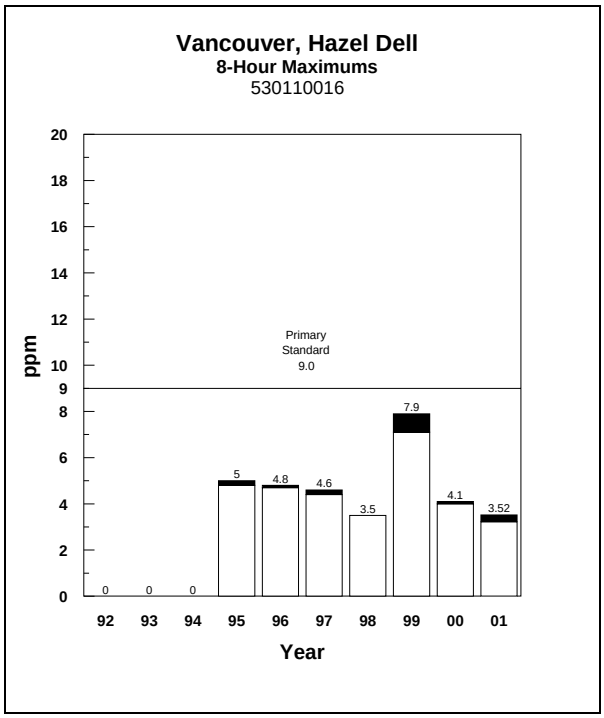
Carbon Monoxide

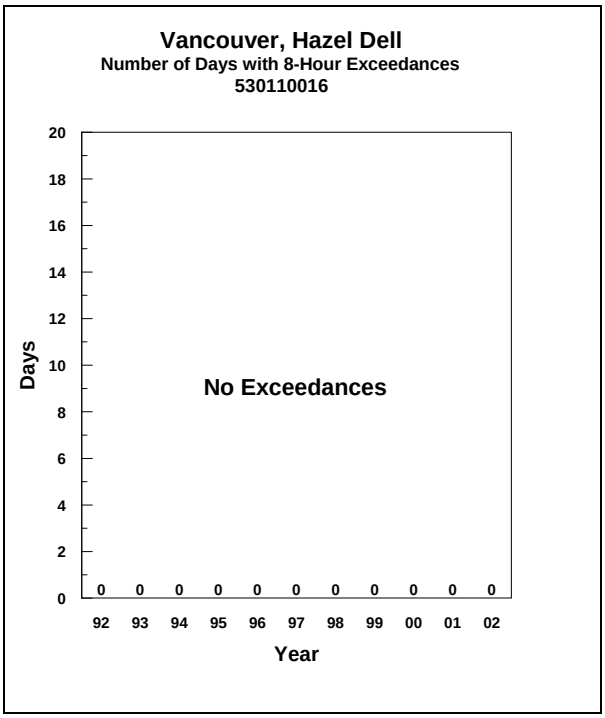
Carbon Monoxide for 1999 - 2002 (ppm)

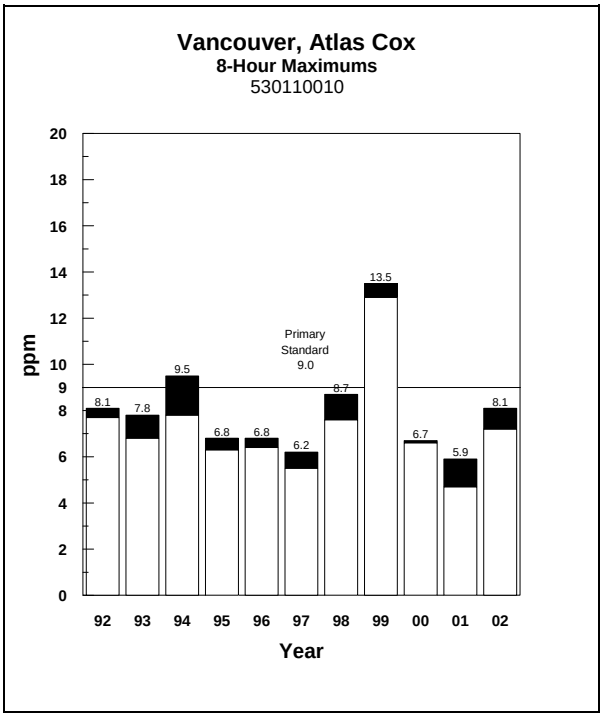
Station	Location	Period of Record	# Hours	# Days	% Valid Data
	1999				
530110016	Vancouver, Hazel Dell	Jan-Dec	8537	356	98
530110010	Vancouver, Atlas Cox	Jan-Dec	8705	363	99
	2000				
530110016	Vancouver, Hazel Dell	Jan-Dec	8726	364	99
530110010	Vancouver, Atlas Cox	Jan-Dec	8719	363	99
	2001				
530110016	Vancouver, Hazel Dell	Jan-Dec	1917	80	98
530110010	Vancouver, Atlas Cox	Jan-Dec	8692	362	99
	2002				
530110010	Vancouver, Atlas Cox	Jan-Dec	8334	347	95

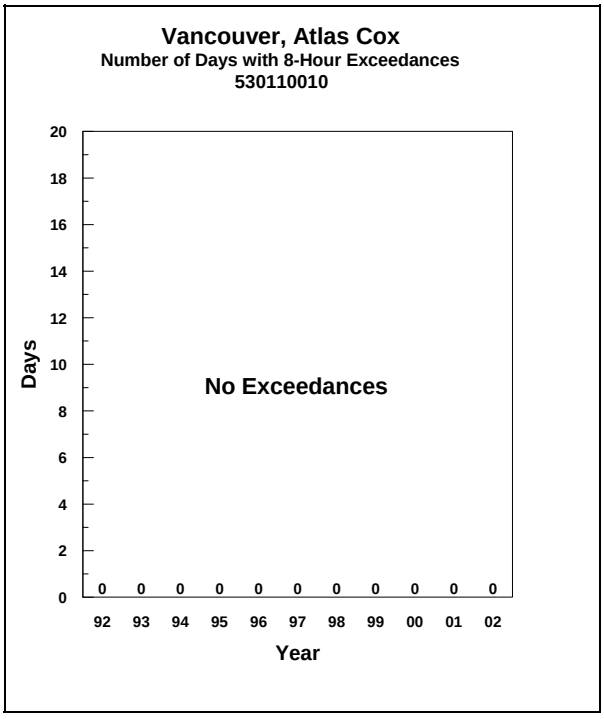
Southwest Area (cont)

Carbon Monoxide









Southwest Area (cont)

Ozone

1-Hour Ozone for 1999 - 2002 (ppm)

Station	Location	1-Hr Maximums					
		1st High		2nd High		2nd Day	High*
	1999	Date	Conc.	Date	Conc.	Date	Conc.
530110011	Vancouver, Blairmount	09/22	.080	09/22	.079	07/09	.074
530110009	Clark Co., NE 164th	07/09	.075	06/12	.071	06/12	.071
530150013	Cowlitz Co., Woodland	06/14	.073	06/14	.071	07/10	.067
530410003	Lewis Co., Packwood Lk.	07/10	.071	07/10	.069	07/12	.064
	2000						
530110011	Vancouver, Blairmount	06/04	.104	06/04	.084	08/23	.072
530410003	Lewis Co., Packwood Lk.	08/23	.063	05/24	.061	05/24	.061
	2001						
530110011	Vancouver, Blairmount	05/22	.089	08/10	.084	08/10	.084
	2000						
530110011	Vancouver, Blairmount	07/10	.086	07/10	.083	07/22	.081

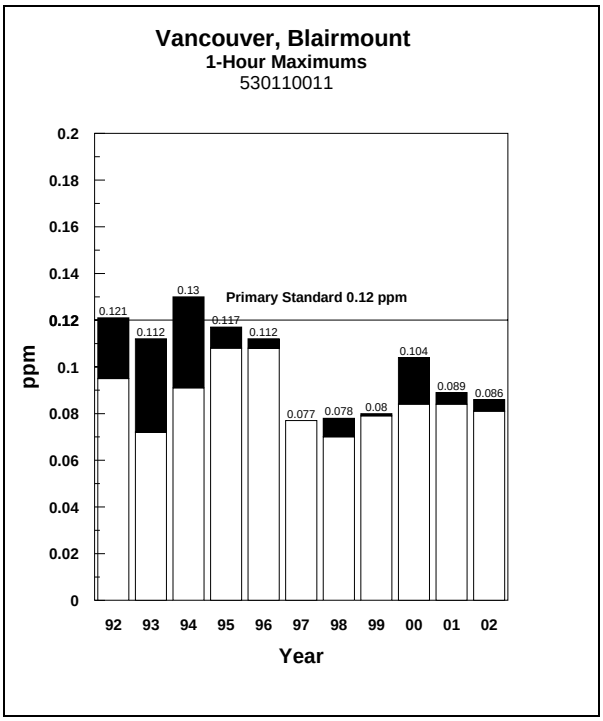
* 2nd Day High – Second day with the highest 1-hour average.
Conc. = Concentrations

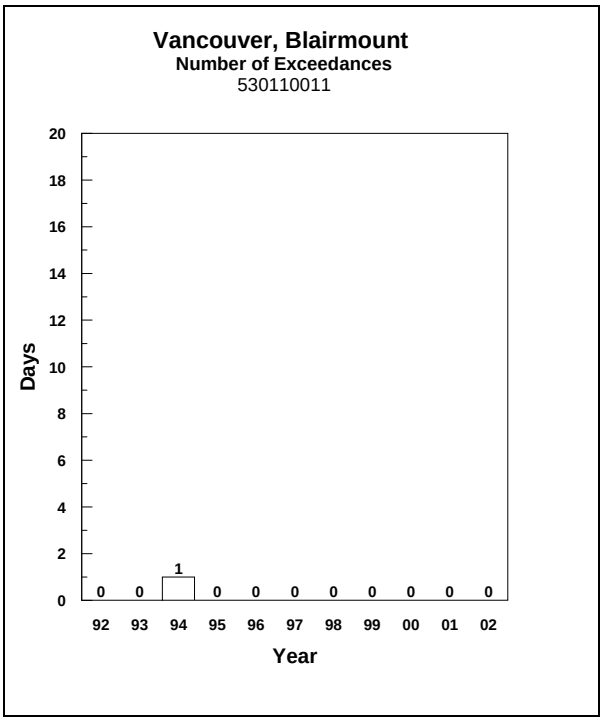
Ozone for 1999 - 2002

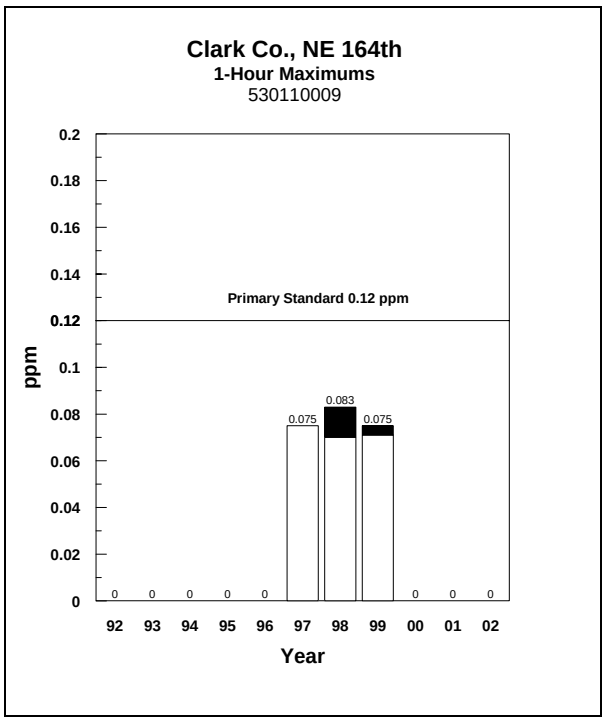
Station	Location	Period of			% Valid
	1999	Record	# Hours	# Days	Data
530110011	Vancouver, Blairmount	May-Sep	3522	147	96
530110009	Clark Co., NE 146th	May-Sep	3558	148	97
530150013	Cowlitz Co., Woodland	Jan-Dec	8583	358	98
530410003	Lewis Co., Packwood Lake	Jun-Sep	2581	108	99
	2000				
530110011	Vancouver, Blairmount	May-Sep	3634	151	99
530410003	Lewis Co., Packwood Lake	May-Sep	2965	124	99
	2001				
530110011	Vancouver, Blairmount	May-Sep	3493	146	95
	2002				
530110011	Vancouver, Blairmount	May-Sep	3595	150	97

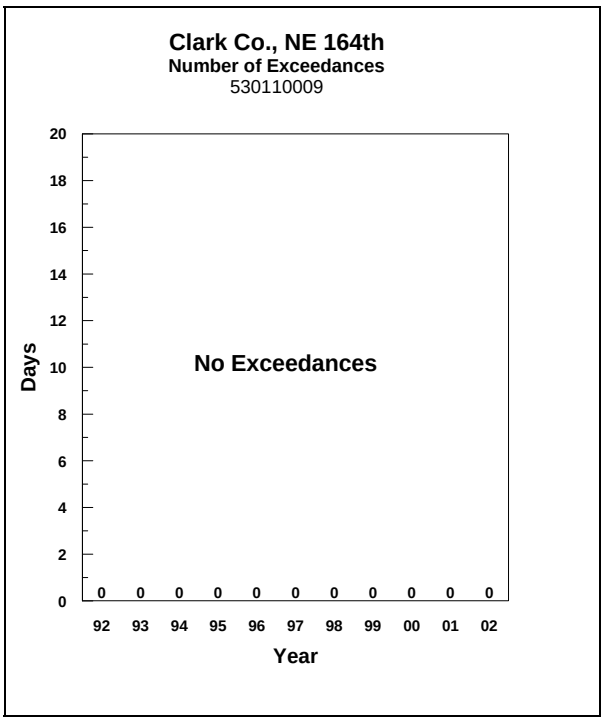
Southwest Area (cont)

Ozone



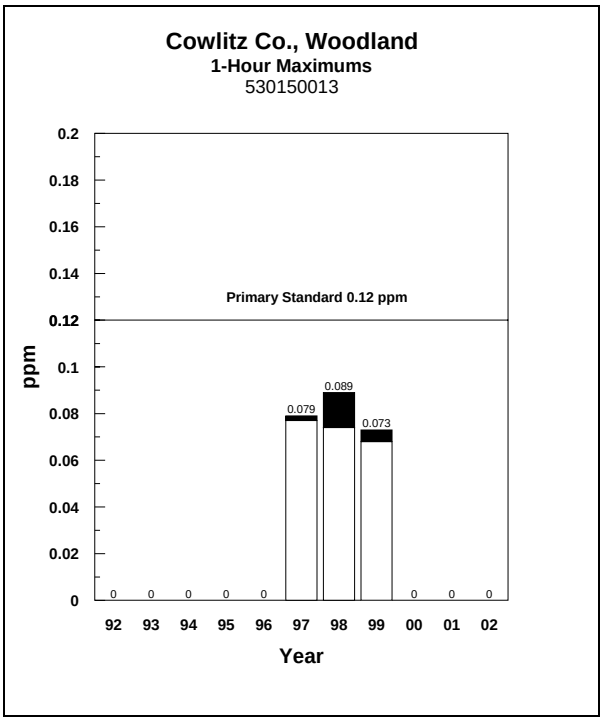


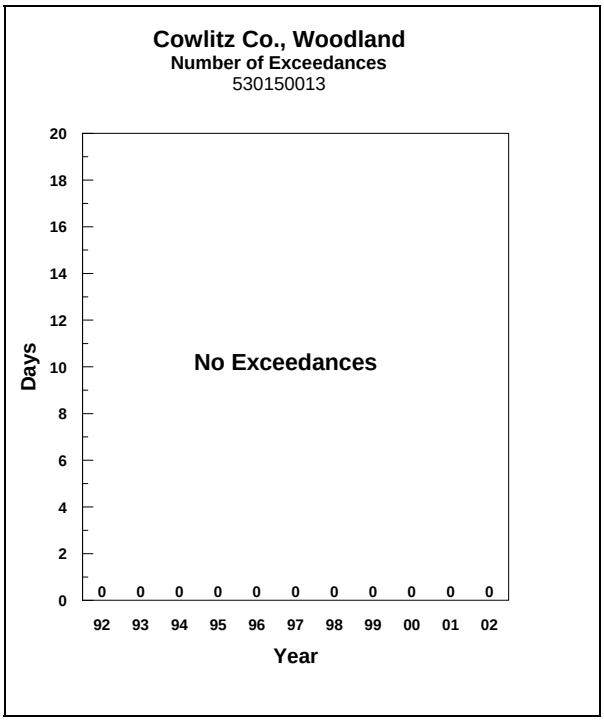


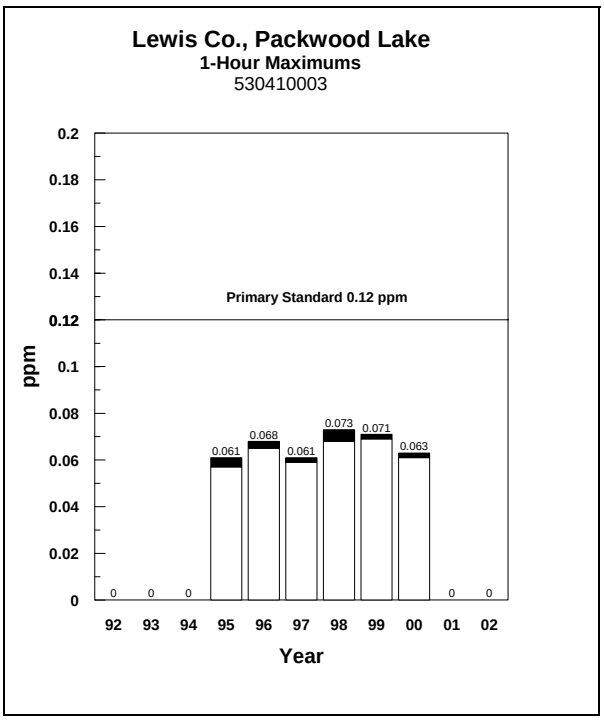


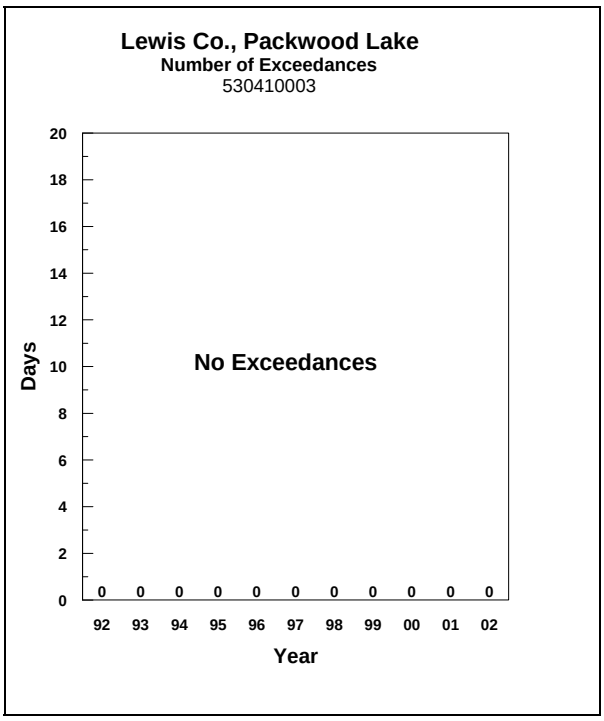
Southwest Area (concluded)

Ozone









Spokane Area

Particulate Matter (PM_{10})

PM_{10} Annual Arithmetic Means ($\mu g/m^3$)

Station	Location	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
530631017	Spokane, Rockwood			26*	24	23	25	24	20	21	25	20
530630001	Cheney, Turnbull Sl	17	18	17	11	13	13	13	13	14	14	16
530632002	Millwood, City Hall	35	39	34	28	31	26	26	26	27	27	30
530630016	Spokane, Ferry	45	43	38	32	32	29	31	28	28	29	30
530630047	Spokane, Monroe St				20*	23	24	22	19	23	20	24

* Average based on less than 12 months of data.

PM_{10} for 1999 - 2002 ($\mu g/m^3$)

Station	Location	1st High Concentration	Date	2nd High Concentration	Date
	1999				
530631017	Spokane, Rockwood	72	07/07	55	09/15
530630001	Cheney, Turnbull Sl	43	10/21	40	01/21
530632002	Millwood, City Hall	61	03/19	60	10/21
530630016	Spokane, Ferry	343	09/25	128	09/23
530630047	Spokane, Monroe St	54	09/21	54	10/21
	2000				
530631017	Spokane, Rockwood	52	08/10	42	02/09
530630001	Cheney, Turnbull Sl	72	08/10	32	09/27
530632002	Millwood, City Hall	68	08/10	61	02/18
530630016	Spokane, Ferry	94	02/18	87	02/18
530630047	Spokane, Monroe St	62	02/18	52	08/10
	2001				
530631017	Spokane, Rockwood	211	09/25	68	02/27
530630001	Cheney, Turnbull Sl	50	07/12	36	04/25
530632002	Millwood, City Hall	61	08/17	55	11/09
530630016	Spokane, Ferry	260	09/25	103	03/07
530630047	Spokane, Monroe St	58	11/09	45	08/17
	2002				
530631017	Spokane, Rockwood	60	05/02	50	03/27
530630001	Cheney, Turnbull Sl	96	05/02	67	09/29
530632002	Millwood, City Hall	99	05/02	85	09/19
530630016	Spokane, Ferry	102	05/02	92	11/27
530630047	Spokane, Monroe St	66	09/29	61	05/02

Spokane Area (cont)

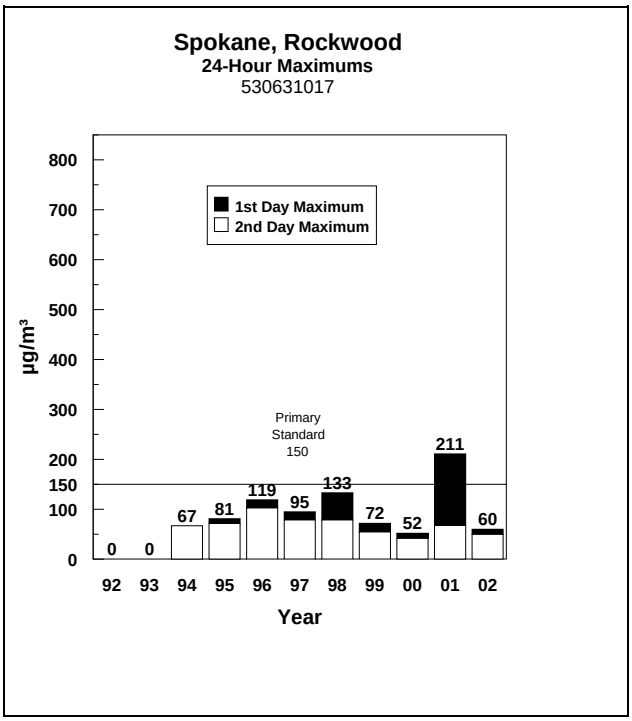
Particulate Matter (PM_{10})

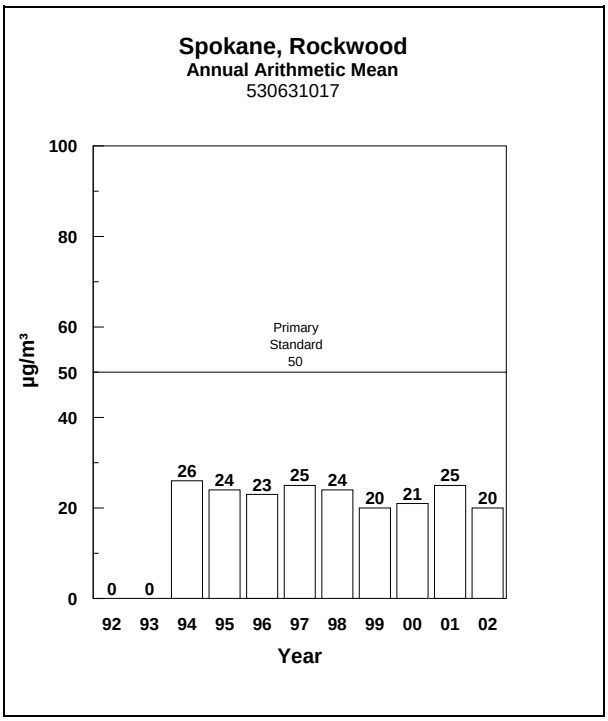
PM_{10} for 1999 - 2002

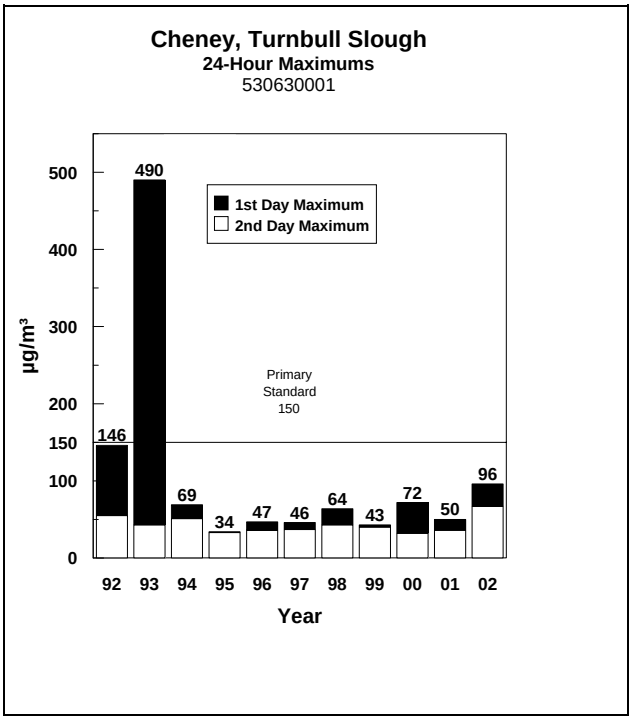
Station	Location	Period of Record	Sampling Frequency	# Samples	% Valid Data
	1999				
530631017	Spokane, Rockwood	Jan-Dec	1/1, 1/3	258	97
530630001	Cheney, Turnbull Sl	Jan-Dec	1/6	60	100
530632002	Millwood, City Hall	Jan-Dec	1/6	57	95
530630016	Spokane, Ferry	Jan-Dec	1/7	49	94
530630047	Spokane, Monroe St	Jan-Dec	1/6	58	97
	2000				
530631017	Spokane, Rockwood	Jan-Dec	1/3	122	100
530630001	Cheney, Turnbull Sl	Jan-Dec	1/6	61	100
530632002	Millwood, City Hall	Jan-Dec	1/6	60	98
530630016	Spokane, Ferry	Jan-Dec	1/1	352	96
530630047	Spokane, Monroe St	Jan-Dec	1/6	61	100
	2001				
530631017	Spokane, Rockwood	Jan-Dec	1/3	122	100
530630001	Cheney, Turnbull Sl	Jan-Dec	1/6	61	100
530632002	Millwood, City Hall	Jan-Dec	1/6	56	92
530630016	Spokane, Ferry	Jan-Dec	1/1	364	99
530630047	Spokane, Monroe St	Jan-Dec	1/6	59	97
	2002				
530631017	Spokane, Rockwood	Jan-Jun	1/3	60	100
530630001	Cheney, Turnbull Sl	Jan-Dec	1/6	60	98
530632002	Millwood, City Hall	Jan-Dec	1/6	59	96
530630016	Spokane, Ferry	Jan-Dec	1/1	360	98
530630047	Spokane, Monroe St	Jan-Dec	1/6	60	98

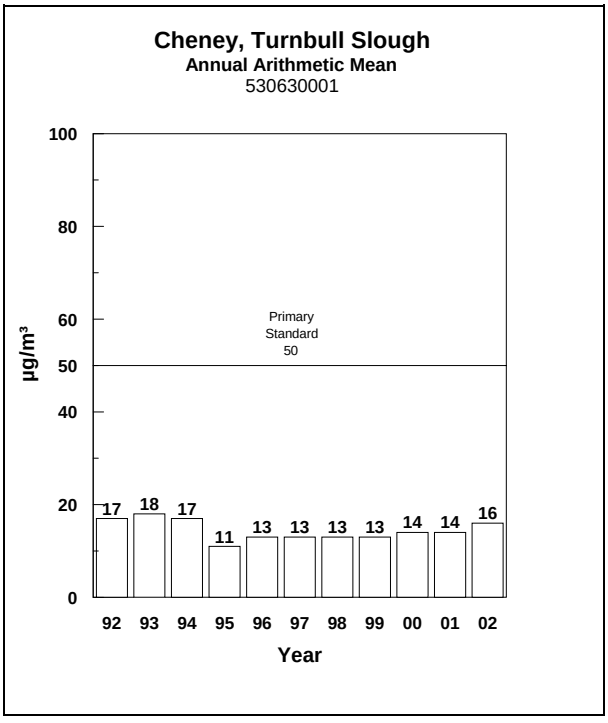
Spokane Area (cont)

Particulate Matter (PM_{10})



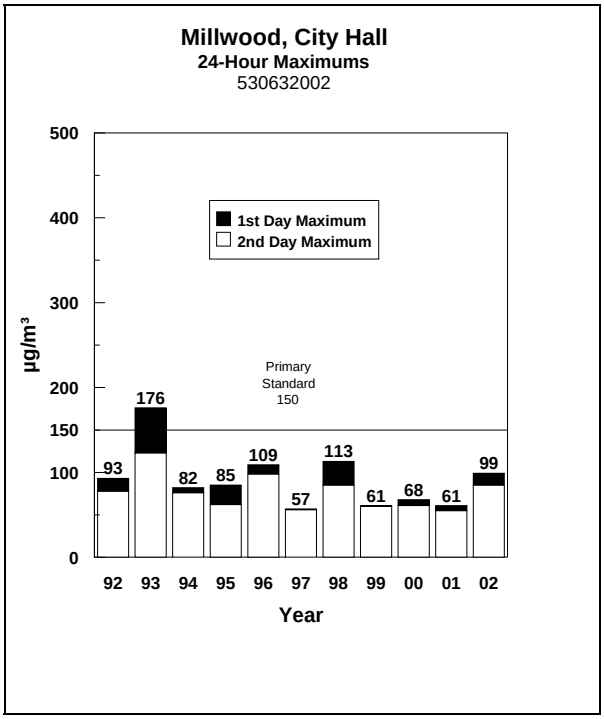


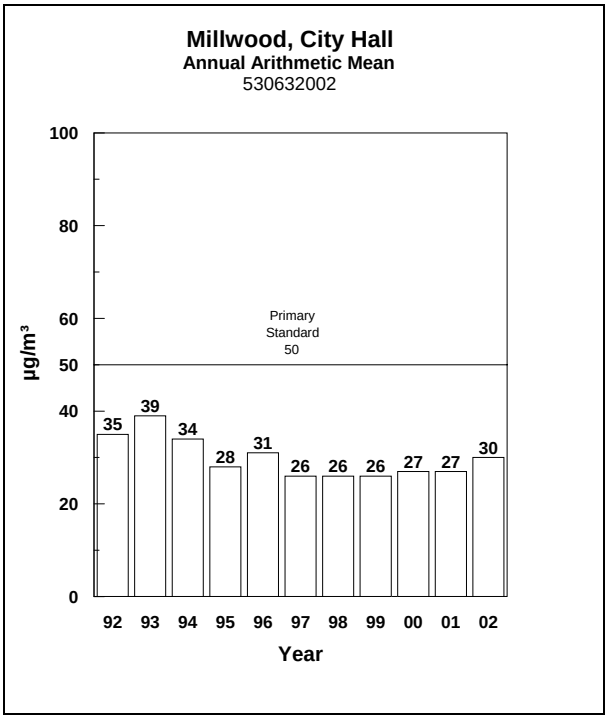


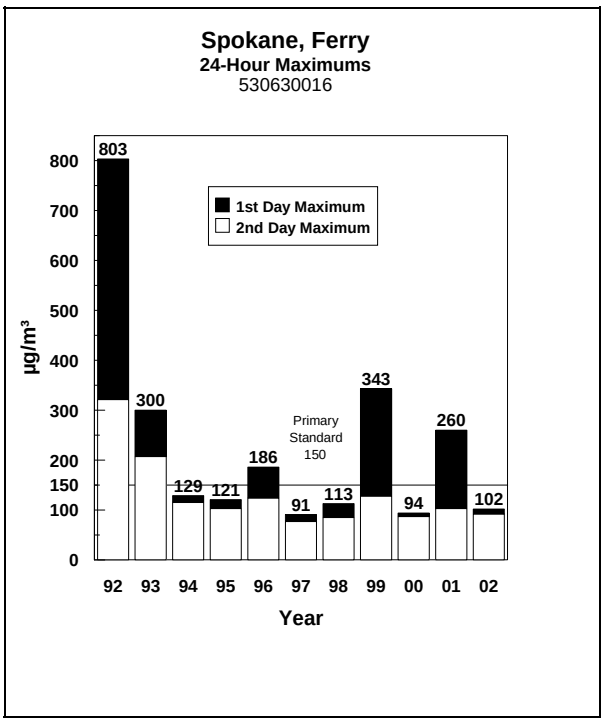


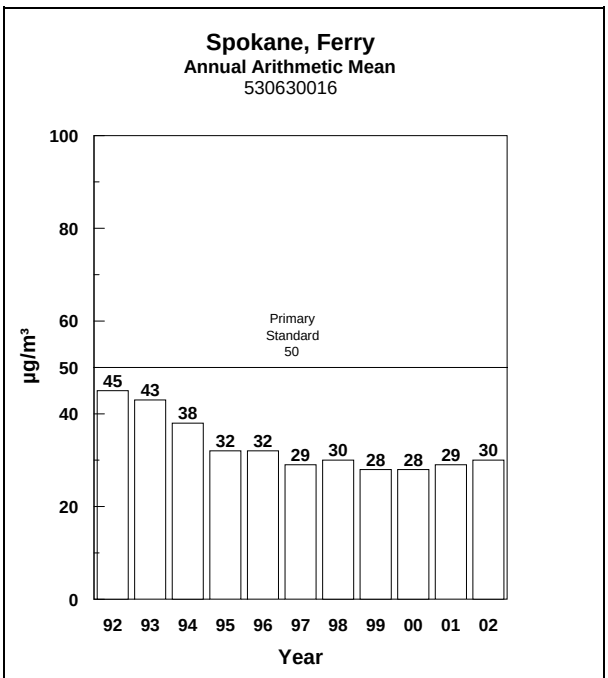
Spokane Area (cont)

Particulate Matter (PM_{10})



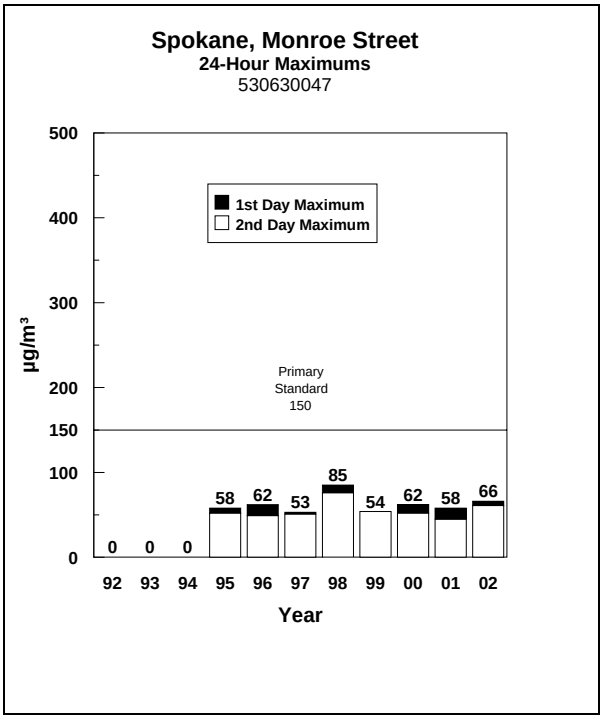


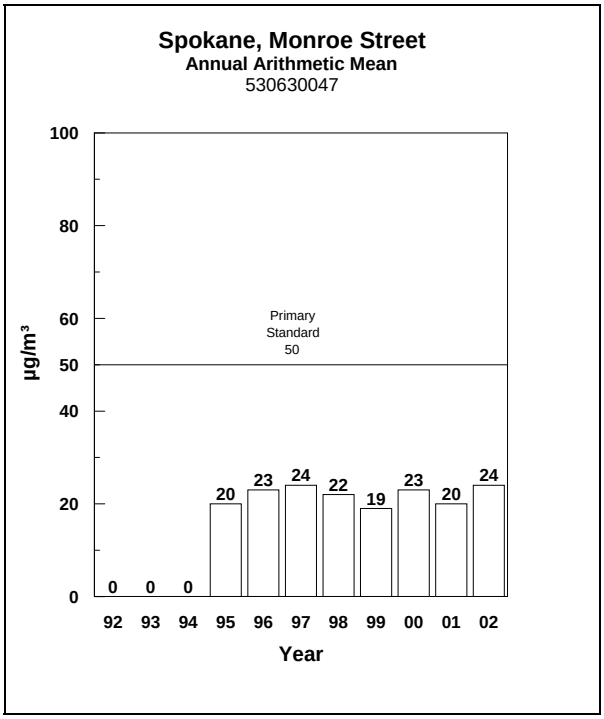




Spokane Area (cont)

Particulate Matter (PM_{10})





Spokane Area (cont)

Particulate Matter ($PM_{2.5}$)

$PM_{2.5}$ Annual Arithmetic Means ($\mu g/m^3$)

Station	Location	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
530630001	Cheney, Turnbull Sl									11.1*		
530630016	Spokane, Ferry St								10.3	10.5	10.1	10.2
530630047	Spokane, Monroe St								8.5	10.0	9.2	8.8

* Average based on less than 12 months of data.

$PM_{2.5}$ for 1999 - 2002 ($\mu g/m^3$)

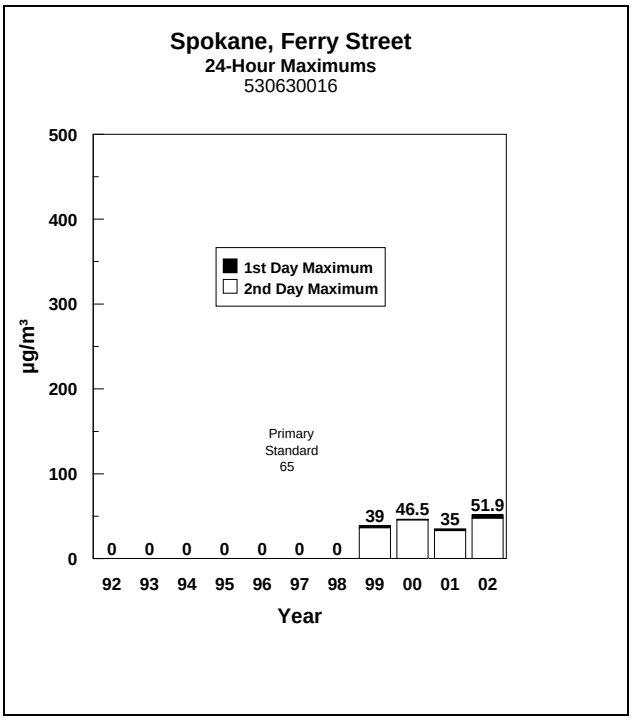
Station	Location	1st High Concentration	Date	2nd High Concentration	Date
	1999				
530630016	Spokane, Ferry Street	39.0	01/06	36.5	01/05
530630047	Spokane, Monroe Street	28.2	11/02	27.6	11/03
	2000				
530630001	Cheney, Turnbull Slough	26.4	11/02	15.3	11/14
530630016	Spokane, Ferry Street	46.5	11/02	45.7	10/25
530630047	Spokane, Monroe Street	34.6	11/02	29.0	10/24
	2001				
530630016	Spokane, Ferry Street	35.1	11/09	32.9	02/01
530630047	Spokane, Monroe Street	38.8	11/09	27.8	01/13
	2002				
530630016	Spokane, Ferry Street	51.9	11/27	47.8	11/03
530630047	Spokane, Monroe Street	43.0	11/28	39.3	11/04

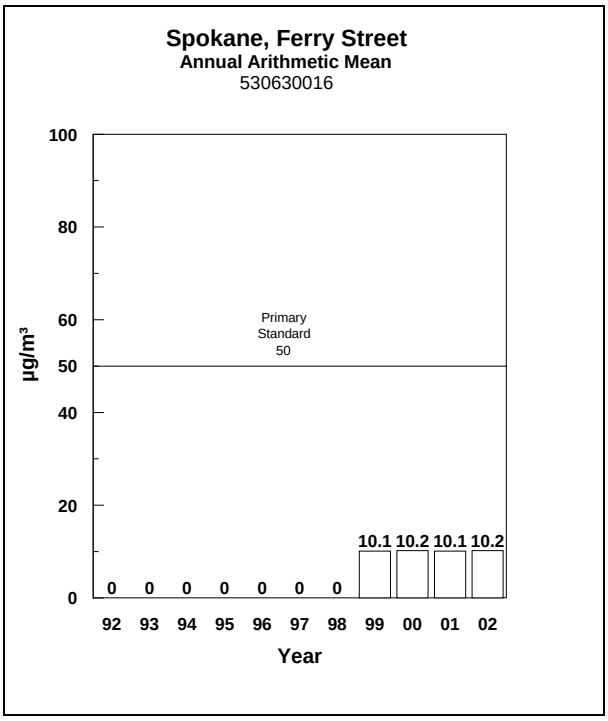
$PM_{2.5}$ for 1999 - 2002

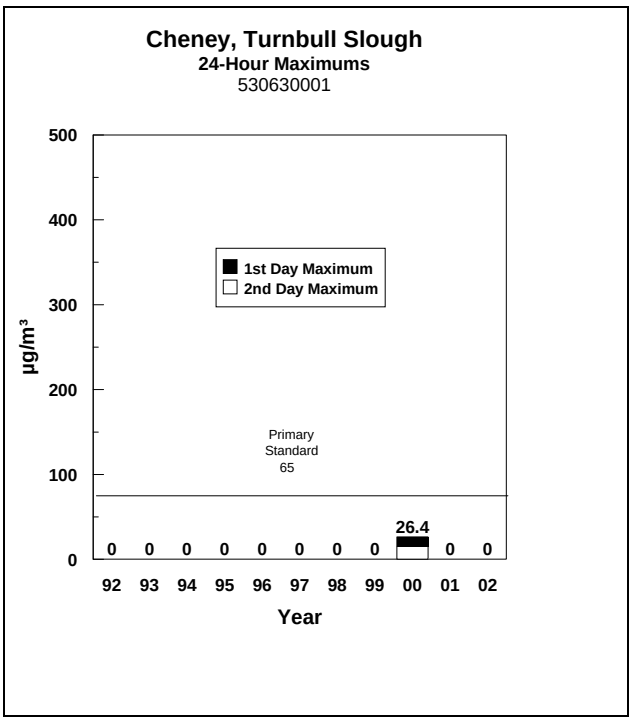
Station	Location	Period of Record	Sampling Frequency	# Samples	% Valid Data
	1999				
530630016	Spokane, Ferry Street	Jan-Dec	1/1	243	67
530630047	Spokane, Monroe Street	Jan-Dec	1/3	80	68
	2000				
530630001	Cheney, Turnbull Slough	Oct-Dec	1/6	10	91
530630016	Spokane, Ferry Street	Jan-Dec	1/1	341	93
530630047	Spokane, Monroe Street	Jan-Dec	1/3	121	99
	2001				
530630016	Spokane, Ferry Street	Jan-Dec	1/1	354	97
530630047	Spokane, Monroe Street	Jan-Dec	1/3	112	91
	2002				
530630016	Spokane, Ferry Street	Jan-Dec	1/1	357	98
530630047	Spokane, Monroe Street	Jan-Dec	1/3	120	98

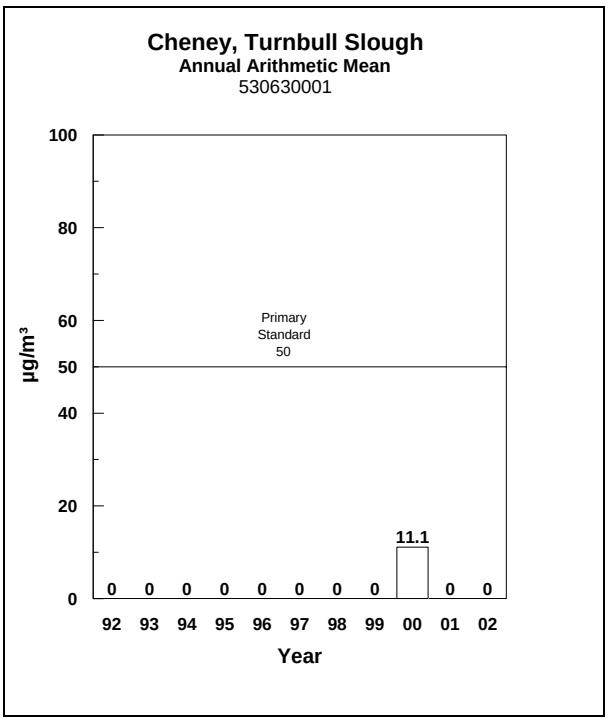
Spokane Area (cont)

Particulate Matter ($PM_{2.5}$)



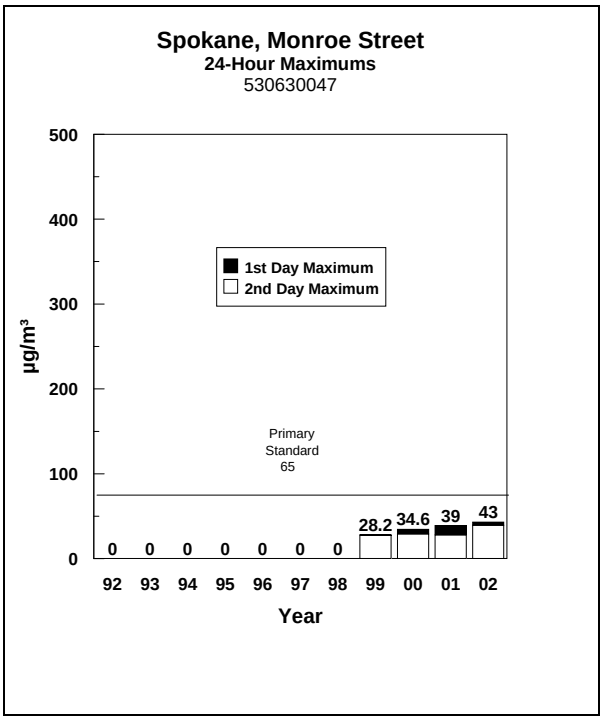


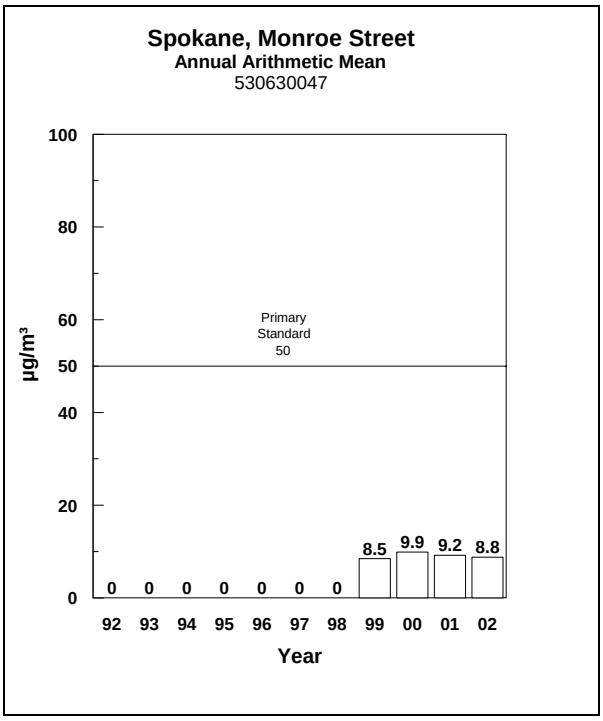




Spokane Area (cont)

Particulate Matter ($PM_{2.5}$)





Spokane Area (cont)

Carbon Monoxide

Carbon Monoxide for 1999 - 2002 (ppm)

Station	Location	1999	1st Conc.	1-Hr High Date	Max 2nd Conc.	High Date	8-Hr 1st Conc.	Max High Date	2nd Conc.	High Date	2nd Day Conc.	High* Date
530630040	Spokane, Hamilton St.		9.4	01/06	9.3	01/11	6.7	01/11	6.7	1/11	5.7	1/6
530630043	Spokane, Division		6.6	01/11	6.2	01/11	5.2	01/11	5.2	1/11	3.7	1/6
530630045	Spokane, Riverside		6.9	10/20	6.6	07/26	4.8	01/11	4.7	1/11	4.1	
530630048	Spokane, 3rd Ave Wa N		8.3	01/11	5.8	01/11	4.5	01/11	4.1	1/11	4.1	1/6
530630049	Spokane, 3rd Ave Wa S		12.3	01/11	8.2	01/05	7.3	01/11	6.9	1/11	5.6	1/6
		2000	1st Conc.	1-Hr High Date	Max 2nd Conc.	High Date	8-Hr 1st Conc.	Max High Date	2nd Conc.	High Date	2nd Day Conc.	High* Date
530630040	Spokane, Hamilton St.		9.1	11/21	8.7	11/21	6.9	11/21	6.7	11/21	5.6	10/25
530630045	Spokane, Riverside		6.0	02/08	6.0	10/17	4.6	10/16	4.1	02/08	4.1	02/08
530630049	Spokane, 3rd Ave Wa S		9.8	11/21	8.9	11/20	5.3	10/24	5.4	10/24	4.9	11/21
		2001	1st Conc.	1-Hr High Date	Max 2nd Conc.	High Date	8-Hr 1st Conc.	Max High Date	2nd Conc.	High Date	2nd Conc.	High* Date
530630040	Spokane, Hamilton St.		8.5	11/09	7.4	02/01	5.22	11/04	5.22	11/09	5.22	11/09
530630045	Spokane, Riverside		5.3	03/06	5.2	02/01	3.57	02/01	3.21	01/10	3.21	01/10
530630049	Spokane, 3rd Ave Wa S		8.2	11/09	7.6	11/09	7.4	02/01	4.7	02/01	4.7	02/01
		2002	1st Conc.	1-Hr High Date	Max 2nd Conc.	High Date	8-Hr 1st Conc.	Max High Date	2nd Conc.	High Date	2nd Conc.	High* Date
530630040	Spokane, Hamilton St.		9.5	11/06	7.8	11/06	5.86	11/06	4.91	11/01	4.91	11/01
530630045	Spokane, Riverside		5.4	10/14	8.6	11/01	3.81	11/06	3.27	10/18	3.27	10/18
530630049	Spokane, 3rd Ave Wa S		10.1	11/06	8.6	11/01	5.72	11/06	5.23	11/06	5.23	11/06

2nd Day High = Second day with the highest 8-hour average.
Conc. = Concentrations Max = Maximum

Spokane Area (cont)

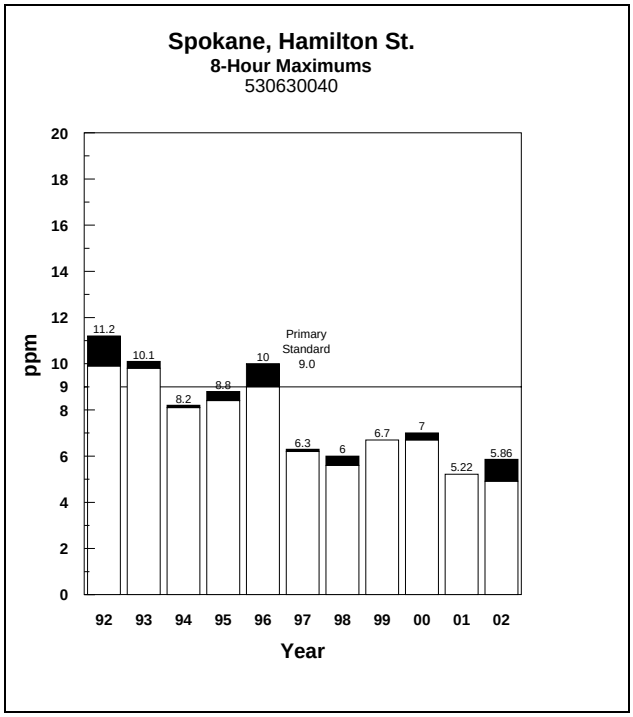
Carbon Monoxide

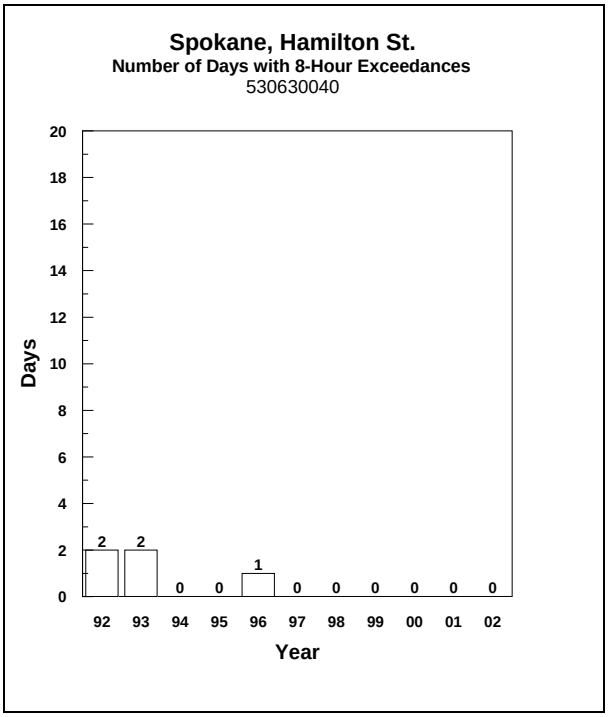
Carbon Monoxide for 1999 - 2002 (ppm)

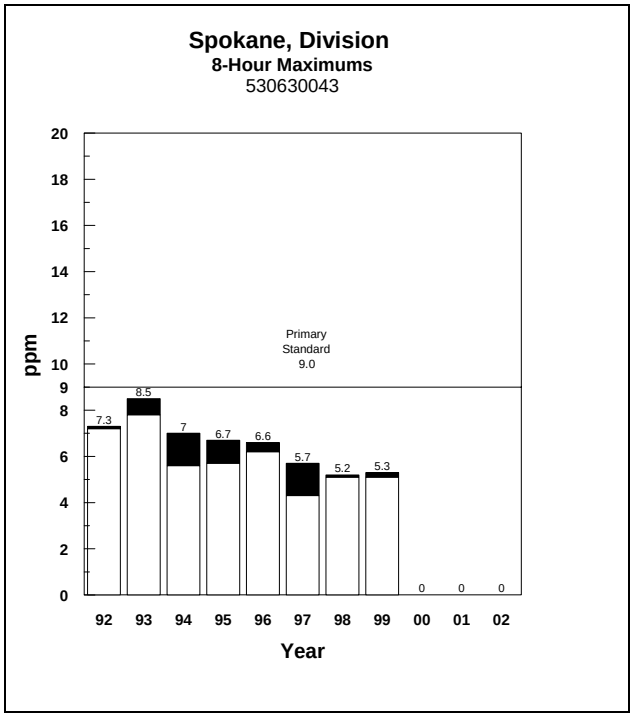
Station	Location	Period of Record	# Hours	# Days	% Valid Data
1999					
530630040	Spokane, Hamilton St.	Jan-Dec	8699	362	99
530630043	Spokane, Division	Jan-Jul	4827	201	99
530630045	Spokane, Riverside	Jan-Dec	8711	363	99
530630048	Spokane, 3rd Ave. & Wa. N	Jan-Sep	6107	254	97
530630049	Spokane, 3rd Ave. & Wa. S	Jan-Dec	8532	356	97
2000					
530630040	Spokane, Hamilton St.	Jan-Dec	8713	363	99
530630045	Spokane, Riverside	Jan-Dec	8551	356	97
530630049	Spokane, 3rd Ave. & Wa. S	Jan-Dec	8649	360	98
2001					
530630040	Spokane, Hamilton St.	Jan-Dec	8683	362	99
530630045	Spokane, Riverside	Jan-Dec	7420	309	84
530630049	Spokane, 3rd Ave. & Wa. S	Jan-Dec	8511	355	97
530630005	Spokane, Gonzaga	Jan-Dec	2654	111	97
2002					
530630040	Spokane, Hamilton St.	Jan-Dec	8699	362	99
530630045	Spokane, Riverside	Jan-Dec	8681	362	99
530630049	Spokane, 3rd Ave. & Wa. S	Jan-Dec	8623	359	98

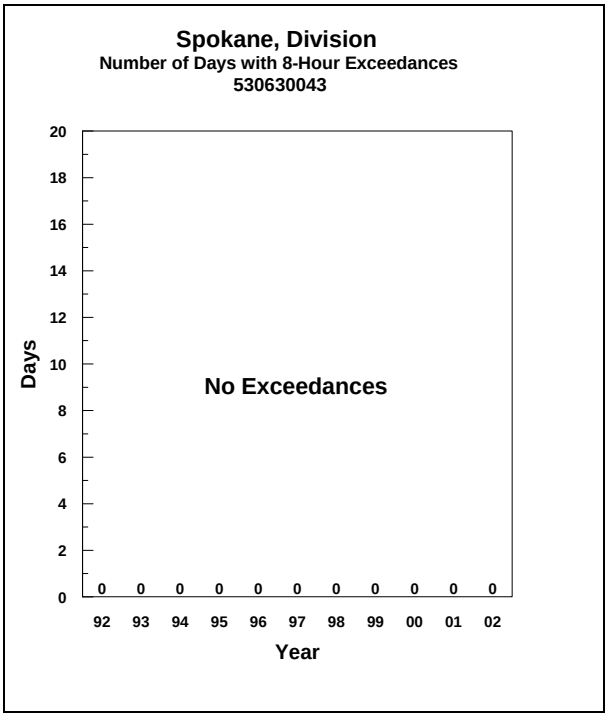
Spokane Area (cont)

Carbon Monoxide



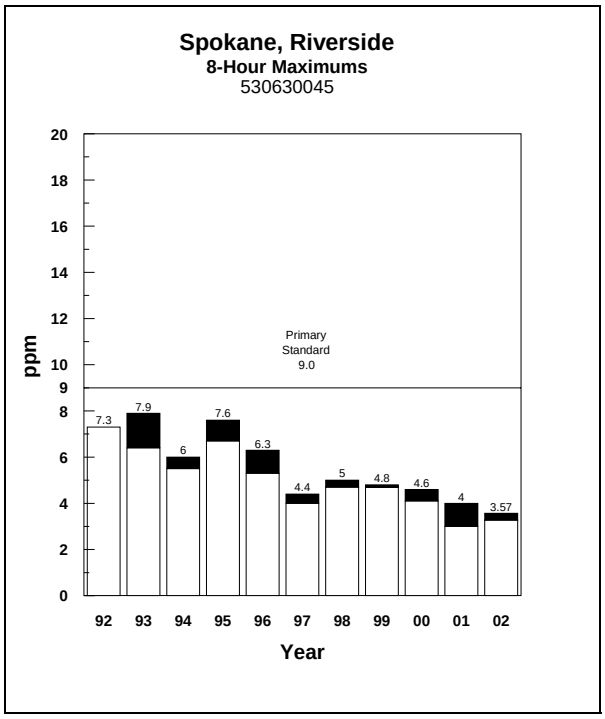


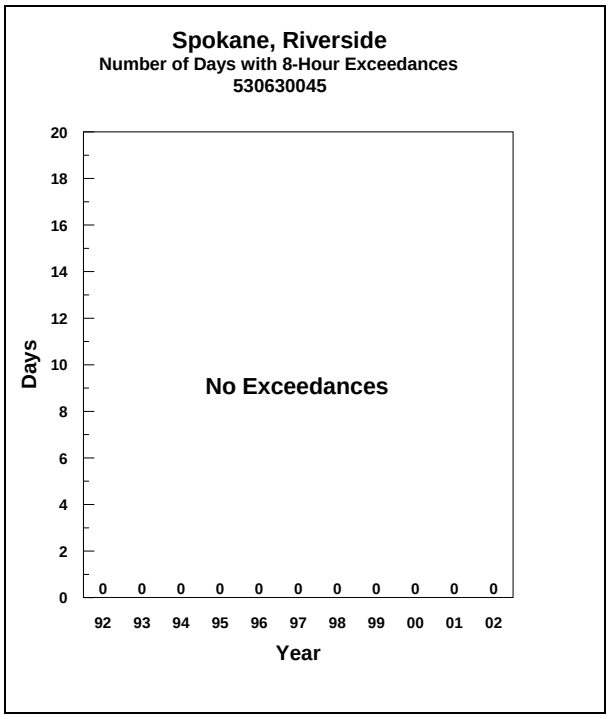


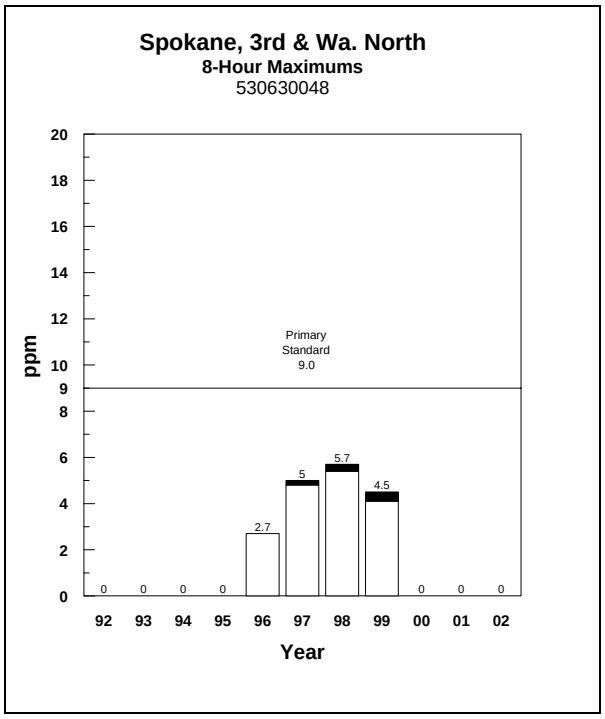


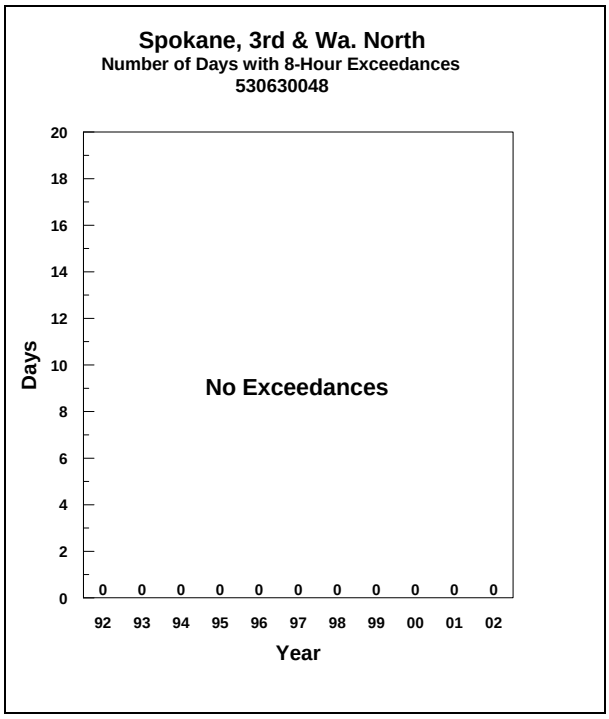
Spokane Area (cont)

Carbon Monoxide



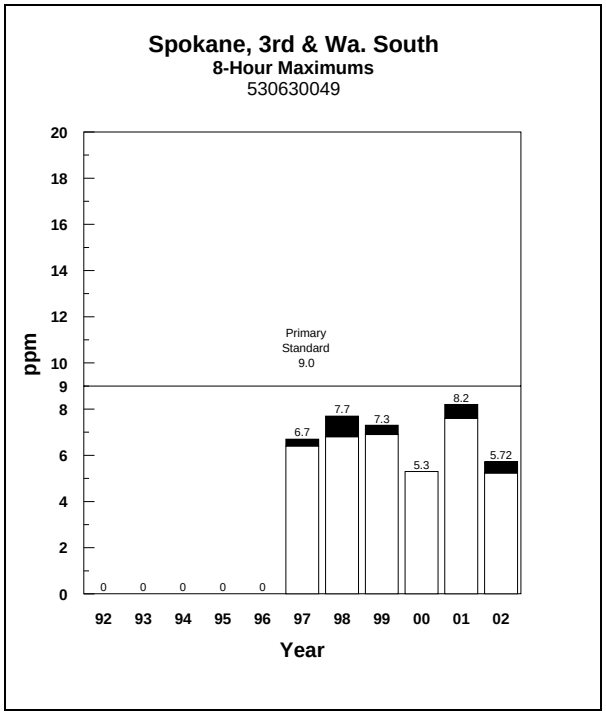


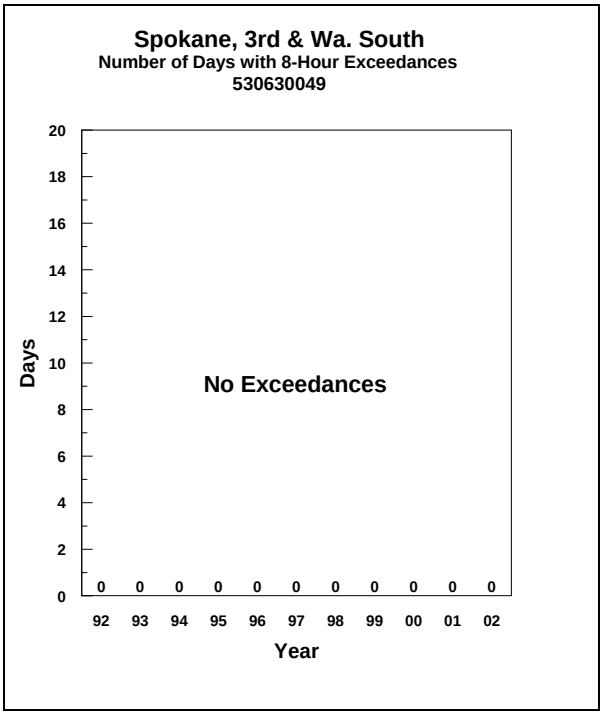




Spokane Area (cont)

Carbon Monoxide





Spokane Area (cont)

Ozone

1-Hour Ozone for 1999 - 2002 (ppm)

Station	Location	1st Conc.	1-Hr Maximums High Date	2nd Conc.	High Date	2nd Day Conc.	High* Date
	1999						
530630046	Spokane, Greenbluff	.081	07/28	.076	07/28	.073	08/23
	2000						
530630046	Spokane, Greenbluff	.082	07/31	.082	08/17	.082	08/17
	2001						
530630046	Spokane, Greenbluff	.085	08/16	.084	08/13	.084	08/13
530630001	Cheney, Turnbull Slough	.078	08/16	08/16	0.077	.072	08/14
	2002						
530630046	Spokane, Greenbluff	.097	07/13	.086	07/12	.086	07/12
530630001	Cheney, Turnbull Slough	.072	06/14	.070	06/14	.068	08/05

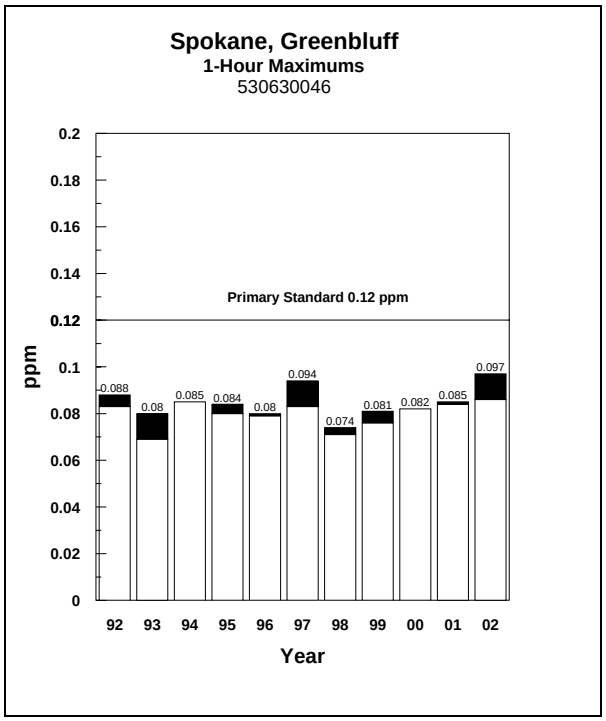
* 2nd Day High-Second day with the highest 1-Hour average.
Conc. = Concentrations

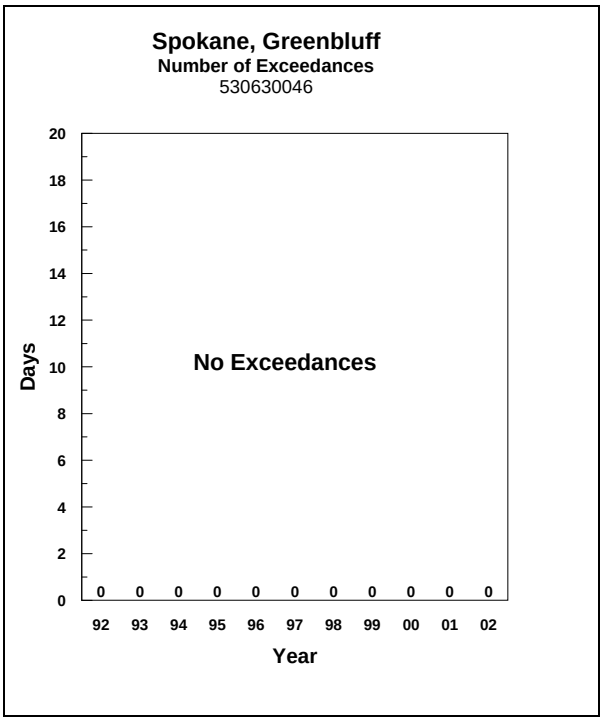
Ozone for 1999 - 2002

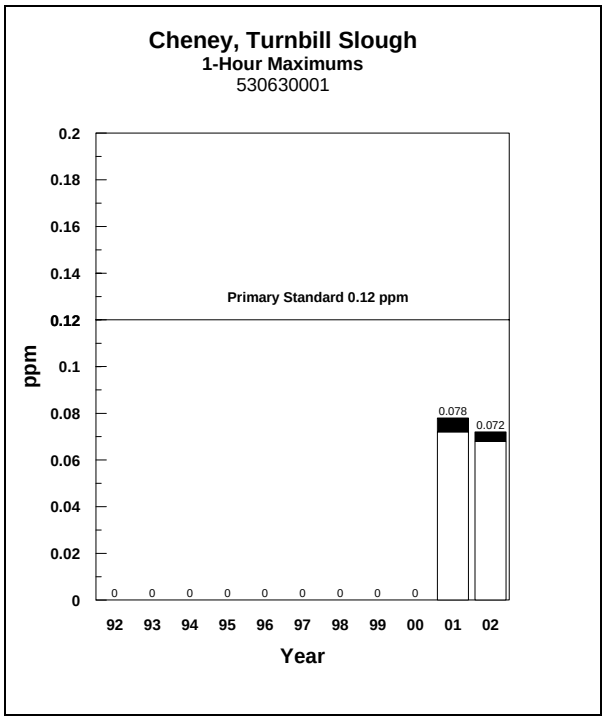
Station	Location	Period of Record	# Hours	# Days	% Valid Data
	1999				
530630046	Spokane, Greenbluff	May-Sep	3638	152	99
	2000				
530630046	Spokane, Greenbluff	May-Sep	3643	152	99
	2001				
530630046	Spokane, Greenbluff	May-Sep	3638	152	99
530630001	Cheney, Turnbull Slough	May-Sep	3639	152	99
	2002				
530630046	Spokane, Greenbluff	May-Sep	3457	144	94
530630001	Cheney, Turnbull Slough	May-Sep	3614	151	98

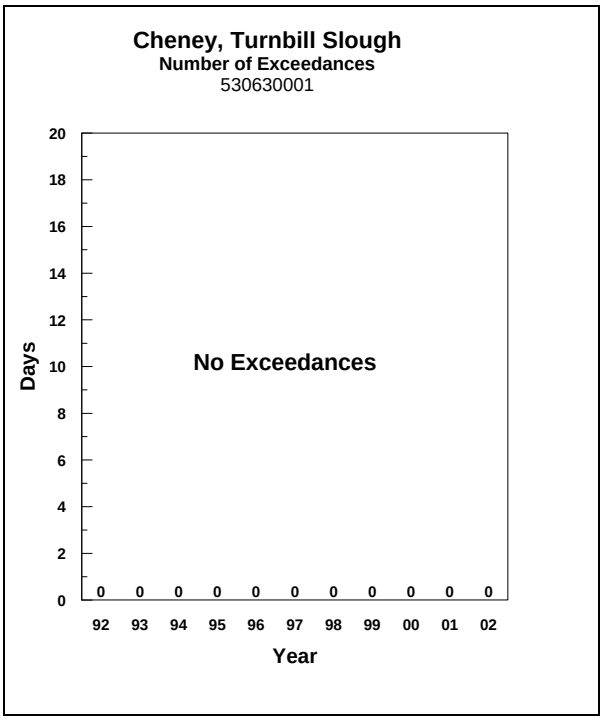
Spokane Area (concluded)

Ozone









Yakima Area

Particulate Matter (PM_{10})

PM_{10} Annual Arithmetic Means ($\mu g/m^3$)

Station	Location	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
530770005	Sunnyside, Harrison							26*	27	26	27	
530770011	Yakima, Garfield Elem.	32	38	31	24	35	37	26	25	25		
530770012	Yakima, YVCC	33	31	27	26*	44*	29	25	20*			
530770009	Yakima, S 4th										26	26

* Average based on less than 12 months of data.

PM_{10} for 1999 - 2002 ($\mu g/m^3$)

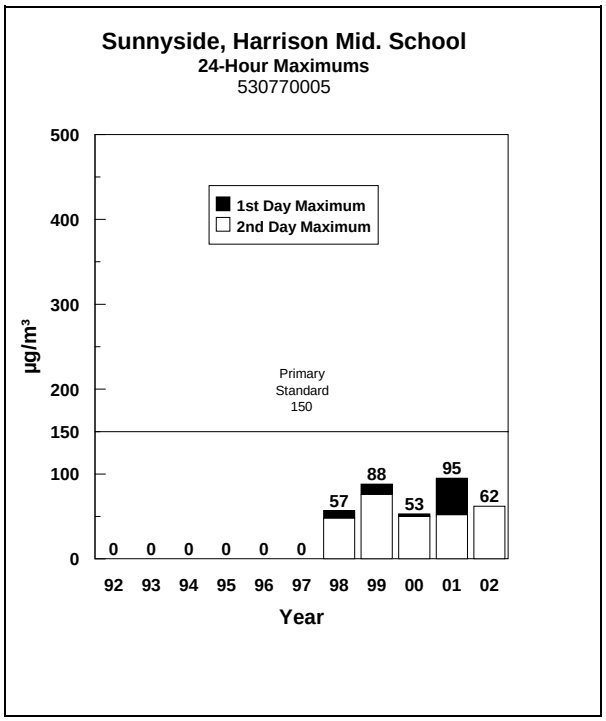
Station	Location	1st High Concentration	Date	2nd High Concentration	Date
	1999				
530770005	Sunnyside, Harrison.	88	08/04	76	10/21
530770009	Yakima, Mental Health	76	11/09	63	11/12
530770011	Yakima, YVCC	56	10/04	49	04/25
	2000				
530770005	Sunnyside, Harrison	95	10/04	52	08/17
530770009	Yakima, S 4th	76	11/09	63	11/12
530770011	Yakima, YVCC	56	10/04	49	04/25
	2001				
530770009	Yakima, S 4th	76	11/09	63	11/12
530770011	Yakima, YVCC	56	10/04	49	04/25
	2002				
530770009	Yakima, S 4th	79	11/04	67	10/17

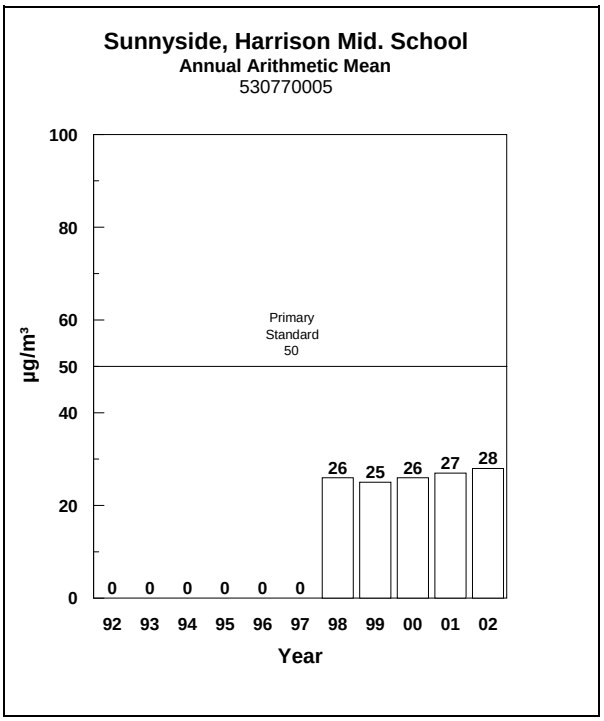
Yakima Area (cont)

Particulate Matter (PM_{10})

PM_{10} for 1999 - 2002

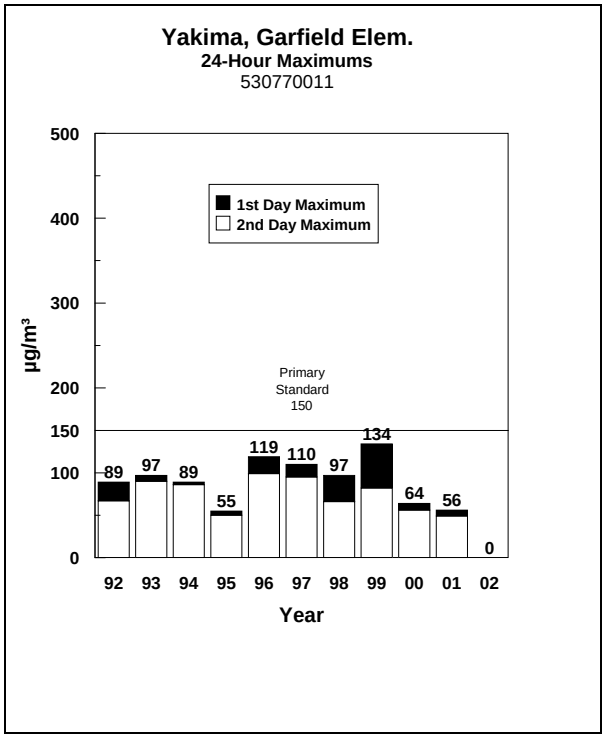
Station	Location	Period of Record	Sampling Frequency	# Samples	% Valid Data
	1999				
530770005	Sunnyside, Harrison	Jan-Dec	1/6	50	83
530770011	Yakima, Garfield Elem.	Jan-Dec	1/6	57	95
530770012	Yakima, YVCC	Jan-Aug	1/3	73	91
	2000				
530770005	Sunnyside, Harrison Md. Sch.	Jan-Dec	1/6	59	97
530770011	Yakima, Garfield Elem.	Jan-Dec	1/6	60	98
530770009	Yakima, S 4th	Apr-Dec	1/3	79	93
	2001				
530770011	Yakima, Garfield Elem.	Jan-Dec	1/6	49	98
530770009	Yakima, S 4th	Jan-Dec	1/3	120	98
	2002				
530770009	Yakima, S 4th	Jan-Dec	1/3	120	98

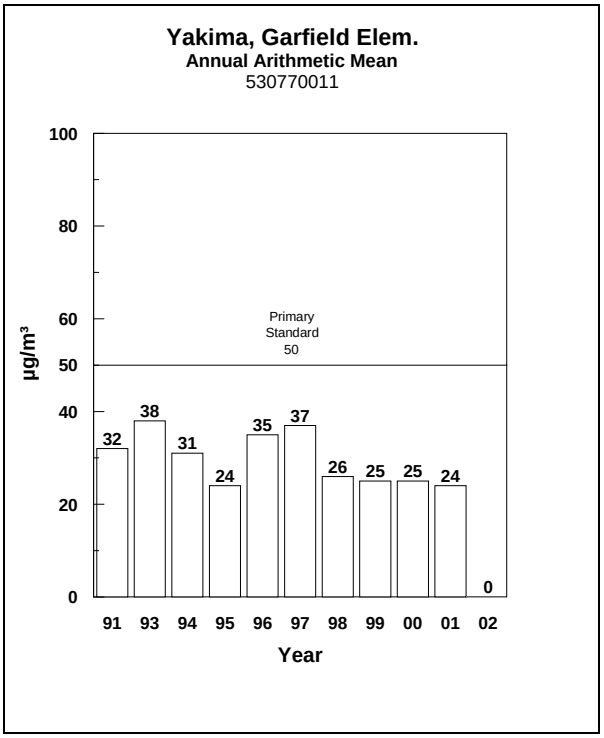


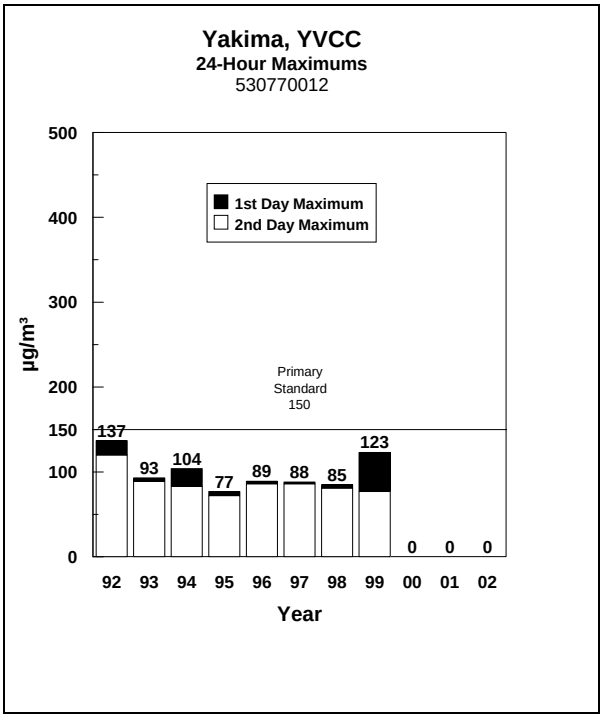


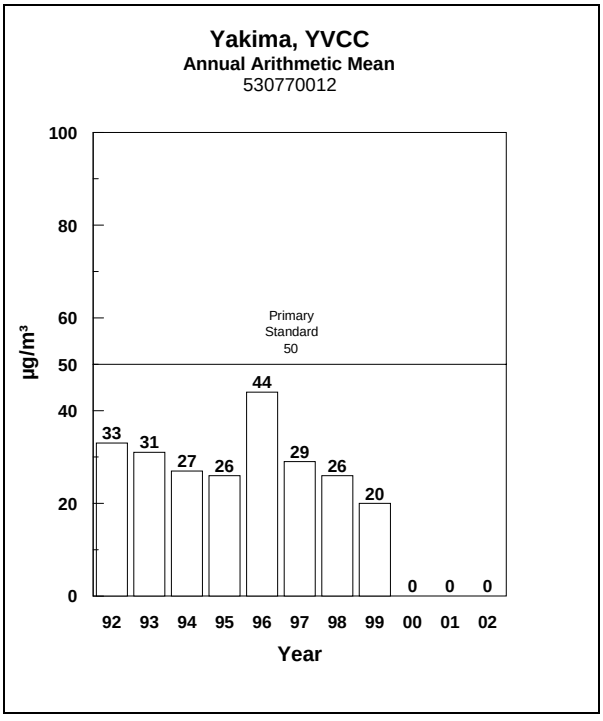
Yakima Area (cont)

Particulate Matter (PM_{10})



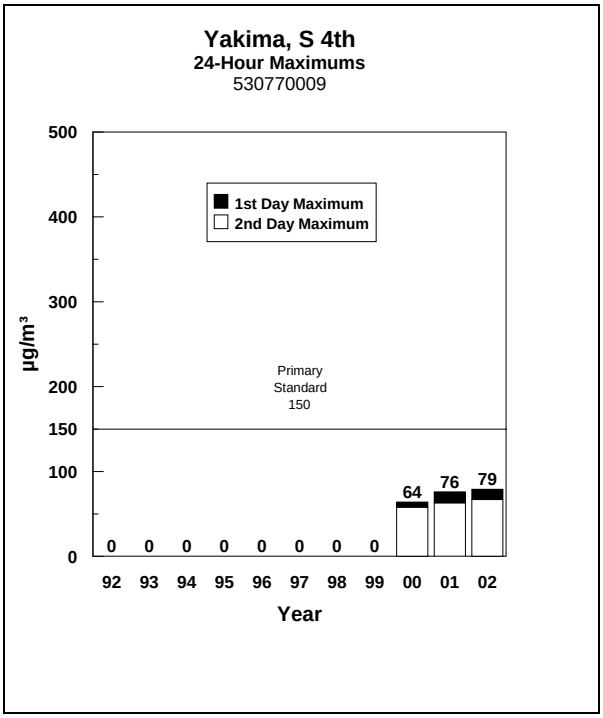


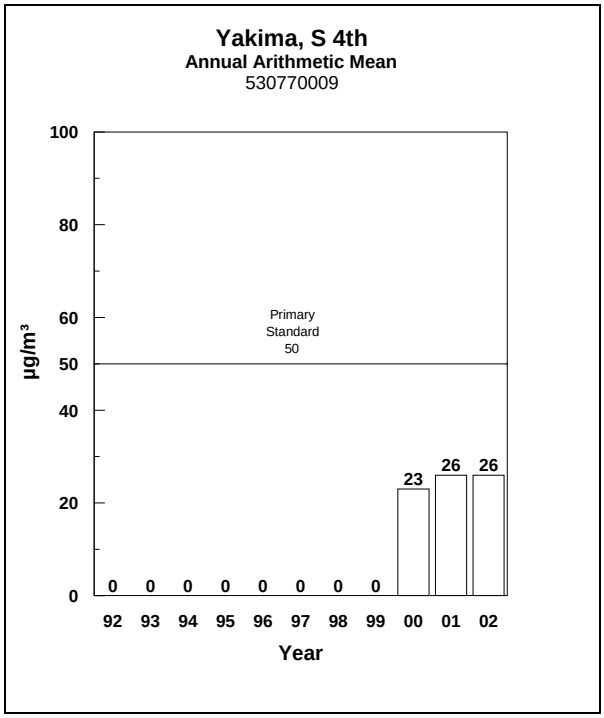




Yakima Area (cont)

Particulate Matter (PM_{10})





Yakima Area (cont)

Particulate Matter ($PM_{2.5}$)

$PM_{2.5}$ Annual Arithmetic Means ($\mu g/m^3$)

Station	Location	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
530770012	Yakima, YVCC								8.1*			
530770009	Yakima, South 4th									9.9	11	11

* Average based on less than 12 months of data.

$PM_{2.5}$ for 1999 - 2002 ($\mu g/m^3$)

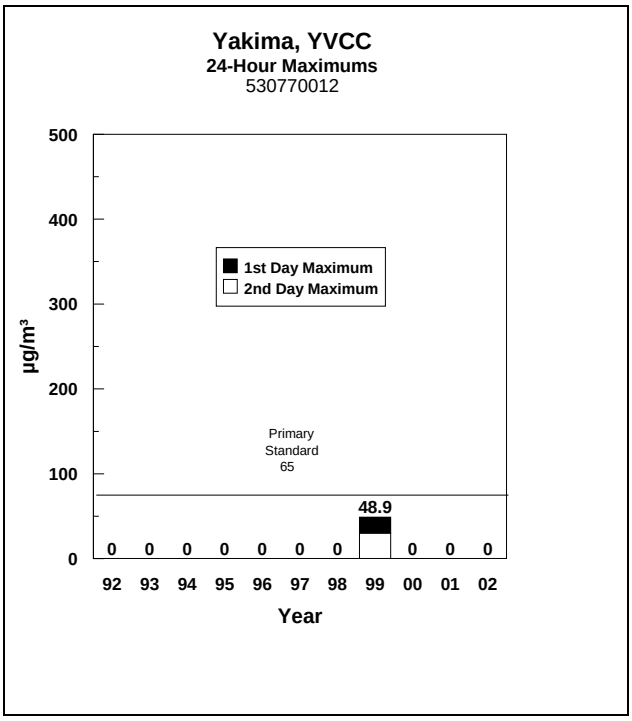
Station	Location	1st High Concentration	Date	2nd High Concentration	Date
	1999				
530770012	Yakima, YVCC	48.9	01/09	30.0	01/12
	2000				
530770009	Yakima, South 4th	44.8	12/29	44.1	12/20
	2001				
530770009	Yakima, South 4th	44.8	11/12	53.7	11-09
	2002				
530770009	Yakima, South 4th	48.2	11/28	49.7	11/04

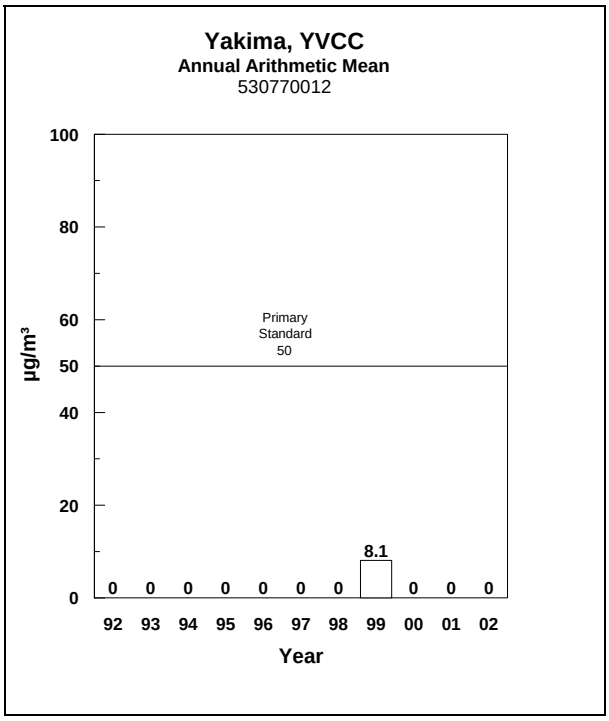
$PM_{2.5}$ for 1999 - 2002

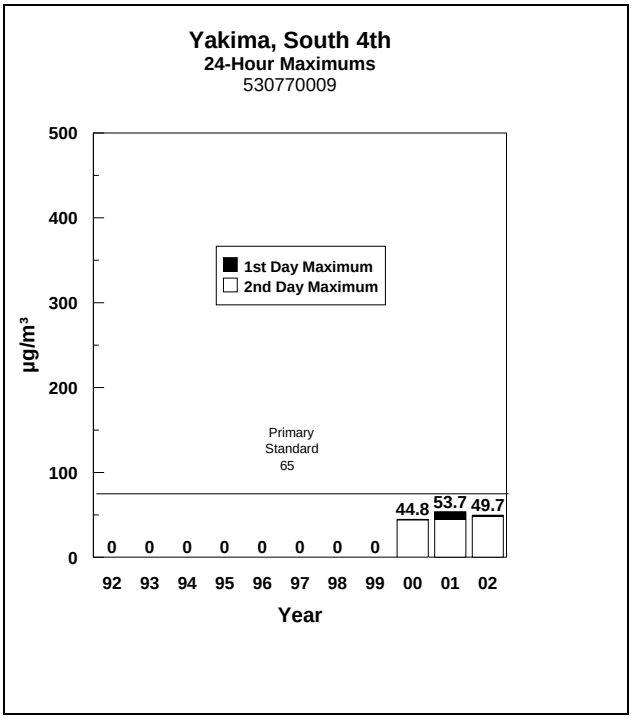
Station	Location	Period of Record	Sampling Frequency	# Samples	% Valid Data
	1999				
530770012	Yakima, YVCC	Jan-Aug	1/3	65	80
	2000				
530770009	Yakima, South 4th	Jan-Dec	1/3	80	100
	2001				
530770009	Yakima, South 4th	Jan-Dec	1/3	122	100
	2002				
530770009	Yakima, South 4th	Jan-Dec	1/3	122	100

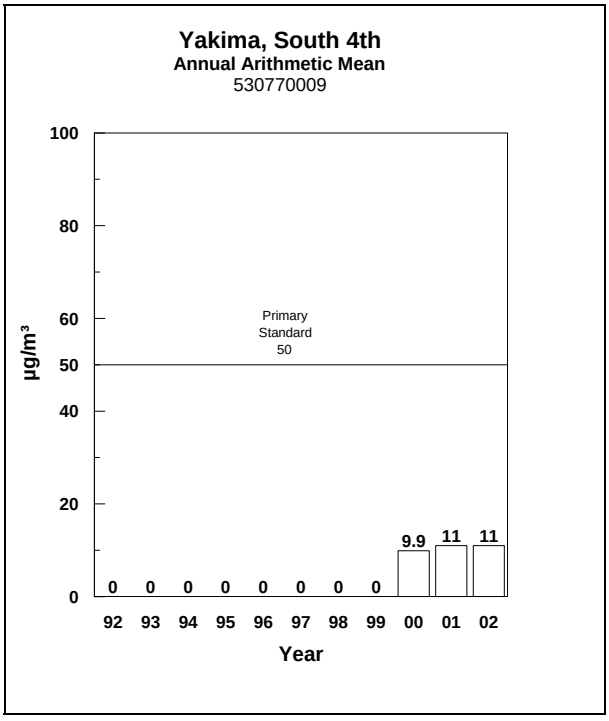
Yakima Area (cont)

Particulate Matter ($PM_{2.5}$)









Yakima Area (cont)

Carbon Monoxide

Carbon Monoxide for 1999 - 2002 (ppm)

Station	Location	1st Conc.	1-Hr High Date	Max 2nd Conc.	High Date	8-Hr 1st Conc.	Max High Date	2nd Conc.	High Date	2nd Day Conc.	High* Date
	1999										
530771002	Yakima Co Corthse.	10.5	01/11	8.6	01/08	5.6	01/11	5.4	01/11	4.8	01/05
	2000	1st Conc.	1-Hr High Date	Max 2nd Conc.	High Date	8-Hr 1st Conc.	Max High Date	2nd Con	High Date	2nd Day Con	High* Date
530771002	Yakima Co Corthse	5.2	01/14	4.9	12/19	3.4	01/11	3.4	12/19	3.1	01/07
	2001	1st Conc.	1-Hr High Date	Max 2nd Conc.	High Date	8-Hr 1st Conc.	Max High Date	2nd Conc.	High Date	2nd Day Conc.	High* Date
530771002	Yakima Co Corthse	5.4	01/30	4.5	01/12	2.67	01/12	2.53	01/30	2.53	01/30
530770014	Yakima, Yak Ave	5.6	11/02	5.1	11/02	3.26	12/13	3.23	11/30	3.23	11/30
	2002	1st Conc.	1-Hr High Date	Max 2nd Conc.	High Date	8-Hr 1st Conc.	Max High Date	2nd Conc.	High Date	2nd Day Conc.	High* Date
530770014	Yakima, Yak Ave	8.8	01/07	6.4	01/07	4.56	01/07	3.41	12/17	3.41	12/17

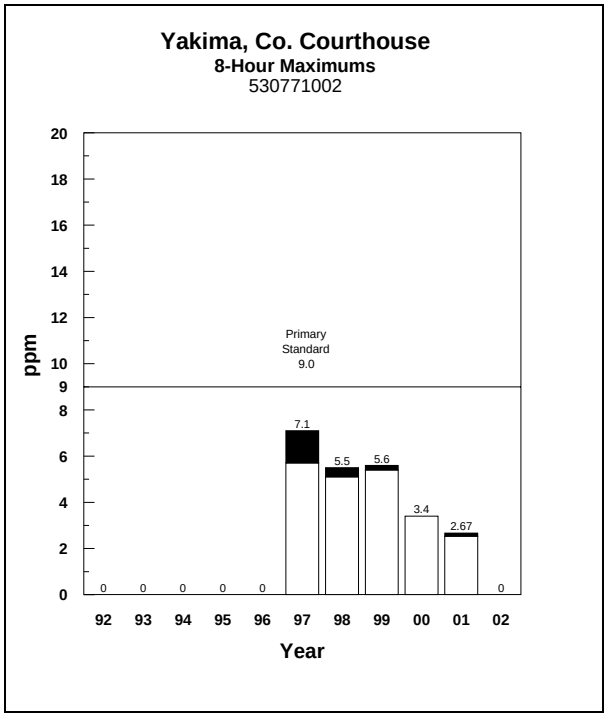
* 2nd Day High = Second day with the highest 8-hour average
Conc. = Concentrations. Max = Maximums

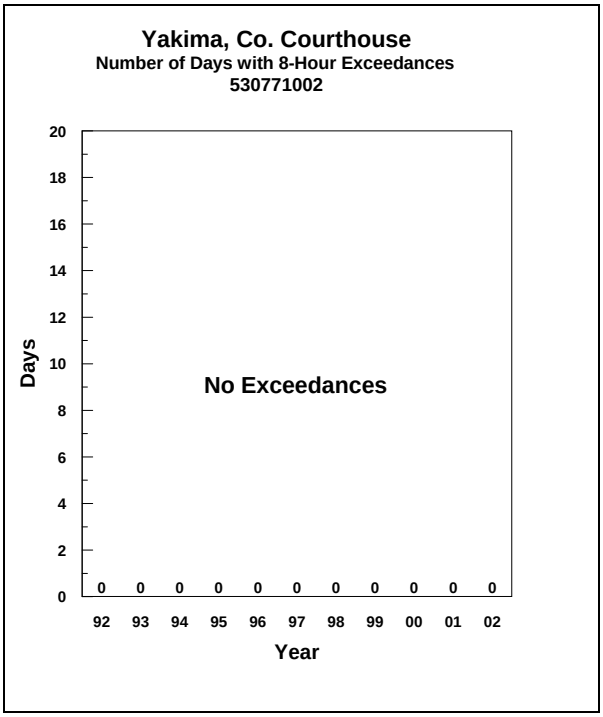
Carbon Monoxide for 1999 - 2002

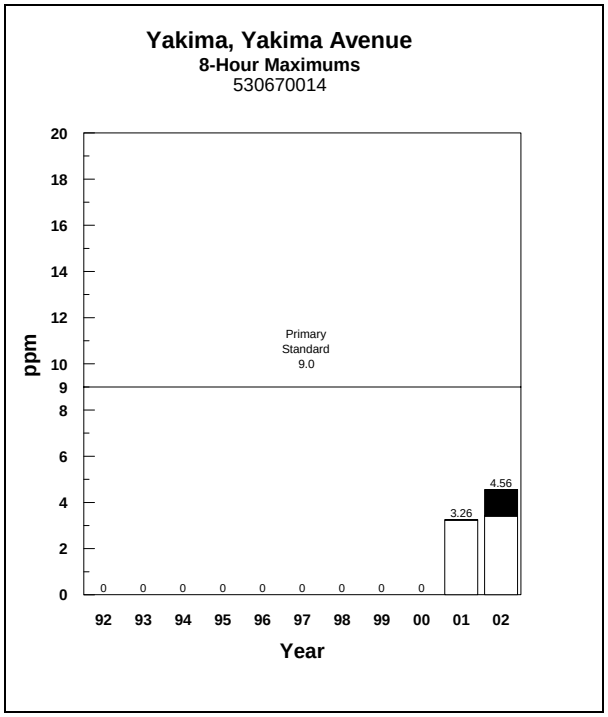
Station	Location	Period of Record		# Hours	# Days	% Valid Data
530771002	Yakima Co. Courthouse	Jan-Dec	**99**	8512	355	97
530771002	Yakima Co. Courthouse	Jan-Dec	**00**	8687	362	99
530771002	Yakima Co. Courthouse	Jan-Dec	**01**	2080	87	98
530770014	Yakima, Yakima Avenue	Apr-Dec	**01**	6427	268	97
530770014	Yakima, Yakima Avenue	Apr-Dec	**02**	4524	189	88

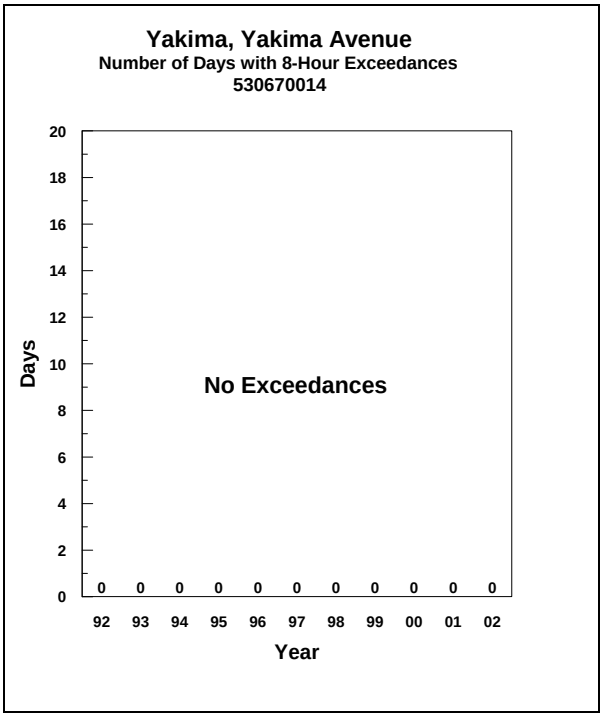
Yakima Area (concluded)

Carbon Monoxide









Visibility Monitoring for 1999 and 2000

During the 2002-2003 legislative session, a $2 billion budget shortfall forced extremely tough choices throughout state government. Faced with the need to cut whole programs, the Department of Ecology chose to retain air quality protection efforts with a primary focus on protecting human health rather than scenic views. Ultimately, visibility-related activities were not funded in the 2003-2005 budget passed by the legislature. Ecology will no longer be able to meet a congressional mandate to achieve views unobstructed by haze in national parks and wilderness areas, such as Mt. Rainier and the North Cascades. Ecology will also no longer track and analyze trends in visibility-impairing pollutants, nor can it continue to participate in the Columbia River Gorge visibility protection plan being developed with the state of Oregon and others.

The visibility information in this report pre-dates the budget reduction measures described above.

Ecology, in cooperation with the National Park Service and the U.S. Forest Service, monitors visibility conditions in Washington's Class I areas. Class I areas are areas that are given more stringent air quality protection than other areas of the state (see the map on page 104 for Class I areas and monitoring locations).

Nephelometer Monitoring

Although monitoring at the Ecology-operated sites is generally conducted from June through October, the period of most concern is July 1 through Labor Day. This "visibility protection period" coincides with the period of heaviest visitation to the Class I areas of the state. As in past years, Ecology's visibility monitoring at or near Class I areas for the 1999 and 2000 season involved the operation of nephelometers at several sites in western Washington. Class I area sites operated were South Mountain, Paradise Visitor Center, Carbon River Ranch, Marblemount (discontinued in 1999), Ross Dam (added in 2000), and Hurricane Ridge. Monitoring at Hurricane Ridge was not conducted in 1999 due to a major remodeling and construction project at the visitors' lodge. A new site was established at Ross Dam in June of 2000 and replaces the site at Marblemount. Data from these sites is presented in graphs on the following pages.

Nephelometers measure the scattering of light caused by fine particles in the air, which is the major component of visibility impairment. (Additional visibility impairment is caused by the absorption of light by elemental carbon particles. Absorption typically accounts for less than 10 percent of total visibility impairment.) Visibility is considered significantly impaired when the nephelometer one-hour light scatter average is greater than or equal to 50 inverse megameters (Mm^{-1}) (a visual range of approximately 78 kilometers).

With the exception of Hurricane Ridge, the number of impaired hours in 1999 and 2000 was the same as or lower than in 1998.

Visibility is also monitored with nephelometers by Ecology, the U.S. Forest Service and local air quality agencies at various non-Class I area sites in western Washington. In 1999 and 2000, this included Wishram (added in 2000) and Mt. Zion in the Columbia River Gorge National Scenic Area, Coldwater Ridge in the Mt. St. Helens National Monument, Beacon Hill in Seattle, and Mountain View Elementary School in Lacey. Equipment failure at Mt. Zion in 1999 resulted in no data during the July 1 – Labor Day period. Nephelometer data from these sites is presented here for comparison with the Class I area sites.

Visibility (cont)

National Network for Interagency Monitoring of Protected Visual Environments

The National Park Service and the U.S. Forest Service also monitor visibility at two long-term Class I area sites, Mt. Rainier National Park (near Ashford) and Alpine Lakes Wilderness (at Snoqualmie Pass). These two sites are part of the national IMPROVE network (**I**nteragency **M**onitoring of **PRO**tected **V**isual **E**nvironments). $PM_{2.5}$ and PM_{10} samples are collected at these sites. The samples are then chemically analyzed for pollutant species composition to reconstruct visibility levels and determine which pollutant species contribute to visibility impairment. Ecology began including a summary of this data in the annual data summary report in 1998.

The U.S. Environmental Protection Agency recently provided national guidance on methods for calculating and tracking visibility data (light extinction) from the IMPROVE network monitoring sites. [1]

This report employs those new methods. ***Note: Because of this methodology change, visibility levels reported here cannot be compared with those from previous reports.***

Graphs of IMPROVE data from the Mt. Rainier National Park and Alpine Lakes Wilderness sites are included on the following pages. Visibility in these graphs is shown as total light extinction (light scatter plus light absorption) and is reconstructed by summing the individual pollutant components' contributions to light scatter and absorption. Total light extinction is expressed as inverse megameters (Mm^{-1}). Simply said, visibility becomes worse as light extinction increases. For reference, a light extinction value of 100 Mm^{-1} is equal to a visual range of 39 kilometers and 20 Mm^{-1} is equal to a 196 km visual range. Rayleigh scatter is the amount of light scatter caused by pure air and is included in the graphs. Visibility under natural conditions (in the absence of human-caused pollutants) is estimated to be 16.97 and 16.79 Mm^{-1} at Mt. Rainier and Alpine Lakes, respectively. [2]

The Theil method was used to determine if there were statistically significant long-term trends in the annual average light extinction. [3] A five percent cumulative probability level was chosen to represent a statistically significant trend. A trends graph of annual average light extinction on the worst visibility days is included for Mt. Rainier National Park. Analysis of this data indicates a statistically significant decrease in light extinction (improving visibility) has occurred over the period 1989 – 1999. Please note that 1990 is not included in the trend because that year did not meet minimum data completeness requirements (75 percent). There are not enough years of data from the Alpine Lakes Wilderness site to determine a trend. This is because only two years out of the data record meet the minimum data completeness requirements. A minimum of five years is needed to perform the Theil trends analysis.

IMPROVE Network Expansion

The IMPROVE network has undergone a national expansion over the last two years. The expansion was completed for Washington State during the summer of 2001. There are now a total of six Class I area IMPROVE sites. These sites are:

- Ross Dam (for North Cascades NP and Glacier Peak W),
- Loup Loup Ski Area (for Pasayten W),
- Snoqualmie Pass (for Alpine Lakes W),
- Ashford (for Mt. Rainier NP),
- White Pass Ski Area (for Mt. Rainier NP, Goat Rocks W and Mt. Adams W), and
- Blyn Mountain (for Olympic NP).

Visibility (cont)

As data becomes available from the new sites it will be included in future data summary reports.

Columbia River Gorge National Scenic Area IMPROVE Monitoring

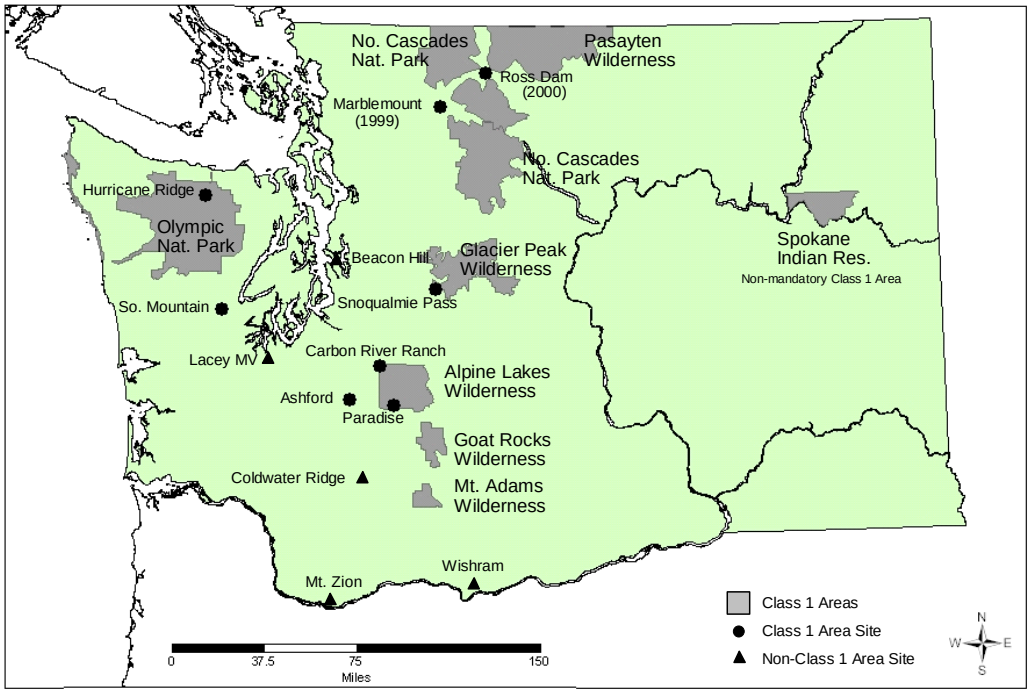
An amendment to the air quality provisions of the Columbia River Gorge National Scenic Area Management Plan was adopted in May 2000. This amendment directs the states of Oregon and Washington to protect and improve air quality (including visibility) in the Scenic Area and to continue to monitor air quality. Because of this, Ecology feels it is appropriate to include IMPROVE visibility data from the Scenic Area as part of this data summary report.

Graphs of IMPROVE data from the Mt. Zion and Wishram monitoring sites are included on the following pages. A trends graph of annual average light extinction on the worst visibility days is also included for the Wishram site. Analysis of this data indicates a statistically significant decrease in light extinction (improving visibility) has occurred over the period 1994 – 1999. Please note that 1995 is not included in the trend because that year did not meet minimum data completeness requirements. There are not enough years of data from the Mt. Zion site to determine a trend.

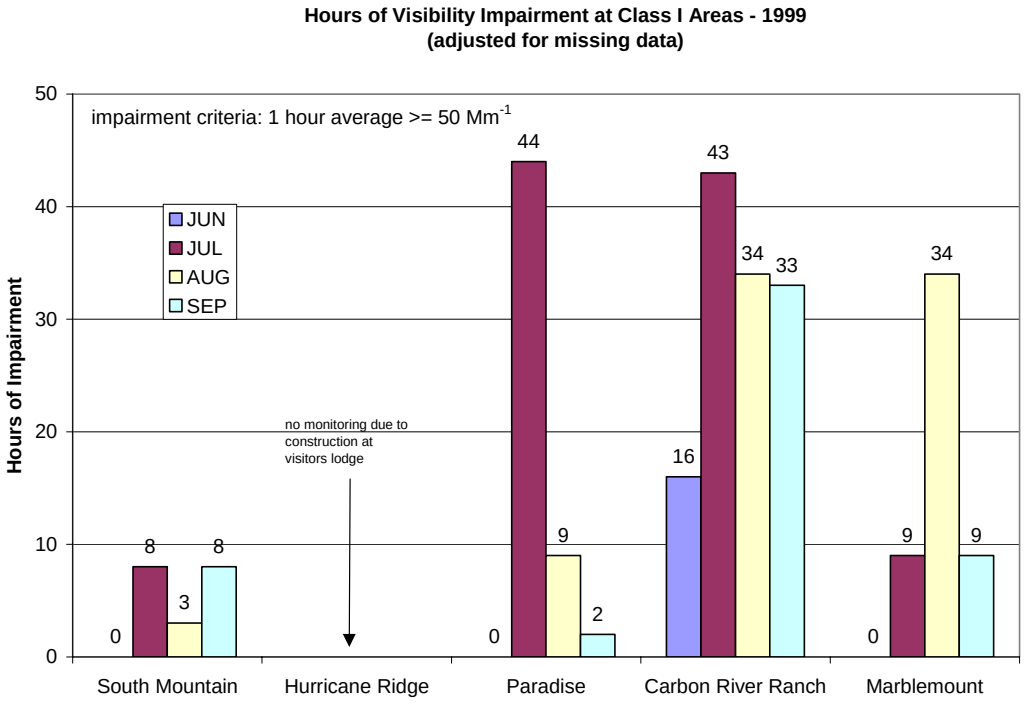
References:

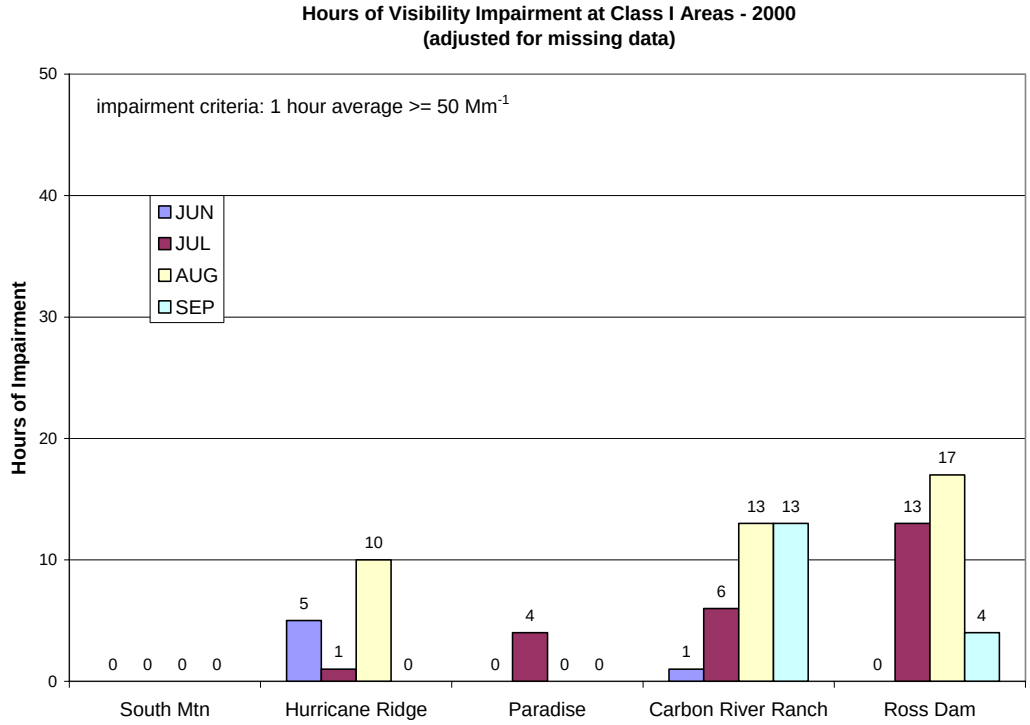
1. *Draft Guidance for Tracking Progress under the Regional Haze Rule*, USEPA-OAQPS, Research Triangle Park, NC, September 27, 2001
2. *Draft Guidance for Estimating Natural Visibility Conditions under the Regional Haze Rule,* USEPA-OAQPS, Research Triangle Park, NC, September 27,2001
3. *Visibility in Mandatory Class I Areas [1994 – 1998]: A Report to Congress – Appendix D*, USEPA, November, 2001

Washington State Mandatory Class One Areas With Visibility Monitoring Sites



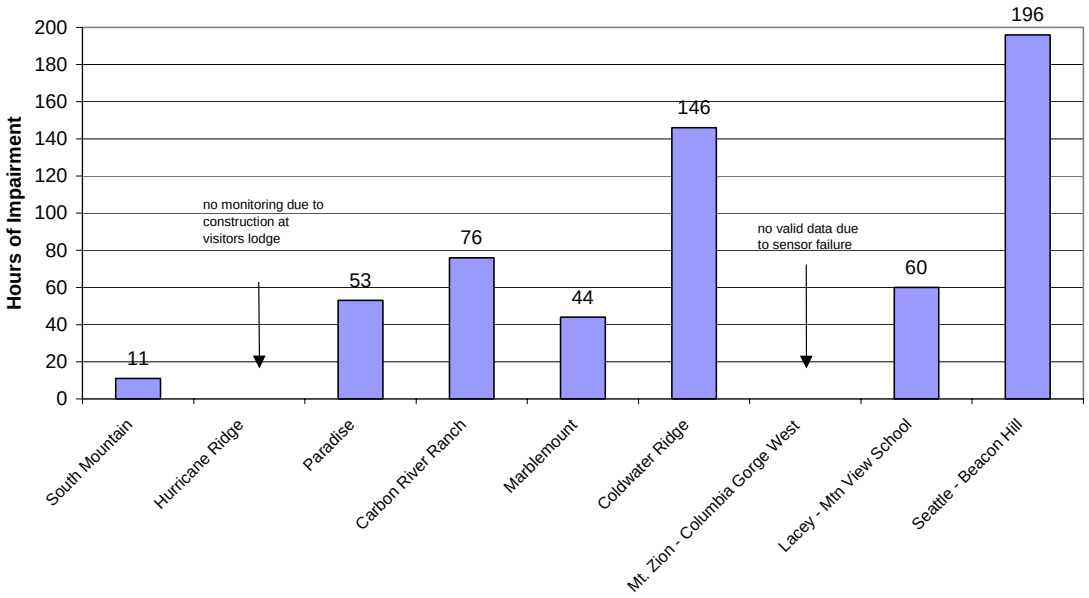
Visibility (cont)



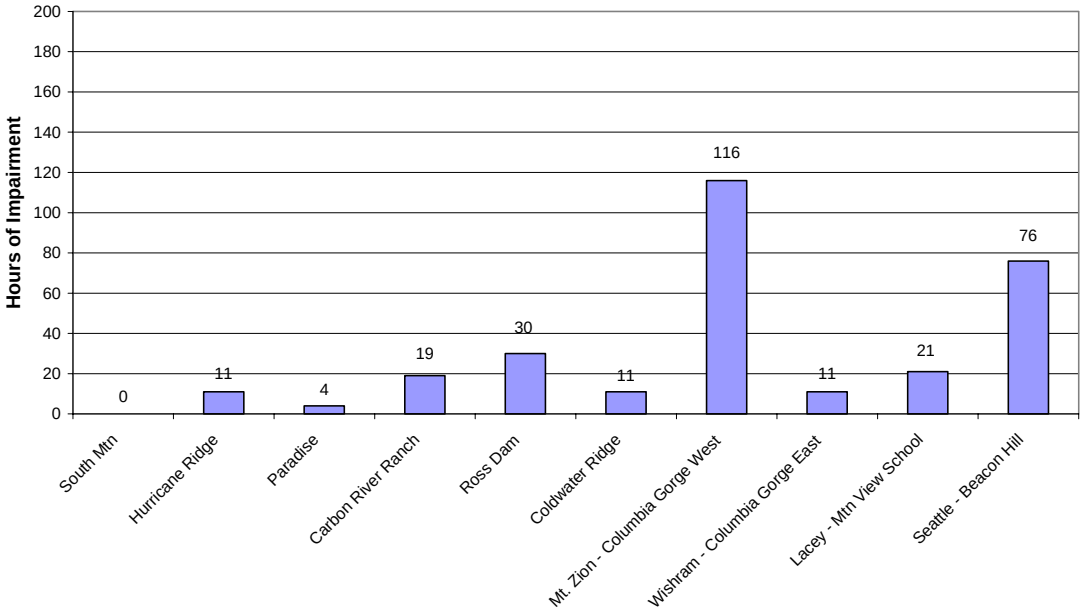


Visibility (cont)

Comparison of Class I Area Visibility With Other Non-Class I Areas
July 1 - Labor Day, 1999
(adjusted for missing data)

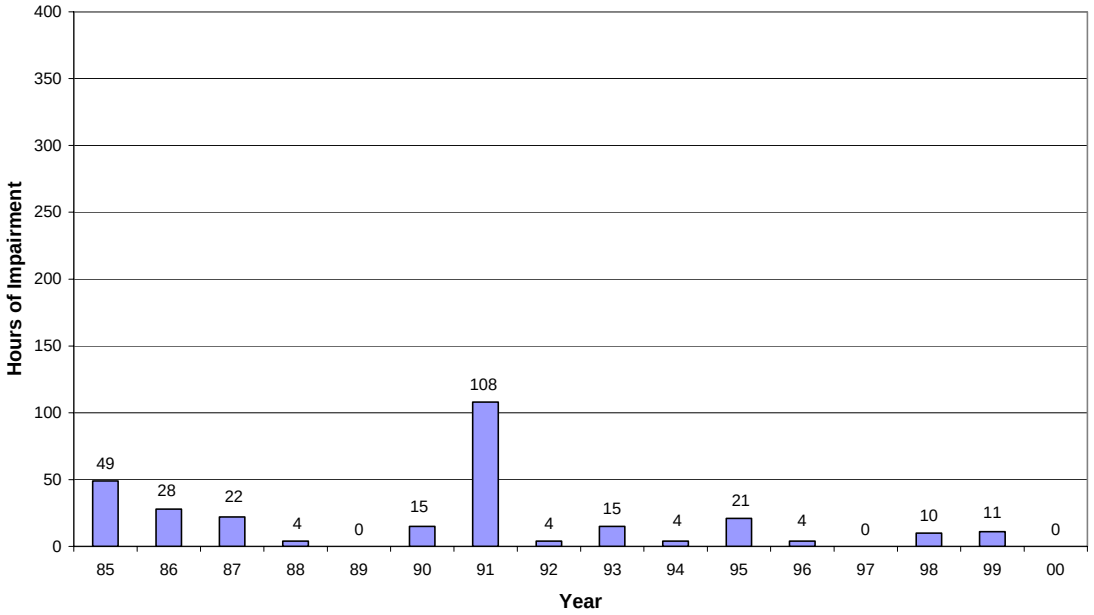


Comparison of Class I Area Visibility With Other Non-Class I Areas
July 1 - Labor Day, 2000
(adjusted for missing data)

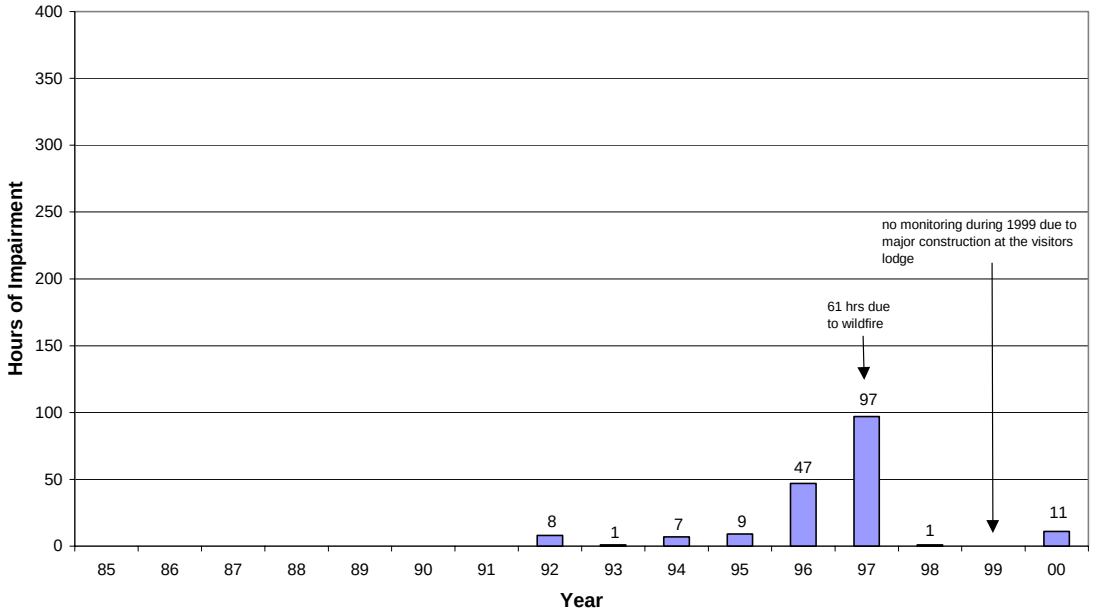


Visibility (cont)

South Mountain
Hours of Visibility Impairment
July 1st - Labor Day

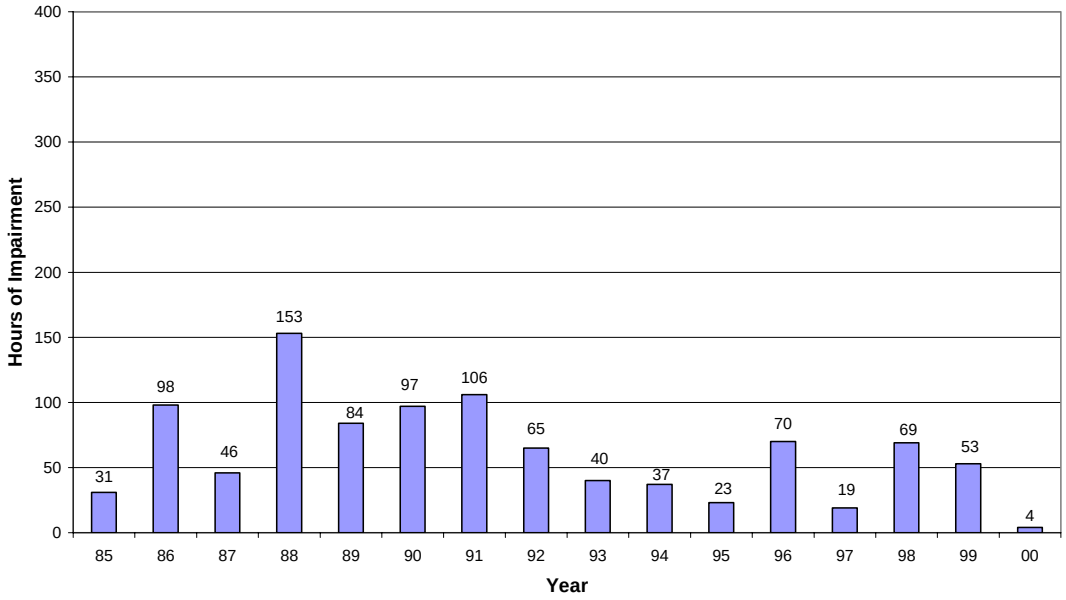


Hurricane Ridge
Hours of Visibility Impairment
July 1st - Labor Day

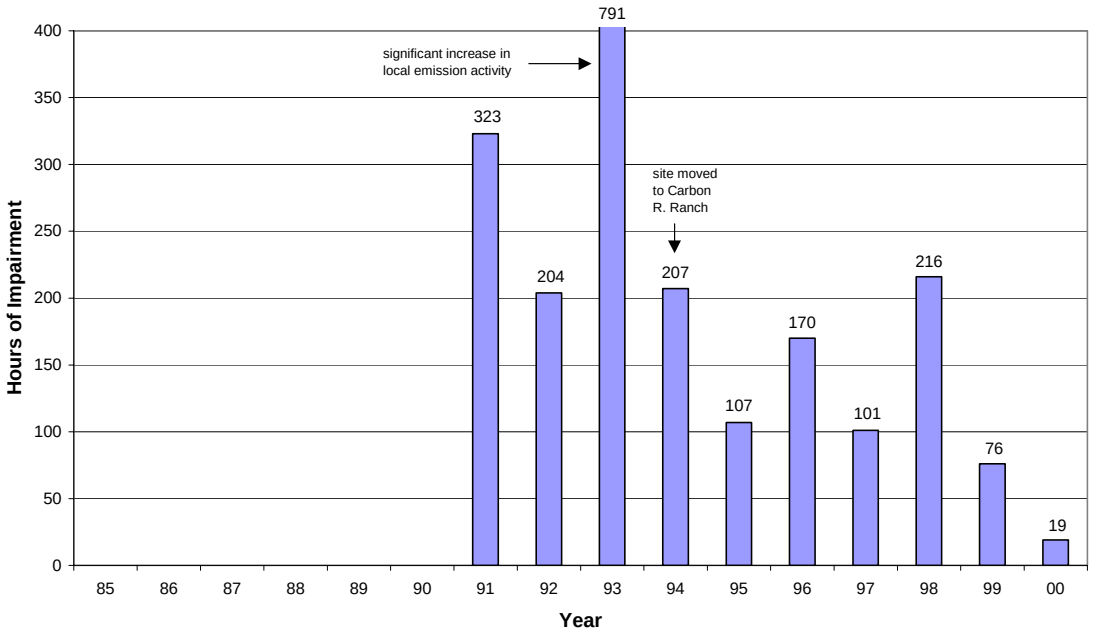


Visibility (cont)

Paradise
Hours of Visibility Impairment
July 1st - Labor Day



Carbon River Ranch/Oly Camp
Hours of Visibility Impairment
July 1st - Labor Day



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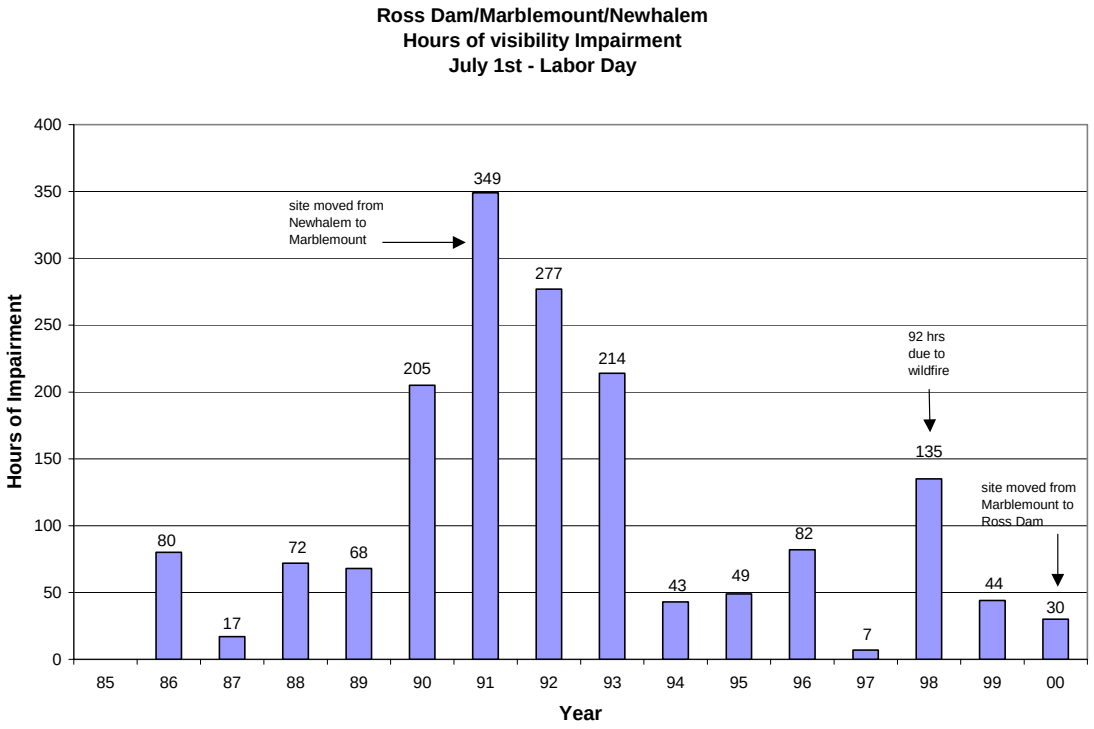
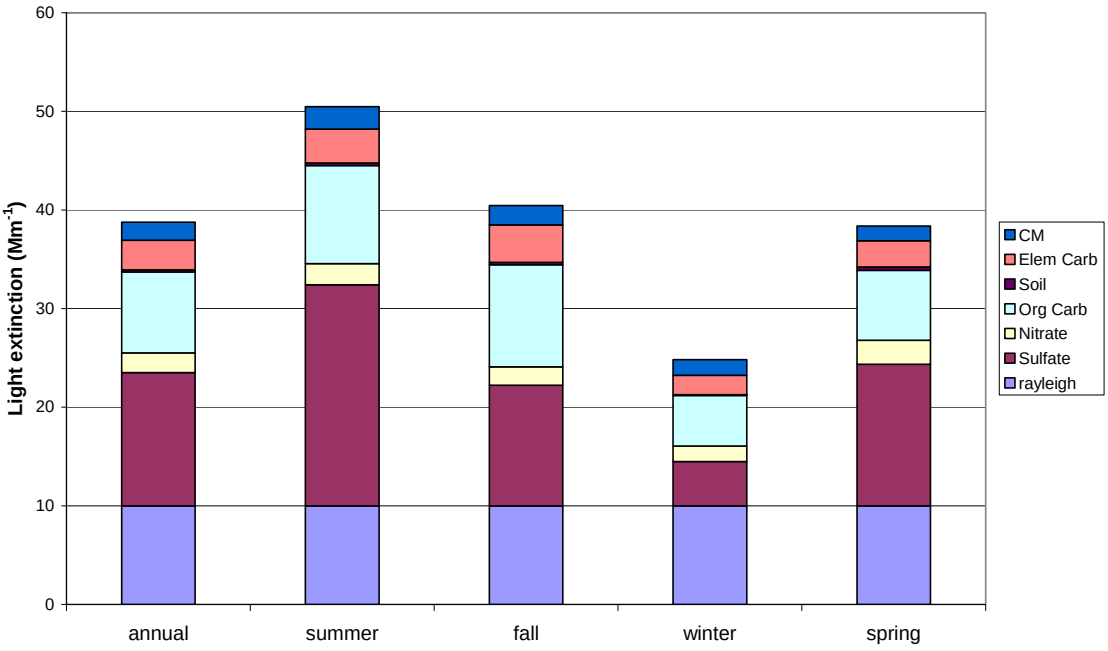
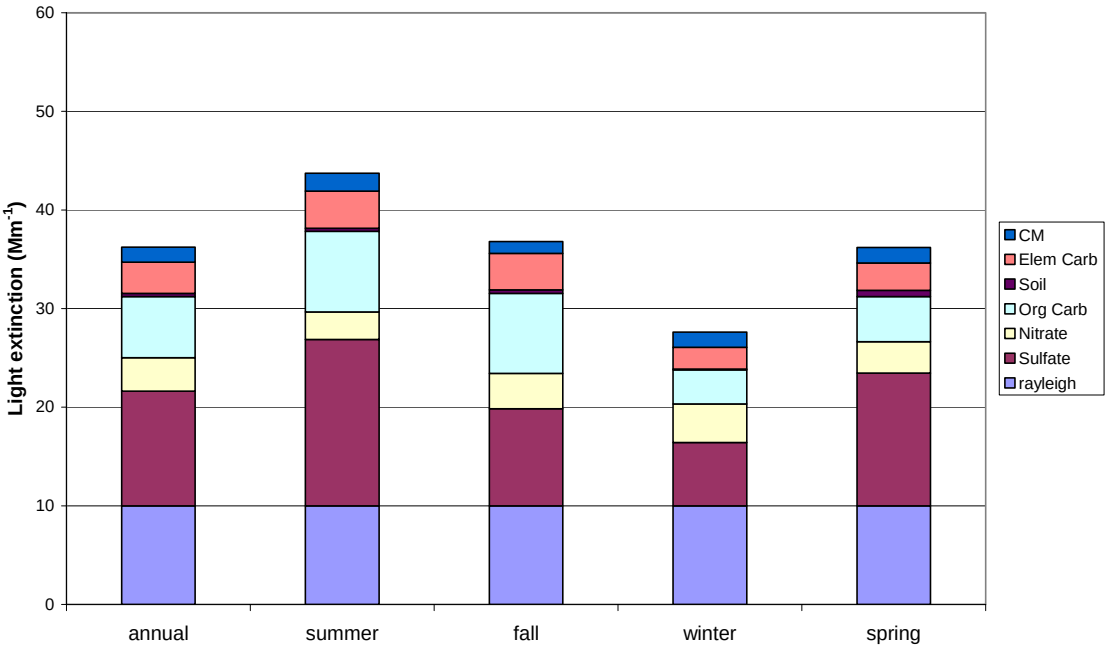


Visibility (cont)

Mt. Rainier NP annual and seasonal reconstructed light extinction
12/96 - 11/99



Alpine Lakes W annual and seasonal reconstructed light extinction
12/96 - 11/98



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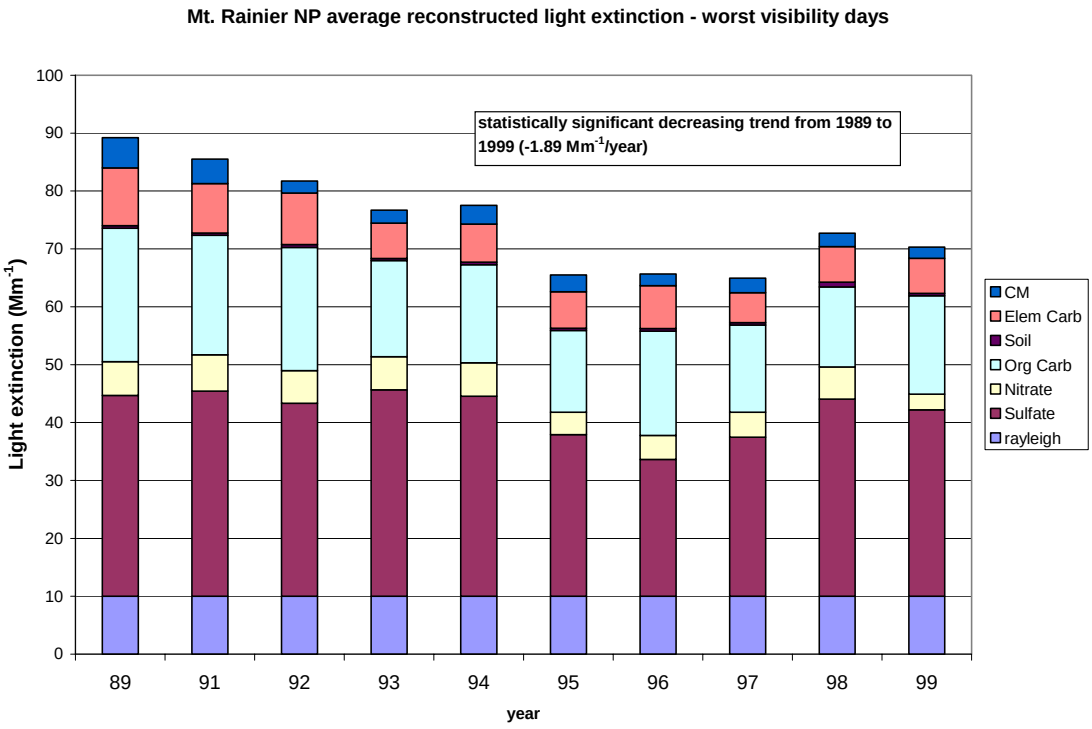
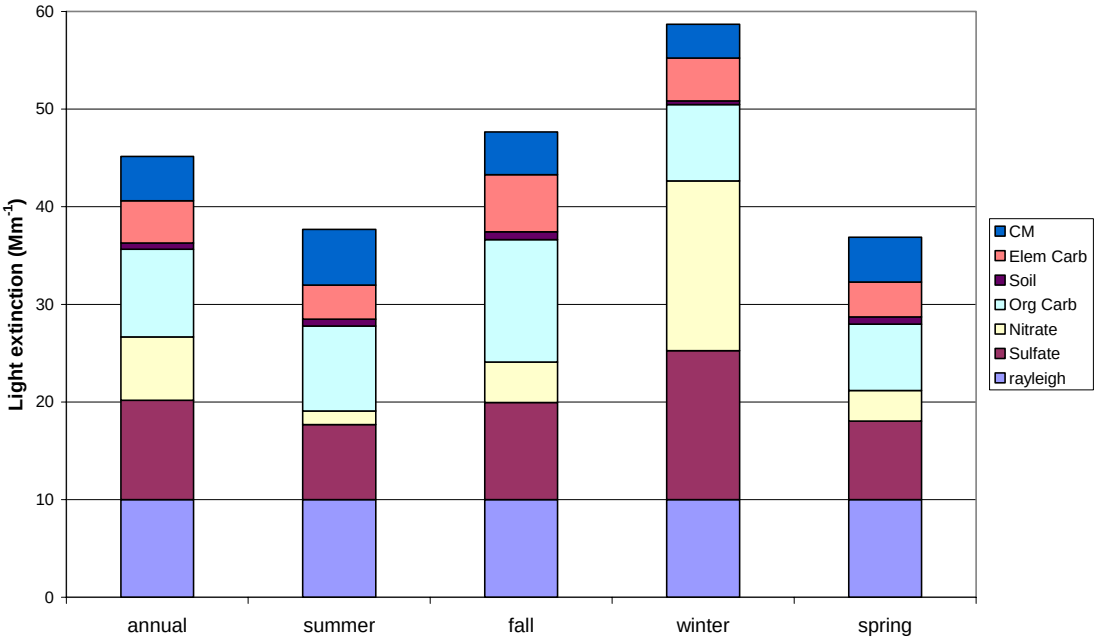
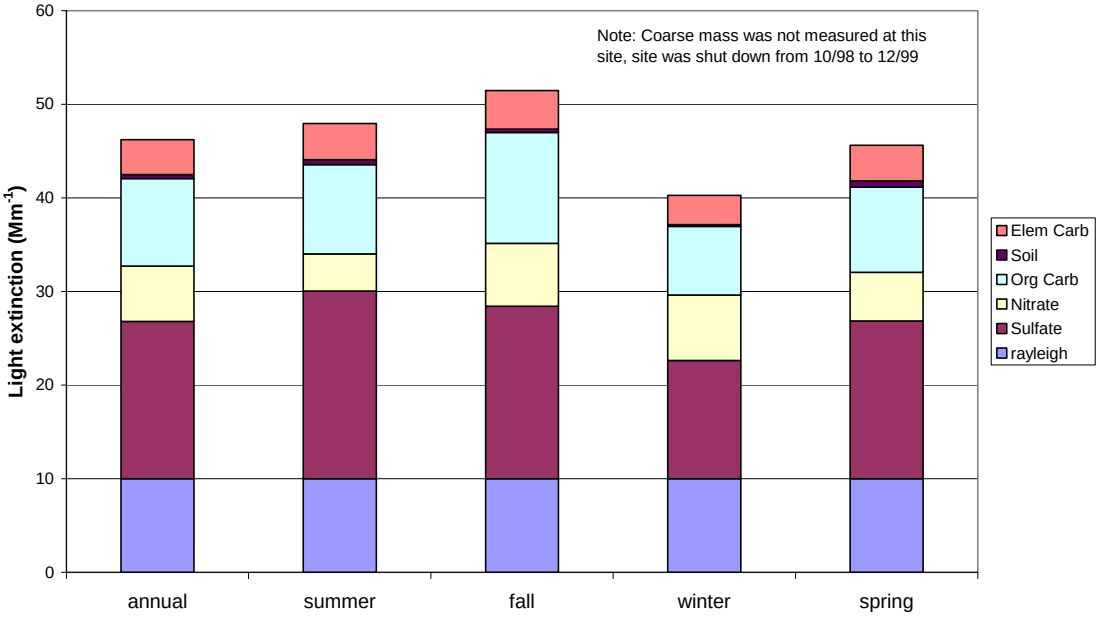


Visibility (cont)

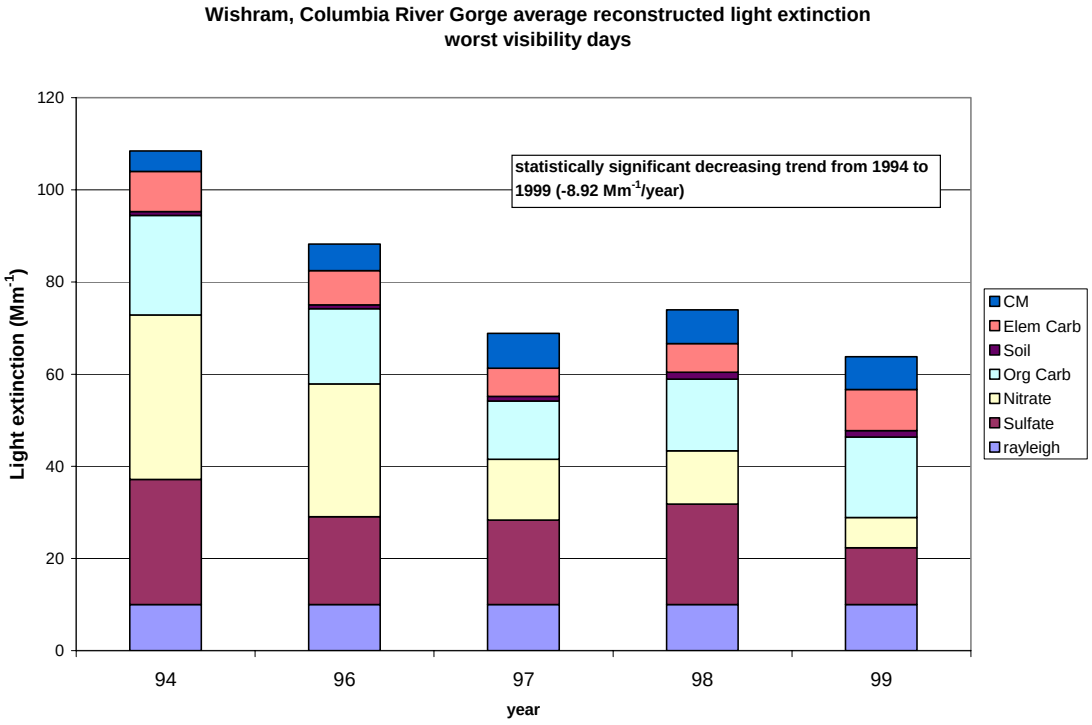
Wishram, Columbia River Gorge NSA, annual and seasonal reconstructed light extinction
12/95 - 11/98



Mt. Zion, Columbia River Gorge NSA, annual and seasonal reconstructed light extinction
(due to fine mass only)
9/96 - 8/98



Visibility (concluded)



Quality Assurance
1999 - Table of Contents

1.0 Introduction

The 1999 Annual Air Monitoring Data Quality Assessment Report summarizes the quality and completeness of the air monitoring data collected by the Washington State Department of Ecology Air Quality Program.

It is the policy of the program to provide for the generation, storage and use of air monitoring data that meets the following precision, accuracy and data completeness criteria, and is representative and comparable. To ensure the data meets these criteria it is reviewed and certified as valid by the program's Quality Assurance Unit prior to being reported or used to make decisions concerning air quality, orair pollution abatement or control.

- Automated and manual method precision. Based on precision checks performed as specified in the Code of Federal Regulations, Title 40, Chapter 1, Part 58 (40 CFR 58), Appendix A, "Quality Assurance Requirements for State and Local Air Monitoring Stations (SLAMS)," individual instrument precision must be within ±10%, and the integrated probability intervals (95% probability limits) for each parameter should be within ±15%.

- Automated and manual method accuracy. Based on quality control checks and performance audits conducted as specified in 40 CFR 58, Appendix A, individual instrument accuracy results must be within ±10%, and the integrated probability intervals (95% probability limits) for each parameter should be within ±15%.

- Meteorological accuracy. Based on the results from quality control checks and performance audits, the accuracy must be within the following tolerances:

  wind speed - ±5 percent
  wind direction - ±5 degrees
  temperature - ±1 degree Centigrade

- Data completeness. Based on qualitative and quantitative review of the data, 75% of each hour of data must be valid for the hour to be considered valid, and there should be at least 80% certified valid data from each monitoring instrument.

Representativeness is achieved by adhering to the specifications in 40 CFR 58, Appendix D, "Network Design for State and Local Air Monitoring Stations (SLAMS) and National Air Monitoring Stations (NAMS)" and Appendix E, "Probe Siting Criteria for Ambient Air Quality Monitoring." Comparability is ensured through the use of uniform procedures and reference or equivalent methods as specified in 40 CFR 58, Appendix C, "Ambient Air Quality Monitoring Methodology."

2.0 Summary

Automated Data

Carbon Monoxide

Carbon monoxide (CO) data was collected at 20 monitoring stations. The data generated from these stations met the precision, accuracy, and data completeness criteria.

Nephelometer

Nephelometer (B-scat) data was collected at 14 monitoring stations. The data generated from these stations met the precision criteria. The data completeness criteria was not met at the Skamania County, Mt. Zion station due to operator errors.

Nitrogen Dioxide

Nitrogen dioxide (NO_2) data was collected at 3 monitoring stations. The data generated from these stations met the precision, accuracy, and data completeness criteria.

Ozone

Ozone (O_3) data was collected at 17 monitoring stations. The data generated from these stations met the precision, accuracy, and data completeness criteria.

Sulfur Dioxide

Sulfur dioxide (SO_2) data was collected at 7 monitoring stations. The data generated from these stations met the precision and accuracy criteria. The data completeness criteria was not met at the Bellingham Chestnut Street station due to a Quality Assurance audit failure, operator errors, and a sensor failure.

Manual Data

Pb

Lead (Pb) data was collected at one monitoring station. The data generated from this station met the precision, accuracy, and data completeness criteria.

$PM_{2.5}$

$PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5 micrometers) data was collected at 18 monitoring stations. The data generated from these stations met the precision and accuracy criteria expressed as bias. The data completeness criteria was not met at the following stations:

- The Kennewick, VSC station due to a Quality Assurance audit failure and the required QC checks were not performed
- The Moose Lodge, Vancouver station due to a Quality Assurance audit failure which revealed a bad transfer standard
- The Spokane, Crown Zellerbach station due to filters not received at the laboratory, retrieval of filters greater than the 96 hour time requirements, and QC check failures
- The Spokane, Crown Zellerbach collocated station due to filters not received at the laboratory, retrieval of filters greater than the 96 hour time requirements, and QC check failures

- The Spokane, Monroe Street station due to filters not received at the laboratory, retrieval of filters greater than the 96 hour time requirements, and QC check failures
- The Bellingham, Yew Street collocated station due to a Quality Assurance audit failure, operator errors, and filter and field data being mixed

PM_{10}

PM_{10} (particulate matter with an aerodynamic diameter of 10 micrometers) data was collected at 35 monitoring stations. The data generated from these stations met the precision and accuracy criteria. The data completeness criteria was not met at the Wenatchee, Columbia School station due to operator errors.

TSP

TSP (total suspended particulate) data was collected at 1 monitoring station. The data generated by this station met the precision, accuracy, and data completeness criteria.

Meteorological Data

Meteorological data was collected at 18 monitoring stations. These stations satisfy the Environmental Protection Agency (EPA) Prevention of Significant Deterioration (PSD) specifications and Ecology's data validation requirements.

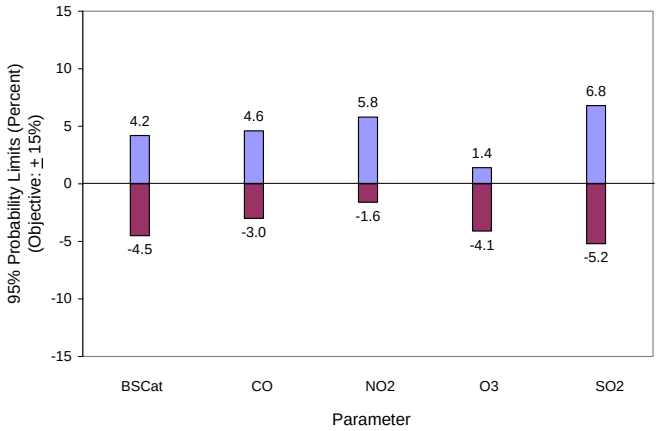
Data users should be cautious about using incomplete data to make conclusive statements, as violations of the State or National Ambient Air Quality Standards may have occurred during periods of incomplete data.

3.0 Automated Method Data Quality

Precision of Automated Methods

Utilizing the procedures and calculations specified in 40 CFR 58, Appendix A, Sections 3.1 and 5.1, the precision of the automated analyzers (B-scat, CO, NO_2, O_3, and SO_2) was checked at least once every two weeks and an estimate of the precision calculated for each parameter. Figure 1 presents the resulting 95% probability limits.

Figure 1. Summary of Automated Method Precision



Accuracy of Automated Methods

Utilizing the procedures and calculations specified in 40 CFR 58, Appendix A, Sections 3.2 and 5.2, at least 50% of the automated analyzers (CO, NO_2, O_3, and SO_2) were audited and an estimate of the accuracy calculated for each parameter. Figures 2, 3, 4, and 5 present the resulting 95% probability limits.

Figure 2. Summary of Carbon Monoxide (CO)
Automated Method Accuracy

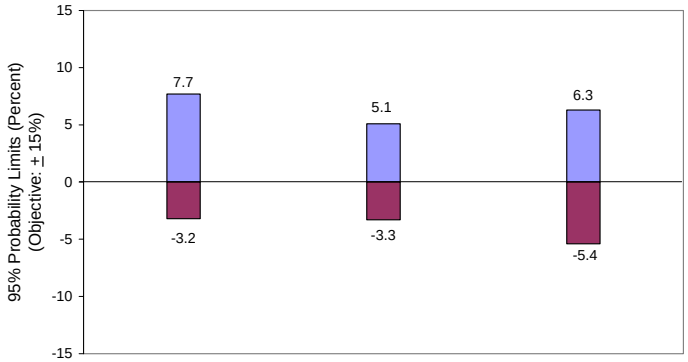


Figure 3. Summary of Nitrogen Dioxide (NO_2)
Automated Method Accuracy

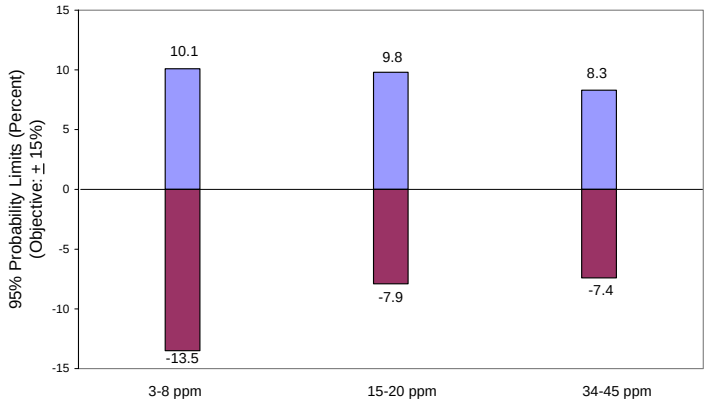


Figure 4. Summary of Ozone (O_3)
Automated Method Accuracy

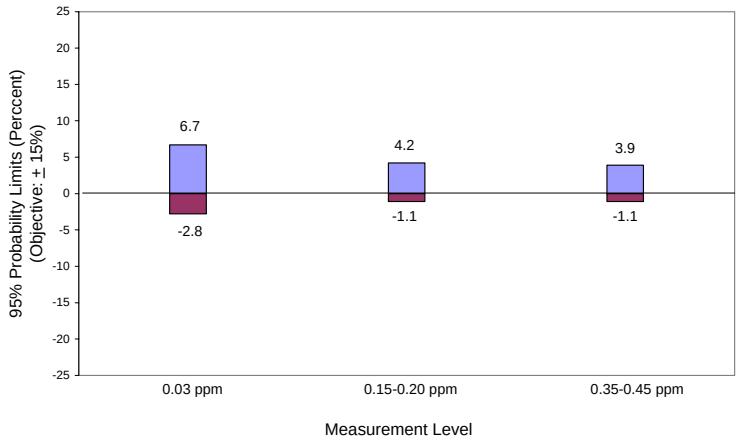
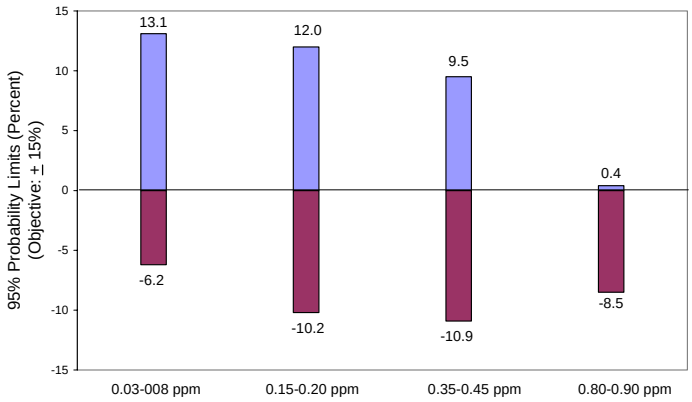


Figure 5. Summary of Sulfur Dioxide (SO_2)
Automated Method Accuracy

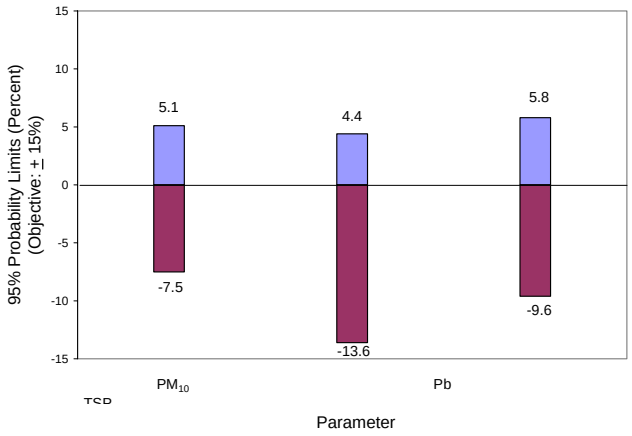


4.0 Manual Method Data Quality

Precision of Manual Methods

Utilizing the procedures and calculations specified in 40 CFR 58, Appendix A, Sections 3.3 and 5.3, duplicate, collocated sampling was conducted to evaluate manual method (Pb, $PM_{2.5}$, PM_{10}, and TSP) data precision and an estimate of the precision is calculated for each parameter. $PM_{2.5}$ precision is expressed as bias, and is calculated for each monitoring station. This data is not presented graphically but is available on request. Figure 6 presents the resulting 95% probability limits for Pb, PM_{10} and TSP.

Figure 6.
Summary of Manual Method Precision



Accuracy of Manual Methods

Utilizing the procedures and calculations specified in 40 CFR 58, Appendix A, Sections 3.4 and 5.4, the accuracy of the manual methods (Pb, PM_{10}, and TSP) were audited and an estimate of the accuracy calculated for each parameter. Accuracy for $PM_{2.5}$ is expressed as bias to produce a single average for the network. The annual average was 0.49. Figures 7 and 8 present the resulting 95% probability limits for Pb, PM_{10}, and TSP.

Figure 7. Summary of Particulate Matter Manual Method Accuracy

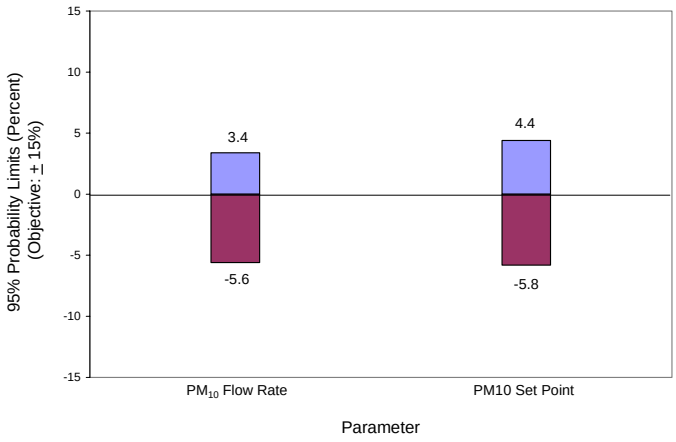
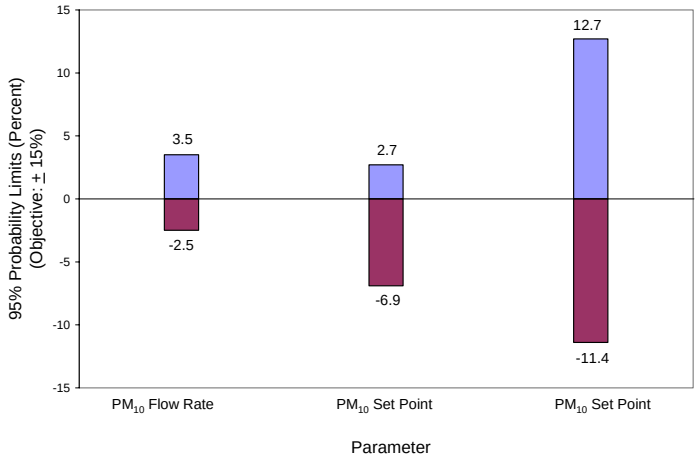


Figure 8. Summary of Particulate Matter Manual Method Accuracy



5.0 Percent Valid Data

Percent valid data is a gauge of the amount of certified valid data obtained from a monitoring instrument compared to the amount expected under ideal conditions (24 hours per day, 365 days per year). Exceptions are analyzers which had a short term or a seasonal sampling period and manual method samplers that run either every day, every other day, every third day, or every sixth day. The O_3 network has a required seasonal sampling period of April 1 through October 31. The completeness of the data is determined for each monitoring instrument, the sampling period and frequency taken into account and the results expressed as a percentage in Table 1. When the 80% certified data objective is not met, the result is **highlighted** and an explanation given. When the sampling period is less than ideal it is noted. The manual method sampling frequency is noted after the station identification number, such that 1/1, 1/2, 1/3, and 1/6 denotes every day, every other day, every third day, and every sixth day sampling frequency, respectively.

Para-meter	Station ID#	Location	% Valid data	Valid hours	Remarks
B-scat (Neph)	1776K55B	Seattle, Duwamish Trailer	97	8476	
B-scat (Neph)	1777002A	Seattle, Sea-Tac North	99	3818	station discontinued 6/10
B-scat (Neph)	1777003A	Seattle, Sea-Tac South	99	3774	station discontinued 6/7
B-scat (Neph)	1744K74B	City Hall, Lake Forest Park	99	2983	station discontinued 5/6
B-scat (Neph)	1758001A	North Bend, USFS	96	552	parameter established 12/7
B-scat (Neph)	1740K73B	Kent, Central & James	92	8086	
B-scat (Neph)	3444003G	Lacey, Mt. View School	99	8691	
B-scat (Neph)	0566010G	Pt. Angeles, Stevens School	99	1459	station established 11/1
B-scat (Neph)	2700014A	Pierce County, Carbon River	88	5128	seasonal; established 5/1, discontinued 9/30
B-scat (Neph)	2700017A	Pierce County, Rainier #3	97	8509	

Para-meter	Station ID#	Location	% Valid data	Valid hours	Remarks
B-scat (Neph)	3000001A	Skamania Co., Mt. Zion	**78**	6838	operator errors
B-scat (Neph)	2300001A	Mason County, South Mountain	99	2838	seasonal; established 6/3, discontinued 9/30
B-scat (Neph)	2900014A	Skagit County, Marblemount	99	3401	seasonal; established 5/10, discontinued 9/30
B-scat (Neph)	0800005A	Cowlitz Co., Coldwater	99	3634	seasonal; established 5/1, discontinued 9/30
CO	1776026A	Seattle, 4th & Pike	99	8708	
CO	1776308A	Seattle, James St.	99	8701	
CO	1776043A	Seattle, Northgate Apts. #2	99	8663	
CO	1776020A	Seattle, Zanadu Comics	99	8705	
CO	1708003A	Bellevue, Sturtevants	96	4163	station discontinued 6/30
CO	1708005A	Bellevue, NE 8th & 108th NE	99	8703	
CO	1708007A	Bellevue, 148th & 24th	99	8704	
CO	3146002A	Lynnwood	99	8709	
CO	2782013A	Tacoma, Pacific Ave.	99	8509	
CO	3124006A	Everett, Nevada Bob's	99	8682	
CO	3278043A	Spokane, Back Door Tavern	99	4827	station discontinued 7/22
CO	3278045A	Spokane, Spokane Club	99	8711	
CO	3278039A	Spokane, Hamilton St.	99	8699	
CO	3278047A	Spokane, 3rd Ave. & Wa.	97	6107	station discontinued 9/20
CO	3278048A	Spokane, 3rd Ave. & Wa. South	97	8532	
CO	3278049A	Spokane, Gonzaga	99	8708	
CO	3444004A	Lacey, OAPCA Office	99	5700	station discontinued 5/31 – 10/5
CO	0688011A	Vancouver, Atlas & Cox	99	8705	
CO	0600003A	Vancouver, Hazel Dell	98	8537	

Para-meter	Station ID#	Location	% Valid data	Valid hours	Remarks
CO	3996005A	Yakima Co. Courthouse	97	8512	
NO	1776029A	Seattle, Beacon Hill	91	8007	
NO_2	1776029A	Seattle, Beacon Hill	91	8007	
NO_x	1776029A	Seattle, Beacon Hill	91	8007	
NO	1777002A	Seattle, Sea-Tac North	90	3294	parameter discontinued 6/3
NO_2	1777002A	Seattle, Sea-Tac North	90	3294	parameter discontinued 6/3
NO_x	1777002A	Seattle, Sea-Tac North	90	3294	parameter discontinued 6/3
NO	1777003A	Seattle, Sea-Tac South	92	3517	parameter discontinued 6/7
NO_2	1777003A	Seattle, Sea-Tac South	92	3517	parameter discontinued 6/7
NO_x	1777003A	Seattle, Sea-Tac South	92	3517	parameter discontinued 6/7
O_3	1700007A	King County, Enumclaw	93	3400	seasonal; May - September
O_3	1700002A	King County, Lake Sammamish	99	3636	seasonal; May - September
O_3	1758002A	King County, Mud Mountain	99	3635	seasonal; May - September
O_3	1758001A	King County, North Bend	99	3620	seasonal; May - September
O_3	1776029A	Seattle, Beacon Hill	99	3619	seasonal; May - September
O_3	3700006A	Whatcom County, FCC Custer	99	3620	seasonal; May - September
O_3	0600002A	Vancouver, Mt. View School	96	3522	seasonal; May - September
O_3	3200019A	Spokane County, Greenbluff	99	3638	seasonal; May - September
O_3	3214003A	Cheney, Turnbull Slough	93	3404	seasonal; May - September
O_3	2100006A	Lewis County, Packwood Lake	99	2581	seasonal; established 6/10, discontinued 9/27
O_3	2700007A	Pierce County, Pack Forest	99	3617	seasonal; May - September
O_3	2700017A	Pierce County, Rainier #3	99	8651	
O_3	2700005A	Pierce County, Graham	98	998	seasonal; station established 8/19
O_3	2000001A	Wishram, Columbia River Gorge	99	3637	seasonal; May - September
O_3	0800004A	Cowlitz Co., Woodland	98	8583	seasonal; May - September

Para-meter	Station ID#	Location	% Valid data	Valid hours	Remarks
O_3	0600005A	Clark Co., Hockinson	97	3558	seasonal; May - September
O_3	3496001A	Yelm, Fire Station	99	4008	seasonal; 4/15 - September
SO_2	1776K55B	Seattle, Duwamish Trailer	99	6489	parameter discontinued 9/30
SO_2	2782P16B	Tacoma, 54th Ave. N.E	99	6493	station discontinued 9/30
SO_2	2782P17B	Tacoma, Alexander Ave.	99	6454	parameter discontinued 9/30
SO_2	2900004C	Anacortes, March Point	83	5453	station discontinued 9/30
SO_2	3124S04B	Everett, Hoyt Ave.	99	6463	station discontinued 9/30
SO_2	2900001C	Anacortes, South Texaco	91	5940	station discontinued 9/30
SO_2	3706069C	Bellingham, Chestnut Street	**71**	4618	Quality Assurance audit failure, operator errors, sensor failure, station discontinued 9/30
Wind speed	1776029A	Seattle, Beacon Hill	98	8614	
Wind dir.	1776029A	Seattle, Beacon Hill	98	8614	
T_A	1776029A	Seattle, Beacon Hill	99	8742	
Wind speed	1776042A	Seattle, NOAA	99	8741	
Wind Dir.	1776042A	Seattle, NOAA	99	8741	
T_A	1776042A	Seattle, NOAA	99	8741	
T_D	1776042A	Seattle, NOAA	99	8741	
Wind Speed	1777002A	Seattle, Sea-Tac North	99	3843	station discontinued 6/10
Wind Dir.	1777002A	Seattle, Sea-Tac North	99	3843	station discontinued 6/10
T_A	1777002A	Seattle, Sea-Tac North	99	3843	station discontinued 6/10
Wind Speed	1777003A	Seattle, Tyee Valley Golf	99	3766	parameter discontinued 6/7
Wind Dir.	1777003A	Seattle, Tyee Valley Golf	99	3766	parameter discontinued 6/7

Para-meter	Station ID#	Location	% Valid data	Valid hours	Remarks
T_A	1777003A	Seattle, Tyee Valley Golf	99	3766	parameter discontinued 6/7
Wind speed	0566010G	Pt. Angeles, Stevens School	100	81	parameter established 12/28
Wind dir.	0566010G	Pt. Angeles, Stevens School	100	81	parameter established 12/28
T_A	0566010G	Pt. Angeles, Stevens School	100	81	parameter established 12/28
Wind speed	3496001A	Yelm, Fire Station	98	6384	parameter discontinued 9/29
Wind dir.	3496001A	Yelm, Fire Station	98	6384	parameter discontinued 9/29
T_A	3496001A	Yelm, Fire Station	98	6384	parameter discontinued 9/29
Wind speed	3996009F	Yakima, Sundquist Annex	99	5778	station discontinued 8/31
Wind dir.	3996009F	Yakima, Sundquist Annex	99	5778	station discontinued 8/31
T_A	3996009F	Yakima, Sundquist Annex	99	5796	station discontinued 8/31
Wind speed	3278009E	Spokane, Crown Zellerbach	99	8654	
Wind dir.	3278009E	Spokane, Crown Zellerbach	99	8654	
T_A	3278009E	Spokane, Crown Zellerbach	99	8748	
Wind speed	3278046A	Spokane, Monroe St.	97	8519	
Wind dir.	3278046A	Spokane, Monroe St.	97	8519	
T_A	3278046A	Spokane, Monroe St.	97	8519	
Wind speed	2782016A	Tacoma, Indian Hill Reservoir	99	8723	
Wind dir.	2782016A	Tacoma, Indian Hill Reservoir	99	8723	
T_A	2782016A	Tacoma, Indian Hill Reservoir	99	8748	
Wind speed	3200020E	Spokane County, Rockwood	98	8574	

Para-meter	Station ID#	Location	% Valid data	Valid hours	Remarks
Wind dir.	3200020E	Spokane County, Rockwood	98	8574	
T_A	3200020E	Spokane County, Rockwood	99	8736	
Wind speed	1700004A	King Co., Enumclaw FS#3	99	8746	
Wind dir.	1700004A	King Co., Enumclaw FS#3	99	8746	
T_A	1700004A	King Co., Enumclaw FS#3	99	8745	
Wind speed	0566010G	Pt. Angeles, Stevens School	100	81	parameter established 12/28
Wind dir.	0566010G	Pt. Angeles, Stevens School	100	81	parameter established 12/28
T_A	0566010G	Pt. Angeles, Stevens School	100	81	parameter established 12/28
Wind speed	0688016A	Clark County, BPA	97	8532	
Wind dir.	0688016A	Clark County, BPA	97	8532	
T_A	0688016A	Clark County, BPA	97	8556	
Wind speed	3000001A	Skamania Co., Mt. Zion	98	8616	
Wind dir.	3000001A	Skamania Co., Mt. Zion	98	8616	
T_A	3000001A	Skamania Co., Mt. Zion	98	8616	
Wind speed	0800004A	Cowlitz County, Woodland	98	8575	
Wind dir.	0800004A	Cowlitz County, Woodland	98	8575	
T_A	0800004A	Cowlitz County, Woodland	98	8583	
Wind speed	0800005A	Cowlitz Co., Coldwater	99	3655	established 5/1, discontinued 9/30

Para-meter	Station ID#	Location	% Valid data	Valid hours	Remarks
Wind dir.	0800005A	Cowlitz Co., Coldwater	99	3655	established 5/1, discontinued 9/30
T_A	0800005A	Cowlitz Co., Coldwater	99	2914	established 6/1, discontinued 9/30
Wind speed	2300001A	Mason Co., South Mountain	80	2259	discontinued 9/30
Wind dir.	2300001A	Mason Co., South Mountain	80	2259	discontinued 9/30
T_A	2300001A	Mason Co., South Mountain	80	2259	discontinued 9/30
Lead	1776K71B	Seattle, Harbor Island Texaco 1/3	98	89	station discontinued 10/1
Lead	1776K71B	Seattle, Harbor Island Texaco collocated 1/6	100	45	station discontinued 10/1
$PM_{2.5}$	0340003J	Kennewick, VSC 1/3	**48**	58	QC checks not performed; Quality Assurance audit failure
$PM_{2.5}$	0688012D	Vancouver, Moose Lodge 1/3	**78**	94	Quality Assurance audit failure; faulty transfer standard used for calibration
$PM_{2.5}$	1776029A	Seattle, Beacon Hill 1/3, 1/1	85	121	
$PM_{2.5}$	1776K55B	Seattle, Duwamish Trailer 1/1	95	346	
$PM_{2.5}$	1776K55B	Seattle, Duwamish Trailer collocated 1/6	83	50	
$PM_{2.5}$	1776K76B	Seattle, South Park 1/1	98	357	
$PM_{2.5}$	1708004A	Bellevue, Scan Design 1/3	92	84	site discontinued 10/1
$PM_{2.5}$	1744K77B	Lake Forest Park 1/3	97	95	
$PM_{2.5}$	3146S09B	Lynnwood, PUD 1/3	100	30	station established 10/3
$PM_{2.5}$	1740K73B	Kent, Central & James 1/3	95	117	
$PM_{2.5}$	1758001A	King County, North Bend 1/3	92	93	
$PM_{2.5}$	2782P17B	Tacoma, Alexander Ave. 1/1	96	350	

Para-meter	Station ID#	Location	% Valid data	Valid hours	Remarks
$PM_{2.5}$	2782P17B	Tacoma, Alexander Ave. collocated 1/6	87	52	
$PM_{2.5}$	2700P18B	Puyallup, South Hill 1/1	96	350	
$PM_{2.5}$	3148S07B	Marysville, J.H.S. 1/3	95	115	
$PM_{2.5}$	3278009E	Spokane, Crown Zellerbach 1/1	**67**	243	filters not received; retrieval > 96 hours; QC check failures
$PM_{2.5}$	3278009E	Spokane, C.Z. collocated 1/6	**55**	33	filters not received; retrieval > 96 hours; QC check failures
$PM_{2.5}$	3278046A	Spokane, Monroe Street 1/3	**68**	80	filters not received; retrieval > 96 hours; QC check failures
$PM_{2.5}$	0566010G	Port Angeles, Stevens Middle School 1/6	93	27	parameter established 7/5
$PM_{2.5}$	3444003G	Lacey, Mt. View Elem. 1/3	92	111	
$PM_{2.5}$	3706003C	Bellingham, Yew Street 1/3	87	96	
$PM_{2.5}$	3706003C	Bellingham, Yew Street collocated 1/6	**53**	32	Quality Assurance audit failure; operator errors; filter and field data mixed
$PM_{2.5}$	3996009F	Yakima, YVCC Sundquist 1/3	80	65	station discontinued 8/31
$PM_{2.5}$	3996009F	Yakima, YVCC Sundquist collocated 1/6	83	29	station discontinued 8/31
$PM_{2.5}$	1772002A	Redmond, City Hall 1/3	90	45	station established 8/4
PM_{10}	0214005A	Clarkston, STP 1/6	93	56	
PM_{10}	3692007A	Walla Walla, Fire Station 1/3	86	104	
PM_{10}	0340003J	Kennewick, VSC 1/1	85	309	
PM_{10}	0490005A	Wenatchee, Columbia School 1/3, 1/6	**60**	45	operator errors
PM_{10}	1922003A	Ellensburg, Hal Holmes 1/3, 1/6	95	77	
PM_{10}	3316004A	Colville, County Courthouse 1/3	83	101	
PM_{10}	3250004E	Millwood, Millwood City Hall 1/6	95	57	

Para-meter	Station ID#	Location	% Valid data	Valid hours	Remarks
PM_{10}	3278009E	Spokane, Crown Zellerbach 1/1	96	351	
PM_{10}	3278009E	Spokane, C.Z. collocated 1/7	94	49	
PM_{10}	3214999E	Cheney, Turnbull Slough 1/6	100	60	
PM_{10}	3200020E	Spokane, Rockwood 1/1, 1/3	97	258	
PM_{10}	3996008F	Yakima, Garfield Elementary 1/6	95	57	
PM_{10}	3278046A	Spokane, Monroe Street 1/6	97	58	
PM_{10}	3996009F	Yakima, YVCC Sundquist 1/3	91	73	station discontinued 8/31
PM_{10}	3978007F	Sunnyside, Harrison Middle School 1/6	83	50	
PM_{10}	1740K73B	Kent, Central & James 1/6	87	52	
PM_{10}	1776K55B	Seattle, Duwamish Trailer 1/6	100	60	
PM_{10}	1776K55B	Seattle, Duwamish Trailer collocated 1/6	95	57	
PM_{10}	1777002A	Seattle, Sea-Tac North 1/6	96	24	parameter discontinued 5/31
PM_{10}	1776K76B	Seattle, South Park 1/6	100	22	station discontinued 5/13
PM_{10}	1777003A	Seattle, Tyee Valley Golf 1/6	88	23	station discontinued 6/7
PM_{10}	1744K74B	Lake Forest Park, City Hall 1/6	95	20	station discontinued 5/7
PM_{10}	1744K77B	Lake Forest Park, Park Bothell Ave. 1/6	100	25	parameter established 8/4
PM_{10}	3146S08B	Lynnwood, 59^{th} Place 1/6	100	21	station discontinued 5/7
PM_{10}	1800B05B	Kitsap Co., Meadowdale 1/6	93	56	
PM_{10}	3706005C	Bellingham, School Dist. 1/6	100	6	station discontinued 1/31
PM_{10}	2700P18B	Puyallup, South Hill 1/6	100	60	

Para-meter	Station ID#	Location	% Valid data	Valid hours	Remarks
PM_{10}	2782P01B	Tacoma, Fire Station #12 1/6	97	58	
PM_{10}	2782P01B	Tacoma, Fire Station #12 collocated 1/6	97	58	
PM_{10}	2782P16B	Tacoma, 54th Ave. N.E. 1/6	98	44	station discontinued 9/30
PM_{10}	2782P17B	Tacoma, Alexander Ave. 1/6	83	50	
PM_{10}	3148S07B	Marysville, J.H.S. 1/6	97	58	
PM_{10}	1708004A	Bellevue, Scan Design 1/6	91	42	site discontinued 10/4
PM_{10}	3444003G	Lacey, Mt. View Elem. 1/6	100	60	
PM_{10}	3706003C	Bellingham, Yew Street	100	51	site established 2/28
PM_{10}	0844004D	Longview, City Shops 1/6	100	60	
PM_{10}	0688012D	Vancouver, Moose Lodge 1/6	95	57	
PM_{10}	3600002J	Wallula, Nedrow Farm 1/6	90	54	
TSP	1776K71B	Seattle, Harbor Island Texaco 1/3	98	89	station discontinued 10/1
TSP	1776K71B	Seattle, Harbor Island Texaco collocated 1/6	100	45	station discontinued 10/1

Quality Assurance
2000 - Table of Contents

1.0 Introduction

The 2000 Air Monitoring Data Quality Assessment Report summarizes the quality and completeness of the air monitoring data collected by the Washington State Department of Ecology Air Quality Program.

It is the policy of the program to provide for the generation, storage and use of air monitoring data that meets the following precision, accuracy and data completeness criteria, and is representative and comparable. To ensure the data meets these criteria it is reviewed and certified as valid by the program's Quality Assurance Unit prior to being reported or used to make decisions concerning air quality, air pollution abatement or control.

- Automated and manual method precision. Based on precision checks performed as specified in the Code of Federal Regulations, Title 40, Chapter 1, Part 58 (40 CFR 58), Appendix A, "Quality Assurance Requirements for State and Local Air Monitoring Stations (SLAMS)," individual instrument precision must be within ±10%, and the integrated probability intervals (95% probability limits) for each parameter should be within ±15%.

- Automated and manual method accuracy. Based on quality control checks and performance audits conducted as specified in 40 CFR 58, Appendix A, individual instrument accuracy results must be within ±10%, and the integrated probability intervals (95% probability limits) for each parameter should be within ±15%.

- Meteorological accuracy. Based on the results from quality control checks and performance audits, the accuracy must be within the following tolerances:

  wind speed - ±5 percent
  wind direction - ±5 degrees
  temperature - ±1 degree Centigrade

- Data completeness. Based on qualitative and quantitative review of the data, 75% of each hour of data must be valid for the hour to be considered valid, and there should be at least 80% certified valid data from each monitoring instrument.

Representativeness is achieved by adhering to the specifications in 40 CFR 58, Appendix D, "Network Design for State and Local Air Monitoring Stations (SLAMS) and National Air Monitoring Stations (NAMS)" and Appendix E, "Probe Siting Criteria for Ambient Air Quality Monitoring." Comparability is ensured through the use of uniform procedures and reference or equivalent methods as specified in 40 CFR 58, Appendix C, "Ambient Air Quality Monitoring Methodology."

2.0 Summary

Automated Data

Carbon Monoxide

Carbon monoxide (CO) data was collected at 19 monitoring stations. The data generated from these stations met the precision, accuracy, and data completeness criteria.

Nephelometer

Nephelometer (B-scat) data was collected at 12 monitoring stations. The data generated from these stations met the precision and data completeness criteria.

Nitrogen Dioxide

Nitrogen dioxide (NO_2) data was collected at 2 monitoring stations. The data generated from these stations met the precision and data completeness criteria. The accuracy criteria was not met due to 1 audit failure and relative large percent differences determined during other audits.

Ozone

Ozone (O_3) data was collected at 15 monitoring station. The data generated from these stations met the precision, accuracy, and data completeness criteria.

$PM_{2.5}$ TEOM

$PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5 micrometers) data as measured by the Tapered Element Oscillating Microbalance method was collected at 12 monitoring stations. The data collected is not considered reference or equivalent method data and precision and accuracy are not calculated. The data completeness criteria was not met at Spokane Crown Zellerbach, North Bend USFS, and the Vancouver Moose Lodge stations due to instrument malfunctions.

Sulfur Dioxide

Sulfur dioxide (SO_2) data was collected at 1 monitoring station. The data generated from this station met the precision and data completeness criteria. The accuracy criteria was not met although no single audit result exceeded the percent difference criteria of 10%.

Manual Data

$PM_{2.5}$

$PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5 micrometers) data was collected at 29 monitoring stations. The data generated from these stations met the precision and accuracy criteria expressed as bias. The data completeness criteria was not met at the Bellingham Yew Street collocated station due to instrument failures and operator errors.

PM_{10}

PM_{10} (particulate matter with an aerodynamic diameter of 10 micrometers) data was collected at 27 monitoring stations. The data generated from these stations met the precision, accuracy, and data completeness criteria.

Meteorological Data

Meteorological data was collected at 15 monitoring stations. These stations satisfy the Environmental Protection Agency (EPA) Prevention of Significant Deterioration (PSD) specifications and Ecology's data validation requirements.

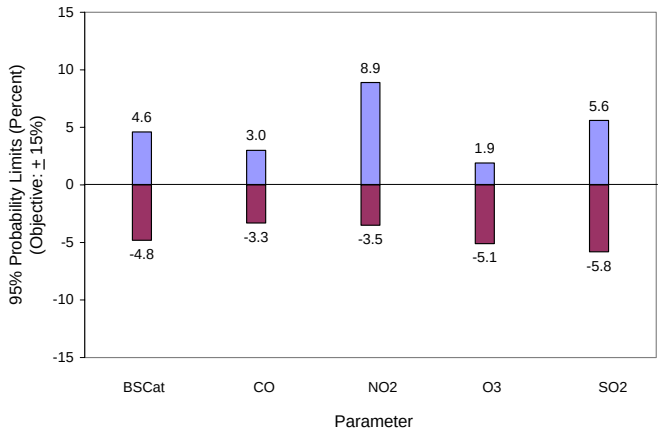
Data users should be cautious about using incomplete data to make conclusive statements, as violations of the State or National Ambient Air Quality Standards may have occurred during periods of incomplete data.

3.0 Automated Method Data Quality

Precision of Automated Methods

Utilizing the procedures and calculations specified in 40 CFR 58, Appendix A, Sections 3.1 and 5.1, the precision of the automated analyzers (B-scat, CO, NO_2, O_3, and SO_2) was checked at least once every two weeks and an estimate of the precision calculated for each parameter. Figure 1 presents the resulting 95% probability limits.

Figure 1. Summary of Automated Method Precision



Accuracy of Automated Methods

Utilizing the procedures and calculations specified in 40 CFR 58, Appendix A, Sections 3.2 and 5.2, at least 50% of the automated analyzers (CO, O_3, NO_2, SO_2) were audited and an estimate of the accuracy calculated. Figures 2, 3, 4, and 5 present the resulting 95% probability limits.

Figure 2. Summary of Carbon Monoxide (CO)
Automated Method Accuracy

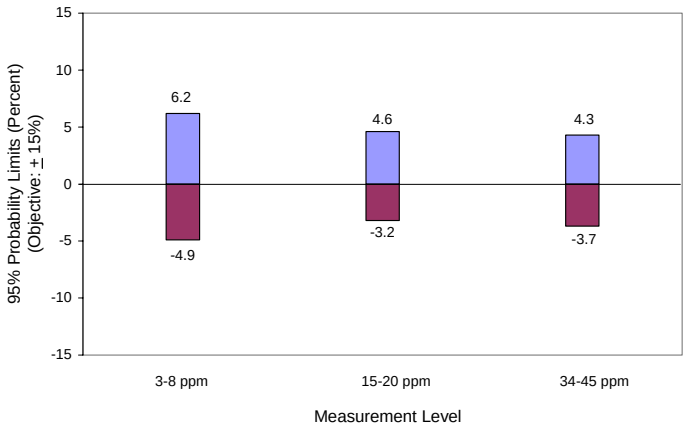


Figure 3. Summary of Ozone (O_3)
Automated Method Accuracy

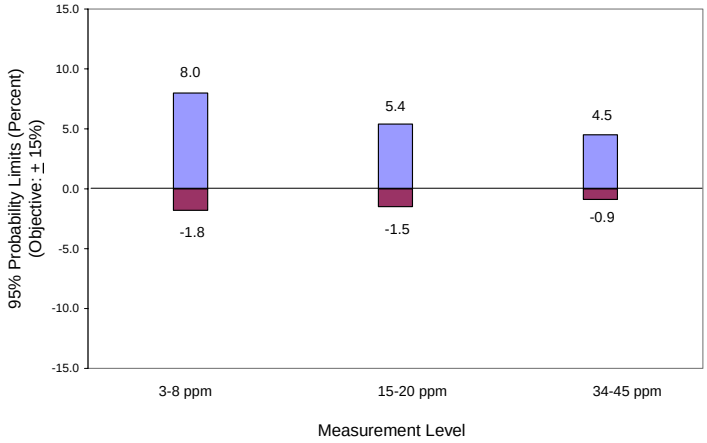


Figure 4. Summary of Nitrogen Dioxide (NO_2) Automated Method Accuracy

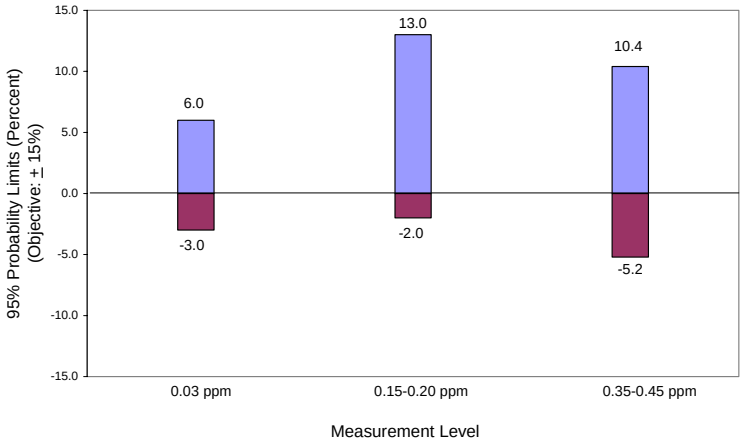
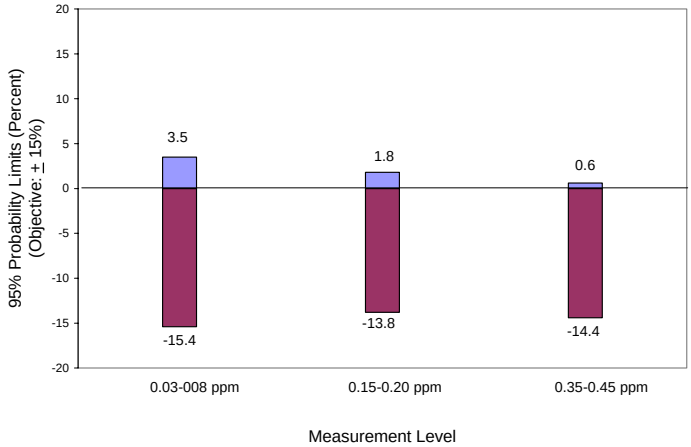


Figure 5. Summary of Sulfur Dioxide (SO_2) Automated Method Accuracy

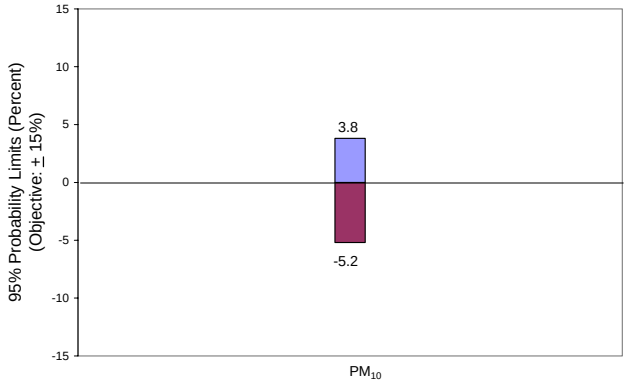


4.0 Manual Method Data Quality

Precision of Manual Methods

Utilizing the procedures and calculations specified in 40 CFR 58, Appendix A, Sections 3.3 and 5.3, duplicate, collocated sampling was conducted to evaluate manual method ($PM_{2.5}$ and PM_{10}) data precision and an estimate of the precision is calculated for each parameter. $PM_{2.5}$ precision is expressed as bias, and is calculated for each monitoring station. This data is not presented graphically but is available on request. Figure 6 presents the resulting 95% probability limits for PM_{10} manual method precision.

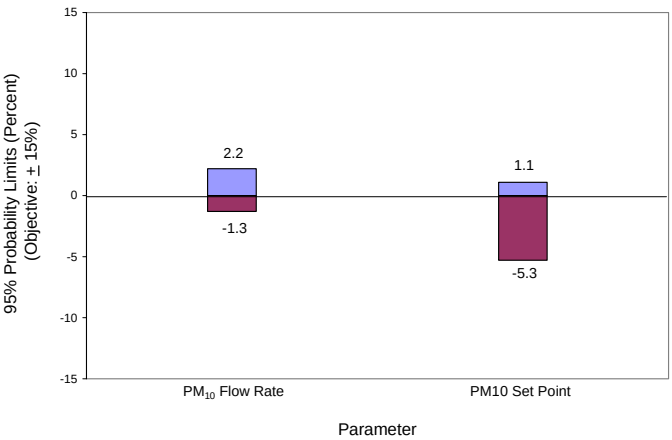
Figure 6.
Summary of Manual Method Precision



Accuracy of Manual Methods

Utilizing the procedures and calculations specified in 40 CFR 58, Appendix A, Sections 3.4 and 5.4, the accuracy of the manual method, PM_{10} was audited and an estimate of the accuracy calculated. Accuracy for $PM_{2.5}$ is expressed as bias to produce a single average for the network. The annual average was –0.09. Figure 7 presents the resulting 95% probability limits PM_{10}.

Figure 7. Summary of Particulate Matter
Manual Method Accuracy



5.0 Percent Valid Data

Percent valid data is a gauge of the amount of certified valid data obtained from a monitoring instrument compared to the amount expected under ideal conditions (24 hours per day, 365 days per year). Exceptions are analyzers which had a short term or a seasonal sampling period and manual method samplers that run every day, every other day, every third day, or every sixth day. The O_3 network has a required seasonal sampling period of May through September.
The completeness of the data is determined for each monitoring instrument, the sampling period and frequency taken into account and the results expressed as a percentage in Table 1. When the 80% certified data objective is not met, the result is **highlighted** and an explanation given. When the sampling period is less than ideal it is noted. The manual method sampling frequency is noted after the station identification number, such that 1/1, 1/3, and 1/6 denotes every day, every third day, and every sixth day sampling frequency, respectively.

Para-meter	AIRS ID#	Location	% Valid data	Valid hours	Remarks
B-scat (Neph)	530670013	Lacey, Mt. View School	98	8630	
B-scat (Neph)	530090009	Pt. Angeles, Stevens School	99	8734	
B-scat (Neph)	530530012	Pierce County, Rainier #3	99	8707	
B-scat (Neph)	530590001	Skamania Co., Mt. Zion	83	7246	
B-scat (Neph)	530090003	Clallam County, Hurricane Ridge	99	3362	seasonal; established 6/12, discontinued 10/31
B-scat (Neph)	530150009	Mt. St. Helens, Coldwater	99	4381	seasonal; established 5/1, discontinued 10/31
B-scat (Neph)	530530020	Pierce County, Carbon River	98	4327	seasonal; established 5/1, discontinued 10/31
B-scat (Neph)	530450002	Mason County, South Mountain	99	4378	seasonal; established 5/1, discontinued 10/31
B-scat (Neph)	530730018	Whatcom County, Ross Dam	84	4149	station established 6/9
B-scat (Neph)	530530057	Seattle, Duwamish Trailer	99	738	strip chart use discontinued 1/31, unable to validate data
B-scat (Neph)	530332004	Kent, Central & James	98	633	station discontinued 1/27

Para-meter	AIRS ID#	Location	% Valid data	Valid hours	Remarks
B-scat (Neph)	530330017	North Bend, USFS	98	4325	parameter discontinued 6/30
CO	530330077	Seattle, 4th & Pike	98	8658	
CO	530330051	Seattle, James St.	99	8702	
CO	530330025	Seattle, Northgate Apts. #2	99	8686	
CO	530330087	Seattle, Zanadu Comics	99	8706	
CO	530330015	Bellevue, NE 8th & 108th NE	96	8450	
CO	530330019	Bellevue, 148th & 24th	99	8731	
CO	530330080	Seattle, Beacon Hill	99	7923	parameter established 2/1
CO	530330032	Seattle, Corson Avenue	95	7665	parameter established 2/1
CO	530610004	Lynnwood, Shopping Mall	99	8712	
CO	530610012	Everett, Erickson's #2	99	2257	station burned down 4/4
CO	530530032	Tacoma, Pacific Ave.	87	7608	station temporarily discontinued for remodeling 8/16 – 9/30
CO	530670011	Lacey, OAPCA Office	99	4783	seasonal; discontinued 4/30, reestablished 10/14
CO	530630045	Spokane, Spokane Club	97	8551	
CO	530630040	Spokane, Hamilton St.	99	8713	
CO	530630049	Spokane, 3rd Ave. & Wa. South	98	8649	
CO	530630005	Spokane, Gonzaga	98	8634	
CO	530110010	Vancouver, Atlas & Cox	99	8719	
CO	530110016	Vancouver, Hazel Dell	99	8726	
CO	530771002	Yakima Co. Courthouse	99	8687	
NO	530330080	Seattle, Beacon Hill	84	7408	
NO_2	530330080	Seattle, Beacon Hill	84	7407	
NO_x	530330080	Seattle, Beacon Hill	84	7407	

Para-meter	AIRS ID#	Location	% Valid data	Valid hours	Remarks
NO	530330032	Seattle, Corson Avenue	83	6665	parameter established 2/1
NO_2	530330032	Seattle, Corson Avenue	83	6665	parameter established 2/1
NO_x	530330032	Seattle, Corson Avenue	83	6664	parameter established 2/1
O_3	530337001	King County, Enumclaw	99	3632	seasonal, 5/1 - 9/30
O_3	530330023	King County, Mud Mountain	98	3591	seasonal, 5/1 - 9/30
O_3	530330010	King County, Lake Sammamish	99	3636	seasonal, 5/1 - 9/30
O_3	530330017	North Bend, USFS	99	3623	seasonal, 5/1 - 9/30
O_3	530330080	Seattle, Beacon Hill	94	3468	seasonal, 5/1 - 9/30
O_3	530670002	Yelm, Fire Station	99	3633	seasonal, 5/1 - 9/30
O_3	530531008	Pierce County, Pack Forest	98	3616	seasonal, 5/1 - 9/30
O_3	530530028	Pierce County, Graham	98	3609	seasonal, 5/1 - 9/30
O_3	530410003	Lewis County, Packwood Lake	99	2965	seasonal, 5/24 - 9/26
O_3	530390003	Klickitat County, Wishram	94	3436	seasonal, 5/1 - 9/30
O_3	530110011	Vancouver, Mt. View School	99	3634	seasonal, 5/1 - 9/30
O_3	530730005	Whatcom County, Custer	98	3617	seasonal, 5/1 - 9/30
O_3	530630046	Spokane County, Greenbluff	99	3643	seasonal, 5/1 - 9/30
O_3	530630001	Cheney, Turnbull Slough	97	3577	seasonal, 5/1 - 9/30
O_3	530530012	Pierce County, Rainier #3	98	8586	
$PM_{2.5}$ TEOM	530530057	Seattle, Duwamish Trailer	96	8440	
$PM_{2.5}$ TEOM	530530033	Kent, Smith Street	98	7727	station established 2/7
$PM_{2.5}$ TEOM	530332004	Kent, Central & James	630	99	station discontinued 1/27

Para-meter	AIRS ID#	Location	% Valid data	Valid hours	Remarks
$PM_{2.5}$ TEOM	530611007	Marysville, J.H.S.	83	7289	station temporarily discontinued due to remodel 7/27 – 9/21
$PM_{2.5}$ TEOM	530330024	Bothell Ave., Lake Forest Park	99	8669	
$PM_{2.5}$ TEOM	530610005	Lynnwood, Snohomish PUD	99	4315	parameter established 7/3
$PM_{2.5}$ TEOM	530330017	North Bend, USFS	**73**	5267	parameter established 3/7, instrument malfunction 8/1 – 9/30
$PM_{2.5}$ TEOM	530530031	Tacoma, Alexander Ave.	99	3070	parameter established 8/25
$PM_{2.5}$ TEOM	530530029	Tacoma, L Street	86	1240	parameter established 11/2
$PM_{2.5}$ TEOM	530670013	Lacey, Mt. View School	97	2916	parameter established 8/29
$PM_{2.5}$ TEOM	530630016	Spokane, Crown Zellerbach	**77**	6795	**Instrument failures, operator error**
$PM_{2.5}$ TEOM	530110013	Vancouver, Moose Lodge	**64**	2161	parameter established 8/14; instrument failure
SO_2	530330080	Seattle, Beacon Hill	88	6785	parameter established 2/14
Wind speed	530330080	Seattle, Beacon Hill	99	8744	
Wind dir.	530330080	Seattle, Beacon Hill	99	8748	
T_A	530330080	Seattle, Beacon Hill	99	8762	
Wind speed	530330032	Seattle, Corson Avenue	97	5354	parameter established 5/17
Wind dir.	530330032	Seattle, Corson Avenue	97	5354	parameter established 5/17
T_A	530330032	Seattle, Corson Avenue	97	5354	parameter established 5/17
Wind speed	530330042	Seattle, NOAA	97	8505	

Para-meter	AIRS ID#	Location	% Valid data	Valid hours	Remarks
Wind Dir.	530330042	Seattle, NOAA	97	8505	
T_A	530330042	Seattle, NOAA	99	8763	
Wind speed	530330017	North Bend, USFS	95	8099	
Wind dir.	530330017	North Bend, USFS	95	8099	
T_A	530330017	North Bend, USFS	94	8211	
Wind speed	530337002	King Co., Enumclaw FS#3	90	7863	
Wind dir.	530337002	King Co., Enumclaw FS#3	90	7863	
T_A	530337002	King Co., Enumclaw FS#3	99	8775	
Wind speed	530531016	Tacoma, Indian Hill Reservoir	98	8563	
Wind dir.	530531016	Tacoma, Indian Hill Reservoir	98	8563	
T_A	530531016	Tacoma, Indian Hill Reservoir	99	8777	
Wind speed	530630016	Spokane, Crown Zellerbach	99	8774	
Wind dir.	530630016	Spokane, Crown Zellerbach	99	8774	
T_A	530630016	Spokane, Crown Zellerbach	99	8774	
Wind speed	530630047	Spokane, Monroe St.	99	8729	
Wind dir.	530630047	Spokane, Monroe St.	99	8729	
T_A	530630047	Spokane, Monroe St.	99	8749	
Wind speed	530631017	Spokane County, Rockwood	99	8777	
Wind dir.	530631017	Spokane County, Rockwood	99	8777	

Para-meter	AIRS ID#	Location	% Valid data	Valid hours	Remarks
T_A	530631017	Spokane County, Rockwood	99	8777	
Wind speed	530990011	Pt. Angeles, Daishowa	95	8370	
Wind dir.	530990011	Pt. Angeles, Daishowa	95	8370	
T_A	530990011	Pt. Angeles, Daishowa	**72**	6330	sensor failure
Wind speed	530110017	Clark County, BPA	95	8381	
Wind dir.	530110017	Clark County, BPA	95	8381	
T_A	530110017	Clark County, BPA	99	8659	
Wind speed	530590001	Skamania Co., Mt. Zion	85	7441	
Wind dir.	530590001	Skamania Co., Mt. Zion	85	7497	
T_A	530590001	Skamania Co., Mt. Zion	99	8738	
Wind speed	530450002	Mason County, South Mountain	99	2851	parameter established 7/7, discontinued 10/31
Wind dir.	530450002	Mason County, South Mountain	99	2851	parameter established 7/7, discontinued 10/31
T_A	530450002	Mason County, South Mountain	99	2851	parameter established 7/7, discontinued 10/31
Wind speed	530150009	Mt. St. Helens, Coldwater	99	4544	parameter established 4/25, discontinued 10/31
Wind dir.	530150009	Mt. St. Helens, Coldwater	99	4544	parameter established 4/25, discontinued 10/31
T_A	530150009	Mt. St. Helens, Coldwater	99	4544	parameter established 4/25, discontinued 10/31
Wind speed	530150013	Cowlitz County, Woodland	99	3346	station discontinued 5/19

Para-meter	AIRS ID#	Location	% Valid data	Valid hours	Remarks
Wind dir.	530150013	Cowlitz County, Woodland	99	3346	station discontinued 5/19
T_A	530150013	Cowlitz County, Woodland	99	3346	station discontinued 5/19
$PM_{2.5}$	530050002	Kennewick, VSC 1/3	84	102	
$PM_{2.5}$	530770009	Yakima, Mental Health Building 1/3	100	80	station established 4/20
$PM_{2.5}$	530770009	Yakima, Mental Health Building collocated 1/6	97	35	station established 4/20
$PM_{2.5}$	530330080	Seattle, Beacon Hill 1/1	93	340	
$PM_{2.5}$	530530057	Seattle, Duwamish Trailer 1/1	97	356	
$PM_{2.5}$	530530057	Seattle, Duwamish Trailer collocated 1/6	98	60	
$PM_{2.5}$	530330021	Seattle, South Park 1/1	96	351	
$PM_{2.5}$	530330024	Bothell Ave, Lake Forest Park 1/3	93	114	
$PM_{2.5}$	530610005	Lynnwood, PUD 1/3	98	119	
$PM_{2.5}$	530332004	Kent, Central & James 1/3	100	9	station discontinued 1/27
$PM_{2.5}$	530530033	Kent, Smith Street 1/3	100	111	station established 2/7
$PM_{2.5}$	530330037	Bellevue, Goldfarbs 1/3	80	16	station established 11/2
$PM_{2.5}$	530330017	North Bend, USFS 1/3	89	108	
$PM_{2.5}$	530530031	Tacoma, Alexander Ave. 1/1	99	362	
$PM_{2.5}$	530530031	Tacoma, Alexander Ave. collocated 1/6	93	57	
$PM_{2.5}$	530530029	South Tacoma, Community Center 1/1	95	348	
$PM_{2.5}$	530531018	Puyallup, South Hill 1/3	91	111	
$PM_{2.5}$	530611007	Marysville, J.H.S. 1/3	98	119	

Para-meter	AIRS ID#	Location	% Valid data	Valid hours	Remarks
$PM_{2.5}$	530630016	Spokane, Crown Zellerbach 1/1	93	341	
$PM_{2.5}$	530630016	Spokane, C.Z. collocated 1/6	100	61	
$PM_{2.5}$	530630047	Spokane, Monroe Street 1/3	99	121	
$PM_{2.5}$	530670013	Lacey, Mt. View Elem. 1/3	99	121	
$PM_{2.5}$	530090009	Pt. Angeles, Stevens Middle School 1/6	98	60	
$PM_{2.5}$	530730015	Bellingham, Yew Street 1/3	90	110	
$PM_{2.5}$	530730015	Bellingham, Yew Street collocated 1/6	**75**	46	instrument failure; operator errors
$PM_{2.5}$	530570014	Mount Vernon, Laventure 1/6	93	56	
$PM_{2.5}$	530330027	Redmond, City Hall 1/3	93	114	
$PM_{2.5}$	530310003	Port Townsend, Blue Heron Middle School 1/6	97	58	
$PM_{2.5}$	530110013	Vancouver, Moose Lodge 1/3	94	115	
$PM_{2.5}$	530410006	Centralia, Centralia College 1/6	92	55	
$PM_{2.5}$	530750004	Colfax, Public Safety Building 1/6	95	57	
$PM_{2.5}$	530630001	Cheney, Turnbull Slough 1/6	91	10	parameter established 10/3; discontinued 12/2
$PM_{2.5}$	530010003	Ritzville, County Shop 1/6	92	11	station established 10/17
$PM_{2.5}$	530750003	Pullman, Pioneer Place 1/6	92	56	
PM_{10}	530030004	Clarkston, STP 1/6	97	59	
PM_{10}	530710005	Walla Walla, Fire Station 1/3	84	103	

Para-meter	AIRS ID#	Location	% Valid data	Valid hours	Remarks
PM_{10}	530050002	Kennewick, VSC 1/1	89	325	
PM_{10}	530070006	Wenatchee, Columbia School 1/3; 1/6	94	85	
PM_{10}	530370002	Ellensburg, Hal Holmes 1/3, 1/6	96	73	
PM_{10}	530650004	Colville, County Courthouse 1/3	89	108	
PM_{10}	530632002	Millwood, Millwood City Hall 1/6	98	60	
PM_{10}	530630016	Spokane, Crown Zellerbach 1/1	96	352	
PM_{10}	530630016	Spokane, C.Z. collocated 1/6	95	58	
PM_{10}	530630001	Cheney, Turnbull Slough 1/6	100	61	
PM_{10}	530631017	Spokane, Rockwood 1/3	100	122	
PM_{10}	530630047	Spokane, Monroe Street 1/6	100	61	
PM_{10}	530770009	Yakima, Mental Health Building 1/3	93	79	station established 4/20
PM_{10}	530770011	Yakima, Garfield Elementary 1/6	98	60	
PM_{10}	530770005	Sunnyside, Harrison Middle School 1/6	97	59	
PM_{10}	530332004	Kent, Central & James 1/6	100	5	station discontinued 1/27
PM_{10}	530530033	Kent, Smith Street 1/6	98	53	station established 2/7
PM_{10}	530530057	Seattle, Duwamish Trailer 1/6	100	61	
PM_{10}	530530057	Seattle, Duwamish Trailer collocated 1/6	84	51	
PM_{10}	530330024	Bothell Ave, Lake Forest Park 1/6	93	57	
PM_{10}	530531018	Puyallup, South Hill 1/6	98	60	

Para-meter	AIRS ID#	Location	% Valid data	Valid hours	Remarks
PM_{10}	530531004	Tacoma, Fire Station #12 1/6	100	61	
PM_{10}	530531004	Tacoma, Fire Station #12 collocated 1/6	95	58	
PM_{10}	530530031	Tacoma, Alexander Ave. 1/6	97	59	
PM_{10}	530611007	Marysville, J.H.S. 1/6	98	51	station temporarily discontinued due to remodel 7/27 – 9/21
PM_{10}	530670013	Lacey, Mt. View Elem. 1/6	98	60	
PM_{10}	530730015	Bellingham, Yew Street 1/6	100	61	
PM_{10}	530150006	Longview, City Shops 1/6	100	61	
PM_{10}	530110013	Vancouver, Moose Lodge 1/6	98	60	
PM_{10}	530711001	Wallula, Nedrow Farm 1/6	97	59	

Quality Assurance
2001 - Table of Contents

1.0 Introduction

The 2001 Air Monitoring Data Quality Assessment Report summarizes the quality and completeness of the air monitoring data collected by the Washington State Department of Ecology Air Quality Program.

It is the policy of the program to provide for the generation, storage, and use of representative and comparable air monitoring data that meet the precision, accuracy, and completeness criteria described below. To ensure the data meets these criteria it is reviewed and certified as valid by the program's Quality Assurance Unit prior to being reported or used to make decisions concerning air quality, air pollution abatement or control.

- Automated and manual method precision. Based on precision checks performed as specified in the Code of Federal Regulations, Title 40, Chapter 1, Part 58 (40 CFR 58), Appendix A, "Quality Assurance Requirements for State and Local Air Monitoring Stations (SLAMS)," individual instrument precision must be within ±10%, and the integrated probability intervals (95% probability limits) for each parameter should be within ±15%.

- Automated and manual method accuracy. Based on quality control checks and performance audits conducted as specified in 40 CFR 58, Appendix A, individual instrument accuracy results must be within ±10%, and the integrated probability intervals (95% probability limits) for each parameter should be within ±15%.

- Meteorological accuracy. Based on the results from quality control checks and performance audits, the accuracy must be within the following tolerances:

  wind speed - ±5 percent
  wind direction - ±5 degrees
  temperature - ±1 degree Centigrade

- Data completeness. Based on qualitative and quantitative review of the data, 75% of each hour of data must be valid for the hour to be considered valid, and there should be at least 80% certified valid data from each monitoring instrument.

Representativeness is achieved by adhering to the specifications in 40 CFR 58, Appendix D, "Network Design for State and Local Air Monitoring Stations (SLAMS) and National Air Monitoring Stations (NAMS)" and Appendix E, "Probe Siting Criteria for Ambient Air Quality Monitoring." Comparability is ensured through the use of uniform procedures and reference or equivalent methods as specified in 40 CFR 58, Appendix C, "Ambient Air Quality Monitoring Methodology."

2.0 Summary

Automated Data

Carbon Monoxide

Carbon monoxide (CO) data was collected at 20 monitoring stations. The data generated from these stations met the precision, accuracy, and data completeness criteria.

Nephelometer

Nephelometer (B-scat) data was collected at 24 monitoring stations. The data generated from these stations met the precision criteria. The data completeness criteria was not met at the Camas station due to instrument failures.

Nitrogen Dioxide

Nitrogen dioxide (NO_2) data was collected at 2 monitoring stations. The data generated from these stations met the precision, accuracy, and data completeness criteria.

Ozone

Ozone (O_3) data was collected at 13 monitoring stations. The data generated from these stations met the precision, accuracy, and data completeness criteria.

$PM_{2.5}$ TEOM

$PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5 micrometers) data as measured by the Tapered Element Oscillating Microbalance method was collected at 14 monitoring stations. The data collected is not considered reference or equivalent method data and precision and accuracy are not calculated. The data completeness criteria was not met at the Spokane Monroe Street and Kennewick Vocational Skills Center stations due to instrument failures.

Sulfur Dioxide

Sulfur dioxide (SO_2) data was collected at 1 monitoring station. The data generated from this station met the precision, accuracy, and data completeness criteria.

Manual Data

$PM_{2.5}$

$PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5 micrometers) data was collected at 34 monitoring stations. The data generated from these stations met the precision and accuracy criteria expressed as bias. The data completeness criteria was not met at the Bellingham Yew Street co - located station due to instrument failure.

PM_{10}

PM_{10} (particulate matter with an aerodynamic diameter of 10 micrometers) data was collected at 26 monitoring stations. The data generated from these stations met the precision, accuracy, and data completeness criteria.

Meteorological Data

Meteorological data was collected at 16 monitoring stations. These stations satisfy the Environmental Protection Agency (EPA) Prevention of Significant Deterioration (PSD) specifications and Ecology's data validation requirements. The data completeness criteria was not met at the Mt. Zion station due to sensor failure.

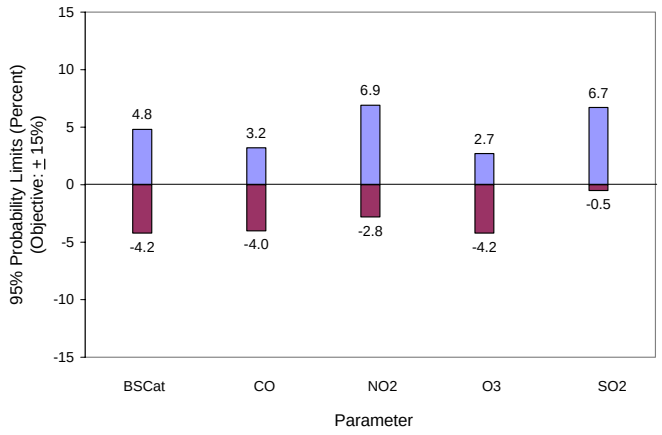
Data users should be cautious about using incomplete data to make conclusive statements, as violations of the State or National Ambient Air Quality Standards may have occurred during periods of incomplete data.

3.0 Automated Method Data Quality

Precision of Automated Methods

Utilizing the procedures and calculations specified in 40 CFR 58, Appendix A, Sections 3.1 and 5.1, the precision of the automated analyzers (B-scat, CO, NO_2, O_3, and SO_2) was checked at least once every two weeks and an estimate of the precision calculated for each parameter. Figure 1 presents the resulting 95% probability limits.

Figure 1. Summary of Automated Method Precision



Accuracy of Automated Methods

Utilizing the procedures and calculations specified in 40 CFR 58, Appendix A, Sections 3.2 and 5.2, at least 50% of the automated analyzers (CO, O_3, NO_2, SO_2) were audited and an estimate of the accuracy calculated. Figures 2, 3, 4, and 5 present the resulting 95% probability limits.

Figure 2. Summary of Carbon Monoxide (CO)
Automated Method Accuracy

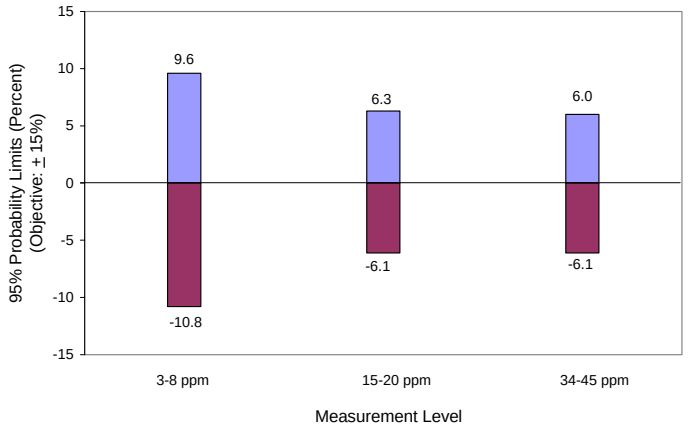


Figure 3. Summary of Ozone (O_3)
Automated Method Accuracy

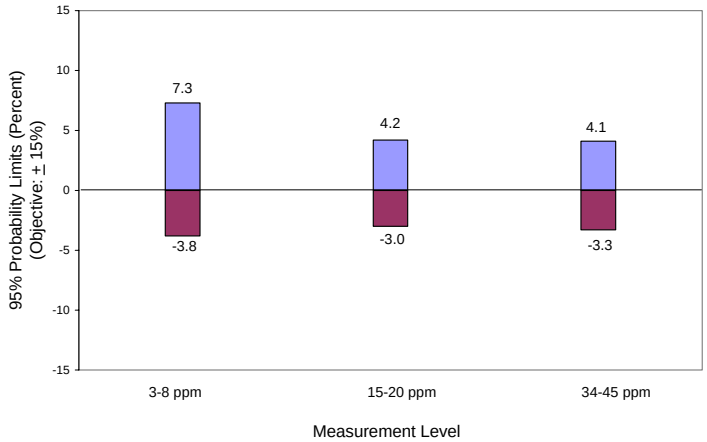


Figure 4. Summary of Nitrogen Dioxide (NO_2)
Automated Method Accuracy

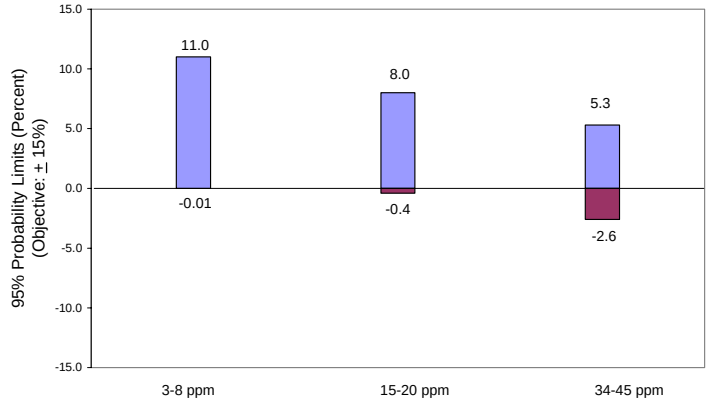
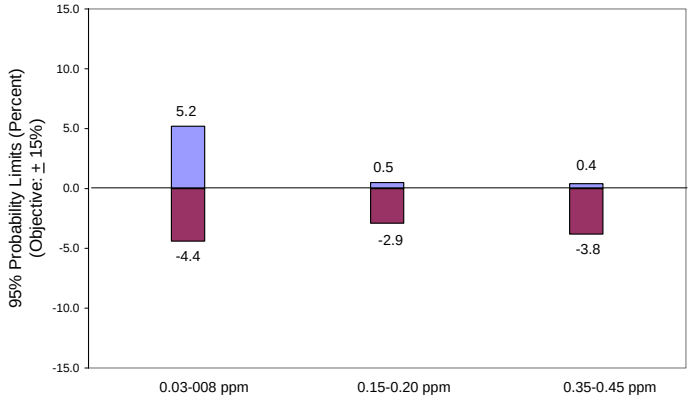


Figure 5. Summary of Sulfur Dioxide (SO_2)
Automated Method Accuracy

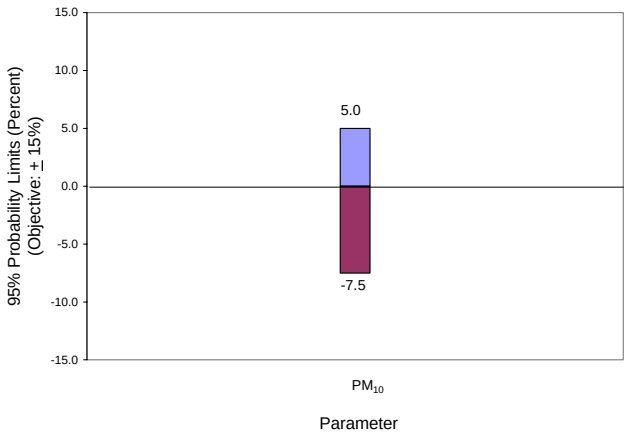


4.0 Manual Method Data Quality

Precision of Manual Methods

Utilizing the procedures and calculations specified in 40 CFR 58, Appendix A, Sections 3.3 and 5.3, duplicate, collocated sampling was conducted to evaluate manual method ($PM_{2.5}$ and PM_{10}) data precision and an estimate of the precision is calculated for each parameter. $PM_{2.5}$ precision is expressed as bias, and is calculated for each monitoring station. This data is not presented graphically but is available on request. Figure 6 presents the resulting 95% probability limits for PM_{10} manual method precision.

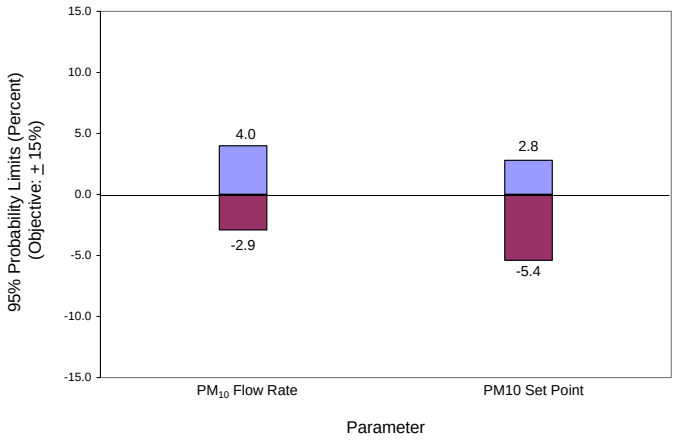
Figure 6.
Summary of Manual Method Precision



Accuracy of Manual Methods

Utilizing the procedures and calculations specified in 40 CFR 58, Appendix A, Sections 3.4 and 5.4, the accuracy of the manual method, PM_{10} was audited and an estimate of the accuracy calculated. Accuracy for $PM_{2.5}$ is expressed as bias to produce a single average for the network. The annual average was -0.30. Figure 7 presents the resulting 95% probability limits for PM_{10}.

Figure 7. Summary of Particulate Matter Manual Method Accuracy



5.0 Percent Valid Data

Percent valid data is a gauge of the amount of certified valid data obtained from a monitoring instrument compared to the amount expected under ideal conditions (24 hours per day, 365 days per year). Exceptions are analyzers which had a short term or a seasonal sampling period and manual method samplers that run every day, every other day, every third day, or every sixth day. The O_3 network has a required seasonal sampling period of May through September.
The completeness of the data is determined for each monitoring instrument, the sampling period and frequency taken into account and the results expressed as a percentage in Table 1. When the 80% certified data objective is not met, the result is **highlighted** and an explanation given. When the sampling period is less than ideal it is noted. The manual method sampling frequency is noted after the station identification number, such that 1/1, 1/3, and 1/6 denotes every day, every third day, and every sixth day sampling frequency, respectively.

Para-meter	AIRS ID#	Location	% Valid data	Valid hours	Remarks
B-scat (Neph)	530330080	Seattle, Beacon Hill	84	7415	
B-scat (Neph)	530670013	Lacey, Mt. View School	98	8660	
B-scat (Neph)	530090009	Pt. Angeles, Stevens School	96	8418	
B-scat (Neph)	530310003	Pt. Townsend, Middle School	96	7532	
B-scat (Neph)	530530012	Pierce County, Rainier #3	98	8657	
B-scat (Neph)	530590001	Skamania Co., Mt. Zion	91	8035	
B-scat (Neph)	530390003	Klickitat County, Wishram	95	8320	
B-scat (Neph)	530090003	Clallam County, Hurricane Ridge	99	3581	Seasonal, 5/1-9/30
B-scat (Neph)	530150009	Mt. St. Helens, Coldwater	99	3645	Seasonal, 5/1-9/30
B-scat (Neph)	530530020	Pierce County, Carbon River	98	3611	Seasonal, 5/1-9/30
B-scat (Neph)	530450002	Mason County, South Mountain	96	3563	Seasonal, 5/1-9/30
B-scat (Neph)	530450004	M.G. Hospital, Shelton	99	5418	
B-scat (Neph)	530730015	Bellingham, Yew Street	85	7496	
B-scat (Neph)	530570014	Mount Vernon, Laventure	94	8037	
B-scat (Neph)	530730018	Whatcom County, Ross Dam	88	7709	

Para-meter	AIRS ID#	Location	% Valid data	Valid hours	Remarks
B-scat (Neph)	530330017	North Bend	99	1452	Parameter re-established 11/1
B-scat (Neph)	530110019	Vancouver, McLoughlin	96	7110	
B-scat (Neph)	530110020	Camas, City Hall	**78**	5008	Instrument failures
B-scat (Neph)	530150015	Longview, Olympic School	93	5471	
B-scat (Neph)	530650004	Colville, County Courthouse	99	6662	
B-scat (Neph)	530650009	Chewelah, Clay St.	97	5700	
B-scat (Neph)	530710005	Walla Walla, Fire Station	96	7084	
B-scat (Neph)	530750003	Pullman, Pioneer Place	99	7282	
B-scat (Neph)	530010003	Ritzville, County Shop	99	7293	
CO	530330077	Seattle, 4th & Pike	96	8480	
CO	530330025	Seattle, Northgate Apts. #2	91	8000	
CO	530330087	Seattle, Zanadu Comics	98	8598	
CO	530330015	Bellevue, NE 8th & 108th NE	95	8342	
CO	530330019	Bellevue, BP Station	99	8681	
CO	530330080	Seattle, Beacon Hill	98	8643	
CO	530330032	Seattle, Corson Avenue	95	8404	
CO	530330051	Seattle, 5th & James	96	1366	Station discontinued 2/28
CO	530610004	Lynnwood, Shopping Mall	99	8681	
CO	530610006	Everett, Broadway	92	6081	Station established 4/1

Para-meter	AIRS ID#	Location	% Valid data	Valid hours	Remarks
CO	530530032	Tacoma, Pacific Ave.	95	8366	
CO	530670011	Lacey, OAPCA Office	98	4995	Seasonal, Oct.-March
CO	530630045	Spokane, Spokane Club	84	7420	
CO	530630040	Spokane, Hamilton St.	99	8683	
CO	530630049	Spokane, 3rd Ave. & Wa. South	97	8511	
CO	530630005	Spokane, Gonzaga	97	2654	Station discontinued 4/24
CO	530110010	Vancouver, Atlas & Cox	99	8692	
CO	530110016	Vancouver, Hazeldell	98	1917	Station discontinued 3/22
CO	530771014	Yakima, Yakima Ave.	97	6427	Station established 4/1
CO	530771002	Yakima, Courthouse	98	2080	Station discontinued 3/29
NO	530330080	Seattle, Beacon Hill	93	8181	
NO_2	530330080	Seattle, Beacon Hill	93	8183	
NO_x	530330080	Seattle, Beacon Hill	93	8183	
NO	530330032	Seattle, Corson Avenue	92	8113	
NO_2	530330032	Seattle, Corson Avenue	92	8125	
NO_x	530330032	Seattle, Corson Avenue	92	8101	
O_3	530330023	King County, Mud Mountain	98	3626	Seasonal, 5/1 - 9/30
O_3	530330010	King County, Lake Sammamish	98	3633	Seasonal, 5/1 - 9/30
O_3	530330017	North Bend, USFS	98	3613	Seasonal, 5/1 - 9/30
O_3	530330080	Seattle, Beacon Hill	97	3573	Seasonal, 5/1 - 9/30
O_3	530670002	Yelm, Fire Station	97	3569	Seasonal, 5/1 - 9/30
O_3	530531008	Pierce County, Pack Forest	91	3375	Seasonal, 5/1 - 9/30
O_3	530530028	Pierce County, Graham	98	3614	Seasonal, 5/1 - 9/30
O_3	530390003	Klickitat County, Wishram	98	3620	Seasonal, 5/1 - 9/30
O_3	530110011	Vancouver, Mt. View School	95	3493	Seasonal, 5/1 - 9/30

Para-meter	AIRS ID#	Location	% Valid data	Valid hours	Remarks
O_3	530730005	Whatcom County, Custer	98	3622	Seasonal, 5/1 - 9/30
O_3	530630046	Spokane County, Greenbluff	99	3638	Seasonal, 5/1 - 9/30
O_3	530630001	Cheney, Turnbull Slough	99	3639	Seasonal, 5/1 - 9/30
O_3	530530012	Pierce County, Rainier #3	89	7821	
$PM_{2.5}$ TEOM	530530057	Seattle, Duwamish Trailer	99	8726	
$PM_{2.5}$ TEOM	530332004	Kent, Central & James	99	7664	Station re-established 2/11
$PM_{2.5}$ TEOM	530330033	Kent, E Smith St.	97	886	Station discontinued 2/7
$PM_{2.5}$ TEOM	530611007	Marysville, J.H.S.	97	8535	
$PM_{2.5}$ TEOM	530330024	Bothell Way, Lake Forest Park	99	8669	
$PM_{2.5}$ TEOM	530610005	Lynnwood, Snohomish PUD	98	8608	
$PM_{2.5}$ TEOM	530330017	North Bend, USFS	97	8575	
$PM_{2.5}$ TEOM	530530031	Tacoma, Alexander Ave.	94	8235	
$PM_{2.5}$ TEOM	530530029	Tacoma, L Street	91	8054	
$PM_{2.5}$ TEOM	530670013	Lacey, Mt. View School	97	8526	
$PM_{2.5}$ TEOM	530630016	Spokane, Crown Zellerbach	85	7488	
$PM_{2.5}$ TEOM	530630047	Spokane, Monroe St.	**57**	5046	Instrument failures
$PM_{2.5}$ TEOM	530110013	Vancouver, Moose Lodge	91	8012	
$PM_{2.5}$ TEOM	530050002	Kennewick, VSC	**56**	4929	Instrument failures
SO_2	530330080	Seattle, Beacon Hill	94	8245	

Para-meter	AIRS ID#	Location	% Valid data	Valid hours	Remarks
Wind speed	530330080	Seattle, Beacon Hill	99	8679	
Wind dir.	530330080	Seattle, Beacon Hill	99	8681	
T_A	530330080	Seattle, Beacon Hill	99	8744	
Wind speed	530330032	Seattle, Corson Avenue	96	8417	
Wind dir.	530330032	Seattle, Corson Avenue	96	8481	
T_A	530330032	Seattle, Corson Avenue	96	8415	
Wind speed	530330042	Seattle, NOAA	99	8737	
Wind Dir.	530330042	Seattle, NOAA	93	8225	
T_A	530330042	Seattle, NOAA	99	8738	
Wind speed	530330020	Seattle, SeaTac North	92	4732	
Wind dir.	530330020	Seattle, SeaTac North	94	4844	
T_A	530330020	Seattle, SeaTac North	94	4844	
Wind speed	530330017	North Bend, USFS	99	8718	
Wind dir.	530330017	North Bend, USFS	99	8748	
T_A	530330017	North Bend, USFS	99	8748	
Wind speed	530337002	King Co., Enumclaw FS#3	99	7275	Site temporarily discontinued due to shelter replacement
Wind dir.	530337002	King Co., Enumclaw FS#3	97	7078	Site temporarily discontinued due to shelter replacement
T_A	530337002	King Co., Enumclaw FS#3	99	7290	Site temporarily discontinued due to shelter replacement
Wind speed	530531016	Tacoma, Indian Hill Reservoir	99	8743	
Wind dir.	530531016	Tacoma, Indian Hill Reservoir	99	8743	

Para-meter	AIRS ID#	Location	% Valid data	Valid hours	Remarks
T_A	530531016	Tacoma, Indian Hill Reservoir	99	8754	
Wind speed	530630016	Spokane, Crown Zellerbach	98	8655	
Wind dir.	530630016	Spokane, Crown Zellerbach	99	8749	
T_A	530630016	Spokane, Crown Zellerbach	99	8749	
Wind speed	530630047	Spokane, Monroe St.	99	8734	
Wind dir.	530630047	Spokane, Monroe St.	97	8576	
T_A	530630047	Spokane, Monroe St.	99	8746	
Wind speed	530631017	Spokane County, Rockwood	99	8715	
Wind dir.	530631017	Spokane County, Rockwood	99	8753	
T_A	530631017	Spokane County, Rockwood	99	8753	
Wind speed	530990011	Pt. Angeles, Daishowa	99	8748	
Wind dir.	530990011	Pt. Angeles, Daishowa	99	8748	
T_A	530990011	Pt. Angeles, Daishowa	99	8748	
Wind speed	530110017	Clark County, BPA	98	8618	
Wind dir.	530110017	Clark County, BPA	97	8573	
T_A	530110017	Clark County, BPA	98	8618	
Wind speed	530590001	Skamania Co., Mt. Zion	97	8553	
Wind dir.	530590001	Skamania Co., Mt. Zion	87	7667	

Para-meter	AIRS ID#	Location	% Valid data	Valid hours	Remarks
T_A	530590001	Skamania Co., Mt. Zion	**65**	5729	Sensor failure
Wind speed	530450002	Mason County, South Mountain	99	3926	
Wind dir.	530450002	Mason County, South Mountain	99	3926	
T_A	530450002	Mason County, South Mountain	96	3787	
Wind speed	530150009	Mt. St. Helens, Coldwater	98	4200	
Wind dir.	530150009	Mt. St. Helens, Coldwater	98	4200	
T_A	530150009	Mt. St. Helens, Coldwater	99	4265	
Wind speed	530390003	Klickitat County, Wishram	99	5516	
Wind dir.	530390003	Klickitat County, Wishram	99	5516	
T_A	530390003	Klickitat County, Wishram	99	5518	
$PM_{2.5}$	530050002	Kennewick, VSC 1/3	87	107	
$PM_{2.5}$	530770009	Yakima, Mental Health Building 1/3	100	122	
$PM_{2.5}$	530770009	Yakima, Mental Health Building collocated 1/6	96	59	
$PM_{2.5}$	530330080	Seattle, Beacon Hill 1/1	95	349	
$PM_{2.5}$	530530057	Seattle, Duwamish Trailer 1/1	96	352	
$PM_{2.5}$	530530057	Seattle, Duwamish Trailer collocated 1/6	100	61	
$PM_{2.5}$	530330021	Seattle, South Park 1/1	95	349	
$PM_{2.5}$	530330024	Bothell Ave, Lake Forest Park 1/3	96	118	
$PM_{2.5}$	530610005	Lynnwood, PUD 1/3	98	120	

Para-meter	AIRS ID#	Location	% Valid data	Valid hours	Remarks
$PM_{2.5}$	530330033	Kent, E Smith St. 1/3	92	12	Station discontinued 2/7
$PM_{2.5}$	530332004	Kent, Central & James 1/3	96	109	Station re-established 2/11
$PM_{2.5}$	530330037	Bellevue, Goldfarbs 1/3	97	119	
$PM_{2.5}$	530330017	North Bend, USFS 1/3	95	117	
$PM_{2.5}$	530530031	Tacoma, Alexander Ave. 1/1	98	360	
$PM_{2.5}$	530530031	Tacoma, Alexander Ave. collocated 1/6	96	59	
$PM_{2.5}$	530530029	South Tacoma, Community Center 1/1	96	351	
$PM_{2.5}$	530531018	Puyallup, South Hill 1/3	98	120	
$PM_{2.5}$	530611007	Marysville, J.H.S. 1/3	100	122	
$PM_{2.5}$	530630016	Spokane, Crown Zellerbach 1/1	97	354	
$PM_{2.5}$	530630016	Spokane, C.Z. collocated 1/6	91	56	
$PM_{2.5}$	530630047	Spokane, Monroe Street 1/3	91	112	
$PM_{2.5}$	530670013	Lacey, Mt. View Elem. 1/3	95	117	
$PM_{2.5}$	530670013	Lacey, Mt. View Elem. collocated 1/6	84	39	
$PM_{2.5}$	530450004	M.G. Hospital, Shelton 1/6	100	41	Station established 4/24
$PM_{2.5}$	530090009	Pt. Angeles, Stevens M.S. 1/6	100	15	Parameter discontinued 3/26
$PM_{2.5}$	530310003	Pt. Townsend, Blue Heron 1/6	100	15	Parameter discontinued 3/26
$PM_{2.5}$	530730015	Bellingham, Yew Street 1/3	95	117	
$PM_{2.5}$	530730015	Bellingham, Yew Street collocated 1/6	**70**	43	Instrument failure
$PM_{2.5}$	530570014	Mount Vernon, Laventure 1/6	100	61	
$PM_{2.5}$	530330027	Redmond, City Hall 1/3	90	110	

Para-meter	AIRS ID#	Location	% Valid data	Valid hours	Remarks
$PM_{2.5}$	530110013	Vancouver, Moose Lodge 1/3	97	119	
$PM_{2.5}$	530110020	Camas, City Hall 1/6	100	45	Station established 4/5
$PM_{2.5}$	530150015	Longview, Olympic School 1/6	100	47	Station established 3/27
$PM_{2.5}$	530410006	Centralia, Community College 1/6	93	14	Station discontinued 3/20
$PM_{2.5}$	530650004	Colville, County Courthouse 1/6	89	41	Parameter established 4/1
$PM_{2.5}$	530650009	Chewelah, Clay St. 1/6	92	39	Station established 4/25
$PM_{2.5}$	530010003	Ritzville, County Shop 1/6	91	56	
$PM_{2.5}$	530750003	Pullman, Pioneer Place 1/6	96	59	
$PM_{2.5}$	530750003	Pullman, Pioneer Place collocated 1/6	88	54	
$PM_{2.5}$	530710005	Walla Walla, Fire Station 1/3	91	42	Parameter established 1/13
$PM_{2.5}$	530750004	Colfax, 1/6	100	6	Station discontinued 1/31
PM_{10}	530030004	Clarkston, STP 1/6	88	54	
PM_{10}	530710005	Walla Walla, Fire Station 1/6	80	97	
PM_{10}	530050002	Kennewick, VSC 1/1	85	311	
PM_{10}	530070006	Wenatchee, Columbia School 1/3; 1/6	89	90	
PM_{10}	530370002	Ellensburg, Hal Holmes 1/3, 1/6	90	103	
PM_{10}	530650004	Colville, County Courthouse 1/3	95	116	
PM_{10}	530632002	Millwood, Millwood City Hall 1/6	92	56	
PM_{10}	530630016	Spokane, Crown Zellerbach 1/1	99	364	

Para-meter	AIRS ID#	Location	% Valid data	Valid hours	Remarks
PM_{10}	530630016	Spokane, C.Z. collocated 1/6	100	61	
PM_{10}	530630001	Cheney, Turnbull Slough 1/6	100	61	
PM_{10}	530631017	Spokane, Rockwood 1/3	100	122	
PM_{10}	530630047	Spokane, Monroe Street 1/6	97	59	
PM_{10}	530770009	Yakima, Mental Health Building 1/3	98	120	
PM_{10}	530770011	Yakima, Garfield Elementary 1/6	98	49	Station discontinued 10/17
PM_{10}	530770005	Sunnyside, Harrison Middle School 1/6	98	60	
PM_{10}	530332004	Kent, Central & James 1/6	96	52	Station re-established 2/11
PM_{10}	530330033	Kent, E Smith St. 1/6	100	7	Station discontinued 2/7
PM_{10}	530330057	Seattle, Duwamish Trailer 1/6	90	55	
PM_{10}	530330057	Seattle, Duwamish Trailer collocated 1/6	97	59	
PM_{10}	530330024	Bothell Ave, Lake Forest Park 1/3	98	45	Parameter discontinued 9/29
PM_{10}	530611007	Marysville, J.H.S. 1/6	93	43	Parameter discontinued 9/29
PM_{10}	530530031	Tacoma, Alexander Ave. 1/6	98	60	
PM_{10}	530531018	Puyallup, South Hill 1/6	96	44	Parameter discontinued 9/29
PM_{10}	530670013	Lacey, Mt. View Elem. 1/6	100	62	
PM_{10}	530730015	Bellingham, Yew Street 1/6	100	61	
PM_{10}	530150006	Longview, City Shops 1/6	100	15	Station discontinued 3/28
PM_{10}	530110013	Vancouver, Moose Lodge 1/6	100	61	
PM_{10}	530711001	Wallula, Nedrow Farm 1/6	97	59	

Quality Assurance
2002 - Table of Contents

1.0 Introduction

The 2002 Air Monitoring Data Quality Assessment Report summarizes the quality and completeness of the air monitoring data collected by the Washington State Department of Ecology Air Quality Program.

It is the policy of the program to provide for the generation, storage, and use of representative and comparable air monitoring data that meet the precision, accuracy, and completeness criteria described below. To ensure the data meets these criteria it is reviewed and certified as valid by the program's Quality Assurance Unit prior to being reported or used to make decisions concerning air quality, air pollution abatement, or control.

- Automated and manual method precision. Based on precision checks performed as specified in the Code of Federal Regulations, Title 40, Chapter 1, Part 58 (40 CFR 58), Appendix A, "Quality Assurance Requirements for State and Local Air Monitoring Stations (SLAMS)", individual instrument precision must be within ±10%, and the integrated probability intervals (95% probability limits) for each parameter should be within ±15%.

- Automated and manual method accuracy. Based on quality control checks and performance audits conducted as specified in 40 CFR 58, Appendix A, individual instrument accuracy results must be within ±10%, and the integrated probability intervals (95% probability limits) for each parameter should be within ±15%.

- Meteorological accuracy. Based on the results from quality control checks and performance audits, the accuracy must be within the following tolerances:

  wind speed - ±5 percent
  wind direction - ±5 degrees
  temperature - ±1 degree Centigrade

- Data completeness. Based on qualitative and quantitative review of the data, 75% of each hour of data must be valid for the hour to be considered valid, and there should be at least 80% certified valid data from each monitoring instrument.

Representativeness is achieved by adhering to the specifications in 40 CFR 58, Appendix D, "Network Design for State and Local Air Monitoring Stations (SLAMS) and National Air Monitoring Stations (NAMS)" and Appendix E, "Probe Siting Criteria for Ambient Air Quality Monitoring". Comparability is ensured through the use of uniform procedures and reference or equivalent methods as specified in 40 CFR 58, Appendix C, "Ambient Air Quality Monitoring Methodology".

2.0 Summary

Automated Data

Carbon Monoxide

Carbon monoxide (CO) data was collected at 16 monitoring stations. The data generated from these stations met the precision, accuracy, and data completeness criteria.

Nephelometer

Nephelometer (B-scat) data was collected at 39 monitoring stations. The data generated from these stations met the precision criteria. The data completeness criteria was not met at the Okanogan and Twisp Ranger Stations due to operator error. The data completeness criteria was not met at the Vancouver McLoughlin School station due to equipment problems.

Nitrogen Dioxide

Nitrogen dioxide (NO_2) data was collected at 2 monitoring stations. The data generated from these stations met the precision and data completeness criteria. The accuracy criteria was not met due to an audit failure at the Seattle, Beacon Hill station.

Ozone

Ozone (O_3) data was collected at 15 monitoring stations. The data generated from these stations met the precision and accuracy criteria. The data completeness criteria was not met at the White Pass station due to shelter temperature problems.

$PM_{2.5}$ TEOM

$PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5 micrometers) data as measured by the Tapered Element Oscillating Microbalance method was collected at 14 monitoring stations. The data collected is not considered reference or equivalent method data and precision and accuracy are not calculated. The data completeness criteria was not met at the North Bend and Kennewick stations due to instrument failures.

Sulfur Dioxide

Sulfur dioxide (SO_2) data was collected at 1 monitoring station. The data generated from this station met the precision, accuracy, and data completeness criteria.

Manual Data

$PM_{2.5}$

$PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5 micrometers) data was collected at 32 monitoring stations. The data generated from these stations met the precision and accuracy (expressed as bias) criteria. The data completeness criteria was not met at the Walla Walla station due to a sampler failure.

PM_{10}

PM_{10} (particulate matter with an aerodynamic diameter of 10 micrometers) data was collected at 22 monitoring stations. The data generated from these stations met the precision, accuracy, and data completeness criteria.

Meteorological Data

Meteorological data was collected at 18 monitoring stations. These stations satisfy the Environmental Protection Agency (EPA) Prevention of Significant Deterioration (PSD) specifications and Ecology's data validation requirements.

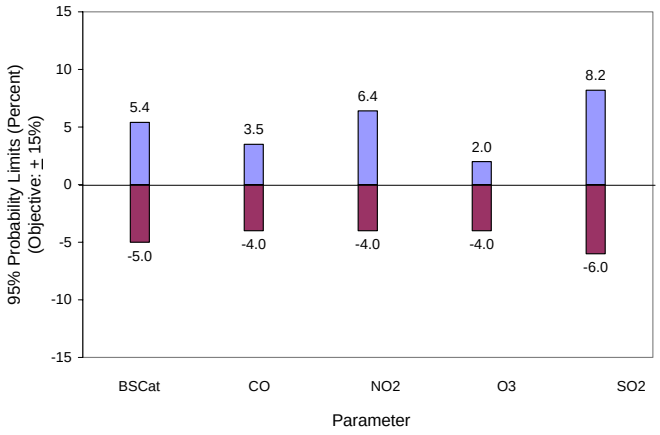
Data users should be cautious about using incomplete data to make conclusive statements, as violations of the State or National Ambient Air Quality Standards may have occurred during periods of incomplete data. The data completeness criteria was not met for wind speed at Seatac North and was not met for wind direction at Mt. Zion station due to sensor failures.

3.0 Automated Method Data Quality

Precision of Automated Methods

Utilizing the procedures and calculations specified in 40 CFR 58, Appendix A, Sections 3.1 and 5.1, the precision of the automated analyzers (B-scat, CO, NO_2, O_3, and SO_2) was checked at least once every two weeks and an estimate of the precision calculated for each parameter. Figure 1 presents the resulting 95% probability limits.

Figure 1. Summary of Automated Method Precision



Accuracy of Automated Methods

Utilizing the procedures and calculations specified in 40 CFR 58, Appendix A, Sections 3.2 and 5.2, at least 50% of the automated analyzers (CO, O_3, NO_2, SO_2) were audited and an estimate of the accuracy calculated. Figures 2, 3, 4, and 5 present the resulting 95% probability limits.

Figure 2. Summary of Carbon Monoxide (CO)
Automated Method Accuracy

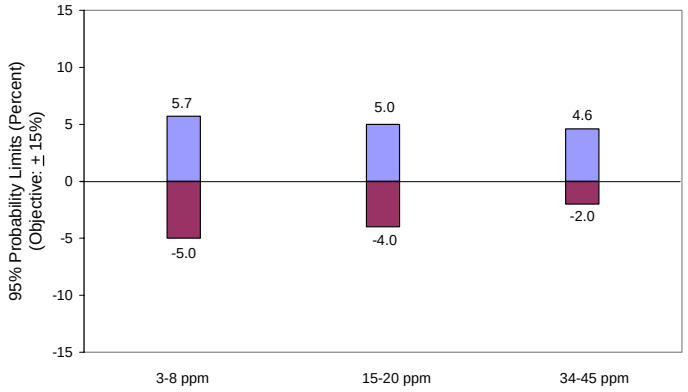


Figure 3. Summary of Ozone (O_3)
Automated Method Accuracy

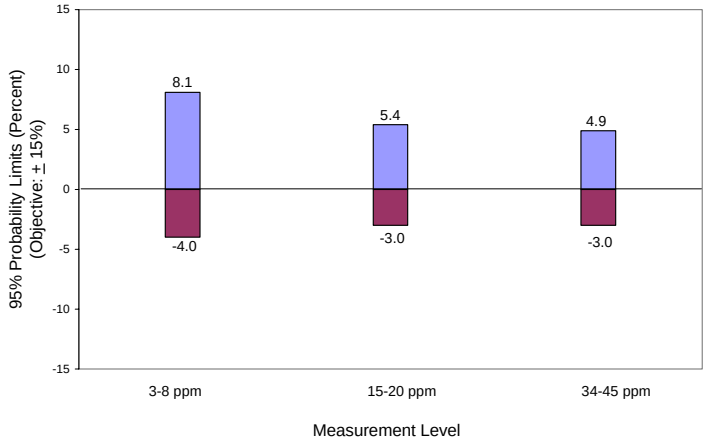


Figure 4. Summary of Nitrogen Dioxide (NO_2)
Automated Method Accuracy

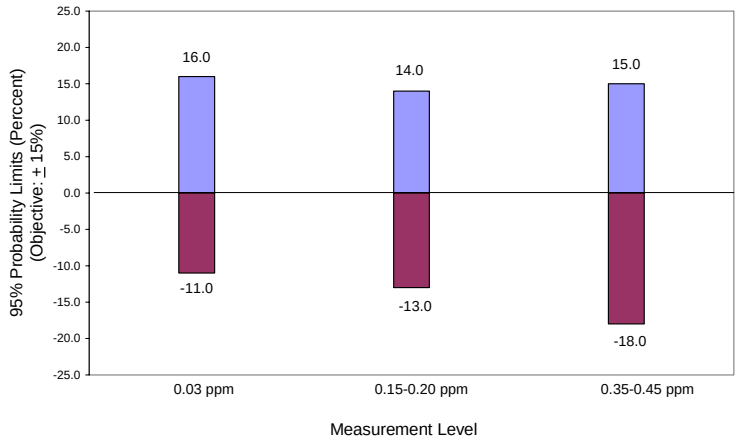
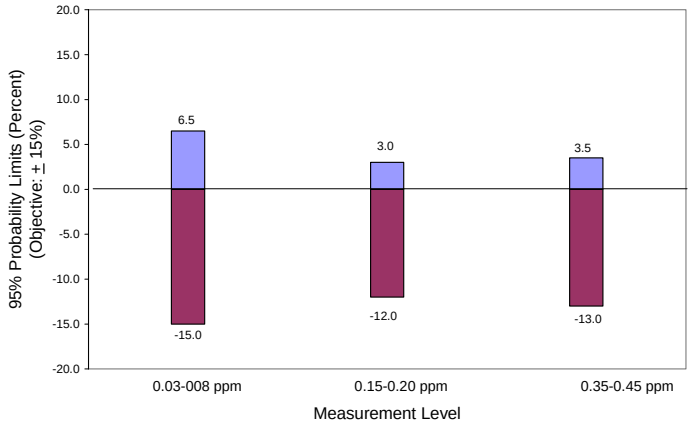


Figure 5. Summary of Sulfur Dioxide (SO_2)
Automated Method Accuracy

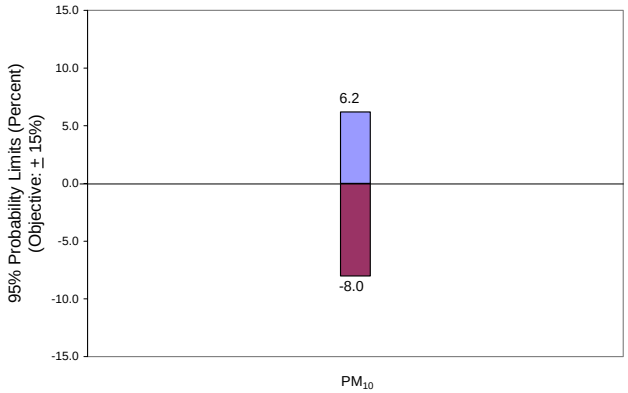


4.0 Manual Method Data Quality

Precision of Manual Methods

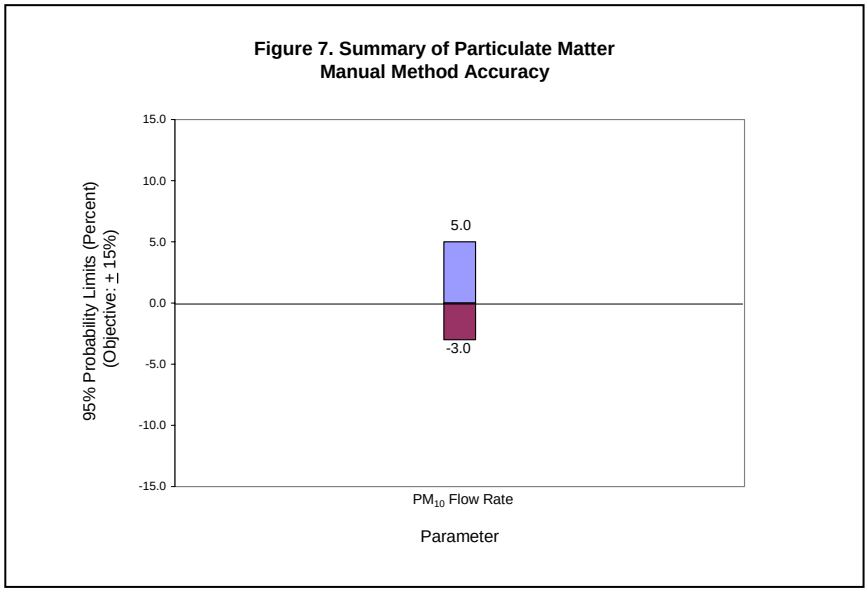
Utilizing the procedures and calculations specified in 40 CFR 58, Appendix A, Sections 3.3 and 5.3, duplicate, collocated sampling was conducted to evaluate manual method ($PM_{2.5}$ and PM_{10}) data precision and an estimate of the precision is calculated for each parameter. $PM_{2.5}$ precision is expressed as bias, and is calculated for each monitoring station. This data is not presented graphically but is available on request. Figure 6 presents the resulting 95% probability limits for PM_{10} manual method precision.

Figure 6.
Summary of Manual Method Precision



Accuracy of Manual Methods

Utilizing the procedures and calculations specified in 40 CFR 58, Appendix A, Sections 3.4 and 5.4, the accuracy of the manual method, PM_{10} was audited and an estimate of the accuracy calculated. Accuracy for $PM_{2.5}$ is expressed as bias to produce a single average for the network. The annual average was -0.2. Figure 7 presents the resulting 95% probability limits for PM_{10}.



5.0 Percent Valid Data

Percent valid data is a gauge of the amount of certified valid data obtained from a monitoring instrument compared to the amount expected under ideal conditions (24 hours per day, 365 days per year). Exceptions are analyzers which had a short term or a seasonal sampling period and manual method samplers that run every day, every other day, every third day, or every sixth day. The O_3 network has a required seasonal sampling period of May through September.
The completeness of the data is determined for each monitoring instrument, the sampling period and frequency taken into account and the results expressed as a percentage in Table 1. When the 80% certified data objective is not met, the result is **highlighted** and an explanation given. When the sampling period is less than ideal it is noted. The manual method sampling frequency is noted after the station identification number, such that 1/1, 1/3, and 1/6 denotes every day, every third day, and every sixth day sampling frequency, respectively.

Para-meter	AIRS ID#	Location	Valid Hours	% Valid data	Remarks
B-scat (Neph)	530330080	Seattle, Beacon Hill	8678	99	
B-scat (Neph)	530670013	Lacey, Mt. View School	8725	99	
B-scat (Neph)	530090009	Pt. Angeles, Stevens School	8724	99	
B-scat (Neph)	530310003	Pt. Townsend, Middle School	8716	99	
B-scat (Neph)	530530012	Pierce County, Rainier #3	8659	98	
B-scat (Neph)	530590001	Skamania Co., Mt. Zion	8412	96	
B-scat (Neph)	530390003	Klickitat County, Wishram	8469	96	
B-scat (Neph)	530090003	Clallam County, Hurricane Ridge	2407	82	Seasonal monitor
B-scat (Neph)	530150009	Mt. St. Helens, Coldwater	2909	99	Seasonal monitor
B-scat (Neph)	530530020	Pierce County, Carbon River	2681	99	Seasonal monitor
B-scat (Neph)	530450002	Mason County, South Mountain	2906	99	Seasonal monitor
B-scat (Neph)	530730015	Bellingham, Yew Street	8417	96	
B-scat (Neph)	530450004	M.G. Hospital, Shelton	5234	99	Site discontinued 8/8
B-scat (Neph)	530570014	Mount Vernon, Laventure	4304	99	Site discontinued 6/31
B-scat (Neph)	530570015	Mount Vernon, NWAPA Office	3517	99	Site established 8/7

Para-meter	AIRS ID#	Location	Valid Hours	% Valid data	Remarks
B-scat (Neph)	530730018	Whatcom County, Ross Dam	8207	93	
B-scat (Neph)	530330037	Bellevue, Goldfarbs	5860	99	Parameter established 5/1
B-scat (Neph)	530330017	North Bend	8434	96	
B-scat (Neph)	530110019	Vancouver, McLoughlin	**6345**	**72**	**Equipment problems**
B-scat (Neph)	530110020	Camas, City Hall	2967	91	
B-scat (Neph)	530150015	Longview, Olympic School	3035	93	
B-scat (Neph)	530650004	Colville, County Courthouse	8720	99	
B-scat (Neph)	530710005	Walla Walla, Fire Station	8534	97	
B-scat (Neph)	530750003	Pullman, Pioneer Place	8695	99	
B-scat (Neph)	530010003	Ritzville, County Shop	8716	99	
B-scat (Neph)	530650009	Chewelah, Clay St.	2853	99	Site discontinued 4/30
B-scat (Neph)	530330027	Redmond, City Hall	8079	97	
B-scat (Neph)	530590002	Stevenson, Skamania Co. Jail	3894	80	Site established 6/13
B-scat (Neph)	530410008	Vader	4183	98	Site established 7/8
B-scat (Neph)	530390004	Klickitat County, Towal Road	3845	93	Site established 7/13

Para-meter	AIRS ID#	Location	Valid Hours	% Valid data	Remarks
B-scat (Neph)	530750005	LaCrosse	3658	91	Site established 7/19
B-scat (Neph)	530750006	Rosalia	4683	99	Site established 6/19
B-scat (Neph)	530272002	Aberdeen	3287	99	Site established 8/16
B-scat (Neph)	530330023	King County, Mud Mtn	2684	91	Parameter established 8/10
B-scat (Neph)	530070008	Wenatchee, Ranger Station	2143	97	Site established 10/1
B-scat (Neph)	530070007	Chelan, Ranger Station	733	98	Site established 12/1
B-scat (Neph)	530070009	Leavenworth, Ranger Station	2113	98	Site established 10/4
B-scat (Neph)	530470008	Okanogan, Ranger Station	**497**	**33**	Site established 11/1 **Operator error**
B-scat (Neph)	530470007	Twisp, Ranger Station	**1696**	**76**	Site established 10/1 **Operator error**
CO	530330077	Seattle, 4th & Pike	8689	99	
CO	530330025	Seattle, Northgate Apts. #2	7340	83	
CO	530330087	Seattle, Zanadu Comics	8702	99	
CO	530330032	Seattle, Corson Avenue	5486	94	Parameter discontinued 8/29
CO	530330015	Bellevue, NE 8th & 108th NE	8103	92	
CO	530330019	Bellevue, BP Station	8680	99	
CO	530330080	Seattle, Beacon Hill	8629	98	
CO	530610004	Lynnwood, Shopping Mall	8376	95	
CO	530610006	Everett, Broadway	8333	95	
CO	530530032	Tacoma, Pacific Ave.	8702	99	

Para-meter	AIRS ID#	Location	Valid Hours	% Valid data	Remarks
CO	530670011	Lacey, OAPCA Office	2665	92	Site discontinued 4/30
CO	530630045	Spokane, Spokane Club	8681	99	
CO	530630040	Spokane, Hamilton St.	8699	99	
CO	530630049	Spokane, 3rd Ave. & Wa. South	8623	98	
CO	530110010	Vancouver, Atlas & Cox	8334	95	
CO	530771014	Yakima, Yakima Ave.	4524	88	Seasonal monitor
NO	530330080	Seattle, Beacon Hill	7523	85	
NO_2	530330080	Seattle, Beacon Hill	7521	85	
NO_x	530330080	Seattle, Beacon Hill	7521	85	
NO	530330032	Seattle, Corson Avenue	5348	97	Parameter discontinued 8/15
NO_2	530330032	Seattle, Corson Avenue	5350	97	Parameter discontinued 8/15
NO_x	530330032	Seattle, Corson Avenue	5343	97	Parameter discontinued 8/15
O_3	530330023	King County, Mud Mountain	3047	97	Seasonal monitor
O_3	530330010	King County, Lake Sammamish	3646	99	Seasonal monitor
O_3	530330017	North Bend, USFS	3641	99	Seasonal monitor
O_3	530330080	Seattle, Beacon Hill	3295	89	Seasonal monitor
O_3	530670002	Yelm, Fire Station	3397	92	Seasonal monitor
O_3	530531008	Pierce County, Pack Forest	3578	97	Seasonal monitor
O_3	530530028	Pierce County, Graham	3632	98	Seasonal monitor
O_3	530390003	Klickitat County, Wishram	3212	87	Seasonal monitor
O_3	530110011	Vancouver, Mt. View School	3595	97	Seasonal monitor
O_3	530730005	Whatcom County, Custer	3423	93	Seasonal monitor
O_3	530630046	Spokane County, Greenbluff	3457	94	Seasonal monitor
O_3	530630001	Cheney, Turnbull Slough	3614	98	Seasonal monitor
O_3	530450005	Belfair	3470	94	Seasonal monitor

Para-meter	AIRS ID#	Location	Valid Hours	% Valid data	Remarks
O_3	530410007	White Pass	**1544**	**75**	Seasonal monitor Site established 7/17 **Shelter temperature problems**
O_3	530530012	Pierce County, Rainier #3	8151	93	
$PM_{2.5}$ TEOM	530530057	Seattle, Duwamish Trailer	8649	98	
$PM_{2.5}$ TEOM	530332004	Kent, Central & James	8595	98	
$PM_{2.5}$ TEOM	530611007	Marysville, J.H.S.	7689	87	
$PM_{2.5}$ TEOM	530330024	Bothell Way, Lake Forest Park	8691	99	
$PM_{2.5}$ TEOM	530610005	Lynnwood, Snohomish PUD	8585	98	
$PM_{2.5}$ TEOM	530330017	North Bend, USFS	**3607**	**41**	**Instrument failure**
$PM_{2.5}$ TEOM	530530031	Tacoma, Alexander Ave.	8617	98	
$PM_{2.5}$ TEOM	530530029	Tacoma, L Street	7976	91	
$PM_{2.5}$ TEOM	530670013	Lacey, Mt. View School	8429	96	
$PM_{2.5}$ TEOM	530630016	Spokane, Crown Zellerbach	8436	96	
$PM_{2.5}$ TEOM	530630047	Spokane, Monroe St.	7583	86	
$PM_{2.5}$ TEOM	530110013	Vancouver, Moose Lodge	8312	94	
$PM_{2.5}$ TEOM	530050002	Kennewick, VSC	**5722**	**65**	**Instrument failures**
$PM_{2.5}$ TEOM	530330080	Seattle, Beacon Hill	473	89	Parameter established 12/10
SO_2	530330080	Seattle, Beacon Hill	8654	98	

Para-meter	AIRS ID#	Location	Valid Hours	% Valid data	Remarks
Organic Carbon	530330080	Seattle, Beacon Hill	8398	95	
Black Carbon	530330080	Seattle, Beacon Hill	8398	95	
Total Carbon	530330080	Seattle, Beacon Hill	8398	95	
Sulfate	530330080	Seattle, Beacon Hill	7408	84	
Nitrate	530330080	Seattle, Beacon Hill	**6783**	**77**	**Analyzer failure**
Wind speed	530330080	Seattle, Beacon Hill	8718	99	
Wind dir.	530330080	Seattle, Beacon Hill	8745	99	
T_A	530330080	Seattle, Beacon Hill	8747	99	
Wind speed	530330032	Seattle, Corson Avenue	6804	85	
Wind dir.	530330032	Seattle, Corson Avenue	6770	84	
T_A	530330032	Seattle, Corson Avenue	7991	99	
Wind speed	530330020	Seattle, SeaTac North	**181**	**12**	**Sensor failure** Site disc. 2/28/02
Wind dir.	530330020	Seattle, SeaTac North	1246	87	Site disc. 2/28/02
T_A	530330020	Seattle, SeaTac North	1246	87	Site disc. 2/28/02
Wind speed	530330042	Seattle, NOAA	8655	98	
Wind Dir.	530330042	Seattle, NOAA	8655	98	
T_A	530330042	Seattle, NOAA	8673	99	
Wind speed	530330017	North Bend, USFS	8755	99	
Wind dir.	530330017	North Bend, USFS	8755	99	
T_A	530330017	North Bend, USFS	8753	99	

Para-meter	AIRS ID#	Location	Valid Hours	% Valid data	Remarks
Wind speed	530337002	King Co., Enumclaw FS#3	3842	99	Site temporarily discontinued during 1st and 2nd quarter 2002
Wind dir.	530337002	King Co., Enumclaw FS#3	3798	98	Site temporarily discontinued during 1st and 2nd quarter 2002
T_A	530337002	King Co., Enumclaw FS#3	3712	96	Site temporarily discontinued during 1st and 2nd quarter 2002
Wind speed	530531016	Tacoma, Indian Hill Reservoir	8750	99	
Wind dir.	530531016	Tacoma, Indian Hill Reservoir	8750	99	
T_A	530531016	Tacoma, Indian Hill Reservoir	8702	99	
Wind speed	530630016	Spokane, Crown Zellerbach	8739	99	
Wind dir.	530630016	Spokane, Crown Zellerbach	8403	95	
T_A	530630016	Spokane, Crown Zellerbach	8747	99	
Wind speed	530630047	Spokane, Monroe St.	8729	99	
Wind dir.	530630047	Spokane, Monroe St.	8543	97	
T_A	530630047	Spokane, Monroe St.	8739	99	
Wind speed	530631017	Spokane County, Rockwood	4240	98	Site discontinued 6/28
Wind dir.	530631017	Spokane County, Rockwood	4275	99	Site discontinued 6/28
T_A	530631017	Spokane County, Rockwood	4275	99	Site discontinued 6/28
Wind speed	530090011	Pt. Angeles, Daishowa	8758	99	
Wind dir.	530090011	Pt. Angeles, Daishowa	8758	99	

Para-meter	AIRS ID#	Location	Valid Hours	% Valid data	Remarks
T_A	530090011	Pt. Angeles, Daishowa	8758	99	
Wind speed	530110017	Clark County, BPA	8753	99	
Wind dir.	530110017	Clark County, BPA	8753	99	
T_A	530110017	Clark County, BPA	8753	99	
Wind speed	530590001	Skamania Co., Mt. Zion	8381	95	
Wind dir.	530590001	Skamania Co., Mt. Zion	**5379**	**61**	**Sensor failure**
T_A	530590001	Skamania Co., Mt. Zion	8722	99	
Wind speed	530450002	Mason County, South Mountain	1456	99	Seasonal monitor Shortened season due to tower re-location
Wind dir.	530450002	Mason County, South Mountain	1444	98	Seasonal monitor Shortened season due to tower re-location
T_A	530450002	Mason County, South Mountain	1456	99	Seasonal monitor Shortened season due to tower re-location
Wind speed	530150009	Mt. St. Helens, Coldwater	2921	99	Seasonal monitor
Wind dir.	530150009	Mt. St. Helens, Coldwater	2570	87	Seasonal monitor
T_A	530150009	Mt. St. Helens, Coldwater	2921	99	Seasonal monitor
Wind speed	530390003	Klickitat County, Wishram	8750	99	
Wind dir.	530390003	Klickitat County, Wishram	8750	99	
T_A	530390003	Klickitat County, Wishram	8750	99	
Wind speed	530390004	Klickitat County, Towal Road	3771	97	Site established 7/13
Wind dir.	530390004	Klickitat County, Towal Road	3771	97	Site established 7/13

Para-meter	AIRS ID#	Location	Valid Hours	% Valid data	Remarks
T_A	530390004	Klickitat County, Towal Road	3833	99	Site established 7/13
RHum	530390004	Klickitat County, Towal Road	3833	99	Site established 7/13
Wind speed	530710006	Burbank	264	100	Site established 11/5
Wind dir.	530710006	Burbank	264	100	Site established 11/5
T_A	530710006	Burbank	264	100	Site established 11/5
$PM_{2.5}$	530050002	Kennewick, VSC 1/3	116	95	
$PM_{2.5}$	530770009	Yakima, Mental Health Building 1/3	122	100	
$PM_{2.5}$	530770009	Yakima, Mental Health Building collocated 1/6	56	91	
$PM_{2.5}$	530330080	Seattle, Beacon Hill 1/1	354	97	
$PM_{2.5}$	530530057	Seattle, Duwamish Trailer 1/1	357	98	
$PM_{2.5}$	530530057	Seattle, Duwamish Trailer collocated 1/6	59	96	
$PM_{2.5}$	530330021	Seattle, South Park 1/1	343	94	
$PM_{2.5}$	530330024	Bothell Ave, Lake Forest Park 1/3	116	95	
$PM_{2.5}$	530610005	Lynnwood, PUD 1/3	120	98	
$PM_{2.5}$	530332004	Kent, Central & James 1/3	122	100	
$PM_{2.5}$	530330037	Bellevue, Goldfarbs 1/3	117	96	
$PM_{2.5}$	530330017	North Bend, USFS 1/3	117	96	
$PM_{2.5}$	530530031	Tacoma, Alexander Ave. 1/1	345	95	
$PM_{2.5}$	530530031	Tacoma, Alexander Ave. collocated 1/6	56	91	
$PM_{2.5}$	530530029	South Tacoma, Community Center 1/1	350	96	
$PM_{2.5}$	530531018	Puyallup, South Hill 1/3	120	98	

Para-meter	AIRS ID#	Location	Valid Hours	% Valid data	Remarks
$PM_{2.5}$	530611007	Marysville, J.H.S. 1/3	121	99	
$PM_{2.5}$	530630016	Spokane, Crown Zellerbach 1/1	357	98	
$PM_{2.5}$	530630016	Spokane, C.Z. collocated 1/6	59	96	
$PM_{2.5}$	530630047	Spokane, Monroe Street 1/3	120	98	
$PM_{2.5}$	530670013	Lacey, Mt. View Elem. 1/3	121	99	
$PM_{2.5}$	530670013	Lacey, Mt. View Elem. collocated 1/6	61	100	
$PM_{2.5}$	530450004	M.G. Hospital, Shelton 1/6	37	100	Site discontinued 8/6
$PM_{2.5}$	530730015	Bellingham, Yew Street 1/3	122	100	
$PM_{2.5}$	530730015	Bellingham, Yew Street collocated 1/6	58	95	
$PM_{2.5}$	530570014	Mount Vernon, Laventure 1/6	6	100	Site discontinued 1/30
$PM_{2.5}$	530330027	Redmond, City Hall 1/3	117	96	
$PM_{2.5}$	530110013	Vancouver, Moose Lodge 1/3	121	99	
$PM_{2.5}$	530110020	Camas, City Hall 1/6	23	100	Site Discontinued 5/14
$PM_{2.5}$	530150015	Longview, Olympic School	23	100	Site Discontinued 5/14
$PM_{2.5}$	530650004	Colville, County Courthouse 1/6	20	100	Parameter Discontinued 4/26
$PM_{2.5}$	530650009	Chewelah, Clay St. 1/6	20	100	Site Discontinued 4/26
$PM_{2.5}$	530010003	Ritzville, County Shop 1/6	30	100	Site discontinued 6/25
$PM_{2.5}$	530750003	Pullman, Pioneer Place 1/6	30	100	Parameter discontinued 6/25
$PM_{2.5}$	530750003	Pullman, Pioneer Place collocated 1/6	30	100	Parameter discontinued 6/25
$PM_{2.5}$	530710005	Walla Walla, Fire Station 1/3	**20**	**74**	Parameter discontinued 5/26 **Sampler failure**
$PM_{2.5}$	530590002	Stevenson, Skamania Co. Jail 1/6	33	100	Site established 6/13

Para-meter	AIRS ID#	Location	Valid Hours	% Valid data	Remarks
$PM_{2.5}$	530272002	Aberdeen 1/6	28	100	Site established 8/16
$PM_{2.5}$	530410008	Vader 1/6	30	100	Site established 7/8
PM_{10}	530030004	Clarkston, STP 1/6	59	96	
PM_{10}	530710005	Walla Walla, Fire Station 1/3	108	88	
PM_{10}	530050002	Kennewick, VSC 1/1	338	92	
PM_{10}	530070006	Wenatchee, Columbia School 1/3; 1/6	76	87	
PM_{10}	530370002	Ellensburg, Hal Holmes 1/3, 1/6	74	85	
PM_{10}	530650004	Colville, County Courthouse 1/3	122	100	
PM_{10}	530632002	Millwood, Millwood City Hall 1/6	59	96	
PM_{10}	530630016	Spokane, Crown Zellerbach 1/1	360	98	
PM_{10}	530630016	Spokane, C.Z. collocated 1/6	61	100	
PM_{10}	530630001	Cheney, Turnbull Slough 1/6	60	98	
PM_{10}	530630047	Spokane, Monroe Street 1/6	60	98	
PM_{10}	530631017	Spokane, Rockwood	60	100	Site discontinued 6/30
PM_{10}	530770009	Yakima, Mental Health Building 1/3	120	98	
PM_{10}	530770005	Sunnyside, Harrison Middle School 1/6	58	95	
PM_{10}	530332004	Kent, Central & James 1/6	61	100	
PM_{10}	530330057	Seattle, Duwamish Trailer 1/6	61	100	
PM_{10}	530330057	Seattle, Duwamish Trailer collocated 1/6	61	100	
PM_{10}	530530031	Tacoma, Alexander Ave. 1/6	60	98	

Para-meter	AIRS ID#	Location	Valid Hours	% Valid data	Remarks
PM_{10}	530670013	Lacey, Mt. View Elem. 1/6	60	98	
PM_{10}	530730015	Bellingham, Yew Street 1/6	60	98	
PM_{10}	530110013	Vancouver, Moose Lodge 1/6	61	100	
PM_{10}	530711001	Wallula, Nedrow Farm 1/6	54	88	
PM_{10}	530710003	Wallula Port	16	100	Site established 11/5
PM_{10}	530710006	Burbank	2	100	Site established 11/5