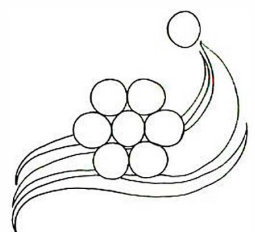


1973 AIR QUALITY DATA SUMMARY

For Counties Of
King
Kitsap
Pierce
Snohomish

measured and compiled by
Technical Services Division

PUGET SOUND
AIR POLLUTION CONTROL AGENCY



PUGET SOUND AIR POLLUTION CONTROL AGENCY

1973

AIR QUALITY DATA SUMMARY

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INTRODUCTION

Presented herein is the air quality and meteorological data collected for the Central Puget Sound Region for the Year 1973. Data is presented so as to be intelligible to persons who may not be familiar with air quality and meteorological data, yet detailed enough for those who require information for decision making or scientific purposes.

The report begins with a description of the Agency's air monitoring system and the location of monitoring sites. The body of the report contains summaries of concentrations of each pollutant measured during 1973 and several analyses and interpretations of this data.

The report contains wind roses for twelve of the Agency's monitoring stations. The measurement of wind speed and direction concomitant with air quality is essential to the evaluation and control of air pollution in any given area. Wind speeds below four knots usually result in higher air pollutant concentrations. Wind direction information is essential for determining which sources or source areas affect a specific station.

For specific information on air pollutants emitted by the aluminum industry, pulp and paper industry, and mobile sources (carbon monoxide, hydrocarbons and oxides of nitrogen), please contact the Washington State Department of Ecology, Olympia, Washington 98504.

SAMPLING SYSTEM DESCRIPTION

During 1973, the Puget Sound Air Pollution Control Agency operated air sampling devices at 33 locations within the 4-county area of jurisdiction. These sites can be categorized as: continuous automatic with telemetered data, and manually operated stations containing semiautomatic samplers and/or static sampling devices.

The telemetry network, consisting of ten sites located in industrial, commercial and residential areas, provides real-time data for continuous surveillance of sulfur dioxide, coefficient of haze (a measure of suspended particulate and sometimes referred to as "soiling index"), wind speed, and wind direction. A computer at the Agency's Seattle office operates the network. It compiles, processes and prints out the data and summary information at regular intervals. During normal operation, five-minute averages are obtained every 15 minutes, with one-hour and 24-hour moving averages compiled and printed each hour. Four-hour averages are also provided six times daily. During periods of poor air quality, continuous sampling may be selected with a print-out every five minutes.

The processed data is converted to a scaled index value which defines air quality in relation to the stages of an air pollution episode. The reported index value for each of the three major metropolitan areas in our region (Everett, Seattle, Tacoma) is the value calculated from the highest 24-hour average of suspended particulate and/or sulfur dioxide. This information is made available to the news media and serves to keep the citizens informed of air quality on a continuing day-to-day basis.

The manually operated network consists of stations with high-volume samplers, lead peroxide candles, and particle fallout collectors; also included are one nitrogen dioxide, one carbon monoxide, one sulfur dioxide, two oxidant, and three wind sensors. Some stations contain one sampling device, others have several. As a result of budget restrictions, the operation of all particle fallout collectors and lead peroxide sensors was discontinued on August 31, 1973.

The tables and graphs presented in this data summary are generally self-explanatory. The data shows seasonal and geographic variability. Sufficient suspended particulate data was available to show six year means by station and site classification.

PUGET SOUND AIR POLLUTION CONTROL AGENCY
ATMOSPHERIC SAMPLING NETWORK
December 31, 1973

Sta. No.	Location	1	2*	3	4	5	6	7	8	9	10*
S 2	School Dist. Office, 1513-7th St., Marysville	x	x		x				x		
S 3	Medical-Dental Bldg., 2730 Colby Av., Everett	x	x	x	x				x		x
K 1	Public Safety Bldg., 604-3rd Av., Seattle	x	x								x
K 4	U.S.C.G. Station, 2700 W. Commodore Way, Seattle	x									
K 5	Tolt River Watershed (East of Lake Joy)	x									
K 9	SE Dist. Health Cen., 12015 S.W. 128th St., Renton	x									
K10	Food Circus Building, Seattle Center	x	x	x	x	x			x	x	
K11	Lake Forest Park Rsvr., N.E. 195th & 46th Av. N.E., Seattle								x		
K15	KIRO Radio & TV Transmitter, Maury Island		x								
K35	25 South Hanford Street, Seattle		x								x
K48	Gold Beach, Maury Island		x								
K50	AMCI, 227 Andover Park E., Tukwila, Wash.			x	x				x		
K51	115 East Main St. & Auburn Av., Auburn, Wash.	x	x								
K52	Green Lake Rsvr., 12th Av. N.E. & N.E. 73rd., Seattle			x	x				x		x
K53	Puget Power Bldg., 10604 N.E. 4th, Bellevue, Wash.	x									
K54	Municipal Bldg., 200 Mill Ave. S., Renton, Wash.	x	x								
K55	Duwamish, 4500 Blk. E. Marginal Way S., Seattle	x	x	x	x				x		
K56	240th & 103rd S.W., Burton, Vashon Island			x					x		
K57	Hancock Ranch, 240th & 49th Av. S.W., Maury Island		x								
K58	1209 - 2nd Av., Seattle						x				
K59	Duwamish Valley, 12026 - 42nd Av. S., King County, Wash.	x									
K60	Harbor Island, 3400 - 13th Av. S.W., Seattle	x									
T 1	McMicken Hts., S. 176th & 42nd Av. S., King Co., Wash.	x	x	x	x	x	x	x	x		x
P 1	Mann-Russell Electric, 1401 Thorne Road, Tacoma	x	x								x
P 2	N. 26th & Pearl, Tacoma	x	x	x	x				x		
P 3	Fife Senior High School, 5616 - 20th E., Fife, Wash.	x		x	x				x		
P 4	Clover Park Educ. Cen., 4500 Steilacoom Blvd. S.W., Tacoma		x								
P 5	Hess Building, 901 Tacoma Av. South, Tacoma	x									
P 6	Meeker Jr. H.S., 1526 - 51st Street N.E., Tacoma	x		x	x				x		
P 8	Willard Elem. School, S. 32nd & S. "D" St., Tacoma	x		x	x				x		
B 1	Dewey Jr. H.S., Perry Av. & Holman St., Bremerton	x	x								x
B 2	Winslow City Hall, Winslow, Wash.		x								
B 3	Kitsap County Airport, Belfair Highway, Wash.		x								
A13	Everett Av. & Pine St., Everett	x									
A03	Duwamish, 6770 E. Marginal Way S., Seattle	x									
A15	Cascadia College, 2002 E. 28th St., Tacoma	x									
A01	City Hall, 239 - 4th St., Bremerton	x									

"A" codes operated by Washington State Dept. of Ecology

* Discontinued 8/31/73

TYPE OF SAMPLING

- | | | | |
|--------------------------------------|-------------------------|--|----------------------|
| 1. High-Volume Sampler | 4. Soiling Index (COH) | 7. Nitrogen Dioxide (NO ₂) | 10. Particle Fallout |
| 2. Sulfation Rate | 5. Total Oxidants | 8. Wind Speed & Direction | |
| 3. Sulfur Dioxide (SO ₂) | 6. Carbon Monoxide (CO) | 9. Nephelometer | |

TYPE OF NETWORK

AUTOMATIC (Telemetry)

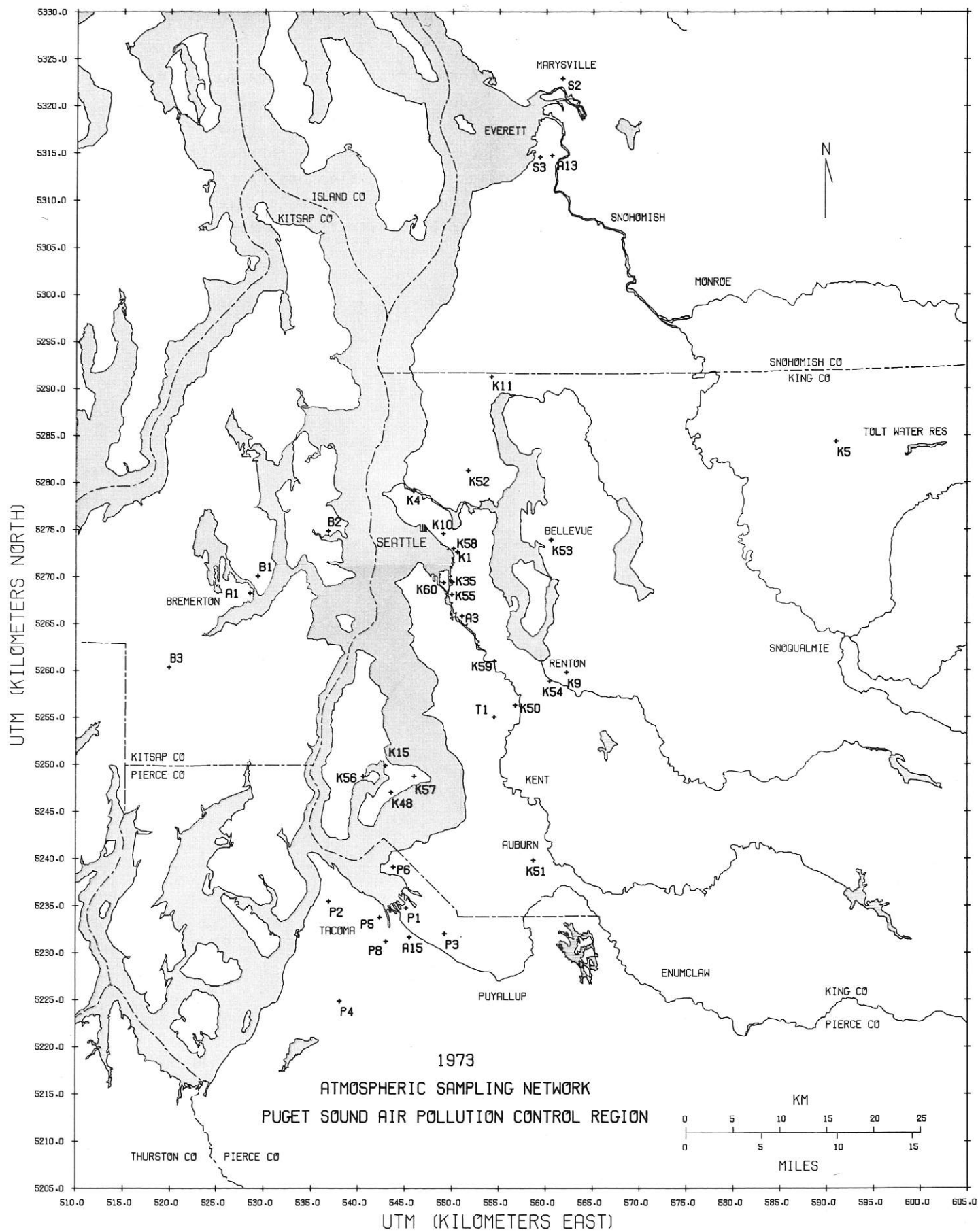
Measuring cycles established by computer program. Data automatically transmitted, interpreted, and printed out under control of central station computer; automatic scan may be by-passed for off-schedule interrogation of remote stations by central station personnel.

SEMI-AUTOMATIC

Samplers which operate on continuous or intermittent cycles controlled by integral timers, record data on strip charts or on specially conditioned filters; strip charts or filters must be removed by field personnel for later analysis and data reduction.

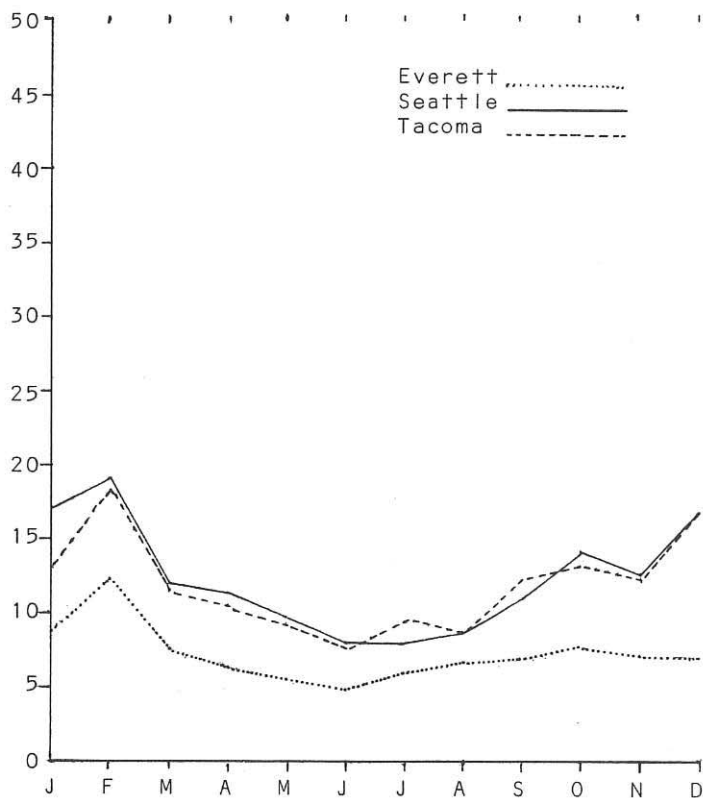
STATIC

Samplers not requiring automatic metering or timing. These include particle fallout samplers sometimes called dust buckets, and lead peroxide candles which measure sulfur-containing compounds that can form sulfate. Both kinds of samplers are exposed to the ambient air on 30 day sampling cycles, and removed by field personnel for later analysis and data reduction.

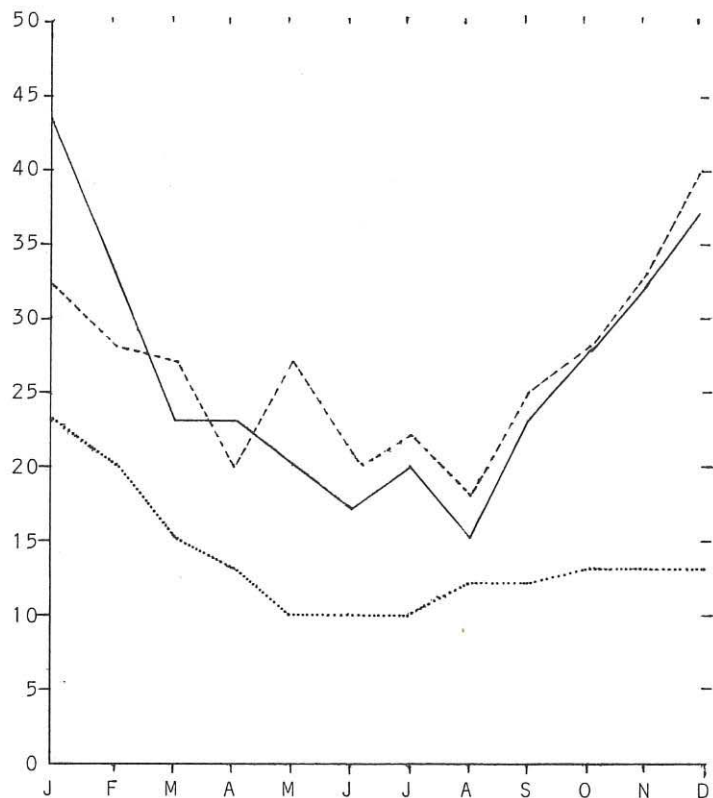


AIR QUALITY INDEX

The air quality index is a scalar value representing the average concentration of pollutants over a 24-hour period. An index is calculated three times a day, at 0800, 1200, and 1600 hours for each of the three geographic areas - Everett, Seattle, and Tacoma. These values are tape-recorded Monday through Friday and are available to the news media through an unlisted telephone number. An index of 50 is defined as the alert stage of the Washington State Episode Avoidance Plan and is the lower limit for implementation of first stage source emission reduction actions. Values of 100 and 150 correspond to the warning and emergency stages respectively.



This plot shows the monthly arithmetic mean for each area during 1973.

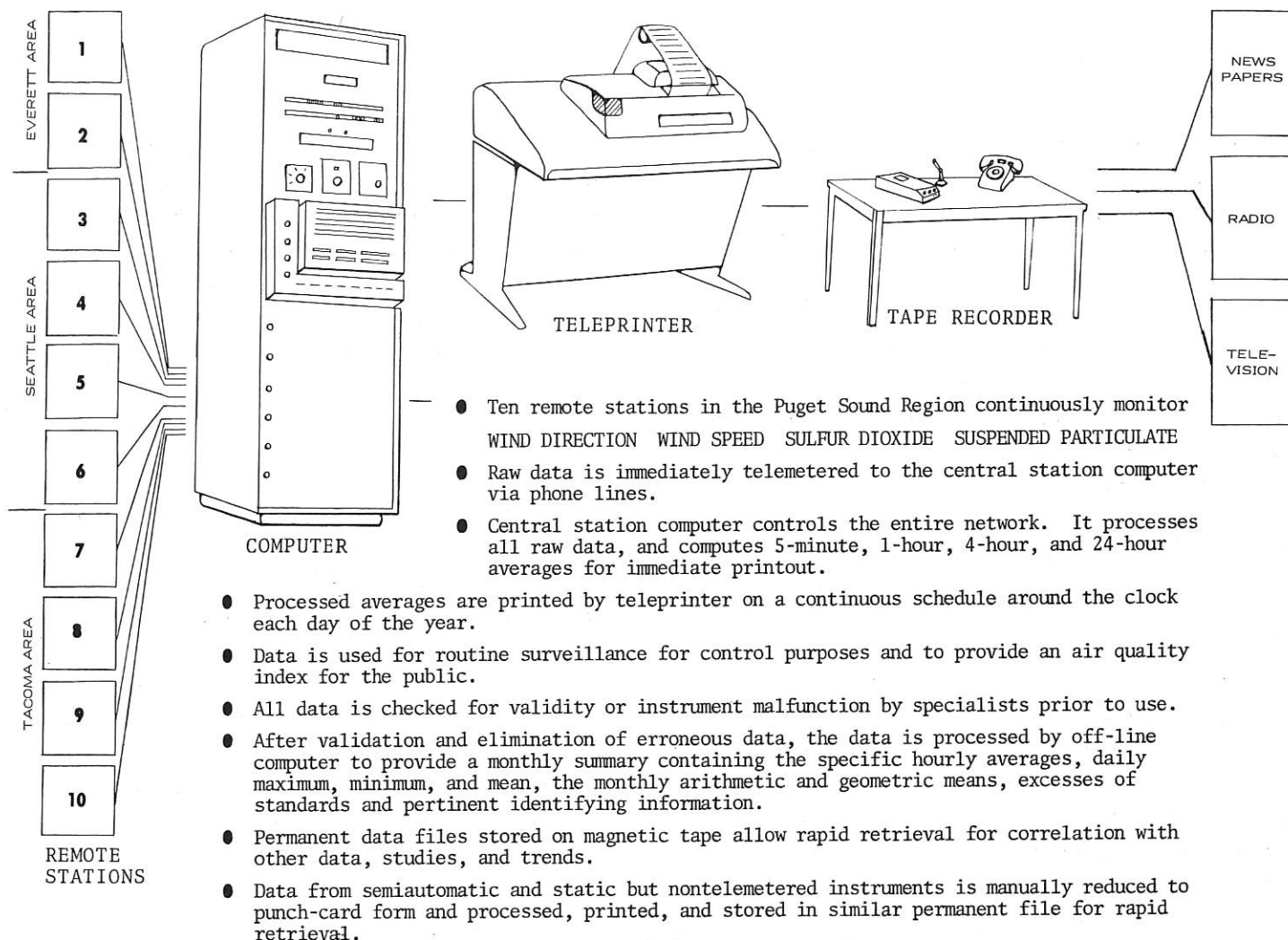


This plot shows the 24-hour maximum value by month for each area during 1973.

AIR STAGNATION ADVISORIES

Air stagnation advisories are issued by the National Weather Service when meteorological conditions are such that a significant build-up of air pollutants is considered likely. During 1973, no such advisories were issued or considered necessary. The chart on the right indicates a maximum 24-hour value of 43 was reached in Seattle during January and a maximum 24 hour value of 40 was reached in Tacoma during December. In both cases, adverse meteorological conditions were of short duration and advisories were not issued.

COLLECTING AIR QUALITY DATA BY TELEMETRY



One of the Agency's monitoring stations shown with the following equipment.

Instrumentation on the roof:

- Wind speed-wind direction sensors
- Meteorological shelter (Temperature and relative humidity)
- Two high volume samplers (suspended particulate)
- Two lead peroxide candles (sulfates)
- Oxidant sensor
- Particle fallout collector

Inside the station:

- Recorders for wind speed/direction and oxidant sensors
- Sensors and recorders for sulfur dioxide, carbon monoxide and nitrogen dioxide.



ANALYSIS OF SUSPENDED PARTICULATES

The Agency operates a network of high volume samplers which monitors suspended particulates at several locations within Snohomish, King, Kitsap, and Pierce Counties. These samplers have operated on an intermittent schedule sampling continuously for 24 hours every third day from February 1965 through December 1968, every fourth day from January 1969 through December 1972, and every sixth day since January 1973. A total of 22 stations have acquired at least two years of data through the end of 1973; two Seattle area stations have been operating continuously since February, 1965 thus accumulating nine years of data.

In April, 1971 the Federal Government promulgated national primary and secondary ambient air standards for suspended particulates. Later in the year the Agency's existing standard for suspended particulates was modified so that it was identical to the national secondary standard. This sets a value of 60 micrograms per cubic meter, annual geometric mean, which shall not be exceeded. The standard is written in terms of a geometric mean rather than an arithmetic mean because the distribution of air quality data is better described by the geometric statistic.

As a result of the averaging period indicated by the standard, a minimum of one year of sampling is required at any location to assess the suspended particulate levels with respect to the annual standard. As additional years of data are acquired, the suspended particulate levels become better documented at that location. These levels are a complex function of emissions from many sources, meteorological diffusion and dispersion of these emissions, and the surrounding topographic features.

For example, valleys are topographic features that limit the free movement of air thus contributing to the trapping of suspended particulates emitted from sources in the valley. Meteorological patterns follow average seasonal and annual cycles; however, each year varies somewhat from average conditions. Source emissions also change with time.

In urban areas where suspended particulate levels exceed the standards, action was required by the Clean Air Act to reduce concentrations of suspended particulates to meet the standards. The Agency has implemented emission standards and required sources to comply with these standards, encouraged paving of roads and parking lots, reduced open burning, and taken many other individual actions designed to reduce source emissions of suspended particulates. Since the air quality levels measured at sampling stations are a complex function of other factors in addition to changes in source emissions, it is never absolutely evident whether an increase or decrease in measured suspended particulate concentrations is a direct result of corresponding changes in source emissions. Meteorological conditions that are slightly different from normal may have considerably influenced the concentrations measured at a sampling station.

Analysis of trends in air quality must, therefore, be considered with all factors in mind. Assessment of a trend based on only a year or two of data may be quite erroneous.

The pages which follow this narrative provide 1973 suspended particulate data in several formats which interpret and analyze the data in different ways.

	Page
Table of Monthly Averages 1973	10
Six Year Graphic by Source Area Class	11
Six Year Annual Geometric Means by Station	12
Frequency of 24-Hour Averages Exceeding Specified Levels 1973	13
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An analysis technique which allows a reasonable determination of area trends is the moving mean or average. As applied to suspended particulates, a 12 month moving geometric mean relates directly to the annual standard. This moving mean is calculated simply by computing the 12 month geometric mean for consecutive 12 month intervals and

A variation of this technique which does even a better job of portraying a trend, but requires more years of data, is calculation of the moving geometric mean in multiples of 12 months. For example, 24 and 36 month moving geometric means smooth out some of the year to year variations in meteorology and short-term changes in source emissions to more clearly depict the trend.

Data has been acquired continuously at the Public Safety Building in Seattle since February, 1965. The 12 month moving geometric mean plot (page 17) shows short-term fluctuations, but also depicts a long-term downward trend which appears to level out at about the value of the annual standard. This long term trend is even more evident in the 24 and 36 month moving geometric mean graphs. Assessment of a trend based on isolated 12 month segments of the 12 month moving geometric mean trace could easily be erroneous; for example, the period from mid 1968 to mid 1969 indicates an upward trend.

The other Seattle area station with about nine years of data is located at 2700 West Commodore Way. The 12 month moving geometric

mean plot (page 17) indicates a long-term downward trend with values generally below the annual standard except for an upturn during 1973. Whether this recent upturn at this station represents a reversal of the long-term trend or is just a short-term fluctuation is not known. The 24 and 36 month moving geometric mean graphs more clearly depict the long-term downward trend at this station.

Parallel to depicting levels of suspended particulates in the urban areas, it is important to document these concentrations in the non-urban regions. The Agency has operated a single station near the Tolt Water Reservoir in the foothills of the Cascade Mountains since November, 1966. The 12, 24, and 36 month moving geometric mean graphs (page 18) all depict a reasonably constant value of about 14 micrograms per cubic meter which is neither increasing nor decreasing. This value is considered to be an average background value for the air of the Puget Sound region. Evidently this station is not significantly affected by the urbanized areas in the Puget Sound region.

Two areas in the Puget Sound region have exceeded the standard regularly since monitoring was initiated. These are the industrialized Duwamish Valley in south Seattle and the tide flats in Tacoma. The 12 month moving geometric mean for the station on Thorne Road (tide flats) in Tacoma (page 18), which has been operating since August, 1967, demonstrates a decrease into 1972 followed by an increase in 1973. All of the values exceed the annual standard. However, the 36 month moving geometric mean plot appears to indicate a slight long-term downward trend at this location.

In the Duwamish Valley a station at 3224-4th Avenue South (page 19) operated from February, 1965 through February, 1970. The station was relocated to provide more representative sampling. During the period of sampling, the 12 month moving geometric means considerably exceeded the annual standard, averaging about 105 micrograms per cubic meter. Due to loss of access to the relocation site (building closed) within a year, the next Duwamish site

to meet the two year data requirement began operation at 4500 E. Marginal Way South in August, 1971. The 12 month moving geometric mean plot at this station (page 19) shows values averaging about 77 micrograms per cubic meter with a noticeable decrease in the last few months of 1973. However, due to the relatively short period of data, no assessment can be made about the long-term trend at this station.

The only other monitoring site which exceeded the annual standard for suspended particulates at the end of 1973 was the station in Auburn which has operated since March, 1970. The 12 month moving geometric mean trace (page 19) depicts a modest increase during 1973, though no long-term trend can be discerned.

Analysis of data acquired at 11 other suspended particulate monitoring stations includes the communities of Renton, Bellevue, Everett, Marysville, and Bremerton in addition to other sites in the greater Seattle and Tacoma areas. Since the data record is not as long at many of these stations, a long-term trend is difficult to ascertain. The values at all of these stations are below the annual standard. The graphs for two stations in the Renton area (page 23) and one station in Marysville (page 20) show some evidence of a slight downward trend; data from the communities of Bellevue, Everett, and Bremerton (page 24) reflect reasonably constant levels. Most of the graphs for the additional sites in the greater Seattle and Tacoma areas (pages 20, 21, and 22) depict evidence of a long-term downward trend.

In summary, this analysis shows that air quality levels of suspended particulates are decreasing in the major urban areas. Continued effort is required to reduce levels to meet the standards in the industrialized Duwamish Valley of Seattle and industrialized tide flats area of Tacoma. Outlying areas where growth is expected require continuing and increased monitoring, particularly in valleys which serve as a natural restriction in the dispersion of pollutants.

SUSPENDED PARTICULATE for Year 1973

(Micrograms per cubic meter)

Location	Area Class	Monthly Arithmetic Averages												No. of Obs.	Arith. Mean	Geo. Mean
		J	F	M	A	M	J	J	A	S	O	N	D			
Tolt River Watershed, East of Lake Joy	RUR	5.4	16.7	16.9	16.4	16.4	17.4	18.2	26.2	18.3	10.4	4.9	6.6	53	15	12
School Dist. Off. 1513-7th St., Marysville	COM	44.2	64.1	45.8	51.4	35.7								24	49	43**
Everett and Pine St., Everett*	RES	59.8	116.4	93.4	72.2	76.8	53.4	62.0	64.0	50.4	38.2	35.8	34.4	61	63	53
Medical-Dental Bldg., 2730 Colby Av., Everett	COM	44.6	60.1	47.2	60.0	39.6	39.8	38.8	44.6	34.5	33.1	26.6	24.0	61	41	38
USCG Sta., 2700 W. Commodore Way, Seattle	COM	69.7	39.8	68.8	67.7	51.8	54.5	46.7	55.4	61.0	78.9	52.7	66.2	61	59	55
Food Circus Bldg., Seattle Center	COM	78.3	65.3	37.4	34.1	33.3	33.9	27.0	33.6	32.1	33.4	28.1	38.2	61	39	36
Public Safety Bldg., 604-3rd Av., Seattle	COM	102.7	104.6	68.8	59.6	52.5	57.4	43.8	47.5	48.8	54.8	45.3	79.4	60	64	58
Harbor Island, 3400-13th Av. S.W., Seattle	IND										46.6	49.7	75.0	12	60	--**
Duwamish, 4300 Blk. E. Marg. Way S., Seattle	IND	127.2	110.6	76.6	75.6	73.9	72.3	58.5	74.0	60.2	57.0	48.0	76.6	60	75	68
Duwamish, 6700 E. Marg. Way S., Seattle*	IND	194.6	247.8	144.0	130.2	112.4	138.4	113.0	101.3	107.2	111.6	72.6	101.8	61	131	111
Duwamish Valley, 12026-42nd Av. S., King Co.	IND.										34.6	31.9	49.0	13	39	--**
McMicken Hts., 176th & 42nd Av. S., King Co.	RES	36.9	53.2	40.6	38.0	35.1	35.1	42.2	41.6	31.1	26.7	22.0	35.2	53	38	35
Puget Power Bldg., 10604 N.E. 4th, Bellevue	COM	73.2	74.9	45.2	35.9	31.3	35.1	33.9	38.1	30.5	35.9	19.8	31.9	61	40	35
S.E. Dist. Health Center, Renton	SUB	28.3	56.7	34.7	50.6	33.5	35.9	41.5	43.0	35.6	26.6	19.0	22.6	61	36	31
Municipal Bldg., 200 Mill Av. S., Renton	COM	43.0	59.8	58.1	54.6	47.8	40.2	42.0	50.0	42.1	31.2	29.5	46.1	59	45	42
115 East Main St. & Auburn Av., Auburn	COM	88.2	86.2	64.4	77.5	59.6	67.1	75.3	85.6	60.0	46.9	44.1	60.4	61	68	63
Meeker Jr. H.S., 1526-51st St. NE, Tacoma	RES	55.1	54.2	38.7	48.8	42.9	32.4	33.3	43.6	38.4	36.8	23.3	40.3	61	41	38
Mann-Russell Elec., 1401 Thorne Rd., Tacoma	IND	85.6	103.8	72.2	132.4	94.2	133.3	112.3	116.6	96.4	54.4	47.0	76.9	61	94	82
Fife Sr. H.S., 5616-20th E., Fife	COM	63.4	80.7	41.3	59.7	44.8	48.1	55.6	55.7	41.4	27.3	30.5	47.5	60	50	43
Cascadia College, 2002 E. 28th St., Tacoma*	RES	101.4	141.0	97.6	137.2	97.3	88.2	105.4	120.8	67.0	44.6	31.6	44.0	59	90	66
Willard Elem. School, Tacoma	RES		127.0	54.6	70.8	50.5	47.9	69.5	64.9	54.1	39.6	38.1	72.0	54	61	51
Hess Building, 901 Tacoma Av., Tacoma	COM	92.3	75.5	46.7	64.0	55.6	36.1	54.4	59.4	38.5	50.2	36.9	53.5	58	55	49
N. 26th and Pearl St., Tacoma	COM	57.7	75.6	38.1	29.6	47.7	46.6	61.6	67.9	59.7	36.8	37.7	44.9	57	50	42
City Hall, 239-4th St., Bremerton*	COM	55.8	45.0	27.6	43.8	30.4	28.0	29.0	34.0	29.4	29.2	25.2	27.8	58	34	31
Dewey Jr. H.S., Bremerton	RES	38.1	36.7	27.2	27.7	31.0	24.4	20.6	27.7	24.0	18.3	22.1	23.4	60	27	25

* Washington State Dept. of Ecology Stations

** Marysville discontinued 5-21-73

Harbor Island established 10-24-73

Duamish Valley established 10-12-73

The amount of suspended particulate per unit volume of air is determined by operating high-volume samplers for a 24-hour period at each site approximately once every six days.

STANDARDS: (24-hour & annual)

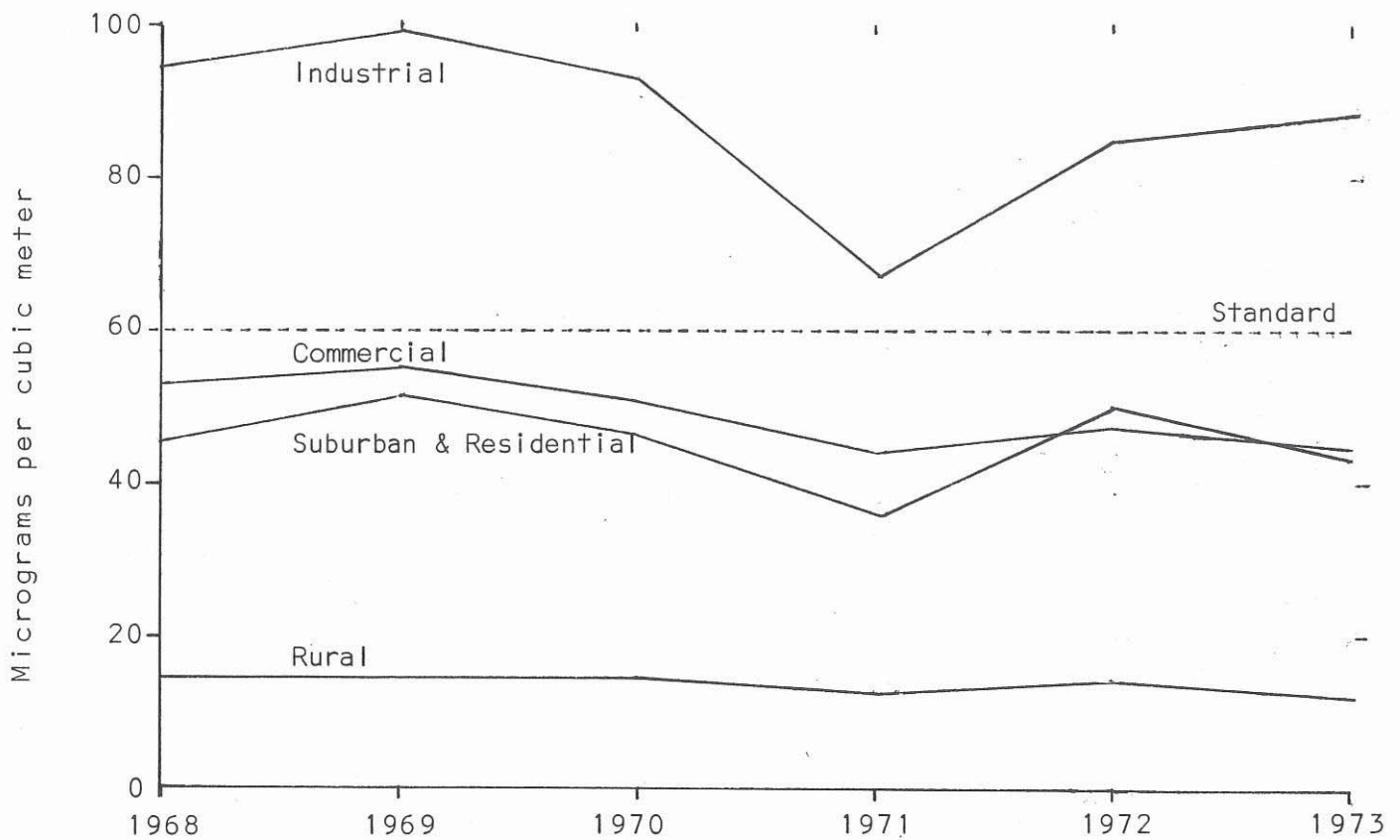
150 $\mu\text{g}/\text{m}^3$

60 $\mu\text{g}/\text{m}^3$

24-hour average not to be exceeded more than once per year.
annual geometric mean never to be exceeded.

SIX-YEAR SUSPENDED PARTICULATE AVERAGE BY SOURCE AREA CLASS

The average of the annual means of the sampling sites in different source area classifications are compared to the annual standard. The data from which this plot was derived is found on the following page.



SUSPENDED PARTICULATE
ANNUAL GEOMETRIC MEANS ($\mu\text{g}/\text{m}^3$)

	Location	1968	1969	1970	1971	1972	1973
Industrial	3224 - 4th Avenue S., Seattle	101	108	118*			
	Duwamish, 4500 Blk. E Marginal Way S.				68*	81	68
	Duwamish, 4600 Blk. E Marginal Way S.			78			
	Duwamish, 6770 E. Marginal Way S.**					97*	111
	1401 Thorne Road, Tacoma	87	90	82	67	71	82
	ANNUAL AVERAGE	94.0	99.0	92.7	67.5	83.0	87.0
Commercial	School Dist. Office, Marysville	49	57	54	36	50	43*
	709 Broadway, Eve	45	38	45*			
	Medical-Dental Bldg., Everett			54	42	50	38
	2700 W. Commodore Way, Seattle	56	53	45	42	38	55
	Food Circus Bldg., Seattle	49	56	50	44	45	36
	Public Safety Bldg., Seattle	68	71	57	59	59	58
	Puget Power Bldg., Bellevue			36	36	40	35
	Municipal Bldg., Renton			61	43	44	42
	115 E. Main St. & Auburn Av., Auburn			56	52	55	63
	Fife Sr. H.S., Fife	66	65	51	41	44	43
	Hess Bldg., Tacoma		58	61	48	47	49
	N. 26th & Pearl, Tacoma	40	46	50	40	44	42
	Clover Park Educ. Center, Tacoma	48	48	43*			
	City Hall, Bremerton**					41	31
	ANNUAL AVERAGE	52.6	54.7	51.0	43.9	46.4	44.6
Residential & Suburban	Everett & Pine St., Everett**					60	53
	5960 Rainier Av. South, Seattle	56	61	66*			
	McMicken Heights, King County					42*	35
	14822 Bellevue-Redmond Rd., Bellevue	42	46	39*			
	S.E. Dist. Health Center, Renton	38	45	35	29	36	31
	100-30th N.E., Auburn	45	51	37*			
	Meeker Jr. H.S., Tacoma			74	54	44	38
	Cascadia College, Tacoma**					94	66
	Willard Elem. School, Tacoma						51
	Dewey Jr. H.S., Bremerton			28*	25	27	25
	ANNUAL AVERAGE	45.2	50.8	46.5	36.0	50.5	42.7
Rural	TOLT RIVER WATERSHED	14	14	14	13	14	12

* Data base for geometric mean less than 9 months.

** Washington State Dept. of Ecology stations.

ANNUAL STANDARD: $60 \mu\text{g}/\text{m}^3$ annual geometric mean not to be exceeded.

SUSPENDED PARTICULATE FOR YEAR 1973
(Micrograms per cubic meter)

Frequency of Concentrations Exceeding Specified Levels

- A. Number of observations exceeding 150 $\mu\text{g}/\text{m}^3$
B. Number of observations exceeding 60 $\mu\text{g}/\text{m}^3$
C. Total number of observations

Location	Jan.			Feb.			Mar.			Apr.			May			June			July			Aug.			Sept.			Oct.			Nov.			Dec.			Annual			
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C				
Tolt River Watershed			3			4			5			4			4			5			3			5			5			5			5			53				
School Dist. Office, Marysville	1	5		3	5		2	5		2	5		1	4																					9	24				
Everett & Pine St., Everett*	2	5	2	3	5	1	3	5		2	5		3	5		2	5		3	5		3	6		2	5		1	5		1	5		1	5		3	26	61	
Medical-Dental Building, Everett	1	5		2	5				5		2	5		2	5			5			5		1	6			5			5			5			8	61			
2700 W. Commodore Way, Seattle	4	5		1	5		3	5		3	5			5		1	5		1	5		2	6		2	5	1	3	5		3	5		2	5		1	25	61	
Food Circus Bldg., Seattle Center	4	5		2	5				5			5			5			5			5			6			5		1	5			5		1	5		8	61	
Public Safety Building, Seattle	1	4	5	1	4	5		4	5		2	5		1	5		1	5			5		1	6			4		1	5		1	5		2	5		2	21	60
Harbor Island, Seattle ^a																													2		1	5	1	2	5		1	3	12	
Duwamish, 4500 E. Marg. Way S.	2	3	4	1	4	5		4	5		3	5		3	5		2	5		2	5		4	6		3	5		1	5		2	5		4	5		3	35	60
Duwamish, 6770 E. Marg. Way S.*	3	4	5	3	5	5	2	5	5	2	5	5	5	5	2	5	5		4	5		5	6		5	5	1	3	5		3	5	1	4	5	14	53	61		
Duwamish Valley, 12026-42nd Av. S. ^b																												1	4		4		1	5			2	13		
McMicken Heights, King Co.			5		2	5		1	5		1	4			5		1	5		1	5			6			5			5		1		2		6	53			
Puget Power Building, Bellevue	4	5		3	5				5			5			5			5			5			6			5		1	5			5			5		8	61	
S.E. Dist. Health Cen., Renton			5	1	2	5			5		2	5			5			5			5			6			5		1	5			5			5		1	5	61
Municipal Building, Renton	1	4		2	4		3	5		2	5			5			5			5			5			5			5			5		1	5		11	59		
115 E. Main St., Auburn	4	5		4	5		4	5		3	5		2	5		2	5		4	5		5	6		1	5		1	5		1	5		3	5		34	61		
Meeker Jr. High School, Tacoma	2	5		1	5			5		1	5		1	5			5			5			6			5		1	5			5		1	5		7	61		
1401 Thorne Rd., Tacoma	4	5		4	5		4	5	1	4	5	1	5	5	1	5	5	1	4	5		6	6	1	5	5	2	5		2	5	1	2	5		6	47	61		
Fife Sr. High School, Fife	4	5		2	5		1	5		2	5		1	5		2	5		2	5		2	6		1	5		1	5			4		1	5		19	60		
Cascadia College, Tacoma*	1	4	5	3	4	5	2	3	5	2	4	5	1	1	3	1	3	5	1	3	5	1	5	6	2	5		1	5			5		1	5		12	31	59	
Willard Elem. School, Tacoma ^C				2	3	4		2	5		2	5		2	5		2	5		3	5		4	6		1	5		1	5		1	5		2	4		2	23	54
Hess Building, Tacoma	4	4		3	5		1	5		2	5		3	5			5		2	5		3	6		1	3		1	5			5		1	5		21	58		
N. 26th & Pearl, Tacoma	3	5		4	5		1	5			5		2	5		2	5		2	3		2	4		2	5		1	5		2	5		1	5		22	57		
City Hall, Bremerton*	3	5			5	1		5		1	5			5			4			5			5			5			5			4			5		1	4	58	
Dewey Jr. High School, Bremerton			5		1	5			5			5			5			5			4		6			5			5			5			5		1	60		
All-Station Totals	7	56	105	13	59	112	6	41	115	5	43	113	2	32	111	4	28	109	2	31	105	1	45	128	1	25	107	2	22	116		17	113	3	30	116	46	429	1350	

* Washington State Dept. of Ecology Stations.

a site established 10-24-73

b site established 10-12-73

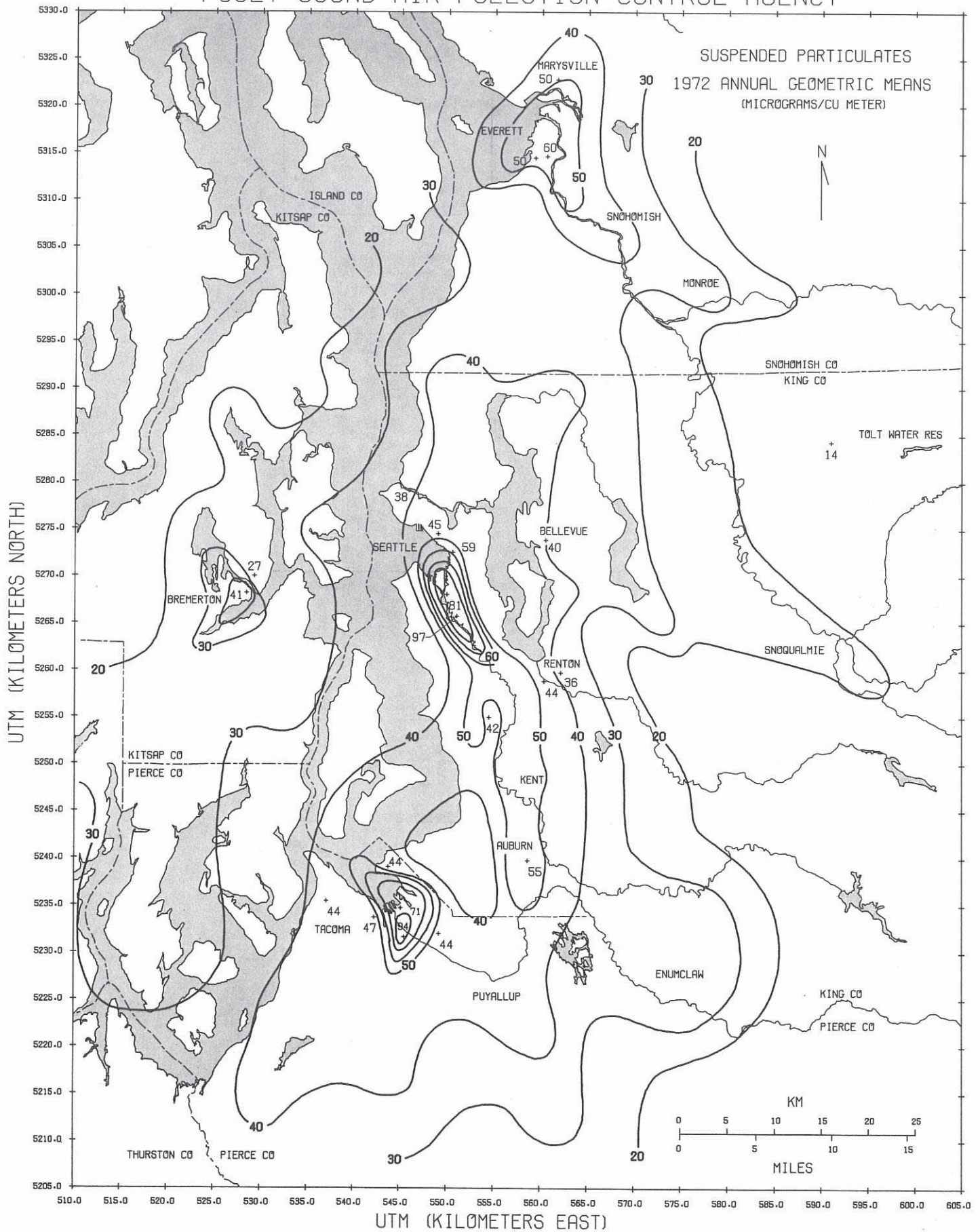
c site established 2-7-73

SUSPENDED PARTICULATE FOR YEAR 1973
Percentage Frequency Distributions
(Micrograms per cubic meter of air)

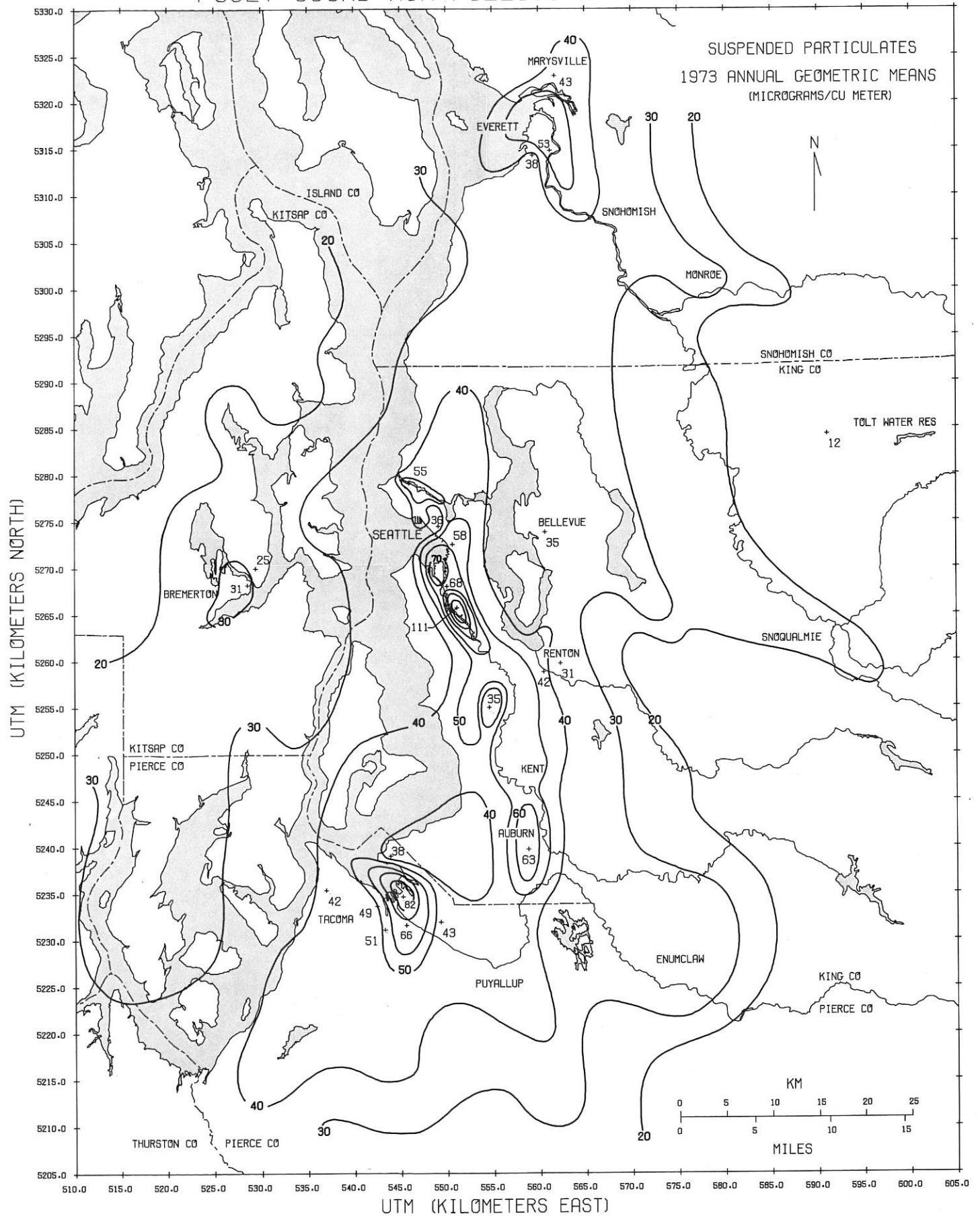
Location	Area Class	No. of Samples	Min. Date		Frequency Distribution-Percent										Max. Date		Arith. Mean	Geo. Mean	Std. Geo. Dev.	Std. Arith. Dev.
					10	20	30	40	50	60	70	80	90	95						
Tolt River Watershed	RUR	53	3	Nov 5	4	7	8	9	12	14	16	23	27	34	37	Mar 22	15	12	1.96	9.36
School Dist. Off., Marysville	COM	24	16	Jan 16	23	28	29	36	40	45	65	66	75	82	119	Feb 21	49	43	1.65	24.70
Medical-Dental Bldg., Everett	COM	61	13	Nov 11	20	28	33	36	40	42	46	51	59	69	90	Apr 9	41	38	1.50	16.42
Everett Av. & Pine St., Everett*	COM	61	13	Nov 11	21	32	41	48	54	63	71	87	108	124	212	Feb 9	63	53	1.81	37.84
2700 W. Commodore Way, Seattle	COM	61	13	Feb 27	32	43	47	53	58	64	68	74	80	86	164	Oct 18	59	55	1.52	23.34
Food Circus Bldg., Seattle Center	COM	61	15	Oct 24	23	27	29	30	32	35	40	44	68	87	112	Feb 9	39	36	1.51	20.26
Public Safety Building, Seattle	COM	60	28	Nov 11	34	41	47	49	52	56	70	79	105	141	157	Feb 21	64	58	1.53	31.24
Duwamish, 4500 E Marg Way S, Seattle	IND	60	24	Nov 11	42	48	54	58	64	75	87	99	113	134	190	Jan 22	75	68	1.54	34.04
Duwamish, 6770 E Marg Way S, Seattle*	IND	61	25	Nov 11	54	73	84	94	112	125	144	157	238	305	463	Feb 9	131	111	1.77	81.27
McMicken Hts., King County	RES	53	20	Jan 16	22	24	26	28	30	38	44	50	61	66	87	Feb 9	38	35	1.47	15.88
Puget Power Bldg., Bellevue	COM	61	5	Nov 11	19	24	28	30	33	41	46	52	71	88	111	Feb 21	40	35	1.72	22.35
S.E. Dist. Health Center, Renton	SUB	61	8	Dec 29	16	20	22	27	32	38	42	47	58	63	129	Feb 9	36	31	1.75	21.20
Municipal Building, Renton	COM	59	15	Nov 23	24	29	36	38	42	46	54	58	66	79	102	Dec 5	45	42	1.50	17.82
115 E. Main St. & Auburn Av., Auburn	COM	61	24	Oct 30	34	40	48	56	66	78	85	89	108	113	120	Feb 21	68	63	1.53	26.35
Meeker Jr. High School, Tacoma	RES	61	17	Nov 5	22	26	30	34	37	42	47	52	61	74	92	Jan 22	41	38	1.48	16.45
1401 Thorne Rd., Tacoma	IND	61	17	Oct 24	42	56	65	72	84	95	108	129	144	172	300	Jun 26	94	82	1.70	49.90
Fife Sr. High School, Fife	COM	60	11	Oct 24	19	26	33	38	45	56	60	69	82	100	126	Feb 9	50	43	1.76	26.35
Cascadia College, Tacoma*	IND	59	12	Dec 11	20	33	42	50	63	82	122	150	177	221	262	Apr 9	90	66	2.28	67.55
Willard Elem. School, Tacoma	RES	54	14	Mar 10	20	29	37	43	52	66	74	88	112	129	179	Feb 21	61	51	1.86	37.18
Hess Building, Tacoma	COM	58	16	Jul 8	25	31	34	42	49	57	67	75	89	108	134	Feb 9	55	49	1.65	27.90
N. 26th and Pearl, Tacoma	COM	57	10	Nov 23	17	23	29	37	46	56	66	75	81	92	116	Feb 9	50	42	1.86	26.52
City Hall, 239 4th St., Bremerton*	COM	58	15	Oct 31	20	23	24	28	30	33	36	41	48	68	97	Apr 21	34	31	1.48	15.64
Dewey Jr. High School, Bremerton	RES	60	11	Nov 11	15	18	22	22	24	26	31	34	40	47	60	Feb 9	27	25	1.44	10.36

* Washington State Department of Ecology stations.

PUGET SOUND AIR POLLUTION CONTROL AGENCY



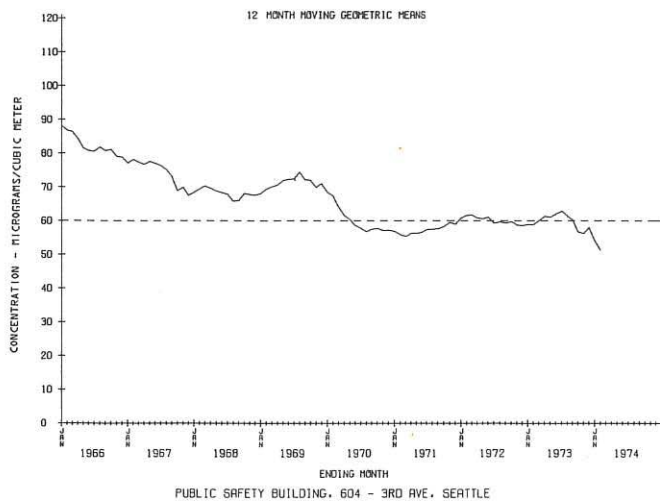
PUGET SOUND AIR POLLUTION CONTROL AGENCY



PUGET SOUND AIR POLLUTION CONTROL AGENCY

SUSPENDED PARTICULATES

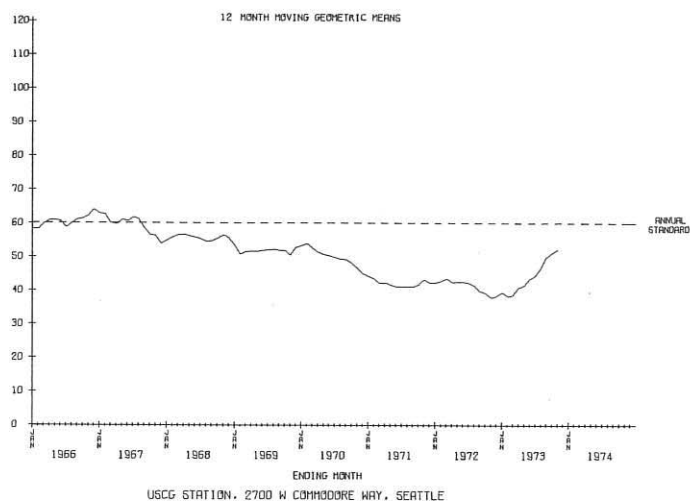
12 MONTH MOVING GEOMETRIC MEANS



PUGET SOUND AIR POLLUTION CONTROL AGENCY

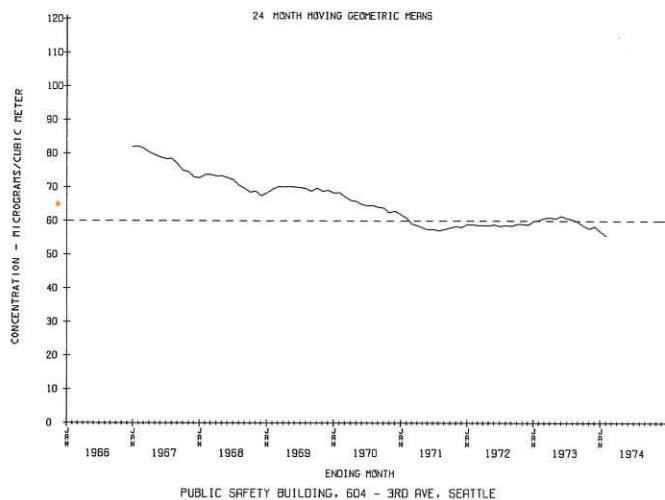
SUSPENDED PARTICULATES

12 MONTH MOVING GEOMETRIC MEANS



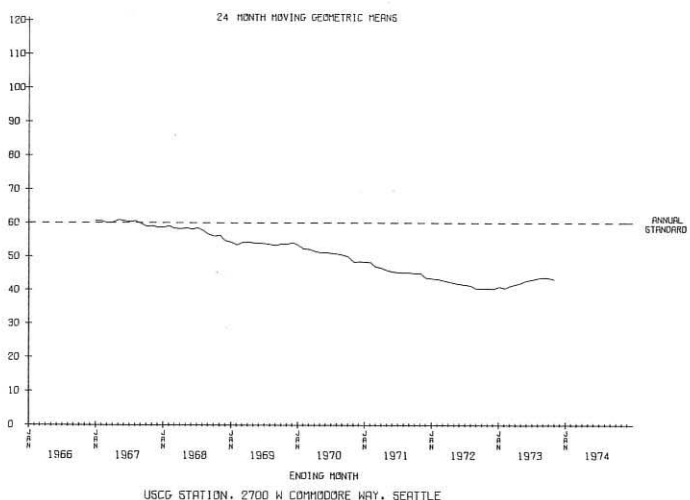
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24 MONTH MOVING GEOMETRIC MEANS



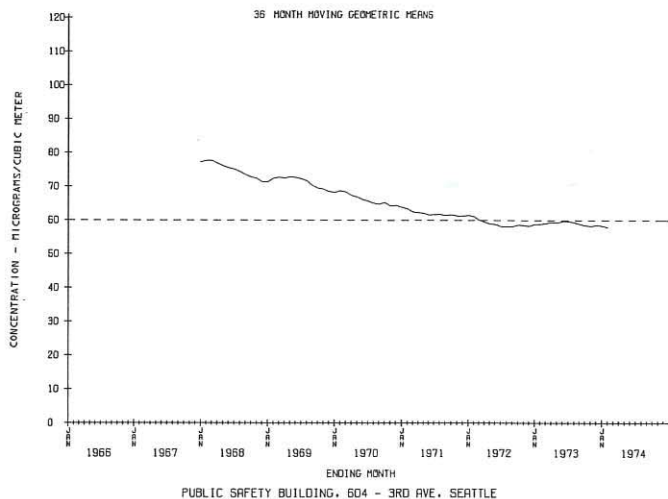
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24 MONTH MOVING GEOMETRIC MEANS



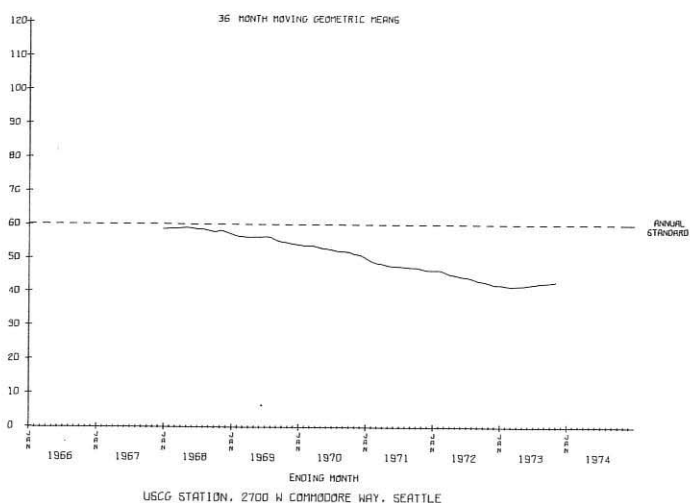
SUSPENDED PARTICULATES

36 MONTH MOVING GEOMETRIC MEANS



SUSPENDED PARTICULATES

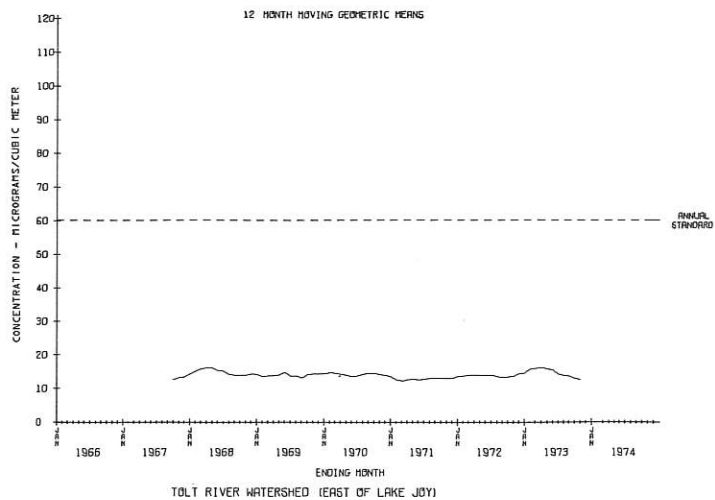
36 MONTH MOVING GEOMETRIC MEANS



PUGET SOUND AIR POLLUTION CONTROL AGENCY

SUSPENDED PARTICULATES

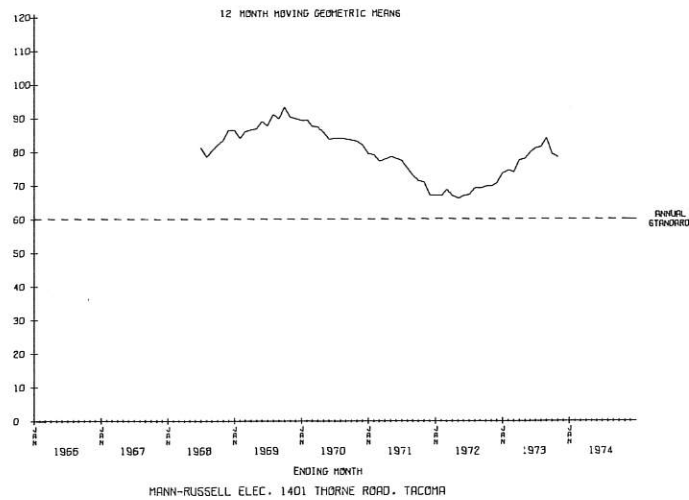
12 MONTH MOVING GEOMETRIC MEANS



PUGET SOUND AIR POLLUTION CONTROL AGENCY

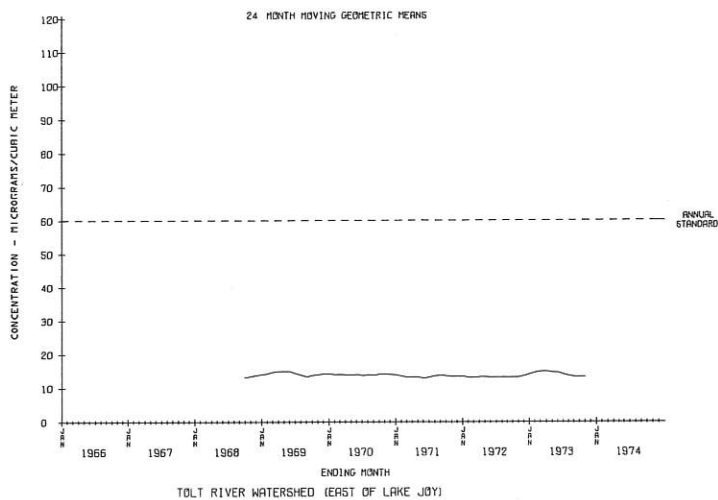
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12 MONTH MOVING GEOMETRIC MEANS



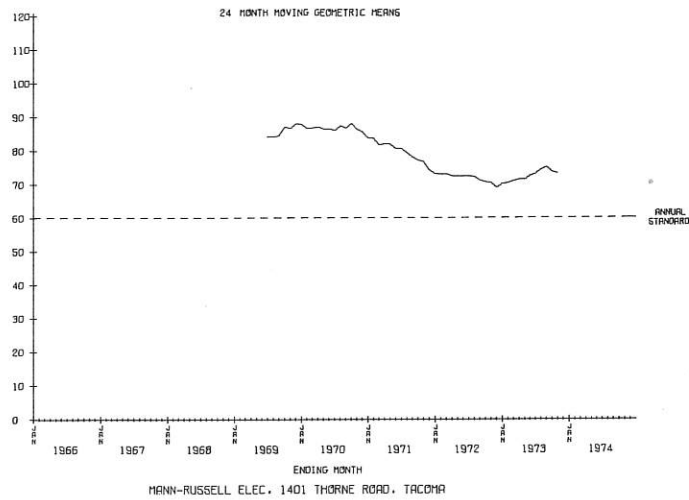
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24 MONTH MOVING GEOMETRIC MEANS



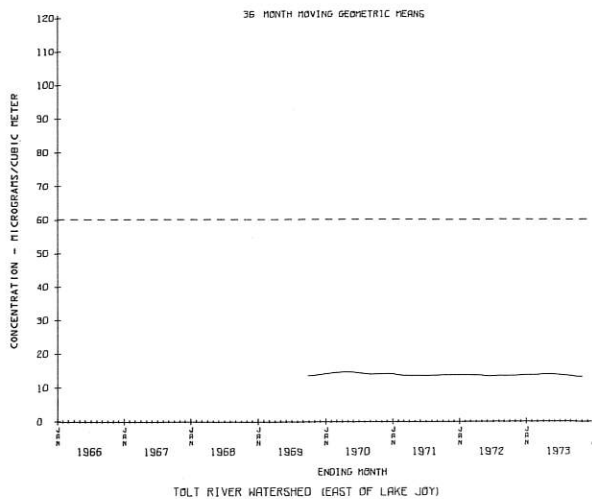
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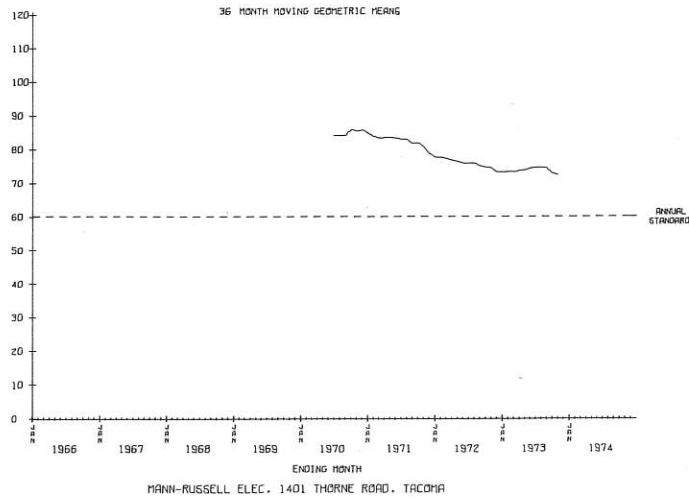
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36 MONTH MOVING GEOMETRIC MEANS

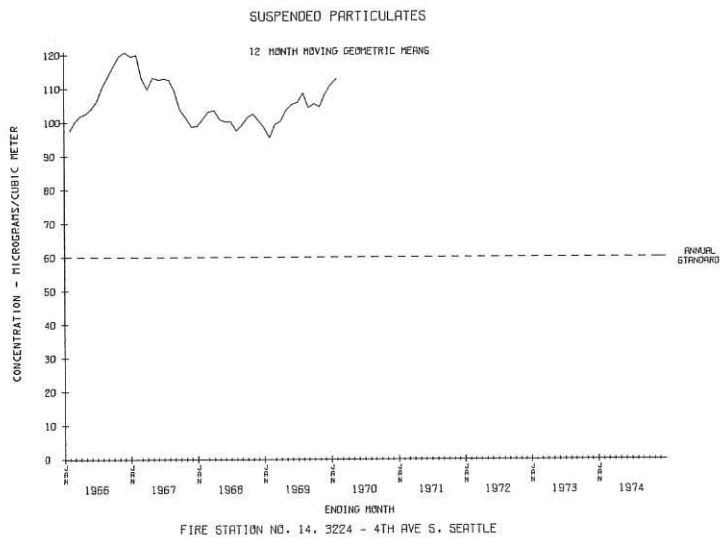


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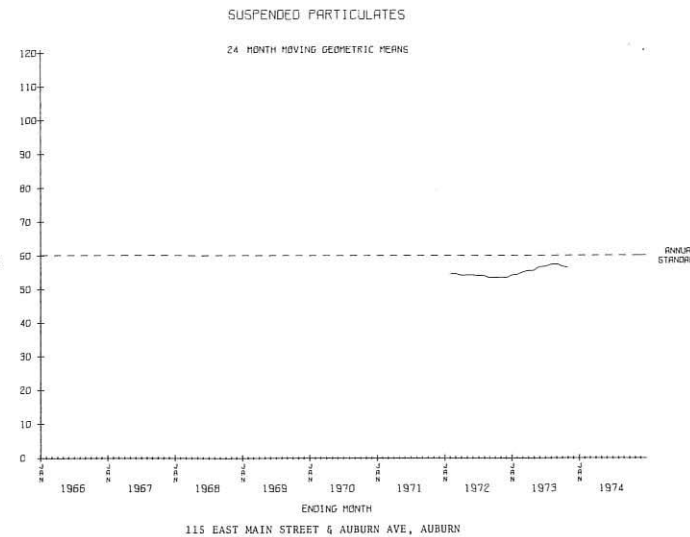
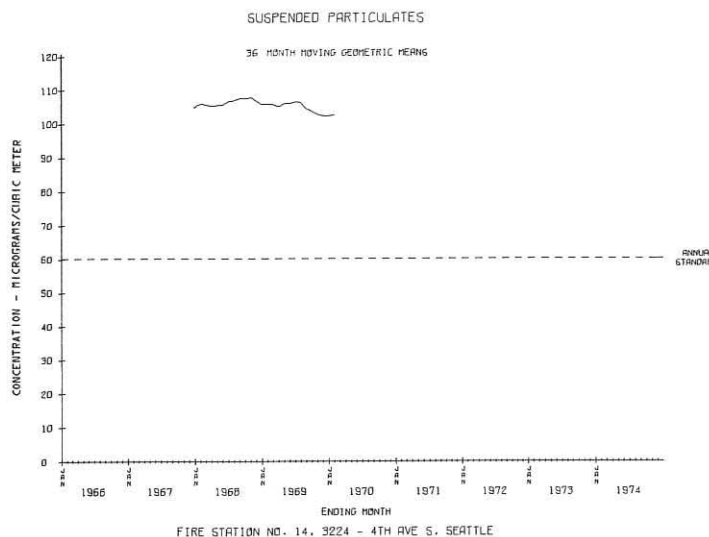
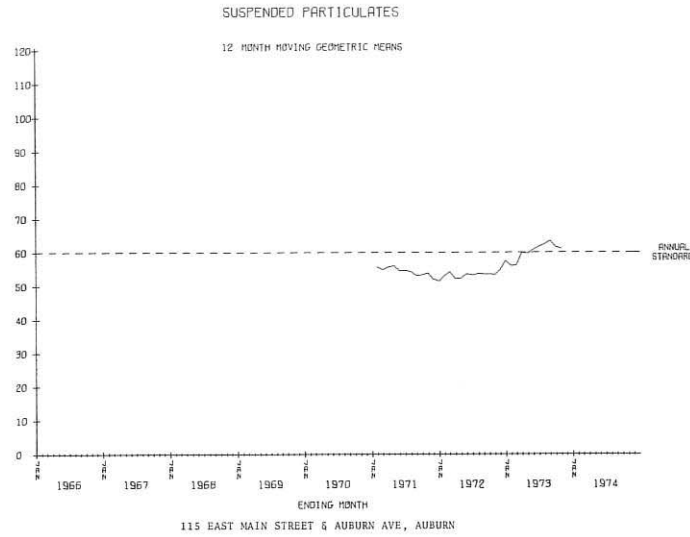
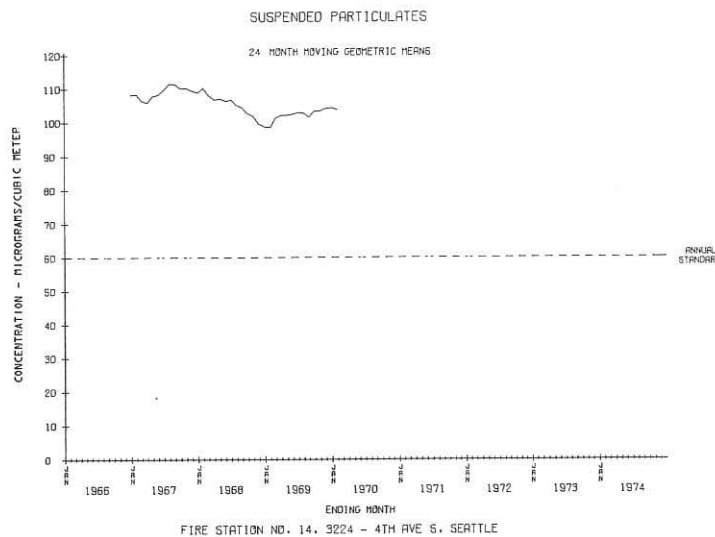
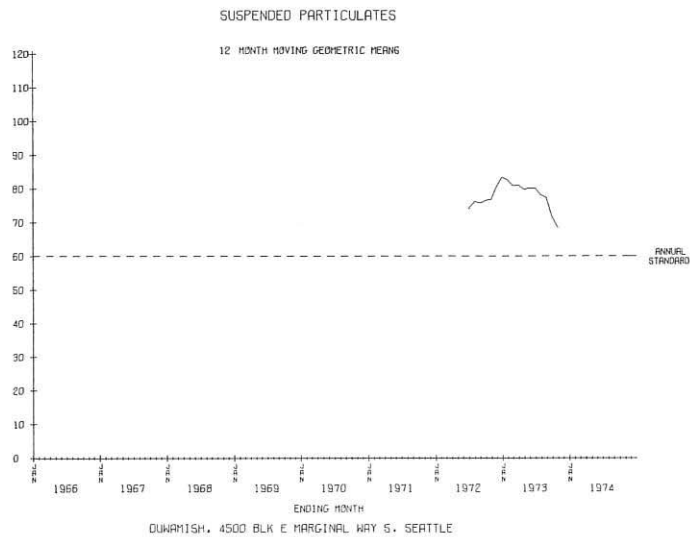
36 MONTH MOVING GEOMETRIC MEANS



PUGET SOUND AIR POLLUTION CONTROL AGENCY



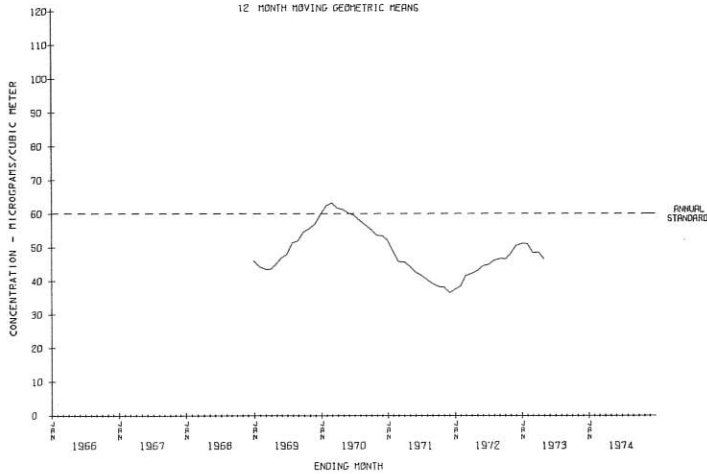
PUGET SOUND AIR POLLUTION CONTROL AGENCY



PUGET SOUND AIR POLLUTION CONTROL AGENCY

SUSPENDED PARTICULATES

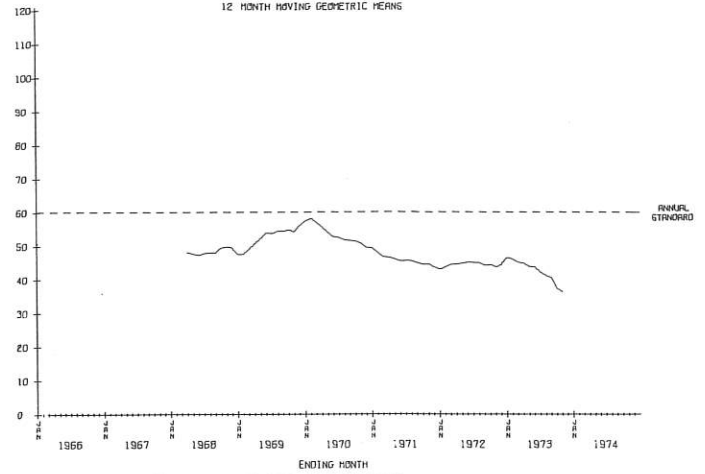
12 MONTH MOVING GEOMETRIC MEANS



PUGET SOUND AIR POLLUTION CONTROL AGENCY

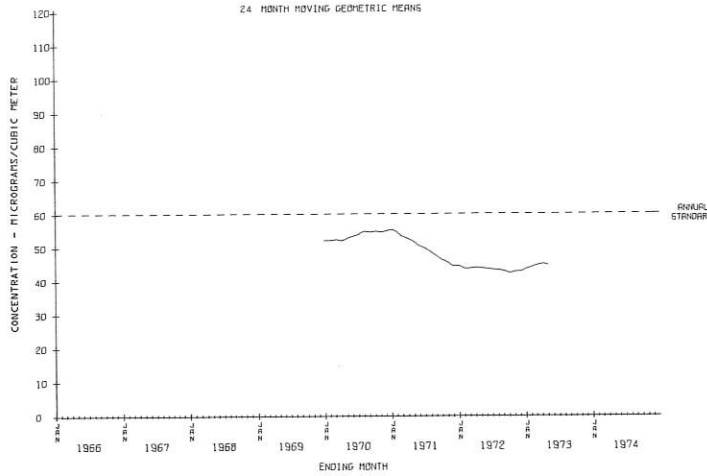
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12 MONTH MOVING GEOMETRIC MEANS



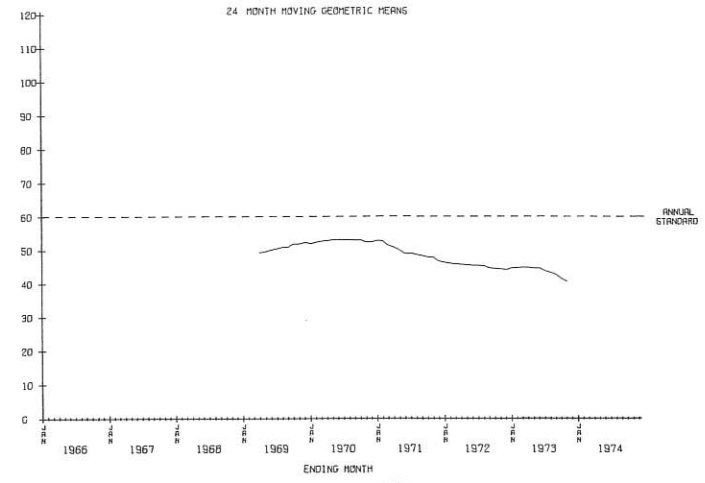
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24 MONTH MOVING GEOMETRIC MEANS



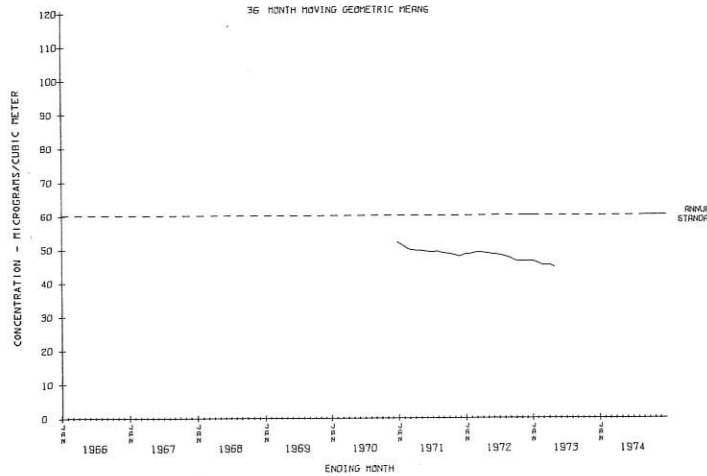
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24 MONTH MOVING GEOMETRIC MEANS



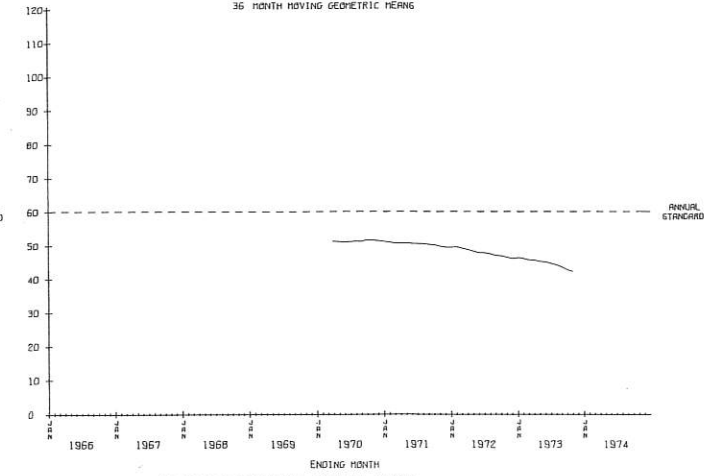
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36 MONTH MOVING GEOMETRIC MEANS



SUSPENDED PARTICULATES

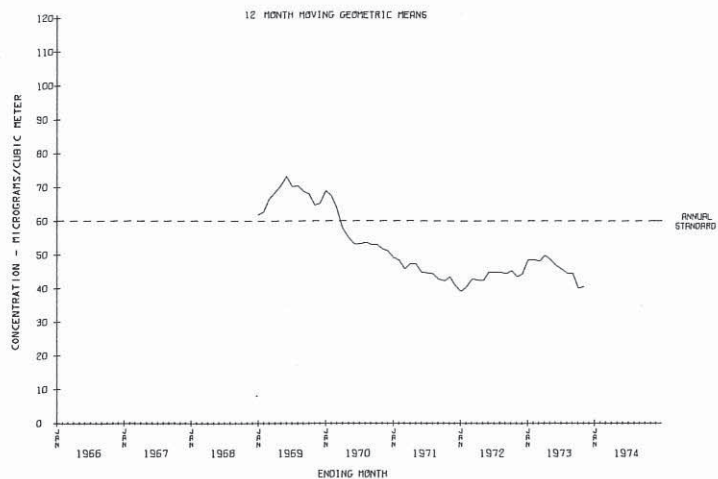
36 MONTH MOVING GEOMETRIC MEANS



PUGET SOUND AIR POLLUTION CONTROL AGENCY

SUSPENDED PARTICULATES

12 MONTH MOVING GEOMETRIC MEANS

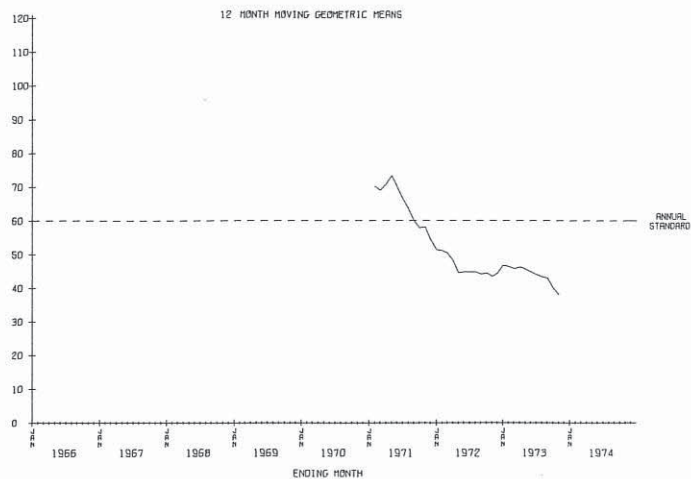


FIFE SR HIGH SCHOOL, 5616-20TH E, FIFE, WASH

PUGET SOUND AIR POLLUTION CONTROL AGENCY

SUSPENDED PARTICULATES

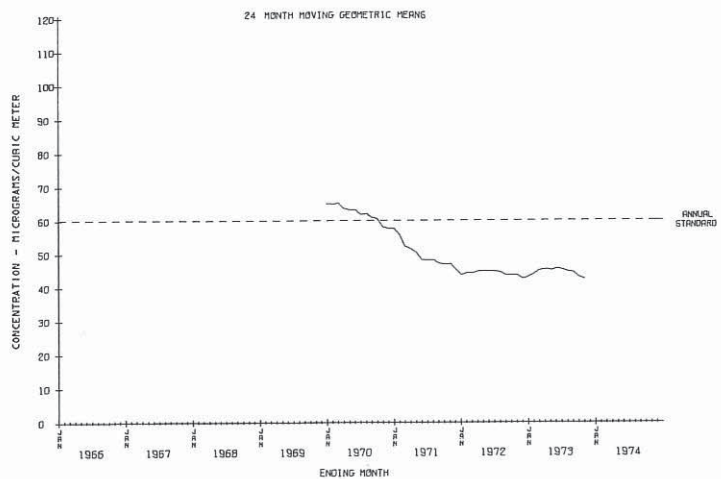
12 MONTH MOVING GEOMETRIC MEANS



MEEKER JR HS, 1526 - 51ST STREET NE, TACOMA

SUSPENDED PARTICULATES

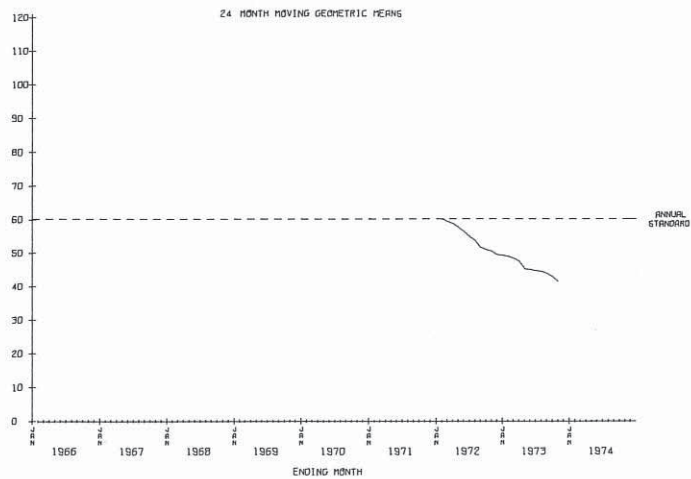
24 MONTH MOVING GEOMETRIC MEANS



FIFE SR HIGH SCHOOL, 5616-20TH E, FIFE, WASH

SUSPENDED PARTICULATES

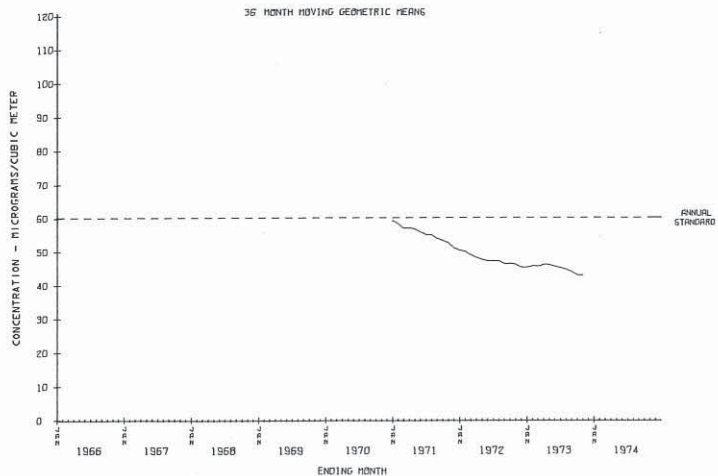
24 MONTH MOVING GEOMETRIC MEANS



MEEKER JR HS, 1526 - 51ST STREET NE, TACOMA

SUSPENDED PARTICULATES

36 MONTH MOVING GEOMETRIC MEANS

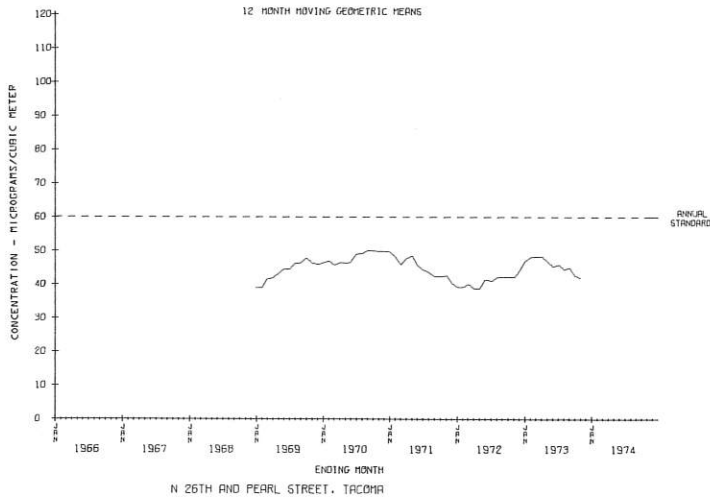


FIFE SR HIGH SCHOOL, 5616-20TH E, FIFE, WASH

PUGET SOUND AIR POLLUTION CONTROL AGENCY

SUSPENDED PARTICULATES

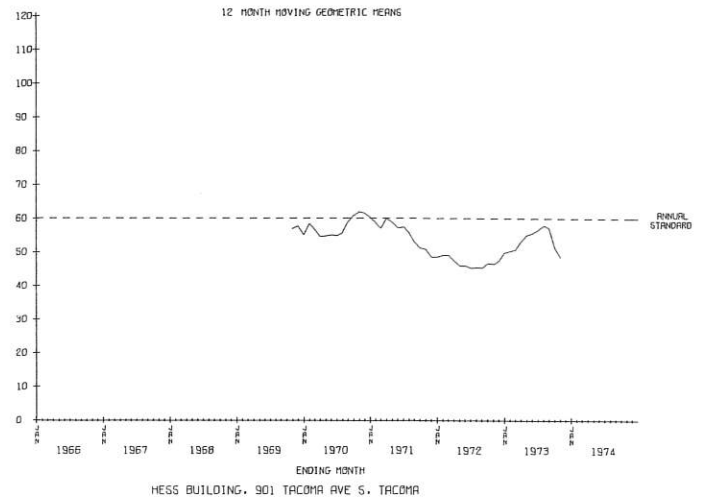
12 MONTH MOVING GEOMETRIC MEANS



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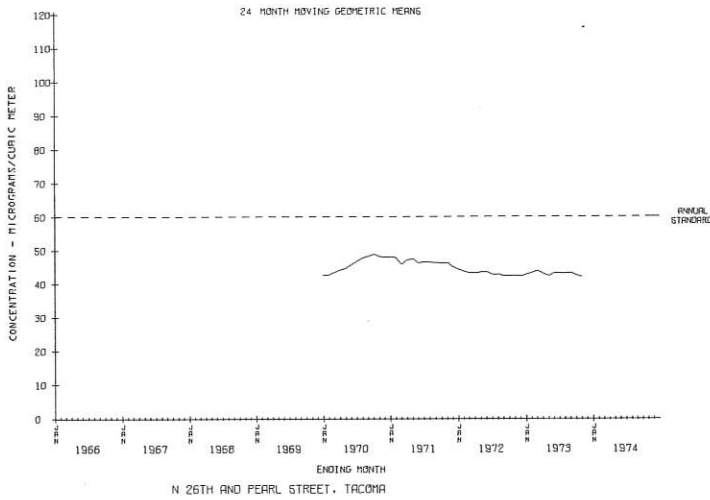
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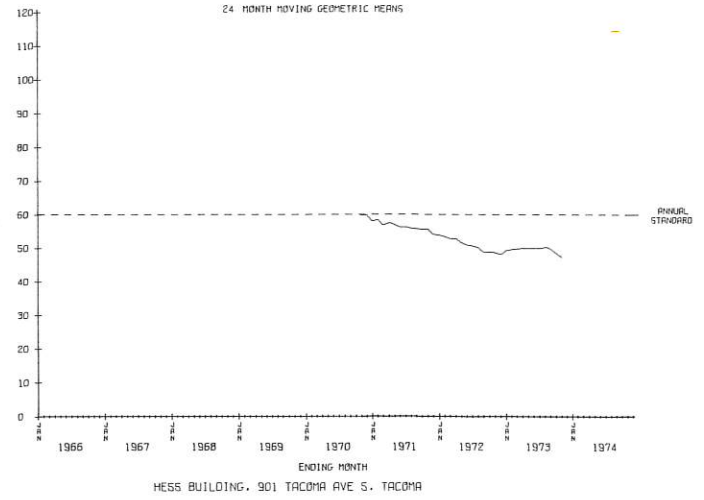
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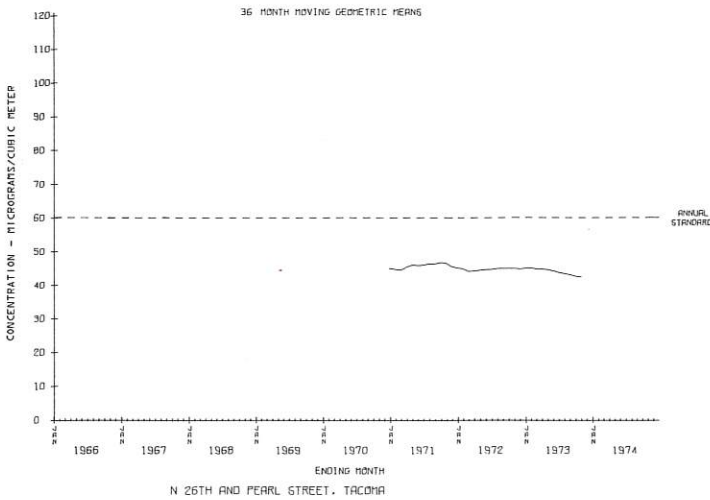
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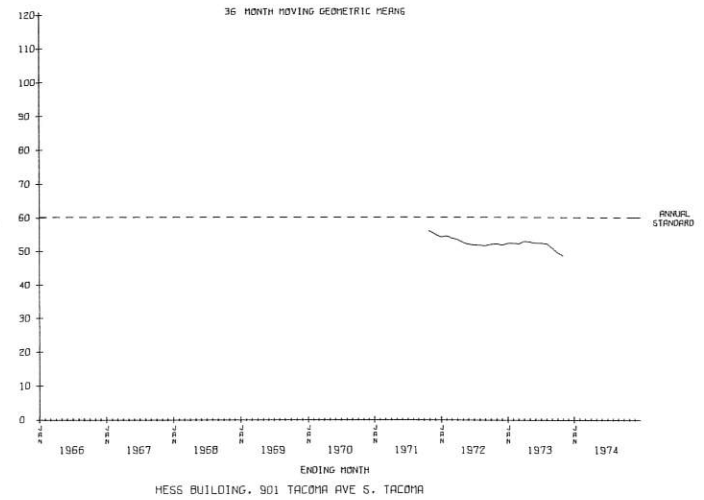
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36 MONTH MOVING GEOMETRIC MEANS



SUSPENDED PARTICULATES

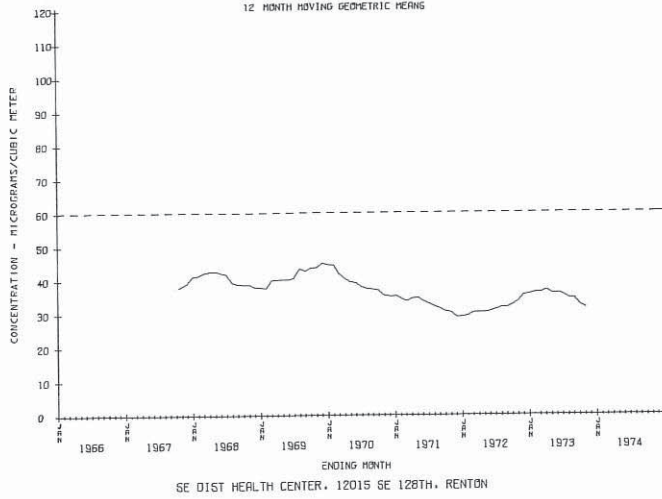
36 MONTH MOVING GEOMETRIC MEANS



PUGET SOUND AIR POLLUTION CONTROL AGENCY

SUSPENDED PARTICULATES

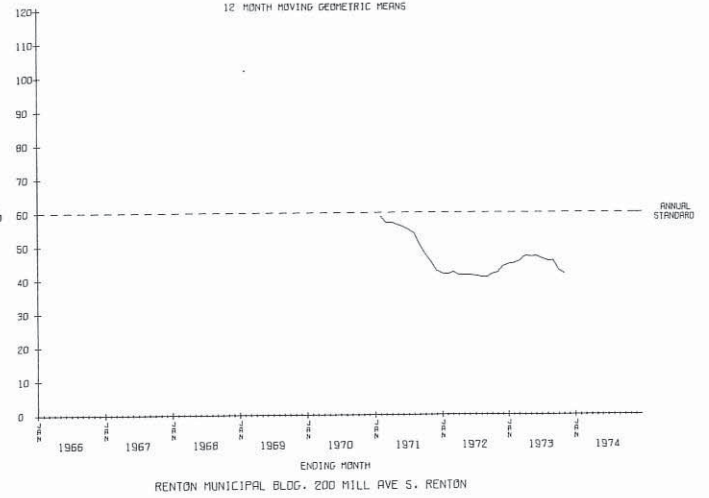
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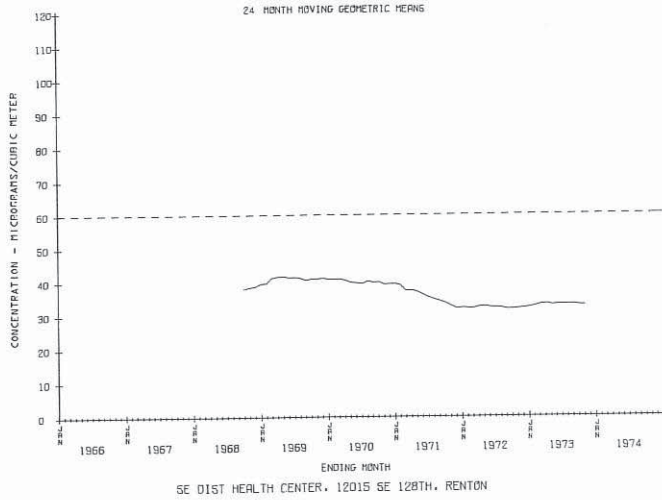
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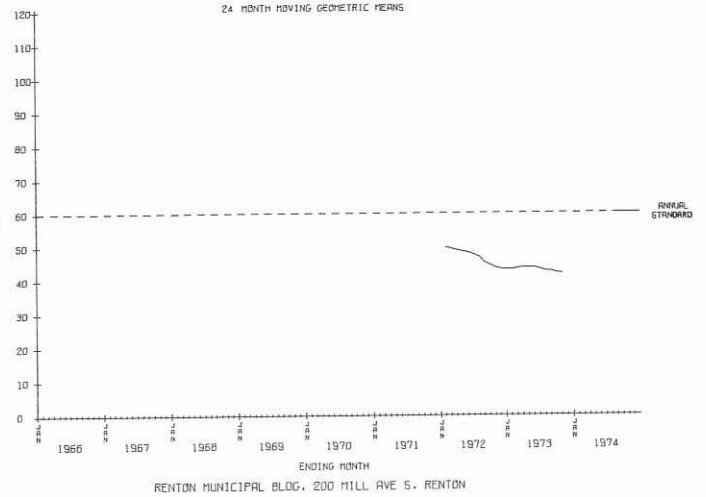
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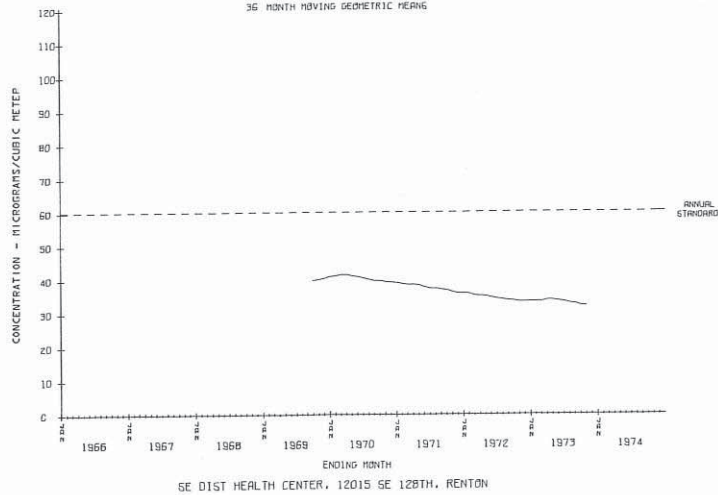
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24 MONTH MOVING GEOMETRIC MEANS



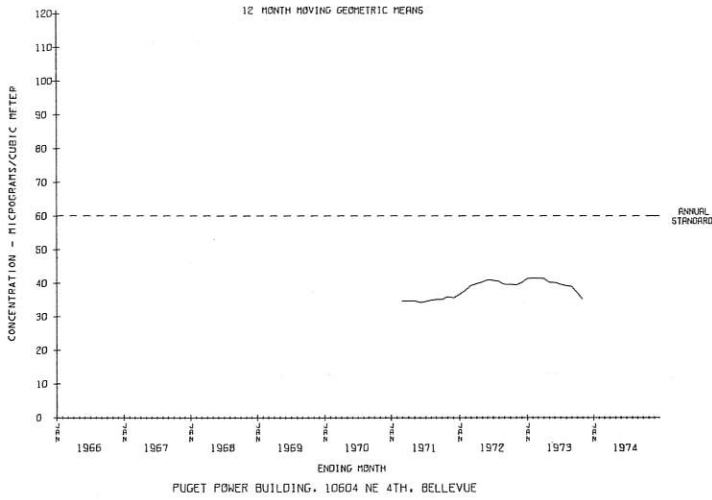
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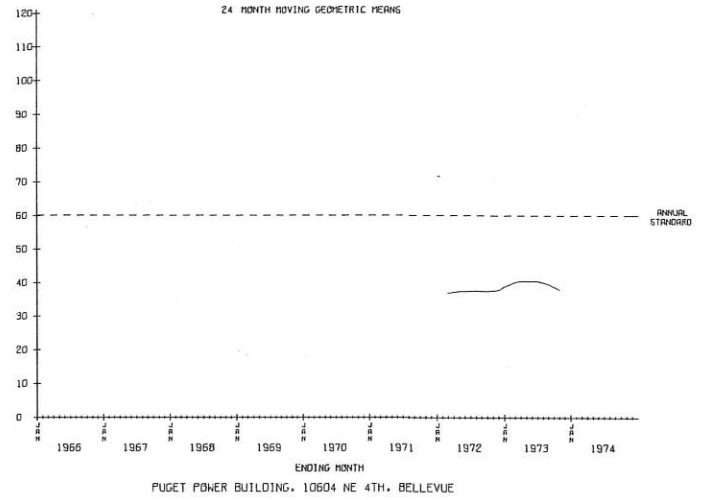
PUGET SOUND AIR POLLUTION CONTROL AGENCY

SUSPENDED PARTICULATES

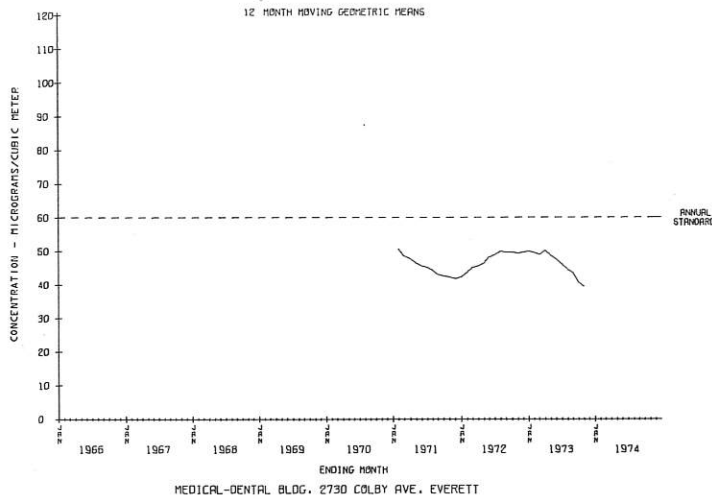


PUGET SOUND AIR POLLUTION CONTROL AGENCY

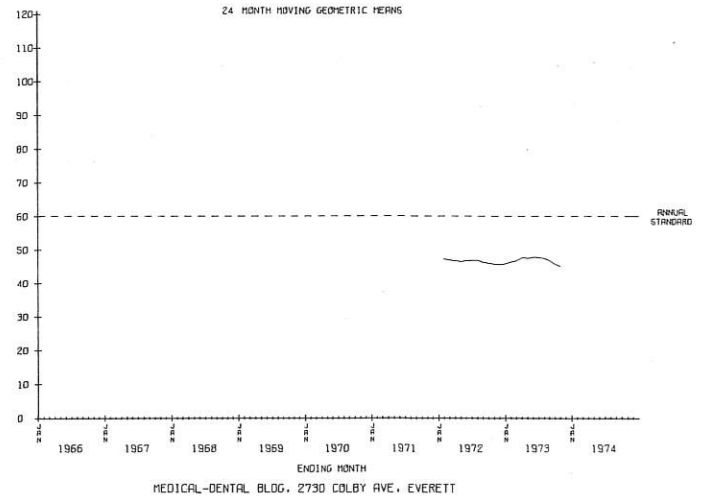
SUSPENDED PARTICULATES



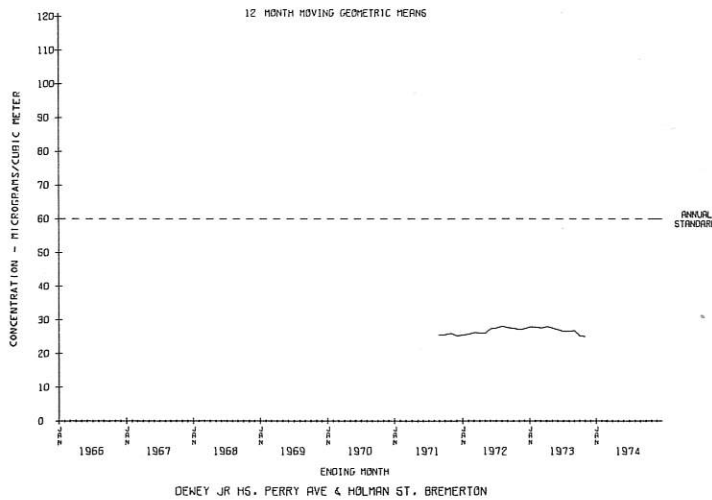
SUSPENDED PARTICULATES



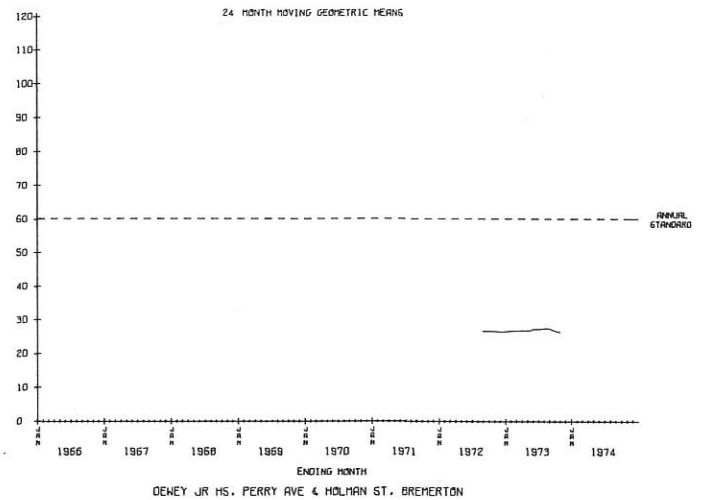
SUSPENDED PARTICULATES



SUSPENDED PARTICULATES



SUSPENDED PARTICULATES



SULFUR DIOXIDE POLLUTION ROSE FREQUENCY DISTRIBUTIONS

Sulfur dioxide and wind are measured continuously on a simultaneous basis at many monitoring stations. These data are reduced to hour averages and stored in historical data files for further summary and analysis. The Sulfur Dioxide Pollution Rose is an analysis depicting the wind direction associated with various sulfur dioxide concentrations for each simultaneous hour of observation.

The sulfur dioxide pollution roses included in this document are tabular arrays with sulfur dioxide summarized in columns and wind direction summarized in rows. Each table value is the percentage frequency of the total number of hour average observations for which the indicated sulfur dioxide concentration was observed at a given wind direction. Occurrences of sulfur dioxide with very light winds at the station appear in the seventeenth row of the table.

This analysis allows an assessment of the location of source(s) having the most prominent effect on sulfur dioxide air quality at the station. When

the period of sampling is substantial enough (a full year or more of data) this analysis technique becomes a reliable method to document source-receptor relationships. Caution must be exercised in the interpretation of these relationships since the wind direction at the receptor may not completely represent the transport wind between a source and the receptor.

This analysis also provides a frequency distribution of all the hour average sulfur dioxide concentrations at the station. The distribution is presented in the row of column totals. The first column (.00 to .00) presents specifically the occurrences of 0.00 hour average sulfur dioxide readings.

Finally, the column of row totals provides a frequency distribution of wind direction (to 16 points of the compass) or simply a wind rose without respect to speed. These totals would be identical to the values shown later in the plotted wind roses if it were not for the pairing of wind direction with sulfur dioxide rather than wind speed in the pollution rose analysis.

PUGET SOUND AIR POLLUTION CONTROL AGENCY - PERCENTAGE FREQUENCY DISTRIBUTION OF HOURLY AVERAGES

MEDICAL-DENTAL BLDG, 2730 COLBY AVE, EVERETT

ALL MONTHS 1973

NOTE -- A DECIMAL POINT ALONE (.) INDICATES ZERO

A TABLE READING OF (.0) INDICATES A VALUE LESS THAN .0501 PERCENT

WIND DIRECTION (DEGREES)	SULFUR DIOXIDE (PPM)																OVER .70	TOTALS
	.00 TO .00	.01 TO .02	.03 TO .04	.05 TO .06	.07 TO .08	.09 TO .10	.11 TO .15	.16 TO .20	.21 TO .25	.26 TO .30	.31 TO .35	.36 TO .40	.41 TO .50	.51 TO .60	.61 TO .70			
N (349 - 11)	2.0	.3	.1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2.4
NNE (12 - 33)	1.6	.4	.1	.0	.	.0	.	.	.	.	.	.	.	.	.	.	.	2.2
NE (34 - 56)	1.6	.6	.0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2.2
ENE (57 - 78)	1.1	.5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1.7
E (79 - 101)	1.5	.7	.0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2.2
ESE (102 - 123)	5.8	2.1	.2	.0	.	.	.	.	.	.	.	.	.	.	.	.	.	8.1
SE (124 - 146)	19.9	7.3	.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	27.5
SSE (147 - 168)	5.0	2.7	.2	.0	.0	.	.	.	.	.	.	.	.	.	.	.	.	7.8
S (169 - 191)	2.0	.9	.0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2.9
SSW (192 - 213)	.8	.6	.1	.0	.0	.	.	.	.	.	.	.	.	.	.	.	.	1.5
SW (214 - 236)	.2	.3	.0	.0	.	.	.	.0	.21	.	.	.	.	.	.	.	.	.7
WSW (237 - 258)	.8	.7	.1	.	.	.0	.	.0	.	.	.	.	.	.	.	.	.	1.6
W (259 - 281)	10.1	7.9	1.1	.2	.0	.0	.1	.0	.	.	.	.	.	.	.	.	.	19.5
WNW (282 - 303)	4.1	3.9	.9	.2	.0	.0	.1	.0	.0	.	.	.	.	.	.	.	.	9.2
NW (304 - 326)	3.9	1.3	.2	.0	.0	.0	.0	.	.	.	.	.	.0	.	.	.	.	5.5
NNW (327 - 348)	2.6	.4	.1	.0	.	.	.	.	.	.	.	.	.	.	.	.	.	3.1
CALM AND LIGHT/VARIABLE	1.0	.8	.1	.0	.	.	.	.	.	.	.	.	.	.	.	.	.	1.9
TOTALS	64.2	31.4	3.4	.6	.1	.1	.1	.0	.0	.	.	.	.0	.	.	.	.	*****

TOTAL NUMBER OF OBSERVATIONS = 8514

***** DUE TO ROUNDING AFTER DIVISION, COLUMN AND ROW TOTALS MAY NOT BE IDENTICAL TO THE RESULT OF SIMPLE ADDITION OF TABLE READINGS

PUGET SOUND AIR POLLUTION CONTROL AGENCY - PERCENTAGE FREQUENCY DISTRIBUTION
OF HOURLY AVERAGES

FOOD CIRCUS BUILDING, SEATTLE CENTER
ALL MONTHS 1973

NOTE -- A DECIMAL POINT ALONE (.) INDICATES ZERO
A TABLE READING OF (.0) INDICATES A VALUE LESS THAN .0501 PERCENT

WIND DIRECTION (DEGREES)	SULFUR DIOXIDE (PPM)															OVER .70	TOTALS
	.00 TO .00	.01 TO .02	.03 TO .04	.05 TO .06	.07 TO .08	.09 TO .10	.11 TO .15	.16 TO .20	.21 TO .25	.26 TO .30	.31 TO .35	.36 TO .40	.41 TO .50	.51 TO .60	.61 TO .70		
N (349 - 11)	2.4	.8	.3	.0	.0	.	.	.	.	.	.	.	.	.	.	.	3.5
NNE (12 - 33)	5.9	1.5	.1	.0	.0	.	.	.	.	.	.	.	.	.	.	.	7.5
NE (34 - 56)	7.4	1.9	.2	.	.	.	.	.	.	.	.	.	.	.	.	.	9.6
ENE (57 - 78)	2.3	.9	.1	.	.	.	.	.	.	.	.	.	.	.	.	.	3.3
E (79 - 101)	.9	.4	.0	.	.	.	.	.	.	.	.	.	.	.	.	.	1.4
ESE (102 - 123)	.9	.3	.0	.0	.	.	.	.	.	.	.	.	.	.	.	.	1.2
SE (124 - 146)	2.4	.9	.2	.0	.0	.	.	.	.	.	.	.	.	.	.	.	3.5
SSE (147 - 168)	6.2	4.7	1.0	.4	.2	.1	.0	.	.	.	.	.	.	.	.	.	12.6
S (169 - 191)	9.0	4.6	1.4	.3	.1	.1	.1	.0	.	.	.	.	.	.	.	.	15.8
SSW (192 - 213)	6.2	2.3	.5	.1	.0	.	.0	.	.	.	.	.	.	.	.	.	9.1
SW (214 - 236)	3.3	1.2	.2	.0	.0	.	.	.	.0	.	.	.	.	.	.	.	4.9
WSW (237 - 258)	5.1	1.4	.3	.1	.	.0	.0	.	.	.	.	.0	.	.	.	.	6.9
W (259 - 281)	2.8	.8	.1	.0	.	.0	.	.	.	.	.	.	.	.	.	.	3.7
WNW (282 - 303)	.9	.2	.0	.	.	.	.	.	.	.	.	.	.	.	.	.	1.1
NW (304 - 326)	4.1	.4	.0	.	.	.	.	.	.	.	.	.	.	.	.	.	4.6
NNW (327 - 348)	4.1	.7	.1	.	.	.	.	.	.	.	.	.	.	.	.	.	4.9
CALM AND LIGHT/VARIABLE	3.0	2.7	.5	.1	.0	.0	.0	.	.	.	.	.	.	.	.	.	6.4
TOTALS	66.9	25.8	5.2	1.2	.4	.2	.2	.0	.0	.	.	.0	.	.	.	.	*****

TOTAL NUMBER OF OBSERVATIONS = 8474

GREEN LAKE RSVR, 12TH AV NE & NE 73RD, SEATTLE

JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, OCT, NOV, DEC, 1973

NOTE -- A DECIMAL POINT ALONE (.) INDICATES ZERO
A TABLE READING OF (.0) INDICATES A VALUE LESS THAN .0501 PERCENT

WIND DIRECTION (DEGREES)	SULFUR DIOXIDE (PPM)															OVER .70	TOTALS
	.00 TO .00	.01 TO .02	.03 TO .04	.05 TO .06	.07 TO .08	.09 TO .10	.11 TO .15	.16 TO .20	.21 TO .25	.26 TO .30	.31 TO .35	.36 TO .40	.41 TO .50	.51 TO .60	.61 TO .70		
N (349 - 11)	6.4	.4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	6.8
NNE (12 - 33)	7.2	.5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	7.7
NE (34 - 56)	5.6	.8	.0	.	.	.	.	.	.	.	.	.	.	.	.	.	6.4
ENE (57 - 78)	2.7	.6	.0	.	.	.	.	.	.	.	.	.	.	.	.	.	3.2
E (79 - 101)	1.8	.3	.0	.	.	.	.	.	.	.	.	.	.	.	.	.	2.2
ESE (102 - 123)	2.1	.3	.	.0	.	.	.	.	.	.	.	.	.	.	.	.	2.5
SE (124 - 146)	5.2	1.5	.2	.0	.0	.	.	.	.	.	.	.	.	.	.	.	7.0
SSE (147 - 168)	5.2	2.2	.4	.1	.0	.	.	.	.	.	.	.	.	.	.	.	7.9
S (169 - 191)	7.2	3.5	.8	.2	.1	.0	.0	.	.	.	.	.	.	.	.	.	11.7
SSW (192 - 213)	10.9	2.4	.4	.1	.0	.	.	.	.	.	.	.	.	.	.	.	13.8
SW (214 - 236)	2.1	.5	.1	.0	.	.	.	.	.0	.	.	.	.	.	.	.	2.6
WSW (237 - 258)	1.3	.4	.	.	.0	.	.	.	.	.	.	.	.	.	.	.	1.7
W (259 - 281)	1.6	.5	.0	.0	.	.	.	.	.	.	.	.	.	.	.	.	2.2
WNW (282 - 303)	2.2	.4	.0	.	.	.	.	.	.	.	.	.	.	.	.	.	2.6
NW (304 - 326)	2.7	.2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2.9
NNW (327 - 348)	5.8	.4	.0	.	.	.	.	.	.	.	.	.	.	.	.	.	6.2
CALM AND LIGHT/VARIABLE	8.6	3.7	.3	.0	.	.	.	.	.	.	.	.	.	.	.	.	12.7
TOTALS	78.5	18.7	2.1	.4	.2	.0	.0	.	.0	.	.	.	.	.	.	.	*****

TOTAL NUMBER OF OBSERVATIONS = 7249

***** DUE TO ROUNDING AFTER DIVISION, COLUMN AND ROW TOTALS MAY NOT BE
IDENTICAL TO THE RESULT OF SIMPLE ADDITION OF TABLE READINGS

PUGET SOUND AIR POLLUTION CONTROL AGENCY - PERCENTAGE FREQUENCY DISTRIBUTION
OF HOURLY AVERAGES

DUWAMISH, 4500 BLK E MARGINAL WAY S, SEATTLE
ALL MONTHS 1973

NOTE -- A DECIMAL POINT ALONE (.) INDICATES ZERO
A TABLE READING OF (.0) INDICATES A VALUE LESS THAN .0501 PERCENT

WIND DIRECTION (DEGREES)	SULFUR DIOXIDE (PPM)														OVER .70	TOTALS
	.00 TO .00	.01 TO .02	.03 TO .04	.05 TO .06	.07 TO .08	.09 TO .10	.11 TO .15	.16 TO .20	.21 TO .25	.26 TO .30	.31 TO .35	.36 TO .40	.41 TO .50	.51 TO .60	.61 TO .70	
N (349 - 11)	1.7	2.1	.7	.2	.1	.0	.0	.	.	.	.	.	.	.	.	4.9
NNE (12 - 33)	2.6	1.4	.2	.0	.	.0	.	.	.	.	.	.	.	.	.	4.3
NE (34 - 56)	3.0	.7	.1	.	.	.	.	.	.	.	.	.	.	.	.	3.8
ENE (57 - 78)	1.0	.4	.0	.0	.	.	.	.	.	.	.	.	.	.	.	1.4
E (79 - 101)	.6	.2	.0	.0	.	.	.	.	.	.	.	.	.	.	.	.8
ESE (102 - 123)	.5	.3	.1	.	.	.	.	.	.	.	.	.	.	.	.	.9
SE (124 - 146)	2.4	1.0	.1	.0	.0	.	.	.	.	.	.	.	.	.	.	3.5
SSE (147 - 168)	7.8	3.7	.4	.1	.0	.0	.	.	.0	.	.	.	.	.	.	12.0
S (169 - 191)	9.2	4.7	.9	.4	.1	.0	.1	.0	.0	.	.	.	.	.	.	15.4
SSW (192 - 213)	8.1	3.4	.8	.4	.1	.0	.1	.0	.	.0	.	.	.	.	.	12.9
SW (214 - 236)	4.2	1.4	.2	.1	.1	.0	.0	.	.	.	.	.	.	.	.	6.0
WSW (237 - 258)	1.7	.5	.1	.0	.0	.	.0	.	.	.	.	.	.	.	.	2.4
W (259 - 281)	1.0	.3	.0	.	.0	.0	.0	.	.	.	.	.	.	.	.	1.4
WNW (282 - 303)	1.4	1.0	.1	.0	.0	.	.0	.	.0	.	.	.	.	.	.	2.5
NW (304 - 326)	4.8	4.8	.9	.2	.1	.0	.	.0	.	.	.	.	.	.	.	10.9
NNW (327 - 348)	1.9	3.4	.9	.4	.1	.0	.1	.0	.	.	.	.	.	.	.	6.8
CALM AND LIGHT/VARIABLE	5.4	3.7	.5	.2	.1	.0	.	.	.	.	.	.	.	.	.	10.1
TOTALS	57.3	33.0	6.0	2.2	.7	.3	.3	.1	.0	.0	.	.	.	.	.	*****

TOTAL NUMBER OF OBSERVATIONS = 8414

AMCI, 227 ANDOVER PARK EAST, TUKWILA
ALL MONTHS 1973

NOTE -- A DECIMAL POINT ALONE (.) INDICATES ZERO
A TABLE READING OF (.0) INDICATES A VALUE LESS THAN .0501 PERCENT

WIND DIRECTION (DEGREES)	SULFUR DIOXIDE (PPM)														OVER .70	TOTALS
	.00 TO .00	.01 TO .02	.03 TO .04	.05 TO .06	.07 TO .08	.09 TO .10	.11 TO .15	.16 TO .20	.21 TO .25	.26 TO .30	.31 TO .35	.36 TO .40	.41 TO .50	.51 TO .60	.61 TO .70	
N (349 - 11)	7.8	.9	.0	.0	.	.	.0	.	.	.	.	.	.	.	.	8.8
NNE (12 - 33)	3.8	.7	.	.	.	.	.	.	.	.	.	.	.	.	.	4.6
NE (34 - 56)	1.7	.3	.0	.	.	.	.	.	.	.	.	.	.	.	.	2.0
ENE (57 - 78)	.8	.1	.	.	.	.	.	.	.	.	.	.	.	.	.	.9
E (79 - 101)	.9	.2	.	.	.	.	.	.	.	.	.	.	.	.	.	1.1
ESE (102 - 123)	1.1	.1	.	.	.	.	.	.	.	.	.	.	.	.	.	1.2
SE (124 - 146)	1.2	.2	.0	.	.	.	.	.	.	.	.	.	.	.	.	1.5
SSE (147 - 168)	3.2	.7	.1	.	.0	.	.0	.	.	.	.	.	.	.	.	4.0
S (169 - 191)	14.1	2.3	.2	.0	.	.0	.0	.	.0	.	.	.	.	.	.	16.7
SSW (192 - 213)	15.6	4.0	.4	.1	.1	.0	.0	.0	.	.0	.	.	.0	.	.	20.4
SW (214 - 236)	4.4	2.4	.9	.3	.2	.1	.1	.0	.	.	.	.	.	.	.	8.3
WSW (237 - 258)	1.9	.9	.5	.1	.0	.1	.0	.0	.	.	.	.	.	.	.	3.6
W (259 - 281)	.9	.3	.0	.0	.	.	.0	.	.	.	.	.	.	.	.	1.3
WNW (282 - 303)	.6	.2	.0	.	.0	.	.	.	.	.	.	.	.	.	.	.9
NW (304 - 326)	2.6	.6	.0	.	.	.	.	.	.	.	.	.	.	.	.	3.2
NNW (327 - 348)	6.0	1.6	.0	.0	.	.	.	.	.	.	.	.	.	.	.	7.6
CALM AND LIGHT/VARIABLE	11.2	2.6	.1	.0	.0	.	.	.	.	.	.	.	.	.	.	14.0
TOTALS	77.6	18.2	2.5	.6	.4	.2	.2	.1	.0	.0	.	.	.0	.	.	*****

TOTAL NUMBER OF OBSERVATIONS = 8017

***** DUE TO ROUNDING AFTER DIVISION, COLUMN AND ROW TOTALS MAY NOT BE
IDENTICAL TO THE RESULT OF SIMPLE ADDITION OF TABLE READINGS

PUGET SOUND AIR POLLUTION CONTROL AGENCY - PERCENTAGE FREQUENCY DISTRIBUTION
OF HOURLY AVERAGES

MCMICKEN HTS, S 176TH & 42ND AV S, KING CO, WA

ALL MONTHS 1973

NOTE -- A DECIMAL POINT ALONE (.) INDICATES ZERO

A TABLE READING OF (.0) INDICATES A VALUE LESS THAN .0501 PERCENT

WIND DIRECTION (DEGREES)	SULFUR DIOXIDE (PPM)															OVER .70	TOTALS
	.00 TO .00	.01 TO .02	.03 TO .04	.05 TO .06	.07 TO .08	.09 TO .10	.11 TO .15	.16 TO .20	.21 TO .25	.26 TO .30	.31 TO .35	.36 TO .40	.41 TO .50	.51 TO .60	.61 TO .70		
N (349 - 11)	8.4	1.4	.1	.1	.	.	.	.	.	.	.	.	.	.	.	.	9.9
NNE (12 - 33)	4.6	.6	.0	.0	.	.	.	.	.	.	.	.	.	.	.	.	5.2
NE (34 - 56)	2.7	.2	.0	.	.	.	.	.	.	.	.	.	.	.	.	.	2.9
ENE (57 - 78)	1.6	.2	.0	.	.0	.	.	.	.	.	.	.	.	.	.	.	1.9
E (79 - 101)	1.7	.1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1.8
ESE (102 - 123)	1.6	.1	.0	.	.	.	.	.	.	.	.	.	.	.	.	.	1.7
SE (124 - 146)	2.9	.3	.0	.0	.0	.	.	.	.	.	.	.	.	.	.	.	3.2
SSE (147 - 168)	7.3	.8	.1	.1	.0	.	.0	.	.	.	.	.	.	.	.	.	8.4
S (169 - 191)	8.7	1.7	.5	.5	.1	.1	.1	.2	.1	.	.0	.0	.	.	.	.	12.1
SSW (192 - 213)	6.3	1.4	.7	.6	.4	.2	.5	.2	.1	.0	.	.0	.0	.	.	.	10.5
SW (214 - 236)	6.3	1.6	.6	.3	.2	.1	.1	.1	.1	.0	.	.0	.0	.	.	.	9.4
WSW (237 - 258)	3.2	.9	.3	.1	.1	.1	.1	.1	.	.	.	.	.	.	.	.	4.8
W (259 - 281)	2.0	.3	.1	.0	.0	.	.0	.	.	.	.	.	.	.	.	.	2.3
WNW (282 - 303)	1.3	.2	.1	.0	.	.	.0	.	.	.	.	.	.	.	.	.	1.6
NW (304 - 326)	1.9	.3	.0	.0	.	.	.	.	.	.	.	.	.	.	.	.	2.3
NNW (327 - 348)	3.9	1.1	.2	.1	.	.	.	.	.	.	.	.	.	.	.	.	5.3
CALM AND LIGHT/VARIABLE	13.6	2.4	.4	.2	.0	.0	.0	.0	.	.	.	.	.	.	.	.	16.8
TOTALS	77.9	13.6	3.3	2.0	.9	.6	.9	.5	.2	.0	.0	.0	.0	.	.	.	*****

TOTAL NUMBER OF OBSERVATIONS = 7594

MEEKER JR HS, 1526 - 51ST STREET NE, TACOMA

ALL MONTHS 1973

NOTE -- A DECIMAL POINT ALONE (.) INDICATES ZERO

A TABLE READING OF (.0) INDICATES A VALUE LESS THAN .0501 PERCENT

WIND DIRECTION (DEGREES)	SULFUR DIOXIDE (PPM)															OVER .70	TOTALS
	.00 TO .00	.01 TO .02	.03 TO .04	.05 TO .06	.07 TO .08	.09 TO .10	.11 TO .15	.16 TO .20	.21 TO .25	.26 TO .30	.31 TO .35	.36 TO .40	.41 TO .50	.51 TO .60	.61 TO .70		
N (349 - 11)	4.8	.7	.0	.0	.0	.0	.	.0	.	.	.	.	.	.	.	.	5.6
NNE (12 - 33)	11.2	1.4	.1	.	.0	.0	.	.	.	.	.	.	.	.	.	.	12.7
NE (34 - 56)	6.2	.9	.0	.0	.0	.0	.	.0	.	.	.	.	.	.	.	.	7.2
ENE (57 - 78)	1.9	.2	.0	.0	.0	.	.	.	.	.	.	.	.	.	.	.	2.1
E (79 - 101)	.8	.2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1.0
ESE (102 - 123)	1.1	.1	.0	.	.	.	.	.	.	.	.	.	.	.	.	.	1.3
SE (124 - 146)	2.3	.6	.1	.0	.	.0	.	.	.	.	.	.	.	.	.	.	3.1
SSE (147 - 168)	7.4	2.1	.2	.	.	.	.	.	.	.	.	.	.	.	.	.	9.7
S (169 - 191)	6.6	1.4	.0	.0	.0	.0	.0	.	.	.	.	.	.	.	.	.	8.2
SSW (192 - 213)	8.3	.9	.1	.	.0	.	.	.	.	.	.	.	.	.	.	.	9.3
SW (214 - 236)	10.5	.7	.0	.0	.	.0	.	.	.	.	.	.	.	.	.	.	11.2
WSW (237 - 258)	4.3	.7	.0	.	.0	.0	.	.0	.	.0	.	.0	.	.	.	.	5.1
W (259 - 281)	1.9	.9	.2	.1	.0	.0	.1	.0	.	.	.	.	.	.	.0	.	3.3
WNW (282 - 303)	1.0	.7	.2	.2	.1	.0	.1	.0	.	.	.0	.	.	.	.	.	2.3
NW (304 - 326)	2.0	.8	.3	.2	.1	.0	.1	.0	.0	.	.	.	.	.	.0	.	3.4
NNW (327 - 348)	1.6	.5	.0	.0	.0	.0	.0	.	.	.	.	.	.	.	.	.	2.5
CALM AND LIGHT/VARIABLE	9.2	2.5	.2	.0	.0	.0	.0	.0	.0	.	.	.	.	.	.	.	12.0
TOTALS	81.6	15.2	1.6	.6	.3	.2	.3	.1	.0	.0	.0	.0	.	.0	.0	.	*****

TOTAL NUMBER OF OBSERVATIONS = 8417

***** DUE TO ROUNDING AFTER DIVISION, COLUMN AND ROW TOTALS MAY NOT BE
IDENTICAL TO THE RESULT OF SIMPLE ADDITION OF TABLE READINGS

PUGET SOUND AIR POLLUTION CONTROL AGENCY - PERCENTAGE FREQUENCY DISTRIBUTION
OF HOURLY AVERAGES

WILLARD ELEM SCHOOL, S 32ND & S 'D' ST, TACOMA

FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, DEC, 1973

NOTE -- A DECIMAL POINT ALONE (.) INDICATES ZERO

A TABLE READING OF (.0) INDICATES A VALUE LESS THAN .0501 PERCENT

WIND DIRECTION (DEGREES)	SULFUR DIOXIDE (PPM)															OVER .70	TOTALS
	.00 TO .00	.01 TO .02	.03 TO .04	.05 TO .06	.07 TO .08	.09 TO .10	.11 TO .15	.16 TO .20	.21 TO .25	.26 TO .30	.31 TO .35	.36 TO .40	.41 TO .50	.51 TO .60	.61 TO .70		
N (349 - 11)	6.4	3.8	.4	.1	.0	.	.0	.	.	.	.	.	.	.	.	.	10.9
NNE (12 - 33)	4.6	4.3	.8	.2	.1	.0	.1	.	.	.0	.	.	.	.	.	.	10.1
NE (34 - 56)	1.6	1.8	.1	.0	.0	.	.	.	.0	.	.	.	.	.	.	.	3.6
ENE (57 - 78)	.8	.5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1.3
E (79 - 101)	.4	.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.7
ESE (102 - 123)	.5	.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.8
SE (124 - 146)	.5	.4	.0	.	.	.	.	.	.	.	.	.	.	.	.	.	.9
SSE (147 - 168)	.8	.4	.0	.	.	.	.	.	.	.	.	.	.	.	.	.	1.2
S (169 - 191)	7.0	1.9	.1	.	.	.	.	.	.	.	.	.	.	.	.	.	8.9
SSW (192 - 213)	15.4	5.0	.1	.0	.	.	.	.	.	.	.	.	.	.	.	.	20.5
SW (214 - 236)	7.6	2.4	.1	.	.0	.	.	.	.	.	.	.	.	.	.	.	10.1
WSW (237 - 258)	6.9	1.8	.1	.0	.	.	.	.	.	.	.	.	.	.	.	.	8.8
W (259 - 281)	3.4	.9	.1	.	.	.	.	.	.	.	.	.	.	.	.	.	4.4
WNW (282 - 303)	1.3	.4	.1	.1	.0	.	.	.	.	.	.	.	.	.	.	.	1.9
NW (304 - 326)	.6	.2	.0	.0	.0	.0	.	.	.	.	.	.	.	.	.	.	.9
NNW (327 - 348)	.7	.5	.1	.0	.	.	.	.	.	.	.	.	.	.	.	.	1.3
CALM AND LIGHT/VARIABLE	5.6	7.3	.3	.1	.0	.0	.0	.	.	.	.	.	.	.	.	.	13.6
TOTALS	64.2	32.3	2.5	.6	.3	.1	.1	.	.0	.0	.	.	.	.	.	.	*****

TOTAL NUMBER OF OBSERVATIONS = 7197

N 26TH AND PEARL STREET, TACOMA

ALL MONTHS 1973

NOTE -- A DECIMAL POINT ALONE (.) INDICATES ZERO

A TABLE READING OF (.0) INDICATES A VALUE LESS THAN .0501 PERCENT

WIND DIRECTION (DEGREES)	SULFUR DIOXIDE (PPM)															OVER .70	TOTALS
	.00 TO .00	.01 TO .02	.03 TO .04	.05 TO .06	.07 TO .08	.09 TO .10	.11 TO .15	.16 TO .20	.21 TO .25	.26 TO .30	.31 TO .35	.36 TO .40	.41 TO .50	.51 TO .60	.61 TO .70		
N (349 - 11)	1.9	1.0	.3	.2	.1	.1	.0	.1	.0	.0	.	.	.	.	.	.	3.9
NNE (12 - 33)	5.0	3.0	.8	.4	.3	.1	.2	.1	.0	.0	.0	.	.	.	.0	.	9.9
NE (34 - 56)	7.1	2.0	.4	.1	.1	.0	.1	.0	.0	.	.	.	.	.	.	.	9.9
ENE (57 - 78)	2.2	.6	.1	.0	.0	.0	.0	.0	.	.	.	.	.	.	.	.	2.9
E (79 - 101)	1.1	.6	.0	.0	.	.	.	.	.	.	.	.	.	.	.	.	1.8
ESE (102 - 123)	.5	.3	.0	.	.	.	.	.	.	.	.	.	.	.	.	.	.9
SE (124 - 146)	.8	.2	.0	.0	.	.	.	.	.	.	.	.	.	.	.	.	1.1
SSE (147 - 168)	3.0	.5	.0	.	.	.	.	.	.	.	.	.	.	.	.	.	3.5
S (169 - 191)	6.9	.8	.0	.	.	.	.	.	.	.	.	.	.	.	.	.	7.7
SSW (192 - 213)	10.9	.8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	11.7
SW (214 - 236)	13.7	.5	.0	.	.	.	.	.	.	.	.	.	.	.	.	.	14.2
WSW (237 - 258)	11.1	.4	.0	.0	.	.0	.0	.	.	.	.	.	.	.	.	.	11.6
W (259 - 281)	5.0	.3	.0	.1	.	.	.	.	.	.	.	.	.	.	.	.	5.4
WNW (282 - 303)	1.5	.2	.0	.0	.0	.	.	.	.	.	.	.	.	.	.	.	1.8
NW (304 - 326)	1.2	.3	.1	.0	.0	.0	.0	.0	.0	.	.	.	.	.	.	.0	1.7
NNW (327 - 348)	1.0	.2	.1	.0	.0	.0	.0	.	.0	.	.0	.	.	.	.	.	1.4
CALM AND LIGHT/VARIABLE	7.5	2.4	.3	.1	.1	.0	.1	.0	.0	.	.	.0	.	.	.	.	10.5
TOTALS	80.4	14.3	2.3	1.0	.7	.3	.5	.3	.1	.0	.0	.0	.	.	.0	.0	*****

TOTAL NUMBER OF OBSERVATIONS = 8627

***** DUE TO ROUNDING AFTER DIVISION, COLUMN AND ROW TOTALS MAY NOT BE
IDENTICAL TO THE RESULT OF SIMPLE ADDITION OF TABLE READINGS

SULFUR DIOXIDE FOR YEAR 1973
(Concentrations in parts per million by volume)

Frequencies of Concentrations Exceeding Specified Levels

- A. Number of occurrences > 1.00 ppm for 5 minutes.
- B. Number of occurrences > 0.25 ppm for 1 hour.
- C. Number of occurrences > 0.40 ppm for 1 hour.

Location	Jan.			Feb.			Mar.			Apr.			May			June			July			Aug.			Sept.			Oct.			Nov.			Dec.			Annual		
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C			
Medical-Dental Building, Everett																1			1	1						1								3		1			
Green Lake Reservoir, Seattle										1																								1					
Food Circus Bldg., Seattle Center										2	1																							2		1			
Duwamish, 4500 Blk. E Marg Way S.					4					2					1		1		1															9					
227 Andover Park E., Tukwila																			1		1			1	1								3		1				
McMicken Heights, King County	1				2					4	2		2		2	2	1		3	2		1				2							2	17	5				
Meeker Jr. High School, Tacoma							3	2	1				1			2		1	6	2		1				1							4	13	3				
Willard Elem. School, Tacoma															1								1											2					
N. 26th & Pearl, Tacoma	1			1						2		2	5		4	5	1	2	4		3	5	1		2				1		4	2	2	16	27	4			
240th & 103rd SW, Burton, Vashon Isl.*										1			3	1		1																		5		1			
All-Station Frequencies	2			1	6		3	2	1	12	3		2	11	1	6	13	2	3	15	5	3	9	1	4		5	1		1		4	2	2	22	82	16		

* Discontinued 9-14-73

STANDARDS: 1.00 ppm for 5 minutes not to be exceeded more than once in 8 hours.
0.40 ppm for 1 hour never to be exceeded.
0.25 ppm for 1 hour not to be exceeded more than twice in seven consecutive days.

SULFUR DIOXIDE FOR YEAR 1973
(Concentrations in parts per million by volume)

Location	Annual Arith. Mean	Highest 24-Hour Average	Highest 1-Hour Average	Highest 5-Minute Av. Exc. 1.00 ppm
Medical-Dental Bldg., Everett	0.006	0.04	0.46	
Green Lake Reservoir, Seattle	0.003	0.02	0.26	
Food Circus Bldg., Seattle Center	0.007	0.05	0.56	
Duwamish, 4500 Blk. E. Marg. Way S.	0.009	0.05	0.32	
227 Andover Park E., Tukwila	0.005	0.03	0.41	
McMicken Heights, King County	0.008	0.07	0.59	1.39
Meeker Jr. H.S., Tacoma	0.004	0.09	0.65	1.19
Fife Sr. H.S., Fife	--*	0.02	0.13	
Willard Elem. School, Tacoma	0.006	0.03	0.36	
N. 26th & Pearl St., Tacoma	0.006	0.06	0.69	1.86
240th & 103rd SW, Burton, Vashon Isl.**	0.004	0.04	0.42	

* Insufficient data

** Discontinued 9-14-73

STANDARDS: 0.10 ppm for 24 hours never to be exceeded.
0.02 ppm for 365 days never to be exceeded.

COEFFICIENT OF HAZE SUMMARY For Year 1973
(COH's/1000 Linear Feet)

Location	Monthly Arithmetic Averages												Arith. ^b	Geo. ^b
	J	F	M	A	M	J	J	A	S	O	N	D	Mean	Mean
School District Office, Marysville ^c	0.46	0.68	0.37	0.32	0.22								0.42	0.28
Medical-Dental Building, Everett	0.44	0.66	0.42	0.35	0.32	0.30	0.36	0.38	0.39	0.46	0.43	0.40	0.41	0.34
Green Lake Reservoir, Seattle	-- ^a	-- ^a	0.50	0.37	0.27	0.24	0.25	0.33	0.38	0.55	0.63	0.77	0.43	0.34
Food Circus Bldg., Seattle Center	0.58	0.67	0.35	0.37	0.35	0.29	0.30	0.37	0.47	0.54	0.52	0.68	0.45	0.36
Duwamish, 4500 Blk. E. Marg. Way S.	1.00	1.12	0.67	0.68	0.56	0.44	0.47	0.51	0.60	0.77	0.73	0.93	0.70	0.53
McMicken Heights, King County						-- ^a	0.31	0.28	0.33	0.46	0.37	0.50	0.38	0.29
227 Andover Park East, Tukwila	0.56	0.85	0.56	0.55	0.41	0.34	0.37	0.38	0.54	0.76	0.65	0.60	0.54	0.41
Meeker Jr. High School, Tacoma	0.53	0.63	0.42	0.36	0.25	0.20	0.21	0.27	0.41	0.48	0.44	0.52	0.39	0.29
Fife Sr. High School, Fife	0.70	1.06	0.61	0.61	0.47	0.43	0.50	0.46	0.64	0.66	0.58	-- ^a	0.61	0.43
Willard Elem. School, Tacoma ^d		1.01	0.60	0.59	0.46	0.44	0.52	0.48	0.67	0.77	0.75	0.95	0.65	0.48
N. 26th & Pearl St., Tacoma	0.37	0.46	0.28	0.25	0.19	0.18	0.18	0.23	0.32	0.39	0.34	0.38	0.30	0.22
Arithmetic Mean	0.58	0.79	0.48	0.44	0.35	0.32	0.35	0.37	0.48	0.58	0.54	0.64		

a. Insufficient data

b. Developed from all available hourly values

c. Site discontinued 5-21-73

d. Site established 2-7-73

Coefficient of Haze is a measure of the light extinction produced by the suspended particulate in air. These measurements are made over half hour periods on a continuing basis using tape samplers. Federal, State or local standards have not been established for this measurement. In the Washington State Episode Avoidance Plan, a 24-hour average of 3.0 COH is the Alert level, 5.0 COH is the Warning level and 7.0 COH is the Emergency level. The highest 24-hour average (2.6 COH) and the maximum hourly average (4.5 COH) were recorded on January 10 in the Duwamish industrial area.

PARTICLE FALLOUT SUMMARY FOR YEAR 1973
(Total weight/grams/m²/mo)

Location	Area Class	Monthly Arithmetic Averages											Arith. Mean	No. of Occ. Exc. Std.
		J	F	M	A	M	J	J	A	S	O	N		
Medical-Dental Building, Everett	Com.	5.2	4.3	5.9	6.0	6.1	4.6	3.5	5.1				5.1	5
Public Safety Building, Seattle	Com	9.9	12.3	6.4	6.0	5.7	2.4	4.0	4.3				6.4	5
25 S. Hanford St., Seattle	Ind.	20.7	20.2	23.5	15.7	16.0	16.2	5.7	9.2				15.9	6
McMicken Heights, King County	Rur	2.1	2.3	2.6	2.6	2.6	2.7	2.7	2.2				2.5	0
115 E. Main St. & Auburn Av., Auburn	Com	4.0	2.8	4.4	2.2	2.2	2.1	2.9	3.1				3.0	0
1401 Thorne Rd., Tacoma	Ind	5.7	6.4	6.6	9.9	7.5	8.1	4.8	4.4				6.7	1
Dewey Jr. H.S., Bremerton	Res	3.3	1.9	2.6	2.6	2.1	2.6	3.2	1.3				2.4	0
Arithmetic Mean		7.2	7.2	7.4	6.4	6.0	5.5	3.8	4.2					

NOTE: Particle Fallout Network discontinued 8-31-73.

Particle Fallout is measured by exposing a specially designed open container to the ambient air for a one-month period to determine the total amount of solids collected.

STANDARDS: Industrial Area 10.0 g/m²/mo. Residential & Commercial Areas 5.0 g/m²/mo.

1 gram per square meter per month = 2.86 tons per square mile per month.

SULFATION RATE SUMMARY FOR YEAR 1973*
(Milligrams of Sulfur Trioxide per 100 square centimeters per day)

Location	Monthly Arithmetic Averages								Arith. Mean
	J	F	M	A	M	J	J	A	
School District Office, Marysville**	0.31	0.25	0.24	0.22	0.59				0.32
Medical-Dental Building, Everett	0.61	0.66	0.56	0.63	0.62	0.59	0.52	0.44	0.58
Food Circus Bldg., Seattle Center	1.43	1.04	1.10	0.70	0.81	0.72	0.50	0.60	0.86
Public Safety Building, Seattle	0.92	0.70	0.88	0.53	0.65	0.66	0.55	0.60	0.69
25 S. Hanford Street, Seattle	0.65	0.69	0.67	0.56	0.85	0.65	0.32	0.33	0.59
Duwamish, 4500 Blk. E. Marg. Way, Seattle	0.76	0.79	0.90	0.55	0.90	0.81	0.65	0.78	0.77
McMicken Heights, King County	0.40	0.46	0.54	0.54	0.64	0.59	0.47	0.43	0.51
Municipal Building, Renton	0.28	0.42	0.43	0.48	0.58	0.57	0.41	0.59	0.47
115 East Main St. & Auburn Av., Auburn	0.27	0.24	0.30	0.22	0.26	0.30	0.22	0.21	0.25
1401 Thorne Rd., Tacoma	0.40	0.35	0.40	0.39	0.39	0.60	0.38	0.44	0.42
Clover Park Educ. Cen., Tacoma	0.26	0.33	0.27	0.31	0.31	0.35	0.23	0.21	0.28
N. 26th and Pearl St., Tacoma	0.51	0.58	0.47	0.50	0.55	0.48	0.42	0.40	0.49
Gold Beach, Maury Island	1.04	0.59	1.11	0.95	1.06	0.74	0.56	0.64	0.84
Hancock Ranch, Maury Island	0.68	0.53	0.81	0.77	1.05	0.72	0.53	0.83	0.74
KIRO Transmitter, Maury Island	0.51	0.33	0.60	0.34	0.58	0.43	0.29	0.38	0.43
Kitsap County Airport	0.13	0.20	0.08	0.11	0.23	0.17	0.08	0.00	0.12
Dewey Jr. H.S., Bremerton	0.50	0.46	0.37	0.30	0.18	0.24	0.10	0.06	0.28
Winslow City Hall	0.27	0.26	0.27	0.25	0.23	0.27	0.20	0.07	0.23
Arithmetic Mean	0.55	0.49	0.56	0.46	0.58	0.52	0.38	0.41	

* Sulfation Rate network discontinued 8-31-73

** Sampling discontinued 5-18-73

Total sulfate concentration is determined by exposing a lead peroxide surface to the air for a one-month period and analyzing the sample for sulfates. Standards have not been established, and the various sulfate compounds cannot be economically analyzed and identified. In the Puget Sound area, the data shows both geographic and seasonal variations.

TOTAL OXIDANTS FOR YEAR 1973
(Concentrations in parts per million)

STANDARD: 0.08 ppm for 1 hour not to be exceeded more than once per year.

Location	Period of Operation	Highest 24-Hour Average	Highest 4-Hour Average	Highest 1-Hour Average	Occurrences exceeding 0.08 ppm
Food Circus Bldg., Seattle Center	Jan. 1 - Nov. 29	0.05 ppm	0.07 ppm	0.07 ppm	0
McMicken Heights, King County	Jan. 1 - Nov. 09	0.04 ppm	0.07 ppm	0.08 ppm	0

Total oxidants are measured on a continuous basis using a coulometric method and readings are corrected for SO₂ only. The Table lists the highest average concentrations observed for the periods indicated and the number of hours exceeding 0.08 ppm.

NITROGEN DIOXIDE FOR YEAR 1973
(Concentrations in parts per million)

STANDARD: 0.05 ppm annual arithmetic mean not to be exceeded.

Location	Period of Operation	Highest 24-Hour Average	Highest 1-Hour Average	Arith. Mean for Period of Operation
McMicken Heights, King County	Jan. 1 - Dec. 31	0.08 ppm	0.20 ppm	0.035 ppm

Nitrogen dioxide is measured on a continuous basis using the colorimetric - Saltzman method. The Table lists the highest average concentrations observed for the periods indicated and the arithmetic mean for the period of operation.

CARBON MONOXIDE FOR YEAR 1973
(Concentrations in parts per million)

STANDARDS: 35 ppm for 1-hour average not to be exceeded more than once per year.
9 ppm for 8-hour average not to be exceeded more than once per year.

Location	Period of Operation	Highest 24-Hour Average	Highest 8-Hour Average	Highest 1-Hour Average	No. of 8 hr. Avgs. < 9 ppm
1209-2nd Ave., Seattle	Aug 13-Sep 30, Dec 12-Dec 31	13 ppm	18 ppm	28 ppm	80
McMicken Heights, King County	Jan. 1 - May 16	3 ppm	4 ppm	5 ppm	0

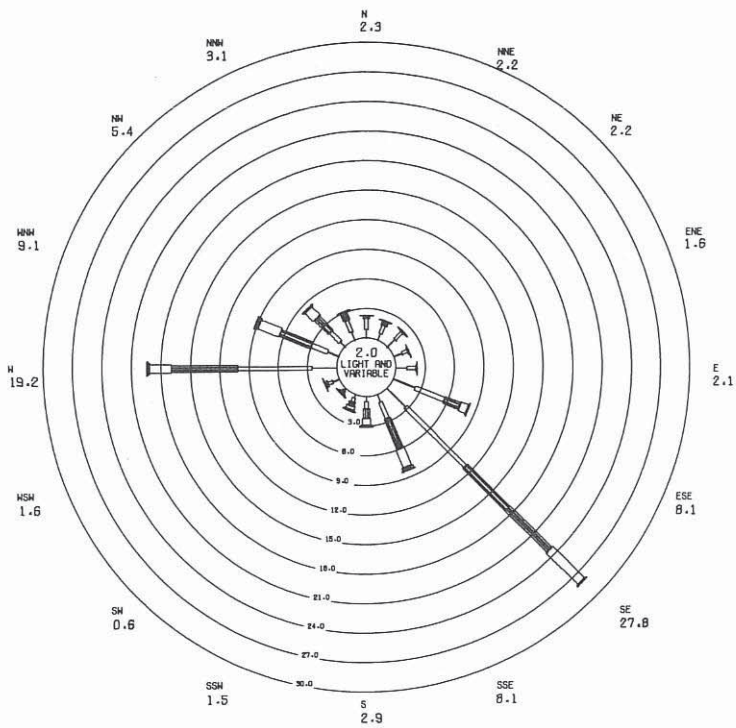
Carbon monoxide is measured on a continuous basis using the nondispersive infrared method. The Table lists the highest average concentrations observed for the periods indicated.

WIND ROSES

A wind rose is a graphical means of summarizing the winds for a given time period. It is essentially a count, expressed as a percentage frequency, of the number of observations which had a particular direction and speed during that time period.

In these roses, representing 1973 winds, each spoke points in the direction from which the wind blows. The length of each segment of a spoke indicates the relative frequency of winds of different speeds. Using the scale located to the lower right of each rose, these lengths may be converted to percentages of the total observations.

The percentage frequency of winds from any given direction (without regard to speed) is expressed numerically beneath that direction on the perimeter of the roses. The percentage frequency of light and variable winds (winds less than 1.5 knots) is shown in the center of the rose.



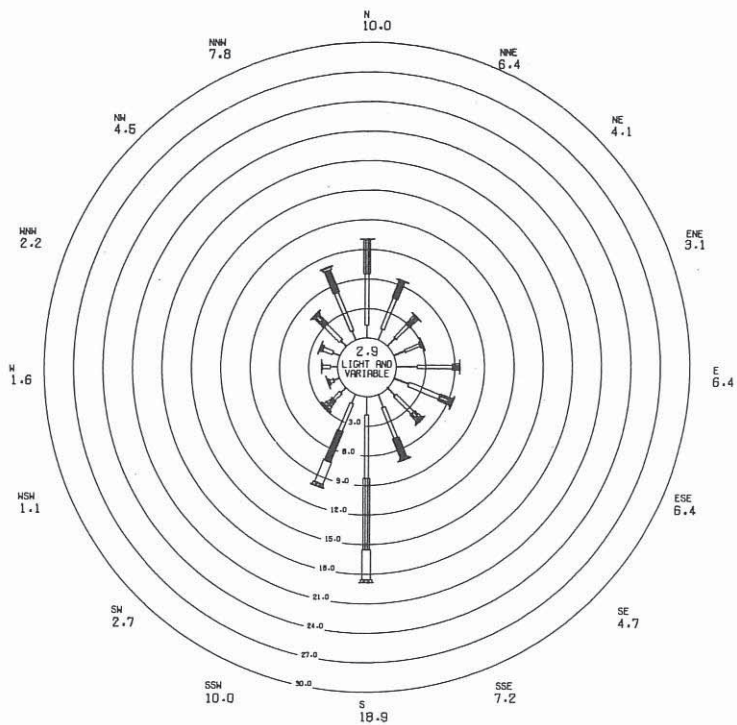
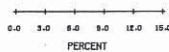
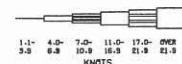
HOURLY AVERAGE SURFACE WINDS

PERCENTAGE FREQUENCY OF OCCURRENCE

STATION LOCATION- PUGET SOUND AIR POLLUTION CONTROL AGENCY
MED-DENTAL BLDG., 2790 COLBY AVE., EVERETT

INCLUSIVE DATES- ALL MONTHS 1973

TOTAL OBSERVATIONS- 8,687



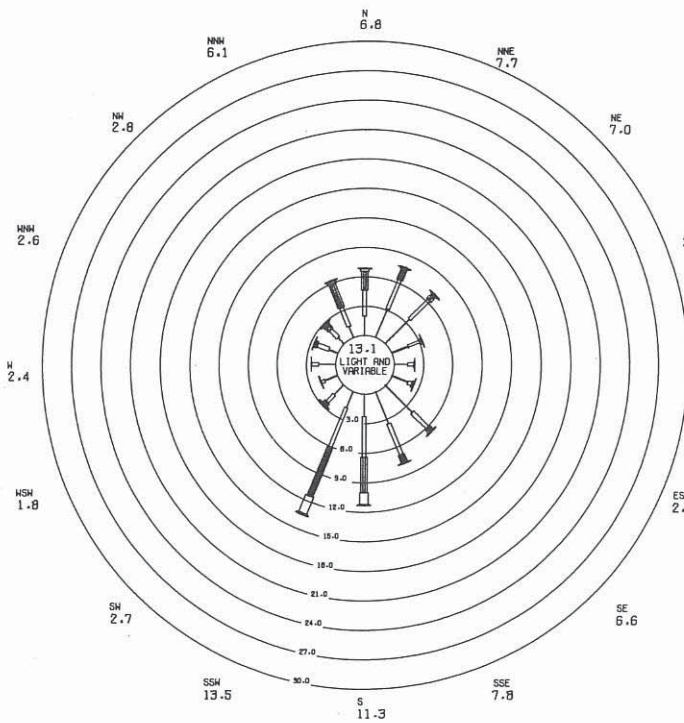
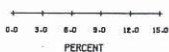
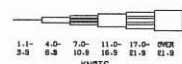
HOURLY AVERAGE SURFACE WINDS

PERCENTAGE FREQUENCY OF OCCURRENCE

STATION LOCATION- PUGET SOUND AIR POLLUTION CONTROL AGENCY
LAKE FOREST PARK RESERVOIR

INCLUSIVE DATES- ALL MONTHS 1973

TOTAL OBSERVATIONS- 8,012



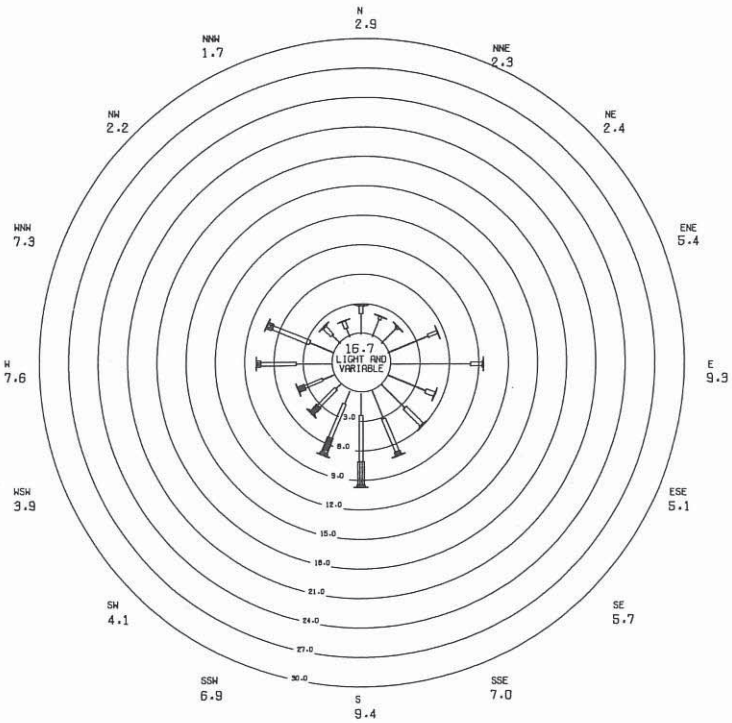
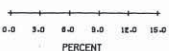
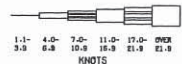
HOURLY AVERAGE SURFACE WINDS

PERCENTAGE FREQUENCY OF OCCURRENCE

STATION LOCATION- PUGET SOUND AIR POLLUTION CONTROL AGENCY
GREENLAKE RSVR., 12TH NE & NE 73RD, SEATTLE

INCLUSIVE DATES- ALL MONTHS 1973

TOTAL OBSERVATIONS- 8,668



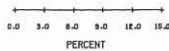
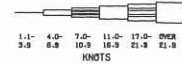
HOURLY AVERAGE SURFACE WINDS

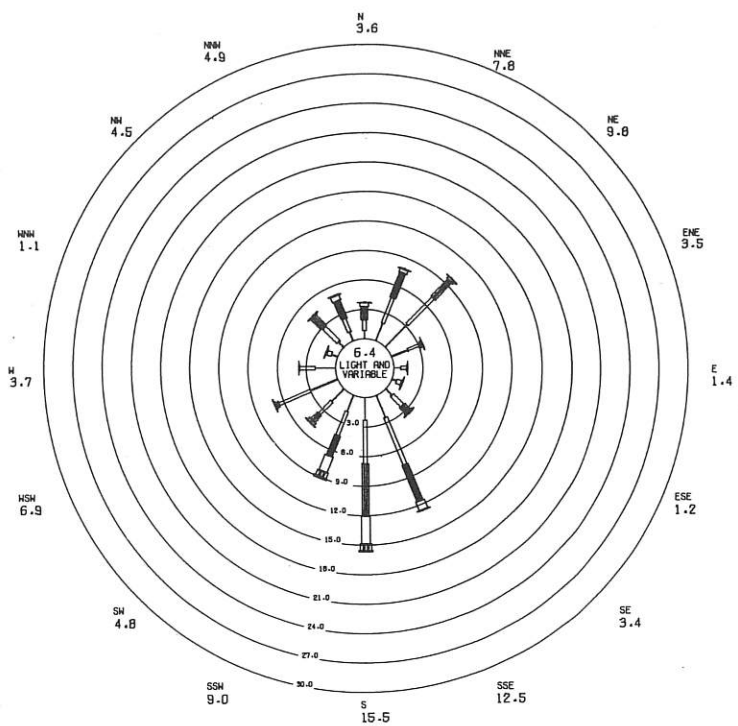
PERCENTAGE FREQUENCY OF OCCURRENCE

STATION LOCATION- PUGET SOUND AIR POLLUTION CONTROL AGENCY
NWS URBAN SITE, 2725 MONTLAKE BLVD E., SEA

INCLUSIVE DATES- ALL MONTHS 1973

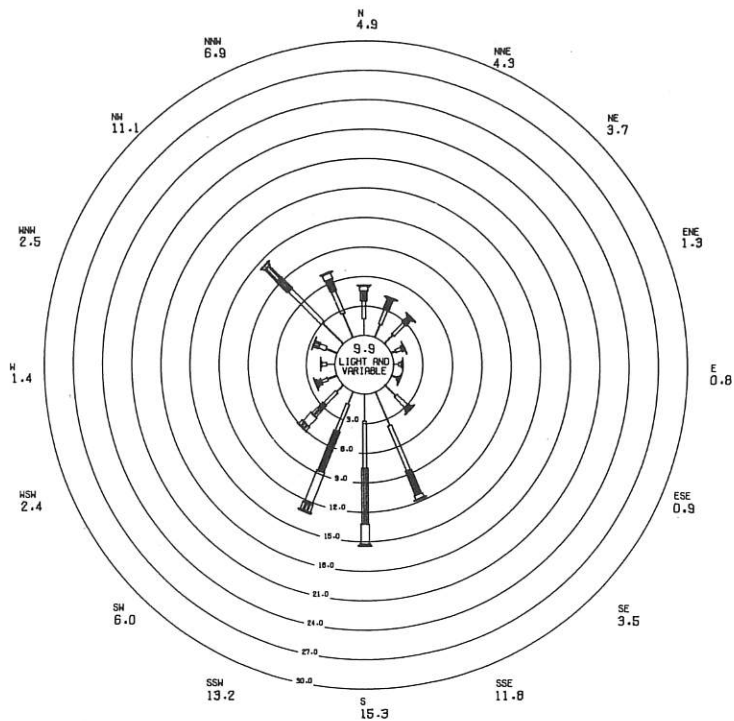
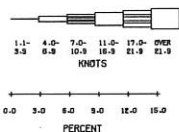
TOTAL OBSERVATIONS- 8,618





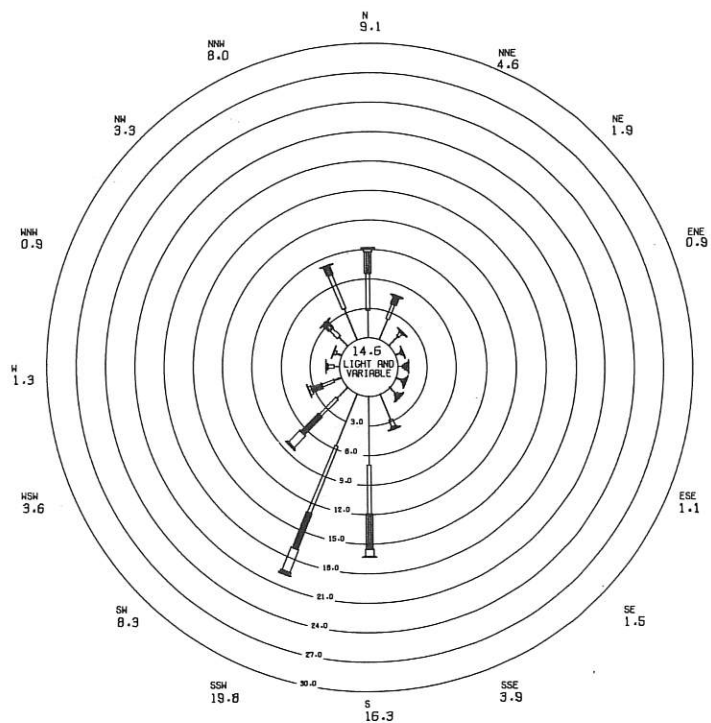
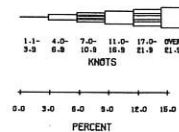
HOUR AVERAGE SURFACE WINDS
PERCENTAGE FREQUENCY OF OCCURRENCE

STATION LOCATION- PUGET SOUND AIR POLLUTION CONTROL AGENCY
FOOD CIRCUS BUILDING, SEATTLE CENTER
INCLUSIVE DATES- ALL MONTHS 1973
TOTAL OBSERVATIONS- 8,692



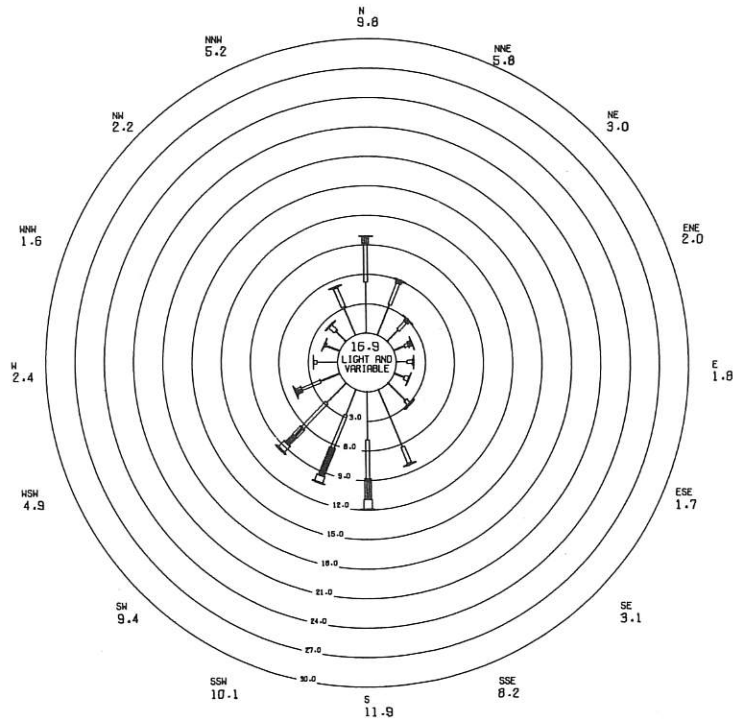
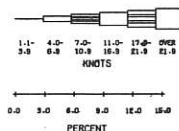
HOUR AVERAGE SURFACE WINDS
PERCENTAGE FREQUENCY OF OCCURRENCE

STATION LOCATION- PUGET SOUND AIR POLLUTION CONTROL AGENCY
DUWAMISH, 4500 BLK E MARG WAY, SEATTLE
INCLUSIVE DATES- ALL MONTHS 1973
TOTAL OBSERVATIONS- 8,707



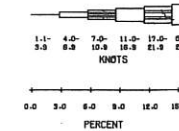
HOUR AVERAGE SURFACE WINDS
PERCENTAGE FREQUENCY OF OCCURRENCE

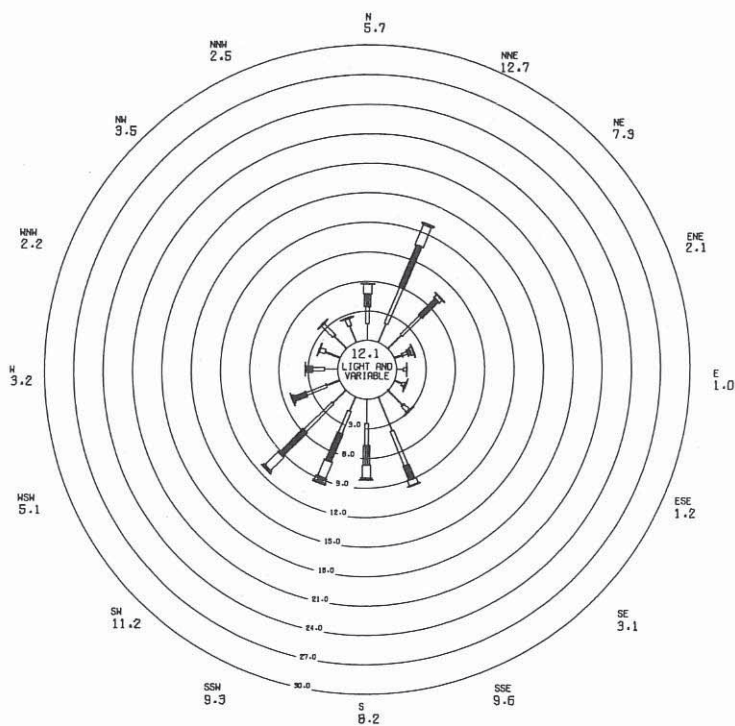
STATION LOCATION- PUGET SOUND AIR POLLUTION CONTROL AGENCY
227 ANDOVER PARK E, TUKWILA
INCLUSIVE DATES- ALL MONTHS 1973
TOTAL OBSERVATIONS- 8,618



HOUR AVERAGE SURFACE WINDS
PERCENTAGE FREQUENCY OF OCCURRENCE

STATION LOCATION- PUGET SOUND AIR POLLUTION CONTROL AGENCY
MCHICKEN HTS, S 176TH & 42ND AV S, KING CO
INCLUSIVE DATES- ALL MONTHS 1973
TOTAL OBSERVATIONS- 8,111





AMBIENT AIR QUALITY STANDARDS

SULFUR OXIDES

The presence of sulfur oxides in the ambient air has been associated with a variety of respiratory diseases and increased mortality rates. They represent a significant economic burden and have a nuisance impact. When sulfur oxides are inhaled with small particles, the health effect is increased. Inhalation of sulfur dioxide can cause increased airway resistance by constricting lung passages.

PARTICULATES

Small discrete masses of solid or liquid matter dispersed in the atmosphere, especially those of one micron or less in diameter, are associated with a variety of adverse effects on public health and welfare. Particulate matter in the respiratory tract may produce injury by itself, or it may act in conjunction with gases to increase the effect on the body. Small particles suspended in the air are chiefly responsible for reduced visibility in the Puget Sound area. Soiling of buildings and other property is a common effect of high particulate levels.

CARBON MONOXIDE

Carbon monoxide reacts with the hemoglobin in red blood cells to decrease the oxygen-carrying capacity of the blood. The national primary standard for carbon monoxide was based on evidence that levels of carboxyhemoglobin in human blood as low as 2.5% may be associated with impairment of ability to discriminate time intervals. The national ambient air quality standards for carbon monoxide are intended to protect against the occurrence of carboxyhemoglobin levels above 2%. Note: Smoking up to 2 packs of cigarettes a day raises carboxyhemoglobin levels to about 5%. This is equivalent to exposure for 8 or more hours to 30 ppm of carbon monoxide.

	NATIONAL					Notes	PUGET SOUND REGION	
	PRIMARY		Notes	SECONDARY				
	ug/m ³	ppm		ug/m ³	ppm			
SULFUR OXIDES								
Annual Average	80	.03	a			a	.02	ppm
30-day Average						a	.04	ppm
24-hour Average	365	.14	b			a	.10	ppm
3-hour Average			b	1,300	.50			
1-hour Average						c	.25	ppm
1-hour Average						a	.40	ppm
5-min. Average						d	1.00	ppm
SUSPENDED PARTICULATES	ug/m ³	---		ug/m ³	---			
Annual Geom. Mean	75	---	a	60		a	60	ug/m ³
24-hour Average	260	---	b	150		b	150	ug/m ³
CARBON MONOXIDE	mg/m ³	ppm						
8-hour Average	10	9	b	same			same	
1-hour Average	40	35	b	same			same	
PHOTOCHEMICAL OXIDANTS	ug/m ³	ppm						
1-hour Average	160	.08	b	same			same	
NITROGEN DIOXIDE	ug/m ³	ppm						
Annual Average	100	.05	a	same			same	
HYDROCARBONS	ug/m ³	ppm						
3-hour Average	160	.24	b	same			same	

STATE AND REGION PARTICLE FALLOUT STANDARDS (No National Standard)

Industrial Areas (a)	10 grams/meter ² /month (28.6 tons/mile ² /month)
Commercial-Residential Areas (a)	5 grams/meter ² /month (14.3 tons/mile ² /month)

ppm	= parts per million	a	Never to be exceeded
ug/m ³	= micrograms per cubic meter	b	Not to be exceeded more than once per year
		c	Not to be exceeded more than twice in seven days
mg/m ³	= milligrams per cubic meter	d	Not to be exceeded more than once in eight hours

PHOTOCHEMICAL OXIDANTS

Photochemical oxidants are produced in the atmosphere when nitrogen oxides and some hydrocarbons are exposed to sunlight. Photochemical oxidants cause irritation to the mucous membranes, damage to vegetation and deterioration of materials. They affect the clearance mechanism of the lungs and alter resistance to respiratory bacterial infections. The national primary air quality standard for photochemical oxidants is based on evidence of increased frequency of asthma attacks for some people on days when hourly averages reach 0.1 ppm. Eye irritation is possible when atmospheric concentrations reach this level.

NITROGEN DIOXIDE

Nitric oxide results from the fixation of nitrogen and oxygen at high temperatures as in fuel combustion. There are several atmospheric reactions which lead to the oxidation of nitric oxide to nitrogen dioxide, and the presence of nitrogen dioxide in ambient air is essential to the production of photochemical oxidants. The presence of nitrogen dioxide in ambient air has been associated with a variety of respiratory diseases.

HYDROCARBONS

Defined as organic compounds composed exclusively of carbon and hydrogen, hydrocarbons are primarily associated with the use of petroleum products. They are the main components of photochemical smog. Hydrocarbons alone have no known effect on human health; therefore the sole purpose of prescribing a hydrocarbon standard is to control photochemical oxidants.

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