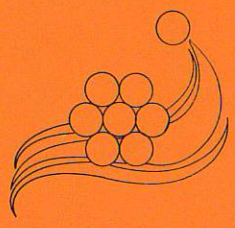
1974
AIR QUALITY DATA SUMMARY

for counties of
KING
KITSAP
PIERCE
SNOHOMISH

measured and compiled by the
Technical Services Division



PUGET SOUND
AIR POLLUTION CONTROL AGENCY

March 5, 1976

TO: Project Administrator

FROM: Chief-Technical Services

SUBJECT: 1975 Air Quality Data Summary

There will be a meeting in my office at 1330, 11 March, 1976 to develop plans for publishing subject document. Suggest Calico, Svoboda and Knechtel be in attendance; others are invited and their ideas are solicited.

Agency management desires that we make some additions and/or improvements to this new edition. Give this some serious thought and be prepared to contribute toward this goal at the meeting.

A. L. Kellogg

ALK:wb

cc: Sr. Meteorologist & Data Analyst
Meteorologist & Systems Analyst

Wind vrs rain ⇒ pollutant dispersion
Standards sheet
CØH description improvement
Minimum CØ description improvement
Seasonal variation breakdown

SUSPENDED PARTICULATE FOR YEAR 1975
(Micrograms per cubic meter)

Location	Area Class	Monthly Arithmetic Averages												No. of Obs.	Arith. Mean	Geo Mea
		J	F	M	A	M	J	J	A	S	O	N	D			
Tolt River Watershed	RUR	4.7	4.4	9.6	13.4	17.5	13.4	27.6	15.5	30.5	5.9	3.8	3.5	53	13	9
Tulalip Test Facility	RUR	16.3	18.0	23.9	26.0	21.9	26.3	32.3	34.4	52.8	16.5	10.4	15.6	55	23	20
Medical-Dental Bldg., Everett	COM	39.1	32.4	41.0	48.3	42.2	36.7	51.8	37.1	60.6	35.8	27.5	32.5	60	41	36
U.S.C.G. Station, Seattle	COM	46.6	58.5	44.5	46.3	37.7	35.5	49.4	36.1	56.6	46.3	53.9	54.4	60	47	41
Food Circus Bldg., Seattle Center	COM	42.8	44.9	43.2	42.0	38.5	40.9	41.7	35.1	58.2	30.2	28.3	43.8	60	41	37
Public Safety Bldg., Seattle	COM	52.6	50.4	61.5	58.4	41.0	39.2	50.9	43.9	61.6	38.5	35.7	52.1	60	49	45
Harbor Island, Seattle	IND	63.8	76.0	97.0	85.5	75.1	79.7	79.0	62.4	92.7	56.3	60.6	65.0	60	75	66
4500 Blk. E. Marg. Way S., Seattle	IND	60.8	72.0	68.2	67.6	61.9	58.3	66.8	45.2	91.4	41.0	55.1	50.4	60	62	53
S. River St. and Maynard, Seattle*	IND	50.5	49.8	76.5	72.0	73.2	60.8	89.6	51.8	108.2	47.5	62.0	31.0	58	66	57
South Park, Seattle	RES	48.3	45.6	56.6	53.8	49.0	48.3	53.1	29.9	81.0	27.7	28.3	41.7	60	47	39
10000 W. Marg. Way S., Seattle	IND	31.7	29.9	46.8	43.0	31.4	36.9	44.7	27.0	55.9	24.2	24.4	34.3	60	36	31
Duwamish Valley, King County	RES	39.0	33.5	47.4	47.8	41.2	37.8	58.1	36.1	63.9	26.7	35.1	45.9	60	43	37
Puget Power Bldg., Bellevue	COM	29.0	27.3	32.2	33.6	23.1	26.8	34.6	25.6	44.5	23.2	19.8	33.3	58	30	27
S.E. Dist. Health Center, Renton	SUB	23.4	30.0	32.1	33.4	30.7	30.1	52.6	40.0	63.1	19.8	16.2	27.7	60	33	27
Municipal Bldg, Renton	COM	33.4	31.7	38.9	42.7	30.1	35.0	65.7	56.0	79.7	34.1	26.0	38.3	60	43	37
Southcenter, Tukwila	COM	41.1	29.7	35.3	39.4	35.4	48.3	50.6	35.8	58.8	26.4	29.8	35.4	60	39	33
McMicken Hts., King County	RES	31.6	27.9	34.4	39.4	33.0	35.0	47.9	29.4	59.6	22.2	21.1	27.3	60	34	30
1234 N. Central Ave., Kent	COM	28.8	23.8	38.6	50.6	48.0	47.9	51.1	32.8	79.4	22.0	28.5	32.7	59	41	32
Main St. & Auburn Ave., Auburn	COM.	35.2	36.7	45.6	47.2	50.0	36.4	50.8	37.9	74.0	27.2	31.3	39.3	59	42	38
Meeker Jr. H.S., Tacoma	RES	22.5	56.1	64.9	64.8	45.7	39.6	47.7	29.0	52.4	24.0	23.3	29.7	56	40	34
2340 Taylor Way, Tacoma[a]	IND			51.2	82.5	79.9	67.8	75.6	42.2	104.4	43.2	42.3	54.1	45	65	53
Tideflats, Tacoma	IND	41.8	49.0	66.1	63.6	60.1	41.2	76.5	54.1	119.6	56.4	57.9	51.3	61	63	53
1241 Cleveland Way, Tacoma[b]	IND			64.8	73.8	60.8	62.0	62.0	43.5	92.4	43.7	33.8	50.4	43	60	54
Fife Sr. H.S., Fife	COM	34.3	36.3	47.6	43.5	40.0	43.7	60.1	32.3	72.4	23.5	26.9	32.5	60	41	33
Cascadia College, Tacoma	RES	31.6	33.6	72.7	62.6	61.9	52.6	64.7	37.8	117.4	27.2	36.4	38.3	61	53	40
Willard Elem. School, Tacoma	RES	41.8	49.1	63.6	54.4	47.7	47.1	51.6	27.9	86.9	32.0	39.4	22.4	60	47	38
Hess Bldg., Tacoma	COM	34.2	39.0	37.4	44.1	34.0	37.4	51.9	40.9	70.7	37.4	43.8	50.5	60	43	38
112th St. S.W. & Lochlea, Lakewood*	RES	28.6	22.4	33.7	31.2	26.6	33.4	42.4	20.4	80.2	27.8	29.4	16.5	60	33	26
N. 26th & Pearl, Tacoma	COM	32.8	34.3	55.5	52.8	55.6	57.3	48.5	32.0	81.5	23.9	29.5	32.8	60	45	35
City Hall, Bremerton*	COM	40.4	36.2	48.2	47.0	53.0	39.6	54.6	35.4	55.4	35.0	34.0	27.8	53	41	37
Dewey Jr. H.S., Bremerton	RES	24.2	22.6	24.6	27.5	22.5	22.8	31.4	21.9	40.9	20.0	19.6	22.2	60	25	22

* Washington State Dept. of Ecology Stations
a Station established
b Station established

SUSPENDED PARTICULATE FOR YEAR 1975
(Micrograms per cubic meter)

Frequency of Concentrations Exceeding Specified Levels
A. Number of observations exceeding 150 μgm/m³
B. Number of observations exceeding 60 μgm/m³
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	A	B	C
Tolt River Watershed			5			4			3			4			5			4			4			5			5			4			5			5					53
Tulalip Test Facility			5			4			6			5			5			5			3			1	3		1	4		5			5			5			2		59
Medical-Dental Bldg., Everett			5		1	4		1	6		1	5		1	5			5		1	5		1	5		2	5		1	5		1	5		1	5			11	60
U.S.C.G. Station, Seattle		1	5		2	4		2	6		1	5			5			5			5			5			1	5		2	5	1	1	5	1	1	5	2	11	60
Food Circus Bldg., Seattle Center		1	5			4		1	6			5			5			5			5			5			2	5			5			5		1	5			5	60
Public Safety Bldg., Seattle		2	5		1	4		2	6		2	5			5			5		2	5			5		2	5			5		1	5		1	5			13	60
Harbor Island, Seattle		2	5		2	4	1	4	6		3	5		3	5		4	5		4	5		2	5		5	5		2	5	1	1	5	1	1	5	3	33	60
4500 Blk. E. Marg. Way S., Seattle		2	5		2	4		3	6		2	5		2	5		2	5		3	5		1	5		4	5			5	1	1	5		1	5	1	23	60
S. River St. and Maynard, Seattle*		2	4		2	4	1	3	6		3	5		4	6		2	5		5	5		2	5		5	5		1	4	1	1	5			4	2	30	59
South Park, Seattle		1	5		1	4		3	6		2	5		1	5		1	5		1	5			5		4	5			5		1	5	1		5			16	60
10000 W. Marg. Way S., Seattle			5			4		1	6		2	5			5		1	5		1	5			5		2	5			5			5	1		5			8	60
Duwamish Valley, King County		1	5			4		1	6		2	5		1	5		1	5		1	5			5		3	5			5		1	5	1		5			12	60
Puget Power Bldg., Bellevue			5			4			6			5			5			4			4			5			5			5			5	1		5			1	58
S.E. Dist. Health Center, Renton			5		1	4		1	6			5			5			5		2	5		1	5		3	5			5			5	1		5			9	60
Municipal Bldg., Renton			5			4		1	6		2	5			5			5		3	5		2	5		4	5			5		1	5	1		5			14	60
Southcenter, Tukwila		1	5			4			6		1	5		1	5		1	5		1	5		1	5		3	5			5		1	5	1		5			11	60
McMicken Hts., King County			5			4			6		2	5			5		1	5		1	5			5		3	5			5			5			5			7	60
1234 N. Central Ave., Kent			5			4		1	6		2	5		1	4		1	5		2	5			5		4	5			5		1	5	1		5			13	59
Main St. & Auburn Ave., Auburn			5			4		2	6		1	5		1	5			5		1	5			5		3	4			5		1	5	1		5			10	59
Mercer Jr. H.S., Tacoma			5		2	4		1	3		2	4		2	5		1	5		1	5			5		1	5			5			5	1		5			11	59
2340 Taylor Way, Tacoma[a]									1		3	5		4	5		2	4		3	5		1	5		5	5		1	5		1	5	1		5			21	43
Tideflats, Tacoma			5		1	4		4	6		3	5		2	5			5		4	5		2	5	1	6	6		2	5	1	1	5		1	5	2	26	62
1241 Cleveland Way, Tacoma[b]								1	1		4	5		2	5		2	5		3	5		1	5		4	5		1	5			2		1	2			19	47
Fife Sr. H.S., Fife			5			4		1	6		2	5		1	5		1	5		1	5		1	5		4	5			5		1	5	1		5			13	60
Cascadia College, Tacoma			5			5		4	6		2	5	1	1	5		1	5		3	5		1	5		5	5			5		1	5	1		5	1		19	60
Willard Elem. School, Tacoma			5		1	4		3	6		2	5		1	5		1	5		1	5			5		4	5			5		1	5			5			14	60
Hess Bldg., Tacoma			5			4			6		1	5			5			5		1	5		1	5		3	5			5		1	5	1		5			8	60
112th St. S.W. & Lochlea, Lakewood*			5			5		1	6			5			5			5		1	5			5		5	5			5		1	5			4			8	60
N. 26th & Pearl, Tacoma		1	5			4		3	6		2	5		1	5		2	5		1	5		1	5		4	5			5		1	5	1		5			17	60
City Hall, Bremerton*			5			4		1	6			2			1			5		1	5			5		2	5			5		1	5		1	5			6	53
Dewey Jr. H.S., Bremerton			5			4			6			5			5			5			5			5			5			5			5			5				60
	14	144		16	118		2	45	170	47	150		1	29	151	24	152		48	151		19	153		1	94	154	10	153		5	21	152	2	24	153	11	391	180

1974
AIR QUALITY
DATA SUMMARY

measured and compiled by the
Technical Services Division

PUGET SOUND
AIR POLLUTION CONTROL AGENCY
410 West Harrison Street
Seattle, Washington 98119

Puget Sound Air Pollution Control Agency

Serving King, Kitsap, Pierce and Snohomish Counties
410 West Harrison Street, Seattle, Washington 98119

Reference copies of this summary have been placed in public and college libraries within the Puget Sound Region. Individual copies are for sale at the Puget Sound Air Pollution Control Agency Seattle Headquarters office. Price: $3.00

Published June 1, 1975
Technical Services Division
(206) 344-7325

PUGET SOUND AIR POLLUTION CONTROL AGENCY

1974

AIR QUALITY DATA SUMMARY

CONTENTS

INTRODUCTION

Presented herein is the air quality and meteorological data collected for the Central Puget Sound Region for the Year 1974. 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 1974 and several analyses and interpretations of the data.

The report contains wind roses for fourteen 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 1974, the Puget Sound Air Pollution Control Agency operated air sampling devices at 28 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.

The telemetry network, consisting of 13 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.

A manual network was operated at 27 stations containing 26 high-volume samplers, one nitrogen dioxide, two oxidant, and one wind sensor. Some stations contained one sampling device, others had several. The high volume samplers operated at fixed intervals under control of electronic timers, and collected particulate matter on specially prepared filter paper. The other devices continuously recorded data on strip chart paper. In all cases, data was reduced manually by qualified technicians.

The tables and graphs presented in this summary are generally self-explanatory. The data shows seasonal and geographic variability. Sufficient suspended particulate data is available to show seven year means at many stations.

CONVERSION TABLE

Air quality standards for gases are defined in terms of micrograms (µg) or milligrams (mg) per cubic meter as well as in parts per million. As this data summary expresses measurements for gaseous pollutants in terms of ppm, the following conversion table is for the convenience of those of our readers who wish to interpret our results in terms of $\mu g/m^3$ or mg/m^3. Conversion factors are extracted from the Federal Register, assuming a pressure of 760 mm Hg and a 25°C temperature.

Pollutant	Multiply PPM by	To Obtain
CO	1.145	mg/m^3
NO_2	1880	$\mu g/m^3$
O_3	1961	$\mu g/m^3$
SO_2	2618	$\mu g/m^3$

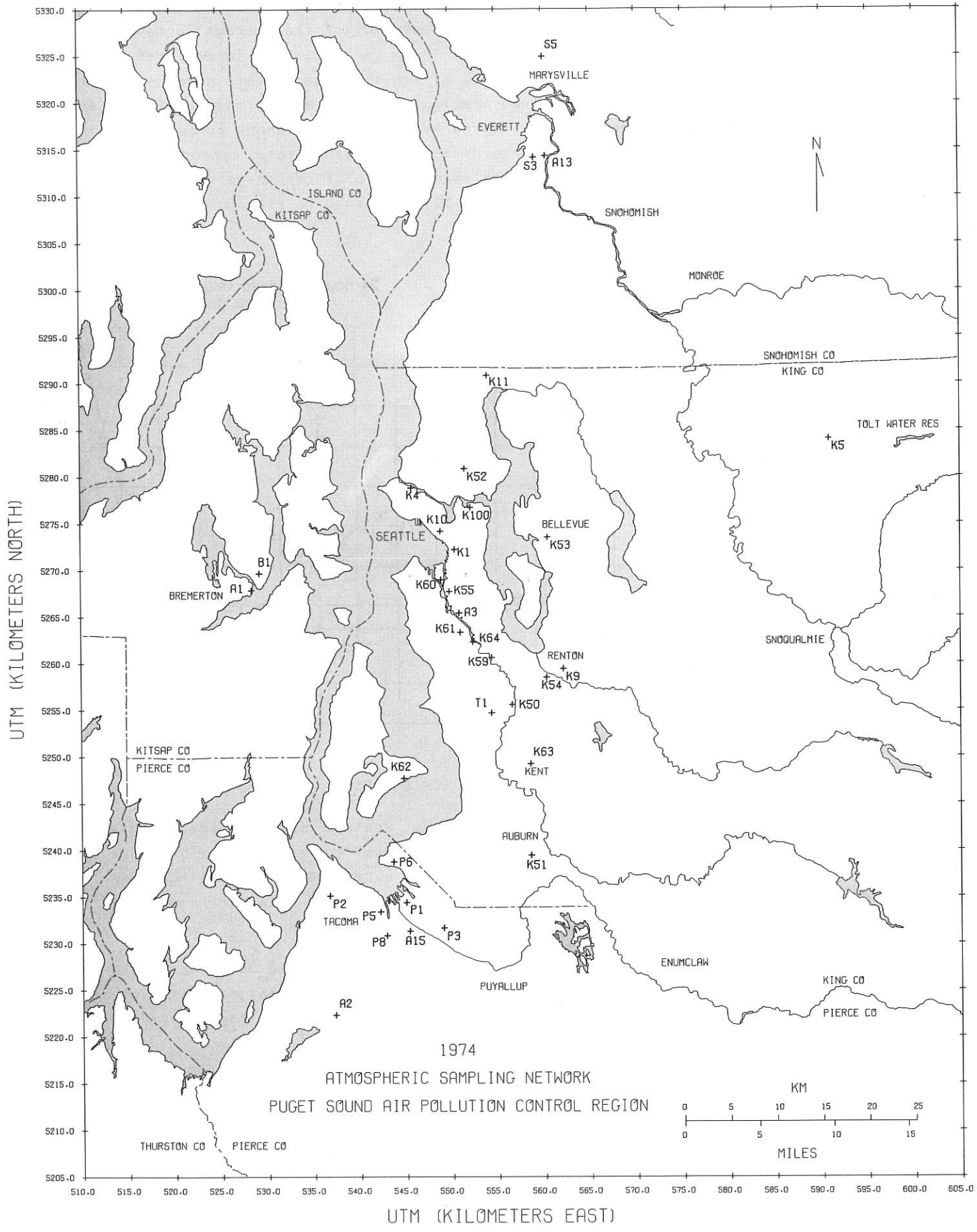
PUGET SOUND AIR POLLUTION CONTROL AGENCY
ATMOSPHERIC SAMPLING NETWORK
1974

Sta. No.	Location	1	2	3	4	5	6	7	8
S 3	Medical-Dental Bldg., 2730 Colby Ave., Everett	×	×	×	×				
S 5	Tulalip Test Facility, Snohomish County	×		×	×				
K 1	Public Safety Bldg., 604 - 3rd Ave., Seattle	×							
K 4	U.S.C.G. Station, 2700 W. Commodore Way, Seattle	×							
K 5	Tolt River Watershed (East of Lake Joy)	×							
K 9	S.E. Dist. Health Center, 12015 S.W. 128th St., Renton	×							
K10	Food Circus Building, Seattle Center	×	×	×	×		×		
K11	Lake Forest Park Rsvr., N.E. 195th & 46th Ave. N.E., Seattle				×				
K50	Southcenter, 401 Andover Park E., Tukwila	×	×	×	×				
K51	115 East Main St. & Auburn Ave., Auburn	×							
K52	Green Lake Rsvr., 12th Ave. N.E. 73rd, Seattle	×	×	×	×				
K53	Puget Power Bldg., 10604 N.E. 4th, Bellevue	×							
K54	Municipal Bldg., 200 Mill Ave. S., Renton	×							
K55	Duwamish, 4500 Blk. E. Marginal Way S., Seattle	×	×	×	×				
K59	Duwamish Valley, 12026 - 42nd Ave. S., King County	×							
K60	Harbor Island, 3400 - 13th Ave. S.W., Seattle	×							
K61	South Park, 723 S. Concord St., Seattle	×							
K62	S.W. 248th & 59th Ave. S.W., Maury Island		×	×	×				
K63	1234 North Central Ave., Kent	×	×	×	×			×	×
K64	10000 W. Marginal Way S.W., Seattle	×		×	×				
K100	NWS Urban Site, 2725 Montlake Blvd. E., Seattle				×				
T 1	McMicken Hts., S. 176th & 42nd Ave. S., King County	×	×	×	×	×	×		
P 1	Mann-Russell Electric, 1401 Thorne Road, Tacoma	×							
P 2	N. 26th & Pearl, Tacoma	×	×	×	×				
P 3	Fife Senior High School, 5616 - 20th E., Fife	×							
P 5	Hess Building, 901 Tacoma Ave., South, Tacoma	×							
P 6	Meeker Jr. H.S., 1526 - 51st St. N.E., Tacoma	×	×	×	×				
P 8	Willard Elem. School, S. 32nd & S. "D" St., Tacoma	×	×	×	×				
B 1	Dewey Jr. H.S., Perry Ave. & Holman St., Bremerton	×	×	×	×				
A13	Everett Ave. & Pine St., Everett	×							
A03	Duwamish, 6770 E. Marginal Way S., Seattle	×							
A15	Cascadia College, 2002 E. 28th St., Tacoma	×							
A02	112th St. S.W. & Loch Lea, Lakewood	×							
A01	City Hall, 239 - 4th St., Bremerton	×							

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

TYPE OF SAMPLING

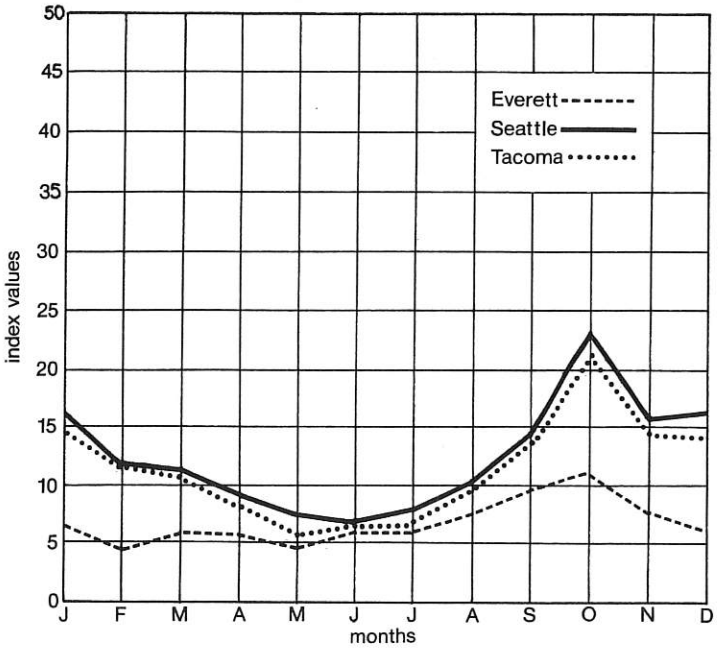
1. High-Volume Sampler
2. Sulfur Dioxide (SO_2)
3. Soiling Index (COH)
4. Wind Speed & Direction
5. Nitrogen Dioxide (NO_2)
6. Total Oxidant
7. Nephelometer
8. Ozone


S5
MARYSVILLE
EVERETT
S3
A13
N
ISLAND CO
KITSAP CO
SNOHOMISH
MONROE
SNOHOMISH CO
KING CO
K11
TOLT WATER RES
K5
K52
K4
K10
K100
SEATTLE
BELLEVUE
K53
K1
B1
A1
BREMERTON
K60
K55
A3
K61
K64
K59
RENTON
K9
K54
T1
K50
SNOQUALMIE
KITSAP CO
PIERCE CO
K62
K63
KENT
AUBURN
K51
P6
P2
P5
P1
TACOMA
P8
A15
P3
ENUMCLAW
PUYALLUP
KING CO
PIERCE CO
A2
1974
ATMOSPHERIC SAMPLING NETWORK
PUGET SOUND AIR POLLUTION CONTROL REGION
KM
0 5 10 15 20 25
0 5 10 15
MILES
THURSTON CO
PIERCE CO
UTM (KILOMETERS NORTH)
5330.0 5325.0 5320.0 5315.0 5310.0 5305.0 5300.0 5295.0 5290.0 5285.0 5280.0 5275.0 5270.0 5265.0 5260.0 5255.0 5250.0 5245.0 5240.0 5235.0 5230.0 5225.0 5220.0 5215.0 5210.0 5205.0
510.0 515.0 520.0 525.0 530.0 535.0 540.0 545.0 550.0 555.0 560.0 565.0 570.0 575.0 580.0 585.0 590.0 595.0 600.0 605.0
UTM (KILOMETERS EAST)

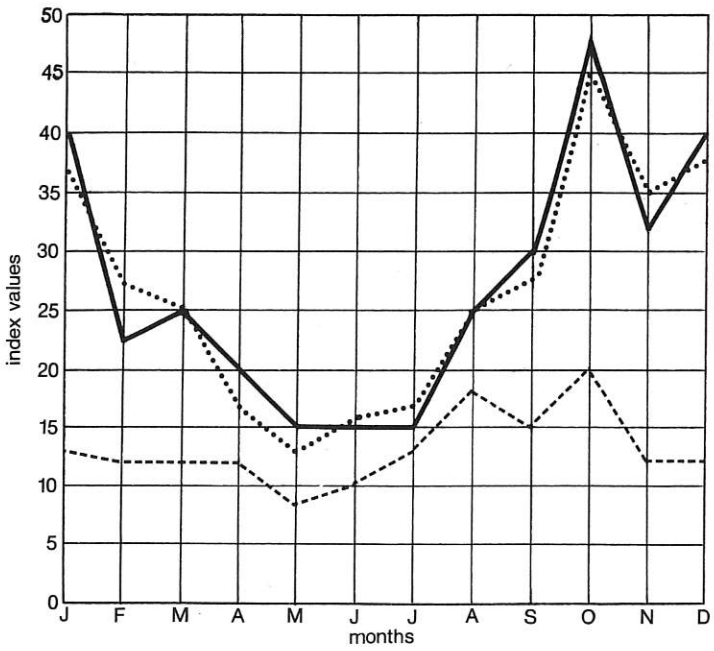
AIR QUALITY INDEX

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.

Monthly arithmetic mean for each area during 1974



24-hour maximum value by month for each area during 1974



AIR STAGNATION ADVISORIES

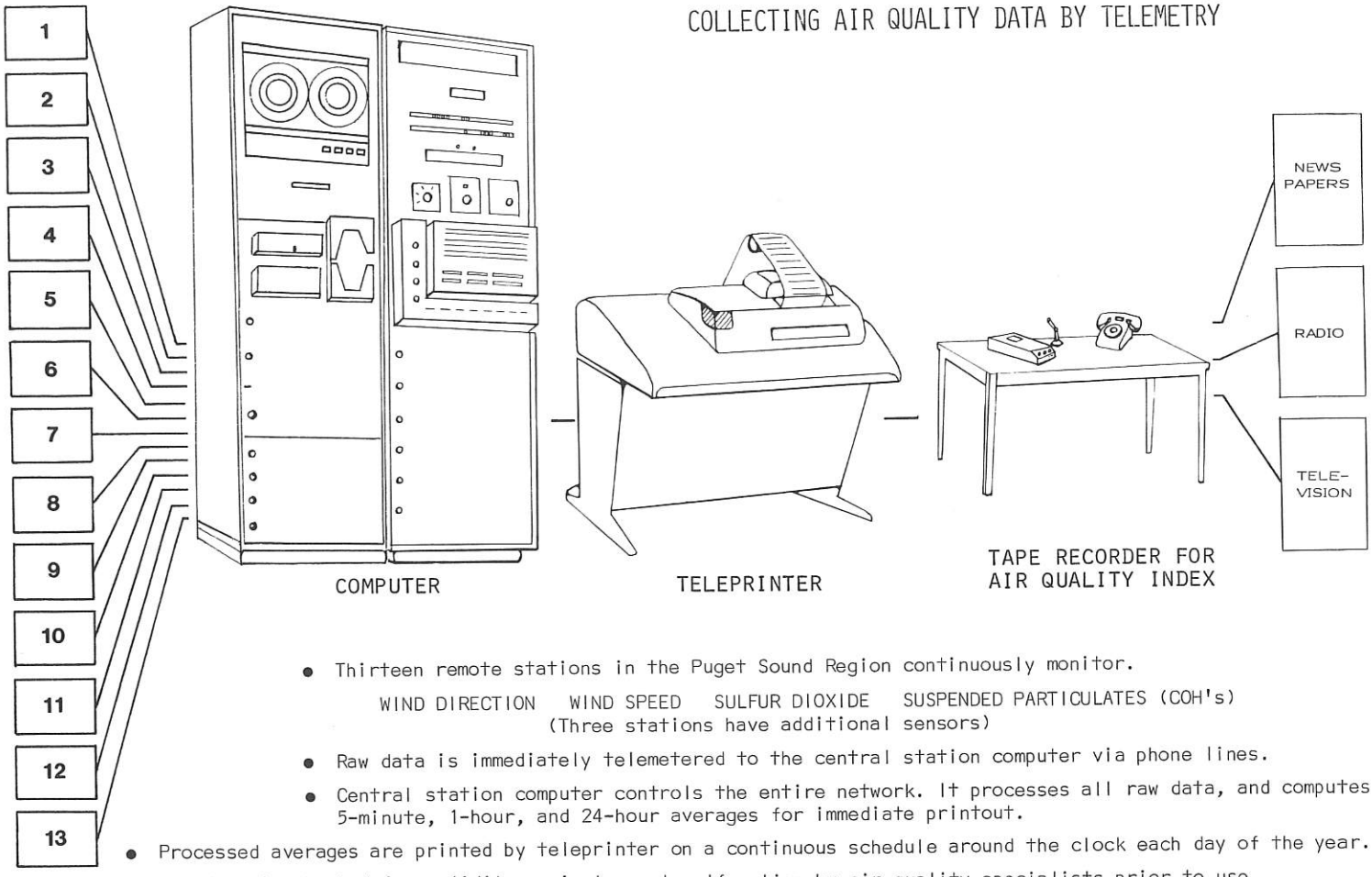
Air stagnation advisories are issued by the National Weather Service when stagnant atmospheric conditions exist and these conditions are forecast to continue for 24 hours or more. During October 1974, two such advisories were issued by the National Weather Service; one for 4:00 p.m. October 15 through 1:00 p.m. October 19, and the other for 1:00 p.m. October 23 through 1:00 p.m. October 25.

The table below lists the maximum Air Quality Index value recorded on each day the advisories were in effect. These values were recorded in the City Center/Industrial areas and consequently were higher than the residential and rural sections of Puget Sound. The alert level, an index of 50, was not reached.

MAXIMUM AIR QUALITY INDEX VALUES

1974	OCT 15	OCT 16	OCT 17	OCT 18	OCT 19	OCT 23	OCT 24	OCT 25
EVERETT	17	18	20	12	18	12	15	20
SEATTLE	37	48	43	33	33	37	35	37
TACOMA	35	45	40	32	35	35	37	38

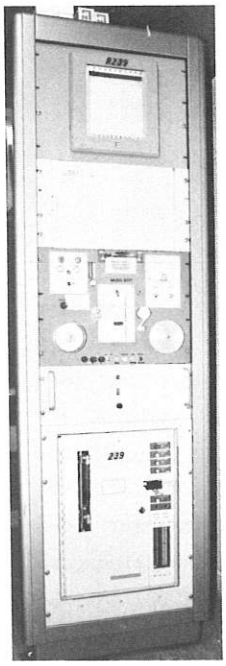
COLLECTING AIR QUALITY DATA BY TELEMETRY



- Thirteen remote stations in the Puget Sound Region continuously monitor.

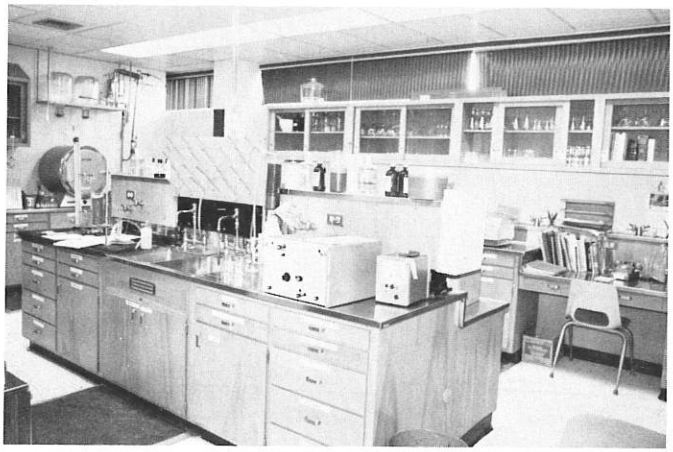
  WIND DIRECTION WIND SPEED SULFUR DIOXIDE SUSPENDED PARTICULATES (COH's)
  (Three stations have additional sensors)

- Raw data is immediately telemetered to the central station computer via phone lines.
- Central station computer controls the entire network. It processes all raw data, and computes 5-minute, 1-hour, and 24-hour averages for immediate printout.
- Processed averages are printed by teleprinter on a continuous schedule around the clock each day of the year.
- All data is checked for validity or instrument malfunction by air quality specialists prior to use.
- Data is used to evaluate the attainment of ambient air quality standards and the effectiveness of the control plan; to maintain real-time surveillance for episode avoidance; and to report an air quality index to the public.
- After validation and elimination of erroneous data, the data is processed by off-line computer to provide a monthly summary containing the specific hourly averages, daily maximum, minimum, and mean, monthly arithmetic and geometric means, excesses of standards and pertinent identifying information.
- Permanent data files stored on magnetic tape or disk allow rapid retrieval for correlation with other data, trend analyses, atmospheric modeling, land use planning, and special studies.
- Nontelemetered data from semiautomatic instruments is manually reduced, punched on cards, processed, printed, and stored in similar permanent files for rapid retrieval.

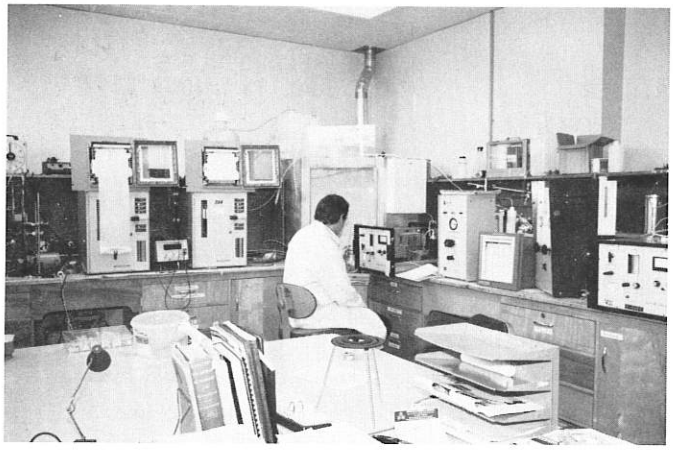


On the left is one of the thirteen basic remote station equipment cabinets housing the sulfur dioxide monitor, the wind speed and direction signal conditioner and translator, the tape sampler for suspended particulates measured as COH (soiling index) and the telemetry electronics. The anemometer, wind direction sensor, and probes for SO_2 and COH are installed to obtain representative samples in the ambient air. Each station has a capability of fourteen separate sensors. One station is presently equipped with six sensors while two stations will be equipped with twelve sensors each in early 1975. Other stations will continue to operate with either three or four sensors.

On the right is the central station computer whose functions are described above. One equipment rack contains the magnetic tape recorder and high speed paper tape reader; the 24K byte computer and telemetry interface electronics are in the other equipment rack. Next to it is a console printer which also serves as a standby system printer. The large teletype console prints the processed data and also contains a paper tape punch and reader. At the extreme right is a weather teletype.

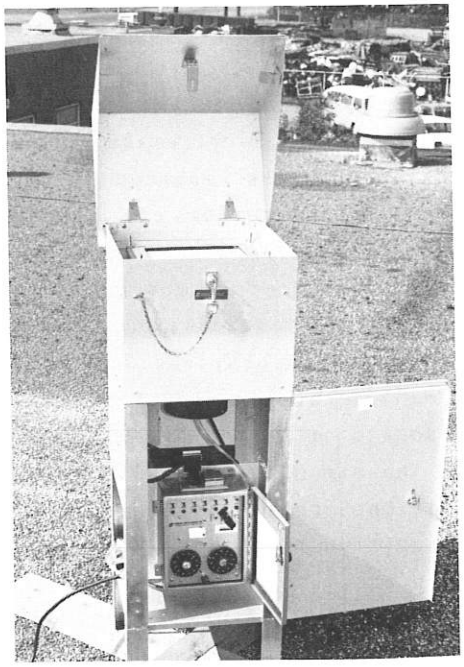


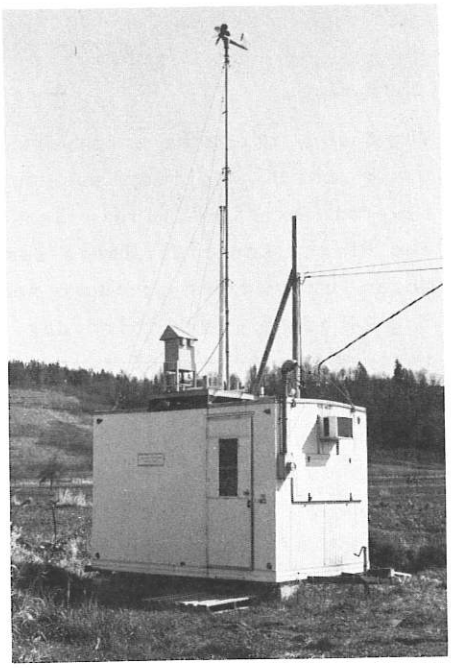
Collection of valid data requires extensive support from both the chemical and the instrument calibration laboratories. On the left is the Agency chemical laboratory. Here chemicals and gases are prepared for use in calibration of gas sampling equipment and are analyzed after calibration; filters for measurement of suspended particulates are conditioned and weighed; photomicrographs are made of pollution specimens undergoing microscopic analysis; spectrophotometric calibration is performed on neutral density filters used in the calibration of tape samplers; gravimetric, limited organic, and inorganic analysis is completed on industrial stack samples, etc.



All equipment requires calibration at scheduled intervals and/or after most repair work. On the left, a technician is calibrating one of a pair of Meloy Sulfur Analyzers. A pair of Davis Sulfur Dioxide Monitors and their recorders to his left are in the final phase of calibration prior to field installation. To his right are a hydrogen generator, a strip chart recorder, a second hydrogen generator and a Meloy Sulfur Analyzer. These instruments are calibrated in pairs using procedures outlined in the Federal Register.

Instrumentation in the Seattle City Light trailer described on the next page is shown at left and right above. At left, at the top of the first rack is a multipoint recorder which provides backup recording of all data except COH, wind and suspended particulates by high volume sampler. Below the recorder is a tape sampler with flow regulator for measuring COH. In the second rack is the remote delta-temperature device, the NO-NO_2-NOx instrument and the SO_2 instrument. The third rack contains the electronics for two levels of wind and the telemetry hardware for all measurements except suspended particulates collected by high volume sampler. At the right is another view of the instrument racks described above. Resting on the counter is a gas chromatograph for monitoring HC and CO together with its bottled pure air supply. Between the instrument racks and gas chromatograph is a cabinet housing bottled hydrogen for the SO_2 instrument and gas chromatograph.



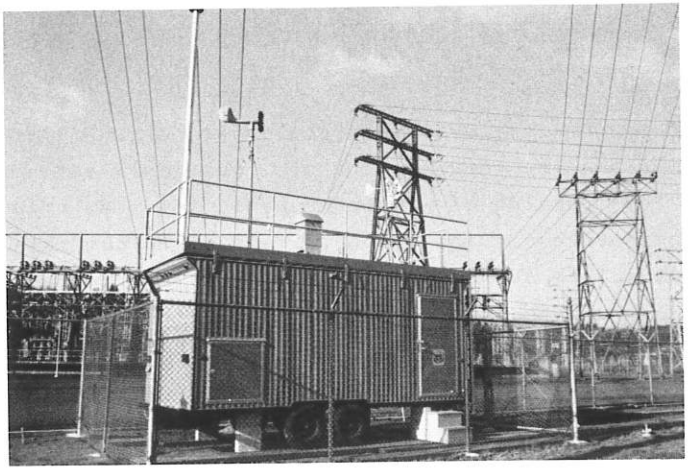


Above is a high volume air sampler used for measuring suspended particulates. This instrument, open for illustrative purposes, contains a specially prepared filter in the top portion of the protective cabinet and an electric timer at the base. This instrument is normally operated for a 24-hour period and will collect particulates as small as 0.3 microns with 99.7% efficiency. A micron is 0.001 millimeters or 0.000039 inches.

Most of the Agency equipment is located in schools, fire stations, city halls and commercial structures. In some areas, structures do not exist or do not meet the siting criteria. In these areas, trailers or portable buildings must be used as shelters for sampling equipment. At the top center is a portable building used at the McMicken Heights Reservoir, near SEA-TAC Airport. Visible on the roof are the total oxidant sampler, the high volume sampler, the wind sensing equipment, and the probes for SO_2, COH (tape sampler) and NO_2. Inside are the analyzers and the telemetry electronics.

On the top right is a portable building used at Kent. On the roof are the high volume sampler, the wind sensing equipment and probes for bringing air to the analyzers. This station measures SO_2, Ozone, COH, b_{scat} (a measure of light scatter by aerosols), wind speed, direction and suspended particulates by high volume sampler. All the data except suspended particulates measured by the high volume sampler are telemetered.

Below is one of two trailers owned by Seattle City Light and operated by the Agency. These well instrumented special purpose units provide environmental information for Seattle City Light at a power substation in the Duwamish Basin Industrial area and at a site near Marysville. Measurements include HC, CO, NO, NO_2, NOx, SO_2, COH, delta-temperature, wind and suspended particulates. All data is telemetered except suspended particulate measured by high volume samplers. These stations went into partial operation during the latter half of 1974 and will be fully operational by mid-1975. Consequently only limited data on suspended particulates as measured by tape sampler and high volume sampler are reported in the annual summary for 1974.



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 20 stations have acquired at least four years of data through the end of 1974; two Seattle area stations have been operating continuously since February, 1965 thus accumu ating ten 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 paterns 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 1974 suspended particulate data in several formats which interpret and analyze the data in different ways.

Summarized suspended particulate data from previous years in graphic and tabular form are included to indicate spatial and temporal variations and trends. These tables, graphs, and charts are:

The 1973 and 1974 annual geometric mean isopleth maps indicate the horizontal distribution of suspended particulates throughout the region. The value for any given location may be easily interpolated and assessed with respect to the annual standard of 60 micrograms per cubic meter (geometric mean). The development of these annual average isopleth maps require the input of (1) measured air quality data, (2) meteorological conditions, (3) topographic influences, i.e., land, water, valleys and hills, (4) demography of the area, and (5) the particulate emissions of all sources. These maps delineate the areas which exceed the standard and provide information on the change from one calendar year to the next.

An analysis technique which allows a reasonable determination of 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 identifying each resultant value with the ending month for the particular 12 month interval. These values may be easily plotted on a graph to depict observed concentrations which relate directly to the annual standard. As more and more years of data are acquired at a sampling station the power of the technique to portray a trend is enhanced.

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.

These analysis techniques were applied to suspended particulate monitoring stations in the Puget Sound region which had acquired at least two years of data through the end of 1974. The longer moving geometric means were applied as the data base permitted.

Data has been acquired continuously at the Public Safety Building in Seattle since February, 1965. The 12 month moving geometric mean plot (page 19) 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 July to November 1974 indicates a sharp upward trend.

The other Seattle area station with about ten years of data is located at 2700 West Commodore Way. The 12 month moving geometric mean plot (page 19) indicates a long-term downward trend with values generally below the annual standard except for an upturn during 1973. In February 1974, a reversal of the short-term uptrend occurred and is sustained for the remainder of the year. The 24 and 36 month moving geometric mean graphs more clearly depict the long-term downward trend which appears to level off during the past two years.

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 20) 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 tideflats in

Tacoma. The 12 month moving geometric mean for the station on Thorne Road (tideflats) in Tacoma (page 20), which has been operating since August, 1967, demonstrates a decrease into 1972 followed by an increase in 1973 and a decrease the first half of 1974. 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.

Another station just south of the tideflats but influenced by emissions from this source area, shows a similar pattern exhibiting greater extremes over the past three years. Located at 2002 E. 28th Street, Tacoma, this station has been operational only since February 1970. The 12 month moving geometric mean trace (page 24) depicts a rapid climb from December 1971 to January 1973, then a decrease at about the same rate until August 1974, and then a rise to the end of the year. The 36 month moving geometric mean trace indicates a fairly steady long-term trend at a value of about 73 micrograms per cubic meter.

A station was operated in the Duwamish Valley at 3224 - 4th Ave. S. (Page 21) from February 1965 through February 1970. Because a local source biased the results, the station was relocated to another area. Note that 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 21) initially shows values averaging about 77 micrograms per cubic meter. Then the values decrease from mid-1973 to the annual standard in mid-1974, and increase again during the last half of 1974. The 24 month moving geometric mean plot shows a slight downward trend.

Sufficient data was available for a 12 month moving geometric mean plot for another Duwamish station at 6770 E. Marginal Way S., approximately one mile south of the station just described. This station exhibiting an irregular sawtooth pattern averaging well above 100 micrograms per cubic meter, appears to show unusual up and down influence and appears, between the peaks and lows for the past 18 months, to level off. However, due to the relatively short period of data, no assessment can be made about the long-term trend at this station.

The 12 month moving geometric mean for the Auburn station indicated a fairly steady climb from January 1972 to December 1973, and at that time exceeded the annual standard for suspended particulates. During 1974 there was a general decrease. Both the 24 and 36 month moving geometric mean plots depict a fairly level long-term trend.

Analysis of data acquired at 13 other suspended particulate monitoring stations includes the communities of Bellevue, Renton, Marysville, Everett and Bremerton in addition to other sites in the greater Seattle and Tacoma areas. The values at all of these stations are below the annual standard. The graphs for two stations in the Renton area (page 26) and one station in Marysville (page 27) show some evidence of a slight downward trend; data from the communities of Bellevue, Everett, and Bremerton reflect reasonably constant levels. Most of the graphs for the additional sites in the greater Seattle and Tacoma areas 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 tideflats 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 1974
(Micrograms per cubic meter)

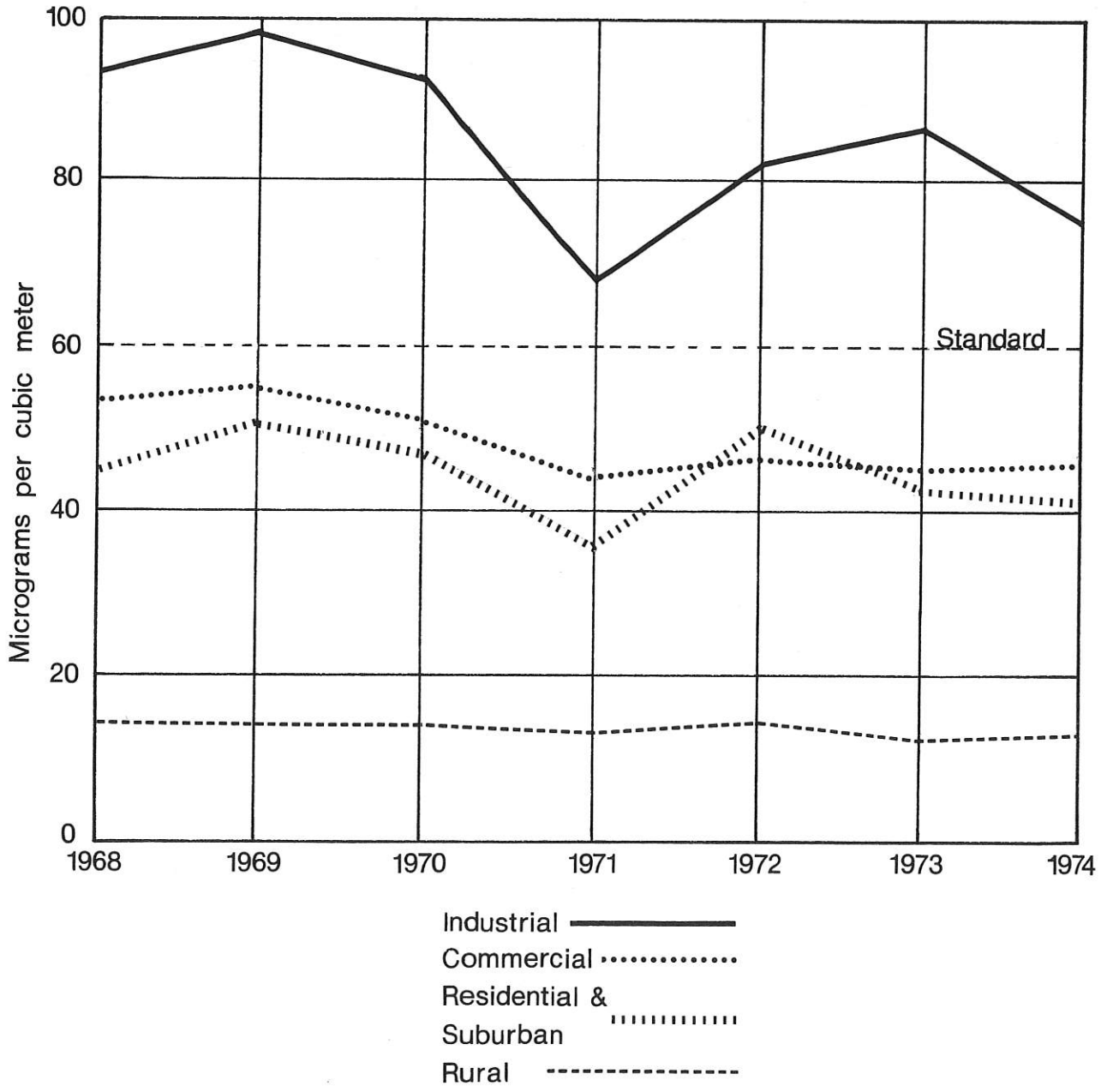
Location	Area Class	Monthly Arithmetic Averages												No. of Obs.	Arith. Mean	Geo. Mean
		J	F	M	A	M	J	J	A	S	O	N	D			
Tolt River Watershed, East of Lake Joy	RUR	13.4	6.5	14.4	6.1	11.0	19.7	26.6	39.5	27.0	25.2	9.0	9.9	57	18	13
Tulalip Test Facility, Snohomish County	RUR[b]										57.6	15.0	14.7	15	26	18
Everett and Pine St., Everett	RES[a,c]	69.6	38.0	60.8	44.5									19	54	43
Medical-Dental Bldg., 2730 Colby Ave., Everett	COM	39.1	33.2	47.2	47.1	39.6	41.6	39.3	55.3	67.8	64.2	37.7	28.7	61	45	40
USCG Sta., 2700 W. Commodore Way, Seattle	COM	91.2	72.1	48.6	47.4	52.1	35.8	37.7	39.6	59.2	65.2	55.6	71.6	61	57	50
Food Circus Bldg., Seattle Center	COM	22.9	48.9	55.5	45.2	43.8	40.3	37.4	56.7	68.6	66.5	39.1	50.9	59	49	45
Public Safety Bldg., 604-3rd Ave., Seattle	COM	50.4	52.7	70.8	65.8	55.1	46.9	43.5	73.8	113.1	141.8	77.5	72.1	62	72	63
Harbor Island, 3400-13th Ave., S.W., Seattle	IND	114.4	62.0	79.1	90.0	56.8	73.9	57.0	118.9	144.1	122.1	72.2	74.1	65	91	77
Duwamish, 4500 Blk. E. Marg. Way S., Seattle	IND	122.5	57.6	71.6	75.1	56.8	56.1	44.6	98.3	124.1	106.0	52.4	64.0	65	80	68
Duwamish, 6700 Blk. E. Marg. Way S., Seattle	IND[a]	176.0	126.2	167.0	173.4	182.2	98.4	60.2	90.5	134.3	183.5	53.6	59.0	58	128	102
South Park, 723 S. Concord, Seattle	RES[b]		22.4	49.2	66.0	43.3	63.8	30.0	70.3	101.8	87.5	50.6	50.2	56	60	50
Duwamish, 10000 W. Marg. Way, Seattle	IND[b]							45.1	85.1	127.9	105.6	33.1	50.4	31	78	60
Duwamish Valley, 12026-42nd Ave.S. King Co.	RES	72.3	42.6	52.4	47.0	36.3	44.4	32.6	67.9	96.5	71.8	42.7	55.6	61	56	48
Puget Power Bldg. 10604 N.E. 4th, Bellevue	COM	37.8	31.6	37.3	31.0	35.0	30.0	31.1	41.1	42.7	41.9	23.7	33.3	61	35	32
S.E. Dist. Health Center, Renton	SUB	20.7	26.3	39.9	39.5	29.9	36.5	27.9	56.9	68.8	54.3	26.0	34.7	60	39	33
Municipal Bldg., 200 Mill Ave. S., Renton	COM	42.9	41.6	45.8	35.1	41.5	40.5	33.0	68.2	80.4	66.3	33.9	54.9	61	49	43
Southcenter, Andover Park E., Tukwila	COM[b]											35.9	42.8	11	40	36
McMicken Hts., 176th & 42nd S., King Co.	RES	28.1	30.0	39.0	39.0	29.9	39.3	33.0	98.2	59.4	68.3	32.2	38.2	55	41	35
1234 N. Central Ave., Kent	COM[b]						49.4	43.4	91.1	117.5	75.8	40.4	43.4	33	67	53
115 East Main St. & Auburn Ave., Auburn	COM	76.8	63.0	40.2	46.9	46.5	55.1	37.8	89.6	72.0	67.6	36.8	56.4	61	57	51
Meeker Jr. H.S., 1526-51st St. N.E., Tacoma	RES	56.8	33.6	40.2	31.3	37.4	35.5	29.0	74.4	62.2	61.3	27.9	44.5	61	45	38
Mann-Russell Elec., 1401 Thorne Rd., Tacoma	IND	76.3	72.6	65.9	77.3	58.7	61.8	68.4	130.1	124.8	94.6	67.6	73.3	61	81	69
Fife Sr. H.S., 5616-20th E., Fife	COM	57.6	36.6	48.7	44.6	33.8	49.9	47.0	85.4	77.7	69.5	38.2	58.1	61	54	44
Cascadia College, 2002 E. 28th St., Tacoma	RES[a]	106.0	30.0	90.0	69.8	143.0	66.7	54.4	170.6	130.8	127.2	34.8	52.0	54	86	58
Willard Elem. School, Tacoma	RES	84.2	31.0	58.8	58.1	36.1	53.2	46.5	107.6	100.0	102.8	37.8	55.0	61	64	49
Hess Bldg., 901 Tacoma Ave., Tacoma	COM	83.7	31.0	48.6	36.8	39.8	34.1	30.7	64.3	76.2	92.2	33.4	45.2	60	52	42
112th St. S.W. & Loch Lea, Lakewood	RES[a,b]					31.0	46.8	23.8	63.0	60.4	71.8	25.8	36.0	37	47	37
N. 26th & Pearl St., Tacoma	COM	46.1	37.5	29.1	54.1	40.6	62.9	40.7	89.1	90.4	88.5	27.5	41.7	60	54	41
City Hall, 239-4th St., Bremerton	COM[a]	29.8	32.2	36.8	34.2	30.5	28.8	29.0	45.2	45.4	59.8	37.3	26.0	53	36	33
Dewey Jr. H.S., Bremerton	RES	28.0	18.6	29.2	20.9	19.2	20.9	19.4	29.5	41.4	42.3	25.4	30.3	60	27	24

a Washington State Dept. of Ecology Stations
b Station established during 1974
c Station discontinued during 1974

STANDARDS: (24-hour & annual)
150 µg/m³ 24-hour average not to be exceeded more than once per year.
60 µg/m³ annual geometric mean never to be exceeded.

SEVEN-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 ($\mu g/m^3$)

	Location	1968	1969	1970	1971	1972	1973	1974
Industrial	3224 - 4th Avenue S., Seattle	101	108	118*				
	4500 Blk. E. Marg. Way S., Seattle				68*	81	68	68
	4600 Blk. E. Marg. Way S., Seattle			78				
	6770 E. Marg. Way S., Seattle**					97*	111	102
	Harbor Island, Seattle							77
	10000 W. Marg. Way S., Seattle							60*
	Mann-Russell Electric, Tacoma	87	90	82	67	71	82	69
	ANNUAL AVERAGE	94.0	99.0	92.7	67.5	83.0	87.0	75.2
Commercial	School Dist. Office, Marysville	49	57	54	36	50	43*	
	709 Broadway, Everett	45	38	45*				
	Medical-Dental Bldg., Everett			54	42	50	38	40
	Public Safety Bldg., Seattle	68	71	57	59	59	58	63
	U.S.C.G. Station, Seattle	56	53	45	42	38	55	50
	Food Circus Bldg., Seattle Center	49	56	50	44	45	36	45
	Main St. & Auburn Ave., Auburn			56	52	55	63	51
	Puget Power Bldg., Bellevue			36	36	40	35	32
	Municipal Bldg., Renton			61	43	44	42	43
	1234 N. Central Ave., Kent							53*
	Fife Sr. H.S., Fife, Wa.	66	65	51	41	44	43	44
	Hess Bldg., Tacoma		58	61	48	47	49	42
	N. 26th & Pearl, Tacoma	40	46	50	40	44	42	41
	Clover Park Educ. Center, Tacoma	48	48	43*				
	City Hall, Bremerton**		39	33	53	41	31	33
	ANNUAL AVERAGE	52.6	54.7	51.0	43.9	46.4	44.6	44.8
Residential & Suburban	Everett & Pine, Everett**					60	53	
	5960 Rainier Ave. S., Seattle	56	61	66*				
	Duwamish Valley, King Co.							48
	South Park, Seattle							50
	McMicken Heights, King Co., Wa.					42*	35	35
	14822 Bellevue-Redmond Rd., Bellevue	42	46	39*				
	S.E. Dist. Health Center, Renton	38	45	35	29	36	31	33
	100 - 30th N.E., Auburn	45	51	37*				
	Meeker Jr. H.S., Tacoma			74	54	44	38	38
	Cascadia College, Tacoma**			66	62	94	66	58
	Willard Elem. School, Tacoma						51	49
	112th St. S.W. & Loch Lea, Lakewood, Wa.**							37*
	Dewey Jr. H.S., Bremerton			28*	25	27	25	24
	ANNUAL AVERAGE	45.2	50.8	46.5	36.0	50.5	42.7	41.3
Rural	Tolt River Watershed	14	14	14	13	14	12	13

* Data base for geometric mean less than 9 months.
** Washington State Department of Ecology stations.

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

SUSPENDED PARTICULATE FOR YEAR 1974
(Micrograms per cubic meter)

Frequency of Concentrations Exceeding Specified Levels

A. Number of observations exceeding 150 $\mu g/m^3$
B. Number of observations exceeding 60 $\mu g/m^3$
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	A	B	C
Tolt River Watershed			5			5			5			5			3			6			4			5			5			5			4			5			57
Tulalip Test Facility[a]																												1	4			5			6		1	15
Everett & Pine, Everett[b] *		2	5			5		2	5		1	4																									5	19
Medical-Dental Bldg., Everett		1	5			5		2	5		1	5			5			5			5		2	5		4	5		3	5		1	5			6		14	61
U.S.C.G. Station, Seattle	2	3	5		3	5		1	5		1	5		2	5			5			5			5		2	5		2	5		1	5	4	6	2	19	61
Food Circus Bldg., Seattle Center			3		1	5		2	5		1	5		1	5			5			5		1	5		3	5		2	5			5	1	6		12	59
Public Safety Bldg., Seattle		1	6		1	5		3	5		2	5		1	5			5			5		4	5	1	4	5	2	5	5		3	5	4	6	3	28	62
Harbor Island, Seattle	2	5	7		3	5		3	5	1	3	5		3	5		2	5		2	5	1	4	5	2	6	6	2	5	6		3	5	4	6	8	43	65
4500 Blk. E. Marg. Way S., Seattle	2	4	6		2	5		2	5		2	5		3	5		1	5		1	5	1	5	5	2	6	6	1	6	7		1	5	2	6	6	35	65
6700 E. Marg. Way S., Seattle*	3	3	5	1	4	5	3	4	5	2	5	5	3	5	5	1	3	5		2	5		4	4	2	5	5	3	5	5		2	5	2	4	18	44	58
South Park, Seattle[e]						3		2	5		2	5		1	5		3	5			5		4	5		5	5		4	7		2	5	2	6		25	56
10000 W. Marg. Way S., Seattle[d]																			1	3		4	5	2	5	5	2	4	7			5	2	6	4	16	31
Duwamish Valley, King County		3	5		1	4		2	5		2	5			5		1	5			4		3	5		5	5		4	7		1	5	2	6		24	61
Puget Power Bldg., Bellevue		1	5			5			5			5		1	5			5			5			5			5		1	5			5			6		3	61
S.E. Dist. Health Center, Renton			4			5		1	5			5			5			5			5		3	5		4	5		2	5			5	1	6		11	60
Municipal Bldg., Renton		2	5		1	5		2	5			5			5			5			5		4	5		3	5		3	5			5	2	6		17	61
Southcenter, Tukwila[e]																																	5	1	6		1	11
McMicken Hts., King County			5			5		1	5		1	5			5			5		1	5		2	2		1	2		2	5			5		6		8	55
1234 N. Central Ave., Kent[f]																		2		1	5		5	5	2	4	5		3	5		1	5	2	6	2	16	33
Main St. & Auburn Ave., Auburn		3	5		2	5		0	5		1	5			5		2	5		1	5		5	5		4	5		3	5			5	2	6		23	61
Meeker Jr. H.S., Tacoma		2	5		1	5		2	5			5			5			5			5		5	5		3	5		3	5			5	1	6		17	61
Mann-Russell Elec., Tacoma	1	2	5		2	5		3	5		3	5	3	5	5		2	5		3	5	1	5	5	2	4	5		4	5	1	1	5	4	6	5	36	61
Fife Sr. H.S., Fife		3	6		1	4		2	5		2	5		1	5		2	5		1	5		4	5		4	5			5			5		3	6		27	61
Cascadia College, Tacoma*	2	2	5		1	5	1	2	5		4	5					1	3		2	5	4	5	5	3	4	5	3	3	5		1	5	2	6	13	27	54
Willard Elem. School, Tacoma	2	3	5			5		2	5		3	5			5		2	5		2	5	1	5	5		4	5	1	3	5		1	5	3	6	4	28	61
Hess Bldg., Tacoma	1	4	5			5		2	5			5		1	5			4		1	5		3	5		3	5	1	3	5			5	1	6	2	18	60
112th St. S.W. & Loch Lea, Lakewood[g]*															1			5			5		2	5		2	5		3	5			5	1	6		8	37
N. 26th & Pearl, Tacoma		2	5		1	5		1	5		2	5			5		3	5		1	5		5	5		4	5		3	5			5	1	5		23	60
City Hall, Bremerton*			5			4			5			5			4			4			5			4		1	5		2	4			3		5		3	53
Dewey Jr. H.S., Bremerton			5			5			5			5			5			5			5			4		1	5			5			6			1	60
All-Station Totals	15	46	122	1	24	120	4	41	125	3	36	124	3	22	113	1	22	124		19	131	8	84	130	16	90	133	15	83	147	1	19	142		47	169	67	533	1580

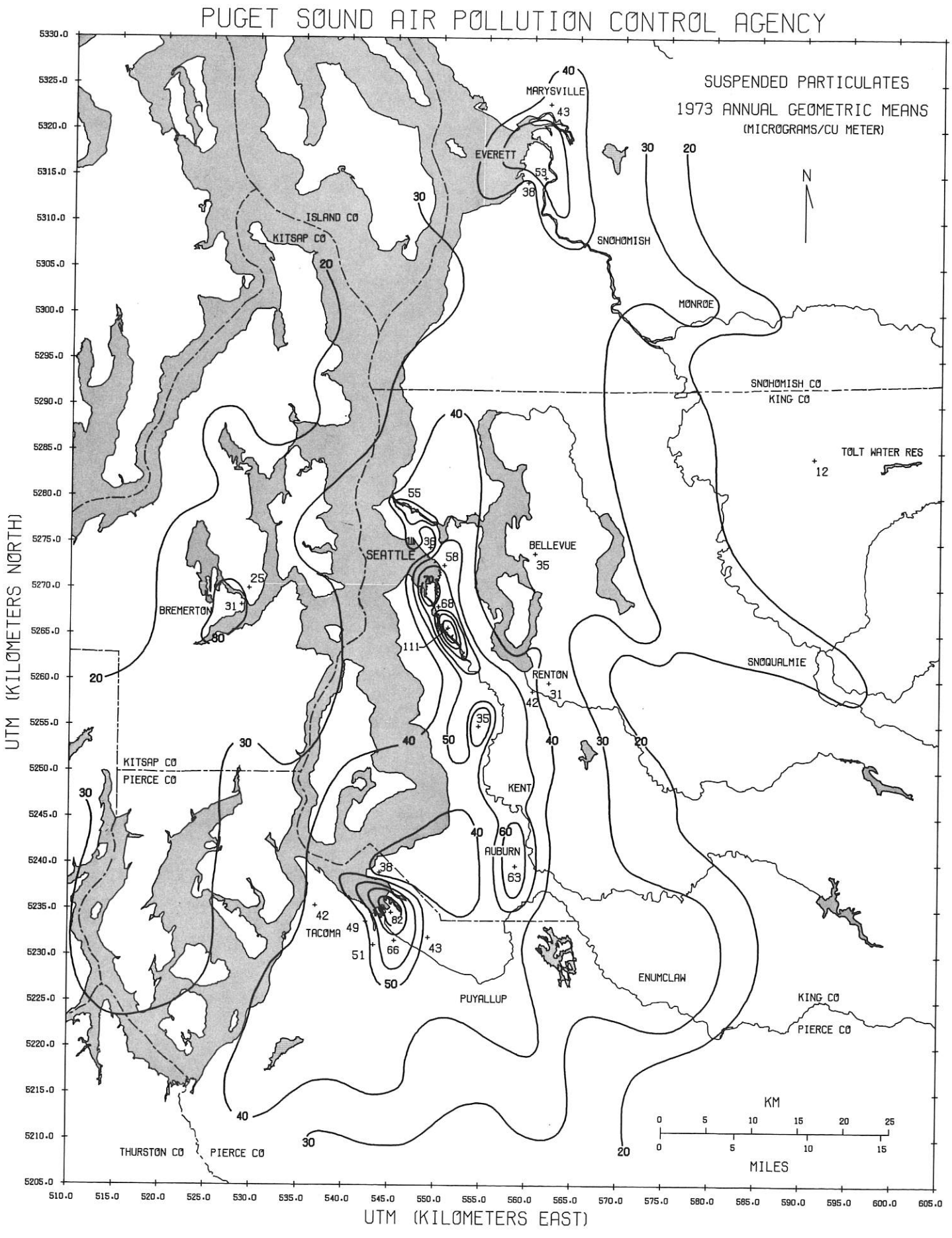
* Washington State Department of Ecology Stations.

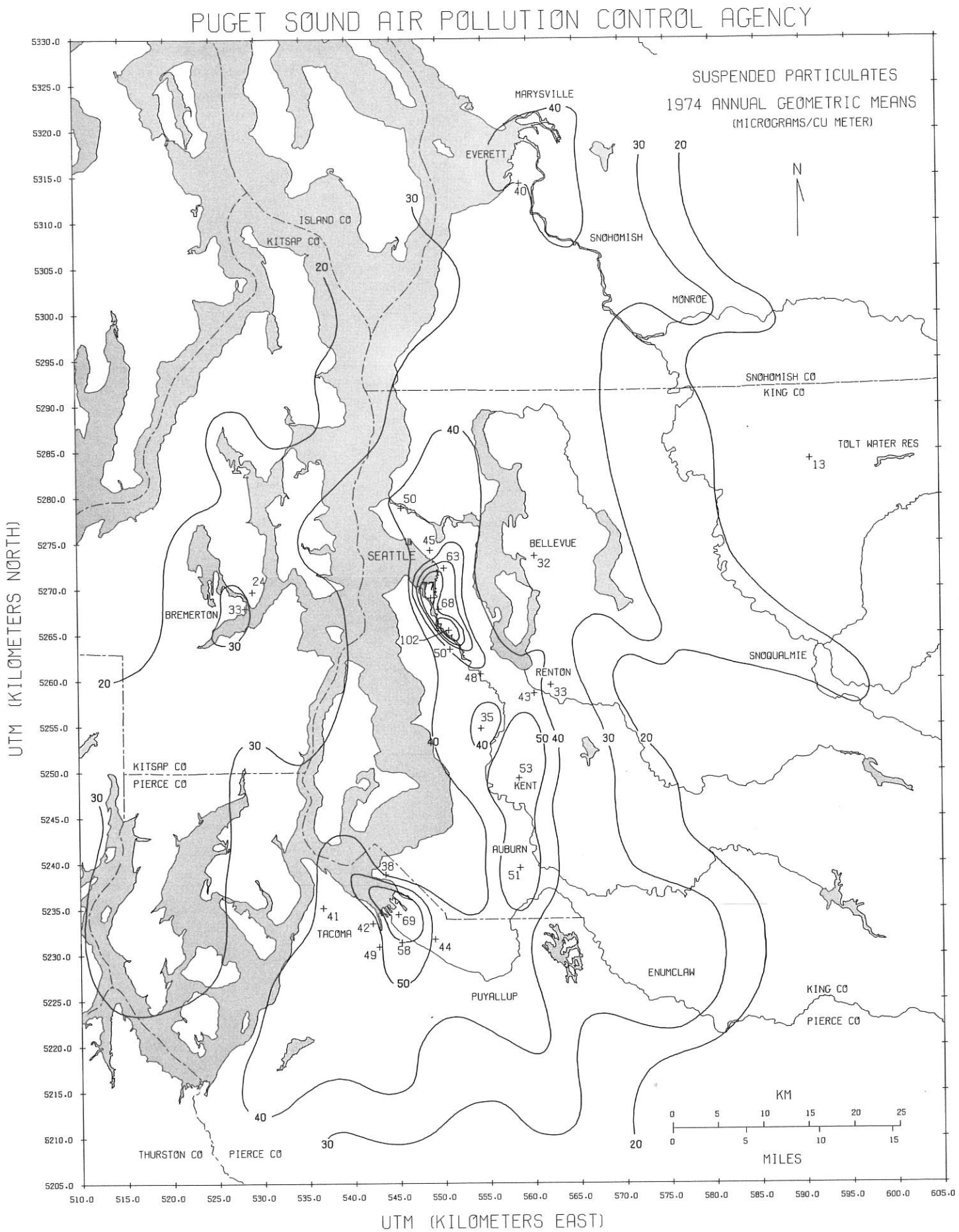
a Site established 10/ 8/74
b Site discontinued 4/23/74
c Site established 2/16/74
d Site established 7/13/74
e Site established 11/ 7/74
f Site established 6/22/74
g Site established 5/29/74

SUSPENDED PARTICULATE FOR YEAR 1974
Percentage Frequency Distributions
(Micrograms per cubic meter of air

Location	Area Class	No. of Samples	Min.	Date	Frequency Distribution-Percent 10	20	30	40	50	60	70	80	90	95	Max.	Date	Arith. Mean	Geo. Mean	Std. Geo. Dev.	Std. Arith. Dev.
Tolt River Watershed	RUR	57	1	Apr 5	3	5	7	10	14	18	24	28	38	45	46	Jul 22	18	13	2.50	13.11
Tulalip Test Facility	RUR	15	6	Nov 13	10	11	12	12	17	17	21	21	39	39	143	Oct 8	26	18	2.11	33.60
Everett & Pine, Everett*	RES	19	11	Jan 23	14	23	27	35	42	50	54	87	113	122	123	Jan 5	54	43	2.05	36.78
Medical-Dental Bldg., Everett	COM	61	12	Jan 17	20	25	29	38	40	47	52	64	74	80	110	Oct 8	45	40	1.63	20.91
U.S.C.G. Station, Seattle	COM	61	16	Jan 23	30	33	37	43	50	55	60	70	100	112	159	Jan 11	57	50	1.61	30.42
Food Circus Bldg., Seattle Center	COM	59	16	Jan 29	25	31	36	41	44	48	53	59	82	89	97	Oct 26	49	45	1.51	20.20
Public Safety Bldg., Seattle	COM	62	24	Jul 4	32	39	49	53	57	63	82	94	126	136	229	Oct 8	72	63	1.66	41.27
Harbor Island, Seattle	IND	65	28	May 27	35	44	55	68	82	86	108	129	180	195	257	Sep 20	91	77	1.76	53.24
4500 Blk. E. Marg. Way S., Seattle	IND	65	19	Jul 4	32	40	50	57	63	74	92	115	141	176	264	Jan 8	80	68	1.76	48.64
6700 Blk. E. Marg. Way S., Seattle*	IND	60	24	Nov 19	34	55	72	97	116	140	158	193	221	268	320	Jan 5	128	105	1.97	76.65
South Park, Seattle	RES	56	17	Feb 22	21	26	33	39	53	62	78	91	107	119	152	Oct 16	60	50	1.87	35.34
10000 W. Marg. Way, Seattle	IND	31	16	Dec 19	19	24	36	48	72	79	97	114	155	160	235	Oct 8	78	60	2.12	55.55
Duwamish Valley, King County	RES	61	12	Jan 29	23	26	31	39	50	59	70	82	100	116	147	Jan 8	56	48	1.82	32.05
Puget Power Bldg., Bellevue	COM	61	10	Nov 19	15	22	25	28	32	35	43	48	54	56	70	Jan 11	35	32	1.57	14.53
S.E. Dist. Health Center, Renton	SUB	60	8	Jan 31	15	18	22	26	34	40	49	57	68	76	92	Sep 20	39	33	1.82	21.40
Municipal Bldg., Renton	COM	61	14	Jun 4	23	28	34	37	43	48	56	66	82	97	119	Sep 20	49	43	1.64	24.40
Southcenter, Tukwila	COM	11	19	Nov 19	19	19	29	31	33	38	47	51	58	58	80	Dec 31	40	36	1.56	18.15
McMicken Hts., King County	RES	55	11	Jan 29	19	21	26	28	35	42	48	55	73	74	122	Aug 9	41	35	1.71	22.92
1234 N. Central Ave., Kent	COM	33	8	Nov 19	23	30	34	46	55	72	77	84	109	145	234	Sep 14	67	53	2.05	46.75
Main St. & Auburn Ave., Auburn	COM	61	16	Jan 29	27	32	38	46	50	60	67	80	96	108	136	Jan 5	57	51	1.63	27.41
Meeker Jr. H.S., Tacoma	RES	61	14	Apr 11	18	22	26	32	38	45	54	64	79	92	119	Jan 8	45	38	1.74	24.63
Mann-Russell Electric, Tacoma	IND	61	25	Jul 4	30	39	49	60	68	86	98	109	142	160	234	Aug 9	81	69	1.75	45.99
Fife Sr. H.S., Fife	COM	61	8	Jan 29	15	19	27	42	49	62	71	89	99	104	147	Jan 8	54	44	2.05	32.88
Cascadia College, Tacoma*	RES	54	5	Jan 29	14	23	31	47	59	72	121	154	179	199	316	Jan 11	86	58	2.60	73.43
Willard Elem. School, Tacoma	RES	61	12	Nov 19	17	21	29	35	56	70	87	103	124	154	173	Oct 8	64	49	2.14	44.30
Hess Bldg., Tacoma	COM	60	12	Jan 29	20	24	26	30	36	50	60	72	109	121	164	Oct 8	52	42	1.92	36.21
112th St. S.W. & Loch Lea, Lakewood	RES	38	8	Nov 19	12	20	24	31	43	50	56	68	90	91	122	Oct 8	47	38	2.04	28.67
N. 26th & Pearl, Tacoma	COM	60	10	Jan 23	13	16	23	35	46	58	76	89	108	123	131	Jan 11	54	41	2.15	36.86
City Hall, Bremerton*	COM	53	13	Jan 28	18	22	26	30	34	39	43	48	58	60	66	Oct 17	36	33	1.52	14.03
Dewey Jr. H.S., Bremerton	RES	60	9	Jan 29	12	14	17	19	24	27	31	37	50	54	60	Oct 14	27	24	1.68	13.76

*Washington State Department of Ecology Stations.

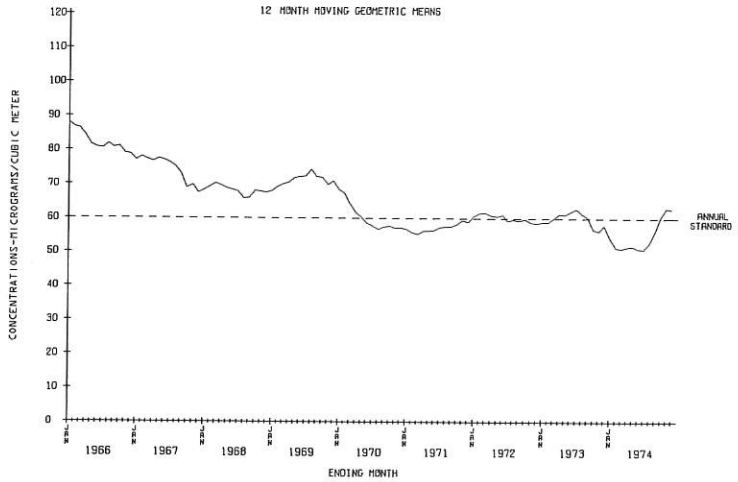

PUGET SOUND AIR POLLUTION CONTROL AGENCY
SUSPENDED PARTICULATES
1973 ANNUAL GEOMETRIC MEANS
(MICROGRAMS/CU METER)
N
MARYSVILLE
43
EVERETT
53
38
SNOHOMISH
MONROE
ISLAND CO
KITSAP CO
SNOHOMISH CO
KING CO
TOLT WATER RES
12
SEATTLE
BELLEVUE
35
BREMERTON
RENTON
SNOQUALMIE
KITSAP CO
PIERCE CO
KENT
AUBURN
63
TACOMA
PUYALLUP
ENUMCLAW
KING CO
PIERCE CO
THURSTON CO
PIERCE CO
KM
MILES
UTM (KILOMETERS NORTH)
UTM (KILOMETERS EAST)


PUGET SOUND AIR POLLUTION CONTROL AGENCY
SUSPENDED PARTICULATES
1974 ANNUAL GEOMETRIC MEANS
(MICROGRAMS/CU METER)
N
MARYSVILLE
EVERETT
SNOHOMISH
MONROE
ISLAND CO
KITSAP CO
SNOHOMISH CO
KING CO
TOLT WATER RES
SEATTLE
BELLEVUE
BREMERTON
RENTON
SNOQUALMIE
KENT
AUBURN
TACOMA
PUYALLUP
ENUMCLAW
KITSAP CO
PIERCE CO
KING CO
PIERCE CO
THURSTON CO
PIERCE CO
KM
MILES
UTM (KILOMETERS NORTH)
UTM (KILOMETERS EAST)

PUGET SOUND AIR POLLUTION CONTROL AGENCY

SUSPENDED PARTICULATES

12 MONTH MOVING GEOMETRIC MEANS

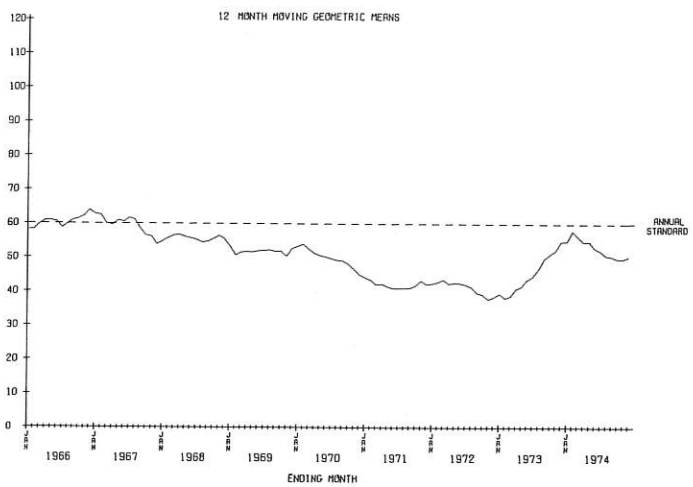


PUBLIC SAFETY BUILDING, 604 - 3RD AVE, SEATTLE

PUGET SOUND AIR POLLUTION CONTROL AGENCY

SUSPENDED PARTICULATES

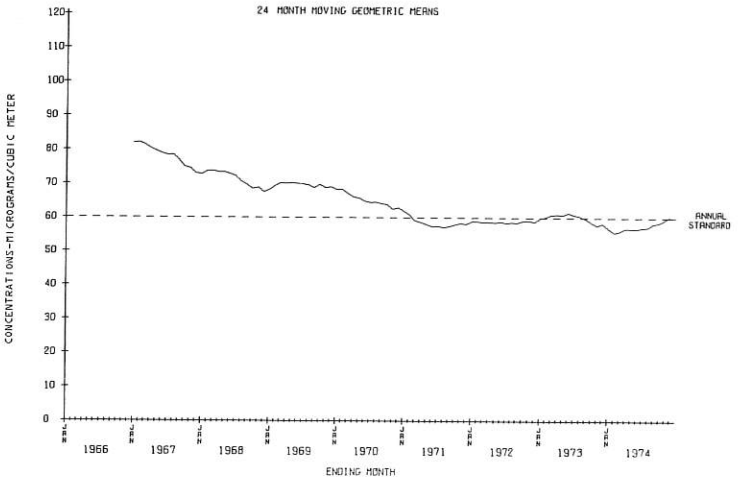
12 MONTH MOVING GEOMETRIC MEANS



USCG STATION, 2700 W COMMODORE WAY, SEATTLE

SUSPENDED PARTICULATES

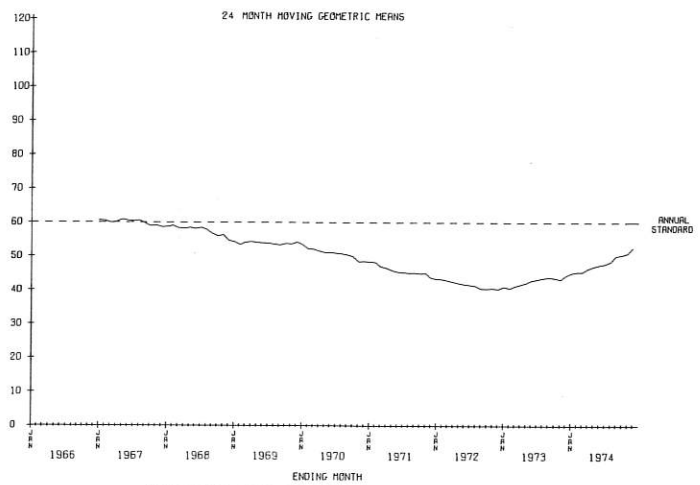
24 MONTH MOVING GEOMETRIC MEANS



PUBLIC SAFETY BUILDING, 604 - 3RD AVE, SEATTLE

SUSPENDED PARTICULATES

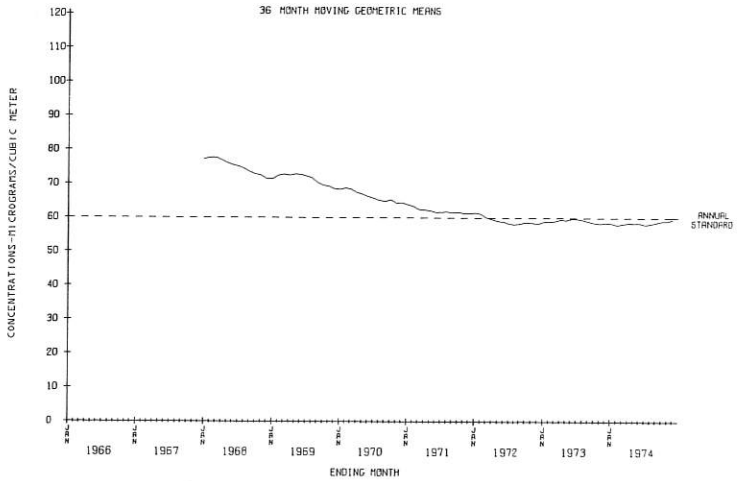
24 MONTH MOVING GEOMETRIC MEANS



USCG STATION, 2700 W COMMODORE WAY, SEATTLE

SUSPENDED PARTICULATES

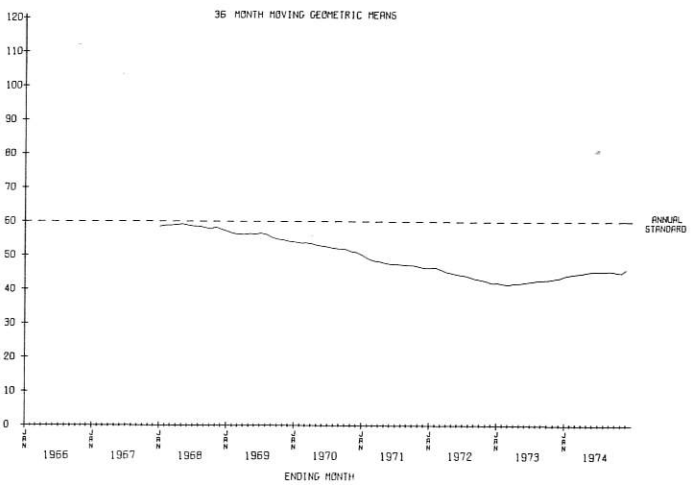
36 MONTH MOVING GEOMETRIC MEANS



PUBLIC SAFETY BUILDING, 604 - 3RD AVE, SEATTLE

SUSPENDED PARTICULATES

36 MONTH MOVING GEOMETRIC MEANS

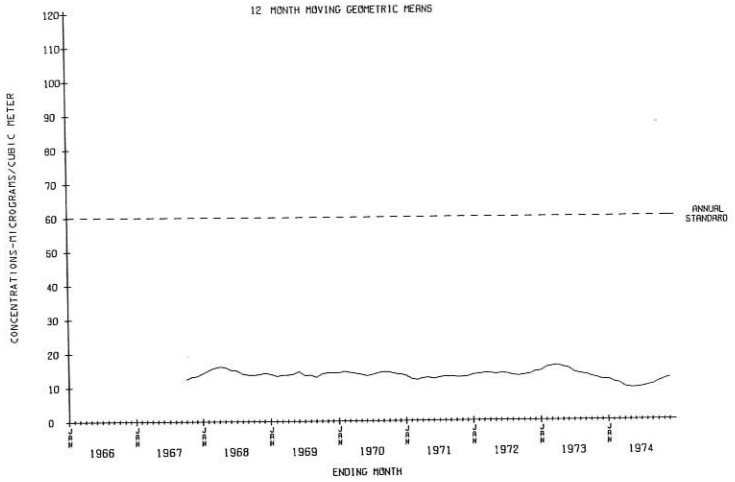


USCG STATION, 2700 W COMMODORE WAY, SEATTLE

PUGET SOUND AIR POLLUTION CONTROL AGENCY

SUSPENDED PARTICULATES

12 MONTH MOVING GEOMETRIC MEANS

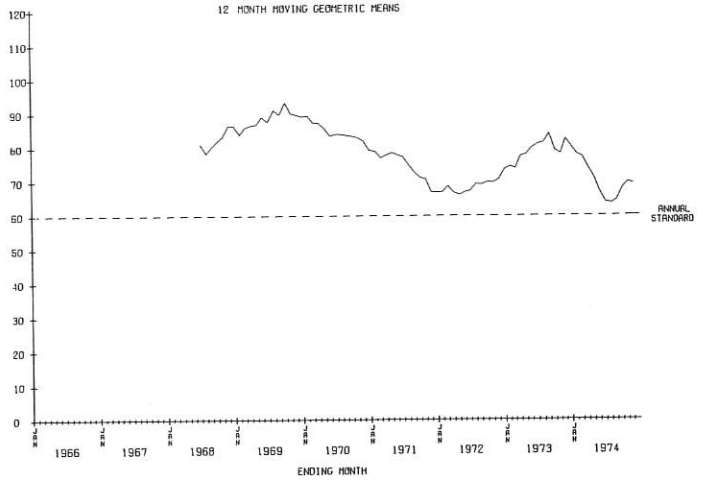


TOLT RIVER WATERSHED (EAST OF LAKE JOY)

PUGET SOUND AIR POLLUTION CONTROL AGENCY

SUSPENDED PARTICULATES

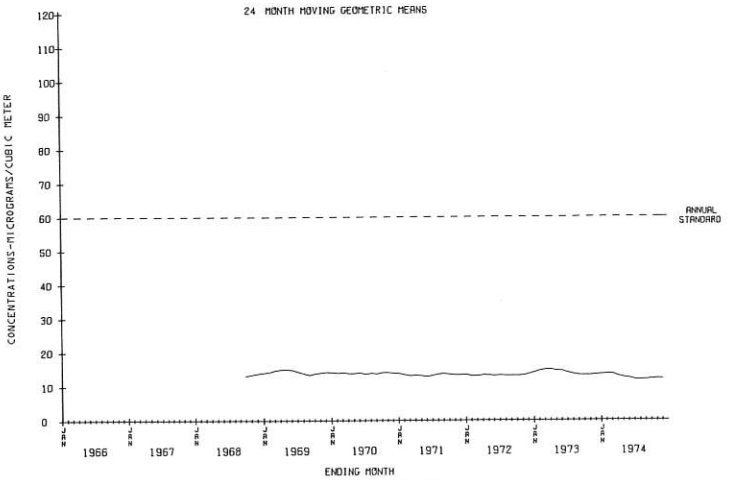
12 MONTH MOVING GEOMETRIC MEANS



MANN-RUSSELL ELEC. 1401 THORNE ROAD. TACOMA

SUSPENDED PARTICULATES

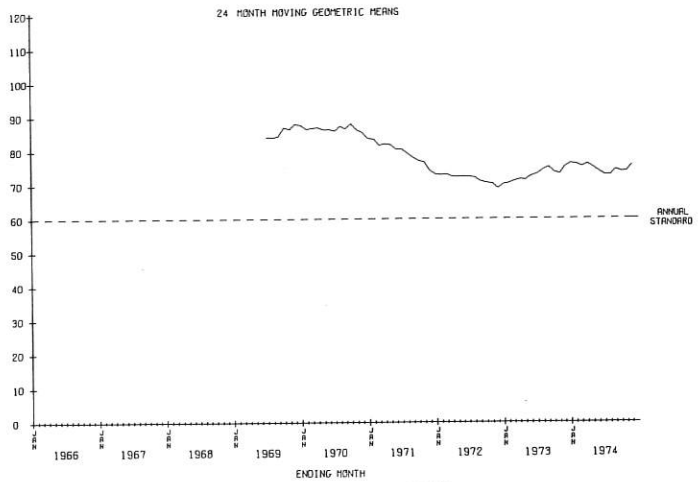
24 MONTH MOVING GEOMETRIC MEANS



TOLT RIVER WATERSHED (EAST OF LAKE JOY)

SUSPENDED PARTICULATES

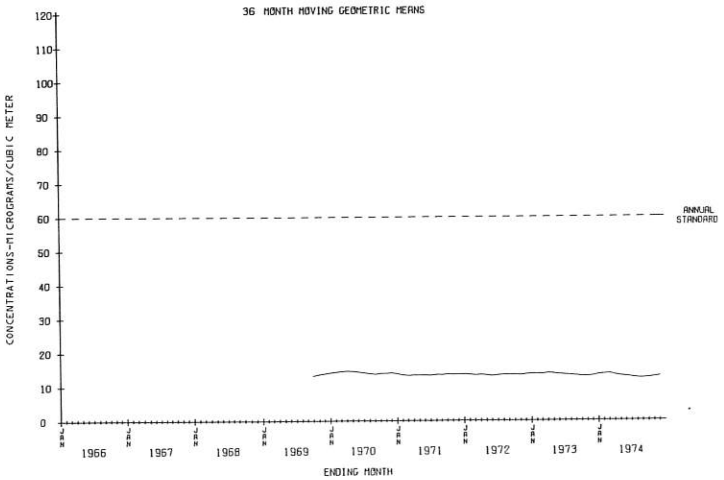
24 MONTH MOVING GEOMETRIC MEANS



MANN-RUSSELL ELEC. 1401 THORNE ROAD. TACOMA

SUSPENDED PARTICULATES

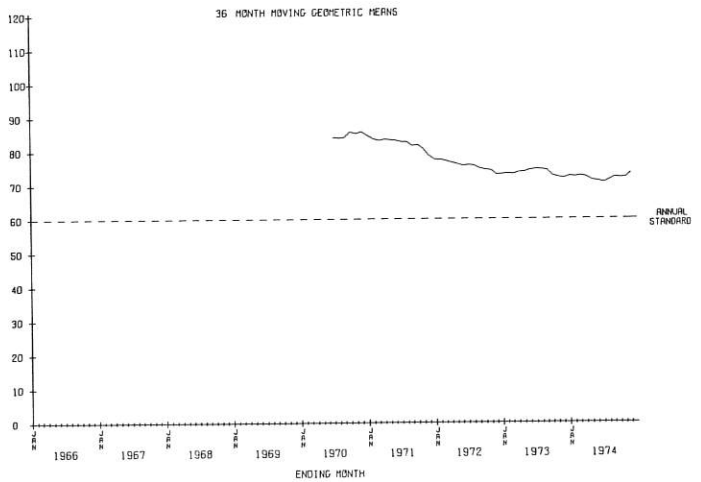
36 MONTH MOVING GEOMETRIC MEANS



TOLT RIVER WATERSHED (EAST OF LAKE JOY)

SUSPENDED PARTICULATES

36 MONTH MOVING GEOMETRIC MEANS

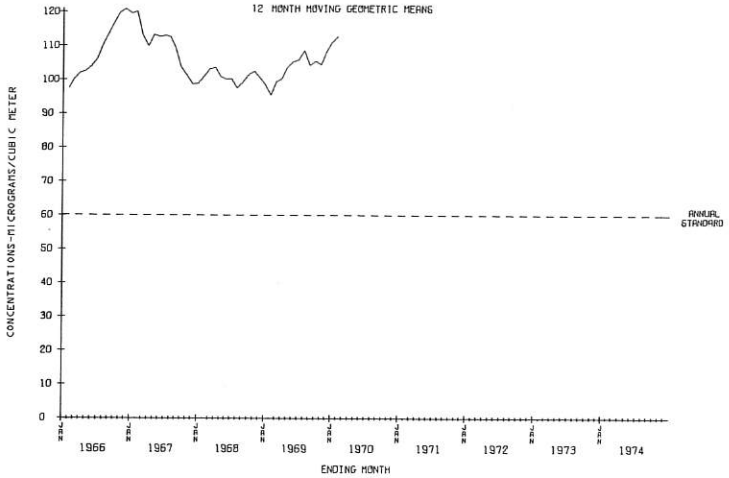


MANN-RUSSELL ELEC. 1401 THORNE ROAD. TACOMA

PUGET SOUND AIR POLLUTION CONTROL AGENCY

SUSPENDED PARTICULATES

12 MONTH MOVING GEOMETRIC MEANS

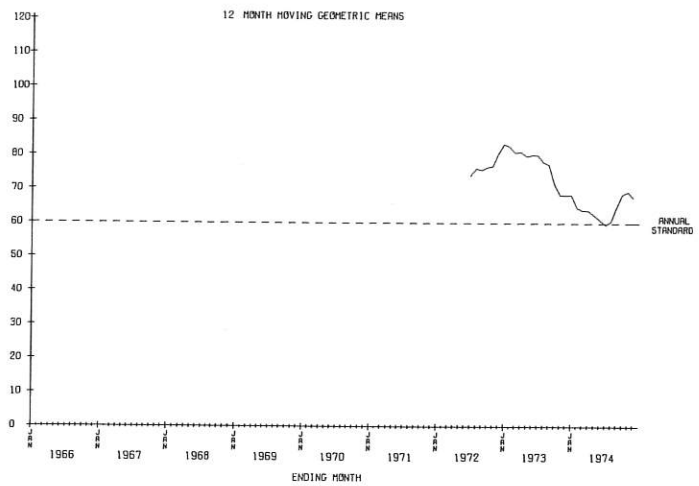


FIRE STATION NO. 14, 3224 - 4TH AVE S, SEATTLE

PUGET SOUND AIR POLLUTION CONTROL AGENCY

SUSPENDED PARTICULATES

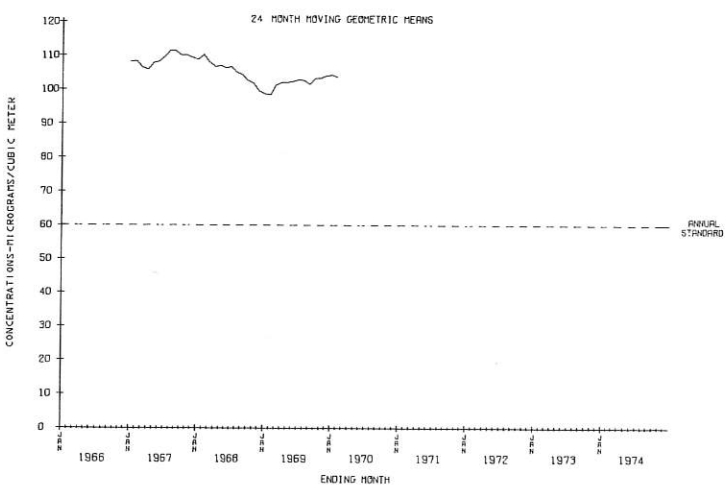
12 MONTH MOVING GEOMETRIC MEANS



DUWAMISH, 4500 BLK E MARGINAL WAY S, SEATTLE

SUSPENDED PARTICULATES

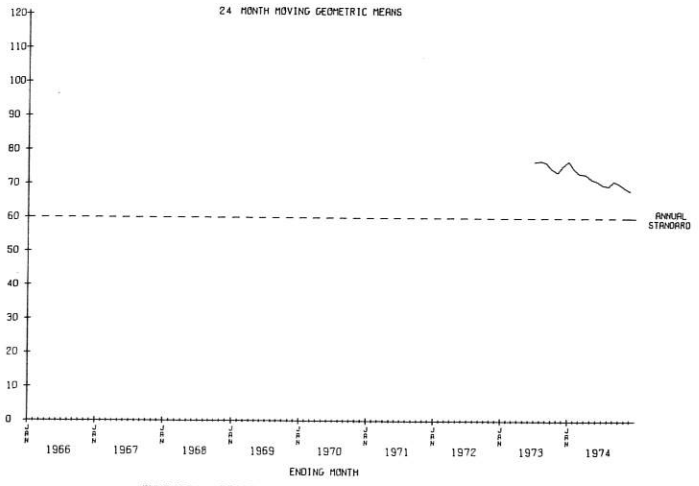
24 MONTH MOVING GEOMETRIC MEANS



FIRE STATION NO. 14, 3224 - 4TH AVE S, SEATTLE

SUSPENDED PARTICULATES

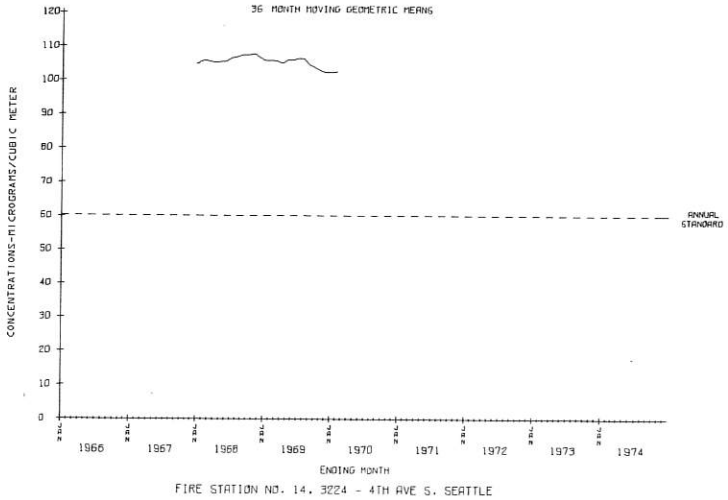
24 MONTH MOVING GEOMETRIC MEANS



DUWAMISH, 4500 BLK E MARGINAL WAY S, SEATTLE

SUSPENDED PARTICULATES

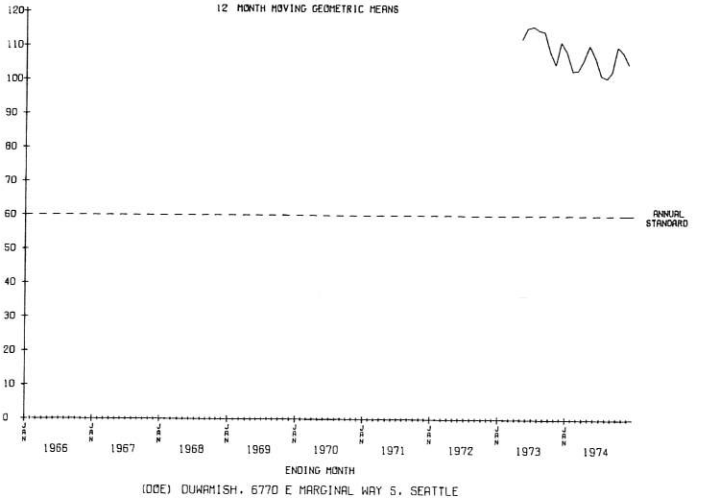
36 MONTH MOVING GEOMETRIC MEANS



FIRE STATION NO. 14, 3224 - 4TH AVE S, SEATTLE

SUSPENDED PARTICULATES

12 MONTH MOVING GEOMETRIC MEANS

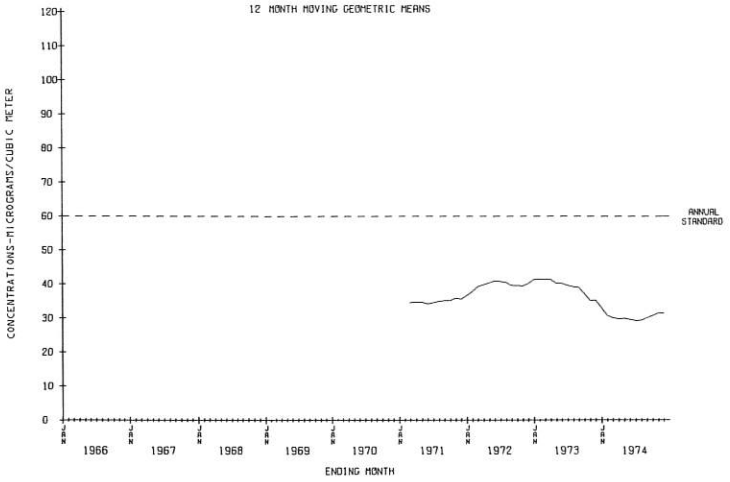


(DOE) DUWAMISH, 6770 E MARGINAL WAY S, SEATTLE

PUGET SOUND AIR POLLUTION CONTROL AGENCY

SUSPENDED PARTICULATES

12 MONTH MOVING GEOMETRIC MEANS

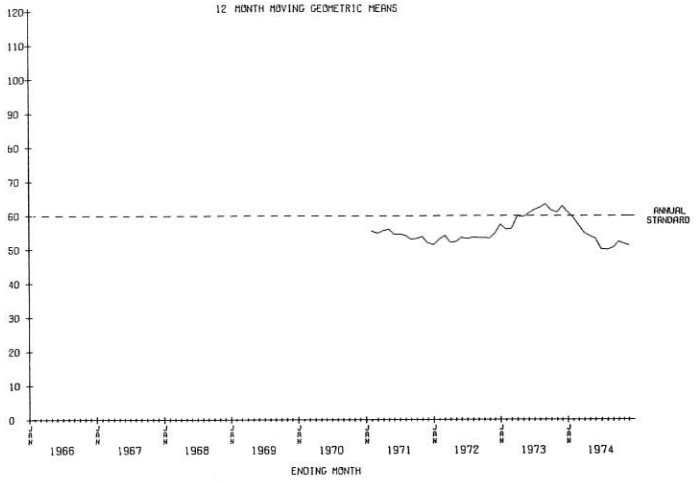


PUGET POWER BUILDING, 10604 NE 4TH, BELLEVUE

PUGET SOUND AIR POLLUTION CONTROL AGENCY

SUSPENDED PARTICULATES

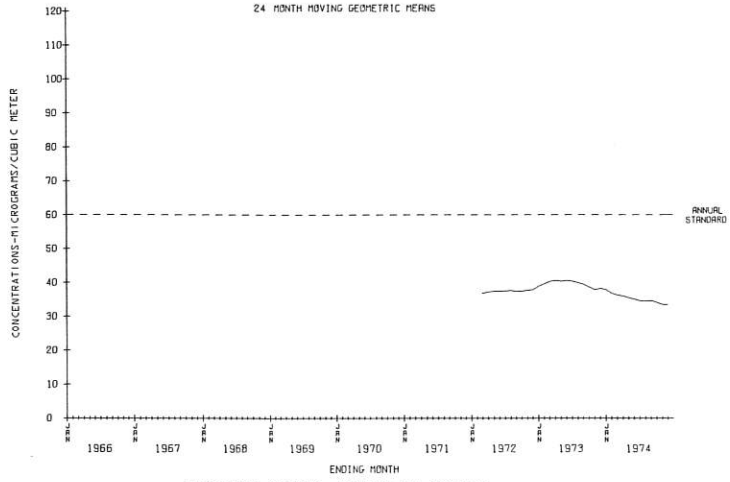
12 MONTH MOVING GEOMETRIC MEANS



115 EAST MAIN STREET & AUBURN AVE, AUBURN, WA

SUSPENDED PARTICULATES

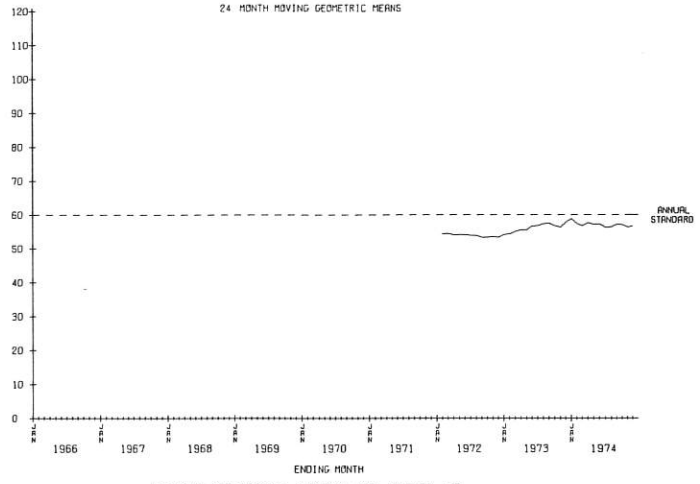
24 MONTH MOVING GEOMETRIC MEANS



PUGET POWER BUILDING, 10604 NE 4TH, BELLEVUE

SUSPENDED PARTICULATES

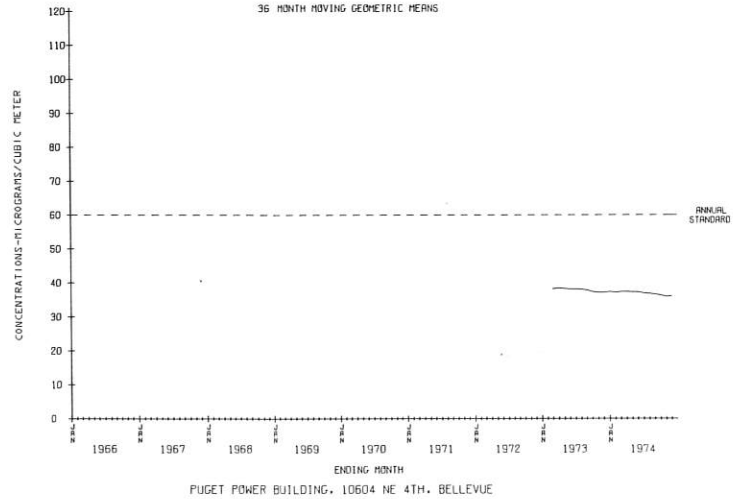
24 MONTH MOVING GEOMETRIC MEANS



115 EAST MAIN STREET & AUBURN AVE, AUBURN, WA

SUSPENDED PARTICULATES

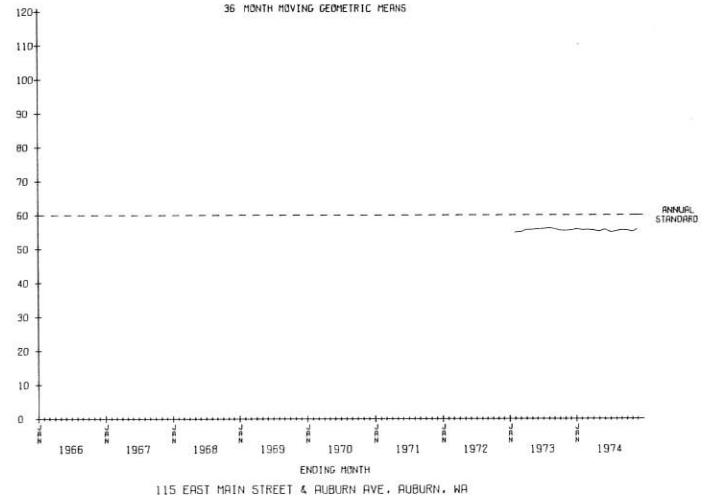
36 MONTH MOVING GEOMETRIC MEANS



PUGET POWER BUILDING, 10604 NE 4TH, BELLEVUE

SUSPENDED PARTICULATES

36 MONTH MOVING GEOMETRIC MEANS

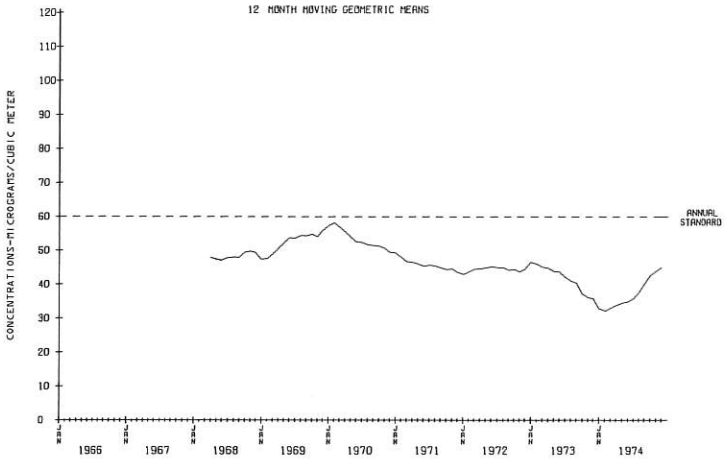


115 EAST MAIN STREET & AUBURN AVE, AUBURN, WA

PUGET SOUND AIR POLLUTION CONTROL AGENCY

SUSPENDED PARTICULATES

12 MONTH MOVING GEOMETRIC MEANS

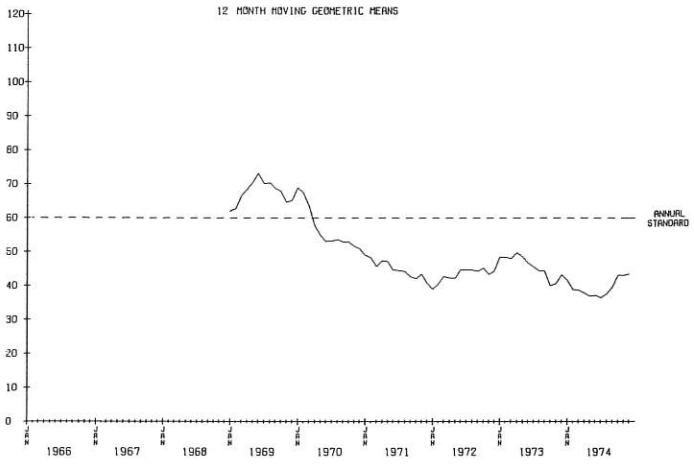


FOOD CIRCUS BUILDING, SEATTLE CENTER

PUGET SOUND AIR POLLUTION CONTROL AGENCY

SUSPENDED PARTICULATES

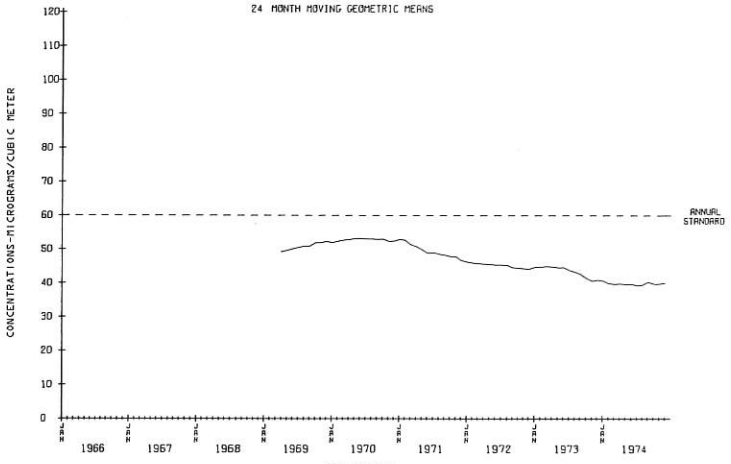
12 MONTH MOVING GEOMETRIC MEANS



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

SUSPENDED PARTICULATES

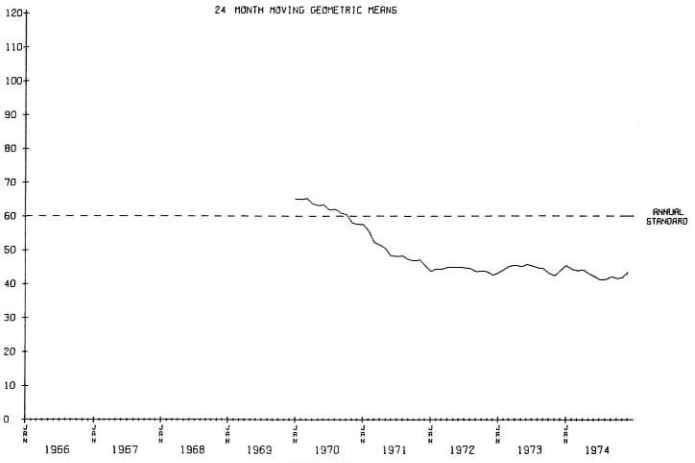
24 MONTH MOVING GEOMETRIC MEANS



FOOD CIRCUS BUILDING, SEATTLE CENTER

SUSPENDED PARTICULATES

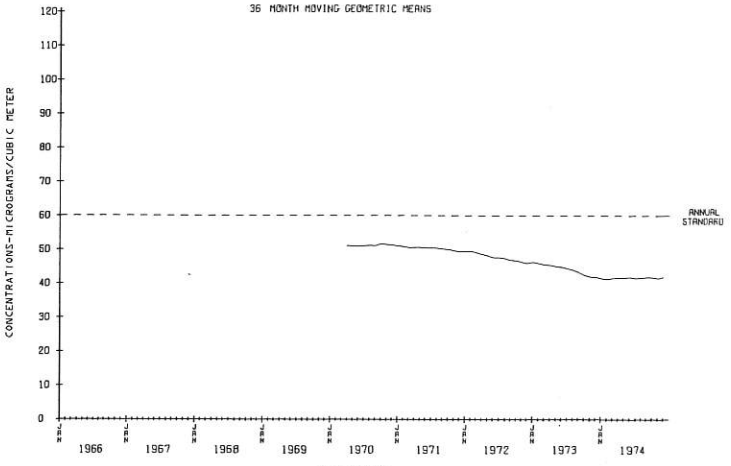
24 MONTH MOVING GEOMETRIC MEANS



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

SUSPENDED PARTICULATES

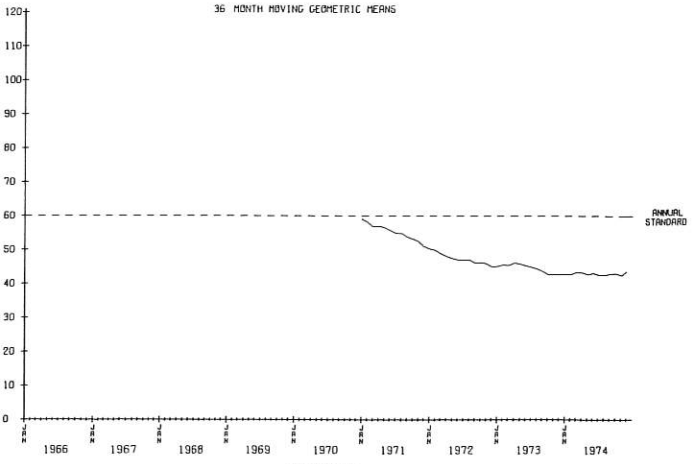
36 MONTH MOVING GEOMETRIC MEANS



FOOD CIRCUS BUILDING, SEATTLE CENTER

SUSPENDED PARTICULATES

36 MONTH MOVING GEOMETRIC MEANS

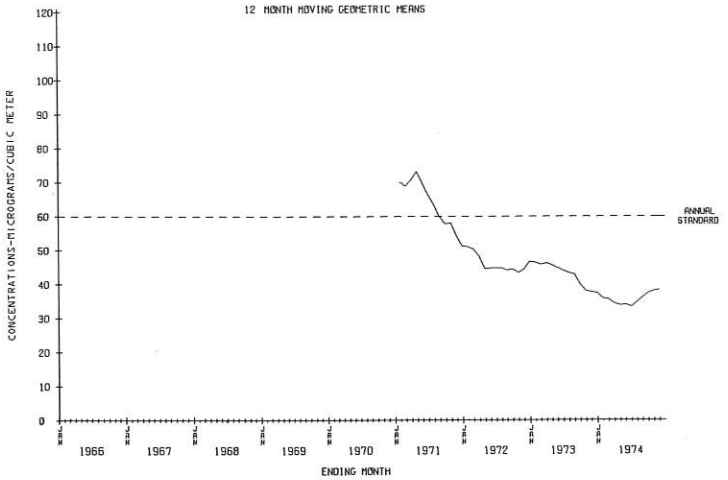


FIFE SR HIGH SCHOOL, 5616-20TH E, FIFE, WASH

PUGET SOUND AIR POLLUTION CONTROL AGENCY

SUSPENDED PARTICULATES

12 MONTH MOVING GEOMETRIC MEANS

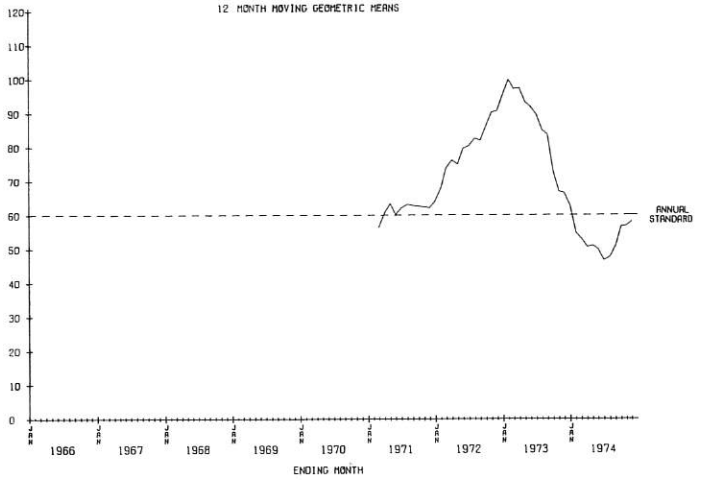


MEEKER JR HS. 1526 - 51ST STREET NE. TACOMA

PUGET SOUND AIR POLLUTION CONTROL AGENCY

SUSPENDED PARTICULATES

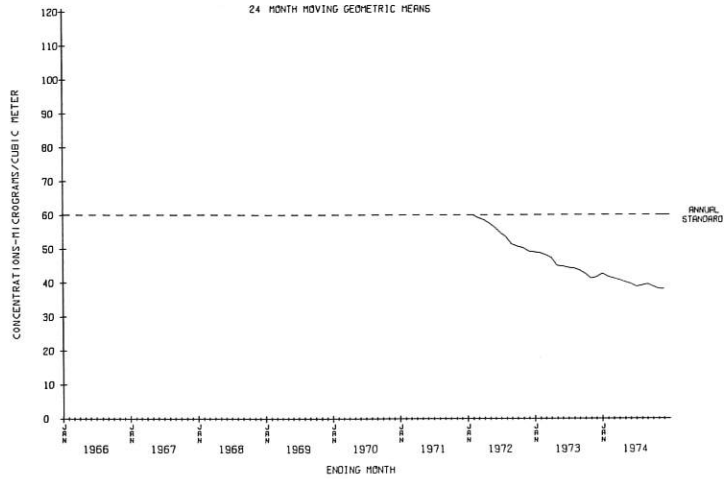
12 MONTH MOVING GEOMETRIC MEANS



(DOE) CASCADIA COLLEGE. 2002 E 28TH ST. TACOMA

SUSPENDED PARTICULATES

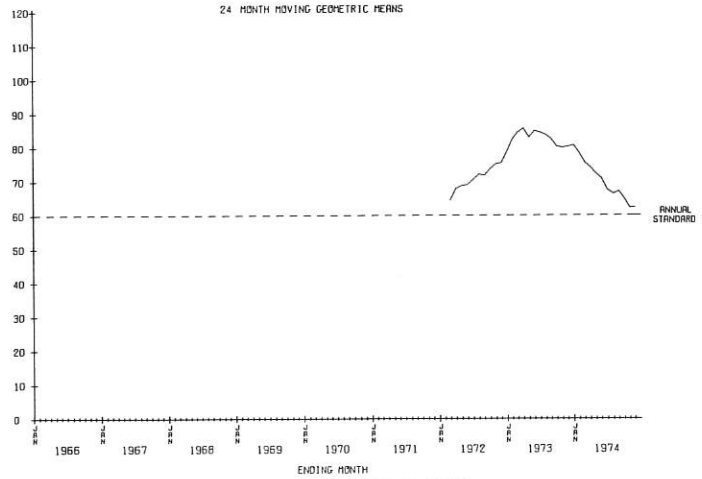
24 MONTH MOVING GEOMETRIC MEANS



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

SUSPENDED PARTICULATES

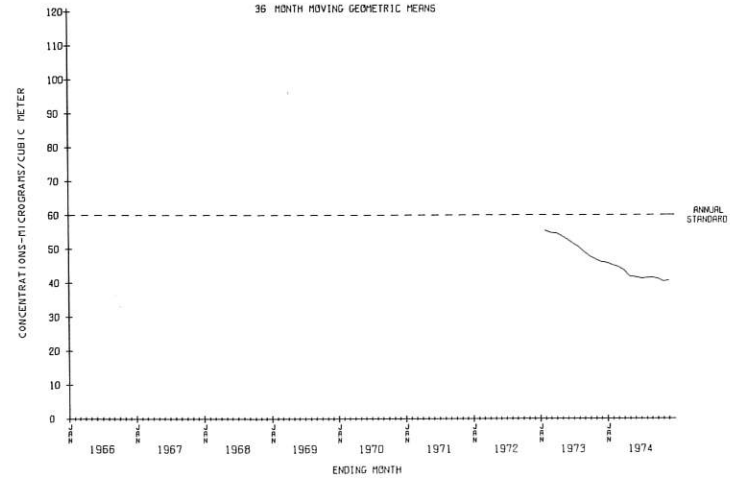
24 MONTH MOVING GEOMETRIC MEANS



(DOE) CASCADIA COLLEGE. 2002 E 28TH ST. TACOMA

SUSPENDED PARTICULATES

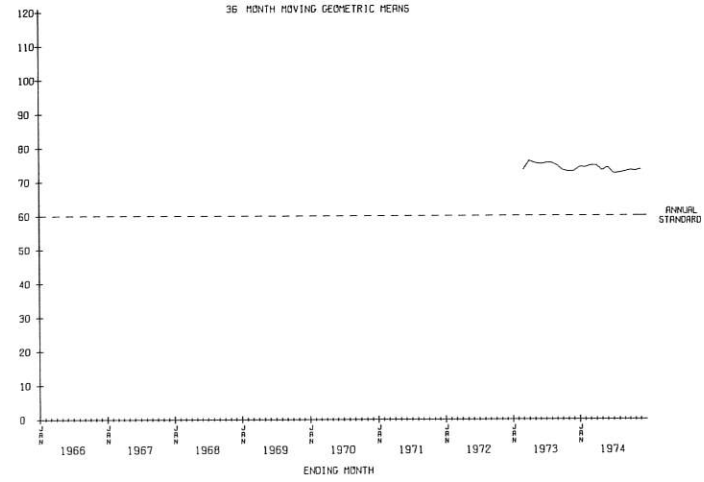
36 MONTH MOVING GEOMETRIC MEANS



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

SUSPENDED PARTICULATES

36 MONTH MOVING GEOMETRIC MEANS

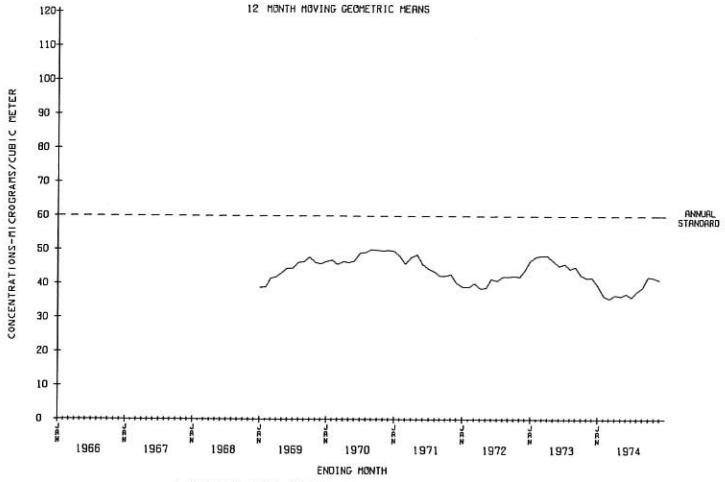


(DOE) CASCADIA COLLEGE. 2002 E 28TH ST. TACOMA

PUGET SOUND AIR POLLUTION CONTROL AGENCY

SUSPENDED PARTICULATES

12 MONTH MOVING GEOMETRIC MEANS

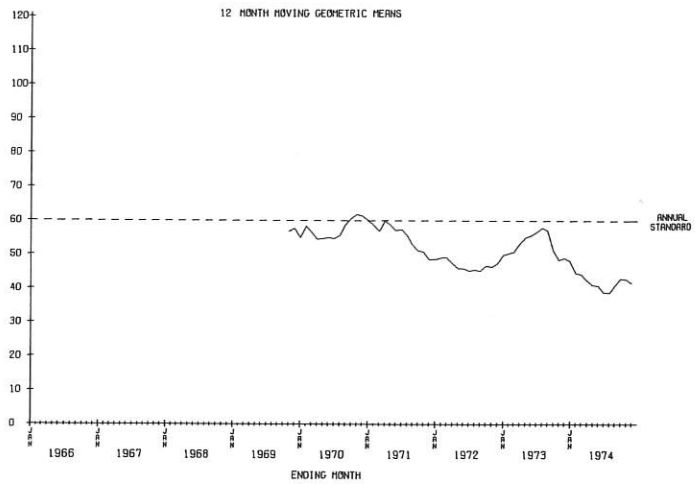


N 26TH AND PEARL STREET, TACOMA

PUGET SOUND AIR POLLUTION CONTROL AGENCY

SUSPENDED PARTICULATES

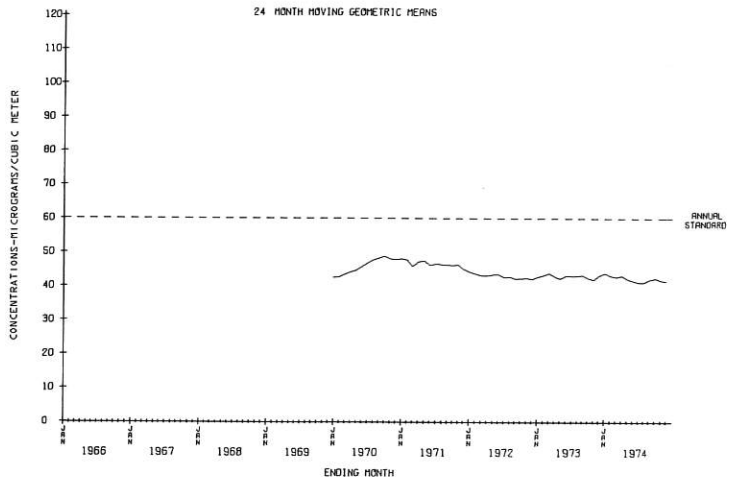
12 MONTH MOVING GEOMETRIC MEANS



HESS BUILDING, 901 TACOMA AVE S, TACOMA

SUSPENDED PARTICULATES

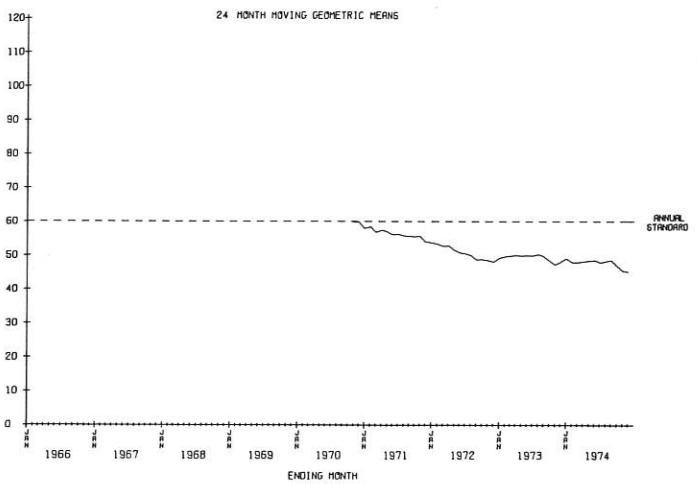
24 MONTH MOVING GEOMETRIC MEANS



N 26TH AND PEARL STREET, TACOMA

SUSPENDED PARTICULATES

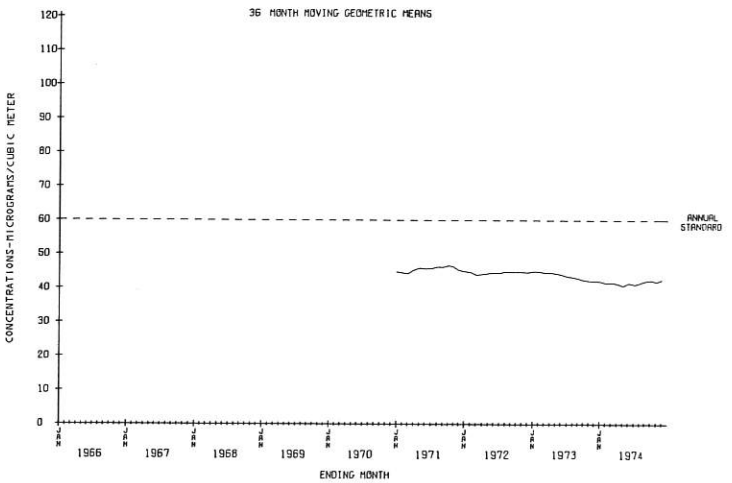
24 MONTH MOVING GEOMETRIC MEANS



HESS BUILDING, 901 TACOMA AVE S, TACOMA

SUSPENDED PARTICULATES

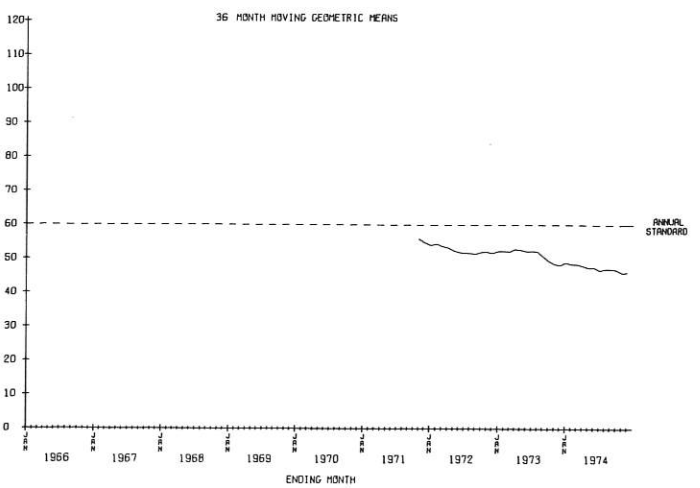
36 MONTH MOVING GEOMETRIC MEANS



N 26TH AND PEARL STREET, TACOMA

SUSPENDED PARTICULATES

36 MONTH MOVING GEOMETRIC MEANS

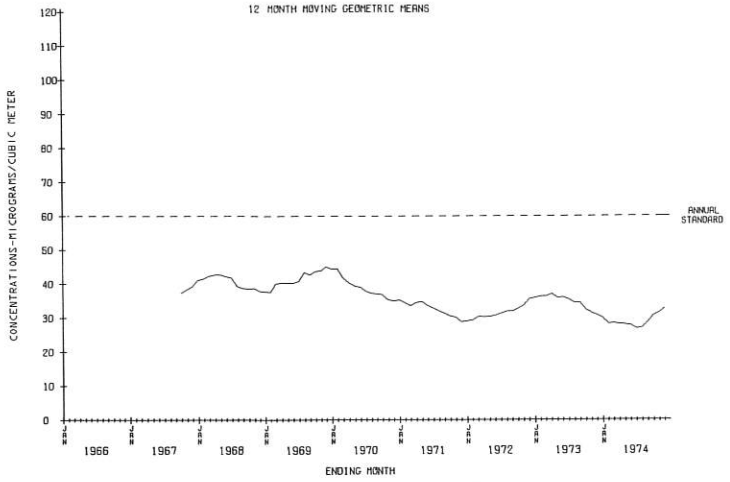


HESS BUILDING, 901 TACOMA AVE S, TACOMA

PUGET SOUND AIR POLLUTION CONTROL AGENCY

SUSPENDED PARTICULATES

12 MONTH MOVING GEOMETRIC MEANS

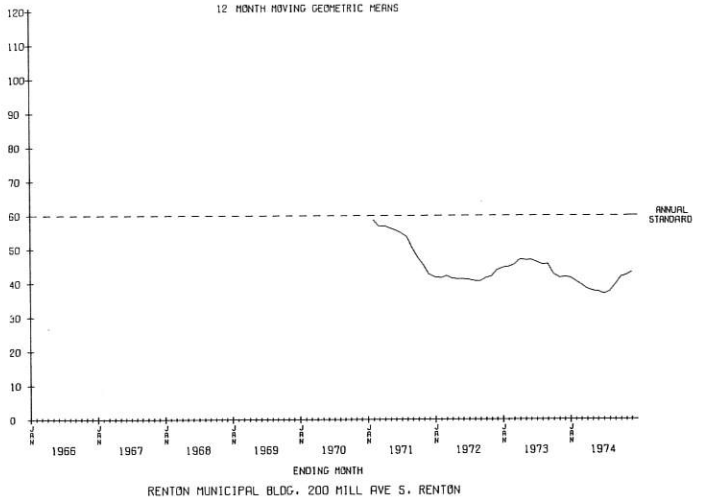


SE DIST HEALTH CENTER, 12015 SE 128TH, RENTON

PUGET SOUND AIR POLLUTION CONTROL AGENCY

SUSPENDED PARTICULATES

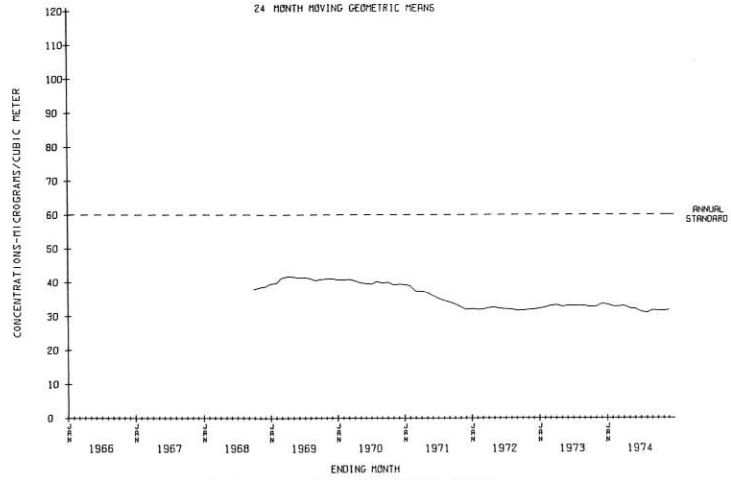
12 MONTH MOVING GEOMETRIC MEANS



RENTON MUNICIPAL BLDG, 200 MILL AVE S, RENTON

SUSPENDED PARTICULATES

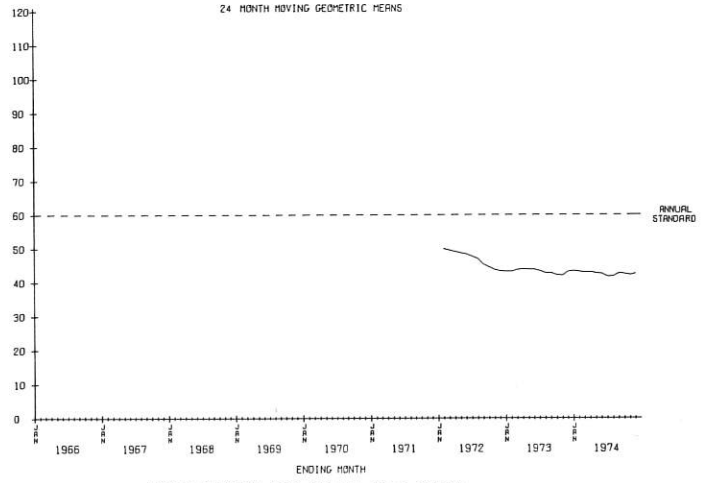
24 MONTH MOVING GEOMETRIC MEANS



SE DIST HEALTH CENTER, 12015 SE 128TH, RENTON

SUSPENDED PARTICULATES

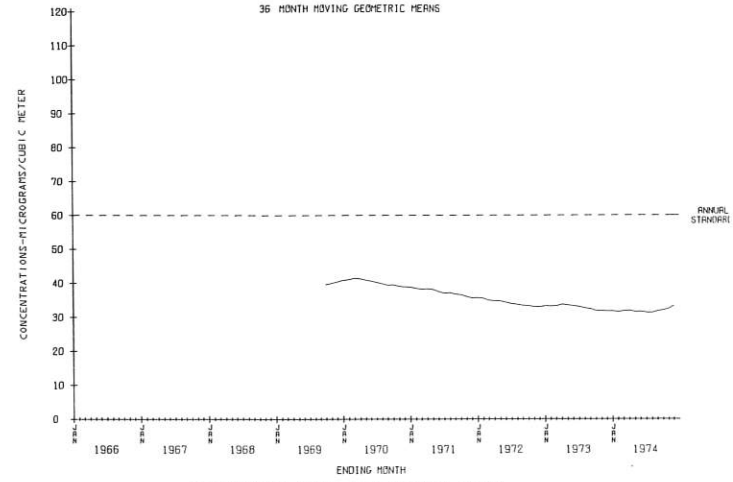
24 MONTH MOVING GEOMETRIC MEANS



RENTON MUNICIPAL BLDG, 200 MILL AVE S, RENTON

SUSPENDED PARTICULATES

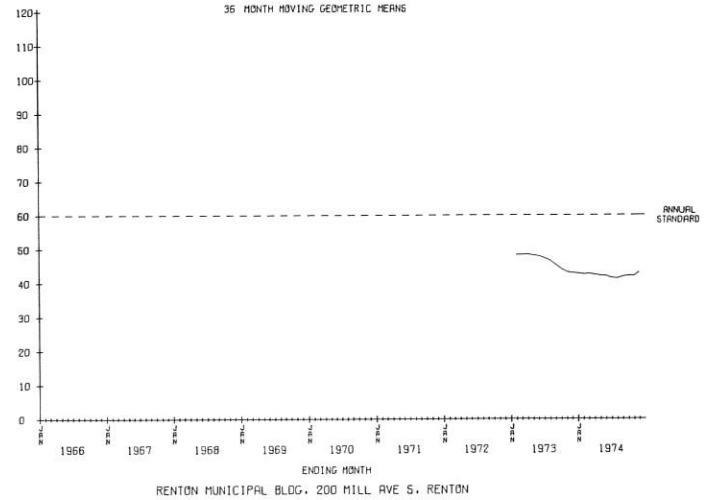
36 MONTH MOVING GEOMETRIC MEANS



SE DIST HEALTH CENTER, 12015 SE 128TH, RENTON

SUSPENDED PARTICULATES

36 MONTH MOVING GEOMETRIC MEANS

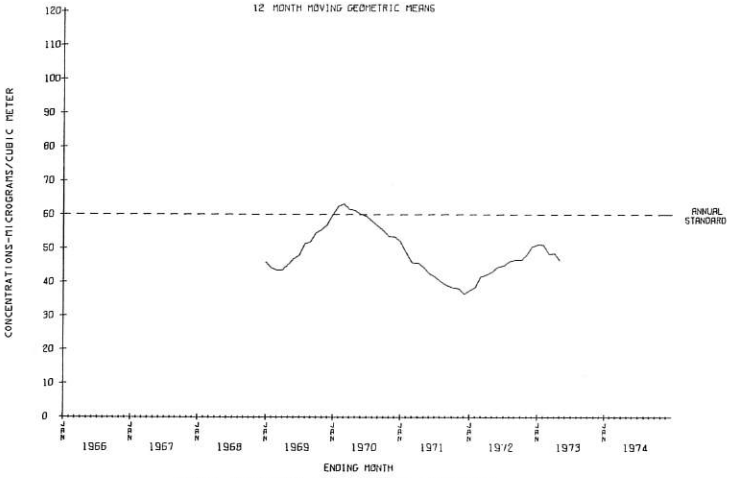


RENTON MUNICIPAL BLDG, 200 MILL AVE S, RENTON

PUGET SOUND AIR POLLUTION CONTROL AGENCY

SUSPENDED PARTICULATES

12 MONTH MOVING GEOMETRIC MEANS

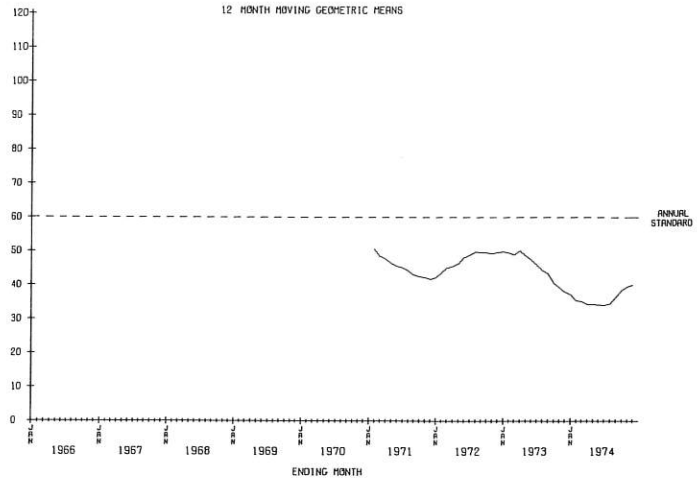


SCHOOL DIST OFFICE, 1513 - 7TH ST. MARYSVILLE

PUGET SOUND AIR POLLUTION CONTROL AGENCY

SUSPENDED PARTICULATES

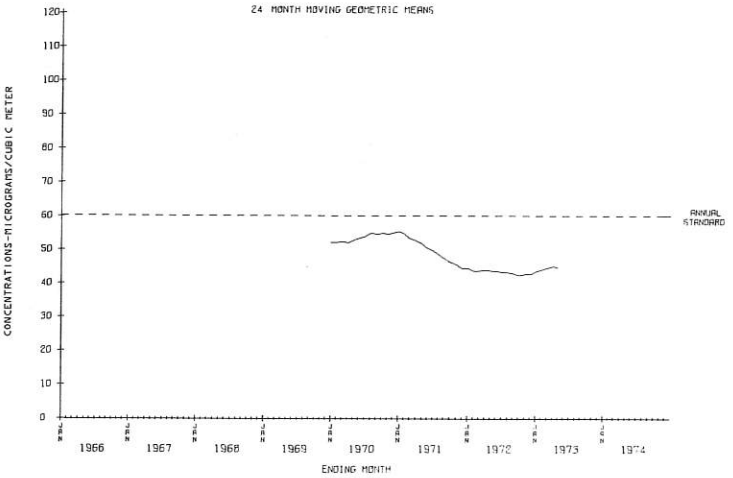
12 MONTH MOVING GEOMETRIC MEANS



MEDICAL-DENTAL BLDG, 2730 COLBY AVE, EVERETT

SUSPENDED PARTICULATES

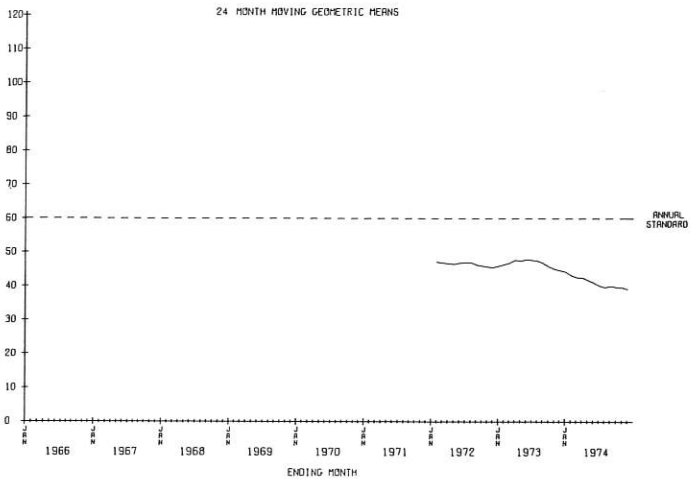
24 MONTH MOVING GEOMETRIC MEANS



SCHOOL DIST OFFICE, 1513 - 7TH ST. MARYSVILLE

SUSPENDED PARTICULATES

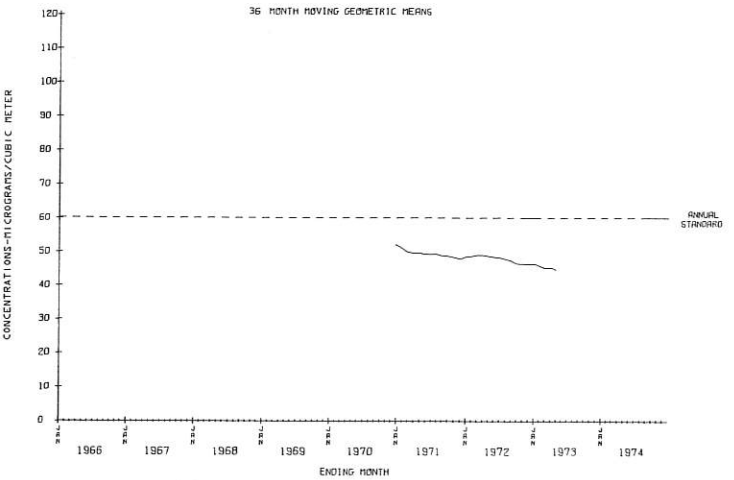
24 MONTH MOVING GEOMETRIC MEANS



MEDICAL-DENTAL BLDG, 2730 COLBY AVE, EVERETT

SUSPENDED PARTICULATES

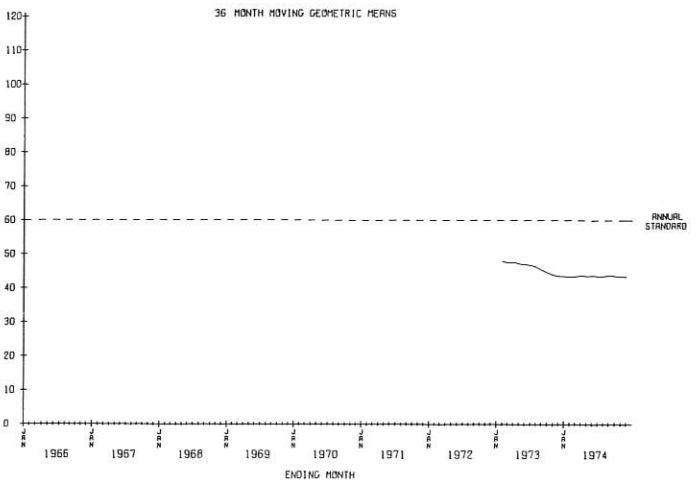
36 MONTH MOVING GEOMETRIC MEANS



SCHOOL DIST OFFICE, 1513 - 7TH ST. MARYSVILLE

SUSPENDED PARTICULATES

36 MONTH MOVING GEOMETRIC MEANS

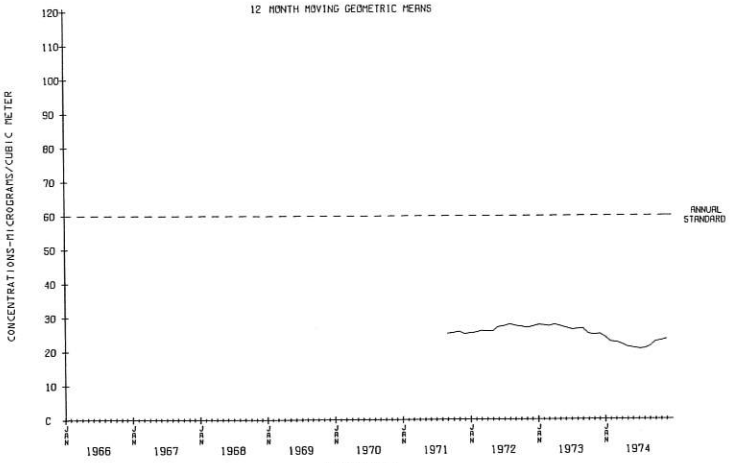


MEDICAL-DENTAL BLDG, 2730 COLBY AVE, EVERETT

PUGET SOUND AIR POLLUTION CONTROL AGENCY

SUSPENDED PARTICULATES

12 MONTH MOVING GEOMETRIC MEANS

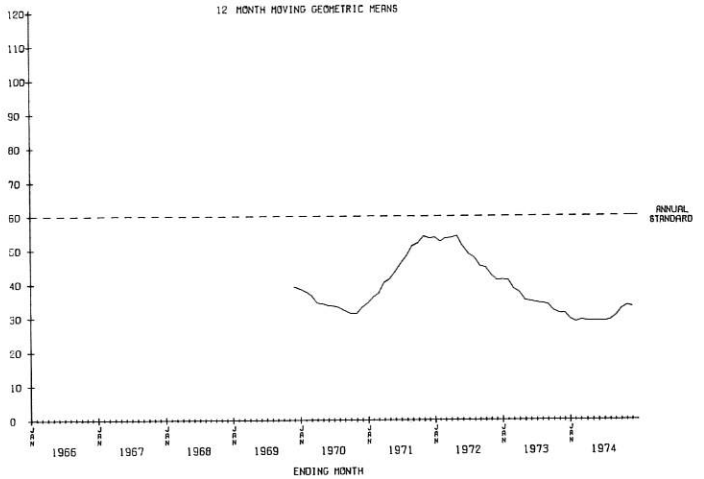


DEWEY JR HS. PERRY AVE & HOLMAN ST. BREMERTON

PUGET SOUND AIR POLLUTION CONTROL AGENCY

SUSPENDED PARTICULATES

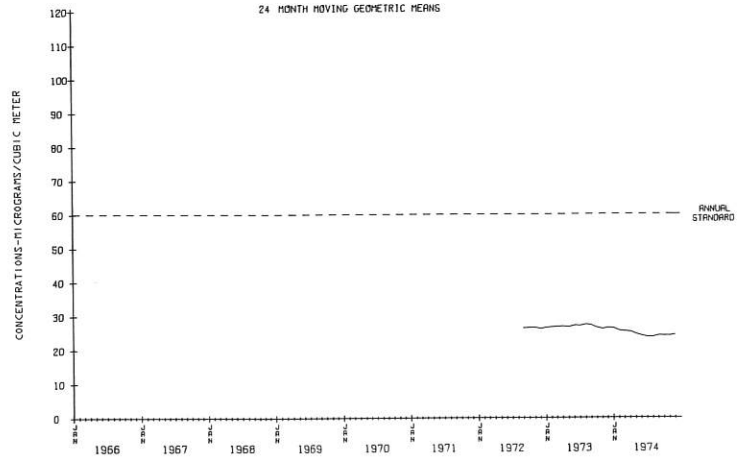
12 MONTH MOVING GEOMETRIC MEANS



(DOE) CITY HALL. 239 4TH ST. BREMERTON

SUSPENDED PARTICULATES

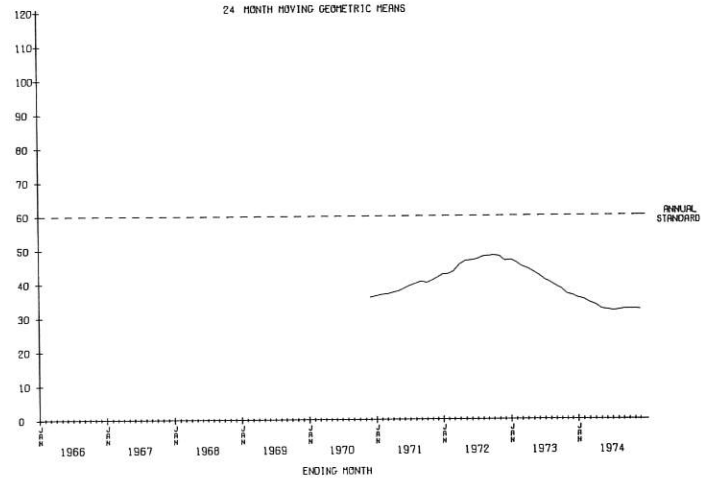
24 MONTH MOVING GEOMETRIC MEANS



DEWEY JR HS. PERRY AVE & HOLMAN ST. BREMERTON

SUSPENDED PARTICULATES

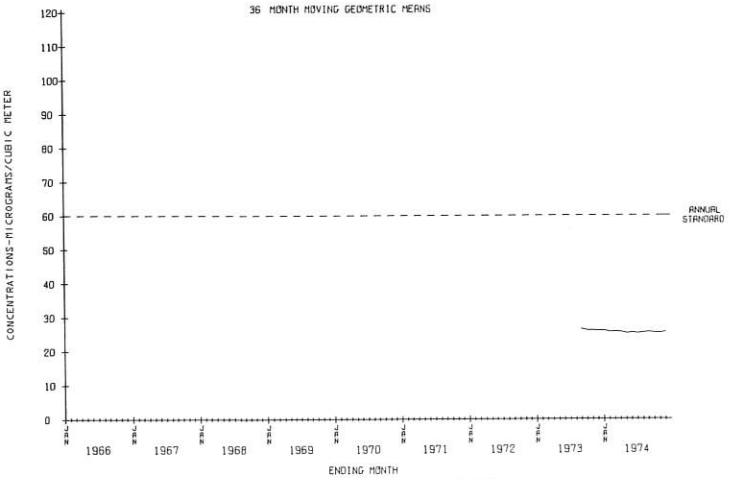
24 MONTH MOVING GEOMETRIC MEANS



(DOE) CITY HALL. 239 4TH ST. BREMERTON

SUSPENDED PARTICULATES

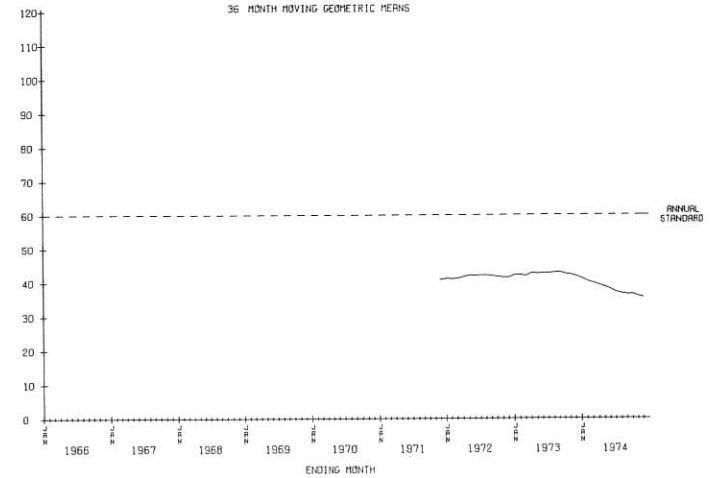
36 MONTH MOVING GEOMETRIC MEANS



DEWEY JR HS. PERRY AVE & HOLMAN ST. BREMERTON

SUSPENDED PARTICULATES

36 MONTH MOVING GEOMETRIC MEANS



(DOE) CITY HALL. 239 4TH ST. BREMERTON

SULFUR DIOXIDE POLLUTION ROSE FREQUENCY DISTRIBUTIONS

Sulfur dioxide and wind are measured continuously on a simultaneous basis at 12 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 directions summarized in rows. Each table value is 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 (0.00 to 0.00) presents specifically the occurrence of 0.00 hour average sulfur dioxide readings.

Finally, the column of row totals provides a frequency distribution of hourly wind direction (to 16 points of the compass) or simply a wind rose without respect to speed.

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

MEDICAL-DENTAL BLDG, 2730 COLBY AVE, EVERETT
ALL MONTHS 1974

		SULFUR DIOXIDE (PPM)															
WIND DIRECTION (DEGREES)		.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	OVER .70	TOTALS
N	(349 - 011)	155	13					1										169
NNE	(012 - 033)	135	8	3					1									147
NE	(034 - 056)	145	13															158
ENE	(057 - 078)	145	9															154
E	(079 - 101)	153	19	1	1													174
ESE	(102 - 123)	494	75	8	1													578
SE	(124 - 146)	1985	200	4														2189
SSE	(147 - 168)	822	109	2	1													934
S	(169 - 191)	321	38		1													360
SSW	(192 - 213)	171	5															176
SW	(214 - 236)	53	7															60
WSW	(237 - 258)	75	35	2		1												113
W	(259 - 281)	872	393	56	13	6	2	2	3	1								1348
WNW	(282 - 303)	286	261	101	60	36	23	27	13	5	7	7						826
NW	(304 - 326)	266	169	50	15	8	5	4	2	4				1			1	525
NNW	(327 - 348)	222	21	2				1										246
CALM AND LIGHT/VARIABLE		172	84	1	2	1		2										262
TOTALS		6472	1459	230	94	52	30	37	19	10	7	7		1			1	8419

FOOD CIRCUS BUILDING, SEATTLE CENTER
JAN, FEB, MAR, APR, MAY, JUN, JUL, NOV, DEC, 1974

		SULFUR DIOXIDE (PPM)															
WIND DIRECTION (DEGREES)		.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	OVER .70	TOTALS
N	(349 - 011)	171	24	5	4	4	1											209
NNE	(012 - 033)	97	24	13	4	5												143
NE	(034 - 056)	345	100	11	3													459
ENE	(057 - 078)	304	72	11	2	1												390
E	(079 - 101)	105	22	2														129
ESE	(102 - 123)	67	6	1														74
SE	(124 - 146)	82	23	1	1													107
SSE	(147 - 168)	249	68	19	7	3												346
S	(169 - 191)	523	337	86	24	19	6	2		1								998
SSW	(192 - 213)	678	307	84	37	11	4	1	1	1								1124
SW	(214 - 236)	255	65	8	3	2												333
WSW	(237 - 258)	140	33	6	3													182
W	(259 - 281)	238	41	4	2	3												288
WNW	(282 - 303)	89	20	1	2													112
NW	(304 - 326)	38	5		1													44
NNW	(327 - 348)	162	27	4														193
CALM AND LIGHT/VARIABLE		144	74	21	6	6	3											254
TOTALS		3687	1248	277	99	54	14	3	1	2								5385

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

DUWAMISH, 4500 BLK E MARGINAL WAY S, SEATTLE
ALL MONTHS 1974

WIND DIRECTION (DEGREES)		SULFUR DIOXIDE (PPM) .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	OVER .70	TOTALS
N	(349 - 011)	147	130	30	24	10	6	5	7									359
NNE	(012 - 033)	193	75	15	8		1											292
NE	(034 - 056)	189	61	8	1													259
ENE	(057 - 078)	176	36	4	2													218
E	(079 - 101)	96	26	3														125
ESE	(102 - 123)	47	16	6	1													70
SE	(124 - 146)	159	77	5		1												242
SSE	(147 - 168)	449	250	29	7	1	1											737
S	(169 - 191)	701	274	42	21	6		2	1									1047
SSW	(192 - 213)	658	297	77	28	8	1	4										1073
SW	(214 - 236)	626	210	59	24	18	7	2										946
WSW	(237 - 258)	228	28	5														261
W	(259 - 281)	121	19	3	1													144
WNW	(282 - 303)	112	29	16	3		1	1										162
NW	(304 - 326)	371	272	70	20	9	3	7		2								754
NNW	(327 - 348)	259	206	69	19	14	7	10	1									585
CALM AND LIGHT/VARIABLE		547	390	53	21	10	4		1	1	1							1028
TOTALS		5079	2396	494	180	77	31	31	10	3	1							8302

SOUTH CENTER, ANDOVER PARK EAST, TUKWILA, WA
JAN, FEB, MAR, APR, MAY, JUN, OCT, NOV, DEC, 1974

WIND DIRECTION (DEGREES)		SULFUR DIOXIDE (PPM) .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	OVER .70	TOTALS
N	(349 - 011)	301	24	2	1													328
NNE	(012 - 033)	156	8	2														166
NE	(034 - 056)	99	7	1	1													108
ENE	(057 - 078)	46	2															48
E	(079 - 101)	46	3															49
ESE	(102 - 123)	46	4	1														51
SE	(124 - 146)	76	8	1														85
SSE	(147 - 168)	173	22	3		2		1										201
S	(169 - 191)	877	43	9	1	2	1		1									934
SSW	(192 - 213)	1163	103	21	7	5	2											1301
SW	(214 - 236)	281	108	39	11	6	1	3										449
WSW	(237 - 258)	88	31	13	3	2												137
W	(259 - 281)	41	15	3	2													61
WNW	(282 - 303)	25	7	1														33
NW	(304 - 326)	89	20															109
NNW	(327 - 348)	225	30	3				1										259
CALM AND LIGHT/VARIABLE		672	92	8		3												775
TOTALS		4404	527	107	26	20	4	5	1									5094

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

MCMICKEN HTS, S 176TH & 42ND AV S, KING CO, WA
ALL MONTHS 1974

SULFUR DIOXIDE (PPM)

WIND DIRECTION (DEGREES)	.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	OVER .70	TOTALS
N (349 - 011)	316	89	6		1												412
NNE (012 - 033)	536	146	9	1													692
NE (034 - 056)	507	75	7	2													591
ENE (057 - 078)	250	27	2		1												280
E (079 - 101)	137	19	1														157
ESE (102 - 123)	89	11															100
SE (124 - 146)	137	9															146
SSE (147 - 168)	405	54	2		1	1											463
S (169 - 191)	500	85	2			1	1										589
SSW (192 - 213)	428	65	10														503
SW (214 - 236)	921	279	78	27	9	3	8	3		1	1						1330
WSW (237 - 258)	624	265	57	37	17	7	5	4	1								1017
W (259 - 281)	152	49	7	2	4	2	1										217
WNW (282 - 303)	53	17	2														72
NW (304 - 326)	80	17	3														100
NNW (327 - 348)	195	40	3														238
CALM AND LIGHT/VARIABLE	864	199	32	4	3	1	2	1									1106
TOTALS	6194	1446	221	73	36	15	17	8	1	1	1						8013

1234 NORTH CENTRAL AVENUE, KENT, WA
AUG, SEP, OCT, NOV, DEC, 1974

SULFUR DIOXIDE (PPM)

WIND DIRECTION (DEGREES)	.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	OVER .70	TOTALS
N (349 - 011)	147	12															159
NNE (012 - 033)	54	5															59
NE (034 - 056)	7	1															8
ENE (057 - 078)	6																6
E (079 - 101)	20																20
ESE (102 - 123)	27		1														28
SE (124 - 146)	76	1				1											78
SSE (147 - 168)	237	5															242
S (169 - 191)	363	7	1														371
SSW (192 - 213)	142	6				2											150
SW (214 - 236)	93	13	1	1	1	1											110
WSW (237 - 258)	54	13	4	1	2		1										75
W (259 - 281)	74	21	5		1	1	1										103
WNW (282 - 303)	43	7	1		1												52
NW (304 - 326)	21	2	3					1									27
NNW (327 - 348)	54	5															59
CALM AND LIGHT/VARIABLE	1357	128	19	4	2	2	1	1									1514
TOTALS	2775	226	35	6	7	7	3	2									3061

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

MEEKER JR HS, 1526 - 51ST STREET NE, TACOMA
ALL MONTHS 1974

		SULFUR DIOXIDE (PPM)															
WIND DIRECTION (DEGREES)		.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	OVER .70	TOTALS
N	(349 - 011)	576	27	3	1		1	1	1									610
NNE	(012 - 033)	914	18	1	1	1												935
NE	(034 - 056)	310	9		1													320
ENE	(057 - 078)	79	7															86
E	(079 - 101)	75	3															78
ESE	(102 - 123)	80	12	3	1	1												97
SE	(124 - 146)	255	70	18	3	2	2											350
SSE	(147 - 168)	604	90	13	5													712
S	(169 - 191)	597	42	4	4	1	1											649
SSW	(192 - 213)	882	9	2														893
SW	(214 - 236)	751	11	2														764
WSW	(237 - 258)	301	16	7	2	3												329
W	(259 - 281)	109	22	3	3		1											138
WNW	(282 - 303)	89	23	10	4	2	3	3										134
NW	(304 - 326)	153	41	10	4	4	3	1	1									217
NNW	(327 - 348)	143	14	5	2	2												166
CALM AND LIGHT/VARIABLE		847	126	30	7	3	2	1										1016
TOTALS		6765	540	111	38	19	13	6	2									7494

N 26TH AND PEARL STREET, TACOMA
ALL MONTHS 1974

		SULFUR DIOXIDE (PPM)															
WIND DIRECTION (DEGREES)		.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	OVER .70	TOTALS
N	(349 - 011)	158	101	19	13	2	8	6	2	3		2						314
NNE	(012 - 033)	424	291	74	34	25	16	22	8	5	5	2	1	1		1	1	910
NE	(034 - 056)	493	176	32	14	6	3	10	2	1		1						738
ENE	(057 - 078)	147	40	6	2			2	1									198
E	(079 - 101)	86	34	7														127
ESE	(102 - 123)	35	19	2		1												57
SE	(124 - 146)	58	29	3														90
SSE	(147 - 168)	226	40	4	1													271
S	(169 - 191)	571	49	1				1										622
SSW	(192 - 213)	1092	91	2														1185
SW	(214 - 236)	1161	165															1326
WSW	(237 - 258)	678	132	5														815
W	(259 - 281)	257	61	3	2			1										324
WNW	(282 - 303)	85	19	5	3	1												113
NW	(304 - 326)	73	27	6	3		1		2									112
NNW	(327 - 348)	68	32	5	5	1			1	1								113
CALM AND LIGHT/VARIABLE		650	339	51	11	4	1	4	1		1	1		2				1065
TOTALS		6262	1645	225	88	40	29	46	17	10	6	6	1	3		1	1	8380

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

SW 248TH & 59TH AVE, SW, MAURY ISLAND, WASH.
JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, DEC, 1974

SULFUR DIOXIDE (PPM)

WIND DIRECTION (DEGREES)	.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	OVER .70	TOTALS
N (349 - 011)	341	21															362
NNE (012 - 033)	131	7															138
NE (034 - 056)	71	6	2														79
ENE (057 - 078)	73	7															80
E (079 - 101)	91	4	1														96
ESE (102 - 123)	118	10	3	1		1											133
SE (124 - 146)	666	81	21	6	2	2	6		1	2							787
SSE (147 - 168)	373	54	7	7	2		1										444
S (169 - 191)	488	95	26	10	6	3	2	1	1		1						633
SSW (192 - 213)	328	145	72	42	30	23	27	8	2	2							679
SW (214 - 236)	344	66	26	9	8	2	6	1	1		1						464
WSW (237 - 258)	180	15	6	1													202
W (259 - 281)	105	11	1	1													118
WNW (282 - 303)	95	7			1												103
NW (304 - 326)	136	9															145
NNW (327 - 348)	1462	31	1														1494
CALM AND LIGHT/VARIABLE	357	50	9	5	3			1	1								426
TOTALS	5359	619	175	82	52	31	42	11	6	4	2						6383

DEWEY JR HS, PERRY AVE & HOLMAN ST, BREMERTON
JUL, AUG, SEP, OCT, DEC, 1974

SULFUR DIOXIDE (PPM)

WIND DIRECTION (DEGREES)	.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	OVER .70	TOTALS
N (349 - 011)	80	1															81
NNE (012 - 033)	283	2															285
NE (034 - 056)	418	3															421
ENE (057 - 078)	138		1														139
E (079 - 101)	229	8	1														238
ESE (102 - 123)	93	3															96
SE (124 - 146)	44		2														46
SSE (147 - 168)	45	6	1														52
S (169 - 191)	170	10	1														181
SSW (192 - 213)	365	29	6	2			2										404
SW (214 - 236)	317	95	11	3	1												427
WSW (237 - 258)	106	17	2														125
W (259 - 281)	51	7															58
WNW (282 - 303)	34	1															35
NW (304 - 326)	33																33
NNW (327 - 348)	38	1															39
CALM AND LIGHT/VARIABLE	513	36	9	4	1		2	2									567
TOTALS	2957	219	34	9	2		4	2									3227

SULFUR DIOXIDE FOR YEAR 1974
(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	A	B	C
Medical-Dental Bldg., Everett										3			2	3	1	4	7	1	5	9	1	9	6	1	1	1		10	5	2							31	34	6
Green Lake Rsvr., Seattle[a]																																							
Food Circus Bldg., Seattle Center																																							
Duwamish, 4500 Blk. E. Marg. Way S.																						1			2												3		
Southcenter, Tukwila																																							
McMicken Hts, King County				3	1					1						1						1			1											7	1	
1234 N. Central Ave., Kent[b]																									1											1		
Meeker Jr. H.S., Tacoma																																							
Willard Elem. School, Tacoma																																							
N. 26th & Pearl, Tacoma	1	1		4	2		6	3	3	1	3					1	2								1	3			4	1		1				10	21	6
S.W. 248th & 59th Ave S.W. Maury Is.		4		1	2					3			1															1				3		1	14		
Dewey Jr. H.W., Bremerton[c]																																	3			3			
All Station Frequencies	1	5		1	9	3	6	3	3	1	10		2	4	1	5	10	1	5	9	1	9	8	1	2	8		10	10	3		1			6		42	83	13

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.
0.10 ppm for 24 hours not to be exceeded more than once in a Year. (NOTE: 1 occurrence on March 18, 1974, at N. 26th & Pearl.)

a Discontinued 7/15/74
b Established 8/ 1/74
c Established 6/24/74

SULFUR DIOXIDE FOR 1974
(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	.007	.07	.92	1.50
Green Lake Reservoir, Seattle[a]	.003	.03	.10	
Food Circus Bldg., Seattle Center	.006	.06	.21	
4500 Blk. E. Marg. Way S., Seattle	.009	.06	.29	
Southcenter, Tukwila	.003	.02	.17	
McMicken Heights, King County	.005	.04	.52	
1234 N. Central Ave., Kent[b]	.002	.02	.27	
Meeker Jr. H.S., Tacoma	.002	.03	.17	
Willard Elem. School, Tacoma	.003	.02	.16	
N. 26th & Pearl, Tacoma	.007	.11	.74	1.92
Maury Island	.006	.06	.40	1.28
Dewey Jr. H.S., Bremerton	.001	.03	.33	

a Discontinued 7/15/74

b Established 8/ 1/74

STANDARDS: 0.~~10~~ OK ppm for 24 hours never to be exceeded.
0.02 ppm for 365 days never to be exceeded.
0.~~04~~ 40 ppm for 1 hour never to be exceeded.

COEFFICIENT OF HAZE SUMMARY FOR YEAR 1974

(COH's/1000 Linear Feet)

Location	Monthly Arithmetic Averages												Arith.[a] Mean	Geo.[a] Mean
	J	F	M	A	M	J	J	A	S	O	N	D		
Tulalip Test Facility, Wa.[b]									0.32	0.42	0.26	0.26	0.31	0.24
Medical-Dental Bldg., Everett	0.37	0.28	0.34	0.34	0.29	0.31	0.35	0.46	0.58	0.69	0.44	0.36	0.40	0.32
Green Lake Rsvr., Seattle[c]	0.72	0.60	0.55	0.44	0.33	0.29	0.16						0.48	0.38
Food Circus Bldg., Seattle Center	0.61	0.42	0.43	0.39	0.31	0.22	0.25	0.39	0.58	0.91	0.67	0.68	0.50	0.38
4500 Blk. E. Marg. Way S., Seattle	0.86	0.58	0.60	0.45	0.38	0.35	0.43	0.65	0.83	1.28	0.82	0.91	0.68	0.48
10000 W. Marg, Way S., Seattle[b]									1.04	1.43	0.84	0.91	1.06	0.79
Southcenter, Tukwila	0.72	0.64	0.53	0.50	0.40	0.47				1.77	0.77	0.75	0.65	0.48
McMicken Hts., King County	0.37	0.61	0.49	0.42	0.31	0.35	0.38	0.52	0.56	1.00	0.73	0.61	0.53	0.40
1234 N. Central Ave., Kent[b]							0.31	0.41	0.64	0.95	0.70	0.61	0.63	0.47
Meeker Jr. H.S., Tacoma	0.46	0.48	0.34	0.24	0.21	0.18	0.17	0.26	0.33	0.60	0.43	0.43	0.35	0.25
Willard Elem. School, Tacoma	0.83	0.73	0.64	0.49	0.36	0.42	0.43	0.62	0.82	1.28	0.87	0.87	0.70	0.49
N. 26th & Pearl, Tacoma	0.35	0.23	0.39	0.23	0.16	0.19	0.14	0.23	0.45	0.76	0.54	0.49	0.35	0.21
Maury Island, Wa.	0.31	0.35	0.29	0.18	0.15	0.17	0.17	0.18	0.29	0.48	0.34	0.28	0.27	0.20
Dewey Jr. H.S., Bremerton[b]						0.16	0.15	0.17	0.24	0.47	0.32	0.37	0.28	0.21
Weighted Arithmetic Mean[d]	0.56	0.50	0.47	0.37	0.29	0.28	0.28	0.38	0.56	0.87	0.60	0.58		

a Developed from all available hourly values
b Station established during 1974
c Station discontinued during 1974
d Means weighted by number of readings per month

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 (2.9 COH) was recorded on October 16 in the Seattle Duwamish industrial area, while the maximum hourly average (4.4 COH) was recorded on October 18 at Willard Elementary School, Tacoma.

The Washington State Department of Ecology (DOE) has statewide jurisdiction over mobile sources of pollution (motor vehicles). The DOE operates equipment that measures motor vehicle related pollutants in certain areas of the State. During 1974, 11 carbon monoxide analyzers were in operation in the Puget Sound Air Quality Control Region from four months to a full year. Some of these stations were in operation prior to 1974.

The carbon monoxide data presented below was extracted from the Department of Ecology "Annual Summary of Ambient Air Quality Data for Selected Monitoring Stations in the State." Detailed information regarding hourly, daily and seasonal averages and trends, site information, and emission control strategies may be obtained by contacting the Department of Ecology.

In general, high ambient levels of carbon monoxide occur near congested, slow moving or stalled automobile traffic when low level winds are light and stable meteorological conditions exist. Peak concentrations generally coincide with the morning and evening traffic peaks. Minimum values are measured during the night and on weekends.

The ambient air quality standard for carbon monoxide states that concentrations measured in the ambient air shall not exceed 9 ppm maximum 8 hour average or 35 ppm maximum one hour concentration, neither to be exceeded more than once per year. An alert is to be declared when carbon monoxide reaches 15 ppm for an eight hour average and meteorological conditions are such that the concentrations can be expected to remain at or above that level for 12 or more hours or increase unless control actions are taken (Washington Administrative Code (WAC) 18-08-030(2)). The warning level is 30 ppm for an eight hour average and the emergency level is 40 ppm for an eight hour average with meteorological conditions as indicated above.

The table below lists the maximum one hour and 8 hour averages measured during 1974 with the total number of days the eight hour average was in excess of 9 ppm at least once.

CARBON MONOXIDE - PPM

Location	Period of Record (Month)	1 hr Max	8 hr Max	No. Days 8 hr > 9 ppm
Seattle				
6770 E. Marginal Way S.	Jan. 1 - Dec. 31	17	9	0
1000 4th Ave. S.	Jan. 1 - Dec. 31	35	25	35
609 Westlake N.	Jan. 1 - Dec. 31	25	15	39
1300 S. Dearborn St.	Jan. 8 - Dec. 31	35	26	152
1408 4th Ave.	Jan. 1 - Dec. 31	25	17	55
City Hall, 5th & James St.	Jan. 1 - Dec. 31	36	22	82
N. E. 112 & 5th N. E.	Apr. 15 - Dec. 31	26	12	6
Tacoma				
112 St. S.W. & Loch Lea, Lakewood	June 11 - Dec. 31	11	7	0
901 Tacoma Ave. S.	Jan. 1 - Dec. 31	15	7	0
715 S. 11th Street	Jan. 1 - Dec. 31	28	21	6
Everett				
Everett & Pine	Jan. 1 - Apr. 26	11	5	0

PHOTOCHEMICAL OXIDANTS

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

Photochemical reactivity may be defined as the tendency of an atmospheric system containing organic substances (such as reactive hydrocarbons) and nitrogen oxides to undergo, under the influence of ultraviolet radiation and appropriate meteorological conditions, a series of chemical reactions that result in the type of air pollution referred to as photochemical oxidants. This reaction requires some time (2 to 5 hours) to take place, therefore the maximum concentrations of photochemical oxidants can normally be expected from 5 to 15 miles downwind of the sources that emit reactive hydrocarbons and nitrogen oxides.

Since ultraviolet radiation is a necessary part of this reaction, the summer months with more hours of sunlight and with the sun at a higher elevation angle is the season with the highest probability of occurrence of photochemical oxidants. Light northerly winds normally accompany the sunny clear days in this region during the summer; therefore, the highest probability of occurrence of maximum concentrations of photochemical oxidants is 5 to 15 miles south of the source areas emitting reactive hydrocarbons and nitrogen oxides. The maximum values normally occur between noon and sunset.

During 1974, three instruments were available to this Agency. One was operated at the Food Circus Building in the Seattle Center Complex. The other two were operated about nine miles and twelve miles south of downtown Seattle; the first at McMicken Heights just east of Sea-Tac Airport at an elevation of 480 feet, and the second at Kent, in the Green River valley, elevation 35 feet. The instrument at Kent is specific for ozone while the other two measure total oxidants corrected for sulfur oxides.

The State Department of Ecology operated three additional instruments in the region which are specific for ozone. These were located in the Duwamish Valley industrial area of Seattle, in downtown Tacoma, and in Lakewood, about eight miles south of Tacoma business-industrial area.

Although the data is limited to less than one full year, the tables which follow clearly indicate that higher values occur south of the source areas. While values of 0.01 to 0.04 ppm for periods of several hours have been recorded during the fall and winter, no values exceeding 0.08 ppm were recorded from September 24, 1974 through year end. During the period July-August, the Kent area experienced three times the number of occurrences exceeding 0.08 ppm than did the McMicken Heights area.

TOTAL OXIDANTS FOR YEAR 1974

(Concentration in parts per million)

Location	Period of Operation	Highest 24-Hour Average	Highest 4-Hour Average	Highest 1-Hour Average	Hours Exceeding 0.08 ppm
Food Circus Bldg., Seattle Center	April 11 - Sept. 30	0.04 ppm	0.07 ppm	0.07 ppm	0
McMicken Heights, King County	May 7 - Oct. 31	0.05 ppm	0.10 ppm	0.10 ppm	12

Total oxidants are measured on a continuous basis using a coulometric method with an on-line SO_2 scrubber.

OZONE FOR YEAR 1974

(Concentration in parts per million)

Location	Period of Operation	Highest 24-Hour Average	Highest 4-Hour Average	Highest 1-Hour Average	Hours Exceeding 0.08 ppm
1234 N. Central Ave., Kent	July 25 - Dec. 31	0.04 ppm	0.12 ppm	0.14 ppm	37
6770 E. Marg. Way S., Seattle	Jan 1 - May 7, Oct. 1 - Dec. 7	0.03 ppm	0.05 ppm	0.06 ppm	0
Hess Building, Tacoma	April 1 - Dec. 31	0.03 ppm	0.06 ppm	0.07 ppm	0
112th St. S.W. & Loch Lea, Lakewood	June 12 - Dec. 31	0.03 ppm	0.10 ppm	0.12 ppm	5

Ozone is measured on a continuous basis using the gas phase chemiluminescence method.

NITROGEN DIOXIDE FOR YEAR 1974

(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	Arithmetic Mean for Period of Operation
McMicken Heights, King Co.	Jan. 1 - Dec. 16	0.06 ppm	0.11 ppm	0.025 ppm

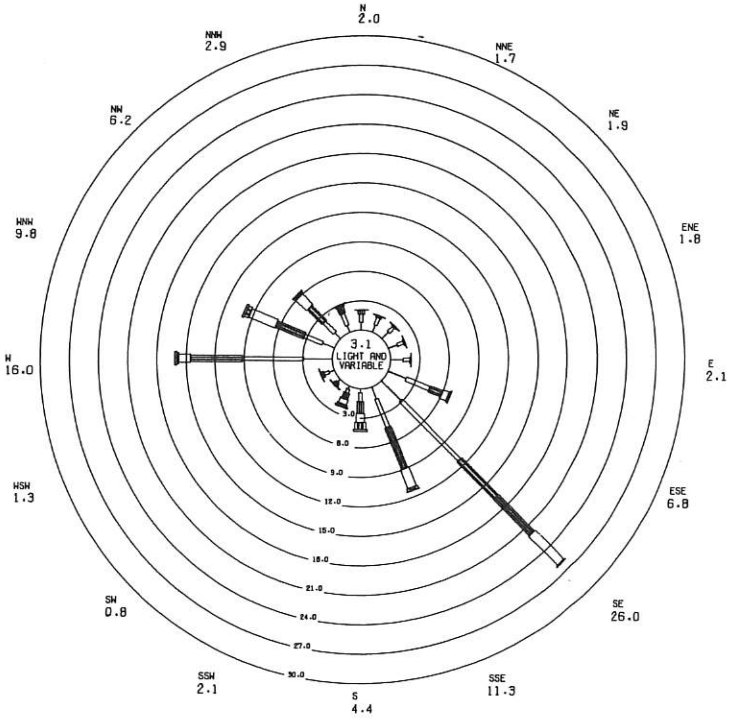
Nitrogen dioxide is measured on a continuous basis using the colorimetric-Saltzman method. The Table lists the highest average concentrations observed for the periods indicated and the arithmetic mean for the period of operation.

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 1974 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.



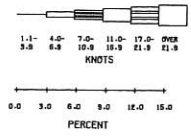
HOUR AVERAGE SURFACE WINDS

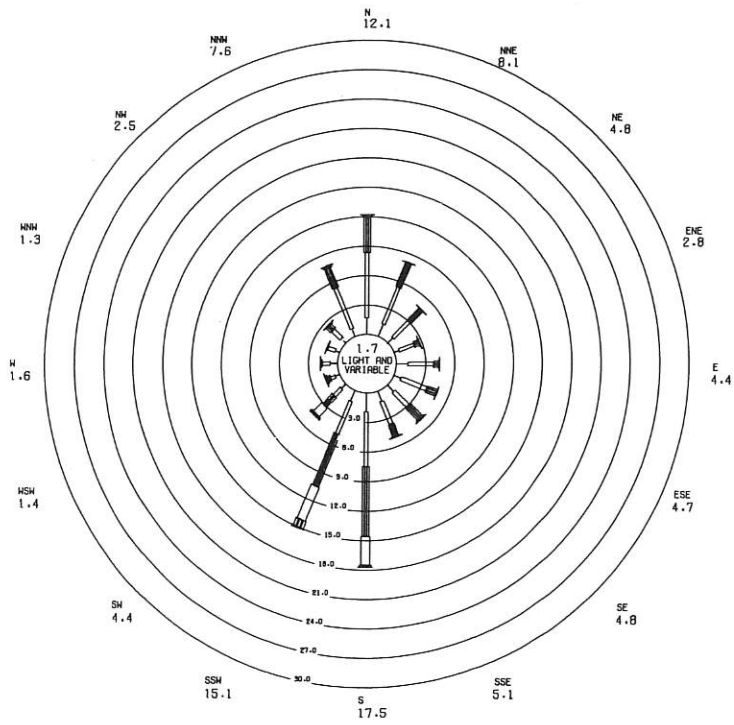
PERCENTAGE FREQUENCY OF OCCURRENCE

STATION LOCATION- PUGET SOUND AIR POLLUTION CONTROL AGENCY
MED-DENTAL BLDG. 2730 COLBY AVE. EVERETT

INCLUSIVE DATES- ALL MONTHS 1974

TOTAL OBSERVATIONS- 8,527





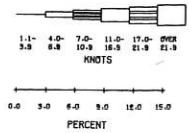
HOUR AVERAGE SURFACE WINDS

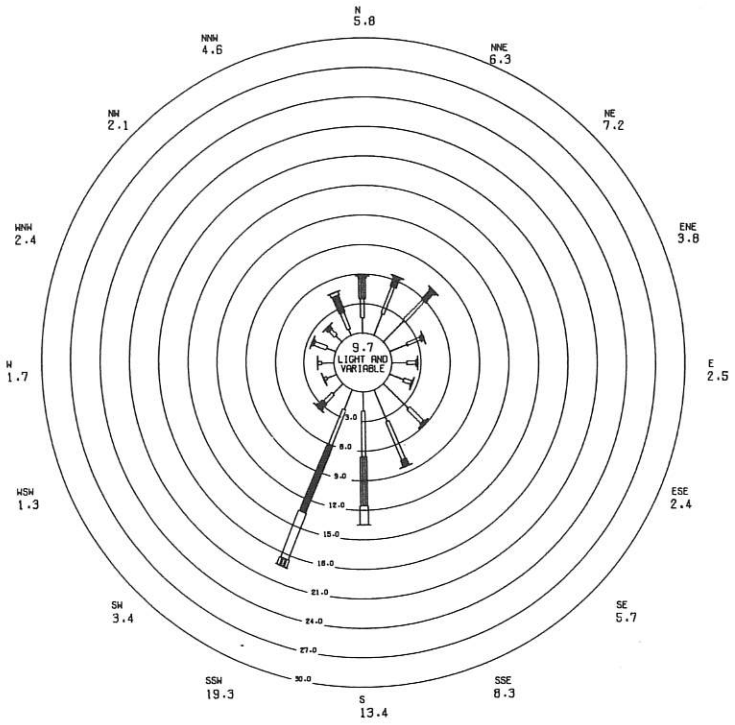
PERCENTAGE FREQUENCY OF OCCURRENCE

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

INCLUSIVE DATES- ALL MONTHS 1974

TOTAL OBSERVATIONS- 8,719





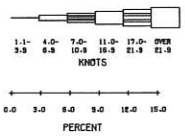
HOUR AVERAGE SURFACE WINDS

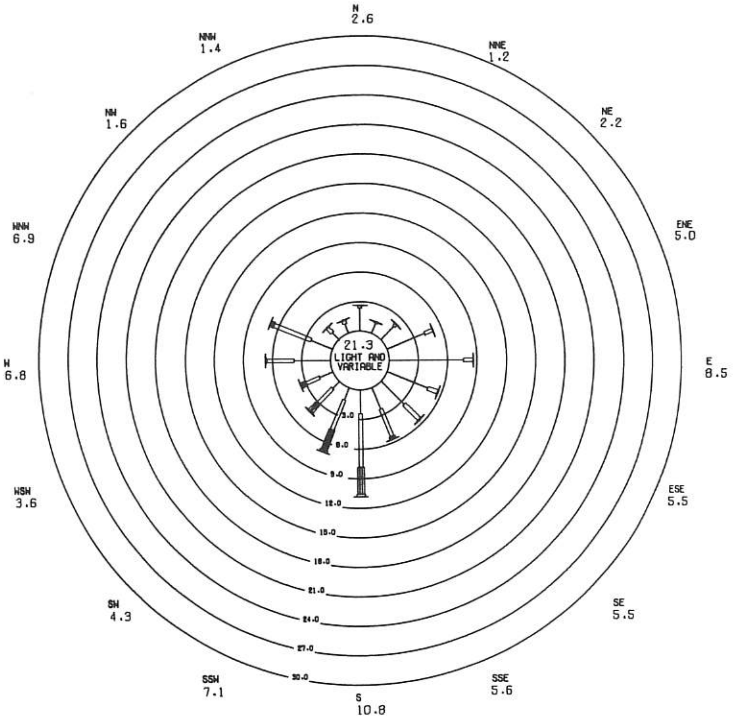
PERCENTAGE FREQUENCY OF OCCURRENCE

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

INCLUSIVE DATES- JAN-JUL, 1974

TOTAL OBSERVATIONS- 4,607





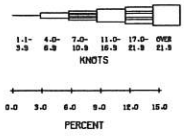
HOUR AVERAGE SURFACE WINDS

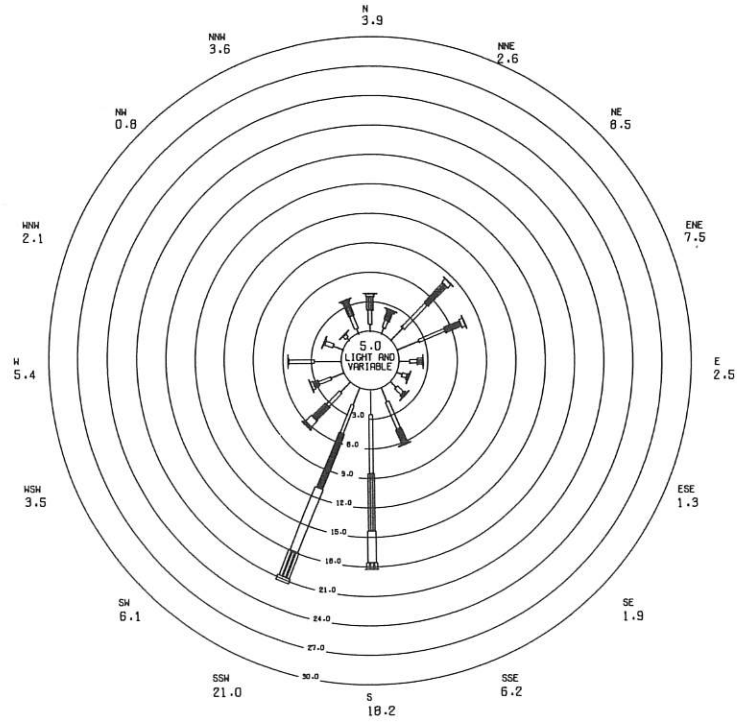
PERCENTAGE FREQUENCY OF OCCURRENCE

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

INCLUSIVE DATES- ALL MONTHS 1974

TOTAL OBSERVATIONS- 8,366





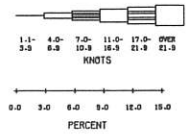
HOUR AVERAGE SURFACE WINDS

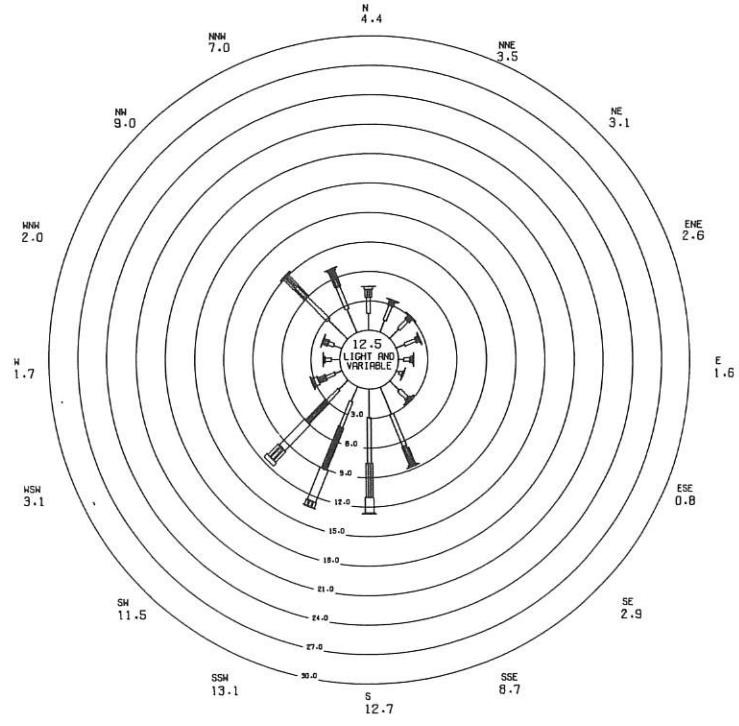
PERCENTAGE FREQUENCY OF OCCURRENCE

STATION LOCATION- PUGET SOUND AIR POLLUTION CONTROL AGENCY
FOOD CIRCUS BUILDING. SEATTLE CENTER

INCLUSIVE DATES- JAN-JUL, NOV-DEC, 1974

TOTAL OBSERVATIONS- 5,684





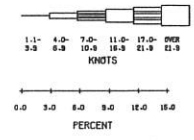
HOUR AVERAGE SURFACE WINDS

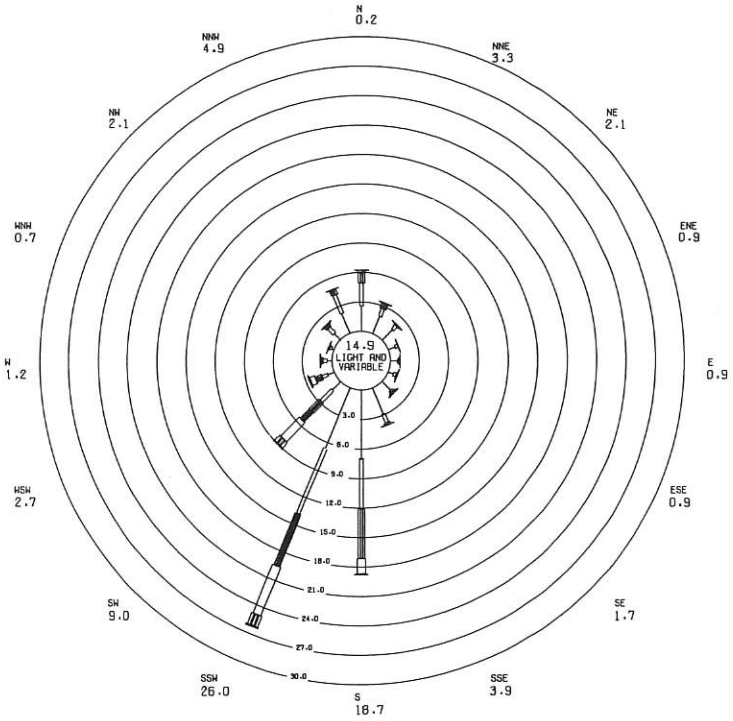
PERCENTAGE FREQUENCY OF OCCURRENCE

STATION LOCATION- PUGET SOUND AIR POLLUTION CONTROL AGENCY
DUWAMISH. 4500 BLK E MARG WAY. SEATTLE

INCLUSIVE DATES- ALL MONTHS 1974

TOTAL OBSERVATIONS- 8,521





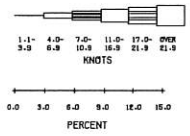
HOUR AVERAGE SURFACE WINDS

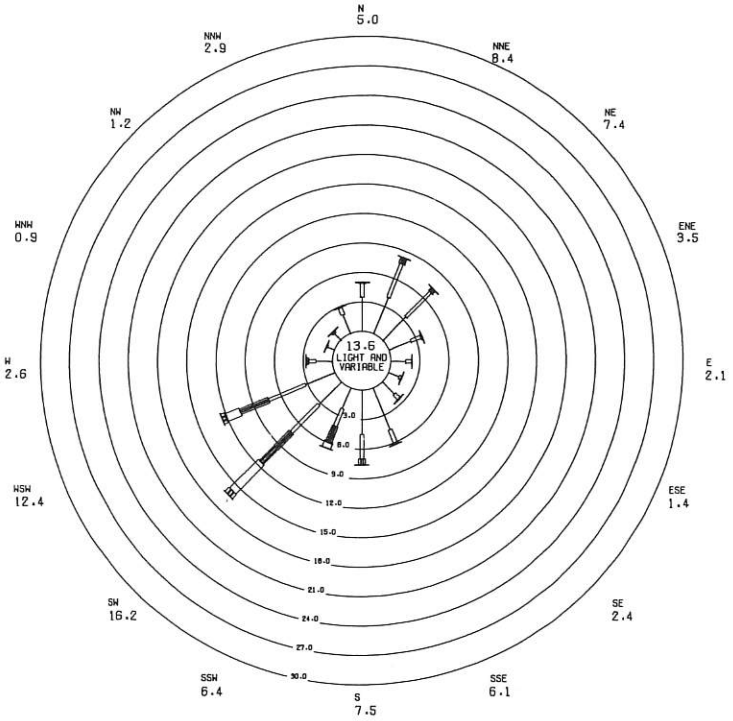
PERCENTAGE FREQUENCY OF OCCURRENCE

STATION LOCATION- PUGET SOUND AIR POLLUTION CONTROL AGENCY
227 ANDOVER PARK E, TUKWILA

INCLUSIVE DATES- JAN-JUN, OCT-DEC, 1974

TOTAL OBSERVATIONS- 5,498





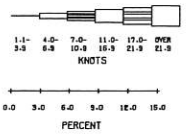
HOUR AVERAGE SURFACE WINDS

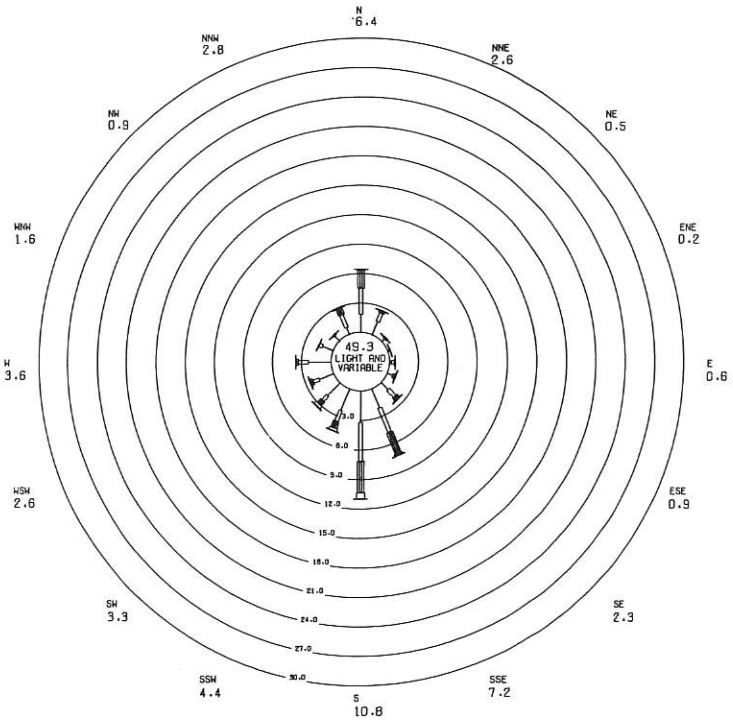
PERCENTAGE FREQUENCY OF OCCURRENCE

STATION LOCATION- PUGET SOUND AIR POLLUTION CONTROL AGENCY
MCMICKEN HTS.S 176TH & 42ND AV S,KING CO

INCLUSIVE DATES- ALL MONTHS 1974

TOTAL OBSERVATIONS- 8,447





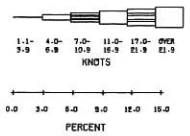
HOUR AVERAGE SURFACE WINDS

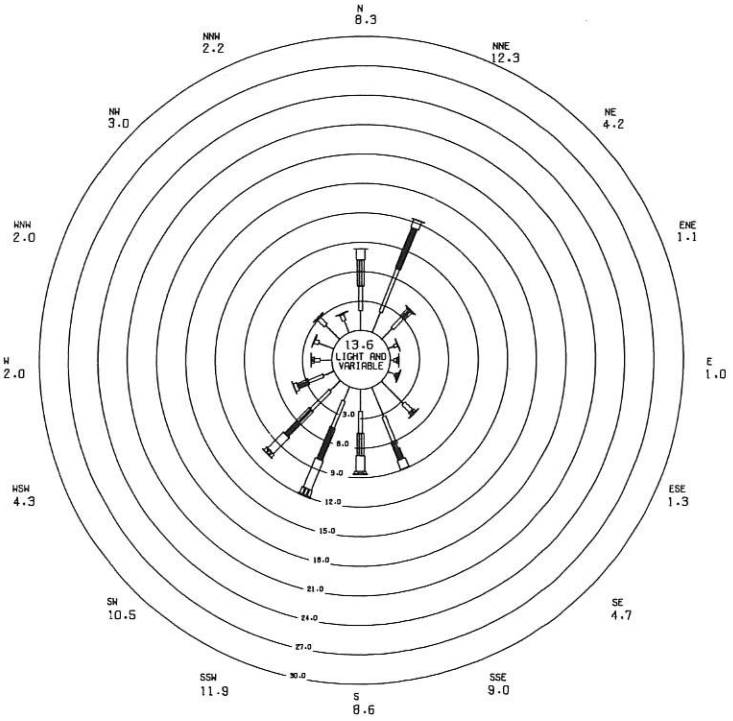
PERCENTAGE FREQUENCY OF OCCURRENCE

STATION LOCATION- PUGET SOUND AIR POLLUTION CONTROL AGENCY
1234 NORTH CENTRAL AVENUE, KENT WA

INCLUSIVE DATES- JUL-DEC, 1974

TOTAL OBSERVATIONS- 3465





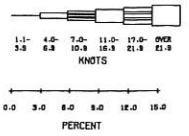
HOUR AVERAGE SURFACE WINDS

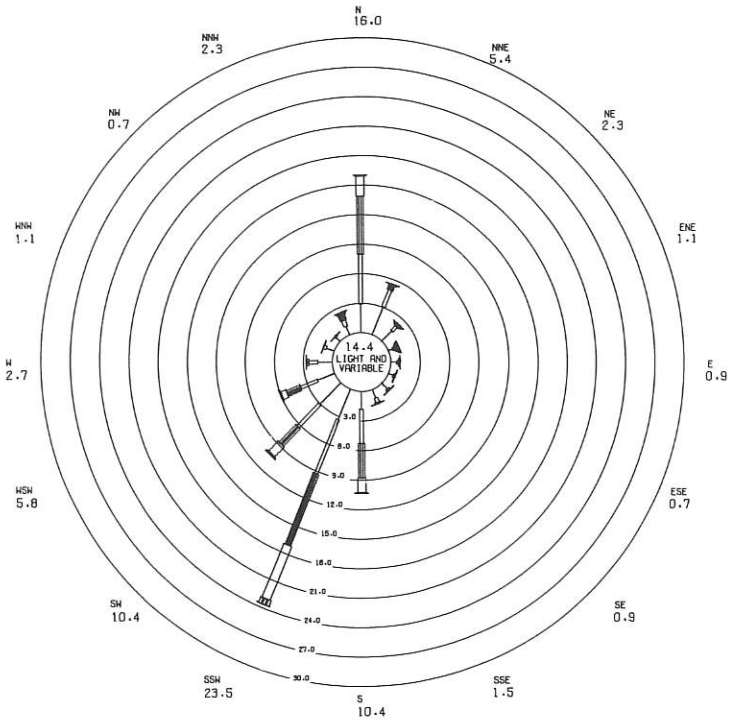
PERCENTAGE FREQUENCY OF OCCURRENCE

STATION LOCATION- PUGET SOUND AIR POLLUTION CONTROL AGENCY
MEEKER JHS.1526 51ST STREET NE, TACOMA

INCLUSIVE DATES- ALL MONTHS 1974

TOTAL OBSERVATIONS- 8,461





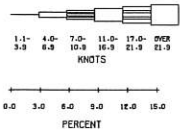
HOUR AVERAGE SURFACE WINDS

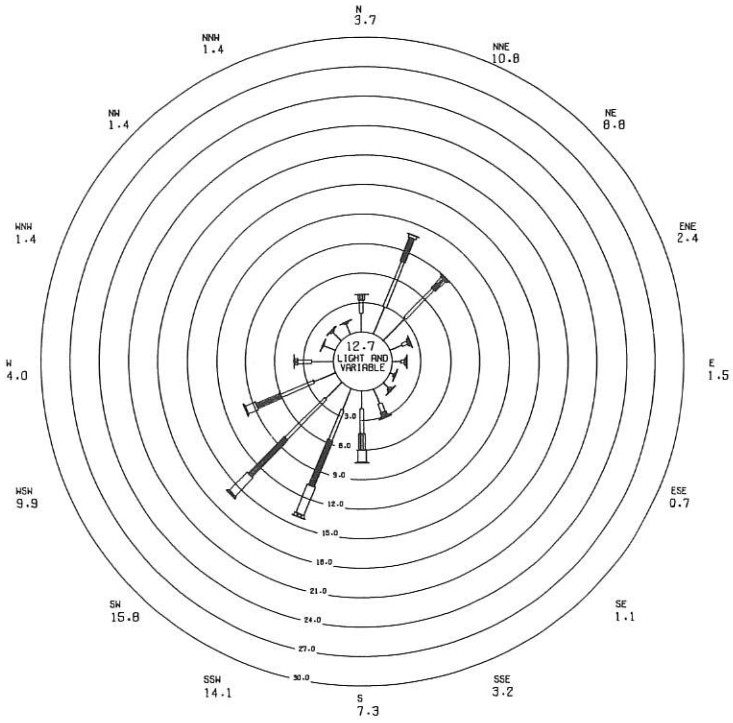
PERCENTAGE FREQUENCY OF OCCURRENCE

STATION LOCATION- PUGET SOUND AIR POLLUTION CONTROL AGENCY
WILLARD ELEM SCHOOL. S 32ND & S 'D' ST. TACOMA

INCLUSIVE DATES- ALL MONTHS 1974

TOTAL OBSERVATIONS- 8,509





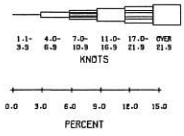
HOUR AVERAGE SURFACE WINDS

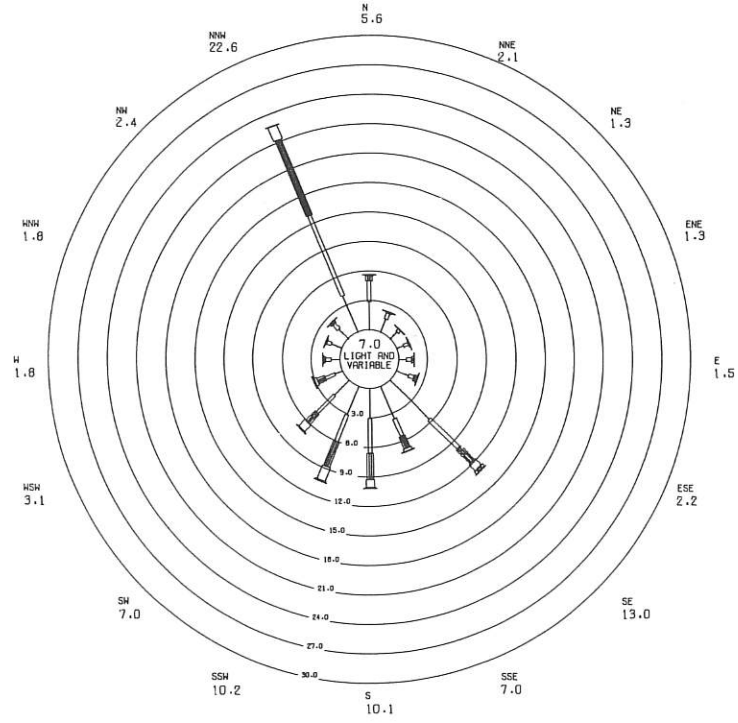
PERCENTAGE FREQUENCY OF OCCURRENCE

STATION LOCATION- PUGET SOUND AIR POLLUTION CONTROL AGENCY
N 26TH AND PEARL STREET. TACOMA

INCLUSIVE DATES- ALL MONTHS 1974

TOTAL OBSERVATIONS- 8,519





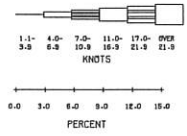
HOUR AVERAGE SURFACE WINDS

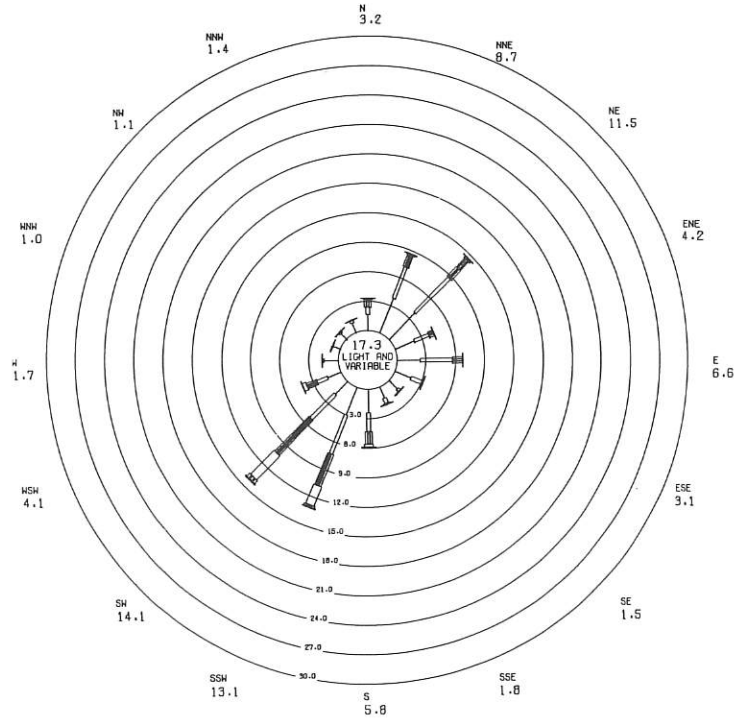
PERCENTAGE FREQUENCY OF OCCURRENCE

STATION LOCATION- PUGET SOUND AIR POLLUTION CONTROL AGENCY
SW 248TH & 59TH AVE SW. MAURY ISLAND. WASH

INCLUSIVE DATES- ALL MONTHS, 1974

TOTAL OBSERVATIONS- 7,490





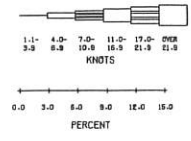
HOUR AVERAGE SURFACE WINDS

PERCENTAGE FREQUENCY OF OCCURRENCE

STATION LOCATION- PUGET SOUND AIR POLLUTION CONTROL AGENCY
DEWEY JR HI. PERRY AVE & HOLMAN ST. BREMERTON

INCLUSIVE DATES- JUL-DEC, 1974

TOTAL OBSERVATIONS- 3,976



AMBIENT AIR QUALITY STANDARDS

	NATIONAL PRIMARY		Notes	NATIONAL SECONDARY		Notes	PUGET SOUND REGION
SULFUR OXIDES	ug/m³	ppm		ug/m³	ppm		
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/m³	---		ug/m³	---		
Annual Geom. Mean	75	---	a	60		a	60 ug/m³
24-hour Average	260	---	b	150		b	150 ug/m³
CARBON MONOXIDE	mg/m³	ppm					
8-hour Average	10	9	b	same			same
1-hour Average	40	35	b	same			same
PHOTOCHEMICAL OXIDANTS	ug/m³	ppm					
1-hour Average	160	.08	b	same			same
NITROGEN DIOXIDE	ug/m³	ppm					
Annual Average	100	.05	a	same			same
HYDROCARBONS	ug/m³	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

ug/m³ = micrograms per cubic meter

mg/m³ = milligrams per cubic meter

a Never to be exceeded

b Not to be exceeded more than once per year

c Not to be exceeded more than twice in seven days

d Not to be exceeded more than once in eight hours

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.

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.