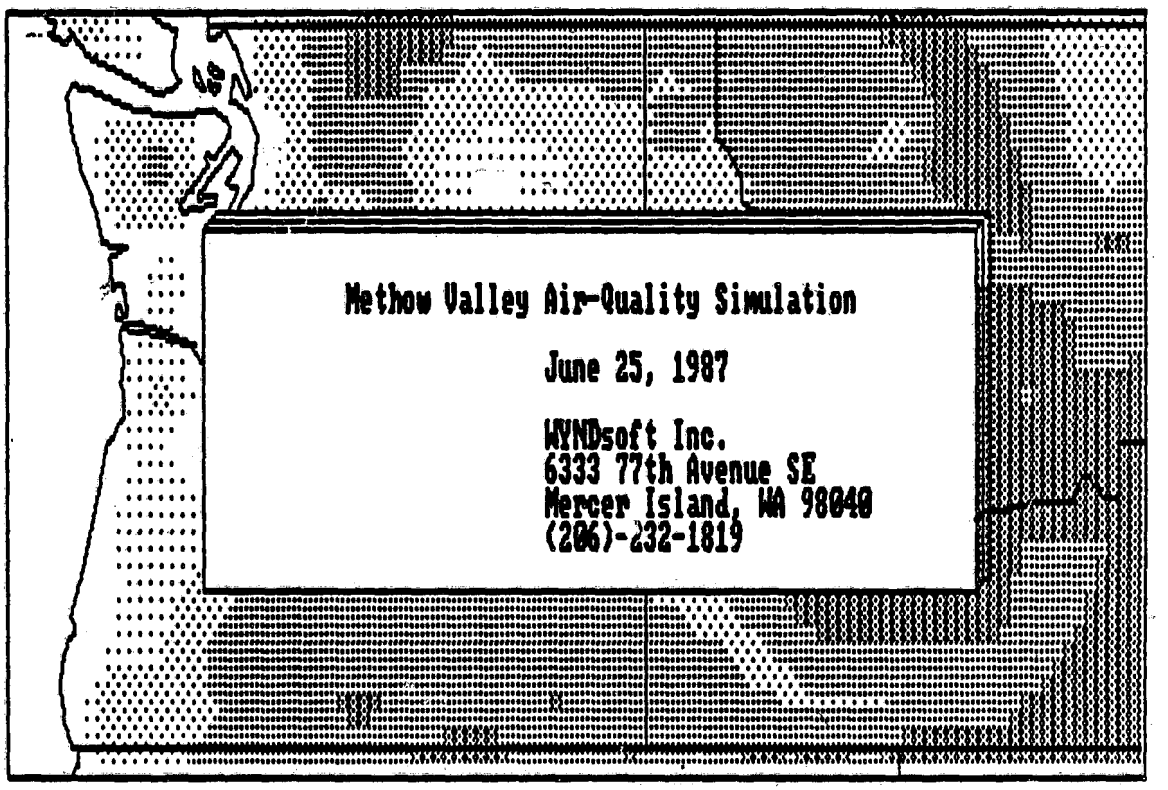

Methow Valley Air-Quality Simulation

June 25, 1987

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Report No. EPA-910/9-87-180

Methow Valley Air-Quality Simulation

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June 25, 1987

Prepared for

U.S. Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, Washington 98101-3188

An Air-Quality Simulation of Total Suspended Particles In the Methow Valley of Okanogan County, Washington State

Halstead Harrison

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Mercer Island, WA 98040

The concentrations of total suspended particles (TSP) in the air of a constricted mountain valley system have been simulated with a 820-box, 2-layer model that accounts for systematic and random winds with boundary conditions appropriate to the complex valley contours. Three-day episodes were computed with the actual winds of February 10-12, 1985, with base-case and projected emissions.

Resulting estimates of TSP-concentration fields are presented as functions of time and space, for highest 24-hour averages and for highest 6-min episodes. Comparisons are presented between observations and simulations.

I. Introduction

This report completes a two-part task for the US Environmental Protection Agency, Region X, to simulate smokey episodes in the Methow Valley of Okanogan County.[1] Task 1 of this projected has been completed with the report 'On Air-Quality Modeling in Complex Terrain, with Emphasis on WYNDvalley, A Dispersion Model for Near-Stagnant Flows' [Harrison, 1987]. That report described the application of Gaussian-plume and box-model simulations in complex terrain, and the technical details of WYNDvalley, a box model that had been used in an earlier simulation of the Methow. [R.W. Beck Associates, 1985]. This present report describes recent modifications of WYNDvalley and presents data for source emissions and winds, and the model's output simulations for the concentrations of suspended atmospheric particles.

II. WYNDvalley

WYNDvalley is a conventional linear box model adapted to the complex topologies and boundaries that characterize drainage-valley airsheds. For details the reader is referred to the report of Task 1 [Harrison, 1987]. The choice of transport parameters is crucial to successful use of such models ... or, indeed, all models. A sensitive parameter that dominates predictions for tracer concentrations in airsheds that are laterally restricted, as in the present case, is the rate at which ventilation occurs across the upper surface of the modeled region, into the free atmosphere above. In the previous exercise of WYNDvalley, this ventilation was simulated as occuring from a single layer of 'boxes' whose heights (100m) and ventilation rates were estimated subjectively with the help of

[1] Order Number 7Y0499NNSA, March 26, 1987 [amended April 1, 1987], ATTN: R. Wilson, EPA, 1200 Sixth Avenue ES-098, Seattle, WA 98101-3188

acoustic soundings on 'typical' stable winter days. The resulting rates corresponded roughly to Gifford-Pasquill-Turner stability class E, for which the eddy-diffusivity coefficient at σ_z = 100m is about 0.13 $m^2 s^{-1}$, and the net ventilation rate is about 7 percent per hour.

A conceptual difficulty arises, however, in discussing this rate in terms of stability classes, in that the latter imply a fetch distance of about 20 km before the 'puffs' attain vertical spreads that equal the assumed box heights. The lateral dimensions of each cell in the model is only 0.8 km, and thus the cells do not have time to fill unless the wind speeds are less than 0.04 km/hr. This difficulty is in part 'only' conceptual, because the model's ventilation rate is ultimately empirical, but it is in part also real because with a model having a single layer the choice of any coefficient will sensitively affect predicted concentration fields at the surface.

Meanwhile, since the first implementation of WYNDvalley to the Methow, improvements in compiler algorithms have made available an additional speed factor of four to six. With this new speed in hand I have chosen to add a second layer and to diminish the time steps from 10 minutes to 6. For the work reported here, the model now comprises two layers, each of 410 boxes of size 804 m (1/2 mile) x 804 m and 50 meters high. Additionally, a third 'ghost' layer overrides the lower two as a boundary condition. Each cell in this ghost layer is set at half the TSP concentration of the layer below. The effect of these modifications is to diminish the sensitivity of surface-layer concentrations to errors in the assumed ventilation rates: in effect the vertical gradient compensates somewhat as the distribution of tracer over the net height of the two lower layers is no longer forced to be uniform.

In a second major modification of WYNDvalley, I have chosen to replace more or less *ad hoc* assumptions for the valley winds by real measurements. Pressures of time and cost that affected the first effort have been relaxed by this second opportunity, and a study has since appeared that documents the winds at two sites in the valley, for winter period comparable to that to be simulated. [WDOE, 1986] Thus the parameters for horizontal transport may now be somewhat less arbitrary.

III. Data

1. Emissions

   Revised source inventories for TSP emissions associated with wood stove use are presented in Table I. The left column of this table indexes 410 stacked pairs of 0.5 mile square boxes, each box 50 meters high. The i- and j- coordinates

of the next two columns locate each box: i- increases leftwards from the upper right corner of the accompanying figures 1b and 1p, and j- increases downwards. The fourth column '1985' gives one of the base-case inventories used in the previous exercise [Beck, 1985]. The fifth column '1983' is the base inventory for the present study. The sixth, 'inc' gives the anticipated increments above the 1983 base case, and the seventh 'Total' sums the two. The last column lists the differences between the 1985 and 1983 inventories. All emissions are in kilograms per day.

Figure 2 illustrates an assumed fractional emission curve for TSP as a function of time of day. This curve remains unchanged from that assumed earlier.

2. Transport

I am grateful to Mr. R. Miller and Ms. P. Thede of the Washington State Department of Ecology for making available to me the original wind data collected by WDOE at the Knott Station in Winthrop and the Bernheisel residence in Carleton, during the period January 1 through April 14, of 1985. These data display hourly velocities in 1 mph increments, and directions in 5 degree increments. An examination of this record showed three periods of 72 hours (midnight to midnight) for which the mean winds were less than 2 mph. While most of the velocity entries for these periods showed finite winds, the direction entries defaulted to '000', which coded 'calms'. [360 coded northerly winds].

I selected one of these 72-hour episodes, from midnight to midnight of February 10-12, 1985, as displaying the largest incidence of calms.

Table II lists the transport coefficients used in each of 72 successive hours for the simulations. The second and third columns show the horizontal and vertical diffusivities. The fourth column gives the winds. All northerly winds are negative and all southerly are positive. All winds within 90 degrees of each of these two cardinals were subsumed into one category or the other. [This is less arbitrary than will later appear, because most winds were assigned as 'random'.] The last three columns show the diffusive [R_d], ventilation [R_v], and advection [R_w] terms as used by WYNDvalley, as fractions per hour. These were obtained in the following way:

a. Gifford-Pasquill-Turner stability class 'E' was assumed, for which the horizontal and vertical diffusivities were taken to be 12.5 and 0.126 $m^2 s^{-1}$, respectively, at wind speeds of 1 mph [Harrison, 1987: table 1, page 23]. These values were then multiplied by the magnitudes of the prevailing hourly wind speeds, and R_d and R_v were estimated as $K_y/\partial x^2$ and $K_z/\partial z^2$.

b. Next the '000' flag for 'calms' was examined, and where these occurred the horizontal eddy-term, R_d, was modified by adding the absolute value of the indicated wind speeds divided by the horizontal grid spacing, ∂x. Where the '000' flag was omitted, the advective term, R_w, was retained as the wind speeds over ∂x, with appropriate sign. In the few cases where wind speeds were tabulated as zero, 1 mph was assumed for the K_y and K_z, but no 'random' winds were added to the R_d.

Figure 3 illustrates the temporal behavior of the three transport terms, in arbitrary but proportional scales, for the 72 hour period of the simulations.

3. Results

a. The time-dependent behavior of TSP simulations at Twisp, Winthrop, and Early Winters, during the 72 hour episode, are shown in figures 4b and 4p, for the base-case and projected emissions, respectively. These show steadily increasing concentrations at the three sites, punctuated by several short spikes when the winds were reported as zero, and terminated by more brisk winds in the late evening of February 12. Curves of this type are sensitive to the assumed starting conditions, unless relatively brisk winds also depress the TSP levels at the beginning of the episode, as indeed they do here. For the present illustrations, starting TSP levels were assumed to be at steady-state with the starting transport parameters, but results for the last 24 hours of the simulation are essentially equivalent when zero initial TSP levels were assumed instead.

b. Spatial patterns for TSP concentrations are displayed in 5-8, for both 24 hour averages [between hour 48 and 72] and for the highest 6 minute levels, for the base-case emissions, for projected emissions, and for the difference between these emissions.

Some comparisons between simulations and observations are presented below in Table IV.

Table IV

Model Comparisons with Observations
Entries are TSP in $\mu g/m^3$

	Base Year			Projected Year
n	Site	observed 24-hr	model 24-hr/6-min	model 24-hr/6-min
24	Mazama	156	33/48	80/126
134	Winthrop	86	89/178	135/268
241	Twisp		112/197	130/222
353	Carleton	45	39/63	46/74

IV. Summary and Discussion

The modeled numbers approach, but do not exceed, the emerging PM10 standard that 2nd highest annual 24-hr averages should be less than 150 $\mu g/m^3$. For 2 out of 3 comparisons that are available between the model and observations, the agreement is excellent. The third is wildly wrong. This case was observed on a windy fall day, not in the winter season . A suspicion here is that somebody was burning leaves or slash. The highest 24-hr TSP observed in Mazama during in December and January of 1984-1985 was 18 $\mu g/m^3$.

Modeling '2nd-highest 24-hr averages' is extraordinarily vulnerable to outliers, both of measurements and models. The user of these numbers must ultimately judge how representative of 2nd-highest episodes are the parameters chosen, and must do this with little assistance from measurements, for which a single episode was chosen from only four months meteorological data. The parameters selected here represent a best guess at severe conditions that might be encountered 3-10 times per year. As a another guess, the PM10 standard may be exceeded with the projected emissions, about 5-10 times per decade. But all bets are off for emission sources not included in the present inventory ... such as leaf burning.

V. References

Beck, R.W. and Associates (1985)
Methow Valley Air-Quality Study and Management Plan
Okanogan County Planning Department, 227 4th North, Okanogan, WA 98440

Harrison, H. (1987)
On Air-Quality Modeling in Complex Terrain, with Emphasis on WYNDvalley, A Dispersion Model for Near-Stagnant Flows
WYNDsoft Inc., 6333 77th Avenue SE, Mercer Island, WA 98040

WDOE (1986)
Washington State Air Monitoring Data for 1985
Washington State Department of Ecology, Office of Air Programs,
Olympia, WA 98504-8711

Figure Captions

1b,p Spatial distributions of emission inventories in kg/day for base-case and projected emissions.

2 Diurnal emission function for wood-smoke emissions

3 Temporal behavior of the transport coefficients for April 10-12, 1985. The ordinate scales are arbitrary and offset, but proportional.

4b,c Temporal behavior of the simulated TSP concentrations at Twisp, Winthrop and Early Winters (Mazama), for base-case and projected emissions.

5b,p Spatial distributions of the highest 24-hour average simulated TSP, for base-case and projected emissions.

6b,p Spatial distributions of the highest 6-minute maxima of simulated TSP, for base-case and projected emissions.

7 Spatial distributions of the 24-hr increments [projected minus base-case] of simulated TSP.

8 Spatial distributions of the 6-minute increments [projected minus base-case] of simulated TSP.

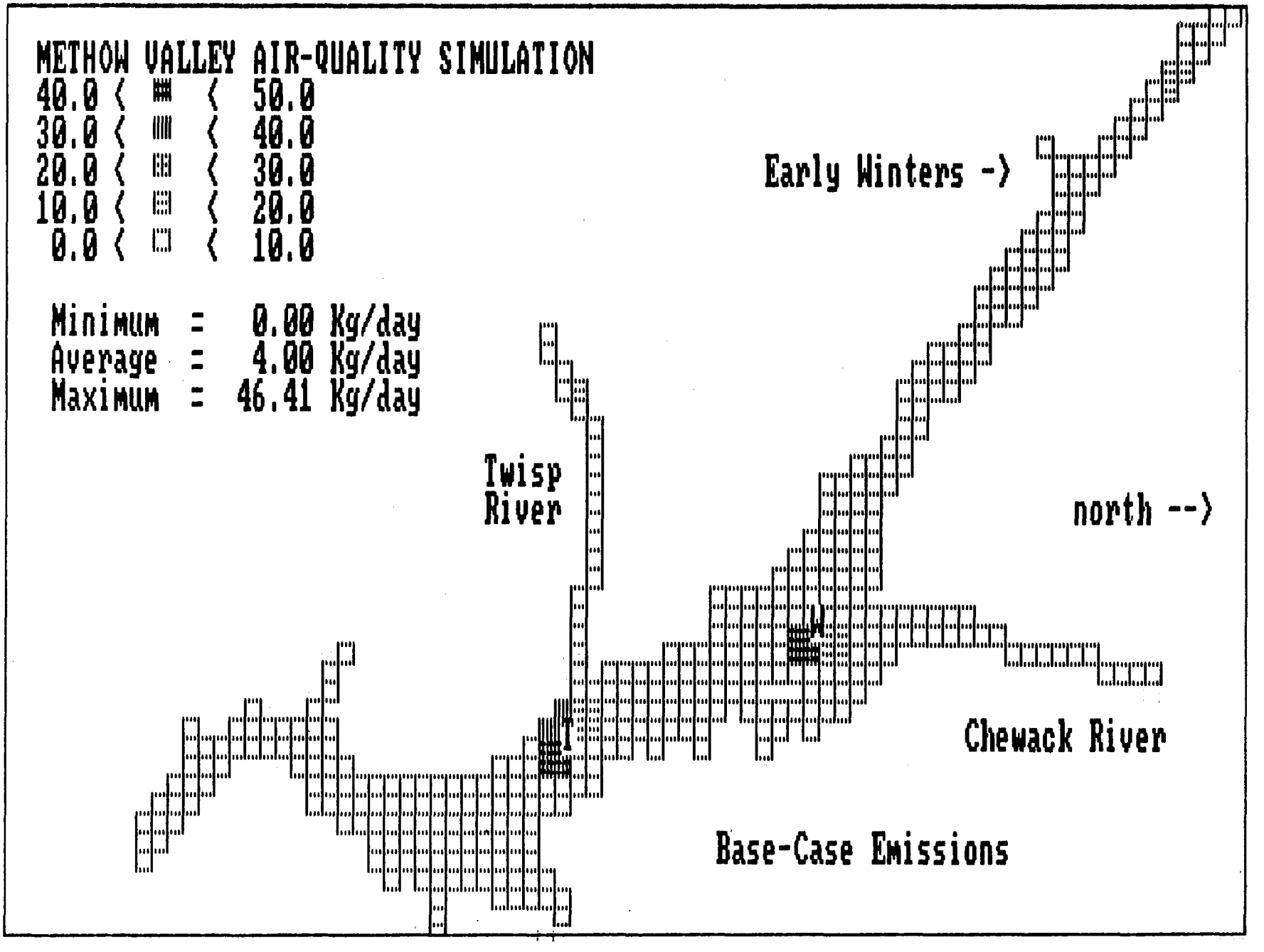
METHOW VALLEY AIR-QUALITY SIMULATION
40.0 < < 50.0
30.0 < < 40.0
20.0 < < 30.0
10.0 < < 20.0
0.0 < < 10.0
Minimum = 0.00 Kg/day
Average = 4.00 Kg/day
Maximum = 46.41 Kg/day
Early Winters ->
Twisp River
north -->
Chewack River
Base-Case Emissions

Figure 1b

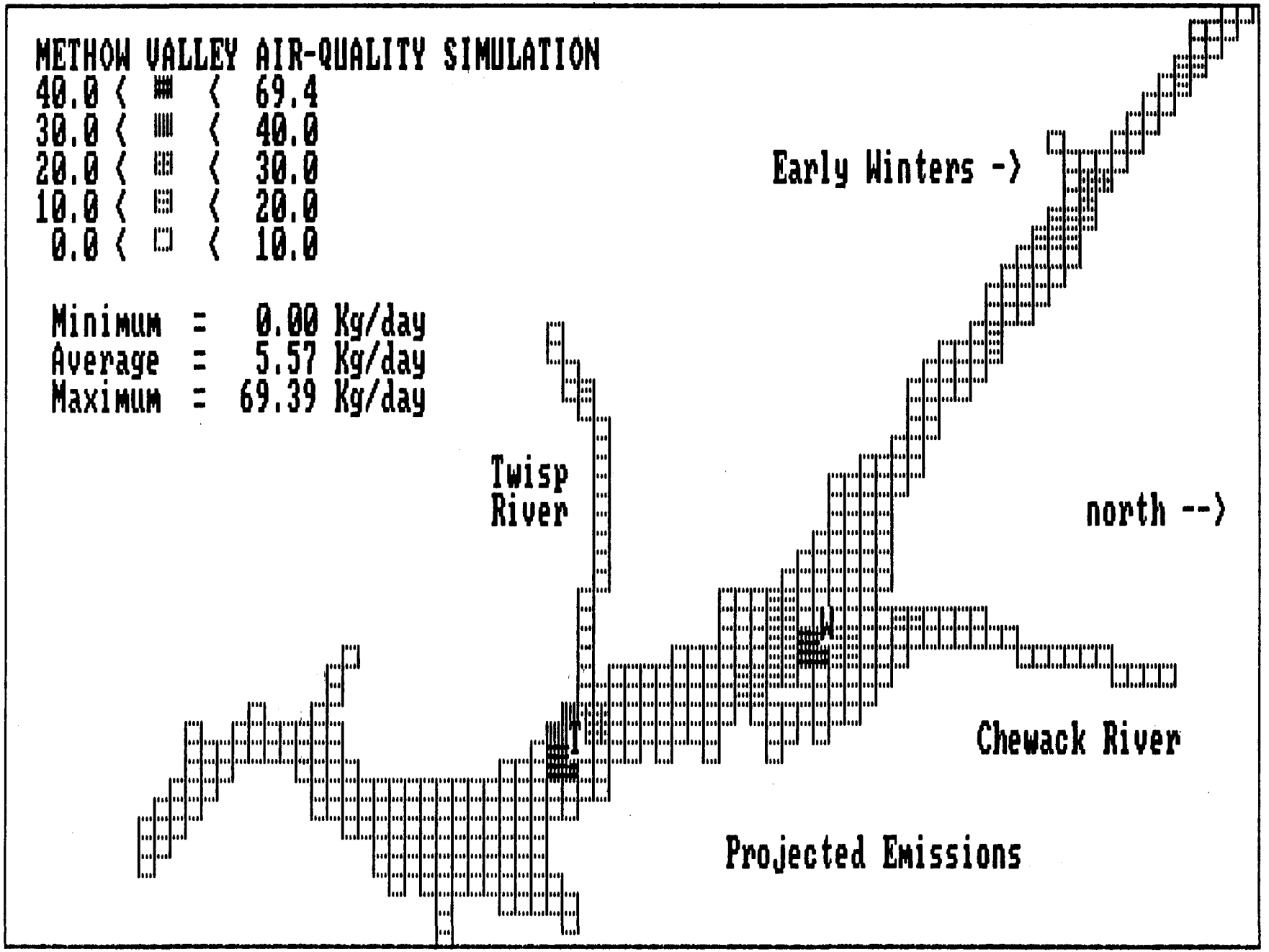
METHOW VALLEY AIR-QUALITY SIMULATION
40.0 < < 69.4
30.0 < < 40.0
20.0 < < 30.0
10.0 < < 20.0
0.0 < < 10.0
Minimum = 0.00 Kg/day
Average = 5.57 Kg/day
Maximum = 69.39 Kg/day
Early Winters ->
Twisp River
north -->
Chewack River
Projected Emissions

Figure 1p

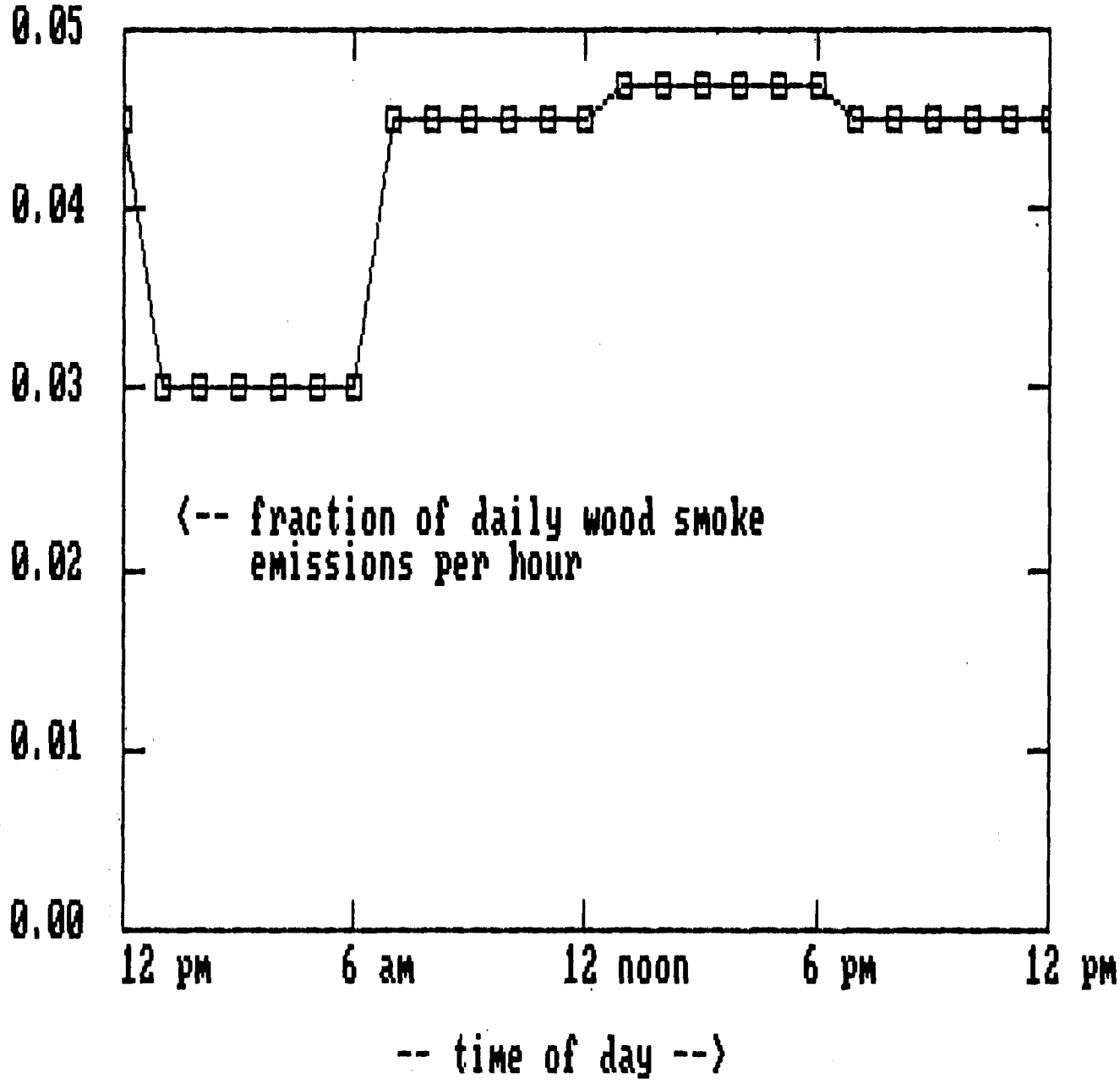
0.05
0.04
0.03
0.02
0.01
0.00
<-- fraction of daily wood smoke
emissions per hour
12 pm
6 am
12 noon
6 pm
12 pm
-- time of day -->

Figure 2

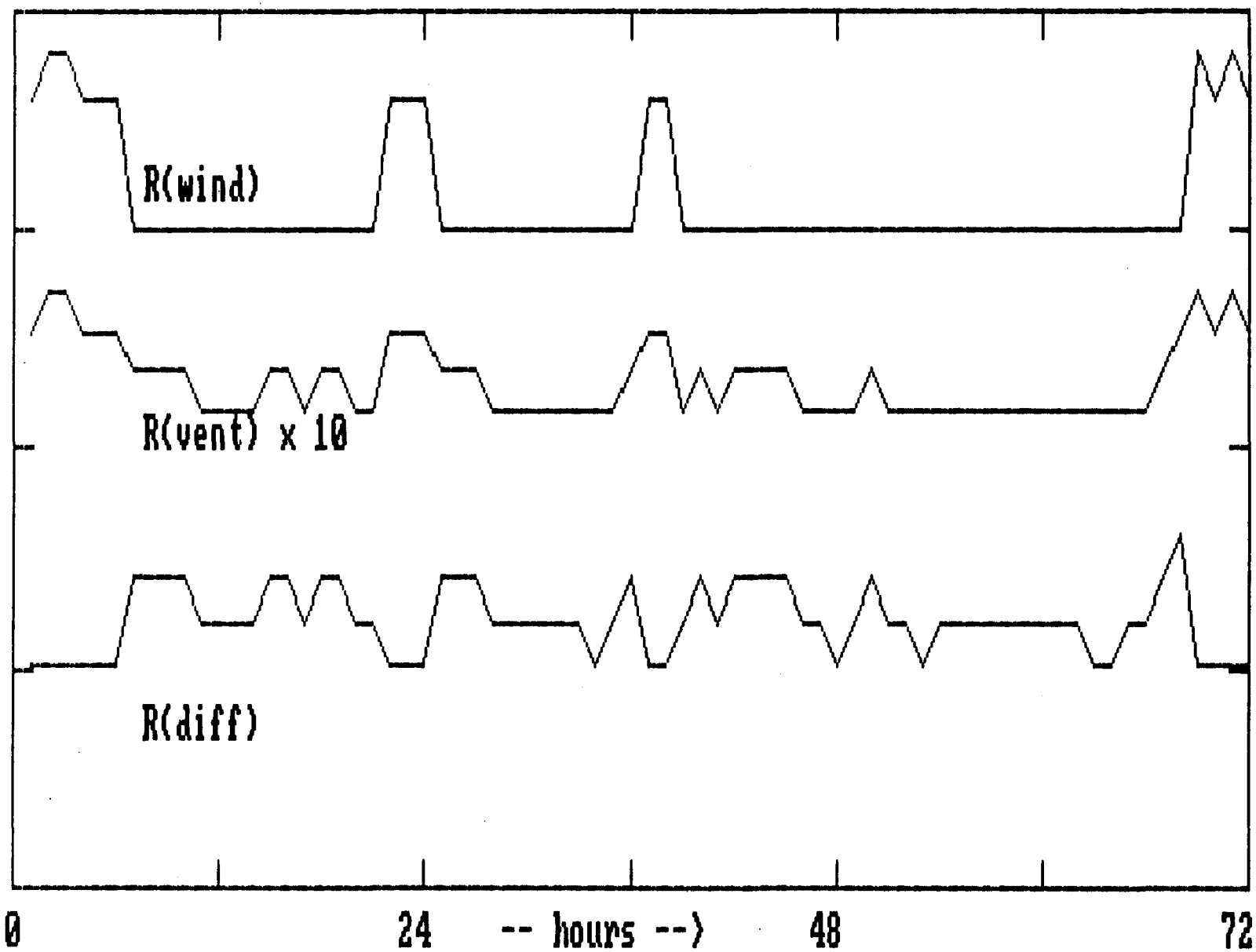

Figure 3

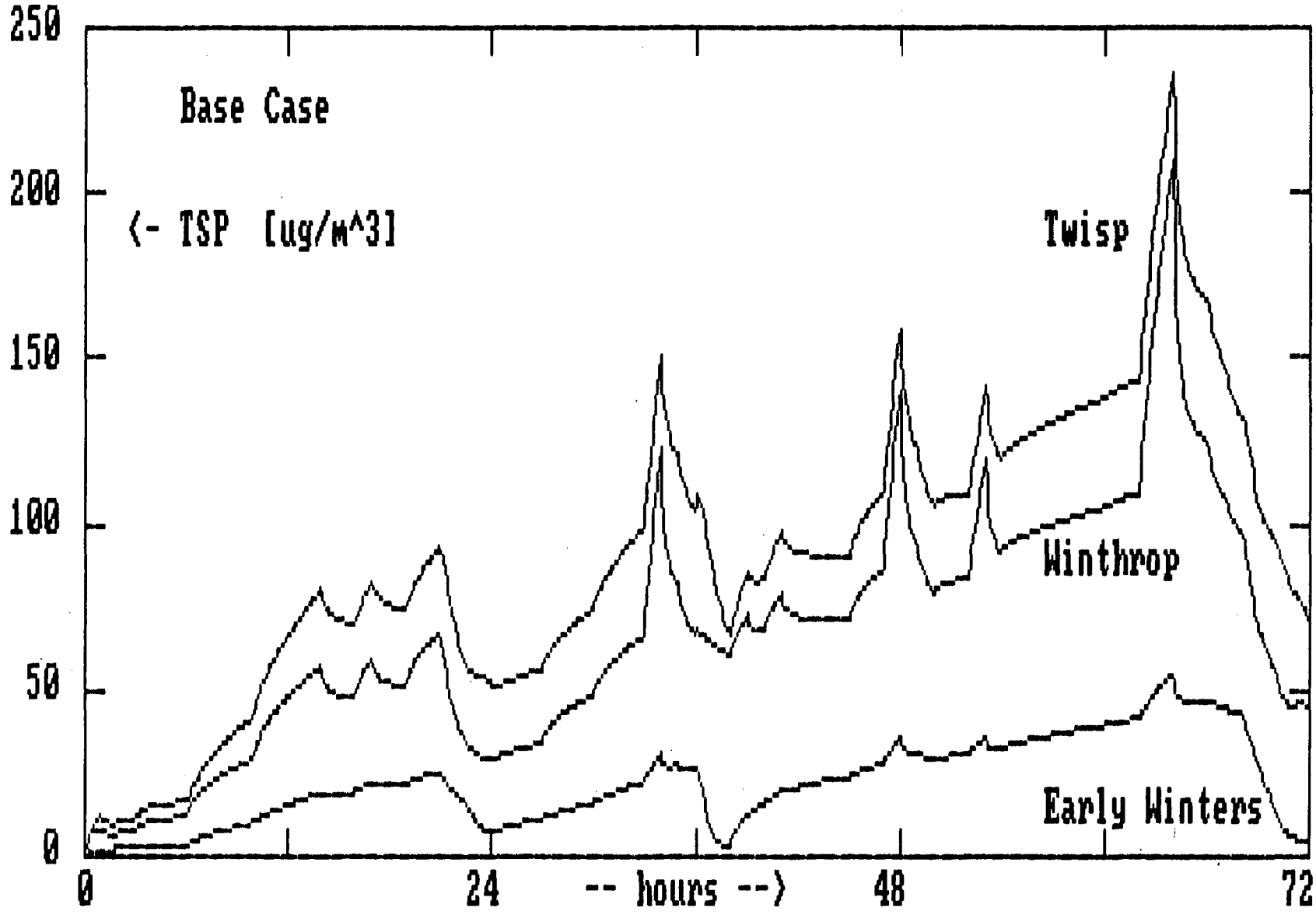
Base Case
<- TSP [ug/m^3]
Twisp
Winthrop
Early Winters
250
200
150
100
50
0
0
24
-- hours -->
48
72

Figure 4b

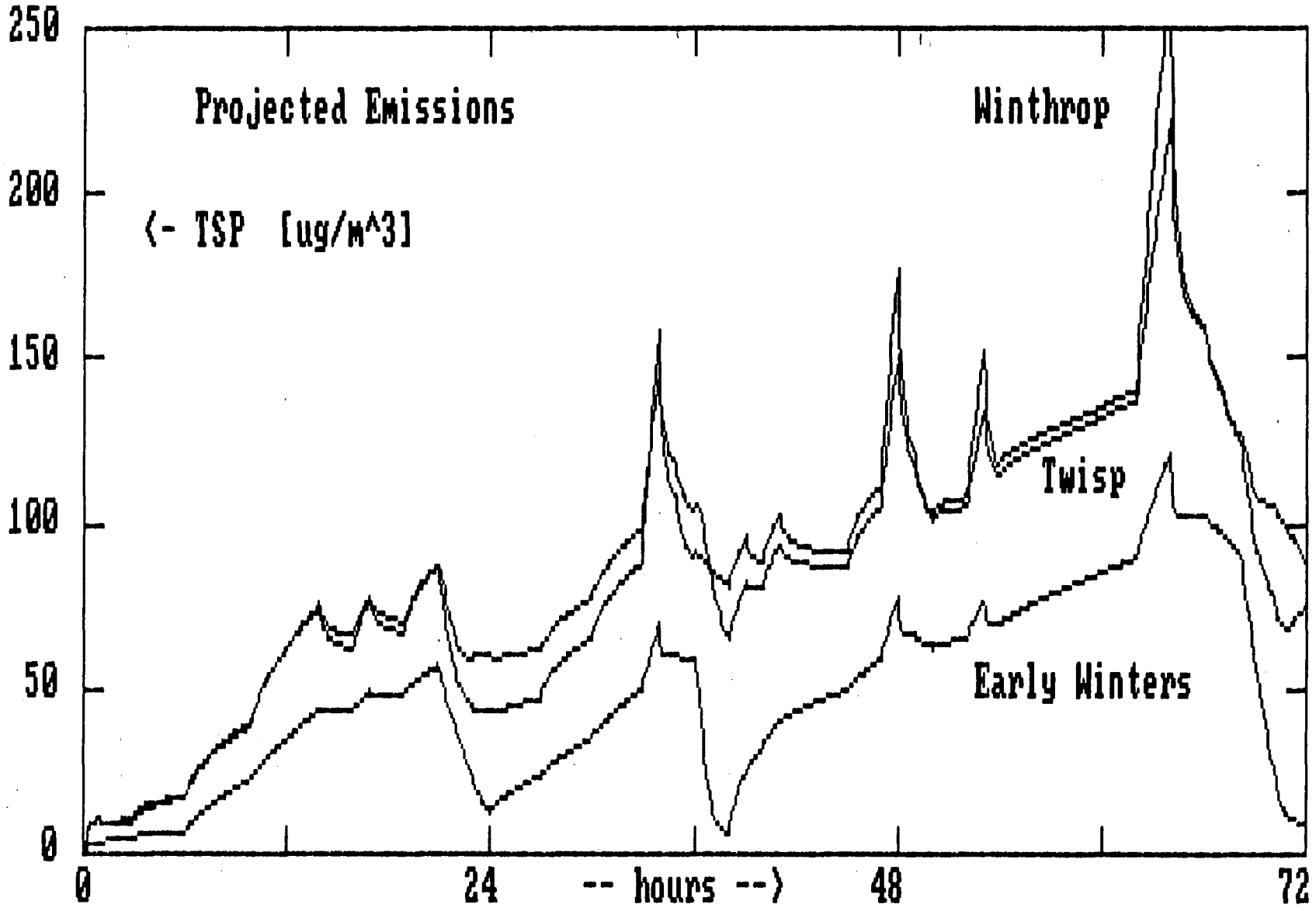
Projected Emissions
Winthrop
<- TSP [ug/m^3]
Twisp
Early Winters
250
200
150
100
50
0
0
24
-- hours -->
48
72

Figure 4p

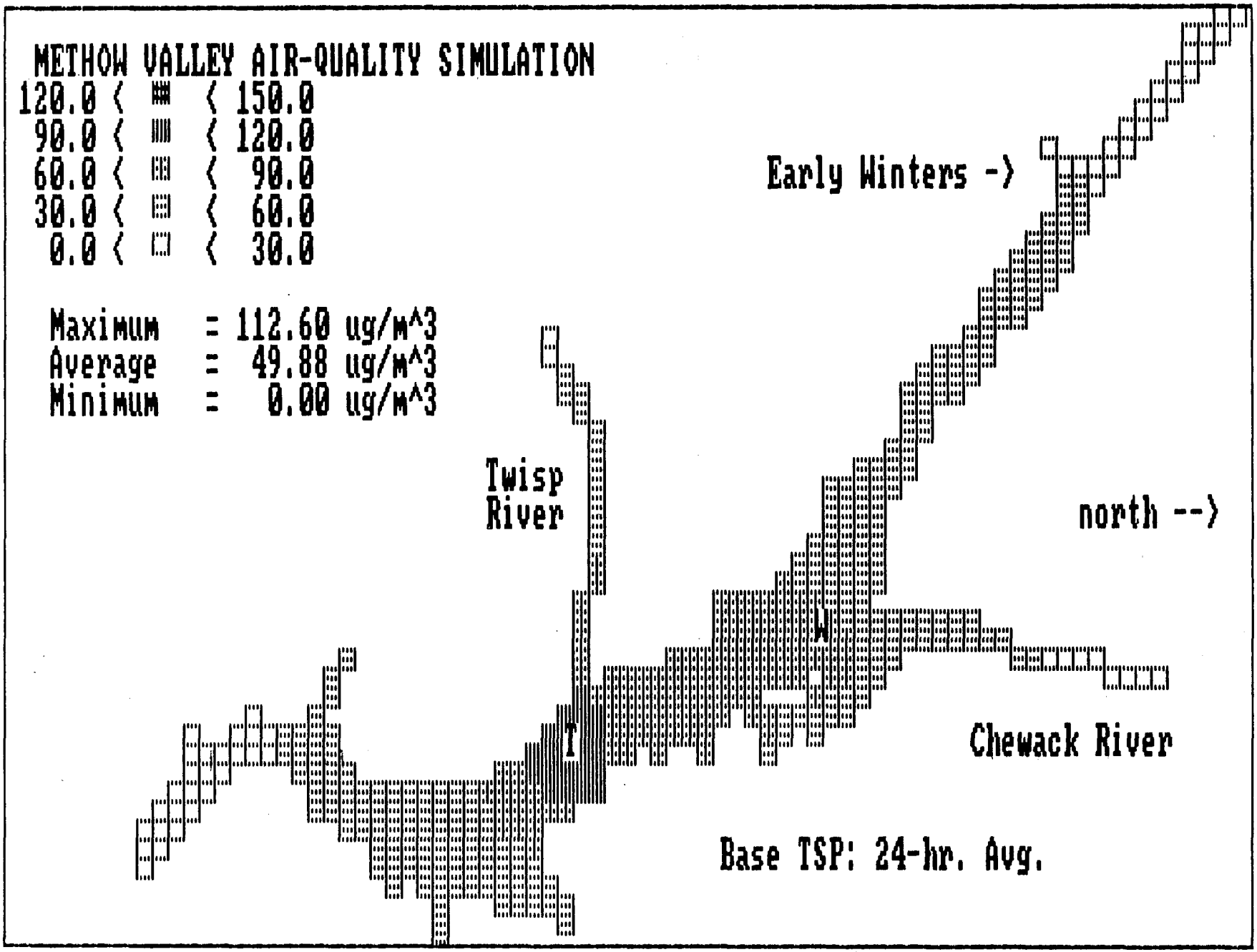
METHOW VALLEY AIR-QUALITY SIMULATION
120.0 < < 150.0
90.0 < < 120.0
60.0 < < 90.0
30.0 < < 60.0
0.0 < < 30.0
Maximum = 112.60 ug/m^3
Average = 49.88 ug/m^3
Minimum = 0.00 ug/m^3
Early Winters ->
Twisp River
north -->
W
T
Chewack River
Base TSP: 24-hr. Avg.

Figure 5b

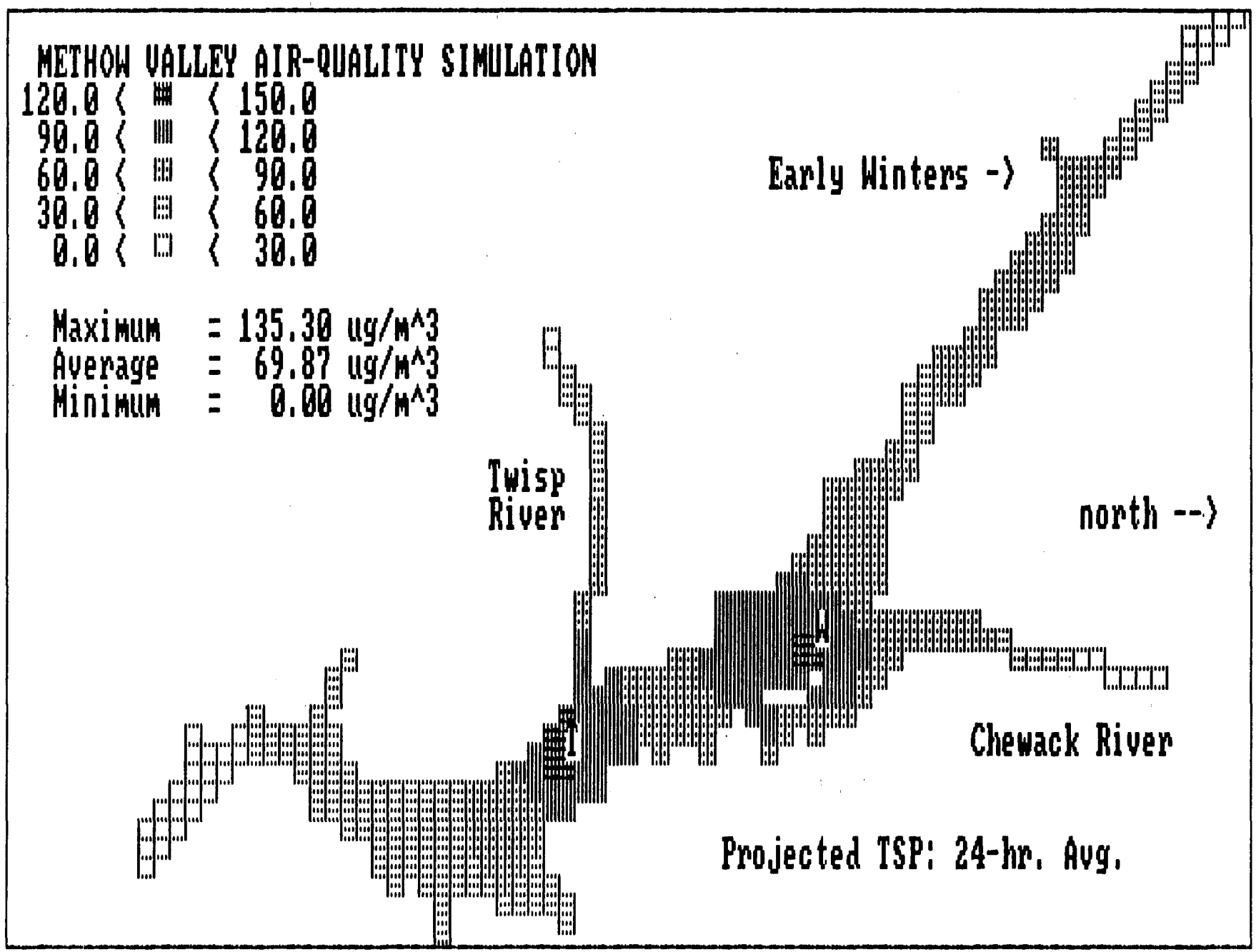
METHOW VALLEY AIR-QUALITY SIMULATION
120.0 < < 150.0
90.0 < < 120.0
60.0 < < 90.0
30.0 < < 60.0
0.0 < < 30.0
Maximum = 135.30 ug/m^3
Average = 69.87 ug/m^3
Minimum = 0.00 ug/m^3
Early Winters ->
Twisp River
north -->
Chewack River
Projected TSP: 24-hr. Avg.

Figure 5p

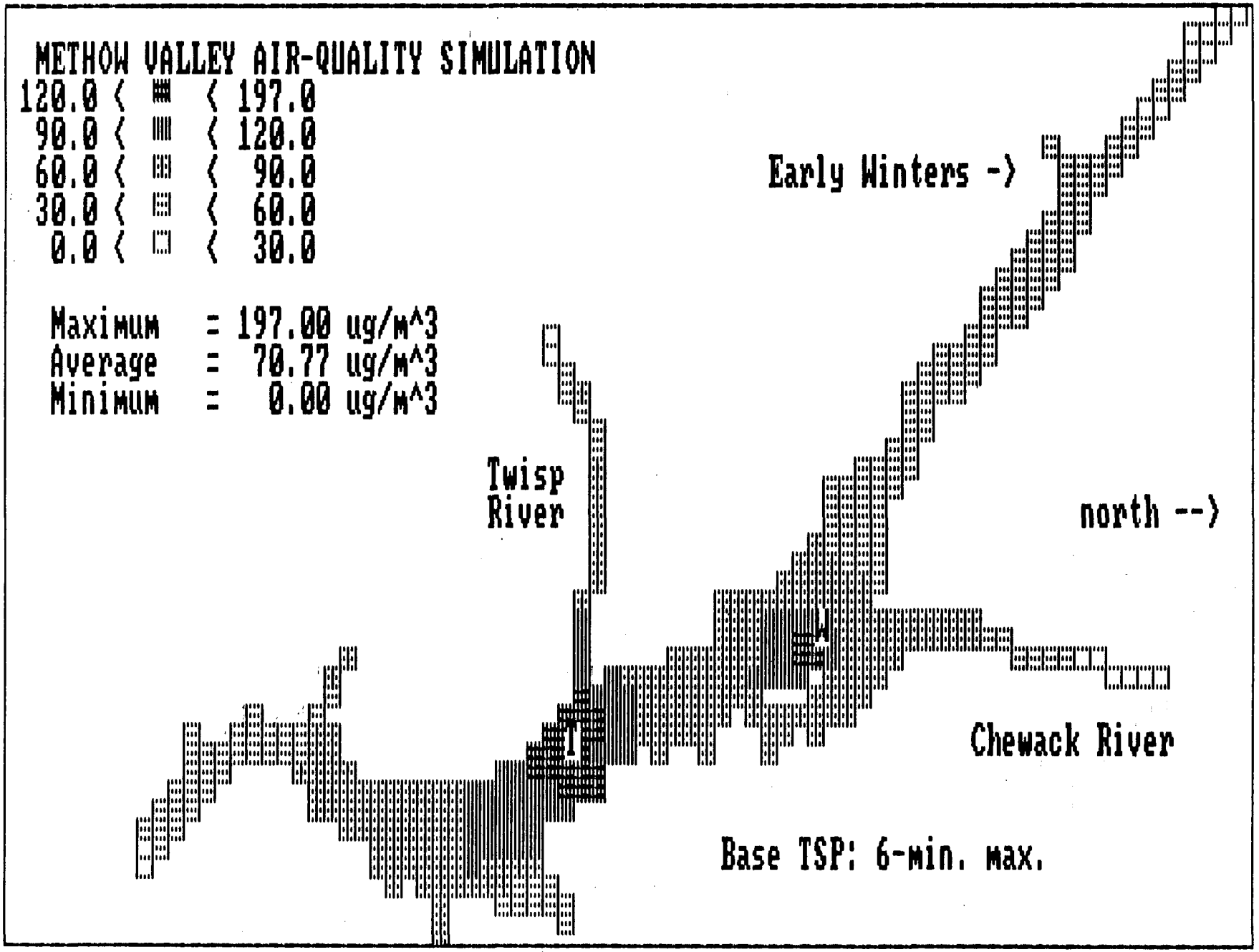
METHOW VALLEY AIR-QUALITY SIMULATION
120.0 < < 197.0
90.0 < < 120.0
60.0 < < 90.0
30.0 < < 60.0
0.0 < < 30.0
Maximum = 197.00 ug/m^3
Average = 70.77 ug/m^3
Minimum = 0.00 ug/m^3
Early Winters ->
Twisp River
north -->
Chewack River
Base TSP: 6-min. max.

Figure 6b

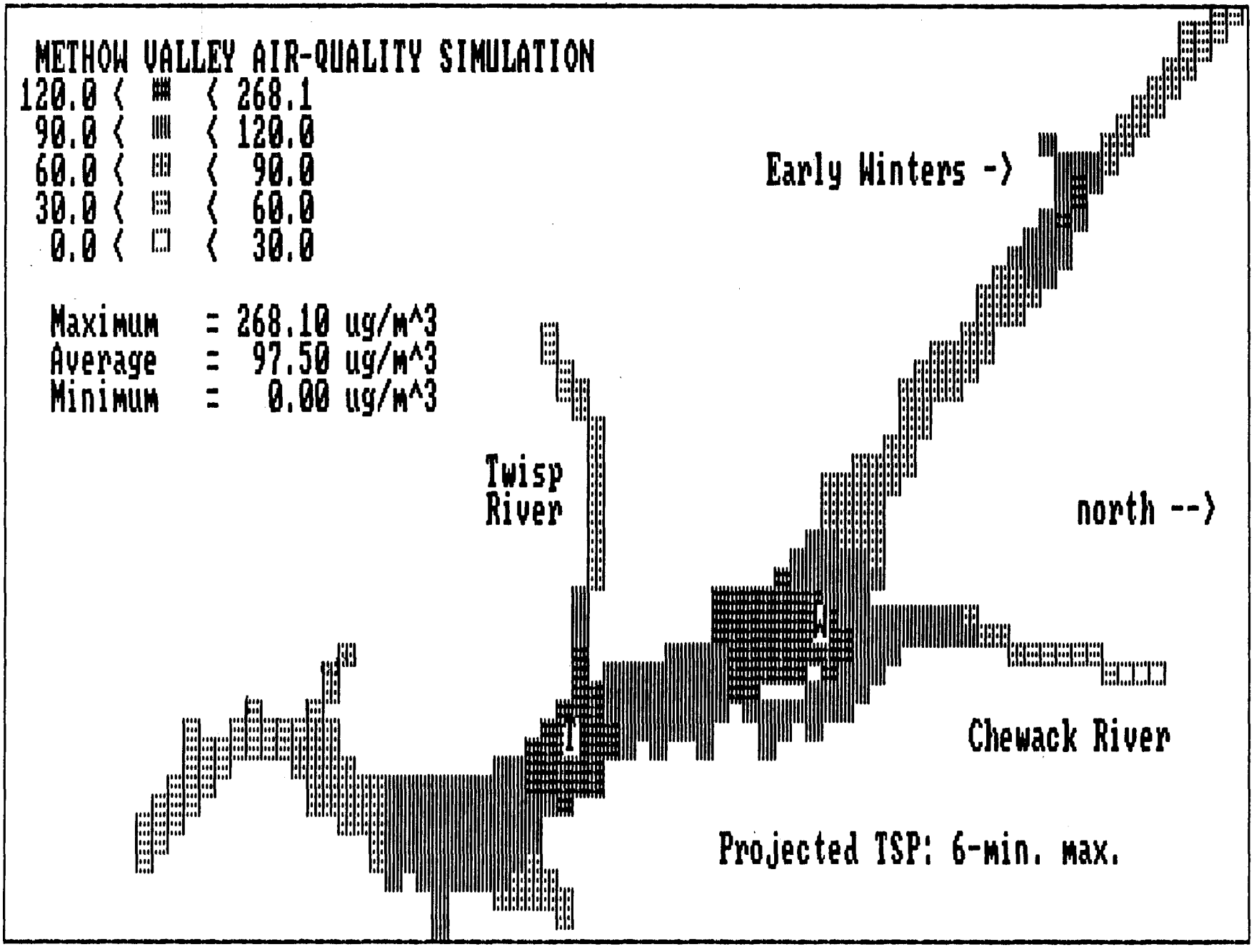
METHOW VALLEY AIR-QUALITY SIMULATION
120.0 < < 268.1
90.0 < < 120.0
60.0 < < 90.0
30.0 < < 60.0
0.0 < < 30.0
Maximum = 268.10 ug/m^3
Average = 97.50 ug/m^3
Minimum = 0.00 ug/m^3
Early Winters ->
Twisp River
north -->
Chewack River
Projected TSP: 6-min. max.

Figure 6D

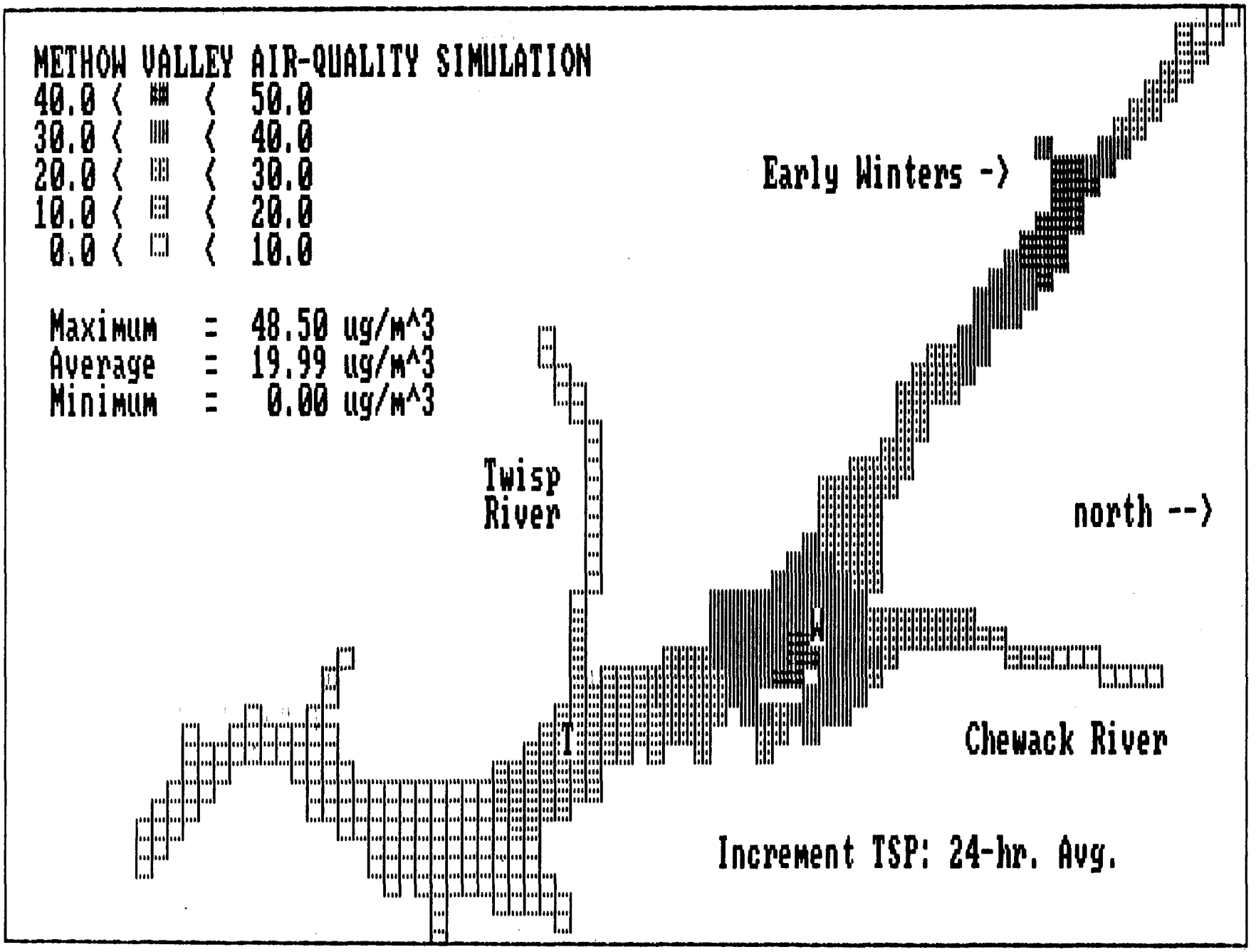
METHOW VALLEY AIR-QUALITY SIMULATION
40.0 < ## < 50.0
30.0 < ### < 40.0
20.0 < ## < 30.0
10.0 < # < 20.0
0.0 < # < 10.0
Maximum = 48.50 ug/m^3
Average = 19.99 ug/m^3
Minimum = 0.00 ug/m^3
Early Winters ->
Twisp River
north -->
Chewack River
Increment TSP: 24-hr. Avg.

Figure 7

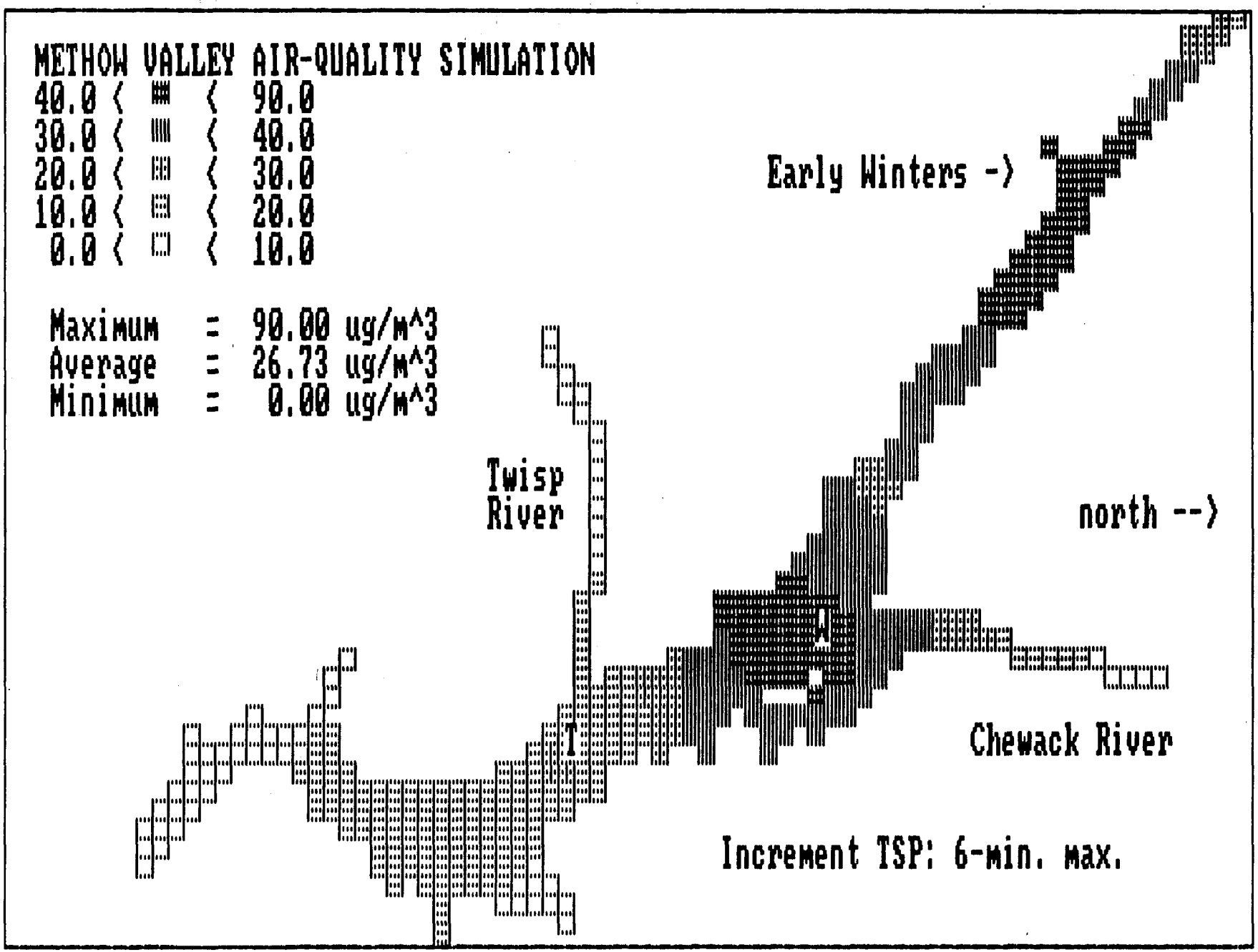
METHOW VALLEY AIR-QUALITY SIMULATION
40.0 < ▓ < 90.0
30.0 < ▒ < 40.0
20.0 < ▒ < 30.0
10.0 < ▒ < 20.0
0.0 < ▒ < 10.0
Maximum = 90.00 ug/m^3
Average = 26.73 ug/m^3
Minimum = 0.00 ug/m^3
Early Winters ->
Twisp River
north -->
Chewack River
Increment TSP: 6-min. max.

Figure 8

Table I

Source Data [kg/day] for Methow Valley

n	i	j	1985	1983	inc	Total	1985-1983
1	-3	-1	0.00	0.00	0.00	0.00	0.00
2	-2	-1	0.00	0.00	0.00	0.00	0.00
3	-2	0	0.00	0.00	0.00	0.00	0.00
4	-1	0	0.00	0.00	0.00	0.00	0.00
5	-1	1	0.00	0.00	0.00	0.00	0.00
6	0	1	0.00	0.00	0.00	0.00	0.00
7	0	2	0.00	0.00	0.00	0.00	0.00
8	1	1	0.00	0.00	0.96	0.96	0.00
9	1	2	0.00	0.00	0.96	0.96	0.00
10	1	3	13.81	11.75	6.21	17.96	2.06
11	2	3	13.81	11.75	6.21	17.96	2.06
12	2	4	13.81	11.75	6.21	17.96	2.06
13	3	4	0.00	0.00	2.22	2.22	0.00
14	3	5	0.99	0.86	5.23	6.09	0.13
15	4	5	0.99	0.86	5.23	6.09	0.13
16	4	6	0.99	0.86	5.23	6.09	0.13
17	5	6	0.00	0.00	0.00	0.00	0.00
18	5	7	0.00	0.00	0.00	0.00	0.00
19	6	7	0.00	0.00	0.00	0.00	0.00
20	6	8	0.00	0.00	0.00	0.00	0.00
21	7	8	1.97	1.94	1.00	2.94	0.03
22	7	9	8.88	7.22	13.82	21.04	1.66
23	8	8	1.97	1.94	1.00	2.94	0.03
24	8	9	8.88	7.22	13.82	21.04	1.66
25	8	10	8.88	7.22	13.82	21.04	1.66
26	8	11	6.91	6.79	7.87	14.66	0.12
27	9	8	0.49	0.64	0.00	0.64	-0.15
28	9	9	2.96	2.75	0.00	2.75	0.21
29	9	10	2.96	2.75	0.00	2.75	0.21
30	9	11	4.19	3.72	13.48	17.20	0.47
31	9	12	4.19	3.72	13.48	17.20	0.47
32	9	13	2.63	2.26	1.80	4.06	0.37
33	10	7	0.49	0.64	0.00	0.64	-0.15
34	10	11	4.19	3.72	13.48	17.20	0.47
35	10	12	4.19	3.72	13.48	17.20	0.47
36	10	13	2.63	2.26	1.80	4.06	0.37
37	10	14	2.63	2.26	1.80	4.06	0.37
38	11	12	8.88	8.09	5.06	13.15	0.79
39	11	13	1.97	2.02	3.09	5.11	-0.05
40	11	14	1.97	2.02	3.09	5.11	-0.05
41	11	15	1.64	1.29	0.64	1.93	0.35
42	12	13	1.97	2.02	3.09	5.11	-0.05
43	12	14	1.97	2.02	3.09	5.11	-0.05
44	12	15	1.64	1.29	0.64	1.93	0.35

45	12	16	1.64	1.29	0.64	1.93	0.35
46	13	14	0.00	0.00	0.00	0.00	0.00
47	13	15	3.70	3.39	2.26	5.66	0.31
48	13	16	3.70	3.39	2.26	5.66	0.31
49	14	15	3.70	3.39	2.26	5.66	0.31
50	14	16	3.70	3.39	2.26	5.66	0.31
51	14	17	9.37	8.09	3.56	11.64	1.28
52	14	18	9.37	8.09	3.56	11.64	1.28
53	15	17	1.97	1.72	1.26	2.98	0.25
54	15	18	1.97	1.72	1.26	2.98	0.25
55	15	19	4.28	3.99	4.61	8.59	0.29
56	16	18	1.97	1.72	1.26	2.98	0.25
57	16	19	4.28	3.99	4.61	8.59	0.29
58	16	20	4.28	3.99	4.61	8.59	0.29
59	17	18	1.97	1.29	0.00	1.29	0.68
60	17	19	1.73	1.70	0.27	1.97	0.03
61	17	20	1.73	1.70	0.27	1.97	0.03
62	18	19	1.73	1.70	0.27	1.97	0.03
63	18	20	1.73	1.70	0.27	1.97	0.03
64	18	21	3.95	3.39	0.20	3.61	0.56
65	18	22	3.95	3.39	0.20	3.61	0.56
66	19	20	0.00	0.00	0.00	0.00	0.00
67	19	21	1.48	1.29	0.80	2.09	0.19
68	19	22	1.48	1.29	0.80	2.09	0.19
69	19	23	1.23	1.29	0.67	1.96	-0.06
70	19	24	1.23	1.29	0.67	1.96	-0.06
71	20	23	1.23	1.29	0.67	1.96	-0.06
72	20	24	1.23	1.29	0.67	1.96	-0.06
73	20	25	1.97	2.57	1.18	3.75	-0.60
74	21	24	0.00	0.00	0.00	0.00	0.00
75	21	25	0.74	0.64	0.89	1.53	0.10
76	21	26	0.74	0.64	0.89	1.53	0.10
77	21	27	0.25	0.32	0.75	1.08	-0.07
78	21	28	0.25	0.32	0.75	1.08	-0.07
79	21	29	0.25	0.32	0.16	0.48	-0.07
80	21	30	0.25	0.32	0.16	0.48	-0.07
81	22	24	0.00	0.00	0.00	0.00	0.00
82	22	25	0.74	0.64	0.89	1.53	0.10
83	22	26	0.74	0.64	0.89	1.53	0.10
84	22	27	0.25	0.32	0.75	1.08	-0.07
85	22	28	0.25	0.32	0.75	1.08	-0.07
86	22	29	0.25	0.32	0.16	0.48	-0.07
87	22	30	0.25	0.32	0.16	0.48	-0.07
88	22	31	0.99	0.86	1.01	1.87	0.13
89	22	32	0.99	0.86	1.01	1.87	0.13
90	22	33	4.69	4.04	2.28	6.32	0.65
91	22	34	4.69	4.04	2.28	6.32	0.65
92	22	35	0.66	0.43	0.39	0.82	0.23
93	22	36	0.66	0.43	0.39	0.82	0.23
94	23	25	2.96	2.67	4.07	6.74	0.29

95	23	26	2.96	2.67	4.07	6.74	0.29
96	23	27	2.22	2.02	1.32	3.34	0.20
97	23	28	2.22	2.02	1.32	3.34	0.20
98	23	29	0.49	0.64	0.75	1.40	-0.15
99	23	30	0.49	0.64	0.75	1.40	-0.15
100	23	31	1.23	1.29	2.63	3.92	-0.06
101	23	32	1.23	1.29	2.63	3.92	-0.06
102	23	33	13.07	10.51	4.36	14.88	2.56
103	23	34	13.07	10.51	4.36	14.88	2.56
104	23	35	1.48	1.38	0.81	2.18	0.10
105	23	36	1.48	1.38	0.81	2.18	0.10
106	23	37	0.00	0.00	0.00	0.00	0.00
107	24	25	2.96	2.67	4.07	6.74	0.29
108	24	26	2.96	2.67	4.07	6.74	0.29
109	24	27	2.22	2.02	1.32	3.34	0.20
110	24	28	2.22	2.02	1.32	3.34	0.20
111	24	29	0.49	0.64	0.75	1.40	-0.15
112	24	30	0.49	0.64	0.75	1.40	-0.15
113	24	31	1.23	1.29	2.63	3.92	-0.06
114	24	32	1.23	1.29	2.63	3.92	-0.06
115	24	33	13.07	10.51	4.36	14.88	2.56
116	24	34	13.07	10.51	4.36	14.88	2.56
117	24	35	1.48	1.38	0.81	2.18	0.10
118	24	36	1.48	1.38	0.81	2.18	0.10
119	24	37	0.00	0.00	0.00	0.00	0.00
120	25	28	0.00	0.00	1.18	1.18	0.00
121	25	29	1.73	1.38	0.46	1.84	0.35
122	25	30	1.73	1.38	0.46	1.84	0.35
123	25	31	5.67	4.77	2.25	7.02	0.90
124	25	32	5.67	4.77	2.25	7.02	0.90
125	25	33	56.00	46.41	22.99	69.39	9.59
126	25	34	56.00	46.41	22.99	69.39	9.59
127	25	36	1.48	1.29	4.22	5.51	0.19
128	25	37	0.33	0.43	0.00	0.43	-0.10
129	25	38	0.33	0.43	0.00	0.43	-0.10
130	26	29	1.73	1.38	0.46	1.84	0.35
131	26	30	1.73	1.38	0.46	1.84	0.35
132	26	31	5.67	4.77	2.25	7.02	0.90
133	26	32	5.67	4.77	2.25	7.02	0.90
134	26	33	56.00	46.41	22.99	69.39	9.59
135	26	34	56.00	46.41	22.99	69.39	9.59
136	26	35	1.48	1.29	4.22	5.51	0.19
137	26	37	0.33	0.43	0.00	0.43	-0.10
138	27	30	4.93	5.17	3.22	8.39	-0.24
139	27	31	8.14	7.11	5.99	13.11	1.03
140	27	32	8.14	7.11	5.99	13.11	1.03
141	27	33	8.39	7.11	3.06	10.17	1.28
142	27	34	8.39	7.11	3.06	10.17	1.28
143	27	35	9.37	8.09	4.02	12.10	1.28
144	27	37	1.23	1.29	1.13	2.42	-0.06

145	27	38	1.23	1.29	1.13	2.42	-0.06
146	28	31	8.14	7.11	5.99	13.11	1.03
147	28	32	8.14	7.11	5.99	13.11	1.03
148	28	33	8.39	7.11	3.06	10.17	1.28
149	28	34	8.39	7.11	3.06	10.17	1.28
150	28	35	9.37	8.09	4.02	12.10	1.28
151	28	37	1.23	1.29	1.13	2.42	-0.06
152	28	38	1.23	1.29	1.13	2.42	-0.06
153	28	39	2.96	2.58	0.21	2.79	0.38
154	29	31	7.40	6.14	3.74	9.89	1.26
155	29	32	7.40	6.14	3.74	9.89	1.26
156	29	33	4.69	4.04	2.49	6.53	0.65
157	29	34	4.69	4.04	2.49	6.53	0.65
158	29	35	11.84	9.78	3.35	13.13	2.06
159	29	36	11.84	9.78	3.35	13.13	2.06
160	29	37	3.95	3.88	4.18	8.06	0.07
161	30	31	7.40	6.14	3.74	9.89	1.26
162	30	32	7.40	6.14	3.74	9.89	1.26
163	30	33	4.69	4.04	2.49	6.53	0.65
164	30	34	4.69	4.04	2.49	6.53	0.65
165	30	35	11.84	9.78	3.35	13.13	2.06
166	30	36	11.84	9.78	3.35	13.13	2.06
167	31	31	1.48	1.29	1.34	2.63	0.19
168	31	32	1.48	1.29	1.34	2.63	0.19
169	31	33	6.91	5.93	3.11	9.04	0.98
170	31	34	6.91	5.93	3.11	9.04	0.98
171	31	35	3.45	2.99	2.06	5.05	0.46
172	31	36	3.45	2.99	2.06	5.05	0.46
173	31	37	0.66	0.43	1.26	1.69	0.23
174	32	34	6.91	5.93	3.11	9.04	0.98
175	32	35	3.45	2.99	2.06	5.05	0.46
176	32	36	3.45	2.99	2.06	5.05	0.46
177	32	37	0.66	0.43	1.26	1.69	0.23
178	32	38	0.66	0.43	1.26	1.69	0.23
179	32	39	2.96	2.58	0.62	3.21	0.38
180	33	34	0.00	0.00	0.00	0.00	0.00
181	33	35	4.19	3.72	2.20	5.91	0.47
182	33	36	4.19	3.72	2.20	5.91	0.47
183	33	37	2.71	2.34	0.29	2.64	0.37
184	33	38	2.71	2.34	0.29	2.64	0.37
185	34	34	0.00	0.00	0.00	0.00	0.00
186	34	35	4.19	3.72	2.20	5.91	0.47
187	34	36	4.19	3.72	2.20	5.91	0.47
188	34	37	2.71	2.34	0.29	2.64	0.37
189	34	38	2.71	2.34	0.29	2.64	0.37
190	35	35	0.00	0.00	0.00	0.00	0.00
191	35	36	0.00	0.00	0.00	0.00	0.00
192	35	37	2.96	2.66	0.29	2.96	0.30
193	35	38	2.96	2.66	0.29	2.96	0.30
194	35	39	0.00	0.00	0.00	0.00	0.00

195	36	35	0.00	0.00	0.00	0.00	0.00
196	36	36	0.00	0.00	0.00	0.00	0.00
197	36	37	2.96	2.66	0.29	2.96	0.30
198	36	38	2.96	2.66	0.29	2.96	0.30
199	37	35	0.00	0.00	0.00	0.00	0.00
200	37	36	0.00	0.00	0.00	0.00	0.00
201	37	37	4.93	4.36	0.10	4.47	0.57
202	37	38	4.93	4.36	0.10	4.47	0.57
203	37	39	2.96	2.58	0.59	3.16	0.38
204	38	35	0.00	0.00	0.00	0.00	0.00
205	38	36	0.00	0.00	0.00	0.00	0.00
206	38	37	4.93	4.36	0.10	4.47	0.57
207	38	38	4.93	4.36	0.10	4.47	0.57
208	38	39	2.96	2.58	0.59	3.16	0.38
209	39	22	5.92	5.33	0.42	5.75	0.59
210	39	23	2.96	2.59	0.10	2.68	0.37
211	39	24	2.96	2.59	0.10	2.68	0.37
212	39	25	5.92	5.33	0.42	5.75	0.59
213	39	26	5.92	5.33	0.42	5.75	0.59
214	39	27	3.95	3.39	0.59	3.98	0.56
215	39	28	3.95	3.39	0.59	3.98	0.56
216	39	29	1.97	1.94	0.20	2.14	0.03
217	39	30	1.97	1.94	0.20	2.14	0.03
218	39	36	4.60	3.99	0.68	4.67	0.61
219	39	37	22.45	18.92	1.66	20.58	3.53
220	39	38	22.45	18.92	1.66	20.58	3.53
221	39	39	4.44	3.72	0.38	4.09	0.72
222	39	40	4.44	3.72	0.38	4.09	0.72
223	39	41	0.49	0.64	0.00	0.64	-0.15
224	40	20	15.79	13.25	0.84	14.08	2.54
225	40	21	5.92	5.33	0.42	5.75	0.59
226	40	31	6.41	5.97	0.59	6.56	0.44
227	40	32	6.41	5.97	0.59	6.56	0.44
228	40	33	10.85	8.90	0.86	9.76	1.95
229	40	34	10.85	8.90	0.86	9.76	1.95
230	40	35	4.60	3.99	0.68	4.67	0.61
231	40	36	4.60	3.99	0.68	4.67	0.61
232	40	37	22.45	18.92	1.66	20.58	3.53
233	40	38	22.45	18.92	1.66	20.58	3.53
234	40	39	4.44	3.72	0.38	4.09	0.72
235	40	40	4.44	3.72	0.38	4.09	0.72
236	40	41	0.49	0.64	0.00	0.64	-0.15
237	41	19	5.43	4.68	0.59	5.28	0.75
238	41	20	5.43	4.68	0.59	5.28	0.75
239	41	37	41.77	35.03	2.36	37.39	6.74
240	41	38	41.77	35.03	2.36	37.39	6.74
241	41	39	52.30	43.25	4.78	48.03	9.05
242	41	40	52.30	43.25	4.78	48.03	9.05
243	41	41	6.41	5.42	0.51	5.93	0.99
244	41	42	6.41	5.42	0.51	5.93	0.99

245	41	47	2.96	2.70	0.14	2.83	0.26
246	41	48	2.96	2.70	0.14	2.83	0.26
247	42	17	1.97	1.29	0.31	1.61	0.68
248	42	18	1.97	1.29	0.31	1.61	0.68
249	42	38	41.77	35.03	2.36	37.39	6.74
250	42	39	52.30	43.25	4.78	48.03	9.05
251	42	40	52.30	43.25	4.78	48.03	9.05
252	42	41	6.41	5.42	0.51	5.93	0.99
253	42	42	6.41	5.42	0.51	5.93	0.99
254	42	46	2.96	2.58	0.21	2.79	0.38
255	42	47	2.96	2.70	0.14	2.83	0.26
256	43	39	5.59	4.96	0.46	5.42	0.63
257	43	40	5.59	4.96	0.46	5.42	0.63
258	43	41	6.91	5.82	0.43	6.25	1.09
259	43	42	6.91	5.82	0.43	6.25	1.09
260	43	43	3.95	3.72	0.29	4.01	0.23
261	43	44	3.95	3.72	0.29	4.01	0.23
262	43	45	1.23	0.97	0.05	1.02	0.26
263	43	46	1.23	0.97	0.05	1.02	0.26
264	43	47	1.48	1.29	0.20	1.50	0.19
265	44	40	5.59	4.96	0.46	5.42	0.63
266	44	41	6.91	5.82	0.43	6.25	1.09
267	44	42	6.91	5.82	0.43	6.25	1.09
268	44	43	3.95	3.72	0.29	4.01	0.23
269	44	44	3.95	3.72	0.29	4.01	0.23
270	44	45	1.23	0.97	0.05	1.02	0.26
271	44	46	1.23	0.97	0.05	1.02	0.26
272	44	47	1.48	1.29	0.20	1.50	0.19
273	45	40	0.00	0.00	0.00	0.00	0.00
274	45	41	1.23	0.97	0.29	1.26	0.26
275	45	42	1.23	0.97	0.29	1.26	0.26
276	45	43	7.15	6.15	0.51	6.66	1.00
277	45	44	7.15	6.15	0.51	6.66	1.00
278	45	45	1.97	2.02	0.16	2.18	-0.05
279	45	46	1.97	2.02	0.16	2.18	-0.05
280	45	47	0.00	0.00	0.00	0.00	0.00
281	46	41	1.23	0.97	0.29	1.26	0.26
282	46	42	1.23	0.97	0.29	1.26	0.26
283	46	43	7.15	6.15	0.51	6.66	1.00
284	46	44	7.15	6.15	0.51	6.66	1.00
285	46	45	1.97	2.02	0.16	2.18	-0.05
286	46	46	1.97	2.02	0.16	2.18	-0.05
287	47	41	0.49	0.32	0.10	0.43	0.17
288	47	42	0.49	0.32	0.10	0.43	0.17
289	47	43	3.95	3.40	0.51	3.91	0.55
290	47	44	3.95	3.40	0.51	3.91	0.55
291	47	45	0.99	0.64	0.05	0.70	0.35
292	47	46	0.99	0.64	0.05	0.70	0.35
293	48	41	0.49	0.32	0.10	0.43	0.17
294	48	42	0.49	0.32	0.10	0.43	0.17

295	48	43	3.95	3.40	0.51	3.91	0.55
296	48	44	3.95	3.40	0.51	3.91	0.55
297	48	45	0.99	0.64	0.05	0.70	0.35
298	48	46	0.99	0.64	0.05	0.70	0.35
299	49	41	0.00	0.00	0.00	0.00	0.00
300	49	42	0.00	0.00	0.00	0.00	0.00
301	49	43	2.22	2.02	0.16	2.18	0.20
302	49	44	2.22	2.02	0.16	2.18	0.20
303	49	45	1.48	1.29	0.21	1.50	0.19
304	49	46	1.48	1.29	0.21	1.50	0.19
305	49	47	1.97	1.94	0.20	2.14	0.03
306	49	48	1.97	1.94	0.20	2.14	0.03
307	49	49	2.96	2.58	0.00	2.58	0.38
308	50	41	0.00	0.00	0.00	0.00	0.00
309	50	42	0.00	0.00	0.00	0.00	0.00
310	50	43	2.22	2.02	0.16	2.18	0.20
311	50	44	2.22	2.02	0.16	2.18	0.20
312	50	45	1.48	1.29	0.21	1.50	0.19
313	50	46	1.48	1.29	0.21	1.50	0.19
314	51	41	0.99	0.97	0.51	1.48	0.02
315	51	42	0.99	0.97	0.51	1.48	0.02
316	51	43	6.66	5.42	1.12	6.54	1.24
317	51	44	6.66	5.42	1.12	6.54	1.24
318	51	45	0.00	0.00	0.00	0.00	0.00
319	52	41	0.99	0.97	0.51	1.48	0.02
320	52	42	0.99	0.97	0.51	1.48	0.02
321	52	43	6.66	5.42	1.12	6.54	1.24
322	52	44	6.66	5.42	1.12	6.54	1.24
323	52	45	0.00	0.00	0.00	0.00	0.00
324	52	46	0.00	0.00	0.00	0.00	0.00
325	53	41	5.43	4.45	1.12	5.57	0.98
326	53	42	5.43	4.45	1.12	5.57	0.98
327	53	43	0.33	0.43	0.07	0.50	-0.10
328	53	44	0.33	0.43	0.07	0.50	-0.10
329	53	45	0.00	0.00	0.00	0.00	0.00
330	54	41	5.43	4.45	1.12	5.57	0.98
331	54	42	5.43	4.45	1.12	5.57	0.98
332	54	43	0.33	0.43	0.07	0.50	-0.10
333	55	40	4.60	3.99	0.96	4.95	0.61
334	55	41	4.93	4.36	0.56	4.93	0.57
335	55	42	4.93	4.36	0.56	4.93	0.57
336	55	43	1.97	2.58	0.00	2.58	-0.61
337	55	34	5.92	5.17	0.62	5.79	0.75
338	56	35	0.49	0.65	0.10	0.75	-0.16
339	56	36	0.49	0.65	0.10	0.75	-0.16
340	56	38	0.00	0.00	0.00	0.00	0.00
341	56	39	4.60	3.99	0.96	4.95	0.61
342	56	40	4.60	3.99	0.96	4.95	0.61
343	56	41	4.93	4.36	0.56	4.93	0.57
344	56	42	4.93	4.36	0.56	4.93	0.57

345	57	37	0.66	0.43	0.14	0.57	0.23
346	57	38	0.66	0.43	0.14	0.57	0.23
347	57	39	7.40	6.14	1.28	7.43	1.26
348	57	40	7.40	6.14	1.28	7.43	1.26
349	57	41	1.48	1.29	0.20	1.50	0.19
350	57	42	1.48	1.29	0.20	1.50	0.19
351	58	38	0.66	0.43	0.14	0.57	0.23
352	58	39	7.40	6.14	1.28	7.43	1.26
353	58	40	7.40	6.14	1.28	7.43	1.26
354	59	38	2.96	2.58	0.69	3.27	0.38
355	59	39	2.96	2.75	0.42	3.16	0.21
356	60	38	2.96	2.58	0.69	3.27	0.38
357	60	39	2.96	2.75	0.42	3.16	0.21
358	61	37	1.64	1.72	0.39	2.11	-0.08
359	61	38	1.64	1.72	0.39	2.11	-0.08
360	61	39	1.48	1.29	0.10	1.39	0.19
361	62	38	1.64	1.72	0.39	2.11	-0.08
362	62	39	1.48	1.29	0.10	1.39	0.19
363	63	39	4.19	3.72	0.51	4.23	0.47
364	63	40	4.19	3.72	0.51	4.23	0.47
365	64	39	4.19	3.72	0.51	4.23	0.47
366	64	40	4.19	3.72	0.51	4.23	0.47
367	64	41	1.97	1.29	0.00	1.29	0.68
368	65	38	0.00	0.00	0.00	0.00	0.00
369	65	39	0.49	0.64	0.00	0.64	-0.15
370	65	40	0.49	0.64	0.00	0.64	-0.15
371	65	41	4.44	3.72	0.21	3.93	0.72
372	65	42	4.44	3.72	0.21	3.93	0.72
373	66	41	4.44	3.72	0.21	3.93	0.72
374	66	42	4.44	3.72	0.21	3.93	0.72
375	66	43	0.00	0.00	0.00	0.00	0.00
376	67	42	0.00	0.00	0.00	0.00	0.00
377	67	43	0.25	0.32	0.00	0.32	-0.07
378	67	44	0.25	0.32	0.00	0.32	-0.07
379	68	43	0.25	0.32	0.00	0.32	-0.07
380	68	44	0.25	0.32	0.00	0.32	-0.07
381	68	45	0.00	0.00	0.00	0.00	0.00
382	3	35	0.00	0.00	0.00	0.00	0.00
383	4	35	0.00	0.00	0.00	0.00	0.00
384	5	35	0.00	0.00	0.00	0.00	0.00
385	6	35	0.00	0.00	0.00	0.00	0.00
386	7	34	0.00	0.00	0.00	0.00	0.00
387	8	34	0.00	0.00	0.00	0.00	0.00
388	9	34	4.93	4.05	1.02	5.07	0.88
389	10	34	4.93	4.05	1.02	5.07	0.88
390	11	34	1.48	1.29	0.00	1.29	0.19
391	12	34	1.48	1.29	0.00	1.29	0.19
392	13	33	1.48	1.29	0.31	1.61	0.19
393	14	33	1.48	1.29	0.31	1.61	0.19
394	15	32	4.93	4.04	0.59	4.63	0.89

395	15	33	8.39	7.44	1.02	8.47	0.95
396	16	32	4.93	4.04	0.59	4.63	0.89
397	16	33	8.39	7.44	1.02	8.47	0.95
398	17	32	7.89	7.44	2.37	9.80	0.45
399	17	33	0.99	0.65	0.20	0.86	0.34
400	18	32	7.89	7.44	2.37	9.80	0.45
401	18	33	0.99	0.65	0.20	0.86	0.34
402	19	32	9.87	8.25	2.53	10.78	1.62
403	19	33	0.66	0.43	1.97	2.40	0.23
404	20	32	9.87	8.25	2.53	10.78	1.62
405	20	33	0.66	0.43	1.97	2.40	0.23
406	20	34	0.66	0.43	1.97	2.40	0.23
407	21	32	0.99	0.86	1.01	1.87	0.13
408	21	33	4.69	4.04	2.28	6.32	0.65
409	21	34	4.69	4.04	2.28	6.32	0.65
410	21	35	0.66	0.43	0.39	0.82	0.23

Table II

Transport Parameters

Winthrop: Knott Station
1:00 AM Feb 10, 1985 thru 12:00 PM Feb 12, 1985

i	Ky m^2/s	Kz m^2/s	wind mph	Rd /hr	Rv /hr	Rw /hr
1	37.50	0.38	-3	0.209	0.544	6.000
2	50.00	0.50	-4	0.278	0.726	8.000
3	50.00	0.50	-4	0.278	0.726	8.000
4	37.50	0.38	-3	0.209	0.544	6.000
5	37.50	0.38	-3	0.209	0.544	6.000
6	37.50	0.38	-3	0.209	0.544	6.000
7	25.00	0.25	2	4.139	0.363	0.000
8	25.00	0.25	2	4.139	0.363	0.000
9	25.00	0.25	2	4.139	0.363	0.000
10	25.00	0.25	2	4.139	0.363	0.000
11	12.50	0.13	1	2.070	0.181	0.000
12	12.50	0.13	1	2.070	0.181	0.000
13	12.50	0.13	1	2.070	0.181	0.000
14	12.50	0.13	1	2.070	0.181	0.000
15	25.00	0.25	2	4.139	0.363	0.000
16	25.00	0.25	2	4.139	0.363	0.000
17	12.50	0.13	1	2.070	0.181	0.000
18	25.00	0.25	2	4.139	0.363	0.000
19	25.00	0.25	2	4.139	0.363	0.000
20	12.50	0.13	1	2.070	0.181	0.000
21	12.50	0.13	1	2.070	0.181	0.000
22	37.50	0.38	-3	0.209	0.544	6.000
23	37.50	0.38	-3	0.209	0.544	6.000
24	37.50	0.38	-3	0.209	0.544	6.000
25	25.00	0.25	2	4.139	0.363	0.000
26	25.00	0.25	2	4.139	0.363	0.000
27	25.00	0.25	2	4.139	0.363	0.000
28	12.50	0.13	1	2.070	0.181	0.000
29	12.50	0.13	1	2.070	0.181	0.000
30	12.50	0.13	1	2.070	0.181	0.000
31	12.50	0.13	1	2.070	0.181	0.000
32	12.50	0.13	1	2.070	0.181	0.000
33	12.50	0.13	1	2.070	0.181	0.000
34	12.50	0.13	0	0.070	0.181	0.000
35	12.50	0.13	1	2.070	0.181	0.000
36	25.00	0.25	2	4.139	0.363	0.000
37	37.50	0.38	3	0.209	0.544	6.000
38	37.50	0.38	3	0.209	0.544	6.000
39	12.50	0.13	1	2.070	0.181	0.000

40	25.00	0.25	2	4.139	0.363	0.000
41	12.50	0.13	1	2.070	0.181	0.000
42	25.00	0.25	2	4.139	0.363	0.000
43	25.00	0.25	2	4.139	0.363	0.000
44	25.00	0.25	2	4.139	0.363	0.000
45	25.00	0.25	2	4.139	0.363	0.000
46	12.50	0.13	1	2.070	0.181	0.000
47	12.50	0.13	1	2.070	0.181	0.000
48	12.50	0.13	0	0.070	0.181	0.000
49	12.50	0.13	1	2.070	0.181	0.000
50	25.00	0.25	2	4.139	0.363	0.000
51	12.50	0.13	1	2.070	0.181	0.000
52	12.50	0.13	1	2.070	0.181	0.000
53	12.50	0.13	0	0.070	0.181	0.000
54	12.50	0.13	1	2.070	0.181	0.000
55	12.50	0.13	1	2.070	0.181	0.000
56	12.50	0.13	1	2.070	0.181	0.000
57	12.50	0.13	1	2.070	0.181	0.000
58	12.50	0.13	1	2.070	0.181	0.000
59	12.50	0.13	1	2.070	0.181	0.000
60	12.50	0.13	1	2.070	0.181	0.000
61	12.50	0.13	1	2.070	0.181	0.000
62	12.50	0.13	1	2.070	0.181	0.000
63	12.50	0.13	0	0.070	0.181	0.000
64	12.50	0.13	0	0.070	0.181	0.000
65	12.50	0.13	1	2.070	0.181	0.000
66	12.50	0.13	1	2.070	0.181	0.000
67	25.00	0.25	2	4.139	0.363	0.000
68	37.50	0.38	3	6.209	0.544	0.000
69	50.00	0.50	-4	0.278	0.726	8.000
70	37.50	0.38	-3	0.209	0.544	6.000
71	50.00	0.50	-4	0.278	0.726	8.000
72	37.50	0.38	-3	0.209	0.544	6.000

Table III

Computed TSP Concentrations for the Methow Valley

Base Case TSP					Projected TSP				
cell	iy	jx	Cavg(i) ug/m^3	Cmax(i) ug/m^3	cell	iy	jx	Cavg(i) ug/m^3	Cmax(i) ug/m^3
1	-3	-1	0.0	0.0	1	-3	-1	0.0	0.0
2	-2	-1	0.0	0.0	2	-2	-1	0.0	0.0
3	-2	0	2.4	13.0	3	-2	0	4.9	30.5
4	-1	0	3.9	14.9	4	-1	0	8.0	35.5
5	-1	1	6.1	15.4	5	-1	1	12.4	36.6
6	0	1	8.7	16.3	6	0	1	17.8	38.9
7	0	2	10.9	17.6	7	0	2	22.2	39.2
8	1	1	10.7	17.2	8	1	1	22.1	40.9
9	1	2	13.1	21.7	9	1	2	26.8	42.9
10	1	3	18.7	42.9	10	1	3	36.7	75.3
11	2	3	20.4	44.9	11	2	3	40.7	80.2
12	2	4	22.0	46.4	12	2	4	44.8	84.8
13	3	4	19.8	31.3	13	3	4	43.6	67.9
14	3	5	20.5	29.7	14	3	5	46.8	68.2
15	4	5	20.4	29.7	15	4	5	48.1	69.3
16	4	6	21.1	30.4	16	4	6	50.4	71.9
17	5	6	21.4	31.3	17	5	6	50.8	74.5
18	5	7	22.5	32.4	18	5	7	53.5	78.1
19	6	7	23.5	33.9	19	6	7	56.3	82.2
20	6	8	25.2	35.5	20	6	8	60.5	87.0
21	7	8	27.2	37.9	21	7	8	65.3	93.2
22	7	9	29.8	46.3	22	7	9	73.1	119.6
23	8	8	29.0	40.0	23	8	8	69.5	98.4
24	8	9	30.7	47.2	24	8	9	75.1	120.9
25	8	10	32.0	48.8	25	8	10	78.9	126.0
26	8	11	32.8	48.2	26	8	11	80.1	115.8
27	9	8	29.0	40.0	27	9	8	69.3	98.0
28	9	9	30.3	41.3	28	9	9	72.2	101.6
29	9	10	31.3	43.2	29	9	10	75.5	108.4
30	9	11	32.1	43.5	30	9	11	80.6	120.7
31	9	12	32.3	42.5	31	9	12	80.3	118.5
32	9	13	31.8	41.5	32	9	13	75.6	100.3
33	10	7	28.1	38.7	33	10	7	66.7	94.3
34	10	11	32.1	42.9	34	10	11	79.7	119.3
35	10	12	32.1	42.1	35	10	12	79.2	116.7
36	10	13	31.8	41.3	36	10	13	74.4	98.3
37	10	14	31.6	40.6	37	10	14	72.2	93.9
38	11	12	33.0	49.7	38	11	12	76.4	106.3
39	11	13	31.5	40.8	39	11	13	72.8	95.0

40	11	14	31.4	40.2	40	11	14	70.8	91.0
41	11	15	31.3	39.8	41	11	15	68.8	88.0
42	12	13	31.4	40.4	42	12	13	70.8	91.6
43	12	14	31.3	40.0	43	12	14	69.4	88.3
44	12	15	31.4	39.8	44	12	15	67.6	86.0
45	12	16	31.7	39.9	45	12	16	67.3	84.7
46	13	14	31.0	39.8	46	13	14	67.0	86.2
47	13	15	32.1	40.3	47	13	15	67.8	86.0
48	13	16	32.8	40.8	48	13	16	67.6	84.3
49	14	15	32.5	40.6	49	14	15	67.4	84.4
50	14	16	33.2	41.7	50	14	16	67.2	84.1
51	14	17	35.0	50.8	51	14	17	67.8	89.6
52	14	18	35.6	51.1	52	14	18	67.3	88.6
53	15	17	33.6	42.3	53	15	17	65.0	82.1
54	15	18	33.8	42.0	54	15	18	64.5	81.7
55	15	19	34.5	42.7	55	15	19	65.4	82.5
56	16	18	33.2	40.8	56	16	18	62.7	80.2
57	16	19	33.9	41.6	57	16	19	63.7	81.0
58	16	20	34.1	41.8	58	16	20	63.8	81.6
59	17	18	32.8	39.9	59	17	18	60.8	78.2
60	17	19	32.9	39.8	60	17	19	60.7	78.3
61	17	20	33.1	39.6	61	17	20	60.5	78.9
62	18	19	32.7	39.2	62	18	19	59.4	76.5
63	18	20	32.7	38.9	63	18	20	59.0	76.5
64	18	21	33.4	39.9	64	18	21	59.3	77.2
65	18	22	33.9	40.5	65	18	22	59.2	75.5
66	19	20	32.3	38.6	66	19	20	58.1	74.6
67	19	21	32.8	38.7	67	19	21	58.5	74.8
68	19	22	33.5	39.1	68	19	22	59.1	75.2
69	19	23	34.2	40.1	69	19	23	59.6	73.7
70	19	24	34.8	41.1	70	19	24	60.4	72.1
71	20	23	34.5	40.7	71	20	23	60.1	73.4
72	20	24	35.2	41.7	72	20	24	61.0	72.0
73	20	25	36.3	43.0	73	20	25	62.4	71.4
74	21	24	35.6	42.9	74	21	24	61.7	71.3
75	21	25	36.6	44.2	75	21	25	63.2	73.0
76	21	26	38.0	46.4	76	21	26	65.1	76.1
77	21	27	40.1	49.7	77	21	27	67.7	80.7
78	21	28	42.1	52.9	78	21	28	70.1	85.0
79	21	29	44.4	56.1	79	21	29	72.8	89.3
80	21	30	46.8	59.1	80	21	30	75.8	93.5
81	22	24	36.8	44.5	81	22	24	63.5	73.6
82	22	25	37.6	45.6	82	22	25	64.9	75.1
83	22	26	39.0	47.6	83	22	26	66.6	77.9
84	22	27	40.6	50.3	84	22	27	68.5	81.6
85	22	28	42.7	53.5	85	22	28	70.9	85.9
86	22	29	45.1	56.8	86	22	29	73.7	90.4
87	22	30	47.8	60.3	87	22	30	77.3	95.4
88	22	31	51.8	65.4	88	22	31	82.7	102.4
89	22	32	56.3	70.6	89	22	32	87.1	109.5

90	22	33	58.7	73.3	90	22	33	90.2	113.1
91	22	34	59.4	74.2	91	22	34	90.9	114.0
92	22	35	58.1	73.6	92	22	35	88.9	113.0
93	22	36	57.4	73.2	93	22	36	87.8	112.3
94	23	25	39.3	47.1	94	23	25	68.1	81.1
95	23	26	40.5	49.0	95	23	26	69.6	82.9
96	23	27	42.1	51.7	96	23	27	70.8	83.6
97	23	28	44.4	55.1	97	23	28	73.3	88.1
98	23	29	46.6	58.7	98	23	29	76.0	93.2
99	23	30	49.8	62.9	99	23	30	80.3	99.3
100	23	31	53.9	68.3	100	23	31	86.2	107.0
101	23	32	58.1	74.3	101	23	32	91.8	115.6
102	23	33	64.0	85.5	102	23	33	98.1	129.2
103	23	34	64.6	86.1	103	23	34	98.6	129.5
104	23	35	60.9	76.7	104	23	35	93.1	117.7
105	23	36	59.0	74.5	105	23	36	90.2	114.1
106	23	37	57.6	73.4	106	23	37	88.1	112.5
107	24	25	40.4	48.2	107	24	25	69.9	84.2
108	24	26	41.2	49.6	108	24	26	70.7	84.6
109	24	27	43.6	53.6	109	24	27	72.8	86.2
110	24	28	46.3	57.5	110	24	28	75.9	91.8
111	24	29	48.7	61.5	111	24	29	79.0	97.3
112	24	30	52.2	66.4	112	24	30	83.7	104.3
113	24	31	56.8	72.9	113	24	31	90.4	114.1
114	24	32	62.5	83.5	114	24	32	98.3	129.5
115	24	33	69.3	100.6	115	24	33	107.1	152.9
116	24	34	70.6	102.3	116	24	34	107.6	154.5
117	24	35	64.7	83.2	117	24	35	98.8	127.1
118	24	36	59.8	74.9	118	24	36	91.4	114.8
119	24	37	58.3	73.7	119	24	37	89.1	112.7
120	25	28	48.1	60.7	120	25	28	78.6	96.4
121	25	29	51.5	65.2	121	25	29	82.6	102.7
122	25	30	55.2	70.7	122	25	30	87.6	110.5
123	25	31	60.8	78.6	123	25	31	95.6	121.9
124	25	32	67.6	95.4	124	25	32	105.1	146.3
125	25	33	83.5	173.5	125	25	33	128.4	261.8
126	25	34	85.2	175.4	126	25	34	130.4	264.6
127	25	36	62.2	77.6	127	25	36	95.7	118.9
128	25	37	58.9	73.7	128	25	37	89.7	112.4
129	25	38	57.9	72.8	129	25	38	88.0	110.8
130	26	29	54.4	69.6	130	26	29	86.7	108.9
131	26	30	58.3	75.4	131	26	30	91.9	117.3
132	26	31	63.6	83.0	132	26	31	99.4	128.2
133	26	32	69.9	99.2	133	26	32	108.4	151.8
134	26	33	85.6	175.4	134	26	33	131.2	264.4
135	26	34	88.6	178.1	135	26	34	135.3	268.1
136	26	35	75.3	109.9	136	26	35	116.0	168.5
137	26	37	59.1	73.2	137	26	37	89.6	110.8
138	27	30	62.0	80.2	138	27	30	97.4	124.3
139	27	31	66.2	86.2	139	27	31	103.6	133.2

140	27	32	70.5	95.1	140	27	32	109.5	146.6
141	27	33	74.2	105.5	141	27	33	113.5	159.9
142	27	34	76.5	108.0	142	27	34	116.4	162.9
143	27	35	77.6	107.4	143	27	35	117.9	161.9
144	27	37	59.8	73.0	144	27	37	89.7	109.4
145	27	38	59.7	72.8	145	27	38	89.4	109.0
146	28	31	67.5	87.6	146	28	31	105.1	134.6
147	28	32	69.4	90.3	147	28	32	107.3	138.0
148	28	33	71.0	93.4	148	28	33	108.2	141.4
149	28	34	72.1	95.4	149	28	34	109.0	143.2
150	28	35	72.9	94.4	150	28	35	109.6	140.7
151	28	37	61.9	74.8	151	28	37	92.2	111.3
152	28	38	60.6	73.3	152	28	38	90.5	109.4
153	28	39	59.9	72.3	153	28	39	89.1	107.8
154	29	31	68.0	87.2	154	29	31	104.4	132.7
155	29	32	68.2	87.6	155	29	32	104.4	132.9
156	29	33	68.3	88.0	156	29	33	103.7	132.4
157	29	34	68.8	88.0	157	29	34	103.4	131.3
158	29	35	70.0	90.9	158	29	35	103.8	131.0
159	29	36	68.8	88.7	159	29	36	101.8	127.7
160	29	37	64.5	77.1	160	29	37	95.8	114.2
161	30	31	67.4	85.2	161	30	31	102.8	129.0
162	30	32	67.5	85.1	162	30	32	102.4	128.3
163	30	33	66.9	84.6	163	30	33	100.8	126.4
164	30	34	66.9	83.9	164	30	34	99.7	124.0
165	30	35	68.0	88.5	165	30	35	99.9	126.4
166	30	36	67.3	87.2	166	30	36	98.1	124.0
167	31	31	66.0	83.6	167	31	31	100.3	126.1
168	31	32	66.1	83.5	168	31	32	99.9	125.3
169	31	33	66.7	82.5	169	31	33	99.4	122.1
170	31	34	66.1	80.9	170	31	34	97.2	118.0
171	31	35	64.8	78.8	171	31	35	94.2	113.5
172	31	36	64.1	76.8	172	31	36	92.2	112.5
173	31	37	62.8	75.8	173	31	37	89.5	111.8
174	32	34	65.0	77.8	174	32	34	93.7	113.0
175	32	35	63.5	76.4	175	32	35	90.8	111.0
176	32	36	62.9	75.6	176	32	36	89.1	109.7
177	32	37	62.0	75.0	177	32	37	86.9	108.9
178	32	38	61.7	74.6	178	32	38	85.7	108.2
179	32	39	61.9	74.2	179	32	39	84.9	105.4
180	33	34	62.5	76.0	180	33	34	87.6	109.2
181	33	35	63.4	76.1	181	33	35	88.6	109.9
182	33	36	63.1	76.0	182	33	36	87.4	108.2
183	33	37	62.5	75.8	183	33	37	85.6	106.6
184	33	38	62.4	75.5	184	33	38	85.0	105.9
185	34	34	62.5	76.5	185	34	34	85.7	105.9
186	34	35	63.5	77.0	186	34	35	86.8	106.7
187	34	36	63.9	77.5	187	34	36	86.5	107.2
188	34	37	63.7	77.7	188	34	37	85.1	105.2
189	34	38	64.1	78.3	189	34	38	84.8	103.8

190	35	35	64.0	79.2	190	35	35	84.8	102.9
191	35	36	64.7	80.1	191	35	36	85.0	103.4
192	35	37	66.1	80.9	192	35	37	86.0	104.2
193	35	38	66.3	81.3	193	35	38	85.8	102.6
194	35	39	65.8	81.3	194	35	39	85.0	102.3
195	36	35	67.0	83.8	195	36	35	85.7	104.2
196	36	36	67.6	84.4	196	36	36	86.2	104.6
197	36	37	69.5	85.8	197	36	37	88.0	105.6
198	36	38	70.7	87.1	198	36	38	89.0	106.6
199	37	35	70.8	89.1	199	37	35	88.4	107.9
200	37	36	71.8	90.2	200	37	36	89.3	108.8
201	37	37	74.6	92.7	201	37	37	92.0	111.1
202	37	38	77.1	96.4	202	37	38	94.3	114.3
203	37	39	78.1	98.6	203	37	39	95.3	116.3
204	38	35	75.2	95.0	204	38	35	92.1	112.8
205	38	36	77.1	97.5	205	38	36	94.0	115.1
206	38	37	81.1	102.5	206	38	37	97.9	119.8
207	38	38	83.1	106.1	207	38	38	99.8	123.4
208	38	39	84.4	109.3	208	38	39	101.0	126.5
209	39	22	45.7	57.5	209	39	22	50.8	63.4
210	39	23	47.1	59.0	210	39	23	52.5	65.2
211	39	24	49.5	61.3	211	39	24	55.3	67.9
212	39	25	52.9	65.2	212	39	25	59.3	72.6
213	39	26	55.1	67.8	213	39	26	62.2	75.8
214	39	27	56.4	68.1	214	39	27	64.0	76.8
215	39	28	58.3	70.2	215	39	28	66.3	79.5
216	39	29	60.3	73.4	216	39	29	68.7	83.2
217	39	30	64.0	78.5	217	39	30	72.9	89.1
218	39	36	85.1	109.3	218	39	36	101.7	126.5
219	39	37	91.8	129.0	219	39	37	108.7	147.1
220	39	38	93.7	130.9	220	39	38	110.5	148.9
221	39	39	90.9	119.9	221	39	39	107.1	137.0
222	39	40	90.7	120.9	222	39	40	106.5	137.6
223	39	41	90.5	121.7	223	39	41	105.8	138.0
224	40	20	43.0	69.4	224	40	20	47.5	75.5
225	40	21	43.0	56.7	225	40	21	47.7	62.3
226	40	31	69.7	85.8	226	40	31	79.4	97.5
227	40	32	74.7	93.2	227	40	32	85.2	106.0
228	40	33	80.0	101.3	228	40	33	91.4	115.2
229	40	34	83.6	106.9	229	40	34	96.0	122.2
230	40	35	85.7	111.6	230	40	35	99.0	128.1
231	40	36	92.2	122.8	231	40	36	108.5	140.1
232	40	37	99.1	139.9	232	40	37	115.8	158.3
233	40	38	101.7	145.5	233	40	38	118.5	164.1
234	40	39	97.5	134.4	234	40	39	113.8	152.1
235	40	40	94.6	126.6	235	40	40	110.3	143.3
236	40	41	91.6	122.5	236	40	41	106.7	138.7
237	41	19	35.7	46.9	237	41	19	39.7	51.9
238	41	20	39.5	51.8	238	41	20	44.0	57.2
239	41	37	108.4	177.7	239	41	37	125.2	197.5

240	41	38	110.8	182.0	240	41	38	127.6	202.0
241	41	39	112.3	197.0	241	41	39	129.6	221.5
242	41	40	107.4	188.3	242	41	40	124.0	211.9
243	41	41	92.5	122.0	243	41	41	107.3	137.7
244	41	42	88.5	116.0	244	41	42	102.7	131.0
245	41	47	48.5	56.7	245	41	47	55.1	64.2
246	41	48	48.4	56.3	246	41	48	54.9	63.8
247	42	17	23.7	29.4	247	42	17	26.6	32.6
248	42	18	24.5	29.9	248	42	18	27.4	33.2
249	42	38	112.6	184.5	249	42	38	129.2	204.4
250	42	39	112.4	196.8	250	42	39	129.1	220.9
251	42	40	106.9	186.5	251	42	40	123.0	209.5
252	42	41	90.3	116.0	252	42	41	104.4	130.8
253	42	42	82.7	105.4	253	42	42	95.8	118.9
254	42	46	49.1	57.9	254	42	46	55.8	65.6
255	42	47	48.6	57.1	255	42	47	55.2	64.6
256	43	39	98.1	139.6	256	43	39	112.9	156.8
257	43	40	91.5	120.4	257	43	40	105.5	135.5
258	43	41	84.9	106.3	258	43	41	98.0	121.8
259	43	42	77.1	100.1	259	43	42	89.2	114.9
260	43	43	68.7	94.6	260	43	43	79.7	108.4
261	43	44	60.6	90.4	261	43	44	70.4	103.8
262	43	45	51.4	61.4	262	43	45	58.6	69.5
263	43	46	49.0	58.4	263	43	46	55.8	66.2
264	43	47	48.4	57.5	264	43	47	55.1	65.2
265	44	40	81.3	102.5	265	44	40	93.8	117.4
266	44	41	76.6	102.5	266	44	41	88.5	117.6
267	44	42	71.9	102.0	267	44	42	83.2	117.2
268	44	43	65.4	96.3	268	44	43	75.9	110.5
269	44	44	59.8	90.6	269	44	44	69.5	104.1
270	44	45	55.0	85.7	270	44	45	63.9	98.6
271	44	46	49.4	59.0	271	44	46	56.3	67.0
272	44	47	48.4	57.6	272	44	47	55.3	65.4
273	45	40	70.7	98.3	273	45	40	81.7	112.7
274	45	41	68.4	98.3	274	45	41	79.3	112.7
275	45	42	64.9	98.3	275	45	42	75.3	112.8
276	45	43	63.0	98.4	276	45	43	73.0	113.2
277	45	44	59.1	93.1	277	45	44	68.5	107.3
278	45	45	54.5	86.9	278	45	45	63.4	100.1
279	45	46	52.4	81.9	279	45	46	60.7	94.3
280	45	47	48.4	57.4	280	45	47	55.3	65.1
281	46	41	61.4	94.6	281	46	41	71.3	108.7
282	46	42	59.3	94.5	282	46	42	68.9	108.6
283	46	43	58.9	95.3	283	46	43	68.3	109.7
284	46	44	57.1	95.3	284	46	44	66.2	109.9
285	46	45	53.5	89.8	285	46	45	62.2	103.7
286	46	46	51.7	83.8	286	46	46	60.0	96.8
287	47	41	54.6	91.1	287	47	41	63.6	104.8
288	47	42	54.3	91.1	288	47	42	63.2	104.9
289	47	43	54.3	91.5	289	47	43	63.2	105.4

290	47	44	53.4	92.2	290	47	44	62.1	106.4
291	47	45	51.5	91.6	291	47	45	59.9	105.9
292	47	46	50.2	86.9	292	47	46	58.4	100.6
293	48	41	50.3	87.8	293	48	41	58.7	101.3
294	48	42	50.3	87.9	294	48	42	58.7	101.4
295	48	43	50.9	88.5	295	48	43	59.3	102.1
296	48	44	50.5	88.9	296	48	44	58.8	102.6
297	48	45	49.2	88.9	297	48	45	57.2	102.9
298	48	46	48.4	88.3	298	48	46	56.3	102.4
299	49	41	47.3	84.8	299	49	41	55.2	98.1
300	49	42	47.4	84.9	300	49	42	55.3	98.1
301	49	43	48.0	85.3	301	49	43	55.9	98.6
302	49	44	47.9	85.9	302	49	44	55.8	99.3
303	49	45	47.3	86.1	303	49	45	55.2	99.6
304	49	46	47.0	86.2	304	49	46	54.8	99.9
305	49	47	46.8	85.7	305	49	47	54.4	99.6
306	49	48	46.0	83.4	306	49	48	53.4	97.2
307	49	49	45.6	81.6	307	49	49	52.7	95.0
308	50	41	45.3	82.1	308	50	41	53.0	95.2
309	50	42	45.5	82.2	309	50	42	53.2	95.2
310	50	43	46.2	82.6	310	50	43	54.0	95.6
311	50	44	46.2	83.0	311	50	44	53.9	96.0
312	50	45	46.0	83.4	312	50	45	53.7	96.5
313	50	46	45.9	83.6	313	50	46	53.5	97.0
314	51	41	44.2	79.8	314	51	41	52.0	92.7
315	51	42	44.4	79.8	315	51	42	52.2	92.8
316	51	43	45.8	80.5	316	51	43	53.7	93.6
317	51	44	45.8	80.9	317	51	44	53.7	93.9
318	51	45	44.2	80.4	318	51	45	51.7	93.3
319	52	41	43.6	77.7	319	52	41	51.3	90.4
320	52	42	43.7	77.7	320	52	42	51.4	90.4
321	52	43	44.9	78.4	321	52	43	52.7	91.2
322	52	44	44.8	79.0	322	52	44	52.5	91.9
323	52	45	43.2	78.5	323	52	45	50.5	91.3
324	52	46	42.6	78.1	324	52	46	49.9	90.8
325	53	41	43.9	76.2	325	53	41	51.8	89.0
326	53	42	43.9	76.2	326	53	42	51.7	89.0
327	53	43	42.8	75.7	327	53	43	50.3	88.3
328	53	44	42.7	76.3	328	53	44	50.1	89.0
329	53	45	42.5	76.9	329	53	45	49.8	89.7
330	54	41	43.5	74.8	330	54	41	51.2	87.7
331	54	42	43.4	74.8	331	54	42	51.1	87.8
332	54	43	42.3	74.2	332	54	43	49.6	86.9
333	55	40	42.4	73.4	333	55	40	49.9	86.4
334	55	41	42.8	73.6	334	55	41	50.2	86.4
335	55	42	42.8	73.7	335	55	42	50.3	86.5
336	55	43	42.4	73.4	336	55	43	49.6	86.1
337	55	34	48.3	76.0	337	55	34	54.1	85.1
338	56	35	40.7	63.5	338	56	35	46.1	71.8
339	56	36	35.7	57.5	339	56	36	40.9	65.1

340	56	38	38.7	67.6	¦	340	56	38	45.5	79.5
341	56	39	40.9	71.7	¦	341	56	39	48.2	84.5
342	56	40	41.6	72.1	¦	342	56	40	49.0	84.9
343	56	41	42.0	72.3	¦	343	56	41	49.3	85.1
344	56	42	42.1	72.5	¦	344	56	42	49.4	85.2
345	57	37	32.6	52.4	¦	345	57	37	38.1	59.8
346	57	38	37.9	63.3	¦	346	57	38	44.5	73.9
347	57	39	39.9	65.8	¦	347	57	39	46.9	76.8
348	57	40	41.2	70.6	¦	348	57	40	48.5	82.9
349	57	41	40.5	70.4	¦	349	57	41	47.6	82.7
350	57	42	40.7	70.7	¦	350	57	42	47.7	83.1
351	58	38	31.9	48.2	¦	351	58	38	37.5	55.4
352	58	39	38.2	59.4	¦	352	58	39	45.0	69.1
353	58	40	39.4	63.3	¦	353	58	40	46.3	73.6
354	59	38	30.8	45.8	¦	354	59	38	36.2	52.7
355	59	39	31.4	45.8	¦	355	59	39	36.8	52.7
356	60	38	28.4	43.8	¦	356	60	38	33.3	50.5
357	60	39	28.8	43.9	¦	357	60	39	33.7	50.6
358	61	37	26.5	42.0	¦	358	61	37	31.0	48.5
359	61	38	26.5	41.9	¦	359	61	38	30.9	48.5
360	61	39	26.4	41.9	¦	360	61	39	30.7	48.4
361	62	38	25.2	40.5	¦	361	62	38	29.4	46.9
362	62	39	24.2	40.3	¦	362	62	39	28.0	46.6
363	63	39	22.7	39.5	¦	363	63	39	26.1	45.7
364	63	40	21.4	39.2	¦	364	63	40	24.6	45.3
365	64	39	20.6	38.5	¦	365	64	39	23.6	44.6
366	64	40	20.0	38.5	¦	366	64	40	22.9	44.6
367	64	41	18.1	37.8	¦	367	64	41	20.6	43.6
368	65	38	19.2	37.0	¦	368	65	38	21.9	42.9
369	65	39	19.2	37.2	¦	369	65	39	21.9	43.0
370	65	40	18.0	37.2	¦	370	65	40	20.5	43.0
371	65	41	17.2	37.6	¦	371	65	41	19.4	43.5
372	65	42	15.2	36.9	¦	372	65	42	17.2	42.6
373	66	41	15.2	36.5	¦	373	66	41	17.2	42.2
374	66	42	13.3	36.8	¦	374	66	42	14.9	42.4
375	66	43	10.1	35.4	¦	375	66	43	11.5	40.8
376	67	42	9.7	34.4	¦	376	67	42	11.0	39.7
377	67	43	7.7	34.0	¦	377	67	43	8.7	39.2
378	67	44	5.6	31.7	¦	378	67	44	6.4	36.6
379	68	43	6.4	30.6	¦	379	68	43	7.2	35.3
380	68	44	4.8	29.3	¦	380	68	44	5.5	33.8
381	68	45	4.1	28.1	¦	381	68	45	4.7	32.4
382	3	35	0.0	0.0	¦	382	3	35	0.0	0.0
383	4	35	3.0	17.5	¦	383	4	35	4.2	23.4
384	5	35	6.1	20.4	¦	384	5	35	8.6	27.6
385	6	35	9.5	22.8	¦	385	6	35	13.3	31.2
386	7	34	13.3	25.1	¦	386	7	34	18.5	34.8
387	8	34	17.7	27.2	¦	387	8	34	24.6	38.4
388	9	34	23.5	34.4	¦	388	9	34	32.3	46.2
389	10	34	27.6	38.9	¦	389	10	34	38.0	52.5

390	11	34	30.2	39.7
391	12	34	33.8	44.6
392	13	33	38.3	50.7
393	14	33	43.8	58.0
394	15	32	47.7	62.3
395	15	33	48.5	67.1
396	16	32	49.4	63.8
397	16	33	50.2	68.6
398	17	32	51.5	69.3
399	17	33	49.9	64.4
400	18	32	52.8	70.0
401	18	33	51.2	65.3
402	19	32	54.3	72.5
403	19	33	52.5	66.5
404	20	32	55.6	73.1
405	20	33	53.9	68.0
406	20	34	54.0	68.8
407	21	32	54.8	68.6
408	21	33	56.3	69.9
409	21	34	56.7	70.9
410	21	35	56.0	71.5
		Average =	49.9	

390	11	34	42.0	54.1
391	12	34	47.4	61.5
392	13	33	54.1	70.4
393	14	33	62.4	81.3
394	15	32	68.1	87.7
395	15	33	69.0	91.6
396	16	32	71.0	90.7
397	16	33	72.0	94.4
398	17	32	75.1	99.1
399	17	33	72.9	93.2
400	18	32	78.1	101.7
401	18	33	75.9	96.3
402	19	32	81.3	106.2
403	19	33	79.7	100.3
404	20	32	84.1	108.3
405	20	33	82.6	103.9
406	20	34	63.0	105.4
407	21	32	84.3	105.8
408	21	33	86.3	107.5
409	21	34	86.9	108.9
410	21	35	85.9	109.7
		Average =	69.9	

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5. Report Date 06-25-87

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7. Author(s) Halstead Harrison

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9. Performing Organization Name and Address

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Mercer Island, WA 98040

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14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

The concentrations of total suspended particles (TSP) in the air of a constricted mountain valley system have been simulated with a 820-box, 2-layer model that accounts for systematic and random winds with boundary conditions appropriate to the complex valley contours. Three-day episodes were computed with the actual winds of February 10-12, 1985, with base-case and projected emissions.

Resulting estimates of TSP-concentration fields are presented as functions of time and space, for highest 24-hour averages and for highest 6-min episodes. Comparisons are presented between observations and simulations.

17. Document Analysis a. Descriptors

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report)	21. No. of Pages
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