

AN ATMOSPHERIC
CARBON MONOXIDE TRANSPORT MODEL
FOR FAIRBANKS, ALASKA



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ABSTRACT

A comprehensive computer model of atmospheric carbon monoxide transport has been developed for Fairbanks, Alaska. The model, based on a finite element method computational scheme, accepts input from specified vehicle traffic parameters including miles per day, number of cold starts, and total idle time. The carbon monoxide concentrations are calculated for specified time intervals at numerous points throughout the urban area. A test of the model against the data of January 22, 1975, indicates a good correspondence.

Extremely high carbon monoxide concentration were calculated at an unmeasured point down wind of the business district. The model should prove useful for a number of community needs including parking management, planning and zoning, episode strategy planning, and carbon monoxide forecasting.

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AN ATMOSPHERIC CARBON MONOXIDE TRANSPORT MODEL FOR FAIRBANKS, ALASKA

INTRODUCTION

Fairbanks, Alaska, a large northern urban area (Figures 1 and 2), has a long history of air quality problems. The poor air quality is caused by a combination of circumstances during the winter season including severe temperature inversions, a restricted geographic basin, and low winds. Fairbanks is also the focus of much oil pipeline activity which has brought about a great expansion of commercial and residential activity in the area which in turn has greatly increased vehicular activity. Even before the pipeline construction, Fairbanks was officially recognized as a carbon monoxide (CO) problem area and has had certain maximum CO level requirements placed upon it by the Federal Environmental Protection Agency (EPA, 1973). Each winter, the warning level of 30 part per million (ppm) of CO and the 40 ppm emergency level are occasionally surpassed. The serious level of 9 ppm occurs on a high percentage of the days of each calendar year. (Gilmore and Hanna, 1973; Swift, 1974; and Holty, 1973). The need for a comprehensive carbon monoxide program is evident.

Fairbanks' carbon monoxide problem has several aspects and is quite complex (Figure 3) even for an urban area the size of Fairbanks which has an approximate population of 50,000. The primary concern, of course, is the effect on human health (Joy, Tilsworth, and Williams, 1975). High concentrations of carbon monoxide must have a source, usually vehicular traffic, and any meaningful control program will have to involve control of this source. Such controls may include parking, vehicle starting methods, and integration of the use of private vehicles with mass transit in a variety of ways. Another aspect of an overall strategy is the control of emissions on the vehicle itself. This phase can be approached either through improved maintenance of the existing equipment (Coutts, Leonard, and MacKenzie, 1973)

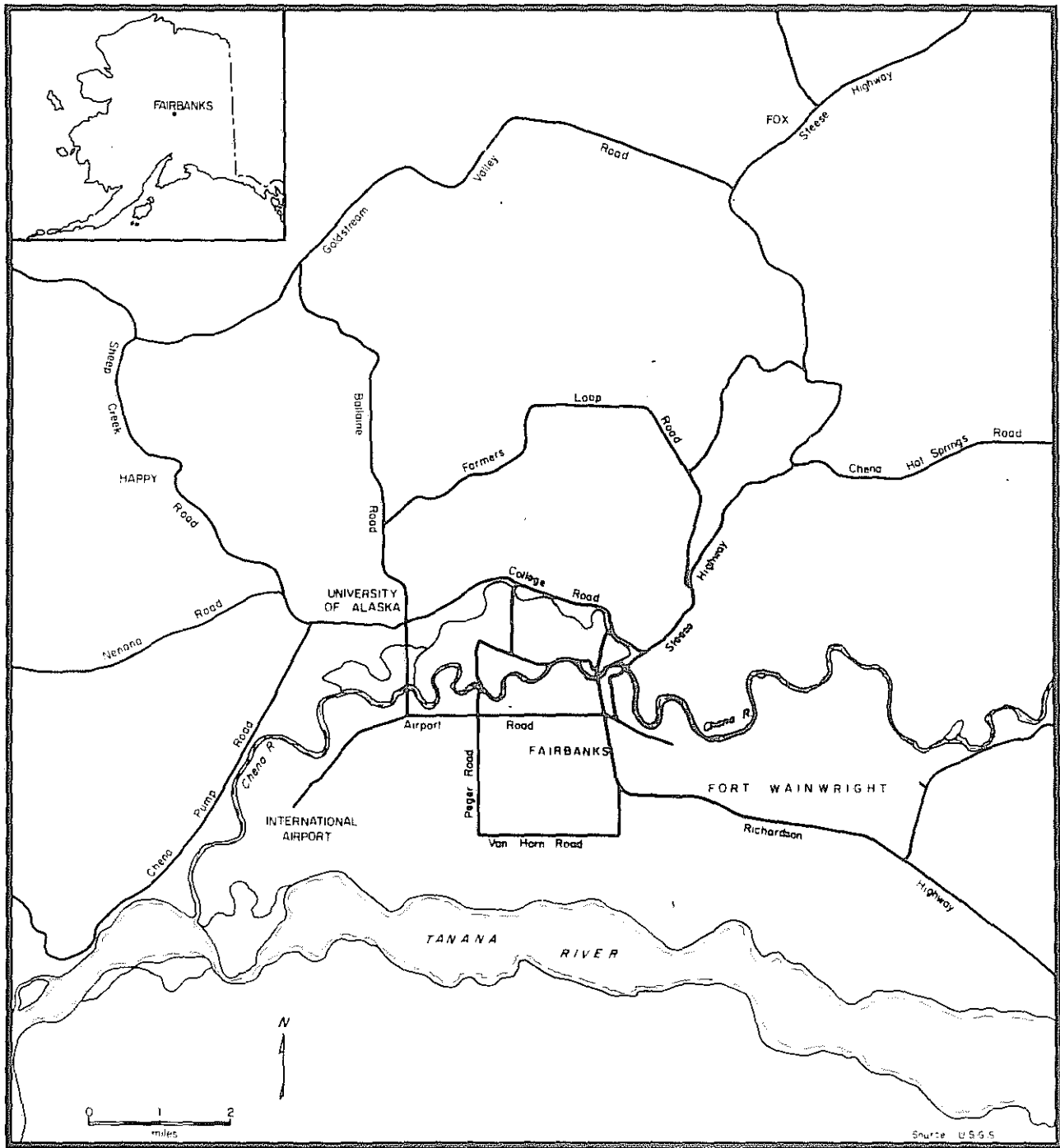


FIGURE 1: The location of Fairbanks, Alaska, and some of the principal streets and roads in its vicinity.

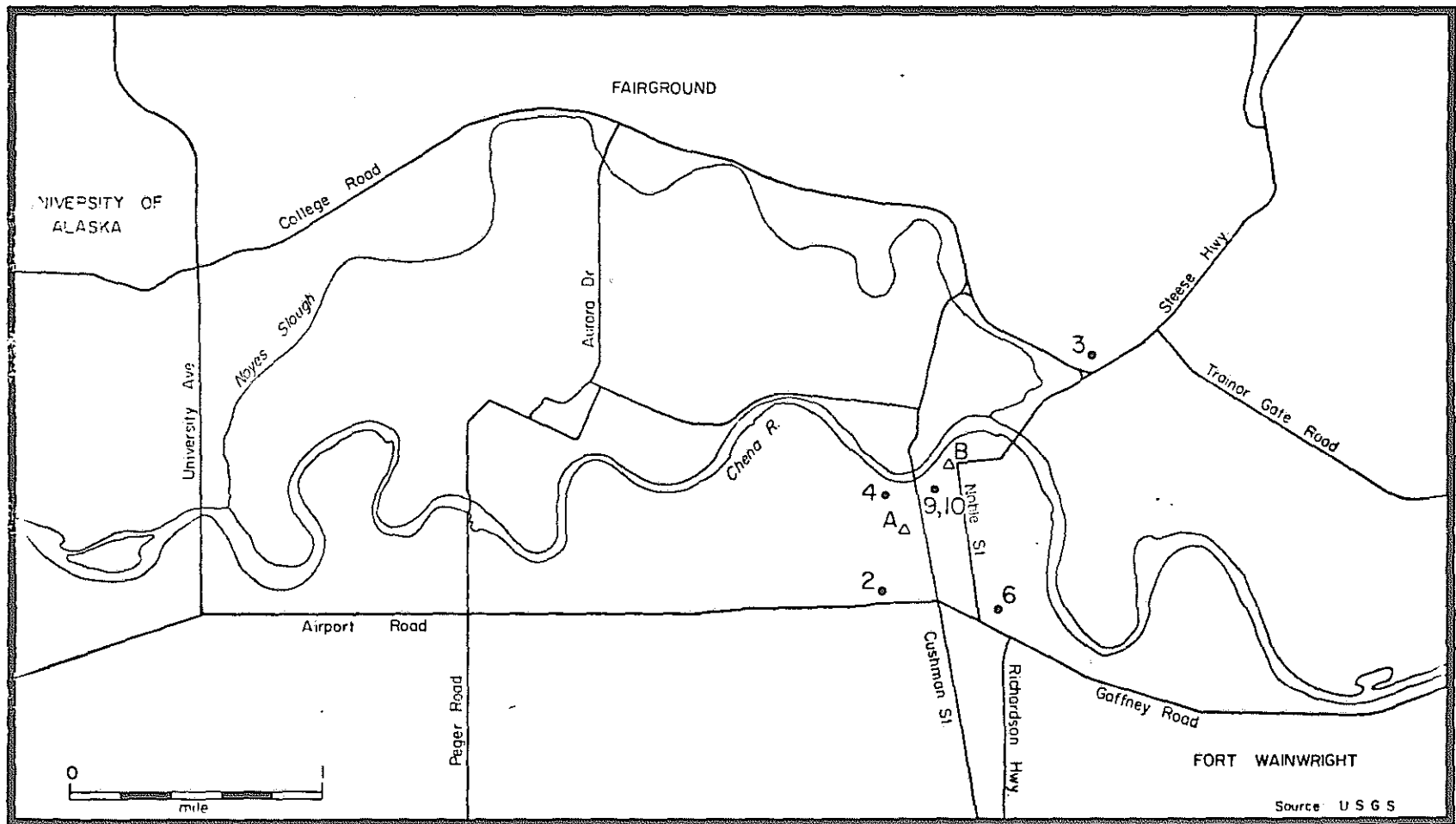


FIGURE 2: Some principal streets and roads in the main business section of Fairbanks - and locations of bag samplers. (See TABLE 6.)

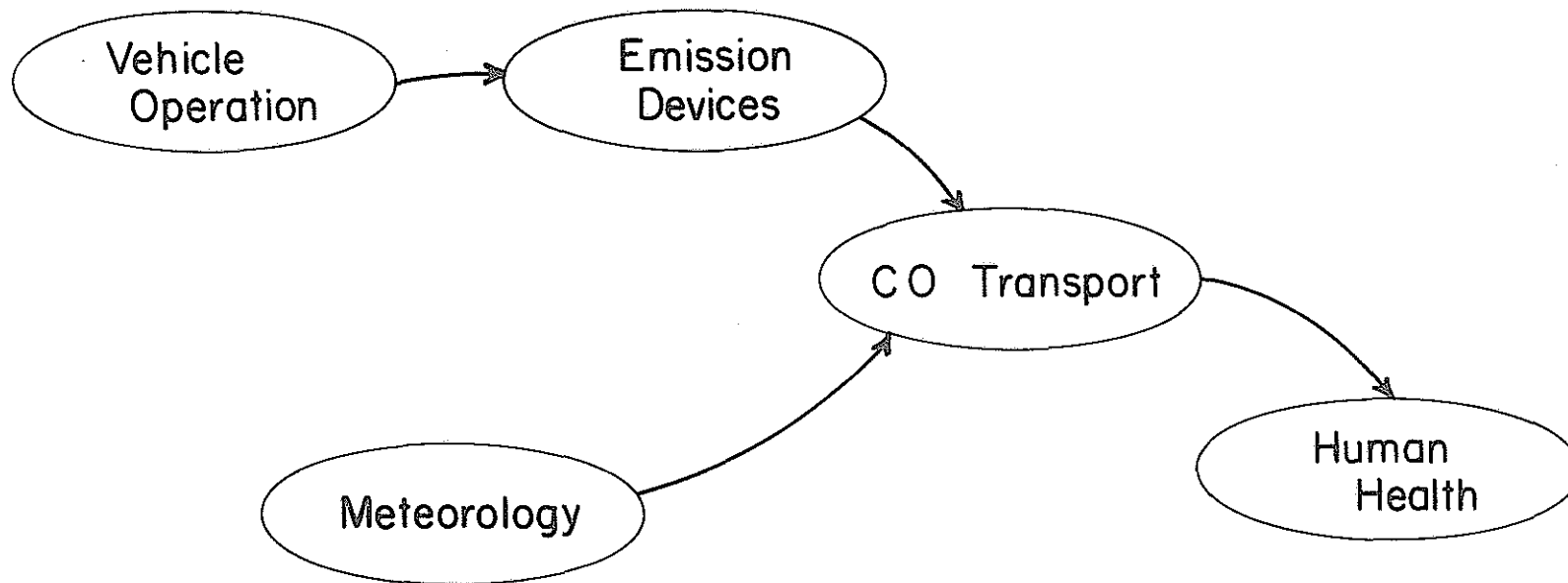


FIGURE 3: A diagram indicating the main features of Fairbanks's CO problem: the parts which can be controlled, vehicle operation and emission devices; the natural environment, meteorology; the part which can be studied, CO transport; and, the ultimate effects, human health problems.

or through installation of retrofit devices such as catalytic converters. All three aspects are tied together through the actual movement of carbon monoxide within the urban area itself via the phenomenon we will call 'atmospheric carbon monoxide transport'.

The tie between the occurrence and control of carbon monoxide sources and the ultimate health effects must be obtained through an understanding of atmospheric carbon monoxide transport. Such an understanding will tell us how the pollutant travels from the emission source to points of human habitation and how it is influenced by the meteorological parameters of wind, mixing height, and turbulence phenomenon. A key aspect in the formation of a competent control strategy is the development of a rather complete carbon monoxide transport model.

In order to completely understand, or model, carbon monoxide transport, we will need to know several key features of the problem. The characteristics of the emission sources must be accurately known in conjunction with a complete characterization of the manner of operation of motor vehicles, including their spatial and temporal distribution. The actual extent of the carbon monoxide problem must be determined through a comprehensive measurement program. Finally, the two must be tied together through an accurate simulation of the effects of atmospheric transport.

To that end, this report provides a general description of the development of a complete atmospheric CO transport model for the Fairbanks area. A companion report (Norton and Carlson, 1976) is available which offers a complete description of the mathematical basis of the transport model and of the information needed to use it. This very large, computer-oriented model requires competence and determination in order to create the appropriate input in order to get reasonable results. This report explains some of the background data, mostly through use of a case study, which allows the reader to interpret the model and relate the results to other aspects of the problem.

Included is a discussion of some salient features of Fairbanks' carbon monoxide problem. Certain aspects of the model itself are explained as well. These are tied together through a complete discussion of a case study of an actual air pollution episode in the Fairbanks area.

BACKGROUND OF THE CARBON MONOXIDE PROBLEM IN FAIRBANKS

Poor air quality and attendant problems in the Fairbanks townsite probably began when the townsite was first developed. Much of the early work was directed at the ice-fog problem caused by automobile emissions and heating plants discharging cooling waters (Benson, 1970). Benson and a number of others have documented the primary cause of both the ice fog and carbon monoxide conditions as being due to the severe temperature inversion which traps a layer of still air very close to the surface (Benson, 1970, and Wendler and Nicpon, 1975). This inversion creates a mixing layer only several meters thick which, in combination with low winds and a rather tight geographic restriction creates an air mass which remains virtually stationary for lengthy periods during the winter. (The geographic restriction is due to the area's being bound on three sides by low-lying hills.)

Although the ice-fog phenomena is a significant problem in itself, the main thrust of this report relates only to carbon monoxide. In the past several years, carbon monoxide has been detected in high concentrations in downtown Fairbanks and has been a constant cause of concern. The problem has increased steadily as the Fairbanks area has grown until the USEPA finally declared Fairbanks an area of special air quality concern (Gilmore and Hanna, 1973; ADEC, 1973; FNSB, 1973; EPA, 1973).

As a result of the regulatory restrictions being placed on the Fairbanks area, there have been a series of projects leading to a better understanding of the problem (FNSB, 1973). These steps range from measuring the nature and distribution of the original carbon monoxide sources through the mode of transport to the health effects. The effects of various planning and zoning alternatives and episode strategies must also be understood clearly.

There have been a number of attempts to gain an understanding of the total air quality problem in Fairbanks. A series of research efforts have been aimed toward understanding the meteorological conditions (Swift, 1974).

Leonard (1975) and Coutts, Leonard, and MacKenzie (1973) reported on various measures of emissions control including idle and startup. There has been other work on various aspects of parking and traffic management (FNSB, 1973).

Although many of these efforts are essential in obtaining a complete understanding of the carbon monoxide air quality problem, there remains a need for a comprehensive atmospheric transport model that will augment the understanding of the other efforts. Some initial work was carried out at the Institute of Water Resources in December and January, 1974. This work led to a proposal for a comprehensive modeling project which was initially funded by the Fairbanks North Star Borough through general revenue sharing funds in the spring of 1974. Further funding was obtained from the Federal Highway Administration through the Alaska Department of Highways and the Fairbanks North Star Borough. Finally, funds were received for preparation of a user and documentation manual from the Federal Highway Administration through the Alaska Department of Highways.

The end result of this activity is a well-documented computer program which appears to be highly successful. The model is easily used, is quite adaptable to local traffic situations, and is presently being used by several groups in the Fairbanks area.

This report presents a brief background about the nature and use of the atmospheric carbon monoxide simulation program (ACOSP). First the various features of the model and more of the background of the Fairbanks atmospheric system are defined. The primary results of the model are then presented through results of a case study. A very comprehensive and complete guide to use of the model is available in "A User's Guide to the Atmospheric Carbon Monoxide Simulation Program," (Norton and Carlson, 1976). The user's guide is highly recommended for those who intend to use the model to solve problems pertaining to their own interest. The reader should keep in mind that the results represent only one particular circumstance and are presented for illustrative purposes. Inferences made from these results should be extended to other areas and circumstances of interest with great caution. A great deal of work is necessary in order to obtain a complete understanding of the complete carbon monoxide problem in the Fairbanks area; the model presented here is only a beginning.

SIMULATION OF ATMOSPHERIC TRANSPORT

Since the model resembles the actual carbon monoxide problem, we will discuss its components in much the same way that we have already discussed its real-life counterparts. Three important input components are traffic, meteorology, and CO measurements.

Input to the model includes a complete and accurate set of traffic data. A rather complete inventory of vehicle movement throughout the area for a typical day must be tabulated. Appropriate factors accounting for the amount of carbon monoxide emissions coming from different traffic modes must also be accounted for, including moving vehicles, cold starts, and idling.

A faithful reproduction of atmospheric conditions present in the air basin at a given time is needed. This is usually characterized by specific meteorological conditions including the wind vector and the mixing height. The latter is determined by information on the temperature inversion condition and the turbulent mixing, which is characterized by a diffusion coefficient.

An accurate set of measurements of carbon monoxide concentrations is also required throughout the study area. These measurements provide both a guide to the model's validity as well as a check on the input data setup and the assumptions made to operate the model.

This information is connected by a set of computer instruments called the modeling program. The model basis is the fundamental advection-diffusion equation which describes the transport of a conservative element in fluid flow. This equation accounts for movement of a constituent in the flow field by wind advection, turbulent mixing, and accumulation and depletion of the constituent within a given space control element. The model also has an option to allow for loss through the top of the mixing layer. A more complete explanation of the atmospheric transport process is given in Csanady (1973) and Norton and Carlson (1976).

There are a number of ways in which the transport equation may be calculated. Probably the oldest and most common are various mathematical solutions.

These solutions are very useful as, once they are achieved, a tabulation of concentration is easily made (Csanady, 1973). However, the solutions are usually very difficult to find for all but the simplest initial and boundary conditions.

Another type of solution is derived from a method which uses a standard analytic solution for a point or line source. These point and line sources are spread around to simulate the many types of diverse source emissions that occur in most urban areas. These semianalytic solutions are quite popular and form the usual basis for the so-called receptor or area-of-influence models. These models are explained in a number of references: Mancuso and Ludwig, 1972; Busse and Zimmerman, 1973; Ingram and Fauth, 1974.

The last type of solution, direct numerical techniques, is based on a rewriting of the advection-diffusion equation into a finite-difference form. The new form is then solved in time and the solution achieved by keeping track of the numerical tabulation of the concentration at a given space point. Finite-difference solutions are quite advanced and some three dimensional models are available including those presented by Reynolds, Roth, and Seinfeld, 1973; and Egan and Mahoney, 1971. However, there are several drawbacks. Probably the most important is the inflexibility of the finite-difference rectangular grids in fitting them to a complicated geometry such as a curved boundary. In addition, most finite-difference grids do not allow for concentration computations at areas of special interest.

The last type of numerical solution is based on a finite-element technique, used here, which is somewhat newer and, to our knowledge, has never before been used for a model of the air quality transport mechanism.

The finite-element simulation is a direct solution of the advection-diffusion equation (See Figure 4 and Table 1). It provides a well-formulated solution which is quite stable and reliable. The finite-element technique itself has been widely used in the field of structural and solid mechanics. Its most important advantage is its great flexibility in adapting to the geometry and boundary conditions of a given problem. For example, one can

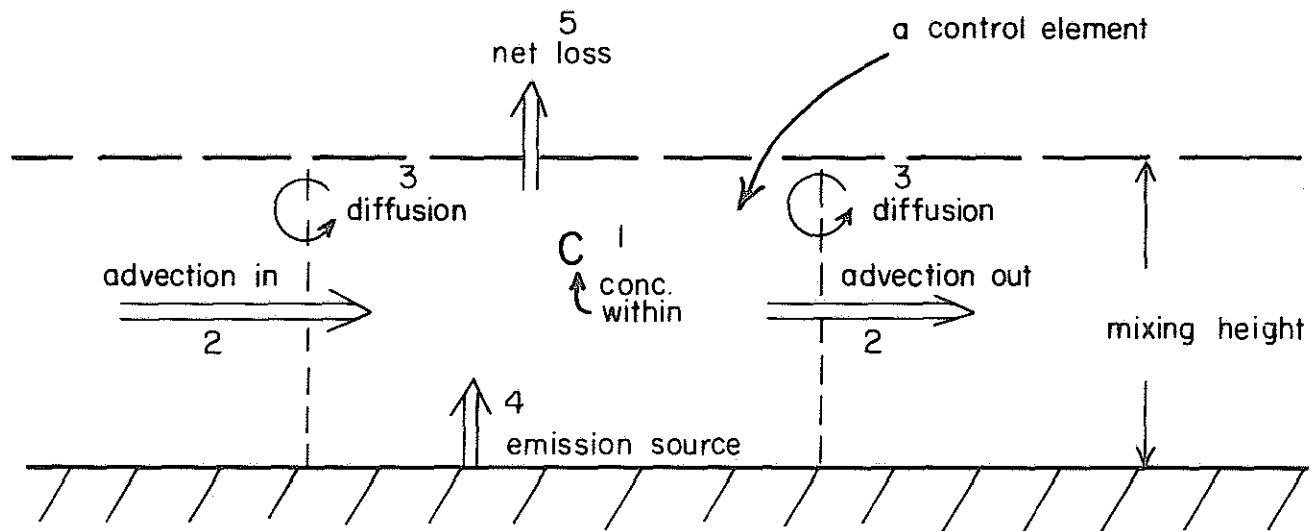


FIGURE 4: A schematic illustration of the atmospheric transport equation.

Table 1: A Description of the Advection-Diffusion Equation

$$\frac{\partial C}{\partial t} = u \frac{\partial C}{\partial x} + \frac{\partial^2 C}{\partial x^2} + S_5 - Kc$$

1 2 3 4 5

Term

- 1 - Rate of change with time of the carbon monoxide concentration, C, within the control volume
- 2 - Net rate of advection transfer of C into the control element
- 3 - Net rate of diffusion transfer of C into the control element
- 4 - Rate of emission of C into the control element from traffic and stationary sources
- 5 - Net loss of C from control element to upper layers or through decay within the element

concentrate the computational grid where there is a special interest for more information. Also, it is quite easy to modify the elements. The final advantage is that it is one of the few numerical techniques which allow for curved-element sides.

Certain aspects of the model have been discussed and it is now appropriate to enter into a more detailed discussion of the modeling procedure. Some aspects are: the network setup, specification of emission loads, specification of meteorological parameters, incorporation of recorded carbon monoxide measurements, establishment of initial and boundary conditions, and examination of the model output.

The first step in the modeling effort is establishment of an appropriate computational network. The distribution of the vehicle emission inputs is the primary factor for specifying the finite-element network. These elements can take on a number of different configurations, the most usual of which are triangular and quadrilateral with straight sides and triangular or quadrilateral element with one or more curved sides. A single-line element is also available. When put together, these element types can satisfy almost any kind of geometrical specification. An illustration of the grid used for Fairbanks is shown in Figures 5 and 6. Another important characteristic influencing the node network is the need for concentration calculation in certain areas. The usual experience has been that there is generally sufficient information on concentration provided by the model. It is sometimes an advantage to assume a regular geometric network solely for ease of data setup and computational checking.

The Atmospheric Carbon Monoxide Simulation Program or ACOSP at this time has a limit of 110 elements and 250 node points. These limits are somewhat flexible and a revised version is being considered which approximately doubles these values.

The next part of the setup effort is to specify the emission loads, the source of which, in our case, is primarily vehicular traffic. The operation modes include moving vehicles, idling, and cold starts. The model can also

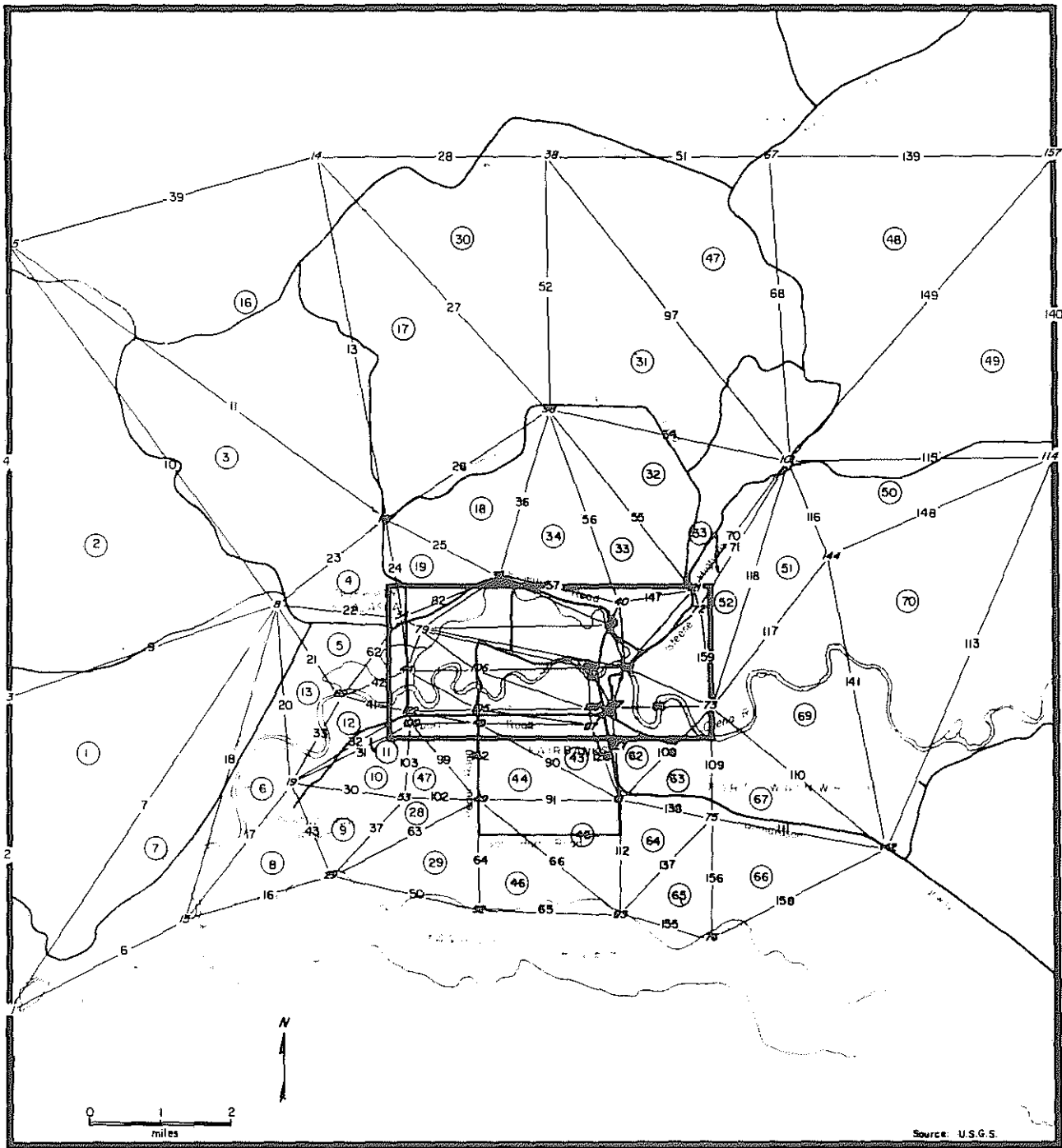


FIGURE 5: The finite-element computation grid for the Fairbanks urban area.

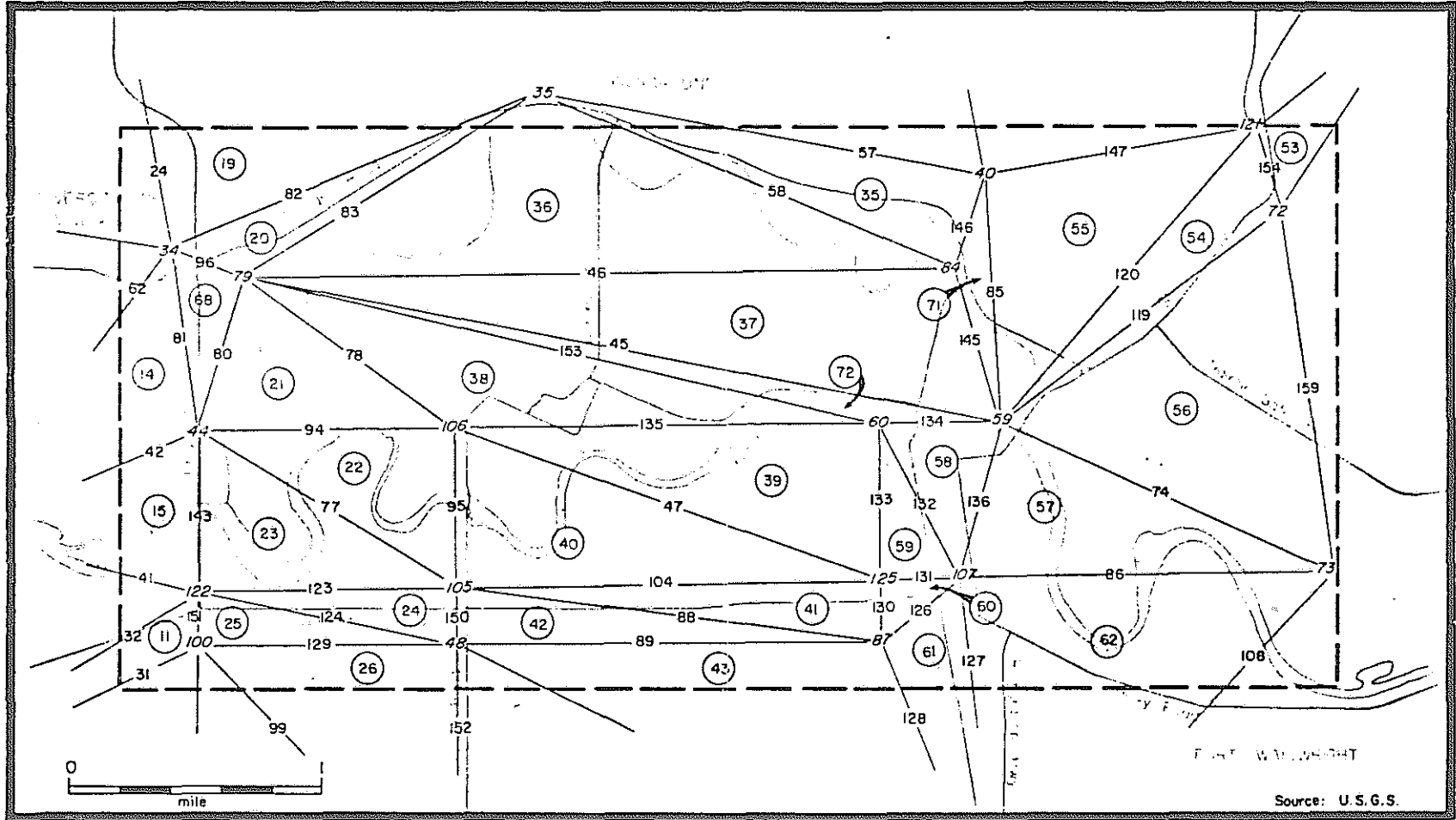


FIGURE 6: The finite-element computation grid for the Fairbanks business district.

account for stationary sources and for distribution of the loads within daily periods. The moving traffic is specified for each element and includes the characteristics of total number of vehicle miles per day and average speed. The two other vehicle operation modes are very important in the Fairbanks area. Under certain conditions cold starts can contribute a major portion of the total amount of carbon monoxide emissions for a short trip (Leonard, 1975). The emission specification must include an appropriate factor which converts the traffic information into CO emissions. These include two factors for moving traffic and a factor each for idle and cold-start operation (See Table 4). The final specification establishes the characteristic of traffic distribution for each of the operational modes throughout a 24-hour day. The distribution of local traffic, cold starts, and idling is shown in Figure 7 and Table 2. The main arterial traffic loads are shown in Figure 8 and Table 3.

The wind field in Fairbanks and many northern areas have very low, almost imperceptible, speeds during the severe air quality episodes. The complex variations of height of this wind field also give the impression of several simultaneous wind directions.

The mixing height is very difficult to specify because of the very steep inversion. Usually an estimate of the mixing height can be made by examining inversion estimates. The diffusion coefficient must also be specified. This cannot be measured directly but must be estimated from past experience and from certain characteristics of the wind field and mixing height (See Figure 24 and Table 5).

Although not needed directly as a part of the modeling effort itself, a complete set of actual carbon monoxide measurements is useful to check the validity of the model results. In the Fairbanks area, this is accomplished by two primary continuous measurement points and several integrative samples of 8 hours duration (Gilmore and Hanna, 1973). These are located as shown in Figure 2. Eight-hour bag samplers are generally in operation at these points from 10 a.m. to 6 p.m. An examination of the continuous

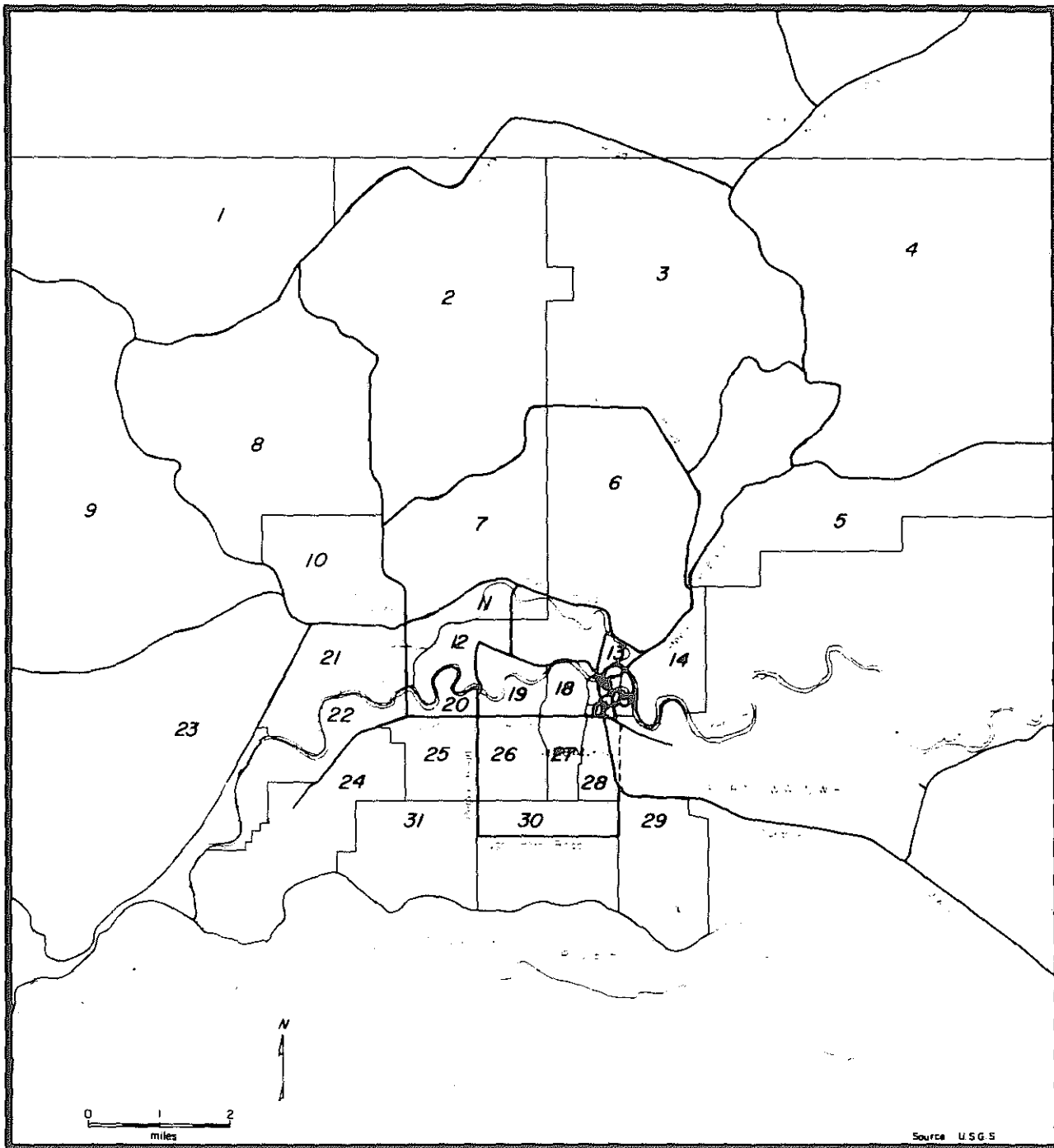


FIGURE 7: The distribution of the traffic input data including local traffic, idle, and cold starts. (Keyed to TABLE 2.)

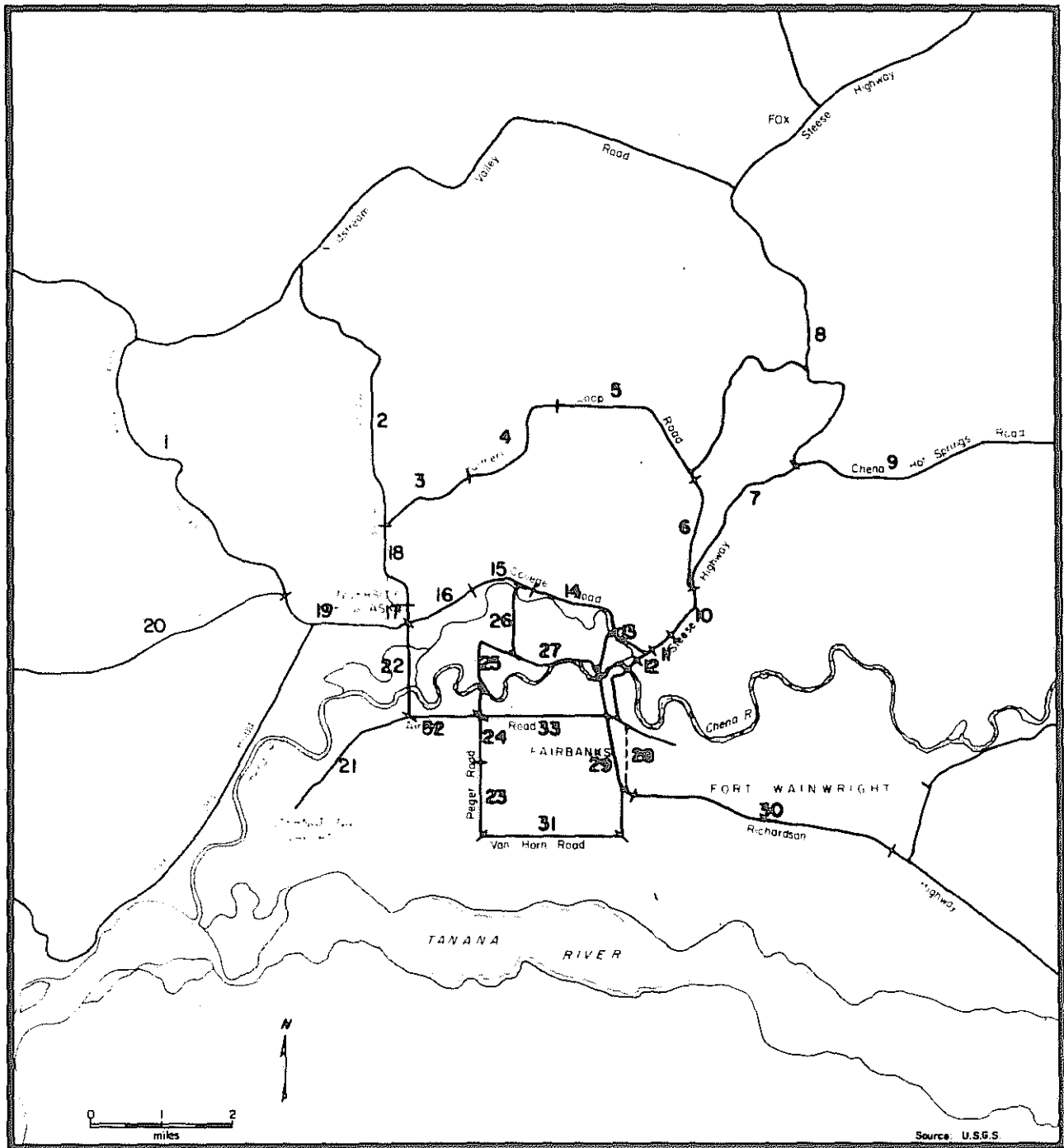


FIGURE 8: The distribution of the main arterial traffic loads for Fairbanks area. (Keyed to TABLE 3)

TABLE 2

The Traffic Local Input Data Distribution
Shown in Figure 7

Zone	Vehicle Mile per day	Average Speed	Idle Time, Hours	No. of Cold Starts
1	1304	25	54	326
2	896	25	149	896
3	3552	25	197	1184
4	2574	25	143	858
5	369	25	61	369
6	3072	25	512	3072
7	600	25	249	1499
8	501	25	83	501
9	1452	25	80	484
10	4563	20	760	4563
11	3154	20	876	5256
12	2228	20	928	5569
13	1474	20	614	3686
14	9770	20	1661	9970
15	1178	15	490	2945
16	5963	15	2484	14908
17	2211	15	921	5527
18	4077	15	1132	6795
19	1393	15	386	2321
20	2379	20	396	2379
21	3032	20	252	1516
22	1609	20	335	2011
23	3960	40	132	792
24	4642	20	773	4642
25	1493	25	248	1493
26	488	20	203	1219
27	4234	20	588	3528
28	5194	15	1442	8657
29	1669	25	278	1669
30	656	20	182	1093
31	318	25	26	159
Fort Wainwright				
	14505	35	700	4202

SOURCE: J. Miller, Alaska Department of Highways.

TABLE 3

The Arterial Traffic Input Data
Distribution Shown in Figure 8

Arterial Element	Vehicle Mile	Speed
1	14112	45
2	8316	45
3	10080	46
4	8820	46
5	10332	50
6	11502	50
7	59570	44
8	55265	42
9	39732	51
10	35305	35
11	18216	30
12	9752	25
13	11846	40
14	59670	35
15	33055	42
16	35165	38
17	5700	46
18	18816	46
19	25124	35
20	34675	43
21	127699	40
22	53760	42
23	17122	45
24	17695	45
25	21826	36
26	18291	32
27	28000	38
28	33840	45
29	64440	25
30	132048	53
31	32422	45
32	24018	45
33	62617	40

SOURCE: J. Miller, Alaska Department of
Highways.

Table 4: The Equations Used to Estimate Carbon Monoxide Emissions from the Traffic Data

Moving vehicle emissions, E_1

$$E_1 = V\alpha_1 S^{-\beta}; \text{ gm/day}$$

where

V = vehicle miles/day/element

S = average vehicle speed

α_1 = a factor, value of 200* used in January 22 simulation

β = a factor, .55* used in January 22 simulation

Idling vehicle emissions, E_2

$$E_2 = \alpha_2 T$$

where

α_2 = a factor, gm/hour, value of 600* used in January 22 simulation

T = total idle hours/day/element

Cold start vehicle emissions, E_3

$$E_3 = \alpha_3 N$$

where

α_3 = a factor, gm/cold start, value of 340 used in January 22 simulation*

N = total number of cold starts/day/element

*SOURCE: L. Leonard, University of Alaska.

Table 5: Explanation and Specification of Meteorological Values Used in January 22 Simulation

Wind, v

Estimated from airport data, Figures 22 and 23. Values used for simulation:

speed, .1 m/sec.

direction, from due north.

Mixing height -

Estimated from airport air temperature vs. elevation data, Figure 24. Can be calculated by extending a vertical line from the afternoon ground temperature to the morning temperature - elevation curve. Value used in simulation:

$h = 3 \text{ m}$

Diffusion coefficient -

Hard to measure, few cold region values available. May be crudely approximated by $D = v \cdot h$. Value used in simulation:

$D = 1.0 \text{ m}^2/\text{sec.}$

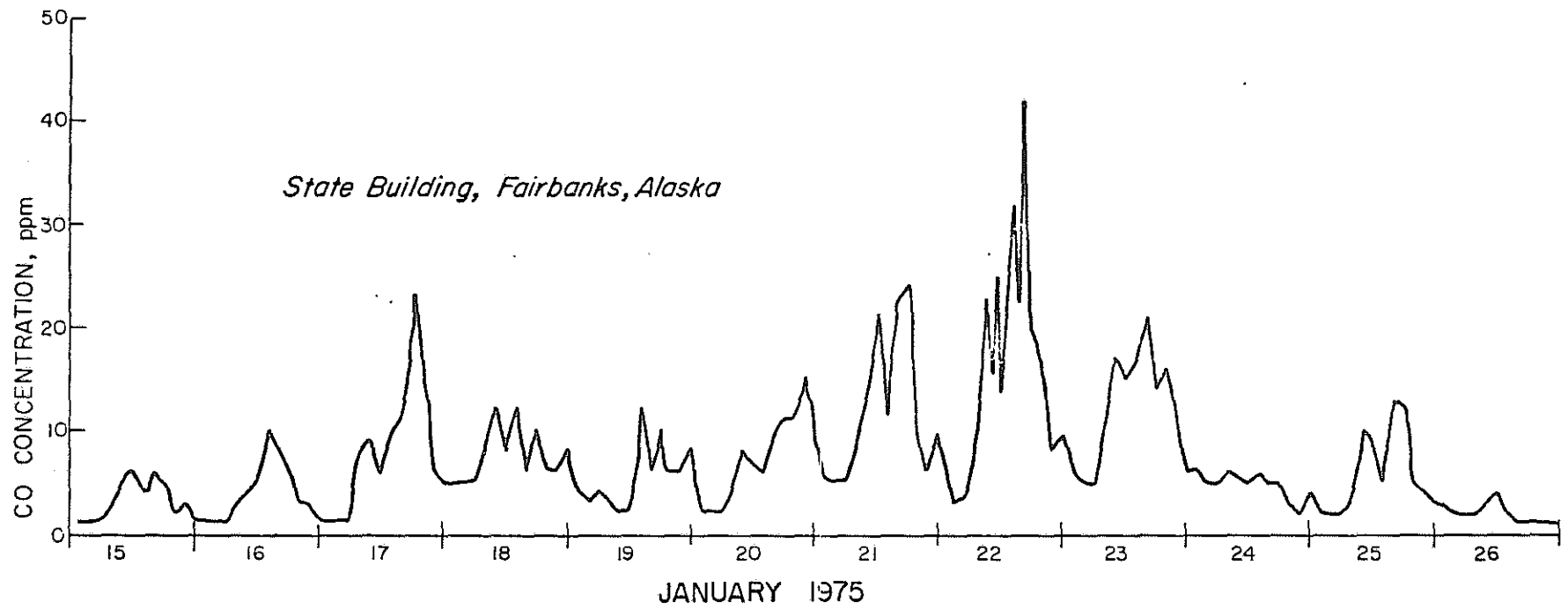


FIGURE 9: Measured CO concentrations at the State Office Building, Fifth and Barnette Streets, Fairbanks, January 15 to 26, 1975.

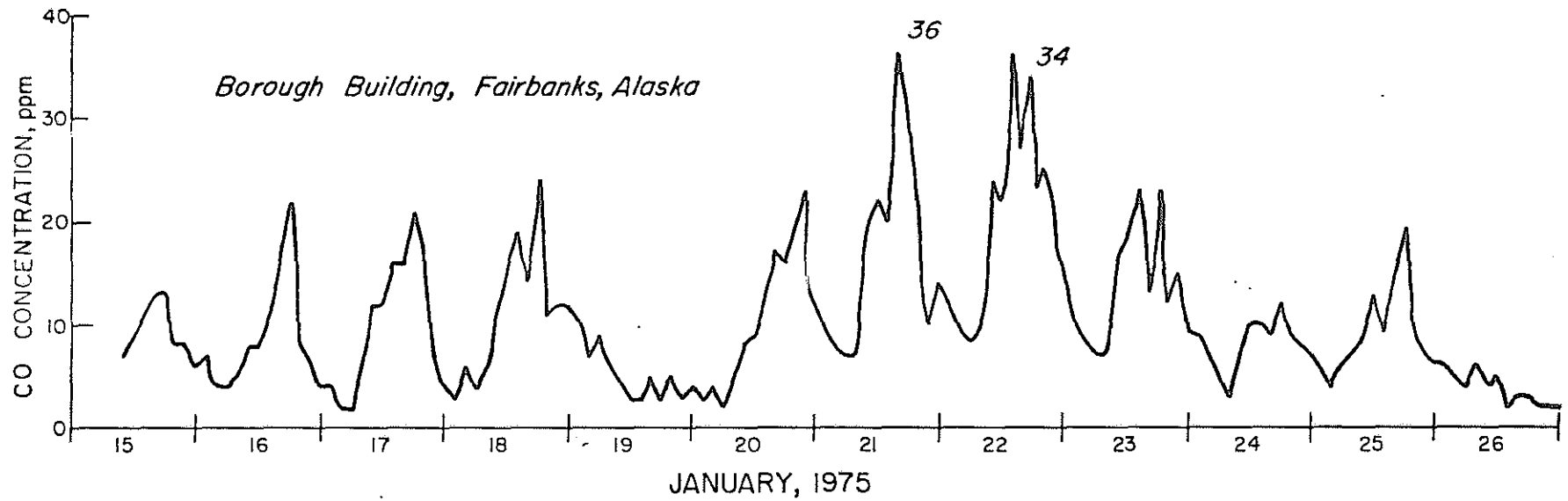


FIGURE 10: Measured CO concentrations at the Borough Office Building, Second Ave. between Cushman and Lacey Streets, Fairbanks, January 15 to 26, 1975.

*Borough Building,
Fairbanks, Alaska*

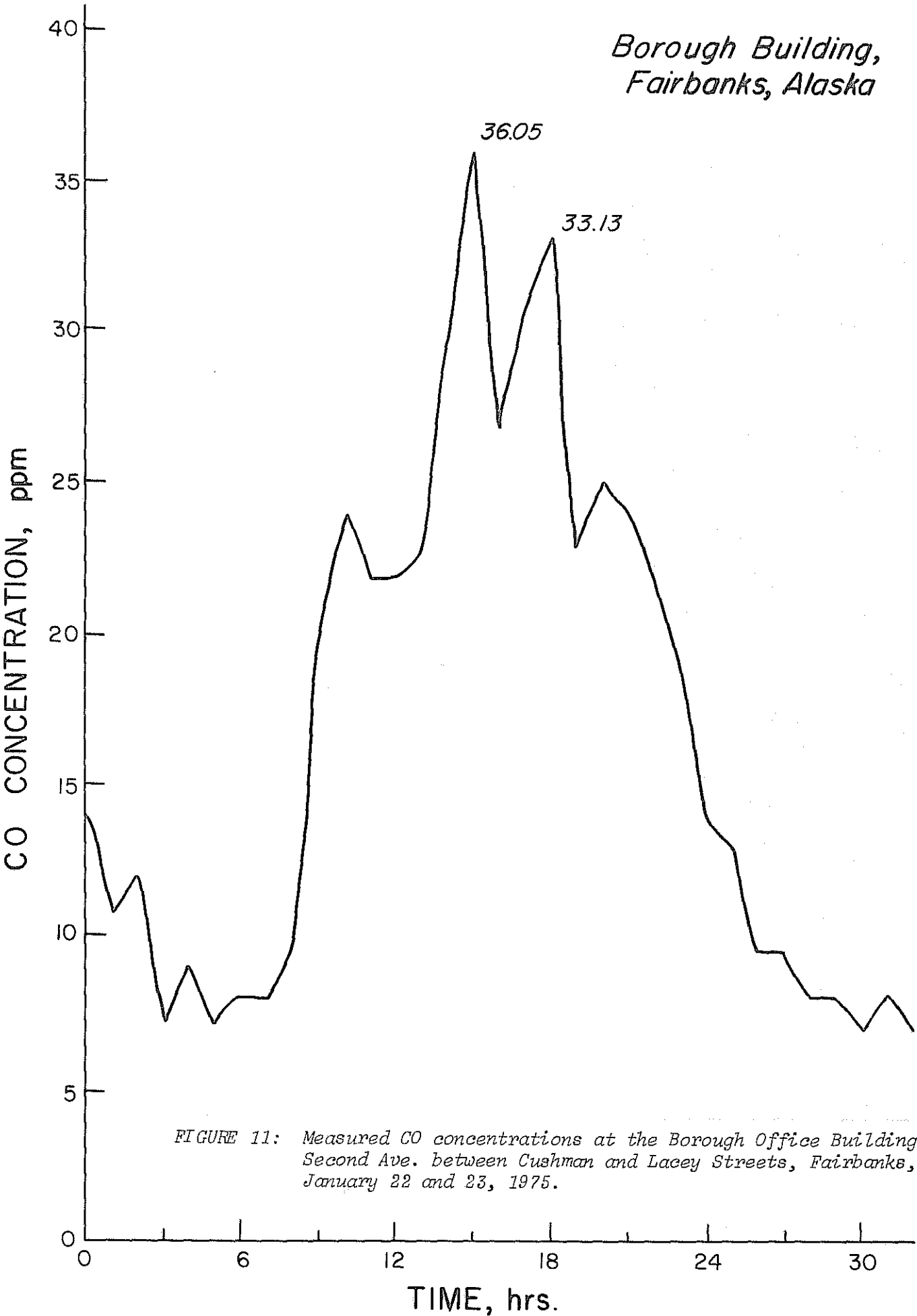
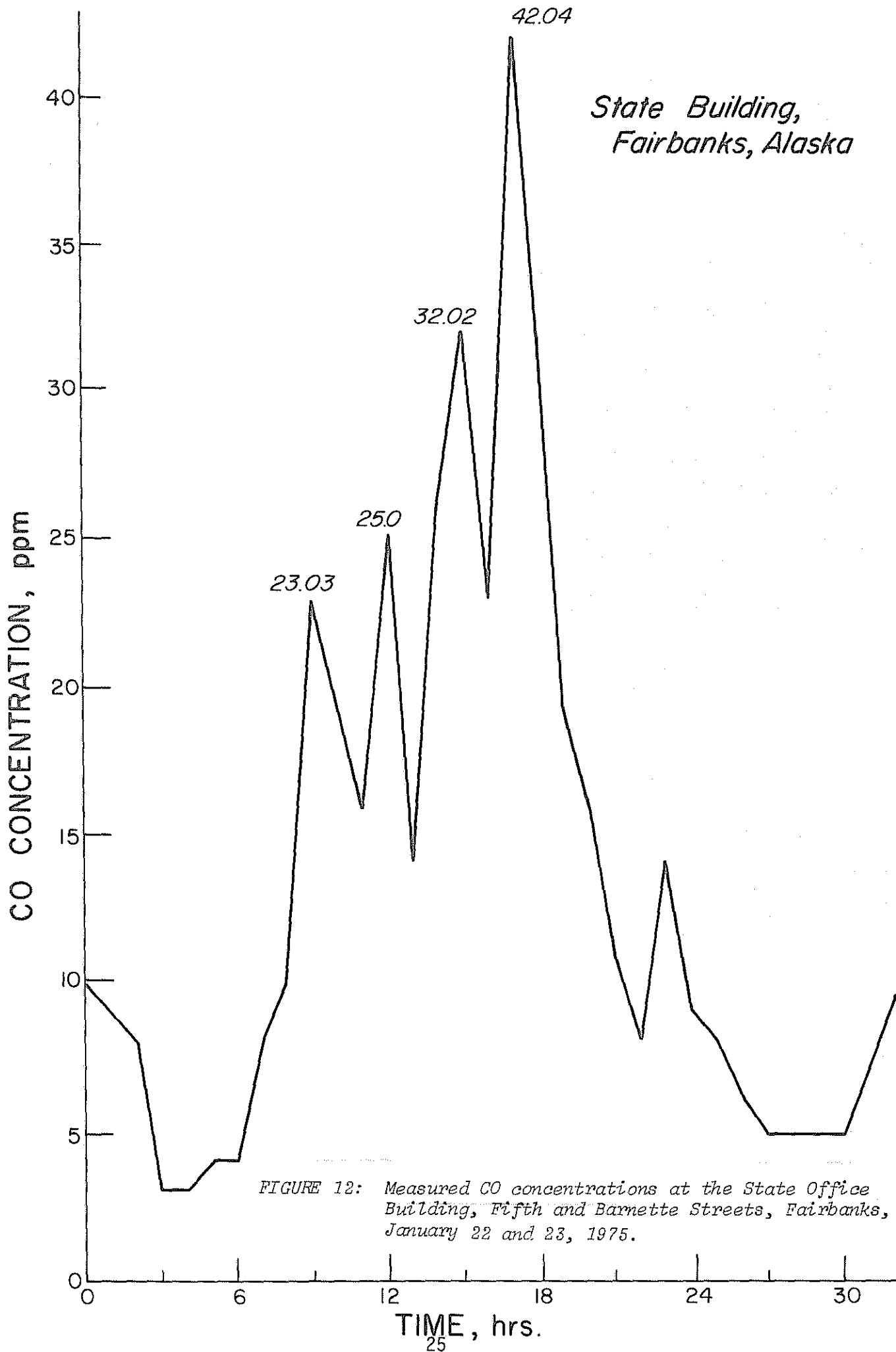


FIGURE 11: Measured CO concentrations at the Borough Office Building, Second Ave. between Cushman and Lacey Streets, Fairbanks, January 22 and 23, 1975.



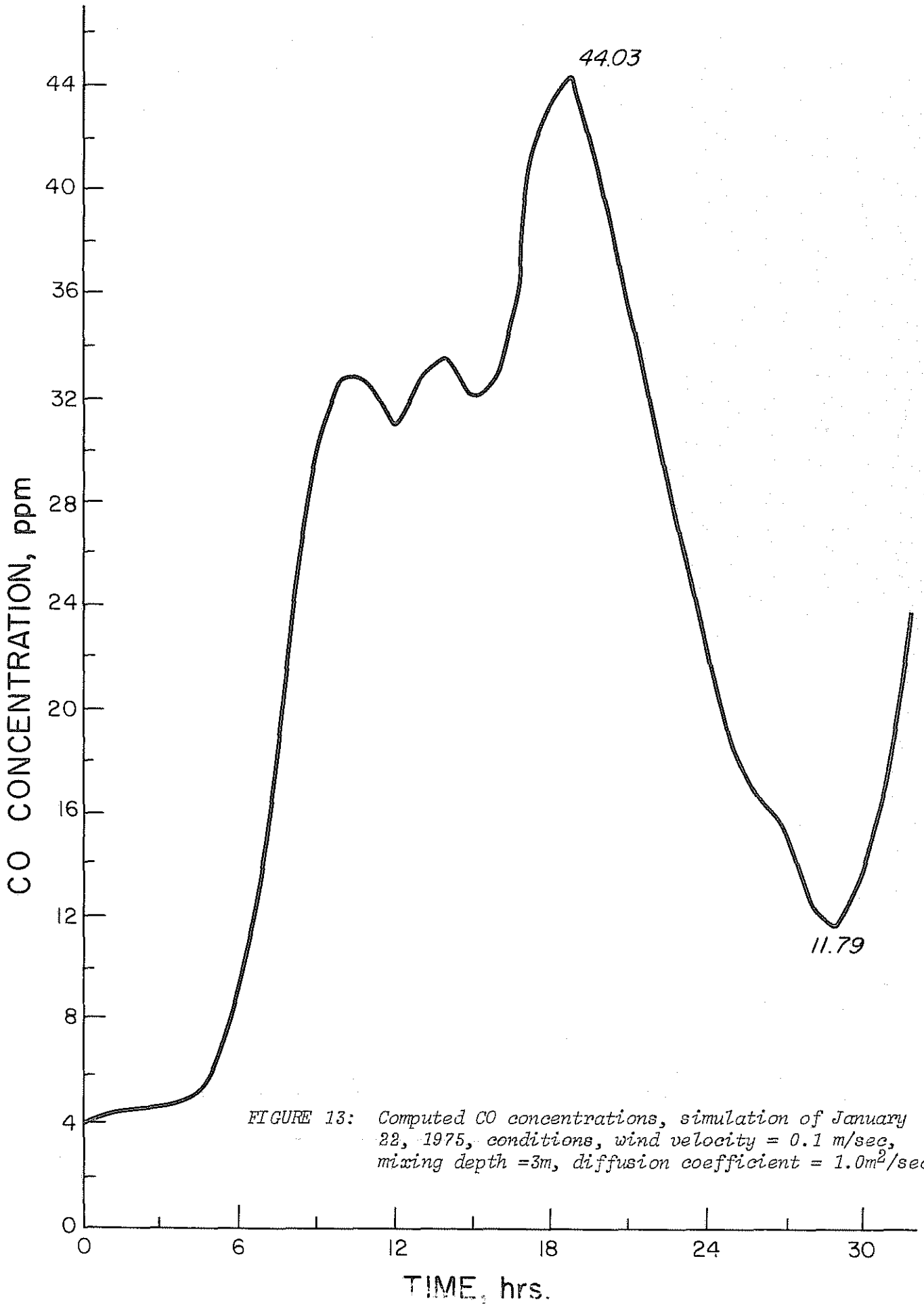


FIGURE 13: Computed CO concentrations, simulation of January 22, 1975, conditions, wind velocity = 0.1 m/sec, mixing depth = 3m, diffusion coefficient = 1.0m²/sec.

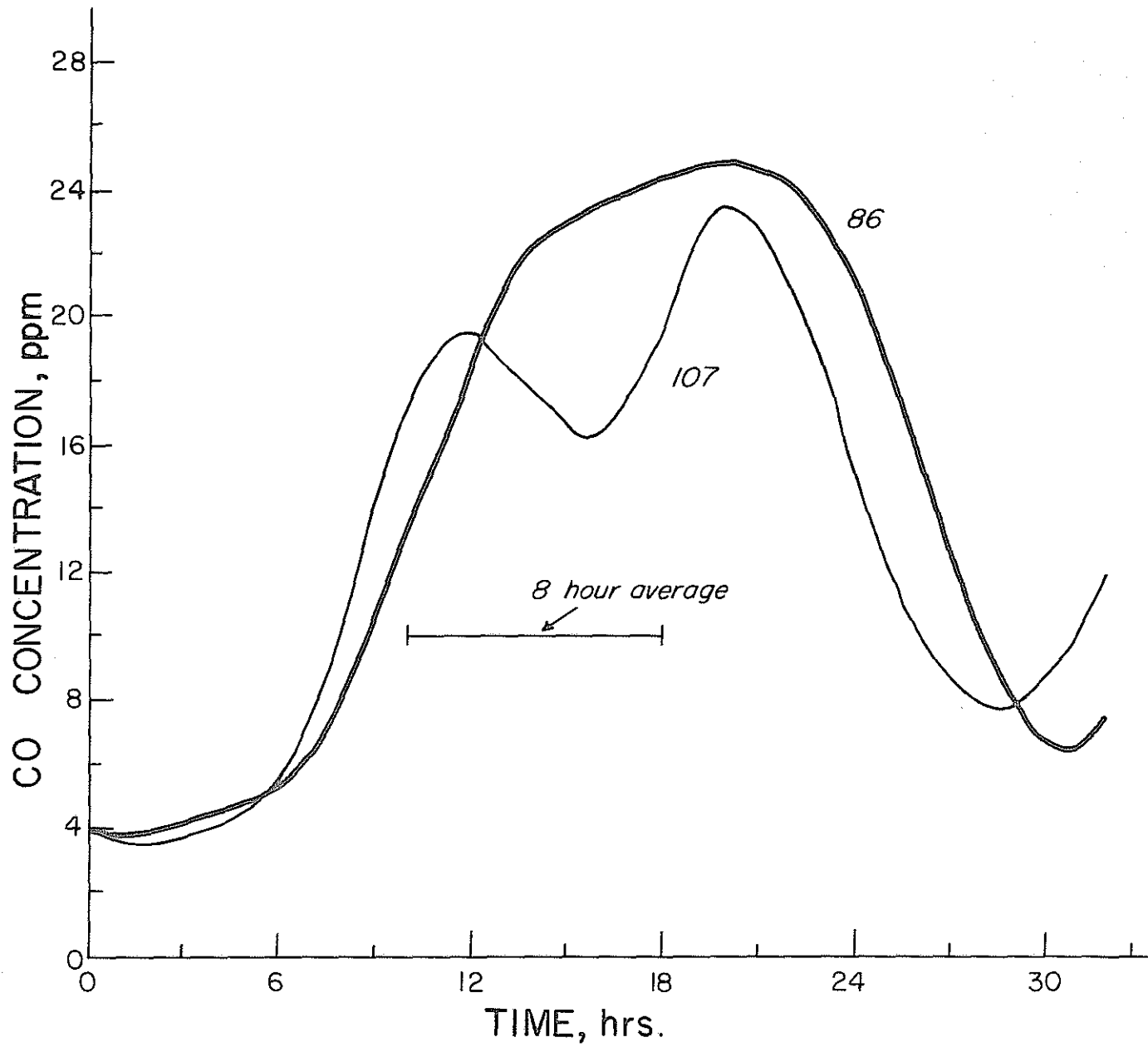


FIGURE 14: Comparison between computed value for Node 86, 107 and 8-hour average at Station #6.

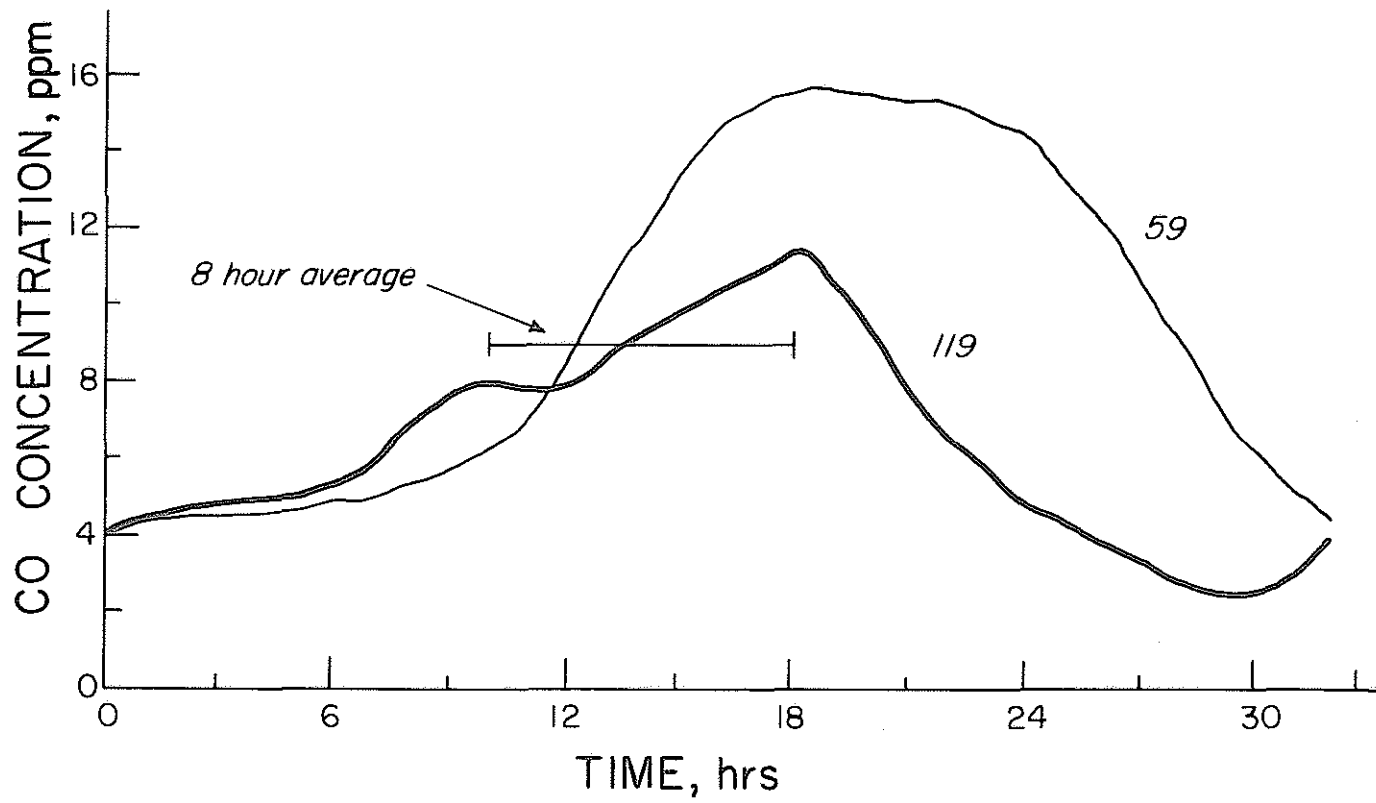


FIGURE 15: Comparison between computed value for Node 119, 59 and 8-hour average at Station #3.

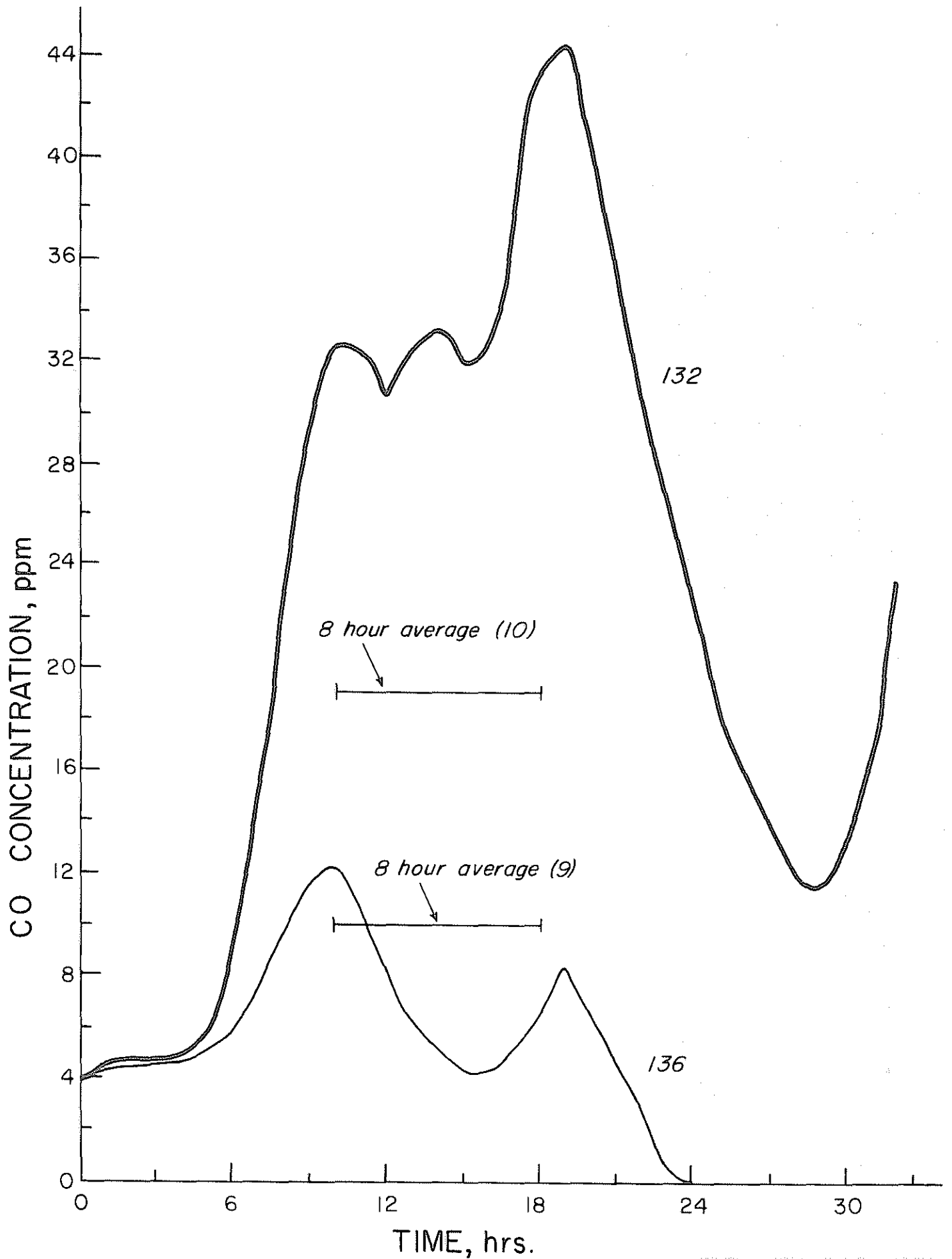


FIGURE 16: Comparison between computed value for Node 132, 136, 8-hr. ave., St. #9&10.

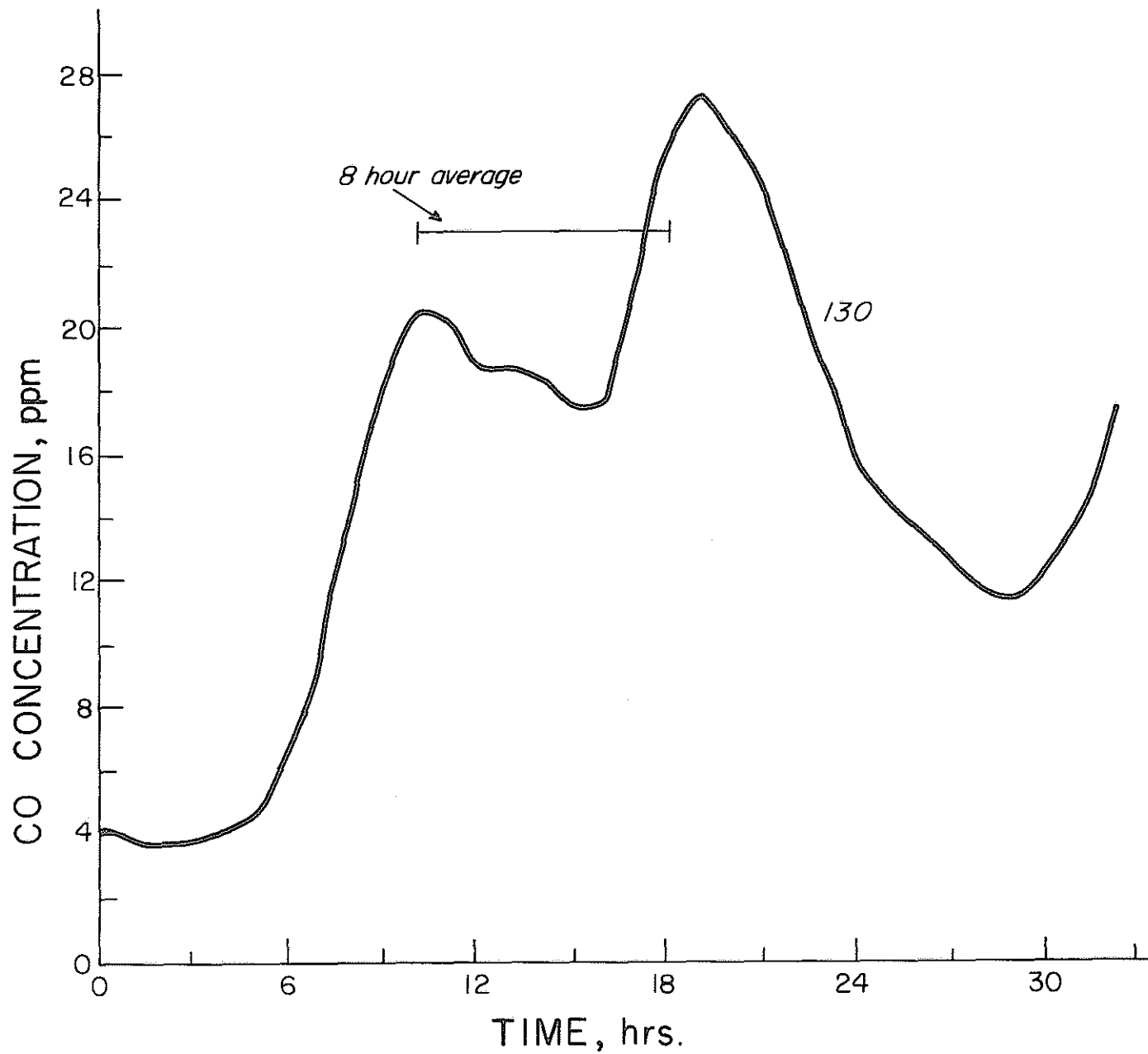


FIGURE 17: Comparison between computed value for Node 132 and 8-hour average at Station #2.

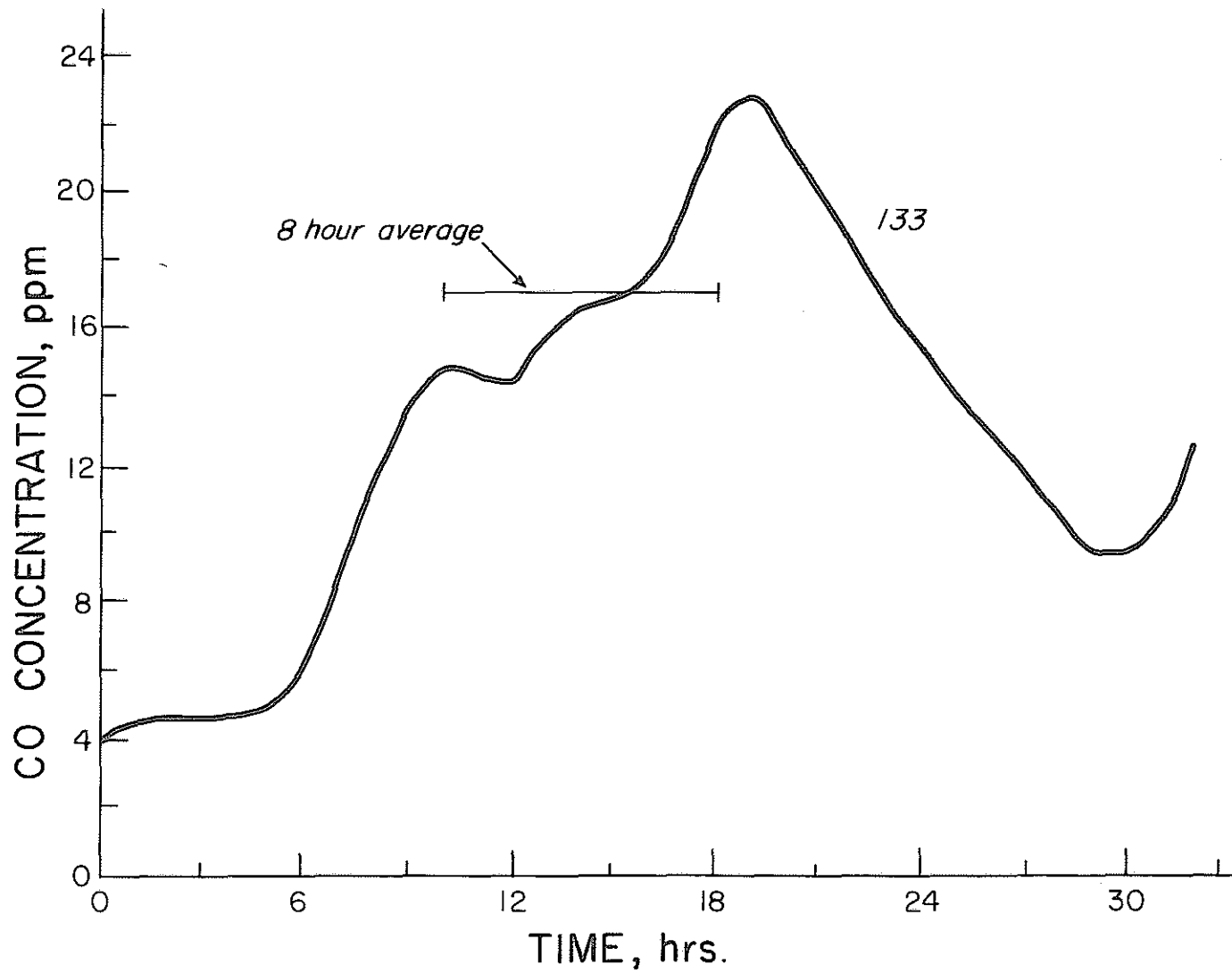


FIGURE 18: Comparison between computed value for Node 133 and 8-hour average at Station #4.

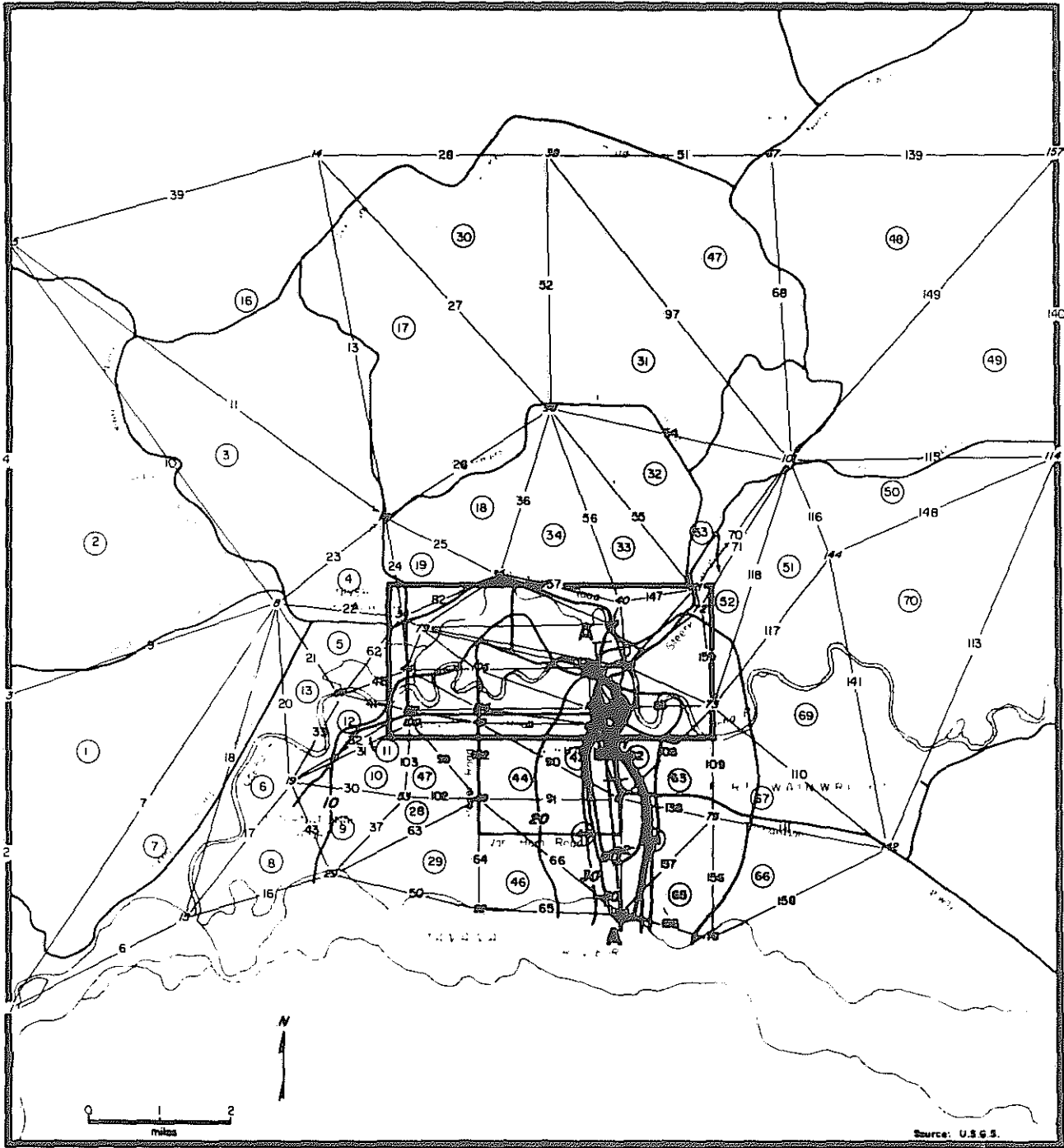


FIGURE 19: Concentration contours for when Node 132 is at a maximum.

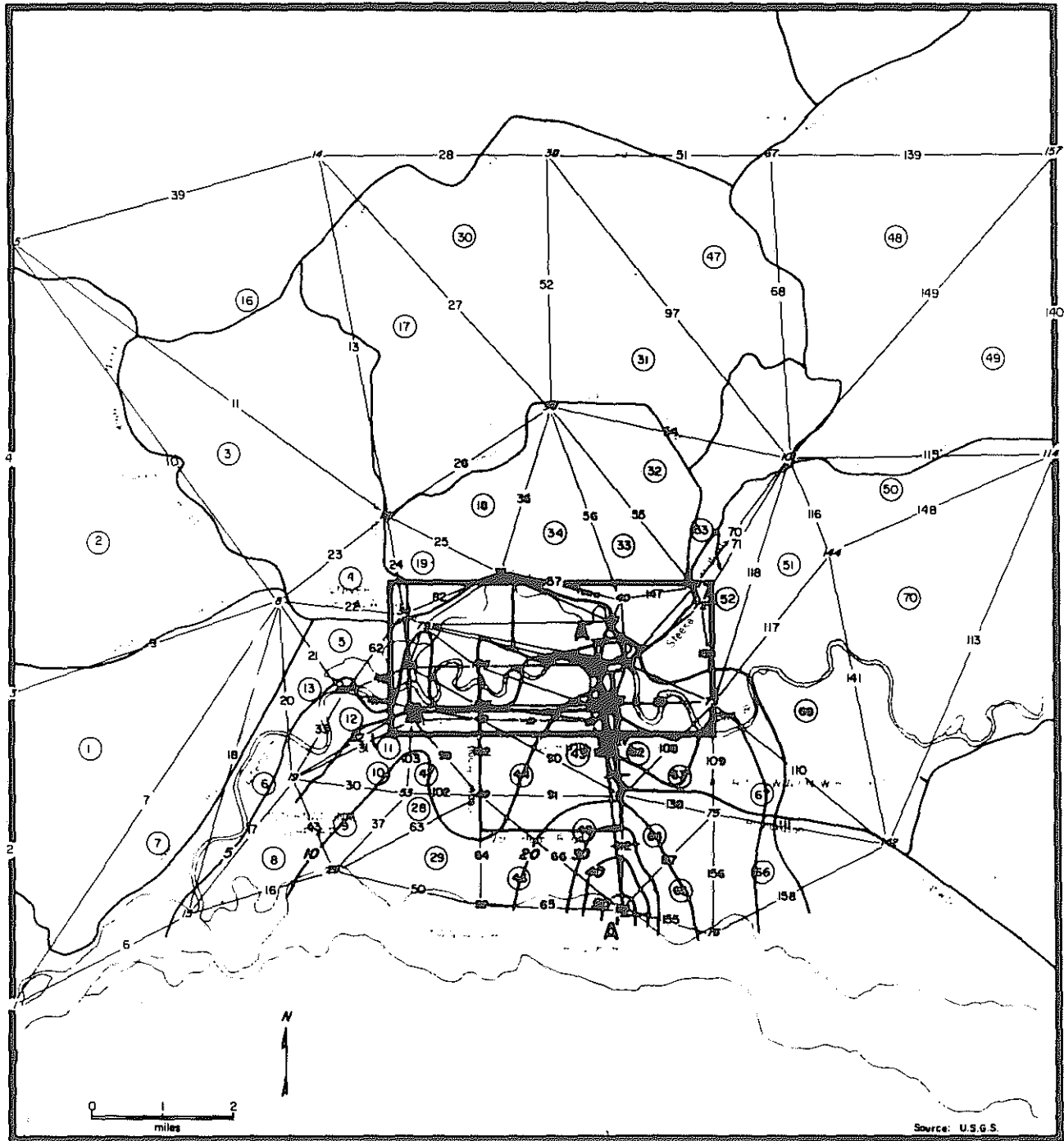


FIGURE 20: Concentration contours for when Node 132 is at a minimum.

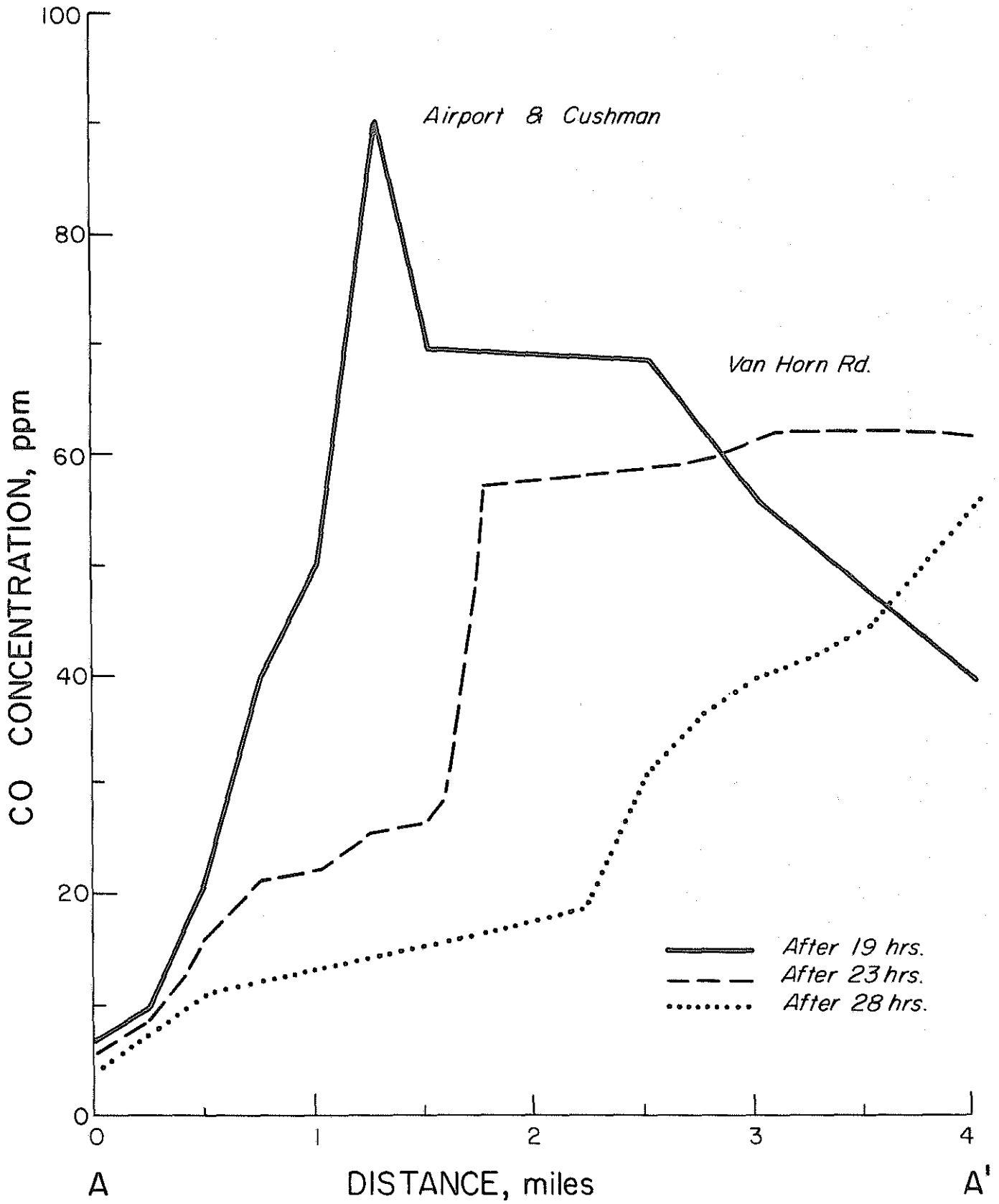


FIGURE 21: Profile of concentrations as taken from A to A'. (See FIGURE 20.)

traces in Figures 9 and 10 will show that the fluctuation of carbon monoxide concentration is quite active and can be expected to vary considerably within a short time period. The bag samplers average only the concentration measured in the 8-hour period of operation. (See Table 6 for bag-sampler locations.)

Another important specification includes boundary and initial conditions. The upwind boundary concentrations must be specified thus allowing for inclusion of any background concentration present in the area. Every solution must start at a given time for which the concentrations are provided. Although it is possible to specify a very complex initial-condition field, it is often more convenient to start the solution with a uniform field and allow the computation to run for a sufficient time to allow the effects of the uniform conditions to disappear.

The last and most important feature of the modeling effort is proper interpretation of the model output. The primary output of the simulation model is the specification of the carbon monoxide concentration history at given node points. This information can be interpreted in several ways. We used three different kinds of interpretation. One is a plot of the concentration history throughout the simulation period at a given node point. An example of this is seen in Figure 13. This is the most usual kind of interpretation and can be directly related to actual measurement plots (Figures 11 and 12). See Figures 14-18 for a comparison to the bag measurements. Another type of interpretation is made by drawing the concentration contours of the solution space at a given time (Figures 19 and 20). These can provide important information about the areal extent of the problem and provide a means of extending the available information. The third interpretation is made by showing a slice through the contour surface or a profile of concentration amounts along lines of interest within the field as illustrated by Figure 21. Numerous other interpretations are possible, but these are the most useful.

The foregoing discussion presents a glimpse of some considerations which must be specified when undertaking a modeling effort. These are explained in more detail through the actual case study discussed in the following

TABLE 6

Location of Samplers (See Figure 2)

Bag Sampler	Location
2	Barnette and Airport
3	Steese and College Road
4	Nordstrom
6	RCA Building
9	Co-op Drug Store
10	2nd Avenue
Continuous Sampler	
A	State Office Building
B	Borough Office Building

section. For a more complete description, the reader is again reminded to refer to the complete user's guide (Norton and Carlson, 1976).

AN ACTUAL POLLUTION EPISODE

Mathematical modeling of a complex environmental phenomena is a very difficult field of study, even for professionals who have had a great deal of experience. We have discussed several important aspects of the air quality problem in the Fairbanks area and some of the things which must be considered in modeling the phenomena. A method useful in gaining an understanding of both the actual situation and its simulation is analysis of a case study. A comprehensive case study also allows hidden questions to surface. However, although there are a number of valuable lessons to be learned, all of the many features of a specific air quality problem will not necessarily be present in the given situation. If the results are favorable, competence in the modeling activity is acquired and credibility is achieved.

The period of study is January 22, 1975. Although there are numerous episodes of severe carbon monoxide concentration each year, the chosen data provide the opportunity to examine a very serious occurrence. The plots in Figures 9 and 10 indicate very high values occurring several days which exceeded even the warning level of 30 ppm. The day was not at all unusual when compared with other days of the month. Several criteria were used in selecting January 22, 1975 for study. We had a set of traffic data provided by the Alaska Department of Highways, Fairbanks District, which was fairly accurate for that date. A more extensive set of data of a more scientific nature was available for the winter period of 1974-75, but the traffic data was somewhat uncertain (Swift, 1974). It also seemed more realistic to attempt to model a situation which must rely on the more usually available data. Because of the tremendous variations of carbon monoxide occurrence between the day and night periods, the attempted simulation should be a good test of the ACOSP model.

The input setup for the case study may be divided as follows: traffic, meteorology, and program bookkeeping.

The traffic input data is fairly straightforward. The primary traffic characteristics are given on the maps shown in Figures 7 and 8. The information relating to the traffic zones and arterials is explained in Tables 2 and 3. Each zone and arterial specified has a total number of vehicle miles, an average speed, a number of idle hours, and a number of cold starts for each day. This traffic data was distributed to the element network shown in Figures 5 and 6. If a traffic zone was covered by several elements, the traffic data was redistributed to the elements. Final distribution of the element emissions is given in the printout pages 6 and 7 (Appendix). The network shown in Figures 5 and 6 is not very efficient, as we had only triangular elements available. Therefore, we were not able to take advantage of either the quadrilateral elements in order to more closely match the traffic zones or the linear elements in order to match the arterial segments. Certain factors which convert the traffic data to carbon monoxide emissions are given in Table 4. These include values for alpha and beta, emissions per cold start, and emissions per hour of idle time.

The meteorology specification is next. We chose the values of a uniform north wind, from north to south, a low mixing height, and a diffusion coefficient as specified in Table 5. These values are somewhat hard to determine. The specification of the north wind came from the information provided by meteorological instrumentation at the airport (Figures 22 and 23). One difficulty is that most instruments have a threshold at which no movement takes place, therefore a low wind speed is not measured. With this factor in mind, these values were supplemented with some of the authors' own observations of a very low threshold, uniformly north wind throughout most inversion periods. The determination of the mixing height is much more difficult and is taken largely from observations of temperatures with elevation at the airport as shown in Figure 24. The mixing height of 3 meters, although extremely low, is likely and compares favorably with calculations from the previous winter of 4 to 6 meters (Swift, 1974). The

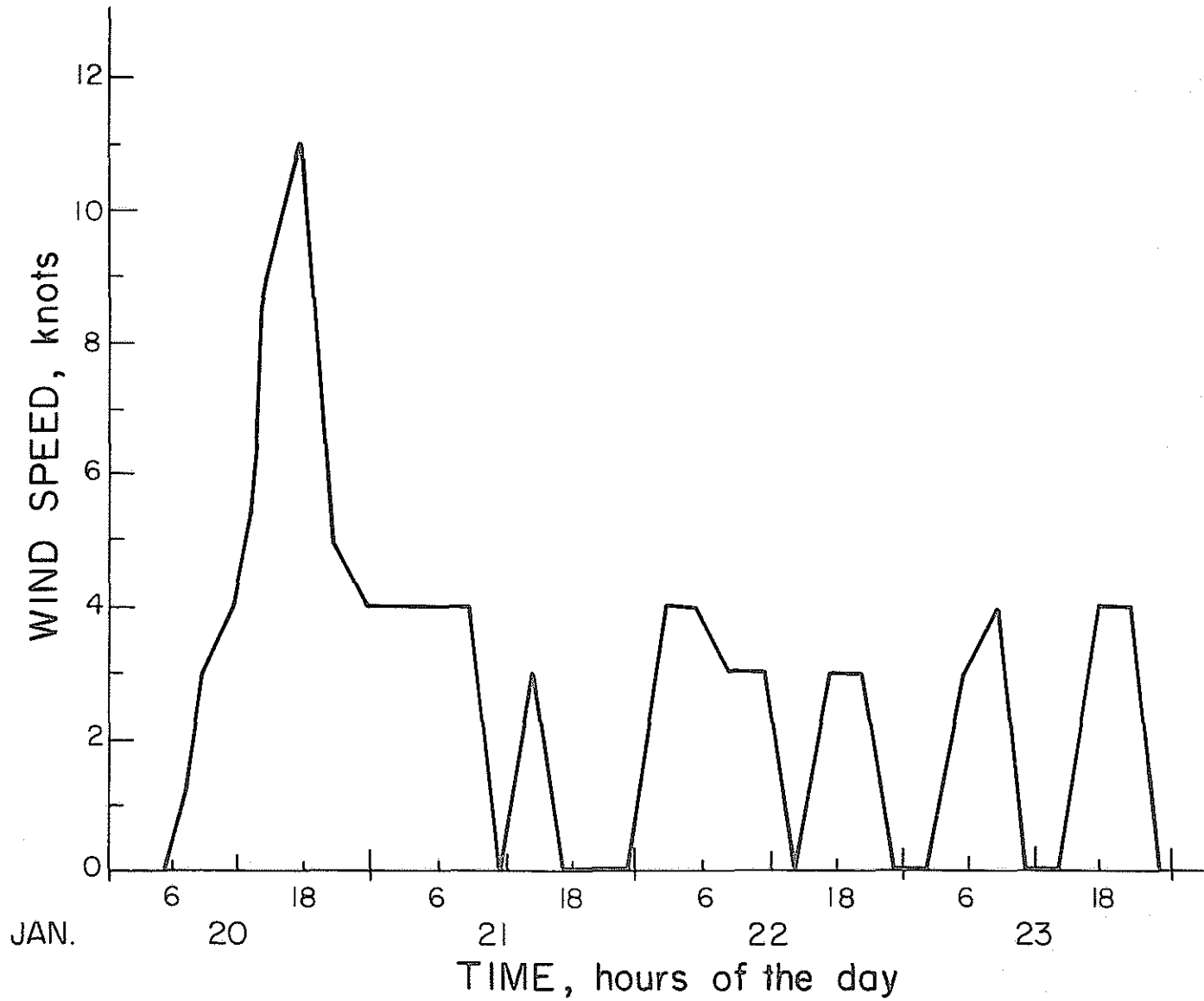


FIGURE 22: Wind speed versus time - meteorological instrumentation.

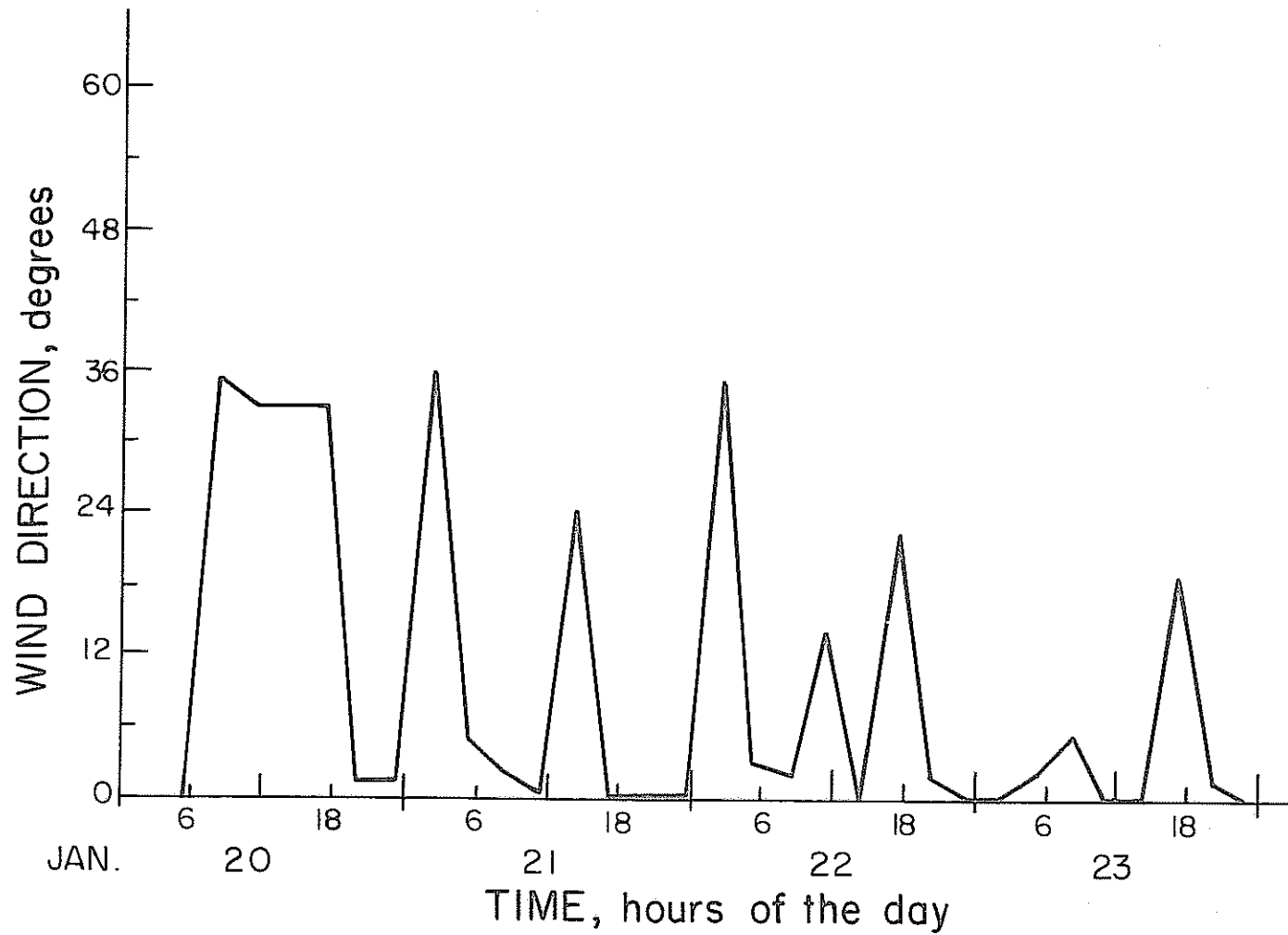


FIGURE 23: Wind direction (degrees) versus time.

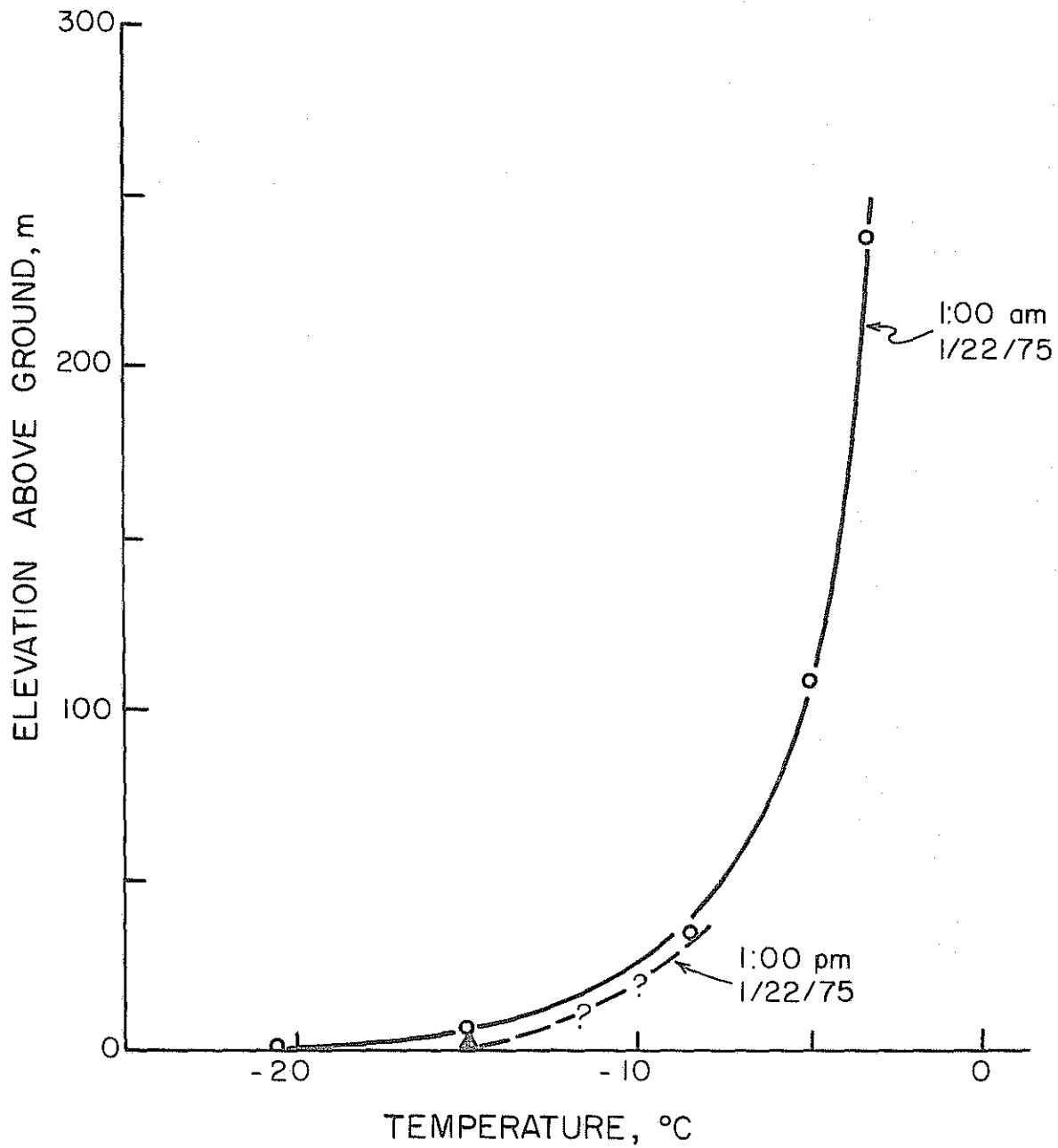


FIGURE 24: Plot of air temperature versus elevation on the morning and afternoon of January 22, 1975. A very low mixing depth is indicated.

diffusion coefficient is the most difficult parameter to estimate and was therefore subjected to some experimentation combining it with the wind speed and mixing height as it is very closely correlated to these values. Few literature references are based on the very steep inversions of cold regions. An estimate of the diffusion coefficient is given by the product of the mixing length and velocity which, in this case, would give us a value of $1.0 \text{ m}^2/\text{sec}$. The meteorological variables are summarized in Table 5.

The program bookkeeping data are fairly routine and include the length of simulation run, length of the time step and other parameters of interest. For this particular case study, we have chosen a run of 32 hours and a 1-hour time step. The printouts for each hour plus information on the input data are given in the appendix.

The results of the simulation run are given as carbon monoxide concentrations at each node for each hour. However, the values are somewhat difficult to interpret in that form and a number of auxiliary plots have been made which provide a more useful interpretation.

The first result is a comparison of the output from node 132 which is located approximately between the two continuous monitors at the Borough Office Building between First and Second Avenues and the State Office Building at the intersection of Barnette Street and Sixth Avenue. The three sets of data are shown in Figures 11-13. A comparison indicates very good results. Many of the important features of the actual concentration are faithfully simulated such as the peak concentration, the timing of the peak, and the rate of increase and decrease. One, of course, should not be disappointed that an exact reproduction has not occurred when we keep in mind the integration aspects of the modeling effort and the inaccuracies of the measurements. Another check has been made by comparing the concentrations predicted at various nodal points with that of the integrated bag samplers. The comparison, of course, is somewhat more difficult as only an 8-hour average is given for the time period of 10:00 a.m. to 6:00 p.m. However, the comparison will give some indication of the spatial accuracy of the model

computations. The predicted and measured values are shown in Figures 14-18. Generally the comparison is good. There are some discrepancies, especially with the downtown bag samplers as shown in Figure 16. The downtown bag sampler is the most difficult and complex situation to model. Nevertheless, the predicted results of the node points which straddle the bag sampling sites in the downtown area do bracket the measured values and a check has been made on the computational results. Another result (Figure 14) which is somewhat distorted is in that area in which the measurement is particularly sensitive to wind direction and the area next to the Fort Wainwright area for which no traffic data were made available.

In summary, the direct comparison of the model prediction to measured values indicate a reasonable fit has been made to the measured values and the model appears to be operating as it should.

Besides the direct comparisons shown, certain other interpretations are quite helpful. One is a contour plot of CO concentrations at the time when the highest concentration is indicated in the downtown area at node 132 (Figure 19). This plot indicates a predictable distribution pattern. One area of particular importance is the extremely high concentration immediately downwind of the primary business district and the very busy arterials of Cushman Street, Airport Way, and the Richardson Highway. A momentary concentration of nearly 90 parts per million is indicated. A similar contour plot has been made at the time of minimum concentration in the downtown area and shows a pervasive, very extensive low-level concentration throughout the entire area at all times (Figure 20).

Another interesting interpretation results from examination of carbon monoxide concentrations as they are related to distance along the north-south line drawn by Cushman Street as it proceeds southward from the Chena River. (Section A-A, Figure 6). The concentration builds up in the downtown and near-downtown area and then slowly moves out in a wave at the speed at which the wind carries it (Figure 21). The concentration is also diffused from the wave front as it moves downwind.

The results of the case study indicate a good simulation of one particular time period. The carbon monoxide concentration problem is widespread throughout the area and there is a potential for an extremely high concentration downwind from the busy business district and several heavily used arterials. Although this examination of an actual occurrence of January 22, 1975, has been useful in understanding the model, readers should be warned it is only one example and there is a need for more study. An extensive measurement effort is vital in order that a more complete description of the various meteorological variables and a more complete description of a concentration field may be provided.

The model now offers an opportunity to examine various potential planning and zoning alternatives with knowledge of potential CO levels in mind. It also may be used to evaluate traffic episode control devices and has a potential use as a forecasting tool.

SUMMARY

This report provides a brief description of the air quality problem in the Fairbanks area and attempts to offer a partial solution through a comprehensive computer modeling effort. A model (Atmospheric Carbon Monoxide Simulation Program or ACOSP) has been developed which appears to be valid for the Fairbanks area; it is easy to use and quite adaptable to a number of different situations. The basis for the model lies in first principles of mass continuity for conservative constituents and involves few empirical relationships. It is easy to set up for a given situation and is directly adaptable to a number of traffic and meteorological specifications. Most importantly, for the case study examined, it has compared well with field measurements, especially when considering the many assumptions made, the integrative nature of the model and the uncertainty in the concentration measurements.

The authors are not suggesting that the carbon monoxide problem in the Fairbanks area has been solved and there is no need for further work - quite

the opposite. The model only provides a very useful tool for examining the many facets of the complicated air quality problem in the Fairbanks area. Some suggested uses are indicated below.

For example, one can examine numerous planning and zoning alternatives as they affect traffic and parking. The effects of various kinds of parking controls, such as idling or use of warmed garages, can also be studied. A particularly useful application can be made when planning new traffic arterials and distribution of local traffic among the various traffic zones.

The model could also be used in forecasting serious air pollution episodes although, since a very small lead time is available, the model will probably have limited forecasting use until a much better determination is made of the mixing height and the velocity in the near-downtown area.

Examination of various episode controls such as blocking off certain traffic segments can be carried out with the model. These can now be tried out in a suitable fashion and the effects of various controls examined. Some type of consensus can then be reached to achieve the greatest amount of carbon monoxide reduction with the least amount of disruption to traffic and business patterns within the populated areas.

Some recommendations for future work are as follows. The carbon monoxide measurement program must be expanded to include more continuous measurements and a much wider aerial sampling. Of particular importance is examination of the possibly very high carbon monoxide concentration occurrences in the downwind area from the business district. A more extensive meteorological network should be established in a particular effort to acquire a better determination of mixing height and wind pattern. Also, there should be an effort to update the traffic data continuously as it is related to idling and cold starts modified by various parking developments. Arterials are, of course, important and can be updated easily through normal traffic studies. Most important, potential users must use the model, try it out under a wide variety of circumstances, and gain confidence in its results.

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APPENDIX
OUTPUT OF THE COMPUTER PROGRAM

MATHEMATICAL SIMULATION OF CARBON MONOXIDE DISTRIBUTION IN THE ATMOSPHERE
TWO DIMENSIONAL FINITE ELEMENT FOR HORIZONTAL PROBLEMS OF VARIABLE THICKNESS
INITIAL APPLICATION TO THE FAIRBANKS, ALASKA AIRSHED...

TEST DATA TO CHECK NORTON'S APRIL 28 CHANGES

NUMBER OF ELEMENTS	72
NUMBER OF B-C	13
DIFFUSION COEFFS	1
CORNER NODES	44
OUTPUT PRINT OPTION	1
LINES FOR CONTINUITY	0
TYPE OF VEL FIELD	0
TYPE OF INITIAL COND	0
REORDERING OPTION	2
LOGICAL UNIT(SCRATCH)	11
VELOCITY FIELD OPTION	0
DYNAMIC INPUT OPTION	0
VERTICAL DIST OPTION	0

X SCALE =	0.305
Y SCALE =	0.305
W SCALE =	1.000
U SCALE =	1.000
V SCALE =	1.000

UNITS CONVERSION IS 8.562E-04
EXTERNAL UNITS ARE PPM

TIME CONTROL AND VERTICAL DISTRIBUTION SPECS

TOTAL RUN TIME(HOURS)	32
PRINT INTERVAL(HOURS)	1
TIME STEP(HOURS)	1.00
VERT DIST HEIGHT(M)	0.
VERT DIST PARAMETER	0.

ELEMENT CHARACTERISTICS

NUMBER	X DIFFUSION (M2/SEC)	Y DIFFUSION (M2/SEC)
1	1.000E 00	1.000E 00

..... VELOCITIES AND BOUNDARY CONDITIONS ARE CONSTANT FOR THIS RUN

MATHEMATICAL SIMULATION OF CARBON MONOXIDE DISTRIBUTION IN THE ATMOSPHERE
 TWO DIMENSIONAL FINITE ELEMENT FOR HORIZONTAL PROBLEMS OF VARIABLE THICKNESS
 INITIAL APPLICATION TO THE FAIRBANKS, ALASKA AIRSHED...

TEST DATA TO CHECK NORTON'S APRIL 28 CHANGES

FIXED NODAL SPECIFICATIONS

NODE NUMBER	X-LOC (METERS)	Y-LOC (METERS)	HEIGHT (METERS)	NODAL ORDER	NODE NUMBER	X-LOC (METERS)	Y-LOC (METERS)	HEIGHT (METERS)	NODAL ORDER
1	57119.52	1201978.80	3.0	31	81	66522.60	1209926.45	3.0	35
2	57226.20	1205484.00	3.0	19	82	67627.50	1211107.56	3.0	82
3	57332.25	1208989.20	3.0	100	83	67779.90	1210939.92	3.0	25
4	57492.90	1214137.70	3.0	151	84	71262.24	1210437.00	3.0	36
5	57652.92	1219276.20	3.0	122	85	71551.80	1209972.19	3.0	98
6	59268.36	1202908.44	3.0	32	86	72382.38	1208105.28	3.0	26
7	60411.36	1206474.59	3.0	30	87	70744.08	1207891.92	3.0	27
8	63703.20	1210970.41	3.0	53	88	69448.68	1208074.80	3.0	14
9	60518.04	1209979.80	3.0	103	89	67448.68	1207922.41	3.0	13
10	60678.06	1215123.30	3.0	33	90	69783.96	1207175.64	3.0	39
11	61952.22	1216068.19	3.0	69	91	69806.82	1206436.50	3.0	155
12	62263.52	1212660.16	3.0	21	92	67955.64	1203975.23	3.0	76
13	65532.00	1216929.23	3.0	8	93	71323.20	1203731.41	3.0	156
14	64800.48	1220998.31	3.0	20	94	67360.80	1209187.31	3.0	75
15	61417.20	1203838.08	3.0	41	95	68176.14	1208722.50	3.0	137
16	63131.70	1204341.00	3.0	29	96	66675.00	1210497.95	3.0	138
17	62666.88	1205546.84	3.0	37	97	72717.66	1217325.48	3.0	109
18	62560.20	1207404.23	3.0	43	98	69936.36	1215176.64	3.0	73
19	63716.56	1206255.59	3.0	15	99	67360.80	1207259.45	3.0	108
20	63809.88	1208913.00	3.0	16	100	66522.60	1208044.31	3.0	86
21	64389.00	1209781.69	3.0	17	101	75331.32	1213866.00	3.0	107
22	65112.90	1210818.00	3.0	18	102	67322.70	1206512.70	3.0	127
23	64983.36	1211915.28	3.0	102	103	66484.50	1207297.56	3.0	126
24	66393.06	1211762.98	3.0	49	104	69456.30	1208242.44	3.0	131
25	67497.96	1212204.84	3.0	99	105	68153.28	1208257.69	3.0	132
26	68099.94	1214018.41	3.0	152	106	68199.00	1209187.31	3.0	60
27	67368.42	1218087.48	3.0	48	107	71231.76	1208135.77	3.0	133
28	67452.24	1220891.64	3.0	129	108	72473.82	1207236.59	3.0	135
29	64846.20	1204843.92	3.0	124	109	73479.66	1207008.00	3.0	153
30	65181.48	1206703.20	3.0	150	110	75445.62	1206596.52	3.0	134
31	65219.58	1207449.95	3.0	105	111	75392.28	1205529.72	3.0	59
32	65219.58	1207556.64	3.0	123	112	71369.92	1205064.91	3.0	45
33	64495.68	1207724.28	3.0	77	113	79354.68	1209507.36	3.0	145
34	66522.60	1210665.59	3.0	44	114	81351.12	1213896.48	3.0	84
35	68732.40	1211549.52	3.0	143	115	78341.22	1213881.23	3.0	46
36	69334.38	1213363.08	3.0	42	116	75834.24	1212822.06	3.0	58
37	65646.30	1205697.36	3.0	63	117	74935.08	1209926.45	3.0	146
38	70104.00	1220784.95	3.0	81	118	74432.16	1210970.41	3.0	40
39	61226.70	1220137.27	3.0	34	119	72428.10	1209903.59	3.0	57
40	71536.56	1210848.48	3.0	62	120	72397.62	1210124.58	3.0	56
41	65793.70	1208425.31	3.0	22	121	73228.20	1211153.28	3.0	147
42	65798.70	1208870.14	3.0	1	122	66522.60	1208257.69	3.0	121
43	64381.38	1205849.77	3.0	6	123	67337.94	1208257.69	3.0	55
44	66522.60	1209187.31	3.0	7	124	67337.94	1208105.28	3.0	70
45	69197.22	1209713.09	3.0	24	125	70759.32	1208227.20	3.0	101
46	69044.82	1210383.66	3.0	12	126	70987.92	1208013.84	3.0	54
47	67479.16	1208707.27	3.0	23	127	71323.20	1207267.08	3.0	97
48	68153.28	1207952.88	3.0	11	128	71079.36	1207145.16	3.0	38
49	68199.00	1206474.59	3.0	5	129	67337.94	1207998.59	3.0	52

50	66415.92	1204409.58	3.0	10	130	70751.70	1208059.56	3.0	28
51	72610.98	1220784.95	3.0	3	131	70995.54	1208181.48	3.0	158
52	70020.18	1217980.80	3.0	9	132	71010.78	1208602.20	3.0	142
53	66446.40	1206550.80	3.0	4	133	70774.56	1208653.92	3.0	111
54	72633.84	1214521.31	3.0	2	134	71178.42	1209088.27	3.0	110
55	71542.28	1213164.95	3.0	92	135	69494.40	1209133.98	3.0	141
56	70736.46	1213012.56	3.0	64	136	71349.40	1208615.81	3.0	144
57	70134.48	1211199.00	3.0	50	137	72374.76	1204836.30	3.0	117
58	69997.32	1210993.27	3.0	65	138	72420.48	1206169.80	3.0	74
59	71567.04	1209045.88	3.0	93	139	78318.36	1220716.38	3.0	136
60	70789.80	1209080.64	3.0	66	140	81434.94	1217272.14	3.0	159
61	71414.64	1206398.41	3.0	112	141	76847.70	1208448.19	3.0	72
62	65798.70	1209629.28	3.0	61	142	77358.24	1205118.23	3.0	119
63	66522.60	1205659.27	3.0	91	143	66522.60	1208722.50	3.0	118
64	68092.32	1205224.92	3.0	90	144	76337.16	1211778.13	3.0	71
65	69654.42	1203853.31	3.0	128	145	71414.64	1209766.44	3.0	116
66	69761.10	1205103.00	3.0	87	146	71399.40	1210642.73	3.0	85
67	75117.96	1220784.95	3.0	89	147	72382.38	1211000.88	3.0	120
68	75224.64	1217375.48	3.0	88	148	78844.14	1212837.30	3.0	154
69	65074.80	1208592.95	3.0	130	149	78425.04	1217256.91	3.0	148
70	74279.76	1212509.64	3.0	125	150	68153.28	1208105.28	3.0	114
71	74310.24	1212228.66	3.0	104	151	66522.60	1208151.00	3.0	115
72	73289.16	1210711.31	3.0	47	152	68176.14	1207213.73	3.0	140
73	73533.00	1208074.80	3.0	106	153	68808.60	1209705.48	3.0	157
74	72550.02	1208585.34	3.0	95	154	73258.68	1210932.30	3.0	149
75	73426.32	1205941.20	3.0	94	155	72321.42	1203449.45	3.0	139
76	73319.64	1203167.52	3.0	80	156	73372.98	1204554.36	3.0	67
77	67337.94	1203722.50	3.0	79	157	81518.76	1220647.80	3.0	68
78	67513.20	1209758.81	3.0	96	158	75338.94	1204142.88	3.0	51
79	66527.40	1210330.31	3.0	78	159	73411.08	1209393.06	3.0	113
80	66675.00	1209758.81	3.0	83					

MATHEMATICAL SIMULATION OF CARBON MONOXIDE DISTRIBUTION IN THE ATMOSPHERE
TWO DIMENSIONAL FINITE ELEMENT FOR HORIZONTAL PROBLEMS OF VARIABLE THICKNESS
INITIAL APPLICATION TO THE FAIRBANKS, ALASKA AIRSHED...

TEST DATA TO CHECK NORTON'S APRIL 28 CHANGES

NODAL CONNECTIONS AND MATERIAL NUMBERS....

ELEMENT	NODES(COUNTERCLOCKWISE)								TYPE	AREA(M2)	ELEMENT	NODES(COUNTERCLOCKWISE)								TYPE	AREA(M2)
1	1	7	8	9	3	2	0	0	1	22117910.00	37	59	145	84	46	79	45	0	0	1	2990096.34
2	3	9	8	10	5	4	0	0	1	32448711.25	38	106	135	60	153	79	78	0	0	1	1407493.20
3	8	23	12	11	5	10	0	0	1	16349582.75	39	125	133	60	135	106	47	0	0	1	1107168.41
4	8	22	34	24	12	23	0	0	1	3054188.63	40	105	104	125	47	106	95	0	0	1	1212044.05
5	69	62	34	22	8	21	0	0	1	3142440.57	41	87	130	125	104	105	88	0	0	1	437110.49
6	15	17	19	20	8	18	0	0	1	5464030.75	42	48	89	87	88	105	150	0	0	1	394826.99
7	1	6	15	18	8	7	0	0	1	13201052.50	43	61	128	87	89	48	90	0	0	1	1914274.11
8	15	16	29	43	19	17	0	0	1	3916565.72	44	49	91	61	90	48	152	0	0	1	2375068.66
9	29	37	53	30	19	43	0	0	1	2402936.59	45	93	112	61	91	49	66	0	0	1	4291539.56
10	19	30	53	103	100	31	0	0	1	1900776.94	46	92	65	93	66	49	64	0	0	1	4196910.00
11	19	31	100	151	122	32	0	0	1	279031.81	47	101	68	67	51	38	97	0	0	1	17345648.25
12	19	32	122	41	69	33	0	0	1	1451831.80	48	101	149	157	139	67	68	0	0	1	22128753.50
13	19	33	69	21	8	20	0	0	1	2563313.06	49	101	115	114	140	157	149	0	0	1	20318285.00
14	69	42	44	81	34	62	0	0	1	1070127.14	50	144	148	114	115	101	116	0	0	1	6299619.94
15	69	41	122	143	44	42	0	0	1	672970.21	51	73	117	144	116	101	118	0	0	1	4789869.25
16	12	13	14	39	5	11	0	0	1	30343728.00	52	73	118	101	71	72	159	0	0	1	3076702.13
17	12	26	98	27	14	13	0	0	1	16639636.00	53	72	71	101	70	121	154	0	0	1	547441.30
18	35	36	98	26	12	25	0	0	1	5266453.38	54	59	119	72	154	121	120	0	0	1	429799.46
19	34	82	35	25	12	24	0	0	1	2539277.53	55	59	120	121	147	40	25	0	0	1	1467028.78
20	79	83	35	32	34	96	0	0	1	505164.00	56	73	159	72	119	59	74	0	0	1	2467144.16
21	44	94	106	78	79	80	0	0	1	958062.80	57	107	86	73	74	59	136	0	0	1	1114749.78
22	105	95	106	94	44	77	0	0	1	779211.24	58	107	136	59	134	60	132	0	0	1	370569.71
23	122	123	105	77	44	143	0	0	1	757961.05	59	125	131	107	132	60	133	0	0	1	202992.84
24	48	150	105	123	122	124	0	0	1	248525.82	60	87	126	107	131	125	130	0	0	1	79896.81
25	100	129	48	124	122	151	0	0	1	173973.31	61	61	127	107	126	87	128	0	0	1	445937.11
26	49	152	48	129	100	99	0	0	1	1203211.59	62	61	108	73	86	107	127	0	0	1	1993477.61
27	53	102	49	99	100	103	0	0	1	1311662.00	63	61	138	75	109	73	108	0	0	1	2170440.50
28	49	102	53	37	29	63	0	0	1	1556696.00	64	93	137	75	138	61	112	0	0	1	2703479.22
29	92	64	49	63	29	50	0	0	1	4015983.06	65	93	155	76	156	75	137	0	0	1	2799328.72
30	98	52	38	28	14	27	0	0	1	14889782.25	66	76	158	142	111	75	156	0	0	1	5496835.63
31	98	54	101	97	38	52	0	0	1	15238225.75	67	75	111	142	110	73	109	0	0	1	4238456.81
32	121	70	101	54	98	55	0	0	1	8695709.50	68	44	80	79	96	34	81	0	0	1	225290.63
33	40	147	121	55	98	56	0	0	1	3904701.94	69	142	141	144	117	73	110	0	0	1	11228387.63
34	35	57	40	56	98	36	0	0	1	5507525.56	70	142	113	114	148	144	141	0	0	1	17777686.00
35	84	146	40	57	35	58	0	0	1	673075.65	71	59	85	40	146	84	145	0	0	1	246657.46
36	79	46	84	58	35	83	0	0	1	2601838.50	72	60	134	59	45	79	153	0	0	1	515805.28

SUMMARY OF INPUT DATA USED TO CALCULATE CARBON MONOXIDE LOADS
FOR INPUT TO THE FAIRBANKS AIR QUALITY MCMODEL...

TEST DATA TO CHECK NORTON'S APRIL 28 CHANGES

GM/HR AT IDLE	600.00
GM/COLDSTART	340.00
SPEED EMISSION FACTOR ALPHA	200.00
SPEED EMISSION FACTOR BETA	0.55

FRACTION OF DAILY CO LOAD FOR TRAVELING, IDLING, STARTING AND OTHER SOURCES.....

HOUR	TRAVEL	IDLING	STARTING	OTHER
1	0.020	0.	0.	0.
2	0.010	0.	0.	0.
3	0.010	0.	0.	0.
4	0.010	0.	0.	0.
5	0.010	0.010	0.010	0.
6	0.010	0.020	0.030	0.
7	0.020	0.040	0.050	0.
8	0.050	0.070	0.090	0.
9	0.050	0.090	0.080	0.
10	0.040	0.080	0.080	0.
11	0.050	0.060	0.060	0.
12	0.060	0.060	0.050	0.
13	0.070	0.050	0.080	0.
14	0.070	0.040	0.050	0.
15	0.070	0.040	0.040	0.
16	0.070	0.060	0.050	0.
17	0.080	0.080	0.080	0.
18	0.080	0.090	0.090	0.
19	0.070	0.070	0.060	0.
20	0.050	0.060	0.040	0.
21	0.040	0.040	0.030	0.
22	0.040	0.020	0.020	0.
23	0.030	0.010	0.010	0.
24	0.020	0.010	0.	0.

SUMMARY OF INPUT DATA USED TO CALCULATE CARBON MONOXIDE LOADS
FOR INPUT TO THE FAIRBANKS AIR QUALITY MODEL...

TEST DATA TO CHECK NORTON'S APRIL 28 CHANGES

DAILY MASS INPUTS OF CO FOR EACH ELEMENT FROM EACH SOURCE
THE LOAD INPUT UNITS ARE (GM/DAY/ELEMENT)...

NUMBER ELEMENT	.....DATA INPUTS.....					.....CALCULATED CO EMISSIONS.....					CO LOAD (GM/M2)
	MILES (DAY)	SPEED (MPH)	IDLING (H/DY)	CLD STS (DAY)	OTHER (DAY)	TRAVEL (GM/DY)	IDLING (GM/DY)	STARTS (GM/DY)	OTHER (GM/DY)	TOTAL (GM/DY)	
1	37315.0	43.0	83.0	528.0	0.	942987.2	52800.0	179520.0	0.	1175307.	0.05
2	15564.0	45.0	81.0	484.0	0.	383605.1	48600.0	164560.0	0.	596765.	0.02
3	2532.0	20.0	422.0	2532.0	0.	97482.6	253200.0	860880.0	0.	1211563.	0.07
4	21098.0	46.0	380.0	2282.0	0.	513753.1	228000.0	775880.0	0.	1517633.	0.50
5	25882.0	35.0	63.0	379.0	0.	732471.0	37800.0	128860.0	0.	899131.	0.29
6	1609.0	20.0	335.0	2011.0	0.	61946.9	201000.0	683740.0	0.	946687.	0.17
7	1302.0	40.0	44.0	264.0	0.	34238.0	26400.0	89760.0	0.	150398.	0.01
8	1547.0	20.0	258.0	1547.0	0.	59559.9	154800.0	525980.0	0.	740340.	0.19
9	1547.0	20.0	258.0	1547.0	0.	59559.9	154800.0	525980.0	0.	740340.	0.31
10	1547.0	20.0	258.0	1547.0	0.	59559.9	154800.0	525980.0	0.	740340.	0.39
11	63850.0	40.0	0.	0.	0.	1679027.9	0.	0.	0.	1679028.	6.04
12	63850.0	40.0	0.	0.	0.	1679027.9	0.	0.	0.	1679028.	1.16
13	1516.0	20.0	126.0	758.0	0.	58366.4	75600.0	257720.0	0.	391686.	0.15
14	758.0	20.0	63.0	379.0	0.	29183.2	37800.0	128860.0	0.	195843.	0.18
15	53760.0	42.0	0.	0.	0.	1376265.3	0.	0.	0.	1376265.	2.05
16	1304.0	25.0	54.0	326.0	0.	44405.9	32400.0	110840.0	0.	187646.	0.01
17	18244.0	38.0	75.0	448.0	0.	509708.8	45000.0	152320.0	0.	707029.	0.04
18	9120.0	46.0	125.0	750.0	0.	222079.3	75000.0	255000.0	0.	552079.	0.10
19	150.0	25.0	62.0	375.0	0.	5108.0	37200.0	127500.0	0.	169808.	0.07
20	35165.0	35.0	0.	0.	0.	951173.3	0.	0.	0.	951173.	1.88
21	21826.0	36.0	0.	0.	0.	608187.9	0.	0.	0.	608188.	0.63
22	1190.0	20.0	198.0	1190.0	0.	45815.3	118800.0	404600.0	0.	569215.	0.73
23	1190.0	20.0	198.0	1190.0	0.	45815.3	118800.0	404600.0	0.	569215.	0.75
24	1980.0	40.0	66.0	396.0	0.	52067.0	39600.0	134640.0	0.	226307.	0.91
25	1980.0	40.0	66.0	396.0	0.	52067.0	39600.0	134640.0	0.	226307.	1.30
26	747.0	25.0	124.0	747.0	0.	25438.0	74400.0	253980.0	0.	353818.	0.29
27	747.0	25.0	124.0	747.0	0.	25438.0	74400.0	253980.0	0.	353818.	0.27
28	159.0	25.0	13.0	80.0	0.	5414.5	7800.0	27200.0	0.	40415.	0.03
29	159.0	25.0	13.0	80.0	0.	5414.5	7800.0	27200.0	0.	40415.	0.01
30	448.0	25.0	75.0	448.0	0.	15256.0	45000.0	152320.0	0.	212576.	0.01
31	12108.0	50.0	99.0	592.0	0.	281623.5	59400.0	201280.0	0.	542304.	0.04
32	12526.0	50.0	171.0	1024.0	0.	291345.9	102600.0	348160.0	0.	742106.	0.09
33	1024.0	25.0	171.0	1024.0	0.	34870.9	102600.0	348160.0	0.	485631.	0.12
34	1174.0	25.0	233.0	1399.0	0.	39978.9	139800.0	475660.0	0.	655439.	0.12
35	59670.0	35.0	0.	0.	0.	1688684.9	0.	0.	0.	1688685.	2.51
36	36209.0	42.0	876.0	5256.0	0.	926956.6	525600.0	1787040.0	0.	3239597.	1.25
37	19405.0	32.0	464.0	2785.0	0.	576914.1	278400.0	946900.0	0.	1802214.	0.60
38	28000.0	38.0	0.	0.	0.	757368.2	0.	0.	0.	757368.	0.54
39	4077.0	15.0	1133.0	6795.0	0.	183874.1	679800.0	2310300.0	0.	3173974.	2.87
40	1393.0	15.0	387.0	2321.0	0.	62824.8	232200.0	789140.0	0.	1084165.	0.89

SUMMARY OF INPUT DATA USED TO CALCULATE CARBON MONOXIDE LOADS
FOR INPUT TO THE FAIRBANKS AIR QUALITY MMODEL...

TEST DATA TO CHECK NORTON'S APRIL 28 CHANGES

DAILY MASS INPUTS OF C O FOR EACH ELEMENT FROM EACH SOURCE
THE LOAD INPUT UNITS ARE (GM/DAY/ELEMENT)...

NUMBER ELEMENT	.....DATA INPUTS.....					.....CALCULATED CO EMISSIONS.....					CO LOAD (GM/M2)
	MILES (DAY)	SPEED (MPH)	IDLING (H/DY)	CLD STS (DAY)	OTHER (DAY)	TRAVEL (GM/DY)	IDLING (GM/DY)	STARTS (GM/DY)	OTHER (GM/DY)	TOTAL (GM/DY)	
41	2117.0	20.0	294.0	1764.0	0.	81505.0	176400.0	599760.0	0.	857665.	1.96
42	163.0	20.0	69.0	406.0	0.	6275.5	40800.0	138040.0	0.	185116.	0.47
43	7311.0	16.0	1737.0	10421.0	0.	318229.8	1042200.0	3543140.0	0.	4903570.	2.56
44	17447.0	45.0	135.0	813.0	0.	430015.3	81000.0	276420.0	0.	787435.	0.33
45	328.0	20.0	91.0	547.0	0.	12628.1	54600.0	185980.0	0.	253208.	0.06
46	32750.0	45.0	91.0	547.0	0.	807187.5	54600.0	185980.0	0.	1047768.	0.25
47	1776.0	25.0	99.0	592.0	0.	60479.2	59400.0	201280.0	0.	321159.	0.02
48	56552.0	42.0	72.0	429.0	0.	1447741.0	43200.0	145860.0	0.	1636801.	0.07
49	1287.0	25.0	72.0	429.0	0.	43827.0	43200.0	145860.0	0.	232887.	0.01
50	185.0	25.0	31.0	185.0	0.	6299.9	18600.0	62900.0	0.	87800.	0.01
51	92.0	25.0	15.0	92.0	0.	3132.9	9000.0	31280.0	0.	43413.	0.01
52	92.0	25.0	15.0	92.0	0.	3132.9	9000.0	31280.0	0.	43413.	0.01
53	59570.0	44.0	0.	0.	0.	1486478.5	0.	0.	0.	1486478.	2.72
54	18216.0	30.0	0.	0.	0.	561133.7	0.	0.	0.	561134.	1.31
55	47151.0	36.0	0.	0.	0.	1313876.5	0.	0.	0.	1313876.	0.88
56	19522.0	23.0	1662.0	9970.0	0.	695991.6	997200.0	3389800.0	0.	5082992.	2.06
57	1178.0	15.0	491.0	2945.0	0.	53128.2	294600.0	1001300.0	0.	1349028.	1.21
58	2982.0	15.0	1242.0	7454.0	0.	134489.2	745200.0	2534360.0	0.	3414049.	9.21
59	2982.0	15.0	1242.0	7454.0	0.	134489.2	745200.0	2534360.0	0.	3414049.	16.82
60	2211.0	15.0	921.0	5527.0	0.	99716.9	552600.0	1879180.0	0.	2531497.	31.68
61	64440.0	25.0	113.0	10206.0	0.	2194413.8	67800.0	3470040.0	0.	5732254.	12.85
62	36741.0	45.0	244.0	10236.0	0.	905553.5	146400.0	3480240.0	0.	4532193.	2.27
63	2901.0	35.0	140.0	840.0	0.	82099.5	84000.0	285600.0	0.	451699.	0.21
64	835.0	25.0	139.0	835.0	0.	28434.8	83400.0	283900.0	0.	395735.	0.15
65	835.0	25.0	139.0	835.0	0.	28434.8	83400.0	283900.0	0.	395735.	0.14
66	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
67	134949.0	53.0	140.0	840.0	0.	3039820.5	84000.0	285600.0	0.	3409421.	0.80
68	5700.0	46.0	0.	0.	0.	138799.5	0.	0.	0.	138800.	0.62
69	2901.0	35.0	140.0	840.0	0.	82099.5	84000.0	285600.0	0.	451699.	0.04
70	2901.0	35.0	140.0	840.0	0.	82099.5	84000.0	285600.0	0.	451699.	0.03
71	11600.0	40.0	0.	0.	0.	289260.9	0.	0.	0.	289261.	1.17
72	1114.0	20.0	464.0	2785.0	0.	42889.3	278400.0	946900.0	0.	1268189.	2.46

...SETUP CALL FOR C O ROUTING...

...NUMBER OF EQUATIONS IS 146 ...TOTAL STORAGE IS 8906

MATHEMATICAL SIMULATION OF CARBON MONOXIDE DISTRIBUTION IN THE ATMOSPHERE
 TWO DIMENSIONAL FINITE ELEMENT FOR HORIZONTAL PROBLEMS OF VARIABLE THICKNESS
 INITIAL APPLICATION TO THE FAIRBANKS, ALASKA AIRSHED...

TEST DATA TO CHECK NORTON'S APRIL 28 CHANGES

INITIAL CONDITIONS

...CONCENTRATIONS ARE MEAN VERTICAL VALUES...

... OUTPUT FOR NODES				... THE SYMBOL * DENOTES A SPECIFIED VALUE ...											
NODF	CONC	X-VEL	Y-VEL	NODE	CONC	X-VEL	Y-VEL	NODE	CONC	X-VEL	Y-VEL	NODE	CONC	X-VEL	Y-VEL
NUM	PPM	M/SEC	M/SEC	NUM	PPM	M/SEC	M/SEC	NUM	PPM	M/SEC	M/SEC	NUM	PPM	M/SEC	M/SEC
1	0.	*	0.	41	4.00	0.	-0.10	81	4.00	0.	-0.10	121	4.00	0.	-0.10
2	0.	*	0.	42	4.00	0.	-0.10	82	4.00	0.	-0.10	122	4.00	0.	-0.10
3	0.	*	0.	43	4.00	0.	-0.10	83	4.00	0.	-0.10	123	4.00	0.	-0.10
4	0.	*	0.	44	4.00	0.	-0.10	84	4.00	0.	-0.10	124	4.00	0.	-0.10
5	0.	*	0.	45	4.00	0.	-0.10	85	4.00	0.	-0.10	125	4.00	0.	-0.10
6	4.00	0.	-0.10	46	4.00	0.	-0.10	86	4.00	0.	-0.10	126	4.00	0.	-0.10
7	4.00	0.	-0.10	47	4.00	0.	-0.10	87	4.00	0.	-0.10	127	4.00	0.	-0.10
8	4.00	0.	-0.10	48	4.00	0.	-0.10	88	4.00	0.	-0.10	128	4.00	0.	-0.10
9	4.00	0.	-0.10	49	4.00	0.	-0.10	89	4.00	0.	-0.10	129	4.00	0.	-0.10
10	4.00	0.	-0.10	50	4.00	0.	-0.10	90	4.00	0.	-0.10	130	4.00	0.	-0.10
11	4.00	0.	-0.10	51	0.	*	0.	91	4.00	0.	-0.10	131	4.00	0.	-0.10
12	4.00	0.	-0.10	52	4.00	0.	-0.10	92	4.00	0.	-0.10	132	4.00	0.	-0.10
13	4.00	0.	-0.10	53	4.00	0.	-0.10	93	4.00	0.	-0.10	133	4.00	0.	-0.10
14	0.	*	0.	54	4.00	0.	-0.10	94	4.00	0.	-0.10	134	4.00	0.	-0.10
15	4.00	0.	-0.10	55	4.00	0.	-0.10	95	4.00	0.	-0.10	135	4.00	0.	-0.10
16	4.00	0.	-0.10	56	4.00	0.	-0.10	96	4.00	0.	-0.10	136	4.00	0.	-0.10
17	4.00	0.	-0.10	57	4.00	0.	-0.10	97	4.00	0.	-0.10	137	4.00	0.	-0.10
18	4.00	0.	-0.10	58	4.00	0.	-0.10	98	4.00	0.	-0.10	138	4.00	0.	-0.10
19	4.00	0.	-0.10	59	4.00	0.	-0.10	99	4.00	0.	-0.10	139	0.	*	0.
20	4.00	0.	-0.10	60	4.00	0.	-0.10	100	4.00	0.	-0.10	140	4.00	0.	-0.10
21	4.00	0.	-0.10	61	4.00	0.	-0.10	101	4.00	0.	-0.10	141	4.00	0.	-0.10
22	4.00	0.	-0.10	62	4.00	0.	-0.10	102	4.00	0.	-0.10	142	4.00	0.	-0.10
23	4.00	0.	-0.10	63	4.00	0.	-0.10	103	4.00	0.	-0.10	143	4.00	0.	-0.10
24	4.00	0.	-0.10	64	4.00	0.	-0.10	104	4.00	0.	-0.10	144	4.00	0.	-0.10
25	4.00	0.	-0.10	65	4.00	0.	-0.10	105	4.00	0.	-0.10	145	4.00	0.	-0.10
26	4.00	0.	-0.10	66	4.00	0.	-0.10	106	4.00	0.	-0.10	146	4.00	0.	-0.10
27	4.00	0.	-0.10	67	0.	*	0.	107	4.00	0.	-0.10	147	4.00	0.	-0.10
28	0.	*	0.	68	4.00	0.	-0.10	108	4.00	0.	-0.10	148	4.00	0.	-0.10
29	4.00	0.	-0.10	69	4.00	0.	-0.10	109	4.00	0.	-0.10	149	4.00	0.	-0.10
30	4.00	0.	-0.10	70	4.00	0.	-0.10	110	4.00	0.	-0.10	150	4.00	0.	-0.10
31	4.00	0.	-0.10	71	4.00	0.	-0.10	111	4.00	0.	-0.10	151	4.00	0.	-0.10
32	4.00	0.	-0.10	72	4.00	0.	-0.10	112	4.00	0.	-0.10	152	4.00	0.	-0.10
33	4.00	0.	-0.10	73	4.00	0.	-0.10	113	4.00	0.	-0.10	153	4.00	0.	-0.10
34	4.00	0.	-0.10	74	4.00	0.	-0.10	114	4.00	0.	-0.10	154	4.00	0.	-0.10
35	4.00	0.	-0.10	75	4.00	0.	-0.10	115	4.00	0.	-0.10	155	4.00	0.	-0.10
36	4.00	0.	-0.10	76	4.00	0.	-0.10	116	4.00	0.	-0.10	156	4.00	0.	-0.10
37	4.00	0.	-0.10	77	4.00	0.	-0.10	117	4.00	0.	-0.10	157	0.	*	0.
38	0.	*	0.	78	4.00	0.	-0.10	118	4.00	0.	-0.10	158	4.00	0.	-0.10
39	0.	*	0.	79	4.00	0.	-0.10	119	4.00	0.	-0.10	159	4.00	0.	-0.10
40	4.00	0.	-0.10	80	4.00	0.	-0.10	120	4.00	0.	-0.10				

MATHEMATICAL SIMULATION OF CARBON MONOXIDE DISTRIBUTION IN THE ATMOSPHERE
TWO DIMENSIONAL FINITE ELEMENT FOR HORIZONTAL PROBLEMS OF VARIABLE THICKNESS
INITIAL APPLICATION TO THE FAIRBANKS, ALASKA AIRSHED...

TEST DATA TO CHECK NORTON'S APRIL 28 CHANGES

...RESULTS AFTER 1 HOURS OF DYNAMIC SIMULATION...

...CONCENTRATIONS ARE MEAN VERTICAL VALUES...

... OUTPUT FOR NODES 1 TO 159 ... THE SYMBOL * DENOTES A SPECIFIED VALUE ...

NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC
1	0. *	0.	-0.10	41	4.46	0.	-0.10	81	3.98	0.	-0.10	121	4.06	0.	-0.10
2	0. *	0.	-0.10	42	4.12	0.	-0.10	82	4.01	0.	-0.10	122	4.26	0.	-0.10
3	0. *	0.	-0.10	43	4.03	0.	-0.10	83	4.18	0.	-0.10	123	4.00	0.	-0.10
4	0. *	0.	-0.10	44	4.10	0.	-0.10	84	4.44	0.	-0.10	124	3.90	0.	-0.10
5	0. *	0.	-0.10	45	4.05	0.	-0.10	85	4.32	0.	-0.10	125	4.21	0.	-0.10
6	3.83	0.	-0.10	46	4.11	0.	-0.10	86	3.99	0.	-0.10	126	5.21	0.	-0.10
7	3.98	0.	-0.10	47	3.99	0.	-0.10	87	4.07	0.	-0.10	127	4.50	0.	-0.10
8	4.06	0.	-0.10	48	4.16	0.	-0.10	88	4.13	0.	-0.10	128	4.66	0.	-0.10
9	4.01	0.	-0.10	49	4.04	0.	-0.10	89	3.82	0.	-0.10	129	3.93	0.	-0.10
10	3.95	0.	-0.10	50	3.99	0.	-0.10	90	4.00	0.	-0.10	130	3.91	0.	-0.10
11	3.71	0.	-0.10	51	0. *	0.	-0.10	91	4.03	0.	-0.10	131	3.77	0.	-0.10
12	4.31	0.	-0.10	52	3.61	0.	-0.10	92	4.03	0.	-0.10	132	4.34	0.	-0.10
13	3.76	0.	-0.10	53	4.03	0.	-0.10	93	4.01	0.	-0.10	133	4.10	0.	-0.10
14	0. *	0.	-0.10	54	4.23	0.	-0.10	94	4.20	0.	-0.10	134	4.04	0.	-0.10
15	4.13	0.	-0.10	55	3.99	0.	-0.10	95	4.10	0.	-0.10	135	4.13	0.	-0.10
16	4.00	0.	-0.10	56	4.02	0.	-0.10	96	4.43	0.	-0.10	136	4.15	0.	-0.10
17	3.99	0.	-0.10	57	4.03	0.	-0.10	97	3.70	0.	-0.10	137	4.02	0.	-0.10
18	4.11	0.	-0.10	58	4.27	0.	-0.10	98	4.30	0.	-0.10	138	3.99	0.	-0.10
19	4.09	0.	-0.10	59	4.17	0.	-0.10	99	4.03	0.	-0.10	139	0. *	0.	-0.10
20	3.99	0.	-0.10	60	3.92	0.	-0.10	100	4.54	0.	-0.10	140	3.81	0.	-0.10
21	4.07	0.	-0.10	61	4.28	0.	-0.10	101	4.36	0.	-0.10	141	4.01	0.	-0.10
22	4.08	0.	-0.10	62	4.05	0.	-0.10	102	4.02	0.	-0.10	142	4.03	0.	-0.10
23	4.16	0.	-0.10	63	3.99	0.	-0.10	103	4.07	0.	-0.10	143	4.29	0.	-0.10
24	4.05	0.	-0.10	64	4.04	0.	-0.10	104	4.07	0.	-0.10	144	4.04	0.	-0.10
25	4.02	0.	-0.10	65	4.07	0.	-0.10	105	3.74	0.	-0.10	145	4.23	0.	-0.10
26	4.23	0.	-0.10	66	4.02	0.	-0.10	106	4.18	0.	-0.10	146	4.53	0.	-0.10
27	3.68	0.	-0.10	67	0. *	0.	-0.10	107	3.87	0.	-0.10	147	4.04	0.	-0.10
28	0. *	0.	-0.10	68	3.63	0.	-0.10	108	4.00	0.	-0.10	148	4.01	0.	-0.10
29	4.03	0.	-0.10	69	4.07	0.	-0.10	109	4.21	0.	-0.10	149	3.69	0.	-0.10
30	4.09	0.	-0.10	70	4.05	0.	-0.10	110	4.04	0.	-0.10	150	4.16	0.	-0.10
31	4.71	0.	-0.10	71	4.25	0.	-0.10	111	4.18	0.	-0.10	151	4.68	0.	-0.10
32	4.46	0.	-0.10	72	4.41	0.	-0.10	112	4.03	0.	-0.10	152	4.13	0.	-0.10
33	4.00	0.	-0.10	73	4.06	0.	-0.10	113	4.00	0.	-0.10	153	4.09	0.	-0.10
34	4.04	0.	-0.10	74	4.09	0.	-0.10	114	4.14	0.	-0.10	154	4.53	0.	-0.10
35	4.05	0.	-0.10	75	4.09	0.	-0.10	115	4.21	0.	-0.10	155	4.01	0.	-0.10
36	4.01	0.	-0.10	76	4.02	0.	-0.10	116	4.04	0.	-0.10	156	3.98	0.	-0.10
37	4.01	0.	-0.10	77	4.02	0.	-0.10	117	3.99	0.	-0.10	157	0. *	0.	-0.10
38	0. *	0.	-0.10	78	4.17	0.	-0.10	118	4.01	0.	-0.10	158	3.99	0.	-0.10
39	0. *	0.	-0.10	79	4.25	0.	-0.10	119	4.28	0.	-0.10	159	4.04	0.	-0.10
40	3.98	0.	-0.10	80	4.24	0.	-0.10	120	4.23	0.	-0.10				

MATHEMATICAL SIMULATION OF CARBON MONOXIDE DISTRIBUTION IN THE ATMOSPHERE
 TWO DIMENSIONAL FINITE ELEMENT FOR HORIZONTAL PROBLEMS OF VARIABLE THICKNESS
 INITIAL APPLICATION TO THE FAIRBANKS, ALASKA AIRSHED...

TEST DATA TO CHECK NORTON'S APRIL 28 CHANGES

...RESULTS AFTER 2 HOURS OF DYNAMIC SIMULATION...

...CONCENTRATIONS ARE MEAN VERTICAL VALUES...

... OUTPUT FOR NODES 1 TO 159 ... THE SYMBOL * DENOTES A SPECIFIED VALUE ...

NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC
1	0.	*	0.	41	4.67	0.	-0.10	81	4.02	0.	-0.10	121	4.05	0.	-0.10
2	0.	*	0.	42	4.10	0.	-0.10	82	3.96	0.	-0.10	122	4.56	0.	-0.10
3	0.	*	0.	43	4.05	0.	-0.10	83	4.26	0.	-0.10	123	3.98	0.	-0.10
4	0.	*	0.	44	4.17	0.	-0.10	84	4.73	0.	-0.10	124	4.00	0.	-0.10
5	0.	*	0.	45	4.09	0.	-0.10	85	4.50	0.	-0.10	125	4.37	0.	-0.10
6	3.68	0.	-0.10	46	4.23	0.	-0.10	86	4.00	0.	-0.10	126	5.42	0.	-0.10
7	3.95	0.	-0.10	47	4.00	0.	-0.10	87	4.05	0.	-0.10	127	4.73	0.	-0.10
8	4.12	0.	-0.10	48	4.25	0.	-0.10	88	4.26	0.	-0.10	128	5.13	0.	-0.10
9	4.02	0.	-0.10	49	4.08	0.	-0.10	89	3.71	0.	-0.10	129	3.90	0.	-0.10
10	3.89	0.	-0.10	50	3.99	0.	-0.10	90	4.02	0.	-0.10	130	3.88	0.	-0.10
11	3.41	0.	-0.10	51	0.	*	0.	91	4.06	0.	-0.10	131	3.66	0.	-0.10
12	4.57	0.	-0.10	52	3.22	0.	-0.10	92	4.05	0.	-0.10	132	4.57	0.	-0.10
13	3.52	0.	-0.10	53	4.03	0.	-0.10	93	4.00	0.	-0.10	133	4.14	0.	-0.10
14	0.	*	0.	54	4.40	0.	-0.10	94	4.31	0.	-0.10	134	4.08	0.	-0.10
15	4.23	0.	-0.10	55	4.01	0.	-0.10	95	4.22	0.	-0.10	135	4.20	0.	-0.10
16	3.99	0.	-0.10	56	4.06	0.	-0.10	96	4.46	0.	-0.10	136	4.34	0.	-0.10
17	4.00	0.	-0.10	57	4.01	0.	-0.10	97	3.40	0.	-0.10	137	4.03	0.	-0.10
18	4.20	0.	-0.10	58	4.35	0.	-0.10	98	4.52	0.	-0.10	138	4.00	0.	-0.10
19	4.13	0.	-0.10	59	4.30	0.	-0.10	99	4.02	0.	-0.10	139	0.	*	0.
20	3.98	0.	-0.10	60	3.82	0.	-0.10	100	4.86	0.	-0.10	140	3.59	0.	-0.10
21	4.13	0.	-0.10	61	4.61	0.	-0.10	101	4.64	0.	-0.10	141	4.02	0.	-0.10
22	4.12	0.	-0.10	62	4.09	0.	-0.10	102	4.01	0.	-0.10	142	4.05	0.	-0.10
23	4.30	0.	-0.10	63	3.99	0.	-0.10	103	4.29	0.	-0.10	143	4.37	0.	-0.10
24	4.14	0.	-0.10	64	4.07	0.	-0.10	104	4.11	0.	-0.10	144	4.05	0.	-0.10
25	4.07	0.	-0.10	65	4.11	0.	-0.10	105	3.89	0.	-0.10	145	4.46	0.	-0.10
26	4.42	0.	-0.10	66	4.03	0.	-0.10	106	4.33	0.	-0.10	146	4.53	0.	-0.10
27	3.36	0.	-0.10	67	0.	*	0.	107	3.77	0.	-0.10	147	4.02	0.	-0.10
28	0.	*	0.	68	3.26	0.	-0.10	108	4.02	0.	-0.10	148	4.03	0.	-0.10
29	4.05	0.	-0.10	69	4.10	0.	-0.10	109	4.32	0.	-0.10	149	3.37	0.	-0.10
30	4.29	0.	-0.10	70	4.10	0.	-0.10	110	4.04	0.	-0.10	150	4.22	0.	-0.10
31	5.10	0.	-0.10	71	4.42	0.	-0.10	111	4.31	0.	-0.10	151	4.75	0.	-0.10
32	4.64	0.	-0.10	72	4.71	0.	-0.10	112	4.11	0.	-0.10	152	4.23	0.	-0.10
33	4.01	0.	-0.10	73	4.09	0.	-0.10	113	3.99	0.	-0.10	153	4.17	0.	-0.10
34	4.05	0.	-0.10	74	4.15	0.	-0.10	114	4.26	0.	-0.10	154	4.51	0.	-0.10
35	4.04	0.	-0.10	75	4.19	0.	-0.10	115	4.38	0.	-0.10	155	4.02	0.	-0.10
36	4.04	0.	-0.10	76	3.99	0.	-0.10	116	4.11	0.	-0.10	156	3.98	0.	-0.10
37	4.02	0.	-0.10	77	4.19	0.	-0.10	117	3.98	0.	-0.10	157	0.	*	0.
38	0.	*	0.	78	4.26	0.	-0.10	118	4.04	0.	-0.10	158	4.03	0.	-0.10
39	0.	*	0.	79	4.41	0.	-0.10	119	4.31	0.	-0.10	159	4.13	0.	-0.10
40	3.93	0.	-0.10	80	4.44	0.	-0.10	120	4.35	0.	-0.10				

MATHEMATICAL SIMULATION OF CARBON MONOXIDE DISTRIBUTION IN THE ATMOSPHERE
TWO DIMENSIONAL FINITE ELEMENT FOR HORIZONTAL PROBLEMS OF VARIABLE THICKNESS
INITIAL APPLICATION TO THE FAIRBANKS, ALASKA AIRSHED...

TEST DATA TO CHECK NORTON'S APRIL 28 CHANGES

...RESULTS AFTER 3 HOURS OF DYNAMIC SIMULATION...

...CONCENTRATIONS ARE MEAN VERTICAL VALUES...

... OUTPUT FOR NODES 1 TO 159 ...				... THE SYMBOL * DENOTES A SPECIFIED VALUE ...											
NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC
1	0. *	0.	-0.10	41	4.70	0.	-0.10	81	4.07	0.	-0.10	121	4.02	0.	-0.10
2	0. *	0.	-0.10	42	4.05	0.	-0.10	82	3.93	0.	-0.10	122	4.74	0.	-0.10
3	0. *	0.	-0.10	43	4.09	0.	-0.10	83	4.23	0.	-0.10	123	4.00	0.	-0.10
4	0. *	0.	-0.10	44	4.23	0.	-0.10	84	4.74	0.	-0.10	124	4.11	0.	-0.10
5	0. *	0.	-0.10	45	4.16	0.	-0.10	85	4.54	0.	-0.10	125	4.44	0.	-0.10
6	3.54	0.	-0.10	46	4.31	0.	-0.10	86	4.09	0.	-0.10	126	5.22	0.	-0.10
7	3.93	0.	-0.10	47	4.02	0.	-0.10	87	3.98	0.	-0.10	127	4.76	0.	-0.10
8	4.18	0.	-0.10	48	4.27	0.	-0.10	88	4.37	0.	-0.10	128	5.36	0.	-0.10
9	4.03	0.	-0.10	49	4.12	0.	-0.10	89	3.70	0.	-0.10	129	3.94	0.	-0.10
10	3.80	0.	-0.10	50	3.98	0.	-0.10	90	4.04	0.	-0.10	130	3.93	0.	-0.10
11	3.10	0.	-0.10	51	0. *	0.	-0.10	91	4.10	0.	-0.10	131	3.77	0.	-0.10
12	4.77	0.	-0.10	52	2.83	0.	-0.10	92	4.07	0.	-0.10	132	4.70	0.	-0.10
13	3.29	0.	-0.10	53	4.13	0.	-0.10	93	3.99	0.	-0.10	133	4.12	0.	-0.10
14	0. *	0.	-0.10	54	4.48	0.	-0.10	94	4.32	0.	-0.10	134	4.16	0.	-0.10
15	4.31	0.	-0.10	55	4.07	0.	-0.10	95	4.36	0.	-0.10	135	4.23	0.	-0.10
16	3.97	0.	-0.10	56	4.12	0.	-0.10	96	4.30	0.	-0.10	136	4.54	0.	-0.10
17	4.01	0.	-0.10	57	3.99	0.	-0.10	97	3.09	0.	-0.10	137	4.02	0.	-0.10
18	4.28	0.	-0.10	58	4.30	0.	-0.10	98	4.64	0.	-0.10	138	4.03	0.	-0.10
19	4.12	0.	-0.10	59	4.43	0.	-0.10	99	3.99	0.	-0.10	139	0. *	0.	-0.10
20	3.99	0.	-0.10	60	3.81	0.	-0.10	100	4.95	0.	-0.10	140	3.36	0.	-0.10
21	4.18	0.	-0.10	61	4.97	0.	-0.10	101	4.80	0.	-0.10	141	4.02	0.	-0.10
22	4.17	0.	-0.10	62	4.14	0.	-0.10	102	4.00	0.	-0.10	142	4.06	0.	-0.10
23	4.42	0.	-0.10	63	3.99	0.	-0.10	103	4.58	0.	-0.10	143	4.36	0.	-0.10
24	4.28	0.	-0.10	64	4.09	0.	-0.10	104	4.11	0.	-0.10	144	4.04	0.	-0.10
25	4.15	0.	-0.10	65	4.12	0.	-0.10	105	3.91	0.	-0.10	145	4.65	0.	-0.10
26	4.54	0.	-0.10	66	4.02	0.	-0.10	106	4.44	0.	-0.10	146	4.30	0.	-0.10
27	3.04	0.	-0.10	67	0. *	0.	-0.10	107	3.84	0.	-0.10	147	3.96	0.	-0.10
28	0. *	0.	-0.10	68	2.91	0.	-0.10	108	4.04	0.	-0.10	148	4.07	0.	-0.10
29	4.08	0.	-0.10	69	4.13	0.	-0.10	109	4.36	0.	-0.10	149	3.04	0.	-0.10
30	4.58	0.	-0.10	70	4.20	0.	-0.10	110	4.03	0.	-0.10	150	4.25	0.	-0.10
31	5.15	0.	-0.10	71	4.49	0.	-0.10	111	4.39	0.	-0.10	151	4.81	0.	-0.10
32	4.68	0.	-0.10	72	4.75	0.	-0.10	112	4.24	0.	-0.10	152	4.30	0.	-0.10
33	4.01	0.	-0.10	73	4.09	0.	-0.10	113	3.98	0.	-0.10	153	4.25	0.	-0.10
34	4.06	0.	-0.10	74	4.21	0.	-0.10	114	4.35	0.	-0.10	154	4.27	0.	-0.10
35	4.01	0.	-0.10	75	4.30	0.	-0.10	115	4.49	0.	-0.10	155	4.02	0.	-0.10
36	4.11	0.	-0.10	76	3.95	0.	-0.10	116	4.25	0.	-0.10	156	4.02	0.	-0.10
37	4.08	0.	-0.10	77	4.43	0.	-0.10	117	3.97	0.	-0.10	157	0. *	0.	-0.10
38	0. *	0.	-0.10	78	4.32	0.	-0.10	118	4.08	0.	-0.10	158	4.09	0.	-0.10
39	0. *	0.	-0.10	79	4.42	0.	-0.10	119	4.65	0.	-0.10	159	4.28	0.	-0.10
40	3.89	0.	-0.10	80	4.61	0.	-0.10	120	4.41	0.	-0.10				

MATHEMATICAL SIMULATION OF CARBON MONOXIDE DISTRIBUTION IN THE ATMOSPHERE
TWO DIMENSIONAL FINITE ELEMENT FOR HORIZONTAL PROBLEMS OF VARIABLE THICKNESS
INITIAL APPLICATION TO THE FAIRBANKS, ALASKA AIRSHED...

TEST DATA TO CHECK NORTON'S APRIL 28 CHANGES

...RESULTS AFTER 4 HOURS OF DYNAMIC SIMULATION...

...CONCENTRATIONS ARE MEAN VERTICAL VALUES...

... OUTPUT FOR NODES 1 TO 159 ...				... THE SYMBOL * DENOTES A SPECIFIED VALUE ...											
NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC
1	0.	*	0.	41	4.56	0.	-0.10	81	4.10	0.	-0.10	121	3.99	0.	-0.10
2	0.	*	0.	42	4.05	0.	-0.10	82	3.96	0.	-0.10	122	4.75	0.	-0.10
3	0.	*	0.	43	4.14	0.	-0.10	83	4.17	0.	-0.10	123	4.11	0.	-0.10
4	0.	*	0.	44	4.30	0.	-0.10	84	4.58	0.	-0.10	124	4.16	0.	-0.10
5	0.	*	0.	45	4.27	0.	-0.10	85	4.54	0.	-0.10	125	4.44	0.	-0.10
6	3.43	0.	-0.10	46	4.33	0.	-0.10	86	4.26	0.	-0.10	126	5.23	0.	-0.10
7	3.92	0.	-0.10	47	4.06	0.	-0.10	87	3.96	0.	-0.10	127	4.75	0.	-0.10
8	4.24	0.	-0.10	48	4.31	0.	-0.10	88	4.40	0.	-0.10	128	5.44	0.	-0.10
9	4.04	0.	-0.10	49	4.14	0.	-0.10	89	3.76	0.	-0.10	129	4.03	0.	-0.10
10	3.68	0.	-0.10	50	3.98	0.	-0.10	90	4.07	0.	-0.10	130	4.00	0.	-0.10
11	2.80	0.	-0.10	51	0.	*	0.	91	4.15	0.	-0.10	131	3.93	0.	-0.10
12	4.89	0.	-0.10	52	2.45	0.	-0.10	92	4.09	0.	-0.10	132	4.81	0.	-0.10
13	3.05	0.	-0.10	53	4.35	0.	-0.10	93	3.99	0.	-0.10	133	4.12	0.	-0.10
14	0.	*	0.	54	4.47	0.	-0.10	94	4.31	0.	-0.10	134	4.30	0.	-0.10
15	4.38	0.	-0.10	55	4.15	0.	-0.10	95	4.48	0.	-0.10	135	4.30	0.	-0.10
16	3.96	0.	-0.10	56	4.18	0.	-0.10	96	4.22	0.	-0.10	136	4.66	0.	-0.10
17	4.02	0.	-0.10	57	4.00	0.	-0.10	97	2.79	0.	-0.10	137	4.01	0.	-0.10
18	4.35	0.	-0.10	58	4.22	0.	-0.10	98	4.66	0.	-0.10	138	4.07	0.	-0.10
19	4.09	0.	-0.10	59	4.57	0.	-0.10	99	3.97	0.	-0.10	139	0.	*	0.
20	4.01	0.	-0.10	60	3.95	0.	-0.10	100	5.02	0.	-0.10	140	3.10	0.	-0.10
21	4.23	0.	-0.10	61	5.30	0.	-0.10	101	4.86	0.	-0.10	141	4.02	0.	-0.10
22	4.24	0.	-0.10	62	4.19	0.	-0.10	102	4.02	0.	-0.10	142	4.07	0.	-0.10
23	4.50	0.	-0.10	63	4.00	0.	-0.10	103	4.81	0.	-0.10	143	4.38	0.	-0.10
24	4.43	0.	-0.10	64	4.12	0.	-0.10	104	4.10	0.	-0.10	144	4.04	0.	-0.10
25	4.25	0.	-0.10	65	4.13	0.	-0.10	105	3.99	0.	-0.10	145	4.73	0.	-0.10
26	4.59	0.	-0.10	66	4.02	0.	-0.10	106	4.52	0.	-0.10	146	4.19	0.	-0.10
27	2.71	0.	-0.10	67	0.	*	0.	107	4.06	0.	-0.10	147	3.92	0.	-0.10
28	0.	*	0.	68	2.57	0.	-0.10	108	4.07	0.	-0.10	148	4.12	0.	-0.10
29	4.13	0.	-0.10	69	4.18	0.	-0.10	109	4.37	0.	-0.10	149	2.71	0.	-0.10
30	4.84	0.	-0.10	70	4.32	0.	-0.10	110	4.01	0.	-0.10	150	4.33	0.	-0.10
31	5.09	0.	-0.10	71	4.54	0.	-0.10	111	4.45	0.	-0.10	151	4.94	0.	-0.10
32	4.73	0.	-0.10	72	4.60	0.	-0.10	112	4.42	0.	-0.10	152	4.36	0.	-0.10
33	4.02	0.	-0.10	73	4.11	0.	-0.10	113	3.97	0.	-0.10	153	4.33	0.	-0.10
34	4.10	0.	-0.10	74	4.29	0.	-0.10	114	4.41	0.	-0.10	154	4.15	0.	-0.10
35	3.98	0.	-0.10	75	4.39	0.	-0.10	115	4.53	0.	-0.10	155	4.01	0.	-0.10
36	4.20	0.	-0.10	76	3.92	0.	-0.10	116	4.42	0.	-0.10	156	4.08	0.	-0.10
37	4.24	0.	-0.10	77	4.61	0.	-0.10	117	3.97	0.	-0.10	157	0.	*	0.
38	0.	*	0.	78	4.36	0.	-0.10	118	4.12	0.	-0.10	158	4.16	0.	-0.10
39	0.	*	0.	79	4.33	0.	-0.10	119	4.70	0.	-0.10	159	4.41	0.	-0.10
40	3.67	0.	-0.10	80	4.74	0.	-0.10	120	4.41	0.	-0.10				

MATHEMATICAL SIMULATION OF CARBON MONOXIDE DISTRIBUTION IN THE ATMOSPHERE
TWO DIMENSIONAL FINITE ELEMENT FOR HORIZONTAL PROBLEMS OF VARIABLE THICKNESS
INITIAL APPLICATION TO THE FAIRBANKS, ALASKA AIRSHED...

TEST DATA TO CHECK NORTON'S APRIL 28 CHANGES

...RESULTS AFTER 5 HOURS OF DYNAMIC SIMULATION...

...CONCENTRATIONS ARE MEAN VERTICAL VALUES...

... OUTPUT FOR NODES 1 TO 159 ... THE SYMBOL * DENOTES A SPECIFIED VALUE ...

NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC
1	0. *	0.	-0.10	41	4.63	0.	-0.10	81	4.15	0.	-0.10	121	4.01	0.	-0.10
2	0. *	0.	-0.10	42	4.07	0.	-0.10	82	4.04	0.	-0.10	122	4.74	0.	-0.10
3	0. *	0.	-0.10	43	4.22	0.	-0.10	83	4.20	0.	-0.10	123	4.35	0.	-0.10
4	0. *	0.	-0.10	44	4.38	0.	-0.10	84	4.45	0.	-0.10	124	4.36	0.	-0.10
5	0. *	0.	-0.10	45	4.39	0.	-0.10	85	4.53	0.	-0.10	125	4.79	0.	-0.10
6	3.32	0.	-0.10	46	4.40	0.	-0.10	86	4.59	0.	-0.10	126	7.41	0.	-0.10
7	3.92	0.	-0.10	47	4.35	0.	-0.10	87	4.53	0.	-0.10	127	5.07	0.	-0.10
8	4.29	0.	-0.10	48	4.51	0.	-0.10	88	4.49	0.	-0.10	128	6.03	0.	-0.10
9	4.05	0.	-0.10	49	4.18	0.	-0.10	89	3.91	0.	-0.10	129	4.23	0.	-0.10
10	3.55	0.	-0.10	50	3.97	0.	-0.10	90	4.29	0.	-0.10	130	4.71	0.	-0.10
11	2.50	0.	-0.10	51	0. *	0.	-0.10	91	4.21	0.	-0.10	131	6.23	0.	-0.10
12	4.95	0.	-0.10	52	2.09	0.	-0.10	92	4.13	0.	-0.10	132	5.98	0.	-0.10
13	2.82	0.	-0.10	53	4.64	0.	-0.10	93	4.03	0.	-0.10	133	4.52	0.	-0.10
14	0. *	0.	-0.10	54	4.38	0.	-0.10	94	4.35	0.	-0.10	134	4.59	0.	-0.10
15	4.44	0.	-0.10	55	4.24	0.	-0.10	95	4.68	0.	-0.10	135	4.45	0.	-0.10
16	3.98	0.	-0.10	56	4.24	0.	-0.10	96	4.24	0.	-0.10	136	5.01	0.	-0.10
17	4.07	0.	-0.10	57	4.03	0.	-0.10	97	2.50	0.	-0.10	137	4.03	0.	-0.10
18	4.41	0.	-0.10	58	4.25	0.	-0.10	98	4.60	0.	-0.10	138	4.13	0.	-0.10
19	4.06	0.	-0.10	59	4.74	0.	-0.10	99	4.04	0.	-0.10	139	0. *	0.	-0.10
20	4.07	0.	-0.10	60	4.34	0.	-0.10	100	5.15	0.	-0.10	140	2.85	0.	-0.10
21	4.22	0.	-0.10	61	5.70	0.	-0.10	101	4.23	0.	-0.10	141	4.02	0.	-0.10
22	4.35	0.	-0.10	62	4.24	0.	-0.10	102	4.08	0.	-0.10	142	4.77	0.	-0.10
23	4.55	0.	-0.10	63	4.04	0.	-0.10	103	4.98	0.	-0.10	143	4.50	0.	-0.10
24	4.61	0.	-0.10	64	4.15	0.	-0.10	104	4.16	0.	-0.10	144	4.08	0.	-0.10
25	4.36	0.	-0.10	65	4.14	0.	-0.10	105	4.26	0.	-0.10	145	4.75	0.	-0.10
26	4.59	0.	-0.10	66	4.03	0.	-0.10	106	4.62	0.	-0.10	146	4.15	0.	-0.10
27	2.39	0.	-0.10	67	0. *	0.	-0.10	107	4.58	0.	-0.10	147	3.93	0.	-0.10
28	0. *	0.	-0.10	68	2.25	0.	-0.10	108	4.23	0.	-0.10	148	4.19	0.	-0.10
29	4.24	0.	-0.10	69	4.27	0.	-0.10	109	4.39	0.	-0.10	149	2.40	0.	-0.10
30	5.05	0.	-0.10	70	4.46	0.	-0.10	110	4.00	0.	-0.10	150	4.54	0.	-0.10
31	5.04	0.	-0.10	71	4.57	0.	-0.10	111	4.49	0.	-0.10	151	4.59	0.	-0.10
32	4.76	0.	-0.10	72	4.43	0.	-0.10	112	4.67	0.	-0.10	152	4.43	0.	-0.10
33	4.05	0.	-0.10	73	4.21	0.	-0.10	113	3.97	0.	-0.10	153	4.50	0.	-0.10
34	4.20	0.	-0.10	74	4.57	0.	-0.10	114	4.45	0.	-0.10	154	4.13	0.	-0.10
35	3.98	0.	-0.10	75	4.47	0.	-0.10	115	4.49	0.	-0.10	155	4.02	0.	-0.10
36	4.29	0.	-0.10	76	3.94	0.	-0.10	116	4.59	0.	-0.10	156	4.16	0.	-0.10
37	4.52	0.	-0.10	77	4.73	0.	-0.10	117	3.98	0.	-0.10	157	0. *	0.	-0.10
38	0. *	0.	-0.10	78	4.37	0.	-0.10	118	4.16	0.	-0.10	158	4.23	0.	-0.10
39	0. *	0.	-0.10	79	4.30	0.	-0.10	119	4.83	0.	-0.10	159	4.60	0.	-0.10
40	3.87	0.	-0.10	80	4.82	0.	-0.10	120	4.32	0.	-0.10				

MATHEMATICAL SIMULATION OF CARBON MONOXIDE DISTRIBUTION IN THE ATMOSPHERE
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TEST DATA TO CHECK NORTON'S APRIL 28 CHANGES

...RESULTS AFTER 6 HOURS OF DYNAMIC SIMULATION...

...CONCENTRATIONS ARE MEAN VERTICAL VALUES...

... OUTPUT FOR NODES 1 TO 159 ... THE SYMBOL * DENOTES A SPECIFIED VALUE ...

NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC		
1	0.	*	0.	-0.10	41	4.61	0.	-0.10	81	4.29	0.	-0.10	121	4.10	0.	-0.10	
2	0.	*	0.	-0.10	42	4.11	0.	-0.10	82	4.14	0.	-0.10	122	4.84	0.	-0.10	
3	0.	*	0.	-0.10	43	4.32	0.	-0.10	83	4.34	0.	-0.10	123	4.66	0.	-0.10	
4	0.	*	0.	-0.10	44	4.47	0.	-0.10	84	4.41	0.	-0.10	124	4.74	0.	-0.10	
5	0.	*	0.	-0.10	45	4.56	0.	-0.10	85	4.58	0.	-0.10	125	6.22	0.	-0.10	
6	3.23	0.	0.	-0.10	46	4.66	0.	-0.10	86	5.74	0.	-0.10	126	14.26	0.	-0.10	
7	3.92	0.	0.	-0.10	47	5.03	0.	-0.10	87	6.57	0.	-0.10	127	6.24	0.	-0.10	
8	4.34	0.	0.	-0.10	48	4.96	0.	-0.10	88	4.84	0.	-0.10	128	8.35	0.	-0.10	
9	4.05	0.	0.	-0.10	49	4.27	0.	-0.10	89	4.04	0.	-0.10	129	4.63	0.	-0.10	
10	3.40	0.	0.	-0.10	50	3.97	0.	-0.10	90	4.98	0.	-0.10	130	6.61	0.	-0.10	
11	2.21	0.	0.	-0.10	51	0.	*	0.	-0.10	91	4.35	0.	-0.10	131	12.35	0.	-0.10
12	4.96	0.	0.	-0.10	52	1.76	0.	-0.10	92	4.19	0.	-0.10	132	9.17	0.	-0.10	
13	2.60	0.	0.	-0.10	53	4.92	0.	-0.10	93	4.15	0.	-0.10	133	5.97	0.	-0.10	
14	0.	*	0.	-0.10	54	4.22	0.	-0.10	94	4.40	0.	-0.10	134	5.23	0.	-0.10	
15	4.51	0.	0.	-0.10	55	4.31	0.	-0.10	95	5.05	0.	-0.10	135	4.68	0.	-0.10	
16	4.06	0.	0.	-0.10	56	4.32	0.	-0.10	96	4.28	0.	-0.10	136	5.93	0.	-0.10	
17	4.16	0.	0.	-0.10	57	4.10	0.	-0.10	97	2.24	0.	-0.10	137	4.11	0.	-0.10	
18	4.46	0.	0.	-0.10	58	4.41	0.	-0.10	98	4.46	0.	-0.10	138	4.24	0.	-0.10	
19	4.07	0.	0.	-0.10	59	4.88	0.	-0.10	99	4.24	0.	-0.10	139	0.	*	0.	-0.10
20	4.18	0.	0.	-0.10	60	4.97	0.	-0.10	100	5.31	0.	-0.10	140	2.59	0.	-0.10	
21	4.33	0.	0.	-0.10	61	6.60	0.	-0.10	101	4.72	0.	-0.10	141	4.04	0.	-0.10	
22	4.55	0.	0.	-0.10	62	4.33	0.	-0.10	102	4.17	0.	-0.10	142	4.09	0.	-0.10	
23	4.58	0.	0.	-0.10	63	4.16	0.	-0.10	103	5.19	0.	-0.10	143	4.73	0.	-0.10	
24	4.82	0.	0.	-0.10	64	4.19	0.	-0.10	104	4.49	0.	-0.10	144	4.17	0.	-0.10	
25	4.47	0.	0.	-0.10	65	4.16	0.	-0.10	105	4.77	0.	-0.10	145	4.78	0.	-0.10	
26	4.53	0.	0.	-0.10	66	4.09	0.	-0.10	106	4.76	0.	-0.10	146	4.08	0.	-0.10	
27	2.08	0.	0.	-0.10	67	0.	*	0.	-0.10	107	5.75	0.	-0.10	147	4.03	0.	-0.10
28	0.	*	0.	-0.10	68	1.96	0.	-0.10	108	4.75	0.	-0.10	148	4.26	0.	-0.10	
29	4.44	0.	0.	-0.10	69	4.41	0.	-0.10	109	4.45	0.	-0.10	149	2.11	0.	-0.10	
30	5.24	0.	0.	-0.10	70	4.59	0.	-0.10	110	4.00	0.	-0.10	150	5.14	0.	-0.10	
31	5.01	0.	0.	-0.10	71	4.56	0.	-0.10	111	4.52	0.	-0.10	151	5.11	0.	-0.10	
32	4.78	0.	0.	-0.10	72	4.29	0.	-0.10	112	5.01	0.	-0.10	152	4.61	0.	-0.10	
33	4.13	0.	0.	-0.10	73	4.46	0.	-0.10	113	3.99	0.	-0.10	153	4.85	0.	-0.10	
34	4.40	0.	0.	-0.10	74	5.23	0.	-0.10	114	4.46	0.	-0.10	154	4.12	0.	-0.10	
35	4.03	0.	0.	-0.10	75	4.56	0.	-0.10	115	4.38	0.	-0.10	155	4.06	0.	-0.10	
36	4.40	0.	0.	-0.10	76	4.00	0.	-0.10	116	4.75	0.	-0.10	156	4.25	0.	-0.10	
37	4.92	0.	0.	-0.10	77	4.90	0.	-0.10	117	4.01	0.	-0.10	157	0.	*	0.	-0.10
38	0.	*	0.	-0.10	78	4.41	0.	-0.10	118	4.18	0.	-0.10	158	4.29	0.	-0.10	
39	0.	*	0.	-0.10	79	4.42	0.	-0.10	119	5.14	0.	-0.10	159	4.95	0.	-0.10	
40	3.91	0.	0.	-0.10	80	4.87	0.	-0.10	120	4.11	0.	-0.10					

MATHEMATICAL SIMULATION OF CARBON MONOXIDE DISTRIBUTION IN THE ATMOSPHERE
 TWO DIMENSIONAL FINITE ELEMENT FOR HORIZONTAL PROBLEMS OF VARIABLE THICKNESS
 INITIAL APPLICATION TO THE FAIRBANKS, ALASKA AIRSHED...

TEST DATA TO CHECK HORTON'S APRIL 28 CHANGES

...RESULTS AFTER 7 HOURS OF DYNAMIC SIMULATION...

...CONCENTRATIONS ARE MEAN VERTICAL VALUES...

... OUTPUT FOR NODES 1 TO 159 ... THE SYMBOL * DENOTES A SPECIFIED VALUE ...

NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC
1	0.	*	0.	41	4.79	0.	-0.10	81	4.52	0.	-0.10	121	4.29	0.	-0.10
2	0.	*	0.	42	4.21	0.	-0.10	82	4.27	0.	-0.10	122	5.11	0.	-0.10
3	0.	*	0.	43	4.48	0.	-0.10	83	4.63	0.	-0.10	123	4.92	0.	-0.10
4	0.	*	0.	44	4.50	0.	-0.10	84	4.53	0.	-0.10	124	5.20	0.	-0.10
5	0.	*	0.	45	4.91	0.	-0.10	85	4.82	0.	-0.10	125	9.13	0.	-0.10
6	3.15	0.	-0.10	46	5.20	0.	-0.10	86	6.30	0.	-0.10	126	26.53	0.	-0.10
7	3.95	0.	-0.10	47	6.10	0.	-0.10	87	10.52	0.	-0.10	127	8.57	0.	-0.10
8	4.38	0.	-0.10	48	5.69	0.	-0.10	88	5.69	0.	-0.10	128	13.52	0.	-0.10
9	4.06	0.	-0.10	49	4.46	0.	-0.10	89	3.93	0.	-0.10	129	5.19	0.	-0.10
10	3.24	0.	-0.10	50	4.00	0.	-0.10	90	6.32	0.	-0.10	130	9.65	0.	-0.10
11	1.94	0.	-0.10	51	0.	*	0.	91	4.74	0.	-0.10	131	21.57	0.	-0.10
12	4.92	0.	-0.10	52	1.46	0.	-0.10	92	4.27	0.	-0.10	132	14.24	0.	-0.10
13	2.39	0.	-0.10	53	5.22	0.	-0.10	93	4.34	0.	-0.10	133	8.04	0.	-0.10
14	0.	*	0.	54	4.02	0.	-0.10	94	4.47	0.	-0.10	134	5.64	0.	-0.10
15	4.59	0.	-0.10	55	4.35	0.	-0.10	95	5.62	0.	-0.10	135	5.07	0.	-0.10
16	4.19	0.	-0.10	56	4.41	0.	-0.10	96	4.50	0.	-0.10	136	7.42	0.	-0.10
17	4.32	0.	-0.10	57	4.22	0.	-0.10	97	1.99	0.	-0.10	137	4.27	0.	-0.10
18	4.52	0.	-0.10	58	4.77	0.	-0.10	98	4.27	0.	-0.10	138	4.53	0.	-0.10
19	4.17	0.	-0.10	59	4.98	0.	-0.10	99	4.62	0.	-0.10	139	0.	*	0.
20	4.32	0.	-0.10	60	5.50	0.	-0.10	100	5.72	0.	-0.10	140	2.35	0.	-0.10
21	4.43	0.	-0.10	61	8.57	0.	-0.10	101	4.57	0.	-0.10	141	4.08	0.	-0.10
22	4.87	0.	-0.10	62	4.48	0.	-0.10	102	4.35	0.	-0.10	142	4.12	0.	-0.10
23	4.61	0.	-0.10	63	4.35	0.	-0.10	103	5.48	0.	-0.10	143	5.20	0.	-0.10
24	5.05	0.	-0.10	64	4.26	0.	-0.10	104	5.36	0.	-0.10	144	4.33	0.	-0.10
25	4.57	0.	-0.10	65	4.23	0.	-0.10	105	5.34	0.	-0.10	145	4.91	0.	-0.10
26	4.43	0.	-0.10	66	4.18	0.	-0.10	106	5.10	0.	-0.10	146	4.21	0.	-0.10
27	1.79	0.	-0.10	67	0.	*	0.	107	7.73	0.	-0.10	147	4.25	0.	-0.10
28	0.	*	0.	68	1.69	0.	-0.10	108	5.71	0.	-0.10	148	4.33	0.	-0.10
29	4.76	0.	-0.10	69	4.60	0.	-0.10	109	4.70	0.	-0.10	149	1.86	0.	-0.10
30	5.46	0.	-0.10	70	4.75	0.	-0.10	110	4.03	0.	-0.10	150	6.43	0.	-0.10
31	5.24	0.	-0.10	71	4.59	0.	-0.10	111	4.60	0.	-0.10	151	5.62	0.	-0.10
32	4.97	0.	-0.10	72	4.28	0.	-0.10	112	5.53	0.	-0.10	152	5.03	0.	-0.10
33	4.28	0.	-0.10	73	4.94	0.	-0.10	113	4.03	0.	-0.10	153	5.50	0.	-0.10
34	4.70	0.	-0.10	74	6.39	0.	-0.10	114	4.45	0.	-0.10	154	4.33	0.	-0.10
35	4.13	0.	-0.10	75	4.70	0.	-0.10	115	4.19	0.	-0.10	155	4.17	0.	-0.10
36	4.52	0.	-0.10	76	4.10	0.	-0.10	116	4.88	0.	-0.10	156	4.35	0.	-0.10
37	5.39	0.	-0.10	77	5.19	0.	-0.10	117	4.04	0.	-0.10	157	0.	*	0.
38	0.	*	0.	78	4.61	0.	-0.10	118	4.16	0.	-0.10	158	4.34	0.	-0.10
39	0.	*	0.	79	4.72	0.	-0.10	119	5.65	0.	-0.10	159	5.48	0.	-0.10
40	4.00	0.	-0.10	80	5.07	0.	-0.10	120	3.89	0.	-0.10				

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NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC
1	0.*	0.	-0.10	41	5.55	0.	-0.10	81	4.91	0.	-0.10	121	4.56	0.	-0.10
2	0.*	0.	-0.10	42	4.48	0.	-0.10	82	4.44	0.	-0.10	122	5.84	0.	-0.10
3	0.*	0.	-0.10	43	4.72	0.	-0.10	83	5.24	0.	-0.10	123	5.12	0.	-0.10
4	0.*	0.	-0.10	44	4.50	0.	-0.10	84	5.17	0.	-0.10	124	5.78	0.	-0.10
5	0.*	0.	-0.10	45	5.59	0.	-0.10	85	5.59	0.	-0.10	125	14.14	0.	-0.10
6	3.08	0.	-0.10	46	6.23	0.	-0.10	86	8.09	0.	-0.10	126	47.54	0.	-0.10
7	4.00	0.	-0.10	47	7.52	0.	-0.10	87	17.09	0.	-0.10	127	13.04	0.	-0.10
8	4.43	0.	-0.10	48	6.95	0.	-0.10	88	7.42	0.	-0.10	128	23.61	0.	-0.10
9	4.07	0.	-0.10	49	4.87	0.	-0.10	89	3.45	0.	-0.10	129	5.90	0.	-0.10
10	3.09	0.	-0.10	50	4.06	0.	-0.10	90	8.74	0.	-0.10	130	14.53	0.	-0.10
11	1.68	0.	-0.10	51	0.*	0.	-0.10	91	5.63	0.	-0.10	131	35.96	0.	-0.10
12	4.85	0.	-0.10	52	1.21	0.	-0.10	92	4.39	0.	-0.10	132	22.65	0.	-0.10
13	2.20	0.	-0.10	53	5.62	0.	-0.10	93	4.63	0.	-0.10	133	11.31	0.	-0.10
14	0.*	0.	-0.10	54	3.78	0.	-0.10	94	4.71	0.	-0.10	134	6.32	0.	-0.10
15	4.70	0.	-0.10	55	4.32	0.	-0.10	95	6.68	0.	-0.10	135	5.90	0.	-0.10
16	4.41	0.	-0.10	56	4.52	0.	-0.10	96	5.14	0.	-0.10	136	9.84	0.	-0.10
17	4.58	0.	-0.10	57	4.43	0.	-0.10	97	1.78	0.	-0.10	137	4.55	0.	-0.10
18	4.58	0.	-0.10	58	5.58	0.	-0.10	98	4.05	0.	-0.10	138	5.14	0.	-0.10
19	4.44	0.	-0.10	59	5.24	0.	-0.10	99	5.30	0.	-0.10	139	0.*	0.	-0.10
20	4.54	0.	-0.10	60	5.98	0.	-0.10	100	6.90	0.	-0.10	140	2.12	0.	-0.10
21	4.62	0.	-0.10	61	12.72	0.	-0.10	101	4.41	0.	-0.10	141	4.16	0.	-0.10
22	5.41	0.	-0.10	62	4.75	0.	-0.10	102	4.66	0.	-0.10	142	4.20	0.	-0.10
23	4.66	0.	-0.10	63	4.63	0.	-0.10	103	6.02	0.	-0.10	143	6.20	0.	-0.10
24	5.32	0.	-0.10	64	4.43	0.	-0.10	104	6.94	0.	-0.10	144	4.58	0.	-0.10
25	4.67	0.	-0.10	65	4.43	0.	-0.10	105	5.90	0.	-0.10	145	5.40	0.	-0.10
26	4.31	0.	-0.10	66	4.36	0.	-0.10	106	6.10	0.	-0.10	146	4.89	0.	-0.10
27	1.53	0.	-0.10	67	0.*	0.	-0.10	107	10.87	0.	-0.10	147	4.63	0.	-0.10
28	0.*	0.	-0.10	68	1.46	0.	-0.10	108	7.33	0.	-0.10	148	4.36	0.	-0.10
29	5.24	0.	-0.10	69	4.92	0.	-0.10	109	5.39	0.	-0.10	149	1.66	0.	-0.10
30	5.87	0.	-0.10	70	4.97	0.	-0.10	110	4.14	0.	-0.10	150	8.73	0.	-0.10
31	6.32	0.	-0.10	71	4.83	0.	-0.10	111	4.91	0.	-0.10	151	7.07	0.	-0.10
32	5.69	0.	-0.10	72	4.74	0.	-0.10	112	6.47	0.	-0.10	152	5.90	0.	-0.10
33	4.51	0.	-0.10	73	5.80	0.	-0.10	113	4.08	0.	-0.10	153	6.74	0.	-0.10
34	5.16	0.	-0.10	74	8.37	0.	-0.10	114	4.43	0.	-0.10	154	5.11	0.	-0.10
35	4.28	0.	-0.10	75	5.02	0.	-0.10	115	3.95	0.	-0.10	155	4.39	0.	-0.10
36	4.64	0.	-0.10	76	4.26	0.	-0.10	116	4.98	0.	-0.10	156	4.45	0.	-0.10
37	5.95	0.	-0.10	77	5.81	0.	-0.10	117	4.07	0.	-0.10	157	0.*	0.	-0.10
38	0.*	0.	-0.10	78	5.10	0.	-0.10	118	4.08	0.	-0.10	158	4.36	0.	-0.10
39	0.*	0.	-0.10	79	5.39	0.	-0.10	119	6.75	0.	-0.10	159	6.38	0.	-0.10
40	4.12	0.	-0.10	80	5.78	0.	-0.10	120	3.87	0.	-0.10				

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NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC
1	0.	*	0.	41	6.43	0.	-0.10	81	5.57	0.	-0.10	121	4.87	0.	-0.10
2	0.	*	0.	42	4.63	0.	-0.10	82	4.59	0.	-0.10	122	6.92	0.	-0.10
3	0.	*	0.	43	4.98	0.	-0.10	83	5.70	0.	-0.10	123	4.83	0.	-0.10
4	0.	*	0.	44	4.18	0.	-0.10	84	5.82	0.	-0.10	124	6.50	0.	-0.10
5	0.	*	0.	45	6.47	0.	-0.10	85	6.53	0.	-0.10	125	19.73	0.	-0.10
6	3.02	0.	-0.10	46	7.40	0.	-0.10	86	10.35	0.	-0.10	126	66.54	0.	-0.10
7	4.07	0.	-0.10	47	8.33	0.	-0.10	87	24.07	0.	-0.10	127	17.76	0.	-0.10
8	4.47	0.	-0.10	48	5.03	0.	-0.10	88	9.81	0.	-0.10	128	36.51	0.	-0.10
9	4.07	0.	-0.10	49	5.48	0.	-0.10	89	2.32	0.	-0.10	129	6.50	0.	-0.10
10	2.93	0.	-0.10	50	4.17	0.	-0.10	90	11.77	0.	-0.10	130	18.40	0.	-0.10
11	1.44	0.	-0.10	51	0.	0.	-0.10	91	7.26	0.	-0.10	131	45.99	0.	-0.10
12	4.75	0.	-0.10	52	0.99	0.	-0.10	92	4.52	0.	-0.10	132	29.42	0.	-0.10
13	2.02	0.	-0.10	53	6.03	0.	-0.10	93	4.92	0.	-0.10	133	13.82	0.	-0.10
14	0.	*	0.	54	3.52	0.	-0.10	94	4.81	0.	-0.10	134	6.22	0.	-0.10
15	4.80	0.	-0.10	55	4.23	0.	-0.10	95	7.97	0.	-0.10	135	7.03	0.	-0.10
16	4.67	0.	-0.10	56	4.63	0.	-0.10	96	5.58	0.	-0.10	136	11.78	0.	-0.10
17	4.89	0.	-0.10	57	4.62	0.	-0.10	97	1.59	0.	-0.10	137	4.23	0.	-0.10
18	4.63	0.	-0.10	58	6.23	0.	-0.10	98	3.78	0.	-0.10	138	6.28	0.	-0.10
19	4.77	0.	-0.10	59	5.53	0.	-0.10	99	6.11	0.	-0.10	139	0.	0.	-0.10
20	4.73	0.	-0.10	60	5.45	0.	-0.10	100	8.29	0.	-0.10	140	1.91	0.	-0.10
21	4.90	0.	-0.10	61	19.15	0.	-0.10	101	4.24	0.	-0.10	141	4.30	0.	-0.10
22	5.98	0.	-0.10	62	5.10	0.	-0.10	102	5.05	0.	-0.10	142	4.29	0.	-0.10
23	4.66	0.	-0.10	63	5.00	0.	-0.10	103	6.96	0.	-0.10	143	7.16	0.	-0.10
24	5.51	0.	-0.10	64	4.69	0.	-0.10	104	9.12	0.	-0.10	144	4.88	0.	-0.10
25	4.75	0.	-0.10	65	4.66	0.	-0.10	105	5.70	0.	-0.10	145	6.13	0.	-0.10
26	4.14	0.	-0.10	66	4.57	0.	-0.10	106	7.66	0.	-0.10	146	5.37	0.	-0.10
27	1.29	0.	-0.10	67	0.	*	0.	107	14.32	0.	-0.10	147	4.98	0.	-0.10
28	0.	*	0.	68	1.26	0.	-0.10	108	9.10	0.	-0.10	148	4.36	0.	-0.10
29	5.76	0.	-0.10	69	5.21	0.	-0.10	109	6.37	0.	-0.10	149	1.50	0.	-0.10
30	6.56	0.	-0.10	70	5.16	0.	-0.10	110	4.21	0.	-0.10	150	11.52	0.	-0.10
31	7.57	0.	-0.10	71	5.19	0.	-0.10	111	5.31	0.	-0.10	151	8.22	0.	-0.10
32	6.46	0.	-0.10	72	5.41	0.	-0.10	112	8.14	0.	-0.10	152	7.11	0.	-0.10
33	4.77	0.	-0.10	73	6.88	0.	-0.10	113	4.14	0.	-0.10	153	8.22	0.	-0.10
34	5.60	0.	-0.10	74	10.47	0.	-0.10	114	4.38	0.	-0.10	154	5.65	0.	-0.10
35	4.40	0.	-0.10	75	5.49	0.	-0.10	115	3.66	0.	-0.10	155	4.65	0.	-0.10
36	4.73	0.	-0.10	76	4.37	0.	-0.10	116	5.02	0.	-0.10	156	4.59	0.	-0.10
37	6.51	0.	-0.10	77	6.91	0.	-0.10	117	4.07	0.	-0.10	157	0.	*	0.
38	0.	*	0.	78	5.68	0.	-0.10	118	4.00	0.	-0.10	158	4.44	0.	-0.10
39	0.	*	0.	79	5.87	0.	-0.10	119	7.66	0.	-0.10	159	7.37	0.	-0.10
40	4.18	0.	-0.10	80	7.06	0.	-0.10	120	4.04	0.	-0.10				

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TWO DIMENSIONAL FINITE ELEMENT FOR HORIZONTAL PROBLEMS OF VARIABLE THICKNESS
INITIAL APPLICATION TO THE FAIRBANKS, ALASKA AIRSHED...

TEST DATA TO CHECK NORTON'S APRIL 28 CHANGES

...RESULTS AFTER 10 HOURS OF DYNAMIC SIMULATION...

...CONCENTRATIONS ARE MEAN VERTICAL VALUES...

... OUTPUT FOR NODES 1 TO 159 ... THE SYMBOL * DENOTES A SPECIFIED VALUE ...

NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC
1	0.	*	0.	41	6.92	0.	-0.10	81	6.49	0.	-0.10	121	5.16	0.	-0.10
2	0.	*	0.	42	4.64	0.	-0.10	82	4.76	0.	-0.10	122	7.85	0.	-0.10
3	0.	*	0.	43	5.24	0.	-0.10	83	5.78	0.	-0.10	123	4.13	0.	-0.10
4	0.	*	0.	44	3.50	0.	-0.10	84	5.84	0.	-0.10	124	7.18	0.	-0.10
5	0.	*	0.	45	7.32	0.	-0.10	85	7.18	0.	-0.10	125	23.93	0.	-0.10
6	2.99	0.	-0.10	46	8.38	0.	-0.10	86	13.02	0.	-0.10	126	77.35	0.	-0.10
7	4.14	0.	-0.10	47	8.23	0.	-0.10	87	28.82	0.	-0.10	127	21.55	0.	-0.10
8	4.48	0.	-0.10	48	8.58	0.	-0.10	88	12.38	0.	-0.10	128	49.09	0.	-0.10
9	4.05	0.	-0.10	49	6.27	0.	-0.10	89	1.04	0.	-0.10	129	6.90	0.	-0.10
10	2.76	0.	-0.10	50	4.36	0.	-0.10	90	14.91	0.	-0.10	130	20.48	0.	-0.10
11	1.22	0.	-0.10	51	0.	*	0.	91	9.71	0.	-0.10	131	49.61	0.	-0.10
12	4.60	0.	-0.10	52	0.79	0.	-0.10	92	4.65	0.	-0.10	132	32.77	0.	-0.10
13	1.85	0.	-0.10	53	6.60	0.	-0.10	93	5.23	0.	-0.10	133	14.38	0.	-0.10
14	0.	*	0.	54	3.25	0.	-0.10	94	4.51	0.	-0.10	134	6.22	0.	-0.10
15	4.37	0.	-0.10	55	4.07	0.	-0.10	95	9.41	0.	-0.10	135	8.37	0.	-0.10
16	4.91	0.	-0.10	56	4.70	0.	-0.10	96	5.46	0.	-0.10	136	12.21	0.	-0.10
17	5.18	0.	-0.10	57	4.79	0.	-0.10	97	1.41	0.	-0.10	137	5.12	0.	-0.10
18	4.67	0.	-0.10	58	6.34	0.	-0.10	98	3.47	0.	-0.10	138	7.96	0.	-0.10
19	5.06	0.	-0.10	59	6.01	0.	-0.10	99	6.89	0.	-0.10	139	0.	*	0.
20	4.87	0.	-0.10	60	4.33	0.	-0.10	100	9.15	0.	-0.10	140	1.71	0.	-0.10
21	5.20	0.	-0.10	61	27.29	0.	-0.10	101	4.06	0.	-0.10	141	4.48	0.	-0.10
22	6.40	0.	-0.10	62	5.47	0.	-0.10	102	5.52	0.	-0.10	142	4.35	0.	-0.10
23	4.59	0.	-0.10	63	5.45	0.	-0.10	103	8.18	0.	-0.10	143	7.70	0.	-0.10
24	5.56	0.	-0.10	64	5.02	0.	-0.10	104	11.17	0.	-0.10	144	5.16	0.	-0.10
25	4.80	0.	-0.10	65	4.83	0.	-0.10	105	4.76	0.	-0.10	145	6.79	0.	-0.10
26	3.92	0.	-0.10	66	4.35	0.	-0.10	106	9.74	0.	-0.10	146	5.37	0.	-0.10
27	1.07	0.	-0.10	67	0.	*	0.	107	17.35	0.	-0.10	147	5.23	0.	-0.10
28	0.	*	0.	68	1.07	0.	-0.10	108	10.62	0.	-0.10	148	4.29	0.	-0.10
29	6.28	0.	-0.10	69	5.43	0.	-0.10	109	7.39	0.	-0.10	149	1.36	0.	-0.10
30	7.45	0.	-0.10	70	5.23	0.	-0.10	110	4.18	0.	-0.10	150	13.96	0.	-0.10
31	8.12	0.	-0.10	71	5.44	0.	-0.10	111	5.63	0.	-0.10	151	8.88	0.	-0.10
32	6.89	0.	-0.10	72	5.82	0.	-0.10	112	10.37	0.	-0.10	152	8.33	0.	-0.10
33	5.01	0.	-0.10	73	8.06	0.	-0.10	113	4.19	0.	-0.10	153	9.60	0.	-0.10
34	5.89	0.	-0.10	74	12.14	0.	-0.10	114	4.30	0.	-0.10	154	5.66	0.	-0.10
35	4.47	0.	-0.10	75	6.07	0.	-0.10	115	3.35	0.	-0.10	155	4.89	0.	-0.10
36	4.77	0.	-0.10	76	4.41	0.	-0.10	116	4.97	0.	-0.10	156	4.83	0.	-0.10
37	7.08	0.	-0.10	77	8.49	0.	-0.10	117	4.07	0.	-0.10	157	0.	*	0.
38	0.	*	0.	78	5.96	0.	-0.10	118	3.97	0.	-0.10	158	4.62	0.	-0.10
39	0.	*	0.	79	5.73	0.	-0.10	119	7.99	0.	-0.10	159	8.31	0.	-0.10
40	4.21	0.	-0.10	80	8.86	0.	-0.10	120	4.33	0.	-0.10				

MATHEMATICAL SIMULATION OF CARBON MONOXIDE DISTRIBUTION IN THE ATMOSPHERE
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... OUTPUT FOR NODES 1 TO 159 ... THE SYMBOL * DENOTES A SPECIFIED VALUE ...

NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC
1	0. *	0.	-0.10	41	7.35	0.	-0.10	81	7.48	0.	-0.10	121	5.36	0.	-0.10
2	0. *	0.	-0.10	42	4.77	0.	-0.10	82	5.04	0.	-0.10	122	8.33	0.	-0.10
3	0. *	0.	-0.10	43	5.49	0.	-0.10	83	5.62	0.	-0.10	123	3.48	0.	-0.10
4	0. *	0.	-0.10	44	2.75	0.	-0.10	84	5.39	0.	-0.10	124	7.40	0.	-0.10
5	0. *	0.	-0.10	45	7.88	0.	-0.10	85	7.55	0.	-0.10	125	25.41	0.	-0.10
6	2.97	0.	-0.10	46	8.99	0.	-0.10	86	15.73	0.	-0.10	126	78.82	0.	-0.10
7	4.21	0.	-0.10	47	7.47	0.	-0.10	87	30.03	0.	-0.10	127	23.99	0.	-0.10
8	4.45	0.	-0.10	48	8.75	0.	-0.10	88	14.58	0.	-0.10	128	58.61	0.	-0.10
9	4.03	0.	-0.10	49	7.20	0.	-0.10	89	-0.07	0.	-0.10	129	7.00	0.	-0.10
10	2.58	0.	-0.10	50	4.60	0.	-0.10	90	17.64	0.	-0.10	130	20.17	0.	-0.10
11	1.01	0.	-0.10	51	0. *	0.	-0.10	91	17.80	0.	-0.10	131	46.43	0.	-0.10
12	4.44	0.	-0.10	52	0.62	0.	-0.10	92	4.83	0.	-0.10	132	32.52	0.	-0.10
13	1.70	0.	-0.10	53	7.50	0.	-0.10	93	5.68	0.	-0.10	133	14.65	0.	-0.10
14	0. *	0.	-0.10	54	2.98	0.	-0.10	94	3.92	0.	-0.10	134	6.75	0.	-0.10
15	4.91	0.	-0.10	55	3.83	0.	-0.10	95	11.04	0.	-0.10	135	9.88	0.	-0.10
16	5.10	0.	-0.10	56	4.68	0.	-0.10	96	5.42	0.	-0.10	136	10.80	0.	-0.10
17	5.40	0.	-0.10	57	4.95	0.	-0.10	97	1.24	0.	-0.10	137	5.51	0.	-0.10
18	4.68	0.	-0.10	58	6.20	0.	-0.10	98	3.13	0.	-0.10	138	9.95	0.	-0.10
19	5.31	0.	-0.10	59	6.93	0.	-0.10	99	7.57	0.	-0.10	139	0. *	0.	-0.10
20	4.93	0.	-0.10	60	3.45	0.	-0.10	100	9.80	0.	-0.10	140	1.52	0.	-0.10
21	5.55	0.	-0.10	61	36.07	0.	-0.10	101	3.86	0.	-0.10	141	4.71	0.	-0.10
22	6.66	0.	-0.10	62	5.79	0.	-0.10	102	6.10	0.	-0.10	142	4.37	0.	-0.10
23	4.44	0.	-0.10	63	5.77	0.	-0.10	103	9.25	0.	-0.10	143	8.11	0.	-0.10
24	5.46	0.	-0.10	64	5.43	0.	-0.10	104	12.39	0.	-0.10	144	5.40	0.	-0.10
25	4.75	0.	-0.10	65	4.98	0.	-0.10	105	3.41	0.	-0.10	145	7.25	0.	-0.10
26	3.67	0.	-0.10	66	5.37	0.	-0.10	106	11.93	0.	-0.10	146	5.85	0.	-0.10
27	0.88	0.	-0.10	67	0. *	0.	-0.10	107	19.01	0.	-0.10	147	5.41	0.	-0.10
28	0. *	0.	-0.10	68	0.89	0.	-0.10	108	11.57	0.	-0.10	148	4.15	0.	-0.10
29	6.75	0.	-0.10	69	5.68	0.	-0.10	109	8.50	0.	-0.10	149	1.24	0.	-0.10
30	3.27	0.	-0.10	70	5.21	0.	-0.10	110	4.10	0.	-0.10	150	15.69	0.	-0.10
31	8.43	0.	-0.10	71	5.71	0.	-0.10	111	5.93	0.	-0.10	151	9.84	0.	-0.10
32	7.39	0.	-0.10	72	6.05	0.	-0.10	112	14.87	0.	-0.10	152	9.30	0.	-0.10
33	5.21	0.	-0.10	73	9.29	0.	-0.10	113	4.21	0.	-0.10	153	10.62	0.	-0.10
34	5.94	0.	-0.10	74	13.00	0.	-0.10	114	4.19	0.	-0.10	154	6.00	0.	-0.10
35	4.53	0.	-0.10	75	6.72	0.	-0.10	115	3.04	0.	-0.10	155	5.07	0.	-0.10
36	4.73	0.	-0.10	76	4.48	0.	-0.10	116	4.83	0.	-0.10	156	5.14	0.	-0.10
37	7.74	0.	-0.10	77	10.07	0.	-0.10	117	4.04	0.	-0.10	157	0. *	0.	-0.10
38	0. *	0.	-0.10	78	5.85	0.	-0.10	118	3.97	0.	-0.10	158	4.33	0.	-0.10
39	0. *	0.	-0.10	79	5.16	0.	-0.10	119	7.89	0.	-0.10	159	8.98	0.	-0.10
40	4.18	0.	-0.10	80	11.15	0.	-0.10	120	4.85	0.	-0.10				

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NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC
1	0.	*	0.	41	7.98	0.	-0.10	81	8.42	0.	-0.10	121	5.44	0.	-0.10
2	0.	*	0.	42	5.07	0.	-0.10	82	5.37	0.	-0.10	122	8.71	0.	-0.10
3	0.	*	0.	43	5.74	0.	-0.10	83	5.47	0.	-0.10	123	3.31	0.	-0.10
4	0.	*	0.	44	2.39	0.	-0.10	84	5.13	0.	-0.10	124	7.52	0.	-0.10
5	0.	*	0.	45	7.98	0.	-0.10	85	7.77	0.	-0.10	125	24.85	0.	-0.10
6	2.97	0.	-0.10	46	9.44	0.	-0.10	86	18.18	0.	-0.10	126	74.28	0.	-0.10
7	4.28	0.	-0.10	47	6.82	0.	-0.10	87	28.37	0.	-0.10	127	25.08	0.	-0.10
8	4.39	0.	-0.10	48	9.03	0.	-0.10	88	16.02	0.	-0.10	128	63.79	0.	-0.10
9	3.99	0.	-0.10	49	8.19	0.	-0.10	89	-0.66	0.	-0.10	129	6.97	0.	-0.10
10	2.39	0.	-0.10	50	4.91	0.	-0.10	90	19.72	0.	-0.10	130	18.58	0.	-0.10
11	0.82	0.	-0.10	51	0.	*	0.	91	16.11	0.	-0.10	131	41.10	0.	-0.10
12	4.23	0.	-0.10	52	0.48	0.	-0.10	92	5.10	0.	-0.10	132	30.95	0.	-0.10
13	1.55	0.	-0.10	53	8.56	0.	-0.10	93	6.60	0.	-0.10	133	14.26	0.	-0.10
14	0.	*	0.	54	2.73	0.	-0.10	94	3.28	0.	-0.10	134	8.20	0.	-0.10
15	4.94	0.	-0.10	55	3.52	0.	-0.10	95	12.87	0.	-0.10	135	11.33	0.	-0.10
16	5.27	0.	-0.10	56	4.60	0.	-0.10	96	5.60	0.	-0.10	136	8.41	0.	-0.10
17	5.57	0.	-0.10	57	5.04	0.	-0.10	97	1.03	0.	-0.10	137	6.17	0.	-0.10
18	4.68	0.	-0.10	58	6.12	0.	-0.10	98	2.77	0.	-0.10	138	11.94	0.	-0.10
19	5.56	0.	-0.10	59	8.38	0.	-0.10	99	8.11	0.	-0.10	139	0.	*	0.
20	4.95	0.	-0.10	60	3.45	0.	-0.10	100	10.65	0.	-0.10	140	1.32	0.	-0.10
21	5.96	0.	-0.10	61	44.29	0.	-0.10	101	3.67	0.	-0.10	141	4.98	0.	-0.10
22	6.79	0.	-0.10	62	6.02	0.	-0.10	102	6.73	0.	-0.10	142	4.37	0.	-0.10
23	4.23	0.	-0.10	63	6.58	0.	-0.10	103	10.09	0.	-0.10	143	8.62	0.	-0.10
24	5.26	0.	-0.10	64	5.95	0.	-0.10	104	12.68	0.	-0.10	144	5.59	0.	-0.10
25	4.59	0.	-0.10	65	5.18	0.	-0.10	105	2.43	0.	-0.10	145	7.57	0.	-0.10
26	3.42	0.	-0.10	66	6.31	0.	-0.10	106	13.62	0.	-0.10	146	6.96	0.	-0.10
27	0.70	0.	-0.10	67	0.	*	0.	107	19.07	0.	-0.10	147	5.57	0.	-0.10
28	0.	*	0.	68	0.73	0.	-0.10	108	11.99	0.	-0.10	148	3.93	0.	-0.10
29	7.19	0.	-0.10	69	6.00	0.	-0.10	109	9.67	0.	-0.10	149	1.15	0.	-0.10
30	8.94	0.	-0.10	70	5.13	0.	-0.10	110	3.99	0.	-0.10	150	16.66	0.	-0.10
31	9.07	0.	-0.10	71	6.13	0.	-0.10	111	6.28	0.	-0.10	151	10.80	0.	-0.10
32	8.08	0.	-0.10	72	6.47	0.	-0.10	112	20.14	0.	-0.10	152	9.90	0.	-0.10
33	5.37	0.	-0.10	73	10.54	0.	-0.10	113	4.23	0.	-0.10	153	11.11	0.	-0.10
34	5.78	0.	-0.10	74	13.11	0.	-0.10	114	4.05	0.	-0.10	154	6.64	0.	-0.10
35	4.64	0.	-0.10	75	7.45	0.	-0.10	115	2.74	0.	-0.10	155	5.23	0.	-0.10
36	4.65	0.	-0.10	76	4.63	0.	-0.10	116	4.65	0.	-0.10	156	5.53	0.	-0.10
37	8.52	0.	-0.10	77	11.28	0.	-0.10	117	3.97	0.	-0.10	157	0.	*	0.
38	0.	*	0.	78	5.41	0.	-0.10	118	4.00	0.	-0.10	158	5.06	0.	-0.10
39	0.	*	0.	79	4.69	0.	-0.10	119	7.94	0.	-0.10	159	9.41	0.	-0.10
40	4.06	0.	-0.10	80	13.72	0.	-0.10	120	5.45	0.	-0.10				

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1	0.	*	0.	41	8.79	0.	-0.10	81	9.24	0.	-0.10	121	5.50	0.	-0.10
2	0.	*	0.	42	5.47	0.	-0.10	82	5.71	0.	-0.10	122	9.47	0.	-0.10
3	0.	*	0.	43	6.04	0.	-0.10	83	5.49	0.	-0.10	123	3.85	0.	-0.10
4	0.	*	0.	44	2.86	0.	-0.10	84	5.43	0.	-0.10	124	8.01	0.	-0.10
5	0.	*	0.	45	7.63	0.	-0.10	85	7.95	0.	-0.10	125	24.73	0.	-0.10
6	2.98	0.	-0.10	46	10.22	0.	-0.10	86	20.51	0.	-0.10	126	74.31	0.	-0.10
7	4.36	0.	-0.10	47	7.39	0.	-0.10	87	27.17	0.	-0.10	127	24.20	0.	-0.10
8	4.30	0.	-0.10	48	10.11	0.	-0.10	88	17.04	0.	-0.10	128	66.78	0.	-0.10
9	3.95	0.	-0.10	49	9.13	0.	-0.10	89	0.55	0.	-0.10	129	7.30	0.	-0.10
10	2.20	0.	-0.10	50	5.27	0.	-0.10	90	21.53	0.	-0.10	130	18.68	0.	-0.10
11	0.66	0.	-0.10	51	0.	*	0.	91	19.18	0.	-0.10	131	42.76	0.	-0.10
12	4.13	0.	-0.10	52	0.36	0.	-0.10	92	5.52	0.	-0.10	132	37.74	0.	-0.10
13	1.40	0.	-0.10	53	9.61	0.	-0.10	93	2.38	0.	-0.10	133	15.57	0.	-0.10
14	0.	*	0.	54	2.52	0.	-0.10	94	2.77	0.	-0.10	134	10.77	0.	-0.10
15	4.98	0.	-0.10	55	3.14	0.	-0.10	95	14.91	0.	-0.10	135	12.63	0.	-0.10
16	5.46	0.	-0.10	56	4.51	0.	-0.10	96	5.72	0.	-0.10	136	6.96	0.	-0.10
17	5.75	0.	-0.10	57	5.05	0.	-0.10	97	0.92	0.	-0.10	137	7.28	0.	-0.10
18	4.68	0.	-0.10	58	6.26	0.	-0.10	98	2.42	0.	-0.10	138	13.62	0.	-0.10
19	5.85	0.	-0.10	59	10.22	0.	-0.10	99	8.56	0.	-0.10	139	0.	*	0.
20	4.98	0.	-0.10	60	4.80	0.	-0.10	100	11.73	0.	-0.10	140	1.14	0.	-0.10
21	6.40	0.	-0.10	61	51.45	0.	-0.10	101	3.49	0.	-0.10	141	5.29	0.	-0.10
22	6.90	0.	-0.10	62	6.17	0.	-0.10	102	7.34	0.	-0.10	142	4.38	0.	-0.10
23	4.03	0.	-0.10	63	7.28	0.	-0.10	103	10.95	0.	-0.10	143	9.39	0.	-0.10
24	5.10	0.	-0.10	64	6.57	0.	-0.10	104	12.62	0.	-0.10	144	5.71	0.	-0.10
25	4.34	0.	-0.10	65	5.55	0.	-0.10	105	2.96	0.	-0.10	145	7.98	0.	-0.10
26	3.19	0.	-0.10	66	7.86	0.	-0.10	106	14.49	0.	-0.10	146	8.09	0.	-0.10
27	0.55	0.	-0.10	67	0.	*	0.	107	18.67	0.	-0.10	147	5.79	0.	-0.10
28	0.	*	0.	68	0.59	0.	-0.10	108	12.58	0.	-0.10	148	3.64	0.	-0.10
29	7.70	0.	-0.10	69	6.46	0.	-0.10	109	10.89	0.	-0.10	149	1.09	0.	-0.10
30	9.64	0.	-0.10	70	5.03	0.	-0.10	110	3.90	0.	-0.10	150	17.58	0.	-0.10
31	10.09	0.	-0.10	71	6.56	0.	-0.10	111	6.69	0.	-0.10	151	11.79	0.	-0.10
32	8.85	0.	-0.10	72	7.09	0.	-0.10	112	26.46	0.	-0.10	152	10.31	0.	-0.10
33	5.59	0.	-0.10	73	11.86	0.	-0.10	113	4.23	0.	-0.10	153	11.34	0.	-0.10
34	5.57	0.	-0.10	74	13.15	0.	-0.10	114	3.89	0.	-0.10	154	6.99	0.	-0.10
35	4.87	0.	-0.10	75	8.32	0.	-0.10	115	2.46	0.	-0.10	155	5.51	0.	-0.10
36	4.56	0.	-0.10	76	4.90	0.	-0.10	116	4.44	0.	-0.10	156	6.00	0.	-0.10
37	9.46	0.	-0.10	77	12.19	0.	-0.10	117	3.87	0.	-0.10	157	0.	*	0.
38	0.	*	0.	78	4.39	0.	-0.10	118	4.01	0.	-0.10	158	5.31	0.	-0.10
39	0.	*	0.	79	4.79	0.	-0.10	119	8.78	0.	-0.10	159	9.99	0.	-0.10
40	3.93	0.	-0.10	80	16.26	0.	-0.10	120	5.78	0.	-0.10				

MATHEMATICAL SIMULATION OF CARBON MONOXIDE DISTRIBUTION IN THE ATMOSPHERE
TWO DIMENSIONAL FINITE ELEMENT FOR HORIZONTAL PROBLEMS OF VARIABLE THICKNESS
INITIAL APPLICATION TO THE FAIRBANKS, ALASKA AIRSHED...

TEST DATA TO CHECK NORTON'S APRIL 28 CHANGES

...RESULTS AFTER 14 HOURS OF DYNAMIC SIMULATION...

...CONCENTRATIONS ARE MEAN VERTICAL VALUES...

... OUTPUT FOR NODES 1 TO 159 ...				... THE SYMBOL * DENOTES A SPECIFIED VALUE ...											
NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC
1	0.	*	0.	41	9.53	0.	-0.10	81	9.72	0.	-0.10	121	5.56	0.	-0.10
2	0.	*	0.	42	5.79	0.	-0.10	82	6.02	0.	-0.10	122	10.46	0.	-0.10
3	0.	*	0.	43	6.29	0.	-0.10	83	5.30	0.	-0.10	123	4.45	0.	-0.10
4	0.	*	0.	44	3.98	0.	-0.10	84	5.86	0.	-0.10	124	8.47	0.	-0.10
5	0.	*	0.	45	7.66	0.	-0.10	85	3.01	0.	-0.10	125	25.18	0.	-0.10
6	3.00	0.	-0.10	46	10.96	0.	-0.10	86	22.15	0.	-0.10	126	72.63	0.	-0.10
7	4.43	0.	-0.10	47	7.96	0.	-0.10	87	26.51	0.	-0.10	127	26.05	0.	-0.10
8	4.18	0.	-0.10	48	11.43	0.	-0.10	88	17.64	0.	-0.10	128	67.08	0.	-0.10
9	3.89	0.	-0.10	49	9.78	0.	-0.10	89	-0.23	0.	-0.10	129	7.81	0.	-0.10
10	2.01	0.	-0.10	50	5.70	0.	-0.10	90	22.44	0.	-0.10	130	18.18	0.	-0.10
11	0.52	0.	-0.10	51	0.	*	0.	91	21.63	0.	-0.10	131	41.51	0.	-0.10
12	4.00	0.	-0.10	52	0.26	0.	-0.10	92	6.05	0.	-0.10	132	33.19	0.	-0.10
13	1.26	0.	-0.10	53	10.52	0.	-0.10	93	11.28	0.	-0.10	133	16.53	0.	-0.10
14	0.	*	0.	54	2.35	0.	-0.10	94	2.35	0.	-0.10	134	12.23	0.	-0.10
15	5.01	0.	-0.10	55	2.68	0.	-0.10	95	16.23	0.	-0.10	135	13.30	0.	-0.10
16	5.62	0.	-0.10	56	4.38	0.	-0.10	96	5.75	0.	-0.10	136	5.74	0.	-0.10
17	5.90	0.	-0.10	57	4.98	0.	-0.10	97	0.76	0.	-0.10	137	8.77	0.	-0.10
18	4.66	0.	-0.10	58	6.15	0.	-0.10	98	2.09	0.	-0.10	138	14.85	0.	-0.10
19	6.11	0.	-0.10	59	11.84	0.	-0.10	99	8.83	0.	-0.10	139	0.	*	0.
20	4.95	0.	-0.10	60	5.76	0.	-0.10	100	12.71	0.	-0.10	140	0.95	0.	-0.10
21	6.80	0.	-0.10	61	56.58	0.	-0.10	101	3.31	0.	-0.10	141	5.60	0.	-0.10
22	6.86	0.	-0.10	62	6.27	0.	-0.10	102	7.62	0.	-0.10	142	4.37	0.	-0.10
23	3.79	0.	-0.10	63	3.07	0.	-0.10	103	11.85	0.	-0.10	143	10.23	0.	-0.10
24	4.88	0.	-0.10	64	7.24	0.	-0.10	104	12.99	0.	-0.10	144	5.72	0.	-0.10
25	3.98	0.	-0.10	65	6.18	0.	-0.10	105	4.05	0.	-0.10	145	8.35	0.	-0.10
26	2.97	0.	-0.10	66	9.97	0.	-0.10	106	14.31	0.	-0.10	146	8.92	0.	-0.10
27	0.42	0.	-0.10	67	0.	*	0.	107	17.78	0.	-0.10	147	6.02	0.	-0.10
28	0.	*	0.	68	0.47	0.	-0.10	108	13.09	0.	-0.10	148	3.29	0.	-0.10
29	8.23	0.	-0.10	69	6.95	0.	-0.10	109	12.05	0.	-0.10	149	1.04	0.	-0.10
30	10.33	0.	-0.10	70	4.91	0.	-0.10	110	3.77	0.	-0.10	150	18.63	0.	-0.10
31	11.04	0.	-0.10	71	6.93	0.	-0.10	111	7.06	0.	-0.10	151	12.61	0.	-0.10
32	9.54	0.	-0.10	72	7.41	0.	-0.10	112	33.31	0.	-0.10	152	10.83	0.	-0.10
33	5.84	0.	-0.10	73	12.97	0.	-0.10	113	4.21	0.	-0.10	153	11.16	0.	-0.10
34	5.35	0.	-0.10	74	12.75	0.	-0.10	114	3.71	0.	-0.10	154	6.90	0.	-0.10
35	5.19	0.	-0.10	75	9.19	0.	-0.10	115	2.23	0.	-0.10	155	5.93	0.	-0.10
36	4.43	0.	-0.10	76	5.22	0.	-0.10	116	4.21	0.	-0.10	156	6.59	0.	-0.10
37	10.41	0.	-0.10	77	12.62	0.	-0.10	117	3.74	0.	-0.10	157	0.	*	0.
38	0.	*	0.	78	4.54	0.	-0.10	118	4.03	0.	-0.10	158	5.59	0.	-0.10
39	0.	*	0.	79	4.96	0.	-0.10	119	9.51	0.	-0.10	159	10.50	0.	-0.10
40	3.78	0.	-0.10	80	18.39	0.	-0.10	120	5.85	0.	-0.10				

MATHEMATICAL SIMULATION OF CARBON MONOXIDE DISTRIBUTION IN THE ATMOSPHERE
TWO DIMENSIONAL FINITE ELEMENT FOR HORIZONTAL PROBLEMS OF VARIABLE THICKNESS
INITIAL APPLICATION TO THE FAIRBANKS, ALASKA AIRSHED...

TEST DATA TO CHECK MORTON'S APRIL 22 CHANGES

...RESULTS AFTER 15 HOURS OF DYNAMIC SIMULATION...

...CONCENTRATIONS ARE MEAN VERTICAL VALUES...

... OUTPUT FOR NODES 1 TO 159 ...				... THE SYMBOL * DENOTES A SPECIFIED VALUE ...											
NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC
1	0.	*	0.	41	10.08	0.	-0.10	81	9.81	0.	-0.10	121	5.60	0.	-0.10
2	0.	*	0.	42	5.94	0.	-0.10	82	6.26	0.	-0.10	122	11.42	0.	-0.10
3	0.	*	0.	43	6.49	0.	-0.10	83	4.99	0.	-0.10	123	4.20	0.	-0.10
4	0.	*	0.	44	5.48	0.	-0.10	84	6.19	0.	-0.10	124	8.72	0.	-0.10
5	0.	*	0.	45	7.60	0.	-0.10	85	7.95	0.	-0.10	125	25.31	0.	-0.10
6	3.04	0.	-0.10	46	11.36	0.	-0.10	86	22.97	0.	-0.10	126	67.39	0.	-0.10
7	4.49	0.	-0.10	47	8.09	0.	-0.10	87	25.53	0.	-0.10	127	24.55	0.	-0.10
8	4.02	0.	-0.10	48	12.63	0.	-0.10	88	17.87	0.	-0.10	128	64.90	0.	-0.10
9	3.82	0.	-0.10	49	10.13	0.	-0.10	89	0.63	0.	-0.10	129	8.22	0.	-0.10
10	1.80	0.	-0.10	50	6.23	0.	-0.10	90	22.30	0.	-0.10	130	17.56	0.	-0.10
11	0.39	0.	-0.10	51	0.	*	0.	91	23.15	0.	-0.10	131	37.41	0.	-0.10
12	3.39	0.	-0.10	52	0.16	0.	-0.10	92	6.65	0.	-0.10	132	32.00	0.	-0.10
13	1.12	0.	-0.10	53	11.35	0.	-0.10	93	15.41	0.	-0.10	133	16.67	0.	-0.10
14	0.	*	0.	54	2.22	0.	-0.10	94	2.26	0.	-0.10	134	13.32	0.	-0.10
15	5.02	0.	-0.10	55	2.14	0.	-0.10	95	16.47	0.	-0.10	135	13.54	0.	-0.10
16	5.72	0.	-0.10	56	4.18	0.	-0.10	96	5.78	0.	-0.10	136	4.45	0.	-0.10
17	6.00	0.	-0.10	57	4.87	0.	-0.10	97	0.60	0.	-0.10	137	10.57	0.	-0.10
18	4.63	0.	-0.10	58	5.80	0.	-0.10	98	1.79	0.	-0.10	138	15.51	0.	-0.10
19	6.31	0.	-0.10	59	13.14	0.	-0.10	99	9.04	0.	-0.10	139	0.	*	0.
20	4.85	0.	-0.10	60	6.23	0.	-0.10	100	13.50	0.	-0.10	140	0.76	0.	-0.10
21	7.10	0.	-0.10	61	59.15	0.	-0.10	101	3.10	0.	-0.10	141	5.91	0.	-0.10
22	6.64	0.	-0.10	62	6.37	0.	-0.10	102	8.13	0.	-0.10	142	4.36	0.	-0.10
23	3.54	0.	-0.10	63	8.87	0.	-0.10	103	12.73	0.	-0.10	143	11.12	0.	-0.10
24	4.61	0.	-0.10	64	7.90	0.	-0.10	104	13.57	0.	-0.10	144	5.60	0.	-0.10
25	3.52	0.	-0.10	65	7.17	0.	-0.10	105	5.18	0.	-0.10	145	8.64	0.	-0.10
26	2.79	0.	-0.10	66	12.51	0.	-0.10	106	13.80	0.	-0.10	146	9.44	0.	-0.10
27	0.30	0.	-0.10	67	0.	*	0.	107	16.66	0.	-0.10	147	6.21	0.	-0.10
28	0.	*	0.	68	0.37	0.	-0.10	108	13.40	0.	-0.10	148	2.39	0.	-0.10
29	8.77	0.	-0.10	69	7.43	0.	-0.10	109	13.12	0.	-0.10	149	0.99	0.	-0.10
30	11.01	0.	-0.10	70	4.77	0.	-0.10	110	3.59	0.	-0.10	150	19.27	0.	-0.10
31	11.75	0.	-0.10	71	7.15	0.	-0.10	111	7.32	0.	-0.10	151	13.39	0.	-0.10
32	10.11	0.	-0.10	72	7.31	0.	-0.10	112	40.05	0.	-0.10	152	11.58	0.	-0.10
33	6.14	0.	-0.10	73	13.77	0.	-0.10	113	4.15	0.	-0.10	153	10.75	0.	-0.10
34	5.11	0.	-0.10	74	12.03	0.	-0.10	114	3.51	0.	-0.10	154	6.61	0.	-0.10
35	5.59	0.	-0.10	75	10.01	0.	-0.10	115	2.03	0.	-0.10	155	6.61	0.	-0.10
36	4.23	0.	-0.10	76	5.62	0.	-0.10	116	3.96	0.	-0.10	156	7.29	0.	-0.10
37	11.32	0.	-0.10	77	12.65	0.	-0.10	117	3.59	0.	-0.10	157	0.	*	0.
38	0.	*	0.	78	4.27	0.	-0.10	118	4.09	0.	-0.10	158	5.90	0.	-0.10
39	0.	*	0.	79	5.07	0.	-0.10	119	9.88	0.	-0.10	159	10.84	0.	-0.10
40	3.64	0.	-0.10	80	19.85	0.	-0.10	120	5.74	0.	-0.10				

MATHEMATICAL SIMULATION OF CARBON MONOXIDE DISTRIBUTION IN THE ATMOSPHERE
 TWO DIMENSIONAL FINITE ELEMENT FOR HORIZONTAL PROBLEMS OF VARIABLE THICKNESS
 INITIAL APPLICATION TO THE FAIRBANKS, ALASKA AIRSHED...

TEST DATA TO CHECK NORTON'S APRIL 28 CHANGES

...RESULTS AFTER 15 HOURS OF DYNAMIC SIMULATION...

...CONCENTRATIONS ARE MEAN VERTICAL VALUES...

... OUTPUT FOR NODES 1 TO 159 ... THE SYMBOL * DENOTES A SPECIFIED VALUE ...

NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC
1	0. *	0.	-0.10	41	10.42	0.	-0.10	81	9.63	0.	-0.10	121	5.61	0.	-0.10
2	0. *	0.	-0.10	42	5.92	0.	-0.10	82	6.35	0.	-0.10	122	12.28	0.	-0.10
3	0. *	0.	-0.10	43	6.72	0.	-0.10	83	4.81	0.	-0.10	123	5.52	0.	-0.10
4	0. *	0.	-0.10	44	7.13	0.	-0.10	84	6.41	0.	-0.10	124	8.98	0.	-0.10
5	0. *	0.	-0.10	45	7.58	0.	-0.10	85	7.85	0.	-0.10	125	25.44	0.	-0.10
6	3.09	0.	-0.10	46	11.61	0.	-0.10	86	23.34	0.	-0.10	126	65.25	0.	-0.10
7	4.54	0.	-0.10	47	9.60	0.	-0.10	87	25.42	0.	-0.10	127	23.01	0.	-0.10
8	3.85	0.	-0.10	48	13.66	0.	-0.10	88	17.98	0.	-0.10	128	62.29	0.	-0.10
9	3.74	0.	-0.10	49	10.32	0.	-0.10	89	2.24	0.	-0.10	129	8.51	0.	-0.10
10	1.59	0.	-0.10	50	6.88	0.	-0.10	90	21.97	0.	-0.10	130	18.69	0.	-0.10
11	0.29	0.	-0.10	51	0. *	0.	-0.10	91	23.63	0.	-0.10	131	38.10	0.	-0.10
12	3.81	0.	-0.10	52	0.37	0.	-0.10	92	7.33	0.	-0.10	132	32.79	0.	-0.10
13	0.97	0.	-0.10	53	12.22	0.	-0.10	93	20.75	0.	-0.10	133	17.36	0.	-0.10
14	0. *	0.	-0.10	54	2.14	0.	-0.10	94	2.61	0.	-0.10	134	14.47	0.	-0.10
15	5.05	0.	-0.10	55	1.58	0.	-0.10	95	16.19	0.	-0.10	135	13.59	0.	-0.10
16	5.81	0.	-0.10	56	3.95	0.	-0.10	96	5.79	0.	-0.10	136	4.06	0.	-0.10
17	6.10	0.	-0.10	57	4.75	0.	-0.10	97	0.43	0.	-0.10	137	12.63	0.	-0.10
18	4.60	0.	-0.10	58	5.57	0.	-0.10	98	1.55	0.	-0.10	138	15.63	0.	-0.10
19	6.49	0.	-0.10	59	14.23	0.	-0.10	99	9.38	0.	-0.10	139	0. *	0.	-0.10
20	4.74	0.	-0.10	60	7.39	0.	-0.10	100	14.23	0.	-0.10	140	0.57	0.	-0.10
21	7.26	0.	-0.10	61	59.55	0.	-0.10	101	2.88	0.	-0.10	141	6.20	0.	-0.10
22	6.34	0.	-0.10	62	6.49	0.	-0.10	102	8.39	0.	-0.10	142	4.37	0.	-0.10
23	3.32	0.	-0.10	63	9.61	0.	-0.10	103	13.62	0.	-0.10	143	12.16	0.	-0.10
24	4.39	0.	-0.10	64	8.53	0.	-0.10	104	13.79	0.	-0.10	144	5.37	0.	-0.10
25	3.01	0.	-0.10	65	8.62	0.	-0.10	105	6.38	0.	-0.10	145	8.94	0.	-0.10
26	2.65	0.	-0.10	66	15.30	0.	-0.10	106	13.34	0.	-0.10	146	9.65	0.	-0.10
27	0.19	0.	-0.10	67	0. *	0.	-0.10	107	16.25	0.	-0.10	147	6.40	0.	-0.10
28	0. *	0.	-0.10	68	0.29	0.	-0.10	108	13.87	0.	-0.10	148	2.46	0.	-0.10
29	9.37	0.	-0.10	69	7.94	0.	-0.10	109	14.13	0.	-0.10	149	0.95	0.	-0.10
30	11.74	0.	-0.10	70	4.63	0.	-0.10	110	3.40	0.	-0.10	150	19.35	0.	-0.10
31	12.30	0.	-0.10	71	7.15	0.	-0.10	111	7.51	0.	-0.10	151	14.28	0.	-0.10
32	10.53	0.	-0.10	72	6.95	0.	-0.10	112	46.12	0.	-0.10	152	12.55	0.	-0.10
33	6.54	0.	-0.10	73	14.35	0.	-0.10	113	4.08	0.	-0.10	153	10.62	0.	-0.10
34	4.91	0.	-0.10	74	11.67	0.	-0.10	114	3.29	0.	-0.10	154	6.30	0.	-0.10
35	6.05	0.	-0.10	75	10.84	0.	-0.10	115	1.87	0.	-0.10	155	7.64	0.	-0.10
36	4.01	0.	-0.10	76	6.14	0.	-0.10	116	3.73	0.	-0.10	156	8.10	0.	-0.10
37	12.27	0.	-0.10	77	12.44	0.	-0.10	117	3.44	0.	-0.10	157	0. *	0.	-0.10
38	0. *	0.	-0.10	78	4.08	0.	-0.10	118	4.15	0.	-0.10	158	6.20	0.	-0.10
39	0. *	0.	-0.10	79	5.37	0.	-0.10	119	10.28	0.	-0.10	159	11.24	0.	-0.10
40	3.57	0.	-0.10	80	20.50	0.	-0.10	120	5.43	0.	-0.10				

MATHEMATICAL SIMULATION OF CARBON MONOXIDE DISTRIBUTION IN THE ATMOSPHERE
 TWO DIMENSIONAL FINITE ELEMENT FOR HORIZONTAL PROBLEMS OF VARIABLE THICKNESS
 INITIAL APPLICATION TO THE FAIRBANKS, ALASKA AIRSHED...

TEST DATA TO CHECK NORTON'S APRIL 28 CHANGES

...RESULTS AFTER 17 HOURS OF DYNAMIC SIMULATION...

...CONCENTRATIONS ARE MEAN VERTICAL VALUES...

... OUTPUT FOR NODES 1 TO 159 ... THE SYMBOL * DENOTES A SPECIFIED VALUE ...

NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC
1	0.	*	0.	41	10.77	0.	-0.10	81	9.35	0.	-0.10	121	5.61	0.	-0.10
2	0.	*	0.	42	5.78	0.	-0.10	82	6.26	0.	-0.10	122	13.14	0.	-0.10
3	0.	*	0.	43	7.04	0.	-0.10	83	4.88	0.	-0.10	123	6.34	0.	-0.10
4	0.	*	0.	44	8.62	0.	-0.10	84	6.69	0.	-0.10	124	9.55	0.	-0.10
5	0.	*	0.	45	7.74	0.	-0.10	85	7.93	0.	-0.10	125	27.07	0.	-0.10
6	3.14	0.	-0.10	46	12.00	0.	-0.10	86	23.70	0.	-0.10	126	72.70	0.	-0.10
7	4.60	0.	-0.10	47	10.00	0.	-0.10	87	28.05	0.	-0.10	127	22.91	0.	-0.10
8	3.68	0.	-0.10	48	14.48	0.	-0.10	88	18.13	0.	-0.10	128	62.29	0.	-0.10
9	3.65	0.	-0.10	49	10.55	0.	-0.10	89	3.94	0.	-0.10	129	8.81	0.	-0.10
10	1.39	0.	-0.10	50	7.59	0.	-0.10	90	22.42	0.	-0.10	130	22.03	0.	-0.10
11	0.20	0.	-0.10	51	0.	*	0.	91	23.34	0.	-0.10	131	46.59	0.	-0.10
12	3.74	0.	-0.10	52	-0.02	0.	-0.10	92	8.04	0.	-0.10	132	37.50	0.	-0.10
13	0.82	0.	-0.10	53	13.19	0.	-0.10	93	27.00	0.	-0.10	133	19.52	0.	-0.10
14	0.	*	0.	54	2.10	0.	-0.10	94	3.32	0.	-0.10	134	16.40	0.	-0.10
15	5.12	0.	-0.10	55	1.01	0.	-0.10	95	16.00	0.	-0.10	135	13.69	0.	-0.10
16	5.94	0.	-0.10	56	3.70	0.	-0.10	96	5.85	0.	-0.10	136	5.31	0.	-0.10
17	6.27	0.	-0.10	57	4.63	0.	-0.10	97	0.28	0.	-0.10	137	14.83	0.	-0.10
18	4.57	0.	-0.10	58	5.74	0.	-0.10	98	1.39	0.	-0.10	138	15.37	0.	-0.10
19	6.73	0.	-0.10	59	15.12	0.	-0.10	99	9.93	0.	-0.10	139	0.	*	0.
20	4.67	0.	-0.10	60	9.23	0.	-0.10	100	15.25	0.	-0.10	140	0.39	0.	-0.10
21	7.29	0.	-0.10	61	59.05	0.	-0.10	101	2.65	0.	-0.10	141	6.48	0.	-0.10
22	6.11	0.	-0.10	62	6.67	0.	-0.10	102	8.73	0.	-0.10	142	4.46	0.	-0.10
23	3.19	0.	-0.10	63	10.28	0.	-0.10	103	14.60	0.	-0.10	143	13.48	0.	-0.10
24	4.29	0.	-0.10	64	9.18	0.	-0.10	104	14.03	0.	-0.10	144	5.05	0.	-0.10
25	2.48	0.	-0.10	65	10.53	0.	-0.10	105	7.72	0.	-0.10	145	9.33	0.	-0.10
26	2.56	0.	-0.10	66	18.08	0.	-0.10	106	12.89	0.	-0.10	146	9.74	0.	-0.10
27	0.10	0.	-0.10	67	0.	*	0.	107	17.42	0.	-0.10	147	6.64	0.	-0.10
28	0.	*	0.	68	0.23	0.	-0.10	108	14.89	0.	-0.10	148	2.02	0.	-0.10
29	10.06	0.	-0.10	69	8.43	0.	-0.10	109	15.21	0.	-0.10	149	0.93	0.	-0.10
30	12.55	0.	-0.10	70	4.57	0.	-0.10	110	3.22	0.	-0.10	150	19.52	0.	-0.10
31	12.95	0.	-0.10	71	7.01	0.	-0.10	111	7.68	0.	-0.10	151	15.56	0.	-0.10
32	10.99	0.	-0.10	72	6.59	0.	-0.10	112	51.03	0.	-0.10	152	13.76	0.	-0.10
33	7.07	0.	-0.10	73	14.90	0.	-0.10	113	3.98	0.	-0.10	153	10.93	0.	-0.10
34	4.83	0.	-0.10	74	12.21	0.	-0.10	114	3.08	0.	-0.10	154	6.21	0.	-0.10
35	6.51	0.	-0.10	75	11.74	0.	-0.10	115	1.75	0.	-0.10	155	9.10	0.	-0.10
36	3.80	0.	-0.10	76	6.82	0.	-0.10	116	3.55	0.	-0.10	156	8.99	0.	-0.10
37	13.35	0.	-0.10	77	12.20	0.	-0.10	117	3.29	0.	-0.10	157	0.	*	0.
38	0.	*	0.	78	4.19	0.	-0.10	118	4.15	0.	-0.10	158	6.47	0.	-0.10
39	0.	*	0.	79	5.99	0.	-0.10	119	10.93	0.	-0.10	159	11.86	0.	-0.10
40	3.61	0.	-0.10	80	20.46	0.	-0.10	120	4.99	0.	-0.10				

MATHEMATICAL SIMULATION OF CARBON MONOXIDE DISTRIBUTION IN THE ATMOSPHERE
TWO DIMENSIONAL FINITE ELEMENT FOR HORIZONTAL PROBLEMS OF VARIABLE THICKNESS
INITIAL APPLICATION TO THE FAIRBANKS, ALASKA AIRSHED...

TEST DATA TO CHECK NORTON'S APRIL 23 CHANGES

...RESULTS AFTER 18 HOURS OF DYNAMIC SIMULATION...

...CONCENTRATIONS ARE MEAN VERTICAL VALUES...

... OUTPUT FOR NODES 1 TO 159 ... THE SYMBOL * DENOTES A SPECIFIED VALUE ...

NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC
1	0.	*	0.	41	11.07	0.	-0.10	81	9.13	0.	-0.10	121	5.56	0.	-0.10
2	0.	*	0.	42	5.46	0.	-0.10	82	6.07	0.	-0.10	122	13.93	0.	-0.10
3	0.	*	0.	43	7.39	0.	-0.10	83	4.97	0.	-0.10	123	6.79	0.	-0.10
4	0.	*	0.	44	9.43	0.	-0.10	84	6.91	0.	-0.10	124	10.43	0.	-0.10
5	0.	*	0.	45	8.17	0.	-0.10	85	8.17	0.	-0.10	125	30.38	0.	-0.10
6	3.19	0.	-0.10	46	12.46	0.	-0.10	86	24.21	0.	-0.10	126	85.63	0.	-0.10
7	4.64	0.	-0.10	47	11.47	0.	-0.10	87	32.64	0.	-0.10	127	24.11	0.	-0.10
8	3.52	0.	-0.10	48	14.65	0.	-0.10	88	18.53	0.	-0.10	128	65.78	0.	-0.10
9	3.55	0.	-0.10	49	10.89	0.	-0.10	89	4.81	0.	-0.10	129	9.08	0.	-0.10
10	1.20	0.	-0.10	50	8.30	0.	-0.10	90	23.73	0.	-0.10	130	25.88	0.	-0.10
11	0.13	0.	-0.10	51	0.	*	0.	91	22.89	0.	-0.10	131	56.32	0.	-0.10
12	3.68	0.	-0.10	52	-0.09	0.	-0.10	92	8.74	0.	-0.10	132	43.19	0.	-0.10
13	0.67	0.	-0.10	53	14.17	0.	-0.10	93	33.64	0.	-0.10	133	22.08	0.	-0.10
14	0.	*	0.	54	2.09	0.	-0.10	94	4.09	0.	-0.10	134	16.94	0.	-0.10
15	5.21	0.	-0.10	55	0.48	0.	-0.10	95	15.83	0.	-0.10	135	13.89	0.	-0.10
16	6.12	0.	-0.10	56	3.42	0.	-0.10	96	5.76	0.	-0.10	136	7.34	0.	-0.10
17	6.47	0.	-0.10	57	4.48	0.	-0.10	97	0.13	0.	-0.10	137	16.92	0.	-0.10
18	4.55	0.	-0.10	58	6.05	0.	-0.10	98	1.28	0.	-0.10	138	15.11	0.	-0.10
19	7.01	0.	-0.10	59	15.61	0.	-0.10	99	10.62	0.	-0.10	139	0.	*	0.
20	4.58	0.	-0.10	60	10.37	0.	-0.10	100	16.35	0.	-0.10	140	0.20	0.	-0.10
21	7.18	0.	-0.10	61	58.83	0.	-0.10	101	2.42	0.	-0.10	141	6.74	0.	-0.10
22	5.94	0.	-0.10	62	6.39	0.	-0.10	102	9.18	0.	-0.10	142	4.62	0.	-0.10
23	3.12	0.	-0.10	63	10.93	0.	-0.10	103	15.72	0.	-0.10	143	14.33	0.	-0.10
24	4.25	0.	-0.10	64	9.83	0.	-0.10	104	15.03	0.	-0.10	144	4.67	0.	-0.10
25	1.97	0.	-0.10	65	12.78	0.	-0.10	105	3.67	0.	-0.10	145	2.65	0.	-0.10
26	2.52	0.	-0.10	66	20.54	0.	-0.10	106	12.60	0.	-0.10	146	9.59	0.	-0.10
27	0.01	0.	-0.10	67	0.	*	0.	107	19.94	0.	-0.10	147	6.85	0.	-0.10
28	0.	*	0.	68	0.20	0.	-0.10	108	16.31	0.	-0.10	148	7.59	0.	-0.10
29	10.35	0.	-0.10	69	8.97	0.	-0.10	109	16.37	0.	-0.10	149	0.92	0.	-0.10
30	13.38	0.	-0.10	70	4.54	0.	-0.10	110	3.04	0.	-0.10	150	20.29	0.	-0.10
31	13.53	0.	-0.10	71	6.31	0.	-0.10	111	7.81	0.	-0.10	151	16.71	0.	-0.10
32	11.41	0.	-0.10	72	6.25	0.	-0.10	112	54.57	0.	-0.10	152	15.16	0.	-0.10
33	7.66	0.	-0.10	73	15.43	0.	-0.10	113	3.85	0.	-0.10	153	11.49	0.	-0.10
34	4.81	0.	-0.10	74	13.48	0.	-0.10	114	2.90	0.	-0.10	154	6.16	0.	-0.10
35	6.83	0.	-0.10	75	12.72	0.	-0.10	115	1.65	0.	-0.10	155	10.92	0.	-0.10
36	3.62	0.	-0.10	76	7.56	0.	-0.10	116	3.43	0.	-0.10	156	9.97	0.	-0.10
37	14.56	0.	-0.10	77	12.16	0.	-0.10	117	3.16	0.	-0.10	157	0.	*	0.
38	0.	*	0.	78	4.61	0.	-0.10	118	4.11	0.	-0.10	158	6.73	0.	-0.10
39	0.	*	0.	79	6.54	0.	-0.10	119	11.35	0.	-0.10	159	12.55	0.	-0.10
40	3.71	0.	-0.10	80	20.00	0.	-0.10	120	4.51	0.	-0.10				

MATHEMATICAL SIMULATION OF CARBON MONOXIDE DISTRIBUTION IN THE ATMOSPHERE
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INITIAL APPLICATION TO THE FAIRBANKS, ALASKA AIRSHED...

TEST DATA TO CHECK NORTON'S APRIL 28 CHANGES

...RESULTS AFTER 19 HOURS OF DYNAMIC SIMULATION...

...CONCENTRATIONS ARE MEAN VERTICAL VALUES...

... OUTPUT FOR NODES 1 TO 159 ... THE SYMBOL * DENOTES A SPECIFIED VALUE ...

NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC
1	0.	*	0.	41	11.05	0.	-0.10	81	9.69	0.	-0.10	121	5.35	0.	-0.10
2	0.	*	0.	42	4.89	0.	-0.10	82	5.74	0.	-0.10	122	14.28	0.	-0.10
3	0.	*	0.	43	7.68	0.	-0.10	83	4.71	0.	-0.10	123	6.32	0.	-0.10
4	0.	*	0.	44	9.11	0.	-0.10	84	6.68	0.	-0.10	124	11.22	0.	-0.10
5	0.	*	0.	45	8.61	0.	-0.10	85	8.27	0.	-0.10	125	32.88	0.	-0.10
6	3.25	0.	-0.10	46	12.51	0.	-0.10	86	24.54	0.	-0.10	126	90.83	0.	-0.10
7	4.67	0.	-0.10	47	11.55	0.	-0.10	87	36.06	0.	-0.10	127	24.82	0.	-0.10
8	3.35	0.	-0.10	48	13.65	0.	-0.10	88	19.14	0.	-0.10	128	69.72	0.	-0.10
9	3.43	0.	-0.10	49	11.30	0.	-0.10	89	4.64	0.	-0.10	129	9.02	0.	-0.10
10	1.02	0.	-0.10	50	9.01	0.	-0.10	90	25.01	0.	-0.10	130	27.05	0.	-0.10
11	0.05	0.	-0.10	51	0.	*	0.	91	22.81	0.	-0.10	131	55.90	0.	-0.10
12	3.61	0.	-0.10	52	-0.13	0.	-0.10	92	9.36	0.	-0.10	132	44.02	0.	-0.10
13	0.52	0.	-0.10	53	15.03	0.	-0.10	93	39.95	0.	-0.10	133	22.41	0.	-0.10
14	0.	*	0.	54	2.08	0.	-0.10	94	4.60	0.	-0.10	134	16.11	0.	-0.10
15	5.28	0.	-0.10	55	-0.00	0.	-0.10	95	15.28	0.	-0.10	135	14.08	0.	-0.10
16	6.24	0.	-0.10	56	3.07	0.	-0.10	96	5.37	0.	-0.10	136	3.03	0.	-0.10
17	6.62	0.	-0.10	57	4.25	0.	-0.10	97	-0.01	0.	-0.10	137	18.58	0.	-0.10
18	4.51	0.	-0.10	58	5.94	0.	-0.10	98	1.19	0.	-0.10	138	15.13	0.	-0.10
19	7.27	0.	-0.10	59	15.60	0.	-0.10	99	11.23	0.	-0.10	139	0.	*	0.
20	4.39	0.	-0.10	60	9.69	0.	-0.10	100	17.03	0.	-0.10	140	0.02	0.	-0.10
21	6.93	0.	-0.10	61	59.14	0.	-0.10	101	2.15	0.	-0.10	141	6.74	0.	-0.10
22	5.68	0.	-0.10	62	7.06	0.	-0.10	102	9.69	0.	-0.10	142	4.31	0.	-0.10
23	3.03	0.	-0.10	63	11.61	0.	-0.10	103	16.20	0.	-0.10	143	15.69	0.	-0.10
24	4.12	0.	-0.10	64	10.46	0.	-0.10	104	16.53	0.	-0.10	144	4.21	0.	-0.10
25	1.48	0.	-0.10	65	15.12	0.	-0.10	105	8.25	0.	-0.10	145	9.67	0.	-0.10
26	2.49	0.	-0.10	66	22.39	0.	-0.10	106	12.73	0.	-0.10	146	9.17	0.	-0.10
27	-0.08	0.	-0.10	67	0.	*	0.	107	22.15	0.	-0.10	147	6.85	0.	-0.10
28	0.	*	0.	68	0.17	0.	-0.10	108	17.34	0.	-0.10	148	1.17	0.	-0.10
29	11.63	0.	-0.10	69	9.24	0.	-0.10	109	17.45	0.	-0.10	149	0.92	0.	-0.10
30	13.99	0.	-0.10	70	4.46	0.	-0.10	110	2.80	0.	-0.10	150	21.07	0.	-0.10
31	13.62	0.	-0.10	71	6.60	0.	-0.10	111	7.79	0.	-0.10	151	17.22	0.	-0.10
32	11.62	0.	-0.10	72	5.80	0.	-0.10	112	56.80	0.	-0.10	152	16.40	0.	-0.10
33	8.18	0.	-0.10	73	15.78	0.	-0.10	113	3.69	0.	-0.10	153	11.85	0.	-0.10
34	4.65	0.	-0.10	74	14.47	0.	-0.10	114	2.71	0.	-0.10	154	6.02	0.	-0.10
35	6.92	0.	-0.10	75	13.69	0.	-0.10	115	1.57	0.	-0.10	155	12.92	0.	-0.10
36	3.43	0.	-0.10	76	8.32	0.	-0.10	116	3.35	0.	-0.10	156	11.02	0.	-0.10
37	15.75	0.	-0.10	77	12.40	0.	-0.10	117	3.05	0.	-0.10	157	0.	0.	-0.10
38	0.	*	0.	78	4.95	0.	-0.10	118	4.09	0.	-0.10	158	6.99	0.	-0.10
39	0.	*	0.	79	6.37	0.	-0.10	119	10.71	0.	-0.10	159	17.83	0.	-0.10
40	3.78	0.	-0.10	80	19.46	0.	-0.10	120	4.25	0.	-0.10				

MATHEMATICAL SIMULATION OF CARBON MONOXIDE DISTRIBUTION IN THE ATMOSPHERE
TWO DIMENSIONAL FINITE ELEMENT FOR HORIZONTAL PROBLEMS OF VARIABLE THICKNESS
INITIAL APPLICATION TO THE FAIRBANKS, ALASKA AIRSHED...

TEST DATA TO CHECK HORTON'S APRIL 28 CHANGES

...RESULTS AFTER 20 HOURS OF DYNAMIC SIMULATION...

...CONCENTRATIONS ARE MEAN VERTICAL VALUES...

... OUTPUT FOR NODES 1 TO 159 ... THE SYMBOL * DENOTES A SPECIFIED VALUE ...

NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC
1	0.	*	0.	41	10.55	0.	-0.10	81	9.31	0.	-0.10	121	4.75	0.	-0.10
2	0.	*	0.	42	4.19	0.	-0.10	82	5.37	0.	-0.10	122	13.95	0.	-0.10
3	0.	*	0.	43	7.88	0.	-0.10	83	4.14	0.	-0.10	123	5.41	0.	-0.10
4	0.	*	0.	44	7.84	0.	-0.10	84	5.82	0.	-0.10	124	11.61	0.	-0.10
5	0.	*	0.	45	8.67	0.	-0.10	85	7.95	0.	-0.10	125	32.57	0.	-0.10
6	3.31	0.	-0.10	46	12.07	0.	-0.10	86	24.66	0.	-0.10	126	84.93	0.	-0.10
7	4.67	0.	-0.10	47	10.53	0.	-0.10	87	35.58	0.	-0.10	127	24.31	0.	-0.10
8	3.18	0.	-0.10	48	11.82	0.	-0.10	88	17.62	0.	-0.10	128	71.30	0.	-0.10
9	3.29	0.	-0.10	49	11.83	0.	-0.10	89	4.43	0.	-0.10	129	3.67	0.	-0.10
10	0.83	0.	-0.10	50	9.74	0.	-0.10	90	25.82	0.	-0.10	130	25.97	0.	-0.10
11	-0.02	0.	-0.10	51	0.	*	0.	91	23.27	0.	-0.10	131	48.36	0.	-0.10
12	3.52	0.	-0.10	52	-0.27	0.	-0.10	92	9.90	0.	-0.10	132	40.65	0.	-0.10
13	0.37	0.	-0.10	53	15.92	0.	-0.10	93	45.34	0.	-0.10	133	21.33	0.	-0.10
14	0.	*	0.	54	2.05	0.	-0.10	94	4.69	0.	-0.10	134	15.45	0.	-0.10
15	5.33	0.	-0.10	55	-0.37	0.	-0.10	95	14.63	0.	-0.10	135	14.24	0.	-0.10
16	6.29	0.	-0.10	56	2.66	0.	-0.10	96	4.56	0.	-0.10	136	6.92	0.	-0.10
17	6.70	0.	-0.10	57	3.91	0.	-0.10	97	-0.15	0.	-0.10	137	19.69	0.	-0.10
18	4.45	0.	-0.10	58	5.35	0.	-0.10	98	1.09	0.	-0.10	138	15.49	0.	-0.10
19	7.46	0.	-0.10	59	15.37	0.	-0.10	99	11.67	0.	-0.10	139	0.	*	0.
20	4.09	0.	-0.10	60	8.44	0.	-0.10	100	16.86	0.	-0.10	140	-0.16	0.	-0.10
21	6.56	0.	-0.10	61	59.68	0.	-0.10	101	1.84	0.	-0.10	141	7.08	0.	-0.10
22	5.31	0.	-0.10	62	7.05	0.	-0.10	102	10.20	0.	-0.10	142	5.00	0.	-0.10
23	2.89	0.	-0.10	63	12.35	0.	-0.10	103	17.63	0.	-0.10	143	15.76	0.	-0.10
24	3.90	0.	-0.10	64	11.03	0.	-0.10	104	17.28	0.	-0.10	144	3.69	0.	-0.10
25	1.00	0.	-0.10	65	17.28	0.	-0.10	105	6.72	0.	-0.10	145	9.30	0.	-0.10
26	2.45	0.	-0.10	66	23.60	0.	-0.10	106	13.28	0.	-0.10	146	8.52	0.	-0.10
27	-0.17	0.	-0.10	67	0.	*	0.	107	23.12	0.	-0.10	147	6.58	0.	-0.10
28	0.	*	0.	68	0.14	0.	-0.10	108	17.62	0.	-0.10	148	0.78	0.	-0.10
29	12.36	0.	-0.10	69	9.29	0.	-0.10	109	18.26	0.	-0.10	149	0.91	0.	-0.10
30	14.26	0.	-0.10	70	4.27	0.	-0.10	110	2.50	0.	-0.10	150	20.90	0.	-0.10
31	12.99	0.	-0.10	71	6.34	0.	-0.10	111	7.54	0.	-0.10	151	16.92	0.	-0.10
32	11.43	0.	-0.10	72	5.26	0.	-0.10	112	58.03	0.	-0.10	152	16.96	0.	-0.10
33	8.54	0.	-0.10	73	15.92	0.	-0.10	113	3.49	0.	-0.10	153	11.87	0.	-0.10
34	4.23	0.	-0.10	74	14.71	0.	-0.10	114	2.52	0.	-0.10	154	5.65	0.	-0.10
35	6.81	0.	-0.10	75	14.61	0.	-0.10	115	1.50	0.	-0.10	155	14.90	0.	-0.10
36	3.24	0.	-0.10	76	9.12	0.	-0.10	116	3.28	0.	-0.10	156	12.10	0.	-0.10
37	16.82	0.	-0.10	77	12.85	0.	-0.10	117	2.96	0.	-0.10	157	0.	*	0.
38	0.	*	0.	78	4.75	0.	-0.10	118	4.08	0.	-0.10	158	7.23	0.	-0.10
39	0.	*	0.	79	5.46	0.	-0.10	119	9.25	0.	-0.10	159	12.62	0.	-0.10
40	3.78	0.	-0.10	80	19.00	0.	-0.10	120	4.20	0.	-0.10				

MATHEMATICAL SIMULATION OF CARBON MONOXIDE DISTRIBUTION IN THE ATMOSPHERE
TWO DIMENSIONAL FINITE ELEMENT FOR HORIZONTAL PROBLEMS OF VARIABLE THICKNESS
INITIAL APPLICATION TO THE FAIRBANKS, ALASKA AIRSHED...

TEST DATA TO CHECK NORTON'S APRIL 28 CHANGES

...RESULTS AFTER 21 HOURS OF DYNAMIC SIMULATION...

...CONCENTRATIONS ARE MEAN VERTICAL VALUES...

... OUTPUT FOR NODES 1 TO 159 ... THE SYMBOL * DENOTES A SPECIFIED VALUE ...

NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC
1	0.	*	0.	41	9.30	0.	-0.10	81	9.66	0.	-0.10	121	4.41	0.	-0.10
2	0.	*	0.	42	3.65	0.	-0.10	82	5.02	0.	-0.10	122	13.07	0.	-0.10
3	0.	*	0.	43	8.01	0.	-0.10	83	3.47	0.	-0.10	123	4.89	0.	-0.10
4	0.	*	0.	44	6.33	0.	-0.10	84	4.61	0.	-0.10	124	11.56	0.	-0.10
5	0.	*	0.	45	3.18	0.	-0.10	85	7.23	0.	-0.10	125	29.80	0.	-0.10
6	3.37	0.	-0.10	46	11.36	0.	-0.10	86	24.50	0.	-0.10	126	73.42	0.	-0.10
7	4.64	0.	-0.10	47	9.47	0.	-0.10	87	32.26	0.	-0.10	127	22.89	0.	-0.10
8	3.00	0.	-0.10	48	9.97	0.	-0.10	88	19.50	0.	-0.10	128	69.20	0.	-0.10
9	3.12	0.	-0.10	49	12.40	0.	-0.10	89	4.69	0.	-0.10	129	8.27	0.	-0.10
10	0.65	0.	-0.10	50	10.50	0.	-0.10	90	26.17	0.	-0.10	130	23.78	0.	-0.10
11	-0.03	0.	-0.10	51	0.	*	0.	91	24.16	0.	-0.10	131	40.06	0.	-0.10
12	3.42	0.	-0.10	52	-0.36	0.	-0.10	92	10.37	0.	-0.10	132	35.79	0.	-0.10
13	0.21	0.	-0.10	53	16.55	0.	-0.10	93	49.53	0.	-0.10	133	19.65	0.	-0.10
14	0.	*	0.	54	1.99	0.	-0.10	94	4.36	0.	-0.10	134	15.47	0.	-0.10
15	5.36	0.	-0.10	55	-0.62	0.	-0.10	95	14.32	0.	-0.10	135	14.25	0.	-0.10
16	6.27	0.	-0.10	56	2.21	0.	-0.10	96	3.57	0.	-0.10	136	4.83	0.	-0.10
17	6.73	0.	-0.10	57	3.50	0.	-0.10	97	-0.23	0.	-0.10	137	20.34	0.	-0.10
18	4.39	0.	-0.10	58	4.99	0.	-0.10	98	0.98	0.	-0.10	138	16.05	0.	-0.10
19	7.61	0.	-0.10	59	15.20	0.	-0.10	99	11.89	0.	-0.10	139	0.	*	0.
20	3.70	0.	-0.10	60	7.93	0.	-0.10	100	16.02	0.	-0.10	140	-0.33	0.	-0.10
21	6.14	0.	-0.10	61	59.89	0.	-0.10	101	1.50	0.	-0.10	141	7.15	0.	-0.10
22	4.90	0.	-0.10	62	6.80	0.	-0.10	102	10.69	0.	-0.10	142	5.20	0.	-0.10
23	2.73	0.	-0.10	63	13.11	0.	-0.10	103	17.98	0.	-0.10	143	15.19	0.	-0.10
24	3.65	0.	-0.10	64	11.56	0.	-0.10	104	16.72	0.	-0.10	144	3.15	0.	-0.10
25	0.53	0.	-0.10	65	19.12	0.	-0.10	105	5.20	0.	-0.10	145	8.61	0.	-0.10
26	2.41	0.	-0.10	66	24.33	0.	-0.10	106	13.51	0.	-0.10	146	8.09	0.	-0.10
27	-0.26	0.	-0.10	67	0.	*	0.	107	22.70	0.	-0.10	147	6.13	0.	-0.10
28	0.	*	0.	68	0.12	0.	-0.10	108	17.28	0.	-0.10	148	0.43	0.	-0.10
29	13.00	0.	-0.10	69	9.18	0.	-0.10	109	18.73	0.	-0.10	149	0.39	0.	-0.10
30	14.11	0.	-0.10	70	3.99	0.	-0.10	110	2.21	0.	-0.10	150	19.68	0.	-0.10
31	12.01	0.	-0.10	71	6.06	0.	-0.10	111	7.12	0.	-0.10	151	16.21	0.	-0.10
32	11.01	0.	-0.10	72	4.72	0.	-0.10	112	58.62	0.	-0.10	152	16.59	0.	-0.10
33	8.73	0.	-0.10	73	15.93	0.	-0.10	113	3.27	0.	-0.10	153	11.47	0.	-0.10
34	3.60	0.	-0.10	74	14.20	0.	-0.10	114	2.34	0.	-0.10	154	5.25	0.	-0.10
35	6.59	0.	-0.10	75	15.46	0.	-0.10	115	1.43	0.	-0.10	155	16.71	0.	-0.10
36	3.07	0.	-0.10	76	10.01	0.	-0.10	116	3.26	0.	-0.10	156	13.17	0.	-0.10
37	17.73	0.	-0.10	77	13.14	0.	-0.10	117	2.89	0.	-0.10	157	0.	*	0.
38	0.	*	0.	78	4.00	0.	-0.10	118	4.04	0.	-0.10	158	7.39	0.	-0.10
39	0.	*	0.	79	4.28	0.	-0.10	119	7.65	0.	-0.10	159	12.04	0.	-0.10
40	3.71	0.	-0.10	80	13.61	0.	-0.10	120	4.25	0.	-0.10				

MATHEMATICAL SIMULATION OF CARBON MONOXIDE DISTRIBUTION IN THE ATMOSPHERE
TWO DIMENSIONAL FINITE ELEMENT FOR HORIZONTAL PROBLEMS OF VARIABLE THICKNESS
INITIAL APPLICATION TO THE FAIRBANKS, ALASKA AIRSHED...

TEST DATA TO CHECK NORTON'S APRIL 28 CHANGES

...RESULTS AFTER 22 HOURS OF DYNAMIC SIMULATION...

...CONCENTRATIONS ARE MEAN VERTICAL VALUES...

... OUTPUT FOR NODES 1 TO 159 ... THE SYMBOL * DENOTES A SPECIFIED VALUE ...

NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC
1	0.	*	0.	41	9.17	0.	-0.10	81	9.26	0.	-0.10	121	3.80	0.	-0.10
2	0.	*	0.	42	3.44	0.	-0.10	82	4.72	0.	-0.10	122	12.03	0.	-0.10
3	0.	*	0.	43	8.05	0.	-0.10	83	2.65	0.	-0.10	123	4.99	0.	-0.10
4	0.	*	0.	44	5.29	0.	-0.10	84	3.62	0.	-0.10	124	11.29	0.	-0.10
5	0.	*	0.	45	7.31	0.	-0.10	85	6.36	0.	-0.10	125	26.08	0.	-0.10
6	3.41	0.	-0.10	46	10.60	0.	-0.10	86	24.11	0.	-0.10	126	60.73	0.	-0.10
7	4.59	0.	-0.10	47	8.77	0.	-0.10	87	27.73	0.	-0.10	127	20.38	0.	-0.10
8	2.81	0.	-0.10	48	8.68	0.	-0.10	88	18.55	0.	-0.10	128	63.71	0.	-0.10
9	2.95	0.	-0.10	49	12.83	0.	-0.10	89	5.18	0.	-0.10	129	8.04	0.	-0.10
10	0.47	0.	-0.10	50	11.27	0.	-0.10	90	25.26	0.	-0.10	130	20.38	0.	-0.10
11	-0.14	0.	-0.10	51	0.	*	0.	91	25.15	0.	-0.10	131	32.37	0.	-0.10
12	3.32	0.	-0.10	52	-0.45	0.	-0.10	92	10.79	0.	-0.10	132	31.16	0.	-0.10
13	0.05	0.	-0.10	53	17.08	0.	-0.10	93	52.52	0.	-0.10	133	18.16	0.	-0.10
14	0.	*	0.	54	1.91	0.	-0.10	94	3.78	0.	-0.10	134	15.61	0.	-0.10
15	5.39	0.	-0.10	55	-0.77	0.	-0.10	95	14.14	0.	-0.10	135	13.97	0.	-0.10
16	6.21	0.	-0.10	56	1.77	0.	-0.10	96	2.83	0.	-0.10	136	2.50	0.	-0.10
17	6.71	0.	-0.10	57	3.02	0.	-0.10	97	-0.39	0.	-0.10	137	20.66	0.	-0.10
18	4.32	0.	-0.10	58	3.89	0.	-0.10	98	0.85	0.	-0.10	138	16.56	0.	-0.10
19	7.74	0.	-0.10	59	15.09	0.	-0.10	99	11.81	0.	-0.10	139	0.	0.	-0.10
20	3.24	0.	-0.10	60	8.14	0.	-0.10	100	15.00	0.	-0.10	140	-0.49	0.	-0.10
21	5.74	0.	-0.10	61	50.06	0.	-0.10	101	1.14	0.	-0.10	141	7.13	0.	-0.10
22	4.56	0.	-0.10	62	6.30	0.	-0.10	102	11.09	0.	-0.10	142	5.39	0.	-0.10
23	2.55	0.	-0.10	63	13.86	0.	-0.10	103	17.74	0.	-0.10	143	14.32	0.	-0.10
24	3.39	0.	-0.10	64	12.03	0.	-0.10	104	15.46	0.	-0.10	144	2.62	0.	-0.10
25	0.03	0.	-0.10	65	20.58	0.	-0.10	105	4.48	0.	-0.10	145	7.70	0.	-0.10
26	2.38	0.	-0.10	66	24.79	0.	-0.10	106	12.82	0.	-0.10	146	8.16	0.	-0.10
27	-0.36	0.	-0.10	67	0.	*	0.	107	20.94	0.	-0.10	147	5.62	0.	-0.10
28	0.	*	0.	68	0.10	0.	-0.10	108	16.46	0.	-0.10	148	0.14	0.	-0.10
29	13.50	0.	-0.10	69	8.97	0.	-0.10	109	18.92	0.	-0.10	149	0.89	0.	-0.10
30	13.54	0.	-0.10	70	3.68	0.	-0.10	110	2.01	0.	-0.10	150	18.03	0.	-0.10
31	11.25	0.	-0.10	71	5.89	0.	-0.10	111	6.65	0.	-0.10	151	15.37	0.	-0.10
32	10.64	0.	-0.10	72	4.34	0.	-0.10	112	58.77	0.	-0.10	152	15.42	0.	-0.10
33	8.74	0.	-0.10	73	15.81	0.	-0.10	113	3.05	0.	-0.10	153	10.49	0.	-0.10
34	2.91	0.	-0.10	74	12.98	0.	-0.10	114	2.18	0.	-0.10	154	4.99	0.	-0.10
35	6.34	0.	-0.10	75	16.22	0.	-0.10	115	1.35	0.	-0.10	155	18.23	0.	-0.10
36	2.94	0.	-0.10	76	11.01	0.	-0.10	116	3.27	0.	-0.10	156	14.17	0.	-0.10
37	18.37	0.	-0.10	77	12.83	0.	-0.10	117	2.84	0.	-0.10	157	0.	*	0.
38	0.	*	0.	78	3.06	0.	-0.10	118	3.94	0.	-0.10	158	7.42	0.	-0.10
39	0.	*	0.	79	3.25	0.	-0.10	119	6.36	0.	-0.10	159	11.18	0.	-0.10
40	3.55	0.	-0.10	80	12.21	0.	-0.10	120	4.26	0.	-0.10				

MATHEMATICAL SIMULATION OF CARBON MONOXIDE DISTRIBUTION IN THE ATMOSPHERE
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...RESULTS AFTER 23 HOURS OF DYNAMIC SIMULATION...

...CONCENTRATIONS ARE MEAN VERTICAL VALUES...

... OUTPUT FOR NODES 1 TO 159 ... THE SYMBOL * DENOTES A SPECIFIED VALUE ...

NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC
1	0. *	0.	-0.10	41	2.57	0.	-0.10	81	9.72	0.	-0.10	121	3.23	0.	-0.10
2	0. *	0.	-0.10	42	3.40	0.	-0.10	82	4.42	0.	-0.10	122	11.14	0.	-0.10
3	0. *	0.	-0.10	43	7.99	0.	-0.10	83	2.30	0.	-0.10	123	5.40	0.	-0.10
4	0. *	0.	-0.10	44	5.06	0.	-0.10	84	3.04	0.	-0.10	124	10.75	0.	-0.10
5	0. *	0.	-0.10	45	6.28	0.	-0.10	85	5.41	0.	-0.10	125	22.55	0.	-0.10
6	3.44	0.	-0.10	46	9.84	0.	-0.10	86	22.98	0.	-0.10	126	48.15	0.	-0.10
7	4.52	0.	-0.10	47	8.35	0.	-0.10	87	23.20	0.	-0.10	127	18.22	0.	-0.10
8	2.62	0.	-0.10	48	8.14	0.	-0.10	88	17.05	0.	-0.10	128	55.62	0.	-0.10
9	2.77	0.	-0.10	49	12.89	0.	-0.10	89	5.73	0.	-0.10	129	8.08	0.	-0.10
10	0.30	0.	-0.10	50	12.06	0.	-0.10	90	24.67	0.	-0.10	130	18.03	0.	-0.10
11	-0.19	0.	-0.10	51	0. *	0.	-0.10	91	25.82	0.	-0.10	131	25.65	0.	-0.10
12	3.21	0.	-0.10	52	-0.52	0.	-0.10	92	11.20	0.	-0.10	132	26.50	0.	-0.10
13	-0.11	0.	-0.10	53	17.21	0.	-0.10	93	54.49	0.	-0.10	133	16.86	0.	-0.10
14	0. *	0.	-0.10	54	1.79	0.	-0.10	94	3.15	0.	-0.10	134	15.59	0.	-0.10
15	5.40	0.	-0.10	55	-0.83	0.	-0.10	95	13.57	0.	-0.10	135	13.19	0.	-0.10
16	6.12	0.	-0.10	56	1.37	0.	-0.10	96	2.20	0.	-0.10	136	0.45	0.	-0.10
17	6.65	0.	-0.10	57	2.47	0.	-0.10	97	-0.49	0.	-0.10	137	20.73	0.	-0.10
18	4.26	0.	-0.10	58	3.19	0.	-0.10	98	0.70	0.	-0.10	138	16.81	0.	-0.10
19	7.82	0.	-0.10	59	14.83	0.	-0.10	99	11.45	0.	-0.10	139	0. *	0.	-0.10
20	2.72	0.	-0.10	60	8.36	0.	-0.10	100	13.80	0.	-0.10	140	-0.63	0.	-0.10
21	5.38	0.	-0.10	61	56.53	0.	-0.10	101	0.78	0.	-0.10	141	7.01	0.	-0.10
22	4.25	0.	-0.10	62	5.66	0.	-0.10	102	11.27	0.	-0.10	142	5.58	0.	-0.10
23	2.36	0.	-0.10	63	14.53	0.	-0.10	103	17.06	0.	-0.10	143	13.26	0.	-0.10
24	3.13	0.	-0.10	64	12.40	0.	-0.10	104	14.17	0.	-0.10	144	2.14	0.	-0.10
25	-0.34	0.	-0.10	65	21.67	0.	-0.10	105	4.68	0.	-0.10	145	6.72	0.	-0.10
26	2.35	0.	-0.10	66	25.16	0.	-0.10	106	11.24	0.	-0.10	146	8.19	0.	-0.10
27	-0.45	0.	-0.10	67	0. *	0.	-0.10	107	18.23	0.	-0.10	147	5.07	0.	-0.10
28	0. *	0.	-0.10	68	0.09	0.	-0.10	108	15.35	0.	-0.10	148	-0.10	0.	-0.10
29	13.81	0.	-0.10	69	8.64	0.	-0.10	109	18.74	0.	-0.10	149	0.90	0.	-0.10
30	12.72	0.	-0.10	70	3.34	0.	-0.10	110	1.89	0.	-0.10	150	16.35	0.	-0.10
31	10.68	0.	-0.10	71	5.76	0.	-0.10	111	6.14	0.	-0.10	151	14.08	0.	-0.10
32	10.16	0.	-0.10	72	4.01	0.	-0.10	112	58.49	0.	-0.10	152	13.82	0.	-0.10
33	8.59	0.	-0.10	73	15.50	0.	-0.10	113	2.82	0.	-0.10	153	9.05	0.	-0.10
34	2.29	0.	-0.10	74	11.20	0.	-0.10	114	2.01	0.	-0.10	154	4.43	0.	-0.10
35	6.14	0.	-0.10	75	16.83	0.	-0.10	115	1.25	0.	-0.10	155	19.41	0.	-0.10
36	2.83	0.	-0.10	76	12.06	0.	-0.10	116	3.28	0.	-0.10	156	15.07	0.	-0.10
37	18.64	0.	-0.10	77	12.01	0.	-0.10	117	2.79	0.	-0.10	157	0. *	0.	-0.10
38	0. *	0.	-0.10	78	2.11	0.	-0.10	118	3.73	0.	-0.10	158	7.33	0.	-0.10
39	0. *	0.	-0.10	79	2.52	0.	-0.10	119	5.45	0.	-0.10	159	10.16	0.	-0.10
40	3.29	0.	-0.10	80	17.52	0.	-0.10	120	4.04	0.	-0.10				

MATHEMATICAL SIMULATION OF CARBON MONOXIDE DISTRIBUTION IN THE ATMOSPHERE
TWO DIMENSIONAL FINITE ELEMENT FOR HORIZONTAL PROBLEMS OF VARIABLE THICKNESS
INITIAL APPLICATION TO THE FAIRBANKS, ALASKA AIRSHED...

TEST DATA TO CHECK HORTON'S APRIL 28 CHANGES

...RESULTS AFTER 24 HOURS OF DYNAMIC SIMULATION...

...CONCENTRATIONS ARE MEAN VERTICAL VALUES...

... OUTPUT FOR NODES 1 TO 159 ... THE SYMBOL * DENOTES A SPECIFIED VALUE ...

NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC
1	0.	*	0.	41	7.86	0.	-0.10	81	9.11	0.	-0.10	121	2.78	0.	-0.10
2	0.	*	0.	42	3.38	0.	-0.10	82	4.08	0.	-0.10	122	10.43	0.	-0.10
3	0.	*	0.	43	7.84	0.	-0.10	83	1.78	0.	-0.10	123	5.82	0.	-0.10
4	0.	*	0.	44	5.54	0.	-0.10	84	2.67	0.	-0.10	124	10.06	0.	-0.10
5	0.	*	0.	45	5.27	0.	-0.10	85	4.41	0.	-0.10	125	19.54	0.	-0.10
6	3.46	0.	-0.10	46	9.03	0.	-0.10	86	21.14	0.	-0.10	126	36.41	0.	-0.10
7	4.42	0.	-0.10	47	7.99	0.	-0.10	87	19.44	0.	-0.10	127	14.95	0.	-0.10
8	2.43	0.	-0.10	48	8.20	0.	-0.10	88	15.35	0.	-0.10	128	46.06	0.	-0.10
9	2.58	0.	-0.10	49	12.49	0.	-0.10	89	6.63	0.	-0.10	129	8.28	0.	-0.10
10	0.13	0.	-0.10	50	12.87	0.	-0.10	90	22.59	0.	-0.10	130	15.81	0.	-0.10
11	-0.23	0.	-0.10	51	0.	*	0.	91	25.76	0.	-0.10	131	20.25	0.	-0.10
12	3.11	0.	-0.10	52	-0.59	0.	-0.10	92	11.58	0.	-0.10	132	22.21	0.	-0.10
13	-0.28	0.	-0.10	53	16.90	0.	-0.10	93	55.74	0.	-0.10	133	15.52	0.	-0.10
14	0.	*	0.	54	1.66	0.	-0.10	94	2.63	0.	-0.10	134	15.22	0.	-0.10
15	5.39	0.	-0.10	55	-0.84	0.	-0.10	95	12.28	0.	-0.10	135	11.90	0.	-0.10
16	5.99	0.	-0.10	56	1.03	0.	-0.10	96	1.68	0.	-0.10	136	-1.31	0.	-0.10
17	6.55	0.	-0.10	57	1.90	0.	-0.10	97	-0.57	0.	-0.10	137	20.79	0.	-0.10
18	4.19	0.	-0.10	58	2.41	0.	-0.10	98	0.54	0.	-0.10	138	16.61	0.	-0.10
19	7.79	0.	-0.10	59	14.23	0.	-0.10	99	10.91	0.	-0.10	139	0.	0.	-0.10
20	2.16	0.	-0.10	60	8.50	0.	-0.10	100	12.34	0.	-0.10	140	-0.74	0.	-0.10
21	5.03	0.	-0.10	61	51.96	0.	-0.10	101	0.41	0.	-0.10	141	6.79	0.	-0.10
22	3.94	0.	-0.10	62	4.98	0.	-0.10	102	11.17	0.	-0.10	142	5.74	0.	-0.10
23	2.17	0.	-0.10	63	15.02	0.	-0.10	103	16.06	0.	-0.10	143	12.16	0.	-0.10
24	2.87	0.	-0.10	64	12.61	0.	-0.10	104	12.99	0.	-0.10	144	1.72	0.	-0.10
25	-0.71	0.	-0.10	65	22.48	0.	-0.10	105	5.34	0.	-0.10	145	5.75	0.	-0.10
26	2.32	0.	-0.10	66	25.52	0.	-0.10	106	9.17	0.	-0.10	146	7.86	0.	-0.10
27	-0.55	0.	-0.10	67	0.	*	0.	107	15.19	0.	-0.10	147	4.55	0.	-0.10
28	0.	*	0.	68	0.09	0.	-0.10	108	14.09	0.	-0.10	148	-0.27	0.	-0.10
29	13.89	0.	-0.10	69	8.19	0.	-0.10	109	18.20	0.	-0.10	149	0.91	0.	-0.10
30	11.79	0.	-0.10	70	2.98	0.	-0.10	110	1.86	0.	-0.10	150	14.66	0.	-0.10
31	10.01	0.	-0.10	71	5.54	0.	-0.10	111	5.57	0.	-0.10	151	12.59	0.	-0.10
32	9.50	0.	-0.10	72	3.46	0.	-0.10	112	57.64	0.	-0.10	152	12.15	0.	-0.10
33	8.33	0.	-0.10	73	14.91	0.	-0.10	113	2.60	0.	-0.10	153	7.47	0.	-0.10
34	1.85	0.	-0.10	74	9.15	0.	-0.10	114	1.85	0.	-0.10	154	3.52	0.	-0.10
35	6.04	0.	-0.10	75	17.20	0.	-0.10	115	1.14	0.	-0.10	155	20.27	0.	-0.10
36	2.72	0.	-0.10	76	13.11	0.	-0.10	116	3.28	0.	-0.10	156	15.86	0.	-0.10
37	12.45	0.	-0.10	77	10.64	0.	-0.10	117	2.74	0.	-0.10	157	0.	*	0.
38	0.	*	0.	78	1.31	0.	-0.10	118	3.57	0.	-0.10	158	7.14	0.	-0.10
39	0.	*	0.	79	2.07	0.	-0.10	119	4.76	0.	-0.10	159	9.08	0.	-0.10
40	2.99	0.	-0.10	80	16.31	0.	-0.10	120	3.55	0.	-0.10				

MATHEMATICAL SIMULATION OF CARBON MONOXIDE DISTRIBUTION IN THE ATMOSPHERE
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NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC
1	0.*	0.	-0.10	41	7.18	0.	-0.10	81	8.06	C.	-0.10	121	2.48	0.	-0.10
2	0.*	0.	-0.10	42	3.37	0.	-0.10	82	3.67	C.	-0.10	122	9.87	0.	-0.10
3	0.*	0.	-0.10	43	7.63	0.	-0.10	83	1.41	C.	-0.10	123	6.14	0.	-0.10
4	0.*	0.	-0.10	44	6.44	0.	-0.10	84	2.44	0.	-0.10	124	8.98	0.	-0.10
5	0.*	0.	-0.10	45	4.43	0.	-0.10	85	3.55	0.	-0.10	125	17.10	0.	-0.10
6	3.46	0.	-0.10	46	8.13	0.	-0.10	86	18.71	0.	-0.10	126	27.65	0.	-0.10
7	4.30	0.	-0.10	47	7.61	0.	-0.10	87	16.84	0.	-0.10	127	11.31	0.	-0.10
8	2.23	0.	-0.10	48	8.52	0.	-0.10	88	13.63	0.	-0.10	128	36.79	0.	-0.10
9	2.32	0.	-0.10	49	11.71	0.	-0.10	89	7.61	0.	-0.10	129	8.32	0.	-0.10
10	-0.02	0.	-0.10	50	13.64	0.	-0.10	90	19.96	0.	-0.10	130	14.34	0.	-0.10
11	-0.27	0.	-0.10	51	0.*	0.	-0.10	91	24.74	0.	-0.10	131	16.62	0.	-0.10
12	3.02	0.	-0.10	52	-0.64	0.	-0.10	92	11.92	0.	-0.10	132	18.34	0.	-0.10
13	-0.44	0.	-0.10	53	16.27	0.	-0.10	93	56.53	0.	-0.10	133	14.22	0.	-0.10
14	0.*	0.	-0.10	54	1.52	0.	-0.10	94	2.40	0.	-0.10	134	14.48	0.	-0.10
15	5.38	0.	-0.10	55	-0.82	0.	-0.10	95	10.43	0.	-0.10	135	10.38	0.	-0.10
16	5.85	0.	-0.10	56	0.75	0.	-0.10	96	1.51	0.	-0.10	136	-1.63	0.	-0.10
17	6.41	0.	-0.10	57	1.39	0.	-0.10	97	-0.64	C.	-0.10	137	20.75	0.	-0.10
18	4.13	0.	-0.10	58	1.78	0.	-0.10	98	0.39	0.	-0.10	138	15.91	0.	-0.10
19	7.64	0.	-0.10	59	13.32	0.	-0.10	99	10.33	0.	-0.10	139	0.*	0.	-0.10
20	1.59	0.	-0.10	60	8.61	0.	-0.10	100	10.96	0.	-0.10	140	-0.34	0.	-0.10
21	4.71	0.	-0.10	61	45.64	0.	-0.10	101	0.05	C.	-0.10	141	6.49	0.	-0.10
22	3.63	0.	-0.10	62	4.38	0.	-0.10	102	10.83	C.	-0.10	142	5.89	0.	-0.10
23	1.99	0.	-0.10	63	15.23	0.	-0.10	103	14.82	C.	-0.10	143	11.26	0.	-0.10
24	2.62	0.	-0.10	64	12.63	0.	-0.10	104	11.83	0.	-0.10	144	1.38	0.	-0.10
25	-1.00	0.	-0.10	65	23.14	0.	-0.10	105	5.94	0.	-0.10	145	4.92	0.	-0.10
26	2.29	0.	-0.10	66	25.86	0.	-0.10	106	7.07	0.	-0.10	146	7.40	0.	-0.10
27	-0.63	0.	-0.10	67	0.*	0.	-0.10	107	12.42	0.	-0.10	147	4.12	0.	-0.10
28	0.*	0.	-0.10	68	0.09	0.	-0.10	108	12.83	0.	-0.10	148	-0.38	0.	-0.10
29	13.72	0.	-0.10	69	7.69	0.	-0.10	109	17.42	0.	-0.10	149	0.94	0.	-0.10
30	10.86	0.	-0.10	70	2.64	0.	-0.10	110	1.92	0.	-0.10	150	12.85	0.	-0.10
31	9.43	0.	-0.10	71	5.26	0.	-0.10	111	5.02	C.	-0.10	151	11.48	0.	-0.10
32	8.83	0.	-0.10	72	2.75	0.	-0.10	112	55.96	0.	-0.10	152	10.76	0.	-0.10
33	8.00	0.	-0.10	73	14.10	0.	-0.10	113	2.39	0.	-0.10	153	6.05	0.	-0.10
34	1.63	0.	-0.10	74	7.21	0.	-0.10	114	1.69	0.	-0.10	154	2.75	0.	-0.10
35	6.05	0.	-0.10	75	17.34	0.	-0.10	115	1.00	0.	-0.10	155	20.86	0.	-0.10
36	2.59	0.	-0.10	76	14.14	0.	-0.10	116	3.24	C.	-0.10	156	16.49	0.	-0.10
37	17.87	0.	-0.10	77	8.90	0.	-0.10	117	2.70	0.	-0.10	157	0.*	0.	-0.10
38	0.*	0.	-0.10	78	0.92	0.	-0.10	118	3.33	0.	-0.10	158	6.85	0.	-0.10
39	0.*	0.	-0.10	79	1.94	0.	-0.10	119	4.25	0.	-0.10	159	8.03	0.	-0.10
40	2.71	0.	-0.10	80	14.54	0.	-0.10	120	2.92	0.	-0.10				

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1	0. *	0.	-0.10	41	6.43	0.	-0.10	81	6.77	0.	-0.10	121	2.30	0.	-0.10
2	0. *	0.	-0.10	42	3.21	0.	-0.10	82	3.14	0.	-0.10	122	9.40	0.	-0.10
3	0. *	0.	-0.10	43	7.38	0.	-0.10	83	1.18	0.	-0.10	123	6.24	0.	-0.10
4	0. *	0.	-0.10	44	7.26	0.	-0.10	84	2.22	0.	-0.10	124	7.86	0.	-0.10
5	0. *	0.	-0.10	45	3.78	0.	-0.10	85	2.82	0.	-0.10	125	15.16	0.	-0.10
6	3.44	0.	-0.10	46	7.13	0.	-0.10	86	15.88	0.	-0.10	126	21.63	0.	-0.10
7	4.15	0.	-0.10	47	7.19	0.	-0.10	87	15.18	0.	-0.10	127	9.08	0.	-0.10
8	2.04	0.	-0.10	48	8.54	0.	-0.10	88	11.90	0.	-0.10	128	28.93	0.	-0.10
9	2.18	0.	-0.10	49	10.69	0.	-0.10	89	8.42	0.	-0.10	129	7.99	0.	-0.10
10	-0.17	0.	-0.10	50	14.31	0.	-0.10	90	17.29	0.	-0.10	130	13.43	0.	-0.10
11	-0.30	0.	-0.10	51	0. *	0.	-0.10	91	22.83	0.	-0.10	131	14.66	0.	-0.10
12	2.92	0.	-0.10	52	-0.68	0.	-0.10	92	12.19	0.	-0.10	132	16.37	0.	-0.10
13	-0.61	0.	-0.10	53	15.35	0.	-0.10	93	56.96	0.	-0.10	133	12.97	0.	-0.10
14	0. *	0.	-0.10	54	1.38	0.	-0.10	94	2.41	0.	-0.10	134	13.31	0.	-0.10
15	5.35	0.	-0.10	55	-0.80	0.	-0.10	95	8.34	0.	-0.10	135	8.81	0.	-0.10
16	5.71	0.	-0.10	56	0.52	0.	-0.10	96	1.45	0.	-0.10	136	-1.58	0.	-0.10
17	6.24	0.	-0.10	57	0.95	0.	-0.10	97	-0.65	0.	-0.10	137	20.65	0.	-0.10
18	4.07	0.	-0.10	58	1.33	0.	-0.10	98	0.25	0.	-0.10	138	14.77	0.	-0.10
19	7.36	0.	-0.10	59	12.10	0.	-0.10	99	9.78	0.	-0.10	139	0. *	0.	-0.10
20	1.05	0.	-0.10	60	8.53	0.	-0.10	100	9.71	0.	-0.10	140	-0.90	0.	-0.10
21	4.37	0.	-0.10	61	38.25	0.	-0.10	101	-0.28	0.	-0.10	141	6.11	0.	-0.10
22	3.30	0.	-0.10	62	3.94	0.	-0.10	102	10.33	0.	-0.10	142	6.02	0.	-0.10
23	1.85	0.	-0.10	63	15.09	0.	-0.10	103	13.50	0.	-0.10	143	10.46	0.	-0.10
24	2.40	0.	-0.10	64	12.44	0.	-0.10	104	10.64	0.	-0.10	144	1.12	0.	-0.10
25	-1.18	0.	-0.10	65	23.71	0.	-0.10	105	6.14	0.	-0.10	145	4.19	0.	-0.10
26	2.25	0.	-0.10	66	26.06	0.	-0.10	106	5.22	0.	-0.10	146	6.58	0.	-0.10
27	-0.71	0.	-0.10	67	0. *	0.	-0.10	107	10.27	0.	-0.10	147	3.77	0.	-0.10
28	0. *	0.	-0.10	68	0.10	0.	-0.10	108	11.68	0.	-0.10	148	-0.42	0.	-0.10
29	13.32	0.	-0.10	69	7.14	0.	-0.10	109	16.45	0.	-0.10	149	0.98	0.	-0.10
30	9.98	0.	-0.10	70	2.29	0.	-0.10	110	2.05	0.	-0.10	150	10.82	0.	-0.10
31	8.77	0.	-0.10	71	4.87	0.	-0.10	111	4.48	0.	-0.10	151	10.40	0.	-0.10
32	8.02	0.	-0.10	72	1.97	0.	-0.10	112	53.24	0.	-0.10	152	9.72	0.	-0.10
33	7.66	0.	-0.10	73	13.10	0.	-0.10	113	2.18	0.	-0.10	153	4.90	0.	-0.10
34	1.61	0.	-0.10	74	5.62	0.	-0.10	114	1.53	0.	-0.10	154	2.05	0.	-0.10
35	6.10	0.	-0.10	75	17.23	0.	-0.10	115	0.86	0.	-0.10	155	21.28	0.	-0.10
36	2.43	0.	-0.10	76	15.08	0.	-0.10	116	3.14	0.	-0.10	156	16.95	0.	-0.10
37	16.97	0.	-0.10	77	7.06	0.	-0.10	117	2.66	0.	-0.10	157	0. *	0.	-0.10
38	0. *	0.	-0.10	78	0.62	0.	-0.10	118	3.08	0.	-0.10	158	6.49	0.	-0.10
39	0. *	0.	-0.10	79	2.02	0.	-0.10	119	3.77	0.	-0.10	159	7.02	0.	-0.10
40	2.48	0.	-0.10	80	12.27	0.	-0.10	120	2.20	0.	-0.10				

MATHEMATICAL SIMULATION OF CARBON MONOXIDE DISTRIBUTION IN THE ATMOSPHERE
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...CONCENTRATIONS ARE MEAN VERTICAL VALUES...

... OUTPUT FOR NODES 1 TO 159 ... THE SYMBOL * DEVOTES A SPECIFIED VALUE ...

NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC
1	0.	*	0.	41	5.67	0.	-0.10	81	5.43	0.	-0.10	121	2.18	0.	-0.10
2	0.	*	0.	42	2.95	0.	-0.10	82	2.52	0.	-0.10	122	2.87	0.	-0.10
3	0.	*	0.	43	7.11	0.	-0.10	83	1.08	0.	-0.10	123	5.97	0.	-0.10
4	0.	*	0.	44	7.59	0.	-0.10	84	1.98	0.	-0.10	124	6.31	0.	-0.10
5	0.	*	0.	45	3.29	0.	-0.10	85	2.29	0.	-0.10	125	13.57	0.	-0.10
6	3.41	0.	-0.10	46	6.07	0.	-0.10	86	12.91	0.	-0.10	126	17.82	0.	-0.10
7	3.99	0.	-0.10	47	6.69	0.	-0.10	87	13.99	0.	-0.10	127	6.95	0.	-0.10
8	1.86	0.	-0.10	48	7.87	0.	-0.10	88	10.26	0.	-0.10	128	22.96	0.	-0.10
9	1.99	0.	-0.10	49	9.62	0.	-0.10	89	8.69	0.	-0.10	129	7.24	0.	-0.10
10	-0.31	0.	-0.10	50	14.79	0.	-0.10	90	14.94	0.	-0.10	130	12.72	0.	-0.10
11	-0.34	0.	-0.10	51	0.	*	0.	91	20.33	0.	-0.10	131	13.50	0.	-0.10
12	2.20	0.	-0.10	52	-0.71	0.	-0.10	92	12.32	0.	-0.10	132	14.36	0.	-0.10
13	-0.76	0.	-0.10	53	14.23	0.	-0.10	93	56.95	0.	-0.10	133	11.71	0.	-0.10
14	0.	*	0.	54	1.24	0.	-0.10	94	2.56	0.	-0.10	134	11.78	0.	-0.10
15	5.32	0.	-0.10	55	-0.73	0.	-0.10	95	6.34	0.	-0.10	135	7.36	0.	-0.10
16	5.55	0.	-0.10	56	0.32	0.	-0.10	96	1.46	0.	-0.10	136	-0.95	0.	-0.10
17	5.01	0.	-0.10	57	0.59	0.	-0.10	97	-0.71	0.	-0.10	137	20.37	0.	-0.10
18	4.01	0.	-0.10	58	1.12	0.	-0.10	98	0.12	0.	-0.10	138	13.36	0.	-0.10
19	6.94	0.	-0.10	59	10.65	0.	-0.10	99	9.22	0.	-0.10	139	0.	0.	-0.10
20	0.56	0.	-0.10	60	8.12	0.	-0.10	100	3.64	0.	-0.10	140	-0.94	0.	-0.10
21	4.01	0.	-0.10	61	30.71	0.	-0.10	101	-0.57	0.	-0.10	141	5.68	0.	-0.10
22	2.95	0.	-0.10	62	3.66	0.	-0.10	102	9.77	0.	-0.10	142	6.13	0.	-0.10
23	1.74	0.	-0.10	63	14.62	0.	-0.10	103	12.20	0.	-0.10	143	9.74	0.	-0.10
24	2.21	0.	-0.10	64	12.08	0.	-0.10	104	9.43	0.	-0.10	144	0.95	0.	-0.10
25	-1.25	0.	-0.10	65	24.23	0.	-0.10	105	5.81	0.	-0.10	145	3.54	0.	-0.10
26	2.20	0.	-0.10	66	25.91	0.	-0.10	106	3.77	0.	-0.10	146	5.61	0.	-0.10
27	-0.78	0.	-0.10	67	0.	*	0.	107	8.23	0.	-0.10	147	3.48	0.	-0.10
28	0.	*	0.	68	0.12	0.	-0.10	108	10.59	0.	-0.10	148	-0.41	0.	-0.10
29	12.72	0.	-0.10	69	6.53	0.	-0.10	109	15.39	0.	-0.10	149	1.03	0.	-0.10
30	2.14	0.	-0.10	70	1.95	0.	-0.10	110	2.23	0.	-0.10	150	8.74	0.	-0.10
31	8.06	0.	-0.10	71	4.43	0.	-0.10	111	4.00	0.	-0.10	151	9.60	0.	-0.10
32	7.20	0.	-0.10	72	1.30	0.	-0.10	112	49.38	0.	-0.10	152	8.93	0.	-0.10
33	7.32	0.	-0.10	73	11.97	0.	-0.10	113	1.99	0.	-0.10	153	4.00	0.	-0.10
34	1.68	0.	-0.10	74	4.47	0.	-0.10	114	1.37	0.	-0.10	154	1.60	0.	-0.10
35	6.10	0.	-0.10	75	16.91	0.	-0.10	115	0.71	0.	-0.10	155	21.58	0.	-0.10
36	2.23	0.	-0.10	76	15.90	0.	-0.10	116	2.96	0.	-0.10	156	17.22	0.	-0.10
37	15.89	0.	-0.10	77	5.38	0.	-0.10	117	2.63	0.	-0.10	157	0.	*	0.
38	0.	*	0.	78	0.70	0.	-0.10	118	2.83	0.	-0.10	158	6.09	0.	-0.10
39	0.	*	0.	79	2.18	0.	-0.10	119	3.24	0.	-0.10	159	6.05	0.	-0.10
40	2.33	0.	-0.10	80	9.77	0.	-0.10	120	1.57	0.	-0.10				

MATHEMATICAL SIMULATION OF CARBON MONOXIDE DISTRIBUTION IN THE ATMOSPHERE
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NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC
1	0.	*	0.	41	5.02	0.	-0.10	81	4.29	0.	-0.10	121	2.07	0.	-0.10
2	0.	*	0.	42	2.62	0.	-0.10	82	1.56	0.	-0.10	122	8.17	0.	-0.10
3	0.	*	0.	43	6.81	0.	-0.10	83	1.09	0.	-0.10	123	5.31	0.	-0.10
4	0.	*	0.	44	7.22	0.	-0.10	84	1.77	0.	-0.10	124	5.89	0.	-0.10
5	0.	*	0.	45	2.91	0.	-0.10	85	1.99	0.	-0.10	125	12.14	0.	-0.10
6	3.37	0.	-0.10	46	5.07	0.	-0.10	86	10.12	0.	-0.10	126	15.48	0.	-0.10
7	3.82	0.	-0.10	47	6.06	0.	-0.10	87	12.90	0.	-0.10	127	5.50	0.	-0.10
8	1.68	0.	-0.10	48	6.50	0.	-0.10	88	8.79	0.	-0.10	128	18.87	0.	-0.10
9	1.79	0.	-0.10	49	8.64	0.	-0.10	89	8.31	0.	-0.10	129	6.18	0.	-0.10
10	-0.44	0.	-0.10	50	15.02	0.	-0.10	90	13.07	0.	-0.10	130	11.93	0.	-0.10
11	-0.38	0.	-0.10	51	0.	*	0.	91	17.70	0.	-0.10	131	12.37	0.	-0.10
12	2.66	0.	-0.10	52	-0.73	0.	-0.10	92	12.30	0.	-0.10	132	12.51	0.	-0.10
13	-0.90	0.	-0.10	53	12.99	0.	-0.10	93	56.27	0.	-0.10	133	10.40	0.	-0.10
14	0.	*	0.	54	1.10	0.	-0.10	94	2.72	0.	-0.10	134	10.07	0.	-0.10
15	3.23	0.	-0.10	55	-0.72	0.	-0.10	95	4.70	0.	-0.10	135	6.10	0.	-0.10
16	5.45	0.	-0.10	56	0.16	0.	-0.10	96	1.46	0.	-0.10	136	-0.11	0.	-0.10
17	5.74	0.	-0.10	57	0.29	0.	-0.10	97	-0.72	0.	-0.10	137	19.82	0.	-0.10
18	3.94	0.	-0.10	58	1.14	0.	-0.10	98	0.01	0.	-0.10	138	11.88	0.	-0.10
19	4.44	0.	-0.10	59	9.09	0.	-0.10	99	8.59	0.	-0.10	139	0.	*	0.
20	0.13	0.	-0.10	60	7.36	0.	-0.10	100	7.83	0.	-0.10	140	-0.95	0.	-0.10
21	3.62	0.	-0.10	61	23.89	0.	-0.10	101	-0.82	0.	-0.10	141	5.20	0.	-0.10
22	2.60	0.	-0.10	62	3.49	0.	-0.10	102	4.19	0.	-0.10	142	6.21	0.	-0.10
23	1.67	0.	-0.10	63	13.89	0.	-0.10	103	11.00	0.	-0.10	143	9.04	0.	-0.10
24	2.05	0.	-0.10	64	11.58	0.	-0.10	104	8.27	0.	-0.10	144	0.96	0.	-0.10
25	-1.21	0.	-0.10	65	24.63	0.	-0.10	105	4.98	0.	-0.10	145	2.96	0.	-0.10
26	2.12	0.	-0.10	66	25.27	0.	-0.10	106	2.78	0.	-0.10	146	4.67	0.	-0.10
27	-0.83	0.	-0.10	67	0.	*	0.	107	7.47	0.	-0.10	147	3.20	0.	-0.10
28	0.	*	0.	68	0.14	0.	-0.10	108	9.48	0.	-0.10	148	-0.36	0.	-0.10
29	11.99	0.	-0.10	69	6.01	0.	-0.10	109	14.33	0.	-0.10	149	1.09	0.	-0.10
30	8.32	0.	-0.10	70	1.61	0.	-0.10	110	2.43	0.	-0.10	150	6.89	0.	-0.10
31	7.42	0.	-0.10	71	4.01	0.	-0.10	111	3.61	0.	-0.10	151	8.96	0.	-0.10
32	6.48	0.	-0.10	72	0.91	0.	-0.10	112	44.46	0.	-0.10	152	8.20	0.	-0.10
33	6.98	0.	-0.10	73	10.78	0.	-0.10	113	1.80	0.	-0.10	153	3.31	0.	-0.10
34	1.77	0.	-0.10	74	3.73	0.	-0.10	114	1.22	0.	-0.10	154	1.43	0.	-0.10
35	6.00	0.	-0.10	75	16.41	0.	-0.10	115	0.56	0.	-0.10	155	21.76	0.	-0.10
36	2.02	0.	-0.10	76	16.54	0.	-0.10	116	2.72	0.	-0.10	156	17.29	0.	-0.10
37	14.70	0.	-0.10	77	4.06	0.	-0.10	117	2.59	0.	-0.10	157	0.	*	0.
38	0.	*	0.	78	0.96	0.	-0.10	118	2.59	0.	-0.10	158	5.67	0.	-0.10
39	0.	*	0.	79	2.29	0.	-0.10	119	2.70	0.	-0.10	159	5.10	0.	-0.10
40	2.25	0.	-0.10	80	7.41	0.	-0.10	120	1.16	0.	-0.10				

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1	0.	*	0.	41	4.47	0.	-0.10	81	3.52	0.	-0.10	121	1.94	0.	-0.10
2	0.	*	0.	42	2.28	0.	-0.10	82	1.23	0.	-0.10	122	7.33	0.	-0.10
3	0.	*	0.	43	6.51	0.	-0.10	83	1.16	0.	-0.10	123	4.45	0.	-0.10
4	0.	*	0.	44	6.19	0.	-0.10	84	1.53	0.	-0.10	124	5.22	0.	-0.10
5	0.	*	0.	45	2.63	0.	-0.10	85	1.86	0.	-0.10	125	11.09	0.	-0.10
6	3.30	0.	-0.10	46	4.31	0.	-0.10	86	7.86	0.	-0.10	126	15.78	0.	-0.10
7	3.63	0.	-0.10	47	5.56	0.	-0.10	87	12.23	0.	-0.10	127	4.96	0.	-0.10
8	1.52	0.	-0.10	48	4.90	0.	-0.10	88	7.63	0.	-0.10	128	16.76	0.	-0.10
9	1.40	0.	-0.10	49	7.83	0.	-0.10	89	7.51	0.	-0.10	129	5.15	0.	-0.10
10	-0.55	0.	-0.10	50	14.95	0.	-0.10	90	11.82	0.	-0.10	130	11.59	0.	-0.10
11	-0.42	0.	-0.10	51	0.	*	0.	91	15.36	0.	-0.10	131	13.21	0.	-0.10
12	2.49	0.	-0.10	52	-0.73	0.	-0.10	92	12.11	0.	-0.10	132	11.79	0.	-0.10
13	-1.03	0.	-0.10	53	11.74	0.	-0.10	93	54.65	0.	-0.10	133	9.48	0.	-0.10
14	0.	*	0.	54	0.97	0.	-0.10	94	2.79	0.	-0.10	134	8.60	0.	-0.10
15	5.23	0.	-0.10	55	-0.65	0.	-0.10	95	3.62	0.	-0.10	135	5.10	0.	-0.10
16	5.35	0.	-0.10	56	0.03	0.	-0.10	96	1.26	0.	-0.10	136	0.99	0.	-0.10
17	5.45	0.	-0.10	57	0.03	0.	-0.10	97	-0.71	0.	-0.10	137	18.93	0.	-0.10
18	3.58	0.	-0.10	58	1.31	0.	-0.10	98	-0.09	0.	-0.10	138	10.54	0.	-0.10
19	5.88	0.	-0.10	59	7.57	0.	-0.10	99	7.86	0.	-0.10	139	0.	*	0.
20	-0.21	0.	-0.10	60	6.56	0.	-0.10	100	7.20	0.	-0.10	140	-0.94	0.	-0.10
21	3.24	0.	-0.10	61	18.55	0.	-0.10	101	-1.00	0.	-0.10	141	4.72	0.	-0.10
22	2.30	0.	-0.10	62	3.37	0.	-0.10	102	8.62	0.	-0.10	142	6.25	0.	-0.10
23	1.62	0.	-0.10	63	12.98	0.	-0.10	103	10.02	0.	-0.10	143	8.28	0.	-0.10
24	1.96	0.	-0.10	64	11.00	0.	-0.10	104	7.22	0.	-0.10	144	0.34	0.	-0.10
25	-1.07	0.	-0.10	65	24.80	0.	-0.10	105	4.00	0.	-0.10	145	2.47	0.	-0.10
26	2.02	0.	-0.10	66	24.07	0.	-0.10	106	2.22	0.	-0.10	146	3.74	0.	-0.10
27	-0.88	0.	-0.10	67	0.	*	0.	107	7.71	0.	-0.10	147	2.91	0.	-0.10
28	0.	*	0.	68	0.17	0.	-0.10	108	8.41	0.	-0.10	148	-0.27	0.	-0.10
29	11.21	0.	-0.10	69	5.46	0.	-0.10	109	13.27	0.	-0.10	149	1.16	0.	-0.10
30	7.59	0.	-0.10	70	1.29	0.	-0.10	110	2.64	0.	-0.10	150	5.52	0.	-0.10
31	6.85	0.	-0.10	71	3.61	0.	-0.10	111	3.34	0.	-0.10	151	8.28	0.	-0.10
32	5.88	0.	-0.10	72	0.85	0.	-0.10	112	38.84	0.	-0.10	152	7.34	0.	-0.10
33	6.62	0.	-0.10	73	9.66	0.	-0.10	113	1.63	0.	-0.10	153	2.33	0.	-0.10
34	1.93	0.	-0.10	74	3.42	0.	-0.10	114	1.07	0.	-0.10	154	1.32	0.	-0.10
35	5.77	0.	-0.10	75	15.81	0.	-0.10	115	0.43	0.	-0.10	155	21.80	0.	-0.10
36	1.81	0.	-0.10	76	16.99	0.	-0.10	116	2.41	0.	-0.10	156	17.16	0.	-0.10
37	13.52	0.	-0.10	77	3.26	0.	-0.10	117	2.55	0.	-0.10	157	0.	*	0.
38	0.	*	0.	78	1.25	0.	-0.10	118	2.36	0.	-0.10	158	5.27	0.	-0.10
39	0.	*	0.	79	2.31	0.	-0.10	119	2.35	0.	-0.10	159	4.31	0.	-0.10
40	2.24	0.	-0.10	80	5.48	0.	-0.10	120	0.99	0.	-0.10				

MATHEMATICAL SIMULATION OF CARSON MONOXIDE DISTRIBUTION IN THE ATMOSPHERE
TWO DIMENSIONAL FINITE ELEMENT FOR HORIZONTAL PROBLEMS OF VARIABLE THICKNESS
INITIAL APPLICATION TO THE FAIRBANKS, ALASKA AIRSHED...

TEST DATA TO CHECK NORTON'S APRIL 28 CHANGES

...RESULTS AFTER 30 HOURS OF DYNAMIC SIMULATION...

...CONCENTRATIONS ARE MEAN VERTICAL VALUES...

... OUTPUT FOR NODES 1 TO 159 ... THE SYMBOL * DENOTES A SPECIFIED VALUE ...

NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC
1	0.	*	0.	41	3.93	0.	-0.10	81	3.16	0.	-0.10	121	1.85	0.	-0.10
2	0.	*	0.	42	2.04	0.	-0.10	82	0.70	0.	-0.10	122	6.60	0.	-0.10
3	0.	*	0.	43	6.23	0.	-0.10	83	1.33	0.	-0.10	123	3.73	0.	-0.10
4	0.	*	0.	44	4.31	0.	-0.10	84	1.35	0.	-0.10	124	4.30	0.	-0.10
5	0.	*	0.	45	2.51	0.	-0.10	85	1.90	0.	-0.10	125	11.03	0.	-0.10
6	3.22	0.	-0.10	46	3.96	0.	-0.10	86	6.49	0.	-0.10	126	20.86	0.	-0.10
7	3.44	0.	-0.10	47	5.42	0.	-0.10	87	12.85	0.	-0.10	127	5.65	0.	-0.10
8	1.36	0.	-0.10	48	3.63	0.	-0.10	88	6.94	0.	-0.10	128	17.23	0.	-0.10
9	1.41	0.	-0.10	49	7.20	0.	-0.10	89	6.44	0.	-0.10	129	4.47	0.	-0.10
10	-0.65	0.	-0.10	50	14.61	0.	-0.10	90	11.33	0.	-0.10	130	12.23	0.	-0.10
11	-0.47	0.	-0.10	51	0.	*	0.	91	13.63	0.	-0.10	131	17.74	0.	-0.10
12	2.27	0.	-0.10	52	-0.72	0.	-0.10	92	11.79	0.	-0.10	132	13.13	0.	-0.10
13	-1.14	0.	-0.10	53	10.62	0.	-0.10	93	51.93	0.	-0.10	133	9.40	0.	-0.10
14	0.	*	0.	54	0.84	0.	-0.10	94	2.71	0.	-0.10	134	7.47	0.	-0.10
15	5.20	0.	-0.10	55	-0.54	0.	-0.10	95	3.21	0.	-0.10	135	4.38	0.	-0.10
16	5.27	0.	-0.10	56	-0.05	0.	-0.10	96	0.21	0.	-0.10	136	2.47	0.	-0.10
17	5.16	0.	-0.10	57	-0.19	0.	-0.10	97	-0.69	0.	-0.10	137	17.69	0.	-0.10
18	3.92	0.	-0.10	58	1.53	0.	-0.10	98	-0.17	0.	-0.10	138	9.49	0.	-0.10
19	5.32	0.	-0.10	59	4.18	0.	-0.10	99	7.07	0.	-0.10	139	0.	*	0.
20	-0.44	0.	-0.10	60	5.97	0.	-0.10	100	6.64	0.	-0.10	140	-0.91	0.	-0.10
21	2.89	0.	-0.10	61	15.29	0.	-0.10	101	-1.11	0.	-0.10	141	4.26	0.	-0.10
22	2.12	0.	-0.10	62	3.24	0.	-0.10	102	8.08	0.	-0.10	142	6.27	0.	-0.10
23	1.62	0.	-0.10	63	12.00	0.	-0.10	103	9.30	0.	-0.10	143	7.46	0.	-0.10
24	1.94	0.	-0.10	64	10.36	0.	-0.10	104	6.49	0.	-0.10	144	0.37	0.	-0.10
25	-0.87	0.	-0.10	65	24.62	0.	-0.10	105	3.27	0.	-0.10	145	2.09	0.	-0.10
26	1.89	0.	-0.10	66	22.36	0.	-0.10	106	2.03	0.	-0.10	146	2.86	0.	-0.10
27	-0.90	0.	-0.10	67	0.	*	0.	107	8.25	0.	-0.10	147	2.60	0.	-0.10
28	0.	*	0.	68	0.20	0.	-0.10	108	7.56	0.	-0.10	148	-0.16	0.	-0.10
29	10.45	0.	-0.10	69	4.97	0.	-0.10	109	12.25	0.	-0.10	149	1.24	0.	-0.10
30	7.01	0.	-0.10	70	1.00	0.	-0.10	110	2.84	0.	-0.10	150	4.94	0.	-0.10
31	6.34	0.	-0.10	71	3.16	0.	-0.10	111	3.18	0.	-0.10	151	7.56	0.	-0.10
32	5.40	0.	-0.10	72	0.96	0.	-0.10	112	33.00	0.	-0.10	152	6.34	0.	-0.10
33	6.26	0.	-0.10	73	3.74	0.	-0.10	113	1.46	0.	-0.10	153	2.81	0.	-0.10
34	1.88	0.	-0.10	74	3.62	0.	-0.10	114	0.95	0.	-0.10	154	1.13	0.	-0.10
35	5.42	0.	-0.10	75	15.16	0.	-0.10	115	0.32	0.	-0.10	155	21.65	0.	-0.10
36	1.63	0.	-0.10	76	17.22	0.	-0.10	116	2.06	0.	-0.10	156	16.85	0.	-0.10
37	12.43	0.	-0.10	77	3.00	0.	-0.10	117	2.51	0.	-0.10	157	0.	*	0.
38	0.	*	0.	78	1.49	0.	-0.10	118	2.09	0.	-0.10	158	4.90	0.	-0.10
39	0.	*	0.	79	2.20	0.	-0.10	119	2.36	0.	-0.10	159	3.83	0.	-0.10
40	2.27	0.	-0.10	80	4.12	0.	-0.10	120	0.93	0.	-0.10				

MATHEMATICAL SIMULATION OF CARBON MONOXIDE DISTRIBUTION IN THE ATMOSPHERE
TWO DIMENSIONAL FINITE ELEMENT FOR HORIZONTAL PROBLEMS OF VARIABLE THICKNESS
INITIAL APPLICATION TO THE FAIRBANKS, ALASKA AIRSHED...

TEST DATA TO CHECK NORTON'S APRIL 23 CHANGES

...RESULTS AFTER 31 HOURS OF DYNAMIC SIMULATION...

...CONCENTRATIONS ARE MEAN VERTICAL VALUES...

... OUTPUT FOR NODES 1 TO 159 ... THE SYMBOL * DENOTES A SPECIFIED VALUE ...

NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC
1	0.*	0.	-0.10	41	3.73	0.	-0.10	81	3.11	0.	-0.10	121	1.81	0.	-0.10
2	0.*	0.	-0.10	42	2.01	0.	-0.10	82	0.37	0.	-0.10	122	5.27	0.	-0.10
3	0.*	0.	-0.10	43	5.92	0.	-0.10	83	1.54	0.	-0.10	123	3.21	0.	-0.10
4	0.*	0.	-0.10	44	3.40	0.	-0.10	84	1.13	0.	-0.10	124	4.53	0.	-0.10
5	0.*	0.	-0.10	45	2.67	0.	-0.10	85	2.19	0.	-0.10	125	12.44	0.	-0.10
6	3.12	0.	-0.10	46	4.04	0.	-0.10	86	6.14	0.	-0.10	126	31.36	0.	-0.10
7	3.25	0.	-0.10	47	5.60	0.	-0.10	87	15.28	0.	-0.10	127	7.73	0.	-0.10
8	1.22	0.	-0.10	48	3.13	0.	-0.10	88	6.88	0.	-0.10	128	20.98	0.	-0.10
9	1.24	0.	-0.10	49	6.71	0.	-0.10	89	5.11	0.	-0.10	129	4.32	0.	-0.10
10	-0.72	0.	-0.10	50	14.03	0.	-0.10	90	11.60	0.	-0.10	130	13.34	0.	-0.10
11	-0.52	0.	-0.10	51	0.*	0.	-0.10	91	12.69	0.	-0.10	131	25.37	0.	-0.10
12	2.02	0.	-0.10	52	-0.69	0.	-0.10	92	11.36	0.	-0.10	132	16.50	0.	-0.10
13	-1.22	0.	-0.10	53	9.74	0.	-0.10	93	48.10	0.	-0.10	133	10.16	0.	-0.10
14	0.*	0.	-0.10	54	0.73	0.	-0.10	94	2.51	0.	-0.10	134	6.57	0.	-0.10
15	5.18	0.	-0.10	55	-0.43	0.	-0.10	95	3.37	0.	-0.10	135	4.07	0.	-0.10
16	5.23	0.	-0.10	56	-0.07	0.	-0.10	96	0.42	0.	-0.10	136	4.24	0.	-0.10
17	4.91	0.	-0.10	57	-0.34	0.	-0.10	97	-0.65	0.	-0.10	137	16.16	0.	-0.10
18	3.77	0.	-0.10	58	1.82	0.	-0.10	98	-0.24	0.	-0.10	138	8.86	0.	-0.10
19	4.82	0.	-0.10	59	5.04	0.	-0.10	99	6.31	0.	-0.10	139	0.*	0.	-0.10
20	-0.54	0.	-0.10	60	5.46	0.	-0.10	100	6.33	0.	-0.10	140	-0.85	0.	-0.10
21	2.62	0.	-0.10	61	14.52	0.	-0.10	101	-1.13	0.	-0.10	141	3.83	0.	-0.10
22	2.14	0.	-0.10	62	3.08	0.	-0.10	102	7.58	0.	-0.10	142	6.25	0.	-0.10
23	1.65	0.	-0.10	63	11.03	0.	-0.10	103	8.77	0.	-0.10	143	6.74	0.	-0.10
24	1.96	0.	-0.10	64	9.72	0.	-0.10	104	6.36	0.	-0.10	144	0.95	0.	-0.10
25	-0.63	0.	-0.10	65	24.05	0.	-0.10	105	2.85	0.	-0.10	145	1.85	0.	-0.10
26	1.74	0.	-0.10	66	20.29	0.	-0.10	106	2.21	0.	-0.10	146	2.35	0.	-0.10
27	-0.91	0.	-0.10	67	0.*	0.	-0.10	107	9.59	0.	-0.10	147	2.32	0.	-0.10
28	0.*	0.	-0.10	68	0.24	0.	-0.10	108	7.06	0.	-0.10	148	-0.05	0.	-0.10
29	9.77	0.	-0.10	69	4.58	0.	-0.10	109	11.35	0.	-0.10	149	1.32	0.	-0.10
30	6.60	0.	-0.10	70	0.80	0.	-0.10	110	3.05	0.	-0.10	150	5.40	0.	-0.10
31	6.12	0.	-0.10	71	2.72	0.	-0.10	111	3.20	0.	-0.10	151	7.11	0.	-0.10
32	5.21	0.	-0.10	72	1.17	0.	-0.10	112	27.53	0.	-0.10	152	5.38	0.	-0.10
33	5.89	0.	-0.10	73	8.15	0.	-0.10	113	1.30	0.	-0.10	153	3.17	0.	-0.10
34	1.97	0.	-0.10	74	4.36	0.	-0.10	114	0.85	0.	-0.10	154	1.08	0.	-0.10
35	5.01	0.	-0.10	75	14.51	0.	-0.10	115	0.24	0.	-0.10	155	21.25	0.	-0.10
36	1.50	0.	-0.10	76	17.25	0.	-0.10	116	1.70	0.	-0.10	156	16.39	0.	-0.10
37	11.51	0.	-0.10	77	3.17	0.	-0.10	117	2.43	0.	-0.10	157	0.*	0.	-0.10
38	0.*	0.	-0.10	78	1.72	0.	-0.10	118	1.78	0.	-0.10	158	4.58	0.	-0.10
39	0.*	0.	-0.10	79	2.01	0.	-0.10	119	2.78	0.	-0.10	159	3.73	0.	-0.10
40	2.30	0.	-0.10	80	3.44	0.	-0.10	120	0.95	0.	-0.10				

MATHEMATICAL SIMULATION OF CARBON MONOXIDE DISTRIBUTION IN THE ATMOSPHERE
TWO DIMENSIONAL FINITE ELEMENT FOR HORIZONTAL PROBLEMS OF VARIABLE THICKNESS
INITIAL APPLICATION TO THE FAIRBANKS, ALASKA AIRSHED...

TEST DATA TO CHECK NORTON'S APRIL 28 CHANGES

...RESULTS AFTER 32 HOURS OF DYNAMIC SIMULATION...

...CONCENTRATIONS ARE MEAN VERTICAL VALUES...

... OUTPUT FOR NODES 1 TO 159 ...				... THE SYMBOL * DENOTES A SPECIFIED VALUE ...											
NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC	NODE NUM	CONC PPM	X-VEL M/SEC	Y-VEL M/SEC
1	0.	*	0.	41	4.09	0.	-0.10	81	3.29	0.	-0.10	121	1.85	0.	-0.10
2	0.	*	0.	42	2.20	0.	-0.10	82	0.21	0.	-0.10	122	5.73	0.	-0.10
3	0.	*	0.	43	5.73	0.	-0.10	83	2.03	0.	-0.10	123	2.97	0.	-0.10
4	0.	*	0.	44	2.27	0.	-0.10	84	1.36	0.	-0.10	124	4.46	0.	-0.10
5	0.	*	0.	45	3.21	0.	-0.10	85	2.49	0.	-0.10	125	16.07	0.	-0.10
6	3.00	0.	-0.10	46	4.71	0.	-0.10	86	7.07	0.	-0.10	126	50.62	0.	-0.10
7	3.03	0.	-0.10	47	6.30	0.	-0.10	87	20.33	0.	-0.10	127	12.06	0.	-0.10
8	1.10	0.	-0.10	48	3.80	0.	-0.10	88	7.83	0.	-0.10	128	29.33	0.	-0.10
9	1.02	0.	-0.10	49	6.40	0.	-0.10	89	3.47	0.	-0.10	129	4.72	0.	-0.10
10	-0.76	0.	-0.10	50	13.28	0.	-0.10	90	12.95	0.	-0.10	130	17.26	0.	-0.10
11	-0.57	0.	-0.10	51	0.	*	0.	91	12.70	0.	-0.10	131	32.34	0.	-0.10
12	1.75	0.	-0.10	52	-0.63	0.	-0.10	92	10.90	0.	-0.10	132	23.47	0.	-0.10
13	-1.27	0.	-0.10	53	9.13	0.	-0.10	93	43.37	0.	-0.10	133	12.32	0.	-0.10
14	0.	*	0.	54	0.64	0.	-0.10	94	2.40	0.	-0.10	134	6.30	0.	-0.10
15	5.19	0.	-0.10	55	-0.31	0.	-0.10	95	4.24	0.	-0.10	135	4.44	0.	-0.10
16	5.26	0.	-0.10	56	-0.03	0.	-0.10	96	0.51	0.	-0.10	136	6.65	0.	-0.10
17	4.75	0.	-0.10	57	-0.40	0.	-0.10	97	-0.60	0.	-0.10	137	14.50	0.	-0.10
18	5.72	0.	-0.10	58	2.44	0.	-0.10	98	-0.28	0.	-0.10	138	8.73	0.	-0.10
19	4.46	0.	-0.10	59	4.38	0.	-0.10	99	5.81	0.	-0.10	139	0.	*	0.
20	-0.50	0.	-0.10	60	5.19	0.	-0.10	100	6.77	0.	-0.10	140	-0.79	0.	-0.10
21	2.51	0.	-0.10	61	16.96	0.	-0.10	101	-1.05	0.	-0.10	141	3.46	0.	-0.10
22	2.47	0.	-0.10	62	2.95	0.	-0.10	102	7.18	0.	-0.10	142	6.23	0.	-0.10
23	1.73	0.	-0.10	63	10.14	0.	-0.10	103	8.50	0.	-0.10	143	6.54	0.	-0.10
24	2.04	0.	-0.10	64	9.11	0.	-0.10	104	7.03	0.	-0.10	144	1.12	0.	-0.10
25	-0.36	0.	-0.10	65	23.16	0.	-0.10	105	2.78	0.	-0.10	145	1.98	0.	-0.10
26	1.60	0.	-0.10	66	18.12	0.	-0.10	106	3.13	0.	-0.10	146	2.61	0.	-0.10
27	-0.89	0.	-0.10	67	0.	*	0.	107	11.97	0.	-0.10	147	2.16	0.	-0.10
28	0.	*	0.	68	0.30	0.	-0.10	108	7.21	0.	-0.10	148	0.06	0.	-0.10
29	9.26	0.	-0.10	69	4.35	0.	-0.10	109	10.82	0.	-0.10	149	1.42	0.	-0.10
30	6.51	0.	-0.10	70	0.76	0.	-0.10	110	3.32	0.	-0.10	150	7.17	0.	-0.10
31	6.81	0.	-0.10	71	2.50	0.	-0.10	111	3.52	0.	-0.10	151	7.51	0.	-0.10
32	5.65	0.	-0.10	72	1.72	0.	-0.10	112	23.10	0.	-0.10	152	4.82	0.	-0.10
33	5.55	0.	-0.10	73	8.12	0.	-0.10	113	1.16	0.	-0.10	153	4.22	0.	-0.10
34	2.20	0.	-0.10	74	5.94	0.	-0.10	114	0.81	0.	-0.10	154	1.56	0.	-0.10
35	4.59	0.	-0.10	75	13.98	0.	-0.10	115	0.19	0.	-0.10	155	20.59	0.	-0.10
36	1.43	0.	-0.10	76	17.14	0.	-0.10	116	1.38	0.	-0.10	156	15.79	0.	-0.10
37	10.86	0.	-0.10	77	3.77	0.	-0.10	117	2.29	0.	-0.10	157	0.	*	0.
38	0.	*	0.	78	2.05	0.	-0.10	118	1.39	0.	-0.10	158	4.31	0.	-0.10
39	0.	*	0.	79	2.06	0.	-0.10	119	3.96	0.	-0.10	159	4.13	0.	-0.10
40	2.26	0.	-0.10	80	3.62	0.	-0.10	120	1.10	0.	-0.10				