Appendix A

Modeled Estimates of PCBs in Air

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In order to assess the impact of volatilization of PCBs from the Upper Hudson, PCB emission estimates were coupled with air dispersion modeling using the Industrial Source Complex (ISC) model. The ISC model is recommended as a preferred model by the U.S. Environmental Protection Agency (USEPA) for use in regulatory and permitting applications. The ISC model was developed by USEPA for determining atmospheric pollutant concentrations associated with point, line, area and volume sources of emission. The model has undergone several revisions to incorporate new features (*e.g.*, Schulman and Hanna 1986; Schulman and Scire 1980) since first being issued by Bowers *et al.* (1979).

The ISC model, based on an advanced steady-state Gaussian plume equation, calculates chemical concentrations at specific downwind locations as a function of wind speed, atmospheric stability, temperature gradient, mixing height and downwind distance. It can account for plume rise, building downwash effect, settling and dry deposition of particulates, receptor elevation and complex terrain adjustment. At each receptor location, the computed concentrations are weighted and averaged according to the joint frequency of occurrence of wind-speed and wind-direction categories, classified by the Pasquill-Gifford atmospheric stability categories.

Two separate versions of the ISC model are available to permit both long-term and short-term air quality impact analysis. The primary difference between the two models is the type of weather data needed as input. The short-term version, ISCST, was designed to calculate contaminant concentrations over time periods as short as one hour. The ISCST model can be used to calculate ambient concentrations over longer time periods (for example one year), simply by averaging the hourly predictions over the appropriate averaging period. Because the ISCST predictions are based upon more detailed meteorologic inputs, the predictions from the ISCST model are more accurate than those estimated using the ISCLT model. The ISCST model requires more detailed weather input data than does the long-term version, ISCLT, which was designed to determine the monthly, seasonal, or annual average concentrations. For this assessment, the current ISC Short Term model, ISCST3 Version 97363, was used to estimate the concentration of PCBs in air in the immediate vicinity of the river.

A.1 Features of the ISC Model

The ISC model[1] provides a range of user-specified and USEPA-recommended default options. The “simple terrain” algorithm of the ISC model, which was adopted here, is appropriate when the topography within the model domain can be described as reasonably flat terrain with elevation variation of less than approximately 30 feet, or when the chemical release point is reasonably close to the ground, which is the case for the current analysis.

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[1] “ISC" is used to describe common features possessed by both ISCST3 and ISCLT3 models. "ISCST3" or "ISCLT3" is used if a distinction between the two models exists.

The model assumes that pollutants from an emission source disperse in a Gaussian manner, with dispersion coefficients that vary as a function of atmospheric stability. Six atmospheric stability classes (A-F) are used in the model, with A representing the most unstable atmospheric class and F representing the most stable class. For each of these six stability classes, dispersion coefficients are calculated, as a function of distance, to define the spread of the plume from the source in the horizontal and vertical directions.

A set of standard rural or urban dispersion coefficients are used by the ISCST3 model, depending on the location of the source and the surrounding land use. The EPA guidance on the distinction between urban and rural is based on land use within a 3-km radius of the site in question. If over 50% of the land use within a 3 km radius is rural (single-family residential is considered rural), then rural dispersion coefficients are appropriate. Rural dispersion coefficients were adopted for the current assessment. It should be noted that rural atmospheric dispersion coefficients lead to predictions of lower chemical dispersion and mixing than do the urban dispersion coefficients which account for the increased mixing induced by the higher heat fluxes in urban settings and greater mixing induced by air flow around large buildings. Thus, the rural dispersion coefficients used lead to predictions of higher chemical concentrations in the atmosphere.

The standard EPA default regulatory options were used in the ISCST3 modeling. Default vertical wind profile exponents were used for each stability class (A:0.07, B:0.07, C:0.10, D:0.15, E:0.35, F:0.55 for the rural mode). These wind profile exponents define the increase in wind velocity with height. Also, default vertical potential temperature gradients were used for each stability class (A:0.0, B:0.0, C:0.0, D:0.0, E:0.02, F:0.035 ^{o}K/m); these define the strength of the temperature inversion during stable (E and F) atmospheric conditions.

A.2 Meteorological Data

The principal meteorological input required by the ISCST model is hourly meteorological data including the joint frequency of occurrence of wind-speed and wind-direction categories, and mixing heights classified according to the Pasquill stability categories. The meteorologic data was obtained from the National Climatic Data Center for the National Weather Service (NWS) station at Albany New York Airport from EPA's electronic bulletin board service (USEPA, 1998). The most recent full-year (8760 hours) of NWS data from the Albany station was used for the ISCST modeling.

A.3 Source Characterization

Volatile emissions of PCBs from the Upper Hudson River water surface provide the source term for the air modeling performed for this assessment. The PCB flux (μg/sec) from the river surface depends on chemical factors (*e.g.*, the volatility of PCBs and their affinity to partition into air, water, *etc.*); atmospheric conditions, including wind speed, ambient temperature; and the diffusion of PCBs at the water-air interface.

A model incorporating a two-layer film resistance approach is commonly applied to the estimation of chemical volatilization at the air-water interface (Achman *et al.*, 1993; Bopp 1983). The two-layer model accounts for diffusion through a water boundary layer on the water side of the interface, then diffusion through an air boundary layer on the air side of the air-water boundary. Given the complexity and uncertainty of modeling this chemical release, PCB releases were estimated using two approaches. The first approach uses the two-layer model, and the physical-chemical parameters for PCBs determined by Bopp (1983) to estimate the flux of PCBs from the water column into the air. This estimate was compared with an empirical calculation based on actual PCB flux measurements from Green Bay, Lake Michigan (Achman *et al*., 1993).

According to the two-layer film resistance model, the flux of chemical across the air-water interface is given by (Bopp, 1983):

$$F = K_l (C_w - C_g/H) \qquad [1]$$

and

$$\frac{1}{K_l} = \frac{m_l}{D_l} + \frac{m_g}{HD_g} \qquad [2]$$

where:

F	=	flux (g/cm^2-sec)
C_w	=	chemical concentration in water (g/cm^3)
C_g	=	chemical concentration in bulk gas phase (g/cm^3)
H	=	dimensionless Henry's law constant
K_l	=	mass transfer coefficient (cm/sec)
μ_l, μ_g	=	liquid and gaseous boundary layer thickness (cm)
D_l	=	liquid phase diffusion coefficient (cm^2/sec)
D_g	=	gas phase diffusion coefficient (cm^2/sec)

The mass transfer coefficient is a function of chemical-specific Henry's law constant and chemical diffusion coefficients. Values for tri- and tetrachlorobiphenyl published by Bopp (1983) were used to estimate the PCB mass transfer coefficient. The parameter values, and the mass transfer coefficients calculated using equation [2] are summarized below. The calculated mass transfer coefficients compare favorably with the empirical coefficients determined by Achman *et al.* (1993) based on *in-situ* measurements for total PCBs in Lake Michigan. Achman *et al*. (1993) determined mass transfer coefficients ranging from 0.02 to 0.31 m/day (0.2×10^{-4} to 3.6×10^{-4} cm/sec).

Chemical-Specific Input Parameters for Flux Estimate[a]

Parameter (units)	Trichlorobiphenyl	Tetrachlorobiphenyl
H (dimensionless)	3.3×10^{-2}	1.4×10^{-2}
D_l (cm^2/sec)	0.58×10^{-5}	0.58×10^{-5}
D_g (cm^2/sec)	5.4×10^{-2}	5.2×10^{-2}
K_l (cm/sec) [b]	2.7×10^{-4}	2.2×10^{-4}

Notes:
[a]*Source: Bopp (1983)*
[b]*Calculated using equation [2] with* m_l *= 0.018 cm and* m_g *= 1 cm (Bopp, 1983)*

It is typically observed, as suggested by Bopp (1983), that the gas phase term (C_g/H) in Equation [1] is small with respect to the chemical concentration in water (C_w). Under these conditions, the flux of chemical from the water reduces to:

$$F \approx K_l \times C_w \qquad [3]$$

Equation [3] indicates that the flux is linearly proportional to the concentration in water. For a unit concentration in water (1 ng/L ≡ 10^{-12} g/cm^3), the flux of PCBs into the air based on Equation [3] is:

trichlorobiphenyl:	2.7×10^{-7} (ng/cm^2-sec per ng/L)
tetrachlorobiphenyl:	2.2×10^{-7} (ng/cm^2-sec per ng/L)

Given the only slight differences in the flux estimates, the higher flux rate (2.7×10^{-7} ng/cm^2-sec per ng/L) was used as the source term to the ISCST model to estimate the PCB concentration in air.

The flux calculated according to the two-film theory model, was compared with the PCB flux from water estimated based on the field studies performed by Achman *et al.* (1993), who measured PCB volatilization from Lake Michigan on 14 separate days from June to October, 1989. The total PCB concentration in water measured during the study period ranged from 0.35 ng/L to 7.8 ng/L. The measured PCB flux rates ranged from 13 to 1,300 ng/m^2-day. The highest flux rate (1,300 ng/m^2-day) corresponded to a PCB concentration in water of 6.67 ng/L and was measured on a day with a wind speed of 6.5 m/sec (the day with the highest observed wind speed during the study when PCB measurements were taken).

Using the 14 measurements from the Achman *et al.* study, the ordinary least squares linear regression fit to the data gives:

$$\text{Flux (ng/m}^2\text{-day)} = 0.087\ C_l\ (\text{ng/m}^3) + 47.5 \qquad (R^2=0.31)$$

The data exhibited a significant degree of variability, as evidenced by the low R^2 value. Using this empirical regression equation, the flux of PCBs from water per unit concentration is 134.5 ng/m^2-day per ng/L, or 1.6×10^{-7} ng/cm^2-sec per ng/L. The average normalized flux (average of 14 measurements) measured by Achman *et al.* was 104 ng/m^2-day, or 1.2×10^{-7} ng/cm^2-sec per ng/L. These experimental results are very close to the flux estimate calculated above using the two-layer film resistance theory.

A.4 Scaling Unit Emission Rate to Actual Source Strength

The ISC model yields a predicted chemical concentration (*e.g.*, pg/m^3) at a particular point in space averaged over a particular time period that is linearly proportional to the emission source (in µg/sec). This linear property is common to the Gaussian "advection dispersion" type models widely used for chemical fate and transport not only in air but in soil, groundwater and surface water. Because of the linear relationship between the source emission rate and the predicted ambient chemical concentration in air, the ISC model can be run for a "unit emission source" (*i.e.*, 1 µg/sec), and the results then scaled based on the actual source strength of any particular constituent modeled. This greatly reduces the number of modeling iterations required. The ISC model results for the unit source are converted to the chemical-specific concentration predictions by a simple arithmetic conversion using the chemical-specific emission rates for the source(s) under consideration:

$$C_i(x,y) = C^*(x,y) \times J_i \qquad [1]$$

where:

$C_i(x,y)$	=	chemical concentration of the ith chemical at a particular (x,y) location (pg/m^3)
$C^*(x,y)$	=	normalized chemical concentration in air at a particular (x,y) location per unit emission rate (pg/m^3 per µg/sec emissions)
J_i	=	emission rate for the ith chemical (µg/sec)

For this assessment, a unit source (1 µg/sec) was apportioned to a representative reach of the river, taken as a one kilometer long, by approximately 200 meter wide, which is a representative width of the Upper Hudson in the vicinity of the Thompson Island Pool area.

As described above, the flux rate (µg/cm^2-sec) is linearly proportional to the concentration of PCBs dissolved in water. Therefore, the ISCST model results can be scaled linearly to the PCB concentration in water.

A.5 Summary of Modeling Results

The average normalized chemical concentration predictions, C*(x,y), were calculated for receptor points covering a uniform grid (50 m × 50 m) up to 200 meters on either side of this representative stretch of river. The complete ISCST output file is provided in Attachment B-1. A plot of the annual average normalized PCB concentration in air is provided in Figure B-1.

Not surprisingly, the maximum average concentrations are predicted to occur immediately along either side of the river, with slightly higher ambient concentrations predicted along the eastern, or predominantly downwind, bank of the river. The typical concentration along the eastern river bank is on the order of 70 picograms per cubic meter per 1 μg/sec emission source strength (*e.g.*, 70 pg/m^3 per μg/sec). The concentration drops approximately 10-fold as the distance downwind increases to approximately 200 meters. The downwind average normalized concentration within a 200 meter wide zone is approximately 22 pg/m^3 per μg/sec of PCB emissions.

A.6 References

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Schulman, L.L., and S.R. Hanna. 1986. Evaluation of downwash modifications to the Industrial Source Complex model. *J. Air Poll. Control Assoc.* 36(3):258-164.

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U.S. Environmental Protection Agency (USEPA). Office of Air Quality Planning and Standards. 1995. *User's guide for the Industrial Source Complex (ISC3) dispersion model 3rd edition*. (revised). Volumes 1 and 2. Research Triangle Park, N.C. EPA - 454/b-95-003a and -003b.

Table A-1
Airborne PCB Concentrations (ng/m³)

Monitor Height	Date	Location	Aroclor 1221	Aroclor 1242	Aroclor 1254	Total PCBs (a)
1 m	8/25-27/80	A	<10	110	<10	120
1 m	9/5-7/80	A	<10	520	<10	530
1 m	8/19-26/81	A	<0.3	46	1.3	47
1 m	9/2-9/81	A	<0.3	50	1.1	51
1 m	9/16-26/81	A	<0.3	32	0.6	33
1 m	9/10/81	A	<3	60	<2	63
1 m	9/10/81	B	<3	58	<2	61
4.5m	9/10/81	A	<3	39	<2	42
4.5m	9/10/81	B	<3	31	<2	34

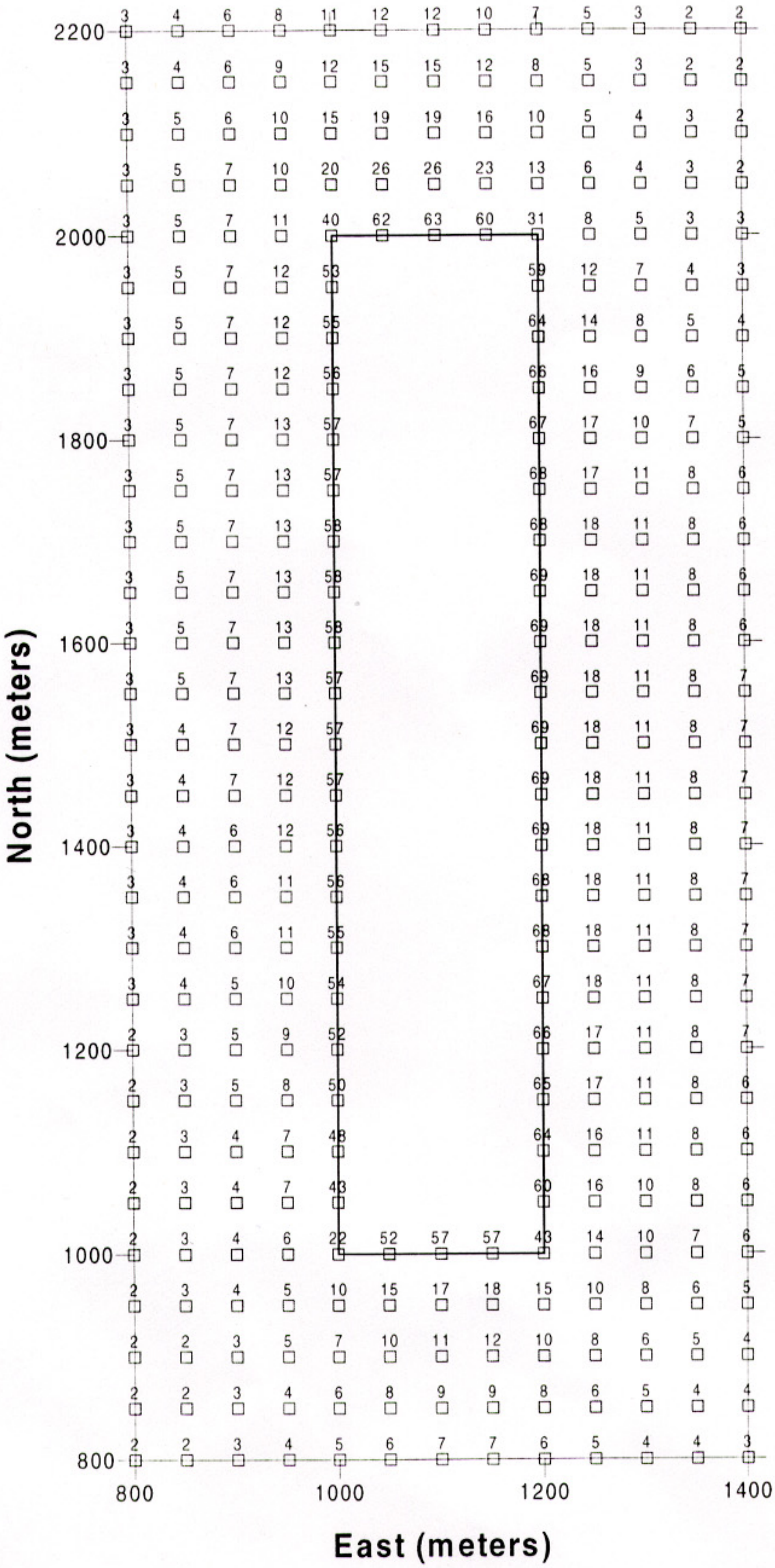
Notes:
(a) Total PCB based on summing Aroclor concentrations, including 1/2 the detection limit for non-detected results.
Source: Buckley and Tofflemire (1983)

Table A-2
Summary of PCBs Detected in Air and Corresponding Water Sampling Results
Remnant Deposit Monitoring Program (Harza, 1992)

AIR			WATER		Transfer Coefficient
Site	**Date**	**PCB Conc ($\mu g/m^3$)**	**Associated Water Sample Locations**	**Total PCB ($\mu g/L$)**	**Ratio PCB_{air}/PCB_{h2o}**
A2	9/18/91	0.03	RS2-W1	1.8 (9/19/91)	0.02
			RS2-W2	NS	
			E1	1.1 (9/19/91)	0.03
A3	9/18/91	0.03	RS3-W1	1.5 (9/19/91)	0.02
			RS3-W2	1.8 (9/19/91)	0.02
A4	6/8/91	0.03	RS4-W1	NS	
			E3	0.14 (6/7/91)	0.2
			RS4-W2	NS	
			E4	ND (6/7/91)	
	9/18/91	0.13	RS4-W1	NS	
			E3	1.4 (9/19/91)	0.09
			RS4-W2	NS	
			E4	1.5 (9/19/91)	0.09
	9/18/91	0.11	RS4-W1		
			E3		
			RS4-W2		
			E4		
B3	5/15/91	0.08	RS3-W1	ND	
			RS3-W2	ND	
	5/15/91	0.06	RS3-W1		
			RS3-W2		
	5/21/91	0.04	RS3-W1	0.14	0.3
			RS3-W2	ND	
	5/21/91	0.03	RS3-W1		
			RS3-W2		
	5/24/91	0.06	RS3-W1	NS	
			RS3-W2	NS	
	5/24/91	0.04	RS3-W1		
			RS3-W2		
	5/27/91	0.03	RS3-W1	NS	
			RS3-W2	NS	
	6/8/91	0.05	RS3-W1	0.2	0.3
			RS3-W2	0.14	0.4

Figure A-1

ISCST Model Results
Normalized PCB Concentration
(pg/m³ per 1 µg/s)



Gradient Corporation
An IT Company

Attachment A-1

ISCST3 Modeling Results

**BEE-Line Software: BEEST for Windows data input file
** Date: 3/18/99 Time: 10:41:10 AM
NO ECHO

BEE-Line ISCST3 "BEEST" Version 6.61

Input File - C:\Beework\hudson.DTA
Output File - C:\Beework\hudson.LST
Met File - C:\Beework\METDATA\ALBAN91.MET

****
*** SETUP Finishes Successfully ***
****

```
**MODELOPTs: CONC                          RURAL  FLAT          DFAULT

                              ***     MODEL SETUP OPTIONS SUMMARY       ***
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

**Intermediate Terrain Processing is Selected

**Model Is Setup For Calculation of Average CONCentration Values.

  --  SCAVENGING/DEPOSITION LOGIC --
**Model Uses NO DRY DEPLETION.  DDPLETE =  F
**Model Uses NO WET DEPLETION.  WDPLETE =  F
**NO WET SCAVENGING Data Provided.
**Model Does NOT Use GRIDDED TERRAIN Data for Depletion Calculations

**Model Uses RURAL Dispersion.

**Model Uses Regulatory DEFAULT Options:
           1. Final Plume Rise.
           2. Stack-tip Downwash.
           3. Buoyancy-induced Dispersion.
           4. Use Calms Processing Routine.
           5. Not Use Missing Data Processing Routine.
           6. Default Wind Profile Exponents.
           7. Default Vertical Potential Temperature Gradients.
           8. "Upper Bound" Values for Supersquat Buildings.
           9. No Exponential Decay for RURAL Mode

**Model Assumes Receptors on FLAT Terrain.

**Model Assumes No FLAGPOLE Receptor Heights.

**Model Calculates ANNUAL Averages Only

**This Run Includes:     1 Source(s);      1 Source Group(s); and     320 Receptor(s)

**The Model Assumes A Pollutant Type of:  OTHER

**Model Set To Continue RUNning After the Setup Testing.

**Output Options Selected:
         Model Outputs Tables of ANNUAL Averages by Receptor
         Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)

**NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                m for Missing Hours
                                                                b for Both Calm and Missing Hours

**Misc. Inputs:  Anem. Hgt. (m) =    10.00 ;    Decay Coef. =    0.000     ;   Rot. Angle =     0.0
                 Emission Units = UG/S                                     ;  Emission Rate Unit Factor =   0.10000E+07
                 Output Units   = PG/M³

**Approximate Storage Requirements of Model =     1.2 MB of RAM.

**Input Runstream File:          C:\Beework\hudson.DTA
**Output Print File:             C:\Beework\hudson.LST
```

**MODELOPTs: CONC   RURAL FLAT   DFAULT

*** AREA SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (GRAMS/SEC /METER**2)	COORD (SW CORNER) X (METERS)	Y (METERS)	BASE ELEV. (METERS)	RELEASE HEIGHT (METERS)	X-DIM OF AREA (METERS)	Y-DIM OF AREA (METERS)	ORIENT. OF AREA (DEG.)	INIT. SZ (METERS)	EMISSION RATE SCALAR VARY BY
RIVER	0	0.50000E-05	1000.0	1000.0	0.0	0.00	200.00	1000.00	0.00	0.00	

**MODELOPTs: CONC   RURAL FLAT   DFAULT

*** SOURCE IDs DEFINING SOURCE GROUPS ***

GROUP ID	SOURCE IDs
ALL	RIVER ,

**MODELOPTs: CONC   RURAL FLAT   DFAULT

*** DISCRETE CARTESIAN RECEPTORS ***
(X-COORD, Y-COORD, ZELEV, ZFLAG)
(METERS)

```
(   1000.0,   1000.0,      0.0,      0.0);      (   1000.0,   1050.0,      0.0,      0.0);
(   1000.0,   1100.0,      0.0,      0.0);      (   1000.0,   1150.0,      0.0,      0.0);
(   1000.0,   1200.0,      0.0,      0.0);      (   1000.0,   1250.0,      0.0,      0.0);
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(   1000.0,   1600.0,      0.0,      0.0);      (   1000.0,   1650.0,      0.0,      0.0);
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(   1100.0,   2000.0,      0.0,      0.0);      (   1150.0,   2000.0,      0.0,      0.0);
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(   1200.0,   1900.0,      0.0,      0.0);      (   1200.0,   1850.0,      0.0,      0.0);
(   1200.0,   1800.0,      0.0,      0.0);      (   1200.0,   1750.0,      0.0,      0.0);
(   1200.0,   1700.0,      0.0,      0.0);      (   1200.0,   1650.0,      0.0,      0.0);
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(   1200.0,   1300.0,      0.0,      0.0);      (   1200.0,   1250.0,      0.0,      0.0);
(   1200.0,   1200.0,      0.0,      0.0);      (   1200.0,   1150.0,      0.0,      0.0);
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(   1200.0,   1000.0,      0.0,      0.0);      (   1150.0,   1000.0,      0.0,      0.0);
(   1100.0,   1000.0,      0.0,      0.0);      (   1050.0,   1000.0,      0.0,      0.0);
(    800.0,    800.0,      0.0,      0.0);      (    850.0,    800.0,      0.0,      0.0);
(    900.0,    800.0,      0.0,      0.0);      (    950.0,    800.0,      0.0,      0.0);
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(   1100.0,    800.0,      0.0,      0.0);      (   1150.0,    800.0,      0.0,      0.0);
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(   1400.0,    800.0,      0.0,      0.0);      (    800.0,    850.0,      0.0,      0.0);
(    850.0,    850.0,      0.0,      0.0);      (    900.0,    850.0,      0.0,      0.0);
(    950.0,    850.0,      0.0,      0.0);      (   1000.0,    850.0,      0.0,      0.0);
(   1050.0,    850.0,      0.0,      0.0);      (   1100.0,    850.0,      0.0,      0.0);
(   1150.0,    850.0,      0.0,      0.0);      (   1200.0,    850.0,      0.0,      0.0);
(   1250.0,    850.0,      0.0,      0.0);      (   1300.0,    850.0,      0.0,      0.0);
(   1350.0,    850.0,      0.0,      0.0);      (   1400.0,    850.0,      0.0,      0.0);
(    800.0,    900.0,      0.0,      0.0);      (    850.0,    900.0,      0.0,      0.0);
(    900.0,    900.0,      0.0,      0.0);      (    950.0,    900.0,      0.0,      0.0);
(   1000.0,    900.0,      0.0,      0.0);      (   1050.0,    900.0,      0.0,      0.0);
(   1100.0,    900.0,      0.0,      0.0);      (   1150.0,    900.0,      0.0,      0.0);
(   1200.0,    900.0,      0.0,      0.0);      (   1250.0,    900.0,      0.0,      0.0);
(   1300.0,    900.0,      0.0,      0.0);      (   1350.0,    900.0,      0.0,      0.0);
(   1400.0,    900.0,      0.0,      0.0);      (    800.0,    950.0,      0.0,      0.0);
(    850.0,    950.0,      0.0,      0.0);      (    900.0,    950.0,      0.0,      0.0);
```

**MODELOPTs: CONC   RURAL FLAT   DFAULT

*** DISCRETE CARTESIAN RECEPTORS ***
(X-COORD, Y-COORD, ZELEV, ZFLAG)
(METERS)

```
(   950.0,    950.0,    0.0,    0.0);    (  1000.0,    950.0,    0.0,    0.0);
(  1050.0,    950.0,    0.0,    0.0);    (  1100.0,    950.0,    0.0,    0.0);
(  1150.0,    950.0,    0.0,    0.0);    (  1200.0,    950.0,    0.0,    0.0);
(  1250.0,    950.0,    0.0,    0.0);    (  1300.0,    950.0,    0.0,    0.0);
(  1350.0,    950.0,    0.0,    0.0);    (  1400.0,    950.0,    0.0,    0.0);
(   800.0,   1000.0,    0.0,    0.0);    (   850.0,   1000.0,    0.0,    0.0);
(   900.0,   1000.0,    0.0,    0.0);    (   950.0,   1000.0,    0.0,    0.0);
(  1250.0,   1000.0,    0.0,    0.0);    (  1300.0,   1000.0,    0.0,    0.0);
(  1350.0,   1000.0,    0.0,    0.0);    (  1400.0,   1000.0,    0.0,    0.0);
(   800.0,   1050.0,    0.0,    0.0);    (   850.0,   1050.0,    0.0,    0.0);
(   900.0,   1050.0,    0.0,    0.0);    (   950.0,   1050.0,    0.0,    0.0);
(  1250.0,   1050.0,    0.0,    0.0);    (  1300.0,   1050.0,    0.0,    0.0);
(  1350.0,   1050.0,    0.0,    0.0);    (  1400.0,   1050.0,    0.0,    0.0);
(   800.0,   1100.0,    0.0,    0.0);    (   850.0,   1100.0,    0.0,    0.0);
(   900.0,   1100.0,    0.0,    0.0);    (   950.0,   1100.0,    0.0,    0.0);
(  1250.0,   1100.0,    0.0,    0.0);    (  1300.0,   1100.0,    0.0,    0.0);
(  1350.0,   1100.0,    0.0,    0.0);    (  1400.0,   1100.0,    0.0,    0.0);
(   800.0,   1150.0,    0.0,    0.0);    (   850.0,   1150.0,    0.0,    0.0);
(   900.0,   1150.0,    0.0,    0.0);    (   950.0,   1150.0,    0.0,    0.0);
(  1250.0,   1150.0,    0.0,    0.0);    (  1300.0,   1150.0,    0.0,    0.0);
(  1350.0,   1150.0,    0.0,    0.0);    (  1400.0,   1150.0,    0.0,    0.0);
(   800.0,   1200.0,    0.0,    0.0);    (   850.0,   1200.0,    0.0,    0.0);
(   900.0,   1200.0,    0.0,    0.0);    (   950.0,   1200.0,    0.0,    0.0);
(  1250.0,   1200.0,    0.0,    0.0);    (  1300.0,   1200.0,    0.0,    0.0);
(  1350.0,   1200.0,    0.0,    0.0);    (  1400.0,   1200.0,    0.0,    0.0);
(   800.0,   1250.0,    0.0,    0.0);    (   850.0,   1250.0,    0.0,    0.0);
(   900.0,   1250.0,    0.0,    0.0);    (   950.0,   1250.0,    0.0,    0.0);
(  1250.0,   1250.0,    0.0,    0.0);    (  1300.0,   1250.0,    0.0,    0.0);
(  1350.0,   1250.0,    0.0,    0.0);    (  1400.0,   1250.0,    0.0,    0.0);
(   800.0,   1300.0,    0.0,    0.0);    (   850.0,   1300.0,    0.0,    0.0);
(   900.0,   1300.0,    0.0,    0.0);    (   950.0,   1300.0,    0.0,    0.0);
(  1250.0,   1300.0,    0.0,    0.0);    (  1300.0,   1300.0,    0.0,    0.0);
(  1350.0,   1300.0,    0.0,    0.0);    (  1400.0,   1300.0,    0.0,    0.0);
(   800.0,   1350.0,    0.0,    0.0);    (   850.0,   1350.0,    0.0,    0.0);
(   900.0,   1350.0,    0.0,    0.0);    (   950.0,   1350.0,    0.0,    0.0);
(  1250.0,   1350.0,    0.0,    0.0);    (  1300.0,   1350.0,    0.0,    0.0);
(  1350.0,   1350.0,    0.0,    0.0);    (  1400.0,   1350.0,    0.0,    0.0);
(   800.0,   1400.0,    0.0,    0.0);    (   850.0,   1400.0,    0.0,    0.0);
(   900.0,   1400.0,    0.0,    0.0);    (   950.0,   1400.0,    0.0,    0.0);
(  1250.0,   1400.0,    0.0,    0.0);    (  1300.0,   1400.0,    0.0,    0.0);
(  1350.0,   1400.0,    0.0,    0.0);    (  1400.0,   1400.0,    0.0,    0.0);
(   800.0,   1450.0,    0.0,    0.0);    (   850.0,   1450.0,    0.0,    0.0);
(   900.0,   1450.0,    0.0,    0.0);    (   950.0,   1450.0,    0.0,    0.0);
(  1250.0,   1450.0,    0.0,    0.0);    (  1300.0,   1450.0,    0.0,    0.0);
(  1350.0,   1450.0,    0.0,    0.0);    (  1400.0,   1450.0,    0.0,    0.0);
```

**MODELOPTs: CONC RURAL FLAT DFAULT

*** DISCRETE CARTESIAN RECEPTORS ***
(X-COORD, Y-COORD, ZELEV, ZFLAG)
(METERS)

(800.0,	1500.0,	0.0,	0.0);	(850.0,	1500.0,	0.0,	0.0);
(900.0,	1500.0,	0.0,	0.0);	(950.0,	1500.0,	0.0,	0.0);
(1250.0,	1500.0,	0.0,	0.0);	(1300.0,	1500.0,	0.0,	0.0);
(1350.0,	1500.0,	0.0,	0.0);	(1400.0,	1500.0,	0.0,	0.0);
(800.0,	1550.0,	0.0,	0.0);	(850.0,	1550.0,	0.0,	0.0);
(900.0,	1550.0,	0.0,	0.0);	(950.0,	1550.0,	0.0,	0.0);
(1250.0,	1550.0,	0.0,	0.0);	(1300.0,	1550.0,	0.0,	0.0);
(1350.0,	1550.0,	0.0,	0.0);	(1400.0,	1550.0,	0.0,	0.0);
(800.0,	1600.0,	0.0,	0.0);	(850.0,	1600.0,	0.0,	0.0);
(900.0,	1600.0,	0.0,	0.0);	(950.0,	1600.0,	0.0,	0.0);
(1250.0,	1600.0,	0.0,	0.0);	(1300.0,	1600.0,	0.0,	0.0);
(1350.0,	1600.0,	0.0,	0.0);	(1400.0,	1600.0,	0.0,	0.0);
(800.0,	1650.0,	0.0,	0.0);	(850.0,	1650.0,	0.0,	0.0);
(900.0,	1650.0,	0.0,	0.0);	(950.0,	1650.0,	0.0,	0.0);
(1250.0,	1650.0,	0.0,	0.0);	(1300.0,	1650.0,	0.0,	0.0);
(1350.0,	1650.0,	0.0,	0.0);	(1400.0,	1650.0,	0.0,	0.0);
(800.0,	1700.0,	0.0,	0.0);	(850.0,	1700.0,	0.0,	0.0);
(900.0,	1700.0,	0.0,	0.0);	(950.0,	1700.0,	0.0,	0.0);
(1250.0,	1700.0,	0.0,	0.0);	(1300.0,	1700.0,	0.0,	0.0);
(1350.0,	1700.0,	0.0,	0.0);	(1400.0,	1700.0,	0.0,	0.0);
(800.0,	1750.0,	0.0,	0.0);	(850.0,	1750.0,	0.0,	0.0);
(900.0,	1750.0,	0.0,	0.0);	(950.0,	1750.0,	0.0,	0.0);
(1250.0,	1750.0,	0.0,	0.0);	(1300.0,	1750.0,	0.0,	0.0);
(1350.0,	1750.0,	0.0,	0.0);	(1400.0,	1750.0,	0.0,	0.0);
(800.0,	1800.0,	0.0,	0.0);	(850.0,	1800.0,	0.0,	0.0);
(900.0,	1800.0,	0.0,	0.0);	(950.0,	1800.0,	0.0,	0.0);
(1250.0,	1800.0,	0.0,	0.0);	(1300.0,	1800.0,	0.0,	0.0);
(1350.0,	1800.0,	0.0,	0.0);	(1400.0,	1800.0,	0.0,	0.0);
(800.0,	1850.0,	0.0,	0.0);	(850.0,	1850.0,	0.0,	0.0);
(900.0,	1850.0,	0.0,	0.0);	(950.0,	1850.0,	0.0,	0.0);
(1250.0,	1850.0,	0.0,	0.0);	(1300.0,	1850.0,	0.0,	0.0);
(1350.0,	1850.0,	0.0,	0.0);	(1400.0,	1850.0,	0.0,	0.0);
(800.0,	1900.0,	0.0,	0.0);	(850.0,	1900.0,	0.0,	0.0);
(900.0,	1900.0,	0.0,	0.0);	(950.0,	1900.0,	0.0,	0.0);
(1250.0,	1900.0,	0.0,	0.0);	(1300.0,	1900.0,	0.0,	0.0);
(1350.0,	1900.0,	0.0,	0.0);	(1400.0,	1900.0,	0.0,	0.0);
(800.0,	1950.0,	0.0,	0.0);	(850.0,	1950.0,	0.0,	0.0);
(900.0,	1950.0,	0.0,	0.0);	(950.0,	1950.0,	0.0,	0.0);
(1250.0,	1950.0,	0.0,	0.0);	(1300.0,	1950.0,	0.0,	0.0);
(1350.0,	1950.0,	0.0,	0.0);	(1400.0,	1950.0,	0.0,	0.0);
(800.0,	2000.0,	0.0,	0.0);	(850.0,	2000.0,	0.0,	0.0);
(900.0,	2000.0,	0.0,	0.0);	(950.0,	2000.0,	0.0,	0.0);
(1250.0,	2000.0,	0.0,	0.0);	(1300.0,	2000.0,	0.0,	0.0);
(1350.0,	2000.0,	0.0,	0.0);	(1400.0,	2000.0,	0.0,	0.0);
(800.0,	2050.0,	0.0,	0.0);	(850.0,	2050.0,	0.0,	0.0);

**MODELOPTs: CONC   RURAL FLAT   DFAULT

*** DISCRETE CARTESIAN RECEPTORS ***
(X-COORD, Y-COORD, ZELEV, ZFLAG)
(METERS)

(900.0,	2050.0,	0.0,	0.0);	(950.0,	2050.0,	0.0,	0.0);
(1000.0,	2050.0,	0.0,	0.0);	(1050.0,	2050.0,	0.0,	0.0);
(1100.0,	2050.0,	0.0,	0.0);	(1150.0,	2050.0,	0.0,	0.0);
(1200.0,	2050.0,	0.0,	0.0);	(1250.0,	2050.0,	0.0,	0.0);
(1300.0,	2050.0,	0.0,	0.0);	(1350.0,	2050.0,	0.0,	0.0);
(1400.0,	2050.0,	0.0,	0.0);	(800.0,	2100.0,	0.0,	0.0);
(850.0,	2100.0,	0.0,	0.0);	(900.0,	2100.0,	0.0,	0.0);
(950.0,	2100.0,	0.0,	0.0);	(1000.0,	2100.0,	0.0,	0.0);
(1050.0,	2100.0,	0.0,	0.0);	(1100.0,	2100.0,	0.0,	0.0);
(1150.0,	2100.0,	0.0,	0.0);	(1200.0,	2100.0,	0.0,	0.0);
(1250.0,	2100.0,	0.0,	0.0);	(1300.0,	2100.0,	0.0,	0.0);
(1350.0,	2100.0,	0.0,	0.0);	(1400.0,	2100.0,	0.0,	0.0);
(800.0,	2150.0,	0.0,	0.0);	(850.0,	2150.0,	0.0,	0.0);
(900.0,	2150.0,	0.0,	0.0);	(950.0,	2150.0,	0.0,	0.0);
(1000.0,	2150.0,	0.0,	0.0);	(1050.0,	2150.0,	0.0,	0.0);
(1100.0,	2150.0,	0.0,	0.0);	(1150.0,	2150.0,	0.0,	0.0);
(1200.0,	2150.0,	0.0,	0.0);	(1250.0,	2150.0,	0.0,	0.0);
(1300.0,	2150.0,	0.0,	0.0);	(1350.0,	2150.0,	0.0,	0.0);
(1400.0,	2150.0,	0.0,	0.0);	(800.0,	2200.0,	0.0,	0.0);
(850.0,	2200.0,	0.0,	0.0);	(900.0,	2200.0,	0.0,	0.0);
(950.0,	2200.0,	0.0,	0.0);	(1000.0,	2200.0,	0.0,	0.0);
(1050.0,	2200.0,	0.0,	0.0);	(1100.0,	2200.0,	0.0,	0.0);
(1150.0,	2200.0,	0.0,	0.0);	(1200.0,	2200.0,	0.0,	0.0);
(1250.0,	2200.0,	0.0,	0.0);	(1300.0,	2200.0,	0.0,	0.0);
(1350.0,	2200.0,	0.0,	0.0);	(1400.0,	2200.0,	0.0,	0.0);

*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
(1=YES; 0=NO)

```
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1
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NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
(METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

*** WIND PROFILE EXPONENTS ***

STABILITY CATEGORY	WIND SPEED CATEGORY 1	2	3	4	5	6
A	.70000E-01	.70000E-01	.70000E-01	.70000E-01	.70000E-01	.70000E-01
B	.70000E-01	.70000E-01	.70000E-01	.70000E-01	.70000E-01	.70000E-01
C	.10000E+00	.10000E+00	.10000E+00	.10000E+00	.10000E+00	.10000E+00
D	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00	.15000E+00
E	.35000E+00	.35000E+00	.35000E+00	.35000E+00	.35000E+00	.35000E+00
F	.55000E+00	.55000E+00	.55000E+00	.55000E+00	.55000E+00	.55000E+00

*** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***
(DEGREES KELVIN PER METER)

STABILITY CATEGORY	WIND SPEED CATEGORY 1	2	3	4	5	6
A	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
B	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
C	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
D	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
E	.20000E-01	.20000E-01	.20000E-01	.20000E-01	.20000E-01	.20000E-01
F	.35000E-01	.35000E-01	.35000E-01	.35000E-01	.35000E-01	.35000E-01

**MODELOPTs: CONC   RURAL FLAT   DFAULT

*** THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

FILE: C:\Beework\METDATA\ALBAN91.MET
FORMAT: (4I2,2F9.4,F6.1,I2,2F7.1,f9.4,f10.1,f8.4,i4,f7.2)
SURFACE STATION NO.: 14735   UPPER AIR STATION NO.: 14735
NAME: UNKNOWN   NAME: UNKNOWN
YEAR: 1991   YEAR: 1991

YR	MN	DY	HR	FLOW VECTOR	SPEED (M/S)	TEMP (K)	STAB CLASS	MIXING HEIGHT (M) RURAL	MIXING HEIGHT (M) URBAN	USTAR (M/S)	M-O LENGTH (M)	Z-0 (M)	IPCODE	PRATE (mm/HR)
91	1	1	1	121.0	2.57	263.7	6	1179.8	484.0	0.0000	0.0	0.0000	0	0.00
91	1	1	2	188.0	1.54	263.1	6	1179.0	484.0	0.0000	0.0	0.0000	0	0.00
91	1	1	3	214.0	1.54	264.3	6	1178.2	484.0	0.0000	0.0	0.0000	0	0.00
91	1	1	4	13.0	1.54	263.1	7	1177.3	484.0	0.0000	0.0	0.0000	0	0.00
91	1	1	5	33.0	2.06	263.1	6	1176.5	484.0	0.0000	0.0	0.0000	0	0.00
91	1	1	6	352.0	2.57	262.6	6	1175.7	484.0	0.0000	0.0	0.0000	0	0.00
91	1	1	7	355.0	0.00	262.6	7	1174.8	484.0	0.0000	0.0	0.0000	0	0.00
91	1	1	8	323.0	2.06	263.7	6	86.1	534.5	0.0000	0.0	0.0000	0	0.00
91	1	1	9	357.0	4.12	265.4	5	266.6	640.2	0.0000	0.0	0.0000	0	0.00
91	1	1	10	351.0	4.63	267.0	4	447.1	746.0	0.0000	0.0	0.0000	0	0.00
91	1	1	11	354.0	4.12	269.3	3	627.6	851.7	0.0000	0.0	0.0000	0	0.00
91	1	1	12	346.0	3.09	270.4	4	808.0	957.5	0.0000	0.0	0.0000	0	0.00
91	1	1	13	353.0	2.57	271.5	4	988.5	1063.2	0.0000	0.0	0.0000	0	0.00
91	1	1	14	359.0	3.60	271.5	4	1169.0	1169.0	0.0000	0.0	0.0000	0	0.00
91	1	1	15	2.0	3.60	272.0	4	1169.0	1169.0	0.0000	0.0	0.0000	0	0.00
91	1	1	16	354.0	3.09	272.0	4	1169.0	1169.0	0.0000	0.0	0.0000	0	0.00
91	1	1	17	341.0	4.12	272.6	4	1163.8	1163.8	0.0000	0.0	0.0000	0	0.00
91	1	1	18	347.0	5.14	273.1	4	1154.6	1154.6	0.0000	0.0	0.0000	0	0.00
91	1	1	19	344.0	6.17	272.6	4	1145.4	1145.4	0.0000	0.0	0.0000	0	0.00
91	1	1	20	347.0	4.63	272.0	5	1136.2	789.4	0.0000	0.0	0.0000	0	0.00
91	1	1	21	340.0	5.14	271.5	5	1127.1	683.0	0.0000	0.0	0.0000	0	0.00
91	1	1	22	342.0	5.14	271.5	5	1117.9	576.7	0.0000	0.0	0.0000	0	0.00
91	1	1	23	350.0	4.63	270.9	5	1108.7	470.3	0.0000	0.0	0.0000	0	0.00
91	1	1	24	340.0	4.63	270.9	5	1099.5	364.0	0.0000	0.0	0.0000	0	0.00

*** NOTES: STABILITY CLASS 1=A, 2=B, 3=C, 4=D, 5=E AND 6=F.
FLOW VECTOR IS DIRECTION TOWARD WHICH WIND IS BLOWING.

**MODELOPTs: CONC RURAL FLAT DFAULT

*** THE ANNUAL (1 YRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): RIVER ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF OTHER IN PG/M³ **

X-COORD (M)	Y-COORD (M)	CONC	X-COORD (M)	Y-COORD (M)	CONC
1000.00	1000.00	22.07373	1000.00	1050.00	42.87648
1000.00	1100.00	47.50103	1000.00	1150.00	50.25271
1000.00	1200.00	52.20403	1000.00	1250.00	53.62135
1000.00	1300.00	54.71456	1000.00	1350.00	55.58282
1000.00	1400.00	56.27484	1000.00	1450.00	56.81124
1000.00	1500.00	57.23437	1000.00	1550.00	57.48371
1000.00	1600.00	57.61974	1000.00	1650.00	57.64756
1000.00	1700.00	57.56608	1000.00	1750.00	57.34848
1000.00	1800.00	56.93792	1000.00	1850.00	56.19948
1000.00	1900.00	54.97485	1000.00	1950.00	52.66998
1000.00	2000.00	40.45110	1050.00	2000.00	62.16137
1100.00	2000.00	63.03386	1150.00	2000.00	59.93647
1200.00	2000.00	30.52155	1200.00	1950.00	58.85975
1200.00	1900.00	63.55464	1200.00	1850.00	65.82605
1200.00	1800.00	67.10719	1200.00	1750.00	67.85329
1200.00	1700.00	68.33302	1200.00	1650.00	68.63849
1200.00	1600.00	68.85168	1200.00	1550.00	68.93349
1200.00	1500.00	68.93752	1200.00	1450.00	68.80656
1200.00	1400.00	68.57832	1200.00	1350.00	68.25227
1200.00	1300.00	67.80934	1200.00	1250.00	67.23401
1200.00	1200.00	66.43845	1200.00	1150.00	65.28090
1200.00	1100.00	63.53041	1200.00	1050.00	60.45412
1200.00	1000.00	43.19268	1150.00	1000.00	57.37995
1100.00	1000.00	56.52396	1050.00	1000.00	51.99488
800.00	800.00	1.71132	850.00	800.00	2.09794
900.00	800.00	2.65345	950.00	800.00	3.53305
1000.00	800.00	4.89268	1050.00	800.00	6.23722
1100.00	800.00	7.07984	1150.00	800.00	7.05333
1200.00	800.00	6.19377	1250.00	800.00	5.06923
1300.00	800.00	4.12667	1350.00	800.00	3.57315
1400.00	800.00	3.20853	800.00	850.00	1.82337
850.00	850.00	2.27357	900.00	850.00	2.92581
950.00	850.00	3.99271	1000.00	850.00	5.83157
1050.00	850.00	7.75454	1100.00	850.00	8.76458
1150.00	850.00	8.74653	1200.00	850.00	7.60235
1250.00	850.00	6.02888	1300.00	850.00	4.96236
1350.00	850.00	4.31338	1400.00	850.00	3.80759
800.00	900.00	1.92499	850.00	900.00	2.44381
900.00	900.00	3.23949	950.00	900.00	4.57338
1000.00	900.00	7.22578	1050.00	900.00	10.17241

**MODELOPTs: CONC RURAL FLAT DFAULT

*** THE ANNUAL (1 YRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): RIVER ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF OTHER IN PG/M³ **

X-COORD (M)	Y-COORD (M)	CONC	X-COORD (M)	Y-COORD (M)	CONC
1100.00	900.00	11.47499	1150.00	900.00	11.62601
1200.00	900.00	9.99092	1250.00	900.00	7.56808
1300.00	900.00	6.22603	1350.00	900.00	5.24577
1400.00	900.00	4.47277	800.00	950.00	2.02206
850.00	950.00	2.60182	900.00	950.00	3.54064
950.00	950.00	5.29063	1000.00	950.00	9.69326
1050.00	950.00	14.87307	1100.00	950.00	17.25429
1150.00	950.00	17.74545	1200.00	950.00	14.76254
1250.00	950.00	10.28474	1300.00	950.00	7.88130
1350.00	950.00	6.24828	1400.00	950.00	5.13477
800.00	1000.00	2.14564	850.00	1000.00	2.79230
900.00	1000.00	3.87225	950.00	1000.00	6.07374
1250.00	1000.00	14.04338	1300.00	1000.00	9.51243
1350.00	1000.00	7.17653	1400.00	1000.00	5.74568
800.00	1050.00	2.23053	850.00	1050.00	2.92121
900.00	1050.00	4.10313	950.00	1050.00	6.68728
1250.00	1050.00	15.74475	1300.00	1050.00	10.40069
1350.00	1050.00	7.73811	1400.00	1050.00	6.13843
800.00	1100.00	2.27582	850.00	1100.00	3.02233
900.00	1100.00	4.35000	950.00	1100.00	7.49496
1250.00	1100.00	16.49319	1300.00	1100.00	10.80454
1350.00	1100.00	8.01431	1400.00	1100.00	6.36010
800.00	1150.00	2.34492	850.00	1150.00	3.16385
900.00	1150.00	4.66363	950.00	1150.00	8.40458
1250.00	1150.00	16.97028	1300.00	1150.00	11.06846
1350.00	1150.00	8.18003	1400.00	1150.00	6.47795
800.00	1200.00	2.43513	850.00	1200.00	3.32748
900.00	1200.00	5.03939	950.00	1200.00	9.24351
1250.00	1200.00	17.28089	1300.00	1200.00	11.23282
1350.00	1200.00	8.29107	1400.00	1200.00	6.56854
800.00	1250.00	2.53023	850.00	1250.00	3.52037
900.00	1250.00	5.41777	950.00	1250.00	9.99459
1250.00	1250.00	17.57410	1300.00	1250.00	11.37267
1350.00	1250.00	8.39251	1400.00	1250.00	6.64296
800.00	1300.00	2.64137	850.00	1300.00	3.72551
900.00	1300.00	5.78423	950.00	1300.00	10.66136
1250.00	1300.00	17.77308	1300.00	1300.00	11.44867
1350.00	1300.00	8.44976	1400.00	1300.00	6.68927
800.00	1350.00	2.76531	850.00	1350.00	3.93330
900.00	1350.00	6.12460	950.00	1350.00	11.23338

**MODELOPTs: CONC RURAL FLAT DFAULT

*** THE ANNUAL (1 YRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): RIVER ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF OTHER IN PG/M³ **

X-COORD (M)	Y-COORD (M)	CONC	X-COORD (M)	Y-COORD (M)	CONC
1250.00	1350.00	17.92351	1300.00	1350.00	11.48068
1350.00	1350.00	8.47758	1400.00	1350.00	6.72504
800.00	1400.00	2.89661	850.00	1400.00	4.13610
900.00	1400.00	6.42739	950.00	1400.00	11.70851
1250.00	1400.00	18.02281	1300.00	1400.00	11.48968
1350.00	1400.00	8.44733	1400.00	1400.00	6.73121
800.00	1450.00	3.02478	850.00	1450.00	4.32314
900.00	1450.00	6.69188	950.00	1450.00	12.09709
1250.00	1450.00	18.07342	1300.00	1450.00	11.47856
1350.00	1450.00	8.46418	1400.00	1450.00	6.71343
800.00	1500.00	3.14226	850.00	1500.00	4.48695
900.00	1500.00	6.91755	950.00	1500.00	12.40904
1250.00	1500.00	18.07918	1300.00	1500.00	11.44505
1350.00	1500.00	8.42549	1400.00	1500.00	6.67164
800.00	1550.00	3.24445	850.00	1550.00	4.62138
900.00	1550.00	7.10563	950.00	1550.00	12.64957
1250.00	1550.00	18.03699	1300.00	1550.00	11.38648
1350.00	1550.00	8.35973	1400.00	1550.00	6.60078
800.00	1600.00	3.32626	850.00	1600.00	4.71823
900.00	1600.00	7.25438	950.00	1600.00	12.82312
1250.00	1600.00	17.94057	1300.00	1600.00	11.29694
1350.00	1600.00	8.26190	1400.00	1600.00	6.48852
800.00	1650.00	3.38384	850.00	1650.00	4.80180
900.00	1650.00	7.35930	950.00	1650.00	12.92826
1250.00	1650.00	17.77885	1300.00	1650.00	11.16586
1350.00	1650.00	8.11881	1400.00	1650.00	6.31361
800.00	1700.00	3.41242	850.00	1700.00	4.84942
900.00	1700.00	7.41567	950.00	1700.00	12.95698
1250.00	1700.00	17.53460	1300.00	1700.00	10.97170
1350.00	1700.00	7.89871	1400.00	1700.00	6.05283
800.00	1750.00	3.42700	850.00	1750.00	4.86509
900.00	1750.00	7.41404	950.00	1750.00	12.90482
1250.00	1750.00	17.17905	1300.00	1750.00	10.66610
1350.00	1750.00	7.55333	1400.00	1750.00	5.68428
800.00	1800.00	3.42856	850.00	1800.00	4.82506
900.00	1800.00	7.33115	950.00	1800.00	12.73545
1250.00	1800.00	16.63605	1300.00	1800.00	10.17012
1350.00	1800.00	7.04240	1400.00	1800.00	5.19690
800.00	1850.00	3.42112	850.00	1850.00	4.80525
900.00	1850.00	7.25945	950.00	1850.00	12.48831

**MODELOPTs: CONC   RURAL FLAT   DFAULT

*** THE ANNUAL (1 YRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): RIVER ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF OTHER IN PG/M³ **

X-COORD (M)	Y-COORD (M)	CONC	X-COORD (M)	Y-COORD (M)	CONC
1250.00	1850.00	15.76420	1300.00	1850.00	9.37212
1350.00	1850.00	6.31179	1400.00	1850.00	4.59092
800.00	1900.00	3.41695	850.00	1900.00	4.75733
900.00	1900.00	7.09176	950.00	1900.00	12.08076
1250.00	1900.00	14.28900	1300.00	1900.00	8.13863
1350.00	1900.00	5.38364	1400.00	1900.00	3.91706
800.00	1950.00	3.40993	850.00	1950.00	4.70961
900.00	1950.00	6.91910	950.00	1950.00	11.51345
1250.00	1950.00	11.62837	1300.00	1950.00	6.50294
1350.00	1950.00	4.38036	1400.00	1950.00	3.24484
800.00	2000.00	3.36931	850.00	2000.00	4.61827
900.00	2000.00	6.70275	950.00	2000.00	10.85766
1250.00	2000.00	7.90739	1300.00	2000.00	4.88160
1350.00	2000.00	3.44472	1400.00	2000.00	2.62147
800.00	2050.00	3.36040	850.00	2050.00	4.57935
900.00	2050.00	6.57309	950.00	2050.00	10.35232
1000.00	2050.00	19.72559	1050.00	2050.00	25.73849
1100.00	2050.00	25.86624	1150.00	2050.00	22.77712
1200.00	2050.00	13.24762	1250.00	2050.00	6.22397
1300.00	2050.00	3.99196	1350.00	2050.00	2.87120
1400.00	2050.00	2.21432	800.00	2100.00	3.38354
850.00	2100.00	4.55844	900.00	2100.00	6.41473
950.00	2100.00	9.62609	1000.00	2100.00	15.19395
1050.00	2100.00	18.84926	1100.00	2100.00	18.71589
1150.00	2100.00	16.01717	1200.00	2100.00	10.17593
1250.00	2100.00	5.47558	1300.00	2100.00	3.57546
1350.00	2100.00	2.57722	1400.00	2100.00	1.97631
800.00	2150.00	3.37633	850.00	2150.00	4.48595
900.00	2150.00	6.17376	950.00	2150.00	8.79050
1000.00	2150.00	12.48498	1050.00	2150.00	14.92951
1100.00	2150.00	14.71947	1150.00	2150.00	12.48565
1200.00	2150.00	8.45336	1250.00	2150.00	4.97807
1300.00	2150.00	3.28740	1350.00	2150.00	2.38715
1400.00	2150.00	1.83961	800.00	2200.00	3.34134
850.00	2200.00	4.38106	900.00	2200.00	5.85992
950.00	2200.00	7.99835	1000.00	2200.00	10.58626
1050.00	2200.00	12.26181	1100.00	2200.00	12.08466
1150.00	2200.00	10.25024	1200.00	2200.00	7.28442
1250.00	2200.00	4.60203	1300.00	2200.00	3.06388
1350.00	2200.00	2.23310	1400.00	2200.00	1.72748

**MODELOPTs: CONC   RURAL FLAT   DFAULT

*** THE SUMMARY OF MAXIMUM ANNUAL (1 YRS) RESULTS ***

** CONC OF OTHER   IN PG/M³   **

GROUP ID		AVERAGE CONC	RECEPTOR (XR, YR, ZELEV, ZFLAG)				OF TYPE	NETWORK GRID-ID
ALL	1ST HIGHEST VALUE IS	68.93752 AT (	1200.00,	1500.00,	0.00,	0.00)	DC	NA
	2ND HIGHEST VALUE IS	68.93349 AT (	1200.00,	1550.00,	0.00,	0.00)	DC	NA
	3RD HIGHEST VALUE IS	68.85168 AT (	1200.00,	1600.00,	0.00,	0.00)	DC	NA
	4TH HIGHEST VALUE IS	68.80656 AT (	1200.00,	1450.00,	0.00,	0.00)	DC	NA
	5TH HIGHEST VALUE IS	68.63849 AT (	1200.00,	1650.00,	0.00,	0.00)	DC	NA
	6TH HIGHEST VALUE IS	68.57832 AT (	1200.00,	1400.00,	0.00,	0.00)	DC	NA
	7TH HIGHEST VALUE IS	68.33302 AT (	1200.00,	1700.00,	0.00,	0.00)	DC	NA
	8TH HIGHEST VALUE IS	68.25227 AT (	1200.00,	1350.00,	0.00,	0.00)	DC	NA
	9TH HIGHEST VALUE IS	67.85329 AT (	1200.00,	1750.00,	0.00,	0.00)	DC	NA
	10TH HIGHEST VALUE IS	67.80934 AT (	1200.00,	1300.00,	0.00,	0.00)	DC	NA

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR
BD = BOUNDARY

**MODELOPTs: CONC   RURAL FLAT   DFAULT

*** Message Summary : ISCST3 Model Execution ***

--------- Summary of Total Messages --------

A Total of 0 Fatal Error Message(s)
A Total of 0 Warning Message(s)
A Total of 1217 Informational Message(s)

A Total of 1217 Calm Hours Identified

******** FATAL ERROR MESSAGES ********
*** NONE ***

******** WARNING MESSAGES ********
*** NONE ***

****
*** ISCST3 Finishes Successfully ***
****