## BP Refinery
**Ferndale, WA**  
2nd Quarter 1996

--- Run title (3 lines) ---

**CALMET MODEL CONTROL FILE**

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### INPUT GROUP: 0 -- Input and Output File Names

<table>
<thead>
<tr>
<th>Subgroup (a)</th>
<th>File Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Name</td>
<td>Type</td>
</tr>
<tr>
<td>---------------</td>
<td>-----------</td>
</tr>
<tr>
<td>GEO.DAT</td>
<td>input</td>
</tr>
<tr>
<td>SURF.DAT</td>
<td>input</td>
</tr>
<tr>
<td>CLOUD.DAT</td>
<td>input</td>
</tr>
<tr>
<td>PRECIP.DAT</td>
<td>input</td>
</tr>
<tr>
<td>MM4.DAT</td>
<td>input</td>
</tr>
<tr>
<td>WT.DAT</td>
<td>input</td>
</tr>
<tr>
<td>CALMET.LST</td>
<td>output</td>
</tr>
<tr>
<td>CALMET.DAT</td>
<td>output</td>
</tr>
<tr>
<td>PACOUT.DAT</td>
<td>output</td>
</tr>
</tbody>
</table>

All file names will be converted to lower case if LCFILES = T

Otherwise, if LCFILES = F, file names will be converted to UPPER CASE

T = lower case  
F = UPPER CASE

### NUMBER OF UPPER AIR & OVERWATER STATIONS:

- Number of upper air stations (NUSTA) No default  
  ! NUSTA = 20 !
- Number of overwater met stations (NOWSTA) No default  
  ! NOWSTA = 0 !

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### Subgroup (b)

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#### Upper air files (one per station)

<table>
<thead>
<tr>
<th>Default Name</th>
<th>Type</th>
<th>File Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>UP1.DAT</td>
<td>input</td>
<td>1 ! UPDAT=D:\CALPUFF\UA2547.DAT !</td>
</tr>
<tr>
<td>UP2.DAT</td>
<td>input</td>
<td>2 ! UPDAT=D:\CALPUFF\UA2555.DAT !</td>
</tr>
<tr>
<td>UP3.DAT</td>
<td>input</td>
<td>3 ! UPDAT=D:\CALPUFF\UA2563.DAT !</td>
</tr>
<tr>
<td>UP4.DAT</td>
<td>input</td>
<td>4 ! UPDAT=D:\CALPUFF\UA2571.DAT !</td>
</tr>
<tr>
<td>UP5.DAT</td>
<td>input</td>
<td>5 ! UPDAT=D:\CALPUFF\UA3347.DAT !</td>
</tr>
<tr>
<td>UP6.DAT</td>
<td>input</td>
<td>6 ! UPDAT=D:\CALPUFF\UA3355.DAT !</td>
</tr>
<tr>
<td>UP7.DAT</td>
<td>input</td>
<td>7 ! UPDAT=D:\CALPUFF\UA3363.DAT !</td>
</tr>
<tr>
<td>UP8.DAT</td>
<td>input</td>
<td>8 ! UPDAT=D:\CALPUFF\UA3371.DAT !</td>
</tr>
<tr>
<td>UP9.DAT</td>
<td>input</td>
<td>9 ! UPDAT=D:\CALPUFF\UA4147.DAT !</td>
</tr>
<tr>
<td>UP10.DAT</td>
<td>input</td>
<td>10 ! UPDAT=D:\CALPUFF\UA4155.DAT !</td>
</tr>
</tbody>
</table>
UP11.DAT  input  11  ! UPDAT=D:\CALPUFF\UA4163.DAT!  !END!
UP12.DAT  input  12  ! UPDAT=D:\CALPUFF\UA4171.DAT!  !END!
UP13.DAT  input  13  ! UPDAT=D:\CALPUFF\UA4947.DAT!  !END!
UP14.DAT  input  14  ! UPDAT=D:\CALPUFF\UA4955.DAT!  !END!
UP15.DAT  input  15  ! UPDAT=D:\CALPUFF\UA4963.DAT!  !END!
UP16.DAT  input  16  ! UPDAT=D:\CALPUFF\UA4971.DAT!  !END!
UP17.DAT  input  17  ! UPDAT=D:\CALPUFF\UA5747.DAT!  !END!
UP18.DAT  input  18  ! UPDAT=D:\CALPUFF\UA5755.DAT!  !END!
UP19.DAT  input  19  ! UPDAT=D:\CALPUFF\UA5763.DAT!  !END!
UP20.DAT  input  20  ! UPDAT=D:\CALPUFF\UA5771.DAT!  !END!

Subgroup (c)

Overwater station files (one per station)

<table>
<thead>
<tr>
<th>Default Name</th>
<th>Type</th>
<th>File Name</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Subgroup (d)

Other file names

<table>
<thead>
<tr>
<th>Default Name</th>
<th>Type</th>
<th>File Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIAG.DAT</td>
<td>input</td>
<td>* DIADAT=*</td>
</tr>
<tr>
<td>PROG.DAT</td>
<td>input</td>
<td>* PRGDAT=*</td>
</tr>
<tr>
<td>TEST.PRT</td>
<td>output</td>
<td>! TSTPRT= D:\CALPUFF\INTER.PRT!</td>
</tr>
<tr>
<td>TEST.OUT</td>
<td>output</td>
<td>* TSTOUT=*</td>
</tr>
<tr>
<td>TEST.KIN</td>
<td>output</td>
<td>* TSTKIN=*</td>
</tr>
<tr>
<td>TEST.FRD</td>
<td>output</td>
<td>* TSTFRD=*</td>
</tr>
<tr>
<td>TEST.SLP</td>
<td>output</td>
<td>* TSTSLP=*</td>
</tr>
</tbody>
</table>

NOTES: (1) File/path names can be up to 70 characters in length
       (2) Subgroups (a) and (d) must have ONE 'END' (surround by delimiters) at the end of the group
       (3) Subgroups (b) and (c) must have an 'END' (surround by delimiters) at the end of EACH LINE

!END!

INPUT GROUP: 1 -- General run control parameters

Starting date:  Year (IBYR) -- No default  ! IBYR= 1990 !
               Month (IBMO) -- No default  ! IBMO= 4 !
               Day (IBDY) -- No default  ! IBDY= 1 !
               Hour (IBHR) -- No default  ! IBHR= 0 !

Base time zone (IBTZ) -- No default  ! IBTZ= 8 !
PST = 08, MST = 07
CST = 06, EST = 05
Length of run (hours) (IRLG) -- No default ! IRLG = 2184 !

Run type (IRTYPE) -- Default: 1 ! IRTYPE = 1 !

0 = Computes wind fields only
1 = Computes wind fields and micrometeorological variables (u*, w*, L, zl, etc.)
(IRTYPE must be 1 to run CALPUFF or CALGRID)

Compute special data fields required by CALGRID (i.e., 3-D fields of W wind components and temperature) in additional to regular fields ? (LCALGRD)
(LCALGRD must be T to run CALGRID)

Flag to stop run after SETUP phase (ITEST) Default: 2 ! ITEST = 2 !
(Used to allow checking of the model inputs, files, etc.)
ITEST = 1 - STOPS program after SETUP phase
ITEST = 2 - Continues with execution of COMPUTATIONAL phase after SETUP

!END!

INPUT GROUP: 2 -- Grid control parameters
-------------

HORIZONTAL GRID DEFINITION:

| No. X grid cells (NX) | No default ! NX = 42 ! |
| No. Y grid cells (NY) | No default ! NY = 34 ! |

GRID SPACING (DGRIDKM) No default ! DGRIDKM = 12. !
Units: km

REFERENCE COORDINATES of SOUTHWEST corner of grid cell (1,1)

| X coordinate (XORIGKM) | No default ! XORIGKM = 923.800 ! |
| Y coordinate (YORIGKM) | No default ! YORIGKM = -108.000 ! |
| Units: km               |                                      |

| Latitude (XLATO) | No default ! XLATO = 47.013 ! |
| Longitude (XLONG) | No default ! XLONG = 126.130 ! |

UTM ZONE (IUTMZN) Default: 0 ! IUTMZN = 10 !

LAMBERT CONFORMAL PARAMETERS

Rotate input winds from true north to map north using a Lambert conformal projection? (LLCONF) Default: F ! LLCONF = T !
Latitude of 1st standard parallel
Latitude of 2nd standard parallel  
(XLAT1 and XLAT2; + in NH, - in SH)

Default: 30.  ! XLAT1 = 30.000 !
Default: 60.  ! XLAT2 = 60.000 !

Longitude (RLONG)
(used only if LCONF = T)
(Positive = W. Hemisphere;
Negative = E. Hemisphere)

Default = 90.  ! RLONG = 138.800 !

Origin Latitude (RLAT0)
(used only if IPROG > 2)
(Positive = N. Hemisphere;
Negative = S. Hemisphere)

Default = 40.  ! RLAT0 = 48.700 !

Vertical grid definition:

No. of vertical layers (NZ)  
No default  ! NZ = 10 !

Cell face heights in arbitrary
vertical grid (ZFACE(NZ+1))  
No defaults
Units: m

! ZFACE = 0.,20.,40.,60.,160.,300.,600.,1000.,1500.,2200.,3000. !

!END!

-------------------------------------------------------------------

INPUT GROUP: 3 -- Output Options
-------------

DISK OUTPUT OPTION

Save met. fields in an unformatted output file ?  (LSAVE)  
(F = Do not save, T = Save)

Default: T  ! LSAVE = T !

Type of unformatted output file:
(IFORMO)

Default: 1  ! IFORMO = 1 !

1 = CALPUFF/CALGRID type file (CALMET.DAT)
2 = MESOPUFF-II type file (PACOUT.DAT)

LINE PRINTER OUTPUT OPTIONS:

Print met. fields ?  (LPRINT)  
(F = Do not print, T = Print)

Default: F  ! LPRINT = T !

(Print interval
(IPRINF) in hours
(Meteorological fields are printed every 1 hours)

Default: 1  ! IPRINF = 1 !
Specify which layers of U, V wind component
to print (IUVOUT(NZ)) -- NOTE: NZ values must be entered
(0=Do not print, 1=print)
(used only if LPRINT=T)  Defaults: NZ*0
  ! IUVOUT = 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0 !

Specify which levels of the W wind component to print
(NOTE: W defined at TOP cell face -- 10 values)
(IWOUT(NZ)) -- NOTE: NZ values must be entered
(0=Do not print, 1=print)
(used only if LPRINT=T & LCALGRD=T)
  ! IWOUT = 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0 !

Specify which levels of the 3-D temperature field to print
(ITOUT(NZ)) -- NOTE: NZ values must be entered
(0=Do not print, 1=print)
(used only if LPRINT=T & LCALGRD=T)
  ! ITOUT = 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0 !

Specify which meteorological fields
to print
(used only if LPRINT=T)
  ! STABILITY = 0                      ! - PGT stability class
  ! USTAR = 0                         ! - Friction velocity
  ! MONIN = 0                         ! - Monin-Obukhov length
  ! MIXHT = 0                         ! - Mixing height
  ! WSTAR = 0                         ! - Convective velocity scale
  ! PRECIP = 0                        ! - Precipitation rate
  ! SENSEAT = 0                       ! - Sensible heat flux
  ! CONVZI = 0                        ! - Convective mixing ht.

Testing and debug print options for micrometeorological module

Print input meteorological data and
internal variables (LDB)  Default: F  ! LDB = F !
(F = Do not print, T = print)
(NOTE: this option produces large amounts of output)

First time step for which debug data
are printed (NN1)  Default: 1  ! NN1 = 1 !
Last time step for which debug data are printed (NN2)  Default: 1  ! NN2 = 5 !

Testing and debug print options for wind field module (all of the following print options control output to wind field module's output files: TEST.PRT, TEST.OUT, TEST.KIN, TEST.FRD, and TEST.SLP)

Control variable for writing the test/debug wind fields to disk files (IOUTD) 
(0=Do not write, 1=write)  Default: 0  ! IOUTD = 0 !

Number of levels, starting at the surface, to print (NZPRN2)  Default: 1  ! NZPRN2 = 10 !

Print the INTERPOLATED wind components ?
(IPR0) (0=no, 1=yes)  Default: 0  ! IPR0 = 1 !

Print the TERRAIN ADJUSTED surface wind components ?
(IPR1) (0=no, 1=yes)  Default: 0  ! IPR1 = 1 !

Print the SMOOTHED wind components and the INITIAL DIVERGENCE fields ?
(IPR2) (0=no, 1=yes)  Default: 0  ! IPR2 = 1 !

Print the FINAL wind speed and direction fields ?
(IPR3) (0=no, 1=yes)  Default: 0  ! IPR3 = 1 !

Print the FINAL DIVERGENCE fields ?
(IPR4) (0=no, 1=yes)  Default: 0  ! IPR4 = 1 !

Print the winds after KINEMATIC effects are added ?
(IPR5) (0=no, 1=yes)  Default: 0  ! IPR5 = 1 !

Print the winds after the FROUDE NUMBER adjustment is made ?
(IPR6) (0=no, 1=yes)  Default: 0  ! IPR6 = 1 !

Print the winds after SLOPE FLOWS are added ?
(IPR7) (0=no, 1=yes)  Default: 0  ! IPR7 = 1 !

Print the FINAL wind field components ?
(IPR8) (0=no, 1=yes)  Default: 0  ! IPR8 = 1 !

!END!

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INPUT GROUP: 4 -- Meteorological data options
-------------------
NUMBER OF SURFACE & PRECIP. METEOROLOGICAL STATIONS

Number of surface stations   (NSSTA)   No default   ! NSSTA = 17 !
Number of precipitation stations (NPSTA) No default     ! NPSTA = 63 !

CLOUD DATA OPTIONS
Gridded grid fields:
   (ICLOUD) Default: 0     ! ICLOUD = 0 !
   ICLoud = 0 - Gridded clouds not used
   ICLoud = 1 - Gridded CLOUD.DAT generated as OUTPUT
   ICLoud = 2 - Gridded CLOUD.DAT read as INPUT

FILE FORMATS

Surface meteorological data file format
   (IFORMS) Default: 2     ! IFORMS = 2 !
   (1 = unformatted (e.g., SMERGE output))
   (2 = formatted  (free-formatted user input))

Precipitation data file format
   (IFORMP) Default: 2     ! IFORMP = 2 !
   (1 = unformatted (e.g., PMERGE output))
   (2 = formatted  (free-formatted user input))

Cloud data file format
   (IFORMC) Default: 2     ! IFORMC = 2 !
   (1 = unformatted - CALMET unformatted output)
   (2 = formatted  - free-formatted CALMET output or user input)

END!

-----------------------------------------------

INPUT GROUP: 5 -- Wind Field Options and Parameters
-----------------------------------------------

WIND FIELD MODEL OPTIONS
Model selection variable (IWFCOD) Default: 1     ! IWFCOD = 1 !
   0 = Objective analysis only
   1 = Diagnostic wind module

Compute Froude number adjustment
   effects ? (IFRADJ) Default: 1     ! IFRADJ = 1 !
   (0 = NO, 1 = YES)

Compute kinematic effects ? (IKINE) Default: 0     ! IKINE = 0 !
   (0 = NO, 1 = YES)

Use O'Brien procedure for adjustment
   of the vertical velocity ? (IOBR) Default: 0     ! IOBR = 0 !
   (0 = NO, 1 = YES)

Compute slope flow effects ? (ISLOPE) Default: 1     ! ISLOPE = 1 !
(0 = NO, 1 = YES)

Extrapolate surface wind observations
to upper layers? (IEXTRP)  Default: -4  ! IEXTRP = -1 !
1 = no extrapolation is done,  
2 = power law extrapolation used,  
3 = user input multiplicative factors  
   for layers 2 - NZ used (see FEXTRP array)  
4 = similarity theory used  
-1, -2, -3, -4 = same as above except layer 1 data  
at upper air stations are ignored

Extrapolate surface winds even  
if calm? (ICALM)  Default: 0  ! ICALM = 0 !
1 = NO, 1 = YES

Layer-dependent biases modifying the weights of  
surface and upper air stations (BIAS(NZ))
-1=<BIAS=<1
Negative BIAS reduces the weight of upper air stations  
(e.g. BIAS=-0.1 reduces the weight of upper air stations  
by 10%; BIAS=-1, reduces their weight by 100%)
Positive BIAS reduces the weight of surface stations  
(e.g. BIAS= 0.2 reduces the weight of surface stations  
by 20%; BIAS=1 reduces their weight by 100%)
Zero BIAS leaves weights unchanged (1/R**2 interpolation)  
Default: NZ*0  
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0

Minimum distance from nearest upper air station  
to surface station for which extrapolation  
of surface winds at surface station will be allowed  
(RMIN2: Set to -1 for IEXTRP = 4 or other situations  
where all surface stations should be extrapolated)  
Default: 4.  ! RMIN2 = 4.0 !

Use gridded prognostic wind field model  
output fields as input to the diagnostic  
wind field model (IPROG)  Default: 0  ! IPROG = 15 !
0 = No, [IWFCOD = 0 or 1]
1 = Yes, use CSUMM prog. winds as Step 1 field, [IWFCOD = 0]
2 = Yes, use CSUMM prog. winds as initial guess field [IWFCOD = 1]
3 = Yes, use winds from MM4.DAT file as Step 1 field [IWFCOD = 0]
4 = Yes, use winds from MM4.DAT file as initial guess field [IWFCOD = 1]
5 = Yes, use winds from MM4.DAT file as observations [IWFCOD = 1]
13 = Yes, use winds from MM5.DAT file as Step 1 field [IWFCOD = 0]
14 = Yes, use winds from MM5.DAT file as initial guess field [IWFCOD = 1]
15 = Yes, use winds from MM5.DAT file as observations [IWFCOD = 1]

RADIUS OF INFLUENCE PARAMETERS

Use varying radius of influence  Default: F  ! LVARY = T !
(if no stations are found within RMAX1,RMAX2,  
or RMAX3, then the closest station will be used)
Maximum radius of influence over land in the surface layer (RMAX1)  
No default  
Units: km  
! RMAX1 = 0.5 !

Maximum radius of influence over land aloft (RMAX2)  
No default  
Units: km  
! RMAX2 = 0.5 !

Maximum radius of influence over water (RMAX3)  
No default  
Units: km  
! RMAX3 = 0.5 !

OTHER WIND FIELD INPUT PARAMETERS

Minimum radius of influence used in the wind field interpolation (RMIN)  
Default: 0.1  
Units: km  
! RMIN = 0.1 !

Radius of influence of terrain features (TERRAD)  
No default  
Units: km  
! TERRAD = 50. !

Relative weighting of the first guess field and observations in the SURFACE layer (R1)  
(R1 is the distance from an observational station at which the observation and first guess field are equally weighted)  
No default  
Units: km  
! R1 = 1. !

Relative weighting of the first guess field and observations in the layers ALOFT (R2)  
(R2 is applied in the upper layers in the same manner as R1 is used in the surface layer).  
No default  
Units: km  
! R2 = 1. !

Relative weighting parameter of the prognostic wind field data (RPROG)  
(Used only if IPROG = 1)  
No default  
Units: km  
! RPROG = 0. !

Maximum acceptable divergence in the divergence minimization procedure (DIVLIM)  
Default: 5.0E-6  
! DIVLIM = 5.0E-06 !

Maximum number of iterations in the divergence min. procedure (NITER)  
Default: 50  
! NITER = 50 !

Number of passes in the smoothing procedure (NSMTH(NZ))  
Default: 2, (m*nz-1)*4  
! NSMTH = 2, 4, 4, 4, 4, 4, 4, 4, 4, 4 !

Maximum number of stations used in each layer for the interpolation of data to a grid point (NINTR2(NZ))  
Default: 99.  
! NINTR2 =
Critical Froude number (CRITFN)  Default: 1.0  ! CRITFN = 1. !

Empirical factor controlling the influence of kinematic effects (ALPHA)  Default: 0.1  ! ALPHA = 0.1 !

Multiplicative scaling factor for extrapolation of surface observations to upper layers (FEXTR2(NZ))  Default: NZ*0.0
  ! FEXTR2 = 0., 0., 0., 0., 0., 0., 0., 0. !
  (Used only if IEXTRP = 3 or -3)

BARRIER INFORMATION

Number of barriers to interpolation of the wind fields (NBAR)  Default: 0  ! NBAR = 0 !

THE FOLLOWING 4 VARIABLES ARE INCLUDED ONLY IF NBAR > 0

NOTE: NBAR values must be entered for each variable
No defaults

Units: km

X coordinate of BEGINNING of each barrier (XBBAR(NBAR))  ! XBBAR = 0. !

Y coordinate of BEGINNING of each barrier (YBBAR(NBAR))  ! YBBAR = 0. !

X coordinate of ENDING of each barrier (XEBAR(NBAR))  ! XEBAR = 0. !

Y coordinate of ENDING of each barrier (YEBAR(NBAR))  ! YEBAR = 0. !

DIAGNOSTIC MODULE DATA INPUT OPTIONS

Surface temperature (IDIOPT1)  Default: 0  ! IDIOPT1 = 0 !

0 = Compute internally from hourly surface observations
1 = Read preprocessed values from a data file (DIAG.DAT)

Surface met. station to use for the surface temperature (ISURFT)  No default  ! ISURFT = 3 !
(Must be a value from 1 to NSSTA)
(Used only if IDIOPT1 = 0)

Domain-averaged temperature lapse rate (IDIOPT2)  Default: 0  ! IDIOPT2 = 0 !

0 = Compute internally from twice-daily upper air observations
1 = Read hourly preprocessed values from a data file (DIAG.DAT)
Upper air station to use for
the domain-scale lapse rate (IUPT) No default
(Must be a value from 1 to NUSTA)
(Used only if IDIOPT2 = 0)
---------------------------------

Depth through which the domain-scale
lapse rate is computed (ZUPT) Default: 200. ! ZUPT = 200. !
(Used only if IDIOPT2 = 0) Units: meters
---------------------------------

Domain-averaged wind components
(IDIOPT3)
0 = Compute internally from
 twice-daily upper air observations
1 = Read hourly preprocessed values
   a data file (DIAG.DAT)

Upper air station to use for
the domain-scale winds (IUPWND) Default: -1 ! IUPWND = 10 !
(Must be a value from -1 to NUSTA)
(Used only if IDIOPT3 = 0)
---------------------------------

Bottom and top of layer through
which the domain-scale winds
are computed
(ZUPWND(1), ZUPWND(2)) Defaults: 1., 1000. ! ZUPWND = 1., 1000.
(Used only if IDIOPT3 = 0) Units: meters
---------------------------------

Observed surface wind components
for wind field module (IDIOPT4) Default: 0 ! IDIOPT4 = 0 !
0 = Read WS, WD from a surface
   data file (SURF.DAT)
1 = Read hourly preprocessed U, V from
   a data file (DIAG.DAT)

Observed upper air wind components
for wind field module (IDIOPT5) Default: 0 ! IDIOPT5 = 0 !
0 = Read WS, WD from an upper
   air data file (UP1.DAT, UP2.DAT, etc.)
1 = Read hourly preprocessed U, V from
   a data file (DIAG.DAT)
---------------------------------

LAKE BREEZE INFORMATION

Use Lake Breeze Module (LLBREZE) Default: F ! LLBREZE = F !

Number of lake breeze regions (NBOX) ! NBOX = 0 !
X Grid line 1 defining the region of interest ! XG1 = 0. !
X Grid line 2 defining the region of interest ! XG2 = 0. !
Y Grid line 1 defining the region of interest ! YG1 = 0. !
Y Grid line 2 defining the region of interest ! YG2 = 0. !

X Point defining the coastline (Straight line)
  (XBCST) (KM) Default: none ! XBCST = 0. !
Y Point defining the coastline (Straight line)
  (YBCST) (KM) Default: none ! YBCST = 0. !
X Point defining the coastline (Straight line)
  (XECST) (KM) Default: none ! XECST = 0. !
Y Point defining the coastline (Straight line)
  (YECST) (KM) Default: none ! YECST = 0. !

Number of stations in the region Default: none ! NLB = *1 !*
(Surface stations + upper air stations)
Station ID's in the region (METBXID(NLB))
(Surface stations first, then upper air stations)
! METBXID = *0 !*

!END!

-------------------------------------------------------------------------------

INPUT GROUP: 6 -- Mixing Height, Temperature and Precipitation Parameters

EMPIRICAL MIXING HEIGHT CONSTANTS
Neutral, mechanical equation
  (CONSB) Default: 1.41 ! CONSTB = 1.41 !
Convective mixing ht. equation
  (CONSTE) Default: 0.15 ! CONSTE = 0.15 !
Stable mixing ht. equation
  (CONSTN) Default: 2400. ! CONSTN = 2400. !
Overwater mixing ht. equation
  (CONSTW) Default: 0.16 ! CONSTW = 0.16 !
Absolute value of Coriolis
  parameter (FCORIOL) Default: 1.0E-04 ! FCORIOL = 1.0E-04
Units: (1/s)

SPATIAL AVERAGING OF MIXING HEIGHTS
Conduct spatial averaging
  (IAVEZI) (0=no, 1=yes) Default: 1 ! IAVEZI = 1 !
Max. search radius in averaging
  process (MNMDAV) Default: 1 ! MNMDAV = 50 !
Units: Grid cells
Half-angle of upwind looking cone for averaging (HAFANG)

Layer of winds used in upwind averaging (ILEVZI)
(must be between 1 and NZ)

OTHER MIXING HEIGHT VARIABLES

Minimum potential temperature lapse rate in the stable layer above the current convective mixing ht.
(DPTMIN)

Depth of layer above current conv. mixing height through which lapse rate is computed (DZIZI)

Minimum overland mixing height (ZIMIN)
Maximum overland mixing height (ZIMAX)
Minimum overwater mixing height (ZIMINW) -- (Not used if observed overwater mixing hts. are used)
Maximum overwater mixing height (ZIMAXW) -- (Not used if observed overwater mixing hts. are used)

TEMPERATURE PARAMETERS

Interpolation type
(1 = 1/R ; 2 = 1/R**2)

Radius of influence for temperature interpolation (TRADM)

Maximum Number of stations to include in temperature interpolation (NUMTS)

Conduct spatial averaging of temperatures (IAVET) (0=no, 1=yes)
(will use mixing ht MNMDAV, HAFANG so make sure they are correct)

Default temperature gradient below the mixing height over water (K/m) (TGDEFB)

Default temperature gradient above the mixing height over water (K/m) (TGDEFA)

Beginning (JWAT1) and ending (JWAT2) land use categories for temperature interpolation over water -- Make

Default: 30. ! HAFANG = 30. !
Units: deg.

Default: 1 ! ILEVZI = 1 

Default: 0.001 ! DPTMIN = 0.001 
Units: deg. K/m

Units: meters

Default: 50. ! ZIMIN = 50. 
Units: meters

Default: 3000. ! ZIMAX = 3000. 
Units: meters

Default: 50. ! ZIMINW = 50. 
Units: meters

Default: 3000. ! ZIMAXW = 3000. 
Units: meters

Default: 1 ! IRAD = 1 

Default: 500. ! TRADM = 100. 
Units: km

Default: 5 ! NUMTS = 5 

Default: 1 ! IAVET = 1 

Default: -.0098 ! TGDEFB = -.0098 

Default: -.0045 ! TGDEFA = -.0045 

! JWAT1 = 999 
! JWAT2 = 999 

bigger than largest land use to disable

PRECIP INTERPOLATION PARAMETERS

Method of interpolation (NFLAGP)          Default = 2  ! NFLAGP = 2  !
(1=1/R, 2=1/R**2, 3=EXP/R**2)
Radius of Influence (km) (SIGNMAP)        Default = 100.0 ! SIGNMAP = 48. !
(0.0 => use half dist. btwn nearest stns w & w/out
precip when NFLAGP = 3)
Minimum Precip. Rate Cutoff (mm/hr)        Default = 0.01 ! CUTP = 0.01 !
(values < CUTP = 0.0 mm/hr)

!END!

-----------------------------------------------

INPUT GROUP: 7 -- Surface meteorological station parameters

-----------------------------------------------

SURFACE STATION VARIABLES
(One record per station -- 17 records in all)

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>ID</td>
</tr>
<tr>
<td>X coord. (km)</td>
<td>Y coord. (km)</td>
</tr>
<tr>
<td>SS1 = 'HQM'</td>
<td>1</td>
</tr>
<tr>
<td>SS2 = 'QLM'</td>
<td>2</td>
</tr>
<tr>
<td>SS3 = 'YKM'</td>
<td>3</td>
</tr>
<tr>
<td>SS4 = 'TCP'</td>
<td>4</td>
</tr>
<tr>
<td>SS5 = 'FWM'</td>
<td>5</td>
</tr>
<tr>
<td>SS6 = 'SEA'</td>
<td>6</td>
</tr>
<tr>
<td>SS7 = 'SMR'</td>
<td>7</td>
</tr>
<tr>
<td>SS8 = 'BFI'</td>
<td>8</td>
</tr>
<tr>
<td>SS9 = 'UIL'</td>
<td>9</td>
</tr>
<tr>
<td>SS10 = 'EAT'</td>
<td>10</td>
</tr>
<tr>
<td>SS11 = 'PAE'</td>
<td>11</td>
</tr>
<tr>
<td>SS12 = 'QLM'</td>
<td>12</td>
</tr>
<tr>
<td>SS13 = 'AWO'</td>
<td>13</td>
</tr>
<tr>
<td>SS14 = 'VIC'</td>
<td>14</td>
</tr>
<tr>
<td>SS15 = 'BLI'</td>
<td>15</td>
</tr>
<tr>
<td>SS16 = 'VAN'</td>
<td>16</td>
</tr>
<tr>
<td>SS17 = 'ABB'</td>
<td>17</td>
</tr>
</tbody>
</table>

1

Four character string for station name
(MUST START IN COLUMN 9)

2

Five digit integer for station ID

!END!

-----------------------------------------------
INPUT GROUP: 8 -- Upper air meteorological station parameters

UPPER AIR STATION VARIABLES
(One record per station -- 20 records in all)

<table>
<thead>
<tr>
<th>Name</th>
<th>ID</th>
<th>X coord. (km)</th>
<th>Y coord. (km)</th>
<th>Time zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>US1</td>
<td>2547</td>
<td>971.800</td>
<td>-60.000</td>
<td>8</td>
</tr>
<tr>
<td>US2</td>
<td>2555</td>
<td>971.800</td>
<td>36.000</td>
<td>8</td>
</tr>
<tr>
<td>US3</td>
<td>2563</td>
<td>971.800</td>
<td>132.000</td>
<td>8</td>
</tr>
<tr>
<td>US4</td>
<td>2571</td>
<td>971.800</td>
<td>228.000</td>
<td>8</td>
</tr>
<tr>
<td>US5</td>
<td>3347</td>
<td>1067.800</td>
<td>-60.000</td>
<td>8</td>
</tr>
<tr>
<td>US6</td>
<td>3355</td>
<td>1067.800</td>
<td>36.000</td>
<td>8</td>
</tr>
<tr>
<td>US7</td>
<td>3363</td>
<td>1067.800</td>
<td>132.000</td>
<td>8</td>
</tr>
<tr>
<td>US8</td>
<td>3371</td>
<td>1067.800</td>
<td>228.000</td>
<td>8</td>
</tr>
<tr>
<td>US9</td>
<td>4147</td>
<td>1163.800</td>
<td>-60.000</td>
<td>8</td>
</tr>
<tr>
<td>US10</td>
<td>4155</td>
<td>1163.800</td>
<td>36.000</td>
<td>8</td>
</tr>
<tr>
<td>US11</td>
<td>4163</td>
<td>1163.800</td>
<td>132.000</td>
<td>8</td>
</tr>
<tr>
<td>US12</td>
<td>4171</td>
<td>1163.800</td>
<td>228.000</td>
<td>8</td>
</tr>
<tr>
<td>US13</td>
<td>4947</td>
<td>1259.800</td>
<td>-60.000</td>
<td>8</td>
</tr>
<tr>
<td>US14</td>
<td>4955</td>
<td>1259.800</td>
<td>36.000</td>
<td>8</td>
</tr>
<tr>
<td>US15</td>
<td>4963</td>
<td>1259.800</td>
<td>132.000</td>
<td>8</td>
</tr>
<tr>
<td>US16</td>
<td>4971</td>
<td>1259.800</td>
<td>228.000</td>
<td>8</td>
</tr>
<tr>
<td>US17</td>
<td>5747</td>
<td>1355.800</td>
<td>-60.000</td>
<td>8</td>
</tr>
<tr>
<td>US18</td>
<td>5755</td>
<td>1355.800</td>
<td>36.000</td>
<td>8</td>
</tr>
<tr>
<td>US19</td>
<td>5763</td>
<td>1355.800</td>
<td>132.000</td>
<td>8</td>
</tr>
<tr>
<td>US20</td>
<td>5771</td>
<td>1355.800</td>
<td>228.000</td>
<td>8</td>
</tr>
</tbody>
</table>

1. Four character string for station name
   (MUST START IN COLUMN 9)

2. Five digit integer for station ID

END!

INPUT GROUP: 9 -- Precipitation station parameters

PRECIPITATION STATION VARIABLES
(One record per station -- 63 records in all)
(NOT INCLUDED IF NPSTA = 0)

<table>
<thead>
<tr>
<th>Name</th>
<th>Station Code</th>
<th>X coord. (km)</th>
<th>Y coord. (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS1</td>
<td>2547</td>
<td>971.800</td>
<td>-60.000</td>
</tr>
</tbody>
</table>
! PS59 = '4171'  4171  1163.800  228.000  !
! PS60 = '4571'  4571  1211.800  228.000  !
! PS61 = '4971'  4971  1259.800  228.000  !
! PS62 = '5371'  5371  1307.800  228.000  !
! PS63 = '5771'  5771  1355.800  228.000  !

-------------------

1
Four character string for station name
(MUST START IN COLUMN 9)

2
Six digit station code composed of state
code (first 2 digits) and station ID (last
4 digits)

!END!
INPUT GROUP: 0 -- Input and Output File Names

<table>
<thead>
<tr>
<th>Default Name</th>
<th>Type</th>
<th>File Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CALMET.DAT</td>
<td>input</td>
<td>* METDAT =</td>
</tr>
<tr>
<td>OR</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>ISCMET.DAT</td>
<td>input</td>
<td>* ISCDAT =</td>
</tr>
<tr>
<td>OR</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>PLMMET.DAT</td>
<td>input</td>
<td>* PLMDAT =</td>
</tr>
<tr>
<td>OR</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>PROFILE.DAT</td>
<td>input</td>
<td>* PRFDAT =</td>
</tr>
<tr>
<td>SURFACE.DAT</td>
<td>input</td>
<td>* SFCDAT =</td>
</tr>
<tr>
<td>RESTARTB.DAT</td>
<td>input</td>
<td>* RSTABT=</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>CALPUFF.LST</td>
<td>output</td>
<td>! PUFLST =D:\CALPUFF\6PUFF.LST !</td>
</tr>
<tr>
<td></td>
<td></td>
<td>!</td>
</tr>
<tr>
<td>CONC.DAT</td>
<td>output</td>
<td>! CONDAT =D:\CALPUFF\6CONC.DAT !</td>
</tr>
<tr>
<td></td>
<td></td>
<td>!</td>
</tr>
<tr>
<td>DFLX.DAT</td>
<td>output</td>
<td>! DFDAT =D:\CALPUFF\6DRYDEP.DAT !</td>
</tr>
<tr>
<td></td>
<td></td>
<td>!</td>
</tr>
<tr>
<td>WFLX.DAT</td>
<td>output</td>
<td>! WFDAT =D:\CALPUFF\6WETDEP.DAT !</td>
</tr>
<tr>
<td></td>
<td></td>
<td>!</td>
</tr>
<tr>
<td>VISB.DAT</td>
<td>output</td>
<td>! VISDAT =D:\CALPUFF\6VISB.DAT !</td>
</tr>
<tr>
<td>RESTARTA.DAT</td>
<td>output</td>
<td>* RSTARTA=</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

Emission Files

| PTEMARB.DAT     | input       | * PTDAT =         |
| VOLMARB.DAT     | input       | * VOLDAT =       |
| BAREMARB.DAT    | input       | * ARDAT =         |
| LNERMARB.DAT    | input       | * LNDAT =         |

Other Files

| OZONE.DAT       | input       | * OZDAT =         |
| UD.DAT          | input       | * VDDAT =         |
| CHEM.DAT        | input       | * CHEMDAT=       |
| HILL.DAT        | input       | * HILDAT=        |
| HILLRT.DAT      | input       | * RCTDAT=        |
| COASTL.DAT      | input       | * CSTDAT=        |
| FLUXBDY.DAT     | input       | * BDDAT=         |
| BCON.DAT        | input       | * BCNDAT=        |
| DEBUG.DAT       | output      | * DEBUG =        |
| MSSFIX.DAT      | output      | * FLXDAT=        |
| MASSBAL.DAT     | output      | * BALDAT=        |
| FOG.DAT         | output      | * FOGDAT=        |

All file names will be converted to lower case if LCFILES = T
Otherwise, if LCFILES = F, file names will be converted to UPPER CASE
T = lower case ! LCFILES = F !
F = UPPER CASE

NOTE: (1) file/path names can be up to 70 characters in length

Provision for multiple input files
---------------------------------------

Number of CALMET.DAT files for run (NMEDDAT)
  Default: 1 ! NMEDDAT = 4 !

Number of PTEMARB.DAT files for run (NPTDAT)
  Default: 0 ! NPTDAT = 0 !

Number of BAEMARB.DAT files for run (NARDAT)
  Default: 0 ! NARDAT = 0 !

Number of VOLEMARB.DAT files for run (NVOLDAT)
  Default: 0 ! NVOLDAT = 0 !

!END!

-----------------
Subgroup (0a)
-----------------

The following CALMET.DAT filenames are processed in sequence if NMEDDAT>1

<table>
<thead>
<tr>
<th>Default Name</th>
<th>Type</th>
<th>File Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>none</td>
<td>input</td>
<td>\METDAT=D:\CALPUFF\98Q2MET.DAT</td>
</tr>
<tr>
<td>none</td>
<td>input</td>
<td>\METDAT=D:\CALPUFF\98Q3MET.DAT</td>
</tr>
<tr>
<td>none</td>
<td>input</td>
<td>\METDAT=D:\CALPUFF\98Q4MET.DAT</td>
</tr>
<tr>
<td>none</td>
<td>input</td>
<td>\METDAT=D:\CALPUFF\99Q1MET.DAT</td>
</tr>
</tbody>
</table>

------------------------------

INPUT GROUP: 1 -- General run control parameters
------------------------------

Option to run all periods found
in the met. file (METRUN) Default: 0 ! METRUN = 0 !

  METRUN = 0 - Run period explicitly defined below
  METRUN = 1 - Run all periods in met. file

Starting date: Year (IBYR) -- No default ! IBYR = 1998 !
  (used only if METRUN = 0) Month (IBMO) -- No default ! IBMO = 4 !
  Day (IBDY) -- No default ! IBDY = 1 !
  Hour (IBHR) -- No default ! IBHR = 0 !

Length of run (hours) (IRLG) -- No default ! IRLG = 7992 !

Number of chemical species (NSPEC)
  Default: 5 ! NSPEC = 6 !
Number of chemical species to be emitted (NSE)  Default: 3  ! NSE = 4 !

Flag to stop run after SETUP phase (ITEST)  Default: 2  ! ITEST = 2 !
(Used to allow checking of the model inputs, files, etc.)
   ITEST = 1 - STOPS program after SETUP phase
   ITEST = 2 - Continues with execution of program after SETUP

Restart Configuration:

Control flag (MRESTART)  Default: 0  ! MRESTART = 0 !
   0 = Do not read or write a restart file
   1 = Read a restart file at the beginning of the run
   2 = Write a restart file during run
   3 = Read a restart file at beginning of run and write a restart file during run

Number of periods in Restart output cycle (NRESPD)  Default: 0  ! NRESPD = 0 !
   0 = File written only at last period
   >0 = File updated every NRESPD periods

Meteorological Data Format (METFM)  Default: 1  ! METFM = 1 !
   METFM = 1 - CALMET binary file (CALMET.MET)
   METFM = 2 - ISC ASCII file (ISCMET.MET)
   METFM = 3 - AUSPLUME ASCII file (PLMNET.MET)
   METFM = 4 - CTDM plus tower file (PROFILE.DAT) and surface parameters file (SURFACE.DAT)

PG sigma-y is adjusted by the factor (AVET/POTIME)**0.2
Averaging Time (minutes) (AVET)  Default: 60.0  ! AVET = 60.0!

PG Averaging Time (minutes) (POTIME)  Default: 60.0  ! POTIME = 60.0!

!END!

-------------------------------------------

INPUT GROUP: 2 -- Technical options
-------------

Vertical distribution used in the near field (MGAUSS)  Default: 1  ! MGAUSS = 1 !
   0 = uniform
   1 = Gaussian
Terrain adjustment method (MCTADJ)
0 = no adjustment
1 = ISC-type of terrain adjustment
2 = simple, CALPUFF-type of terrain adjustment
3 = partial plume path adjustment
Default: 3 \[ \text{MCTADJ} = 3 \]

Subgrid-scale complex terrain flag (MCTSG)
0 = not modeled
1 = modeled
Default: 0 \[ \text{MCTSG} = 0 \]

Near-field puffs modeled as elongated 0 (MSLUG)
0 = no
1 = yes (slug model used)
Default: 0 \[ \text{MSLUG} = 0 \]

Transitional plume rise modeled? (MTRANS)
0 = no (i.e., final rise only)
1 = yes (i.e., transitional rise computed)
Default: 1 \[ \text{MTRANS} = 1 \]

Stack tip downwash? (MTIP)
0 = no (i.e., no stack tip downwash)
1 = yes (i.e., use stack tip downwash)
Default: 1 \[ \text{MTIP} = 1 \]

Vertical wind shear modeled above stack top? (MSHEAR)
0 = no (i.e., vertical wind shear not modeled)
1 = yes (i.e., vertical wind shear modeled)
Default: 0 \[ \text{MSHEAR} = 0 \]

Puff splitting allowed? (MSPLIT)
0 = no (i.e., puffs not split)
1 = yes (i.e., puffs are split)
Default: 0 \[ \text{MSPLIT} = 0 \]

Chemical mechanism flag (MCHEM)
0 = chemical transformation not modeled
1 = transformation rates computed internally (MESOPUFF II scheme)
2 = user-specified transformation rates used
3 = transformation rates computed internally (RIVAD/ARM3 scheme)
4 = secondary organic aerosol formation computed (MESOPUFF II scheme for OH)
Default: 1 \[ \text{MCHEM} = 1 \]

Wet removal modeled? (MWET)
0 = no
1 = yes
Default: 1 \[ \text{MWET} = 1 \]

Dry deposition modeled? (MDRY)
0 = no
1 = yes
Default: 1 \[ \text{MDRY} = 1 \]
for each species in Input Group 3)

Method used to compute dispersion coefficients (MDISP)

1 = dispersion coefficients computed from measured values of turbulence, sigma v, sigma w
2 = dispersion coefficients from internally calculated sigma v, sigma w using micrometeorological variables (u*, w*, L, etc.)
3 = PG dispersion coefficients for RURAL areas (computed using the ISCST multi-segment approximation) and MF coefficients in urban areas
4 = same as 3 except PG coefficients computed using the MESOPUFF II eqns.
5 = CTDM sigmas used for stable and neutral conditions. For unstable conditions, sigmas are computed as in MDISP = 3, described above. MDISP = 5 assumes that measured values are read

Sigma-v/sigma-theta, sigma-w measurements used? (MTURBW)
(Used only if MDISP = 1 or 5) Default: 3 ! MTURBW = 3 !

1 = use sigma-v or sigma-theta measurements from PROFILE.DAT to compute sigma-y
(valid for METFM = 1, 2, 3, 4)
2 = use sigma-w measurements from PROFILE.DAT to compute sigma-z
(valid for METFM = 1, 2, 3, 4)
3 = use both sigma-(v/theta) and sigma-w from PROFILE.DAT to compute sigma-y and sigma-z
(valid for METFM = 1, 2, 3, 4)
4 = use sigma-theta measurements from PLMNET.DAT to compute sigma-y
(valid only if METFM = 3)

Back-up method used to compute dispersion when measured turbulence data are missing (MDISP2)
(used only if MDISP = 1 or 5)

2 = dispersion coefficients from internally calculated sigma v, sigma w using micrometeorological variables (u*, w*, L, etc.)
3 = PG dispersion coefficients for RURAL areas (computed using the ISCST multi-segment approximation) and MF coefficients in urban areas
4 = same as 3 except PG coefficients computed using the MESOPUFF II eqns.

PG sigma-y,z adj. for roughness? (MROUGH)

0 = no
1 = yes

Partial plume penetration of elevated inversion? (MPARTL)

0 = no
1 = yes

Strength of temperature inversion  Default: 0  ! MTINV = 0 !
provided in PROFILE.DAT extended records?
(MTINV)
0 = no (computed from measured/default gradients)
1 = yes

PDF used for dispersion under convective conditions?
(Default: 0  ! MPDF = 0 !
(MPDF)
0 = no
1 = yes

Sub-Grid TIBL module used for shore line?
Default: 0  ! MSGTIBL = 0 !
(MSGTIBL)
0 = no
1 = yes

Boundary conditions (concentration) modeled?
Default: 0  ! MBCON = 0 !
(MBCON)
0 = no
1 = yes

Analyses of fogging and icing impacts due to emissions from
arrays of mechanically-forced cooling towers can be performed
using CALPUFF in conjunction with a cooling tower emissions
processor (CTEMISS) and its associated postprocessors. Hourly
emissions of water vapor and temperature from each cooling tower
cell are computed for the current cell configuration and ambient
conditions by CTEMISS. CALPUFF models the dispersion of these
emissions and provides cloud information in a specialized format
for further analysis. Output to FOG.DAT is provided in either
'plume mode' or 'receptor mode' format.

Configure for FOG Model output?
Default: 0  ! MFOG = 0 !
(MFOG)
0 = no
1 = yes - report results in PLUME Mode format
2 = yes - report results in RECEPTOR Mode format

Test options specified to see if
they conform to regulatory
values? (MREG)
Default: 1  ! MREG = 1 !
0 = NO checks are made
1 = Technical options must conform to USEPA values
  METFM  1
  AVET  60. (min)
  MGROUS  1
  MCTADJ  3
  MTRANS  1
MTIP   1
MCHEM  1 (if modeling SOx, NOx)
MWET   1
MDRY   1
MDISP  3
MROUGH 0
MPARTL 1
SYTDEF 550. (m)
MHFTSZ 0

!END!

INPUT GROUP: 3a, 3b -- Species list
-------------

---------
Subgroup (3a)
-----------

The following species are modeled:

! CSPEC =       SO2 !       !END!
! CSPEC =       SO4 !       !END!
! CSPEC =       NOX !       !END!
! CSPEC =       HNO3 !      !END!
! CSPEC =       NO3 !       !END!
! CSPEC =       PM10 !      !END!

<table>
<thead>
<tr>
<th>GROUP</th>
<th>SPECIES</th>
<th>MODELED</th>
<th>EMITTED</th>
<th>DEPOSITED</th>
<th>OUTPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUMBER</td>
<td>NAME</td>
<td>(0=NO, 1=YES)</td>
<td>(0=NO, 1=YES)</td>
<td>(0=NO, 1=YES)</td>
<td>(0=NO, 1=YES)</td>
</tr>
<tr>
<td>(0=NONE,</td>
<td></td>
<td></td>
<td></td>
<td>1=COMPUTED-GAS</td>
<td>1=1st</td>
</tr>
<tr>
<td>Limit: 12</td>
<td>CGROUP,</td>
<td></td>
<td></td>
<td>2=COMPUTED-PARTICLE</td>
<td>2=2nd</td>
</tr>
<tr>
<td>Characters</td>
<td>Characters</td>
<td>CGROUP,</td>
<td></td>
<td>3=USER-SPECIFIED</td>
<td>3=</td>
</tr>
<tr>
<td>in length)</td>
<td>in length)</td>
<td>etc.)</td>
<td></td>
<td>etc.)</td>
<td></td>
</tr>
<tr>
<td>!</td>
<td>SO2 =</td>
<td>1,</td>
<td>1,</td>
<td>1,</td>
<td>0 !</td>
</tr>
<tr>
<td>!</td>
<td>SO4 =</td>
<td>1,</td>
<td>1,</td>
<td>2,</td>
<td>0 !</td>
</tr>
<tr>
<td>!</td>
<td>NOX =</td>
<td>1,</td>
<td>1,</td>
<td>1,</td>
<td>0 !</td>
</tr>
<tr>
<td>!</td>
<td>HNO3 =</td>
<td>1,</td>
<td>0,</td>
<td>1,</td>
<td>0 !</td>
</tr>
<tr>
<td>!</td>
<td>NO3 =</td>
<td>1,</td>
<td>0,</td>
<td>2,</td>
<td>0 !</td>
</tr>
<tr>
<td>!</td>
<td>PM10 =</td>
<td>1,</td>
<td>1,</td>
<td>2,</td>
<td>0 !</td>
</tr>
</tbody>
</table>

!END!

---------
Subgroup (3b)
----------
The following names are used for Species-Groups in which results for certain species are combined (added) prior to output. The CGRP name will be used as the species name in output files. Use this feature to model specific particle-size distributions by treating each size-range as a separate species. Order must be consistent with 3(a) above.

----------

INPUT GROUP: 4 -- Grid control parameters
----------

METEOROLOGICAL grid:

No. X grid cells (NX) No default ! NX = 42 !
No. Y grid cells (NY) No default ! NY = 34 !
No. vertical layers (NZ) No default ! NZ = 10 !

Grid spacing (DGRIDKM) No default ! DGRIDKM = 12. !
Units: km

Cell face heights (ZFACE(nz+1)) No defaults
Units: m

! ZFACE = 0., 20., 40., 80., 160., 300., 600., 1000., 1500., 2200., 3000. !

Reference Coordinates of SOUTHWEST corner of grid cell(1, 1):

X coordinate (XORIGKM) No default ! XORIGKM = 923.8 !
Y coordinate (YORIGKM) No default ! YORIGKM = -108. !
Units: km

UTM zone (IUTMZN) No default ! IUTMZN = 10 !

Reference coordinates of CENTER of the domain (used in the calculation of solar elevation angles):

Latitude (deg.) (XLAT) No default ! XLAT = 48.376 !
Longitude (deg.) (XLONG) No default ! XLONG = 122.188 !
Time zone (XTZ) No default ! XTZ = 8.0 !
(PST=8, MST=7, CST=6, EST=5)

Computational grid:

The computational grid is identical to or a subset of the MET. grid. The lower left (LL) corner of the computational grid is at grid point...
(IBCOMP, JBCOMP) of the MET. grid. The upper right (UR) corner of the computational grid is at grid point (IECOMP, JECOMP) of the MET. grid. The grid spacing of the computational grid is the same as the MET. grid.

X index of LL corner (IBCOMP) No default ! IBCOMP = 1 !
(1 <= IBCOMP <= NX)

Y index of LL corner (JBCOMP) No default ! JBCOMP = 1 !
(1 <= JBCOMP <= NY)

X index of UR corner (IECOMP) No default ! IECOMP = 42 !
(1 <= IECOMP <= NX)

Y index of UR corner (JECOMP) No default ! JECOMP = 34 !
(1 <= JECOMP <= NY)

SAMPLING GRID (GRIDDED RECEPTORS):

The lower left (LL) corner of the sampling grid is at grid point (IBSAMP, JBSAMP) of the MET. grid. The upper right (UR) corner of the sampling grid is at grid point (IESAMP, JESAMP) of the MET. grid. The sampling grid must be identical to or a subset of the computational grid. It may be a nested grid inside the computational grid. The grid spacing of the sampling grid is DGRIDKM/MESHDN.

Logical flag indicating if gridded receptors are used (LSAMP) Default: T ! LSAMP = F !
(T=yes, F=no)

X index of LL corner (IBSAMP) No default ! IBSAMP = 1 !
(IBCOMP <= IBSAMP <= IECOMP)

Y index of LL corner (JBSAMP) No default ! JBSAMP = 1 !
(JBCOMP <= JBSAMP <= JECOMP)

X index of UR corner (IESAMP) No default ! IESAMP = 1 !
(IBCOMP <= IESAMP <= IECOMP)

Y index of UR corner (JESAMP) No default ! JESAMP = 1 !
(JBCOMP <= JESAMP <= JECOMP)

Nesting factor of the sampling grid (MESHDN) Default: 1 ! MESHDN = 1 !
(MESHDN is an integer >= 1)

!END!

---------------------------------------------------------------------------------------------------

INPUT GROUP: 5 -- Output Options
FILE

DEFAULT VALUE

* 

VALUE THIS RUN

* 

Concentrations (ICON) 1 ! ICON = 1 !
Dry Fluxes (IDRY) 1 ! IDRY = 1 !
Wet Fluxes (IWET) 1 ! IWET = 1 !
Relative Humidity (IVIS) 1 ! IVIS = 1 !
(relative humidity file is required for visibility analysis)

Use data compression option in output file? (LCOMPRS)
Default: T ! LCOMPRS = T !

* 0 = Do not create file, 1 = create file

DIAGNOSTIC MASS FLUX OUTPUT OPTIONS:

Mass flux across specified boundaries for selected species reported hourly? (IMFLX)
Default: 0 ! IMFLX = 0 !
0 = no
1 = yes (FLUXBDY.DAT and MASSFLX.DAT filenames are specified in Input Group 0)

Mass balance for each species reported hourly? (IMBAL)
Default: 0 ! IMBAL = 0 !
0 = no
1 = yes (MASSBAL.DAT filename is specified in Input Group 0)

LINE PRINTER OUTPUT OPTIONS:

Print concentrations (ICPRT)
Default: 0 ! ICFRQ = 7992 !
Print dry fluxes (IDPRT)
Default: 0 ! IDFRQ = 7992 !
Print wet fluxes (IWFRQ)
Default: 0 ! IWFRQ = 7992 !
(0 = Do not print, 1 = Print)

Concentration print interval (ICFRQ) in hours
Default: 1 ! ICFRQ = 7992 !

Dry flux print interval (IDFRQ) in hours
Default: 1 ! IDFRQ = 7992 !

Wet flux print interval (IWFRQ) in hours
Default: 1 ! IWFRQ = 7992 !

Units for Line Printer Output (IPRTU)
Default: 1 ! IPRTU = 3 !

for

Concentration
Deposition
1 = g/m**3 g/m**2/s
2 = mg/m**3 mg/m**2/s
3 = ug/m**3 ug/m**2/s
4 = \text{ng/m}^{+3} \text{ ng/m}^{+2}/s
5 = \text{Odour Units}

Messages tracking progress of run written to the screen?

(imesg) Default: 2 \text{! IMESG = 2!}
0 = no
1 = yes (advection step, puff ID)
2 = yes (YYYYJJJHH, # old puffs, # emitted puffs)

 SPECIES (or GROUP for combined species) LIST FOR OUTPUT OPTIONS

<table>
<thead>
<tr>
<th>WET FLUXES --------</th>
<th>------- CONCENTRATIONS -------</th>
<th>------- DRY FLUXES -------</th>
<th>-------</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECIES /GROUP</td>
<td>PRINTED? SAVED ON DISK?</td>
<td>PRINTED? SAVED ON DISK?</td>
<td>PRINTED?</td>
</tr>
<tr>
<td>SAVED ON DISK?</td>
<td></td>
<td></td>
<td>--------</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------------------------</td>
<td>--------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>!</td>
<td>S02 = 1, 1, 1, 1, 1, 1, 1</td>
<td>!</td>
<td></td>
</tr>
<tr>
<td>1, 0</td>
<td>!</td>
<td>!</td>
<td></td>
</tr>
<tr>
<td>!</td>
<td>NOX = 1, 1, 1, 1, 1, 0</td>
<td>!</td>
<td></td>
</tr>
<tr>
<td>0, 0</td>
<td>!</td>
<td>!</td>
<td></td>
</tr>
<tr>
<td>!</td>
<td>PM10 = 1, 1, 1, 1, 1, 1</td>
<td>!</td>
<td></td>
</tr>
<tr>
<td>1, 0</td>
<td>!</td>
<td>!</td>
<td></td>
</tr>
<tr>
<td>!</td>
<td>S04 = 1, 1, 1, 1, 1, 1</td>
<td>!</td>
<td></td>
</tr>
<tr>
<td>1, 0</td>
<td>!</td>
<td>!</td>
<td></td>
</tr>
<tr>
<td>!</td>
<td>HNO3 = 1, 1, 1, 1, 1, 1</td>
<td>!</td>
<td></td>
</tr>
<tr>
<td>1, 0</td>
<td>!</td>
<td>!</td>
<td></td>
</tr>
<tr>
<td>!</td>
<td>NO3 = 1, 1, 1, 1, 1, 1</td>
<td>!</td>
<td></td>
</tr>
<tr>
<td>1, 0</td>
<td>!</td>
<td>!</td>
<td></td>
</tr>
</tbody>
</table>

OPTIONS FOR PRINTING "DEBUG" QUANTITIES (much output)

Logical for debug output (LDEBUG)
Default: F \text{! LDEBUG = F!}

First puff to track (IPFDEB)
Default: 1 \text{! IPFDEB = 1!}

Number of puffs to track (NPFDEB)
Default: 1 \text{! NPFDEB = 1!}

Met. period to start output (NN1)
Default: 1 \text{! NN1 = 1!}

Met. period to end output (NN2)
Default: 10 \text{! NN2 = 10!}

!END!

-----------------------------------------------

INPUT GROUP: 6a, 6b, & 6c -- Subgrid scale complex terrain inputs
Subgroup (6a)

Number of terrain features (NHILL)  Default: 0  !  NHILL = 0  !

Number of special complex terrain receptors (NCTREC)  Default: 0  !  NCTREC = 0  !

Terrain and CTSG Receptor data for CTSG hills input in CTDM format?
(MHILL)
1 = Hill and Receptor data created by CTDM processors & read from HILL.DAT and HILLRCT.DAT files
2 = Hill data created by OPTHILL & input below in Subgroup (6b);
   Receptor data in Subgroup (6c)

Factor to convert horizontal dimensions to meters (MHILL=1)  Default: 1.0  !  XHILL2M = 1. !

Factor to convert vertical dimensions to meters (MHILL=1)  Default: 1.0  !  ZHILL2M = 1. !

X-origin of CTDM system relative to CALPUFF coordinate system, in Kilometers (MHILL=1)

Y-origin of CTDM system relative to CALPUFF coordinate system, in Kilometers (MHILL=1)

! END !

Subgroup (6b)

1 **

HILL information

<table>
<thead>
<tr>
<th>HILL</th>
<th>XC</th>
<th>YC</th>
<th>THETAH</th>
<th>ZGRID</th>
<th>RELIEF</th>
<th>EXPO 1</th>
<th>EXPO 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCALE 1</td>
<td>SCALE 2</td>
<td>AMAX1</td>
<td>AMAX2</td>
<td>(m)</td>
<td>(km)</td>
<td>(deg.)</td>
<td>(m)</td>
</tr>
<tr>
<td>NO.</td>
<td>(km)</td>
<td>(m)</td>
<td>(m)</td>
<td>(m)</td>
<td>(m)</td>
<td>(m)</td>
<td>(m)</td>
</tr>
</tbody>
</table>

Subgroup (6c)

COMPLEX TERRAIN RECEPTOR INFORMATION
Description of Complex Terrain Variables:

XC, YC = Coordinates of center of hill
THETAH = Orientation of major axis of hill (clockwise from North)
ZGRID = Height of the 0 of the grid above mean sea level
RELIEF = Height of the crest of the hill above the grid elevation
EXPO 1 = Hill-shape exponent for the major axis
EXPO 2 = Hill-shape exponent for the major axis
SCALE 1 = Horizontal length scale along the major axis
SCALE 2 = Horizontal length scale along the minor axis
AMAX = Maximum allowed axis length for the major axis
BMAX = Maximum allowed axis length for the major axis

XRCT, YRCT = Coordinates of the complex terrain receptors
ZRCT = Height of the ground (MSL) at the complex terrain Receptor
XHH = Hill number associated with each complex terrain receptor
(NOTE: MUST BE ENTERED AS A REAL NUMBER)

**
NOTE: DATA for each hill and CTSG receptor are treated as a separate input subgroup and therefore must end with an input group terminator.
INPUT GROUP: 8 -- Size parameters for dry deposition of particles

For SINGLE SPECIES, the mean and standard deviation are used to compute a deposition velocity for NINT (see group 9) size-ranges, and these are then averaged to obtain a mean deposition velocity.

For GROUPED SPECIES, the size distribution should be explicitly specified (by the 'species' in the group), and the standard deviation for each should be entered as 0. The model will then use the deposition velocity for the stated mean diameter.

<table>
<thead>
<tr>
<th>SPECIES NAME</th>
<th>GEOMETRIC MASS MEAN DIAMETER (microns)</th>
<th>GEOMETRIC STANDARD DEVIATION (microns)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SO4</td>
<td>0.48</td>
<td>2.0</td>
</tr>
<tr>
<td>NO3</td>
<td>0.48</td>
<td>2.0</td>
</tr>
<tr>
<td>PM10</td>
<td>0.48</td>
<td>2.0</td>
</tr>
</tbody>
</table>

!END!

INPUT GROUP: 9 -- Miscellaneous dry deposition parameters

Reference cuticle resistance \((s/cm)\) (RCUTR) Default: 30 \(\text{RCUTR} = 30.0\) !
Reference ground resistance \((s/cm)\) (RGR) Default: 10 \(\text{RGR} = 10.0\) !
Reference pollutant reactivity (REACTR) Default: 8 \(\text{REACTR} = 8.0\) !

Number of particle-size intervals used to evaluate effective particle deposition velocity (NINT) Default: 9 \(\text{NINT} = 9\) !

Vegetation state in unirrigated areas (IVEG) Default: 1 \(\text{IVEG} = 1\) !
IVEG=1 for active and unstressed vegetation
IVEG=2 for active and stressed vegetation
IVEG=3 for inactive vegetation

!END!

INPUT GROUP: 10 -- Wet Deposition Parameters

Scavenging Coefficient -- Units: \((\text{sec})^{-1}\)
<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Liquid Precip.</th>
<th>Frozen Precip.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SO2 =</td>
<td>3.0E-05,</td>
<td>0.0E00 !</td>
</tr>
<tr>
<td>SO4 =</td>
<td>1.0E-04,</td>
<td>3.0E-05 !</td>
</tr>
<tr>
<td>HNO3 =</td>
<td>6.0E-05,</td>
<td>0.0E00 !</td>
</tr>
<tr>
<td>NO3 =</td>
<td>1.0E-04,</td>
<td>3.0E-05 !</td>
</tr>
<tr>
<td>PM10 =</td>
<td>1.0E-04,</td>
<td>3.0E-05 !</td>
</tr>
</tbody>
</table>

!END!

INPUT GROUP: 11 -- Chemistry Parameters

Ozone data input option (MOZ) Default: 1
(Used only if MCHEM = 1, 3, or 4)
0 = use a constant background ozone value
1 = read hourly ozone concentrations from the OZONE.DAT data file

Background ozone concentration (BCKO3) in ppb Default: 80.
(Used only if MCHEM = 1, 3, or 4 and MOZ = 0 or (MOZ = 1 and all hourly O3 data missing)

Background ammonia concentration (BCKNH3) in ppb Default: 10.

Nighttime SO2 loss rate (RNITE1) in percent/hour Default: 0.2

Nighttime NOX loss rate (RNITE2) in percent/hour Default: 2.0

Nighttime HNO3 formation rate (RNITE3) in percent/hour Default: 2.0

--- Data for SECONDARY ORGANIC AEROSOL (SOA) Option
(used only if MCHEM = 4)

The SOA module uses monthly values of:
Fine particulate concentration in ug/m^3 (BCKPMF)
Organic fraction of fine particulate (OFRAC)
VOC / NOX ratio (after reaction) (VCNX)
to characterize the air mass when computing the formation of SOA from VOC emissions.
Typical values for several distinct air mass types are:

Month 1 2 3 4 5 6 7 8 9 10 11 12
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Clean Continental
INPUT GROUP: 12 -- Misc. Dispersion and Computational Parameters

Horizontal size of puff (m) beyond which
time-dependent dispersion equations (Heffter)
are used to determine sigma-y and
sigma-z (SYTDEP)  Default: 550. ! SYTDEP = 5.5E02 !

Switch for using Heffter equation for sigma z
as above (0 = Not use Heffter; 1 = use Heffter
(MHFTSZ)  Default: 0 ! MHFTSZ = 0
Stability class used to determine plume growth rates for puffs above the boundary layer (JSUP)

Default: 5  !  JSUP = 5  !

Vertical dispersion constant for stable conditions (kl in Eqn. 2.7-3) (CONK1)

Default: 0.01  !  CONK1 = .01 !

Vertical dispersion constant for neutral/unstable conditions (k2 in Eqn. 2.7-4) (CONK2)

Default: 0.1  !  CONK2 = .1 !

Factor for determining Transition-point from Schulman-Scire to Huber-Snyder Building Downwash scheme (SS used for Hs < Hb + TBD * HL) (TBD)

Default: 0.5  !  TBD = .5 !
TBD < 0  ==> always use Huber-Snyder
TBD = 1.5  ==> always use Schulman-Scire
TBD = 0.5  ==> ISC Transition-point

Range of land use categories for which urban dispersion is assumed (IURB1, IURB2)

Default: 10  !  IURB1 = 10 !
19  !  IURB2 = 19 !

Site characterization parameters for single-point Met data files

(needed for METFM = 2,3,4)

Land use category for modeling domain (ILANDUIN)

Default: 20  !  ILANDUIN = 20 !

Roughness length (m) for modeling domain (Z0IN)

Default: 0.25  !  Z0IN = .25 !

Leaf area index for modeling domain (XLAIN)

Default: 3.0  !  XLAIN = 3.0 !

Elevation above sea level (m) (ELEVIN)

Default: 0.0  !  ELEVIN = 100.0 !

Latitude (degrees) for met location (XLATIN)

Default: -999.  !  XLATIN = 48.85

Longitude (degrees) for met location (XLONIN)

Default: -999.  !  XLONIN = 122.75 !

Specialized information for interpreting single-point Met data files

Anemometer height (m) (Used only if METFM = 2,3) (ANEMHT)

Default: 10.  !  ANEMHT = 10.0 !

Form of lateral turbulence data in PROFILE.DAT file
(Used only if METPM = 4 or MTURBVW = 1 or 3)
(ISIGMAV)

! 0 = read sigma-theta
! 1 = read sigma-v

Choice of mixing heights (Used only if METPM = 4)
(IMIXCTDM)

! 0 = read PREDICTED mixing heights
! 1 = read OBSERVED mixing heights

Maximum length of a slug (met. grid units)
(XMXLEN)

Default: 1.0 ! XMXLEN = 1.0 !

Maximum travel distance of a puff(slug) (in
grid units) during one sampling step
(XSAMLEN)

Default: 1.0 ! XSAMLEN = 1.0

Maximum Number of slugs/puffs release from
one source during one time step
(MXNEW)

Default: 99 ! MXNEW = 99

Maximum Number of sampling steps for
one puff(slug) during one time step
(MXSAM)

Default: 99 ! MXSAM = 99

Number of iterations used when computing
the transport wind for a sampling step
that includes gradual rise (for CALMET
and PROFILE winds)
(NCOUNT)

Default: 2 ! NCOUNT = 2

Minimum sigma_y for a new puff(slug) (m)
(SYMIN)

Default: 1.0 ! SYMIN = 1.0 !

Minimum sigma_z for a new puff(slug) (m)
(SZMIN)

Default: 1.0 ! SZMIN = 1.0 !

Default minimum turbulence velocities
sigma-v and sigma-w for each
stability class (m/s)
(SVMIN(6) and SWMIN(6))

Default SVMIN : .50, .50, .50, .50, .50,

.50

.016

Default SWMIN : .20, .12, .08, .06, .03,

F

Stability Class : A B C D E

! SVMIN = 0.500, 0.500, 0.500, 0.500,
Divergence criterion for \(dw/dz\) across puff
used to initiate adjustment for horizontal
convergence (l/s)
Partial adjustment starts at CDIV(1), and
full adjustment is reached at CDIV(2)
(CDIV(2))

Default: 0.0, 0.0 ! CDIV = .0,

Minimum wind speed (m/s) allowed for
non-calm conditions. Also used as minimum
speed returned when using power-law
extrapolation toward surface
(WSCALM)

Default: 0.5 ! WSCALM = 1.0 !

Maximum mixing height (m)
(XMAXZI)

Default: 3000. ! XMAXZI =

Minimum mixing height (m)
(XMINZI)

Default: 50. ! XMINZI = 50.0

Default wind speed classes --
5 upper bounds (m/s) are entered;
the 6th class has no upper limit
(WSCAT(5))

Default:
ISC RURAL : 1.54, 3.09, 5.14, 8.23, 10.8

(WSCAT(5))

Wind Speed Class : 1 2 3 4 5
--- --- --- --- --- -

--

Default wind speed profile power-law
exponents for stabilities 1-6
(FLX0(6))

Default: ISC RURAL values
ISC RURAL : .07, .07, .10, .15, .35, .55
ISC URBAN : .15, .15, .20, .25, .30, .30

Stability Class : A B C D E
--- --- --- --- --- -

--

Default potential temperature gradient
for stable classes E, F (degK/m)
(PTG0(2))

Default: 0.020, 0.035
![PTG0 = 0.020, 0.035 !]

Default plume path coefficients for
each stability class (used when option
for partial plume height terrain adjustment
is selected -- MCTADJ=3)

<table>
<thead>
<tr>
<th>Stability Class</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPC(6)</td>
<td>.50</td>
<td>.50</td>
<td>.50</td>
<td>.50</td>
<td>.35</td>
</tr>
<tr>
<td>.35</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

! PPC = 0.50, 0.50, 0.50, 0.50, 0.35,

0.35 !

 Slug-to-puff transition criterion factor
equal to sigma-y/length of slug
(SL2PF) Default: 10. ! SL2PF = 10.0 !

Puff-splitting control variables ----------------------------

VERTICAL SPLIT

Number of puffs that result every time a puff
is split - nsplit=2 means that 1 puff splits
into 2 (NSPLIT) Default: 3 ! NSPLIT = 3 !

Time(s) of a day when split puffs are eligible to
be split once again; this is typically set once
per day, around sunset before nocturnal shear develops.
24 values: 0 is midnight (00:00) and 23 is 11 PM (23:00)
0=do not re-split 1=eligible for re-split
(IRESPLIT(24)) Default: Hour 17 = 1
! IRESPLIT = 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0

Split is allowed only if last hour's mixing
height (m) exceeds a minimum value
(ZISPLIT) Default: 100. ! ZISPLIT = 100.0
!

Split is allowed only if ratio of last hour's
mixing ht to the maximum mixing ht experienced
by the puff is less than a maximum value (this
postpones a split until a nocturnal layer develops)
(ROLDMAX) Default: 0.25 ! ROLDMAX = 0.25
!

HORIZONTAL SPLIT

Number of puffs that result every time a puff
is split - nsplit=5 means that 1 puff splits
into 5 (NSPLITH) Default: 5 ! NSPLITH = 5 !

Minimum sigma-y (Grid Cells Units) of puff
before it may be split
(SYSPLITH)                     Default:  1.0       ! SYSPLITH = 1.0

Minimum puff elongation rate (SYSPLITH/hr) due to wind shear, before it may be split
(SHSPLITH)                     Default:  2.0       ! SHSPLITH = 2.0

Minimum concentration (g/m^3) of each species in puff before it may be split
Enter array of NSPEC values; if a single value is entered, it will be used for ALL species
(CNSPLITH)                     Default:  1.0E-07 ! CNSPLITH = 1.0E-07

Integration control variables -------------------------------

Fractional convergence criterion for numerical SLUG sampling integration
(EFSSLUG)                     Default:  1.0e-04 ! EFSSLUG = 1.0E-04

Fractional convergence criterion for numerical AREA source integration
(EPSAREA)                     Default:  1.0e-06 ! EPSAREA = 1.0E-06

Trajectory step-length (m) used for numerical rise integration
(DSRISE)                      Default:  1.0       ! DSRISE = 1.0

!END!

---------------------------------------------------------------

INPUT GROUPS: 13a, 13b, 13c, 13d -- Point source parameters
---------------------------------------------------------------

---------------
Subgroup (13a)
---------------

Number of point sources with parameters provided below
(NPT1)  No default ! NPT1 = 4

Units used for point source emissions below
(IPTU)  Default: 1 ! IPTU = 3

1 = g/s
2 = kg/hr
3 = lb/hr
4 = tons/yr
5 = Odour Unit * m**3/s (vol. flux of odour compound)
6 = Odour Unit * m**3/min
7 = metric tons/yr

---------------------------------------------------------------
Number of source-species combinations with variable emissions scaling factors provided below in (13d) (NSPT1) Default: 0 ! NSPT1 = 0 !

Number of point sources with variable emission parameters provided in external file (NPT2) No default ! NPT2 = 0 !

(If NPT2 > 0, these point source emissions are read from the file: PTEMARB.DAT)

!END!

------------
Subgroup (13b)
------------

POINT SOURCE: CONSTANT DATA

<table>
<thead>
<tr>
<th>Source Emission No.</th>
<th>X UTM</th>
<th>Y UTM</th>
<th>Stack Base</th>
<th>Stack Exit</th>
<th>Exit Bldg.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(km)</td>
<td>(km)</td>
<td>(m)</td>
<td>(m)</td>
<td>(m)</td>
</tr>
<tr>
<td>---------------------</td>
<td>--------</td>
<td>--------</td>
<td>------------</td>
<td>------------</td>
<td>------------</td>
</tr>
<tr>
<td>1 ! SRCNAM = T2 !</td>
<td>1129.065</td>
<td>134.135</td>
<td>45.72, 35.05</td>
<td>5.79, 20.3</td>
<td>355.3</td>
</tr>
<tr>
<td></td>
<td>1.26E01</td>
<td>1.0E00</td>
<td>5.61E01</td>
<td>0.0E00, 0.0E00, 5.62E01</td>
<td></td>
</tr>
<tr>
<td>1 ! FMFAC = 1.0 ! !END!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 ! SRCNAM = GEN !</td>
<td>1129.141</td>
<td>134.218</td>
<td>3.6, 35.1</td>
<td>.2, 183.7</td>
<td>754.8</td>
</tr>
<tr>
<td></td>
<td>6.3E-02</td>
<td>5.0E-03</td>
<td>2.3E00, 0.0E00, 5.8E-02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 ! FMFAC = 1.0 ! !END!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 ! SRCNAM = FPUMP !</td>
<td>1129.043</td>
<td>134.203</td>
<td>3.56, 35.05</td>
<td>.15, 36.32</td>
<td>722.0</td>
</tr>
<tr>
<td></td>
<td>8.3E-03</td>
<td>6.6E-04</td>
<td>2.75E-01, 0.0E00, 0.0E00, 4.2E-03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 ! FMFAC = 1.0 ! !END!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 ! SRCNAM = COOL2 !</td>
<td>1129.003</td>
<td>134.143</td>
<td>22.86, 35.05</td>
<td>9.15, 8.2</td>
<td>305.37, 1.0</td>
</tr>
<tr>
<td></td>
<td>0.0E00, 0.0E00, 0.0E00, 1.6E00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 ! FMFAC = 1.0 ! !END!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

Data for each source are treated as a separate input subgroup and therefore must end with an input group terminator.
SRCNAM is a 12-character name for a source
(No default)
X is an array holding the source data listed by the column headings
(No default)
SIGYZI is an array holding the initial sigma-y and sigma-z (m)
(Default: 0.0, 0.0)
FMFAC is a vertical momentum flux factor (0.0 or 1.0) used to represent
the effect of rain-caps or other physical configurations that
reduce momentum rise associated with the actual exit velocity.
(Default: 1.0 -- full momentum used)

b
0. = No building downwash modeled, 1. = downwash modeled
NOTE: must be entered as a REAL number (i.e., with decimal point)

c
An emission rate must be entered for every pollutant modeled.
Enter emission rate of zero for secondary pollutants that are
modeled, but not emitted. Units are specified by IPTU
(e.g. 1 for g/s).

-----------------
Subgroup (13c)
-----------------

BUILDING DIMENSION DATA FOR SOURCES SUBJECT TO DOWNWASH
-----------------------------------------------
Source No. Effective building width and height (in meters) every 10 degrees

1
  ! SRCNAM = T2 !
  1
  ! HEIGHT = 29.0, 29.0, 29.0, 29.0, 29.0, 29.0,
  29.0, 29.0, 18.3, 29.0, 29.0, 29.0,
  29.0, 29.0, 29.0, 29.0, 29.0, 29.0,
  29.0, 29.0, 29.0, 29.0, 29.0, 29.0,
  29.0, 29.0, 29.0, 29.0, 29.0, 29.0,
  29.0, 29.0, 29.0, 29.0, 29.0, 29.0!  1
  ! WIDTH = 34.1, 34.1, 33.1, 31.1, 28.1, 24.3,
  19.8, 14.6, 101.0, 14.6, 19.7, 24.3,
  28.1, 31.1, 33.1, 34.1, 34.1, 33.0,
  34.1, 34.1, 33.1, 31.1, 28.1, 24.3,
  19.7, 14.6, 9.0, 14.6, 19.7, 24.3,
  28.1, 31.1, 33.1, 34.1, 34.1, 33.0!

!END!
2
  ! SRCNAM = GEN !
  2
  ! HEIGHT = 3.3, 3.3, 29.0, 29.0, 29.0, 29.0,
  29.0, 15.2, 15.2, 15.2, 15.2, 15.2,
  15.2, 15.2, 15.2, 9.1, 9.1, 9.1,
  3.3, 3.3, 3.3, 3.3, 9.1, 9.1,
  9.1, 15.2, 9.1, 9.1, 9.1, 15.2,
  15.2, 15.2, 9.1, 9.1, 9.1, 9.1!  2
  ! WIDTH = 4.0, 4.9, 33.1, 31.1, 28.1, 24.3,
  19.7, 61.8, 58.0, 61.8, 63.7, 63.7,
  61.8, 58.0, 52.4, 67.8, 82.3, 61.0,
  4.0, 4.9, 5.6, 6.2, 26.4, 24.9,
  22.6, 61.8, 16.0, 19.6, 22.6, 63.7,
!END!
3 ! SRCNAM = FPUFF !
3 ! HEIGHT = 12.2, 18.3, 18.3, 18.3, 18.3, 18.3,
18.3, 18.3, 18.3, 18.3, 18.3, 15.2, 29.0,
29.0, 29.0, 29.0, 29.0, 29.0, 29.0,
12.2, 18.3, 18.3, 18.3, 18.3, 18.3,
18.3, 18.3, 18.3, 18.3, 15.2, 29.0,
29.0, 29.0, 29.0, 29.0, 29.0, 29.0!
3 ! WIDTH = 12.8, 66.5, 79.9, 91.0, 99.2, 104.4,
106.5, 105.4, 101.0, 105.4, 63.7, 24.3,
28.1, 31.1, 33.1, 34.1, 34.1, 33.0,
12.8, 66.5, 79.9, 91.0, 99.2, 104.5,
106.5, 105.4, 101.0, 105.4, 63.7, 24.3,
28.1, 31.1, 33.1, 34.1, 34.1, 33.0!
!END!
4 ! SRCNAM = COOL2 !
4 ! HEIGHT = 18.3, 18.3, 18.3, 18.3, 18.3, 18.3,
18.3, 18.3, 18.3, 18.3, 18.3, 18.3,
18.3, 18.3, 18.3, 18.3, 18.3, 18.3,
18.3, 18.3, 18.3, 18.3, 18.3, 18.3,
29.0, 29.0, 18.3, 29.0, 29.0, 29.0,
29.0, 29.0, 18.3, 18.3, 18.3, 18.3!
4 ! WIDTH = 51.0, 66.5, 79.9, 91.0, 99.2, 104.5,
106.5, 105.4, 101.0, 105.4, 106.5, 104.5,
99.2, 91.0, 79.9, 66.5, 51.0, 34.0,
51.0, 66.5, 79.9, 91.0, 99.2, 104.5,
19.7, 14.6, 101.0, 14.6, 19.7, 24.3,
28.1, 31.1, 79.9, 66.5, 51.0, 34.0!
!END!
---

a
Each pair of width and height values is treated as a separate input
subgroup and therefore must end with an input group terminator.

---------------------

Subgroup (13d)
---------------------

POINT SOURCE: VARIABLE EMISSIONS DATA
---------------------

Use this subgroup to describe temporal variations in the emission
rates given in 13b. Factors entered multiply the rates in 13b.
Skip sources here that have constant emissions. For more elaborate
variation in source parameters, use PTEMARB.DAT and NPT2 > 0.

IVARY determines the type of variation, and is source-specific:

(IVARY)

Default: 0

0 = Constant
1 = Diurnal cycle (24 scaling factors: hours 1-24)
2 = Monthly cycle (12 scaling factors: months 1-12)
3 = Hour & Season (4 groups of 24 hourly scaling factors,
   where first group is DEC-JAN-FEB)
4 = Speed & Stab. (6 groups of 6 scaling factors, where
The first group is Stability Class A, and the speed classes have upper bounds (m/s) defined in Group 12 (12 scaling factors, where temperature classes have upper bounds (C) of: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 50+). 

---

Data for each species are treated as a separate input subgroup and therefore must end with an input group terminator.

INPUT GROUPS: 14a, 14b, 14c, 14d -- Area source parameters

Subgroup (14a)

Number of polygon area sources with parameters specified below (NAR1) No default ! NAR1 = 0 !

Units used for area source emissions below (IARU) Default: 1 ! IARU = 1 !

1 = g/m**2/s
2 = kg/m**2/hr
3 = lb/m**2/hr
4 = tons/m**2/yr
5 = Odour Unit * m/s (vol. flux/m**2 of odour compound)
6 = Odour Unit * m/min
7 = metric tons/m**2/yr

Number of source-species combinations with variable emissions scaling factors provided below in (14d) (NSAR1) Default: 0 ! NSAR1 = 0 !

Number of buoyant polygon area sources with variable location and emission parameters (NAR2) No default ! NAR2 = 0 ! (If NAR2 > 0, ALL parameter data for these sources are read from the file: BAEMARB.DAT)

!END!

Subgroup (14b)

AREA SOURCE: CONSTANT DATA
<table>
<thead>
<tr>
<th>Source No.</th>
<th>Effect. Height (m)</th>
<th>Base Elevation (m)</th>
<th>Initial Sigma z (m)</th>
<th>Emission Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- a
  Data for each source are treated as a separate input subgroup and therefore must end with an input group terminator.

- b
  An emission rate must be entered for every pollutant modeled. Enter emission rate of zero for secondary pollutants that are modeled, but not emitted. Units are specified by IARU (e.g. 1 for g/m**2/s).

Subgroup (14c)

COORDINATES (UTM-km) FOR EACH VERTEX(4) OF EACH POLYGON

<table>
<thead>
<tr>
<th>Source No.</th>
<th>Ordered list of X followed by list of Y, grouped by source</th>
</tr>
</thead>
</table>

- a
  Data for each source are treated as a separate input subgroup and therefore must end with an input group terminator.

Subgroup (14d)

AREA SOURCE: VARIABLE EMISSIONS DATA

Use this subgroup to describe temporal variations in the emission rates given in 14b. Factors entered multiply the rates in 14b. Skip sources here that have constant emissions. For more elaborate variation in source parameters, use BAEMARB.DAT and NAR2 > 0.

IVARY determines the type of variation, and is source-specific:

(IVARY)

<table>
<thead>
<tr>
<th>IVARY</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Constant</td>
</tr>
<tr>
<td>1</td>
<td>Diurnal cycle (24 scaling factors: hours 1-24)</td>
</tr>
<tr>
<td>2</td>
<td>Monthly cycle (12 scaling factors: months 1-12)</td>
</tr>
<tr>
<td>3</td>
<td>Hour &amp; Season (4 groups of 24 hourly scaling factors, where first group is DEC-JAN-FEB)</td>
</tr>
<tr>
<td>4</td>
<td>Speed &amp; Stab. (6 groups of 6 scaling factors, where first group is Stability Class A, and the speed classes have upper</td>
</tr>
</tbody>
</table>