CORMIX2 PREDICTION FILE:
2222222222222222222222222222222222222222222222222222222222222222222222222222222
22222222222
                        CORMIX MIXING ZONE EXPERT SYSTEM
              Subsystem CORMIX2: Multiport Diffuser Discharges
                          CORMIX Version 12.0GTH
                     HYDRO2 Version 12.0.1.0 August 2021

CASE DESCRIPTION
 Site name/label:
 Design case:
 FILE NAME: D:\...Existing\ExistingLocation_ExistingFlow_Summer.prd
 Time stamp: 06/13/2025--16:00:47

ENVIRONMENT PARAMETERS (metric units)
 Bounded section
 BS   =   246.89 AS   =   459.79 QA   =   5.27 ICHREG= 1
 HA   =   1.86 HD   =   1.43
 UA   =   0.011 F   =   0.147 USTAR =0.1554E-02
 UW   =   3.576 UWSTAR=0.4081E-02
 Uniform density environment
 STRCND=   U   RHOAM = 997.5748

DIFFUSER DISCHARGE PARAMETERS (metric units)
 Diffuser type: DITYPE= alternating_perpendicular
 BANK =   LEFT   DISTB =   19.51 YB1 =   4.88 YB2 =   34.14
 LD   =   29.26 NOPEN = 16   NRISER=   16   SPAC =   1.95
NPPERR =   1
 D0   =   0.457 A0   =   0.164 H0   =   0.00 SUB0 =   1.43
 D0INP =   0.457 CR0   =   1.000 B0   =0.8416E-01
 Nozzle/port arrangement: near_vertical_discharge
 GAMMA =   90.00 THETA =   90.00 SIGMA =   0.00 BETA =   90.00
 U0   =   0.167 Q0   =   0.438 Q0A   =0.4381E+00
 RHO0 = 998.1411 DRHO0 =-.5663E+00 GP0   =-.5567E-02
 C0   =0.1000E+03 CUNITS= %
 IPOLL = 1   KS   =0.0000E+00 KD   =0.0000E+00

FLUX VARIABLES - PER UNIT DIFFUSER LENGTH (metric units)
 q0   =0.1497E-01   SIGNJ0=   -1.0
 m0 =U0^2*B0 =0.2341E-02   j0 =U0*GP0*B0 =-.7814E-04   (based on slot width B0)
 m0 =U0*q0   =0.2497E-02   j0 =q0*GP0   =-.8335E-04   (based on volume flux q0)
 Associated 2-d length scales (meters)
 lQ=B =   0.090 lM   =   1.28 lm   =   18.99
 lmp   = 99999.00 lbp   = 99999.00 la   = 99999.00

FLUX VARIABLES - ENTIRE DIFFUSER (metric units)
 Q0   =0.4381E+00 M0   =0.6851E-01 J0   =-.2287E-02

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 Associated 3-d length scales (meters)
 LQ    =       0.41  LM    =       2.80  Lm    =      23.57  Lb    =    1617.41
                                         Lmp   =   99999.00  Lbp   =   99999.00


 NON-DIMENSIONAL PARAMETERS
 FR0   =       7.71  FRD0  =       3.31  R     =      14.54  PL    =   140.00
 (slot)               (port/nozzle)



 FLOW CLASSIFICATION
 222222222222222222222222222222222222222222222222
 2  Flow class (CORMIX2)       =     MNU13        2
 2  Applicable layer depth HS =      1.43         2
 2  Limiting Dilution S=QA/Q0 + 1=    13.03       2
 222222222222222222222222222222222222222222222222

 MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
  C0    =0.1000E+03  CUNITS= %
  NTOX  =  0
  NSTD  =  0
  REGMZ =  0
  XINT  =   2500.00  XMAX  =   2500.00


 X-Y-Z COORDINATE SYSTEM:
     ORIGIN is located at the bottom and the diffuser mid-point:
         19.51 m  from the LEFT  bank/shore.
     X-axis points downstream, Y-axis points to left, Z-axis points upward.
 NSTEP =  20 display intervals per module
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 BEGIN MOD201: DIFFUSER DISCHARGE MODULE

 Due to complex near-field motions:  EQUIVALENT SLOT DIFFUSER (2-D) GEOMETRY

 Profile definitions:
   BV = Gaussian 1/e (37%) width, in vertical plane normal to trajectory
   BH = top-hat half-width, in horizontal plane normal to trajectory
   S  = hydrodynamic centerline dilution
   C  = centerline concentration (includes reaction effects, if any)
   Uc = Local centerline excess velocity (above ambient)
   TT = Cumulative travel time

       X        Y        Z        S        C       BV       BH       Uc        TT
      0.00     0.00     0.00     1.0  0.100E+03  0.07    14.63     0.167   .00000E+00

 END OF MOD201: DIFFUSER DISCHARGE MODULE
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BEGIN MOD234: UNSTABLE RECIRCULATION REGION OVER LAYER DEPTH

 INITIAL LOCAL VERTICAL INSTABILITY REGION:
   Bulk dilution (S =   2.38) occurs in a limited region (horizontal extent
   =   8.40 m) surrounding the discharge location.

  Control volume inflow:
      X       Y       Z       S       C       BV       BH       TT
     0.00    0.00    0.00    1.0 0.100E+03   0.07    14.63   .00000E+00

  Control volume outflow:
      X       Y       Z       S       C       BV       BH       TT
     8.40    0.00    0.72    2.4 0.420E+02   1.43    18.21   .47128E+02

END OF MOD234: UNSTABLE RECIRCULATION REGION OVER LAYER DEPTH
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BEGIN MOD234a: UPSTREAM SPREADING AFTER NEAR-FIELD INSTABILITY

 UPSTREAM INTRUSION PROPERTIES:
         Upstream intrusion length            =       77.65 m
         X-position of upstream stagnation point =    -69.25 m
         Thickness in intrusion region        =        0.19 m
         Half-width at downstream end         =      123.75 m
         Thickness at downstream end          =        0.61 m

 In this case, the upstream INTRUSION IS VERY LARGE, exceeding 10 times
   the local water depth.
 This may be caused by a very small ambient velocity, perhaps in
   combination with large discharge buoyancy.
 If the ambient conditions are strongly transient (e.g. tidal), then the
   CORMIX steady-state predictions of upstream intrusion are probably
   unrealistic.
 The plume predictions prior to boundary impingement and wedge formation
   will be acceptable, however.

  Control volume inflow:
      X       Y       Z       S       C       BV       BH       TT
     8.40    0.00    0.72    2.4 0.420E+02   1.43    18.21   .47128E+02

 Profile definitions:
   BV = top-hat thickness, measured vertically
   BH = top-hat half-width, measured horizontally in y-direction
   ZU = upper plume boundary (Z-coordinate)
   ZL = lower plume boundary (Z-coordinate)
   S  = hydrodynamic average (bulk) dilution
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   C  = average (bulk) concentration (includes reaction effects, if any)
   TT = Cumulative travel time

     X        Y       Z       S        C       BV       BH       ZU       ZL
TT
   -69.25     0.00    0.00  9999.9 0.000E+00   0.00     0.00     0.00     0.00
.68182E+04
   -66.46     0.00    0.00    10.0 0.998E+01   0.04    17.50     0.04     0.00
.65749E+04
   -52.78     0.00    0.00     4.2 0.240E+02   0.11    42.51     0.11     0.00
.53826E+04
   -39.11     0.00    0.00     3.1 0.318E+02   0.14    57.51     0.14     0.00
.41902E+04
   -25.44     0.00    0.00     2.7 0.370E+02   0.17    69.34     0.17     0.00
.29979E+04
   -11.76     0.00    0.00     2.5 0.402E+02   0.18    79.43     0.18     0.00
.18056E+04
     1.91     0.00    0.00     2.4 0.418E+02   0.19    88.37     0.19     0.00
.61323E+03
    15.58     0.00    0.00     2.5 0.406E+02   0.21   116.82     0.21     0.00
.67336E+03
    29.26     0.00    0.00     3.0 0.337E+02   0.34   118.73     0.34     0.00
.18657E+04
    42.93     0.00    0.00     3.5 0.284E+02   0.49   120.50     0.49     0.00
.30580E+04
    56.60     0.00    0.00     3.8 0.260E+02   0.58   122.17     0.58     0.00
.42504E+04
    70.27     0.00    0.00     4.0 0.251E+02   0.61   123.75     0.61     0.00
.54427E+04
 Cumulative travel time =        5442.6982 sec  (    1.51 hrs)

END OF MOD234a: UPSTREAM SPREADING AFTER NEAR-FIELD INSTABILITY
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** End of NEAR-FIELD REGION (NFR) **

 In this design case, the diffuser is located CLOSE TO BANK/SHORE.
 Some lateral boundary interaction occurs at end of the near-field.
   This may be related to a design case with a VERY LOW AMBIENT VELOCITY.
   The dilution values in one or more of the preceding zones may be too high.
 Carefully evaluate results in near-field and check degree of interaction.

 Consider locating outfall further away from bank or shore.
 In the next prediction module, the plume centerline will be set
   to follow the bank/shore.
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BEGIN MOD241: BUOYANT AMBIENT SPREADING

 Plume is ATTACHED to LEFT  bank/shore.
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   Plume width is now determined from LEFT  bank/shore.

 Profile definitions:
   BV = top-hat thickness, measured vertically
   BH = top-hat half-width, measured horizontally in y-direction
   ZU = upper plume boundary (Z-coordinate)
   ZL = lower plume boundary (Z-coordinate)
   S  = hydrodynamic average (bulk) dilution
   C  = average (bulk) concentration (includes reaction effects, if any)
   TT = Cumulative travel time

 Plume Stage 2 (bank attached):
      X         Y        Z        S        C       BV       BH       ZU       ZL
TT
     70.27    19.51     0.00    4.0 0.251E+02   1.06   143.25    1.06     0.00
.54427E+04
     85.37    19.51     0.00    4.1 0.245E+02   1.04   150.29    1.04     0.00
.66584E+04
    100.47    19.51     0.00    4.2 0.239E+02   1.02   156.95    1.02     0.00
.78741E+04
    115.57    19.51     0.00    4.3 0.233E+02   1.00   163.29    1.00     0.00
.90898E+04
    130.67    19.51     0.00    4.4 0.227E+02   0.99   169.37    0.99     0.00
.10306E+05
    145.77    19.51     0.00    4.5 0.222E+02   0.98   175.21    0.98     0.00
.11521E+05
    160.87    19.51     0.00    4.6 0.216E+02   0.98   180.84    0.98     0.00
.12737E+05
    175.97    19.51     0.00    4.7 0.211E+02   0.97   186.30    0.97     0.00
.13953E+05
    191.07    19.51     0.00    4.9 0.206E+02   0.97   191.59    0.97     0.00
.15168E+05
    206.17    19.51     0.00    5.0 0.200E+02   0.97   196.73    0.97     0.00
.16384E+05
    221.27    19.51     0.00    5.1 0.195E+02   0.97   201.75    0.97     0.00
.17600E+05
    236.37    19.51     0.00    5.3 0.190E+02   0.97   206.65    0.97     0.00
.18815E+05
    251.47    19.51     0.00    5.4 0.185E+02   0.97   211.44    0.97     0.00
.20031E+05
    266.57    19.51     0.00    5.5 0.181E+02   0.98   216.14    0.98     0.00
.21247E+05
    281.67    19.51     0.00    5.7 0.176E+02   0.98   220.75    0.98     0.00
.22463E+05
    296.77    19.51     0.00    5.8 0.171E+02   0.99   225.28    0.99     0.00
.23678E+05
    311.87    19.51     0.00    6.0 0.167E+02   1.00   229.73    1.00     0.00
.24894E+05
    326.97    19.51     0.00    6.2 0.162E+02   1.00   234.12    1.00     0.00
.26110E+05
```

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    342.07     19.51     0.00     6.3 0.158E+02   1.01   238.44   1.01   0.00
.27325E+05
    357.17     19.51     0.00     6.5 0.154E+02   1.02   242.71   1.02   0.00
.28541E+05
    372.27     19.51     0.00     6.7 0.150E+02   1.03   246.89   1.03   0.00
.29757E+05
 Cumulative travel time =        29756.8086 sec  (     8.27 hrs)
 Plume is LATERALLY FULLY MIXED at the end of the buoyant spreading regime.

END OF MOD241: BUOYANT AMBIENT SPREADING
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 Due to the attachment or proximity of the plume to the bottom, the bottom
   coordinate for the FAR-FIELD differs from the ambient depth, ZFB = 0 m.
 In a subsequent analysis set "depth at discharge" equal to "ambient depth".
--------------------------------------------------------------------------------
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BEGIN MOD261: PASSIVE AMBIENT MIXING IN UNIFORM AMBIENT

  Vertical diffusivity (initial value)   = 0.119E-02 m^2/s
  Horizontal diffusivity (initial value) = 0.149E-02 m^2/s

 Profile definitions:
   BV = Gaussian s.d.*sqrt(pi/2) (46%) thickness, measured vertically
      = or equal to layer depth, if fully mixed
   BH = Gaussian s.d.*sqrt(pi/2) (46%) half-width,
        measured horizontally in Y-direction
   ZU = upper plume boundary (Z-coordinate)
   ZL = lower plume boundary (Z-coordinate)
   S  = hydrodynamic centerline dilution
   C  = centerline concentration (includes reaction effects, if any)
   TT = Cumulative travel time

 Plume Stage 2 (bank attached):
       X         Y         Z         S       C       BV       BH       ZU       ZL
TT
    372.27     19.51     0.00     6.7 0.150E+02   1.03   246.89   1.03   0.00
.29757E+05
    478.65     19.51     0.00     6.8 0.147E+02   1.05   246.89   1.05   0.00
.38322E+05
    585.04     19.51     0.00     6.9 0.144E+02   1.07   246.89   1.07   0.00
.46888E+05
    691.43     19.51     0.00     7.1 0.142E+02   1.09   246.89   1.09   0.00
.55453E+05
    797.81     19.51     0.00     7.2 0.139E+02   1.11   246.89   1.11   0.00
.64019E+05
    904.20     19.51     0.00     7.3 0.136E+02   1.14   246.89   1.14   0.00
.72584E+05
   1010.59     19.51     0.00     7.5 0.133E+02   1.16   246.89   1.16   0.00
.81150E+05
```

```
   1116.97      19.51      0.00      7.7 0.131E+02    1.18    246.89    1.18    0.00
.89715E+05
   1223.36      19.51      0.00      7.8 0.128E+02    1.21    246.89    1.21    0.00
.98281E+05
   1329.75      19.51      0.00      8.0 0.125E+02    1.24    246.89    1.24    0.00
.10685E+06
   1436.13      19.51      0.00      8.2 0.122E+02    1.26    246.89    1.26    0.00
.11541E+06
   1542.52      19.51      0.00      8.4 0.120E+02    1.29    246.89    1.29    0.00
.12398E+06
   1648.91      19.51      0.00      8.5 0.117E+02    1.32    246.89    1.32    0.00
.13254E+06
   1755.29      19.51      0.00      8.7 0.114E+02    1.35    246.89    1.35    0.00
.14111E+06
   1861.68      19.51      0.00      9.0 0.112E+02    1.39    246.89    1.39    0.00
.14967E+06
   1968.07      19.51      0.00      9.2 0.109E+02    1.42    246.89    1.42    0.00
.15824E+06
 Plume interacts with SURFACE.
 The passive diffusion plume becomes VERTICALLY FULLY MIXED within this
    prediction interval.
   2074.45      19.51      0.00      9.3 0.108E+02    1.43    246.89    1.43    0.00
.16680E+06
 Effluent is FULLY MIXED over the entire channel cross-section.
 Except for possible far-field decay or reaction processes, there are
      NO FURTHER CHANGES with downstream direction.
   2180.84      19.51      0.00      9.3 0.108E+02    1.43    246.89    1.43    0.00
.17537E+06
   2287.23      19.51      0.00      9.3 0.108E+02    1.43    246.89    1.43    0.00
.18394E+06
   2393.61      19.51      0.00      9.3 0.108E+02    1.43    246.89    1.43    0.00
.19250E+06
   2500.00      19.51      0.00      9.3 0.108E+02    1.43    246.89    1.43    0.00
.20107E+06
 Cumulative travel time =       201066.7500 sec  (   55.85 hrs)
```

Note:
CORMIX is a steady state model and assumes discharge and ambient conditions do not vary
 over time. The predicted plume cumulative travel time exceeds 48 hours at this trajectory
 distance. Keep in mind that ambient and discharge conditions are likely to vary over
 large space and time scales. Predictions at such large space and time scales may be

 inconsistent with CORMIX modeling assumptions.

Please carefully evaluate your simulation results and limit model interpretation to space
 and time scales consistent with steady state assumptions and ambient

schematization.

 Simulation limit based on maximum specified distance =   2500.00 m.
    This is the REGION OF INTEREST limitation.

END OF MOD261: PASSIVE AMBIENT MIXING IN UNIFORM AMBIENT

CORMIX2: Multiport Diffuser Discharges   End of Prediction File
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22222222222

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CORMIX2 PREDICTION FILE:
2222222222222222222222222222222222222222222222222222222222222222222222222222222
22222222222
                     CORMIX MIXING ZONE EXPERT SYSTEM
             Subsystem CORMIX2: Multiport Diffuser Discharges
                        CORMIX Version 12.0GTH
                    HYDRO2 Version 12.0.1.0 August 2021
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CASE DESCRIPTION
 Site name/label:
 Design case:
 FILE NAME:         D:\...Location\ExistingLocation_ExistingFlow_Winter.prd
 Time stamp:        06/13/2025--14:11:43

ENVIRONMENT PARAMETERS (metric units)
 Bounded section
 BS    =    246.89  AS    =    459.79  QA     =      5.27  ICHREG= 1
 HA    =      1.86  HD    =      1.43
 UA    =     0.011  F     =     0.147  USTAR =0.1554E-02
 UW    =     3.576  UWSTAR=0.4081E-02
 Uniform density environment
 STRCND=  U          RHOAM =  999.7019

DIFFUSER DISCHARGE PARAMETERS (metric units)
 Diffuser type:      DITYPE= alternating_perpendicular
 BANK  =  LEFT       DISTB =     19.51  YB1   =      4.88  YB2   =     34.14
 LD    =     29.26  NOPEN =   16        NRISER=   16       SPAC  =      1.95
NPPERR =     1
 D0    =     0.457  A0    =     0.164  H0    =      0.00  SUB0  =      1.43
 D0INP =     0.457  CR0   =     1.000  B0    =0.8416E-01
 Nozzle/port arrangement:   near_vertical_discharge
 GAMMA =     90.00  THETA =     90.00  SIGMA =      0.00  BETA  =     90.00
 U0    =     0.167  Q0    =     0.438  Q0A   =0.4381E+00
 RHO0  =  999.6425  DRHO0 =0.5945E-01  GP0   =0.5832E-03
 C0    =0.1000E+03  CUNITS=  %
 IPOLL =  1         KS    =0.0000E+00  KD    =0.0000E+00

FLUX VARIABLES - PER UNIT DIFFUSER LENGTH (metric units)
 q0    =0.1497E-01        SIGNJ0=      1.0
 m0 =U0^2*B0 =0.2341E-02   j0 =U0*GP0*B0 =0.8186E-05   (based on slot width B0)
 m0 =U0*q0   =0.2497E-02   j0 =q0*GP0    =0.8732E-05   (based on volume flux q0)
 Associated 2-d length scales (meters)
 lQ=B  =      0.090  lM    =      5.75  lm    =     18.99
 lmp   =  99999.00  lbp   =  99999.00  la    =  99999.00

FLUX VARIABLES - ENTIRE DIFFUSER (metric units)
 Q0    =0.4381E+00  M0    =0.6851E-01  J0    =0.2395E-03
```

```
 Associated 3-d length scales (meters)
 LQ   =      0.41  LM   =      8.65  Lm   =     23.57  Lb   =     169.54
                                     Lmp  =  99999.00  Lbp  =  99999.00


 NON-DIMENSIONAL PARAMETERS
  FR0  =     23.80  FRD0 =     10.21  R    =     14.54  PL   =    2.63
  (slot)            (port/nozzle)



 FLOW CLASSIFICATION
  22222222222222222222222222222222222222222222222222
  2  Flow class (CORMIX2)      =    MU8          2
  2  Applicable layer depth HS =     1.43        2
  2  Limiting Dilution S=QA/Q0 + 1=    13.03     2
  22222222222222222222222222222222222222222222222222

 MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
  C0    =0.1000E+03  CUNITS=  %
  NTOX  =  0
  NSTD  =  0
  REGMZ =  0
  XINT  = 100000.00  XMAX  = 100000.00


 X-Y-Z COORDINATE SYSTEM:
     ORIGIN is located at the bottom and the diffuser mid-point:
        19.51 m  from the LEFT  bank/shore.
     X-axis points downstream, Y-axis points to left, Z-axis points upward.
 NSTEP =  20 display intervals per module
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 ----------
 BEGIN MOD201: DIFFUSER DISCHARGE MODULE

  Due to complex near-field motions:  EQUIVALENT SLOT DIFFUSER (2-D) GEOMETRY

  Profile definitions:
    BV = Gaussian 1/e (37%) width, in vertical plane normal to trajectory
    BH = top-hat half-width, in horizontal plane normal to trajectory
    S  = hydrodynamic centerline dilution
    C  = centerline concentration (includes reaction effects, if any)
    Uc = Local centerline excess velocity (above ambient)
    TT = Cumulative travel time

       X         Y         Z         S         C        BV        BH        Uc        TT
     0.00      0.00      0.00      1.0 0.100E+03     0.07     14.63     0.167   .00000E+00

 END OF MOD201: DIFFUSER DISCHARGE MODULE
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BEGIN MOD234: UNSTABLE RECIRCULATION REGION OVER LAYER DEPTH

 INITIAL LOCAL VERTICAL INSTABILITY REGION:
   Bulk dilution (S =   1.48) occurs in a limited region (horizontal extent
   =   10.74 m) surrounding the discharge location.

  Control volume inflow:
       X        Y        Z        S        C        BV        BH        TT
     0.00     0.00     0.00     1.0 0.100E+03     0.07     14.63    .00000E+00

  Control volume outflow:
       X        Y        Z        S        C        BV        BH        TT
    10.74     0.00     0.72     1.5 0.675E+02     1.43     18.21    .60273E+02

END OF MOD234: UNSTABLE RECIRCULATION REGION OVER LAYER DEPTH
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BEGIN MOD234a: UPSTREAM SPREADING AFTER NEAR-FIELD INSTABILITY

 UPSTREAM INTRUSION PROPERTIES:
         Upstream intrusion length                =       16.62 m
         X-position of upstream stagnation point =       -5.87 m
         Thickness in intrusion region            =        0.90 m
         Half-width at downstream end             =       44.46 m
         Thickness at downstream end              =        0.86 m

 In this case, the upstream INTRUSION IS VERY LARGE, exceeding 10 times
   the local water depth.
 This may be caused by a very small ambient velocity, perhaps in
   combination with large discharge buoyancy.
 If the ambient conditions are strongly transient (e.g. tidal), then the
   CORMIX steady-state predictions of upstream intrusion are probably
   unrealistic.
 The plume predictions prior to boundary impingement and wedge formation
   will be acceptable, however.

  Control volume inflow:
       X        Y        Z        S        C        BV        BH        TT
    10.74     0.00     0.72     1.5 0.675E+02     1.43     18.21    .60273E+02

 Profile definitions:
   BV = top-hat thickness, measured vertically
   BH = top-hat half-width, measured horizontally in y-direction
   ZU = upper plume boundary (Z-coordinate)
   ZL = lower plume boundary (Z-coordinate)
   S  = hydrodynamic average (bulk) dilution
```

```
    C  = average (bulk) concentration (includes reaction effects, if any)
    TT = Cumulative travel time

       X        Y        Z        S        C        BV        BH       ZU       ZL
TT
     -5.87     0.00     1.43   9999.9 0.000E+00   0.00      0.00     1.43     1.43
.15092E+04
     -5.09     0.00     1.43      5.5 0.183E+02   0.24      6.29     1.43     1.19
.14414E+04
     -1.29     0.00     1.43      2.3 0.437E+02   0.58     15.27     1.43     0.85
.11095E+04
      2.52     0.00     1.43      1.8 0.569E+02   0.76     20.66     1.43     0.67
.77749E+03
      6.33     0.00     1.43      1.6 0.645E+02   0.86     24.91     1.43     0.57
.44552E+03
     10.13     0.00     1.43      1.5 0.674E+02   0.90     28.54     1.43     0.53
.11354E+03
     13.94     0.00     1.43      1.5 0.657E+02   0.90     40.06     1.43     0.54
.33898E+03
     17.75     0.00     1.43      1.7 0.606E+02   0.89     41.07     1.43     0.55
.67095E+03
     21.55     0.00     1.43      1.8 0.557E+02   0.87     42.00     1.43     0.56
.10029E+04
     25.36     0.00     1.43      1.9 0.525E+02   0.86     42.87     1.43     0.57
.13349E+04
     29.17     0.00     1.43      2.0 0.510E+02   0.86     43.69     1.43     0.57
.16669E+04
     32.97     0.00     1.43      2.0 0.501E+02   0.86     44.46     1.43     0.58
.19989E+04
 Cumulative travel time =        1998.8536 sec  (    0.56 hrs)

END OF MOD234a: UPSTREAM SPREADING AFTER NEAR-FIELD INSTABILITY
------------------------------------------------------------------------------------
----------
** End of NEAR-FIELD REGION (NFR) **

 In this design case, the diffuser is located CLOSE TO BANK/SHORE.
 Some lateral boundary interaction occurs at end of the near-field.
   This may be related to a design case with a VERY LOW AMBIENT VELOCITY.
   The dilution values in one or more of the preceding zones may be too high.
 Carefully evaluate results in near-field and check degree of interaction.

 Consider locating outfall further away from bank or shore.
 In the next prediction module, the plume centerline will be set
   to follow the bank/shore.
------------------------------------------------------------------------------------
----------
BEGIN MOD241: BUOYANT AMBIENT SPREADING

 Plume is ATTACHED to LEFT  bank/shore.
```

Plume width is now determined from LEFT bank/shore.

Profile definitions:
  BV = top-hat thickness, measured vertically
  BH = top-hat half-width, measured horizontally in y-direction
  ZU = upper plume boundary (Z-coordinate)
  ZL = lower plume boundary (Z-coordinate)
  S = hydrodynamic average (bulk) dilution
  C = average (bulk) concentration (includes reaction effects, if any)
  TT = Cumulative travel time

Plume Stage 2 (bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL
32.97	19.51	1.43	2.0	0.501E+02	1.19	63.97	1.43	0.24
.19989E+04								
40.24	19.51	1.43	2.1	0.476E+02	1.13	71.34	1.43	0.31
.25842E+04								
47.51	19.51	1.43	2.2	0.451E+02	1.08	78.32	1.43	0.35
.31695E+04								
54.78	19.51	1.43	2.3	0.427E+02	1.05	84.99	1.43	0.38
.37548E+04								
62.05	19.51	1.43	2.5	0.404E+02	1.03	91.39	1.43	0.40
.43401E+04								
69.32	19.51	1.43	2.6	0.382E+02	1.03	97.56	1.43	0.41
.49255E+04								
76.59	19.51	1.43	2.8	0.361E+02	1.02	103.53	1.43	0.41
.55108E+04								
83.86	19.51	1.43	2.9	0.340E+02	1.03	109.32	1.43	0.40
.60961E+04								
91.13	19.51	1.43	3.1	0.320E+02	1.04	114.96	1.43	0.39
.66814E+04								
98.40	19.51	1.43	3.3	0.301E+02	1.05	120.45	1.43	0.38
.72667E+04								
105.67	19.51	1.43	3.5	0.283E+02	1.07	125.81	1.43	0.36
.78521E+04								
112.94	19.51	1.43	3.8	0.266E+02	1.09	131.06	1.43	0.34
.84374E+04								
120.21	19.51	1.43	4.0	0.250E+02	1.12	136.20	1.43	0.31
.90227E+04								
127.48	19.51	1.43	4.3	0.235E+02	1.15	141.25	1.43	0.28
.96080E+04								
134.75	19.51	1.43	4.5	0.221E+02	1.18	146.20	1.43	0.25
.10193E+05								
142.02	19.51	1.43	4.8	0.208E+02	1.22	151.07	1.43	0.21
.10779E+05								
149.29	19.51	1.43	5.1	0.195E+02	1.26	155.86	1.43	0.18
.11364E+05								
156.56	19.51	1.43	5.5	0.183E+02	1.30	160.58	1.43	0.14
.11949E+05								

```
      163.83      19.51      1.43      5.8 0.173E+02   1.34    165.24     1.43     0.09
.12535E+05
      171.10      19.51      1.43      6.2 0.162E+02   1.38    169.83     1.43     0.05
.13120E+05
      178.37      19.51      1.43      6.5 0.153E+02   1.43    174.35     1.43     0.00
.13705E+05
 Cumulative travel time =          13705.2891 sec  (     3.81 hrs)

END OF MOD241: BUOYANT AMBIENT SPREADING
-----------------------------------------------------------------------------------
----------
 Bottom coordinate for FAR-FIELD is determined by average depth, ZFB = -0.43m
-----------------------------------------------------------------------------------
----------
BEGIN MOD261: PASSIVE AMBIENT MIXING IN UNIFORM AMBIENT

  Vertical diffusivity (initial value)   = 0.119E-02 m^2/s
  Horizontal diffusivity (initial value) = 0.149E-02 m^2/s

 Profile definitions:
   BV = Gaussian s.d.*sqrt(pi/2) (46%) thickness, measured vertically
      = or equal to layer depth, if fully mixed
   BH = Gaussian s.d.*sqrt(pi/2) (46%) half-width,
        measured horizontally in Y-direction
   ZU = upper plume boundary (Z-coordinate)
   ZL = lower plume boundary (Z-coordinate)
   S  = hydrodynamic centerline dilution
   C  = centerline concentration (includes reaction effects, if any)
   TT = Cumulative travel time

 Plume Stage 2 (bank attached):
       X          Y          Z          S        C        BV       BH        ZU       ZL
TT
      178.37      19.51      1.43      6.5 0.153E+02   1.43    174.35     1.43     0.00
.13705E+05
     5169.45      19.51      1.43      8.8 0.114E+02   1.86    179.66     1.43     0.00
.41555E+06
    10160.54      19.51      1.43      9.0 0.111E+02   1.86    184.82     1.43     0.00
.81740E+06
    15151.62      19.51      1.43      9.3 0.108E+02   1.86    189.84     1.43     0.00
.12192E+07
    20142.70      19.51      1.43      9.5 0.105E+02   1.86    194.72     1.43     0.00
.16211E+07
    25133.78      19.51      1.43      9.7 0.103E+02   1.86    199.49     1.43     0.00
.20229E+07
    30124.86      19.51      1.43     10.0 0.100E+02   1.86    204.15     1.43     0.00
.24248E+07
    35115.94      19.51      1.43     10.2 0.983E+01   1.86    208.70     1.43     0.00
.28266E+07
    40107.02      19.51      1.43     10.4 0.962E+01   1.86    213.16     1.43     0.00
```

```
 .32285E+07
   45098.11    19.51    1.43    10.6 0.943E+01   1.86    217.52    1.43    0.00
 .36303E+07
   50089.19    19.51    1.43    10.8 0.925E+01   1.86    221.80    1.43    0.00
 .40322E+07
   55080.27    19.51    1.43    11.0 0.908E+01   1.86    225.99    1.43    0.00
 .44340E+07
   60071.35    19.51    1.43    11.2 0.892E+01   1.86    230.12    1.43    0.00
 .48359E+07
   65062.43    19.51    1.43    11.4 0.876E+01   1.86    234.16    1.43    0.00
 .52377E+07
   70053.52    19.51    1.43    11.6 0.861E+01   1.86    238.14    1.43    0.00
 .56396E+07
   75044.59    19.51    1.43    11.8 0.848E+01   1.86    242.06    1.43    0.00
 .60414E+07
   80035.67    19.51    1.43    12.0 0.834E+01   1.86    245.91    1.43    0.00
 .64432E+07
```

 The passive diffusion plume becomes LATERALLY FULLY MIXED over the channel
     width during the current prediction interval.
 The x-coordinate of bank attachment is   81317.47 m.

```
   85026.75    19.51    1.43    12.2 0.822E+01   1.86    246.89    1.43    0.00
 .68451E+07
```

 Effluent is FULLY MIXED over the entire channel cross-section.
 Except for possible far-field decay or reaction processes, there are
     NO FURTHER CHANGES with downstream direction.

```
   90017.83    19.51    1.43    12.0 0.831E+01   1.86    246.89    1.43    0.00
 .72469E+07
   95008.91    19.51    1.43    12.0 0.831E+01   1.86    246.89    1.43    0.00
 .76488E+07
   99999.98    19.51    1.43    12.0 0.831E+01   1.86    246.89    1.43    0.00
 .80506E+07
```

 Cumulative travel time =   8050626.0000 sec (2236.28 hrs)

Note:
CORMIX is a steady state model and assumes discharge and ambient conditions do not vary
 over time. The predicted plume cumulative travel time exceeds 48 hours at this trajectory
 distance. Keep in mind that ambient and discharge conditions are likely to vary over
 large space and time scales. Predictions at such large space and time scales may be

 inconsistent with CORMIX modeling assumptions.

Please carefully evaluate your simulation results and limit model interpretation to space
 and time scales consistent with steady state assumptions and ambient schematization.

 Simulation limit based on maximum specified distance = 100000.00 m.

This is the REGION OF INTEREST limitation.

END OF MOD261: PASSIVE AMBIENT MIXING IN UNIFORM AMBIENT

CORMIX2: Multiport Diffuser Discharges   End of Prediction File
22222222222222222222222222222222222222222222222222222222222222222222222222222222
22222222222

```
CORMIX2 PREDICTION FILE:
2222222222222222222222222222222222222222222222222222222222222222222222222222222
22222222222
                      CORMIX MIXING ZONE EXPERT SYSTEM
              Subsystem CORMIX2: Multiport Diffuser Discharges
                          CORMIX Version 12.0GTH
                     HYDRO2 Version 12.0.1.0 August 2021
--------------------------------------------------------------------------------
----------
--------------------------------------------------------------------------------
----------
CASE DESCRIPTION
 Site name/label:
 Design case:
 FILE NAME:         D:\...serLocation\ExistingLocation_Tier1Flow_Summer.prd
 Time stamp:        06/13/2025--14:19:56

ENVIRONMENT PARAMETERS (metric units)
 Bounded section
 BS    =    246.89 AS    =    459.79 QA    =      5.27  ICHREG= 1
 HA    =      1.86 HD    =      1.43
 UA    =      0.011 F    =      0.147 USTAR =0.1554E-02
 UW    =      3.576 UWSTAR=0.4081E-02
 Uniform density environment
 STRCND=   U        RHOAM =  997.5748

DIFFUSER DISCHARGE PARAMETERS (metric units)
 Diffuser type:     DITYPE= alternating_perpendicular
 BANK  =   LEFT     DISTB =     19.51  YB1   =      4.88  YB2   =     34.14
 LD    =     29.26 NOPEN =   16        NRISER=   16       SPAC  =      1.95
NPPERR =     1
 D0    =      0.457 A0    =      0.164 H0    =      0.00  SUB0  =      1.43
 D0INP =      0.457 CR0   =      1.000 B0    =0.8416E-01
 Nozzle/port arrangement:   near_vertical_discharge
 GAMMA =     90.00  THETA =     90.00  SIGMA =      0.00  BETA  =     90.00
 U0    =      0.217 Q0    =      0.570 Q0A   =0.5696E+00
 RHO0  =  998.5800  DRHO0 =-.1005E+01  GP0   =-.9882E-02
 C0    =0.1000E+03  CUNITS= %
 IPOLL =  1         KS    =0.0000E+00  KD    =0.0000E+00

FLUX VARIABLES - PER UNIT DIFFUSER LENGTH (metric units)
 q0    =0.1947E-01          SIGNJ0=     -1.0
 m0 =U0^2*B0 =0.3957E-02   j0 =U0*GP0*B0 =-.1803E-03   (based on slot width B0)
 m0 =U0*q0   =0.4221E-02   j0 =q0*GP0     =-.1924E-03   (based on volume flux q0)
 Associated 2-d length scales (meters)
 lQ=B  =      0.090 lM    =      1.24  lm    =     32.10
 lmp   = 99999.00  lbp   = 99999.00  la    = 99999.00

FLUX VARIABLES - ENTIRE DIFFUSER (metric units)
 Q0    =0.5696E+00  M0    =0.1158E+00  J0    =-.5277E-02
```

```
 Associated 3-d length scales (meters)
 LQ   =     0.41  LM   =     2.73  Lm   =     30.65  Lb   =    3732.32
                                   Lmp  =  99999.00  Lbp  =  99999.00


 NON-DIMENSIONAL PARAMETERS
 FR0  =     7.52  FRD0 =     3.23  R    =     18.91  PL   =   140.00
 (slot)           (port/nozzle)



 FLOW CLASSIFICATION
 2222222222222222222222222222222222222222222222222
 2  Flow class (CORMIX2)     =    MNU13        2
 2  Applicable layer depth HS =    1.43        2
 2  Limiting Dilution S=QA/Q0 + 1=   10.26     2
 2222222222222222222222222222222222222222222222222

 MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
 C0    =0.1000E+03  CUNITS=  %
 NTOX  =  0
 NSTD  =  0
 REGMZ =  0
 XINT  =  10000.00  XMAX  =  10000.00

 X-Y-Z COORDINATE SYSTEM:
    ORIGIN is located at the bottom and the diffuser mid-point:
       19.51 m  from the LEFT  bank/shore.
    X-axis points downstream, Y-axis points to left, Z-axis points upward.
 NSTEP =  20 display intervals per module
 -------------------------------------------------------------------------------
 ----------
 -------------------------------------------------------------------------------
 ----------
 BEGIN MOD201: DIFFUSER DISCHARGE MODULE

  Due to complex near-field motions:  EQUIVALENT SLOT DIFFUSER (2-D) GEOMETRY

  Profile definitions:
    BV = Gaussian 1/e (37%) width, in vertical plane normal to trajectory
    BH = top-hat half-width, in horizontal plane normal to trajectory
    S  = hydrodynamic centerline dilution
    C  = centerline concentration (includes reaction effects, if any)
    Uc = Local centerline excess velocity (above ambient)
    TT = Cumulative travel time

        X         Y        Z        S       C       BV       BH       Uc       TT
      0.00      0.00     0.00     1.0 0.100E+03   0.07    14.63    0.217   .00000E+00

 END OF MOD201: DIFFUSER DISCHARGE MODULE
 -------------------------------------------------------------------------------
 ----------
```

```
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----------
BEGIN MOD234: UNSTABLE RECIRCULATION REGION OVER LAYER DEPTH

 INITIAL LOCAL VERTICAL INSTABILITY REGION:
   Bulk dilution (S =   2.31) occurs in a limited region (horizontal extent
   =   8.20 m) surrounding the discharge location.

  Control volume inflow:
      X       Y       Z       S       C       BV      BH       TT
     0.00    0.00    0.00    1.0 0.100E+03  0.07    14.63   .00000E+00

  Control volume outflow:
      X       Y       Z       S       C       BV      BH       TT
     8.20    0.00    0.72    2.3 0.433E+02  1.43    18.21   .35906E+02

END OF MOD234: UNSTABLE RECIRCULATION REGION OVER LAYER DEPTH
--------------------------------------------------------------------------------
----------
--------------------------------------------------------------------------------
----------
BEGIN MOD234a: UPSTREAM SPREADING AFTER NEAR-FIELD INSTABILITY

 UPSTREAM INTRUSION PROPERTIES:
        Upstream intrusion length             =     144.05 m
        X-position of upstream stagnation point =    -135.86 m
        Thickness in intrusion region         =       0.12 m
        Half-width at downstream end          =     201.53 m
        Thickness at downstream end           =       0.55 m

 In this case, the upstream INTRUSION IS VERY LARGE, exceeding 10 times
   the local water depth.
 This may be caused by a very small ambient velocity, perhaps in
   combination with large discharge buoyancy.
 If the ambient conditions are strongly transient (e.g. tidal), then the
   CORMIX steady-state predictions of upstream intrusion are probably
   unrealistic.
 The plume predictions prior to boundary impingement and wedge formation
   will be acceptable, however.

  Control volume inflow:
      X       Y       Z       S       C       BV      BH       TT
     8.20    0.00    0.72    2.3 0.433E+02  1.43    18.21   .35906E+02

 Profile definitions:
   BV = top-hat thickness, measured vertically
   BH = top-hat half-width, measured horizontally in y-direction
   ZU = upper plume boundary (Z-coordinate)
   ZL = lower plume boundary (Z-coordinate)
   S  = hydrodynamic average (bulk) dilution
```

```
   C  = average (bulk) concentration (includes reaction effects, if any)
   TT = Cumulative travel time
```

X	Y	Z	S	C	BV	BH	ZU	ZL
TT								
-135.86	0.00	0.00	9999.9	0.000E+00	0.00	0.00	0.00	0.00
.12598E+05								
-130.96	0.00	0.00	10.0	0.100E+02	0.03	28.50	0.03	0.00
.12171E+05								
-106.97	0.00	0.00	4.1	0.241E+02	0.07	69.23	0.07	0.00
.10079E+05								
-82.98	0.00	0.00	3.1	0.320E+02	0.09	93.66	0.09	0.00
.79865E+04								
-58.98	0.00	0.00	2.7	0.374E+02	0.10	112.93	0.10	0.00
.58943E+04								
-34.99	0.00	0.00	2.4	0.409E+02	0.11	129.36	0.11	0.00
.38021E+04								
-11.00	0.00	0.00	2.3	0.429E+02	0.12	143.92	0.12	0.00
.17099E+04								
12.99	0.00	0.00	2.3	0.430E+02	0.12	191.19	0.12	0.00
.45410E+03								
36.99	0.00	0.00	2.9	0.343E+02	0.24	194.03	0.24	0.00
.25463E+04								
60.98	0.00	0.00	3.8	0.266E+02	0.41	196.68	0.41	0.00
.46385E+04								
84.97	0.00	0.00	4.3	0.234E+02	0.51	199.17	0.51	0.00
.67307E+04								
108.96	0.00	0.00	4.5	0.223E+02	0.55	201.53	0.55	0.00
.88229E+04								

```
 Cumulative travel time =        8822.9062 sec  (    2.45 hrs)

END OF MOD234a: UPSTREAM SPREADING AFTER NEAR-FIELD INSTABILITY
------------------------------------------------------------------------------------
----------
** End of NEAR-FIELD REGION (NFR) **

 In this design case, the diffuser is located CLOSE TO BANK/SHORE.
 Some lateral boundary interaction occurs at end of the near-field.
   This may be related to a design case with a VERY LOW AMBIENT VELOCITY.
   The dilution values in one or more of the preceding zones may be too high.
 Carefully evaluate results in near-field and check degree of interaction.

 Consider locating outfall further away from bank or shore.
 In the next prediction module, the plume centerline will be set
   to follow the bank/shore.
------------------------------------------------------------------------------------
----------
BEGIN MOD241: BUOYANT AMBIENT SPREADING

 Plume is ATTACHED to LEFT  bank/shore.
```

Plume width is now determined from LEFT bank/shore.

 Profile definitions:
   BV = top-hat thickness, measured vertically
   BH = top-hat half-width, measured horizontally in y-direction
   ZU = upper plume boundary (Z-coordinate)
   ZL = lower plume boundary (Z-coordinate)
   S = hydrodynamic average (bulk) dilution
   C = average (bulk) concentration (includes reaction effects, if any)
   TT = Cumulative travel time

 Plume Stage 2 (bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL
TT								
108.96	19.51	0.00	4.5	0.223E+02	1.01	221.04	1.01	0.00
.88229E+04								
112.03	19.51	0.00	4.5	0.222E+02	1.00	222.42	1.00	0.00
.90644E+04								
115.10	19.51	0.00	4.5	0.222E+02	1.00	223.80	1.00	0.00
.93059E+04								
118.17	19.51	0.00	4.5	0.221E+02	1.00	225.17	1.00	0.00
.95474E+04								
121.24	19.51	0.00	4.5	0.220E+02	1.00	226.52	1.00	0.00
.97889E+04								
124.30	19.51	0.00	4.6	0.219E+02	0.99	227.87	0.99	0.00
.10030E+05								
127.37	19.51	0.00	4.6	0.219E+02	0.99	229.21	0.99	0.00
.10272E+05								
130.44	19.51	0.00	4.6	0.218E+02	0.99	230.54	0.99	0.00
.10513E+05								
133.51	19.51	0.00	4.6	0.217E+02	0.99	231.86	0.99	0.00
.10755E+05								
136.58	19.51	0.00	4.6	0.217E+02	0.98	233.17	0.98	0.00
.10996E+05								
139.65	19.51	0.00	4.6	0.216E+02	0.98	234.47	0.98	0.00
.11238E+05								
142.72	19.51	0.00	4.6	0.215E+02	0.98	235.76	0.98	0.00
.11479E+05								
145.78	19.51	0.00	4.7	0.214E+02	0.98	237.05	0.98	0.00
.11721E+05								
148.85	19.51	0.00	4.7	0.214E+02	0.98	238.32	0.98	0.00
.11962E+05								
151.92	19.51	0.00	4.7	0.213E+02	0.97	239.59	0.97	0.00
.12204E+05								
154.99	19.51	0.00	4.7	0.212E+02	0.97	240.85	0.97	0.00
.12445E+05								
158.06	19.51	0.00	4.7	0.212E+02	0.97	242.11	0.97	0.00
.12687E+05								
161.13	19.51	0.00	4.7	0.211E+02	0.97	243.35	0.97	0.00
.12928E+05								

```
     164.20     19.51     0.00     4.8 0.210E+02  0.97   244.59    0.97     0.00
.13170E+05
     167.26     19.51     0.00     4.8 0.209E+02  0.96   245.82    0.96     0.00
.13411E+05
     170.33     19.51     0.00     4.8 0.209E+02  0.96   246.89    0.96     0.00
.13653E+05
 Cumulative travel time =        13652.8330 sec  (    3.79 hrs)
 Plume is LATERALLY FULLY MIXED at the end of the buoyant spreading regime.

END OF MOD241: BUOYANT AMBIENT SPREADING
--------------------------------------------------------------------------------
----------
 Due to the attachment or proximity of the plume to the bottom, the bottom
   coordinate for the FAR-FIELD differs from the ambient depth, ZFB = 0 m.
 In a subsequent analysis set "depth at discharge" equal to "ambient depth".
--------------------------------------------------------------------------------
----------
BEGIN MOD261: PASSIVE AMBIENT MIXING IN UNIFORM AMBIENT

  Vertical diffusivity (initial value)   = 0.119E-02 m^2/s
  Horizontal diffusivity (initial value) = 0.149E-02 m^2/s

 Profile definitions:
   BV = Gaussian s.d.*sqrt(pi/2) (46%) thickness, measured vertically
      = or equal to layer depth, if fully mixed
   BH = Gaussian s.d.*sqrt(pi/2) (46%) half-width,
        measured horizontally in Y-direction
   ZU = upper plume boundary (Z-coordinate)
   ZL = lower plume boundary (Z-coordinate)
   S  = hydrodynamic centerline dilution
   C  = centerline concentration (includes reaction effects, if any)
   TT = Cumulative travel time

 Plume Stage 2 (bank attached):
      X         Y         Z         S      C       BV       BH       ZU       ZL
TT
     170.33     19.51     0.00     4.8 0.209E+02  0.96   246.89    0.96     0.00
.13653E+05
     661.82     19.51     0.00     4.9 0.204E+02  0.99   246.89    0.99     0.00
.52333E+05
    1153.30     19.51     0.00     5.0 0.199E+02  1.01   246.89    1.01     0.00
.91014E+05
    1644.78     19.51     0.00     5.1 0.195E+02  1.03   246.89    1.03     0.00
.12969E+06
    2136.27     19.51     0.00     5.3 0.190E+02  1.06   246.89    1.06     0.00
.16837E+06
    2627.75     19.51     0.00     5.4 0.185E+02  1.08   246.89    1.08     0.00
.20706E+06
    3119.23     19.51     0.00     5.5 0.181E+02  1.11   246.89    1.11     0.00
.24574E+06
```

```
    3610.72      19.51     0.00     5.7 0.176E+02   1.14    246.89    1.14    0.00
.28442E+06
    4102.20      19.51     0.00     5.8 0.171E+02   1.17    246.89    1.17    0.00
.32310E+06
    4593.68      19.51     0.00     6.0 0.167E+02   1.21    246.89    1.21    0.00
.36178E+06
    5085.17      19.51     0.00     6.2 0.162E+02   1.24    246.89    1.24    0.00
.40046E+06
    5576.65      19.51     0.00     6.3 0.158E+02   1.28    246.89    1.28    0.00
.43914E+06
    6068.13      19.51     0.00     6.5 0.153E+02   1.32    246.89    1.32    0.00
.47782E+06
    6559.62      19.51     0.00     6.7 0.148E+02   1.36    246.89    1.36    0.00
.51650E+06
    7051.10      19.51     0.00     7.0 0.144E+02   1.40    246.89    1.40    0.00
.55518E+06
 Plume interacts with SURFACE.
 The passive diffusion plume becomes VERTICALLY FULLY MIXED within this
   prediction interval.
    7542.58      19.51     0.00     7.1 0.140E+02   1.43    246.89    1.43    0.00
.59386E+06
 Effluent is FULLY MIXED over the entire channel cross-section.
 Except for possible far-field decay or reaction processes, there are
     NO FURTHER CHANGES with downstream direction.
    8034.07      19.51     0.00     7.1 0.140E+02   1.43    246.89    1.43    0.00
.63254E+06
    8525.55      19.51     0.00     7.1 0.140E+02   1.43    246.89    1.43    0.00
.67122E+06
    9017.03      19.51     0.00     7.1 0.140E+02   1.43    246.89    1.43    0.00
.70990E+06
    9508.52      19.51     0.00     7.1 0.140E+02   1.43    246.89    1.43    0.00
.74858E+06
   10000.00      19.51     0.00     7.1 0.140E+02   1.43    246.89    1.43    0.00
.78726E+06
 Cumulative travel time =      787261.6875 sec  (  218.68 hrs)
```

Note:
CORMIX is a steady state model and assumes discharge and ambient conditions do not
vary
 over time. The predicted plume cumulative travel time exceeds 48 hours at this
trajectory
 distance. Keep in mind that ambient and discharge conditions are likely to vary
over
 large space and time scales. Predictions at such large space and time scales may be

 inconsistent with CORMIX modeling assumptions.

Please carefully evaluate your simulation results and limit model interpretation to
space
 and time scales consistent with steady state assumptions and ambient

schematization.

 Simulation limit based on maximum specified distance = 10000.00 m.
   This is the REGION OF INTEREST limitation.

END OF MOD261: PASSIVE AMBIENT MIXING IN UNIFORM AMBIENT

CORMIX2: Multiport Diffuser Discharges   End of Prediction File
2222222222222222222222222222222222222222222222222222222222222222222222222222222
22222222222

```
CORMIX2 PREDICTION FILE:
2222222222222222222222222222222222222222222222222222222222222222222222222222222
22222222222
                      CORMIX MIXING ZONE EXPERT SYSTEM
            Subsystem CORMIX2: Multiport Diffuser Discharges
                       CORMIX Version 12.0GTH
                    HYDRO2 Version 12.0.1.0 August 2021
--------------------------------------------------------------------------------
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CASE DESCRIPTION
 Site name/label:
 Design case:
 FILE NAME:          D:\...serLocation\ExistingLocation_Tier1Flow_Winter.prd
 Time stamp:         06/12/2025--14:43:16

ENVIRONMENT PARAMETERS (metric units)
 Bounded section
 BS    =    246.89 AS    =    459.79 QA    =      5.27  ICHREG= 1
 HA    =      1.86 HD    =      1.43
 UA    =     0.011 F     =     0.147 USTAR =0.1554E-02
 UW    =     3.576 UWSTAR=0.4081E-02
 Uniform density environment
 STRCND= U          RHOAM =  999.7019

DIFFUSER DISCHARGE PARAMETERS (metric units)
 Diffuser type:     DITYPE= alternating_perpendicular
 BANK  = LEFT      DISTB =     19.51 YB1   =      4.88 YB2   =      34.14
 LD    =     29.26 NOPEN =  16       NRISER=  16       SPAC  =       1.95
NPPERR =     1
 D0    =     0.457 A0    =     0.164 H0    =      0.00 SUB0  =       1.43
 D0INP =     0.457 CR0   =     1.000 B0    =0.8416E-01
 Nozzle/port arrangement:   near_vertical_discharge
 GAMMA =     90.00 THETA =     90.00 SIGMA =      0.00 BETA  =      90.00
 U0    =     0.217 Q0    =     0.570 Q0A   =0.5696E+00
 RHO0  = 999.2432  DRHO0 =0.4587E+00 GP0   =0.4499E-02
 C0    =0.1000E+03 CUNITS= %
 IPOLL = 1         KS    =0.0000E+00 KD    =0.0000E+00

FLUX VARIABLES - PER UNIT DIFFUSER LENGTH (metric units)
 q0    =0.1947E-01       SIGNJ0=      1.0
 m0 =U0^2*B0 =0.3957E-02  j0 =U0*GP0*B0 =0.8211E-04   (based on slot width B0)
 m0 =U0*q0   =0.4221E-02  j0 =q0*GP0    =0.8758E-04   (based on volume flux q0)
 Associated 2-d length scales (meters)
 lQ=B  =     0.090 lM    =      2.09 lm    =      32.10
 lmp   = 99999.00  lbp   = 99999.00  la    =  99999.00

FLUX VARIABLES - ENTIRE DIFFUSER (metric units)
 Q0    =0.5696E+00  M0    =0.1158E+00 J0    =0.2403E-02
```

```
 Associated 3-d length scales (meters)
 LQ   =      0.41  LM   =      4.05  Lm   =      30.65  Lb   =    1699.51
                                     Lmp  =  99999.00  Lbp  =  99999.00


 NON-DIMENSIONAL PARAMETERS
 FR0   =     11.14  FRD0 =      4.78  R    =      18.91  PL   =     4.36
 (slot)             (port/nozzle)



 FLOW CLASSIFICATION
 222222222222222222222222222222222222222222222222
 2  Flow class (CORMIX2)     =    MU8          2
 2  Applicable layer depth HS =      1.43      2
 2  Limiting Dilution S=QA/Q0 + 1=    10.26    2
 222222222222222222222222222222222222222222222222

 MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
 C0    =0.1000E+03  CUNITS=  %
 NTOX  =  0
 NSTD  =  0
 REGMZ =  0
 XINT  =   2500.00  XMAX  =   2500.00

 X-Y-Z COORDINATE SYSTEM:
     ORIGIN is located at the bottom and the diffuser mid-point:
        19.51 m  from the LEFT  bank/shore.
     X-axis points downstream, Y-axis points to left, Z-axis points upward.
 NSTEP =  20 display intervals per module
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BEGIN MOD201: DIFFUSER DISCHARGE MODULE

 Due to complex near-field motions:  EQUIVALENT SLOT DIFFUSER (2-D) GEOMETRY

 Profile definitions:
   BV = Gaussian 1/e (37%) width, in vertical plane normal to trajectory
   BH = top-hat half-width, in horizontal plane normal to trajectory
   S  = hydrodynamic centerline dilution
   C  = centerline concentration (includes reaction effects, if any)
   Uc = Local centerline excess velocity (above ambient)
   TT = Cumulative travel time

      X        Y        Z        S        C       BV       BH       Uc       TT
     0.00     0.00     0.00     1.0 0.100E+03   0.07    14.63     0.217  .00000E+00

END OF MOD201: DIFFUSER DISCHARGE MODULE
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BEGIN MOD234: UNSTABLE RECIRCULATION REGION OVER LAYER DEPTH

 INITIAL LOCAL VERTICAL INSTABILITY REGION:
   Bulk dilution (S =   1.86) occurs in a limited region (horizontal extent
   =   10.74 m) surrounding the discharge location.

  Control volume inflow:
      X       Y       Z       S       C       BV      BH       TT
     0.00    0.00    0.00    1.0 0.100E+03   0.07    14.63   .00000E+00

  Control volume outflow:
      X       Y       Z       S       C       BV      BH       TT
    10.74    0.00    0.72    1.9 0.539E+02   1.43    18.21   .47062E+02

END OF MOD234: UNSTABLE RECIRCULATION REGION OVER LAYER DEPTH
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BEGIN MOD234a: UPSTREAM SPREADING AFTER NEAR-FIELD INSTABILITY

 UPSTREAM INTRUSION PROPERTIES:
        Upstream intrusion length            =      134.30 m
        X-position of upstream stagnation point =    -123.55 m
        Thickness in intrusion region        =        0.42 m
        Half-width at downstream end         =      294.76 m
        Thickness at downstream end          =        0.60 m

 In this case, the upstream INTRUSION IS VERY LARGE, exceeding 10 times
   the local water depth.
 This may be caused by a very small ambient velocity, perhaps in
   combination with large discharge buoyancy.
 If the ambient conditions are strongly transient (e.g. tidal), then the
   CORMIX steady-state predictions of upstream intrusion are probably
   unrealistic.
 The plume predictions prior to boundary impingement and wedge formation
   will be acceptable, however.

  Control volume inflow:
      X       Y       Z       S       C       BV      BH       TT
    10.74    0.00    0.72    1.9 0.539E+02   1.43    18.21   .47062E+02

 Profile definitions:
   BV = top-hat thickness, measured vertically
   BH = top-hat half-width, measured horizontally in y-direction
   ZU = upper plume boundary (Z-coordinate)
   ZL = lower plume boundary (Z-coordinate)
   S  = hydrodynamic average (bulk) dilution
```

```
   C  = average (bulk) concentration (includes reaction effects, if any)
   TT = Cumulative travel time


      X        Y        Z        S        C        BV        BH        ZU        ZL
TT
   -123.55    0.00    1.43  9999.9  0.000E+00    0.00      0.00     1.43     1.43
.11758E+05
   -117.92    0.00    1.43     7.2  0.138E+02    0.11     41.69     1.43     1.33
.11267E+05
    -90.32    0.00    1.43     3.0  0.332E+02    0.26    101.25     1.43     1.17
.88598E+04
    -62.71    0.00    1.43     2.3  0.436E+02    0.34    136.99     1.43     1.09
.64526E+04
    -35.11    0.00    1.43     2.0  0.500E+02    0.39    165.17     1.43     1.04
.40454E+04
     -7.50    0.00    1.43     1.9  0.533E+02    0.41    189.20     1.43     1.02
.16382E+04
     20.10    0.00    1.43     1.9  0.515E+02    0.42    268.68     1.43     1.01
.86309E+03
     47.71    0.00    1.43     3.0  0.329E+02    0.46    274.67     1.43     0.97
.32703E+04
     75.31    0.00    1.43     4.7  0.213E+02    0.52    280.18     1.43     0.91
.56775E+04
    102.92    0.00    1.43     6.1  0.165E+02    0.56    285.33     1.43     0.87
.80846E+04
    130.52    0.00    1.43     6.8  0.147E+02    0.59    290.17     1.43     0.84
.10492E+05
    158.12    0.00    1.43     7.2  0.140E+02    0.60    294.76     1.43     0.83
.12899E+05
 Cumulative travel time =       12899.0205 sec  (    3.58 hrs)

END OF MOD234a: UPSTREAM SPREADING AFTER NEAR-FIELD INSTABILITY
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** End of NEAR-FIELD REGION (NFR) **
 Some BOUNDARY INTERACTION with both banks occurs at end of near-field.
   The dilution values in one or more of the preceding zones may be too high.
 Carefully evaluate results in near-field and check degree of interaction.
 Bottom coordinate for FAR-FIELD is determined by average depth, ZFB = -0.43m
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BEGIN MOD281: MIXED PLUME/BOUNDED CHANNEL/POSSIBLE UPSTREAM WEDGE INTRUSION

 An UPSTREAM INTRUDING WEDGE is formed along the surface/pycnocline.

 UPSTREAM WEDGE INTRUSION PROPERTIES in bounded channel (laterally uniform):
        Wedge length                      =      17.05 m
        X-Position of wedge tip           =     141.07 m
        Thickness at discharge (end of NFR)  =       0.68 m
          (Wedge thickness gradually decreases to zero at wedge tip.)
```

In this case, the upstream INTRUSION IS VERY LARGE, exceeding 10 times
  the local water depth.
This may be caused by a very small ambient velocity, perhaps in combination
  with large discharge buoyancy.
If the ambient conditions are strongly transient (e.g. tidal), then the
  CORMIX steady-state predictions of upstream intrusion are probably
  unrealistic.
The plume predictions prior to boundary impingement and wedge formation
 will be acceptable, however.

X	Y	Z	S	C	BV	BH	ZU	ZL
TT								
158.12	19.51	1.43	7.2	0.140E+02	1.43	246.89	1.43	0.00
.12899E+05								

 Cumulative travel time =   12899.0205 sec (3.58 hrs)

 VERTICALLY AND LATERALLY FULLY MIXED over layer depth: END OF SIMULATION!

END OF MOD281: MIXED PLUME/BOUNDED CHANNEL/POSSIBLE UPSTREAM WEDGE INTRUSION

CORMIX2: Multiport Diffuser Discharges   End of Prediction File
2222222222222222222222222222222222222222222222222222222222222222222222222222222222
22222222222

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CORMIX2 PREDICTION FILE:
2222222222222222222222222222222222222222222222222222222222222222222222222222222
22222222222
                    CORMIX MIXING ZONE EXPERT SYSTEM
            Subsystem CORMIX2: Multiport Diffuser Discharges
                       CORMIX Version 12.0GTH
                    HYDRO2 Version 12.0.1.0 August 2021
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CASE DESCRIPTION
 Site name/label:
 Design case:
 FILE NAME:         D:\...Boomi_DiffuserLocation\Location3_Tier2_Summer.prd
 Time stamp:        06/11/2025--12:51:32

ENVIRONMENT PARAMETERS (metric units)
 Bounded section
 BS    =      92.54 AS    =     455.52 QA    =       5.27  ICHREG= 1
 HA    =       4.92 HD    =       4.92
 UA    =       0.012 F    =       0.106 USTAR =0.1334E-02
 UW    =       3.353 UWSTAR=0.3806E-02
 Uniform density environment
 STRCND=  U          RHOAM =  997.5748

DIFFUSER DISCHARGE PARAMETERS (metric units)
 Diffuser type:     DITYPE= alternating_perpendicular
 BANK  =  LEFT       DISTB =      46.18 YB1   =      35.05 YB2   =      57.30
 LD    =      22.25 NOPEN =   10        NRISER=   10       SPAC  =       2.47
 NPPERR =    1
 D0    =       0.457 A0    =       0.164 H0    =       0.46 SUB0  =       4.47
 D0INP =       0.457 CR0   =       1.000 B0    =0.6641E-01
 Nozzle/port arrangement:   near_vertical_discharge
 GAMMA =      90.00 THETA =      90.00 SIGMA =       0.00 BETA  =      90.00
 U0    =       0.587 Q0    =       0.964 Q0A   =0.9639E+00
 RHO0  =  998.5800 DRHO0 =-.1005E+01 GP0   =-.9882E-02
 C0    =0.1000E+03  CUNITS=  %
 IPOLL =  1          KS    =0.0000E+00 KD    =0.0000E+00

FLUX VARIABLES - PER UNIT DIFFUSER LENGTH (metric units)
 q0    =0.4332E-01        SIGNJ0=      -1.0
 m0 =U0^2*B0 =0.2289E-01   j0 =U0*GP0*B0 =-.3853E-03   (based on slot width B0)
 m0 =U0*q0   =0.2543E-01   j0 =q0*GP0    =-.4281E-03   (based on volume flux q0)
 Associated 2-d length scales (meters)
 lQ=B  =       0.074 lM    =       4.32 lm    =     189.84
 lmp   =  99999.00 lbp   =  99999.00 la    =  99999.00

FLUX VARIABLES - ENTIRE DIFFUSER (metric units)
 Q0    =0.9639E+00  M0    =0.5093E+00  J0    =-.8573E-02
```

```
 Associated 3-d length scales (meters)
 LQ   =      0.41  LM    =      6.51  Lm   =      64.99  Lb   =    6142.07
                                      Lmp  =   99999.00  Lbp  =   99999.00


 NON-DIMENSIONAL PARAMETERS
  FR0  =     22.92  FRD0  =      8.73  R    =      50.72  PL   =    140.00
  (slot)             (port/nozzle)



 FLOW CLASSIFICATION
  2222222222222222222222222222222222222222222222222
  2  Flow class (CORMIX2)      =     MNU13        2
  2  Applicable layer depth HS =      4.92        2
  2  Limiting Dilution S=QA/Q0 + 1=      6.47     2
  2222222222222222222222222222222222222222222222222

 MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
  C0    =0.1000E+03  CUNITS=  %
  NTOX  =  0
  NSTD  =  0
  REGMZ =  0
  XINT  =   1000.00  XMAX  =   1000.00

 X-Y-Z COORDINATE SYSTEM:
     ORIGIN is located at the bottom and the diffuser mid-point:
        46.18 m  from the LEFT  bank/shore.
     X-axis points downstream, Y-axis points to left, Z-axis points upward.
 NSTEP =  20 display intervals per module
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 ----------
 BEGIN MOD201: DIFFUSER DISCHARGE MODULE

  Due to complex near-field motions:  EQUIVALENT SLOT DIFFUSER (2-D) GEOMETRY

  Profile definitions:
    BV = Gaussian 1/e (37%) width, in vertical plane normal to trajectory
    BH = top-hat half-width, in horizontal plane normal to trajectory
    S  = hydrodynamic centerline dilution
    C  = centerline concentration (includes reaction effects, if any)
    Uc = Local centerline excess velocity (above ambient)
    TT = Cumulative travel time

        X         Y         Z         S         C        BV        BH        Uc        TT
      0.00      0.00      0.46       1.0 0.100E+03      0.05     11.13      0.587    .00000E+00

 END OF MOD201: DIFFUSER DISCHARGE MODULE
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BEGIN MOD234: UNSTABLE RECIRCULATION REGION OVER LAYER DEPTH

 INITIAL LOCAL VERTICAL INSTABILITY REGION:
   Bulk dilution (S =   4.56) occurs in a limited region (horizontal extent
   =   19.54 m) surrounding the discharge location.

  Control volume inflow:
       X       Y       Z       S       C       BV      BH       TT
      0.00    0.00    0.46    1.0 0.100E+03  0.05    11.13   .00000E+00

  Control volume outflow:
       X       Y       Z       S       C       BV      BH       TT
     19.54    0.00    2.46    4.6 0.220E+02  4.92    23.43   .32629E+02

END OF MOD234: UNSTABLE RECIRCULATION REGION OVER LAYER DEPTH
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--------------------------------------------------------------------------------
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BEGIN MOD234a: UPSTREAM SPREADING AFTER NEAR-FIELD INSTABILITY

 UPSTREAM INTRUSION PROPERTIES:
         Upstream intrusion length             =      229.87 m
         X-position of upstream stagnation point =    -210.33 m
         Thickness in intrusion region         =        0.26 m
         Half-width at downstream end          =      364.21 m
         Thickness at downstream end           =        1.08 m

 In this case, the upstream INTRUSION IS VERY LARGE, exceeding 10 times
   the local water depth.
 This may be caused by a very small ambient velocity, perhaps in
   combination with large discharge buoyancy.
 If the ambient conditions are strongly transient (e.g. tidal), then the
   CORMIX steady-state predictions of upstream intrusion are probably
   unrealistic.
 The plume predictions prior to boundary impingement and wedge formation
   will be acceptable, however.

  Control volume inflow:
       X       Y       Z       S       C       BV      BH       TT
     19.54    0.00    2.46    4.6 0.220E+02  4.92    23.43   .32629E+02

 Profile definitions:
   BV = top-hat thickness, measured vertically
   BH = top-hat half-width, measured horizontally in y-direction
   ZU = upper plume boundary (Z-coordinate)
   ZL = lower plume boundary (Z-coordinate)
   S  = hydrodynamic average (bulk) dilution
```

```
   C  = average (bulk) concentration (includes reaction effects, if any)
   TT = Cumulative travel time

       X       Y       Z       S       C       BV      BH      ZU      ZL
TT
    -210.33   0.00    0.00  9999.9 0.000E+00  0.00    0.00    0.00    0.00
.19892E+05
    -202.09   0.00    0.00    19.2 0.521E+01  0.06    51.51   0.06    0.00
.19180E+05
    -161.72   0.00    0.00     8.0 0.125E+02  0.15   125.11   0.15    0.00
.15692E+05
    -121.35   0.00    0.00     6.0 0.166E+02  0.19   169.27   0.19    0.00
.12204E+05
     -80.97   0.00    0.00     5.2 0.193E+02  0.23   204.09   0.23    0.00
.87159E+04
     -40.60   0.00    0.00     4.8 0.210E+02  0.25   233.77   0.25    0.00
.52280E+04
      -0.23   0.00    0.00     4.6 0.219E+02  0.26   260.09   0.26    0.00
.17400E+04
      40.15   0.00    0.00     4.8 0.208E+02  0.30   343.91   0.30    0.00
.18132E+04
      80.52   0.00    0.00     6.3 0.158E+02  0.55   349.48   0.55    0.00
.53012E+04
     120.89   0.00    0.00     8.0 0.124E+02  0.84   354.68   0.84    0.00
.87891E+04
     161.26   0.00    0.00     9.0 0.111E+02  1.01   359.57   1.01    0.00
.12277E+05
     201.64   0.00    0.00     9.5 0.106E+02  1.08   364.21   1.08    0.00
.15765E+05
 Cumulative travel time =        15765.0625 sec  (    4.38 hrs)

END OF MOD234a: UPSTREAM SPREADING AFTER NEAR-FIELD INSTABILITY
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** End of NEAR-FIELD REGION (NFR) **

 The LIMITING DILUTION (given by ambient flow/discharge ratio) is:     6.5
   This value is LESS than the predicted dilution of     9.5 at the end
   of the NFR.
   Mixing for this discharge configuration is constrained by the ambient flow.

 The previous module predictions MAYBE UNRELIABLE since the limiting dilution
   cannot be exceeded for this unstable shallow discharge configuration.
 CAREFULLY evalute the degree of near-field lateral boundary interaction.

 A subsequent module (MOD281) will predict the properties of the
   cross-sectionally fully mixed plume with limiting dilution and will
   compute a POSSIBLE UPSTREAM WEDGE INTRUSION.
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BEGIN MOD281: MIXED PLUME/BOUNDED CHANNEL/POSSIBLE UPSTREAM WEDGE INTRUSION

 The DOWNSTREAM flow field for this unstable shallow water discharge is
     VERTICALLY FULLY MIXED.
 The mixing is controlled by the limiting dilution =   6.5

 Channel DENSIMETRIC FROUDE NUMBER (FCHAN) for this mixed flow =   0.13

 An UPSTREAM INTRUDING BOTTOM WEDGE is formed.

 UPSTREAM WEDGE INTRUSION PROPERTIES in bounded channel (laterally uniform):
         Wedge length   =   1838.14 m
         X-Position of wedge tip   =   -1636.50 m
         Thickness at discharge (end of NFR)   =   3.64 m
          (Wedge thickness gradually decreases to zero at wedge tip.)

 In this case, the upstream INTRUSION IS VERY LARGE, exceeding 10 times
   the local water depth.
 This may be caused by a very small ambient velocity, perhaps in combination
   with large discharge buoyancy.
 If the ambient conditions are strongly transient (e.g. tidal), then the
   CORMIX steady-state predictions of upstream intrusion are probably
   unrealistic.
 The plume predictions prior to boundary impingement and wedge formation
  will be acceptable, however.

        X   Y   Z   S   C   BV   BH   ZU   ZL
TT
    201.64   46.18   0.00   6.5 0.155E+02   4.92   92.54   4.92   0.00
.15765E+05
 Cumulative travel time =   15765.0635 sec (4.38 hrs)

 VERTICALLY AND LATERALLY FULLY MIXED over layer depth: END OF SIMULATION!

END OF MOD281: MIXED PLUME/BOUNDED CHANNEL/POSSIBLE UPSTREAM WEDGE INTRUSION

CORMIX2: Multiport Diffuser Discharges   End of Prediction File
2222222222222222222222222222222222222222222222222222222222222222222222222222222
22222222222

CORMIX2 PREDICTION FILE:
22222222222222222222222222222222222222222222222222222222222222222222222222222222
22222222222
                        CORMIX MIXING ZONE EXPERT SYSTEM
                Subsystem CORMIX2: Multiport Diffuser Discharges
                          CORMIX Version 12.0GTH
                      HYDRO2 Version 12.0.1.0 August 2021

CASE DESCRIPTION
 Site name/label:
 Design case:
 FILE NAME: D:\...Boomi_DiffuserLocation\Location3_Tier2_Winter.prd
 Time stamp: 06/11/2025--12:58:12

ENVIRONMENT PARAMETERS (metric units)
 Bounded section
 BS   =   92.54 AS   =   455.52 QA   =   5.27 ICHREG= 1
 HA   =   4.92 HD   =   4.92
 UA   =   0.012 F   =   0.106 USTAR =0.1334E-02
 UW   =   4.247 UWSTAR=0.4920E-02
 Uniform density environment
 STRCND= U   RHOAM = 999.7019

DIFFUSER DISCHARGE PARAMETERS (metric units)
 Diffuser type: DITYPE= alternating_perpendicular
 BANK = LEFT   DISTB =   46.18 YB1   =   35.05 YB2   =   57.30
 LD   =   22.25 NOPEN =   10   NRISER=   10   SPAC =   2.47
 NPPERR =   1
 D0   =   0.457 A0   =   0.164 H0   =   0.46 SUB0 =   4.47
 D0INP =   0.457 CR0   =   1.000 B0   =0.6641E-01
 Nozzle/port arrangement: near_vertical_discharge
 GAMMA =   90.00 THETA =   90.00 SIGMA =   0.00 BETA =   90.00
 U0   =   0.587 Q0   =   0.964 Q0A   =0.9639E+00
 RHO0 = 999.2432 DRHO0 =0.4587E+00 GP0   =0.4499E-02
 C0   =0.1000E+03 CUNITS= %
 IPOLL = 1   KS   =0.0000E+00 KD   =0.0000E+00

FLUX VARIABLES - PER UNIT DIFFUSER LENGTH (metric units)
 q0   =0.4332E-01   SIGNJ0=   1.0
 m0 =U0^2*B0 =0.2289E-01   j0 =U0*GP0*B0 =0.1754E-03   (based on slot width B0)
 m0 =U0*q0   =0.2543E-01   j0 =q0*GP0   =0.1949E-03   (based on volume flux q0)
 Associated 2-d length scales (meters)
 lQ=B =   0.074 lM   =   7.29 lm   =   189.84
 lmp   = 99999.00 lbp   = 99999.00 la   = 99999.00

FLUX VARIABLES - ENTIRE DIFFUSER (metric units)
 Q0   =0.9639E+00 M0   =0.5093E+00 J0   =0.3903E-02

```
 Associated 3-d length scales (meters)
 LQ    =      0.41  LM     =      9.65  Lm    =     64.99  Lb    =    2796.79
                                       Lmp   =  99999.00  Lbp   =  99999.00


 NON-DIMENSIONAL PARAMETERS
 FR0   =      33.97  FRD0  =     12.94  R     =     50.72  PL    =     3.79
 (slot)             (port/nozzle)



 FLOW CLASSIFICATION
 2222222222222222222222222222222222222222222222222
 2  Flow class (CORMIX2)     =    MU8          2
 2  Applicable layer depth HS =     4.92       2
 2  Limiting Dilution S=QA/Q0 + 1=    6.47     2
 2222222222222222222222222222222222222222222222222

 MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
 C0    =0.1000E+03  CUNITS=  %
 NTOX  =  0
 NSTD  =  0
 REGMZ =  0
 XINT  =   1000.00  XMAX  =   1000.00


 X-Y-Z COORDINATE SYSTEM:
     ORIGIN is located at the bottom and the diffuser mid-point:
         46.18 m  from the LEFT  bank/shore.
     X-axis points downstream, Y-axis points to left, Z-axis points upward.
 NSTEP =  20 display intervals per module
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 BEGIN MOD201: DIFFUSER DISCHARGE MODULE

  Due to complex near-field motions:  EQUIVALENT SLOT DIFFUSER (2-D) GEOMETRY

  Profile definitions:
    BV = Gaussian 1/e (37%) width, in vertical plane normal to trajectory
    BH = top-hat half-width, in horizontal plane normal to trajectory
    S  = hydrodynamic centerline dilution
    C  = centerline concentration (includes reaction effects, if any)
    Uc = Local centerline excess velocity (above ambient)
    TT = Cumulative travel time

       X        Y        Z        S        C       BV       BH       Uc       TT
      0.00     0.00     0.46     1.0 0.100E+03   0.05    11.13    0.587  .00000E+00

 END OF MOD201: DIFFUSER DISCHARGE MODULE
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BEGIN MOD234: UNSTABLE RECIRCULATION REGION OVER LAYER DEPTH

 INITIAL LOCAL VERTICAL INSTABILITY REGION:
   Bulk dilution (S =   3.60) occurs in a limited region (horizontal extent
   =   28.95 m) surrounding the discharge location.

   Control volume inflow:
       X        Y        Z        S        C        BV        BH        TT
      0.00     0.00     0.46     1.0 0.100E+03   0.05     11.13    .00000E+00

   Control volume outflow:
       X        Y        Z        S        C        BV        BH        TT
     28.95     0.00     2.46     3.6 0.277E+02   4.92     23.43    .48354E+02

END OF MOD234: UNSTABLE RECIRCULATION REGION OVER LAYER DEPTH
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BEGIN MOD234a: UPSTREAM SPREADING AFTER NEAR-FIELD INSTABILITY

 UPSTREAM INTRUSION PROPERTIES:
        Upstream intrusion length              =      232.97 m
        X-position of upstream stagnation point =     -204.02 m
        Thickness in intrusion region          =        1.12 m
        Half-width at downstream end           =      504.70 m
        Thickness at downstream end            =        1.55 m

 In this case, the upstream INTRUSION IS VERY LARGE, exceeding 10 times
   the local water depth.
 This may be caused by a very small ambient velocity, perhaps in
   combination with large discharge buoyancy.
 If the ambient conditions are strongly transient (e.g. tidal), then the
   CORMIX steady-state predictions of upstream intrusion are probably
   unrealistic.
 The plume predictions prior to boundary impingement and wedge formation
   will be acceptable, however.

   Control volume inflow:
       X        Y        Z        S        C        BV        BH        TT
     28.95     0.00     2.46     3.6 0.277E+02   4.92     23.43    .48354E+02

 Profile definitions:
   BV = top-hat thickness, measured vertically
   BH = top-hat half-width, measured horizontally in y-direction
   ZU = upper plume boundary (Z-coordinate)
   ZL = lower plume boundary (Z-coordinate)
   S  = hydrodynamic average (bulk) dilution
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```
   C  = average (bulk) concentration (includes reaction effects, if any)
   TT = Cumulative travel time

       X        Y       Z       S       C      BV       BH      ZU      ZL
TT
    -204.02     0.00    4.92  9999.9 0.000E+00  0.00     0.00    4.92    4.92
.20176E+05
    -194.32     0.00    4.92    14.1 0.709E+01  0.29    71.38    4.92    4.64
.19337E+05
    -146.76     0.00    4.92     5.9 0.170E+02  0.69   173.37    4.92    4.23
.15228E+05
     -99.19     0.00    4.92     4.5 0.224E+02  0.90   234.56    4.92    4.02
.11119E+05
     -51.63     0.00    4.92     3.9 0.257E+02  1.04   282.81    4.92    3.89
.70101E+04
      -4.07     0.00    4.92     3.6 0.274E+02  1.11   323.95    4.92    3.82
.29011E+04
      43.49     0.00    4.92     3.8 0.263E+02  1.13   460.39    4.92    3.80
.13047E+04
      91.05     0.00    4.92     6.9 0.145E+02  1.21   470.56    4.92    3.71
.54137E+04
     138.61     0.00    4.92    11.7 0.857E+01  1.35   479.93    4.92    3.57
.95227E+04
     186.18     0.00    4.92    15.6 0.641E+01  1.46   488.68    4.92    3.46
.13632E+05
     233.74     0.00    4.92    17.7 0.564E+01  1.52   496.91    4.92    3.40
.17741E+05
     281.30     0.00    4.92    18.8 0.531E+01  1.55   504.70    4.92    3.37
.21850E+05
 Cumulative travel time =        21849.6621 sec  (    6.07 hrs)

END OF MOD234a: UPSTREAM SPREADING AFTER NEAR-FIELD INSTABILITY
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** End of NEAR-FIELD REGION (NFR) **

 The LIMITING DILUTION (given by ambient flow/discharge ratio) is:     6.5
   This value is LESS than the predicted dilution of    18.8 at the end
   of the NFR.
   Mixing for this discharge configuration is constrained by the ambient flow.

 The previous module predictions MAYBE UNRELIABLE since the limiting dilution
   cannot be exceeded for this unstable shallow discharge configuration.
 CAREFULLY evalute the degree of near-field lateral boundary interaction.

 A subsequent module (MOD281) will predict the properties of the
   cross-sectionally fully mixed plume with limiting dilution and will
   compute a POSSIBLE UPSTREAM WEDGE INTRUSION.
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BEGIN MOD281: MIXED PLUME/BOUNDED CHANNEL/POSSIBLE UPSTREAM WEDGE INTRUSION

 The DOWNSTREAM flow field for this unstable shallow water discharge is
     VERTICALLY FULLY MIXED.
 The mixing is controlled by the limiting dilution =   6.5

 Channel DENSIMETRIC FROUDE NUMBER (FCHAN) for this mixed flow =   0.20

 An UPSTREAM INTRUDING WEDGE is formed along the surface/pycnocline.

 UPSTREAM WEDGE INTRUSION PROPERTIES in bounded channel (laterally uniform):
          Wedge length   =   486.35 m
          X-Position of wedge tip   =   -205.05 m
          Thickness at discharge (end of NFR)   =   3.25 m
           (Wedge thickness gradually decreases to zero at wedge tip.)

 In this case, the upstream INTRUSION IS VERY LARGE, exceeding 10 times
   the local water depth.
 This may be caused by a very small ambient velocity, perhaps in combination
   with large discharge buoyancy.
 If the ambient conditions are strongly transient (e.g. tidal), then the
   CORMIX steady-state predictions of upstream intrusion are probably
   unrealistic.
 The plume predictions prior to boundary impingement and wedge formation
  will be acceptable, however.

        X   Y   Z   S   C   BV   BH   ZU   ZL
TT
     281.30   46.18   4.92   6.5 0.155E+02   4.92   92.54   4.92   0.00
.21850E+05
 Cumulative travel time =   21849.6621 sec (6.07 hrs)

  VERTICALLY AND LATERALLY FULLY MIXED over layer depth: END OF SIMULATION!

END OF MOD281: MIXED PLUME/BOUNDED CHANNEL/POSSIBLE UPSTREAM WEDGE INTRUSION

CORMIX2: Multiport Diffuser Discharges   End of Prediction File
222222222222222222222222222222222222222222222222222222222222222222222222222222
22222222222

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CORMIX2 PREDICTION FILE:
2222222222222222222222222222222222222222222222222222222222222222222222222222222
22222222222
                        CORMIX MIXING ZONE EXPERT SYSTEM
                Subsystem CORMIX2: Multiport Diffuser Discharges
                          CORMIX Version 12.0GTH
                     HYDRO2 Version 12.0.1.0 August 2021
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CASE DESCRIPTION
 Site name/label:
 Design case:
 FILE NAME:          D:\...Boomi_DiffuserLocation\Location3_Tier3_Summer.prd
 Time stamp:         06/11/2025--12:53:04

ENVIRONMENT PARAMETERS (metric units)
 Bounded section
 BS    =     92.54 AS    =     455.52 QA    =       5.27  ICHREG= 1
 HA    =      4.92 HD    =       4.92
 UA    =     0.012 F     =      0.106 USTAR =0.1334E-02
 UW    =     3.353 UWSTAR=0.3806E-02
 Uniform density environment
 STRCND=  U         RHOAM =  997.5748

DIFFUSER DISCHARGE PARAMETERS (metric units)
 Diffuser type:      DITYPE= alternating_perpendicular
 BANK  =  LEFT     DISTB =    46.18 YB1   =     35.05 YB2   =     57.30
 LD    =     22.25 NOPEN =  10       NRISER=   10      SPAC  =     2.47
 NPPERR =     1
 D0    =      0.457 A0    =      0.164 H0    =      0.46 SUB0  =     4.47
 D0INP =      0.457 CR0   =      1.000 B0    =0.6641E-01
 Nozzle/port arrangement:   near_vertical_discharge
 GAMMA =     90.00  THETA =     90.00  SIGMA =      0.00  BETA  =     90.00
 U0    =      0.854 Q0    =      1.403 Q0A   =0.1403E+01
 RHO0  = 998.5800  DRHO0 =-.1005E+01  GP0   =-.9882E-02
 C0    =0.1000E+03  CUNITS= %
 IPOLL = 1          KS    =0.0000E+00  KD    =0.0000E+00

FLUX VARIABLES - PER UNIT DIFFUSER LENGTH (metric units)
 q0    =0.6305E-01        SIGNJ0=      -1.0
 m0 =U0^2*B0 =0.4848E-01   j0 =U0*GP0*B0 =-.5607E-03   (based on slot width B0)
 m0 =U0*q0   =0.5387E-01   j0 =q0*GP0    =-.6230E-03   (based on volume flux q0)
 Associated 2-d length scales (meters)
 lQ=B  =      0.074 lM    =       7.12 lm    =     402.09
 lmp   = 99999.00  lbp   = 99999.00  la    =  99999.00

FLUX VARIABLES - ENTIRE DIFFUSER (metric units)
 Q0    =0.1403E+01  M0    =0.1079E+01  J0    =-.1248E-01
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 Associated 3-d length scales (meters)
 LQ   =      0.41  LM   =      9.48  Lm   =     94.59  Lb   =    8938.84
                                     Lmp  =  99999.00  Lbp  =   99999.00


 NON-DIMENSIONAL PARAMETERS
 FR0  =     33.36  FRD0 =     12.71  R    =     73.82  PL   =   140.00
 (slot)            (port/nozzle)



 FLOW CLASSIFICATION
 2222222222222222222222222222222222222222222222222
 2  Flow class (CORMIX2)      =     MNU13       2
 2  Applicable layer depth HS =      4.92       2
 2  Limiting Dilution S=QA/Q0 + 1=     4.76     2
 2222222222222222222222222222222222222222222222222

 MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
 C0    =0.1000E+03  CUNITS=  %
 NTOX  =  0
 NSTD  =  0
 REGMZ =  0
 XINT  =   1000.00  XMAX  =   1000.00


 X-Y-Z COORDINATE SYSTEM:
     ORIGIN is located at the bottom and the diffuser mid-point:
        46.18 m  from the LEFT  bank/shore.
     X-axis points downstream, Y-axis points to left, Z-axis points upward.
 NSTEP =  20 display intervals per module
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 BEGIN MOD201: DIFFUSER DISCHARGE MODULE

  Due to complex near-field motions:  EQUIVALENT SLOT DIFFUSER (2-D) GEOMETRY

  Profile definitions:
    BV = Gaussian 1/e (37%) width, in vertical plane normal to trajectory
    BH = top-hat half-width, in horizontal plane normal to trajectory
    S  = hydrodynamic centerline dilution
    C  = centerline concentration (includes reaction effects, if any)
    Uc = Local centerline excess velocity (above ambient)
    TT = Cumulative travel time

       X        Y        Z        S        C        BV       BH       Uc        TT
      0.00     0.00     0.46     1.0 0.100E+03   0.05    11.13     0.854  .00000E+00

 END OF MOD201: DIFFUSER DISCHARGE MODULE
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BEGIN MOD234: UNSTABLE RECIRCULATION REGION OVER LAYER DEPTH

 INITIAL LOCAL VERTICAL INSTABILITY REGION:
   Bulk dilution (S =   3.51) occurs in a limited region (horizontal extent
   =   28.43 m) surrounding the discharge location.

   Control volume inflow:
       X        Y        Z        S        C        BV       BH        TT
      0.00     0.00     0.46     1.0 0.100E+03   0.05    11.13   .00000E+00

   Control volume outflow:
       X        Y        Z        S        C        BV       BH        TT
     28.43     0.00     2.46     3.5 0.285E+02   4.92    23.43   .32828E+02

END OF MOD234: UNSTABLE RECIRCULATION REGION OVER LAYER DEPTH
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--------------------------------------------------------------------------------
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BEGIN MOD234a: UPSTREAM SPREADING AFTER NEAR-FIELD INSTABILITY

 UPSTREAM INTRUSION PROPERTIES:
         Upstream intrusion length            =      350.06 m
         X-position of upstream stagnation point =    -321.63 m
         Thickness in intrusion region        =        0.23 m
         Half-width at downstream end          =      487.75 m
         Thickness at downstream end           =        1.04 m

 In this case, the upstream INTRUSION IS VERY LARGE, exceeding 10 times
   the local water depth.
 This may be caused by a very small ambient velocity, perhaps in
   combination with large discharge buoyancy.
 If the ambient conditions are strongly transient (e.g. tidal), then the
   CORMIX steady-state predictions of upstream intrusion are probably
   unrealistic.
 The plume predictions prior to boundary impingement and wedge formation
   will be acceptable, however.

   Control volume inflow:
       X        Y        Z        S        C        BV       BH        TT
     28.43     0.00     2.46     3.5 0.285E+02   4.92    23.43   .32828E+02

 Profile definitions:
   BV = top-hat thickness, measured vertically
   BH = top-hat half-width, measured horizontally in y-direction
   ZU = upper plume boundary (Z-coordinate)
   ZL = lower plume boundary (Z-coordinate)
   S  = hydrodynamic average (bulk) dilution
```

```
    C  = average (bulk) concentration (includes reaction effects, if any)
    TT = Cumulative travel time

       X        Y        Z        S        C        BV        BH        ZU        ZL
TT
    -321.63     0.00     0.00  9999.9 0.000E+00     0.00      0.00      0.00      0.00
.30276E+05
    -309.75     0.00     0.00    15.2 0.657E+01     0.05     68.98      0.05      0.00
.29250E+05
    -251.55     0.00     0.00     6.3 0.158E+02     0.13    167.55      0.13      0.00
.24221E+05
    -193.34     0.00     0.00     4.8 0.210E+02     0.17    226.69      0.17      0.00
.19192E+05
    -135.13     0.00     0.00     4.1 0.245E+02     0.19    273.32      0.19      0.00
.14164E+05
     -76.93     0.00     0.00     3.7 0.268E+02     0.21    313.08      0.21      0.00
.91352E+04
     -18.72     0.00     0.00     3.6 0.281E+02     0.22    348.33      0.22      0.00
.41066E+04
      39.48     0.00     0.00     3.6 0.281E+02     0.23    462.80      0.23      0.00
.98770E+03
      97.69     0.00     0.00     4.8 0.206E+02     0.45    469.65      0.45      0.00
.60163E+04
     155.90     0.00     0.00     6.7 0.149E+02     0.76    476.05      0.76      0.00
.11045E+05
     214.10     0.00     0.00     7.9 0.127E+02     0.96    482.06      0.96      0.00
.16074E+05
     272.31     0.00     0.00     8.3 0.120E+02     1.04    487.75      1.04      0.00
.21102E+05
 Cumulative travel time =        21102.1152 sec  (    5.86 hrs)

END OF MOD234a: UPSTREAM SPREADING AFTER NEAR-FIELD INSTABILITY
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----------
** End of NEAR-FIELD REGION (NFR) **

 The LIMITING DILUTION (given by ambient flow/discharge ratio) is:     4.8
   This value is LESS than the predicted dilution of     8.3 at the end
   of the NFR.
   Mixing for this discharge configuration is constrained by the ambient flow.

 The previous module predictions MAYBE UNRELIABLE since the limiting dilution
   cannot be exceeded for this unstable shallow discharge configuration.
 CAREFULLY evalute the degree of near-field lateral boundary interaction.

 A subsequent module (MOD281) will predict the properties of the
   cross-sectionally fully mixed plume with limiting dilution and will
   compute a POSSIBLE UPSTREAM WEDGE INTRUSION.
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BEGIN MOD281: MIXED PLUME/BOUNDED CHANNEL/POSSIBLE UPSTREAM WEDGE INTRUSION

 The DOWNSTREAM flow field for this unstable shallow water discharge is
     VERTICALLY FULLY MIXED.
 The mixing is controlled by the limiting dilution =   4.8

 Channel DENSIMETRIC FROUDE NUMBER (FCHAN) for this mixed flow =   0.11

 An UPSTREAM INTRUDING BOTTOM WEDGE is formed.

 UPSTREAM WEDGE INTRUSION PROPERTIES in bounded channel (laterally uniform):
         Wedge length   =   2574.41 m
         X-Position of wedge tip   =   -2302.10 m
         Thickness at discharge (end of NFR)   =   3.76 m
          (Wedge thickness gradually decreases to zero at wedge tip.)

 In this case, the upstream INTRUSION IS VERY LARGE, exceeding 10 times
   the local water depth.
 This may be caused by a very small ambient velocity, perhaps in combination
   with large discharge buoyancy.
 If the ambient conditions are strongly transient (e.g. tidal), then the
   CORMIX steady-state predictions of upstream intrusion are probably
   unrealistic.
 The plume predictions prior to boundary impingement and wedge formation
  will be acceptable, however.

        X   Y   Z   S   C   BV   BH   ZU   ZL
TT
    272.31   46.18   0.00   4.8 0.210E+02   4.92   92.54   4.92   0.00
.21102E+05
 Cumulative travel time =   21102.1172 sec (5.86 hrs)

  VERTICALLY AND LATERALLY FULLY MIXED over layer depth: END OF SIMULATION!

END OF MOD281: MIXED PLUME/BOUNDED CHANNEL/POSSIBLE UPSTREAM WEDGE INTRUSION

CORMIX2: Multiport Diffuser Discharges   End of Prediction File
2222222222222222222222222222222222222222222222222222222222222222222222222222222
22222222222

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CORMIX2 PREDICTION FILE:
2222222222222222222222222222222222222222222222222222222222222222222222222222222222
22222222222
                    CORMIX MIXING ZONE EXPERT SYSTEM
            Subsystem CORMIX2: Multiport Diffuser Discharges
                       CORMIX Version 12.0GTH
                   HYDRO2 Version 12.0.1.0 August 2021
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CASE DESCRIPTION
 Site name/label:
 Design case:
 FILE NAME:       D:\...Boomi_DiffuserLocation\Location3_Tier3_Winter.prd
 Time stamp:      06/11/2025--12:56:19

ENVIRONMENT PARAMETERS (metric units)
 Bounded section
 BS    =     92.54 AS    =    455.52 QA    =       5.27  ICHREG= 1
 HA    =      4.92 HD    =      4.92
 UA    =     0.012 F     =     0.106 USTAR =0.1334E-02
 UW    =     4.247 UWSTAR=0.4920E-02
 Uniform density environment
 STRCND= U          RHOAM =  999.7019

DIFFUSER DISCHARGE PARAMETERS (metric units)
 Diffuser type:     DITYPE= alternating_perpendicular
 BANK  = LEFT       DISTB =     46.18 YB1   =     35.05 YB2   =     57.30
 LD    =     22.25 NOPEN =   10       NRISER=   10       SPAC  =     2.47
NPPERR =     1
 D0    =     0.457 A0    =     0.164 H0    =      0.46 SUB0  =     4.47
 D0INP =     0.457 CR0   =     1.000 B0    =0.6641E-01
 Nozzle/port arrangement:   near_vertical_discharge
 GAMMA =     90.00 THETA =     90.00 SIGMA =      0.00 BETA  =     90.00
 U0    =     0.854 Q0    =     1.403 Q0A   =0.1403E+01
 RHO0  = 999.2432  DRHO0 =0.4587E+00 GP0   =0.4499E-02
 C0    =0.1000E+03 CUNITS= %
 IPOLL = 1         KS    =0.0000E+00 KD    =0.0000E+00

FLUX VARIABLES - PER UNIT DIFFUSER LENGTH (metric units)
 q0    =0.6305E-01         SIGNJ0=      1.0
 m0 =U0^2*B0 =0.4848E-01   j0 =U0*GP0*B0 =0.2553E-03   (based on slot width B0)
 m0 =U0*q0   =0.5387E-01   j0 =q0*GP0     =0.2837E-03   (based on volume flux q0)
 Associated 2-d length scales (meters)
 lQ=B  =      0.074 lM    =     12.02 lm    =     402.09
 lmp   = 99999.00  lbp   = 99999.00  la    = 99999.00

FLUX VARIABLES - ENTIRE DIFFUSER (metric units)
 Q0    =0.1403E+01 M0    =0.1079E+01 J0    =0.5681E-02
```

```
 Associated 3-d length scales (meters)
 LQ   =     0.41  LM   =    14.04  Lm   =    94.59  Lb   =   4070.30
                                   Lmp  = 99999.00  Lbp  =  99999.00


 NON-DIMENSIONAL PARAMETERS
 FR0  =    49.43  FRD0 =    18.84  R    =    73.82  PL   =    2.95
 (slot)          (port/nozzle)



 FLOW CLASSIFICATION
 2222222222222222222222222222222222222222222222222
 2  Flow class (CORMIX2)     =    MU8         2
 2  Applicable layer depth HS =     4.92      2
 2  Limiting Dilution S=QA/Q0 + 1=    4.76    2
 2222222222222222222222222222222222222222222222222

 MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
 C0    =0.1000E+03  CUNITS=  %
 NTOX  =  0
 NSTD  =  0
 REGMZ =  0
 XINT  =   1000.00  XMAX  =   1000.00

 X-Y-Z COORDINATE SYSTEM:
    ORIGIN is located at the bottom and the diffuser mid-point:
       46.18 m  from the LEFT  bank/shore.
    X-axis points downstream, Y-axis points to left, Z-axis points upward.
 NSTEP =  20 display intervals per module
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BEGIN MOD201: DIFFUSER DISCHARGE MODULE

 Due to complex near-field motions:  EQUIVALENT SLOT DIFFUSER (2-D) GEOMETRY

 Profile definitions:
   BV = Gaussian 1/e (37%) width, in vertical plane normal to trajectory
   BH = top-hat half-width, in horizontal plane normal to trajectory
   S  = hydrodynamic centerline dilution
   C  = centerline concentration (includes reaction effects, if any)
   Uc = Local centerline excess velocity (above ambient)
   TT = Cumulative travel time

      X        Y        Z        S        C       BV       BH       Uc       TT
     0.00     0.00     0.46     1.0 0.100E+03  0.05    11.13     0.854  .00000E+00

END OF MOD201: DIFFUSER DISCHARGE MODULE
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```

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BEGIN MOD234: UNSTABLE RECIRCULATION REGION OVER LAYER DEPTH

 INITIAL LOCAL VERTICAL INSTABILITY REGION:
   Bulk dilution (S =   2.77) occurs in a limited region (horizontal extent
   =   36.92 m) surrounding the discharge location.

  Control volume inflow:
      X        Y        Z        S        C        BV        BH        TT
     0.00     0.00     0.46     1.0 0.100E+03  0.05     11.13    .00000E+00

  Control volume outflow:
      X        Y        Z        S        C        BV        BH        TT
    36.92     0.00     2.46     2.8 0.362E+02  4.92     23.43    .42629E+02

END OF MOD234: UNSTABLE RECIRCULATION REGION OVER LAYER DEPTH
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BEGIN MOD234a: UPSTREAM SPREADING AFTER NEAR-FIELD INSTABILITY

 UPSTREAM INTRUSION PROPERTIES:
         Upstream intrusion length              =     338.71 m
         X-position of upstream stagnation point =    -301.79 m
         Thickness in intrusion region          =       1.31 m
         Half-width at downstream end            =     719.69 m
         Thickness at downstream end             =       1.85 m

 In this case, the upstream INTRUSION IS VERY LARGE, exceeding 10 times
   the local water depth.
 This may be caused by a very small ambient velocity, perhaps in
   combination with large discharge buoyancy.
 If the ambient conditions are strongly transient (e.g. tidal), then the
   CORMIX steady-state predictions of upstream intrusion are probably
   unrealistic.
 The plume predictions prior to boundary impingement and wedge formation
   will be acceptable, however.

  Control volume inflow:
      X        Y        Z        S        C        BV        BH        TT
    36.92     0.00     2.46     2.8 0.362E+02  4.92     23.43    .42629E+02

 Profile definitions:
   BV = top-hat thickness, measured vertically
   BH = top-hat half-width, measured horizontally in y-direction
   ZU = upper plume boundary (Z-coordinate)
   ZL = lower plume boundary (Z-coordinate)
   S  = hydrodynamic average (bulk) dilution
```

```
       C  = average (bulk) concentration (includes reaction effects, if any)
       TT = Cumulative travel time

           X        Y        Z        S        C       BV       BH       ZU       ZL
      TT
        -301.79     0.00     4.92  9999.9 0.000E+00     0.00     0.00     4.92     4.92
      .29305E+05
        -287.82     0.00     4.92    10.9 0.920E+01     0.33   101.78     4.92     4.59
      .28098E+05
        -219.36     0.00     4.92     4.5 0.221E+02     0.80   247.22     4.92     4.12
      .22183E+05
        -150.90     0.00     4.92     3.4 0.290E+02     1.05   334.48     4.92     3.87
      .16269E+05
         -82.44     0.00     4.92     3.0 0.333E+02     1.21   403.28     4.92     3.72
      .10355E+05
         -13.98     0.00     4.92     2.8 0.357E+02     1.29   461.95     4.92     3.63
      .44404E+04
          54.47     0.00     4.92     2.9 0.339E+02     1.31   657.21     4.92     3.61
      .15592E+04
         122.93     0.00     4.92     6.7 0.149E+02     1.42   671.55     4.92     3.50
      .74735E+04
         191.39     0.00     4.92    12.8 0.782E+01     1.59   684.77     4.92     3.33
      .13388E+05
         259.85     0.00     4.92    17.8 0.561E+01     1.73   697.10     4.92     3.19
      .19302E+05
         328.31     0.00     4.92    20.6 0.486E+01     1.81   708.70     4.92     3.11
      .25216E+05
         396.76     0.00     4.92    22.0 0.455E+01     1.85   719.69     4.92     3.07
      .31131E+05
       Cumulative travel time =        31130.7617 sec  (     8.65 hrs)

      END OF MOD234a: UPSTREAM SPREADING AFTER NEAR-FIELD INSTABILITY
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      ** End of NEAR-FIELD REGION (NFR) **

       The LIMITING DILUTION (given by ambient flow/discharge ratio) is:     4.8
         This value is LESS than the predicted dilution of    22.0 at the end
         of the NFR.
         Mixing for this discharge configuration is constrained by the ambient flow.

       The previous module predictions MAYBE UNRELIABLE since the limiting dilution
         cannot be exceeded for this unstable shallow discharge configuration.
       CAREFULLY evalute the degree of near-field lateral boundary interaction.

       A subsequent module (MOD281) will predict the properties of the
         cross-sectionally fully mixed plume with limiting dilution and will
         compute a POSSIBLE UPSTREAM WEDGE INTRUSION.
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BEGIN MOD281: MIXED PLUME/BOUNDED CHANNEL/POSSIBLE UPSTREAM WEDGE INTRUSION

 The DOWNSTREAM flow field for this unstable shallow water discharge is
     VERTICALLY FULLY MIXED.
 The mixing is controlled by the limiting dilution =   4.8

 Channel DENSIMETRIC FROUDE NUMBER (FCHAN) for this mixed flow =   0.17

 An UPSTREAM INTRUDING WEDGE is formed along the surface/pycnocline.

 UPSTREAM WEDGE INTRUSION PROPERTIES in bounded channel (laterally uniform):
         Wedge length   =   694.43 m
         X-Position of wedge tip   =   -297.67 m
         Thickness at discharge (end of NFR)   =   3.41 m
          (Wedge thickness gradually decreases to zero at wedge tip.)

 In this case, the upstream INTRUSION IS VERY LARGE, exceeding 10 times
   the local water depth.
 This may be caused by a very small ambient velocity, perhaps in combination
   with large discharge buoyancy.
 If the ambient conditions are strongly transient (e.g. tidal), then the
   CORMIX steady-state predictions of upstream intrusion are probably
   unrealistic.
 The plume predictions prior to boundary impingement and wedge formation
  will be acceptable, however.

        X   Y   Z   S   C   BV   BH   ZU   ZL
TT
    396.76   46.18   4.92   4.8 0.210E+02   4.92   92.54   4.92   0.00
.31131E+05
 Cumulative travel time =   31130.7559 sec (8.65 hrs)

 VERTICALLY AND LATERALLY FULLY MIXED over layer depth: END OF SIMULATION!

END OF MOD281: MIXED PLUME/BOUNDED CHANNEL/POSSIBLE UPSTREAM WEDGE INTRUSION

CORMIX2: Multiport Diffuser Discharges   End of Prediction File
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