301(h)-Modified
NPDES Permit Reissuance
Questionnaire for Small Dischargers

Attachment D: Supporting Technical Analysis
Hydraulic and Initial Dilution Modeling

UTULEI WASTEWATER
TREATMENT PLANT

NPDES Permit No. AS0020001

Submitted By

AMERICAN SAMOA POWER AUTHORITY

May 1, 2006

Diffuser Hydraulic Modeling: 6mgd, without orifice plates

```
 INPUT FILE NAME  = u6mgdb.in
 OUTPUT FILE NAME = u6mgdb.out
1Utulei Outfall and Diffuser Calculations--without Orifice
 Determine Flow Distribution Among Ports for 6 mgd  Max Flow

 UNIT OPTION SPECIFIED =  0
     LENGTH/ELEVATION/  DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
                WIDTH/    HEIGHT = IN     DIAM = IN

              TIME 16:35:22                                        PAGE   1
 Q1=    6.00     Q2=    0.00     Q3=    0.00
 ========================================================================


 CONDITIONS SET -                                                  SEQ =  1
 Outfall Maxn Flow Rates and Starting WSL
 ENERGY LINE = 100.00  Q1 =   6.00  Q2 =   0.00  Q3 =   0.00  VEL = 0.00
0ELEMENT NO. 26                                                   SEQ =  2
  Diffusser Configuration with largest port seaward
 NUMBER OF PORTS ------------------------      6
 PERCENT BETWEEN SHARP EDGE PORT (0.0) --    0.0
      AND BELL MOUTH PORT (100.0)
 AVAILABLE ENERGY AT PORT NO. 1 --------    0.71
 SPECIFIC GRAVITY DIFFERENCE ------------ 0.0000


 *------ PORT PARAMETERS ------*   *--------- PIPE PARAMETERS ---------*
     DIAM  CD   FLOW  VEL ENERGY    LNTH  DIAM         FLOW  VEL  H LOSS
 NUM                                      FRICT
   1 7.75 0.73* 1.04  4.91  0.71     7.0  21.0 0.034   1.04  0.67  0.001
   2 7.75 0.72* 1.04  4.91  0.71     7.0  21.0 0.028   2.08  1.34  0.003
   3 7.75 0.71* 1.02  4.80  0.72     7.0  21.0 0.026   3.10  1.99  0.006
   4 7.75 0.68* 0.99  4.65  0.72     7.0  21.0 0.024   4.08  2.63  0.010
   5 7.75 0.65* 0.95  4.48  0.73     7.0  21.0 0.023   5.03  3.24  0.015
   6 7.75 0.63* 0.97  4.58  0.83     7.0  21.0 0.022   6.00  3.86  0.020
                                   -------                         ------
                                      42.0                          0.056
 HYDRAULIC GRADE LINE ELEV. HLOSS =  0.85    DN =  100.00  UP =   100.69
 ENERGY LINE ELEVATION                       DN =  100.00  UP =   100.85
 TOTAL FLOWRATE       ----       6.000
```

Diffuser Hydraulic Modeling: 6mgd, with orifice plates

```
INPUT FILE NAME  = u6mgda.in
 OUTPUT FILE NAME = u6mgda.out
1Utulei Outfall and Diffuser Calculations
 Determine Flow Distribution Among Ports for 6 mgd  Max Flow

 UNIT OPTION SPECIFIED =  0
     LENGTH/ELEVATION/  DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
                WIDTH/    HEIGHT = IN     DIAM = IN

              TIME 16:36:00                                        PAGE   1
 Q1=    6.00     Q2=    0.00     Q3=    0.00
 ========================================================================


 CONDITIONS SET -                                                  SEQ =  1
 Outfall Max Flow Rates and Starting WSL
 ENERGY LINE = 100.00  Q1 =   6.00  Q2 =   0.00  Q3 =   0.00  VEL = 0.00
0ELEMENT NO. 26                                                   SEQ =  2
  Diffusser Configuration with largest port seaward
 NUMBER OF PORTS ------------------------      6
 PERCENT BETWEEN SHARP EDGE PORT (0.0) --    0.0
      AND BELL MOUTH PORT (100.0)
 AVAILABLE ENERGY AT PORT NO. 1 --------    2.55
 SPECIFIC GRAVITY DIFFERENCE ------------ 0.0000


 *------ PORT PARAMETERS ------*   *--------- PIPE PARAMETERS ---------*
     DIAM  CD   FLOW  VEL ENERGY    LNTH  DIAM         FLOW  VEL  H LOSS
 NUM                                          FRICT
   1 6.20 0.86* 1.49 10.97  2.55     7.0  21.0 0.031   1.49  0.96  0.002
   2 5.80 0.88* 1.34 11.33  2.56     7.0  21.0 0.026   2.83  1.82  0.005
   3 5.20 0.91* 1.12 11.72  2.59     7.0  21.0 0.024   3.95  2.54  0.010
   4 4.50 0.93* 0.87 12.13  2.65     7.0  21.0 0.023   4.81  3.10  0.014
   5 3.80 0.94* 0.64 12.50  2.73     7.0  21.0 0.023   5.45  3.51  0.017
   6 3.50 0.94* 0.55 12.76  2.85     7.0  21.0 0.022   6.00  3.86  0.020
                                    -------                         ------
                                       42.0                          0.069
 HYDRAULIC GRADE LINE ELEV. HLOSS =  2.87    DN =  100.00  UP =   102.68
 ENERGY LINE ELEVATION                       DN =  100.00  UP =   102.87
 TOTAL FLOWRATE       ----       6.000
```

Diffuser Hydraulic Modeling: 3mgd, without orifice plates

```
 INPUT FILE NAME  = u3mgda.in
 OUTPUT FILE NAME = u3mgda.out
1Utulei Outfall and Diffuser Calculations
 Determine Flow Distribution Among Ports for 3 mgd  Design Flow

 UNIT OPTION SPECIFIED =  0
     LENGTH/ELEVATION/  DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
                WIDTH/    HEIGHT = IN     DIAM = IN

              TIME 16:33:14                                        PAGE   1
 Q1=    3.00     Q2=    0.00     Q3=    0.00
 ========================================================================


 CONDITIONS SET -                                                  SEQ =  1
 Outfall Design Flow Rates and Starting WSL
 ENERGY LINE = 100.00  Q1 =   3.00  Q2 =   0.00  Q3 =   0.00  VEL = 0.00
0ELEMENT NO. 26                                                   SEQ =  2
  Diffusser Configuration with largest port seaward
 NUMBER OF PORTS ------------------------      6
 PERCENT BETWEEN SHARP EDGE PORT (0.0) --    0.0
      AND BELL MOUTH PORT (100.0)
 AVAILABLE ENERGY AT PORT NO. 1 --------    0.64
 SPECIFIC GRAVITY DIFFERENCE ------------ 0.0000


 *------ PORT PARAMETERS ------*   *--------- PIPE PARAMETERS ---------*
     DIAM  CD   FLOW  VEL ENERGY    LNTH  DIAM         FLOW  VEL  H LOSS
 NUM                                        FRICT
   1 6.20 0.85* 0.74  5.48  0.64     7.0  21.0 0.038   0.74  0.48  0.001
   2 5.80 0.88* 0.67  5.66  0.64     7.0  21.0 0.031   1.41  0.91  0.002
   3 5.20 0.91* 0.56  5.86  0.65     7.0  21.0 0.029   1.97  1.27  0.003
   4 4.50 0.93* 0.43  6.07  0.66     7.0  21.0 0.027   2.40  1.55  0.004
   5 3.80 0.94* 0.32  6.26  0.69     7.0  21.0 0.027   2.72  1.75  0.005
   6 3.50 0.94* 0.28  6.40  0.72     7.0  21.0 0.026   3.00  1.93  0.006
                                    -------                         ------
                                      42.0                          0.020
 HYDRAULIC GRADE LINE ELEV. HLOSS =  0.72    DN =  100.00  UP =   100.67
 ENERGY LINE ELEVATION                       DN =  100.00  UP =   100.72
 TOTAL FLOWRATE       ----       3.000
```

Diffuser Hydraulic Modeling: 3mgd, with orifice plates

```
 INPUT FILE NAME  = u3mgdb.in
 OUTPUT FILE NAME = u3mgdb.out
1Utulei Outfall and Diffuser Calculations--without Orifice
 Determine Flow Distribution Among Ports for 3 mgd  Design Flow

 UNIT OPTION SPECIFIED =  0
     LENGTH/ELEVATION/  DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
                WIDTH/    HEIGHT = IN     DIAM = IN

              TIME 16:33:38                                        PAGE   1
 Q1=    3.00     Q2=    0.00     Q3=    0.00
 ============================================================================


 CONDITIONS SET -                                                  SEQ =  1
 Outfall Design Flow Rates and Starting WSL
 ENERGY LINE = 100.00  Q1 =   3.00  Q2 =   0.00  Q3 =   0.00  VEL = 0.00
0ELEMENT NO. 26                                                   SEQ =  2
  Diffusser Configuration with largest port seaward
 NUMBER OF PORTS ------------------------      6
 PERCENT BETWEEN SHARP EDGE PORT (0.0) --    0.0
      AND BELL MOUTH PORT (100.0)
 AVAILABLE ENERGY AT PORT NO. 1 --------    0.18
 SPECIFIC GRAVITY DIFFERENCE ------------ 0.0000


 *------ PORT PARAMETERS ------*   *--------- PIPE PARAMETERS ---------*
     DIAM  CD   FLOW  VEL ENERGY    LNTH  DIAM         FLOW  VEL  H LOSS
 NUM                                       FRICT
   1 7.75 0.72* 0.52  2.45  0.18     7.0  21.0 0.042   0.52  0.33  0.000
   2 7.75 0.72* 0.52  2.45  0.18     7.0  21.0 0.034   1.04  0.67  0.001
   3 7.75 0.70* 0.51  2.40  0.18     7.0  21.0 0.031   1.55  0.99  0.002
   4 7.75 0.68* 0.49  2.33  0.18     7.0  21.0 0.029   2.04  1.31  0.003
   5 7.75 0.65* 0.48  2.24  0.19     7.0  21.0 0.027   2.51  1.62  0.004
   6 7.75 0.62* 0.49  2.30  0.21     7.0  21.0 0.026   3.00  1.93  0.006
                                    -------                        ------
                                      42.0                          0.017
 HYDRAULIC GRADE LINE ELEV. HLOSS =  0.22    DN =  100.00  UP =   100.18
 ENERGY LINE ELEVATION                       DN =  100.00  UP =   100.22
 TOTAL FLOWRATE       ----       3.000
```

Diffuser Hydraulic Modeling: 2.2 mgd, without orifice plates

```
 INPUT FILE NAME  = u2p2mgdb.i
 OUTPUT FILE NAME = u2p2mgdb.o
1Utulei Outfall and Diffuser Calculations--without Orifice
 Determine Flow Distribution Among Ports for 2.2 mgd  Design Flow

 UNIT OPTION SPECIFIED =  0
     LENGTH/ELEVATION/  DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
                WIDTH/    HEIGHT = IN     DIAM = IN

              TIME 16:32:53                                        PAGE   1
 Q1=    2.20     Q2=    0.00     Q3=    0.00
 ========================================================================


 CONDITIONS SET -                                                  SEQ =  1
 Outfall Design Flow Rates and Starting WSL
 ENERGY LINE = 100.00  Q1 =   2.20  Q2 =   0.00  Q3 =   0.00  VEL = 0.00
0ELEMENT NO. 26                                                   SEQ =  2
  Diffusser Configuration with largest port seaward
 NUMBER OF PORTS ------------------------      6
 PERCENT BETWEEN SHARP EDGE PORT (0.0) --    0.0
      AND BELL MOUTH PORT (100.0)
 AVAILABLE ENERGY AT PORT NO. 1 --------    0.10
 SPECIFIC GRAVITY DIFFERENCE ------------ 0.0000


 *------ PORT PARAMETERS ------*   *--------- PIPE PARAMETERS ---------*
     DIAM  CD   FLOW  VEL ENERGY    LNTH  DIAM         FLOW  VEL  H LOSS
 NUM                                          FRICT
   1 7.75 0.72* 0.38  1.80  0.10     7.0  21.0 0.046   0.38  0.24  0.000
   2 7.75 0.72* 0.38  1.80  0.10     7.0  21.0 0.037   0.76  0.49  0.001
   3 7.75 0.70* 0.37  1.76  0.10     7.0  21.0 0.033   1.13  0.73  0.001
   4 7.75 0.68* 0.36  1.71  0.10     7.0  21.0 0.031   1.49  0.96  0.002
   5 7.75 0.65* 0.35  1.65  0.10     7.0  21.0 0.029   1.84  1.19  0.003
   6 7.75 0.62* 0.36  1.69  0.11     7.0  21.0 0.028   2.20  1.42  0.003
                                    -------                         ------
                                       42.0                          0.010
 HYDRAULIC GRADE LINE ELEV. HLOSS =  0.12    DN =  100.00  UP =   100.10
 ENERGY LINE ELEVATION                       DN =  100.00  UP =   100.12
 TOTAL FLOWRATE       ----       2.200
```

Diffuser Hydraulic Modeling: 2.2 mgd, with orifice plates

```
 INPUT FILE NAME  = u2p2mgda.i
 OUTPUT FILE NAME = u2p2mgda.o
1Utulei Outfall and Diffuser Calculations
 Determine Flow Distribution Among Ports for 2.2 mgd  Design Flow

 UNIT OPTION SPECIFIED =  0
     LENGTH/ELEVATION/  DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
                WIDTH/    HEIGHT = IN     DIAM = IN

              TIME 16:32:19                                        PAGE   1
 Q1=    2.20     Q2=    0.00     Q3=    0.00
 ==========================================================================


 CONDITIONS SET -                                                  SEQ =  1
 Outfall Design Flow Rates and Starting WSL
 ENERGY LINE = 100.00  Q1 =   2.20  Q2 =   0.00  Q3 =   0.00  VEL = 0.00
0ELEMENT NO. 26                                                   SEQ =  2
  Diffusser Configuration with largest port seaward
 NUMBER OF PORTS ------------------------      6
 PERCENT BETWEEN SHARP EDGE PORT (0.0) --    0.0
      AND BELL MOUTH PORT (100.0)
 AVAILABLE ENERGY AT PORT NO. 1 --------    0.34
 SPECIFIC GRAVITY DIFFERENCE ------------ 0.0000


 *------ PORT PARAMETERS ------*   *--------- PIPE PARAMETERS ---------*
     DIAM  CD   FLOW  VEL ENERGY    LNTH  DIAM         FLOW  VEL  H LOSS
 NUM                                          FRICT
   1 6.20 0.85* 0.54  4.01  0.34     7.0  21.0 0.041   0.54  0.35  0.000
   2 5.80 0.88* 0.49  4.15  0.35     7.0  21.0 0.034   1.04  0.67  0.001
   3 5.20 0.91* 0.41  4.30  0.35     7.0  21.0 0.031   1.45  0.93  0.002
   4 4.50 0.93* 0.32  4.45  0.36     7.0  21.0 0.030   1.76  1.13  0.002
   5 3.80 0.94* 0.23  4.60  0.37     7.0  21.0 0.029   2.00  1.28  0.003
   6 3.50 0.94* 0.20  4.70  0.39     7.0  21.0 0.028   2.20  1.42  0.003
                                   -------                          ------
                                      42.0                           0.012
 HYDRAULIC GRADE LINE ELEV. HLOSS =  0.39    DN =  100.00  UP =   100.36
 ENERGY LINE ELEVATION                       DN =  100.00  UP =   100.39
 TOTAL FLOWRATE       ----       2.200
```

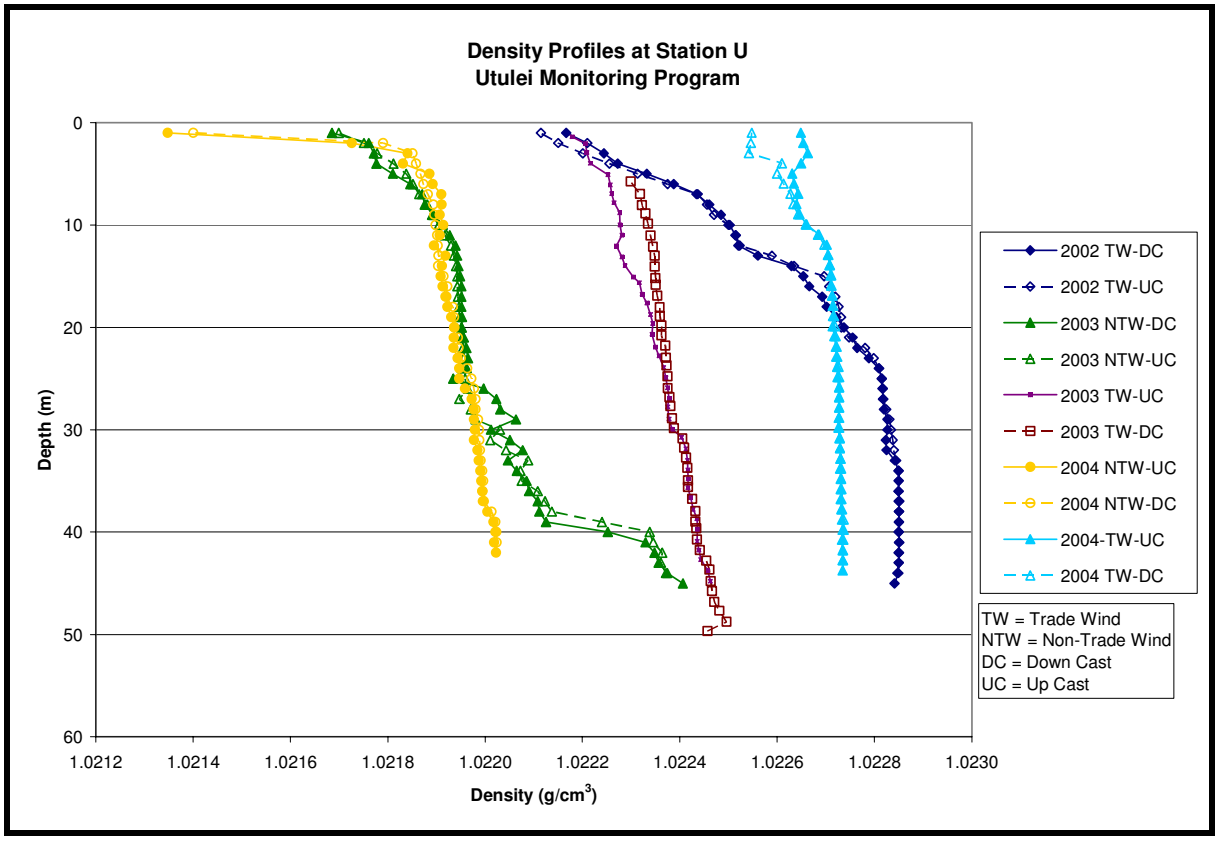
Diffuser Hydraulic Modeling: 1.5 mgd, without orifice plates

```
 INPUT FILE NAME  = u1p5mgdb.i
 OUTPUT FILE NAME = u1p5mgdb.o
1Utulei Outfall and Diffuser Calculations--without Orifice
 Determine Flow Distribution Among Ports for 1.5 mgd  Annual Avg Flow

 UNIT OPTION SPECIFIED =  0
     LENGTH/ELEVATION/  DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
                WIDTH/    HEIGHT = IN     DIAM = IN

              TIME 16:31:11                                        PAGE   1
 Q1=    1.50     Q2=    0.00     Q3=    0.00
 ========================================================================


 CONDITIONS SET -                                                  SEQ =  1
 Outfall Anual Avg Flow Rates and Starting WSL
 ENERGY LINE = 100.00  Q1 =   1.50  Q2 =   0.00  Q3 =   0.00  VEL = 0.00
0ELEMENT NO. 26                                                   SEQ =  2
  Diffusser Configuration with largest port seaward
 NUMBER OF PORTS ------------------------      6
 PERCENT BETWEEN SHARP EDGE PORT (0.0) --    0.0
      AND BELL MOUTH PORT (100.0)
 AVAILABLE ENERGY AT PORT NO. 1 --------    0.05
 SPECIFIC GRAVITY DIFFERENCE ------------ 0.0000


 *------ PORT PARAMETERS ------*   *--------- PIPE PARAMETERS ---------*
     DIAM  CD   FLOW  VEL ENERGY    LNTH  DIAM         FLOW  VEL  H LOSS
 NUM                                          FRICT
   1 7.75 0.71* 0.26  1.22  0.05     7.0  21.0 0.037   0.26  0.17  0.000
   2 7.75 0.71* 0.26  1.22  0.05     7.0  21.0 0.042   0.52  0.33  0.000
   3 7.75 0.70* 0.25  1.20  0.05     7.0  21.0 0.037   0.77  0.50  0.001
   4 7.75 0.67* 0.25  1.16  0.05     7.0  21.0 0.034   1.02  0.65  0.001
   5 7.75 0.65* 0.24  1.13  0.05     7.0  21.0 0.032   1.26  0.81  0.001
   6 7.75 0.62* 0.24  1.16  0.05     7.0  21.0 0.031   1.50  0.96  0.002
                                    -------                        ------
                                      42.0                          0.005
 HYDRAULIC GRADE LINE ELEV. HLOSS =  0.06    DN =  100.00  UP =   100.05
 ENERGY LINE ELEVATION                       DN =  100.00  UP =   100.06
 TOTAL FLOWRATE       ----       1.500
```

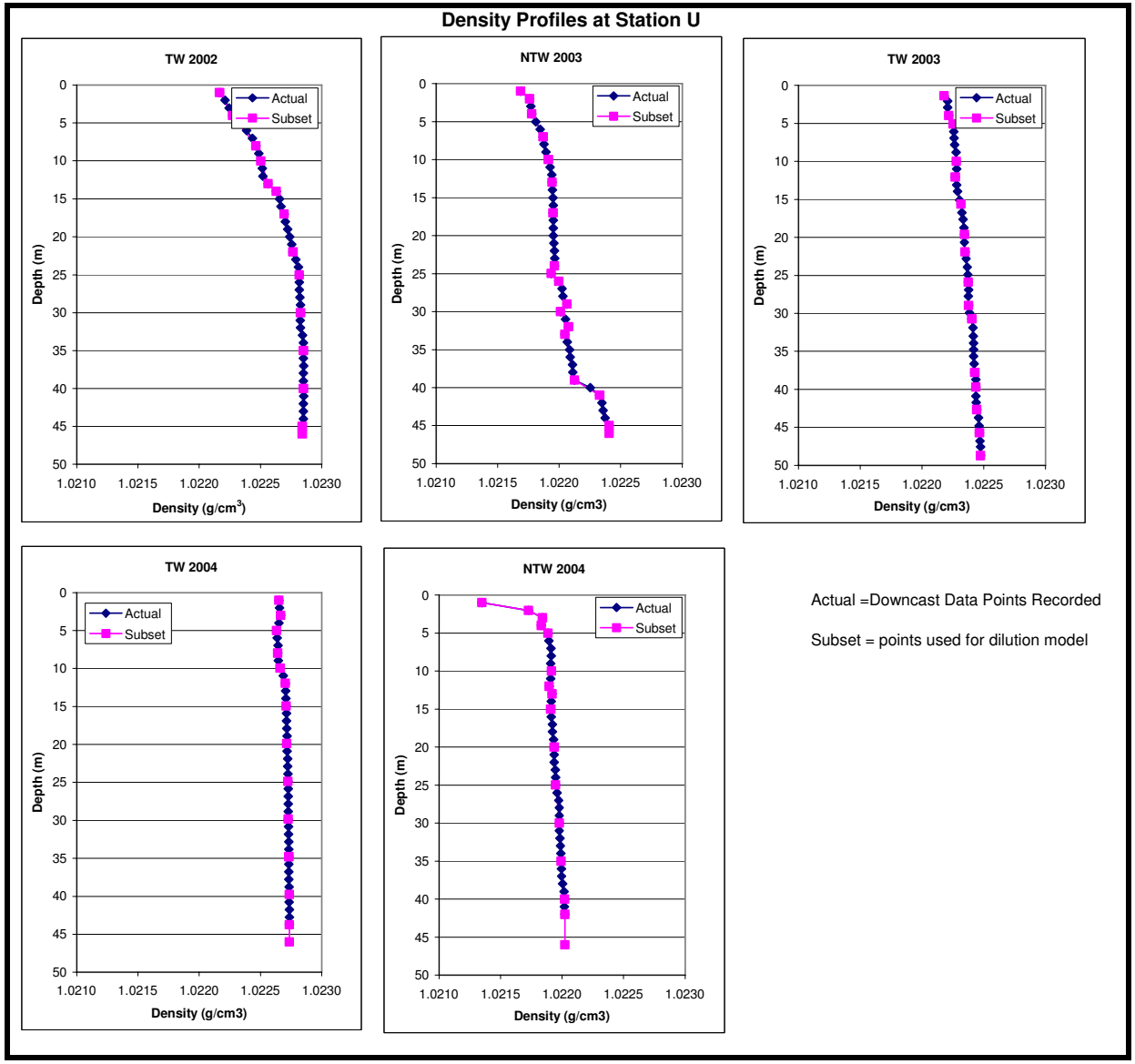
Diffuser Hydraulic Modeling: 1.5 mgd, with orifice plates

```
 INPUT FILE NAME  = u1p5mgda.i
 OUTPUT FILE NAME = u1p5mgda.o
1Utulei Outfall and Diffuser Calculations
 Determine Flow Distribution Among Ports for 1.5 mgd  Annual Avg Flow

 UNIT OPTION SPECIFIED =  0
     LENGTH/ELEVATION/  DEPTH = FT    FLOWS = MGD    VELOCITY = FPS
                WIDTH/    HEIGHT = IN     DIAM = IN

              TIME 16:30:20                                        PAGE   1
 Q1=    1.50     Q2=    0.00     Q3=    0.00
 ========================================================================


 CONDITIONS SET -                                                  SEQ =  1
 Outfall Anual Avg Flow Rates and Starting WSL
 ENERGY LINE = 100.00  Q1 =   1.50  Q2 =   0.00  Q3 =   0.00  VEL = 0.00
0ELEMENT NO. 26                                                   SEQ =  2
  Diffusser Configuration with largest port seaward
 NUMBER OF PORTS ------------------------      6
 PERCENT BETWEEN SHARP EDGE PORT (0.0) --    0.0
      AND BELL MOUTH PORT (100.0)
 AVAILABLE ENERGY AT PORT NO. 1 --------    0.16
 SPECIFIC GRAVITY DIFFERENCE ------------ 0.0000


 *------ PORT PARAMETERS ------*   *--------- PIPE PARAMETERS ---------*
     DIAM  CD   FLOW  VEL ENERGY    LNTH  DIAM         FLOW  VEL  H LOSS
 NUM                                          FRICT
   1 6.20 0.85* 0.37  2.73  0.16     7.0  21.0 0.046   0.37  0.24  0.000
   2 5.80 0.88* 0.34  2.83  0.16     7.0  21.0 0.038   0.71  0.45  0.000
   3 5.20 0.90* 0.28  2.93  0.16     7.0  21.0 0.035   0.98  0.63  0.001
   4 4.50 0.93* 0.22  3.04  0.17     7.0  21.0 0.033   1.20  0.77  0.001
   5 3.80 0.94* 0.16  3.14  0.17     7.0  21.0 0.032   1.36  0.88  0.002
   6 3.50 0.94* 0.14  3.21  0.18     7.0  21.0 0.031   1.50  0.96  0.002
                                    -------                          ------
                                       42.0                           0.006
 HYDRAULIC GRADE LINE ELEV. HLOSS =  0.18    DN =  100.00  UP =   100.17
 ENERGY LINE ELEVATION                       DN =  100.00  UP =   100.18
 TOTAL FLOWRATE       ----       1.500
```

Density Profiles Used to Determine Critical Conditions



Density Profile Data Used in Model Runs to Determine Critical Conditions



Summary of Initial Dilution Model Results

Utulei UDKDEN Model Runs

Utulei worst case evaluation based on densities recorded at Station U (no port restrictions)

Case ID	Case	Discharge m^3/sec	Port Size m	Depth m	Trapping Level (TL) m below surf.	Dilution (TL)	Dilution (End)
U02TW	6 mgd-7.75" port	0.2628	0.1969	44.20	10.33	81.39	95.74
U03NTW	6 mgd-7.75" port	0.2628	0.1969	44.20	5.35	83.10	**90.54**
U03TW	6 mgd-7.75" port	0.2628	0.1969	44.20		100.12	
U04NTW	6 mgd-7.75" port	0.2628	0.1969	44.20	2.42	96.13	100.40
U04TW	6 mgd-7.75" port	0.2628	0.1969	44.20		103.50	

Utulei flow evaluation based on 6.0, 3.0, and 2.2 mgd (no port restrictions)

Case ID	Case	Discharge m^3/sec	Port Size m	Depth m	Trapping Level (TL) m below surf.	Dilution (TL)	Dilution (End)
U03NTW	6.0 mgd-7.75" port	0.2628	0.1969	44.20	5.35	83.10	90.54
3p0mgd	3.0 mgd-7.75" port	0.1314	0.1969	44.20	8.72	112.54	127.29
2p2mgd	2.2 mgd-7.75" port	0.0964	0.1969	44.20	11.38	125.29	144.32

Utulei port evaluation based on existing port orifice restrictions

Case ID	Case	Discharge m^3/sec	Port Size m	Depth m	Trapping Level (TL) m below surf.	Dilution (TL)	Dilution (End)
6p6-pt1	6.0 mgd-port 1	0.0653	0.1575	44.20	4.40	70.72	75.21
6p6-pt2	6.0 mgd-port 2	0.0587	0.1473	44.20	5.34	74.06	79.85
6p6-pt3	6.0 mgd-port 3	0.0491	0.1321	44.20	5.96	81.28	88.59
6p6-pt4	6.0 mgd-port 4	0.0381	0.1143	44.20	6.92	92.07	102.06
6p6-pt5	6.0 mgd-port 5	0.0280	0.0965	44.20	11.69	97.63	113.17
6p6-pt6	6.0 mgd-port 6	0.0241	0.0889	44.20	12.12	105.22	121.50
Flux average dilution							90.90
3p0-pt1	3.0 mgd-port 1	0.0324	0.1575	44.20	6.80	95.42	105.86
3p0-pt2	3.0 mgd-port 2	0.0294	0.1473	44.20	7.43	100.11	111.72
3p0-pt3	3.0 mgd-port 3	0.0245	0.1321	44.20	8.73	107.32	121.70
3p0-pt4	3.0 mgd-port 4	0.0188	0.1143	44.20	11.82	115.59	133.92
3p0-pt5	3.0 mgd-port 5	0.0140	0.0965	44.20	25.32	96.20	142.66
3p0-pt6	3.0 mgd-port 6	0.0123	0.0889	44.20	25.50	103.58	152.19
Flux average dilution							122.40
2p2-pt1	2.2 mgd-port 1	0.0237	0.1575	44.20	7.19	114.63	128.19
2p2-pt2	2.2 mgd-port 2	0.0215	0.1473	44.20	9.21	113.11	129.75
2p2-pt3	2.2 mgd-port 3	0.0180	0.1321	44.20	10.06	123.02	141.71
2p2-pt4	2.2 mgd-port 4	0.0140	0.1143	44.20	25.02	95.72	152.10
2p2-pt5	2.2 mgd-port 5	0.0101	0.0965	44.20	25.71	110.82	151.23
2p2-pt6	2.2 mgd-port 6	0.0088	0.0889	44.20	26.37	116.33	144.27
Flux average dilution							138.45

UDKHDEN INITIAL DILUTION MODEL RUNS – DETERMINATION OF CRITICAL DENSITY PROFILE

PROGRAM UDKHDEN
SOLUTION TO MULTIPLE BUOYANT DISCHARGE PROBLEM WITH
AMBIENT CURRENTS AND VERTICAL GRADIENTS. AUG 1985

UDKHDEN CH2MHILL Version 2.2 (1-24-89)
UNIVERSAL DATA FILE: u02tw.in
CASE I.D. Utulei-**2002TW-6mgd-6 ports**
RUN TITLE: u02tw
DISCHARGE= 0.2628 CU-M/S DENSITY=1.00000 G/CM3 ** DIAMETER= 0.1969-M
** NUMBER OF PORTS= 6 ** SPACING= 2.13-M ** DEPTH = 44.20-M

AMBIENT STRATIFICATION PROFILE

DEPTH (M)	DENSITY (G/CM3)	VELOCITY (M/S)
0.00	1.02220	0.000
1.00	1.02220	0.000
4.00	1.02230	0.000
8.00	1.02250	0.000
10.00	1.02250	0.000
13.00	1.02260	0.000
14.00	1.02260	0.000
17.00	1.02270	0.000
22.00	1.02280	0.000
25.00	1.02280	0.000
30.00	1.02280	0.000
35.00	1.02290	0.000
40.00	1.02290	0.000
45.00	1.02280	0.000
46.00	1.02280	0.000

FROUDE NO= 6.86, PORT SPACING/PORT DIA= 10.82
STARTING LENGTH= 1.152

ALL LENGTHS ARE IN METERS-TIME IN SEC. FIRST LINE ARE INITIAL CONDITIONS.

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	0.00	0.00	90.00	0.00	0.20	1.000	1.000	1.000	0.00	1.00
0.00	1.15	0.09	90.00	9.84	0.54	1.000	0.986	0.985	0.80	1.95
0.00	2.58	0.71	90.00	38.90	1.57	0.387	0.303	0.302	2.86	6.37
PLUMES MERGING										
0.00	3.57	1.92	90.00	60.28	2.28	0.335	0.169	0.167	5.96	11.54
0.00	4.22	3.35	90.00	69.95	2.62	0.349	0.124	0.121	9.15	15.96
0.00	4.69	4.86	90.00	74.88	2.91	0.358	0.098	0.094	12.22	20.23
0.00	5.06	6.39	90.00	77.83	3.19	0.358	0.080	0.076	15.25	24.38
0.00	5.36	7.93	90.00	79.79	3.46	0.353	0.066	0.063	18.29	28.38
0.00	5.62	9.49	90.00	81.19	3.72	0.344	0.055	0.053	21.41	32.23
0.00	5.85	11.05	90.00	82.22	4.00	0.331	0.045	0.045	24.63	35.92
0.00	6.05	12.61	90.00	82.98	4.27	0.317	0.037	0.039	28.00	39.41
0.00	6.23	14.17	90.00	83.58	4.44	0.318	0.032	0.036	31.45	42.79
0.00	6.56	17.31	90.00	84.47	5.37	0.298	0.025	0.029	38.77	49.16
0.00	6.84	20.44	90.00	85.14	5.97	0.301	0.023	0.026	46.07	55.42
0.00	7.10	23.58	90.00	85.65	6.59	0.302	0.019	0.023	53.33	61.70
0.00	7.32	26.73	90.00	86.01	7.32	0.299	0.013	0.021	60.61	67.94
0.00	7.54	29.87	90.00	86.22	8.20	0.289	0.006	0.019	68.04	74.03
0.00	7.74	33.01	90.00	86.32	9.26	0.276	0.002	0.018	75.78	79.86
PLUMES HAVE REACHED EQUILIBRIUM HEIGHT - STRATIFIED ENVIRONMENT										
0.00	7.89	35.37	90.00	86.32	10.25	0.262	-0.001	0.017	81.89	84.02

Utulei-2002TW-6mgd-6 ports

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	7.99	36.94	90.00	86.30	10.95	0.252	-0.003	0.016	86.15	86.66
0.00	8.10	38.52	90.00	86.22	11.83	0.240	-0.008	0.016	90.59	89.19
0.00	8.20	40.09	90.00	86.04	13.02	0.224	-0.012	0.016	95.31	91.58
0.00	8.31	41.66	90.00	85.74	14.68	0.203	-0.015	0.015	100.44	93.78
0.00	8.44	43.23	90.00	85.22	17.11	0.177	-0.018	0.015	106.20	95.74

TRAPPING LEVEL= 10.33 METERS BELOW SURFACE, DILUTION= 81.39

PROGRAM UDKHDEN
SOLUTION TO MULTIPLE BUOYANT DISCHARGE PROBLEM WITH
AMBIENT CURRENTS AND VERTICAL GRADIENTS. AUG 1985

UDKHDEN CH2MHILL Version 2.2 (1-24-89)
UNIVERSAL DATA FILE: u03ntw.in
CASE I.D. Utulei-**2003NTW-6mgd-6 ports**
RUN TITLE: u03ntw
DISCHARGE= 0.2628 CU-M/S DENSITY=1.00000 G/CM3 ** DIAMETER= 0.1969-M
** NUMBER OF PORTS= 6 ** SPACING= 2.13-M ** DEPTH = 44.20-M

AMBIENT STRATIFICATION PROFILE

DEPTH (M)	DENSITY (G/CM3)	VELOCITY (M/S)
0.00	1.02169	0.000
1.00	1.02169	0.000
2.00	1.02176	0.000
4.00	1.02178	0.000
7.00	1.02187	0.000
10.00	1.02191	0.000
13.00	1.02194	0.000
17.00	1.02195	0.000
24.00	1.02196	0.000
25.00	1.02193	0.000
26.00	1.02200	0.000
29.00	1.02206	0.000
30.00	1.02201	0.000
32.00	1.02208	0.000
33.00	1.02205	0.000
39.00	1.02212	0.000
41.00	1.02233	0.000
45.00	1.02241	0.000
46.00	1.02241	0.000

FROUDE NO= 6.92, PORT SPACING/PORT DIA= 10.82
STARTING LENGTH= 1.152

ALL LENGTHS ARE IN METERS-TIME IN SEC. FIRST LINE ARE INITIAL CONDITIONS.

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	0.00	0.00	90.00	0.00	0.20	1.000	1.000	1.000	0.00	1.00
0.00	1.15	0.09	90.00	9.66	0.54	1.000	0.986	0.986	0.81	1.95
0.00	2.58	0.70	90.00	38.39	1.58	0.385	0.302	0.303	2.86	6.37
PLUMES MERGING										
0.00	3.58	1.90	90.00	59.77	2.29	0.331	0.165	0.168	5.99	11.50
0.00	4.24	3.33	90.00	69.41	2.64	0.343	0.117	0.121	9.23	15.84
0.00	4.73	4.83	90.00	74.06	2.95	0.343	0.079	0.095	12.39	19.97
0.00	5.13	6.35	90.00	76.77	3.26	0.334	0.062	0.077	15.59	23.87
0.00	5.46	7.89	90.00	78.65	3.56	0.322	0.050	0.064	18.90	27.54
0.00	5.75	9.44	90.00	80.02	3.85	0.309	0.041	0.054	22.34	31.01
0.00	6.01	10.99	90.00	81.06	4.14	0.293	0.034	0.046	25.96	34.28
0.00	6.24	12.55	90.00	81.91	4.35	0.290	0.032	0.041	29.73	37.39
0.00	6.46	14.11	90.00	82.58	4.82	0.271	0.024	0.035	33.53	40.47
0.00	6.83	17.24	90.00	83.59	5.49	0.274	0.020	0.031	41.56	46.22
0.00	7.17	20.37	90.00	84.20	6.23	0.269	0.013	0.027	49.60	51.92
0.00	7.47	23.51	90.00	84.67	6.99	0.265	0.012	0.025	57.80	57.47
0.00	7.75	26.64	90.00	85.06	7.75	0.261	0.010	0.023	66.14	62.90
0.00	8.02	29.78	90.00	85.39	8.49	0.258	0.009	0.021	74.59	68.24
0.00	8.26	32.92	90.00	85.66	9.26	0.254	0.007	0.019	83.15	73.51
Utulei-2003NTW-6mgd-6 ports										
X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	8.49	36.07	90.00	85.85	10.13	0.248	0.004	0.018	91.86	78.67
PLUMES HAVE REACHED EQUILIBRIUM HEIGHT - STRATIFIED ENVIRONMENT										
0.00	8.72	39.21	90.00	85.92	11.24	0.237	-0.001	0.017	100.87	83.67
0.00	8.83	40.78	90.00	85.88	11.99	0.229	-0.003	0.017	105.56	86.06
0.00	8.95	42.35	90.00	85.82	12.83	0.219	-0.004	0.016	110.45	88.36
0.00	9.06	43.92	90.00	85.65	13.99	0.206	-0.009	0.016	115.60	90.54

TRAPPING LEVEL= 5.35 METERS BELOW SURFACE, DILUTION= 83.10

PROGRAM UDKHDEN
SOLUTION TO MULTIPLE BUOYANT DISCHARGE PROBLEM WITH
AMBIENT CURRENTS AND VERTICAL GRADIENTS. AUG 1985

UDKHDEN CH2MHILL Version 2.2 (1-24-89)
UNIVERSAL DATA FILE: u03tw.in
CASE I.D. Utulei-**2003TW-6mgd-6 ports**
RUN TITLE: u03tw
DISCHARGE= 0.2628 CU-M/S DENSITY=1.00000 G/CM3 ** DIAMETER= 0.1969-M
** NUMBER OF PORTS= 6 ** SPACING= 2.13-M ** DEPTH = 44.20-M

AMBIENT STRATIFICATION PROFILE

DEPTH (M)	DENSITY (G/CM3)	VELOCITY (M/S)
0.00	1.02218	0.000
1.00	1.02218	0.000
4.00	1.02222	0.000
5.00	1.02225	0.000
10.00	1.02228	0.000
12.00	1.02227	0.000
16.00	1.02232	0.000
20.00	1.02234	0.000
22.00	1.02235	0.000
26.00	1.02237	0.000
29.00	1.02238	0.000
31.00	1.02240	0.000
38.00	1.02243	0.000
40.00	1.02244	0.000
43.00	1.02244	0.000
46.00	1.02246	0.000
49.00	1.02247	0.000

FROUDE NO= 6.91, PORT SPACING/PORT DIA= 10.82
STARTING LENGTH= 1.152

ALL LENGTHS ARE IN METERS-TIME IN SEC. FIRST LINE ARE INITIAL CONDITIONS.

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	0.00	0.00	90.00	0.00	0.20	1.000	1.000	1.000	0.00	1.00
0.00	1.15	0.09	90.00	9.69	0.54	1.000	0.986	0.986	0.81	1.95
0.00	2.58	0.70	90.00	38.46	1.58	0.386	0.302	0.303	2.86	6.37
PLUMES MERGING										
0.00	3.58	1.90	90.00	59.88	2.29	0.332	0.167	0.167	5.98	11.50
0.00	4.24	3.33	90.00	69.57	2.63	0.345	0.121	0.121	9.21	15.87
0.00	4.72	4.83	90.00	74.50	2.92	0.352	0.094	0.095	12.33	20.07
0.00	5.10	6.36	90.00	77.47	3.20	0.351	0.076	0.077	15.41	24.13
0.00	5.41	7.91	90.00	79.44	3.48	0.345	0.062	0.064	18.53	28.04
0.00	5.68	9.46	90.00	80.85	3.75	0.334	0.052	0.054	21.73	31.79
0.00	5.92	11.02	90.00	81.91	4.02	0.322	0.044	0.046	25.04	35.37
0.00	6.13	12.58	90.00	82.73	4.27	0.311	0.038	0.040	28.49	38.78
0.00	6.32	14.14	90.00	83.39	4.43	0.314	0.034	0.036	32.00	42.10
0.00	6.65	17.27	90.00	84.35	5.32	0.297	0.026	0.029	39.38	48.44
0.00	6.94	20.41	90.00	85.05	5.92	0.299	0.022	0.026	46.72	54.68
0.00	7.20	23.55	90.00	85.56	6.56	0.300	0.019	0.023	54.03	60.91
0.00	7.43	26.69	90.00	85.97	7.22	0.299	0.017	0.021	61.33	67.13
0.00	7.64	29.83	90.00	86.28	7.92	0.297	0.013	0.019	68.67	73.29
0.00	7.84	32.98	90.00	86.51	8.69	0.293	0.011	0.018	76.10	79.37
0.00	8.03	36.12	90.00	86.71	9.47	0.288	0.010	0.017	83.64	85.34
0.00	8.20	39.27	90.00	86.87	10.27	0.284	0.008	0.016	91.29	91.21

Utulei-2003TW-6mgd-6 ports

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	8.37	42.41	90.00	86.97	11.23	0.275	0.003	0.015	99.12	96.95

DILUTION= 100.12

PROGRAM UDKHDEN
SOLUTION TO MULTIPLE BUOYANT DISCHARGE PROBLEM WITH
AMBIENT CURRENTS AND VERTICAL GRADIENTS. AUG 1985

UDKHDEN CH2MHILL Version 2.2 (1-24-89)
UNIVERSAL DATA FILE: u04ntw.in
CASE I.D. Utulei-**2004NTW-6mgd-6 ports**
RUN TITLE: u04ntw
DISCHARGE= 0.2628 CU-M/S DENSITY=1.00000 G/CM3 ** DIAMETER= 0.1969-M
** NUMBER OF PORTS= 6 ** SPACING= 2.13-M ** DEPTH = 44.20-M

AMBIENT STRATIFICATION PROFILE

DEPTH (M)	DENSITY (G/CM3)	VELOCITY (M/S)
0.00	1.02135	0.000
1.00	1.02135	0.000
2.00	1.02173	0.000
3.00	1.02184	0.000
4.00	1.02183	0.000
5.00	1.02189	0.000
10.00	1.02191	0.000
12.00	1.02190	0.000
13.00	1.02192	0.000
15.00	1.02191	0.000
20.00	1.02194	0.000
25.00	1.02195	0.000
30.00	1.02198	0.000
35.00	1.02199	0.000
40.00	1.02202	0.000
42.00	1.02202	0.000
46.00	1.02202	0.000

FROUDE NO= 6.98, PORT SPACING/PORT DIA= 10.82
STARTING LENGTH= 1.153

ALL LENGTHS ARE IN METERS-TIME IN SEC. FIRST LINE ARE INITIAL CONDITIONS.

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	0.00	0.00	90.00	0.00	0.20	1.000	1.000	1.000	0.00	1.00
0.00	1.15	0.09	90.00	9.51	0.54	1.000	0.986	0.986	0.81	1.95
0.00	2.59	0.69	90.00	37.99	1.58	0.384	0.303	0.303	2.87	6.36
PLUMES MERGING										
0.00	3.59	1.89	90.00	59.54	2.29	0.329	0.168	0.168	6.01	11.47
0.00	4.26	3.31	90.00	69.34	2.64	0.343	0.122	0.122	9.26	15.80
0.00	4.74	4.81	90.00	74.32	2.93	0.350	0.095	0.095	12.40	19.97
0.00	5.13	6.34	90.00	77.32	3.21	0.349	0.076	0.077	15.50	24.01
0.00	5.45	7.88	90.00	79.31	3.48	0.342	0.063	0.064	18.64	27.89
0.00	5.72	9.43	90.00	80.73	3.75	0.332	0.052	0.054	21.86	31.61
0.00	5.96	10.99	90.00	81.80	4.03	0.319	0.044	0.046	25.20	35.16
0.00	6.17	12.55	90.00	82.64	4.27	0.309	0.038	0.040	28.69	38.54
0.00	6.36	14.11	90.00	83.31	4.43	0.312	0.035	0.037	32.21	41.84
0.00	6.70	17.25	90.00	84.30	5.31	0.296	0.027	0.030	39.62	48.15
0.00	6.99	20.38	90.00	85.01	5.90	0.299	0.023	0.026	46.98	54.38
0.00	7.25	23.52	90.00	85.54	6.52	0.300	0.020	0.024	54.30	60.61
0.00	7.48	26.66	90.00	85.96	7.17	0.300	0.017	0.021	61.59	66.83
0.00	7.70	29.81	90.00	86.29	7.85	0.299	0.015	0.020	68.90	73.02
0.00	7.89	32.95	90.00	86.56	8.53	0.297	0.013	0.018	76.24	79.17
0.00	8.08	36.10	90.00	86.79	9.23	0.296	0.012	0.017	83.63	85.26
0.00	8.25	39.24	90.00	86.98	9.94	0.294	0.010	0.016	91.06	91.31

Utulei-2004NTW-6mgd-6 ports

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
PLUMES HAVE REACHED EQUILIBRIUM HEIGHT - STRATIFIED ENVIRONMENT										
0.00	8.41	42.39	90.00	87.05	10.97	0.283	-0.006	0.015	98.63	97.25
0.00	8.49	43.96	90.00	86.83	12.47	0.255	-0.029	0.014	102.69	100.04

TRAPPING LEVEL= 2.42 METERS BELOW SURFACE, DILUTION= 96.13

PROGRAM UDKHDEN
SOLUTION TO MULTIPLE BUOYANT DISCHARGE PROBLEM WITH
AMBIENT CURRENTS AND VERTICAL GRADIENTS. AUG 1985

UDKHDEN CH2MHILL Version 2.2 (1-24-89)
UNIVERSAL DATA FILE: u04tw.in
CASE I.D. Utulei-**2004NTW-6mgd-6 ports**
RUN TITLE: u04tw
DISCHARGE= 0.2628 CU-M/S DENSITY=1.00000 G/CM3 ** DIAMETER= 0.1969-M
** NUMBER OF PORTS= 6 ** SPACING= 2.13-M ** DEPTH = 44.20-M

AMBIENT STRATIFICATION PROFILE

DEPTH (M)	DENSITY (G/CM3)	VELOCITY (M/S)
0.00	1.02265	0.000
1.00	1.02265	0.000
3.00	1.02266	0.000
5.00	1.02263	0.000
8.00	1.02264	0.000
10.00	1.02266	0.000
12.00	1.02270	0.000
15.00	1.02271	0.000
20.00	1.02271	0.000
25.00	1.02272	0.000
30.00	1.02273	0.000
35.00	1.02273	0.000
40.00	1.02273	0.000
44.00	1.02273	0.000
46.00	1.02273	0.000

FROUDE NO= 6.87, PORT SPACING/PORT DIA= 10.82
STARTING LENGTH= 1.152

ALL LENGTHS ARE IN METERS-TIME IN SEC. FIRST LINE ARE INITIAL CONDITIONS.

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	0.00	0.00	90.00	0.00	0.20	1.000	1.000	1.000	0.00	1.00
0.00	1.15	0.09	90.00	9.80	0.54	1.000	0.986	0.986	0.80	1.95
0.00	2.58	0.71	90.00	38.78	1.58	0.387	0.302	0.302	2.86	6.37
PLUMES MERGING										
0.00	3.57	1.92	90.00	60.13	2.28	0.334	0.167	0.167	5.96	11.53
0.00	4.22	3.35	90.00	69.76	2.63	0.347	0.121	0.121	9.17	15.92
0.00	4.70	4.85	90.00	74.65	2.92	0.354	0.094	0.094	12.27	20.14
0.00	5.08	6.38	90.00	77.60	3.20	0.353	0.077	0.077	15.34	24.23
0.00	5.39	7.92	90.00	79.57	3.47	0.347	0.063	0.063	18.44	28.17
0.00	5.65	9.48	90.00	80.98	3.74	0.338	0.053	0.053	21.60	31.95
0.00	5.88	11.03	90.00	82.05	4.01	0.326	0.046	0.046	24.87	35.58
0.00	6.09	12.60	90.00	82.88	4.26	0.316	0.040	0.040	28.28	39.04
0.00	6.28	14.16	90.00	83.54	4.42	0.319	0.036	0.036	31.73	42.42
0.00	6.60	17.29	90.00	84.53	5.25	0.304	0.029	0.029	38.96	48.88
0.00	6.88	20.43	90.00	85.24	5.82	0.308	0.025	0.026	46.12	55.29
0.00	7.13	23.57	90.00	85.78	6.42	0.311	0.022	0.023	53.19	61.73
0.00	7.35	26.71	90.00	86.19	7.04	0.312	0.020	0.021	60.22	68.19
0.00	7.55	29.86	90.00	86.54	7.66	0.313	0.018	0.019	67.23	74.66
0.00	7.73	33.00	90.00	86.81	8.30	0.313	0.015	0.018	74.21	81.12
0.00	7.90	36.15	90.00	87.01	9.05	0.309	0.011	0.016	81.24	87.53
0.00	8.06	39.30	90.00	87.17	9.85	0.304	0.010	0.015	88.38	93.84
0.00	8.21	42.44	90.00	87.32	10.58	0.302	0.011	0.014	95.60	100.05

DILUTION= 103.50

UDKHDEN INITIAL DILUTION MODEL RUNS – CRITCAL PROFILE WITHOUT ORIFICE PLATES

PROGRAM UDKHDEN
SOLUTION TO MULTIPLE BUOYANT DISCHARGE PROBLEM WITH
AMBIENT CURRENTS AND VERTICAL GRADIENTS. AUG 1985

UDKHDEN CH2MHILL Version 2.2 (1-24-89)
UNIVERSAL DATA FILE: 2p2mgd.in
CASE I.D. Utulei-2003NTW-2.2 mgd-6 ports
RUN TITLE: 2.2 mgd case for 2003 NTW
DISCHARGE= 0.0964 CU-M/S DENSITY=1.00000 G/CM3 ** DIAMETER= 0.1969-M
** NUMBER OF PORTS= 6 ** SPACING= 2.13-M ** DEPTH = 44.20-M

AMBIENT STRATIFICATION PROFILE

DEPTH (M)	DENSITY (G/CM3)	VELOCITY (M/S)
0.00	1.02169	0.000
1.00	1.02169	0.000
2.00	1.02176	0.000
4.00	1.02178	0.000
7.00	1.02187	0.000
10.00	1.02191	0.000
13.00	1.02194	0.000
17.00	1.02195	0.000
24.00	1.02196	0.000
25.00	1.02193	0.000
26.00	1.02200	0.000
29.00	1.02206	0.000
30.00	1.02201	0.000
32.00	1.02208	0.000
33.00	1.02205	0.000
39.00	1.02212	0.000
41.00	1.02233	0.000
45.00	1.02241	0.000
46.00	1.02241	0.000

FROUDE NO= 2.54, PORT SPACING/PORT DIA= 10.82
STARTING LENGTH= 0.890

ALL LENGTHS ARE IN METERS-TIME IN SEC. FIRST LINE ARE INITIAL CONDITIONS.

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	0.00	0.00	90.00	0.00	0.20	1.000	1.000	1.000	0.00	1.00
0.00	0.92	0.45	90.00	52.30	0.69	1.000	0.613	0.614	2.00	3.14
0.00	1.52	1.89	90.00	76.30	1.39	0.792	0.188	0.190	5.45	10.14
0.00	1.80	3.44	90.00	82.23	2.06	0.704	0.093	0.097	9.46	19.89
PLUMES MERGING										
0.00	1.98	5.00	90.00	84.53	2.54	0.679	0.051	0.066	13.82	29.17
0.00	2.11	6.57	90.00	85.64	2.90	0.664	0.037	0.051	18.29	37.08
0.00	2.22	8.14	90.00	86.36	3.21	0.645	0.029	0.042	22.87	44.55
0.00	2.31	9.71	90.00	86.85	3.52	0.617	0.022	0.035	27.63	51.60
0.00	2.40	11.29	90.00	87.20	3.84	0.582	0.018	0.029	32.65	58.19
0.00	2.47	12.86	90.00	87.50	4.13	0.553	0.016	0.025	37.94	64.34
0.00	2.53	14.44	90.00	87.71	4.38	0.536	0.011	0.022	43.45	70.16
0.00	2.59	16.01	90.00	87.89	4.95	0.501	0.011	0.019	49.16	75.79
0.00	2.70	19.16	90.00	88.10	5.72	0.489	0.002	0.017	61.16	86.26
0.00	2.81	22.31	90.00	88.18	6.77	0.458	0.003	0.015	73.81	96.12
0.00	2.90	25.46	90.00	88.25	7.77	0.435	0.002	0.014	87.20	105.36
0.00	3.00	28.60	90.00	88.32	8.78	0.416	0.002	0.012	101.23	114.15
0.00	3.09	31.75	90.00	88.36	9.83	0.398	0.001	0.012	115.89	122.53

PLUMES HAVE REACHED EQUILIBRIUM HEIGHT - STRATIFIED ENVIRONMENT

Utulei-2003NTW-2.2 mgd-6 ports

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	3.16	34.12	90.00	88.36	10.82	0.379	-0.001	0.011	127.40	128.53
0.00	3.20	35.69	90.00	88.33	11.66	0.361	-0.002	0.011	135.46	132.34
0.00	3.25	37.26	90.00	88.26	12.78	0.338	-0.003	0.010	143.98	135.94
0.00	3.30	38.84	90.00	88.10	14.58	0.303	-0.006	0.010	153.26	139.26
0.00	3.35	40.41	90.00	87.72	18.17	0.247	-0.009	0.010	164.08	142.14
0.00	3.43	41.99	90.00	86.57	27.81	0.161	-0.010	0.010	178.69	144.32

PLUMES HAVE REACHED MAXIMUM HEIGHT - STRATIFIED ENVIRONMENT

TRAPPING LEVEL= 11.38 METERS BELOW SURFACE, DILUTION= 125.29

PROGRAM UDKHDEN
SOLUTION TO MULTIPLE BUOYANT DISCHARGE PROBLEM WITH
AMBIENT CURRENTS AND VERTICAL GRADIENTS. AUG 1985

UDKHDEN CH2MHILL Version 2.2 (1-24-89)
UNIVERSAL DATA FILE: 3p0mgd.in
CASE I.D. Utulei-2003NTW-3.0 mgd-6 ports
RUN TITLE: 3.0 mgd for 2003 NTW
DISCHARGE= 0.1314 CU-M/S DENSITY=1.00000 G/CM3 ** DIAMETER= 0.1969-M
** NUMBER OF PORTS= 6 ** SPACING= 2.13-M ** DEPTH = 44.20-M

AMBIENT STRATIFICATION PROFILE

DEPTH (M)	DENSITY (G/CM3)	VELOCITY (M/S)
0.00	1.02169	0.000
1.00	1.02169	0.000
2.00	1.02176	0.000
4.00	1.02178	0.000
7.00	1.02187	0.000
10.00	1.02191	0.000
13.00	1.02194	0.000
17.00	1.02195	0.000
24.00	1.02196	0.000
25.00	1.02193	0.000
26.00	1.02200	0.000
29.00	1.02206	0.000
30.00	1.02201	0.000
32.00	1.02208	0.000
33.00	1.02205	0.000
39.00	1.02212	0.000
41.00	1.02233	0.000
45.00	1.02241	0.000
46.00	1.02241	0.000

FROUDE NO= 3.46, PORT SPACING/PORT DIA= 10.82
STARTING LENGTH= 1.044

ALL LENGTHS ARE IN METERS-TIME IN SEC. FIRST LINE ARE INITIAL CONDITIONS.

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	0.00	0.00	90.00	0.00	0.20	1.000	1.000	1.000	0.00	1.00
0.00	1.05	0.30	90.00	33.68	0.59	1.000	0.832	0.833	1.54	2.31
0.00	1.96	1.55	90.00	67.92	1.37	0.637	0.240	0.242	4.53	7.97
0.00	2.40	3.06	90.00	77.82	2.04	0.570	0.120	0.122	8.18	15.76
PLUMES MERGING										
0.00	2.68	4.61	90.00	81.64	2.52	0.556	0.070	0.082	12.11	23.38
0.00	2.88	6.17	90.00	83.42	2.87	0.547	0.049	0.064	16.09	29.92
0.00	3.04	7.74	90.00	84.55	3.18	0.534	0.038	0.052	20.15	36.11
0.00	3.18	9.31	90.00	85.32	3.49	0.514	0.030	0.043	24.35	41.97
0.00	3.30	10.88	90.00	85.87	3.80	0.487	0.024	0.036	28.76	47.48
0.00	3.41	12.45	90.00	86.31	4.09	0.462	0.022	0.030	33.40	52.64
0.00	3.51	14.02	90.00	86.65	4.34	0.448	0.016	0.027	38.24	57.51
0.00	3.60	15.59	90.00	86.91	4.82	0.417	0.015	0.023	43.18	62.26
0.00	3.75	18.74	90.00	87.28	5.57	0.415	0.007	0.020	53.68	71.08
0.00	3.90	21.89	90.00	87.45	6.49	0.396	0.005	0.018	64.52	79.53
0.00	4.03	25.04	90.00	87.61	7.36	0.383	0.005	0.016	75.78	87.60
0.00	4.16	28.18	90.00	87.74	8.22	0.372	0.004	0.015	87.40	95.39
0.00	4.28	31.33	90.00	87.85	9.10	0.362	0.003	0.014	99.33	102.95
0.00	4.40	34.48	90.00	87.91	10.11	0.348	0.001	0.013	111.64	110.27

Utulei-2003NTW-3.0 mgd-6 ports

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
PLUMES HAVE REACHED EQUILIBRIUM HEIGHT - STRATIFIED ENVIRONMENT										
0.00	4.48	36.84	90.00	87.91	11.10	0.332	-0.001	0.012	121.29	115.52
0.00	4.54	38.41	90.00	87.86	12.00	0.315	-0.004	0.012	128.04	118.85
0.00	4.60	39.99	90.00	87.74	13.33	0.291	-0.007	0.012	135.26	121.97
0.00	4.67	41.56	90.00	87.52	15.29	0.259	-0.008	0.011	143.22	124.81
0.00	4.74	43.14	90.00	87.10	18.55	0.217	-0.012	0.011	152.39	127.29

TRAPPING LEVEL= 8.71 METERS BELOW SURFACE, DILUTION= 112.54

PROGRAM UDKHDEN
SOLUTION TO MULTIPLE BUOYANT DISCHARGE PROBLEM WITH
AMBIENT CURRENTS AND VERTICAL GRADIENTS. AUG 1985

UDKHDEN CH2MHILL Version 2.2 (1-24-89)
UNIVERSAL DATA FILE: u03ntw.in
CASE I.D. Utulei-2003NTW-6mgd-6 ports
RUN TITLE: u03ntw
DISCHARGE= 0.2628 CU-M/S DENSITY=1.00000 G/CM3 ** DIAMETER= 0.1969-M
** NUMBER OF PORTS= 6 ** SPACING= 2.13-M ** DEPTH = 44.20-M

AMBIENT STRATIFICATION PROFILE

DEPTH (M)	DENSITY (G/CM3)	VELOCITY (M/S)
0.00	1.02169	0.000
1.00	1.02169	0.000
2.00	1.02176	0.000
4.00	1.02178	0.000
7.00	1.02187	0.000
10.00	1.02191	0.000
13.00	1.02194	0.000
17.00	1.02195	0.000
24.00	1.02196	0.000
25.00	1.02193	0.000
26.00	1.02200	0.000
29.00	1.02206	0.000
30.00	1.02201	0.000
32.00	1.02208	0.000
33.00	1.02205	0.000
39.00	1.02212	0.000
41.00	1.02233	0.000
45.00	1.02241	0.000
46.00	1.02241	0.000

FROUDE NO= 6.92, PORT SPACING/PORT DIA= 10.82
STARTING LENGTH= 1.152

ALL LENGTHS ARE IN METERS-TIME IN SEC. FIRST LINE ARE INITIAL CONDITIONS.

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	0.00	0.00	90.00	0.00	0.20	1.000	1.000	1.000	0.00	1.00
0.00	1.15	0.09	90.00	9.66	0.54	1.000	0.986	0.986	0.81	1.95
0.00	2.58	0.70	90.00	38.39	1.58	0.385	0.302	0.303	2.86	6.37
PLUMES MERGING										
0.00	3.58	1.90	90.00	59.77	2.29	0.331	0.165	0.168	5.99	11.50
0.00	4.24	3.33	90.00	69.41	2.64	0.343	0.117	0.121	9.23	15.84
0.00	4.73	4.83	90.00	74.06	2.95	0.343	0.079	0.095	12.39	19.97
0.00	5.13	6.35	90.00	76.77	3.26	0.334	0.062	0.077	15.59	23.87
0.00	5.46	7.89	90.00	78.65	3.56	0.322	0.050	0.064	18.90	27.54
0.00	5.75	9.44	90.00	80.02	3.85	0.309	0.041	0.054	22.34	31.01
0.00	6.01	10.99	90.00	81.06	4.14	0.293	0.034	0.046	25.96	34.28
0.00	6.24	12.55	90.00	81.91	4.35	0.290	0.032	0.041	29.73	37.39
0.00	6.46	14.11	90.00	82.58	4.82	0.271	0.024	0.035	33.53	40.47
0.00	6.83	17.24	90.00	83.59	5.49	0.274	0.020	0.031	41.56	46.22
0.00	7.17	20.37	90.00	84.20	6.23	0.269	0.013	0.027	49.60	51.92
0.00	7.47	23.51	90.00	84.67	6.99	0.265	0.012	0.025	57.80	57.47
0.00	7.75	26.64	90.00	85.06	7.75	0.261	0.010	0.023	66.14	62.90
0.00	8.02	29.78	90.00	85.39	8.49	0.258	0.009	0.021	74.59	68.24
0.00	8.26	32.92	90.00	85.66	9.26	0.254	0.007	0.019	83.15	73.51
Utulei-2003NTW-6mgd-6 ports										
X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	8.49	36.07	90.00	85.85	10.13	0.248	0.004	0.018	91.86	78.67
PLUMES HAVE REACHED EQUILIBRIUM HEIGHT - STRATIFIED ENVIRONMENT										
0.00	8.72	39.21	90.00	85.92	11.24	0.237	-0.001	0.017	100.87	83.67
0.00	8.83	40.78	90.00	85.88	11.99	0.229	-0.003	0.017	105.56	86.06
0.00	8.95	42.35	90.00	85.82	12.83	0.219	-0.004	0.016	110.45	88.36
0.00	9.06	43.92	90.00	85.65	13.99	0.206	-0.009	0.016	115.60	90.54

TRAPPING LEVEL= 5.35 METERS BELOW SURFACE, DILUTION= 83.10

UDKHDEN INITIAL DILUTION MODEL RUNS – CRITCAL PROFILE WITH ORIFICE PLATES

PROGRAM UDKHDEN
SOLUTION TO MULTIPLE BUOYANT DISCHARGE PROBLEM WITH
AMBIENT CURRENTS AND VERTICAL GRADIENTS. AUG 1985

UDKHDEN CH2MHILL Version 2.2 (1-24-89)
UNIVERSAL DATA FILE: 2p2-pt1.in
CASE I.D. Utulei-2003NTW-2.2 mgd-Port 1 (0.54 mgdx2--6.2" port)
RUN TITLE: 2.2 mgd port 1 6.2" orifice
DISCHARGE= 0.0473 CU-M/S DENSITY=1.00000 G/CM3 ** DIAMETER= 0.1575-M
** NUMBER OF PORTS= 2 ** SPACING= 2.13-M ** DEPTH = 44.20-M

AMBIENT STRATIFICATION PROFILE

DEPTH (M)	DENSITY (G/CM3)	VELOCITY (M/S)
0.00	1.02169	0.000
1.00	1.02169	0.000
2.00	1.02176	0.000
4.00	1.02178	0.000
7.00	1.02187	0.000
10.00	1.02191	0.000
13.00	1.02194	0.000
17.00	1.02195	0.000
24.00	1.02196	0.000
25.00	1.02193	0.000
26.00	1.02200	0.000
29.00	1.02206	0.000
30.00	1.02201	0.000
32.00	1.02208	0.000
33.00	1.02205	0.000
39.00	1.02212	0.000
41.00	1.02233	0.000
45.00	1.02241	0.000
46.00	1.02241	0.000

FROUDE NO= 6.53, PORT SPACING/PORT DIA= 13.52
STARTING LENGTH= 0.916

ALL LENGTHS ARE IN METERS-TIME IN SEC. FIRST LINE ARE INITIAL CONDITIONS.

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	0.00	0.00	90.00	0.00	0.16	1.000	1.000	1.000	0.00	1.00
0.00	0.92	0.08	90.00	10.78	0.43	1.000	0.982	0.982	0.76	1.96
0.00	2.04	0.61	90.00	41.33	1.25	0.396	0.298	0.298	2.68	6.45
0.00	2.79	1.61	90.00	61.99	1.82	0.345	0.161	0.163	5.54	11.82
PLUMES MERGING										
0.00	3.28	2.77	90.00	71.30	2.29	0.331	0.104	0.107	8.63	17.98
0.00	3.63	3.98	90.00	75.93	2.57	0.338	0.074	0.083	11.74	23.22
0.00	3.91	5.21	90.00	78.41	2.85	0.334	0.051	0.068	14.83	28.20
0.00	4.14	6.45	90.00	80.04	3.11	0.327	0.042	0.057	17.98	32.94
0.00	4.35	7.69	90.00	81.25	3.36	0.317	0.035	0.049	21.21	37.46
0.00	4.53	8.94	90.00	82.16	3.60	0.305	0.029	0.042	24.55	41.77
0.00	4.69	10.18	90.00	82.88	3.85	0.292	0.024	0.037	28.03	45.85
0.00	4.84	11.44	90.00	83.45	4.11	0.277	0.020	0.032	31.68	49.71
0.00	5.11	13.94	90.00	84.34	4.45	0.270	0.015	0.027	39.32	56.97
0.00	5.34	16.45	90.00	85.01	5.22	0.255	0.014	0.022	47.47	63.70
0.00	5.55	18.96	90.00	85.47	5.76	0.254	0.008	0.020	55.61	70.37
0.00	5.74	21.47	90.00	85.76	6.41	0.248	0.008	0.019	63.90	76.90
0.00	5.92	23.99	90.00	86.03	7.02	0.244	0.007	0.017	72.33	83.28
0.00	6.09	26.50	90.00	86.26	7.63	0.241	0.006	0.016	80.88	89.56

Utulei-2003NTW-2.2 mgd-Port 1 (0.54 mgdx2--6.2" port)

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	6.25	29.02	90.00	86.46	8.24	0.238	0.006	0.015	89.53	95.74
0.00	6.41	31.53	90.00	86.63	8.87	0.235	0.005	0.014	98.30	101.83
0.00	6.55	34.05	90.00	86.75	9.58	0.230	0.003	0.013	107.20	107.82
0.00	6.69	36.56	90.00	86.80	10.44	0.222	0.001	0.013	116.36	113.63
PLUMES HAVE REACHED EQUILIBRIUM HEIGHT - STRATIFIED ENVIRONMENT										
0.00	6.82	38.77	90.00	86.78	11.44	0.211	-0.003	0.012	124.72	118.51
0.00	6.89	40.02	90.00	86.69	12.24	0.202	-0.005	0.012	129.74	121.17
0.00	6.96	41.28	90.00	86.56	13.25	0.190	-0.006	0.012	135.04	123.68
0.00	7.04	42.54	90.00	86.37	14.49	0.177	-0.009	0.011	140.69	126.04
0.00	7.12	43.80	90.00	85.98	16.57	0.157	-0.012	0.011	146.90	128.19

TRAPPING LEVEL= 7.19 METERS BELOW SURFACE, DILUTION= 114.63

PROGRAM UDKHDEN
SOLUTION TO MULTIPLE BUOYANT DISCHARGE PROBLEM WITH
AMBIENT CURRENTS AND VERTICAL GRADIENTS. AUG 1985

UDKHDEN CH2MHILL Version 2.2 (1-24-89)
UNIVERSAL DATA FILE: 2p2-pt2.in
CASE I.D. Utulei-2003NTW-2.2 mgd-Port 2 (0.49 mgdx2--5.8" port)
RUN TITLE: 2.2 mgd port 2 5.8" orifice
DISCHARGE= 0.0429 CU-M/S DENSITY=1.00000 G/CM3 ** DIAMETER= 0.1473-M
** NUMBER OF PORTS= 2 ** SPACING= 2.13-M ** DEPTH = 44.20-M

AMBIENT STRATIFICATION PROFILE

DEPTH (M)	DENSITY (G/CM3)	VELOCITY (M/S)
0.00	1.02169	0.000
1.00	1.02169	0.000
2.00	1.02176	0.000
4.00	1.02178	0.000
7.00	1.02187	0.000
10.00	1.02191	0.000
13.00	1.02194	0.000
17.00	1.02195	0.000
24.00	1.02196	0.000
25.00	1.02193	0.000
26.00	1.02200	0.000
29.00	1.02206	0.000
30.00	1.02201	0.000
32.00	1.02208	0.000
33.00	1.02205	0.000
39.00	1.02212	0.000
41.00	1.02233	0.000
45.00	1.02241	0.000
46.00	1.02241	0.000

FROUDE NO= 7.00, PORT SPACING/PORT DIA= 14.46
STARTING LENGTH= 0.858

ALL LENGTHS ARE IN METERS-TIME IN SEC. FIRST LINE ARE INITIAL CONDITIONS.

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	0.00	0.00	90.00	0.00	0.15	1.000	1.000	1.000	0.00	1.00
0.00	0.86	0.06	90.00	9.40	0.41	1.000	0.987	0.987	0.69	1.95
0.00	1.93	0.51	90.00	37.88	1.19	0.380	0.300	0.301	2.46	6.40
0.00	2.69	1.41	90.00	59.49	1.74	0.325	0.164	0.166	5.17	11.61
PLUMES MERGING										
0.00	3.18	2.47	90.00	69.63	2.22	0.307	0.105	0.108	8.14	17.88
0.00	3.54	3.60	90.00	74.80	2.51	0.312	0.076	0.083	11.16	23.31
0.00	3.82	4.74	90.00	77.60	2.77	0.312	0.053	0.068	14.15	28.34
0.00	4.05	5.90	90.00	79.29	3.02	0.305	0.041	0.057	17.18	33.10
0.00	4.26	7.06	90.00	80.56	3.26	0.296	0.034	0.049	20.29	37.62
0.00	4.44	8.22	90.00	81.53	3.49	0.286	0.028	0.043	23.50	41.94
0.00	4.60	9.39	90.00	82.29	3.73	0.274	0.024	0.037	26.83	46.05
0.00	4.76	10.56	90.00	82.90	3.96	0.263	0.020	0.033	30.31	49.96
0.00	5.03	12.90	90.00	83.86	4.35	0.249	0.016	0.027	37.73	57.21
0.00	5.27	15.24	90.00	84.50	5.09	0.230	0.013	0.022	45.65	63.98
0.00	5.48	17.59	90.00	85.00	5.58	0.230	0.009	0.020	53.78	70.44
0.00	5.68	19.94	90.00	85.26	6.24	0.222	0.005	0.019	62.04	76.76
0.00	5.87	22.29	90.00	85.49	6.91	0.216	0.005	0.017	70.58	82.85
0.00	6.05	24.64	90.00	85.68	7.57	0.211	0.004	0.016	79.35	88.75

Utulei-2003NTW-2.2 mgd-Port 2 (0.49 mgdx2--5.8" port)

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	6.22	26.99	90.00	85.86	8.22	0.207	0.004	0.015	88.32	94.51
0.00	6.39	29.34	90.00	86.01	8.87	0.202	0.003	0.014	97.48	100.13
0.00	6.55	31.69	90.00	86.14	9.54	0.198	0.002	0.014	106.83	105.63
0.00	6.71	34.04	90.00	86.21	10.32	0.192	0.001	0.013	116.41	110.99
PLUMES HAVE REACHED EQUILIBRIUM HEIGHT - STRATIFIED ENVIRONMENT										
0.00	6.85	36.10	90.00	86.21	11.18	0.185	-0.001	0.012	125.09	115.52
0.00	6.92	37.28	90.00	86.17	11.77	0.179	-0.002	0.012	130.24	118.01
0.00	7.00	38.45	90.00	86.08	12.54	0.171	-0.004	0.012	135.59	120.41
0.00	7.09	39.63	90.00	85.90	13.59	0.161	-0.006	0.012	141.22	122.69
0.00	7.17	40.80	90.00	85.60	15.07	0.147	-0.008	0.011	147.30	124.80
0.00	7.27	41.98	90.00	85.17	17.04	0.132	-0.008	0.011	154.01	126.73
0.00	7.37	43.15	90.00	84.31	20.45	0.111	-0.013	0.011	161.68	128.42
0.00	7.51	44.32	90.00	81.91	29.48	0.077	-0.013	0.011	171.65	129.75

TRAPPING LEVEL= 9.21 METERS BELOW SURFACE, DILUTION= 113.11

PROGRAM UDKHDEN
SOLUTION TO MULTIPLE BUOYANT DISCHARGE PROBLEM WITH
AMBIENT CURRENTS AND VERTICAL GRADIENTS. AUG 1985

UDKHDEN CH2MHILL Version 2.2 (1-24-89)
UNIVERSAL DATA FILE: 2p2-pt3.in
CASE I.D. Utulei-2003NTW-2.2 mgd-Port 3 (0.41 mgdx2--5.2" port)
RUN TITLE: 2.2 mgd port 3 5.2" orifice
DISCHARGE= 0.0359 CU-M/S DENSITY=1.00000 G/CM3 ** DIAMETER= 0.1321-M
** NUMBER OF PORTS= 2 ** SPACING= 2.13-M ** DEPTH = 44.20-M

AMBIENT STRATIFICATION PROFILE

DEPTH (M)	DENSITY (G/CM3)	VELOCITY (M/S)
0.00	1.02169	0.000
1.00	1.02169	0.000
2.00	1.02176	0.000
4.00	1.02178	0.000
7.00	1.02187	0.000
10.00	1.02191	0.000
13.00	1.02194	0.000
17.00	1.02195	0.000
24.00	1.02196	0.000
25.00	1.02193	0.000
26.00	1.02200	0.000
29.00	1.02206	0.000
30.00	1.02201	0.000
32.00	1.02208	0.000
33.00	1.02205	0.000
39.00	1.02212	0.000
41.00	1.02233	0.000
45.00	1.02241	0.000
46.00	1.02241	0.000

FROUDE NO= 7.69, PORT SPACING/PORT DIA= 16.12
STARTING LENGTH= 0.771

ALL LENGTHS ARE IN METERS-TIME IN SEC. FIRST LINE ARE INITIAL CONDITIONS.

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	0.00	0.00	90.00	0.00	0.13	1.000	1.000	1.000	0.00	1.00
0.00	0.77	0.05	90.00	7.80	0.36	1.000	0.991	0.991	0.59	1.94
0.00	1.76	0.39	90.00	33.29	1.09	0.362	0.303	0.303	2.16	6.35
0.00	2.49	1.14	90.00	55.83	1.60	0.300	0.168	0.169	4.66	11.36
0.00	2.99	2.08	90.00	67.12	2.04	0.283	0.109	0.111	7.43	17.35
PLUMES MERGING										
0.00	3.34	3.07	90.00	73.07	2.37	0.281	0.080	0.083	10.31	23.31
0.00	3.62	4.09	90.00	76.41	2.61	0.284	0.057	0.067	13.16	28.51
0.00	3.84	5.12	90.00	78.37	2.84	0.281	0.040	0.057	16.02	33.48
0.00	4.05	6.16	90.00	79.68	3.07	0.273	0.033	0.049	18.94	38.20
0.00	4.23	7.20	90.00	80.71	3.29	0.264	0.028	0.043	21.94	42.69
0.00	4.39	8.25	90.00	81.53	3.51	0.255	0.023	0.038	25.05	46.97
0.00	4.54	9.29	90.00	82.19	3.73	0.244	0.020	0.034	28.28	51.06
0.00	4.81	11.39	90.00	83.19	4.17	0.223	0.014	0.027	35.18	58.62
0.00	5.04	13.49	90.00	83.97	4.44	0.220	0.012	0.023	42.51	65.62
0.00	5.25	15.59	90.00	84.52	5.18	0.205	0.011	0.020	50.35	72.17
0.00	5.45	17.70	90.00	84.98	5.61	0.205	0.008	0.018	58.21	78.57
0.00	5.63	19.80	90.00	85.19	6.24	0.198	0.003	0.017	66.19	84.86
0.00	5.80	21.91	90.00	85.38	6.85	0.192	0.004	0.016	74.46	90.90
Utulei-2003NTW-2.2 mgd-Port 3 (0.41 mgdx2--5.2" port)										
X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	5.97	24.02	90.00	85.55	7.46	0.188	0.003	0.015	82.95	96.76
0.00	6.13	26.12	90.00	85.71	8.06	0.184	0.003	0.014	91.64	102.47
0.00	6.28	28.23	90.00	85.85	8.66	0.180	0.003	0.013	100.51	108.05
0.00	6.43	30.34	90.00	85.96	9.27	0.176	0.002	0.013	109.57	113.51
PLUMES HAVE REACHED EQUILIBRIUM HEIGHT - STRATIFIED ENVIRONMENT										
0.00	6.73	34.56	90.00	86.08	10.73	0.166	0.000	0.011	128.36	124.02
0.00	6.80	35.61	90.00	86.06	11.23	0.162	-0.001	0.011	133.28	126.53
0.00	6.87	36.67	90.00	86.01	11.80	0.157	-0.002	0.011	138.34	128.96
0.00	6.95	37.72	90.00	85.92	12.48	0.151	-0.003	0.011	143.58	131.31
0.00	7.02	38.77	90.00	85.76	13.39	0.143	-0.005	0.011	149.06	133.56
0.00	7.10	39.83	90.00	85.49	14.70	0.132	-0.007	0.011	154.93	135.67
0.00	7.19	40.88	90.00	85.03	16.62	0.118	-0.008	0.010	161.38	137.59
0.00	7.29	41.93	90.00	84.30	19.46	0.102	-0.009	0.010	168.71	139.29
0.00	7.40	42.98	90.00	82.85	24.81	0.080	-0.012	0.010	177.52	140.71
0.00	7.58	44.02	90.00	75.94	47.84	0.041	-0.012	0.010	190.86	141.71

TRAPPING LEVEL= 10.06 METERS BELOW SURFACE, DILUTION= 123.02

PROGRAM UDKHDEN
SOLUTION TO MULTIPLE BUOYANT DISCHARGE PROBLEM WITH
AMBIENT CURRENTS AND VERTICAL GRADIENTS. AUG 1985

UDKHDEN CH2MHILL Version 2.2 (1-24-89)
UNIVERSAL DATA FILE: 2p2-pt4.in
CASE I.D. Utulei-2003NTW-2.2 mgd-Port 4 (0.32 mgdx2--4.5" port)
RUN TITLE: 2.2 mgd port 4 4.5" orifice
DISCHARGE= 0.0280 CU-M/S DENSITY=1.00000 G/CM3 ** DIAMETER= 0.1143-M
** NUMBER OF PORTS= 2 ** SPACING= 2.13-M ** DEPTH = 44.20-M

AMBIENT STRATIFICATION PROFILE

DEPTH (M)	DENSITY (G/CM3)	VELOCITY (M/S)
0.00	1.02169	0.000
1.00	1.02169	0.000
2.00	1.02176	0.000
4.00	1.02178	0.000
7.00	1.02187	0.000
10.00	1.02191	0.000
13.00	1.02194	0.000
17.00	1.02195	0.000
24.00	1.02196	0.000
25.00	1.02193	0.000
26.00	1.02200	0.000
29.00	1.02206	0.000
30.00	1.02201	0.000
32.00	1.02208	0.000
33.00	1.02205	0.000
39.00	1.02212	0.000
41.00	1.02233	0.000
45.00	1.02241	0.000
46.00	1.02241	0.000

FROUDE NO= 8.61, PORT SPACING/PORT DIA= 18.64
STARTING LENGTH= 0.667

ALL LENGTHS ARE IN METERS-TIME IN SEC. FIRST LINE ARE INITIAL CONDITIONS.

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	0.00	0.00	90.00	0.00	0.11	1.000	1.000	1.000	0.00	1.00
0.00	0.67	0.03	90.00	6.23	0.31	1.000	0.994	0.994	0.49	1.94
0.00	1.54	0.28	90.00	28.05	0.96	0.345	0.305	0.305	1.82	6.31
0.00	2.23	0.87	90.00	51.00	1.44	0.274	0.172	0.173	4.06	11.13
0.00	2.72	1.64	90.00	63.71	1.82	0.257	0.113	0.115	6.60	16.80
PLUMES MERGING										
0.00	3.07	2.49	90.00	70.63	2.19	0.246	0.080	0.082	9.26	23.34
0.00	3.34	3.36	90.00	74.72	2.43	0.249	0.062	0.066	11.97	29.02
0.00	3.56	4.25	90.00	77.18	2.64	0.250	0.045	0.056	14.64	34.28
0.00	3.75	5.14	90.00	78.71	2.84	0.246	0.032	0.049	17.34	39.29
0.00	3.92	6.04	90.00	79.78	3.05	0.239	0.026	0.043	20.10	44.06
0.00	4.07	6.94	90.00	80.64	3.25	0.232	0.023	0.038	22.96	48.60
0.00	4.21	7.84	90.00	81.35	3.45	0.224	0.019	0.034	25.90	52.95
0.00	4.47	9.65	90.00	82.44	3.83	0.207	0.014	0.028	32.12	61.08
0.00	4.70	11.47	90.00	83.21	4.22	0.190	0.011	0.023	38.90	68.44
0.00	4.90	13.29	90.00	83.88	4.44	0.189	0.009	0.020	45.99	75.36
0.00	5.09	15.11	90.00	84.31	5.19	0.174	0.008	0.017	53.61	81.83
0.00	5.27	16.93	90.00	84.71	5.57	0.174	0.006	0.016	61.32	88.10
0.00	5.43	18.75	90.00	84.94	6.07	0.170	0.001	0.015	69.11	94.28

Utulei-2003NTW-2.2 mgd-Port 4 (0.32 mgdx2--4.5" port)

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
PLUMES HAVE REACHED EQUILIBRIUM HEIGHT - STRATIFIED ENVIRONMENT										
0.00	5.53	19.89	90.00	84.97	6.52	0.164	0.001	0.015	74.14	98.01
0.00	5.61	20.80	90.00	85.02	6.82	0.161	0.002	0.014	78.28	100.91
0.00	5.69	21.71	90.00	85.08	7.12	0.158	0.002	0.014	82.48	103.75
0.00	5.77	22.62	90.00	85.13	7.41	0.156	0.002	0.013	86.74	106.55
0.00	5.85	23.53	90.00	85.18	7.71	0.153	0.002	0.013	91.08	109.30
0.00	5.92	24.44	90.00	85.23	8.01	0.151	0.001	0.013	95.48	112.00
0.00	6.00	25.35	90.00	85.28	8.31	0.149	0.001	0.012	99.94	114.67
0.00	6.07	26.26	90.00	85.32	8.61	0.147	0.001	0.012	104.46	117.29
0.00	6.15	27.18	90.00	85.36	8.91	0.145	0.001	0.012	109.04	119.88

0.00	6.22	28.09	90.00	85.39	9.22	0.143	0.001	0.012	113.69	122.43
0.00	6.29	29.00	90.00	85.42	9.53	0.141	0.001	0.011	118.40	124.95
0.00	6.37	29.91	90.00	85.45	9.85	0.139	0.001	0.011	123.17	127.43
0.00	6.44	30.82	90.00	85.47	10.18	0.137	0.000	0.011	128.02	129.87
0.00	6.51	31.73	90.00	85.48	10.53	0.135	0.000	0.011	132.93	132.27
0.00	6.58	32.64	90.00	85.47	10.93	0.133	-0.001	0.011	137.94	134.64
0.00	6.66	33.56	90.00	85.44	11.38	0.129	-0.001	0.010	143.05	136.95
0.00	6.73	34.47	90.00	85.38	11.90	0.126	-0.002	0.010	148.30	139.20
0.00	6.80	35.38	90.00	85.28	12.53	0.121	-0.002	0.010	153.73	141.38
0.00	6.88	36.29	90.00	85.14	13.29	0.116	-0.003	0.010	159.38	143.47
0.00	6.96	37.20	90.00	84.92	14.25	0.109	-0.004	0.010	165.33	145.46
0.00	7.04	38.11	90.00	84.57	15.61	0.101	-0.006	0.010	171.69	147.33
0.00	7.13	39.02	90.00	83.93	17.80	0.089	-0.007	0.010	178.72	149.02
0.00	7.24	39.93	90.00	82.65	21.86	0.073	-0.009	0.009	186.94	150.48
0.00	7.38	40.83	90.00	78.98	32.74	0.049	-0.010	0.009	197.93	151.60
0.00	7.66	41.47	90.00	-9.28	166.76	0.009	-0.010	0.009	218.84	152.10

PLUMES HAVE REACHED MAXIMUM HEIGHT - STRATIFIED ENVIRONMENT

TRAPPING LEVEL= 25.02 METERS BELOW SURFACE, DILUTION= 95.72

PROGRAM UDKHDEN
SOLUTION TO MULTIPLE BUOYANT DISCHARGE PROBLEM WITH
AMBIENT CURRENTS AND VERTICAL GRADIENTS. AUG 1985

UDKHDEN CH2MHILL Version 2.2 (1-24-89)
UNIVERSAL DATA FILE: 2p2-pt5.in
CASE I.D. Utulei-2003NTW-2p2 mgd-Port 5 (0.23 mgdx2--3.8" port)
RUN TITLE: 2.2 mgd port 5 3.8" orifice
DISCHARGE= 0.0202 CU-M/S DENSITY=1.00000 G/CM3 ** DIAMETER= 0.0965-M
** NUMBER OF PORTS= 2 ** SPACING= 2.13-M ** DEPTH = 44.20-M

AMBIENT STRATIFICATION PROFILE

DEPTH (M)	DENSITY (G/CM3)	VELOCITY (M/S)
0.00	1.02169	0.000
1.00	1.02169	0.000
2.00	1.02176	0.000
4.00	1.02178	0.000
7.00	1.02187	0.000
10.00	1.02191	0.000
13.00	1.02194	0.000
17.00	1.02195	0.000
24.00	1.02196	0.000
25.00	1.02193	0.000
26.00	1.02200	0.000
29.00	1.02206	0.000
30.00	1.02201	0.000
32.00	1.02208	0.000
33.00	1.02205	0.000
39.00	1.02212	0.000
41.00	1.02233	0.000
45.00	1.02241	0.000
46.00	1.02241	0.000

FROUDE NO= 9.49, PORT SPACING/PORT DIA= 22.07
STARTING LENGTH= 0.563

ALL LENGTHS ARE IN METERS-TIME IN SEC. FIRST LINE ARE INITIAL CONDITIONS.

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	0.00	0.00	90.00	0.00	0.10	1.000	1.000	1.000	0.00	1.00
0.00	0.56	0.02	90.00	5.13	0.26	1.000	0.996	0.996	0.41	1.93
0.00	1.31	0.20	90.00	23.95	0.83	0.335	0.306	0.306	1.53	6.29
0.00	1.93	0.65	90.00	46.59	1.25	0.254	0.174	0.175	3.51	10.99
0.00	2.38	1.27	90.00	60.45	1.59	0.236	0.116	0.117	5.81	16.43
0.00	2.71	1.97	90.00	68.21	1.90	0.227	0.083	0.085	8.23	22.69
PLUMES MERGING										
0.00	2.97	2.70	90.00	72.94	2.21	0.220	0.062	0.065	10.73	29.58
0.00	3.17	3.44	90.00	75.96	2.41	0.221	0.049	0.054	13.27	35.49
0.00	3.35	4.19	90.00	77.88	2.59	0.221	0.036	0.047	15.80	41.03
0.00	3.50	4.95	90.00	79.12	2.78	0.217	0.025	0.041	18.35	46.31
0.00	3.64	5.71	90.00	79.96	2.97	0.210	0.020	0.037	20.97	51.33
0.00	3.77	6.47	90.00	80.66	3.15	0.203	0.017	0.033	23.68	56.09
0.00	4.00	8.00	90.00	81.76	3.50	0.190	0.013	0.028	29.38	64.99
0.00	4.21	9.53	90.00	82.56	3.85	0.175	0.009	0.023	35.52	73.11
0.00	4.41	11.06	90.00	83.14	4.21	0.160	0.007	0.019	42.20	80.48
0.00	4.58	12.59	90.00	83.68	4.42	0.158	0.007	0.018	49.28	87.34
0.00	4.75	14.13	90.00	84.00	5.13	0.144	0.003	0.015	56.77	93.80
0.00	4.91	15.66	90.00	84.30	5.50	0.142	0.005	0.014	64.62	99.88
Utulei-2003NTW-2p2 mgd-Port 5 (0.23 mgdx2--3.8" port)										
X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	5.06	17.20	90.00	84.55	5.90	0.140	0.002	0.013	72.54	105.89
PLUMES HAVE REACHED EQUILIBRIUM HEIGHT - STRATIFIED ENVIRONMENT										
0.00	5.20	18.74	90.00	84.63	6.44	0.135	-0.001	0.013	80.67	111.73
0.00	5.27	19.51	90.00	84.53	6.87	0.129	-0.003	0.012	84.91	114.52
0.00	5.35	20.27	90.00	84.44	7.30	0.124	-0.001	0.012	89.33	117.20
0.00	5.42	21.04	90.00	84.38	7.70	0.120	-0.001	0.012	93.92	119.77
0.00	5.50	21.81	90.00	84.30	8.12	0.116	-0.001	0.012	98.65	122.25
0.00	5.58	22.58	90.00	84.22	8.55	0.112	-0.001	0.011	103.55	124.65
0.00	5.66	23.35	90.00	84.13	9.00	0.108	-0.002	0.011	108.62	126.97
0.00	5.74	24.11	90.00	84.03	9.47	0.105	-0.002	0.011	113.87	129.21

0.00	5.82	24.88	90.00	83.92	9.97	0.101	-0.002	0.011	119.30	131.36
0.00	5.90	25.65	90.00	83.79	10.50	0.097	-0.002	0.011	124.93	133.44
0.00	5.98	26.42	90.00	83.64	11.06	0.094	-0.002	0.011	130.77	135.44
0.00	6.07	27.18	90.00	83.48	11.67	0.090	-0.002	0.010	136.85	137.37
0.00	6.16	27.95	90.00	83.28	12.32	0.086	-0.002	0.010	143.18	139.22
0.00	6.25	28.72	90.00	83.05	13.06	0.083	-0.002	0.010	149.79	140.98
0.00	6.35	29.48	90.00	82.78	13.89	0.079	-0.002	0.010	156.73	142.67
0.00	6.44	30.25	90.00	82.45	14.84	0.074	-0.002	0.010	164.05	144.26
0.00	6.55	31.01	90.00	82.03	15.96	0.070	-0.002	0.010	171.81	145.77
0.00	6.66	31.78	90.00	81.47	17.39	0.065	-0.003	0.010	180.13	147.17
0.00	6.78	32.54	90.00	80.61	19.44	0.058	-0.003	0.010	189.24	148.46
0.00	6.91	33.30	90.00	79.15	22.72	0.050	-0.004	0.010	199.57	149.60
0.00	7.08	34.06	90.00	76.18	29.05	0.039	-0.004	0.009	212.09	150.55
0.00	7.31	34.79	90.00	64.99	50.80	0.022	-0.005	0.009	230.30	151.23

PLUMES HAVE REACHED MAXIMUM HEIGHT - STRATIFIED ENVIRONMENT

TRAPPING LEVEL= 25.71 METERS BELOW SURFACE, DILUTION= 110.82

PROGRAM UDKHDEN
SOLUTION TO MULTIPLE BUOYANT DISCHARGE PROBLEM WITH
AMBIENT CURRENTS AND VERTICAL GRADIENTS. AUG 1985

UDKHDEN CH2MHILL Version 2.2 (1-24-89)
UNIVERSAL DATA FILE: 2p2-pt6.in
CASE I.D. Utulei-2003NTW-2.2 mgd-Port 6 (0.20 mgdx2--3.5" port)
RUN TITLE: 2.2 mgd port 6 3.5" orifice
DISCHARGE= 0.0175 CU-M/S DENSITY=1.00000 G/CM3 ** DIAMETER= 0.0889-M
** NUMBER OF PORTS= 2 ** SPACING= 2.13-M ** DEPTH = 44.20-M

AMBIENT STRATIFICATION PROFILE

DEPTH (M)	DENSITY (G/CM3)	VELOCITY (M/S)
0.00	1.02169	0.000
1.00	1.02169	0.000
2.00	1.02176	0.000
4.00	1.02178	0.000
7.00	1.02187	0.000
10.00	1.02191	0.000
13.00	1.02194	0.000
17.00	1.02195	0.000
24.00	1.02196	0.000
25.00	1.02193	0.000
26.00	1.02200	0.000
29.00	1.02206	0.000
30.00	1.02201	0.000
32.00	1.02208	0.000
33.00	1.02205	0.000
39.00	1.02212	0.000
41.00	1.02233	0.000
45.00	1.02241	0.000
46.00	1.02241	0.000

FROUDE NO= 10.09, PORT SPACING/PORT DIA= 23.96
STARTING LENGTH= 0.518

ALL LENGTHS ARE IN METERS-TIME IN SEC. FIRST LINE ARE INITIAL CONDITIONS.

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	0.00	0.00	90.00	0.00	0.09	1.000	1.000	1.000	0.00	1.00
0.00	0.52	0.02	90.00	4.54	0.24	1.000	0.997	0.997	0.37	1.93
0.00	1.21	0.16	90.00	21.55	0.77	0.329	0.306	0.306	1.39	6.28
0.00	1.80	0.55	90.00	43.66	1.17	0.243	0.176	0.176	3.23	10.91
0.00	2.24	1.10	90.00	58.17	1.49	0.224	0.118	0.119	5.41	16.21
0.00	2.57	1.73	90.00	66.51	1.78	0.215	0.085	0.086	7.71	22.28
0.00	2.82	2.40	90.00	71.61	2.07	0.208	0.064	0.066	10.10	29.09
PLUMES MERGING										
0.00	3.03	3.08	90.00	74.95	2.31	0.206	0.051	0.054	12.55	35.65
0.00	3.20	3.77	90.00	77.15	2.48	0.207	0.039	0.046	14.99	41.43
0.00	3.35	4.47	90.00	78.58	2.65	0.205	0.028	0.041	17.44	46.93
0.00	3.48	5.17	90.00	79.53	2.83	0.199	0.019	0.037	19.94	52.18
0.00	3.61	5.87	90.00	80.21	3.01	0.193	0.016	0.033	22.52	57.15
0.00	3.83	7.27	90.00	81.30	3.35	0.180	0.012	0.028	27.94	66.39
0.00	4.04	8.68	90.00	82.11	3.69	0.166	0.009	0.023	33.78	74.82
0.00	4.23	10.09	90.00	82.71	4.03	0.152	0.006	0.020	40.11	82.48
0.00	4.40	11.50	90.00	83.16	4.33	0.143	0.005	0.017	47.01	89.42
0.00	4.56	12.91	90.00	83.60	4.85	0.131	0.004	0.015	54.18	96.07
0.00	4.72	14.33	90.00	83.79	5.33	0.127	0.001	0.014	61.96	102.12

Utulei-2003NTW-2.2 mgd-Port 6 (0.20 mgdx2--3.5" port)

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	4.87	15.74	90.00	84.03	5.71	0.125	0.003	0.013	69.96	107.95
0.00	5.02	17.15	90.00	84.18	6.14	0.122	0.001	0.013	78.10	113.67
PLUMES HAVE REACHED EQUILIBRIUM HEIGHT - STRATIFIED ENVIRONMENT										
0.00	5.12	18.22	90.00	84.19	6.57	0.118	-0.001	0.012	84.40	117.82
0.00	5.20	18.92	90.00	84.08	6.98	0.113	-0.004	0.012	88.75	120.49
0.00	5.27	19.63	90.00	83.82	7.57	0.106	-0.004	0.012	93.35	123.01
0.00	5.35	20.34	90.00	83.60	8.14	0.101	-0.003	0.011	98.23	125.38
0.00	5.43	21.04	90.00	83.38	8.70	0.096	-0.003	0.011	103.36	127.62
0.00	5.51	21.75	90.00	83.13	9.32	0.091	-0.003	0.011	108.78	129.75
0.00	5.60	22.46	90.00	82.84	10.01	0.086	-0.003	0.011	114.50	131.76

0.00	5.69	23.16	90.00	82.49	10.78	0.081	-0.003	0.011	120.57	133.66
0.00	5.79	23.87	90.00	82.07	11.68	0.075	-0.003	0.011	127.04	135.43
0.00	5.89	24.57	90.00	81.55	12.72	0.070	-0.003	0.010	133.99	137.08
0.00	6.00	25.27	90.00	80.89	14.00	0.064	-0.003	0.010	141.52	138.61
0.00	6.11	25.97	90.00	80.02	15.61	0.058	-0.003	0.010	149.78	140.00
0.00	6.24	26.67	90.00	78.80	17.77	0.051	-0.003	0.010	159.01	141.25
0.00	6.39	27.37	90.00	76.94	20.96	0.044	-0.003	0.010	169.62	142.34
0.00	6.57	28.06	90.00	73.55	26.50	0.035	-0.003	0.010	182.48	143.24
0.00	6.82	28.72	90.00	64.22	40.60	0.023	-0.003	0.010	200.14	143.92
0.00	7.32	29.05	90.00	-37.94	75.97	0.012	-0.003	0.010	236.18	144.27

PLUMES HAVE REACHED MAXIMUM HEIGHT - STRATIFIED ENVIRONMENT

TRAPPING LEVEL= 26.37 METERS BELOW SURFACE, DILUTION= 116.33

PROGRAM UDKHDEN
SOLUTION TO MULTIPLE BUOYANT DISCHARGE PROBLEM WITH
AMBIENT CURRENTS AND VERTICAL GRADIENTS. AUG 1985

UDKHDEN CH2MHILL Version 2.2 (1-24-89)
UNIVERSAL DATA FILE: 3p0-pt1.in
CASE I.D. Utulei-2003NTW-3.0 mgd-Port 1 (0.74 mgdx2--6.2" port)
RUN TITLE: 3.0 mgd port 1 6.2" orifice
DISCHARGE= 0.0648 CU-M/S DENSITY=1.00000 G/CM3 ** DIAMETER= 0.1575-M
** NUMBER OF PORTS= 2 ** SPACING= 2.13-M ** DEPTH = 44.20-M

AMBIENT STRATIFICATION PROFILE

DEPTH (M)	DENSITY (G/CM3)	VELOCITY (M/S)
0.00	1.02169	0.000
1.00	1.02169	0.000
2.00	1.02176	0.000
4.00	1.02178	0.000
7.00	1.02187	0.000
10.00	1.02191	0.000
13.00	1.02194	0.000
17.00	1.02195	0.000
24.00	1.02196	0.000
25.00	1.02193	0.000
26.00	1.02200	0.000
29.00	1.02206	0.000
30.00	1.02201	0.000
32.00	1.02208	0.000
33.00	1.02205	0.000
39.00	1.02212	0.000
41.00	1.02233	0.000
45.00	1.02241	0.000
46.00	1.02241	0.000

FROUDE NO= 8.94, PORT SPACING/PORT DIA= 13.52
STARTING LENGTH= 0.923

ALL LENGTHS ARE IN METERS-TIME IN SEC. FIRST LINE ARE INITIAL CONDITIONS.

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	0.00	0.00	90.00	0.00	0.16	1.000	1.000	1.000	0.00	1.00
0.00	0.92	0.04	90.00	5.80	0.43	1.000	0.995	0.995	0.56	1.94
0.00	2.13	0.36	90.00	26.35	1.33	0.343	0.307	0.308	2.06	6.26
0.00	3.11	1.14	90.00	49.12	1.98	0.268	0.175	0.176	4.63	10.93
PLUMES MERGING										
0.00	3.81	2.19	90.00	62.14	2.41	0.261	0.120	0.123	7.53	15.71
0.00	4.33	3.33	90.00	68.98	2.66	0.269	0.093	0.097	10.38	19.81
0.00	4.73	4.53	90.00	72.85	2.91	0.270	0.066	0.080	13.18	23.78
0.00	5.08	5.74	90.00	75.21	3.17	0.263	0.050	0.068	16.01	27.57
0.00	5.38	6.96	90.00	76.92	3.42	0.254	0.041	0.058	18.93	31.18
0.00	5.65	8.19	90.00	78.26	3.66	0.244	0.035	0.050	21.96	34.62
0.00	5.90	9.43	90.00	79.31	3.90	0.235	0.029	0.044	25.12	37.88
0.00	6.12	10.67	90.00	80.16	4.15	0.223	0.025	0.038	28.44	40.97
0.00	6.52	13.16	90.00	81.50	4.47	0.220	0.020	0.033	35.33	46.83
0.00	6.87	15.65	90.00	82.42	5.32	0.205	0.017	0.027	42.68	52.29
0.00	7.19	18.15	90.00	83.12	5.84	0.205	0.012	0.025	50.06	57.66
0.00	7.48	20.65	90.00	83.54	6.51	0.200	0.009	0.023	57.55	62.92
0.00	7.76	23.16	90.00	83.92	7.15	0.196	0.008	0.021	65.21	68.05
0.00	8.02	25.67	90.00	84.25	7.78	0.193	0.007	0.020	72.99	73.08
Utulei-2003NTW-3.0 mgd-Port 1 (0.74 mgdx2--6.2" port)										
X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	8.26	28.17	90.00	84.54	8.40	0.191	0.006	0.018	80.90	78.02
0.00	8.50	30.68	90.00	84.79	9.03	0.188	0.006	0.017	88.90	82.88
0.00	8.72	33.19	90.00	84.99	9.70	0.185	0.004	0.016	97.03	87.67
0.00	8.94	35.70	90.00	85.12	10.49	0.180	0.002	0.015	105.33	92.35
PLUMES HAVE REACHED EQUILIBRIUM HEIGHT - STRATIFIED ENVIRONMENT										
0.00	9.21	38.84	90.00	85.12	11.79	0.170	-0.003	0.015	116.13	97.97
0.00	9.31	40.10	90.00	85.02	12.53	0.163	-0.005	0.014	120.69	100.10
0.00	9.42	41.35	90.00	84.86	13.45	0.155	-0.006	0.014	125.46	102.14
0.00	9.54	42.61	90.00	84.64	14.53	0.146	-0.008	0.014	130.51	104.06
0.00	9.66	43.86	90.00	84.24	16.14	0.133	-0.010	0.013	135.94	105.86

TRAPPING LEVEL= 6.80 METERS BELOW SURFACE, DILUTION= 95.42

PROGRAM UDKHDEN
SOLUTION TO MULTIPLE BUOYANT DISCHARGE PROBLEM WITH
AMBIENT CURRENTS AND VERTICAL GRADIENTS. AUG 1985

UDKHDEN CH2MHILL Version 2.2 (1-24-89)
UNIVERSAL DATA FILE: 3p0-pt2.in
CASE I.D. Utulei-2003NTW-3.0 mgd-Port 2 (0.67 mgdx2--5.8" port)
RUN TITLE: 3.0 mgd port 2 5.8" orifice
DISCHARGE= 0.0587 CU-M/S DENSITY=1.00000 G/CM3 ** DIAMETER= 0.1473-M
** NUMBER OF PORTS= 2 ** SPACING= 2.13-M ** DEPTH = 44.20-M

AMBIENT STRATIFICATION PROFILE

DEPTH (M)	DENSITY (G/CM3)	VELOCITY (M/S)
0.00	1.02169	0.000
1.00	1.02169	0.000
2.00	1.02176	0.000
4.00	1.02178	0.000
7.00	1.02187	0.000
10.00	1.02191	0.000
13.00	1.02194	0.000
17.00	1.02195	0.000
24.00	1.02196	0.000
25.00	1.02193	0.000
26.00	1.02200	0.000
29.00	1.02206	0.000
30.00	1.02201	0.000
32.00	1.02208	0.000
33.00	1.02205	0.000
39.00	1.02212	0.000
41.00	1.02233	0.000
45.00	1.02241	0.000
46.00	1.02241	0.000

FROUDE NO= 9.58, PORT SPACING/PORT DIA= 14.46
STARTING LENGTH= 0.863

ALL LENGTHS ARE IN METERS-TIME IN SEC. FIRST LINE ARE INITIAL CONDITIONS.

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	0.00	0.00	90.00	0.00	0.15	1.000	1.000	1.000	0.00	1.00
0.00	0.86	0.03	90.00	5.06	0.40	1.000	0.996	0.996	0.50	1.93
0.00	2.01	0.30	90.00	23.51	1.25	0.336	0.308	0.308	1.87	6.24
0.00	2.96	0.97	90.00	45.94	1.89	0.255	0.177	0.178	4.29	10.83
PLUMES MERGING										
0.00	3.66	1.92	90.00	59.77	2.33	0.243	0.121	0.123	7.07	15.65
0.00	4.18	2.98	90.00	67.26	2.58	0.250	0.094	0.097	9.84	19.77
0.00	4.59	4.08	90.00	71.57	2.81	0.253	0.070	0.081	12.55	23.76
0.00	4.93	5.21	90.00	74.19	3.05	0.249	0.051	0.068	15.27	27.62
0.00	5.24	6.35	90.00	76.04	3.28	0.243	0.043	0.059	18.05	31.32
0.00	5.51	7.49	90.00	77.48	3.52	0.234	0.036	0.051	20.93	34.85
0.00	5.75	8.65	90.00	78.62	3.75	0.225	0.031	0.045	23.91	38.21
0.00	5.97	9.80	90.00	79.54	3.98	0.216	0.026	0.039	27.01	41.42
0.00	6.37	12.13	90.00	80.96	4.36	0.205	0.023	0.032	33.59	47.38
0.00	6.72	14.46	90.00	81.99	5.08	0.191	0.015	0.027	40.44	53.06
0.00	7.03	16.79	90.00	82.78	5.53	0.193	0.014	0.024	47.56	58.45
0.00	7.31	19.13	90.00	83.30	6.08	0.190	0.007	0.022	54.70	63.80
0.00	7.58	21.47	90.00	83.62	6.75	0.185	0.007	0.021	62.01	69.00
0.00	7.84	23.82	90.00	83.93	7.38	0.181	0.006	0.019	69.51	74.05
Utulei-2003NTW-3.0 mgd-Port 2 (0.67 mgdx2--5.8" port)										
X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	8.08	26.16	90.00	84.20	8.00	0.177	0.006	0.018	77.15	78.98
0.00	8.31	28.51	90.00	84.45	8.62	0.174	0.005	0.017	84.93	83.82
0.00	8.54	30.85	90.00	84.66	9.24	0.172	0.004	0.016	92.84	88.58
0.00	8.75	33.20	90.00	84.83	9.90	0.168	0.003	0.015	100.88	93.25
PLUMES HAVE REACHED EQUILIBRIUM HEIGHT - STRATIFIED ENVIRONMENT										
0.00	9.17	37.89	90.00	84.93	11.65	0.157	-0.002	0.014	117.65	102.20
0.00	9.28	39.07	90.00	84.85	12.31	0.151	-0.004	0.014	122.10	104.30
0.00	9.38	40.24	90.00	84.70	13.14	0.144	-0.006	0.013	126.73	106.33
0.00	9.49	41.42	90.00	84.49	14.15	0.136	-0.006	0.013	131.62	108.25
0.00	9.61	42.59	90.00	84.20	15.38	0.127	-0.009	0.013	136.81	110.06
0.00	9.73	43.76	90.00	83.64	17.34	0.114	-0.012	0.013	142.46	111.72

TRAPPING LEVEL= 7.43 METERS BELOW SURFACE, DILUTION= 100.11

PROGRAM UDKHDEN
SOLUTION TO MULTIPLE BUOYANT DISCHARGE PROBLEM WITH
AMBIENT CURRENTS AND VERTICAL GRADIENTS. AUG 1985

UDKHDEN CH2MHILL Version 2.2 (1-24-89)
UNIVERSAL DATA FILE: 3p0-pt4.in
CASE I.D. Utulei-2003NTW-3.0 mgd-Port 4 (0.43 mgdx2--4.5" port)
RUN TITLE: 3.0 mgd port 4 4.5" orifice
DISCHARGE= 0.0377 CU-M/S DENSITY=1.00000 G/CM3 ** DIAMETER= 0.1143-M
** NUMBER OF PORTS= 2 ** SPACING= 2.13-M ** DEPTH = 44.20-M

AMBIENT STRATIFICATION PROFILE

DEPTH (M)	DENSITY (G/CM3)	VELOCITY (M/S)
0.00	1.02169	0.000
1.00	1.02169	0.000
2.00	1.02176	0.000
4.00	1.02178	0.000
7.00	1.02187	0.000
10.00	1.02191	0.000
13.00	1.02194	0.000
17.00	1.02195	0.000
24.00	1.02196	0.000
25.00	1.02193	0.000
26.00	1.02200	0.000
29.00	1.02206	0.000
30.00	1.02201	0.000
32.00	1.02208	0.000
33.00	1.02205	0.000
39.00	1.02212	0.000
41.00	1.02233	0.000
45.00	1.02241	0.000
46.00	1.02241	0.000

FROUDE NO= 11.60, PORT SPACING/PORT DIA= 18.64
STARTING LENGTH= 0.669

ALL LENGTHS ARE IN METERS-TIME IN SEC. FIRST LINE ARE INITIAL CONDITIONS.

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	0.00	0.00	90.00	0.00	0.11	1.000	1.000	1.000	0.00	1.00
0.00	0.67	0.02	90.00	3.45	0.31	1.000	0.998	0.998	0.36	1.93
0.00	1.57	0.16	90.00	16.75	0.99	0.322	0.309	0.309	1.38	6.24
0.00	2.38	0.57	90.00	36.74	1.55	0.225	0.180	0.181	3.30	10.67
0.00	3.02	1.22	90.00	52.27	1.98	0.202	0.122	0.124	5.66	15.55
PLUMES MERGING										
0.00	3.52	1.99	90.00	61.84	2.30	0.197	0.091	0.094	8.17	20.59
0.00	3.90	2.81	90.00	67.63	2.51	0.202	0.074	0.077	10.67	24.93
0.00	4.22	3.67	90.00	71.33	2.69	0.205	0.058	0.066	13.11	29.14
0.00	4.50	4.54	90.00	73.70	2.88	0.203	0.043	0.057	15.55	33.23
0.00	4.74	5.42	90.00	75.31	3.08	0.198	0.034	0.051	18.03	37.18
0.00	4.96	6.31	90.00	76.56	3.27	0.193	0.029	0.045	20.57	40.95
0.00	5.17	7.20	90.00	77.60	3.46	0.186	0.025	0.040	23.20	44.57
0.00	5.53	8.99	90.00	79.21	3.84	0.174	0.019	0.033	28.74	51.35
0.00	5.85	10.79	90.00	80.36	4.21	0.160	0.014	0.027	34.72	57.54
0.00	6.15	12.60	90.00	81.30	4.44	0.159	0.014	0.024	40.99	63.36
0.00	6.41	14.41	90.00	81.98	5.15	0.147	0.008	0.021	47.67	68.84
0.00	6.66	16.22	90.00	82.57	5.52	0.147	0.009	0.019	54.43	74.15
0.00	6.89	18.04	90.00	83.00	5.94	0.146	0.006	0.018	61.21	79.43

Utulei-2003NTW-3.0 mgd-Port 4 (0.43 mgdx2--4.5" port)

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	7.11	19.85	90.00	83.17	6.55	0.141	0.002	0.017	68.13	84.58
0.00	7.32	21.67	90.00	83.32	7.16	0.136	0.002	0.016	75.34	89.51
0.00	7.53	23.48	90.00	83.45	7.76	0.132	0.002	0.015	82.80	94.26
0.00	7.74	25.30	90.00	83.58	8.36	0.128	0.002	0.014	90.47	98.86
0.00	8.14	28.94	90.00	83.79	9.57	0.121	0.001	0.013	106.46	107.68
PLUMES HAVE REACHED EQUILIBRIUM HEIGHT - STRATIFIED ENVIRONMENT										
0.00	8.53	32.57	90.00	83.90	10.89	0.115	0.000	0.012	123.32	116.03
0.00	8.63	33.48	90.00	83.88	11.29	0.112	-0.001	0.012	127.70	118.03
0.00	8.73	34.39	90.00	83.84	11.75	0.110	-0.001	0.012	132.18	119.99

0.00	8.83	35.30	90.00	83.77	12.26	0.107	-0.002	0.012	136.78	121.90
0.00	8.93	36.21	90.00	83.65	12.86	0.103	-0.003	0.012	141.51	123.75
0.00	9.03	37.12	90.00	83.48	13.57	0.099	-0.003	0.011	146.43	125.54
0.00	9.13	38.03	90.00	83.23	14.47	0.094	-0.005	0.011	151.57	127.25
0.00	9.24	38.93	90.00	82.81	15.73	0.088	-0.007	0.011	157.03	128.85
0.00	9.36	39.84	90.00	82.12	17.60	0.079	-0.008	0.011	162.99	130.33
0.00	9.50	40.75	90.00	80.93	20.58	0.068	-0.009	0.011	169.75	131.64
0.00	9.66	41.65	90.00	78.77	25.76	0.055	-0.010	0.011	177.85	132.75
0.00	9.87	42.53	90.00	72.70	39.29	0.036	-0.012	0.011	188.82	133.58
0.00	10.25	43.01	90.00	-26.67	112.63	0.013	-0.014	0.011	207.65	133.92

PLUMES HAVE REACHED MAXIMUM HEIGHT - STRATIFIED ENVIRONMENT

TRAPPING LEVEL= 11.82 METERS BELOW SURFACE, DILUTION= 115.59

PROGRAM UDKHDEN
SOLUTION TO MULTIPLE BUOYANT DISCHARGE PROBLEM WITH
AMBIENT CURRENTS AND VERTICAL GRADIENTS. AUG 1985

UDKHDEN CH2MHILL Version 2.2 (1-24-89)
UNIVERSAL DATA FILE: 3p0-pt5.in
CASE I.D. Utulei-2003NTW-3.0 mgd-Port 5 (0.32 mgdx2--3.8" port)
RUN TITLE: 3.0 mgd port 5 3.8" orifice
DISCHARGE= 0.0280 CU-M/S DENSITY=1.00000 G/CM3 ** DIAMETER= 0.0965-M
** NUMBER OF PORTS= 2 ** SPACING= 2.13-M ** DEPTH = 44.20-M

AMBIENT STRATIFICATION PROFILE

DEPTH (M)	DENSITY (G/CM3)	VELOCITY (M/S)
0.00	1.02169	0.000
1.00	1.02169	0.000
2.00	1.02176	0.000
4.00	1.02178	0.000
7.00	1.02187	0.000
10.00	1.02191	0.000
13.00	1.02194	0.000
17.00	1.02195	0.000
24.00	1.02196	0.000
25.00	1.02193	0.000
26.00	1.02200	0.000
29.00	1.02206	0.000
30.00	1.02201	0.000
32.00	1.02208	0.000
33.00	1.02205	0.000
39.00	1.02212	0.000
41.00	1.02233	0.000
45.00	1.02241	0.000
46.00	1.02241	0.000

FROUDE NO= 13.15, PORT SPACING/PORT DIA= 22.07
STARTING LENGTH= 0.564

ALL LENGTHS ARE IN METERS-TIME IN SEC. FIRST LINE ARE INITIAL CONDITIONS.

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	0.00	0.00	90.00	0.00	0.10	1.000	1.000	1.000	0.00	1.00
0.00	0.56	0.01	90.00	2.68	0.26	1.000	0.999	0.999	0.29	1.93
0.00	1.33	0.11	90.00	13.24	0.84	0.317	0.309	0.309	1.12	6.24
0.00	2.04	0.39	90.00	30.80	1.35	0.211	0.181	0.182	2.74	10.61
0.00	2.64	0.88	90.00	46.63	1.74	0.183	0.125	0.126	4.82	15.31
0.00	3.11	1.49	90.00	57.35	2.07	0.173	0.092	0.094	7.10	20.52
PLUMES MERGING										
0.00	3.48	2.16	90.00	64.24	2.32	0.172	0.073	0.075	9.44	25.54
0.00	3.79	2.87	90.00	68.73	2.49	0.176	0.061	0.064	11.76	30.01
0.00	4.05	3.60	90.00	71.79	2.64	0.178	0.049	0.056	14.04	34.36
0.00	4.28	4.34	90.00	73.83	2.81	0.177	0.037	0.050	16.32	38.61
0.00	4.48	5.08	90.00	75.23	2.98	0.173	0.027	0.044	18.62	42.72
0.00	4.67	5.83	90.00	76.27	3.16	0.167	0.023	0.040	20.99	46.64
0.00	5.02	7.33	90.00	77.92	3.51	0.157	0.018	0.033	25.97	53.98
0.00	5.32	8.85	90.00	79.15	3.84	0.146	0.013	0.028	31.31	60.71
0.00	5.60	10.37	90.00	80.07	4.19	0.134	0.010	0.023	37.08	66.87
0.00	5.86	11.89	90.00	80.81	4.41	0.131	0.010	0.021	43.18	72.61
0.00	6.09	13.41	90.00	81.45	5.04	0.122	0.006	0.018	49.62	78.08
0.00	6.32	14.94	90.00	81.85	5.44	0.120	0.006	0.017	56.30	83.25

Utulei-2003NTW-3.0 mgd-Port 5 (0.32 mgdx2--3.8" port)

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	6.53	16.47	90.00	82.30	5.77	0.119	0.005	0.016	63.04	88.35
0.00	6.73	18.00	90.00	82.59	6.19	0.117	0.003	0.015	69.84	93.38
PLUMES HAVE REACHED EQUILIBRIUM HEIGHT - STRATIFIED ENVIRONMENT										
0.00	6.91	19.34	90.00	82.64	6.70	0.113	-0.002	0.015	75.95	97.67
0.00	7.00	20.11	90.00	82.61	7.04	0.110	0.000	0.014	79.57	100.02
0.00	7.10	20.87	90.00	82.62	7.35	0.108	0.000	0.014	83.28	102.32
0.00	7.20	21.64	90.00	82.63	7.66	0.105	0.000	0.014	87.07	104.56
0.00	7.30	22.40	90.00	82.63	7.98	0.103	0.000	0.013	90.93	106.75
0.00	7.40	23.17	90.00	82.63	8.30	0.101	0.000	0.013	94.88	108.90
0.00	7.50	23.94	90.00	82.62	8.62	0.099	0.000	0.013	98.91	111.00

0.00	7.60	24.70	90.00	82.61	8.95	0.097	0.000	0.013	103.02	113.06
0.00	7.70	25.47	90.00	82.60	9.28	0.095	0.000	0.012	107.21	115.07
0.00	7.80	26.23	90.00	82.58	9.62	0.094	0.000	0.012	111.48	117.05
0.00	7.90	27.00	90.00	82.56	9.96	0.092	0.000	0.012	115.83	118.99
0.00	8.00	27.76	90.00	82.53	10.31	0.090	0.000	0.012	120.27	120.89
0.00	8.10	28.53	90.00	82.50	10.68	0.088	-0.001	0.012	124.80	122.75
0.00	8.20	29.29	90.00	82.46	11.05	0.086	-0.001	0.011	129.42	124.58
0.00	8.30	30.06	90.00	82.40	11.45	0.085	-0.001	0.011	134.13	126.36
0.00	8.40	30.82	90.00	82.34	11.86	0.083	-0.001	0.011	138.95	128.11
0.00	8.51	31.59	90.00	82.26	12.30	0.081	-0.001	0.011	143.88	129.82
0.00	8.61	32.35	90.00	82.14	12.81	0.079	-0.002	0.011	148.94	131.48
0.00	8.72	33.12	90.00	81.96	13.40	0.076	-0.002	0.011	154.16	133.09
0.00	8.83	33.88	90.00	81.73	14.11	0.073	-0.003	0.011	159.57	134.65
0.00	8.94	34.65	90.00	81.41	14.97	0.069	-0.003	0.010	165.23	136.14
0.00	9.06	35.41	90.00	80.96	16.06	0.065	-0.004	0.010	171.21	137.55
0.00	9.18	36.17	90.00	80.31	17.50	0.061	-0.004	0.010	177.61	138.86
0.00	9.32	36.93	90.00	79.36	19.51	0.055	-0.005	0.010	184.61	140.07
0.00	9.47	37.69	90.00	77.78	22.67	0.047	-0.006	0.010	192.51	141.15
0.00	9.66	38.44	90.00	74.20	29.34	0.037	-0.008	0.010	202.10	142.04
0.00	9.94	39.15	90.00	56.48	58.20	0.018	-0.009	0.010	216.87	142.66

PLUMES HAVE REACHED MAXIMUM HEIGHT - STRATIFIED ENVIRONMENT

TRAPPING LEVEL= 25.32 METERS BELOW SURFACE, DILUTION= 96.20

PROGRAM UDKHDEN
SOLUTION TO MULTIPLE BUOYANT DISCHARGE PROBLEM WITH
AMBIENT CURRENTS AND VERTICAL GRADIENTS. AUG 1985

UDKHDEN CH2MHILL Version 2.2 (1-24-89)
UNIVERSAL DATA FILE: 3p0-pt6.in
CASE I.D. Utulei-2003NTW-3.0 mgd-Port 6 (0.28 mgdx2--3.5" port)
RUN TITLE: 3.0 mgd port 6 3.5" orifice
DISCHARGE= 0.0245 CU-M/S DENSITY=1.00000 G/CM3 ** DIAMETER= 0.0889-M
** NUMBER OF PORTS= 2 ** SPACING= 2.13-M ** DEPTH = 44.20-M

AMBIENT STRATIFICATION PROFILE

DEPTH (M)	DENSITY (G/CM3)	VELOCITY (M/S)
0.00	1.02169	0.000
1.00	1.02169	0.000
2.00	1.02176	0.000
4.00	1.02178	0.000
7.00	1.02187	0.000
10.00	1.02191	0.000
13.00	1.02194	0.000
17.00	1.02195	0.000
24.00	1.02196	0.000
25.00	1.02193	0.000
26.00	1.02200	0.000
29.00	1.02206	0.000
30.00	1.02201	0.000
32.00	1.02208	0.000
33.00	1.02205	0.000
39.00	1.02212	0.000
41.00	1.02233	0.000
45.00	1.02241	0.000
46.00	1.02241	0.000

FROUDE NO= 14.13, PORT SPACING/PORT DIA= 23.96
STARTING LENGTH= 0.519

ALL LENGTHS ARE IN METERS-TIME IN SEC. FIRST LINE ARE INITIAL CONDITIONS.

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	0.00	0.00	90.00	0.00	0.09	1.000	1.000	1.000	0.00	1.00
0.00	0.52	0.01	90.00	2.32	0.24	1.000	0.999	0.999	0.26	1.93
0.00	1.23	0.09	90.00	11.55	0.78	0.315	0.309	0.309	1.01	6.24
0.00	1.89	0.32	90.00	27.59	1.26	0.205	0.182	0.182	2.47	10.59
0.00	2.47	0.73	90.00	43.24	1.64	0.174	0.126	0.127	4.41	15.19
0.00	2.93	1.27	90.00	54.50	1.95	0.163	0.094	0.095	6.56	20.25
PLUMES MERGING										
0.00	3.30	1.88	90.00	61.97	2.22	0.159	0.073	0.075	8.81	25.61
0.00	3.61	2.52	90.00	66.94	2.40	0.161	0.061	0.064	11.06	30.24
0.00	3.87	3.18	90.00	70.37	2.55	0.164	0.052	0.055	13.28	34.69
0.00	4.09	3.86	90.00	72.77	2.69	0.165	0.041	0.049	15.47	39.04
0.00	4.29	4.54	90.00	74.42	2.85	0.163	0.031	0.044	17.66	43.29
0.00	4.48	5.23	90.00	75.57	3.02	0.159	0.023	0.040	19.90	47.37
0.00	4.81	6.61	90.00	77.27	3.34	0.150	0.018	0.033	24.57	55.03
0.00	5.11	8.00	90.00	78.55	3.66	0.140	0.014	0.028	29.55	62.08
0.00	5.38	9.40	90.00	79.53	3.98	0.130	0.011	0.024	34.90	68.57
0.00	5.62	10.80	90.00	80.28	4.28	0.121	0.008	0.021	40.66	74.51
0.00	5.86	12.20	90.00	80.93	4.46	0.120	0.009	0.019	46.64	80.18
0.00	6.07	13.61	90.00	81.43	5.13	0.111	0.005	0.017	53.04	85.48

Utulei-2003NTW-3.0 mgd-Port 6 (0.28 mgdx2--3.5" port)

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	6.28	15.01	90.00	81.76	5.52	0.109	0.005	0.016	59.61	90.57
0.00	6.48	16.42	90.00	82.18	5.82	0.109	0.005	0.015	66.23	95.60
0.00	6.67	17.83	90.00	82.45	6.21	0.107	0.003	0.014	72.91	100.57
PLUMES HAVE REACHED EQUILIBRIUM HEIGHT - STRATIFIED ENVIRONMENT										
0.00	6.83	19.07	90.00	82.51	6.67	0.103	-0.002	0.014	78.89	104.81
0.00	6.93	19.77	90.00	82.45	7.01	0.100	-0.001	0.013	82.43	107.15
0.00	7.02	20.48	90.00	82.44	7.31	0.098	0.000	0.013	86.06	109.42
0.00	7.11	21.18	90.00	82.44	7.60	0.096	0.000	0.013	89.77	111.64
0.00	7.21	21.89	90.00	82.44	7.89	0.094	0.000	0.013	93.55	113.82
0.00	7.30	22.59	90.00	82.44	8.19	0.093	0.000	0.012	97.40	115.95

0.00	7.39	23.30	90.00	82.43	8.49	0.091	0.000	0.012	101.33	118.04
0.00	7.49	24.00	90.00	82.42	8.79	0.089	0.000	0.012	105.33	120.09
0.00	7.58	24.71	90.00	82.40	9.10	0.088	0.000	0.012	109.41	122.10
0.00	7.68	25.41	90.00	82.39	9.42	0.086	0.000	0.011	113.56	124.07
0.00	7.77	26.12	90.00	82.36	9.74	0.084	0.000	0.011	117.79	126.01
0.00	7.86	26.82	90.00	82.33	10.07	0.083	0.000	0.011	122.10	127.91
0.00	7.96	27.53	90.00	82.30	10.40	0.081	-0.001	0.011	126.50	129.77
0.00	8.06	28.23	90.00	82.26	10.75	0.080	-0.001	0.011	130.97	131.60
0.00	8.15	28.93	90.00	82.21	11.11	0.078	-0.001	0.011	135.54	133.38
0.00	8.25	29.64	90.00	82.15	11.48	0.077	-0.001	0.011	140.20	135.14
0.00	8.35	30.34	90.00	82.08	11.88	0.075	-0.001	0.010	144.95	136.85
0.00	8.44	31.05	90.00	81.99	12.29	0.073	-0.001	0.010	149.82	138.53
0.00	8.54	31.75	90.00	81.89	12.75	0.071	-0.001	0.010	154.80	140.17
0.00	8.65	32.46	90.00	81.73	13.29	0.069	-0.002	0.010	159.92	141.76
0.00	8.75	33.16	90.00	81.51	13.92	0.067	-0.002	0.010	165.21	143.31
0.00	8.86	33.86	90.00	81.22	14.68	0.064	-0.003	0.010	170.72	144.79
0.00	8.97	34.57	90.00	80.83	15.62	0.061	-0.003	0.010	176.50	146.20
0.00	9.08	35.27	90.00	80.28	16.83	0.057	-0.004	0.010	182.63	147.54
0.00	9.21	35.97	90.00	79.49	18.47	0.052	-0.004	0.010	189.25	148.77
0.00	9.34	36.67	90.00	78.28	20.85	0.046	-0.005	0.010	196.56	149.90
0.00	9.50	37.36	90.00	76.24	24.67	0.039	-0.006	0.009	204.95	150.88
0.00	9.69	38.04	90.00	71.42	33.16	0.029	-0.007	0.009	215.41	151.68
0.00	10.04	38.65	90.00	30.15	86.41	0.011	-0.008	0.009	233.70	152.19

PLUMES HAVE REACHED MAXIMUM HEIGHT - STRATIFIED ENVIRONMENT

TRAPPING LEVEL= 25.50 METERS BELOW SURFACE, DILUTION= 103.58

PROGRAM UDKHDEN
SOLUTION TO MULTIPLE BUOYANT DISCHARGE PROBLEM WITH
AMBIENT CURRENTS AND VERTICAL GRADIENTS. AUG 1985

UDKHDEN CH2MHILL Version 2.2 (1-24-89)
UNIVERSAL DATA FILE: 6p0-pt1.in
CASE I.D. Utulei-2003NTW-6.0 mgd-Port 1 (1.49 mgdx2--6.2" port)
RUN TITLE: 6.0 mgd port 1 with 6.2" orifice
DISCHARGE= 0.1305 CU-M/S DENSITY=1.00000 G/CM3 ** DIAMETER= 0.1575-M
** NUMBER OF PORTS= 2 ** SPACING= 2.13-M ** DEPTH = 44.20-M

AMBIENT STRATIFICATION PROFILE

DEPTH (M)	DENSITY (G/CM3)	VELOCITY (M/S)
0.00	1.02169	0.000
1.00	1.02169	0.000
2.00	1.02176	0.000
4.00	1.02178	0.000
7.00	1.02187	0.000
10.00	1.02191	0.000
13.00	1.02194	0.000
17.00	1.02195	0.000
24.00	1.02196	0.000
25.00	1.02193	0.000
26.00	1.02200	0.000
29.00	1.02206	0.000
30.00	1.02201	0.000
32.00	1.02208	0.000
33.00	1.02205	0.000
39.00	1.02212	0.000
41.00	1.02233	0.000
45.00	1.02241	0.000
46.00	1.02241	0.000

FROUDE NO= 18.01, PORT SPACING/PORT DIA= 13.52
STARTING LENGTH= 0.926

ALL LENGTHS ARE IN METERS-TIME IN SEC. FIRST LINE ARE INITIAL CONDITIONS.

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	0.00	0.00	90.00	0.00	0.16	1.000	1.000	1.000	0.00	1.00
0.00	0.93	0.01	90.00	1.44	0.43	1.000	1.000	1.000	0.28	1.93
0.00	2.18	0.09	90.00	7.17	1.37	0.315	0.312	0.312	1.05	6.17
PLUMES MERGING										
0.00	3.41	0.36	90.00	18.01	2.25	0.196	0.186	0.187	2.61	10.31
0.00	4.56	0.88	90.00	30.51	2.74	0.169	0.145	0.146	4.70	13.16
0.00	5.58	1.62	90.00	41.09	3.04	0.161	0.120	0.122	6.99	15.54
0.00	6.46	2.51	90.00	49.09	3.27	0.158	0.101	0.104	9.34	17.78
0.00	7.23	3.51	90.00	54.98	3.49	0.156	0.083	0.090	11.73	19.95
0.00	7.92	4.57	90.00	59.13	3.71	0.152	0.064	0.078	14.17	22.07
0.00	8.53	5.66	90.00	62.10	3.95	0.146	0.051	0.068	16.70	24.09
0.00	9.10	6.79	90.00	64.46	4.19	0.139	0.044	0.060	19.35	26.01
0.00	9.62	7.94	90.00	66.43	4.35	0.138	0.039	0.055	22.07	27.85
0.00	10.56	10.27	90.00	69.48	5.08	0.129	0.031	0.045	27.77	31.39
0.00	11.40	12.65	90.00	71.78	5.54	0.131	0.027	0.041	33.56	34.80
0.00	12.15	15.06	90.00	73.48	6.05	0.131	0.024	0.037	39.30	38.22
0.00	12.83	17.48	90.00	74.90	6.56	0.131	0.020	0.034	45.04	41.62
0.00	13.47	19.92	90.00	75.87	7.16	0.130	0.015	0.032	50.80	45.01
0.00	14.07	22.37	90.00	76.71	7.76	0.128	0.014	0.030	56.64	48.33

Utulei-2003NTW-6.0 mgd-Port 1 (1.49 mgdx2--6.2" port)

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	14.63	24.83	90.00	77.45	8.35	0.127	0.013	0.028	62.55	51.61
0.00	15.16	27.29	90.00	78.11	8.94	0.126	0.012	0.026	68.50	54.86
0.00	15.67	29.76	90.00	78.69	9.52	0.125	0.011	0.025	74.50	58.08
0.00	16.15	32.23	90.00	79.20	10.11	0.124	0.009	0.023	80.55	61.27
0.00	17.06	37.19	90.00	79.90	11.48	0.120	0.005	0.021	92.87	67.53
PLUMES HAVE REACHED EQUILIBRIUM HEIGHT - STRATIFIED ENVIRONMENT										
0.00	17.77	41.22	90.00	79.99	13.05	0.113	-0.001	0.020	103.32	72.39
0.00	17.99	42.46	90.00	79.94	13.63	0.110	-0.003	0.019	106.69	73.82
0.00	18.22	43.70	90.00	79.79	14.35	0.107	-0.006	0.019	110.15	75.21

TRAPPING LEVEL= 4.40 METERS BELOW SURFACE, DILUTION= 70.72

PROGRAM UDKHDEN
SOLUTION TO MULTIPLE BUOYANT DISCHARGE PROBLEM WITH
AMBIENT CURRENTS AND VERTICAL GRADIENTS. AUG 1985

UDKHDEN CH2MHILL Version 2.2 (1-24-89)
UNIVERSAL DATA FILE: 6p0-pt2.in
CASE I.D. Utulei-2003NTW-6.0 mgd-Port 2 (1.34 mgdx2--5.8" port)
RUN TITLE: 6.0 mgd port 2 5.8" orifice
DISCHARGE= 0.1174 CU-M/S DENSITY=1.00000 G/CM3 ** DIAMETER= 0.1473-M
** NUMBER OF PORTS= 2 ** SPACING= 2.13-M ** DEPTH = 44.20-M

AMBIENT STRATIFICATION PROFILE

DEPTH (M)	DENSITY (G/CM3)	VELOCITY (M/S)
0.00	1.02169	0.000
1.00	1.02169	0.000
2.00	1.02176	0.000
4.00	1.02178	0.000
7.00	1.02187	0.000
10.00	1.02191	0.000
13.00	1.02194	0.000
17.00	1.02195	0.000
24.00	1.02196	0.000
25.00	1.02193	0.000
26.00	1.02200	0.000
29.00	1.02206	0.000
30.00	1.02201	0.000
32.00	1.02208	0.000
33.00	1.02205	0.000
39.00	1.02212	0.000
41.00	1.02233	0.000
45.00	1.02241	0.000
46.00	1.02241	0.000

FROUDE NO= 19.16, PORT SPACING/PORT DIA= 14.46
STARTING LENGTH= 0.865

ALL LENGTHS ARE IN METERS-TIME IN SEC. FIRST LINE ARE INITIAL CONDITIONS.

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	0.00	0.00	90.00	0.00	0.15	1.000	1.000	1.000	0.00	1.00
0.00	0.87	0.01	90.00	1.27	0.40	1.000	1.000	1.000	0.25	1.93
0.00	2.04	0.08	90.00	6.35	1.29	0.314	0.312	0.312	0.96	6.17
0.00	3.20	0.30	90.00	16.11	2.12	0.194	0.186	0.187	2.39	10.32
PLUMES MERGING										
0.00	4.29	0.74	90.00	27.97	2.64	0.162	0.142	0.143	4.36	13.43
0.00	5.27	1.39	90.00	38.52	2.95	0.153	0.118	0.120	6.55	15.88
0.00	6.13	2.19	90.00	46.77	3.19	0.150	0.100	0.103	8.82	18.18
0.00	6.89	3.09	90.00	52.96	3.39	0.148	0.085	0.089	11.12	20.39
0.00	7.56	4.06	90.00	57.51	3.59	0.145	0.068	0.078	13.46	22.55
0.00	8.16	5.08	90.00	60.75	3.81	0.140	0.052	0.069	15.86	24.64
0.00	8.71	6.12	90.00	63.20	4.05	0.134	0.044	0.060	18.36	26.63
0.00	9.23	7.18	90.00	65.24	4.26	0.129	0.039	0.054	20.97	28.52
0.00	10.15	9.34	90.00	68.44	4.88	0.120	0.030	0.044	26.31	32.16
0.00	10.97	11.55	90.00	70.80	5.33	0.122	0.027	0.040	31.96	35.56
0.00	11.70	13.79	90.00	72.70	5.77	0.123	0.022	0.037	37.55	38.98
0.00	12.38	16.05	90.00	74.18	6.24	0.123	0.021	0.034	43.12	42.40
0.00	12.99	18.33	90.00	75.34	6.74	0.123	0.016	0.031	48.69	45.81
0.00	13.58	20.61	90.00	76.10	7.35	0.120	0.012	0.029	54.31	49.18

Utulei-2003NTW-6.0 mgd-Port 2 (1.34 mgdx2--5.8" port)

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	14.13	22.90	90.00	76.80	7.94	0.119	0.011	0.027	60.04	52.47
0.00	14.65	25.20	90.00	77.42	8.53	0.117	0.011	0.026	65.84	55.72
0.00	15.15	27.50	90.00	77.99	9.10	0.116	0.010	0.024	71.70	58.92
0.00	15.63	29.81	90.00	78.50	9.68	0.115	0.009	0.023	77.63	62.09
0.00	16.54	34.44	90.00	79.30	10.89	0.112	0.006	0.021	89.67	68.32
PLUMES HAVE REACHED EQUILIBRIUM HEIGHT - STRATIFIED ENVIRONMENT										
0.00	17.40	39.07	90.00	79.64	12.45	0.107	0.000	0.019	102.15	74.32
0.00	17.61	40.23	90.00	79.60	12.98	0.104	-0.002	0.019	105.39	75.76
0.00	17.82	41.39	90.00	79.52	13.57	0.101	-0.003	0.018	108.73	77.16
0.00	18.04	42.55	90.00	79.39	14.21	0.098	-0.006	0.018	112.15	78.53
0.00	18.26	43.70	90.00	79.13	15.05	0.094	-0.008	0.018	115.69	79.85

TRAPPING LEVEL= 5.34 METERS BELOW SURFACE, DILUTION= 74.06

PROGRAM UDKHDEN
SOLUTION TO MULTIPLE BUOYANT DISCHARGE PROBLEM WITH
AMBIENT CURRENTS AND VERTICAL GRADIENTS. AUG 1985

UDKHDEN CH2MHILL Version 2.2 (1-24-89)
UNIVERSAL DATA FILE: 6p0-pt3.in
CASE I.D. Utulei-2003NTW-6.0 mgd-Port 3 (1.12 mgdx2--5.2" port)
RUN TITLE: 6.0 mgd port 3 5.20" orifice
DISCHARGE= 0.0981 CU-M/S DENSITY=1.00000 G/CM3 ** DIAMETER= 0.1321-M
** NUMBER OF PORTS= 2 ** SPACING= 2.13-M ** DEPTH = 44.20-M

AMBIENT STRATIFICATION PROFILE

DEPTH (M)	DENSITY (G/CM3)	VELOCITY (M/S)
0.00	1.02169	0.000
1.00	1.02169	0.000
2.00	1.02176	0.000
4.00	1.02178	0.000
7.00	1.02187	0.000
10.00	1.02191	0.000
13.00	1.02194	0.000
17.00	1.02195	0.000
24.00	1.02196	0.000
25.00	1.02193	0.000
26.00	1.02200	0.000
29.00	1.02206	0.000
30.00	1.02201	0.000
32.00	1.02208	0.000
33.00	1.02205	0.000
39.00	1.02212	0.000
41.00	1.02233	0.000
45.00	1.02241	0.000
46.00	1.02241	0.000

FROUDE NO= 21.02, PORT SPACING/PORT DIA= 16.12
STARTING LENGTH= 0.775

ALL LENGTHS ARE IN METERS-TIME IN SEC. FIRST LINE ARE INITIAL CONDITIONS.

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	0.00	0.00	90.00	0.00	0.13	1.000	1.000	1.000	0.00	1.00
0.00	0.77	0.01	90.00	1.05	0.36	1.000	1.000	1.000	0.22	1.93
0.00	1.83	0.06	90.00	5.29	1.16	0.313	0.311	0.311	0.83	6.19
0.00	2.87	0.23	90.00	13.57	1.92	0.191	0.186	0.186	2.07	10.35
PLUMES MERGING										
0.00	3.87	0.57	90.00	24.33	2.50	0.151	0.137	0.138	3.85	13.95
0.00	4.79	1.09	90.00	34.63	2.82	0.141	0.114	0.116	5.88	16.54
0.00	5.61	1.75	90.00	43.10	3.05	0.137	0.098	0.100	8.01	18.89
0.00	6.34	2.52	90.00	49.68	3.24	0.135	0.084	0.088	10.19	21.16
0.00	6.98	3.36	90.00	54.74	3.42	0.134	0.073	0.077	12.38	23.38
0.00	7.56	4.24	90.00	58.49	3.61	0.131	0.057	0.069	14.61	25.56
0.00	8.09	5.15	90.00	61.22	3.81	0.127	0.044	0.061	16.90	27.65
0.00	8.58	6.09	90.00	63.33	4.03	0.121	0.038	0.054	19.28	29.66
0.00	9.47	8.00	90.00	66.67	4.36	0.116	0.030	0.046	24.31	33.41
0.00	10.27	9.96	90.00	69.17	5.04	0.108	0.024	0.039	29.54	36.99
0.00	10.98	11.95	90.00	71.12	5.44	0.109	0.023	0.035	34.98	40.38
0.00	11.64	13.96	90.00	72.69	5.85	0.109	0.017	0.033	40.39	43.78
0.00	12.24	15.99	90.00	74.00	6.28	0.109	0.018	0.030	45.79	47.16
0.00	12.81	18.02	90.00	75.05	6.73	0.109	0.014	0.028	51.19	50.54
Utulei-2003NTW-6.0 mgd-Port 3 (1.12 mgdx2--5.2" port)										
X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	13.34	20.07	90.00	75.74	7.28	0.107	0.010	0.026	56.65	53.88
0.00	13.85	22.12	90.00	76.38	7.82	0.106	0.010	0.025	62.20	57.16
0.00	14.33	24.18	90.00	76.97	8.34	0.105	0.009	0.024	67.82	60.38
0.00	14.80	26.24	90.00	77.51	8.86	0.103	0.009	0.022	73.50	63.57
0.00	15.68	30.37	90.00	78.43	9.90	0.102	0.007	0.020	85.02	69.84
0.00	16.50	34.52	90.00	79.11	11.02	0.099	0.004	0.019	96.78	75.97
PLUMES HAVE REACHED EQUILIBRIUM HEIGHT - STRATIFIED ENVIRONMENT										
0.00	17.29	38.67	90.00	79.37	12.47	0.094	-0.001	0.017	108.96	81.88
0.00	17.48	39.71	90.00	79.31	12.97	0.092	-0.003	0.017	112.13	83.30
0.00	17.68	40.75	90.00	79.20	13.55	0.090	-0.004	0.017	115.38	84.69
0.00	17.88	41.79	90.00	79.05	14.17	0.087	-0.004	0.017	118.72	86.04
0.00	18.08	42.83	90.00	78.84	14.87	0.084	-0.007	0.016	122.17	87.34
0.00	18.29	43.86	90.00	78.44	15.81	0.080	-0.009	0.016	125.77	88.59

TRAPPING LEVEL= 5.96 METERS BELOW SURFACE, DILUTION= 81.28

PROGRAM UDKHDEN
SOLUTION TO MULTIPLE BUOYANT DISCHARGE PROBLEM WITH
AMBIENT CURRENTS AND VERTICAL GRADIENTS. AUG 1985

UDKHDEN CH2MHILL Version 2.2 (1-24-89)
UNIVERSAL DATA FILE: 6p0-pt4.in
CASE I.D. Utulei-2003NTW-6.0 mgd-Port 4 (0.87 mgdx2--4.5" port)
RUN TITLE: 6.0 mgd port 4 4.50" orifice
DISCHARGE= 0.0762 CU-M/S DENSITY=1.00000 G/CM3 ** DIAMETER= 0.1143-M
** NUMBER OF PORTS= 2 ** SPACING= 2.13-M ** DEPTH = 44.20-M

AMBIENT STRATIFICATION PROFILE

DEPTH (M)	DENSITY (G/CM3)	VELOCITY (M/S)
0.00	1.02169	0.000
1.00	1.02169	0.000
2.00	1.02176	0.000
4.00	1.02178	0.000
7.00	1.02187	0.000
10.00	1.02191	0.000
13.00	1.02194	0.000
17.00	1.02195	0.000
24.00	1.02196	0.000
25.00	1.02193	0.000
26.00	1.02200	0.000
29.00	1.02206	0.000
30.00	1.02201	0.000
32.00	1.02208	0.000
33.00	1.02205	0.000
39.00	1.02212	0.000
41.00	1.02233	0.000
45.00	1.02241	0.000
46.00	1.02241	0.000

FROUDE NO= 23.44, PORT SPACING/PORT DIA= 18.64
STARTING LENGTH= 0.669

ALL LENGTHS ARE IN METERS-TIME IN SEC. FIRST LINE ARE INITIAL CONDITIONS.

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	0.00	0.00	90.00	0.00	0.11	1.000	1.000	1.000	0.00	1.00
0.00	0.67	0.00	90.00	0.85	0.31	1.000	1.000	1.000	0.18	1.93
0.00	1.58	0.04	90.00	4.26	1.01	0.311	0.310	0.311	0.69	6.20
0.00	2.49	0.16	90.00	11.04	1.67	0.189	0.185	0.185	1.74	10.39
PLUMES MERGING										
0.00	3.37	0.40	90.00	20.32	2.27	0.142	0.133	0.133	3.27	14.45
0.00	4.19	0.79	90.00	30.10	2.62	0.128	0.110	0.111	5.11	17.36
0.00	4.95	1.31	90.00	38.68	2.86	0.123	0.094	0.096	7.07	19.89
0.00	5.62	1.93	90.00	45.65	3.05	0.121	0.082	0.085	9.09	22.28
0.00	6.23	2.61	90.00	51.15	3.21	0.120	0.072	0.076	11.14	24.61
0.00	6.77	3.34	90.00	55.48	3.36	0.119	0.063	0.068	13.19	26.91
0.00	7.27	4.11	90.00	58.77	3.52	0.118	0.051	0.061	15.27	29.16
0.00	7.73	4.90	90.00	61.21	3.70	0.114	0.039	0.055	17.39	31.35
0.00	8.55	6.53	90.00	64.69	4.09	0.105	0.029	0.045	21.89	35.44
0.00	9.30	8.21	90.00	67.33	4.37	0.101	0.024	0.039	26.69	39.21
0.00	9.97	9.91	90.00	69.38	5.01	0.094	0.019	0.033	31.69	42.82
0.00	10.59	11.63	90.00	71.01	5.37	0.095	0.018	0.031	36.90	46.24
0.00	11.16	13.36	90.00	72.41	5.73	0.095	0.015	0.029	42.10	49.65
0.00	11.70	15.11	90.00	73.48	6.14	0.094	0.015	0.027	47.31	53.04
0.00	12.20	16.87	90.00	74.51	6.50	0.094	0.013	0.025	52.52	56.41
0.00	12.68	18.64	90.00	75.28	6.93	0.094	0.009	0.024	57.76	59.77
0.00	13.13	20.41	90.00	75.78	7.45	0.092	0.008	0.023	63.07	63.07
0.00	13.58	22.18	90.00	76.30	7.92	0.091	0.007	0.022	68.47	66.31
0.00	14.41	25.74	90.00	77.23	8.86	0.089	0.006	0.020	79.47	72.65
0.00	15.20	29.31	90.00	78.01	9.79	0.087	0.005	0.018	90.70	78.85
0.00	15.94	32.90	90.00	78.63	10.76	0.085	0.004	0.017	102.16	84.92
0.00	16.64	36.48	90.00	78.93	11.96	0.082	0.001	0.016	113.96	90.80
PLUMES HAVE REACHED EQUILIBRIUM HEIGHT - STRATIFIED ENVIRONMENT										
0.00	16.95	38.05	90.00	78.92	12.62	0.079	-0.001	0.015	119.31	93.28
0.00	17.13	38.95	90.00	78.84	13.09	0.078	-0.003	0.015	122.45	94.67
0.00	17.31	39.85	90.00	78.69	13.64	0.076	-0.005	0.015	125.66	96.02
0.00	17.49	40.75	90.00	78.46	14.29	0.073	-0.006	0.015	128.98	97.32
0.00	17.67	41.64	90.00	78.18	15.01	0.070	-0.006	0.014	132.41	98.59
0.00	17.86	42.54	90.00	77.83	15.81	0.068	-0.008	0.014	135.97	99.80
0.00	18.06	43.43	90.00	77.27	16.91	0.064	-0.010	0.014	139.71	100.96
0.00	18.27	44.32	90.00	76.55	18.23	0.060	-0.010	0.014	143.69	102.06

TRAPPING LEVEL= 6.92 METERS BELOW SURFACE, DILUTION= 92.07

PROGRAM UDKHDEN
SOLUTION TO MULTIPLE BUOYANT DISCHARGE PROBLEM WITH
AMBIENT CURRENTS AND VERTICAL GRADIENTS. AUG 1985

UDKHDEN CH2MHILL Version 2.2 (1-24-89)
UNIVERSAL DATA FILE: 6p0-pt5.in
CASE I.D. Utulei-2003NTW-6.0 mgd-Port 5 (0.64 mgdx2--3.8" port)
RUN TITLE: 6.0 mgd port 5 3.80" orifice
DISCHARGE= 0.0561 CU-M/S DENSITY=1.00000 G/CM3 ** DIAMETER= 0.0965-M
** NUMBER OF PORTS= 2 ** SPACING= 2.13-M ** DEPTH = 44.20-M

AMBIENT STRATIFICATION PROFILE

DEPTH (M)	DENSITY (G/CM3)	VELOCITY (M/S)
0.00	1.02169	0.000
1.00	1.02169	0.000
2.00	1.02176	0.000
4.00	1.02178	0.000
7.00	1.02187	0.000
10.00	1.02191	0.000
13.00	1.02194	0.000
17.00	1.02195	0.000
24.00	1.02196	0.000
25.00	1.02193	0.000
26.00	1.02200	0.000
29.00	1.02206	0.000
30.00	1.02201	0.000
32.00	1.02208	0.000
33.00	1.02205	0.000
39.00	1.02212	0.000
41.00	1.02233	0.000
45.00	1.02241	0.000
46.00	1.02241	0.000

FROUDE NO= 26.35, PORT SPACING/PORT DIA= 22.07
STARTING LENGTH= 0.564

ALL LENGTHS ARE IN METERS-TIME IN SEC. FIRST LINE ARE INITIAL CONDITIONS.

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	0.00	0.00	90.00	0.00	0.10	1.000	1.000	1.000	0.00	1.00
0.00	0.56	0.00	90.00	0.67	0.26	1.000	1.000	1.000	0.15	1.93
0.00	1.34	0.03	90.00	3.38	0.85	0.310	0.310	0.310	0.56	6.22
0.00	2.10	0.11	90.00	8.82	1.42	0.187	0.185	0.185	1.43	10.43
0.00	2.86	0.27	90.00	16.52	1.96	0.138	0.132	0.132	2.70	14.59
PLUMES MERGING										
0.00	3.58	0.55	90.00	25.41	2.39	0.116	0.104	0.105	4.31	18.31
0.00	4.25	0.93	90.00	33.87	2.64	0.110	0.090	0.091	6.10	21.12
0.00	4.86	1.40	90.00	41.11	2.83	0.107	0.079	0.081	7.96	23.70
0.00	5.41	1.94	90.00	47.03	2.98	0.106	0.070	0.072	9.85	26.19
0.00	5.91	2.53	90.00	51.80	3.12	0.106	0.062	0.066	11.75	28.63
0.00	6.37	3.15	90.00	55.65	3.25	0.106	0.056	0.060	13.66	31.04
0.00	6.79	3.80	90.00	58.68	3.38	0.104	0.046	0.054	15.57	33.42
0.00	7.54	5.15	90.00	62.72	3.70	0.099	0.028	0.045	19.51	37.99
0.00	8.21	6.54	90.00	65.35	4.04	0.091	0.022	0.038	23.75	42.20
0.00	8.83	7.95	90.00	67.45	4.32	0.087	0.018	0.033	28.30	46.07
0.00	9.40	9.39	90.00	69.14	4.87	0.080	0.015	0.029	32.99	49.79
0.00	9.93	10.83	90.00	70.51	5.22	0.080	0.013	0.027	38.01	53.23
0.00	10.43	12.30	90.00	71.70	5.54	0.080	0.013	0.025	43.04	56.65

Utulei-2003NTW-6.0 mgd-Port 5 (0.64 mgdx2--3.8" port)

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	10.90	13.77	90.00	72.70	5.88	0.080	0.009	0.024	48.08	60.05
0.00	11.35	15.24	90.00	73.49	6.25	0.079	0.011	0.022	53.16	63.40
0.00	11.78	16.73	90.00	74.26	6.59	0.079	0.008	0.021	58.27	66.74
0.00	12.19	18.21	90.00	74.83	6.99	0.078	0.006	0.020	63.43	70.04
0.00	12.99	21.20	90.00	75.25	8.05	0.073	0.002	0.019	74.12	76.38
0.00	13.76	24.19	90.00	75.65	9.09	0.070	0.002	0.017	85.41	82.37
0.00	14.52	27.18	90.00	76.00	10.13	0.067	0.002	0.016	97.21	88.07
0.00	15.26	30.18	90.00	76.27	11.19	0.064	0.001	0.015	109.53	93.54
PLUMES HAVE REACHED EQUILIBRIUM HEIGHT - STRATIFIED ENVIRONMENT										
0.00	15.99	33.18	90.00	76.37	12.38	0.061	0.000	0.014	122.37	98.77

0.00	16.17	33.93	90.00	76.33	12.73	0.060	-0.001	0.014	125.69	100.03
0.00	16.35	34.68	90.00	76.26	13.11	0.059	-0.001	0.014	129.06	101.28
0.00	16.54	35.43	90.00	76.15	13.54	0.058	-0.002	0.014	132.50	102.50
0.00	16.72	36.18	90.00	75.98	14.01	0.057	-0.003	0.014	136.01	103.69
0.00	16.91	36.93	90.00	75.76	14.54	0.055	-0.003	0.014	139.61	104.85
0.00	17.10	37.68	90.00	75.47	15.15	0.053	-0.004	0.013	143.32	105.99
0.00	17.30	38.42	90.00	75.02	15.91	0.051	-0.006	0.013	147.16	107.08
0.00	17.50	39.17	90.00	74.39	16.88	0.049	-0.007	0.013	151.17	108.13
0.00	17.72	39.91	90.00	73.49	18.15	0.046	-0.008	0.013	155.41	109.12
0.00	17.94	40.65	90.00	72.21	19.82	0.042	-0.009	0.013	159.98	110.04
0.00	18.19	41.38	90.00	70.47	22.00	0.038	-0.010	0.013	164.97	110.89
0.00	18.46	42.10	90.00	67.97	24.99	0.034	-0.010	0.013	170.53	111.64
0.00	18.78	42.81	90.00	63.49	29.97	0.028	-0.013	0.013	176.97	112.30
0.00	19.18	43.46	90.00	51.50	41.92	0.020	-0.014	0.013	185.25	112.83
0.00	19.81	43.86	90.00	1.68	67.82	0.013	-0.014	0.013	198.24	113.17

PLUMES HAVE REACHED MAXIMUM HEIGHT - STRATIFIED ENVIRONMENT

TRAPPING LEVEL= 11.69 METERS BELOW SURFACE, DILUTION= 97.63

PROGRAM UDKHDEN
SOLUTION TO MULTIPLE BUOYANT DISCHARGE PROBLEM WITH
AMBIENT CURRENTS AND VERTICAL GRADIENTS. AUG 1985

UDKHDEN CH2MHILL Version 2.2 (1-24-89)
UNIVERSAL DATA FILE: 6p0-pt6.in
CASE I.D. Utulei-2003NTW-6.0 mgd-Port 6 (0.55 mgdx2--3.5" port)
RUN TITLE: 6.0 mgd port 6 3.50" orifice
DISCHARGE= 0.0482 CU-M/S DENSITY=1.00000 G/CM3 ** DIAMETER= 0.0889-M
** NUMBER OF PORTS= 2 ** SPACING= 2.13-M ** DEPTH = 44.20-M

AMBIENT STRATIFICATION PROFILE

DEPTH (M)	DENSITY (G/CM3)	VELOCITY (M/S)
0.00	1.02169	0.000
1.00	1.02169	0.000
2.00	1.02176	0.000
4.00	1.02178	0.000
7.00	1.02187	0.000
10.00	1.02191	0.000
13.00	1.02194	0.000
17.00	1.02195	0.000
24.00	1.02196	0.000
25.00	1.02193	0.000
26.00	1.02200	0.000
29.00	1.02206	0.000
30.00	1.02201	0.000
32.00	1.02208	0.000
33.00	1.02205	0.000
39.00	1.02212	0.000
41.00	1.02233	0.000
45.00	1.02241	0.000
46.00	1.02241	0.000

FROUDE NO= 27.80, PORT SPACING/PORT DIA= 23.96
STARTING LENGTH= 0.519

ALL LENGTHS ARE IN METERS-TIME IN SEC. FIRST LINE ARE INITIAL CONDITIONS.

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	0.00	0.00	90.00	0.00	0.09	1.000	1.000	1.000	0.00	1.00
0.00	0.52	0.00	90.00	0.60	0.24	1.000	1.000	1.000	0.13	1.93
0.00	1.23	0.02	90.00	3.04	0.79	0.310	0.309	0.309	0.51	6.22
0.00	1.94	0.09	90.00	7.96	1.31	0.186	0.184	0.184	1.30	10.45
0.00	2.63	0.23	90.00	14.99	1.82	0.136	0.131	0.132	2.47	14.62
PLUMES MERGING										
0.00	3.31	0.46	90.00	23.33	2.26	0.112	0.103	0.103	3.96	18.64
0.00	3.94	0.79	90.00	31.64	2.53	0.104	0.088	0.089	5.66	21.68
0.00	4.52	1.20	90.00	38.95	2.72	0.101	0.077	0.079	7.45	24.39
0.00	5.04	1.68	90.00	45.04	2.87	0.100	0.069	0.071	9.28	26.97
0.00	5.52	2.20	90.00	50.01	3.00	0.100	0.061	0.064	11.11	29.50
0.00	5.96	2.76	90.00	54.04	3.13	0.100	0.055	0.059	12.95	31.99
0.00	6.36	3.35	90.00	57.31	3.25	0.099	0.048	0.054	14.79	34.45
0.00	7.08	4.58	90.00	61.79	3.52	0.096	0.031	0.045	18.53	39.24
0.00	7.72	5.85	90.00	64.49	3.84	0.089	0.022	0.038	22.50	43.70
0.00	8.31	7.14	90.00	66.60	4.16	0.083	0.017	0.033	26.77	47.80
0.00	8.85	8.46	90.00	68.31	4.38	0.080	0.015	0.030	31.30	51.62
0.00	9.36	9.79	90.00	69.71	4.98	0.074	0.012	0.026	36.00	55.28
0.00	9.84	11.12	90.00	70.86	5.29	0.074	0.010	0.024	40.95	58.73

Utulei-2003NTW-6.0 mgd-Port 6 (0.55 mgdx2--3.5" port)

X	Y	Z	TH1	TH2	WIDTH	DUCL	DRHO	DCCL	TIME	DILUTION
0.00	10.29	12.47	90.00	71.93	5.59	0.074	0.011	0.023	45.92	62.14
0.00	10.72	13.83	90.00	72.80	5.91	0.073	0.007	0.022	50.89	65.54
0.00	11.14	15.19	90.00	73.48	6.26	0.073	0.009	0.021	55.92	68.90
0.00	11.53	16.56	90.00	74.23	6.57	0.072	0.007	0.020	60.96	72.23
0.00	12.28	19.30	90.00	75.02	7.40	0.070	0.000	0.018	71.21	78.78
0.00	13.01	22.05	90.00	75.35	8.39	0.066	0.002	0.017	82.01	84.97
0.00	13.72	24.81	90.00	75.70	9.36	0.063	0.002	0.016	93.33	90.86
0.00	14.41	27.56	90.00	75.99	10.33	0.061	0.001	0.015	105.13	96.50
0.00	15.10	30.32	90.00	76.20	11.34	0.058	0.001	0.014	117.41	101.91

PLUMES HAVE REACHED EQUILIBRIUM HEIGHT - STRATIFIED ENVIRONMENT

0.00	15.65	32.57	90.00	76.26	12.24	0.056	0.000	0.013	127.76	106.14
0.00	15.82	33.26	90.00	76.22	12.56	0.056	-0.001	0.013	131.03	107.40
0.00	15.99	33.95	90.00	76.16	12.91	0.055	-0.001	0.013	134.35	108.65
0.00	16.16	34.64	90.00	76.06	13.29	0.054	-0.002	0.013	137.73	109.88
0.00	16.33	35.33	90.00	75.92	13.71	0.053	-0.002	0.013	141.18	111.08
0.00	16.50	36.02	90.00	75.72	14.19	0.051	-0.003	0.013	144.70	112.26
0.00	16.68	36.71	90.00	75.47	14.72	0.050	-0.003	0.013	148.31	113.40
0.00	16.86	37.40	90.00	75.14	15.34	0.048	-0.004	0.012	152.03	114.52
0.00	17.05	38.08	90.00	74.67	16.10	0.047	-0.005	0.012	155.89	115.59
0.00	17.24	38.77	90.00	73.99	17.08	0.044	-0.007	0.012	159.92	116.62
0.00	17.44	39.45	90.00	73.03	18.36	0.041	-0.008	0.012	164.20	117.59
0.00	17.65	40.13	90.00	71.64	20.10	0.038	-0.009	0.012	168.80	118.49
0.00	17.89	40.80	90.00	69.61	22.52	0.034	-0.010	0.012	173.87	119.32
0.00	18.15	41.46	90.00	66.57	25.97	0.030	-0.010	0.012	179.59	120.05
0.00	18.46	42.10	90.00	61.48	31.44	0.025	-0.010	0.012	186.32	120.67
0.00	18.85	42.69	90.00	49.38	42.89	0.018	-0.013	0.012	194.88	121.17
0.00	19.45	43.02	90.00	-3.72	66.43	0.012	-0.014	0.012	207.94	121.50

PLUMES HAVE REACHED MAXIMUM HEIGHT - STRATIFIED ENVIRONMENT

TRAPPING LEVEL= 12.12 METERS BELOW SURFACE, DILUTION= 105.22