

APPENDIX 5A-1

INTERPRETATION OF SIMULATION OUTPUT

Peng Chau outfall consists of 2 risers, each of 4 jets.

The outfall has been designed to allow adequate distance between the 2 risers and no side merging are encountered. The following categories of plumes are observed in the modeled scenarios for each riser:

- 1) Non merging surfacing plumes
- 2) Non merging trapping plumes
- 3) Merging surfacing plumes
- 4) Merging trapping plumes

For determination of initial dilutions of **categories 1 and 2**, minimum initial dilution at the maximum plume rise-height of 4 simulated jets are adopted as the representative initial dilution for the modeled scenario, as a conservative approach.

For determination of initial dilutions of **categories 3 and 4** where plume merging occur, composite dilution of 4 simulated jets are determined by the following approaches:

Determination of Composite Dilution

Composite dilutions from merged plumes are determined with the aid of the visual component of VISJET. The composite dilution factor is obtained by cutting a vertical plane at the position defined as the downstream distance or edge of the ZID. This is applied to surfacing plumes and trapped plumes. For surfacing plume, the determination of this downstream distance is straight forward. The downstream distance in the close vicinity to where the minimum dilution at surface layer (centre) level occurs for all jets of the riser are compared and the longest downstream distance is adopted. For trapped plumes, the determination of the maximum downstream distance for a riser is based on the following steps:

- ❑ Define the downstream distance for each jet
 - For the jet in which the downstream distance at maximum rise level is available in the output files, the downstream distance at maximum rise level (depth) is adopted.
 - For the jet in which the downstream distance at maximum rise level (depth) is NOT available in the output files, the downstream distance at trapping level is adopted.
- ❑ Compare the downstream distance for each riser
 - Compare the downstream distances of each jet on the same riser (4 jets per riser) and determine the longest downstream distance.

While the longest downstream distance of all jets in the same riser is used to define the position of the vertical cutting plane, some jets may never reach this plane as their jet momentum reaches zero prior to this defined position. This issue is resolved by simulating these scenarios using the continuous mode option in VISJET, in which the cross sectional area of each evolved effluent plume is projected beyond its classically defined near field extents onto the vertical cutting plane.

Once this is completed a composite dilution of the projected jets can be obtained. In the situation when effluent plume jets merge, the value of the composite initial dilution of the merged jets for the vertical cutting plane as defined above, is calculated within VISJET and recorded.

As the configurations of two outfall risers are identical, output files from one riser (4 jets) are provided in **Appendix 5A-2**.

APPENDIX 5A-2 VISJET OUTPUT

**Wet Season Low Ambient Velocity, Average Dry Weather Flow
(1,580 m³/day)**

ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED AMBIENT
.....
CASE NO. 1 JETLAG 2000
TITLE Jet1

INPUT PARAMETERS
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ENTRAINMENT HYPOTHESIS : ASYMMETRIC
SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
COFLOW FACTOR : STANDARD
TIME STEP CONTRL : VARIABLE (> 0.985)
MAX NUMBER OF TIME STEPS : 1500
PRINTOUT INTERVAL : 100
MAX NUMBER OF ITERATIONS : 5
ITERATION ERROR BOUND : 0.00100
APPROX RATIO OF MASS/DMASS : 144.0

ENVIROMENTAL CONDITIONS
^^^^^^^^^^^^^^^^
DEPTH(m) SIGMAT U(m/s)
EXIT 8.00 -2.00 0.291
.....
AMBIENT 0.00 14.00 0.050
1.00 14.50 0.050
2.00 15.00 0.050
3.00 15.50 0.050
4.00 16.00 0.050
5.00 16.50 0.050
6.00 17.00 0.050
7.00 17.50 0.050
8.00 18.00 0.050
8.50 18.00 0.050

LENGTH & DILUTION SCALES
^^^^^^^^^^^^^^^^
Total Q ... 0.0023 (m3/s) Qj ... 2.29E-03 (m3/s)
Port No. ... 1 Mj ... 6.65E-04 (m4/s2)
Depth ... 8.0000 (m) Bj ... 4.40E-04 (m4/s3)
Diameter ... 0.1000 (m) lQ ... 0.0886 (m)
Uj ... 0.2911 (m/s) lm ... 0.5159 (m)
Ua ... 0.0500 (m/s) lb ... 3.5234 (m)
dp/pa ... 0.01965 lM ... 0.1974 (m)
po ... 0.99800 (g/cc) Sm ... 5.8212
pa ... 1.01800 (g/cc) Sb ... 271.5300
Ver. ang ... 0.00 lQ/lm ... 0.1718
Hor. ang ... 0.00 lQ/LM ... 0.4489
Fd ... 2.10 lm/lb ... 0.1464
Uj/Ua ... 5.82 lM/lb ... 0.0560

Coflowing case:
dMj ... 0.0006
lm* ... 0.4695
Sm* ... 4.8213

Stratification case:
T ... -425.01

X	Y	Z	PLUME RADIUS	AVERAGE DILUTION	DENSITY DIFF.	VELOCITY
(m)	(m)	(m)	(m)		(sigmat)	(m/s)
0.000	0.000	0.000	0.050	1.00	20.0000	0.291
0.233	0.000	0.069	0.084	1.97	10.0441	0.200
0.441	0.000	0.252	0.130	3.91	4.9537	0.168
0.655	0.000	0.536	0.200	7.81	2.3722	0.142
0.915	0.000	0.927	0.310	15.59	1.0435	0.118
1.267	0.000	1.422	0.493	31.17	0.3416	0.093
NEUTRAL BUOYANCY LEVEL REACHED						
1.768	0.000	1.946	0.809	62.33	-0.0179	0.069
2.706	0.000	2.360	1.296	120.74	-0.1566	0.052
MAXIMUM RISE REACHED						
TRAPPING LEVEL REACHED						
4.071	0.000	2.074	1.366	141.44	-0.0027	0.055
NUMBER OF STEPS = 756						
NEUTRAL BUOYANCY LEVEL = 1.9098 M ABOVE DISCHARGE PORT						
AVG DILUTION = 59.3415 B = 0.78 M						
MAXIMUM RISE (CENTER) = 2.3721 M ABOVE DISCHARGE PORT						
AVG DILUTION = 123.7397 B = 1.32 M						
COMPUTATIONS CEASE: PLUME TRAPPED						
TRAPPED LEVEL = 2.0684 M ABOVE DISCHARGE PORT						
AVG DILUTION = 142.0923 B = 1.37 M						

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ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED AMBIENT
.....
CASE NO. 2 JETLAG 2000
TITLE Jet2

INPUT PARAMETERS
^^^^^^^^^^^^^^^^
ENTRAINMENT HYPOTHESIS : ASYMMETRIC
SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
COFLOW FACTOR : STANDARD
TIME STEP CONTRL : VARIABLE (> 0.985)
MAX NUMBER OF TIME STEPS : 1500
PRINTOUT INTERVAL : 100
MAX NUMBER OF ITERATIONS : 5
ITERATION ERROR BOUND : 0.00100
APPROX RATIO OF MASS/DMASS : 144.0

ENVIROMENTAL CONDITIONS

	DEPTH (m)	SIGMAT	U (m/s)
EXIT	8.00	-2.00	0.291
.....
AMBIENT	0.00	14.00	0.050
	1.00	14.50	0.050
	2.00	15.00	0.050
	3.00	15.50	0.050
	4.00	16.00	0.050
	5.00	16.50	0.050
	6.00	17.00	0.050
	7.00	17.50	0.050
	8.00	18.00	0.050
	8.50	18.00	0.050

LENGTH & DILUTION SCALES

Total Q ...	0.0023 (m3/s)	Qj ...	2.29E-03 (m3/s)
Port No. ...	1	Mj ...	6.65E-04 (m4/s2)
Depth ...	8.0000 (m)	Bj ...	4.40E-04 (m4/s3)
Diameter ...	0.1000 (m)	lQ ...	0.0886 (m)
Uj ...	0.2911 (m/s)	lm ...	0.5159 (m)
Ua ...	0.0500 (m/s)	lb ...	3.5234 (m)
dp/pa ...	0.01965	lM ...	0.1974 (m)
po ...	0.99800 (g/cc)	Sm ...	5.8212
pa ...	1.01800 (g/cc)	Sb ...	271.5300
Ver. ang ...	0.00	lQ/lm ...	0.1718
Hor. ang ...	90.00	lQ/LM ...	0.4489
Fd ...	2.10	lm/lb ...	0.1464
Uj/Ua ...	5.82	lM/lb ...	0.0560

Coflowing case:
dMj ... 0.0006
lm* ... 0.4695
Sm* ... 4.8213

Stratification case:
T ... -425.01

X	Y	Z	PLUME RADIUS (m)	AVERAGE DILUTION	DENSITY DIFF. (sigmat)	VELOCITY (m/s)
0.000	0.000	0.000	0.050	1.00	20.0000	0.291
0.013	0.170	0.042	0.092	1.96	10.0605	0.170
0.061	0.322	0.194	0.143	3.91	4.9764	0.140
0.158	0.444	0.466	0.212	7.79	2.3886	0.126
0.326	0.539	0.852	0.323	15.57	1.0530	0.109
0.603	0.614	1.341	0.507	31.12	0.3485	0.088
NEUTRAL BUOYANCY LEVEL REACHED						
1.031	0.671	1.848	0.828	62.25	-0.0070	0.066
1.816	0.721	2.246	1.329	122.75	-0.1443	0.051
MAXIMUM RISE REACHED						
TRAPPING LEVEL REACHED						
3.250	0.783	1.993	1.430	148.87	-0.0012	0.053

NUMBER OF STEPS = 765

NEUTRAL BUOYANCY LEVEL = 1.8337 M ABOVE DISCHARGE PORT
AVG DILUTION = 61.0140 B = 0.82 M
MAXIMUM RISE (CENTER) = 2.2764 M ABOVE DISCHARGE PORT
AVG DILUTION = 131.3833 B = 1.39 M
COMPUTATIONS CEASE: PLUME TRAPPED
TRAPPED LEVEL = 1.9905 M ABOVE DISCHARGE PORT
AVG DILUTION = 149.1936 B = 1.43 M
ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED AMBIENT
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CASE NO. 3 JETLAG 2000
TITLE Jet3

INPUT PARAMETERS

ENTRAINMENT HYPOTHESIS : ASYMMETRIC
SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
COFLOW FACTOR : STANDARD
TIME STEP CONTRL : VARIABLE (> 0.985)
MAX NUMBER OF TIME STEPS : 1500
PRINTOUT INTERVAL : 100
MAX NUMBER OF ITERATIONS : 5
ITERATION ERROR BOUND : 0.00100
APPROX RATIO OF MASS/DMASS : 144.0

ENVIROMENTAL CONDITIONS

	DEPTH (m)	SIGMAT	U (m/s)
EXIT	8.00	-2.00	0.291
.....
AMBIENT	0.00	14.00	0.050
	1.00	14.50	0.050
	2.00	15.00	0.050
	3.00	15.50	0.050
	4.00	16.00	0.050
	5.00	16.50	0.050
	6.00	17.00	0.050
	7.00	17.50	0.050
	8.00	18.00	0.050
	8.50	18.00	0.050

LENGTH & DILUTION SCALES

Total Q ...	0.0023 (m3/s)	Qj ...	2.29E-03 (m3/s)
Port No. ...	1	Mj ...	6.65E-04 (m4/s2)
Depth ...	8.0000 (m)	Bj ...	4.40E-04 (m4/s3)
Diameter ...	0.1000 (m)	lQ ...	0.0886 (m)
Uj ...	0.2911 (m/s)	lm ...	0.5159 (m)
Ua ...	0.0500 (m/s)	lb ...	3.5234 (m)
dp/pa ...	0.01965	lM ...	0.1974 (m)
po ...	0.99800 (g/cc)	Sm ...	5.8212
pa ...	1.01800 (g/cc)	Sb ...	271.5300
Ver. ang ...	0.00	lQ/lm ...	0.1718
Hor. ang ...	180.00	lQ/LM ...	0.4489
Fd ...	2.10	lm/lb ...	0.1464
Uj/Ua ...	5.82	lM/lb ...	0.0560

Coflowing case:
dMj ... 0.0006

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lm* ... 0.4695
Sm* ... 4.8213

Stratification case:
T ... -425.01

X      Y      Z      PLUME  AVERAGE  DENSITY  VELOCITY
(m)    (m)    (m)    RADIUS  DILUTION  DIFF.    (m/s)
      (m)    (m)    (m)    (m)      (sigmat)

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0.000  0.000  0.000  0.050   1.00   20.0000  0.291
-0.216 0.000  0.081  0.092   1.95  10.1272  0.168
-0.332 0.000  0.287  0.142   3.88   4.9871  0.140
-0.357 0.000  0.586  0.215   7.74   2.3845  0.122
-0.287 0.000  0.986  0.328  15.45   1.0463  0.104
-0.089 0.000  1.478  0.517  30.88   0.3445  0.084
NEUTRAL BUOYANCY LEVEL REACHED
0.263  0.000  1.966  0.847   61.78  -0.0018  0.063
0.915  0.000  2.341  1.352  122.72  -0.1331  0.049
MAXIMUM RISE REACHED
TRAPPING LEVEL REACHED
2.392  0.000  2.116  1.480  153.60  -0.0004  0.051

NUMBER OF STEPS = 774
NEUTRAL BUOYANCY LEVEL = 1.9628 M ABOVE DISCHARGE PORT
AVG DILUTION = 61.4411 B = 0.84 M
MAXIMUM RISE (CENTER) = 2.3920 M ABOVE DISCHARGE PORT
AVG DILUTION = 137.2430 B = 1.45 M
COMPUTATIONS CEASE: PLUME TRAPPED
TRAPPED LEVEL = 2.1152 M ABOVE DISCHARGE PORT
AVG DILUTION = 153.7165 B = 1.48 M

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ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED AMBIENT
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CASE NO. 4 JETLAG 2000
TITLE Jet4

INPUT PARAMETERS
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ENTRAINMENT HYPOTHESIS : ASYMMETRIC
SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
COFLOW FACTOR : STANDARD
TIME STEP CONTRL : VARIABLE ( > 0.985 )
MAX NUMBER OF TIME STEPS : 1500
PRINTOUT INTERVAL : 100
MAX NUMBER OF ITERATIONS : 5
ITERATION ERROR BOUND : 0.00100
APPROX RATIO OF MASS/DMASS : 144.0

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ENVIROMENTAL CONDITIONS
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DEPTH(m) SIGMAT U(m/s)
EXIT 8.00 -2.00 0.291
.....
AMBIENT 0.00 14.00 0.050
1.00 14.50 0.050
2.00 15.00 0.050
3.00 15.50 0.050
4.00 16.00 0.050

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5.00 16.50 0.050
6.00 17.00 0.050
7.00 17.50 0.050
8.00 18.00 0.050
8.50 18.00 0.050

LENGTH & DILUTION SCALES
^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
Total Q ... 0.0023 (m3/s) Qj ... 2.29E-03 (m3/s)
Port No. ... 1 Mj ... 6.65E-04 (m4/s2)
Depth ... 8.0000 (m) Bj ... 4.40E-04 (m4/s3)
Diameter ... 0.1000 (m) lQ ... 0.0886 (m)
Uj ... 0.2911 (m/s) lm ... 0.5159 (m)
Ua ... 0.0500 (m/s) lb ... 3.5234 (m)
dp/pa ... 0.01965 lM ... 0.1974 (m)
po ... 0.99800 (g/cc) Sm ... 5.8212
pa ... 1.01800 (g/cc) Sb ... 271.5300
Ver. ang ... 0.00 lQ/lm ... 0.1718
Hor. ang ... 90.00 lQ/LM ... 0.4489
Fd ... 2.10 lm/lb ... 0.1464
Uj/Ua ... 5.82 lM/lb ... 0.0560

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Coflowing case:
dMj ... 0.0006
lm* ... 0.4695
Sm* ... 4.8213

Stratification case:
T ... -425.01

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X      Y      Z      PLUME  AVERAGE  DENSITY  VELOCITY
(m)    (m)    (m)    RADIUS  DILUTION  DIFF.    (m/s)
      (m)    (m)    (m)    (m)      (sigmat)

-----
0.000  0.000  0.000  0.050   1.00   20.0000  0.291
0.013  -0.170  0.042  0.092   1.96  10.0604  0.170
0.061  -0.322  0.194  0.143   3.91   4.9766  0.140
0.158  -0.444  0.466  0.212   7.79   2.3887  0.126
0.326  -0.539  0.852  0.323  15.57   1.0530  0.109
0.603  -0.614  1.341  0.507  31.12   0.3481  0.088
NEUTRAL BUOYANCY LEVEL REACHED
1.031  -0.671  1.847  0.828   62.25  -0.0070  0.066
1.816  -0.721  2.246  1.329  122.73  -0.1441  0.051
MAXIMUM RISE REACHED
TRAPPING LEVEL REACHED
3.251  -0.783  1.991  1.430  148.86  -0.0013  0.053

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NUMBER OF STEPS = 765
NEUTRAL BUOYANCY LEVEL = 1.8335 M ABOVE DISCHARGE PORT
AVG DILUTION = 61.0139 B = 0.82 M
MAXIMUM RISE (CENTER) = 2.2759 M ABOVE DISCHARGE PORT
AVG DILUTION = 131.3399 B = 1.39 M
COMPUTATIONS CEASE: PLUME TRAPPED
TRAPPED LEVEL = 1.9888 M ABOVE DISCHARGE PORT
AVG DILUTION = 149.2023 B = 1.43 M

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**Wet Season High Ambient Velocity, Average Dry Weather Flow
(1,580 m³/day)**

Stratification case:
T ... -425.01

1
ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED AMBIENT
.....
CASE NO. 1 JETLAG 2000
TITLE Jet1

INPUT PARAMETERS

ENTRAINMENT HYPOTHESIS : ASYMMETRIC
SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
COFLOW FACTOR : STANDARD
TIME STEP CONTRL : VARIABLE (> 0.985)
MAX NUMBER OF TIME STEPS : 1500
PRINTOUT INTERVAL : 100
MAX NUMBER OF ITERATIONS : 5
ITERATION ERROR BOUND : 0.00100
APPROX RATIO OF MASS/DMASS : 144.0

ENVIROMENTAL CONDITIONS

	DEPTH(m)	SIGMAT	U(m/s)
EXIT	8.00	-2.00	0.291
.....
AMBIENT	0.00	14.00	0.400
	1.00	14.50	0.400
	2.00	15.00	0.400
	3.00	15.50	0.400
	4.00	16.00	0.400
	5.00	16.50	0.400
	6.00	17.00	0.400
	7.00	17.50	0.400
	8.00	18.00	0.400
	8.50	18.00	0.400

LENGTH & DILUTION SCALES

Total Q ...	0.0023 (m3/s)	Qj ...	2.29E-03 (m3/s)
Port No. ...	1	Mj ...	6.65E-04 (m4/s2)
Depth ...	8.0000 (m)	Bj ...	4.40E-04 (m4/s3)
Diameter ...	0.1000 (m)	lQ ...	0.0886 (m)
Uj ...	0.2911 (m/s)	lm ...	0.0645 (m)
Ua ...	0.4000 (m/s)	lb ...	0.0069 (m)
dp/pa ...	0.01965	lM ...	0.1974 (m)
po ...	0.99800 (g/cc)	Sm ...	0.7277
pa ...	1.01800 (g/cc)	Sb ...	0.0083
Ver. ang ...	0.00	lQ/lm ...	1.3743
Hor. ang ...	0.00	lQ/lM ...	0.4489
Fd ...	2.10	lm/lb ...	9.3709
Uj/Ua ...	0.73	lM/lb ...	28.6859

Coflowing case:
dMj ... -0.0002
lm* ... -0.0395
Sm* ... 0.2723

X	Y	Z	PLUME RADIUS	AVERAGE DILUTION	DENSITY DIFF.	VELOCITY
(m)	(m)	(m)	(m)		(sigmat)	(m/s)
0.000	0.000	0.000	0.050	1.00	20.0000	0.291
0.165	0.000	0.017	0.064	1.99	9.9648	0.349
0.382	0.000	0.049	0.087	3.95	4.9734	0.377
0.749	0.000	0.100	0.121	7.87	2.4698	0.390
1.376	0.000	0.175	0.170	15.72	1.2084	0.396
2.444	0.000	0.284	0.239	31.38	0.5646	0.398
4.281	0.000	0.439	0.338	62.69	0.2258	0.399
7.692	0.000	0.656	0.477	125.19	0.0329	0.400
NEUTRAL BUOYANCY LEVEL REACHED						
17.078	0.000	0.924	0.649	231.25	-0.0836	0.400
MAXIMUM RISE REACHED						
TRAPPING LEVEL REACHED						
26.981	0.000	0.780	0.743	303.19	-0.0002	0.400
NUMBER OF STEPS = 849						
NEUTRAL BUOYANCY LEVEL = 0.7164 M ABOVE DISCHARGE PORT						
AVG DILUTION = 146.1387 B = 0.52 M						
MAXIMUM RISE (CENTER) = 0.9261 M ABOVE DISCHARGE PORT						
AVG DILUTION = 232.1567 B = 0.65 M						
COMPUTATIONS CEASE: PLUME TRAPPED						
TRAPPED LEVEL = 0.7794 M ABOVE DISCHARGE PORT						
AVG DILUTION = 303.4422 B = 0.74 M						

1
ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED AMBIENT
.....
CASE NO. 2 JETLAG 2000
TITLE Jet2

INPUT PARAMETERS

ENTRAINMENT HYPOTHESIS : ASYMMETRIC
SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
COFLOW FACTOR : STANDARD
TIME STEP CONTRL : VARIABLE (> 0.985)
MAX NUMBER OF TIME STEPS : 1500
PRINTOUT INTERVAL : 100
MAX NUMBER OF ITERATIONS : 5
ITERATION ERROR BOUND : 0.00100
APPROX RATIO OF MASS/DMASS : 144.0

ENVIROMENTAL CONDITIONS

	DEPTH(m)	SIGMAT	U(m/s)
EXIT	8.00	-2.00	0.291
.....
AMBIENT	0.00	14.00	0.400
	1.00	14.50	0.400
	2.00	15.00	0.400
	3.00	15.50	0.400

4.00 16.00 0.400
5.00 16.50 0.400
6.00 17.00 0.400
7.00 17.50 0.400
8.00 18.00 0.400
8.50 18.00 0.400

LENGTH & DILUTION SCALES

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Total Q ... 0.0023 (m3/s) Qj ... 2.29E-03 (m3/s)
Port No. ... 1 Mj ... 6.65E-04 (m4/s2)
Depth ... 8.0000 (m) Bj ... 4.40E-04 (m4/s3)
Diameter ... 0.1000 (m) lQ ... 0.0886 (m)
Uj ... 0.2911 (m/s) lm ... 0.0645 (m)
Ua ... 0.4000 (m/s) lb ... 0.0069 (m)
dp/pa ... 0.01965 lM ... 0.1974 (m)
po ... 0.99800 (g/cc) Sm ... 0.7277
pa ... 1.01800 (g/cc) Sb ... 0.0083
Ver. ang ... 0.00 lQ/lm ... 1.3743
Hor. ang ... 90.00 lQ/LM ... 0.4489
Fd ... 2.10 lm/lb ... 9.3709
Uj/Ua ... 0.73 lM/lb ... 28.6859

Coflowing case:
dMj ... -0.0002
lm* ... -0.0395
Sm* ... 0.2723

Stratification case:
T ... -425.01

X	Y	Z	PLUME RADIUS	AVERAGE DILUTION	DENSITY DIFF.	VELOCITY
(m)	(m)	(m)	(m)		(sigmat)	(m/s)
0.000	0.000	0.000	0.050	1.00	20.0000	0.291
0.008	0.014	0.000	0.076	1.97	10.0359	0.247
0.069	0.037	0.003	0.094	3.70	5.3228	0.304
0.337	0.081	0.022	0.124	7.34	2.6699	0.350
0.941	0.126	0.078	0.168	14.64	1.3153	0.375
1.979	0.164	0.176	0.234	29.25	0.6224	0.388
3.737	0.194	0.321	0.328	58.42	0.2576	0.394
6.925	0.222	0.530	0.462	116.66	0.0522	0.397
NEUTRAL BUOYANCY LEVEL REACHED						
14.972	0.255	0.809	0.642	225.67	-0.0771	0.398
MAXIMUM RISE REACHED						
TRAPPING LEVEL REACHED						
26.730	0.288	0.684	0.750	307.98	-0.0001	0.399

NUMBER OF STEPS = 860
NEUTRAL BUOYANCY LEVEL = 0.6216 M ABOVE DISCHARGE PORT
AVG DILUTION = 148.4639 B = 0.52 M
MAXIMUM RISE (CENTER) = 0.8282 M ABOVE DISCHARGE PORT
AVG DILUTION = 235.6828 B = 0.66 M
COMPUTATIONS CEASE: PLUME TRAPPED
TRAPPED LEVEL = 0.6842 M ABOVE DISCHARGE PORT

AVG DILUTION = 308.0379 B = 0.75 M

1

ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED AMBIENT

.....

CASE NO. 3 JETLAG 2000

TITLE Jet3

INPUT PARAMETERS

^^^^^^^^^^^^^^^^^^^^

ENTRAINMENT HYPOTHESIS : ASYMMETRIC
SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
COFLOW FACTOR : STANDARD
TIME STEP CONTRL : VARIABLE (> 0.985)
MAX NUMBER OF TIME STEPS : 250000
PRINTOUT INTERVAL : 100
MAX NUMBER OF ITERATIONS : 5
ITERATION ERROR BOUND : 0.00100
APPROX RATIO OF MASS/DMASS : 144.0

ENVIROMENTAL CONDITIONS

^^^^^^^^^^^^^^^^^^^^

	DEPTH(m)	SIGMAT	U(m/s)
EXIT	8.00	-2.00	0.291
.....			
AMBIENT	0.00	14.00	0.400
	1.00	14.50	0.400
	2.00	15.00	0.400
	3.00	15.50	0.400
	4.00	16.00	0.400
	5.00	16.50	0.400
	6.00	17.00	0.400
	7.00	17.50	0.400
	8.00	18.00	0.400
	8.50	18.00	0.400

LENGTH & DILUTION SCALES

^^^^^^^^^^^^^^^^^^^^

Total Q ... 0.0023 (m3/s) Qj ... 2.29E-03 (m3/s)
Port No. ... 1 Mj ... 6.65E-04 (m4/s2)
Depth ... 8.0000 (m) Bj ... 4.40E-04 (m4/s3)
Diameter ... 0.1000 (m) lQ ... 0.0886 (m)
Uj ... 0.2911 (m/s) lm ... 0.0645 (m)
Ua ... 0.4000 (m/s) lb ... 0.0069 (m)
dp/pa ... 0.01965 lM ... 0.1974 (m)
po ... 0.99800 (g/cc) Sm ... 0.7277
pa ... 1.01800 (g/cc) Sb ... 0.0083
Ver. ang ... 0.00 lQ/lm ... 1.3743
Hor. ang ... 180.00 lQ/LM ... 0.4489
Fd ... 2.10 lm/lb ... 9.3709
Uj/Ua ... 0.73 lM/lb ... 28.6859

Stratification case:
T ... -425.01

X	Y	Z	PLUME RADIUS	AVERAGE DILUTION	DENSITY DIFF.	VELOCITY
---	---	---	--------------	------------------	---------------	----------

(m)	(m)	(m)	(m)	(sigmat)	(m/s)
0.000E+00	0.000E+00	0.000E+00	0.500E-01	1.0	20.0000
-0.871E-01	0.314E-08	0.224E-01	0.123	1.6	12.5820
-0.664E-01	0.442E-08	0.478E-01	0.113	2.4	8.3214
-0.564E-01	0.465E-08	0.538E-01	0.110	2.6	7.7230
-0.251E-01	0.513E-08	0.682E-01	0.108	3.2	6.2841
0.112	0.610E-08	0.107	0.119	5.5	3.5874
0.463	0.709E-08	0.169	0.153	11.	1.7729
1.16	0.796E-08	0.257	0.207	22.	0.8549
2.44	0.871E-08	0.384	0.287	44.	0.3810
4.80	0.938E-08	0.565	0.402	87.	0.1238
NEUTRAL BUOYANCY LEVEL REACHED					
9.72	0.101E-07	0.822	0.566	0.17E+03	-0.0323
MAXIMUM RISE REACHED					
25.3	0.112E-07	0.832	0.737	0.30E+03	-0.0091
TRAPPING LEVEL REACHED					
26.0	0.113E-07	0.816	0.747	0.31E+03	-0.0009
NUMBER OF STEPS = 221602					
NEUTRAL BUOYANCY LEVEL = 0.7517 M ABOVE DISCHARGE PORT					
AVG DILUTION = 147.6635 B = 0.52 M					
MAXIMUM RISE (CENTER) = 0.9611 M ABOVE DISCHARGE PORT					
AVG DILUTION = 234.2572 B = 0.66 M					
COMPUTATIONS CEASE: PLUME TRAPPED					
TRAPPED LEVEL = 0.8137 M ABOVE DISCHARGE PORT					
AVG DILUTION =306.3 B = 0.75 M					

7.00	17.50	0.400
8.00	18.00	0.400
8.50	18.00	0.400
LENGTH & DILUTION SCALES		
^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^		
Total Q ...	0.0023 (m3/s)	Qj ... 2.29E-03 (m3/s)
Port No. ...	1	Mj ... 6.65E-04 (m4/s2)
Depth ...	8.0000 (m)	Bj ... 4.40E-04 (m4/s3)
Diameter ...	0.1000 (m)	lQ ... 0.0886 (m)
Uj ...	0.2911 (m/s)	lm ... 0.0645 (m)
Ua ...	0.4000 (m/s)	lb ... 0.0069 (m)
dp/pa ...	0.01965	lM ... 0.1974 (m)
po ...	0.99800 (g/cc)	Sm ... 0.7277
pa ...	1.01800 (g/cc)	Sb ... 0.0083
Ver. ang ...	0.00	lQ/lm ... 1.3743
Hor. ang ...	90.00	lQ/lM ... 0.4489
Fd ...	2.10	lm/lb ... 9.3709
Uj/Ua ...	0.73	lM/lb ... 28.6859

Coflowing case:
dMj ... -0.0002
lm* ... -0.0395
Sm* ... 0.2723

Stratification case:
T ... -425.01

1
ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED AMBIENT

CASE NO. 4 JETLAG 2000
TITLE Jet4

INPUT PARAMETERS
^^^^^^^^^^^^^^^^
ENTRAINMENT HYPOTHESIS : ASYMMETRIC
SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
COFLOW FACTOR : STANDARD
TIME STEP CONTRL : VARIABLE (> 0.985)
MAX NUMBER OF TIME STEPS : 1500
PRINTOUT INTERVAL : 100
MAX NUMBER OF ITERATIONS : 5
ITERATION ERROR BOUND : 0.00100
APPROX RATIO OF MASS/DMASS : 144.0

ENVIRONMENTAL CONDITIONS
^^^^^^^^^^^^^^^^
DEPTH(m) SIGMAT U(m/s)
EXIT 8.00 -2.00 0.291
.....
AMBIENT 0.00 14.00 0.400
1.00 14.50 0.400
2.00 15.00 0.400
3.00 15.50 0.400
4.00 16.00 0.400
5.00 16.50 0.400
6.00 17.00 0.400

X	Y	Z	PLUME RADIUS	AVERAGE DILUTION	DENSITY DIFF.	VELOCITY
(m)	(m)	(m)	(m)	(sigmat)	(sigmat)	(m/s)
0.000	0.000	0.000	0.050	1.00	20.0000	0.291
0.008	-0.014	0.000	0.076	1.97	10.0359	0.247
0.069	-0.037	0.003	0.094	3.70	5.3228	0.304
0.337	-0.081	0.022	0.124	7.34	2.6699	0.350
0.941	-0.126	0.078	0.168	14.64	1.3153	0.375
1.979	-0.164	0.176	0.234	29.25	0.6224	0.388
3.737	-0.194	0.321	0.328	58.42	0.2576	0.394
6.925	-0.222	0.530	0.462	116.66	0.0522	0.397
NEUTRAL BUOYANCY LEVEL REACHED						
14.972	-0.255	0.809	0.642	225.67	-0.0771	0.398
MAXIMUM RISE REACHED						
TRAPPING LEVEL REACHED						
26.730	-0.288	0.684	0.750	307.98	-0.0001	0.399
NUMBER OF STEPS = 860						
NEUTRAL BUOYANCY LEVEL = 0.6216 M ABOVE DISCHARGE PORT						
AVG DILUTION = 148.4639 B = 0.52 M						
MAXIMUM RISE (CENTER) = 0.8282 M ABOVE DISCHARGE PORT						
AVG DILUTION = 235.6828 B = 0.66 M						
COMPUTATIONS CEASE: PLUME TRAPPED						
TRAPPED LEVEL = 0.6842 M ABOVE DISCHARGE PORT						
AVG DILUTION = 308.0379 B = 0.75 M						

Wet Season Low Ambient Velocity, Peak Dry Weather Flow (4,740 m³/day)

ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED AMBIENT

CASE NO. 1 JETLAG 2000
TITLE Jet1

INPUT PARAMETERS

ENTRAINMENT HYPOTHESIS : ASYMMETRIC
SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
COFLOW FACTOR : STANDARD
TIME STEP CONTRL : VARIABLE (> 0.985)
MAX NUMBER OF TIME STEPS : 1500
PRINTOUT INTERVAL : 100
MAX NUMBER OF ITERATIONS : 5
ITERATION ERROR BOUND : 0.00100
APPROX RATIO OF MASS/DMASS : 144.0

ENVIROMENTAL CONDITIONS

	DEPTH(m)	SIGMAT	U(m/s)
EXIT	8.00	-2.00	0.873
AMBIENT	0.00	14.00	0.050
	1.00	14.50	0.050
	2.00	15.00	0.050
	3.00	15.50	0.050
	4.00	16.00	0.050
	5.00	16.50	0.050
	6.00	17.00	0.050
	7.00	17.50	0.050
	8.00	18.00	0.050
	8.50	18.00	0.050

LENGTH & DILUTION SCALES

Total Q ...	0.0069 (m3/s)	Qj ...	6.86E-03 (m3/s)
Port No. ...	1	Mj ...	5.99E-03 (m4/s2)
Depth ...	8.0000 (m)	Bj ...	1.32E-03 (m4/s3)
Diameter ...	0.1000 (m)	lQ ...	0.0886 (m)
Uj ...	0.8732 (m/s)	lm ...	1.5477 (m)
Ua ...	0.0500 (m/s)	lb ...	10.5702 (m)
dp/pa ...	0.01965	lM ...	0.5922 (m)
po ...	0.99800 (g/cc)	Sm ...	17.4638
pa ...	1.01800 (g/cc)	Sb ...	814.5901
Ver. ang ...	0.00	lQ/lm ...	0.0573
Hor. ang ...	0.00	lQ/lM ...	0.1496
Fd ...	6.29	lm/lb ...	0.1464
Uj/Ua ...	17.46	lM/lb ...	0.0560

Coflowing case:

dMj ... 0.0056
lm* ... 1.5027
Sm* ... 16.4638

Stratification case:

T ... -425.01

X	Y	Z	PLUME RADIUS	AVERAGE DILUTION	DENSITY DIFF. (sigmat)	VELOCITY (m/s)
(m)	(m)	(m)	(m)			
0.000	0.000	0.000	0.050	1.00	20.0000	0.873
0.305	0.000	0.015	0.096	1.96	10.0956	0.468
0.849	0.000	0.149	0.175	3.89	5.0060	0.279
1.478	0.000	0.537	0.291	7.77	2.3588	0.200
2.117	0.000	1.183	0.466	15.51	0.9409	0.156
2.868	0.000	2.069	0.769	30.99	0.1475	0.115
NEUTRAL BUOYANCY LEVEL REACHED						
3.943	0.000	2.965	1.398	62.02	-0.2393	0.069
MAXIMUM RISE REACHED						
TRAPPING LEVEL REACHED						
5.930	0.000	2.609	1.657	85.07	-0.0029	0.068
NUMBER OF STEPS = 686						
NEUTRAL BUOYANCY LEVEL = 2.3375 M ABOVE DISCHARGE PORT						
AVG DILUTION = 37.3690 B = 0.89 M						
MAXIMUM RISE (CENTER) = 3.1049 M ABOVE DISCHARGE PORT						
AVG DILUTION = 76.0795 B = 1.66 M						
COMPUTATIONS CEASE: PLUME TRAPPED						
TRAPPED LEVEL = 2.6035 M ABOVE DISCHARGE PORT						
AVG DILUTION = 85.3407 B = 1.66 M						

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ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED AMBIENT

CASE NO. 2 JETLAG 2000
TITLE Jet2

INPUT PARAMETERS

ENTRAINMENT HYPOTHESIS : ASYMMETRIC
SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
COFLOW FACTOR : STANDARD
TIME STEP CONTRL : VARIABLE (> 0.985)
MAX NUMBER OF TIME STEPS : 1500
PRINTOUT INTERVAL : 100
MAX NUMBER OF ITERATIONS : 5
ITERATION ERROR BOUND : 0.00100
APPROX RATIO OF MASS/DMASS : 144.0

ENVIROMENTAL CONDITIONS

	DEPTH(m)	SIGMAT	U(m/s)
EXIT	8.00	-2.00	0.873
AMBIENT	0.00	14.00	0.050
	1.00	14.50	0.050
	2.00	15.00	0.050
	3.00	15.50	0.050
	4.00	16.00	0.050
	5.00	16.50	0.050
	6.00	17.00	0.050
	7.00	17.50	0.050
	8.00	18.00	0.050

8.50 18.00 0.050

LENGTH & DILUTION SCALES

^^^^^^^^^^^^^^^^^^^^^^^^^^^^

Total Q ... 0.0069 (m3/s)	Qj ... 6.86E-03 (m3/s)
Port No. ... 1	Mj ... 5.99E-03 (m4/s2)
Depth ... 8.0000 (m)	Bj ... 1.32E-03 (m4/s3)
Diameter ... 0.1000 (m)	lQ ... 0.0886 (m)
Uj ... 0.8732 (m/s)	lm ... 1.5477 (m)
Ua ... 0.0500 (m/s)	lb ... 10.5702 (m)
dp/pa ... 0.01965	lM ... 0.5922 (m)
po ... 0.99800 (g/cc)	Sm ... 17.4638
pa ... 1.01800 (g/cc)	Sb ... 814.5901
Ver. ang ... 0.00	lQ/lm ... 0.0573
Hor. ang ... 90.00	lQ/LM ... 0.1496
Fd ... 6.29	lm/lb ... 0.1464
Uj/Ua ... 17.46	lM/lb ... 0.0560

Coflowing case:

dMj ... 0.0056
lm* ... 1.5027
Sm* ... 16.4638

Stratification case:

T ... -425.01

X	Y	Z	PLUME RADIUS	AVERAGE DILUTION	DENSITY DIFF.	VELOCITY
(m)	(m)	(m)	(m)		(sigmat)	(m/s)
0.000	0.000	0.000	0.050	1.00	20.0000	0.873
0.008	0.303	0.016	0.098	1.96	10.0933	0.445
0.056	0.748	0.131	0.187	3.90	5.0110	0.244
0.177	1.200	0.457	0.318	7.77	2.3847	0.168
0.415	1.603	1.072	0.501	15.51	0.9650	0.135
0.828	1.938	1.940	0.816	31.00	0.1667	0.102
NEUTRAL BUOYANCY LEVEL REACHED						
1.480	2.202	2.740	1.481	62.10	-0.1943	0.062
MAXIMUM RISE REACHED						
2.825	2.474	2.756	1.903	92.82	-0.1179	0.056
TRAPPING LEVEL REACHED						
3.240	2.549	2.531	1.970	101.30	-0.0015	0.057

NUMBER OF STEPS = 714

NEUTRAL BUOYANCY LEVEL = 2.2370 M ABOVE DISCHARGE PORT

AVG DILUTION = 38.7210 B = 0.98 M

MAXIMUM RISE (CENTER) = 2.9438 M ABOVE DISCHARGE PORT

AVG DILUTION = 92.1974 B = 2.00 M

COMPUTATIONS CEASE: PLUME TRAPPED

TRAPPED LEVEL = 2.5280 M ABOVE DISCHARGE PORT

AVG DILUTION = 101.4975 B = 1.97 M

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ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED AMBIENT

.....

CASE NO. 3 JETLAG 2000

TITLE Jet3

INPUT PARAMETERS

^^^^^^^^^^^^^^^^

ENTRAINMENT HYPOTHESIS : ASYMMETRIC
SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
COFLOW FACTOR : STANDARD
TIME STEP CONTRL : VARIABLE (> 0.985)
MAX NUMBER OF TIME STEPS : 1500
PRINTOUT INTERVAL : 100
MAX NUMBER OF ITERATIONS : 5
ITERATION ERROR BOUND : 0.00100
APPROX RATIO OF MASS/DMASS : 144.0

ENVIROMENTAL CONDITIONS

^^^^^^^^^^^^^^^^

	DEPTH (m)	SIGMAT	U (m/s)
EXIT	8.00	-2.00	0.873
.....
AMBIENT	0.00	14.00	0.050
	1.00	14.50	0.050
	2.00	15.00	0.050
	3.00	15.50	0.050
	4.00	16.00	0.050
	5.00	16.50	0.050
	6.00	17.00	0.050
	7.00	17.50	0.050
	8.00	18.00	0.050
	8.50	18.00	0.050

LENGTH & DILUTION SCALES

^^^^^^^^^^^^^^^^

Total Q ... 0.0069 (m3/s)	Qj ... 6.86E-03 (m3/s)
Port No. ... 1	Mj ... 5.99E-03 (m4/s2)
Depth ... 8.0000 (m)	Bj ... 1.32E-03 (m4/s3)
Diameter ... 0.1000 (m)	lQ ... 0.0886 (m)
Uj ... 0.8732 (m/s)	lm ... 1.5477 (m)
Ua ... 0.0500 (m/s)	lb ... 10.5702 (m)
dp/pa ... 0.01965	lM ... 0.5922 (m)
po ... 0.99800 (g/cc)	Sm ... 17.4638
pa ... 1.01800 (g/cc)	Sb ... 814.5901
Ver. ang ... 0.00	lQ/lm ... 0.0573
Hor. ang ... 180.00	lQ/LM ... 0.1496
Fd ... 6.29	lm/lb ... 0.1464
Uj/Ua ... 17.46	lM/lb ... 0.0560

Coflowing case:

dMj ... 0.0056
lm* ... 1.5027
Sm* ... 16.4638

Stratification case:

T ... -425.01

X	Y	Z	PLUME RADIUS	AVERAGE DILUTION	DENSITY DIFF.	VELOCITY
(m)	(m)	(m)	(m)		(sigmat)	(m/s)
0.000	0.000	0.000	0.050	1.00	20.0000	0.873
-0.288	0.000	0.015	0.101	1.96	10.0990	0.419
-0.802	0.000	0.191	0.195	3.86	5.0366	0.222

```

-1.225    0.000    0.696    0.323    7.69    2.3308    0.161
-1.404    0.000    1.444    0.513    15.36    0.8912    0.128
-1.328    0.000    2.392    0.863    30.71    0.1012    0.090
NEUTRAL BUOYANCY LEVEL REACHED
-0.987    0.000    3.125    1.648    61.60    -0.1978    0.050
MAXIMUM RISE REACHED
-0.193    0.000    3.271    2.216    96.14    -0.1798    0.043
TRAPPING LEVEL REACHED
0.430    0.000    2.920    2.143    103.01    -0.0026    0.049

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NUMBER OF STEPS = 731
NEUTRAL BUOYANCY LEVEL = 2.5811 M ABOVE DISCHARGE PORT
AVG DILUTION = 35.0673 B = 0.97 M
MAXIMUM RISE (CENTER) = 3.3197 M ABOVE DISCHARGE PORT
AVG DILUTION = 96.1378 B = 2.27 M
COMPUTATIONS CEASE: PLUME TRAPPED
TRAPPED LEVEL = 2.9151 M ABOVE DISCHARGE PORT
AVG DILUTION = 103.4342 B = 2.15 M

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1
ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED AMBIENT
.....
CASE NO. 4 JETLAG 2000
TITLE Jet4

INPUT PARAMETERS
^^^^^^^^^^^^^^^^
ENTRAINMENT HYPOTHESIS : ASYMMETRIC
SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
COFLOW FACTOR : STANDARD
TIME STEP CONTRL : VARIABLE ( > 0.985 )
MAX NUMBER OF TIME STEPS : 1500
PRINTOUT INTERVAL : 100
MAX NUMBER OF ITERATIONS : 5
ITERATION ERROR BOUND : 0.00100
APPROX RATIO OF MASS/DMASS : 144.0

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ENVIROMENTAL CONDITIONS
^^^^^^^^^^^^^^^^^^^^^^^^^^^^
DEPTH(m) SIGMAT U(m/s)
EXIT 8.00 -2.00 0.873
.....
AMBIENT 0.00 14.00 0.050
1.00 14.50 0.050
2.00 15.00 0.050
3.00 15.50 0.050
4.00 16.00 0.050
5.00 16.50 0.050
6.00 17.00 0.050
7.00 17.50 0.050
8.00 18.00 0.050
8.50 18.00 0.050

```

```

LENGTH & DILUTION SCALES
^^^^^^^^^^^^^^^^^^^^^^^^^^^^
Total Q ... 0.0069 (m3/s) Qj ... 6.86E-03 (m3/s)
Port No. ... 1 Mj ... 5.99E-03 (m4/s2)
Depth ... 8.0000 (m) Bj ... 1.32E-03 (m4/s3)
Diameter ... 0.1000 (m) lQ ... 0.0886 (m)

```

```

Uj ... 0.8732 (m/s) lm ... 1.5477 (m)
Ua ... 0.0500 (m/s) lb ... 10.5702 (m)
dp/pa ... 0.01965 lM ... 0.5922 (m)
po ... 0.99800 (g/cc) Sm ... 17.4638
pa ... 1.01800 (g/cc) Sb ... 814.5901
Ver. ang ... 0.00 lQ/lm ... 0.0573
Hor. ang ... 90.00 lQ/lM ... 0.1496
Fd ... 6.29 lm/lb ... 0.1464
Uj/Ua ... 17.46 lM/lb ... 0.0560

```

```

Coflowing case:
dMj ... 0.0056
lm* ... 1.5027
Sm* ... 16.4638

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```

Stratification case:
T ... -425.01

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X	Y	Z	PLUME RADIUS	AVERAGE DILUTION	DENSITY DIFF.	VELOCITY
(m)	(m)	(m)	(m)		(sigmat)	(m/s)
0.000	0.000	0.000	0.050	1.00	20.0000	0.873
0.008	-0.303	0.016	0.098	1.96	10.0933	0.445
0.056	-0.748	0.131	0.187	3.90	5.0109	0.244
0.177	-1.200	0.457	0.318	7.77	2.3847	0.168
0.415	-1.603	1.072	0.501	15.51	0.9650	0.135
0.828	-1.938	1.940	0.816	31.00	0.1667	0.102
NEUTRAL BUOYANCY LEVEL REACHED						
1.480	-2.202	2.740	1.481	62.10	-0.1941	0.062
MAXIMUM RISE REACHED						
2.826	-2.474	2.757	1.904	92.85	-0.1177	0.056
TRAPPING LEVEL REACHED						
3.241	-2.549	2.532	1.970	101.31	-0.0015	0.057

```

NUMBER OF STEPS = 714
NEUTRAL BUOYANCY LEVEL = 2.2370 M ABOVE DISCHARGE PORT
AVG DILUTION = 38.7210 B = 0.98 M
MAXIMUM RISE (CENTER) = 2.9441 M ABOVE DISCHARGE PORT
AVG DILUTION = 92.2220 B = 2.00 M
COMPUTATIONS CEASE: PLUME TRAPPED
TRAPPED LEVEL = 2.5292 M ABOVE DISCHARGE PORT
AVG DILUTION = 101.5105 B = 1.97 M

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**Wet Season High Ambient Velocity, Peak Dry Weather Flow
(4,740 m³/day)**

ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED AMBIENT

CASE NO. 1 JETLAG 2000
TITLE Jet1

INPUT PARAMETERS

ENTRAINMENT HYPOTHESIS : ASYMMETRIC
SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
COFLOW FACTOR : STANDARD
TIME STEP CONTRL : VARIABLE (> 0.985)
MAX NUMBER OF TIME STEPS : 1500
PRINTOUT INTERVAL : 100
MAX NUMBER OF ITERATIONS : 5
ITERATION ERROR BOUND : 0.00100
APPROX RATIO OF MASS/DMASS : 144.0

ENVIRONMENTAL CONDITIONS

	DEPTH(m)	SIGMAT	U(m/s)
EXIT	8.00	-2.00	0.873
AMBIENT	0.00	14.00	0.400
	1.00	14.50	0.400
	2.00	15.00	0.400
	3.00	15.50	0.400
	4.00	16.00	0.400
	5.00	16.50	0.400
	6.00	17.00	0.400
	7.00	17.50	0.400
	8.00	18.00	0.400
	8.50	18.00	0.400

LENGTH & DILUTION SCALES

Total Q ...	0.0069 (m3/s)	Qj ...	6.86E-03 (m3/s)
Port No. ...	1	Mj ...	5.99E-03 (m4/s2)
Depth ...	8.0000 (m)	Bj ...	1.32E-03 (m4/s3)
Diameter ...	0.1000 (m)	lQ ...	0.0886 (m)
Uj ...	0.8732 (m/s)	lm ...	0.1935 (m)
Ua ...	0.4000 (m/s)	lb ...	0.0206 (m)
dp/pa ...	0.01965	lM ...	0.5922 (m)
po ...	0.99800 (g/cc)	Sm ...	2.1830
pa ...	1.01800 (g/cc)	Sb ...	0.0249
Ver. ang ...	0.00	lQ/lm ...	0.4581
Hor. ang ...	0.00	lQ/lM ...	0.1496
Fd ...	6.29	lm/lb ...	9.3709
Uj/Ua ...	2.18	lM/lb ...	28.6859

Coflowing case:

dMj ...	0.0032
lm* ...	0.1424
Sm* ...	1.1830

Stratification case:

T ... -425.01

X (m)	Y (m)	Z (m)	PLUME RADIUS (m)	AVERAGE DILUTION	DENSITY DIFF. (sigmat)	VELOCITY (m/s)
0.000	0.000	0.000	0.050	1.00	20.0000	0.873
0.388	0.000	0.017	0.082	1.97	10.0703	0.641
0.826	0.000	0.064	0.128	3.91	5.0173	0.523
1.396	0.000	0.137	0.192	7.80	2.4824	0.464
2.247	0.000	0.246	0.280	15.56	1.2020	0.433
3.658	0.000	0.409	0.403	31.08	0.5411	0.417
6.113	0.000	0.649	0.576	62.07	0.1822	0.409
NEUTRAL BUOYANCY LEVEL REACHED						
11.144	0.000	1.001	0.817	123.75	-0.0386	0.404
MAXIMUM RISE REACHED						
27.519	0.000	1.013	1.071	211.62	-0.0070	0.402
TRAPPING LEVEL REACHED						
27.888	0.000	1.001	1.079	214.56	-0.0011	0.402

NUMBER OF STEPS = 800

NEUTRAL BUOYANCY LEVEL = 0.9183 M ABOVE DISCHARGE PORT
AVG DILUTION = 108.2038 B = 0.76 M
MAXIMUM RISE (CENTER) = 1.2059 M ABOVE DISCHARGE PORT
AVG DILUTION = 166.4464 B = 0.95 M
COMPUTATIONS CEASE: PLUME TRAPPED
TRAPPED LEVEL = 0.9991 M ABOVE DISCHARGE PORT
AVG DILUTION = 215.1182 B = 1.08 M

1

ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED AMBIENT

CASE NO. 2 JETLAG 2000
TITLE Jet2

INPUT PARAMETERS

ENTRAINMENT HYPOTHESIS : ASYMMETRIC
SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
COFLOW FACTOR : STANDARD
TIME STEP CONTRL : VARIABLE (> 0.985)
MAX NUMBER OF TIME STEPS : 1500
PRINTOUT INTERVAL : 100
MAX NUMBER OF ITERATIONS : 5
ITERATION ERROR BOUND : 0.00100
APPROX RATIO OF MASS/DMASS : 144.0

ENVIRONMENTAL CONDITIONS

	DEPTH(m)	SIGMAT	U(m/s)
EXIT	8.00	-2.00	0.873
AMBIENT	0.00	14.00	0.400
	1.00	14.50	0.400
	2.00	15.00	0.400
	3.00	15.50	0.400
	4.00	16.00	0.400
	5.00	16.50	0.400
	6.00	17.00	0.400

7.00 17.50 0.400
8.00 18.00 0.400
8.50 18.00 0.400

LENGTH & DILUTION SCALES
^^

Total Q ... 0.0069 (m3/s) Qj ... 6.86E-03 (m3/s)
Port No. ... 1 Mj ... 5.99E-03 (m4/s2)
Depth ... 8.0000 (m) Bj ... 1.32E-03 (m4/s3)
Diameter ... 0.1000 (m) lQ ... 0.0886 (m)
Uj ... 0.8732 (m/s) lm ... 0.1935 (m)
Ua ... 0.4000 (m/s) lb ... 0.0206 (m)
dp/pa ... 0.01965 lM ... 0.5922 (m)
po ... 0.99800 (g/cc) Sm ... 2.1830
pa ... 1.01800 (g/cc) Sb ... 0.0249
Ver. ang ... 0.00 lQ/lm ... 0.4581
Hor. ang ... 90.00 lQ/LM ... 0.1496
Fd ... 6.29 lm/lb ... 9.3709
Uj/Ua ... 2.18 lM/lb ... 28.6859

Coflowing case:
dMj ... 0.0032
lm* ... 0.1424
Sm* ... 1.1830

Stratification case:
T ... -425.01

X	Y	Z	PLUME RADIUS (m)	AVERAGE DILUTION	DENSITY DIFF. (sigmat)	VELOCITY (m/s)
0.000	0.000	0.000	0.050	1.00	20.0000	0.873
0.012	0.066	0.001	0.095	1.97	10.0439	0.482
0.047	0.108	0.002	0.152	3.92	5.0276	0.371
0.199	0.175	0.009	0.214	7.69	2.5521	0.367
0.758	0.291	0.044	0.297	15.31	1.2668	0.380
2.136	0.431	0.161	0.414	30.54	0.5900	0.390
4.688	0.559	0.391	0.580	61.01	0.2097	0.395
NEUTRAL BUOYANCY LEVEL REACHED						
9.616	0.680	0.742	0.818	121.75	-0.0248	0.397
MAXIMUM RISE REACHED						
25.126	0.876	0.825	1.093	218.18	-0.0247	0.398
TRAPPING LEVEL REACHED						
26.651	0.890	0.780	1.124	230.60	-0.0011	0.398

NUMBER OF STEPS = 806
NEUTRAL BUOYANCY LEVEL = 0.6902 M ABOVE DISCHARGE PORT
AVG DILUTION = 111.5014 B = 0.78 M
MAXIMUM RISE (CENTER) = 0.9681 M ABOVE DISCHARGE PORT
AVG DILUTION = 176.9254 B = 0.99 M
COMPUTATIONS CEASE: PLUME TRAPPED
TRAPPED LEVEL = 0.7774 M ABOVE DISCHARGE PORT
AVG DILUTION = 231.2082 B = 1.13 M

1
ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED AMBIENT
.....
CASE NO. 3 JETLAG 2000

TITLE Jet3

INPUT PARAMETERS
^^^^^^^^^^^^^^^^^^^^

ENTRAINMENT HYPOTHESIS : ASYMMETRIC
SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
COFLOW FACTOR : STANDARD
TIME STEP CONTRL : VARIABLE (> 0.985)
MAX NUMBER OF TIME STEPS : 1500
PRINTOUT INTERVAL : 100
MAX NUMBER OF ITERATIONS : 5
ITERATION ERROR BOUND : 0.00100
APPROX RATIO OF MASS/DMASS : 144.0

ENVIROMENTAL CONDITIONS
^^^^^^^^^^^^^^^^^^^^

	DEPTH (m)	SIGMAT	U (m/s)
EXIT	8.00	-2.00	0.873
.....
AMBIENT	0.00	14.00	0.400
	1.00	14.50	0.400
	2.00	15.00	0.400
	3.00	15.50	0.400
	4.00	16.00	0.400
	5.00	16.50	0.400
	6.00	17.00	0.400
	7.00	17.50	0.400
	8.00	18.00	0.400
	8.50	18.00	0.400

LENGTH & DILUTION SCALES
^^^^^^^^^^^^^^^^^^^^

Total Q ... 0.0069 (m3/s) Qj ... 6.86E-03 (m3/s)
Port No. ... 1 Mj ... 5.99E-03 (m4/s2)
Depth ... 8.0000 (m) Bj ... 1.32E-03 (m4/s3)
Diameter ... 0.1000 (m) lQ ... 0.0886 (m)
Uj ... 0.8732 (m/s) lm ... 0.1935 (m)
Ua ... 0.4000 (m/s) lb ... 0.0206 (m)
dp/pa ... 0.01965 lM ... 0.5922 (m)
po ... 0.99800 (g/cc) Sm ... 2.1830
pa ... 1.01800 (g/cc) Sb ... 0.0249
Ver. ang ... 0.00 lQ/lm ... 0.4581
Hor. ang ... 180.00 lQ/LM ... 0.1496
Fd ... 6.29 lm/lb ... 9.3709
Uj/Ua ... 2.18 lM/lb ... 28.6859

Coflowing case:
dMj ... 0.0032
lm* ... 0.1424
Sm* ... 1.1830

Stratification case:
T ... -425.01

X	Y	Z	PLUME RADIUS	AVERAGE DILUTION	DENSITY DIFF.	VELOCITY (m/s)
(m)	(m)	(m)	(m)		(sigmat)	
0.000	0.000	0.000	0.050	1.00	20.0000	0.873
-0.224	0.000	0.013	0.108	1.75	11.3450	0.327
-0.412	0.000	0.088	0.217	2.65	7.4070	0.123
-0.410	0.000	0.116	0.275	3.79	5.1580	0.110
-0.390	0.000	0.135	0.261	4.34	4.4945	0.139
-0.372	0.000	0.148	0.255	4.77	4.0812	0.160
-0.351	0.000	0.159	0.252	5.19	3.7460	0.178
-0.242	0.000	0.203	0.255	6.94	2.7793	0.232
0.231	0.000	0.321	0.308	13.62	1.3719	0.314
1.254	0.000	0.490	0.407	27.18	0.6246	0.358
3.265	0.000	0.732	0.559	54.29	0.2230	0.379
NEUTRAL BUOYANCY LEVEL REACHED						
7.424	0.000	1.078	0.779	108.33	-0.0162	0.389
MAXIMUM RISE REACHED						
21.207	0.000	1.247	1.011	184.26	-0.0607	0.393
TRAPPING LEVEL REACHED						
24.474	0.000	1.140	1.079	210.28	-0.0028	0.394

5.00	16.50	0.400
6.00	17.00	0.400
7.00	17.50	0.400
8.00	18.00	0.400
8.50	18.00	0.400

LENGTH & DILUTION SCALES

Total Q	...	0.0069 (m3/s)	Qj ... 6.86E-03 (m3/s)
Port No.	...	1	Mj ... 5.99E-03 (m4/s2)
Depth	...	8.0000 (m)	Bj ... 1.32E-03 (m4/s3)
Diameter	...	0.1000 (m)	lQ ... 0.0886 (m)
Uj	...	0.8732 (m/s)	lm ... 0.1935 (m)
Ua	...	0.4000 (m/s)	lb ... 0.0206 (m)
dp/pa	...	0.01965	lM ... 0.5922 (m)
po	...	0.99800 (g/cc)	Sm ... 2.1830
pa	...	1.01800 (g/cc)	Sb ... 0.0249
Ver. ang	...	0.00	lQ/lm ... 0.4581
Hor. ang	...	90.00	lQ/lM ... 0.1496
Fd	...	6.29	lm/lb ... 9.3709
Uj/Ua	...	2.18	lM/lb ... 28.6859

NUMBER OF STEPS = 1217
 NEUTRAL BUOYANCY LEVEL = 1.0449 M ABOVE DISCHARGE PORT
 AVG DILUTION = 102.3881 B = 0.76 M
 MAXIMUM RISE (CENTER) = 1.3432 M ABOVE DISCHARGE PORT
 AVG DILUTION = 162.3893 B = 0.95 M
 COMPUTATIONS CEASE: PLUME TRAPPED
 TRAPPED LEVEL = 1.1341 M ABOVE DISCHARGE PORT
 AVG DILUTION = 211.6417 B = 1.08 M

Coflowing case:
 dMj ... 0.0032
 lm* ... 0.1424
 Sm* ... 1.1830

Stratification case:
 T ... -425.01

1
 ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED AMBIENT
 CASE NO. 4 JETLAG 2000
 TITLE Jet4
 INPUT PARAMETERS

 ENTRAINMENT HYPOTHESIS : ASYMMETRIC
 SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
 COFLOW FACTOR : STANDARD
 TIME STEP CONTRL : VARIABLE (> 0.985)
 MAX NUMBER OF TIME STEPS : 1500
 PRINTOUT INTERVAL : 100
 MAX NUMBER OF ITERATIONS : 5
 ITERATION ERROR BOUND : 0.00100
 APPROX RATIO OF MASS/DMASS : 144.0

X	Y	Z	PLUME RADIUS	AVERAGE DILUTION	DENSITY DIFF.	VELOCITY (m/s)
(m)	(m)	(m)	(m)		(sigmat)	
0.000	0.000	0.000	0.050	1.00	20.0000	0.873
0.012	-0.066	0.001	0.095	1.97	10.0439	0.482
0.047	-0.108	0.002	0.152	3.92	5.0282	0.371
0.199	-0.175	0.009	0.214	7.69	2.5532	0.367
0.758	-0.291	0.044	0.297	15.31	1.2673	0.380
2.136	-0.431	0.161	0.414	30.54	0.5900	0.390
4.688	-0.559	0.391	0.580	61.01	0.2099	0.395
NEUTRAL BUOYANCY LEVEL REACHED						
9.613	-0.680	0.742	0.818	121.75	-0.0248	0.397
MAXIMUM RISE REACHED						
25.123	-0.876	0.827	1.093	218.17	-0.0250	0.398
TRAPPING LEVEL REACHED						
26.649	-0.890	0.781	1.124	230.59	-0.0014	0.398

ENVIROMENTAL CONDITIONS

DEPTH (m)	SIGMAT	U (m/s)
EXIT 8.00	-2.00	0.873
.....
AMBIENT 0.00	14.00	0.400
1.00	14.50	0.400
2.00	15.00	0.400
3.00	15.50	0.400
4.00	16.00	0.400

NUMBER OF STEPS = 806
 NEUTRAL BUOYANCY LEVEL = 0.6903 M ABOVE DISCHARGE PORT
 AVG DILUTION = 111.5185 B = 0.78 M
 MAXIMUM RISE (CENTER) = 0.9688 M ABOVE DISCHARGE PORT
 AVG DILUTION = 177.0951 B = 0.99 M
 COMPUTATIONS CEASE: PLUME TRAPPED
 TRAPPED LEVEL = 0.7784 M ABOVE DISCHARGE PORT
 AVG DILUTION = 231.3388 B = 1.13 M

**Dry Season Low Ambient Velocity, Average Dry Weather Flow
(1,580 m³/day)**

ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED AMBIENT
.....
CASE NO. 1 JETLAG 2000
TITLE Jet1

INPUT PARAMETERS
.....

ENTRAINMENT HYPOTHESIS : ASYMMETRIC
SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
COFLOW FACTOR : STANDARD
TIME STEP CONTRL : VARIABLE (> 0.985)
MAX NUMBER OF TIME STEPS : 1500
PRINTOUT INTERVAL : 100
MAX NUMBER OF ITERATIONS : 5
ITERATION ERROR BOUND : 0.00100
APPROX RATIO OF MASS/DMASS : 144.0

ENVIROMENTAL CONDITIONS
.....

	DEPTH(m)	SIGMAT	U(m/s)
EXIT	8.00	-2.00	0.291
.....
AMBIENT	0.00	20.00	0.050
	1.00	20.00	0.050
	2.00	20.00	0.050
	3.00	20.00	0.050
	4.00	20.00	0.050
	5.00	20.00	0.050
	6.00	20.00	0.050
	7.00	20.00	0.050
	8.00	20.00	0.050
	8.50	20.00	0.050

LENGTH & DILUTION SCALES
.....

Total Q ...	0.0023 (m3/s)	Qj ...	2.29E-03 (m3/s)
Port No. ...	1	Mj ...	6.65E-04 (m4/s2)
Depth ...	8.0000 (m)	Bj ...	4.84E-04 (m4/s3)
Diameter ...	0.1000 (m)	lQ ...	0.0886 (m)
Uj ...	0.2911 (m/s)	lm ...	0.5159 (m)
Ua ...	0.0500 (m/s)	lb ...	3.8681 (m)
dp/pa ...	0.02157	lM ...	0.1884 (m)
po ...	0.99800 (g/cc)	Sm ...	5.8212
pa ...	1.02000 (g/cc)	Sb ...	327.2635
Ver. ang ...	0.00	lQ/lm ...	0.1718
Hor. ang ...	0.00	lQ/lM ...	0.4704
Fd ...	2.00	lm/lb ...	0.1334
Uj/Ua ...	5.82	lM/lb ...	0.0487

Coflowing case:
dMj ... 0.0006
lm* ... 0.4695
Sm* ... 4.8213

X	Y	Z	PLUME RADIUS	AVERAGE DILUTION	DENSITY DIFF.	VELOCITY
(m)	(m)	(m)	(m)		(sigmat)	(m/s)
0.000	0.000	0.000	0.050	1.00	22.0000	0.291
0.226	0.000	0.071	0.084	1.96	11.0780	0.204
0.426	0.000	0.258	0.128	3.91	5.5386	0.174
0.630	0.000	0.548	0.195	7.79	2.7695	0.150
0.876	0.000	0.952	0.299	15.56	1.3851	0.127
1.208	0.000	1.496	0.458	31.10	0.6927	0.108
1.688	0.000	2.206	0.702	62.15	0.3464	0.092
2.406	0.000	3.111	1.068	124.25	0.1733	0.079
3.508	0.000	4.255	1.608	248.38	0.0867	0.070
5.244	0.000	5.710	2.389	496.48	0.0434	0.063
8.051	0.000	7.607	3.501	992.26	0.0217	0.059
8.721	0.000	8.010	3.746	1123.95	0.0192	0.058

NUMBER OF STEPS = 1016
SURFACE LAYER (CENTER) LEVEL = 5.65 M ABOVE DISCHARGE PORT
AVG DILUTION = 483.44

COMPUTATIONS CEASE: PLUME HITS WATER SURFACE
AVG DILUTION AT WATER SURFACE = 1120.60

1
ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED AMBIENT
.....
CASE NO. 2 JETLAG 2000
TITLE Jet2

INPUT PARAMETERS
.....

ENTRAINMENT HYPOTHESIS : ASYMMETRIC
SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
COFLOW FACTOR : STANDARD
TIME STEP CONTRL : VARIABLE (> 0.985)
MAX NUMBER OF TIME STEPS : 1500
PRINTOUT INTERVAL : 100
MAX NUMBER OF ITERATIONS : 5
ITERATION ERROR BOUND : 0.00100
APPROX RATIO OF MASS/DMASS : 144.0

ENVIROMENTAL CONDITIONS
.....

	DEPTH(m)	SIGMAT	U(m/s)
EXIT	8.00	-2.00	0.291
.....
AMBIENT	0.00	20.00	0.050
	1.00	20.00	0.050
	2.00	20.00	0.050
	3.00	20.00	0.050
	4.00	20.00	0.050
	5.00	20.00	0.050
	6.00	20.00	0.050
	7.00	20.00	0.050
	8.00	20.00	0.050
	8.50	20.00	0.050

LENGTH & DILUTION SCALES

^^

Total Q ...	0.0023 (m3/s)	Qj ...	2.29E-03 (m3/s)
Port No. ...	1	Mj ...	6.65E-04 (m4/s2)
Depth ...	8.0000 (m)	Bj ...	4.84E-04 (m4/s3)
Diameter ...	0.1000 (m)	lQ ...	0.0886 (m)
Uj ...	0.2911 (m/s)	lm ...	0.5159 (m)
Ua ...	0.0500 (m/s)	lb ...	3.8681 (m)
dp/pa ...	0.02157	lM ...	0.1884 (m)
po ...	0.99800 (g/cc)	Sm ...	5.8212
pa ...	1.02000 (g/cc)	Sb ...	327.2635
Ver. ang ...	0.00	lQ/lm ...	0.1718
Hor. ang ...	90.00	lQ/LM ...	0.4704
Fd ...	2.00	lm/lb ...	0.1334
Uj/Ua ...	5.82	lM/lb ...	0.0487

Coflowing case:
dMj ... 0.0006
lm* ... 0.4695
Sm* ... 4.8213

X	Y	Z	PLUME RADIUS	AVERAGE DILUTION	DENSITY DIFF.	VELOCITY
(m)	(m)	(m)	(m)		(sigmat)	(m/s)
0.000	0.000	0.000	0.050	1.00	22.0000	0.291
0.012	0.167	0.045	0.091	1.96	11.0853	0.173
0.059	0.315	0.204	0.139	3.90	5.5461	0.147
0.152	0.432	0.483	0.205	7.78	2.7736	0.134
0.312	0.523	0.885	0.309	15.54	1.3872	0.119
0.575	0.593	1.427	0.468	31.05	0.6938	0.103
0.998	0.649	2.133	0.712	62.06	0.3470	0.089
1.669	0.693	3.032	1.078	124.06	0.1735	0.078
2.733	0.728	4.168	1.617	247.99	0.0868	0.069
4.437	0.755	5.616	2.396	495.68	0.0434	0.063
7.218	0.778	7.509	3.506	990.65	0.0217	0.059
8.041	0.782	8.003	3.806	1153.65	0.0187	0.058

NUMBER OF STEPS = 1020
SURFACE LAYER (CENTER) LEVEL = 5.61 M ABOVE DISCHARGE PORT
AVG DILUTION = 494.03

COMPUTATIONS CEASE: PLUME HITS WATER SURFACE
AVG DILUTION AT WATER SURFACE = 1152.59

1 ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED AMBIENT

CASE NO. 3 JETLAG 2000
TITLE Jet3

INPUT PARAMETERS

^^^^^^^^^^^^^^^^

ENTRAINMENT HYPOTHESIS : ASYMMETRIC
SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
COFLOW FACTOR : STANDARD

TIME STEP CONTRL : VARIABLE (> 0.985)

MAX NUMBER OF TIME STEPS : 1500
PRINTOUT INTERVAL : 100
MAX NUMBER OF ITERATIONS : 5
ITERATION ERROR BOUND : 0.00100
APPROX RATIO OF MASS/DMASS : 144.0

ENVIRONMENTAL CONDITIONS

^^

	DEPTH(m)	SIGMAT	U(m/s)
EXIT	8.00	-2.00	0.291
AMBIENT	0.00	20.00	0.050
	1.00	20.00	0.050
	2.00	20.00	0.050
	3.00	20.00	0.050
	4.00	20.00	0.050
	5.00	20.00	0.050
	6.00	20.00	0.050
	7.00	20.00	0.050
	8.00	20.00	0.050
	8.50	20.00	0.050

LENGTH & DILUTION SCALES

^^

Total Q ...	0.0023 (m3/s)	Qj ...	2.29E-03 (m3/s)
Port No. ...	1	Mj ...	6.65E-04 (m4/s2)
Depth ...	8.0000 (m)	Bj ...	4.84E-04 (m4/s3)
Diameter ...	0.1000 (m)	lQ ...	0.0886 (m)
Uj ...	0.2911 (m/s)	lm ...	0.5159 (m)
Ua ...	0.0500 (m/s)	lb ...	3.8681 (m)
dp/pa ...	0.02157	lM ...	0.1884 (m)
po ...	0.99800 (g/cc)	Sm ...	5.8212
pa ...	1.02000 (g/cc)	Sb ...	327.2635
Ver. ang ...	0.00	lQ/lm ...	0.1718
Hor. ang ...	180.00	lQ/LM ...	0.4704
Fd ...	2.00	lm/lb ...	0.1334
Uj/Ua ...	5.82	lM/lb ...	0.0487

Coflowing case:
dMj ... 0.0006
lm* ... 0.4695
Sm* ... 4.8213

X	Y	Z	PLUME RADIUS	AVERAGE DILUTION	DENSITY DIFF.	VELOCITY
(m)	(m)	(m)	(m)		(sigmat)	(m/s)
0.000	0.000	0.000	0.050	1.00	22.0000	0.291
-0.209	0.000	0.082	0.091	1.95	11.1585	0.172
-0.319	0.000	0.290	0.139	3.88	5.5789	0.147
-0.343	0.000	0.594	0.207	7.73	2.7905	0.131
-0.275	0.000	1.008	0.312	15.44	1.3958	0.115
-0.087	0.000	1.554	0.473	30.85	0.6982	0.100
0.275	0.000	2.259	0.718	61.66	0.3492	0.087
0.895	0.000	3.152	1.084	123.26	0.1747	0.076

1.914 0.000 4.279 1.622 246.39 0.0874 0.068
 3.578 0.000 5.718 2.397 492.47 0.0437 0.062
 6.323 0.000 7.602 3.502 984.23 0.0219 0.058
 6.983 0.000 8.002 3.745 1114.86 0.0193 0.058

Fd ... 2.00 1m/lb ... 0.1334
 Uj/Ua ... 5.82 1M/lb ... 0.0487

Coflowing case:
 dMj ... 0.0006
 lm* ... 0.4695
 Sm* ... 4.8213

NUMBER OF STEPS = 1016
 SURFACE LAYER (CENTER) LEVEL = 5.64 M ABOVE DISCHARGE PORT
 AVG DILUTION = 477.29

COMPUTATIONS CEASE: PLUME HITS WATER SURFACE
 AVG DILUTION AT WATER SURFACE = 1114.09

1
 ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED AMBIENT

CASE NO. 4 JETLAG 2000
 TITLE Jet4

INPUT PARAMETERS

ENTRAINMENT HYPOTHESIS : ASYMMETRIC
 SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
 COFLOW FACTOR : STANDARD
 TIME STEP CONTRL : VARIABLE (> 0.985)
 MAX NUMBER OF TIME STEPS : 1500
 PRINTOUT INTERVAL : 100
 MAX NUMBER OF ITERATIONS : 5
 ITERATION ERROR BOUND : 0.00100
 APPROX RATIO OF MASS/DMASS : 144.0

X	Y	Z	PLUME RADIUS (m)	AVERAGE DILUTION	DENSITY DIFF. (sigmat)	VELOCITY (m/s)
0.000	0.000	0.000	0.050	1.00	22.0000	0.291
0.012	-0.167	0.045	0.091	1.96	11.0853	0.173
0.059	-0.315	0.204	0.139	3.90	5.5461	0.147
0.152	-0.432	0.483	0.205	7.78	2.7736	0.134
0.312	-0.523	0.885	0.309	15.54	1.3872	0.119
0.575	-0.593	1.427	0.468	31.05	0.6938	0.103
0.998	-0.649	2.133	0.712	62.06	0.3470	0.089
1.669	-0.693	3.032	1.078	124.06	0.1735	0.078
2.733	-0.728	4.168	1.617	247.99	0.0868	0.069
4.437	-0.755	5.616	2.396	495.68	0.0434	0.063
7.218	-0.778	7.509	3.506	990.65	0.0217	0.059
8.041	-0.782	8.003	3.806	1153.65	0.0187	0.058

NUMBER OF STEPS = 1020
 SURFACE LAYER (CENTER) LEVEL = 5.61 M ABOVE DISCHARGE PORT
 AVG DILUTION = 494.03

COMPUTATIONS CEASE: PLUME HITS WATER SURFACE
 AVG DILUTION AT WATER SURFACE = 1152.59

ENVIROMENTAL CONDITIONS

DEPTH (m)	SIGMAT	U (m/s)
EXIT 8.00	-2.00	0.291
AMBIENT 0.00	20.00	0.050
1.00	20.00	0.050
2.00	20.00	0.050
3.00	20.00	0.050
4.00	20.00	0.050
5.00	20.00	0.050
6.00	20.00	0.050
7.00	20.00	0.050
8.00	20.00	0.050
8.50	20.00	0.050

LENGTH & DILUTION SCALES

Total Q ... 0.0023 (m3/s) Qj ... 2.29E-03 (m3/s)
 Port No. ... 1 Mj ... 6.65E-04 (m4/s2)
 Depth ... 8.0000 (m) Bj ... 4.84E-04 (m4/s3)
 Diameter ... 0.1000 (m) lQ ... 0.0886 (m)
 Uj ... 0.2911 (m/s) lm ... 0.5159 (m)
 Ua ... 0.0500 (m/s) lb ... 3.8681 (m)
 dp/pa ... 0.02157 lM ... 0.1884 (m)
 po ... 0.99800 (g/cc) Sm ... 5.8212
 pa ... 1.02000 (g/cc) Sb ... 327.2635
 Ver. ang ... 0.00 lQ/lm ... 0.1718
 Hor. ang ... 90.00 lQ/lM ... 0.4704

**Dry Season High Ambient Velocity, Average Dry Weather Flow
(1,580 m³/day)**

1
ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED AMBIENT
.....
CASE NO. 1 JETLAG 2000
TITLE Jet1

INPUT PARAMETERS
^^^^^^^^^^^^^^^^

ENTRAINMENT HYPOTHESIS : ASYMMETRIC
SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
COFLOW FACTOR : STANDARD
TIME STEP CONTRL : VARIABLE (> 0.985)
MAX NUMBER OF TIME STEPS : 90000
PRINTOUT INTERVAL : 100
MAX NUMBER OF ITERATIONS : 5
ITERATION ERROR BOUND : 0.00100
APPROX RATIO OF MASS/DMASS : 144.0

ENVIROMENTAL CONDITIONS
^^^^^^^^^^^^^^^^

	DEPTH(m)	SIGMAT	U(m/s)
EXIT	8.00	-2.00	0.291
.....
AMBIENT	0.00	20.00	0.400
	1.00	20.00	0.400
	2.00	20.00	0.400
	3.00	20.00	0.400
	4.00	20.00	0.400
	5.00	20.00	0.400
	6.00	20.00	0.400
	7.00	20.00	0.400
	8.00	20.00	0.400
	8.50	20.00	0.400

LENGTH & DILUTION SCALES
^^^^^^^^^^^^^^^^

Total Q ...	0.0023 (m3/s)	Qj ...	2.29E-03 (m3/s)
Port No. ...	1	Mj ...	6.65E-04 (m4/s2)
Depth ...	8.0000 (m)	Bj ...	4.84E-04 (m4/s3)
Diameter ...	0.1000 (m)	lQ ...	0.0886 (m)
Uj ...	0.2911 (m/s)	lm ...	0.0645 (m)
Ua ...	0.4000 (m/s)	lb ...	0.0076 (m)
dp/pa ...	0.02157	lM ...	0.1884 (m)
po ...	0.99800 (g/cc)	Sm ...	0.7277
pa ...	1.02000 (g/cc)	Sb ...	0.0100
Ver. ang ...	0.00	lQ/lm ...	1.3743
Hor. ang ...	0.00	lQ/lM ...	0.4704
Fd ...	2.00	lm/lb ...	8.5357
Uj/Ua ...	0.73	lM/lb ...	24.9379

Coflowing case:
dMj ... -0.0002
lm* ... -0.0395
Sm* ... 0.2723

X	Y	Z	PLUME RADIUS	AVERAGE DILUTION	DENSITY DIFF.	VELOCITY
(m)	(m)	(m)	(m)		(sigmat)	(m/s)
0.000E+00	0.000E+00	0.000E+00	0.500E-01	1.0	22.0000	0.291
0.159	0.000E+00	0.175E-01	0.642E-01	2.0	10.9660	0.350
0.367	0.000E+00	0.501E-01	0.872E-01	3.9	5.4858	0.377
0.718	0.000E+00	0.101	0.121	7.9	2.7452	0.390
1.31	0.000E+00	0.177	0.170	16.	1.3738	0.396
2.32	0.000E+00	0.287	0.239	31.	0.6874	0.399
3.98	0.000E+00	0.441	0.338	63.	0.3440	0.400
6.77	0.000E+00	0.657	0.477	0.13E+03	0.1721	0.400
11.5	0.000E+00	0.963	0.674	0.25E+03	0.0861	0.400
19.4	0.000E+00	1.40	0.953	0.50E+03	0.0431	0.400
32.6	0.000E+00	2.01	1.35	0.10E+04	0.0216	0.400
55.0	0.000E+00	2.87	1.90	0.20E+04	0.0108	0.400
92.5	0.000E+00	4.10	2.69	0.40E+04	0.0054	0.400
156.	0.000E+00	5.83	3.80	0.80E+04	0.0027	0.400
250.	0.000E+00	8.03	5.21	0.15E+05	0.0014	0.400

NUMBER OF STEPS = 1389
SURFACE LAYER (CENTER) LEVEL = 4.83 M ABOVE DISCHARGE PORT
AVG DILUTION = 0.55E+04

COMPUTATIONS CEASE: PLUME HITS WATER SURFACE
AVG DILUTION AT WATER SURFACE = 0.15E+05

1
ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED AMBIENT
.....
CASE NO. 2 JETLAG 2000
TITLE Jet2

INPUT PARAMETERS
^^^^^^^^^^^^^^^^

ENTRAINMENT HYPOTHESIS : ASYMMETRIC
SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
COFLOW FACTOR : STANDARD
TIME STEP CONTRL : VARIABLE (> 0.985)
MAX NUMBER OF TIME STEPS : 90000
PRINTOUT INTERVAL : 100
MAX NUMBER OF ITERATIONS : 5
ITERATION ERROR BOUND : 0.00100
APPROX RATIO OF MASS/DMASS : 144.0

ENVIROMENTAL CONDITIONS
^^^^^^^^^^^^^^^^

	DEPTH(m)	SIGMAT	U(m/s)
EXIT	8.00	-2.00	0.291
.....
AMBIENT	0.00	20.00	0.400
	1.00	20.00	0.400
	2.00	20.00	0.400
	3.00	20.00	0.400
	4.00	20.00	0.400
	5.00	20.00	0.400
	6.00	20.00	0.400

7.00 20.00 0.400
8.00 20.00 0.400
8.50 20.00 0.400

LENGTH & DILUTION SCALES
^^

Total Q ...	0.0023 (m3/s)	Qj ...	2.29E-03 (m3/s)
Port No. ...	1	Mj ...	6.65E-04 (m4/s2)
Depth ...	8.0000 (m)	Bj ...	4.84E-04 (m4/s3)
Diameter ...	0.1000 (m)	lQ ...	0.0886 (m)
Uj ...	0.2911 (m/s)	lm ...	0.0645 (m)
Ua ...	0.4000 (m/s)	lb ...	0.0076 (m)
dp/pa ...	0.02157	lM ...	0.1884 (m)
po ...	0.99800 (g/cc)	Sm ...	0.7277
pa ...	1.02000 (g/cc)	Sb ...	0.0100
Ver. ang ...	0.00	lQ/lm ...	1.3743
Hor. ang ...	90.00	lQ/LM ...	0.4704
Fd ...	2.00	lm/lb ...	8.5357
Uj/Ua ...	0.73	lM/lb ...	24.9379

Coflowing case:
dMj ... -0.0002
lm* ... -0.0395
Sm* ... 0.2723

X	Y	Z	PLUME RADIUS	AVERAGE DILUTION	DENSITY DIFF.	VELOCITY
(m)	(m)	(m)	(m)		(sigmat)	(m/s)
0.000E+00	0.000E+00	0.000E+00	0.500E-01	1.0	22.0000	0.291
0.814E-02	0.141E-01	0.316E-03	0.762E-01	2.0	11.0395	0.247
0.690E-01	0.372E-01	0.325E-02	0.941E-01	3.7	5.8561	0.304
0.333	0.802E-01	0.240E-01	0.123	7.3	2.9451	0.350
0.911	0.124	0.815E-01	0.168	15.	1.4740	0.376
1.89	0.159	0.180	0.234	29.	0.7375	0.389
3.50	0.187	0.326	0.328	58.	0.3691	0.395
6.19	0.210	0.536	0.462	0.12E+03	0.1847	0.398
10.7	0.230	0.835	0.652	0.23E+03	0.0924	0.399
18.2	0.246	1.26	0.921	0.47E+03	0.0462	0.400
30.9	0.260	1.86	1.30	0.93E+03	0.0231	0.400
52.2	0.271	2.70	1.84	0.19E+04	0.0116	0.400
88.0	0.281	3.90	2.60	0.37E+04	0.0058	0.400
148.	0.289	5.59	3.67	0.74E+04	0.0029	0.400
249.	0.296	7.98	5.19	0.15E+05	0.0015	0.400
251.	0.296	8.00	5.21	0.15E+05	0.0014	0.400

NUMBER OF STEPS = 1399
SURFACE LAYER (CENTER) LEVEL = 4.82 M ABOVE DISCHARGE PORT
AVG DILUTION = 0.56E+04

COMPUTATIONS CEASE: PLUME HITS WATER SURFACE
AVG DILUTION AT WATER SURFACE = 0.15E+05

1
ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED AMBIENT
CASE NO. 3 JETLAG 2000

TITLE Jet3

INPUT PARAMETERS
^^^^^^^^^^^^^^^^^^^^

ENTRAINMENT HYPOTHESIS : ASYMMETRIC
SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
COFLOW FACTOR : STANDARD
TIME STEP CONTRL : VARIABLE (> 0.985)
MAX NUMBER OF TIME STEPS : 90000
PRINTOUT INTERVAL : 100
MAX NUMBER OF ITERATIONS : 5
ITERATION ERROR BOUND : 0.00100
APPROX RATIO OF MASS/DMASS : 144.0

ENVIROMENTAL CONDITIONS
^^^^^^^^^^^^^^^^^^^^

EXIT	DEPTH (m)	SIGMAT	U (m/s)
AMBIENT	0.00	20.00	0.400
	1.00	20.00	0.400
	2.00	20.00	0.400
	3.00	20.00	0.400
	4.00	20.00	0.400
	5.00	20.00	0.400
	6.00	20.00	0.400
	7.00	20.00	0.400
	8.00	20.00	0.400
	8.50	20.00	0.400

LENGTH & DILUTION SCALES
^^^^^^^^^^^^^^^^^^^^

Total Q ...	0.0023 (m3/s)	Qj ...	2.29E-03 (m3/s)
Port No. ...	1	Mj ...	6.65E-04 (m4/s2)
Depth ...	8.0000 (m)	Bj ...	4.84E-04 (m4/s3)
Diameter ...	0.1000 (m)	lQ ...	0.0886 (m)
Uj ...	0.2911 (m/s)	lm ...	0.0645 (m)
Ua ...	0.4000 (m/s)	lb ...	0.0076 (m)
dp/pa ...	0.02157	lM ...	0.1884 (m)
po ...	0.99800 (g/cc)	Sm ...	0.7277
pa ...	1.02000 (g/cc)	Sb ...	0.0100
Ver. ang ...	0.00	lQ/lm ...	1.3743
Hor. ang ...	180.00	lQ/LM ...	0.4704
Fd ...	2.00	lm/lb ...	8.5357
Uj/Ua ...	0.73	lM/lb ...	24.9379

Coflowing case:
dMj ... -0.0002
lm* ... -0.0395
Sm* ... 0.2723

X	Y	Z	PLUME RADIUS	AVERAGE DILUTION	DENSITY DIFF.	VELOCITY
(m)	(m)	(m)	(m)		(sigmat)	(m/s)
0.000E+00	0.000E+00	0.000E+00	0.500E-01	1.0	22.0000	0.291
-0.596E-01	0.429E-08	0.497E-01	0.111	2.5	8.6586	0.149
0.139E-01	0.521E-08	0.798E-01	0.110	3.9	5.5571	0.236

0.241	0.624E-08	0.132	0.133	7.7	2.8007	0.317
0.717	0.713E-08	0.205	0.177	15.	1.4018	0.359
1.61	0.790E-08	0.311	0.242	31.	0.7016	0.380
3.19	0.855E-08	0.463	0.338	61.	0.3511	0.390
5.92	0.910E-08	0.678	0.475	0.12E+03	0.1757	0.396
10.5	0.956E-08	0.985	0.669	0.24E+03	0.0879	0.398
18.3	0.995E-08	1.42	0.944	0.49E+03	0.0440	0.399
31.5	0.103E-07	2.03	1.33	0.98E+03	0.0220	0.400
53.6	0.105E-07	2.90	1.89	0.20E+04	0.0110	0.400
90.7	0.108E-07	4.12	2.66	0.39E+04	0.0055	0.400
153.	0.110E-07	5.86	3.77	0.78E+04	0.0028	0.400
245.	0.111E-07	8.02	5.14	0.15E+05	0.0015	0.400

Diameter ...	0.1000 (m)	lQ ...	0.0886 (m)
Uj ...	0.2911 (m/s)	lm ...	0.0645 (m)
Ua ...	0.4000 (m/s)	lb ...	0.0076 (m)
dp/pa ...	0.02157	lM ...	0.1884 (m)
po ...	0.99800 (g/cc)	Sm ...	0.7277
pa ...	1.02000 (g/cc)	Sb ...	0.0100
Ver. ang ...	0.00	lQ/lm ...	1.3743
Hor. ang ...	90.00	lQ/lM ...	0.4704
Fd ...	2.00	lm/lb ...	8.5357
Uj/Ua ...	0.73	lM/lb ...	24.9379

Coflowing case:
dMj ... -0.0002
lm* ... -0.0395
Sm* ... 0.2723

NUMBER OF STEPS = 40888
SURFACE LAYER (CENTER) LEVEL = 4.86 M ABOVE DISCHARGE PORT
AVG DILUTION = 0.54E+04

COMPUTATIONS CEASE: PLUME HITS WATER SURFACE
AVG DILUTION AT WATER SURFACE = 0.14E+05

X	Y	Z	PLUME RADIUS	AVERAGE DILUTION	DENSITY DIFF. (sigmat)	VELOCITY (m/s)
(m)	(m)	(m)	(m)			
0.000E+00	0.000E+00	0.000E+00	0.500E-01	1.0	22.0000	0.291
0.814E-02	-0.141E-01	0.316E-03	0.762E-01	2.0	11.0395	0.247
0.690E-01	-0.372E-01	0.325E-02	0.941E-01	3.7	5.8561	0.304
0.333	-0.802E-01	0.240E-01	0.123	7.3	2.9451	0.350
0.911	-0.124	0.815E-01	0.168	15.	1.4740	0.376
1.89	-0.159	0.180	0.234	29.	0.7375	0.389
3.50	-0.187	0.326	0.328	58.	0.3691	0.395
6.19	-0.210	0.536	0.462	0.12E+03	0.1847	0.398
10.7	-0.230	0.835	0.652	0.23E+03	0.0924	0.399
18.2	-0.246	1.26	0.921	0.47E+03	0.0462	0.400
30.9	-0.260	1.86	1.30	0.93E+03	0.0231	0.400
52.2	-0.271	2.70	1.84	0.19E+04	0.0116	0.400
88.0	-0.281	3.90	2.60	0.37E+04	0.0058	0.400
148.	-0.289	5.59	3.67	0.74E+04	0.0029	0.400
249.	-0.296	7.98	5.19	0.15E+05	0.0015	0.400
251.	-0.296	8.00	5.21	0.15E+05	0.0014	0.400

1
ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED AMBIENT
CASE NO. 4 JETLAG 2000
TITLE Jet4

INPUT PARAMETERS
ENTRAINMENT HYPOTHESIS : ASYMMETRIC
SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
COFLOW FACTOR : STANDARD
TIME STEP CONTRL : VARIABLE (> 0.985)
MAX NUMBER OF TIME STEPS : 90000
PRINTOUT INTERVAL : 100
MAX NUMBER OF ITERATIONS : 5
ITERATION ERROR BOUND : 0.00100
APPROX RATIO OF MASS/DMASS : 144.0

NUMBER OF STEPS = 1399
SURFACE LAYER (CENTER) LEVEL = 4.82 M ABOVE DISCHARGE PORT
AVG DILUTION = 0.56E+04

COMPUTATIONS CEASE: PLUME HITS WATER SURFACE
AVG DILUTION AT WATER SURFACE = 0.15E+05

ENVIROMENTAL CONDITIONS

DEPTH (m)	SIGMAT	U (m/s)
EXIT 8.00	-2.00	0.291
AMBIENT 0.00	20.00	0.400
1.00	20.00	0.400
2.00	20.00	0.400
3.00	20.00	0.400
4.00	20.00	0.400
5.00	20.00	0.400
6.00	20.00	0.400
7.00	20.00	0.400
8.00	20.00	0.400
8.50	20.00	0.400

LENGTH & DILUTION SCALES
Total Q ... 0.0023 (m3/s) Qj ... 2.29E-03 (m3/s)
Port No. ... 1 Mj ... 6.65E-04 (m4/s2)
Depth ... 8.0000 (m) Bj ... 4.84E-04 (m4/s3)

Dry Season low Ambient Velocity, Peak Dry Weather Flow (4,740 m³/day)

1
ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED AMBIENT
.....
CASE NO. 1 JETLAG 2000
TITLE Jet1

INPUT PARAMETERS
.....
ENTRAINMENT HYPOTHESIS : ASYMMETRIC
SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
COFLOW FACTOR : STANDARD
TIME STEP CONTRL : VARIABLE (> 0.985)
MAX NUMBER OF TIME STEPS : 1500
PRINTOUT INTERVAL : 100
MAX NUMBER OF ITERATIONS : 5
ITERATION ERROR BOUND : 0.00100
APPROX RATIO OF MASS/DMASS : 144.0

ENVIROMENTAL CONDITIONS
.....

	DEPTH(m)	SIGMAT	U(m/s)
EXIT	8.00	-2.00	0.873
.....
AMBIENT	0.00	20.00	0.050
	1.00	20.00	0.050
	2.00	20.00	0.050
	3.00	20.00	0.050
	4.00	20.00	0.050
	5.00	20.00	0.050
	6.00	20.00	0.050
	7.00	20.00	0.050
	8.00	20.00	0.050
	8.50	20.00	0.050

LENGTH & DILUTION SCALES
.....

Total Q ...	0.0069 (m3/s)	Qj ...	6.86E-03 (m3/s)
Port No. ...	1	Mj ...	5.99E-03 (m4/s2)
Depth ...	8.0000 (m)	Bj ...	1.45E-03 (m4/s3)
Diameter ...	0.1000 (m)	lQ ...	0.0886 (m)
Uj ...	0.8732 (m/s)	lm ...	1.5477 (m)
Ua ...	0.0500 (m/s)	lb ...	11.6044 (m)
dp/pa ...	0.02157	lM ...	0.5652 (m)
po ...	0.99800 (g/cc)	Sm ...	17.4638
pa ...	1.02000 (g/cc)	Sb ...	981.7905
Ver. ang ...	0.00	lQ/lm ...	0.0573
Hor. ang ...	0.00	lQ/lM ...	0.1568
Fd ...	6.00	lm/lb ...	0.1334
Uj/Ua ...	17.46	lM/lb ...	0.0487
		Coflowing case:	
		dMj ...	0.0056
		lm* ...	1.5027
		Sm* ...	16.4638

X	Y	Z	PLUME RADIUS	AVERAGE DILUTION	DENSITY DIFF.	VELOCITY
(m)	(m)	(m)	(m)		(sigmat)	(m/s)
0.000	0.000	0.000	0.050	1.00	22.0000	0.873
0.304	0.000	0.016	0.095	1.96	11.1116	0.469
0.836	0.000	0.159	0.173	3.89	5.5672	0.282
1.432	0.000	0.554	0.286	7.75	2.7844	0.207
2.034	0.000	1.227	0.447	15.48	1.3926	0.169
2.711	0.000	2.220	0.690	30.93	0.6965	0.142
3.562	0.000	3.591	1.062	61.82	0.3483	0.120
4.733	0.000	5.413	1.632	123.59	0.1742	0.101
6.441	0.000	7.771	2.496	247.09	0.0871	0.087
6.631	0.000	8.012	2.593	262.98	0.0819	0.085
NUMBER OF STEPS = 807						
SURFACE LAYER (CENTER) LEVEL = 6.12 M ABOVE DISCHARGE PORT						
AVG DILUTION = 155.08						
COMPUTATIONS CEASE: PLUME HITS WATER SURFACE						
AVG DILUTION AT WATER SURFACE = 262.17						

1
ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED AMBIENT
.....
CASE NO. 2 JETLAG 2000
TITLE Jet2

INPUT PARAMETERS
.....
ENTRAINMENT HYPOTHESIS : ASYMMETRIC
SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
COFLOW FACTOR : STANDARD
TIME STEP CONTRL : VARIABLE (> 0.985)
MAX NUMBER OF TIME STEPS : 1500
PRINTOUT INTERVAL : 100
MAX NUMBER OF ITERATIONS : 5
ITERATION ERROR BOUND : 0.00100
APPROX RATIO OF MASS/DMASS : 144.0

ENVIROMENTAL CONDITIONS
.....

	DEPTH(m)	SIGMAT	U(m/s)
EXIT	8.00	-2.00	0.873
.....
AMBIENT	0.00	20.00	0.050
	1.00	20.00	0.050
	2.00	20.00	0.050
	3.00	20.00	0.050
	4.00	20.00	0.050
	5.00	20.00	0.050
	6.00	20.00	0.050
	7.00	20.00	0.050
	8.00	20.00	0.050
	8.50	20.00	0.050

LENGTH & DILUTION SCALES

```

Total Q ... 0.0069 (m3/s)
Port No. ... 1
Depth ... 8.0000 (m)
Diameter ... 0.1000 (m)
Uj ... 0.8732 (m/s)
Ua ... 0.0500 (m/s)
dp/pa ... 0.02157
po ... 0.99800 (g/cc)
pa ... 1.02000 (g/cc)
Ver. ang ... 0.00
Hor. ang ... 90.00
Fd ... 6.00
Uj/Ua ... 17.46
    
```

```

Qj ... 6.86E-03 (m3/s)
Mj ... 5.99E-03 (m4/s2)
Bj ... 1.45E-03 (m4/s3)
lQ ... 0.0886 (m)
lm ... 1.5477 (m)
lb ... 11.6044 (m)
lM ... 0.5652 (m)
Sm ... 17.4638
Sb ... 981.7905
lQ/lm ... 0.0573
lQ/LM ... 0.1568
lm/lb ... 0.1334
lM/lb ... 0.0487
    
```

Coflowing case:
dMj ... 0.0056
lm* ... 1.5027
Sm* ... 16.4638

X	Y	Z	PLUME RADIUS	AVERAGE DILUTION	DENSITY DIFF.	VELOCITY
(m)	(m)	(m)	(m)		(sigmat)	(m/s)
0.000	0.000	0.000	0.050	1.00	22.0000	0.873
0.008	0.302	0.017	0.098	1.96	11.1095	0.445
0.055	0.741	0.141	0.185	3.89	5.5641	0.248
0.172	1.178	0.484	0.310	7.75	2.7842	0.176
0.397	1.560	1.133	0.475	15.48	1.3928	0.150
0.775	1.868	2.122	0.718	30.92	0.6966	0.131
1.388	2.111	3.491	1.091	61.80	0.3484	0.113
2.367	2.304	5.309	1.662	123.55	0.1743	0.098
3.918	2.455	7.654	2.527	247.01	0.0872	0.084
4.176	2.472	8.002	2.668	270.29	0.0796	0.083

NUMBER OF STEPS = 811
SURFACE LAYER (CENTER) LEVEL = 6.07 M ABOVE DISCHARGE PORT
AVG DILUTION = 157.77

COMPUTATIONS CEASE: PLUME HITS WATER SURFACE
AVG DILUTION AT WATER SURFACE = 270.12

1 ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED AMBIENT

CASE NO. 3 JETLAG 2000
TITLE Jet3

INPUT PARAMETERS

```

ENTRAINMENT HYPOTHESIS : ASYMMETRIC
SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
COFLOW FACTOR : STANDARD
TIME STEP CONTRL : VARIABLE ( > 0.985 )
MAX NUMBER OF TIME STEPS : 1500
PRINTOUT INTERVAL : 100
MAX NUMBER OF ITERATIONS : 5
    
```

ITERATION ERROR BOUND : 0.00100
APPROX RATIO OF MASS/DMASS : 144.0

ENVIROMENTAL CONDITIONS

	DEPTH (m)	SIGMAT	U (m/s)
EXIT	8.00	-2.00	0.873
AMBIENT	0.00	20.00	0.050
	1.00	20.00	0.050
	2.00	20.00	0.050
	3.00	20.00	0.050
	4.00	20.00	0.050
	5.00	20.00	0.050
	6.00	20.00	0.050
	7.00	20.00	0.050
	8.00	20.00	0.050
	8.50	20.00	0.050

LENGTH & DILUTION SCALES

```

Total Q ... 0.0069 (m3/s)
Port No. ... 1
Depth ... 8.0000 (m)
Diameter ... 0.1000 (m)
Uj ... 0.8732 (m/s)
Ua ... 0.0500 (m/s)
dp/pa ... 0.02157
po ... 0.99800 (g/cc)
pa ... 1.02000 (g/cc)
Ver. ang ... 0.00
Hor. ang ... 180.00
Fd ... 6.00
Uj/Ua ... 17.46
Qj ... 6.86E-03 (m3/s)
Mj ... 5.99E-03 (m4/s2)
Bj ... 1.45E-03 (m4/s3)
lQ ... 0.0886 (m)
lm ... 1.5477 (m)
lb ... 11.6044 (m)
lM ... 0.5652 (m)
Sm ... 17.4638
Sb ... 981.7905
lQ/lm ... 0.0573
lQ/LM ... 0.1568
lm/lb ... 0.1334
lM/lb ... 0.0487
    
```

Coflowing case:
dMj ... 0.0056
lm* ... 1.5027
Sm* ... 16.4638

X	Y	Z	PLUME RADIUS	AVERAGE DILUTION	DENSITY DIFF.	VELOCITY
(m)	(m)	(m)	(m)		(sigmat)	(m/s)
0.000	0.000	0.000	0.050	1.00	22.0000	0.873
-0.287	0.000	0.016	0.101	1.96	11.1158	0.420
-0.788	0.000	0.202	0.193	3.86	5.6131	0.227
-1.182	0.000	0.705	0.314	7.69	2.8064	0.170
-1.346	0.000	1.461	0.480	15.36	1.4037	0.146
-1.279	0.000	2.507	0.727	30.68	0.7021	0.127
-0.919	0.000	3.905	1.103	61.31	0.3512	0.110
-0.146	0.000	5.731	1.677	122.55	0.1757	0.095
1.197	0.000	8.013	2.522	241.63	0.0891	0.083

NUMBER OF STEPS = 796
SURFACE LAYER (CENTER) LEVEL = 6.17 M ABOVE DISCHARGE PORT

AVG DILUTION = 141.52

COMPUTATIONS CEASE: PLUME HITS WATER SURFACE
AVG DILUTION AT WATER SURFACE = 240.83

1
ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED AMBIENT

CASE NO. 4 JETLAG 2000
TITLE Jet4

INPUT PARAMETERS
^^^^^^^^^^^^^^^^^^

ENTRAINMENT HYPOTHESIS : ASYMMETRIC
SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
COFLOW FACTOR : STANDARD
TIME STEP CONTRL : VARIABLE (> 0.985)
MAX NUMBER OF TIME STEPS : 1500
PRINTOUT INTERVAL : 100
MAX NUMBER OF ITERATIONS : 5
ITERATION ERROR BOUND : 0.00100
APPROX RATIO OF MASS/DMASS : 144.0

ENVIROMENTAL CONDITIONS
^^^^^^^^^^^^^^^^^^

	DEPTH(m)	SIGMAT	U(m/s)
EXIT	8.00	-2.00	0.873
AMBIENT	0.00	20.00	0.050
	1.00	20.00	0.050
	2.00	20.00	0.050
	3.00	20.00	0.050
	4.00	20.00	0.050
	5.00	20.00	0.050
	6.00	20.00	0.050
	7.00	20.00	0.050
	8.00	20.00	0.050
	8.50	20.00	0.050

LENGTH & DILUTION SCALES
^^^^^^^^^^^^^^^^^^

Total Q ...	0.0069 (m3/s)	Qj ...	6.86E-03 (m3/s)
Port No. ...	1	Mj ...	5.99E-03 (m4/s2)
Depth ...	8.0000 (m)	Bj ...	1.45E-03 (m4/s3)
Diameter ...	0.1000 (m)	lQ ...	0.0886 (m)
Uj ...	0.8732 (m/s)	lm ...	1.5477 (m)
Ua ...	0.0500 (m/s)	lb ...	11.6044 (m)
dp/pa ...	0.02157	lM ...	0.5652 (m)
po ...	0.99800 (g/cc)	Sm ...	17.4638
pa ...	1.02000 (g/cc)	Sb ...	981.7905
Ver. ang ...	0.00	lQ/lm ...	0.0573
Hor. ang ...	90.00	lQ/LM ...	0.1568
Fd ...	6.00	lm/lb ...	0.1334
Uj/Ua ...	17.46	lM/lb ...	0.0487

Coflowing case:

dMj ... 0.0056
lm* ... 1.5027
Sm* ... 16.4638

X	Y	Z	PLUME RADIUS	AVERAGE DILUTION	DENSITY DIFF. (sigmat)	VELOCITY (m/s)
(m)	(m)	(m)	(m)			
0.000	0.000	0.000	0.050	1.00	22.0000	0.873
0.008	-0.302	0.017	0.098	1.96	11.1095	0.445
0.055	-0.741	0.141	0.185	3.89	5.5641	0.248
0.172	-1.178	0.484	0.310	7.75	2.7842	0.176
0.397	-1.560	1.133	0.475	15.48	1.3928	0.150
0.775	-1.868	2.122	0.718	30.92	0.6966	0.131
1.388	-2.111	3.491	1.091	61.80	0.3484	0.113
2.367	-2.304	5.309	1.662	123.55	0.1743	0.098
3.918	-2.455	7.654	2.527	247.01	0.0872	0.084
4.176	-2.472	8.002	2.668	270.29	0.0796	0.083

NUMBER OF STEPS = 811
SURFACE LAYER (CENTER) LEVEL = 6.07 M ABOVE DISCHARGE PORT
AVG DILUTION = 157.77

COMPUTATIONS CEASE: PLUME HITS WATER SURFACE
AVG DILUTION AT WATER SURFACE = 270.12B = 1.13 M

**Dry Season High Ambient Velocity, Peak Dry Weather Flow
(4,740 m³/day)**

ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED AMBIENT

CASE NO. 1 JETLAG 2000
TITLE Jet1

INPUT PARAMETERS

ENTRAINMENT HYPOTHESIS : ASYMMETRIC
SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
COFLOW FACTOR : STANDARD
TIME STEP CONTRL : VARIABLE (> 0.985)
MAX NUMBER OF TIME STEPS : 90000
PRINTOUT INTERVAL : 100
MAX NUMBER OF ITERATIONS : 5
ITERATION ERROR BOUND : 0.00100
APPROX RATIO OF MASS/DMASS : 144.0

ENVIROMENTAL CONDITIONS

	DEPTH(m)	SIGMAT	U(m/s)
EXIT	8.00	-2.00	0.873
AMBIENT	0.00	20.00	0.400
	1.00	20.00	0.400
	2.00	20.00	0.400
	3.00	20.00	0.400
	4.00	20.00	0.400
	5.00	20.00	0.400
	6.00	20.00	0.400
	7.00	20.00	0.400
	8.00	20.00	0.400
	8.50	20.00	0.400

LENGTH & DILUTION SCALES

Total Q ...	0.0069 (m3/s)	Qj ...	6.86E-03 (m3/s)
Port No. ...	1	Mj ...	5.99E-03 (m4/s2)
Depth ...	8.0000 (m)	Bj ...	1.45E-03 (m4/s3)
Diameter ...	0.1000 (m)	lQ ...	0.0886 (m)
Uj ...	0.8732 (m/s)	lm ...	0.1935 (m)
Ua ...	0.4000 (m/s)	lb ...	0.0227 (m)
dp/pa ...	0.02157	lM ...	0.5652 (m)
po ...	0.99800 (g/cc)	Sm ...	2.1830
pa ...	1.02000 (g/cc)	Sb ...	0.0300
Ver. ang ...	0.00	lQ/lm ...	0.4581
Hor. ang ...	0.00	lQ/lM ...	0.1568
Fd ...	6.00	lm/lb ...	8.5357
Uj/Ua ...	2.18	lM/lb ...	24.9379

Coflowing case:

dMj ...	0.0032
lm* ...	0.1424
Sm* ...	1.1830

X (m)	Y (m)	Z (m)	PLUME RADIUS (m)	AVERAGE DILUTION	DENSITY DIFF. (sigmat)	VELOCITY (m/s)
0.000E+00	0.000E+00	0.000E+00	0.500E-01	1.0	22.0000	0.873
0.379	0.000E+00	0.180E-01	0.818E-01	2.0	11.0824	0.641
0.800	0.000E+00	0.656E-01	0.128	3.9	5.5408	0.524
1.34	0.000E+00	0.140	0.191	7.8	2.7716	0.464
2.15	0.000E+00	0.250	0.280	16.	1.3871	0.434
3.47	0.000E+00	0.414	0.403	31.	0.6942	0.418
5.66	0.000E+00	0.657	0.575	62.	0.3474	0.410
9.32	0.000E+00	1.01	0.817	0.12E+03	0.1739	0.405
15.5	0.000E+00	1.52	1.16	0.25E+03	0.0870	0.403
25.8	0.000E+00	2.24	1.64	0.49E+03	0.0435	0.402
43.1	0.000E+00	3.28	2.32	0.99E+03	0.0218	0.401
72.2	0.000E+00	4.76	3.28	0.20E+04	0.0109	0.401
121.	0.000E+00	6.85	4.64	0.39E+04	0.0055	0.400
152.	0.000E+00	8.00	5.38	0.53E+04	0.0041	0.400

NUMBER OF STEPS = 1241
SURFACE LAYER (CENTER) LEVEL = 4.73 M ABOVE DISCHARGE PORT
AVG DILUTION = 0.20E+04

COMPUTATIONS CEASE: PLUME HITS WATER SURFACE
AVG DILUTION AT WATER SURFACE = 0.53E+04

1

ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED AMBIENT

CASE NO. 2 JETLAG 2000
TITLE Jet2

INPUT PARAMETERS

ENTRAINMENT HYPOTHESIS : ASYMMETRIC
SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
COFLOW FACTOR : STANDARD
TIME STEP CONTRL : VARIABLE (> 0.985)
MAX NUMBER OF TIME STEPS : 90000
PRINTOUT INTERVAL : 100
MAX NUMBER OF ITERATIONS : 5
ITERATION ERROR BOUND : 0.00100
APPROX RATIO OF MASS/DMASS : 144.0

ENVIROMENTAL CONDITIONS

	DEPTH(m)	SIGMAT	U(m/s)
EXIT	8.00	-2.00	0.873
AMBIENT	0.00	20.00	0.400
	1.00	20.00	0.400
	2.00	20.00	0.400
	3.00	20.00	0.400
	4.00	20.00	0.400
	5.00	20.00	0.400
	6.00	20.00	0.400
	7.00	20.00	0.400
	8.00	20.00	0.400

8.50 20.00 0.400

LENGTH & DILUTION SCALES

```

*****
Total Q ... 0.0069 (m3/s)      Qj ... 6.86E-03 (m3/s)
Port No. ... 1                Mj ... 5.99E-03 (m4/s2)
Depth ... 8.0000 (m)         Bj ... 1.45E-03 (m4/s3)
Diameter ... 0.1000 (m)      lQ ... 0.0886 (m)
Uj ... 0.8732 (m/s)         lm ... 0.1935 (m)
Ua ... 0.4000 (m/s)         lb ... 0.0227 (m)
dp/pa ... 0.02157          lM ... 0.5652 (m)
po ... 0.99800 (g/cc)       Sm ... 2.1830
pa ... 1.02000 (g/cc)       Sb ... 0.0300
Ver. ang ... 0.00           lQ/lm ... 0.4581
Hor. ang ... 90.00          lQ/LM ... 0.1568
Fd ... 6.00                 lm/lb ... 8.5357
Uj/Ua ... 2.18              lM/lb ... 24.9379
    
```

Coflowing case:
dMj ... 0.0032
lm* ... 0.1424
Sm* ... 1.1830

X (m)	Y (m)	Z (m)	PLUME RADIUS (m)	AVERAGE DILUTION	DENSITY DIFF. (sigmat)	VELOCITY (m/s)
0.000E+00	0.000E+00	0.000E+00	0.500E-01	1.0	22.0000	0.873
0.119E-01	0.659E-01	0.759E-03	0.945E-01	2.0	11.0486	0.482
0.472E-01	0.107	0.244E-02	0.152	3.9	5.5313	0.372
0.198	0.174	0.968E-02	0.214	7.7	2.8131	0.367
0.752	0.290	0.481E-01	0.296	15.	1.4116	0.380
2.08	0.425	0.171	0.413	30.	0.7069	0.390
4.40	0.542	0.407	0.579	61.	0.3537	0.396
8.19	0.636	0.771	0.816	0.12E+03	0.1770	0.398
14.4	0.713	1.30	1.15	0.24E+03	0.0886	0.400
24.8	0.777	2.04	1.63	0.49E+03	0.0443	0.400
42.0	0.831	3.10	2.30	0.97E+03	0.0222	0.400
71.0	0.875	4.60	3.25	0.19E+04	0.0111	0.400
120.	0.913	6.72	4.60	0.39E+04	0.0056	0.400
154.	0.929	8.02	5.43	0.54E+04	0.0040	0.400

NUMBER OF STEPS = 1246
SURFACE LAYER (CENTER) LEVEL = 4.69 M ABOVE DISCHARGE PORT
AVG DILUTION = 0.20E+04

COMPUTATIONS CEASE: PLUME HITS WATER SURFACE
AVG DILUTION AT WATER SURFACE = 0.54E+04

1 ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED AMBIENT

CASE NO. 3 JETLAG 2000
TITLE Jet3

INPUT PARAMETERS

ENTRAINMENT HYPOTHESIS : ASYMMETRIC

```

SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
COFLOW FACTOR : STANDARD
TIME STEP CONTRL : VARIABLE ( > 0.985 )
MAX NUMBER OF TIME STEPS : 90000
PRINTOUT INTERVAL : 100
MAX NUMBER OF ITERATIONS : 5
ITERATION ERROR BOUND : 0.00100
APPROX RATIO OF MASS/DMASS : 144.0
    
```

ENVIROMENTAL CONDITIONS

```

*****
          DEPTH(m)  SIGMAT  U(m/s)
EXIT      8.00    -2.00    0.873
.....
AMBIENT   0.00    20.00    0.400
          1.00    20.00    0.400
          2.00    20.00    0.400
          3.00    20.00    0.400
          4.00    20.00    0.400
          5.00    20.00    0.400
          6.00    20.00    0.400
          7.00    20.00    0.400
          8.00    20.00    0.400
          8.50    20.00    0.400
    
```

LENGTH & DILUTION SCALES

```

*****
Total Q ... 0.0069 (m3/s)      Qj ... 6.86E-03 (m3/s)
Port No. ... 1                Mj ... 5.99E-03 (m4/s2)
Depth ... 8.0000 (m)         Bj ... 1.45E-03 (m4/s3)
Diameter ... 0.1000 (m)      lQ ... 0.0886 (m)
Uj ... 0.8732 (m/s)         lm ... 0.1935 (m)
Ua ... 0.4000 (m/s)         lb ... 0.0227 (m)
dp/pa ... 0.02157          lM ... 0.5652 (m)
po ... 0.99800 (g/cc)       Sm ... 2.1830
pa ... 1.02000 (g/cc)       Sb ... 0.0300
Ver. ang ... 0.00           lQ/lm ... 0.4581
Hor. ang ... 180.00          lQ/LM ... 0.1568
Fd ... 6.00                 lm/lb ... 8.5357
Uj/Ua ... 2.18              lM/lb ... 24.9379
    
```

Coflowing case:
dMj ... 0.0032
lm* ... 0.1424
Sm* ... 1.1830

X (m)	Y (m)	Z (m)	PLUME RADIUS (m)	AVERAGE DILUTION	DENSITY DIFF. (sigmat)	VELOCITY (m/s)
0.000E+00	0.000E+00	0.000E+00	0.500E-01	1.0	22.0000	0.873
-0.224	0.683E-08	0.146E-01	0.107	1.7	12.5397	0.331
-0.402	0.154E-07	0.884E-01	0.213	2.7	8.1844	0.127
-0.401	0.174E-07	0.118	0.270	3.8	5.6429	0.115
-0.379	0.186E-07	0.138	0.257	4.4	4.8622	0.147
-0.360	0.192E-07	0.150	0.253	4.9	4.3875	0.169

```

-0.319    0.202E-07  0.171    0.251    5.7      3.7862    0.199
-0.749E-01 0.232E-07  0.252    0.273    9.5      2.2613    0.279
0.593     0.265E-07  0.392    0.350    19.      1.1317    0.340
1.91      0.293E-07  0.595    0.473    38.      0.5664    0.371
4.31      0.318E-07  0.885    0.655    76.      0.2835    0.386
8.47      0.338E-07  1.30     0.918    0.15E+03 0.1419    0.393
15.6      0.356E-07  1.89     1.29     0.30E+03 0.0710    0.397
27.6      0.370E-07  2.73     1.82     0.61E+03 0.0355    0.399
47.9      0.382E-07  3.91     2.57     0.12E+04 0.0178    0.400
82.0      0.393E-07  5.58     3.63     0.24E+04 0.0089    0.400
139.      0.401E-07  7.94     5.14     0.48E+04 0.0045    0.400
142.      0.401E-07  8.03     5.19     0.49E+04 0.0044    0.400
    
```

```

Diameter ... 0.1000 (m)      lQ ... 0.0886 (m)
Uj ... 0.8732 (m/s)    lm ... 0.1935 (m)
Ua ... 0.4000 (m/s)    lb ... 0.0227 (m)
dp/pa ... 0.02157      lM ... 0.5652 (m)
po ... 0.99800 (g/cc)  Sm ... 2.1830
pa ... 1.02000 (g/cc)  Sb ... 0.0300
Ver. ang ... 0.00      lQ/lm ... 0.4581
Hor. ang ... 90.00     lQ/LM ... 0.1568
Fd ... 6.00           lm/lb ... 8.5357
Uj/Ua ... 2.18        lM/lb ... 24.9379
    
```

Coflowing case:
dMj ... 0.0032
lm* ... 0.1424
Sm* ... 1.1830

NUMBER OF STEPS = 1601
SURFACE LAYER (CENTER) LEVEL = 4.84 M ABOVE DISCHARGE PORT
AVG DILUTION = 0.18E+04

COMPUTATIONS CEASE: PLUME HITS WATER SURFACE
AVG DILUTION AT WATER SURFACE = 0.49E+04

1 ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED AMBIENT

CASE NO. 4 JETLAG 2000
TITLE Jet4

INPUT PARAMETERS
ENTRAINMENT HYPOTHESIS : ASYMMETRIC
SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
COFLOW FACTOR : STANDARD
TIME STEP CONTRL : VARIABLE (> 0.985)
MAX NUMBER OF TIME STEPS : 90000
PRINTOUT INTERVAL : 100
MAX NUMBER OF ITERATIONS : 5
ITERATION ERROR BOUND : 0.00100
APPROX RATIO OF MASS/DMASS : 144.0

X	Y	Z	PLUME RADIUS	AVERAGE DILUTION	DENSITY DIFF.	VELOCITY
(m)	(m)	(m)	(m)		(sigmat)	(m/s)
0.000E+00	0.000E+00	0.000E+00	0.500E-01	1.0	22.0000	0.873
0.119E-01	-0.659E-01	0.759E-03	0.945E-01	2.0	11.0486	0.482
0.472E-01	-0.107	0.244E-02	0.152	3.9	5.5313	0.372
0.198	-0.174	0.968E-02	0.214	7.7	2.8131	0.367
0.752	-0.290	0.481E-01	0.296	15.	1.4116	0.380
2.08	-0.425	0.171	0.413	30.	0.7069	0.390
4.40	-0.542	0.407	0.579	61.	0.3537	0.396
8.19	-0.636	0.771	0.816	0.12E+03	0.1770	0.398
14.4	-0.713	1.30	1.15	0.24E+03	0.0886	0.400
24.8	-0.777	2.04	1.63	0.49E+03	0.0443	0.400
42.0	-0.831	3.10	2.30	0.97E+03	0.0222	0.400
71.0	-0.875	4.60	3.25	0.19E+04	0.0111	0.400
120.	-0.913	6.72	4.60	0.39E+04	0.0056	0.400
154.	-0.929	8.02	5.43	0.54E+04	0.0040	0.400

ENVIRONMENTAL CONDITIONS
DEPTH(m) SIGMAT U(m/s)
EXIT 8.00 -2.00 0.873
AMBIENT 0.00 20.00 0.400
1.00 20.00 0.400
2.00 20.00 0.400
3.00 20.00 0.400
4.00 20.00 0.400
5.00 20.00 0.400
6.00 20.00 0.400
7.00 20.00 0.400
8.00 20.00 0.400
8.50 20.00 0.400

NUMBER OF STEPS = 1246
SURFACE LAYER (CENTER) LEVEL = 4.69 M ABOVE DISCHARGE PORT
AVG DILUTION = 0.20E+04

COMPUTATIONS CEASE: PLUME HITS WATER SURFACE
AVG DILUTION AT WATER SURFACE = 0.54E+04

LENGTH & DILUTION SCALES
Total Q ... 0.0069 (m3/s) Qj ... 6.86E-03 (m3/s)
Port No. ... 1 Mj ... 5.99E-03 (m4/s2)
Depth ... 8.0000 (m) Bj ... 1.45E-03 (m4/s3)

APPENDIX 5A-3

ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED
AMBIENT

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...
CASE NO. 1 JETLAG
2000
TITLE Jet1

INPUT PARAMETERS
^^^^^^^^^^^^^^^^
ENTRAINMENT HYPOTHESIS : ASYMMETRIC
SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
COFLOW FACTOR : STANDARD
TIME STEP CONTRL : VARIABLE (> 0.985)
MAX NUMBER OF TIME STEPS : 1500
PRINTOUT INTERVAL : 100
MAX NUMBER OF ITERATIONS : 5
ITERATION ERROR BOUND : 0.00100
APPROX RATIO OF MASS/DMASS : 144.0

ENVIROMENTAL CONDITIONS
^^^^^^^^^^^^^^^^
DEPTH (m) SIGMAT U (m/s)
EXIT 8.00 -2.00 0.291
.....
AMBIENT 0.00 14.00 0.180
1.00 14.50 0.180
2.00 15.00 0.180
3.00 15.50 0.180
4.00 16.00 0.180
5.00 16.50 0.180
6.00 17.00 0.180
7.00 17.50 0.180
8.00 18.00 0.180
8.50 18.00 0.180

LENGTH & DILUTION SCALES
^^^^^^^^^^^^^^^^
Total Q ... 0.0023 (m3/s) Qj ... 2.29E-03 (m3/s)
Port No. ... 1 Mj ... 6.65E-04 (m4/s2)
Depth ... 8.0000 (m) Bj ... 4.40E-04 (m4/s3)
Diameter ... 0.1000 (m) lQ ... 0.0886 (m)
Uj ... 0.2911 (m/s) lm ... 0.1433 (m)

Ua ... 0.1800 (m/s) lb ... 0.0755 (m)
dp/pa ... 0.01965 lM ... 0.1974 (m)
po ... 0.99800 (g/cc) Sm ... 1.6170
pa ... 1.01800 (g/cc) Sb ... 0.4491
Ver. ang ... 0.00 lQ/lm ... 0.6184
Hor. ang ... 0.00 lQ/lM ... 0.4489
Fd ... 2.10 lm/lb ... 1.8976
Uj/Ua ... 1.62 lM/lb ... 2.6140

Coflowing case:
dMj ... 0.0003
lm* ... 0.0885
Sm* ... 0.6170

Stratification case:
T ... -425.01

X	Y	Z	PLUME RADIUS (m)	AVERAGE DILUTION	DENSITY DIFF. (sigmat)	VELOCITY (m/s)
0.000	0.000	0.000	0.050	1.00	20.0000	0.291
0.189	0.000	0.033	0.076	1.98	10.0090	0.246
0.360	0.000	0.090	0.114	3.93	4.9818	0.220
0.591	0.000	0.170	0.167	7.84	2.4628	0.204
0.947	0.000	0.280	0.242	15.66	1.1918	0.195
1.531	0.000	0.434	0.347	31.27	0.5400	0.189
2.540	0.000	0.651	0.496	62.46	0.1904	0.185
NEUTRAL BUOYANCY LEVEL REACHED						
4.525	0.000	0.956	0.705	124.48	-0.0173	0.182
MAXIMUM RISE REACHED						
11.175	0.000	1.077	0.924	212.08	-0.0422	0.181
TRAPPING LEVEL REACHED						
12.380	0.000	0.998	0.973	235.36	-0.0008	0.181

NUMBER OF STEPS = 813
NEUTRAL BUOYANCY LEVEL = 0.9202 M ABOVE DISCHARGE PORT
AVG DILUTION = 116.3736 B = 0.68 M
MAXIMUM RISE (CENTER) = 1.1851 M ABOVE DISCHARGE PORT
AVG DILUTION = 182.5899 B = 0.86 M
COMPUTATIONS CEASE: PLUME TRAPPED
TRAPPED LEVEL = 0.9967 M ABOVE DISCHARGE PORT

1
AVG DILUTION = 235.8524 B = 0.97 M
ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED
AMBIENT
.....

...
CASE NO. 2 JETLAG
2000
TITLE Jet2

INPUT PARAMETERS
^^^^^^^^^^^^^^^^
ENTRAINMENT HYPOTHESIS : ASYMMETRIC
SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
COFLOW FACTOR : STANDARD
TIME STEP CONTRL : VARIABLE (> 0.985)
MAX NUMBER OF TIME STEPS : 1500
PRINTOUT INTERVAL : 100
MAX NUMBER OF ITERATIONS : 5
ITERATION ERROR BOUND : 0.00100
APPROX RATIO OF MASS/DMASS : 144.0

ENVIROMENTAL CONDITIONS
^^^^^^^^^^^^^^^^
DEPTH (m) SIGMAT U (m/s)
EXIT 8.00 -2.00 0.291
.....
AMBIENT 0.00 14.00 0.180
1.00 14.50 0.180
2.00 15.00 0.180
3.00 15.50 0.180
4.00 16.00 0.180
5.00 16.50 0.180
6.00 17.00 0.180
7.00 17.50 0.180
8.00 18.00 0.180
8.50 18.00 0.180

LENGTH & DILUTION SCALES
^^^^^^^^^^^^^^^^
Total Q ... 0.0023 (m3/s)
Port No. ... 1
Depth ... 8.0000 (m)
Diameter ... 0.1000 (m)
Uj ... 0.2911 (m/s)
Ua ... 0.1800 (m/s)
dp/pa ... 0.01965

Qj ... 2.29E-03 (m3/s)
Mj ... 6.65E-04 (m4/s2)
Bj ... 4.40E-04 (m4/s3)
lQ ... 0.0886 (m)
lm ... 0.1433 (m)
lb ... 0.0755 (m)
lM ... 0.1974 (m)

po ... 0.99800 (g/cc) Sm ... 1.6170
pa ... 1.01800 (g/cc) Sb ... 0.4491
Ver. ang ... 0.00 lQ/lm ... 0.6184
Hor. ang ... 90.00 lQ/lM ... 0.4489
Fd ... 2.10 lm/lb ... 1.8976
Uj/Ua ... 1.62 lM/lb ... 2.6140

Coflowing case:
dMj ... 0.0003
lm* ... 0.0885
Sm* ... 0.6170

Stratification case:
T ... -425.01

X	Y	Z	PLUME RADIUS	AVERAGE DILUTION	DENSITY DIFF.	VELOCITY
(m)	(m)	(m)	(m)		(sigmat)	(m/s)
0.000	0.000	0.000	0.050	1.00	20.0000	0.291
0.010	0.040	0.002	0.091	1.97	10.0319	0.172
0.046	0.071	0.009	0.135	3.87	5.0868	0.155
0.212	0.128	0.047	0.181	7.52	2.5972	0.166
0.572	0.187	0.148	0.249	15.01	1.2618	0.176
1.163	0.233	0.307	0.348	29.98	0.5728	0.180
2.168	0.271	0.534	0.491	59.89	0.2031	0.181
NEUTRAL BUOYANCY LEVEL REACHED						
4.102	0.307	0.849	0.695	119.54	-0.0140	0.180
MAXIMUM RISE REACHED						
10.343	0.366	1.009	0.912	204.91	-0.0568	0.179
TRAPPING LEVEL REACHED						
11.953	0.378	0.906	0.977	235.53	-0.0013	0.180

NUMBER OF STEPS = 818
NEUTRAL BUOYANCY LEVEL = 0.8208 M ABOVE DISCHARGE PORT
AVG DILUTION = 113.2257 B = 0.68 M
MAXIMUM RISE (CENTER) = 1.0905 M ABOVE DISCHARGE PORT
AVG DILUTION = 181.8180 B = 0.86 M
COMPUTATIONS CEASE: PLUME TRAPPED
TRAPPED LEVEL = 0.9031 M ABOVE DISCHARGE PORT
AVG DILUTION = 236.3185 B = 0.98 M

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ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED
AMBIENT

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CASE NO. 3 JETLAG
2000
TITLE Jet3

INPUT PARAMETERS
^^^^^^^^^^^^^^^^
ENTRAINMENT HYPOTHESIS : ASYMMETRIC
SHEAR ENTRAINMENT : VARIABLE (0 - 0.085)
COFLOW FACTOR : STANDARD
TIME STEP CONTRL : VARIABLE ( > 0.985 )
MAX NUMBER OF TIME STEPS : 1500
PRINTOUT INTERVAL : 100
MAX NUMBER OF ITERATIONS : 5
ITERATION ERROR BOUND : 0.00100
APPROX RATIO OF MASS/DMASS : 144.0

ENVIROMENTAL CONDITIONS
^^^^^^^^^^^^^^^^
DEPTH (m) SIGMAT U (m/s)
EXIT 8.00 -2.00 0.291
.....
AMBIENT 0.00 14.00 0.180
1.00 14.50 0.180
2.00 15.00 0.180
3.00 15.50 0.180
4.00 16.00 0.180
5.00 16.50 0.180
6.00 17.00 0.180
7.00 17.50 0.180
8.00 18.00 0.180
8.50 18.00 0.180

LENGTH & DILUTION SCALES
^^^^^^^^^^^^^^^^
Total Q ... 0.0023 (m3/s) Qj ... 2.29E-03 (m3/s)
Port No. ... 1 Mj ... 6.65E-04 (m4/s2)
Depth ... 8.0000 (m) Bj ... 4.40E-04 (m4/s3)
Diameter ... 0.1000 (m) lQ ... 0.0886 (m)
Uj ... 0.2911 (m/s) lm ... 0.1433 (m)
Ua ... 0.1800 (m/s) lb ... 0.0755 (m)
dp/pa ... 0.01965 lM ... 0.1974 (m)
po ... 0.99800 (g/cc) Sm ... 1.6170
pa ... 1.01800 (g/cc) Sb ... 0.4491
Ver. ang ... 0.00 lQ/lm ... 0.6184
Hor. ang ... 180.00 lQ/lM ... 0.4489

Fd ... 2.10 lm/lb ... 1.8976
Uj/Ua ... 1.62 lM/lb ... 2.6140

Coflowing case:
dMj ... 0.0003
lm* ... 0.0885
Sm* ... 0.6170

Stratification case:
T ... -425.01

X Y Z PLUME AVERAGE DENSITY VELOCITY
RADIUS DILUTION DIFF.
(m) (m) (m) (m) (m) (sigmat) (m/s)
.....
0.000 0.000 0.000 0.050 1.00 20.0000 0.291
-0.144 0.000 0.042 0.091 1.63 12.1866 0.141
-0.169 0.000 0.083 0.136 2.43 8.1142 0.096
-0.150 0.000 0.120 0.180 4.68 4.1782 0.106
-0.019 0.000 0.192 0.216 9.08 2.1238 0.142
0.299 0.000 0.314 0.284 18.11 1.0180 0.163
0.901 0.000 0.489 0.390 36.17 0.4446 0.173
2.021 0.000 0.736 0.545 72.25 0.1320 0.177
NEUTRAL BUOYANCY LEVEL REACHED
4.446 0.000 1.077 0.768 144.04 -0.0594 0.178
MAXIMUM RISE REACHED
TRAPPING LEVEL REACHED
11.280 0.000 1.026 0.976 233.47 -0.0015 0.178

NUMBER OF STEPS = 891
NEUTRAL BUOYANCY LEVEL = 0.9435 M ABOVE DISCHARGE PORT
AVG DILUTION = 112.7714 B = 0.68 M
MAXIMUM RISE (CENTER) = 1.2136 M ABOVE DISCHARGE PORT
AVG DILUTION = 180.4340 B = 0.86 M
COMPUTATIONS CEASE: PLUME TRAPPED
TRAPPED LEVEL = 1.0231 M ABOVE DISCHARGE PORT
AVG DILUTION = 234.4225 B = 0.98 M

1
ARBITRARILY INCLINED BUOYANT JET DISCHARGED IN FLOWING, STRATIFIED
AMBIENT

.....
CASE NO. 4 JETLAG
2000
TITLE Jet4

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INPUT PARAMETERS
^^^^^^^^^^^^^^^^
ENTRAINMENT HYPOTHESIS : ASYMMETRIC
SHEAR ENTRAINMENT     : VARIABLE (0 - 0.085)
COFLOW FACTOR         : STANDARD
TIME STEP CONTRL      : VARIABLE ( > 0.985 )
MAX NUMBER OF TIME STEPS : 1500
PRINTOUT INTERVAL     : 100
MAX NUMBER OF ITERATIONS : 5
ITERATION ERROR BOUND : 0.00100
APPROX RATIO OF MASS/DMASS : 144.0

ENVIROMENTAL CONDITIONS
^^^^^^^^^^^^^^^^
      DEPTH (m)  SIGMAT  U (m/s)
EXIT      8.00   -2.00   0.291
.....
AMBIENT   0.00   14.00   0.180
          1.00   14.50   0.180
          2.00   15.00   0.180
          3.00   15.50   0.180
          4.00   16.00   0.180
          5.00   16.50   0.180
          6.00   17.00   0.180
          7.00   17.50   0.180
          8.00   18.00   0.180
          8.50   18.00   0.180

LENGTH & DILUTION SCALES
^^^^^^^^^^^^^^^^
Total Q ... 0.0023 (m3/s)      Qj ... 2.29E-03 (m3/s)
Port No. ... 1                Mj ... 6.65E-04 (m4/s2)
Depth ... 8.0000 (m)          Bj ... 4.40E-04 (m4/s3)
Diameter ... 0.1000 (m)       lQ ... 0.0886 (m)
Uj ... 0.2911 (m/s)           lm ... 0.1433 (m)
Ua ... 0.1800 (m/s)           lb ... 0.0755 (m)
dp/pa ... 0.01965            lM ... 0.1974 (m)
po ... 0.99800 (g/cc)         Sm ... 1.6170
pa ... 1.01800 (g/cc)         Sb ... 0.4491
Ver. ang ... 0.00             lQ/lm ... 0.6184
Hor. ang ... 90.00            lQ/lM ... 0.4489
Fd ... 2.10                   lm/lb ... 1.8976
Uj/Ua ... 1.62                lM/lb ... 2.6140

Coflowing case:
dMj ... 0.0003
lm* ... 0.0885

Sm* ... 0.6170
Stratification case:
T ... -425.01

      X          Y          Z          PLUME          AVERAGE          DENSITY          VELOCITY
      (m)        (m)        (m)        RADIUS          DILUTION          DIFF.           (m/s)
.....
      0.000      0.000      0.000      0.050          1.00          20.0000         0.291
      0.010     -0.040      0.002      0.091          1.97          10.0319         0.172
      0.046     -0.071      0.009      0.135          3.87          5.0870         0.155
      0.212     -0.128      0.047      0.181          7.52          2.5973         0.166
      0.572     -0.187      0.148      0.249          15.01         1.2618         0.176
      1.163     -0.233      0.307      0.348          29.98         0.5729         0.180
      2.168     -0.271      0.534      0.491          59.89         0.2033         0.181
NEUTRAL BUOYANCY LEVEL REACHED
      4.102     -0.307      0.849      0.695          119.53        -0.0139         0.180
MAXIMUM RISE REACHED
      10.337    -0.366      1.009      0.912          205.00        -0.0570         0.179
TRAPPING LEVEL REACHED
      11.942    -0.378      0.905      0.977          235.62        -0.0015         0.180

NUMBER OF STEPS = 818
NEUTRAL BUOYANCY LEVEL = 0.8209 M ABOVE DISCHARGE PORT
AVG DILUTION = 113.2467 B = 0.68 M
MAXIMUM RISE (CENTER) = 1.0905 M ABOVE DISCHARGE PORT
AVG DILUTION = 181.8362 B = 0.86 M
COMPUTATIONS CEASE: PLUME TRAPPED
TRAPPED LEVEL = 0.9026 M ABOVE DISCHARGE PORT
AVG DILUTION = 236.5086 B = 0.98 M

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