

US EPA ARCHIVE DOCUMENT

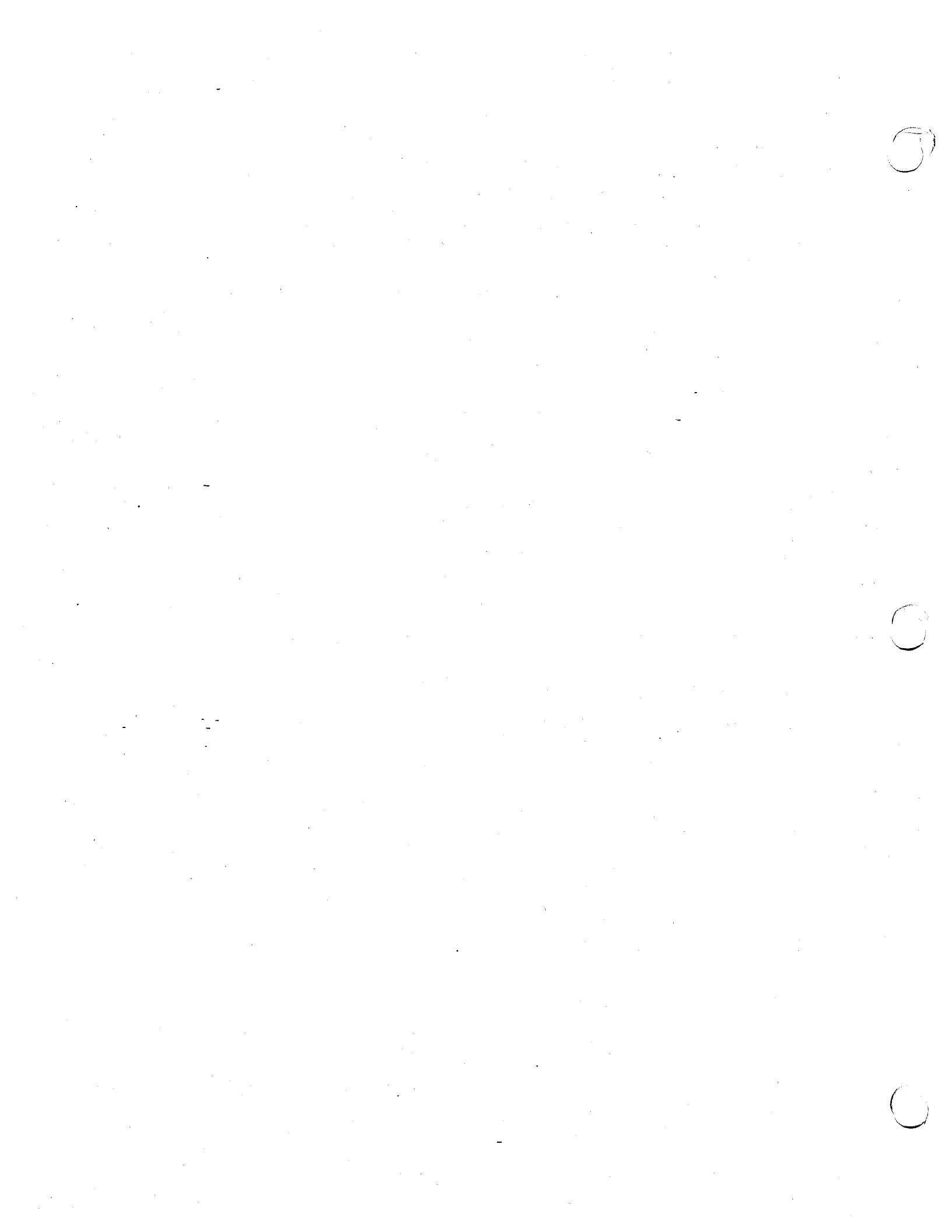
APPENDIX F

Modeling Results

Attachment 1 - Initial Dilution Calculations

Attachment 2 - Sedimentation Analysis

Attachment 3 - Analysis of Effluent Dissolve Oxygen Demand



APPENDIX F – ATTACHMENT 1

Initial Dilution Calculations

5

5

5

Honouliuli diffuser hydraulics, Winter, 25.91 MGD

Number of ports = 148
 drho/rho = 0.0249
 Number of sections = 4
 bell

Mannings N = 0.0140
 Desired Q = 1.1350
 Calculated Q = 1.1350

Friction factor F = 0.0229 Pipe diameter = 1.2192
 Length between ports = 3.6576 dz between ports = 0.0000
 Port diameter = 0.1520

Port number	Specific energy (m)	Coeff cd	Pipe velocity (m/sec)	Port velocity (m/sec)	Port discharge (m ³ /sec)	Port Froude #
1	0.0650	0.9749	0.0171	1.1008	0.0200	5.7161
2	0.0650	0.9747	0.0342	1.1005	0.0200	5.7147

Friction factor F = 0.0229 Pipe diameter = 1.2192
 Length between ports = 3.6576 dz between ports = 0.0000
 Port diameter = 0.0950

Port number	Specific energy (m)	Coeff cd	Pipe velocity (m/sec)	Port velocity (m/sec)	Port discharge (m ³ /sec)	Port Froude #
3	0.0650	0.9745	0.0409	1.1004	0.0078	7.2277
4	0.0650	0.9744	0.0476	1.1002	0.0078	7.2268
5	0.0650	0.9742	0.0543	1.1001	0.0078	7.2258
6	0.0650	0.9739	0.0609	1.0999	0.0078	7.2247
7	0.0650	0.9737	0.0676	1.0997	0.0078	7.2236
8	0.0651	0.9734	0.0743	1.0996	0.0078	7.2225
9	0.0651	0.9731	0.0810	1.0994	0.0078	7.2213
10	0.0651	0.9728	0.0876	1.0992	0.0078	7.2202
11	0.0651	0.9724	0.0943	1.0991	0.0078	7.2191
12	0.0652	0.9721	0.1010	1.0989	0.0078	7.2181
13	0.0652	0.9717	0.1077	1.0987	0.0078	7.2171
14	0.0652	0.9713	0.1143	1.0986	0.0078	7.2162
15	0.0653	0.9708	0.1210	1.0985	0.0078	7.2154
16	0.0653	0.9703	0.1277	1.0984	0.0078	7.2147
17	0.0654	0.9698	0.1343	1.0983	0.0078	7.2141
18	0.0654	0.9693	0.1410	1.0982	0.0078	7.2137
19	0.0655	0.9688	0.1477	1.0982	0.0078	7.2135
20	0.0656	0.9682	0.1543	1.0982	0.0078	7.2134
21	0.0657	0.9676	0.1610	1.0982	0.0078	7.2135
22	0.0658	0.9670	0.1677	1.0983	0.0078	7.2139
23	0.0659	0.9663	0.1743	1.0984	0.0078	7.2145
24	0.0660	0.9657	0.1810	1.0985	0.0078	7.2153

25	0.0661	0.9650	0.1877	1.0987	0.0078	7.2164
26	0.0662	0.9643	0.1943	1.0989	0.0078	7.2178
27	0.0663	0.9635	0.2010	1.0991	0.0078	7.2195
28	0.0665	0.9628	0.2077	1.0994	0.0078	7.2215
29	0.0666	0.9620	0.2144	1.0998	0.0078	7.2239
30	0.0668	0.9612	0.2211	1.1002	0.0078	7.2266
31	0.0670	0.9604	0.2277	1.1007	0.0078	7.2296
32	0.0671	0.9595	0.2344	1.1012	0.0078	7.2331
33	0.0673	0.9587	0.2411	1.1018	0.0078	7.2369
34	0.0675	0.9578	0.2478	1.1024	0.0078	7.2412
35	0.0678	0.9569	0.2545	1.1031	0.0078	7.2459
36	0.0680	0.9560	0.2612	1.1039	0.0078	7.2510
37	0.0682	0.9550	0.2679	1.1048	0.0078	7.2566
38	0.0685	0.9541	0.2746	1.1057	0.0078	7.2627
39	0.0687	0.9531	0.2813	1.1067	0.0078	7.2693
40	0.0690	0.9521	0.2881	1.1078	0.0079	7.2764
41	0.0693	0.9511	0.2948	1.1089	0.0079	7.2840
42	0.0696	0.9501	0.3015	1.1102	0.0079	7.2921
43	0.0699	0.9491	0.3083	1.1115	0.0079	7.3008
44	0.0703	0.9480	0.3150	1.1129	0.0079	7.3101

Friction factor F = 0.0206 Pipe diameter = 1.6764
 Length between ports = 3.6576 dz between ports = 0.0000
 Port diameter = 0.0910

Port number	Specific energy (m)	Coeff cd	Pipe velocity (m/sec)	Port velocity (m/sec)	Port discharge (m ³ /sec)	Port Froude #
45	0.0714	0.9674	0.1700	1.1448	0.0074	7.6827
46	0.0715	0.9671	0.1734	1.1449	0.0074	7.6839
47	0.0715	0.9668	0.1768	1.1451	0.0074	7.6852
48	0.0716	0.9665	0.1801	1.1453	0.0074	7.6865
49	0.0717	0.9662	0.1835	1.1455	0.0075	7.6880
50	0.0717	0.9659	0.1869	1.1458	0.0075	7.6896
51	0.0718	0.9655	0.1903	1.1460	0.0075	7.6913
52	0.0719	0.9652	0.1936	1.1463	0.0075	7.6931
53	0.0720	0.9649	0.1970	1.1466	0.0075	7.6950
54	0.0721	0.9645	0.2004	1.1469	0.0075	7.6970
55	0.0722	0.9642	0.2038	1.1472	0.0075	7.6991
56	0.0723	0.9638	0.2072	1.1475	0.0075	7.7014
57	0.0724	0.9635	0.2105	1.1479	0.0075	7.7038
58	0.0725	0.9631	0.2139	1.1483	0.0075	7.7063
59	0.0726	0.9627	0.2173	1.1487	0.0075	7.7089
60	0.0727	0.9624	0.2207	1.1491	0.0075	7.7117
61	0.0728	0.9620	0.2241	1.1495	0.0075	7.7146
62	0.0729	0.9616	0.2275	1.1500	0.0075	7.7176
63	0.0730	0.9612	0.2309	1.1504	0.0075	7.7208
64	0.0732	0.9608	0.2343	1.1509	0.0075	7.7241
65	0.0733	0.9605	0.2376	1.1514	0.0075	7.7276
66	0.0734	0.9601	0.2410	1.1520	0.0075	7.7312
67	0.0735	0.9597	0.2444	1.1525	0.0075	7.7349
68	0.0737	0.9592	0.2478	1.1531	0.0075	7.7388
69	0.0738	0.9588	0.2512	1.1537	0.0075	7.7429
70	0.0740	0.9584	0.2546	1.1543	0.0075	7.7471
71	0.0741	0.9580	0.2580	1.1550	0.0075	7.7515
72	0.0743	0.9576	0.2614	1.1557	0.0075	7.7560
73	0.0744	0.9572	0.2649	1.1564	0.0075	7.7607
74	0.0746	0.9567	0.2683	1.1571	0.0075	7.7656
75	0.0747	0.9563	0.2717	1.1579	0.0075	7.7707
76	0.0749	0.9559	0.2751	1.1586	0.0075	7.7759
77	0.0751	0.9554	0.2785	1.1594	0.0075	7.7813
78	0.0753	0.9550	0.2819	1.1603	0.0075	7.7868
79	0.0754	0.9545	0.2853	1.1611	0.0076	7.7926
80	0.0756	0.9541	0.2888	1.1620	0.0076	7.7985
81	0.0758	0.9536	0.2922	1.1629	0.0076	7.8046
82	0.0760	0.9532	0.2956	1.1638	0.0076	7.8109
83	0.0762	0.9527	0.2991	1.1648	0.0076	7.8174
84	0.0764	0.9522	0.3025	1.1658	0.0076	7.8240
85	0.0766	0.9518	0.3059	1.1668	0.0076	7.8309
86	0.0768	0.9513	0.3094	1.1679	0.0076	7.8380
87	0.0771	0.9508	0.3128	1.1690	0.0076	7.8452
88	0.0773	0.9504	0.3163	1.1701	0.0076	7.8527
89	0.0775	0.9499	0.3197	1.1712	0.0076	7.8604
90	0.0777	0.9494	0.3232	1.1724	0.0076	7.8682
91	0.0780	0.9489	0.3266	1.1736	0.0076	7.8763
92	0.0782	0.9484	0.3301	1.1748	0.0076	7.8846
93	0.0785	0.9480	0.3336	1.1761	0.0076	7.8931
94	0.0787	0.9475	0.3370	1.1774	0.0077	7.9018

Friction factor F = 0.0194
 Length between ports = 3.6576
 Port diameter = 0.0870

dz between ports = 0.0000

Port number	Specific energy (m)	Coeff cd	Pipe velocity (m/sec)	Port velocity (m/sec)	Port discharge (m ³ /sec)	Port Froude #
95	0.0793	0.9609	0.2436	1.1985	0.0071	8.2264
96	0.0794	0.9606	0.2459	1.1990	0.0071	8.2298
97	0.0795	0.9604	0.2482	1.1995	0.0071	8.2334
98	0.0797	0.9601	0.2506	1.2001	0.0071	8.2370
99	0.0798	0.9599	0.2529	1.2006	0.0071	8.2407
100	0.0799	0.9596	0.2552	1.2012	0.0071	8.2446
101	0.0800	0.9593	0.2575	1.2017	0.0071	8.2485
102	0.0801	0.9591	0.2598	1.2023	0.0071	8.2524
103	0.0802	0.9588	0.2621	1.2029	0.0072	8.2565
104	0.0804	0.9585	0.2645	1.2035	0.0072	8.2607
105	0.0805	0.9583	0.2668	1.2041	0.0072	8.2650
106	0.0806	0.9580	0.2691	1.2048	0.0072	8.2693
107	0.0808	0.9577	0.2714	1.2054	0.0072	8.2738
108	0.0809	0.9575	0.2738	1.2061	0.0072	8.2783
109	0.0810	0.9572	0.2761	1.2068	0.0072	8.2830
110	0.0812	0.9569	0.2784	1.2075	0.0072	8.2877
111	0.0813	0.9566	0.2807	1.2082	0.0072	8.2926
112	0.0815	0.9564	0.2831	1.2089	0.0072	8.2975
113	0.0816	0.9561	0.2854	1.2096	0.0072	8.3026
114	0.0818	0.9558	0.2877	1.2104	0.0072	8.3077
115	0.0819	0.9555	0.2901	1.2111	0.0072	8.3130
116	0.0821	0.9552	0.2924	1.2119	0.0072	8.3183
117	0.0822	0.9550	0.2947	1.2127	0.0072	8.3238
118	0.0824	0.9547	0.2971	1.2135	0.0072	8.3293
119	0.0825	0.9544	0.2994	1.2143	0.0072	8.3350
120	0.0827	0.9541	0.3018	1.2152	0.0072	8.3407
121	0.0829	0.9538	0.3041	1.2160	0.0072	8.3466
122	0.0830	0.9535	0.3065	1.2169	0.0072	8.3526
123	0.0832	0.9532	0.3088	1.2178	0.0072	8.3587
124	0.0834	0.9529	0.3112	1.2187	0.0072	8.3649
125	0.0836	0.9526	0.3135	1.2196	0.0073	8.3712
126	0.0837	0.9524	0.3159	1.2205	0.0073	8.3776
127	0.0839	0.9521	0.3182	1.2215	0.0073	8.3841
128	0.0841	0.9518	0.3206	1.2225	0.0073	8.3908
129	0.0843	0.9515	0.3229	1.2235	0.0073	8.3975
130	0.0845	0.9512	0.3253	1.2245	0.0073	8.4044
131	0.0847	0.9509	0.3277	1.2255	0.0073	8.4114
132	0.0849	0.9506	0.3300	1.2265	0.0073	8.4185
133	0.0851	0.9503	0.3324	1.2276	0.0073	8.4257
134	0.0853	0.9500	0.3348	1.2286	0.0073	8.4331
135	0.0855	0.9497	0.3371	1.2297	0.0073	8.4405
136	0.0857	0.9494	0.3395	1.2308	0.0073	8.4481
137	0.0859	0.9491	0.3419	1.2319	0.0073	8.4558
138	0.0861	0.9488	0.3443	1.2331	0.0073	8.4636

139	0.0863	0.9485	0.3466	1.2342	0.0073	8.4715
140	0.0866	0.9482	0.3490	1.2354	0.0073	8.4796
141	0.0868	0.9478	0.3514	1.2366	0.0074	8.4877
142	0.0870	0.9475	0.3538	1.2378	0.0074	8.4961
143	0.0872	0.9472	0.3562	1.2390	0.0074	8.5045
144	0.0875	0.9469	0.3586	1.2403	0.0074	8.5130
145	0.0877	0.9466	0.3610	1.2415	0.0074	8.5217
146	0.0879	0.9463	0.3634	1.2428	0.0074	8.5305
147	0.0882	0.9460	0.3658	1.2441	0.0074	8.5394
148	0.0884	0.9457	0.3682	1.2454	0.0074	8.5485

```

Jul 31, 1995, 9:34:58 ERL-N PROGRAM PLUMES, Ed 3, 3/11/94 Case: 1 of 16
Title Honouliuli, 1/10/94 CTD, Station HZ, March 1994 Flows nonlinear
tot flow # ports port' flow spacing effl sal effl temp far inc far dis
2.073 146 0.01420 3.658 0.67884 24.8 500 2500
port dep port dia plume dia total vel horiz vel vertl vel asp coeff print frq
60.96 0.09093 0.08881 2.292 2.292 0.000 0.10 500
port elev ver angle cont'coef effl den poll conc decay Froude # Roberts F
0.8382 0.0 0.954 -2.33000 2.46e6 55.26 15.04 0.1551
hor angle red space p amb den p current far dif far vel K:vel/cur Stratif #
90 3.658 24.2849 0.05400 0.0003 0.054 42.440.00003530
depth current density salinity temp amb conc N (freq) red grav.
0.0 1e-5 23.6400 35.0091 24.1078 0 0.01006 0.2616
7 1e-5 23.6647 35.037 24.0957 0 buoy flux puff-ther
14 0.024 23.7158 35.0588 23.9788 0 0.001015 1.741
21 0.024 23.7769 35.0709 23.8027 0 jet-plume jet-cross
28 0.024 23.8424 35.0594 23.5497 0 1.257 3.341
35 0.054 23.8899 35.0546 23.3743 0 plu-cross jet-strat
42 0.054 23.8776 35.0135 23.3096 0 23.59 4.234
49 0.054 23.9741 35.0858 23.1654 0 plu-strat
54 0.054 24.0477 35.0867 22.9126 0 7.769
60.96 0.054 24.2849 35.0789 22.056 0 hor dis>=

```

CORMIX1 flow category algorithm is turned off.

146 L $\frac{1}{4}$ 534 m

Help: F1. Quit: <esc>. Configuration:ATNO0. FILE: honowntnr;

UM INITIAL DILUTION CALCULATION (nonlinear mode)

```

plume dep plume dia poll conc dilution hor dis
m m
60.96 0.08881 2460000 1.000 0.000

```

```

58.68 1.712 75970 31.19 4.432
54.53 3.693 23070 100.6 7.390 -> merging
48.44 9.897 9402 236.0 12.12 -> trap level
45.18 20.54 5830 365.2 16.08 -> begin overlap

```

FARFIELD CALCULATION (based on Brooks, 1960, see guide)

Farfield dispersion based on wastefield width of 551.0m

--4/3 Power Law-- -Const Eddy Diff-

```

conc dilution conc dilution distance Time
conc dilution conc dilution distance m sec hrs
16.52 419.1 17.48 395.7 500.0 8961 2.5
0.03299 565.7 0.03997 465.2 1000 18220 5.1
0.00006794 739.00.00009402 531.4 1500 27480 7.6
1.451E-07 929.9 2.267E-07 591.6 2000 36740 10.2
3.189E-10 1135.8 5.564E-10 46.7 2500 46000 12.8

```

```

Jul 31, 1995, 9:35:11 ERL-N PROGRAM PLUMES, Ed 3, 3/11/94 Case: 2 of 16
Title Honouliuli, 1/10/94 CTD, Station HZ, March 2000 Flows nonlinear
tot flow # ports port flow spacing effl sal effl temp far inc far dis
2.242 146 0.01536 3.658 0.67884 24.8 500 2500
port dep port dia plume dia total vel horiz vel vertl vel asp coeff print frq
60.96 0.09093 0.08881 2.479 2.479 0.000 0.10 0.10 500
port elev ver angle cont coef effl den poll conc decay Froude # Roberts F
0.8382 0.0 0.954 -2.33000 2.46e6 55.26 16.26 0.1434
hor angle red space p amb den p current far dif far vel K:vel/cur Stratif #
90 3.658 24.2849 0.05400 0.0003 0.054 45.900.00003530
depth current density salinity temp amb conc N (freq) red grav.
0.0 1e-5 23.6400 35.0091 24.1078 0 0.01006 0.2616
7 1e-5 23.6647 35.037 24.0957 0 buoy Flux puff-ther
14 0.024 23.7158 35.0588 23.9788 0 0.001098 1.883
21 0.024 23.7769 35.0709 23.8027 0 jet-plume jet-cross
28 0.024 23.8424 35.0594 23.5497 0 1.360 3.613
35 0.054 23.8899 35.0546 23.3743 0 plu-cross jet-strat
42 0.054 23.8776 35.0135 23.3096 0 25.51 4.403
49 0.054 23.9741 35.0858 23.1654 0 plu-strat
54 0.054 24.0477 35.0867 22.9126 0 7.923
60.96 0.054 24.2849 35.0789 22.056 0 hor dis>=

```

CORMIX1 flow category algorithm is turned off.

146 L 1/4 534 m 1 to any range

Help: F1. Quit: <esc>. Configuration: ATNO0. FILE: honowntr;

UM INITIAL DILUTION CALCULATION (nonlinear mode)

plume dep plume dia poll conc dilution hor dis

m m m

60.96 0.08881 2460000 1.000 0.000

58.72 1.762 75970 31.19 4.622

54.62 3.681 24230 95.84 7.621 -> merging

48.15 10.04 9729 227.9 12.58 -> trap level

44.76 20.88 6075 350.3 16.60 -> begin overlap

FARFIELD CALCULATION (based on Brooks, 1960, see guide) 551.3m

Farfield dispersion based on wastefield width of

--4/3 Power Law-- -Const Eddy Diff-

conc dilution conc dilution distance

m m

17.33 401.9 18.33 379.5 500.0

0.03461 542.3 0.04192 446.2 1000

0.00007127 708.50.00009861 509.6 1500

1.522E-07 891.6 2.378E-07 567.3 2000

3.345E-10 1088.9 5.836E-10 620.2 2500

Time

sec

hrs

8952 2.5

18210 5.1

27470 7.6

36730 10.2

45990 12.8

```

Jul 31, 1995, 9:35:21 ERL-N PROGRAM PLUMES, Ed 3, 3/11/94 Case: 3 of 16
Title Honouliuli, 1/10/94 CTD, Station HZ, March 2005 Flows nonlinear
tot flow # ports port flow spacing effl sal effl temp far inc far dis
2.528 146 0.01732 3.658 0.67884 24.8 500 2500
port dep port dia plume dia total vel horiz vel vert1 vel asp coeff print frq
60.96 0.09093 0.08881 2.795 2.795 0.000 0.10 500
0.8382 0.0 0.954 -2.33000 effl den poll conc' decay Froude # Roberts F
hor angle red space p amb den p current salinity temp amb conc N (freq) red grav.
90 3.658 24.2849 0.05400 35.0091 24.1078 0 0.01006 0.2616
depth current density 23.6400 35.0091 24.1078 0 buoy flux puff-ther
0.0 1e-5 23.6647 35.037 24.0957 0 0.001238 2.123
14 0.024 23.7158 35.0588 23.9788 0 jet-plume jet-cross
21 0.024 23.7769 35.0709 23.8027 0 1.533 4.074
28 0.024 23.8424 35.0594 23.5497 0 plu-cross jet-strat
35 0.054 23.8899 35.0546 23.3743 0 28.77 4.675
42 0.054 23.8776 35.0135 23.3096 0 plu-strat
49 0.054 23.9741 35.0858 23.1654 0 8.165
54 0.054 24.0477 35.0867 22.9126 0 hor dis>=
60.96 0.054 24.2849 35.0789 22.056

```

CORMIX1 flow category algorithm is turned off. 1 to any range

146 L ¼ 534 m
 Help: F1. Quit: <esc>. Configuration:ATNO0. FILE: honowntr;
 UM INITIAL DILUTION CALCULATION (nonlinear mode)

```

plume dep plume dia poll conc dilution hor dis
m m m
60.96 0.08881 2460000 1.000 0.000
58.80 1.842 75970 31.19 4.914
54.78 3.676 25990 89.42 7.999 -> merging
47.75 10.21 10280 215.6 13.32 -> trap level
44.16 21.15 6512 326.8 17.41 -> begin overlap

```

FARFIELD CALCULATION (based on Brooks, 1960, see guide) 551.6m
 Farfield dispersion based on wastefield width of
 --4/3 Power Law-- -Const Eddy Diff-

conc	dilution	conc	dilution	distance	Time
conc	dilution	conc	dilution	distance	sec
18.76	374.8	19.84	354.0	500.0	8937
0.03748	505.7	0.04538	416.2	1000	18200
0.00007717	660.7	0.0001067	475.3	1500	27460
1.648E-07	831.3	2.574E-07	522	2000	36710
3.622E-10	1015.4	6.317E-10	525	2500	45970
					hrs
					2.5
					5.1
					7.6
					10.2
					12.8

```

Jul 31, 1995, 9:35:43 ERL-N PROGRAM PLUMES, Ed 3, 3/11/94 Case: 4 of 16
Title Honouliuli, 1/10/94.CTD, Station HZ, March 2010 Flows nonlinear
tot flow # ports port flow spacing effl sal effl temp far inc far dis
2.675 146 0.01832 3.658 0.67884 24.8 500 2500
port dep port dia plume dia total vel horiz vel vertl vel asp coeff print frq
60.96 0.09093 0.08881 2.957 2.957 0.000 0.10 500
port elev ver angle cont coef effl den poll conc decay Froude # Roberts F
0.8382 0.0 0.954 -2.33000 2.4666 55.26 19.40 0.1202
hor angle red space p amb den p current far dif far vel K:vel/cur Stratif #
90 3.658 24.2849 0.05400 0.0003 0.054 54.770.00003530
depth current density salinity temp amb conc N (freq) red grav.
0.0 1e-5 23.6400 35.0091 24.1078 0 0.01006 0.2616
7 1e-5 23.6647 35.037 24.0957 0 buoy flux puff-ther
14 0.024 23.7158 35.0588 23.9788 0 0.001310 2.247
21 0.024 23.7769 35.0709 23.8027 0 jet-plume jet-cross
28 0.024 23.8424 35.0594 23.5497 0 1.622 4.311
35 0.054 23.8899 35.0546 23.3743 0 plu-cross jet-strat
42 0.054 23.8776 35.0135 23.3096 0 30.44 4.809
49 0.054 23.9741 35.0858 23.1654 0 plu-strat
54 0.054 24.0477 35.0867 22.9126 0 8.281
60.96 0.054 24.2849 35.0789 22.056 0 hor dis>=

```

CORMIX1 flow category algorithm is turned off.

1 to any range

146 L ¼ 534 m
Help: F1. Quit: <esc>. Configuration:ATNO0. FILE: honowntr;

UM INITIAL DILUTION CALCULATION (nonlinear mode)

```

plume dep plume dia poll conc dilution hor dis
m m m
60.96 0.08881 2460000 1.000 0.000

```

```

58.84 1.880 75970 31.19 5.049
54.85 3.687 26730 86.98 8.196 -> merging
47.58 10.27 10570 209.7 13.68 -> trap level
43.85 21.44 6691 317.9 17.87 -> begin overlap

```

FARFIELD CALCULATION (based on Brooks, 1960, see guide) 551.9m
Farfield dispersion based on wastefield width of

```

--4/3 Power Law-- -Const Eddy Diff-
conc dilution conc dilution distance m Time
19.39 364.4 20.50 344.2 500.0 sec hrs
0.03874 491.6 0.04690 404.7 1000 8928 2.5
0.00007978 642.3 0.0001103 462.2 1500 18190 5.1
1.703E-07 808.2 2.660E-07 514.6 2000 27450 7.6
3.744E-10 987.1 6.528E-10 562.6 2500 36710 10.2
45970 12.8

```

```

Jul 31, 1995, 9:36: 8 ERL-N PROGRAM PLUMES, Ed 3, 3/11/94 Case: 6 of 16
Title Honouliuli, 4/14/94 CTD, Station HZ, June 2000 Flows nonlinear
tot flow # ports port flow spacing effl sal effl temp far inc far dis
1.671 146 0.01145 3.658 0.6863 24.9 500 2500
port dep port dia plume dia total vel horiz vel vertl vel asp coeff print frq
60.96 0.09093 0.08881 1.847 1.847 0.000 0.10 500
port elev ver angle cont coef effl den poll conc decay Froude # Roberts F
0.8382 0.0 0.954 -2.35000 2.46e6 55.26 12.35 0.08113
hor angle red space p amb den p current far dif far vel K:vel/cur Stratif #
90 3.658 23.2986 0.04000 0.0003 0.06 46.19 4.099E-07
depth current density salinity temp amb conc N (freq) red grav.
0.0 1e-5 23.2913 34.4956 23.9748 0 0.001065 0.2521
7 1e-5 23.3132 34.5285 23.985 0 buoy flux puff-ther
14 0.06 23.3263 34.5446 23.9819 0 0.0007889 1.570
21 0.06 23.3304 34.5503 23.9825 0 jet-plume jet-cross
28 0.06 23.3331 34.5566 23.9893 0 1.032 3.635
35 0.027 23.3332 34.5579 23.9926 0 plu-cross jet-strat
42 0.027 23.3346 34.5611 23.996 0 45.09 11.68
49 0.04 23.3344 34.5609 23.9962 0 plu-strat
54 0.04 23.3407 34.5667 23.9897 0 39.31
60.96 0.04 23.2986 34.4991 23.9593 0 hor dis=>

```

CORMIX1 flow category algorithm is turned off.

146 L ¼ 534 m

Help: F1. Quit: <esc>. Configuration:ATNO0. FILE: honowntr;

UM INITIAL DILUTION CALCULATION (nonlinear mode)

```

plume dep plume dia poll conc dilution hor dis
m m m
60.96 0.08881 2460000 1.000 0.000

```

```

58.26 1.571 75890 31.22 3.966
52.20 3.676 18200 126.6 6.875 -> merging
9.115 27.77 1821 998.3 23.56
5.963 28.62 1736 1026 25.05 -> surface hit

```

FARFIELD CALCULATION (based on Brooks, 1960, see guide)

Farfield dispersion based on wastefield width of 559.0m

--4/3 Power Law-- -Const Eddy Diff-

conc	dilution	conc	dilution	distance	Time
conc	dilution	conc	dilution	distance	sec
					hrs
9.929	1138.1	10.35	1090.4	500.0	7916
0.03703	1486.4	0.04346	1262.7	1000	16250
0.0001404	1906.0	0.0001860	1432.5	1500	24580
5.491E-07	2368.1	8.140E-07	38.9	2000	32920
2.202E-09	2865.8	3.620E-09	33.0	2500	41250

1 to any range

```

Jul 31, 1995, 9:35:56 ERL-N PROGRAM PLUMES, Ed 3, 3/11/94 Case: 5 of 16
Title Honouliuli, 4/14/94 CTD, Station HZ, June 1994 Flows nonlinear
tot flow # ports port flow spacing effl sal effl temp far inc far dis
1.545 146 0.01058 3.658 0.6863 24.9 500 2500
port dep port dia plume dia total vel horiz vel vertl vel asp coeff print frq
60.96 0.09093 0.08881 1.708 1.708 0.000 0.10 500
port elev ver angle cont coef effl den poll conc decay Froude # Roberts F
0.8382 0.0 0.954 -2.35000 2.466 55.26 11.41 0.08775
hor angle red space p amb den p current far dif K:vel/cur Stratif #
90 3.658 23.2986 0.04000 0.0003 0.06 42.70 4.099E-07
depth current density salinity temp amb conc N (freq) red grav.
0.0 7 1e-5 23.2913 34.4956 23.9748 0 0.001065 0.2521
14 1e-5 23.3132 34.5285 23.985 0 buoy flux puff-ther
21 0.06 23.3263 34.5446 23.9819 0 0.0007294 1.452
28 0.06 23.3304 34.5503 23.9825 0 jet-plume jet-cross
35 0.06 23.3331 34.5566 23.9893 0 0.9544 3.361
42 0.027 23.3332 34.5579 23.9926 0 plu-cross jet-strat
49 0.027 23.3346 34.5611 23.996 0 41.69 11.23
54 0.04 23.3344 34.5609 23.9962 0 plu-strat
60.96 0.04 23.3407 34.5667 23.9897 0 38.55
60.96 0.04 23.2986 34.4991 23.9593 0 hor dis>=

```

CORMIX1 flow category algorithm is turned off.

146 L $\frac{1}{4}$ 534 m

Help: F1. Quit: <esc>. Configuration: ATNO0. FILE: honowntr;

UM INITIAL DILUTION CALCULATION (nonlinear mode)

plume dep plume dia poll conc dilution hor dis

60.96 m 0.08881 2460000 1.000 0.000

58.25 1.523 75900 31.22 3.781
52.14 3.677 17330 132.8 6.652 -> merging
13.19 26.31 1853 998.3 21.69
6.432 29.47 1608 1100 25.07 -> surface hit

FARFIELD CALCULATION (based on Brooks, 1960, see guide)

Farfield dispersion based on wastefield width of 559.9m

--4/3 Power Law-- -Const Eddy Diff-

conc	dilution	conc	dilution	distance	Time
9.202	1219.5	9.594	1168.5	500.0	hrs
0.03433	1592.2	0.04027	1352.9	1000	7915 2.2
0.0001302	2041.4	0.0001724	1534.8	1500	16250 4.5
5.092E-07	2536.0	7.545E-07	1702.3	2000	24580 6.8
2.042E-09	3068.7	3.356E-09	1856.6	2500	32920 9.1
					41250 11.5


```

Jul 31, 1995, 9:36:20 ERL-N PROGRAM PLUMES, Ed 3, 3/11/94 Case: 7 of 16
Title Honouliuli, 4/14/94 CTD, Station HZ, June 2005 Flows nonlinear
tot flow # ports port flow spacing effl sal effl temp far inc far dis 2500
1.884 146 0.01290 3.658 0.6863 24.9 500
port dep port dia plume dia total vel horiz vel vertl vel asp coeff print frq 500
60.96 0.09093 0.08881 2.083 2.083 0.000 0.10
port elev ver angle cont coef effl den poll conc decay Froude # Roberts F
0.8382 0.0 0.954 -2.35000 2.46e6 55.26 13.92 0.07196
hor angle red space p amb den p current far dif far vel K:vel/cur Stratif #
90 3.658 23.2986 0.04000 0.0003 0.06 52.07 4.099E-07
depth current density salinity temp amb conc N (freq) red grav.
0.0 7 1e-5 23.2913 34.4956 23.9748 0 0.001065 0.2521
14 1e-5 23.3132 34.5285 23.985 0 buoy flux puff-ther
21 0.06 23.3263 34.5446 23.9819 0 0.0008894 1.771
28 0.06 23.3304 34.5503 23.9825 0 jet-plume jet-cross
35 0.027 23.3331 34.5566 23.9893 0 1.164 4.099
42 0.027 23.3346 34.5579 23.9926 0 plu-cross jet-strat
49 0.04 23.3344 34.5609 23.9962 0 50.84
54 0.04 23.3407 34.5667 23.9897 0 plu-strat
60.96 0.04 23.2986 34.4991 23.9593 0 hor dis>=

```

CORMIX1 flow category algorithm is turned off.

146 L ¼ 534 m

Help: F1. Quit: <esc>. Configuration:ATN00. FILE: honowntr;

UM INITIAL DILUTION CALCULATION (nonlinear mode)

```

plume dep plume dia poll conc dilution hor dis m
60.96 0.08881 2460000 1.000 0.000

```

```

58.31 1.647 75880 31.22 4.256
52.30 3.687 19530 118.1 7.249 -> merging
5.380 27.42 1948 925.0 25.05 -> surface hit

```

FARFIELD CALCULATION (based on Brooks, 1960, see guide)

Farfield dispersion based on wastefield width of 557.8m

--4/3 Power Law-- -Const Eddy Diff-

```

conc dilution conc dilution distance m Time
conc dilution conc dilution distance m sec hrs
11.14 1026.1 11.62 983.0 500.0 7916 2.2
0.04152 1340.6 0.04875 1138.4 1000 16250 4.5
0.0001574 1719.5 0.0002086 1291.7 1500 24580 6.8
6.155E-07 2136.7 9.129E-07 1132.8 2000 32920 9.1
2.468E-09 2586.1 4.061E-09 1132.8 2500 41250 11.5

```

```

Jul 31, 1995, 9:36:35 ERL-N PROGRAM PLUMES, Ed 3, 3/11/94 Case: 8 of 16
Title Honouliuli, 4/14/94 CTD, Station HZ, June 2010 Flows nonlinear
tot flow # ports port flow spacing effl sal effl temp far inc far dis
1.994 146 0.01366 3.658 0.6863 24.9 500 2500
port dep port dia plume dia total vel horiz vel vertl vel asp coeff print frq
60.96 0.09093 0.08881 2.205 2.205 0.000 0.10 500
0.8382 0.0 0.954 -2.35000 2.46e6 decay Froude # Roberts F
hor angle red space p amb den p current far dif far vel K:vel/cur Stratif #
90 3.658 23.2986 0.04000 0.0003 temp 0.06 55.11 4.099E-07
depth current salinity temp 0 0.001065 0.2521
0.0 1e-5 23.2913 34.4956 23.9748 0 buoy flux puff-ther
7 1e-5 23.3132 34.5285 23.985 0 0.0009413 1.874
14 0.06 23.3263 34.5446 23.9819 0 jet-plume jet-cross
21 0.06 23.3304 34.5503 23.9825 0 1.232 4.338
28 0.06 23.3331 34.5566 23.9893 0 plu-cross jet-strat
35 0.027 23.3332 34.5579 23.9926 0 53.80 12.76
42 0.027 23.3346 34.5611 23.996 0 plu-strat
49 0.04 23.3344 34.5609 23.9962 0 41.09
54 0.04 23.3407 34.5667 23.9897 0 hor dis>=
60.96 0.04 23.2986 34.4991 23.9593 0

```

CORMIX1 flow category algorithm is turned off.

1 to any range

Help: F1. Quit: <esc>. Configuration:ATN00. FILE: honowntr;
UM INITIAL DILUTION CALCULATION (nonlinear mode)

```

plume dep plume dia poll conc dilution hor dis
m m m
60.96 0.08881 2460000 1.000 0.000
58.33 1.684 75880 31.22 4.395
52.38 3.688 20230 114.1 7.429 -> merging
5.178 26.89 2056 881.2 25.06 -> surface hit
FARFIELD CALCULATION (based on Brooks, 1960, see guide)
Farfield dispersion based on wastefield width of 557.3m
--4/3 Power Law-- -Const Eddy Diff-
conc dilution conc dilution distance distance Time
m m sec hrs
11.76 977.6 12.26 936.5 500.0 7916 2.2
0.04382 1277.5 0.05145 1084.7 1000 16250 4.5
0.0001661 1638.8 0.0002202 1230.8 1500 24580 6.8
6.494E-07 2036.6 9.635E-07 1365.2 2000 32920 9.1
2.604E-09 2465.0 4.286E-09 1489.1 2500 41250 11.5

```

```

Jul 31, 1995, 9:36:46 ERL-N PROGRAM PLUMES, Ed 3, 3/11/94 Case: 9 of 16
Title Honouliuli, 7/02/93 CTD, Station HZ, July 1994 Flows nonlinear
tot flow # ports port flow spacing effl sal effl temp far inc far dis
1.662 146 0.01138 3.658 0.69084 25.3 500 2500
port dep port dia plume dia total vel horiz vel vertl vel asp coeff print frq
60.96 0.09093 0.08881 1.837 1.837 0.000 0.10 500
port elev ver angle cont'coef effl den poll conc decay Froude # Roberts F
0.8382 0.0 0.954 -2.45000 2.4666 55.26 12.07 0.01925
hor angle red space p amb den p current far dif far vel K:vel/cur Stratif #
90 3.658 24.0830 0.02500 0.0003 0.025 73.500.00007121
depth current density salinity temp amb conc N (freq) red grav.
0.0 1e-5 22.7861 34.634 25.9861 0 0.01427 0.2608
7 1e-5 22.8567 34.728 25.9868 0 buoy flux puff-ther
14 0.016 22.8595 34.729 25.9802 0 0.0008117 1.806
21 0.016 23.0968 34.819 25.4319 0 jet-plume jet-cross
28 0.016 23.8597 35.002 23.3412 0 1.009 5.785
35 0.025 23.9945 35.035 22.9614 0 plu-cross jet-strat
42 0.025 24.0667 35.061 22.7784 0 190.0 3.183
49 0.025 24.0558 34.988 22.6229 0 plu-strat
54 0.025 24.0656 34.991 22.5964 0 5.653
60.96 0.025 24.0830 35.008 22.5806 0 hor dis>=

```

CORMIX1 flow category algorithm is turned off.

146 L $\frac{1}{4}$ 534 m 1 to any range

Help: F1. Quit: <esc>. Configuration:ATNO0. FILE: honowntr;

UM INITIAL DILUTION CALCULATION (nonlinear mode)

plume dep plume dia poll conc dilution hor dis

```

m m
60.96 0.08881 2460000 1.000 0.000

```

```

57.86 1.543 75830 31.20 3.847
49.98 3.678 17350 131.8 6.500 -> merging
33.95 9.169 5993 352.7 10.54 -> trap level
27.74 20.27 4654 434.2 12.57 -> begin overlap

```

FARFIELD CALCULATION (based on Brooks, 1960, see guide)
Farfield dispersion based on wastefield width of 550.7m

--4/3 Power Law-- -Const Eddy Diff-

conc	dilution	conc	dilution	distance	Time
				m	sec
0.01120	699.7	0.01383	564.5	500.0	19500
1.865E-08	1177.3	3.017E-08	723.6	1000	39500
3.532E-14	1736.4	7.116E-14	856.0	1500	59500
7.233E-20	2364.4	1.749E-19	11.2	2000	79500
1.561E-25	3053.0	4.406E-25	1.3	2500	99500
					hrs
					5.4
					11.0
					16.5
					22.1
					27.6

```

Jul 31, 1995, 9:36:56 ERL-N PROGRAM PLUMES, Ed 3, 3/11/94 Case: 10 of 16
Title Honouliuli, 7/02/93 CTD, Station HZ, July 2000 Flows nonlinear
tot flow # ports port flow spacing effl sal effl temp far inc far dis
1.797 146 0.01231 3.658 0.69084 25.3 500 2500
port dep port dia plume dia total vel horiz vel vertl vel asp coeff print frq
60.96 0.09093 0.08881 1.987 1.987 0.000 0.10 500
port elev ver angle cont coef effl den poll conc decay Froude # Roberts F
0.8382 0.0 0.954 -2.45000 2.46e6 55.26 13.05 0.01780
hor angle red space p amb den p current far dif far vel K:vel/cur Stratif #
90 3.658 24.0830 0.02500 0.0003 0.025 79.470.00007121
depth current density salinity temp amb conc N (freq) red grav.
0.0 1e-5 22.7861 34.634 25.9861 0 0.01427 0.2608
7 1e-5 22.8567 34.728 25.9868 0 buoy flux puff-ther
14 0.016 22.8595 34.729 25.9802 0 0.0008777 1.953
21 0.016 23.0968 34.819 25.4319 0 jet-plume jet-cross
28 0.016 23.8597 35.002 23.3412 0 1.091 6.255
35 0.025 23.9945 35.035 22.9614 0 plu-cross jet-strat
42 0.025 24.0667 35.061 22.7784 0 205.5 3.310
49 0.025 24.0558 34.988 22.6229 0 plu-strat
54 0.025 24.0656 34.991 22.5964 0 5.764
60.96 0.025 24.0830 35.008 22.5806 0 hor dis>=

```

CORMIX1 flow category algorithm is turned off.

146 L 1/4 534 m

Help: F1. Quit: <esc>. Configuration:ATN00. FILE: honowntr;

UM INITIAL DILUTION CALCULATION (nonlinear mode)

```

plume dep plume dia poll conc dilution hor dis
m m m
60.96 0.08881 2460000 1.000 0.000

```

```

57.90 1.594 75830 31.20 4.036
50.14 3.680 18230 125.6 6.752 -> merging
33.66 9.238 6255 338.3 10.91 -> trap level
27.39 20.17 4896 413.6 12.94 -> begin overlap

```

FARFIELD CALCULATION (based on Brooks, 1960, see guide)

Farfield dispersion based on wastefield width of 550.6m

--4/3 Power Law-- -Const Eddy Diff-

conc	dilution	conc	dilution	distance	Time
conc	dilution	conc	dilution	m	sec
0.01190	666.3	0.01468	537.7	500.0	19480
1.981E-08	1121.3	3.203E-08	689.2	1000	39480
3.751E-14	1653.9	7.556E-14	815.4	1500	59480
7.681E-20	2252.3	1.857E-19	925.2	2000	79480
1.658E-25	2908.4	4.678E-25	1023.4	2500	99480
					hrs
					5.4
					11.0
					16.5
					22.1
					27.6

1 to any range

```

Jul 31, 1995, 9:37: 6 ERL-N PROGRAM PLUMES, Ed 3, 3/11/94 Case: 11. of 16
Title Honouliuli, 7/02/93 CTD, Station HZ, July 2005 Flows nonlinear
tot flow # ports port flow spacing effl sal effl temp far inc far dis
2.027 146 0.01388 3.658 0.69084 25.3 500 2500
port dep port dia plume dia total vel horiz vel vertl vel asp coeff print frq
60.96 0.09093 0.08881 2.241 2.241 0.000 0.10 0.000 500
port elev ver angle cont coef effl den poll conc decay Froude # Roberts F
0.8382 0.0 0.954 -2.45000 2.46e6 55.26 14.72 0.01578
hor angle red space p amb den p current far dif far vel K:vel/cur Stratif #
90 3.658 24.0830 0.02500 0.0003 0.025 89.640.00007121
depth current density salinity temp amb conc N (freq) red grav.
0.0 1e-5 22.7861 34.634 25.9861 0 0.01427 0.2608
7 1e-5 22.8567 34.728 25.9868 0 buoy flux puff-ther
14 0.016 22.8595 34.729 25.9802 0 0.0009900 2.203
21 0.016 23.0968 34.819 25.4319 0 jet-plume jet-cross
28 0.016 23.8597 35.002 23.3412 0 1.231 7.056
35 0.025 23.9945 35.035 22.9614 0 plu-cross jet-strat
42 0.025 24.0667 35.061 22.7784 0 231.8 3.515
49 0.025 24.0558 34.988 22.6229 0 plu-strat
54 0.025 24.0656 34.991 22.5964 0 5.941
60.96 0.025 24.0830 35.008 22.5806 0 hor dis>=

```

CORMIX1 flow category algorithm is turned off.

146 L X 534 m

1 to any range

Help: F1. Quit: <esc>. Configuration:ATNO0. FILE: honowntr;

UM INITIAL DILUTION CALCULATION (nonlinear mode)

```

plume dep plume dia poll conc dilution hor dis
m m m
60.96 0.08881 2460000 1.000 0.000

```

```

57.99 1.678 75830 31.20 4.333
50.43 3.682 19710 116.4 7.158 -> merging
33.39 9.248 6722 315.7 11.49 -> trap level
26.97 19.60 5307 383.3 13.50 -> begin overlap

```

FARFIELD CALCULATION (based on Brooks, 1960, see guide)

Farfield dispersion based on wastefield width of 550.0m

--4/3 Power Law-- -Const Eddy Diff-

conc	dilution	conc	dilution	distance	Time
conc	dilution	conc	dilution	distance	sec
0.01309	617.2	0.01615	498.2	500.0	19460
2.179E-08	1039.1	3.523E-08	638.7	1000	39460
4.124E-14	1533.0	8.310E-14	755.7	1500	59460
8.444E-20	2087.9	2.042E-19	857.4	2000	79460
1.822E-25	2696.4	5.145E-25	948.5	2500	99460
					hrs
					5.4
					11.0
					16.5
					22.1
					27.6

```

Jul 31, 1995, 9:37:15 ERL-N PROGRAM PLUMES, Ed 3, 3/11/94 Case: 12 of 16
Title Honouliuli, 7/02/93 CTD, Station HZ, July 2010 Flows nonlinear
tot flow # ports port flow spacing effl sal effl temp far inc far dis 2500
2.144 146 0.01468 3.658 0.69084 25.3 500 2500
port dep port dia plume dia total vel horiz vel vertl vel asp coeff print frq
60.96 0.09093 0.08881 2.370 2.370 0.000 0.10 500
port elev ver angle cont coef effl den poll conc decay Froude # Roberts F
0.8382 0.0 0.954 -2.45000 2.46e6 55.26 15.57 0.01492
hor angle red space p amb den p current far dif far vel K:vel/cur Stratif #
90 3.658 24.0830 0.02500 0.0003 0.025 94.820.00007121
depth current density salinity temp amb conc N (freq) red grav.
0.0 1e-5 22.7861 34.634 25.9861 0 0.01427 0.2608
7 1e-5 22.8567 34.728 25.9868 0 buoy flux puff-ther
14 0.016 22.8595 34.729 25.9802 0 0.001047 2.330
21 0.016 23.0968 34.819 25.4319 0 jet-plume jet-cross
28 0.016 23.8597 35.002 23.3412 0 1.302 7.463
35 0.025 23.9945 35.035 22.9614 0 plu-cross jet-strat
42 0.025 24.0667 35.061 22.7784 0 245.2 3.615
49 0.025 24.0558 34.988 22.6229 0 plu-strat
54 0.025 24.0656 34.991 22.5964 0 6.025
60.96 0.025 24.0830 35.008 22.5806 0 hor dis>=

```

CORMIX1 flow category algorithm is turned off.

146 L ¼ 534 m 1 to any range

Help: F1. Quit: <esc>. Configuration:ATNO0. FILE: honowntr;

UM INITIAL DILUTION CALCULATION (nonlinear mode)

```

plume dep plume dia poll conc dilution hor dis
m m
60.96 0.08881 2460000 1.000 0.000

```

```

58.03 1.718 75830 31.20 4.473
50.58 3.686 20420 112.4 7.357 -> merging
33.15 9.325 6915 307.0 11.81 -> trap level
26.80 19.37 5506 370.2 13.79 -> begin overlap

```

FARFIELD CALCULATION (based on Brooks, 1960, see guide)

Farfield dispersion based on wastefield width of 549.8m

--4/3 Power Law-- -Const Eddy Diff-

conc	dilution	conc	dilution	distance	Time
				m	sec hrs
0.01368	596.1	0.01688	481.2	500.0	19450 5.4
2.277E-08	1003.7	3.682E-08	616.9	1000	39450 11.0
4.309E-14	1480.9	8.684E-14	730.0	1500	59450 16.5
8.824E-20	2017.1	2.134E-19	828.2	2000	79450 22.1
1.904E-25	2605.0	5.376E-25	916.2	2500	99450 27.6

```

Jul 31, 1995, 9:38:15 ERL-N PROGRAM PLUMES, Ed 3, 3/11/94 Case: 16 of 16
Title Honouliuli, 12/02/93 CTD, Station HZ, October 2010 Flows nonlinear
tot flow # ports port flow spacing effl sal effl temp far inc far dis
2.189 146 0.01499 3.658 0.67935 26.1 500 2500
port dep port dia plume dia total vel horiz vel vertl vel asp coeff print frq
60.96 0.09093 0.08881 2.420 2.420 0.000 0.10 500
port elev ver angle cont'coef effl den poll conc decay Froude # Roberts F
0.8382 0.0 0.954 -2.67000 2.46e6 55.26 15.98 0.01477
hor angle red space p amb den p current far dif far vel K:vel/cur Stratif #
90 3.658 23.5796 0.02500 0.0003 0.025 96.810.00001870
depth current density salinity temp amb conc N (freq) red grav.
0.0 1e-5 23.2428 34.814 24.941 0 0.007276 0.2581
7 1e-5 23.3360 34.906 24.8624 0 buoy flux puff-ther
14 0.016 23.3631 34.904 24.7677 0 0.001058 2.387
21 0.016 23.4248 34.878 24.4973 0 jet-plume jet-cross
28 0.016 23.4304 34.916 24.5744 0 1.336 7.620
35 0.016 23.4461 34.941 24.5848 0 plu-cross jet-strat
42 0.025 23.4711 34.95 24.5243 0 247.7 5.117
49 0.025 23.4856 34.952 24.481 0 plu-strat
54 0.025 23.5211 34.948 24.352 0 10.01
60.96 0.025 23.5796 34.95 24.1607 0 hor dis>=

```

CORMIX1 flow category algorithm is turned off.

146 L ¼ 534 m

Help: F1. Quit: <esc>. Configuration:ATN00. FILE: honowntr;

UM INITIAL DILUTION CALCULATION (nonlinear mode)

```

plume dep plume dia poll conc dilution hor dis
m m m
60.96 0.08881 2460000 1.000 0.000

```

```

58.06 1.740 75830 31.20 4.543
50.88 3.683 21300 107.8 7.434 -> merging
19.19 14.21 4935 396.9 15.73 -> trap level
9.331 31.26 3834 472.0 18.96 -> begin overlap

```

FARFIELD CALCULATION (based on Brooks, 1960, see guide) 561.7m

```

Farfield dispersion based on wastefield width of
--4/3 Power Law-- -Const Eddy Diff-
conc dilution conc dilution distance distance Time
sec hrs
0.01103 748.9 0.01352 608.9 500.0 19240 5.3
1.840E-08 1258.1 2.948E-08 780.6 1000 39240 10.9
3.486E-14 1854.4 6.953E-14 923.7 1500 59240 16.5
7.143E-20 2524.1 1.708E-19 18.1 2000 79240 22.0
1.542E-25 3258.5 4.304E-25 39.5 2500 99240 27.6

```

```

Jul 31, 1995, 9:37:48 ERL-N PROGRAM PLUMES, Ed 3, 3/11/94 Case: 13 of 16
Title Honouliuli, 12/02/93 CTD, Station HZ, October 1994 Flows nonlinear
tot flow # ports port flow spacing effl sal effl temp far inc far dis
1.697 146 0.01162 3.658 0.67935 26.1 500 2500
port dep port dia plume dia total vel horiz vel vertl vel asp coeff print frq
60.96 0.09093 0.08881 1.876 1.876 0.000 0.10 500
port elev ver angle cont coef effl den poll conc decay Froude # Roberts F
0.8382 0.0 0.954 -2.67000 2.46e6 55.26 12.39 0.01905
hor angle red space p amb den p current far dif far vel K:vel/cur Stratif #
90 3.658 23.5796 0.02500 0.0003 0.025 75.050.00001870
depth current density salinity temp amb conc N (freq) red grav.
0.0 1e-5 23.2428 34.814 24.941 0 0.007276 0.2581
7 1e-5 23.3360 34.906 24.8624 0 buoy flux puff-ther
14 0.016 23.3631 34.904 24.7677 0 0.0008202 1.851
21 0.016 23.4248 34.878 24.4973 0 jet-plume jet-cross
28 0.016 23.4304 34.916 24.5744 0 1.036 5.907
35 0.016 23.4461 34.941 24.5848 0 plu-cross jet-strat
42 0.025 23.4711 34.95 24.5243 0 192.0 4.505
49 0.025 23.4856 34.952 24.481 0 plu-strat
54 0.025 23.5211 34.948 24.352 0 9.394
60.96 0.025 23.5796 34.95 24.1607 0 hor dis>=

```

CORMIX1 flow category algorithm is turned off.

146 L % 534 m 1 to any range

Help: F1. Quit: <esc>. Configuration: ATNO0. FILE: honowntnr;

UM INITIAL DILUTION CALCULATION (nonlinear mode)

plume dep plume dia poll conc dilution hor dis

m m 0.08881 2460000 1.000 0.000

```

57.88 1.562 75820 31.20 3.914
50.24 3.684 18100 126.5 6.576 -> merging
19.84 15.02 4163 462.3 14.68 -> trap level
12.56 30.18 3328 542.2 17.16 -> begin overlap

```

FARFIELD CALCULATION (based on Brooks, 1960, see guide)

Farfield dispersion based on wastefield width of 560.6m

--4/3 Power Law-- -Const Eddy Diff-

conc	dilution	conc	dilution	distance	Time
sec	hrs	sec	hrs	sec	hrs
0.009118	862.8	0.01119	700.4	500.0	19310 5.4
1.521E-08	1449.1	2.441E-08	897.7	1000	39310 10.9
2.883E-14	2135.5	5.758E-14	1062.1	1500	59310 16.5
5.907E-20	2906.4	1.415E-19	1205.1	2000	79310 22.0
1.275E-25	3751.7	3.565E-25	1333.1	2500	99310 27.6


```

Jul 31, 1995, 9:37:57 ERL-N PROGRAM PLUMES, Ed 3, 3/11/94 Case: 14 of 16
Title Honouliuli, 12/02/93 CTD, Station HZ, October 2000 Flows nonlinear
tot flow # ports port flow spacing effl sal effl temp far inc far dis
1.835 146 0.01257 3.658 0.67935 26.1 500 2500
port dep dia plume dia total vel horiz vel vertl vel asp coeff print frq
60.96 0.09093 0.08881 2.029 2.029 0.000 0.10 500
port elev ver angle cont coef effl den poll conc decay Froude # Roberts F
0.8382 0.0 0.954 -2.67000 2.46e6 55.26 13.40 0.01762
hor angle red space p amb den p current far dif far vel K:vel/cur Stratif #
90 3.658 23.5796 0.02500 0.0003 0.025 81.150.00001870
depth current density salinity temp amb conc N (freq) red grav.
0.0 1e-5 23.2428 34.814 24.941 0 0.007276 0.2581
7 1e-5 23.3360 34.906 24.8624 0 buoy flux puff-ther
14 0.016 23.3631 34.904 24.7677 0 0.0008869 2.001
21 0.016 23.4248 34.878 24.4973 0 jet-plume jet-cross
28 0.016 23.4304 34.916 24.5744 0 1.120 6.387
35 0.016 23.4461 34.941 24.5848 0 plu-cross jet-strat
42 0.025 23.4711 34.95 24.5243 0 207.6 4.685
49 0.025 23.4856 34.952 24.481 0 plu-strat
54 0.025 23.5211 34.948 24.352 0 9.580
60.96 0.025 23.5796 34.95 24.1607 0 hor dis>=

```

CORMIX1 flow category algorithm is turned off. 1 to any range

146 L W 534 m Configuration:ATN00. FILE: honowntr;
Help: F1. Quit: <esc>. UM INITIAL DILUTION CALCULATION (nonlinear mode)

```

plume dep plume dia poll conc dilution hor dis
m m m
60.96 0.08881 2460000 1.000 0.000
57.92 1.614 75820 31.20 4.105
50.41 3.684 19020 120.5 6.830 -> merging
19.67 14.69 4397 440.4 14.94 -> trap level
11.60 30.73 3475 520.1 17.64 -> begin overlap

```

FARFIELD CALCULATION (based on Brooks, 1960, see guide) 561.1m
Farfield dispersion based on wastefield width of

```

--4/3 Power Law-- -Const Eddy Diff-
conc dilution conc dilution distance distance
m m
0.009645 826.9 0.01183 671.6 500.0
1.609E-08 1388.7 2.581E-08 860.8 1000
3.050E-14 2046.5 6.088E-14 1018.4 1500
6.249E-20 2785.2 1.496E-19 1018.4 2000
1.349E-25 3595.3 3.769E-25 1018.4 2500
Time
sec hrs
19290 5.4
39290 10.9
59290 16.5
79290 22.0
99290 27.6

```

```

Jul 31, 1995, 9:38: 7 ERL-N PROGRAM PLUMES, Ed 3, 3/11/94 Case: 15 of 16
Title Honouliuli, 12/02/93 CTD, Station HZ, October 2005 Flows nonlinear
tot flow # ports port flow spacing effl sal effl temp far inc far dis
2.069 146 0.01417 3.658 0.67935 26.1 500 2500
port dep port dia plume dia total vel horiz vel vertl vel asp coeff print frq
60.96 0.09093 0.08881 2.287 2.287 0.000 0.10 500
port elev ver angle cont coef effl den poll conc decay Froude # Roberts F
0.8382 0.0 0.954 -2.67000 2.46e6 55.26 15.11 0.01563
hor angle red space p amb den p current far dif far vel K:vel/cur Stratif #
90 3.658 23.5796 0.02500 0.0003 0.025 91.500.00001870
depth current density salinity temp amb conc N (freq) red grav.
0.0 7 1e-5 23.2428 34.814 24.941 0 0.007276 0.2581
14 1e-5 23.3360 34.906 24.8624 0 buoy flux puff-ther
21 0.016 23.3631 34.904 24.7677 0 0.0010000 2.257
28 0.016 23.4248 34.878 24.4973 0 jet-plume jet-cross
35 0.016 23.4304 34.916 24.5744 0 1.263 7.202
42 0.025 23.4711 34.941 24.5848 0 plu-cross jet-strat
49 0.025 23.4856 34.952 24.481 0 plu-strat
54 0.025 23.5211 34.948 24.352 0 9.872
60.96 0.025 23.5796 34.95 24.1607 0 hor dis>=

```

CORMIX1 flow category algorithm is turned off.

146 L $\frac{1}{4}$ 534 m

Help: F1. Quit: <esc>. Configuration: ATNO0. FILE: honowntr;

UM INITIAL DILUTION CALCULATION (nonlinear mode)

plume dep plume dia poll conc dilution hor dis

m m m

60.96 0.08881 2460000 1.000 0.000

58.01 1.699 75820 31.20 4.402

50.72 3.680 20560 111.7 7.234 -> merging

19.25 14.39 4748 410.9 15.47 -> trap level

9.895 32.43 3693 488.7 18.61 -> begin overlap

FARFIELD CALCULATION (based on Brooks, 1960, see guide)

Farfield dispersion based on wastefield width of 562.8m

--4/3 Power Law-- -Const Eddy Diff-

conc dilution conc dilution distance

m m

0.01053 775.1 0.01290 630.2 500.0

1.758E-08 1301.3 2.815E-08 807.8 1000

3.331E-14 1917.5 6.639E-14 955.8 1500

6.826E-20 2609.6 1.631E-19 1084.5 2000

1.474E-25 3368.5 4.110E-25 1199.7 2500

Time

sec

hrs

19260 5.3

39260 10.9

59260 16.5

79260 22.0

99260 27.6

1 to any range

