

EFFECT OF HOMOGENEOUS AND HETEROGENEOUS SURFACE ROUGHNESS ON HEAVIER-THAN-AIR GAS DISPERSION

Volume II
Supplemental Appendices

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Washington, DC 20005



Effect of Homogeneous and Heterogeneous Surface Roughness on HTAG Dispersion

Volume II

Prepared for the American Petroleum Institute
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March 1989

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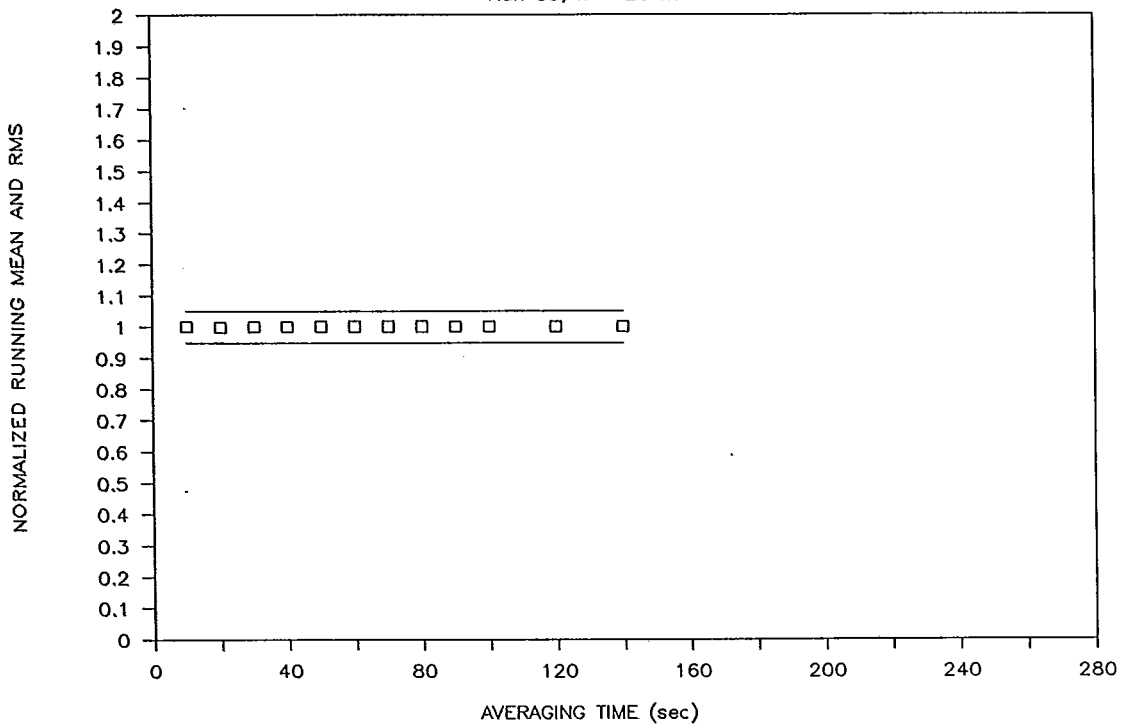
APPENDIX G

CONCENTRATION TIME SERIES



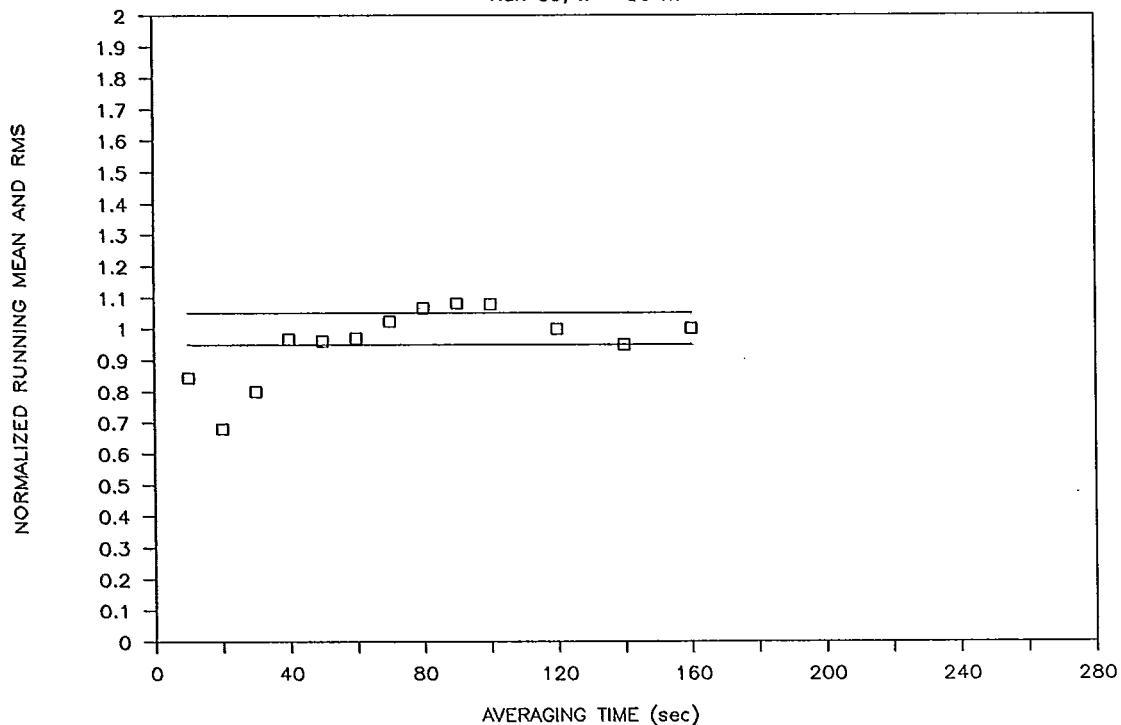
Effect of Increasing Averaging Time

Run 55, x = 20 m



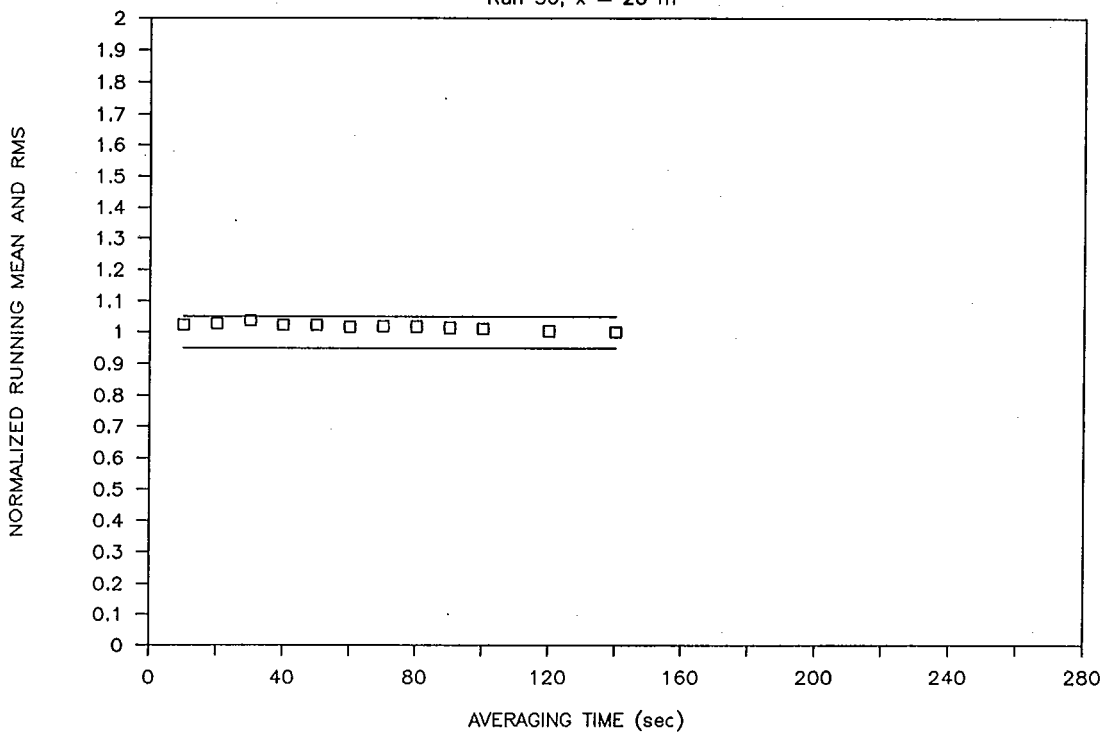
Effect of Increasing Averaging Time

Run 55, x = 50 m



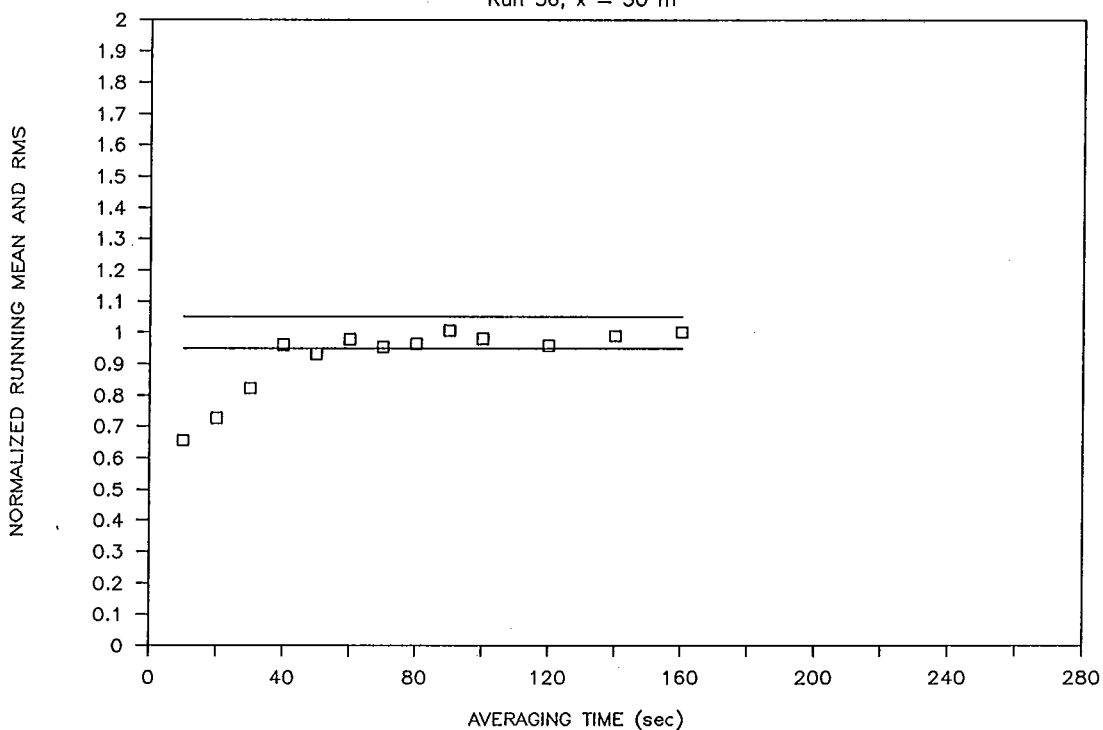
Effect of Increasing Averaging Time

Run 56, x = 20 m



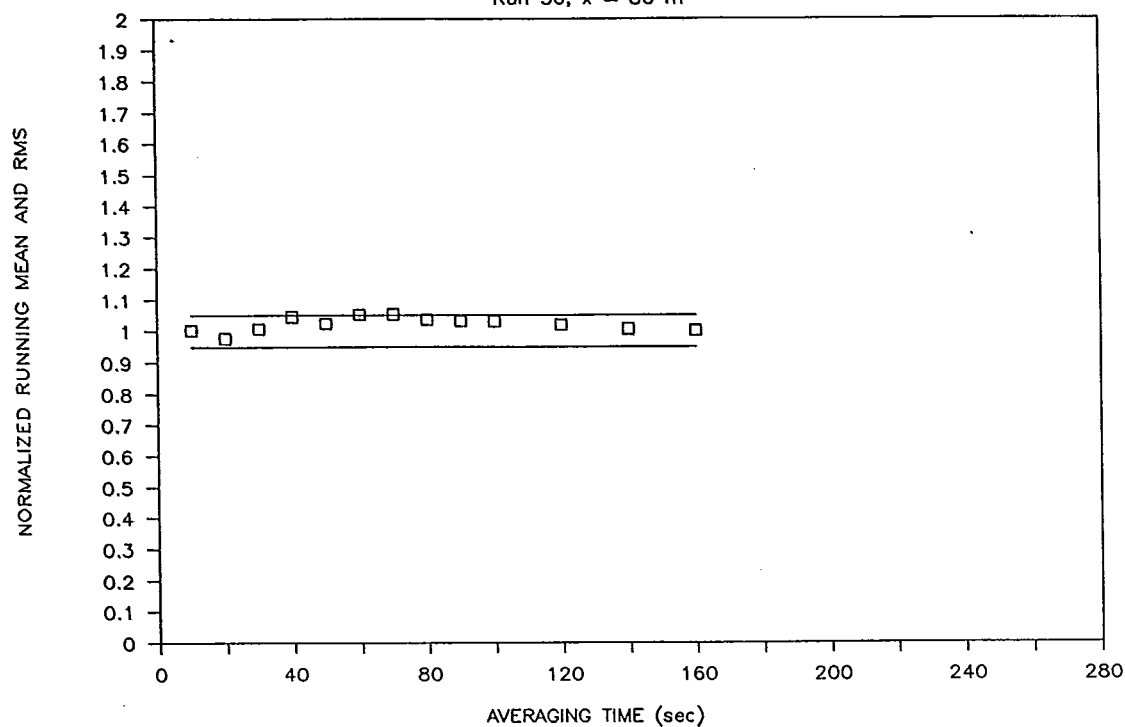
Effect of Increasing Averaging Time

Run 56, x = 50 m



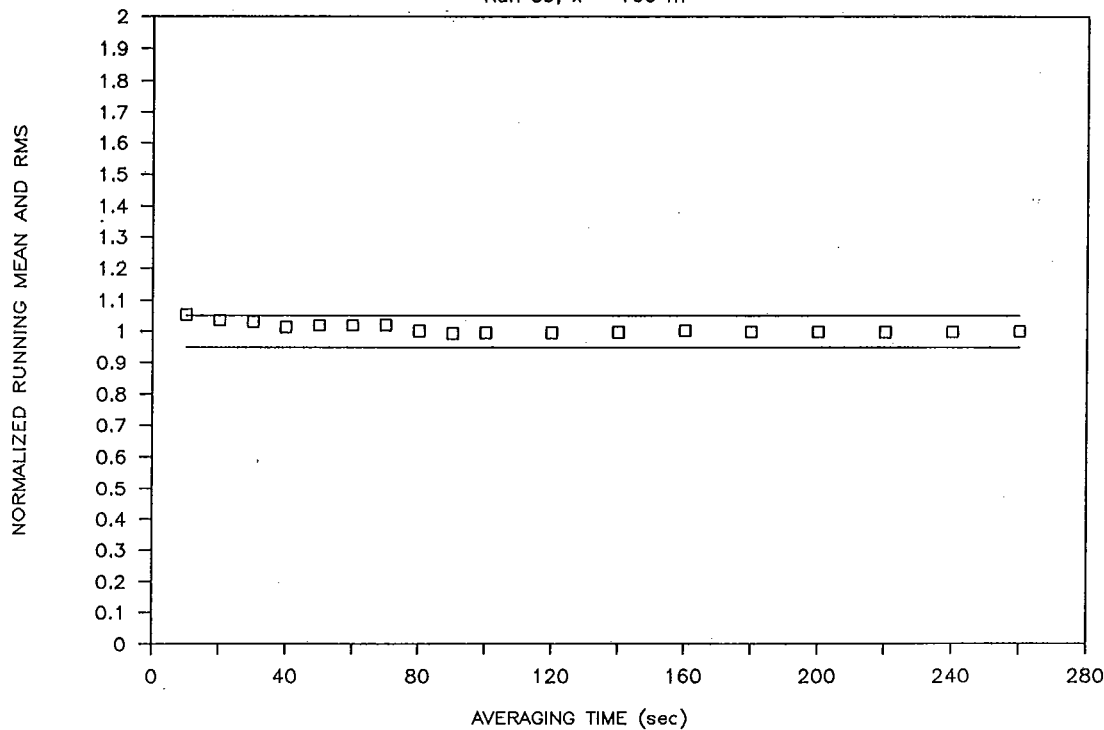
Effect of Increasing Averaging Time

Run 56, x = 80 m



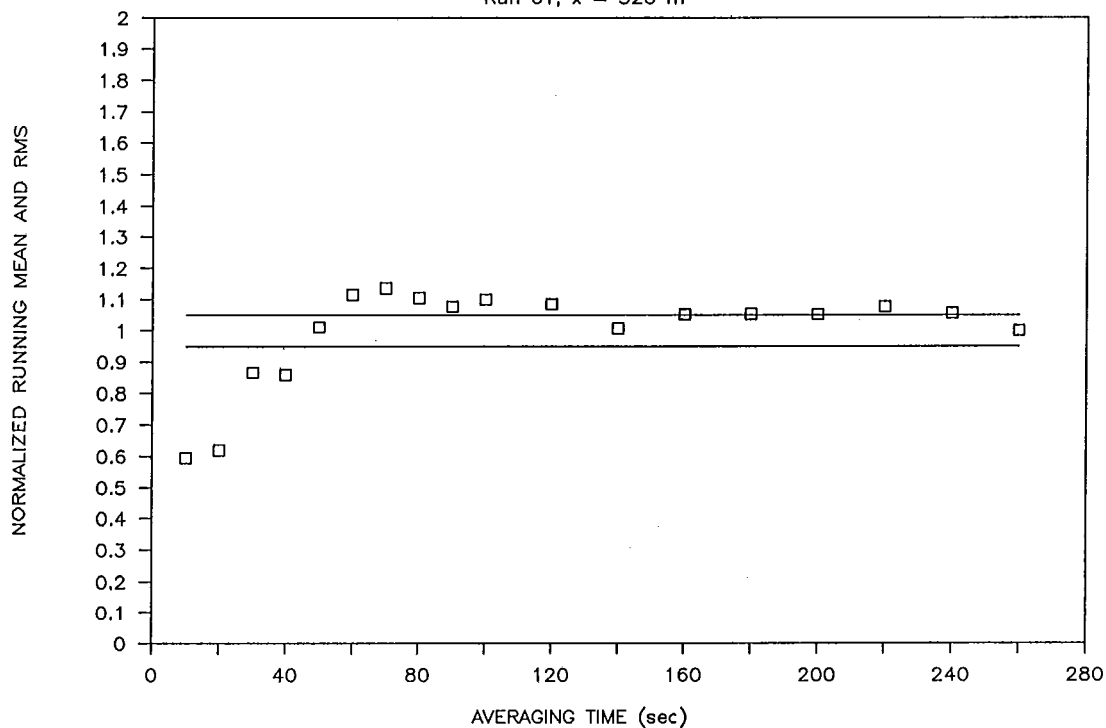
Effect of Increasing Averaging Time

Run 59, x = 160 m



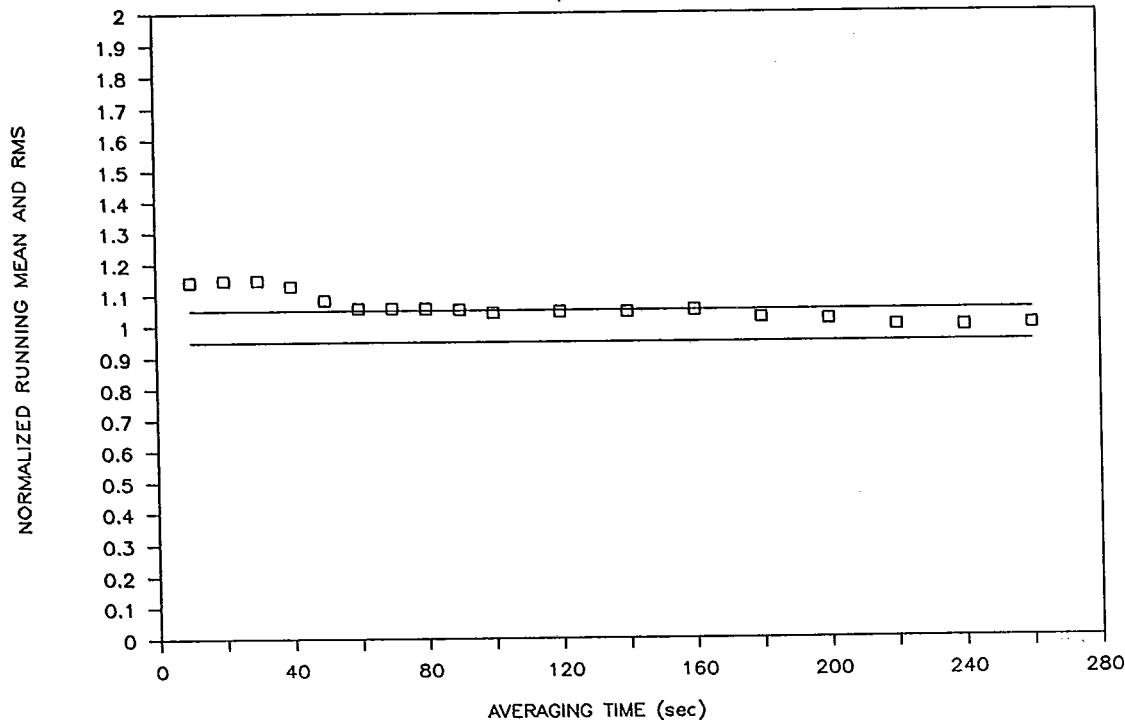
Effect of Increasing Averaging Time

Run 61, x = 320 m



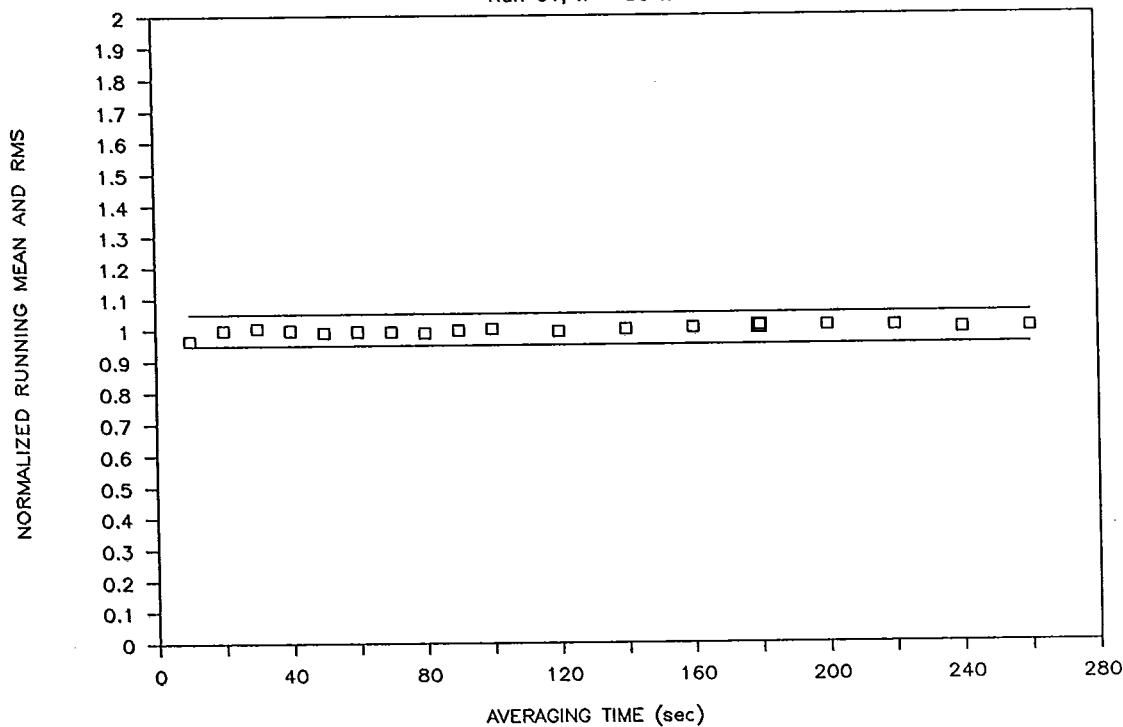
Effect of Increasing Averaging Time

Run 61, x = 160 m

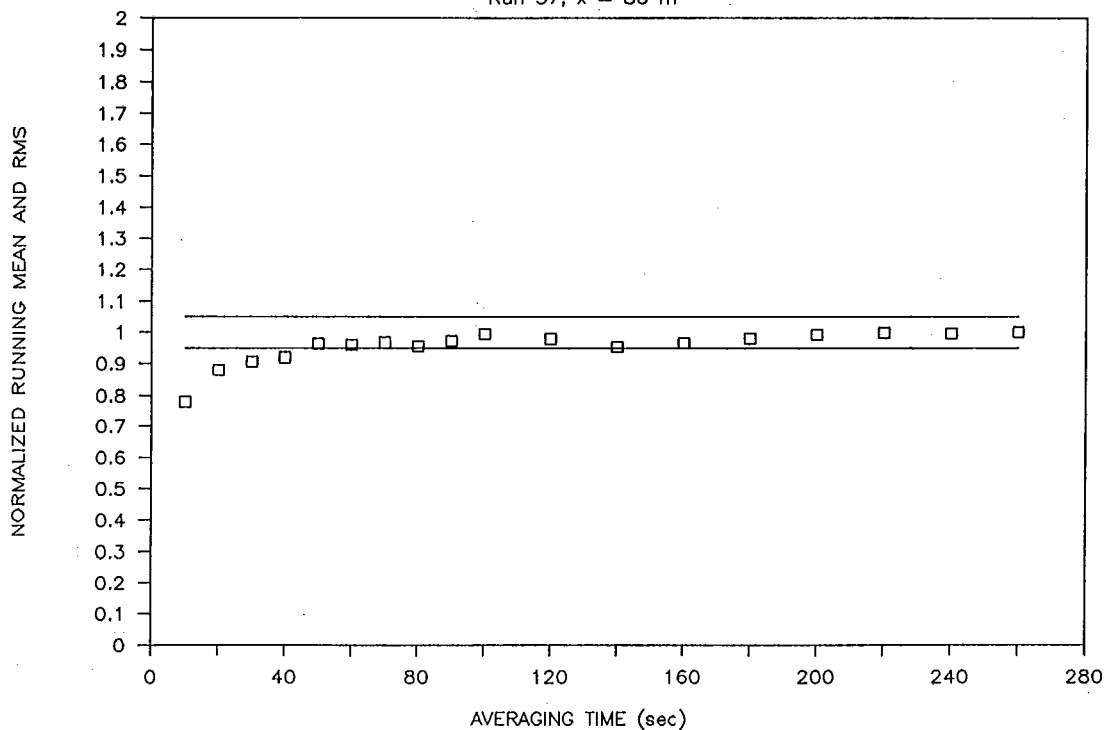


Effect of Increasing Averaging Time

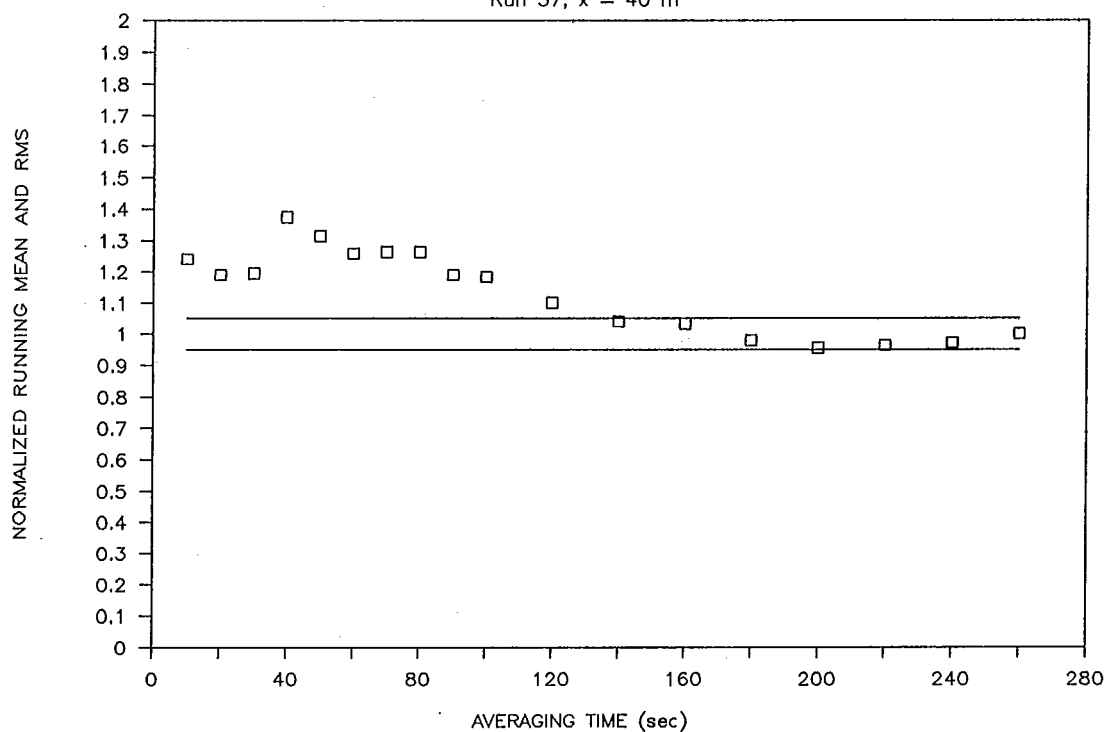
Run 61, x = 80 m



Effect of Increasing Averaging Time

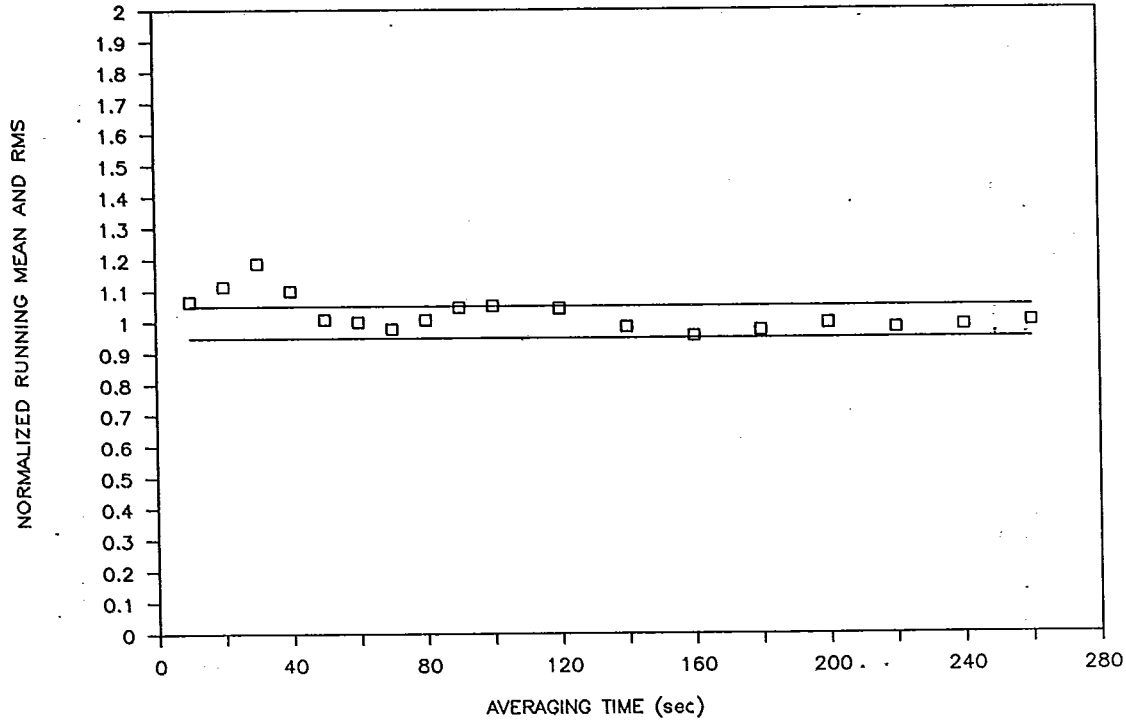
Run 57, $x = 80$ m

Effect of Increasing Averaging Time

Run 57, $x = 40$ m

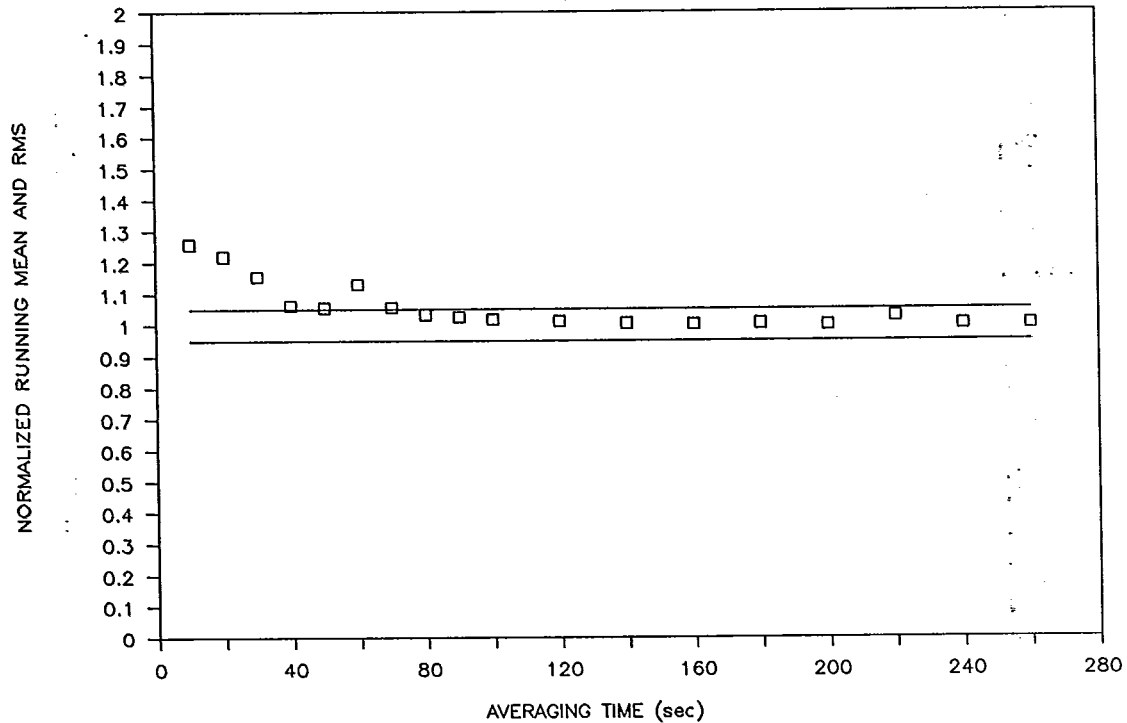
Effect of Increasing Averaging Time

Run 58, x = 40 m



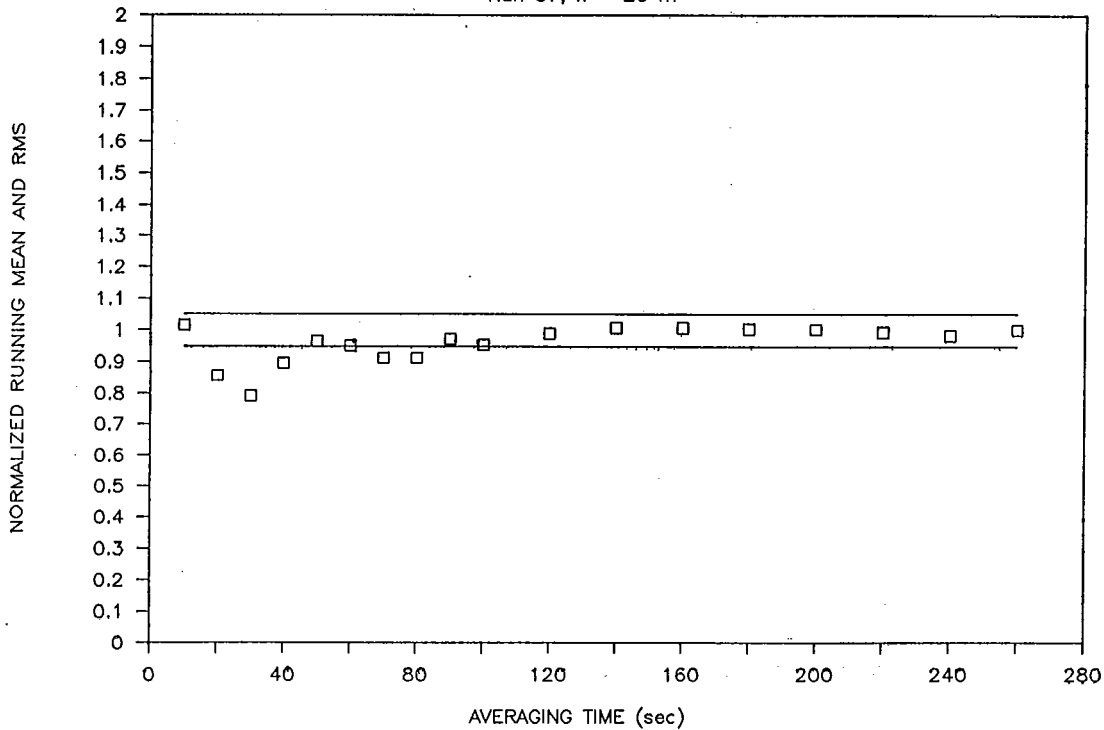
Effect of Increasing Averaging Time

Run 58, x = 20 m



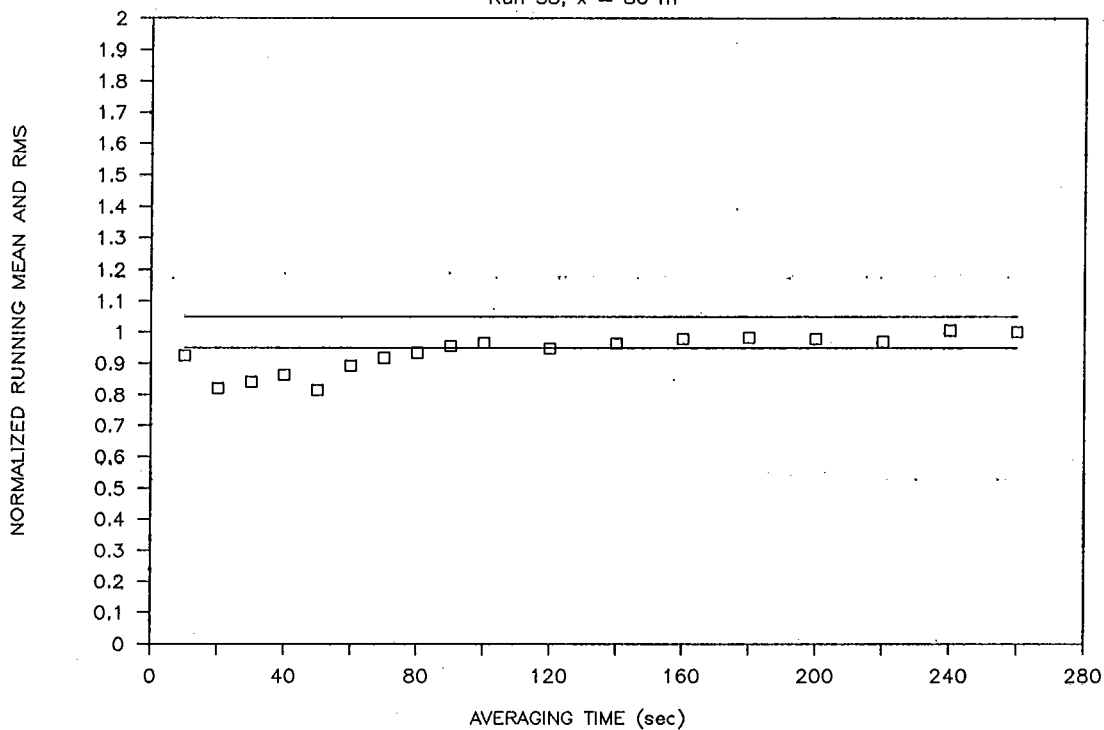
Effect of Increasing Averaging Time

Run 57, x = 20 m



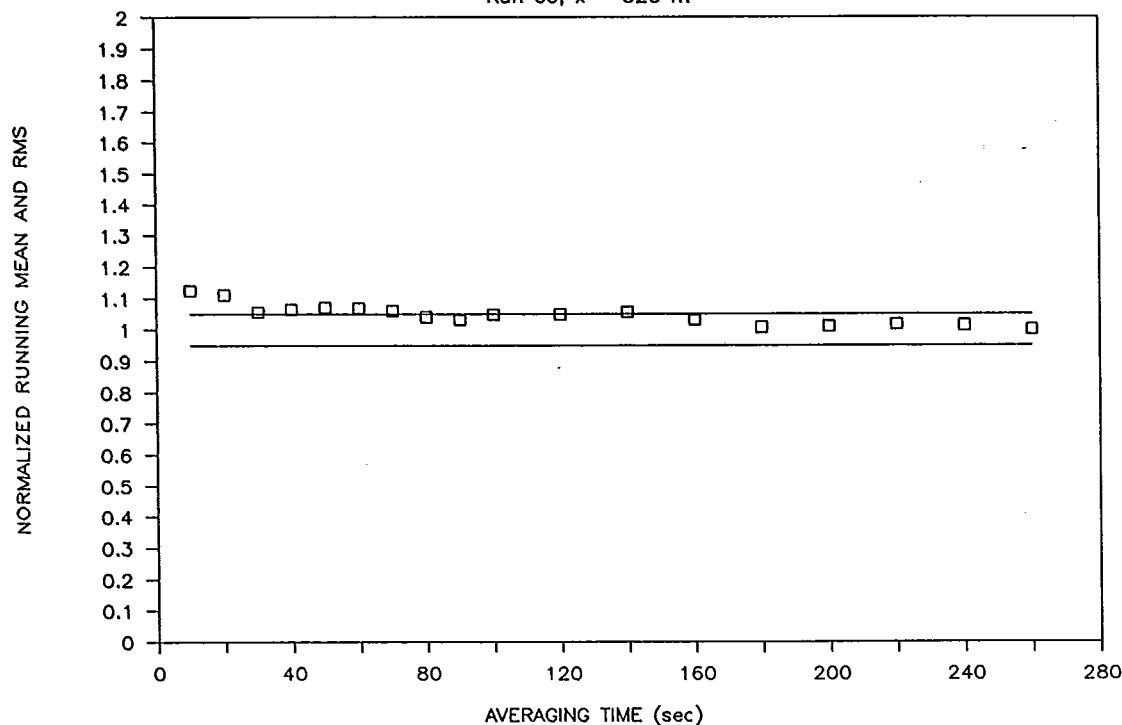
Effect of Increasing Averaging Time

Run 58, x = 80 m



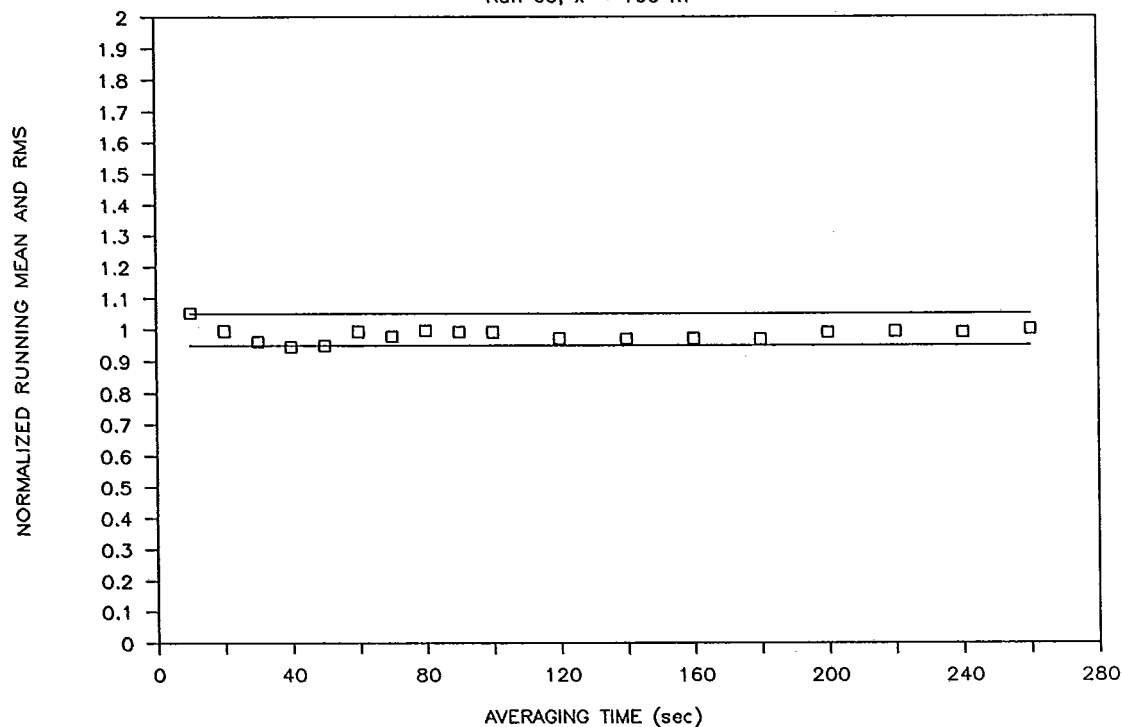
Effect of Increasing Averaging Time

Run 60, x = 320 m

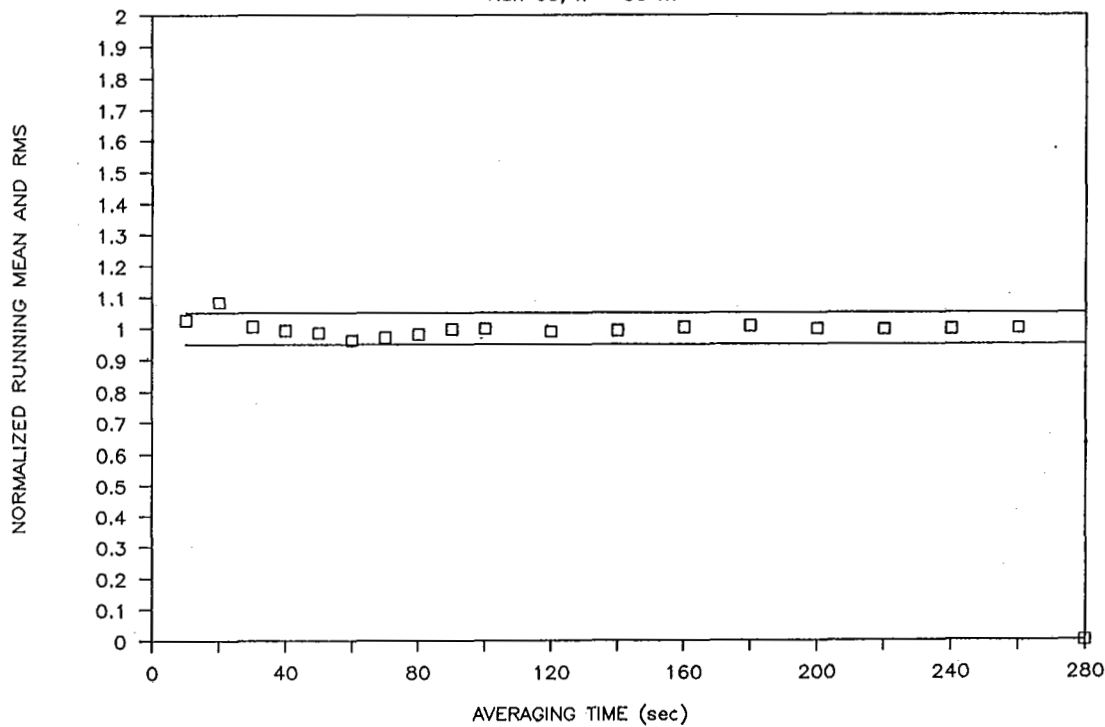


Effect of Increasing Averaging Time

Run 60, x = 160 m



Effect of Increasing Averaging Time

Run 60, $x = 80$ m

APPENDIX H

CONCENTRATION DATA TABULATIONS

(Runs 1 and 2 - hard copy included)

(Refer to data on diskette)

(Files in format NNNZ0417.prn where N = Run # - 3 digit)



Documents

Document Sharing Hub

DEFINITION OF ABBREVIATIONS

USED IN APPENDIX H

<u>Abbreviation</u>	<u>Corresponding Symbol</u> (List of Symbols)
Uam	U_{10} - model
Uaf	U_{10} - full scale
Dens. Rat.	ρ_s/ρ_a
Is	I_s
Cs	C_s
Ibg	I_{bg}
COm	C_o - model

API--Effects of Roughness on HTAG Dispersion
 Germak Peterka Petersen, Inc.
 Scale Reduction 100

Date:	03-May-88	Is (volts)	-7.46
Run No.	1A	Cs (ppm)	61.00
Wind Dir	0	Atn (-)	12.00
Uam (m/s)	0.59	Ibg (volts)	-0.19
Uaf (m/s)	5.90	V (cm ³ /s)	2.47
Dens. Rat.	1	COM (%)	6.00
Tracer	Propane	Release type	Point
		Rghness--cm	1.5

Sample No	X(m)	Y(m)	Z(m)	(I-Ibg)/Is	C/Co*10 ⁴	(CU/Q)f*10 ⁶ (M**-2)
1	20.0	-8.0	0.5	0.04	0.40	960.88
2	20.0	-6.0	0.5	0.10	0.97	2313.44
3	20.0	-4.0	0.5	0.79	7.99	19089.83
4	20.0	-2.0	0.5	3.30	33.94	81061.86
5	20.0	2.0	0.5	7.26	75.52	180399.02
6	20.0	4.0	0.5	2.75	28.17	67279.98
7	20.0	6.0	0.5	0.67	6.69	15969.75
8	20.0	8.0	0.5	0.10	1.01	2418.49
9	20.0	0.0	0.5	6.16	64.00	152864.64
10	20.0	0.0	1.5	0.74	7.49	17894.46
12	20.0	0.0	3.5	0.27	2.65	6338.37
13	20.0	0.0	4.5	0.06	0.62	1477.49
14	20.0	0.0	5.5	0.00	0.04	98.37
17	50.0	-16.0	0.5	-0.01	0.00	0.00
18	50.0	-12.0	0.5	-0.00	0.00	0.00
19	50.0	-8.0	0.5	0.14	1.39	3312.69
20	50.0	-4.0	0.5	0.56	5.61	13410.63
21	50.0	4.0	0.5	1.08	10.94	26133.26
22	50.0	8.0	0.5	0.49	4.88	11646.55
23	50.0	12.0	0.5	0.10	0.99	2359.48
24	50.0	16.0	0.5	-0.01	0.00	0.00
25	50.0	0.0	0.5	1.16	11.74	28041.85
26	50.0	0.0	2.5	0.56	5.65	13498.55
27	50.0	0.0	4.5	0.22	2.22	5294.78
28	50.0	0.0	6.5	0.06	0.58	1393.57
29	50.0	0.0	8.5	0.01	0.06	142.46
30	50.0	0.0	10.5	-0.00	0.00	0.00
31	50.0	0.0	12.5	-0.01	0.00	0.00
33	80.0	-20.0	0.5	-0.01	0.00	0.00
34	80.0	-15.0	0.5	0.01	0.08	183.33
35	80.0	-10.0	0.5	0.09	0.83	1984.81
36	80.0	-5.0	0.5	0.25	2.51	5989.67
37	80.0	5.0	0.5	0.46	4.64	11089.45
38	80.0	10.0	0.5	0.26	2.58	6163.82
39	80.0	15.0	0.5	0.08	0.78	1861.15
40	80.0	20.0	0.5	0.01	0.07	161.69
41	80.0	0.0	0.5	0.47	4.74	11324.91
42	80.0	0.0	3.0	0.28	2.78	6648.02
43	80.0	0.0	5.5	0.13	1.30	3108.88
44	80.0	0.0	8.0	0.05	0.45	1071.54
45	80.0	0.0	10.5	0.01	0.12	285.88
46	80.0	0.0	13.0	-0.00	0.00	0.00
47	80.0	0.0	15.5	-0.00	0.00	0.00
Maximum values:				7.26	75.52	180399.02

API--Effects of Roughness on HTAG Dispersion
 Gernak Peterka Petersen, Inc.
 Scale Reduction 100

Date:	03-May-88	Is (volts)	-7.14
Run No.	2A	Cs (ppm)	61.00
Wind Dir	0	Atn (-)	12.00
Uam (m/s)	0.60	Ibg (volts)	-0.26
Uaf (m/s)	6.00	V (cm ³ /s)	2.47
Dens, Rat.	1.4	COM (%)	6.00
Tracer	Propane	Release type	Point
		Rghness--cm	1.5

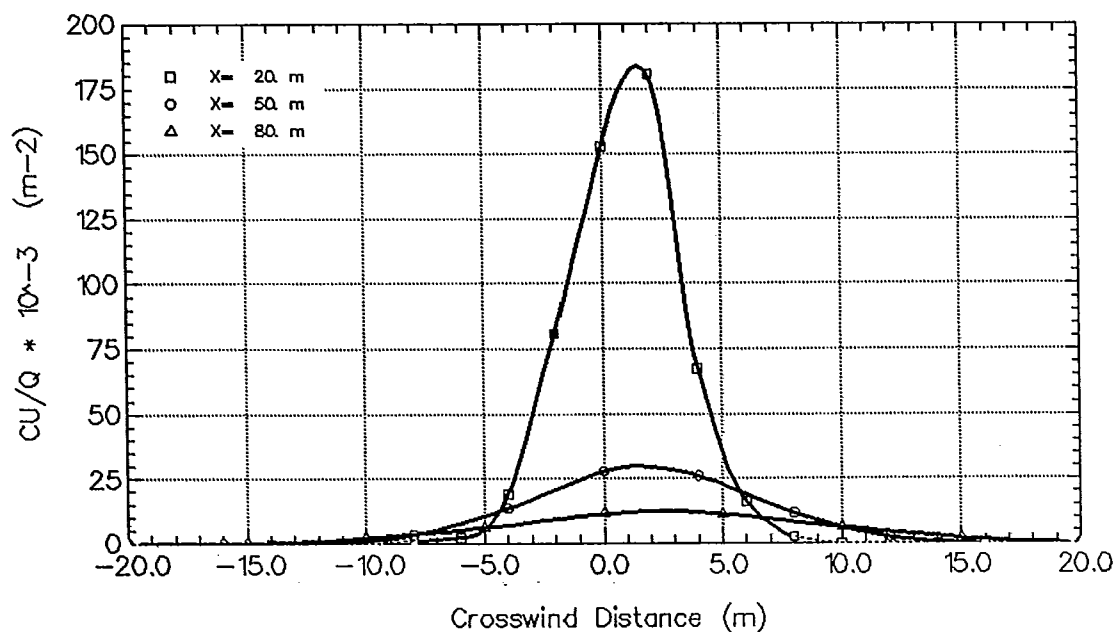
Sample No	X(m)	Y(m)	Z(m)	(I-Ibg)/Is	C/Co*10 ⁴	(CU/Q)f*10 ⁶ (M**2)
1	20.0	-8.0	0.5	-0.02	0.00	0.00
2	20.0	-6.0	0.5	0.16	1.55	3767.95
4	20.0	-2.0	0.5	6.35	65.94	160187.74
5	20.0	2.0	0.5	9.35	97.69	237304.59
6	20.0	4.0	0.5	2.27	23.21	56384.83
7	20.0	6.0	0.5	0.38	3.83	9309.63
8	20.0	8.0	0.5	0.03	0.30	737.43
9	20.0	0.0	0.5	8.98	93.74	227698.48
10	20.0	0.0	1.5	0.97	9.75	23689.55
11	20.0	0.0	2.5	0.47	4.72	11473.57
12	20.0	0.0	3.5	0.10	1.00	2431.01
13	20.0	0.0	4.5	0.01	0.05	117.03
14	20.0	0.0	5.5	-0.02	0.00	0.00
17	50.0	-16.0	0.5	-0.02	0.00	0.00
18	50.0	-12.0	0.5	0.01	0.11	268.60
19	50.0	-8.0	0.5	0.27	2.69	6527.27
20	50.0	-4.0	0.5	1.04	10.54	25612.47
21	50.0	4.0	0.5	1.01	10.22	24821.19
22	50.0	8.0	0.5	0.29	2.92	7101.96
23	50.0	12.0	0.5	0.04	0.36	867.65
24	50.0	16.0	0.5	-0.01	0.00	0.00
25	50.0	0.0	0.5	1.51	15.38	37361.56
26	50.0	0.0	2.5	0.58	5.78	14052.12
27	50.0	0.0	4.5	0.18	1.79	4336.62
28	50.0	0.0	6.5	0.03	0.31	746.82
29	50.0	0.0	8.5	-0.00	0.00	0.00
30	50.0	0.0	10.5	-0.01	0.00	0.00
31	50.0	0.0	12.5	-0.02	0.00	0.00
33	80.0	-20.0	0.5	-0.01	0.00	0.00
34	80.0	-15.0	0.5	0.05	0.49	1178.85
35	80.0	-10.0	0.5	0.20	1.98	4820.16
36	80.0	-5.0	0.5	0.44	4.40	10679.26
37	80.0	5.0	0.5	0.44	4.44	10789.58
38	80.0	10.0	0.5	0.18	1.78	4311.79
39	80.0	15.0	0.5	0.04	0.38	911.65
40	80.0	20.0	0.5	0.00	0.04	88.60
41	80.0	0.0	0.5	0.53	5.31	12905.86
42	80.0	0.0	3.0	0.28	2.77	6738.84
43	80.0	0.0	5.5	0.11	1.12	2711.93
44	80.0	0.0	8.0	0.04	0.34	821.60
45	80.0	0.0	10.5	0.01	0.05	132.31
46	80.0	0.0	13.0	0.00	0.01	19.77
47	80.0	0.0	15.5	-0.00	0.00	0.00
Maximum values:				9.35	97.69	237304.59

APPENDIX I

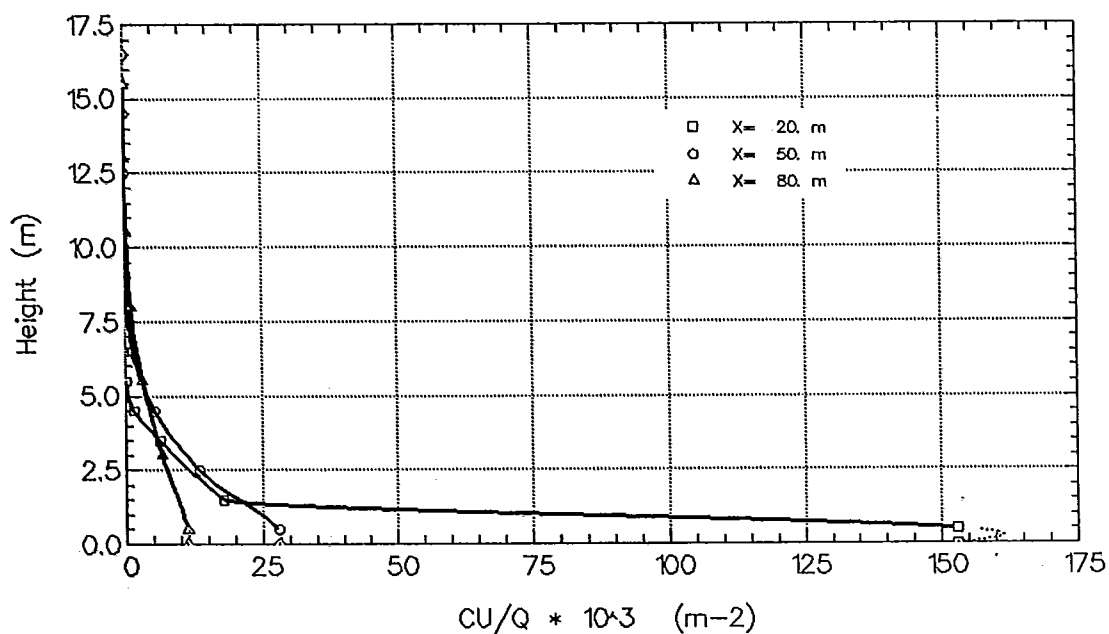
VERTICAL AND LATERAL CONCENTRATION PROFILES AND CUBIC SPLINE LINES USED FOR INTEGRATION



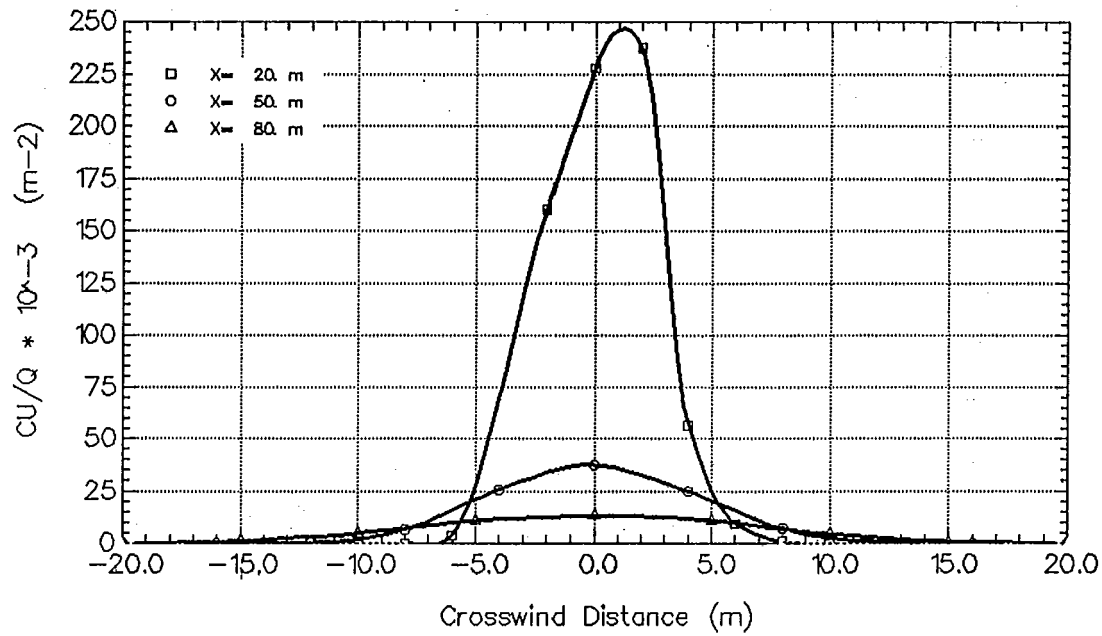
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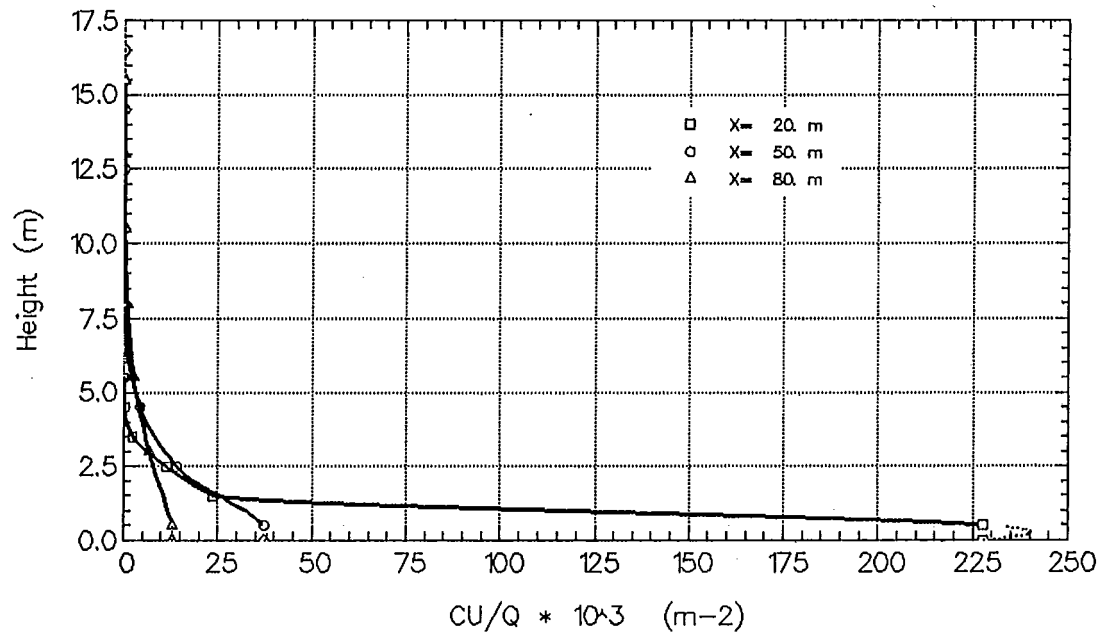
Vertical Profile -- Run 001A



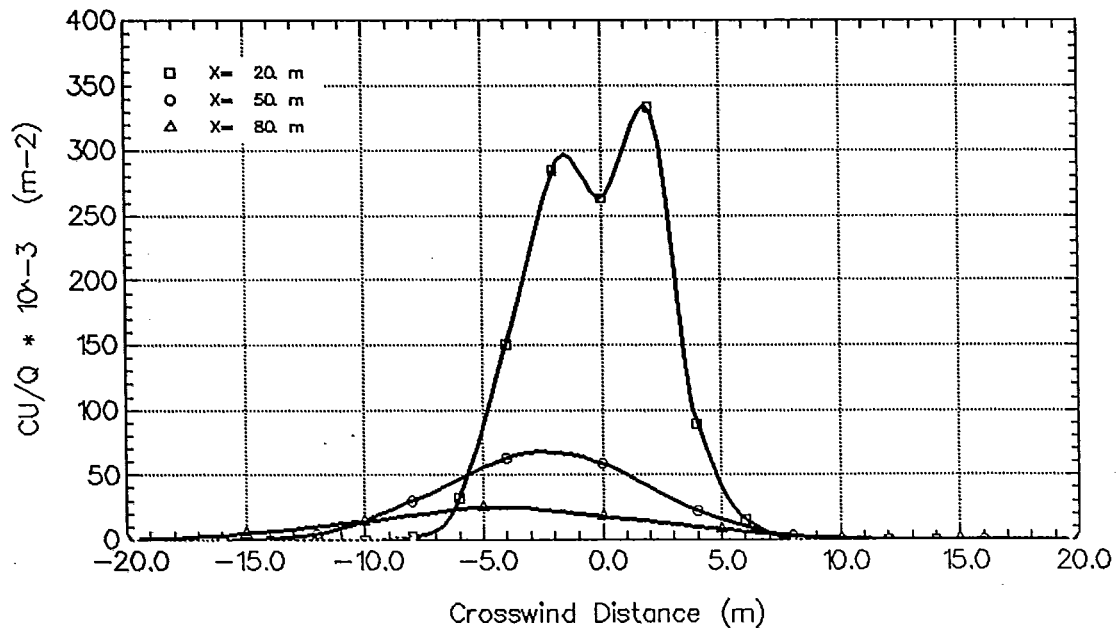
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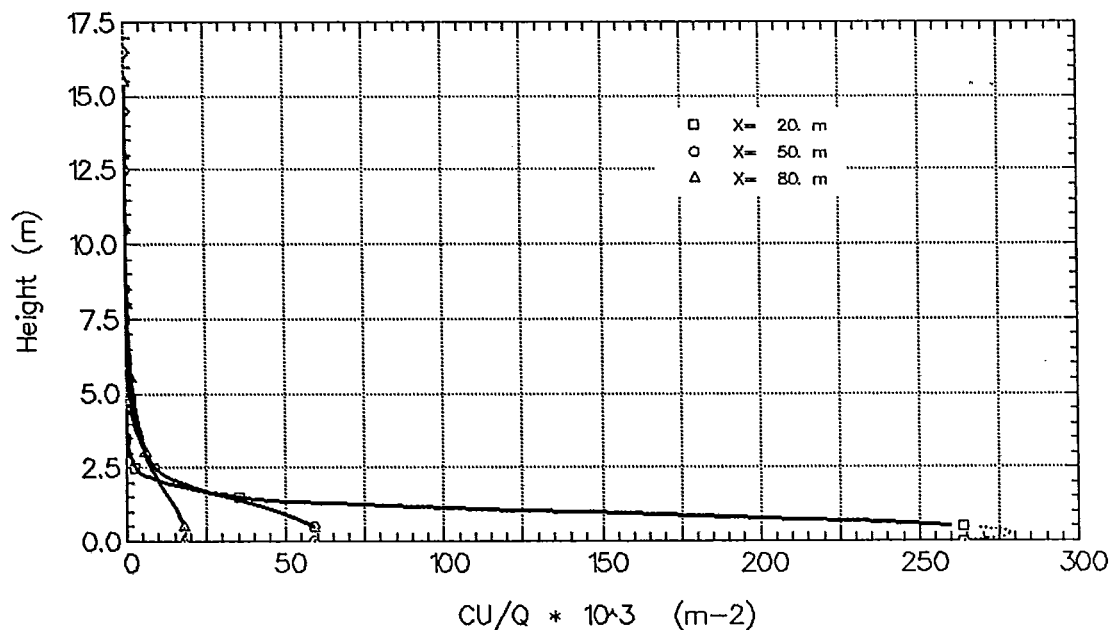
Vertical Profile -- Run 002A



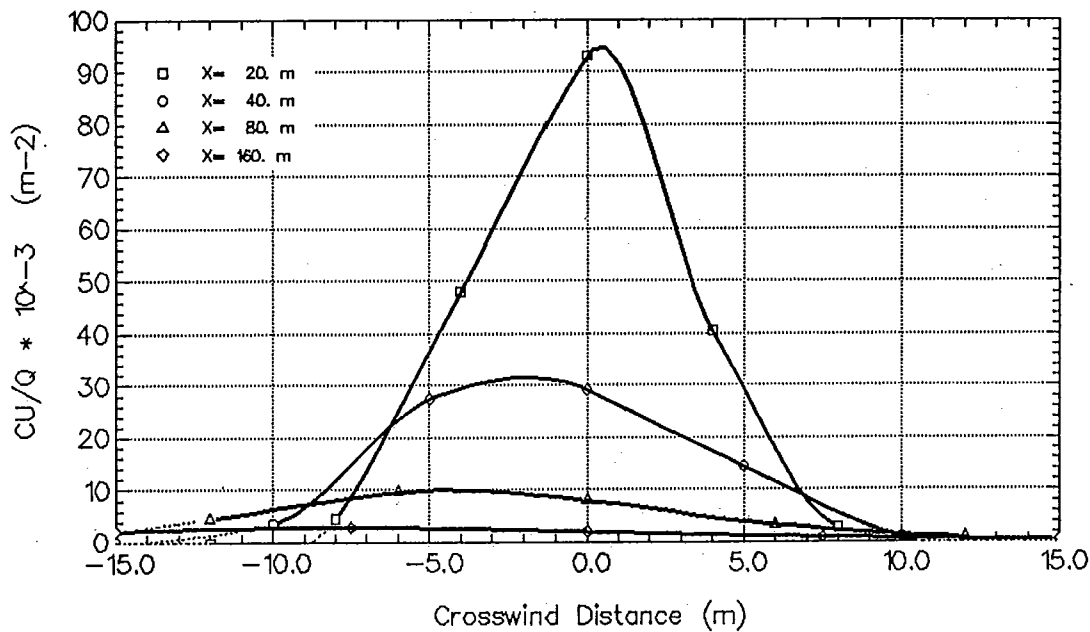
Horizontal Profile -- Run 003B



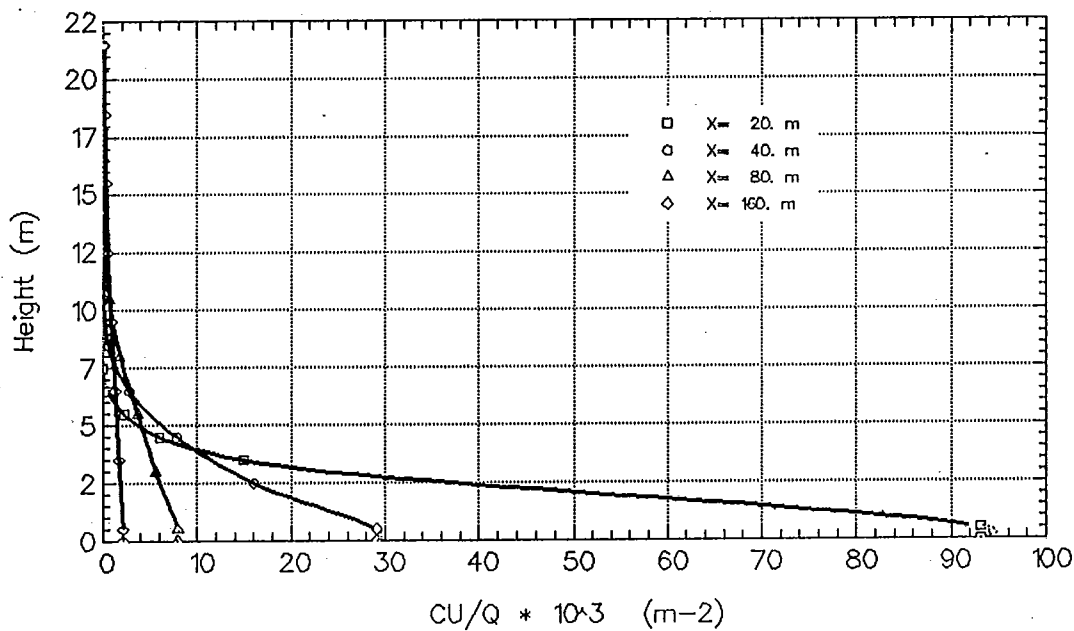
Vertical Profile -- Run 003B



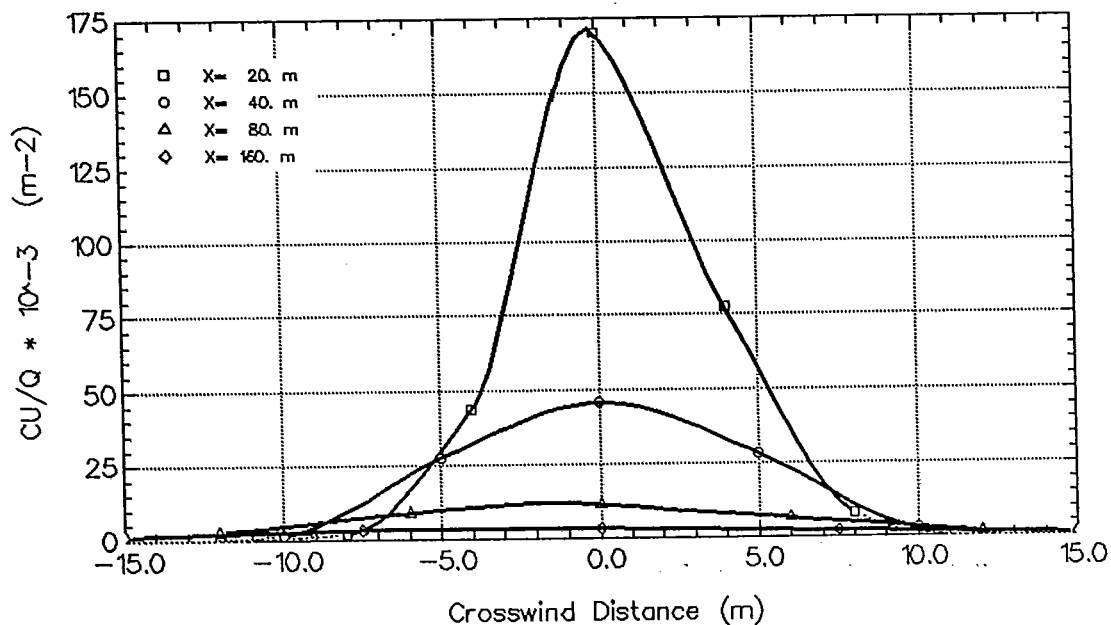
Horizontal Profile -- Run 004D



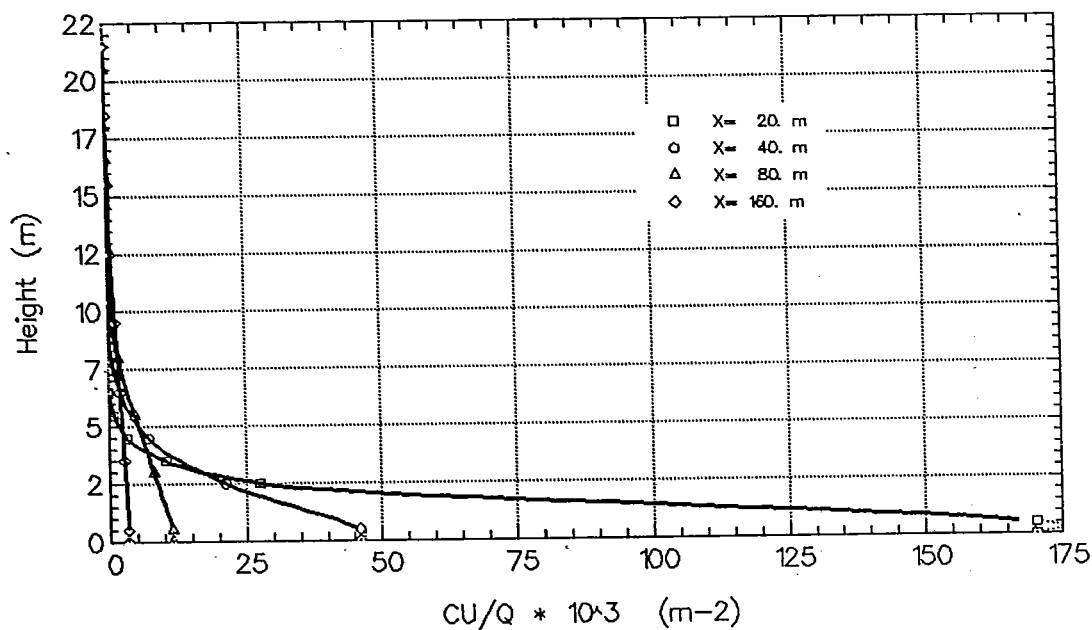
Vertical Profile -- Run 004D



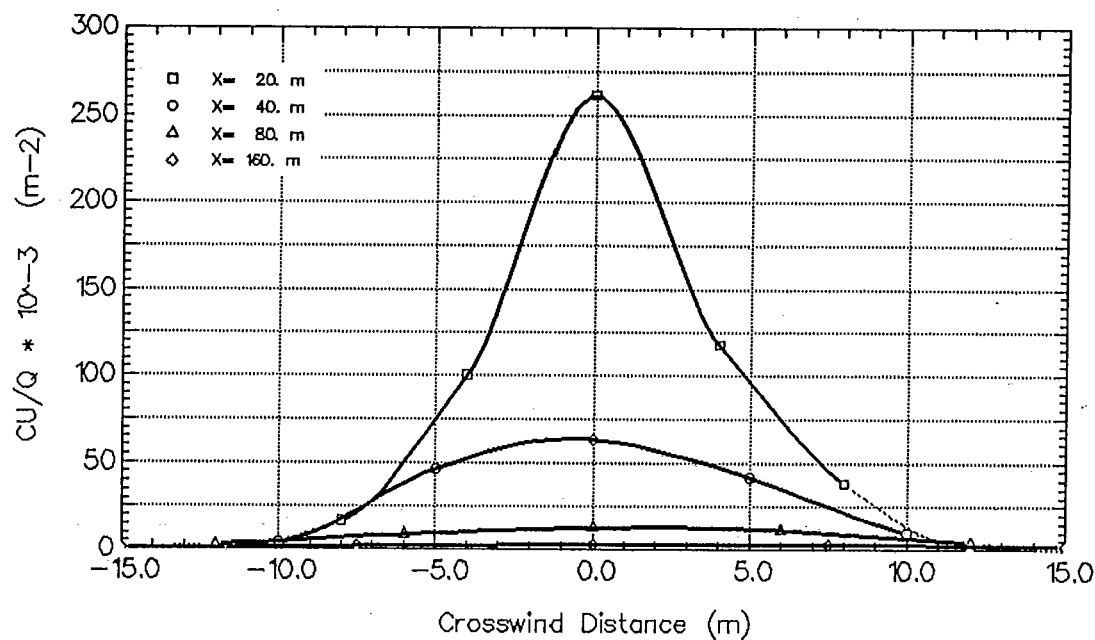
Horizontal Profile -- Run 005B



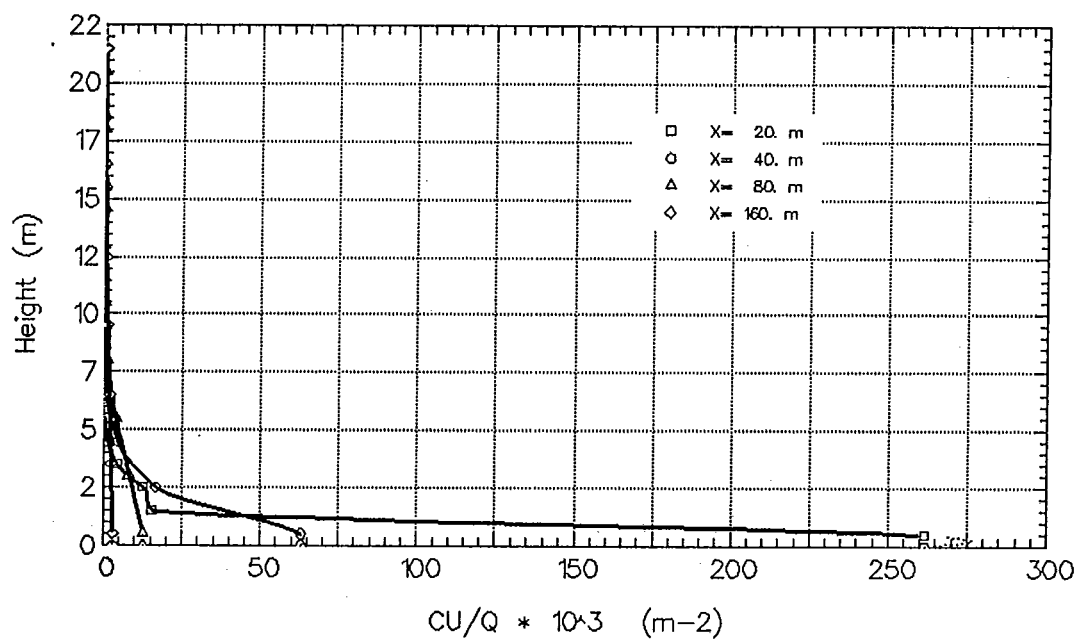
Vertical Profile -- Run 005B



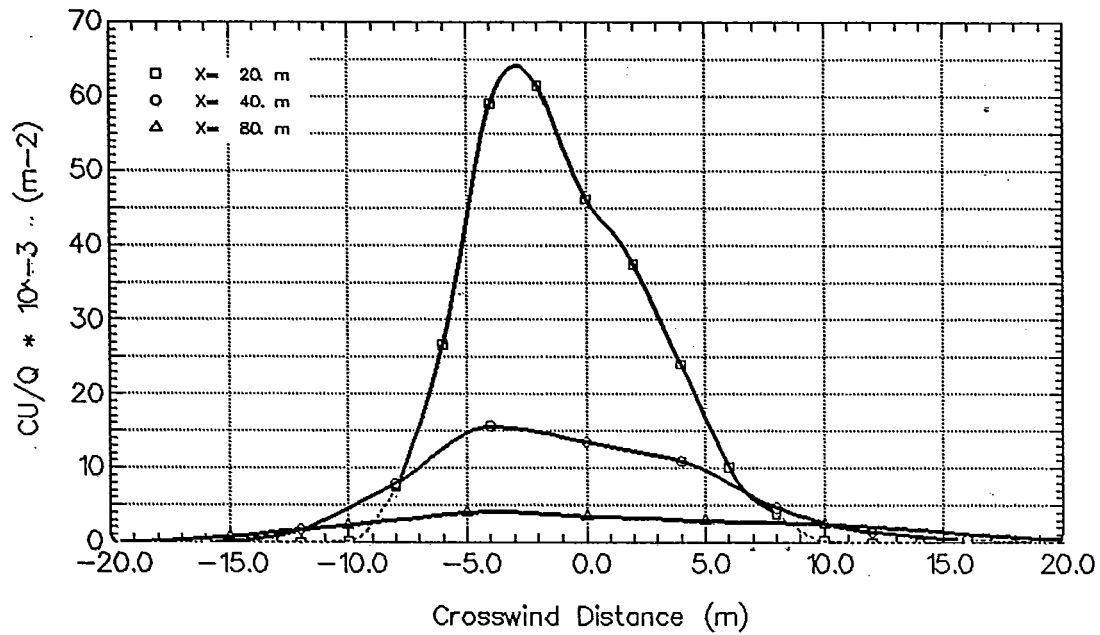
Horizontal Profile -- Run 006B



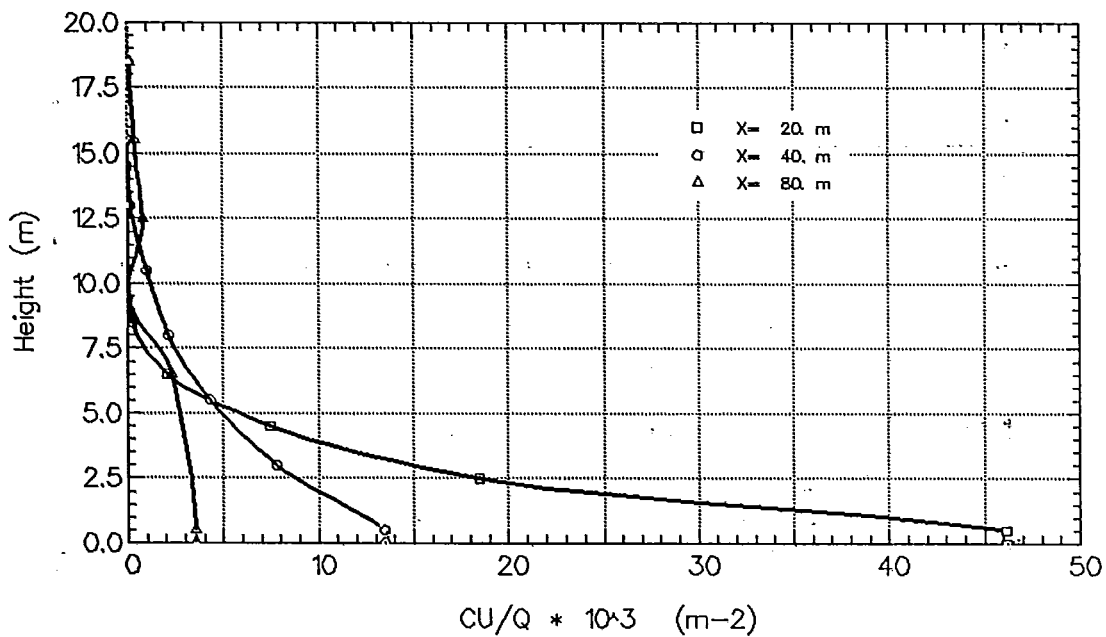
Vertical Profile -- Run 006B



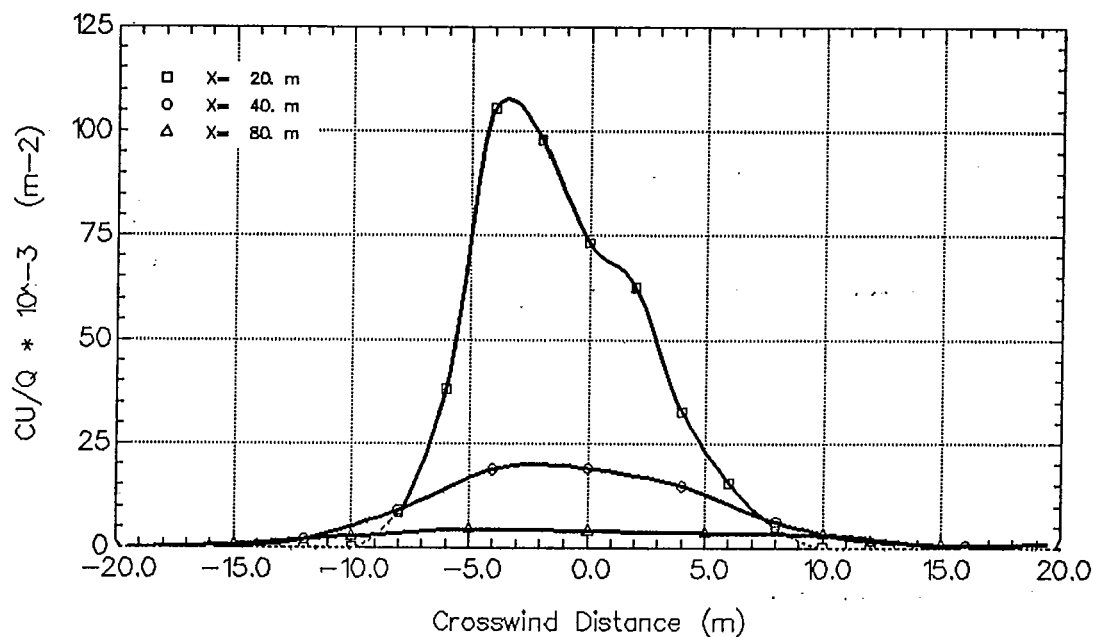
Horizontal Profile -- Run 007B



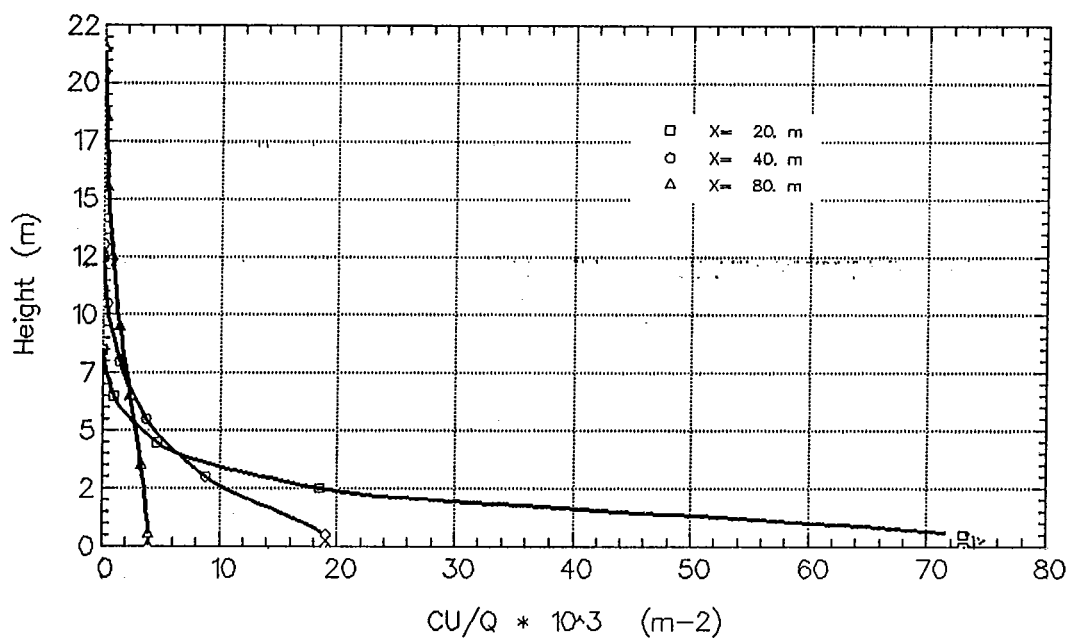
Vertical Profile -- Run 007B



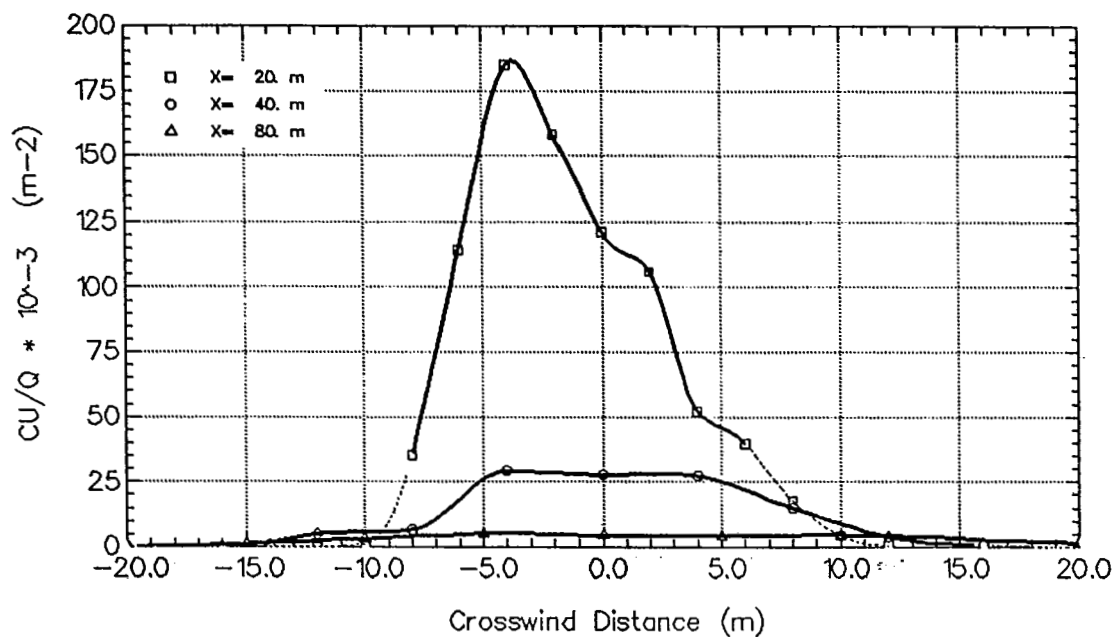
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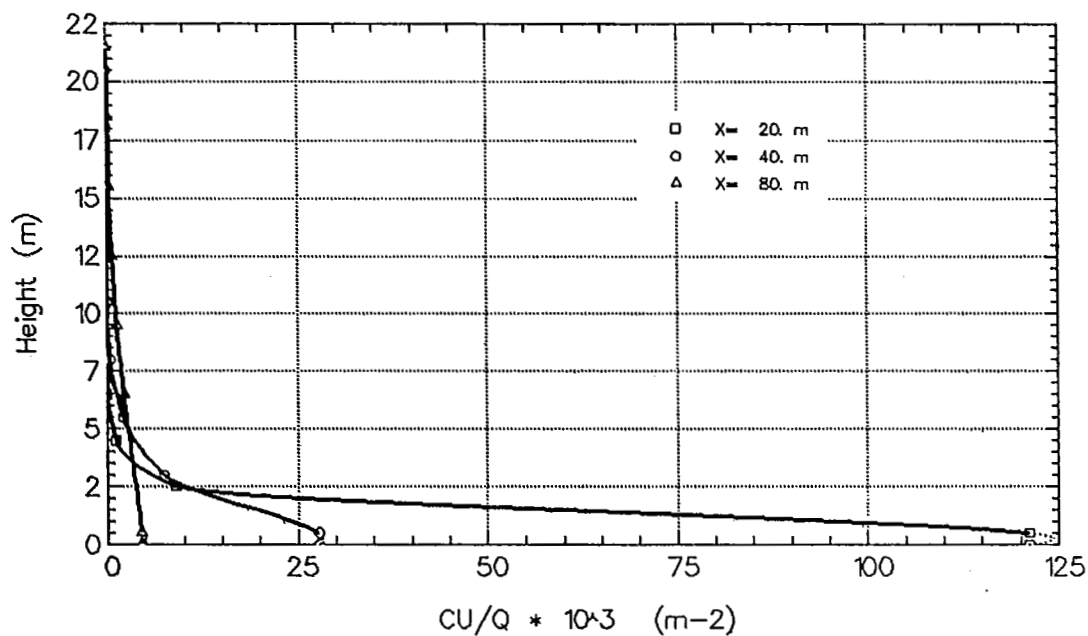
Vertical Profile -- Run 008Z



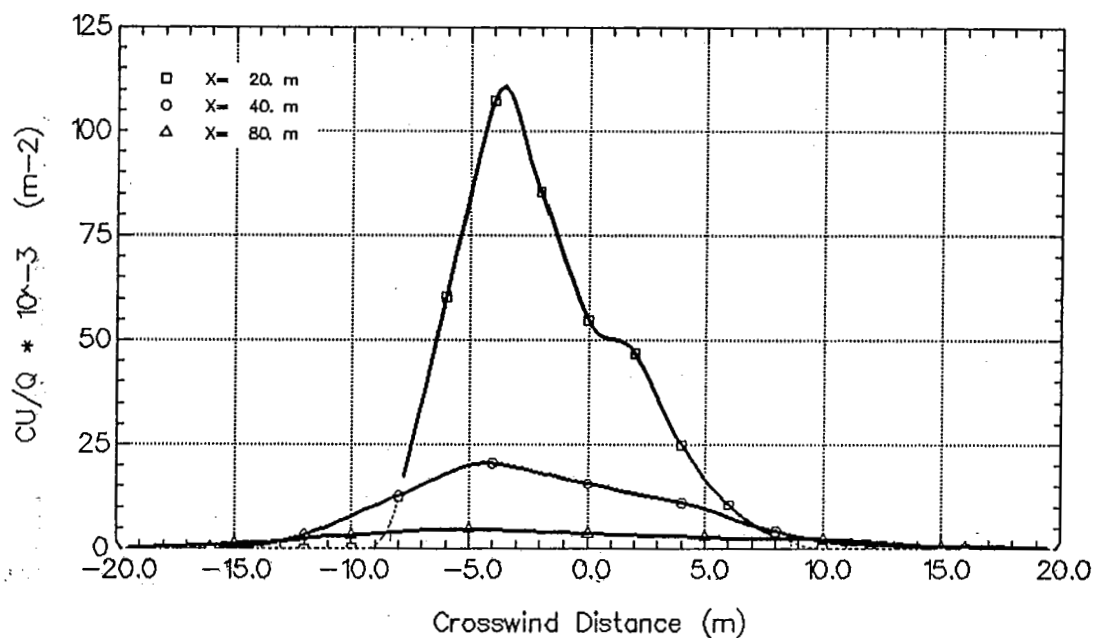
Horizontal Profile -- Run 009B



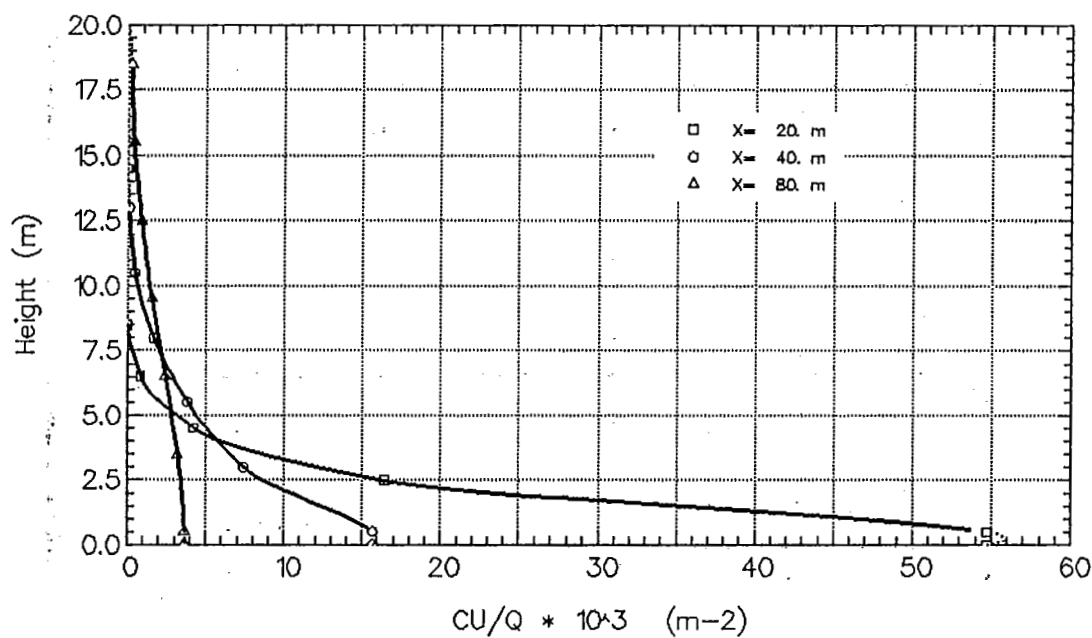
Vertical Profile -- Run 009B



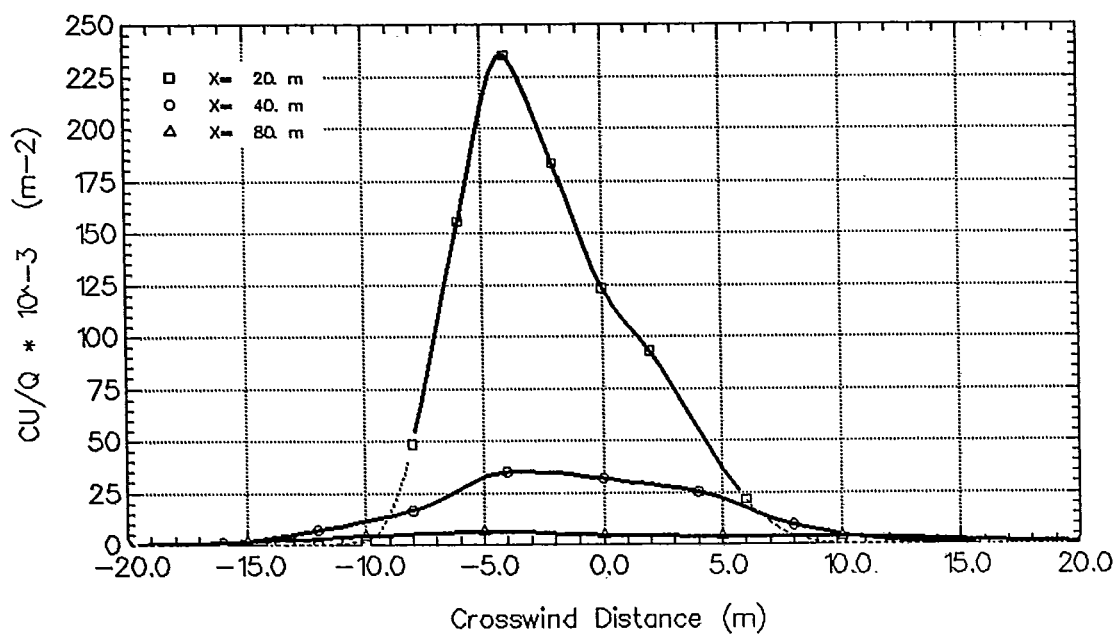
Horizontal Profile -- Run 010C



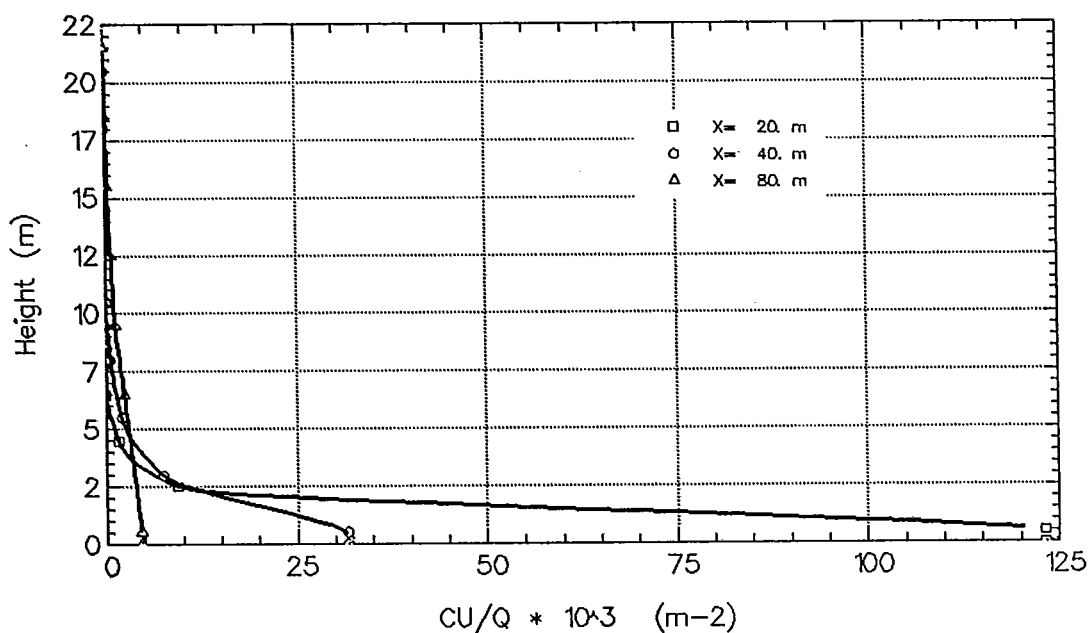
Vertical Profile -- Run 010C



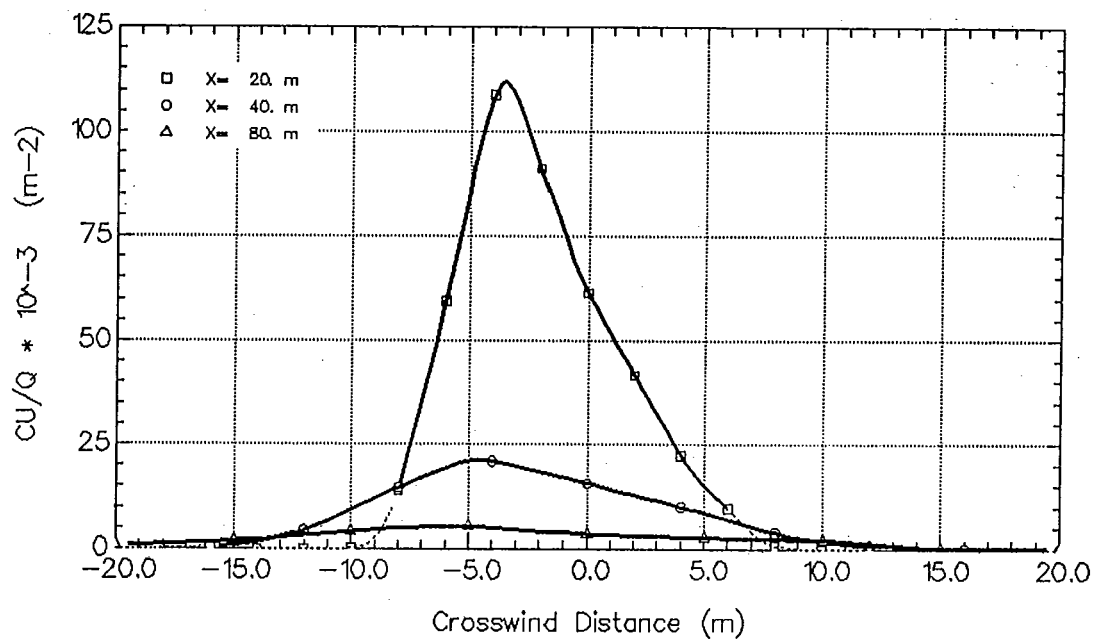
Horizontal Profile -- Run 011D



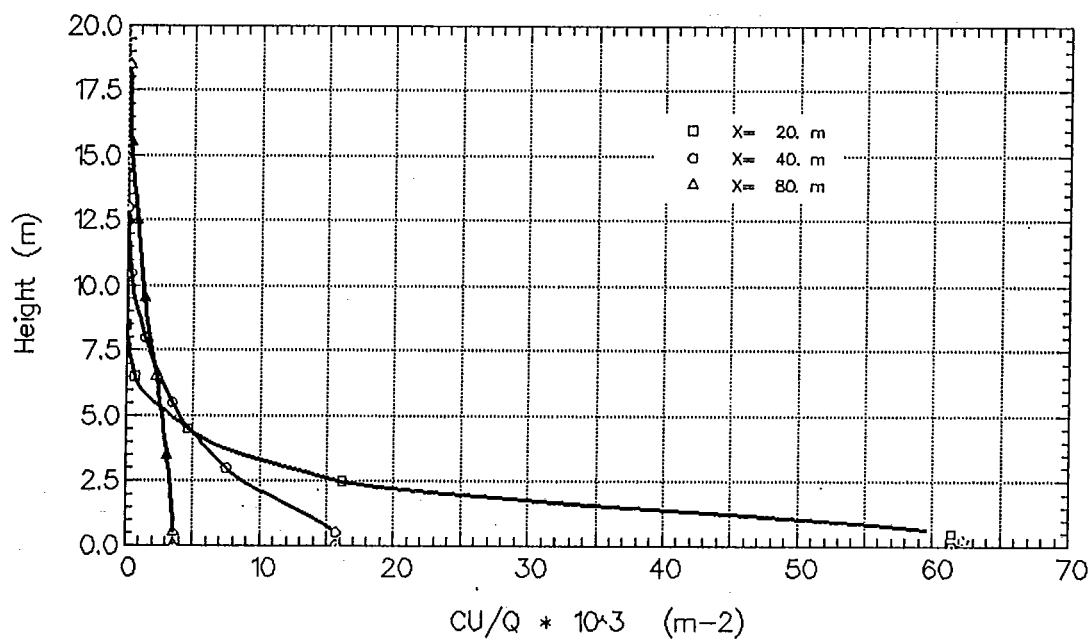
Vertical Profile -- Run 011D



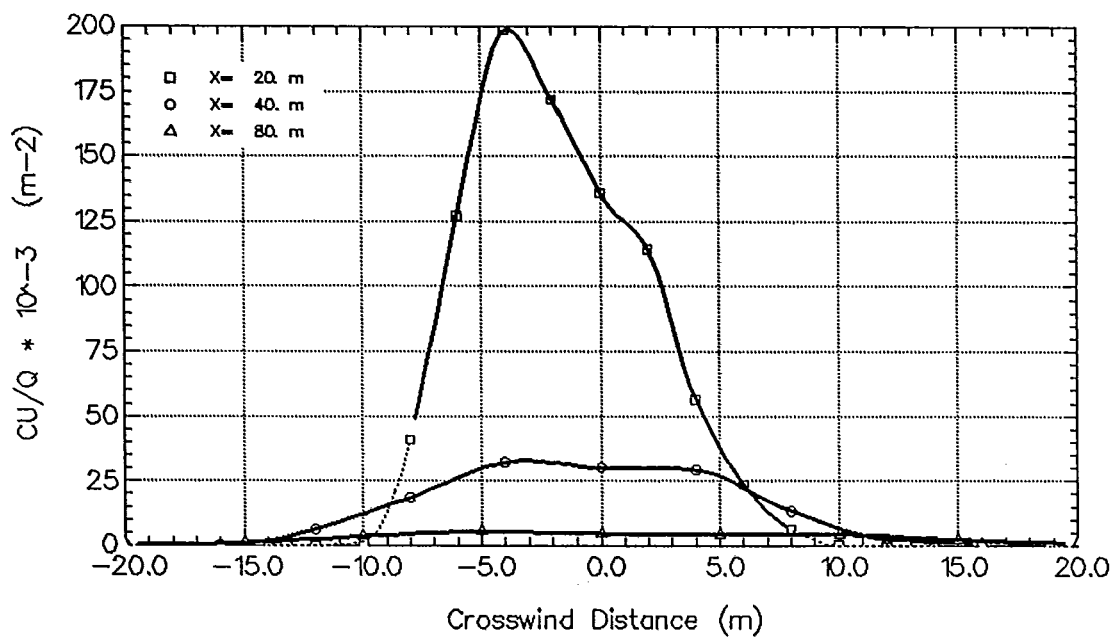
Horizontal Profile -- Run 012Z



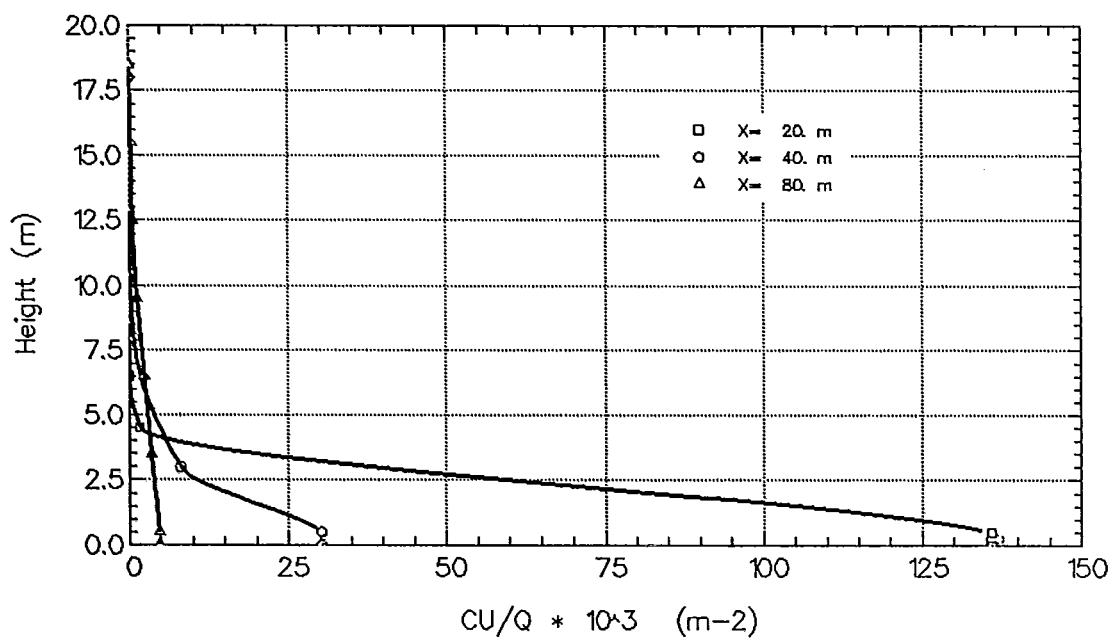
Vertical Profile -- Run 012Z



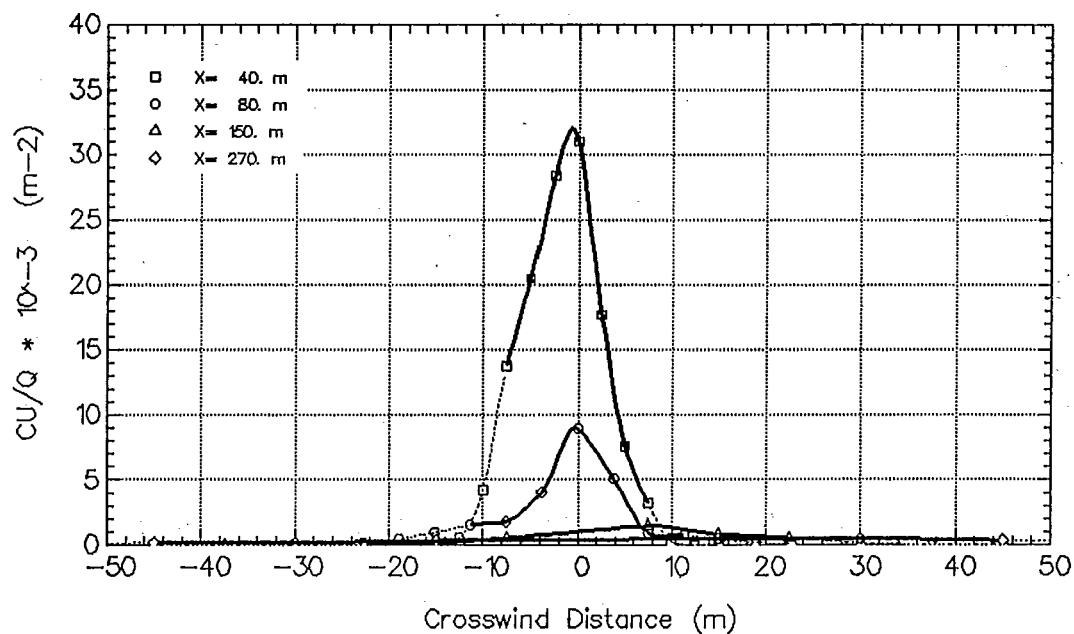
Horizontal Profile -- Run 013F



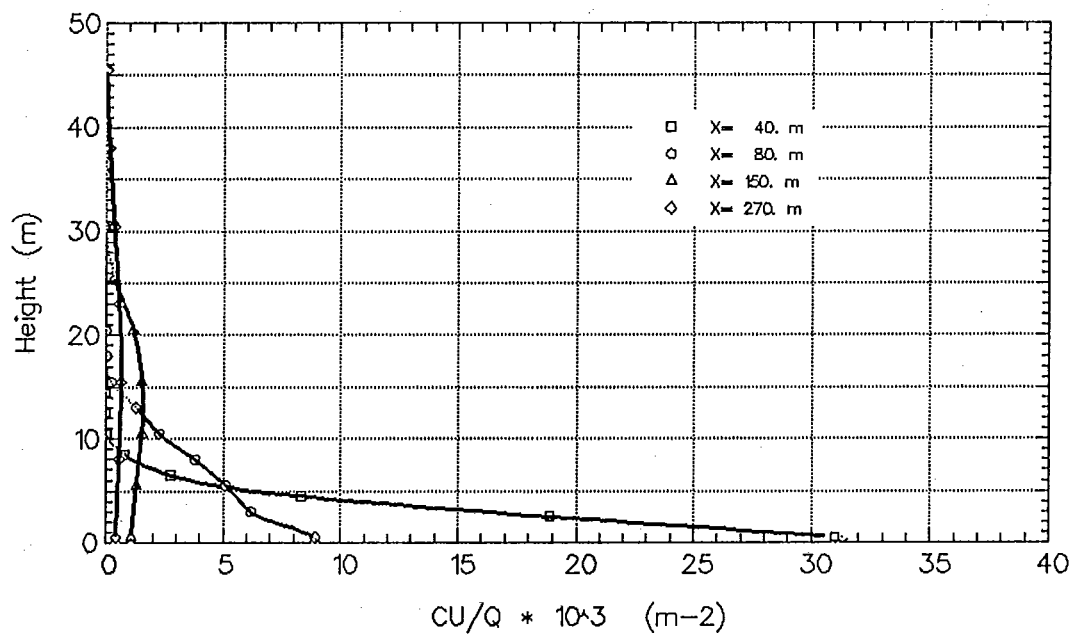
Vertical Profile -- Run 013F



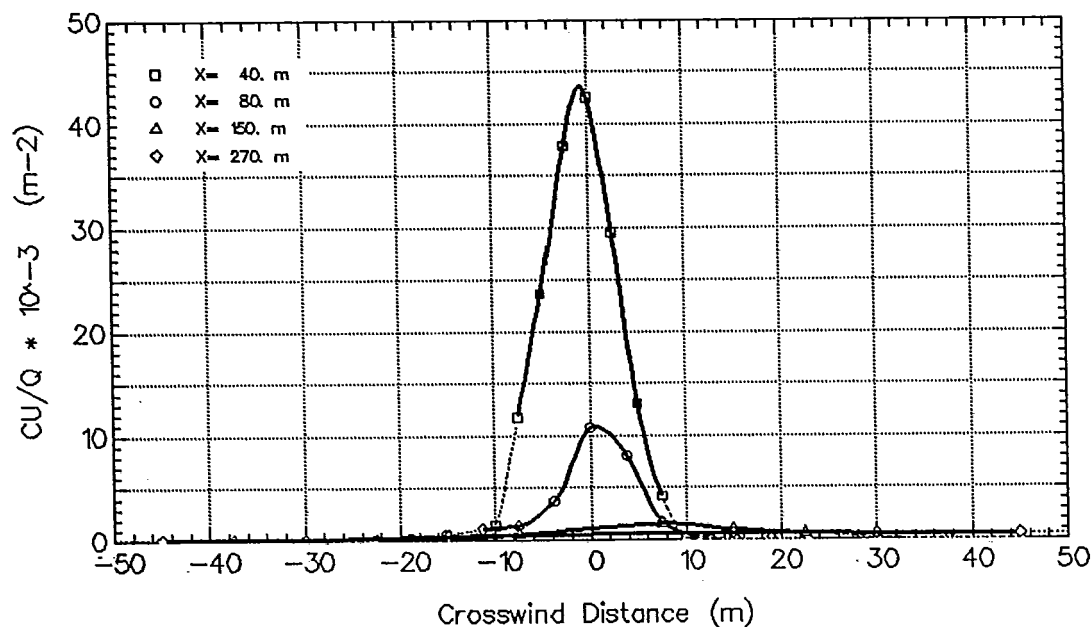
Horizontal Profile -- Run 014A



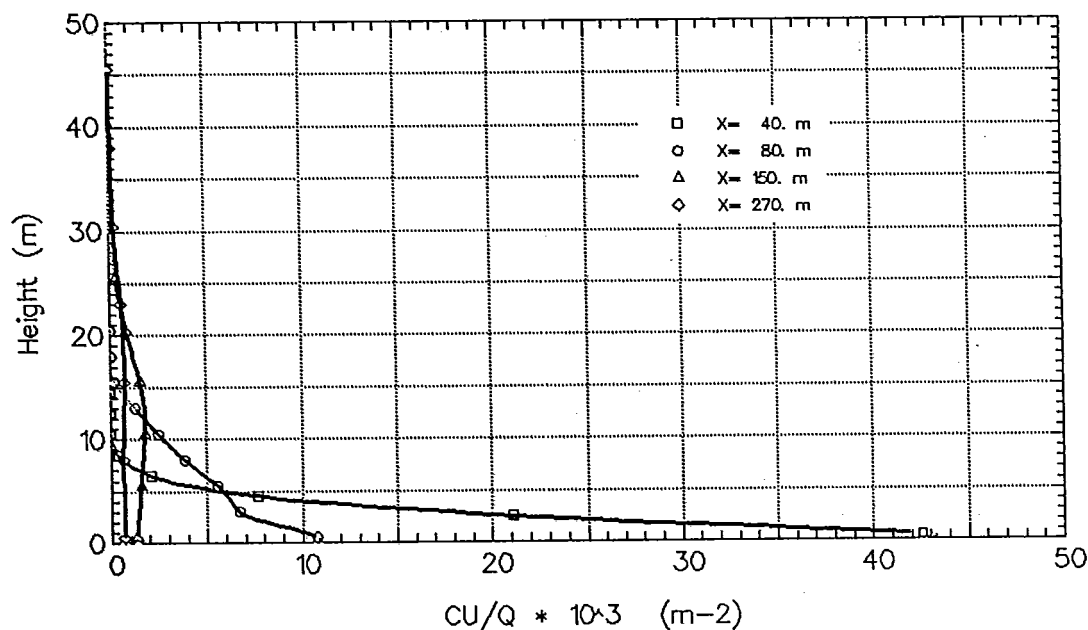
Vertical Profile -- Run 014A



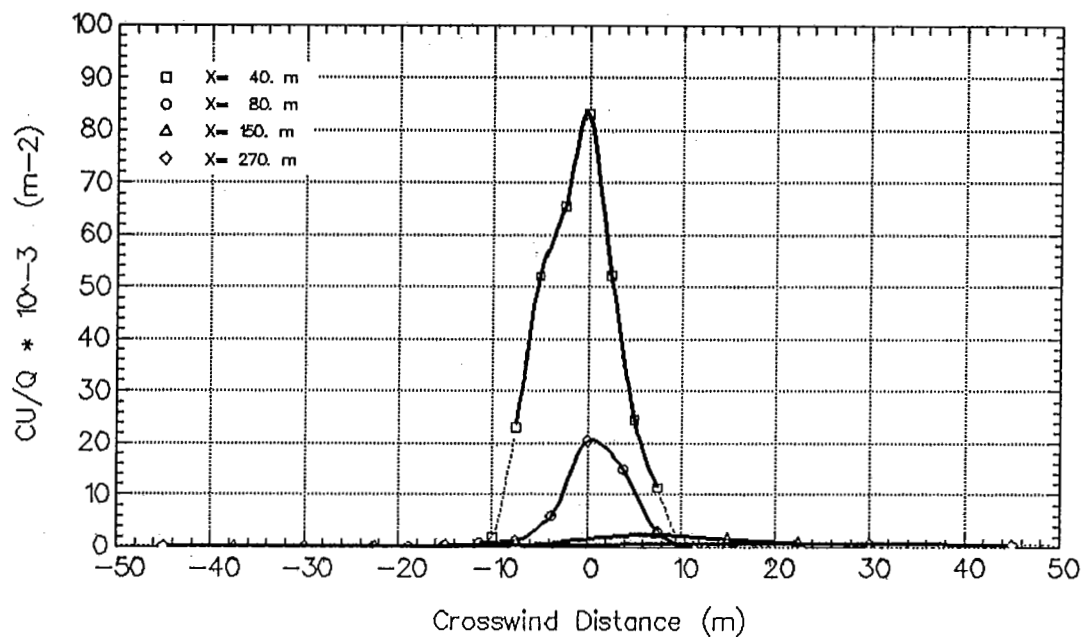
Horizontal Profile -- Run 015A



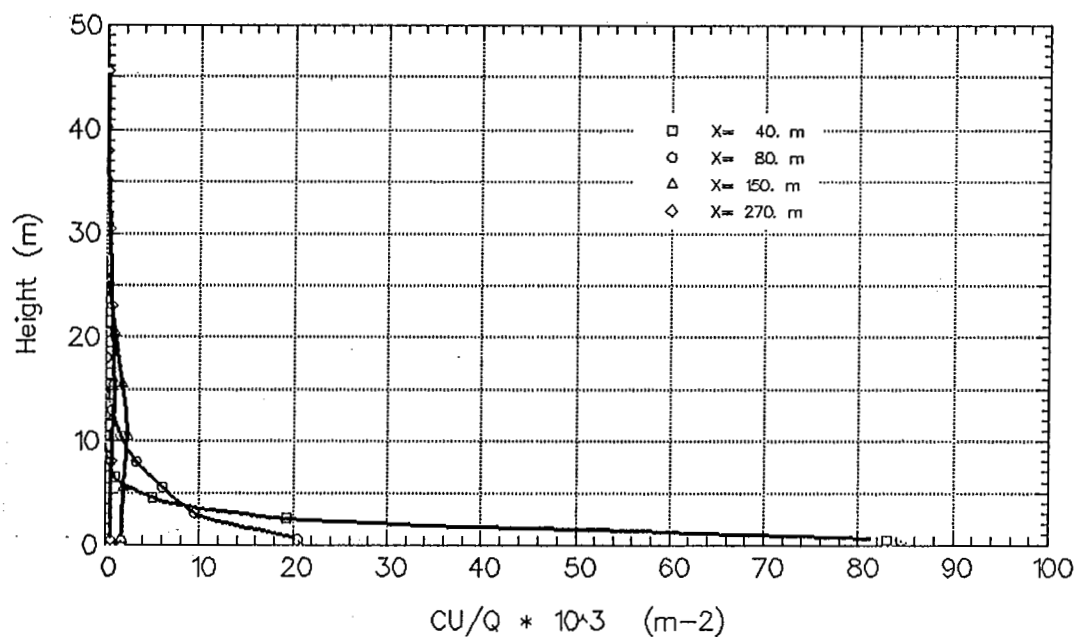
Vertical Profile -- Run 015A



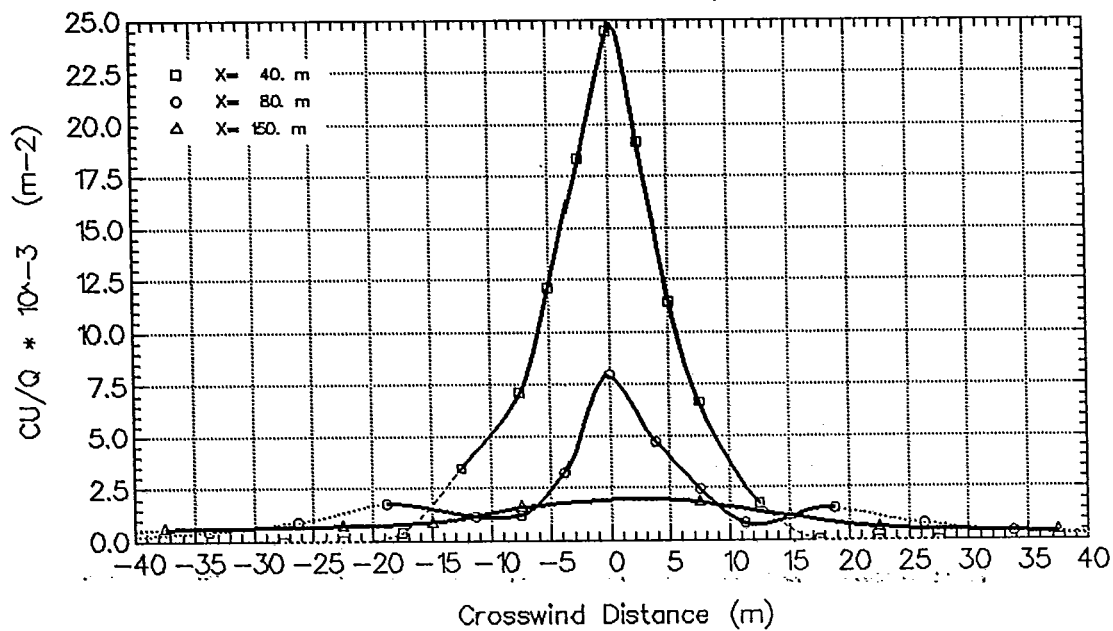
Horizontal Profile -- Run 016Z



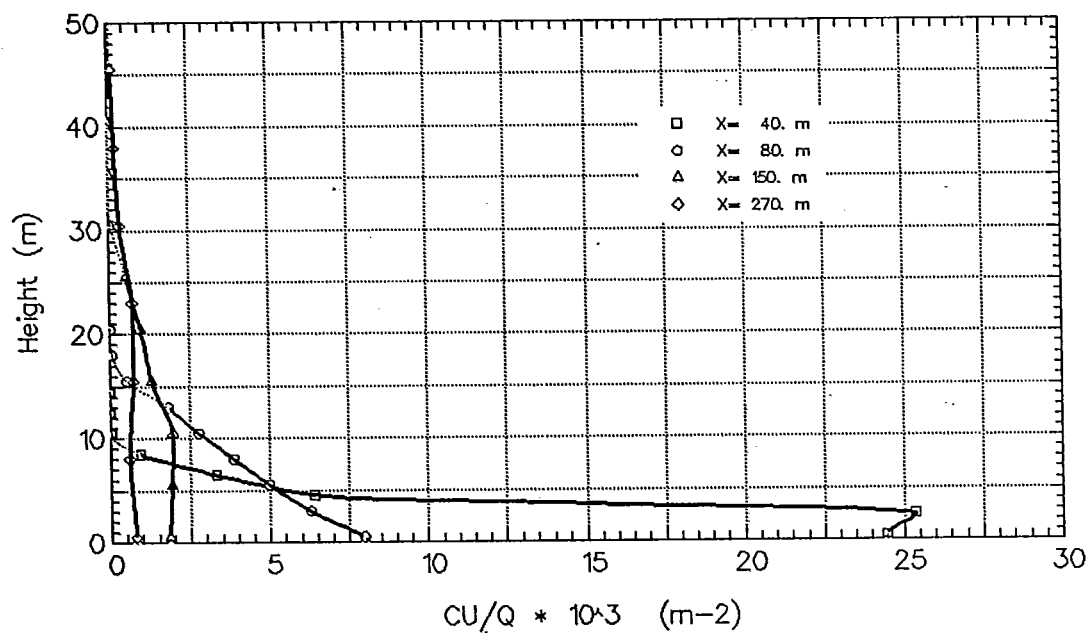
Vertical Profile -- Run 016Z



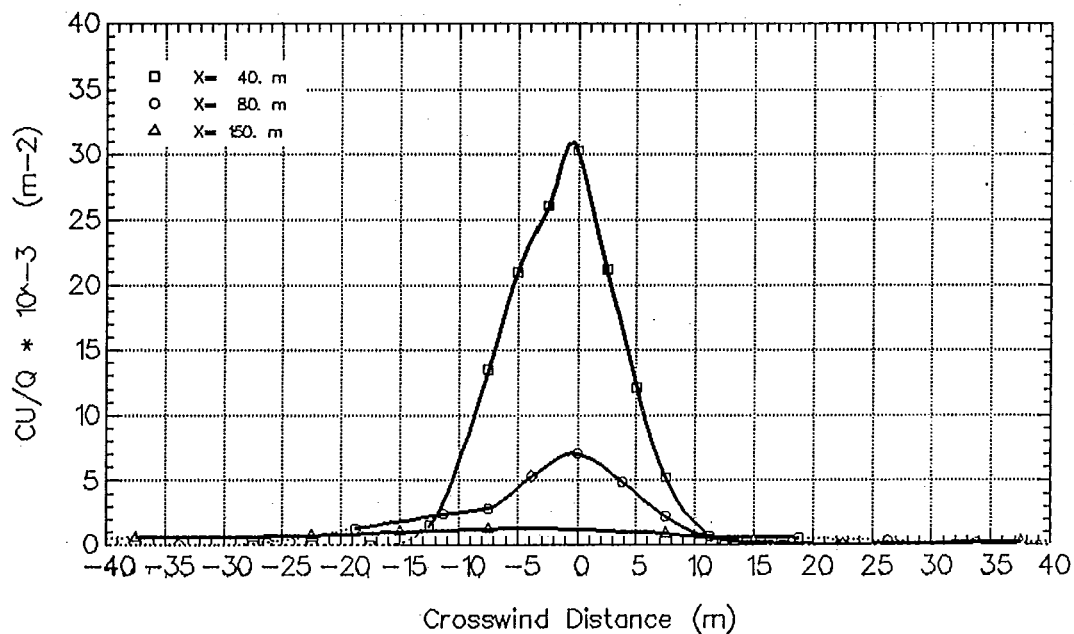
Horizontal Profile -- Run 017A



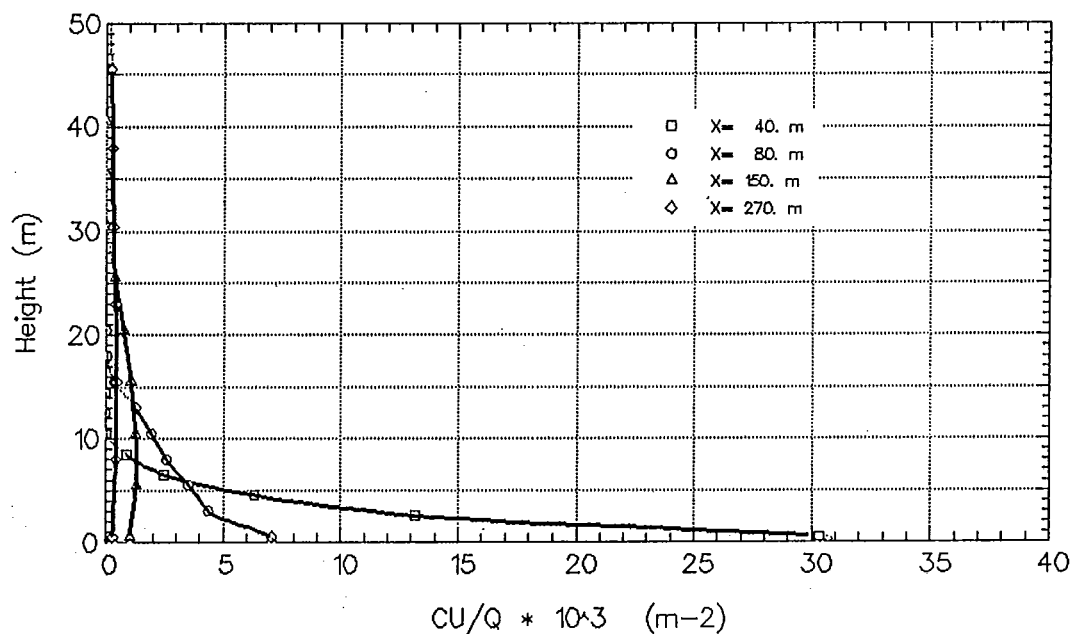
Vertical Profile -- Run 017A



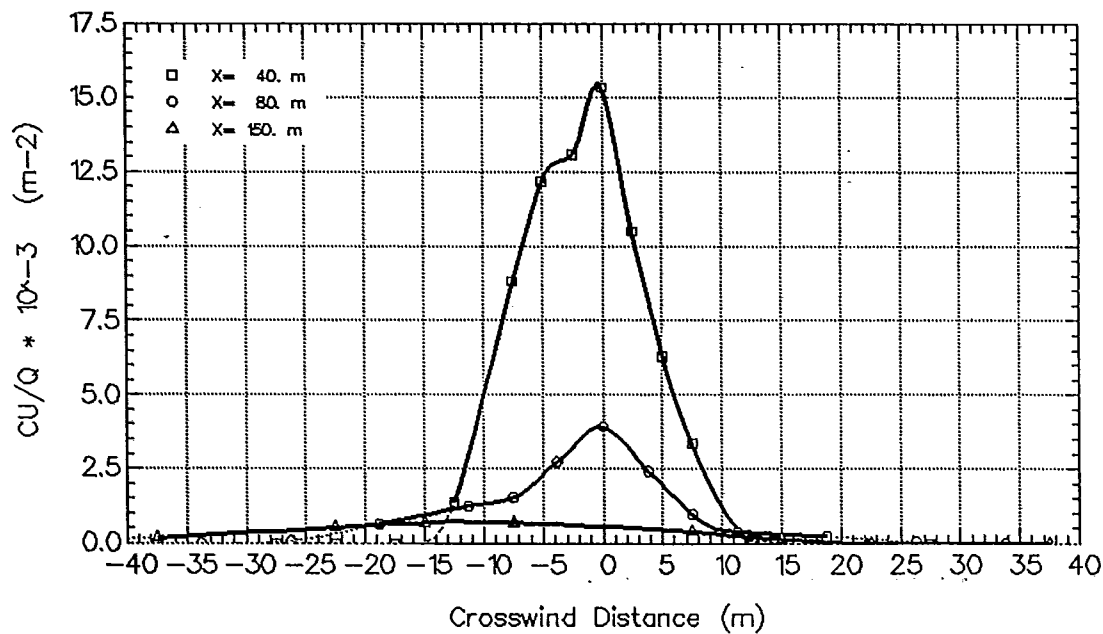
Horizontal Profile -- Run 018Z



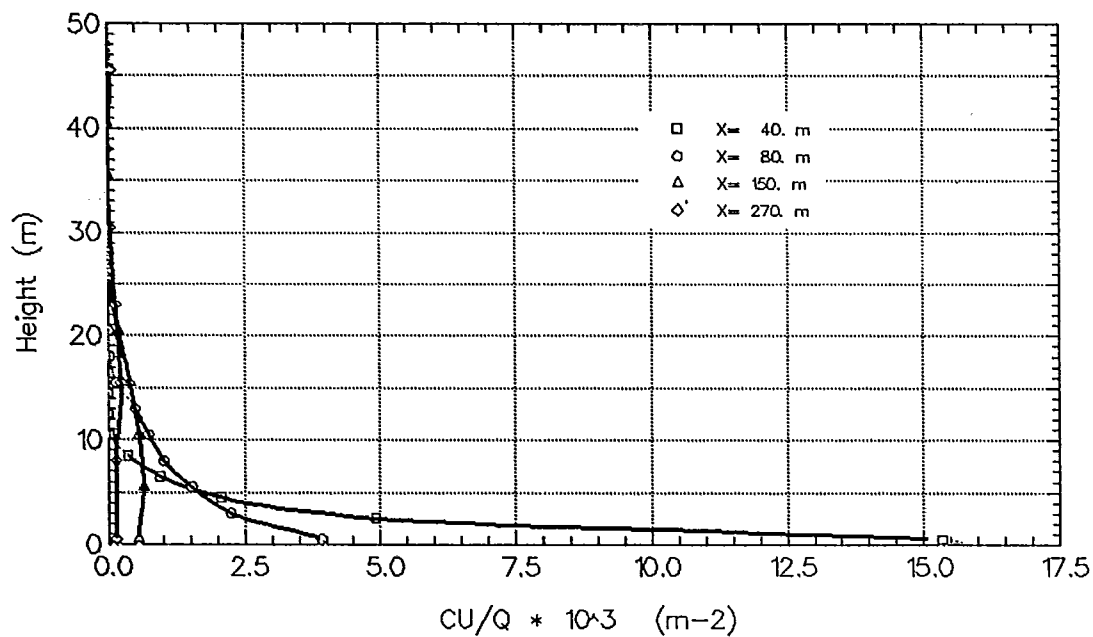
Vertical Profile -- Run 018Z



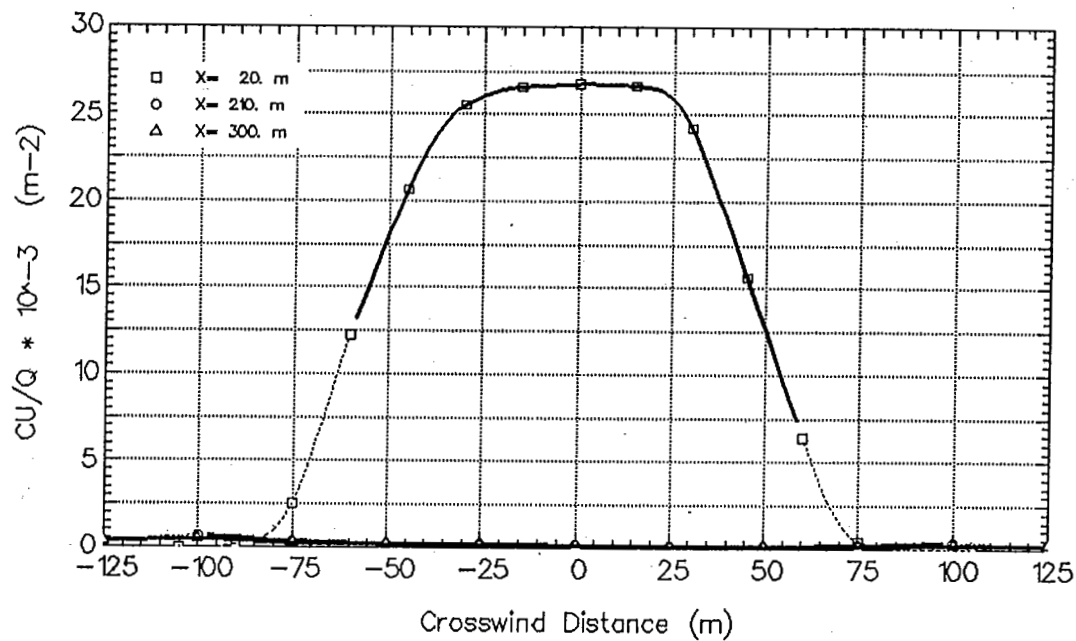
Horizontal Profile -- Run 019A



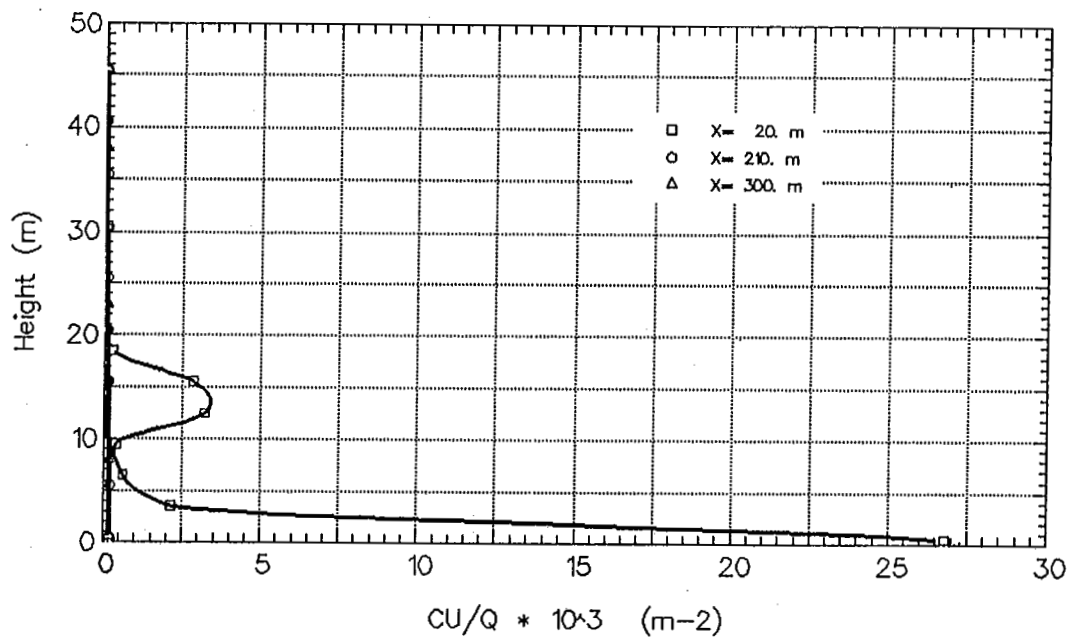
Vertical Profile -- Run 019A



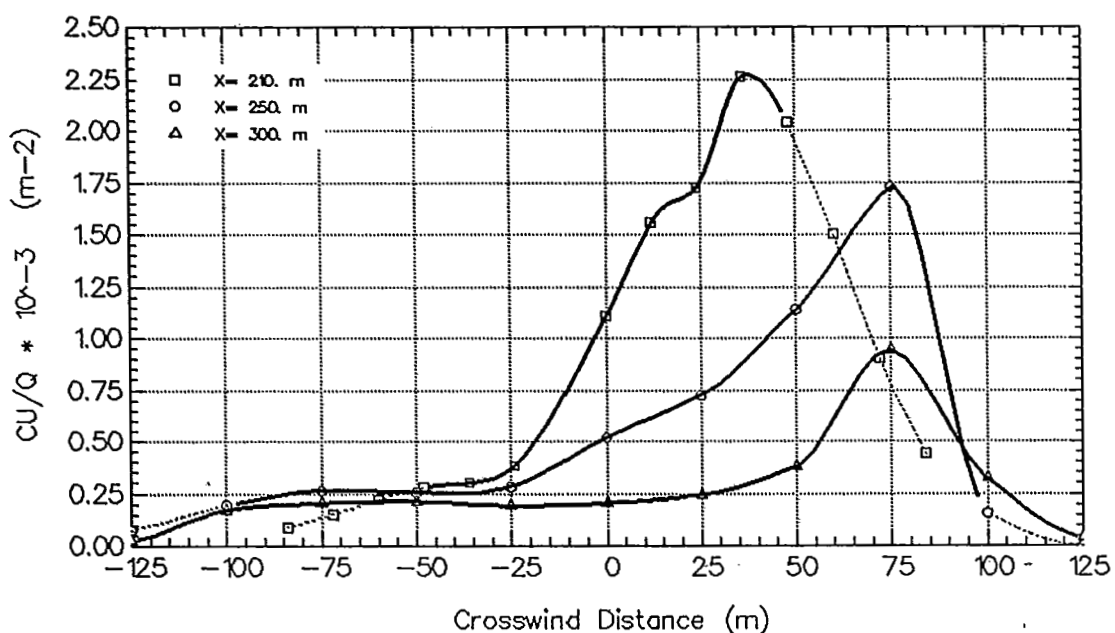
Horizontal Profile -- Run 020A



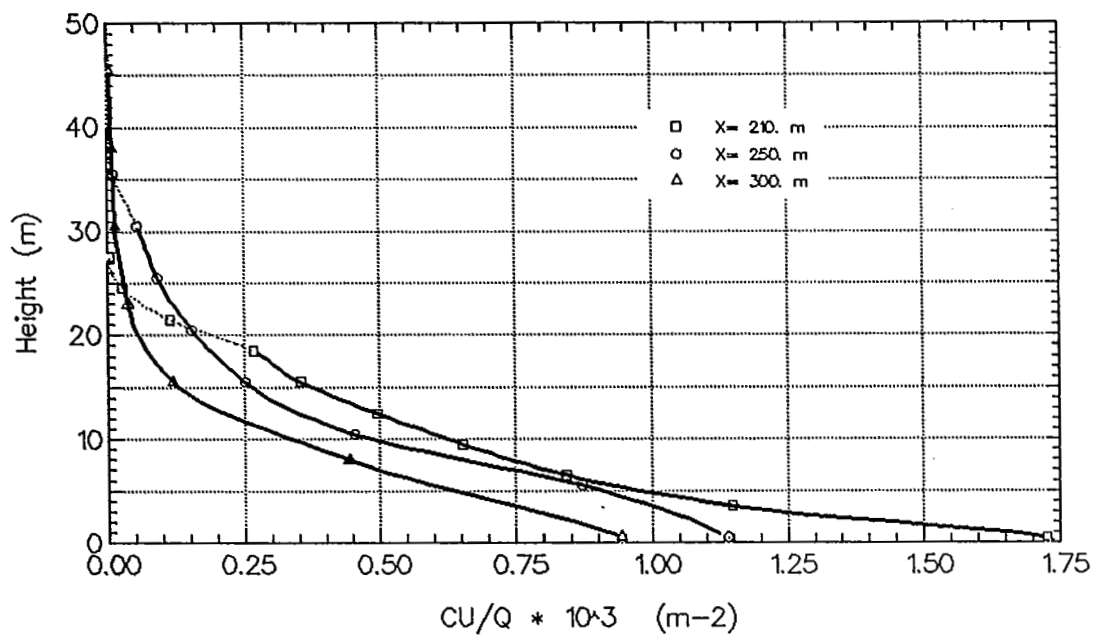
Vertical Profile -- Run 020A



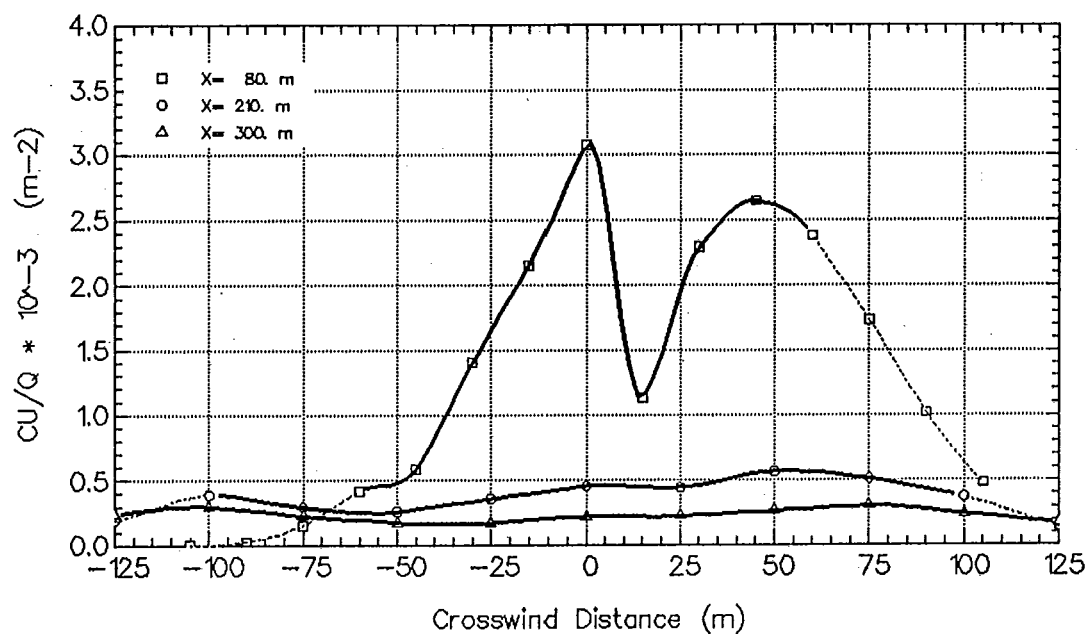
Horizontal Profile -- Run 021B



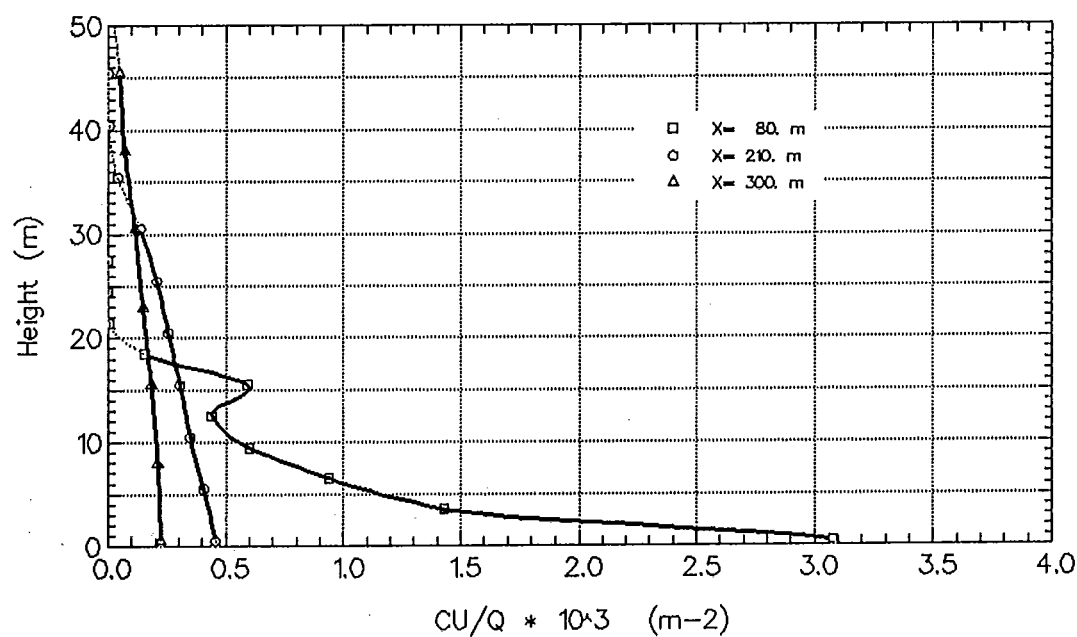
Vertical Profile -- Run 021B



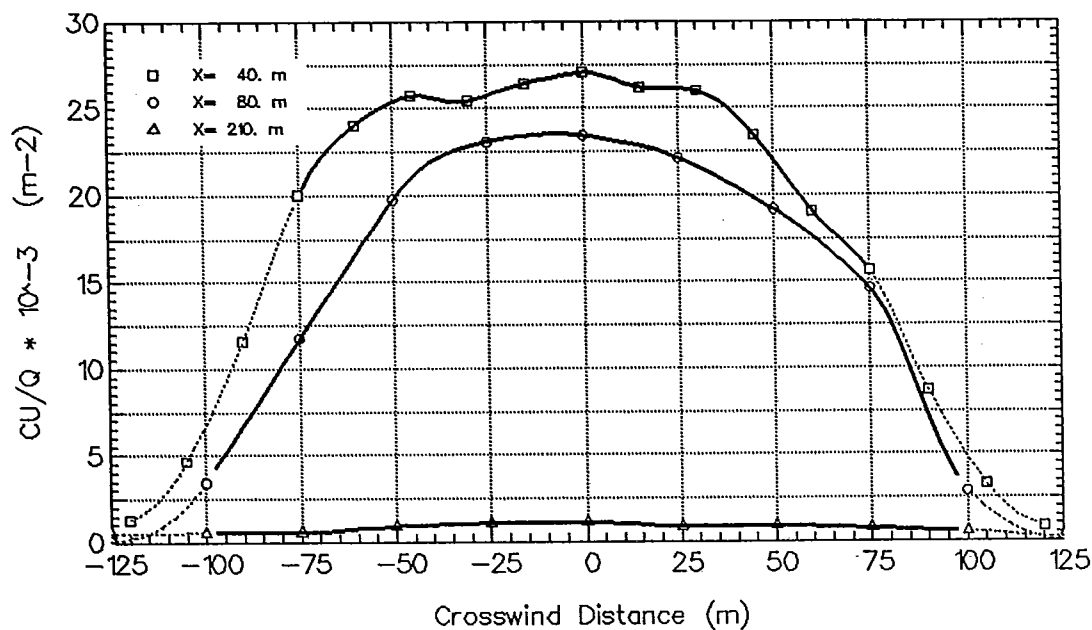
Horizontal Profile -- Run 022A



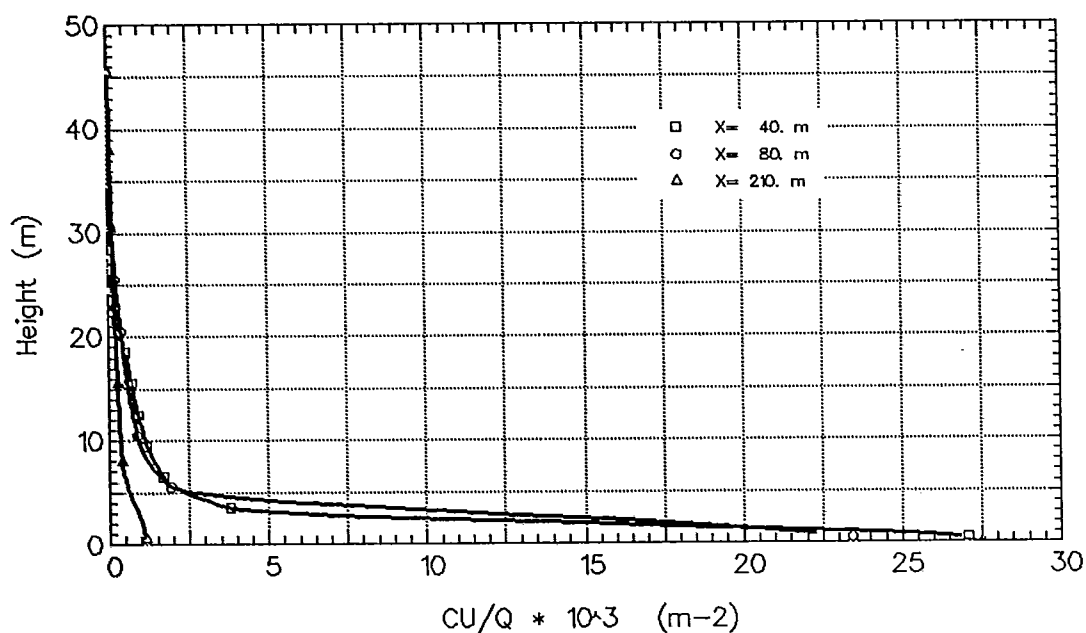
Vertical Profile -- Run 022A



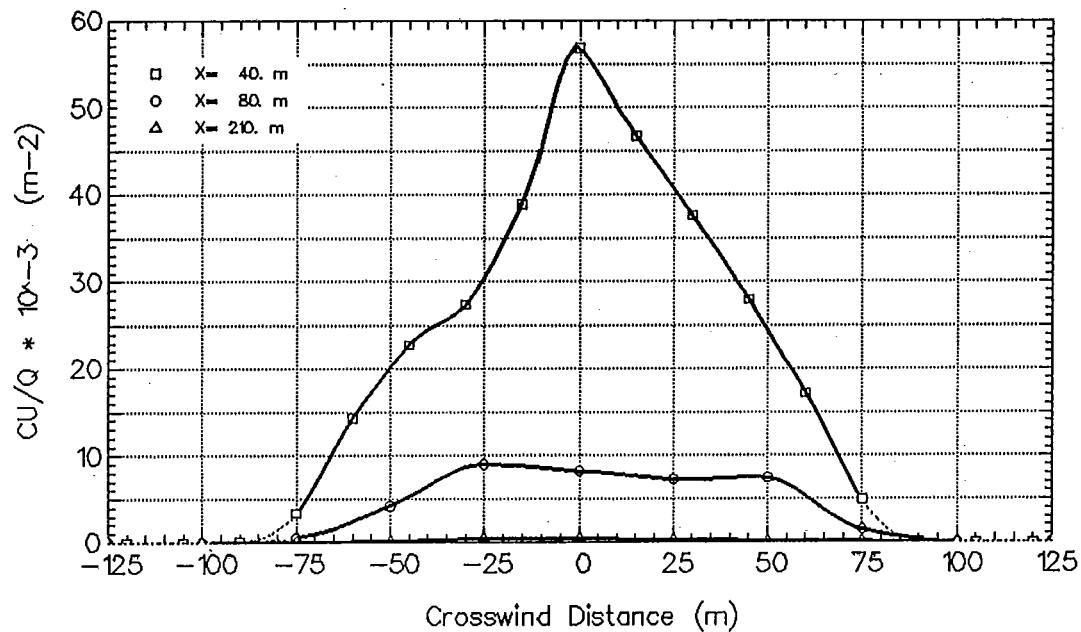
Horizontal Profile -- Run 023A



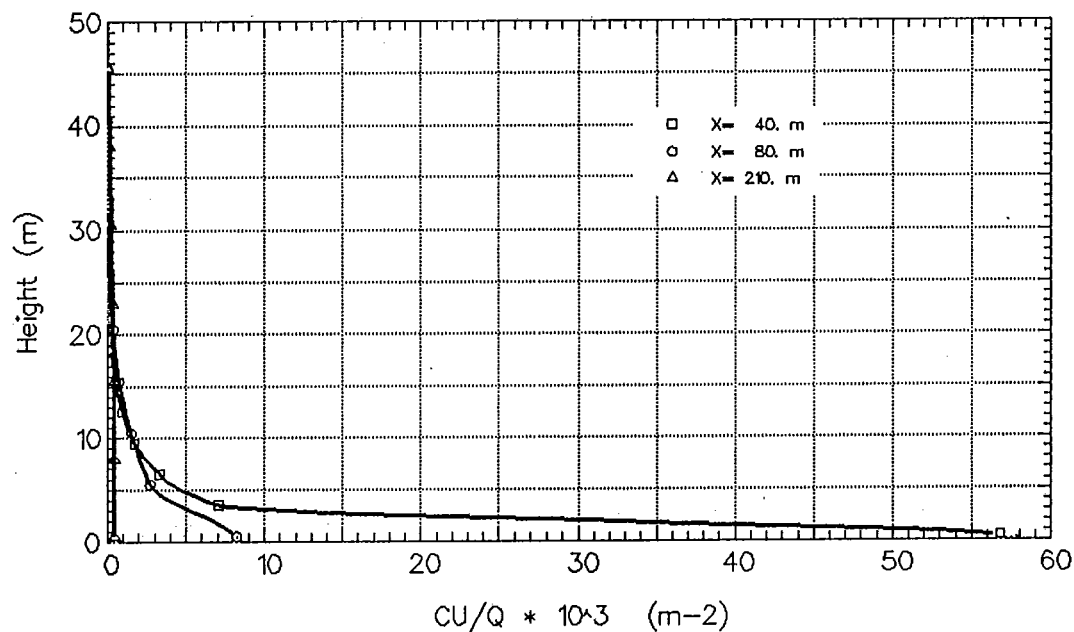
Vertical Profile -- Run 023A



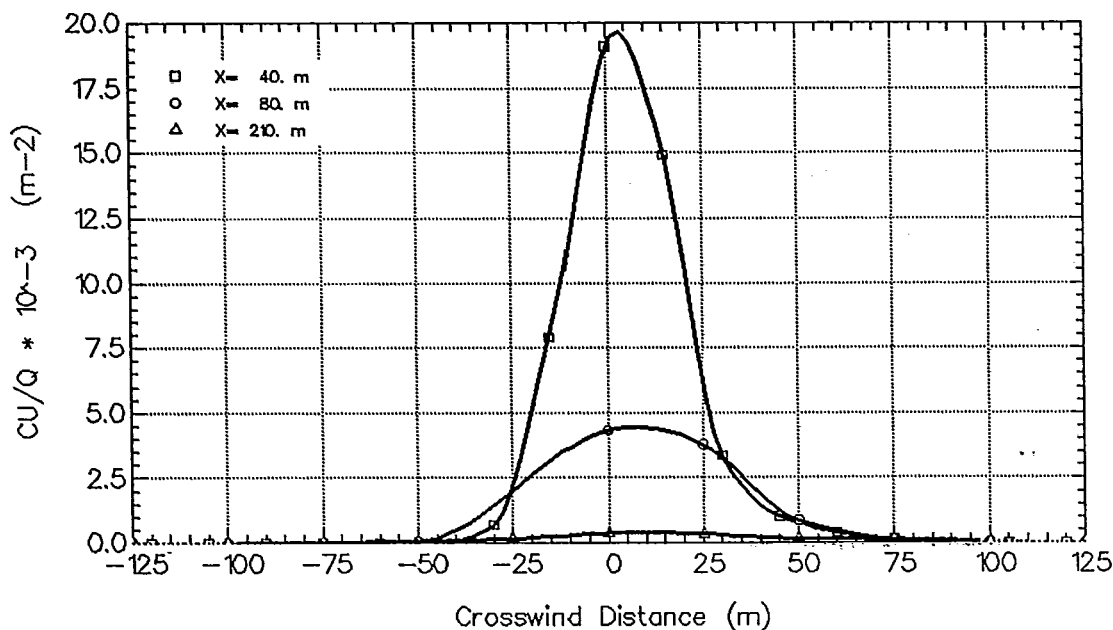
Horizontal Profile -- Run 024A



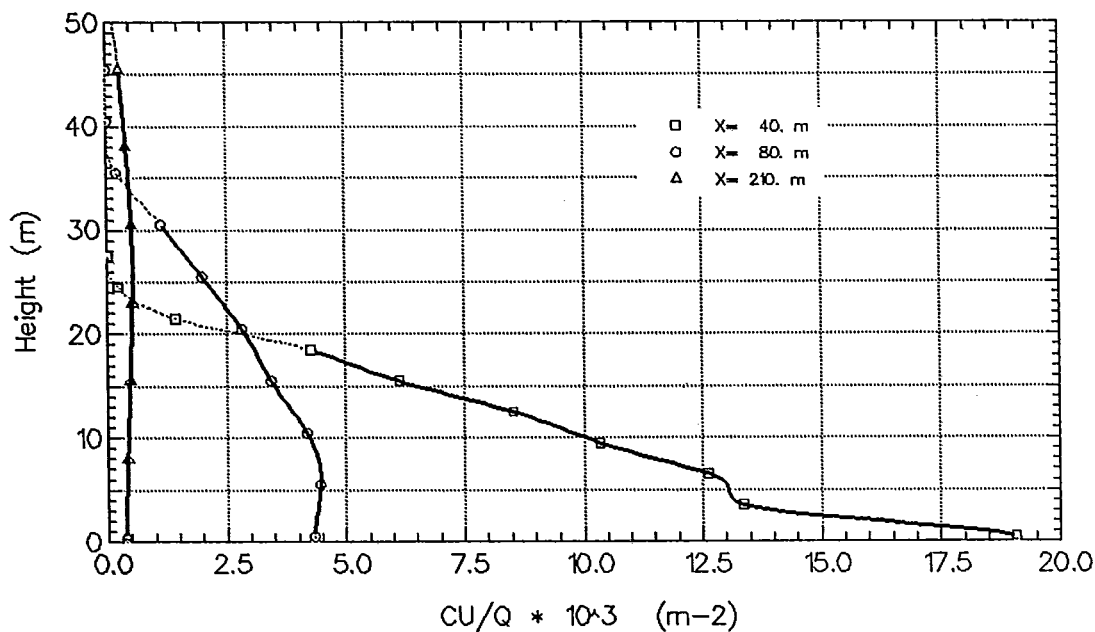
Vertical Profile -- Run 024A



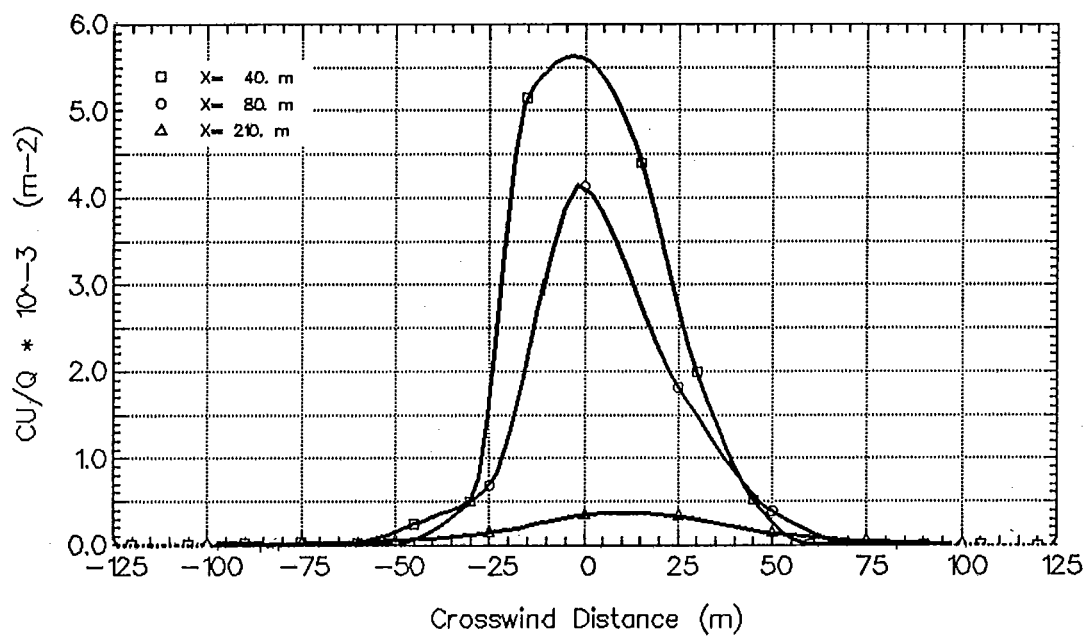
Horizontal Profile -- Run 025A



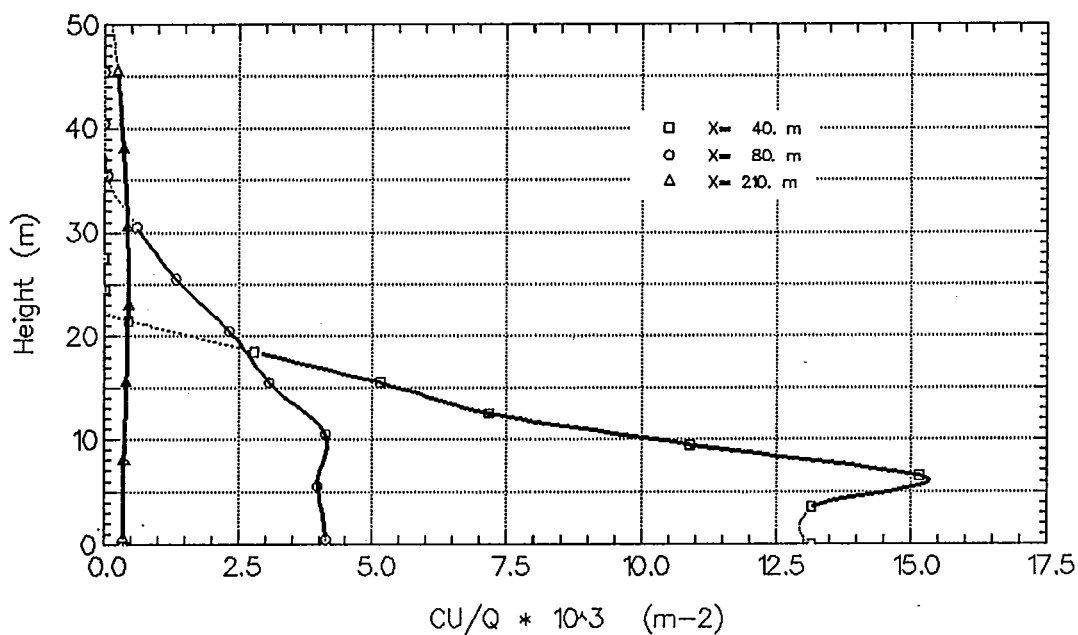
Vertical Profile -- Run 025A



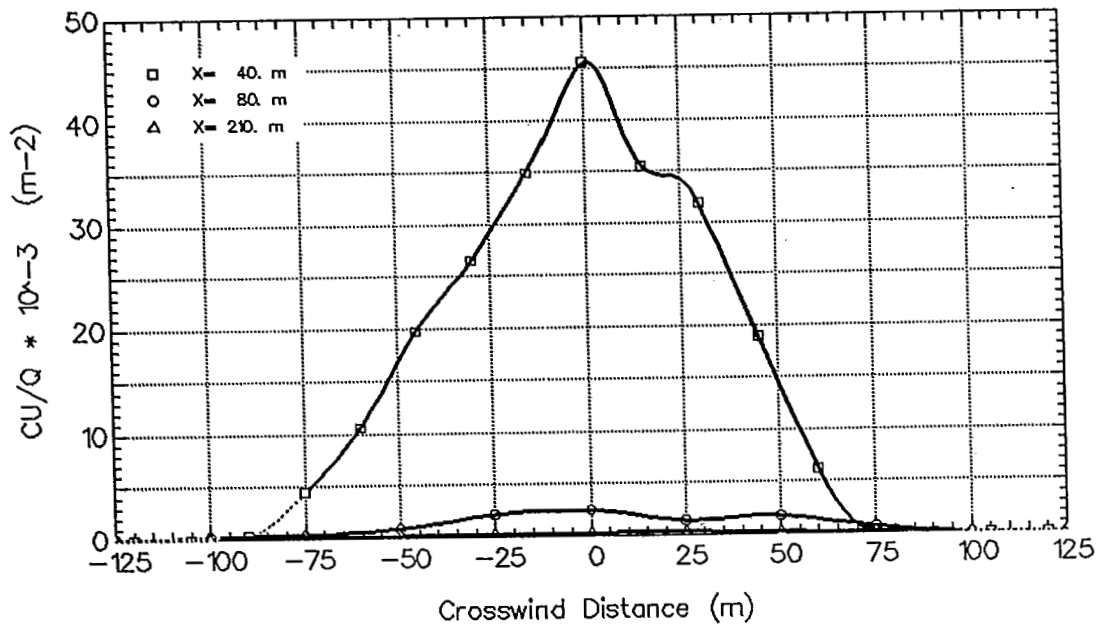
Horizontal Profile -- Run 026A



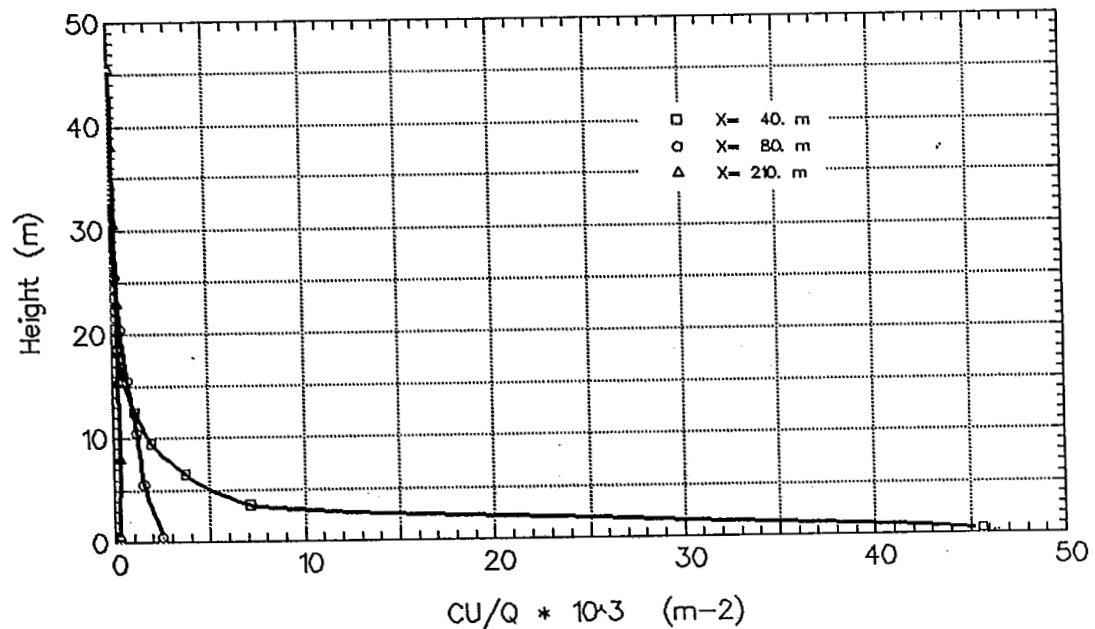
Vertical Profile -- Run 026A



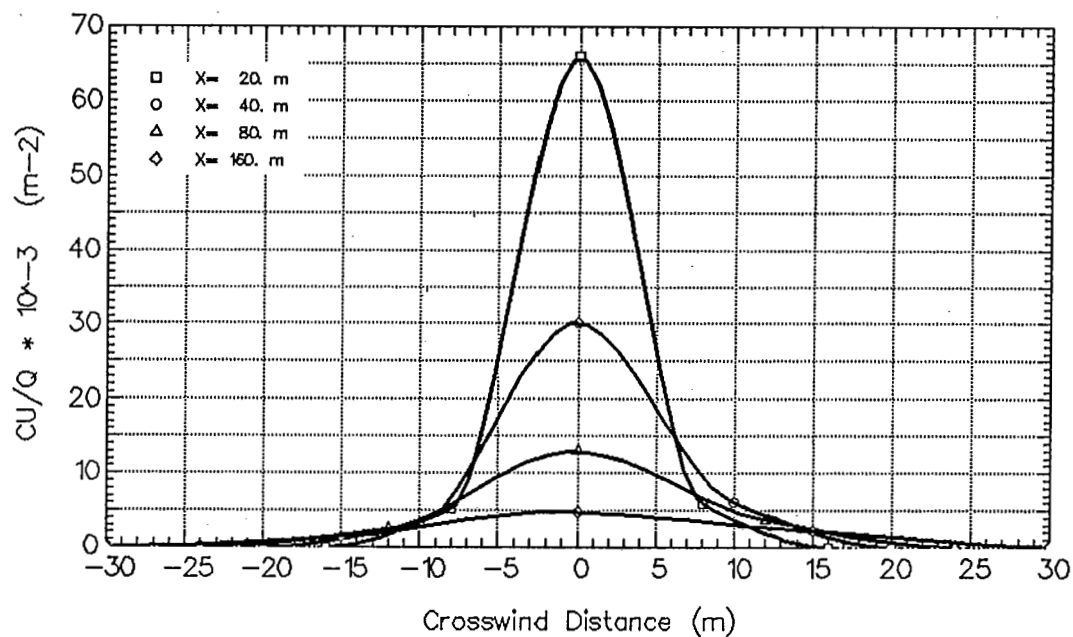
Horizontal Profile -- Run 027A



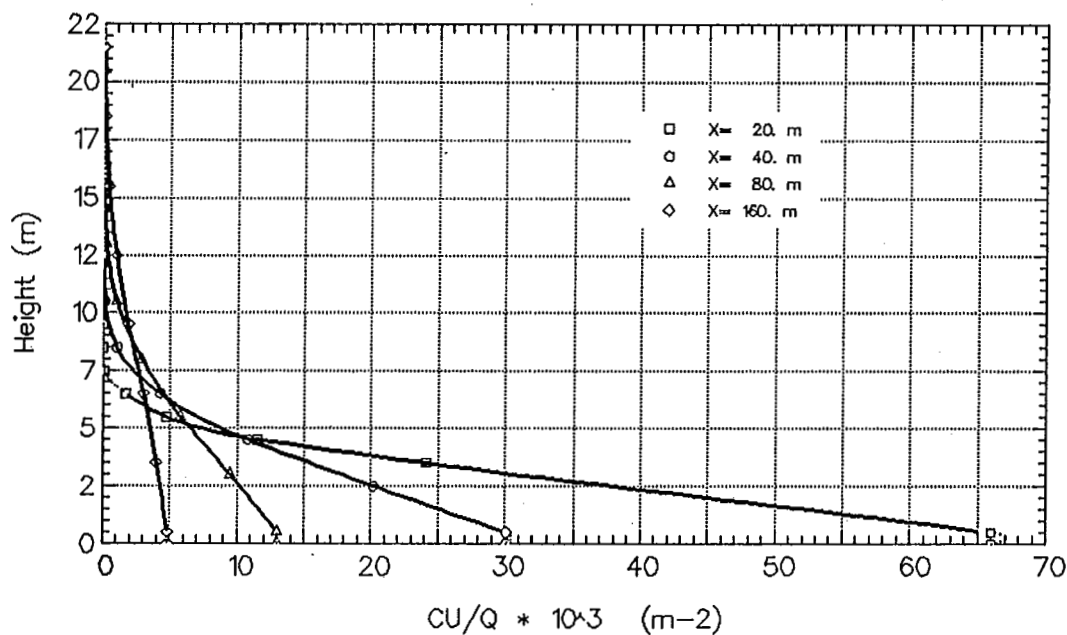
Vertical Profile -- Run 027A



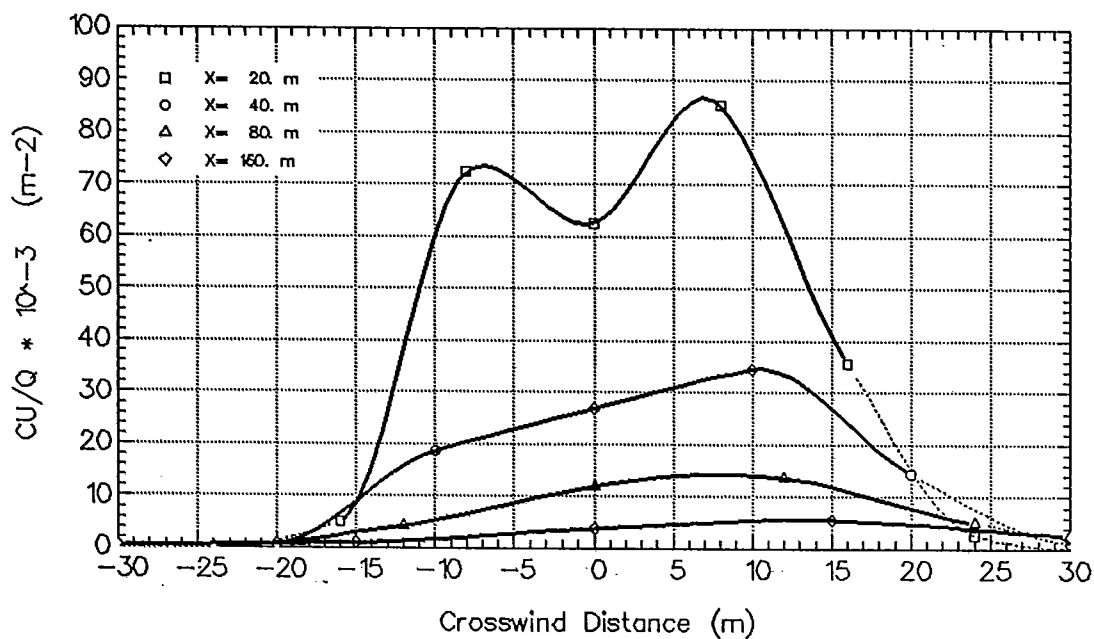
Horizontal Profile -- Run 028B



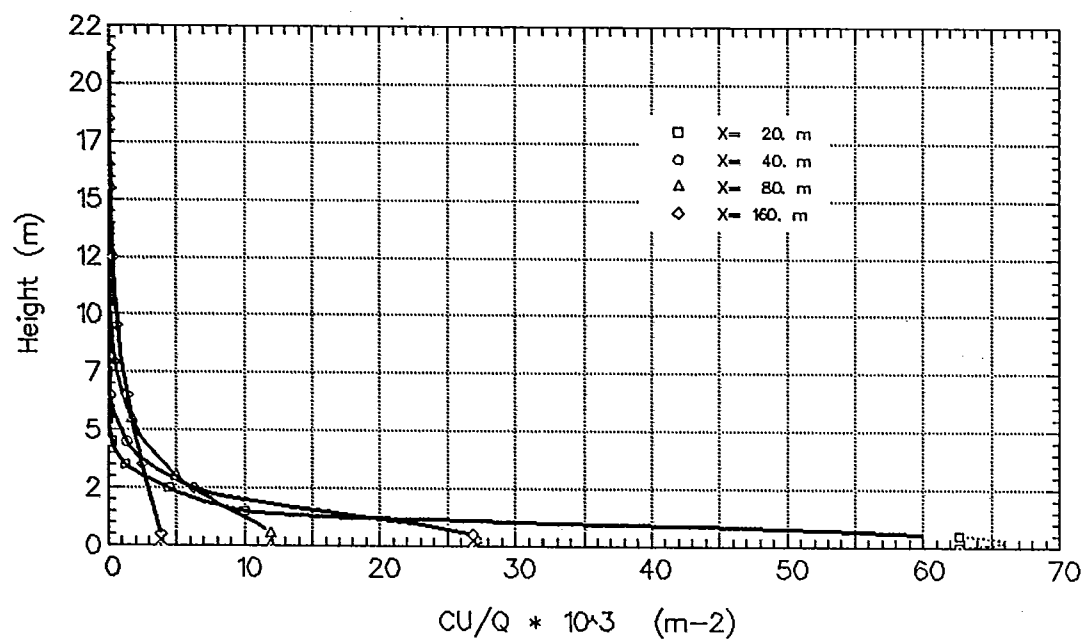
Vertical Profile -- Run 028B



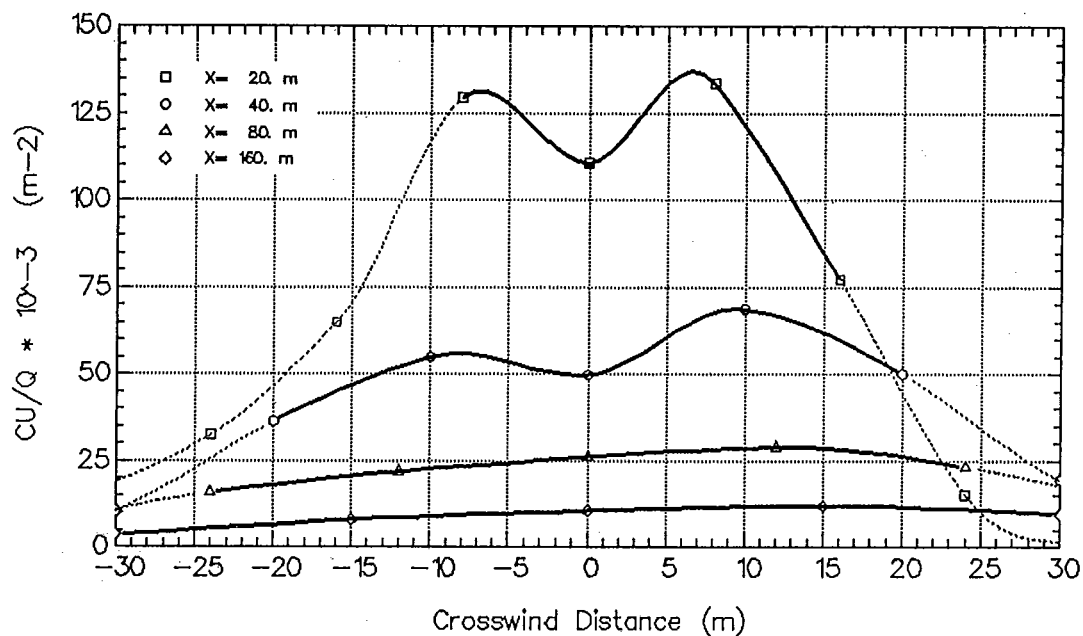
Horizontal Profile -- Run 029A



Vertical Profile -- Run 029A



Horizontal Profile -- Run 030A



Vertical Profile -- Run 030A

