

Table H.4 Benzene column tracer study without flowcells #1.

## No Flowcell #1

K (mMhos/cm)	Time hr	Conductance (mMhos)		Adjust for Range (x10)	Conductance - Initial Conduct.	Added NaCl Conc. from tracer pulse (mg/L)	E-curve S/area under curve of S	Flowrate (mL/min)
		Conductivity (mMhos/cm)						
1	0			0				2.78
	0.0208			0	0	-19.1667		
	0.0833	1.6		16	0.8	425.2778		
	0.1458	1.64		16.4	1.2	647.5000		
	0.1750	1.6		16	0.8	425.2778		
	0.3083	1.54		15.4	0.2	91.9444		
	0.3333	1.52		15.2	0	-19.1667		
	0.4250	1.53		15.3	0.1	36.3889		
	0.5000	1.53		15.3	0.1	36.3889		
	0.5833	1.54		15.4	0.2	91.9444		
	0.6667	1.55		15.5	0.3	147.5000	0.0030	
	<b>0.7500</b>	1.55		15.5	0.3	147.5000	0.0030	
	<b>0.8333</b>	1.54		15.4	0.2	91.9444	0.0019	
	<b>0.9167</b>	1.55		15.5	0.3	147.5000	0.0030	
	<b>1.0000</b>	1.55		15.5	0.3	147.5000	0.0030	
	<b>1.0833</b>	1.56		15.6	0.4	203.0556	0.0041	
	<b>1.1667</b>	1.54		15.4	0.2	91.9444	0.0019	
	<b>1.2542</b>	1.56		15.6	0.4	203.0556	0.0041	
	<b>1.3083</b>	1.63		16.3	1.1	591.9444	0.0121	
	1.3333	1.73		17.3	2.1	1147.5000	0.0234	
	<b>1.3500</b>	1.93		19.3	4.1	2258.6111	0.0460	
	1.3667	2.19		21.9	6.7	3703.0556	0.0755	
	<b>1.3917</b>	2.81		28.1	12.9	7147.5000	0.1456	
	1.4333	4.63		46.3	31.1	17258.6111	0.3516	
	<b>1.4500</b>	5.59		55.9	40.7	22591.9444	0.4603	
	1.4667	6.62		66.2	51	28314.1667	0.5769	
	1.4833	7.56		75.6	60.4	33536.3889	0.6833	
	<b>1.5000</b>	8.15		81.5	66.3	36814.1667	0.7501	

Table H.4 Benzene column tracer study without flowcells #1. (cont')

Time	Conductance (mMhos)		Adjust for Range (x10)	Conductance - Initial Conduct.	Added NaCl Conc. from tracer pulse (mg/L)	E-curve S/area under curve of S
	Conductivity (mMhos/cm)					
1.5167	8.63		86.3	71.1	39480.8333	0.8044
1.5333	8.91		89.1	73.9	41036.3889	0.8361
<b>1.5500</b>	9.26		92.6	77.4	42980.8333	0.8757
1.5667	9.42		94.2	79	43869.7222	0.8939
1.5833	9.06		90.6	75.4	41869.7222	0.8531
<b>1.6000</b>	8.99		89.9	74.7	41480.8333	0.8452
1.6167	8.87		88.7	73.5	40814.1667	0.8316
1.6333	8.83		88.3	73.1	40591.9444	0.8271
<b>1.6500</b>	9		90	74.8	41536.3889	0.8463
1.6750	8.84		88.4	73.2	40647.5000	0.8282
1.6917	8.68		86.8	71.6	39758.6111	0.8101
<b>1.7042</b>	8.45		84.5	69.3	38480.8333	0.7841
1.7167	8.65		86.5	71.3	39591.9444	0.8067
1.7333	8.56		85.6	70.4	39091.9444	0.7965
<b>1.7500</b>	8.19		81.9	66.7	37036.3889	0.7546
1.7667	8.12		81.2	66	36647.5000	0.7467
1.7833	8.26		82.6	67.4	37425.2778	0.7625
<b>1.8000</b>	7.91		79.1	63.9	35480.8333	0.7229
1.8167	7.81		78.1	62.9	34925.2778	0.7116
1.8333	7.8		78	62.8	34869.7222	0.7105
<b>1.8500</b>	7.66		76.6	61.4	34091.9444	0.6946
1.8667	7.6		76	60.8	33758.6111	0.6878
1.8833	7.53		75.3	60.1	33369.7222	0.6799
<b>1.9000</b>	7.33		73.3	58.1	32258.6111	0.6573
1.9167	7.29		72.9	57.7	32036.3889	0.6527
1.9333	7.11		71.1	55.9	31036.3889	0.6324
<b>1.9500</b>	7.06		70.6	55.4	30758.6111	0.6267
1.9667	6.95		69.5	54.3	30147.5000	0.6143

Table H.4 Benzene column tracer study without flowcells #1. (cont')

Time	Conductance (mMhos)		Adjust for Range (x10)	Conductance - Initial Conduct.	Added NaCl Conc. from tracer pulse (mg/L)	E-curve S/area under curve of S
	Conductivity (mMhos/cm)					
1.9833	6.99		69.9	54.7	30369.7222	0.6188
<b>2.0000</b>	6.97		69.7	54.5	30258.6111	0.6165
2.0167	6.83		68.3	53.1	29480.8333	0.6007
2.0333	6.64		66.4	51.2	28425.2778	0.5792
<b>2.0500</b>	6.62		66.2	51	28314.1667	0.5769
2.0667	6.5		65	49.8	27647.5000	0.5633
2.0833	6.48		64.8	49.6	27536.3889	0.5611
<b>2.1000</b>	6.36		63.6	48.4	26869.7222	0.5475
2.1167	6.23		62.3	47.1	26147.5000	0.5328
2.1333	6.14		61.4	46.2	25647.5000	0.5226
<b>2.1500</b>	6.09		60.9	45.7	25369.7222	0.5169
2.1667	5.96		59.6	44.4	24647.5000	0.5022
2.1833	5.94		59.4	44.2	24536.3889	0.4999
<b>2.2000</b>	5.93		59.3	44.1	24480.8333	0.4988
2.2167	5.76		57.6	42.4	23536.3889	0.4796
2.2333	5.77		57.7	42.5	23591.9444	0.4807
<b>2.2500</b>	5.63		56.3	41.1	22814.1667	0.4648
2.2667	5.53		55.3	40.1	22258.6111	0.4535
2.2833	5.51		55.1	39.9	22147.5000	0.4513
<b>2.3000</b>	5.37		53.7	38.5	21369.7222	0.4354
2.3167	5.41		54.1	38.9	21591.9444	0.4399
2.3333	5.23		52.3	37.1	20591.9444	0.4196
<b>2.3500</b>	5.17		51.7	36.5	20258.6111	0.4128
2.3667	5.13		51.3	36.1	20036.3889	0.4082
2.3833	5.02		50.2	35	19425.2778	0.3958
<b>2.4000</b>	4.94		49.4	34.2	18980.8333	0.3867
2.4167	4.93		49.3	34.1	18925.2778	0.3856
2.4333	4.87		48.7	33.5	18591.9444	0.3788

Table H.4 Benzene column tracer study without flowcells #1. (cont')

Time	Conductance (mMhos)		Adjust for Range (x10)	Conductance - Initial Conduct.	Added NaCl Conc. from tracer pulse (mg/L)	E-curve S/area under curve of S
	Conductivity (mMhos/cm)					
hr						
<b>2.4500</b>	4.76	47.6	32.4	17980.8333	0.3664	
2.4667	4.74	47.4	32.2	17869.7222	0.3641	
2.4833	4.63	46.3	31.1	17258.6111	0.3516	
<b>2.5000</b>	4.68	46.8	31.6	17536.3889	0.3573	
2.5167	4.57	45.7	30.5	16925.2778	0.3449	
2.5333	4.51	45.1	29.9	16591.9444	0.3381	
<b>2.5500</b>	4.47	44.7	29.5	16369.7222	0.3335	
2.5667	4.45	44.5	29.3	16258.6111	0.3313	
2.5833	4.34	43.4	28.2	15647.5000	0.3188	
<b>2.6000</b>	4.25	42.5	27.3	15147.5000	0.3086	
2.6167	4.22	42.2	27	14980.8333	0.3052	
2.6333	4.18	41.8	26.6	14758.6111	0.3007	
<b>2.6500</b>	4.16	41.6	26.4	14647.5000	0.2984	
2.6667	4.15	41.5	26.3	14591.9444	0.2973	
2.6833	4.05	40.5	25.3	14036.3889	0.2860	
<b>2.7000</b>	4	40	24.8	13758.6111	0.2803	
2.7167	3.96	39.6	24.4	13536.3889	0.2758	
2.7333	3.9	39	23.8	13203.0556	0.2690	
<b>2.7500</b>	3.86	38.6	23.4	12980.8333	0.2645	
2.7667	3.83	38.3	23.1	12814.1667	0.2611	
2.7833	3.79	37.9	22.7	12591.9444	0.2566	
2.8167	3.73	37.3	22.1	12258.6111	0.2498	
<b>2.8500</b>	3.65	36.5	21.3	11814.1667	0.2407	
2.8833	3.56	35.6	20.4	11314.1667	0.2305	
<b>2.9167</b>	3.47	34.7	19.5	10814.1667	0.2203	
<b>2.9500</b>	3.39	33.9	18.7	10369.7222	0.2113	
2.9833	3.37	33.7	18.5	10258.6111	0.2090	

Table H.4 Benzene column tracer study without flowcells #1. (cont')

Time	Conductance (mMhos)		Adjust for Range (x10)	Conductance - Initial Conduct.	Added NaCl Conc. from tracer pulse (mg/L)	E-curve S/area under curve of S
	Conductivity (mMhos/cm)					
3.0167	3.29		32.9	17.7	9814.1667	0.2000
3.1000	3.16		31.6	16.4	9091.9444	0.1852
3.1833	3.06		30.6	15.4	8536.3889	0.1739
3.2667	2.99		29.9	14.7	8147.5000	0.1660
3.3500	2.84		28.4	13.2	7314.1667	0.1490
3.4333	2.77		27.7	12.5	6925.2778	0.1411
3.5167	2.69		26.9	11.7	6480.8333	0.1320
3.6833	2.56		25.6	10.4	5758.6111	0.1173
3.8500	2.45		24.5	9.3	5147.5000	0.1049
4.1000	2.3		23	7.8	4314.1667	0.0879
4.3500	2.15		21.5	6.3	3480.8333	0.0709
4.6000	2.01		20.1	4.9	2703.0556	0.0551
4.8500	1.93		19.3	4.1	2258.6111	0.0460
5.1000	1.83		18.3	3.1	1703.0556	0.0347
5.3500	1.67		16.7	1.5	814.1667	0.0166
5.6000	1.58		15.8	0.6	314.1667	0.0064
5.8500	1.56		15.6	0.4	203.0556	0.0041
6.3500	1.53		15.3	0.1	36.3889	0.0007
6.4333	1.52		15.2	0		



Table H.4 Benzene column tracer study without flowcells #1. (cont')

Time (hr)	E	dt	height	area	t	dt <sup>h</sup> *t
1.5500	0.8757	0.0500	0.8605	0.0430	1.5750	0.0678
1.6000	0.8452	0.0500	0.8457	0.0423	1.6250	0.0687
1.6500	0.8463	0.0542	0.8152	0.0442	1.6771	0.0741
1.7042	0.7841	0.0458	0.7693	0.0353	1.7271	0.0609
1.7500	0.7546	0.0500	0.7388	0.0369	1.7750	0.0656
1.8000	0.7229	0.0500	0.7088	0.0354	1.8250	0.0647
1.8500	0.6946	0.0500	0.6760	0.0338	1.8750	0.0634
1.9000	0.6573	0.0500	0.6420	0.0321	1.9250	0.0618
1.9500	0.6267	0.0500	0.6216	0.0311	1.9750	0.0614
2.0000	0.6165	0.0500	0.5967	0.0298	2.0250	0.0604
2.0500	0.5769	0.0500	0.5622	0.0281	2.0750	0.0583
2.1000	0.5475	0.0500	0.5322	0.0266	2.1250	0.0565
2.1500	0.5169	0.0500	0.5079	0.0254	2.1750	0.0552
2.2000	0.4988	0.0500	0.4818	0.0241	2.2250	0.0536
2.2500	0.4648	0.0500	0.4501	0.0225	2.2750	0.0512
2.3000	0.4354	0.0500	0.4241	0.0212	2.3250	0.0493
2.3500	0.4128	0.0500	0.3998	0.0200	2.3750	0.0475
2.4000	0.3867	0.0500	0.3765	0.0188	2.4250	0.0457
2.4500	0.3664	0.0500	0.3618	0.0181	2.4750	0.0448
2.5000	0.3573	0.0500	0.3454	0.0173	2.5250	0.0436
2.5500	0.3335	0.0500	0.3211	0.0161	2.5750	0.0413
2.6000	0.3086	0.0500	0.3035	0.0152	2.6250	0.0398
2.6500	0.2984	0.0500	0.2894	0.0145	2.6750	0.0387
2.7000	0.2803	0.0500	0.2724	0.0136	2.7250	0.0371
2.7500	0.2645	0.1000	0.2526	0.0253	2.8000	0.0707
2.8500	0.2407	0.0667	0.2305	0.0154	2.8833	0.0443
2.9167	0.2203	0.0333	0.2158	0.0072	2.9333	0.0211
2.9500	0.2113	0.0667	0.2056	0.0137	2.9833	0.0409
3.0167	0.2000	0.0833	0.1926	0.0161	3.0583	0.0491
3.1000	0.1852	0.0833	0.1796	0.0150	3.1417	0.0470
3.1833	0.1739	0.0833	0.1700	0.0142	3.2250	0.0457
3.2667	0.1660	0.0833	0.1575	0.0131	3.3083	0.0434
3.3500	0.1490	0.0833	0.1451	0.0121	3.3917	0.0410

Table H.4 Benzene column tracer study without flowcells #1. (cont')

Time (hr)	E	dt	height	area	t	dt*h*t
3.4333	0.1411	0.0833	0.1366	0.0114	3.4750	0.0396
3.5167	0.1320	0.1667	0.1247	0.0208	3.6000	0.0748
3.6833	0.1173	0.1667	0.1111	0.0185	3.7667	0.0698
3.8500	0.1049	0.2500	0.0964	0.0241	3.9750	0.0958
4.1000	0.0879	0.2500	0.0794	0.0199	4.2250	0.0839
4.3500	0.0709	0.2500	0.0630	0.0157	4.4750	0.0705
4.6000	0.0551	0.2500	0.0505	0.0126	4.7250	0.0597
4.8500	0.0460	0.2500	0.0404	0.0101	4.9750	0.0502
5.1000	0.0347	0.2500	0.0256	0.0064	5.2250	0.0335
5.3500	0.0166	0.2500	0.0115	0.0029	5.4750	0.0157
5.6000	0.0064	0.2500	0.0053	0.0013	5.7250	0.0075
5.8500	0.0041	0.5000	0.0024	0.0012	6.1000	0.0074
6.3500	0.0007					

Control No FC#1 - E-Curve

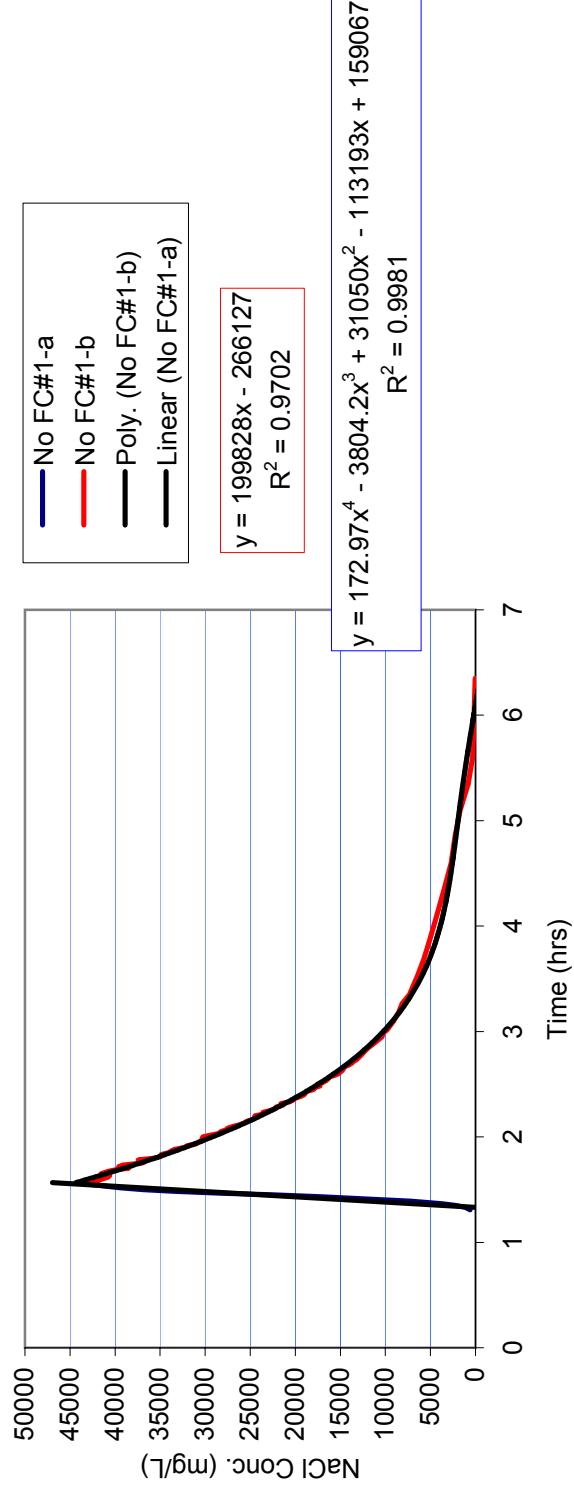




Table H.5. Benzene column tracer study without flowcells #2.

## No Flowcell #2

2.63

Time hr	Conductance (mMhos)	Adjust for Range (x10)	Conductance - Initial Conduct.	Added NaCl Conc. from tracer pulse (mg/L)	E-curve S/area under curve of S	Flowrate (mL/min)
	Conductivity (mMhos/cm)					
0	1.47	14.7				2.78
		0				
0.0292	1.5	15				
0.1667	1.46	14.6				
0.3333	1.35	13.5				
0.5000	1.34	13.4	0			
<b>0.6667</b>	1.35	13.5	0.1	36.3889	0.0008	
<b>0.8333</b>	1.35	13.5	0.1	36.3889	0.0008	
<b>0.9167</b>	1.37	13.7	0.3	147.5000	0.0032	
<b>1.0000</b>	1.37	13.7	0.3	147.5000	0.0032	
<b>1.0833</b>	1.36	13.6	0.2	91.9444	0.0020	
<b>1.1667</b>	1.36	13.6	0.2	91.9444	0.0020	
<b>1.2500</b>	1.36	13.6	0.2	91.9444	0.0020	
<b>1.3333</b>	1.36	13.6	0.2	91.9444	0.0020	
1.3500	1.37	13.7	0.3	147.5000	0.0032	
<b>1.3667</b>	1.37	13.7	0.3	147.5000	0.0032	
1.3833	1.39	13.9	0.5	258.6111	0.0056	
<b>1.4000</b>	1.4	14	0.6	314.1667	0.0067	
1.4167	1.43	14.3	0.9	480.8333	0.0103	
1.4417	1.46	14.6	1.2	647.5000	0.0139	
<b>1.4500</b>	1.46	14.6	1.2	647.5000	0.0139	
1.4708	1.54	15.4	2	1091.9444	0.0234	
1.4833	1.61	16.1	2.7	1480.8333	0.0318	
<b>1.5000</b>	1.73	17.3	3.9	2147.5000	0.0461	
1.5250	2.01	20.1	6.7	3703.0556	0.0795	
1.5333	2.15	21.5	8.1	4480.8333	0.0962	
<b>1.5500</b>	2.39	23.9	10.5	5814.1667	0.1248	
1.5667	4.72	47.2	33.8	18758.6111	0.4027	

Table H.5. Benzene column tracer study without flowcells #2. (con't)

Time	Conductance (mMhos)		Adjust for Range (x10)	Conductance - Initial Conduct.	Added NaCl Conc. from tracer pulse (mg/L)	E-curve S/area under curve of S
	Conductivity (mMhos/cm)					
1.5861	5.61		56.1	42.7	23703.0556	0.5088
<b>1.6000</b>	5.93		59.3	45.9	25480.8333	0.5469
1.6417	6.43		64.3	50.9	28258.6111	0.6066
<b>1.6500</b>	6.67		66.7	53.3	29591.9444	0.6352
1.6667	6.75		67.5	54.1	30036.3889	0.6447
1.6833	6.89		68.9	55.5	30814.1667	0.6614
<b>1.7000</b>	6.92		69.2	55.8	30980.8333	0.6650
1.7167	6.96		69.6	56.2	31203.0556	0.6698
1.7417	6.88		68.8	55.4	30758.6111	0.6602
<b>1.7500</b>	7.01		70.1	56.7	31480.8333	0.6757
1.7667	6.92		69.2	55.8	30980.8333	0.6650
1.7833	6.81		68.1	54.7	30369.7222	0.6519
<b>1.8000</b>	6.76		67.6	54.2	30091.9444	0.6459
1.8167	6.71		67.1	53.7	29814.1667	0.6400
1.8333	6.72		67.2	53.8	29869.7222	0.6412
<b>1.8500</b>	6.73		67.3	53.9	29925.2778	0.6423
1.8667	6.56		65.6	52.2	28980.8333	0.6221
1.8833	6.54		65.4	52	28869.7222	0.6197
<b>1.9000</b>	6.54		65.4	52	28869.7222	0.6197
1.9167	6.37		63.7	50.3	27925.2778	0.5994
1.9333	6.33		63.3	49.9	27703.0556	0.5946
<b>1.9500</b>	6.39		63.9	50.5	28036.3889	0.6018
1.9667	6.22		62.2	48.8	27091.9444	0.5815
1.9833	6.2		62	48.6	26980.8333	0.5791
<b>2.0000</b>	6.22		62.2	48.8	27091.9444	0.5815
2.0167	6.07		60.7	47.3	26258.6111	0.5636
2.0333	6.05		60.5	47.1	26147.5000	0.5613
<b>2.0500</b>	5.93		59.3	45.9	25480.8333	0.5469

Table H.5. Benzene column tracer study without flowcells #2. (con't)

Time	Conductance (mMhos)		Adjust for Range (x10)	Conductance - Initial Conduct.	Added NaCl Conc. from tracer pulse		E-curve S/area under curve of S
	Conductivity (mMhos/cm)				(mg/L)		
2.0667	5.87		58.7	45.3	25147.5000		0.5398
2.0833	5.82		58.2	44.8	24869.7222		0.5338
<b>2.1000</b>	5.77		57.7	44.3	24591.9444		0.5279
2.1167	5.71		57.1	43.7	24258.6111		0.5207
2.1333	5.71		57.1	43.7	24258.6111		0.5207
<b>2.1500</b>	5.6		56	42.6	23647.5000		0.5076
2.1667	5.56		55.6	42.2	23425.2778		0.5028
2.1833	5.53		55.3	41.9	23258.6111		0.4992
<b>2.2000</b>	5.47		54.7	41.3	22925.2778		0.4921
2.2167	5.49		54.9	41.5	23036.3889		0.4945
2.2333	5.46		54.6	41.2	22869.7222		0.4909
<b>2.2500</b>	5.42		54.2	40.8	22647.5000		0.4861
2.2667	5.23		52.3	38.9	21591.9444		0.4635
2.2833	5.21		52.1	38.7	21480.8333		0.4611
<b>2.3000</b>	5.13		51.3	37.9	21036.3889		0.4515
2.3167	5.07		50.7	37.3	20703.0556		0.4444
2.3333	5.09		50.9	37.5	20814.1667		0.4468
<b>2.3500</b>	5.04		50.4	37	20536.3889		0.4408
2.3667	5		50	36.6	20314.1667		0.4360
2.3833	4.87		48.7	35.3	19591.9444		0.4205
<b>2.4000</b>	4.82		48.2	34.8	19314.1667		0.4146
2.4167	4.76		47.6	34.2	18980.8333		0.4074
2.4333	4.73		47.3	33.9	18814.1667		0.4038
<b>2.4500</b>	4.67		46.7	33.3	18480.8333		0.3967
2.4667	4.61		46.1	32.7	18147.5000		0.3895
2.4833	4.61		46.1	32.7	18147.5000		0.3895
<b>2.5000</b>	4.51		45.1	31.7	17591.9444		0.3776
2.5167	4.43		44.3	30.9	17147.5000		0.3681

Table H.5. Benzene column tracer study without flowcells #2. (con't)

Time	Conductance (mMhos)		Adjust for Range (x10)	Conductance - Initial Conduct.	Added NaCl Conc. from tracer pulse (mg/L)	E-curve S/area under curve of S
	Conductivity (mMhos/cm)					
2.5333	4.39		43.9	30.5	16925.2778	0.3633
<b>2.5500</b>	4.37		43.7	30.3	16814.1667	0.3609
2.5667	4.34		43.4	30	16647.5000	0.3573
2.5833	4.28		42.8	29.4	16314.1667	0.3502
<b>2.6000</b>	4.32		43.2	29.8	16536.3889	0.3550
2.6167	4.21		42.1	28.7	15925.2778	0.3418
2.6333	4.16		41.6	28.2	15647.5000	0.3359
<b>2.6500</b>	4.1		41	27.6	15314.1667	0.3287
2.6667	4.06		40.6	27.2	15091.9444	0.3239
2.6833	4		40	26.6	14758.6111	0.3168
<b>2.7167</b>	3.94		39.4	26	14425.2778	0.3096
<b>2.7500</b>	3.9		39	25.6	14203.0556	0.3049
2.7833	3.78		37.8	24.4	13536.3889	0.2906
<b>2.8167</b>	3.7		37	23.6	13091.9444	0.2810
<b>2.8500</b>	3.62		36.2	22.8	12647.5000	0.2715
2.8833	3.59		35.9	22.5	12480.8333	0.2679
<b>2.9167</b>	3.5		35	21.6	11980.8333	0.2572
<b>2.9500</b>	3.43		34.3	20.9	11591.9444	0.2488
2.9833	3.36		33.6	20.2	11203.0556	0.2405
<b>3.0167</b>	3.29		32.9	19.5	10814.1667	0.2321
<b>3.0500</b>	3.27		32.7	19.3	10703.0556	0.2297
3.0833	3.15		31.5	18.1	10036.3889	0.2154
<b>3.1167</b>	3.08		30.8	17.4	9647.5000	0.2071
<b>3.1500</b>	3.05		30.5	17.1	9480.8333	0.2035
3.1833	3		30	16.6	9203.0556	0.1975
<b>3.2500</b>	2.92		29.2	15.8	8758.6111	0.1880
<b>3.3333</b>	2.77		27.7	14.3	7925.2778	0.1701

Table H.5. Benzene column tracer study without flowcells #2. (con't)

Time	Conductance (mMhos)		Adjust for Range (x10)	Conductance - Initial Conduct.	Added NaCl Conc. from tracer pulse (mg/L)	E-curve S/area under curve of S
	Conductivity (mMhos/cm)					
3.4167	2.69		26.9	13.5	7480.8333	0.1606
3.5000	2.59		25.9	12.5	6925.2778	0.1487
3.5833	2.51		25.1	11.7	6480.8333	0.1391
3.6667	2.45		24.5	11.1	6147.5000	0.1320
3.7500	2.37		23.7	10.3	5703.0556	0.1224
3.8333	2.3		23	9.6	5314.1667	0.1141
4.0000	2.2		22	8.6	4758.6111	0.1021
4.1667	2.12		21.2	7.8	4314.1667	0.0926
4.3333	2.07		20.7	7.3	4036.3889	0.0866
4.5000	2		20	6.6	3647.5000	0.0783
4.6667	1.95		19.5	6.1	3369.7222	0.0723
4.9167	1.89		18.9	5.5	3036.3889	0.0652
5.1667	1.82		18.2	4.8	2647.5000	0.0568
5.4167	1.79		17.9	4.5	2480.8333	0.0533
5.6667	1.73		17.3	3.9	2147.5000	0.0461
5.9167	1.71		17.1	3.7	2036.3889	0.0437
6.4167	1.65		16.5	3.1	1703.0556	0.0366
6.9208	1.58		15.8	2.4	1314.1667	0.0282
7.1833	1.57		15.7	2.3	1258.6111	0.0270
7.3000	1.57		15.7	2.3	1258.6111	0.0270
7.4167	1.56		15.6	2.2	1203.0556	0.0258

Table H.5. Benzene column tracer study without flowcells #2. (con't)

Polynomial #1 -31816x<sup>2</sup> + 114781x - 100114  
 Polynomial #2 24.197x<sup>4</sup> - 923.7x<sup>3</sup> + 11131x<sup>2</sup> - 54798x + 98557

Time (hr)	5	4	3	2	1	Area Under Curve
			Polynomial #1			
1.45				-3.18E+05	1.15E+06	-1.00E+06
1.75				-323312.7785	1206635.263	-1451653
				-568372.4375	1757584.063	-1751995
						<b>5547.141</b>
			Polynomial #2			
		24.197	-923.7	11131	-54798	98557
1.75		79.42948809	-2165.823926	19885.06771	-83909.4375	172474.75
7.417		108625.7818	-698850.159	1513902.008	-1507270.747	730997.269
						<b>41040.16745</b>

Injected 20 mL of 58560 mg/L NaCl (=1N NaCl)

**Total Area** 46587.30845  
**% Recovered** 79.55483001

Time (hr)	E	dt	height	area	t	dt*h*t
0.6667	0.0008	0.1667	0.0008	0.0001	0.7500	0.0001
0.8333	0.0008	0.0833	0.0020	0.0002	0.8750	0.0001
0.9167	0.0032	0.0833	0.0032	0.0003	0.9583	0.0003
1.0000	0.0032	0.0833	0.0026	0.0002	1.0417	0.0002
1.0833	0.0020	0.0833	0.0020	0.0002	1.1250	0.0002
1.1667	0.0020	0.0833	0.0020	0.0002	1.2083	0.0002
1.2500	0.0020	0.0833	0.0020	0.0002	1.2917	0.0002
1.3333	0.0020	0.0333	0.0026	0.0001	1.3500	0.0001
1.3667	0.0032	0.0333	0.0050	0.0002	1.3833	0.0002
						<b>Sum of Area</b> 0.999284137
						<b>Sum of Area*t</b> 2.914168541
						<b>HRT mean</b> 2.91625618

$$HRT_{mean} = \frac{\sum t_i c_i \Delta t_i}{\sum c_i \Delta t_i}$$

Table H.5. Benzene column tracer study without flowcells #2. (con't)

Time (hr)	E	dt	height	area	t	dt <sup>2</sup> h <sup>2</sup> t
1.4000	0.0067	0.0500	0.0103	0.0005	1.4250	0.0007
1.4500	0.0139	0.0500	0.0300	0.0015	1.4750	0.0022
1.5000	0.0461	0.0500	0.0854	0.0043	1.5250	0.0065
1.5500	0.1248	0.0500	0.3359	0.0168	1.5750	0.0265
1.6000	0.5469	0.0500	0.5911	0.0296	1.6250	0.0480
1.6500	0.6352	0.0500	0.6501	0.0325	1.6750	0.0544
1.7000	0.6650	0.0500	0.6704	0.0335	1.7250	0.0578
1.7500	0.6757	0.0500	0.6608	0.0330	1.7750	0.0586
1.8000	0.6459	0.0500	0.6441	0.0322	1.8250	0.0588
1.8500	0.6423	0.0500	0.6310	0.0316	1.8750	0.0592
1.9000	0.6197	0.0500	0.6107	0.0305	1.9250	0.0588
1.9500	0.6018	0.0500	0.5917	0.0296	1.9750	0.0584
2.0000	0.5815	0.0500	0.5642	0.0282	2.0250	0.0571
2.0500	0.5469	0.0500	0.5374	0.0269	2.0750	0.0558
2.1000	0.5279	0.0500	0.5177	0.0259	2.1250	0.0550
2.1500	0.5076	0.0500	0.4998	0.0250	2.1750	0.0544
2.2000	0.4921	0.0500	0.4891	0.0245	2.2250	0.0544
2.2500	0.4861	0.0500	0.4688	0.0234	2.2750	0.0533
2.3000	0.4515	0.0500	0.4462	0.0223	2.3250	0.0519
2.3500	0.4408	0.0500	0.4277	0.0214	2.3750	0.0508
2.4000	0.4146	0.0500	0.4056	0.0203	2.4250	0.0492
2.4500	0.3967	0.0500	0.3872	0.0194	2.4750	0.0479
2.5000	0.3776	0.0500	0.3693	0.0185	2.5250	0.0466
2.5500	0.3609	0.0500	0.3579	0.0179	2.5750	0.0461
2.6000	0.3550	0.0500	0.3418	0.0171	2.6250	0.0449
2.6500	0.3287	0.0667	0.3192	0.0213	2.6833	0.0571
2.7167	0.3096	0.0333	0.3073	0.0102	2.7333	0.0280
2.7500	0.3049	0.0667	0.2929	0.0195	2.7833	0.0544
2.8167	0.2810	0.0333	0.2762	0.0092	2.8333	0.0261
2.8500	0.2715	0.0667	0.2643	0.0176	2.8833	0.0508
2.9167	0.2572	0.0333	0.2530	0.0084	2.9333	0.0247
2.9500	0.2488	0.0667	0.2405	0.0160	2.9833	0.0478
3.0167	0.2321	0.0333	0.2309	0.0077	3.0333	0.0234

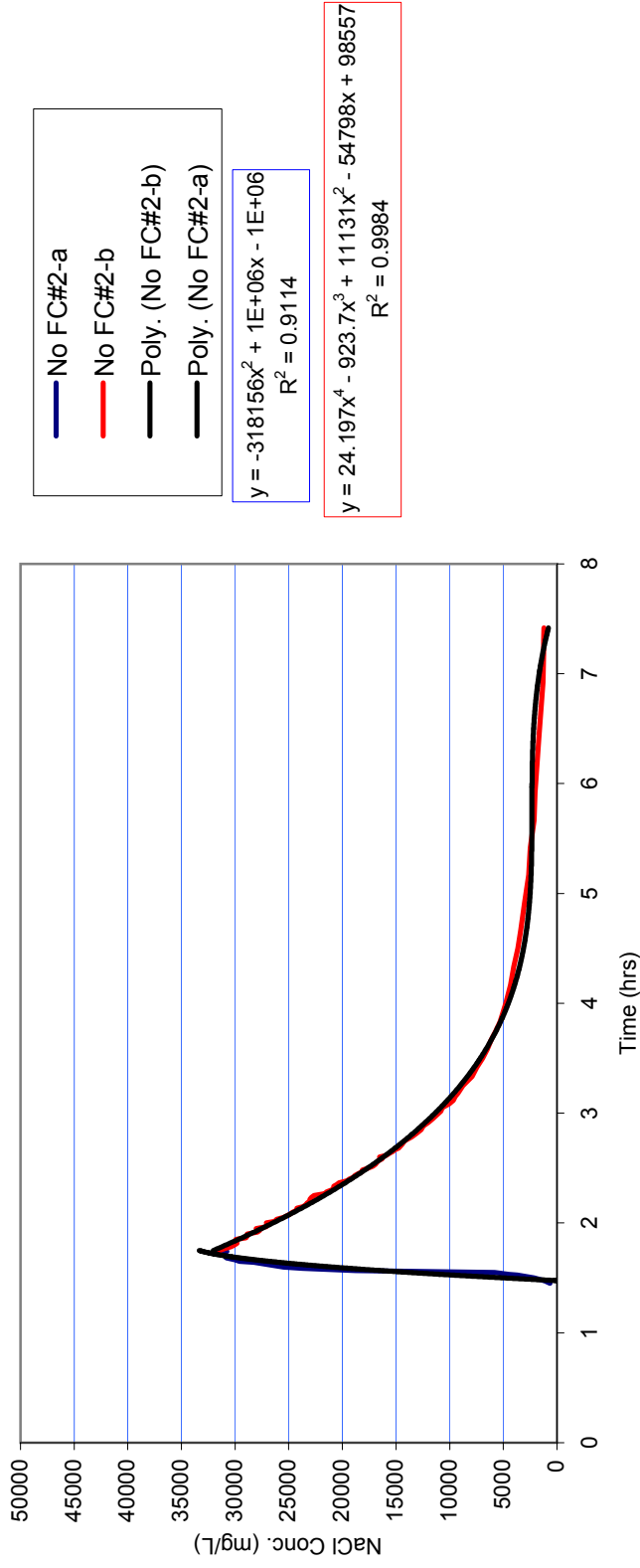
Table H.5. Benzene column tracer study without flowcells #2. (con't)

Time (hr)	E	dt	height	area	t	dt <sup>2</sup> h <sup>2</sup> t
3.0500	0.2297	0.0667	0.2184	0.0146	3.0833	0.0449
3.1167	0.2071	0.0333	0.2053	0.0068	3.1333	0.0214
3.1500	0.2035	0.1000	0.1958	0.0196	3.2000	0.0626
3.2500	0.1880	0.0833	0.1791	0.0149	3.2917	0.0491
3.3333	0.1701	0.0833	0.1653	0.0138	3.3750	0.0465
3.4167	0.1606	0.0833	0.1546	0.0129	3.4583	0.0446
3.5000	0.1487	0.0833	0.1439	0.0120	3.5417	0.0425
3.5833	0.1391	0.0833	0.1355	0.0113	3.6250	0.0409
3.6667	0.1320	0.0833	0.1272	0.0106	3.7083	0.0393
3.7500	0.1224	0.0833	0.1182	0.0099	3.7917	0.0374
3.8333	0.1141	0.1667	0.1081	0.0180	3.9167	0.0706
4.0000	0.1021	0.1667	0.0974	0.0162	4.0833	0.0663
4.1667	0.0926	0.1667	0.0896	0.0149	4.2500	0.0635
4.3333	0.0866	0.1667	0.0825	0.0137	4.4167	0.0607
4.5000	0.0783	0.1667	0.0753	0.0126	4.5833	0.0575
4.6667	0.0723	0.2500	0.0688	0.0172	4.7917	0.0824
4.9167	0.0652	0.2500	0.0610	0.0153	5.0417	0.0769
5.1667	0.0568	0.2500	0.0550	0.0138	5.2917	0.0728
5.4167	0.0533	0.2500	0.0497	0.0124	5.5417	0.0688
5.6667	0.0461	0.2500	0.0449	0.0112	5.7917	0.0650
5.9167	0.0437	0.5000	0.0401	0.0201	6.1667	0.1237
6.4167	0.0366	0.5042	0.0324	0.0163	6.6688	0.1089
6.9208	0.0282	0.2625	0.0276	0.0072	7.0521	0.0511
7.1833	0.0270	0.1167	0.0270	0.0032	7.2417	0.0228
7.3000	0.0270	0.1167	0.0264	0.0031	7.3583	0.0227
7.4167	0.0258					



Table H.5. Benzene column tracer study without flowcells #2. (con't)

Benzene No FC#2 - NaCl Effluent Conc. vs Time



## With Flowcells

Table H.6. Benzene column tracer study with flowcells attached.

Time hr	Conductance (mMhos)		Adjust for Range (x10)	Conductance - Initial Conduct.	Added NaCl Conc. from tracer pulse (mg/L)	E-curve S/area under curve of S	Flowrate (mL/min)
	Conductivity (mMhos/cm)						
0.0000			0				0.915
0.0000			0				
0.0075			0				
0.0250		1.62	16.2				
0.1667		1.56	15.6				
0.3333		1.55	15.5				
0.4167		1.55	15.5				
0.5000		1.57	15.7				
0.5833		1.54	15.4				
0.6667		1.54	15.4				
0.7500		1.54	15.4				
0.8333		1.54	15.4				
0.9167		1.54	15.4				
1.0028		1.57	15.7	0			
1.0833		1.56	15.6	-0.1	-74.7222		
1.1667		1.56	15.6	-0.1	-74.7222		
1.2500		1.57	15.7	0	-19.1667		
1.3333		1.57	15.7	0	-19.1667		
1.4167		1.57	15.7	0	-19.1667		
1.5000		1.56	15.6	-0.1	-74.7222		
1.5833		1.56	15.6	-0.1	-74.7222		
1.7500		1.58	15.8	0.1	36.3889		
1.9208		1.57	15.7	0	-19.1667		
2.1667		1.56	15.6	-0.1	-74.7222		
2.3333		1.58	15.8	0.1	36.3889		
2.3917		1.59	15.9	0.2	91.9444		
2.4250		1.61	16.1	0.4	203.0556		
2.4667		1.61	16.1	0.4	203.0556		

Table H.6. Benzene column tracer study with flowcells attached. (con't)

Time	Conductance (mMhos)		Adjust for Range (x10)	Conductance - Initial Conduct.	Added NaCl Conc. from tracer pulse (mg/L)	E-curve S/area under curve of S
	Conductivity (mMhos/cm)					
<b>2.5167</b>	1.64		16.4	0.7	369.7222	0.0089
<b>2.5500</b>	1.67		16.7	1	536.3889	0.0129
2.5833	1.71		17.1	1.4	758.6111	0.0183
<b>2.6167</b>	1.79		17.9	2.2	1203.0556	0.0290
2.6417	1.91		19.1	3.4	1869.7222	0.0451
<b>2.6500</b>	1.98		19.8	4.1	2258.6111	0.0545
2.6667	2.18		21.8	6.1	3369.7222	0.0812
2.6833	2.43		24.3	8.6	4758.6111	0.1147
<b>2.7000</b>	2.73		27.3	11.6	6425.2778	0.1549
2.7167	3.11		31.1	15.4	8536.3889	0.2058
2.7333	3.53		35.3	19.6	10869.7222	0.2620
<b>2.7500</b>	4.01		40.1	24.4	13536.3889	0.3263
2.7667	4.29		42.9	27.2	15091.9444	0.3638
2.7833	4.56		45.6	29.9	16591.9444	0.4000
<b>2.8000</b>	4.77		47.7	32	17758.6111	0.4281
2.8167	4.86		48.6	32.9	18258.6111	0.4402
2.8333	4.98		49.8	34.1	18925.2778	0.4563
<b>2.8583</b>	5.03		50.3	34.6	19203.0556	0.4630
2.8750	5.14		51.4	35.7	19814.1667	0.4777
2.8917	5.18		51.8	36.1	20036.3889	0.4830
<b>2.9167</b>	5.16		51.6	35.9	19925.2778	0.4804
<b>2.9500</b>	5.16		51.6	35.9	19925.2778	0.4804
2.9667	5.1		51	35.3	19591.9444	0.4723
2.9833	5.17		51.7	36	19980.8333	0.4817
<b>3.0000</b>	5.14		51.4	35.7	19814.1667	0.4777
3.0167	5.05		50.5	34.8	19314.1667	0.4656
3.0333	5		50	34.3	19036.3889	0.4589
<b>3.0833</b>	5		50	34.3	19036.3889	0.4589

Table H.6. Benzene column tracer study with flowcells attached. (con't)

Time	Conductance (mMhos)		Adjust for Range (x10)	Conductance - Initial Conduct.	Added NaCl Conc. from tracer pulse (mg/L)	E-curve S/area under curve of S
	Conductivity (mMhos/cm)					
3.1333	4.87		48.7	33	18314.1667	0.4415
3.2000	4.82		48.2	32.5	18036.3889	0.4348
3.2833	4.72		47.2	31.5	17480.8333	0.4214
3.3667	4.5		45	29.3	16258.6111	0.3920
3.4500	4.38		43.8	28.1	15591.9444	0.3759
3.5333	4.31		43.1	27.4	15203.0556	0.3665
3.7000	4.1		41	25.3	14036.3889	0.3384
3.8667	3.88		38.8	23.1	12814.1667	0.3089
4.0333	3.7		37	21.3	11814.1667	0.2848
4.2000	3.53		35.3	19.6	10869.7222	0.2620
4.3667	3.38		33.8	18.1	10036.3889	0.2420
4.5333	3.18		31.8	16.1	8925.2778	0.2152
4.7000	3.03		30.3	14.6	8091.9444	0.1951
4.8667	2.94		29.4	13.7	7591.9444	0.1830
5.0333	2.77		27.7	12	6647.5000	0.1603
5.2833	2.64		26.4	10.7	5925.2778	0.1428
5.5333	2.49		24.9	9.2	5091.9444	0.1228
5.7833	2.38		23.8	8.1	4480.8333	0.1080
6.0333	2.26		22.6	6.9	3814.1667	0.0920
6.2833	2.18		21.8	6.1	3369.7222	0.0812
6.5333	2.1		21	5.3	2925.2778	0.0705
6.7833	2.02		20.2	4.5	2480.8333	0.0598
7.0333	1.94		19.4	3.7	2036.3889	0.0491
7.2833	1.89		18.9	3.2	1758.6111	0.0424
7.6167	1.82		18.2	2.5	1369.7222	0.0330
7.9500	1.77		17.7	2	1091.9444	0.0263
8.2833	1.75		17.5	1.8	980.8333	0.0236
8.6167	1.7		17	1.3	703.0556	0.0169

Table H.6. Benzene column tracer study with flowcells attached. (con't)

Time hr	Conductance (mMhos)	Adjust for Range (x10)	Conductance - Initial Conduct.	Added NaCl Conc. from tracer pulse (mg/L)	E-curve S/area under curve of S
	Conductivity (mMhos/cm)				
8.9500	1.67	16.7	1	536.3889	0.0129
9.3833	1.65	16.5	0.8	425.2778	0.0103
9.7167	1.62	16.2	0.5	258.6111	0.0062
10.0500	1.6	16	0.3	147.5000	0.0036
10.3833	1.6	16	0.3	147.5000	0.0036
10.7167	1.6	16	0.3	147.5000	0.0036

Polynomial #1 -61935x2 + 417756x - 668301  
 Polynomial #2 4.4326x4 - 192.37x3 + 3145.2x2 - 23179x + 65564

Time (hr)	Polynomial #1					Area Under Curve
	5	4	3	2	1	
2.583				<b>-61935</b>	<b>4.18E+05</b>	-688396.0388
2.8917				-355785.3863	1393610.831	-1726221.483
				-499200.0178	1746622.983	-1932526.002
	Polynomial #2					<b>3293.001947</b>
2.8917	<b>4.4362</b>		<b>-192.37</b>	<b>3145.2</b>	<b>65564</b>	114848.0318
10.71	179.3937416		-3362.7168	25350.51096	-96910.57487	153034.7511
	125022.583		-632754.4921	1287939.387	-1329363.167	<b>38186.71927</b>
Injected 20 mL of 58560 mg/L NaCl (=1N NaCl)						<b>41479.72121</b>
						<b>70.83285726</b>
<b>Total Area</b>						<b>41479.72121</b>
<b>% Recovered</b>						<b>70.83285726</b>

Table H.6. Benzene column tracer study with flowcells attached. (con't)

Time (hr)	E	dt	height	area	t	dt <sup>h</sup> *t
<b>2.5167</b>	0.0089	0.0333	0.0109	0.0004	2.5333	0.0009
<b>2.5500</b>	0.0129	0.0667	0.0210	0.0014	2.5833	0.0036
<b>2.6167</b>	0.0290	0.0333	0.0417	0.0014	2.6333	0.0037
<b>2.6500</b>	0.0545	0.0500	0.1047	0.0052	2.6750	0.0140
<b>2.7000</b>	0.1549	0.0500	0.2406	0.0120	2.7250	0.0328
<b>2.7500</b>	0.3263	0.0500	0.3772	0.0189	2.7750	0.0523
<b>2.8000</b>	0.4281	0.0583	0.4455	0.0260	2.8292	0.0735
<b>2.8583</b>	0.4630	0.0583	0.4717	0.0275	2.8875	0.0794
<b>2.9167</b>	0.4804	0.0333	0.4804	0.0160	2.9333	0.0470
<b>2.9500</b>	0.4804	0.0500	0.4790	0.0240	2.9750	0.0713
<b>3.0000</b>	0.4777	0.0833	0.4683	0.0390	3.0417	0.1187
<b>3.0833</b>	0.4589	0.0500	0.4502	0.0225	3.1083	0.0700
<b>3.1333</b>	0.4415	0.0667	0.4382	0.0292	3.1667	0.0925
<b>3.2000</b>	0.4348	0.0833	0.4281	0.0357	3.2417	0.1157
<b>3.2833</b>	0.4214	0.0833	0.4067	0.0339	3.3250	0.1127
<b>3.3667</b>	0.3920	0.0833	0.3839	0.0320	3.4083	0.1090
<b>3.4500</b>	0.3759	0.0833	0.3712	0.0309	3.4917	0.1080
<b>3.5333</b>	0.3665	0.1667	0.3525	0.0587	3.6167	0.2125
<b>3.7000</b>	0.3384	0.1667	0.3237	0.0539	3.7833	0.2041
<b>3.8667</b>	0.3089	0.1667	0.2969	0.0495	3.9500	0.1954
<b>4.0333</b>	0.2848	0.1667	0.2734	0.0456	4.1167	0.1876
<b>4.2000</b>	0.2620	0.1667	0.2520	0.0420	4.2833	0.1799
<b>4.3667</b>	0.2420	0.1667	0.2286	0.0381	4.4500	0.1695
<b>4.5333</b>	0.2152	0.1667	0.2051	0.0342	4.6167	0.1578
<b>4.7000</b>	0.1951	0.1667	0.1891	0.0315	4.7833	0.1507
<b>4.8667</b>	0.1830	0.1667	0.1716	0.0286	4.9500	0.1416
<b>5.0333</b>	0.1603	0.2500	0.1516	0.0379	5.1583	0.1954

**Sum of Area**  
0.999328344

**Sum of Area\*t**  
4.381626144

**HRT mean**  
4.384571067

Table H.6. Benzene column tracer study with flowcells attached. (con't)

Time (hr)	E	dt	height	area	t	dt <sup>2</sup> h <sup>2</sup> t
5.2833	0.1428	0.2500	0.1328	0.0332	5.4083	0.1796
5.5333	0.1228	0.2500	0.1154	0.0288	5.6583	0.1632
5.7833	0.1080	0.2500	0.1000	0.0250	5.9083	0.1477
6.0333	0.0920	0.2500	0.0866	0.0216	6.1583	0.1333
6.2833	0.0812	0.2500	0.0759	0.0190	6.4083	0.1216
6.5333	0.0705	0.2500	0.0652	0.0163	6.6583	0.1085
6.7833	0.0598	0.2500	0.0545	0.0136	6.9083	0.0940
7.0333	0.0491	0.2500	0.0457	0.0114	7.1583	0.0819
7.2833	0.0424	0.3333	0.0377	0.0126	7.4500	0.0936
7.6167	0.0330	0.3333	0.0297	0.0099	7.7833	0.0770
7.9500	0.0263	0.3333	0.0250	0.0083	8.1167	0.0676
8.2833	0.0236	0.3333	0.0203	0.0068	8.4500	0.0572
8.6167	0.0169	0.3333	0.0149	0.0050	8.7833	0.0437
8.9500	0.0129	0.4333	0.0116	0.0050	9.1667	0.0460
9.3833	0.0103	0.3333	0.0082	0.0027	9.5500	0.0262
9.7167	0.0062	0.3333	0.0049	0.0016	9.8833	0.0161
10.0500	0.0036	0.6667	0.0036	0.0024	10.3833	0.0246
10.7167	0.0036					

Table H.6. Benzene column tracer study with flowcells attached. (con't)

Benzene #3 - NaCl Effluent Conc vs. Time

