APPENDIX E:

DATA, FIGURES, AND TABLES FROM MANUSCRIPT #2:

MEASURING NITRIFYING POPULATIONS IN A BIOLOGICAL AERATED FILTER SYSTEM USING QUANTITATIVE DOT BLOTTING

PROFILE # 4

4th Column Profile

Date: **9/30/98**
Flows: **C column:** **12.0 gpm** **N column:** **10.5 gpm**
9.4 m/hr **8.2 m/hr**

Quantification of Mass Standards

Dilutions of *E.coli* and *N. europaea* probed with Universal Probe EUB338

EUB338

Mass blotted	E. coli signal	N. europaea signal
667.7	217301.5	363512.5
267.1	102998.31	256134
133.5	116076.5	178695.1
26.7	29349.1	65959.6
2.7	3628.5	5457.3

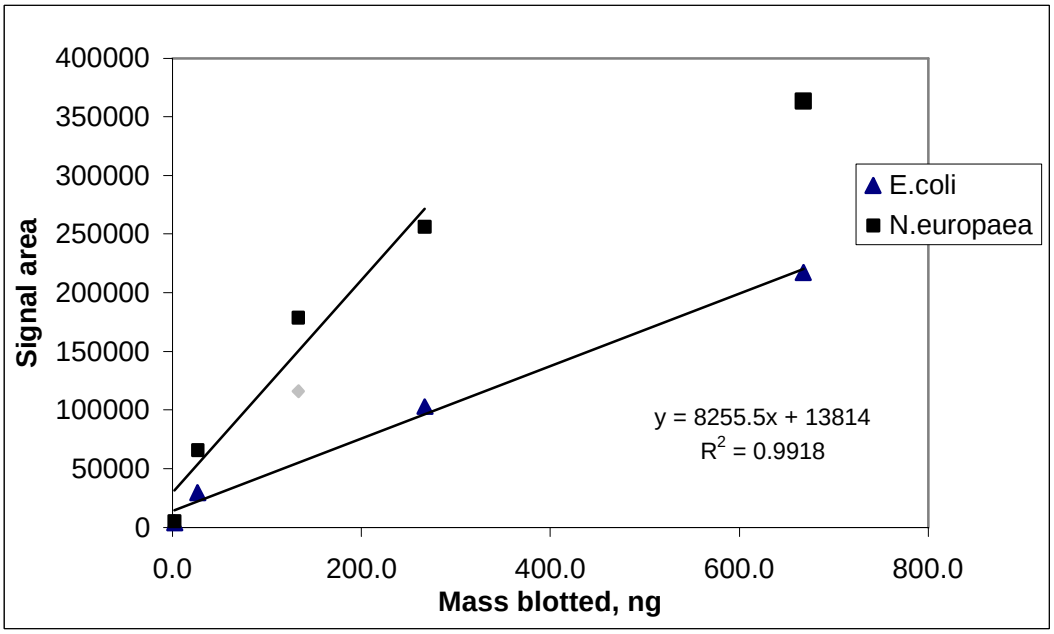


Figure E-1. EUB338 Mass Standard Fit, Profile 4, 9/30/98, 9.4 & 8.2 m/hr.

4th Column Profile

Date: **9/30/98**
Flows: **C column:** **12.0 gpm** **N column:** **10.5 gpm**
9.4 m/hr **8.2 m/hr**

Quantification of Mass Standards

Dilutions of *E.coli* and *N. europaea* probed with Universal Probe Nso190

Mass blotted	E. coli signal	N. europaea signal
667.7	79209.9	792095.8
267.1	98759.4	782903.6
133.5	66119.3	459684.4
26.7		214431.9
2.7		80695.13

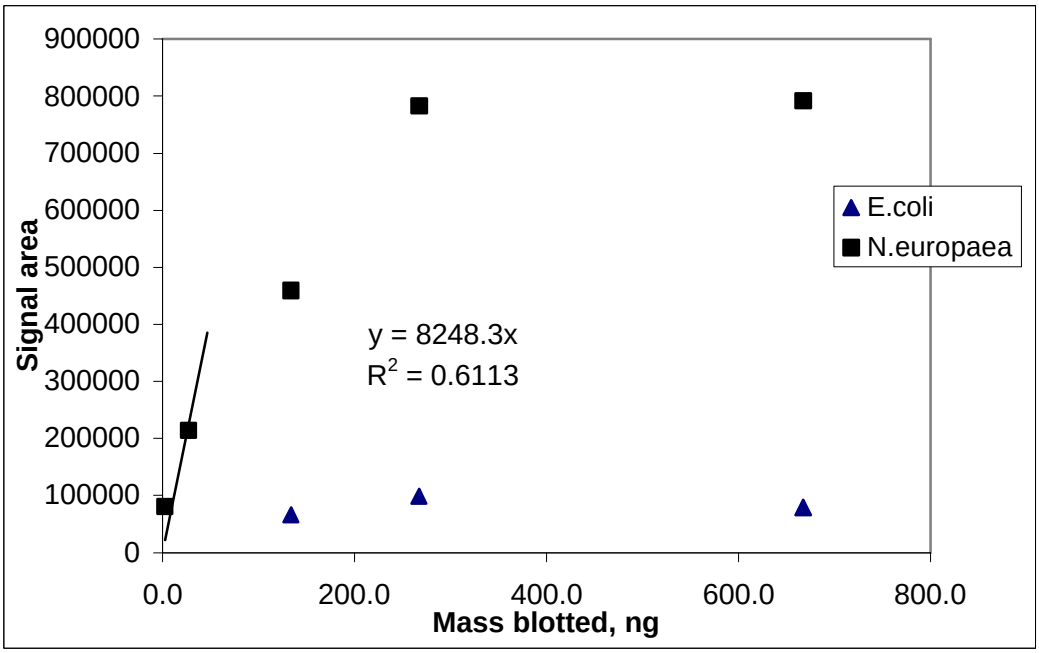


Figure E-2. Nso190 Mass Standard Fit, Profile 4, 9/30/98, 9.4 & 8.2 m/hr.

Table E-1. **Profile 4** **C Column EUB338 Densitometry Analysis Data** **9/30/98**

Flows: **C column:** **12.0 gpm** **N column:** **10.5 gpm**
9.4 m/hr **8.2 m/hr**

Sample	Approx. Mass NA blotted, ng	Peak Area	Mass, per standard fit	Volume Blotted, ul	Actual conc. ng/ul	Total Average concentration
C1a	15	**83085.25**	**8.39**	**1.65**	**5.09**	4.94
	15	**79147.56**	**7.91**	**1.65**	**4.80**	
	5	28262.93	1.75	0.551		
	5	40440.46	3.23	0.551		
	1	10981.84	-0.34	0.11		
	1	8380.175	-0.66	0.11		
C1b	15	132740.4	14.41	2.28		7.79
	15	134666.5	14.64	2.28		
	5	**65705.32**	**6.29**	**0.76**	**8.27**	
	5	**59611.9**	**5.55**	**0.76**	**7.30**	
	1	53467.53	4.80	0.152		
	1	19175.37	0.65	0.152		
C2a	15	**72103.38**	**7.06**	**22.4**	**0.32**	0.34
	15	**81329.38**	**8.18**	**22.4**	**0.37**	
	5	35682.33	2.65	7.46		
	5	34057.03	2.45	7.46		
	1	14189.67	0.05	1.49		
	1	4327.805	-1.15	1.49		
C2b	15	158293	17.50	27.3		1.21
	15	202377.8	22.84	27.3		
	5	**116411.2**	**12.43**	**9.09**	**1.37**	
	5	**92203.7**	**9.50**	**9.09**	**1.04**	
	1	83721.44	8.47	1.82		
	1	41407.99	3.34	1.82		
C3a	15	133541.3	14.50	8.62		2.29
	15	142437.4	15.58	8.62		
	5	**59007.9**	**5.47**	**2.87**	**1.91**	
	5	**77194.63**	**7.68**	**2.87**	**2.68**	
	1	66282.25	6.36	0.575		
	1	87013.56	8.87	0.575		
C3b	15	105090.2	11.06	4.64		3.48
	15	124031	13.35	4.64		
	5	**61183.59**	**5.74**	**1.55**	**3.70**	
	5	**55420.93**	**5.04**	**1.55**	**3.25**	
	1	17815.63	0.48	0.31		
	1	18077.01	0.52	0.31		
C4a	15	**103030.88**	**10.81**	**7.46**	**1.45**	1.64
	15	**126286.3**	**13.62**	**7.46**	**1.83**	
	5	39521.57	3.11	2.49		
	5	127930.9	13.82	2.49		
	1	17620.64	0.46	0.498		
	1	9903.9	-0.47	0.498		
C4b	15	**159917.4**	**17.70**	**7.98**	**2.22**	2.21
	15	**158760.6**	**17.56**	**7.98**	**2.20**	
	5	59667.51	5.55	2.66		
	5	41892.2	3.40	2.66		
	1	12755.54	-0.13	0.532		
	1	16381.89	0.31	0.532		

Dilutions in bold print were selected for analysis based on quality of signal obtained on detection film.
Italics indicate poor sample signal quality.

Table E-2. Profile 4 C Column Nso190 Densitometry Analysis Data 9/30/98

Flows: C column: 12.0 gpm N column: 10.5 gpm
9.4 m/hr 8.2 m/hr

Sample	Approx. Mass NA blotted, ng	Peak Area	Mass, per standard fit	Volume Blotted, ul	Actual conc. ng/ul	Total Average concentration	Fraction of nitrifier	Overall average
C1a	50	*324003.8*	1.47	5.5		0.57	11.6%	9.5%
	50	*268576.1*	1.22	5.5				
	10	135789.2	0.62	1.1				
	10	86904.9	0.39	1.1				
	5	**96559.8**	**0.44**	**0.6**	**0.80**			
	5	**42513.1**	**0.19**	**0.6**	**0.35**			
C1b	50	*416615.9*	1.89	7.6		0.57	7.3%	
	50	*387814.2*	1.76	7.6				
	10	154812.76	0.70	1.5				
	10	123088.7	0.56	1.5				
	5	**96320.3**	**0.44**	**0.8**	**0.58**			
	5	**94591.32**	**0.43**	**0.8**	**0.56**			
C2a	50	*366288.8*	1.66	74.6		0.04	13.2%	10.9%
	50	*263980.1*	1.20	74.6				
	10	144867.8	0.66	14.9				
	10	146177.7	0.66	14.9				
	5	**53746.3**	**0.24**	**7.5**	**0.03**			
	5	**93790.38**	**0.43**	**7.5**	**0.06**			
C2b	50	*418330.2*	1.90	90.1		0.10	8.6%	
	50	*386978.1*	1.76	90.1				
	10	265132.6	1.20	18.2				
	10	271132.7	1.23	18.2				
	5	**209372.4**	**0.95**	**9.1**	**0.10**			
	5	**206702.4**	**0.94**	**9.1**	**0.10**			
C3a	50	*289710.6*	1.32	28.0		0.09	3.9%	4.1%
	50	*279573.6*	1.27	28.0				
	10	**121827**	**0.55**	**5.8**	**0.10**			
	10	**107848.2**	**0.49**	**5.8**	**0.09**			
	5	**55706.54**	**0.25**	**2.9**	**0.09**			
	5	**55532.25**	**0.25**	**2.9**	**0.09**			
C3b	50	*215646.8*	0.98	15.5		0.15	4.3%	
	50	*226853.9*	1.03	15.5				
	10	**91811.78**	**0.42**	**3.1**	**0.13**			
	10	**96104.56**	**0.44**	**3.1**	**0.14**			
	5	**59864.78**	**0.27**	**1.6**	**0.18**			
	5	**42030.81**	**0.19**	**1.6**	**0.12**			
C4a	50	*283219.5*	1.29	24.9		0.13	7.8%	6.3%
	50	*272287.5*	1.24	24.9				
	10	**108437.7**	**0.49**	**5.0**	**0.10**			
	10	**113481.5**	**0.52**	**5.0**	**0.10**			
	5	**90639.81**	**0.41**	**2.5**	**0.17**			
	5	**49253.99**	**0.22**	**2.5**	**0.09**			
C4b	50	*263048.4*	1.19	26.6		0.11	4.9%	
	50	*254285.3*	1.15	26.6				
	10	**115782.3**	**0.53**	**5.3**	**0.10**			
	10	**89940.68**	**0.41**	**5.3**	**0.08**			
	5	**61017.39**	**0.28**	**2.7**	**0.10**			
	5	**64905.72**	**0.29**	**2.7**	**0.11**			

Dilutions in bold print were selected for analysis based on quality of signal obtained on detection film.
Italics indicate poor sample signal quality.

Table E-3. **Profile 4** **N Column EUB338 Densitometry Analysis Data** **9/30/98**

Flows: **C column:** **12.0 gpm** **N column:** **10.5 gpm**
9.4 m/hr **8.2 m/hr**

Sample	Peak Area	Mass, per standard fit	Volume Blotted, ul	Actual conc. ng/ul	Total Average concentration
N1a	**65809.5**	**6.30**	**5.49**	**1.15**	1.33
	64430.69	**6.13**	**5.49**	**1.12**	
	63614.99	**6.03**	**3.66**	**1.65**	
	56380.98	**5.16**	**3.66**	**1.41**	
	21681.83	0.95	0.37		
	20568.91	0.82	0.37		
N1b	**92607.19**	**9.54**	**5.81**	**1.64**	1.94
	115091.8	**12.27**	**5.81**	**2.11**	
	79833.56	**8.00**	**3.88**	**2.06**	
	155554.4	17.17	3.88		
	58059.51	5.36	0.39		
	36972.59	2.81	0.39		
N2a	87267.31	8.90	6.25		2.15
	77037.69	7.66	6.25		
	77214.44	**7.68**	**4.17**	**1.84**	
	88878.38	**9.09**	**4.17**	**2.18**	
	21553.61	**0.94**	**0.42**	**2.25**	
	21770.23	**0.96**	**0.42**	**2.31**	
N2b	**57660**	**5.31**	**5.54**	**0.96**	1.23
	79802.5	**7.99**	**5.54**	**1.44**	
	53158.51	**4.77**	**3.69**	**1.29**	
	61461.64	5.77	3.69		
	25710.65	1.44	0.37		
	15124.41	0.16	0.37		
N3a	92255.94	9.50	5.26		2.27
	81238.75	8.17	5.26		
	51038.5	**4.51**	**3.51**	**1.28**	
	79418.44	**7.95**	**3.51**	**2.26**	
	17543.73	**0.45**	**0.35**	**1.29**	
	26081.21	**1.49**	**0.35**	**4.23**	
N3b	158266.9	17.50	1.26		12.37
	155480	17.16	1.26		
	99047.06	**10.32**	**0.84**	**12.29**	
	100109.38	**10.45**	**0.84**	**12.44**	
	13954.05	0.02	0.084		
	38809.98	3.03	0.084		
N4a	**49447.86**	**4.32**	**36.6**	**0.12**	0.11
	38309.23	**2.97**	**36.6**	**0.08**	
			24.4		
	42025.14	**3.42**	**24.4**	**0.14**	
	11857.38	-0.24	2.4		
	11454.02	-0.29	2.4		
N4b	**43253.01**	**3.57**	**10.6**	**0.34**	0.27
	36827.5	**2.79**	**10.6**	**0.26**	
	23778.19	**1.21**	**7.1**	**0.17**	
	31121.41	**2.10**	**7.1**	**0.30**	
	4627.586	-1.11	0.709		
	4887.824	-1.08	0.709		

Dilutions in bold print were selected for analysis based on quality of signal obtained on detection film.
Italics indicate poor sample signal quality.

Table E-4. Profile 4 N Column Nso190 Densitometry Analysis Data 9/30/98

Flows: C column: 12.0 gpm N column: 10.5 gpm
9.4 m/hr 8.2 m/hr

Sample	Peak Area	Mass, per standard fit	Volume Blotted, ul	Actual conc. ng/ul	Total Average concentration	Fraction of nitrifier	Overall average
N1a	177953.3	0.8	18.3		0.13	9.6%	8.3%
	231337.2	1.1	18.3				
	98437.94	**0.4**	**3.66**	**0.12**			
	71856.56	**0.3**	**3.66**	**0.09**			
	66201.69	**0.3**	**1.83**	**0.16**			
	54546.75	**0.2**	**1.83**	**0.14**			
N1b	279516.6	1.3	19.4		0.13	7.0%	
	244873	1.1	19.4				
	89105.44	**0.4**	**3.88**	**0.10**			
	122949.2	**0.6**	**3.88**	**0.14**			
	61848.12	**0.3**	**1.94**	**0.14**			
	62523.58	**0.3**	**1.94**	**0.15**			
N2a	223158.2	1.0	20.8		0.14	6.7%	5.8%
	280454.8	1.3	20.8				
	86410.7	**0.4**	**4.17**	**0.09**			
	113768.2	**0.5**	**4.17**	**0.12**			
	99824.81	**0.5**	**2.08**	**0.22**			
	62584.86	**0.3**	**2.08**	**0.14**			
N2b	**145519.4**	**0.7**	**18.4**	**0.04**	0.06	4.9%	
	141476.7	**0.6**	**18.4**	**0.03**			
	45522.4	**0.2**	**3.69**	**0.06**			
	40033.45	**0.2**	**3.69**	**0.05**			
	46975.43	**0.2**	**1.85**	**0.12**			
	29727.56	**0.1**	**1.85**	**0.07**			
N3a	143218.11	0.7	17.5		0.07	3.0%	1.9%
	210273.4	1.0	17.5				
	45928.67	**0.2**	**3.51**	**0.06**			
	45897.01	**0.2**	**3.51**	**0.06**			
	29149.65	**0.1**	**1.75**	**0.08**			
	29398.59	**0.1**	**1.75**	**0.08**			
N3b	41937.71	0.2	4.17		0.11	0.9%	
	51079.74	0.2	4.17				
	19419.76	**0.1**	**0.834**	**0.11**			
	17350.91	**0.1**	**0.834**	**0.09**			
	10022.273	**0.0**	**0.417**	**0.11**			
	11639.375	**0.1**	**0.417**	**0.13**			
N4a	147869.2	0.7	122		0.01	9.9%	8.7%
	150324.3	0.7	122				
	53107.39	**0.2**	**24.4**	**0.01**			
	48166.18	**0.2**	**24.4**	**0.01**			
	43199.9	**0.2**	**12.2**	**0.02**			
	26233.19	**0.1**	**12.2**	**0.01**			
N4b	90313.38	0.4	35.5		0.02	7.5%	
	125413.5	0.6	35.5				
	35174.93	**0.2**	**7.09**	**0.02**			
	20307.638	**0.1**	**7.09**	**0.01**			
	17933.35	**0.1**	**3.55**	**0.02**			
	17059.069	**0.1**	**3.55**	**0.02**			

Dilutions in bold print were selected for analysis based on quality of signal obtained on detection film.
Italics indicate poor sample signal quality.

Table E-5. Profile 4 C Column Sample Concentration Determination 9/30/98
Spectrophotometry Method

Flows: C column: 12.0 gpm N column: 10.5 gpm
9.4 m/hr 8.2 m/hr

Sample	Absorbance A_{260}	Average A260	Absorbance A_{280}	Average A280	Conc., ng/ul
C1a	0.1224	0.1225	0.0592	0.059	980.0
	0.1226		0.0591		980.0
					980.0
					980.0
					980.0
					980.0
C1b	0.088	0.08815	0.0434	0.043	705.2
	0.0883		0.0434		705.2
					705.2
					705.2
					705.2
					705.2
C2a	0.0089	0.00905	0.0042	0.004	72.4
	0.0092		0.0045		72.4
					72.4
					72.4
					72.4
					72.4
C2b	0.0069	0.00695	0.004	0.004	55.6
	0.007		0.004		55.6
					55.6
					55.6
					55.6
					55.6
C3a	0.0222	0.0222	0.0126	0.013	177.6
					177.6
					177.6
					177.6
					177.6
					177.6
C3b	0.0439	0.037	0.0396	0.028	296.0
	0.0301		0.0156		296.0
					296.0
					296.0
					296.0
					296.0
C4a	0.0248	0.02575	0.014	0.014	206.0
	0.0267		0.0149		206.0
					206.0
					206.0
					206.0
					206.0
C4b	0.025	0.02505	0.0125	0.013	200.4
	0.0251		0.0125		200.4
					200.4
					200.4
					200.4
					200.4

Concentration determined by: C = A260*62.9 - A280*36

Table E-6. Profile 4 C Column Nso190 Densitometry Analysis Data
Spectrophotometry Method **9/30/98**

Flows: C column: 12.0 gpm N column: 10.5 gpm
9.4 m/hr 8.2 m/hr

Sample	Dilution Made	Diluted Conc., ng/u	Denatured Conc., ng/ul	vol. Blotted ul	Blot Mass ng	Peak Area	Area/mass	Overall por averages	Standard deviation
C1a	0.1	98.0	24.5	5.5	134.75	*324003.8*		614.2	199.2
	0.1	98.0	24.5	5.5	134.75	*268576.1*			
	0.1	98.0	24.5	1.1	26.95	135789.2			
	0.1	98.0	24.5	1.1	26.95	86904.9			
	0.1	98.0	24.5	**5.5**	134.75	**96559.8**	716.58		
	0.1	98.0	24.5	**5.5**	134.75	**42513.1**	315.50		
C1b	0.1	70.5	17.6	7.6	133.988	*416615.9*			
	0.1	70.5	17.6	7.6	133.988	*387814.2*			
	0.1	70.5	17.6	1.5	26.7976	154812.8			
	0.1	70.5	17.6	1.5	26.7976	123088.7			
	0.1	70.5	17.6	**7.6**	133.988	**96320.3**	718.87		
	0.1	70.5	17.6	**7.6**	133.988	**94591.32**	705.97		
C2a	1	72.4	18.1	74.6	1350.26	*366288.8*		543.0	121.2
	1	72.4	18.1	74.6	1350.26	*263980.1*			
	1	72.4	18.1	14.9	269.69	144867.8	537.16		
	1	72.4	18.1	14.9	269.69	146177.7	542.02		
	1	72.4	18.1	**7.5**	135.026	**53746.3**	398.04		
	1	72.4	18.1	**7.5**	135.026	**93790.38**	694.61		
C2b	1	55.6	13.9	90.1	1252.39	*418330.2*			
	1	55.6	13.9	90.1	1252.39	*386978.1*			
	1	55.6	13.9	18.2	252.98	265132.6	all at		
	1	55.6	13.9	18.2	252.98	271132.7	saturation		
	1	55.6	13.9	**9.1**	126.351	**209372.4**			
	1	55.6	13.9	**9.1**	126.351	**206702.4**			
C3a	1	177.6	44.4	28.0	1243.2	*289710.6*		435.0	47.3
	1	177.6	44.4	28.0	1243.2	*279573.6*			
	1	177.6	44.4	**5.8**	255.3	**121827**	477.19		
	1	177.6	44.4	**5.8**	255.3	**107848.2**	422.44		
	1	177.6	44.4	**2.9**	127.428	**55706.54**	437.16		
	1	177.6	44.4	**2.9**	127.428	**55532.25**	435.79		
C3b	1	296.0	74.0	15.5	1147	*215646.8*			
	1	296.0	74.0	15.5	1147	*226853.9*			
	1	296.0	74.0	**3.1**	229.4	**91811.78**	400.23		
	1	296.0	74.0	**3.1**	229.4	**96104.56**	418.94		
	1	296.0	74.0	**1.6**	114.7	**59864.78**	521.92		
	1	296.0	74.0	**1.6**	114.7	**42030.81**	366.44		
C4a	1	206.0	51.5	24.9	1282.35	*283219.5*		423.7	49.4
	1	206.0	51.5	24.9	1282.35	*272287.5*			
	1	206.0	51.5	**5.0**	256.47	**108437.7**	422.81		
	1	206.0	51.5	**5.0**	256.47	**113481.5**	442.47		
	1	206.0	51.5	**2.5**	128.235	*90639.81*			
	1	206.0	51.5	**2.5**	128.235	**49253.99**	384.09		
C4b	1	200.4	50.1	26.6	1332.66	*263048.4*			
	1	200.4	50.1	26.6	1332.66	*254285.3*			
	1	200.4	50.1	**5.3**	266.532	**115782.3**	434.40		
	1	200.4	50.1	**5.3**	266.532	**89940.68**	337.45		
	1	200.4	50.1	**2.7**	133.266	**61017.39**	457.86		
	1	200.4	50.1	**2.7**	133.266	**64905.72**	487.04		

Table E-7. **Profile 4** **N Column Sample Concentration Determination** **9/30/98**
Spectrophotometry Method

Flows: **C column:** **12.0 gpm** **N column:** **10.5 gpm**
9.4 m/hr **8.2 m/hr**

Sample	Absorbance A_{260}	Average A260	Absorbance A_{280}	Average A280	Conc., ng/ul
N1a	0.0319	0.03545	0.0172	0.019	283.6
	0.039		0.0211		283.6
					283.6
					283.6
					283.6
					283.6
N1b	0.0335	0.03375	0.0178	0.018	270.0
	0.034		0.018		270.0
					270.0
					270.0
					270.0
					270.0
N2a	0.0311	0.03115	0.0166	0.017	249.2
	0.0312		0.0169		249.2
					249.2
					249.2
					249.2
					249.2
N2b	0.0367	0.03605	0.0182	0.018	288.4
	0.0354		0.018		288.4
					288.4
					288.4
					288.4
					288.4
N3a	0.0374	0.0374	0.0194	0.020	299.2
	0.0374		0.0196		299.2
					299.2
					299.2
					299.2
					299.2
N3b	0.068	0.07795	0.0362	0.036	623.6
	0.0879				623.6
					623.6
					623.6
					623.6
					623.6
N4a	0.0046	0.0051	0.0026	0.003	40.8
	0.0056		0.0033		40.8
					40.8
					40.8
					40.8
					40.8
N4b	0.0088	0.00895	0.0051	0.005	71.6
	0.0091		0.0052		71.6
					71.6
					71.6
					71.6
					71.6

Concentration determined by: C = A260*62.9 - A280*36

Table E-8. **Profile 4** **N Column Nso190 Densitometry Analysis Data** **9/30/98**
Spectrophotometry Method

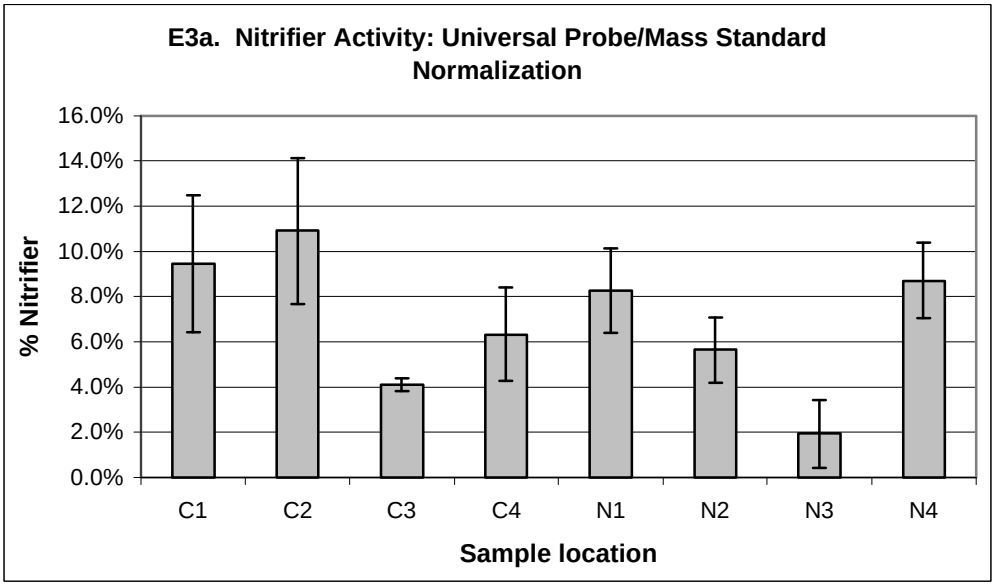
Flows: **C column:** **12.0 gpm** **N column:** **10.5 gpm**
9.4 m/hr **8.2 m/hr**

Sample	Dilution Made	Diluted Conc., ng/u	Denatured Conc., ng/ul	vol. Blotted ul	Blot Mass ng	Peak Area	Area/mass	Overall por averages	Standard deviation
N1a	1	283.6	70.9	18.3	1297.47	177953.3		470.1	37.1
	1	283.6	70.9	18.3	1297.47	231337.2			
	1	283.6	70.9	3.66	259.494	98437.94			
	1	283.6	70.9	3.66	259.494	71856.56			
	1	283.6	70.9	**1.83**	129.747	**66201.69**	510.24		
	1	283.6	70.9	**1.83**	129.747	**54546.75**	420.41		
N1b	1	270.0	67.5	19.4	1309.5	279516.6			
	1	270.0	67.5	19.4	1309.5	244873			
	1	270.0	67.5	3.88	261.9	89105.44			
	1	270.0	67.5	3.88	261.9	122949.2			
	1	270.0	67.5	**1.94**	130.95	**61848.12**	472.30		
	1	270.0	67.5	**1.94**	130.95	**62523.58**	477.46		
N2a	1	249.2	62.3	20.8	1295.84	223158.2		457.1	234.3
	1	249.2	62.3	20.8	1295.84	280454.8			
	1	249.2	62.3	**4.17**	259.791	**86410.7**			
	1	249.2	62.3	**4.17**	259.791	**113768.2**			
	1	249.2	62.3	**2.08**	129.584	**99824.81**	770.35		
	1	249.2	62.3	**2.08**	129.584	**62584.86**	482.97		
N2b	1	288.4	72.1	**18.4**	1326.64	**145519.4**			
	1	288.4	72.1	**18.4**	1326.64	**141476.7**			
	1	288.4	72.1	**3.69**	266.049	**45522.4**			
	1	288.4	72.1	**3.69**	266.049	**40033.45**			
	1	288.4	72.1	**1.85**	133.385	**46975.43**	352.18		
	1	288.4	72.1	**1.85**	133.385	**29727.56**	222.87		
N3a	1	299.2	74.8	17.5	1309	143218.1		176.6	32.8
	1	299.2	74.8	17.5	1309	210273.4			
	1	299.2	74.8	**3.51**	262.548	**45928.67**	174.93		
	1	299.2	74.8	**3.51**	262.548	**45897.01**	174.81		
	1	299.2	74.8	**1.75**	130.9	**29149.65**	222.69		
	1	299.2	74.8	**1.75**	130.9	**29398.59**	224.59		
N3b	0.1	62.4	15.6	41.7	650.103	41937.71			
	0.1	62.4	15.6	41.7	650.103	51079.74			
	0.1	62.4	15.6	**8.34**	130.0206	**19419.76**	149.36		
	0.1	62.4	15.6	**8.34**	130.0206	**17350.91**	133.45		
	0.1	62.4	15.6	**4.17**	65.0103	**10022.27**	154.16		
	0.1	62.4	15.6	**4.17**	65.0103	**11639.38**	179.04		
N4a	1	40.8	10.2	122	1244.4	147869.2		244.1	60.3
	1	40.8	10.2	122	1244.4	150324.3			
	1	40.8	10.2	**24.4**	248.88	**53107.39**	213.39		
	1	40.8	10.2	**24.4**	248.88	**48166.18**	193.53		
	1	40.8	10.2	**12.2**	124.44	**43199.9**	347.15		
	1	40.8	10.2	**12.2**	124.44	**26233.19**	210.81		
N4b	1	71.6	17.9	35.5	635.45	90313.38			
	1	71.6	17.9	35.5	635.45	125413.5			
	1	71.6	17.9	**7.09**	126.911	**35174.93**	277.16		
	1	71.6	17.9	**7.09**	126.911	**20307.64**	160.01		
	1	71.6	17.9	**3.55**	63.545	**17933.35**	282.21		
	1	71.6	17.9	**3.55**	63.545	**17059.07**	268.46		

Table E-9. **Profile 4. Ammonia Oxidizer Activity** **9/30/98**

Flows: **C column:** **12.0 gpm** **N column:** **10.5 gpm**
9.4 m/hr **8.2 m/hr**

	Ammonia Oxidizer Activity			
	Mass Standard Method		Spectrophotometry Method	
Sample	Nitrifier Fraction	Standard Deviation	Peak Area/ Mass	Standard Deviation
C1	9.5%	3.0%	614.2	199.2
C2	10.9%	3.2%	543.0	121.2
C3	4.1%	0.3%	435.0	47.3
C4	6.3%	2.1%	423.7	49.4
N1	8.3%	1.9%	470.1	37.1
N2	5.6%	1.4%	457.1	234.3
N3	1.9%	1.5%	176.6	32.8
N4	8.7%	1.7%	244.1	60.3



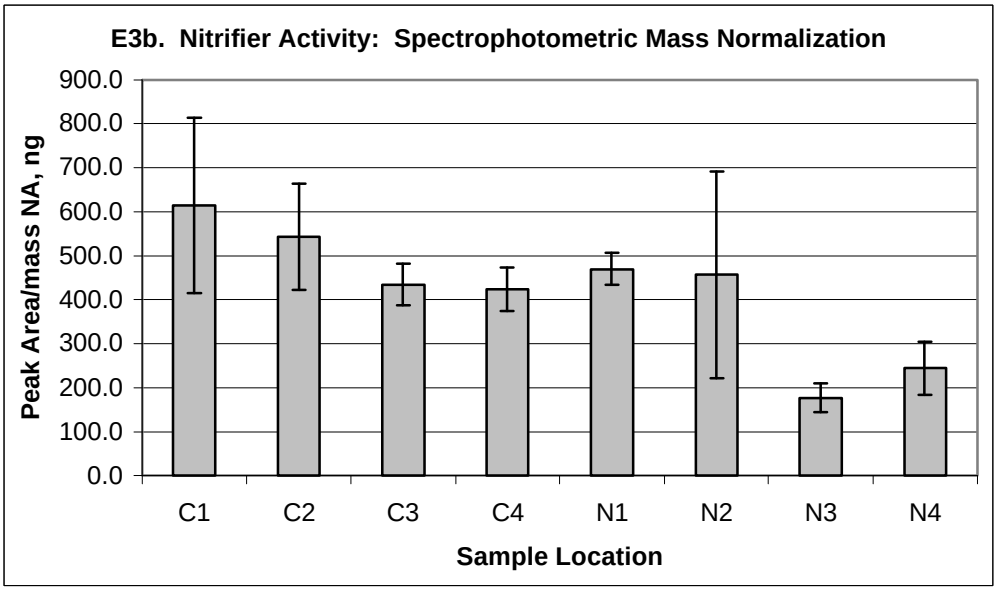


Figure E-3. Column Profiles at 9.4 & 8.2 m/hr, 9/30/98. a. Nitrifier activity normalized to mass standards; b. Nitrifier activity normalized to nucleic acid mass.