Appendix B

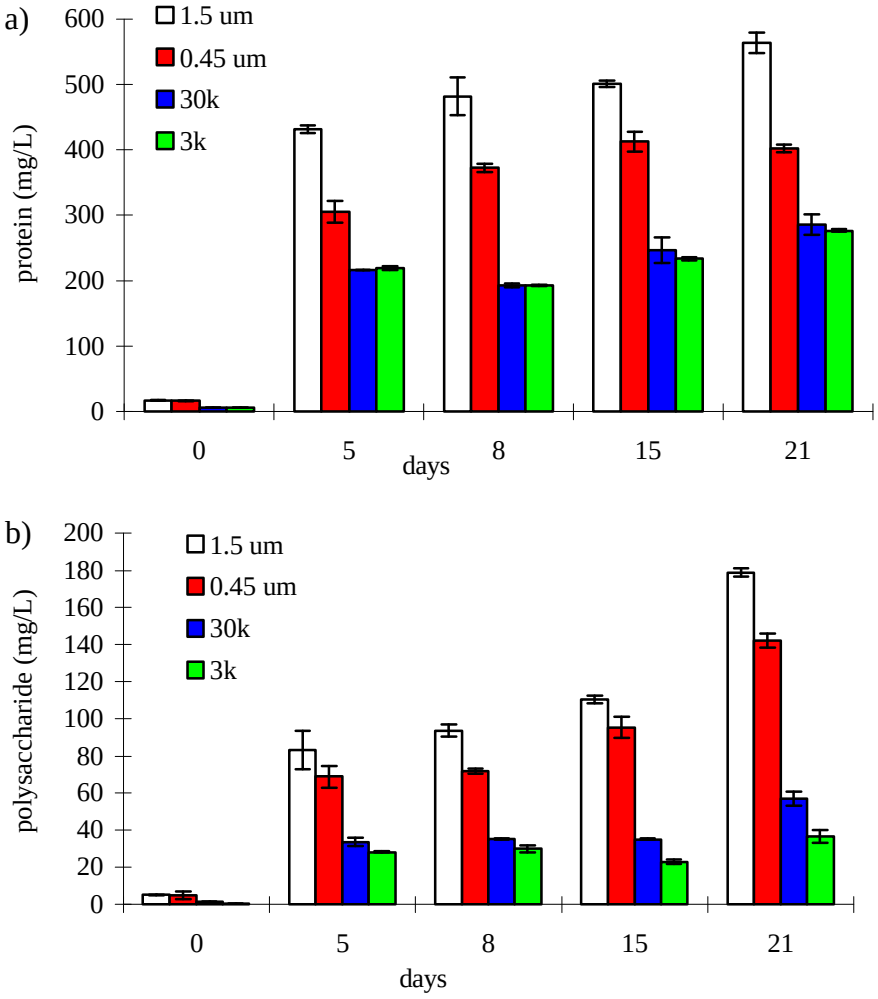

Figure B1: Molecular Weight Distributions of a) Protein and b) Polysaccharide for Pepper s Ferry Anaerobic Digestion Study at 36°C.

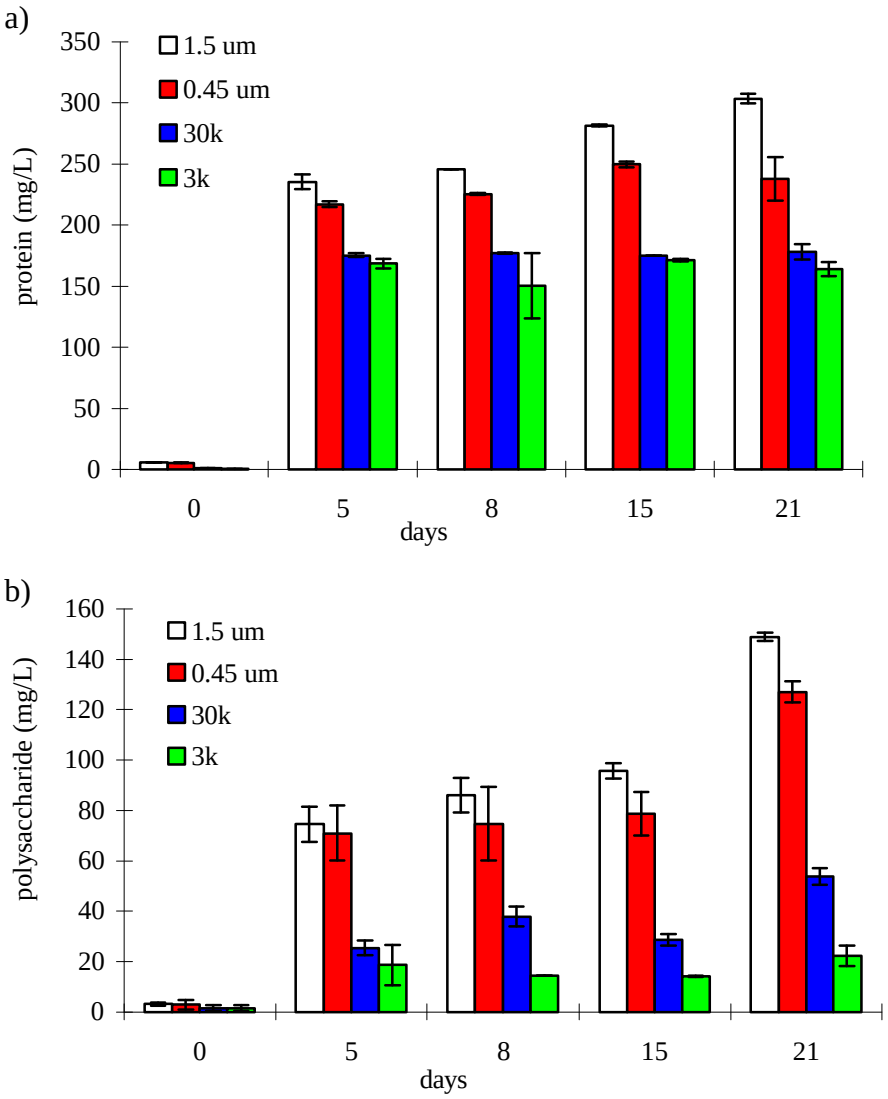

Figure B2: Molecular Weight Distributions of a) Protein and b) Polysaccharide for Blacksburg Anaerobic Digestion Study at 36°C.

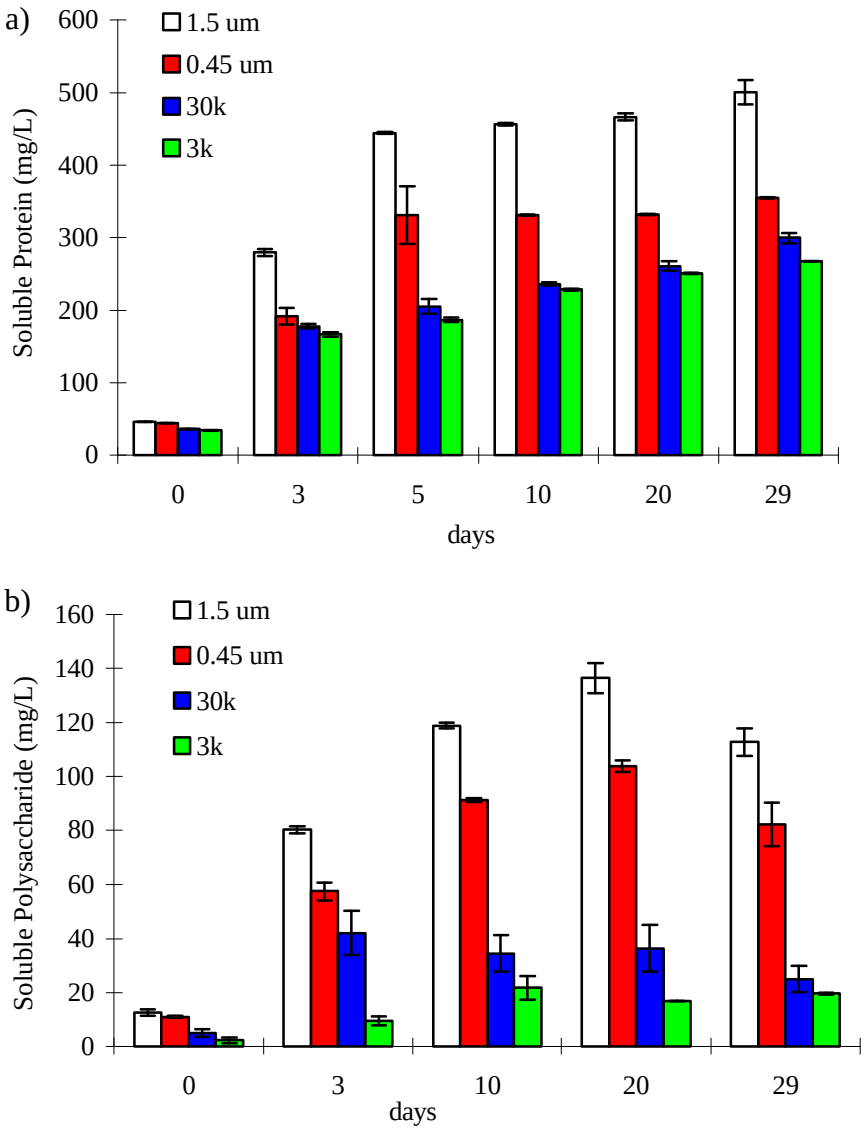

Figure B3: Molecular Weight Distributions of a) Protein and b) Polysaccharide for Pepper s Ferry Anaerobic Digestion Study at 38°C.

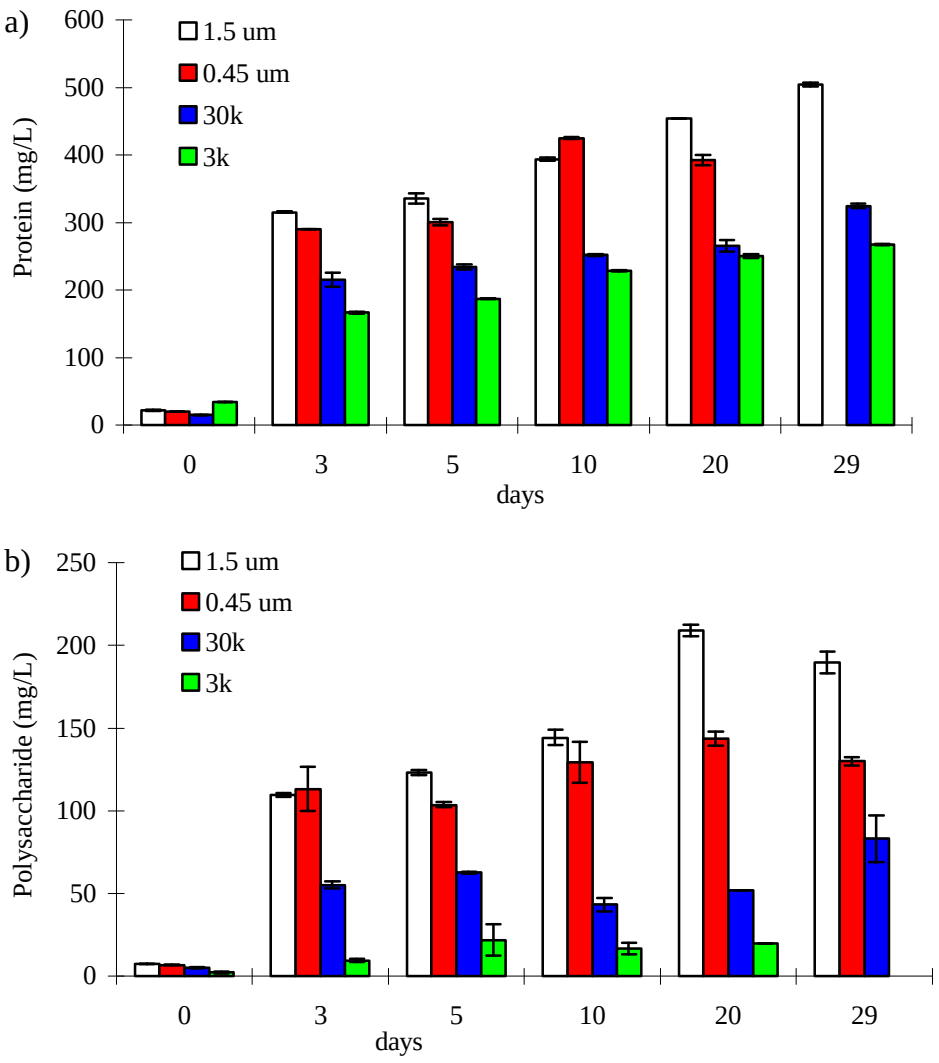

Figure B4: Molecular Weight Distributions of a) Protein and b) Polysaccharide for Blacksburg Anaerobic Digestion Study at 38°C.

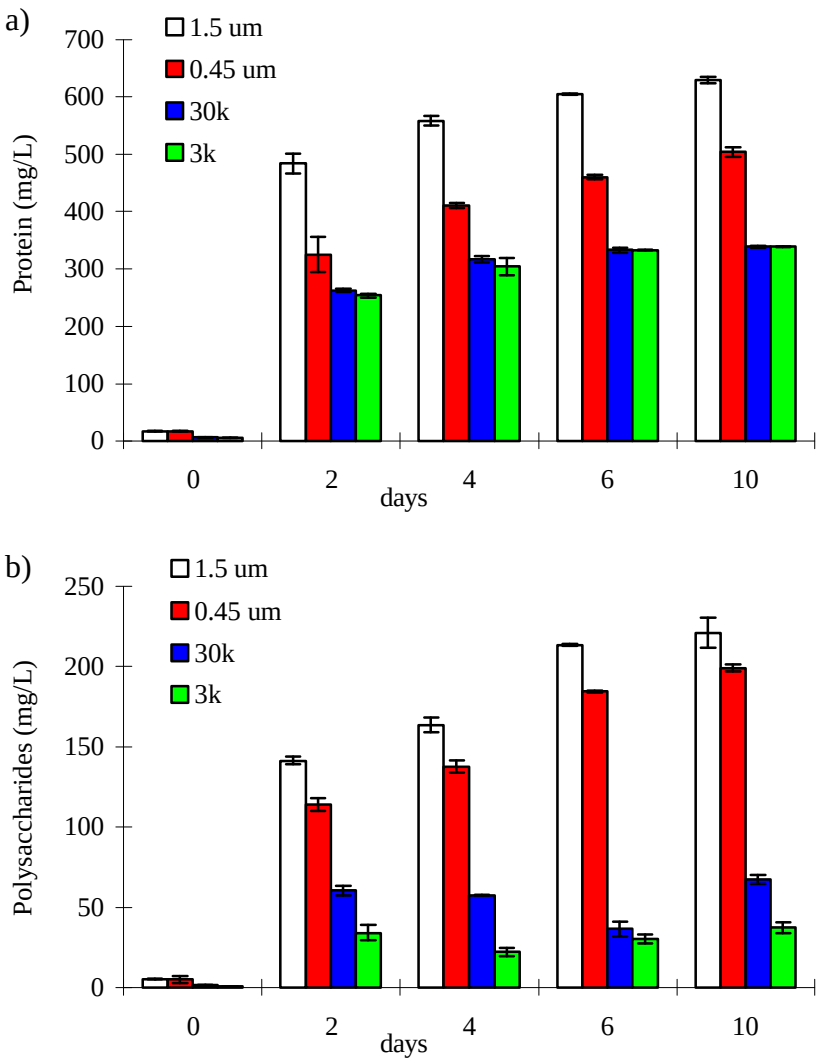

Figure B5: Molecular Weight Distributions of a) Protein and b) Polysaccharide for Pepper s Ferry Anaerobic Digestion Study at 55°C.

Table B1: Total, Free, and Bound Calcium and Magnesium, 20°C

Free calcium and magnesium run on IC, total soluble calcium and magnesium run on AA, mg/L

BB AER	Total Ca	Free Ca	Bound Ca	BB AER	Total Mg	Free Mg	Bound Mg
0	34.8	34.80	0.00	0	17.1	17.10	0.00
2	47	57.66	-10.66	2	19.1	16.80	2.30
5	66	72.55	-6.55	5	22.5	18.59	3.91
10	150	116.15	33.85	10	60.5	32.04	28.46
19	152.5	116.03	36.47	19	48	32.33	15.67
50	290	192.39	97.61	50	30	52.32	-22.32

PF AER	Total Ca	Free Ca	Bound Ca	PF AER	Total Mg	Free Mg	Bound Mg
0	36.5	36.5	0.00	0	13	13	0.00
2	77.5	37.27	40.23	2	7	12.31	-5.31
5	95	84.17	10.83	5	21	24.26	-3.26
10	237.5	110.24	127.26	10	52.5	34.32	18.18
19	237.5	105.97	131.53	19	89	28.01	60.99
50	420	285.36	134.64	50	85	40.36	44.64

BB ANA	Total Ca	Free Ca	Bound Ca	BB ANA	Total Mg	Free Mg	Bound Mg
0	34.8	34.80	0.00	0	17.1	17.10	0.00
2	25	30.33	-5.33	2	39.5	17.05	22.45
5	29	36.98	-7.98	5	28	20.19	7.81
10		33.74	-33.74	10	39	21.31	17.69
19	24	26.08	-2.08	19	51	20.31	30.69
50	21	32.28	-11.28	50	48.5	13.23	35.27

PF ANA	Total Ca	Free Ca	Bound Ca	PF ANA	Total Mg	Free Mg	Bound Mg
0	39	36.50	2.50	0	22.4	13.00	9.40
2	36	38.43	-2.43	2	41	18.68	22.32
5	31	35.79	-4.79	5	28	19.20	8.80
10	25	28.92	-3.92	10	43	18.53	24.47
19	30	18.64	11.36	19	44	14.06	29.94
50	19	30.23	-11.23	50	42.5	24.26	18.24

Table B2: Enzymatic Data, 20°C

Raw enzymatic data (abs/min)

Extinction coefficient: 1060/(mol*min)
Peptidase activity: Abs/min
Dilution = x2

days	BB AER	PF AER	BB ANA	PF ANA
0	0.03095	0.0438	0.03095	0.0438
2	0.0272	0.04335	0.0241	0.0277
5	0.01085	0.0186	0.01715	0.01595
10	0.00125	0.00435	0.01505	0.0067
19	0.0058	0.0091	0.0188	0.003
50	0.00415	0.00065	0.00955	0.00795

Extinction coefficient: 3700/(mol*min)
Glucosidase activity: Abs/min
Dilution = x2

days	BB AER	PF AER	BB ANA	PF ANA
0	0.0042	0.0042	0.0042	0.0042
2	0.0025	0.004	0.0038	0.003
5	0.0016	0.0001	0.0062	0.0032
10	7.8E-07	2.1E-06	0.00485	0.00145
19	0.0003	1E-08	0.0033	0.0007
50	0	0	0.0049	0.0013

Table B3: CST, SRF, and Polymer Demand, 20°C

CST, s

day	BB AER	PF AER	BB ANA	PF ANA
2	20.1	16.8	48.1	51.4
5	31.7	18.2	106	491.9
10	44.2	26.9	476.8	905.3
19	57.8	30.3	1474.4	921.4
50	105.1	32.2	2985.8	1608.9

Specific resistance to filtration, m/kg

day	BB AER	PF AER	BB ANA	PF ANA
0	4.57E+11	5.64E+11	4.57E+11	5.64E+11
2	8.75E+11	1.42E+12	4.48E+12	3.87E+12
5	6.05E+11	5.22E+11	2.02E+13	5.75E+13
10	2.01E+12	7.70E+11	3.29E+13	3.84E+13
19	2.39E+12	4.14E+12	4.32E+13	2.75E+13
50	2.36E+12	6.53E+11	2.90E+13	1.03E+13

Polymer demand, lb polymer/ton dry solids

day	BB AER	PF AER	BB ANA	PF ANA
0	7.5	5.9	7.5	5.9
2	8.1	7.5	31.4	47.7
5	10.3	9.8	59.8	146.9
10	26.5	21.8	103.2	184.8
19	31.9	29.7	127.9	70.4
50	18.5	22.6	181.6	151.4

Table B4: Total Protein, Polysaccharide, and COD, 20°C

Total protein, total polysaccharide, and total COD with standard deviations, mg/L

BB AER

days	total pro	t.pro dev	total poly	t.poly dev	total COD	t.COD dev
0	5,105.3	84.5	3,417.7	188.3	10635.2	260.2
2	5,284.0	8.6	1,848.0	59.3	9089.6	988.8
5	4,456.0	167.6	1,808.1	44.3	8648	780.6
10	7,320.4	163.7	1,752.4	90.5	4894.4	52.0
19	5,124.2	209.9	1,432.4	6.9	8309.6	53.2
50	4,960.6	52.8	1,299.1	16.9	7618.56	347.6

PF AER

days	total pro	t.pro dev	total poly	t.poly dev	total COD	t.COD dev
0	4,908.3	155.8	2,391.5	0.0	12180.8	156.1
2	4,504.7	234.3	1,593.8	11.1	11371.2	2133.8
5	4,766.2	62.7	1,646.2	78.9	9236.8	52.0
10	6,249.2	101.6	1,414.6	113.7	7139.2	0.0
19	4,704.9	116.2	1,374.7	44.4	7256.8	1435.7
50	4,899.5	15.2	1,566.6	29.3	8888.32	173.8

BB ANA

days	total pro	t.pro dev	total poly	t.poly dev	total COD	t.COD dev
0	5,105.3	84.5	2,391.5	0	10635.2	260.2
2	4,265.3	843.4	1,593.8	11.1	11592.0	780.6
5	6,233.0	11.9	1,646.2	78.9	11628.8	1249.0
10	5,335.5	42.2	1,414.6	113.7	10524.8	728.6
19	3,511.2	88.4	1,374.7	44.4	11994.4	159.5
50	6,098.3	68.6	1,566.6	29.3	9257.0	231.7

PF ANA

days	total pro	t.pro dev	total poly	t.poly dev	total COD	t.COD dev
0	4,908.3	155.8	2,391.5	0.0	12,180.8	156.1
2	4,506.1	295.7	1,593.8	11.1	12,806.4	1,665.4
5	6,797.7	89.1	1,646.2	78.9	10,819.2	312.3
10	4,911.5	66.7	1,414.6	113.7	11,297.6	156.1
19	2,083.3	136.0	1,374.7	44.4	12,107.2	1,807.9
50	4,893.4	99.0	1,566.6	29.3	7,905.3	57.9

Table B5: COD, Proteins, Polysaccharides, 20°C

COD, proteins, polysaccharides, and acetate, mg/L

AER BB

days	COD	COD dev	Proteins	std dev	Poly	Poly Dev	acetate
0	2.15	1.52	12.88	0.40	4.86	0.26	3.8
2	46.73	8.13	11.59	0.21	24.13	0.69	7.7
5	76.70	8.51	32.14	0.21	34.02	1.26	12.9
10	129.34	1.06	32.47	0.51	77.12	1.18	12.7
19	191.76	26.59	41.84	0.85	99.33	0.61	25.4
30	147.91	17.64	53.44	4.25	113.00	4.59	
50	171.01	10.14	36.85	2.85	103.25	3.52	23.9

AER PF

days	COD	COD dev	Proteins	pro dev	Poly	Poly Dev	acetate
0	67.68	12.76	26.48	0.06	5.23	1.83	28.6
2	45.872	9.57	11.83	0.05	28.65	0.62	10.3
5	86.104	1.60	24.18	0.91	36.37	0.74	10.8
10	85.352	2.66	31.68	0.99	51.79	2.07	13.2
19	263.2	74.44	46.98	1.88	82.99	1.22	20.7
30	183.0	22.4	75.76	1.85	124.4	0.8	
50	171.01	1.45	129.86	4.52	106.6	5.1	14.8

ANA BB

days	COD	COD dev	proteins	pro dev	Poly	Poly Dev	acetate
0	34.20	2.15	12.88	0.40	4.86	0.26	3.8
2	567.76	58.49	117.56	3.17	35.34	0.39	154.6
5	1074.56	10.41	217.44	2.45	66.27	2.95	365.0
10	1943.92	15.95	362.36	15.40	94.39	1.04	689.3
19	2541.76	0.00	427.77	9.84	118.68	0.00	797.4
30	1797.84	11.20	393.38	0.00	143.76	1.93	
50	1097.73	46.34	385.9	17.0	199.82	0.78	52.3

ANA PF

days	COD	COD dev	Proteins	pro dev	Poly	Poly Dev	acetate
0	67.68	12.76	26.48	0.06	5.23	1.83	28.6
2	1150.56	31.90	193.71	1.02	42.26	0.46	405.1
5	1880.32	3.69	429.83	15.83	80.27	0.59	935.2
10	2428.96	31.90	591.16	6.30	91.25	1.04	1,685.5
19	1436.32	85.08	471.79	5.85	75.68	3.04	212.1
30	2605.68	33.60	589.04	24.58	119.99	6.04	
50	974.85	104.27	277.68	24.52	203.4	5.9	36.2

Table B6: Calcium, Magnesium, Potassium, Sodium, and Ammonia, 20°C

Cation data, mg/L (IC)

AER BB

days	Ca	Mg	K	Na	NH4
0	34.80	17.10	22.10	55.00	5.55
2	57.66	16.80	18.06	57.62	26.03
5	72.55	18.59	37.15	47.88	19.29
10	116.15	32.04	38.59	54.36	25.29
19	116.03	32.33	38.12	51.35	83.89
50	192.39	52.32	61.42	61.57	125.80

AER PF

days	Ca	Mg	K	Na	NH4
0	36.5	13	27.4	421.3	13.98
2	37.27	12.31	24.79	397.08	0
5	84.17	24.26	35.16	285.10	42.3716
10	110.24	34.32	35.63	373.66	0
19	105.97	28.01	33.36	367.61	20.2739
50	285.36	40.36	61.27	438.60	44.33

ANA BB

days	Ca	Mg	K	Na	NH4
0	34.80	17.10	22.10	55.00	5.50
2	30.33	17.05	38.92	53.04	48.57
5	36.98	20.19	37.67	49.48	93.13
10	33.74	21.31	60.91	52.07	180.98
19	26.08	20.31	52.07	50.37	210.47
50	32.28	13.23	125.37	66.68	212.04

ANA PF

days	Ca	Mg	K	Na	NH4
0	36.50	13.00	27.30	421.30	14.00
2	38.43	18.68	48.60	402.05	71.96
5	35.79	19.20	55.64	386.43	214.65
10	28.92	18.53	60.82	381.29	274.18
19	18.64	14.06	28.62	387.65	275.31
50	30.23	24.26	72.43	455.62	271.66

Table B7: Mixed Liqueur and Volatile Suspended Solids, 20°C

Solids Data, mg/L

BB AER	day	MLSS	MLVSS
	0	12060	
	2	12310	9850
	5	11620	9170
	10	9370	7560
	19	8040	6270
	50	6060	4590
PF AER	0	13570	
	2	12300	9330
	5	10940	8160
	10	9780	7330
	19	8140	6060
	50	7080	5030
BB ANA	0	12060	
	2	11840	9540
	5	10950	8690
	10	9510	7560
	19	8670	6880
	50	8590	6270
PF ANA	0	13570	
	2	11160	8390
	5	6840	4900
	10	6040	4330
	19	10800	
	50	9250	7520

Table B8: Mixed Liquor Suspended and Volatile Solids, 30°C

Solids Data, mg/L

	Day	MLSS	MLVSS
BB w/ SO4	0	14235	10265
	5	13860	9730
	10	11120	7730
	16	10390	6980
	29	9420	6100
BB w/o SO4	0	14490	10425
	5	12570	8750
	10	11240	7740
	16	10180	6780
	29	9810	6210

PF w/ SO4	0	13475	9820
	5	12310	8810
	10	11720	8310
	16	11170	7690
	29	10310	6870
PF w/o SO4	0	13905	10195
	5	12300	8690
	10	11890	8410
	16	11280	7740
	29	9970	6570

Table B9: Protein, Polysaccharide, Ferrous Iron, and Total Dissolved Iron, 30°C

	Day	Protein	Pro dev	Poly	Poly Dev	Ferrous	Total Diss Iron
BB w/ SO4	0	47.27	1.53	16.79	1.17	0	0.66
	5	458.30	113.18	133.24	2.44	0.08	0.9
	10	390.61	15.35	110.86	7.17	0.21	1.26
	16	346.86	2.87	73.06	8.45	0.145	0.26
	29	350.86	17.06	61.94	0.39	0.245	0.41
	Day	Protein	Pro dev	Poly	Poly Dev	Ferrous	Total Diss Iron
BB w/o SO4	0	35.47	0.21	15.28	3.95	0	0.07
	5	213.98	0.37	149.07	3.22	6.013	6.5
	10	265.07	0.92	112.33	1.39	5.688	6.1
	16	291.32	1.33	72.31	8.24	1.635	2.23
	29	219.51	0.21	62.49	0.39	0.68	1.28
	Day	Protein	Pro dev	Poly	Poly Dev	Ferrous	Total Diss Iron
PF w/ SO4	0	51.26	0.66	16.72	0.40	0	0.9
	5	308.66	16.21	97.12	2.53	0.24	0.18
	10	276.62	6.52	80.70	2.61	0.305	0.25
	16	264.85	1.12	47.55	1.81	0.185	0.26
	29	277.95	2.54	48.83	0.39	0.795	0.725
	Day	Protein	Pro dev	Poly	Poly Dev	Ferrous	Total Diss Iron
PF w/o SO4	0	43.60	0.65	17.21	0.55	0	0.28
	5	152.27	1.48	95.90	2.14	29.06	33.1
	10	198.46	0.12	87.87	4.21	13.06	9.645
	16	217.62	6.75	43.04	3.99	4.635	4.875
	29	217.71	3.39	40.91	0.00	3.015	5

Table B10: Polymer Demand, SRF, and CST Data, 30°C

Polymer Demand, lb polymer/ton dry solids

day	BB w/ SO4	BB w/o SO4	PF w/ SO4	PF w/o SO4
0	5.62	5.52	11.87	11.51
5	23.09	25.46	27.62	22.76
10	43.17	32.03	34.13	23.55
16	25.02	26.52	21.49	23.05
29	38.22	36.70	32.98	32.10

Specific Resistance to Filtration, m/kg

day	BB w/ SO4	BB w/o SO4	PF w/ SO4	PF w/o SO4
0	2.5063E+11	6.758E+11	3.563E+11	3.561E+11
10	6.6049E+12	5.844E+12	4.658E+12	4.196E+12
16	1.047E+13	1.031E+13	7.748E+12	5.964E+12
29	9.4965E+12	1.453E+13	6.583E+12	9.253E+12

CST, s

day	BB w/SO4	BB w/o SO4	PF w/SO4	PF w/o SO4
0	34.2	37.2	38.1	32.9
5	76	64.8	62.2	55.5
10	80	88.5	81.6	79.9
16	102.2	128.7	118.6	86.6
29	162.8	161.9	72.9	93.2

Table B11: COD and Acetate, 30°C

BB w/ SO4	Day	COD	COD dev	Acetate
	0	197.1	18.9	35.6
	5	1527.4	59.5	1561.2
	10	2324.0	5.7	1379.2
	16	2714.1	27.1	1985.0
	29	1708.0	50.9	210.7

BB w/o SO4	Day	COD	COD dev	Acetate
	0	137.8	10.8	21.3
	5	2092.0	28.3	992.9
	10	2516.0	39.6	699.5
	16	1937.0	21.7	443.8
	29	1432.0	11.3	154.4

PF w/ SO4	Day	COD	COD dev	Acetate
	0	206.7	21.7	52.0
	5	1368.5	13.5	1035.1
	10	1699.6	10.8	742.8
	16	1270.9	10.8	34.0
	29	692.0	84.9	58.1

PF w/o SO4	Day	COD	COD dev	Acetate

0	174.2	29.8	34.3
5	1502.5	13.5	622.5
10	1590.5	2.7	617.0
16	1470.0	10.8	112.0
29	876.0	107.5	44.5

Table B12: Cation and Anion Data, 30°C

Cation and Anion Data, mg/L

BB w/ SO4

days	Chloride	Phosphate	Sulfate	Ammonia	Sodium	Potassium	Magnesium	Calcium
0	96.21	1.14	400.11	8.25	60.1	16.57	96.78	62.39
5	85.95	30.38	3.31	98.76	63.1	52.40	102.12	70.55
10	103.42	11.54	0	131.71	63.4	53.56	104.88	67.35
16	112.03	3.22	0	154.08	63.4	61.81	105.26	59.94
29	118.63	11.54	0	177.3	69.8	61.89	72.30	50.24

BB w/o SO4

days	Chloride	Phosphate	Sulfate	Ammonia	Sodium	Potassium	Magnesium	Calcium
0	287.85	1.14	13.23	9.29	61.1	17.54	25.01	40.85
5	380.20	56.41	8.74	108.19	64.6	51.98	99.80	63.57
10	347.43	44.82	0	134.98	64.5	59.43	105.26	65.16
16	358.91	25.40	0	161.71	65.0	61.96	101.01	51.92
29	278.53	14.31	0	181.5	70.7	61.38	76.60	51.77

PF w/ SO4

days	Chloride	Phosphate	Sulfate	Ammonia	Sodium	Potassium	Magnesium	Calcium
0	203.92	1.14	450.03	17.3	377.6	28.38	14.37	36.58
5	220.70	38.18	6.99	106.2	380.3	53.72	19.50	38.74
10	201.02	42.04	0	154.4	379.8	54.50	19.88	37.49
16	209.63	50.36	0	213.7	382.8	56.93	19.28	28.84
29	212.50	53.14	0	261.0	418.1	53.32	15.23	26.52

PF w/o SO4

days	Chloride	Phosphate	Sulfate	Ammonia	Sodium	Potassium	Magnesium	Calcium
0	424.93	1.14	56.91	22.9	388.4	32.21	15.29	39.15
5	430.52	4.62	6.99	130.0	397.3	54.77	24.93	61.01
10	384.7458	5.99192	0	154.2	395.7	56.50	25.15	52.63
16	396.2287	11.53848	0	191.1	397.8	57.74	23.96	42.71
29	424.9359	14.31176	0	265.2	430.3	53.40	23.42	38.0

Table B13: Total Protein, Polysaccharide, and COD, 30°C

Total protein, total polysaccharide, and total COD with standard deviations, mg/L

BB w/ SO4

day	total pro	t.pro dev	total poly	t.poly dev	total COD	t.COD dev
0	3884.9	26.5	1366.9	49.2	12800.0	1244.5
5	3189.1	91.4	1143.7	210.9	15360.0	565.7
10	2061.5	99.3	1636.7	97.8	12961.8	787.2
16	1707.5	49.0	1106.9	46.3	12285.8	731.0
29	1994.1	197.3	932.4	91.6	9303.8	112.5

BB w/o SO4

day	total pro	t.pro dev	total poly	t.poly dev	total COD	t.COD dev
0	2453.0	618.5	1358.8	54.9	9080.0	509.1
5	2356.5	15.9	1074.7	224.6	13680.0	0.0
10	2125.2	25.2	1760.8	128.0	13518.4	112.5
16	1671.0	166.9	1142.1	74.5	11808.7	281.1
29	1268.3	5.3	954.9	107.5	9423.1	281.1

PF w/ SO4

day	total pro	t.pro dev	total poly	t.poly dev	total COD	t.COD dev
0	2464.24	242.367	1255.3	65.7	14840.0	169.7
5	2644.04	157.605	1064.5	143.2	12440.0	961.7
10	2848.2	30.4615	1897.3	11.9	14313.6	674.7
16	2511.06	43.7056	1209.6	86.6	12763.0	168.7
29	2079.33	76.8158	1101.2	4.0	10934.0	168.7

PF w/o SO4

day	total pro	t.pro dev	total poly	t.poly dev	total COD	t.COD dev
0	2964.3	184.1	1265.4	18.3	13400.0	396.0
5	2105.6	113.9	1070.6	129.2	14720.0	339.4
10	2106.5	194.7	1886.3	28.7	14194.3	1405.7
16	2016.6	102.0	1280.4	49.2	12683.4	168.7
29	1616.7	39.7	1112.5	19.9	10496.6	674.7

Table B14: Protein, Polysaccharide, COD, and Acetate, 38°C

Protein, Polysaccharide, COD, and acetate, mg/L

Blacksburg

day	Protein	pro stdev	Polysacc	Poly dev	COD	COD dev	acetate
0	8.8	0.7	7.6	2.3	19.1	0.0	3.8
2	250.5	4.7	82.7	1.6	2191.6	5.4	0.0
5	365.9	5.6	129.5	2.7	3121.0	10.8	1499.1
10	409.9	1.8	152.4	1.5	2532.0	21.6	511.3
20	484.0	1.7	209.0	3.6	3090.4	75.7	887.4
29	561.5	1.9	218.4	1.0	3655.5	81.8	731.5

Pepper's Ferry

day	protein	pro stdev	Polysacc	Poly dev	COD	COD dev	acetate
0	15.8	1.4	8.0	0.9	61.2	5.4	10.0
2	202.1	3.7	54.4	0.0	1518.4	37.9	644.3
5	453.3	17.7	95.1	0.4	2310.2	54.1	2480.4
10	455.3	12.1	114.7	2.3	2191.6	5.4	1327.2
20	469.9	2.5	142.6	7.3	2080.7	54.1	1213.7
29	526.0	1.5	118.0	38.6	2205.6	158.1	395.8

Table B15: Cation and Anion Data, 38°C

Cation and Anion Data, mg/L

Blacksburg

day	Chloride	Phosphate	Sulfate	Ammonia	Sodium	Potassium	Magnesium	Calcium
0	39.1	1.0	19.8	2.3	31.7	8.1	14.2	35.2
2	46.3	37.1	0.0	121.8	30.7	43.6	29.4	63.7
5	20.8	50.8	0.0	162.1	31.0	48.6	31.7	61.6
10	11.6	50.0	0.0	200.3	29.9	40.0	26.4	26.2
20	11.6	47.5	0.0	213.7	31.0	40.4	17.7	24.8
29	11.6	50.0	0.0	132.9	15.1	19.8	6.9	4.0

Pepper's Ferry

day	Chloride	Phosphate	Sulfate	Ammonia	Sodium	Potassium	Magnesium	Calcium
0	64.6	0.0	457.0	0.1	317.3	10.8	16.0	32.3
2	75.5	7.2	350.7	156.0	330.9	35.6	25.3	46.9
5	82.8	10.4	3.4	206.6	327.9	36.2	27.9	36.0
10	57.5	10.0	0.0	197.7	347.2	37.7	19.6	2.6
20	67.5	10.0	0.0	215.3	353.2	37.4	17.7	4.0
29	50.3	10.0	0.0	228.7	353.6	37.6	16.9	3.5

Table B16: Mixed Liqueur Suspended and Volatile Solids, 38°C

Solids Data, mg/L

Blacksburg

Day	MLVSS	MLSS
0	10020	12945
2	8730	11385
5	7910	10630
10	8180	11160
20	7030	9970
29	6830	9980

Pepper's Ferry

Day	MLVSS	MLSS
0	9245	12515
2	8465	11595
5	7420	10410
10	7110	10160
20	6380	9570
29	6060	9170

Table B17: SRF, CST, and Polymer Demand, 38°C

Specific Resistance to Filtration, m/kg

day	Blacksburg	Pepper's Ferry
0	2.49E+11	1.54E+12
2	6.32E+11	5.73E+12
5	1.28E+12	1.11E+13
10	2.68E+12	1.15E+13
20	1.06E+13	1.69E+13
29	1.38E+13	2.51E+13

CST, s

day	Blacksburg	Pepper's Ferry
0	23.3	77.6
2	32.7	114.4
5	52.3	180.9
10	135.6	370.1
20	135	521.6
29	167.3	390.1

Polymer Demand, lb polymer/ton dry solids

day	Blacksburg	Pepper's Ferry
0	9.27	12.78
2	17.57	22.42
5	45.16	57.64
10	84.23	78.74
20	136.41	91.95
29	163.93	109.05

Table B18: Total Protein, Polysaccharide, and COD, 38°C

Total protein, total polysaccharide, and total COD with standard deviations, mg/L

Blacksburg

day	total pro	t.pro dev	total poly	t.poly dev	total COD	t.COD dev
0	4316.8	153.3	1716.9	62.4	15031.5	54.1
2	3298.1	28.3	1626.0	145.1	13004.3	432.7
5	2696.9	30.4	1615.2	105.4	13004.3	757.3
10	2450.1	22.8	1356.8	16.7	12086.4	108.2
20	2261.8	10.9	1839.5	138.1	11168.4	757.3
29	2475.5	408.8	1453.5	80.2	865.1	334.5

Pepper's Ferry

day	total pro	t.pro dev	total poly	t.poly dev	total COD	t.COD dev
0	3694.1	3.3	1839.3	29.8	14228.3	973.6
2	2919.1	7.6	1463.6	71.6	14610.7	2271.8
5	2793.8	134.8	816.8	3.2	12086.4	108.2
10	3660.3	242.5	1674.0	38.4	15031.5	54.1
20	2182.6	27.2	1560.9	49.9	10403.5	
29	2297.9	181.6	1038.6	5.0	628.5	32.7

Table B19: Protein, Polysaccharide, COD, and Acetate, 55°C

Protein, Polysaccharide, COD, and Acetate, mg/L

Blacksburg

day	Protein	Pro dev	Poly	Poly dev	COD	COD dev	acetate
0	14.9	0.2	5.7	1.0	77.1	19.1	33.2
2	321.1	6.9	28.3	5.0	2402.3	0.0	1163.3
3	365.5	10.5	158.6	0.5	2861.2	5.5	1172.4
4	404.0	3.8	190.0	3.7	3011.5	10.9	1157.0
5	431.4	6.2	208.6	4.0	3296.9	43.6	1262.0
6	469.4	2.2	224.9	14.6	3289.2	54.5	1154.4
10	498.0	6.7	289.1	4.6	2087.0	388.4	271.1

Pepper's Ferry

day	Protein	Pro dev	Poly	Poly dev	COD	COD dev	acetate
0	33.8	0.2	8.5	1.2	73.3	13.6	9.8
2	539.9	14.8	42.5	6.0	2703.1	43.6	1168.1
3	444.1	3.6	158.6	2.3	3096.4	54.5	1187.2
4	564.3	6.6	190.7	2.8	3435.7	10.9	1285.8
5	530.8	1.3	231.8	0.0	3636.2	109.1	1428.6
6	588.3	22.3	279.0	11.6	3767.3	32.7	1342.0
10	668.0	6.3	328.0	0.5	2814.9	261.8	1383.6

Table B20: Enzymatic Data, 55°C

Raw enzymatic data (abs/min)

Extinction coefficient: 1060/(mol*min)
Peptidase activity: Abs/min
Dilution = x2

day	Blacksburg	Pepper's Ferry
0	0.00275	0.00125
2	0.0041	0.00055
3	0.0004	0
4	0.00015	0.0001
5	0	0
6	0	0
10	0.0002	0

Extinction coefficient: 3700/(mol*min)
Glucosidase activity: Abs/min
Dilution = x2

day	Blacksburg	Pepper's Ferry
0	0.000001	0
2	1.33E-06	0
3	0	0.0005
4	0	0
5	0	0
6	0	0
10	0	0.000000447

Table B21: Total Protein, Polysaccharide, and COD, 55°C

Total protein, total polysaccharide, and total COD with standard deviations, mg/L

Blacksburg

day	total pro	t.pro dev	total poly	t.poly dev	total COD	t.COD dev
0	2907.0	57.1	1726.6	25.1	10252.8	217.2
2	2069.6	81.1	1907.5	150.5	11174.4	977.5
3	1988.1	6.9	1596.0	140.3	10828.8	271.5
4	1758.7	155.3	1496.8	9.4	11366.4	706.0
5	1678.0	132.5	1676.3	229.5	11097.6	0.0
6	1606.1	3.4	1747.7	140.9	10022.4	434.4
10	1957.2	148.2	1702.6	13.9	9139.2	380.1

Pepper's Ferry

day	total pro	t.pro dev	total poly	t.poly dev	total COD	t.COD dev
0	3188.8	33.1	1779.8	0.0	12249.6	325.8
2	2341.7	79.9	1694.7	40.1	12364.8	162.9
3	2280.4	159.9	1493.5	4.7	13862.4	217.2
4	1969.5	56.0	1394.3	4.7	13363.2	54.3
5	2034.1	5.7	1415.3	0.0	13324.8	108.6
6	1904.1	2.3	1626.8	221.4	13478.4	217.2
10	2531.1	5.6	1715.7	106.5	12403.2	868.9

Table B22: Cation Data, 55°C

Blacksburg

day	Ammonia	Sodium	Potassium	Magnesium	Calcium
0	4.5	64.0	12.3	12.1	25.2
2	159.2	61.1	34.1	26.3	41.3
4	173.9	60.1	33.5	19.3	15.6
6	169.2	61.7	31.7	14.6	10.1
10	205.0	62.1	32.6	12.7	3.9

Pepper's Ferry

day	Ammonia	Sodium	Potassium	Magnesium	Calcium
0	0.2	480.3	27.4	19.6	35.0
2	184.2	508.6	39.8	23.5	17.6
4	206.6	509.2	39.8	14.6	4.0
6	215.5	517.7	39.6	10.9	2.7
10	220.6	522.9	40.0	11.5	2.8

Table B23: Anion Data, 55°C

Anion Data, mg/L

Blacksburg

day	Chloride	Phosphate	Sulfate
0	51.7	0.0	69.6
2	23.0	35.0	30.8
3	23.0	20.0	11.4
4	23.0	27.5	0.0
5	23.0	25.0	0.0
6	23.0	15.0	0.0
10	11.6	27.5	0.0

Pepper's Ferry

day	Chloride	Phosphate	Sulfate
0	94.8	0.0	580.3
3	97.7	0.0	228.0
5	86.2	0.0	147.2
10	69.0	95.0	11.4

Table B24: Mixed Liqueur Suspended and Volatile Solids, 55°C

Solids Data, mg/L

Blacksburg

day	MLVSS	MLSS
0	8320	10980
2	7480	10240
4	7320	10200
6	6310	9050
10	5970	8810

Pepper's Ferry

day	MLVSS	MLSS
0	10015	13340
2	8890	12490
4	8350	11900
6	7320	10780
10	7060	10520

Table B25: Polymer Demand, SRF, and CST, 55°C

Polymer Demand, lb polymer/ton dry solids

day	Blacksburg	Pepper's Ferry
0	21.9	21.0
2	43.0	48.0
4	86.3	84.0
6	172.4	137.3
10	247.4	205.3

Specific Resistance to Filtration, m/kg

day	Blacksburg	Pepper's Ferry
0	3.178E+11	3.153E+11
2	2.794E+12	2.098E+12
4	8.710E+12	8.088E+12
6	1.249E+13	1.771E+13
10	1.395E+13	1.587E+13

CST, s

day	Blacksburg	Pepper's Ferry
0	20.1	22.2
2	45	60.2
4	119	132.3
6	261.7	294
10	567.5	1398.2

Table B26: COD, Protein, Polysaccharides, and Acetate, Thermophilic/Mesophilic Study

COD, Protein, Polysaccharides, and Acetate, mg/L

day	COD	COD dev	Protein	Pro dev	Poly	Poly dev	acetate
0	73.3	13.6	33.8	0.2	8.5	1.2	9.8
2	2745.5	16.4	540.4	5.7	147.1	2.5	1255.3
4	3327.7	0.0	566.2	1.4	158.6	2.3	1244.2
8	2213.3	65.4	270.1	14.2	207.1	19.2	1439.4
15	2344.4	98.2	565.1	14.6	195.4	19.0	1547.1
21	2475.6	0.0	558.2	26.4	225.4	7.3	1471.1

Table B27: SRF, Polymer Demand, and CST, Thermophilic/Mesophilic Study

day	SRF m/kg	lb polymer/ ton dry solids	CST, s
0	3.15E+11	21.0	22.2
2	2.37E+12	48.7	61.5
4	8.23E+12	82.6	115.4
8	1.19E+13	89.0	174.8
15	1.28E+13	105.9	145.5
21	2.04E+13	146.9	1401.2

Table B28: Total Protein, Polysaccharide, and COD, Thermophilic/Mesophilic Study

Total protein, total polysaccharide, and total COD with standard deviations, mg/L

Pepper's Ferry

day	total pro	t.pro dev	total poly	t.poly dev	total COD	t.COD dev
0	3188.8	33.1	1779.8	0.0	12249.6	325.8
2	2414.4	155.3	1786.9	80.2	12760.6	433.5
4	2239.2	56.0	1043.8	416.2	13527.0	216.8
8	2484.2	11.2	1634.8	4.6	14178.4	812.9
15	2661.2	16.8	1475.5	56.3	13603.6	108.4
21	2494.6	3.4	1333.3	130.8	13910.2	108.4

Table B29: Mixed Liqueur Suspended and Volatile Solids, Thermophilic/Mesophilic Study

Solids Data, mg/L

Day	MLVSS	MLSS
0	10015	13340
2	8800	12310
4	8730	12110
8	7500	10790
15	7340	10580
21	7330	10620

Table B30: Cation and Anion Data, Thermophilic/Mesophilic Study

Cation and Anion Data, mg/L

day	Ammonia	Sodium	Potassium	Magnesium	Calcium	Chloride	Phosphate	Sulfate
0	0.2	480.3	27.4	19.6	35.0	94.8	0.0	580.3
2	177.3	512.9	39.5	22.7	18.6	86.2	15.0	328.2
4	203.7	516.7	39.5	18.8	5.0	90.5	10.0	205.4
8	211.0	513.1	39.3	15.9	3.1	89.1	10.0	134.3
15	214.7	519.8	39.2	16.1	2.9	100.5	12.5	14.7
21	214.1	519.7	39.1	12.7	3.5	97.7	10.0	11.4

Table B31: Enzymatic Data, 36°C

Raw enzymatic data (abs/min)

Extinction coefficient:
1060/(mol*min)
Peptidase activity: Abs/min
Dilution = x2

day	Blacksburg	Pepper's Ferry
0	0.00275	0.00125
5	0	0.01555
8	0.00175	0.007433
15	0.00205	0.0126
21	0.00235	0.00085

Extinction coefficient:
3700/(mol*min)
Glucosidase activity: Abs/min
Dilution = x2

day	Blacksburg	Pepper's Ferry
0	1.0E-06	0.0005
5	0.0003	5.3E-07
8	0.0004	0.0005
15	0.0003	0.0014
21	0.0003	0.0002

Table B32: Total Protein, Polysaccharide, and COD, 36°C

Total protein, total polysaccharide, and total COD with standard deviations, mg/L

Blacksburg

day	total pro	t.pro dev	total poly	t.poly dev	total COD	t.COD dev
0	2907.0	57.1	1726.6	25.1	10252.8	217.2
5	2345.3	48.3	1570.5	20.0	11225.4	108.4
8	2321.5	3.4	1589.6	32.0	11455.3	0.0
15	2118.3	97.7	1421.2	20.5	10344.2	704.4
21	2500.1	480.5	1507.1	31.4	9846.2	975.3

Pepper's Ferry

day	total pro	t.pro dev	total poly	t.poly dev	total COD	t.COD dev
0	3188.8	33.1	1779.8	0.0	12249.6	325.8
5	3351.8	64.0	1623.4	44.9	13907.3	541.8
8	3204.2	19.1	1570.2	68.5	13715.7	54.2
15	2854.1	58.4	1649.3	66.6	12068.3	216.7
21	2535.0	498.4	1647.7	0.0	12106.6	54.2

Table B33: COD and Acetate, 36°C

COD and Acetate, mg/L

Blacksburg

day	COD	COD dev	acetate
0	77.1	19.1	33.2
5	1762.9	164.5	760.3
8	1623.4	0.0	492.7
15	1237.8	10.9	33.1
21	1688.9	27.3	395.5

Pepper's Ferry

day	COD	COD dev	acetate
0	73.3	13.6	9.8
5	1773.8	16.4	1055.7
8	2016.7	10.9	1169.6
15	1365.0	180.0	21.1
21	2174.8	5.5	395.5

VITA

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Miss Rust's academic career includes work and research experience. She worked under the cooperative education program for R.R. Donnelley Printing Company in Lynchburg, Virginia for four semesters. In the summer 1996 she worked in the environmental engineering laboratory for Dr. Nancy G. Love on a project entitled "Enrichment and Characterization of an Anaerobic Methyl Ethyl Ketoxime-Degrading Culture from an Anoxic/Anaerobic/Aerobic Activated Sludge Sequencing Batch Reactor". This paper was published in the proceedings of the Second International Conference on Microorganisms in Activated Sludge and Biofilm Processes in Berkeley, California in 1997 and in *Water Science and Technology* in 1998. Miss Rust continued her research in the academic year 1996-1997 on a National Science Foundation Research Experience for Undergraduates grant.