

Saturated Hydraulic Conductivity Tests Using Falling Head Procedure

Application: Determine initial saturated hydraulic conductivity of column media.

Method: saturate media--flush columns for designated 2.0 hour flushing period.

Close under-drain and allow column media to saturate and fill to invert of overflow (~15.24 cm). If necessary top off ponded water to invert of overflow.

Open bottom drain and time from 6" to soil surface.

Analysis performed by: D Rapoza and C Hinman

Dates: measurements taken on 11-29-18, 11-30-18, 12-3-18, 12-13-18

Sample ID: none

Test Time

Treatment Column	1	Treatment Column	2	Treatment Column	3	Treatment Column	4	Treatment Column	5	Treatment Column	6	Treatment Column	7	Treatment Column	8
11	total time sec 157.03 hrs 0.0436	21	total time sec 125.76 hrs 0.0349	31	total time sec 106.91 hrs 0.0297	41	total time sec 84.36 hrs 0.0234	51	total time sec 146.53 hrs 0.0407	61	total time sec 137.67 hrs 0.0382	71	total time sec 74.95 hrs 0.0208	81	total time sec 68.41 hrs 0.0190
12	total time sec 153.51 hrs 0.0426	22	total time sec 127.9 hrs 0.0355	32	total time sec 177.76 hrs 0.0494	42	total time sec 138.34 hrs 0.0384	52	total time sec 136.14 hrs 0.0378	62	total time sec 159.81 hrs 0.0444	72	total time sec 70.83 hrs 0.0197	82	total time sec 65.39 hrs 0.0182
13	total time sec 158.5 hrs 0.0440	23	total time sec 124.09 hrs 0.0345	33	total time sec 109.6 hrs 0.0304	43	total time sec 95.37 hrs 0.0265	53	total time sec 144.64 hrs 0.0402	63	total time sec 123.1 hrs 0.0342	73	total time sec 70.07 hrs 0.0195	83	total time sec 59.39 hrs 0.0165

Ksat Calculation

$$K_{sat} = L / (t_1 - t_2) * \ln(h_1 + L / h_2 + L)$$

L = depth of media + aggregate drainage layer = 76.2cm. Significant settling observed, so media depth = total column ht (93.98 cm) - measured depth at end of Ksat test.

t1 = start time and t2 = stop time of test

h1 = initial height and h2 = final height = falling distance

h1 + L = distance from column bottom to overflow invert = 91.44cm. h2 + L = distance from column bottom to media surface (media depth). Since there is differential settling in each column, media depth = 93.98 cm - measured depth.

Measured depth = depth from media surface to column rim

Treatment Column	1	Treatment Column	2	Treatment Column	3	Treatment Column	4	Treatment Column	5	Treatment Column	6	Treatment Column	7	Treatment Column	8
11	Measured Depth (cm) 25.88 Media Depth (L) 68.10 $\ln(h_1+L/h_2+L) = 0.29470581$ Ksat (cm/hr) 460.10 Ksat (in/hr) 181.14	21	Measured Depth (cm) 21.30 Media Depth (L) 70.14 $\ln(h_1+L/h_2+L) = 0.26518977$ Ksat (cm/hr) 532.45 Ksat (in/hr) 209.63	31	Measured Depth (cm) 17.94 Media Depth (L) 76.04 $\ln(h_1+L/h_2+L) = 0.1844235$ Ksat (cm/hr) 472.22 Ksat (in/hr) 185.91	41	Measured Depth (cm) 13.87 Media Depth (L) 77.57 $\ln(h_1+L/h_2+L) = 0.16450226$ Ksat (cm/hr) 544.54 Ksat (in/hr) 214.39	51	Measured Depth (cm) 21.08 Media Depth (L) 70.36 $\ln(h_1+L/h_2+L) = 0.2620581$ Ksat (cm/hr) 453.00 Ksat (in/hr) 178.35	61	Measured Depth (cm) 21.65 Media Depth (L) 69.79 $\ln(h_1+L/h_2+L) = 0.27019229$ Ksat (cm/hr) 493.09 Ksat (in/hr) 194.13	71	Measured Depth (cm) 20.61 Media Depth (L) 70.8 $\ln(h_1+L/h_2+L) = 0.25540038$ Ksat (cm/hr) 868.90 Ksat (in/hr) 342.09	81	Measured Depth (cm) 21.40 Media Depth (L) 72.58 $\ln(h_1+L/h_2+L) = 0.23099362$ Ksat (cm/hr) 882.27 Ksat (in/hr) 347.35
12	Measured Depth (cm) 24.23 Media Depth (L) 67.21 $\ln(h_1+L/h_2+L) = 0.30786097$ Ksat (cm/hr) 485.24 Ksat (in/hr) 191.04	22	Measured Depth (cm) 23.69 Media Depth (L) 67.75 $\ln(h_1+L/h_2+L) = 0.29985856$ Ksat (cm/hr) 571.82 Ksat (in/hr) 225.13	32	Measured Depth (cm) 19.40 Media Depth (L) 74.58 $\ln(h_1+L/h_2+L) = 0.20381064$ Ksat (cm/hr) 307.83 Ksat (in/hr) 121.19	42	Measured Depth (cm) 17.37 Media Depth (L) 74.07 $\ln(h_1+L/h_2+L) = 0.21067243$ Ksat (cm/hr) 406.07 Ksat (in/hr) 159.87	52	Measured Depth (cm) 19.81 Media Depth (L) 71.63 $\ln(h_1+L/h_2+L) = 0.24416904$ Ksat (cm/hr) 462.49 Ksat (in/hr) 182.08	62	Measured Depth (cm) 21.78 Media Depth (L) 69.66 $\ln(h_1+L/h_2+L) = 0.27205675$ Ksat (cm/hr) 426.92 Ksat (in/hr) 168.08	72	Measured Depth (cm) 19.62 Media Depth (L) 71.82 $\ln(h_1+L/h_2+L) = 0.24152003$ Ksat (cm/hr) 881.62 Ksat (in/hr) 347.10	82	Measured Depth (cm) 20.42 Media Depth (L) 73.56 $\ln(h_1+L/h_2+L) = 0.21758162$ Ksat (cm/hr) 881.16 Ksat (in/hr) 346.91
13	Measured Depth (cm) 25.62 Media Depth (L) 65.82 $\ln(h_1+L/h_2+L) = 0.32875928$ Ksat (cm/hr) 491.48 Ksat (in/hr) 193.50	23	Measured Depth (cm) 21.69 Media Depth (L) 69.75 $\ln(h_1+L/h_2+L) = 0.2707656$ Ksat (cm/hr) 547.90 Ksat (in/hr) 215.71	33	Measured Depth (cm) 18.35 Media Depth (L) 75.63 $\ln(h_1+L/h_2+L) = 0.18982999$ Ksat (cm/hr) 471.58 Ksat (in/hr) 185.66	43	Measured Depth (cm) 15.11 Media Depth (L) 76.33 $\ln(h_1+L/h_2+L) = 0.18061697$ Ksat (cm/hr) 520.41 Ksat (in/hr) 204.89	53	Measured Depth (cm) 20.83 Media Depth (L) 70.61 $\ln(h_1+L/h_2+L) = 0.25851124$ Ksat (cm/hr) 454.32 Ksat (in/hr) 178.87	63	Measured Depth (cm) 20.61 Media Depth (L) 70.83 $\ln(h_1+L/h_2+L) = 0.25540038$ Ksat (cm/hr) 529.03 Ksat (in/hr) 208.28	73	Measured Depth (cm) 20.73 Media Depth (L) 70.71 $\ln(h_1+L/h_2+L) = 0.25709601$ Ksat (cm/hr) 934.00 Ksat (in/hr) 367.72	83	Measured Depth (cm) 20.42 Media Depth (L) 73.56 $\ln(h_1+L/h_2+L) = 0.21758162$ Ksat (cm/hr) 970.18 Ksat (in/hr) 381.96
	Treatment Mean (cm/hr) 478.94 Treatment Mean (in/hr) 188.56		Treatment Mean (cm/hr) 550.73 Treatment Mean (in/hr) 216.82		Treatment Mean (cm/hr) 417.21 Treatment Mean (in/hr) 164.26		Treatment Mean (cm/hr) 490.34 Treatment Mean (in/hr) 193.05		Treatment Mean (cm/hr) 456.60 Treatment Mean (in/hr) 179.76		Treatment Mean (cm/hr) 483.01 Treatment Mean (in/hr) 190.16		Treatment Mean (cm/hr) 894.84 Treatment Mean (in/hr) 352.30		Treatment Mean (cm/hr) 911.20 Treatment Mean (in/hr) 358.74

DRAFT BSM PHASE 2 FLUSHING RESULTS FOR AC MEETING

1.1. MEDIA BLENDS

Selected media blends were flushed with deionized water for the equivalent of one Seattle water year. Below are the media blends descriptions followed by a draft summary of flushing results and summary statistic tables.

Notes for the flushing experiments:

- One of the samples for Treatment 2 and two of the samples for Treatment 3 were lost in the lab for all metals, dissolved organic carbon, nitrate+nitrite, total phosphorus, ortho phosphorus, and total suspended solids for the first flushing experiment.
- Aluminum was evaluated on the first, second and fourth flushing experiments for treatments 2 and 4 with polishing layers and the first and fourth experiments for the remaining treatments without polishing layers.
- Polycyclic aromatic hydrocarbons (PAH) were evaluated for flushing experiments 1 and 4.
- PAH effluent concentrations were all below reporting limit except for Treatment 1 (60/40) and are not included in tables below.
- Hydrocarbons were evaluated for flushing experiments 1 and 4.
- Fecal coliform was evaluated for flushing experiments 1 and 4.
- Only the primary contaminants of concern for water quality treatment objectives are summarized in text below. Tables are presented for those primary contaminants and all other contaminants except PAH in tables below.

BSM Phase 2 Treatment Blends					
BSM Blend Number	BSM Blend Abbreviations	Primary BSM Blend	Polishing Layer	Justification	Notes
1	60/40	60% ecology sand/40%compost	none	Current Ecology specification for comparison to other treatments. Sand: Use current BSM sand specification.	
2	60/40/aafep-layer	60% ecology sand/40%compost	90% state sand/7% coarse activated alumina/3% iron aggregate	Current Ecology specification with polishing layer to assess performance compared to 60/40 without polishing layer and other high-performance treatments. Sand: Use current BSM sand specification.	
3	70vs/20cp/10ash/compmulch	70% volcanic sand/20% coco coir/ 10% high carbon wood ash/ 2-inch compost mulch	None	BSM Phase 1 Study suggests that this blend with compost mulch grows plants as well as the 60/40 BSM; however, no water quality treatment performance was evaluated in that study. Sand: volcanic sand has tested well in previous studies and represents the finer gradation material for this study.	Blend attempts to meet all plant growing and treatment performance needs, at lower cost/cubic meter.
4	70vs/20cp/10ash/compmulch/ aafep-layer	70% volcanic sand/20% coco coir/ 10% high carbon wood ash/ 2-inch compost mulch	90% state sand/7% coarse activated alumina/3% iron aggregate	BSM Phase 1 Study suggests that this blend with compost mulch grows plants as well as the 60/40 BSM; however, no water quality treatment performance was evaluated in that study. This blend adds the polishing layer to ensure higher treatment performance if primary BSM does not capture all contaminants from compost mulch. Sand: volcanic sand has tested well in previous studies and represents the finer gradation material for this study.	Blend attempts to meet all plant growing and treatment performance needs, but at a higher cost/cubic meter.
5	70vs/20cp/10ash	70% volcanic sand/ 20% coco coir/ 10% high carbon wood ash	None	Volcanic sand combined with best performing materials from initial high-performance BSM study with Kitsap Co (Herrera 2015). Sand: volcanic sand has tested well in previous studies and represents the finer, high flow gradation material for this study.	
6	70ss/20cp/10ash	70% state sand/20% coco coir/ 10% high carbon wood ash	None	State sand combined with best performing materials from initial high-performance BSM study with Kitsap Co (Herrera 2015). Sand: state sand has tested well in previous studies and represents the coarser, high flow gradation material for this study.	
7	70ls/20cp/10ash	70% lava sand/20% coco coir/ 10% high carbon wood ash	None	Lava sand combined with best performing materials from initial high-performance BSM study with Kitsap Co (Herrera 2015). Sand: Lava sand is more porous with a rougher surface and may provide better TSS capture.	Examines lava sand for improved TSS capture, but with no orifice control.
8	70ls/20cp/10ash/orifice	70% lava sand/20% coco coir/ 10% high carbon wood ash (orifice control)	None	Lava sand combined with best performing materials from initial high-performance BSM study with Kitsap Co (Herrera 2015). Sand: Lava sand is more porous with a rougher surface and may provide better TSS capture.	Examines lava sand for improved TSS capture with orifice control.

Treatment comparisons:

- Treatments 1 and 2: compare 60/40 BSM with and without polishing layer.
- Treatment 3 and 4: compare different BSM blends below compost mulch (compost mulch provides improved plant growth).
- Treatments 5 and 6: evaluate treatment performance of high Ksat vs higher Ksat BSM blends.
- Treatments 7 and 8: same high Ksat BSM blends with orifice vs no orifice control.

Activated alumina: Actiguard F 14-18 mesh.

Coco coir: Botanicare Cocogro.

Compost: medium compost supplied by Cedar Grove meeting Washington Administration Code 173-350-220.

Iron aggregate: Connelly-GPM ETI CC-1004.

High carbon wood ash: Biological Carbon PD 100+mesh.

1.2. TOTAL SUSPENDED SOLIDS

Total suspended solids influent concentrations were below the reporting limit (1.0 mg/L) for all flushing events (see TSS Table below). TSS effluent concentrations started relatively high, but came down rapidly. For example, Treatment 2 started with a high of 99 mg/L and by the last flush concentrations had fallen to 3 mg/L. Best performer overall was Treatment 2 with a median of 14 mg/L followed by Treatment 4 with a median of 17 mg/L.

1.3. TOTAL PHOSPHORUS

Total phosphorus (TP) influent concentrations were near or below the reporting limit (5.0 µg/L) for all flushing events (see TP Table below). All treatments flushed TP albeit some at much lower concentrations than others. The 60/40 media flushed the highest concentrations starting at approximately 1500 µg/L. Treatment 4, with a polishing layer was the best performer with a median concentration of 60.9 µg/L and treatment 6 the next best performer with a median of 120 µg/L. Note that the polishing layer in Treatment 2 did reduce TP concentrations significantly (223 µg/L) compared to Treatment 1 with no polishing layer (986 µg/L); however, 223 µg/L was over three times higher than the best performer (Treatment 4 with the high-performance primary media and polishing layer).

1.4. ORTHO-PHOSPHORUS

Ortho-Phosphorus influent concentrations were just above the reporting limit (median of 4.34 and 4.14 µg/L on day 1 and 2 respectively) for all flushing events (see Ortho Phosphorus Table below). The 60/40 media flushed the highest concentrations starting at approximately 1200 µg/L. Treatment 4, with a polishing layer was the best performer with a median concentration of 14.4 µg/L and treatment 6 the next best performer with a median of 118 µg/L.

1.5. NITRATE+NITRITE

Nitrate+nitrite influent concentrations were all below the reporting limit (see Nitrate-Nitrite Table below). All treatments performed well for minimal nitrate+nitrite flushing except treatments 1 and 2 (60/40 with and without polishing layer) and Treatment 3 (compost mulch without polishing layer). Treatments 4 through 8 were all best performers with effluent concentrations of 0.5 mg/L.

1.6. DISSOLVED COPPER

Dissolved copper (dissolved Cu) influent concentrations varied among flushing events ranging from very low (0.6 day 1 and 1.8 µg/L day 2) to 17.5 and 16 µg/L on day 1 and day 2 respectively

for the fourth flushing (see dissolved Cu Table below). Most treatments performed well except for the 60/40 treatment with a high of nearly 40 µg/L for the first flushing experiment and a median effluent concentration of 13.2 µg/L. The best performer was Treatment 6 with a median effluent concentration of 0.4 µg/L followed by Treatment 4 at 0.5 µg/L.

1.7. DISSOLVED ZINC

Dissolved Zn influent concentrations varied slightly among flushing events ranging from 3.5 to 10.3 µg/L (see dissolved Zn Table below). All treatments performed well with nearly all median effluent concentrations near or below the reporting limit. The best performers were treatments 3 and 8 at 0.5 µg/L followed by Treatment 4 at 0.8 µg/L.

1.8. FECAL COLIFORM

Fecal coliform levels were assessed for the first and last flush only to evaluate bacteria levels inherent in the column array (see Fecal Coliform Table below). Influent concentrations were all below the reporting limit. This indicates that the column array is not promoting excessive bacteria colonization. Effluent concentrations from the compost treatments (1 and 2) were extremely high for the first flushing (greater than 25,000 CFU), but were comparable to other treatments by the last flushing. The best performer was Treatment 4 with a median effluent concentration of 502 CFU and Treatment 3 the next best performer at 604 CFU.

1.9. ALUMINUM

The polishing layers in treatments 2 and 4 contain activated alumina. Accordingly, we evaluated aluminum (Al) influent and effluent concentrations on the first, second and fourth flushing experiments for treatments 2 and 4 and the first and fourth experiments for the remaining treatments without polishing layers. Surprisingly, treatments 7 and 8 had the highest Al effluent concentrations at 22,800 and 19,400 respectively. Presumably this is from the lava sand used in these blends which is the only difference from treatments 5 and 6 with much lower Al effluent concentrations. Treatment 3 was the best performer with a median effluent concentration of 1010 µg/L followed by Treatment 2 at 1780 µg/L. Interestingly, Treatment 1 (60/4 with no polishing layer) had a higher median effluent concentration than Treatment 2 (60/40 with polishing layer).

Flushing Experiments Results – Tables

Flushing Experiment Raw Data and Summary Statistics for Total Suspended Solids																							
Flushing Event	Flushing Volume	Percent Water Year	Flow Rate	Influent Day 1 (mg/L)	Flag	Treatment 1 60/40 (mg/L)	Flag	Treatment 2 60/40/aafep-layer (mg/L)	Flag	Treatment 3 70vs/20cp/10ash/compmulch (mg/L)	Flag	Treatment 4 70vs/20cp/10ash/compmulch/aafep-layer (mg/L)	Flag	Influent day 2 (mg/L)	Flag	Treatment 5 70vs/20cp/10ash (mg/L)	Flag	Treatment 6 70ss/20cp/10ash (mg/L)	flag	Treatment 7 70ls/20cp/10ash (mg/L)	Flag	Treatment 8 70ls/20cp/10ash/orifice (mg/L)	Flag
1	17.81	0.05	6.67	1	U	53.3		44.7		56.3		61.7		1	U	107.0		96.7		47.0		31.2	
						51.6		99.0		no sample		73.3				122.0		99.0		63.4		92.8	
						69.0		no sample		no sample		54.3				92.7		74.3		56.2		27.2	
2	17.81	0.25	6.67	1	U	51.3		14.0		156.0		26.2		1	U	115.0		124.0		103.0		145.0	
						73.6		14.4		99.0		20.2				103.0		107.0		58.4		94.0	
						36.3		14.6		183.0		31.8				87.4		115.0		120.0		68.0	
3	35.62	0.5	11	1	U	32.3		13.8		18.6		8.6		1	U	61.8		37.7		55.4		31.8	
						27.8		12.0		22.4		11.3				40.5		31.0		34.2		21.5	
						39.7		14.4		29.0		13.8				63.4		45.6		36.6		59.6	
4	35.62	1	11	1	U	9.2		3.0		12.6		1.9		1	U	2.2		2.6		4.7		6.6	
						12.4		4.6		4.8		1.7				6.4		3.0		3.6		2.3	
						14.0		4.0		7.6		1.4				3.7		2.6		3.9		3.8	
Min				0.5		9.2		3.0		4.8		1.4		0.5		2.2		2.6		3.6		2.3	
Max				0.5		73.6		99.0		183.0		73.3		0.5		122.0		124.0		120.0		145.0	
Mean				0.5		39.2		21.7		58.9		25.5		0.5		67.1		61.5		48.9		48.6	
Median				0.5		38.0		14.0		25.7		17.0		0.5		75.4		60.0		51.2		31.5	

Flushing Experiment Raw Data and Summary Statistics for TP																							
Flushing Event	Flushing Volume	Percent Water Year	Flow Rate	Influent Day 1 (ug/L)	Flag	Treatment 1 60/40 (ug/L)	Flag	Treatment 2 60/40/aafep-layer (ug/L)	Flag	Treatment 3 70vs/20cp/10ash/compmulch (ug/L)	Flag	Treatment 4 70vs/20cp/10ash/compmulch/aafep-layer (ug/L)	Flag	Influent day 2 (ug/L)	Flag	Treatment 5 70vs/20cp/10ash (ug/L)	Flag	Treatment 6 70ss/20cp/10ash (ug/L)	flag	Treatment 7 70ls/20cp/10ash (ug/L)	Flag	Treatment 8 70ls/20cp/10ash/orifice (ug/L)	Flag
1	17.81	0.05	6.67	5	U	1502.30		316.40		422.80		128.20		5	U	460.10		285.30		836.60		763.70	
						1001.60		341.90		no sample		106.20				894.80		265.30		1029.10		902.10	
						2030.00		no sample		no sample		108.00				393.50		334.10		925.30		889.10	
2	17.81	0.25	6.67	6.1	J	1168.60		276.70		219.10		84.50		7.9		151.00		129.30		189.30		182.50	
						1115.10		255.50		259.30		69.00				152.40		114.20		216.90		203.70	
						1367.60		261.90		190.60		58.90				150.80		125.70		197.80		148.80	
3	35.62	0.5	11	5	U	856.00	J	204.00	J	157.60	J	55.70	J	2.5	U	103.18	J	72.94	J	171.65	J	153.03	J
						799.70	J	222.60	J	250.20	J	62.90	J			86.03	J	63.34	J	156.06	J	136.80	
						859.60	J	203.80	J	164.40	J	42.00	J			102.09	J	78.53	J	150.21	J	161.20	
4	35.62	1	11	5	U	951.60		91.30		295.30		25.70		5	U	307.30		117.10		339.80		367.50	
						970.10		79.80		242.50		23.00				284.30		104.80		337.00		328.50	
						903.70		77.70		263.10		11.90				291.90		123.00		327.80		344.50	
Min				2.5		799.70		77.70		157.60		11.90		1.25		86.03		63.34		150.21		136.80	
Max				6.1		2030.00		341.90		422.80		128.20		7.9		894.80		334.10		1029.10		902.10	
Mean				3.4		1130.00		212.00		246.00		64.70		3.54		281.00		151.00		406.00		382.00	
Median				2.5		986.00		223.00		246.00		60.90		2.5		218.00		120.00		272.00		266.00	

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Flushing Experiment Raw Data and Summary Statistics for Ortho-Phosphorus

Flushing Event	Flushing Volume	Percent Water Year	Flow Rate	Influent Day 1 (ug/L)	Flag	Treatment 1 60/40 (ug/L)	Flag	Treatment 2 60/40/aafep-layer (ug/L)	Flag	Treatment 3 70vs/20cp/10ash/compmulch (ug/L)	Flag	Treatment 4 70vs/20cp/10ash/compmulch/aafep-layer (ug/L)	Flag	Influent day 2 (ug/L)	Flag	Treatment 5 70vs/20cp/10ash (ug/L)	Flag	Treatment 6 70ss/20cp/10ash (ug/L)	flag	Treatment 7 70ls/20cp/10ash (ug/L)	Flag	Treatment 8 70ls/20cp/10ash/orifice (ug/L)	Flag
1	17.81	0.05	6.67	9.5		1233.70		54.90		254.40		15.80		5.2		477.70		265.90		835.10		859.00	
						1089.10		51.60		no sample		12.50	J			418.00		227.40		843.20		973.50	
						997.50		no sample		no sample		16.00				368.80		310.00		833.40		989.00	
2	17.81	0.25	6.67	5.3		991.80		77.00		229.70		16.70		8.9		183.90		138.50		260.90		242.50	
						998.20		46.60		290.60		17.40				208.20		117.20		278.20		259.70	
						1330.60		61.50		264.00		16.00				187.90		150.20		241.30		230.90	
3	35.62	0.5	11	3.4		635.60		47.80		106.70		10.40		2.5	U	38.57		34.61		95.32		94.57	
						648.50		52.00		225.30		9.10				39.03		29.77		99.83		83.70	
						759.60		44.00	J	144.20		5.20				41.92		35.11		87.77		87.60	
4	35.62	1	11	0.9	J	798.20		24.80		267.70		15.90		3.1		284.90		117.50		330.90		365.10	
						812.80		23.50		232.50		12.90				292.10		94.30		350.80		305.40	
						835.00		20.40		204.00		8.70				302.70		118.20		345.40		321.40	
Min				0.9		635.60		20.40		106.70		5.20		1.25		38.57		29.77		87.77		83.70	
Max				9.5		1330.60		77.00		290.60		17.40		8.9		477.70		310.00		843.20		989.00	
Mean				4.78		928.00		45.80		222.00		13.00		4.61		237.00		137.00		384.00		401.00	
Median				4.35		913.00		47.80		231.00		14.40		4.15		247.00		118.00		305.00		283.00	

Flushing Experiment Raw Data and Summary Statistics for Nitrite-N+Nitrate-N																									
Flushing Event	Flushing Volume	Percent Water Year	Flow Rate	Influent Day 1 (mg/L)	Flag	Treatment 1 60/40 (mg/L)	Flag	Treatment 2 60/40/aafep-layer (mg/L)	Flag	Treatment 3 70vs/20cp/10ash/compmulch (mg/L)	Flag	Treatment 4 70vs/20cp/10ash/compmulch/aafep-layer (mg/L)	Flag	Influent day 2 (mg/L)	Flag	Treatment 5 70vs/20cp/10ash (mg/L)	Flag	Treatment 6 70ss/20cp/10ash (mg/L)	flag	Treatment 7 70ls/20cp/10ash (mg/L)	Flag	Treatment 8 70ls/20cp/10ash/orifice (mg/L)	Flag		
1	17.81	0.05	6.67	0.1	U	20.50		5.08		1.17		1.19		0.1	U	0.10	U	0.10	U	0.10	U	0.10	U		
						16.30		4.48		no sample		0.78				0.10	U	0.10	U	0.29		0.12			
						14.60		no sample		no sample		0.87				0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
2	17.81	0.25	6.67	0.1	U	0.31		0.10	U	0.10	U	0.10	U	0.1	U	0.10	U	0.10	U	0.10	U	0.10	U		
						0.34		0.10	U	0.10	U			0.10	U	0.10	U	0.10	U	0.10	U	0.10	U		
						0.30		0.10	U	0.10	U			0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
3	35.62	0.5	11	0.1	U	1.20		0.69		0.19		0.10	U	0.1	U	0.10	U	0.10	U	0.10	U	0.10	U		
						1.31		0.60		0.14		0.11				0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
						1.21		0.65		0.10	U	0.10	U			0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
4	35.62	1	11	0.1	U	0.14		0.11		0.45		0.10	U	0.1	U	0.10	U	0.10	U	0.10	U	0.10	U		
						0.16		0.10	U	0.10	U			0.10	U	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
						0.14		0.10		0.48		0.10	U			0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
Min				0.05		0.14		0.05		0.05		0.05		0.05		0.05		0.05		0.05		0.05			
Max				0.05		20.50		5.08		1.17		1.19		0.05		0.05		0.05		0.29		0.12			
Mean				0.05		4.71		1.08		0.27		0.28		0.05		0.05		0.05		0.07		0.06			
Median				0.05		0.77		0.11		0.10		0.05		0.05		0.05		0.05		0.05		0.05			

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Flushing Experiment Raw Data and Summary Statistics for Copper, Dissolved

Flushing Event	Flushing Volume	Percent Water Year	Flow Rate	Influent Day 1 (ug/L)	Flag	Treatment 1 60/40 (ug/L)	Flag	Treatment 2 60/40/aafep-layer (ug/L)	Flag	Treatment 3 70vs/20cp/10ash/compmulch (ug/L)	Flag	Treatment 4 70vs/20cp/10ash/compmulch/aafep-layer (ug/L)	Flag	Influent day 2 (ug/L)	Flag	Treatment 5 70vs/20cp/10ash (ug/L)	Flag	Treatment 6 70ss/20cp/10ash (ug/L)	flag	Treatment 7 70ls/20cp/10ash (ug/L)	Flag	Treatment 8 70ls/20cp/10ash/orifice (ug/L)	Flag
1	17.81	0.05	6.67	0.6		39.1		8.3		7.9		1.4		1.8		3.2	J	0.7	J	1.5	J	0.9	J
						39.4		8.6		no sample		0.5		4.8	J	1.1	J	1.5	J	0.7	J		
						38.4		no sample		no sample		9.3		4.1	J	0.6	J	0.9	J	0.7	J		
2	17.81	0.25	6.67	0.5		15.6		4.2		4.5		0.9		0.6		4.0		2.4		2.5		0.1	
						14.8		3.1		6.6		0.6		3.9		7.4		2.5		5.7			
						15.8		4.3		6.2		0.6		1.1		1.9		3.4		1.6			
3	35.62	0.5	11	2.4		6.9		2.5		4.2		0.5		6.9		0.1	U	0.2		0.1	U	0.1	U
						8.2		2.2		8.0		0.4		0.3		0.2		0.1	U	0.1	U		
						11.6		3.1		2.5		0.1	U	0.3		0.1	U	0.2		0.1	U		
4	35.62	1	11	17.5		2.6		0.1	U	5.9		0.1	U	16		0.1	U	0.1	U	0.1	U	0.1	U
						2.7		0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U		
						2.8		0.1	U	4.0		0.1	U	0.1	U	0.1	U	0.1	U	0.1	U		
Min				0.5		2.6		0.1		0.1		0.1		0.6		0.1		0.1		0.1		0.1	
Max				17.5		39.4		8.6		8.0		9.3		16.0		4.8		7.4		3.4		5.7	
Mean				5.3		16.5		3.3		5.0		1.2		6.3		1.8		1.2		1.1		0.8	
Median				1.5		13.2		3.1		5.2		0.5		4.4		0.7		0.4		0.6		0.1	

Flushing Experiment Raw Data and Summary Statistics for Zinc, Dissolved																							
Flushing Event	Flushing Volume	Percent Water Year	Flow Rate	Influent Day 1 (ug/L)	Flag	Treatment 1 60/40 (ug/L)	Flag	Treatment 2 60/40/aafep-layer (ug/L)	Flag	Treatment 3 70vs/20cp/10ash/compmulch (ug/L)	Flag	Treatment 4 70vs/20cp/10ash/compmulch/aafep-layer (ug/L)	Flag	Influent day 2 (ug/L)	Flag	Treatment 5 70vs/20cp/10ash (ug/L)	Flag	Treatment 6 70ss/20cp/10ash (ug/L)	flag	Treatment 7 70ls/20cp/10ash (ug/L)	Flag	Treatment 8 70ls/20cp/10ash/orifice (ug/L)	Flag
1	17.81	0.05	6.67	3.5		7.8		4.3		3.4		1.5		4.9		2.3		1.8		1.0	U	1.0	U
						8.7		2.3		no sample		1.5				2.3		1.0	U	1.0	U	1.0	U
						11.8		no sample		no sample		8.7				6.2		2.6		1.0	U	1.0	U
2	17.81	0.25	6.67	1.5		1.9		1.0	U	1.0	U	5.7		2.3		2.7		1.4		1.8		8.8	
						1.0	U	1.0	U	2.9		1.0	U			2.7		3.3		2.0		6.9	
						1.0	U	1.0	U	1.0	U	1.1				1.0	U	1.3		2.7		1.1	
3	35.62	0.5	11	7.7		2.4		2.0		1.0		1.0	U	10.3		1.0	U	1.0	U	1.0	U	1.0	U
						3.3		2.2		1.7		1.0	U			1.1		1.9		3.2		1.0	U
						8.1		2.1		1.0	U	1.2				1.0	U	1.0	U	1.3		1.1	
4	35.62	1	11	6.8		1.0	U	3.7		1.0	U	1.0	U	5.1		1.0	U	1.0	U	1.0	U	1.0	U
						1.0	U	1.2		1.0	U	1.0	U			1.3		1.0	U	1.0	U	1.0	U
						1.4		1.0	U	1.0	U	1.0	U			1.0	U	1.00	U	1.9		1.0	U
Min				1.5		0.50		0.50		0.50		0.50		2.3		0.50		0.50		0.50		0.50	
Max				7.7		11.80		4.30		3.40		8.70		10.3		6.20		3.30		3.20		8.80	
Mean				4.88		3.95		1.80		1.20		1.89		5.65		1.76		1.27		1.32		1.83	
Median				5.15		2.15		2.00		0.50		0.80		5		1.20		0.90		0.90		0.50	

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Flushing Experiment Raw Data and Summary Statistics for Fecal Coliform																							
Flushing Event	Flushing Volume	Percent Water Year	Flow Rate	Influent Day 1 (CFU)	Flag	Treatment 1 60/40 (CFU)	Flag	Treatment 2 60/40/aafep-layer (CFU)	Flag	Treatment 3 70vs/20cp/10ash/compmulch (CFU)	Flag	Treatment 4 70vs/20cp/10ash/compmulch/aafep-layer (CFU)	Flag	Influent day 2 (CFU)	Flag	Treatment 5 70vs/20cp/10ash (CFU)	Flag	Treatment 6 70ss/20cp/10ash (CFU)	flag	Treatment 7 70ls/20cp/10ash (CFU)	Flag	Treatment 8 70ls/20cp/10ash/orifice (CFU)	Flag
1	17.81	0.05	6.67	2	U	25000		25000		2000		1000		2	U	3200		2400		3800		9800	
						25000		25000		2400		1300				2600		1500		2700		10100	
						25000		25000		1200		1500				2800		1600		4300		5300	
2	17.81	0.25	6.67																				
3	35.62	0.5	11																				
4	35.62	1	11	2	U	2	U	2	U	8		2	U	2	U	4		12		2		20	
						2	U	2	U	2	U	2	U			20		4		4		28	
						2	U	2	U	2	U	4				4		2		12		4	
Min				1		1		1		1		1		1		4		2		2		4	
Max				1		25000		25000		2400		1500		1		3200		2400		4300		10100	
Mean				1		12500		12500		935		634		1		1440		920		1800		4210	
Median				1		12500		12500		604		502		1		1310		756		1360		2660	

Flushing Experiment Raw Data and Summary Statistics for Aluminum

Flushing Event	Flushing Volume	Percent Water Year	Flow Rate	Influent Day 1 (ug/L)	Flag	Treatment 1 60/40 (ug/L)	Flag	Treatment 2 60/40/aafep-layer (ug/L)	Flag	Treatment 3 70vs/20cp/10ash/compmulch (ug/L)	Flag	Treatment 4 70vs/20cp/10ash/compmulch/aafep-layer (ug/L)	Flag	Influent day 2 (ug/L)	Flag	Treatment 5 70vs/20cp/10 ash (ug/L)	Flag	Treatment 6 70ss/20cp/10 ash (ug/L)	flag	Treatment 7 70ls/20cp/10 ash (ug/L)	Flag	Treatment 8 70ls/20cp/10ash/orifice (ug/L)	Flag
1	17.81	0.05	6.67	1	U	4260		3140		5880		5420		1	U	7260		7750		52500		41200	
						4220		4040		no sample		6170				7610		7890		44800		40800	
						4270		no sample		no sample		595				7710		6840		45400		37700	
2	17.81	0.25	6.67					1780				2550											
								1860				2230											
								1780				2840											
3	35.62	0.5	11																				
4	35.62	1	11	1	U	1280		607		1140		287		1	U	371		335		805		1020	
						1410		534		495		260				619		361		743		682	
						1370		477		882		218				514		378		660		593	
Min				0.5		1280		477		495		218		1		371		335		660		593	
Max				0.5		4270		4040		5880		6170		1		7710		7890		52500		41200	
Mean				0.5		2800		1780		2100		2290		1		4010		3930		24200		20300	
Median				0.5		2820		1780		1010		2230		1		3940		3610		22800		19400	

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Flushing Experiment Raw Data and Summary Statistics for Cadmium																							
Flushing Event	Flushing Volume	Percent Water Year	Flow Rate	Influent Day 1 (ug/L)	Flag	Treatment 1 60/40 (ug/L)	Flag	Treatment 2 60/40/aafep-layer (ug/L)	Flag	Treatment 3 70vs/20cp/10ash/compmulch (ug/L)	Flag	Treatment 4 70vs/20cp/10ash/compmulch/aafep-layer (ug/L)	Flag	Influent day 2 (ug/L)	Flag	Treatment 5 70vs/20cp/10ash (ug/L)	Flag	Treatment 6 70ss/20cp/10ash (ug/L)	flag	Treatment 7 70ls/20cp/10ash (ug/L)	Flag	Treatment 8 70ls/20cp/10ash/orifice (ug/L)	Flag
1	17.81	0.05	6.67	0.1	U	0.3		0.1		0.1		0.1		0.1	U	0.1		0.1	U	0.1	U	0.1	U
						0.3		0.1		no sample		0.1				0.1		0.1	U	0.1	U	0.1	U
						0.3		no sample		no sample		0.1				0.1		0.1	U	0.1	U	0.1	U
2	17.81	0.25	6.67	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
						0.1	U	0.1	U	0.1	U	0.1	U			0.1	U	0.1	U	0.1	U	0.1	U
						0.1	U	0.1	U	0.1	U	0.1	U			0.1	U	0.1	U	0.1	U	0.1	U
3	35.62	0.5	11	0.1	U	0.1		0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
						0.1		0.1	U	0.1	U	0.1	U			0.1	U	0.1	U	0.1	U	0.1	U
						0.1	U	0.1	U	0.1	U	0.1	U			0.1	U	0.1	U	0.1	U	0.1	U
4	35.62	1	11	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
						0.1	U	0.1	U	0.1	U	0.1	U			0.1	U	0.1	U	0.1	U	0.1	U
						0.1		0.1	U	0.1	U	0.1	U			0.1	U	0.1	U	0.1	U	0.1	U
Min				0.05		0.05		0.05		0.05		0.05		0.05		0.05		0.05		0.05		0.05	
Max				0.05		0.30		0.10		0.10		0.10		0.1		0.10		0.05		0.10		0.10	
Mean				0.05		0.13		0.06		0.06		0.06		0.06		0.06		0.05		0.05		0.05	
Median				0.05		0.08		0.05		0.05		0.05		0.05		0.05		0.05		0.05		0.05	

Flushing Experiment Raw Data and Summary Statistics for Cadmium, Dissolved

Flushing Event	Flushing Volume	Percent Water Year	Flow Rate	Influent Day 1 (ug/L)	Flag	Treatment 1 60/40 (ug/L)	Flag	Treatment 2 60/40/aafep-layer (ug/L)	Flag	Treatment 3 70vs/20cp/10ash/compmulch (ug/L)	Flag	Treatment 4 70vs/20cp/10ash/compmulch/aafep-layer (ug/L)	Flag	Influent day 2 (ug/L)	Flag	Treatment 5 70vs/20cp/10ash (ug/L)	Flag	Treatment 6 70ss/20cp/10ash (ug/L)	flag	Treatment 7 70ls/20cp/10ash (ug/L)	Flag	Treatment 8 70ls/20cp/10ash/orifice (ug/L)	Flag		
1	17.81	0.05	6.67	0.1	U	0.2		0.1		0.1		0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
						0.1		0.1	U	no sample		0.1	U			0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
						0.1		no sample		no sample		0.1	U			0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
2	17.81	0.25	6.67	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
						0.1	U	0.1	U	0.1	U	0.1	U			0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
						0.1	U	0.1	U	0.1	U	0.1	U			0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
3	35.62	0.5	11	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
						0.1	U	0.1	U	0.1	U	0.1	U			0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
						0.1	U	0.1	U	0.1	U	0.1	U			0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
4	35.62	1	11	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
						0.1	U	0.1	U	0.1	U	0.1	U			0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
						0.1	U	0.1	U	0.1	U	0.1	U			0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Min				0.05		0.05		0.05		0.05		0.05		0.05		0.05		0.05		0.05		0.05		0.05	
Max				0.05		0.20		0.10		0.10		0.05		0.05		0.05		0.05		0.10		0.05		0.05	
Mean				0.05		0.07		0.05		0.06		0.05		0.05		0.05		0.05		0.05		0.05		0.05	
Median				0.05		0.05		0.05		0.05		0.05		0.05		0.05		0.05		0.05		0.05		0.05	

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Flushing Experiment Raw Data and Summary Statistics for Copper																							
Flushing Event	Flushing Volume	Percent Water Year	Flow Rate	Influent Day 1 (ug/L)	Flag	Treatment 1 60/40 (ug/L)	Flag	Treatment 2 60/40/aafep-layer (ug/L)	Flag	Treatment 3 70vs/20cp/10ash/compmulch (ug/L)	Flag	Treatment 4 70vs/20cp/10ash/compmulch/aafep-layer (ug/L)	Flag	Influent day 2 (ug/L)	Flag	Treatment 5 70vs/20cp/10ash (ug/L)	Flag	Treatment 6 70ss/20cp/10ash (ug/L)	flag	Treatment 7 70ls/20cp/10ash (ug/L)	Flag	Treatment 8 70ls/20cp/10ash/orifice (ug/L)	Flag
1	17.81	0.05	6.67	0.5		41.1		23.0		19.9		18.5		0.4		27.9		28.6		20.1		16.9	
						38.6		26.8		no sample		18.3				29.2		29.7		18.8		17.3	
						38.5		no sample		no sample		19.6				31.3		16.3		19.0		17.4	
2	17.81	0.25	6.67	0.5		24.7		10.5		22.6		8.7		0.5		15.3		13.0		13.2		17.0	
						24.3		11.4		22.5		6.6				14.9		13.7		10.0		13.4	
						25.3		11.0		24.1		9.5				17.9		14.5		11.9		9.1	
3	35.62	0.5	11	2.9		15.5		7.3		9.1		3.5		7.1		7.1		5.9		7.4		4.9	
						15.2		7.1		12.9		4.1				5.1		5.5		5.1		5.5	
						14.4		6.7		9.2		3.7				6.9		6.4		5.5		7.2	
4	35.62	1	11	17.6		7.2		2.0		10.2		0.7		16.9		0.1	U	0.1	U	0.3		0.3	
						7.7		2.0		4.8		0.6				0.4		0.1	U	0.1	U	0.1	U
						7.9		2.2		7.2		0.1				0.1		0.1	U	0.1	U	0.1	U
Min				0.5		7.2		2.0		4.8		0.1		0.4		0.1		0.1		0.1		0.1	
Max				17.6		41.1		26.8		24.1		19.6		16.9		31.3		29.7		20.1		17.4	
Mean				5.4		21.7		10.0		14.2		7.8		6.2		13.0		11.1		9.3		9.1	
Median				1.7		19.9		7.3		11.6		5.4		3.8		11.0		9.7		8.7		8.2	

Flushing Experiment Raw Data and Summary Statistics for Lead																							
Flushing Event	Flushing Volume	Percent Water Year	Flow Rate	Influent Day 1 (ug/L)	Flag	Treatment 1 60/40 (ug/L)	Flag	Treatment 2 60/40/aafep-layer (ug/L)	Flag	Treatment 3 70vs/20cp/10ash/compmulch (ug/L)	Flag	Treatment 4 70vs/20cp/10ash/compmulch/aafep-layer (ug/L)	Flag	Influent day 2 (ug/L)	Flag	Treatment 5 70vs/20cp/10ash (ug/L)	Flag	Treatment 6 70ss/20cp/10ash (ug/L)	flag	Treatment 7 70ls/20cp/10ash (ug/L)	Flag	Treatment 8 70ls/20cp/10ash/orifice (ug/L)	Flag
1	17.81	0.05	6.67	0.1	U	5.6		3.2		1.7		2.3		0.1	U	2.8		3.0		4.0		3.2	
						5.0		4.0				2.2				2.9		3.1		3.7		3.5	
						5.1						2.5				3.1		2.9		3.7		3.1	
2	17.81	0.25	6.67	0.1	U	4.3		2.0		3.0		0.8		0.1	U	2.2		2.7		2.4		2.9	
						4.1		2.1		2.3		0.6				2.2		2.8		2.0		2.6	
						4.3		2.0		3.3		0.8				2.5		2.8		2.3		2.0	
3	35.62	0.5	11	1		3.0		1.5		0.9		0.6		3.9		1.1		1.1		1.1		0.8	
						3.0		1.7		1.1		0.6				0.8		1.0		1.0		0.9	
						3.0		1.6		1.0		0.5				1.0		1.2		1.0		1.2	
4	35.62	1	11	1.6		1.1		0.7		0.5		0.2		0.8		0.1		0.1		0.1		0.1	
						1.3		0.7		0.3		0.2				0.1		0.1		0.1		0.1	
						2.5		0.6		0.3		0.1				0.1		0.1		0.1		0.1	
Min				0.05		1.10		0.60		0.30		0.10		0.05		0.10		0.10		0.10		0.10	
Max				1.60		5.60		4.00		3.30		2.50		3.90		3.10		3.10		4.00		3.50	
Mean				0.68		3.52		1.83		1.44		0.95		1.20		1.58		1.74		1.79		1.71	
Median				0.53		3.55		1.70		1.05		0.60		0.43		1.65		1.95		1.55		1.60	

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Flushing Experiment Raw Data and Summary Statistics for Lead, Dissolved

Flushing Event	Flushing Volume	Percent Water Year	Flow Rate	Influent Day 1 (ug/L)	Flag	Treatment 1 60/40 (ug/L)	Flag	Treatment 2 60/40/aafep-layer (ug/L)	Flag	Treatment 3 70vs/20cp/10ash/compmulch (ug/L)	Flag	Treatment 4 70vs/20cp/10ash/compmulch/aafep-layer (ug/L)	Flag	Influent day 2 (ug/L)	Flag	Treatment 5 70vs/20cp/10ash (ug/L)	Flag	Treatment 6 70ss/20cp/10ash (ug/L)	flag	Treatment 7 70ls/20cp/10ash (ug/L)	Flag	Treatment 8 70ls/20cp/10ash/orifice (ug/L)	Flag		
1	17.81	0.05	6.67	0.1	U	0.5		0.3		0.3		0.2		0.1	U	0.1	U	0.1	U	0.1	U	0.1	U		
						0.9		0.2		no sample		0.1	U			0.1		0.1	U	0.1	U	0.1	U	0.1	U
						1.1		no sample		no sample		0.4				0.2		0.1	U	0.1	U	0.1	U	0.1	U
2	17.81	0.25	6.67	0.1	U	0.2		0.1		0.1	U	0.1		0.1	U	0.5		0.5		0.4		0.2			
						0.1	U	0.1	U	0.1				0.6		0.4		0.4		0.4		1.0			
						0.1		0.2		0.1	U	0.1	U	0.3		0.4		0.5		0.5		0.3			
3	35.62	0.5	11	0.2		0.4		0.4		0.2		0.2		2.4		0.1	U	0.1	U	0.1	U	0.1			
						0.7		0.5		0.4		0.2				0.1	U	0.1	U	0.1	U	0.1		0.1	
						1.8		0.7		0.1		0.1		0.1		0.1	U	0.1	U	0.1	U	0.1	U	0.1	
4	35.62	1	11	0.6		0.1		0.1		0.1		0.1	U	0.5		0.1	U	0.1	U	0.1	U	0.1	U		
						0.1		0.1	U	0.1	U	0.1	U			0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
						0.1		0.1	U	0.1	U	0.1	U			0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Min				0.05		0.05		0.05		0.05		0.05		0.05		0.05		0.05		0.05		0.05			
Max				0.60		1.80		0.70		0.40		0.40		2.40		0.60		0.50		0.50		1.00			
Mean				0.23		0.50		0.24		0.14		0.13		0.75		0.17		0.15		0.15		0.18			
Median				0.13		0.30		0.20		0.10		0.10		0.28		0.05		0.05		0.05		0.08			

Flushing Experiment Raw Data and Summary Statistics for Dissolved Organic Carbon																							
Flushing Event	Flushing Volume	Percent Water Year	Flow Rate	Influent Day 1 (mg/L)	Flag	Treatment 1 60/40 (mg/L)	Flag	Treatment 2 60/40/aafep-layer (mg/L)	Flag	Treatment 3 70vs/20cp/10ash/compmulch (mg/L)	Flag	Treatment 4 70vs/20cp/10ash/c ompmulch/aafep-layer (mg/L)	Flag	Influent day 2 (mg/L)	Flag	Treatment 5 70vs/20cp/10 ash (mg/L)	Flag	Treatment 6 70ss/20cp/10 ash (mg/L)	flag	Treatment 7 70ls/20cp/10 ash (mg/L)	Flag	Treatment 8 70ls/20cp/10ash/orifice (mg/L)	Flag
1	17.81	0.05	6.67	1.50	U	94.80		22.70		48.50		13.90		1.50	U	2.54		3.44		2.54		2.19	
						130.00		31.60		no sample		20.90				9.48		2.98		2.94		3.52	
						105.00		no sample		no sample		22.90				20.60		2.54		2.49		2.25	
2	17.81	0.25	6.67	1.50	U	16.60		9.65		3.10		1.50	U	1.50	U	1.50	U	1.50	U	1.50	U	1.50	U
						20.80		6.07		3.70		1.50	U			1.50	U	1.50	U	1.50	U	1.50	U
						25.40		6.21		3.49		1.50	U			1.50	U	1.50	U	1.50	U	1.50	U
3	35.62	0.5	11	1.50	U	7.40		2.78		2.04		1.50	U	1.50	U	1.50	U	1.50	U	1.50	U	1.50	U
						7.08		2.86		2.95		1.50	U			1.50	U	1.50	U	1.50	U	1.50	U
						6.32		3.72		1.54		1.50	U			1.50	U	1.50	U	1.50	U	1.50	U
4	35.62	1	11	1.50	U	3.16		1.50	U	3.08		1.50	U	1.50	U	1.50	U	1.50	U	1.50	U	1.50	U
						3.55		1.50	U	1.56		1.50	U			1.50	U	1.50	U	1.50	U	1.50	U
						3.35		1.50	U	2.66		1.50	U			1.50	U	1.50	U	1.50	U	1.50	U
Min				0.75		3.16		0.75		1.54		0.75		0.75		0.75		0.75		0.75		0.75	
Max				0.75		130.00		31.60		48.50		22.90		0.75		20.60		3.44		2.94		3.52	
Mean				0.75		35.30		7.99		7.26		5.37		0.75		3.28		1.31		1.23		1.23	
Median				0.75		12.00		3.72		3.02		0.75		0.75		0.75		0.75		0.75		0.75	

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Flushing Experiment Raw Data and Summary Statistics for Diesel Oil Range (C10-C25 Hydrocarbons)																							
Flushing Event	Flushing Volume	Percent Water Year	Flow Rate	Influent Day 1 (mg/L)	Flag	Treatment 1 60/40 (mg/L)	Flag	Treatment 2 60/40/aafep-layer (mg/L)	Flag	Treatment 3 70vs/20cp/10ash/compmulch (mg/L)	Flag	Treatment 4 70vs/20cp/10ash/compmulch/aafep-layer (mg/L)	Flag	Influent day 2 (mg/L)	Flag	Treatment 5 70vs/20cp/10 ash (mg/L)	Flag	Treatment 6 70ss/20cp/10 ash (mg/L)	flag	Treatment 7 70ls/20cp/10 ash (mg/L)	Flag	Treatment 8 70ls/20cp/10ash/orifice (mg/L)	Flag
1	17.81	0.05	6.67	0.25	U	0.52		0.39		0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
						0.59		0.25	U	0.25	U	0.25	U			0.25	U	0.25	U	0.25	U	0.25	U
						0.38		0.25	U	0.25	U	0.46				0.25	U	0.25	U	0.30		0.25	U
2	17.81	0.25	6.67																				
3	35.62	0.5	11																				
4	35.62	1	11	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
						0.25	U	0.25	U	0.25	U	0.25	U			0.25	U	0.25	U	0.25	U	0.25	U
						0.25	U	0.25	U	0.25	U	0.25	U			0.25	U	0.25	U	0.25	U	0.25	U
Min				0.13		0.13		0.13		0.13		0.13		0.125		0.13		0.13		0.13		0.13	
Max				0.13		0.59		0.39		0.13		0.46		0.125		0.13		0.13		0.30		0.13	
Mean				0.13		0.31		0.17		0.13		0.18		0.125		0.13		0.13		0.15		0.13	
Median				0.13		0.25		0.13		0.13		0.13		0.125		0.13		0.13		0.13		0.13	

Flushing Experiment Raw Data and Summary Statistics for Heavy Fuel Oil Range (>C25 Hydrocarbons)																							
Flushing Event	Flushing Volume	Percent Water Year	Flow Rate	Influent Day 1 (mg/L)	Flag	Treatment 1 60/40 (mg/L)	Flag	Treatment 2 60/40/aafep-layer (mg/L)	Flag	Treatment 3 70vs/20cp/10ash/compmulch (mg/L)	Flag	Treatment 4 70vs/20cp/10ash/compmulch/aafep-layer (mg/L)	Flag	Influent day 2 (mg/L)	Flag	Treatment 5 70vs/20cp/10 ash (mg/L)	Flag	Treatment 6 70ss/20cp/10 ash (mg/L)	flag	Treatment 7 70ls/20cp/10 ash (mg/L)	Flag	Treatment 8 70ls/20cp/10ash/orifice (mg/L)	Flag
1	17.81	0.05	6.67	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
						0.50	U	0.50	U	0.50	U	0.50	U			0.50	U	0.50	U	0.50	U	0.50	U
						0.50	U	0.50	U	0.50	U	0.50	U			0.50	U	0.50	U	0.50	U	0.50	U
2	17.81	0.25	6.67																				
3	35.62	0.5	11																				
4	35.62	1	11	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
						0.50	U	0.50	U	0.50	U	0.50	U			0.50	U	0.50	U	0.50	U	0.50	U
						0.50	U	0.50	U	0.50	U	0.50	U			0.50	U	0.50	U	0.50	U	0.50	U
Min				0.25		0.25		0.25		0.25		0.25		0.25		0.25		0.25		0.25		0.25	
Max				0.25		0.25		0.25		0.25		0.25		0.25		0.25		0.25		0.25		0.25	
Mean				0.25		0.25		0.25		0.25		0.25		0.25		0.25		0.25		0.25		0.25	
Median				0.25		0.25		0.25		0.25		0.25		0.25		0.25		0.25		0.25		0.25	

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DRAFT BSM PHASE 2 DOSING RESULTS FOR AC MEETING

1.1. MEDIA BLENDS

Selected media blends were dosed with Highway 520 water for the equivalent of 25 percent of a Seattle water year. Below are the media blends descriptions followed by a draft summary of dosing results and summary statistic tables for dosing experiments 1-4.

Notes for the dosing experiments:

- Treatment 1 and 8 were dropped after the second dosing experiment. Treatment 1 was clearly not meeting water quality treatment objectives due to ongoing export of phosphorus and nitrogen and poor TSS capture performance. Treatment 8 was a replicate of Treatment 7 except the outlet for Treatment 8 was restricted (orifice control) and no significant difference was observed between the two.
- Only the primary contaminants of concern for water quality treatment objectives are summarized in text below. Tables are presented for those primary contaminants and all other contaminants except PAH in tables below.
- Cadmium was not analyzed after dosing experiment 2 because both influent and effluent concentrations were near or below the reporting limit.
- Our statistical approach uses half the reporting limit for non-detects.
- Dosing experiment 4 was collected from Highway 520 after a long antecedent dry period and was extraordinarily dirty. For example, total Zn concentration was 681 µg/L on day 2 of experiment 4 and total Cu 246 µg/L on day 1 of experiment 4.

BSM Phase 2 Treatment Blends					
BSM Blend Number	BSM Blend Abbreviations	Primary BSM Blend	Polishing Layer	Justification	Notes
1	60/40	60% ecology sand/40%compost	none	Current Ecology specification for comparison to other treatments. Sand: Use current BSM sand specification.	
2	60/40/aafep-layer	60% ecology sand/40%compost	90% state sand/7% coarse activated alumina/3% iron aggregate	Current Ecology specification with polishing layer to assess performance compared to 60/40 without polishing layer and other high-performance treatments. Sand: Use current BSM sand specification.	
3	70vs/20cp/10ash/compmulch	70% volcanic sand/20% coco coir/ 10% high carbon wood ash/ 2-inch compost mulch	None	BSM Phase 1 Study suggests that this blend with compost mulch grows plants as well as the 60/40 BSM; however, no water quality treatment performance was evaluated in that study. Sand: volcanic sand has tested well in previous studies and represents the finer gradation material for this study.	Blend attempts to meet all plant growing and treatment performance needs, at lower cost/cubic meter.
4	70vs/20cp/10ash/compmulch/ aafep-layer	70% volcanic sand/20% coco coir/ 10% high carbon wood ash/ 2-inch compost mulch	90% state sand/7% coarse activated alumina/3% iron aggregate	BSM Phase 1 Study suggests that this blend with compost mulch grows plants as well as the 60/40 BSM; however, no water quality treatment performance was evaluated in that study. This blend adds the polishing layer to ensure higher treatment performance if primary BSM does not capture all contaminants from compost mulch. Sand: volcanic sand has tested well in previous studies and represents the finer gradation material for this study.	Blend attempts to meet all plant growing and treatment performance needs, but at a higher cost/cubic meter.
5	70vs/20cp/10ash	70% volcanic sand/ 20% coco coir/ 10% high carbon wood ash	None	Volcanic sand combined with best performing materials from initial high-performance BSM study with Kitsap Co (Herrera 2015). Sand: volcanic sand has tested well in previous studies and represents the finer, high flow gradation material for this study.	
6	70ss/20cp/10ash	70% state sand/20% coco coir/ 10% high carbon wood ash	None	State sand combined with best performing materials from initial high-performance BSM study with Kitsap Co (Herrera 2015). Sand: state sand has tested well in previous studies and represents the coarser, high flow gradation material for this study.	
7	70ls/20cp/10ash	70% lava sand/20% coco coir/ 10% high carbon wood ash	None	Lava sand combined with best performing materials from initial high-performance BSM study with Kitsap Co (Herrera 2015). Sand: Lava sand is more porous with a rougher surface and may provide better TSS capture.	Examines lava sand for improved TSS capture, but with no orifice control.
8	70ls/20cp/10ash/orifice	70% lava sand/20% coco coir/ 10% high carbon wood ash (orifice control)	None	Lava sand combined with best performing materials from initial high-performance BSM study with Kitsap Co (Herrera 2015). Sand: Lava sand is more porous with a rougher surface and may provide better TSS capture.	Examines lava sand for improved TSS capture with orifice control.

Treatment comparisons:

- Treatments 1 and 2: compare 60/40 BSM with and without polishing layer.
- Treatment 3 and 4: compare different BSM blends below compost mulch (compost mulch provides improved plant growth).
- Treatments 5 and 6: evaluate treatment performance of high Ksat vs higher Ksat BSM blends.
- Treatments 7 and 8: same high Ksat BSM blends with orifice vs no orifice control.

Activated alumina: Actiguard F 14-18 mesh.

Coco coir: Botanicare Cocogro.

Compost: medium compost supplied by Cedar Grove meeting Washington Administration Code 173-350-220.

Iron aggregate: Connelly-GPM ETI CC-1004.

High carbon wood ash: Biological Carbon PD 100+mesh.

1.2. TOTAL SUSPENDED SOLIDS

Total suspended solids influent concentrations varied from relatively low (36.6 mg/L on day 1 of experiment 1) to relatively high (310 mg/L on day 2 of experiment 4). See TSS Table below. All treatments performed well for TSS capture except Treatment 1 (60/40). Treatment 4 and was the best performer at 88.5 percent reduction (bootstrapped lower 95% confidence interval around median removal efficiency). Treatments 2, 5, 6 and 7 also performed well at approximately 80 to 84 percent removal (bootstrapped lower 95% confidence interval around median removal efficiency).

1.3. TOTAL PHOSPHORUS

Total phosphorus (TP) influent concentrations were relatively low except for experiment 4 (667 and 757 µg/L for day 1 and day 2 respectively). See TP Table below. Phosphorus is likely the most challenging stormwater contaminant for bioretention systems. Clearly the best performer was Treatment 4 with the high-performance media and polishing layer at 71.3 percent reduction (bootstrapped lower 95% confidence interval around median removal efficiency). Treatment 6 performed reasonably well with a 41.3 percent reduction (bootstrapped lower 95% confidence interval around median removal efficiency). The remainder of the treatments performed poorly with Treatment 1 exporting 367 percent (bootstrapped lower 95% confidence interval around median removal efficiency).

1.4. ORTHO-PHOSPHORUS

Ortho-Phosphorus (ortho-P) influent concentrations were relatively low (median of 11.9 and 10.4 µg/L on day 1 and 2 respectively). See Ortho Phosphorus Table below. Again Treatment 2 was clearly the best performer with a 25 percent median reduction. Treatment 2 performed reasonably well given the low influent concentrations (13.3 percent reduction); however, all other treatments exported ortho-P with Treatment 1 export 3480 percent after a full year of flushing.

1.5. NITRATE+NITRITE

Nitrate+nitrite influent concentrations varied from relatively low (0.206 mg/L) on day 1 of experiment 1 to relatively high (1.21 mg/L) for experiment 4. See Nitrate-Nitrite Table below. These media are not designed to capture nitrogen without a saturated zone; accordingly, none performed exceptionally well. Nevertheless, treatments 5 and 6 did reduce nitrate-nitrite by 34.8 and 33.5 percent respectively. Treatment 1 had a median export of 1310 percent after a full year of flushing.

1.6. DISSOLVED COPPER

Dissolved copper (dissolved Cu) influent concentrations varied widely among dosing events ranging from a low of 6.4 µg/L on day 1 of experiment 1 to 222 µg/L day 2 for the fourth flushing (see dissolved Cu Table below). Treatment 4 performed exceptionally well with a 94.6 percent reduction (bootstrapped lower 95% confidence interval around median removal efficiency). Treatment 2 was next at 89.3 percent reduction and then treatments 3, 5, 6, and 7 all with percent reductions above the TAPE thresholds of >30 percent removal.

1.7. DISSOLVED ZINC

Dissolved Zn influent concentrations varied widely among dosing events ranging from 40.9 µg/L on day 1 of experiment 1 to 386 µg/L on day 2 of experiment 4 (see dissolved Zn Table below). All treatments performed well for Zn capture. The best performers were treatments 4 and 3 at 96 and 94.4 percent reduction respectively (bootstrapped lower 95% confidence interval around median removal efficiency). All other treatments performed well and exceeded the TAPE threshold of >60 percent removal.

Dosing Experiments Results – Tables

Dosing Experiment Raw Data and Summary Statistics for Total Suspended Solids																							
Dosing Event	Flushing Volume (liters)	Percent Water Year	Flow Rate (liters/hr)	Influent Day 1 (mg/L)	flag	Treatment 1 60/40 (mg/L)	flag	Treatment 2 60/40/aafep-layer (mg/L)	flag	Treatment 3 70vs/20cp/10ash/c ompmulch (mg/L)	flag	Treatment 4 70vs/20cp/10ash/c ompmulch/aafep-layer (mg/L)	flag	Influent Day 2 (mg/L)	flag	Treatment 5 70vs/20cp/10ash (mg/L)	flag	Treatment 6 70ss/20cp/10ash (mg/L)	flag	Treatment 7 70ls/20cp/10ash (mg/L)	flag	Treatment 8 70ls/20cp/10ash/orifice (mg/L)	flag
1	35.62	0.33	6.67	36.6		30.8		7.6		34.0		8.1		53.2		10.6		6.0		11.8		7.1	
						40.6		4.6		19.6		8.4				16.4		5.6		8.3		8.0	
						36.7		5.8		12.2		10.9				13.4		7.7		9.5		17.1	
2	35.62	0.62	6.67	116		23.6		14.0		22.4		4.7		118		6.2		7.2		9.5		5.6	
						25.6		11.8		19.0		4.0				7.6		6.2		7.3		34.0	
						26.6		13		15.5		5.3				8.5		8.4		7.5		9.6	
3	35.62	1.14	11	41.0				10.6		23		5.0		52.5		12.0		16.1		14.7			
								9.4		12.8		4.2				15.3		15.6		10.8			
								8.8		21.6		4.3				26.0		16.9		16.1			
4	35.62	1.65	11	254				22.4		31.2		12.3		310		36.3		54.7		55.3			
								21.7		25.3		14.7				37.7		35.0		50.3			
								23.7		27.0		12.7				47.7		44.3		64.3			
Min				36.6		23.6		4.6		12.2		4.0		52.5		6.2		5.6		7.3		5.6	
Max				254		40.6		23.7		34.0		14.7		310		47.7		54.7		64.3		34	
Mean				112		30.6		12.8		22		7.88		133		19.8		18.6		22.1		13.6	
Median				78.5		28.7		11.2		22		6.7		85.6		14.4		12		11.3		8.8	
Percent Reduction (bootstrapped lower 95% CI)				0		38.6		84.9		66.2		88.5		0		80.1		83.9		82.4		82.7	

Dosing Experiment Raw Data and Summary Statistics for TP																							
Dosing Event	Flushing Volume (liters)	Percent Water Year	Flow Rate (liters/hr)	Influent Day 1 (ug/L)	flag	Treatment 1 60/40 (ug/L)	flag	Treatment 2 60/40/aafep-layer (ug/L)	flag	Treatment 3 70vs/20cp/10ash/c ompmulch (ug/L)	flag	Treatment 4 70vs/20cp/10ash/c ompmulch/aafep-layer (ug/L)	flag	Influent Day 2 (ug/L)	flag	Treatment 5 70vs/20cp/10ash (ug/L)	flag	Treatment 6 70ss/20cp/10ash (ug/L)	flag	Treatment 7 70ls/20cp/10ash (ug/L)	flag	Treatment 8 70ls/20cp/10ash/orifice (ug/L)	flag
1	35.62	0.33	6.67	52.2		295		69.9		74.6		22.7		63.5		103.2		45.5		141.5		134.2	
						315.7		55.0		79.7		22.2				87.1		40.4		139.8		140.2	
						369.8		55.3		84.4		20.5				89.5		48.1		124.5		135.6	
2	35.62	0.62	6.67	198.7		715.5		144.1		209.9		37.4		280.3		165.4		86.3		192.5		205.1	
						513.0		118.4		190.1		33.4				155.5		84.2		202.7		317.2	
						733.2		110.1		196.7		32.8				160.8		92.1		184.1		208.7	
3	35.62	1.14	11	95.2				138.7		235.6		38.7		102.9		199.2		99.1		190.5			
								129.5		224.6		35.0				185.9		102.4		198.2			
								100.1		236.9		35.4				200.4		108.6		186.7			
4	35.62	1.65	11	667.1				205.2		340.9		112.1		757		317.8		243.3		334.9			
								195.3		318.7		109.5				301.3		232.3		342.3			
								189.8		336.7		107.6				311.2		231.3		337.8			
Min				52.2		295		55.0		74.6		20.5		63.5		87.1		40.4		124.5		134.2	
Max				667.1		733.2		205.2		340.9		112.1		757		317.8		243.3		342.3		317.2	
Mean				253		490		126		211		50.6		301		190		118		215		190	
Median				147		441		124		217		35.2		192		176		95.6		192		173	
Percent Reduction (bootstrapped lower 95% CI)				0		-382		15.3		-37.6		71.3		0		-10		41.3		-29.7		-52.8	

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Dosing Experiment Raw Data and Summary Statistics for Ortho-Phosphorus																							
Dosing Event	Flushing Volume (liters)	Percent Water Year	Flow Rate (liters/hr)	Influent Day 1 (ug/L)	flag	Treatment 1 60/40 (ug/L)	flag	Treatment 2 60/40/aafep-layer (ug/L)	flag	Treatment 3 70vs/20cp/10ash/c ompmulch (ug/L)	flag	Treatment 4 70vs/20cp/10ash/c ompmulch/aafep-layer (ug/L)	flag	Influent Day 2 (ug/L)	flag	Treatment 5 70vs/20cp/10ash (ug/L)	flag	Treatment 6 70ss/20cp/10ash (ug/L)	flag	Treatment 7 70ls/20cp/10ash (ug/L)	flag	Treatment 8 70ls/20cp/10ash/orifice (ug/L)	flag
1	35.62	0.33	6.67	13.1		325.2		4.8		60.4		NA		8.7		86.5		28		124.3		131.1	
						370.2		3.9		59.6		NA				78.3		26		131		119.2	
						343.8		3.7		59.6		NA				83.4		30.1		116.9		127.3	
2	35.62	0.62	6.67	8.6		380.8		11.9		103.1		7.4		11.5		98.8		33.1		108.9		117.9	
						391.1		10.2		101.2		6.1				92.3		31.5		118.1		112.8	
						394.3		9.2		102.1		5.5				96		33.9		100.6		116	
3	35.62	1.14	11	10.7				19.3		156.3		11.2		9.2		145.8		48.9		130			
								10		159.1		8.5				132.2		47.3		137.1			
								12.9		157		6.8				138.3		52		121.3			
4	35.62	1.65	11	19.2				13.7		130.6		16.1		11.5		133.1		46		101.2			
								7.2		128.3		11.1				120.5		51.1		113.2			
								15.1		123.9		12.5				122.8		50.9		99.8			
Min				8.6		325.2		3.7		59.6		5.5		8.7		78.3		26		99.8		112.8	
Max				19.2		394.3		19.3		159.1		16.1		11.5		145.8		52		137.1		131.1	
Mean				12.9		368		10.2		112		9.47		10.2		111		39.9		117		121	
Median				11.9		376		10.1		114		8.5		10.4		110		40		118		119	
Percent Reduction				0		-3480		13.3		-845		25		0		-996		-293		-1070		-1130	

Dosing Experiment Raw Data and Summary Statistics for Nitrite-N+Nitrate-N																							
Dosing Event	Flushing Volume (liters)	Percent Water Year	Flow Rate (liters/hr)	Influent Day 1 (mg/L)	flag	Treatment 1 60/40 (mg/L)	flag	Treatment 2 60/40/aafep-layer (mg/L)	flag	Treatment 3 70vs/20cp/10ash/c ompmulch (mg/L)	flag	Treatment 4 70vs/20cp/10ash/c ompmulch/aafep-layer (mg/L)	flag	Influent Day 2 (mg/L)	flag	Treatment 5 70vs/20cp/10ash (mg/L)	flag	Treatment 6 70ss/20cp/10ash (mg/L)	flag	Treatment 7 70ls/20cp/10ash (mg/L)	flag	Treatment 8 70ls/20cp/10ash/orifice (mg/L)	flag
1	35.62	0.33	6.67	0.206		5.05		6.17		0.26		0.246		0.203		0.079		0.104		0.129		0.137	
						4.55		4.08		0.266		0.132				0.084		0.106		0.115		0.125	
						6.11		4.2		0.192		0.115				0.076		0.084		0.126		0.112	
2	35.62	0.62	6.67	0.603		1.73		1.54		0.437		0.377		0.556		0.304		0.35		0.394		0.343	
						1.37		1.41		0.459		0.378				0.316		0.392		0.411		0.333	
						1.87		1.08		0.394		0.474				0.332		0.332		0.394		0.329	
3	35.62	1.14	11	0.42				1.14	D	0.511		0.456		0.417		0.364		0.316		0.416			
								1.64	D	0.627		0.388				0.369		0.36		0.411			
								1.15	D	0.456		0.507				0.399		0.288		0.424			
4	35.62	1.65	11	1.21	D			3.28	D	1.01		1.18	D	1.03	D	0.777		0.779		0.89			
								5.49	D	0.94		1.21	D			0.761		0.87		0.875			
								8.09	D	0.983		1.16	D			0.748		0.706		0.881			
Min				0.206		1.37		1.08		0.192		0.115		0.203		0.076		0.084		0.115		0.112	
Max				1.21		6.11		8.09		1.01		1.21		1.03		0.777		0.87		0.89		0.343	
Mean				0.61		3.45		3.27		0.545		0.552		0.552		0.384		0.391		0.456		0.23	
Median				0.511		3.21		2.46		0.458		0.422		0.487		0.348		0.341		0.411		0.233	
Percent Reduction				0		-1310		-734		1.3		11.8		0		34.8		33.5		20.4		39.2	

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Dosing Experiment Raw Data and Summary Statistics for Copper, Dissolved																							
Dosing Event	Flushing Volume (liters)	Percent Water Year	Flow Rate (liters/hr)	Influent Day 1 (ug/L)	flag	Treatment 1 60/40 (ug/L)	flag	Treatment 2 60/40/aafep-layer (ug/L)	flag	Treatment 3 70vs/20cp/10ash/c ompmulch (ug/L)	flag	Treatment 4 70vs/20cp/10ash/c ompmulch/aafep-layer (ug/L)	flag	Influent Day 2 (ug/L)	flag	Treatment 5 70vs/20cp/10ash (ug/L)	flag	Treatment 6 70ss/20cp/10ash (ug/L)	flag	Treatment 7 70ls/20cp/10ash (ug/L)	flag	Treatment 8 70ls/20cp/10ash/orifice (ug/L)	flag
1	35.62	0.33	6.67	6.4		8.09		0.872		4.09		0.5	U	6.43	J	2.22	J	1.32	J	1.83	J	2.02	J
						8.7		0.636		3.04		0.5	U			2.2	J	1.4	J	1.81	J	1.71	J
						8.05		0.676		3.52		0.5	U			2.34	J	1.39	J	1.85	J	1.88	J
2	35.62	0.62	6.67	41.6	J	19.2	J	2.84	J	17.4	J	1.67	J	40.3		13.1		10.3		12.6		12.1	
						18.9	J	2.61	J	16.8	J	1.55	J			13.8		10.8		12.3		12.1	
						18.9	J	3.29	J	17.6	J	1.69	J			14.6		9.92		13.3		11.7	
3	35.62	1.14	11	15.0	J			3.83	J	10.4	J	1.24	J	12.8	J	7.45	J	5.82	J	8.0	J		
								1.54	J	11.2	J	1.02	J			7.0	J	6.47	J	7.62	J		
								1.89	J	9.25	J	1.04	J			7.06	J	6.15	J	7.47	J		
4	35.62	1.65	11	120				10.8		47.1		7.0		222		53.3		50.3		56.6			
								6.7		45.4		6.9				54.4		52.8		54.2			
								11.2		50.0		8.1				53.5		47.1		58.7			
Min				6.4		8.05		0.636		3.04		0.25		6.43		2.2		1.32		1.81		1.71	
Max				120		19.2		11.2		50		8.1		222		54.4		52.8		58.7		12.1	
Mean				45.8		13.6		3.91		19.6		2.58		70.4		19.2		17		19.7		6.92	
Median				28.3		13.8		2.72		14		1.4		26.6		10.3		8.2		10.2		6.86	
Percent Reduction (bootstrapped lower 95% CI)				0		11.7		89.3		48.5		94.6		0		62.4		70.5		63.4		70.6	

Dosing Experiment Raw Data and Summary Statistics for Zinc, Dissolved																							
Dosing Event	Flushing Volume (liters)	Percent Water Year	Flow Rate (liters/hr)	Influent Day 1 (ug/L)	flag	Treatment 1 60/40 (ug/L)	flag	Treatment 2 60/40/aafep-layer (ug/L)	flag	Treatment 3 70vs/20cp/10ash/c ompmulch (ug/L)	flag	Treatment 4 70vs/20cp/10ash/c ompmulch/aafep-layer (ug/L)	flag	Influent Day 2 (ug/L)	flag	Treatment 5 70vs/20cp/10ash (ug/L)	flag	Treatment 6 70ss/20cp/10ash (ug/L)	flag	Treatment 7 70ls/20cp/10ash (ug/L)	flag	Treatment 8 70ls/20cp/10ash/orifice (ug/L)	flag
1	35.62	0.33	6.67	40.9		4.67		1.03	J	3.10	J	4.00	U	52.6	J	3.34	J	3.62	J	66.7	J	4.41	J
						4.89		1.01	J	3.33	J	4.00	U			3.30	J	3.35	J	4.36	J	4.35	J
						5.11		1.02	J	4.09		4.00	U			3.39	J	3.23	J	4.22	J	4.20	J
2	35.62	0.62	6.67	139	J	28.6	J	7.87	J	23.5	J	4.46	J	122		20.6		20.1		22.6		22.6	
						28.5	J	6.97	J	24.8	J	3.31	J			21.3		20.0		23.1		22.7	
						28.1	J	11.4	J	25.3	J	3.52	J			20.9		19.7		23.7		22.6	
3	35.62	1.14	11	66.0	J			4.31	J	7.03	J	2.39	J	64.2	J	7.74	J	7.16	J	8.91	J		
								2.57	J	7.37	J	2.31	J			7.36	J	7.76	J	8.97	J		
								3.46	J	7.37	J	2.81	J			7.11	J	7.17	J	8.26	J		
4	35.62	1.65	11	305				27.1		45.0		14.8		386		43.7		42.0		55.1			
								17.8		55.6		14.2				41.2		41.3		57.2			
								31.1		51.9		12.7				37.8		47.3		53.8			
Min				40.9		4.67		1.01		3.10		2.00		52.6		3.30		3.23		4.22		4.20	
Max				305		28.6		31.1		55.6		14.8		386		43.7		47.3		66.7		22.7	
Mean				138		16.6		9.64		21.5		5.54		156		18.1		18.6		28.1		13.5	
Median				102		16.6		5.64		15.4		3.06		93.1		14.2		13.7		22.8		13.5	
Percent Reduction (bootstrapped lower 95% CI)				0		83.7		94.4		86.5		96		0		88.5		88.6		75.8		86.5	

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Dosing Experiment Raw Data and Summary Statistics for Fecal Coliform																							
Dosing Event	Flushing Volume (liters)	Percent Water Year	Flow Rate (liters/hr)	Influent Day 1 (CFU)	flag	Treatment 1 60/40 (CFU)	flag	Treatment 2 60/40/aafep-layer (CFU)	flag	Treatment 3 70vs/20cp/10ash/c ompmulch (CFU)	flag	Treatment 4 70vs/20cp/10ash/c ompmulch/aafep-layer (CFU)	flag	Influent Day 2 (CFU)	flag	Treatment 5 70vs/20cp/10ash (CFU)	flag	Treatment 6 70ss/20cp/10ash (CFU)	flag	Treatment 7 70ls/20cp/10ash (CFU)	flag	Treatment 8 70ls/20cp/10ash/orifice (CFU)	flag
1	35.62	0.33	6.67	20		11		10		52		5		13		7		8		2	U	7	
						11		10		3		2	U			5		7		7		2	
						18		70		5		2	U			2		5		7		3	
2	35.62	0.62	6.67	1400		380		500		209		200		190		540		130		700		100	
						600		500		240		290				800		500		140		130	
						600		400		600		145				130		300		130		800	
3	35.62	1.14	11	1500				540		700		320		500		300		320		580			
								200		540		590				310		530		390			
								550		1000		370				240		320		420			
4	35.62	1.65	11	700				100		600		800		7500		300		900		1600			
								100		300		1200				600		700		1500			
								100		300		900				400		900		1000			
Min				20		11		10		3		1		13		2		5		1		2	
Max				1500		600		550		1000		1200		7500		800		900		1600		800	
Mean				905		270		257		379		402		2050		303		385		540		174	
Median				1050		199		150		300		305		345		300		320		405		53.5	
Percent Reduction				0		47.9		43.4		42		51.7		0		10.9		24.1		20.1		-5.74	

Dosing Experiment Raw Data and Summary Statistics for Cadmium																							
Dosing Event	Flushing Volume (liters)	Percent Water Year	Flow Rate (liters/hr)	Influent Day 1 (ug/L)	flag	Treatment 1 60/40 (ug/L)	flag	Treatment 2 60/40/aafep-layer (ug/L)	flag	Treatment 3 70vs/20cp/10ash/c ompmulch (ug/L)	flag	Treatment 4 70vs/20cp/10ash/c ompmulch/aafep-layer (ug/L)	flag	Influent Day 2 (ug/L)	flag	Treatment 5 70vs/20cp/10ash (ug/L)	flag	Treatment 6 70ss/20cp/10ash (ug/L)	flag	Treatment 7 70ls/20cp/10ash (ug/L)	flag	Treatment 8 70ls/20cp/10ash/orifice (ug/L)	flag
1	35.62	0.33	6.67	0.041	J	0.081	J	0.1	U	0.1	U	0.1	U	0.076	J,D	0.1	U	0.1	U	0.1	U	0.1	U
						0.088	J	0.1	U	0.041	J	0.05	J			0.1	U	0.1	U	0.1	U	0.1	U
						0.092	J	0.1	U	0.1	U	0.1	U			0.1	U	0.1	U	0.1	U	0.1	U
2	35.62	0.62	6.67	0.21	D	0.108	J	0.042	J	0.079	J	0.1	U	0.162	J	0.086	J	0.087	J	0.031	J	0.061	J
						0.078	J	0.032	J	0.08	J	0.1	U			0.071	J	0.106		0.034	J	0.09	J
						0.092	J	0.034	J	0.076	J	0.1	U			0.066	J	0.081	J	0.034	J	0.2	U
3	35.62	1.14	11																				
4	35.62	1.65	11																				
Min				0.041		0.078		0.032		0.041		0.05		0.076		0.05		0.05		0.031		0.05	
Max				0.21		0.108		0.05		0.08		0.05		0.162		0.086		0.106		0.05		0.1	
Mean				0.126		0.0898		0.043		0.0627		0.05		0.119		0.0622		0.0707		0.0415		0.0668	
Median				0.126		0.09		0.046		0.063		0.05		0.119		0.058		0.0655		0.042		0.0555	
Percent Reduction				0		-28.2		30.5		24		27.1		0		44.2		38.9		56.9		41.3	

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Dosing Experiment Raw Data and Summary Statistics for Cadmium, Dissolved

Dosing Event	Flushing Volume (liters)	Percent Water Year	Flow Rate (liters/hr)	Influent Day 1 (ug/L)	flag	Treatment 1 60/40 (ug/L)	flag	Treatment 2 60/40/aafep-layer (ug/L)	flag	Treatment 3 70vs/20cp/10ash/c ompmulch (ug/L)	flag	Treatment 4 70vs/20cp/10ash/c ompmulch/aafep-layer (ug/L)	flag	Influent Day 2 (ug/L)	flag	Treatment 5 70vs/20cp/10ash (ug/L)	flag	Treatment 6 70ss/20cp/10ash (ug/L)	flag	Treatment 7 70ls/20cp/10ash (ug/L)	flag	Treatment 8 70ls/20cp/10ash/orifice (ug/L)	flag
1	35.62	0.33	6.67	0.1	U	0.038	J	0.1	U	0.1	U	0.1	U	0.05	U,J	0.05	U,J	0.05	U,J	0.05	U,J	0.05	U,J
						0.1	U	0.1	U	0.1	U	0.1	U			0.05	U,J	0.05	U,J	0.05	U,J	0.05	U,J
						0.1	U	0.1	U	0.1	U	0.1	U			0.05	U,J	0.05	U,J	0.05	U,J	0.05	U,J
2	35.62	0.62	6.67	0.056	J	0.057	J	0.05	U,J	0.08	J	0.05	U,J	0.07	J	0.064	J	0.068	J	0.031	J	0.036	J
						0.055	J	0.05	U,J	0.08	J	0.05	U,J			0.059	J	0.096	J	0.1	U	0.031	J
						0.057	J	0.05	U,J	0.06	J	0.05	U,J			0.076	J	0.06	J	0.037	J	0.035	J
3	35.62	1.14	11																				
4	35.62	1.65	11																				
Min				0.05		0.038		0.05		0.05		0.05		0.05		0.05		0.05		0.031		0.031	
Max				0.056		0.057		0.05		0.08		0.05		0.07		0.076		0.096		0.05		0.05	
Mean				0.053		0.0512		0.05		0.0617		0.05		0.06		0.0582		0.0623		0.0447		0.042	
Median				0.053		0.0525		0.05		0.055		0.05		0.06		0.0545		0.055		0.05		0.043	
Percent Reduction				0		3.7		5.36		-15.5		5.36		0		2.62		-3.33		21.9		25.7	

Dosing Experiment Raw Data and Summary Statistics for Copper																							
Dosing Event	Flushing Volume (liters)	Percent Water Year	Flow Rate (liters/hr)	Influent Day 1 (ug/L)	flag	Treatment 1 60/40 (ug/L)	flag	Treatment 2 60/40/aafep-layer (ug/L)	flag	Treatment 3 70vs/20cp/10ash/c ompmulch (ug/L)	flag	Treatment 4 70vs/20cp/10ash/c ompmulch/aafep-layer (ug/L)	flag	Influent Day 2 (ug/L)	flag	Treatment 5 70vs/20cp/10ash (ug/L)	flag	Treatment 6 70ss/20cp/10ash (ug/L)	flag	Treatment 7 70ls/20cp/10ash (ug/L)	flag	Treatment 8 70ls/20cp/10ash/orifice (ug/L)	flag
1	35.62	0.33	6.67	21.4		13.6		2.31		12.2		1.63		24.8	D	3.83		2.7		3.46		3.57	
						14.6		1.88		8		1.51				3.79		2.18		3.24		3.27	
						14.6		2.01		8.15		1.73				3.92		2.56		3.69		4.06	
2	35.62	0.62	6.67	92		27.5		7.36		23.6		3.97		87.4	D	17.3		14		18.1		16.7	
						28.7		7.57		22		4.09				16.8		14.5		16.9		18.1	D
						29.2		8.27		22.5		3.81				17.4		14.2		16.9		17	D
3	35.62	1.14	11	36.2	D			6.63		17.5		3.46		31.6		11.7		11.6		12.4			
								5.39		16.7		3.27				12.1		12.2		11.6			
								5.22		15.7		3.3				13.1		11.1		11.7			
4	35.62	1.65	11	246				20.8		66.3		15.4		222		53.3		50.3		56.6			
								14.9		59.1		15.4				54.4		52.8		54.2			
								19.8		64.3		16.6				53.5		47.1		58.7			
Min				21.4		13.6		1.88		8		1.51		24.8		3.79		2.18		3.24		3.27	
Max				246		29.2		20.8		66.3		16.6		222		54.4		52.8		58.7		18.1	
Mean				98.9		21.4		8.51		28		6.18		91.4		21.8		19.6		22.3		10.4	
Median				64.1		21		7		19.8		3.64		59.5		15		13.1		14.6		10.4	
Percent Reduction				0		51.2		89.6		64.9		93.1		0		75.4		78.6		75.8		82.8	

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Dosing Experiment Raw Data and Summary Statistics for Lead																							
Dosing Event	Flushing Volume (liters)	Percent Water Year	Flow Rate (liters/hr)	Influent Day 1 (ug/L)	flag	Treatment 1 60/40 (ug/L)	flag	Treatment 2 60/40/aafep-layer (ug/L)	flag	Treatment 3 70vs/20cp/10ash/c ompmulch (ug/L)	flag	Treatment 4 70vs/20cp/10ash/c ompmulch/aafep-layer (ug/L)	flag	Influent Day 2 (ug/L)	flag	Treatment 5 70vs/20cp/10ash (ug/L)	flag	Treatment 6 70ss/20cp/10ash (ug/L)	flag	Treatment 7 70ls/20cp/10ash (ug/L)	flag	Treatment 8 70ls/20cp/10ash/orifice (ug/L)	flag
1	35.62	0.33	6.67	5.83		0.993		0.395		1.01		0.166		6.89		0.358		0.376		0.556		0.555	
						1.13		0.36		0.725		0.178				0.394		0.295		0.517		0.479	
						1.14		0.407		0.678		0.195				0.393		0.332		0.537		0.618	
2	35.62	0.62	6.67	13.7		2.57		1.67		1.84		0.779		13.9	D	1.29		1.22		1.71		1.63	
						2.78		1.68		1.74		0.72				1.26		1.2		1.6		1.97	D
						2.82		1.9		1.84		0.704				1.25		1.27		1.63		1.88	D
3	35.62	1.14	11	5.6	D			1.44		1.56		0.754		6.01		1.25		1.44		1.4			
								1.38		1.31		0.744				1.26		1.49		1.27			
								1.25		1.56		0.75				1.32		1.39		1.36			
4	35.62	1.65	11	22				3.4		3.7		2		27.3		3		3.4		4.7			
								2.7		3.7		2.1				3.1		3.2		3.9			
								3.3		4		2.1				3.3		3.1		4.4			
Min				5.6		0.993		0.36		0.678		0.166		6.01		0.358		0.295		0.517		0.479	
Max				22		2.82		3.4		4		2.1		27.3		3.3		3.4		4.7		1.97	
Mean				11.8		1.91		1.66		1.97		0.932		13.5		1.51		1.56		1.96		1.19	
Median				9.76		1.86		1.56		1.65		0.747		10.4		1.26		1.33		1.5		1.12	
Percent Reduction				0		80.7		85.5		82.3		92.2		0		88.2		87.6		85.5		89.4	

Dosing Experiment Raw Data and Summary Statistics for Lead, Dissolved

Dosing Event	Flushing Volume (liters)	Percent Water Year	Flow Rate (liters/hr)	Influent Day 1 (ug/L)	flag	Treatment 1 60/40 (ug/L)	flag	Treatment 2 60/40/aafep-layer (ug/L)	flag	Treatment 3 70vs/20cp/10ash/c ompmulch (ug/L)	flag	Treatment 4 70vs/20cp/10ash/c ompmulch/aafep-layer (ug/L)	flag	Influent Day 2 (ug/L)	flag	Treatment 5 70vs/20cp/10ash (ug/L)	flag	Treatment 6 70ss/20cp/10ash (ug/L)	flag	Treatment 7 70ls/20cp/10ash (ug/L)	flag	Treatment 8 70ls/20cp/10ash/orifice (ug/L)	flag
1	35.62	0.33	6.67	0.266		0.136		0.1	U	0.078	J	0.1	U	0.226	J	0.074	J	0.05	U,J	0.095	J	0.102	J
						0.128		0.1	U	0.082	J	0.1	U			0.05	U,J	0.05	U,J	0.106	J	0.262	J
						0.123		0.1	U	0.091	J	0.1	U			0.071	J	0.05	U,J	0.099	J	0.106	J
2	35.62	0.62	6.67	0.624	J	0.557	J	0.205	J	0.397	J	0.131	J	0.719		0.381		0.339		0.424		0.435	
						0.545	J	0.185	J	0.439	J	0.114	J			0.409		0.351		0.392		0.378	
						0.534	J	0.191	J	0.456	J	0.089	J			0.394		0.351		0.394		0.419	
3	35.62	1.14	11	0.412	J			0.23	J	0.162	J	0.112	J	0.208	J	0.143	J	0.112	J	0.195	J		
								0.161	J	0.187	J	0.124	J			0.147	J	0.109	J	0.199	J		
								0.193	J	0.182	J	0.117	J			0.142	J	0.106	J	0.183	J		
4	35.62	1.65	11	1.2				0.8		1.7		0.5		1.1		1.2		0.9		1.7			
								0.6		1.6		0.4				1.1		0.7		1.8			
								1.1		1.7		0.4				0.9		1.4		1.6			
Min				0.266		0.123		0.05		0.078		0.05		0.208		0.05		0.05		0.095		0.102	
Max				1.2		0.557		1.1		1.7		0.5		1.1		1.2		1.4		1.8		0.435	
Mean				0.626		0.337		0.318		0.59		0.178		0.563		0.418		0.376		0.599		0.284	
Median				0.518		0.335		0.192		0.292		0.116		0.472		0.264		0.226		0.296		0.32	
Percent Reduction				0		32.1		58.4		29.4		74.7		0		37.5		46.6		13.2		36.8	

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Dosing Experiment Raw Data and Summary Statistics for Dissolved Organic Carbon																							
Dosing Event	Flushing Volume (liters)	Percent Water Year	Flow Rate (liters/hr)	Influent Day 1 (mg/L)	flag	Treatment 1 60/40 (mg/L)	flag	Treatment 2 60/40/aafep-layer (mg/L)	flag	Treatment 3 70vs/20cp/10ash/c ompmulch (mg/L)	flag	Treatment 4 70vs/20cp/10ash/c ompmulch/aafep-layer (mg/L)	flag	Influent Day 2 (mg/L)	flag	Treatment 5 70vs/20cp/10ash (mg/L)	flag	Treatment 6 70ss/20cp/10ash (mg/L)	flag	Treatment 7 70ls/20cp/10ash (mg/L)	flag	Treatment 8 70ls/20cp/10ash/orifice (mg/L)	flag
1	35.62	0.33	6.67	2.13		8.52		3.34		3.03		0.85		2.23		1.21		1.11		1.27		1.29	
						8.62		2.56		2.18		0.76				1.07		1.12		1.19		1.24	
						8.1		2.83		2.33		0.83				1.28		1.25		1.16		1.26	
2	35.62	0.62	6.67	19.75		21.83		9.62		11.55		5.01		16.36	D	6.84		6.72		8.73		7.86	
						18.76		9.18		11.26		4.9				6.95		7.11	J	7.99		8.32	D
						18.66		10.14		11.59		5.03				7.24		6.56		8.26		8.28	D
3	35.62	1.14	11	4.03	J			4.62	J	4.4	J	1.97	J	3.69	J	2.67	J	2.55	J	2.68	J		
								3.91	J	4.4	J	1.81	J			2.54	J	2.49	J	2.58	J		
								4.15	J	3.75	J	1.85	J			2.72	J	2.49	J	2.63	J		
4	35.62	1.65	11	93.37	D			50.81	D	68.7	D	41.05		94.27	D	54.03	D	59.88	D	61.28	D		
								48.07	D	65.53	D	41.17				55.25	D	64.82	D	59.73	D		
								50.52	D	69.67	D	40.77	D			55.91	D	58.46	D	61.66	D		
Min				2.13		8.1		2.56		2.18		0.76		2.23		1.07		1.11		1.16		1.24	
Max				93.37		21.83		50.81		69.67		41.17		94.27		55.91		64.82		61.66		8.32	
Mean				29.8		14.1		16.6		21.5		12.2		29.1		16.5		17.9		18.3		4.71	
Median				11.9		13.6		6.9		7.83		3.44		10		4.78		4.56		5.34		4.58	
Percent Reduction				0		-147		14.1		11.8		61.5		0		43.5		43.4		39.8		46.8	

Dosing Experiment Raw Data and Summary Statistics for Diesel Range Organics (C12-C24)																							
Dosing Event	Flushing Volume (liters)	Percent Water Year	Flow Rate (liters/hr)	Influent Day 1 (mg/L)	flag	Treatment 1 60/40 (mg/L)	flag	Treatment 2 60/40/aafep-layer (mg/L)	flag	Treatment 3 70vs/20cp/10ash/c ompmulch (mg/L)	flag	Treatment 4 70vs/20cp/10ash/c ompmulch/aafep-layer (mg/L)	flag	Influent Day 2 (mg/L)	flag	Treatment 5 70vs/20cp/10ash (mg/L)	flag	Treatment 6 70ss/20cp/10ash (mg/L)	flag	Treatment 7 70ls/20cp/10ash (mg/L)	flag	Treatment 8 70ls/20cp/10ash/orifice (mg/L)	flag
1	35.62	0.33	6.67	0.217		0.1	U	0.1	U	0.1	U	0.1	U	0.181		0.1	U	0.1	U	0.1	U	0.1	U
						0.1	U	0.1	U	0.1	U	0.1	U			0.1	U	0.1	U	0.1	U	0.1	U
						0.107		0.1	U	0.1	U	0.1	U			0.1	U	0.1	U	0.1	U	0.1	U
2	35.62	0.62	6.67	2.76		0.49		0.186		0.1	U	0.1	U	1.66		0.1	U	0.111		0.308		0.1	U
						0.42		0.48		0.1	U	0.1	U			0.146		0.1	U	0.213		0.1	U
						0.404		0.324		0.1	U	0.1	U			0.18		0.116		0.117		0.238	
3	35.62	1.14	11	0.556				0.149		0.1	U	0.1	U	0.461		0.1	U	0.1	U	0.1	U	0.1	U
								0.156		0.1	U	0.1	U			0.1	U	0.1	U	0.1	U	0.1	U
								0.166		0.1	U	0.1	U			0.1	U	0.1	U	0.1	U	0.1	U
4	35.62	1.65	11	5.12	D			2.47		1.83		1.09		6.85	E	1.33		2.29		2.63			
								1.69		1.84		1.56				1.29		2.35		2.16			
								2.08		1.92		1.22				1.51		1.72		2.67			
Min				0.217		0.05		0.05		0.05		0.05		0.181		0.05		0.05		0.05		0.05	
Max				5.12		0.49		2.47		1.92		1.56		6.85		1.51		2.35		2.67		0.238	
Mean				2.16		0.254		0.654		0.503		0.36		2.29		0.4		0.578		0.7		0.0813	
Median				1.66		0.256		0.176		0.05		0.05		1.06		0.05		0.05		0.0835		0.05	
Percent Reduction				0		76.2		74		82.4		85.2		0		83.5		81.3		78.1		82.8	

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Dosing Experiment Raw Data and Summary Statistics for Motor Oil Range Organics (C24-C38)

Dosing Event	Flushing Volume (liters)	Percent Water Year	Flow Rate (liters/hr)	Influent Day 1 (mg/L)	flag	Treatment 1 60/40 (mg/L)	flag	Treatment 2 60/40/aafep-layer (mg/L)	flag	Treatment 3 70vs/20cp/10ash/c ompmulch (mg/L)	flag	Treatment 4 70vs/20cp/10ash/c ompmulch/aafep-layer (mg/L)	flag	Influent Day 2 (mg/L)	flag	Treatment 5 70vs/20cp/10ash (mg/L)	flag	Treatment 6 70ss/20cp/10ash (mg/L)	flag	Treatment 7 70ls/20cp/10ash (mg/L)	flag	Treatment 8 70ls/20cp/10ash/orifice (mg/L)	flag
1	35.62	0.33	6.67	0.622		0.2	U	0.2	U	0.2	U	0.2	U	0.762		0.2	U	0.2	U	0.2	U	0.2	U
						0.2	U	0.2	U	0.2	U	0.2	U			0.2	U	0.2	U	0.2	U	0.2	U
						0.2	U	0.2	U	0.2	U	0.2	U			0.2	U	0.2	U	0.2	U	0.2	U
2	35.62	0.62	6.67	4.26		0.467		0.2	U	0.2	U	0.2	U	3.49		0.2	U	0.255		0.508		0.21	
						0.433		0.39		0.2	U	0.2	U			0.351		0.2	U	0.44		0.2	U
						0.363		0.292		0.2	U	0.2	U			0.379		0.237		0.286		0.463	
3	35.62	1.14	11	1.26				0.228		0.2	U	0.2	U	1.5		0.2	U	0.2	U	0.2	U		
								0.2	U	0.2	U	0.2	U			0.2	U	0.2	U	0.2	U		
								0.204		0.231		0.2	U			0.2	U	0.2	U	0.2	U		
4	35.62	1.65	11	8.22	D			1.98		1.85		1.18		9.71		1.76		1.6		2.51			
								1.15		1.82		1.54				1.54		1.66		2.16			
								1.6		2.09		1.15				1.71		1.41		2.33			
Min				0.622		0.1		0.1		0.1		0.1		0.762		0.1		0.1		0.1		0.1	
Max				8.22		0.467		1.98		2.09		1.54		9.71		1.76		1.66		2.51		0.463	
Mean				3.59		0.26		0.529		0.566		0.398		3.87		0.537		0.488		0.736		0.179	
Median				2.76		0.231		0.216		0.1		0.1		2.5		0.1		0.1		0.193		0.1	
Percent Reduction				0		87		86.1		86.7		89.5		0		88.8		89.6		86.1		89.7	