APPENDIX A

Installation Reports and Photographs

The contents of this appendix will be provided separately.

APPENDIX B

Field Data Sheets for Sampled Storm Events

The contents of this appendix will be provided separately.

APPENDIX C

Hydrologic Data Quality Assurance Memorandum

Herrera Environmental Consultants, Inc.

Memorandum

To	Project File 09-04411-001
From	Dylan Ahearn, Herrera Environmental Consultants
Date	January 7, 2011
Subject	Hydrologic Data Quality Assurance Review of the WSDOT Compost Amended Biofiltration Swale Evaluation

This memorandum reviews hydrologic data that were compiled over the period from March 18, 2009 through September 30, 2010, relative to quality indicators. The project quality assurance project plan (QAPP) (WSDOT 2008) did not include method quality objectives (MQOs) for the continuous hydrologic data, so this memorandum uses proxy criteria based on best professional judgment. Hydrologic monitoring involved measurements of water level to estimate discharge and precipitation depth. MQOs for these measurements are expressed in terms of bias, precision, representativeness, completeness, and comparability. This document begins with a description of the hydrologic monitoring equipment used in this project and then subsequently presents an analysis of the quality of the data collected with these sensors.

Hydrologic Monitoring Equipment

Water level was monitored in stilling wells attached to flumes that were located at the inlets and outlets of two biofiltration swales in the median of State Route 518 (SR-518) at mile post 1.21. The inlet flumes were 1-inch Parshall flumes while the outlet flumes consisted of 60 degree trapezoidal flumes. One of the biofiltration swales was amended with compost while the other was not. The inlet and outlet stations of the compost-amended biofiltration swale were identified as CAB In and CAB Out, respectively. The inlet and outlet stations of the standard (control) biofiltration swale were identified as CON In and CON Out, respectively.

Druck 1830 (0-1 pounds per square inch [psi]) pressure transducers were installed at each of the stations from March 18 through December 16, 2009. In mid-December 2009, the Druck pressure transducers were damaged from ice formation in the stilling wells. The transducers were subsequently replaced with Instrumentation Northwest PS9805 (0-1 psi) pressure transducers at three out of the four monitoring stations (CAB In, CON In, and CON Out) and with a Druck pressure transducers at the remaining monitoring station (CAB Out). The rain gauge installed in association with the datalogger and automated sampling equipment consisted of an ISCO 674 tipping bucket gauge. Table C-1 provides information on the hydrologic monitoring equipment deployed during this project. Table C-2 summarizes the flow volumes, peak discharge rates, and flow durations measured at each monitoring station during runoff-producing storm events during the monitoring period.

Bias

Bias in continuous hydrologic data is introduced from errors in the record. Errors are manifest as spikes, data gaps, signal drift, and otherwise anomalous readings. The data obtained through this monitoring project were stored and processed in a database system for managing time series data (Aquarius version 2.6). Using the Aquarius Data Correction interface, anomalous spikes were deleted, data gaps linearly interpolated (when appropriate), and sensor drift corrected with prorated linear adjustments between calibrations. A log of all the data corrections for stations CAB In, CAB Out, CON In, and CON Out are provided in Tables C-3, C-4, C-5, and C-6, respectively. When data gaps existed during periods for which a linear interpolation was not appropriate the gap was filled by modeled data from a correlation with another station. Modeled data gap fills were inserted in the CAB In record for a 5-day period in March 2009 and a 3-hour period in August 2009 (Table C-2). One additional model fill was inserted for a 9-day gap at the CON Out station in August 2009 (Table C-6). The average error associated with the modeled fills was 1.3 percent. Occasionally gaps in the record occurred and modeled gap filling was not appropriate or feasible. These gaps constituted a small percentage of the total record so they were not filled (see *Completeness* section below).

There were no rain gauge errors during this monitoring period so a correction log for the rain gauge is not provided. A bias test was conducted on the rain gauge prior to deployment on September 21, 2008. This test indicated that the average tip volume at a rainfall rate of 2 inches per hour was 0.0103 inches per tip, a 2.9 percent error. The manufacturer specifies that the accuracy at a rate of 2 inches per hour should be 1 percent so this target was not met per manufacturer specifications. However, for the purposes of this study an error of 3 percent in the rainfall estimates does not impact the overall project goals.

As can be seen from Tables C-3, C-4, C-5, and C-6, the majority of the errors that were corrected in the water level signals were short gap fills and spike deletions. In addition, drift corrections were frequently conducted in order to compensate for the drift that is inherent in pressure transducers. In order to assess pressure transducer performance, instrument drift was recorded on control charts. Though this drift was corrected in Aquarius prior to data analysis, the control charts still provide a useful tool for assessing transducer performance in the field. Figures C-1 through C-4 present control charts for this project. As mentioned previously, the transducers at each station were replaced in December 2009. New control charts were generated once this switch occurred; the result is two control charts for each station. As is apparent from Figures C-1 through C-4, the sensor drift never exceeded one standard deviation from the mean drift (warning limit). This is an indication that the sensors never exhibited large magnitude drifts and that they performed to specification. Drift corrections for large magnitude drifts are less reliable than for small magnitude drifts, so these data indicate that the drift corrections performed in the Aquarius database were appropriate.

Another qualitative assessment of bias is to compare rainfall versus runoff for those stations with drainage areas that are 100 percent impervious. In theory, there should be a strong relationship between rainfall and runoff for such basins. Both of the inlet stations drained basins that were 100 percent impervious. The rainfall versus runoff relationships for the inlet stations are

presented in Figure C-5. The r^2 for CAB In versus rainfall is 0.82, while the r^2 for CON In versus rainfall is 0.88, both strong relationships. As is apparent from Figure C-5, there are occasional outliers but, on the whole, there is good agreement between rainfall and runoff for both monitoring stations.

Precision

Pressure transducer precision was tested for the initial set of four transducers prior to deployment. Precision tests were not conducted on the second set of four pressure transducers that were deployed in December 2009. These transducers had been previously tested for other projects and quick replacement was paramount to prevent a large data gap in December; consequently, no precision testing is reported for the second set of pressure transducers. Figure C-6 presents the results from the precision testing. The precision tests were conducted at 2.1 feet and 2.5 feet of water depth for 90 hours and 158 hours, respectively. The transducers were lowered into a graduated cylinder with a partially sealed top and programmed to record water depth at a 5-minute time step. The percent difference between the minimum and the maximum recorded levels were calculated to assess instrument precision. At the 2.1-foot depth, the percent differences were 0.32, 0.29, 0.44, and 0.35 percent for CAB In, CAB Out, CON In, and CON Out, respectively. At the 2.5-foot depth the percent difference was 0.54, 0.57, 0.54, and 0.51 percent for CAB In, CAB Out, CON In, and CON Out, respectively. This amount of drift is acceptable and within the manufacturers specifications (± 2 percent full scale range).

Representativeness

The representativeness of the hydrologic data was ensured by the proper selection and installation of all associated monitoring equipment. Rainfall patterns, stormwater conveyance features, and surrounding land uses were also considered in the identification of monitoring locations and sampling frequencies to ensure that representative data will be obtained for this study. Finally, monitoring was be conducted over a sufficient length of time (19 months of flow monitoring and 13 months of water quality monitoring) to ensure that data are collected during representative climatic conditions for western Washington.

Completeness

Completeness was assessed on the basis of the occurrence of gaps in the data record for all monitoring equipment. The surrogate MQO for this analysis is less than 5 percent of the total data record missing due to equipment malfunction or other operational problems. During this monitoring period there were minimal data gaps (Tables C-3 through C-6), and many gaps that did occur were sufficiently short in duration that they could be filled by interpolation or modeled flow from an adjacent station. The remaining gaps constituted 3.5, 1.7, 1.7, and 3.4 percent of the data records for stations CAB In, CAB Out, CON In, and CON Out, respectively.

Comparability

Although there is no numeric MQO for this data quality indicator, standard monitoring procedures, units of measurement, and reporting conventions were applied in this study to meet the quality indicator of data comparability.

Conclusion

Based on the analysis presented herein, the water level data meet the quality objectives for this study. Data gaps were minimal and those that were corrected were dealt with appropriately (linear interpolation of modeled fills with small model error). The tests of precision on the first set of four pressure transducers installed at the site indicated that they functioned according to manufacturer specifications. Finally, a rainfall to runoff relationship for the inlet monitoring stations indicated a strong relationship which is evidence that the flows at these stations were accurate.

The rainfall gauge did not meet the manufacturer specification of 1 percent accuracy at a rainfall rate of 2 inches per hour (3 percent error). Despite this, the rainfall data is still accurate enough for the purposes of this study: which is to determine rainfall depths to identify qualifying events for sampling.

References

WSDOT. 2008. WSDOT Compost Amended Biofiltration Swale Quality Assurance Project Plan. Prepared by Mark Maurer, Washington State Department of Transportation, Olympia, Washington. September 22, 2008.

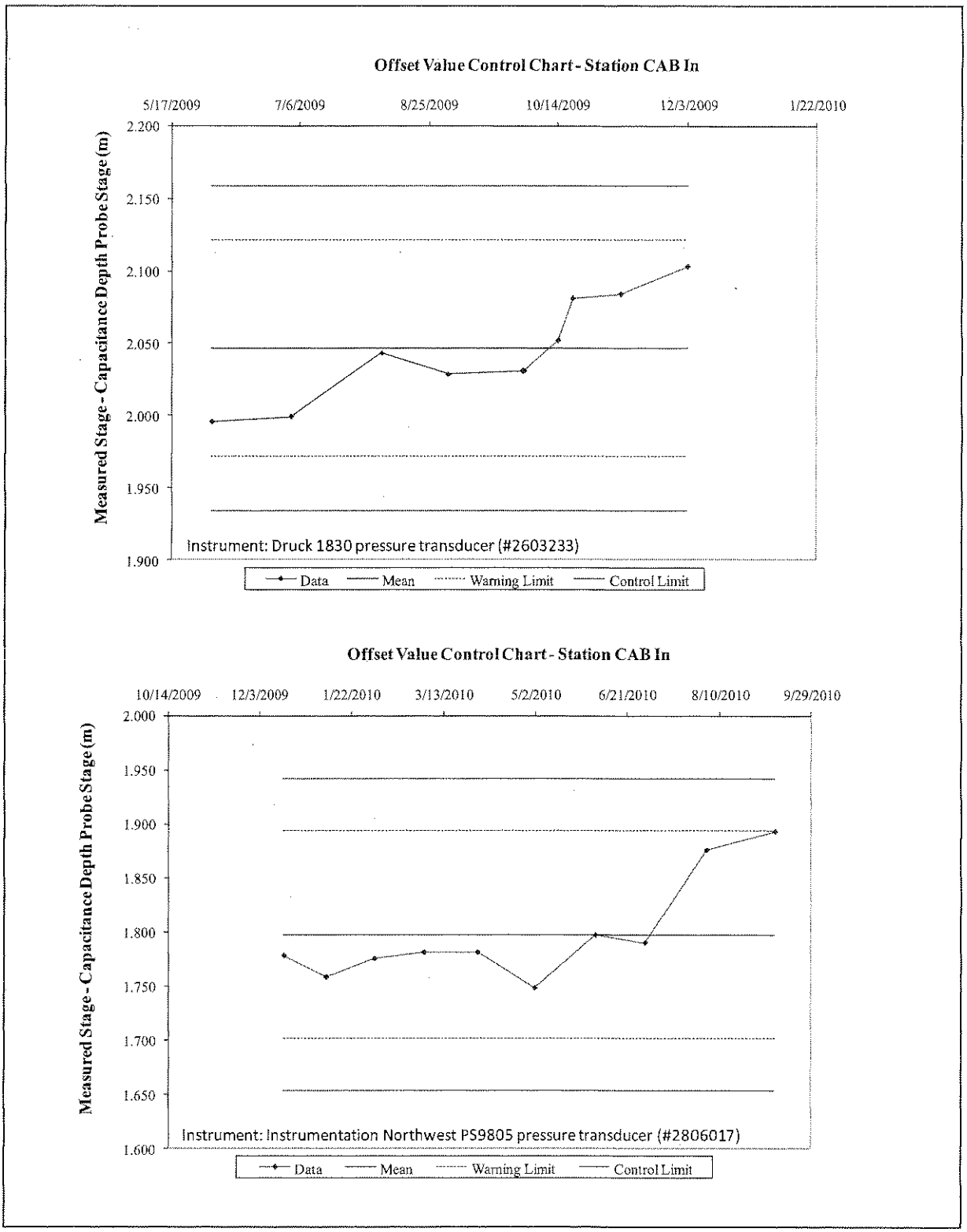
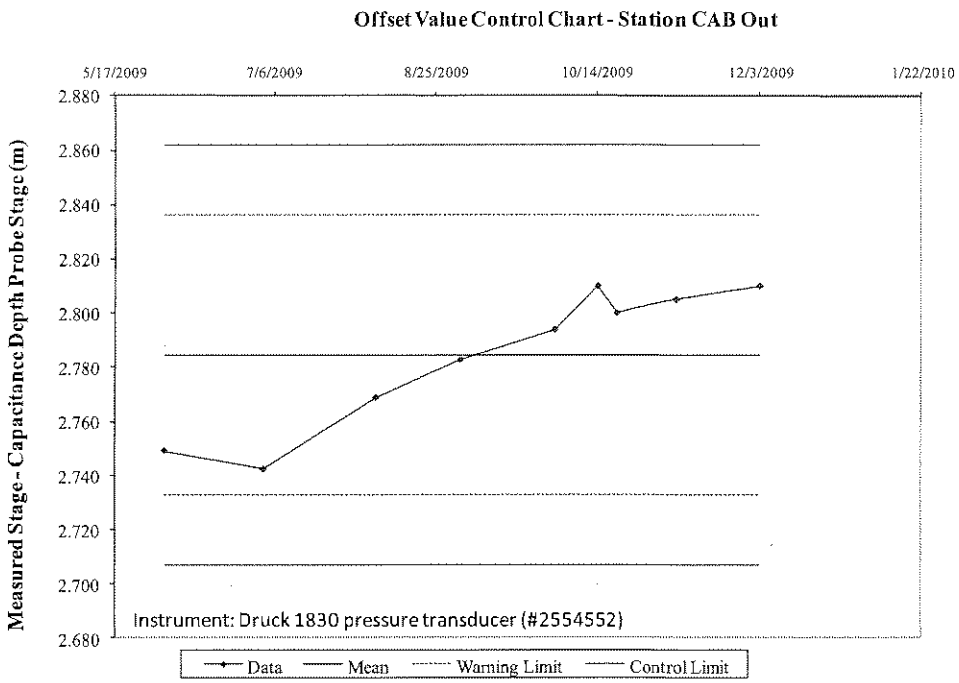


Figure C-1. Control charts for the two pressure sensors installed at CAB In.



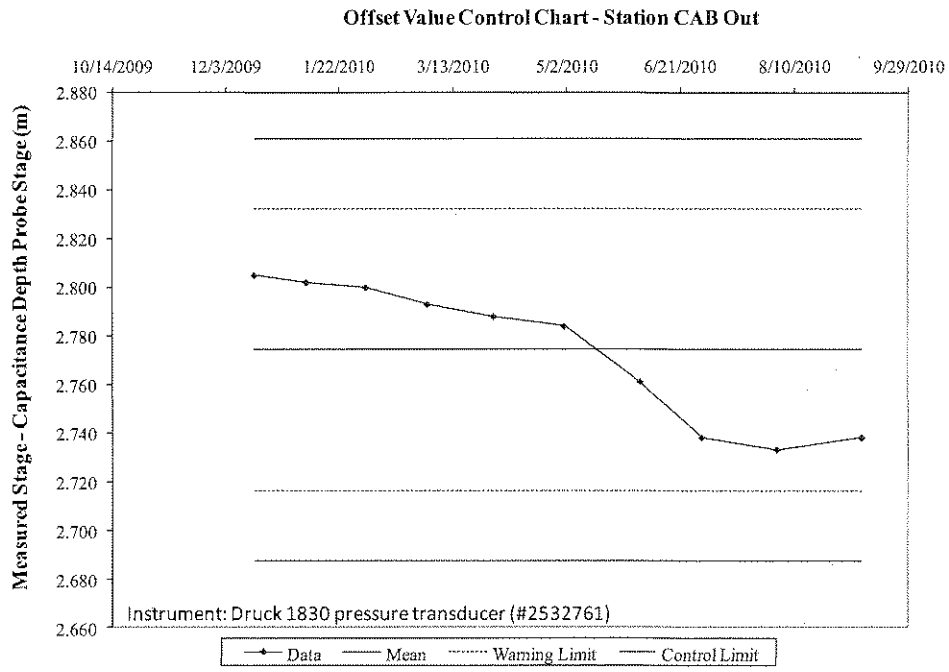


Figure C-2. Control charts for the two pressure sensors installed at CAB Out.

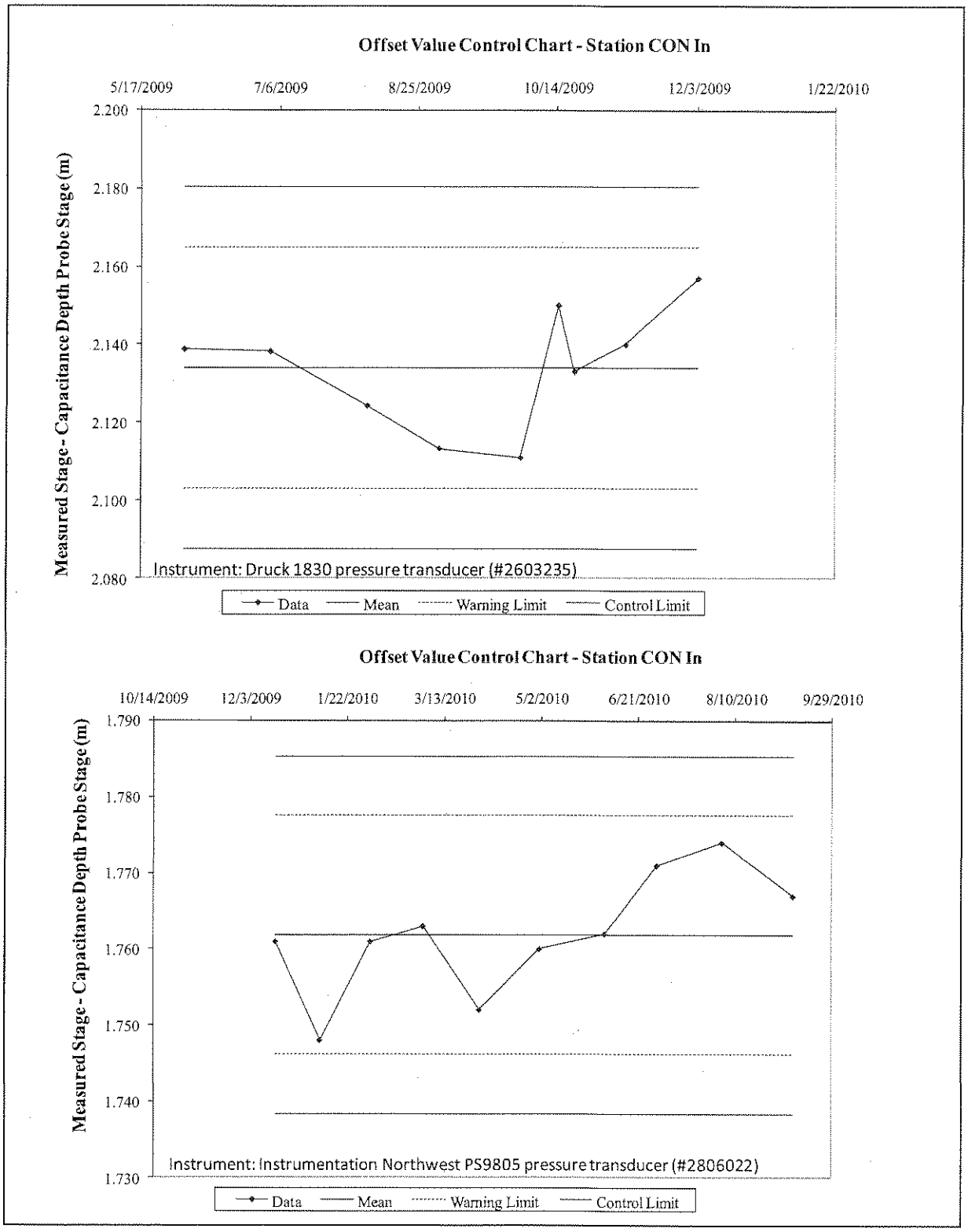


Figure C-3. Control charts for the two pressure sensors installed at CON In.

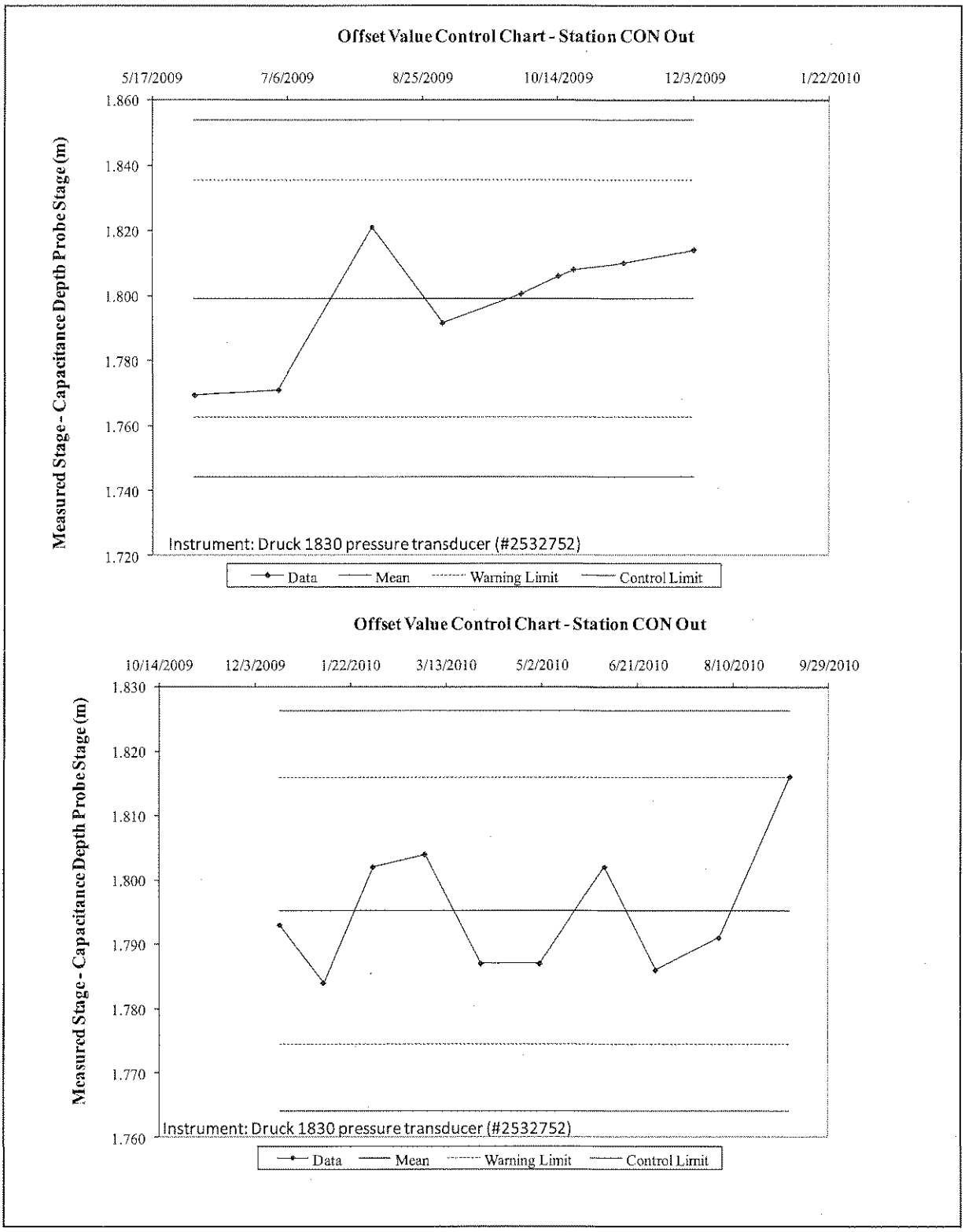


Figure C-4. Control charts for the two pressure sensors installed at CON Out.

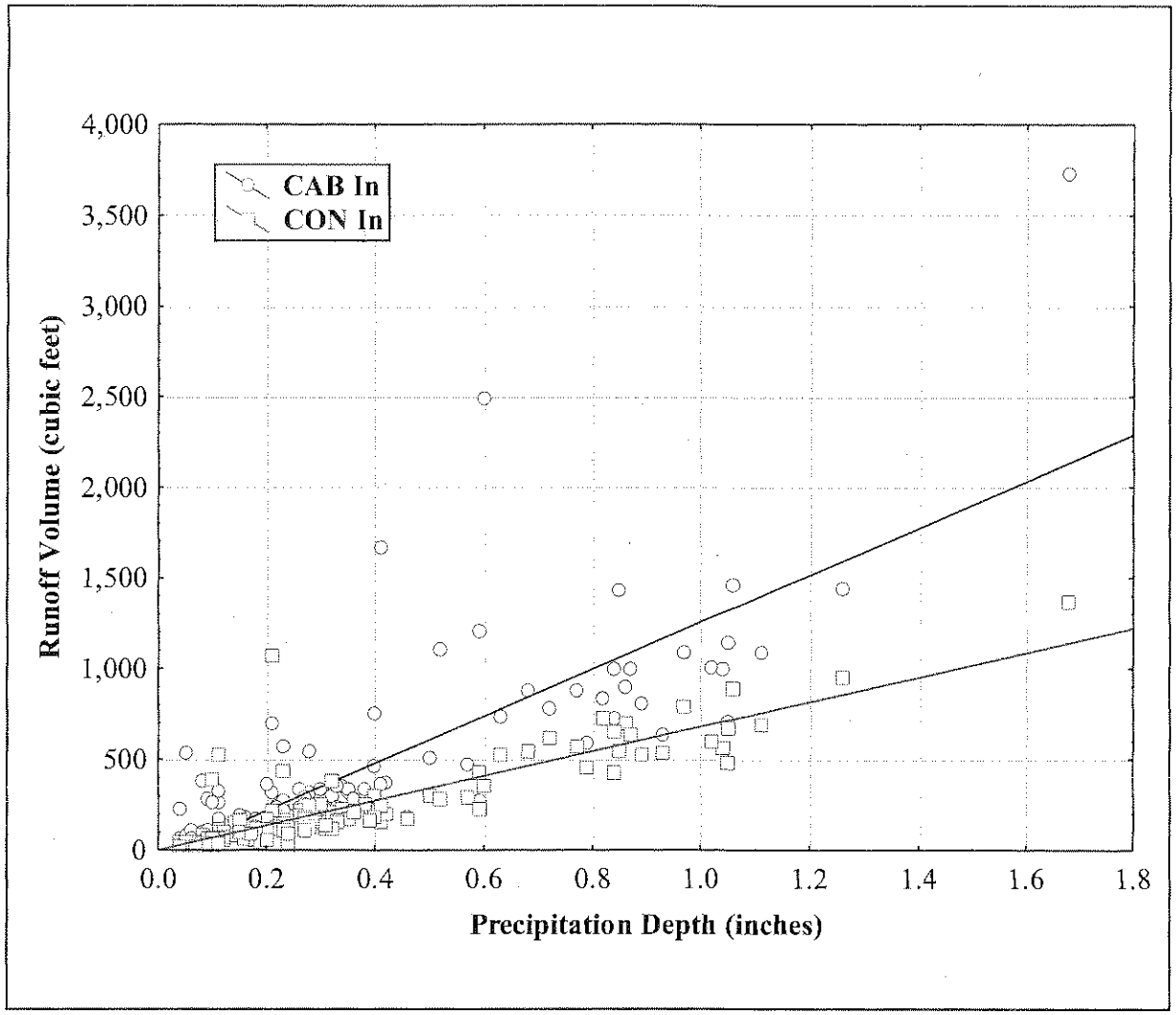


Figure C-5. Rainfall versus runoff relationships for the inlet monitoring stations (CAB In and CON In).

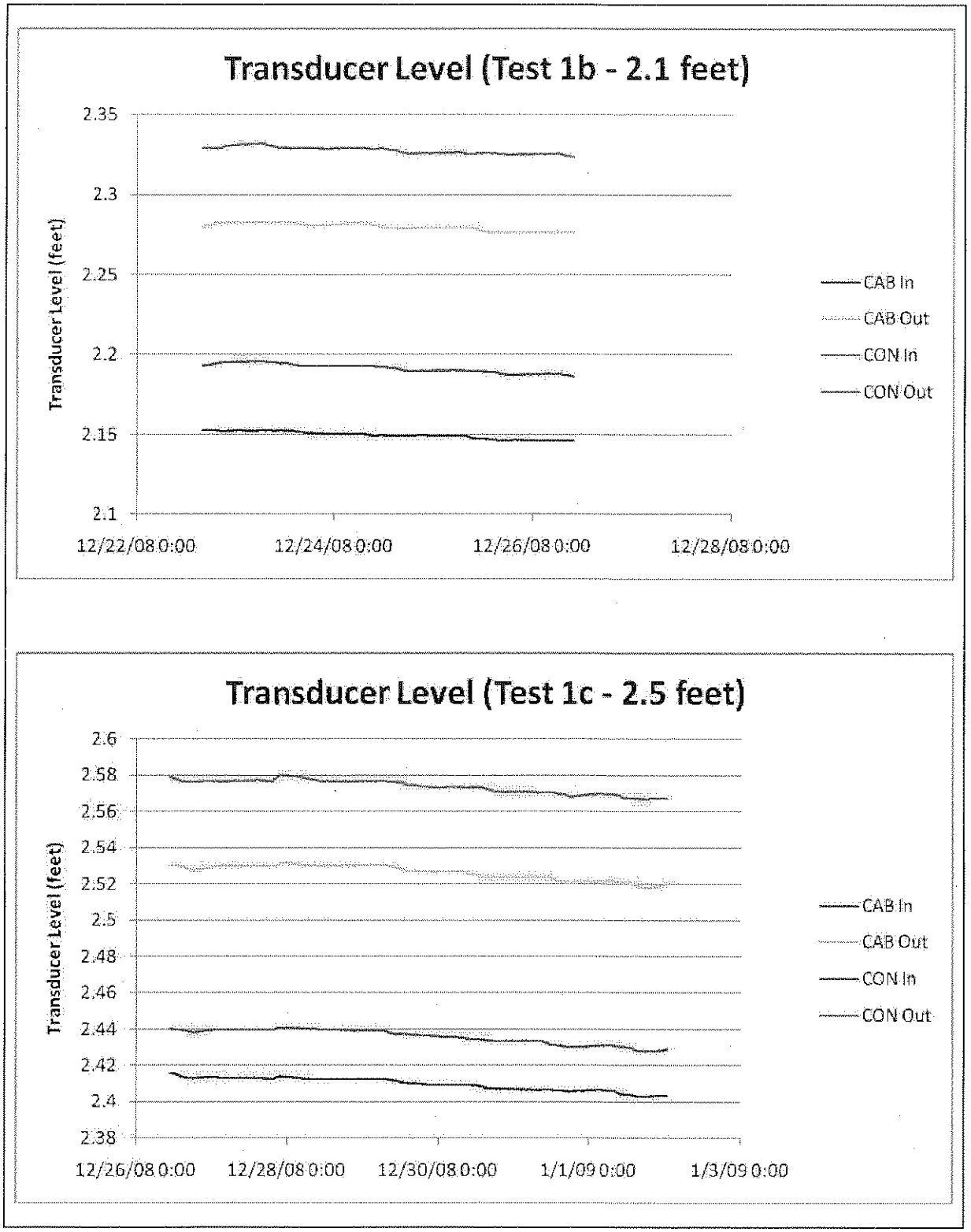


Figure C-6. Results from precision testing of initial set of four pressure transducers.

Table C-1. Monitoring equipment descriptions.

Monitoring Station	Instrument Type	Instrument Make/Model	Serial Number	Dates Installed
CAB In	Pressure transducer	Druck 1830	2603233	March 18, 2009 – December 16, 2009
CAB In	Pressure transducer	INW PS9805	2806017	December 16, 2009 – September 30, 2010
CAB Out	Pressure transducer	Druck 1830	2554552	March 18, 2009 – December 15, 2009
CAB Out	Pressure transducer	Druck 1830	2532761	December 15, 2009 – September 30, 2010
CON In	Pressure transducer	Druck 1830	2603235	March 18, 2009 – December 16, 2009
CON In	Pressure transducer	INW PS9805	2806022	December 16, 2009 – September 30, 2010
CON Out	Pressure transducer	Druck 1830	2532752	March 18, 2009 – December 16, 2009
CON Out	Pressure transducer	INW PS9805	2806020	December 16, 2009 – September 30, 2010
CAB Out/CON In	Rain gauge	ISCO 674	206L00104	March 18, 2009 – September 30, 2010

CAB: compost-amended biofiltration swale
CON: control biofiltration swale
IN: inlet
OUT: outlet

Table C-2. Flow volume, peak discharge, and flow durations for runoff-producing storm events at the SR-518 monitoring site.

	CAB In			CAB Out			CON In			CON Out		
Flow ID	Flow Volume (cf)	Peak Discharge (cfs)	Flow Duration (hours)	Flow Volume (cf)	Peak Discharge (cfs)	Flow Duration (hours)	Flow Volume (cf)	Peak Discharge (cfs)	Flow Duration (hours)	Flow Volume (cf)	Peak Discharge (cfs)	Flow Duration (hours)
1	83.5	0.125	3.8	101.6	0.068	7.6	57.9	0.074	3.0	63.7	0.046	4.2
2	59.1	0.014	6.8	0.023	0.000	3.5	47.3	0.011	8.3	0.003	0.000	0.5
3	82.0	0.008	8.5	19.5	0.002	18.8	28.5	0.006	3.4	2.9	0.001	2.1
4	315.9	0.037	15.9	393.2	0.033	27.2	213.3	0.026	18.2	97.4	0.017	9.9
5	163.5	0.117	3.7	202.3	0.071	7.8	128.2	0.070	5.8	72.9	0.050	2.8
6	238.5	0.030	10.6	363.4	0.039	11.3	215.9	0.018	11.3	126.0	0.019	5.3
7	146.9	0.018	8.0	275.1	0.023	20.5	153.3	0.010	20.9	35.6	0.007	6.6
8	874.5	0.072	7.4	1258.4	0.092	11.3	544.0	0.044	12.3	662.4	0.056	6.8
9	185.7	0.065	3.3	284.7	0.058	7.8	125.8	0.041	5.9	109.5	0.031	2.5
10	36.5	0.018	5.7	0.023	0.000	11.8	48.7	0.014	8.1	0	0	0
11	832.6	0.150	15.9	1158.9	0.114	18.1	724.2	0.102	20.0	458.4	0.086	14.5
12	296.4	0.056	14.7	432.6	0.052	25.3	383.7	0.044	21.5	170.8	0.038	4.9
13	248.9	0.022	8.0	295.2	0.029	14.8	184.9	0.015	12.3	100.2	0.012	4.8
14	101.8	0.038	3.1	59.0	0.012	11.6	84.4	0.027	6.6	39.9	0.011	2.1
15	194.4	0.061	11.1	239.6	0.067	16.1	158.8	0.037	13.7	91.4	0.038	4.6
16	139.5	0.054	2.9	93.0	0.031	7.9	93.2	0.036	3.6	25.3	0.010	5.1
17	225.3	0.187	3.8	198.5	0.069	6.0	165.7	0.135	4.3	71.9	0.026	5.6
18	1082.0	0.146	24.5	1444.6	0.143	22.3	784.4	0.101	30.3	763.8	0.096	15.1
19	894.7	0.062	26.5	1232.0	0.078	28.8	694.3	0.040	36.5	684.3	0.047	24.3
20	779.7	0.309	17.8	970.0	0.089	21.8	614.9	0.048	20.3	577.6	0.052	18.9
21	464.0	0.103	4.8	513.7	0.110	5.7	294.7	0.061	5.7	276.2	0.067	4.4
22	173.1	0.164	1.3	200.0	0.152	2.3	119.9	0.126	1.8	125.2	0.102	1.8

Table C-2 (continued). Flow volume, peak discharge, and flow durations for runoff-producing storm events at the SR-518 monitoring site.

Flow ID	CAB In			CAB Out			CON In			CON Out		
	Flow Volume (cf)	Peak Discharge (cfs)	Flow Duration (hours)	Flow Volume (cf)	Peak Discharge (cfs)	Flow Duration (hours)	Flow Volume (cf)	Peak Discharge (cfs)	Flow Duration (hours)	Flow Volume (cf)	Peak Discharge (cfs)	Flow Duration (hours)
23	34.5	0.019	4.3	0	0	0	29.4	0.013	4.2	0	0	0
24	52.6	0.030	3.6	0	0	0	29.6	0.016	2.2	0	0	0
25	368.2	0.076	5.7	111.4	0.044	2.0	209.6	0.045	5.8	126.5	0.031	6.0
26	108.9	0.033	4.3	1.2	0.001	6.9	58.9	0.021	4.0	20.6	0.013	7.7
27	314.5	0.120	8.8	156.2	0.105	3.5	219.8	0.065	10.4	147.8	0.077	12.3
28	734.9	0.110	8.7	179.1	0.062	4.8	239.0	0.054	7.6	95.8	0.053	3.8
29	104.9	0.031	3.1	0.1	0.000	1.8	56.9	0.018	3.0	2.2	0.001	1.7
30	268.9	0.070	5.3	158.0	0.036	6.3	143.6	0.047	5.1	107.1	0.025	3.3
31	991.9	0.185	13.3	1010.1	0.170	11.9	655.1	0.141	13.6	856.0	0.226	7.7
32	150.8	0.190	6.1	90.5	0.064	3.1	119.6	0.138	14.4	79.5	0.074	1.1
33	313.3	0.051	5.7	185.1	0.043	6.3	147.8	0.031	5.1	109.2	0.026	4.7
34	37.2	0.022	2.1	0	0	0	27.6	0.016	0.9	0	0	0
35	1208.6	0.138	26.5	677.8	0.119	18.1	427.3	0.063	10.4	480.7	0.084	9.1
36	227.7	0.047	18.2	5.0	0.000	5.2	20.3	0.014	2.1	8.8	0.006	1.6
37	1428.0	0.205	21.5	962.6	0.147	12.8	539.2	0.156	12.3	729.5	0.165	12.3
38	1144.0	0.321	8.2	1247.2	0.345	10.9	667.2	0.223	7.3	1335.6	0.446	7.1
39	125.6	0.090	3.0	179.3	0.077	5.8	85.4	0.045	2.5	121.0	0.063	3.3
40	105.3	0.048	6.3	48.4	0.009	5.4	82.6	0.028	6.3	53.6	0.030	2.8
41	356.6	0.034	14.7	318.8	0.029	15.7	228.0	0.025	13.9	200.6	0.024	10.8
42	1454.8	0.149	12.7	1772.1	0.166	9.8	891.0	0.090	13.8	1175.6	0.112	9.2
43	331.1	0.026	13.4	308.7	0.030	13.7	255.1	0.018	17.1	160.1	0.016	9.8
44	337.5	0.076	8.1	326.3	0.075	11.7	186.9	0.043	7.0	190.6	0.044	5.7

Table C-2 (continued). Flow volume, peak discharge, and flow durations for runoff-producing storm events at the SR-518 monitoring site.

Flow ID	CAB In			CAB Out			CON In			CON Out		
	Flow Volume (cf)	Peak Discharge (cfs)	Flow Duration (hours)	Flow Volume (cf)	Peak Discharge (cfs)	Flow Duration (hours)	Flow Volume (cf)	Peak Discharge (cfs)	Flow Duration (hours)	Flow Volume (cf)	Peak Discharge (cfs)	Flow Duration (hours)
45	876.0	0.177	23.3	820.9	0.198	22.9	571.6	0.126	20.3	610.4	0.199	13.0
46	3727.3	0.184	36.3	2741.4	0.187	30.4	1366.6	0.111	33.1	1772.7	0.149	19.8
47	534.8	0.031	20.1	23.2	0.001	14.5	46.4	0.014	7.4	4.4	0.003	1.8
48	262.5	0.039	10.3	73.8	0.031	6.3	93.1	0.025	6.0	71.7	0.024	3.6
49	600.1	0.113	16.8	348.5	0.070	13.4	224.0	0.061	13.8	214.9	0.055	6.6
50	629.9	0.078	24.8	387.8	0.080	14.4	251.4	0.039	19.5	257.1	0.050	6.4
51	363.2	0.073	14.6	240.0	0.068	7.3	176.8	0.039	8.1	160.8	0.041	3.5
52	545.1	0.037	21.1	284.3	0.030	13.9	247.9	0.022	19.8	176.5	0.022	9.1
53	1436.4	0.171	26.2	1699.7	0.172	21.8	951.5	0.126	26.5	1187.7	0.132	19.3
54	172.9	0.035	10.1	124.3	0.030	12.1	99.5	0.021	12.3	52.2	0.017	4.3
55	735.5	0.069	16.1	933.3	0.086	14.3	522.5	0.048	13.9	661.3	0.060	10.3
56	287.2	0.046	6.8	385.8	0.044	12.8	185.6	0.032	6.3	277.0	0.035	5.3
57	998.5	0.090	16.2	1340.1	0.106	19.0	636.9	0.058	16.8	862.3	0.073	11.7
58	80.7	0.024	10.6	114.4	0.027	15.8	100.9	0.025	8.9	42.3	0.015	2.3
59	1086.2	0.137	17.0	1500.9	0.147	16.6	687.4	0.086	18.2	994.2	0.117	14.3
60	255.1	0.054	5.5	372.9	0.067	12.5	171.3	0.033	5.8	228.6	0.043	4.6
61	72.7	0.046	2.9	30.8	0.007	8.0	65.4	0.042	2.5	67.9	0.037	1.3
62	354.9	0.043	6.6	0	0	0	0	0	0	0	0	0
63	131.9	0.037	7.0	103.3	0.021	10.4	0	0	0	0	0	0
64	1660.9	0.055	17.6	385.1	0.075	17.8	151.7	0.094	10.0	252.5	0.029	16.4
65	234.5	0.030	11.8	219.2	0.018	12.8	125.1	0.019	11.4	121.8	0.014	7.8
66	108.2	0.014	18.8	76.5	0.011	18.4	80.6	0.014	13.3	65.3	0.008	13.9

Table C-2 (continued). Flow volume, peak discharge, and flow durations for runoff-producing storm events at the SR-518 monitoring site.

Flow ID	CAB In			CAB Out			CON In			CON Out		
	Flow Volume (cf)	Peak Discharge (cfs)	Flow Duration (hours)	Flow Volume (cf)	Peak Discharge (cfs)	Flow Duration (hours)	Flow Volume (cf)	Peak Discharge (cfs)	Flow Duration (hours)	Flow Volume (cf)	Peak Discharge (cfs)	Flow Duration (hours)
67	46.2	0.010	8.3	9.6	0.001	4.6	38.2	0.010	8.3	23.1	0.006	4.0
68	506.1	0.092	8.4	675.7	0.137	10.3	298.8	0.059	8.3	339.0	0.062	9.1
69	112.5	0.013	9.1	0.0	0.000	0.0	20.3	0.008	4.3	0.4	0.000	0.7
70	375.0	0.041	25.0	295.9	0.032	22.9	203.2	0.027	14.8	159.9	0.016	14.0
71	333.7	0.045	21.3	379.7	0.058	19.8	175.7	0.023	12.9	163.6	0.022	11.8
72	992.2	0.053	29.6	1323.9	0.072	29.8	559.5	0.029	28.8	583.0	0.029	26.9
73	801.4	0.051	29.4	1196.8	0.075	32.8	527.9	0.031	26.1	520.8	0.030	25.9
74	1007.6	0.079	16.9	1554.1	0.121	17.8	601.2	0.045	16.9	672.5	0.051	17.4
75	466.6	0.060	22.6	666.3	0.048	23.5	289.6	0.041	19.7	296.6	0.024	33.4
76	206.2	0.055	7.3	303.0	0.073	8.5	157.7	0.036	6.8	168.2	0.034	6.8
77	154.2	0.030	8.2	237.2	0.032	10.8	129.7	0.021	7.3	134.1	0.018	8.1
78	358.2	0.035	8.3	573.0	0.050	11.0	244.5	0.025	8.2	284.2	0.024	9.3
79	52.9	0.012	9.4	12.4	0.001	11.1	31.4	0.009	12.8	17.4	0.006	6.5
80	26.8	0.010	3.6	10.4	0.001	6.9	20.9	0.007	7.0	13.5	0.005	2.8
81	334.5	0.046	13.8	416.1	0.055	15.3	253.1	0.029	17.8	218.4	0.029	10.5
82	181.8	0.023	9.6	277.4	0.024	14.0	112.1	0.015	9.4	89.4	0.011	9.1
83	11.4	0.006	5.9	0.0	0.000	0.0	11.3	0.006	3.8	0.0	0.000	0.3
84	72.9	0.022	2.5	73.1	0.027	3.9	46.3	0.013	2.5	43.9	0.012	2.0
85	64.2	0.040	3.8	48.1	0.028	3.8	42.3	0.027	3.2	34.8	0.024	4.2
86	750.1	0.166	22.0	337.5	0.146	15.2	183.5	0.122	8.9	173.6	0.088	9.7
87	282.2	0.017	10.6	16.7	0.003	5.4	22.6	0.005	3.8	17.1	0.003	2.6
88	1108.3	0.074	23.8	695.2	0.071	13.9	277.5	0.041	12.3	279.2	0.035	10.9

Table C-2 (continued). Flow volume, peak discharge, and flow durations for runoff-producing storm events at the SR-518 monitoring site.

Flow ID	CAB In			CAB Out			CON In			CON Out		
	Flow Volume (cf)	Peak Discharge (cfs)	Flow Duration (hours)	Flow Volume (cf)	Peak Discharge (cfs)	Flow Duration (hours)	Flow Volume (cf)	Peak Discharge (cfs)	Flow Duration (hours)	Flow Volume (cf)	Peak Discharge (cfs)	Flow Duration (hours)
89	574.2	0.047	11.2	244.1	0.044	10.7	436.8	0.034	9.9	88.2	0.017	7.3
90	693.6	0.017	21.7	68.1	0.005	18.6	1065.6	0.025	23.0	14.1	0.002	5.4
91	261.7	0.066	10.9	94.3	0.030	7.6	393.3	0.041	11.1	6.2	0.004	1.5
92	327.8	0.060	11.6	78.8	0.034	11.6	522.6	0.022	11.4	1.8	0.001	1.3
93	188.6	0.022	5.8	288.3	0.028	9.7	17.7	0.007	5.9	15.7	0.002	5.8
94	96.4	0.013	13.2	176.7	0.020	20.5	74.2	0.012	10.8	71.6	0.009	7.5
95	3.8	0.001	1.5	0.1	0.000	2.4	4.9	0.002	1.5	2.0	0.001	1.3
96	23.7	0.011	5.8	0.0	0.000	0.0	18.0	0.008	3.5	6.2	0.003	1.3
97	49.8	0.014	5.4	6.6	0.001	5.0	35.1	0.009	5.5	11.3	0.006	1.1
98	35.6	0.009	3.3	11.1	0.002	4.7	22.4	0.007	3.7	7.2	0.003	1.9
99	708.3	0.081	24.6	1235.2	0.105	30.3	476.7	0.047	25.4	406.7	0.040	22.6
100	63.5	0.067	1.8	27.4	0.008	4.6	45.5	0.036	2.8	18.8	0.014	1.8
101	126.4	0.031	6.8	141.7	0.044	5.8	115.6	0.021	7.2	50.9	0.015	4.6
102	276.5	0.051	5.3	481.6	0.077	6.6	208.6	0.034	6.4	201.0	0.033	5.1
103	46.8	0.011	2.1	32.6	0.010	5.9	41.2	0.009	3.0	15.1	0.005	1.4
104	587.6	0.121	12.3	1019.0	0.182	22.8	448.3	0.077	22.6	412.9	0.071	12.3
105	2488.1	0.247	17.6	839.4	0.264	14.2	356.1	0.154	16.6	339.2	0.136	10.2
106	384.5	0.083	3.1	32.8	0.008	6.5	40.7	0.020	7.6	24.4	0.015	1.3
107	0.012	0.000	0.1	0	0	0	6.5	0.001	8.2	0	0	0
108	632.7	0.080	14.8	1145.6	0.111	21.0	538.4	0.055	22.5	495.4	0.042	17.7
109	30.3	0.017	3.2	34.0	0.007	7.3	59.2	0.016	16.2	22.6	0.009	3.7
110	58.8	0.027	3.3	82.1	0.035	5.9	75.3	0.017	12.8	43.8	0.017	2.9

Table C-2 (continned). Flow volume, peak discharge, and flow durations for runoff-producing storm events at the SR-518 monitoring site.

Flow ID	CAB In			CAB Out			CON In			CON Out		
	Flow Volume (cf)	Peak Discharge (cfs)	Flow Duration (hours)	Flow Volume (cf)	Peak Discharge (cfs)	Flow Duration (hours)	Flow Volume (cf)	Peak Discharge (cfs)	Flow Duration (honrs)	Flow Volume (cf)	Peak Discharge (cfs)	Flow Duration (hours)
111	52.9	0.024	1.7	59.1	0.028	4.7	73.3	0.021	14.4	37.9	0.015	1.8
112	28.5	0.010	2.8	22.5	0.007	5.3	62.9	0.011	9.1	32.0	0.009	2.7
113	15.5	0.007	2.4	22.8	0.005	8.3	44.6	0.007	14.6	8.3	0.003	3.6
114	42.0	0.009	4.1	18.3	0.003	6.3	62.0	0.007	9.3	15.4	0.006	1.8
115	150.9	0.084	2.8	105.1	0.057	3.2	113.6	0.049	8.0	72.4	0.031	2.7
116	724.1	0.058	10.8	1056.9	0.083	11.3	421.1	0.034	13.9	472.6	0.038	9.5
117	33.3	0.011	10.4	0	0	0	10.9	0.006	5.7	1.6	0.001	0.7
118	12.7	0.005	5.8	0	0	0	3.1	0.002	3.1	0.2	0.000	0.3
119	224.6	0.046	12.9	221.2	0.048	10.6	113.7	0.025	15.7	87.8	0.023	6.8
120	88.7	0.041	6.8	69.2	0.023	7.4	62.9	0.028	9.4	43.7	0.018	3.2
121	53.0	0.030	4.2	10.1	0.002	5.2	37.2	0.030	6.9	13.2	0.004	2.1
122	349.0	0.079	6.2	351.1	0.075	6.4	159.2	0.046	4.4	160.6	0.034	3.5
123	216.8	0.040	6.9	219.7	0.042	6.4	104.2	0.021	8.8	89.7	0.017	3.4
124	9.1	0.002	6.5	0.0	0.000	0.4	8.7	0.001	11.5	0.0	0.000	0.0
125	131.4	0.033	5.2	81.1	0.025	6.3	68.3	0.017	5.3	40.9	0.014	3.5
126	93.6	0.121	1.7	47.7	0.028	3.1	92.0	0.080	2.9	34.9	0.026	1.4
127	231.3	0.110	4.0	284.0	0.112	7.3	156.4	0.054	5.5	166.6	0.047	4.7
128	94.0	0.075	2.8	94.4	0.075	3.6	97.4	0.042	6.8	55.6	0.039	2.3
129	17.5	0.006	5.5	0	0	0	16.8	0.005	4.4	0	0	0
130	28.6	0.019	1.6	0	0	0	23.8	0.012	2.5	5.7	0.004	0.9
131	35.3	0.008	4.8	57.0	0.007	7.9	49.7	0.007	5.7	47.8	0.007	4.8
132	274.3	0.028	12.5	596.0	0.051	17.5	226.8	0.017	16.1	238.1	0.021	14.3

Table C-2 (continued). Flow volume, peak discharge, and flow durations for runoff-producing storm events at the SR-518 monitoring site.

Flow ID	CAB In			CAB Out			CON In			CON Out		
	Flow Volume (cf)	Peak Discharge (cfs)	Flow Duration (hours)	Flow Volume (cf)	Peak Discharge (cfs)	Flow Duration (hours)	Flow Volume (cf)	Peak Discharge (cfs)	Flow Duration (hours)	Flow Volume (cf)	Peak Discharge (cfs)	Flow Duration (hours)
133	15.1	0.003	3.0	21.5	0.003	7.9	21.8	0.003	4.0	10.0	0.002	2.8
134	144.5	0.035	8.3	343.8	0.055	15.3	122.4	0.019	12.3	102.4	0.021	9.5
135	183.0	0.023	10.8	478.0	0.035	19.2	174.5	0.014	12.3	180.8	0.014	11.7
136	57.9	0.010	5.3	162.1	0.021	10.0	58.0	0.009	9.0	0	0	0
137	140.3	0.037	3.8	250.8	0.052	7.7	93.1	0.022	5.1	0	0	0
138	230.1	0.071	5.0	483.2	0.122	10.1	165.4	0.041	5.3	184.3	0.044	5.7
139	25.8	0.023	1.5	60.2	0.024	6.5	36.3	0.023	4.1	31.1	0.017	3.4
140	55.5	0.023	1.7	41.0	0.017	3.4	76.5	0.022	2.5	35.4	0.016	1.4
141	115.2	0.035	4.6	274.0	0.047	9.3	139.3	0.027	8.7	83.6	0.016	5.5
142	52.7	0.025	1.9	50.4	0.019	3.4	88.1	0.023	6.0	38.7	0.014	1.9
143	31.0	0.026	1.2	7.2	0.003	1.9	40.6	0.022	2.5	14.5	0.005	1.4
144	7.7	0.007	0.8	0	0	0	19.1	0.009	1.9	1.4	0.001	0.8
145	107.2	0.028	2.4	0	0	0	47.3	0.014	1.8	25.4	0.009	1.4
146	344.5	0.038	5.1	293.2	0.047	3.7	249.6	0.025	5.5	161.6	0.018	3.7
147	26.1	0.011	1.7	0.0	0.000	2.0	22.4	0.008	2.1	0	0	0.3
148	37.1	0.022	2.6	0.0	0.000	1.0	43.7	0.019	3.3	4.9	0.003	1.3
149	276.5	0.067	6.8	349.4	0.094	7.3	220.0	0.051	7.9	152.9	0.045	5.2
150	67.5	0.024	1.9	0	0	0	42.3	0.016	1.7	16.6	0.011	1.0
151	225.4	0.071	6.4	255.6	0.099	6.1	186.5	0.148	3.7	210.8	0.134	3.3
152	1038.1	0.083	8.9	1709.1	0.158	10.2	840.1	0.150	7.0	1067.6	0.174	7.6
153	396.3	0.067	8.2	594.9	0.096	10.6	192.0	0.040	7.0	235.3	0.038	7.8
154	64.4	0.048	0.9	74.1	0.041	3.9	30.6	0.034	0.8	29.3	0.019	1.1

Table C-2 (continued). Flow volume, peak discharge, and flow durations for runoff-producing storm events at the SR-518 monitoring site.

Flow ID	CAB In			CAB Out			CON Iu			CON Out		
	Flow Volume (cf)	Peak Discharge (cfs)	Flow Duration (hours)	Flow Volume (cf)	Peak Discharge (cfs)	Flow Duration (hours)	Flow Volume (cf)	Peak Discharge (cfs)	Flow Duration (hours)	Flow Volume (cf)	Peak Discharge (cfs)	Flow Duration (hours)
155	183.0	0.056	2.3	163.2	0.049	3.4	97.8	0.029	2.1	83.3	0.020	2.3
156	258.3	0.058	6.2	303.7	0.081	5.7	119.0	0.031	5.2	109.3	0.027	4.9

CAB: compost-amended biofiltration swale
CON: control biofiltration swale
IN: inlet
OUT: outlet
cf: cubic feet
cfs: cubic feet per second

Table C-3 (continued). Hydrologic data correction history for station CAB In.

Date of Correctiou	User	From	To	Comment
8/12/2009 10:07	dyu	6/1/2009 9:40	6/1/2009 9:55	Delete Spike - no rain fall during time period
8/12/2009 10:09	dyu	6/1/2009 9:35	6/1/2009 10:00	Interpolate Gap(Linear) - fill in deleted spike
8/12/2009 10:17	dyu	4/30/2009 17:00	4/30/2009 17:15	Interpolate Gap(Linear) - Fill empty region
8/12/2009 10:18	dyu	4/30/2009 18:20	4/30/2009 19:40	Interpolate Gap(Linear) - Fill empty region
8/12/2009 10:21	dyu	5/2/2009 19:10	5/2/2009 19:20	Interpolate Gap(Linear) - Fill empty region
8/12/2009 10:26	dyu	4/23/2009 18:15	4/23/2009 18:25	Interpolate Gap(Linear) - Fill empty region
8/12/2009 10:27	dyu	4/23/2009 18:35	4/23/2009 19:25	Interpolate Gap(Linear) - Fill empty region
8/12/2009 10:29	dyu	4/22/2009 18:15	4/22/2009 19:10	Interpolate Gap(Linear) - Fill empty region
8/12/2009 10:30	dyu	4/24/2009 17:50	4/24/2009 18:00	Interpolate Gap(Linear) - Fill empty region
8/12/2009 10:30	dyu	4/24/2009 18:10	4/24/2009 19:25	Interpolate Gap(Linear) - Fill empty region
8/12/2009 10:31	dyu	4/25/2009 18:45	4/25/2009 18:55	Interpolate Gap(Linear) - Fill empty region
8/12/2009 10:31	dyu	4/26/2009 19:10	4/26/2009 19:30	Interpolate Gap(Linear) - Fill empty region
8/18/2009 20:48	dyu	3/18/2009 14:30	3/18/2009 14:55	Offset Correction with value of -2.01174 feet - dropped to 0 because of false rain spike
8/18/2009 20:49	dyu	3/18/2009 15:00	3/18/2009 15:00	Delete spike - caused by false rain spike
8/18/2009 20:49	dyu	3/18/2009 14:55	3/18/2009 15:05	Interpolate Gap(Linear) - fill deleted region
8/19/2009 8:40	dahearn	4/27/2009 18:15	4/27/2009 18:25	Interpolate Gap(Linear) - no flow during gap
8/19/2009 8:40	dahearn	4/27/2009 19:15	4/27/2009 19:30	Interpolate Gap(Linear) - no flow during gap
8/19/2009 8:40	dahearn	5/3/2009 17:35	5/3/2009 18:30	Interpolate Gap(Linear) - no flow during gap
8/19/2009 8:40	dahearn	5/3/2009 19:15	5/3/2009 19:40	Interpolate Gap(Linear) - no flow during gap
8/19/2009 8:41	dahearn	5/11/2009 9:35	5/11/2009 9:35	Delete spike
8/19/2009 8:41	dahearn	5/11/2009 9:05	5/11/2009 9:40	Interpolate Gap(Linear) - no flow during gap
8/20/2009 10:31	dahearn	3/23/2009 11:50	3/28/2009 11:40	Fill Region with modeling:[Name = Linear CABIN from CONIN] [Type = Linear Regression] [Equation: T=-0.00224903+1.20858*S1] [Target Name = CAB IN Stage] [Error = 0.012] [Number of Surr. = 1] [#1: CON IN Stage]
8/20/2009 10:40	dahearn	3/24/2009 6:50	3/28/2009 6:40	Transducer shift adjustment

Table C-3. Hydrologic data correction history for station CAB In.

Date of Correction	User	From	To	Comment
8/20/2009 14:08	dyu	4/14/2009 8:55	4/14/2009 9:40	Delete region - no rain during the time period
8/20/2009 14:08	dyu	4/14/2009 8:50	4/14/2009 9:45	Interpolate Gap(Linear) - fill deleted region
8/20/2009 15:08	dahearn	5/11/2009 9:35	5/11/2009 9:35	Delete spike
8/20/2009 15:08	dahearn	5/11/2009 9:05	5/11/2009 9:40	Interpolate Gap(Linear) - spike/drop fill
8/20/2009 15:12	dahearn	5/3/2009 18:30	5/3/2009 18:45	Interpolate Gap(Linear) - short gap
8/20/2009 15:12	dahearn	5/3/2009 18:50	5/3/2009 19:10	Interpolate Gap(Linear) - short gap
8/20/2009 15:56	dahearn	5/4/2009 16:25	5/4/2009 19:25	Fill Region with modeling:[Name = Linear CABIN from CONIN] [Type = Linear Regression] [Equation: T=-0.0241563+1.33974*S1] [Target Name = CAB IN Stage] [Error = 0.011] [Number of Surr. = 1] [#1: CON IN Stage]
9/30/2009 15:51	dyu	8/6/2009 10:20	9/1/2009 9:50	Drift Correction with Calibration Drift value of -0.00962 and Fouling Drift value of 0.0000 feet
9/30/2009 16:26	dyu	9/8/2009 11:15	9/8/2009 11:15	Delete spike - no rain during time period
9/30/2009 16:26	dyu	9/8/2009 11:05	9/8/2009 11:20	Interpolate Gap(Linear) - fill in deleted spike region
10/30/2009 15:49	dyu	9/30/2009 13:50	9/30/2009 14:05	Offset Correction with value of -2.0323 feet
10/30/2009 15:49	dyu	9/30/2009 14:10	9/30/2009 14:10	Delete spike
10/30/2009 15:50	dyu	9/30/2009 14:05	9/30/2009 14:15	Interpolate Gap(Linear) - fill deleted spike region
10/30/2009 15:51	dyu	10/28/2009 10:05	10/28/2009 10:40	Delete spike - no rainfall during period
10/30/2009 15:51	dyu	10/28/2009 10:00	10/28/2009 10:45	Interpolate Gap(Linear) - fill deleted spike region
12/4/2009 10:24	dyu	12/1/2009 10:40	12/1/2009 11:00	Delete spike - no rainfall during time period
12/4/2009 10:24	dyu	12/1/2009 10:35	12/1/2009 11:05	Interpolate Gap(Linear) - fill deleted region
1/19/2010 14:41	dyu	3/18/2009 14:30	5/4/2009 14:45	Drift Correction with Calibration Drift value of 0.00427 and Fouling Drift value of 0.0000 feet
1/19/2010 14:43	dyu	5/4/2009 14:55	5/7/2009 9:50	Drift Correction with Calibration Drift value of 0.0065 and Fouling Drift value of 0.0000 feet
1/19/2010 14:46	dyu	5/20/2009 9:40	6/1/2009 9:35	Drift Correction with Calibration Drift value of -0.0032 and Fouling Drift value of 0.0000 feet

Table C-3. Hydrologic data correction history for station CAB In.

Date of Correction	User	From	To	Comment
1/19/2010 14:49	dyu	7/2/2009 10:30	8/6/2009 10:15	Drift Correction with Calibration Drift value of 0.0145 and Fouling Drift value of 0.0000 feet
1/19/2010 14:52	dyu	9/1/2009 9:55	9/8/2009 15:35	Drift Correction with Calibration Drift value of 0.0074 and Fouling Drift value of 0.0000 feet
1/19/2010 14:54	dyu	9/8/2009 15:40	9/21/2009 10:15	Drift Correction with Calibration Drift value of -0.0143 and Fouling Drift value of 0.0000 feet
1/19/2010 14:55	dyu	9/30/2009 13:50	10/12/2009 9:30	Drift Correction with Calibration Drift value of -0.0072 and Fouling Drift value of 0.0000 feet
1/19/2010 14:57	dyu	10/12/2009 9:35	10/20/2009 11:40	Drift Correction with Calibration Drift value of -0.0282 and Fouling Drift value of 0.0000 feet
1/19/2010 15:02	dyu	10/20/2009 11:45	11/5/2009 10:10	Drift Correction with Calibration Drift value of -0.0037 and Fouling Drift value of 0.0000 feet
1/19/2010 15:06	dyu	12/1/2009 10:40	12/1/2009 11:00	Delete region - no rainfall during time period
1/19/2010 15:06	dyu	12/1/2009 10:35	12/1/2009 11:05	Interpolate Gap(Linear) - fill deleted region
1/19/2010 15:10	dyu	12/7/2009 12:45	12/7/2009 17:35	Delete region - transducer malfunction during freezing temperatures
1/19/2010 15:11	dyu	12/7/2009 12:40	12/7/2009 17:40	Interpolate Gap(Linear) - fill deleted region
1/19/2010 15:13	dyu	12/13/2009 15:45	12/14/2009 8:05	Delete region - transducer malfunction during freezing temperatures
1/19/2010 15:13	dyu	12/13/2009 15:40	12/14/2009 8:10	Interpolate Gap(Linear) - fill deleted region
1/19/2010 15:18	dyu	12/30/2009 13:40	12/30/2009 13:50	Delete region - no rainfall during time period
1/19/2010 15:18	dyu	12/30/2009 13:35	12/30/2009 13:55	Interpolate Gap(Linear) - fill deleted region
1/19/2010 15:39	dyu	12/7/2009 7:00	12/7/2009 11:00	Delete region - transducer malfunction due to freezing temperatures
1/19/2010 15:40	dyu	12/7/2009 6:55	12/7/2009 11:05	Interpolate Gap(Linear) - fill deleted region
1/19/2010 15:48	dyu	11/5/2009 10:15	12/1/2009 10:55	Drift Correction with Calibration Drift value of -0.0192 and Fouling Drift value of 0.0000 feet
1/19/2010 15:51	dyu	12/1/2009 11:00	12/15/2009 13:00	Drift Correction with Calibration Drift value of -0.0219 and Fouling Drift value of 0.0000 feet
1/19/2010 15:52	dyu	12/14/2009 15:45	12/14/2009 15:55	Delete region - no rainfall during time period
1/19/2010 15:52	dyu	12/14/2009 15:40	12/14/2009 16:00	Interpolate Gap(Linear) - fill deleted region

Table C-3. Hydrologic data correction history for station CAB In.

Date of Correction	User	From	To	Comment
1/19/2010 15:55	dyu	12/16/2009 10:15	12/16/2009 10:40	Delete region - no rainfall during time period
1/19/2010 16:00	dyu	12/16/2009 10:45	1/7/2010 11:55	Drift Correction with Calibration Drift value of 0.0198 and Fouling Drift value of 0.0000 feet
2/10/2010 21:33	dyu	1/7/2010 12:00	2/3/2010 15:15	Drift Correction with Calibration Drift value of -0.0173 and Fouling Drift value of 0.0000 feet
3/9/2010 13:51	dyu	3/2/2010 12:30	3/2/2010 12:30	Delete spike
3/9/2010 13:52	dyu	3/2/2010 12:20	3/2/2010 12:35	Interpolate Gap(Linear) - fill deleted spike
3/9/2010 13:56	dyu	2/3/2010 15:20	3/2/2010 11:55	Drift Correction with Calibration Drift value of -0.0056 and Fouling Drift value of 0.0000 feet
4/15/2010 14:39	dyu	3/29/2010 15:30	3/30/2010 8:25	Offset Correction with value of -1.7814 feet
4/15/2010 14:39	dyu	3/30/2010 8:30	3/30/2010 8:30	Delete spike
4/15/2010 14:40	dyu	3/30/2010 8:25	3/30/2010 8:35	Interpolate Gap(Linear) - fill deleted spike
5/19/2010 10:49	dyu	5/13/2009 15:30	5/13/2009 15:30	Delete spike
5/19/2010 10:49	dyu	5/13/2009 15:25	5/13/2009 15:35	Interpolate Gap(Linear) - fill deleted spike region
6/7/2010 15:23	dyu	3/31/2010 10:00	5/3/2010 12:05	Drift Correction with Calibration Drift value of 0.034 and Fouling Drift value of 0.000 feet
6/7/2010 15:27	dyu	5/3/2010 12:10	6/3/2010 11:55	Drift Correction with Calibration Drift value of -0.0493 and Fouling Drift value of 0.000 feet
11/3/2010 12:05	dyu	7/1/2010 9:55	7/9/2010 23:30	Offset Correction with value of -1.8600 feet
11/3/2010 12:06	dyu	7/1/2010 9:40	7/1/2010 9:40	Delete region
11/3/2010 12:06	dyu	7/1/2010 9:35	7/1/2010 9:55	Interpolate Gap(Linear)
11/3/2010 12:08	dyu	7/9/2010 23:40	7/13/2010 15:10	Advanced Correction of (Date/Time Value Diff) (2010-07-09 23:35:00 -0.119 -1.8785) (2010-07-13 15:10:00 -0.043 -1.7890)
11/3/2010 12:08	dyu	7/9/2010 23:35	7/9/2010 23:35	Delete region
11/3/2010 12:08	dyu	7/9/2010 23:30	7/9/2010 23:40	Interpolate Gap(Linear)
11/3/2010 12:10	dyu	7/13/2010 15:15	7/13/2010 15:15	Delete region
11/3/2010 12:10	dyu	7/13/2010 15:10	7/13/2010 15:20	Interpolate Gap(Linear)

Table C-3. Hydrologic data correction history for station CAB In.

Date of Correction	User	From	To	Comment
11/3/2010 12:12	dyu	7/24/2010 20:15	8/2/2010 10:55	Advanced Correction of (Date/Time Value Diff) (2010-07-24 20:15:00 -0.157 -1.782) (2010-08-02 10:55:00 0.0081 -1.692)
11/3/2010 12:12	dyu	8/2/2010 10:50	8/2/2010 10:50	Delete region
11/3/2010 12:14	dyu	6/3/2010 12:00	7/1/2010 9:40	Drift Correction with Calibration Drift value of -0.0493 and Fouling Drift value of 0.0000 feet
11/3/2010 12:16	dyu	8/2/2010 10:55	9/8/2010 13:50	Drift Correction with Calibration Drift value of -0.0167 and Fouling Drift value of 0.0000 feet
11/3/2010 12:18	dyu	9/8/2010 14:25	9/8/2010 14:25	Delete region
11/3/2010 12:18	dyu	9/8/2010 13:50	9/8/2010 14:30	Interpolate Gap(Linear)

Table C-4. Hydrologic data correction history for station CAB Out.

Date of Correction	User	From	To	Comment
8/13/2009 10:52	dyu	3/24/2009 6:50	5/4/2009 14:55	Offset Correction with value of -2.7488 feet
8/13/2009 10:54	dyu	3/27/2009 9:35	3/27/2009 10:10	Interpolate Gap(Linear) - Fill empty region
8/13/2009 10:55	dyu	3/27/2009 12:00	3/27/2009 12:10	Interpolate Gap(Linear) - Fill empty region
8/18/2009 20:50	dyu	3/18/2009 12:50	3/18/2009 12:50	Delete spike - no rain
8/18/2009 20:50	dyu	3/18/2009 12:45	3/18/2009 12:55	Interpolate Gap(Linear) - fill deleted spike
8/18/2009 20:51	dyu	3/18/2009 14:45	3/18/2009 14:45	Delete spike
8/18/2009 20:51	dyu	3/18/2009 14:40	3/18/2009 14:50	Interpolate Gap(Linear) - fill deleted spike
8/19/2009 8:42	dahearn	3/23/2009 13:30	3/23/2009 13:30	Delete spike
8/19/2009 8:42	dahearn	5/11/2009 9:35	5/11/2009 10:00	Interpolate Gap(Linear) - no flow during gap
8/19/2009 8:42	dahearn	3/23/2009 13:20	3/23/2009 13:35	Interpolate Gap(Linear) - no flow during gap
8/19/2009 8:43	dahearn	5/4/2009 14:55	5/4/2009 14:55	Delete drop
8/19/2009 8:44	dahearn	5/4/2009 14:50	5/4/2009 15:00	Interpolate Gap(Linear) - no flow during gap
8/19/2009 8:45	dahearn	3/19/2009 9:50	3/19/2009 9:55	Delete spike
8/19/2009 8:45	dahearn	3/19/2009 9:45	3/19/2009 10:00	Interpolate Gap(Linear) - spike/drop fill
8/19/2009 8:46	dahearn	5/13/2009 15:20	5/13/2009 15:20	Delete spike - intentional datalogger reset
8/19/2009 8:46	dahearn	5/13/2009 15:15	5/13/2009 15:25	Interpolate Gap(Linear) - spike/drop fill
8/19/2009 8:47	dahearn	3/27/2009 12:10	3/27/2009 18:35	Interpolate Gap(Linear) - no flow during gap
8/19/2009 10:57	dyu	5/7/2009 10:00	5/13/2009 14:45	Drift Correction with Calibration Drift value of 0.02095 and Fouling Drift value of 0.0000 feet
9/30/2009 16:29	dyu	9/8/2009 11:15	9/8/2009 11:20	Delete spike - no rainfall during time period
9/30/2009 16:29	dyu	9/8/2009 11:10	9/8/2009 11:25	Interpolate Gap(Linear) - fill deleted region
10/30/2009 16:09	dyu	9/30/2009 14:05	9/30/2009 14:05	Drift Correction with Calibration Drift value of -2.7920 and Fouling Drift value of 0.0000 feet
10/30/2009 16:09	dyu	9/30/2009 14:10	9/30/2009 14:10	Delete spike
10/30/2009 16:09	dyu	9/30/2009 14:05	9/30/2009 14:15	Interpolate Gap(Linear) - fill deleted spike region
10/30/2009 16:12	dyu	10/20/2009 12:05	10/22/2009 8:25	Offset Correction with value of -2.7976 feet

Table C-4 (continued). Hydrologic data correction history for station CAB Out.

Date of Correction	User	From	To	Comment
10/30/2009 16:13	dyu	10/22/2009 8:30	10/22/2009 8:30	Delete spike
10/30/2009 16:13	dyu	10/22/2009 8:25	10/22/2009 8:35	Interpolate Gap(Linear) - fill deleted spike region
12/4/2009 10:26	dyu	10/30/2009 9:30	10/30/2009 9:30	Delete spike - no rain during time period
12/4/2009 10:26	dyu	10/30/2009 9:25	10/30/2009 9:35	Interpolate Gap(Linear) - fill deleted spike
12/4/2009 10:31	dyu	10/22/2009 12:40	11/5/2009 10:15	Drift Correction with Calibration Drift value of 0.00459 and Fouling Drift value of 0.0000 feet
1/19/2010 16:15	dyu	5/13/2009 14:50	6/1/2009 9:55	Drift Correction with Calibration Drift value of 0.0067 and Fouling Drift value of 0.0000 feet
1/19/2010 16:17	dyu	6/1/2009 10:00	7/2/2009 10:40	Drift Correction with Calibration Drift value of -0.0264 and Fouling Drift value of 0.0000 feet
1/19/2010 16:18	dyu	7/2/2009 10:45	8/6/2009 10:20	Drift Correction with Calibration Drift value of -0.0140 and Fouling Drift value of 0.0000 feet
1/19/2010 16:19	dyu	9/1/2009 10:00	9/8/2009 14:55	Drift Correction with Calibration Drift value of 0.0028 and Fouling Drift value of 0.0000 feet
1/19/2010 16:22	dyu	9/8/2009 15:00	9/21/2009 10:20	Drift Correction with Calibration Drift value of -0.0035 and Fouling Drift value of 0.0000 feet
1/19/2010 16:24	dyu	9/30/2009 14:05	10/12/2009 9:35	Drift Correction with Calibration Drift value of -0.0130 and Fouling Drift value of 0.0000 feet
1/19/2010 16:26	dyu	10/12/2009 9:40	10/22/2009 12:35	Drift Correction with Calibration Drift value of 0.0105 and Fouling Drift value of 0.0000 feet
1/19/2010 16:30	dyu	10/22/2009 12:40	11/5/2009 10:15	Drift Correction with Calibration Drift value of -0.0046 and Fouling Drift value of 0.0000 feet
1/19/2010 16:32	dyu	11/5/2009 10:20	12/1/2009 11:30	Drift Correction with Calibratiou Drift value of -0.0054 and Fouling Drift value of 0.0000 feet
1/19/2010 16:35	dyu	12/7/2009 7:30	12/7/2009 8:25	Delete region - transducer malfunction during freezing temperatures
1/19/2010 16:36	dyu	12/7/2009 7:25	12/7/2009 8:30	Interpolate Gap(Linear) - fill deleted region
1/19/2010 21:38	dyu	12/16/2009 10:50	12/16/2009 14:55	Advanced Correction of (Date/Time Value Diff) (2009-12-16 10:50:00 0 - 2.791) (2009-12-16 14:55:00 0.255 -2.778)

Table C-4 (continued). Hydrologic data correction history for station CAB Out.

Date of Correction	User	From	To	Comment
1/19/2010 21:44	dyu	12/19/2009 15:25	12/19/2009 16:45	Delete region - values not consistent with the amount of rainfall replace with model based correction
1/19/2010 21:49	dyu	12/6/2009 19:40	12/7/2009 8:30	Delete region - no rainfall during time period
1/19/2010 21:50	dyu	12/6/2009 19:35	12/7/2009 8:35	Interpolate Gap(Linear) - fill deleted region
1/19/2010 21:56	dyu	12/19/2009 15:20	12/19/2009 16:50	Interpolate Gap(Linear) - fill deleted region
1/19/2010 22:00	dyu	12/16/2009 10:20	12/16/2009 10:25	Delete region - aberrant readings
1/19/2010 22:02	dyu	12/15/2009 13:45	1/7/2010 12:05	Drift Correction with Calibration Drift value of 0.0035 and Fouling Drift value of 0.0000 feet
1/21/2010 15:33	dyu	12/16/2009 14:55	12/16/2009 15:05	Interpolate Gap(Linear)
2/10/2010 21:39	dyu	1/7/2010 12:10	2/3/2010 10:40	Drift Correction with Calibration Drift value of 0.0049 and Fouling Drift value of 0.0000 feet
3/9/2010 14:01	dyu	2/8/2010 7:55	2/10/2010 8:55	Offset Correction with value of -2.791 feet - drop stage below 0
3/9/2010 14:01	dyu	2/10/2010 9:00	2/10/2010 9:00	Delete spike - no rainfall
3/9/2010 14:02	dyu	2/10/2010 8:55	2/10/2010 9:05	Interpolate Gap(Linear) - fill deleted spike
3/9/2010 14:18	dyu	2/20/2010 12:55	2/25/2010 18:05	Offset Correction with value of -2.7829 feet
3/9/2010 14:18	dyu	2/25/2010 18:10	2/25/2010 18:10	Delete spike
3/9/2010 14:18	dyu	2/25/2010 18:05	2/25/2010 18:15	Interpolate Gap(Linear) - fill deleted spike
3/9/2010 14:26	dyu	2/3/2010 10:40	3/2/2010 12:00	Drift Correction with Calibration Drift value of 0.0032 and Fouling Drift value of 0.0000 feet
4/15/2010 14:56	dyu	3/23/2010 20:00	3/25/2010 15:40	Offset Correction with value of -2.7936 feet
4/15/2010 14:57	dyu	3/23/2010 19:55	3/23/2010 19:55	Delete spike
4/15/2010 14:57	dyu	3/23/2010 19:50	3/23/2010 20:00	Interpolate Gap(Linear) - fill deleted spike
4/15/2010 14:57	dyu	3/25/2010 15:45	3/25/2010 15:45	Delete spike
4/15/2010 14:57	dyu	3/25/2010 15:40	3/25/2010 15:50	Interpolate Gap(Linear) - fill deleted spike
4/15/2010 15:03	dyu	3/2/2010 12:05	3/31/2010 10:05	Drift Correction with Calibration Drift value of 0.005 and Fouling Drift value of 0.000 feet
6/7/2010 15:37	dyu	4/25/2010 2:55	4/27/2010 14:45	Offset Correction with value of -2.7875 feet

Table C-4 (continued). Hydrologic data correction history for station CAB Out.

Date of Correction	User	From	To	Comment
6/7/2010 15:38	dyu	4/27/2010 14:50	4/27/2010 14:50	Delete spike
6/7/2010 15:38	dyu	4/27/2010 14:45	4/27/2010 14:55	Interpolate Gap(Linear) - fill deleted spike
6/7/2010 15:41	dyu	5/2/2010 8:00	5/3/2010 11:45	Advanced Correction of (Date/Time Value Diff) (2010-05-02 07:55:00 -0.0133 -2.7885) (2010-05-03 11:45:00 -0.0074 -2.7874)
6/7/2010 15:41	dyu	5/3/2010 11:50	5/3/2010 11:50	Delete spike
6/7/2010 15:41	dyu	5/3/2010 11:45	5/3/2010 11:55	Interpolate Gap(Linear) - fill deleted spike
6/7/2010 15:46	dyu	5/5/2010 0:25	5/10/2010 8:05	Advanced Correction of (Date/Time Value Diff) (2010-05-05 00:25:00 0.185 -2.7840) (2010-05-10 08:05:00 0.07 -2.7858)
6/7/2010 15:47	dyu	5/2/2010 7:55	5/2/2010 7:55	Delete spike
6/7/2010 15:47	dyu	5/2/2010 7:50	5/2/2010 8:00	Interpolate Gap(Linear) - fill deleted spike
6/7/2010 15:47	dyu	5/10/2010 8:10	5/10/2010 8:10	Delete spike
6/7/2010 15:48	dyu	5/10/2010 8:05	5/10/2010 8:15	Interpolate Gap(Linear) - fill deleted spike
6/7/2010 15:51	dyu	5/15/2010 0:00	6/1/2010 9:00	Advanced Correction of (Date/Time Value Diff) (2010-05-14 23:55:00 -0.031 -2.7844) (2010-06-01 09:00:00 -0.025 -2.7836)
6/7/2010 15:51	dyu	5/14/2010 23:55	5/14/2010 23:55	Delete spike
6/7/2010 15:51	dyu	5/14/2010 23:50	5/15/2010 0:00	Interpolate Gap(Linear) - fill deleted spike
6/7/2010 15:52	dyu	6/1/2010 9:05	6/1/2010 9:05	Delete spike
6/7/2010 15:52	dyu	6/1/2010 9:00	6/1/2010 9:10	Interpolate Gap(Linear) - fill deleted spike
6/7/2010 16:05	dyu	5/3/2010 12:10	6/3/2010 12:05	Drift Correction with Calibration Drift value of 0.023 and Fouling Drift value of 0.000 feet
6/7/2010 16:08	dyu	3/31/2010 10:10	5/2/2010 7:50	Drift Correction with Calibration Drift value of 0.004 and Fouling Drift value of 0.000 feet
11/3/2010 12:27	dyu	6/14/2010 22:00	7/1/2010 8:30	Advanced Correction of (Date/Time Value Diff) (2010-06-14 21:55:00 -0.0198 -2.762) (2010-07-01 08:30:00 -0.054 -2.760)
11/3/2010 12:27	dyu	6/14/2010 21:55	6/14/2010 21:55	Delete region
11/3/2010 12:27	dyu	6/14/2010 21:50	6/14/2010 22:00	Interpolate Gap(Linear)

Table C-4 (continued). Hydrologic data correction history for station CAB Out.

Date of Correction	User	From	To	Comment
11/3/2010 12:28	dyu	7/12/2010 5:25	7/13/2010 15:15	Advanced Correction of (Date/Time Value Diff) (2010-07-12 05:25:00 -0.041 -2.737) (2010-07-13 15:15:00 -0.046 -2.738)
11/3/2010 12:28	dyu	7/13/2010 15:20	7/13/2010 15:20	Delete region
11/3/2010 12:28	dyu	7/13/2010 15:15	7/13/2010 15:25	Interpolate Gap(Linear)
11/3/2010 12:30	dyu	7/24/2010 19:30	8/2/2010 10:50	Advanced Correction of (Date/Time Value Diff) (2010-07-24 19:25:00 -0.087 -2.738) (2010-08-02 10:50:00 -0.03 -2.641)
11/3/2010 12:30	dyu	8/2/2010 10:55	8/2/2010 10:55	Delete region
11/3/2010 12:30	dyu	8/2/2010 10:50	8/2/2010 11:00	Interpolate Gap(Linear)
11/3/2010 12:32	dyu	8/25/2010 12:00	9/8/2010 11:45	Advanced Correction of (Date/Time Value Diff) (2010-08-25 11:55:00 -0.071 -2.733) (2010-09-08 11:45:00 0.016 -2.734)
11/3/2010 12:32	dyu	8/25/2010 11:55	8/25/2010 11:55	Delete region
11/3/2010 12:33	dyu	8/25/2010 11:50	8/25/2010 12:00	Interpolate Gap(Linear)
11/3/2010 12:35	dyu	7/24/2010 19:25	7/24/2010 19:25	Delete region
11/3/2010 12:36	dyu	7/24/2010 19:20	7/24/2010 19:30	Interpolate Gap(Linear)
11/3/2010 12:36	dyu	9/8/2010 11:50	9/8/2010 11:50	Delete region
11/3/2010 12:36	dyu	9/8/2010 11:45	9/8/2010 11:55	Interpolate Gap(Linear)
11/3/2010 12:37	dyu	9/30/2010 19:55	10/4/2010 10:45	Offset Correction with value of -2.731 feet

Table C-5. Hydrologic data correction history for station CON In.

Date of Correction	User	From	To	Comment
8/13/2009 11:10	dyu	3/24/2009 6:50	5/4/2009 15:00	Offset Correction with value of -2.1322 feet
8/18/2009 20:12	dyu	4/9/2009 4:00	4/9/2009 15:40	Delete region - no rain during time period
8/18/2009 20:13	dyu	4/9/2009 3:55	4/9/2009 15:45	Interpolate Gap(Linear) - Fill deleted region
8/18/2009 20:54	dyu	3/18/2009 12:35	3/18/2009 14:40	Offset Correction with value of -2.2400 feet - drop to 0 because of false spike
8/18/2009 20:54	dyu	3/18/2009 14:45	3/18/2009 14:45	Delete spike
8/18/2009 20:54	dyu	3/18/2009 14:40	3/18/2009 14:50	Interpolate Gap(Linear) - fill deleted spike
8/19/2009 8:51	dahearn	3/23/2009 13:30	3/23/2009 13:30	Delete spike
8/19/2009 8:51	dahearn	5/11/2009 9:35	5/11/2009 10:00	Interpolate Gap(Linear) - no flow during gap
8/19/2009 8:51	dahearn	3/23/2009 13:20	3/23/2009 13:35	Interpolate Gap(Linear) - no flow during gap
8/19/2009 8:51	dahearn	3/27/2009 9:35	3/27/2009 10:10	Interpolate Gap(Linear) - no flow during gap
8/19/2009 8:52	dahearn	3/19/2009 9:50	3/19/2009 9:55	Delete spike - intentional datalogger reset
8/19/2009 8:52	dahearn	3/19/2009 9:45	3/19/2009 10:00	Interpolate Gap(Linear) - spike/drop fill
8/19/2009 8:53	dahearn	5/13/2009 15:20	5/13/2009 15:20	Delete spike
8/19/2009 8:55	dahearn	4/14/2009 9:30	4/14/2009 9:35	Delete spike
8/19/2009 8:55	dahearn	4/14/2009 9:25	4/14/2009 9:40	Interpolate Gap(Linear) - spike/drop fill
8/19/2009 8:56	dahearn	5/4/2009 15:00	5/4/2009 15:00	Delete drop
8/19/2009 8:56	dahearn	5/4/2009 14:55	5/4/2009 15:05	Interpolate Gap(Linear) - spike/drop fill
8/19/2009 9:55	dahearn	3/27/2009 12:00	3/27/2009 12:10	Interpolate Gap(Linear) - no flow during gap
8/19/2009 9:55	dahearn	3/27/2009 12:10	3/27/2009 18:35	Interpolate Gap(Linear) - no flow during gap
8/20/2009 15:35	dahearn	3/24/2009 6:50	4/12/2009 2:20	Offset Correction with value of -0.020 feet
9/30/2009 16:46	dyu	9/8/2009 11:15	9/8/2009 11:20	Delete spike - no rainfall during time period
9/30/2009 16:46	dyu	9/8/2009 11:10	9/8/2009 11:25	Interpolate Gap(Linear) - fill deleted region
10/30/2009 16:29	dyu	9/30/2009 14:10	9/30/2009 14:10	Delete spike
10/30/2009 16:29	dyu	9/30/2009 14:05	9/30/2009 14:15	Interpolate Gap(Linear) - fill deleted spike region
10/30/2009 16:55	dyu	10/21/2009 4:55	10/21/2009 4:55	Delete spike

Table C-5 (continued). Hydrologic data correction history for station CON In.

Date of Correction	User	From	To	Comment
10/30/2009 16:55	dyu	10/21/2009 4:50	10/21/2009 5:00	Interpolate Gap(Linear) - fill deleted spike region
12/4/2009 10:35	dyu	10/30/2009 9:30	10/30/2009 9:30	Delete spike - no rainfall during time period
12/4/2009 10:35	dyu	10/30/2009 9:25	10/30/2009 9:35	Interpolate Gap(Linear) - fill deleted spike
1/19/2010 22:19	dyu	5/4/2009 15:00	5/7/2009 9:55	Drift Correction with Calibration Drift value of -0.0066 and Fouling Drift value of 0.0000 feet
1/19/2010 22:21	dyu	5/7/2009 10:00	6/1/2009 10:00	Drift Correction with Calibration Drift value of 0.0006 and Fouling Drift value of 0.0000 feet
1/19/2010 22:23	dyu	6/1/2009 10:05	7/2/2009 10:35	Drift Correction with Calibration Drift value of 0.0140 and Fouling Drift value of 0.0000 feet
1/19/2010 22:25	dyu	7/2/2009 10:40	8/6/2009 10:25	Drift Correction with Calibration Drift value of 0.01107 and Fouling Drift value of 0.0000 feet
1/19/2010 22:27	dyu	8/6/2009 10:30	9/1/2009 10:00	Drift Correction with Calibration Drift value of -0.0003 and Fouling Drift value of 0.0000 feet
1/19/2010 22:29	dyu	9/1/2009 10:05	9/8/2009 14:55	Drift Correction with Calibration Drift value of 0.0026 and Fouling Drift value of 0.0000 feet
1/19/2010 22:35	dyu	9/8/2009 15:00	9/21/2009 10:20	Drift Correction with Calibration Drift value of -0.0194 and Fouling Drift value of 0.0000 feet
1/19/2010 22:38	dyu	9/30/2009 14:20	10/12/2009 9:35	Drift Correction with Calibration Drift value of -0.0157 and Fouling Drift value of 0.0000 feet
1/19/2010 22:40	dyu	10/12/2009 9:40	10/22/2009 12:40	Drift Correction with Calibration Drift value of 0.0133 and Fouling Drift value of 0.0000 feet
1/19/2010 22:47	dyu	12/16/2009 14:45	12/16/2009 15:05	Delete region - readings caused by transducer replacement
1/19/2010 22:48	dyu	12/16/2009 14:40	12/16/2009 15:10	Interpolate Gap(Linear) - fill deleted region
1/19/2010 22:52	dyu	12/19/2009 15:25	12/19/2009 16:40	Offset Correction with value of -1.7605 feet
1/19/2010 22:53	dyu	12/19/2009 16:45	12/19/2009 16:45	Delete spike
1/19/2010 22:53	dyu	12/19/2009 16:40	12/19/2009 16:50	Interpolate Gap(Linear) - fill deleted spike
1/19/2010 22:56	dyu	10/22/2009 12:45	11/5/2009 10:20	Drift Correction with Calibration Drift value of -0.0077 and Fouling Drift value of 0.0000 feet

Table C-5 (continued). Hydrologic data correction history for station CON In.

Date of Correction	User	From	To	Comment
1/19/2010 22:57	dyu	11/5/2009 10:25	12/1/2009 11:35	Drift Correction with Calibration Drift value of -0.0170 and Fouling Drift value of 0.0000 feet
1/19/2010 23:01	dyu	12/16/2009 15:00	1/7/2010 12:10	Drift Correction with Calibration Drift value of 0.0127 and Fouling Drift value of 0.0000 feet
1/19/2010 23:03	dyu	12/1/2009 11:40	12/1/2009 11:40	Delete spike
1/19/2010 23:04	dyu	12/1/2009 11:35	12/1/2009 11:45	Interpolate Gap(Linear) - fill deleted spike
1/19/2010 23:10	dyu	12/6/2009 18:00	12/7/2009 4:45	Delete region - sensor malfunction due to freezing temperatures
1/19/2010 23:10	dyu	12/6/2009 17:55	12/7/2009 5:10	Interpolate Gap(Linear) - fill deleted region
1/19/2010 23:13	dyu	10/21/2009 4:55	10/21/2009 4:55	Delete drop
1/19/2010 23:13	dyu	10/21/2009 4:50	10/21/2009 5:00	Interpolate Gap(Linear)
1/19/2010 23:20	dyu	10/20/2009 12:05	10/22/2009 8:25	Offset Correction with value of -2.1300 feet
1/19/2010 23:20	dyu	10/20/2009 12:30	10/20/2009 12:40	Delete spike
1/19/2010 23:21	dyu	10/20/2009 12:25	10/20/2009 12:45	Interpolate Gap(Linear) - fill deleted spike
1/19/2010 23:23	dyu	10/25/2009 1:25	10/25/2009 9:10	Offset Correction with value of -0.0013 feet
2/10/2010 21:45	dyu	1/7/2010 12:15	2/3/2010 15:20	Drift Correction with Calibration Drift value of -0.0131 and Fouling Drift value of 0.0000 feet
3/9/2010 14:48	dyu	2/8/2010 8:00	2/10/2010 8:50	Advanced Correction of (Date/Time Value Diff) (2010-02-08 07:55:00 -0.016 -1.760) (2010-02-10 08:50:00 -0.019 -1.760)
3/9/2010 14:49	dyu	2/8/2010 7:55	2/8/2010 7:55	Delete spike
3/9/2010 14:50	dyu	2/8/2010 7:50	2/8/2010 8:00	Interpolate Gap(Linear) - fill deleted spike
3/9/2010 14:53	dyu	2/20/2010 12:55	2/25/2010 18:05	Offset Correction with value of -1.760 feet
3/9/2010 14:54	dyu	2/25/2010 18:10	2/25/2010 18:10	Delete spike
3/9/2010 14:54	dyu	2/25/2010 18:05	2/25/2010 18:15	Interpolate Gap(Linear)
3/10/2010 14:24	dyu	2/16/2010 8:05	2/20/2010 9:55	Advanced Correction of (Date/Time Value Diff) (2010-02-16 08:05:00 0 -0.071) (2010-02-20 09:55:00 -0.01 0.000) - - aberrant flow tail set to 0
3/10/2010 14:25	dyu	2/16/2010 6:45	2/16/2010 8:00	Advanced Correction of (Date/Time Value Diff) (2010-02-16 06:45:00 0.121 0.000) (2010-02-16 08:00:00 0.001 -0.070)

Table C-5 (continued). Hydrologic data correction history for station CON In.

Date of Correction	User	From	To	Comment
4/15/2010 15:06	dyu	3/23/2010 19:55	3/25/2010 15:40	Offset Correction with value of -1.7637 feet
4/15/2010 15:07	dyu	3/25/2010 15:45	3/25/2010 15:45	Delete spike
4/15/2010 15:07	dyu	3/25/2010 15:40	3/25/2010 15:50	Interpolate Gap(Linear) - fill deleted spike
4/15/2010 15:10	dyu	3/2/2010 12:05	3/31/2010 10:05	Drift Correction with Calibration Drift value of 0.0112 and Fouling Drift value of 0.0000 feet
5/19/2010 13:36	dyu	5/13/2009 15:15	5/13/2009 15:25	Interpolate Gap(Linear)
6/7/2010 16:17	dyu	4/25/2010 3:00	4/27/2010 14:45	Offset Correction with value of -1.7529 feet
6/7/2010 16:18	dyu	4/25/2010 2:55	4/25/2010 2:55	Delete spike
6/7/2010 16:18	dyu	4/25/2010 2:50	4/25/2010 3:00	Interpolate Gap(Linear) - fill deleted spike
6/7/2010 16:19	dyu	4/27/2010 14:50	4/27/2010 14:50	Delete spike
6/7/2010 16:19	dyu	4/27/2010 14:45	4/27/2010 14:55	Interpolate Gap(Linear) - fill deleted spike
6/7/2010 16:21	dyu	5/2/2010 7:55	5/3/2010 11:45	Offset Correction with value of -1.7528 feet
6/7/2010 16:22	dyu	5/3/2010 11:50	5/3/2010 11:50	Delete spike
6/7/2010 16:22	dyu	5/3/2010 11:45	5/3/2010 11:55	Interpolate Gap(Linear) - fill deleted spike
6/7/2010 16:31	dyu	5/5/2010 0:25	5/10/2010 3:20	Offset Correction with value of -1.7500 feet
6/7/2010 16:34	dyu	5/10/2010 3:25	5/10/2010 8:05	Advanced Correction of (Date/Time Value Diff) (2010-05-10 03:25:00 -0.04 -1.7559) (2010-05-10 08:05:00 0.018 -1.7529)
6/7/2010 16:34	dyu	5/10/2010 8:10	5/10/2010 8:10	Delete spike
6/7/2010 16:35	dyu	5/10/2010 8:05	5/10/2010 8:15	Interpolate Gap(Linear) - fill deleted spike
6/7/2010 16:52	dyu	3/31/2010 10:10	5/3/2010 12:10	Drift Correction with Calibration Drift value of -0.0071 and Fouling Drift value of 0.0000 feet
6/7/2010 16:54	dyu	5/3/2010 12:15	6/3/2010 12:05	Drift Correction with Calibration Drift value of -0.0023 and Fouling Drift value of 0.0000 feet
6/8/2010 21:47	dyu	5/14/2010 23:55	5/14/2010 23:55	Delete region
6/8/2010 21:48	dyu	5/14/2010 23:50	5/15/2010 0:00	Interpolate Gap(Linear)
6/16/2010 10:19	dyu	5/15/2010 0:00	5/18/2010 6:05	Offset Correction with value of -1.7600 feet

Table C-5 (continued). Hydrologic data correction history for station CON In.

Date of Correction	User	From	To	Comment
6/16/2010 10:25	dyu	5/18/2010 6:10	5/18/2010 13:20	Offset Correction with value of -1.7600 feet
6/16/2010 10:30	dyu	5/18/2010 13:25	5/19/2010 13:30	Offset Correction with value of -1.9000 feet
6/16/2010 10:32	dyu	5/19/2010 13:35	5/20/2010 17:45	Offset Correction with value of -2.0000 feet
6/16/2010 10:36	dyu	5/20/2010 17:50	5/23/2010 2:45	Offset Correction with value of -2.0000 feet
6/16/2010 10:41	dyu	5/23/2010 2:50	5/25/2010 18:15	Offset Correction with value of -2.0100 feet
6/16/2010 11:12	dyu	2/15/2010 22:20	2/23/2010 13:15	Offset Correction with value of -0.060 feet
6/16/2010 11:17	dyu	2/23/2010 13:20	2/26/2010 1:15	Offset Correction with value of -0.110 feet
6/16/2010 11:21	dyu	4/23/2010 18:15	4/25/2010 3:05	Offset Correction with value of -0.010 feet
6/16/2010 14:00	dyu	6/1/2010 9:10	6/3/2010 23:25	Offset Correction with value of -0.260 feet
6/17/2010 11:11	dyu	5/25/2010 18:30	6/1/2010 8:55	Offset Correction with value of -2.020 feet
6/17/2010 11:33	dyu	5/25/2010 18:15	5/25/2010 18:25	Interpolate Gap(Linear)
11/3/2010 14:39	dyu	6/14/2010 22:00	7/1/2010 8:30	Advanced Correction of (Date/Time Value Diff) (2010-06-14 21:55:00 -0.045 -1.761) (2010-07-01 08:30:00 -0.112 -1.762)
11/3/2010 14:40	dyu	6/14/2010 21:55	6/14/2010 21:55	Delete region
11/3/2010 14:40	dyu	6/14/2010 21:50	6/14/2010 22:00	Interpolate Gap(Linear)
11/3/2010 14:42	dyu	7/12/2010 5:30	7/13/2010 15:15	Advanced Correction of (Date/Time Value Diff) (2010-07-12 05:25:00 -0.106 -1.770) (2010-07-13 15:15:00 -0.12 -1.770)
11/3/2010 14:42	dyu	7/12/2010 5:25	7/12/2010 5:25	Delete region
11/3/2010 14:42	dyu	7/12/2010 5:20	7/12/2010 5:30	Interpolate Gap(Linear)
11/3/2010 14:42	dyu	7/13/2010 15:20	7/13/2010 15:20	Delete region
11/3/2010 14:43	dyu	7/13/2010 15:15	7/13/2010 15:25	Interpolate Gap(Linear)
11/3/2010 14:44	dyu	7/24/2010 19:30	8/2/2010 10:50	Advanced Correction of (Date/Time Value Diff) (2010-07-24 19:25:00 -0.277 -1.771) (2010-08-02 10:50:00 0 -1.407)
11/3/2010 14:44	dyu	7/24/2010 19:25	7/24/2010 19:25	Delete region
11/3/2010 14:44	dyu	7/24/2010 19:20	7/24/2010 19:30	Interpolate Gap(Linear)
11/3/2010 14:45	dyu	8/2/2010 10:55	8/2/2010 11:00	Delete region

Table C-5 (continued). Hydrologic data correction history for station CON In.

Date of Correction	User	From	To	Comment
11/3/2010 14:45	dyu	8/2/2010 10:50	8/2/2010 11:05	Interpolate Gap(Linear)
11/3/2010 14:48	dyu	8/25/2010 11:55	9/8/2010 11:45	Advanced Correction of (Date/Time Value Diff) (2010-08-25 11:55:00 -0.21 -1.774) (2010-09-08 11:45:00 -0.015 -1.776)
11/3/2010 14:48	dyu	9/8/2010 11:50	9/8/2010 11:50	Delete region
11/3/2010 14:48	dyu	9/8/2010 11:45	9/8/2010 11:55	Interpolate Gap(Linear)
11/3/2010 14:49	dyu	9/30/2010 19:55	10/4/2010 10:45	Offset Correction with value of -1.760 feet
11/3/2010 16:17	dyu	7/1/2010 8:35	7/1/2010 8:35	Delete region
11/3/2010 16:17	dyu	7/1/2010 8:30	7/1/2010 8:40	Interpolate Gap(Linear)
11/3/2010 16:21	dyu	7/1/2010 9:50	8/2/2010 10:50	Drift Correction with Calibration Drift value of -0.0035 and Fouling Drift value of 0.0000 feet

Table C-6. Hydrologic data correction history for station CON Out.

Date of Correction	User	From	To	Comment
8/13/2009 11:13	dyu	4/16/2009 19:50	5/4/2009 15:00	Offset Correction with value of -1.7740 feet
8/18/2009 20:58	dyu	3/18/2009 14:50	3/18/2009 14:55	Advanced Correction of (Date/Time Value Diff) (2009-03-18 14:50:00 -0.026 -1.801) (2009-03-18 14:55:00 -0.026 -1.092) - drop stage below 0
8/19/2009 9:12	dahearn	3/23/2009 13:35	3/23/2009 13:35	Delete spike
8/19/2009 9:12	dahearn	3/23/2009 13:30	3/23/2009 13:40	Interpolate Gap(Linear) - spike/drop fill
8/19/2009 9:17	dahearn	5/13/2009 15:35	5/13/2009 15:35	Delete spike
8/19/2009 9:18	dahearn	5/13/2009 15:30	5/13/2009 15:40	Interpolate Gap(Linear) - spike/drop fill
8/19/2009 9:43	dahearn	5/4/2009 15:00	5/4/2009 15:00	Delete drop
8/19/2009 9:43	dahearn	5/4/2009 14:55	5/4/2009 15:05	Interpolate Gap(Linear) - spike/drop fill
8/20/2009 11:41	dyu	4/25/2009 8:35	5/4/2009 15:40	Fill Region with modeling:[Name = Linear Model CON-OUT FROM CAB-OUT] [Type = Linear Regression] [Equation: T=-0.0309317+0.691691*S1] [Target Name = CON OUT Stage] [Error = 0.016] [Number of Surr. = 1] [#1: CAB OUT Stage]
8/20/2009 11:57	dyu	4/25/2009 8:35	5/4/2009 15:35	Advanced Correction of (Date/Time Value Diff) (2009-04-25 08:35:00 -0.016 0.017) (2009-05-04 15:40:00 0 0.031) - adjust model based correction offset from bracketing data
8/20/2009 12:02	dyu	3/27/2009 12:45	3/27/2009 18:35	Interpolate Gap(Linear) - fill region no rainfall recorded at nearby rain station
8/20/2009 15:42	dahearn	3/18/2009 14:50	4/16/2009 19:45	Offset Correction with value of 0.010 feet
8/20/2009 15:46	dahearn	3/18/2009 14:50	3/21/2009 3:55	Offset Correction with value of -0.002 feet
9/30/2009 17:01	dyu	9/8/2009 11:20	9/8/2009 11:20	Delete spike - no rainfall during time period
9/30/2009 17:01	dyu	9/8/2009 11:15	9/8/2009 11:25	Interpolate Gap(Linear) - fill deleted spike
10/9/2009 11:56	dyu	9/8/2009 13:25	9/8/2009 13:40	Delete region - rain spike was deleted
10/9/2009 11:57	dyu	9/8/2009 13:20	9/8/2009 13:45	Interpolate Gap(Linear) - fill in deleted region
10/30/2009 17:12	dyu	9/30/2009 14:10	9/30/2009 14:20	Offset Correction with value of -1.8014 feet
10/30/2009 17:12	dyu	9/30/2009 14:25	9/30/2009 14:25	Delete spike
10/30/2009 17:13	dyu	9/30/2009 14:20	9/30/2009 14:30	Interpolate Gap(Linear) - fill deleted spike region
12/4/2009 10:41	dyu	10/30/2009 9:35	10/30/2009 9:35	Delete spike - no rainfall during time period

Table C-6. Hydrologic data correctiou history for station CON Out.

Date of Correction	User	From	To	Comment
12/4/2009 10:41	dyu	10/30/2009 9:25	10/30/2009 9:40	Interpolate Gap(Linear) - fill deleted spike
1/19/2010 23:52	dyu	12/13/2009 16:35	12/14/2009 14:15	Delete region - sensor malfunction due to freezing temperatures
1/19/2010 23:52	dyu	12/13/2009 16:30	12/14/2009 14:20	Interpolate Gap(Linear) - fill deleted region
1/19/2010 23:53	dyu	12/30/2009 13:45	12/30/2009 13:55	Delete spike
1/19/2010 23:53	dyu	12/30/2009 13:40	12/30/2009 14:00	Interpolate Gap(Linear) - fill deleted spike
1/19/2010 23:57	dyu	12/6/2009 22:25	12/7/2009 7:05	Delete region - sensor malfunction due to freezing temperatures
1/19/2010 23:58	dyu	12/6/2009 22:20	12/7/2009 18:55	Interpolate Gap(Linear) - fill deleted region
1/20/2010 0:01	dyu	12/14/2009 16:15	12/16/2009 10:45	Delete region - anomalous readings due to sensor being replaced
1/20/2010 19:22	dyu	5/4/2009 15:00	5/7/2009 10:05	Drift Correction with Calibration Drift value of 0.0045 and Fouling Drift value of 0.0000 feet
1/20/2010 19:24	dyu	5/7/2009 10:10	6/1/2009 10:00	Drift Correction with Calibration Drift value of -0.0014 and Fouling Drift value of 0.0000 feet
1/20/2010 19:25	dyu	6/1/2009 10:05	7/2/2009 10:30	Drift Correction with Calibration Drift value of -0.0501 and Fouling Drift value of 0.0000 feet
1/20/2010 19:26	dyu	7/2/2009 10:35	8/6/2009 10:30	Drift Correction with Calibration Drift value of 0.02945 and Fouling Drift value of 0.0000 feet
1/20/2010 19:27	dyu	8/6/2009 10:35	9/1/2009 10:00	Drift Correction with Calibration Drift value of -0.00895 and Fouling Drift value of 0.0000 feet
1/20/2010 19:28	dyu	9/1/2009 10:05	9/21/2009 10:30	Drift Correction with Calibration Drift value of -0.0044 and Fouling Drift value of 0.0000 feet
1/20/2010 19:29	dyu	9/30/2009 14:10	10/12/2009 9:40	Drift Correction with Calibration Drift value of -0.0014 and Fouling Drift value of 0.0000 feet
1/20/2010 19:30	dyu	10/12/2009 9:45	10/20/2009 11:50	Drift Correction with Calibration Drift value of -0.0021 and Fouling Drift value of 0.0000 feet
1/20/2010 19:37	dyu	10/20/2009 11:55	11/5/2009 10:25	Drift Correction with Calibration Drift value of -0.0014 and Fouling Drift value of 0.0000 feet
1/20/2010 19:39	dyu	11/5/2009 10:30	12/1/2009 12:05	Drift Correction with Calibration Drift value of -0.0040 and Fouling Drift value of 0.0000 feet

Table C-6. Hydrologic data correction history for station CON Out.

Date of Correction	User	From	To	Comment
1/20/2010 19:45	dyu	12/16/2009 10:50	1/7/2010 11:40	Drift Correction with Calibration Drift value of 0.0088 and Fouling Drift value of 0.0000 feet
2/10/2010 21:50	dyu	1/7/2010 11:45	2/3/2010 15:25	Drift Correction with Calibration Drift value of -0.0171 and Fouling Drift value of 0.0000 feet
3/9/2010 15:16	dyu	2/3/2010 15:25	3/2/2010 12:05	Drift Correction with Calibration Drift value of -0.0022 and Fouling Drift value of 0.0000 feet
4/15/2010 15:15	dyu	3/2/2010 12:10	3/31/2010 10:15	Drift Correction with Calibration Drift value of 0.0146 and Fouling Drift value of 0.0000 feet
6/7/2010 17:05	dyu	3/31/2010 10:20	6/3/2010 12:25	Drift Correction with Calibration Drift value of -0.0153 and Fouling Drift value of 0.0000 feet
11/3/2010 16:33	dyu	7/1/2010 10:05	8/2/2010 11:10	Drift Correction with Calibration Drift value of -0.0044 and Fouling Drift value of 0.0000 feet
11/3/2010 16:35	dyu	8/2/2010 11:20	9/8/2010 14:15	Drift Correction with Calibration Drift value of -0.026 and Fouling Drift value of 0.0000 feet

APPENDIX D

Water Quality
Data Quality Assurance Memorandum

Herrera Environmental Consultants, Inc.

Memorandum

To	Project File 09-04411-001
From	Gina Catarra, Herrera Environmental Consultants
Date	January 7, 2011
Subject	Data Quality Assurance Review of Compost-Amended Biofiltration Swale Performance Monitoring Data

This memorandum presents a review of data quality for surface water samples collected for performance monitoring of a compost-amended biofiltration swale from May 2009 to March 2010. Aquatic Research, Inc. of Seattle, Washington analyzed the samples for:

- Total suspended solids by Standard Method 2540D
- pH by Standard Method 4500-H
- Total Kjeldahl nitrogen (TKN) by EPA method 351.1
- Total phosphorus by EPA method 365.1
- Hardness by Standard Method 2340C
- Soluble reactive phosphorus (SRP) by EPA method 365.1
- Nitrate-nitrite by Standard Method 4500
- Total (copper and zinc) and dissolved (copper and zinc) metals by EPA method 200.8
- Total petroleum hydrocarbons by NWTPH-Dx method

The laboratory's performance was reviewed in accordance with quality control (QC) criteria outlined in the *WSDOT Compost Amended Biofiltration Swale Quality Assurance Project Plan* (QAPP) (WSDOT 2008).

Quality control data summaries submitted by the laboratory were reviewed; raw data was not provided by the laboratory. Data quality assurance worksheets summarizing the quality assurance and quality control (QA/QC) review were completed for each sampling event and are included with the data. Data qualifiers (flags) were added to the sample results in the laboratory reports. Data validation results are summarized below followed by definitions of data qualifiers.

Particle size distribution analyses were conducted by a separate laboratory (Analytical Resources, Inc.) and are not discussed in detail in this memorandum since analytical quality assurance samples (method blanks, laboratory control samples, matrix spikes) are not required for the specified method. Field duplicates were collected for particle size distribution; however, there is

no specified method quality objective (MQO) for evaluating the differences in particle size distributions between the original sample and the duplicate sample. Holding times are the only component of the particle size distribution analysis discussed in this memorandum.

Results for the collected samples summarized in Table D-1 were validated.

Table D-1. Sampling summary for the compost-amended biofiltration swale evaluation.

Event ID	Sample Date	Samples Collected	Sample Type
Storm 1	5/13/2009	CAB IN, CAB OUT, CON IN, CON OUT	Grab
Storm 2	9/19/2009	CAB IN, CAB OUT, CON IN, CON OUT	Grab (CAB and CON), Composite (CON only)
Storm 3	10/14/2009	CAB IN, CAB OUT, CON IN, CON OUT	Composite
Storm 4	10/16-17/2009	CAB IN, CAB OUT, CON IN, CON OUT	Grab, Composite
Storm 5	10/17/2009	CAB IN, CAB OUT, CON IN, CON OUT	Grab
Storm 6	10/23/2009	CAB IN, CAB OUT, CON IN[a], CON OUT	Composite, Grab
Storm 7	10/27/2009	CAB IN, CAB OUT, CON IN, CON OUT	Composite, Grab
Storm 8	10/29/2009	CAB IN[b], CAB OUT, CON IN, CON OUT	Composite
Storm 9	11/5/2009	CAB IN, CAB OUT[c], CON IN, CON OUT	Grab
Storm 10	11/16/2009	CAB IN, CAB OUT, CON IN, CON OUT	Grab
Storm 11	12/21/2009	CAB IN, CAB OUT, CON IN, CON OUT	Composite
Storm 12	1/1/2010	CAB IN[d], CAB OUT, CON IN, CON OUT	Composite, Grab
Storm 13	1/4/2010	CAB IN, CAB OUT, CON IN, CON OUT[e]	Composite, Grab
Storm 14	1/11/2010	CAB IN, CAB OUT[f], CON IN, CON OUT	Composite, Grab
Storm 15	1/14/2010	CAB IN[g], CAB OUT, CON IN[h], CON OUT	Composite, Grab
Storm 16	1/24-25/2010	CAB IN, CAB OUT, CON IN[i], CON OUT	Composite
Storm 17	2/16/2010	CAB IN, CAB OUT, CON IN, CON OUT	Composite
Storm 18	2/26/2010	CAB IN, CAB OUT	Composite (CAB only)
Storm 19	3/12/2010	CAB IN[j], CAB OUT, CON IN, CON OUT	Composite, Grab
Storm 20	3/25/2010	CAB IN, CAB OUT, CON IN, CON OUT	Grab
Storm 21	3/25/2010	CAB IN, CAB OUT[k], CON IN, CON OUT	Composite
Storm 22	3/29/2010	CAB IN, CAB OUT, CON IN, CON OUT[l]	Composite
Storm 23	3/29/2010	CAB IN, CAB OUT, CON IN, CON OUT	Grab
Rinsate Blank	5/4/2009	CAB IN, CAB OUT, CON IN, CON OUT	NA
Rinsate Blank	10/29/2009	CAB IN, CAB OUT, CON IN, CON OUT	NA
Rinsate Blank	5/7/2010	CAB IN, CAB OUT, CON IN, CON OUT	NA

[a] Field duplicate of grab sample CON IN collected during Storm 6.
[b] Field duplicate of composite sample CAB IN collected during Storm 8.
[c] Field duplicate of grab sample CAB OUT collected during Storm 9.
[d] Field duplicate of grab sample CAB IN collected during Storm 12.
[e] Field duplicate of grab sample CON OUT collected during Storm 13.
[f] Field duplicate of grab sample CAB OUT collected during Storm 14.
[g] Field duplicate of grab sample CAB IN collected during Storm 15.
[h] Field duplicate of composite sample CON IN collected during Storm 15.
[i] Field duplicate of composite sample CON IN collected during Storm 16.
[j] Field duplicate of composite sample CAB OUT collected during Storm 19.
[k] Field duplicate of composite sample CAB OUT collected during Storm 21.
[l] Field duplicate of composite sample CON OUT collected during Storm 22.

CAB: compost-amended biofiltration swale IN: inlet NA: not applicable
CON: control biofiltration swale OUT: outlet

Custody, Preservation, Holding Times, and Completeness—Acceptable with Qualification

The samples were properly preserved and sample custody was maintained from sample collection to receipt at the laboratories. With the exceptions noted below, all samples were analyzed within the required holding times (Table D-2). The laboratory reports were complete and contained results for all samples and tests requested on the chain-of-custody (COC) forms.

Table D-2. Summary of sample collection requirements.

Parameter	Method Number [a]	Sample Holding Time [b]	Field Preservation	Laboratory Preservation
Hardness	SM 2340C	28 days	Cool, 4°C	Cool, 4°C, H_2SO_4 to pH < 2
Total suspended solids	SM 2540D	7 days	Cool, 4°C	Cool, 4°C
Total phosphorus	EPA 365.1	28 days	Cool, 4°C	Cool, 4°C, H_2SO_4 to pH < 2
Soluble reactive phosphorus	EPA 365.1	Filter: 12 hours; Analyze: 48 hours	Cool, 4°C	Filter[c]
Total Kjeldahl nitrogen	EPA 355.1	28 days	Cool, 4°C	Cool, 4°C, H_2SO_4 to pH < 2
Nitrate+nitrite nitrogen	SM 4500 NO_3-F	2 days	Cool, 4°C	Cool, 4°C, H_2SO_4 to pH < 2
Copper, dissolved	EPA 200.8	Filter: 12 hours; Analyze: 6 months	Cool, 4°C	Cool, 4°C, HNO_3 to pH < 2 after filtration [c]
Copper, total		6 months		Cool, 4°C, HNO_3 to pH < 2
Zinc, dissolved	EPA 200.8	Filter: 12 hours; Analyze: 6 months	Cool, 4°C	Cool, 4°C, HNO_3 to pH < 2 after filtration [c]
Zinc, total		6 months		Cool, 4°C, HNO_3 to pH < 2
Diesel Range Organics	NWTPH-Dx	Extract: 14 days; Analyze: 40 days	Cool, 4°C	Cool, 4°C, 1+1 HCl to a pH < 2
pH	SM 4500-H+	24 hours	Cool, 4°C	Cool, 4°C
Particle size distribution	TAPE Method	7 days	Cool, 4°C	Cool, 4°C

[a] SM method numbers are from APHA et al. (1998); EPA method numbers are from U.S. EPA (1983, 1984). The 18th edition of *Standard Methods for the Examination of Water and Wastewater* (APHA et al. 1992) is the current legally adopted version in the *Code of Federal Regulations*.

[b] Holding time specified in U.S. EPA guidance (U.S. EPA 1983, 1984) or referenced in APHWA et al. (1992) for equivalent method.

[c] A 0.45 micron fiber nylon filter was used in the laboratory for dissolved metals (copper and zinc) and soluble reactive phosphorus filtration.

C = Celsius.

Several samples were not analyzed within the specified holding times. Samples that were analyzed outside of the specified holding time were qualified as estimated (flagged *J*) (see Table D-3). Holding times were not exceeded for any of the samples shipped to Analytical Resources, Inc. for particle size distribution analysis.

Table D-3. Summary of sample results qualified due to holding time exceedances.

Sample ID	Sample Date	Parameter	Qualifier
CAB IN, CAB OUT, CON IN, CON OUT	10/16-17/2009	SRP	J
CAB IN, CAB OUT, CON IN, CON OUT	10/16-17/2009	Nitrate-nitrite	J
CAB IN, CAB OUT, CON IN, CON OUT	10/23/2009	SRP	J
CAB IN, CAB OUT, CON IN, CON OUT	10/23/2009	Nitrate-nitrite	J
CAB IN, CAB OUT, CON IN, CON OUT	10/23/2009	Nitrate-nitrite	J

CAB: compost-amended biofiltration swale
CON: control biofiltration swale
IN: inlet
OUT: outlet
SRP: soluble reactive phosphorus

Laboratory Reporting Limits—Acceptable with Discussion

The laboratory reporting limits and QAPP specified reporting limits are provided in Table D-4. The laboratory reporting limits generally met the QAPP specified reporting limits for all analyses. No data were qualified based on laboratory reporting limits.

Table D-4. Summary of QAPP and laboratory reporting limits.

Parameter	QAPP Reporting Limit	Laboratory Reporting Limit
Total suspended solids	1.0 mg/L	0.50 mg/L
pH	0.1 std. units	0.10 std. units
Total Kjeldahl nitrogen	0.2 mg/L	0.200 mg/L
Total phosphorus	0.02 mg/L	0.002 mg/L
Hardness	2.0 mg/L	2.0 mg/L
Soluble reactive phosphorus	0.001 mg/L	0.001 mg/L
Nitrate-nitrite	0.010 mg/L	0.010 mg/L
Dissolved metals	0.0001 to 0.005 mg/L	0.0010 to 0.0050 mg/L
Total metals	0.0001 to 0.005 mg/L	0.0010 to 0.0050 mg/L
Total petroleum hydrocarbons	0.25 mg/L (diesel)	0.05 mg/L (diesel); 0.10 mg/L (motor oil)
Particle size distribution	NA	1 micron

mg/L: milligrams per liter

Blank Analysis—Acceptable with Qualification

Method Blanks

Method blanks were analyzed at the required frequency. Method blanks did not contain levels of target analytes above the laboratory reporting limits.

Rinsate Blanks

Equipment rinsate blank samples were collected on May 4, 2009, October 28, 2009, and May 7, 2010. Samples were analyzed for total phosphorus and total and dissolved copper and zinc in accordance with the QAPP. Total phosphorus was detected above the reporting limit in several of the rinsate samples (see Table D-5); dissolved and total copper were not detected above the reporting limit in any rinsate sample. Only one total phosphorus result exceeded the criterion of reported values less than 2 times the reporting limit, as shown in Table D-5.

Table D-5. Summary of sample equipment rinsate blank criterion exceedances.

Sample ID	Sample Date	Parameter	Blank Result	Reporting Limit
CAB IN	5/4/2009	Total phosphorus	**0.007 mg/L**	0.002 mg/L
CAB-OUT	5/4/2009	Total phosphorus	0.004 mg/L	0.002 mg/L
CON IN	5/4/2009	Total phosphorus	0.004 mg/L	0.002 mg/L
CON OUT	5/4/2009	Total phosphorus	0.003 mg/L	0.002 mg/L
CAB DUP	10/28/2009	Total phosphorus	0.003 mg/L	0.002 mg/L
CAB-OUT	5/7/2010	Total phosphorus	0.003 mg/L	0.002 mg/L

Bold blank values exceed QAPP criterion of not to exceed two times the reporting limit.
CAB: compost-amended biofiltration swale
CON: control biofiltration swale
IN: inlet
OUT: outlet
mg/L: milligrams per liter

Total phosphorus is a not common laboratory contaminant and may have been introduced by inadequate equipment decontamination, or was present in the reagent grade deionized (blank) water provided by the laboratory. No results for total phosphorus were qualified because all results were greater than 5 times the detected blank value, in accordance with Functional Guidelines (U.S. EPA 2002).

Laboratory Control Sample Analysis—Acceptable

Laboratory control samples (LCS) were analyzed at the required frequency. The percent recovery values for all sampling events met the QAPP criteria (90 to 110).

Matrix Spike Analysis—Acceptable

Matrix spike (MS) samples were analyzed for nitrate-nitrite, total phosphorus, soluble reactive phosphorus, TKN, hardness, and metals at the required frequency. The percent recovery values for the MS analyses met the control limits (75 to 125 percent) established by the QAPP.

Laboratory Duplicate Analysis—Acceptable

Laboratory duplicates or laboratory control sample duplicates were analyzed at the required frequency. The relative percent difference (RPD) was calculated for each analyte where both

duplicate values were greater than five times the reporting limit (RL). The difference between duplicate values was calculated if the detected compound concentration was less than five times the RL in either the sample or the field duplicate. A control limit of less than 10 percent RPD (15 percent for total suspended solids) was established in the QAPP and a control limit of two times the RL was used to evaluate difference values. The relative percent difference (RPD) values met the control limits established by the QAPP, and all difference values were less than two times the RL.

Field Duplicates—Acceptable with Qualification

Field duplicates were analyzed for all analyses. Six field duplicates were collected for TPH analysis and six field duplicates were collected for all other analyses. Frequency of field duplicate collection was not specified in the QAPP; however, a 10 percent field duplicate frequency was used for this study. With the exceptions noted in Table D-6, field duplicate precision met the QAPP specified criterion of less than 20 percent RPD (25 percent for total suspended solids). In addition, a criterion of less than 2 times the reporting limit was used if the sample concentration was less than 5 times the reporting limit. Table D-6 summarizes the sample results that were qualified as estimated (*J*) for field duplicate RPD exceedance. No other data associated with the sample batch were qualified due to field duplicate criteria exceedance because other quality control criteria were met.

Table D-6. Summary of field duplicate criteria exceedances.

Sample Date	Parameter	Sample ID	Duplicate ID	RPD (%)	Qualifier
10/29/2009	Nitrate-nitrite	CAB IN	CAB IN A	35	J
1/4/2010	Nitrate-nitrite	CON IN	CON IN A	77	J
3/25/2010	Total phosphorus	CAB OUT	CAB OUT A	27	J
3/29/2010	Nitrate-nitrite	CON OUT	CON OUT A	33	J

CAB: compost-amended biofiltration swale
CON: control biofiltration swale
IN: inlet
OUT: outlet
mg/L: milligrams per liter

Data Quality Assessment Summary

In general, the data quality for all parameters was found to be acceptable based on holding time, reporting limit, method blank, control standard, matrix spike, laboratory duplicate, and field duplicate criteria. Due to holding time exceedances, two SRP values and three nitrate-nitrite values were qualified as estimated (*J*). Field duplicate precision exceeded criteria for three nitrate-nitrite values and one total phosphorus value.

Usability of the data is based on the guidance documents previously noted. Upon consideration of the information presented here, the data are acceptable as qualified.

Definition of Data Qualifiers

The following data qualifier definitions are taken from *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (U.S. EPA 2002).

U The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J The associated value is an estimated quantity.

UJ The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

R The data are unusable. (Note: analyte may or may not be present.)

References

APHA, AWWA, and WEF. 1992. Standard Methods for the Examination of Water and Wastewater. 18th Edition. Edited by A.E. Greenberg, American Public Health Association; A.D. Eaton, American Water Works Association; and L.S. Clesceri, Water Environment Federation.

U.S. EPA. 1983. Methods for Chemical Analysis of Water and Wastes. EPA-600/4-79-020. U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio.

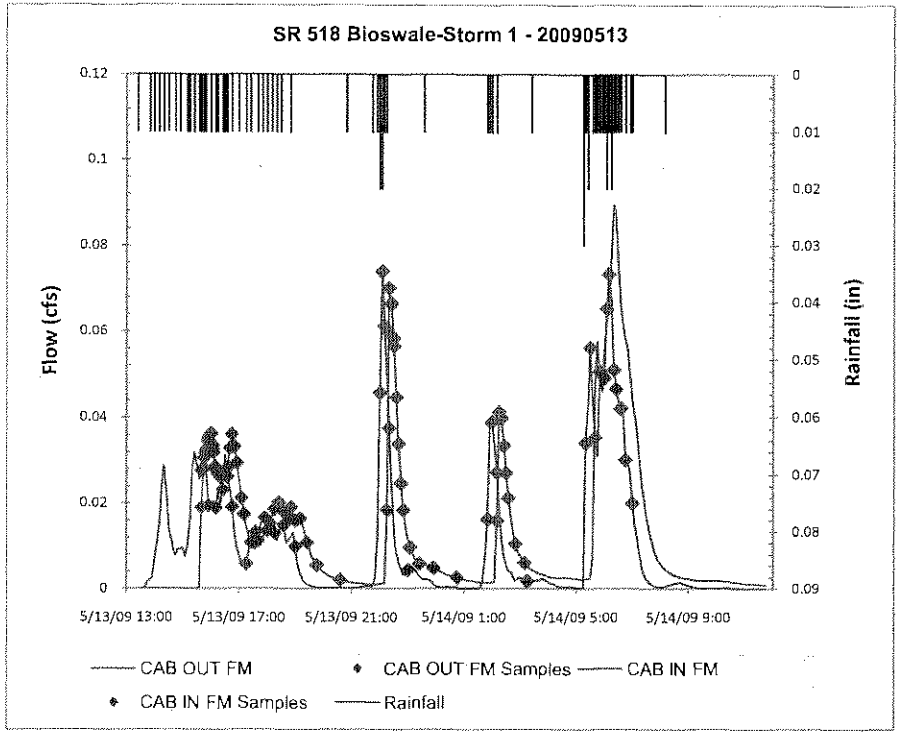
U.S. EPA. 1984. Guidelines Establishing Test Procedures for the Analysis of Pollutants under the Clean Water Act; Final Rule and Interim Final Rule. U.S. Environmental Protection Agency. CFR Part 136. October 26, 1984.

U.S. EPA. 2002. Contract laboratory program national functional guidelines for inorganic data review. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, D.C. (EPA-540/R-01/008).

WSDOT. 2008. WSDOT Compost Amended Biofiltration Swale Quality Assurance Project Plan. Prepared by Mark Maurer, Washington State Department of Transportation, Olympia, Washington. September 22, 2008.

APPENDIX E

Individual Storm Reports for Sampled Storm Events



Site Information

Site Name	Location		
SR518 Compost-Amended Bioswale		IN	OUT
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257396	5257410
0.129	E (UTM)	552309	552284

Storm Information - WY2009-1

Precipitation Information

	Goal		QA	notes
Precipitation Total (in):	≥0.15	0.72		
Precipitation Duration (hr):	1.0	18.8		
Mean Precip. Intensity (in/hr):	0.03	0.038		
Max Precip Intensity (in/5 min)	NA	0.03		
Antecedent Dry Period (hr):	≥6	61.7		

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	779.7		970.0		
Maximum Discharge (cfs):	NA	0.309		0.089		
Flow Duration (hr):	NA	17.6		21.8		

QA Narrative:

Composite samples were not analyzed for this storm event since the 75% coverage goal was not met at all four monitoring stations.

Influent TPH concentrations were less than the 10 mg/L minimum specified in TAPE (2008).

The volume of water measured at the CAB bioswale outlet was approximately 24% greater than the CAB bioswale inlet.

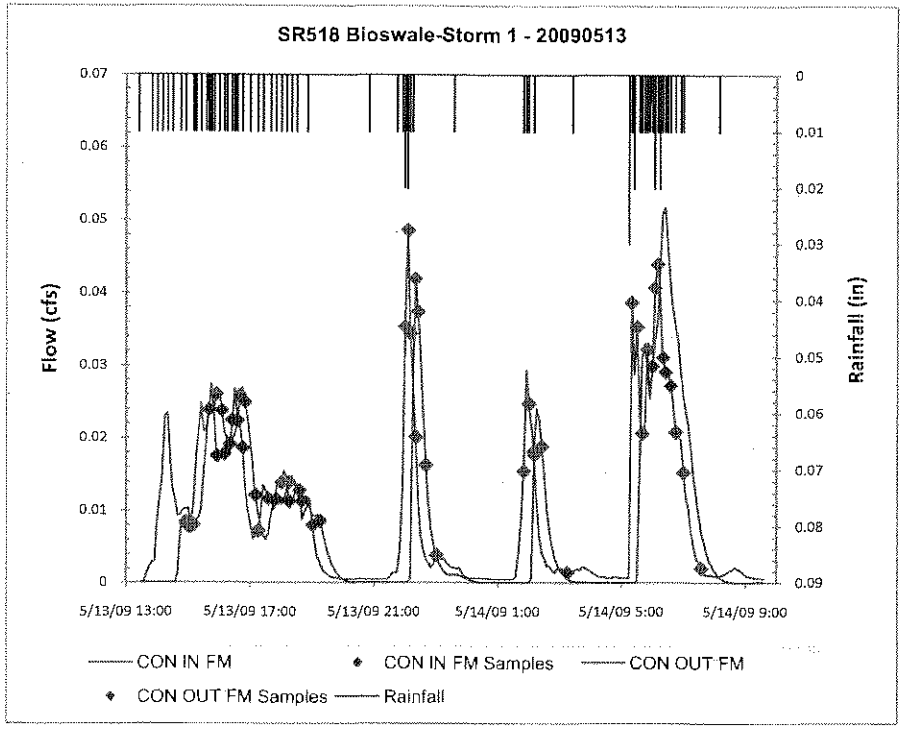
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	NA		NA		
% Storm Sampled:	≥75	NA		NA		
Sampling Duration (hr):	≤36	NA		NA		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)					% Conc. Reduction	% Volume Reduction	% Load Reduction
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes			
TSS					0.50		NA		NA			NA	-24	NA
TKN					0.200		NA		NA			NA	-24	NA
Nitrate + Nitrite					0.010		NA		NA			NA	-24	NA
TP					0.002		NA		NA			NA	-24	NA
SRP					0.001		NA		NA			NA	-24	NA
pH					0.10		NA		NA			NA	-24	NA
Hardness					2.00		NA		NA			NA	-24	NA
Dissolved Cu					0.001		NA		NA			NA	-24	NA
Dissolved Zn					0.005		NA		NA			NA	-24	NA
Total Cu					0.001		NA		NA			NA	-24	NA
Total Zn					0.005		NA		NA			NA	-24	NA
PSD < 1 µm					NA		NA		NA			NA	-24	NA
PSD 1-3.9 µm					NA		NA		NA			NA	-24	NA
PSD 3.9-62.5 µm					NA		NA		NA			NA	-24	NA
PSD 62.5-125 µm					NA		NA		NA			NA	-24	NA
PSD 125-250 µm					NA		NA		NA			NA	-24	NA
PSD 250-500 µm					NA		NA		NA			NA	-24	NA
PSD > 500 µm					NA		NA		NA			NA	-24	NA
TPH-diesel	0.05	U	0.05	U	0.05		0.55	J	0.69	J		0.0	-24	-24
TPH-oil	2.96		1.72		0.1		65.4		47.25			42	-24	28

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Control Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257413	5257413
0.129	E (UTM)	552279	552252

Storm Information - WY2009-1

Precipitation Information

	Goal	QA	notes
Precipitation Total (in):	≥0.15	0.72	
Precipitation Duration (hr):	1.0	18.8	
Mean Precip. Intensity (in/hr):	0.03	0.038	
Max Precip Intensity (in/5 min)	NA	0.03	
Antecedent Dry Period (hr):	≥6	61.7	

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	614.9		577.6		
Maximum Discharge (cfs):	NA	0.048		0.052		
Flow Duration (hr):	NA	20.3		18.9		

QA Narrative:

Composite samples were not analyzed for this storm event since the 75% coverage goal was not met at all four monitoring stations.

Influent TPH concentrations were less than the 10 mg/L minimum specified in TAPE (2008).

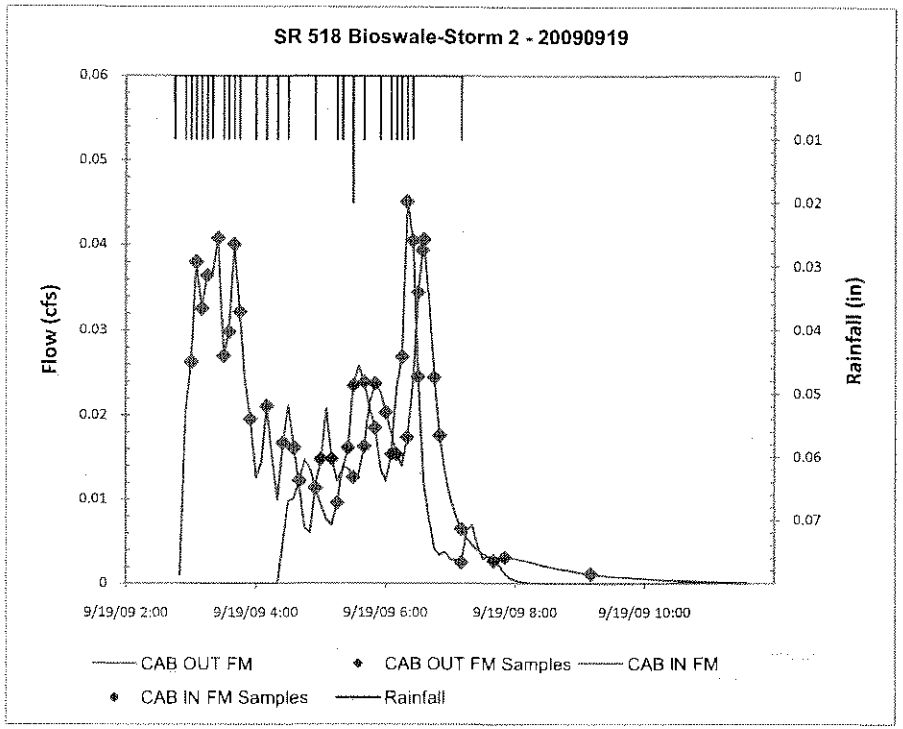
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	34		26		
% Storm Sampled:	≥75	84		96		
Sampling Duration (hr):	≤36	15.9		16.4		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)								
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes	% Conc. Reduction	% Volume Reduction	% Load Reduction
TSS					0.50		NA		NA			NA	6.1	NA
TKN					0.200		NA		NA			NA	6.1	NA
Nitrate + Nitrite					0.010		NA		NA			NA	6.1	NA
TP					0.002		NA		NA			NA	6.1	NA
SRP					0.001		NA		NA			NA	6.1	NA
pH					0.10		NA		NA			NA	6.1	NA
Hardness					2.00		NA		NA			NA	6.1	NA
Dissolved Cu					0.001		NA		NA			NA	6.1	NA
Dissolved Zn					0.005		NA		NA			NA	6.1	NA
Total Cu					0.001		NA		NA			NA	6.1	NA
Total Zn					0.005		NA		NA			NA	6.1	NA
PSD < 1 µm					NA		NA		NA			NA	6.1	NA
PSD 1-3.9 µm					NA		NA		NA			NA	6.1	NA
PSD 3.9-62.5 µm					NA		NA		NA			NA	6.1	NA
PSD 62.5-125 µm					NA		NA		NA			NA	6.1	NA
PSD 125-250 µm					NA		NA		NA			NA	6.1	NA
PSD 250-500 µm					NA		NA		NA			NA	6.1	NA
PSD > 500 µm					NA		NA		NA			NA	6.1	NA
TPH-diesel	0.05	U	0.06	U	0.05		0.44	J	0.49	J		-20.0	6.1	-13
TPH-oil	3.39		2.55		0.1		59.0		41.7			25	6.1	29

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Compost-Amended Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257396	5257410
0.129	E (UTM)	552309	552284

Storm Information - WY2009-2

Precipitation Information

	Goal		QA	notes
Precipitation Total (in):	≥0.15	0.28		
Precipitation Duration (hr):	1.0	4.4		
Mean Precip. Intensity (in/hr):	0.03	0.063		
Max Precip Intensity (in/5 min)	NA	0.02		
Antecedent Dry Period (hr):	≥6	292.3		

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	313.3		185.1		
Maximum Discharge (cfs):	NA	0.051		0.043		
Flow Duration (hr):	NA	5.7		6.3		

QA Narrative:

Composite samples were not analyzed at the CAB for this storm event since the 75% coverage goal was not met due to the ISCO powering off during the storm event.

Influent TPH concentrations were less than the 10 mg/L minimum specified in TAPE (2008).

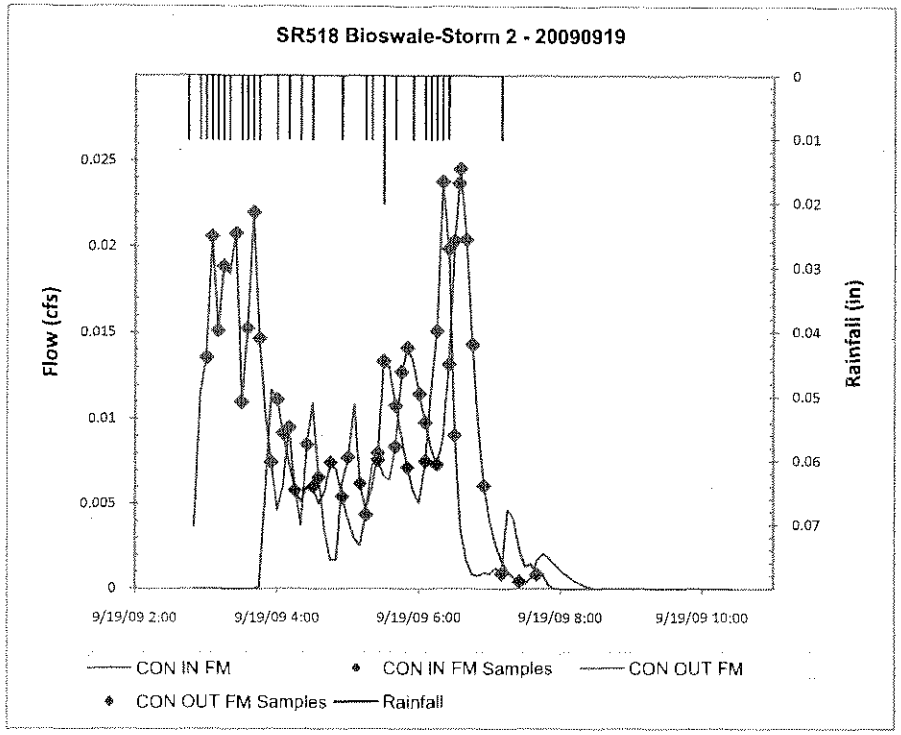
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	NA		NA		
% Storm Sampled:	≥75	NA		NA		
Sampling Duration (hr):	≤36	NA		NA		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)								
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes	% Conc. Reduction	% Volume Reduction	% Load Reduction
TSS					0.50		NA		NA			NA	41	NA
TKN					0.200		NA		NA			NA	41	NA
Nitrate + Nitrite					0.010		NA		NA			NA	41	NA
TP					0.002		NA		NA			NA	41	NA
SRP					0.001		NA		NA			NA	41	NA
pH					0.10		NA		NA			NA	41	NA
Hardness					2.00		NA		NA			NA	41	NA
Dissolved Cu					0.001		NA		NA			NA	41	NA
Dissolved Zn					0.005		NA		NA			NA	41	NA
Total Cu					0.001		NA		NA			NA	41	NA
Total Zn					0.005		NA		NA			NA	41	NA
PSD < 1 µm					NA		NA		NA			NA	41	NA
PSD 1-3.9 µm					NA		NA		NA			NA	41	NA
PSD 3.9-62.5 µm					NA		NA		NA			NA	41	NA
PSD 62.5-125 µm					NA		NA		NA			NA	41	NA
PSD 125-250 µm					NA		NA		NA			NA	41	NA
PSD 250-500 µm					NA		NA		NA			NA	41	NA
PSD > 500 µm					NA		NA		NA			NA	41	NA
TPH-diesel	0.05	U	0.05	U	0.05		0.22	J	0.13	J		0.0	41	41
TPH-oil	2.80		0.30		0.1		24.8		1.57			89	41	94

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Control Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257413	5257413
0.129	E (UTM)	552279	552252

Storm Information - WY2009-2

Precipitation Information

	Goal		QA	notes
Precipitation Total (in):	≥0.15	0.28		
Precipitation Duration (hr):	1.0	4.4		
Mean Precip. Intensity (in/hr):	0.03	0.063		
Max Precip Intensity (in/5 min)	NA	0.02		
Antecedent Dry Period (hr):	≥6	292.3		

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	147.8		109.2		
Maximum Discharge (cfs):	NA	0.031		0.026		
Flow Duration (hr):	NA	5.1		4.7		

QA Narrative:

Composite samples for this storm event were only analyzed at the Control Bioswale since the 75% coverage goal was not met at the CAB.

Influent TPH concentrations were less than the 10 mg/L minimum specified in TAPE (2008).

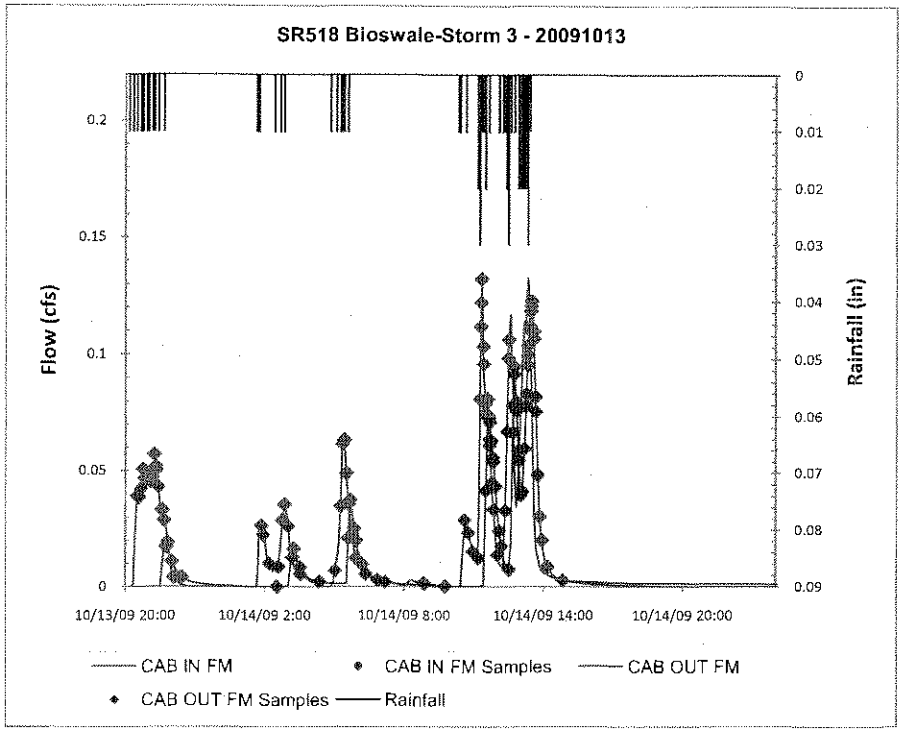
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	26		22		
% Storm Sampled:	≥75	97		92		
Sampling Duration (hr):	≤36	4.7		3.4		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)					% Conc. Reduction	% Volume Reduction	% Load Reduction
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes			
TSS	27.0		7.5		0.50		113		23.2			72	26	79
TKN	1.09		1.26		0.200		4.56		3.90			-16	26	15
Nitrate + Nitrite	0.484		0.485		0.010		2.03		1.50			-0.21	26	26
TP	0.124		0.228		0.002		0.519		0.705			-84	26	-36
SRP	0.066		0.132		0.001		0.276		0.408			-100	26	-48
pH	6.11		6.47		0.10		NA		NA			NA	26	NA
Hardness	7.62		9.58		2.00		NA		NA			NA	26	NA
Dissolved Cu	0.0195		0.0112		0.001		0.082		0.035			43	26	58
Dissolved Zn	0.089		0.027		0.005		0.372		0.083			70	26	78
Total Cu	0.025		0.0119		0.001		0.105		0.037			52	26	65
Total Zn	0.122		0.026		0.005		0.511		0.080			79	26	84
PSD < 1 µm	1.15		0.73		NA		4.81		2.26			37	26	53
PSD 1-3.9 µm	3.32		1.90		NA		13.9		5.87			43	26	58
PSD 3.9-62.5 µm	21.84		25.00		NA		91.4		77.3			-14	26	15
PSD 62.5-125 µm	15.89		8.76		NA		66.5		27.1			45	26	59
PSD 125-250 µm	5.76		3.63		NA		24.1		11.2			37	26	53
PSD 250-500 µm	3.58		0.41		NA		15.0		1.27			89	26	92
PSD > 500 µm	5.03		0.72		NA		21.0		2.23			86	26	89
TPH-diesel	0.05	U	0.05	U	0.05		0.10	J	0.077	J		0.0	26	26
TPH-oil	3.70		0.29		0.1		15.5		0.90			92	26	94

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Compost-Amended Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257396	5257410
0.129	E (UTM)	552309	552284

Storm Information - WY2010-3

Precipitation Information

	Goal	QA	notes
Precipitation Total (in):	≥0.15	0.59	
Precipitation Duration (hr):	1.0	17.3	
Mean Precip. Intensity (in/hr):	0.03	0.034	
Max Precip Intensity (in/5 min)	NA	0.03	
Antecedent Dry Period (hr):	≥6	9.3	

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	1209		677.8		
Maximum Discharge (cfs):	NA	0.138		0.119		
Flow Duration (hr):	NA	26.5		18.1		

QA Narrative:

The 75% coverage goal was met for the first 24 hours of the storm event at CAB In.

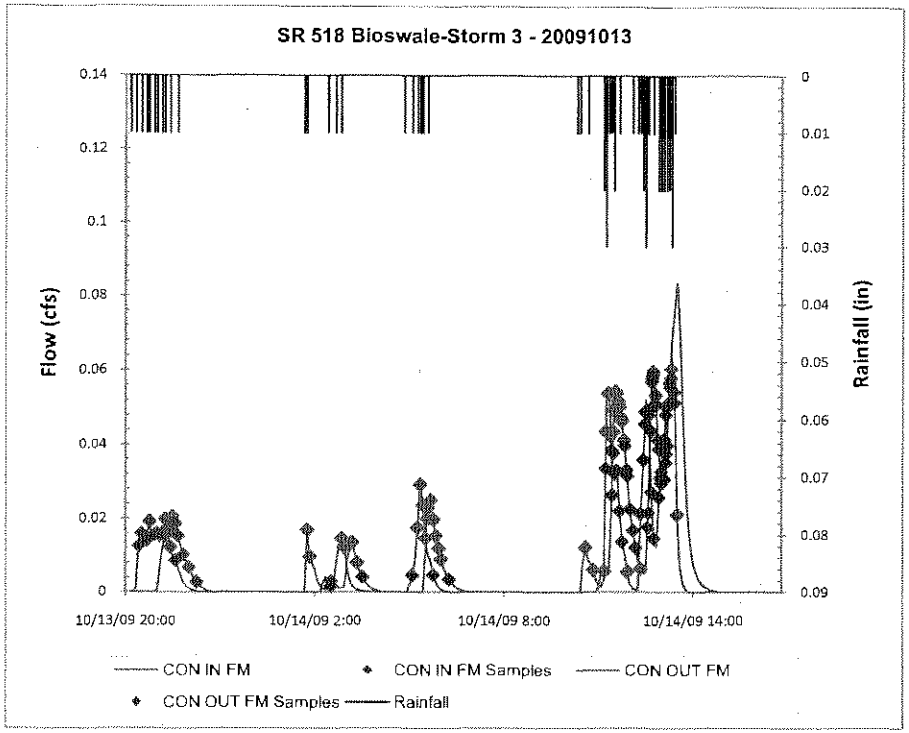
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	60		56		
% Storm Sampled:	≥75	65		98		Met 24-hour coverage
Sampling Duration (hr):	≤36	16.0		17.1		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)					% Conc. Reduction	% Volume Reduction	% Load Reduction
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes			
TSS	141		7.5		0.50		4825		144			95	44	97
TKN	1.73		1.23		0.200		59.2		23.6			29	44	60
Nitrate + Nitrite	0.304		0.204		0.010		10.4		3.92			33	44	62
TP	0.310		0.973		0.002		10.6		18.7			-214	44	-76
SRP	0.023		0.860		0.001		0.787		16.5			-3639	44	-1997
pH	5.92		6.39		0.10		NA		NA			NA	44	NA
Hardness	5.86		16.00		2.00		NA		NA			NA	44	NA
Dissolved Cu	0.0127		0.0068		0.001		0.435		0.131			46	44	70
Dissolved Zn	0.067		0.012		0.005		2.29		0.230			82	44	90
Total Cu	0.0683		0.0094		0.001		2.34		0.180			86	44	92
Total Zn	0.287		0.015		0.005		9.8		0.288			95	44	97
PSD < 1 µm	14.73		0.51		NA		504		9.8			97	44	98
PSD 1-3.9 µm	38.70		1.34		NA		1324		25.7			97	44	98
PSD 3.9-62.5 µm	246.60		16.15		NA		8439		310			93	44	96
PSD 62.5-125 µm	0.00		0.00		NA		0.0		0.0			NA	44	NA
PSD 125-250 µm	0.00		0.00		NA		0.0		0.0			NA	44	NA
PSD 250-500 µm	5.29		0.21		NA		181		4.0			96	44	98
PSD > 500 µm	3.20		0.11		NA		110		2.1			97	44	98
TPH-diesel					0.05		NA		NA			NA	44	NA
TPH-oil					0.1		NA		NA			NA	44	NA

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Control Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257413	5257413
0.129	E (UTM)	552279	552252

Storm Information - WY2010-3

Precipitation Information

	Goal		QA	notes
Precipitation Total (in):	≥0.15	0.59		
Precipitation Duration (hr):	1.0	17.3		
Mean Precip. Intensity (in/hr):	0.03	0.034		
Max Precip Intensity (in/5 min)	NA	0.03		
Antecedent Dry Period (hr):	≥6	9.3		

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	427.3		480.7		
Maximum Discharge (cfs):	NA	0.063		0.084		
Flow Duration (hr):	NA	10.4		9.1		

QA Narrative:

The 75% coverage goal was met for the first 24 hours of the storm event at CON Out.

The volume of water measured at the Control bioswale outlet was approximately 12.5% greater than the Control bioswale inlet due to a large spike in the flow data towards the end of the hydrograph.

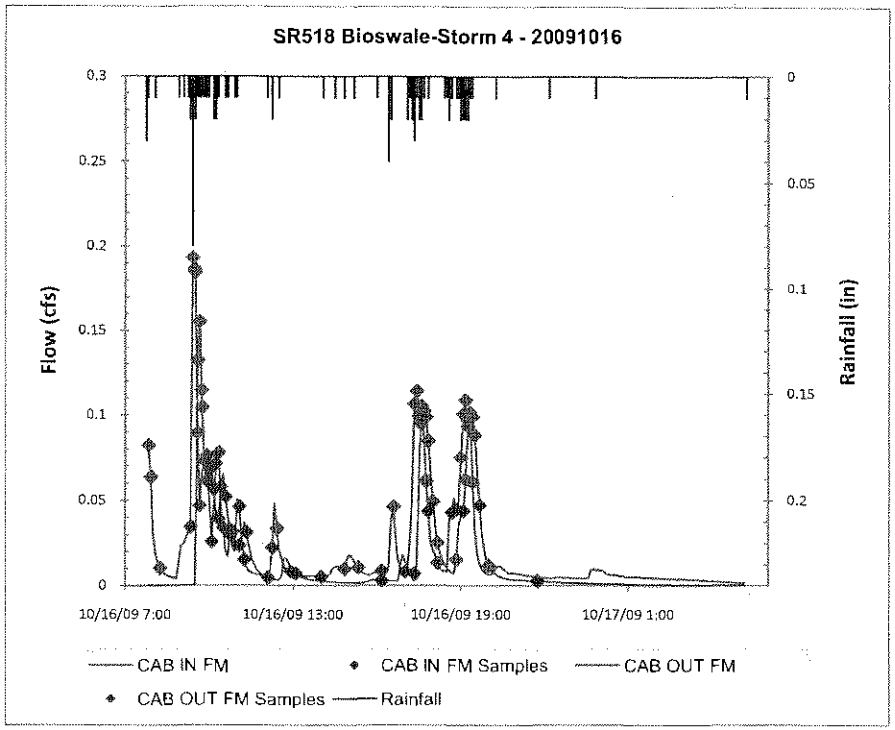
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	56		63		
% Storm Sampled:	≥75	99		72		Met 24-hour coverage
Sampling Duration (hr):	≤36	17.1		16.0		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)					% Conc. Reduction	% Volume Reduction	% Load Reduction
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes			
TSS	77.0		10.0		0.50		932		136			87	-12.5	85
TKN	1.51		0.92		0.200		18.3		12.6			39	-12.5	31
Nitrate + Nitrite	0.306		0.248		0.010		3.70		3.38			19	-12.5	8.8
TP	0.151		0.120		0.002		1.83		1.63			21	-12.5	10.6
SRP	0.021		0.045		0.001		0.254		0.613			-114	-12.5	-141
pH	5.88		5.96		0.10		NA		NA			NA	-12.5	NA
Hardness	5.28		7.23		2.00		NA		NA			NA	-12.5	NA
Dissolved Cu	0.0144		0.0107		0.001		0.174		0.146			26	-12.5	16
Dissolved Zn	0.074		0.021		0.005		0.895		0.286			72	-12.5	68
Total Cu	0.0461		0.0152		0.001		0.558		0.207			67	-12.5	63
Total Zn	0.190		0.030		0.005		2.30		0.408			84	-12.5	82
PSD < 1 µm	6.80		1.00		NA		82.3		13.6			85	-12.5	83
PSD 1-3.9 µm	18.48		3.54		NA		224		48.2			81	-12.5	78
PSD 3.9-62.5 µm	98.70		25.47		NA		1194		347			74	-12.5	71
PSD 62.5-125 µm	0.00		0.00		NA		0.0		0.0			NA	-12.5	NA
PSD 125-250 µm	0.00		0.00		NA		0.0		0.0			NA	-12.5	NA
PSD 250-500 µm	5.04		0.11		NA		61.0		1.50			98	-12.5	98
PSD > 500 µm	6.53		0.34		NA		79.0		4.63			95	-12.5	94
TPH-diesel					0.05		NA		NA			NA	-12.5	NA
TPH-oil					0.1		NA		NA			NA	-12.5	NA

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Compost-Amended Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257396	5257410
0.129	E (UTM)	552309	552284

Storm Information - WY2010-4

Precipitation Information

	Goal		QA	notes
Precipitation Total (in):	≥0.15	0.85		
Precipitation Duration (hr):	1.0	16.1		
Mean Precip. Intensity (in/hr):	0.03	0.053		
Max Precip Intensity (in/5 min)	NA	0.080		
Antecedent Dry Period (hr):	≥6	30.0		

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	1428		962.6		
Maximum Discharge (cfs):	NA	0.205		0.147		
Flow Duration (hr):	NA	21.5		12.8		

QA Narrative:

Influent TPH concentrations were less than the 10 mg/L minimum specified in TAPE (2008).

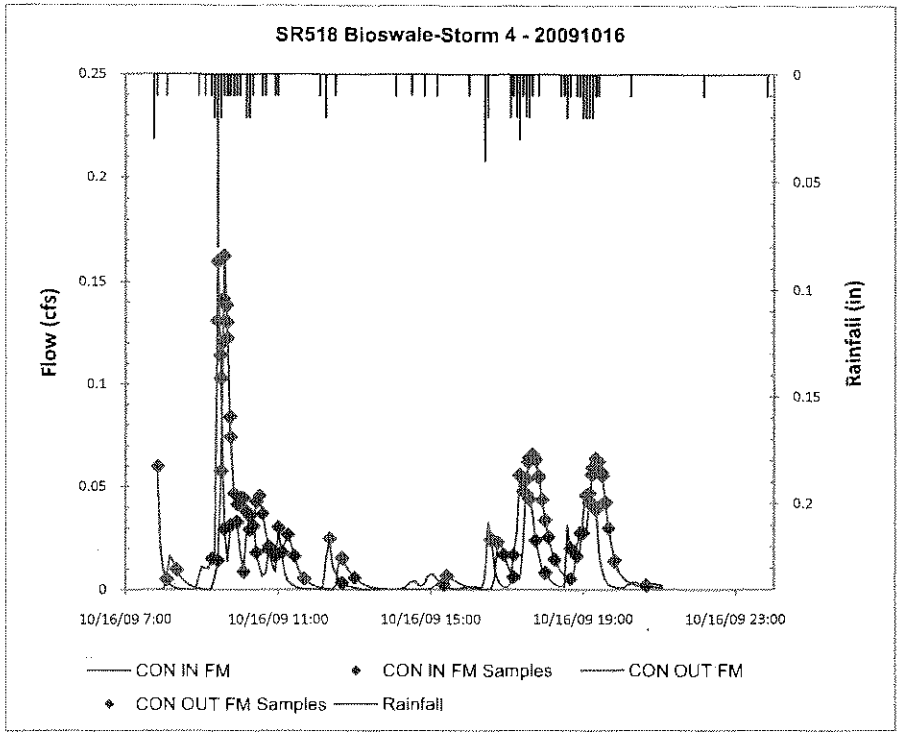
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	43		34		
% Storm Sampled:	≥75	97		100		
Sampling Duration (hr):	≤36	17.8		12.2		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)								
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes	% Conc. Reduction	% Volume Reduction	% Load Reduction
TSS	159		7.5		0.50		6429		204			95	33	97
TKN	0.96		0.36		0.200		38.7		9.76			63	33	75
Nitrate + Nitrite	0.378	J	0.190	J	0.010	Holding time exceeded	15.3	J	5.18	J		50	33	66
TP	0.270		0.823		0.002		10.9		22.4			-205	33	-105
SRP	0.012	J	0.732	J	0.001	Holding time exceeded	0.485	J	20.0	J		-6000	33	-4012
pH	6.49		6.89		0.10		NA		NA			NA	33	NA
Hardness	6.06		15.00		2.00		NA		NA			NA	33	NA
Dissolved Cu	0.0079		0.0060		0.001		0.319		0.164			24	33	49
Dissolved Zn	0.051		0.016		0.005		2.06		0.436			69	33	79
Total Cu	0.0518		0.007		0.001		2.09		0.191			86	33	91
Total Zn	0.206		0.016		0.005		8.33		0.436			92	33	95
PSD < 1 µm	45.24		3.86		NA		1829		105			91	33	94
PSD 1-3.9 µm	104.00		9.98		NA		4205		272			90	33	94
PSD 3.9-62.5 µm	110.50		50.11		NA		4468		1366			55	33	69
PSD 62.5-125 µm	0.00		0.00		NA		0.0		0.0			NA	33	NA
PSD 125-250 µm	0.00		0.00		NA		0.0		0.0			NA	33	NA
PSD 250-500 µm	15.38		0.00		NA		622		0.0			100	33	100
PSD > 500 µm	8.55		0.00		NA		346		0.0			100	33	100
TPH-diesel	0.05	U	0.05	U	0.05		1.01	J	0.68	J		0.0	33	33
TPH-oil	1.94		0.11		0.1		78.4		3.00			94	33	96

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Control Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257413	5257413
0.129	E (UTM)	552279	552252

Storm Information - WY2010-4

Precipitation Information

	Goal		QA	notes
Precipitation Total (in):	≥0.15	0.85		
Precipitation Duration (hr):	1.0	16.1		
Mean Precip. Intensity (in/hr):	0.03	0.053		
Max Precip Intensity (in/5 min)	NA	0.080		
Antecedent Dry Period (hr):	≥6	30.0		

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	539.2		729.5		
Maximum Discharge (cfs):	NA	0.156		0.165		
Flow Duration (hr):	NA	12.3		12.3		

QA Narrative:

Influent TPH concentrations were less than the 10 mg/L minimum specified in TAPE (2008).

The volume of water measured at the Control bioswale outlet was approximately 35% greater than the Control bioswale inlet due to higher peaks in the flow data throughout the hydrograph at the outlet station.

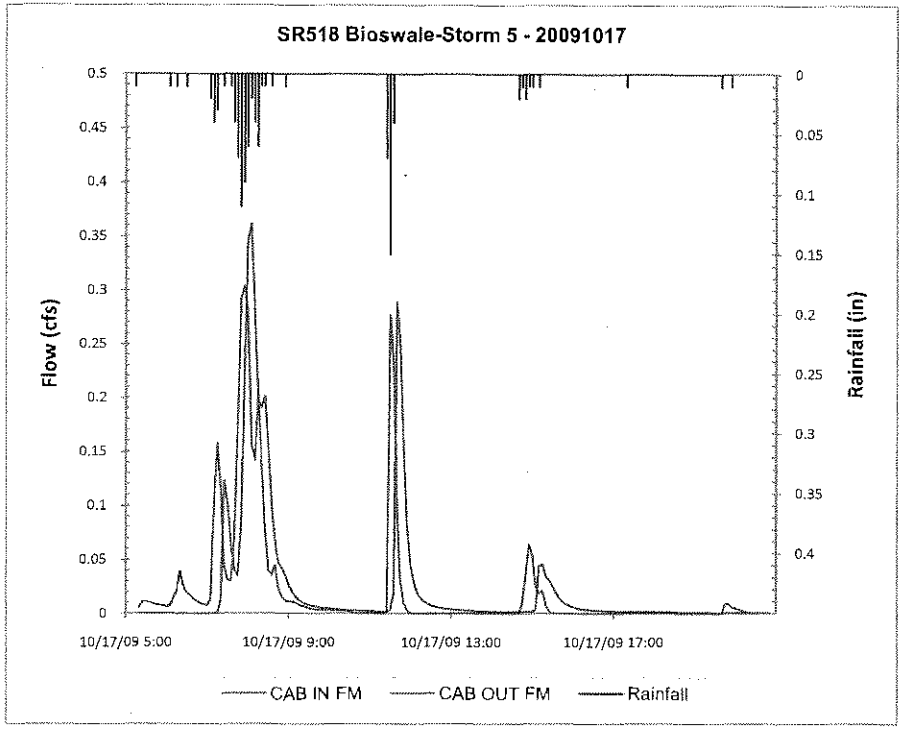
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	32		58		
% Storm Sampled:	≥75	94		98		
Sampling Duration (hr):	≤36	11.8		12.3		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)					% Conc. Reduction	% Volume Reduction	% Load Reduction
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes			
TSS	133		12.0		0.50		2031		248			91	-35	88
TKN	0.54		0.22		0.200		8.25		4.63			59	-35	44
Nitrate + Nitrite	0.336	J	0.178	J	0.010	Holding time exceeded	5.13	J	3.68	J		47	-35	28
TP	0.205		0.090		0.002		3.13		1.86			56	-35	41
SRP	0.012	J	0.026	J	0.001	Holding time exceeded	0.183	J	0.537	J		-117	-35	-193
pH	6.41		6.45		0.10		NA		NA			NA	-35	NA
Hardness	4.69		8.01		2.00		NA		NA			NA	-35	NA
Dissolved Cu	0.0059		0.0076		0.001		0.090		0.157			-29	-35	-74
Dissolved Zn	0.041		0.022		0.005		0.626		0.454			46	-35	27
Total Cu	0.0343		0.0112		0.001		0.524		0.231			67	-35	56
Total Zn	0.14		0.023		0.005		2.14		0.475			84	-35	78
PSD < 1 µm	7.98		7.51		NA		122		155			5.9	-35	-27
PSD 1-3.9 µm	21.00		24.74		NA		321		511			-18	-35	-59
PSD 3.9-62.5 µm	138.94		81.74		NA		2121		1688			41.2	-35	20
PSD 62.5-125 µm	0.00		0.00		NA		0.0		0.0			NA	-35	NA
PSD 125-250 µm	0.00		0.00		NA		0.0		0.0			NA	-35	NA
PSD 250-500 µm	9.74		0.00		NA		149		0.0			100	-35	100
PSD > 500 µm	5.38		0.00		NA		82		0.0			100	-35	100
TPH-diesel	0.05	U	0.05	U	0.05		0.38	J	0.52	J		0.0	-35	-35
TPH-oil	1.74		0.68		0.1		26.6		14.0			61	-35	47

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location		
SR518 Compost-Amended Bioswale		IN	OUT
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257396	5257410
0.129	E (UTM)	552309	552284

Storm Information - WY2010-5

Precipitation Information

	Goal	QA	notes
Precipitation Total (in):	≥0.15	1.05	
Precipitation Duration (hr):	1.0	14.7	
Mean Precip. Intensity (in/hr):	0.03	0.072	
Max Precip Intensity (in/5 min)	NA	0.15	
Antecedent Dry Period (hr):	≥6	9.8	

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	1144		1247		
Maximum Discharge (cfs):	NA	0.321		0.345		
Flow Duration (hr):	NA	8.2		10.9		

QA Narrative:

Influent TPH concentrations were less than the 10 mg/L minimum specified in TAPE (2008).

The volume of water measured at the CAB bioswale outlet was approximately 9% greater than the CAB bioswale inlet.

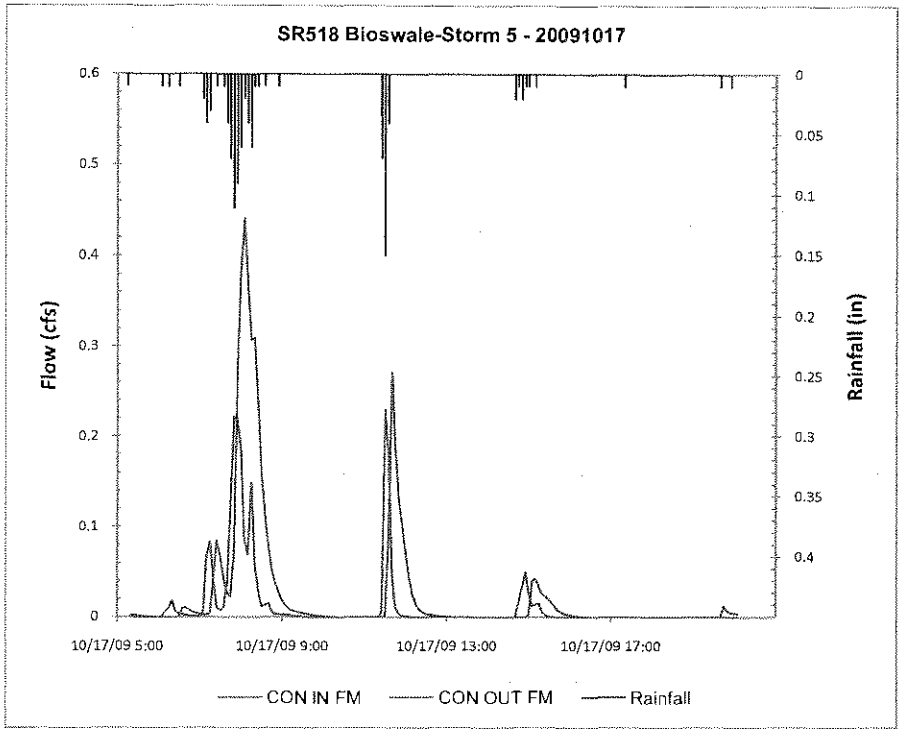
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	NA		NA		
% Storm Sampled:	≥75	NA		NA		
Sampling Duration (hr):	≤36	NA		NA		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)								
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes	% Conc. Reduction	% Volume Reduction	% Load Reduction
TSS					0.50		NA		NA			NA	-9.0	NA
TKN					0.200		NA		NA			NA	-9.0	NA
Nitrate + Nitrite					0.010		NA		NA			NA	-9.0	NA
TP					0.002		NA		NA			NA	-9.0	NA
SRP					0.001		NA		NA			NA	-9.0	NA
pH					0.10		NA		NA			NA	-9.0	NA
Hardness					2.00		NA		NA			NA	-9.0	NA
Dissolved Cu					0.001		NA		NA			NA	-9.0	NA
Dissolved Zn					0.005		NA		NA			NA	-9.0	NA
Total Cu					0.001		NA		NA			NA	-9.0	NA
Total Zn					0.005		NA		NA			NA	-9.0	NA
PSD < 1 µm					NA		NA		NA			NA	-9.0	NA
PSD 1-3.9 µm					NA		NA		NA			NA	-9.0	NA
PSD 3.9-62.5 µm					NA		NA		NA			NA	-9.0	NA
PSD 62.5-125 µm					NA		NA		NA			NA	-9.0	NA
PSD 125-250 µm					NA		NA		NA			NA	-9.0	NA
PSD 250-500 µm					NA		NA		NA			NA	-9.0	NA
PSD > 500 µm					NA		NA		NA			NA	-9.0	NA
TPH-diesel	0.05	U	0.05	U	0.05		0.81	J	0.88	J		0.0	-9.0	-9
TPH-oil	2.29		0.42		0.1		74.2		14.83			82	-9.0	80

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Control Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257413	5257413
0.129	E (UTM)	552279	552252

Storm Information - WY2010-5

Precipitation Information

	Goal		QA	notes
Precipitation Total (in):	≥0.15	1.05		
Precipitation Duration (hr):	1.0	14.7		
Mean Precip. Intensity (in/hr):	0.03	0.072		
Max Precip Intensity (in/5 min)	NA	0.15		
Antecedent Dry Period (hr):	≥6	9.8		

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	667		1336		
Maximum Discharge (cfs):	NA	0.223		0.446		
Flow Duration (hr):	NA	7.3		7.1		

QA Narrative:

Influent TPH concentrations were less than the 10 mg/L minimum specified in TAPE (2008).

The volume of water measured at the Control bioswale outlet was approximately 100% greater than the Control bioswale inlet due to higher peaks in the flow data throughout the hydrograph at the outlet station.

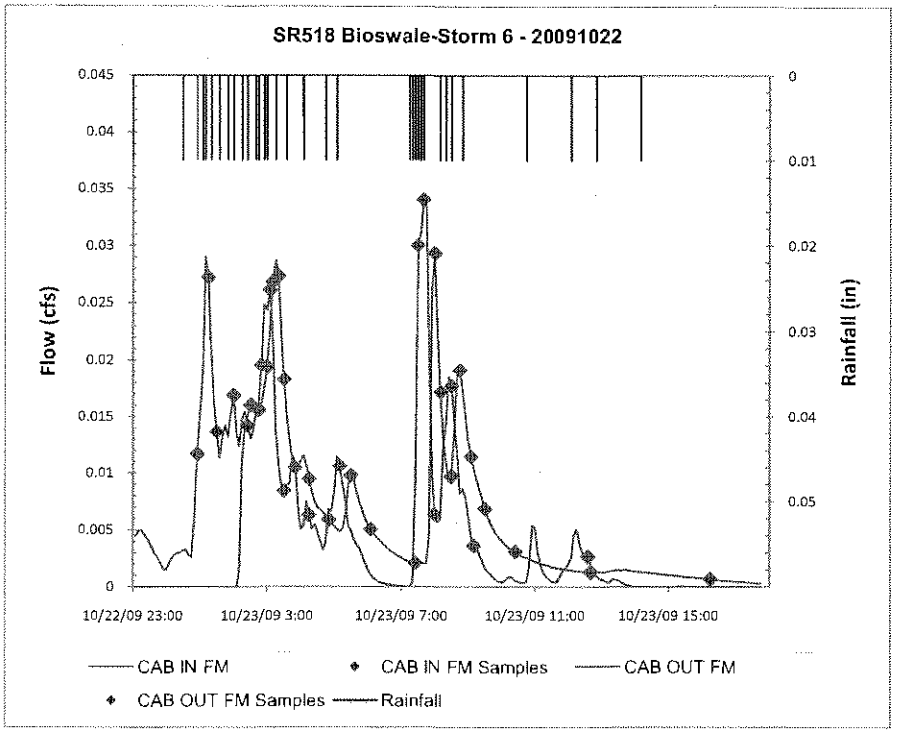
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	NA		NA		
% Storm Sampled:	≥75	NA		NA		
Sampling Duration (hr):	≤36	NA		NA		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)					% Conc. Reduction	% Volume Reduction	% Load Reduction
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes			
TSS					0.50		NA		NA			NA	-100	NA
TKN					0.200		NA		NA			NA	-100	NA
Nitrate + Nitrite					0.010		NA		NA			NA	-100	NA
TP					0.002		NA		NA			NA	-100	NA
SRP					0.001		NA		NA			NA	-100	NA
pH					0.10		NA		NA			NA	-100	NA
Hardness					2.00		NA		NA			NA	-100	NA
Dissolved Cu					0.001		NA		NA			NA	-100	NA
Dissolved Zn					0.005		NA		NA			NA	-100	NA
Total Cu					0.001		NA		NA			NA	-100	NA
Total Zn					0.005		NA		NA			NA	-100	NA
PSD < 1 µm					NA		NA		NA			NA	-100	NA
PSD 1-3.9 µm					NA		NA		NA			NA	-100	NA
PSD 3.9-62.5 µm					NA		NA		NA			NA	-100	NA
PSD 62.5-125 µm					NA		NA		NA			NA	-100	NA
PSD 125-250 µm					NA		NA		NA			NA	-100	NA
PSD 250-500 µm					NA		NA		NA			NA	-100	NA
PSD > 500 µm					NA		NA		NA			NA	-100	NA
TPH-diesel	0.05	U	0.05	U	0.05		0.47	J	0.95	J		0.0	-100	-100
TPH-oil	4.78		0.71		0.1		90.3		26.9			85	-100	70

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Compost-Amended Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257396	5257410
0.129	E (UTM)	552309	552284

Storm Information - WY2010-6

Precipitation Information

	Goal		QA	notes
Precipitation Total (in):	≥0.15	0.34		
Precipitation Duration (hr):	1.0	15.2		
Mean Precip. Intensity (in/hr):	0.03	0.022		
Max Precip Intensity (in/5 min)	NA	0.01		
Antecedent Dry Period (hr):	≥6	36.3		

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	356.6		318.8		
Maximum Discharge (cfs):	NA	0.034		0.029		
Flow Duration (hr):	NA	14.7		15.7		

QA Narrative:

Influent TP concentrations were less than the 0.1 mg/L minimum specified in TAPE (2008).

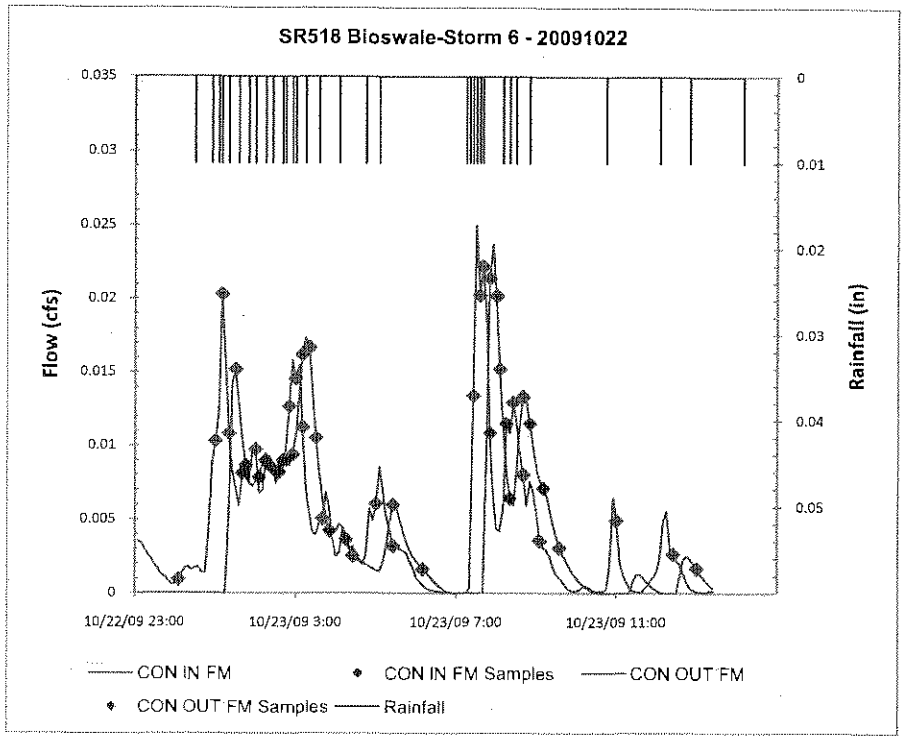
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	16		21		
% Storm Sampled:	≥75	93		95		
Sampling Duration (hr):	≤36	11.7		13.8		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)							
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes	% Conc. Reduction	% Volume Reduction	% Load Reduction
TSS	24.0		2.3		0.50		242		20.8			90	11	91
TKN	1.02		0.988		0.200		10.3		8.92			3.1	11	13
Nitrate + Nitrite	0.248	J	0.236	J	0.010	Holding time exceeded	2.50	J	2.13	J		4.8	11	15
TP	0.064		0.786		0.002		0.646		7.10			-1128	11	-998
SRP	0.008	J	0.676	J	0.001	Holding time exceeded	0.081	J	6.10	J		-8350	11	-7456
pH	6.54		7.13		0.10		NA		NA			NA	11	NA
Hardness	4.10		18.80		2.00		NA		NA			NA	11	NA
Dissolved Cu	0.0070		0.0042		0.001		0.071		0.038			40	11	46
Dissolved Zn	0.054		0.005	U	0.005		0.545		0.023	J		91	11	96
Total Cu	0.0184		0.0051		0.001		0.186		0.046			72	11	75
Total Zn	0.089		0.006		0.005		0.899		0.054			93	11	94
PSD < 1 µm	74.49		86.14		NA		752		778			-16	11	-3.4
PSD 1-3.9 µm	55.51		61.86		NA		560		558			-11	11	0.36
PSD 3.9-62.5 µm	0.00		0.00		NA		0.0		0.0			NA	11	NA
PSD 62.5-125 µm	0.00		0.00		NA		0.0		0.0			NA	11	NA
PSD 125-250 µm	0.00		0.00		NA		0.0		0.0			NA	11	NA
PSD 250-500 µm	0.82		0.62		NA		8.28		5.60			24	11	32
PSD > 500 µm	0.82		0.31		NA		8.28		2.80			62	11	66
TPH-diesel	0.05	U	0.05	U	0.05		0.25	J	0.23	J		0.0	11	11
TPH-oil	1.90		0.31		0.1		19.2		2.80			84	11	85

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Control Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257413	5257413
0.129	E (UTM)	552279	552252

Storm Information - WY2010-6

Precipitation Information

	Goal		QA	notes
Precipitation Total (in):	≥0.15	0.34		
Precipitation Duration (hr):	1.0	15.2		
Mean Precip. Intensity (in/hr):	0.03	0.022		
Max Precip Intensity (in/5 min)	NA	0.01		
Antecedent Dry Period (hr):.	≥6	36.3		

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	228.0		200.6		
Maximum Discharge (cfs):	NA	0.025		0.024		
Flow Duration (hr):	NA	13.9		10.8		

QA Narrative:

Influent TP concentrations were less than the 0.1 mg/L minimum specified in TAPE (2008).

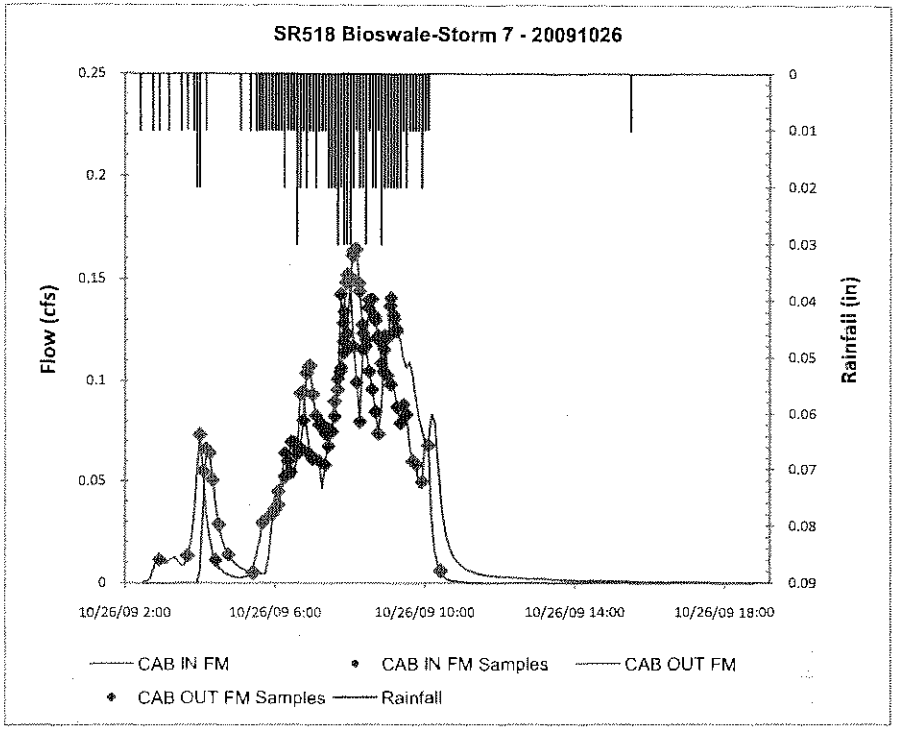
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	25		22		
% Storm Sampled:	≥75	96		97		
Sampling Duration (hr):	≤36	12.3		11.5		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)					% Conc. Reduction	% Volume Reduction	% Load Reduction
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes			
TSS	32.0		5.5		0.50		207		31.2			83	12	85
TKN	1.05		0.707		0.200		6.78		4.02			33	12	41
Nitrate + Nitrite	0.252	J	0.264	J	0.010	Holding time exceeded	1.63	J	1.50	J		-4.8	12	7.8
TP	0.081		0.084		0.002		0.523		0.477			-3.7	12	8.8
SRP	0.008	J	0.022	J	0.001	Holding time exceeded	0.052	J	0.125	J		-175	12	-142
pH	6.58		6.67		0.10		NA		NA			NA	12	NA
Hardness	4.50		7.04		2.00		NA		NA			NA	12	NA
Dissolved Cu	0.0070		0.0061		0.001		0.045		0.035			13	12	23
Dissolved Zn	0.051		0.021		0.005		0.329		0.119			59	12	64
Total Cu	0.0185		0.0095		0.001		0.119		0.054			49	12	55
Total Zn	0.081		0.028		0.005		0.523		0.159			65	12	70
PSD < 1 µm	10.46		13.48		NA		67.5		76.6			-29	12	-13
PSD 1-3.9 µm	17.16		28.58		NA		111		162			-67	12	-47
PSD 3.9-62.5 µm	92.40		110.05		NA		596		625			-19	12	-4.8
PSD 62.5-125 µm	0.00		0.00		NA		0.0		0.0			NA	12	NA
PSD 125-250 µm	0.00		0.00		NA		0.0		0.0			NA	12	NA
PSD 250-500 µm	1.19		0.00		NA		7.7		0.0			100	12	100
PSD > 500 µm	1.73		0.00		NA		11.2		0.0			100	12	100
TPH-diesel	0.05	U	0.05	U	0.05		0.16	J	0.14	J		0.0	12	12
TPH-oil	1.60		1.48		0.1		10.3		8.40			8	12	19

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Compost-Amended Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257396	5257410
0.129	E (UTM)	552309	552284

Storm Information - WY2010-7

Precipitation Information

	Goal		QA	notes
Precipitation Total (in):	≥0.15	1.06		
Precipitation Duration (hr):	1.0	13.1		
Mean Precip. Intensity (in/hr):	0.03	0.081		
Max Precip Intensity (in/5 min)	NA	0.03		
Antecedent Dry Period (hr):	≥6	60.2		

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	1455		1772		
Maximum Discharge (cfs):	NA	0.149		0.166		
Flow Duration (hr):	NA	12.7		9.8		

QA Narrative:

Influent TP concentrations were less than the 0.1 mg/L minimum specified in TAPE (2008). Influent TPH concentrations were less than the 10 mg/L minimum specified in TAPE (2008).

The volume of water measured at the CAB outlet was approximately 22% greater than the CAB inlet due to higher peaks in the flow data throughout the hydrograph at the outlet station.

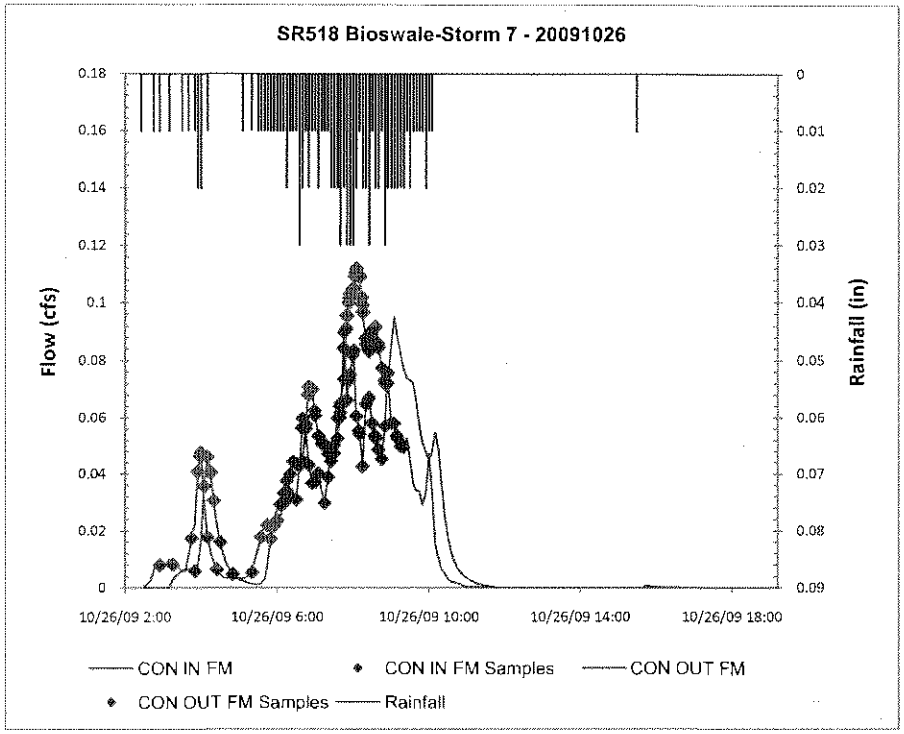
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	47		63		
% Storm Sampled:	≥75	98		76		
Sampling Duration (hr):	≤36	7.5		5.1		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)								
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes	% Conc. Reduction	% Volume Reduction	% Load Reduction
TSS	51.0		5.0		0.50		2101		251			90	-22	88
TKN	0.695		0.576		0.200		28.6		28.9			17	-22	-1.0
Nitrate + Nitrite	0.095		0.132		0.010		3.91		6.62			-39	-22	-69
TP	0.076		0.387		0.002		3.13		19.4			-409	-22	-520
SRP	0.005		0.312		0.001		0.206		15.7			-6140	-22	-7501
pH	6.21		6.74		0.10		NA		NA			NA	-22	NA
Hardness	2.54		8.79		2.00		NA		NA			NA	-22	NA
Dissolved Cu	0.0036		0.0052		0.001		0.148		0.261			-44	-22	-76
Dissolved Zn	0.050		0.008		0.005		2.06		0.401			84	-22	81
Total Cu	0.0217		0.0072		0.001		0.894		0.361			67	-22	60
Total Zn	0.094		0.011		0.005		3.87		0.552			88	-22	86
PSD < 1 µm	1.17		28.00		NA		48.2		1405			-2293	-22	-2815
PSD 1-3.9 µm	2.69		0.00		NA		111		0.0			100	-22	100
PSD 3.9-62.5 µm	21.53		0.00		NA		887		0.0			100	-22	100
PSD 62.5-125 µm	8.84		0.00		NA		364		0.0			100	-22	100
PSD 125-250 µm	17.81		0.00		NA		734		0.0			100	-22	100
PSD 250-500 µm	2.02		0.00		NA		83		0.0			100	-22	100
PSD > 500 µm	1.49		0.00		NA		61		0.0			100	-22	100
TPH-diesel	0.05	U	0.05	U	0.05		1.03	J	1.25	J		0.0	-22	-22
TPH-oil	3.74		0.34		0.1		154		17.1			91	-22	89

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Control Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257413	5257413
0.129	E (UTM)	552279	552252

Storm Information - WY2010-7

Precipitation Information

	Goal		QA	notes
Precipitation Total (in):	≥0.15	1.06		
Precipitation Duration (hr):	1.0	13.1		
Mean Precip. Intensity (in/hr):	0.03	0.081		
Max Precip Intensity (in/5 min)	NA	0.03		
Antecedent Dry Period (hr):	≥6	60.2		

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	891.0		1176		
Maximum Discharge (cfs):	NA	0.090		0.112		
Flow Duration (hr):	NA	13.8		9.2		

QA Narrative:
Influent TP concentrations were less than the 0.1 mg/L minimum specified in TAPE (2008). Influent TPH concentrations were less than the 10 mg/L minimum specified in TAPE (2008). The 75% storm coverage goal was not met at the Control outlet. The volume of water measured at the Control bioswale outlet was approximately 32% greater than the Control bioswale inlet due to higher peaks in the flow data throughout the hydrograph at the outlet station.

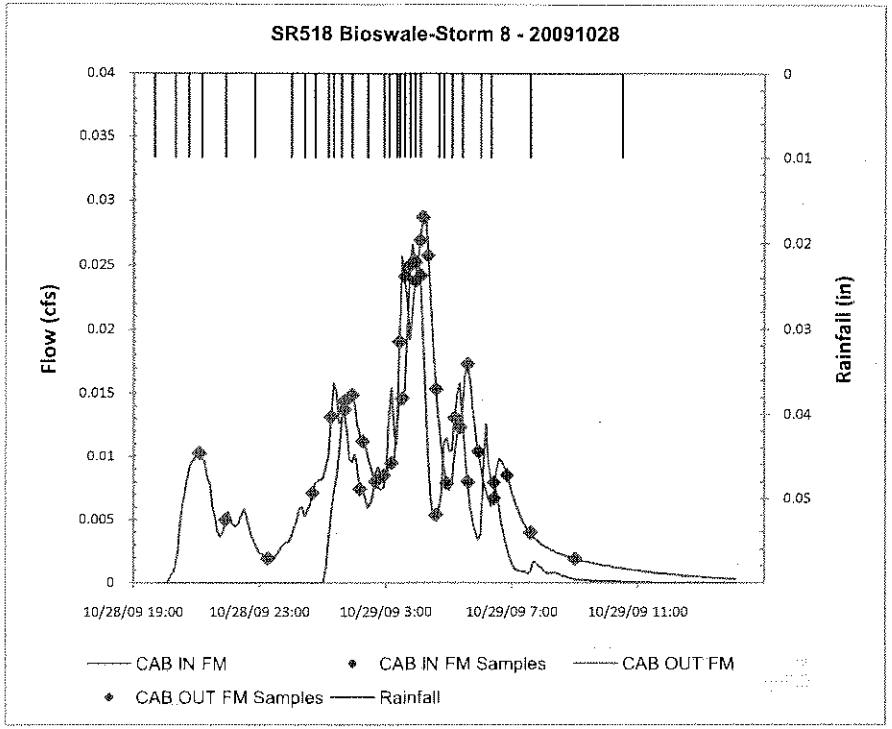
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	60		63		
% Storm Sampled:	≥75	84		68	j	<75% coverage goal
Sampling Duration (hr):	≤36	6.4		5.1		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)					% Conc. Reduction	% Volume Reduction	% Load Reduction
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes			
TSS	39.0		6.0	j	0.50		984		200	j		85	-32	80
TKN	0.662		0.495	j	0.200		16.7		16.5	j		25	-32	1.3
Nitrate + Nitrite	0.160		0.097	j	0.010		4.0		3.2	j		39	-32	20
TP	0.066		0.064	j	0.002		1.7		2.1	j		3.0	-32	-28
SRP	0.007		0.022	j	0.001		0.18		0.73	j		-214	-32	-315
pH	6.27		6.43	j	0.10		NA		NA			NA	-32	NA
Hardness	3.32		4.50	j	2.00		NA		NA			NA	-32	NA
Dissolved Cu	0.0043		0.0046	j	0.001		0.11		0.15	j		-7.0	-32	-41
Dissolved Zn	0.043		0.013	j	0.005		1.1		0.43	j		70	-32	60
Total Cu	0.0226		0.0076	j	0.001		0.57		0.25	j		66	-32	56
Total Zn	0.088		0.018	j	0.005		2.2		0.60	j		80	-32	73
PSD < 1 µm	1.53		12.58	j	NA		38.6		419	j		-722	-32	-985
PSD 1-3.9 µm	2.19		11.42	j	NA		55.3		380	j		-421	-32	-588
PSD 3.9-62.5 µm	12.29		0.00	j	NA		310		0.0	j		100	-32	100
PSD 62.5-125 µm	0.00		0.00	j	NA		0.0		0.0	j		NA	-32	NA
PSD 125-250 µm	0.00		0.00	j	NA		0.0		0.0	j		NA	-32	NA
PSD 250-500 µm	1.05		1.59	j	NA		26.5		52.9	j		-51	-32	-100
PSD > 500 µm	0.53		0.63	j	NA		13.4		21.0	j		-19	-32	-57
TPH-diesel	0.05	U	0.05	U	0.05		0.63	J	0.83	J		0.0	-32	-32
TPH-oil	1.53		0.36		0.1		38.6		12.0			76	-32	69

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Compost-Amended Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257396	5257410
0.129	E (UTM)	552309	552284

Storm Information - WY2010-8

Precipitation Information

	Goal		QA	notes
Precipitation Total (in):	≥0.15	0.30		
Precipitation Duration (hr):	1.0	14.8		
Mean Precip. Intensity (in/hr):	0.03	0.020		
Max Precip Intensity (in/5 min)	NA	0.01		
Antecedent Dry Period (hr):	≥6	57.5		

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	331.1		308.7		
Maximum Discharge (cfs):	NA	0.026		0.030		
Flow Duration (hr):	NA	13.4		13.7		

QA Narrative:

Influent TSS concentrations were less than the 20 mg/L minimum specified in TAPE (2008). Influent TP concentrations were less than the 0.1 mg/L minimum specified in TAPE (2008).

Field duplicate RPD for Nitrate + Nitrite was greater than 20%.

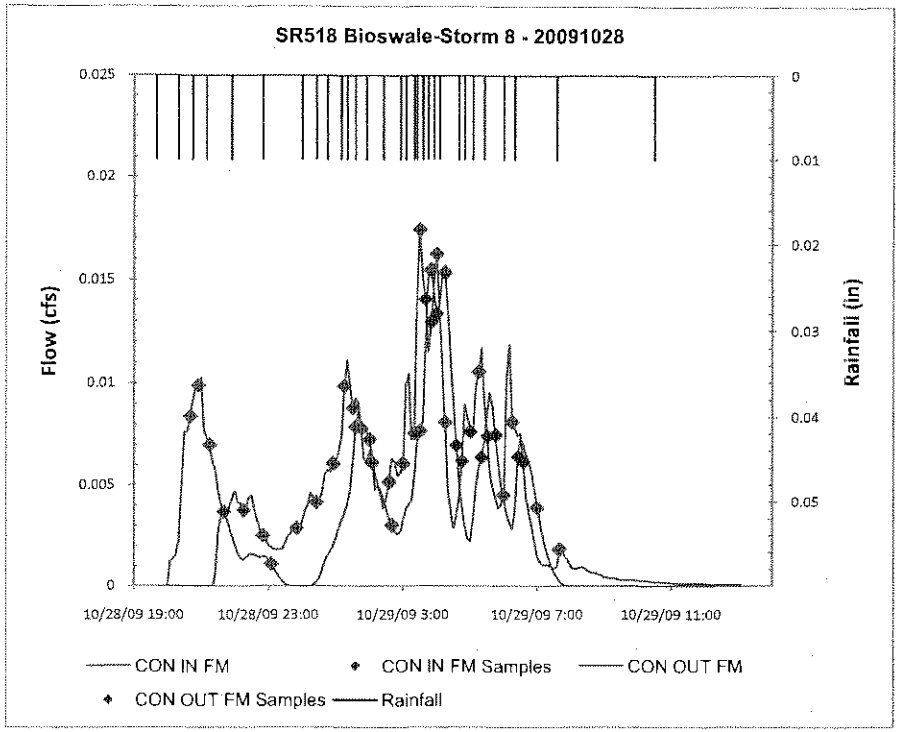
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	16		20		
% Storm Sampled:	≥75	90		90		
Sampling Duration (hr):	≤36	9.3		7.3		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)								
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes	% Conc. Reduction	% Volume Reduction	% Load Reduction
TSS	11.0		0.83		0.50		103		7.26			92	6.8	93
TKN	0.905		0.666		0.200		8.48		5.82			26	6.8	31
Nitrate + Nitrite	0.223	J	0.261		0.010	Field duplicate RPD >20%	2.09	J	2.28			-17	6.8	-9.1
TP	0.036		0.552		0.002		0.338		4.83			-1433	6.8	-1330
SRP	0.005		0.479		0.001		0.047		4.19			-9480	6.8	-8833
pH	6.81		7.27		0.10		NA		NA			NA	6.8	NA
Hardness	3.91		16.80		2.00		NA		NA			NA	6.8	NA
Dissolved Cu	0.0060		0.0031		0.001		0.056		0.027			48	6.8	52
Dissolved Zn	0.057		0.006		0.005		0.53		0.052			89	6.8	90
Total Cu	0.0092		0.0039		0.001		0.086		0.034			58	6.8	60
Total Zn	0.078		0.006		0.005		0.73		0.052			92	6.8	93
PSD < 1 µm	3.64		50.15		NA		34.1		438			-1278	6.8	-1185
PSD 1-3.9 µm	10.04		33.85		NA		94.1		296			-237	6.8	-214
PSD 3.9-62.5 µm	48.30		0.00		NA		453		0.0			100	6.8	100
PSD 62.5-125 µm	0.00		0.00		NA		0.0		0.0			NA	6.8	NA
PSD 125-250 µm	0.00		0.00		NA		0.0		0.0			NA	6.8	NA
PSD 250-500 µm	0.12		0.00		NA		1.13		0.0			100	6.8	100
PSD > 500 µm	3.34		0.00		NA		31.3		0.0			100	6.8	100
TPH-diesel					0.05		NA		NA			NA	6.8	NA
TPH-oil					0.1		NA		NA			NA	6.8	NA

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Control Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257413	5257413
0.129	E (UTM)	552279	552252

Storm Information - WY2010-8

Precipitation Information

	Goal	QA	notes
Precipitation Total (in):	≥0.15	0.30	
Precipitation Duration (hr):	1.0	14.8	
Mean Precip. Intensity (in/hr):	0.03	0.020	
Max Precip Intensity (in/5 min)	NA	0.01	
Antecedent Dry Period (hr):	≥6	57.5	

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	255.1		160.1		
Maximum Discharge (cfs):	NA	0.018		0.016		
Flow Duration (hr):	NA	17.1		9.8		

QA Narrative:

Influent TP concentrations were less than the 0.1 mg/L minimum specified in TAPE (2008).

Sample volume at CON Out was insufficient to run all analyses, thus PSD was not analyzed for CON Out for this storm event.

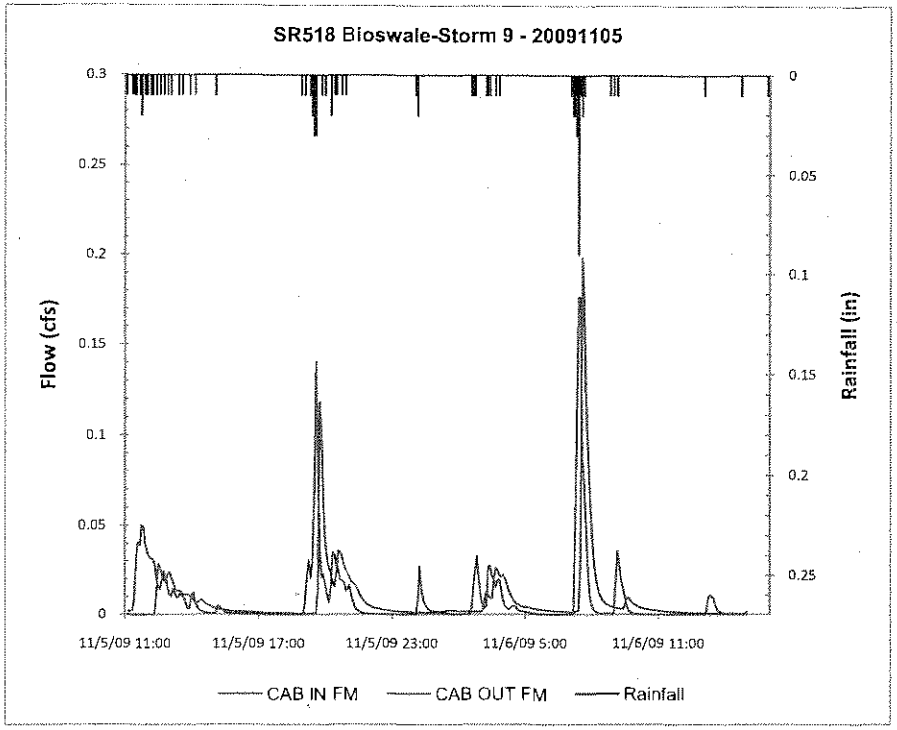
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	29		13		
% Storm Sampled:	≥75	94		91		
Sampling Duration (hr):	≤36	11.0		7.9		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)							
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes	% Conc. Reduction	% Volume Reduction	% Load Reduction
TSS	22.0		5.3		0.50		159		24.0			76	37	85
TKN	1.10		0.783		0.200		7.95		3.55			29	37	55
Nitrate + Nitrite	0.258		0.205		0.010		1.86		0.93			21	37	50
TP	0.048		0.062		0.002		0.35		0.28			-29	37	19
SRP	0.009		0.024		0.001		0.065		0.11			-167	37	-67
pH	6.66		6.88		0.10		NA		NA			NA	37	NA
Hardness	5.47		6.45		2.00		NA		NA			NA	37	NA
Dissolved Cu	0.0085		0.0049		0.001		0.061		0.022			42	37	64
Dissolved Zn	0.054		0.022		0.005		0.39		0.10			59	37	74
Total Cu	0.0135		0.0078		0.001		0.10		0.035			42	37	64
Total Zn	0.071		0.031		0.005		0.51		0.14			56	37	73
PSD < 1 µm	2.13				NA	Not analyzed at Con Out	15.4		NA			NA	37	NA
PSD 1-3.9 µm	4.00				NA	Not analyzed at Con Out	28.9		NA			NA	37	NA
PSD 3.9-62.5 µm	25.89				NA	Not analyzed at Con Out	187		NA			NA	37	NA
PSD 62.5-125 µm	0.00				NA	Not analyzed at Con Out	0.0		NA			NA	37	NA
PSD 125-250 µm	0.00				NA	Not analyzed at Con Out	0.0		NA			NA	37	NA
PSD 250-500 µm	6.25				NA	Not analyzed at Con Out	45.2		NA			NA	37	NA
PSD > 500 µm	10.64				NA	Not analyzed at Con Out	76.9		NA			NA	37	NA
TPH-diesel					0.05		NA		NA			NA	37	NA
TPH-oil					0.1		NA		NA			NA	37	NA

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Compost-Amended Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257396	5257410
0.129	E (UTM)	552309	552284

Storm Information - WY2010-9

Precipitation Information

	Goal		QA	notes
Precipitation Total (in):	≥0.15	0.77		
Precipitation Duration (hr):	1.0	27.7		
Mean Precip. Intensity (in/hr):	0.03	0.028		
Max Precip Intensity (in/5 min)	NA	0.09		
Antecedent Dry Period (hr):	≥6	126.9		

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	876.0		820.9		
Maximum Discharge (cfs):	NA	0.177		0.198		
Flow Duration (hr):	NA	23.3		22.9		

QA Narrative:

Influent TPH concentrations were less than the 10 mg/L minimum specified in TAPE (2008).

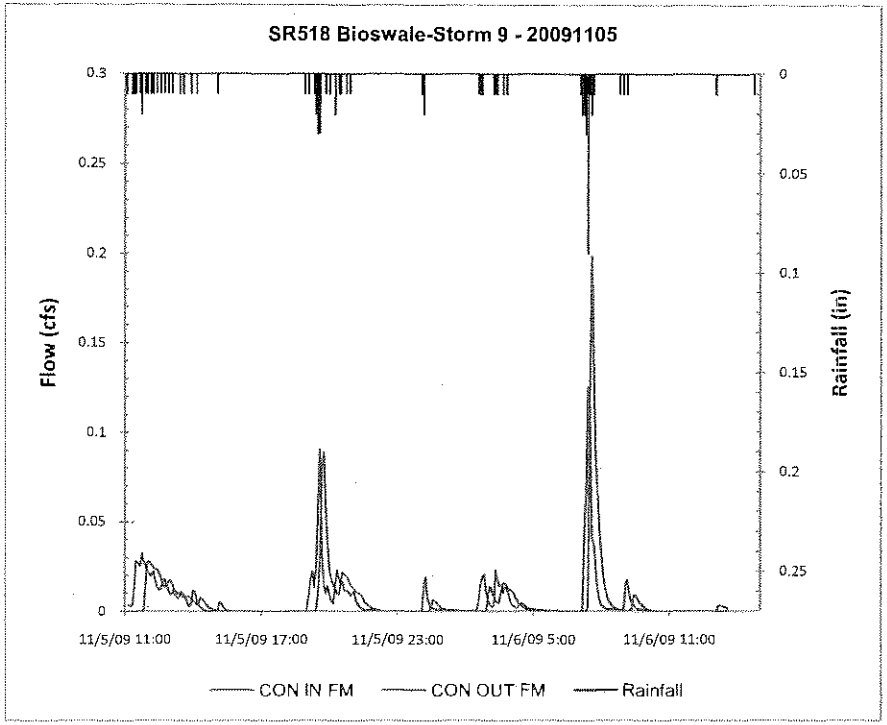
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	NA		NA		
% Storm Sampled:	≥75	NA		NA		
Sampling Duration (hr):	≤36	NA		NA		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)								
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes	% Conc. Reduction	% Volume Reduction	% Load Reduction
TSS					0.50		NA		NA			NA	6.3	NA
TKN					0.200		NA		NA			NA	6.3	NA
Nitrate + Nitrite					0.010		NA		NA			NA	6.3	NA
TP					0.002		NA		NA			NA	6.3	NA
SRP					0.001		NA		NA			NA	6.3	NA
pH					0.10		NA		NA			NA	6.3	NA
Hardness					2.00		NA		NA			NA	6.3	NA
Dissolved Cu					0.001		NA		NA			NA	6.3	NA
Dissolved Zn					0.005		NA		NA			NA	6.3	NA
Total Cu					0.001		NA		NA			NA	6.3	NA
Total Zn					0.005		NA		NA			NA	6.3	NA
PSD < 1 µm					NA		NA		NA			NA	6.3	NA
PSD 1-3.9 µm					NA		NA		NA			NA	6.3	NA
PSD 3.9-62.5 µm					NA		NA		NA			NA	6.3	NA
PSD 62.5-125 µm					NA		NA		NA			NA	6.3	NA
PSD 125-250 µm					NA		NA		NA			NA	6.3	NA
PSD 250-500 µm					NA		NA		NA			NA	6.3	NA
PSD > 500 µm					NA		NA		NA			NA	6.3	NA
TPH-diesel	0.05	U	0.05	U	0.05		0.62	J	0.58	J		0.0	6.3	6.3
TPH-oil	1.97		0.66		0.1		48.9		15.3			66	6.3	69

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Control Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257413	5257413
0.129	E (UTM)	552279	552252

Storm Information - WY2010-9

Precipitation Information

	Goal	QA	notes
Precipitation Total (in):	≥0.15	0.77	
Precipitation Duration (hr):	1.0	27.7	
Mean Precip. Intensity (in/hr):	0.03	0.028	
Max Precip Intensity (in/5 min)	NA	0.09	
Antecedent Dry Period (hr):	≥6	126.9	

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	571.6		610.4		
Maximum Discharge (cfs):	NA	0.126		0.199		
Flow Duration (hr):	NA	20.3		13.0		

QA Narrative:

Influent TPH concentrations were less than the 10 mg/L minimum specified in TAPE (2008).

The volume of water measured at the Control bioswale outlet was 6.8% greater than the Control bioswale inlet due to a large spike in the flow data toward the end of the hydrograph.

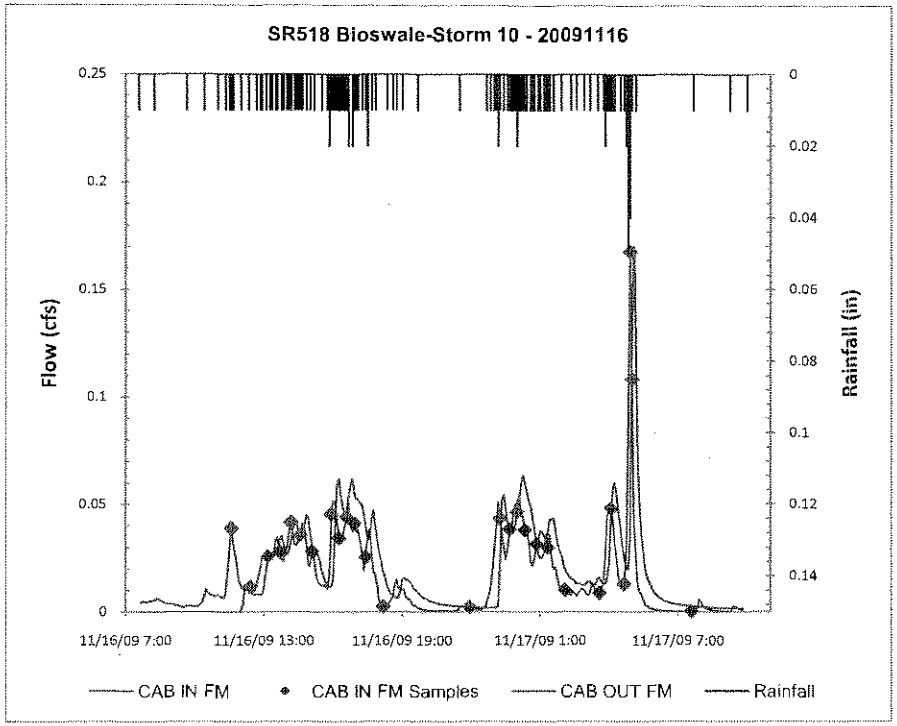
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	NA		NA		
% Storm Sampled:	≥75	NA		NA		
Sampling Duration (hr):	≤36	NA		NA		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)								
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes	% Conc. Reduction	% Volume Reduction	% Load Reduction
TSS					0.50		NA		NA			NA	-6.8	NA
TKN					0.200		NA		NA			NA	-6.8	NA
Nitrate + Nitrite					0.010		NA		NA			NA	-6.8	NA
TP					0.002		NA		NA			NA	-6.8	NA
SRP					0.001		NA		NA			NA	-6.8	NA
pH					0.10		NA		NA			NA	-6.8	NA
Hardness					2.00		NA		NA			NA	-6.8	NA
Dissolved Cu					0.001		NA		NA			NA	-6.8	NA
Dissolved Zn					0.005		NA		NA			NA	-6.8	NA
Total Cu					0.001		NA		NA			NA	-6.8	NA
Total Zn					0.005		NA		NA			NA	-6.8	NA
PSD < 1 µm					NA		NA		NA			NA	-6.8	NA
PSD 1-3.9 µm					NA		NA		NA			NA	-6.8	NA
PSD 3.9-62.5 µm					NA		NA		NA			NA	-6.8	NA
PSD 62.5-125 µm					NA		NA		NA			NA	-6.8	NA
PSD 125-250 µm					NA		NA		NA			NA	-6.8	NA
PSD 250-500 µm					NA		NA		NA			NA	-6.8	NA
PSD > 500 µm					NA		NA		NA			NA	-6.8	NA
TPH-diesel	0.05	U	0.05	U	0.05		0.40	J	0.43	J		0.0	-6.8	-6.8
TPH-oil	2.18		1.30		0.1		35.3		22.5			40	-6.8	36

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Compost-Amended Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257396	5257410
0.129	E (UTM)	552309	552284

Storm Information - WY2010-10

Precipitation Information

	Goal	QA	notes
Precipitation Total (in):	≥0.15	1.26	
Precipitation Duration (hr):	1.0	26.4	
Mean Precip. Intensity (in/hr):	0.03	0.048	
Max Precip Intensity (in/5 min)	NA	0.05	
Antecedent Dry Period (hr):	≥6	16.6	

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	1436		1700		
Maximum Discharge (cfs):	NA	0.171		0.172		
Flow Duration (hr):	NA	26.2		21.8		

QA Narrative:

Influent TPH concentrations were less than the 10 mg/L minimum specified in TAPE (2008).

The volume of water measured at the CAB outlet was approximately 18% greater than the CAB inlet due to higher peaks in the flow data throughout the hydrograph at the outlet station.

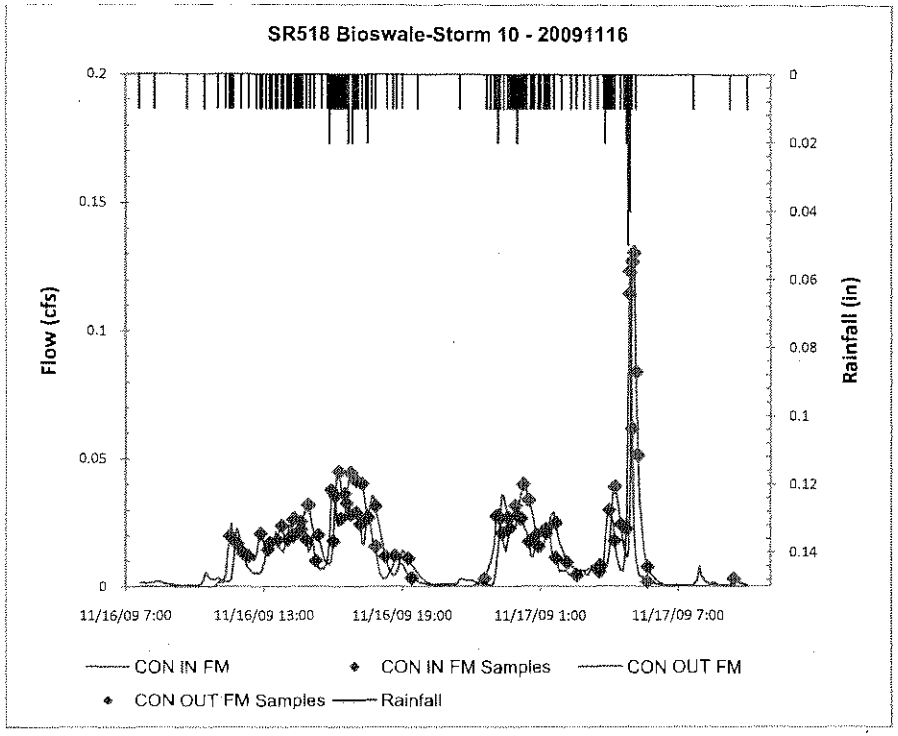
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	NA		NA		
% Storm Sampled:	≥75	NA		NA		
Sampling Duration (hr):	≤36	NA		NA		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)						% Conc. Reduction	% Volume Reduction	% Load Reduction
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes				
TSS					0.50		NA		NA				NA	-18	NA
TKN					0.200		NA		NA				NA	-18	NA
Nitrate + Nitrite					0.010		NA		NA				NA	-18	NA
TP					0.002		NA		NA				NA	-18	NA
SRP					0.001		NA		NA				NA	-18	NA
pH					0.10		NA		NA				NA	-18	NA
Hardness					2.00		NA		NA				NA	-18	NA
Dissolved Cu					0.001		NA		NA				NA	-18	NA
Dissolved Zn					0.005		NA		NA				NA	-18	NA
Total Cu					0.001		NA		NA				NA	-18	NA
Total Zn					0.005		NA		NA				NA	-18	NA
PSD < 1 µm					NA		NA		NA				NA	-18	NA
PSD 1-3.9 µm					NA		NA		NA				NA	-18	NA
PSD 3.9-62.5 µm					NA		NA		NA				NA	-18	NA
PSD 62.5-125 µm					NA		NA		NA				NA	-18	NA
PSD 125-250 µm					NA		NA		NA				NA	-18	NA
PSD 250-500 µm					NA		NA		NA				NA	-18	NA
PSD > 500 µm					NA		NA		NA				NA	-18	NA
TPH-diesel	0.05	U	0.05	U	0.05		1.02	J	1.20	J			0.0	-18	-18
TPH-oil	3.14		0.51		0.1		128		24.5				84	-18	81

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Control Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257413	5257413
0.129	E (UTM)	552279	552252

Storm Information - WY2010-10

Precipitation Information

	Goal		QA	notes
Precipitation Total (in):	≥0.15	1.26		
Precipitation Duration (hr):	1.0	26.4		
Mean Precip. Intensity (in/hr):	0.03	0.048		
Max Precip Intensity (in/5 min)	NA	0.05		
Antecedent Dry Period (hr):	≥6	16.6		

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	951.5		1188		
Maximum Discharge (cfs):	NA	0.126		0.132		
Flow Duration (hr):	NA	26.5		19.3		

QA Narrative:

Influent TPH concentrations were less than the 10 mg/L minimum specified in TAPE (2008).

The volume of water measured at the Control bioswale outlet was approximately 25% greater than the Control bioswale inlet due to higher peaks in the flow data throughout the hydrograph at the outlet station.

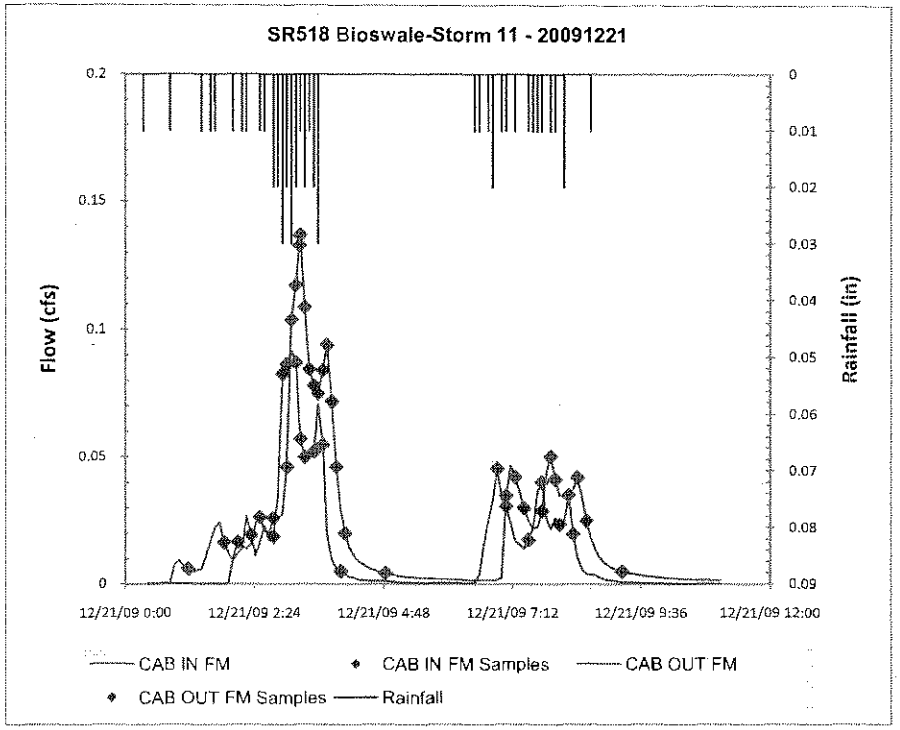
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	NA		NA		
% Storm Sampled:	≥75	NA		NA		
Sampling Duration (hr):	≤36	NA		NA		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)								
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes	% Conc. Reduction	% Volume Reduction	% Load Reduction
TSS					0.50		NA		NA			NA	-25	NA
TKN					0.200		NA		NA			NA	-25	NA
Nitrate + Nitrite					0.010		NA		NA			NA	-25	NA
TP					0.002		NA		NA			NA	-25	NA
SRP					0.001		NA		NA			NA	-25	NA
pH					0.10		NA		NA			NA	-25	NA
Hardness					2.00		NA		NA			NA	-25	NA
Dissolved Cu					0.001		NA		NA			NA	-25	NA
Dissolved Zn					0.005		NA		NA			NA	-25	NA
Total Cu					0.001		NA		NA			NA	-25	NA
Total Zn					0.005		NA		NA			NA	-25	NA
PSD < 1 µm					NA		NA		NA			NA	-25	NA
PSD 1-3.9 µm					NA		NA		NA			NA	-25	NA
PSD 3.9-62.5 µm					NA		NA		NA			NA	-25	NA
PSD 62.5-125 µm					NA		NA		NA			NA	-25	NA
PSD 125-250 µm					NA		NA		NA			NA	-25	NA
PSD 250-500 µm					NA		NA		NA			NA	-25	NA
PSD > 500 µm					NA		NA		NA			NA	-25	NA
TPH-diesel	0.05	U	0.05	U	0.05		0.67	J	0.84	J		0.0	-25	-25
TPH-oil	4.13		1.59		0.1		111		53.5			62	-25	52

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Compost-Amended Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257396	5257410
0.129	E (UTM)	552309	552284

Storm Information - WY2010-11

Precipitation Information

	Goal	QA	notes
Precipitation Total (in):	≥0.15	0.50	
Precipitation Duration (hr):	1.0	8.3	
Mean Precip. Intensity (in/hr):	0.03	0.060	
Max Precip Intensity (in/5 min)	NA	0.03	
Antecedent Dry Period (hr):	≥6	6.2	

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	506.1		675.7		
Maximum Discharge (cfs):	NA	0.092		0.137		
Flow Duration (hr):	NA	8.4		10.3		

QA Narrative:

The volume of water measured at the CAB outlet was approximately 34% greater than the CAB inlet due to higher peaks in the flow data throughout the hydrograph at the outlet station.

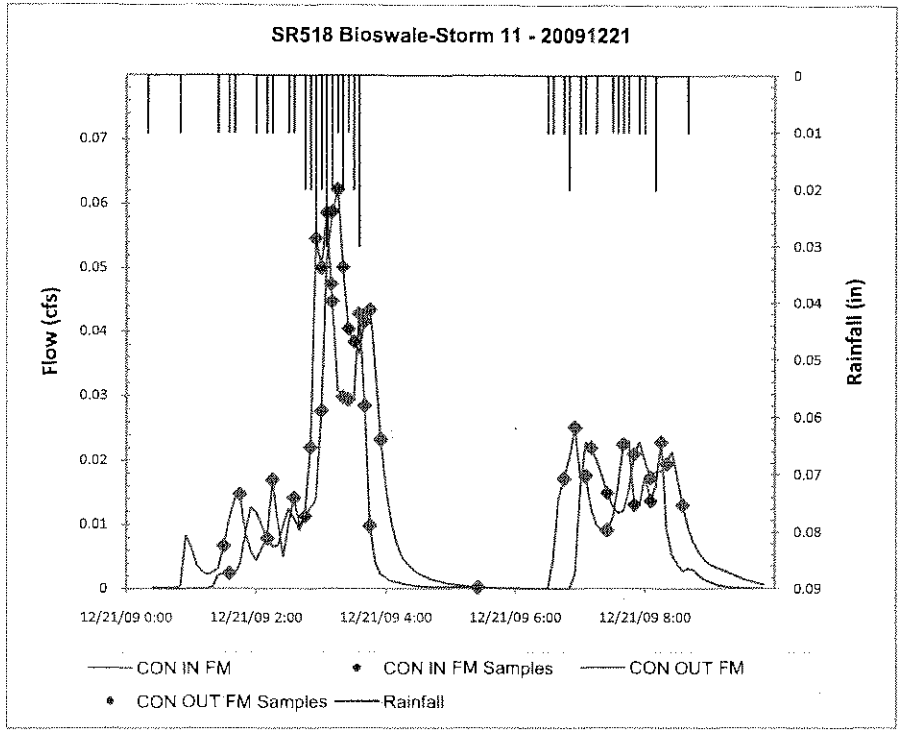
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	18		28		
% Storm Sampled:	≥75	96		97		
Sampling Duration (hr):	≤36	7.2		7.2		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)						% Conc. Reduction	% Volume Reduction	% Load Reduction
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes				
TSS	102		6.5		0.50		1462		124				94	-34	91
TKN	0.828		0.478		0.200		11.9		9.15				42	-34	23
Nitrate + Nitrite	0.118		0.411		0.010		1.69		7.86				-248	-34	-365
TP	0.141		0.341		0.002		2.02		6.52				-142	-34	-223
SRP	0.007		0.257		0.001		0.100		4.92				-3571	-34	-4802
pH	6.37		6.59		0.10		NA		NA				NA	-34	NA
Hardness	7.04		12.7		2.00		NA		NA				NA	-34	NA
Dissolved Cu	0.0054		0.0035		0.001		0.077		0.067				35	-34	13
Dissolved Zn	0.044		0.007		0.005		0.631		0.134				84	-34	79
Total Cu	0.0408		0.0065		0.001		0.585		0.124				84	-34	79
Total Zn	0.182		0.012		0.005		2.61		0.230				93	-34	91
PSD < 1 µm	10.08		1.50		NA		144		28.7				85	-34	80
PSD 1-3.9 µm	14.46		1.19		NA		207		22.8				92	-34	89
PSD 3.9-62.5 µm	68.78		0.00		NA		986		0.0				100	-34	100
PSD 62.5-125 µm	0.00		0.00		NA		0.0		0.0				NA	-34	NA
PSD 125-250 µm	0.00		0.00		NA		0.0		0.0				NA	-34	NA
PSD 250-500 µm	2.66		0.00		NA		38.1		0.0				100	-34	100
PSD > 500 µm	1.53		0.10		NA		21.9		1.91				93	-34	91
TPH-diesel					0.05		NA		NA				NA	-34	NA
TPH-oil					0.1		NA		NA				NA	-34	NA

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Control Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257413	5257413
0.129	E (UTM)	552279	552252

Storm Information - WY2010-11

Precipitation Information

	Goal	QA	notes
Precipitation Total (in):	≥0.15	0.50	
Precipitation Duration (hr):	1.0	8.3	
Mean Precip. Intensity (in/hr):	0.03	0.060	
Max Precip Intensity (in/5 min)	NA	0.03	
Antecedent Dry Period (hr):	≥6	6.2	

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	298.8		339.0		
Maximum Discharge (cfs):	NA	0.059		0.062		
Flow Duration (hr):	NA	8.3		9.1		

QA Narrative:

The volume of water measured at the CON outlet was approximately 13% greater than the CON inlet due to higher peaks in the flow data in the middle of the storm event at the outlet station.

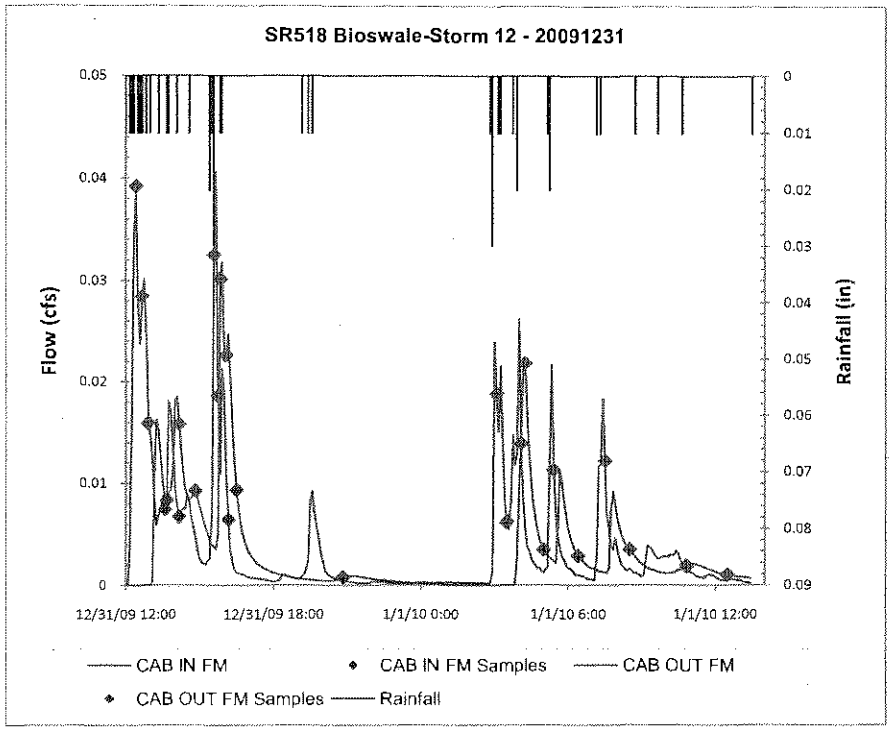
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	23		19		
% Storm Sampled:	≥75	94		95		
Sampling Duration (hr):	≤36	6.8		7.0		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)					% Conc. Reduction	% Volume Reduction	% Load Reduction
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes			
TSS	109		14.0		0.50		922		134			87	-13	85
TKN	0.905		0.760		0.200		7.66		7.29			16	-13	4.7
Nitrate + Nitrite	0.147		0.337		0.010		1.24		3.23			-129	-13	-160
TP	0.129		0.050		0.002		1.09		0.480			61	-13	56
SRP	0.006		0.009		0.001		0.051		0.086			-50	-13	-70
pH	6.56		6.55		0.10		NA		NA			NA	-13	NA
Hardness	8.01		23.5		2.00		NA		NA			NA	-13	NA
Dissolved Cu	0.0064		0.0071		0.001		0.054		0.068			-11	-13	-26
Dissolved Zn	0.052		0.089		0.005		0.440		0.854			-71	-13	-94
Total Cu	0.0443		0.011		0.001		0.375		0.106			75	-13	72
Total Zn	0.170		0.102		0.005		1.44		0.979			40	-13	32
PSD < 1 µm	11.20		9.63		NA		94.7		92.4			14	-13	2.4
PSD 1-3.9 µm	15.53		6.81		NA		131		65.4			56	-13	50
PSD 3.9-62.5 µm	84.19		0.00		NA		712		0.0			100	-13	100
PSD 62.5-125 µm	0.00		0.00		NA		0.0		0.0			NA	-13	NA
PSD 125-250 µm	0.00		0.00		NA		0.0		0.0			NA	-13	NA
PSD 250-500 µm	5.63		0.31		NA		47.6		3.0			94	-13	94
PSD > 500 µm	5.73		0.21		NA		48.5		2.0			96	-13	96
TPH-diesel					0.05		NA		NA			NA	-13	NA
TPH-oil					0.1		NA		NA			NA	-13	NA

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Compost-Amended Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257396	5257410
0.129	E (UTM)	552309	552284

Storm Information - WY2010-12

Precipitation Information

	Goal		QA	notes
Precipitation Total (in):	≥0.15	0.42		
Precipitation Duration (hr):	1.0	22.7		7.7 hour gap in rainfall
Mean Precip. Intensity (in/hr):	0.03	0.033		
Max Precip Intensity (in/5 min)	NA	0.03		
Antecedent Dry Period (hr):	≥6	38.3		

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	375.0		295.9		
Maximum Discharge (cfs):	NA	0.041		0.032		
Flow Duration (hr):	NA	25.0		22.9		

QA Narrative:

Influent TPH concentrations were less than the 10 mg/L minimum specified in TAPE (2008).

Sample volume at CAB Out was insufficient to run all analyses, thus PSD was not analyzed for CAB Out for this storm event.

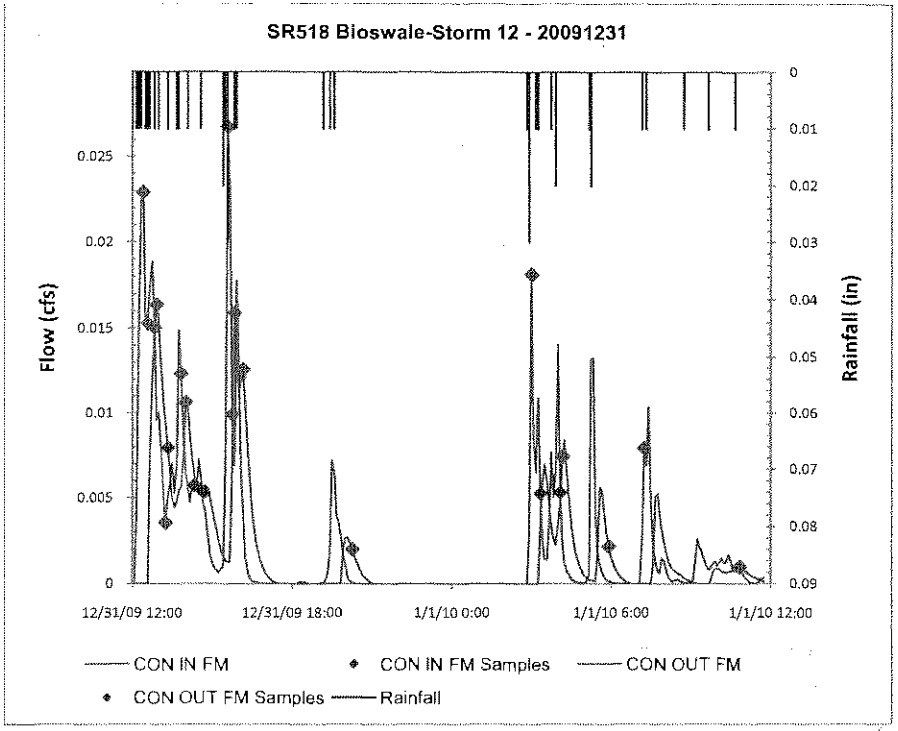
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	14		12		
% Storm Sampled:	≥75	94		91		
Sampling Duration (hr):	≤36	22.4		22.8		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)								
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes	% Conc. Reduction	% Volume Reduction	% Load Reduction
TSS	93.0		2.7		0.50		988		22.6			97	21	98
TKN	1.89		0.733		0.200		20.1		6.14			61	21	69
Nitrate + Nitrite	0.227		1.230		0.010		2.41		10.3			-442	21	-328
TP	0.142		0.300		0.002		1.51		2.51			-111	21	-67
SRP	0.002		0.223		0.001		0.021		1.87			-11050	21	-8699
pH	6.77		6.82		0.10		NA		NA			NA	21	NA
Hardness	27.6		75.8		2.00		NA		NA			NA	21	NA
Dissolved Cu	0.0145		0.0037		0.001		0.154		0.031			74	21	80
Dissolved Zn	0.111		0.014		0.005		1.18		0.117			87	21	90
Total Cu	0.0371		0.0047		0.001		0.394		0.039			87	21	90
Total Zn	0.218		0.016		0.005		2.31		0.134			93	21	94
PSD < 1 µm	10.02				NA	Not analyzed at CAB Out	106		NA			NA	21	NA
PSD 1-3.9 µm	14.49				NA	Not analyzed at CAB Out	154		NA			NA	21	NA
PSD 3.9-62.5 µm	74.73				NA	Not analyzed at CAB Out	794		NA			NA	21	NA
PSD 62.5-125 µm	0.00				NA	Not analyzed at CAB Out	0.0		NA			NA	21	NA
PSD 125-250 µm	0.00				NA	Not analyzed at CAB Out	0.0		NA			NA	21	NA
PSD 250-500 µm	2.97				NA	Not analyzed at CAB Out	31.5		NA			NA	21	NA
PSD > 500 µm	5.22				NA	Not analyzed at CAB Out	55.4		NA			NA	21	NA
TPH-diesel	0.20	U	0.05	U	0.05		1.06	J	0.21	J		75	21	80
TPH-oil	4.70		0.38		0.1		49.9		3.18			92	21	94

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Control Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257413	5257413
0.129	E (UTM)	552279	552252

Storm Information - WY2010-12

Precipitation Information

	Goal		QA	notes
Precipitation Total (in):	≥0.15	0.42		
Precipitation Duration (hr):	1.0	22.7		7.7 hour gap in rainfall
Mean Precip. Intensity (in/hr):	0.03	0.033		
Max Precip Intensity (in/5 min)	NA	0.03		
Antecedent Dry Period (hr):	≥6	38.3		

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	203.2		159.9		
Maximum Discharge (cfs):	NA	0.027		0.016		
Flow Duration (hr):	NA	14.8		14.0		

QA Narrative:

Influent TPH concentrations were less than the 10 mg/L minimum specified in TAPE (2008).

Sample volume at CON Out was insufficient to run all analyses, thus PSD was not analyzed for CON Out for this storm event.

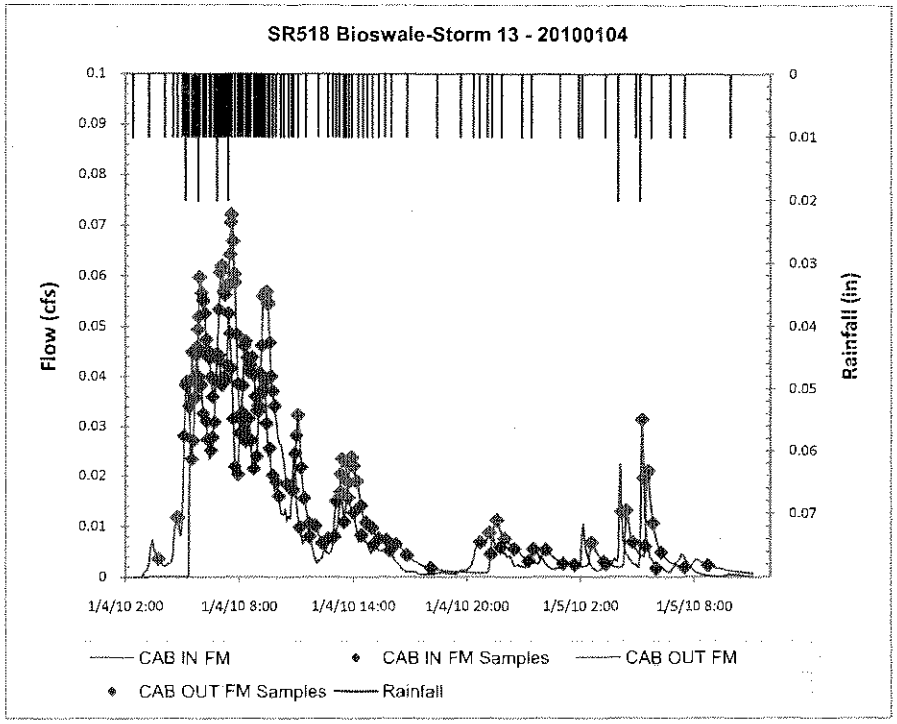
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	14		9	j	< 10 aliquot goal
% Storm Sampled:	≥75	93		84		
Sampling Duration (hr):	≤36	22.4		17.0		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)					% Conc. Reduction	% Volume Reduction	% Load Reduction
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes			
TSS	118		20.0		0.50		679		90.6			83	21	87
TKN	1.87		1.50		0.200		10.8		6.79			20	21	37
Nitrate + Nitrite	0.276		0.489		0.010		1.59		2.21			-77	21	-39
TP	0.172		0.073		0.002		0.990		0.331			58	21	67
SRP	0.006		0.006		0.001		0.035		0.027			0	21	21
pH	6.76		6.68		0.10		NA		NA			NA	21	NA
Hardness	29.7		39.5		2.00		NA		NA			NA	21	NA
Dissolved Cu	0.0159		0.0116		0.001		0.091		0.053			27	21	43
Dissolved Zn	0.108		0.151		0.005		0.621		0.684			-40	21	-10
Total Cu	0.0435		0.0148		0.001		0.250		0.067			66	21	73
Total Zn	0.254		0.159		0.005		1.46		0.720			37	21	51
PSD < 1 µm	10.92				NA	Not analyzed at Con Out	62.8		NA			NA	21	NA
PSD 1-3.9 µm	14.78				NA	Not analyzed at Con Out	85.0		NA			NA	21	NA
PSD 3.9-62.5 µm	91.64				NA	Not analyzed at Con Out	527		NA			NA	21	NA
PSD 62.5-125 µm	0.00				NA	Not analyzed at Con Out	0.0		NA			NA	21	NA
PSD 125-250 µm	0.00				NA	Not analyzed at Con Out	0.0		NA			NA	21	NA
PSD 250-500 µm	3.31				NA	Not analyzed at Con Out	19.0		NA			NA	21	NA
PSD > 500 µm	3.20				NA	Not analyzed at Con Out	18.4		NA			NA	21	NA
TPH-diesel	0.19	U	0.05	U	0.05		0.55	J	0.11	J		73.7	21	79
TPH-oil	4.52		1.25		0.1		26.0		5.66			72	21	78

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Compost-Amended Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257396	5257410
0.129	E (UTM)	552309	552284

Storm Information - WY2010-13

Precipitation Information

	Goal	QA	notes
Precipitation Total (in):	≥0.15	1.04	
Precipitation Duration (hr):	1.0	31.5	
Mean Precip. Intensity (in/hr):	0.03	0.033	
Max Precip Intensity (in/5 min)	NA	0.02	
Antecedent Dry Period (hr):	≥6	38.8	

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	992.2		1324		
Maximum Discharge (cfs):	NA	0.053		0.072		
Flow Duration (hr):	NA	29.6		29.8		

QA Narrative:

Influent TPH concentrations were less than the 10 mg/L minimum specified in TAPE (2008).

The volume of water measured at the CAB outlet was approximately 33% greater than the CAB inlet due to higher peaks in the flow data throughout the hydrograph at the outlet station.

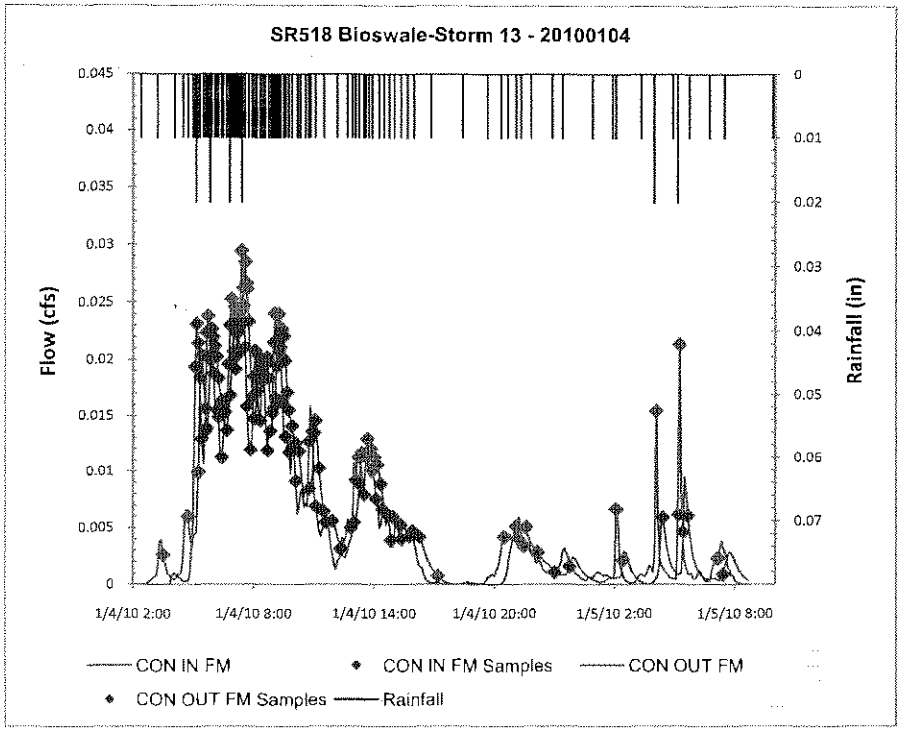
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	74		106		
% Storm Sampled:	≥75	97		98		
Sampling Duration (hr):	≤36	26.3		27.3		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)					% Conc. Reduction	% Volume Reduction	% Load Reduction
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes			
TSS	64.0		5.8		0.50		1798		217			91	-33	88
TKN	0.786		0.480		0.200		22.1		18.0			39	-33	19
Nitrate + Nitrite	0.457		0.415		0.010		12.8		15.6			9.2	-33	-21
TP	0.103		0.297		0.002		2.89		11.1			-188	-33	-285
SRP	0.002		0.228		0.001		0.056		8.55			-11300	-33	-15111
pH	5.87		6.35		0.10		NA		NA			NA	-33	NA
Hardness	5.47		11.90		2.00		NA		NA			NA	-33	NA
Dissolved Cu	0.0053		0.0047		0.001		0.149		0.176			11	-33	-18
Dissolved Zn	0.064		0.01		0.005		1.80		0.375			84	-33	79
Total Cu	0.0263		0.0058		0.001		0.739		0.217			78	-33	71
Total Zn	0.148		0.013		0.005		4.16		0.487			91	-33	88
PSD < 1 µm	21.86		11.64		NA		614		436			47	-33	29
PSD 1-3.9 µm	37.84		7.92		NA		1063		297			79	-33	72
PSD 3.9-62.5 µm	11.90		0.00		NA		334		0.0			100	-33	100
PSD 62.5-125 µm	0.00		0.00		NA		0.0		0.0			NA	-33	NA
PSD 125-250 µm	0.00		0.00		NA		0.0		0.0			NA	-33	NA
PSD 250-500 µm	2.34		0.66		NA		65.7		24.7			72	-33	62
PSD > 500 µm	1.48		1.43		NA		41.6		53.6			3.4	-33	-29
TPH-diesel	0.10	U	0.05	U	0.05		1.40	J	0.94	J		50	-33	33
TPH-oil	1.44		0.35		0.1		40.5		13.1			76	-33	68

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information			
Site Name	Location		
SR518 Control Bioswale		IN	OUT
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257413	5257413
0.129	E (UTM)	552279	552252

Storm Information - WY2010-13

Precipitation Information	Goal		QA	notes
Precipitation Total (in):	≥0.15	1.04		
Precipitation Duration (hr):	1.0	31.5		
Mean Precip. Intensity (in/hr):	0.03	0.033		
Max Precip Intensity (in/5 min)	NA	0.02		
Antecedent Dry Period (hr):	≥6	38.8		

Flow Information	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	559.5		583.0		
Maximum Discharge (cfs):	NA	0.029		0.029		
Flow Duration (hr):	NA	28.8		26.9		

QA Narrative:

Influent TPH concentrations were less than the 10 mg/L minimum specified in TAPE (2008).

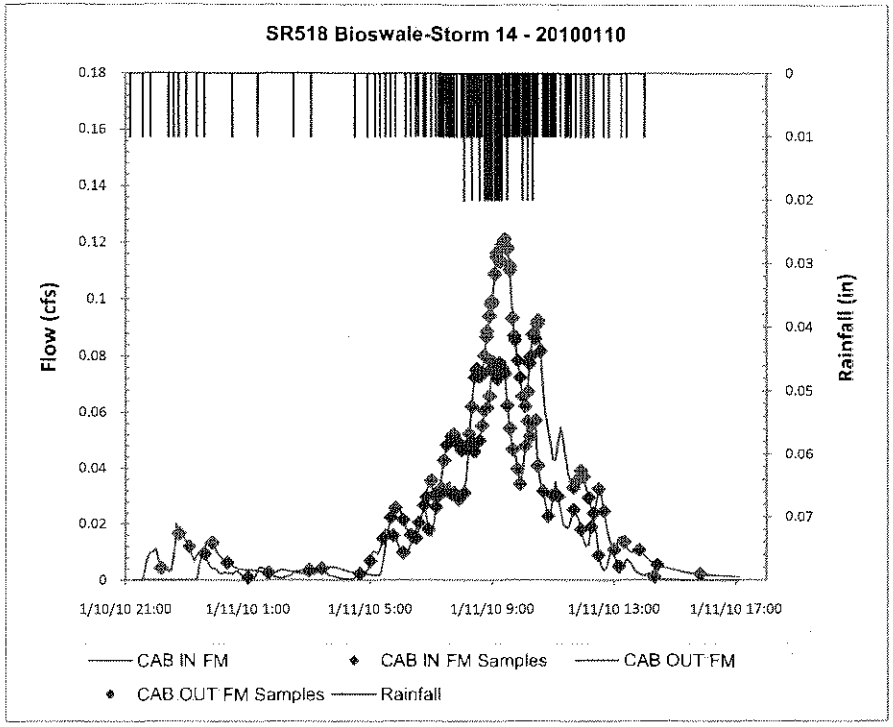
The volume of water measured at the CON outlet was approximately 4.2% greater than the CON inlet.

Sampling Information	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	72		79		
% Storm Sampled:	≥75	98		98		
Sampling Duration (hr):	≤36	27.7		26.2		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)								
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes	% Conc. Reduction	% Volume Reduction	% Load Reduction
TSS	70.0		12.0		0.50		1109		198			83	-4.2	82
TKN	0.912		0.666		0.200		14.4		11.0			27	-4.2	24
Nitrate + Nitrite	0.356		0.230		0.010		5.64		3.80			35	-4.2	33
TP	0.101		0.046		0.002		1.60		0.759			54	-4.2	53
SRP	0.003		0.007		0.001		0.048		0.116			-133	-4.2	-143
pH	6.00		6.17		0.10		NA		NA			NA	-4.2	NA
Hardness	6.25		8.40		2.00		NA		NA			NA	-4.2	NA
Dissolved Cu	0.0056		0.0064		0.001		0.089		0.106			-14	-4.2	-19
Dissolved Zn	0.056		0.043		0.005		0.887		0.710			23	-4.2	20
Total Cu	0.027		0.0088		0.001		0.428		0.145			67	-4.2	66
Total Zn	0.138		0.055		0.005		2.19		0.908			60	-4.2	58
PSD < 1 µm	9.69		7.11		NA		154		117			27	-4.2	24
PSD 1-3.9 µm	12.81		4.00		NA		203		66.0			69	-4.2	67
PSD 3.9-62.5 µm	55.69		0.00		NA		882		0.0			100	-4.2	100
PSD 62.5-125 µm	0.00		0.00		NA		0.0		0.0			NA	-4.2	NA
PSD 125-250 µm	0.00		0.00		NA		0.0		0.0			NA	-4.2	NA
PSD 250-500 µm	2.00		0.78		NA		31.7		12.9			61	-4.2	59
PSD > 500 µm	1.78		0.44		NA		28.2		7.3			75	-4.2	74
TPH-diesel	0.19	U	0.05	U	0.05		1.51	J	0.41	J		74	-4.2	73
TPH-oil	1.43		0.57		0.1		22.7		9.41			60	-4.2	58

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Compost-Amended Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257396	5257410
0.129	E (UTM)	552309	552284

Storm Information - WY2010-14

Precipitation Information

	Goal	QA	notes
Precipitation Total (in):	≥0.15	1.02	
Precipitation Duration (hr):	1.0	16.8	
Mean Precip. Intensity (in/hr):	0.03	0.061	
Max Precip Intensity (in/5 min)	NA	0.02	
Antecedent Dry Period (hr):	≥6	41.7	

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	1008		1554		
Maximum Discharge (cfs):	NA	0.079		0.121		
Flow Duration (hr):	NA	16.9		17.8		

QA Narrative:

Influent TP concentrations were less than the 0.1 mg/L minimum specified in TAPE (2008). Influent TPH concentrations were less than the 10 mg/L minimum specified in TAPE (2008).

The volume of water measured at the CAB outlet was approximately 54% greater than the CAB inlet due to higher peaks in the flow data throughout the hydrograph at the outlet station.

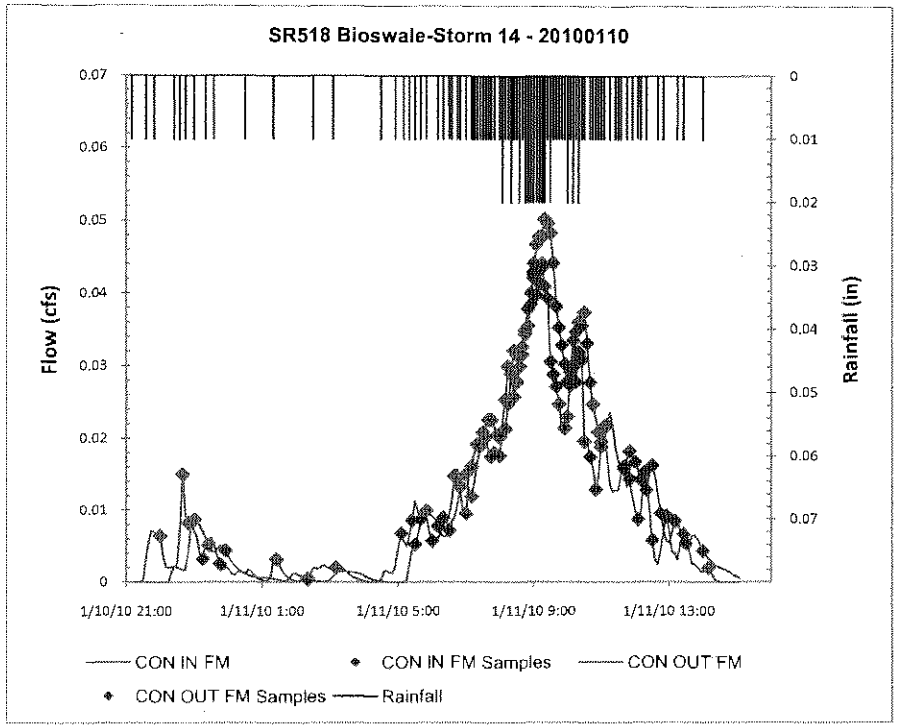
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	57		76		
% Storm Sampled:	≥75	98		98		
Sampling Duration (hr):	≤36	16.2		16.0		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)								
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes	% Conc. Reduction	% Volume Reduction	% Load Reduction
TSS	107		4.8		0.50		3053		211			96	-54	93
TKN	0.379		0.249		0.200		10.8		11.0			34	-54	-1.3
Nitrate + Nitrite	0.163		0.373		0.010		4.65		16.4			-129	-54	-253
TP	0.099		0.212		0.002		2.82		9.33			-114	-54	-230
SRP	0.003		0.178		0.001		0.086		7.83			-5833	-54	-9051
pH	6.11		6.44		0.10		NA		NA			NA	-54	NA
Hardness	5.86		9.38		2.00		NA		NA			NA	-54	NA
Dissolved Cu	0.0060		0.0045		0.001		0.171		0.198			25	-54	-16
Dissolved Zn	0.047		0.008		0.005		1.34		0.352			83	-54	74
Total Cu	0.0222		0.0057		0.001		0.633		0.251			74	-54	60
Total Zn	0.104		0.01		0.005		2.97		0.440			90	-54	85
PSD < 1 µm	63.48		3.77		NA		1811		166			94	-54	91
PSD 1-3.9 µm	45.03		2.29		NA		1285		101			95	-54	92
PSD 3.9-62.5 µm	0.00		0.00		NA		0.0		0.0			NA	-54	NA
PSD 62.5-125 µm	0.00		0.00		NA		0.0		0.0			NA	-54	NA
PSD 125-250 µm	0.00		0.00		NA		0.0		0.0			NA	-54	NA
PSD 250-500 µm	8.38		3.25		NA		239		143			61	-54	40
PSD > 500 µm	1.79		1.68		NA		51.1		73.9			6.1	-54	-45
TPH-diesel	0.05	U	0.05	U	0.05		0.71	J	1.10	J		0.0	-54	-54
TPH-oil	1.28		0.39		0.1		36.5		17.2			70	-54	53

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Control Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257413	5257413
0.129	E (UTM)	552279	552252

Storm Information - WY2010-14

Precipitation Information

	Goal	QA	notes
Precipitation Total (in):	≥0.15	1.02	
Precipitation Duration (hr):	1.0	16.8	
Mean Precip. Intensity (in/hr):	0.03	0.061	
Max Precip Intensity (in/5 min)	NA	0.02	
Antecedent Dry Period (hr):	≥6	41.7	

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	601.2		672.5		
Maximum Discharge (cfs):	NA	0.045		0.051		
Flow Duration (hr):	NA	16.9		17.4		

QA Narrative:

Influent TPH concentrations were less than the 10 mg/L minimum specified in TAPE (2008).

The volume of water measured at the CON outlet was approximately 12% greater than the CON inlet due to higher peaks in the flow data throughout the hydrograph at the outlet station.

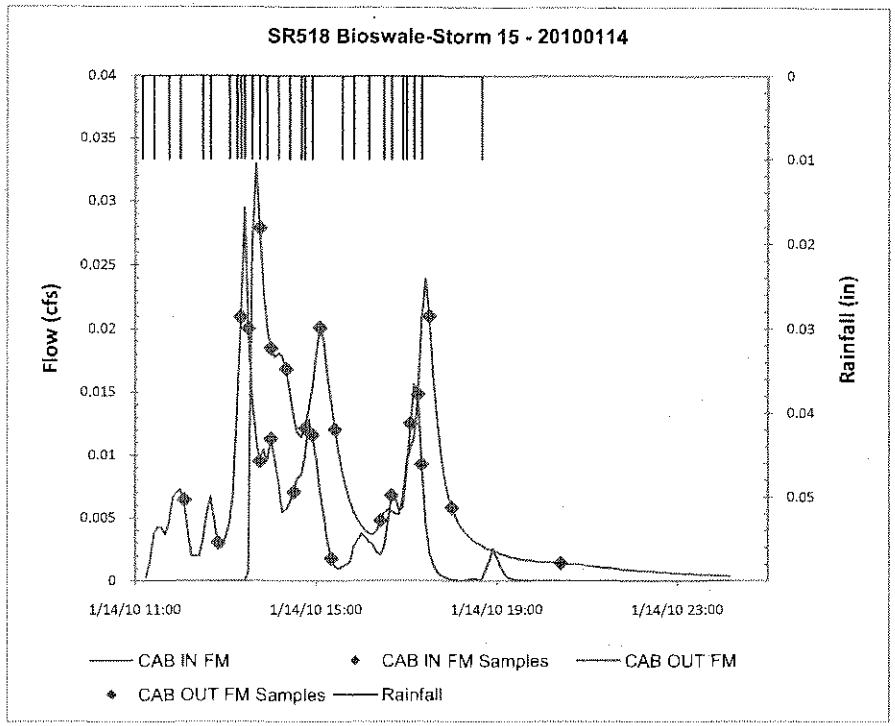
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	64		64		
% Storm Sampled:	≥75	98		98		
Sampling Duration (hr):	≤36	16.2		15.0		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)					% Conc. Reduction	% Volume Reduction	% Load Reduction
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes			
TSS	116		12.0		0.50		1975		228			90	-12	88
TKN	0.475		0.315		0.200		8.09		6.00			34	-12	26
Nitrate + Nitrite	0.150		0.142		0.010		2.55		2.70			5.3	-12	-5.9
TP	0.115		0.032		0.002		1.96		0.609			72	-12	69
SRP	0.003		0.005		0.001		0.051		0.095			-67	-12	-86
pH	6.22		6.35		0.10		NA		NA			NA	-12	NA
Hardness	4.89		5.47		2.00		NA		NA			NA	-12	NA
Dissolved Cu	0.0037		0.0043		0.001		0.063		0.082			-16	-12	-30
Dissolved Zn	0.038		0.028		0.005		0.647		0.533			26	-12	18
Total Cu	0.0239		0.0078		0.001		0.407		0.149			67	-12	63
Total Zn	0.108		0.036		0.005		1.84		0.685			67	-12	63
PSD < 1 µm	68.50		5.81		NA		1166		111			92	-12	91
PSD 1-3.9 µm	53.60		3.38		NA		913		64.4			94	-12	93
PSD 3.9-62.5 µm	0.00		0.00		NA		0.0		0.0			NA	-12	NA
PSD 62.5-125 µm	0.00		0.00		NA		0.0		0.0			NA	-12	NA
PSD 125-250 µm	0.00		0.00		NA		0.0		0.0			NA	-12	NA
PSD 250-500 µm	1.77		2.36		NA		30.1		44.9			-33	-12	-49
PSD > 500 µm	5.10		0.00		NA		86.8		0.0			100	-12	100
TPH-diesel	0.05	U	0.05	U	0.05		0.43	J	0.48	J		0.0	-12	-12
TPH-oil	0.95		0.47		0.1		16.2		8.95			51	-12	45

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Compost-Amended Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257396	5257410
0.129	E (UTM)	552309	552284

Storm Information - WY2010-15

Precipitation Information

	Goal		QA	notes
Precipitation Total (in):	≥0.15	0.28		
Precipitation Duration (hr):	1.0	7.5		
Mean Precip. Intensity (in/hr):	0.03	0.037		
Max Precip Intensity (in/5 min)	NA	0.01		
Antecedent Dry Period (hr):	≥6	16.0		

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	154.2		237.2		
Maximum Discharge (cfs):	NA	0.030		0.032		
Flow Duration (hr):	NA	8.2		10.8		

QA Narrative:

Influent TPH concentrations were less than the 10 mg/L minimum specified in TAPE (2008).

The volume of water measured at the CAB outlet was approximately 54% greater than the CAB inlet due to higher peaks in the flow data throughout the hydrograph at the outlet station.

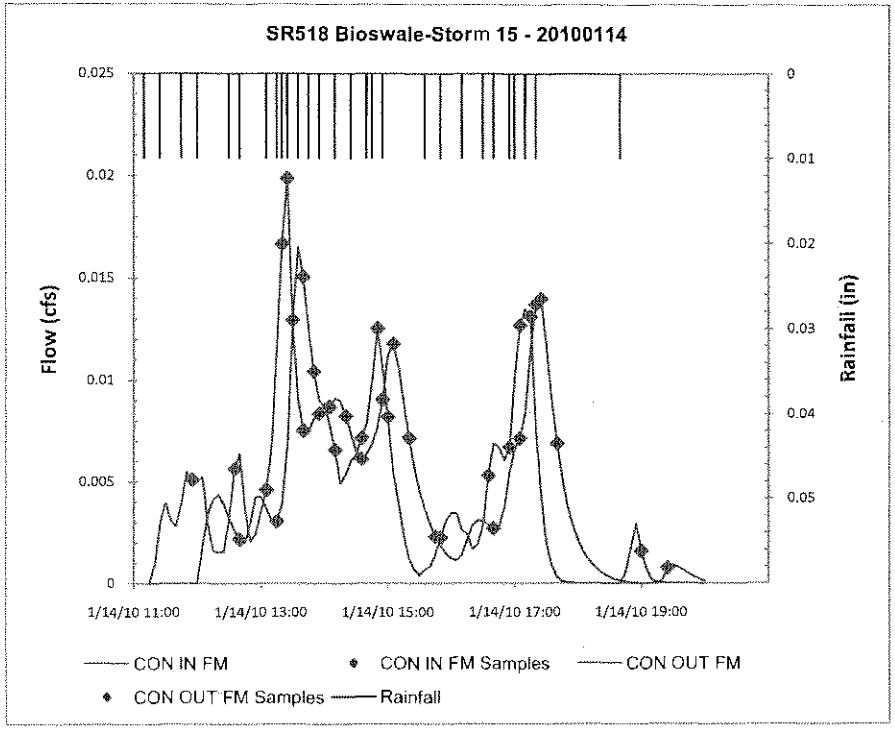
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	12		11		
% Storm Sampled:	≥75	88		88		
Sampling Duration (hr):	≤36	5.3		6.7		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)								
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes	% Conc. Reduction	% Volume Reduction	% Load Reduction
TSS	107		2.5		0.50		467		16.8			98	-54	96
TKN	0.981		0.352		0.200		4.28		2.36			64	-54	45
Nitrate + Nitrite	0.188		0.847		0.010		0.821		5.69			-351	-54	-593
TP	0.138		0.331		0.002		0.602		2.22			-140	-54	-269
SRP	0.008		0.243		0.001		0.035		1.63			-2938	-54	-4573
pH	6.42		6.83		0.10		NA		NA			NA	-54	NA
Hardness	7.82		15.60		2.00		NA		NA			NA	-54	NA
Dissolved Cu	0.0060		0.0038		0.001		0.026		0.026			37	-54	2.6
Dissolved Zn	0.054		0.008		0.005		0.236		0.054			85	-54	77
Total Cu	0.033		0.0044		0.001		0.144		0.030			87	-54	79
Total Zn	0.161		0.008		0.005		0.703		0.054			95	-54	92
PSD < 1 µm	39.52		0.00		NA		173		0.00			100	-54	100
PSD 1-3.9 µm	25.37		0.00		NA		111		0.0			100	-54	100
PSD 3.9-62.5 µm	0.00		0.87		NA		0.0		5.84			NA	-54	NA
PSD 62.5-125 µm	0.00		0.15		NA		0.0		1.01			NA	-54	NA
PSD 125-250 µm	0.00		0.00		NA		0.0		0.0			NA	-54	NA
PSD 250-500 µm	8.19		6.00		NA		35.8		40.3			27	-54	-13
PSD > 500 µm	39.13		2.25		NA		171		15.1			94	-54	91
TPH-diesel	0.05	U	0.05	U	0.05		0.11	J	0.17	J		0.0	-54	-54
TPH-oil	2.62		0.44		0.1		11.4		2.96			83	-54	74

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Control Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257413	5257413
0.129	E (UTM)	552279	552252

Storm Information - WY2010-15

Precipitation Information

	Goal		QA	notes
Precipitation Total (in):	≥0.15	0.28		
Precipitation Duration (hr):	1.0	7.5		
Mean Precip. Intensity (in/hr):	0.03	0.037		
Max Precip Intensity (in/5 min)	NA	0.01		
Antecedent Dry Period (hr):	≥6	16.0		

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	129.7		134.1		
Maximum Discharge (cfs):	NA	0.021		0.018		
Flow Duration (hr):	NA	7.3		8.1		

QA Narrative:

Influent TPH concentrations were less than the 10 mg/L minimum specified in TAPE (2008).

The volume of water measured at the CON outlet was approximately 3.4% greater than the CON inlet due to higher peaks in the flow data in portions of the hydrograph at the outlet station.

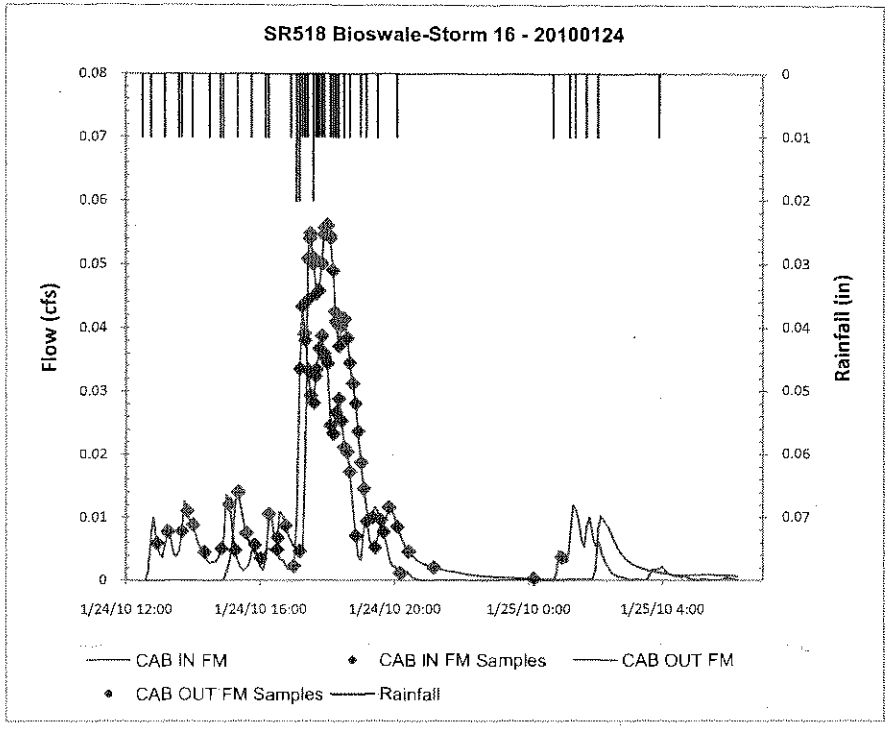
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	17		18		
% Storm Sampled:	≥75	94		94		
Sampling Duration (hr):	≤36	7.1		6.8		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)								
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes	% Conc. Reduction	% Volume Reduction	% Load Reduction
TSS	97.0		18.0		0.50		356		68.3			81	-3.4	81
TKN	1.03		0.513		0.200		3.78		1.95			50	-3.4	48
Nitrate + Nitrite	0.478	J	0.269		0.010	Field duplicate RPD > 20%	1.75	J	1.02			44	-3.4	42
TP	0.137		0.055		0.002		0.503		0.209			60	-3.4	58
SRP	0.003		0.005		0.001		0.011		0.019			-67	-3.4	-72
pH	6.78		6.00		0.10		NA		NA			NA	-3.4	NA
Hardness	8.79		9.38		2.00		NA		NA			NA	-3.4	NA
Dissolved Cu	0.0063		0.0069		0.001		0.023		0.026			-10	-3.4	-13
Dissolved Zn	0.056		0.053		0.005		0.206		0.201			5.4	-3.4	2.1
Total Cu	0.0411		0.0111		0.001		0.151		0.042			73	-3.4	72
Total Zn	0.179		0.063		0.005		0.657		0.239			65	-3.4	64
PSD < 1 µm	1.04		13.11		NA		3.82		49.8			-1161	-3.4	-1204
PSD 1-3.9 µm	3.85		6.63		NA		14.1		25.2			-72	-3.4	-78
PSD 3.9-62.5 µm	43.54		0.00		NA		160		0.0			100	-3.4	100
PSD 62.5-125 µm	10.12		0.00		NA		37.2		0.0			100	-3.4	100
PSD 125-250 µm	0.27		0.00		NA		0.99		0.0			100	-3.4	100
PSD 250-500 µm	3.66		9.00		NA		13.4		34.2			-146	-3.4	-154
PSD > 500 µm	1.89		6.08		NA		6.94		23.1			-222	-3.4	-233
TPH-diesel	0.05	U	0.05	U	0.05		0.09	J	0.09	J		0.0	-3.4	-3.4
TPH-oil	3.49		0.89		0.1		12.8		3.38			74	-3.4	74

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Compost-Amended Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257396	5257410
0.129	E (UTM)	552309	552284

Storm Information - WY2010-16

Precipitation Information

	Goal		QA	notes
Precipitation Total (in):	≥0.15	0.38		
Precipitation Duration (hr):	1.0	12.3		
Mean Precip. Intensity (in/hr):	0.03	0.031		
Max Precip Intensity (in/5 min)	NA	0.02		
Antecedent Dry Period (hr):	≥6	28.8		

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	334.5		416.1		
Maximum Discharge (cfs):	NA	0.046		0.055		
Flow Duration (hr):	NA	13.8		15.3		

QA Narrative:

The volume of water measured at the CAB outlet was approximately 24% greater than the CAB inlet due to a larger magnitude peak in the middle of the storm hydrograph at the outlet station.

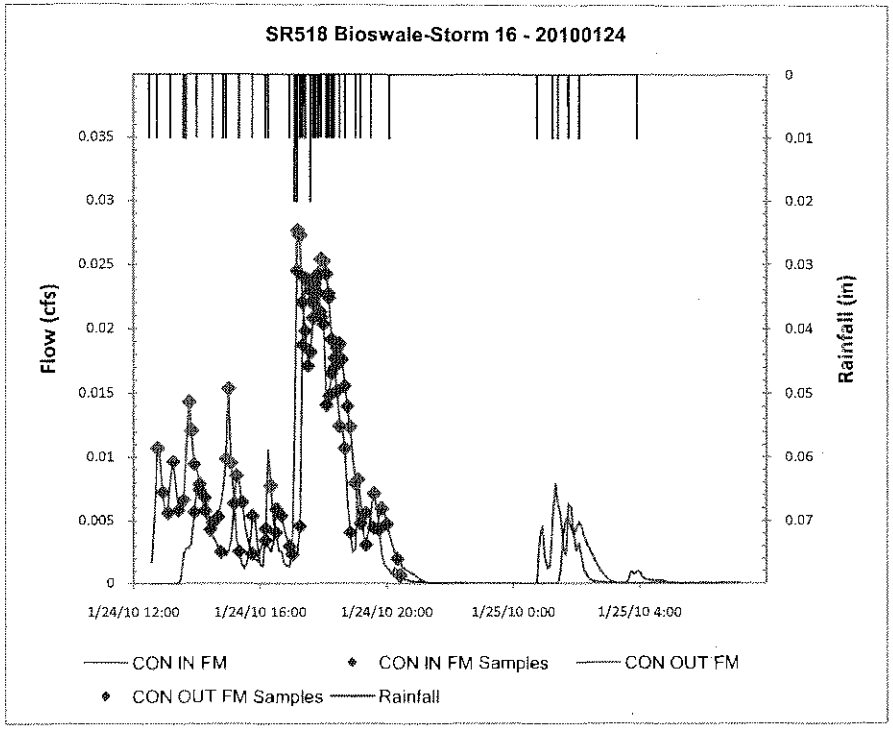
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	41		43		
% Storm Sampled:	≥75	86		89		
Sampling Duration (hr):	≤36	12.1		8.8		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)						% Conc. Reduction	% Volume Reduction	% Load Reduction
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes				
TSS	89.0		5.8		0.50		843		68.3				93	-24	92
TKN	1.64		0.952		0.200		15.5		11.2				42	-24	28
Nitrate + Nitrite	0.174		0.845		0.010		1.65		9.96				-386	-24	-504
TP	0.138		0.332		0.002		1.31		3.91				-141	-24	-199
SRP	0.007		0.233		0.001		0.066		2.75				-3229	-24	-4040
pH	6.47		6.40		0.10		NA		NA				NA	-24	NA
Hardness	5.67		13.50		2.00		NA		NA				NA	-24	NA
Dissolved Cu	0.0067		0.0043		0.001		0.063		0.051				36	-24	20
Dissolved Zn	0.053		0.011		0.005		0.502		0.130				79	-24	74
Total Cu	0.0328		0.0065		0.001		0.311		0.077				80	-24	75
Total Zn	0.178		0.015		0.005		1.69		0.177				92	-24	90
PSD < 1 µm	22.74		5.94		NA		215		70.0				74	-24	68
PSD 1-3.9 µm	67.85		0.00		NA		643		0.0				100	-24	100
PSD 3.9-62.5 µm	0.00		0.00		NA		0.0		0.0				NA	-24	NA
PSD 62.5-125 µm	0.00		0.00		NA		0.0		0.0				NA	-24	NA
PSD 125-250 µm	0.00		0.00		NA		0.0		0.0				NA	-24	NA
PSD 250-500 µm	4.10		0.00		NA		38.8		0.0				100	-24	100
PSD > 500 µm	5.98		0.56		NA		56.6		6.60				91	-24	88
TPH-diesel					0.05		NA		NA				NA	-24	NA
TPH-oil					0.1		NA		NA				NA	-24	NA

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location		
SR518 Control Bioswale		IN	OUT
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257413	5257413
0.129	E (UTM)	552279	552252

Storm Information - WY2010-16

Precipitation Information

	Goal	QA	notes
Precipitation Total (in):	≥0.15	0.38	
Precipitation Duration (hr):	1.0	12.3	
Mean Precip. Intensity (in/hr):	0.03	0.031	
Max Precip Intensity (in/5 min)	NA	0.02	
Antecedent Dry Period (hr):	≥6	28.8	

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	253.1		218.4		
Maximum Discharge (cfs):	NA	0.029		0.029		
Flow Duration (hr):	NA	17.8		10.5		

QA Narrative:

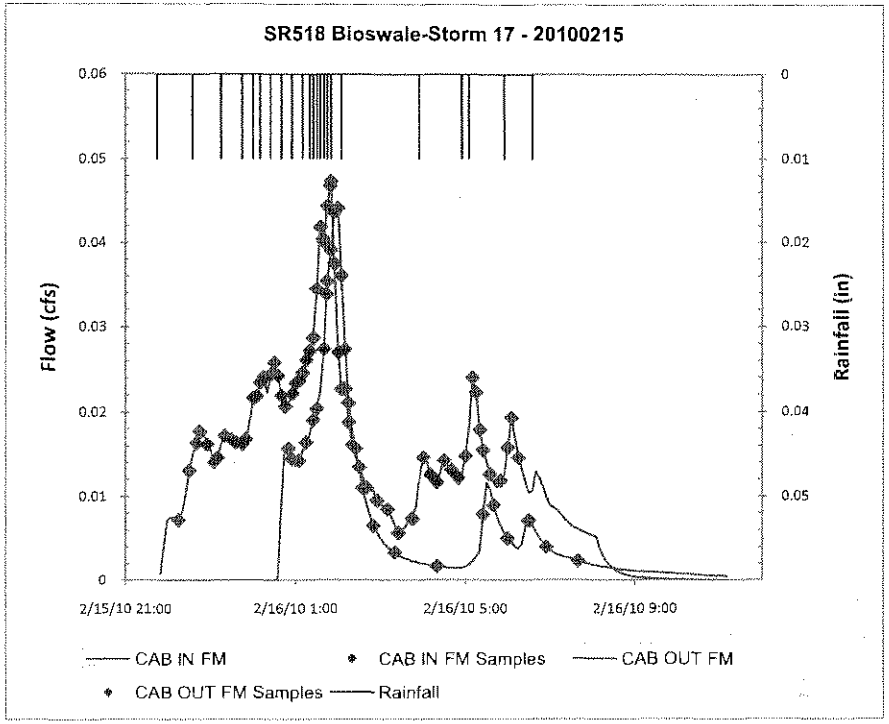
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	51		46		
% Storm Sampled:	≥75	90		90		
Sampling Duration (hr):	≤36	11.7		6.4		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)					% Conc. Reduction	% Volume Reduction	% Load Reduction
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes			
TSS	104		17.0		0.50		745		105			84	13.7	86
TKN	1.83		1.84		0.200		13.1		11.4			-0.5	13.7	13
Nitrate + Nitrite	0.264		0.305		0.010		1.89		1.89			-16	13.7	0.34
TP	0.146		0.066		0.002		1.05		0.408			55	13.7	61
SRP	0.015		0.015		0.001		0.108		0.093			0.0	13.7	14
pH	6.51		5.9		0.10		NA		NA			NA	13.7	NA
Hardness	6.84		8.60		2.00		NA		NA			NA	13.7	NA
Dissolved Cu	0.0083		0.0072		0.001		0.059		0.045			13	13.7	25
Dissolved Zn	0.051		0.048		0.005		0.366		0.297			5.9	13.7	19
Total Cu	0.0365		0.0123		0.001		0.262		0.076			66	13.7	71
Total Zn	0.185		0.061		0.005		1.33		0.377			67	13.7	72
PSD < 1 µm	25.61		17.76		NA		184		110			31	13.7	40
PSD 1-3.9 µm	71.02		0.00		NA		509		0.0			100	13.7	100
PSD 3.9-62.5 µm	0.00		0.00		NA		0.0		0.0			NA	13.7	NA
PSD 62.5-125 µm	0.00		0.00		NA		0.0		0.0			NA	13.7	NA
PSD 125-250 µm	0.00		0.00		NA		0.0		0.0			NA	13.7	NA
PSD 250-500 µm	1.89		1.11		NA		13.5		6.86			41	13.7	49
PSD > 500 µm	2.23		1.22		NA		16.0		7.54			45	13.7	53
TPH-diesel					0.05		NA		NA			NA	13.7	NA
TPH-oil					0.1		NA		NA			NA	13.7	NA

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location		
SR518 Compost-Amended Bioswale		IN	OUT
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257396	5257410
0.129	E (UTM)	552309	552284

Storm Information - WY2010-17

Precipitation Information

	Goal		QA	notes
Precipitation Total (in):	≥0.15	0.23		
Precipitation Duration (hr):	1.0	8.8		
Mean Precip. Intensity (in/hr):	0.03	0.026		
Max Precip Intensity (in/5 min)	NA	0.01		
Antecedent Dry Period (hr):	≥6	26.2		

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	574.2		244.1		
Maximum Discharge (cfs):	NA	0.047		0.044		
Flow Duration (hr):	NA	11.2		10.7		

QA Narrative:

Influent TP concentrations were less than the 0.1 mg/L minimum specified in TAPE (2008).

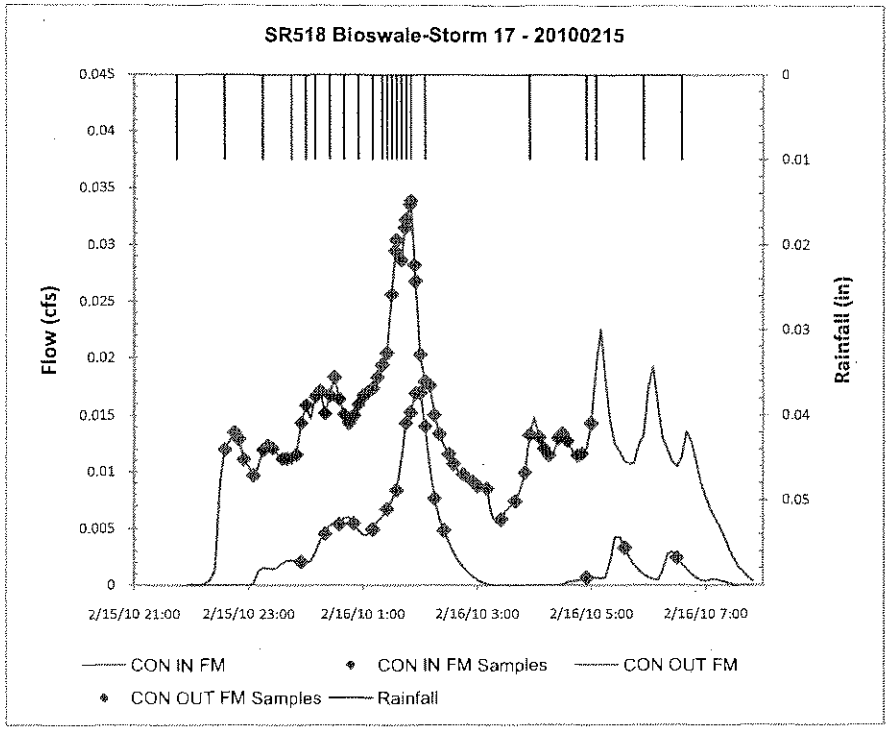
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	63		27		
% Storm Sampled:	≥75	88		91		
Sampling Duration (hr):	≤36	8.0		6.8		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)								
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes	% Conc. Reduction	% Volume Reduction	% Load Reduction
TSS	31.0		4.5		0.50		504		31.1			85	57	94
TKN	0.552		0.350		0.200		8.97		2.42			37	57	73
Nitrate + Nitrite	0.230		0.827		0.010		3.74		5.72			-260	57	-53
TP	0.078		0.416		0.002		1.27		2.87			-433	57	-127
SRP	0.003		0.308		0.001		0.049		2.13			-10167	57	-4264
pH	6.23		5.81		0.10		NA		NA			NA	57	NA
Hardness	8.99		15.80		2.00		NA		NA			NA	57	NA
Dissolved Cu	0.0047		0.0037		0.001		0.076		0.026			21	57	67
Dissolved Zn	0.039		0.008		0.005		0.634		0.055			79	57	91
Total Cu	0.0133		0.0045		0.001		0.216		0.031			66	57	86
Total Zn	0.084		0.01		0.005		1.37		0.069			88	57	95
PSD < 1 µm	10.89		4.09		NA		177		28.3			62	57	84
PSD 1-3.9 µm	21.07		3.23		NA		343		22.3			85	57	93
PSD 3.9-62.5 µm	16.03		0.00		NA		261		0.0			100	57	100
PSD 62.5-125 µm	0.00		0.00		NA		0.0		0.0			NA	57	NA
PSD 125-250 µm	0.00		0.00		NA		0.0		0.0			NA	57	NA
PSD 250-500 µm	0.47		0.00		NA		7.64		0.0			100	57	100
PSD > 500 µm	0.71		1.18		NA		11.5		8.15			-66	57	29
TPH-diesel					0.05		NA		NA			NA	57	NA
TPH-oil					0.1		NA		NA			NA	57	NA

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Control Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257413	5257413
0.129	E (UTM)	552279	552252

Storm Information - WY2010-17

Precipitation Information

	Goal	QA	notes
Precipitation Total (in):	≥0.15	0.23	
Precipitation Duration (hr):	1.0	8.8	
Mean Precip. Intensity (in/hr):	0.03	0.026	
Max Precip Intensity (in/5 min)	NA	0.01	
Antecedent Dry Period (hr):	≥6	26.2	

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	436.8		88.2		
Maximum Discharge (cfs):	NA	0.034		0.017		
Flow Duration (hr):	NA	9.9		7.3		

QA Narrative:

The flow volume at CON Out was much smaller than at CON In for this storm event; however, the total number of aliquots and sample coverage were sufficient to represent an event mean concentration for the storm event at CON Out.

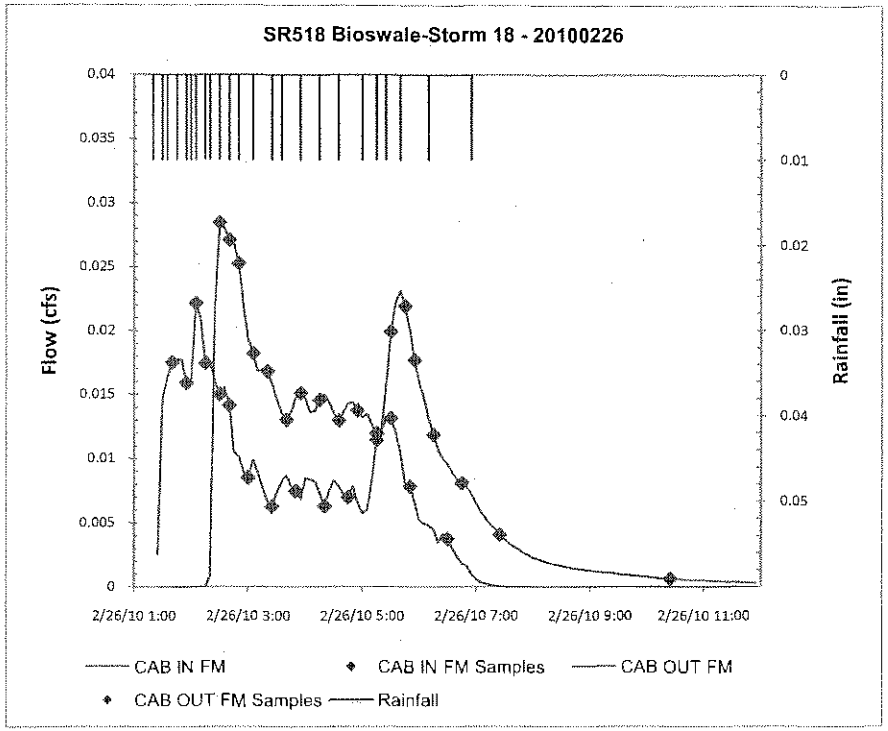
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	63		17		
% Storm Sampled:	≥75	75		92		
Sampling Duration (hr):	≤36	6.4		6.6		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)					% Conc. Reduction	% Volume Reduction	% Load Reduction
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes			
TSS	141		16.0		0.50		1744		39.9			89	80	98
TKN	0.799		0.271		0.200		9.88		0.676			66	80	93
Nitrate + Nitrite	0.265		0.182		0.010		3.28		0.454			31	80	86
TP	0.212		0.052		0.002		2.62		0.130			75	80	95
SRP	0.004		0.005		0.001		0.049		0.012			-25	80	75
pH	5.96		5.94		0.10		NA		NA			NA	80	NA
Hardness	7.43		7.82		2.00		NA		NA			NA	80	NA
Dissolved Cu	0.0058		0.0055		0.001		0.072		0.014			5.2	80	81
Dissolved Zn	0.043		0.046		0.005		0.532		0.115			-7.0	80	78
Total Cu	0.0293		0.0093		0.001		0.362		0.023			68	80	94
Total Zn	0.171		0.065		0.005		2.12		0.162			62	80	92
PSD < 1 µm	13.85		3.66		NA		171		9.14			74	80	95
PSD 1-3.9 µm	22.25		6.40		NA		275		16.0			71	80	94
PSD 3.9-62.5 µm	82.26		16.04		NA		1017		40.0			81	80	96
PSD 62.5-125 µm	0.00		0.00		NA		0.0		0.0			NA	80	NA
PSD 125-250 µm	0.00		0.00		NA		0.0		0.0			NA	80	NA
PSD 250-500 µm	4.35		0.35		NA		53.8		0.87			92	80	98
PSD > 500 µm	6.46		0.47		NA		79.9		1.2			93	80	99
TPH-diesel					0.05		NA		NA			NA	80	NA
TPH-oil					0.1		NA		NA			NA	80	NA

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information			
Site Name	Location		
SR518 Compost-Amended Bioswale		IN	OUT
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257396	5257410
0.129	E (UTM)	552309	552284

Storm Information - WY2010-18				
Precipitation Information	Goal		QA	notes
Precipitation Total (in):	≥0.15	0.24		
Precipitation Duration (hr):	1.0	5.6		
Mean Precip. Intensity (in/hr):	0.03	0.043		
Max Precip Intensity (in/5 min)	NA	0.01		
Antecedent Dry Period (hr):	≥6	20.0		

Flow Information	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	188.6		288.3		
Maximum Discharge (cfs):	NA	0.022		0.028		
Flow Duration (hr):	NA	5.8		9.7		

QA Narrative:

Influent TP concentrations were less than the 0.1 mg/L minimum specified in TAPE (2008). The volume of water measured at the CAB outlet was approximately 53% greater than the CAB inlet due to higher peaks in the flow data throughout the hydrograph at the outlet station.

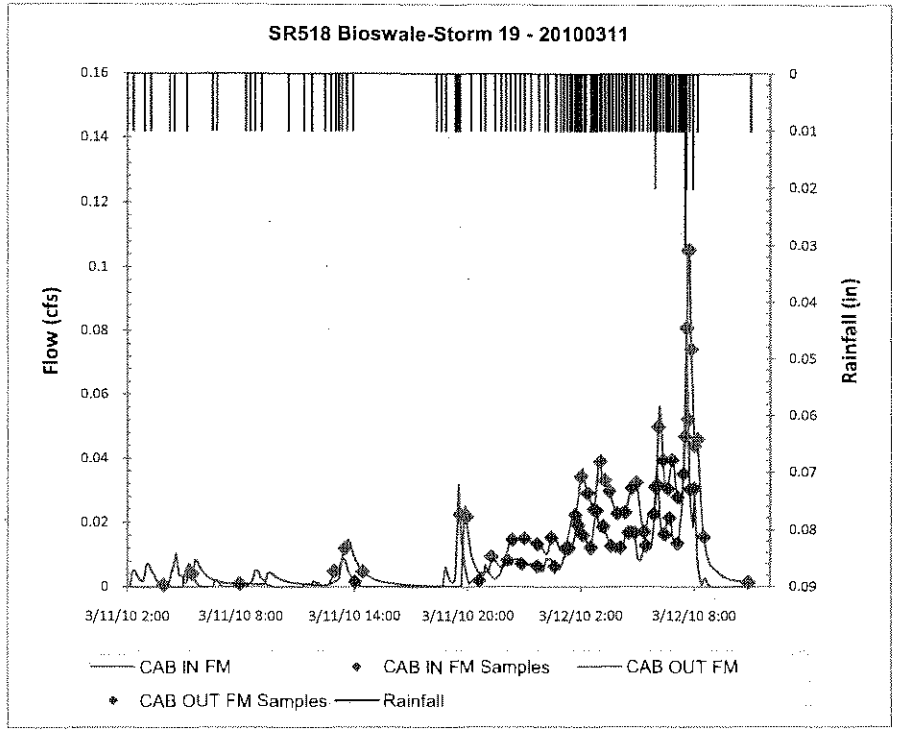
Composite samples were not collected at the Control bioswale during this storm event due to an obstruction of the inlet.

Sampling Information	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	15		18		
% Storm Sampled:	≥75	93		97		
Sampling Duration (hr):	≤36	4.8		7.9		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)					% Conc. Reduction	% Volume Reduction	% Load Reduction
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes			
TSS	46.0		7.3		0.50		246		59.6			84	-53	76
TKN	0.816		0.678		0.200		4.36		5.53			17	-53	-27
Nitrate + Nitrite	0.134		0.746		0.010		0.716		6.09			-457	-53	-751
TP	0.081		0.557		0.002		0.433		4.55			-588	-53	-951
SRP	0.006		0.429		0.001		0.032		3.50			-7050	-53	-10827
pH	6.28		6.58		0.10		NA		NA			NA	-53	NA
Hardness	5.28		16.40		2.00		NA		NA			NA	-53	NA
Dissolved Cu	0.0051		0.0048		0.001		0.027		0.039			5.9	-53	-44
Dissolved Zn	0.043		0.01		0.005		0.230		0.082			77	-53	64
Total Cu	0.0135		0.0058		0.001		0.072		0.047			57	-53	34
Total Zn	0.076		0.011		0.005		0.406		0.090			86	-53	78
PSD < 1 µm	3.14		3.92		NA		16.8		32.0			-25	-53	-91
PSD 1-3.9 µm	4.35		2.90		NA		23.2		23.7			33	-53	-1.9
PSD 3.9-62.5 µm	38.12		0.00		NA		204		0.0			100	-53	100
PSD 62.5-125 µm	0.03		0.00		NA		0.160		0.0			100	-53	100
PSD 125-250 µm	0.00		0.00		NA		0.0		0.0			NA	-53	NA
PSD 250-500 µm	3.22		3.29		NA		17.2		26.9			-2.2	-53	-56
PSD > 500 µm	2.03		1.29		NA		10.8		10.5			36	-53	2.9
TPH-diesel					0.05		NA		NA			NA	-53	NA
TPH-oil					0.1		NA		NA			NA	-53	NA

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Compost-Amended Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257396	5257410
0.129	E (UTM)	552309	552284

Storm Information - WY2010-19

Precipitation Information

	Goal		QA	notes
Precipitation Total (in):	≥0.15	1.05		
Precipitation Duration (hr):	1.0	33.0		
Mean Precip. Intensity (in/hr):	0.03	0.032		
Max Precip Intensity (in/5 min)	NA	0.030		
Antecedent Dry Period (hr):	≥6	23.4		

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	708.3		1235		
Maximum Discharge (cfs):	NA	0.081		0.105		
Flow Duration (hr):	NA	24.6		30.3		

QA Narrative:

Influent TPH concentrations were less than the 10 mg/L minimum specified in TAPE (2008).

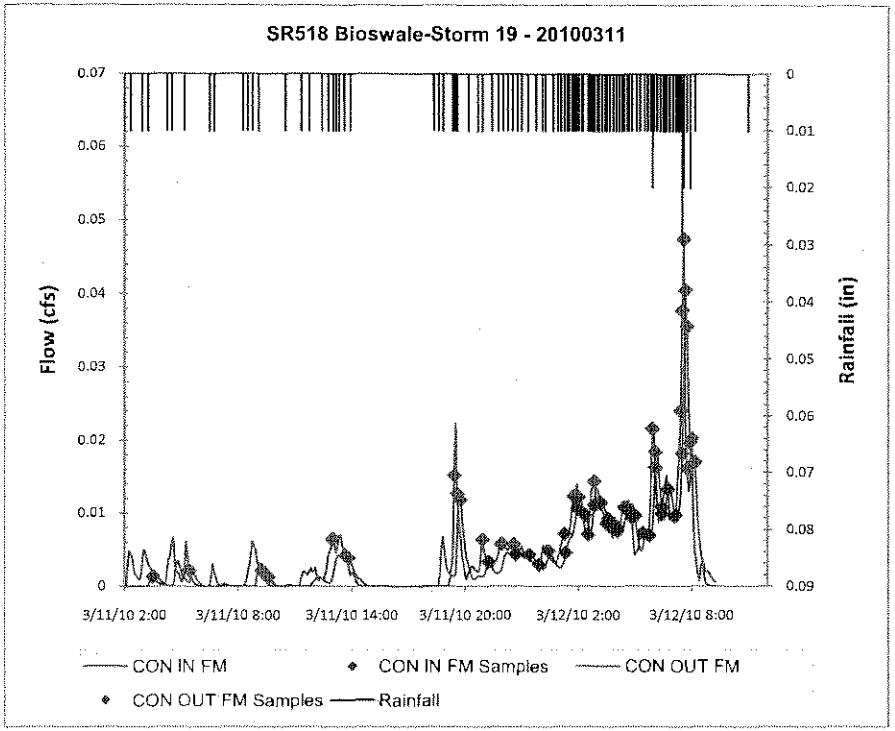
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	31		36		
% Storm Sampled:	≥75	95		97		
Sampling Duration (hr):	≤36	28.1		26.9		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)								
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes	% Conc. Reduction	% Volume Reduction	% Load Reduction
TSS	79.0		4.8		0.50		1584		168			94	-74	89
TKN	0.743		0.432		0.200		14.9		15.1			42	-74	-1.4
Nitrate + Nitrite	0.110		0.475		0.010		2.21		16.6			-332	-74	-653
TP	0.116		0.368		0.002		2.33		12.9			-217	-74	-453
SRP	0.003		0.272		0.001		0.060		9.51			-8967	-74	-15712
pH	6.10		6.65		0.10		NA		NA			NA	-74	NA
Hardness	4.10		12.50		2.00		NA		NA			NA	-74	NA
Dissolved Cu	0.0042		0.0043		0.001		0.084		0.150			-2.4	-74	-79
Dissolved Zn	0.047		0.006		0.005		0.943		0.210			87	-74	78
Total Cu	0.0219		0.0058		0.001		0.439		0.203			74	-74	54
Total Zn	0.125		0.010		0.005		2.51		0.350			92	-74	86
PSD < 1 µm	5.94		1.21		NA		119		42.3			80	-74	64
PSD 1-3.9 µm	7.95		0.87		NA		159		30.4			89	-74	81
PSD 3.9-62.5 µm	59.70		0.00		NA		1197		0.0			100	-74	100
PSD 62.5-125 µm	0.00		0.00		NA		0.0		0.0			NA	-74	NA
PSD 125-250 µm	0.00		0.00		NA		0.0		0.0			NA	-74	NA
PSD 250-500 µm	1.69		0.00		NA		33.9		0.0			100	-74	100
PSD > 500 µm	1.13		0.00		NA		22.7		0.0			100	-74	100
TPH-diesel	0.05	U	0.05	U	0.05		0.50	J	0.87	J		0.0	-74	-74
TPH-oil	1.86		0.15		0.1		37.3		5.25			92	-74	86

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Control Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257413	5257413
0.129	E (UTM)	552279	552252

Storm Information - WY2010-19

Precipitation Information

	Goal		QA	notes
Precipitation Total (in):	≥0.15	1.05		
Precipitation Duration (hr):	1.0	33.0		
Mean Precip. Intensity (in/hr):	0.03	0.032		
Max Precip Intensity (in/5 min)	NA	0.03		
Antecedent Dry Period (hr):	≥6	23.4		

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	476.7		406.7		
Maximum Discharge (cfs):	NA	0.047		0.040		
Flow Duration (hr):	NA	25.4		22.6		

QA Narrative:

Influent TPH concentrations were less than the 10 mg/L minimum specified in TAPE (2008).

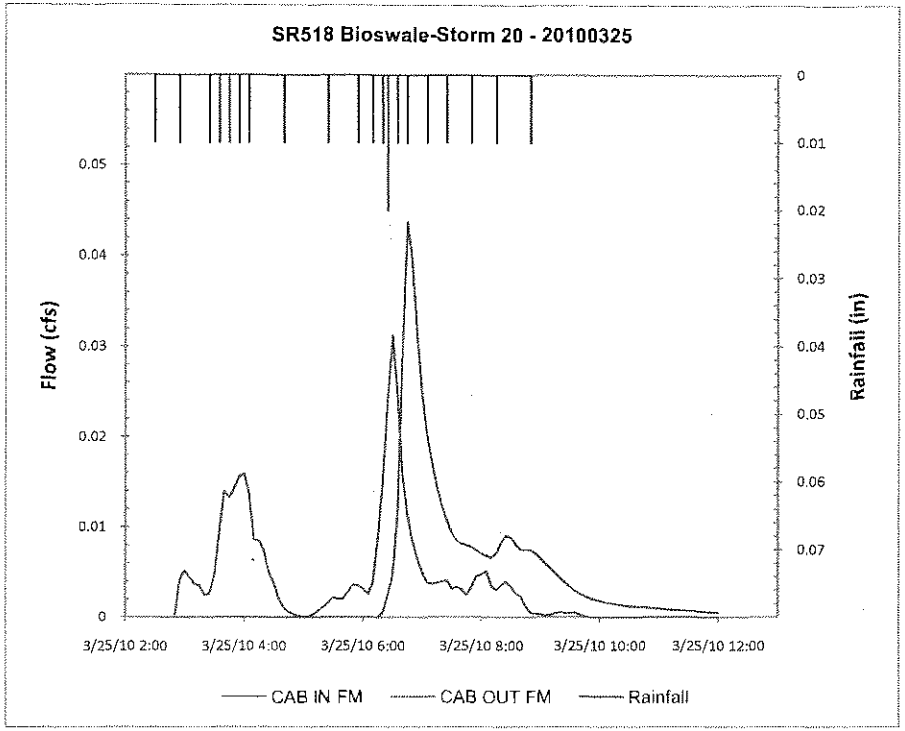
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	33		25		
% Storm Sampled:	≥75	95		92		
Sampling Duration (hr):	≤36	28.5		22.6		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)								
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes	% Conc. Reduction	% Volume Reduction	% Load Reduction
TSS	144		14.0		0.50		1944		161			90	14.7	92
TKN	0.885		0.386		0.200		11.9		4.45			56	14.7	63
Nitrate + Nitrite	0.128		0.137		0.010		1.73		1.58			-7.0	14.7	8.7
TP	0.167		0.048		0.002		2.25		0.553			71	14.7	75
SRP	0.005		0.004		0.001		0.067		0.046			20	14.7	32
pH	6.06		6.17		0.10		NA		NA			NA	14.7	NA
Hardness	4.89		6.06		2.00		NA		NA			NA	14.7	NA
Dissolved Cu	0.0046		0.0053		0.001		0.062		0.061			-15	14.7	1.7
Dissolved Zn	0.038		0.038		0.005		0.513		0.438			0.0	14.7	15
Total Cu	0.0318		0.0095		0.001		0.429		0.109			70	14.7	75
Total Zn	0.149		0.050		0.005		2.01		0.576			66	14.7	71
PSD < 1 µm	7.97		9.02		NA		108		104			-13	14.7	3.5
PSD 1-3.9 µm	10.82		6.78		NA		146		78.1			37	14.7	47
PSD 3.9-62.5 µm	90.86		0.00		NA		1227		0.0			100	14.7	100
PSD 62.5-125 µm	13.40		0.00		NA		181		0.0			100	14.7	100
PSD 125-250 µm	0.010		0.00		NA		0.13		0.0			100	14.7	100
PSD 250-500 µm	1.20		0.00		NA		16.2		0.0			100	14.7	100
PSD > 500 µm	0.00		0.00		NA		0.0		0.0			NA	14.7	NA
TPH-diesel	0.05	U	0.05	U	0.05		0.34	J	0.29	J		0.0	14.7	15
TPH-oil	3.58		1.34		0.1		48.3		15.4			63	14.7	68

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Compost-Amended Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257396	5257410
0.129	E (UTM)	552309	552284

Storm Information - WY2010-20

Precipitation Information

	Goal	QA	notes
Precipitation Total (in):	≥0.15	0.21	
Precipitation Duration (hr):	1.0	6.3	
Mean Precip. Intensity (in/hr):	0.03	0.033	
Max Precip Intensity (in/5 min)	NA	0.02	
Antecedent Dry Period (hr):	≥6	197.5	

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	126.4		141.7		
Maximum Discharge (cfs):	NA	0.031		0.044		
Flow Duration (hr):	NA	6.8		5.8		

QA Narrative:

Influent TPH concentrations were less than the 10 mg/L minimum specified in TAPE (2008).

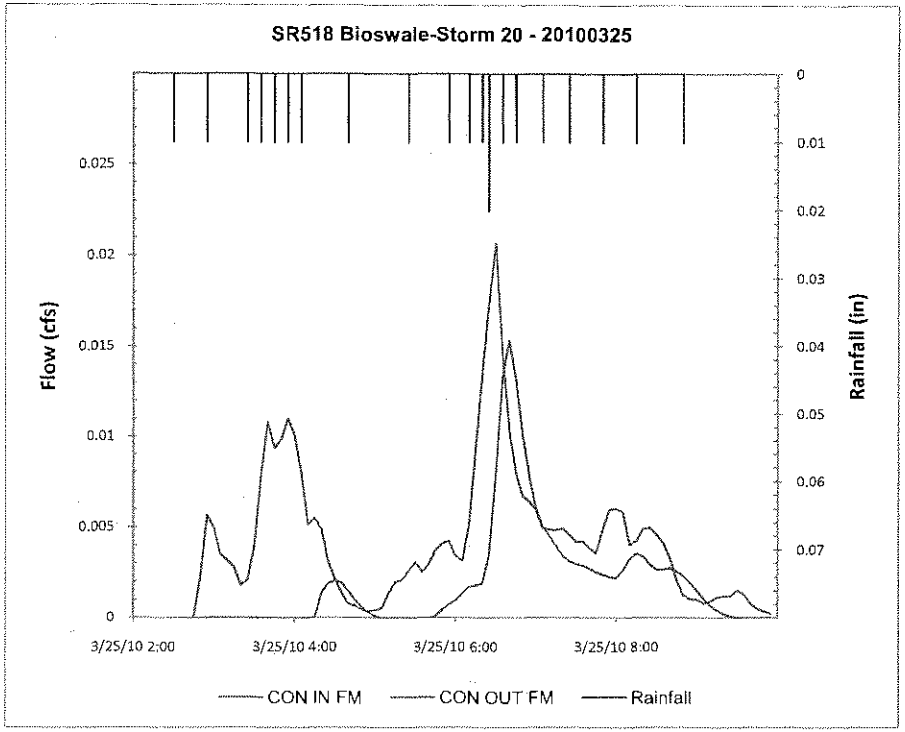
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	NA		NA		
% Storm Sampled:	≥75	NA		NA		
Sampling Duration (hr):	≤36	NA		NA		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)								
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes	% Conc. Reduction	% Volume Reduction	% Load Reduction
TSS					0.50		NA		NA			NA	-12.1	NA
TKN					0.200		NA		NA			NA	-12.1	NA
Nitrate + Nitrite					0.010		NA		NA			NA	-12.1	NA
TP					0.002		NA		NA			NA	-12.1	NA
SRP					0.001		NA		NA			NA	-12.1	NA
pH					0.10		NA		NA			NA	-12.1	NA
Hardness					2.00		NA		NA			NA	-12.1	NA
Dissolved Cu					0.001		NA		NA			NA	-12.1	NA
Dissolved Zn					0.005		NA		NA			NA	-12.1	NA
Total Cu					0.001		NA		NA			NA	-12.1	NA
Total Zn					0.005		NA		NA			NA	-12.1	NA
PSD < 1 µm					NA		NA		NA			NA	-12.1	NA
PSD 1-3.9 µm					NA		NA		NA			NA	-12.1	NA
PSD 3.9-62.5 µm					NA		NA		NA			NA	-12.1	NA
PSD 62.5-125 µm					NA		NA		NA			NA	-12.1	NA
PSD 125-250 µm					NA		NA		NA			NA	-12.1	NA
PSD 250-500 µm					NA		NA		NA			NA	-12.1	NA
PSD > 500 µm					NA		NA		NA			NA	-12.1	NA
TPH-diesel	0.05	U	0.05	U	0.05		0.09	J	0.10	J		0.0	-12.1	-12
TPH-oil	1.88		0.62		0.1		6.73		2.49			67	-12.1	63

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Control Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257413	5257413
0.129	E (UTM)	552279	552252

Storm Information - WY2010-20

Precipitation Information

	Goal	QA	notes
Precipitation Total (in):	≥0.15	0.21	
Precipitation Duration (hr):	1.0	6.3	
Mean Precip. Intensity (in/hr):	0.03	0.033	
Max Precip Intensity (in/5 min)	NA	0.02	
Antecedent Dry Period (hr):	≥6	197.5	

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	115.6		50.9		
Maximum Discharge (cfs):	NA	0.021		0.015		
Flow Duration (hr):	NA	7.2		4.6		

QA Narrative:

Influent TPH concentrations were less than the 10 mg/L minimum specified in TAPE (2008).

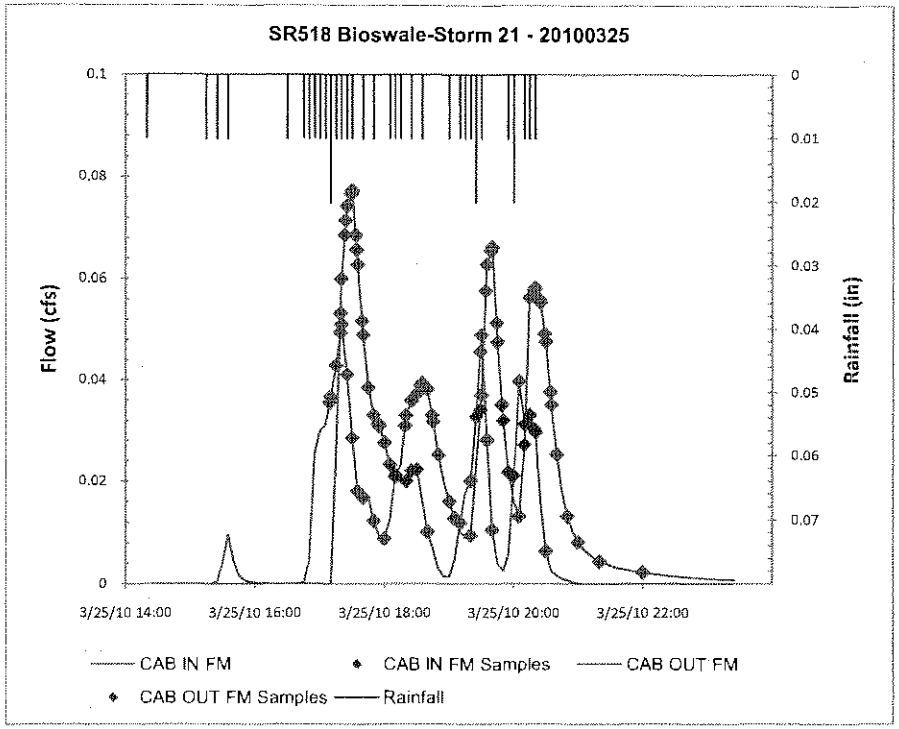
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	NA		NA		
% Storm Sampled:	≥75	NA		NA		
Sampling Duration (hr):	≤36	NA		NA		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)								
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes	% Conc. Reduction	% Volume Reduction	% Load Reduction
TSS					0.50		NA		NA			NA	56	NA
TKN					0.200		NA		NA			NA	56	NA
Nitrate + Nitrite					0.010		NA		NA			NA	56	NA
TP					0.002		NA		NA			NA	56	NA
SRP					0.001		NA		NA			NA	56	NA
pH					0.10		NA		NA			NA	56	NA
Hardness					2.00		NA		NA			NA	56	NA
Dissolved Cu					0.001		NA		NA			NA	56	NA
Dissolved Zn					0.005		NA		NA			NA	56	NA
Total Cu					0.001		NA		NA			NA	56	NA
Total Zn					0.005		NA		NA			NA	56	NA
PSD < 1 µm					NA		NA		NA			NA	56	NA
PSD 1-3.9 µm					NA		NA		NA			NA	56	NA
PSD 3.9-62.5 µm					NA		NA		NA			NA	56	NA
PSD 62.5-125 µm					NA		NA		NA			NA	56	NA
PSD 125-250 µm					NA		NA		NA			NA	56	NA
PSD 250-500 µm					NA		NA		NA			NA	56	NA
PSD > 500 µm					NA		NA		NA			NA	56	NA
TPH-diesel	0.05	U	0.05	U	0.05		0.08	J	0.04	J		0.0	56	56
TPH-oil	4.25		1.44		0.1		13.9		2.08			66	56	85

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Compost-Amended Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257396	5257410
0.129	E (UTM)	552309	552284

Storm Information - WY2010-21

Precipitation Information

	Goal	QA	notes
Precipitation Total (in):	≥0.15	0.36	
Precipitation Duration (hr):	1.0	6.0	
Mean Precip. Intensity (in/hr):	0.03	0.060	
Max Precip Intensity (in/5 min)	NA	0.02	
Antecedent Dry Period (hr):	≥6	6.5	

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	276.5		481.6		
Maximum Discharge (cfs):	NA	0.051		0.077		
Flow Duration (hr):	NA	5.3		6.6		

QA Narrative:

The volume of water measured at the CAB outlet was approximately 74% greater than the CAB inlet due to higher peaks in the flow data throughout the hydrograph at the outlet station.

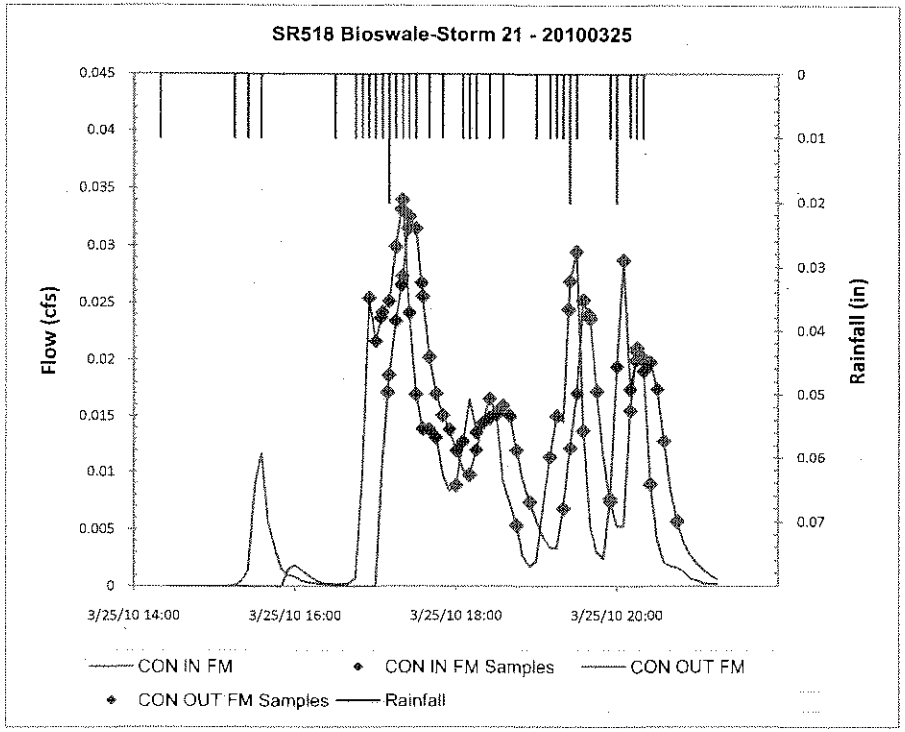
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	30		59		
% Storm Sampled:	≥75	87		97		
Sampling Duration (hr):	≤36	3.4		4.7		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)								
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes	% Conc. Reduction	% Volume Reduction	% Load Reduction
TSS	105		5.0		0.50		822		68.2			95	-74	92
TKN	1.05		0.841		0.200		8.22		11.5			20	-74	-40
Nitrate + Nitrite	0.107		0.667		0.010		0.838		9.10			-523	-74	-986
TP	0.170		0.506	J	0.002	Field duplicate > 20% RPD	1.33		6.90	J		-198	-74	-418
SRP	0.006		0.344		0.001		0.047		4.69			-5633	-74	-9886
pH	5.97		6.40		0.10		NA		NA			NA	-74	NA
Hardness	3.71		13.70		2.00		NA		NA			NA	-74	NA
Dissolved Cu	0.0076		0.0065		0.001		0.060		0.089			14	-74	-49
Dissolved Zn	0.045		0.012		0.005		0.352		0.164			73	-74	54
Total Cu	0.0441		0.0078		0.001		0.345		0.106			82	-74	69
Total Zn	0.177		0.013		0.005		1.39		0.177			93	-74	87
PSD < 1 µm	5.86		18.32		NA		45.9		250			-213	-74	-444
PSD 1-3.9 µm	7.90		14.17		NA		61.9		193			-79	-74	-212
PSD 3.9-62.5 µm	61.49		0.00		NA		481		0.0			100	-74	100
PSD 62.5-125 µm	0.00		0.00		NA		0.0		0.0			NA	-74	NA
PSD 125-250 µm	0.00		0.00		NA		0.0		0.0			NA	-74	NA
PSD 250-500 µm	3.30		0.00		NA		25.8		0.0			100	-74	100
PSD > 500 µm	0.82		1.99		NA		6.42		27.1			-143	-74	-323
TPH-diesel					0.05		NA		NA			NA	-74	NA
TPH-oil					0.1		NA		NA			NA	-74	NA

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Control Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257413	5257413
0.129	E (UTM)	552279	552252

Storm Information - WY2010-21

Precipitation Information

	Goal		QA	notes
Precipitation Total (in):	≥0.15	0.36		
Precipitation Duration (hr):	1.0	6.0		
Mean Precip. Intensity (in/hr):	0.03	0.060		
Max Precip Intensity (in/5 min)	NA	0.02		
Antecedent Dry Period (hr):	≥6	6.5		

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	208.6		201.0		
Maximum Discharge (cfs):	NA	0.034		0.033		
Flow Duration (hr):	NA	6.4		5.1		

QA Narrative:

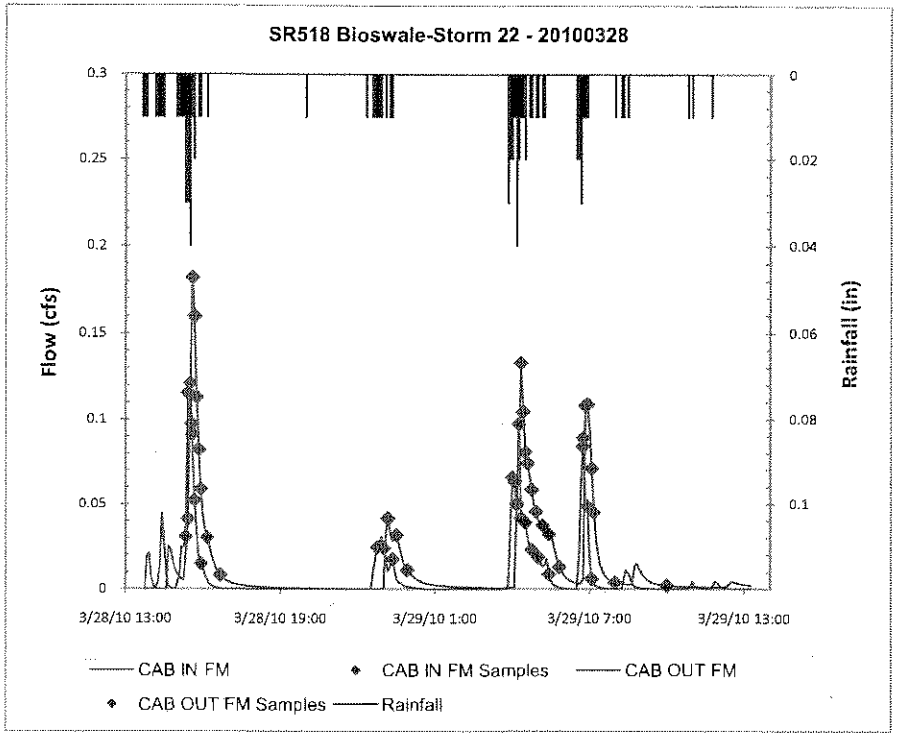
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	33		39		
% Storm Sampled:	≥75	92		96		
Sampling Duration (hr):	≤36	3.5		3.6		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)					% Conc. Reduction	% Volume Reduction	% Load Reduction
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes			
TSS	148		14.0		0.50		874		79.7			91	3.6	91
TKN	1.06		0.623		0.200		6.26		3.55			41	3.6	43
Nitrate + Nitrite	0.161		0.150		0.010		0.951		0.854			6.8	3.6	10
TP	0.243		0.064		0.002		1.44		0.364			74	3.6	75
SRP	0.010		0.006		0.001		0.059		0.034			40	3.6	42
pH	6.11		6.14		0.10		NA		NA			NA	3.6	NA
Hardness	5.28		5.28		2.00		NA		NA			NA	3.6	NA
Dissolved Cu	0.0092		0.0098		0.001		0.054		0.056			-6.5	3.6	-2.6
Dissolved Zn	0.049		0.049		0.005		0.289		0.279			0.0	3.6	3.6
Total Cu	0.0487		0.0169		0.001		0.288		0.096			65	3.6	67
Total Zn	0.191		0.064		0.005		1.13		0.364			66	3.6	68
PSD < 1 µm	8.71		0.92		NA		51.4		5.24			89	3.6	90
PSD 1-3.9 µm	11.79		1.47		NA		69.6		8.37			88	3.6	88
PSD 3.9-62.5 µm	102.09		9.11		NA		603		51.8			91	3.6	91
PSD 62.5-125 µm	13.77		0.00		NA		81.3		0.0			100	3.6	100
PSD 125-250 µm	0.01		0.00		NA		0.059		0.0			100	3.6	100
PSD 250-500 µm	4.33		1.12		NA		25.6		6.37			74	3.6	75
PSD > 500 µm	2.22		1.90		NA		13.1		10.8			14	3.6	18
TPH-diesel					0.05		NA		NA			NA	3.6	NA
TPH-oil					0.1		NA		NA			NA	3.6	NA

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Compost-Amended Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257396	5257410
0.129	E (UTM)	552309	552284

Storm Information - WY2010-22

Precipitation Information

	Goal		QA	notes
Precipitation Total (in):	≥0.15	0.79		
Precipitation Duration (hr):	1.0	22.1		
Mean Precip. Intensity (in/hr):	0.03	0.036		
Max Precip Intensity (in/5 min)	NA	0.04		
Antecedent Dry Period (hr):	≥6	9.3		

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	587.6		1019		
Maximum Discharge (cfs):	NA	0.121		0.182		
Flow Duration (hr):	NA	12.3		22.8		

QA Narrative:

The volume of water measured at the CAB outlet was approximately 73% greater than the CAB inlet due to higher peaks in the flow data throughout the hydrograph at the outlet station.

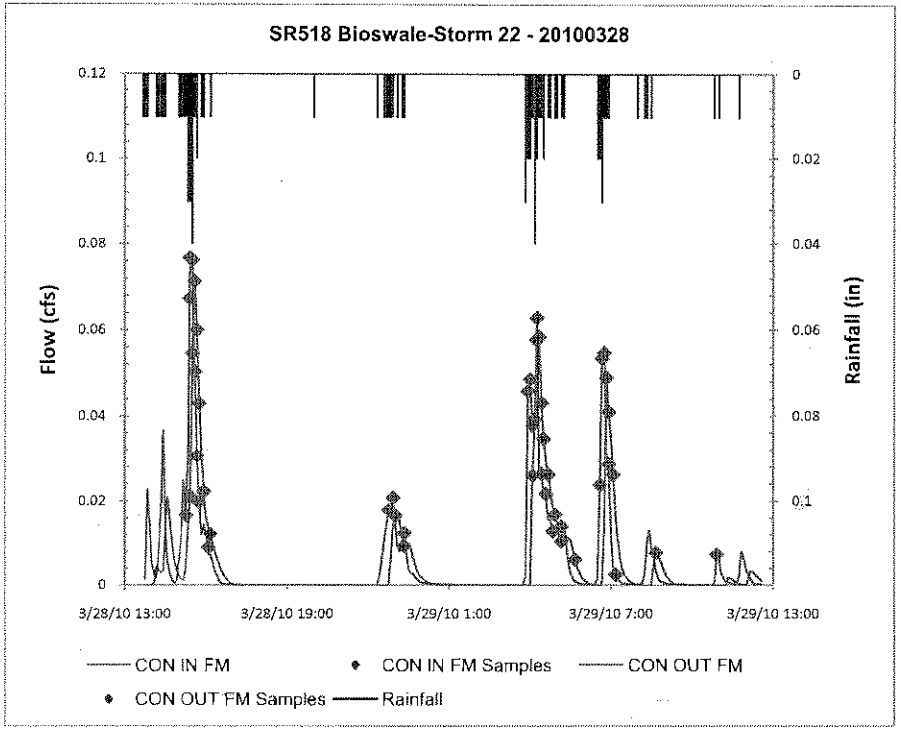
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	23		28		
% Storm Sampled:	≥75	86		94		
Sampling Duration (hr):	≤36	15.8		18.6		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)					% Conc. Reduction	% Volume Reduction	% Load Reduction
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes			
TSS	146		5.7		0.50		2429		164			96	-73	93
TKN	0.874		0.450		0.200		14.5		13.0			49	-73	11
Nitrate + Nitrite	0.095		0.447		0.010		1.58		12.9			-371	-73	-716
TP	0.235		0.355		0.002		3.91		10.2			-51	-73	-162
SRP	0.002		0.236		0.001		0.033		6.81			-11700	-73	-20363
pH	6.03		6.15		0.10		NA		NA			NA	-73	NA
Hardness	3.91		10.9		2.00		NA		NA			NA	-73	NA
Dissolved Cu	0.0040		0.0045		0.001		0.067		0.130			-13	-73	-95
Dissolved Zn	0.039		0.011		0.005		0.649		0.317			72	-73	51
Total Cu	0.0314		0.0057		0.001		0.522		0.164			82	-73	69
Total Zn	0.15		0.013		0.005		2.50		0.375			91	-73	85
PSD < 1 µm	9.07		3.74		NA		151		108			59	-73	28
PSD 1-3.9 µm	10.94		2.89		NA		182		83.4			74	-73	54
PSD 3.9-62.5 µm	102.60		0.00		NA		1707		0.0			100	-73	100
PSD 62.5-125 µm	0.08		0.00		NA		1.33		0.0			100	-73	100
PSD 125-250 µm	0.00		0.00		NA		0.0		0.0			NA	-73	NA
PSD 250-500 µm	3.20		2.57		NA		53.2		74.2			20	-73	-39
PSD > 500 µm	2.13		1.28		NA		35.4		36.9			40	-73	-4.2
TPH-diesel					0.05		NA		NA			NA	-73	NA
TPH-oil					0.1		NA		NA			NA	-73	NA

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Control Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257413	5257413
0.129	E (UTM)	552279	552252

Storm Information - WY2010-22

Precipitation Information

	Goal	QA	notes
Precipitation Total (in):	≥0.15	0.79	
Precipitation Duration (hr):	1.0	22.1	
Mean Precip. Intensity (in/hr):	0.03	0.036	
Max Precip Intensity (in/5 min)	NA	0.04	
Antecedent Dry Period (hr):	≥6	9.3	

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	448.3		412.9		
Maximum Discharge (cfs):	NA	0.077		0.071		
Flow Duration (hr):	NA	22.6		12.3		

QA Narrative:

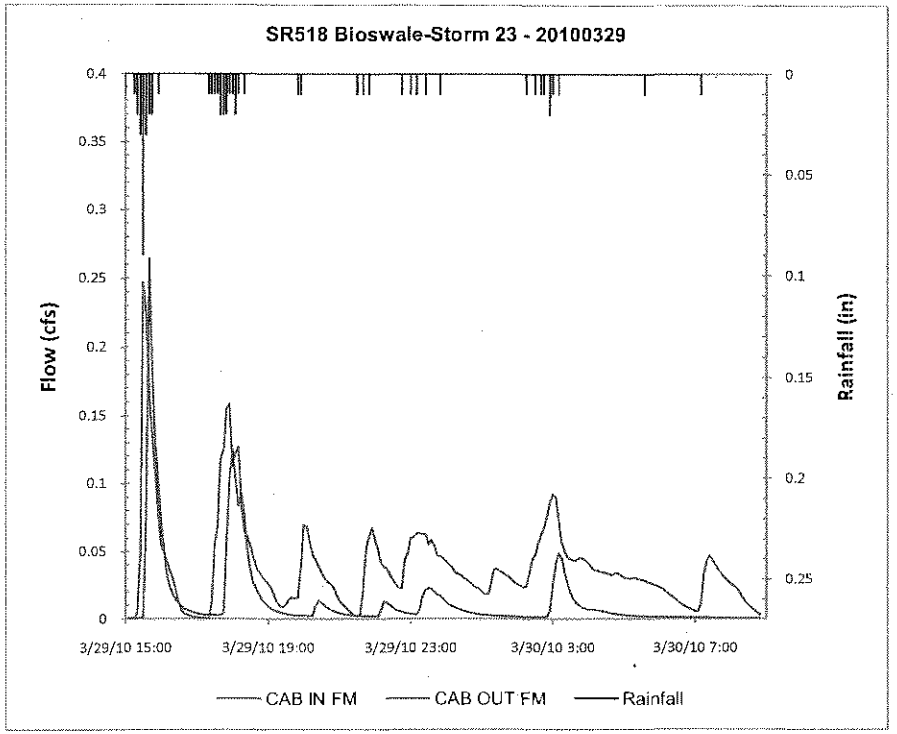
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	26		22		
% Storm Sampled:	≥75	85		89		
Sampling Duration (hr):	≤36	19.7		17.3		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)					% Conc. Reduction	% Volume Reduction	% Load Reduction
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes			
TSS	203		11.0		0.50		2577		129			95	7.9	95
TKN	0.816		0.452		0.200		10.4		5.28			45	7.9	49
Nitrate + Nitrite	0.104		0.138	J	0.010	Field duplicate > 20% RPD	1.32		1.61	J		-33	7.9	-22
TP	0.270		0.051		0.002		3.43		0.596			81	7.9	83
SRP	0.003		0.003		0.001		0.038		0.035			0.0	7.9	7.9
pH	5.96		6.11		0.10		NA		NA			NA	7.9	NA
Hardness	4.89		5.08		2.00		NA		NA			NA	7.9	NA
Dissolved Cu	0.0037		0.0055		0.001		0.047		0.064			-49	7.9	-37
Dissolved Zn	0.043		0.036		0.005		0.546		0.421			16	7.9	23
Total Cu	0.0312		0.0109		0.001		0.396		0.127			65	7.9	68
Total Zn	0.147		0.050		0.005		1.87		0.585			66	7.9	69
PSD < 1 µm	13.00		8.55		NA		165		100			34	7.9	39
PSD 1-3.9 µm	15.01		6.24		NA		191		73.0			58	7.9	62
PSD 3.9-62.5 µm	164.41		0.00		NA		2087		0.0			100	7.9	100
PSD 62.5-125 µm	38.10		0.00		NA		484		0.0			100	7.9	100
PSD 125-250 µm	0.28		0.00		NA		3.55		0.0			100	7.9	100
PSD 250-500 µm	13.89		1.28		NA		176		15.0			91	7.9	92
PSD > 500 µm	5.78		0.00		NA		73.4		0.0			100	7.9	100
TPH-diesel					0.05		NA		NA			NA	7.9	NA
TPH-oil					0.1		NA		NA			NA	7.9	NA

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location		
SR518 Compost-Amended Bioswale		IN	OUT
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257396	5257410
0.129	E (UTM)	552309	552284

Storm Information - WY2010-23

Precipitation Information

	Goal	QA	notes
Precipitation Total (in):	≥0.15	0.60	
Precipitation Duration (hr):	1.0	16.2	
Mean Precip. Intensity (in/hr):	0.03	0.037	
Max Precip Intensity (in/5 min)	NA	0.09	
Antecedent Dry Period (hr):	≥6	4.2	6 hours with <0.04 inches

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	2488		839.4		
Maximum Discharge (cfs):	NA	0.247		0.264		
Flow Duration (hr):	NA	17.6		14.2		

QA Narrative:

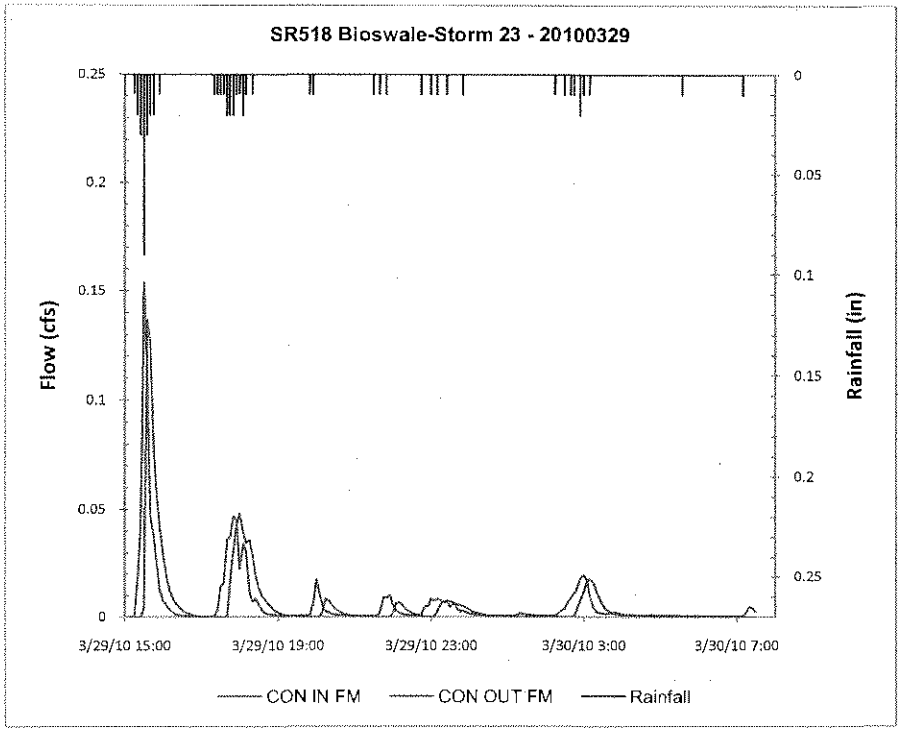
Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	NA		NA		
% Storm Sampled:	≥75	NA		NA		
Sampling Duration (hr):	≤36	NA		NA		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)					% Conc. Reduction	% Volume Reduction	% Load Reduction
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes			
TSS					0.50		NA		NA			NA	66	NA
TKN					0.200		NA		NA			NA	66	NA
Nitrate + Nitrite					0.010		NA		NA			NA	66	NA
TP					0.002		NA		NA			NA	66	NA
SRP					0.001		NA		NA			NA	66	NA
pH					0.10		NA		NA			NA	66	NA
Hardness					2.00		NA		NA			NA	66	NA
Dissolved Cu					0.001		NA		NA			NA	66	NA
Dissolved Zn					0.005		NA		NA			NA	66	NA
Total Cu					0.001		NA		NA			NA	66	NA
Total Zn					0.005		NA		NA			NA	66	NA
PSD < 1 µm					NA		NA		NA			NA	66	NA
PSD 1-3.9 µm					NA		NA		NA			NA	66	NA
PSD 3.9-62.5 µm					NA		NA		NA			NA	66	NA
PSD 62.5-125 µm					NA		NA		NA			NA	66	NA
PSD 125-250 µm					NA		NA		NA			NA	66	NA
PSD 250-500 µm					NA		NA		NA			NA	66	NA
PSD > 500 µm					NA		NA		NA			NA	66	NA
TPH-diesel	0.06	U	0.05	U	0.05		2.11	J	0.59	J		17	66	72
TPH-oil	10.5		0.29		0.1		740		6.89			97	66	99

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable



Site Information

Site Name	Location	IN	OUT
SR518 Control Bioswale			
	zone (UTM)	10	10
Drainage Area (acres)	N (UTM)	5257413	5257413
0.129	E (UTM)	552279	552252

Storm Information - WY2010-23

Precipitation Information

	Goal	QA	notes
Precipitation Total (in):	≥0.15	0.60	
Precipitation Duration (hr):	1.0	16.2	
Mean Precip. Intensity (in/hr):	0.03	0.037	
Max Precip Intensity (in/5 min)	NA	0.09	
Antecedent Dry Period (hr):	≥6	4.2	6 hours with <0.04 inches

Flow Information

	Goal	IN	QA	OUT	QA	notes
Storm Volume (cf):	NA	356.1		339.2		
Maximum Discharge (cfs):	NA	0.154		0.136		
Flow Duration (hr):	NA	16.6		10.2		

QA Narrative:

Influent TPH concentrations were less than the 10 mg/L minimum specified in TAPE (2008).

Sampling Information

	Goal	IN	QA	OUT	QA	notes
Number of Aliquots:	≥10	NA		NA		
% Storm Sampled:	≥75	NA		NA		
Sampling Duration (hr):	≤36	NA		NA		

Analytical Information

	Event Mean Concentration (mg/L or std. units)						Load (grams)					% Conc. Reduction	% Volume Reduction	% Load Reduction
	IN	QA	OUT	QA	MDL	notes	IN	QA	OUT	QA	notes			
TSS					0.50		NA		NA			NA	4.7	NA
TKN					0.200		NA		NA			NA	4.7	NA
Nitrate + Nitrite					0.010		NA		NA			NA	4.7	NA
TP					0.002		NA		NA			NA	4.7	NA
SRP					0.001		NA		NA			NA	4.7	NA
pH					0.10		NA		NA			NA	4.7	NA
Hardness					2.00		NA		NA			NA	4.7	NA
Dissolved Cu					0.001		NA		NA			NA	4.7	NA
Dissolved Zn					0.005		NA		NA			NA	4.7	NA
Total Cu					0.001		NA		NA			NA	4.7	NA
Total Zn					0.005		NA		NA			NA	4.7	NA
PSD < 1 µm					NA		NA		NA			NA	4.7	NA
PSD 1-3.9 µm					NA		NA		NA			NA	4.7	NA
PSD 3.9-62.5 µm					NA		NA		NA			NA	4.7	NA
PSD 62.5-125 µm					NA		NA		NA			NA	4.7	NA
PSD 125-250 µm					NA		NA		NA			NA	4.7	NA
PSD 250-500 µm					NA		NA		NA			NA	4.7	NA
PSD > 500 µm					NA		NA		NA			NA	4.7	NA
TPH-diesel	0.05	U	0.05	U	0.05		0.25	J	0.24	J		0.0	4.7	5
TPH-oil	2.93		2.50		0.1		29.5		24.0			15	4.7	19

notes: j = conditional use (storm/sampling criteria); J = conditional use (chemical analysis criteria); r = rejected (storm/sampling criteria)
R = rejected (chemical analysis criteria); U = at or below detection limit; G = value greater than max. detection limit; NA = not applicable

APPENDIX F

Parameter Summary Sheets

12	70	12/31/2009	CAB	93	2.7	97
13	72	1/4/2010	CAB	64	5.8	91
14	74	1/10/2010	CAB	107	4.8	96
15	77	1/14/2010	CAB	107	2.5	98
16	81	1/24/2010	CAB	89	5.8	93
17	89	2/15/2010	CAB	31	4.5	85
18	93	2/26/2010	CAB	46	7.3	84
19	99	3/11/2010	CAB	79	4.8	94
21	102	3/25/2010	CAB	105	5.0	95
22	104	3/28/2010	CAB	146	5.7	96
2	33	9/19/2009	CON	27	7.5	72
3	35	10/13/2009	CON	77	10	87
4	37	10/16/2009	CON	133	12	91
6	41	10/22/2009	CON	32	5.5	83
7	42	10/26/2009	CON	39	6.0	85
8	43	10/28/2009	CON	22	5.3	76
11	68	12/21/2009	CON	109	14	87
12	70	12/31/2009	CON	118	20	83
13	72	1/4/2010	CON	70	12	83
14	74	1/10/2010	CON	116	12	90
15	77	1/14/2010	CON	97	18	81
16	81	1/24/2010	CON	104	17	84
17	89	2/15/2010	CON	141	16	89
19	99	3/11/2010	CON	144	14	90
21	102	3/25/2010	CON	148	14	91
22	104	3/28/2010	CON	203	11	95

Basic treatment goal (TAPE): 80% removal of total suspended solids for influent concentrations ranging from 100 to 200 mg/L. For influent concentrations greater than 200 mg/L, a higher removal efficiency is appropriate. For influent concentrations less than 100 mg/L, the facilities should achieve an effluent goal of 20 mg/L total suspended solids.

Only one sample (collected at CAB In) had an influent TSS concentration less than 20 mg/L. The irreducible TSS concentration reported in Schueler (1996) was 20-40 mg/L.

Bootstrapped Median	91	5.6	94
Bootstrapped Upper CI Median	107	5.8	95
25th Percentile	50	4.1	91
75th Percentile	107	6.0	95
IQR	57	1.9	4.5
Minimum	11	0.8	84
Maximum	159	7.5	98

CON	Influent (mg/L)	Effluent (mg/L)	% removal
n	16	16	16
Mean	99	12	85
Median	107	12	86
Standard Deviation	51	4.5	5.8
COV	0.52	0.37	0.07
Bootstrapped Lower CI Median	58	10	83
Bootstrapped Median	107	12	86
Bootstrapped Upper CI Median	133	15	90
25th Percentile	62	9.4	83
75th Percentile	135	15	90
IQR	73	5.1	7.0
Minimum	22	5.3	72
Maximum	203	20	95

Wilcoxon signed-rank (1-tailed) test			
	p-value	Median % Difference	Median Difference (mg/L)
CAB	**0.0002**	94	87
CON	**0.0002**	86	91
Effluent concentration (CON - CAB)	**0.0003**	NA	7.0
Removal efficiency (CON - CAB)	**0.0005**	8.0	NA

Bolded values are significant at $p < 0.05$.

mg/L: milligrams per liter

n: number of samples

COV: coefficient of variance

CI: confidence interval

IQR: interquartile range

% Removal
82
69
91
84
89
84
87
84
83
85
79
79
77
87
73
72
70
72
46
59
70
59
-71
-40
23
26
5.4
5.9
-7.0
0.0
0.0
16

. Data collected

nge. Irreducible

CAB	Influent (mg/L)	Effluent (mg/L)	QA	% removal
n	16	16		16
Mean	0.054	0.010		82
Median	0.051	0.009		83
Standard Deviation	0.017	0.003		6.4
COV	0.32	0.32		0.078
Bootstrapped Lower CI Median	0.045	0.008		78
Bootstrapped Median	0.050	0.009		83
Bootstrapped Upper CI Median	0.056	0.011		85
25th Percentile	0.045	0.008		79
75th Percentile	0.055	0.011		86
IQR	0.010	0.004		7.1
Minimum	0.039	0.005	U	69
Maximum	0.111	0.016		91

CON	Influent (mg/L)	Effluent (mg/L)	% removal
n	16	16	16
Mean	0.055	0.045	21
Median	0.051	0.037	20
Standard Deviation	0.019	0.034	41
COV	0.35	0.76	1.96
Bootstrapped Lower CI Median	0.043	0.022	0.0
Bootstrapped Median	0.051	0.037	20
Bootstrapped Upper CI Median	0.056	0.048	59
25th Percentile	0.043	0.022	0.0
75th Percentile	0.056	0.048	59
IQR	0.013	0.026	59
Minimum	0.038	0.013	-71
Maximum	0.108	0.151	72

Wilcoxon signed-rank (1-tailed) test			
	p-value	Median % Difference	Median Difference (mg/L)
CAB	**0.0002**	83	0.0415
CON	**0.0450**	20	0.0085
Effluent concentration (CON - CAB)	**0.0003**	NA	0.028
Removal efficiency (CON - CAB)	**0.0003**	64	NA

Bolded values are significant at $p < 0.05$.

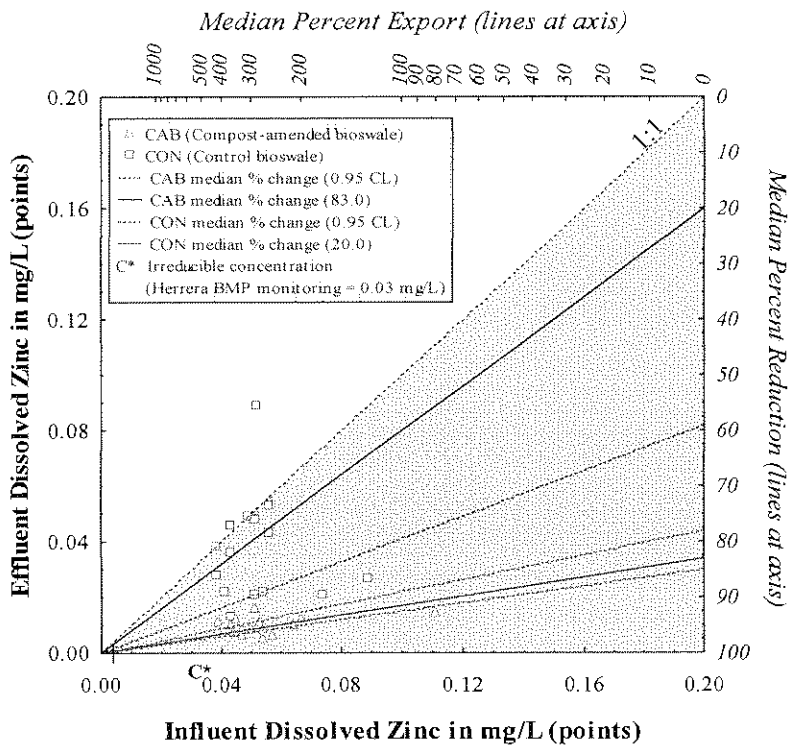
mg/L: milligrams per liter

n: number of samples

COV: coefficient of variance

CI: confidence interval

IQR: interquartile range



13	72	1/4/2010	CAB	**0.0053**	**0.0047**	11
14	74	1/10/2010	CAB	**0.0060**	**0.0045**	25
15	77	1/14/2010	CAB	**0.0060**	**0.0038**	37
16	81	1/24/2010	CAB	**0.0067**	**0.0043**	36
17	89	2/15/2010	CAB	**0.0047**	**0.0037**	21
18	93	2/26/2010	CAB	**0.0051**	**0.0048**	5.9
19	99	3/11/2010	CAB	**0.0042**	**0.0043**	-2.4
21	102	3/25/2010	CAB	**0.0076**	**0.0065**	14
22	104	3/28/2010	CAB	**0.0040**	**0.0045**	-13
2	33	9/19/2009	CON	**0.0195**	**0.0112**	43
3	35	10/13/2009	CON	**0.0144**	**0.0107**	26
4	37	10/16/2009	CON	**0.0059**	**0.0076**	-29
6	41	10/22/2009	CON	**0.0070**	**0.0061**	13
7	42	10/26/2009	CON	**0.0043**	**0.0046**	-7.0
8	43	10/28/2009	CON	**0.0085**	**0.0049**	42
11	68	12/21/2009	CON	**0.0064**	**0.0071**	-11
12	70	12/31/2009	CON	**0.0159**	**0.0116**	27
13	72	1/4/2010	CON	**0.0056**	**0.0064**	-14
14	74	1/10/2010	CON	**0.0037**	**0.0043**	-16
15	77	1/14/2010	CON	**0.0063**	**0.0069**	-9.5
16	81	1/24/2010	CON	**0.0083**	**0.0072**	13
17	89	2/15/2010	CON	**0.0058**	**0.0055**	5.2
19	99	3/11/2010	CON	**0.0046**	**0.0053**	-15
21	102	3/25/2010	CON	**0.0092**	**0.0098**	-6.5
22	104	3/28/2010	CON	**0.0037**	**0.0055**	-49

Bolded values indicate an exceedance of state acute water quality criteria.

Enhanced treatment goal (TAPE): Assumes influent dissolved copper concentrations ranging from 0.003 to 0.02 mg/L. Data collected should demonstrate significantly higher removal rates than basic treatment facilities.

All of the influent dissolved copper concentrations collected at CAB In and Con In fell within the acceptable TAPE range. Irreducible dissolved copper concentrations measured in Herrera BMP monitoring are 0.004 mg/L. All of the dissolved copper influent and effluent monitoring data collected exceeded acute water quality criteria.

Bootstrapped Upper CI Median	0.0073	0.0049	38
25th Percentile	0.0050	0.0038	10
75th Percentile	0.0072	0.0049	38
IQR	0.0022	0.0011	27.5
Minimum	0.0036	0.0031	-44
Maximum	0.0145	0.0068	74

CON	Influent (mg/L)	Effluent (mg/L)	% removal
n	16	16	16
Mean	0.0081	0.0073	0.74
Median	0.0064	0.0067	-6.7
Standard Deviation	0.0046	0.0024	25
COV	0.57	0.33	34
Bootstrapped Lower CI Median	0.0053	0.0054	-14
Bootstrapped Median	0.0063	0.0066	-6.7
Bootstrapped Upper CI Median	0.0085	0.0087	13
25th Percentile	0.0054	0.0055	-15
75th Percentile	0.0087	0.0082	16
IQR	0.0033	0.0027	31
Minimum	0.0037	0.0043	-49
Maximum	0.0195	0.0116	43

Wilcoxon signed-rank (1-tailed) test			
	p-value	Median % Difference	Median Differenc (mg/L)
CAB	**0.0019**	25	0.0017
CON	1.0	-6.7	-0.0005
Effluent concentration (CON - CAB)	**0.0006**	NA	0.0023
Removal efficiency (CON - CAB)	**0.0023**	31	NA

Bolded values are significant at $p < 0.05$.

mg/L: milligrams per liter

n: number of samples

COV: coefficient of variance

CI: confidence interval

IQR: interquartile range

9	45	11/5/2009	CAB	1.97	0.66	66
10	53	11/16/2009	CAB	3.14	0.51	84
12	70	12/31/2009	CAB	4.70	0.38	92
13	72	1/4/2010	CAB	1.44	0.35	76
14	74	1/10/2010	CAB	1.28	0.39	70
15	77	1/14/2010	CAB	2.62	0.44	83
19	99	3/11/2010	CAB	1.86	0.15	92
20	101	3/25/2010	CAB	1.88	0.62	67
23	105	3/29/2010	CAB	10.5	0.29	97
1	20	5/13/2009	CON	3.39	2.55	25
2	33	9/19/2009	CON	3.70	0.29	92
4	37	10/16/2009	CON	1.74	0.68	61
5	38	10/17/2009	CON	4.78	0.71	85
6	41	10/22/2009	CON	1.60	1.48	7.5
7	42	10/26/2009	CON	1.53	0.36	76
9	45	11/5/2009	CON	2.18	1.30	40
10	53	11/16/2009	CON	4.13	1.59	62
12	70	12/31/2009	CON	4.52	1.25	72
13	72	1/4/2010	CON	1.43	0.57	60
14	74	1/10/2010	CON	0.95	0.47	51
15	77	1/14/2010	CON	3.49	0.89	74
19	99	3/11/2010	CON	3.58	1.34	63
20	101	3/25/2010	CON	4.25	1.44	66
23	105	3/29/2010	CON	2.93	2.50	15

Oil treatment goal (TAPE): No ongoing or recurring visible sheen, a daily average total petroleum hydrocarbon concentration of no greater than 10 mg/L, and a maximum of 15 mg/L for a discrete (grab) sample.

Only one of the samples collected at CAB In had an influent TPH concentration greater than 10 mg/L (the minimum acceptable influent concentration). TPH-diesel concentrations were all less than the detection limit of 0.05 mg/L.

Bootstrapped Median	2.29	0.38	84
Bootstrapped Upper CI Median	2.96	0.44	91
25th Percentile	1.89	0.31	73
75th Percentile	3.05	0.48	91
IQR	1.16	0.17	19
Minimum	1.28	0.11	42
Maximum	10.5	1.72	97

CON	Influent (mg/L)	Effluent (mg/L)	% removal
n	15	15	15
Mean	2.95	1.16	57
Median	3.39	1.25	62
Standard Deviation	1.27	0.70	25
COV	0.43	0.60	0.44
Bootstrapped Lower CI Median	1.60	0.57	51
Bootstrapped Median	3.39	1.25	62
Bootstrapped Upper CI Median	3.70	1.48	72
25th Percentile	1.67	0.63	45
75th Percentile	3.92	1.46	73
IQR	2.25	0.84	28
Minimum	0.95	0.29	8
Maximum	4.78	2.55	92

Wilcoxon signed-rank (1-tailed) test			
	p-value	Median % Difference	Median Differenc (mg/L)
CAB	**0.0003**	84	1.83
CON	**0.0003**	62	1.17
Effluent concentration (CON - CAB)	**0.0004**	NA	0.87
Removal efficiency (CON - CAB)	**0.0009**	22	NA

Bolded values are significant at $p < 0.05$.

mg/L: milligrams per liter

n: number of samples

COV: coefficient of variance

CI: confidence interval

IQR: interquartile range

13	72	1/4/2010	CAB	0.148	0.013	91
14	74	1/10/2010	CAB	0.104	0.010	90
15	77	1/14/2010	CAB	0.161	0.008	95
16	81	1/24/2010	CAB	0.178	0.015	92
17	89	2/15/2010	CAB	0.084	0.010	88
18	93	2/26/2010	CAB	0.076	0.011	86
19	99	3/11/2010	CAB	0.125	0.010	92
21	102	3/25/2010	CAB	0.177	0.013	93
22	104	3/28/2010	CAB	0.150	0.013	91
2	33	9/19/2009	CON	0.122	0.026	79
3	35	10/13/2009	CON	0.190	0.030	84
4	37	10/16/2009	CON	0.140	0.023	84
6	41	10/22/2009	CON	0.081	0.028	65
7	42	10/26/2009	CON	0.088	0.018	80
8	43	10/28/2009	CON	0.071	0.031	56
11	68	12/21/2009	CON	0.170	0.102	40
12	70	12/31/2009	CON	0.254	0.159	37
13	72	1/4/2010	CON	0.138	0.055	60
14	74	1/10/2010	CON	0.108	0.036	67
15	77	1/14/2010	CON	0.179	0.063	65
16	81	1/24/2010	CON	0.185	0.061	67
17	89	2/15/2010	CON	0.171	0.065	62
19	99	3/11/2010	CON	0.149	0.050	66
21	102	3/25/2010	CON	0.191	0.064	66
22	104	3/28/2010	CON	0.147	0.050	66

Bootstrapped Upper CI Median	0.178	0.015	95
25th Percentile	0.093	0.010	91
75th Percentile	0.179	0.014	93
IQR	0.086	0.004	1.8
Minimum	0.076	0.006	86
Maximum	0.287	0.016	95

CON	Influent (mg/L)	Effluent (mg/L)	% removal
n	16	16	16
Mean	0.149	0.054	65
Median	0.148	0.050	66
Standard Deviation	0.048	0.035	13
COV	0.32	0.66	0.20
Bootstrapped Lower CI Median	0.122	0.030	62
Bootstrapped Median	0.148	0.050	66
Bootstrapped Upper CI Median	0.179	0.063	73
25th Percentile	0.119	0.030	62
75th Percentile	0.181	0.063	70
IQR	0.062	0.034	8.4
Minimum	0.071	0.018	37
Maximum	0.254	0.159	84

Wilcoxon signed-rank (1-tailed) test			
	p-value	Median % Difference	Median Difference (mg/L)
CAB	**0.0002**	92	0.136
CON	**0.0002**	66	0.097
Effluent concentration (CON - CAB)	**0.0003**	NA	0.039
Removal efficiency (CON - CAB)	**0.0003**	26	NA

Bolded values are significant at $p < 0.05$.

mg/L: milligrams per liter

n: number of samples

COV: coefficient of variance

CI: confidence interval

IQR: interquartile range

13	72	1/4/2010	CAB	0.0263	0.0058	78
14	74	1/10/2010	CAB	0.0222	0.0057	74
15	77	1/14/2010	CAB	0.0330	0.0044	87
16	81	1/24/2010	CAB	0.0328	0.0065	80
17	89	2/15/2010	CAB	0.0133	0.0045	66
18	93	2/26/2010	CAB	0.0135	0.0058	57
19	99	3/11/2010	CAB	0.0219	0.0058	74
21	102	3/25/2010	CAB	0.0441	0.0078	82
22	104	3/28/2010	CAB	0.0314	0.0057	82
2	33	9/19/2009	CON	0.0250	0.0119	52
3	35	10/13/2009	CON	0.0461	0.0152	67
4	37	10/16/2009	CON	0.0343	0.0112	67
6	41	10/22/2009	CON	0.0185	0.0095	49
7	42	10/26/2009	CON	0.0226	0.0076	66
8	43	10/28/2009	CON	0.0135	0.0078	42
11	68	12/21/2009	CON	0.0443	0.0110	75
12	70	12/31/2009	CON	0.0435	0.0148	66
13	72	1/4/2010	CON	0.0270	0.0088	67
14	74	1/10/2010	CON	0.0239	0.0078	67
15	77	1/14/2010	CON	0.0411	0.0111	73
16	81	1/24/2010	CON	0.0365	0.0123	66
17	89	2/15/2010	CON	0.0293	0.0093	68
19	99	3/11/2010	CON	0.0318	0.0095	70
21	102	3/25/2010	CON	0.0487	0.0169	65
22	104	3/28/2010	CON	0.0312	0.0109	65

Bootstrapped Upper CI Median	0.037	0.0068	84
25th Percentile	0.021	0.0050	71
75th Percentile	0.038	0.0066	85
IQR	0.017	0.0016	14
Minimum	0.0092	0.0039	57
Maximum	0.068	0.0094	87

CON	Influent (mg/L)	Effluent (mg/L)	% removal
n	16	16	16
Mean	0.032	0.011	64
Median	0.032	0.011	67
Standard Deviation	0.010	0.0028	8.8
COV	0.32	0.25	0.14
Bootstrapped Lower CI Median	0.025	0.0093	65
Bootstrapped Median	0.032	0.011	67
Bootstrapped Upper CI Median	0.041	0.012	68
25th Percentile	0.025	0.0092	65
75th Percentile	0.042	0.012	68
IQR	0.017	0.0028	2.4
Minimum	0.014	0.0076	42
Maximum	0.049	0.017	75

Wilcoxon signed-rank (1-tailed) test			
	p-value	Median % Difference	Median Differen (mg/L)
CAB	**0.0002**	79	0.0231
CON	**0.0002**	67	0.0213
Effluent concentration (CON - CAB)	**0.0003**	NA	0.0052
Removal efficiency (CON - CAB)	**0.0005**	12	NA

Bolded values are significant at $p < 0.05$.

mg/L: milligrams per liter

n: number of samples

COV: coefficient of variance

CI: confidence interval

IQR: interquartile range

13	72	1/4/2010	CAB	0.103	0.297		-188
14	74	1/10/2010	CAB	0.099	0.212		-114
15	77	1/14/2010	CAB	0.138	0.331		-140
16	81	1/24/2010	CAB	0.138	0.332		-141
17	89	2/15/2010	CAB	0.078	0.416		-433
18	93	2/26/2010	CAB	0.081	0.557		-588
19	99	3/11/2010	CAB	0.116	0.368		-217
21	102	3/25/2010	CAB	0.170	0.506	J	-198
22	104	3/28/2010	CAB	0.235	0.355		-51
2	33	9/19/2009	CON	0.124	0.228		-84
3	35	10/13/2009	CON	0.151	0.120		21
4	37	10/16/2009	CON	0.205	0.090		56
6	41	10/22/2009	CON	0.081	0.084		-3.7
7	42	10/26/2009	CON	0.066	0.064		3.0
8	43	10/28/2009	CON	0.048	0.062		-29
11	68	12/21/2009	CON	0.129	0.050		61
12	70	12/31/2009	CON	0.172	0.073		58
13	72	1/4/2010	CON	0.101	0.046		54
14	74	1/10/2010	CON	0.115	0.032		72
15	77	1/14/2010	CON	0.137	0.055		60
16	81	1/24/2010	CON	0.146	0.066		55
17	89	2/15/2010	CON	0.212	0.052		75
19	99	3/11/2010	CON	0.167	0.048		71
21	102	3/25/2010	CON	0.243	0.064		74
22	104	3/28/2010	CON	0.270	0.051		81

J = conditional use (chemical analysis criteria)

Phosphorus treatment goal (TAPE): 50% removal of TP for influent concentrations ranging from 0.1 to 0.5 mg/L. The phosphorus menu facility choices must achieve basic treatment goals in addition to phosphorus removal.

6 samples collected at CAB In and 3 samples collected at Con In had influent TP concentrations less than 0.1 mg/L. The irreducible TP concentration reported in Schueler (1996) was 0.15-0.20 mg/L.

Bootstrapped Upper CI Median	0.142	0.552	-141
25th Percentile	0.080	0.332	-415
75th Percentile	0.149	0.553	-140
IQR	0.069	0.222	275
Minimum	0.036	0.212	-1433
Maximum	0.310	0.973	-51

CON	Influent (mg/L)	Effluent (mg/L)	% removal
n	16	16	16
Mean	0.148	0.076	39
Median	0.142	0.063	57
Standard Deviation	0.062	0.046	46
COV	0.42	0.61	1.18
Bootstrapped Lower CI Median	0.112	0.050	21
Bootstrapped Median	0.141	0.063	57
Bootstrapped Upper CI Median	0.186	0.073	71
25th Percentile	0.112	0.051	16
75th Percentile	0.180	0.076	71
IQR	0.069	0.025	55
Minimum	0.048	0.032	-84
Maximum	0.270	0.228	81

	Wilcoxon signed-rank (1-tailed) test		
	p-value	Median % Difference	Median Differe (mg/L)
CAB	1.0	-201	-0.282
CON	**0.0018**	57	0.081
Effluent concentration (CON - CAB)	1.0	NA	-0.315
Removal efficiency (CON - CAB)	1.0	-258	NA

Bolded values are significant at $p < 0.05$.

mg/L: milligrams per liter

n: number of samples

COV: coefficient of variance

CI: confidence interval

IQR: interquartile range

13	72	1/4/2010	CAB	0.002		0.228		-11300
14	74	1/10/2010	CAB	0.003		0.178		-5833
15	77	1/14/2010	CAB	0.008		0.243		-2938
16	81	1/24/2010	CAB	0.007		0.233		-3229
17	89	2/15/2010	CAB	0.003		0.308		-10167
18	93	2/26/2010	CAB	0.006		0.429		-7050
19	99	3/11/2010	CAB	0.003		0.272		-8967
21	102	3/25/2010	CAB	0.006		0.344		-5633
22	104	3/28/2010	CAB	0.002		0.236		-11700
2	33	9/19/2009	CON	0.066		0.132		-100
3	35	10/13/2009	CON	0.021		0.045		-114
4	37	10/16/2009	CON	0.012	J	0.026	J	-117
6	41	10/22/2009	CON	0.008	J	0.022	J	-175
7	42	10/26/2009	CON	0.007		0.022		-214
8	43	10/28/2009	CON	0.009		0.024		-167
11	68	12/21/2009	CON	0.006		0.009		-50
12	70	12/31/2009	CON	0.006		0.006		0.0
13	72	1/4/2010	CON	0.003		0.007		-133
14	74	1/10/2010	CON	0.003		0.005		-67
15	77	1/14/2010	CON	0.003		0.005		-67
16	81	1/24/2010	CON	0.015		0.015		0.0
17	89	2/15/2010	CON	0.004		0.005		-25
19	99	3/11/2010	CON	0.005		0.004		20
21	102	3/25/2010	CON	0.010		0.006		40
22	104	3/28/2010	CON	0.003		0.003		0.0

J = conditional use (chemical analysis criteria)

No soluble reactive phosphorus goal is specified in the TAPE guidelines.

Bootstrapped Upper CI Median	0.007	0.429	-5633
25th Percentile	0.003	0.235	-9652
75th Percentile	0.007	0.442	-5135
IQR	0.004	0.206	4517
Minimum	0.002	0.178	-11700
Maximum	0.023	0.860	-2938

CON	Influent (mg/L)	Effluent (mg/L)	% removal
n	16	16	16
Mean	0.011	0.022	-73
Median	0.007	0.008	-67
Standard Deviation	0.015	0.032	76
COV	1.36	1.43	-1.05
Bootstrapped Lower CI Median	0.004	0.005	-117
Bootstrapped Median	0.007	0.008	-67
Bootstrapped Upper CI Median	0.010	0.022	0
25th Percentile	0.004	0.005	-121
75th Percentile	0.011	0.023	0.0
IQR	0.007	0.018	121
Minimum	0.003	0.003	-214
Maximum	0.066	0.132	40

Wilcoxon signed-rank (1-tailed) test			
	p-value	Median % Difference	Median Differe (mg/L)
CAB	1.0	-6595	-0.287
CON	1.0	-67	-0.003
Effluent concentration (CON - CAB)	1.0	NA	-0.282
Removal efficiency (CON - CAB)	1.0	-6528	NA

Bolded values are significant at $p < 0.05$.

mg/L: milligrams per liter

n: number of samples

COV: coefficient of variance

CI: confidence interval

IQR: interquartile range

SR518 Composite-Amended Bioswale Monitoring Hardness Data Summary

WQ Storm #	Flow Storm	Date	Site	Influent (mg $CaCO_3$/L)	Effluent (mg $CaCO_3$/L)
3	35	10/13/2009	CAB	5.86	16.0
4	37	10/16/2009	CAB	6.06	15.0
6	41	10/22/2009	CAB	4.10	18.8
7	42	10/26/2009	CAB	2.54	8.79
8	43	10/28/2009	CAB	3.91	16.8
11	68	12/21/2009	CAB	7.04	12.7
12	70	12/31/2009	CAB	27.6	75.8
13	72	1/4/2010	CAB	5.47	11.9
14	74	1/10/2010	CAB	5.86	9.38
15	77	1/14/2010	CAB	7.82	15.6
16	81	1/24/2010	CAB	5.67	13.5
17	89	2/15/2010	CAB	8.99	15.8
18	93	2/26/2010	CAB	5.28	16.4
19	99	3/11/2010	CAB	4.10	12.5
21	102	3/25/2010	CAB	3.71	13.7
22	104	3/28/2010	CAB	3.91	10.9
2	33	9/19/2009	CON	7.62	9.58
3	35	10/13/2009	CON	5.28	7.23
4	37	10/16/2009	CON	4.69	8.01
6	41	10/22/2009	CON	4.50	7.04
7	42	10/26/2009	CON	3.32	4.50
8	43	10/28/2009	CON	5.47	6.45
11	68	12/21/2009	CON	8.01	23.5
12	70	12/31/2009	CON	29.7	39.5
13	72	1/4/2010	CON	6.25	8.40
14	74	1/10/2010	CON	4.89	5.47
15	77	1/14/2010	CON	8.79	9.38
16	81	1/24/2010	CON	6.84	8.60
17	89	2/15/2010	CON	7.43	7.82
19	99	3/11/2010	CON	4.89	6.06
21	102	3/25/2010	CON	5.28	5.28
22	104	3/28/2010	CON	4.89	5.08

CAB	Influent
n	
Mean	
Median	
Standard Deviation	
COV	
25th Percentile	
75th Percentile	
IQR	
Minimum	
Maximum	

CON	Influent
n	
Mean	
Median	
Standard Deviation	
COV	
25th Percentile	
75th Percentile	
IQR	
Minimum	
Maximum	

	Wilcoxon signed-rank (2-tailed) test		
	p-value	Median % Difference	Median Difference (mg/L)
CAB	**0.0004**	-174	-8.12
CON	**0.0007**	-26	-1.47
Effluent concentration (CON - CAB)	**0.0076**	NA	-6.83

Bolded values are significant at $p < 0.05$.

mg $CaCO_3$/L: milligrams of calcium carbonate per liter

n: number of samples

COV: coefficient of variance

IQR: interquartile range

SR518 Composite-Amended Bioswale Monitoring pH Data Summary

WQ Storm #	Flow Storm #	Date	Site	Influent (S.U.)	Effluent (S.U.)
3	35	10/13/2009	CAB	5.92	6.39
4	37	10/16/2009	CAB	6.49	6.89
6	41	10/22/2009	CAB	6.54	7.13
7	42	10/26/2009	CAB	6.21	6.74
8	43	10/28/2009	CAB	6.81	7.27
11	68	12/21/2009	CAB	6.37	6.59
12	70	12/31/2009	CAB	6.77	6.82
13	72	1/4/2010	CAB	5.87	6.35
14	74	1/10/2010	CAB	6.11	6.44
15	77	1/14/2010	CAB	6.42	6.83
16	81	1/24/2010	CAB	6.47	6.40
17	89	2/15/2010	CAB	6.23	5.81
18	93	2/26/2010	CAB	6.28	6.58
19	99	3/11/2010	CAB	6.10	6.65
21	102	3/25/2010	CAB	5.97	6.40
22	104	3/28/2010	CAB	6.03	6.15
2	33	9/19/2009	CON	6.11	6.47
3	35	10/13/2009	CON	5.88	5.96
4	37	10/16/2009	CON	6.41	6.45
6	41	10/22/2009	CON	6.58	6.67
7	42	10/26/2009	CON	6.27	6.43
8	43	10/28/2009	CON	6.66	6.88
11	68	12/21/2009	CON	6.56	6.55
12	70	12/31/2009	CON	6.76	6.68
13	72	1/4/2010	CON	6.00	6.17
14	74	1/10/2010	CON	6.22	6.35
15	77	1/14/2010	CON	6.78	6.00
16	81	1/24/2010	CON	6.51	5.90
17	89	2/15/2010	CON	5.96	5.94
19	99	3/11/2010	CON	6.06	6.17
21	102	3/25/2010	CON	6.11	6.14
22	104	3/28/2010	CON	5.96	6.11

CAB	Influe
n	
Mean	6
Median	6
Standard Deviation	0
COV	0.
25th Percentile	6
75th Percentile	6
IQR	0
Minimum	5
Maximum	6

CON	Influe
n	
Mean	6
Median	6
Standard Deviation	0
COV	0.
25th Percentile	6
75th Percentile	6
IQR	0
Minimum	5
Maximum	6

	Wilcoxon signed-rank (2-tailed) test		
	p-value	Median % Difference	Median Difference (S.U.)
CAB	**0.0032**	-6.28	-0.405
CON	0.1406	-1.36	-0.085
Effluent measurement (CON - CAB)	**0.0229**	NA	-0.325

Bolded values are significant at $p < 0.05$.

n: number of samples

COV: coefficient of variance

IQR: interquartile range

13	72	1/4/2010	CAB	0.786	0.480	39
14	74	1/10/2010	CAB	0.379	0.249	34
15	77	1/14/2010	CAB	0.981	0.352	64
16	81	1/24/2010	CAB	1.64	0.952	42
17	89	2/15/2010	CAB	0.552	0.350	37
18	93	2/26/2010	CAB	0.816	0.678	17
19	99	3/11/2010	CAB	0.743	0.432	42
21	102	3/25/2010	CAB	1.05	0.841	20
22	104	3/28/2010	CAB	0.874	0.45	49
2	33	9/19/2009	CON	1.09	1.26	-16
3	35	10/13/2009	CON	1.51	0.923	39
4	37	10/16/2009	CON	0.54	0.224	59
6	41	10/22/2009	CON	1.05	0.707	33
7	42	10/26/2009	CON	0.662	0.495	25
8	43	10/28/2009	CON	1.1	0.783	29
11	68	12/21/2009	CON	0.905	0.76	16
12	70	12/31/2009	CON	1.87	1.5	20
13	72	1/4/2010	CON	0.912	0.666	27
14	74	1/10/2010	CON	0.475	0.315	34
15	77	1/14/2010	CON	1.03	0.513	50
16	81	1/24/2010	CON	1.83	1.84	-0.5
17	89	2/15/2010	CON	0.799	0.271	66
19	99	3/11/2010	CON	0.885	0.386	56
21	102	3/25/2010	CON	1.06	0.623	41
22	104	3/28/2010	CON	0.816	0.452	45

Bootstrapped Upper CI Median	1.02	0.760	42
25th Percentile	0.775	0.414	25
75th Percentile	1.03	0.760	44
IQR	0.252	0.347	19
Minimum	0.379	0.249	3.1
Maximum	1.89	1.23	64

CON	Influent (mg/L)	Effluent (mg/L)	% removal
n	16	16	16
Mean	1.03	0.751	33
Median	0.971	0.645	33
Standard Deviation	0.402	0.455	21
COV	0.39	0.61	0.66
Bootstrapped Lower CI Median	0.816	0.452	24
Bootstrapped Median	0.971	0.645	33
Bootstrapped Upper CI Median	1.09	0.815	45
25th Percentile	0.812	0.436	24
75th Percentile	1.09	0.818	46
IQR	0.281	0.383	22
Minimum	0.475	0.224	-16
Maximum	1.87	1.84	66

Wilcoxon signed-rank (1-tailed) test			
	p-value	Median % Difference	Median Difference (mg/L)
CAB	**0.0002**	38	0.309
CON	**0.0007**	33	0.330
Effluent concentration (CON - CAB)	0.3248	NA	0.117
Removal efficiency (CON - CAB)	0.4324	4.6	NA

Bolded values are significant at $p < 0.05$.

mg/L: milligrams per liter

n: number of samples

COV: coefficient of variance

CI: confidence interval

IQR: interquartile range

13	72	1/4/2010	CAB	0.457		0.415		9
14	74	1/10/2010	CAB	0.163		0.373		-129
15	77	1/14/2010	CAB	0.188		0.847		-351
16	81	1/24/2010	CAB	0.174		0.845		-386
17	89	2/15/2010	CAB	0.230		0.827		-260
18	93	2/26/2010	CAB	0.134		0.746		-457
19	99	3/11/2010	CAB	0.110		0.475		-332
21	102	3/25/2010	CAB	0.107		0.667		-523
22	104	3/28/2010	CAB	0.095		0.447		-371
2	33	9/19/2009	CON	0.484		0.485		0
3	35	10/13/2009	CON	0.306		0.248		19
4	37	10/16/2009	CON	0.336	J	0.178	J	47
6	41	10/22/2009	CON	0.252	J	0.264	J	-5
7	42	10/26/2009	CON	0.160		0.097		39
8	43	10/28/2009	CON	0.258		0.205		21
11	68	12/21/2009	CON	0.147		0.337		-129
12	70	12/31/2009	CON	0.276		0.489		-77
13	72	1/4/2010	CON	0.356		0.230		35
14	74	1/10/2010	CON	0.150		0.142		5
15	77	1/14/2010	CON	0.478	J	0.269		44
16	81	1/24/2010	CON	0.264		0.305		-15.5
17	89	2/15/2010	CON	0.265		0.182		31
19	99	3/11/2010	CON	0.128		0.137		-7
21	102	3/25/2010	CON	0.161		0.150		7
22	104	3/28/2010	CON	0.104		0.138	J	-33

J = conditional use (chemical analysis criteria)

Bootstrapped Upper CI Median	0.230	0.746	-17
25th Percentile	0.116	0.255	-374
75th Percentile	0.235	0.766	-11.6
IQR	0.119	0.512	363
Minimum	0.095	0.132	-523
Maximum	0.457	1.23	50

CON	Influent (mg/L)	Effluent (mg/L)	% remov
n	16	16	16
Mean	0.258	0.248	-1.1
Median	0.261	0.218	6.1
Standard Deviation	0.116	0.117	47
COV	0.45	0.47	-41
Bootstrapped Lower CI Median	0.160	0.150	-7.9
Bootstrapped Median	0.261	0.218	6.1
Bootstrapped Upper CI Median	0.306	0.269	31
25th Percentile	0.158	0.148	-9.2
75th Percentile	0.314	0.278	32
IQR	0.156	0.130	41
Minimum	0.104	0.097	-129
Maximum	0.484	0.489	47

Wilcoxon signed-rank (1-tailed) test			
	p-value	Median % Difference	Median Diffe (mg/L)
CAB	1.0	-254	-0.323
CON	0.2040	6.1	0.0095
Effluent concentration (CON - CAB)	1.0	NA	-0.214
Removal efficiency (CON - CAB)	1.0	-260	NA

Bolded values are significant at $p < 0.05$.

mg/L: milligrams per liter

n: number of samples

COV: coefficient of variance

CI: confidence interval

IQR: interquartile range

APPENDIX G

Hydrologic and Water Quality Data Statistical Analyses

Table G-1. Statistical analysis of differences between event-based hydrologic parameters based on the results from a Wilcoxon signed-rank test.

	p-value[a]	Median Difference
Flow Volume (cubic feet)		
CAB In vs. CAB Out[b]	0.4732	10.1
CON In vs. CON Out[b]	**< 0.0001**	17.9
CAB In vs. CON In[c]	**< 0.0001**	58.0
CAB Out vs. CON Out[c]	**< 0.0001**	81.6
Flow Duration (hours)		
CAB In vs. CAB Out[b]	**0.0173**	-0.92
CON In vs. CON Out[b]	**< 0.0001**	2.6
CAB In vs. CON In[c]	0.0635	-0.29
CAB Out vs. CON Out[c]	**< 0.0001**	3.0
Peak Discharge (cubic feet per second)		
CAB In vs. CAB Out[b]	**0.0026**	0.005
CON In vs. CON Out[b]	**< 0.0001**	0.004
CAB In vs. CON In[c]	**< 0.0001**	0.014
CAB Out vs. CON Out[c]	**< 0.0001**	0.014

[a] Values in **bold** indicate that the null hypothesis is rejected at a significance level of 0.05.

[b] Median difference across all influent and effluent samples

[c] Median difference across all CAB and CON samples

CAB: compost-amended biofiltration swale

CON: control biofiltration swale

In: inlet

Out: outlet

Table G-2. Statistical analysis of differences between influent and effluent concentrations based on the results from a Wilcoxon signed-rank test.

Parameter	Sample Size (n)	Test Type	Null Hypothesis (H_O)	Alternate Hypothesis (H_A)	p-value[a]	Median Difference[b] (Influent - Effluent)
TSS concentration						
CAB	16	1-tailed	Effluent ≥ Influent	Effluent < Influent	**0.0002**	87
CON	16	1-tailed	Effluent ≥ Influent	Effluent < Influent	**0.0002**	91
Dissolved zinc concentration						
CAB	16	1-tailed	Effluent ≥ Influent	Effluent < Influent	**0.0002**	0.0415
CON	16	1-tailed	Effluent ≥ Influent	Effluent < Influent	**0.0450**	0.0085
Dissolved copper concentration						
CAB	16	1-tailed	Effluent ≥ Influent	Effluent < Influent	**0.0019**	0.0017
CON	16	1-tailed	Effluent ≥ Influent	Effluent < Influent	1.0	-0.0005
TPH (motor oil) concentration						
CAB	15	1-tailed	Effluent ≥ Influent	Effluent < Influent	**0.0003**	1.83
CON	15	1-tailed	Effluent ≥ Influent	Effluent < Influent	**0.0003**	1.17
Total zinc concentration						
CAB	16	1-tailed	Effluent ≥ Influent	Effluent < Influent	**0.0002**	0.136
CON	16	1-tailed	Effluent ≥ Influent	Effluent < Influent	**0.0002**	0.097
Total copper concentration						
CAB	16	1-tailed	Effluent ≥ Influent	Effluent < Influent	**0.0002**	0.0231
CON	16	1-tailed	Effluent ≥ Influent	Effluent < Influent	**0.0002**	0.0213
TP concentration						
CAB	16	1-tailed	Effluent ≥ Influent	Effluent < Influent	1.0	-0.282
CON	16	1-tailed	Effluent ≥ Influent	Effluent < Influent	**0.0018**	0.081
SRP concentration						
CAB	16	1-tailed	Effluent ≥ Influent	Effluent < Influent	1.0	-0.287
CON	16	1-tailed	Effluent ≥ Influent	Effluent < Influent	1.0	-0.003
Hardness						
CAB	16	2-tailed	Effluent = Influent	Effluent ≠ Influent	**0.0004**	-8.12
CON	16	2-tailed	Effluent = Influent	Effluent ≠ Influent	**0.0007**	-1.47
pH						
CAB	16	2-tailed	Effluent = Influent	Effluent ≠ Influent	**0.0032**	-0.405
CON	16	2-tailed	Effluent = Influent	Effluent ≠ Influent	0.1406	-0.085
TKN concentration						
CAB	16	1-tailed	Effluent ≥ Influent	Effluent < Influent	**0.0002**	0.309
CON	16	1-tailed	Effluent ≥ Influent	Effluent < Influent	**0.0007**	0.330
Nitrate + nitrite concentration						
CAB	16	1-tailed	Effluent ≥ Influent	Effluent < Influent	1.0	-0.323
CON	16	1-tailed	Effluent ≥ Influent	Effluent < Influent	0.2040	0.0095

[a] Values in **bold** indicate that the null hypothesis is rejected at a significance level of 0.05.

[b] Median difference across all pairs of influent and effluent samples

TSS: total suspended solids

TP: total phosphorus

SRP: soluble reactive phosphorus

TKN: total Kjedahl nitrogen

TPH: total petroleum hydrocarbons

mg/L: milligrams per liter

mg $CaCO_3$/L: milligrams of calcium carbonate per liter

Table G-3. Statistical analysis of differences between effluent concentrations and removal efficiencies at the compost-amended and the control biofiltration swale based on the results from a Wilcoxon signed-rank test.

Parameter	Sample Size (n)	Test Type	Null Hypothesis (H_O)	Alternate Hypothesis (H_A)	p-value[a]	Median Difference[b] (CON - CAB)
TSS						
Effluent concentration (mg/L)	15	1-tailed	CAB ≥ CON	CAB < CON	**0.0003**	7.0
Removal efficiency (%)	15	1-tailed	CAB ≥ CON	CAB < CON	**0.0005**	8.0
Dissolved zinc						
Effluent concentration (mg/L)	15	1-tailed	CAB ≥ CON	CAB < CON	**0.0003**	0.028
Removal efficiency (%)	15	1-tailed	CAB ≥ CON	CAB < CON	**0.0003**	64
Dissolved copper						
Effluent concentration (mg/L)	15	1-tailed	CAB ≥ CON	CAB < CON	**0.0006**	0.0023
Removal efficiency (%)	15	1-tailed	CAB ≥ CON	CAB < CON	**0.0023**	31
TPH (motor oil)						
Effluent concentration (mg/L)	15	1-tailed	CAB ≥ CON	CAB < CON	**0.0004**	0.87
Removal efficiency (%)	15	1-tailed	CAB ≥ CON	CAB < CON	**0.0009**	22
Total zinc						
Effluent concentration (mg/L)	15	1-tailed	CAB ≥ CON	CAB < CON	**0.0003**	0.039
Removal efficiency (%)	15	1-tailed	CAB ≥ CON	CAB < CON	**0.0003**	26
Total copper						
Effluent concentration (mg/L)	15	1-tailed	CAB ≥ CON	CAB < CON	**0.0003**	0.0052
Removal efficiency (%)	15	1-tailed	CAB ≥ CON	CAB < CON	**0.0005**	12
TP						
Effluent concentration (mg/L)	15	1-tailed	CAB ≥ CON	CAB < CON	1.0	-0.315
Removal efficiency (%)	15	1-tailed	CAB ≥ CON	CAB < CON	1.0	-258
SRP						
Effluent concentration (mg/L)	15	1-tailed	CAB ≥ CON	CAB < CON	1.0	-0.282
Removal efficiency (%)	15	1-tailed	CAB ≥ CON	CAB < CON	1.0	-6528
Hardness						
Effluent concentration (mg/L)	15	2-tailed	CAB = CON	CAB ≠ CON	**0.0076**	-6.83
pH						
Effluent level	15	2-tailed	CAB = CON	CAB ≠ CON	**0.0229**	-0.325
TKN						
Effluent concentration (mg/L)	15	1-tailed	CAB ≥ CON	CAB < CON	0.3248	0.117
Removal efficiency (%)	15	1-tailed	CAB ≥ CON	CAB < CON	0.4324	4.6
Nitrate + nitrite						
Effluent concentration (mg/L)	15	1-tailed	CAB ≥ CON	CAB < CON	1.0	-0.214
Removal efficiency (%)	15	1-tailed	CAB ≥ CON	CAB < CON	1.0	-260

[a] Values in **bold** indicate that the null hypothesis is rejected at a significance level of 0.05.

[b] Median difference across all pairs of CAB and CON samples

TSS: total suspended solids

TP: total phosphorus

SRP: soluble reactive phosphorus

TKN: total Kjedahl nitrogen

TPH: total petroleum hydrocarbons

mg/L: milligrams per liter

mg $CaCO_3$/L: milligrams of calcium carbonate per liter

Table G-4. Kendall's tau correlation coefficients and p-values from comparisons of storm event characteristics to influent concentrations for the compost-amended biofiltration swale.

Parameter [a]	Precipitation Depth (inches)	Average Precipitation Intensity (inches/hour)	Peak Precipitation Intensity (inches/ 5 minutes)	Antecedent Dry Period (hours)	Precipitation Duration (hours)	Sample Date
TSS concentration (mg/L)						
Kendall Tau correlation coefficient	0.243	0.414	0.372	-0.303	0.060	0.042
p-value[b]	0.190	**0.025**	**0.044**	0.102	0.748	0.821
Dissolved zinc concentration (mg/L)						
Kendall Tau correlation coefficient	0.076	-0.196	-0.122	0.288	0.283	-0.464
p-value[b]	0.682	0.290	0.509	0.120	0.126	**0.012**
Dissolved copper concentration (mg/L)						
Kendall Tau correlation coefficient	-0.110	-0.094	-0.157	-0.017	0.043	-0.363
p-value[b]	0.553	0.613	0.396	0.927	0.817	**0.0499**
TPH (motor oil) concentration (mg/L)						
Kendall Tau correlation coefficient	-0.010	0.172	0.126	-0.181	-0.125	-0.105
p-value[b]	0.96	0.371	0.512	0.347	0.516	0.586
Total zinc concentration (mg/L)						
Kendall Tau correlation coefficient	0.183	0.168	0.259	-0.276	0.153	-0.167
p-value[b]	0.322	0.364	0.162	0.136	0.410	0.368
Total copper concentration (mg/L)						
Kendall Tau correlation coefficient	0.133	0.303	0.293	-0.360	0.000	-0.150
p-value[b]	0.471	0.102	0.113	0.052	1.000	0.418
TP concentration (mg/L)						
Kendall Tau correlation coefficient	0.176	0.228	0.303	-0.454	0.043	0.059
p-value[b]	0.342	0.218	0.101	**0.014**	0.818	0.752
SRP concentration (mg/L)						
Kendall Tau correlation coefficient	-0.122	0.009	-0.009	-0.201	-0.292	-0.400
p-value[b]	0.510	0.962	0.961	0.277	0.114	**0.031**
Hardness concentration (mg $CaCO_3$/L)						
Kendall Tau correlation coefficient	-0.228	-0.043	0.044	-0.085	0.000	-0.143
p-value[b]	0.218	0.818	0.813	0.647	1.000	0.438
pH level						
Kendall Tau correlation coefficient	-0.250	-0.235	-0.293	0.310	-0.119	-0.267
p-value[c]	0.177	0.204	0.113	0.094	0.521	0.150
TKN concentration (mg/L)						
Kendall Tau correlation coefficient	-0.150	-0.151	-0.190	-0.209	-0.034	-0.167
p-value[b]	0.418	0.414	0.305	0.258	0.855	0.368
Nitrate + nitrite concentration (mg/L)						
Kendall Tau correlation coefficient	-0.092	-0.329	-0.199	0.185	0.230	-0.460
p-value[b]	0.619	0.075	0.282	0.318	0.214	**0.013**

[a] Analysis was performed on the entire dataset.

[b] Values in **bold** indicate that the null hypothesis is rejected at a significance level of 0.05.

TSS: total suspended solids

TP: total phosphorus

SRP: soluble reactive phosphorus

TPH: total petroleum hydrocarbons

mg/L: milligrams per liter

mg $CaCO_3$/L: milligrams of calcium carbonate per liter

Table G-5. Kendall's tau correlation coefficieuts and p-values from comparisons of storm event characteristics to effluent concentrations for the compost-amended biofiltration swale.

Parameter [a]	Precipitation Depth (inches)	Average Precipitation Intensity (inches/hour)	Peak Precipitation Intensity (inches/ 5 minutes)	Antecedent Dry Period (hours)	Precipitation Duration (hours)	Sample Date
TSS concentration (mg/L)						
Kendall Tau correlation coefficient	0.220	0.308	0.535	-0.264	-0.052	-0.034
p-value[b]	0.234	0.096	**0.004**	0.154	0.780	0.855
Dissolved zinc concentration (mg/L)						
Kendall Tau correlation coefficient	0.052	0.193	0.216	-0.166	0.018	0.070
p-value[b]	0.778	0.297	0.243	0.370	0.924	0.707
Dissolved copper concentration (mg/L)						
Kendall Tau correlation coefficient	0.279	0.400	0.349	-0.102	0.043	-0.008
p-value[b]	0.132	**0.031**	0.059	0.583	0.817	0.964
TPH (motor oil) concentration (mg/L)						
Kendall Tau correlation coefficient	-0.067	-0.019	-0.087	0.200	-0.010	0.010
p-value[b]	0.727	0.921	0.650	0.299	0.960	0.961
Total zinc concentration (mg/L)						
Kendall Tau correlation coefficient	0.191	0.158	0.369	-0.131	0.115	-0.017
p-value[b]	0.301	0.393	**0.046**	0.479	0.534	0.925
Total copper concentration (mg/L)						
Kendall Tau correlation coefficient	0.349	0.386	0.537	-0.188	-0.026	-0.128
p-value[b]	0.059	**0.037**	**0.004**	0.310	0.888	0.490
TP concentration (mg/L)						
Kendall Tau correlation coefficient	-0.133	-0.134	-0.121	-0.159	-0.119	-0.250
p-value[b]	0.471	0.468	0.514	0.390	0.521	0.177
SRP concentration (mg/L)						
Kendall Tau correlation coefficient	-0.133	-0.084	-0.121	-0.126	-0.119	-0.317
p-value[b]	0.471	0.650	0.514	0.498	0.521	0.087
Hardness concentration (mg $CaCO_3$/L)						
Kendall Tau correlation coefficient	-0.517	-0.454	-0.587	-0.008	-0.085	-0.167
p-value[b]	**0.005**	**0.014**	**0.002**	0.964	0.647	0.368
pH level						
Kendall Tau correlation coefficient	-0.059	-0.025	-0.199	0.252	-0.026	-0.360
p-value[c]	0.752	0.891	0.282	0.173	0.890	0.052
TKN concentration (mg/L)						
Kendall Tau correlation coefficient	-0.100	-0.168	-0.086	-0.092	-0.068	-0.183
p-value[b]	0.589	0.364	0.641	0.619	0.714	0.322
Nitrate + nitrite concentration (mg/L)						
Kendall Tau correlation coefficient	-0.333	-0.202	-0.449	-0.176	-0.068	0.417
p-value[b]	0.072	0.276	**0.015**	0.342	0.714	**0.024**

[a] Analysis was performed on the entire dataset.

[b] Values in **bold** indicate that the null hypothesis is rejected at a significance level of 0.05.

TSS: total suspended solids

TP: total phosphorus

SRP: soluble reactive phosphorus

TPH: total petroleum hydrocarbons

mg/L: milligrams per liter

mg $CaCO_3$/L: milligrams of calcium carbonate per liter

Table G-6. Kendall's tau correlation coefficients and p-values from comparisons of storm event characteristics to removal efficiency estimates for the compost-amended biofiltration swale.

Parameter [a]	Precipitation Depth (inches)	Average Precipitation Intensity (inches/hour)	Peak Precipitation Intensity (inches/ 5 minutes)	Antecedent Dry Period (hours)	Precipitation Duration (hours)	Sample Date
TSS removal efficiency (%)						
Kendall Tau correlation coefficient	0.133	0.202	0.035	-0.142	0.254	0.083
p-value[b]	0.471	0.276	0.852	0.442	0.170	0.653
Dissolved zinc removal efficiency (%)						
Kendall Tau correlation coefficient	-0.017	-0.336	-0.328	0.259	0.203	-0.300
p-value[b]	0.928	0.069	0.077	0.161	0.272	0.105
Dissolved copper removal efficiency (%)						
Kendall Tau correlation coefficient	-0.317	-0.303	-0.293	0.092	0.051	-0.400
p-value[b]	0.087	0.102	0.113	0.619	0.784	**0.031**
TPH (motor oil) removal efficiency (%)						
Kendall Tau correlation coefficient	0.144	0.077	0.126	-0.352	-0.010	0.105
p-value[b]	0.454	0.691	0.512	0.067	0.960	0.586
Total zinc removal efficiency (%)						
Kendall Tau correlation coefficient	-0.150	-0.067	-0.190	-0.243	0.000	-0.267
p-value[b]	0.418	0.716	0.305	0.190	1.000	0.150
Total copper removal efficiency (%)						
Kendall Tau correlation coefficient	0.067	0.185	0.173	-0.259	0.119	-0.117
p-value[b]	0.719	0.318	0.351	0.161	0.521	0.528
TP removal efficiency (%)						
Kendall Tau correlation coefficient	0.133	0.286	0.259	-0.176	0.170	0.183
p-value[b]	0.471	0.123	0.162	0.342	0.360	0.322
SRP removal efficiency (%)						
Kendall Tau correlation coefficient	-0.100	0.218	0.104	-0.259	-0.356	-0.150
p-value[b]	0.589	0.238	0.576	0.161	0.054	0.418
TKN removal efficiency (%)						
Kendall Tau correlation coefficient	0.100	0.050	0.121	-0.176	0.186	0.083
p-value[b]	0.589	0.785	0.514	0.342	0.314	0.653
Nitrate + nitrite removal efficiency (%)						
Kendall Tau correlation coefficient	0.283	-0.050	0.224	0.259	0.305	-0.633
p-value[b]	0.126	0.785	0.226	0.161	0.099	**0.001**

[a] Analysis was performed on the entire dataset.

[b] Values in **bold** indicate that the null hypothesis is rejected at a significance level of 0.05.

TSS: total suspended solids

TP: total phosphorus

SRP: soluble reactive phosphorus

TPH: total petroleum hydrocarbons

mg/L: milligrams per liter

Table G-7. Kendall's tau correlation coefficients and p-values from comparisons of storm event characteristics to influent concentrations for the control biofiltration swale.

Parameter [a]	Precipitation Depth (inches)	Average Precipitation Intensity (inches/hour)	Peak Precipitation Intensity (inches/ 5 minutes)	Antecedent Dry Period (hours)	Precipitation Duration (hours)	Sample Date
TSS concentration (mg/L)						
Kendall Tau correlation coefficient	0.126	0.067	0.137	-0.477	0.127	0.583
p-value[b]	0.498	0.716	0.460	**0.010**	0.494	**0.002**
Dissolved zinc concentration (mg/L)						
Kendall Tau correlation coefficient	-0.335	-0.086	-0.281	0.060	-0.165	-0.308
p-value[b]	0.070	0.641	0.129	0.745	0.374	0.096
Dissolved copper concentration (mg/L)						
Kendall Tau correlation coefficient	-0.387	-0.093	-0.300	0.017	-0.288	-0.326
p-value[b]	**0.037**	0.616	0.104	0.928	0.120	0.078
TPH (motor oil) concentration (mg/L)						
Kendall Tau correlation coefficient	-0.183	0.038	-0.204	-0.124	-0.106	-0.010
p-value[b]	0.342	0.842	0.289	0.520	0.583	0.961
Total zinc concentration (mg/L)						
Kendall Tau correlation coefficient	-0.159	-0.050	-0.068	-0.477	-0.025	0.233
p-value[b]	0.390	0.785	0.712	**0.010**	0.891	0.207
Total copper concentration (mg/L)						
Kendall Tau correlation coefficient	-0.059	0.151	0.103	-0.577	-0.110	0.133
p-value[b]	0.752	0.414	0.579	**0.002**	0.553	0.471
TP concentration (mg/L)						
Kendall Tau correlation coefficient	-0.059	-0.017	0.017	-0.427	0.042	0.433
p-value[b]	0.752	0.928	0.926	**0.021**	0.820	**0.019**
SRP concentration (mg/L)						
Kendall Tau correlation coefficient	-0.155	0.009	0.009	0.069	-0.244	-0.489
p-value[b]	0.402	0.963	0.962	0.709	0.188	**0.008**
Hardness concentration (mg $CaCO_3$/L)						
Kendall Tau correlation coefficient	-0.417	-0.103	-0.330	-0.145	-0.215	0.034
p-value[b]	**0.024**	0.579	0.074	0.434	0.246	0.855
pH level						
Kendall Tau correlation coefficient	-0.211	-0.068	-0.241	0.127	-0.145	-0.118
p-value[c]	0.254	0.714	0.192	0.494	0.434	0.525
TKN concentration (mg/L)						
Kendall Tau correlation coefficient	-0.276	-0.252	-0.359	-0.042	-0.110	-0.100
p-value[b]	0.136	0.173	0.052	0.821	0.553	0.589
Nitrate + nitrite concentration (mg/L)						
Kendall Tau correlation coefficient	-0.259	0.050	-0.222	0.209	-0.160	-0.350
p-value[b]	0.161	0.785	0.230	0.258	0.386	0.059

[a] Analysis was performed on the entire dataset.

[b] Values in **bold** indicate that the null hypothesis is rejected at a significance level of 0.05.

TSS: total suspended solids

TP: total phosphorus

SRP: soluble reactive phosphorus

TPH: total petroleum hydrocarbons

mg/L: milligrams per liter

mg $CaCO_3$/L: milligrams of calcium carbonate per liter

Table G-8. Kendall's tau correlation coefficients and p-values from comparisons of storm event characteristics to effluent concentrations for the control biofiltration swale.

Parameter [a]	Precipitation Depth (inches)	Average Precipitation Intensity (inches/hour)	Peak Precipitation Intensity (inches/ 5 minutes)	Antecedent Dry Period (hours)	Precipitation Duration (hours)	Sample Date
TSS concentration (mg/L)						
Kendall Tau correlation coefficient	-0.077	-0.078	-0.114	-0.283	0.009	0.308
p-value[b]	0.676	0.675	0.538	0.126	0.963	0.096
Dissolved zinc concentration (mg/L)						
Kendall Tau correlation coefficient	-0.177	-0.051	-0.190	-0.346	-0.060	0.319
p-value[b]	0.338	0.784	0.305	0.062	0.748	0.084
Dissolved copper concentration (mg/L)						
Kendall Tau correlation coefficient	-0.218	0.143	-0.112	-0.168	-0.186	-0.209
p-value[b]	0.238	0.438	0.546	0.364	0.314	0.258
TPH (motor oil) concentration (mg/L)						
Kendall Tau correlation coefficient	-0.087	-0.364	-0.146	-0.257	0.202	0.200
p-value[b]	0.653	0.059	0.449	0.181	0.294	0.299
Total zinc concentration (mg/L)						
Kendall Tau correlation coefficient	-0.202	-0.160	-0.232	-0.403	-0.017	0.410
p-value[b]	0.276	0.386	0.210	**0.029**	0.927	**0.027**
Total copper concentration (mg/L)						
Kendall Tau correlation coefficient	-0.211	0.119	-0.069	-0.414	-0.162	0.000
p-value[b]	0.254	0.522	0.709	**0.025**	0.382	1.000
TP concentration (mg/L)						
Kendall Tau correlation coefficient	-0.185	0.008	-0.146	0.118	-0.169	-0.527
p-value[b]	0.318	0.964	0.430	0.525	0.360	**0.004**
SRP concentration (mg/L)						
Kendall Tau correlation coefficient	-0.103	0.043	0.061	0.291	-0.121	-0.775
p-value[b]	0.579	0.817	0.741	0.116	0.514	**< 0.0001**
Hardness concentration (mg $CaCO_3$/L)						
Kendall Tau correlation coefficient	-0.276	-0.034	-0.171	-0.008	-0.177	-0.267
p-value[b]	0.136	0.856	0.356	0.964	0.338	0.150
pH level						
Kendall Tau correlation coefficient	0.017	0.076	-0.060	0.319	0.017	-0.377
p-value[c]	0.928	0.682	0.745	0.084	0.927	**0.042**
TKN concentration (mg/L)						
Kendall Tau correlation coefficient	-0.209	-0.134	-0.171	0.025	-0.127	-0.233
p-value[b]	0.258	0.468	0.356	0.892	0.494	0.207
Nitrate + nitrite concentration (mg/L)						
Kendall Tau correlation coefficient	-0.410	-0.101	-0.274	-0.008	-0.279	-0.267
p-value[b]	**0.027**	0.586	0.139	0.964	0.132	0.150

[b] Values in **bold** indicate that the null hypothesis is rejected at a significance level of 0.05.

TSS: total suspended solids

TP: total phosphorus

SRP: soluble reactive phosphorus

TPH: total petroleum hydrocarbons

mg/L: milligrams per liter

mg $CaCO_3$/L: milligrams of calcium carbonate per liter

Table G-9. Kendall's tau correlation coefficients and p-values from comparisons of storm event characteristics to removal efficiency estimates for the control biofiltration swale.

Parameter [a]	Precipitation Depth (inches)	Average Precipitation Intensity (inches/hour)	Peak Precipitation Intensity (inches/ 5 minutes)	Antecedent Dry Period (hours)	Precipitation Duration (hours)	Sample Date
TSS removal efficiency (%)						
Kendall Tau correlation coefficient	0.343	0.151	0.376	-0.393	0.177	0.400
p-value[b]	0.064	0.414	**0.042**	**0.034**	0.338	**0.031**
Dissolved zinc removal efficiency (%)						
Kendall Tau correlation coefficient	0.067	0.093	0.163	0.437	0.000	-0.444
p-value[b]	0.716	0.616	0.378	**0.018**	1.000	**0.017**
Dissolved copper removal efficiency (%)						
Kendall Tau correlation coefficient	-0.377	-0.185	-0.342	0.259	-0.211	-0.333
p-value[b]	**0.042**	0.318	0.065	0.161	0.254	0.072
TPH (motor oil) removal efficiency (%)						
Kendall Tau correlation coefficient	0.125	0.383	-0.068	-0.010	-0.240	-0.086
p-value[b]	0.516	**0.047**	0.724	0.961	0.212	0.656
Total zinc removal efficiency (%)						
Kendall Tau correlation coefficient	0.209	0.319	0.325	0.042	-0.042	-0.183
p-value[b]	0.258	0.084	0.079	0.821	0.820	0.322
Total copper removal efficiency (%)						
Kendall Tau correlation coefficient	0.276	0.118	0.256	-0.310	0.076	0.133
p-value[b]	0.136	0.525	0.166	0.094	0.682	0.471
TP removal efficiency (%)						
Kendall Tau correlation coefficient	0.075	0.084	0.068	-0.460	0.076	0.633
p-value[b]	0.684	0.650	0.712	**0.013**	0.682	**0.001**
SRP removal efficiency (%)						
Kendall Tau correlation coefficient	-0.128	-0.017	-0.052	-0.434	0.077	0.542
p-value[b]	0.490	0.926	0.778	**0.019**	0.676	**0.003**
TKN removal efficiency (%)						
Kendall Tau correlation coefficient	0.025	-0.118	-0.085	-0.243	0.194	0.250
p-value[b]	0.892	0.525	0.644	0.190	0.294	0.177
Nitrate + nitrite removal efficiency (%)						
Kendall Tau correlation coefficient	-0.042	0.050	-0.034	0.209	-0.093	-0.150
p-value[b]	0.821	0.785	0.853	0.258	0.616	0.418

[a] Analysis was performed on the entire dataset.

[b] Values in **bold** indicate that the null hypothesis is rejected at a significance level of 0.05.

TSS: total suspended solids

TP: total phosphorus

SRP: soluble reactive phosphorus

TPH: total petroleum hydrocarbons

mg/L: milligrams per liter

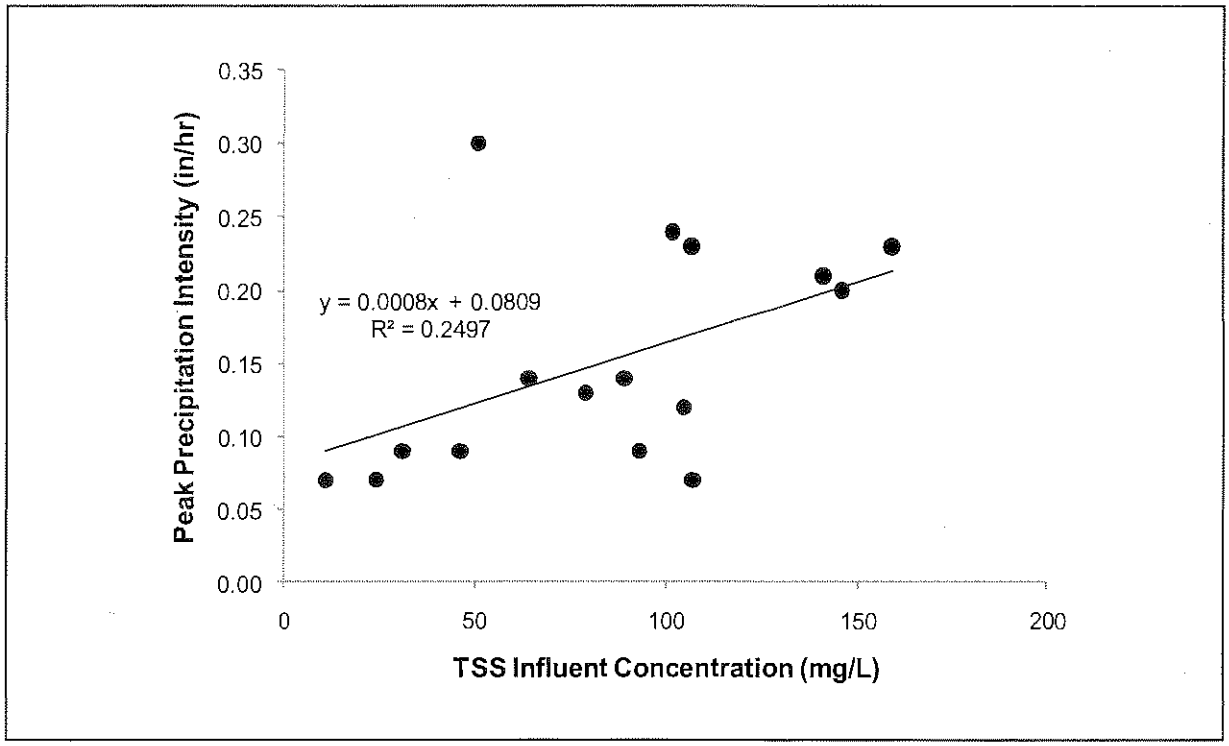


Figure G-1. Influent total suspended solids concentration correlation with peak precipitation intensity for the compost-amended biofiltration swale.

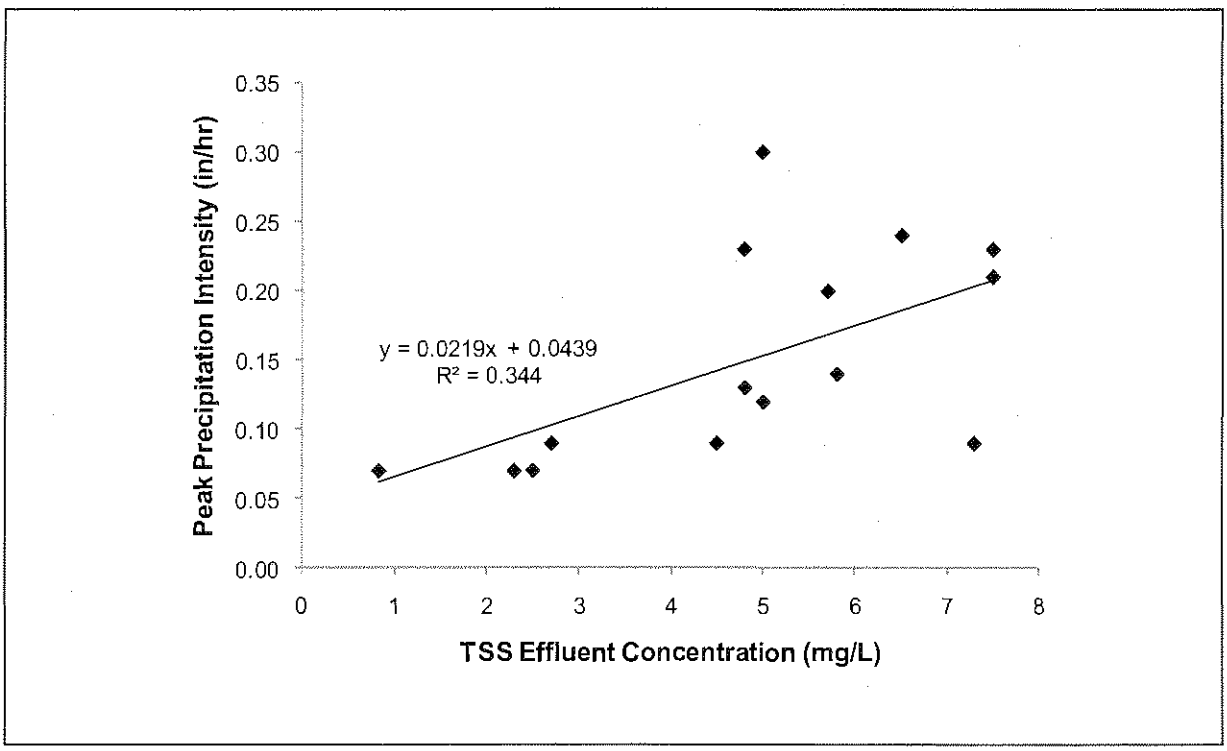


Figure G-2. Effluent total suspended solids concentration correlation with peak precipitation intensity for the compost-amended biofiltration swale.

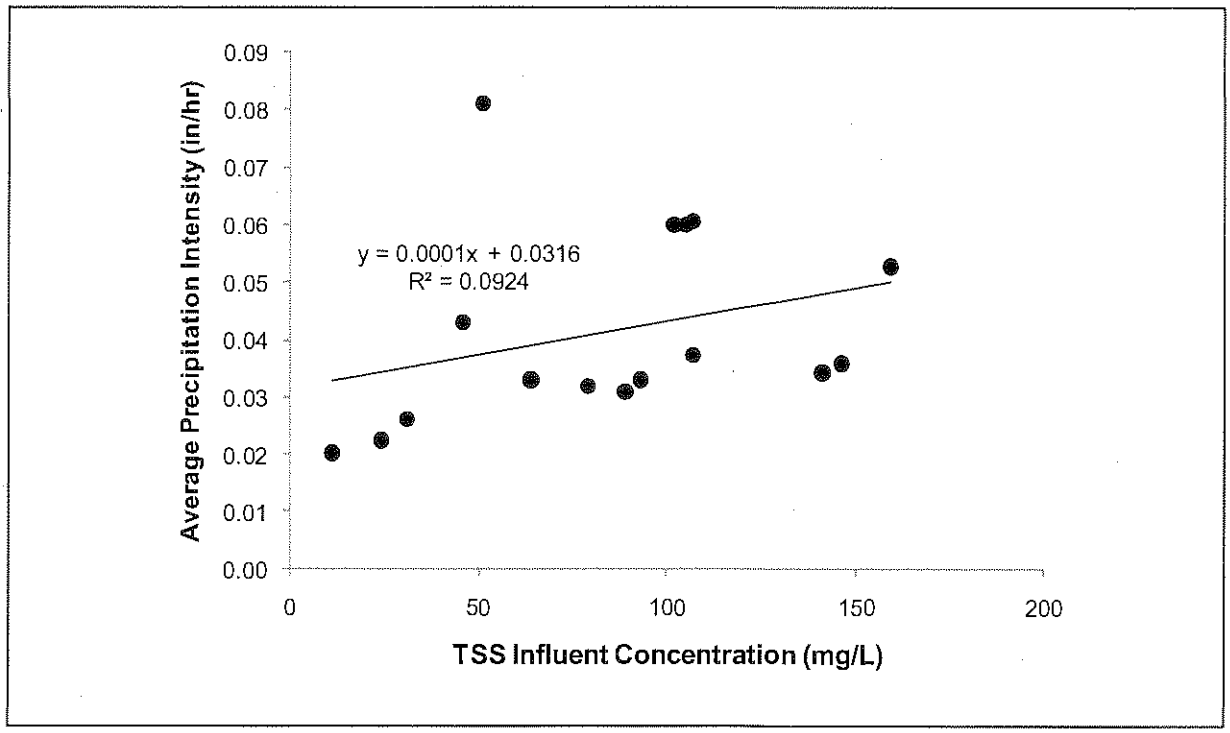


Figure G-3. Influent total suspended solids concentration correlation with average precipitation intensity for the compost-amended biofiltration swale.

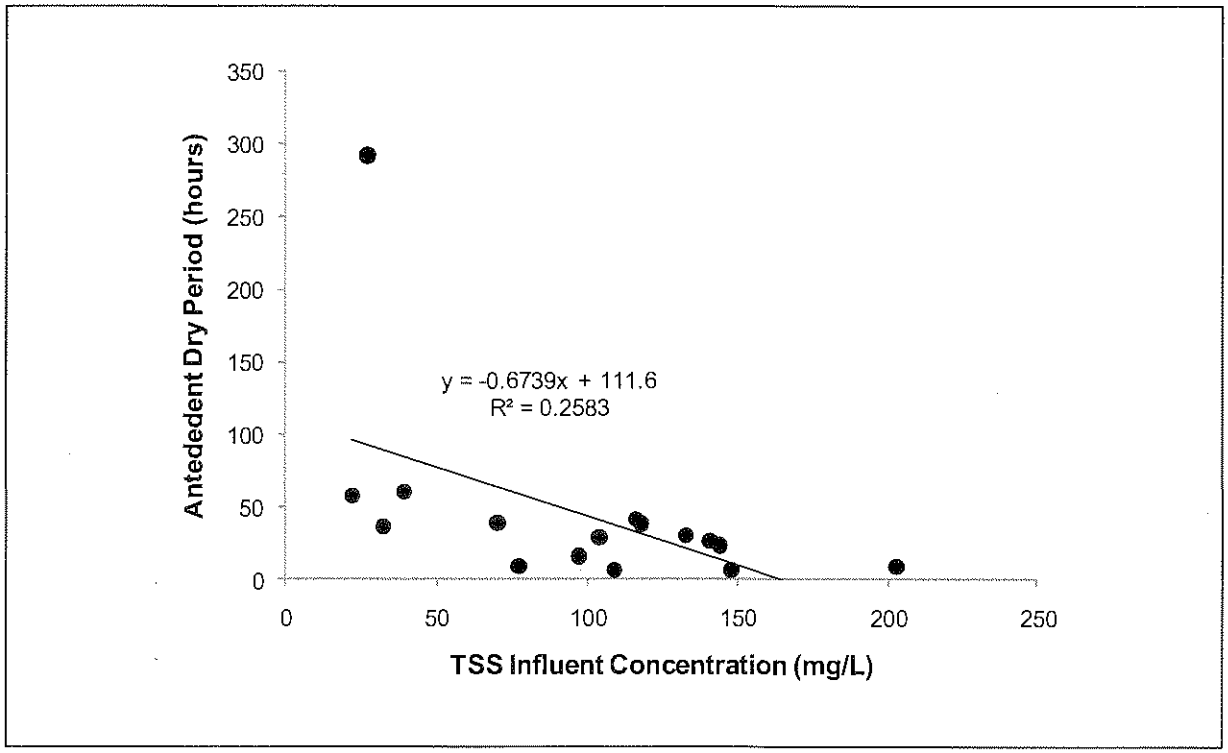


Figure G-4. Influent total suspended solids concentration correlation with antecedent dry period for the control biofiltration swale.

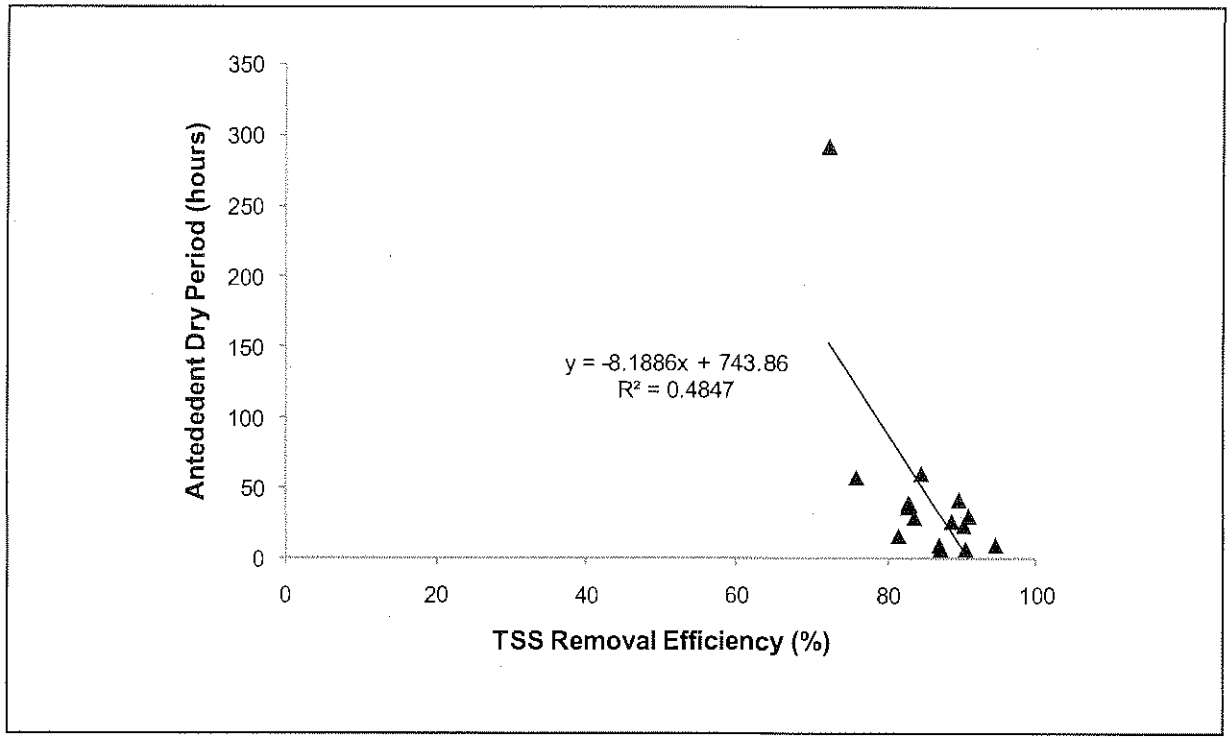


Figure G-5. Total suspended solids removal efficiency correlation with antecedent dry period for the control biofiltration swale.

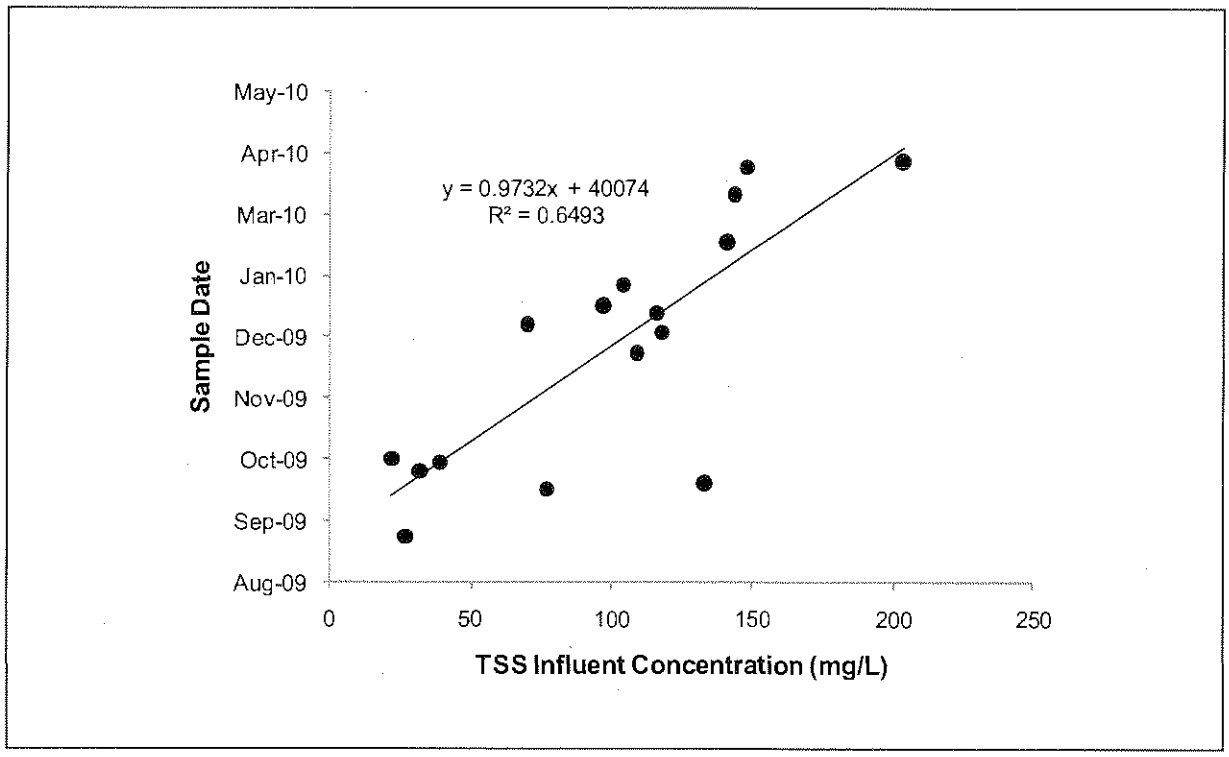


Figure G-6. Influent total suspended solids concentration correlation with sample date for the control biofiltration swale.

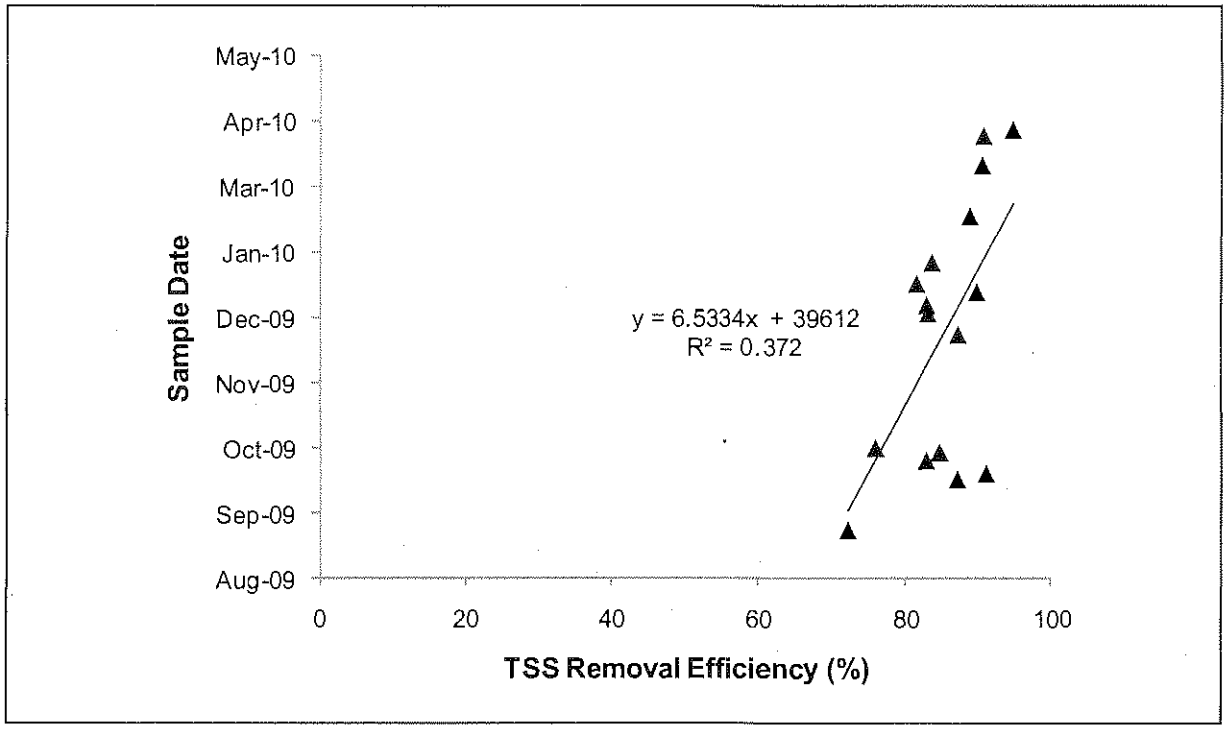


Figure G-7. Total suspended solids removal efficiency correlation with sample date for the control biofiltration swale.

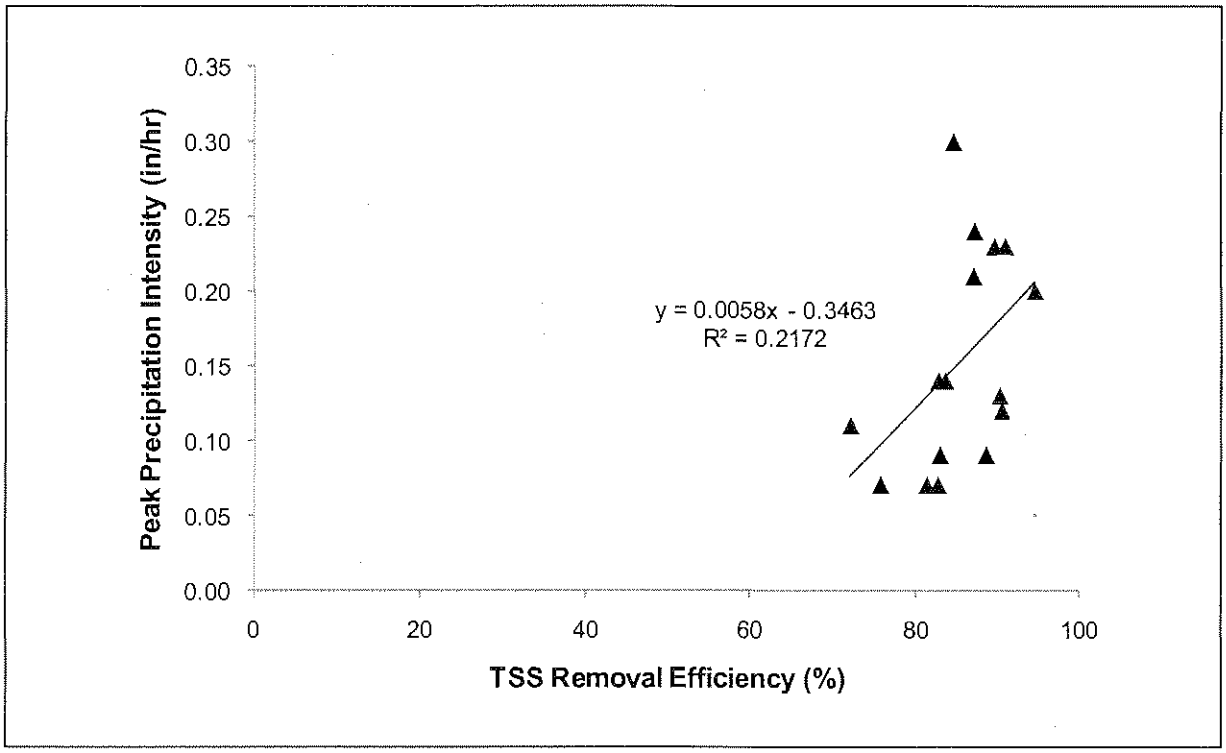


Figure G-8. Total suspended solids removal efficiency correlation with peak precipitation intensity for the control biofiltration swale.

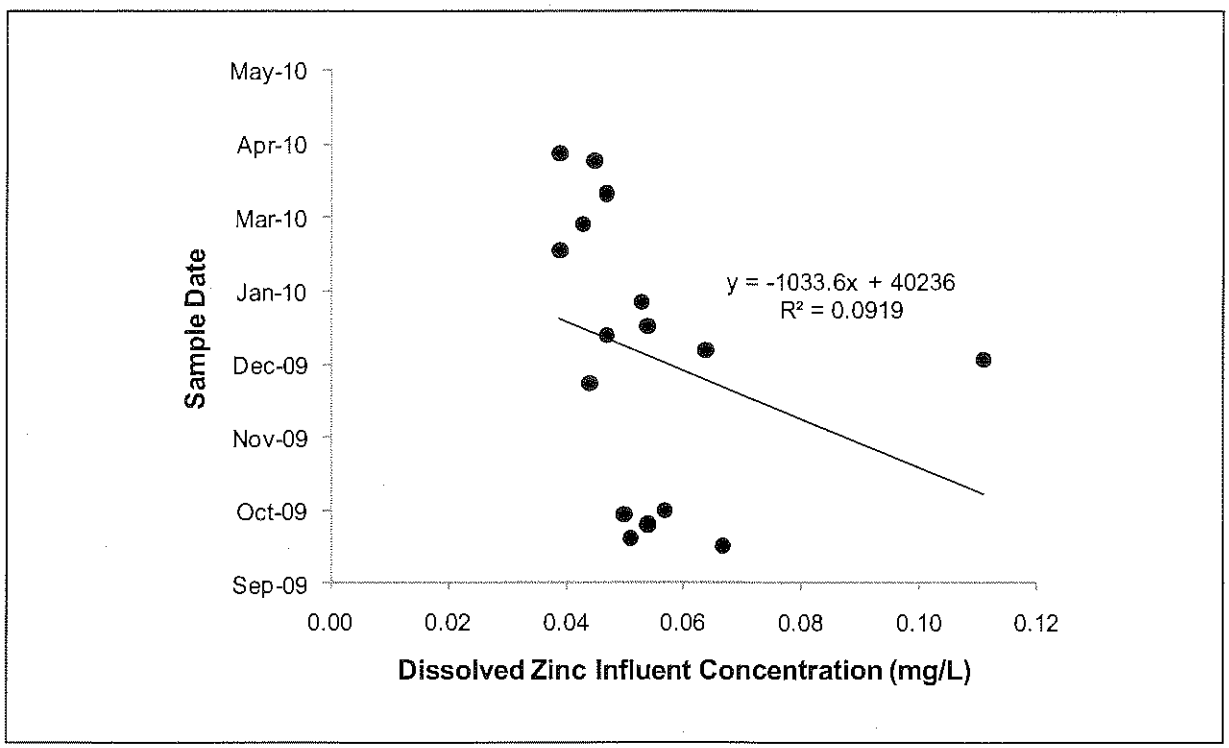


Figure G-9. Influent dissolved zinc concentration correlation with sample date for the compost-amended biofiltration swale.

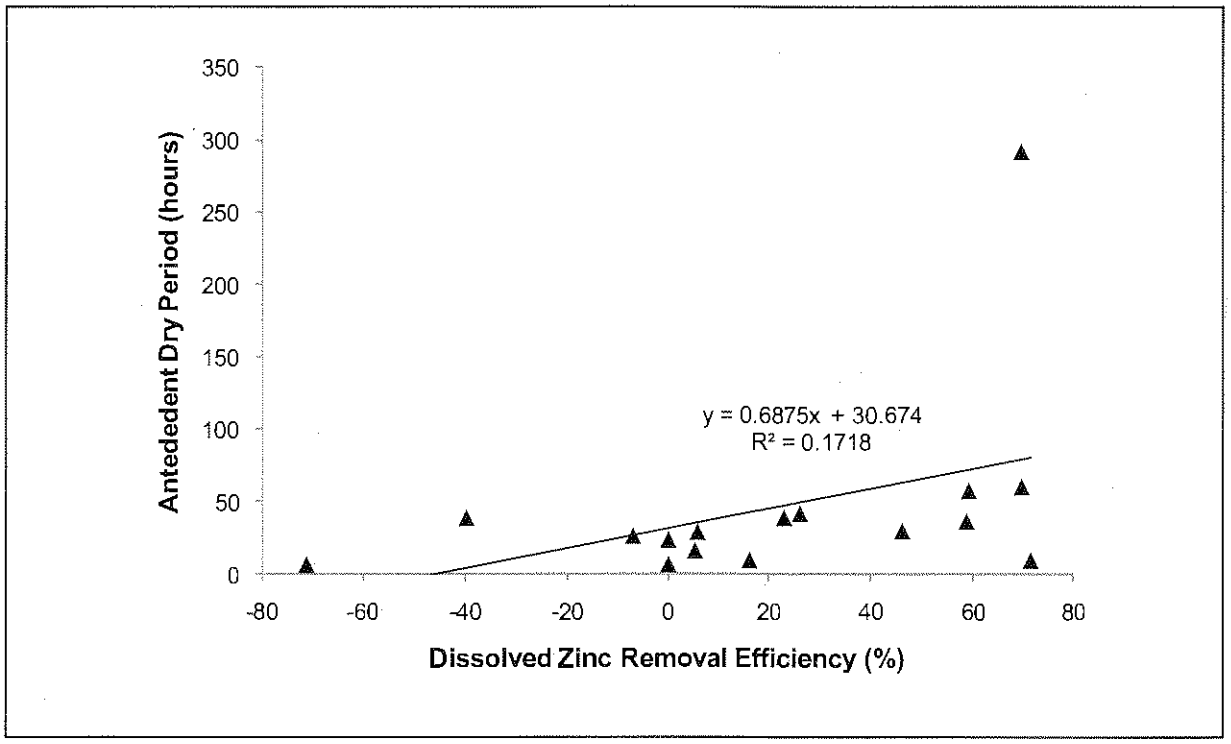


Figure G-10. Dissolved zinc removal efficiency correlation with antecedent dry period for the control biofiltration swale.

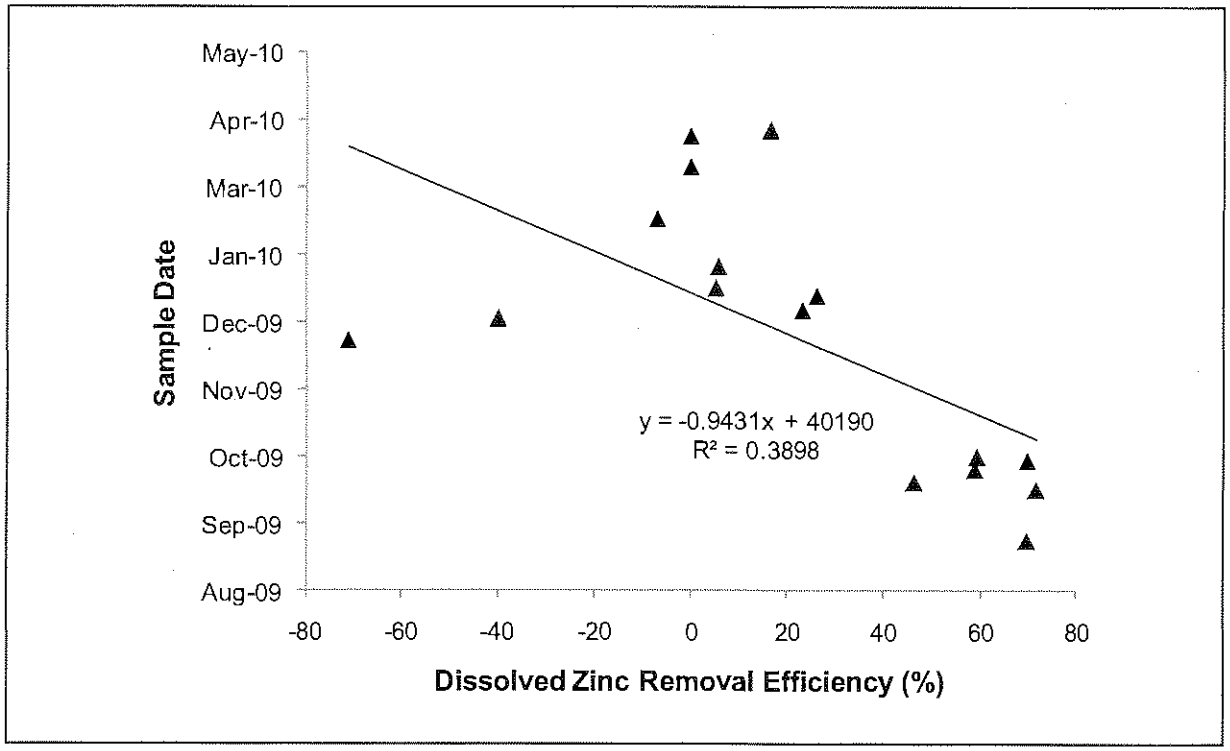


Figure G-11. Dissolved zinc removal efficiency correlation with sample date for the control biofiltration swale.

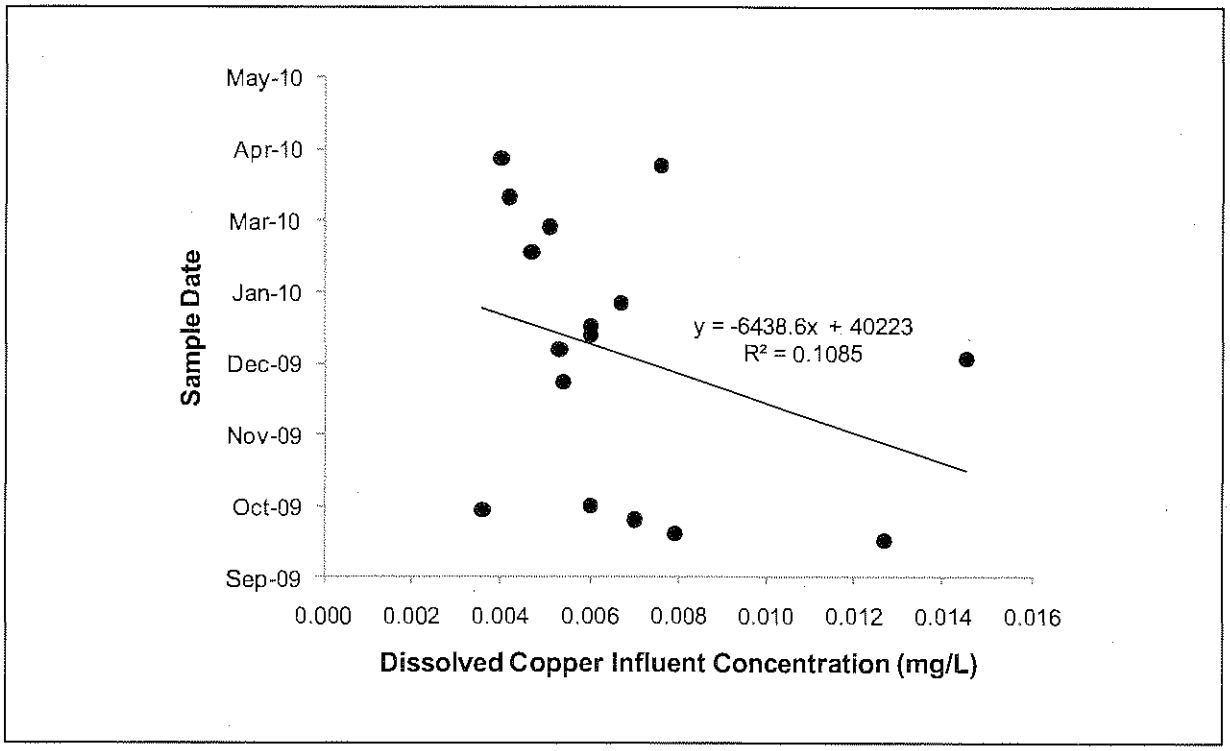


Figure G-12. Influent dissolved copper concentration correlation with sample date for the compost-amended biofiltration swale.

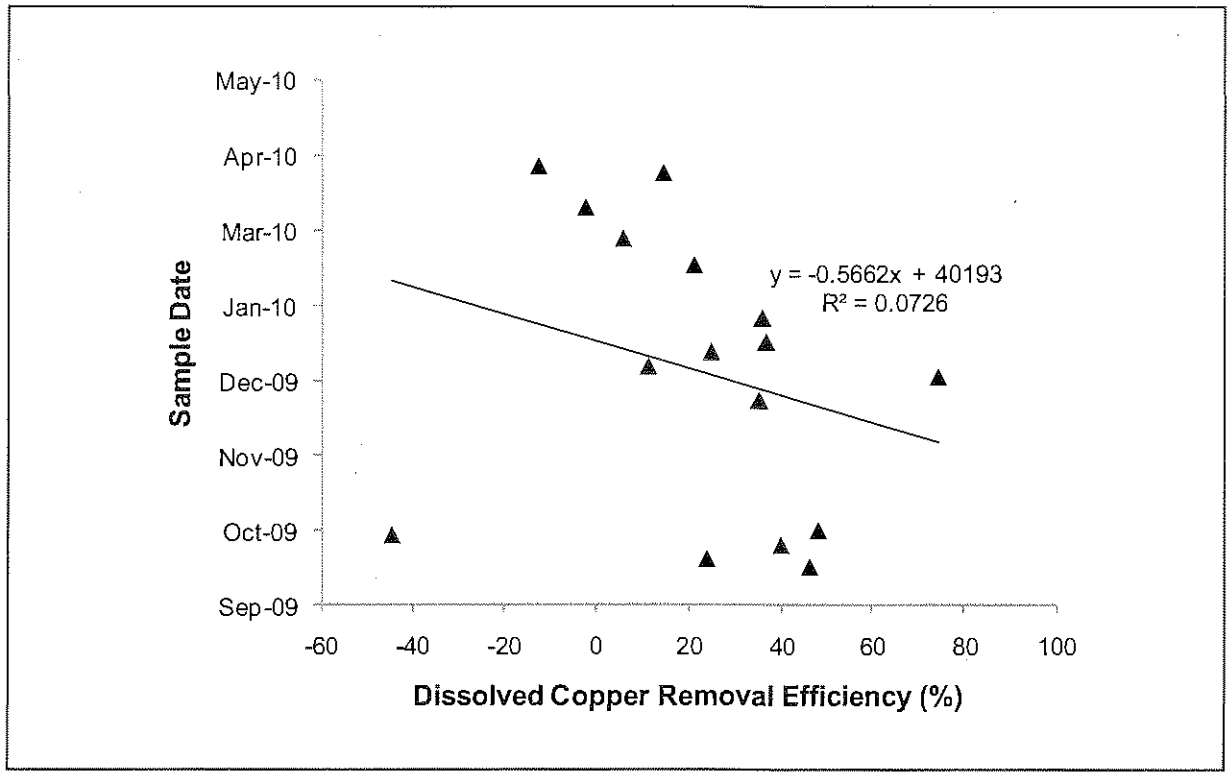


Figure G-13. Dissolved copper removal efficiency correlation with sample date for the compost-amended biofiltration swale.

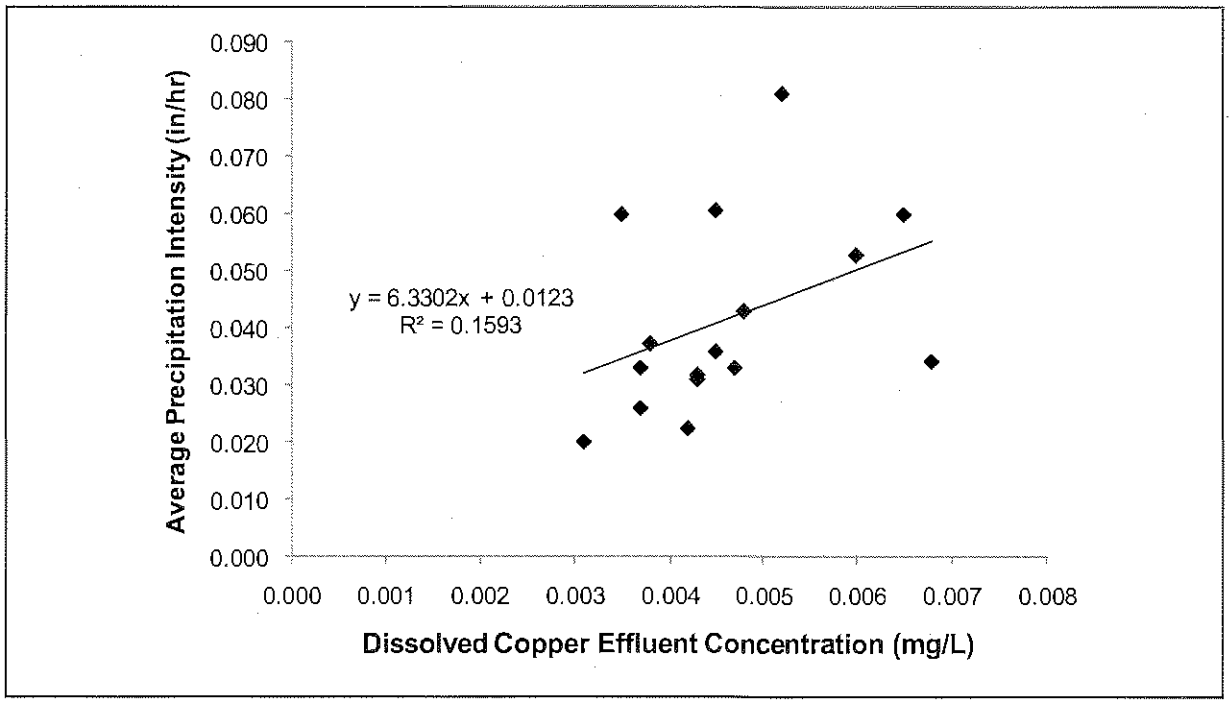


Figure G-14. Effluent dissolved copper concentration correlation with average precipitation intensity for the compost-amended biofiltration swale.

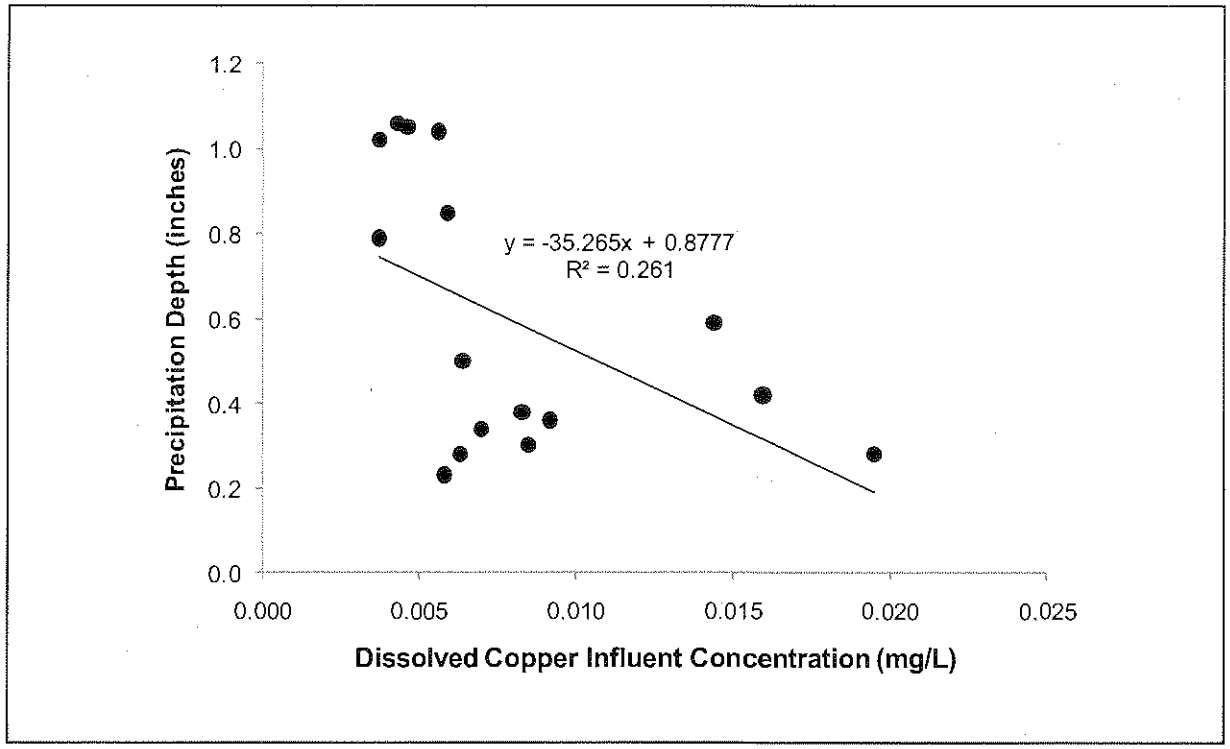


Figure G-15. Influent dissolved copper concentration correlation with precipitation depth for the control biofiltration swale.

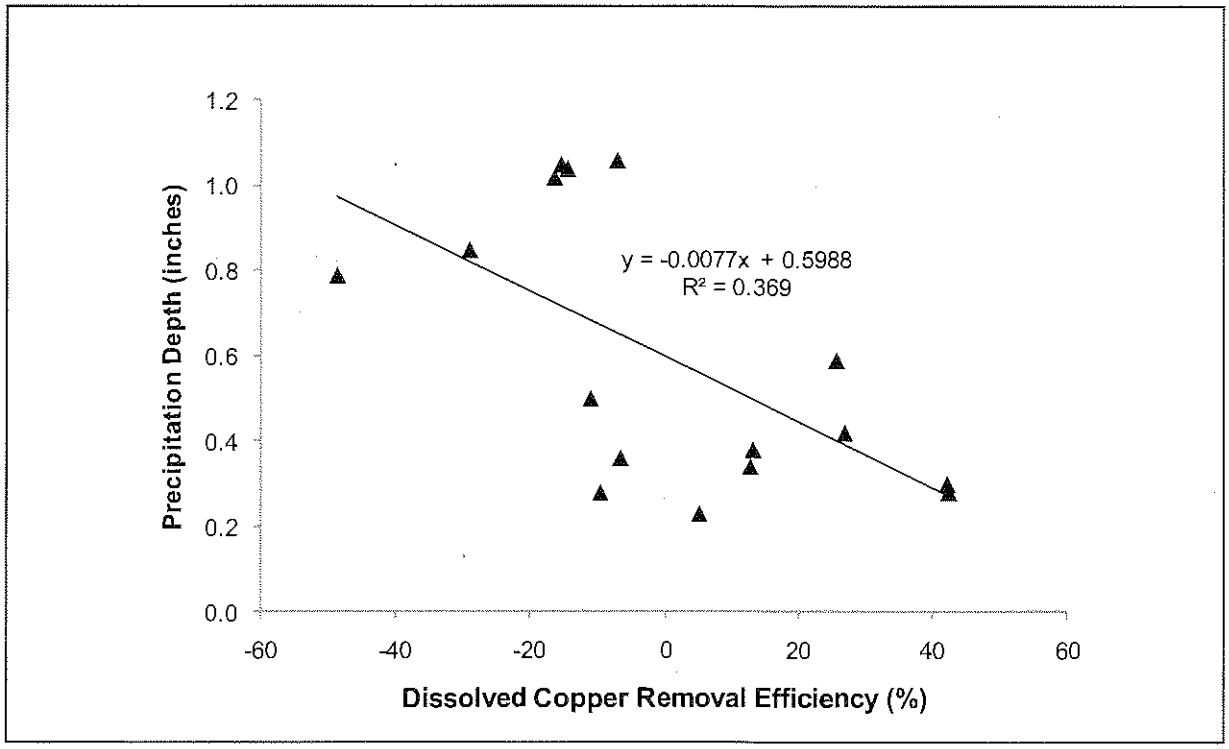


Figure G-16. Dissolved copper removal efficiency correlation with precipitation depth for the control biofiltration swale.

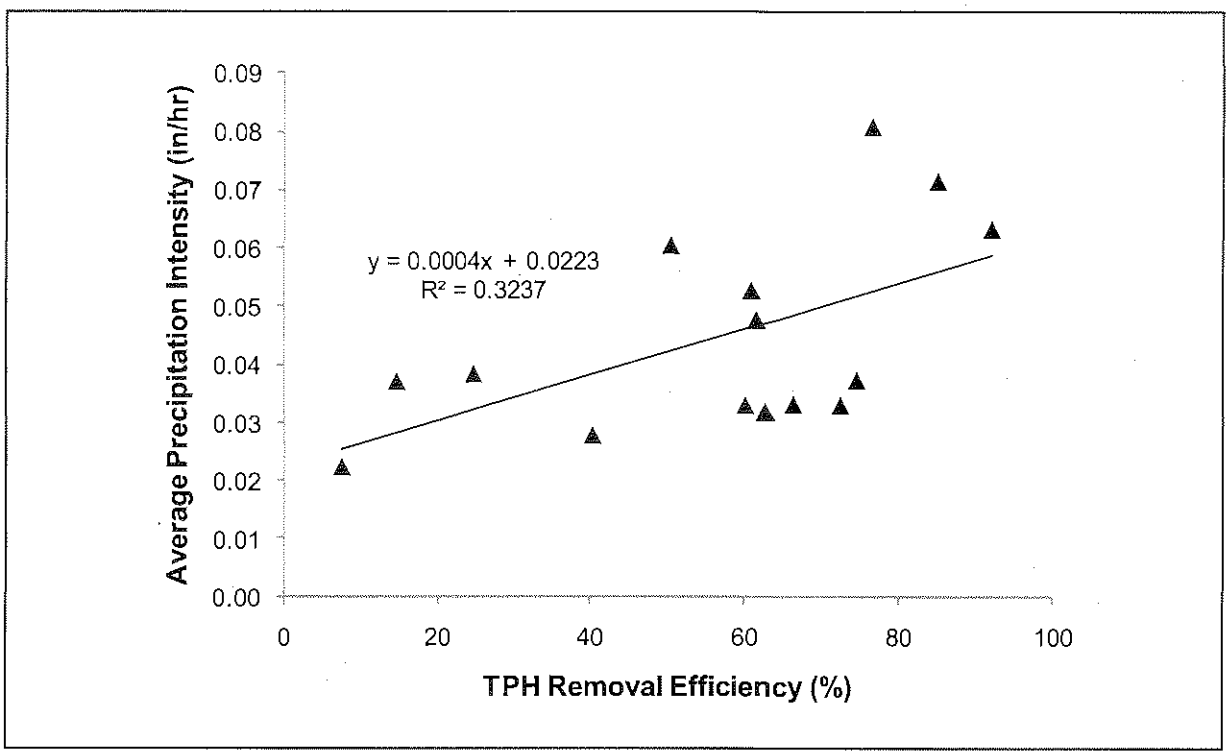


Figure G-17. Total petroleum hydrocarbon removal effiency correlation with average precipitation intensity for the control biofiltration swale.

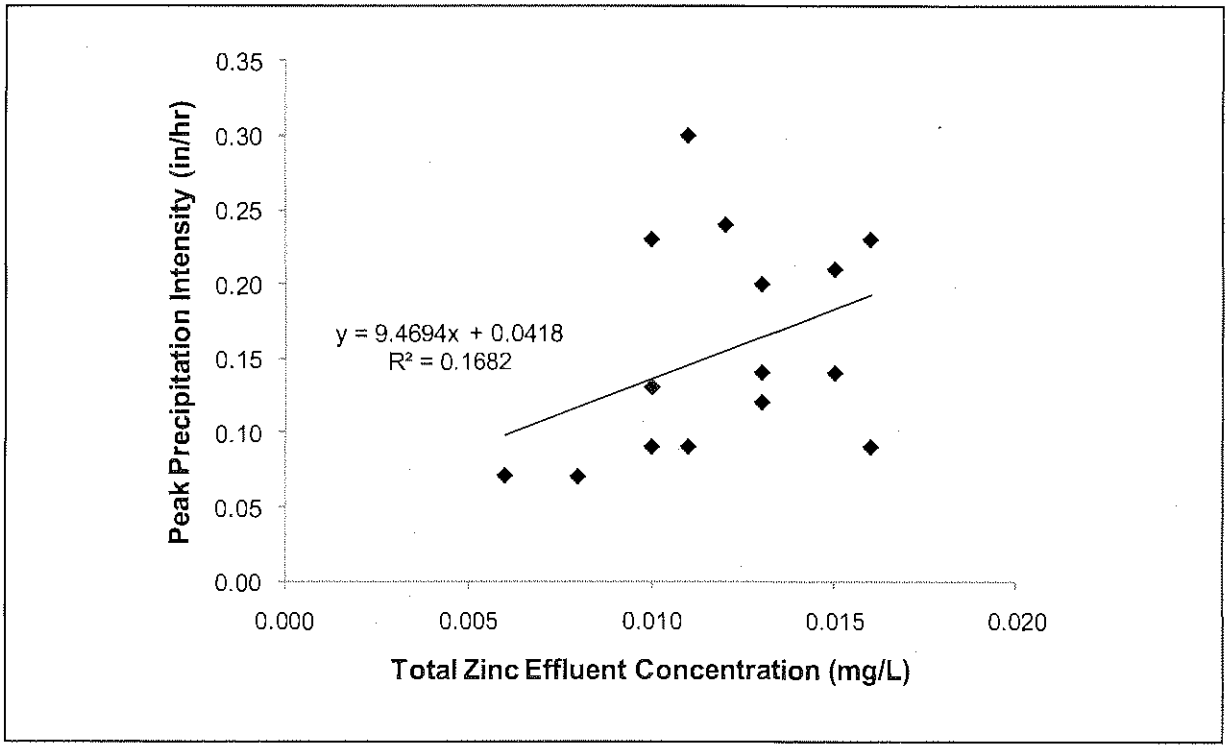


Figure G-18. Effluent total zinc concentration correlation with peak precipitation intensity for the compost-amended biofiltration swale.

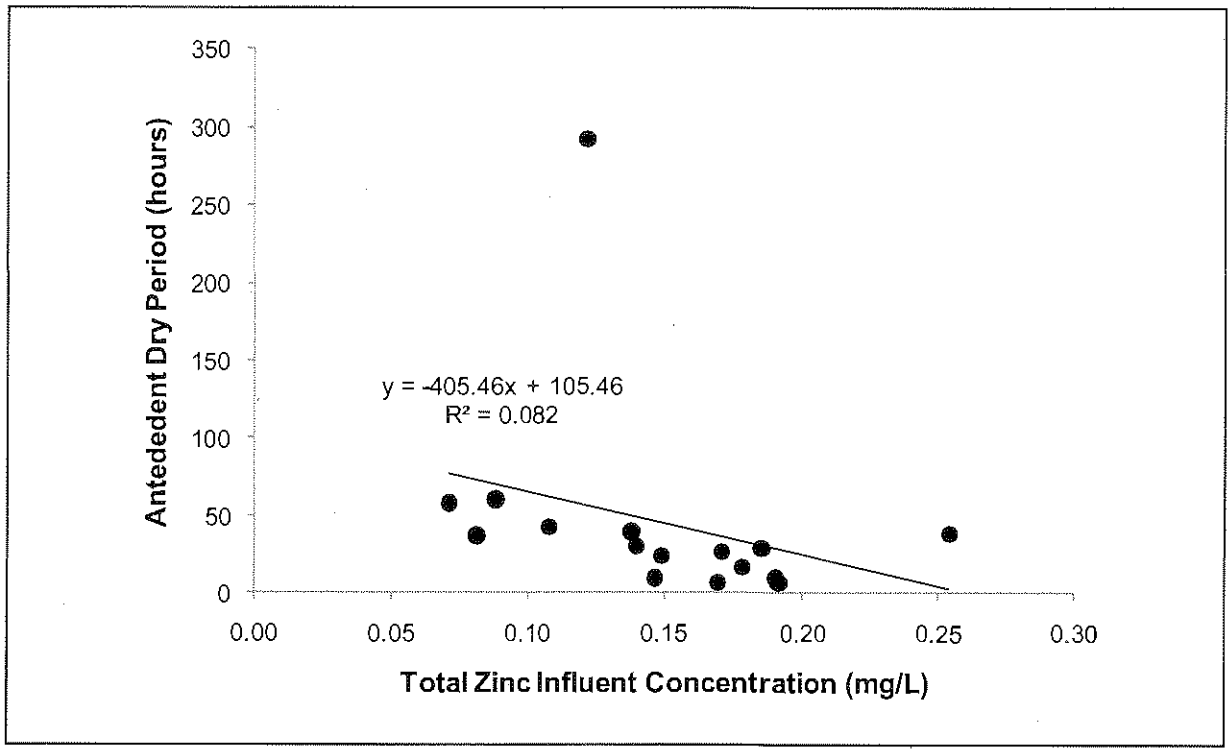


Figure G-19. Influent total zinc concentration correlation with antecedent dry period for the control biofiltration swale.

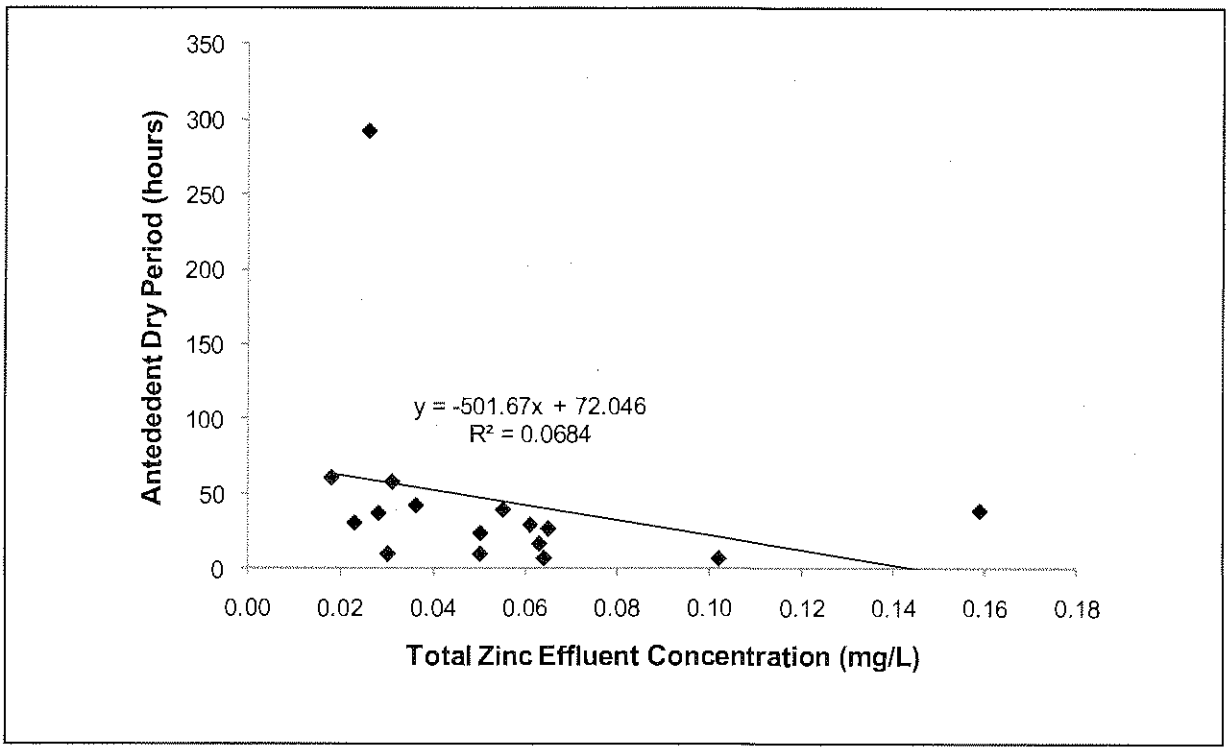


Figure G-20. Effluent total zinc concentration correlation with antecedent dry period for the control biofiltration swale.

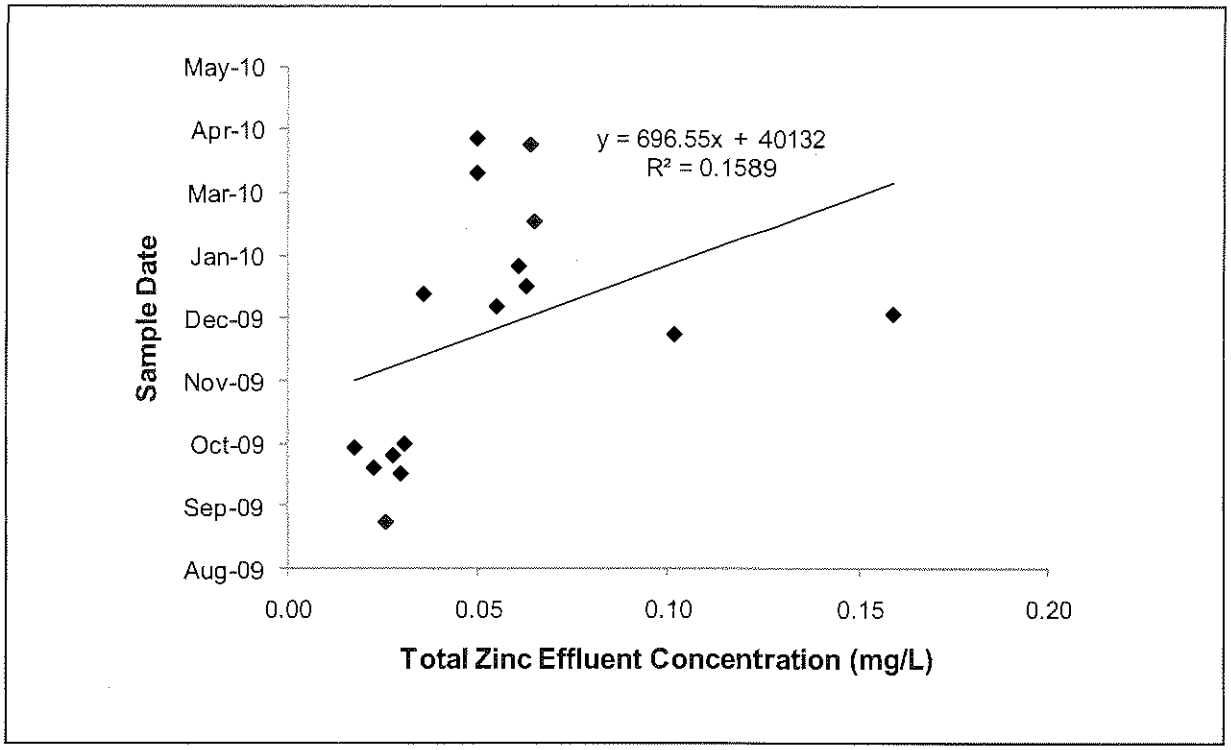


Figure G-21. Effluent total zinc concentration correlation with sample date for the control biofiltration swale.

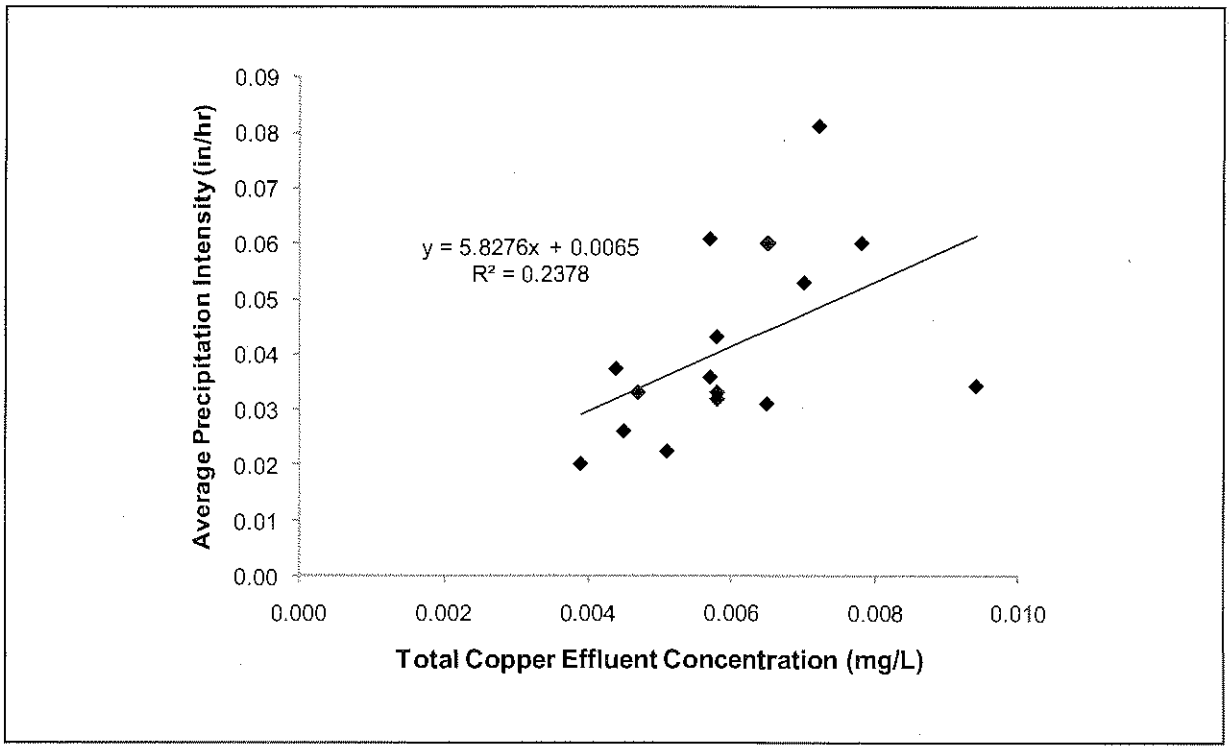


Figure G-22. Effluent total copper concentration correlation with average precipitation intensity for the compost-amended biofiltration swale.

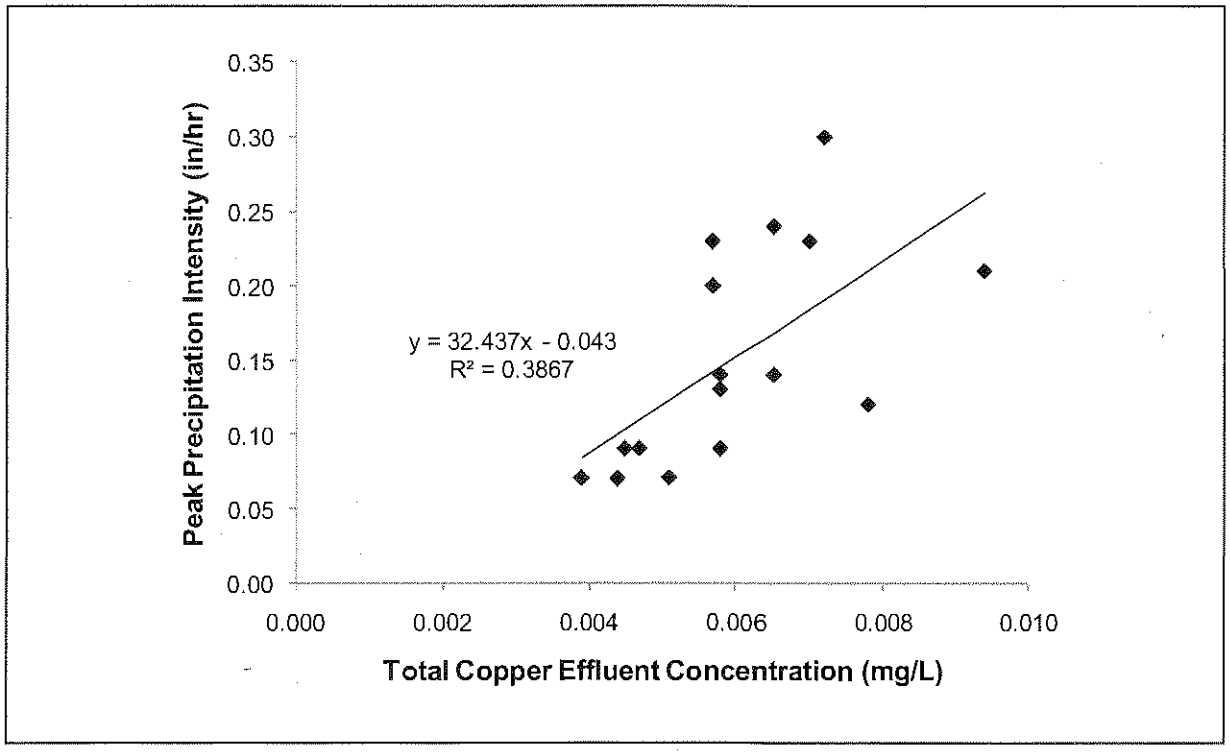


Figure G-23. Effluent total copper concentration correlation with peak precipitation intensity for the compost-amended biofiltration swale.

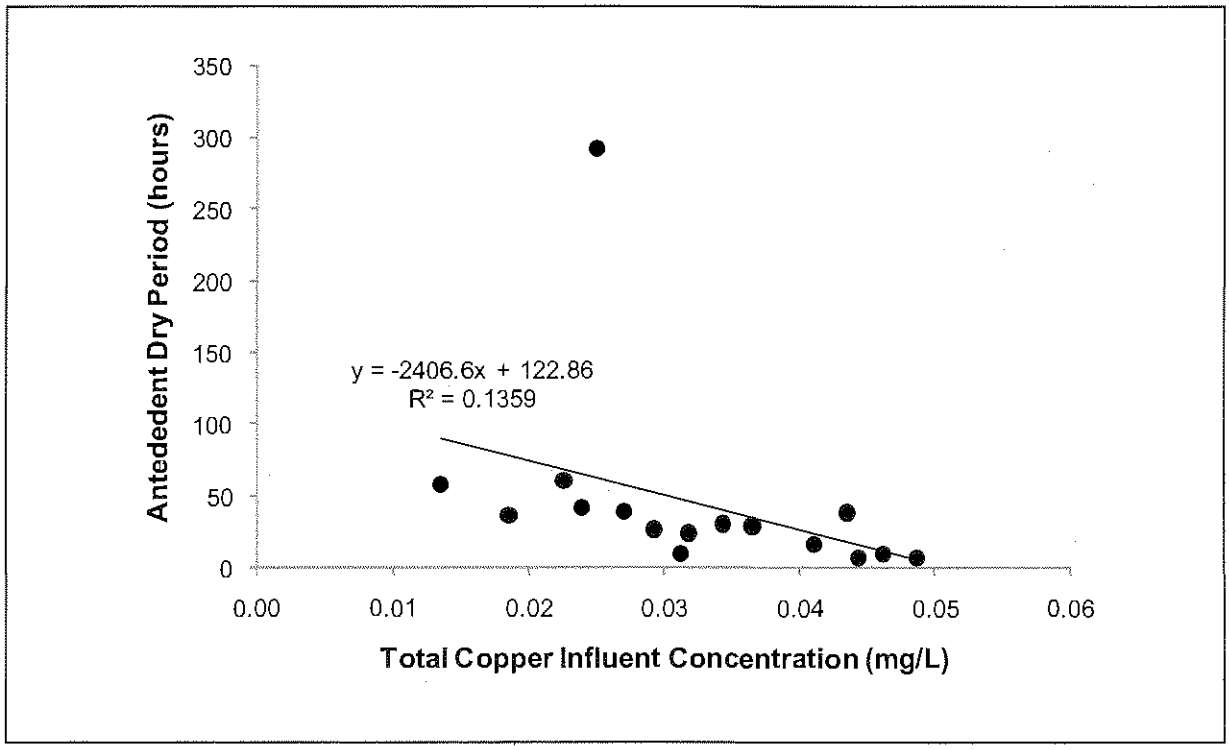


Figure G-24. Influent total copper concentration correlation with antecedent dry period for the control biofiltration swale.

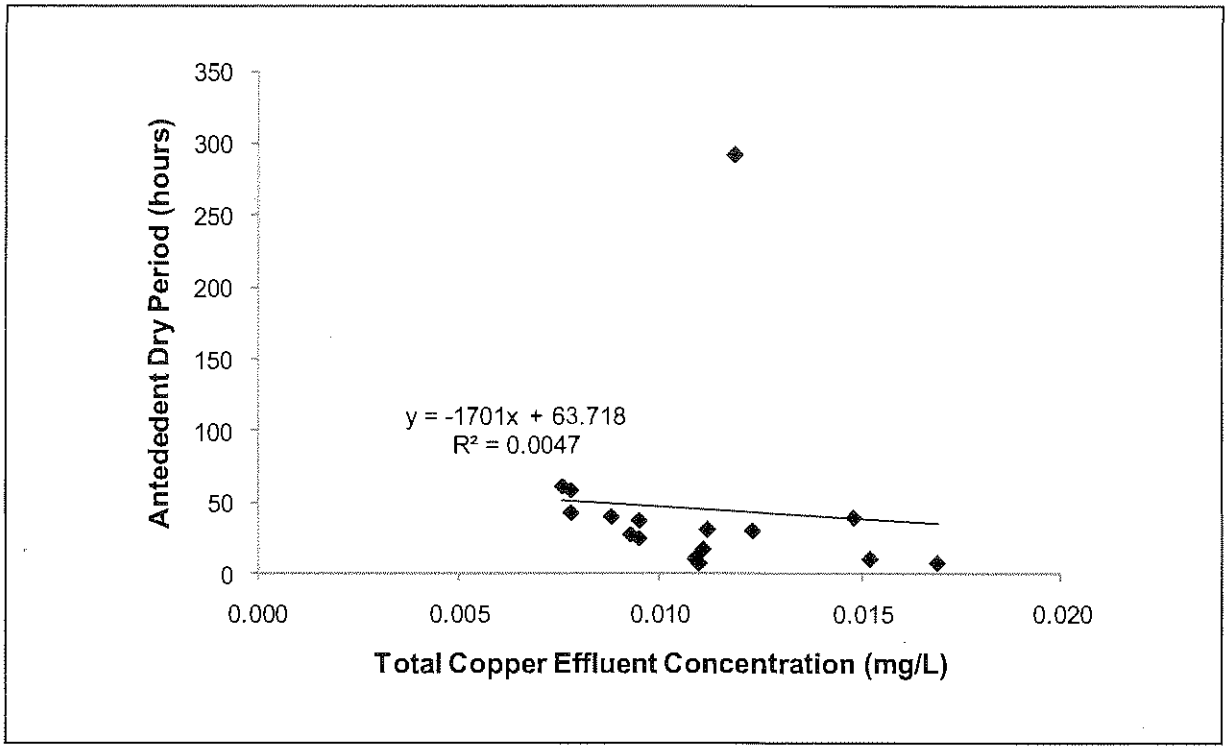


Figure G-25. Effluent total copper concentration correlation with antecedent dry period for the control biofiltration swale.

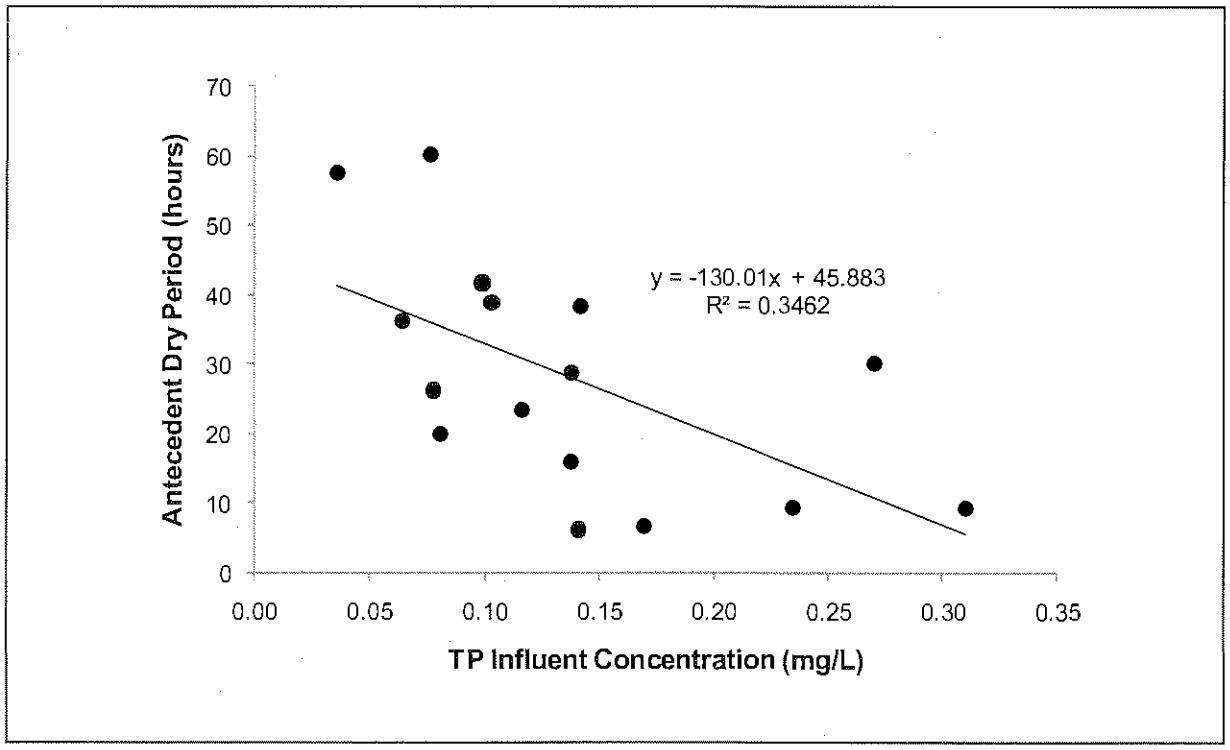


Figure G-26. Influent total phosphorus concentration correlation with antecedent dry period for the compost-amended biofiltration swale.

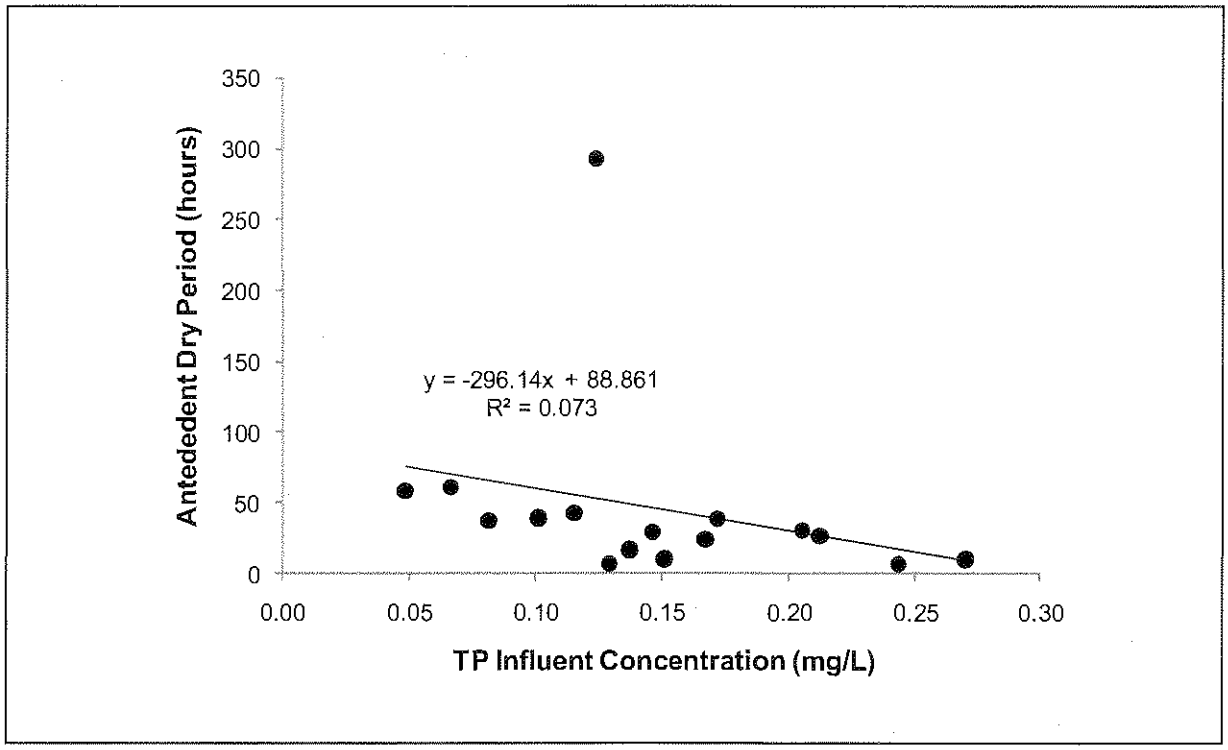


Figure G-27. Influent total phosphorus concentration correlation with antecedent dry period for the control biofiltration swale.

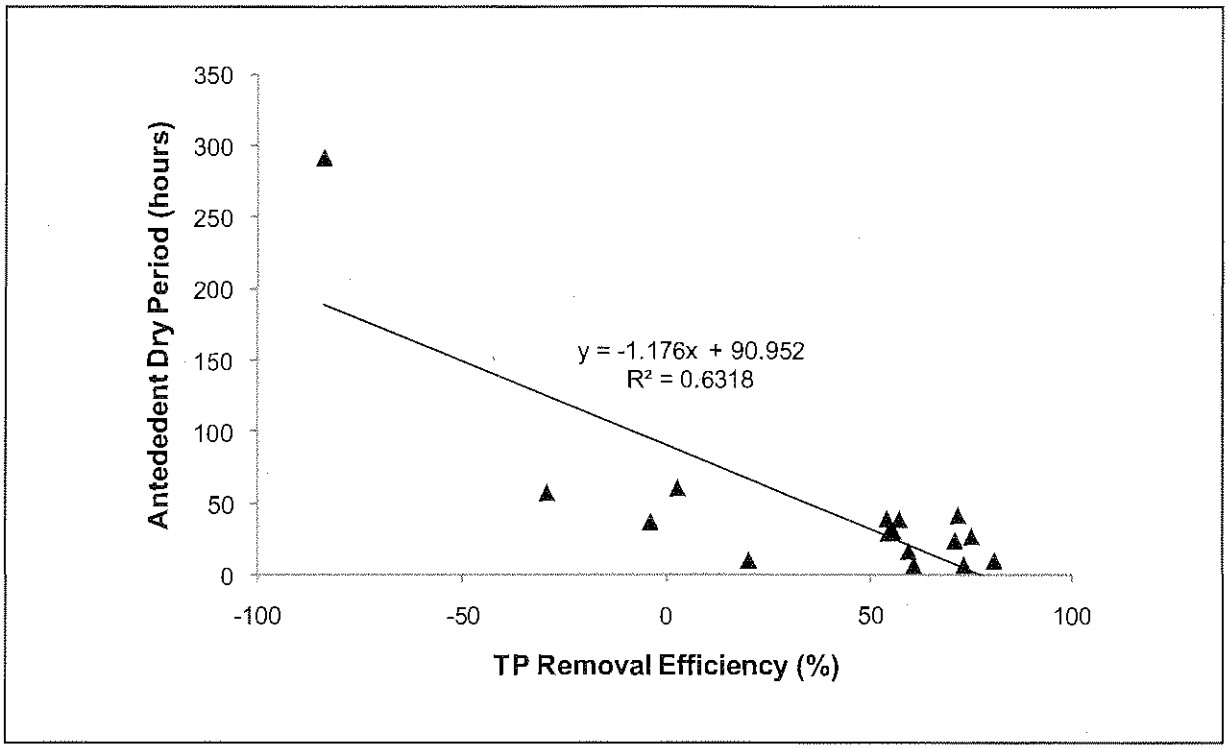


Figure G-28. Total phosphorus removal efficiency correlation with antecedent dry period for the control biofiltration swale.

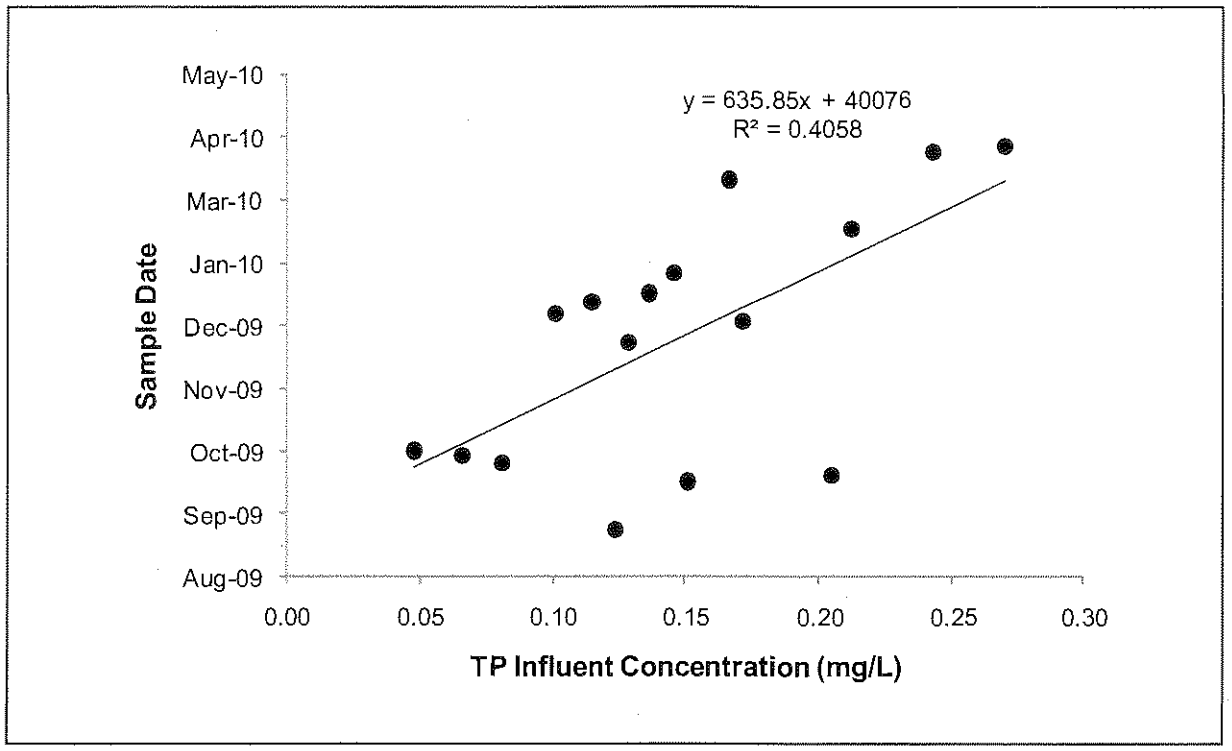


Figure G-29. Influent total phosphorus concentration correlation with sample date for the control biofiltration swale.

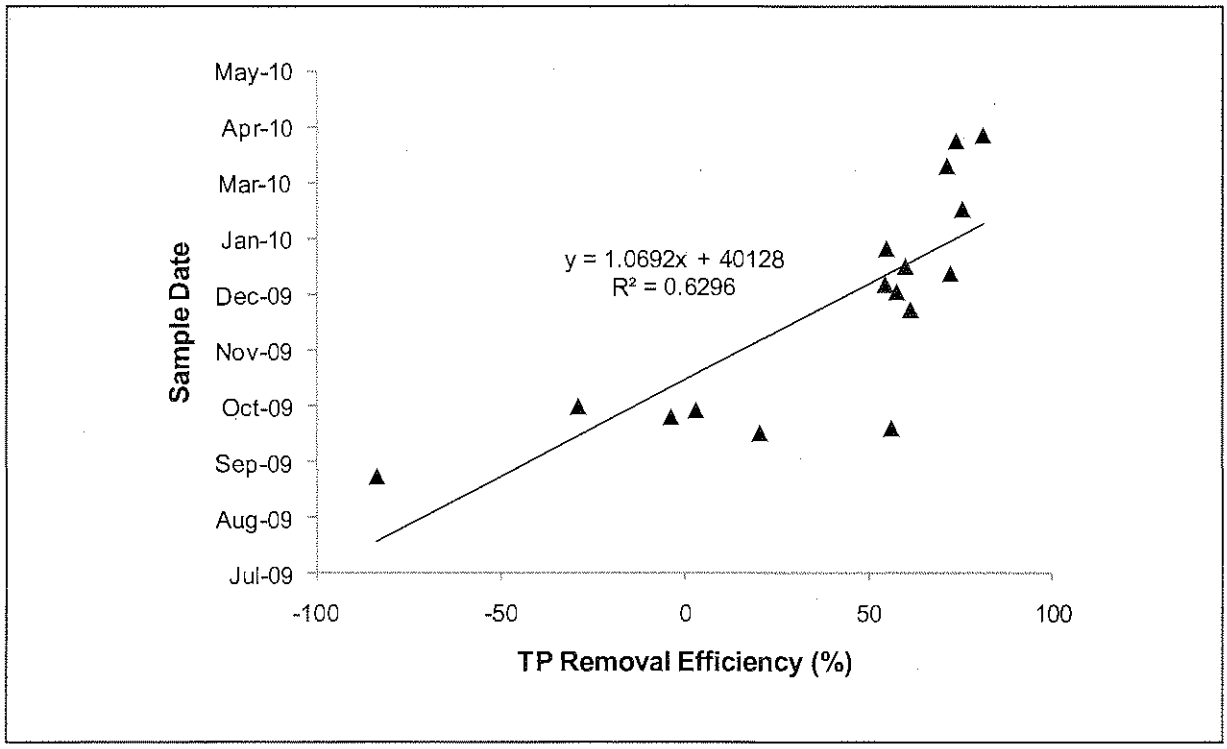


Figure G-30. Total phosphorus removal efficiency correlation with sample date for the control biofiltration swale.

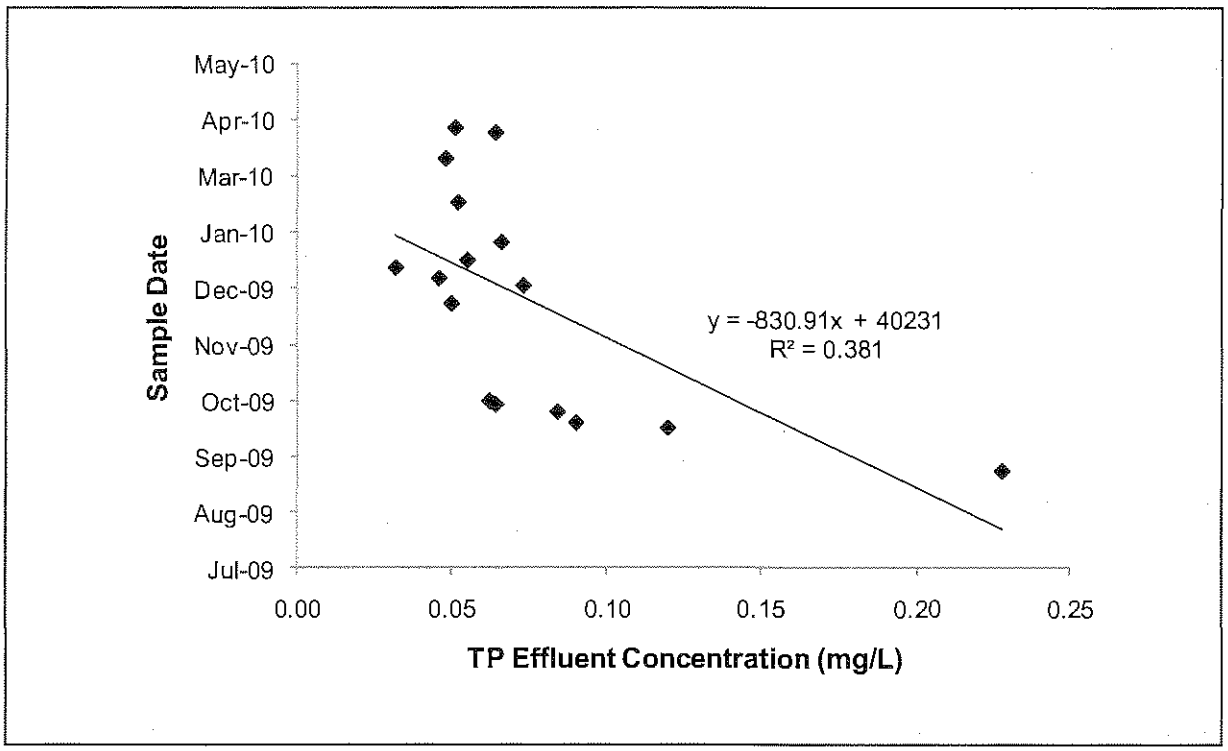


Figure G-31. Effluent total phosphorus concentration correlation with sample date for the control biofiltration swale.

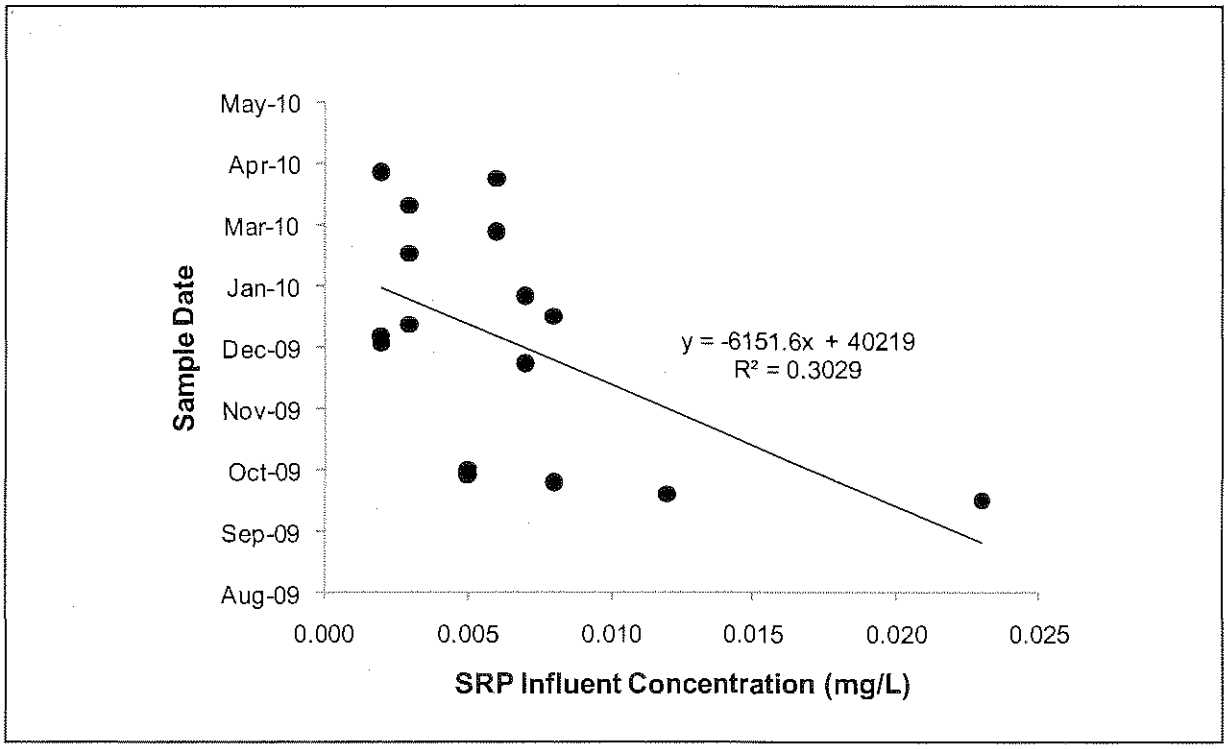


Figure G-32. Influent soluble reactive phosphorus concentration correlation with sample date for the compost-amended biofiltration swale.

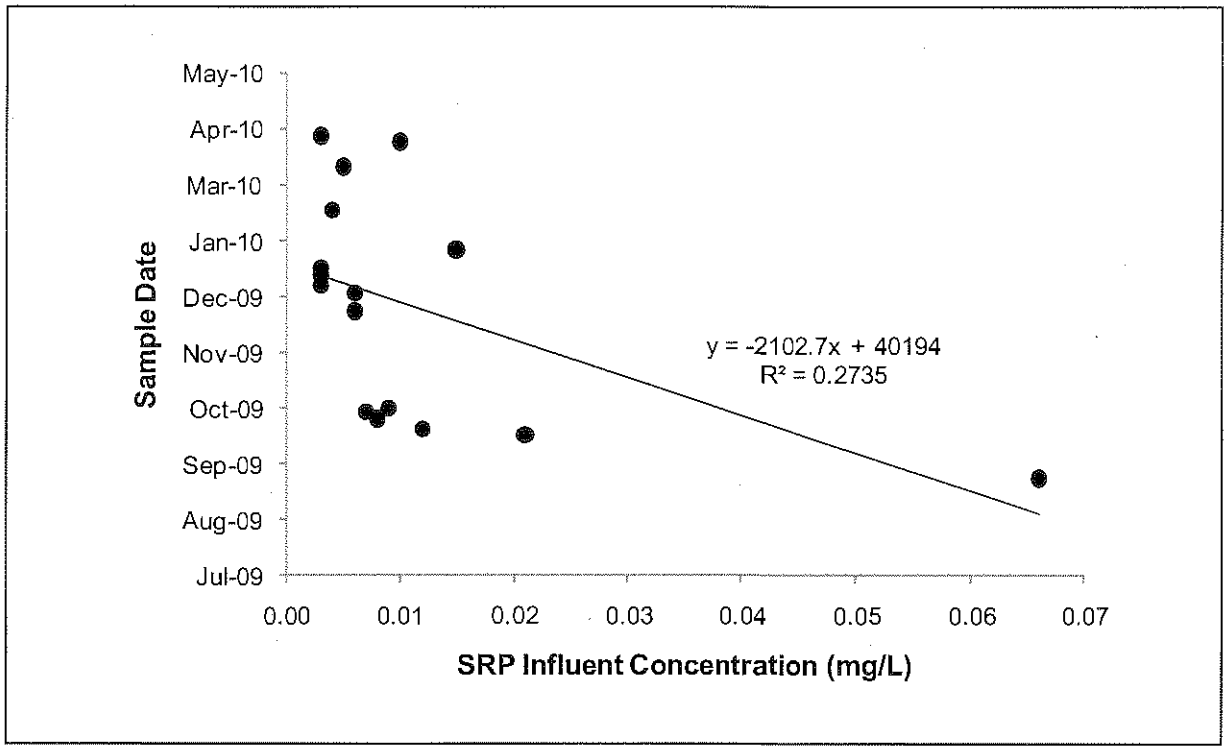


Figure G-33. Influent soluble reactive phosphorus concentration correlation with sample date for the control biofiltration swale.

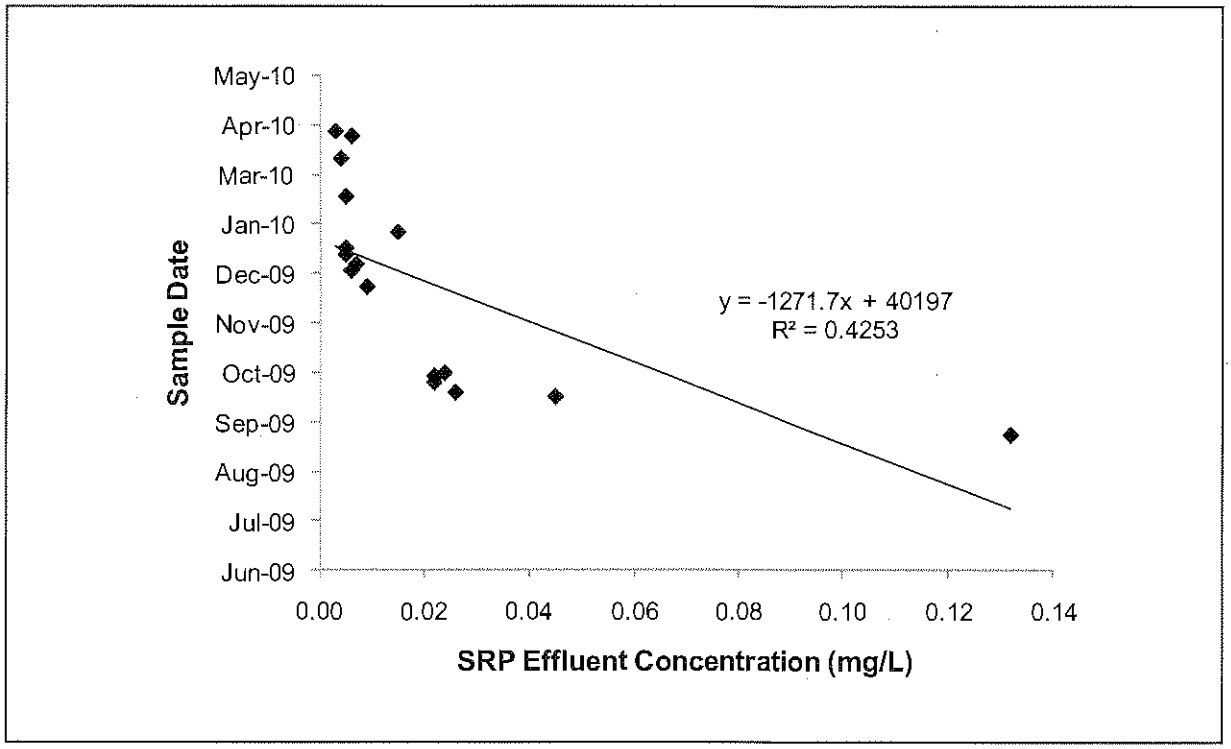


Figure G-34. Effluent soluble reactive phosphorus concentration correlation with sample date for the control biofiltration swale.

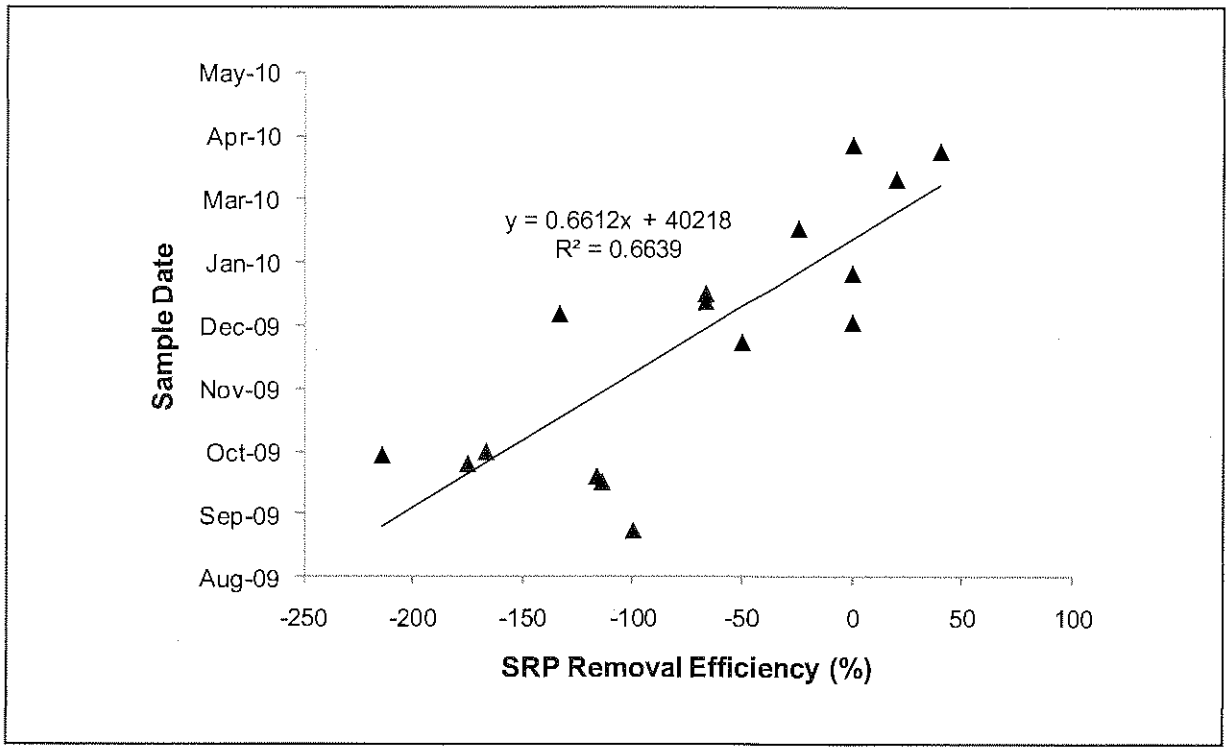


Figure G-35. Soluble reactive phosphorus removal efficiency correlation with sample date for the control biofiltration swale.

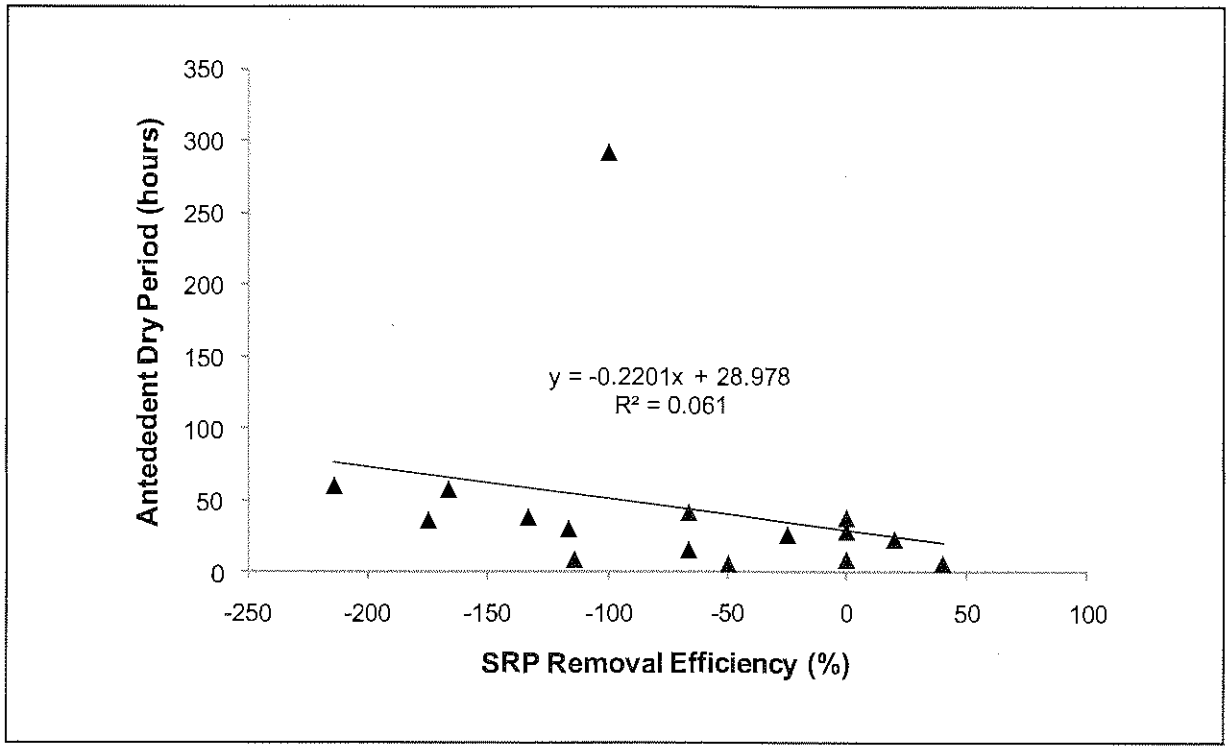


Figure G-36. Soluble reactive phosphorus removal efficiency correlation with antecedent dry period for the control biofiltration swale.

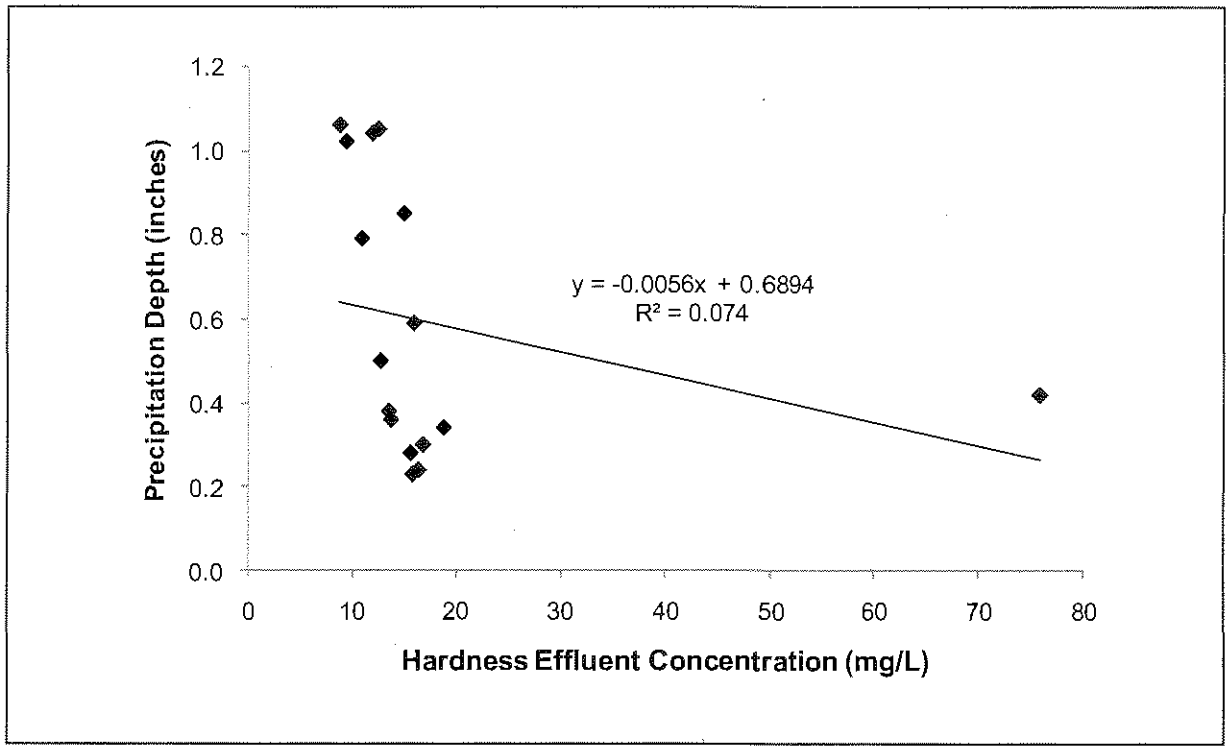


Figure G-37. Effluent hardness concentration correlation with precipitation depth for the compost-amended biofiltration swale.

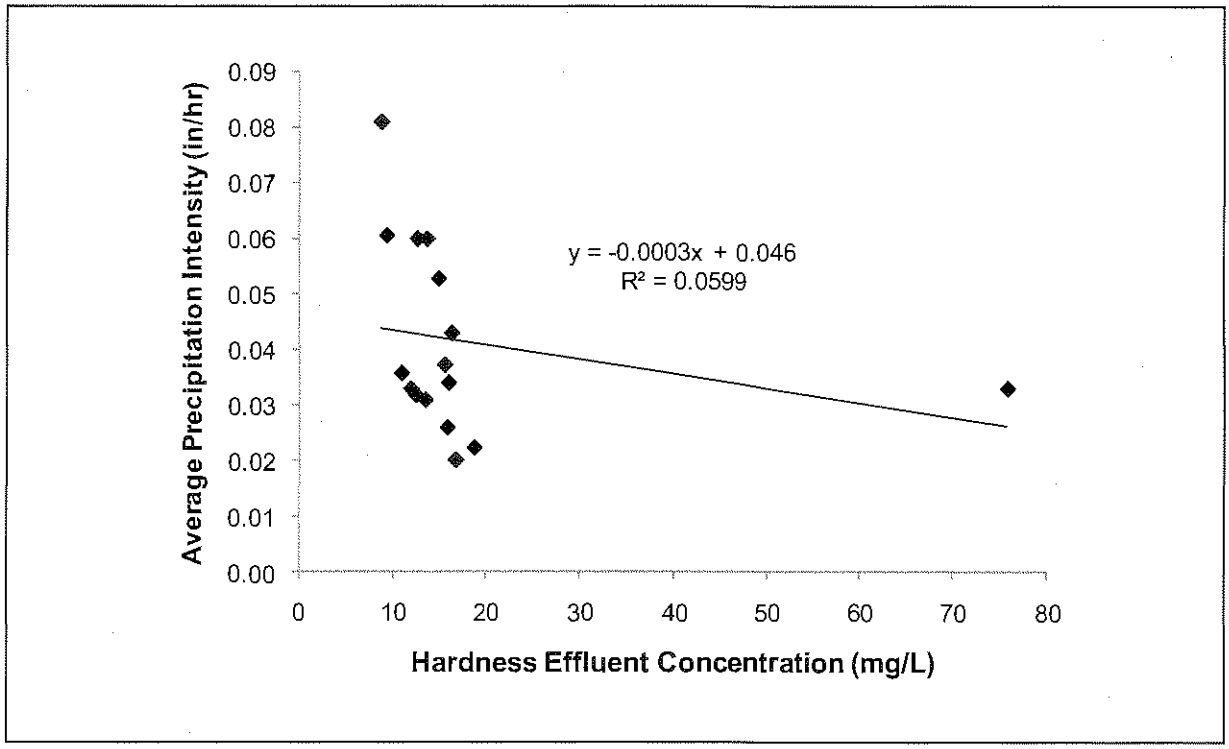


Figure G-38. Effluent hardness concentration correlation with average precipitation intensity for the compost-amended biofiltration swale.

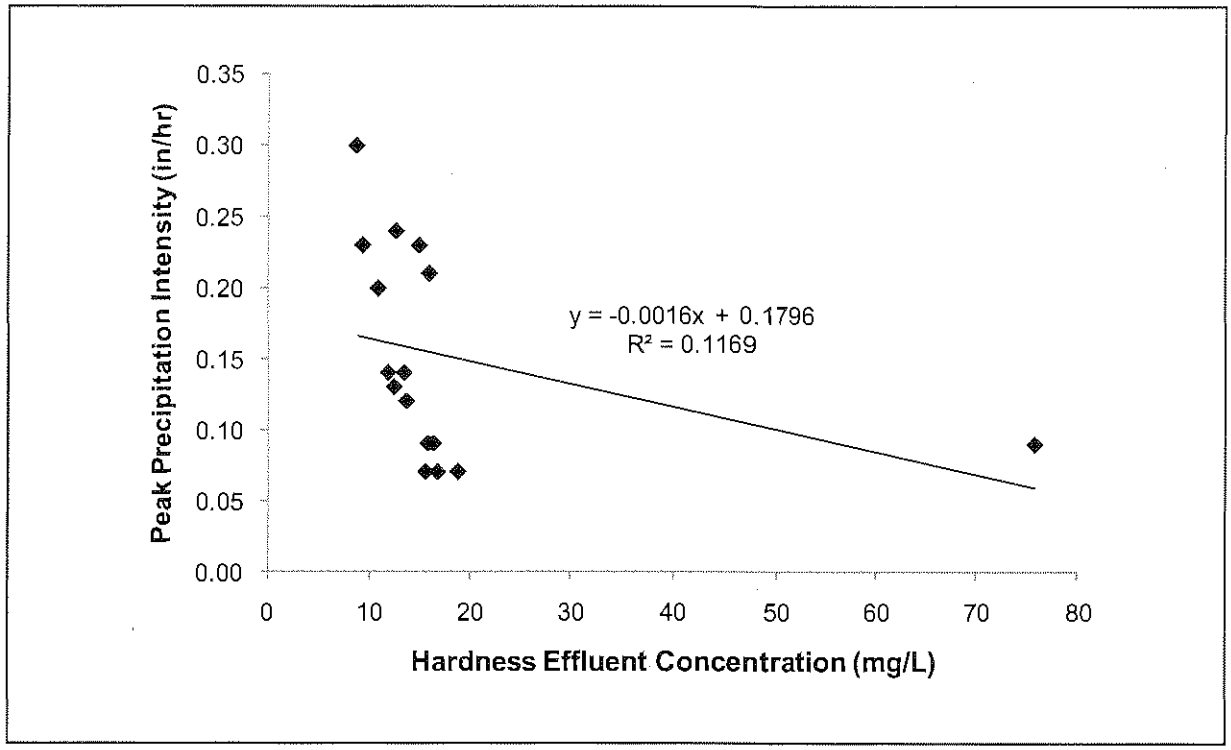


Figure G-39. Effluent hardness concentration correlation with peak precipitation intensity for the compost-amended biofiltration swale.

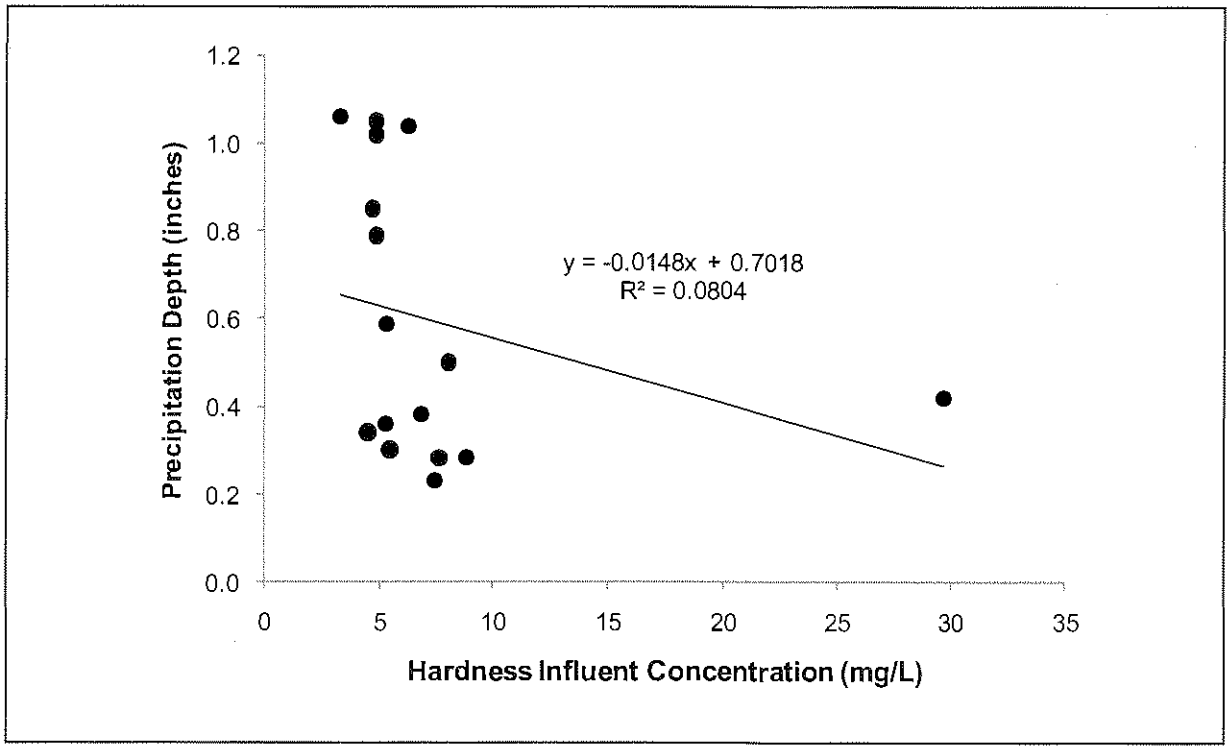


Figure G-40. Influent hardness concentration correlation with precipitation depth for the control biofiltration swale.

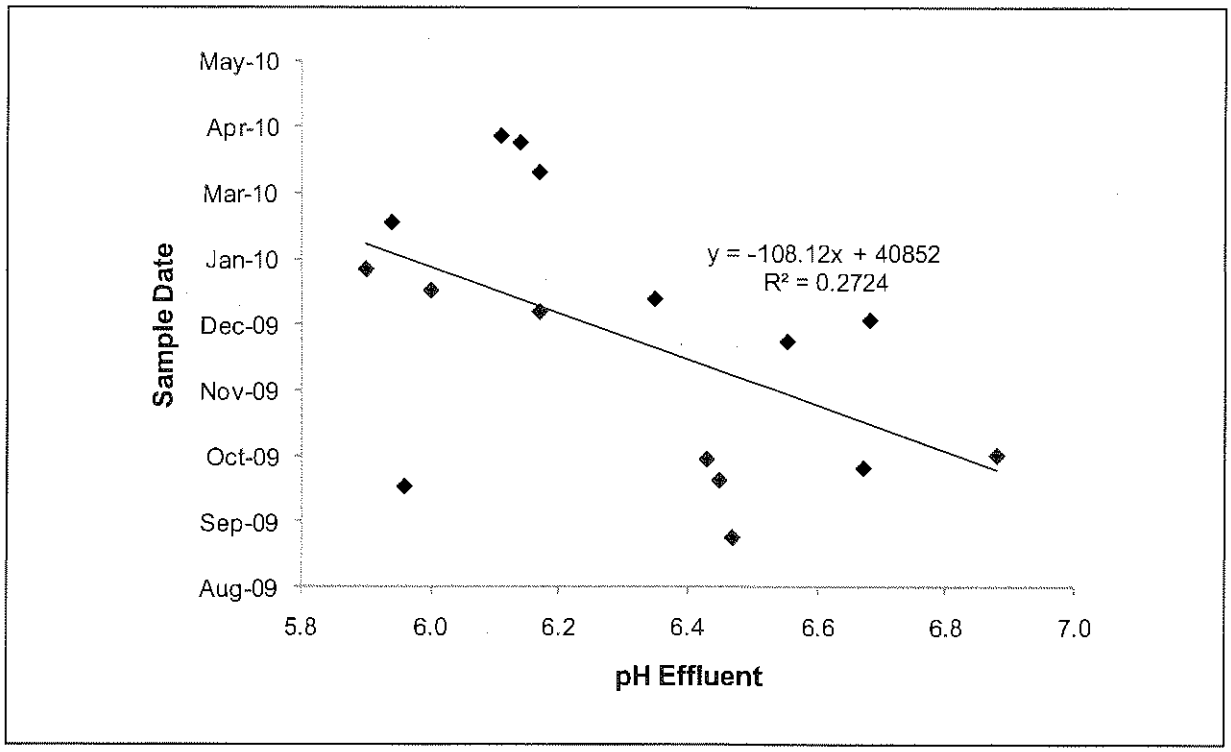


Figure G-41. Effluent pH level correlation with sample date for the control biofiltration swale.

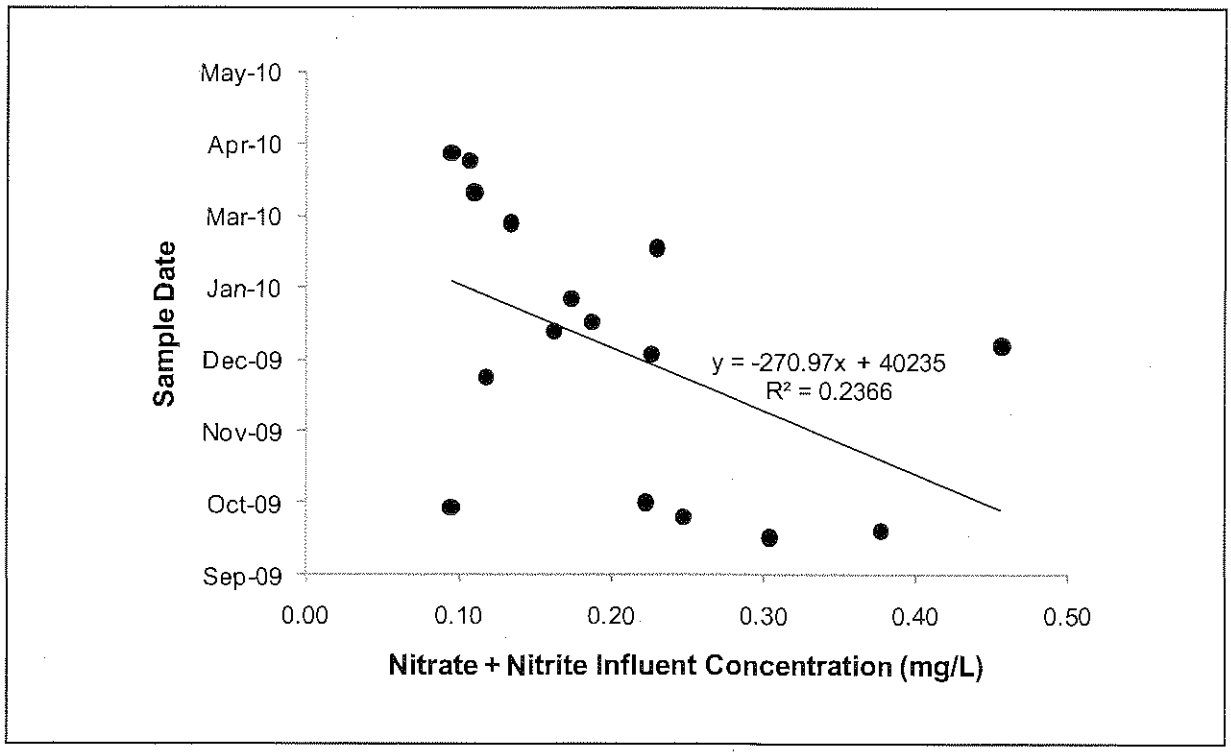


Figure G-42. Influent nitrate + nitrite concentration correlation with sample date for the compost-amended biofiltration swale.

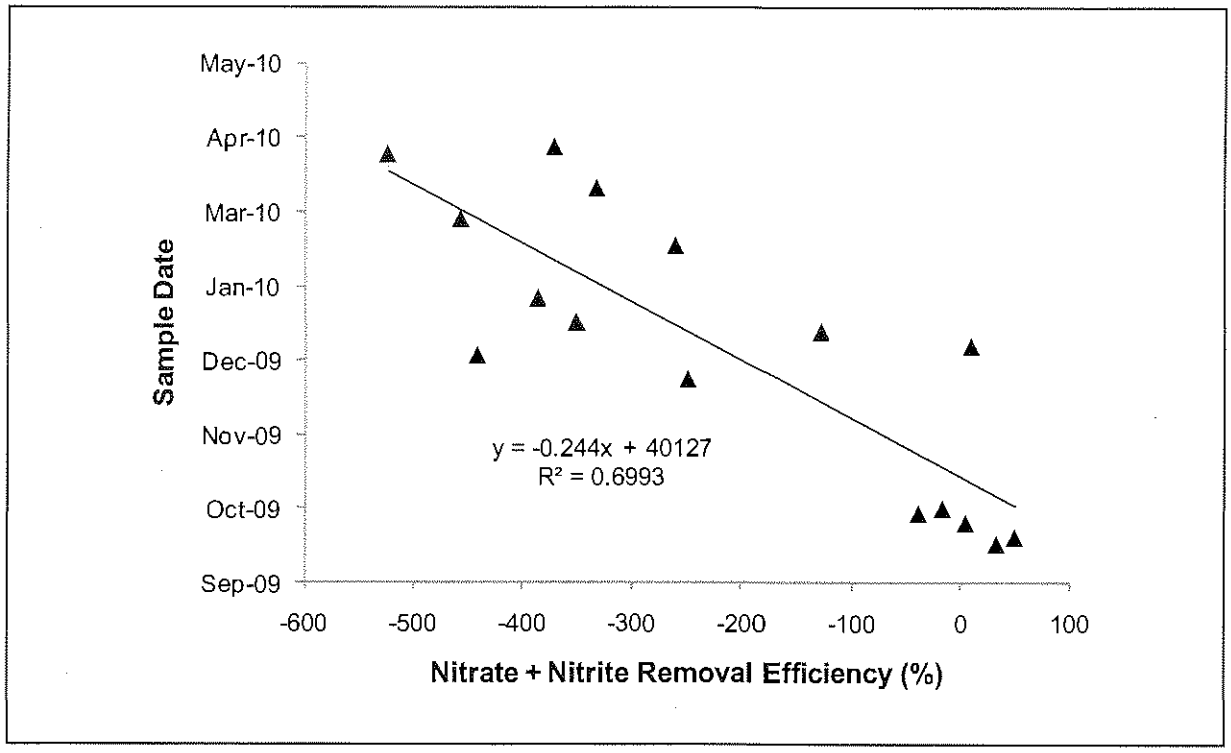


Figure G-43. Nitrate + nitrite removal efficiency correlation with sample date for the compost-amended biofiltration swale.

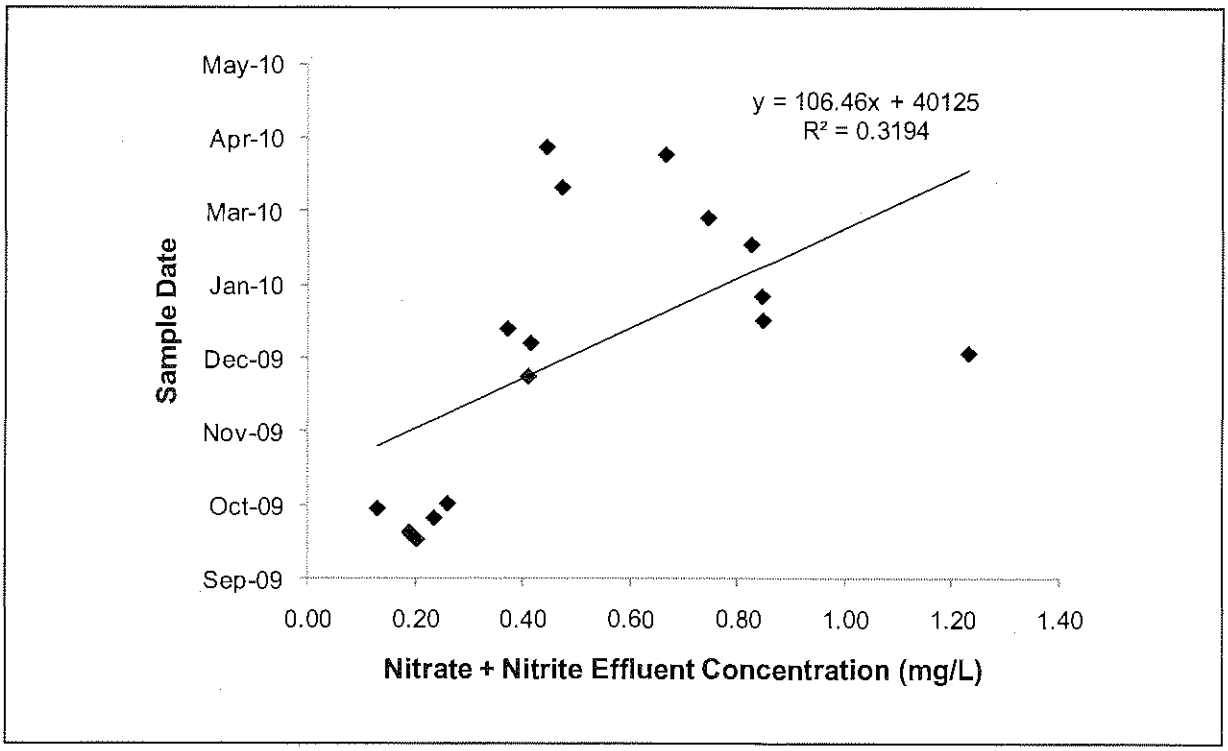


Figure G-44. Effluent nitrate + nitrite concentration correlation with sample date for the compost-amended biofiltration swale.

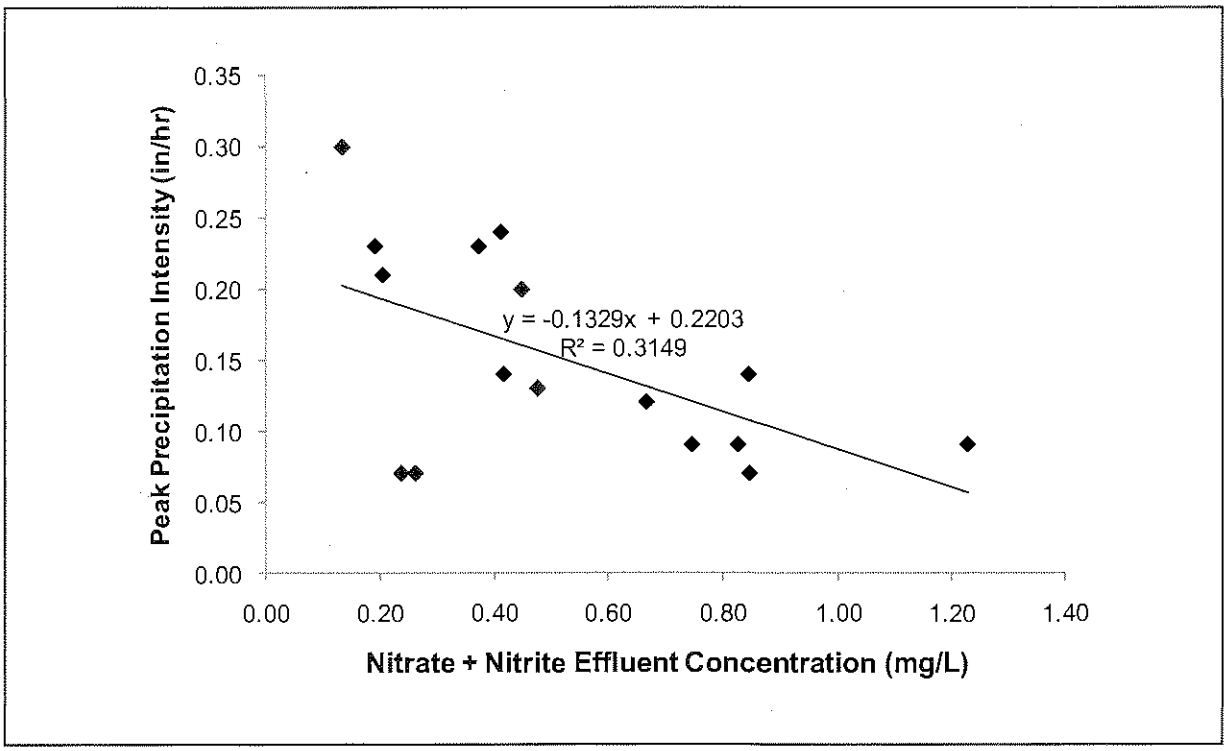


Figure G-45. Effluent nitrate + nitrite concentration correlation with peak precipitation intensity for the compost-amended biofiltration swale.

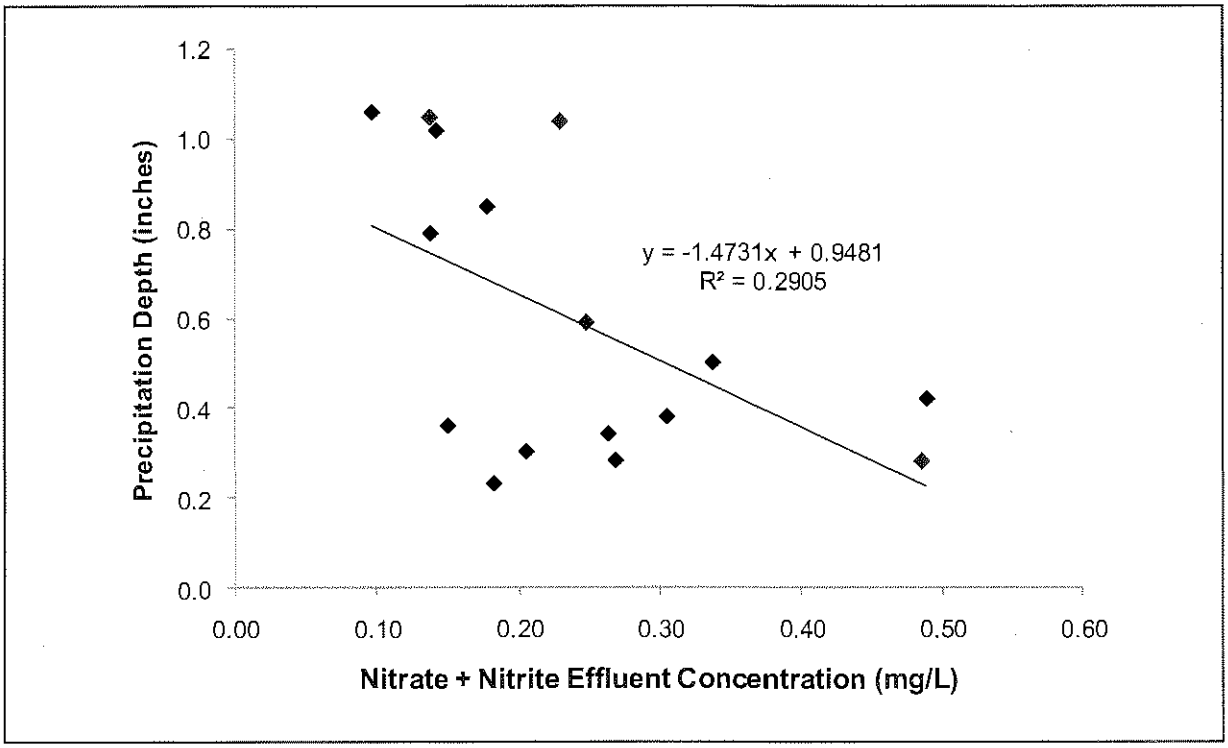


Figure G-46. Effluent nitrate + nitrite concentration correlatiou with precipitation depth for the control biofiltration swale.

APPENDIX H

Laboratory Reports, Chain-of-Custody Records, and Quality Assurance Worksheets for Collected Water Quality Data

The contents of this appendix will be provided separately.

APPENDIX I

Dissolved Zinc and Copper Removal Efficiency Data from Basic Treatment Facilities

Table I-1. Dissolved zinc removal efficiency data for basic treatment facilities that were obtained through the International Stormwater Best Management Practices Database.

BMP Type	Test Site Name	Inflow Samping Date	Outflow Samping Date	Influent Dissolved Zinc Concentration (µg/L)	Effluent Dissolved Zinc Concentration (µg/L)	Method #1 Removal
Biofilter - Grass Strip	Altadena Strip	2/16/2000	2/16/2000	116	15.8	86.4%
Biofilter - Grass Strip	Altadena Strip	2/27/2000	2/27/2000	28	12	57.1%
Biofilter - Grass Strip	Altadena Strip	3/8/2000	3/8/2000	29	13	55.2%
Biofilter - Grass Strip	Altadena Strip	4/18/2000	4/18/2000	43.1	29.2	32.3%
Biofilter - Grass Strip	Altadena Strip	10/27/2000	10/27/2000	131	71	45.8%
Biofilter - Grass Strip	Altadena Strip	1/12/2001	1/12/2001	44	23	47.7%
Biofilter - Grass Strip	Altadena Strip	1/24/2001	1/24/2001	58	43	25.9%
Biofilter - Grass Strip	Altadena Strip	2/10/2001	2/10/2001	66	63	4.5%
Biofilter - Grass Strip	Altadena Strip	4/7/2001	4/7/2001	40	23	42.5%
Biofilter - Grass Strip	Altadena Strip	4/20/2001	4/20/2001	35	20	42.9%
Biofilter - Grass Strip	Carlsbad strip	2/20/2000	2/20/2000	100	29	71.0%
Biofilter - Grass Strip	Carlsbad strip	3/5/2000	3/5/2000	84	23	72.6%
Biofilter - Grass Strip	Carlsbad strip	4/17/2000	4/17/2000	160	49	69.4%
Biofilter - Grass Strip	Carlsbad strip	10/29/2000	10/29/2000	68	32	52.9%
Biofilter - Grass Strip	Carlsbad strip	1/10/2001	1/11/2001	120	36	70.0%
Biofilter - Grass Strip	Carlsbad strip	1/26/2001	1/26/2001	94	38	59.6%
Biofilter - Grass Strip	Carlsbad strip	2/12/2001	2/13/2001	62	36	41.9%
Biofilter - Grass Strip	Carlsbad strip	2/23/2001	2/23/2001	74	34	54.1%
Biofilter - Grass Strip	Carlsbad strip	3/6/2001	3/6/2001	83	20	75.9%
Biofilter - Grass Strip	Cottonwood RVTS	11/12/2001	11/12/2001	31	8.4	72.9%
Biofilter - Grass Strip	Cottonwood RVTS	11/29/2001	11/29/2001	30	5	83.3%
Biofilter - Grass Strip	Cottonwood RVTS	12/6/2001	12/6/2001	29	6.9	76.2%
Biofilter - Grass Strip	Cottonwood RVTS	12/9/2001	12/9/2001	22	5	77.3%
Biofilter - Grass Strip	Cottonwood RVTS	12/13/2001	12/13/2001	20	5	75.0%
Biofilter - Grass Strip	Cottonwood RVTS	12/29/2001	12/29/2001	34	5	85.3%
Biofilter - Grass Strip	Cottonwood RVTS	1/6/2002	1/6/2002	52	6.3	87.9%
Biofilter - Grass Strip	Cottonwood RVTS	1/26/2002	1/26/2002	25	5	80.0%
Biofilter - Grass Strip	Cottonwood RVTS	2/7/2002	2/7/2002	56	5	91.1%
Biofilter - Grass Strip	Cottonwood RVTS	2/20/2002	2/20/2002	25	5	80.0%
Biofilter - Grass Strip	Cottonwood RVTS	3/23/2002	3/23/2002	35	9.4	73.1%
Biofilter - Grass Strip	Cottonwood RVTS	12/12/2002	12/12/2002	37	9.6	74.1%
Biofilter - Grass Strip	Cottonwood RVTS	1/21/2003	1/21/2003	78	52	33.3%
Biofilter - Grass Strip	Cottonwood RVTS	3/13/2003	3/13/2003	36	26	27.8%
Biofilter - Grass Strip	Cottonwood RVTS	4/1/2003	4/1/2003	50	39	22.0%
Biofilter - Grass Strip	I-605/SR-91 strip	3/8/2000	3/8/2000	45	12.8	71.6%
Biofilter - Grass Strip	I-605/SR-91 strip	4/17/2000	4/17/2000	79	50.7	35.8%
Biofilter - Grass Strip	I-605/SR-91 strip	10/27/2000	10/27/2000	79	126	-59.5%
Biofilter - Grass Strip	I-605/SR-91 strip	1/10/2001	1/10/2001	60	35	41.7%
Biofilter - Grass Strip	I-605/SR-91 strip	2/13/2001	2/13/2001	48	22	54.2%
Biofilter - Grass Strip	I-605/SR-91 strip	4/7/2001	4/7/2001	96	402	-318.8%
Biofilter - Grass Strip	Irvine A RVTS	11/24/2001	11/24/2001	61	15	75.4%
Biofilter - Grass Strip	Irvine A RVTS	11/8/2002	11/8/2002	170	94	44.7%
Biofilter - Grass Strip	Irvine A RVTS	2/11/2003	2/11/2003	120	43	64.2%
Biofilter - Grass Strip	Irvine A RVTS	2/25/2003	2/25/2003	44	33	25.0%
Biofilter - Grass Strip	Irvine A RVTS	3/15/2003	3/15/2003	60	18	70.0%

BMP Type	Test Site Name	Inflow Samping Date	Outflow Samping Date	Influent Dissolved Zinc Concentration (µg/L)	Effluent Dissolved Zinc Concentration (µg/L)	Method #1 Removal
Biofilter - Grass Strip	Irvine A RVTS	4/14/2003	4/14/2003	61	13	78.7%
Biofilter - Grass Strip	Irvine B RVTS	3/15/2003	3/15/2003	60	18	70.0%
Biofilter - Grass Strip	Irvine C RVTS	2/11/2003	2/11/2003	120	23	80.8%
Biofilter - Grass Strip	Irvine C RVTS	2/25/2003	2/25/2003	44	16	63.6%
Biofilter - Grass Strip	Irvine C RVTS	3/15/2003	3/15/2003	60	13	78.3%
Biofilter - Grass Strip	Irvine C RVTS	4/14/2003	4/14/2003	61	26	57.4%
Biofilter - Grass Strip	Moreno Valley A RVTS	12/16/2002	12/16/2002	210	57	72.9%
Biofilter - Grass Strip	Moreno Valley A RVTS	12/20/2002	12/20/2002	180	50	72.2%
Biofilter - Grass Strip	Moreno Valley A RVTS	2/11/2003	2/11/2003	140	47	66.4%
Biofilter - Grass Strip	Moreno Valley A RVTS	2/25/2003	2/25/2003	99	36	63.6%
Biofilter - Grass Strip	Moreno Valley A RVTS	3/15/2003	3/15/2003	140	34	75.7%
Biofilter - Grass Strip	Moreno Valley B RVTS	12/16/2002	12/16/2002	210	58	72.4%
Biofilter - Grass Strip	Moreno Valley B RVTS	12/20/2002	12/20/2002	180	45	75.0%
Biofilter - Grass Strip	Moreno Valley B RVTS	2/11/2003	2/11/2003	140	38	72.9%
Biofilter - Grass Strip	Moreno Valley B RVTS	2/25/2003	2/25/2003	99	33	66.7%
Biofilter - Grass Strip	Moreno Valley B RVTS	3/15/2003	3/15/2003	140	36	74.3%
Biofilter - Grass Strip	Moreno Valley B RVTS	4/14/2003	4/14/2003	180	43	76.1%
Biofilter - Grass Strip	Moreno Valley C RVTS	12/16/2002	12/16/2002	210	51	75.7%
Biofilter - Grass Strip	Moreno Valley C RVTS	12/20/2002	12/20/2002	180	49	72.8%
Biofilter - Grass Strip	Moreno Valley C RVTS	2/11/2003	2/11/2003	140	58	58.6%
Biofilter - Grass Strip	Moreno Valley C RVTS	2/25/2003	2/25/2003	99	36	63.6%
Biofilter - Grass Strip	Moreno Valley C RVTS	3/15/2003	3/15/2003	140	41	70.7%
Biofilter - Grass Strip	Moreno Valley C RVTS	4/14/2003	4/14/2003	180	68	62.2%
Biofilter - Grass Strip	Moreno Valley D RVTS	12/16/2002	12/16/2002	210	39	81.4%
Biofilter - Grass Strip	Moreno Valley D RVTS	12/20/2002	12/20/2002	180	110	38.9%
Biofilter - Grass Strip	Moreno Valley D RVTS	2/11/2003	2/11/2003	140	45	67.9%
Biofilter - Grass Strip	Moreno Valley D RVTS	2/25/2003	2/25/2003	99	52	47.5%
Biofilter - Grass Strip	Moreno Valley D RVTS	3/15/2003	3/15/2003	140	45	67.9%
Biofilter - Grass Strip	Moreno Valley D RVTS	4/14/2003	4/14/2003	180	55	69.4%
Biofilter - Grass Strip	Redding A RVTS	12/13/2001	12/13/2001	22	11	50.0%
Biofilter - Grass Strip	Redding A RVTS	12/29/2001	12/29/2001	23	14	39.1%
Biofilter - Grass Strip	Redding A RVTS	3/6/2002	3/6/2002	39	37	5.1%
Biofilter - Grass Strip	Redding B RVTS	12/13/2001	12/13/2001	22	5	77.3%
Biofilter - Grass Strip	Redding B RVTS	12/29/2001	12/29/2001	23	14	39.1%
Biofilter - Grass Strip	Redding B RVTS	3/6/2002	3/6/2002	39	26	33.3%
Biofilter - Grass Strip	Redding C RVTS	12/13/2001	12/13/2001	22	5.5	75.0%
Biofilter - Grass Strip	Redding C RVTS	12/29/2001	12/29/2001	23	21	8.7%
Biofilter - Grass Strip	Redding C RVTS	3/6/2002	3/6/2002	39	51	-30.8%
Biofilter - Grass Strip	Sacramento A RVTS	1/6/2002	1/6/2002	40	38	5.0%
Biofilter - Grass Strip	Sacramento A RVTS	3/6/2002	3/6/2002	32	36	-12.5%
Biofilter - Grass Strip	Sacramento A RVTS	3/23/2002	3/23/2002	26	33	-26.9%
Biofilter - Grass Strip	Sacramento A RVTS	3/13/2003	3/13/2003	20	23	-15.0%
Biofilter - Grass Strip	Sacramento A RVTS	4/4/2003	4/4/2003	20	21	-5.0%
Biofilter - Grass Strip	Sacramento A RVTS	4/12/2003	4/12/2003	38	41	-7.9%
Biofilter - Grass Strip	Sacramento B RVTS	1/6/2002	1/6/2002	40	13	67.5%
Biofilter - Grass Strip	Sacramento B RVTS	3/6/2002	3/6/2002	32	28	12.5%

BMP Type	Test Site Name	Inflow Samping Date	Outflow Samping Date	Influent Dissolved Zinc Concentration (µg/L)	Effluent Dissolved Zinc Concentration (µg/L)	Method #1 Removal
Biofilter - Grass Strip	Sacramento B RVTS	3/23/2002	3/23/2002	26	23	11.5%
Biofilter - Grass Strip	Sacramento C RVTS	1/6/2002	1/6/2002	40	9.8	75.5%
Biofilter - Grass Strip	Sacramento C RVTS	3/6/2002	3/6/2002	32	18	43.8%
Biofilter - Grass Strip	Sacramento C RVTS	3/23/2002	3/23/2002	26	7.5	71.2%
Biofilter - Grass Strip	Sacramento D RVTS	1/6/2002	1/6/2002	40	5	87.5%
Biofilter - Grass Strip	Sacramento D RVTS	3/6/2002	3/6/2002	32	9	71.9%
Biofilter - Grass Strip	San Onofre A RVTS	3/17/2002	3/17/2002	31	17	45.2%
Biofilter - Grass Strip	San Onofre A RVTS	11/8/2002	11/8/2002	140	85	39.3%
Biofilter - Grass Strip	San Onofre A RVTS	11/29/2002	11/29/2002	47	47	0.0%
Biofilter - Grass Strip	San Onofre A RVTS	12/16/2002	12/16/2002	78	41	47.4%
Biofilter - Grass Strip	San Onofre A RVTS	12/20/2002	12/20/2002	63	23	63.5%
Biofilter - Grass Strip	San Onofre A RVTS	2/11/2003	2/11/2003	66	28	57.6%
Biofilter - Grass Strip	San Onofre A RVTS	2/25/2003	2/25/2003	28	16	42.9%
Biofilter - Grass Strip	San Onofre A RVTS	3/15/2003	3/15/2003	46	32	30.4%
Biofilter - Grass Strip	San Onofre A RVTS	4/14/2003	4/14/2003	110	54	50.9%
Biofilter - Grass Strip	San Onofre B RVTS	11/24/2001	11/24/2001	27	16	40.7%
Biofilter - Grass Strip	San Onofre B RVTS	3/17/2002	3/17/2002	31	23	25.8%
Biofilter - Grass Strip	San Onofre B RVTS	11/8/2002	11/8/2002	140	58	58.6%
Biofilter - Grass Strip	San Onofre B RVTS	11/29/2002	11/29/2002	47	40	14.9%
Biofilter - Grass Strip	San Onofre B RVTS	12/16/2002	12/16/2002	78	31	60.3%
Biofilter - Grass Strip	San Onofre B RVTS	12/20/2002	12/20/2002	63	34	46.0%
Biofilter - Grass Strip	San Onofre B RVTS	2/11/2003	2/11/2003	66	29	56.1%
Biofilter - Grass Strip	San Onofre B RVTS	2/25/2003	2/25/2003	28	20	28.6%
Biofilter - Grass Strip	San Onofre B RVTS	3/15/2003	3/15/2003	46	25	45.7%
Biofilter - Grass Strip	San Onofre B RVTS	4/14/2003	4/14/2003	110	47	57.3%
Biofilter - Grass Strip	San Onofre C RVTS	11/8/2002	11/8/2002	140	64	54.3%
Biofilter - Grass Strip	San Onofre C RVTS	12/16/2002	12/16/2002	78	28	64.1%
Biofilter - Grass Strip	San Onofre C RVTS	12/20/2002	12/20/2002	63	43	31.7%
Biofilter - Grass Strip	San Onofre C RVTS	2/11/2003	2/11/2003	66	24	63.6%
Biofilter - Grass Strip	San Onofre C RVTS	3/15/2003	3/15/2003	46	28	39.1%
Biofilter - Grass Strip	San Onofre C RVTS	4/14/2003	4/14/2003	110	15	86.4%
Biofilter - Grass Strip	San Rafael RVTS	11/12/2001	11/12/2001	52	19	63.5%
Biofilter - Grass Strip	San Rafael RVTS	11/29/2001	11/29/2001	25	5	80.0%
Biofilter - Grass Strip	San Rafael RVTS	12/14/2001	12/14/2001	39	5	87.2%
Biofilter - Grass Strip	San Rafael RVTS	12/17/2001	12/17/2001	37	5	86.5%
Biofilter - Grass Strip	San Rafael RVTS	12/21/2001	12/21/2001	49	5.4	89.0%
Biofilter - Grass Strip	San Rafael RVTS	12/30/2001	12/30/2001	78	5.7	92.7%
Biofilter - Grass Strip	San Rafael RVTS	1/6/2002	1/6/2002	50	5.7	88.6%
Biofilter - Grass Strip	San Rafael RVTS	1/26/2002	1/26/2002	44	5.1	88.4%
Biofilter - Grass Strip	San Rafael RVTS	1/28/2002	1/28/2002	33	5	84.8%
Biofilter - Grass Strip	San Rafael RVTS	2/7/2002	2/7/2002	43	7.9	81.6%
Biofilter - Grass Strip	San Rafael RVTS	2/17/2002	2/17/2002	34	8.5	75.0%
Biofilter - Grass Strip	San Rafael RVTS	2/19/2002	2/19/2002	50	8.1	83.8%
Biofilter - Grass Strip	San Rafael RVTS	3/6/2002	3/6/2002	75	14	81.3%
Biofilter - Grass Strip	San Rafael RVTS	3/10/2002	3/10/2002	26	9.4	63.8%
Biofilter - Grass Strip	San Rafael RVTS	3/17/2002	3/17/2002	50	36	28.0%

BMP Type	Test Site Name	Inflow Samping Date	Outflow Samping Date	Influent Dissolved Zinc Concentration (µg/L)	Effluent Dissolved Zinc Concentration (µg/L)	Method #1 Removal
Biofilter - Grass Strip	San Rafael RVTS	3/23/2002	3/23/2002	54	13	75.9%
Biofilter - Grass Strip	San Rafael RVTS	1/21/2003	1/21/2003	20	12	40.0%
Biofilter - Grass Strip	San Rafael RVTS	2/15/2003	2/15/2003	34	11	67.6%
Biofilter - Grass Strip	San Rafael RVTS	3/13/2003	3/13/2003	38	18	52.6%
Biofilter - Grass Strip	San Rafael RVTS	4/12/2003	4/12/2003	79	9.1	88.5%
Biofilter - Grass Strip	Yorba Linda A RVTS	11/24/2001	11/24/2001	61	5	91.8%
Biofilter - Grass Strip	Yorba Linda A RVTS	12/21/2001	12/21/2001	47	11	76.6%
Biofilter - Grass Strip	Yorba Linda A RVTS	11/29/2002	11/29/2002	230	83	63.9%
Biofilter - Grass Strip	Yorba Linda A RVTS	12/16/2002	12/16/2002	93	32	65.6%
Biofilter - Grass Strip	Yorba Linda A RVTS	12/20/2002	12/20/2002	76	40	47.4%
Biofilter - Grass Strip	Yorba Linda A RVTS	2/25/2003	2/25/2003	60	29	51.7%
Biofilter - Grass Strip	Yorba Linda A RVTS	3/4/2003	3/4/2003	31	28	9.7%
Biofilter - Grass Strip	Yorba Linda A RVTS	3/15/2003	3/15/2003	81	29	64.2%
Biofilter - Grass Strip	Yorba Linda A RVTS	4/14/2003	4/14/2003	85	46	45.9%
Biofilter - Grass Strip	Yorba Linda B RVTS	12/21/2001	12/21/2001	47	11	76.6%
Biofilter - Grass Strip	Yorba Linda B RVTS	11/29/2002	11/29/2002	230	69	70.0%
Biofilter - Grass Strip	Yorba Linda B RVTS	12/16/2002	12/16/2002	93	34	63.4%
Biofilter - Grass Strip	Yorba Linda B RVTS	12/20/2002	12/20/2002	76	27	64.5%
Biofilter - Grass Strip	Yorba Linda B RVTS	2/11/2003	2/11/2003	120	19	84.2%
Biofilter - Grass Strip	Yorba Linda B RVTS	2/25/2003	2/25/2003	60	15	75.0%
Biofilter - Grass Strip	Yorba Linda B RVTS	3/4/2003	3/4/2003	31	28	9.7%
Biofilter - Grass Strip	Yorba Linda B RVTS	3/15/2003	3/15/2003	81	22	72.8%
Biofilter - Grass Strip	Yorba Linda B RVTS	4/14/2003	4/14/2003	85	38	55.3%
Biofilter - Grass Strip	Yorba Linda C RVTS	11/24/2001	11/24/2001	61	17	72.1%
Biofilter - Grass Strip	Yorba Linda C RVTS	12/21/2001	12/21/2001	47	14	70.2%
Biofilter - Grass Strip	Yorba Linda C RVTS	12/16/2002	12/16/2002	93	24	74.2%
Biofilter - Grass Strip	Yorba Linda C RVTS	2/11/2003	2/11/2003	120	20	83.3%
Biofilter - Grass Strip	Yorba Linda C RVTS	2/25/2003	2/25/2003	60	11	81.7%
Biofilter - Grass Strip	Yorba Linda C RVTS	3/15/2003	3/15/2003	81	15	81.5%
Biofilter - Grass Strip	Yorba Linda D RVTS	2/11/2003	2/11/2003	120	22	81.7%
Biofilter - Grass Strip	Yorba Linda D RVTS	2/25/2003	2/25/2003	60	11	81.7%
Biofilter - Grass Strip	Yorba Linda D RVTS	3/15/2003	3/15/2003	81	18	77.8%
Biofilter - Grass Strip	Yorba Linda D RVTS	4/14/2003	4/14/2003	85	31	63.5%
Biofilter - Grass Swale	Bioswale Native East	2/16/1999	2/16/1999	35.4	24.3	31.4%
Biofilter - Grass Swale	Bioswale Native East	4/19/1999	4/19/1999	56.2	44.9	20.1%
Biofilter - Grass Swale	Bioswale Native East	10/27/1999	10/27/1999	56.15	18.4	67.2%
Biofilter - Grass Swale	Bioswale Native East	2/22/2000	2/22/2000	34.4	16.7	51.5%
Biofilter - Grass Swale	Bioswale Native East	3/27/2000	3/27/2000	45.2	32.6	27.9%
Biofilter - Grass Swale	Bioswale Native East	6/10/2000	6/10/2000	27.3	15.5	43.2%
Biofilter - Grass Swale	Bioswale Non-Native West	2/16/1999	2/16/1999	35.4	25.5	28.0%
Biofilter - Grass Swale	Bioswale Non-Native West	4/19/1999	4/19/1999	56.2	43.8	22.1%
Biofilter - Grass Swale	Bioswale Non-Native West	10/27/1999	10/27/1999	56.15	22.2	60.5%
Biofilter - Grass Swale	Bioswale Non-Native West	2/22/2000	2/22/2000	34.4	25.6	25.6%
Biofilter - Grass Swale	Bioswale Non-Native West	3/27/2000	3/27/2000	45.2	33	27.0%
Biofilter - Grass Swale	Bioswale Non-Native West	6/10/2000	6/10/2000	27.3	22.7	16.8%
Biofilter - Grass Swale	Cerritos	2/21/2000	2/21/2000	30.1	17.6	41.5%

BMP Type	Test Site Name	Inflow Samping Date	Outflow Samping Date	Influent Dissolved Zinc Concentration (µg/L)	Effluent Dissolved Zinc Concentration (µg/L)	Method #1 Removal
Biofilter - Grass Swale	Cerritos	2/27/2000	2/27/2000	58	35	39.7%
Biofilter - Grass Swale	Cerritos	3/8/2000	3/8/2000	52.3	48.6	7.1%
Biofilter - Grass Swale	Cerritos	4/18/2000	4/18/2000	105	50.3	52.1%
Biofilter - Grass Swale	Cerritos	10/27/2000	10/27/2000	136	53	61.0%
Biofilter - Grass Swale	Cerritos	1/12/2001	1/12/2001	94	21	77.7%
Biofilter - Grass Swale	Cerritos	4/7/2001	4/7/2001	118	29	75.4%
Biofilter - Grass Swale	Dayton Biofilter - Grass Swale	4/3/1991	4/3/1991	58	33	43.1%
Biofilter - Grass Swale	Dayton Biofilter - Grass Swale	11/16/1991	11/16/1991	30	15	50.0%
Biofilter - Grass Swale	Dayton Biofilter - Grass Swale	11/19/1991	11/19/1991	31	10	67.7%
Biofilter - Grass Swale	Dayton Biofilter - Grass Swale	1/29/1992	1/29/1992	83	63	24.1%
Biofilter - Grass Swale	Del Amo	3/8/2000	3/8/2000	24.4	23.7	2.9%
Biofilter - Grass Swale	Del Amo	4/18/2000	4/18/2000	69.5	42.7	38.6%
Biofilter - Grass Swale	Del Amo	10/27/2000	10/27/2000	50	42	16.0%
Biofilter - Grass Swale	Del Amo	1/8/2001	1/8/2001	192	186	3.1%
Biofilter - Grass Swale	Del Amo	1/12/2001	1/12/2001	48	39	18.8%
Biofilter - Grass Swale	Del Amo	1/24/2001	1/24/2001	116	53	54.3%
Biofilter - Grass Swale	East Swale	2/16/1999	2/16/1999	35.8	24.3	32.1%
Biofilter - Grass Swale	East Swale	4/19/1999	4/19/1999	56.2	44.9	20.1%
Biofilter - Grass Swale	East Swale	10/27/1999	10/27/1999	59.9	18.4	69.3%
Biofilter - Grass Swale	East Swale	2/22/2000	2/22/2000	34.4	16.7	51.5%
Biofilter - Grass Swale	East Swale	3/27/2000	3/27/2000	45.2	32.6	27.9%
Biofilter - Grass Swale	East Swale	6/10/2000	6/10/2000	27.3	15.5	43.2%
Biofilter - Grass Swale	East Swale	3/15/2001	3/15/2001	35.4	21.7	38.7%
Biofilter - Grass Swale	East Swale	4/30/2001	4/30/2001	27.8	18.2	34.5%
Biofilter - Grass Swale	East Swale	11/13/2001	11/13/2001	35.1	39.9	-13.7%
Biofilter - Grass Swale	East Swale	12/12/2001	12/12/2001	21.3	13.7	35.7%
Biofilter - Grass Swale	EPCOT Swale	3/23/1983	3/23/1983	256	99	61.3%
Biofilter - Grass Swale	EPCOT Swale	5/16/1983	5/16/1983	23	8	65.2%
Biofilter - Grass Swale	I-5/I-605 swale	2/20/2000	2/20/2000	26.6	6.2	76.7%
Biofilter - Grass Swale	I-5/I-605 swale	2/27/2000	2/27/2000	61	23.3	61.8%
Biofilter - Grass Swale	I-5/I-605 swale	3/8/2000	3/8/2000	69	33.2	51.9%
Biofilter - Grass Swale	I-5/I-605 swale	3/8/2000	3/8/2000	72.9	20.5	71.9%
Biofilter - Grass Swale	I-5/I-605 swale	4/17/2000	4/18/2000	109	55.6	49.0%
Biofilter - Grass Swale	I-5/I-605 swale	4/17/2000	4/17/2000	141	45.4	67.8%
Biofilter - Grass Swale	I-5/I-605 swale	10/27/2000	10/27/2000	113	42	62.8%
Biofilter - Grass Swale	I-5/I-605 swale	10/27/2000	10/27/2000	173	82	52.6%
Biofilter - Grass Swale	I-5/I-605 swale	1/10/2001	1/10/2001	75	44	41.3%
Biofilter - Grass Swale	I-5/I-605 swale	1/12/2001	1/12/2001	76	84	-10.5%
Biofilter - Grass Swale	I-5/I-605 swale	4/7/2001	4/7/2001	171	29	83.0%
Biofilter - Grass Swale	Melrose	1/10/2001	1/10/2001	100	31	69.0%
Biofilter - Grass Swale	Melrose	1/26/2001	1/26/2001	130	29	77.7%
Biofilter - Grass Swale	Melrose	2/12/2001	2/12/2001	110	22	80.0%
Biofilter - Grass Swale	Melrose	2/23/2001	2/23/2001	120	20	83.3%
Biofilter - Grass Swale	Palomar Swale	2/20/2000	2/20/2000	23	41	-78.3%
Biofilter - Grass Swale	Palomar Swale	3/5/2000	3/5/2000	42	16	61.9%
Biofilter - Grass Swale	Palomar Swale	4/17/2000	4/17/2000	83	26	68.7%

BMP Type	Test Site Name	Inflow Samping Date	Outflow Samping Date	Influent Dissolved Zinc Concentration (µg/L)	Effluent Dissolved Zinc Concentration (µg/L)	Method #1 Removal
Biofilter - Grass Swale	Palomar Swale	1/26/2001	1/26/2001	48	32	33.3%
Biofilter - Grass Swale	Palomar Swale	2/12/2001	2/12/2001	33	31	6.1%
Biofilter - Grass Swale	Palomar Swale	2/23/2001	2/23/2001	36	35	2.8%
Biofilter - Grass Swale	Palomar Swale	3/6/2001	3/6/2001	33	34	-3.0%
Biofilter - Grass Swale	Palomar Swale	4/7/2001	4/7/2001	130	72	44.6%
Biofilter - Grass Swale	Palomar Swale	4/21/2001	4/21/2001	72	51	29.2%
Biofilter - Grass Swale	WA Unimproved Ditch at SR 405 MP 27.76	11/2/2004	11/2/2004	24	48	-100.0%
Biofilter - Grass Swale	WA Unimproved Ditch at SR 405 MP 27.76	11/30/2004	11/30/2004	71	58	18.3%
Biofilter - Grass Swale	WA Unimproved Ditch at SR 405 MP 27.76	12/6/2004	12/6/2004	60	65	-8.3%
Biofilter - Grass Swale	WA Unimproved Ditch at SR 405 MP 27.76	12/9/2004	12/9/2004	60	50	16.7%
Biofilter - Grass Swale	WA Unimproved Ditch at SR 405 MP 27.76	12/10/2004	12/10/2004	68	46	32.4%
Biofilter - Grass Swale	WA Unimproved Ditch at SR 405 MP 27.76	12/30/2004	12/30/2004	100	40	60.0%
Biofilter - Grass Swale	WA Unimproved Ditch at SR 525 MP 2.1	11/1/2004	11/2/2004	21	21	0.0%
Biofilter - Grass Swale	WA Unimproved Ditch at SR 525 MP 2.1	11/24/2004	11/24/2004	60	29	51.7%
Biofilter - Grass Swale	WA Unimproved Ditch at SR 525 MP 2.1	12/21/2004	12/21/2004	23	16	30.4%
Biofilter - Grass Swale	WA Unimproved Ditch at SR 525 MP 2.1	12/30/2004	12/30/2004	22	14	36.4%
Biofilter - Grass Swale	WA Unimproved Ditch at SR 525 MP 2.1	3/28/2005	3/28/2005	37	11	70.3%
Biofilter - Grass Swale	West Swale	2/16/1999	2/16/1999	35.8	25.5	28.8%
Biofilter - Grass Swale	West Swale	4/19/1999	4/19/1999	56.2	43.8	22.1%
Biofilter - Grass Swale	West Swale	10/27/1999	10/27/1999	59.9	22.2	62.9%
Biofilter - Grass Swale	West Swale	2/22/2000	2/22/2000	34.4	25.6	25.6%
Biofilter - Grass Swale	West Swale	3/27/2000	3/27/2000	45.2	33	27.0%
Biofilter - Grass Swale	West Swale	6/10/2000	6/10/2000	27.3	22.7	16.8%
Biofilter - Grass Swale	West Swale	3/15/2001	3/15/2001	35.4	22.4	36.7%
Biofilter - Grass Swale	West Swale	4/30/2001	4/30/2001	27.8	19	31.7%
Biofilter - Grass Swale	West Swale	11/13/2001	11/13/2001	35.1	16.2	53.8%
Biofilter - Grass Swale	West Swale	12/12/2001	12/12/2001	21.3	20.1	5.6%
Filter - Other Media	StormFilter	4/26/2002	4/26/2002	60	50	16.7%
Filter - Other Media	StormFilter	5/17/2002	5/17/2002	80	70	12.5%
Filter - Other Media	StormFilter	6/28/2002	6/28/2002	40	40	0.0%
Filter - Peat Mixed With Sand	Lakewood P&R	2/20/2000	2/20/2000	41.6	19	54.3%
Filter - Peat Mixed With Sand	Lakewood P&R	2/27/2000	2/27/2000	81.3	17.4	78.6%
Filter - Peat Mixed With Sand	Lakewood P&R	3/8/2000	3/8/2000	32.7	1	96.9%
Filter - Peat Mixed With Sand	Lakewood P&R	4/17/2000	4/17/2000	120	11	90.8%
Filter - Peat Mixed With Sand	Lakewood P&R	10/26/2000	10/26/2000	148	47	68.2%
Filter - Peat Mixed With Sand	Lakewood P&R	1/10/2001	1/10/2001	53	38	28.3%
Filter - Peat Mixed With Sand	Lakewood P&R	1/24/2001	1/24/2001	90	25	72.2%
Filter - Peat Mixed With Sand	Lakewood P&R	2/10/2001	2/10/2001	59	28	52.5%
Filter - Peat Mixed With Sand	Via Verde P&R	2/20/2000	2/20/2000	23.4	10.6	54.7%
Filter - Peat Mixed With Sand	Via Verde P&R	2/27/2000	2/27/2000	33.3	4.4	86.8%
Filter - Peat Mixed With Sand	Via Verde P&R	3/8/2000	3/8/2000	23.5	9.28	60.5%
Filter - Peat Mixed With Sand	Via Verde P&R	4/17/2000	4/17/2000	44	8	81.8%
Filter - Peat Mixed With Sand	Via Verde P&R	10/27/2000	10/27/2000	118	28	76.3%
Filter - Peat Mixed With Sand	Via Verde P&R	1/11/2001	1/11/2001	47	15	68.1%
Filter - Peat Mixed With Sand	Via Verde P&R	4/7/2001	4/7/2001	57	9.5	83.3%
Filter - Peat Mixed With Sand	Via Verde P&R	4/21/2001	4/21/2001	87	13	85.1%

BMP Type	Test Site Name	Inflow Samping Date	Outflow Samping Date	Influent Dissolved Zinc Concentration (µg/L)	Effluent Dissolved Zinc Concentration (µg/L)	Method #1 Removal
Filter - Sand	Eastern SF	4/6/1999	4/6/1999	37	12	67.6%
Filter - Sand	Eastern SF	2/20/2000	2/20/2000	33.7	15.1	55.2%
Filter - Sand	Eastern SF	2/27/2000	2/27/2000	37.1	20.4	45.0%
Filter - Sand	Eastern SF	3/8/2000	3/8/2000	39.9	1	97.5%
Filter - Sand	Eastern SF	4/17/2000	4/17/2000	35	19	45.7%
Filter - Sand	Eastern SF	1/12/2001	1/12/2001	29	21	27.6%
Filter - Sand	Eastern SF	1/25/2001	1/25/2001	102	77	24.5%
Filter - Sand	Eastern SF	2/14/2001	2/14/2001	54	23	57.4%
Filter - Sand	Eastern SF	3/6/2001	3/6/2001	47	43	8.5%
Filter - Sand	Eastern SF	4/7/2001	4/7/2001	76	41	46.1%
Filter - Sand	Escondido	3/25/1999	3/25/1999	200	38	81.0%
Filter - Sand	Escondido	4/6/1999	4/7/1999	170	51	70.0%
Filter - Sand	Escondido	4/11/1999	4/11/1999	140	10	92.9%
Filter - Sand	Escondido	1/25/2000	1/25/2000	210	16	92.4%
Filter - Sand	Escondido	2/16/2000	2/16/2000	110	9	91.8%
Filter - Sand	Escondido	2/20/2000	2/20/2000	97	6.2	93.6%
Filter - Sand	Escondido	3/5/2000	3/5/2000	170	1	99.4%
Filter - Sand	Escondido	4/17/2000	4/17/2000	170	46	72.9%
Filter - Sand	Escondido	10/29/2000	10/29/2000	230	44	80.9%
Filter - Sand	Escondido	1/26/2001	1/26/2001	210	15	92.9%
Filter - Sand	Escondido	2/10/2001	2/10/2001	160	8.9	94.4%
Filter - Sand	Escondido	2/12/2001	2/12/2001	160	8	95.0%
Filter - Sand	Escondido	2/25/2001	2/25/2001	260	8.8	96.6%
Filter - Sand	Escondido	3/6/2001	3/6/2001	230	9.5	95.9%
Filter - Sand	Foothill SF	4/6/1999	4/6/1999	110	21	80.9%
Filter - Sand	Foothill SF	4/11/1999	4/11/1999	120	21	82.5%
Filter - Sand	Foothill SF	2/20/2000	2/20/2000	151	22.6	85.0%
Filter - Sand	Foothill SF	2/27/2000	2/27/2000	155	34.4	77.8%
Filter - Sand	Foothill SF	3/8/2000	3/8/2000	157	87.4	44.3%
Filter - Sand	Foothill SF	4/17/2000	4/17/2000	220	110	50.0%
Filter - Sand	Foothill SF	1/25/2001	1/25/2001	160	48	70.0%
Filter - Sand	Foothill SF	2/10/2001	2/10/2001	159	55	65.4%
Filter - Sand	Foothill SF	3/6/2001	3/6/2001	96	87	9.4%
Filter - Sand	Foothill SF	4/7/2001	4/7/2001	134	42	68.7%
Filter - Sand	Foothill SF	4/21/2001	4/21/2001	113	50	55.8%
Filter - Sand	I-5/I-78 P&R	3/25/1999	3/25/1999	65	65	0.0%
Filter - Sand	I-5/I-78 P&R	1/25/2000	1/25/2000	200	29	85.5%
Filter - Sand	I-5/I-78 P&R	2/16/2000	2/16/2000	49	24	51.0%
Filter - Sand	I-5/I-78 P&R	2/20/2000	2/20/2000	27	5.8	78.5%
Filter - Sand	I-5/I-78 P&R	3/8/2000	3/8/2000	35	6.5	81.4%
Filter - Sand	I-5/I-78 P&R	4/17/2000	4/17/2000	220	35	84.1%
Filter - Sand	I-5/I-78 P&R	10/26/2000	10/26/2000	210	44	79.0%
Filter - Sand	I-5/I-78 P&R	10/29/2000	10/29/2000	57	15	73.7%
Filter - Sand	I-5/I-78 P&R	1/8/2001	1/8/2001	230	82	64.3%
Filter - Sand	I-5/I-78 P&R	1/10/2001	1/10/2001	35	59	-68.6%
Filter - Sand	I-5/I-78 P&R	1/26/2001	1/26/2001	59	21	64.4%

BMP Type	Test Site Name	Inflow Samping Date	Outflow Samping Date	Influent Dissolved Zinc Concentration (µg/L)	Effluent Dissolved Zinc Concentration (µg/L)	Method #1 Removal
Filter - Sand	I-5/I-78 P&R	2/10/2001	2/10/2001	78	27	65.4%
Filter - Sand	I-5/I-78 P&R	2/12/2001	2/12/2001	27	10	63.0%
Filter - Sand	I-5/I-78 P&R	2/23/2001	2/23/2001	52	23	55.8%
Filter - Sand	I-5/I-78 P&R	3/6/2001	3/6/2001	80	26	67.5%
Filter - Sand	I-5/I-78 P&R	4/7/2001	4/7/2001	200	83	58.5%
Filter - Sand	I-5/I-78 P&R	4/21/2001	4/21/2001	170	88	48.2%
Filter - Sand	La Costa P&R	3/25/1999	3/25/1999	110	5.2	95.3%
Filter - Sand	La Costa P&R	4/6/1999	4/7/1999	50	2	96.0%
Filter - Sand	La Costa P&R	4/11/1999	4/11/1999	45	12	73.3%
Filter - Sand	La Costa P&R	1/25/2000	1/25/2000	220	4.5	98.0%
Filter - Sand	La Costa P&R	2/16/2000	2/16/2000	64	3.2	95.0%
Filter - Sand	La Costa P&R	2/20/2000	2/20/2000	25	1.6	93.6%
Filter - Sand	La Costa P&R	3/4/2000	3/5/2000	23	3	87.0%
Filter - Sand	La Costa P&R	4/17/2000	4/17/2000	81	9.8	87.9%
Filter - Sand	La Costa P&R	10/26/2000	10/26/2000	85	8.1	90.5%
Filter - Sand	La Costa P&R	1/8/2001	1/8/2001	120	17	85.8%
Filter - Sand	La Costa P&R	1/26/2001	1/26/2001	21	6	71.4%
Filter - Sand	La Costa P&R	2/23/2001	2/23/2001	28	7.6	72.9%
Filter - Sand	La Costa P&R	4/7/2001	4/7/2001	100	18	82.0%
Filter - Sand	La Costa P&R	4/21/2001	4/21/2001	170	22	87.1%
Filter - Sand	Lakewood RP SF Vault	5/13/1995	5/13/1995	130	30	76.9%
Filter - Sand	Lakewood RP SF Vault	5/31/1995	5/31/1995	20	20	0.0%
Filter - Sand	Parkrose SF	6/11/2001	6/11/2001	32	3.27	89.8%
Filter - Sand	Parkrose SF	12/12/2001	12/12/2001	28.2	6.38	77.4%
Filter - Sand	Parkrose SF	4/9/2002	4/9/2002	37.2	4.53	87.8%
Filter - Sand	Parkrose SF	6/17/2002	6/17/2002	47.7	18.4	61.4%
Filter - Sand	Parkrose SF	11/7/2002	11/7/2002	77	10.5	86.4%
Filter - Sand	Parkrose SF	12/12/2002	12/12/2002	24.3	6.7	72.4%
Filter - Sand	Termination	2/20/2000	2/20/2000	27.2	17.1	37.1%
Filter - Sand	Termination	2/27/2000	2/27/2000	55.5	20.2	63.6%
Filter - Sand	Termination	4/17/2000	4/17/2000	130	57	56.2%
Filter - Sand	Termination	10/27/2000	10/27/2000	72	98	-36.1%
Filter - Sand	Termination	1/24/2001	1/24/2001	81	115	-42.0%
Filter - Sand	Termination	2/11/2001	2/11/2001	60	54	10.0%
Filter - Sand	Termination	3/7/2001	3/7/2001	27	45	-66.7%
Filter - Sand	Termination	4/7/2001	4/7/2001	135	53	60.7%
Retention Pond (Wet) - Surface Pond With a Permane	DeBary Detention with Filtration Pond	11/5/1992	11/6/1992	26	1	96.2%
Retention Pond (Wet) - Surface Pond With a Permane	DeBary Detention with Filtration Pond	11/24/1992	11/25/1992	46	4	91.3%
Retention Pond (Wet) - Surface Pond With a Permane	La Costa WB	1/25/2000	1/25/2000	120	40	66.7%
Retention Pond (Wet) - Surface Pond With a Permane	La Costa WB	2/16/2000	2/16/2000	96	34	64.6%
Retention Pond (Wet) - Surface Pond With a Permane	La Costa WB	2/20/2000	2/20/2000	28	33	-17.9%
Retention Pond (Wet) - Surface Pond With a Permane	La Costa WB	3/5/2000	3/5/2000	44	38	13.6%
Retention Pond (Wet) - Surface Pond With a Permane	La Costa WB	4/17/2000	4/17/2000	43	85	-97.7%
Retention Pond (Wet) - Surface Pond With a Permane	La Costa WB	1/8/2001	1/8/2001	120	16	86.7%
Retention Pond (Wet) - Surface Pond With a Permane	La Costa WB	1/10/2001	1/10/2001	23	18	21.7%
Retention Pond (Wet) - Surface Pond With a Permane	La Costa WB	1/26/2001	1/26/2001	22	14	36.4%

BMP Type	Test Site Name	Inflow Samping Date	Outflow Samping Date	Influent Dissolved Zinc Concentration (µg/L)	Effluent Dissolved Zinc Concentration (µg/L)	Method #1 Removal
Retention Pond (Wet) - Surface Pond With a Permane	La Costa WB	2/12/2001	2/12/2001	23	32	-39.1%
Retention Pond (Wet) - Surface Pond With a Permane	La Costa WB	2/25/2001	2/25/2001	34	30	11.8%
Retention Pond (Wet) - Surface Pond With a Permane	La Costa WB	3/6/2001	3/6/2001	30	13	56.7%
Retention Pond (Wet) - Surface Pond With a Permane	La Costa WB	4/7/2001	4/7/2001	62	41	33.9%
Retention Pond (Wet) - Surface Pond With a Permane	La Costa WB	4/21/2001	4/21/2001	74	30	59.5%
Retention Pond (Wet) - Surface Pond With a Permane	Lake Ellyn	4/3/1980	4/3/1980	150	21	86.0%
Retention Pond (Wet) - Surface Pond With a Permane	Lake Ellyn	5/17/1980	5/17/1980	46	14	69.6%
Retention Pond (Wet) - Surface Pond With a Permane	Lake Ellyn	5/28/1980	5/28/1980	49	10	79.6%
Retention Pond (Wet) - Surface Pond With a Permane	Lake Ellyn	7/9/1980	7/9/1980	41	9.2	77.6%
Retention Pond (Wet) - Surface Pond With a Permane	Lake Ellyn	7/20/1980	7/20/1980	47	14	70.2%
Retention Pond (Wet) - Surface Pond With a Permane	Lake Ellyn	8/4/1980	8/4/1980	44	14	68.2%
Retention Pond (Wet) - Surface Pond With a Permane	Lake Ellyn	8/19/1980	8/19/1980	27	17	37.0%
Retention Pond (Wet) - Surface Pond With a Permane	Lake Ellyn	9/22/1980	9/22/1980	25	9.5	62.0%
Retention Pond (Wet) - Surface Pond With a Permane	Lake Ellyn	10/24/1980	10/24/1980	61	7	88.5%
Retention Pond (Wet) - Surface Pond With a Permane	Lake Ellyn	12/7/1980	12/7/1980	21	8.6	59.0%
Retention Pond (Wet) - Surface Pond With a Permane	Lake Ellyn	2/16/1981	2/16/1981	81	15	81.5%
Retention Pond (Wet) - Surface Pond With a Permane	Lake Ellyn	2/22/1981	2/22/1981	31	15	51.6%
Retention Pond (Wet) - Surface Pond With a Permane	Lake Ellyn	4/22/1981	4/22/1981	39	6.9	82.3%
Retention Pond (Wet) - Surface Pond With a Permane	Lake Ellyn	4/28/1981	4/28/1981	47	10	78.7%
Retention Pond (Wet) - Surface Pond With a Permane	Lake Ellyn	5/10/1981	5/10/1981	29	8.8	69.7%
Retention Pond (Wet) - Surface Pond With a Permane	Lake Ellyn	5/29/1981	5/29/1981	46	5.8	87.4%
Retention Pond (Wet) - Surface Pond With a Permane	Lake Ellyn	6/8/1981	6/8/1981	40	5.3	86.8%
Retention Pond (Wet) - Surface Pond With a Permane	Seattle METRO Retention Pond	10/6/1982	10/6/1982	273.3	2618	-857.9%
Retention Pond (Wet) - Surface Pond With a Permane	Seattle METRO Retention Pond	10/16/1982	10/16/1982	166.2	213.3	-28.3%
Retention Pond (Wet) - Surface Pond With a Permane	Seattle METRO Retention Pond	1/19/1983	1/19/1983	173.7	125.1	28.0%
Retention Pond (Wet) - Surface Pond With a Permane	Seattle METRO Retention Pond	2/6/1983	2/6/1983	181.9	140.2	22.9%
Retention Pond (Wet) - Surface Pond With a Permane	Shop Creek Pond	7/8/1990	7/8/1990	90	20	77.8%
Retention Pond (Wet) - Surface Pond With a Permane	Shop Creek Pond	7/14/1990	7/14/1990	200	10	95.0%
Retention Pond (Wet) - Surface Pond With a Permane	Shop Creek Pond	7/28/1990	7/28/1990	50	60	-20.0%
Retention Pond (Wet) - Surface Pond With a Permane	Shop Creek Pond	7/29/1990	7/29/1990	30	20	33.3%
Retention Pond (Wet) - Surface Pond With a Permane	Shop Creek Pond	8/4/1990	8/4/1990	110	20	81.8%
Retention Pond (Wet) - Surface Pond With a Permane	Shop Creek Pond	8/17/1990	8/17/1990	60	60	0.0%
Retention Pond (Wet) - Surface Pond With a Permane	Shop Creek Pond	9/5/1990	9/5/1990	30	-10	133.3%
Retention Pond (Wet) - Surface Pond With a Permane	Shop Creek Pond	4/13/1991	4/13/1991	120	100	16.7%
Retention Pond (Wet) - Surface Pond With a Permane	Shop Creek Pond	4/30/1991	4/30/1991	40	20	50.0%
Retention Pond (Wet) - Surface Pond With a Permane	Shop Creek Pond	6/1/1991	6/1/1991	20	10	50.0%
Retention Pond (Wet) - Surface Pond With a Permane	Shop Creek Pond	6/22/1991	6/22/1991	40	20	50.0%
Retention Pond (Wet) - Surface Pond With a Permane	Shop Creek Pond	7/10/1991	7/10/1991	20	20	0.0%
Retention Pond (Wet) - Surface Pond With a Permane	Shop Creek Pond	8/3/1991	8/3/1991	300	130	56.7%
Retention Pond (Wet) - Surface Pond With a Permane	Shop Creek Pond	7/12/1992	7/12/1992	20	10	50.0%
Retention Pond (Wet) - Surface Pond With a Permane	Shop Creek Pond	7/20/1992	7/20/1992	40	30	25.0%
Retention Pond (Wet) - Surface Pond With a Permane	Shop Creek Pond	7/22/1992	7/22/1992	30	40	-33.3%
Retention Pond (Wet) - Surface Pond With a Permane	Shop Creek Pond	8/23/1992	8/23/1992	30	10	66.7%
Retention Pond (Wet) - Surface Pond With a Permane	Shop Creek Pond	6/22/1994	6/22/1994	20	10	50.0%
Retention Pond (Wet) - Surface Pond With a Permane	Silver Star Rd Detention Pond	8/20/1982	8/20/1982	47.8	23.2	51.5%
Retention Pond (Wet) - Surface Pond With a Permane	Silver Star Rd Detention Pond	10/5/1982	10/5/1982	91.2	79.2	13.2%

BMP Type	Test Site Name	Inflow Samping Date	Outflow Samping Date	Influent Dissolved Zinc Concentration (µg/L)	Effluent Dissolved Zinc Concentration (µg/L)	Method #1 Removal
Retention Pond (Wet) - Surface Pond With a Permane	Silver Star Rd Detention Pond	12/8/1982	12/8/1982	48.8	315	-545.5%
Retention Pond (Wet) - Surface Pond With a Permane	Silver Star Rd Detention Pond	1/20/1983	1/20/1983	22.5	114	-406.7%
Retention Pond (Wet) - Surface Pond With a Permane	Silver Star Rd Detention Pond	2/2/1983	2/2/1983	113.5	20	82.4%
Retention Pond (Wet) - Surface Pond With a Permane	Silver Star Rd Detention Pond	6/7/1983	6/7/1983	112.9	73.2	35.2%
Retention Pond (Wet) - Surface Pond With a Permane	Silver Star Rd Detention Pond	6/21/1983	6/21/1983	20.2	27.1	-34.2%
Retention Pond (Wet) - Surface Pond With a Permane	Silver Star Rd Detention Pond	7/29/1983	7/29/1983	41.9	16.9	59.7%
Retention Pond (Wet) - Surface Pond With a Permane	Silver Star Rd Detention Pond	11/20/1983	11/20/1983	36.3	15	58.7%
Retention Pond (Wet) - Surface Pond With a Permane	Silver Star Rd Detention Pond	6/13/1984	6/13/1984	115.4	18.9	83.6%
Retention Pond (Wet) - Surface Pond With a Permane	WA Wet Pond at SR 5 MP 96.05 (Maytown)	11/17/2003	11/17/2003	64	41	35.9%
Retention Pond (Wet) - Surface Pond With a Permane	WA Wet Pond at SR 5 MP 96.05 (Maytown)	11/25/2003	11/25/2003	64	44	31.3%
Retention Pond (Wet) - Surface Pond With a Permane	WA Wet Pond at SR 5 MP 96.05 (Maytown)	11/28/2003	11/28/2003	44	38	13.6%
Retention Pond (Wet) - Surface Pond With a Permane	WA Wet Pond at SR 5 MP 96.05 (Maytown)	12/5/2003	12/5/2003	61	36	41.0%
Retention Pond (Wet) - Surface Pond With a Permane	WA Wet Pond at SR 5 MP 96.05 (Maytown)	12/13/2003	12/13/2003	57	30	47.4%
Retention Pond (Wet) - Surface Pond With a Permane	WA Wet Pond at SR 5 MP 96.05 (Maytown)	1/23/2004	1/23/2004	63	40	36.5%
Retention Pond (Wet) - Surface Pond With a Permane	WA Wet Pond at SR 5 MP 96.05 (Maytown)	1/28/2004	1/28/2004	54	28	48.1%
Retention Pond (Wet) - Surface Pond With a Permane	WA Wet Pond at SR 5 MP 96.05 (Maytown)	11/26/2004	11/26/2004	56	37	33.9%
Retention Pond (Wet) - Surface Pond With a Permane	WA Wet Pond at SR 5 MP 96.05 (Maytown)	12/9/2004	12/9/2004	86	33	61.6%
Retention Pond (Wet) - Surface Pond With a Permane	WA Wet Pond at SR 5 MP 96.05 (Maytown)	1/17/2005	1/18/2005	43	37	14.0%
Retention Pond (Wet) - Surface Pond With a Permane	WA Wet Pond at SR 525 MP 3.31	11/1/2004	11/2/2004	21	7	66.7%
Retention Pond (Wet) - Surface Pond With a Permane	WA Wet Pond at SR 525 MP 3.31	11/16/2004	11/16/2004	26	19	26.9%
Retention Pond (Wet) - Surface Pond With a Permane	WA Wet Pond at SR 525 MP 3.31	11/18/2004	11/18/2004	25	12	52.0%
Retention Pond (Wet) - Surface Pond With a Permane	WA Wet Pond at SR 525 MP 3.31	11/24/2004	11/24/2004	60	28	53.3%
Retention Pond (Wet) - Surface Pond With a Permane	WA Wet Pond at SR 525 MP 3.31	12/6/2004	12/6/2004	42	25	40.5%
Retention Pond (Wet) - Surface Pond With a Permane	WA Wet Pond at SR 525 MP 3.31	12/21/2004	12/21/2004	23	14	39.1%
Retention Pond (Wet) - Surface Pond With a Permane	WA Wet Pond at SR 525 MP 3.31	12/30/2004	12/30/2004	22	8	63.6%
Retention Pond (Wet) - Surface Pond With a Permane	WA Wet Pond at SR 525 MP 3.31	2/4/2005	2/4/2005	20	8	60.0%
Retention Pond (Wet) - Surface Pond With a Permane	WA Wet Pond at SR 525 MP 3.31	3/17/2005	3/17/2005	39	59	-51.3%
Retention Pond (Wet) - Surface Pond With a Permane	WA Wet Pond at SR 525 MP 3.31	3/28/2005	3/28/2005	37	23	37.8%
Retention Pond (Wet) - Surface Pond With a Permane	WA Wet Pond at SR 525 MP 3.31	4/8/2005	4/8/2005	28	7	75.0%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	5/13/1995	5/13/1995	20	130	-550.0%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	5/16/1995	5/16/1995	20	30	-50.0%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	5/23/1995	5/23/1995	50	50	0.0%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	6/4/1995	6/4/1995	20	30	-50.0%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	6/17/1995	6/17/1995	30	60	-100.0%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	7/13/1995	7/13/1995	50	50	0.0%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	8/11/1995	8/11/1995	100	60	40.0%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	9/14/1995	9/14/1995	80	40	50.0%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	5/24/1996	5/24/1996	30	30	0.0%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	6/14/1996	6/14/1996	110	130	-18.2%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	6/16/1996	6/16/1996	60	70	-16.7%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	6/28/1996	6/28/1996	130	110	15.4%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	7/9/1996	7/9/1996	160	240	-50.0%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	7/28/1996	7/28/1996	170	90	47.1%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	8/15/1996	8/15/1996	220	110	50.0%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	8/23/1996	8/23/1996	90	80	11.1%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	4/24/1997	4/24/1997	40	30	25.0%

BMP Type	Test Site Name	Inflow Samping Date	Outflow Samping Date	Influent Dissolved Zinc Concentration (µg/L)	Effluent Dissolved Zinc Concentration (µg/L)	Method #1 Removal
Retention Underground Vault or Pipes (Wet)	Lakewood RP	5/15/1997	5/15/1997	200	120	40.0%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	5/22/1997	5/22/1997	80	20	75.0%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	7/28/1997	7/28/1997	60	40	33.3%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	7/29/1997	7/29/1997	20	20	0.0%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	5/24/1998	5/24/1998	50	80	-60.0%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	6/5/1998	6/5/1998	30	60	-100.0%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	6/15/1998	6/15/1998	80	70	12.5%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	6/22/1998	6/22/1998	130	20	84.6%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	7/9/1998	7/9/1998	80	80	0.0%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	7/22/1998	7/22/1998	70	40	42.9%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	7/25/1998	7/25/1998	30	20	33.3%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	7/30/1998	7/30/1998	50	30	40.0%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	8/10/1998	8/10/1998	40	30	25.0%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	9/1/1998	9/1/1998	220	120	45.5%
Retention Underground Vault or Pipes (Wet)	WA Closed Wet Vault at SR 405 MP 26.10	12/16/2003	12/16/2003	20	18	10.0%
Retention Underground Vault or Pipes (Wet)	WA Closed Wet Vault at SR 405 MP 26.10	1/8/2004	1/8/2004	38	47	-23.7%

Table I-2. Dissolved copper removal efficiency data for basic treatment facilities that were obtained through the International Stormwater Best Management Practices Database.

BMP Type	Test Site Name	Inflow Samping Date	Outflow Samping Date	Influent Dissolved Copper Concentration (µg/L)	Effluent Dissolved Copper Concentration (µg/L)	Method #1 Removal
Biofilter - Grass Strip	Altadena Strip	2/16/2000	2/16/2000	9.4	2.7	71.3%
Biofilter - Grass Strip	Altadena Strip	2/27/2000	2/27/2000	4.6	1.7	63.0%
Biofilter - Grass Strip	Altadena Strip	4/18/2000	4/18/2000	4.8	4.8	0.0%
Biofilter - Grass Strip	Altadena Strip	10/27/2000	10/27/2000	12	12	0.0%
Biofilter - Grass Strip	Altadena Strip	1/12/2001	1/12/2001	3.3	2.9	12.1%
Biofilter - Grass Strip	Altadena Strip	1/24/2001	1/24/2001	6.1	5.3	13.1%
Biofilter - Grass Strip	Altadena Strip	2/10/2001	2/10/2001	8.4	7.9	6.0%
Biofilter - Grass Strip	Carlsbad strip	1/26/2001	1/26/2001	19	1.9	90.0%
Biofilter - Grass Strip	Carlsbad strip	2/12/2001	2/13/2001	18	4.7	73.9%
Biofilter - Grass Strip	Carlsbad strip	2/23/2001	2/23/2001	13	3.9	70.0%
Biofilter - Grass Strip	Cottonwood RVTS	11/12/2001	11/12/2001	9.2	4.7	48.9%
Biofilter - Grass Strip	Cottonwood RVTS	11/21/2001	11/21/2001	5.1	4.6	9.8%
Biofilter - Grass Strip	Cottonwood RVTS	11/29/2001	11/29/2001	8.4	4.2	50.0%
Biofilter - Grass Strip	Cottonwood RVTS	12/6/2001	12/6/2001	12	3.5	70.8%
Biofilter - Grass Strip	Cottonwood RVTS	12/9/2001	12/9/2001	4	4.6	-15.0%
Biofilter - Grass Strip	Cottonwood RVTS	12/13/2001	12/13/2001	4	4.3	-7.5%
Biofilter - Grass Strip	Cottonwood RVTS	12/29/2001	12/29/2001	5.7	2.8	50.9%
Biofilter - Grass Strip	Cottonwood RVTS	1/6/2002	1/6/2002	4.7	2	57.4%
Biofilter - Grass Strip	Cottonwood RVTS	1/26/2002	1/26/2002	7.8	1.8	76.9%
Biofilter - Grass Strip	Cottonwood RVTS	2/20/2002	2/20/2002	6.2	1.5	75.8%
Biofilter - Grass Strip	Cottonwood RVTS	3/23/2002	3/23/2002	16	5	68.8%
Biofilter - Grass Strip	Cottonwood RVTS	12/12/2002	12/12/2002	11	7.5	31.8%
Biofilter - Grass Strip	Cottonwood RVTS	3/13/2003	3/13/2003	9.8	9	8.2%
Biofilter - Grass Strip	Cottonwood RVTS	4/1/2003	4/1/2003	17	11	35.3%
Biofilter - Grass Strip	I-605/SR-91 strip	3/8/2000	3/8/2000	11.2	6.4	42.9%
Biofilter - Grass Strip	I-605/SR-91 strip	10/27/2000	10/27/2000	12	14	-16.7%
Biofilter - Grass Strip	I-605/SR-91 strip	1/10/2001	1/10/2001	11	10	9.1%
Biofilter - Grass Strip	I-605/SR-91 strip	2/13/2001	2/13/2001	9.2	6.9	25.0%
Biofilter - Grass Strip	I-605/SR-91 strip	4/7/2001	4/7/2001	18	24	-33.3%
Biofilter - Grass Strip	Irvine A RVTS	2/25/2003	2/25/2003	15	9.6	36.0%
Biofilter - Grass Strip	Irvine C RVTS	2/25/2003	2/25/2003	15	8.5	43.3%
Biofilter - Grass Strip	Moreno Valley A RVTS	11/24/2001	11/24/2001	20	21	-5.0%
Biofilter - Grass Strip	Moreno Valley A RVTS	12/20/2002	12/20/2002	15	15	0.0%
Biofilter - Grass Strip	Moreno Valley A RVTS	2/11/2003	2/11/2003	15	15	0.0%
Biofilter - Grass Strip	Moreno Valley A RVTS	2/25/2003	2/25/2003	11	12	-9.1%
Biofilter - Grass Strip	Moreno Valley A RVTS	3/15/2003	3/15/2003	15	14	6.7%
Biofilter - Grass Strip	Moreno Valley B RVTS	11/24/2001	11/24/2001	20	20	0.0%
Biofilter - Grass Strip	Moreno Valley B RVTS	12/20/2002	12/20/2002	15	16	-6.7%
Biofilter - Grass Strip	Moreno Valley B RVTS	2/11/2003	2/11/2003	15	14	6.7%
Biofilter - Grass Strip	Moreno Valley B RVTS	2/25/2003	2/25/2003	11	14	-27.3%
Biofilter - Grass Strip	Moreno Valley B RVTS	3/15/2003	3/15/2003	15	14	6.7%
Biofilter - Grass Strip	Moreno Valley B RVTS	4/14/2003	4/14/2003	19	21	-10.5%
Biofilter - Grass Strip	Moreno Valley C RVTS	11/24/2001	11/24/2001	20	20	0.0%
Biofilter - Grass Strip	Moreno Valley C RVTS	12/20/2002	12/20/2002	15	14	6.7%
Biofilter - Grass Strip	Moreno Valley C RVTS	2/11/2003	2/11/2003	15	16	-6.7%

BMP Type	Test Site Name	Inflow Samping Date	Outflow Samping Date	Influent Dissolved Copper Concentration (µg/L)	Effluent Dissolved Copper Concentration (µg/L)	Method #1 Removal
Biofilter - Grass Strip	Moreno Valley C RVTS	2/25/2003	2/25/2003	11	10	9.1%
Biofilter - Grass Strip	Moreno Valley C RVTS	3/15/2003	3/15/2003	15	14	6.7%
Biofilter - Grass Strip	Moreno Valley C RVTS	4/14/2003	4/14/2003	19	15	21.1%
Biofilter - Grass Strip	Moreno Valley D RVTS	11/24/2001	11/24/2001	20	13	35.0%
Biofilter - Grass Strip	Moreno Valley D RVTS	12/20/2002	12/20/2002	15	22	-46.7%
Biofilter - Grass Strip	Moreno Valley D RVTS	2/11/2003	2/11/2003	15	14	6.7%
Biofilter - Grass Strip	Moreno Valley D RVTS	2/25/2003	2/25/2003	11	11	0.0%
Biofilter - Grass Strip	Moreno Valley D RVTS	3/15/2003	3/15/2003	15	10	33.3%
Biofilter - Grass Strip	Moreno Valley D RVTS	4/14/2003	4/14/2003	19	13	31.6%
Biofilter - Grass Strip	Redding A RVTS	12/13/2001	12/13/2001	3	1.4	53.3%
Biofilter - Grass Strip	Redding A RVTS	3/6/2002	3/6/2002	3.2	2.3	28.1%
Biofilter - Grass Strip	Redding A RVTS	1/21/2003	1/21/2003	5.6	3	46.4%
Biofilter - Grass Strip	Redding A RVTS	3/13/2003	3/13/2003	3	2.4	20.0%
Biofilter - Grass Strip	Redding A RVTS	4/12/2003	4/12/2003	8.2	4.1	50.0%
Biofilter - Grass Strip	Redding B RVTS	12/13/2001	12/13/2001	3	1	66.7%
Biofilter - Grass Strip	Redding B RVTS	3/6/2002	3/6/2002	3.2	2.9	9.4%
Biofilter - Grass Strip	Redding B RVTS	1/21/2003	1/21/2003	5.6	2.3	58.9%
Biofilter - Grass Strip	Redding B RVTS	3/13/2003	3/13/2003	3	2.8	6.7%
Biofilter - Grass Strip	Redding C RVTS	12/13/2001	12/13/2001	3	1.2	60.0%
Biofilter - Grass Strip	Redding C RVTS	3/6/2002	3/6/2002	3.2	6.7	-109.4%
Biofilter - Grass Strip	Redding C RVTS	1/21/2003	1/21/2003	5.6	1.1	80.4%
Biofilter - Grass Strip	Redding C RVTS	3/13/2003	3/13/2003	3	3.8	-26.7%
Biofilter - Grass Strip	Redding C RVTS	4/12/2003	4/12/2003	8.2	6.1	25.6%
Biofilter - Grass Strip	Sacramento A RVTS	11/12/2001	11/12/2001	11	5.7	48.2%
Biofilter - Grass Strip	Sacramento A RVTS	11/29/2001	11/29/2001	3.2	1	68.8%
Biofilter - Grass Strip	Sacramento A RVTS	12/20/2001	12/20/2001	3.6	4.2	-16.7%
Biofilter - Grass Strip	Sacramento A RVTS	1/6/2002	1/6/2002	4.7	5.6	-19.1%
Biofilter - Grass Strip	Sacramento A RVTS	1/26/2002	1/26/2002	5.8	3.3	43.1%
Biofilter - Grass Strip	Sacramento A RVTS	2/7/2002	2/7/2002	5.3	3.2	39.6%
Biofilter - Grass Strip	Sacramento A RVTS	2/17/2002	2/17/2002	3.8	3.6	5.3%
Biofilter - Grass Strip	Sacramento A RVTS	3/6/2002	3/6/2002	4.3	5.7	-32.6%
Biofilter - Grass Strip	Sacramento A RVTS	3/13/2003	3/13/2003	6.1	9.1	-49.2%
Biofilter - Grass Strip	Sacramento A RVTS	4/4/2003	4/4/2003	5.9	5.9	0.0%
Biofilter - Grass Strip	Sacramento A RVTS	4/12/2003	4/12/2003	8.1	10	-23.5%
Biofilter - Grass Strip	Sacramento B RVTS	12/20/2001	12/20/2001	3.6	5.5	-52.8%
Biofilter - Grass Strip	Sacramento B RVTS	1/6/2002	1/6/2002	4.7	5	-6.4%
Biofilter - Grass Strip	Sacramento B RVTS	1/26/2002	1/26/2002	5.8	2.5	56.9%
Biofilter - Grass Strip	Sacramento B RVTS	2/7/2002	2/7/2002	5.3	1.7	67.9%
Biofilter - Grass Strip	Sacramento B RVTS	2/17/2002	2/17/2002	3.8	2.4	36.8%
Biofilter - Grass Strip	Sacramento B RVTS	3/6/2002	3/6/2002	4.3	4.6	-7.0%
Biofilter - Grass Strip	Sacramento C RVTS	12/20/2001	12/20/2001	3.6	3.4	5.6%
Biofilter - Grass Strip	Sacramento C RVTS	1/6/2002	1/6/2002	4.7	4.5	4.3%
Biofilter - Grass Strip	Sacramento C RVTS	1/26/2002	1/26/2002	5.8	1.6	72.4%
Biofilter - Grass Strip	Sacramento C RVTS	2/7/2002	2/7/2002	5.3	1.7	67.9%
Biofilter - Grass Strip	Sacramento C RVTS	2/17/2002	2/17/2002	3.8	1.4	63.2%
Biofilter - Grass Strip	Sacramento C RVTS	3/6/2002	3/6/2002	4.3	4.9	-14.0%

BMP Type	Test Site Name	Inflow Samping Date	Outflow Samping Date	Influent Dissolved Copper Concentration (µg/L)	Effluent Dissolved Copper Concentration (µg/L)	Method #1 Removal
Biofilter - Grass Strip	Sacramento D RVTS	11/12/2001	11/12/2001	11	4.3	60.9%
Biofilter - Grass Strip	Sacramento D RVTS	12/20/2001	12/20/2001	3.6	4.9	-36.1%
Biofilter - Grass Strip	Sacramento D RVTS	1/6/2002	1/6/2002	4.7	6	-27.7%
Biofilter - Grass Strip	Sacramento D RVTS	1/26/2002	1/26/2002	5.8	3.9	32.8%
Biofilter - Grass Strip	Sacramento D RVTS	2/7/2002	2/7/2002	5.3	1.8	66.0%
Biofilter - Grass Strip	Sacramento D RVTS	2/17/2002	2/17/2002	3.8	1	73.7%
Biofilter - Grass Strip	Sacramento D RVTS	3/6/2002	3/6/2002	4.3	4	7.0%
Biofilter - Grass Strip	San Onofre A RVTS	3/17/2002	3/17/2002	14	12	14.3%
Biofilter - Grass Strip	San Onofre A RVTS	11/29/2002	11/29/2002	17	21	-23.5%
Biofilter - Grass Strip	San Onofre A RVTS	12/20/2002	12/20/2002	17	9.6	43.5%
Biofilter - Grass Strip	San Onofre A RVTS	2/25/2003	2/25/2003	8.5	7.4	12.9%
Biofilter - Grass Strip	San Onofre A RVTS	3/15/2003	3/15/2003	14	12	14.3%
Biofilter - Grass Strip	San Onofre B RVTS	11/24/2001	11/24/2001	19	9.6	49.5%
Biofilter - Grass Strip	San Onofre B RVTS	3/17/2002	3/17/2002	14	13	7.1%
Biofilter - Grass Strip	San Onofre B RVTS	11/29/2002	11/29/2002	17	19	-11.8%
Biofilter - Grass Strip	San Onofre B RVTS	12/20/2002	12/20/2002	17	14	17.6%
Biofilter - Grass Strip	San Onofre B RVTS	2/25/2003	2/25/2003	8.5	8.3	2.4%
Biofilter - Grass Strip	San Onofre B RVTS	3/15/2003	3/15/2003	14	12	14.3%
Biofilter - Grass Strip	San Onofre C RVTS	12/20/2002	12/20/2002	17	16	5.9%
Biofilter - Grass Strip	San Onofre C RVTS	3/15/2003	3/15/2003	14	11	21.4%
Biofilter - Grass Strip	San Rafael RVTS	11/12/2001	11/12/2001	20	7	65.0%
Biofilter - Grass Strip	San Rafael RVTS	11/29/2001	11/29/2001	8	2.8	65.0%
Biofilter - Grass Strip	San Rafael RVTS	12/14/2001	12/14/2001	13	3.3	74.6%
Biofilter - Grass Strip	San Rafael RVTS	12/17/2001	12/17/2001	17	4.7	72.4%
Biofilter - Grass Strip	San Rafael RVTS	12/21/2001	12/21/2001	13	2.7	79.2%
Biofilter - Grass Strip	San Rafael RVTS	12/30/2001	12/30/2001	9.3	2.3	75.3%
Biofilter - Grass Strip	San Rafael RVTS	1/6/2002	1/6/2002	13	2.6	80.0%
Biofilter - Grass Strip	San Rafael RVTS	1/28/2002	1/28/2002	12	3.4	71.7%
Biofilter - Grass Strip	San Rafael RVTS	2/7/2002	2/7/2002	18	3.8	78.9%
Biofilter - Grass Strip	San Rafael RVTS	2/17/2002	2/17/2002	13	3.1	76.2%
Biofilter - Grass Strip	San Rafael RVTS	2/19/2002	2/19/2002	18	2.7	85.0%
Biofilter - Grass Strip	San Rafael RVTS	3/10/2002	3/10/2002	9.5	2.3	75.8%
Biofilter - Grass Strip	San Rafael RVTS	3/17/2002	3/17/2002	17	2.8	83.5%
Biofilter - Grass Strip	San Rafael RVTS	1/21/2003	1/21/2003	11	4.4	60.0%
Biofilter - Grass Strip	San Rafael RVTS	2/15/2003	2/15/2003	11	6.3	42.7%
Biofilter - Grass Strip	San Rafael RVTS	3/13/2003	3/13/2003	13	7.8	40.0%
Biofilter - Grass Strip	San Rafael RVTS	4/12/2003	4/12/2003	20	7	65.0%
Biofilter - Grass Strip	Yorba Linda A RVTS	11/24/2001	11/24/2001	9.7	6.4	34.0%
Biofilter - Grass Strip	Yorba Linda A RVTS	12/21/2001	12/21/2001	10	10	0.0%
Biofilter - Grass Strip	Yorba Linda A RVTS	12/16/2002	12/16/2002	15	14	6.7%
Biofilter - Grass Strip	Yorba Linda A RVTS	12/20/2002	12/20/2002	12	11	8.3%
Biofilter - Grass Strip	Yorba Linda A RVTS	2/25/2003	2/25/2003	7.6	9.7	-27.6%
Biofilter - Grass Strip	Yorba Linda A RVTS	3/4/2003	3/4/2003	6.2	13	-109.7%
Biofilter - Grass Strip	Yorba Linda A RVTS	3/15/2003	3/15/2003	14	9.5	32.1%
Biofilter - Grass Strip	Yorba Linda A RVTS	4/14/2003	4/14/2003	15	15	0.0%
Biofilter - Grass Strip	Yorba Linda B RVTS	12/21/2001	12/21/2001	10	11	-10.0%

BMP Type	Test Site Name	Inflow Samping Date	Outflow Samping Date	Influent Dissolved Copper Concentration (µg/L)	Effluent Dissolved Copper Concentration (µg/L)	Method #1 Removal
Biofilter - Grass Strip	Yorba Linda B RVTS	12/16/2002	12/16/2002	15	19	-26.7%
Biofilter - Grass Strip	Yorba Linda B RVTS	12/20/2002	12/20/2002	12	8	33.3%
Biofilter - Grass Strip	Yorba Linda B RVTS	2/25/2003	2/25/2003	7.6	6.3	17.1%
Biofilter - Grass Strip	Yorba Linda B RVTS	3/4/2003	3/4/2003	6.2	14	-125.8%
Biofilter - Grass Strip	Yorba Linda B RVTS	3/15/2003	3/15/2003	14	9.9	29.3%
Biofilter - Grass Strip	Yorba Linda B RVTS	4/14/2003	4/14/2003	15	14	6.7%
Biofilter - Grass Strip	Yorba Linda C RVTS	11/24/2001	11/24/2001	9.7	10	-3.1%
Biofilter - Grass Strip	Yorba Linda C RVTS	12/21/2001	12/21/2001	10	11	-10.0%
Biofilter - Grass Strip	Yorba Linda C RVTS	12/16/2002	12/16/2002	15	14	6.7%
Biofilter - Grass Strip	Yorba Linda C RVTS	2/25/2003	2/25/2003	7.6	5.6	26.3%
Biofilter - Grass Strip	Yorba Linda C RVTS	3/15/2003	3/15/2003	14	6.4	54.3%
Biofilter - Grass Strip	Yorba Linda D RVTS	2/25/2003	2/25/2003	7.6	5.2	31.6%
Biofilter - Grass Strip	Yorba Linda D RVTS	3/15/2003	3/15/2003	14	6.2	55.7%
Biofilter - Grass Strip	Yorba Linda D RVTS	4/14/2003	4/14/2003	15	8.3	44.7%
Biofilter - Grass Swale	Bioswale Native East	2/16/1999	2/16/1999	8.17	4.94	39.5%
Biofilter - Grass Swale	Bioswale Native East	10/27/1999	10/27/1999	13.1	9.46	27.8%
Biofilter - Grass Swale	Bioswale Native East	2/22/2000	2/22/2000	6.05	5.64	6.8%
Biofilter - Grass Swale	Bioswale Native East	3/27/2000	3/27/2000	13.7	11	19.7%
Biofilter - Grass Swale	Bioswale Native East	6/10/2000	6/10/2000	7.93	7.79	1.8%
Biofilter - Grass Swale	Bioswale Non-Native West	2/16/1999	2/16/1999	8.17	5	38.8%
Biofilter - Grass Swale	Bioswale Non-Native West	10/27/1999	10/27/1999	12.1	9.24	23.6%
Biofilter - Grass Swale	Bioswale Non-Native West	2/22/2000	2/22/2000	6.05	5.63	6.9%
Biofilter - Grass Swale	Bioswale Non-Native West	3/27/2000	3/27/2000	13.7	11.5	16.1%
Biofilter - Grass Swale	Bioswale Non-Native West	6/10/2000	6/10/2000	7.93	7.89	0.5%
Biofilter - Grass Swale	Cerritos	2/20/2000	2/21/2000	4.1	4.1	0.0%
Biofilter - Grass Swale	Cerritos	2/27/2000	2/27/2000	17.8	15.6	12.4%
Biofilter - Grass Swale	Cerritos	3/8/2000	3/8/2000	11.1	11.7	-5.4%
Biofilter - Grass Swale	Dayton Biofilter - Grass Swale	4/3/1991	4/3/1991	9	3	66.7%
Biofilter - Grass Swale	Dayton Biofilter - Grass Swale	11/16/1991	11/16/1991	5	4	20.0%
Biofilter - Grass Swale	Dayton Biofilter - Grass Swale	11/19/1991	11/19/1991	4	3	25.0%
Biofilter - Grass Swale	Dayton Biofilter - Grass Swale	1/29/1992	1/29/1992	5	3	40.0%
Biofilter - Grass Swale	Dayton Biofilter - Grass Swale	11/1/1992	11/1/1992	7	7	0.0%
Biofilter - Grass Swale	Dayton Biofilter - Grass Swale	11/7/1992	11/7/1992	3	4	-33.3%
Biofilter - Grass Swale	Del Amo	3/8/2000	3/8/2000	9.4	8.5	9.6%
Biofilter - Grass Swale	Del Amo	4/17/2000	4/18/2000	18.9	17.2	9.0%
Biofilter - Grass Swale	Del Amo	10/27/2000	10/27/2000	16	15	6.3%
Biofilter - Grass Swale	Del Amo	1/12/2001	1/12/2001	8.9	9	-1.1%
Biofilter - Grass Swale	East Swale	2/16/1999	2/16/1999	11.1	4.94	55.5%
Biofilter - Grass Swale	East Swale	4/19/1999	4/19/1999	18.6	19.7	-5.9%
Biofilter - Grass Swale	East Swale	10/27/1999	10/27/1999	14.2	9.46	33.4%
Biofilter - Grass Swale	East Swale	2/22/2000	2/22/2000	6.05	5.64	6.8%
Biofilter - Grass Swale	East Swale	3/27/2000	3/27/2000	13.7	11	19.7%
Biofilter - Grass Swale	East Swale	6/10/2000	6/10/2000	7.93	7.79	1.8%
Biofilter - Grass Swale	East Swale	3/15/2001	3/15/2001	8.2	7.73	5.7%
Biofilter - Grass Swale	East Swale	4/30/2001	4/30/2001	6.92	6.74	2.6%
Biofilter - Grass Swale	East Swale	11/13/2001	11/13/2001	5.49	8.2	-49.4%

BMP Type	Test Site Name	Inflow Samping Date	Outflow Samping Date	Influent Dissolved Copper Concentration (µg/L)	Effluent Dissolved Copper Concentration (µg/L)	Method #1 Removal
Biofilter - Grass Swale	I-5/I-605 swale	2/20/2000	2/20/2000	3.1	1.3	58.1%
Biofilter - Grass Swale	I-5/I-605 swale	2/27/2000	2/27/2000	12.2	9.3	23.8%
Biofilter - Grass Swale	I-5/I-605 swale	3/8/2000	3/8/2000	13.4	9.5	29.1%
Biofilter - Grass Swale	I-5/I-605 swale	4/18/2000	4/18/2000	17.1	15	12.3%
Biofilter - Grass Swale	I-5/I-605 swale	10/27/2000	10/27/2000	15	9.9	34.0%
Biofilter - Grass Swale	I-5/I-605 swale	1/12/2001	1/12/2001	6.5	12	-84.6%
Biofilter - Grass Swale	I-605/SR-91 swale	3/8/2000	3/8/2000	10.8	11.5	-6.5%
Biofilter - Grass Swale	I-605/SR-91 swale	4/17/2000	4/17/2000	19	16	15.8%
Biofilter - Grass Swale	I-605/SR-91 swale	10/27/2000	10/27/2000	16	18	-12.5%
Biofilter - Grass Swale	I-605/SR-91 swale	1/10/2001	1/10/2001	7.4	17	-129.7%
Biofilter - Grass Swale	Melrose	1/10/2001	1/10/2001	11	7.4	32.7%
Biofilter - Grass Swale	Melrose	1/26/2001	1/26/2001	11	4.3	60.9%
Biofilter - Grass Swale	Melrose	2/12/2001	2/12/2001	10	4.5	55.0%
Biofilter - Grass Swale	Melrose	2/23/2001	2/23/2001	8.6	3.6	58.1%
Biofilter - Grass Swale	Melrose	4/7/2001	4/7/2001	18	6.7	62.8%
Biofilter - Grass Swale	Palomar Swale	2/20/2000	2/20/2000	7.2	9.7	-34.7%
Biofilter - Grass Swale	Palomar Swale	3/5/2000	3/5/2000	8.6	5.1	40.7%
Biofilter - Grass Swale	Palomar Swale	4/17/2000	4/17/2000	19	11	42.1%
Biofilter - Grass Swale	Palomar Swale	1/26/2001	1/26/2001	11	9.6	12.7%
Biofilter - Grass Swale	Palomar Swale	2/12/2001	2/12/2001	7.3	5.9	19.2%
Biofilter - Grass Swale	Palomar Swale	2/23/2001	2/23/2001	13	13	0.0%
Biofilter - Grass Swale	Palomar Swale	3/6/2001	3/6/2001	7.3	7.3	0.0%
Biofilter - Grass Swale	Palomar Swale	4/21/2001	4/21/2001	15	13	13.3%
Biofilter - Grass Swale	Russell Pond Bioswale	11/15/2001	11/15/2001	3.11	3.15	-1.3%
Biofilter - Grass Swale	Russell Pond Bioswale	4/13/2002	4/13/2002	3.3	5.15	-56.1%
Biofilter - Grass Swale	WA Bioswale at SR 405 MP 26.07	12/5/2003	12/5/2003	4.8	4.8	0.0%
Biofilter - Grass Swale	WA Bioswale at SR 405 MP 26.07	12/20/2003	12/20/2003	5.9	5.9	0.0%
Biofilter - Grass Swale	WA Bioswale at SR 405 MP 26.07	1/15/2004	1/15/2004	5.1	5.1	0.0%
Biofilter - Grass Swale	WA Bioswale at SR 405 MP 26.07	1/26/2004	1/26/2004	5.8	5.8	0.0%
Biofilter - Grass Swale	WA Bioswale at SR 405 MP 26.07	1/30/2004	1/30/2004	4.3	4.3	0.0%
Biofilter - Grass Swale	WA Bioswale at SR 405 MP 26.07	2/9/2004	2/9/2004	6.3	6.3	0.0%
Biofilter - Grass Swale	WA Bioswale at SR 405 MP 26.07	2/16/2004	2/16/2004	5.2	5.2	0.0%
Biofilter - Grass Swale	WA Bioswale at SR 405 MP 26.07	2/17/2004	2/17/2004	4.9	4.9	0.0%
Biofilter - Grass Swale	WA Bioswale at SR 405 MP 26.07	2/27/2004	2/27/2004	5.5	5.5	0.0%
Biofilter - Grass Swale	WA Bioswale at SR 405 MP 26.07	3/4/2004	3/4/2004	6.2	6.2	0.0%
Biofilter - Grass Swale	WA Unimproved Ditch at SR 405 MP 27.76	11/30/2004	11/30/2004	8.6	8.5	1.2%
Biofilter - Grass Swale	WA Unimproved Ditch at SR 405 MP 27.76	12/6/2004	12/6/2004	5.7	6.6	-15.8%
Biofilter - Grass Swale	WA Unimproved Ditch at SR 405 MP 27.76	12/9/2004	12/9/2004	5.9	6	-1.7%
Biofilter - Grass Swale	WA Unimproved Ditch at SR 405 MP 27.76	12/10/2004	12/10/2004	8.3	4.6	44.6%
Biofilter - Grass Swale	WA Unimproved Ditch at SR 405 MP 27.76	12/30/2004	12/30/2004	14	3.3	76.4%
Biofilter - Grass Swale	WA Unimproved Ditch at SR 525 MP 2.1	11/1/2004	11/2/2004	5.5	6.3	-14.5%
Biofilter - Grass Swale	WA Unimproved Ditch at SR 525 MP 2.1	11/24/2004	11/24/2004	7.5	6	20.0%
Biofilter - Grass Swale	WA Unimproved Ditch at SR 525 MP 2.1	12/21/2004	12/21/2004	4.6	4.6	0.0%
Biofilter - Grass Swale	WA Unimproved Ditch at SR 525 MP 2.1	12/30/2004	12/30/2004	3.2	2.3	28.1%
Biofilter - Grass Swale	WA Unimproved Ditch at SR 525 MP 2.1	3/28/2005	3/28/2005	12	4.5	62.5%
Biofilter - Grass Swale	West Swale	2/16/1999	2/16/1999	11.1	5	55.0%

BMP Type	Test Site Name	Inflow Samping Date	Outflow Samping Date	Influent Dissolved Copper Concentration (µg/L)	Effluent Dissolved Copper Concentration (µg/L)	Method #1 Removal
Biofilter - Grass Swale	West Swale	4/19/1999	4/19/1999	18.6	21.5	-15.6%
Biofilter - Grass Swale	West Swale	10/27/1999	10/27/1999	14.2	9.24	34.9%
Biofilter - Grass Swale	West Swale	2/22/2000	2/22/2000	6.05	5.63	6.9%
Biofilter - Grass Swale	West Swale	3/27/2000	3/27/2000	13.7	11.5	16.1%
Biofilter - Grass Swale	West Swale	6/10/2000	6/10/2000	7.93	7.89	0.5%
Biofilter - Grass Swale	West Swale	3/15/2001	3/15/2001	8.2	7.66	6.6%
Biofilter - Grass Swale	West Swale	4/30/2001	4/30/2001	6.92	6.63	4.2%
Biofilter - Grass Swale	West Swale	11/13/2001	11/13/2001	5.49	5.68	-3.5%
Filter - Peat Mixed With Sand	Lakewood P&R	2/27/2000	2/27/2000	5.37	3	44.1%
Filter - Peat Mixed With Sand	Lakewood P&R	4/17/2000	4/19/2000	18	5.5	69.4%
Filter - Peat Mixed With Sand	Lakewood P&R	1/10/2001	1/10/2001	5.5	10	-81.8%
Filter - Peat Mixed With Sand	Lakewood P&R	1/24/2001	1/25/2001	9.4	6.2	34.0%
Filter - Peat Mixed With Sand	Lakewood P&R	2/10/2001	2/12/2001	4.8	4.1	14.6%
Filter - Peat Mixed With Sand	Via Verde P&R	4/17/2000	4/17/2000	3.6	4.6	-27.8%
Filter - Peat Mixed With Sand	Via Verde P&R	10/27/2000	10/27/2000	6.9	13	-88.4%
Filter - Peat Mixed With Sand	Via Verde P&R	4/7/2001	4/7/2001	3	3.1	-3.3%
Filter - Peat Mixed With Sand	Via Verde P&R	4/21/2001	4/21/2001	6	1.7	71.7%
Filter - Sand	Eastern SF	4/6/1999	4/6/1999	10	7.8	22.0%
Filter - Sand	Eastern SF	2/20/2000	2/20/2000	5	3.74	25.2%
Filter - Sand	Eastern SF	2/27/2000	2/27/2000	8.02	7.51	6.4%
Filter - Sand	Eastern SF	4/17/2000	4/17/2000	7.3	6.9	5.5%
Filter - Sand	Eastern SF	1/12/2001	1/12/2001	4.8	4.7	2.1%
Filter - Sand	Eastern SF	1/25/2001	1/25/2001	17	19	-11.8%
Filter - Sand	Eastern SF	2/14/2001	2/14/2001	5.4	3.6	33.3%
Filter - Sand	Eastern SF	3/6/2001	3/6/2001	6.2	6.6	-6.5%
Filter - Sand	Eastern SF	4/7/2001	4/7/2001	5	6.3	-26.0%
Filter - Sand	Escondido	3/25/1999	3/25/1999	17	10	41.2%
Filter - Sand	Escondido	4/6/1999	4/7/1999	5.7	4.9	14.0%
Filter - Sand	Escondido	4/11/1999	4/11/1999	4.1	3.2	22.0%
Filter - Sand	Escondido	2/16/2000	2/16/2000	3.5	3	14.3%
Filter - Sand	Escondido	4/17/2000	4/17/2000	5.5	7	-27.3%
Filter - Sand	Escondido	10/29/2000	10/29/2000	8.5	4.6	45.9%
Filter - Sand	Escondido	1/26/2001	1/26/2001	10	2	80.0%
Filter - Sand	Escondido	2/10/2001	2/10/2001	7.9	4	49.4%
Filter - Sand	Escondido	2/25/2001	2/25/2001	2.9	1.9	34.5%
Filter - Sand	Escondido	3/6/2001	3/6/2001	3.7	2	45.9%
Filter - Sand	Escondido	4/7/2001	4/7/2001	7.6	5.6	26.3%
Filter - Sand	Escondido	4/21/2001	4/21/2001	9.1	4.6	49.5%
Filter - Sand	Foothill SF	4/6/1999	4/6/1999	19	14	26.3%
Filter - Sand	Foothill SF	2/20/2000	2/20/2000	5.36	4.15	22.6%
Filter - Sand	Foothill SF	2/27/2000	2/27/2000	4.49	5.52	-22.9%
Filter - Sand	Foothill SF	3/8/2000	3/8/2000	18	7	61.1%
Filter - Sand	Foothill SF	4/17/2000	4/17/2000	6.8	7.3	-7.4%
Filter - Sand	Foothill SF	10/27/2000	10/27/2000	14	30	-114.3%
Filter - Sand	Foothill SF	1/25/2001	1/25/2001	9.2	11	-19.6%
Filter - Sand	Foothill SF	2/10/2001	2/10/2001	8.8	12	-36.4%

BMP Type	Test Site Name	Inflow Samping Date	Outflow Samping Date	Influent Dissolved Copper Concentration (µg/L)	Effluent Dissolved Copper Concentration (µg/L)	Method #1 Removal
Filter - Sand	Foothill SF	3/6/2001	3/6/2001	4	5.8	-45.0%
Filter - Sand	Foothill SF	4/7/2001	4/7/2001	6.6	8.8	-33.3%
Filter - Sand	Foothill SF	4/21/2001	4/21/2001	5.6	7.8	-39.3%
Filter - Sand	I-5/I-78 P&R	3/25/1999	3/25/1999	8.2	8.2	0.0%
Filter - Sand	I-5/I-78 P&R	4/11/1999	4/11/1999	3	4	-33.3%
Filter - Sand	I-5/I-78 P&R	2/16/2000	2/16/2000	12	10	16.7%
Filter - Sand	I-5/I-78 P&R	2/20/2000	2/20/2000	5.9	4	32.2%
Filter - Sand	I-5/I-78 P&R	3/8/2000	3/8/2000	5.2	5	3.8%
Filter - Sand	I-5/I-78 P&R	4/17/2000	4/17/2000	18	20	-11.1%
Filter - Sand	I-5/I-78 P&R	10/26/2000	10/26/2000	16	13	18.8%
Filter - Sand	I-5/I-78 P&R	10/29/2000	10/29/2000	4.6	4.8	-4.3%
Filter - Sand	I-5/I-78 P&R	1/10/2001	1/10/2001	3.6	11	-205.6%
Filter - Sand	I-5/I-78 P&R	1/26/2001	1/26/2001	4.7	3.5	25.5%
Filter - Sand	I-5/I-78 P&R	2/10/2001	2/10/2001	7.3	5.9	19.2%
Filter - Sand	I-5/I-78 P&R	2/23/2001	2/23/2001	3.1	3.4	-9.7%
Filter - Sand	I-5/I-78 P&R	3/6/2001	3/6/2001	11	4.6	58.2%
Filter - Sand	I-5/I-78 P&R	4/7/2001	4/7/2001	12	12	0.0%
Filter - Sand	I-5/I-78 P&R	4/21/2001	4/21/2001	12	10	16.7%
Filter - Sand	La Costa P&R	3/25/1999	3/25/1999	9.7	8.6	11.3%
Filter - Sand	La Costa P&R	4/6/1999	4/7/1999	5.7	4	29.8%
Filter - Sand	La Costa P&R	4/11/1999	4/11/1999	3.5	4.1	-17.1%
Filter - Sand	La Costa P&R	2/16/2000	2/16/2000	9.3	6.5	30.1%
Filter - Sand	La Costa P&R	2/20/2000	2/20/2000	3.8	2.4	36.8%
Filter - Sand	La Costa P&R	4/17/2000	4/17/2000	8.4	10	-19.0%
Filter - Sand	La Costa P&R	10/26/2000	10/26/2000	8.4	6.9	17.9%
Filter - Sand	La Costa P&R	1/8/2001	1/8/2001	18	15	16.7%
Filter - Sand	La Costa P&R	1/10/2001	1/10/2001	3.6	3.2	11.1%
Filter - Sand	La Costa P&R	2/23/2001	2/23/2001	3.2	2.7	15.6%
Filter - Sand	La Costa P&R	3/6/2001	3/6/2001	3	2.6	13.3%
Filter - Sand	La Costa P&R	4/7/2001	4/7/2001	9.2	9.5	-3.3%
Filter - Sand	La Costa P&R	4/21/2001	4/21/2001	18	8.8	51.1%
Filter - Sand	Lakewood Sand Filter	5/16/1995	5/16/1995	11	7	36.4%
Filter - Sand	Lakewood Sand Filter	5/31/1995	5/31/1995	11	9	18.2%
Filter - Sand	Lakewood Sand Filter	6/4/1995	6/4/1995	6	9	-50.0%
Filter - Sand	Lakewood Sand Filter	5/23/1995	5/23/1995	14	18	-28.6%
Filter - Sand	Lakewood Sand Filter	6/2/1995	6/2/1995	14	9	35.7%
Filter - Sand	Lakewood Sand Filter	8/11/1995	8/11/1995	8	1	87.5%
Filter - Sand	Parkrose Sand Filter	6/11/2001	6/11/2001	4.94	4.19	15.2%
Filter - Sand	Parkrose Sand Filter	4/9/2002	4/9/2002	8.36	2.73	67.3%
Filter - Sand	Parkrose Sand Filter	6/17/2002	6/17/2002	7.53	8.63	-14.6%
Filter - Sand	Parkrose Sand Filter	11/7/2002	11/7/2002	12.2	3.5	71.3%
Filter - Sand	Termination	2/20/2000	2/20/2000	3.94	3.56	9.6%
Filter - Sand	Termination	2/27/2000	2/27/2000	6.9	6.33	8.3%
Filter - Sand	Termination	4/17/2000	4/17/2000	16	13	18.8%
Filter - Sand	Termination	10/27/2000	10/27/2000	7.4	22	-197.3%
Filter - Sand	Termination	1/24/2001	1/24/2001	14	10	28.6%

BMP Type	Test Site Name	Inflow Samping Date	Outflow Samping Date	Influent Dissolved Copper Concentration (µg/L)	Effluent Dissolved Copper Concentration (µg/L)	Method #1 Removal
Filter - Sand	Termination	2/11/2001	2/11/2001	9.2	9.1	1.1%
Filter - Sand	Termination	3/7/2001	3/7/2001	4.5	6.6	-46.7%
Filter - Sand	Termination	4/7/2001	4/7/2001	14	12	14.3%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	DeBary Detention with Filtration Pond	6/14/1992	6/15/1992	6	4	33.3%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	DeBary Detention with Filtration Pond	7/15/1992	7/16/1992	8	8	0.0%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	DeBary Detention with Filtration Pond	7/19/1992	7/20/1992	7	4	42.9%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	DeBary Detention with Filtration Pond	8/13/1992	8/13/1992	8	5	37.5%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	DeBary Detention with Filtration Pond	8/19/1992	8/19/1992	8	5	37.5%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	DeBary Detention with Filtration Pond	9/1/1992	9/1/1992	8	4	50.0%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	DeBary Detention with Filtration Pond	9/4/1992	9/4/1992	8	8	0.0%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	DeBary Detention with Filtration Pond	9/15/1992	9/15/1992	9	6	33.3%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	DeBary Detention with Filtration Pond	9/23/1992	9/24/1992	11	10	9.1%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	DeBary Detention with Filtration Pond	9/28/1992	9/28/1992	7	6	14.3%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	DeBary Detention with Filtration Pond	10/2/1992	10/3/1992	7	5	28.6%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	DeBary Detention with Filtration Pond	11/5/1992	11/6/1992	9	3	66.7%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	DeBary Detention with Filtration Pond	11/24/1992	11/25/1992	6	4	33.3%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	La Costa WB	2/20/2000	2/20/2000	11	12	-9.1%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	La Costa WB	3/5/2000	3/5/2000	8	12	-50.0%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	La Costa WB	4/17/2000	4/17/2000	17	27	-58.8%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	La Costa WB	1/10/2001	1/10/2001	14	4.6	67.1%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	La Costa WB	2/12/2001	2/12/2001	6.5	11	-69.2%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	La Costa WB	2/25/2001	2/25/2001	8.4	5.7	32.1%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	La Costa WB	3/6/2001	3/6/2001	7.5	2.2	70.7%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	La Costa WB	4/20/2001	4/21/2001	20	2.8	86.0%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Shop Creek Pond	6/19/1994	6/19/1994	5	5	0.0%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Shop Creek Pond	6/22/1994	6/22/1994	5	4	20.0%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Shop Creek Pond	7/19/1994	7/19/1994	5	9	-80.0%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Shop Creek Pond	8/8/1994	8/8/1994	5	3	40.0%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Shop Creek Pond	8/10/1994	8/10/1994	8	8	0.0%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Shop Creek Pond	5/16/1995	5/16/1995	3	3	0.0%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Shop Creek Pond	6/13/1995	6/13/1995	6	3	50.0%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Shop Creek Pond	7/13/1995	7/13/1995	9	5	44.4%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Shop Creek Pond	8/18/1995	8/18/1995	7	4	42.9%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Shop Creek Pond	9/20/1995	9/20/1995	3	3	0.0%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Shop Creek Pond	9/29/1995	9/29/1995	7	2	71.4%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Shop Creek Pond	5/25/1996	5/25/1996	12	9	25.0%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Shop Creek Pond	6/15/1996	6/15/1996	7	7	0.0%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Shop Creek Pond	6/22/1996	6/22/1996	5	4	20.0%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Shop Creek Pond	8/7/1996	8/7/1996	7	3	57.1%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Shop Creek Pond	8/23/1996	8/23/1996	9	8	11.1%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Shop Creek Pond	9/11/1996	9/11/1996	4	6	-50.0%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	WA Wet Pond at SR 5 MP 96.05 (Maytown)	11/17/2003	11/17/2003	3.6	4.7	-30.6%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	WA Wet Pond at SR 5 MP 96.05 (Maytown)	11/25/2003	11/25/2003	3.9	3.6	7.7%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	WA Wet Pond at SR 5 MP 96.05 (Maytown)	11/28/2003	11/28/2003	4.2	3.4	19.0%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	WA Wet Pond at SR 5 MP 96.05 (Maytown)	12/5/2003	12/5/2003	3.5	2.7	22.9%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	WA Wet Pond at SR 5 MP 96.05 (Maytown)	1/23/2004	1/23/2004	5	3.8	24.0%

BMP Type	Test Site Name	Inflow Samping Date	Outflow Samping Date	Influent Dissolved Copper Concentration (µg/L)	Effluent Dissolved Copper Concentration (µg/L)	Method #1 Removal
Retention Pond (Wet) - Surface Pond With a Permanent Pool	WA Wet Pond at SR 5 MP 96.05 (Maytown)	1/28/2004	1/28/2004	3.5	3.2	8.6%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	WA Wet Pond at SR 5 MP 96.05 (Maytown)	12/9/2004	12/9/2004	3.8	3.8	0.0%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	WA Wet Pond at SR 525 MP 3.31	11/1/2004	11/2/2004	5.5	1.6	70.9%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	WA Wet Pond at SR 525 MP 3.31	11/16/2004	11/16/2004	7.2	0.5	93.1%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	WA Wet Pond at SR 525 MP 3.31	11/18/2004	11/18/2004	3.9	1.1	71.8%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	WA Wet Pond at SR 525 MP 3.31	11/24/2004	11/24/2004	7.5	1.5	80.0%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	WA Wet Pond at SR 525 MP 3.31	12/6/2004	12/6/2004	6.7	1.3	80.6%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	WA Wet Pond at SR 525 MP 3.31	12/21/2004	12/21/2004	4.6	1.4	69.6%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	WA Wet Pond at SR 525 MP 3.31	12/30/2004	12/30/2004	3.2	0.5	84.4%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	WA Wet Pond at SR 525 MP 3.31	2/4/2005	2/4/2005	6.8	1.2	82.4%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	WA Wet Pond at SR 525 MP 3.31	3/17/2005	3/17/2005	13	0.5	96.2%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	WA Wet Pond at SR 525 MP 3.31	3/28/2005	3/28/2005	12	2.8	76.7%
Retention Pond (Wet) - Surface Pond With a Permanent Pool	WA Wet Pond at SR 525 MP 3.31	4/8/2005	4/8/2005	6.9	2.1	69.6%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	5/13/1995	5/13/1995	19	22	-15.8%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	5/16/1995	5/16/1995	9	11	-22.2%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	5/23/1995	5/23/1995	8	14	-75.0%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	5/31/1995	5/31/1995	7	11	-57.1%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	6/2/1995	6/2/1995	5	14	-180.0%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	6/4/1995	6/4/1995	6	6	0.0%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	7/13/1995	7/13/1995	13	9	30.8%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	8/11/1995	8/11/1995	16	8	50.0%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	9/14/1995	9/14/1995	20	30	-50.0%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	6/16/1996	6/16/1996	16	13	18.8%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	6/28/1996	6/28/1996	15	11	26.7%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	7/9/1996	7/9/1996	19	8	57.9%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	8/23/1996	8/23/1996	14	12	14.3%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	5/22/1997	5/22/1997	12	4	66.7%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	7/28/1997	7/28/1997	13	8	38.5%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	7/29/1997	7/29/1997	3	3	0.0%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	8/2/1997	8/2/1997	14	4	71.4%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	5/24/1998	5/24/1998	8	11	-37.5%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	6/5/1998	6/5/1998	12	10	16.7%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	6/15/1998	6/15/1998	20	7	65.0%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	7/9/1998	7/9/1998	12	4	66.7%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	7/22/1998	7/22/1998	11	6	45.5%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	7/25/1998	7/25/1998	4	3	25.0%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	7/30/1998	7/30/1998	8	4	50.0%
Retention Underground Vault or Pipes (Wet)	Lakewood RP	8/10/1998	8/10/1998	5	4	20.0%
Retention Underground Vault or Pipes (Wet)	WA Closed Wet Vault at SR 405 MP 26.10	12/16/2003	12/16/2003	3.2	3.8	-18.8%
Retention Underground Vault or Pipes (Wet)	WA Closed Wet Vault at SR 405 MP 26.10	1/8/2004	1/8/2004	3.8	3.7	2.6%
Retention Underground Vault or Pipes (Wet)	WA Closed Wet Vault at SR 405 MP 26.10	1/15/2004	1/15/2004	3.5	2.8	20.0%
Retention Underground Vault or Pipes (Wet)	WA Closed Wet Vault at SR 405 MP 26.10	1/26/2004	1/26/2004	4.4	5	-13.6%

Table I-3. Biofilter site information in the International Stormwater Best Management Practices Database.

BMP Type	Test Site Name	Grass Strip's Length	Units	Longitudinal Slope	Grass Species and Densities	Is Strip Irrigated?	Soil Group
Biofilter - Grass Strip	Altadena Strip	7.9	m	0.03	Distichlis spicata	No	
Biofilter - Grass Strip	Carlsbad strip	7.9	m	0.01	Distichlis spicata	No	
Biofilter - Grass Strip	Cottonwood RVTS	9.3	m	0.52	Italian Rye & Brome & Native Grasses	No	C
Biofilter - Grass Strip	I-605/SR-91 strip	7.9	m	0.02	Distichlis spicata	No	
Biofilter - Grass Strip	Irvine A RVTS	3	m	0.11	Italian Rye & Brome & Native Grasses	No	B
Biofilter - Grass Strip	Irvine B RVTS	6	m	0.11	Italian Rye & Brome & Native Grasses	No	B
Biofilter - Grass Strip	Irvine C RVTS	13	m	0.11	Italian Rye & Brome & Native Grasses	No	B
Biofilter - Grass Strip	Moreno Valley A RVTS	2.6	m	0.13	Italian Rye & Brome & Native Grasses	No	C
Biofilter - Grass Strip	Moreno Valley B RVTS	4.9	m	0.13	Italian Rye & Brome & Native Grasses	No	C
Biofilter - Grass Strip	Moreno Valley C RVTS	8	m	0.13	Italian Rye & Brome & Native Grasses	No	C
Biofilter - Grass Strip	Moreno Valley D RVTS	9.9	m	0.13	Italian Rye & Brome & Native Grasses	No	C
Biofilter - Grass Strip	Redding A RVTS	2.2	m	0.1	Italian Rye & Brome & Native Grasses	No	C
Biofilter - Grass Strip	Redding B RVTS	4.2	m	0.1	Italian Rye & Brome & Native Grasses	No	C
Biofilter - Grass Strip	Redding C RVTS	6.2	m	0.1	Italian Rye & Brome & Native Grasses	No	C
Biofilter - Grass Strip	Sacramento A RVTS	1.1	m	0.05	Italian Rye & Brome & Native Grasses	No	D
Biofilter - Grass Strip	Sacramento B RVTS	4.6	m	0.33	Italian Rye & Brome & Native Grasses	No	D
Biofilter - Grass Strip	Sacramento C RVTS	6.6	m	0.33	Italian Rye & Brome & Native Grasses	No	D
Biofilter - Grass Strip	Sacramento D RVTS	8.4	m	0.33	Italian Rye & Brome & Native Grasses	No	D
Biofilter - Grass Strip	San Onofre A RVTS	1.3	m	0.08	Italian Rye & Brome & Native Grasses	No	C
Biofilter - Grass Strip	San Onofre B RVTS	5.3	m	0.1	Italian Rye & Brome & Native Grasses	No	C
Biofilter - Grass Strip	San Onofre C RVTS	9.9	m	0.16	Italian Rye & Brome & Native Grasses	No	C
Biofilter - Grass Strip	San Rafael RVTS	8.3	m	0.5	Italian Rye & Brome & Native Grasses	No	C
Biofilter - Grass Strip	Yorba Linda A RVTS	2.3	m	0.14	Italian Rye & Brome & Native Grasses	No	B
Biofilter - Grass Strip	Yorba Linda B RVTS	5.4	m	0.14	Italian Rye & Brome & Native Grasses	No	B
Biofilter - Grass Strip	Yorba Linda C RVTS	7.6	m	0.14	Italian Rye & Brome & Native Grasses	No	B
Biofilter - Grass Strip	Yorba Linda D RVTS	13	m	0.14	Italian Rye & Brome & Native Grasses	No	B
Biofilter - Grass Swale	Bioswale Native East	30.5	m	0.0023	East (native) Swale Vegetation Hobbs & Hopkins Pro-Time 840 Native Bio-Filter Mix plus 20% Regreen were used for vegetation giving Blue Wildrye 47% Native Red Fescue 40% Tufted Hairgrass 10% Western Mannagrass 2% American Sloughgrass 1%	No	
Biofilter - Grass Swale	Bioswale Non-Native West	30.5	m	0.0023	Westen (non-native) Swale Vegetation Hobbs & Hopkins Pro-Time 835 Bio-Filter Mix giving Elka Perennial Rye Grass 60% Eureka Hard Fescue 15% Yarrow Millefolium 8% Dutch White Clover 7% Sweet Alyssum 3% Shamrock 3% Salinas Strawberry Clover	No	
Biofilter - Grass Swale	Cerritos	20.1	m	0.021	Distichlis spicata	No	

BMP Type	Test Site Name	Grass Strip's Length	Units	Longitudinal Slope	Grass Species and Densities	Is Strip Irrigated?	Soil Group
Biofilter - Grass Swale	Dayton Biofilter - Grass Swale	173.7	m	0.01	Initially seeded with fescue and clover the swale had to be re-seeded in June of 1990 because of bare spots and the predominance of the clover. The final seed mix was Westside Pro Mix by Chas. H. Lily Co. which consisted of 50% Perennial Ryes, 25 % chewin	No	
Biofilter - Grass Swale	Del Amo	53.9	m	0.02	Distichlis spicata	No	
Biofilter - Grass Swale	East Swale	48.8	m	0.0023	Blue Wildrye 47%, Native Red Fescue 40%, Tufted Hairgrass 10%, Western Mannagrass 2%, American Sloughgrass 1%	No	
Biofilter - Grass Swale	EPCOT Swale	167.6	m	0.003	Bahia, high grasses 2-4 inches	No	
Biofilter - Grass Swale	I-5/I-605 swale	39.9	m	0.02	Distichlis spicata	No	
Biofilter - Grass Swale	I-605/SR-91 swale	39.9	m	0.02	Distichlis spicata	No	
Biofilter - Grass Swale	Melrose	105.8	m	0.008	Distichlis spicata	No	
Biofilter - Grass Swale	Palomar Swale	141.7	m	0.0014	Distichlis spicata	No	
Biofilter - Grass Swale	Russell Pond Bioswale	64.0	m	0.22	Natural grasses	No	
Biofilter - Grass Swale	West Swale	48.8	m	0.0023	Elka Perennial Rye Grass 60%, Eureka Hard Fescue 15%, Yarrow Millefolium 8&, Dutch white Clover 7%, Sweet Alyssum 3%, Shamrock 3%, Salinas Strawberry Clover 4%	No	

Filter - Sand	Escondido	12.18	m^3	0.00270	ha	24.99	m	12.18	m^3	0.0
Filter - Sand	Foothill SF	216.62	m^3	0.01020	ha	12.50	m	12.20	m^3	0.0
Filter - Sand	I-5/I-78 P&R	105.62	m^3	0.00560	ha	7.92	m	8.52	m^3	0.0
Filter - Sand	La Costa P&R	285.72	m^3	0.01800	ha	14.94	m	20.47	m^3	0.0
Filter - Sand	Lakewood Sand Filter	9.17	m^3	0.00151	ha	8.23	m	18.69	m^3	0.0
Filter - Sand	Parkrose SF	0.00	m^3	0.00000	ha	0.00	m	8.85	m^3	0.0
Filter - Sand	Termination	222.29	m^3	0.01140	ha	11.89	m	17.39	m^3	0.0

Filter - Sand	Escondido	72	0.00270	ha		2	12 in. sand; geotextile layer; 6 in.
Filter - Sand	Foothill SF	72	0.00400	ha		2	18 in. sand; geotextile layer; 6 in. g
Filter - Sand	I-5/I-78 P&R	72	0.00320	ha		2	18 in. sand; geotextile layer; 6 in. g
Filter - Sand	La Costa P&R	72	0.00720	ha		2	18 in. sand; geotextile layer; 6 in. g
Filter - Sand	Lakewood Sand Filter	6	0.00156	ha	0.45	2	12 inches of ASSHTO C-33 type sa 0.85mm) underlain by a 12 inch de layer that is drained by a perforated coefficient of uniformity is 5.0.
Filter - Sand	Parkrose SF	24	0.00145	ha	0	1	Sand - 2.8 ft deep
Filter - Sand	Termination	72	0.00570	ha		2	18 in. sand; geotextile layer; 6 in. g

With a Permanent Pool	Shop Creek Pond (90-94)	5649.37	m³	0.567	ha	179.2	m	0	ha		11311
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Shop Creek Pond (95-97)	5649.37	m³	0.567	ha	179.2	m	0.202	ha	Cattails, Bullrush	11311
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Silver Star Rd Detention Pond	1948.20	m³	0.0799	ha						
Retention Underground Vault or Pipes (Wet)	Lakewood RP (95)	9.85	m³	0.0016	ha	8.8	m	0	ha	none	19.82
Retention Underground Vault or Pipes (Wet)	Lakewood RP (96)	9.85	m³	0.0016	ha	8.8	m	0	ha	none	19.82
Retention Underground Vault or Pipes (Wet)	Lakewood RP (97-98)	17.13	m³	0.0048	ha			0	ha	none	18.92

Retention Pond (Wet) - Surface Pond With a Permanent Pool	Shop Creek Pond (90-94)	21	419.39	m^3	0.0405	ha	none	0	m^3	100
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Shop Creek Pond (95-97)	21	419.39	m^3	0.0405	ha	Cattails, Bullrush	0	m^3	100
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Silver Star Rd Detention Pond									
Retention Underground Vault or Pipes (Wet)	Lakewood RP (95)	0	0	m^3	0	ha	none	0	m^3	2yr
Retention Underground Vault or Pipes (Wet)	Lakewood RP (96)	0	0	m^3	0	ha	none	0	m^3	2yr
Retention Underground Vault or Pipes (Wet)	Lakewood RP (97-98)	0	0	m^3	0	ha	none	0	m^3	none

Biofilter - Grass Strip	Sacramento A RVTS	Sacramento A	0.38	ha								
Biofilter - Grass Strip	Sacramento B RVTS	Sacramento B	0.45	ha								
Biofilter - Grass Strip	Sacramento C RVTS	Sacramento C	0.50	ha								
Biofilter - Grass Strip	Sacramento D RVTS	Sacramento D	0.54	ha								
Biofilter - Grass Strip	San Onofre A RVTS	San Onofre A	0.56	ha								
Biofilter - Grass Strip	San Onofre B RVTS	San Onofre B	0.70	ha								
Biofilter - Grass Strip	San Onofre C RVTS	San Onofre C	0.84	ha								
Biofilter - Grass Strip	San Rafael RVTS	San Rafael	2.92	ha								
Biofilter - Grass Strip	Yorba Linda A RVTS	Yorba Linda A	1.08	ha								
Biofilter - Grass Strip	Yorba Linda B RVTS	Yorba Linda B	1.16	ha								
Biofilter - Grass Strip	Yorba Linda C RVTS	Yorba Linda C	1.09	ha								
Biofilter - Grass Strip	Yorba Linda D RVTS	Yorba Linda D	1.84	ha								
Biofilter - Grass Swale	Bioswale Native East	City of Portland BES East Test	20.24	ha	640.08	m	36.58	m	0	ha	10	5
Biofilter - Grass Swale	Bioswale Non-Native West	City of Portland BES WestTest	20.24	ha	640.08	m	36.58	m	0	ha	10	5
Biofilter - Grass Swale	Cerritos	Cerritos	0.16	ha	100.00	m	39.99	m				9
Biofilter - Grass Swale	Dayton Biofilter - Grass Swale	Dayton Biofilter - Grass Swale	36.42	ha								2
Biofilter - Grass Swale	Del Amo	605/Del Amo	0.28	ha								9
Biofilter - Grass Swale	East Swale	St. Johns East	20.24	ha								
Biofilter - Grass Swale	EPCOT Swale	EPCOT Swale Watershed	0.00	ha								
Biofilter - Grass Swale	I-5/I-605 swale	I-5/I-605 swale	0.28	ha								9
Biofilter - Grass Swale	I-605/SR-91 swale	I-605/SR-91 swale	0.08	ha								9
Biofilter - Grass Swale	Melrose	Melrose	0.97	ha								9
Biofilter - Grass Swale	Palomar Swale	Palomar	1.86	ha			161.54	m			0	9
Biofilter - Grass Swale	Russell Pond Bioswale	Freemont-Russell Basin	22.66	ha			64.01	m				
Biofilter - Grass Swale	West Swale	St. Johns West	20.24	ha								
Filter - Other Media	Kearny Mesa	Kearny Mesa	0.61	ha								1
Filter - Other Media	StormFilter	Heritage Marketplace	1.62	ha	72.54	m						1
Filter - Peat Mixed With Sand	Lakewood P&R	Lakewood	0.77	ha								1
Filter - Peat Mixed With Sand	Via Verde P&R	Via Verde	0.45	ha								1
Filter - Sand	Eastern SF	Eastern	0.61	ha								9
Filter - Sand	Escondido	Escondido	0.32	ha								6
Filter - Sand	Foothill SF	Foothill (sand)	0.73	ha								1
Filter - Sand	I-5/I-78 P&R	5/78 SF	0.32	ha								9
Filter - Sand	La Costa PR	La Costa PR	1.13	ha								5
Filter - Sand	Lakewood Sand Filter (95)	RP SF Vault Watershed (95)	0.66	ha	125.88	m			0	ha	0	1
Filter - Sand	Parkrose SF	Parkrose Watershed	0.33	ha	57.61	m						8
Filter - Sand	Termination	Termination	1.13	ha								5
Retention Pond (Wet) - Surface Pond With a Permanent Pool	DeBary Detention with Filtration Pond	DeBary Detention Watershed	20.52	ha	1524	m	1829	m				5
Retention Pond (Wet) - Surface Pond With a Permanent Pool	La Costa WB	La Costa WB	1.70	ha								4
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Lake Ellyn	Laka Ellyn Watershed	216.10	ha								3
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Seattle METRO Retention Pond	Seattle METRO Detention Pond	6.07	ha								1
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Shop Creek Pond (90-94)	Shop Creek Watershed (90-94)	222.58	ha	3218	m						1
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Shop Creek Pond (95-97)	Shop Creek Watershed (95-97)	222.58	ha	3218	m						1
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Silver Star Rd Detention Pond	Silver Star Rd Det. Watershed	16.84	ha								
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Wet detention pond, Monroe St.	Westmorland	96.00	ha	1486	m			96	ha		3
Retention Underground Vault or Pipes (Wet)	Lakewood RP (95)	RP SF Vault Watershed (95)	0.66	ha	125.88	m			0	ha	0	1
Retention Underground Vault or Pipes (Wet)	Lakewood RP (96)	RP - MF Vault Watershed (96)	0.66	ha	125.88	m			0	ha	0	1
Retention Underground Vault or Pipes (Wet)	Lakewood RP (97-98)	RP Vault (97-98)	0.66	ha	125.88	m			0	ha	0	1

Biofilter - Grass Strip	Sacramento A RVTS								
Biofilter - Grass Strip	Sacramento B RVTS								
Biofilter - Grass Strip	Sacramento C RVTS								
Biofilter - Grass Strip	Sacramento D RVTS								
Biofilter - Grass Strip	San Onofre A RVTS								
Biofilter - Grass Strip	San Onofre B RVTS								
Biofilter - Grass Strip	San Onofre C RVTS								
Biofilter - Grass Strip	San Rafael RVTS								
Biofilter - Grass Strip	Yorba Linda A RVTS								
Biofilter - Grass Strip	Yorba Linda B RVTS								
Biofilter - Grass Strip	Yorba Linda C RVTS								
Biofilter - Grass Strip	Yorba Linda D RVTS								
Biofilter - Grass Swale	Bioswale Native East			vegetation in the drainage is primarily lawns, shrubs, and trees associated with residential landscaping	1.21	ha	0	m	
Biofilter - Grass Swale	Bioswale Non-Native West			vegetation in the drainage is primarily lawns, shrubs, and trees associated with residential landscaping	1.21	ha	0	m	
Biofilter - Grass Swale	Cerritos		A						
Biofilter - Grass Swale	Dayton Biofilter - Grass Swale				7.28	ha			100
Biofilter - Grass Swale	Del Amo								
Biofilter - Grass Swale	East Swale								
Biofilter - Grass Swale	EPCOT Swale			This study was conducted under controlled conditions. The events were simulated through a pumping of water to the top of the swale and spiking with typical pollutants, and thus did not have typical watershed characteristics.					
Biofilter - Grass Swale	I-5/I-605 swale								
Biofilter - Grass Swale	I-605/SR-91 swale								
Biofilter - Grass Swale	Melrose								
Biofilter - Grass Swale	Palomar Swale	A		Distichlis spicata	1.86	ha			100
Biofilter - Grass Swale	Russell Pond Bioswale								
Biofilter - Grass Swale	West Swale								
Filter - Other Media	Kearny Mesa								
Filter - Other Media	StormFilter								
Filter - Peat Mixed With Sand	Lakewood P&R								
Filter - Peat Mixed With Sand	Via Verde P&R		A						
Filter - Sand	Eastern SF		A						
Filter - Sand	Escondido								
Filter - Sand	Foothill SF								
Filter - Sand	I-5/I-78 P&R								
Filter - Sand	La Costa PR								
Filter - Sand	Lakewood Sand Filter (95)	D	A	NONE					
Filter - Sand	Parkrose SF			Grass and small trees					100
Filter - Sand	Termination								
Retention Pond (Wet) - Surface Pond With a Permanent Pool	DeBary Detention with Filtration Pond	A		Drainage Length was estimated by measuring the map of the area. Length of grass-lined and natural channels were approximated by measuring on enclosed map. Time of concentration for the watershed was given as 80 min.	12.63	ha			45
Retention Pond (Wet) - Surface Pond With a Permanent Pool	La Costa WB								
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Lake Ellyn			The main drainage area is 390 acres and includes downtown Glen Ellyn; inflow from this drainage area was gauged and sampled during the study. The Linden drainage area is 96 acres, and the Lake Road drainage area is 46 acres; both areas drain single-fami					
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Seattle METRO Retention Pond			The name of the drainage basin is West Tributary Receiving water is Kelsey Creek/Lake Washington Land use of the drainage area is identified as light industrial Percent of imperviousness is 90%.					
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Shop Creek Pond (90-94)								
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Shop Creek Pond (95-97)								
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Silver Star Rd Detention Pond			Large cypress trees grow in the slightly lower northern and eastern part of the wetlands. A heavy undergrowth of hyacinths, duckweed, cattails, and small trees occurs under the cypress stand. A thick, virtually impenetrable underbrush of wild grape, bla					
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Wet detention pond, Monroe St.		C	Grass and Trees	6.81	ha			0
Retention Underground Vault or Pipes (Wet)	Lakewood RP (95)	D	A	NONE					
Retention Underground Vault or Pipes (Wet)	Lakewood RP (96)	D	A	NONE					
Retention Underground Vault or Pipes (Wet)	Lakewood RP (97-98)	D	A	NONE					

Biofilter - Grass Strip	Sacramento A RVTS				
Biofilter - Grass Strip	Sacramento B RVTS				
Biofilter - Grass Strip	Sacramento C RVTS				
Biofilter - Grass Strip	Sacramento D RVTS				
Biofilter - Grass Strip	San Onofre A RVTS				
Biofilter - Grass Strip	San Onofre B RVTS				
Biofilter - Grass Strip	San Onofre C RVTS				
Biofilter - Grass Strip	San Rafael RVTS				
Biofilter - Grass Strip	Yorba Linda A RVTS				
Biofilter - Grass Strip	Yorba Linda B RVTS				
Biofilter - Grass Strip	Yorba Linda C RVTS				
Biofilter - Grass Strip	Yorba Linda D RVTS				
Biofilter - Grass Swale	Bioswale Native East				
Biofilter - Grass Swale	Bioswale Non-Native West				
Biofilter - Grass Swale	Cerritos				
Biofilter - Grass Swale	Dayton Biofilter - Grass Swale				
Biofilter - Grass Swale	Del Amo				
Biofilter - Grass Swale	East Swale				
Biofilter - Grass Swale	EPCOT Swale				
Biofilter - Grass Swale	I-5/I-605 swale				
Biofilter - Grass Swale	I-605/SR-91 swale				
Biofilter - Grass Swale	Melrose				
Biofilter - Grass Swale	Palomar Swale				
Biofilter - Grass Swale	Russell Pond Bioswale				
Biofilter - Grass Swale	West Swale				
Filter - Other Media	Kearny Mesa			A	
Filter - Other Media	StormFilter				
Filter - Peat Mixed With Sand	Lakewood P&R				
Filter - Peat Mixed With Sand	Via Verde P&R			A	
Filter - Sand	Eastern SF				
Filter - Sand	Escondido				
Filter - Sand	Foothill SF				
Filter - Sand	I-5/I-78 P&R				
Filter - Sand	La Costa PR				
Filter - Sand	Lakewood Sand Filter (95)	100	0	C	100
Filter - Sand	Parkrose SF				
Filter - Sand	Termination			A	
Retention Pond (Wet) - Surface Pond With a Permanent Pool	DeBary Detention with Filtration Pond				
Retention Pond (Wet) - Surface Pond With a Permanent Pool	La Costa WB				
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Lake Ellyn				
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Seattle METRO Retention Pond				
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Shop Creek Pond (90-94)				
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Shop Creek Pond (95-97)				
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Silver Star Rd Detention Pond				
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Wet detention pond, Monroe St.	0	0	A	0
Retention Underground Vault or Pipes (Wet)	Lakewood RP (95)	100	0	C	100
Retention Underground Vault or Pipes (Wet)	Lakewood RP (96)	100	0	C	100
Retention Underground Vault or Pipes (Wet)	Lakewood RP (97-98)	100	0	C	100

Table I-7. Land use information in the International Stormwater Best Management Practices Database.

BMP Type	Test Site Name	Land Use Description	% of Land Use in Watershed
Biofilter - Grass Strip	Altadena Strip	Maintenance Station	100
Biofilter - Grass Strip	Carlsbad strip	Maintenance Station	100
Biofilter - Grass Strip	Cottonwood RVTS	Forest	100
Biofilter - Grass Strip	I-605/SR-91 strip	Highway	100
Biofilter - Grass Strip	Irvine A RVTS	Forest	100
Biofilter - Grass Strip	Irvine B RVTS	Forest	100
Biofilter - Grass Strip	Irvine C RVTS	Forest	100
Biofilter - Grass Strip	Moreno Valley A RVTS	Forest	100
Biofilter - Grass Strip	Moreno Valley B RVTS	Forest	100
Biofilter - Grass Strip	Moreno Valley C RVTS	Forest	100
Biofilter - Grass Strip	Moreno Valley D RVTS	Forest	100
Biofilter - Grass Strip	Redding A RVTS	Forest	100
Biofilter - Grass Strip	Redding B RVTS	Forest	100
Biofilter - Grass Strip	Redding C RVTS	Forest	100
Biofilter - Grass Strip	Sacramento A RVTS	Forest	100
Biofilter - Grass Strip	Sacramento B RVTS	Forest	100
Biofilter - Grass Strip	Sacramento C RVTS	Forest	100
Biofilter - Grass Strip	Sacramento D RVTS	Forest	100
Biofilter - Grass Strip	San Onofre A RVTS	Forest	100
Biofilter - Grass Strip	San Onofre B RVTS	Forest	100
Biofilter - Grass Strip	San Onofre C RVTS	Forest	100
Biofilter - Grass Strip	Yorba Linda A RVTS	Forest	100
Biofilter - Grass Strip	Yorba Linda B RVTS	Forest	100
Biofilter - Grass Strip	Yorba Linda C RVTS	Forest	100
Biofilter - Grass Strip	Yorba Linda D RVTS	Forest	100
Biofilter - Grass Swale	Bioswale Native East	Open Space	10
Biofilter - Grass Swale	Bioswale Native East	Medium Density Residential	30
Biofilter - Grass Swale	Bioswale Native East	Light Industrial	15
Biofilter - Grass Swale	Bioswale Native East	Multi-Family Residential	25
Biofilter - Grass Swale	Bioswale Native East	Heavy Industrial	20
Biofilter - Grass Swale	Bioswale Non-Native West	Open Space	10
Biofilter - Grass Swale	Bioswale Non-Native West	Heavy Industrial	20
Biofilter - Grass Swale	Bioswale Non-Native West	Light Industrial	15
Biofilter - Grass Swale	Bioswale Non-Native West	Multi-Family Residential	25
Biofilter - Grass Swale	Bioswale Non-Native West	Medium Density Residential	30
Biofilter - Grass Swale	Cerritos	Maintenance Station	100
Biofilter - Grass Swale	Dayton Biofilter - Grass Swale	High Density Residential	100
Biofilter - Grass Swale	Del Amo	Highway	100
Biofilter - Grass Swale	East Swale	Unknown	100
Biofilter - Grass Swale	I-5/I-605 swale	Highway	100
Biofilter - Grass Swale	I-605/SR-91 swale	Highway	100
Biofilter - Grass Swale	Melrose	Highway	100
Biofilter - Grass Swale	Palomar Swale	Highway	100
Biofilter - Grass Swale	Russell Pond Bioswale	Unknown	100
Biofilter - Grass Swale	West Swale	Unknown	100
Filter - Other Media	Kearny Mesa	Maintenance Station	100
Filter - Other Media	StormFilter	Retail	100
Filter - Peat Mixed With Sand	Lakewood	Park & Ride	100
Filter - Peat Mixed With Sand	Via Verde	Park & Ride	100
Filter - Sand	Eastern SF	Maintenance Station	100
Filter - Sand	Escondido	Maintenance Station	100
Filter - Sand	Foothill SF	Maintenance Station	100
Filter - Sand	I-5/I-78 P&R	Park & Ride	100
Filter - Sand	La Costa PR	Park & Ride	100
Filter - Sand	Lakewood Sand Filter (95)	Light Industrial	100
Filter - Sand	Lakewood Sand Filter (95)	Light Industrial	100
Filter - Sand	Parkrose SF	Low Density Residential	100
Filter - Sand	Termination	Park & Ride	100
Retention Pond (Wet) - Surface Pond With a Permanent Pool	DeBary Detention with Filtration Pond	Office Commercial	50
Retention Pond (Wet) - Surface Pond With a Permanent Pool	DeBary Detention with Filtration Pond	Medium Density Residential	50
Retention Pond (Wet) - Surface Pond With a Permanent Pool	La Costa WB	Highway	100
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Lake Ellyn	Multi-Family Residential	3

BMP Type	Test Site Name	Land Use Description	% of Land Use in Watershed
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Lake Ellyn	Office Commercial	5
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Lake Ellyn	Retail	5
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Lake Ellyn	Medium Density Residential	80
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Lake Ellyn	Unknown	7
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Seattle METRO Retention Pond	Light Industrial	100
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Shop Creek Pond (90-94)	Multi-Family Residential	1
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Shop Creek Pond (90-94)	Low Density Residential	99
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Shop Creek Pond (95-97)	Low Density Residential	99
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Shop Creek Pond (95-97)	Multi-Family Residential	1
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Silver Star Rd Detention Pond	Unknown	60
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Silver Star Rd Detention Pond	Low Density Residential	13
Retention Pond (Wet) - Surface Pond With a Permanent Pool	Silver Star Rd Detention Pond	High Density Residential	27
Retention Underground Vault or Pipes (Wet)	Lakewood RP (95)	Light Industrial	100
Retention Underground Vault or Pipes (Wet)	Lakewood RP (95)	Light Industrial	100
Retention Underground Vault or Pipes (Wet)	Lakewood RP (96)	Light Industrial	100
Retention Underground Vault or Pipes (Wet)	Lakewood RP (96)	Light Industrial	100
Retention Underground Vault or Pipes (Wet)	Lakewood RP (97-98)	Light Industrial	100
Retention Underground Vault or Pipes (Wet)	Lakewood RP (97-98)	Light Industrial	100

APPENDIX J

Piezometer Water Quality Data Analysis Memorandum

The contents of this appendix will be provided separately.