

**Preliminary monitoring results for the Canyon Creek stormwater control facility.
DR-13-03, 2013**

City of Austin
Watershed Protection Department
Environmental Resource Management Division

Introduction

This report contains preliminary analytical results for the Canyon Creek stormwater control facility located in the Bull Creek Watershed (Figure 1). This facility contains both biofiltration and sand filtration components. More detailed analytical results are contained in the final report, “Stormwater Control Measures in Austin, TX: Data Report” (City of Austin 2013):

http://www.austintexas.gov/watershed_protection/publications/document.cfm?id=202219



Figure 1. Canyon Creek stormwater control measure drainage area.

Results

These monitoring results represent data collected between October 2008 and June 2010. During that time 16 valid event mean concentrations (EMCs) were collected at the influent (CCI), 21 at the effluent of the bio-filter chamber (CCN) and 19 at the effluent of the sand filter chamber (CCS). CCI-CCN had 15 paired EMCs, CCI-CCS had 14, and CCN-CCS had 17. The original sampling goal was 30 paired EMCs.

There was a reduction in both total suspended solids (TSS) and volatile suspended solids (VSS) for both chambers. The EMCs of the effluent for TSS and VSS between the two chambers were similar.

There was a reduction in total cadmium (Cd) concentrations with the bio-filter if a paired test was used but not otherwise. Note the International BMP Database Project does not use paired analyses but University of Texas Center for Research in Water Resources has used paired analyses for some studies. CCI and CCS, and CCN and CCS, had similar concentrations of total Cd. Dissolved Cd showed no trends but many of the concentrations were at or below detection limits.

Total copper (Cu) was reduced in the sand filter chamber and the EMC concentrations were higher for the bio-filter chamber. Dissolved Cu appears to have been reduced with the sand filter if paired analyses are used but not otherwise. The EMCs from the bio-filter were higher than those from the sand filter and also higher than the influent.

Total and dissolved zinc (Zn) was reduced in both chambers. Total Zn concentrations from the bio-filter were similar to sand filter. Dissolved Zn EMCs were higher in bio-filter effluent than sand filter effluent.

The following parameters showed reductions in both chambers, but effluent from the two chambers was similar:

- Total and dissolved lead (Pb)
- Chemical oxygen demand (COD)
- Bacteria (*Escherichia coli* and fecal coliform)
- Ammonia

Total organic carbon (TOC) was reduced by the sand filter but only if paired analyses are used.

Total hardness concentrations in the effluent were higher than the influent in both chambers, and the concentrations from the bio-filter effluent were higher than those from the sand filter.

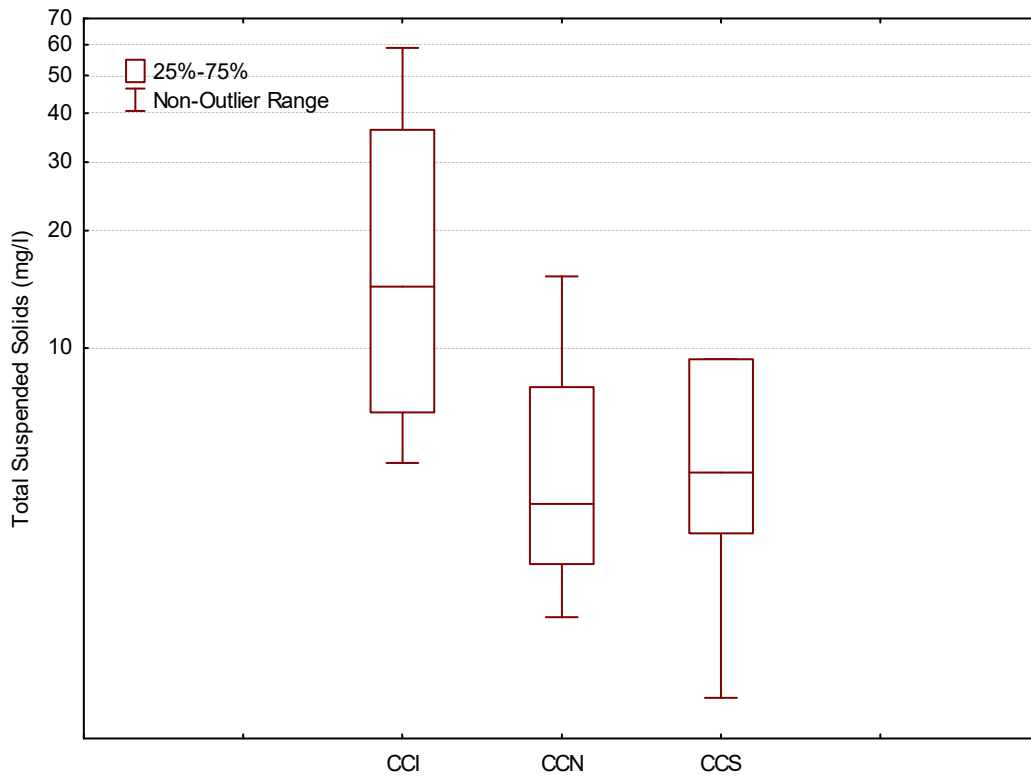
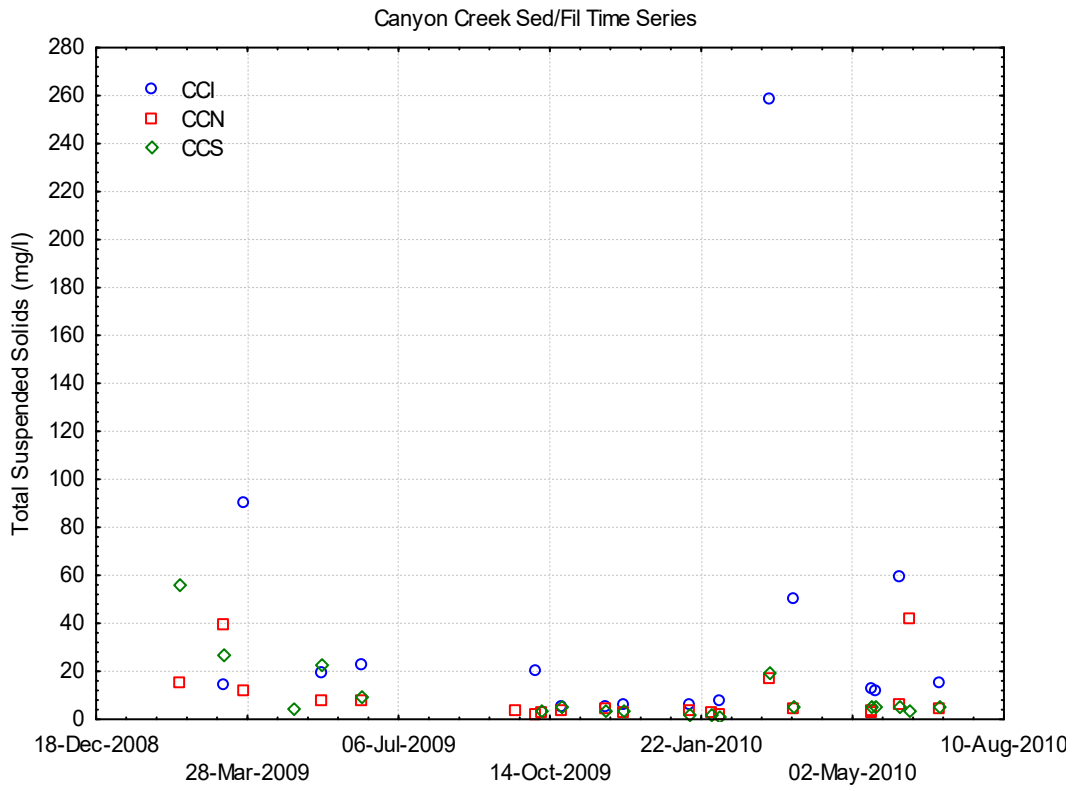
Nitrate + nitrite concentrations in the effluent were higher than the influent in both chambers, and bio-filter effluent was similar to sand filter effluent. There was not evident trend over time in the bio-filter EMCs.

Total Kjeldahl nitrogen (TKN) was reduced by the sand filter. TKN appears to be reduced by the bio-filter if paired analyses are used. Bio-filter effluent EMCs are higher than sand filter EMCs if paired analysis are used.

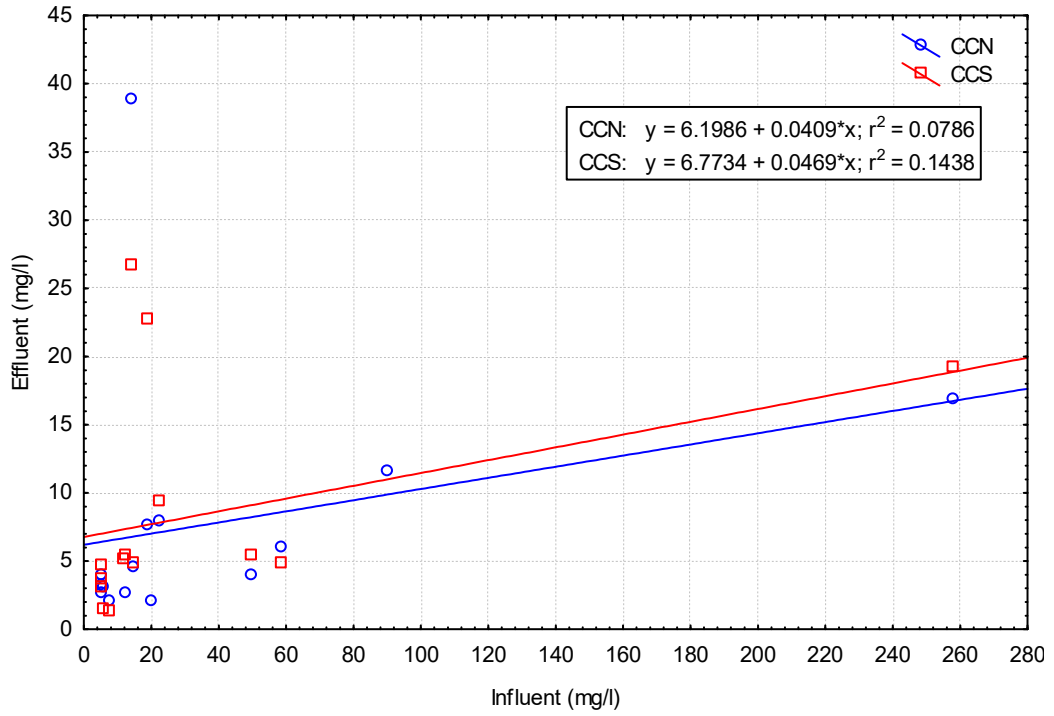
There were no significant reductions in total nitrogen for either chamber. Bio-filter effluent EMCs are higher than sand filter effluent EMCs if paired analyses are used.

Total phosphorus (TP) and dissolved phosphorus (DP) concentrations in the effluent were higher than the influent for bio-filter, while TP was reduced by the sand filter. DP EMCs in sand filter effluent were similar to influent EMCs.

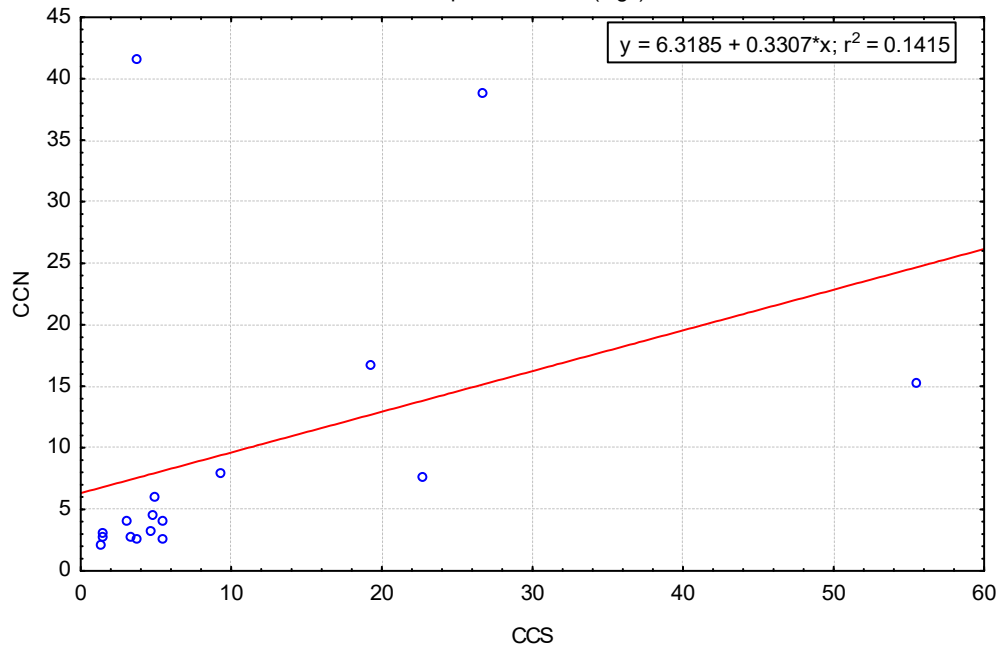
Canyon Creek Total Suspended Solids (mg/l)				
		CCI	CCN	CCS
Non-Parametric	n	16	21	19
	Max	258.0	41.7	55.5
	Upper Quartile Range	36.3	7.9	9.4
	Median	14.4	4.0	4.8
	Lower Quartile Range	6.8	2.8	3.4
	Min	5.1	2.0	1.3
	Efficiency		72.3%	66.6%
	Paired n		15	14
	Wilcoxon		<i>0.0054</i>	<i>0.0157</i>
	Mann-Whitney		<i>0.0007</i>	<i>0.0014</i>
	Paired n			17
	Wilcoxon			0.4631
	Mann-Whitney			0.6295
Arithmetic	UCL	71.3	14.0	16.2
	Mean	37.6	8.9	9.8
	LCL	3.8	3.8	3.4
	Std. Dev.	63.4	11.2	13.3
	W-Test p	0.8858	<i>0.0000</i>	<i>0.0000</i>
	Efficiency		76.3%	73.9%
	t-Test (paired)		0.0741	0.1411
	t-Test (pooled)		<i>0.0489</i>	0.0708
	t-Test (sep.)		0.0929	0.1043
	Levene		<i>0.0081</i>	<i>0.0159</i>
	t-Test (paired)			0.8612
	t-Test (pooled)			0.8157
	t-Test (sep.)			0.8173
	Levene			0.6351
Log Transformed	Geometric Mean	18.0	5.5	5.6
	UCL	83.9	14.6	18.9
	Mean	34.0	8.3	9.3
	LCL	13.8	4.7	4.6
	Std. Dev.	54.5	9.3	12.5
	W-Test p	<i>0.0000</i>	<i>0.0074</i>	0.0898
	Efficiency		75.7%	72.5%
	t-Test (paired)		<i>0.0002</i>	<i>0.0019</i>
	t-Test (pooled)		<i>0.0011</i>	<i>0.0028</i>
	t-Test (sep.)		<i>0.0018</i>	<i>0.0032</i>
	Levene		0.5096	0.5991
	t-Test (paired)			0.8873
	t-Test (pooled)			0.9561
	t-Test (sep.)			0.9563
Levene			0.9652	
Bootstrap	UCL			
	Mean			
	LCL			
	Std. Dev.			
	Eff.			



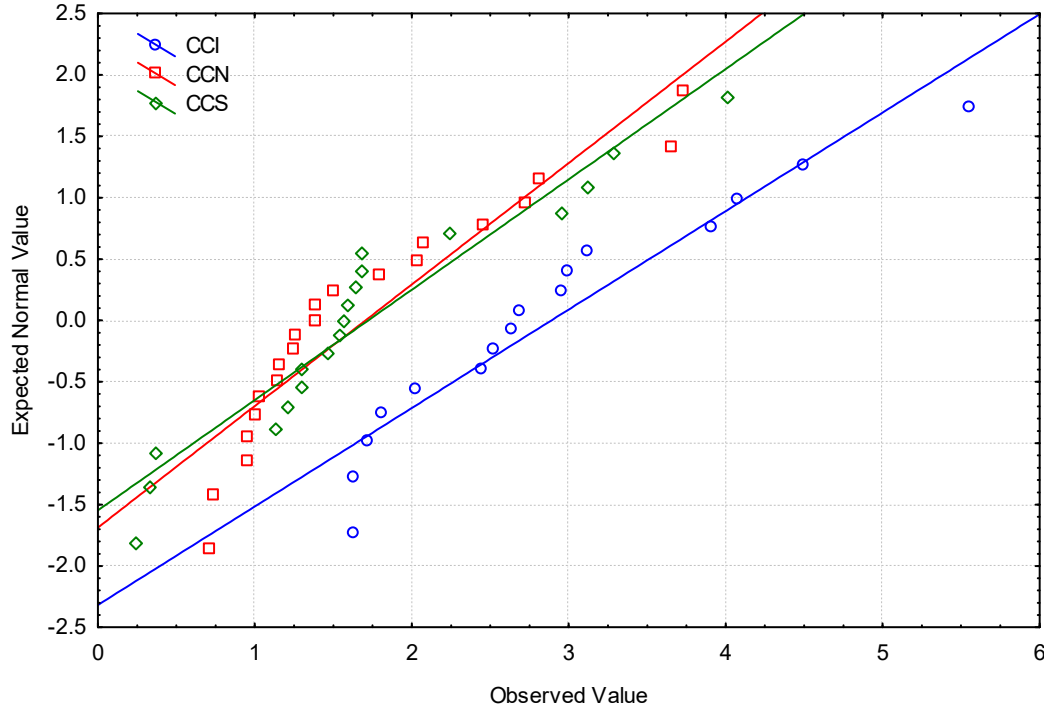
Canyon Creek Sed/Fil
Influent v. Effluent, TSS



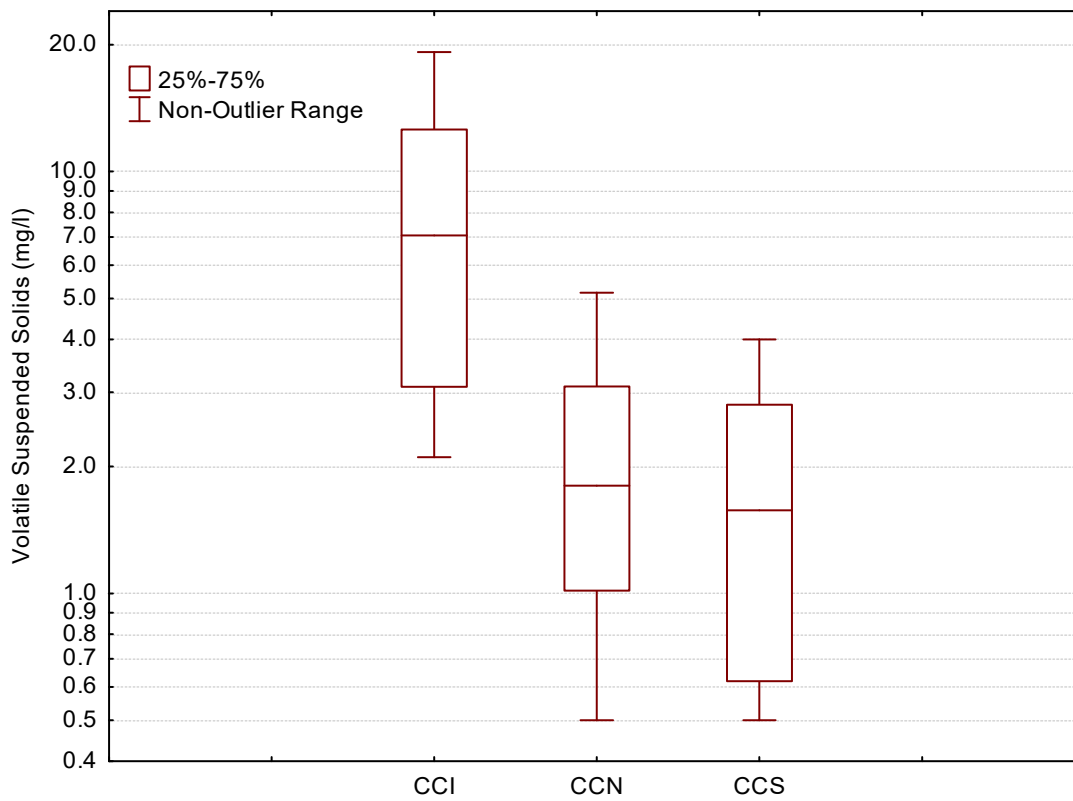
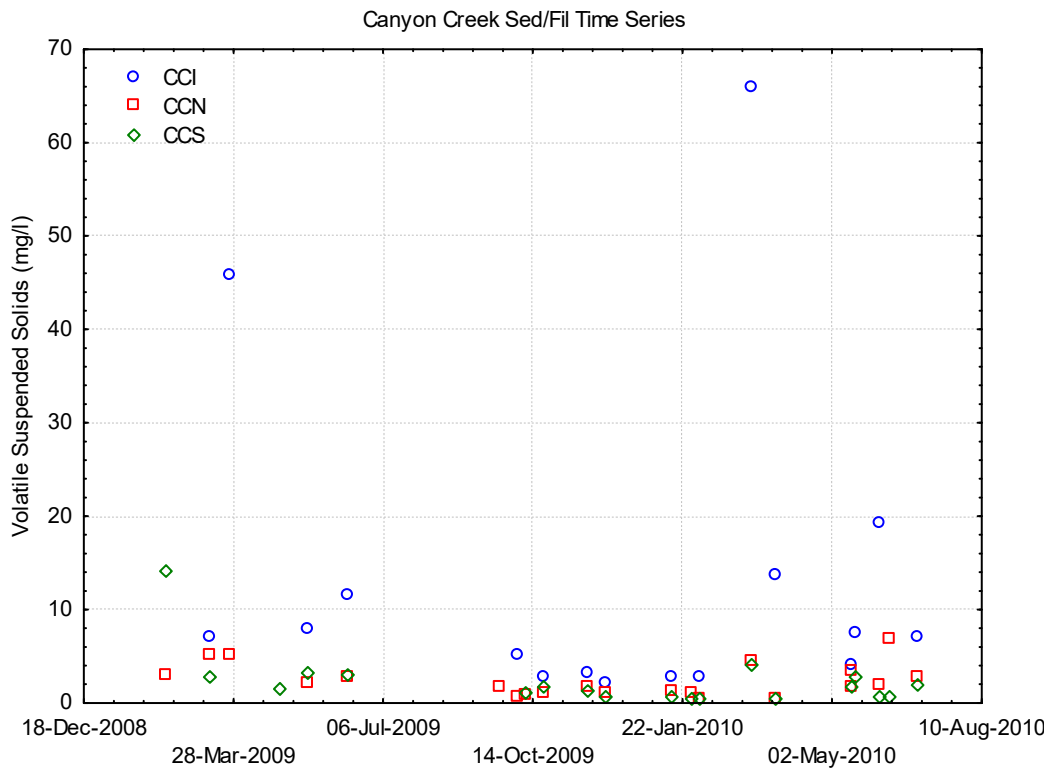
Canyon Creek Sed/Fil
Comparison of Media Types
Total Suspended Solids (mg/l)



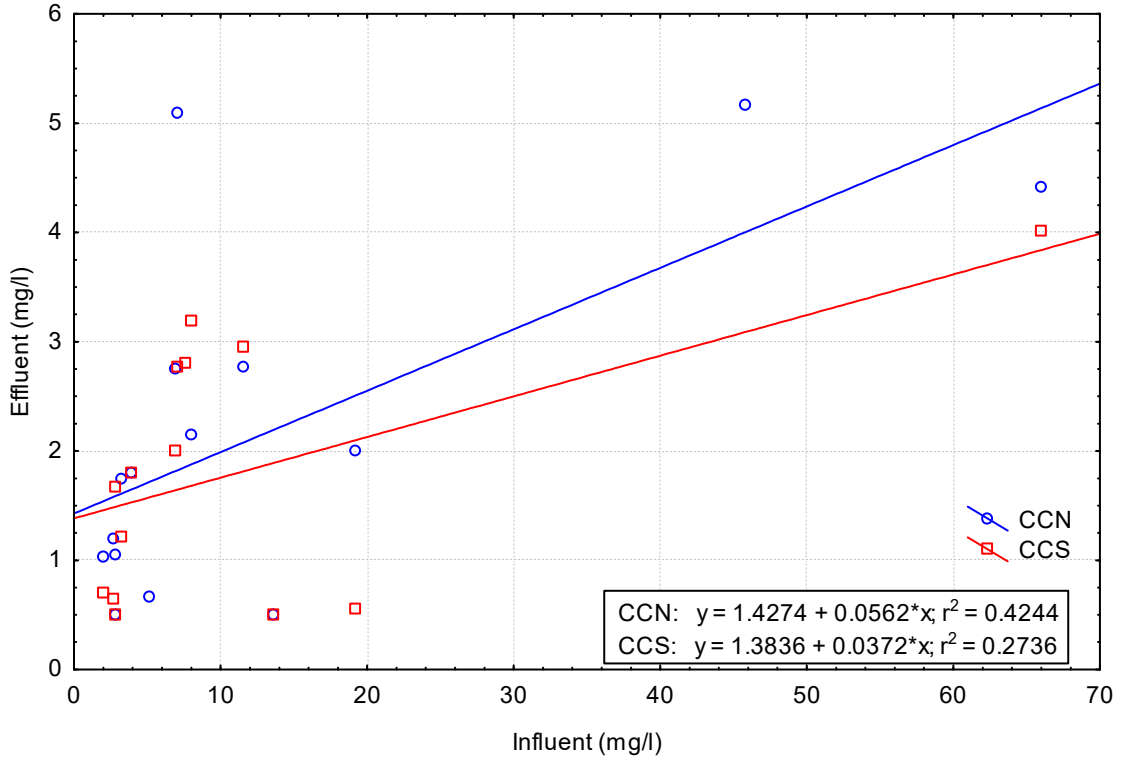
Normal Probability Plot of Log Transformed Data
Total Suspended Solids



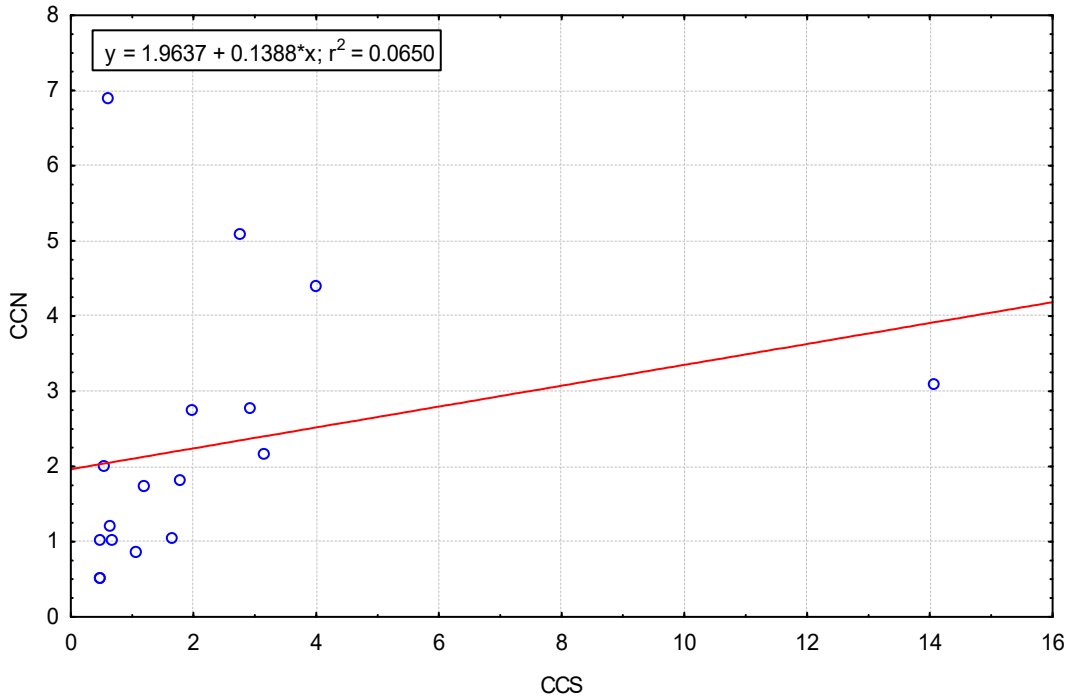
Canyon Creek Volatile Suspended Solids (mg/l)				
		CCI	CCN	CCS
Non-Parametric	n	16	21	19
	Max	66.0	6.89	14.1
	Upper Quartile Range	12.6	3.09	2.80
	Median	7.06	1.80	1.57
	Lower Quartile Range	3.09	1.02	0.62
	Min	2.10	0.50	0.50
	Efficiency		74.5%	77.7%
	Paired n		15	14
	Wilcoxon		<i>0.0007</i>	<i>0.0010</i>
	Mann-Whitney		<i>0.0000</i>	<i>0.0000</i>
	Paired n			17
	Wilcoxon			0.2553
	Mann-Whitney			0.3611
Arithmetic	UCL	22.5	3.17	3.74
	Mean	13.1	2.37	2.27
	LCL	3.61	1.56	0.79
	Std. Dev.	17.7	1.77	3.06
	W-Test p	<i>0.0000</i>	<i>0.0155</i>	<i>0.0000</i>
	Efficiency		81.9%	82.6%
	t-Test (paired)		<i>0.0247</i>	<i>0.0440</i>
	t-Test (pooled)		<i>0.0092</i>	<i>0.0134</i>
	t-Test (sep.)		<i>0.0294</i>	<i>0.0289</i>
	Levene		<i>0.0011</i>	<i>0.0029</i>
	t-Test (paired)			0.9976
	t-Test (pooled)			0.8994
	t-Test (sep.)			0.9021
	Levene			0.6164
	Log Transformed	Geometric Mean	7.45	1.81
UCL		26.6	3.89	3.95
Mean		12.3	2.44	2.16
LCL		5.71	1.53	1.18
Std. Dev.		16.3	2.20	2.43
W-Test p		0.1468	0.6849	0.0854
Efficiency			80.2%	82.5%
t-Test (paired)			<i>0.0000</i>	<i>0.0000</i>
t-Test (pooled)			<i>0.0000</i>	<i>0.0000</i>
t-Test (sep.)			<i>0.0001</i>	<i>0.0000</i>
Levene			0.4596	0.8854
t-Test (paired)				0.2431
t-Test (pooled)				0.3879
t-Test (sep.)				0.3920
Levene				0.4936
Bootstrap	UCL			
	Mean			
	LCL			
	Std. Dev.			
	Eff.			



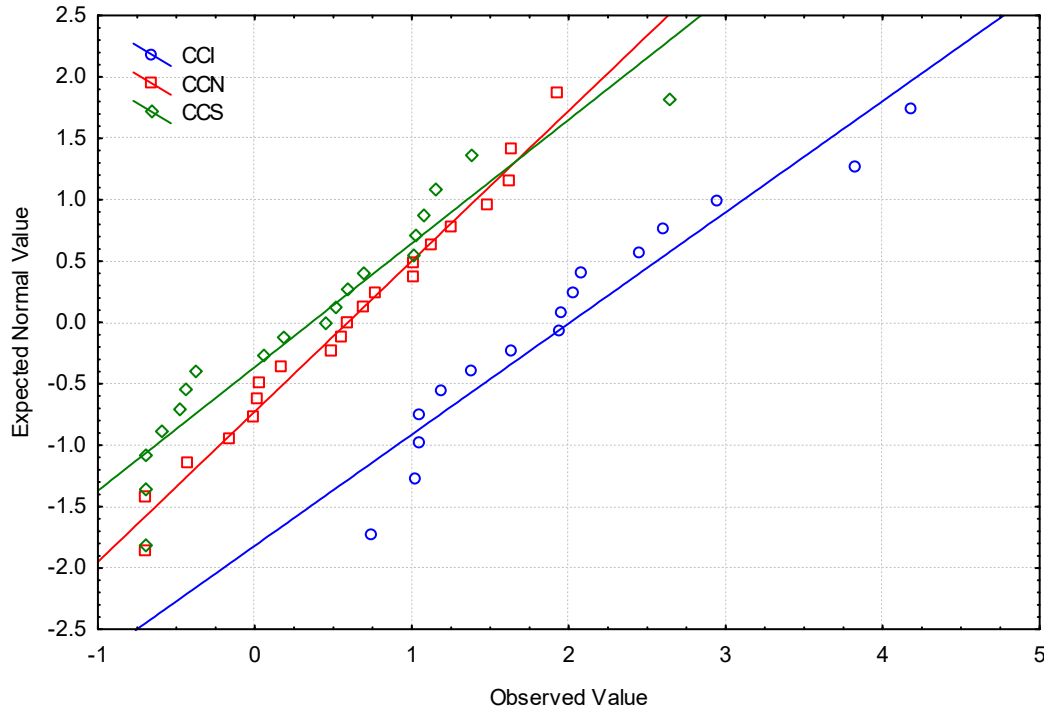
Canyon Creek Sed/Fil
Influent v. Effluent, VSS



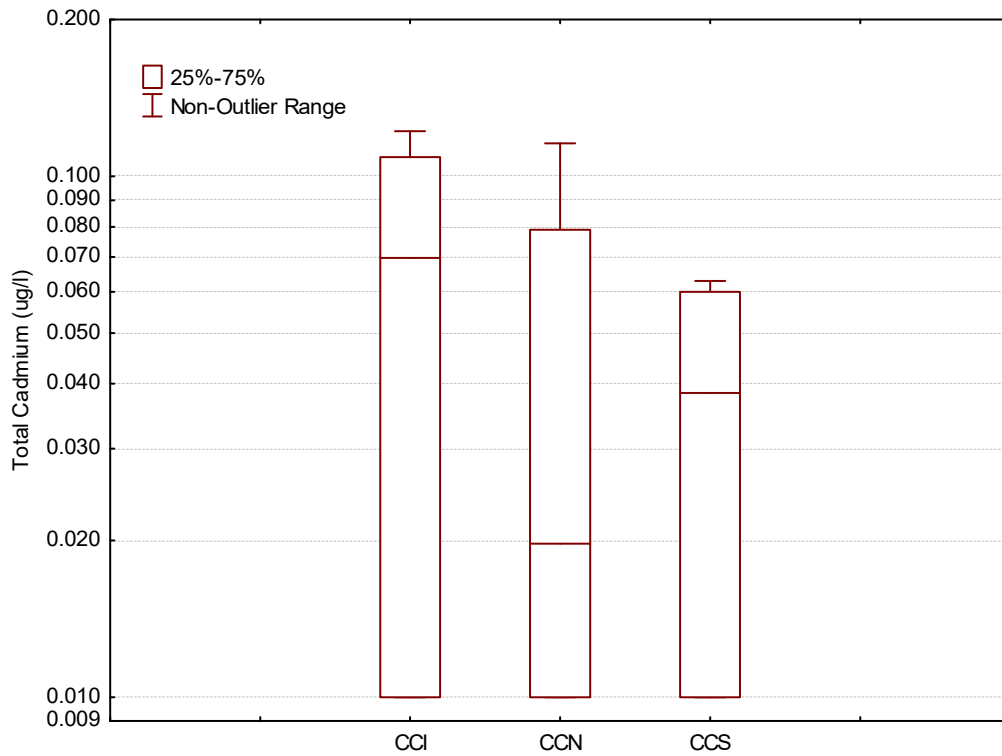
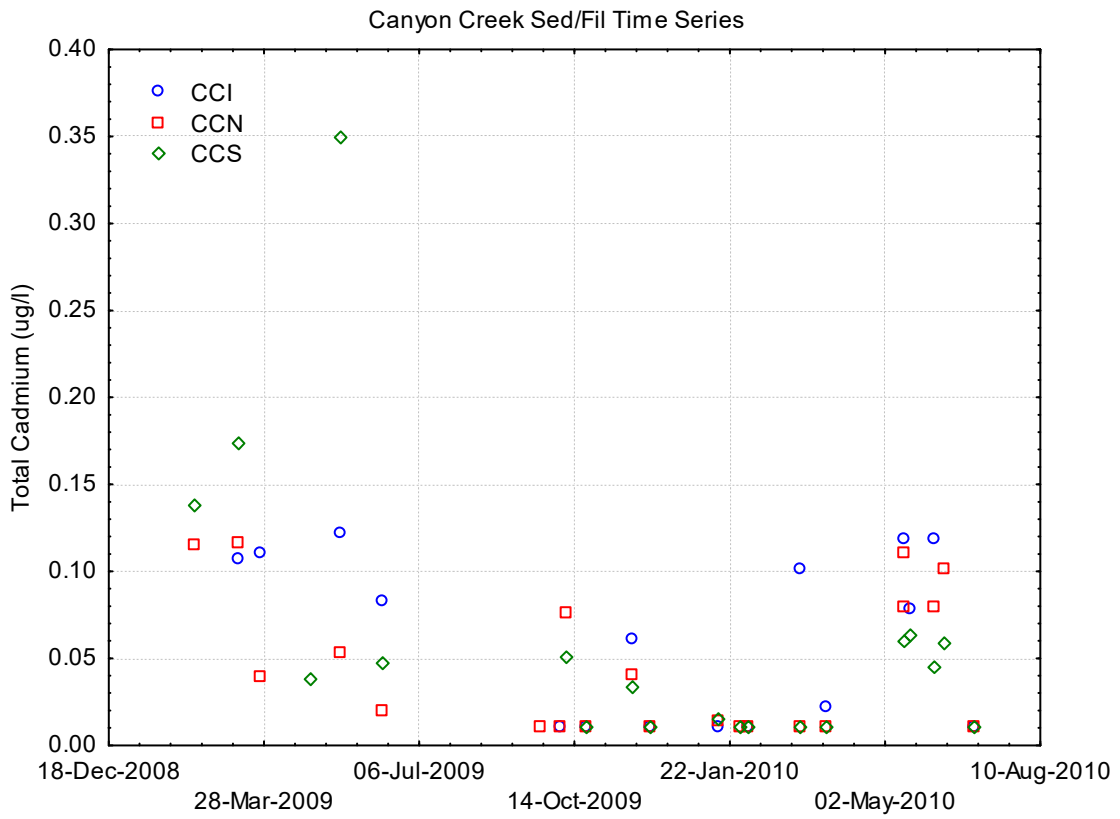
Canyon Creek Sed/Fil
Comparison of Media Types
Volatile Suspended Solids (mg/l)



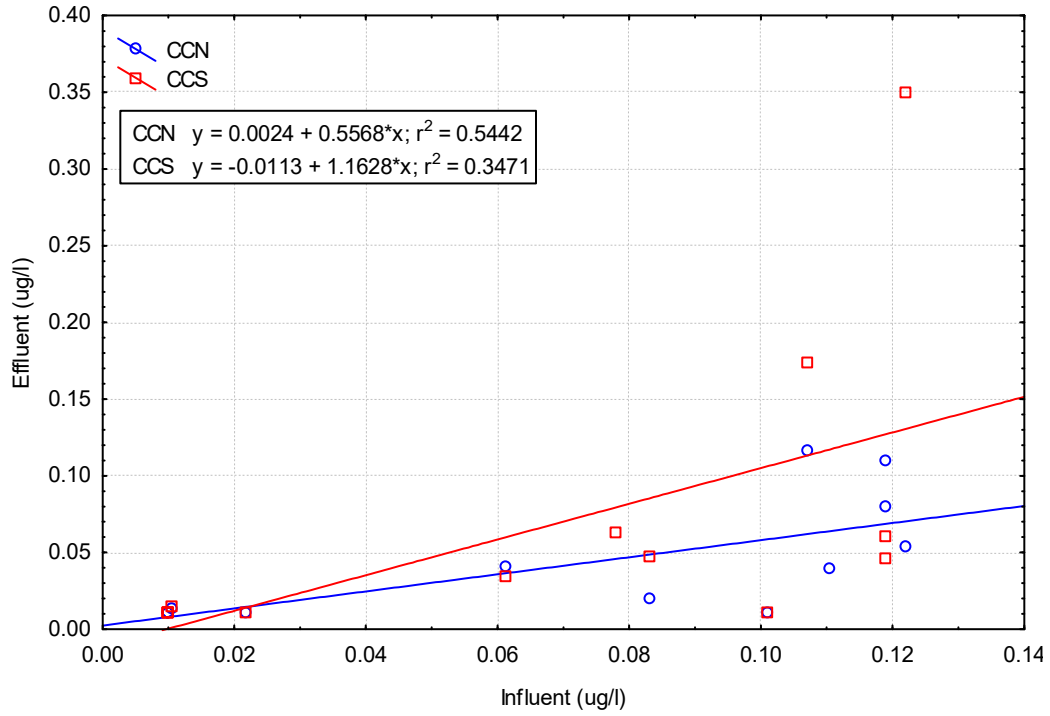
Normal Probability Plot of Log Transformed Data
Volatile Suspended Solids



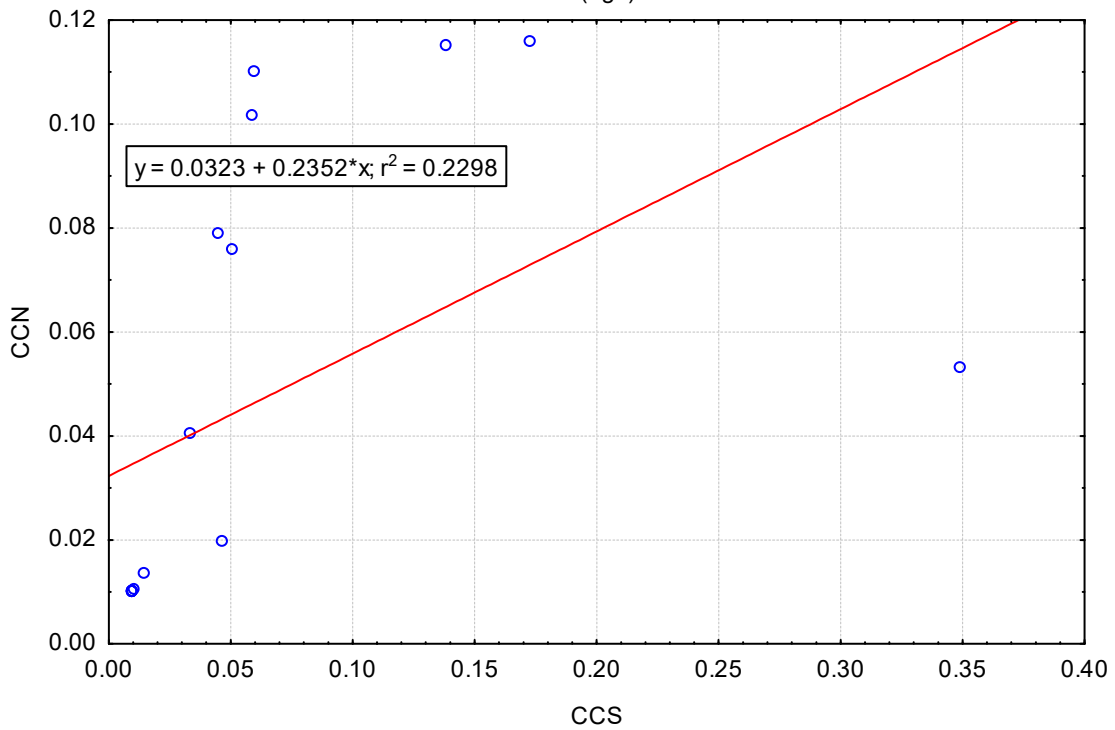
		Canyon Creek Total Cadmium (µg/l)		
		CCI	CCN	CCS
Non-Parametric	n	16	21	19
	Max	0.122	0.116	0.349
	Upper Quartile Range	0.109	0.079	0.060
	Median	0.070	0.020	0.038
	Lower Quartile Range	0.010	0.010	0.010
	Min	0.010	0.010	0.010
	Efficiency		71.7%	45.0%
	Paired n		15	14
	Wilcoxon		0.0535	0.3305
	Mann-Whitney		0.4759	0.5021
	Paired n			17
	Wilcoxon			0.6909
	Mann-Whitney			0.8724
Arithmetic	UCL	0.087	0.063	0.100
	Mean	0.061	0.044	0.060
	LCL	0.036	0.026	0.020
	Std. Dev.	0.048	0.041	0.083
	W-Test p	<i>0.0032</i>	<i>0.0004</i>	<i>0.0000</i>
	Efficiency		27.8%	2.2%
	t-Test (paired)		<i>0.0134</i>	0.9531
	t-Test (pooled)		0.2493	0.9548
	t-Test (sep.)		0.2611	0.9528
	Levene		0.1888	0.6590
	t-Test (paired)			0.4476
	t-Test (pooled)			0.4433
	t-Test (sep.)			0.4596
	Levene			0.3049
	Log Transformed	Geometric Mean	0.038	0.027
UCL		0.180	0.093	0.133
Mean		0.072	0.047	0.060
LCL		0.029	0.024	0.027
Std. Dev.		0.117	0.065	0.094
W-Test p		<i>0.0008</i>	<i>0.0005</i>	<i>0.0176</i>
Efficiency			35.3%	17.6%
t-Test (paired)			<i>0.0216</i>	0.1732
t-Test (pooled)			0.3686	0.6539
t-Test (sep.)			0.3755	0.6545
Levene			0.3218	0.4194
t-Test (paired)				0.6493
t-Test (pooled)				0.6544
t-Test (sep.)				0.6557
Levene				0.8581
Bootstrap	UCL			
	Mean			
	LCL			
	Std. Dev.			
	Eff.			



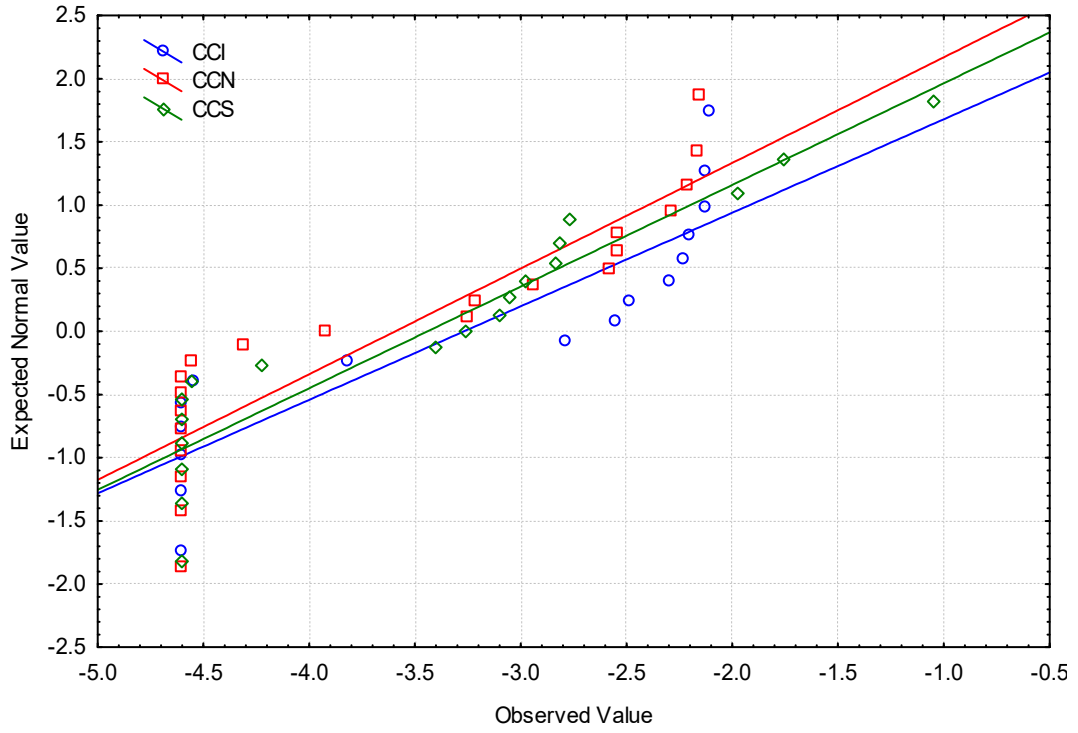
Canyon Creek Sed/Fil
Influent v. Effluent Total Cd



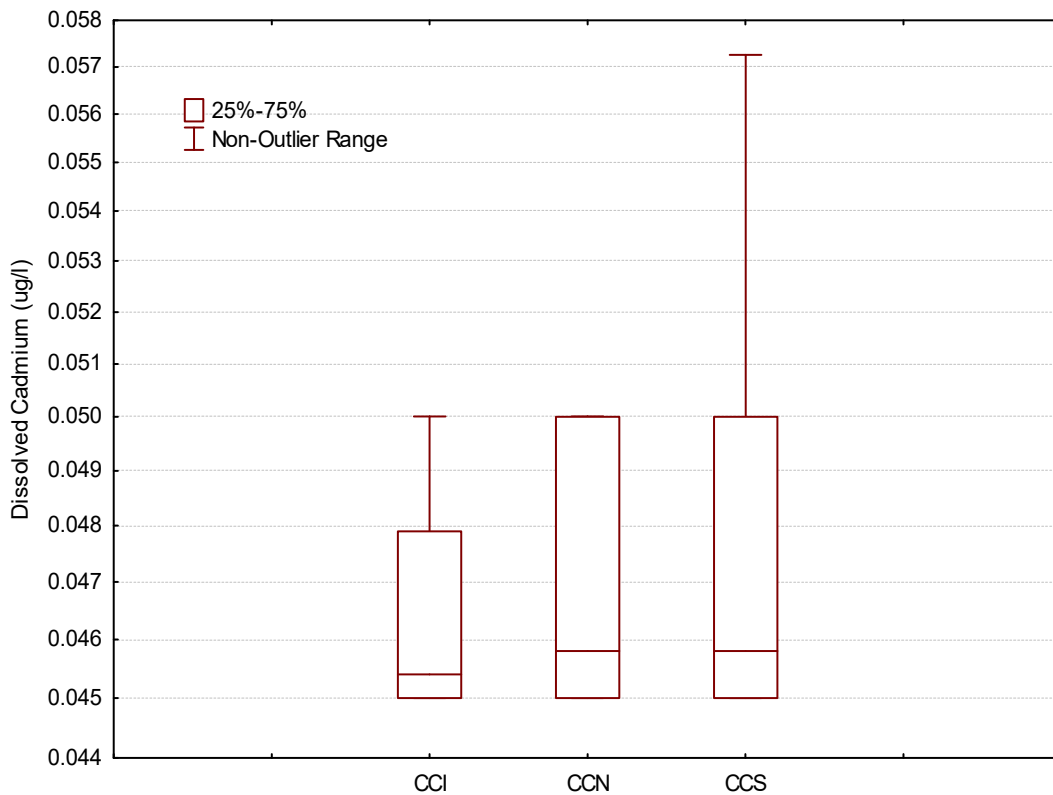
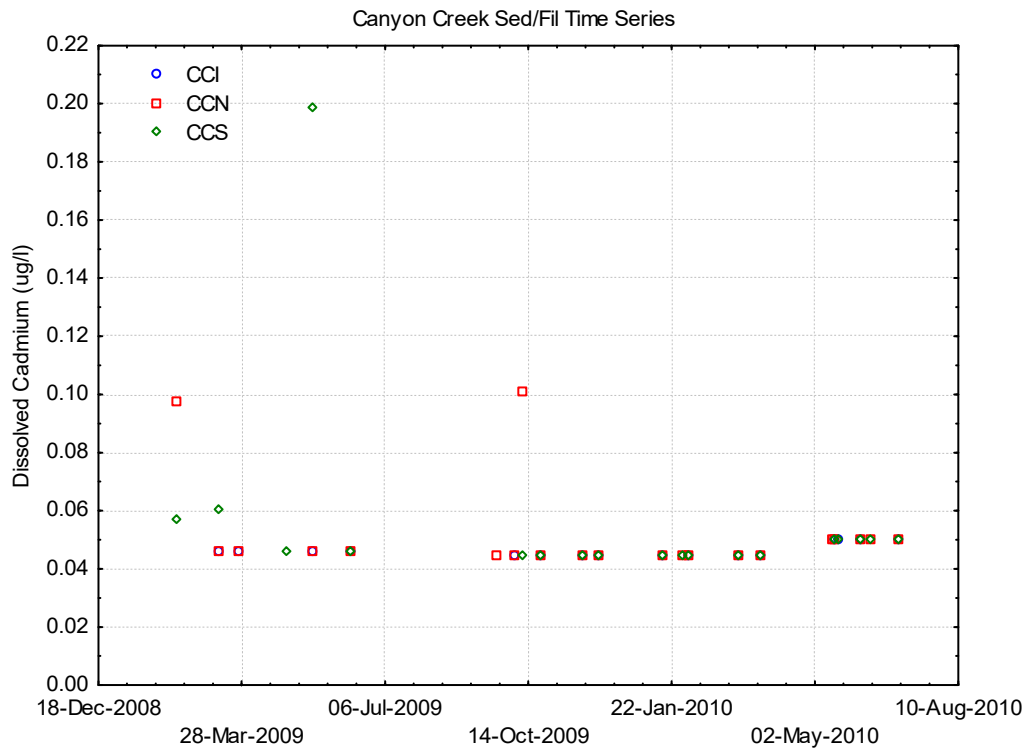
Canyon Creek Sed/Fil
Comparison of media types
Total Cd (ug/l)



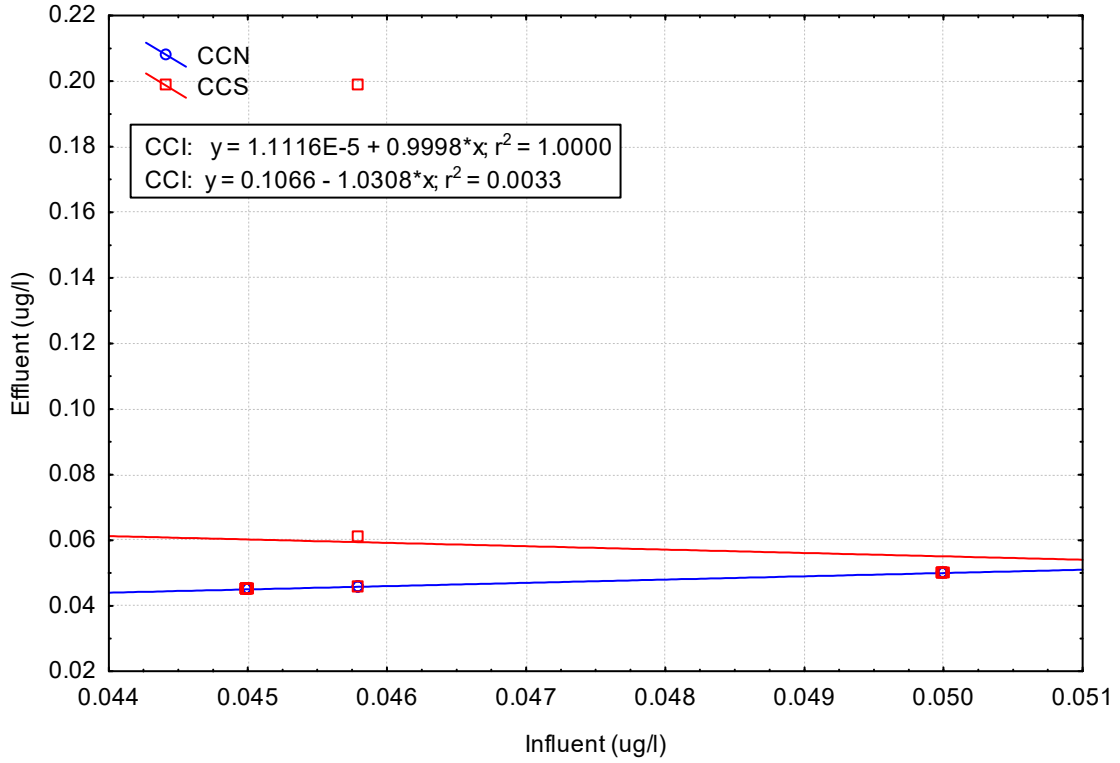
Normal Probability Plot of Log Transformed Data
Total Cadmium



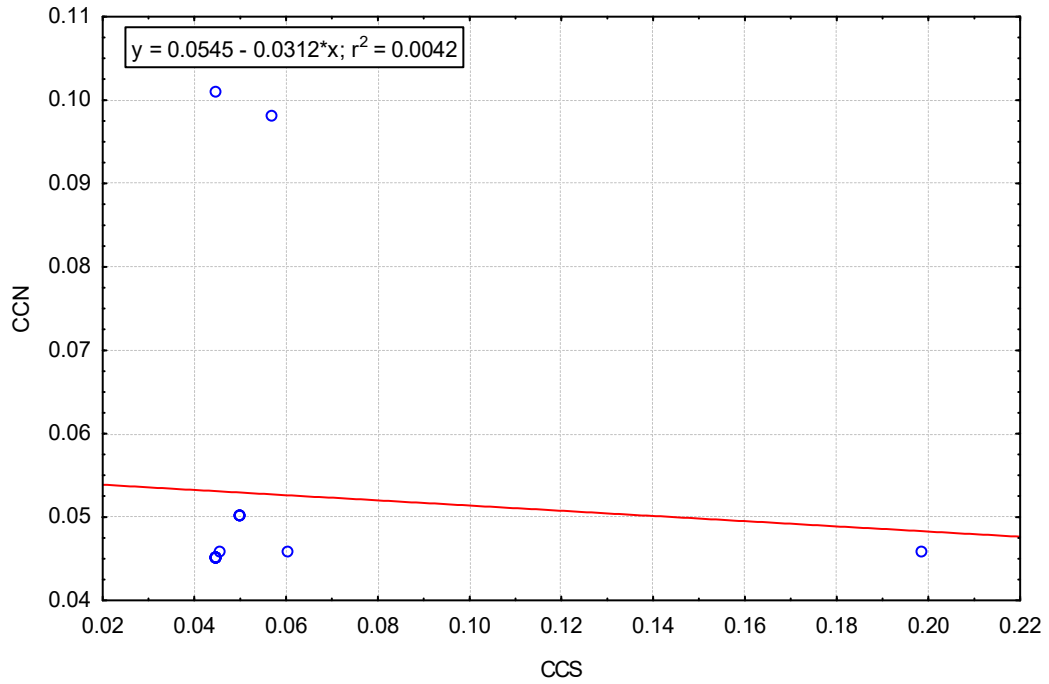
Canyon Creek Dissolved Cadmium (µg/l)				
		CCI	CCN	CCS
Non-Parametric	n	16	21	19
	Max	0.050	0.101	0.199
	Upper Quartile Range	0.048	0.050	0.050
	Median	0.045	0.046	0.046
	Lower Quartile Range	0.045	0.045	0.045
	Min	0.045	0.045	0.045
	Efficiency		-0.9%	-0.9%
	Paired n		15	14
	Wilcoxon		0.5076	0.5049
	Mann-Whitney		0.7736	0.3671
	Paired n			17
	Wilcoxon			0.7333
	Mann-Whitney			0.6295
	Arithmetic	UCL	0.048	0.059
Mean		0.046	0.052	0.056
LCL		0.045	0.044	0.039
Std. Dev.		0.002	0.016	0.035
W-Test p		<i>0.0032</i>	<i>0.0004</i>	<i>0.0000</i>
Efficiency			-10.9%	-20.5%
t-Test (paired)			0.4443	0.2915
t-Test (pooled)			0.2192	0.2852
t-Test (sep.)			0.1672	0.2509
Levene			<i>0.0318</i>	0.0827
t-Test (paired)				0.6855
t-Test (pooled)				0.6024
t-Test (sep.)				0.6159
Levene				0.3810
Log Transformed	Geometric Mean	0.046	0.050	0.052
	UCL	0.048	0.058	0.066
	Mean	0.046	0.051	0.055
	LCL	0.045	0.045	0.045
	Std. Dev.	0.002	0.012	0.019
	W-Test p	<i>0.0001</i>	<i>0.0000</i>	<i>0.0000</i>
	Efficiency		-10.4%	-17.5%
	t-Test (paired)		0.4794	0.2567
	t-Test (pooled)		0.2254	0.2258
	t-Test (sep.)		0.1743	0.1950
	Levene		0.0565	0.0771
	t-Test (paired)			0.8283
	t-Test (pooled)			0.7255
	t-Test (sep.)			0.7307
Levene			0.6209	
Bootstrap	UCL			
	Mean			
	LCL			
	Std. Dev.			
	Eff.			



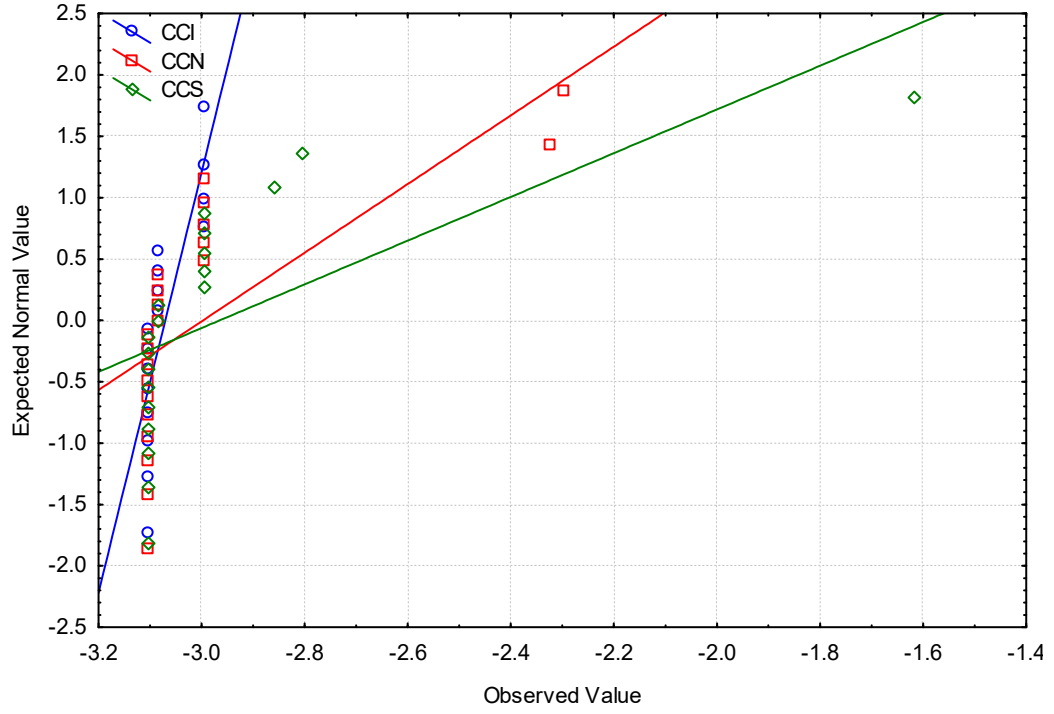
Canyon Creek Sed/Fil
Influent v. Effluent, Dissolved Cd



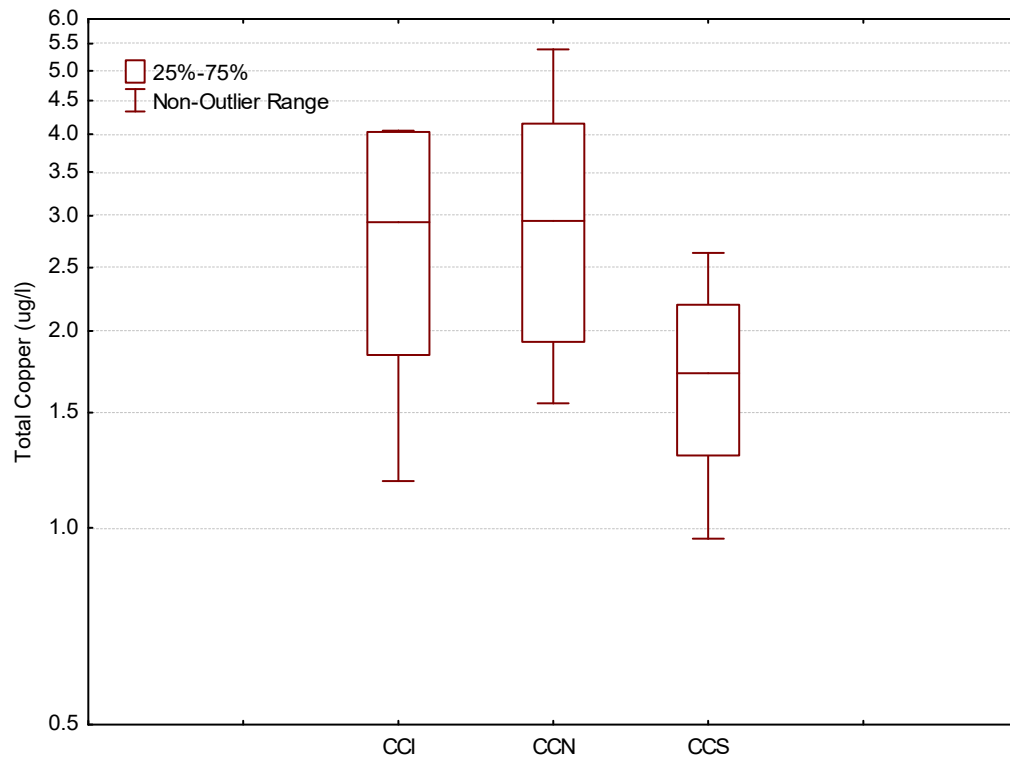
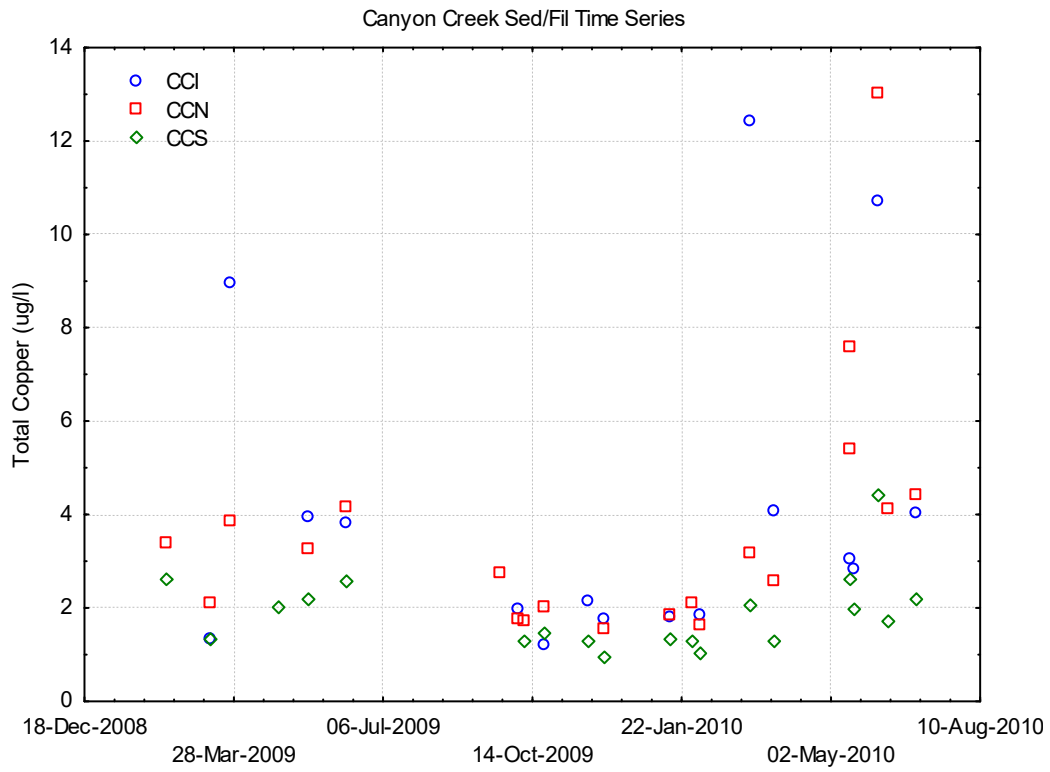
Canyon Creek Sed/Fil
Comparison of media types
Dissolved Cd (ug/l)



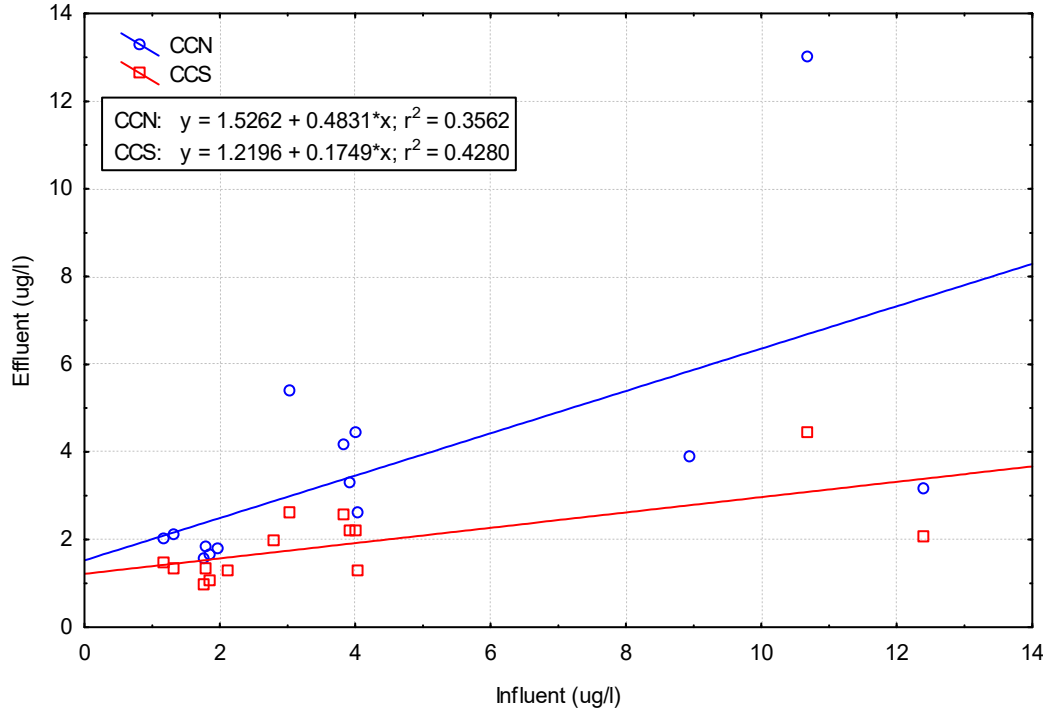
Normal Probability Plot of Log Transformed Data
Dissolved Cadmium



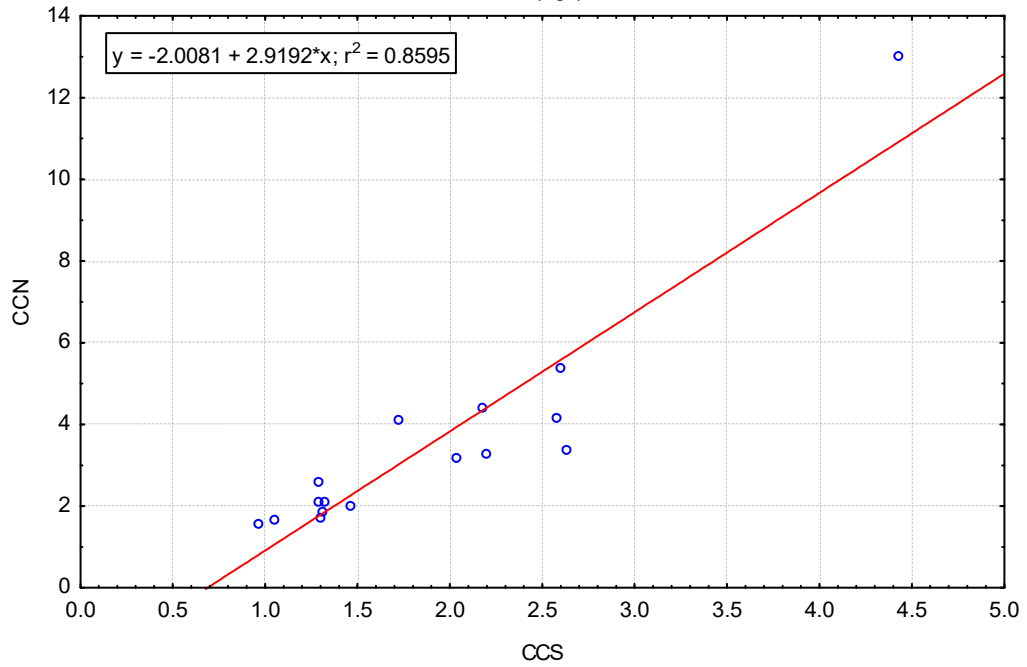
Canyon Creek Total Copper ($\mu\text{g/l}$)				
		CCI	CCN	CCS
Non-Parametric	n	16	20	19
	Max	12.40	13.00	4.43
	Upper Quartile Range	4.03	4.15	2.19
	Median	2.93	2.95	1.72
	Lower Quartile Range	1.84	1.92	1.29
	Min	1.18	1.55	0.96
	Efficiency		-0.4%	41.3%
	Paired n		14	14
	Wilcoxon		0.9750	<i>0.0015</i>
	Mann-Whitney		0.9374	<i>0.0100</i>
	Paired n			16
	Wilcoxon			<i>0.0004</i>
	Mann-Whitney			<i>0.0012</i>
Arithmetic	UCL	5.95	4.87	2.27
	Mean	4.11	3.62	1.87
	LCL	2.27	2.37	1.48
	Std. Dev.	3.45	2.67	0.82
	W-Test p	<i>0.0007</i>	<i>0.0001</i>	<i>0.0033</i>
	Efficiency		12.0%	54.4%
	t-Test (paired)		0.3891	<i>0.0217</i>
	t-Test (pooled)		0.6323	<i>0.0098</i>
	t-Test (sep.)		0.6426	<i>0.0218</i>
	Levene		0.3116	<i>0.0019</i>
	t-Test (paired)			<i>0.0050</i>
	t-Test (pooled)			<i>0.0097</i>
	t-Test (sep.)			<i>0.0106</i>
Levene			<i>0.0248</i>	
Log Transformed	Geometric Mean	3.16	3.05	1.74
	UCL	6.72	4.93	2.34
	Mean	4.08	3.56	1.87
	LCL	2.48	2.57	1.50
	Std. Dev.	3.34	2.14	0.75
	W-Test p	0.1659	0.0999	0.2277
	Efficiency		12.8%	54.1%
	t-Test (paired)		0.5351	<i>0.0011</i>
	t-Test (pooled)		0.8680	<i>0.0035</i>
	t-Test (sep.)		0.8719	<i>0.0066</i>
	Levene		0.3039	<i>0.0283</i>
	t-Test (paired)			<i>0.0000</i>
	t-Test (pooled)			<i>0.0008</i>
t-Test (sep.)			<i>0.0008</i>	
Levene			0.1925	
Bootstrap	UCL			
	Mean			
	LCL			
	Std. Dev.			
	Eff.			



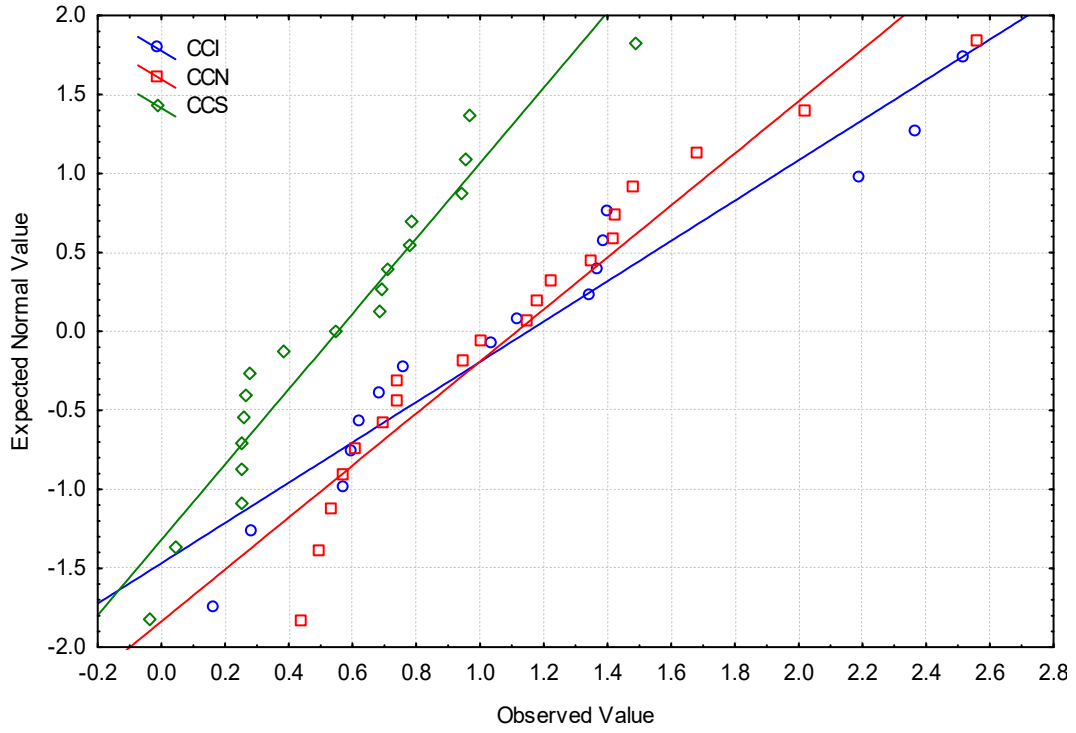
Canyon Creek Sed/Fil
Influent v. Effluent, Total Cu



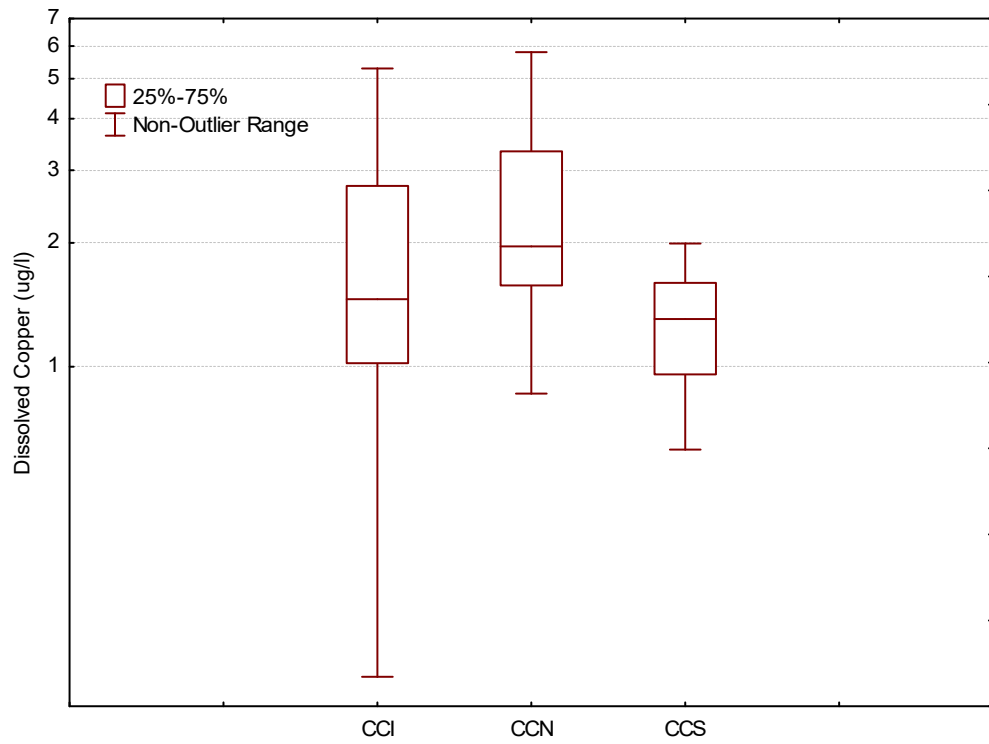
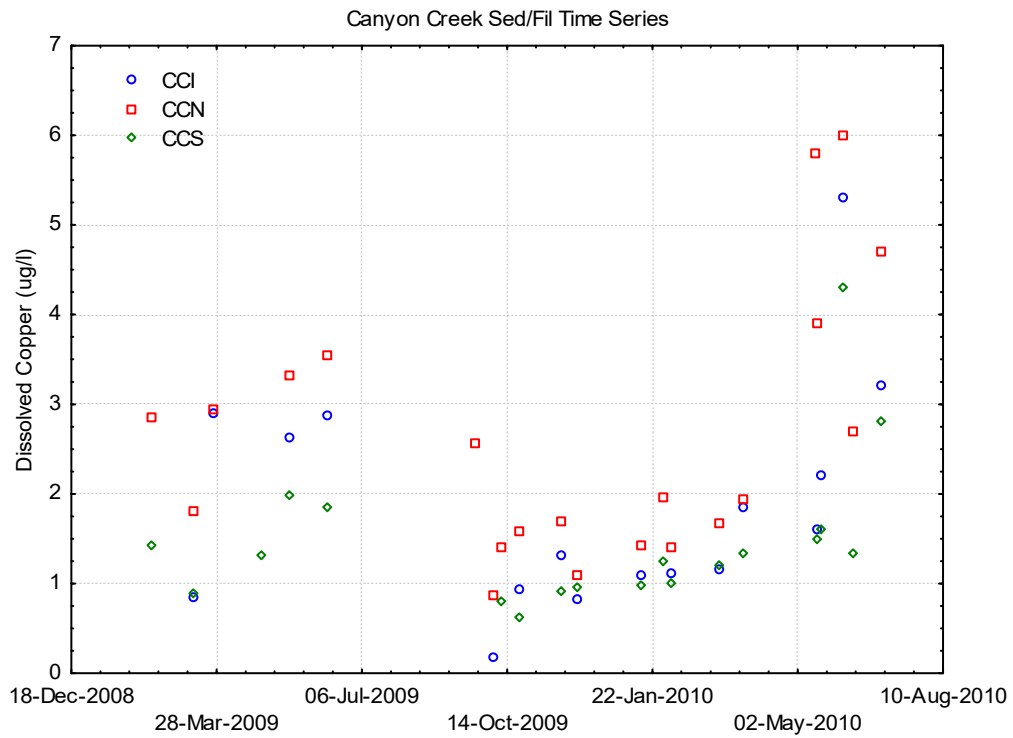
Canyon Creek Sed/Fil
Comparison of Media Types
Total Cu, (ug/l)



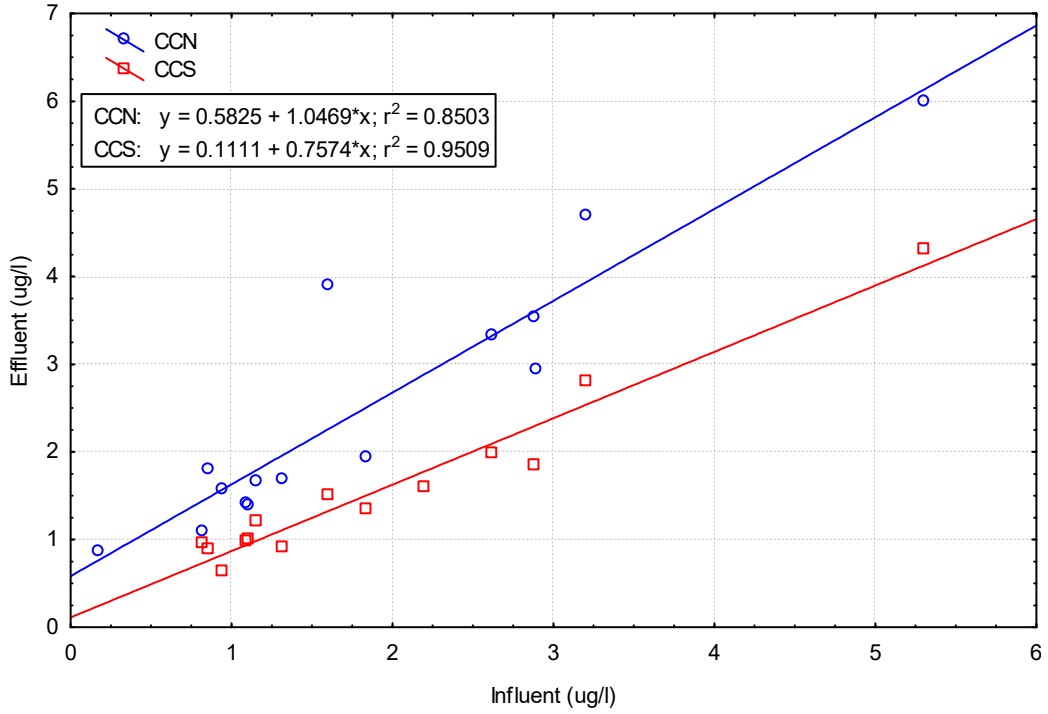
Normal Probability Plot of Log Transformed Data
Total Copper



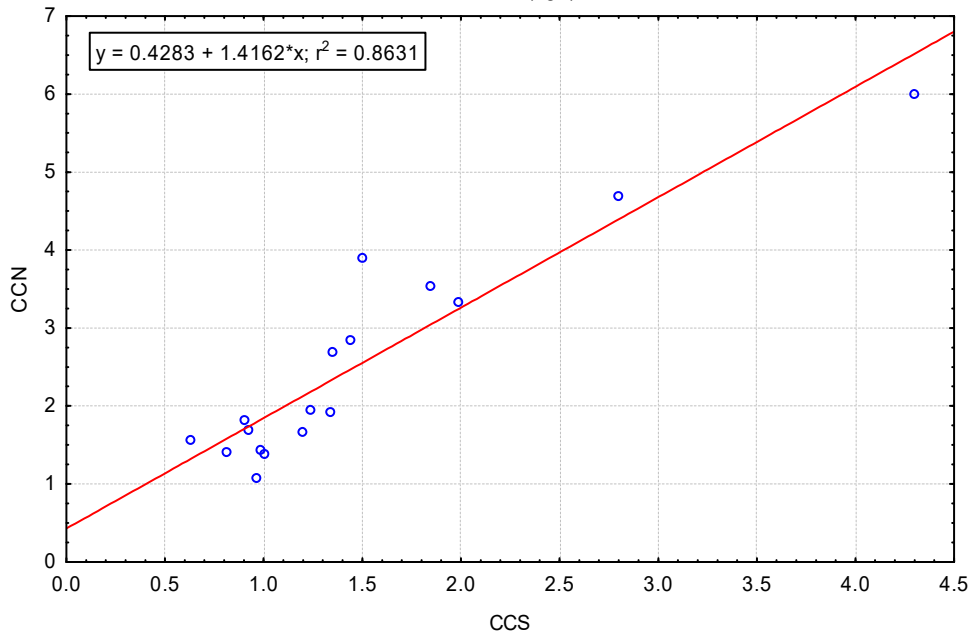
Canyon Creek Dissolved Copper ($\mu\text{g/l}$)		CCI	CCN	CCS
Non-Parametric	n	16	21	19
	Max	5.30	6.00	4.30
	Upper Quartile Range	2.75	3.33	1.60
	Median	1.46	1.96	1.31
	Lower Quartile Range	1.02	1.58	0.96
	Min	0.18	0.86	0.63
	Efficiency		-34.2%	10.5%
	Paired n		15	14
	Wilcoxon		<i>0.0007</i>	<i>0.0063</i>
	Mann-Whitney		0.0726	0.4413
	Paired n			17
	Wilcoxon			<i>0.0003</i>
Mann-Whitney			<i>0.0011</i>	
Arithmetic	UCL	2.55	3.29	1.89
	Mean	1.88	2.62	1.48
	LCL	1.20	1.96	1.07
	Std. Dev.	1.27	1.47	0.85
	W-Test p	0.0555	<i>0.0152</i>	<i>0.0002</i>
	Efficiency		-39.9%	21.1%
	t-Test (paired)		<i>0.0005</i>	<i>0.0033</i>
	t-Test (pooled)		0.1129	0.2781
	t-Test (sep.)		0.1062	0.2965
	Levene		0.5293	0.0744
	t-Test (paired)			<i>0.0000</i>
	t-Test (pooled)			<i>0.0050</i>
	t-Test (sep.)			<i>0.0045</i>
	Levene			<i>0.0165</i>
Log Transformed	Geometric Mean	1.48	2.29	1.33
	UCL	3.53	3.57	1.91
	Mean	2.01	2.64	1.47
	LCL	1.15	1.95	1.13
	Std. Dev.	1.86	1.52	0.70
	W-Test p	0.1642	0.7389	0.2797
	Efficiency		-31.0%	27.1%
	t-Test (paired)		<i>0.0015</i>	<i>0.0031</i>
	t-Test (pooled)		0.0527	0.6110
	t-Test (sep.)		0.0682	0.6281
	Levene		0.3129	0.0716
	t-Test (paired)			<i>0.0000</i>
	t-Test (pooled)			<i>0.0013</i>
	t-Test (sep.)			<i>0.0012</i>
Levene			0.1781	
Bootstrap	UCL			
	Mean			
	LCL			
	Std. Dev.			
	Eff.			



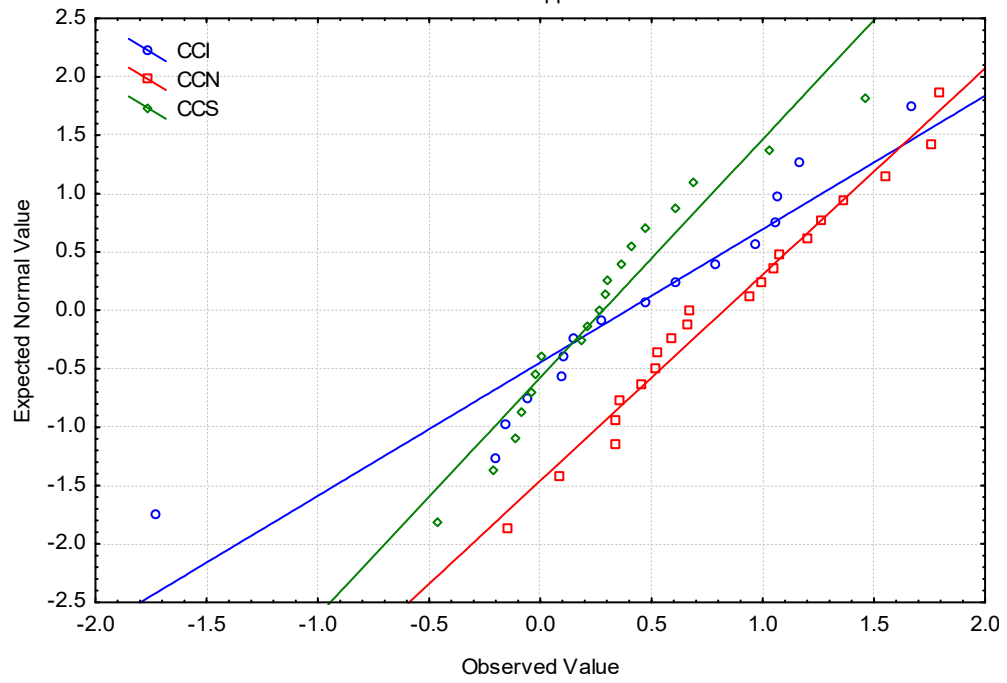
Canyon Creek Sed/Fil
Influent v. Effluent, Dissolved Cu



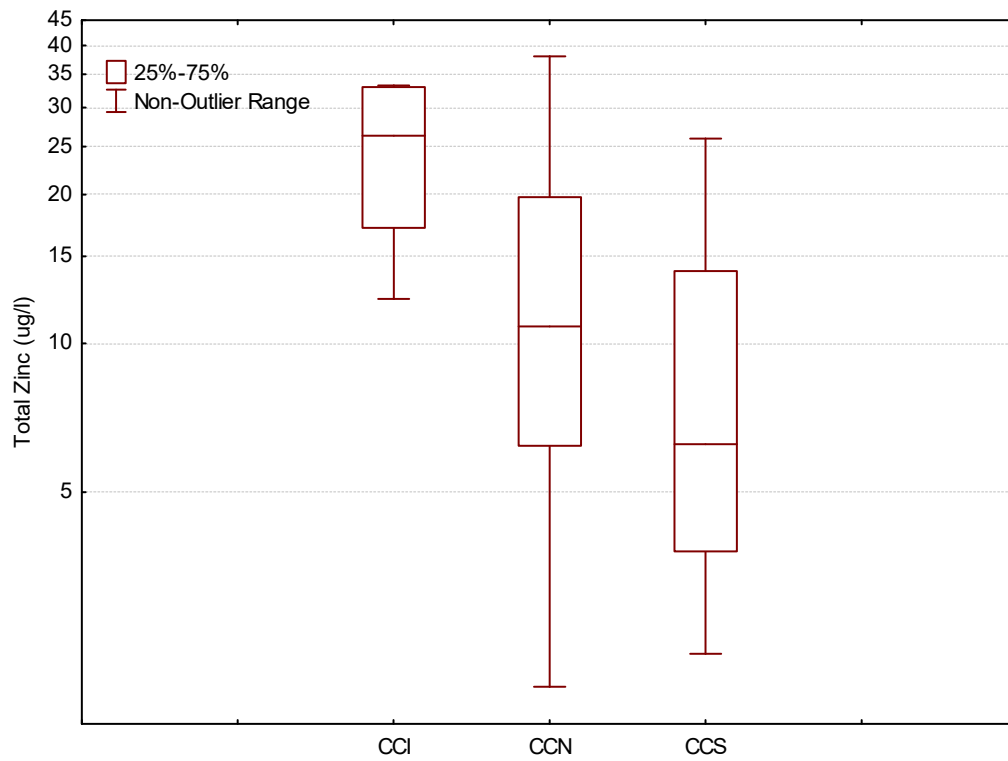
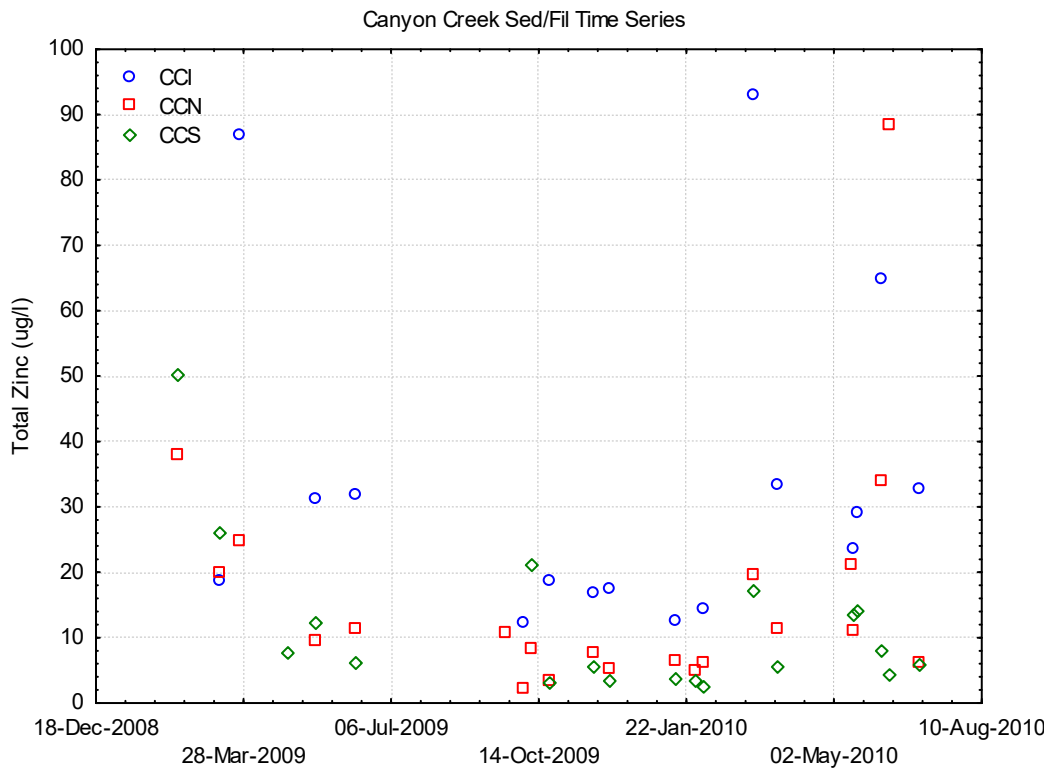
Canyon Creek Sed/Fil
Comparison of Media Types
Dissolved Cu (ug/l)



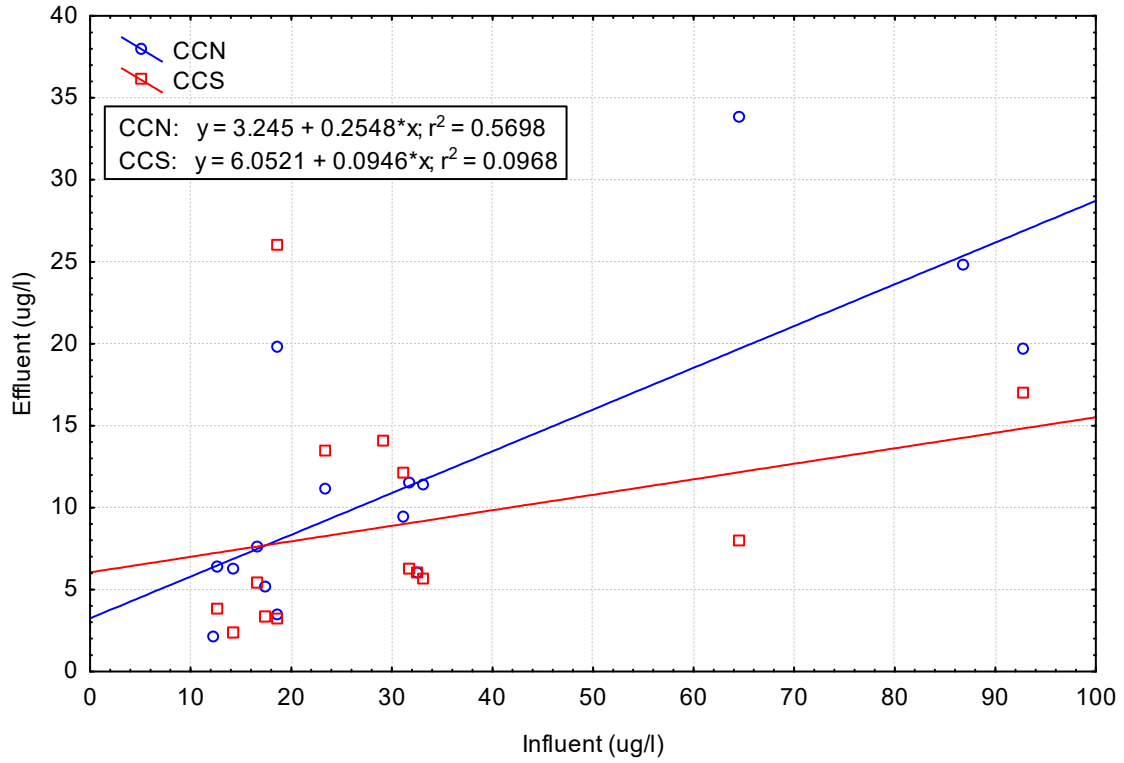
Normal Probability Plot of Log Transformed Data
Dissolved Copper



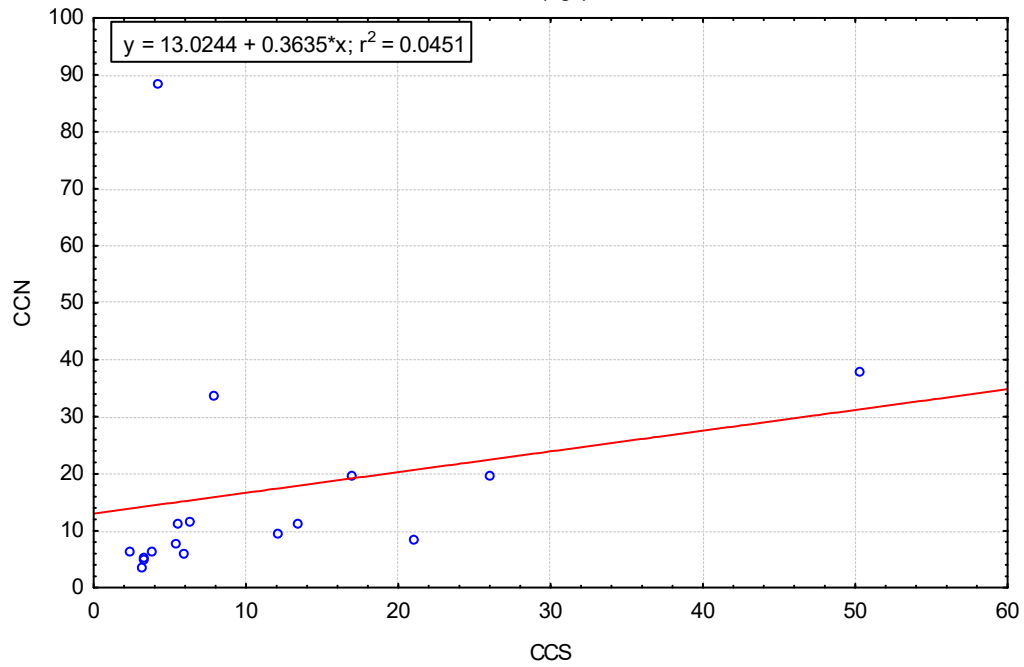
		Canyon Creek Total Zinc (µg/l)		
		CCI	CCN	CCS
Non-Parametric	n	16	21	19
	Max	92.9	88.3	50.3
	Upper Quartile Range	32.9	19.8	14.0
	Median	26.3	10.8	6.3
	Lower Quartile Range	17.1	6.2	3.8
	Min	12.3	2.0	2.4
	Efficiency		58.9%	76.2%
	Paired n		15	14
	Wilcoxon		<i>0.0008</i>	<i>0.0012</i>
	Mann-Whitney		<i>0.0021</i>	<i>0.0000</i>
	Paired n			17
	Wilcoxon			0.3560
	Mann-Whitney			0.1959
Arithmetic	UCL	47.1	25.3	16.8
	Mean	33.6	16.6	11.2
	LCL	20.0	7.9	5.6
	Std. Dev.	25.4	19.1	11.6
	W-Test p	<i>0.0007</i>	<i>0.0000</i>	<i>0.0001</i>
	Efficiency		50.4%	66.7%
	t-Test (paired)		<i>0.0010</i>	<i>0.0016</i>
	t-Test (pooled)		<i>0.0267</i>	<i>0.0016</i>
	t-Test (sep.)		<i>0.0346</i>	<i>0.0040</i>
	Levene		0.2821	<i>0.0318</i>
	t-Test (paired)			0.2834
	t-Test (pooled)			0.2879
	t-Test (sep.)			0.2776
	Levene			0.2570
	Log Transformed	Geometric Mean	27.2	11.1
UCL		51.4	28.4	18.9
Mean		33.3	16.4	11.0
LCL		21.6	9.4	6.4
Std. Dev.		23.5	17.8	10.9
W-Test p		0.0979	0.9203	0.4452
Efficiency			50.8%	66.9%
t-Test (paired)			<i>0.0000</i>	<i>0.0000</i>
t-Test (pooled)			<i>0.0016</i>	<i>0.0000</i>
t-Test (sep.)			<i>0.0010</i>	<i>0.0000</i>
Levene			0.2894	0.2322
t-Test (paired)				0.0788
t-Test (pooled)				0.2041
t-Test (sep.)				0.2027
Levene				0.9970
Bootstrap	UCL			
	Mean			
	LCL			
	Std. Dev.			
	Eff.			



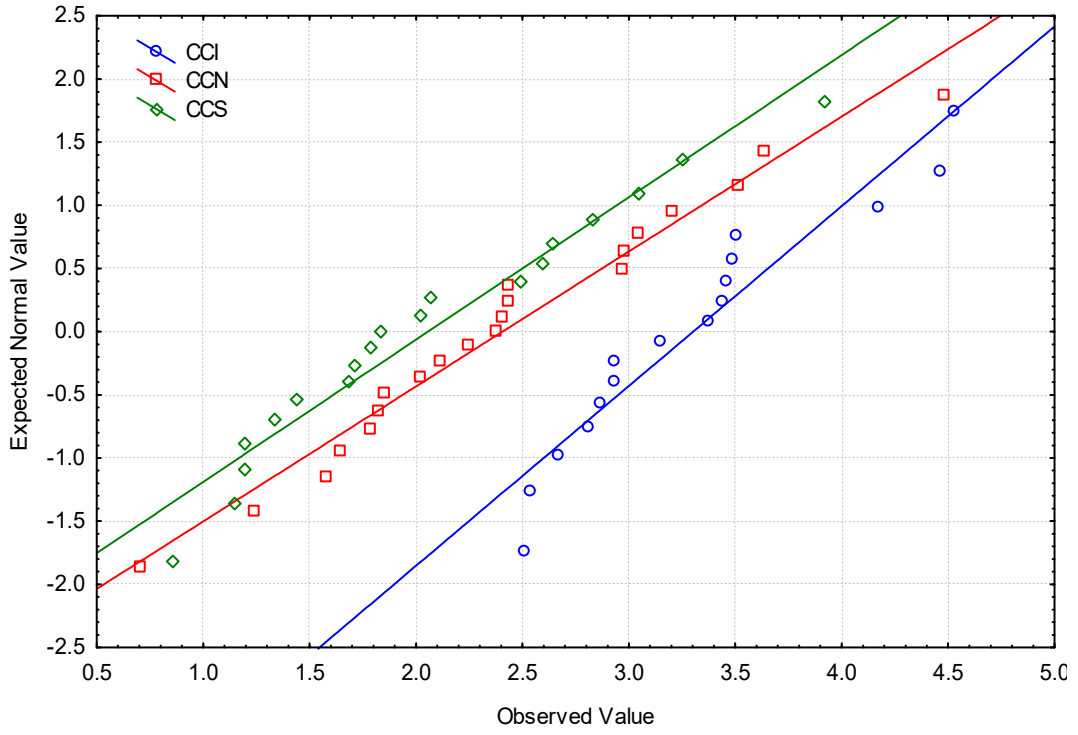
Canyon Creek Sed/Fil
Influent v. Effluent, Total Zn



Canyon Creek Sed/Fil
Comparison of Media Types
Total Zinc (ug/l)

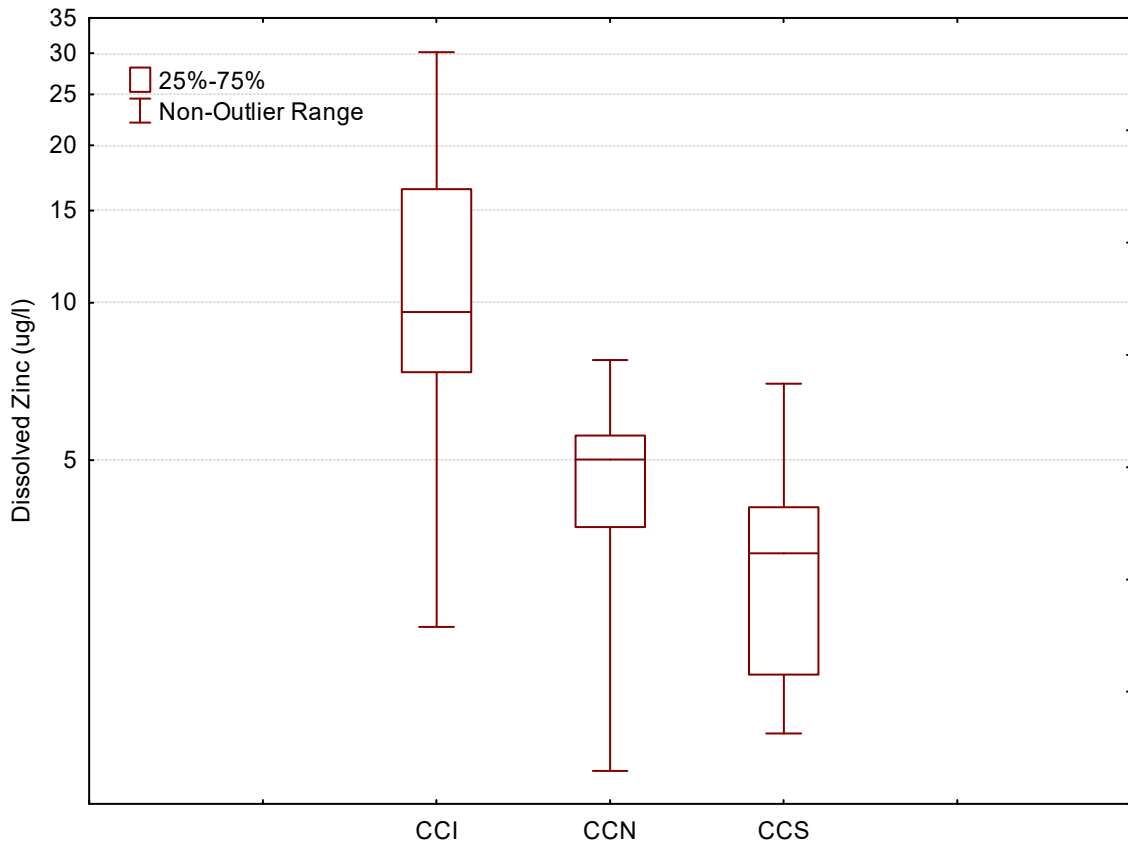
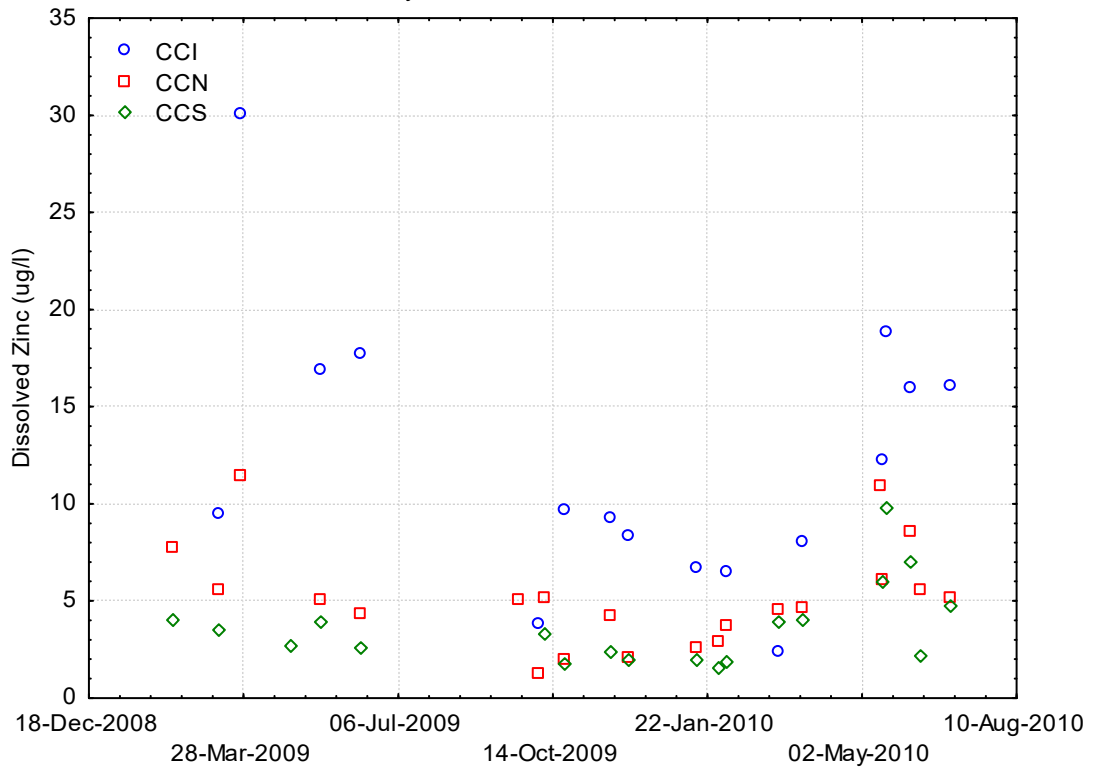


Normal Probability Plot of Log Transformed Data
Total Zinc

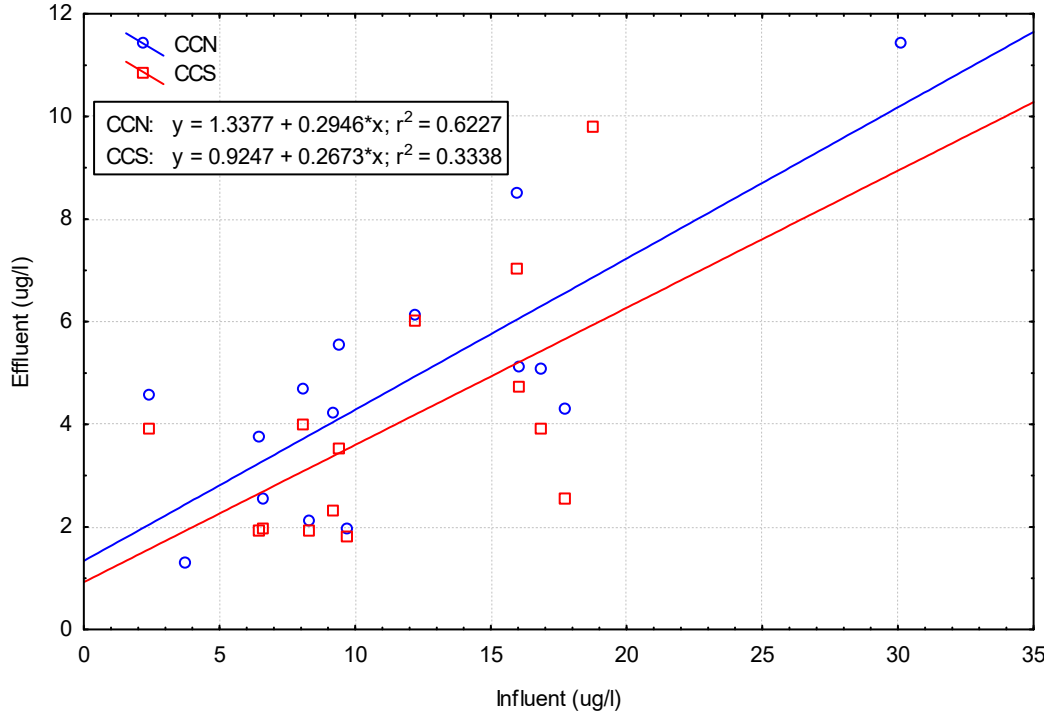


Canyon Creek Dissolved Zinc ($\mu\text{g/l}$)		CCI	CCN	CCS
Non-Parametric	n	16	21	19
	Max	30.1	11.4	9.8
	Upper Quartile Range	16.5	5.57	4.06
	Median	9.59	5.01	3.32
	Lower Quartile Range	7.36	3.72	1.94
	Min	2.40	1.27	1.50
	Eff.		47.8%	65.4%
	Paired n		15	14
	Wilcoxon		<i>0.0008</i>	<i>0.0012</i>
	Mann-Whitney		<i>0.0002</i>	<i>0.0000</i>
	Paired n			17
	Wilcoxon		<i>0.0003</i>	
	Mann-Whitney		<i>0.0217</i>	
Arithmetic	UCL	15.7	6.38	4.64
	Mean	12.0	5.16	3.63
	LCL	8.28	3.95	2.61
	Std. Dev.	6.98	2.67	2.10
	W-Test p	0.1518	0.0576	<i>0.0035</i>
	Eff.		57.0%	69.8%
	t-Test (paired)		<i>0.0002</i>	<i>0.0000</i>
	t-Test (pooled)		<i>0.0002</i>	<i>0.0000</i>
	t-Test (sep.)		<i>0.0015</i>	<i>0.0002</i>
	Levene		<i>0.0010</i>	<i>0.0004</i>
	t-Test (paired)		<i>0.0001</i>	
	t-Test (pooled)		0.0520	
	t-Test (sep.)		<i>0.0494</i>	
	Levene		0.4855	
Log Transformed	Geometric Mean	10.1	4.52	3.18
	UCL	19.2	7.18	4.90
	Mean	12.4	5.26	3.62
	LCL	8.02	3.85	2.68
	Std. Dev.	8.81	3.12	1.96
	W-Test p	0.6326	0.4573	0.4578
	Eff.		57.6%	70.8%
	t-Test (paired)		<i>0.0000</i>	<i>0.0000</i>
	t-Test (pooled)		<i>0.0002</i>	<i>0.0000</i>
	t-Test (sep.)		<i>0.0004</i>	<i>0.0000</i>
	Levene		0.4932	0.5310
	t-Test (paired)		<i>0.0000</i>	
	t-Test (pooled)		<i>0.0433</i>	
	t-Test (sep.)		<i>0.0425</i>	
Levene		0.8845		
Bootstrap	UCL			
	Mean			
	LCL			
	Std. Dev.			
	Eff.			

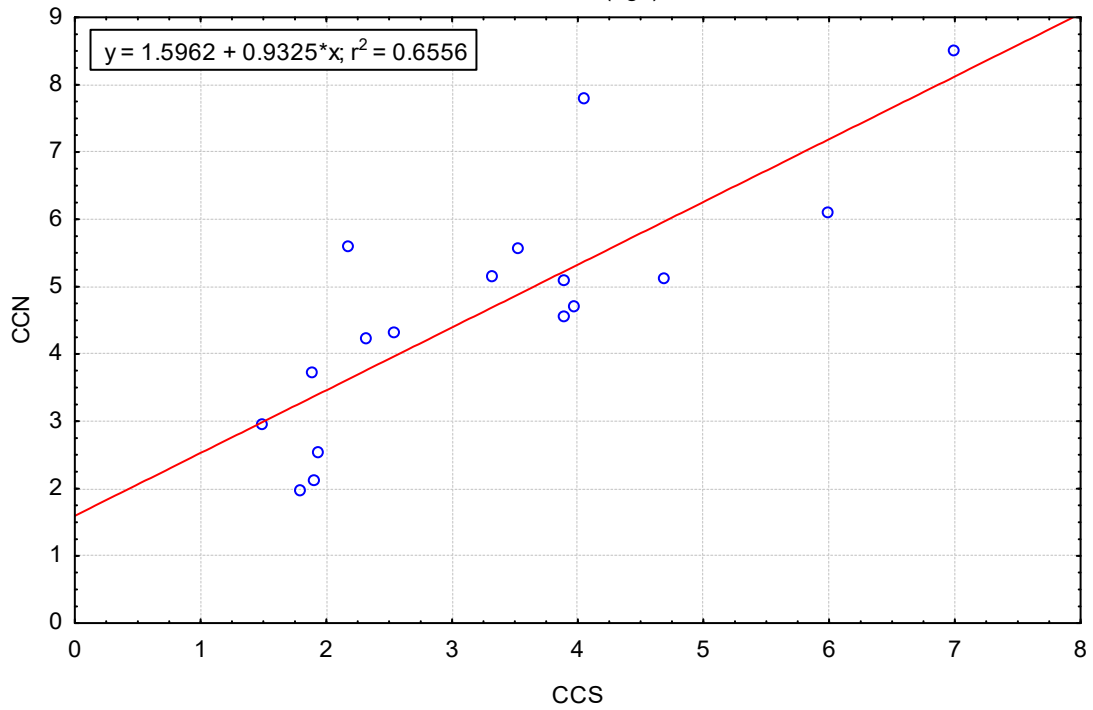
Canyon Creek Sed/Fil Time Series



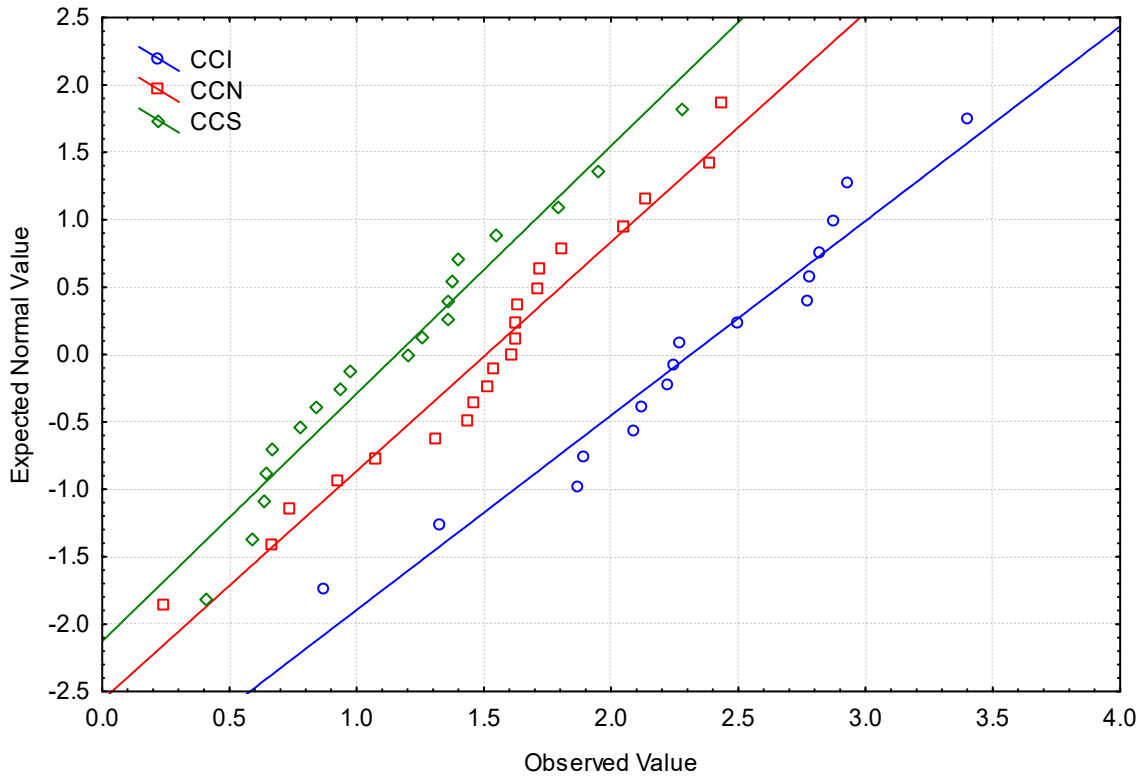
Canyon Creek Sed/Fil
Influent v. Effluent, Dissolved Zn



Canyon Creek Sed/Fil
Comparison of Media Types
Dissolved Zinc (ug/l)

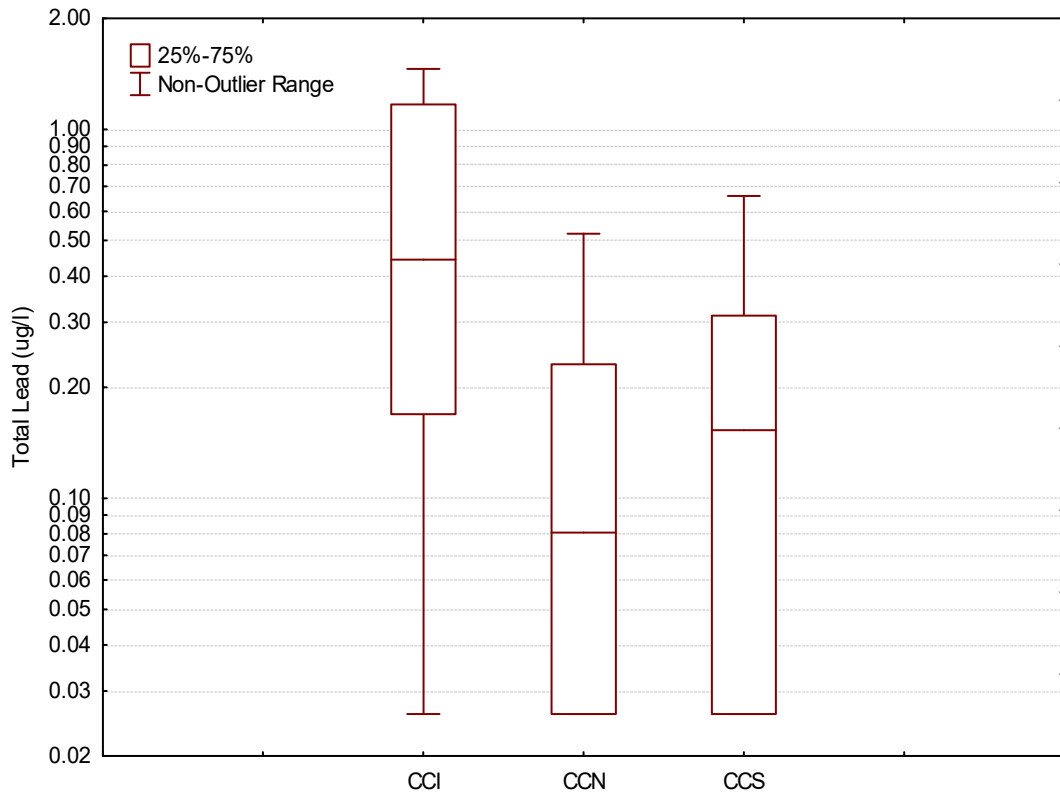
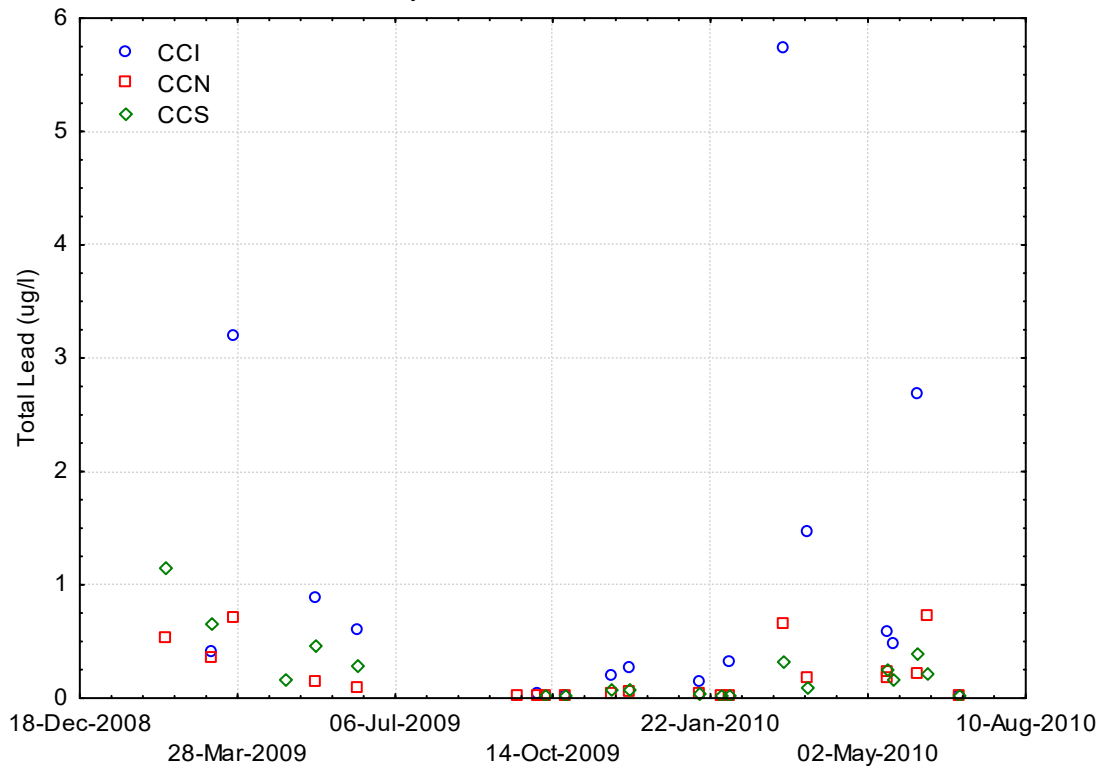


Normal Probability Plot of Log Transformed Data
Dissolved Zinc

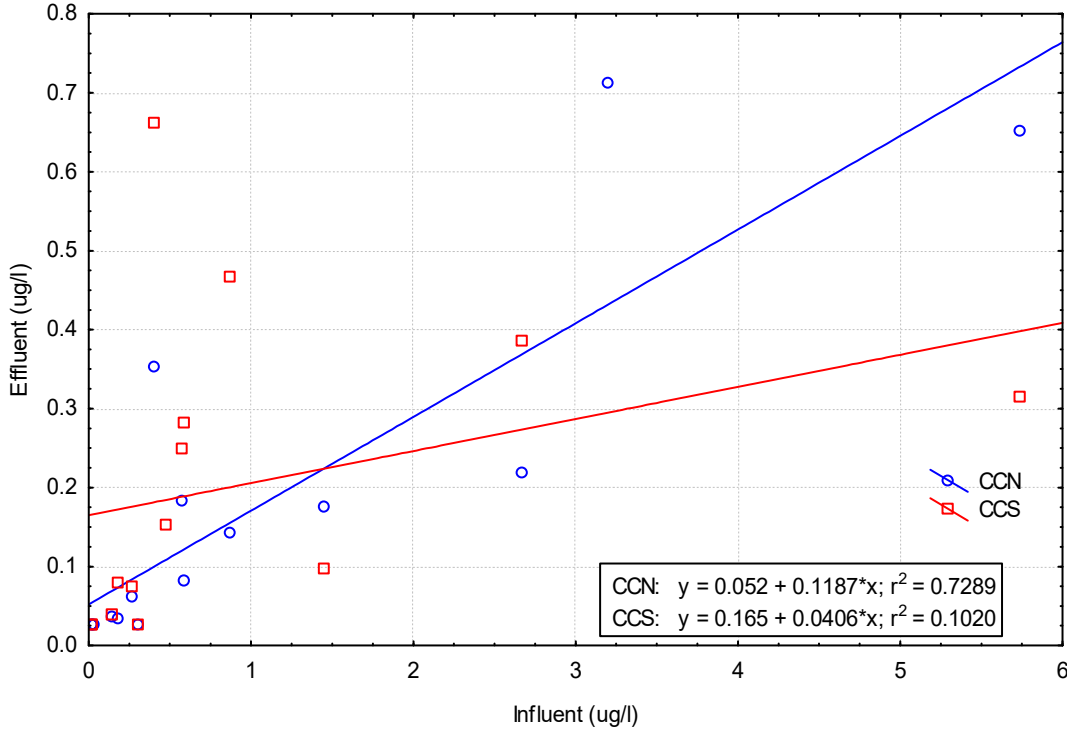


		Canyon Creek Total Lead (µg/l)		
		CCI	CCN	CCS
Non-Parametric	n	16	21	19
	Max	5.74	0.72	1.14
	Upper Quartile Range	1.17	0.23	0.31
	Median	0.44	0.08	0.15
	Lower Quartile Range	0.17	0.03	0.03
	Min	0.03	0.03	0.03
	Efficiency		81.8%	65.5%
	Paired n		15	14
	Wilcoxon		<i>0.0010</i>	<i>0.0035</i>
	Mann-Whitney		<i>0.0093</i>	<i>0.0182</i>
	Paired n			17
	Wilcoxon			0.2330
	Mann-Whitney			0.7076
Arithmetic	UCL	1.90	0.31	0.37
	Mean	1.06	0.20	0.23
	LCL	0.23	0.09	0.10
	Std. Dev.	1.56	0.24	0.28
	W-Test p	<i>0.0001</i>	<i>0.0001</i>	<i>0.0002</i>
	Efficiency		80.8%	78.1%
	t-Test (paired)		<i>0.0250</i>	0.0716
	t-Test (pooled)		<i>0.0174</i>	<i>0.0289</i>
	t-Test (sep.)		<i>0.0446</i>	0.0519
	Levene		<i>0.0004</i>	<i>0.0009</i>
	t-Test (paired)			0.4362
	t-Test (pooled)			0.7288
	t-Test (sep.)			0.7309
	Levene			0.8877
	Log Transformed	Geometric Mean	0.39	0.10
UCL		6.94	0.56	0.65
Mean		1.46	0.22	0.26
LCL		0.31	0.09	0.10
Std. Dev.		5.27	0.46	0.49
W-Test p		0.5871	<i>0.0041</i>	0.1131
Efficiency			84.7%	82.3%
t-Test (paired)			<i>0.0000</i>	<i>0.0010</i>
t-Test (pooled)			<i>0.0067</i>	<i>0.0218</i>
t-Test (sep.)			<i>0.0094</i>	<i>0.0261</i>
Levene			0.7005	0.4865
t-Test (paired)				0.2399
t-Test (pooled)				0.5956
t-Test (sep.)				0.5949
Levene				0.5963
Bootstrap	UCL			
	Mean			
	LCL			
	Std. Dev.			
	Eff.			

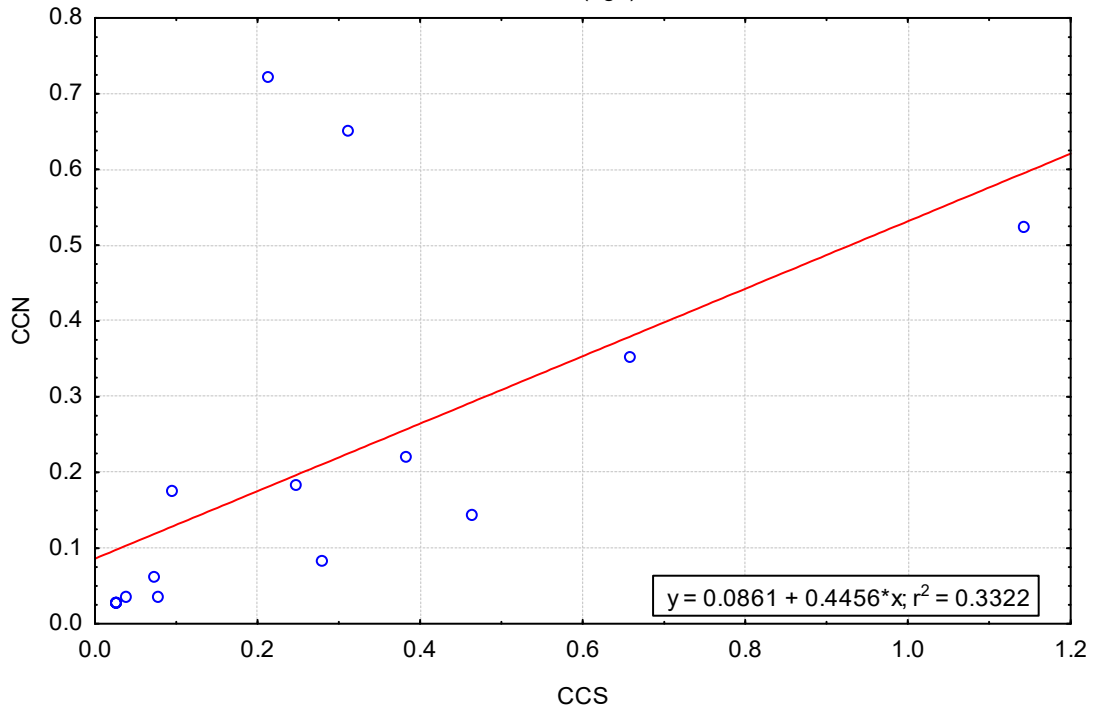
Canyon Creek Sed/Fil Time Series



Canyon Creek Sed/Fil
Influent v. Effluent, Total Pb

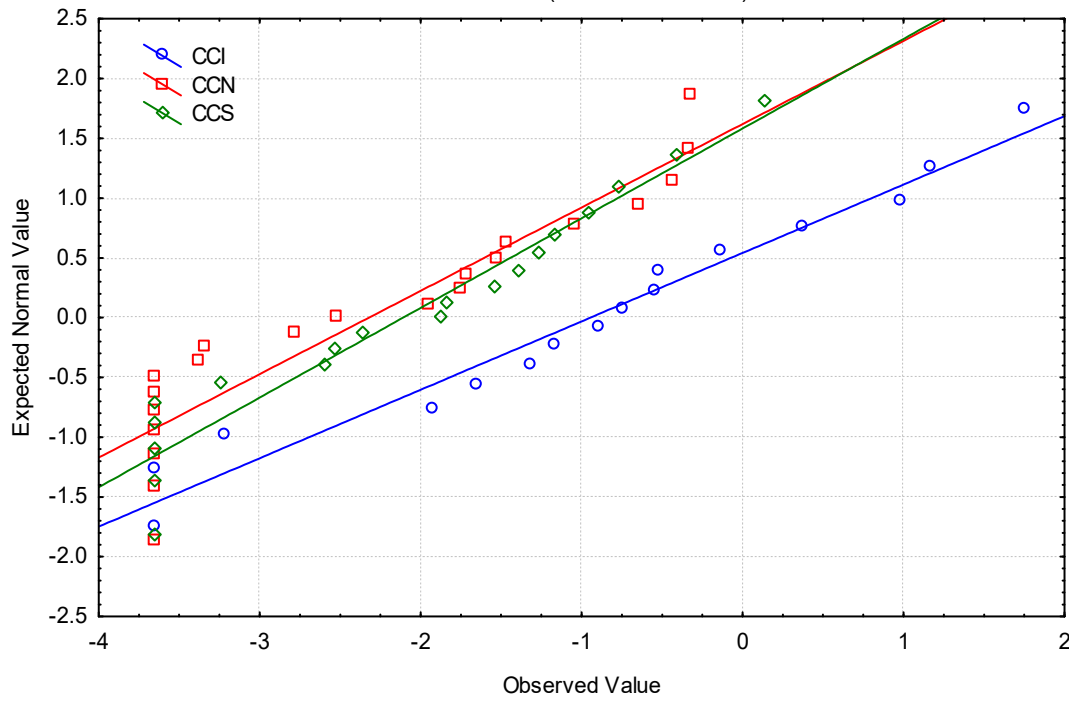


Canyon Creek Sed/Fil
Comparison of Media Types
Total Lead (ug/l)



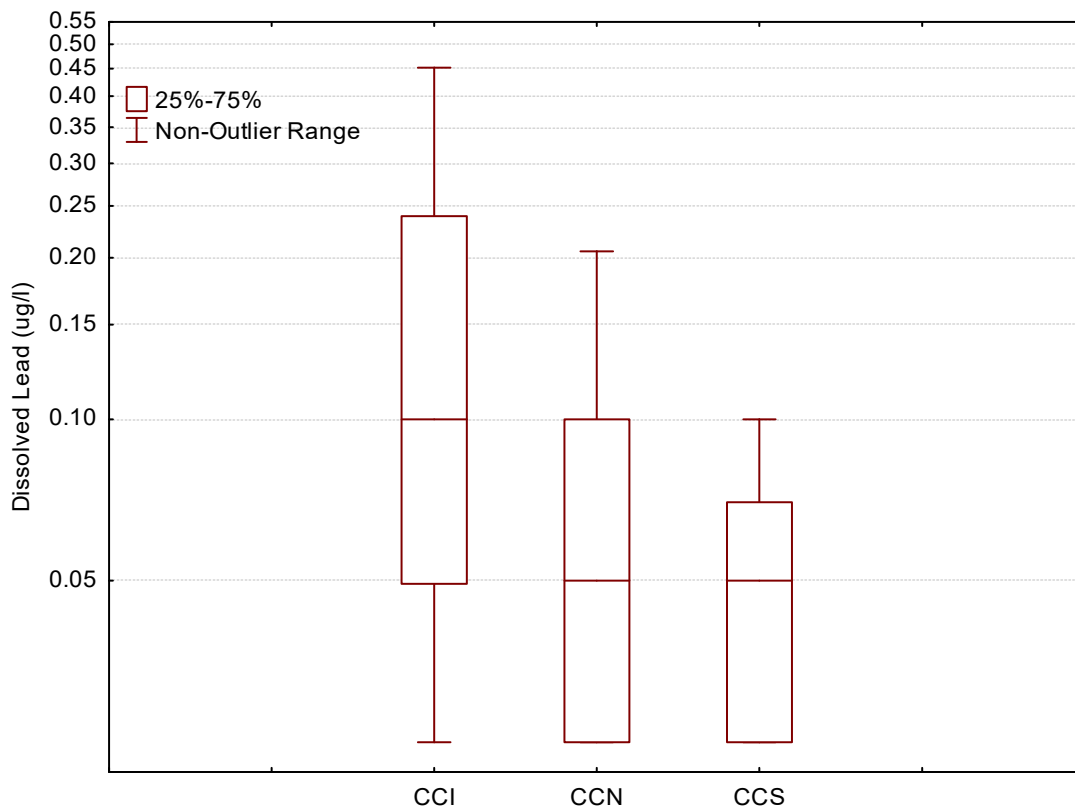
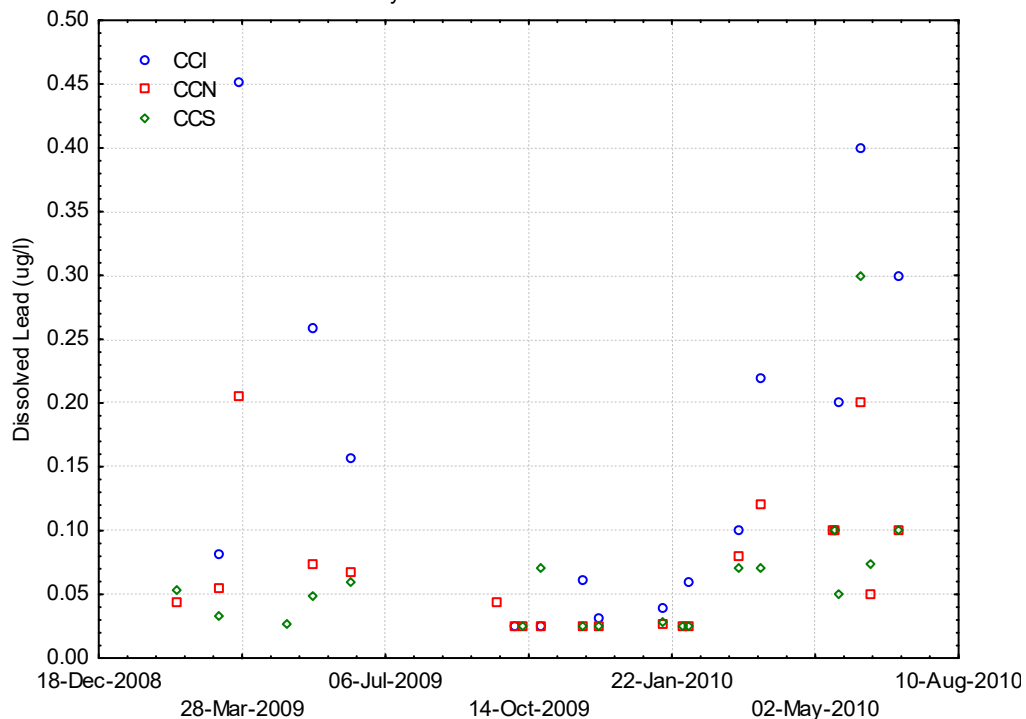
Normal Probability Plot of Log Transformed Data
Total Lead

Exclude condition: NOT("Parameter" = 113)

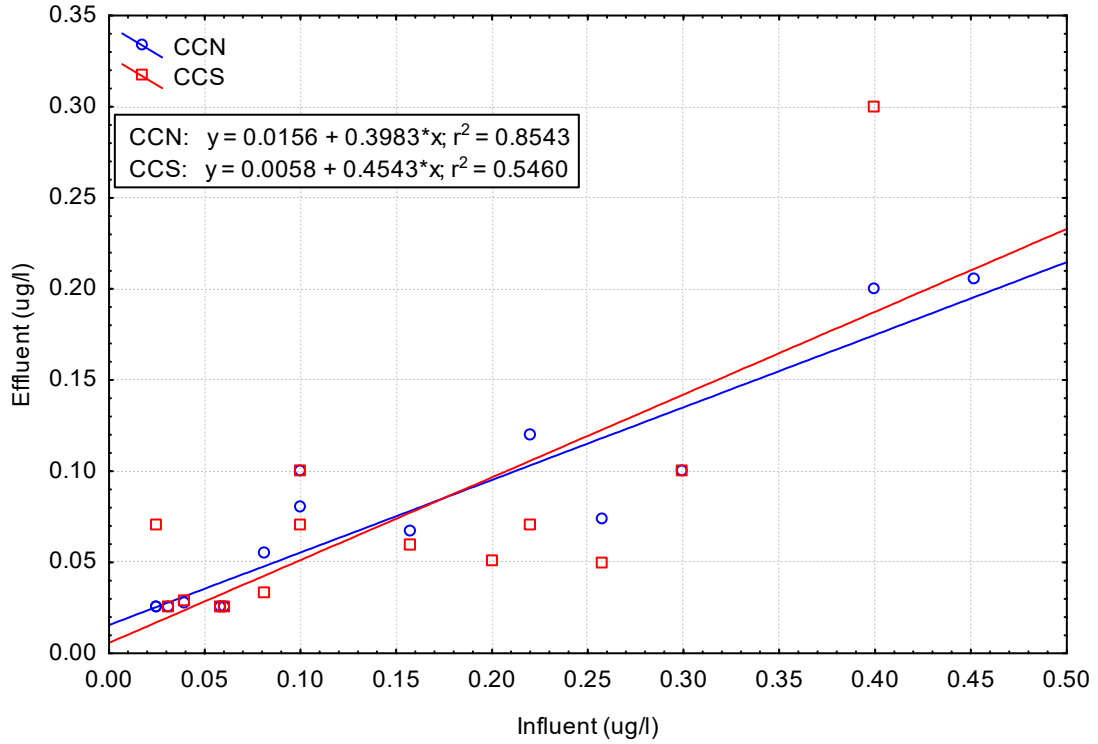


		Canyon Creek Dissolved Lead (µg/l)		
		CCI	CCN	CCS
Non-Parametric	n	16	21	19
	Max	0.45	0.21	0.30
	Upper Quartile Range	0.24	0.10	0.07
	Median	0.10	0.05	0.05
	Lower Quartile Range	0.05	0.03	0.03
	Min	0.02	0.02	0.02
	Efficiency		50.0%	50.0%
	Paired n		15	14
	Wilcoxon		<i>0.0010</i>	<i>0.0043</i>
	Mann-Whitney		<i>0.0437</i>	<i>0.0373</i>
	Paired n		17	
	Wilcoxon		0.8424	
	Mann-Whitney		0.9786	
Arithmetic	UCL	0.23	0.09	0.09
	Mean	0.16	0.07	0.06
	LCL	0.08	0.04	0.03
	Std. Dev.	0.14	0.05	0.06
	W-Test p	<i>0.0250</i>	<i>0.0004</i>	<i>0.0000</i>
	Efficiency		56.3%	59.4%
	t-Test (paired)		<i>0.0042</i>	<i>0.0040</i>
	t-Test (pooled)		<i>0.0103</i>	<i>0.0115</i>
	t-Test (sep.)		<i>0.0243</i>	<i>0.0200</i>
	Levene		<i>0.0004</i>	<i>0.0010</i>
	t-Test (paired)		0.6232	
	t-Test (pooled)		0.7896	
	t-Test (sep.)		0.7912	
	Levene		0.6943	
Log Transformed	Geometric Mean	0.11	0.05	0.05
	UCL	0.35	0.11	0.09
	Mean	0.17	0.07	0.06
	LCL	0.08	0.04	0.04
	Std. Dev.	0.21	0.06	0.05
	W-Test p	0.3969	<i>0.0137</i>	<i>0.0144</i>
	Efficiency		59.2%	63.5%
	t-Test (paired)		<i>0.0001</i>	<i>0.0033</i>
	t-Test (pooled)		<i>0.0188</i>	<i>0.0102</i>
	t-Test (sep.)		<i>0.0256</i>	<i>0.0138</i>
	Levene		0.1421	0.0560
	t-Test (paired)		0.8187	
	t-Test (pooled)		0.7373	
	t-Test (sep.)		0.7364	
	Levene		0.4644	
Bootstrap	UCL			
	Mean			
	LCL			
	Std. Dev.			
	Eff.			

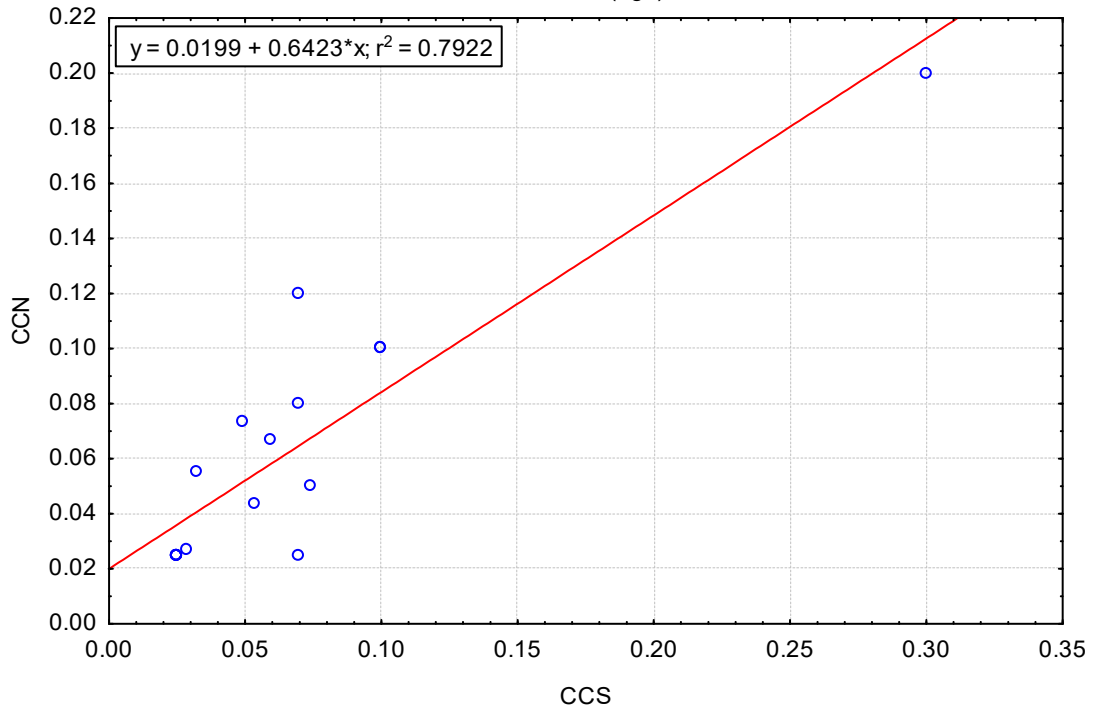
Canyon Creek Sed/Fil Time Series



Canyon Creek Sed/Fil
Influent V. Effluent, Dissolved Pb

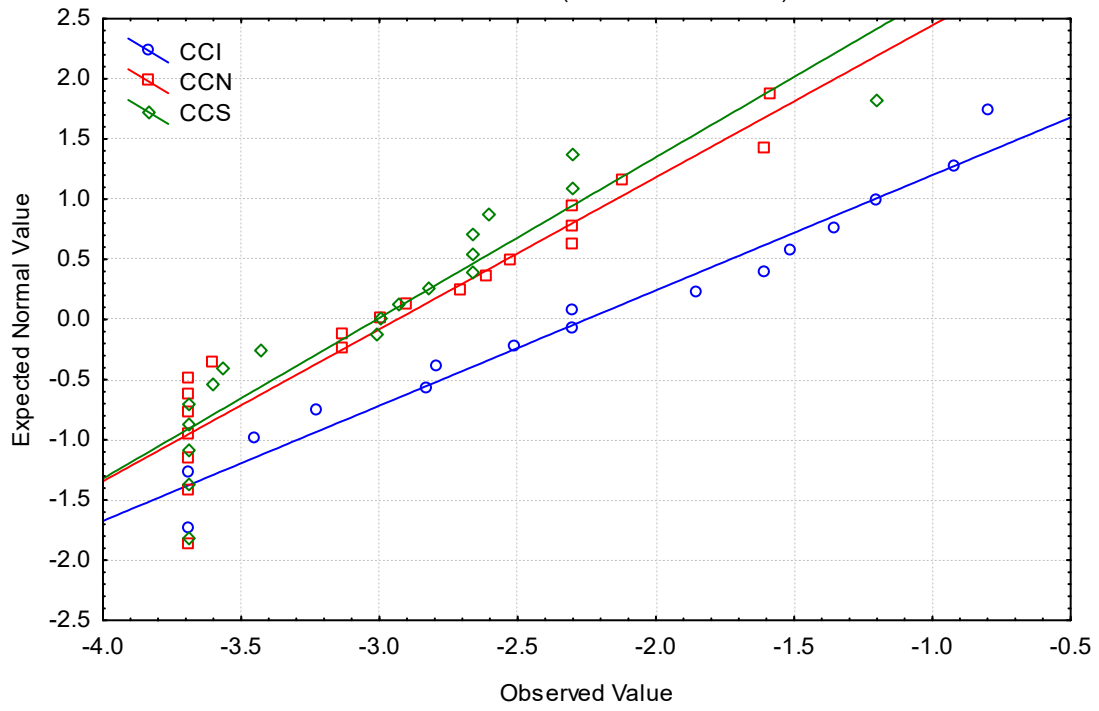


Canyon Creek Sed/Fil
Comparison of Media Types
Dissolved Lead (ug/l)



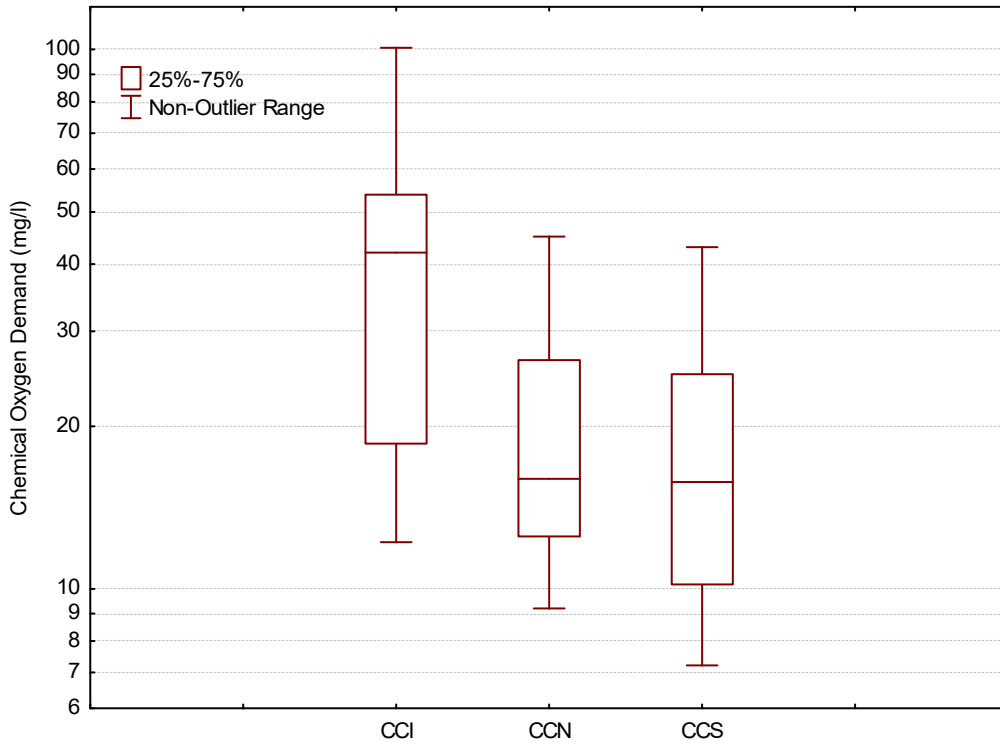
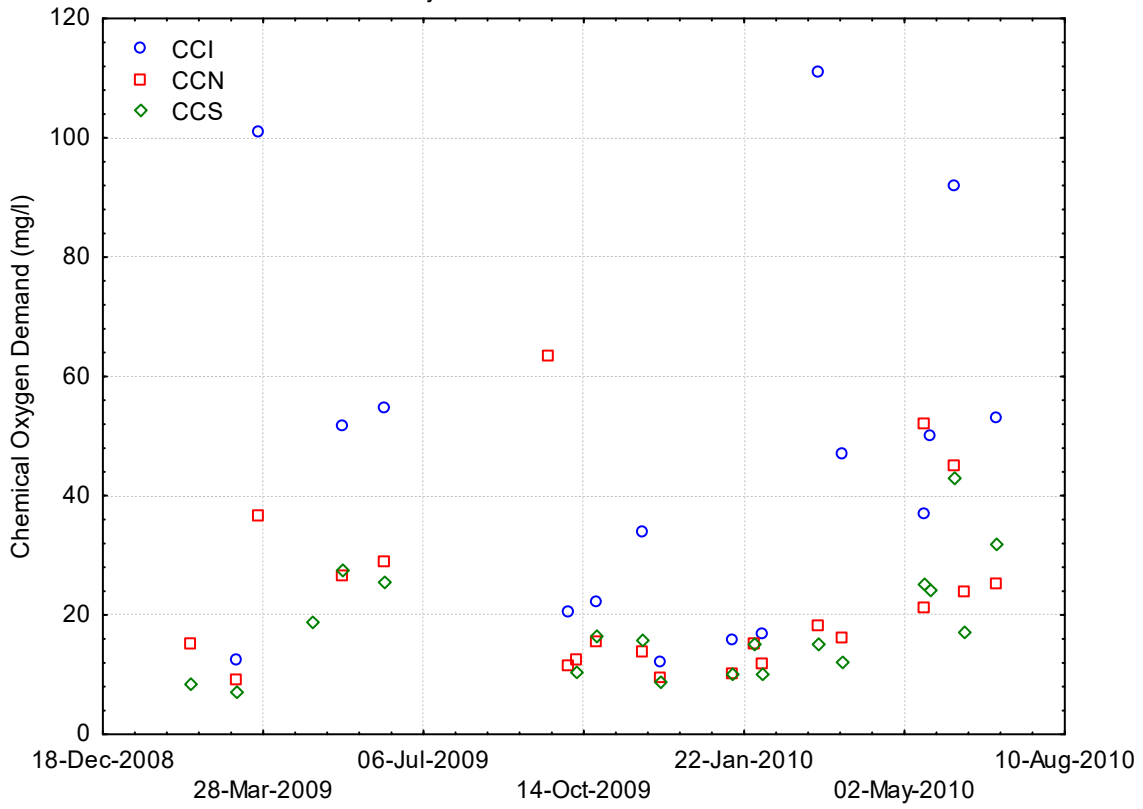
Normal Probability Plot of Log Transformed Data
Dissolved Lead

Exclude condition: NOT("Parameter" = 114)

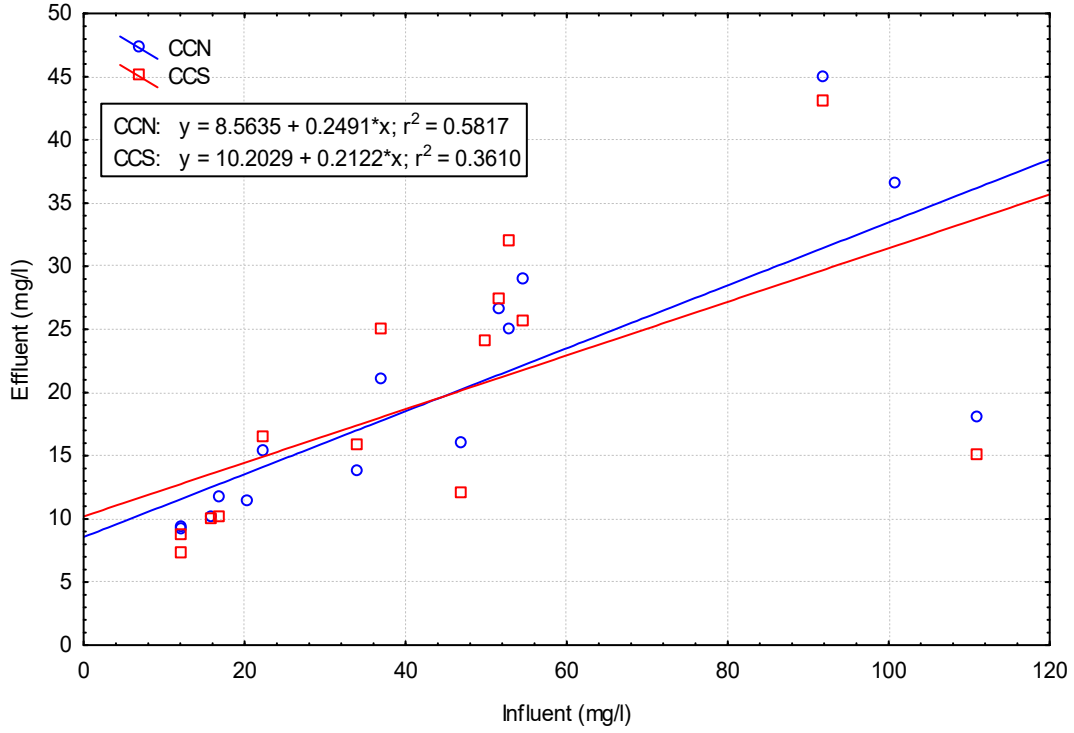


Canyon Creek Chemical Oxygen Demand (mg/l)				
		CCI	CCN	CCS
Non-Parametric	n	16	21	19
	Max	111.0	63.4	43.0
	Upper Quartile Range	53.8	26.5	25.0
	Median	42.0	16.0	15.8
	Lower Quartile Range	18.6	12.5	10.2
	Min	12.2	9.2	7.2
	Efficiency		61.9%	62.4%
	Paired n		15	14
	Wilcoxon		<i>0.0007</i>	<i>0.0010</i>
	Mann-Whitney		<i>0.0102</i>	<i>0.0009</i>
	Paired n			17
	Wilcoxon			0.1930
	Mann-Whitney			0.3755
Arithmetic	UCL	62.5	29.6	22.5
	Mean	45.7	22.9	18.0
	LCL	28.8	16.1	13.5
	Std. Dev.	31.6	14.9	9.4
	W-Test p	<i>0.0302</i>	<i>0.0012</i>	<i>0.0415</i>
	Efficiency		50.0%	60.6%
	t-Test (paired)		<i>0.0017</i>	<i>0.0029</i>
	t-Test (pooled)		<i>0.0061</i>	<i>0.0009</i>
	t-Test (sep.)		<i>0.0147</i>	<i>0.0035</i>
	Levene		<i>0.0100</i>	<i>0.0008</i>
	t-Test (paired)			0.2437
	t-Test (pooled)			0.2308
	t-Test (sep.)			0.2216
	Levene			0.1221
Log Transformed	Geometric Mean	36.1	19.4	16.0
	UCL	78.4	31.4	24.3
	Mean	47.1	22.7	18.1
	LCL	28.2	16.5	13.4
	Std. Dev.	39.4	14.0	9.6
	W-Test p	0.2926	0.2099	0.7277
	Efficiency		51.7%	61.6%
	t-Test (paired)		<i>0.0000</i>	<i>0.0001</i>
	t-Test (pooled)		<i>0.0060</i>	<i>0.0004</i>
	t-Test (sep.)		<i>0.0087</i>	<i>0.0008</i>
	Levene		0.2158	0.0703
	t-Test (paired)			0.0829
	t-Test (pooled)			0.2622
	t-Test (sep.)			0.2591
	Levene			0.4743
Bootstrap	UCL			
	Mean			
	LCL			
	Std. Dev.			
	Eff.			

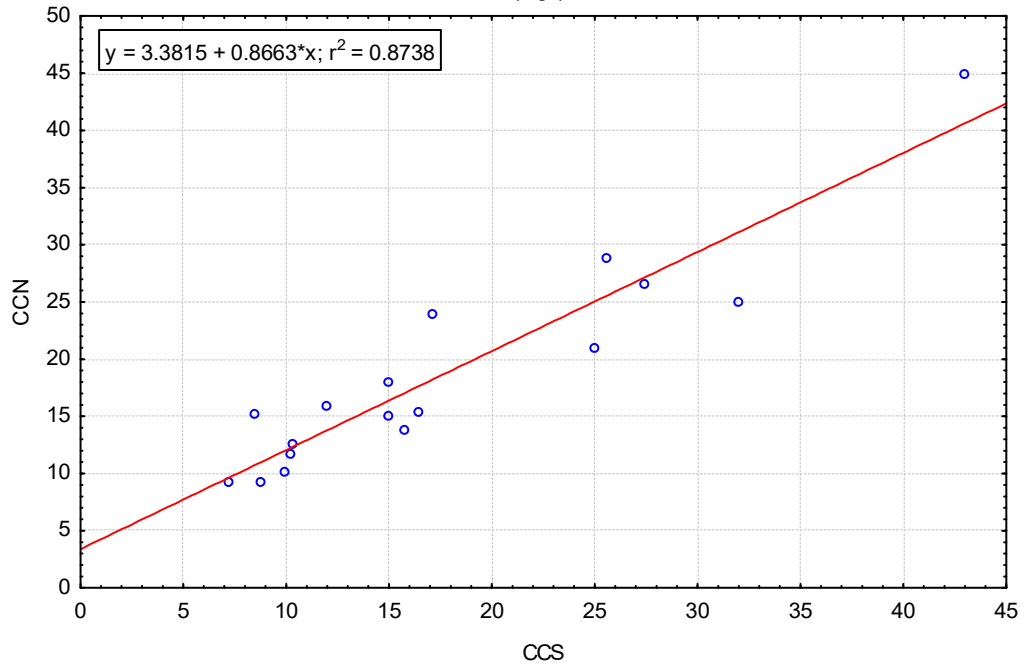
Canyon Creek Sed/Fil Time Series



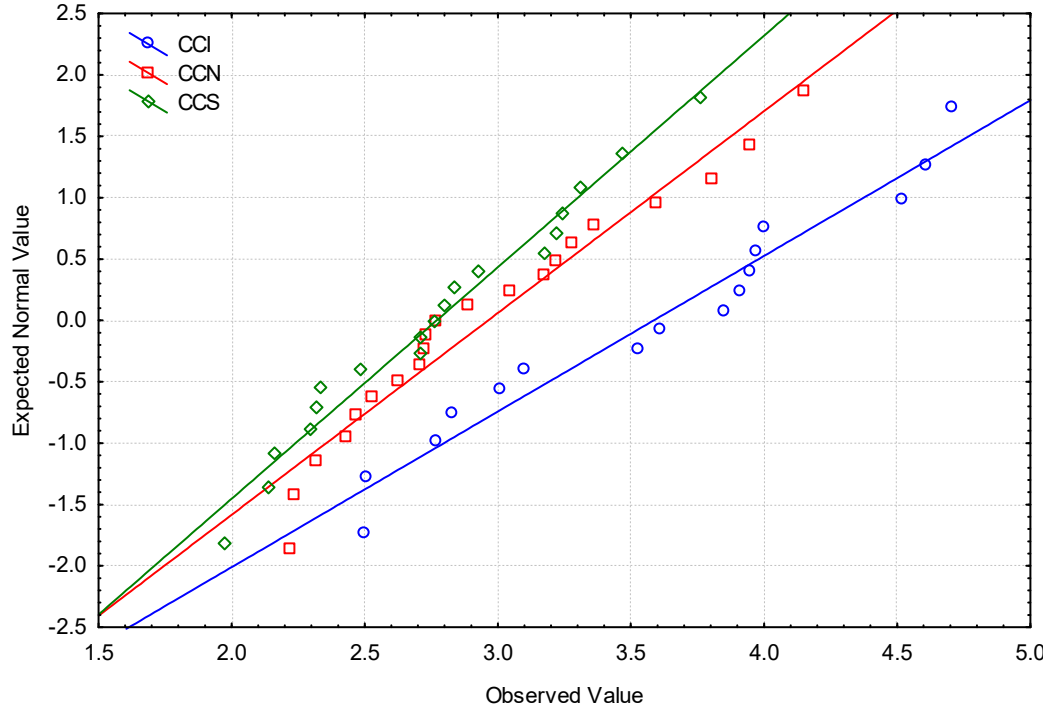
Canyon Creek Sed/Fil
Influent v. Effluent, COD



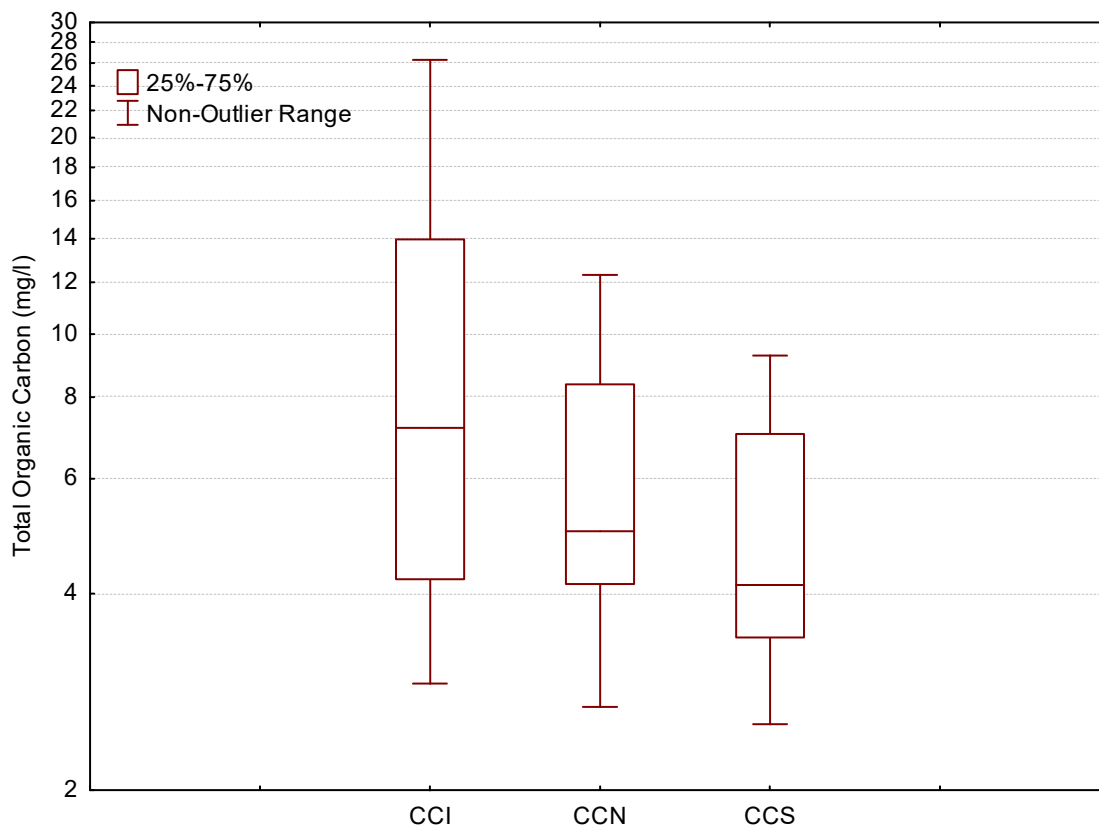
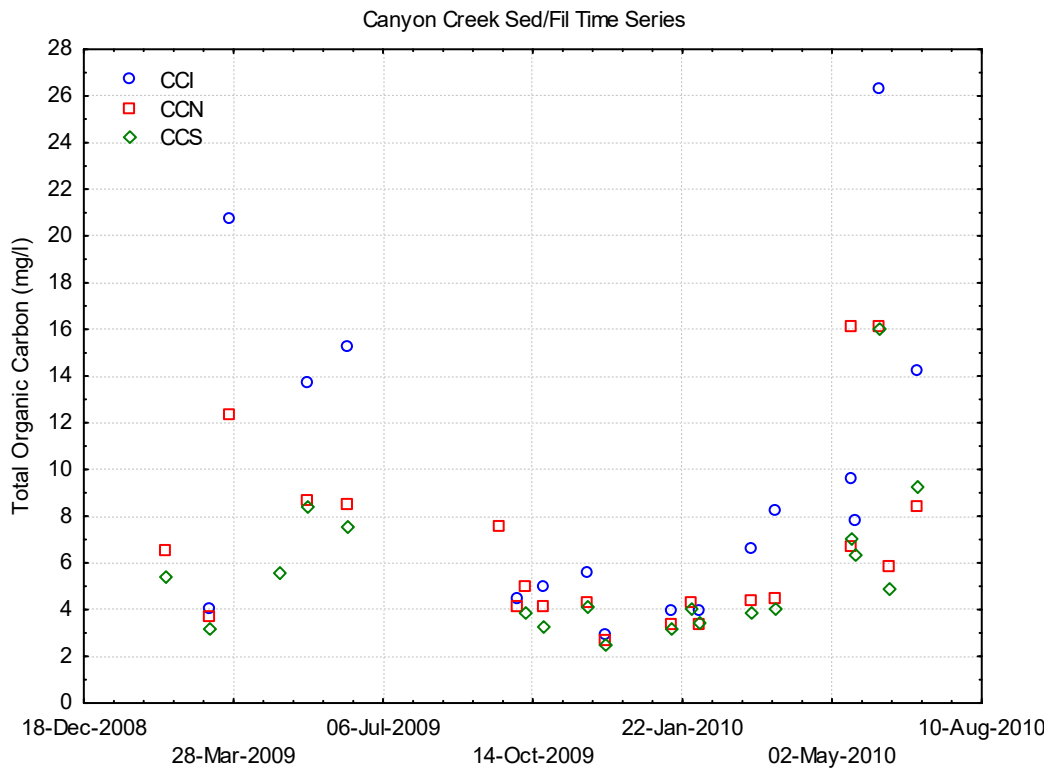
Canyon Creek Sed/Fil
Comparison of media types
COD (mg/l)



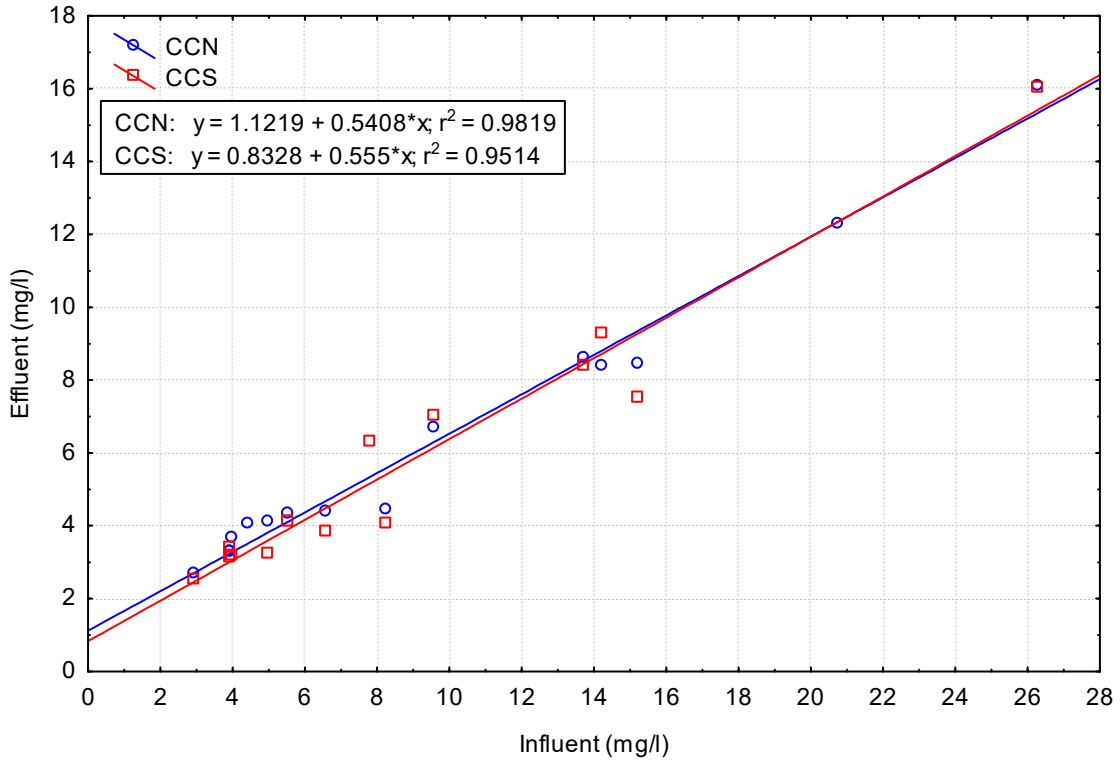
Normal Probability Plot of Log Transformed Data
Chemical Oxygen Demand



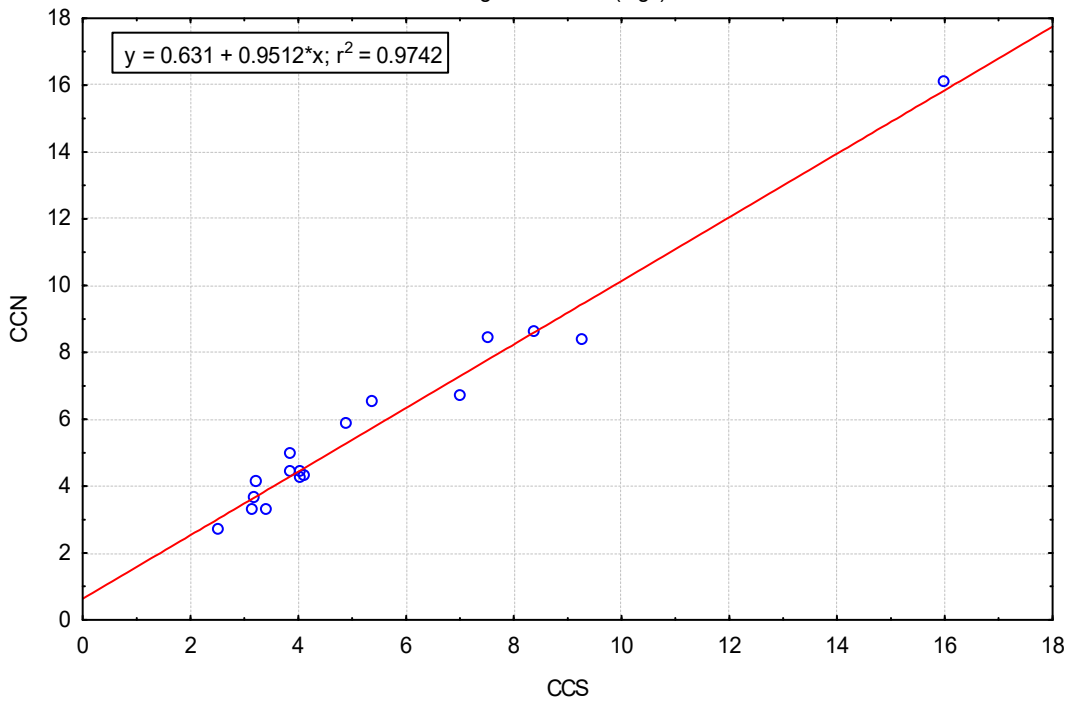
Canyon Creek Total Organic Carbon (mg/l)		CCI	CCN	CCS
Non-Parametric	n	16	21	19
	Max	26.30	16.10	16.00
	Upper Quartile Range	13.96	8.37	7.03
	Median	7.19	4.98	4.13
	Lower Quartile Range	4.21	4.14	3.43
	Min	2.91	2.68	2.53
	Efficiency		30.6%	42.6%
	Paired n		15	14
	Wilcoxon		<i>0.0007</i>	<i>0.0010</i>
	Mann-Whitney		0.2802	0.0519
	Paired n		17	
	Wilcoxon		<i>0.0099</i>	
	Mann-Whitney		0.2154	
	Arithmetic	UCL	13.12	8.45
Mean		9.50	6.67	5.57
LCL		5.88	4.89	4.04
Std. Dev.		6.79	3.91	3.17
W-Test p		<i>0.0114</i>	<i>0.0009</i>	<i>0.0005</i>
Efficiency			29.8%	41.4%
t-Test (paired)			<i>0.0016</i>	<i>0.0014</i>
t-Test (pooled)			0.1189	<i>0.0311</i>
t-Test (sep.)			0.1500	<i>0.0457</i>
Levene			<i>0.0300</i>	<i>0.0060</i>
t-Test (paired)			<i>0.0147</i>	
t-Test (pooled)			0.3388	
t-Test (sep.)			0.3338	
Levene			0.3513	
Log Transformed	Geometric Mean	7.67	5.83	4.97
	UCL	15.11	8.85	7.26
	Mean	9.56	6.64	5.53
	LCL	6.06	4.99	4.22
	Std. Dev.	7.13	3.63	2.70
	W-Test p	0.4332	0.1605	0.2442
	Efficiency		30.5%	42.1%
	t-Test (paired)		<i>0.0000</i>	<i>0.0000</i>
	t-Test (pooled)		0.1650	<i>0.0303</i>
	t-Test (sep.)		0.1824	<i>0.0373</i>
	Levene		0.1984	0.0815
	t-Test (paired)		<i>0.0041</i>	
	t-Test (pooled)		0.3109	
	t-Test (sep.)		0.3084	
Levene		0.5556		
Bootstrap	UCL			
	Mean			
	LCL			
	Std. Dev.			
	Eff.			



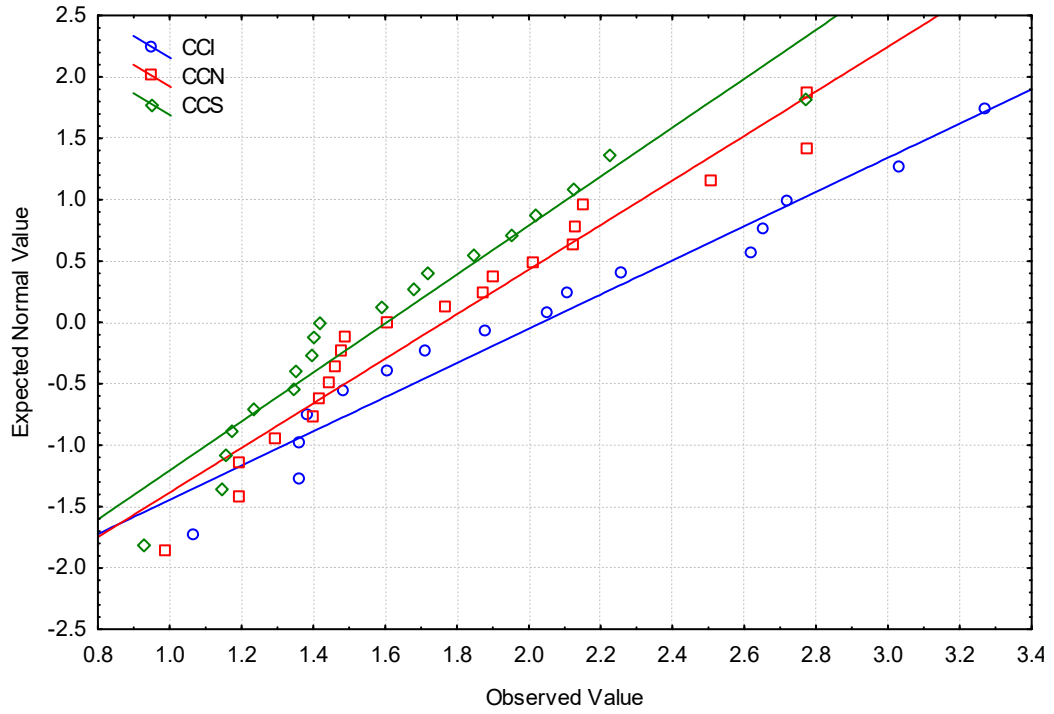
Canyon Creek Sed/Fil
Influent v. Effluent, TOC



Canyon Creek Sed/Fil
comparison of Media Types
Total Organic Carbon (mg/l)

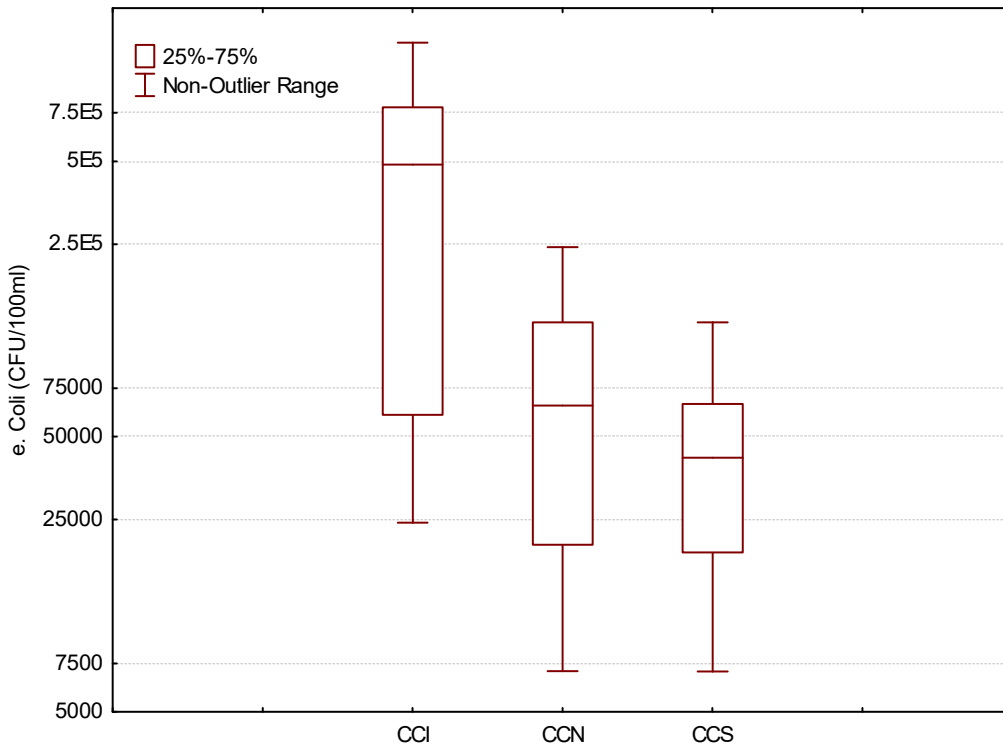
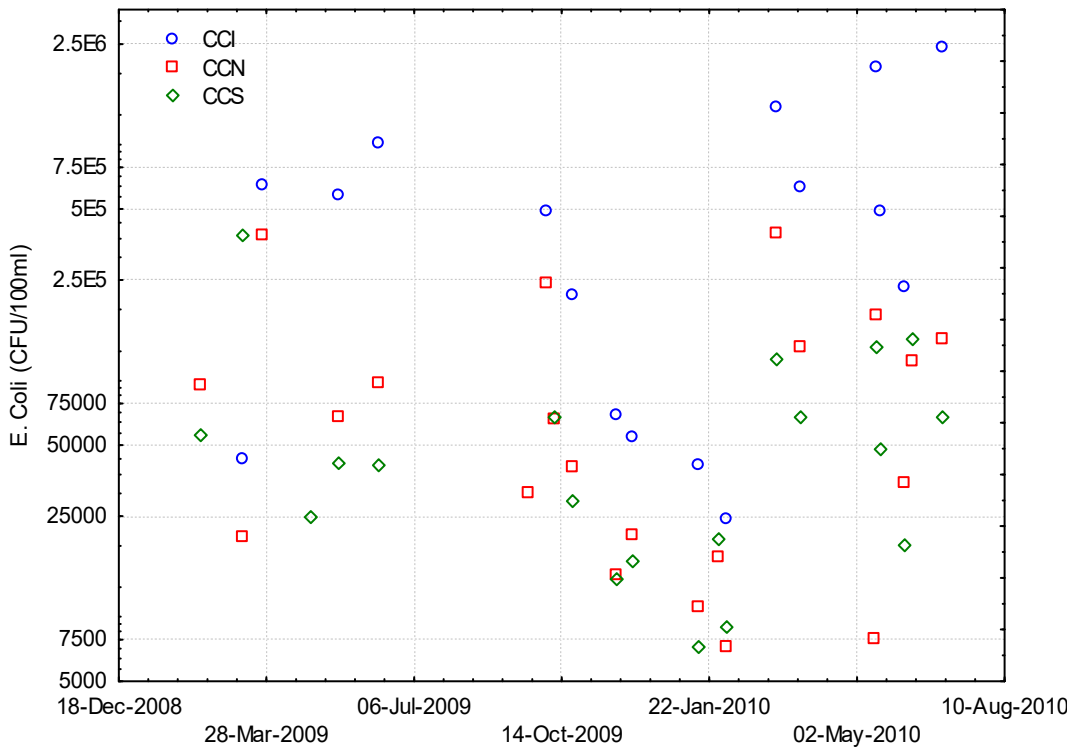


Normal Probability Plot of Log Transformed Data
Total Organic Carbon

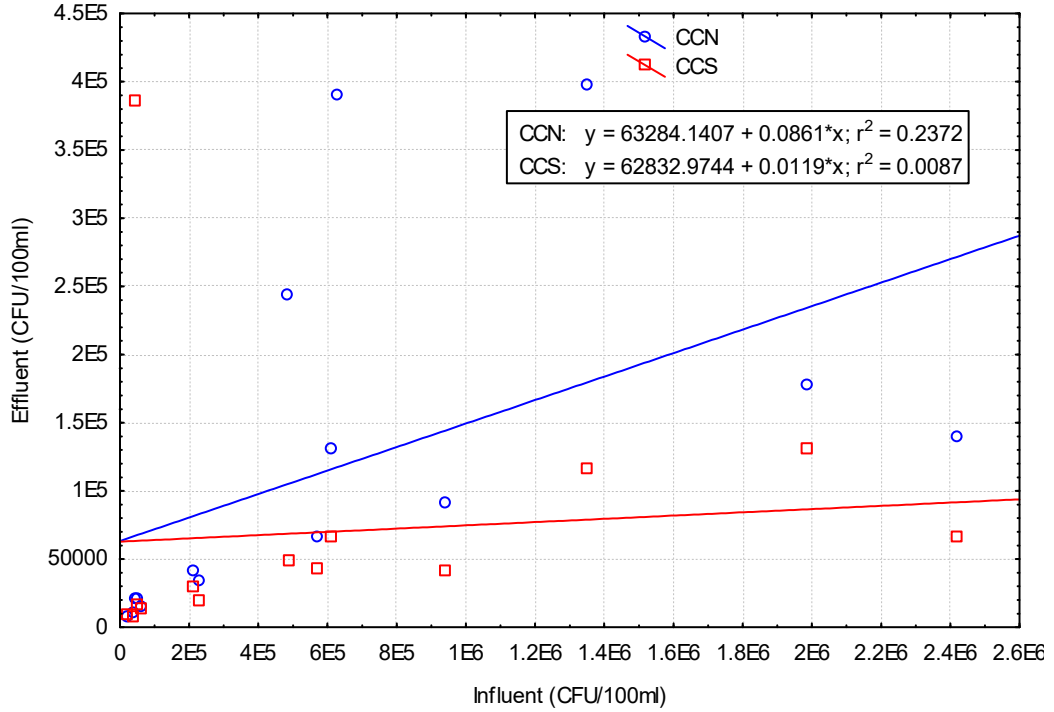


Canyon Creek e. Coli (CFU/100ml)				
		CCI	CCN	CCS
Non-Parametric	n	16	21	19
	Max	2420000	397000	386002
	Upper Quartile Range	786391	130000	65700
	Median	486950	64856	41956
	Lower Quartile Range	60011	20220	19000
	Min	24383	7033	7019
	Efficiency		86.7%	91.4%
	Paired n		15	14
	Wilcoxon		<i>0.0007</i>	<i>0.0043</i>
	Mann-Whitney		<i>0.0008</i>	<i>0.0003</i>
	Paired n			17
	Wilcoxon			0.0615
	Mann-Whitney			0.4688
Arithmetic	UCL	1018497	153044	109810
	Mean	635392	100267	68014
	LCL	252287	47489	26218
	Std. Dev.	718957	115944	86716
	W-Test p	<i>0.0031</i>	<i>0.0002</i>	<i>0.0000</i>
	Efficiency		84.2%	89.3%
	t-Test (paired)		<i>0.0104</i>	<i>0.0149</i>
	t-Test (pooled)		<i>0.0019</i>	<i>0.0017</i>
	t-Test (sep.)		<i>0.0096</i>	<i>0.0066</i>
	Levene		<i>0.0002</i>	<i>0.0002</i>
	t-Test (paired)			0.6689
	t-Test (pooled)			0.3296
	t-Test (sep.)			0.3229
	Levene			0.1701
Log Transformed	Geometric Mean	289738	52085	40633
	UCL	3330041	271189	140107
	Mean	865937	112545	68676
	LCL	225176	46707	33663
	Std. Dev.	2438851	215579	93578
	W-Test p	0.1956	0.5468	0.9582
	Efficiency		87.0%	92.1%
	t-Test (paired)		<i>0.0000</i>	<i>0.0002</i>
	t-Test (pooled)		<i>0.0005</i>	<i>0.0001</i>
	t-Test (sep.)		<i>0.0008</i>	<i>0.0001</i>
	Levene		0.3712	0.0544
	t-Test (paired)			0.4598
	t-Test (pooled)			0.4971
	t-Test (sep.)			0.4930
Levene			0.2078	
Bootstrap	UCL			
	Mean			
	LCL			
	Std. Dev.			
	Eff.			

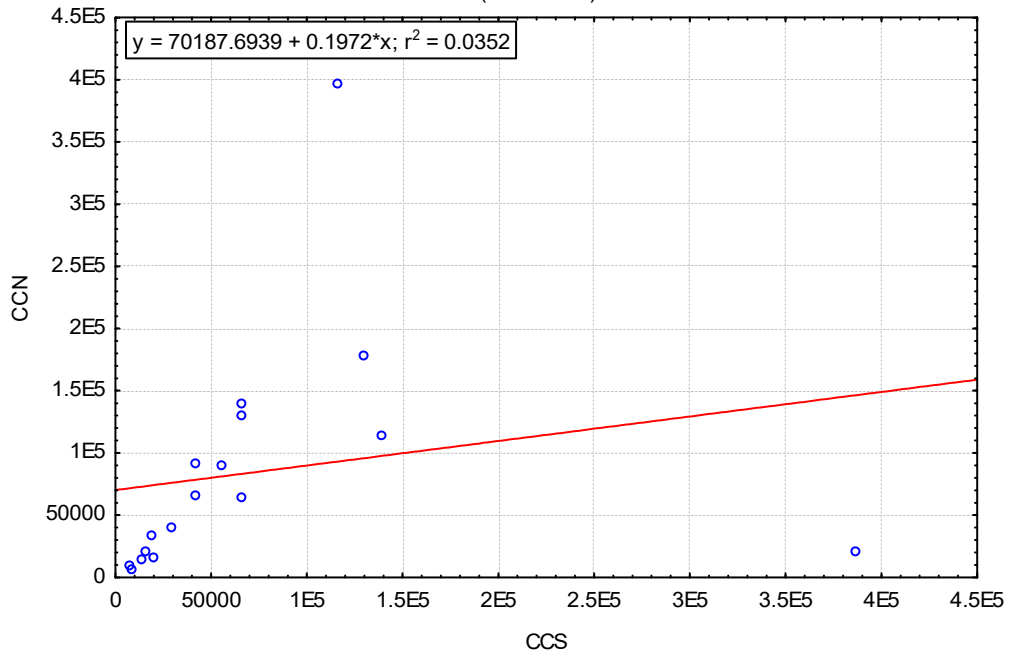
Canyon Creek Sed/Fil Time Series



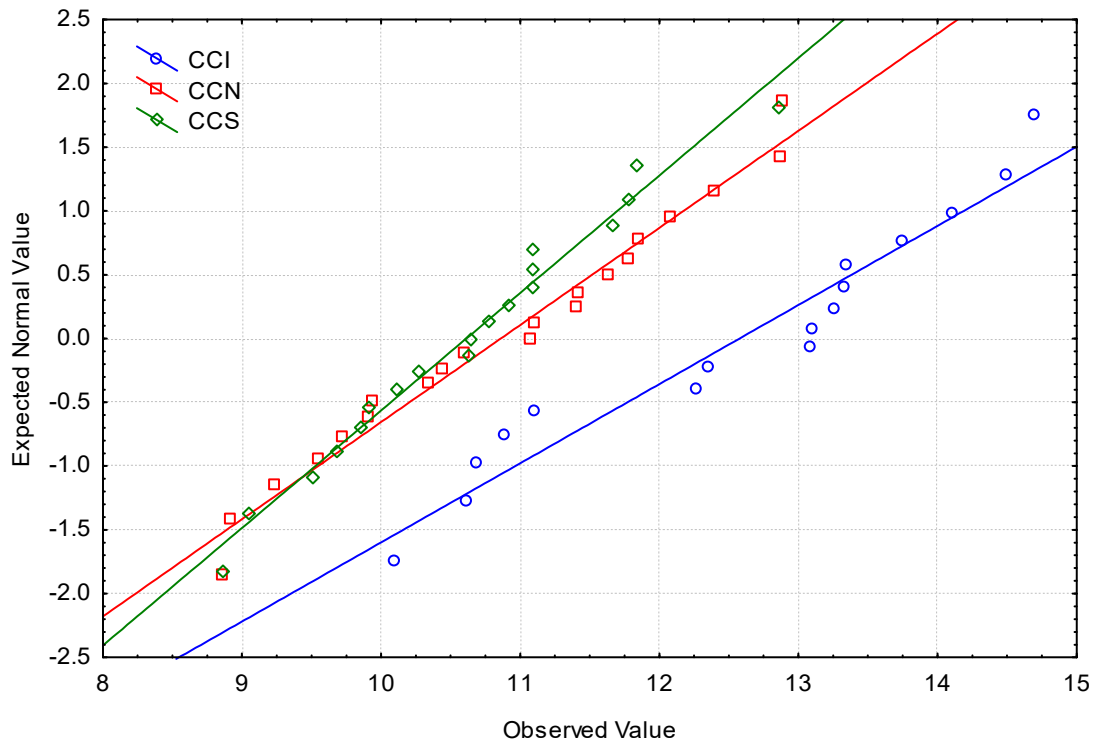
Canyon Creek Sed/Fil
Influent v. Effluent, E. Coli



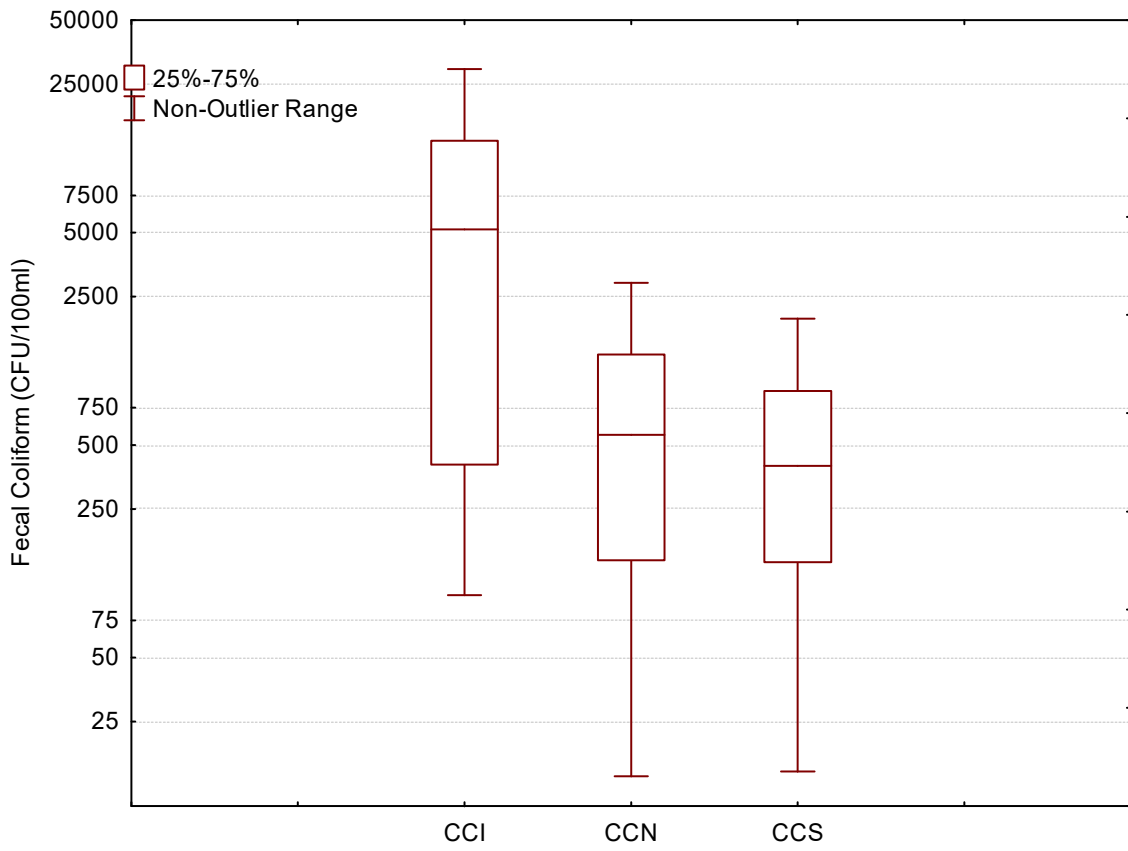
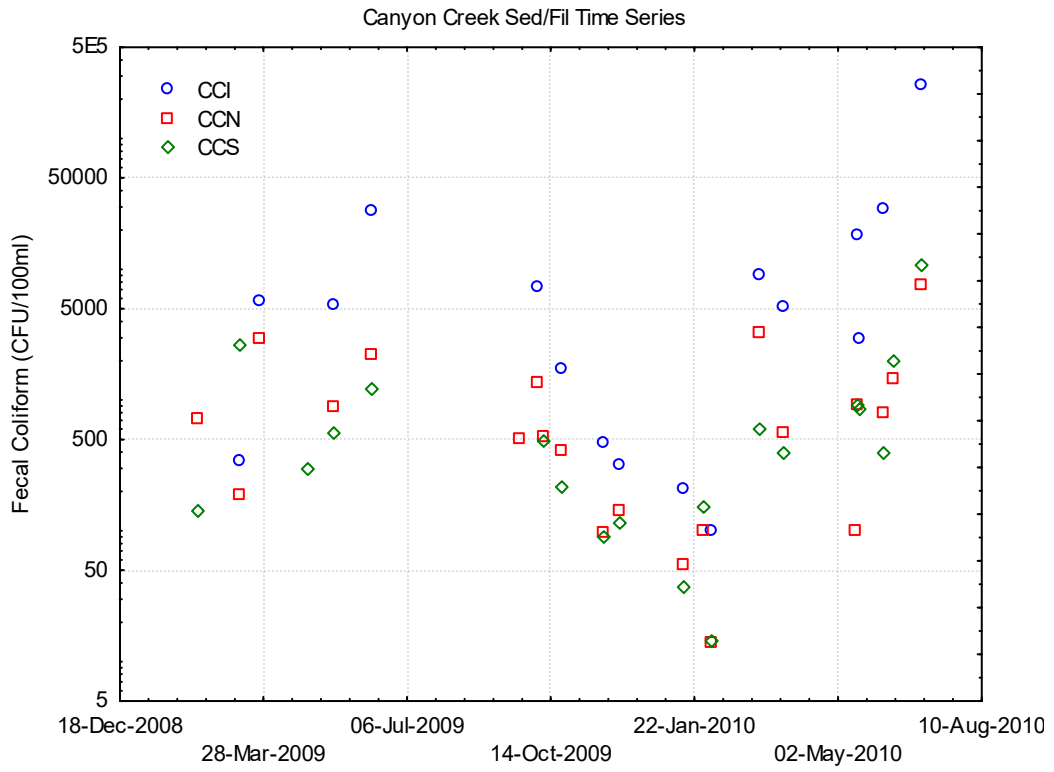
Canyon Creek Sed/Fil
Comparison of Media Types
E. Coli (CFU/100ml)



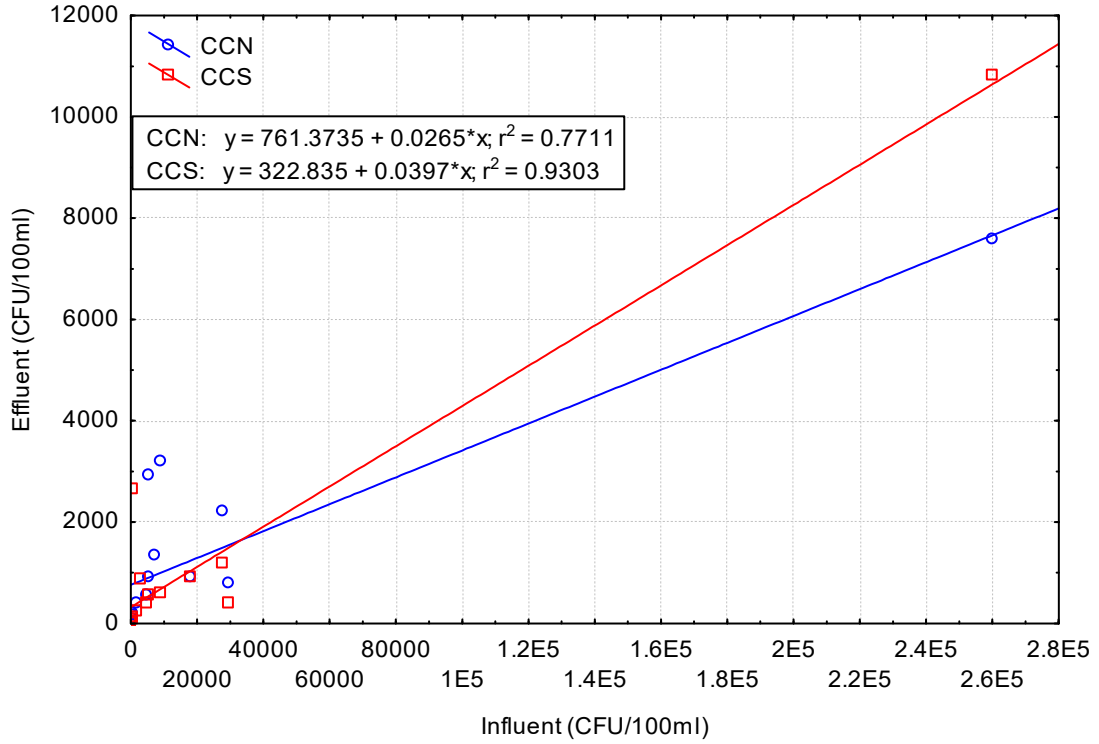
Normal Probability Plot of Log Transformed Data
E. Coli



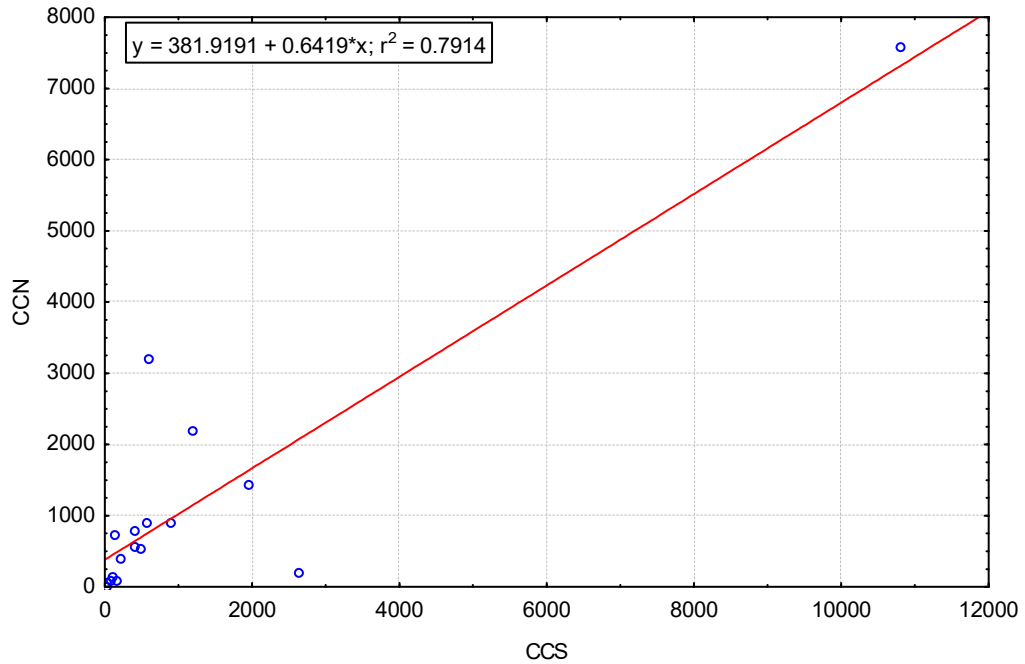
Canyon Creek Fecal Coliform (CFU/100ml)				
		CCI	CCN	CCS
Non-Parametric	n	16	21	19
	Max	260000	7580	10800
	Upper Quartile Range	13550	1337	900
	Median	5187	560	400
	Lower Quartile Range	405	144	141
	Min	99	14	15
	Efficiency		89.2%	92.3%
	Paired n		15	14
	Wilcoxon		<i>0.0007</i>	<i>0.0043</i>
	Mann-Whitney		<i>0.0084</i>	<i>0.0052</i>
	Paired n		17	
	Wilcoxon		0.2868	
	Mann-Whitney		0.5553	
	Arithmetic	UCL	57366	1961
Mean		23367	1175	1152
LCL		-10632	388	-21
Std. Dev.		63805	1728	2435
W-Test p		<i>0.0000</i>	<i>0.0000</i>	<i>0.0000</i>
Efficiency			95.0%	95.1%
t-Test (paired)			0.1806	0.1861
t-Test (pooled)			0.1185	0.1379
t-Test (sep.)			0.1845	0.1842
Levene			0.0181	0.0254
t-Test (paired)			0.8582	
t-Test (pooled)			0.9736	
t-Test (sep.)			0.9741	
Levene			0.7707	
Log Transformed	Geometric Mean	3310	475	382
	UCL	374233	5265	4482
	Mean	32400	1558	1241
	LCL	2805	461	344
	Std. Dev.	315466	4871	3838
	W-Test p	0.7218	0.8275	0.9986
	Efficiency		95.2%	96.2%
	t-Test (paired)		<i>0.0000</i>	<i>0.0002</i>
	t-Test (pooled)		<i>0.0028</i>	<i>0.0015</i>
	t-Test (sep.)		<i>0.0048</i>	<i>0.0023</i>
	Levene		0.1706	0.1465
	t-Test (paired)		0.4667	
	t-Test (pooled)		0.6577	
	t-Test (sep.)		0.6577	
Levene		0.8351		
Bootstrap	UCL			
	Mean			
	LCL			
	Std. Dev.			
	Eff.			



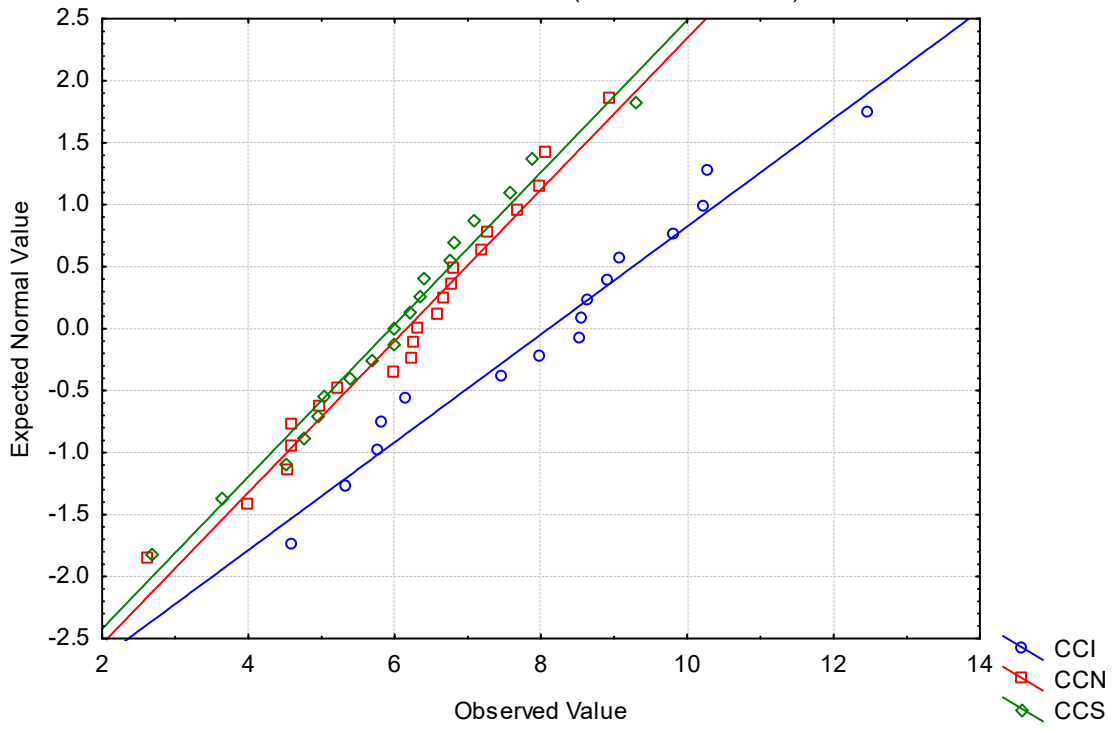
Canyon Creek Sed/Fil
Influent v. Effluent, Fecal Coliform



Canyon Creek Sed/Fil
Comparison of Media Types
Fecal Coliform (CFU/100ml)

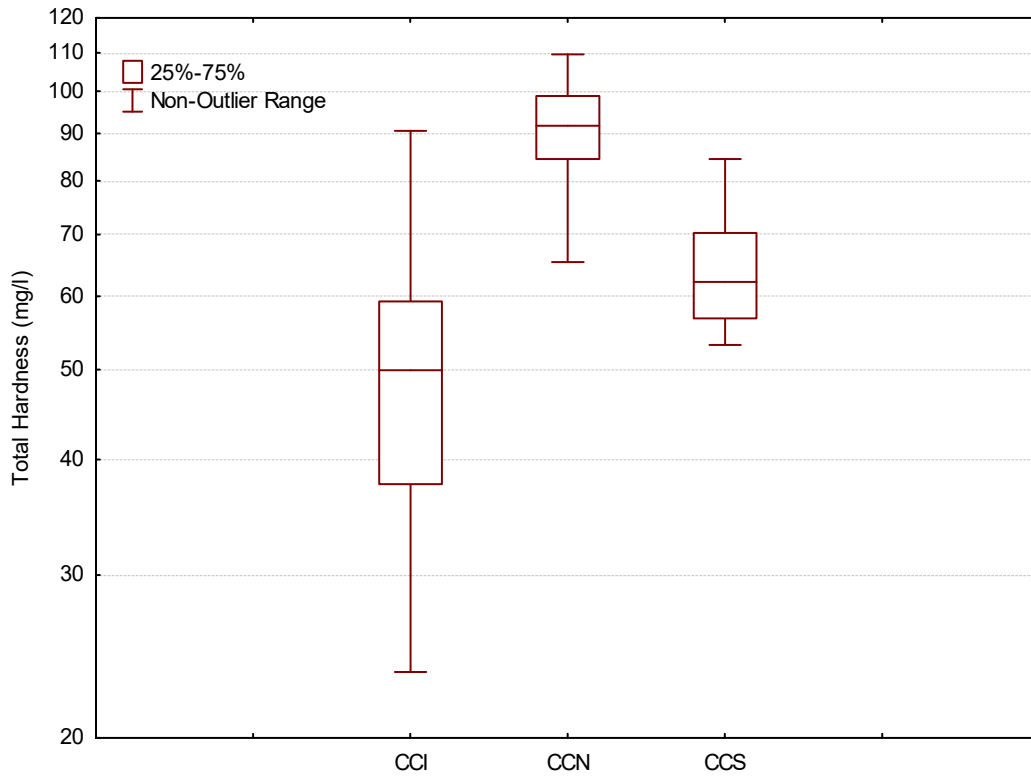
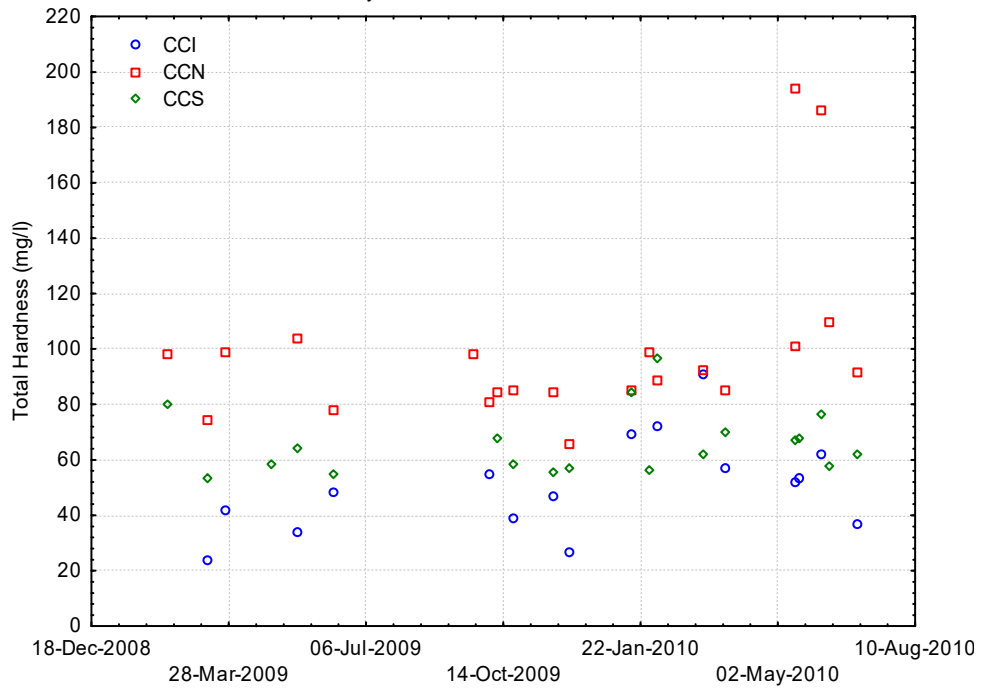


Normal Probability Plot of Log Transformed Data
Fecal Coliform
Exclude condition: NOT("Parameter" = 109)

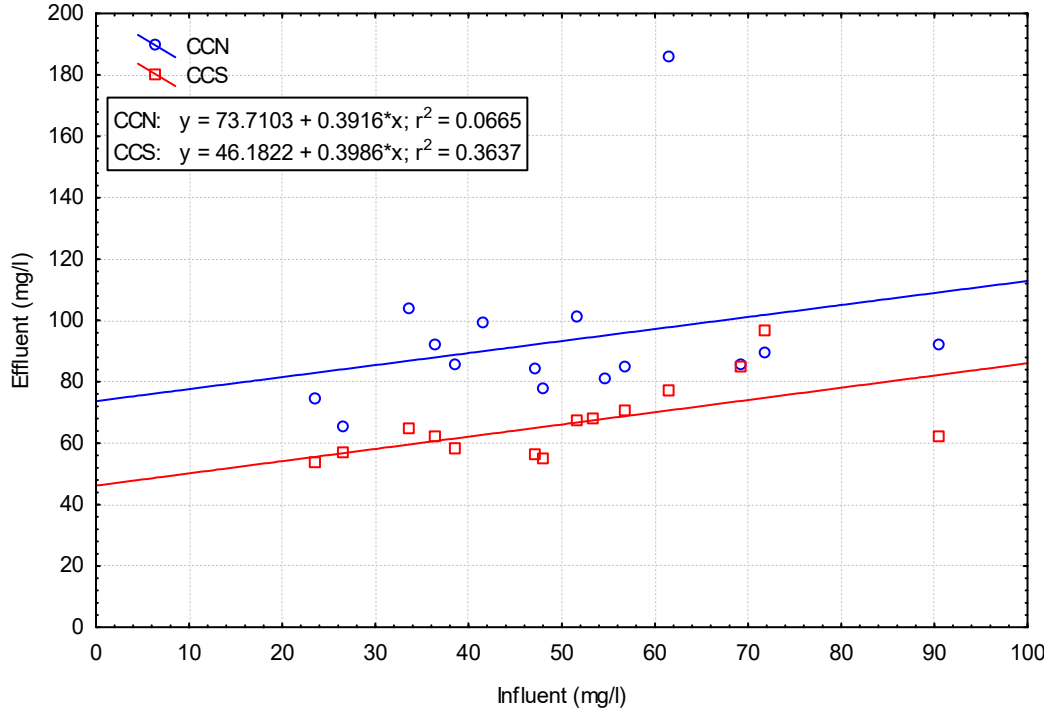


		Canyon Creek Total Hardness (mg/l)		
		CCI	CCN	CCS
Non-Parametric	n	16	21	19
	Max	90.6	194.0	96.4
	Upper Quartile Range	59.3	98.8	70.3
	Median	49.9	91.8	62.2
	Lower Quartile Range	37.6	84.5	56.8
	Min	23.6	65.4	53.2
	Efficiency		-83.9%	-24.6%
	Paired n		15	14
	Wilcoxon		<i>0.0007</i>	<i>0.0092</i>
	Mann-Whitney		<i>0.0000</i>	<i>0.0023</i>
	Paired n			17
	Wilcoxon			<i>0.0004</i>
	Mann-Whitney			<i>0.0000</i>
Arithmetic	UCL	59.7	113.8	71.3
	Mean	50.4	99.2	65.8
	LCL	41.0	84.7	60.2
	Std. Dev.	17.6	32.0	11.5
	W-Test p	0.8765	<i>0.0000</i>	<i>0.0184</i>
	Efficiency		-96.9%	-30.5%
	t-Test (paired)		<i>0.0000</i>	<i>0.0017</i>
	t-Test (pooled)		<i>0.0000</i>	<i>0.0038</i>
	t-Test (sep.)		<i>0.0000</i>	<i>0.0060</i>
	Levene		0.4265	0.1442
	t-Test (paired)			<i>0.0003</i>
	t-Test (pooled)			<i>0.0001</i>
	t-Test (sep.)			<i>0.0001</i>
	Levene			0.1057
	Log Transformed	Geometric Mean	47.5	95.7
UCL		63.8	113.6	72.1
Mean		50.7	98.9	65.8
LCL		40.3	86.1	60.0
Std. Dev.		18.9	26.0	10.8
W-Test p		0.9828	<i>0.0006</i>	0.0902
Efficiency			-95.1%	-29.7%
t-Test (paired)			<i>0.0000</i>	<i>0.0016</i>
t-Test (pooled)			<i>0.0000</i>	<i>0.0018</i>
t-Test (sep.)			<i>0.0000</i>	<i>0.0045</i>
Levene			0.1068	<i>0.0100</i>
t-Test (paired)				<i>0.0000</i>
t-Test (pooled)				<i>0.0000</i>
t-Test (sep.)				<i>0.0000</i>
Levene				0.4395
Bootstrap	UCL			
	Mean			
	LCL			
	Std. Dev.			
	Eff.			

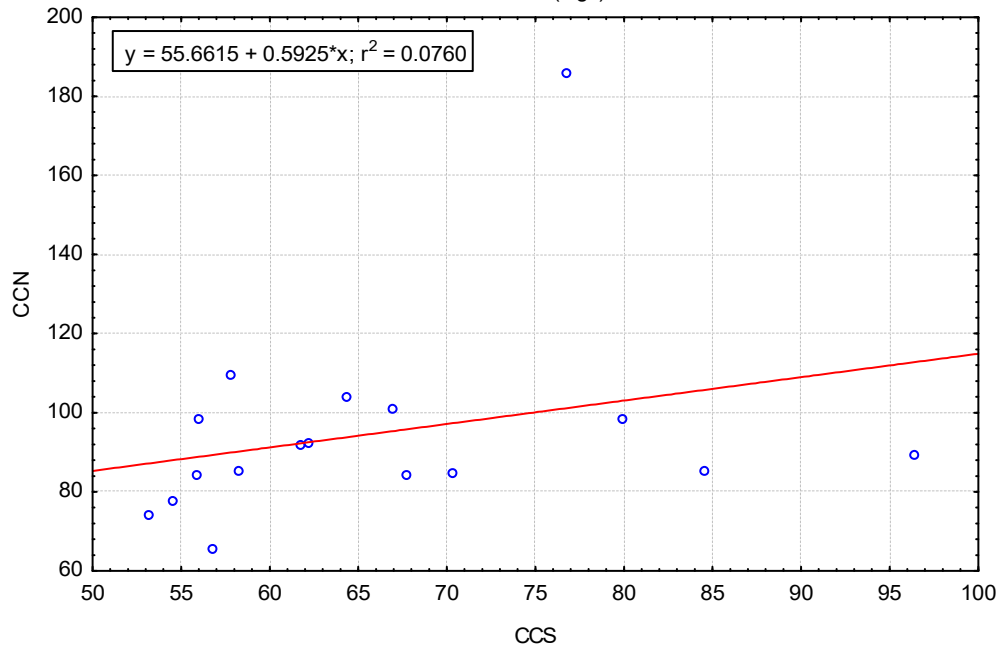
Canyon Creek Sed/Fil Time Series



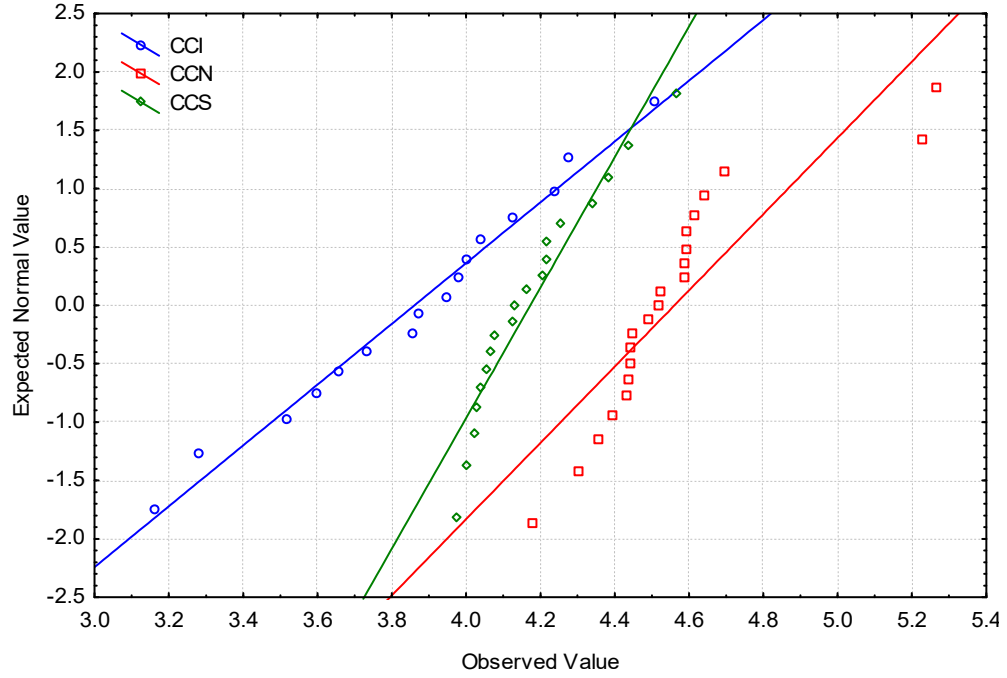
Canyon Creek Sed/Fil
Influent v. Effluent, Total Hardness



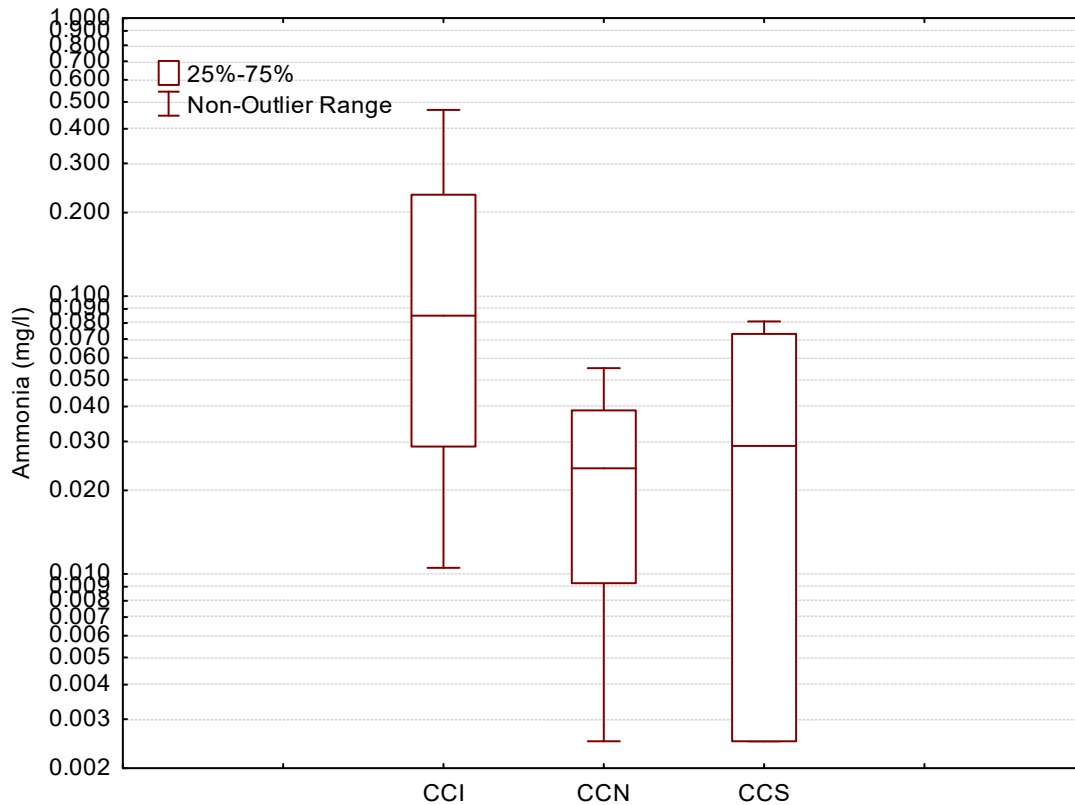
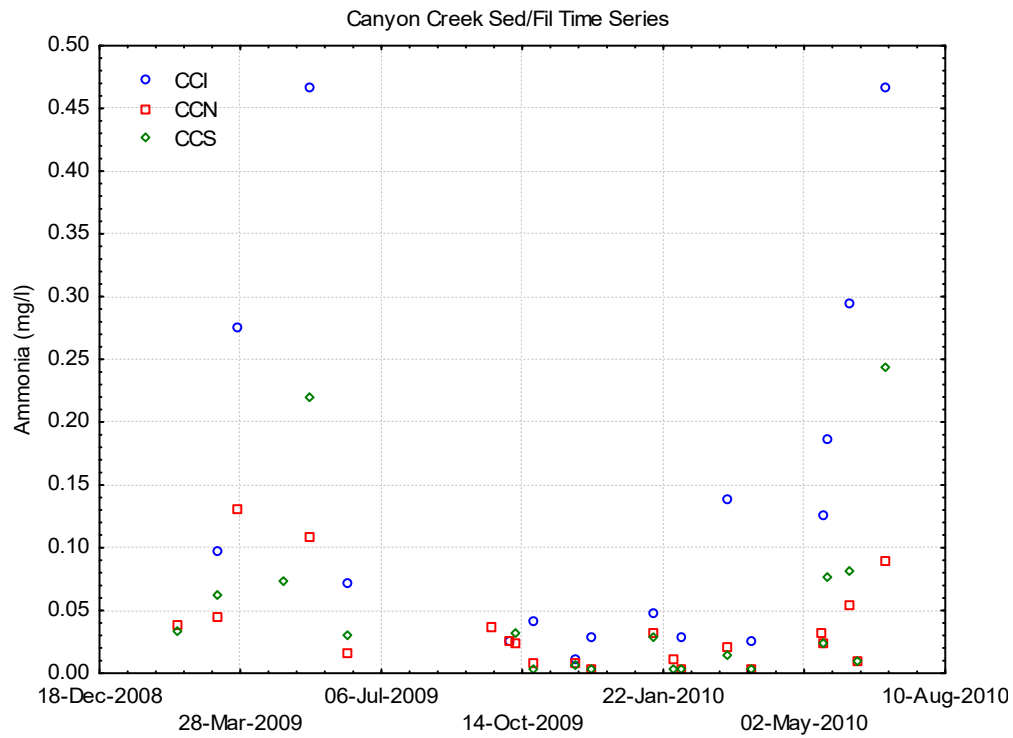
Canyon Creek Sed/Fil
Comparison of Media Types
Total Hardness (mg/l)



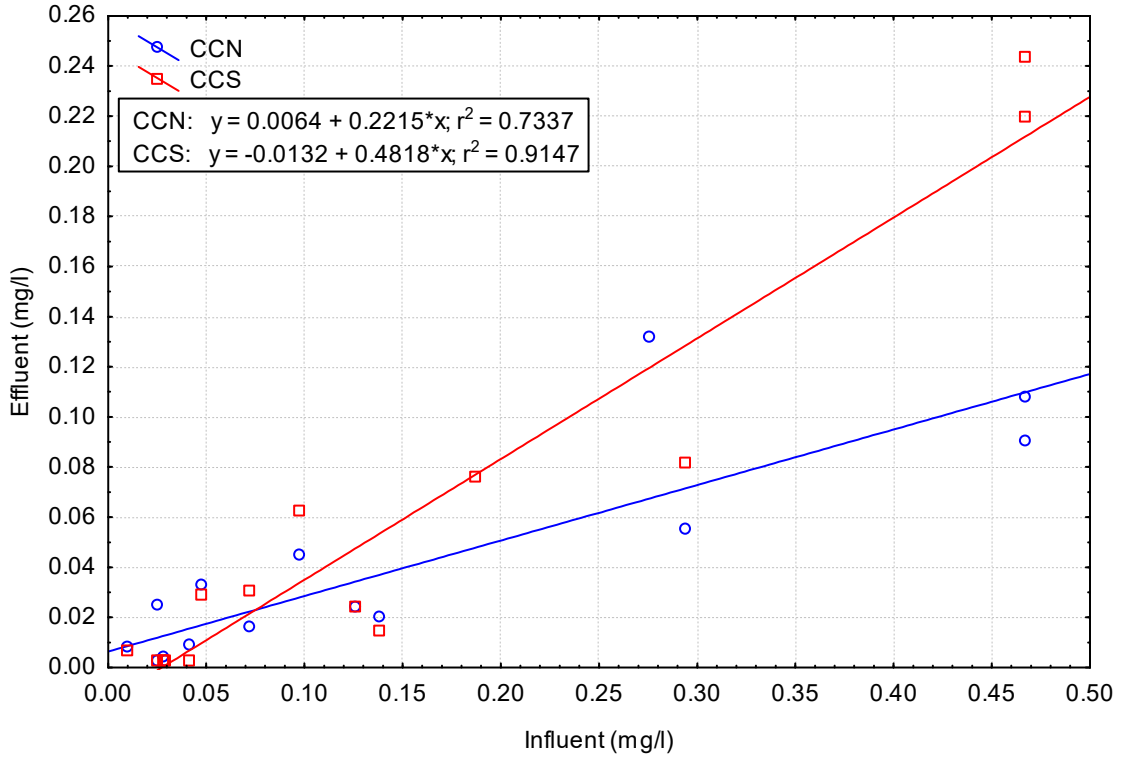
Normal Probability Plot of Log Transformed Data
Total Hardness



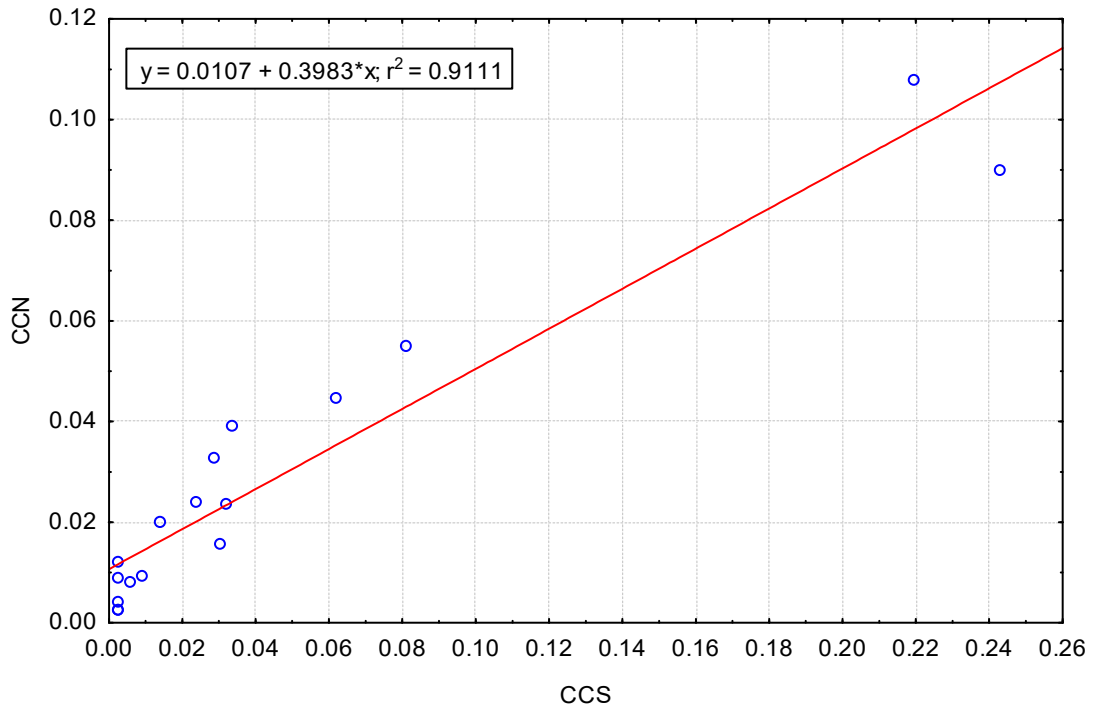
Canyon Creek Ammonia (mg/l)		CCI	CCN	CCS
Non-Parametric	n	16	21	19
	Max	0.467	0.131	0.243
	Upper Quartile Range	0.231	0.039	0.073
	Median	0.085	0.024	0.029
	Lower Quartile Range	0.029	0.009	0.003
	Min	0.011	0.003	0.003
	Efficiency		71.8%	66.0%
	Paired n		14	14
	Wilcoxon		<i>0.0007</i>	<i>0.0010</i>
	Mann-Whitney		<i>0.0013</i>	<i>0.0111</i>
	Paired n			17
	Wilcoxon			0.3003
	Mann-Whitney			0.9147
Arithmetic	UCL	0.227	0.050	0.083
	Mean	0.146	0.034	0.050
	LCL	0.065	0.018	0.016
	Std. Dev.	0.153	0.035	0.069
	W-Test p	<i>0.0028</i>	<i>0.0006</i>	<i>0.0000</i>
	Efficiency		76.4%	65.9%
	t-Test (paired)		<i>0.0056</i>	<i>0.0017</i>
	t-Test (pooled)		<i>0.0026</i>	<i>0.0191</i>
	t-Test (sep.)		<i>0.0112</i>	<i>0.0307</i>
	Levene		<i>0.0000</i>	<i>0.0046</i>
	t-Test (paired)			0.1255
	t-Test (pooled)			0.3757
	t-Test (sep.)			0.3925
	Levene			0.0628
Log Transformed	Geometric Mean	0.083	0.021	0.019
	UCL	0.415	0.084	0.236
	Mean	0.162	0.039	0.064
	LCL	0.063	0.018	0.017
	Std. Dev.	0.273	0.062	0.203
	W-Test p	0.5078	0.5627	0.0702
	Efficiency		76.0%	60.4%
	t-Test (paired)		<i>0.0000</i>	<i>0.0000</i>
	t-Test (pooled)		<i>0.0008</i>	<i>0.0041</i>
	t-Test (sep.)		<i>0.0009</i>	<i>0.0033</i>
	Levene		0.6479	0.1760
	t-Test (paired)			0.7983
	t-Test (pooled)			0.8846
	t-Test (sep.)			0.8865
	Levene			0.0749
Bootstrap	UCL			
	Mean			
	LCL			
	Std. Dev.			
	Eff.			



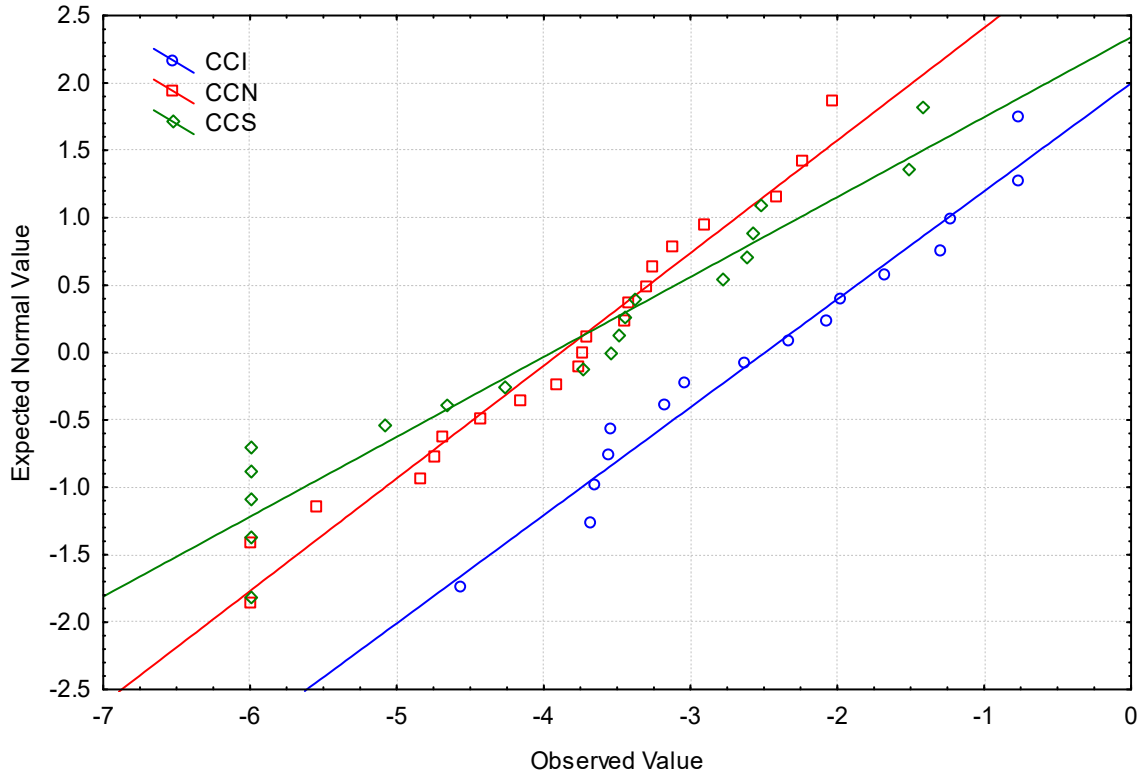
Canyon Creek Sed/Fil
Influent v. Effluent, NH₃



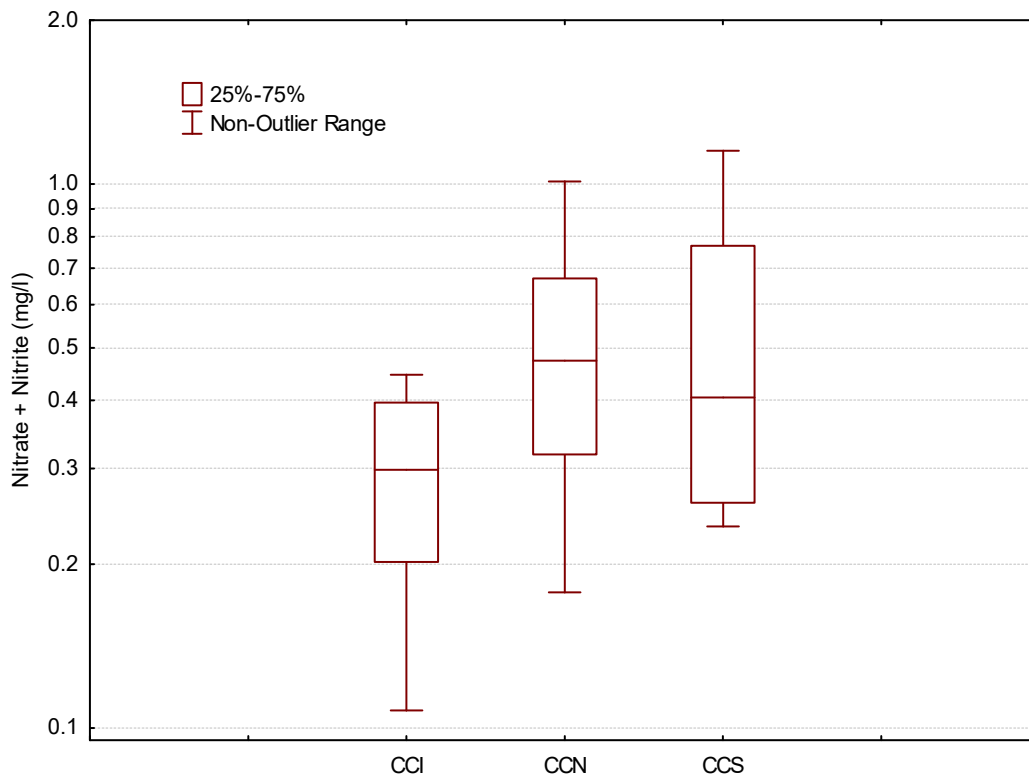
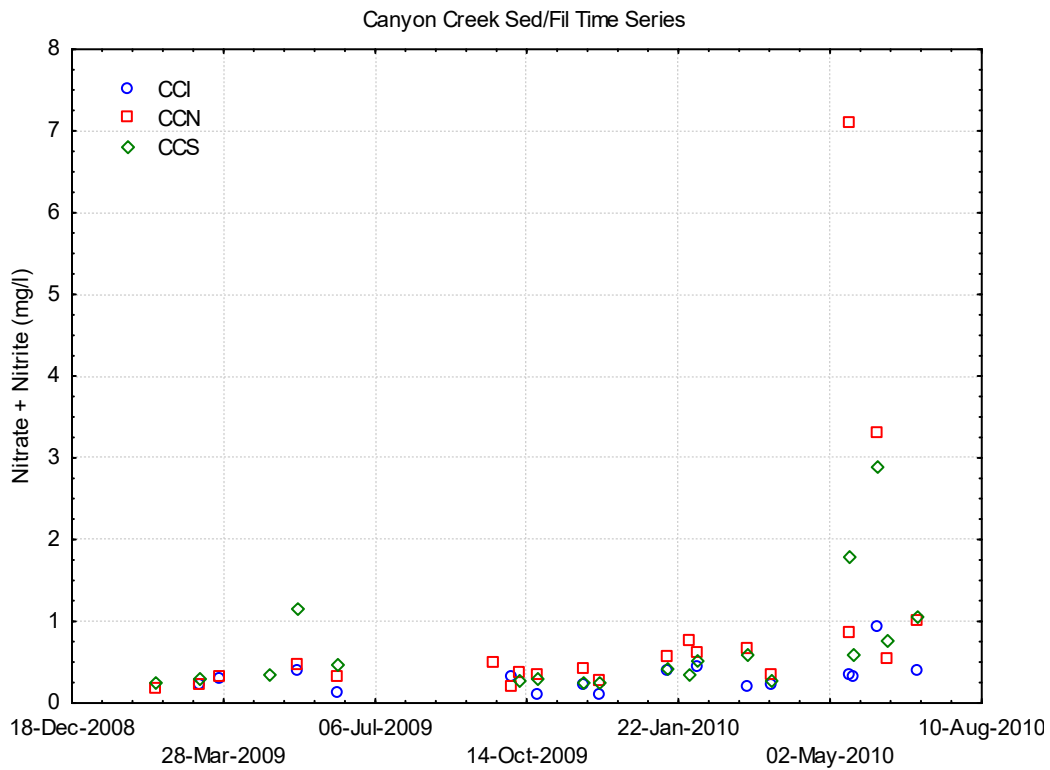
Canyon Creek Sed/Fil
Comparison of Media Types
NH₃ (mg/l)

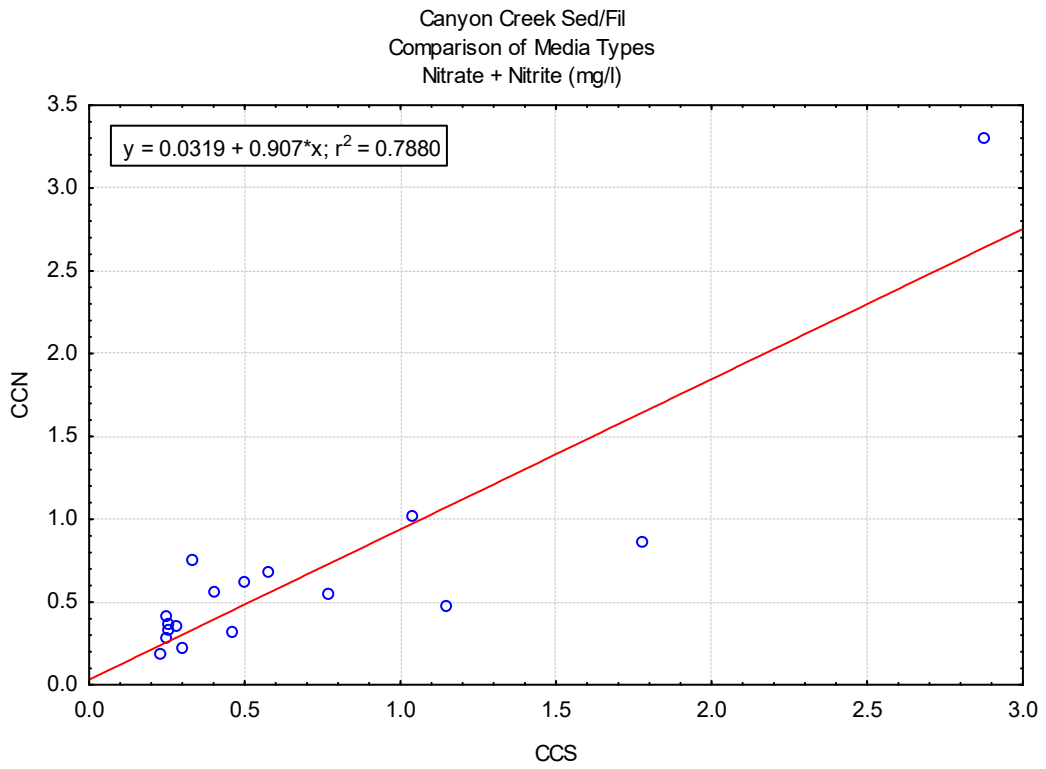
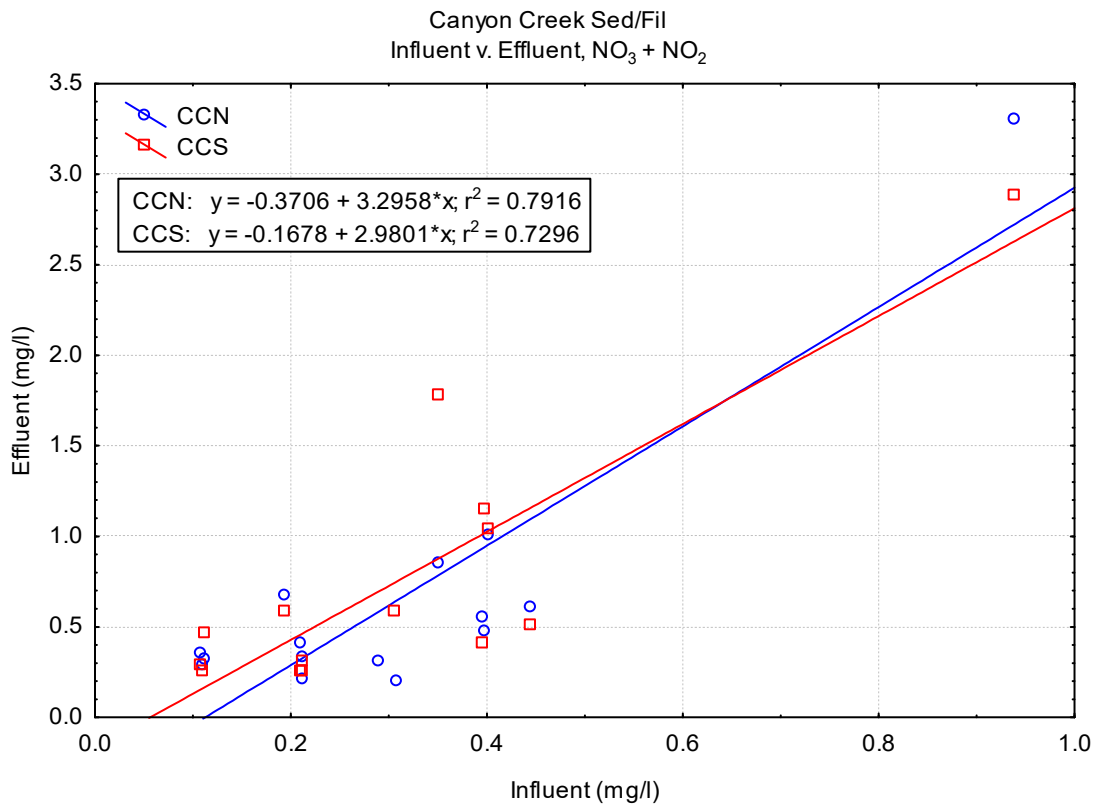


Normal Proabability Plot of Log Transformed Data
Ammonia

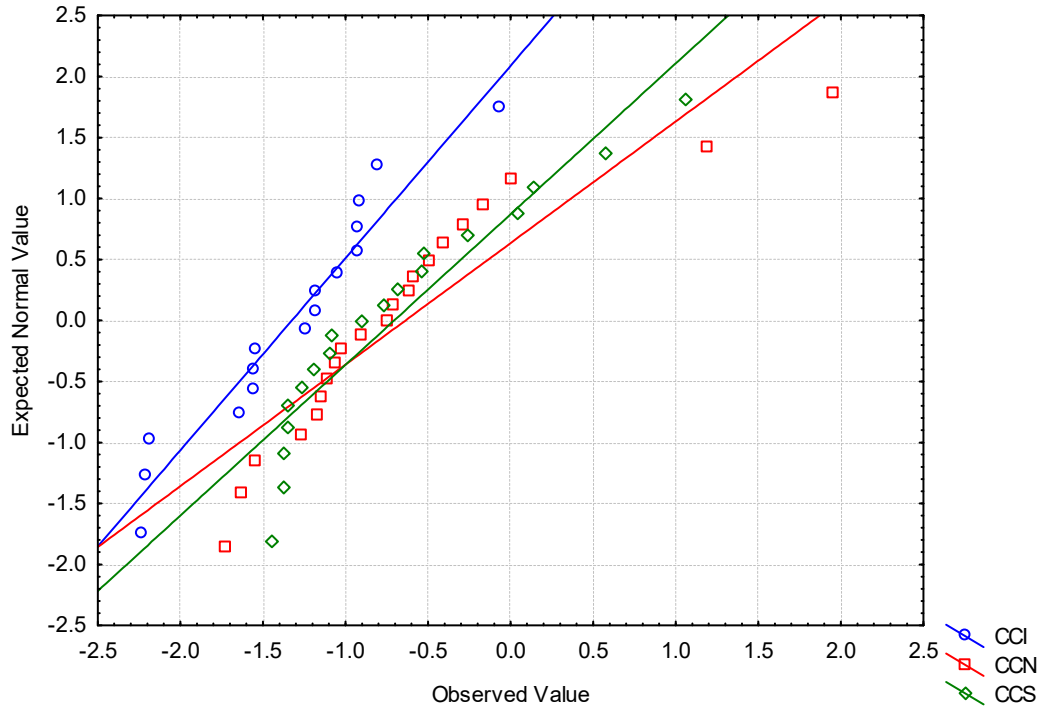


		Canyon Creek Nitrate + Nitrite (mg/l)		
		CCI	CCN	CCS
Non-Parametric	n	16	21	19
	Max	0.938	7.090	2.880
	Upper Quartile Range	0.396	0.671	0.770
	Median	0.298	0.473	0.405
	Lower Quartile Range	0.202	0.318	0.259
	Min	0.108	0.178	0.235
	Efficiency		-58.7%	-35.8%
	Paired n		15	14
	Wilcoxon		<i>0.0018</i>	<i>0.0010</i>
	Mann-Whitney		<i>0.0084</i>	<i>0.0182</i>
	Paired n			17
	Wilcoxon			0.6874
Mann-Whitney			0.7888	
Arithmetic	UCL	0.419	1.628	0.989
	Mean	0.312	0.919	0.668
	LCL	0.205	0.210	0.346
	Std. Dev.	0.200	1.558	0.668
	W-Test p	<i>0.0021</i>	<i>0.0000</i>	<i>0.0000</i>
	Efficiency		-194.5%	-113.9%
	t-Test (paired)		<i>0.0393</i>	<i>0.0114</i>
	t-Test (pooled)		0.1317	<i>0.0485</i>
	t-Test (sep.)		0.0920	<i>0.0383</i>
	Levene		<i>0.0437</i>	<i>0.0157</i>
	t-Test (paired)			0.6968
	t-Test (pooled)			0.5190
	t-Test (sep.)			0.5057
	Levene			0.2499
Log Transformed	Geometric Mean	0.266	0.529	0.494
	UCL	0.465	1.350	1.014
	Mean	0.315	0.779	0.642
	LCL	0.213	0.450	0.406
	Std. Dev.	0.200	0.842	0.533
	W-Test p	0.3297	<i>0.0049</i>	<i>0.0191</i>
	Efficiency		-147.5%	-104.0%
	t-Test (paired)		<i>0.0005</i>	<i>0.0001</i>
	t-Test (pooled)		<i>0.0105</i>	<i>0.0095</i>
	t-Test (sep.)		<i>0.0072</i>	<i>0.0084</i>
	Levene		0.3920	0.3815
	t-Test (paired)			0.9747
	t-Test (pooled)			0.7908
	t-Test (sep.)			0.7888
	Levene			0.8457
Bootstrap	UCL			
	Mean			
	LCL			
	Std. Dev.			
	Eff.			

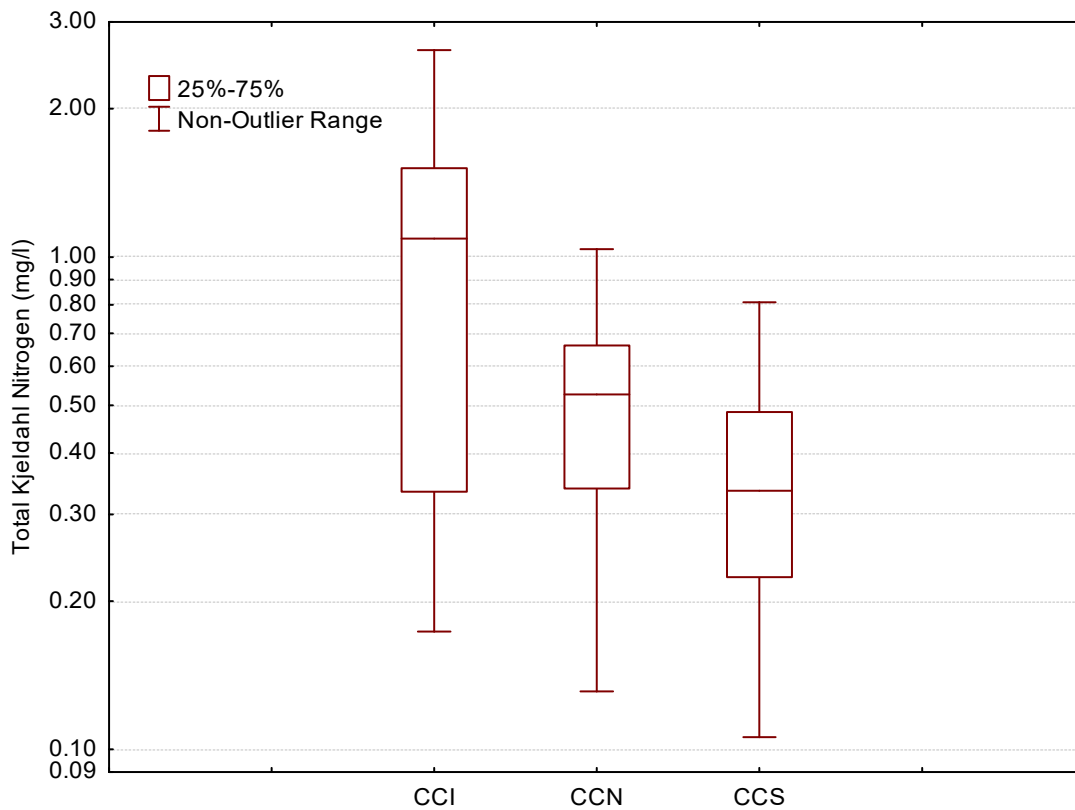
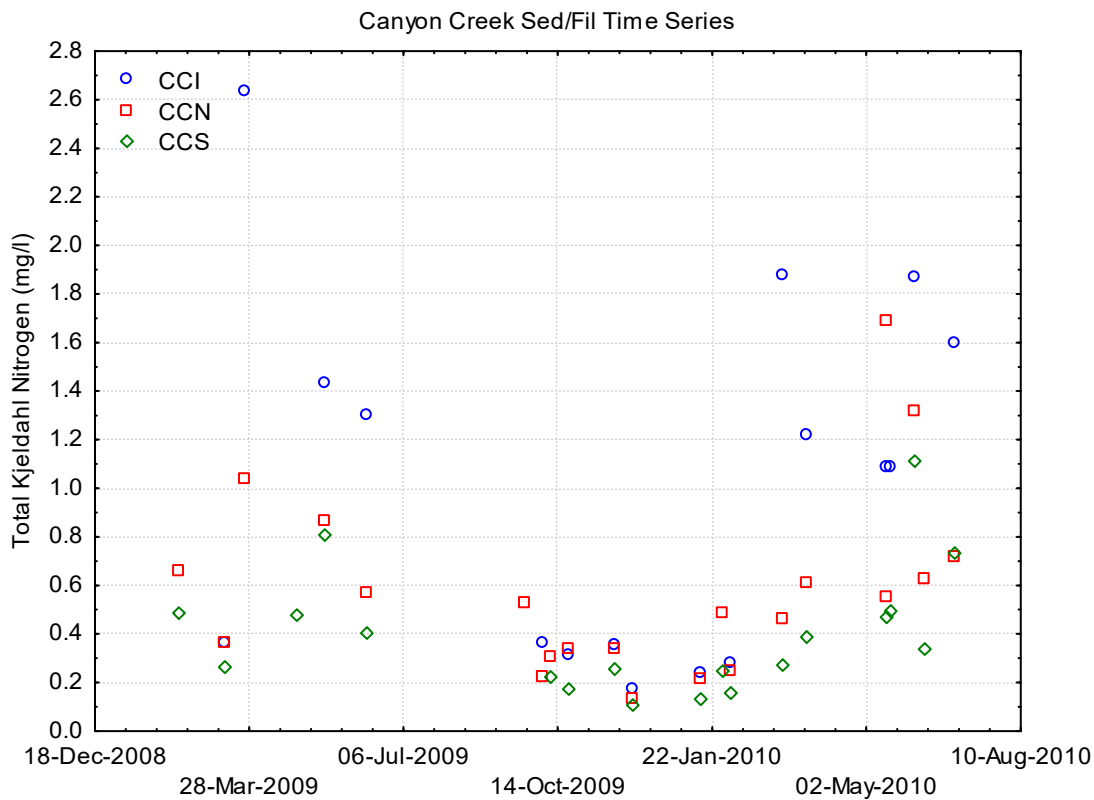




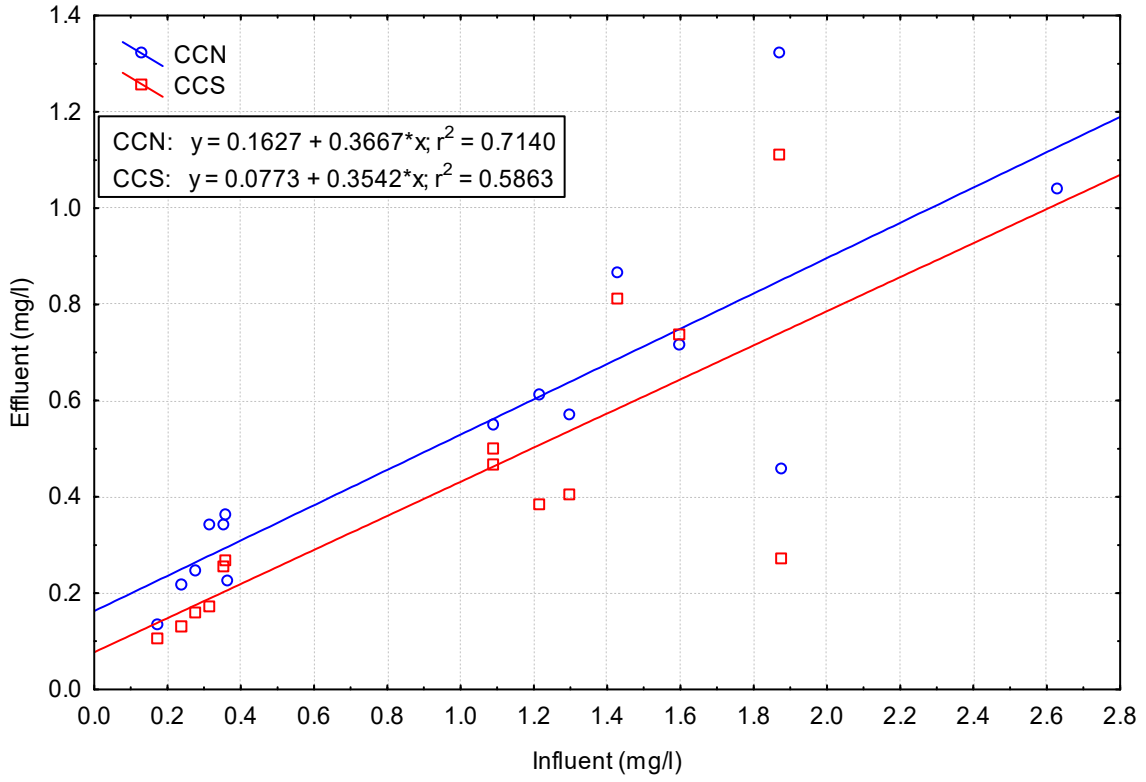
Normal Probability Plot of Log Transformed Data
Nitrate + Nitrite



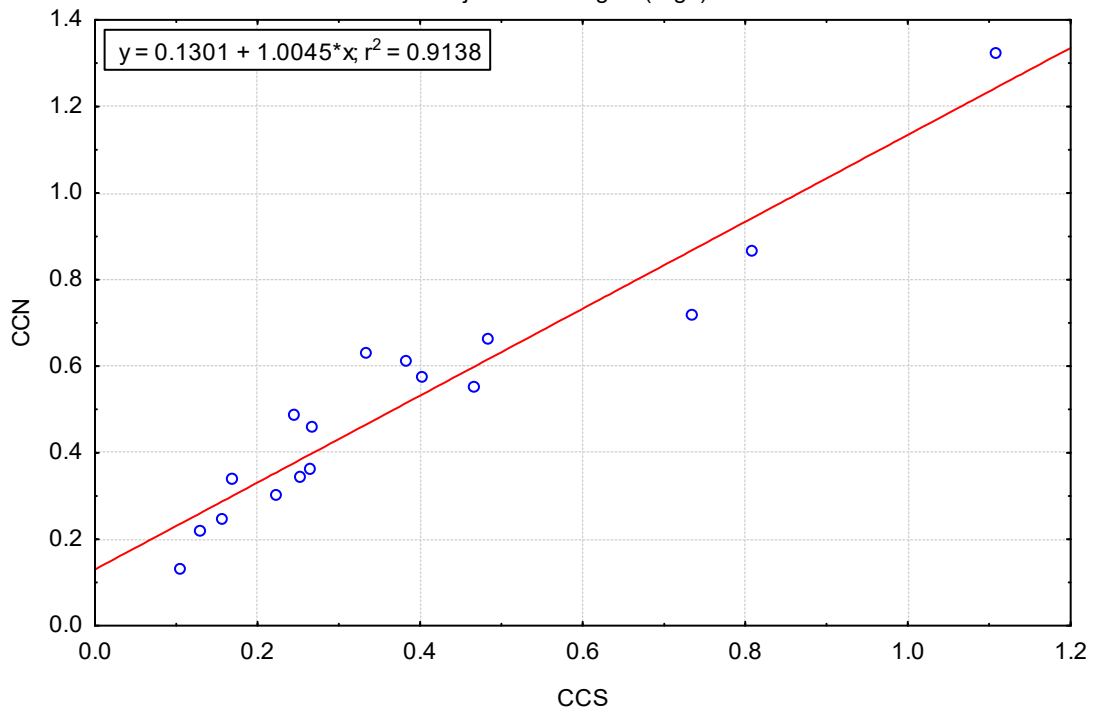
Canyon Creek Total Kjeldahl Nitrogen (mg/l)				
		CCI	CCN	CCS
Non-Parametric	n	16	21	19
	Max	2.63	1.69	1.11
	Upper Quartile Range	1.51	0.66	0.48
	Median	1.09	0.53	0.34
	Lower Quartile Range	0.33	0.34	0.22
	Min	0.17	0.13	0.11
	Efficiency		51.7%	69.2%
	Paired n		15	14
	Wilcoxon		<i>0.0012</i>	<i>0.0010</i>
	Mann-Whitney		0.1557	<i>0.0136</i>
	Paired n			17
	Wilcoxon			<i>0.0004</i>
	Mann-Whitney			0.0693
Arithmetic	UCL	1.41	0.76	0.52
	Mean	1.01	0.58	0.40
	LCL	0.61	0.41	0.27
	Std. Dev.	0.75	0.38	0.26
	W-Test p	0.0618	<i>0.0073</i>	<i>0.0156</i>
	Efficiency		42.3%	60.9%
	t-Test (paired)		<i>0.0033</i>	<i>0.0007</i>
	t-Test (pooled)		<i>0.0295</i>	<i>0.0019</i>
	t-Test (sep.)		<i>0.0488</i>	<i>0.0056</i>
	Levene		<i>0.0019</i>	<i>0.0001</i>
	t-Test (paired)			<i>0.0000</i>
	t-Test (pooled)			0.0799
	t-Test (sep.)			0.0751
	Levene			0.2645
Log Transformed	Geometric Mean	0.73	0.49	0.33
	UCL	2.09	0.85	0.59
	Mean	1.09	0.59	0.40
	LCL	0.56	0.41	0.27
	Std. Dev.	1.19	0.41	0.28
	W-Test p	0.0586	0.9971	0.9657
	Efficiency		45.6%	63.1%
	t-Test (paired)		<i>0.0006</i>	<i>0.0000</i>
	t-Test (pooled)		0.1087	<i>0.0039</i>
	t-Test (sep.)		0.1284	<i>0.0056</i>
	Levene		<i>0.0078</i>	<i>0.0097</i>
	t-Test (paired)			<i>0.0000</i>
	t-Test (pooled)			0.0582
	t-Test (sep.)			0.0583
	Levene			0.8687
Bootstrap	UCL			
	Mean			
	LCL			
	Std. Dev.			
	Eff.			



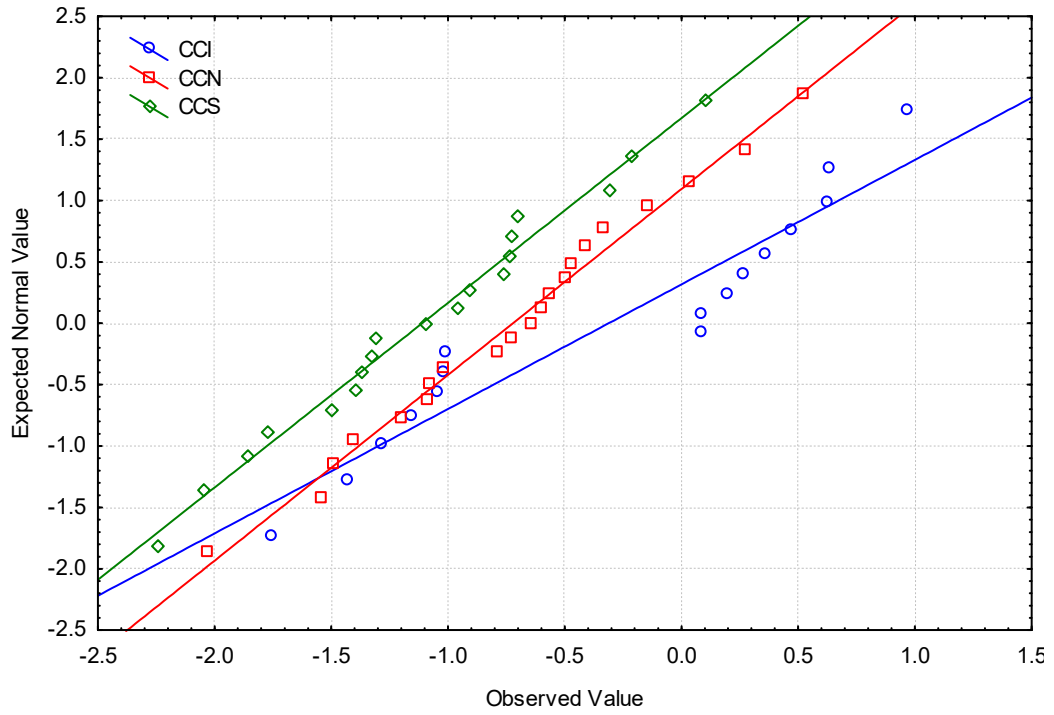
Canyon Creek Sed/Fil
Influent v. Effluent, TKN



Canyon Creek Sed/Fil
Comparison of Media Types
Total Kjeldahl Nitrogen (mg/l)

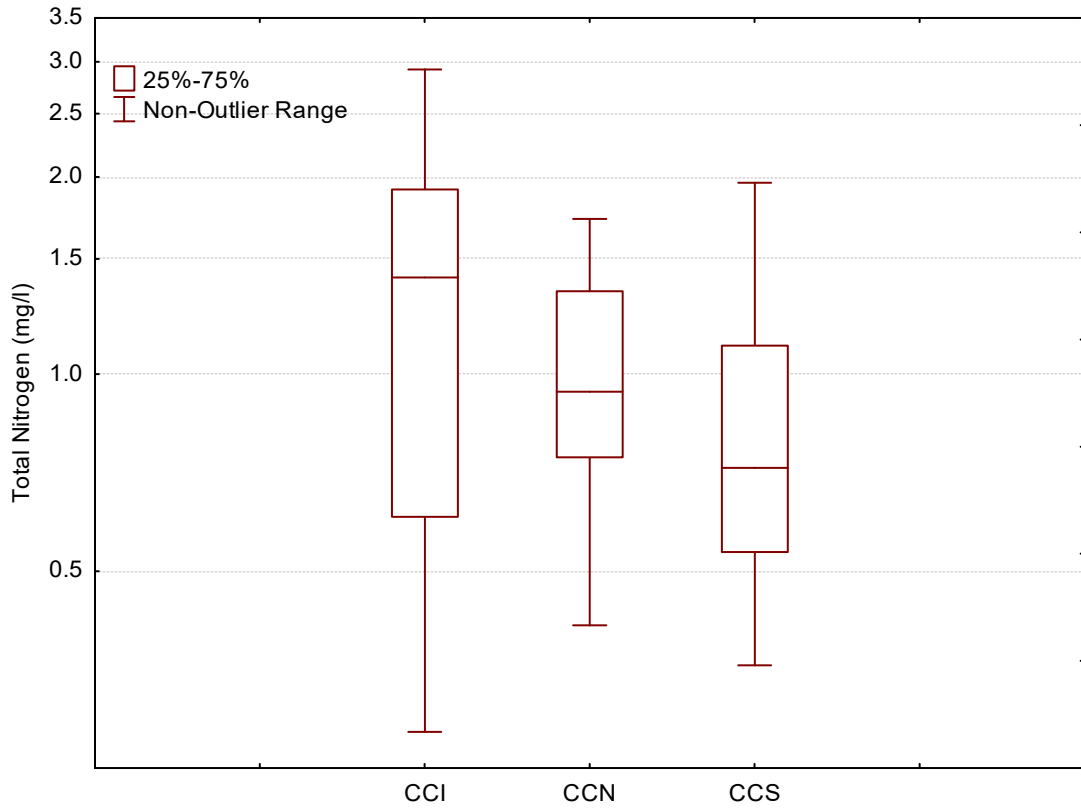
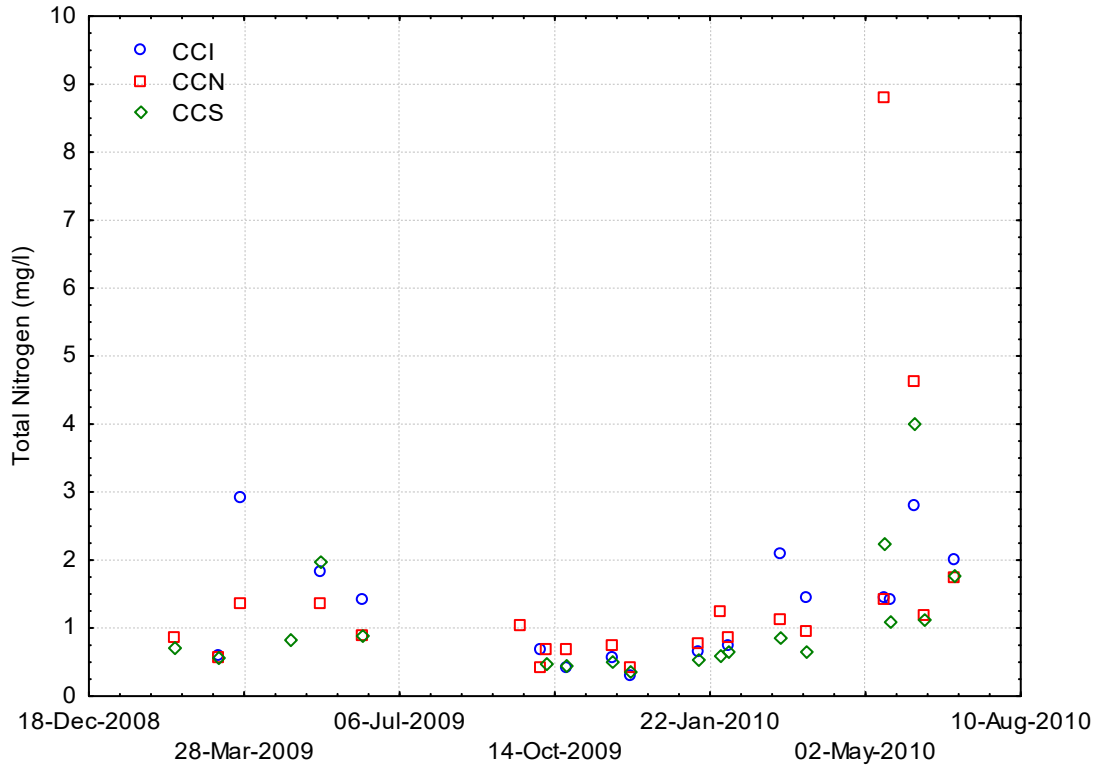


Normal Probability Plot of Log Transformed Data
Total Kjeldahl Nitrogen

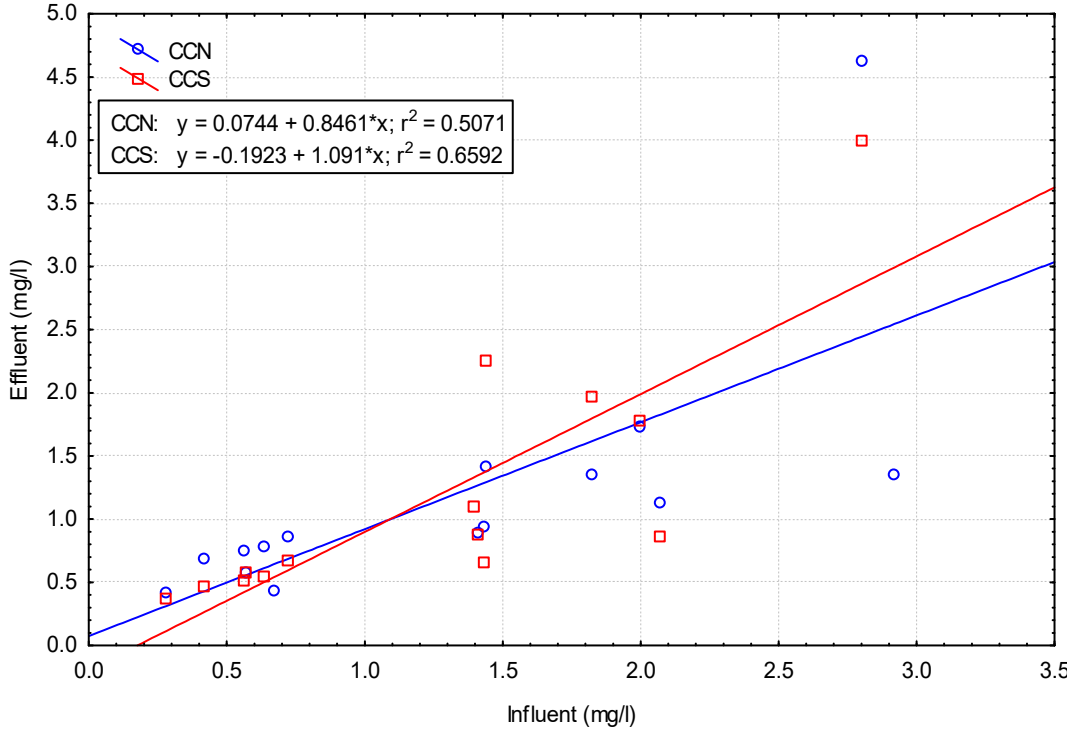


		Canyon Creek Total Nitrogen (mg/l)		
		CCI	CCN	CCS
Non-Parametric	n	16	21	19
	Max	2.92	8.78	3.99
	Upper Quartile Range	1.91	1.34	1.11
	Median	1.41	0.94	0.72
	Lower Quartile Range	0.61	0.75	0.53
	Min	0.28	0.41	0.36
	Efficiency		33.1%	48.8%
	Paired n		15	14
	Wilcoxon		0.2805	0.3967
	Mann-Whitney		0.6171	0.3011
	Paired n			17
	Wilcoxon			<i>0.0442</i>
Mann-Whitney			0.1690	
Arithmetic	UCL	1.77	2.36	1.49
	Mean	1.32	1.50	1.06
	LCL	0.88	0.65	0.64
	Std. Dev.	0.83	1.88	0.89
	W-Test p	0.9657	<i>0.0000</i>	<i>0.0001</i>
	Efficiency		-13.5%	19.7%
	t-Test (paired)		0.5059	0.6308
	t-Test (pooled)		0.7251	0.3792
	t-Test (sep.)		0.7000	0.3766
	Levene		0.4116	0.7309
	t-Test (paired)			0.2835
	t-Test (pooled)			0.3585
	t-Test (sep.)			0.3448
	Levene			0.3030
Log Transformed	Geometric Mean	1.07	1.08	0.85
	UCL	2.24	2.10	1.53
	Mean	1.37	1.38	1.04
	LCL	0.84	0.91	0.71
	Std. Dev.	1.10	1.11	0.72
	W-Test p	0.3325	<i>0.0052</i>	0.0954
	Efficiency		-0.5%	24.3%
	t-Test (paired)		0.4573	0.2481
	t-Test (pooled)		0.9885	0.3177
	t-Test (sep.)		0.9885	0.3230
	Levene		0.3513	0.2863
	t-Test (paired)			<i>0.0344</i>
	t-Test (pooled)			0.2816
	t-Test (sep.)			0.2788
Levene			0.9615	
Bootstrap	UCL			
	Mean			
	LCL			
	Std. Dev.			
	Eff.			

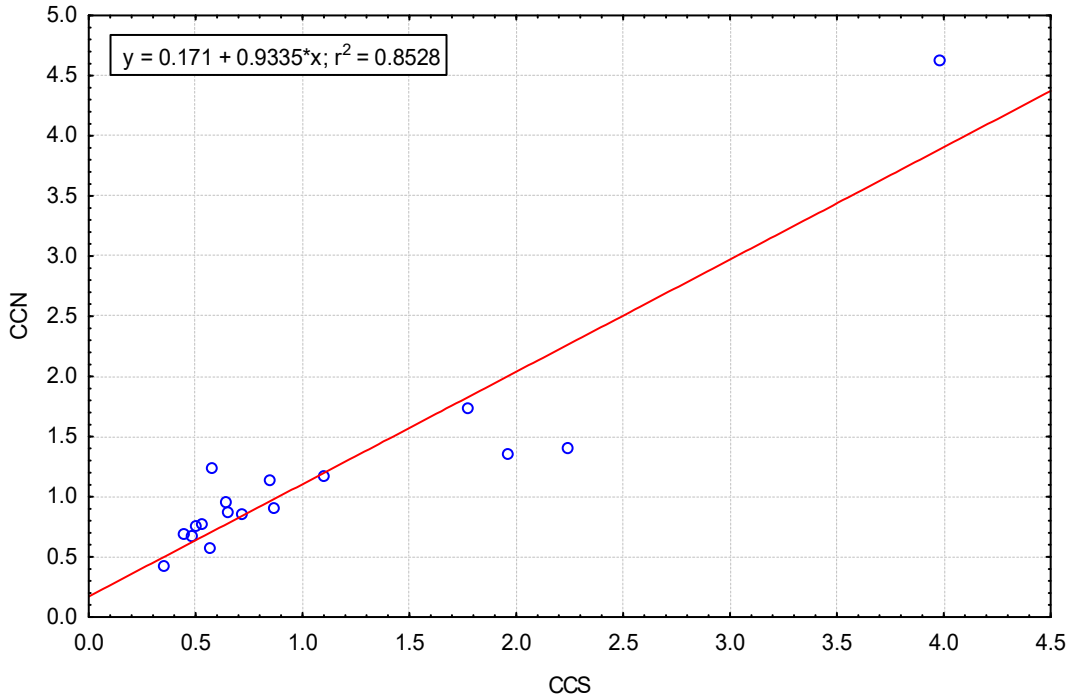
Canyon Creek Sed/Fil Time Series



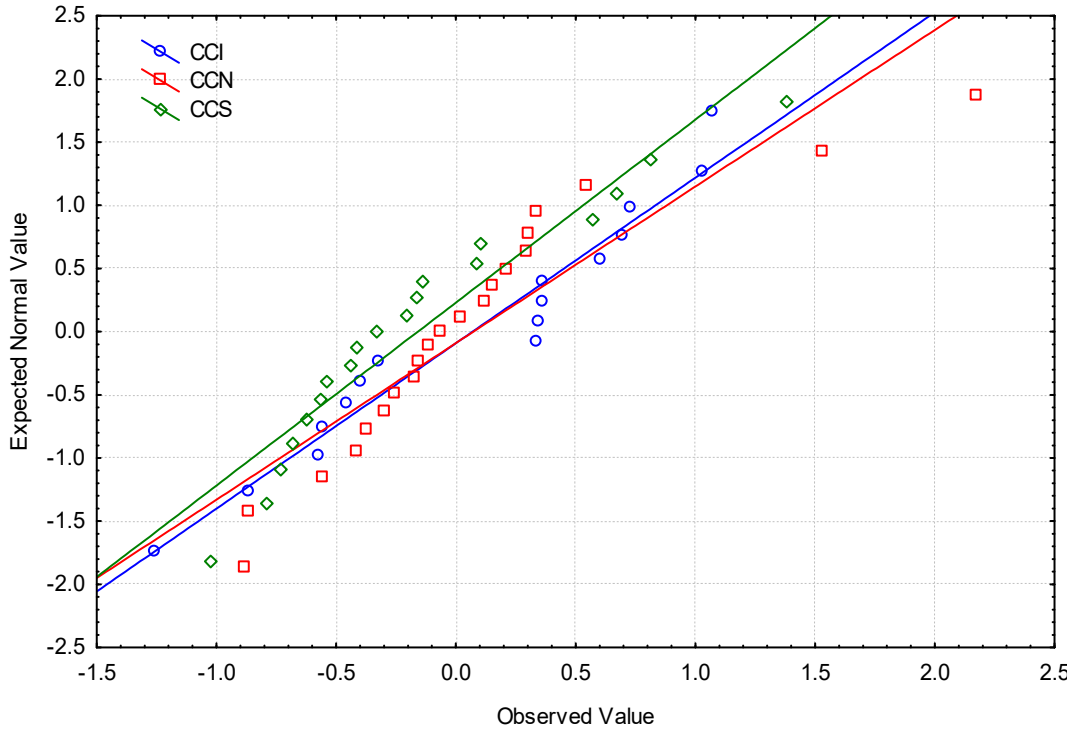
Canyon Creek Sed/Fil
Influent v. Effluent, Total Nitrogen



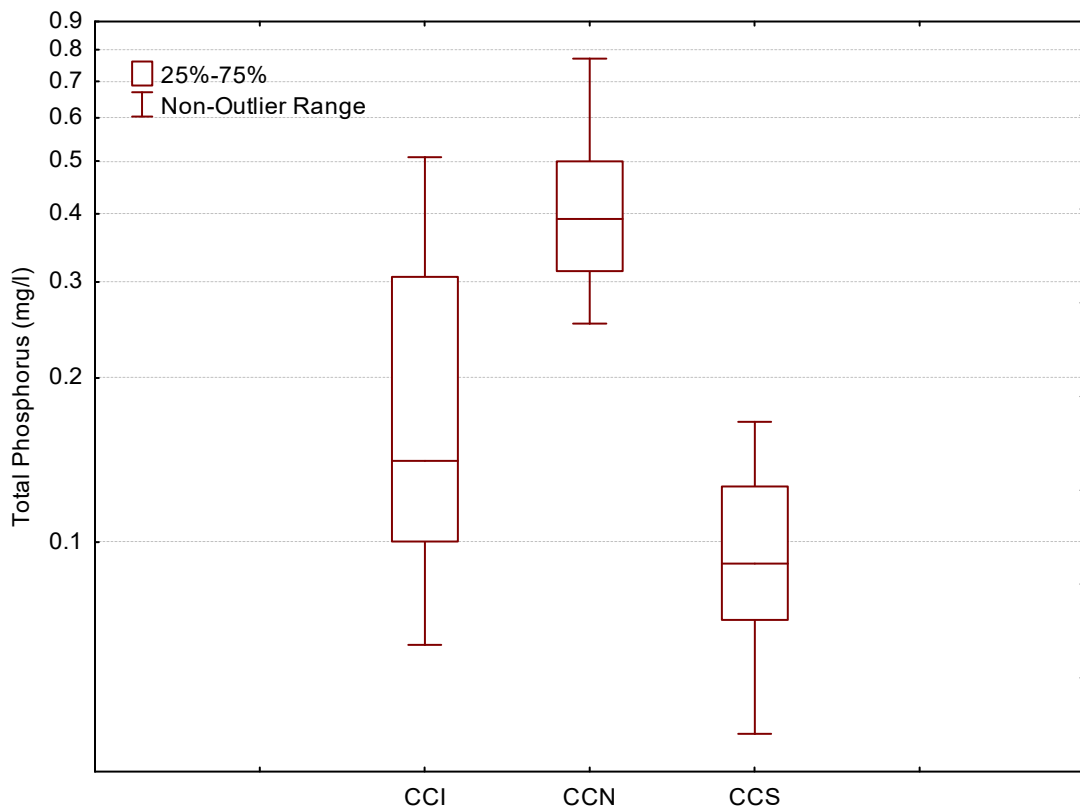
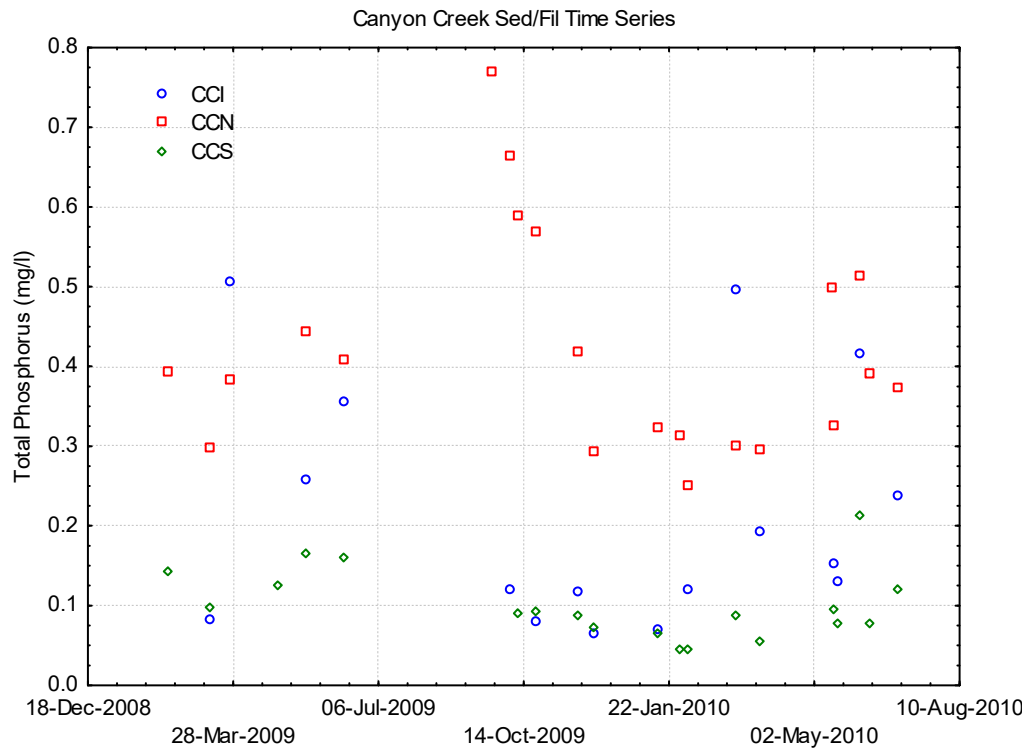
Canyon Creek Sed/Fil
Comparison of Media Types
Total Nitrogen (mg/l)



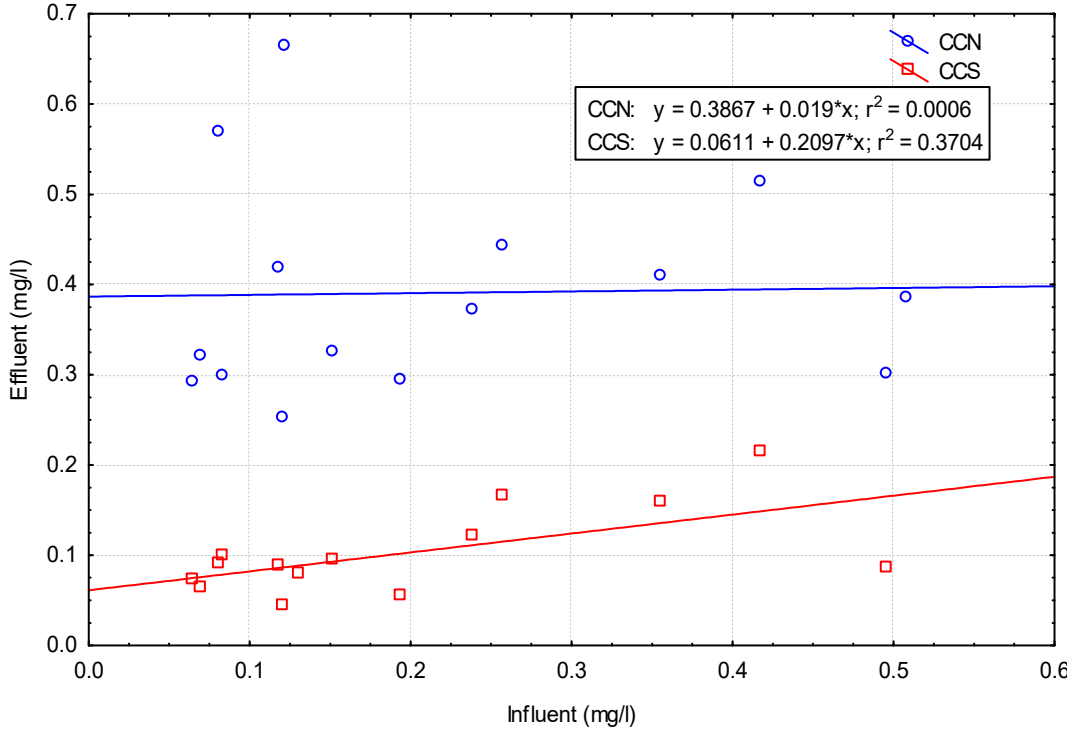
Normal Probability Plot of Log Transformed Data
Total Nitrogen



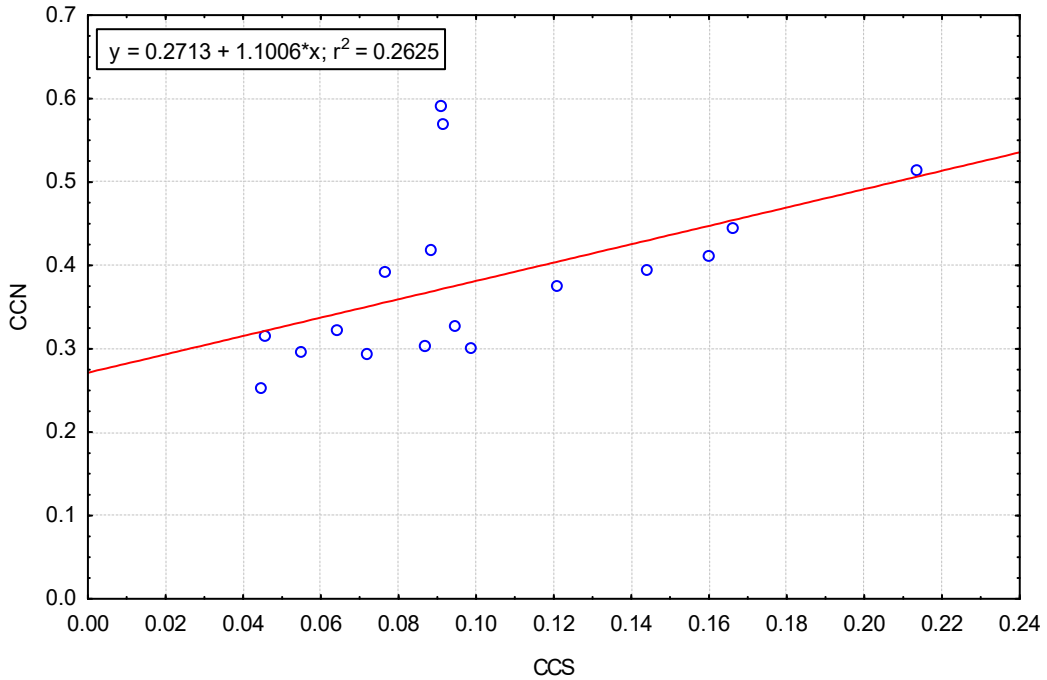
		Canyon Creek Total Phosphorus (mg/l)		
		CCI	CCN	CCS
Non-Parametric	n	16	21	19
	Max	0.51	0.77	0.21
	Upper Quartile Range	0.31	0.50	0.13
	Median	0.14	0.39	0.09
	Lower Quartile Range	0.10	0.31	0.07
	Min	0.06	0.25	0.04
	Efficiency		-177.6%	35.2%
	Paired n		15	14
	Wilcoxon		<i>0.0076</i>	<i>0.0063</i>
	Mann-Whitney		<i>0.0002</i>	<i>0.0150</i>
	Paired n		17	
	Wilcoxon		<i>0.0003</i>	
	Mann-Whitney		<i>0.0000</i>	
Arithmetic	UCL	0.29	0.48	0.12
	Mean	0.21	0.42	0.10
	LCL	0.13	0.36	0.08
	Std. Dev.	0.15	0.14	0.04
	W-Test p	<i>0.0097</i>	<i>0.0290</i>	0.1008
	Efficiency		-97.2%	52.5%
	t-Test (paired)		<i>0.0037</i>	<i>0.0084</i>
	t-Test (pooled)		<i>0.0001</i>	<i>0.0043</i>
	t-Test (sep.)		<i>0.0002</i>	<i>0.0111</i>
	Levene		0.4965	<i>0.0001</i>
	t-Test (paired)		<i>0.0000</i>	
	t-Test (pooled)		<i>0.0000</i>	
	t-Test (sep.)		<i>0.0000</i>	
	Levene		<i>0.0010</i>	
	Log Transformed	Geometric Mean	0.17	0.40
UCL		0.35	0.49	0.13
Mean		0.22	0.42	0.10
LCL		0.13	0.36	0.08
Std. Dev.		0.17	0.13	0.05
W-Test p		0.2418	0.3584	0.8858
Efficiency			-94.8%	52.9%
t-Test (paired)			<i>0.0011</i>	<i>0.0030</i>
t-Test (pooled)			<i>0.0000</i>	<i>0.0035</i>
t-Test (sep.)			<i>0.0002</i>	<i>0.0059</i>
Levene			<i>0.0002</i>	<i>0.0135</i>
t-Test (paired)			<i>0.0000</i>	
t-Test (pooled)			<i>0.0000</i>	
t-Test (sep.)			<i>0.0000</i>	
Levene			0.2447	
Bootstrap	UCL			
	Mean			
	LCL			
	Std. Dev.			
	Eff.			



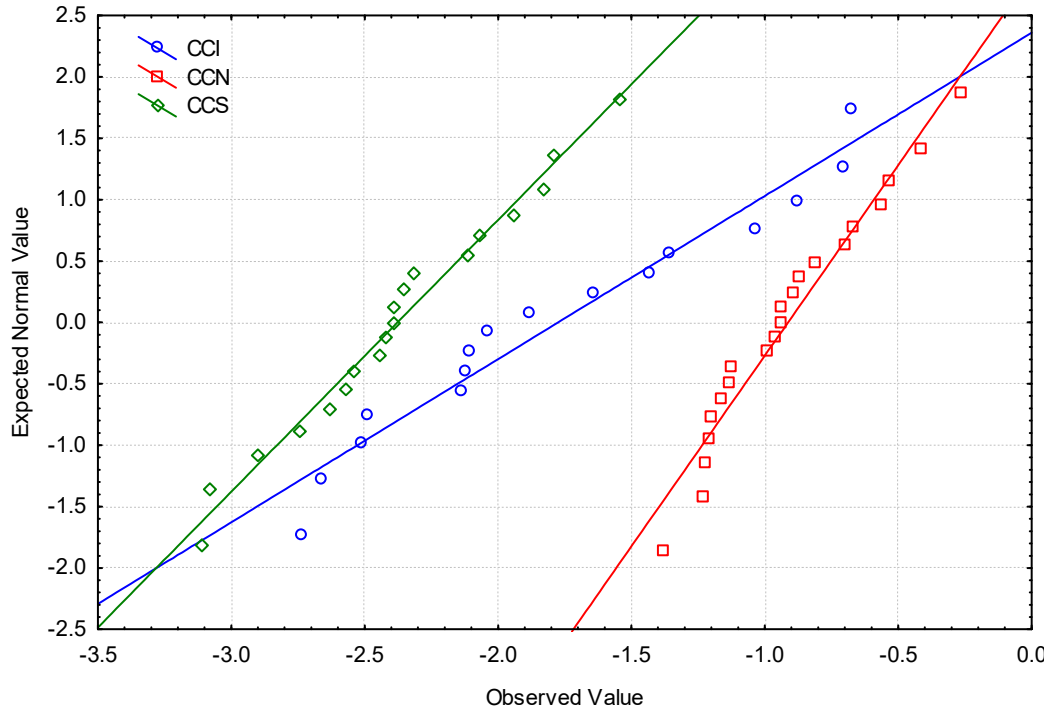
Canyon Creek Sed/Fil
Influent v. Effluent, Total P



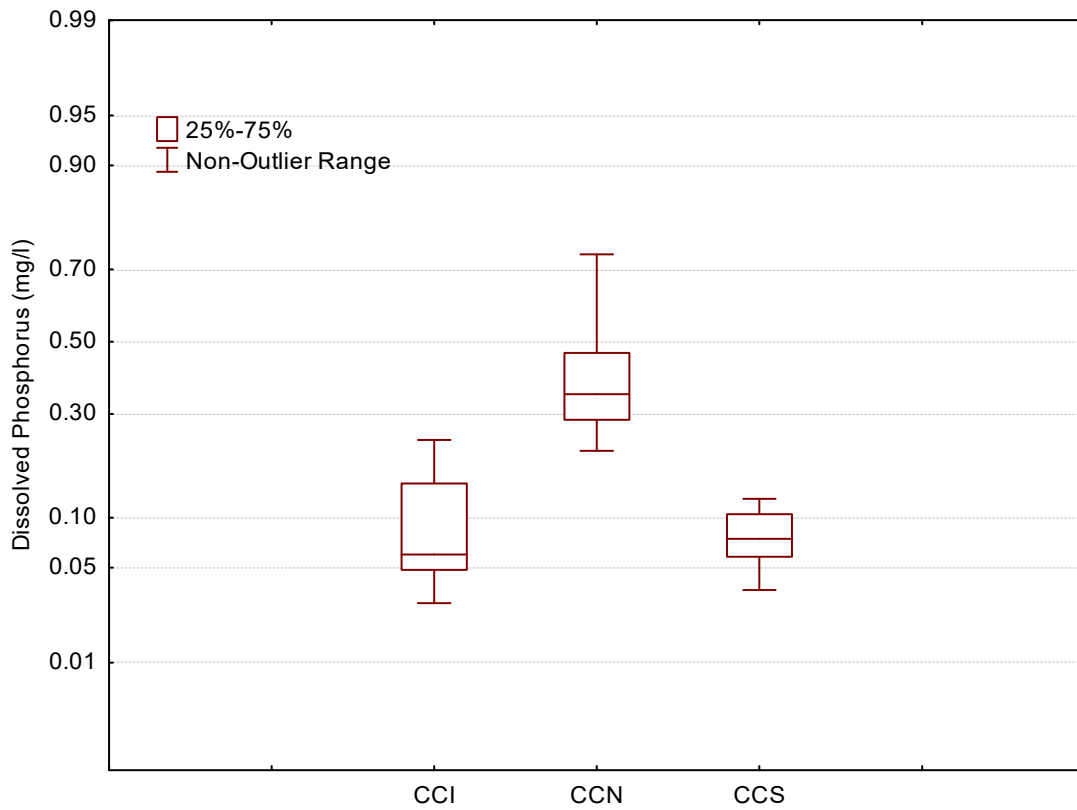
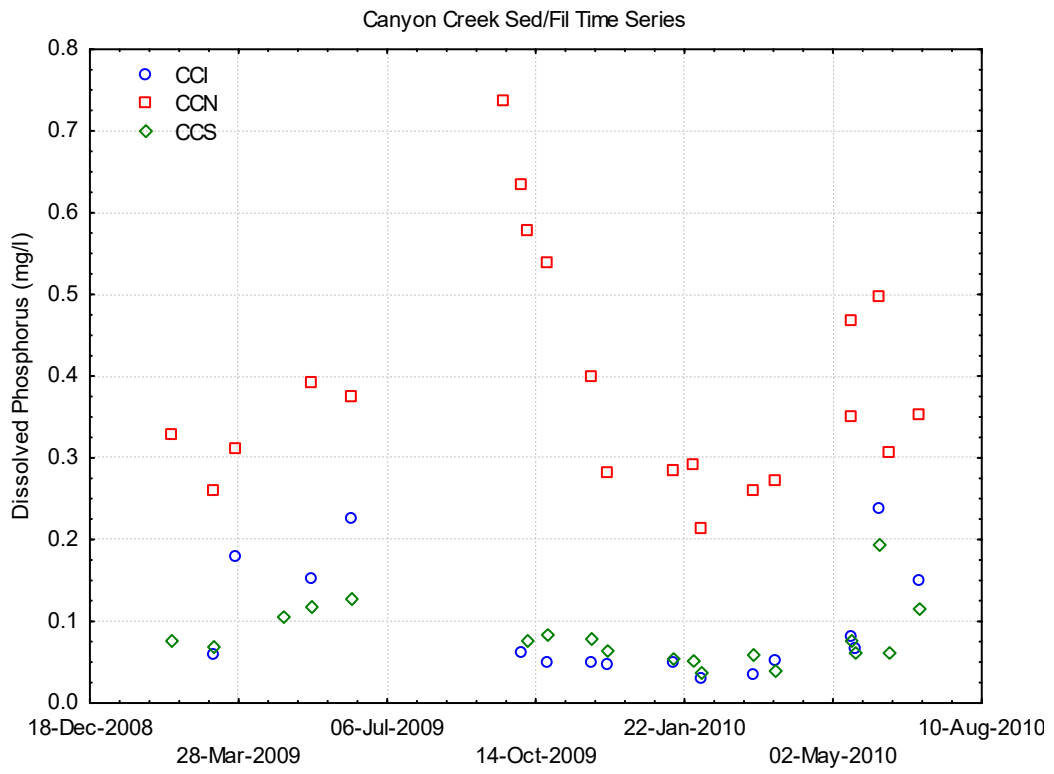
Canyon Creek Sed/Fil
Comparison of Media Types
Total Phosphorus (mg/l)



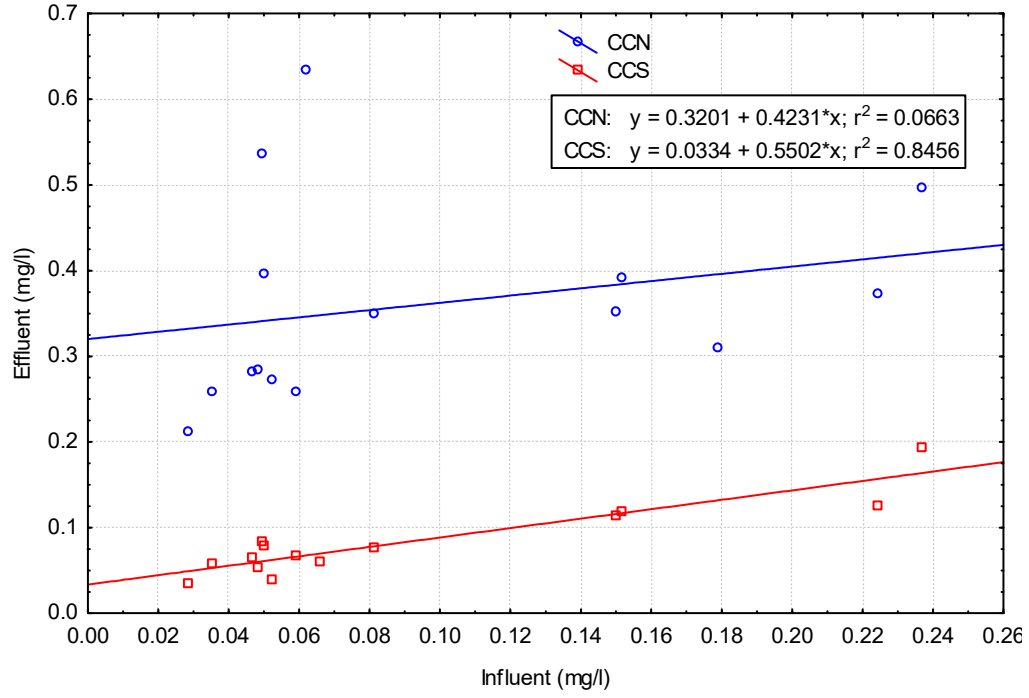
Normal Probability Plot of Log Transformed Data
Total Phosphorus



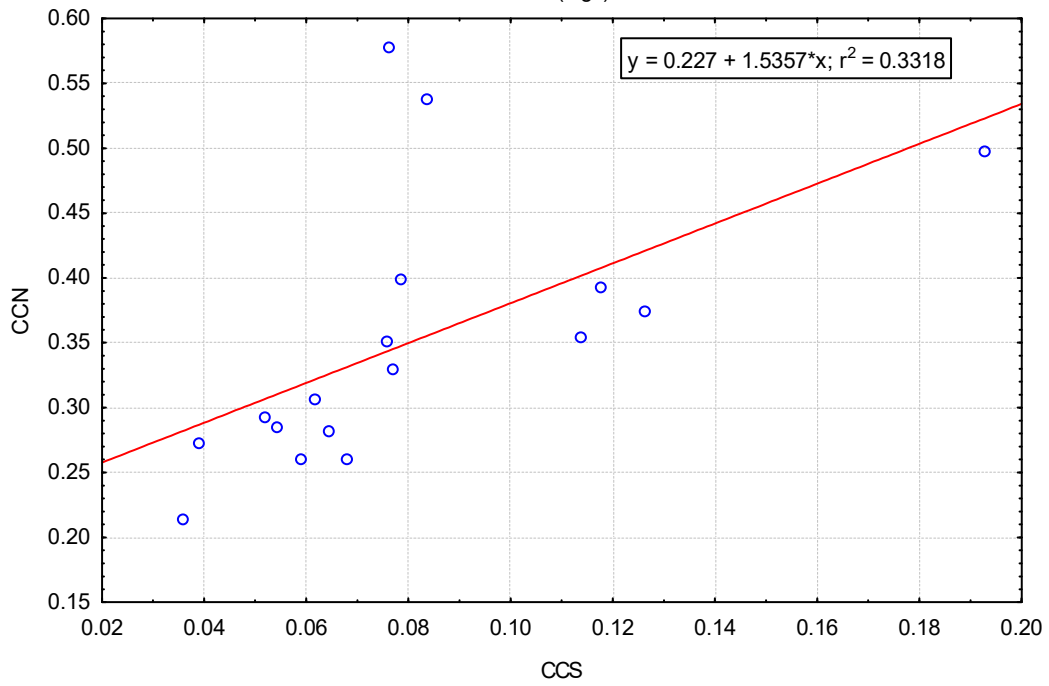
Canyon Creek Dissolved Phosphorus (mg/l)				
		CCI	CCN	CCS
Non-Parametric	n	16	21	19
	Max	0.237	0.736	0.193
	Upper Quartile Range	0.151	0.467	0.105
	Median	0.061	0.351	0.076
	Lower Quartile Range	0.049	0.285	0.059
	Min	0.029	0.213	0.036
	Efficiency		-478.6%	-25.3%
	Paired n		15	14
	Wilcoxon		<i>0.0007</i>	0.7299
	Mann-Whitney		<i>0.0000</i>	0.5893
	Paired n			17
	Wilcoxon		<i>0.0003</i>	
	Mann-Whitney		<i>0.0000</i>	
Arithmetic	UCL	0.132	0.450	0.099
	Mean	0.095	0.387	0.081
	LCL	0.058	0.324	0.063
	Std. Dev.	0.069	0.139	0.037
	W-Test p	<i>0.0025</i>	<i>0.0025</i>	<i>0.0100</i>
	Efficiency		-307.2%	14.5%
	t-Test (paired)		<i>0.0000</i>	0.4342
	t-Test (pooled)		<i>0.0000</i>	0.4602
	t-Test (sep.)		<i>0.0000</i>	0.4843
	Levene		<i>0.0276</i>	<i>0.0033</i>
	t-Test (paired)		<i>0.0000</i>	
	t-Test (pooled)		<i>0.0000</i>	
	t-Test (sep.)		<i>0.0000</i>	
	Levene		<i>0.0002</i>	
Log Transformed	Geometric Mean	0.076	0.366	0.075
	UCL	0.151	0.463	0.103
	Mean	0.095	0.387	0.081
	LCL	0.060	0.323	0.064
	Std. Dev.	0.072	0.131	0.035
	W-Test p	0.0736	0.3907	0.8099
	Efficiency		-306.3%	14.6%
	t-Test (paired)		<i>0.0000</i>	0.6576
	t-Test (pooled)		<i>0.0000</i>	0.9294
	t-Test (sep.)		<i>0.0000</i>	0.9323
	Levene		<i>0.0015</i>	<i>0.0162</i>
	t-Test (paired)		<i>0.0000</i>	
	t-Test (pooled)		<i>0.0000</i>	
	t-Test (sep.)		<i>0.0000</i>	
	Levene			0.5698
Bootstrap	UCL			
	Mean			
	LCL			
	Std. Dev.			
	Eff.			



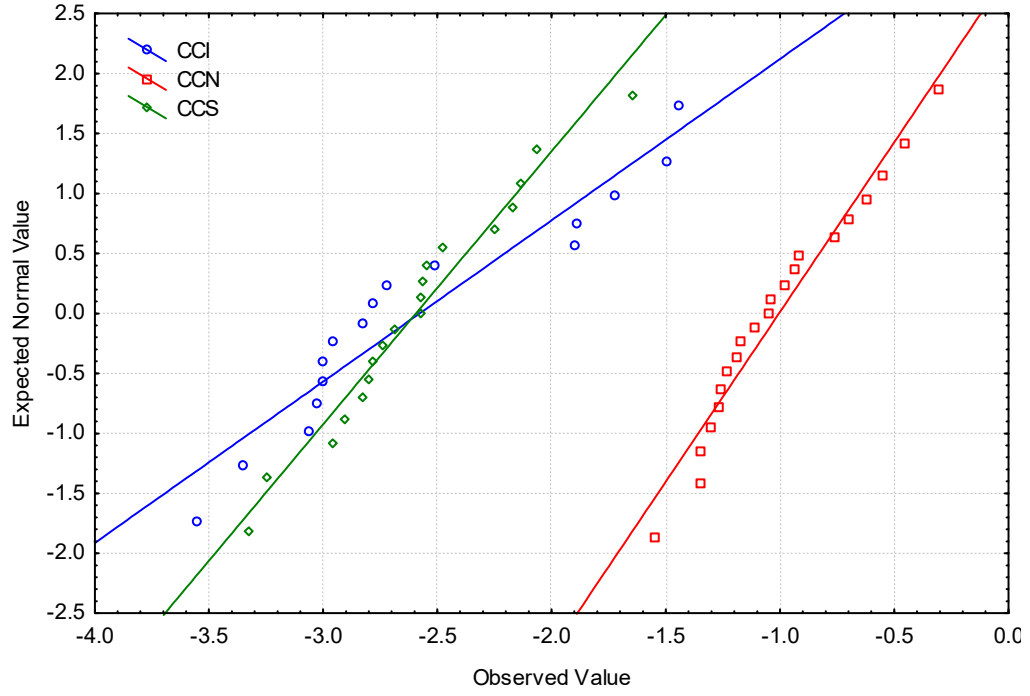
Canyon Creek Sed/Fil
Influent v. Effluent, Dissolved P



Canyon Creek Sed/Fil
Comparison of media types
Dissolved P (mg/l)

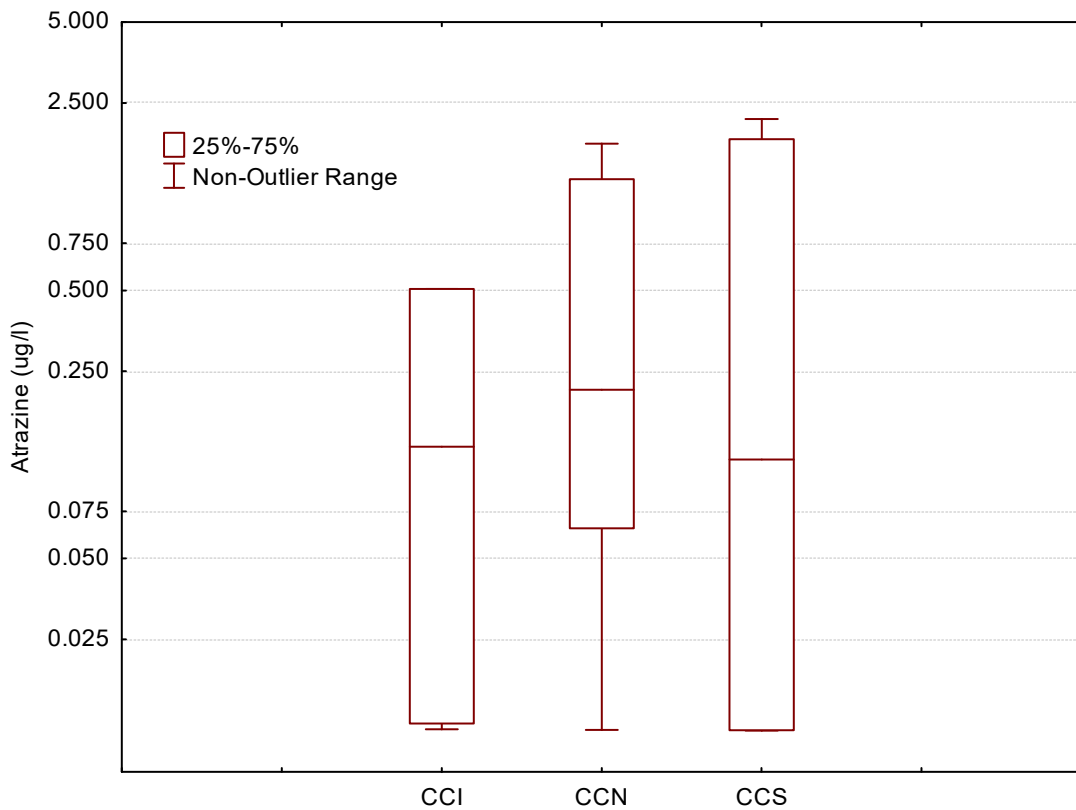
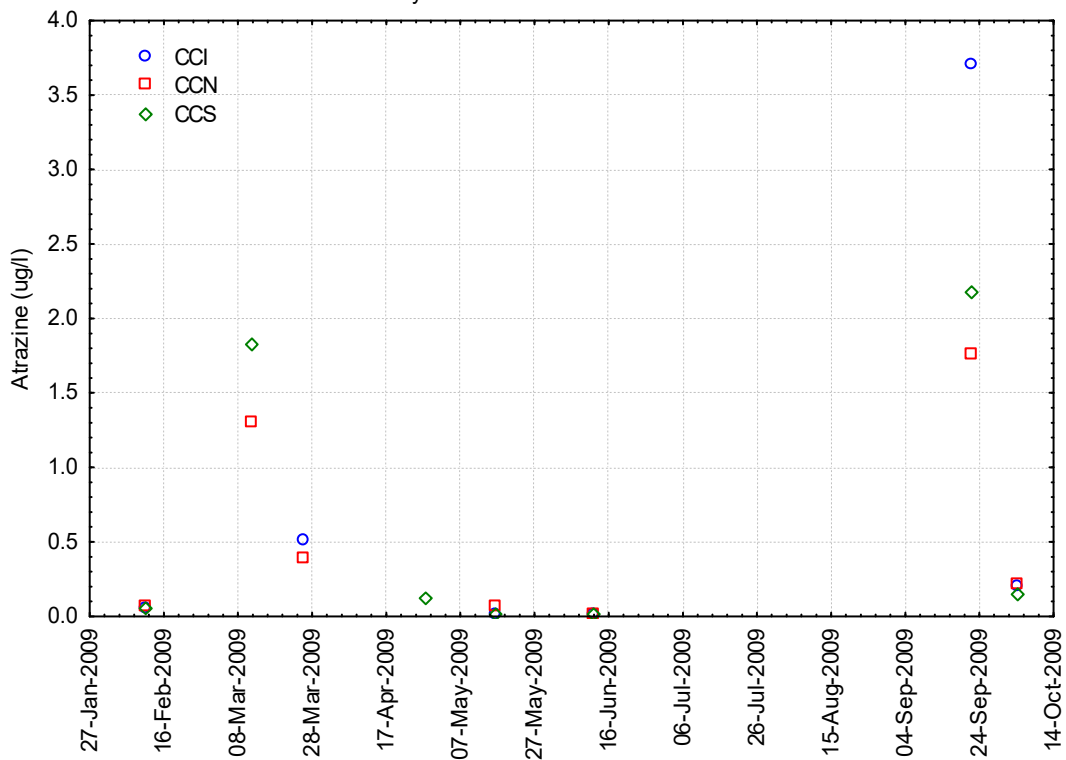


Normal Probability Plot of Log Transformed Data
Dissolved Phosphorus

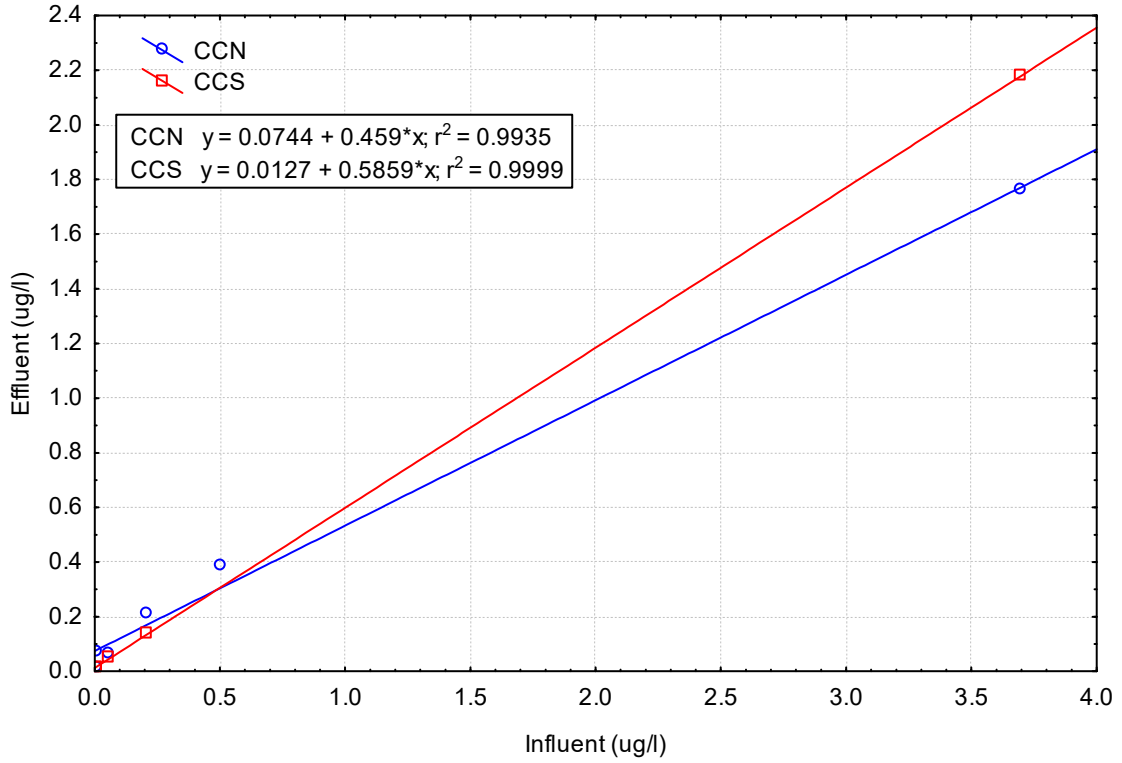


Canyon Creek Atrazine ($\mu\text{g/l}$)		CCI	CCN	CCS	
Non-Parametric	n	6	7	7	
	Max	3.700	1.760	2.180	
	Upper Quartile Range	0.507	1.300	1.830	
	Median	0.131	0.213	0.117	
	Lower Quartile Range	0.012	0.065	0.011	
	Min	0.012	0.012	0.011	
	Efficiency		-63.2%	10.3%	
	Paired n		6	5	
	Wilcoxon		0.7532	0.0431	
	Mann-Whitney		0.7308	0.7308	
	Paired n			6	
	Wilcoxon			0.9165	
	Mann-Whitney			0.7104	
	Arithmetic	UCL	2.279	1.189	1.501
Mean		0.749	0.544	0.621	
LCL		-0.782	-0.101	-0.260	
Std. Dev.		1.458	0.698	0.952	
Efficiency			27.3%	17.1%	
W-Test p		<i>0.0005</i>	<i>0.0253</i>	<i>0.0019</i>	
t-Test (paired)			0.3527	0.3512	
t-Test (pooled)			0.7466	0.8527	
t-Test (sep.)			0.7626	0.8585	
Levene			0.3091	0.6449	
t-Test (paired)				0.2719	
t-Test (pooled)				0.8663	
t-Test (sep.)				0.8666	
Levene				0.2881	
Log Transformed		Geometric Mean	0.120	0.193	0.124
		UCL	379.829	24.564	102.428
	Mean	1.532	0.954	1.238	
	LCL	0.006	0.037	0.015	
	Std. Dev.	19.541	4.615	12.250	
	Efficiency		37.7%	19.2%	
	W-Test p	0.5998	0.7926	0.2669	
	t-Test (paired)		0.6721	0.1390	
	t-Test (pooled)		0.6782	0.9753	
	t-Test (sep.)		0.6852	0.9754	
	Levene		0.4887	0.7828	
	t-Test (paired)			0.3758	
	t-Test (pooled)			0.6847	
	t-Test (sep.)			0.6849	
	Levene			0.7148	
	Bootstrap	UCL			
Mean					
LCL					
Std. Dev.					
Eff.					

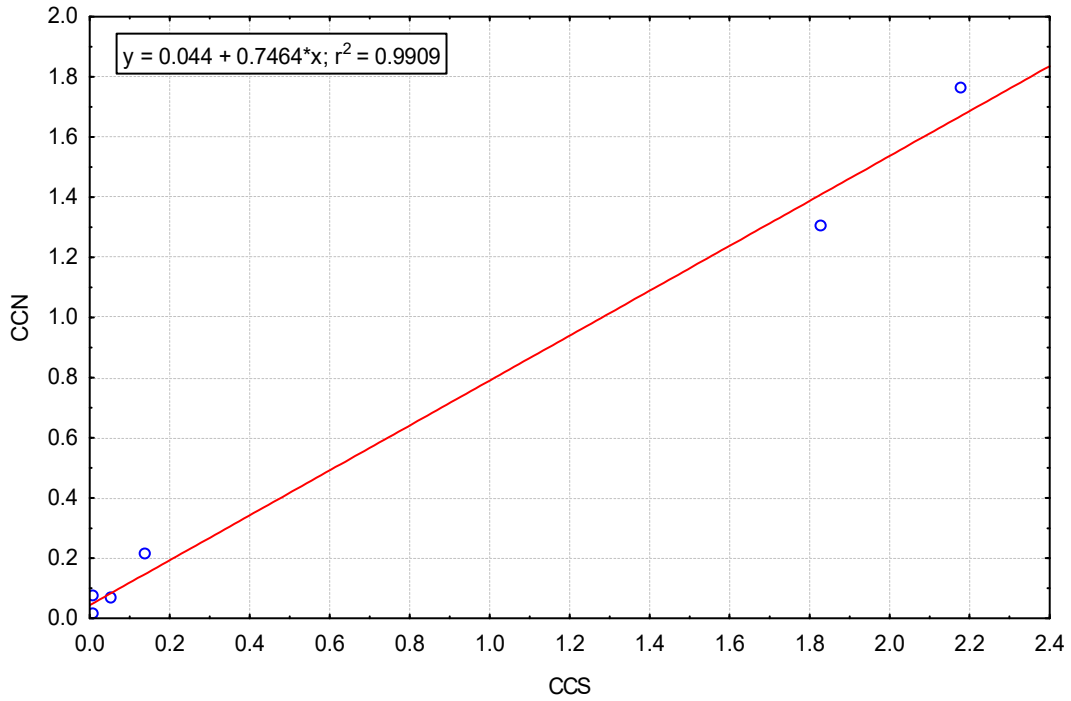
Canyon Creek Sed/Fil Time Series



Canyon Creek Sed/Fil
Influent v. Effluent, Atrazine



Canyon Creek Sed/Fil
Comparison of media types
Atrazine ($\mu\text{g/l}$)



Normal Probability Plot of Log Transformed Data
Atrazine

