EXPANSION OF THE NATIONAL STORMWATER QUALITY DATABASE, NSQD ver. 3

by

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A THESIS

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Chapter 1 Description of NSQD, version 3

1.1 Introduction

An expansion of the National Stormwater Quality Database (NSQD) was conducted by the University of Alabama, Department of Civil, Construction, and Environmental Engineering, with the Center for Watershed Protection, as part of an EPA-funded 104(b)3 project. The main emphasis of this expansion effort was to obtain additional data from communities in the Northeastern region of the United States. New data obtained from MS4 (Municipal separate storm sewer system) communities were obtained for seven municipalities. Most of the new data were in this region, but with some additional data representing other areas. In addition, updated information for 17 other municipalities was also obtained. The new data was obtained from Indianapolis, IN, Madison, WI, Minneapolis, MN, St. Paul, MN, Worchester, MA, New Castle County, DE, Broward County, FL., The updated information was obtained from cities located in Massachusetts, Maryland, Virginia, and Wisconsin. Data also reviewed for possible inclusion in the NSQD were the International BMP Database (http://www.bmpdatabase.org/), as well as older information from the Nationwide Urban Runoff Program (NURP) (EPA 1983). These additional data selected for inclusion in the NSQD, after extensive QA/QC review, represented more than 4,800 separate storm events from MS4 NPDES (National Pollution Discharge Elimination System) Phase I monitoring, the BMP database, NURP data, as well as USGS data for Madison, WI.

1.2 Stormwater Databases: NURP, USGS, International BMP Database and NSQD

The NSQD ver. 3 is a compilation of data collected from various stormwater sampling efforts including; The Nationwide Urban Runoff Program (NURP), The International BMP Database, U.S. Geological Survey Urban-Stormwater Database, the National Stormwater Quality Database NSQD ver. 1.1, and additional data collected from the NPDES (National Pollutant Elimination System) MS4 (municipal separate storm sewer system) stormwater permit holders. A version of the database called NSQD, version 2 beta, which was never released, contained preliminary data from these other sources.. These data were extensively reviewed, and additional NPDES data were collected from the northeast for this project phase for the completion of NSQD ver. 3. The NSQD version 3 contains extensive data for; total suspended solids (TSS), 5-day biochemical oxygen demand (BOD_5), chemical oxygen demand (COD), total phosphorus(TP), Total Kjeldahl Nitrogen (TKN), nitrite plus nitrate (NO_2+NO_3), total copper (Cu), total lead (Pb), and total zinc (Zn). Figure 1 shows the communities included in the NSQD ver. 3, database representing locations from all of the EPA Rain Zones.

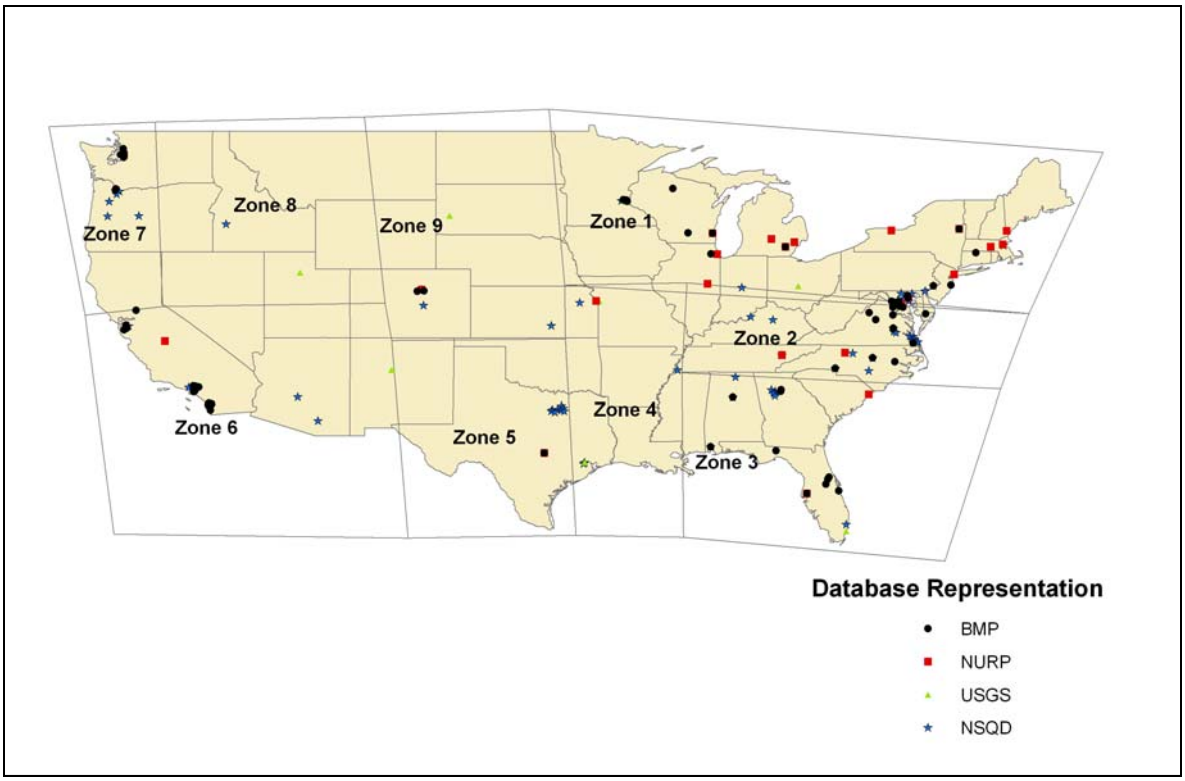

Fig.1. Communities included in NSQD ver. 3

Table 1. Cities Represented in each EPA Rain Zone

Rain Zone	Municipality	State		Rain Zone	Municipality	State
1	Detroit	MI		3	Broward Co.	FL
1	Ann Arbor	MI		3	Atlanta	GA
1	Boston	MA		3	Huntsville	AL
1	Durham	NH		3	Mobile	AL
1	Glen Ellyn	IL		3	Clayton County	GA
1	Indianapolis	IN		3	Cobb County	GA
1	Lake George	NY		3	DeBary	FL
1	Lake Quinsigamond	MA		3	Dekalb County	GA
1	Lansing	MI		3	Fulton County	GA
1	Long Island	NY		3	Jefferson County	AL
1	Madison	WI		3	Lilburn	GA
1	Milwaukee	WI		3	Orlando	FL
1	Minneaplois	MN		3	Suwanee	GA
1	Mystic River	MA		3	Tampa	FL
1	St_Paul	MN		4	Houston	TX
1	Woodbury	MN		4	Memphis	TN
1	Worcester	MA		4	Topeka	KS
2	Anne Arundel	MD		4	Harris County	TX
2	Arlington	VA		4	Kansas City	MO

2	Baltimore	MD		5	Austin	TX
2	Baltimore County	MD		5	Arlington	TX
2	Carroll	MD		5	Dallas	TX
2	Champaign	IL		5	Fort Worth	TX
2	Chantilly	VA		5	Garland	TX
2	Charles County	MD		5	Irving	TX
2	Charlotte	NC		5	Mesquite	TX
2	Charlottesville	VA		5	Plano	TX
2	Chesapeake	VA		5	Tarrant County	TX
2	Chesterfield	VA		6	Alameda County	CA
2	Fayetteville	NC		6	Caltrans	CA
2	Greensboro	NC		6	Carlsbad	CA
2	Lexington	KY		6	Castro	CA
2	Raleigh	NC		6	Encinitas	CA
2	Fairfax County	VA		6	Maricopa County	AZ
2	Frederick County	MD		6	San Diego	CA
2	Greenville	NC		6	Tucson	AZ
2	Hampton	VA		7	Bellevue	WA
2	Harford County	MD		7	Eugene	OR
2	Henrico_County	VA		7	Gresham	OR
2	Howard	MD		7	Portland	OR
2	Knoxville	TN		7	Salem	OR
2	Leesburg	VA		7	Clackamas County	OR
2	Montgomery	MD		7	Clackamas County	OR
2	New Castle Co.	DE		7	Seattle	WA
2	Newport News	VA		8	Ada County Highway District	ID
2	Norfolk	VA		9	Aurora	CO
2	Philadelphia	PA		9	Wichita	KS
2	Portsmouth	VA		9	Colorado Springs	CO
2	Prince Georges	MD		9	Denver	CO
2	Virginia Beach	VA		9	Rapid City	SD
2	Washington DC	DC				
2	Wiston Salem	NC				

There is some variation in land use and EPA Rain Zone representation between the four data sources, making them complementary and better representative of nationwide conditions. With the compilation of the selected data from the four data sources, all major land uses and the nine EPA Rain Zones are represented, filling in the major data gaps that exist in the individual data sources. Table 2 shows the contribution of each database to the NSQD ver. 3.

Table 2. Database Contributions

	NSQD ver. 3	
SOURCE	TOTAL EVENTS	PERCENTAGE
International BMP Database	1,696	19.7
NPDES MS4 (new for ver. 3)	1,221	14.2
NURP (EPA 1983)	1,858	21.6
USGS	62	0.7
NSQD 1.1 (prior NPDES MS4 data collected)	3,765	43.8
TOTAL	8,602	100.0

Table 2 is a summary of available stormwater data included in NSQD ver. 3. This table describes the total number of observations, the percentage of observations above the detection limits, minimum, maximum, average, median, standard deviation, and coefficient of variation for selected constituents in separate land use categories. The land use categories include residential, mixed residential, commercial, mixed commercial, industrial, mixed industrial, institutional, freeways, open space, and mixed open space. The mixed land use groups are labeled with the most predominate land use; as an example, the mixed residential sites have more residential land use areas than any of the other land uses, but it may not be greater than 50%. It is possible that a smaller fractional area of an especially contaminated site could overwhelm the effects from land uses that are better represented. The mixed land use site data is therefore most applicable for verification of mixing calculations based on the single land use data. Basic statistical summaries of selected constituents for general land use categories are available in Table 3.

Table 3. Summary of Selected Stormwater Constituents available in NSQD ver.3

	Drainage Area (acres)	Precipitation Depth (in)	Runoff (in)	Conductivity (µS/cm @25ºC)	DO (mg/L)	Hardness (mg/L CaCO3)	Oil and Grease Total (mg/L)	pH	Turbidity (NTU)	Temperature (C)
Overall										
NUMBER OF OBSERVATIONS	8,103	5,168	2,914	873	222	1,176	2,259	2,380	50	1,333
NUMBER OF SAMPLES WITH VALUES ABOVE DL	8,103	5,090	2,914	873	222	1,160	1,526	2,376	50	1,333
PERCENTAGE WITH DETECTED VALUES	100	98	100	100	100	99	68	100	100	100
MINIMUM	0.40	0.00	0.00	7	2.1	1.9	0.15	3.4	10	-16.6
MAXIMUM	10,339	14	9.9	8,150	12	1,100	11,000	11	630	32
AVERAGE	230	0.73	0.27	260	8.0	64	28	7.4	94	16
MEDIAN	46	0.52	0.12	122	8.2	39	5.0	7.5	55	16
STANDARD DEVIATION	880	0.77	0.53	540	1.9	88	297	0.80	130	6.9
COEFFICIENT OF VARIATION	3.8	1.1	1.9	2.1	0.23	1.4	10	0.11	1.4	0.44
Residential										
NUMBER OF OBSERVATIONS	2786	1687	1027	193	54	244	672	656	0	419
NUMBER OF SAMPLES WITH VALUES ABOVE DL	2786	1632	1027	193	54	242	409	652	0	419
PERCENTAGE WITH DETECTED VALUES	100	97	100	100	100	99	61	99	NA	100
MINIMUM	1.4	0.01	0.00	24.00	5.30	3.00	0.20	3.67	0.00	-15.87
MAXIMUM	7,590	13.98	4.38	8150.00	11.40	401.00	2980.00	10.06	0.00	29.40
AVERAGE	120	0.78	0.20	334.39	8.29	48.18	17.43	7.14	NA	14.81
MEDIAN	63	0.53	0.07	108.40	8.22	33.00	4.00	7.10	NA	15.40
STANDARD DEVIATION	440	0.97	0.43	780.76	1.63	49.91	152.02	0.86	NA	7.88
COEFFICIENT OF VARIATION	3.6	1.25	2.17	2.33	0.20	1.04	8.72	0.12	NA	0.53
Mixed Residential										
NUMBER OF OBSERVATIONS	1245	624	403	105	16	168	283	333	3	137
NUMBER OF SAMPLES WITH VALUES ABOVE DL	1245	624	403	105	16	165	199	333	3	137
PERCENTAGE WITH DETECTED VALUES	100	100	100	100	100	98	70	100	100	100
MINIMUM	3.30	0.01	0.00	37.90	4.90	3.90	0.50	5.60	20.00	0.50
MAXIMUM	10339.00	5.91	3.69	1740.00	10.40	628.00	570.00	10.02	41.00	30.00
AVERAGE	647.15	0.66	0.27	187.18	8.06	57.27	29.36	7.50	29.00	15.87
MEDIAN	101.70	0.51	0.16	112.00	8.59	40.00	4.00	7.50	26.00	15.50
STANDARD DEVIATION	1674.78	0.60	0.36	216.04	1.68	65.81	75.36	0.72	10.82	5.39
COEFFICIENT OF VARIATION	2.59	0.91	1.29	1.15	0.21	1.15	2.57	0.10	0.37	0.34

Table 3. Summary of Selected Stormwater Constituents available in NSQD, ver. 3 (Continued)

	Drainage Area (acres)	Precipitation Depth (in)	Runoff (in)	Conductivity (µS/cm @25ºC)	DO (mg/L)	Hardness (mg/L CaCO3)	Oil and Grease Total (mg/L)	pH	Turbidity (NTU)	Temperature (C)
Commercial										
NUMBER OF OBSERVATIONS	1159	749	407	102	43	189	415	299	0	150
NUMBER OF SAMPLES WITH VALUES ABOVE DL	1159	746	407	102	43	189	286	299	0	150
PERCENTAGE WITH DETECTED VALUES	100	100	100	100	100	100	69	100	NA	100
MINIMUM	0.90	0.01	0.00	7.00	2.05	1.90	0.50	4.50	0.00	4.51
MAXIMUM	380.00	4.39	2.89	4440.00	12.00	356.00	359.00	10.71	0.00	30.00
AVERAGE	43.12	0.75	0.30	250.60	7.81	70.93	13.05	7.44	NA	16.77
MEDIAN	22.70	0.54	0.16	111.00	7.90	45.00	4.64	7.50	NA	16.41
STANDARD DEVIATION	58.55	0.71	0.38	555.65	2.02	70.46	38.16	0.74	NA	6.31
COEFFICIENT OF VARIATION	1.36	0.95	1.25	2.22	0.26	0.99	2.92	0.10	NA	0.38
Mixed Commercial										
NUMBER OF OBSERVATIONS	525	314	127	59	16	98	134	156	0	98
NUMBER OF SAMPLES WITH VALUES ABOVE DL	525	314	127	59	16	97	107	156	0	98
PERCENTAGE WITH DETECTED VALUES	100	100	100	100	100	99	80	100	NA	100
MINIMUM	1.00	0.03	0.01	16.80	3.90	10.00	0.90	5.00	0.00	3.10
MAXIMUM	2564.00	6.46	2.07	621.00	12.30	1100.00	559.00	8.80	0.00	25.00
AVERAGE	164.30	0.68	0.34	123.30	8.38	72.05	31.37	7.60	NA	15.02
MEDIAN	44.90	0.48	0.26	100.00	8.20	36.00	5.00	7.60	NA	14.50
STANDARD DEVIATION	308.67	0.70	0.33	93.49	2.33	127.47	92.15	0.63	NA	5.38
COEFFICIENT OF VARIATION	1.88	1.03	0.96	0.76	0.28	1.77	2.94	0.08	NA	0.36
Industrial										
NUMBER OF OBSERVATIONS	843	575	321	115	39	153	365	334	10	167
NUMBER OF SAMPLES WITH VALUES ABOVE DL	843	572	321	115	39	148	230	334	10	167
PERCENTAGE WITH DETECTED VALUES	100	99	100	100	100	97	63	100	100	100
MINIMUM	1.50	0.03	0.00	40.20	4.20	5.50	0.15	3.40	15.90	-16.56
MAXIMUM	495.02	6.00	2.00	5320.00	10.20	888.00	11000.00	9.90	630.00	31.50
AVERAGE	55.45	0.70	0.20	265.88	7.28	85.53	58.69	7.52	200.92	17.83
MEDIAN	36.00	0.51	0.08	135.00	7.30	43.90	5.00	7.55	127.50	17.10
STANDARD DEVIATION	72.63	0.64	0.31	595.28	1.47	113.86	725.40	0.82	198.21	7.61
COEFFICIENT OF VARIATION	1.31	0.91	1.56	2.24	0.20	1.33	12.36	0.11	0.99	0.43

Table 3. Summary of Selected Stormwater Constituents available in NSQD, ver. 3 (Continued)

	Drainage Area (acres)	Precipitation Depth (in)	Runoff (in)	Conductivity (µS/cm @25ºC)	DO (mg/L)	Hardness (mg/L CaCO3)	Oil and Grease Total (mg/L)	pH	Turbidity (NTU)	Temperature (C)
Mixed Industrial										
NUMBER OF OBSERVATIONS	269	224	108	63	0	96	99	176	11	81
NUMBER OF SAMPLES WITH VALUES ABOVE DL	269	224	108	63	0	91	75	176	11	81
PERCENTAGE WITH DETECTED VALUES	100	100	100	100	NA	95	76	100	100	100
MINIMUM	32.00	0.05	0.00	41.00	0.00	10.00	0.60	5.35	50.00	1.80
MAXIMUM	3915.00	3.03	1.81	722.00	0.00	110.00	480.00	9.70	590.00	27.50
AVERAGE	501.02	0.58	0.30	169.46	NA	37.25	49.31	7.67	118.18	16.94
MEDIAN	127.70	0.40	0.22	118.00	NA	34.00	4.50	7.80	65.00	17.70
STANDARD DEVIATION	970.29	0.50	0.32	133.20	NA	19.16	104.91	0.74	158.40	6.00
COEFFICIENT OF VARIATION	1.94	0.86	1.04	0.79	NA	0.51	2.13	0.10	1.34	0.35
Institutional										
NUMBER OF OBSERVATIONS	142	109	100	0	0	0	0	4	0	3
NUMBER OF SAMPLES WITH VALUES ABOVE DL	142	109	100	0	0	0	0	4	0	3
PERCENTAGE WITH DETECTED VALUES	100	100	100	NA	NA	NA	NA	100	NA	100
MINIMUM	16.00	0.04	0.00	0.00	0.00	0.00	0.00	7.30	0.00	2.00
MAXIMUM	46.59	2.27	2.07	0.00	0.00	0.00	0.00	7.70	0.00	21.70
AVERAGE	22.99	0.77	0.17	NA	NA	NA	NA	7.55	NA	12.10
MEDIAN	16.00	0.66	0.10	NA	NA	NA	NA	7.60	NA	12.60
STANDARD DEVIATION	10.20	0.55	0.25	NA	NA	NA	NA	0.17	NA	9.86
COEFFICIENT OF VARIATION	0.44	0.72	1.44	NA	NA	NA	NA	0.02	NA	0.81
Freeway										
NUMBER OF OBSERVATIONS	692	507	279	86	8	127	151	205	25	115
NUMBER OF SAMPLES WITH VALUES ABOVE DL	692	490	279	86	8	127	134	205	25	115
PERCENTAGE WITH DETECTED VALUES	100	97	100	100	100	100	89	100	100	100
MINIMUM	0.40	0.00	0.01	20.00	6.40	5.00	2.30	5.00	10.20	2.40
MAXIMUM	83.20	6.15	9.85	870.00	9.20	1000.00	30.00	9.65	157.30	27.78
AVERAGE	21.89	0.71	0.62	128.89	8.23	57.19	6.18	7.45	50.42	14.84
MEDIAN	10.00	0.50	0.29	99.00	8.65	34.00	5.00	7.40	35.60	15.57
STANDARD DEVIATION	27.85	0.70	1.19	130.70	1.09	105.95	3.44	0.86	40.90	7.12
COEFFICIENT OF VARIATION	1.27	0.99	1.92	1.01	0.13	1.85	0.56	0.12	0.81	0.48

Table 3. Summary of Selected Stormwater Constituents available in NSQD, ver. 3 (Continued)

	Drainage Area (acres)	Precipitation Depth (in)	Runoff (in)	Conductivity (µS/cm @25ºC)	DO (mg/L)	Hardness (mg/L CaCO3)	Oil and Grease Total (mg/L)	pH	Turbidity (NTU)	Temperature (C)
Mixed Freeway										
NUMBER OF OBSERVATIONS	26	26	12	21	2	12	20	17	0	17
NUMBER OF SAMPLES WITH VALUES ABOVE DL	26	26	12	21	2	12	20	17	0	17
PERCENTAGE WITH DETECTED VALUES	100	100	100	100	100	100	100	100	NA	100
MINIMUM	4.00	0.03	0.06	137.46	5.10	39.20	1.00	6.50	0.00	8.00
MAXIMUM	102.70	1.86	0.77	1159.00	9.85	120.00	157.00	8.20	0.00	23.70
AVERAGE	49.50	0.65	0.28	474.42	7.48	79.73	24.23	7.63	NA	15.78
MEDIAN	63.13	0.47	0.19	353.00	7.48	83.00	4.53	7.70	NA	16.00
STANDARD DEVIATION	33.37	0.53	0.24	299.11	3.36	22.53	44.03	0.46	NA	5.01
COEFFICIENT OF VARIATION	0.67	0.81	0.85	0.63	0.45	0.28	1.82	0.06	NA	0.32
Open Space										
NUMBER OF OBSERVATIONS	78	57	23	7	1	13	24	19	1	7
NUMBER OF SAMPLES WITH VALUES ABOVE DL	78	57	23	7	1	13	7	19	1	7
PERCENTAGE WITH DETECTED VALUES	100	100	100	100	100	100	29	100	100	100
MINIMUM	7.88	0.06	0.02	25.00	7.30	7.67	0.50	6.36	36.00	6.20
MAXIMUM	1120.00	5.10	0.86	150.00	7.30	270.00	3.70	8.80	36.00	21.60
AVERAGE	143.61	0.91	0.27	74.57	7.30	94.47	1.53	7.61	36.00	11.91
MEDIAN	18.50	0.62	0.13	75.00	7.30	41.00	1.30	7.70	36.00	9.10
STANDARD DEVIATION	282.91	0.86	0.28	41.48	NA	93.30	1.07	0.64	NA	5.96
COEFFICIENT OF VARIATION	1.97	0.94	1.03	0.56	NA	0.99	0.70	0.08	NA	0.50
Mixed Open Space										
NUMBER OF OBSERVATIONS	168	167	93	65	0	70	90	128	0	76
NUMBER OF SAMPLES WITH VALUES ABOVE DL	168	167	93	65	0	70	54	128	0	76
PERCENTAGE WITH DETECTED VALUES	100	100	100	100	NA	100	60	100	NA	100
MINIMUM	12.05	0.01	0.00	48.00	0.00	5.00	1.00	6.30	0.00	3.60
MAXIMUM	352.00	3.57	1.15	5955.00	0.00	1030.00	491.00	9.60	0.00	29.00
AVERAGE	169.14	0.62	0.17	464.34	NA	110.66	93.45	7.95	NA	16.13
MEDIAN	115.36	0.51	0.10	215.00	NA	64.20	8.50	7.90	NA	16.00
STANDARD DEVIATION	134.67	0.50	0.21	809.88	NA	141.20	141.16	0.56	NA	4.89
COEFFICIENT OF VARIATION	0.80	0.81	1.22	1.74	NA	1.28	1.51	0.07	NA	0.30

Table 3. Summary of Selected Stormwater Constituents available in NSQD, ver. 3 (Continued)

Overall	TDS (mg/L)	TSS (mg/L)	BOD5 (mg/L)	COD (mg/L)	Fecal Coliform (colonies/100 mL)	Fecal Streptococcus (colonies/100 mL)	Total E. Coli (colonies/100 mL)	Ammonia (mg/L)	N02+NO3 (mg/L)	Nitrogen Total (mg/L)	N
NUMBER OF OBSERVATIONS	3548	6780	4779	5070	2154	1187	160	2516	5563	694	
NUMBER OF SAMPLES WITH VALUES ABOVE DL	3526	6695	4505	5013	1952	1119	147	1836	5467	644	
PERCENTAGE WITH DETECTED VALUES	99	99	94	99	91	94	92	73	98	93	
MINIMUM	3.00	0.11	0.10	1.00	1.00	20.00	6.00	0.01	0.00	0.20	
MAXIMUM	17900	10700	6920	1260	5230000	6000000	66000	12	66	90	
AVERAGE	159.10	137.04	15.78	77.61	47664.55	58290.93	5161.51	0.68	0.88	2.45	
MEDIAN	82.00	62.00	8.50	53.00	4300.00	17000.00	1100.00	0.44	0.60	1.71	
STANDARD DEVIATION	531.82	296.28	105.20	83.35	238415.87	216012.72	10955.75	0.89	1.72	4.11	
COEFFICIENT OF VARIATION	3.34	2.16	6.67	1.07	5.00	3.71	2.12	1.31	1.96	1.68	
Residential											
NUMBER OF OBSERVATIONS	1084	2353	1582	1581	640	283	44	845	1827	115	
NUMBER OF SAMPLES WITH VALUES ABOVE DL	1076	2333	1495	1569	570	252	42	685	1801	114	
PERCENTAGE WITH DETECTED VALUES	99	99	95	99	89	89	95	81	99	99	
MINIMUM	3.00	0.11	0.10	2.50	1.00	20.00	10.00	0.01	0.01	0.20	
MAXIMUM	8200	4168	433	818	5230000	680000	54600	6	66	9	
AVERAGE	146.23	115.46	13.81	70.56	66544.00	59986.71	5982.38	0.51	1.07	2.25	
MEDIAN	76.00	53.00	8.30	51.00	4650.00	24000.00	800.00	0.34	0.64	1.90	
STANDARD DEVIATION	438.97	227.12	23.75	70.70	330755.73	104142.39	11310.90	0.56	2.51	1.62	
COEFFICIENT OF VARIATION	3.00	1.97	1.72	1.00	4.97	1.74	1.89	1.10	2.35	0.72	
Mixed Residential											
NUMBER OF OBSERVATIONS	514	1152	717	906	336	178	11	305	870	137	
NUMBER OF SAMPLES WITH VALUES ABOVE DL	510	1142	685	904	317	174	10	184	859	127	
PERCENTAGE WITH DETECTED VALUES	99	99	96	100	94	98	91	60	99	93	
MINIMUM	5.00	0.50	1.00	1.00	8.00	135.00	87.00	0.05	0.00	0.21	
MAXIMUM	17900.00	10700.00	189.68	626.00	2950000.00	1800000.00	62000.00	9.14	20.00	90.10	
AVERAGE	155.78	177.44	11.44	68.91	64728.71	84263.83	9141.70	0.64	0.83	3.07	
MEDIAN	85.00	79.50	7.53	49.00	11210.40	27500.00	1050.00	0.37	0.60	2.00	
STANDARD DEVIATION	805.24	481.11	14.19	71.51	204369.38	176310.34	19305.05	1.00	1.28	8.04	
COEFFICIENT OF VARIATION	5.17	2.71	1.24	1.04	3.16	2.09	2.11	1.56	1.55	2.62	

Table 3. Summary of Selected Stormwater Constituents available in NSQD, ver. 3 (Continued)

Commercial	TDS (mg/L)	TSS (mg/L)	BOD5 (mg/L)	COD (mg/L)	Fecal Coliform (colonies/100 mL)	Fecal Streptococcus (colonies/100 mL)	Total E. Coli (colonies/100 mL)	Ammonia (mg/L)	N02+NO3 (mg/L)	Nitrogen Total (mg/L)	N
NUMBER OF OBSERVATIONS	562	948	815	724	335	208	40	444	1043	92	
NUMBER OF SAMPLES WITH VALUES ABOVE DL	560	921	768	711	298	193	36	368	1034	90	
PERCENTAGE WITH DETECTED VALUES	100	97	94	98	89	93	90	83	99	98	
MINIMUM	4.00	1.00	0.10	4.00	4.00	20.00	6.00	0.02	0.00	0.22	
MAXIMUM	6260.00	2385.00	211.71	635.00	2150000.00	1100000.00	66000.00	7.80	9.09	18.10	
AVERAGE	175.96	112.46	16.08	85.83	37735.89	45453.79	5472.06	0.76	0.69	2.67	
MEDIAN	77.00	50.95	11.00	58.00	3000.00	12000.00	1660.00	0.50	0.51	1.78	
STANDARD DEVIATION	502.12	196.44	18.22	83.43	168687.03	117679.57	12109.75	0.88	0.82	2.81	
COEFFICIENT OF VARIATION	2.85	1.75	1.13	0.97	4.47	2.59	2.21	1.15	1.18	1.06	
Mixed Commercial											
NUMBER OF OBSERVATIONS	289	479	351	408	116	95	17	198	328	72	
NUMBER OF SAMPLES WITH VALUES ABOVE DL	288	478	345	406	110	94	16	135	319	63	
PERCENTAGE WITH DETECTED VALUES	100	100	98	100	95	99	94	68	97	88	
MINIMUM	14.00	3.70	1.00	2.00	32.00	600.00	15.00	0.06	0.00	0.20	
MAXIMUM	2300.00	2996.00	370.00	650.00	810000.00	1000000.00	7250.00	4.73	3.31	20.20	
AVERAGE	122.07	171.79	16.25	97.93	31839.35	44009.65	2263.50	0.84	0.71	2.26	
MEDIAN	71.50	82.00	10.00	70.00	5400.00	11900.00	1965.00	0.60	0.57	1.50	
STANDARD DEVIATION	222.79	265.90	25.14	89.93	96694.61	116474.92	2123.55	0.78	0.47	2.82	
COEFFICIENT OF VARIATION	1.83	1.55	1.55	0.92	3.04	2.65	0.94	0.94	0.67	1.25	
Industrial											
NUMBER OF OBSERVATIONS	539	691	610	514	366	197	24	381	603	77	
NUMBER OF SAMPLES WITH VALUES ABOVE DL	536	679	572	507	323	185	19	300	584	76	
PERCENTAGE WITH DETECTED VALUES	99	98	94	99	88	94	79	79	97	99	
MINIMUM	3.00	1.00	1.00	2.00	2.00	22.00	20.00	0.03	0.00	0.20	
MAXIMUM	11200.00	2490.00	6920.00	1260.00	3600000.00	6000000.00	24800.00	9.84	8.40	15.20	
AVERAGE	213.42	161.09	28.15	96.85	42905.24	67383.66	3062.89	0.68	0.85	2.01	
MEDIAN	88.00	76.00	9.00	59.00	2000.00	12000.00	310.00	0.45	0.64	1.58	
STANDARD DEVIATION	714.86	260.86	289.65	120.82	276190.39	445645.14	5859.29	0.83	0.80	2.02	
COEFFICIENT OF VARIATION	3.35	1.62	10.29	1.25	6.44	6.61	1.91	1.22	0.93	1.01	

Table 3. Summary of Selected Stormwater Constituents available in NSQD, ver. 3 (Continued)

	TDS (mg/L)	TSS (mg/L)	BOD5 (mg/L)	COD (mg/L)	Fecal Coliform (colonies/100 mL)	Fecal Streptococcus (colonies/100 mL)	Total E. Coli (colonies/100 mL)	Ammonia (mg/L)	N02+NO3 (mg/L)	Nitrogen Total (mg/L)	Nit Kje T (m
Mixed Industrial											
NUMBER OF OBSERVATIONS	214	256	216	219	104	83	0	106	204	92	2
NUMBER OF SAMPLES WITH VALUES ABOVE DL	213	256	208	216	103	81	0	37	201	76	1
PERCENTAGE WITH DETECTED VALUES	100	100	96	99	99	98	NA	35	99	83	
MINIMUM	17.00	3.00	1.00	2.50	5.00	750.00	0.00	0.11	0.03	0.20	0
MAXIMUM	800.00	1472.00	270.00	475.00	300000.00	520000.00	0.00	3.00	2.86	16.70	2
AVERAGE	104.94	155.81	13.76	63.12	15348.93	26063.98	NA	0.77	0.71	2.71	1
MEDIAN	85.00	84.00	8.00	43.50	3400.00	11000.00	NA	0.61	0.60	1.80	1
STANDARD DEVIATION	84.45	213.15	22.39	67.98	37581.50	61738.02	NA	0.56	0.47	2.86	2
COEFFICIENT OF VARIATION	0.80	1.37	1.63	1.08	2.45	2.37	NA	0.73	0.66	1.06	1
Institutional											
NUMBER OF OBSERVATIONS	24	53	51	52	3	3	0	25	138	7	
NUMBER OF SAMPLES WITH VALUES ABOVE DL	24	52	49	50	3	3	0	17	138	7	
PERCENTAGE WITH DETECTED VALUES	100	98	96	96	100	100	NA	68	100	100	
MINIMUM	18.00	2.00	2.00	5.00	1600.00	1600.00	0.00	0.15	0.01	0.83	0
MAXIMUM	235.00	314.00	31.00	280.00	4300.00	65000.00	0.00	0.79	2.81	2.38	3
AVERAGE	83.71	44.63	10.94	52.02	3100.00	23000.00	NA	0.39	0.54	1.56	1
MEDIAN	61.00	18.00	10.00	35.50	3400.00	2400.00	NA	0.32	0.41	1.40	0
STANDARD DEVIATION	58.10	63.52	7.05	47.28	1374.77	36375.27	NA	0.20	0.46	0.60	0
COEFFICIENT OF VARIATION	0.69	1.42	0.64	0.91	0.44	1.58	NA	0.52	0.87	0.39	0
Freeway											
NUMBER OF OBSERVATIONS	114	368	137	447	68	27	13	95	118	20	4
NUMBER OF SAMPLES WITH VALUES ABOVE DL	113	367	131	446	68	27	13	75	117	20	4
PERCENTAGE WITH DETECTED VALUES	99	100	96	100	100	100	100	79	99	100	
MINIMUM	12.00	0.42	2.00	2.44	20.00	560.00	10.00	0.08	0.10	0.64	0
MAXIMUM	1020.00	4800.00	89.00	1012.82	160000.00	130000.00	48800.00	11.87	41.60	3.87	3
AVERAGE	145.28	113.60	12.82	87.82	8604.10	27458.89	6001.54	1.68	1.80	1.83	2
MEDIAN	80.00	53.68	8.75	64.00	2000.00	17000.00	1900.00	1.07	1.09	1.45	1
STANDARD DEVIATION	185.78	290.48	13.50	89.49	22552.83	32169.82	13062.39	2.16	3.97	1.07	2
COEFFICIENT OF VARIATION	1.28	2.56	1.05	1.02	2.62	1.17	2.18	1.28	2.20	0.59	1

Table 3. Summary of Selected Stormwater Constituents available in NSQD, ver. 3 (Continued)

	TDS (mg/L)	TSS (mg/L)	BOD5 (mg/L)	COD (mg/L)	Fecal Coliform (colonies/100 mL)	Fecal Streptococcus (colonies/100 mL)	Total E. Coli (colonies/100 mL)	Ammonia (mg/L)	N02+NO3 (mg/L)	Nitrogen Total (mg/L)	Nit Kje T (m
Mixed Freeway											
NUMBER OF OBSERVATIONS	15	23	23	15	20	16	0	3	22	0	
NUMBER OF SAMPLES WITH VALUES ABOVE DL	15	23	23	15	17	15	0	3	22	0	
PERCENTAGE WITH DETECTED VALUES	100	100	100	100	85	94	NA	100	100	NA	1
MINIMUM	45.00	16.00	2.80	5.00	33.00	30.00	0.00	0.79	0.09	0.00	0
MAXIMUM	278.00	614.00	87.48	110.00	160000.00	73000.00	0.00	1.97	3.17	0.00	2
AVERAGE	181.67	116.67	15.89	52.95	17000.67	19808.67	NA	1.23	1.07	NA	3
MEDIAN	177.00	88.00	8.20	47.00	2600.00	19000.00	NA	0.92	0.91	NA	2
STANDARD DEVIATION	65.16	123.53	18.88	26.62	39923.57	21699.65	NA	0.65	0.72	NA	4
COEFFICIENT OF VARIATION	0.36	1.06	1.19	0.50	2.35	1.10	NA	0.53	0.67	NA	1
Open Space											
NUMBER OF OBSERVATIONS	45	75	49	48	28	22	5	37	49	19	
NUMBER OF SAMPLES WITH VALUES ABOVE DL	44	71	42	38	26	20	5	10	42	18	
PERCENTAGE WITH DETECTED VALUES	98	95	86	79	93	91	100	27	86	95	
MINIMUM	32.00	3.00	1.00	8.00	650.00	160.00	100.00	0.07	0.09	0.28	0
MAXIMUM	542.00	980.00	20.00	476.00	63000.00	101000.00	4700.00	1.80	3.33	6.33	4
AVERAGE	151.41	116.16	6.30	47.38	14723.23	33203.00	1556.00	0.45	0.91	2.07	1
MEDIAN	124.50	21.00	5.50	28.00	4400.00	24900.00	1100.00	0.17	0.52	1.66	0
STANDARD DEVIATION	109.83	217.70	4.18	74.35	18000.24	32470.25	1804.35	0.64	0.86	1.60	1
COEFFICIENT OF VARIATION	0.73	1.87	0.66	1.57	1.22	0.98	1.16	1.42	0.95	0.77	0
Mixed Open Space											
NUMBER OF OBSERVATIONS	148	153	145	145	86	75	0	71	152	58	1
NUMBER OF SAMPLES WITH VALUES ABOVE DL	147	149	140	140	84	75	0	16	148	48	1
PERCENTAGE WITH DETECTED VALUES	99	97	97	97	98	100	NA	23	97	83	
MINIMUM	4.00	3.00	1.00	1.00	4.00	300.00	0.00	0.10	0.05	0.30	0
MAXIMUM	4240.00	2180.00	270.00	830.00	390000.00	1300000.00	0.00	3.90	4.60	9.40	8
AVERAGE	176.53	188.36	13.01	54.61	33909.11	82543.55	NA	0.79	0.79	2.01	1
MEDIAN	109.00	78.00	6.00	34.00	3000.00	21000.00	NA	0.51	0.66	1.70	1
STANDARD DEVIATION	388.57	293.38	34.90	87.72	77998.08	196822.83	NA	0.91	0.64	1.57	1
COEFFICIENT OF VARIATION	2.20	1.56	2.68	1.61	2.30	2.38	NA	1.16	0.81	0.78	0

Table 3. Summary of Selected Stormwater Constituents available in NSQD, ver. 3 (Continued)

Overall	Phosphorous Dissolved (mg/L)	Phosphorous Total (mg/L)	Cadmium Total (µg/L)	Copper Total (µg/L)	Copper Dissolved (µg/L)	Lead Total (µg/L)	Lead Dissolved (µg/L)	Zinc Total (µg/L)	Zinc Dissolved (µg/L)	Nitrogen Nitrate (mg/L)	Nitroge Nitrite (mg/L)
NUMBER OF OBSERVATIONS	3113	7425	3600	5165	433	6044	454	6184	403	176	89
NUMBER OF SAMPLES WITH VALUES ABOVE DL	2518	7232	1562	4544	357	5034	223	6030	381	175	70
PERCENTAGE WITH DETECTED VALUES	81	97	43	88	82	83	49	98	95	99	79
MINIMUM	0.00	0.00	0.04	0.17	0.09	0.05	0.50	0.37	3.10	0.10	0.02
MAXIMUM	6.97	80.20	333.95	1360.00	195.00	19100.00	130.00	22500.00	13900.00	16.79	2.44
AVERAGE	0.20	0.41	3.53	30.07	13.76	95.39	9.56	181.07	268.83	1.28	0.30
MEDIAN	0.12	0.24	0.92	15.00	8.00	24.00	3.00	90.01	50.00	0.71	0.16
STANDARD DEVIATION	0.31	1.15	14.31	62.22	22.88	395.68	19.33	593.18	1067.82	1.77	0.40
COEFFICIENT OF VARIATION	1.58	2.83	4.05	2.07	1.66	4.15	2.02	3.28	3.97	1.39	1.36
Residential											
NUMBER OF OBSERVATIONS	970	2509	1223	1743	101	1932	116	1965	98	15	9
NUMBER OF SAMPLES WITH VALUES ABOVE DL	790	2459	502	1490	65	1539	37	1907	86	15	8
PERCENTAGE WITH DETECTED VALUES	81	98	41	85	64	80	32	97	88	100	89
MINIMUM	0.01	0.01	0.04	0.33	0.60	0.13	0.50	0.37	3.40	0.10	0.03
MAXIMUM	3.10	19.90	80.00	590.00	160.00	19100.00	130.00	14700.00	230.00	2.90	1.00
AVERAGE	0.22	0.41	1.56	28.18	13.43	103.66	12.76	123.49	36.75	0.91	0.32
MEDIAN	0.16	0.28	0.50	13.69	6.00	20.00	3.00	70.00	29.50	0.69	0.21
STANDARD DEVIATION	0.23	0.65	4.87	51.33	27.46	652.41	24.18	398.69	33.50	0.71	0.35
COEFFICIENT OF VARIATION	1.03	1.59	3.13	1.82	2.05	6.29	1.90	3.23	0.91	0.78	1.09
Mixed Residential											
NUMBER OF OBSERVATIONS	453	1104	443	709	29	956	30	930	28	21	10
NUMBER OF SAMPLES WITH VALUES ABOVE DL	371	1080	145	622	21	834	14	879	28	21	8
PERCENTAGE WITH DETECTED VALUES	82	98	33	88	72	87	47	95	100	100	80
MINIMUM	0.01	0.01	0.10	0.60	2.00	0.25	0.81	1.00	7.00	0.20	0.05
MAXIMUM	1.30	10.20	274.90	360.00	26.60	3300.00	10.00	2200.00	190.00	5.93	0.24
AVERAGE	0.17	0.42	8.49	29.13	8.20	126.80	3.63	127.14	59.20	1.19	0.14
MEDIAN	0.12	0.28	0.90	19.35	5.50	50.00	3.00	95.00	48.00	0.79	0.15
STANDARD DEVIATION	0.18	0.62	30.76	35.71	7.07	249.71	2.48	135.43	51.81	1.26	0.07
COEFFICIENT OF VARIATION	1.07	1.46	3.62	1.23	0.86	1.97	0.68	1.07	0.88	1.06	0.49

Table 3. Summary of Selected Stormwater Constituents available in NSQD, ver. 3 (Continued)

Commercial	Phosphorous Dissolved (mg/L)	Phosphorous Total (mg/L)	Cadmium Total (µg/L)	Copper Total (µg/L)	Copper Dissolved (µg/L)	Lead Total (µg/L)	Lead Dissolved (µg/L)	Zinc Total (µg/L)	Zinc Dissolved (µg/L)	Nitrogen Nitrate (mg/L)	Nitrogen Nitrite (mg/L)
NUMBER OF OBSERVATIONS	500	1191	574	960	48	1014	59	1048	49	0	0
NUMBER OF SAMPLES WITH VALUES ABOVE DL	360	1141	228	851	38	872	31	1041	49	0	0
PERCENTAGE WITH DETECTED VALUES	72	96	40	89	79	86	53	99	100	NA	NA
MINIMUM	0.01	0.00	0.04	0.17	2.00	0.05	1.00	0.38	9.00	0.00	0.00
MAXIMUM	1.60	4.27	80.00	753.00	45.00	1687.40	100.00	3050.47	1000.00	0.00	0.00
AVERAGE	0.19	0.28	3.20	27.05	9.31	75.95	14.68	175.16	107.18	NA	NA
MEDIAN	0.11	0.17	0.94	12.00	7.57	18.00	5.00	96.00	59.00	NA	NA
STANDARD DEVIATION	0.24	0.35	6.83	48.66	7.74	148.55	23.33	247.55	147.02	NA	NA
COEFFICIENT OF VARIATION	1.25	1.27	2.13	1.80	0.83	1.96	1.59	1.41	1.37	NA	NA
Mixed Commercial											
NUMBER OF OBSERVATIONS	246	450	213	276	41	402	41	322	39	14	7
NUMBER OF SAMPLES WITH VALUES ABOVE DL	223	446	94	256	33	366	26	318	39	14	2
PERCENTAGE WITH DETECTED VALUES	91	99	44	93	80	91	63	99	100	100	29
MINIMUM	0.01	0.02	0.14	1.10	1.00	0.25	0.90	2.00	13.00	0.14	0.02
MAXIMUM	5.45	15.60	7.70	1300.00	20.00	3170.00	16.00	5500.00	316.00	1.60	0.16
AVERAGE	0.25	0.54	1.32	51.98	9.43	192.16	5.26	225.83	96.67	0.67	0.09
MEDIAN	0.12	0.29	0.85	20.00	10.00	43.50	3.50	140.00	73.00	0.47	0.09
STANDARD DEVIATION	0.51	1.14	1.47	141.13	5.88	348.32	4.04	433.41	76.05	0.50	0.10
COEFFICIENT OF VARIATION	2.06	2.09	1.11	2.72	0.62	1.81	0.77	1.92	0.79	0.75	1.07
Industrial											
NUMBER OF OBSERVATIONS	460	725	583	642	42	675	51	708	42	13	7
NUMBER OF SAMPLES WITH VALUES ABOVE DL	360	691	273	549	38	506	27	701	40	13	7
PERCENTAGE WITH DETECTED VALUES	78	95	47	86	90	75	53	99	95	100	100
MINIMUM	0.00	0.02	0.10	0.39	2.00	0.13	1.00	0.37	4.00	0.42	0.05
MAXIMUM	3.20	7.90	333.95	1360.00	31.00	1200.00	123.00	8100.00	7300.00	1.70	0.33
AVERAGE	0.17	0.39	5.25	37.54	9.79	54.28	22.39	226.72	314.55	0.91	0.12
MEDIAN	0.10	0.22	1.40	20.00	8.00	20.00	5.00	140.00	111.50	0.79	0.07
STANDARD DEVIATION	0.27	0.60	22.09	80.59	6.52	106.98	35.41	388.78	1139.45	0.36	0.10
COEFFICIENT OF VARIATION	1.58	1.53	4.21	2.15	0.67	1.97	1.58	1.71	3.62	0.40	0.86

Table 3. Summary of Selected Stormwater Constituents available in NSQD, ver. 3 (Continued)

	Phosphorous Dissolved (mg/L)	Phosphorous Total (mg/L)	Cadmium Total (µg/L)	Copper Total (µg/L)	Copper Dissolved (µg/L)	Lead Total (µg/L)	Lead Dissolved (µg/L)	Zinc Total (µg/L)	Zinc Dissolved (µg/L)	Nitrogen Nitrate (mg/L)	Nitrogen Nitrite (mg/L)
Mixed Industrial											
NUMBER OF OBSERVATIONS	207	224	176	186	24	250	25	249	24	14	5
NUMBER OF SAMPLES WITH VALUES ABOVE DL	179	216	96	169	24	212	23	245	23	14	3
PERCENTAGE WITH DETECTED VALUES	86	96	55	91	100	85	92	98	96	100	60
MINIMUM	0.01	0.02	0.19	4.00	3.00	1.00	1.00	20.00	91.00	0.16	0.10
MAXIMUM	4.38	4.88	42.00	110.00	17.00	360.00	35.00	22500.00	13900.00	2.00	0.16
AVERAGE	0.17	0.36	2.40	28.29	7.58	54.16	6.90	772.85	2716.13	0.73	0.13
MEDIAN	0.09	0.23	1.65	19.00	6.00	23.00	5.00	170.00	2100.00	0.56	0.13
STANDARD DEVIATION	0.35	0.51	4.38	24.43	4.38	72.68	6.70	2408.99	3208.70	0.53	0.03
COEFFICIENT OF VARIATION	2.09	1.43	1.83	0.86	0.58	1.34	0.97	3.12	1.18	0.73	0.23
Institutional											
NUMBER OF OBSERVATIONS	22	140	24	51	0	51	0	52	0	0	0
NUMBER OF SAMPLES WITH VALUES ABOVE DL	19	139	9	41	0	47	0	52	0	0	0
PERCENTAGE WITH DETECTED VALUES	86	99	38	80	NA	92	NA	100	NA	NA	NA
MINIMUM	0.02	0.00	0.10	2.10	0.00	1.90	0.00	7.80	0.00	0.00	0.00
MAXIMUM	0.24	0.98	1.50	57.00	0.00	127.00	0.00	1300.00	0.00	0.00	0.00
AVERAGE	0.11	0.15	0.52	13.86	NA	31.25	NA	182.43	NA	NA	NA
MEDIAN	0.10	0.10	0.50	9.00	NA	23.00	NA	110.00	NA	NA	NA
STANDARD DEVIATION	0.06	0.13	0.40	11.47	NA	29.57	NA	221.41	NA	NA	NA
COEFFICIENT OF VARIATION	0.60	0.90	0.77	0.83	NA	0.95	NA	1.21	NA	NA	NA
Freeway											
NUMBER OF OBSERVATIONS	52	594	196	346	130	362	126	593	105	99	51
NUMBER OF SAMPLES WITH VALUES ABOVE DL	43	588	161	345	129	358	63	590	104	98	42
PERCENTAGE WITH DETECTED VALUES	83	99	82	100	99	99	50	99	99	99	82
MINIMUM	0.02	0.01	0.09	0.39	3.00	0.97	0.50	0.37	15.00	0.10	0.05
MAXIMUM	6.97	80.20	16.05	800.00	195.00	660.00	43.00	2100.00	1766.00	16.79	2.44
AVERAGE	0.42	0.65	3.74	33.38	20.48	72.79	3.96	162.70	127.47	1.56	0.38
MEDIAN	0.13	0.25	1.10	17.71	10.90	47.00	1.80	100.00	51.00	0.84	0.18
STANDARD DEVIATION	1.20	3.40	4.31	71.86	30.74	79.38	6.53	224.47	236.54	2.22	0.48
COEFFICIENT OF VARIATION	2.86	5.25	1.15	2.15	1.50	1.09	1.65	1.38	1.86	1.42	1.27

Table 3. Summary of Selected Stormwater Constituents available in NSQD, ver. 3 (Continued)

	Phosphorous Dissolved (mg/L)	Phosphorous Total (mg/L)	Cadmium Total (µg/L)	Copper Total (µg/L)	Copper Dissolved (µg/L)	Lead Total (µg/L)	Lead Dissolved (µg/L)	Zinc Total (µg/L)	Zinc Dissolved (µg/L)	Nitrogen Nitrate (mg/L)	Nitrogen Nitrite (mg/L)
Mixed Freeway											
NUMBER OF OBSERVATIONS	11	22	23	23	0	23	0	23	0	0	0
NUMBER OF SAMPLES WITH VALUES ABOVE DL	11	22	13	23	0	13	0	23	0	0	0
PERCENTAGE WITH DETECTED VALUES	100	100	57	100	NA	57	NA	100	NA	NA	NA
MINIMUM	0.01	0.04	0.25	5.00	0.00	5.00	0.00	30.00	0.00	0.00	0.00
MAXIMUM	0.14	0.85	14.34	112.23	0.00	91.70	0.00	657.43	0.00	0.00	0.00
AVERAGE	0.04	0.33	1.74	29.89	NA	18.90	NA	205.06	NA	NA	NA
MEDIAN	0.03	0.34	0.50	14.00	NA	10.00	NA	130.00	NA	NA	NA
STANDARD DEVIATION	0.04	0.22	3.81	29.03	NA	23.63	NA	190.70	NA	NA	NA
COEFFICIENT OF VARIATION	0.92	0.66	2.19	0.97	NA	1.25	NA	0.93	NA	NA	NA
Open Space											
NUMBER OF OBSERVATIONS	44	74	38	44	7	45	1	59	7	0	0
NUMBER OF SAMPLES WITH VALUES ABOVE DL	35	67	21	30	2	19	0	42	1	0	0
PERCENTAGE WITH DETECTED VALUES	80	91	55	68	29	42	0	71	14	NA	NA
MINIMUM	0.01	0.01	0.04	2.00	0.09	0.20	0.00	5.00	160.00	0.00	0.00
MAXIMUM	0.52	15.40	90.00	210.00	1.70	150.00	0.00	3500.00	160.00	0.00	0.00
AVERAGE	0.18	0.55	13.85	18.78	0.90	28.39	NA	298.90	160.00	NA	NA
MEDIAN	0.13	0.24	0.38	10.00	0.90	10.00	NA	60.00	160.00	NA	NA
STANDARD DEVIATION	0.16	1.88	25.89	38.35	1.14	47.36	NA	721.90	NA	NA	NA
COEFFICIENT OF VARIATION	0.89	3.42	1.87	2.04	1.27	1.67	NA	2.42	NA	NA	NA
Mixed Open Space											
NUMBER OF OBSERVATIONS	148	152	107	108	5	155	5	156	5	0	0
NUMBER OF SAMPLES WITH VALUES ABOVE DL	127	146	20	97	1	115	2	153	5	0	0
PERCENTAGE WITH DETECTED VALUES	86	96	19	90	20	74	40	98	100	NA	NA
MINIMUM	0.01	0.02	0.20	2.00	1.00	1.00	2.00	5.00	6.00	0.00	0.00
MAXIMUM	1.11	2.50	21.00	85.00	1.00	450.00	2.00	840.00	29.00	0.00	0.00
AVERAGE	0.16	0.38	3.10	12.73	1.00	30.93	2.00	118.78	14.60	NA	NA
MEDIAN	0.09	0.25	2.00	9.00	1.00	10.00	2.00	80.00	14.00	NA	NA
STANDARD DEVIATION	0.18	0.40	4.43	12.32	NA	71.32	0.00	127.93	8.85	NA	NA
COEFFICIENT OF VARIATION	1.11	1.05	1.43	0.97	NA	2.31	0.00	1.08	0.61	NA	NA

1.2.1 National Pollutant Discharge Elimination System (NPDES)

The first major national regulation in the U.S. requiring control of conventional point source discharges of water pollutants was the Clean Water Act of 1972. Section 208 was a planning provision of the Clean Water Act which provided the capability to implement stormwater management plans at the regional level. An attempt to enlarge the program in 1976 through the "Section 208: Areawide Assessment Procedures Manual", was unsuccessful due to inadequate data and lack of technological development. The Water Quality Act of 1987, an act amending the Federal Water Pollution Control Act (Clean Water Act) to make NPDES requirements applicable to stormwater discharges, reemphasized the control of nonpoint source pollution. Section 319 of this act required states to identify water bodies in which their Section 208 Plan and programs were unsuccessful in controlling these pollutants. Also of importance, the amendments established a two-phase program to regulate 13 classes of stormwater discharges. Phase I, which began in 1990, includes two of these classifications for large and medium sized Municipal Separate Storm Sewer Systems (MS4s). The EPA set up a permit strategy for large and medium sized MS4s to comply with NPDES requirements. Phase I communities were defined as a community serving a population of 250,000, or more. The monitoring efforts of some of these Phase I communities are included in the database and are labeled as MS4.

1.2.2 The Nationwide Urban Runoff Program (NURP)

The US EPA's NURP research effort, which started in 1978 and was completed in 1983, resulted in 2,300 events at 28 NURP projects at 81 monitoring sites (USEPA 1983). The principle objectives of this research program were: to identify the major sources of the pollutants, to determine the pollutant removal abilities of common stormwater control practices, to examine receiving water impacts associated with stormwater discharges, and to characterize stormwater pollutants for different land uses throughout the nation. Although this program was a nationwide effort, about 75% of the stormwater samples were collected in the Great Lakes (EPA Rain Zone 1) and Northeast (EPA Rain Zone 2) areas. Most of the NURP data represented ten "standard" pollutants: total suspended solids (TSS), 5-day biochemical oxygen demand (BOD_5), chemical oxygen demand (COD), total phosphorus (TP), soluble phosphorus (SP), Total Kjeldahl Nitrogen (TKN), nitrite plus nitrate (NO_2+NO_3), total copper (Cu), total lead (Pb), and total zinc (Zn). Initially stored on magnetic tapes, this database was converted to electronic files in 1987 by the University of Illinois, and most of the data is available for download at the University of Alabama website (http://unix.eng.ua.edu/~awra/download.htm). One result of NURP was the definition of event mean concentration (EMC), the ratio between the total mass of a particular constituent divided by the total runoff volume for each event. This was developed as some projects collected discrete data during events, while most collected flow-weighted composite samples. The EMC calculation allows the discrete data to be represented in a comparable manner as the flow-weighted composite data.

1.2.3 The U.S. Geological Survey Urban-Stormwater Database

The USGS stormwater database (Driver et al. 1985) contains 1,144 events that were analyzed for 18 constituents, and more than 15 rainfall-runoff characteristics, from 91 USGS stations in 21 metropolitan areas in the U.S.

There were several differences in the USGS and NURP databases including most notably the USGS reported rainfall-runoff information and other hydrologic characteristics. The USGS's 28 basin characteristics and 11 land use characteristics were more complete than the NURP information. The constituents analyzed during NURP and by the USGS were slightly different, and the USGS database was also more representative of national conditions because it included at least 10% of its samples from EPA Rain Zones 1, 2, 3, 6, 7 and 9.

1.2.5 The National Stormwater Quality Database NSQD ver. 1.1

The University of Alabama and the Center for Watershed Protection developed this database representing 3,765 stormwater events collected at 360 sites in 65 communities around the country (Maestre and Pitt 2005). Approximately one-forth of the communities that participated in the Phase I NPDES stormwater permit monitoring activities are represented with these data. More than 100 constituents and 10 land uses were included in this database consisting of outfall information from NPDES phase I permit holders. The majority of this data was collected in the Chesapeake Bay region and the Southeast, the intent of the original EPA-funded project. However, while collecting these data, additional nationwide data were also obtained and included in the NSQD, ver. 1.1.

1.2.5 The International BMP Database

The International BMP Database (http://www.bmpdatabase.org/) is a collection of influent and effluent data collected to evaluate the effectiveness of structural and nonstructural stormwater controls. This database includes stormwater information from almost 4.000 events from 132 sites in 71 communities and identifies 236 constituents. The BMP database has the most regionally representative data of any of the databases. For inclusion in NSQD ver. 3, only control practice influent data collected at outfalls was used. Much of the BMP database represents source area control practices and that data is not comparable to outfall data contained in the NSQD. In addition, effluent data representing treated stormwater was also not added to the NSQD.

1.3 Methods for Collection of Data

The general approach in data collection was to contact EPA regional offices to obtain state contacts for the MS4 data, then the individual municipalities with Phase I permits were targeted for data collection. Selected outfall data from the International BMP Database were also included in NSQD ver. 3, eliminating any source area and any treated stormwater samples, also eliminating duplicated data from NURP. Tables 2, 3, and 4 show the numbers of events included in the NSQD ver. 3, compared to our earlier ver. 1.1. Ver. 2 (beta) was never released, as it had not undergone complete quality control review. The QA/QC chapter discusses the extensive data quality review that was further used to verify the information included in the NSQD, ver. 3.

Table 4. Land use database comparisons

	Data addition		NSQD ver.1.1		NSQD ver. 3	
LAND USE	TOTAL EVENTS	PERCENTAGE	TOTAL EVENTS	PERCENTAGE	TOTAL EVENTS	PERCENTAGE
Residential	1,937	40.0	1,042	27.7	2,979	34.6
Mixed Residential	634	13.1	611	16.2	1,245	14.5
Commercial	761	15.7	527	14.0	1,288	15.0
Mixed Commercial	201	4.2	324	8.6	525	6.1
Institutional	97	2.0	18	0.5	115	1.3
Mixed Institutional	27	0.6	0	0.0	27	0.3
Industrial	321	6.6	566	15.0	887	10.3
Mixed Industrial	20	0.4	249	6.6	269	3.1
Freeway	552	11.4	211	5.6	763	8.9
Open Space	187	3.9	217	5.8	404	4.7
Mixed Open Space	94	1.9	0	0.0	94	1.1
TOTAL	4,837	100.0	3,765	100.0	8,602	100.0

Table 5. Geographical database comparisons

	Data addition		NSQD ver.1.1		NSQD ver. 3	
RAIN ZONE	TOTAL EVENTS	PERCENTAGE	TOTAL EVENTS	PERCENTAGE	TOTAL EVENTS	PERCENTAGE
Zone 1-Great Lakes	1,202	24.9	69	1.8	1,271	14.8
Zone 2-Mid Atlantic	1,984	41.0	2,000	53.1	3,984	46.3
Zone 3-Southeast	478	9.9	266	7.1	744	8.6
Zone 4-Lower Mississippi Valley	89	1.8	212	5.6	301	3.5
Zone 5-Texas	314	6.5	485	12.9	799	9.3
Zone 6-Southwest	61	1.3	356	9.5	417	4.8
Zone 7-Northwest	636	13.1	229	6.1	865	10.1
Zone 8-Rocky Mountains	0	0.0	24	0.6	24	0.3
Zone 9-Midwest	73	1.5	124	3.3	197	2.3
TOTAL	4,837	100.0	3,765	100.0	8,602	100.0

Table 6. Seasonal database comparisons

	Data addition		NSQD ver.1.1		NSQD ver. 3	
SEASON	TOTAL EVENTS	PERCENTAGE	TOTAL EVENTS	PERCENTAGE	TOTAL EVENTS	PERCENTAGE
Winter (December-February)	820	17.0	1,068	28.4	1,888	21.9
Spring (March-May)	1,187	24.5	1,126	29.9	2,313	26.9
Summer (June-August)	1,345	27.8	703	18.7	2,048	23.8
Fall (September-November)	1,485	30.7	868	23.1	2,353	27.4
TOTAL	4,837	100.0	3,765	100.0	8,602	100.0

There are many factors that can be considered when examining the quality of stormwater. These factors include, but are not limited to the following; land use, geographical region (EPA rain zone), and season. The NSQD includes sampling location information such as city, state, land use, drainage area, and EPA Rain Zone. The database also includes sampling information such as date, season, and rain depth, as well as concentrations of many constituents. Supplemental information available on each sampling location includes the exact sampling locations (street intersections or longitude/latitude), breakdown of land use by percentage, aerial photographs, topographic maps, and information on sampling procedures, and quality control. It is important to note that the supplemental information can vary depending on availability of the information. This information is useful in characterizing stormwater on a national basis, and will provide assistance for the many municipalities that are affected by the NPDES stormwater permit program, and researchers.

1.4 NSQD Column Descriptions

1.4.1 Site Descriptions

Column A assigns each event an identifier in the database for convenient locating. Column B describes the drainage areas primary land use that is associated with the event's sampling location. The main land use category can include; residential (RE), commercial (CO), industrial (ID), freeway (FW), open space (OP), and institutional (IS). Column B can also include a combination of land uses with the primary land use listed first such as RE_CO. As an example, if the land use is listed as RE_CO, the primary land use would be residential with the greatest percentage of land in the drainage area, but may have a smaller percentage of the runoff and pollutants compared to the smaller commercial land use land area. Where information was available, the percentage of each land use is indicated in the columns J through O.

Column C indicates the season in which the event was sampled; Winter (WI) events occurred in November, December, or January; Spring (SP) samples were collected during February, March, and April; Summer (SU) events were collected in May, June, and July; and Fall (FA) events were collected in August, September, and October. Seasonal comparisons can be seen in Table 5 above.

Column D provides some information about the origin of the data. Events labeled MS4 indicate that these data were collected from the Phase I NPDES stormwater monitoring efforts, and are all additions to the NSQD 1.1. Any data from NSQD 1.1 is appropriately

labeled NSQD 1.1. U.S. Geological Survey data is labeled USGS, NURP data is labeled NURP, and data from the International BMP database are labeled BMP.

Columns E, F, and G describe the sampling site location. Column E (LOCATION_ID) gives the state, column F indicates the city, county or municipality that included the sampling location, and column G is the sampling site description as provided by the organization that collected the data. Column H identifies the geographical region where the sample was collected by providing one of nine EPA Rain Zones. Table 4 above shows the Rain Zone comparisons. Column I is used as a referencing column, providing the name of the contact that provided the data. As mentioned above, Columns J through O indicate the percentage of each land use in the drainage area for each sampling location. Column P provides the watershed drainage area for each outfall, in acres. Columns Q and R list the approximate latitude and longitude of the sampling station in degrees, minutes, and seconds.

Column S presents the percentage of land cover that is impervious. Very few locations reported information indicating the hydraulic connections to the drainage systems. Each land use category generally has a defined narrow range of paved and roof areas. Because there is a self-correlation between percentage impervious area and land use, it is not possible to test the hypothesis that different percentages of impervious land cover are more important that the activity represented by the land use category (Maestre et. al 2004).

Column T is the calculated volumetric runoff coefficient (Rv), which is the ratio between the total runoff depth divided by the precipitation depth of each event. Column V gives only 8 sites from NSQD 1.1 that indicates the year when the land was developed. Column W describes the type of stormwater conveyance reported for the sampled watershed, such as curb and gutters or grass swales. While curb and gutters are the most common type of conveyance system, they are usually associated with high density and highly impervious areas. Grass swales can help to infiltrate runoff and can provide some water quality benefit for lower flows. Column X provides any available information on stormwater controls or "BMPs." This database is intended to provide information about outfall samples. Any additional miscellaneous comments that did not fit into other columns, such as outlet pipe information, is provided in column Y.

1.4.2 Hydrologic Information

The conventional event identification is provided in column Z, this column lists the date the event occurred. The precipitation depth recorded during the event is listed in inches in column AA. Columns AC and AE list the start and end date of the event, while columns AD and AF provide the start and end time given by the minute of the day. Column AG reports the maximum 15-minute rain intensity for each event. Column AH is the total runoff depth in inches.

NPDES stormwater monitoring guidelines indicate that the at least the first three hours of a given event must be collected, and column AJ indicates if the runoff and precipitation monitoring was conducted during the total rain event or only the first 3 hours.

An investigation of first flush conditions by Maestre and Pitt (2005) indicated that first flush effects were not present for all land uses and not for all constituents. If the peak flow occurs at the beginning of rain, then commercial and residential land uses were more likely to show first flush effects. Areas with a high level of imperviousness would be expected to have first flush effects however; the data in NSQD 1.1 indicate first flush effects less than 50% of the samples for the most impervious areas possibly due to variation in rain conditions or composite samples that did not represent the complete runoff. Composite sampling information is contained in column AK. The first-flush data were removed from the first version of the database, version 1.0, after the paired first flush statistical analyses to eliminate confusion with only the composite samples in the main database. However 327 events in NSQD ver. 3 indicate FF as reported by the agency that collected the data. Also in this column; 156 events label IS for "In storm sample" as reported by the City of Worcester, MA, with 8,547 events label COM indicating a composite sample.

Column AL indicates if the sample was collected using an automatic sampler or manually. An automatic sampler can be programmed to collect a flow-weighted composite sample or a time-weighted composite same, or a series of discrete samples. The flow-weighted sample's volume is proportionate to the total runoff volume associated with the monitored event, while the time-weighted sample's volume is proportionate to the duration of the event associated with the sample. Column AM indicates if the composite sampled event was time-weighted or flow-weighted.

Column AN indicates the number of days since the last rain, when that information is available. Only 1,783 events provide information for column AN.

1.4.3 Conventional Constituents

Columns AO through BS list the concentrations of the conventional stormwater constituents. Included in this column are the following constituents; Conductivity (µS/cm @ 25ºC), DO (mg/L), Hardness (mg/L CaCO3), Oil and Grease (mg/L), pH, Turbidity (NTU), Temperature (ºC), TDS (mg/L), TS (mg/L), TSS (mg/L), BOD_5 (mg/L), COD (mg/L), Fecal Coliform (colonies/100mL), Fecal Streptococcus (colonies/100mL), and Total E. Coli (colonies/100mL) respectively. Table 7 shows the land uses having the lowest and the highest median concentrations for the conventional constituents.

Table 7. Conventional Constituents Summary

Constituent	Land use with lowest median concentration			Land Use with highest median concentration		
	n	Median	Land Use	n	Median	Land Use
Conductivity (µS/cm @25ºC)	692	10	FW	2786.00	62.60	RE
DO (mg/L)	39	7.3	ID	8	8.65	FW
Hardness (mg/L CaCO3)	244	33.00	RE	189	45	CO
Oil and Grease Total (mg/L)	24	1.3	OP	365	5	ID
pH	656	7.10	RE	19	7.7	OP
Temperature (C)	7	9.1	OP	167	17.1	ID
TDS (mg/L)	24	61	IS	45	124.5	OP
TSS (mg/L)	53	18	IS	691	76	ID
BOD5 (mg/L)	49	5.5	OP	815	11	CO
COD (mg/L)	48	28	OP	447	64	FW
Fecal Coliform (colonies/100 mL)	366	2000	ID	640	4650.00	RE
Fecal Streptococcus (colonies/100 mL)	3	2400	IS	22	24900	OP
Total E. Coli (colonies/100 mL)	24	310	ID	13	1900	FW

The box and whisker plots below shows the log transformed constituent concentrations in mg/L for selected conventional constituents.

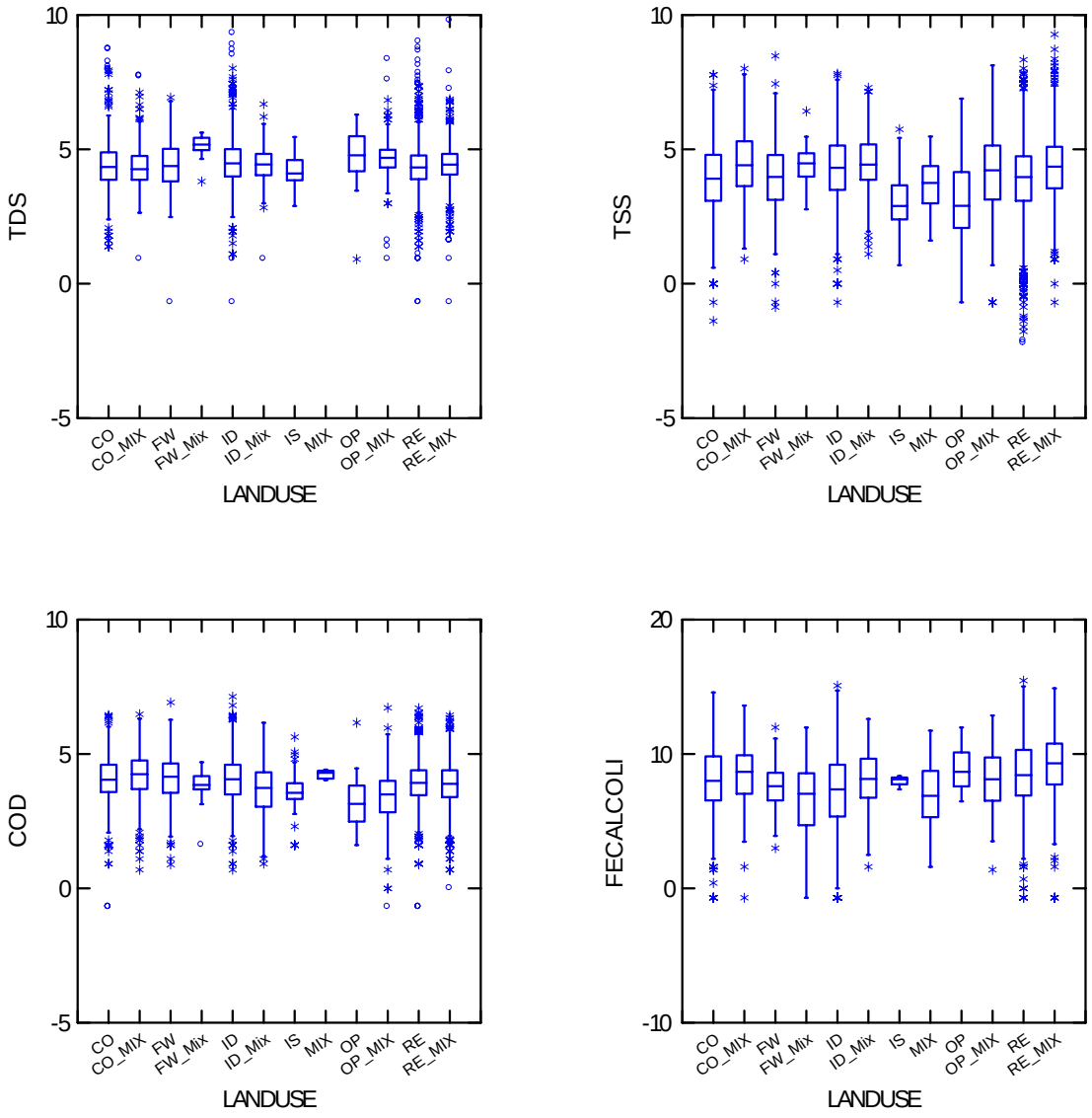

Fig.2 Box Plots of Select Conventional Constituents

1.4.4 Nutrients

Columns BU through CG list the nutrient concentrations in the database. Ammonia (mg/L), NO_2+NO_3 (mg/L), Total Nitrogen (mg/L), Total Kjeldahl Nitrogen (mg/L),

Ortho Phosphate (mg/L), Dissolved Phosphorus (mg/L), and Total Phosphorus (mg/L) are respectively listed in these columns.

Table 8. Nutrients Summary

Constituent	Land use with lowest median concentration			Land Use with highest median concentration		
	n	Median	Land Use	n	Median	Land Use
Ammonia (mg/L)	37	0.17	OP	95	1.1	FW
N02+NO3 (mg/L)	138	0.41	IS	118	1.1	FW
Nitrogen Total (mg/L)	7	1.4	IS	115	1.9	RE
Nitrogen Kjeldahl Total (mg/L)	45	0.74	OP	437	1.7	FW
Phosphorous Dissolved (mg/L)	460	0.10	ID	970	0.16	RE
Phosphorous Total (mg/L)	140	0.10	IS	2509	0.28	RE
Nitrogen_Nitrate (mg/L)	15	0.69	RE	99	0.84	FW
Nitrogen_Nitrite (mg/L)	7	0.07	ID	9	0.21	RE
Nitrogen_Total_Organic (mg/L)	2	0.47	OP	5	2.0	CO

The box and whiskers plots below shows the land use distribution of log transformed concentrations of these selected nutrients; Total Phosphorus (mg/L), Total Kjeldahl Nitrogen (mg/L), and NO_2+NO_3 (mg/L).

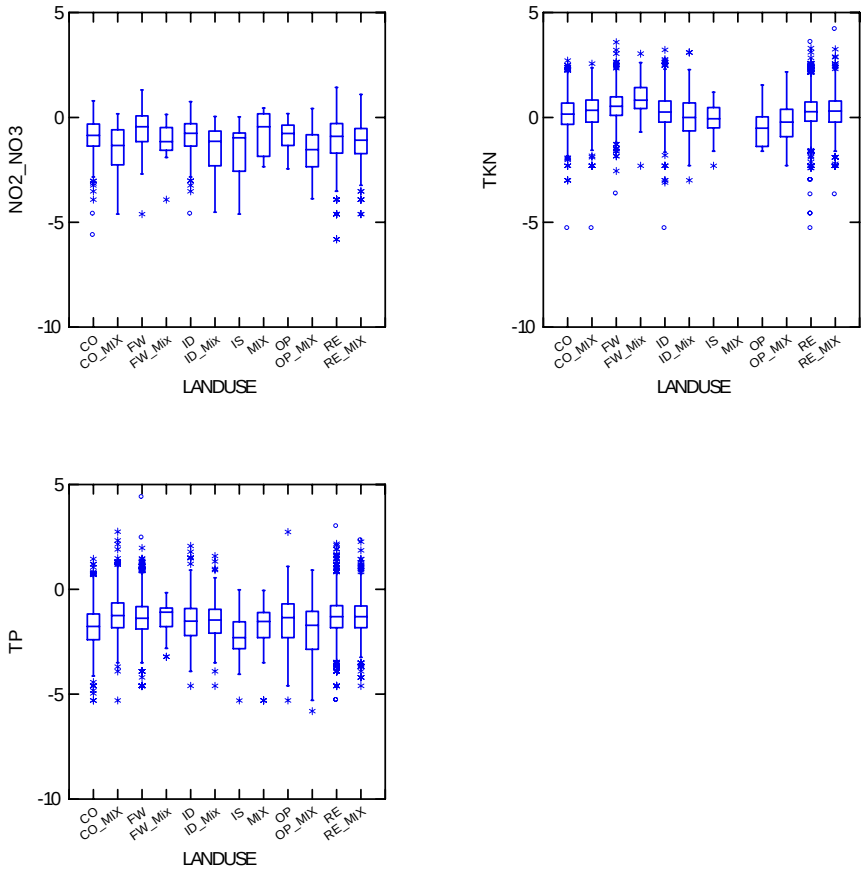

Fig. 3 Box Plots of Selected Nutrients

1.4.5 Metals

Columns CK through EK list the metals concentrations in ug/L. Included in this column are total antimony, dissolved antimony, total arsenic, dissolved arsenic, total beryllium, dissolved beryllium, total cadmium, dissolved cadmium, total chromium, dissolved chromium, total copper, dissolved copper, total cyanide, dissolved cyanide, total lead, dissolved lead, total mercury, dissolved mercury, total nickel, dissolved nickel, total selenium, dissolved selenium, total silver, dissolved silver, total thallium, dissolved thallium, total zinc, and dissolved zinc respectively. All metals concentrations are reported in µg/L. As can be seen from Table 9, freeway and industrial land uses have

higher median concentrations of metals than the other land uses as would be expected. While open space and residential land uses have lower median concentrations that the other land uses.

Table 9. Metals Summary

Constituent	Land use with lowest median concentration			Land Use with highest median concentration		
	n	Median	Land Use	n	Median	Land Use
Cadmium Total (µg/L)	38	0.38	OP	583	1.4	ID
Copper Total (µg/L)	44	10	OP	642	20	ID
Copper Dissolved (µg/L))	7	0.895	OP	130	10.9	FW
Lead Total (µg/L)	45	10	OP	362	47	FW
Lead Dissolved (µg/L)	126	1.8	FW	51	5	ID
Zinc Total (µg/L)	59	60	OP	708	140	ID
Zinc Dissolved (µg/L)	98	29.5	RE	7	160	OP

The box and whiskers plots below show log transformed concentrations of total copper (µg/L), total zinc (µg/L), and total lead (µg/L) by land use.

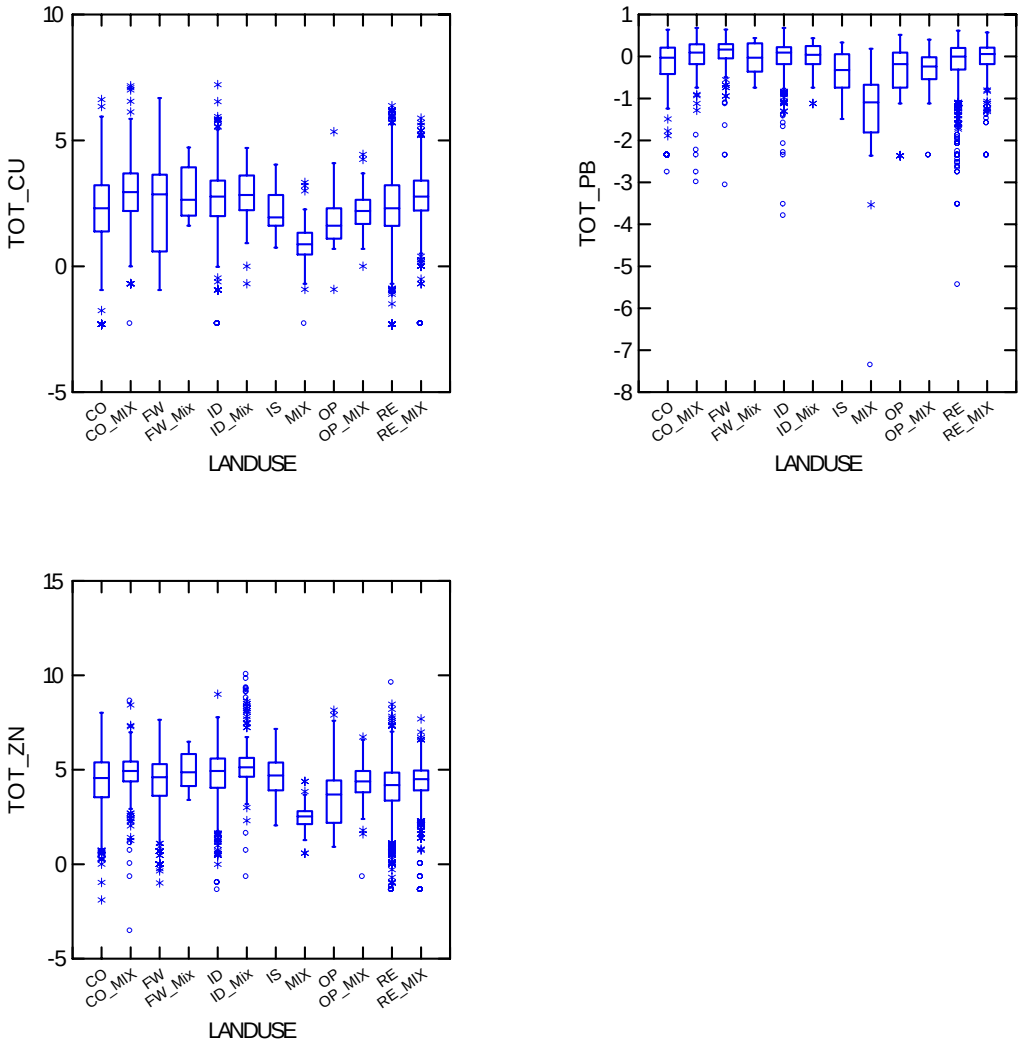

Fig. 4 Box Plots of Selected Metals

1.4.6 Other Constituents

Columns EM through HW list additional constituents. These additional constituents are listed in the following in table 10.

Table 10. Additional Constituents Summaries.

Additional Constituents	NUMBER OF OBSERVATIONS	NUMBER OF SAMPLES WITH VALUES ABOVE DL	PERCENTAGE WITH DETECTED VALUES	MINIMUM	MAXIMUM	MEDIAN	Number of events reported as N/A or N/C
Acrolein (µg/L)	325	1	0.31	10	10	10	494
Acrylonitrile (µg/L)	66	0	0	0	0	N/A	144
Benzene (µg/L)	74	3	4.1	2	160	92	148
Bromoform (µg/L)	50	0	0	0	0	N/A	127
Carbon Tetrachloride (µg/L)	50	0	0	0	0	N/A	127
Chlorobenzene (µg/L)	74	0	0	0	0	N/A	151
Chlorodibromomethane (µg/L)	50	0	0	0	0	N/A	127
Chloroethane (µg/L)	74	0	0	0	0	N/A	151
2-Chloroethylvinylether (µg/L)	532	365	69	0.2	37	2.1	106
Chloroform (µg/L)	362	20	5.5	1.7	3400	23	445
Dichlorobromoethane (µg/L)	116	42	36	0.41	2.4	0.66	104
1,1-Dichloroethane (µg/L)	119	2	1.7	0.59	0.67	0.63	167
1,2-Dichloroethane (µg/L)	108	52	48	0.05	27	0.82	143
1,1-Dichloroethylene (µg/L)	71	1	1.4	1	1	1	147
1,2-Dichloropropane (µg/L)	73	0	0	0	0	N/A	151
1,3-Dichloropropylene (µg/L)	42	0	0	0	0	N/A	118
Ethylbenzene (µg/L)	336	8	2.4	0.2	2.8	0.35	510
Methylbromide ((µg/L)	68	0	0	0	0	N/A	136
Methylchloride (µg/L)	154	12	7.8	0.5	12	4.2	240
Methylenechloride (µg/L)	263	90	34	0.2	80	11	310
1,1,2,2-Tetrachloroethane (µg/L)	74	0	0	0	0	N/A	151
Tetrachloroethylene (µg/L)	77	10	13	0.4	3.3	1.3	157
Toluene (µg/L)	338	23	6.8	0.2	190	0.3	495
1,2-Trans-dichloroetylene (µg/L)	73	0	0	0	0	N/A	150
1,1,1-Trichloroethane (µg/L)	78	6	7.7	0.2	5	2.5	149
1,1,2-Trichloroethane (µg/L)	74	0	0	0	0	N/A	151
Trichloroethylene (µg/L)	74	0	0	0	0	N/A	151
Vinylchloride (µg/L)	74	0	0	0	0	N/A	151
Alkalinity, total as CaCO3 (mg/L)	16	16	100	14	115	52	0
Fecal Coliform/Fecal Strep Ratio	1	1	100	0.17	0.17	0.17	1
Oil and Grease Hidrocarbon	6	0	0	0	0	N/A	6

(mg/L)							
Total_hydrocarbon_fingerprint (mg/L)	4	0	0	0	0	N/A	4
Total_Petroleum_hydrocarbon (mg/L)	165	136	82	0.6	20	2.6	29
Total_Organic_Carbon (mg/L)	85	85	100	2.8	350	13	1
Chloride (mg/L)	215	173	80	0.6	649	9	125
trans-1,3-Dichloropropene (µg/L)	11	0	0	0	0	N/A	20
Bromomethane (µg/L)	6	0	0	0	0	N/A	15
Chloromethane (µg/L)	6	0	0	0	0	N/A	15
Trichlorofluoromethane (µg/L)	8	0	0	0	0	N/A	17
Nitrogen_Nitrate (mg/L)	176	175	99	0.1	17	0.71	1
Nitrogen_Nitrite (mg/L)	89	70	79	0.023	2.4	0.16	20
Nitrogen_Total_Organic (mg/L)	40	40	100	0.13	6.9	1.1	2
Barium, total as Ba (µg/L)	21	21	100	11	210	30	0
Iron, total as Fe (µg/L)	48	48	100	390	24000	2000	0
Iron, Dissolved as Fe (µg/L)	12	4	33	140	930	340	8

1.5 Findings

Land use has an important impact on the quality of stormwater. For example, the concentrations of heavy metals are higher for industrial land use areas due to manufacturing processes and other activities that generate these materials. Similarly, there may be higher concentrations of PAHs (polycyclic aromatic hydrocarbons) for commercial sites due to higher automobile traffic and the large amounts of parking lot land cover (Pitt 2006). Seasons could also be a factor in the variation of nutrient concentrations in stormwater due to seasonal uses of fertilizers and leaf drop occurring during the fall season. Most studies also report lower bacteria concentrations in the winter than in the summer (Pitt 2005). Lead concentrations in stormwater have also significantly decreased since the elimination of lead in gasoline (Pitt 2004). Statistical evaluations are included in the following chapters, including ANOVA analyses comparing different constituent concentrations with land use and geographical location.

Chapter 2 Quality Control/Quality Assurance of the NSQD ver. 3 data addition

2.1 Introduction

Quality assurance and quality control procedures are very important in the process of verifying the correctness of data that is to be added to a database. Corrupt data can dramatically affect any statistical analysis of the data set collected. It is important to identify unusual or "badly" behaving data by using statistical analyses, to identify possible reasons for the anomaly, and finally to correct or eliminate the data after attempting to explain the unusual characteristic.

2.2 Identification of Unusually high or low values

Probability Plots can be used to identify data range and distribution characteristics with a focus on the very high and very low values. These extreme values can have a large affect on typical statistical measures, such as mean, median, range, and coefficient of variation. An extensive evaluation of 10,000 sets of 200 samples each were randomly generated with a lognormal distribution (mean=1, standard deviation=1), but having differing amounts of extreme ("incorrect") values in each data set, was done by Maestre and Pitt (2005). Extreme value percentages and extreme value factors were analyzed for coefficients of variation (COV), standard deviations, and means. They concluded that the coefficient of variation is most effected by low numbers of large extreme values, as can be seen in Figure 5.

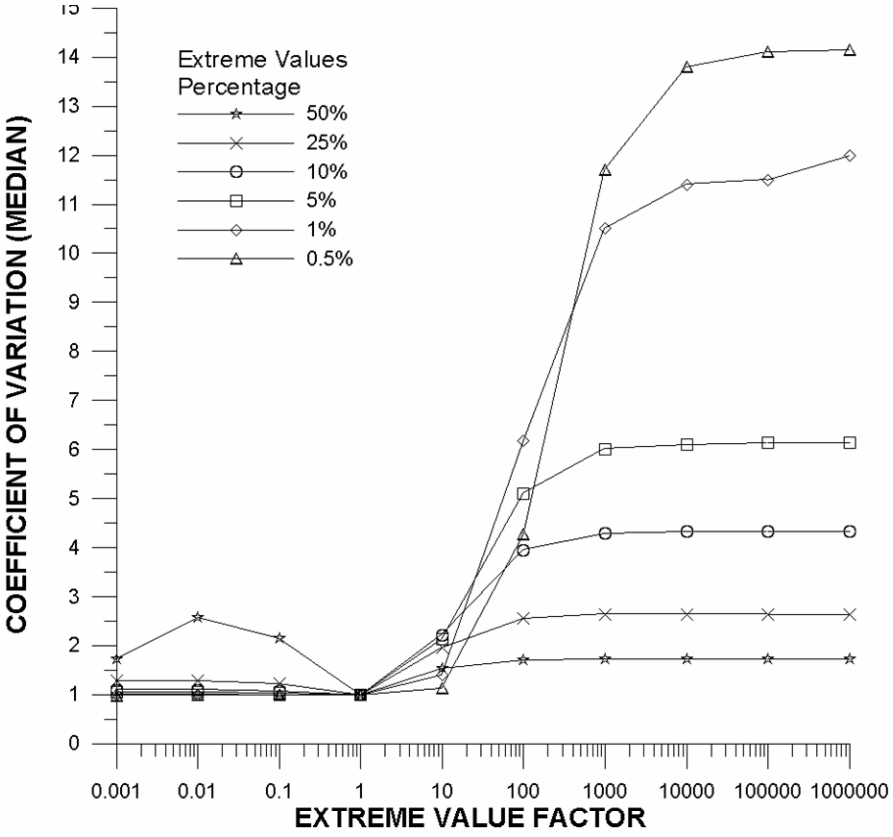

Fig. 5. Effect of unusual values on the coefficient of variation (based on LN(1,1)) (Maestre and Pitt 2005).

Figure 6 shows the effects that extreme values have on the standard deviation. These effects are relatively small for small extreme values, but are much more important as the values of the extremes increase.

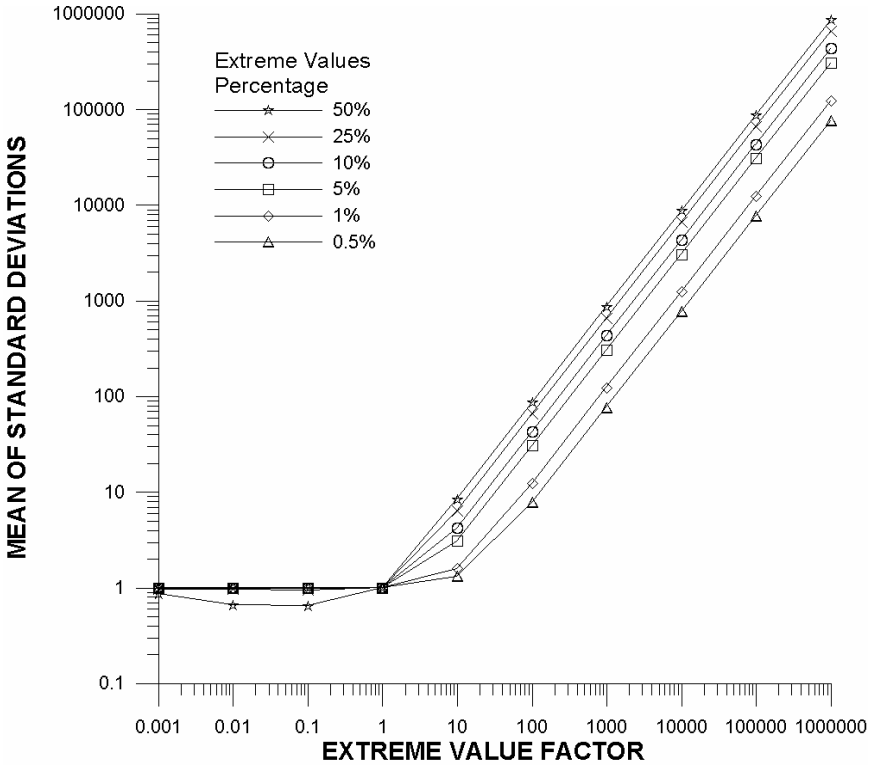

Fig. 6. Effect of unusual values on the standard deviation (based on LN(1,1)) (Maestre and Pitt 2005).

Similar effects were observed affecting the mean values. Figure 7 shows that if the percentage of the extreme values was 50%, the mean can be significantly reduced. The larger extreme value factors have larger impacts on the mean's order of magnitude, especially if greater than about 1000.

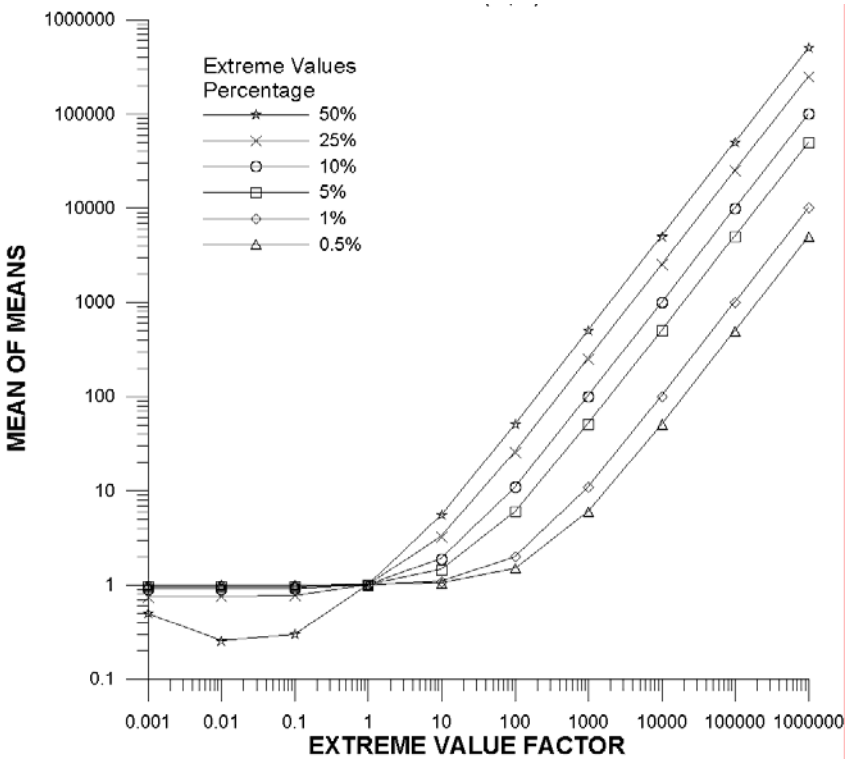

Fig. 7. Effect of unusual values on the mean (based on LN(1,1)) (Maestre and Pitt 2005).

Maestre and Pitt (2005) concluded that for lognormal distributions, the effects of a few high values in the upper tail have a much greater effect on common statistics than unusual values in the lower tail. There has been much discussion on the lower limits of stormwater samples, among stormwater researchers, however this analysis shows the greater importance of values in the upper tail of the distribution on basic statistical evaluations.

2.3 Data Additions

If a data value was labeled as N/A, NC, or ND, the data were assumed to be unavailable and therefore deleted. The actual detection limits are listed in the NSQD ver. 3 as they were reported by the agency that collected the data. As an example, if the constituent's concentration was reported by the agency that collected the data as <0.005 mg/L, then that is the how it appears in the database. As explained in the later section on detection limits, any value that was reported as a left-censored detection limit concentration was taken as half the detection limit for the statistical analysis. In this example the value used for the basic statistical analysis would be taken as 0.0025 mg/L, but the detection limit still listed in the database as reported by the agency that compiled the data. Any constituent's concentration that was determined to be unusual based on basic statistical analysis and unreasonable as compared to the NSQD 1.1 is reported in Appendix A as a deleted concentration and was removed from the database. It is important to note that if the concentrations of other constituents for the same events were not unusual and unreasonable, the other values were kept as usable information. Only constituents having greater than 50% detected values were evaluated with probability plots. By examining the "tails" of the probability plots and the basic statistical summaries, we can filter likely "bad" data. Extreme values for all constituents were evaluated for typographical errors and errors in units reporting. Unusual and unreasonable behavior can be identified using probability plots. Extremely high and low values are identified using the following probability plots; a brief discussion follows the figures where data was further filtered.

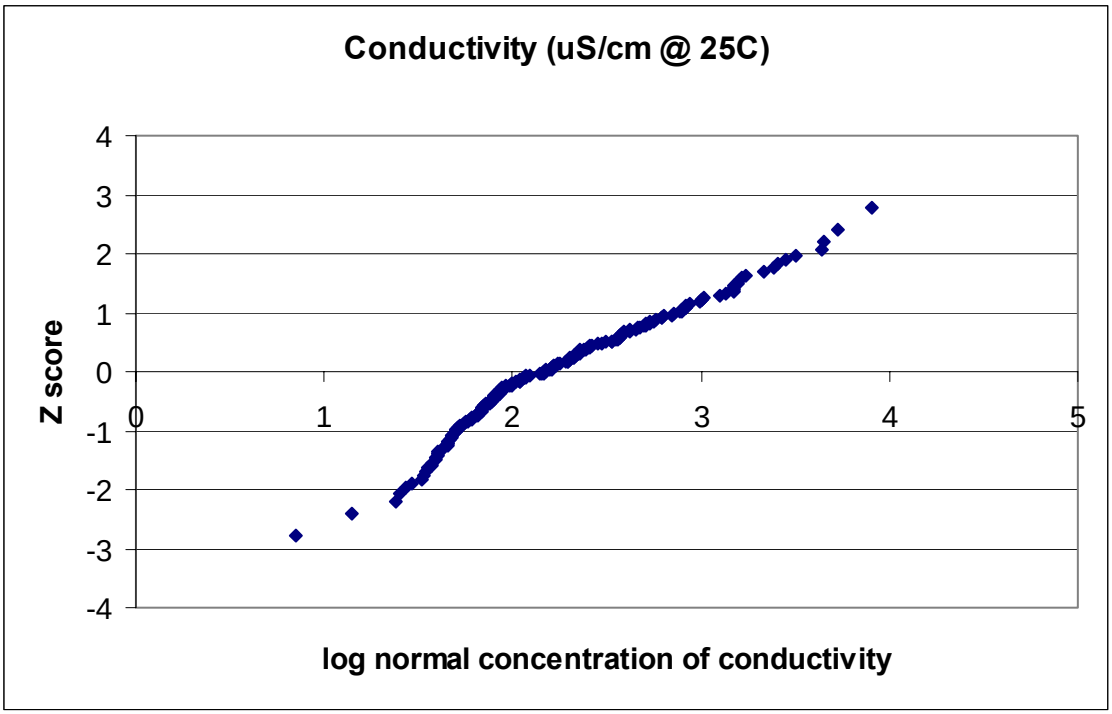

Fig. 8. Probability Plot of Conductivity

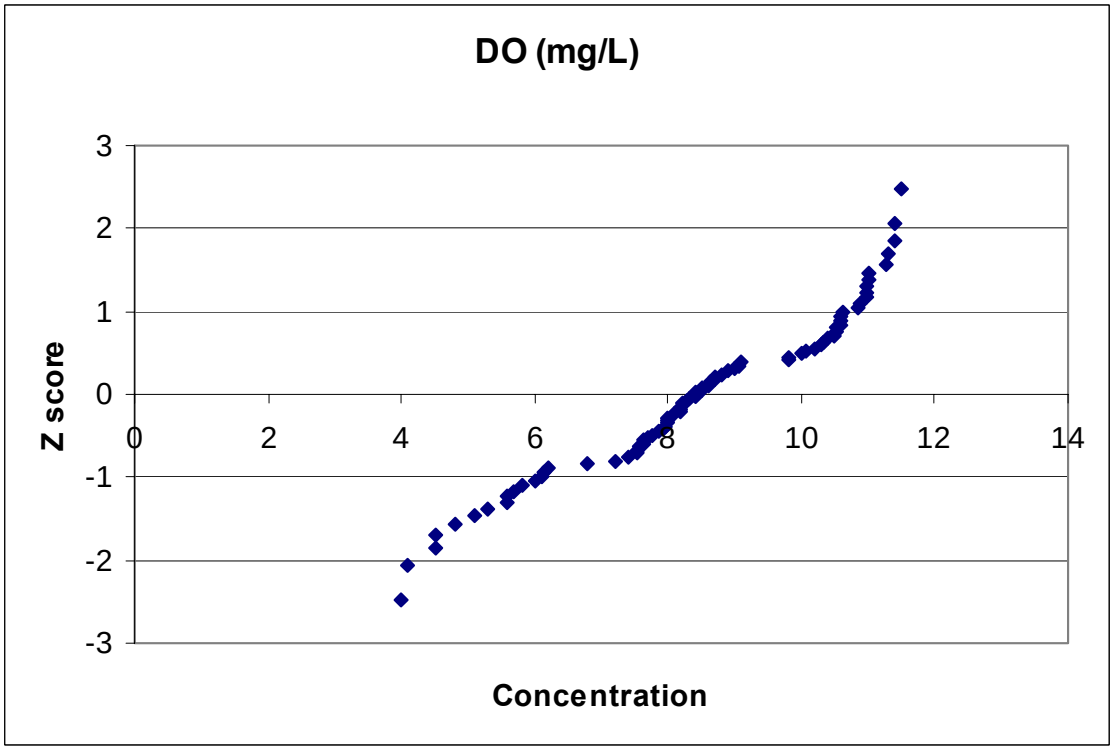

Fig. 9. Probability Plot of DO

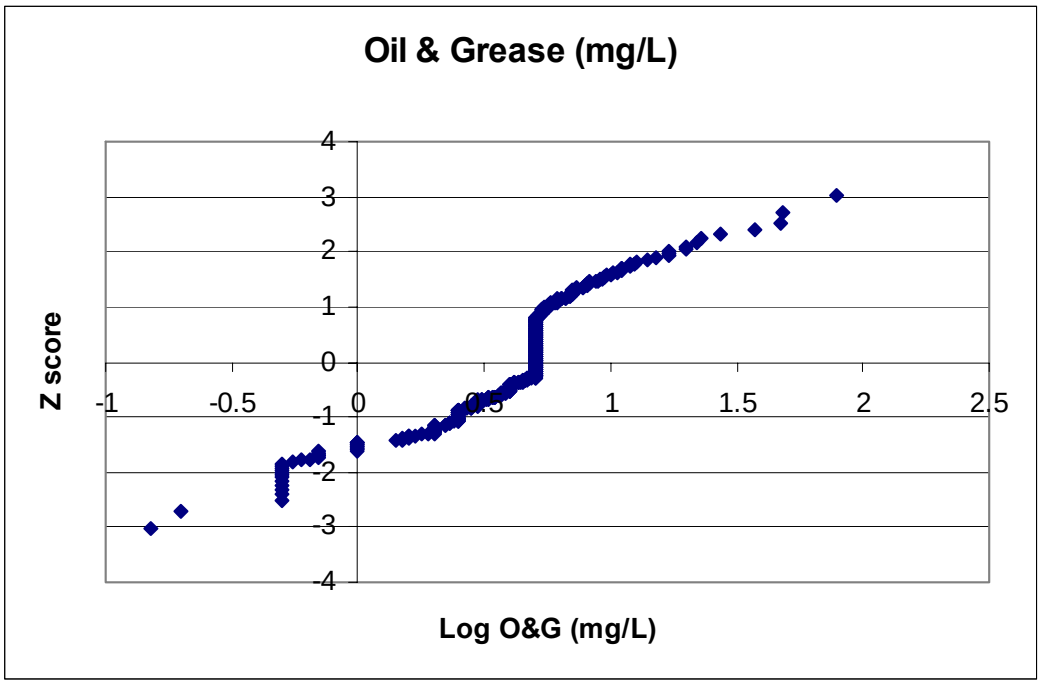

Fig. 10. Probability Plot of Oil and Grease

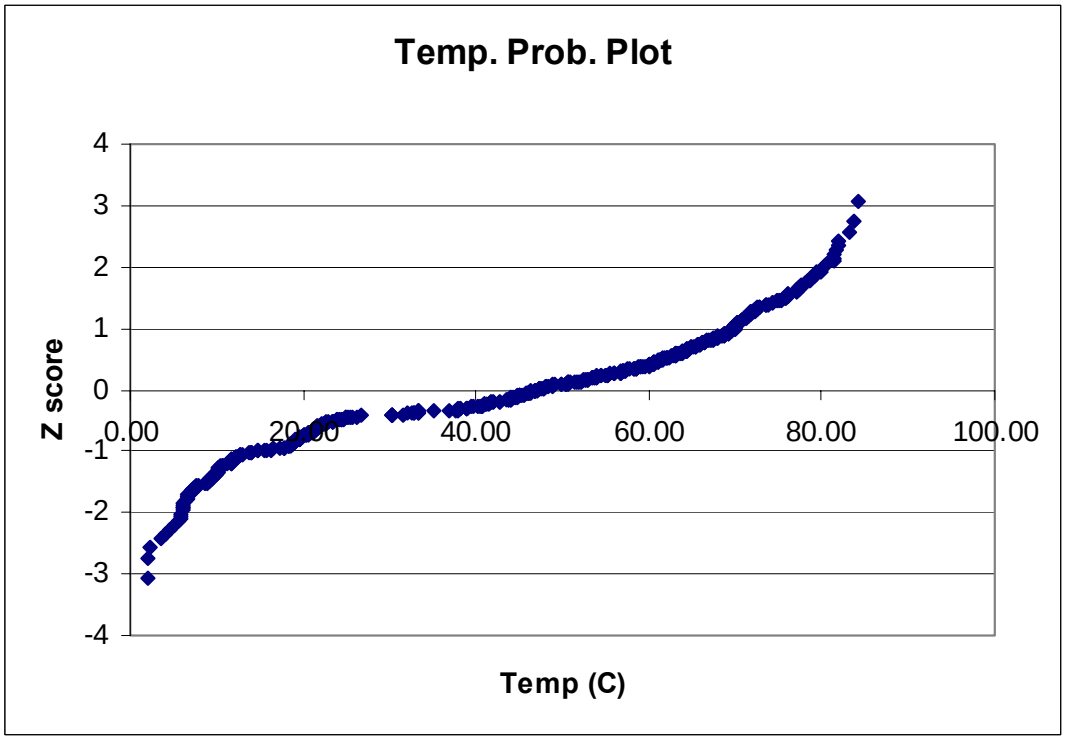

Fig. 11. Probability Plot of Temperature

As can be seen, there are some unusually high temperature measurements, and after some investigation it was discovered that the temperature data from the state of Maryland was given in ºF, instead of in ºC. After the correction was made, the following, more reasonable probability plot was created for the temperature observations.

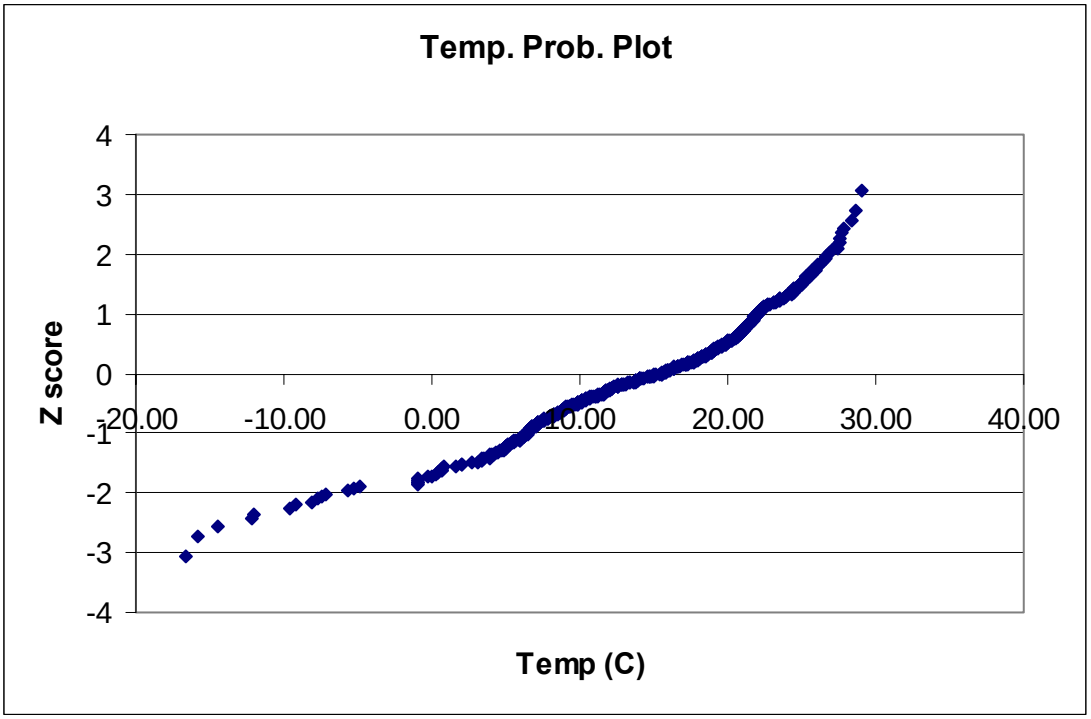

Fig. 12. Corrected Temperature Probability Plot

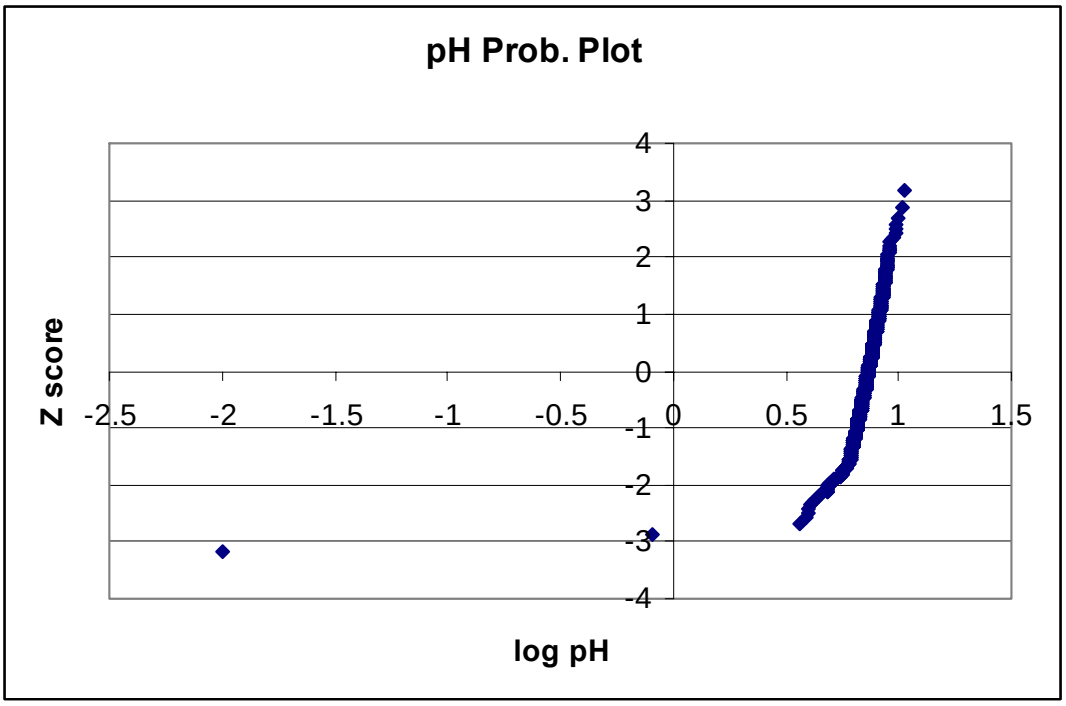

Fig. 13. Probability Plot for pH

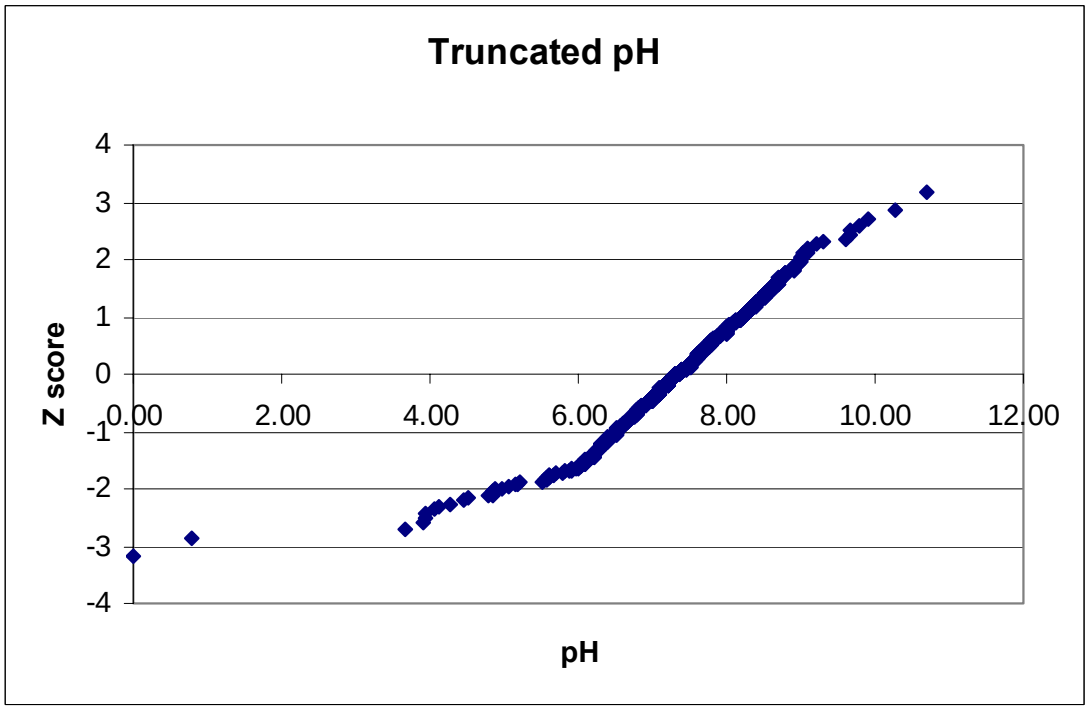

Fig. 14. Truncated pH

The pH concentrations of 0.01 and 0.8 were identified as unusual, and were therefore deleted from the database (see Appendix A for full list of deleted items). However, when checked with the original data reports, these were the data values reported by the State of Maryland.

Table 11. Unusual pH Values

ORDER	Landuse	Season	Database	LOCATION_ID	Jurisdiction	Site_ID	Rain Zone	Contact	pH
367	RE	WI	MS4	Maryland	Charles County	96.5	2	Ray Bahr	0.01
527	CO	SU	MS4	Maryland	Anne Arundel	PAROLE PLAZA	2	Ray Bahr	0.8

The following probability plot is much more reasonable and was created after these data were deleted.

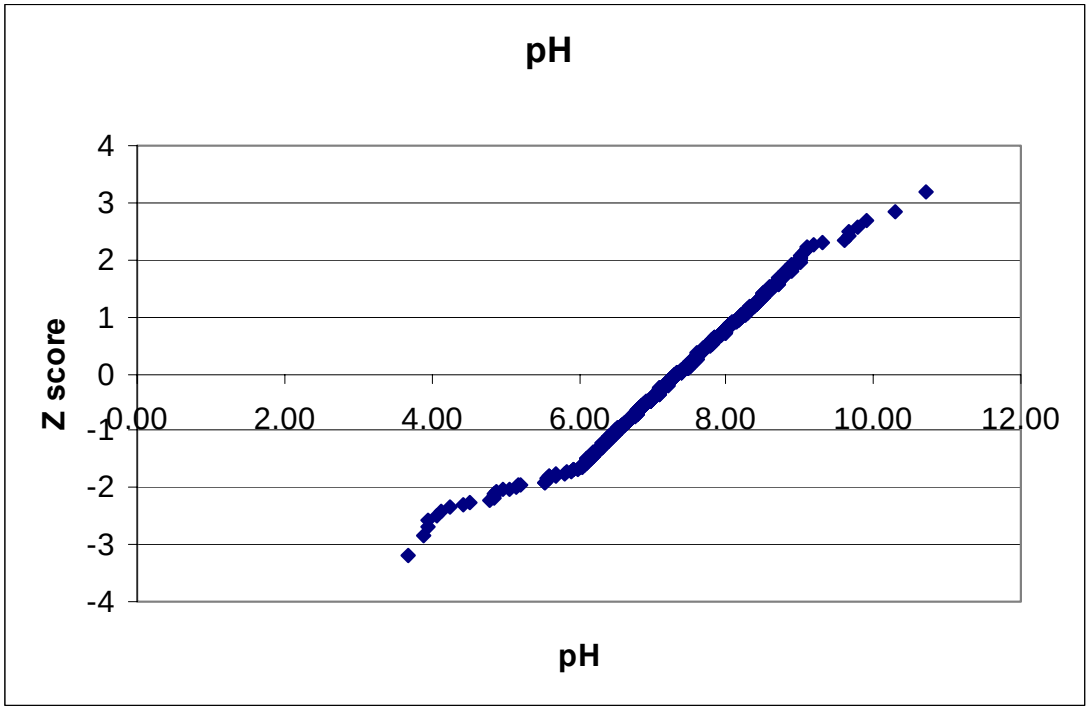

Fig. 15. Correct pH Probability Plot

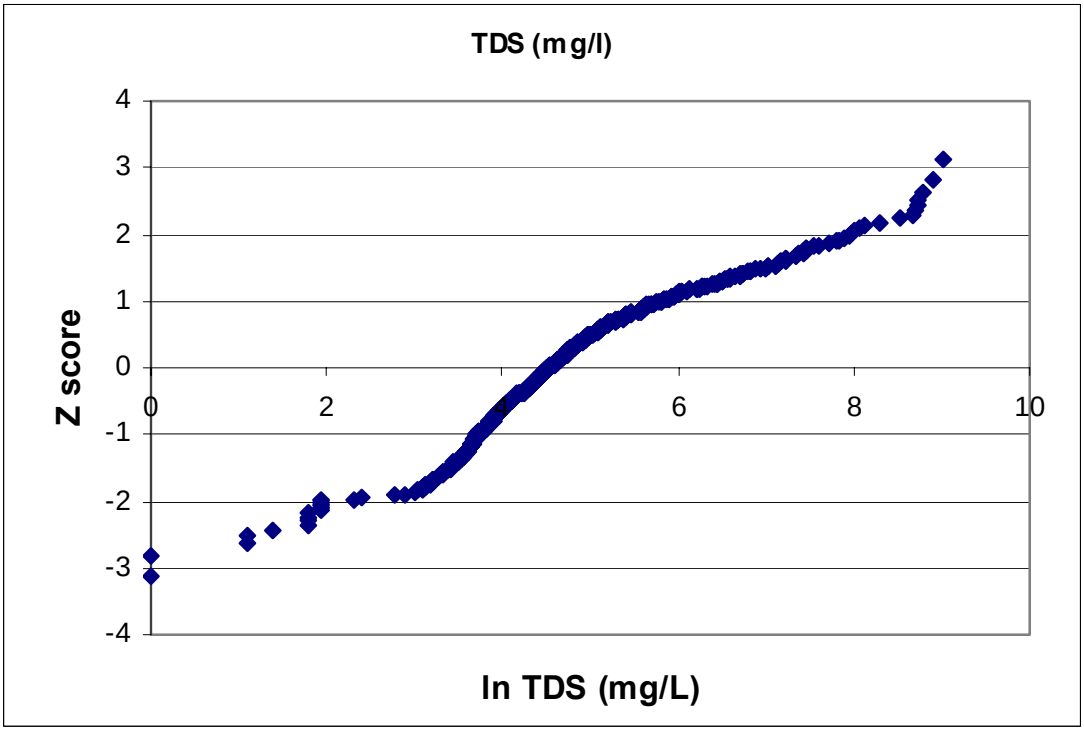

Fig 16 TDS Probability Plot

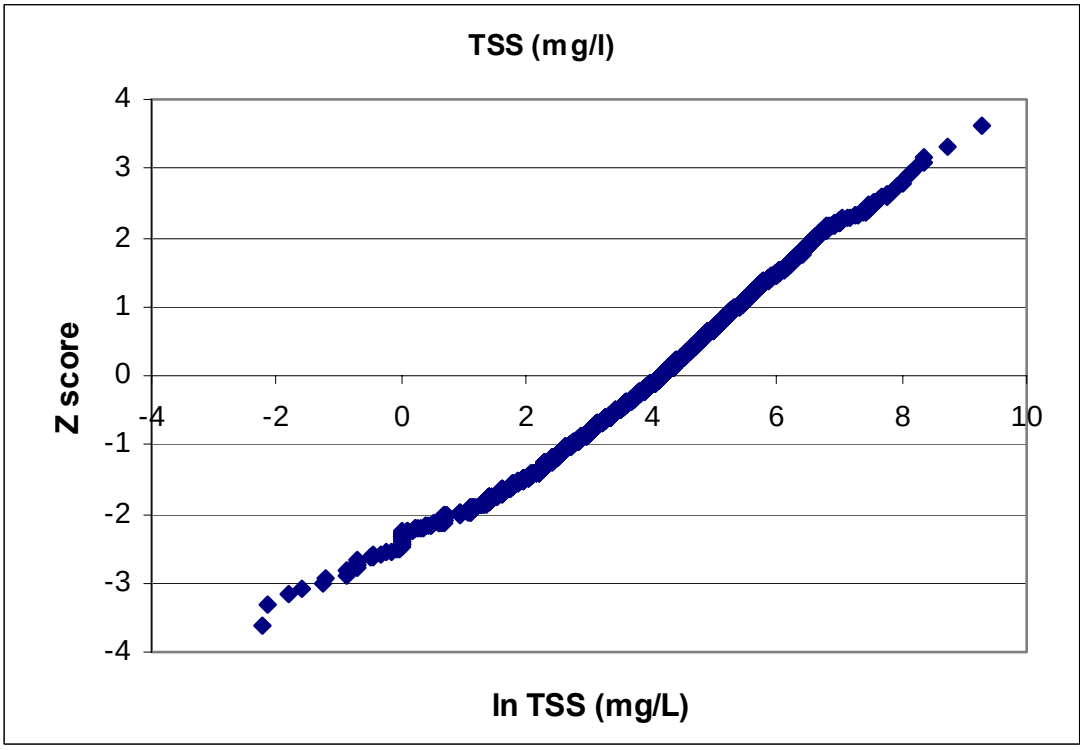

Fig. 17. TSS Probability Plot

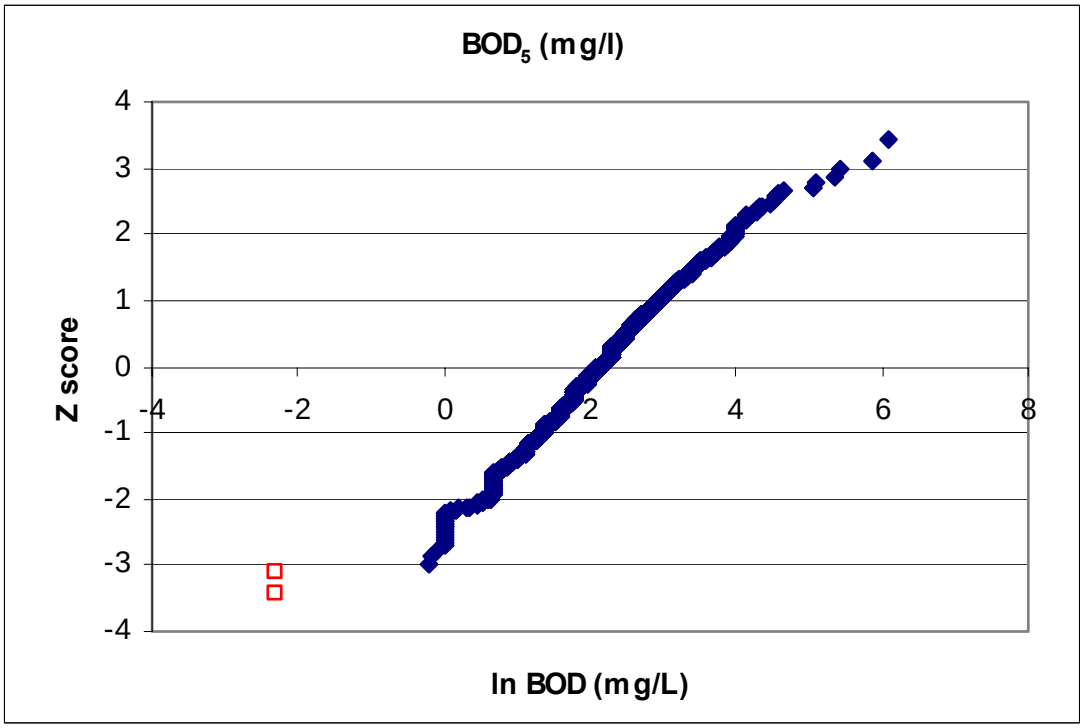

Fig. 18. BOD Probability Plot

Two sites (2,6) in Broward Co, Florida both have low values for the same event, the two lowest values for BOD in the database, these values are highlighted in Figure 18. Site 6 in Broward Co, Florida has another low value of 0.8 for a different event

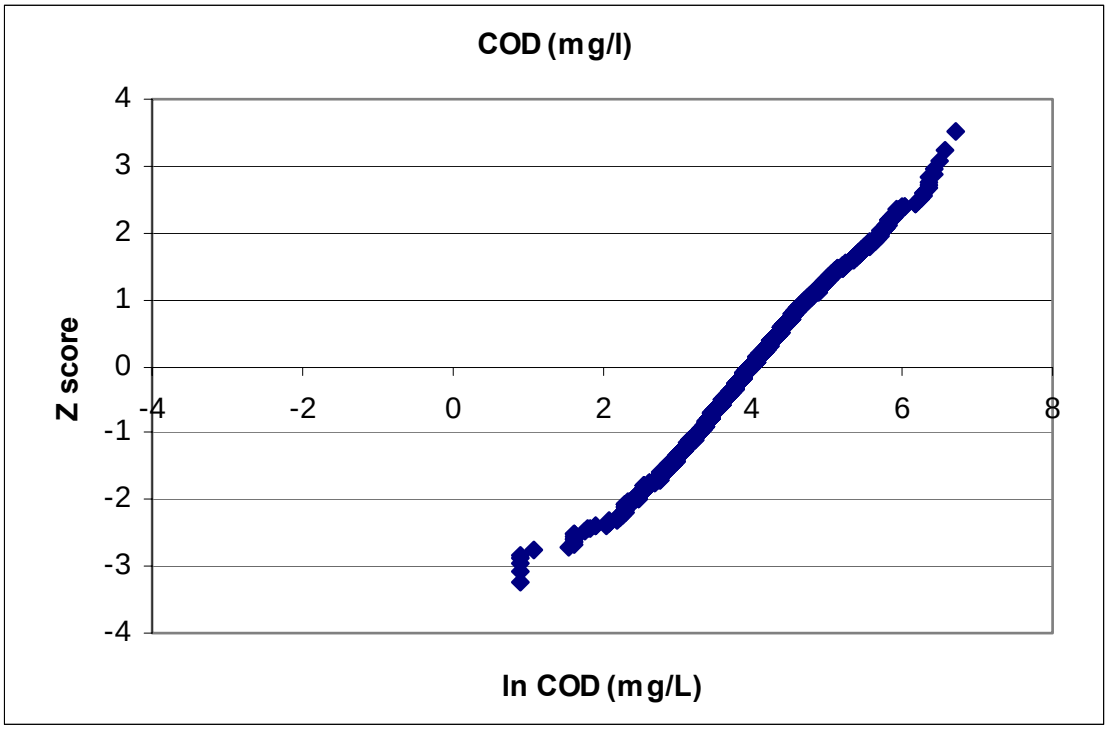

Fig. 19. COD Probability Plot

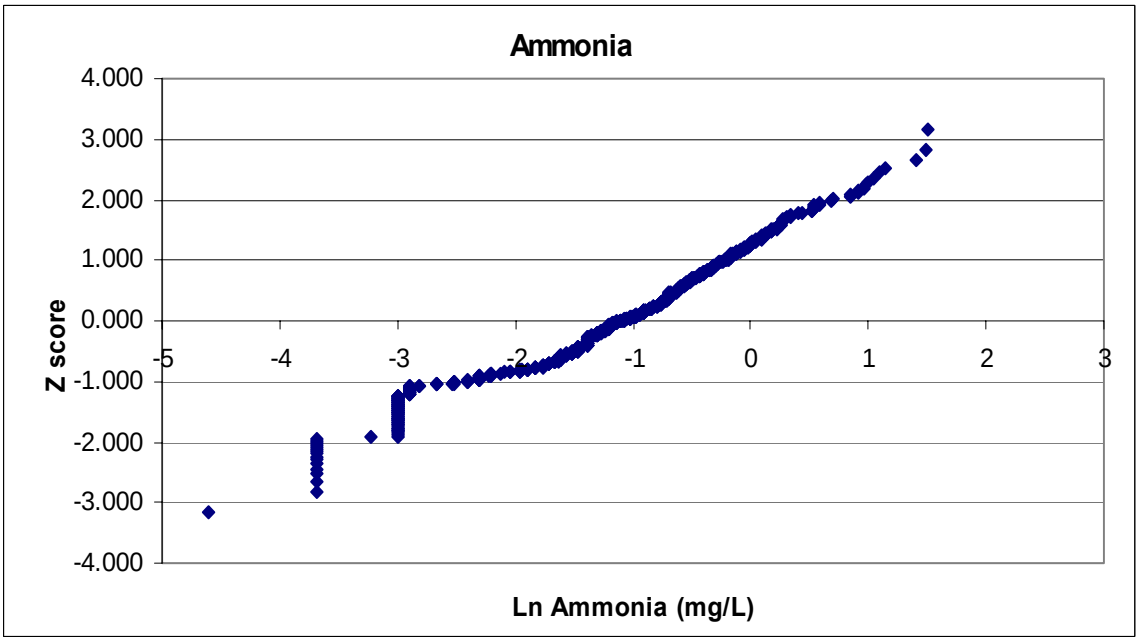

Fig. 20. Ammonia Probability Plot

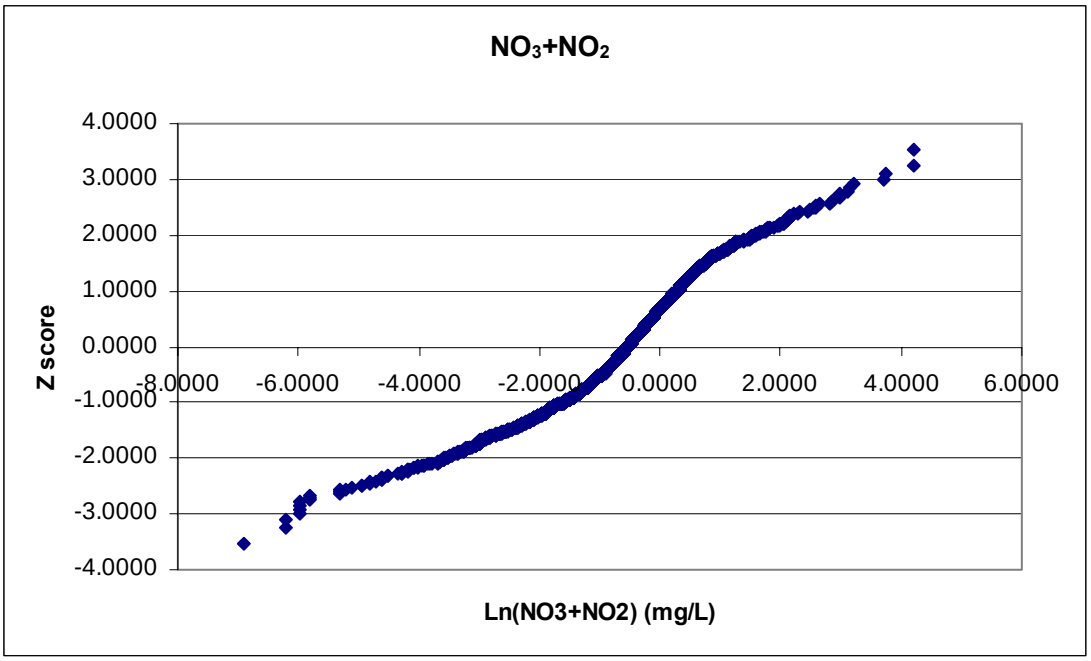

Fig. 21. NO2+NO3 Probability Plot

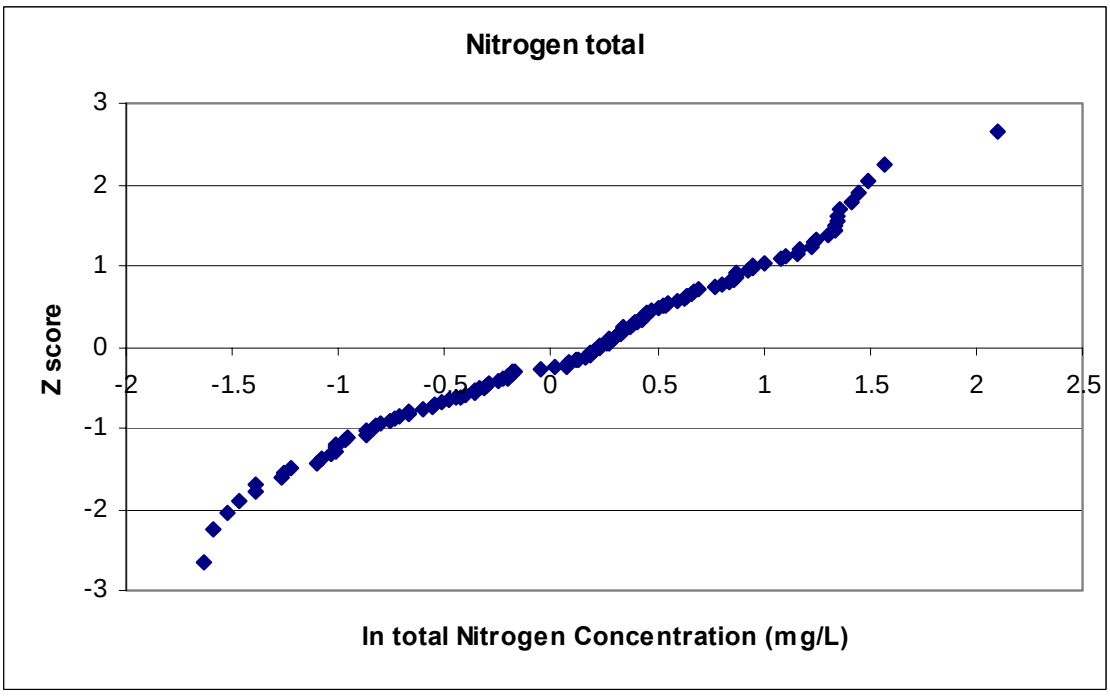

Fig. 22. Total Nitrogen Probability Plot

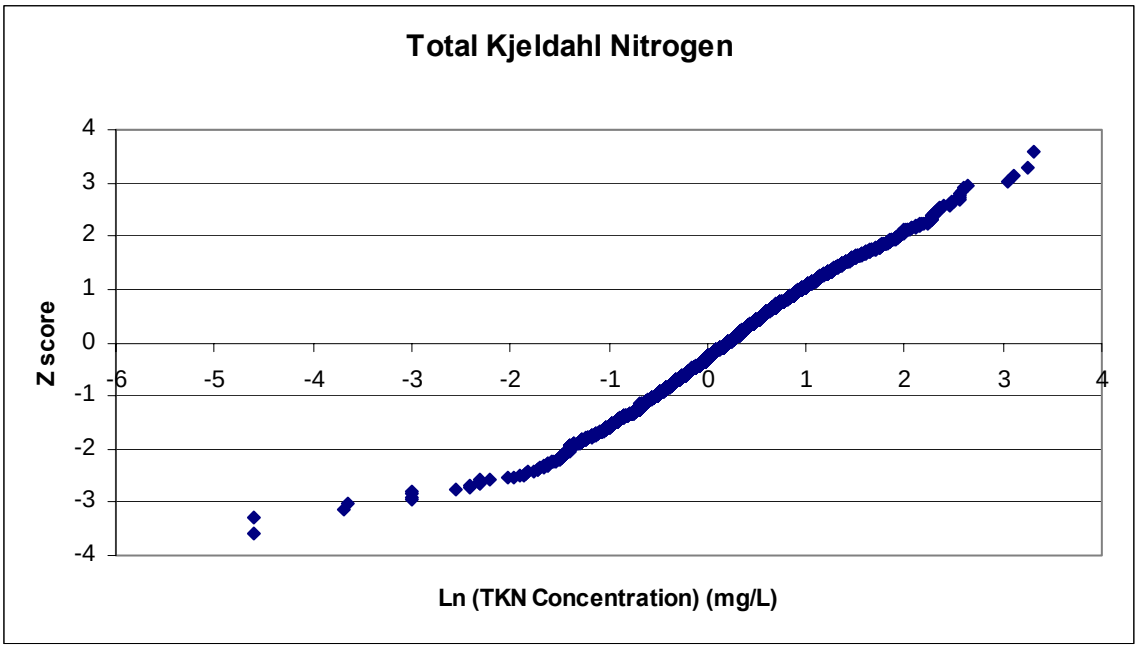

Fig. 23. TKN Probability Plot

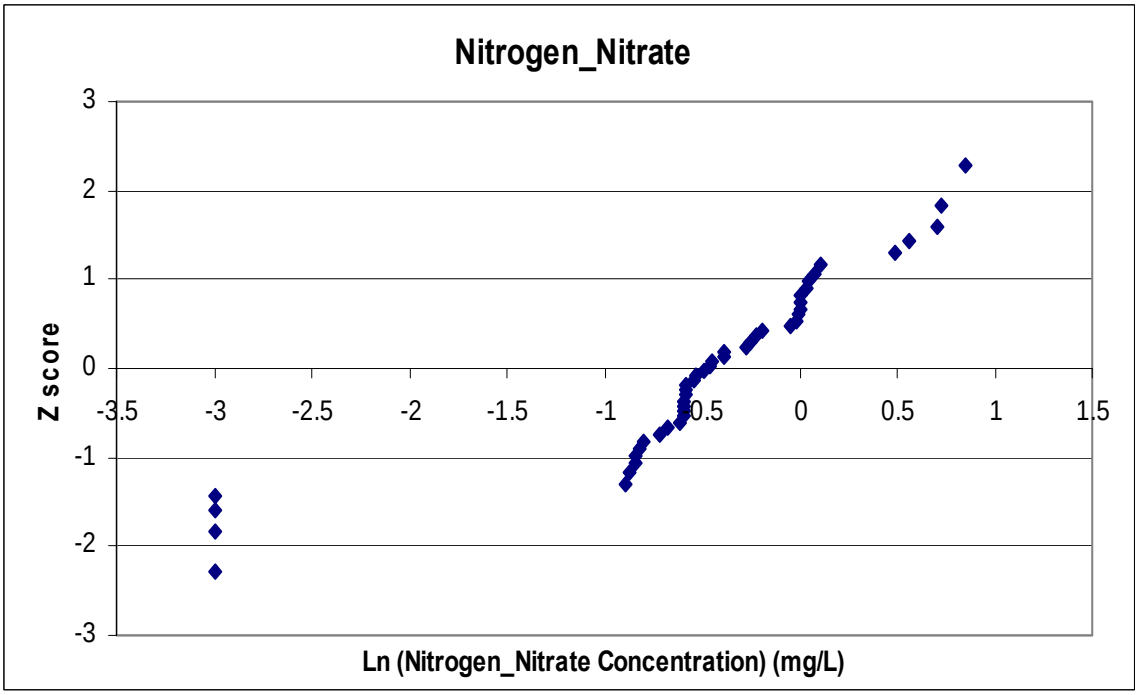

Fig. 24. Nitrogen Nitrate Probability Plot

The data in the lower tail are censored data and don't fit the probability trend. They are presented in the following table as unreasonable and unexplainable data, these were therefore deleted and added to Appendix A.

Table 12. Deleted Nitrogen Nitrate Concentrations

ORDER	Landuse	Season	Database	LOCATION	Rain Zone	Date	Deleted Constituent	Concentration
856	RE	SP	USGS	Wisconsin	1	06/17/93	Nitrogen_Nitrate (mg/l)	<0.10
859	RE	FA	USGS	Wisconsin	1	11/12/93	Nitrogen_Nitrate (mg/l)	<0.10
874	ID	SU	USGS	Wisconsin	1	06/25/93	Nitrogen_Nitrate (mg/l)	<0.10
894	CO	FA	USGS	Wisconsin	1	10/09/93	Nitrogen_Nitrate (mg/l)	<0.10

The following plot is the result of the correction.

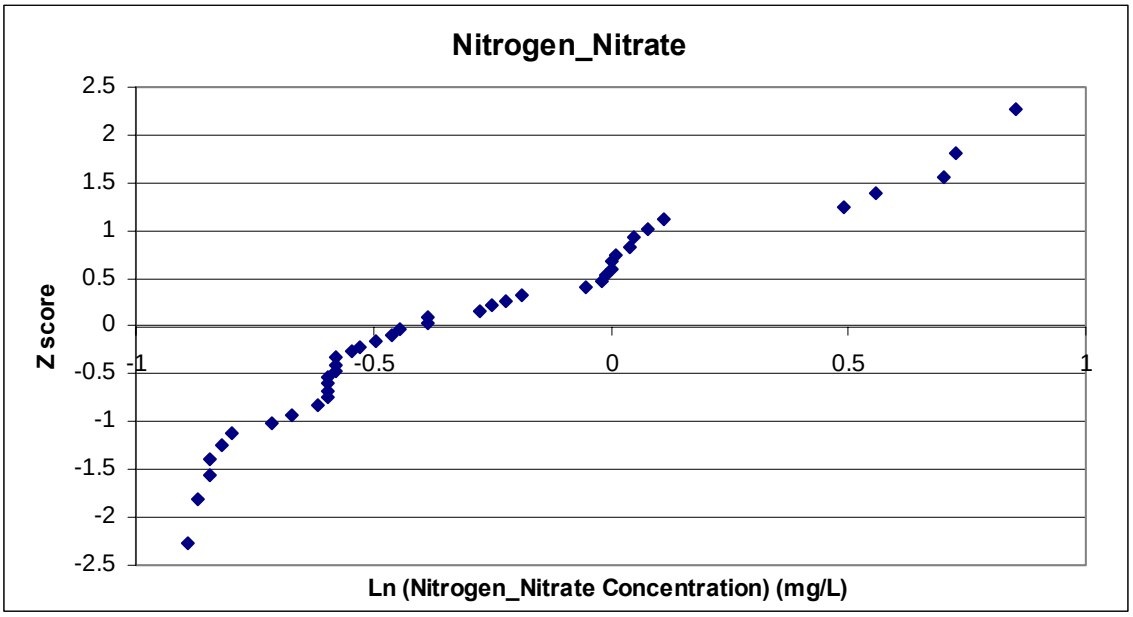

Fig. 25. Corrected Nitrogen Nitrate Probability Plot

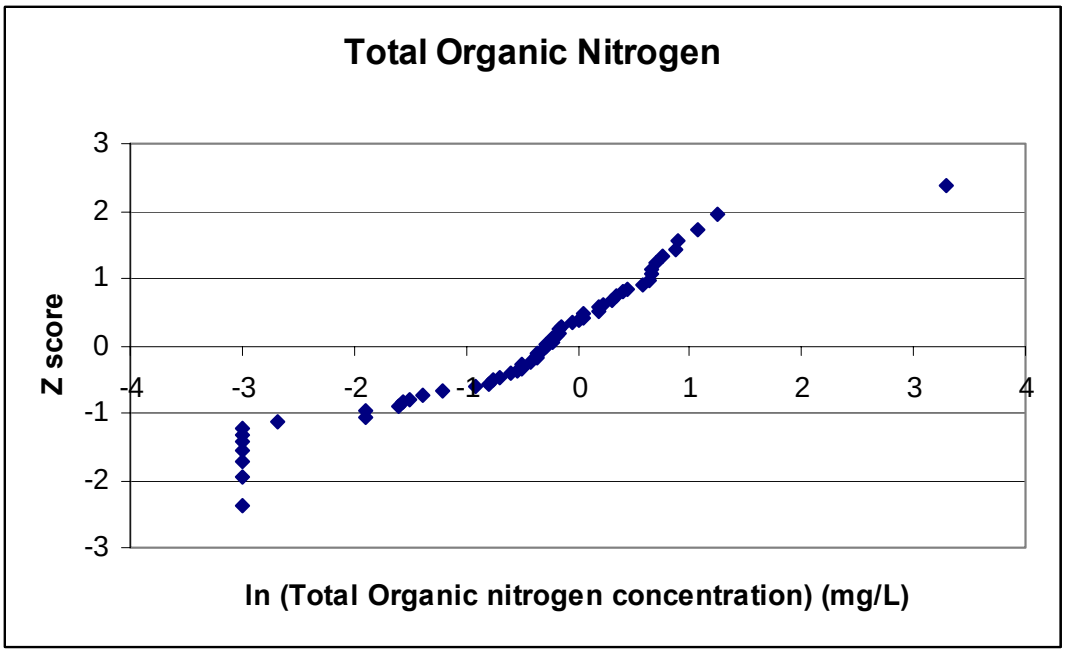

Fig. 26. Total Organic Nitrogen Probability Plot

One event, as can be seen in the Appendix B, has an unusually high concentration of total organic nitrogen of 26.7 mg/L. This event also has an unusually high concentration of TKN (27.2 mg/L) and was therefore considered questionable and listed in Appendix B.

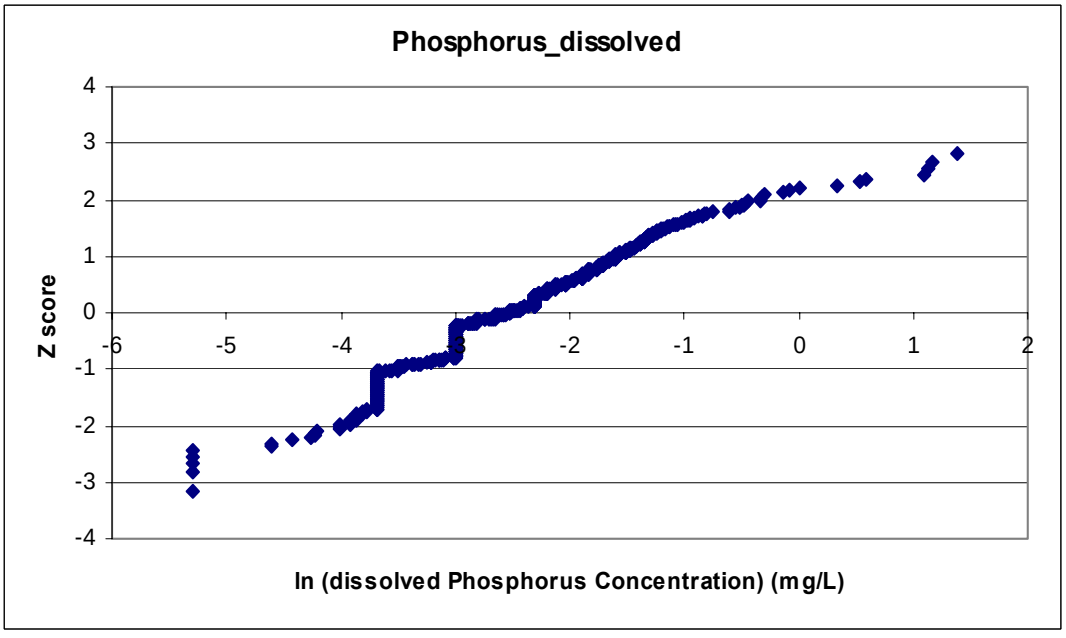

Fig. 27. Dissolved Phosphorus Probability Plot

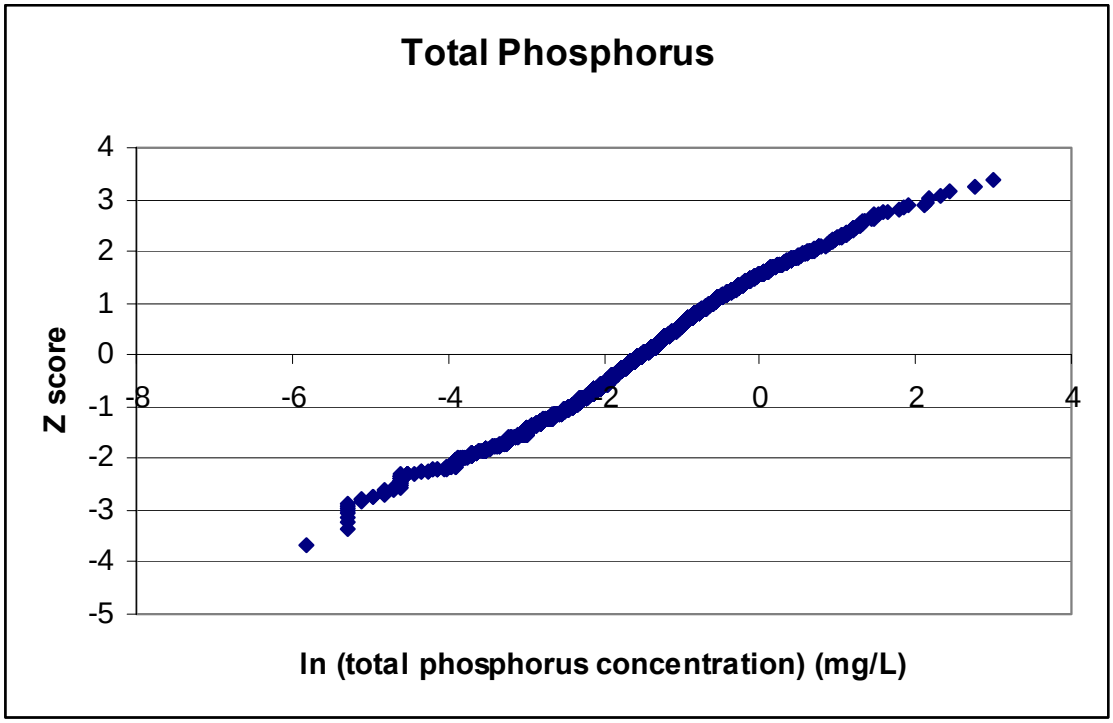

Fig. 28. Total Phosphorus Probability Plot

Many of the metals have low concentrations in stormwater, and detection limits are usually fairly low (approximately1 to 10 µg/L). A common error when reporting metals values can occur as a result of inconsistencies in units. Metals are reported in the NSQD ver. 3 in µg/L, however NPDES data for the following locations were presented in mg/L; Boston, MA, Broward County, FL, New Castle County, DE, Worcester, MA, Indianapolis, IN, and all municipalities in Virginia with the exception of Arlington. This inconsistency in units reporting can cause many values to be incorrect by a factor or 100. The following metals probability plots show how data can be skewed if units are mislabeled. The first plot shown is with unit errors, and the second plot is after corrections are made. The lower tails of the metals probability plots have many values with the same concentrations, these are points represented by half the detection limit.

These data are represented in the database with a "<" followed by the actual detection limit, but are represented by half for the purpose of probability plots.

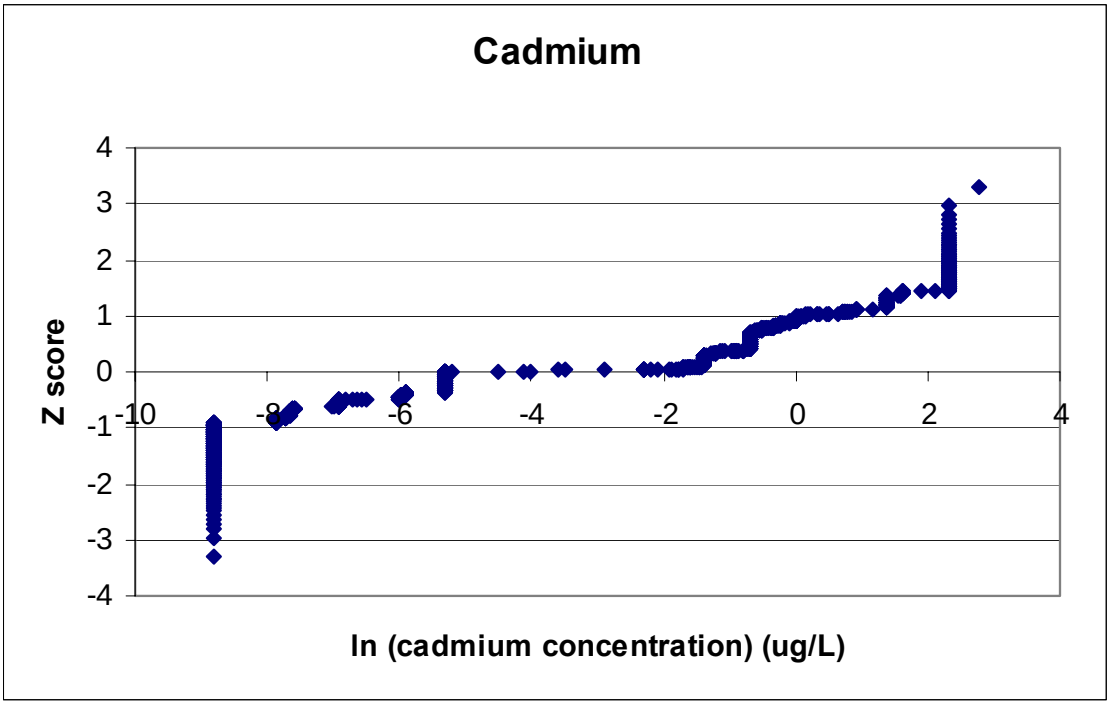

Fig. 29. Cadmium Probability Plot

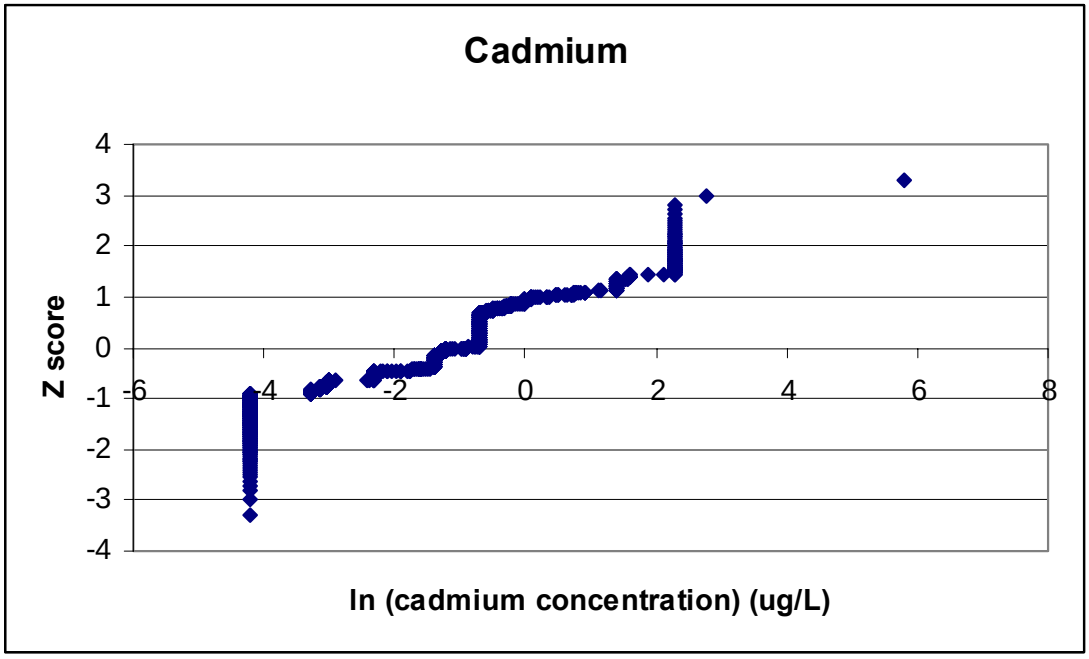

Fig. 30. Corrected Cadmium Probability Plot

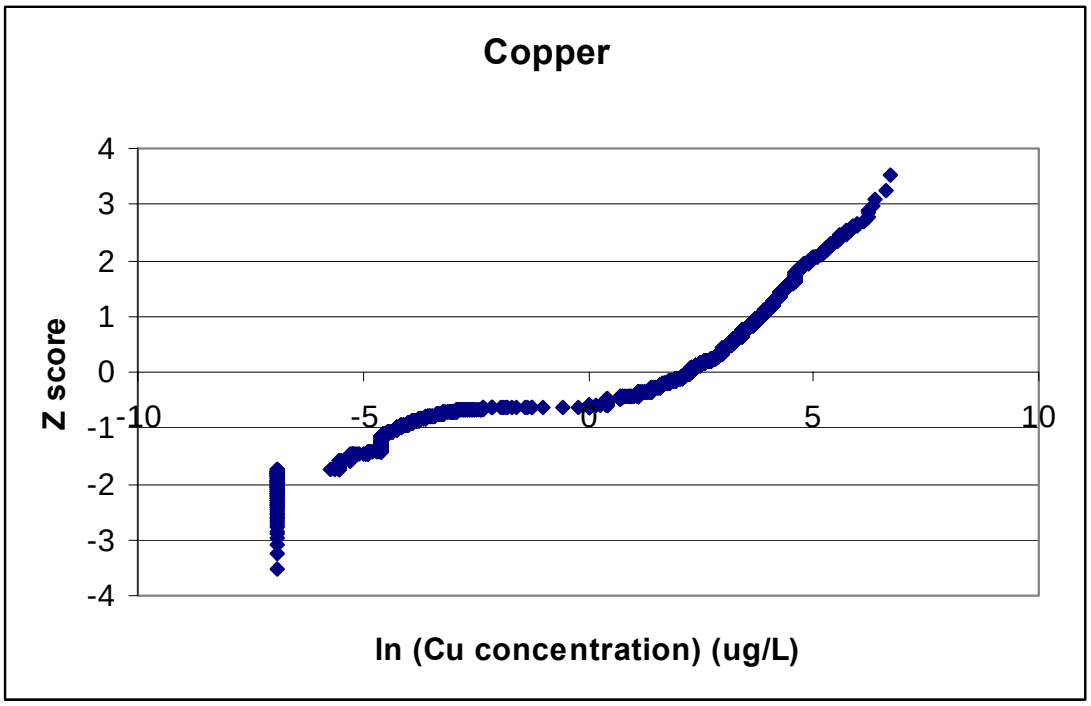

Fig. 31. Copper Probability Plot

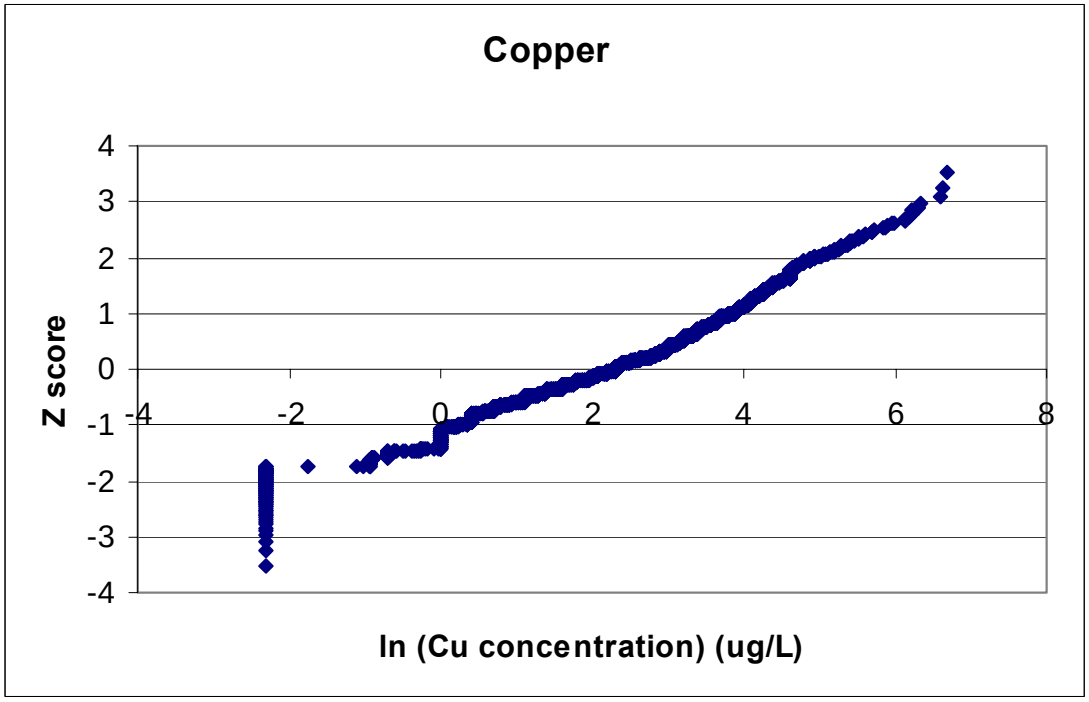

Fig. 32. Corrected Copper Probability Plot

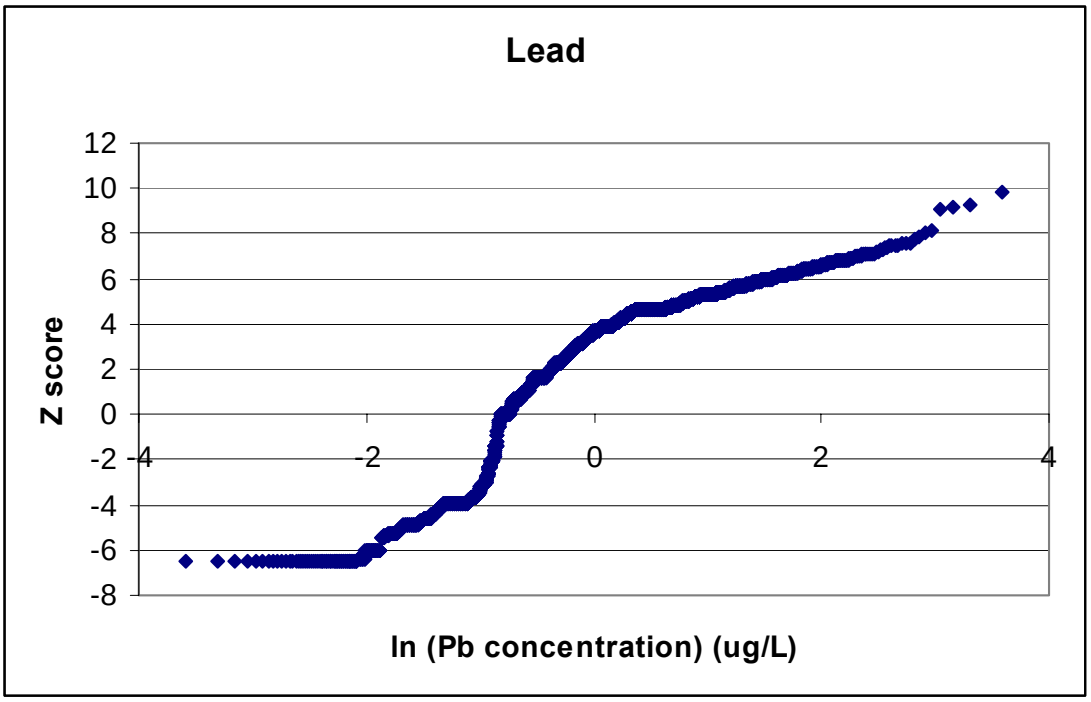

Fig. 33. Lead Probability Plot

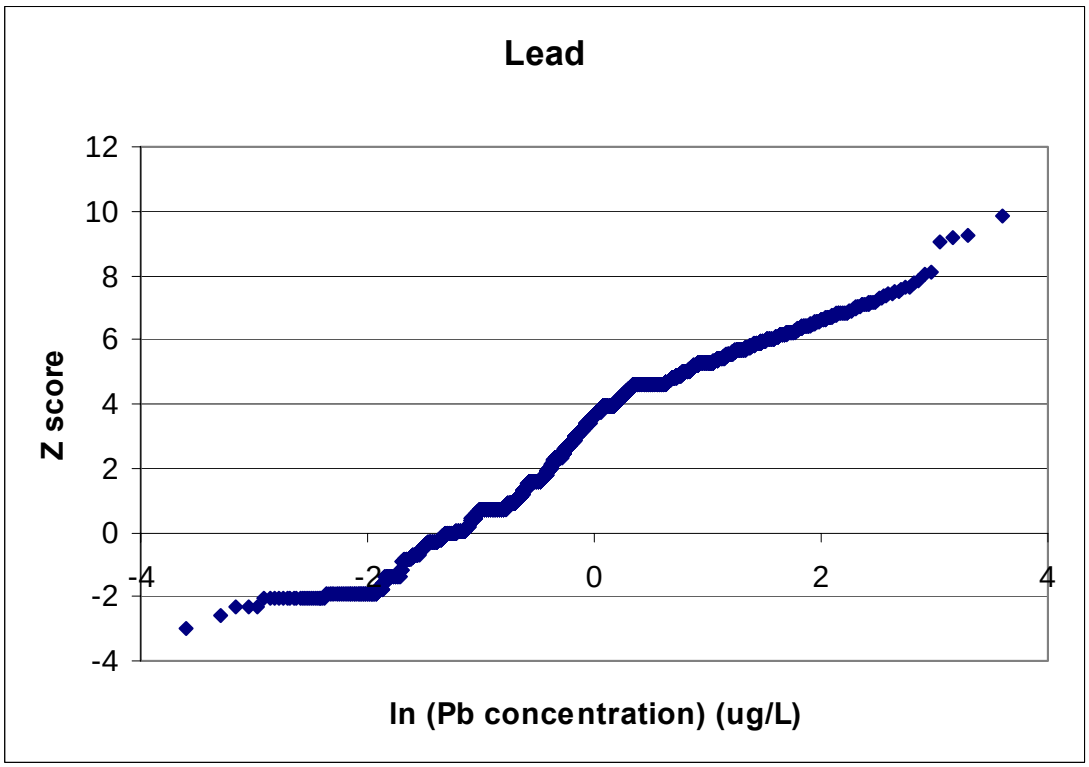

Fig. 34. Corrected Lead Probability Plot

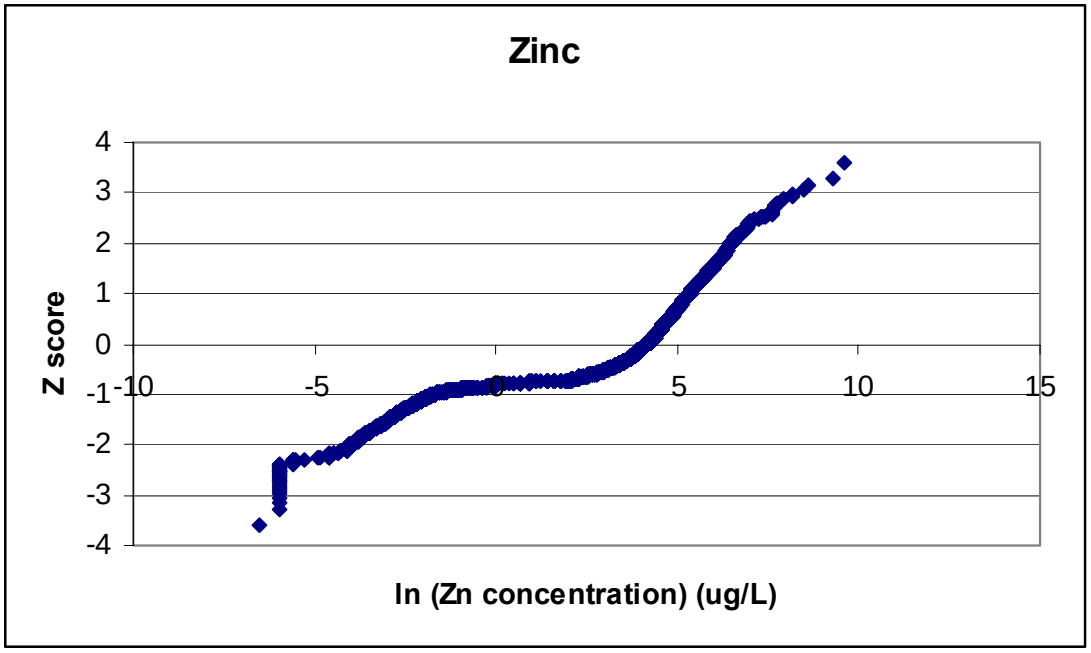

Fig. 35. Zinc Probability Plot

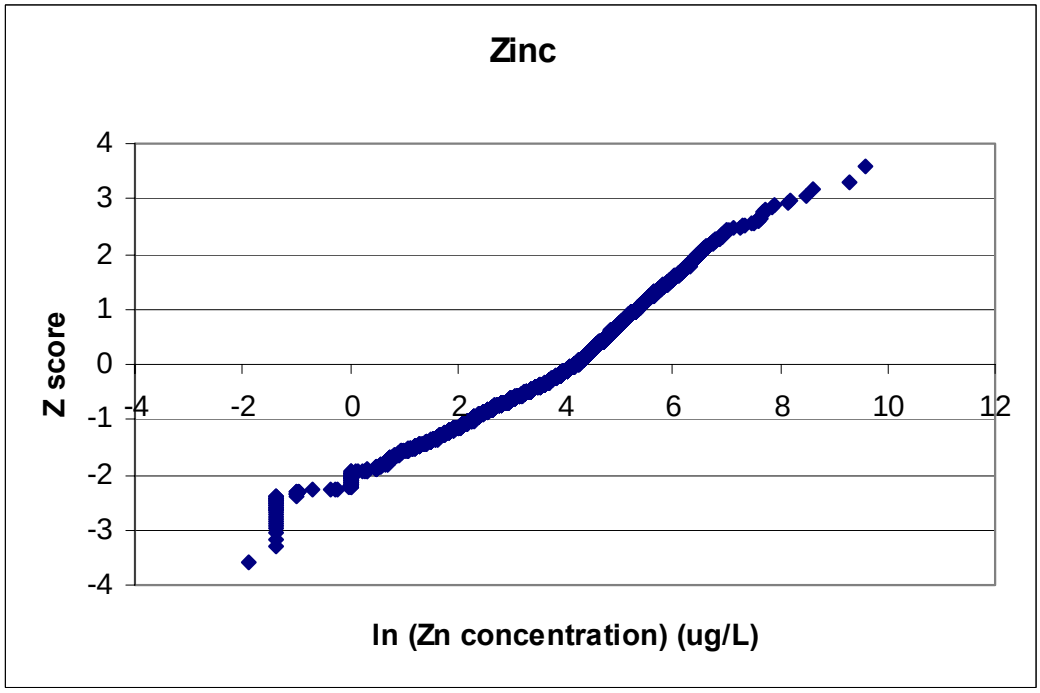

Fig. 36. Corrected Zinc Probability Plot

2.4 Discussion of Detection Limit

There are many data observations in the NSQD with left censored values that refer to the limits of detection. Because these data can greatly affect the outcome of many basic statistics, a number of methods have been used to substitute appropriate values for these missing data in order to perform statistical analysis (Berthouex and Brown 2002). The Cohen's maximum likelihood method refers to a method that randomly generates the missing data based on the known probability distributions of the data. Maestre and Pitt (2005) substantiated the conclusion that the non-detected values in the NSQD can be best estimated using the Cohen method. However, Maestre and Pitt (2005) also concluded that censored data can be adequately adjusted by substituting half of the detection limit when the percentage of left censored observations is lower than 15% of the total data set. Because all the non-detected values are replaced by the same number this can have an effect on the calculated variance. But, if at least 85% of the total observations are above detection, replacing non-detected observations by half has little effect on the mean and variance in stormwater datasets. This method can produce slightly biased results, but it is the most common method used. Certain concentrations for fecal coliform, total coliform, and total E. coli were listed as having right-censored data, such as >2000 colonies/100mL, these values were taken as the upper detection limit. As an example, if the constituent's concentration is listed as >2000, for the statistical analysis this concentration is taken as 2000, but reported as >2000 in the database. Any value reported as N/A, ND, N/C, 0, or a negative number were eliminated when performing statistical analysis. A complete inventory of censored data can be found in Appendix D.

2.5 Logical Plots to Identify Unusual Data Values

Probability plots can identify extremely high or low values, but additional "logical" plots can be developed to identify observations that don't make sense. For example, a scatter plot of dissolved (filtered) concentrations versus the total concentrations of the same constituent should indicate that the dissolved concentrations are always lower than the total concentrations, and all the data should be on one side of the equivalent line. Other related relationships include; TDS vs. specific conductivity; TDS<total solids; SS<total solids; VSS<volatile solids; dissolved constituents < total forms of the constituent; PO_4<total P (of both expressed as P!); NH_3< TKN; BOD vs. COD. Due to reasonable errors in analytical accuracy, there will like be some "noise" along the line of equivalency. Logical plots can be used as a weight of evidence to keep or discard a questionable observation.

After transcription errors were corrected, the following scatter plots were analyzed for logical data errors. The tables below the plots show the unusual data values that are not likely due to the "noise" along the line of equivalent concentrations, these data are also listed in Appendix B. The data in Appendix B are of questionable usability, but the weight of evidence is not sufficient to delete the value, deleted values can be found in Appendix A.

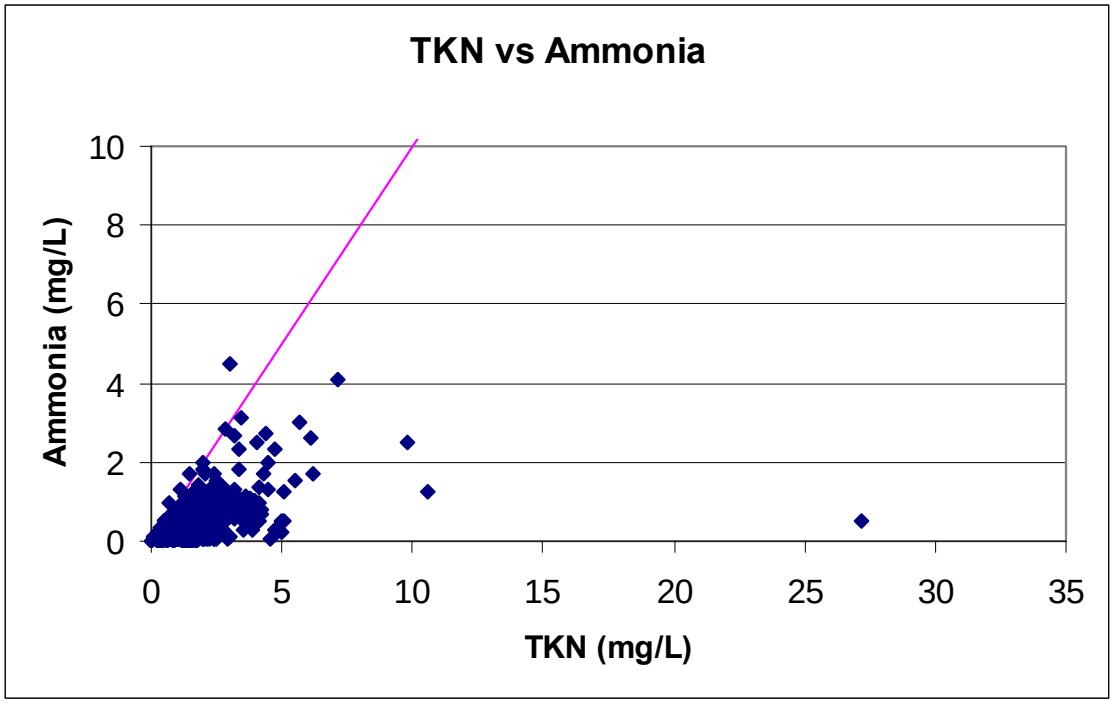

Fig. 36. TKN vs Ammonia Logical Plot

Table 13. Unusual TKN and Ammonia Event

ORDER	Landuse	Season	Database	LOCATION_ID	Jurisdiction	Site_ID	Ammonia (mg/l)	Nitrogen Kjeldahl Total (mg/l)
14	RE	SP	MS4	Minnisota	St_Paul	site2 Luella_St Orange_ave	4.48	3.02

This data point is not associated with a transcription error, but the ammonia concentration was underlined and noted as “data with questionable usability” in Appendix A of the City of Saint Paul’s Storm Water Permit Annual Report from the Department of Public Works, June 2003.

Table 14. Unusual BOD/COD Event

ORDER	Landuse	Season	Database	LOCATION_ID	Jurisdiction	Site_ID	BOD5 (mg/l)	COD (mg/l)
1227	CO_ID	WI	MS4	VA	Norfolk	Armisted Avenue N1	165	120

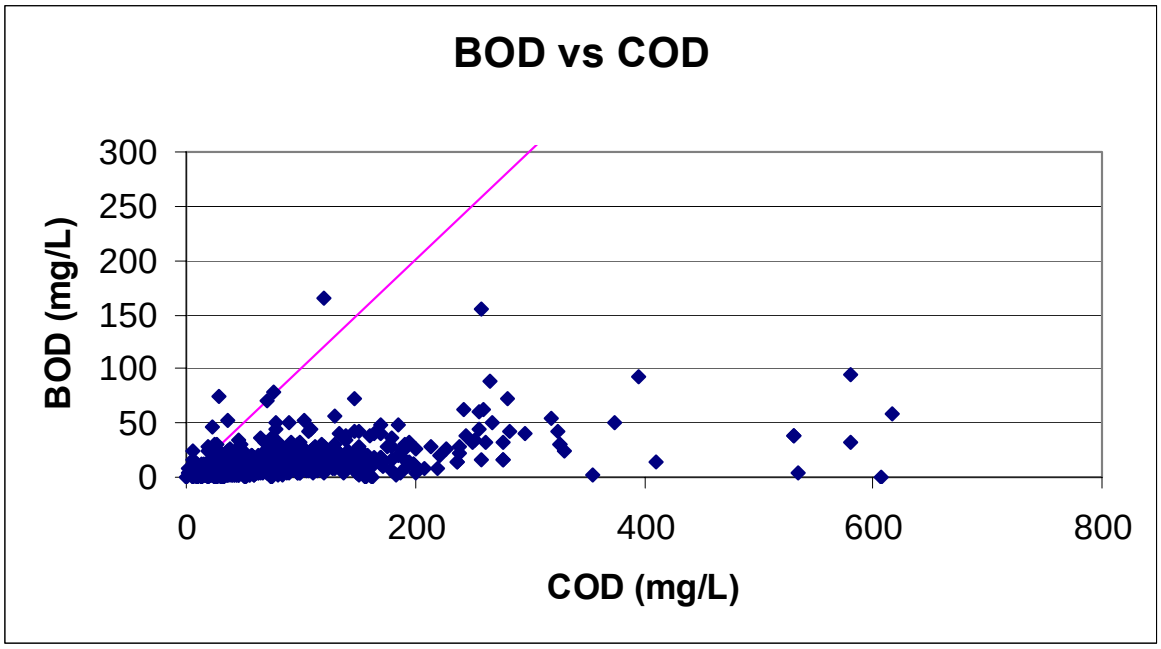

Fig. 37. BOD vs. COD Logical Plot

Table 15. Unusual Conductivity/TDS Events

ORDER	Landuse	Season	Database	LOCATION_ID	Jurisdiction	Site_ID	Conductivity (uS/cm @25°C)	TDS (mg/l)
254	RE	WI	MS4	Massachusetts	Boston	West Roxebury 13D077_078	1340	2540
253	RE	WI	MS4	Massachusetts	Boston	West Roxebury 13D077_078	1635	5810

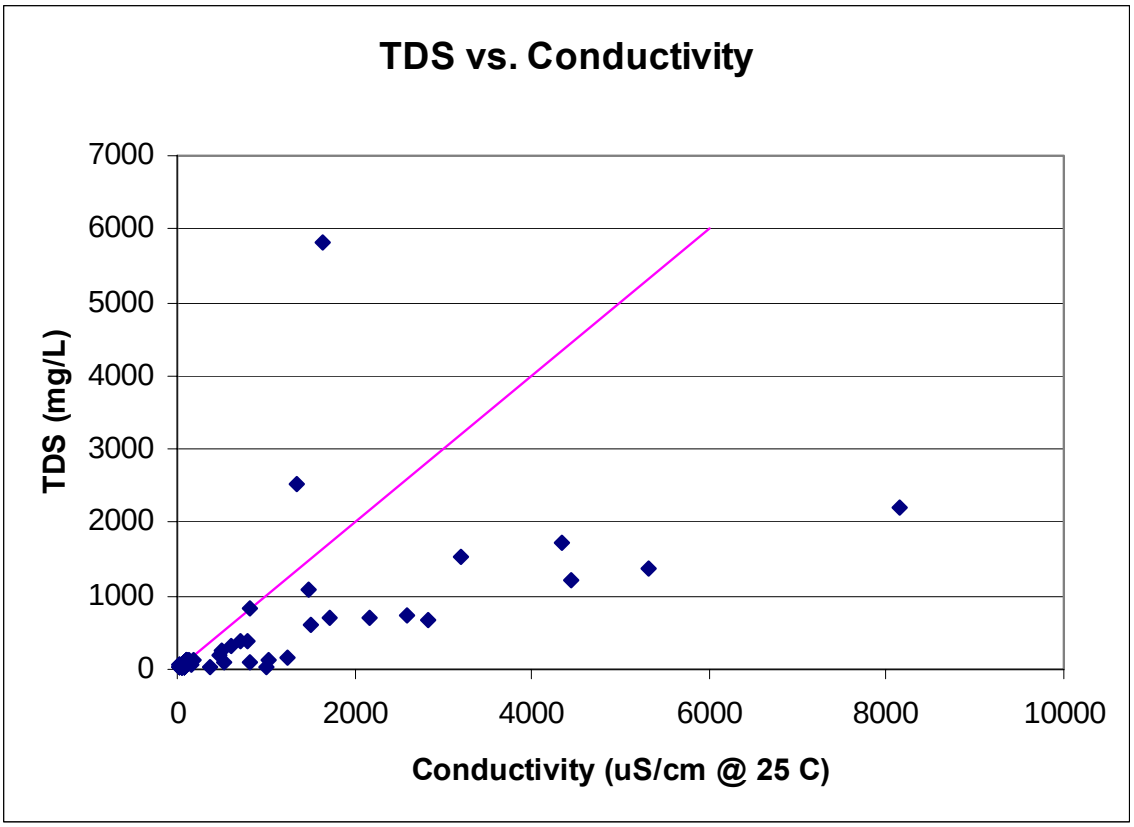

Fig. 38. TDS vs. Conductivity Logical Plot

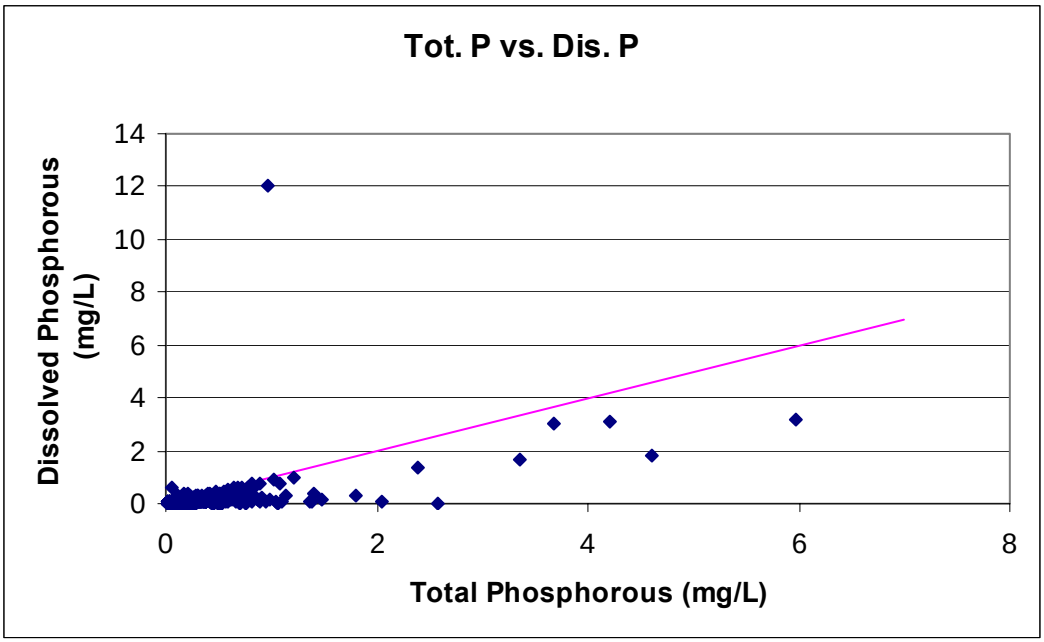

Fig. 39. Total Phosphorus vs. Dissolved Phosphorus Logical Plot

Table 16. Unusual Total Phosphorus/Dissolved Phosphorus Event

ORDER	Landuse	Season	Database	LOCATION_ID	Jurisdiction	Site_ID	Phosphorous Dissolved (mg/l)	Phosphorous Total (mg/l)
905	ID	WI	MS4	Delaware	New Castle Co.	Albe Drive	12	0.96

If the above extreme value, which is associated with a first flush observation, is removed, the following plot is the result. This dissolved phosphorous concentration was determined to be unusual and unreasonable and therefore removed from the database (see Appendix A).

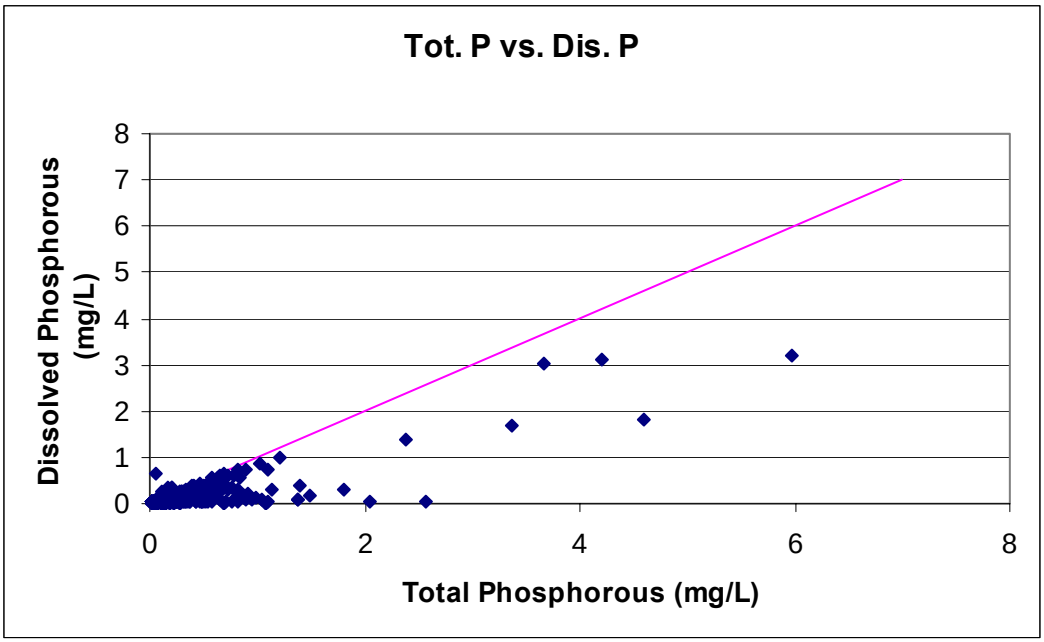

Fig. 40. Corrected Total Phosphorus vs. Dissolved Phosphorus Logical Plot

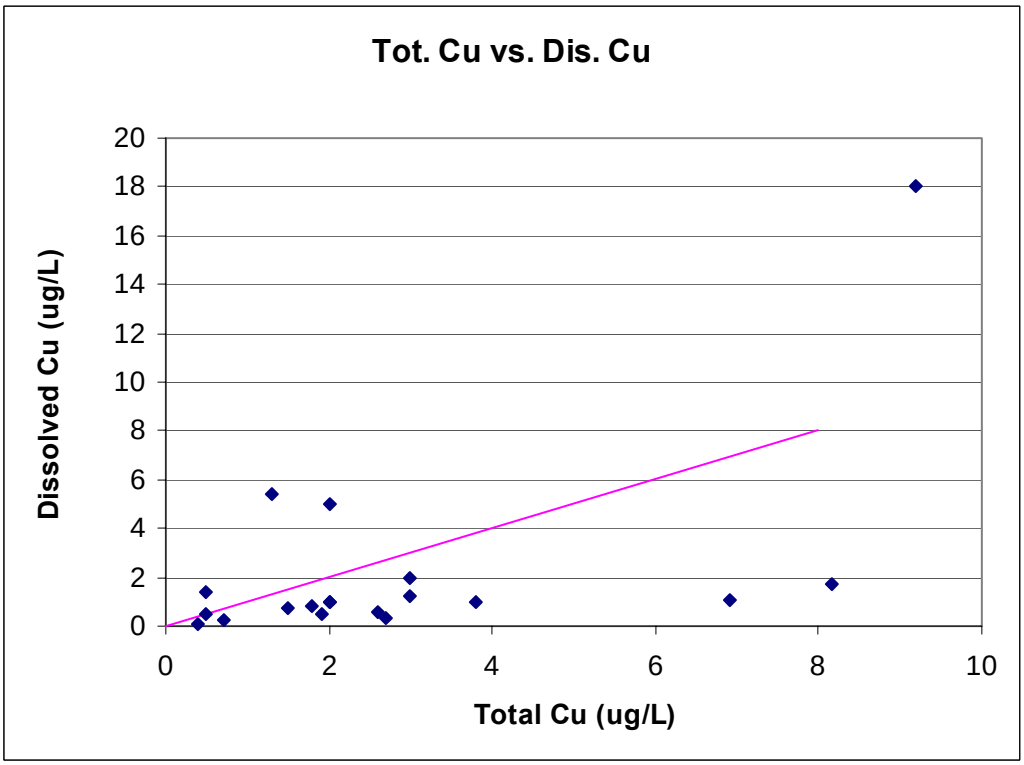

Fig. 41. Total Copper vs. Dissolved Copper Logical Plot

The following point was removed because it was determined to be unusual and unreasonable. The total copper value is less than the dissolved copper, but to add to the questionable usability is the fact that this point is also the highest dissolved copper value with a corresponding total copper concentration. No other constituent's concentrations were significantly high for this event; these were the only unusual data for this event.

Table 17. Unusual Copper Event

ORDER	Landuse	Season	Database	LOCATION_ID	Jurisdiction	Site_ID	Copper Total (ug/l)	Copper Dissolved (ug/l)
230	RE	SP	MS4	Massachuetts	Boston	27K397_Mount_Vernon_St_Charlestown	9.2	18

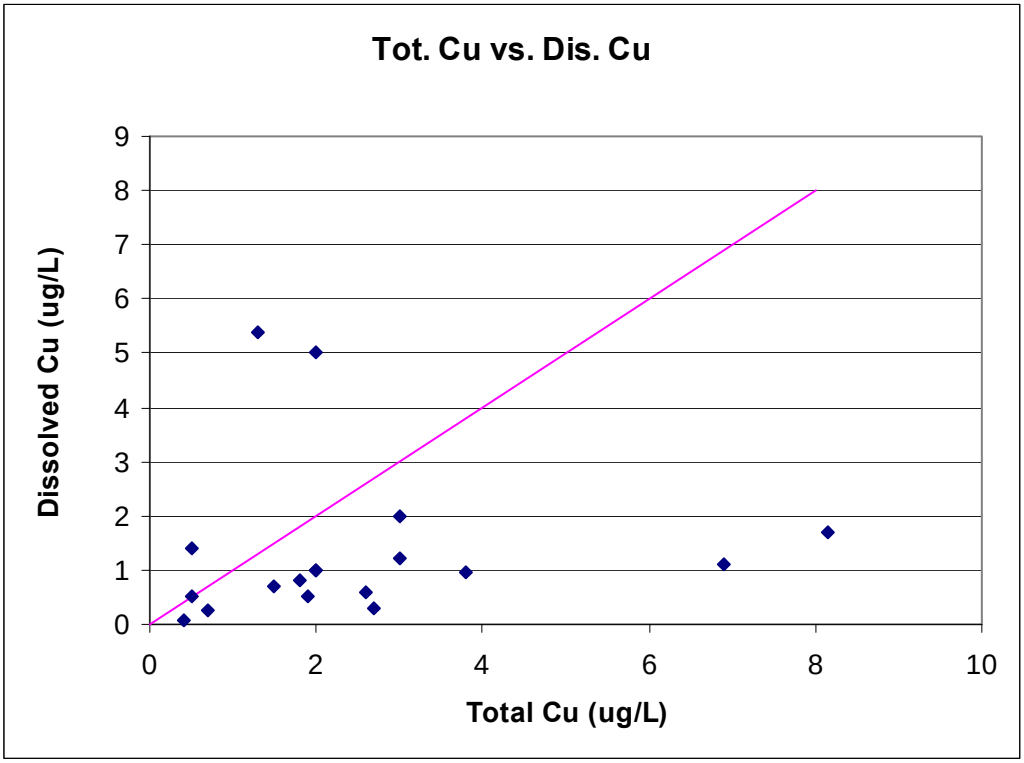

Fig. 42. Corrected Total Copper vs. Dissolved Copper Logical Plot

The following events are noted in Appendix B as having questionable usability, not only is the dissolved concentration higher than the total these values are also the highest

dissolved copper concentrations with a corresponding total copper concentration. However, because there are so few observations, it is difficult do discard the data based on these logical plots. There were no other detectable metals values for these events, therefore insufficient evidence to delete the values, for the anomaly could be attributed to "noise" if more data were available for analysis.

Table 18. Unusual Copper Events

ORDER	Landuse	Season	Database	LOCATION_ID	Rain Zone	Date	Constituent	Concentration
232	RE	SP	MS4	Massachusetts	1	04/28/02	Copper Total (ug/l)	1.3
232	RE	SP	MS4	Massachusetts	1	04/28/02	Copper Dissolved (ug/l)	5.4
235	OP	FA	MS4	Massachusetts	1	09/27/02	Copper Total (ug/l)	<4.0
235	OP	FA	MS4	Massachusetts	1	09/27/02	Copper Dissolved (ug/l)	<10

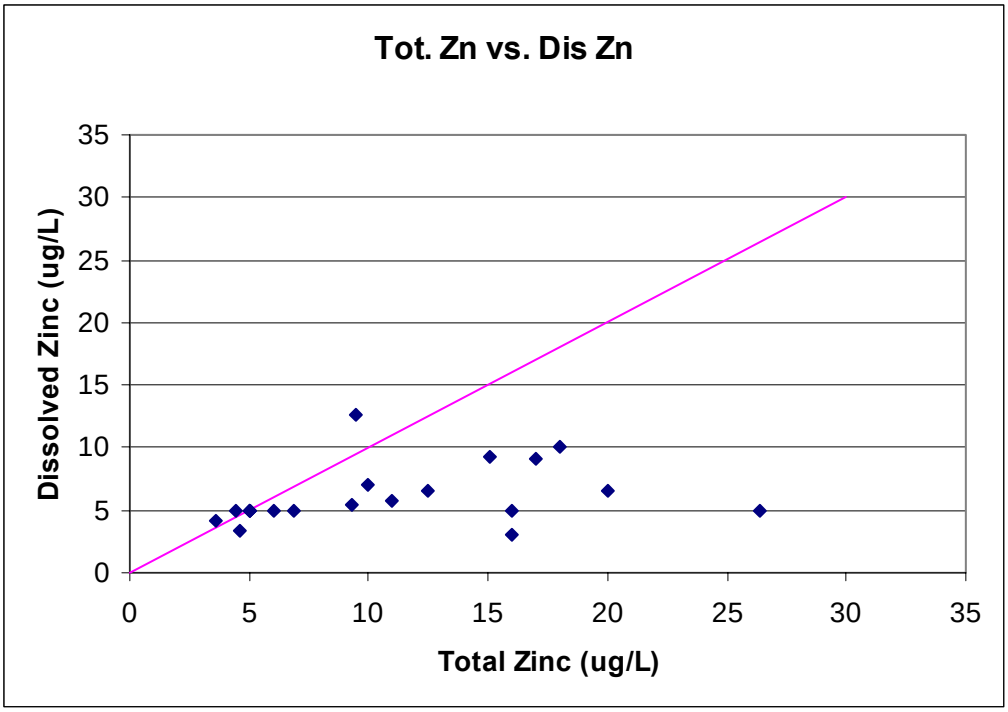

Fig. 43. Total Zinc vs. Dissolved Zinc Logical Plot

Like the total copper vs. dissolved copper plot, the total zinc vs. dissolve zinc plot shows the highest dissolved zinc concentration higher than its corresponding total zinc, therefore

this point is also suspect. Because there are so few data points and because both the dissolved zinc and total zinc values are reasonable, this data point remains in the database, but is of questionable usability. Given more data this point could be attributed to “noise”.

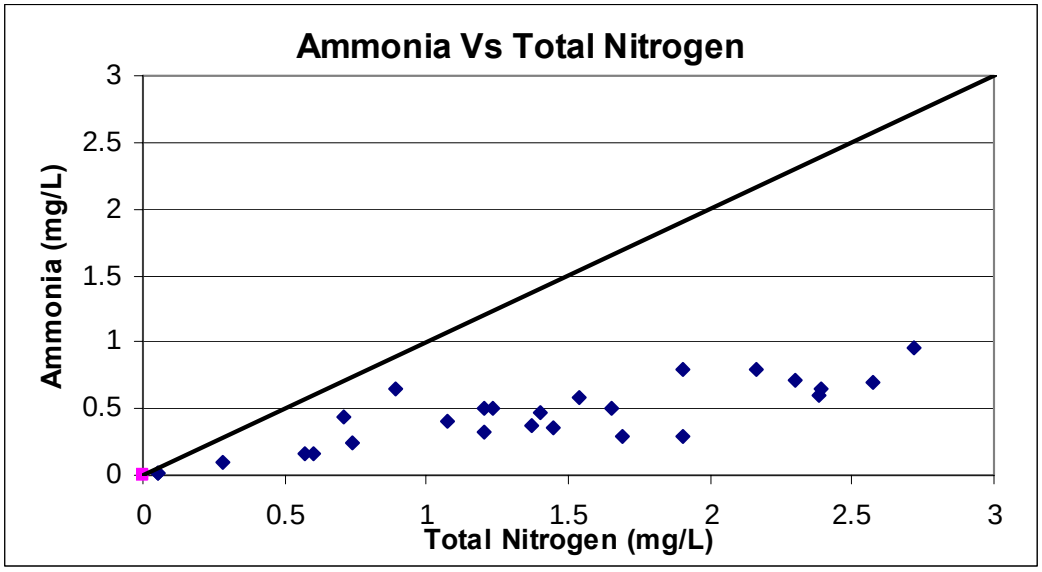

Fig. 44. Ammonia vs. Total Nitrogen Logical Plot

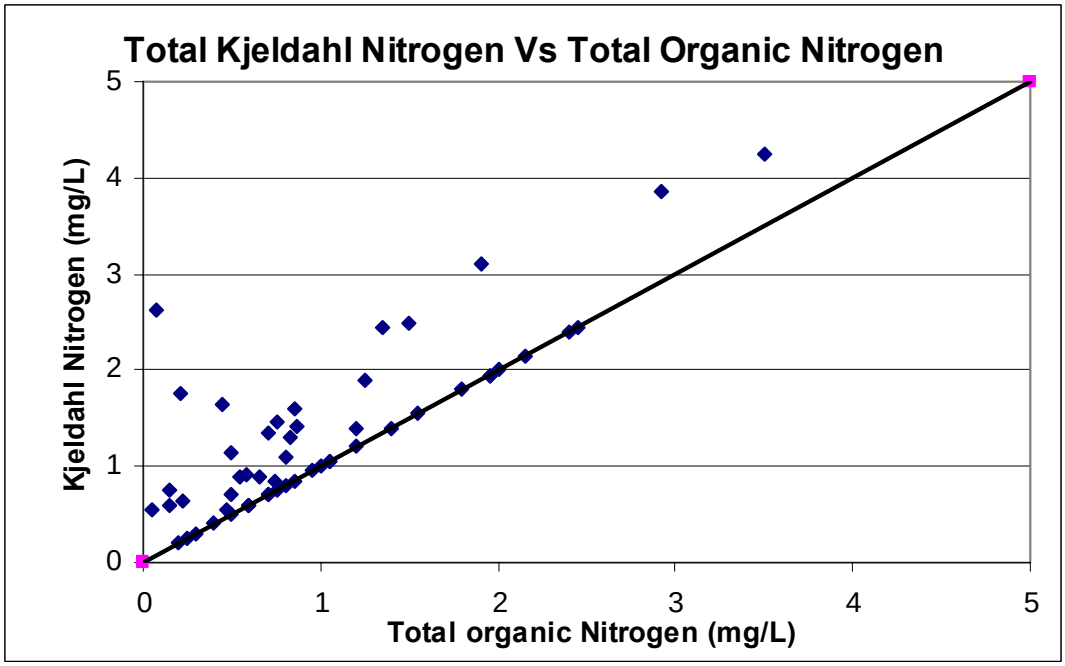

Fig. 45. TKN vs. Total Organic Nitrogen Logical Plot

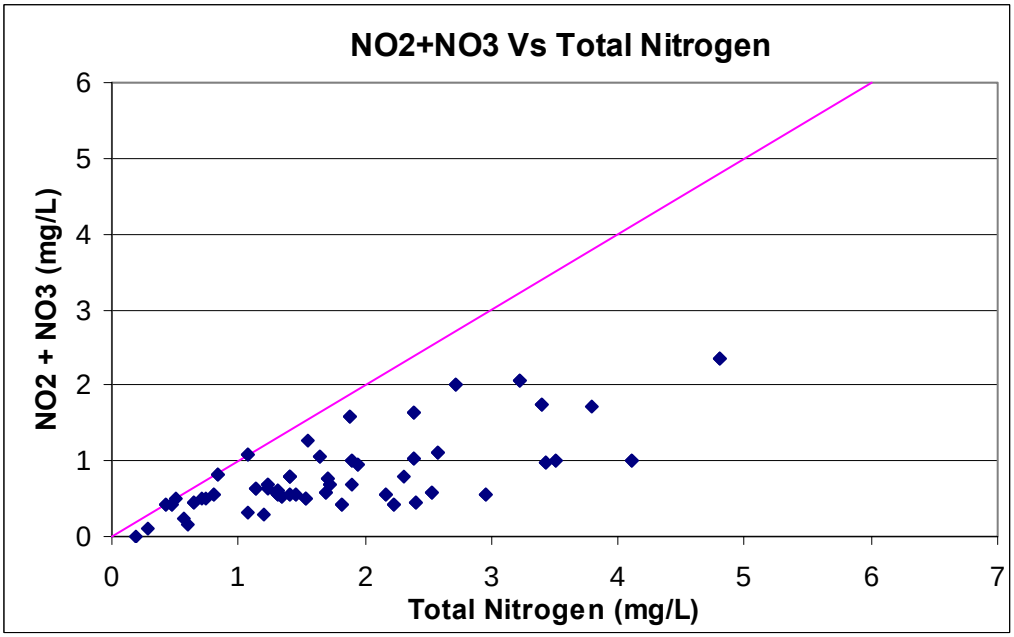

Fig. 46. NO2+NO3 vs. Total Nitrogen Logical Plot

2.6 Data additions comparison with NSQD 1.1

The comparison of data ranges with historical data can be an important part of the QA/QC process. This step in the process can help in the identification of obvious errors in the database. Tables 1, 2, 3 and 4 shows constituents with some disparity from NSQD 1.1 and the additional data collected for NSQD ver. 3 (a full table of all the constituents' comparisons with NSQD 1.1 can be found in Appendix C). The constituents of concern are shown in the tables below because there is some disparity in the additional data and that of the first version of the NSQD, which could be added to the weight of evidence to keep or delete certain observations from the database. When considering the range of concentrations for any given constituent, it should be noted that there different numbers of observations between the two databases. In addition, it was hypothesized that the more northern data that are being added as part of version 3 would have generally higher concentrations than the earlier data in version 1.1. In Table 1, the temperature for the NSQD ver. 3 additional data seems to be very high, these data values are confirmed as reported in ºF, from the state of Maryland. After conversion to ºC, the values are much more reasonable, as can be seen in Table2. Although the range for TDS is reasonable when considering the number of observations, there is a large difference in the average and standard deviation values, but interestingly there were no significant differences in the range, median, or coefficient of variation. In Table 3, there are some obvious range differences in the nutrient values for NO2 + NO3, total organic nitrogen, and total phosphorous.

Table 19. NSQD 1.1 Comparisons

Constituent:	**Temperature (C)**		**TDS (mg/l)**	
Databse	**NSQD 1.1**	**NSQD 3 additional data**	**NSQD 1.1**	**NSQD 3 additional data**
NUMBER OF OBSERVATIONS	861	474	2956	592
NUMBER OF SAMPLES WITH VALUES ABOVE DL	861	472	2936	590
PERCENTAGE WITH DETECTED VALUES	100	99	99	99
MINIMUM	0.5	2.0	3.0	3.0
MAXIMUM	32	84	18000	8200
AVERAGE	17	44	130	330
MEDIAN	17	47	80	92
STANDARD DEVIATION	5.9	23	430	870
COEFFICIENT OF VARIATION	0.36	0.53	3.4	2.6

Table 20. NSQD 1.1 Comparisons after Maryland temperature corrections

Constituent:	**Temperature (C)**		**TDS (mg/l)**	
Databse	**NSQD 1.1**	**NSQD 3 additional data**	**NSQD 1.1**	**NSQD 3 additional data**
NUMBER OF OBSERVATIONS	861	472	2956	592
NUMBER OF SAMPLES WITH VALUES ABOVE DL	861	472	2936	590
PERCENTAGE WITH DETECTED VALUES	100	100	99	99
MINIMUM	0.5	-17	3.0	3.0
MAXIMUM	32	30	18000	8200
AVERAGE	17	14	130	330
MEDIAN	17	16	80	92
STANDARD DEVIATION	5.9	8.2	430	870
COEFFICIENT OF VARIATION	0.36	0.58	3.4	2.6

Table 21. NSQDS 1.1 Comparisons

Constituent:	**N02+NO3 (mg/l)**		**Nitrogen_Total_Organic (mg/l)**		**Phosphorous Total (mg/l)**	
Databse	**NSQD 1.1**	**NSQD 3 additional data**	**NSQD 1.1**	**NSQD 3 additional data**	**NSQD 1.1**	**NSQD 3 additional data**
NUMBER OF OBSERVATIONS	3075	2488	40	58	3285	4140
NUMBER OF SAMPLES WITH VALUES ABOVE DL	2993	2474	40	52	3170	4062
PERCENTAGE WITH DETECTED VALUES	97	99	100	90	97	98
MINIMUM	0.01	0.001	0.13	0.050	0.010	0.0030
MAXIMUM	18	66	6.9	27	15	80
AVERAGE	0.78	1.0	1.5	1.5	0.41	0.40
MEDIAN	0.60	0.59	1.1	0.82	0.27	0.22
STANDARD DEVIATION	0.76	2.4	1.29	3.6	0.62	1.4
COEFFICIENT OF VARIATION	0.97	2.4	0.87	2.4	1.5	3.6

There are some differences in metals concentrations. As would be expected, and can be seen in Table 4, there is a much larger range in the total lead concentrations. This disparity is likely due to the fact that the data additions range from the late 1970s to the 2005. Whereas the NSQD 1.1 events range from the early 1990s until 2001, events occurring after the elimination of lead from gasoline. The Figure below shows how lead concentrations in stormwater have decreased of the past 25 years due to the elimination of lead in gasoline. Copper and Zinc concentrations are also significantly lower, however there is also a large difference in number of observations that could vary the range.

Table 22. NSQD 1.1 Metals comparisons

Constituent:	Copper Dissolved (ug/l)		Lead Total (ug/l)		Zinc Dissolved (ug/l)	
Databse	NSQD 1.1	NSQD 3 additional data	NSQD 1.1	NSQD 3 additional data	NSQD 1.1	NSQD 3 additional data
NUMBER OF OBSERVATIONS	411	22	2949	3095	381	22
NUMBER OF SAMPLES WITH VALUES ABOVE DL	341	16	2290	2744	367	14
PERCENTAGE WITH DETECTED VALUES	83	72	78	89	96	64
MINIMUM	1.0	0.090	0.20	0.049	4.0	3.1
MAXIMUM	200	18	1200	19000	14000	13
AVERAGE	14	2.3	39	140	280	6.7
MEDIAN	8.0	1.1	17	50	52	6.5
STANDARD DEVIATION	23	4.3	72	530	1100	2.7
COEFFICIENT OF VARIATION	1.6	1.8	1.8	3.7	3.9	0.40

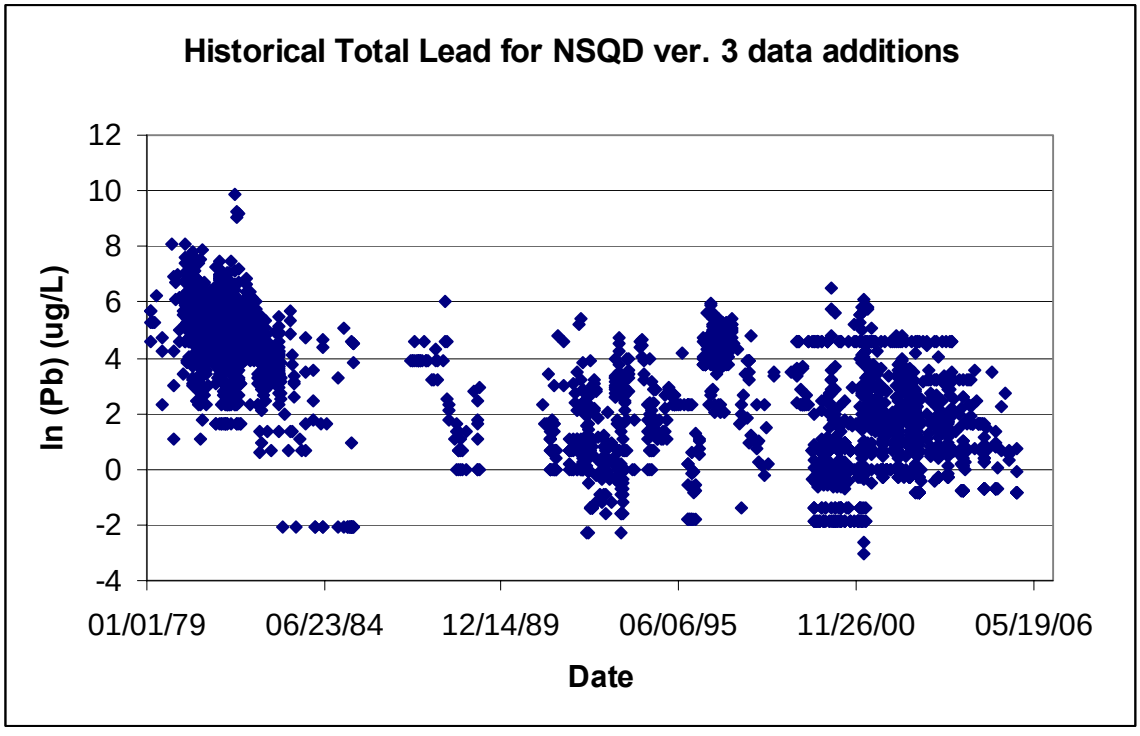

Fig. 47. Historical Lead Data

Chapter 3 Effects of Land Use and Geographical Region on Stormwater Quality

3.1 Introduction

This chapter examines the effects of land use and geographical region on stormwater quality. An examination of the effects of land use and geographical region on stormwater constituent concentrations can be a valuable reference tool for stormwater managers, researchers, environmental scientists, and engineers. The direct effects and interactions of these factors can help describe the variability of stormwater quality as presented in the National Stormwater Quality Database. This chapter examines the statistical differences in mean concentrations for every combination of land use and EPA Rain Zone for many of the constituents contained in the NSQD. As noted in the earlier chapter, land use categories include residential, mixed residential, commercial, mixed commercial, industrial, mixed industrial, institutional, freeways, mixed freeway, open space, and mixed open space. Also included is an unspecified mix category. These data are from Worchester, Massachusetts and further information about the land uses is not available. The mixed land use groups are labeled first with the most predominate land use; as an example, the mixed residential sites have more residential land use areas than any of the other land uses, but it may not be greater than 50%. It is also possible that a smaller fractional area of an especially contaminated site could overwhelm the effects from land uses that are better represented.

All EPA Rain Zones are represented in the database, but not for every constituent. From the weight of evidence presented, the datas shows significant differences in certain

land use and rain zone combinations. Given a particular land use in a particular EPA Rain Zone, this information can be used to identify typical stormwater pollutant concentrations, and identify which land use and EPA Rain Zone combinations are significantly different from other combinations. Two-way basic statistical summaries of the constituents listed in Table 23 are found in Appendix D. The statistical software package, SYSTAT 11, was use to evaluate the land use and EPA Rain Zone interactions using the General Linear Model (GLM). Appendix E provides an analysis of variance (ANOVA) with SYSTAT outputs for the constituents shown in Table 3.1.

Table 23. Summary of Two-way Basic Statistical Tables in Appendix D

Constituent	Number of observations	% above detection limit	% of all possible interaction cells populated for each constituent
Conductivity (µS/cm @25ºC)	873	100	37
DO (mg/L)	222	100	18
Hardness (mg/L CaCO3)	1160	99	41
Oil and Grease Total (mg/L)	1526	68	53
pH	2376	100	56
Turbidity (NTU)	50	100	6
Temperature (ºC)	1333	100	44
TDS (mg/L)	3526	99	58
TSS (mg/L)	6695	99	65
BOD5 (mg/L)	4505	94	61
COD (mg/L)	5013	99	60
Fecal Coliform (colonies/100 mL)	1952	91	58
Fecal Streptococcus (colonies/100 mL)	1119	94	48
Total E. Coli (colonies/100 mL)	147	92	13
Ammonia (mg/L)	1836	73	47
N02+NO3 (mg/L)	5467	98	59
Nitrogen Total (mg/L)	644	93	32
Nitrogen Kjeldahl Total (mg/L)	5985	97	65

Phosphorous Dissolved (mg/L)	2518	81	52
Phosphorous Total (mg/L)	7232	97	63
Cadmium Total (µg/l)	1562	43	56
Copper Total (µg/l)	4544	88	66
Lead Total (µg/l)	5034	83	64
Zinc Total (µg/l)	6030	98	66

Based on the above criteria, number of observations, percentage above detection limit, and number of missing cells in Appendix D two-way tables, selected constituents were chosen for further interaction evaluations (TSS, TDS, BOD_5, COD, NO_2+NO_3, Fecal Coliform, total phosphorus, total copper, and total zinc).

The following general equation for a two-way analysis of variance was applied to calculate the land use and rain zone interaction terms;

$\mu_{ij} = \mu + \alpha_i + \beta_j + \gamma_{ij}$ (Navidi 2006)

The quantity μ_{ij} is the treatment mean or mean within each cell, μ is the population grand mean, α_i is the row effect or the land use effect in this case, β_j is the column effect or rain zone effect in this case, and the γ_{ij} is the interaction term between rain zone and land use. Appendix F shows two-way tables for the interaction terms.

Although two-way tables, interaction tables, and SYSTAT outputs are available for all the constituents in Table 23. TSS, TDS, BOD_5, COD, NO_2+NO_3, Fecal Coliform, total phosphorus, total copper, and total zinc, were selected for comprehensive interaction analysis. All the concentrations are $\log_{10}$ transformed so they would be normally distributed for the statistical evaluations.

3.2 Total Suspended Solids (TSS)

The following plots and the weight of evidence presented in the appendices indicate there is a significant difference in the mixed residential land use in EPA Rain Zone 9 compared to the other combinations. The calculated interaction term for this cell in the interaction table is 645, which is much larger than any other cell for TSS. Although the mixed residential land use mean concentrations are slightly higher than the other land uses from the main effects plot, it is clear the EPA Rain Zone has more significant impact on the mean. The institutional land use appears to have lower concentrations; however it is important to note that TSS data is only available for Rain Zone 1, 2, and 3 for this land use. Because of the volume of data, the x-axis in the interval plots (as shown in Figure 48) is difficult to read. The EPA Rain Zones are in sequential order, and land uses are in alphabetical order for the interval. The interval plots are a valuable tool for visualizing the complete distribution.

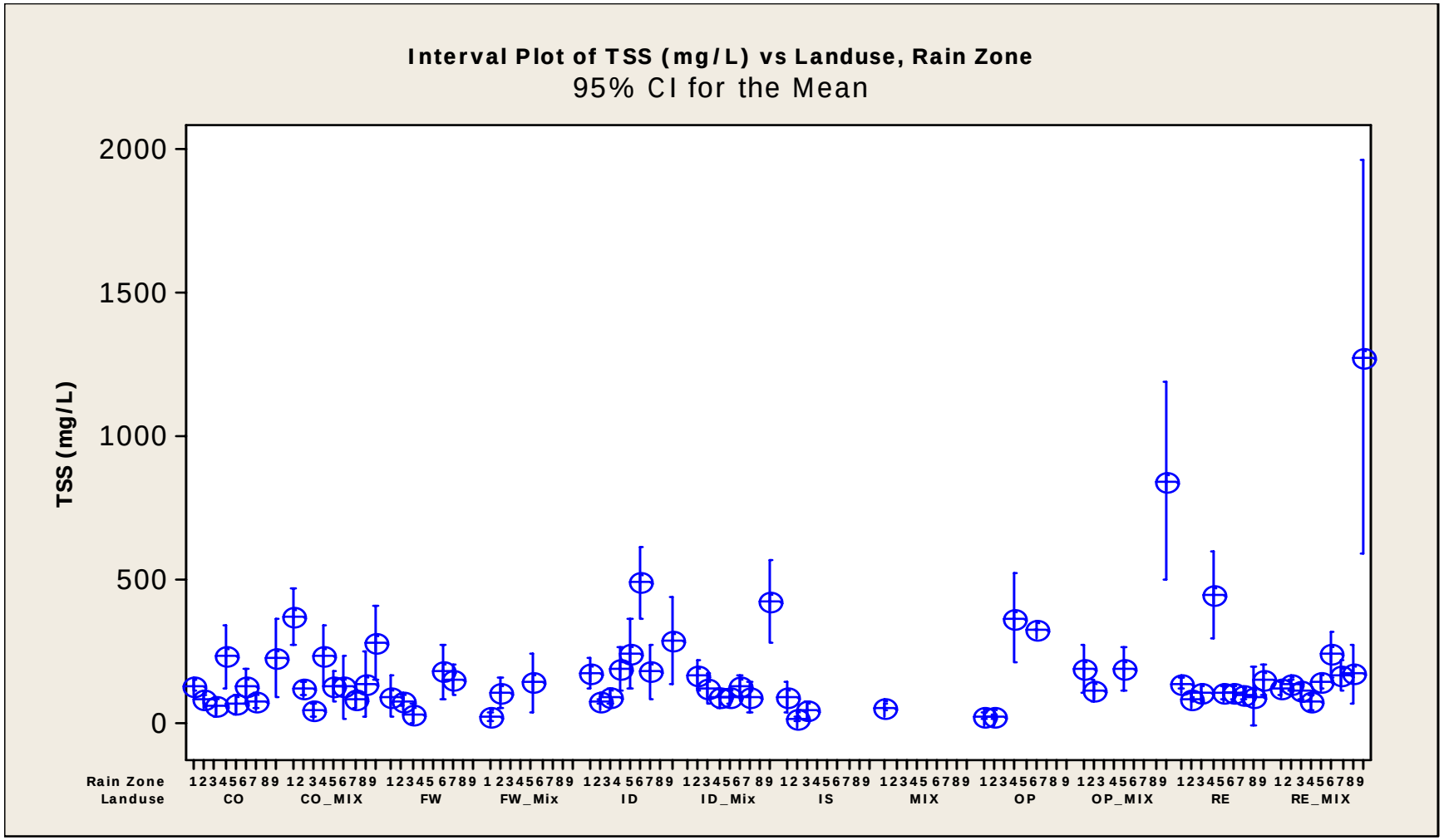

Fig. 48. TSS Interval Plot

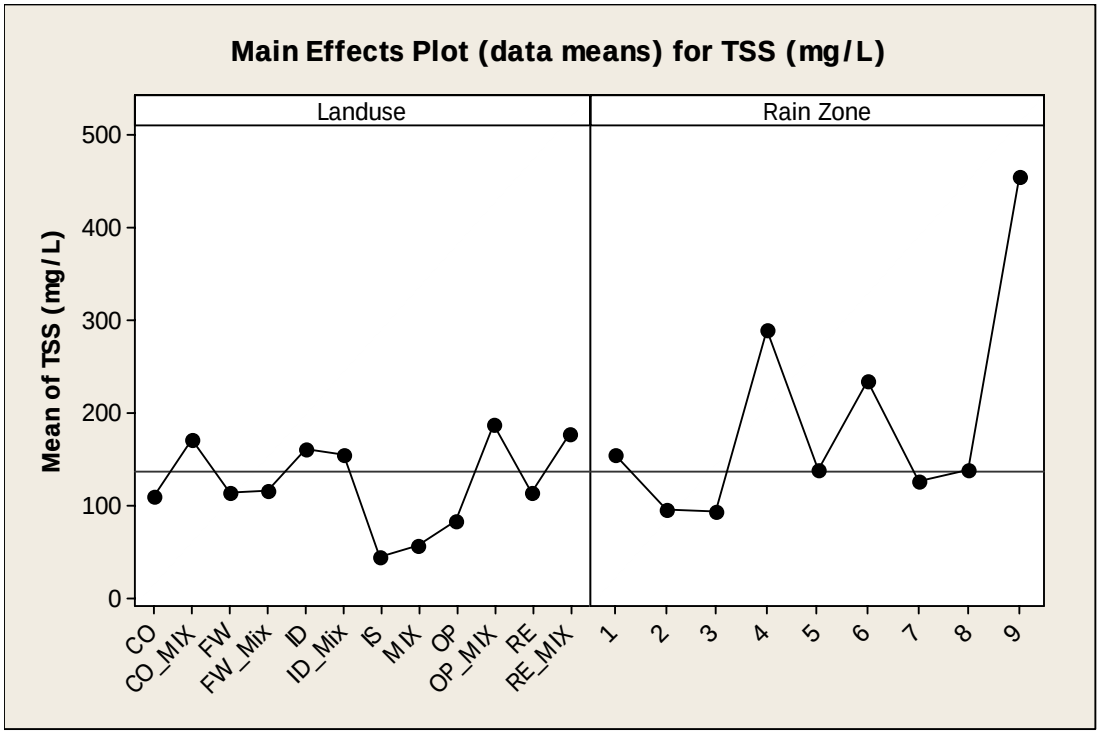

Fig. 49. TSS Main Effects Plot

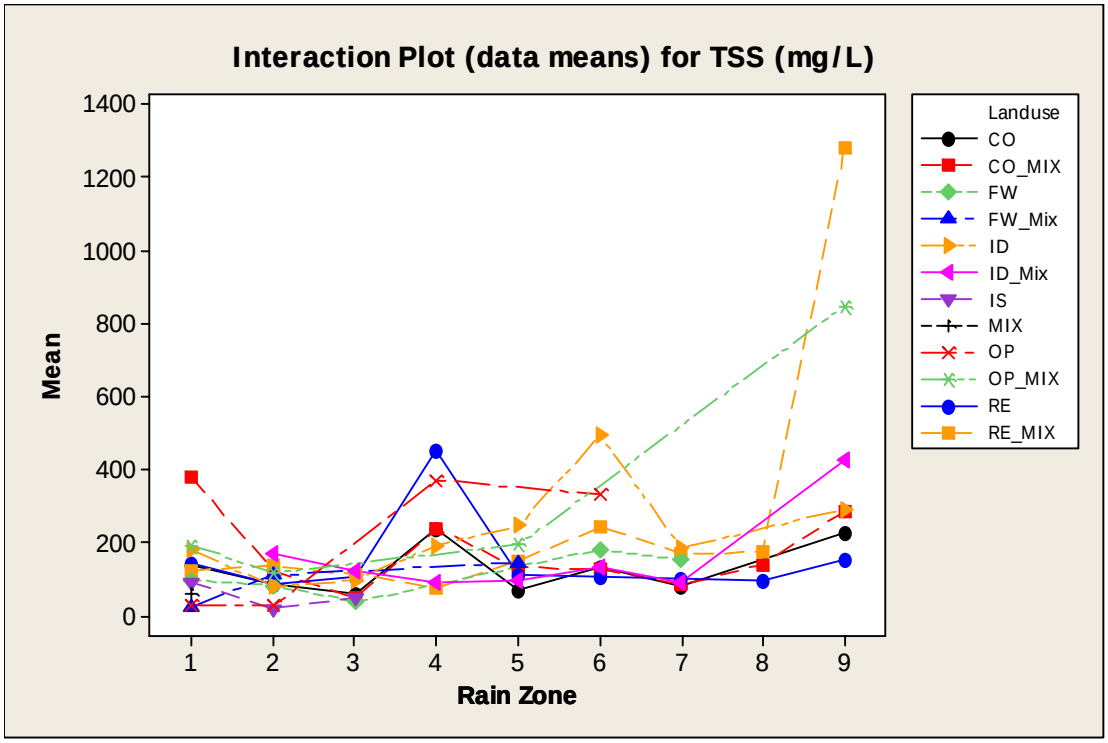

Fig.50. TSS Interaction Plot

3.2 Total Dissolved Solids (mg/L)

The ANOVA analyses for the TDS data show significant differences in EPA Rain Zone, but not for land uses, with p-values of 0.0 and 0.49 respectively. Mixed residential land use in Rain Zone 1, and mixed open space in Rain Zone 9 have interaction values of 514 and 401 respectively. These are significantly larger interaction values than for the other combinations. The interval plot below shows these two combinations having the greatest range in distribution. The institutional land use in rain zone 1 has the lowest mean values and shows an interaction term of -368; however data is only available for Rain Zone 1 and 2 in institutional land use for TDS. Although the ANOVA shows no significance of land use, the extreme interaction values are from the same land use. It is also important to note that there is not a large variation in number of observation from rain zone to rain zone for TDS. The main effects plot shows distinctly higher concentrations from Rain Zone 1.

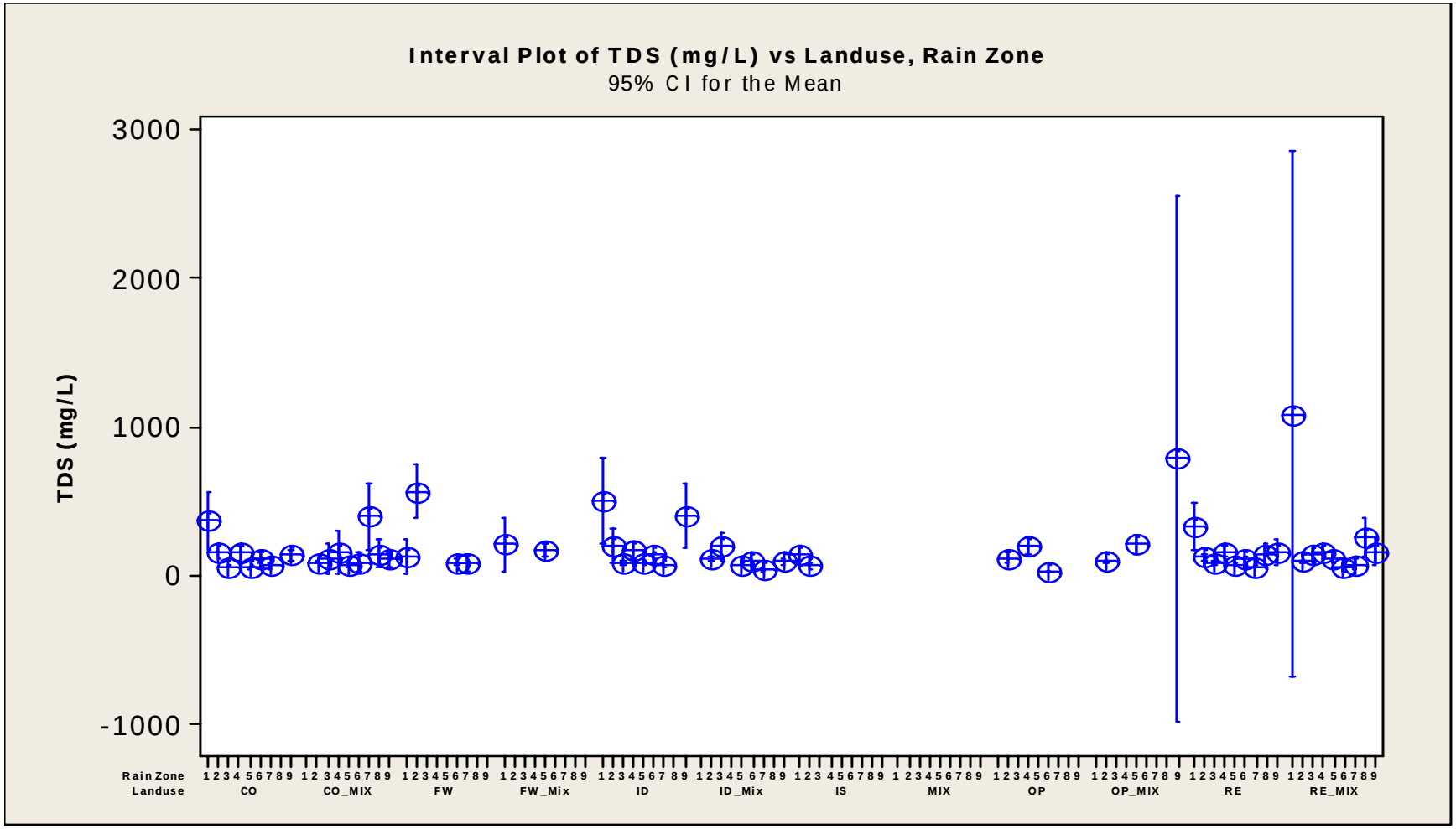

Fig. 51. TDS Interval Plot

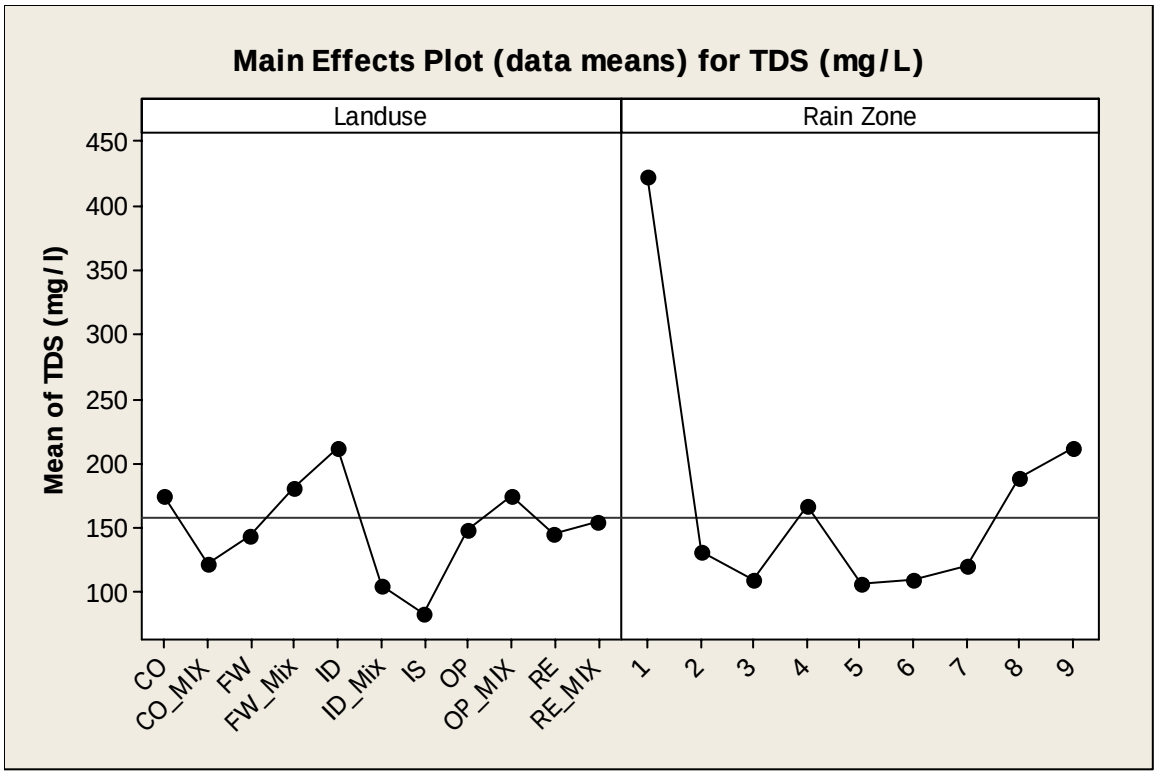

Fig. 52. TDS Main Effects Plot

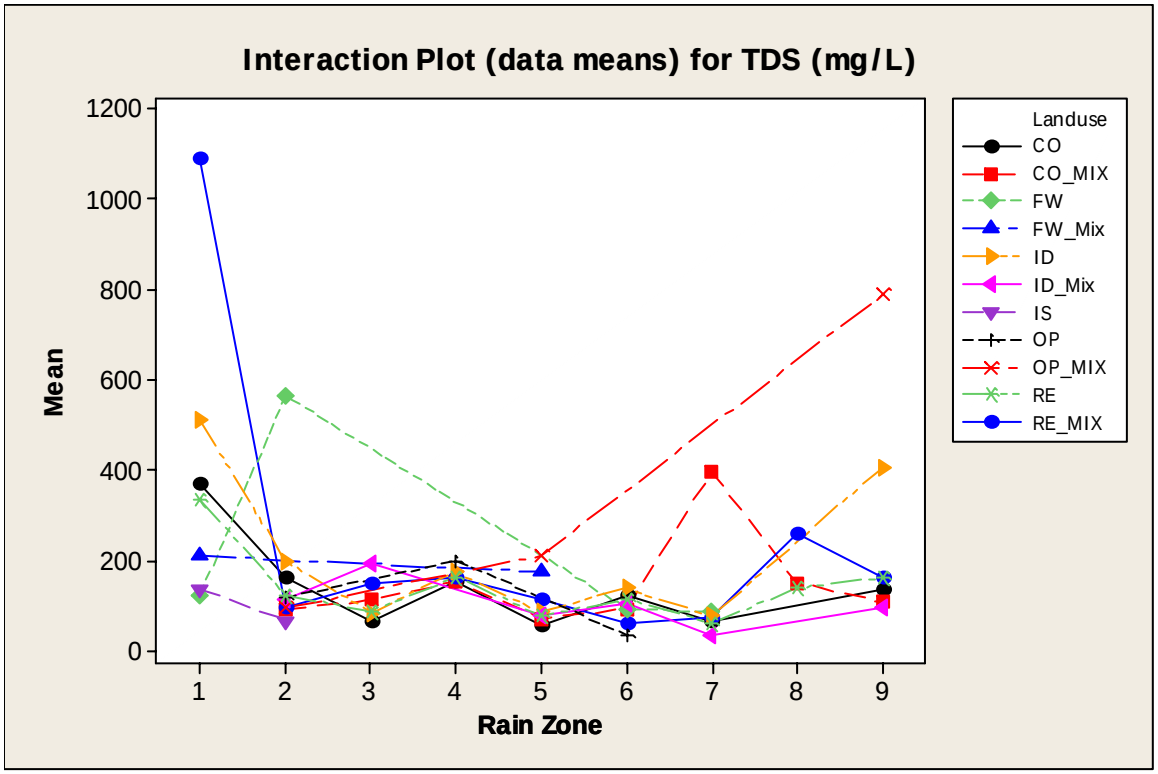

Fig. 53. TDS Interaction Plot

3.4 BOD_5 (mg/L)

The industrial land use in Rain Zone 4 shows the largest interaction term of 78. Rain Zones 4, 6 and 9 show higher concentrations than the others. The industrial land use shows the highest concentrations, while the open space land use shows the lowest. The ANOVA shows significant differences for Rain Zones but not for land use.

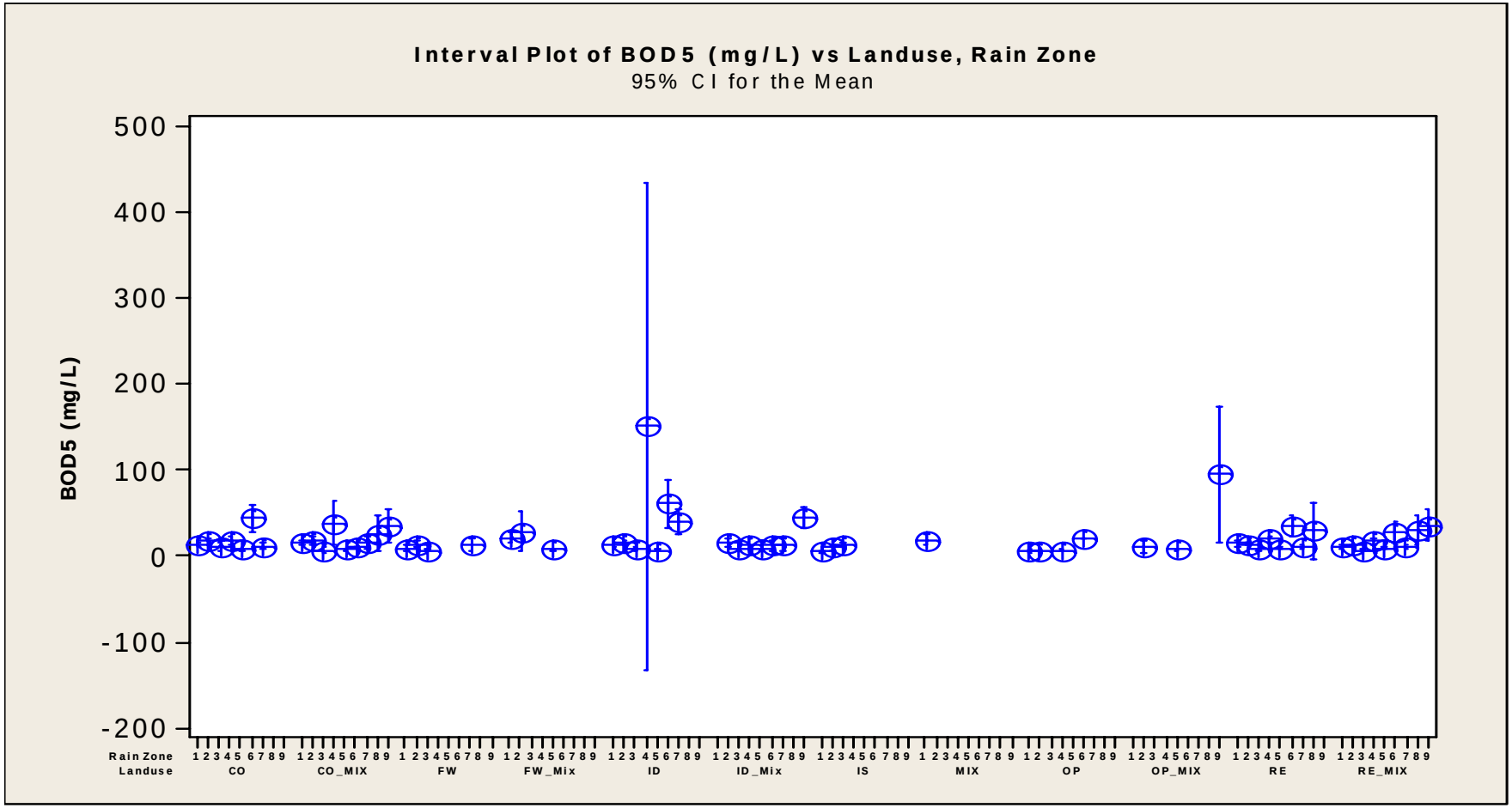

Fig. 54. BOD_5 Interval Plot

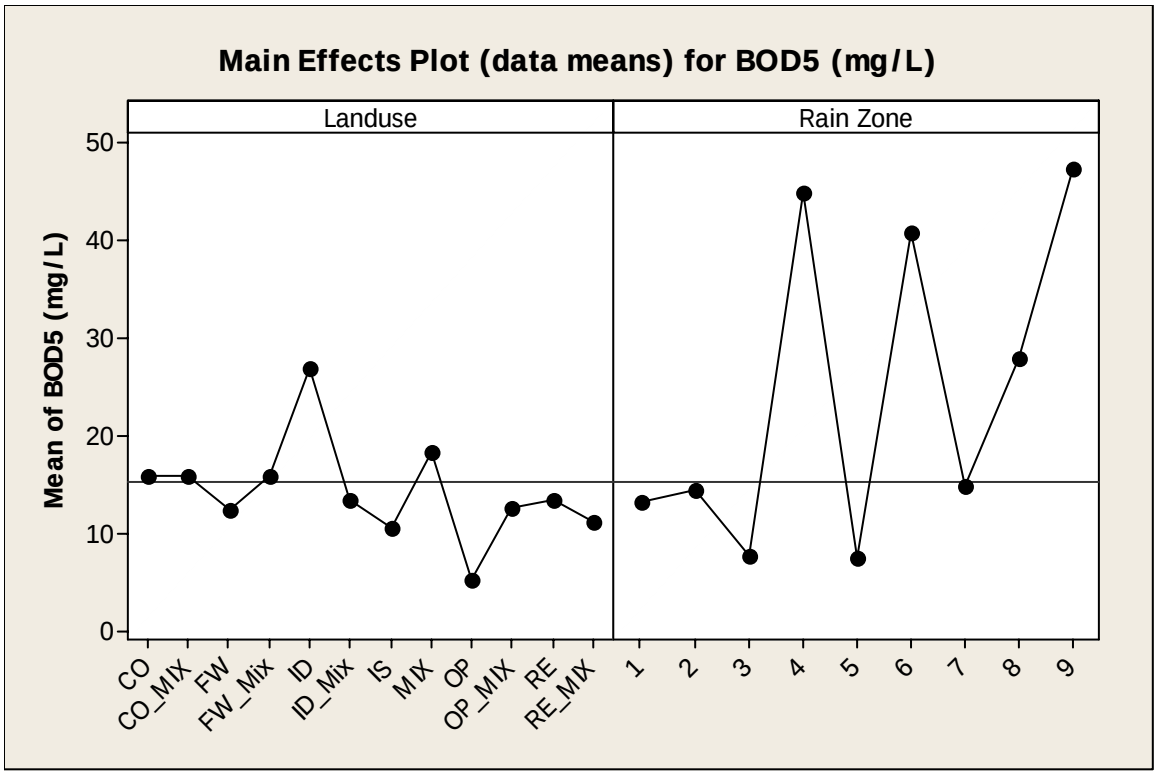

Fig. 55. BOD_5 Main Effects Plot

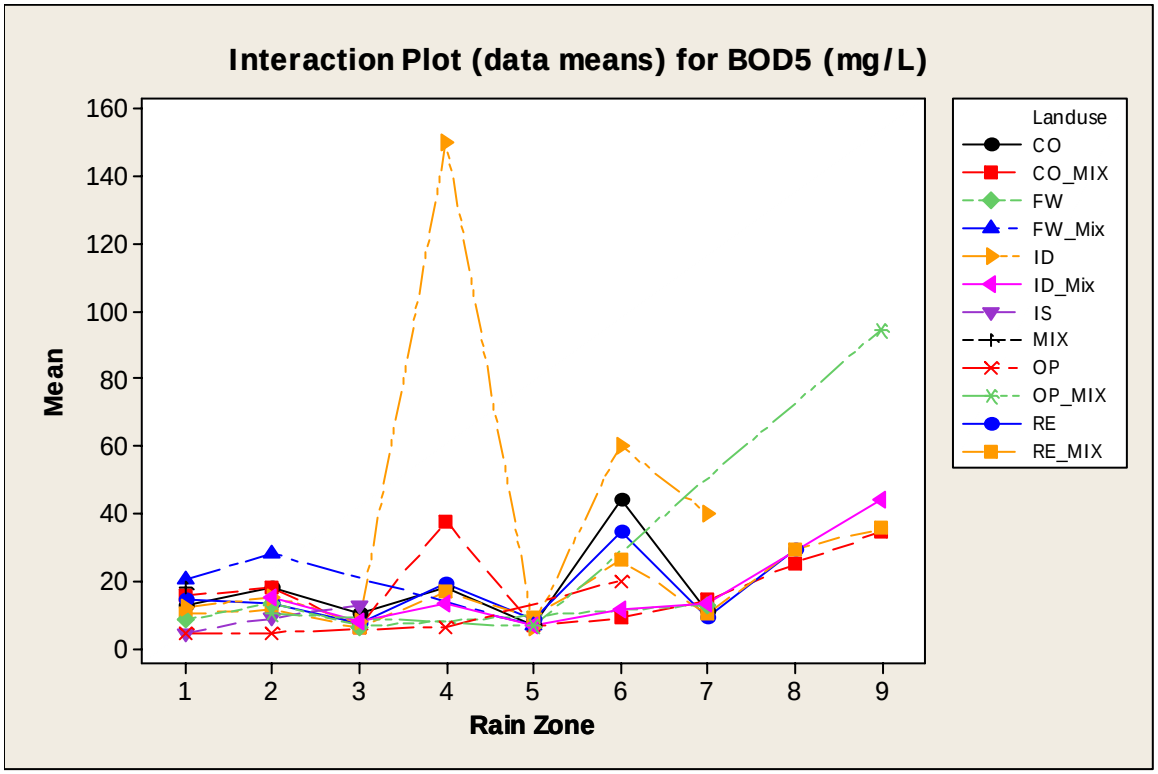

Fig. 56. BOD_5 Interaction Plot

3.5 COD (mg/L)

Similar to BOD_5, COD shows higher concentration in EPA Rain Zones 6 and 9, but also for Rain Zone 8. The higher concentrations for Rain Zone 6 and 9 are fairly consistent for all land uses.

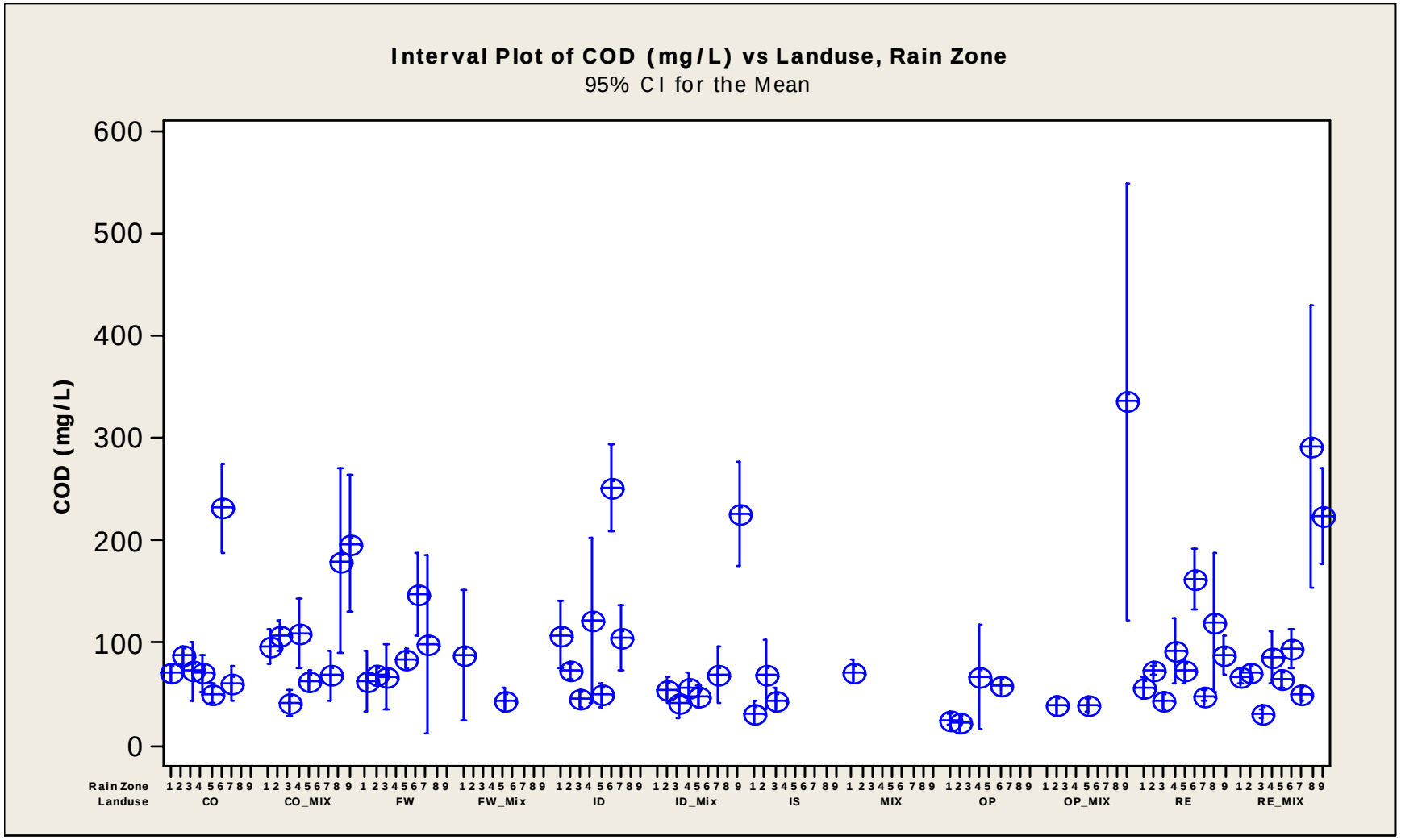

Fig. 57. COD Interval Plot

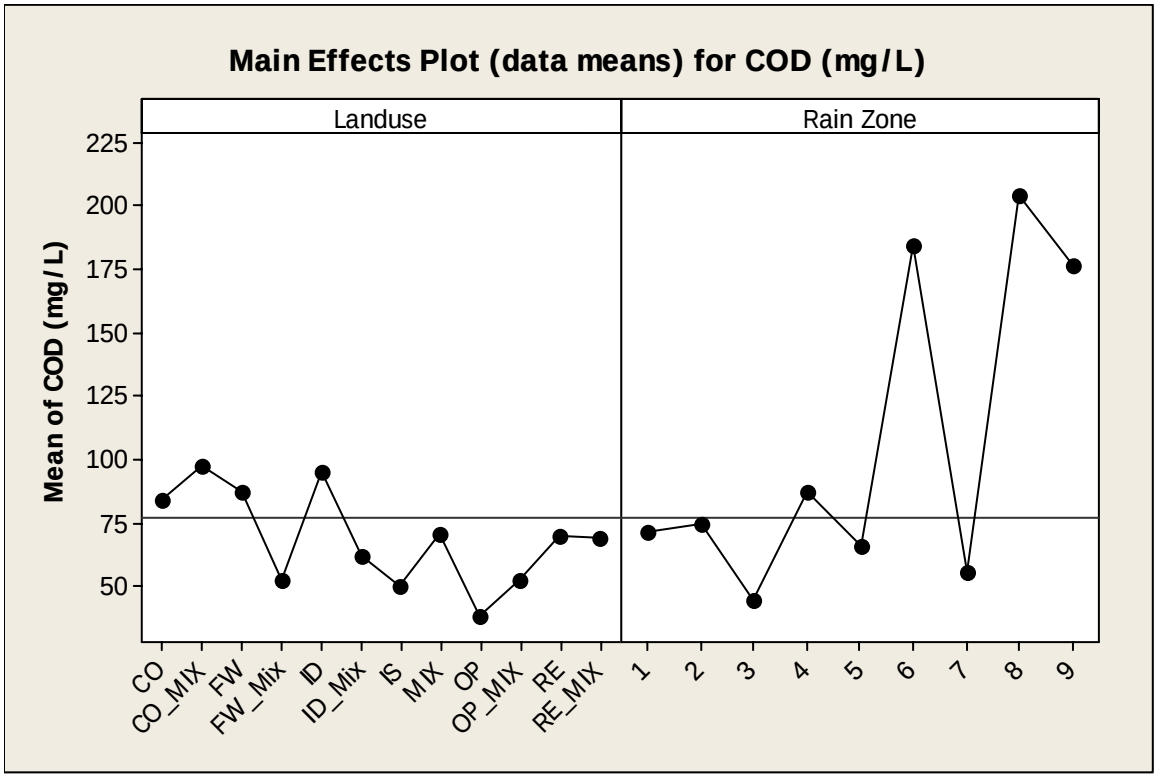

Fig. 58. COD Main Effects Plot

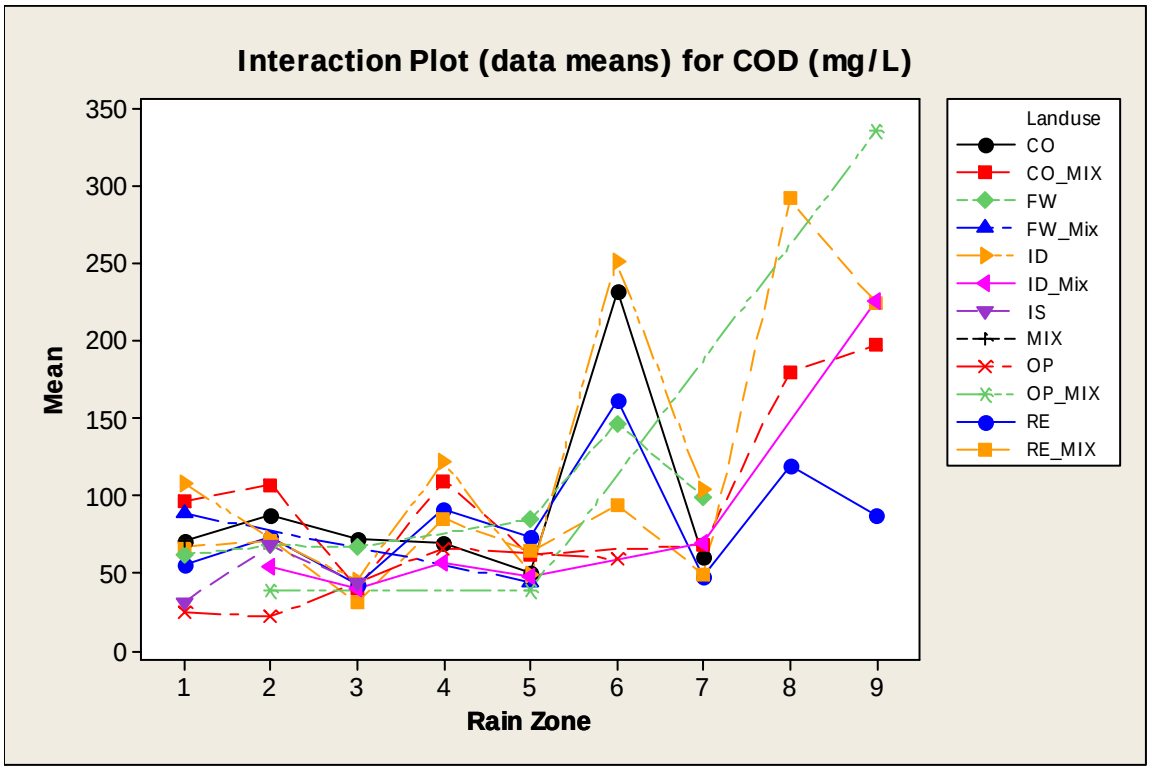

Fig. 59. COD Interaction Plot

3.6 NO_2+NO_3 (mg/L)

NO_2+NO_3 shows little variation between the different EPA Rain Zones, however there are again slightly higher concentrations for Rain Zones 6, 8, and 9. These data show little variations with the exception of these rain zones and the freeway land use. All interaction terms are small. All these data are within a relatively small range, and show very little significant differences among land uses and Rain Zones.

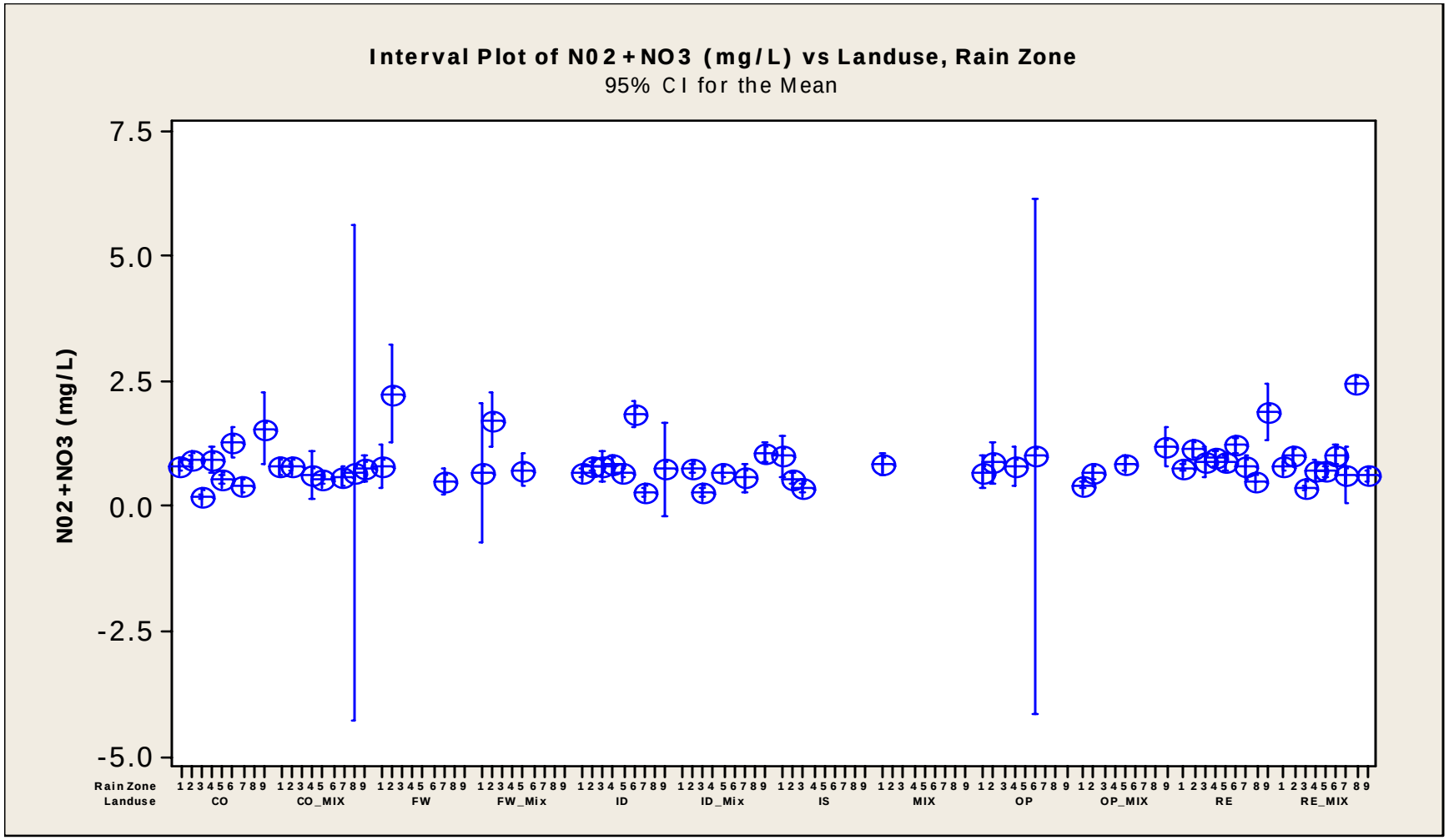

Fig. 60. NO_2+NO_3 Interval Plot

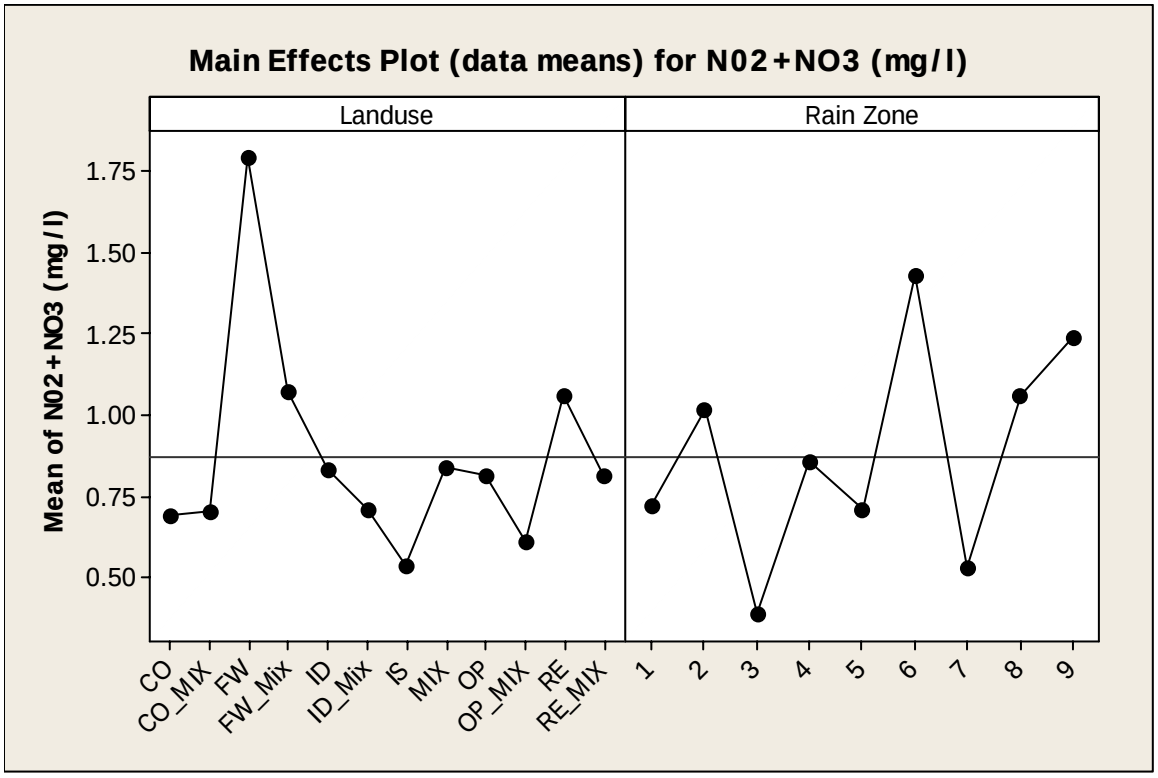

Fig. 61. NO_2+NO_3 Main Effects Plot

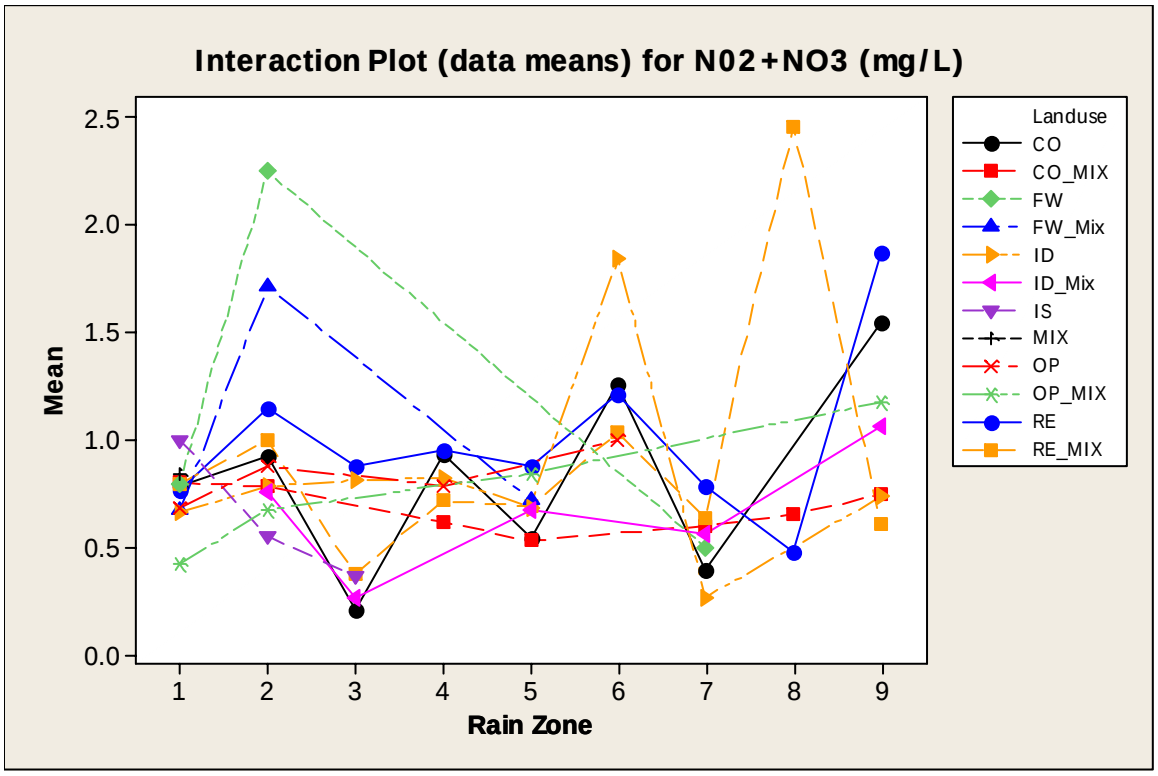

Fig. 62. NO_2+NO_3 Interaction Plot

3.7 Fecal Coliform (colonies/100 mL)

The only notable difference in fecal coliform levels occurs in EPA Rain Zone 1. Total Dissolved Solids was the only other constituent examined with notably high concentrations in EPA Rain Zone 1. Lower levels are observed for institutional and mix land uses, but neither are significant. Residential and mixed residential land uses within EPA Rain Zone 1 are significantly higher than for the other combinations.

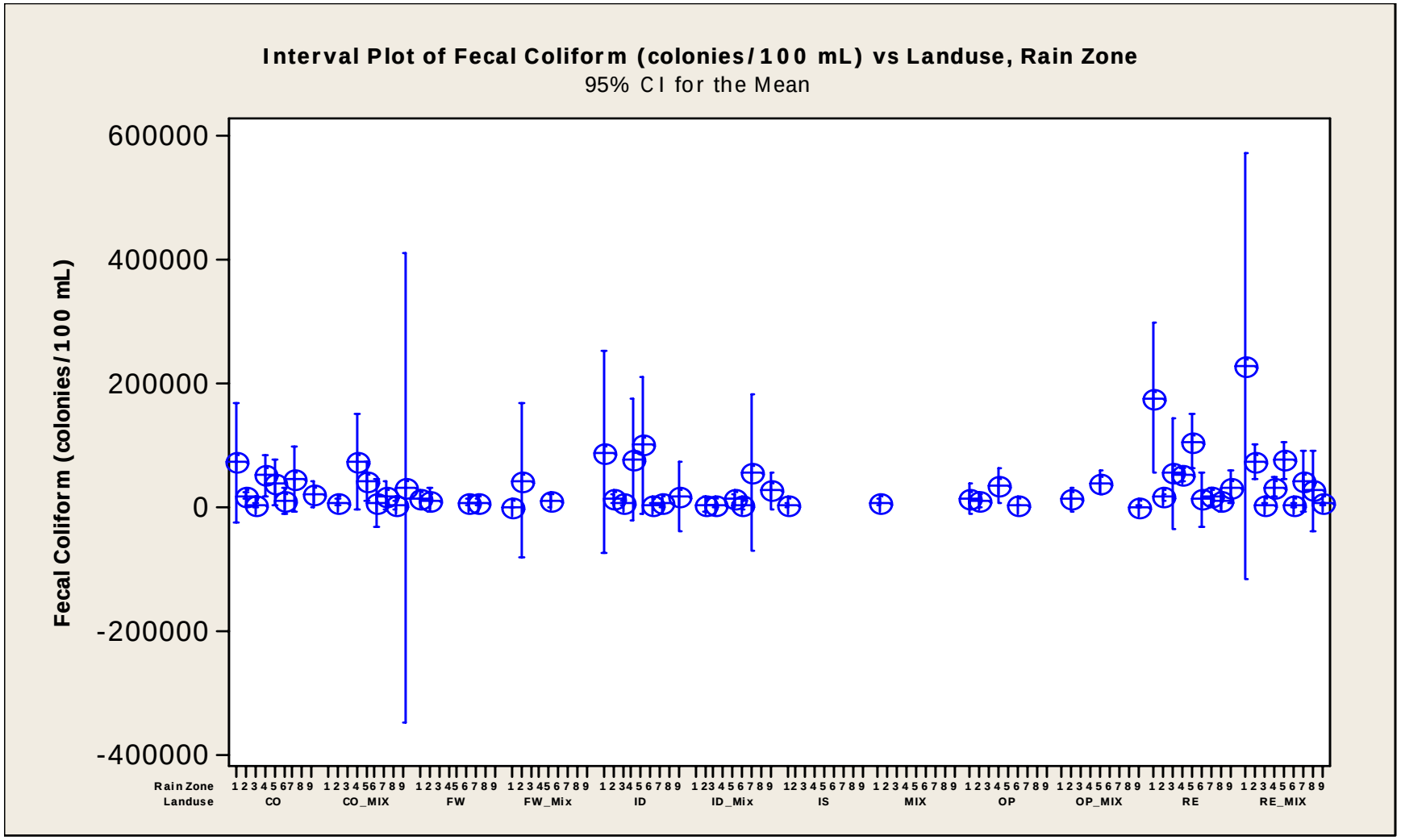

Fig. 63. Fecal Coliform Interval Plot

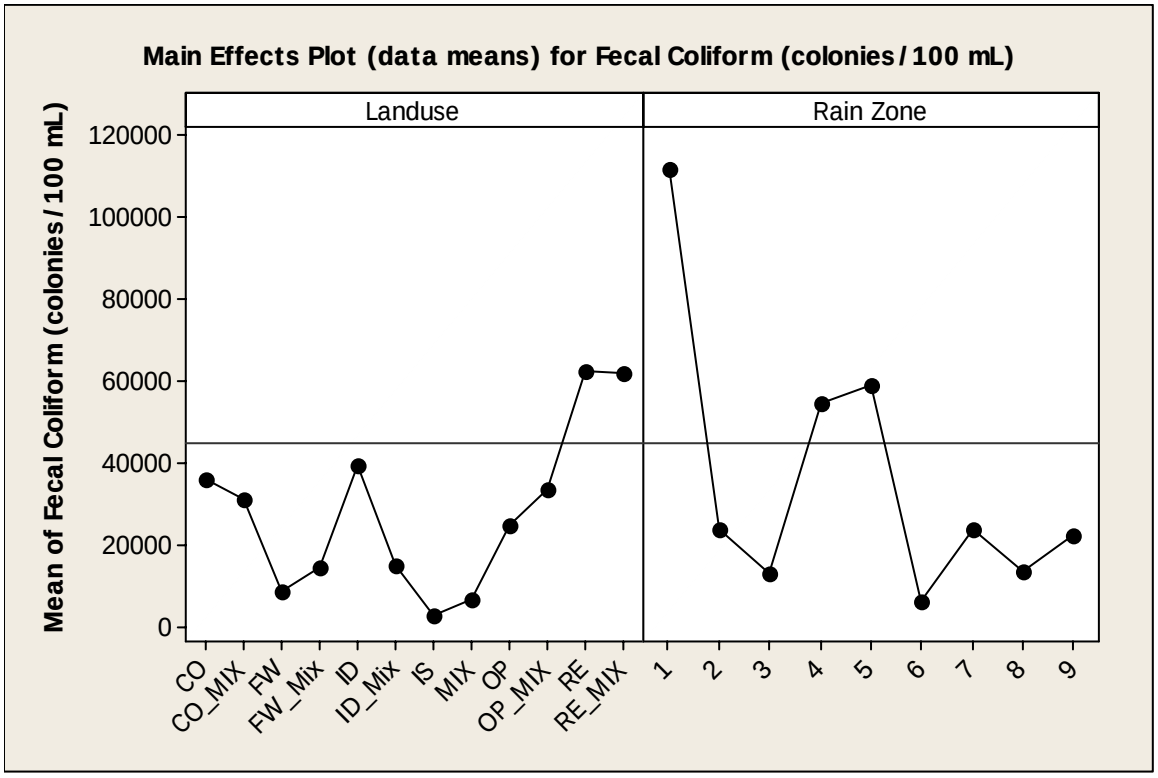

Fig. 64. Fecal Coliform Main Effects Plot

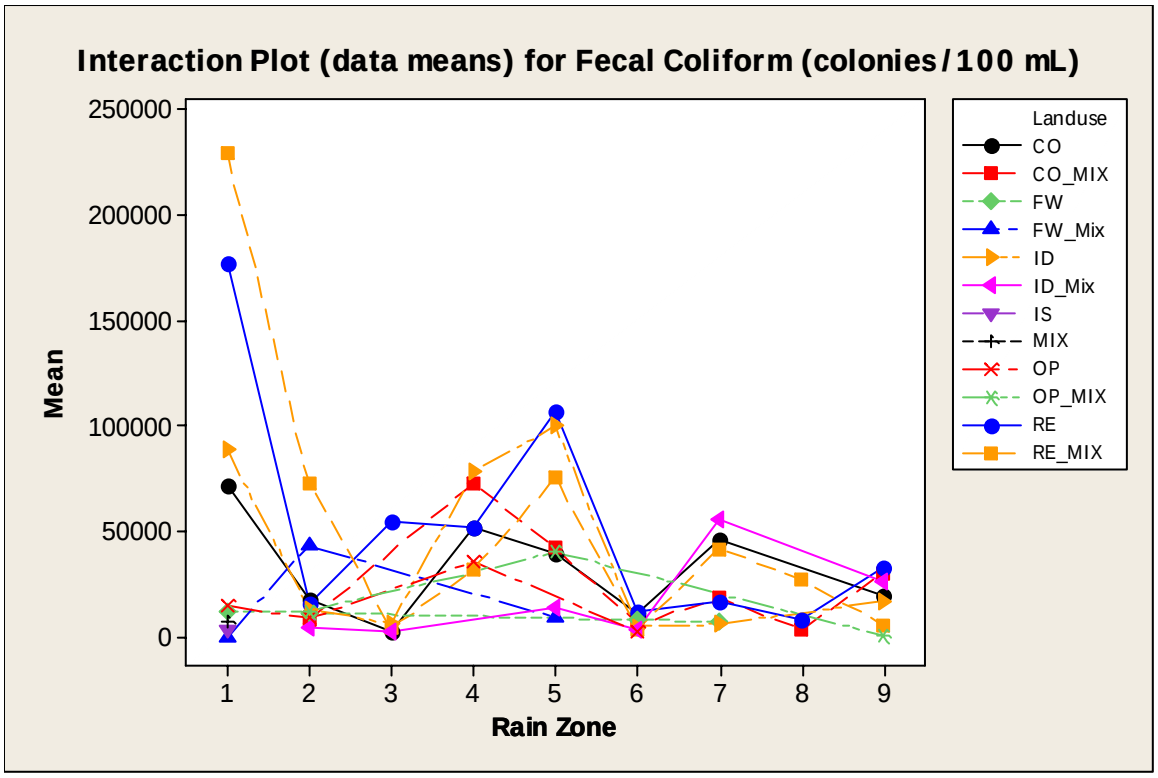

Fig. 65. Fecal Coliform Interaction Plot

3.8 Total Phosphorus (mg/L)

The ANOVA shows significant differences for land uses and EPA Rain Zones, with freeways and open space land uses showing higher concentrations of total phosphorus, and EPA Rain Zones 4, 6, 8, and 9 showing higher concentrations. Industrial land use TP concentrations in EPA Rain Zones 6 and 9, as well as open space areas in EPA Rain Zone 4 seem to be significantly higher than the other combinations.

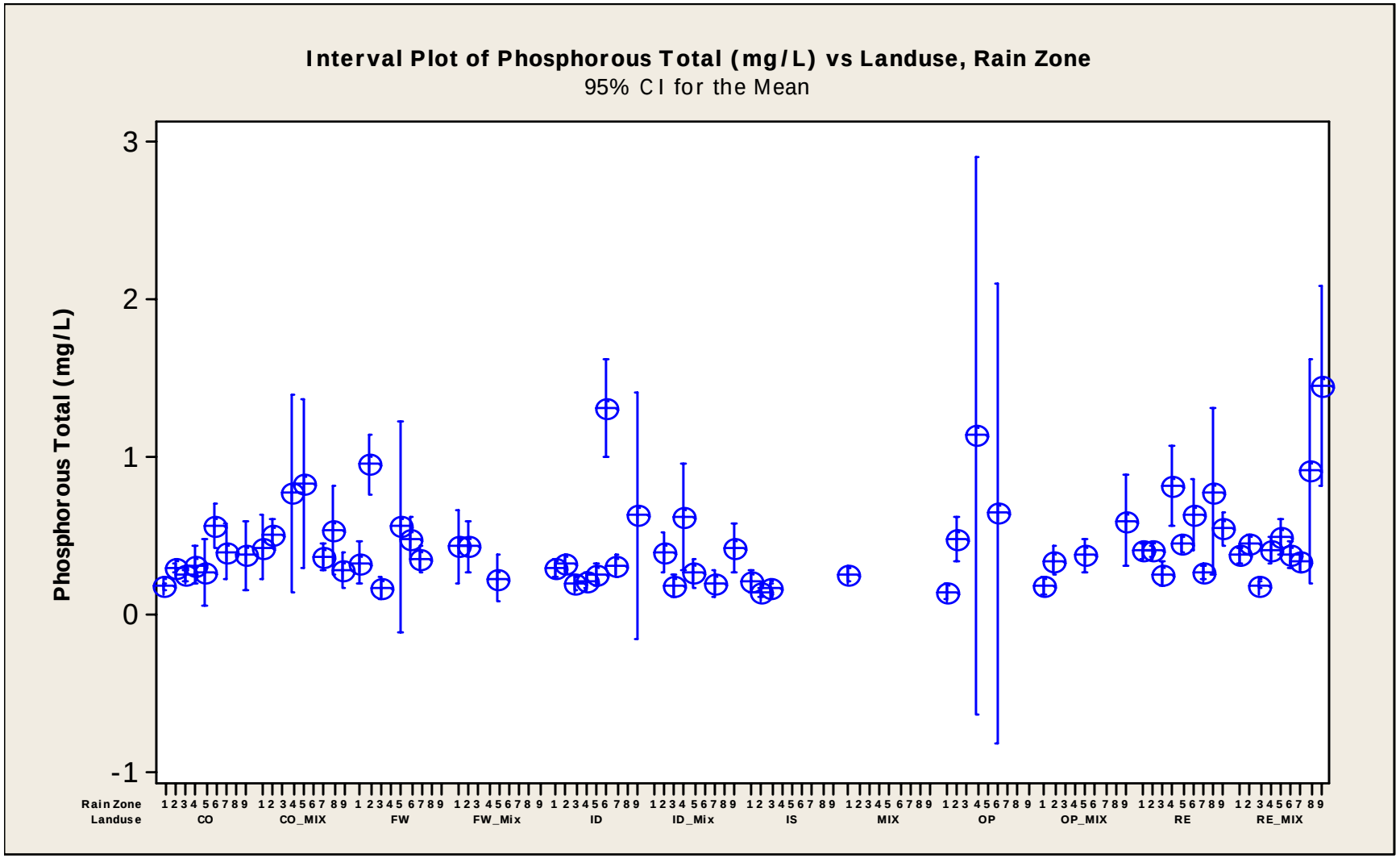

Fig. 66. Total Phosphorus Interval Plot

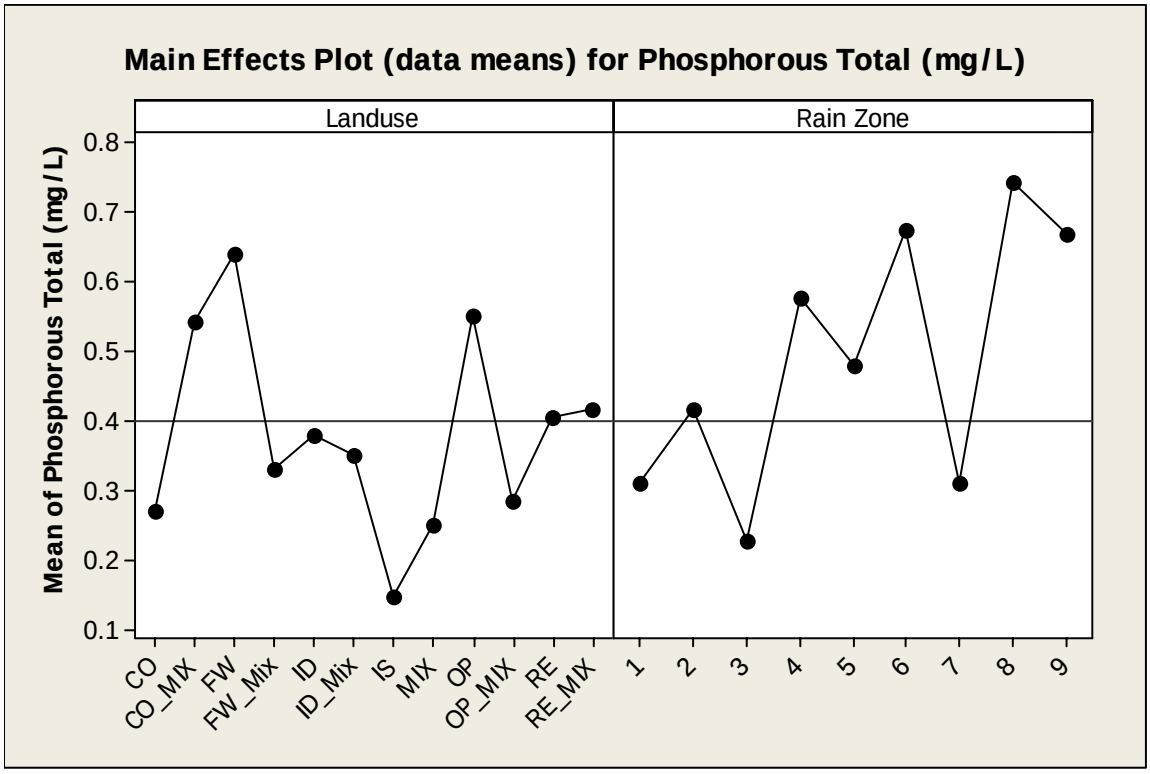

Fig. 67. Total Phosphorus Main Effects Plot

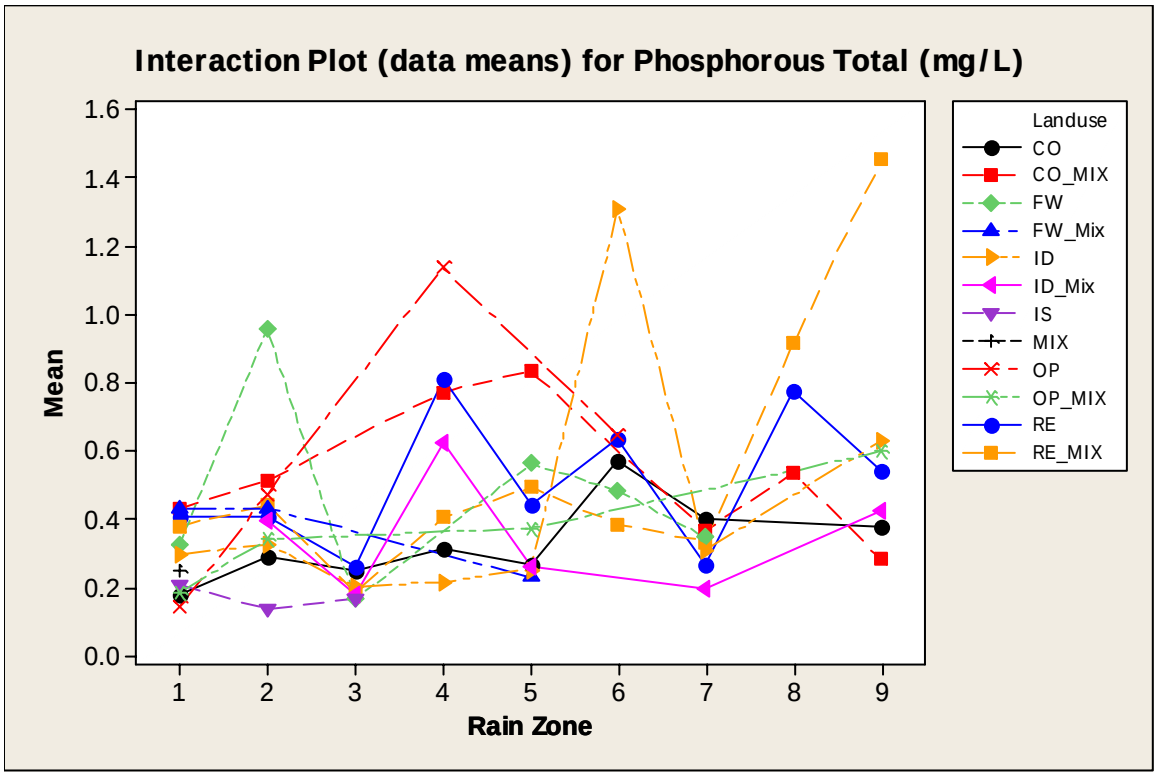

Fig. 68. Total Phosphorus Interaction Plot

3.9 Total Copper

Again, EPA Rain Zones 4 and 6 show significantly higher concentrations of total copper for all land uses, most notably for industrial and open space areas. Although open space shows an overall lower mean, from the interaction plot we can see a significantly higher mean for Rain Zone 6, also indicated by the interval plot there is a large distribution range for this combination. Freeway and industrial land uses, as expected, show higher concentrations. Institutional and open space land uses, with the exception of Rain Zone 6, show lower concentrations.

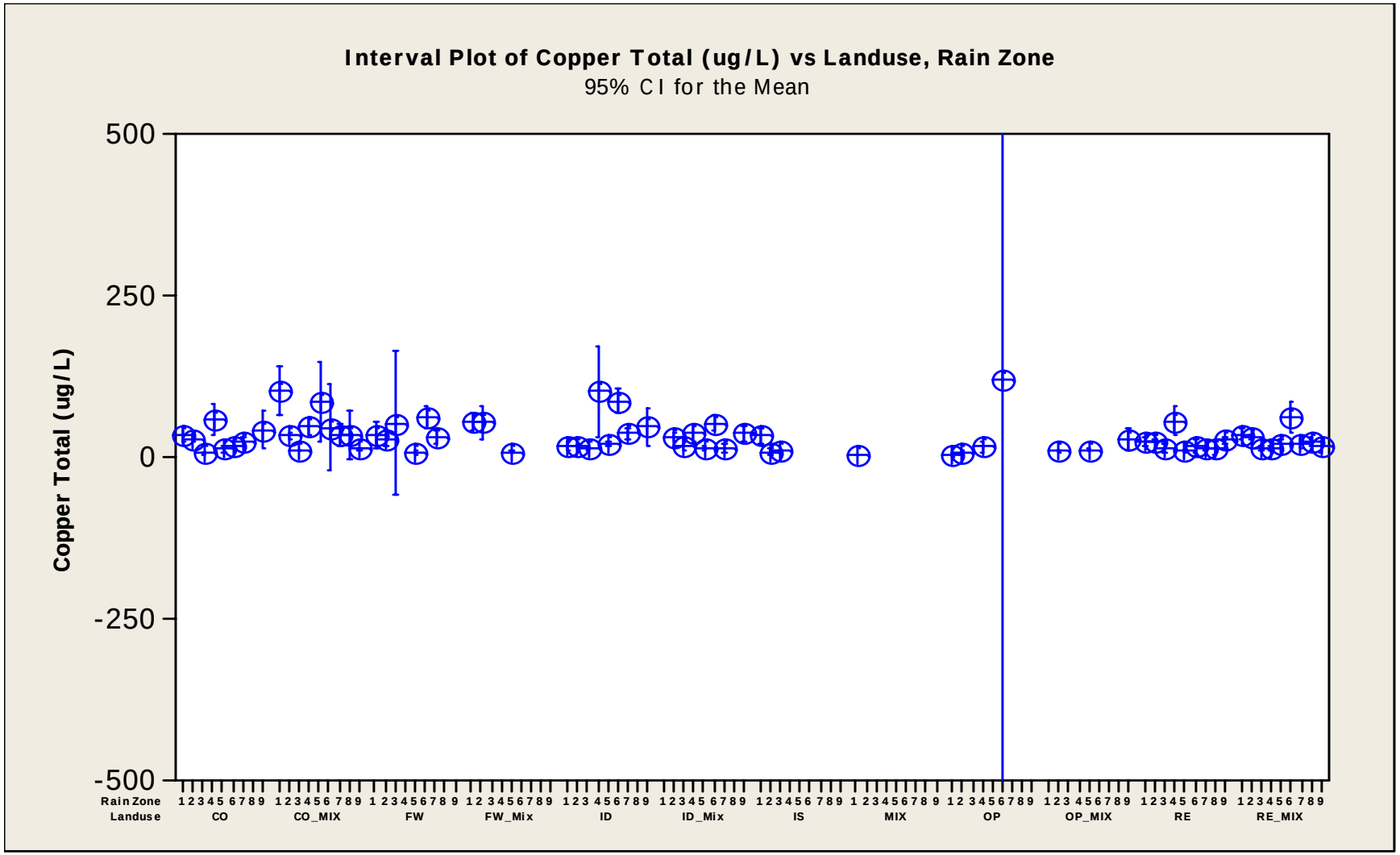

Fig. 69. Total Copper Interval Plot

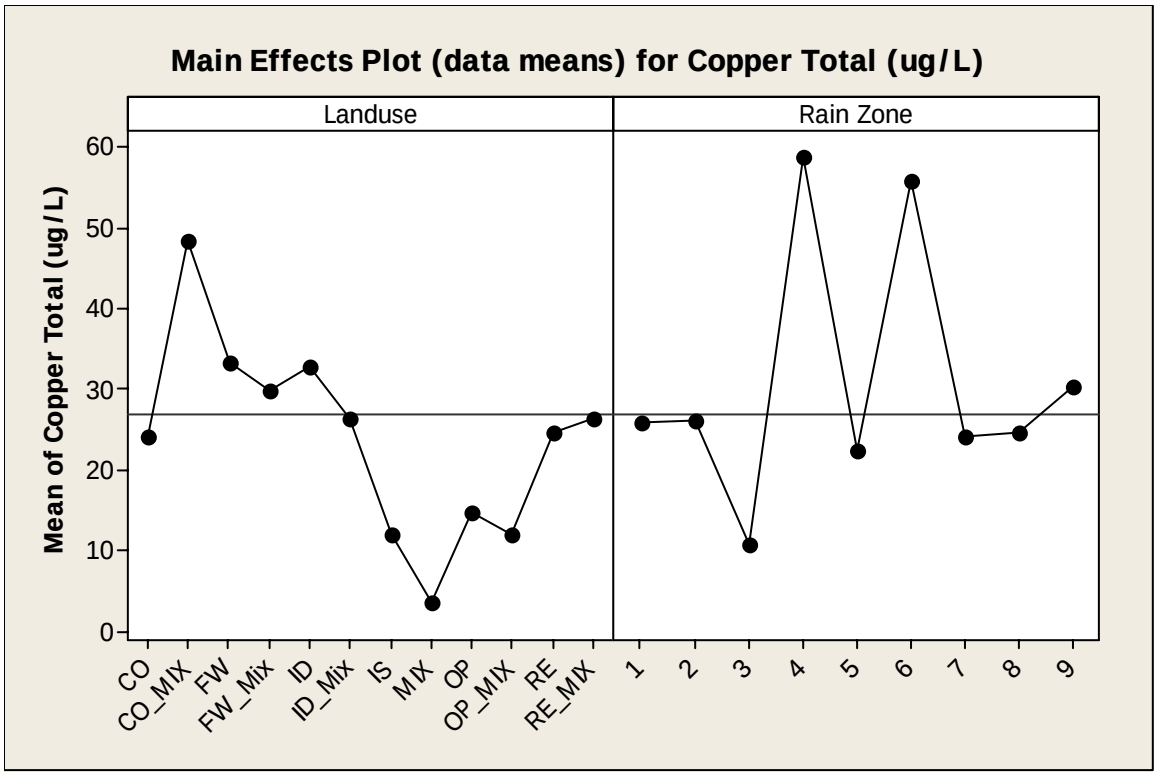

Fig. 70. Total Copper Main Effects Plot

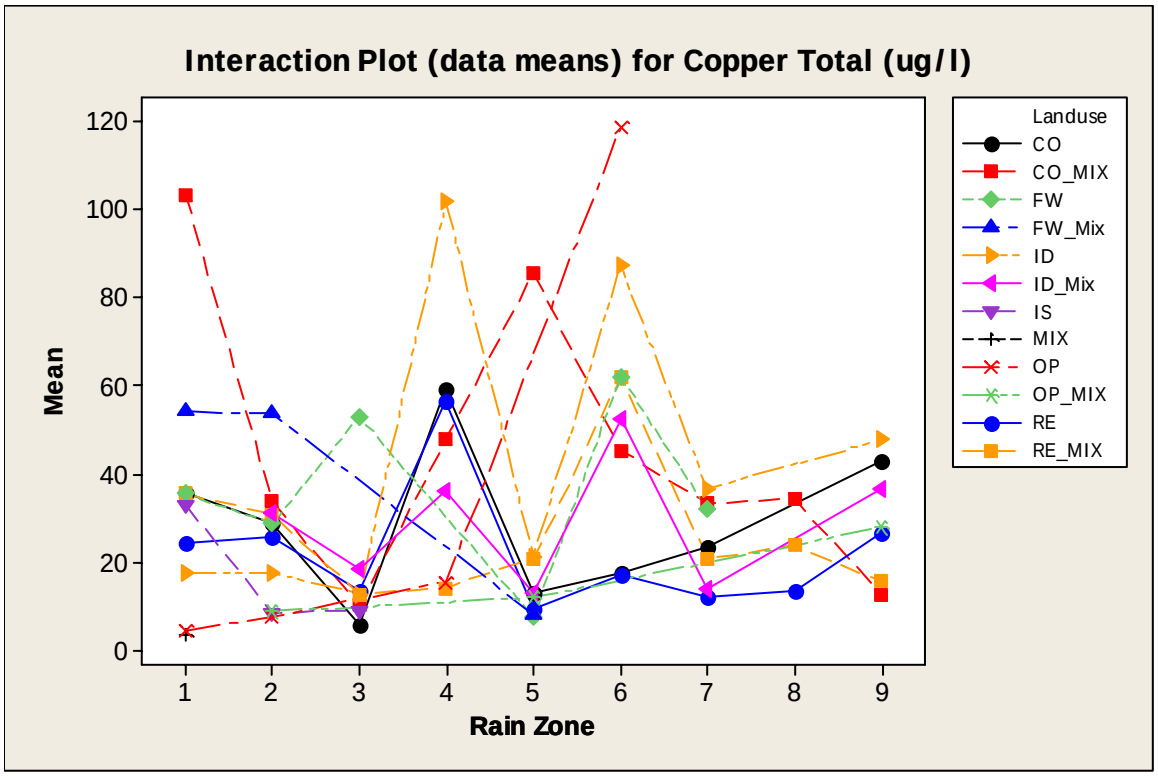

Fig. 71. Total Copper Interaction Plot

3.10 Total Zinc (mg/L)

Total zinc concentrations in mixed industrial land use areas in EPA Rain Zones 4 and 6 are significantly higher than the other combinations. Mixed commercial land use areas in the same EPA Rain Zones are also slightly higher than for the other combinations. These significant interactions are also observed in the ANOVA analyese for the land uses and EPA Rain Zones. The interactions for these combinations also indicate significant differences in these combinations.

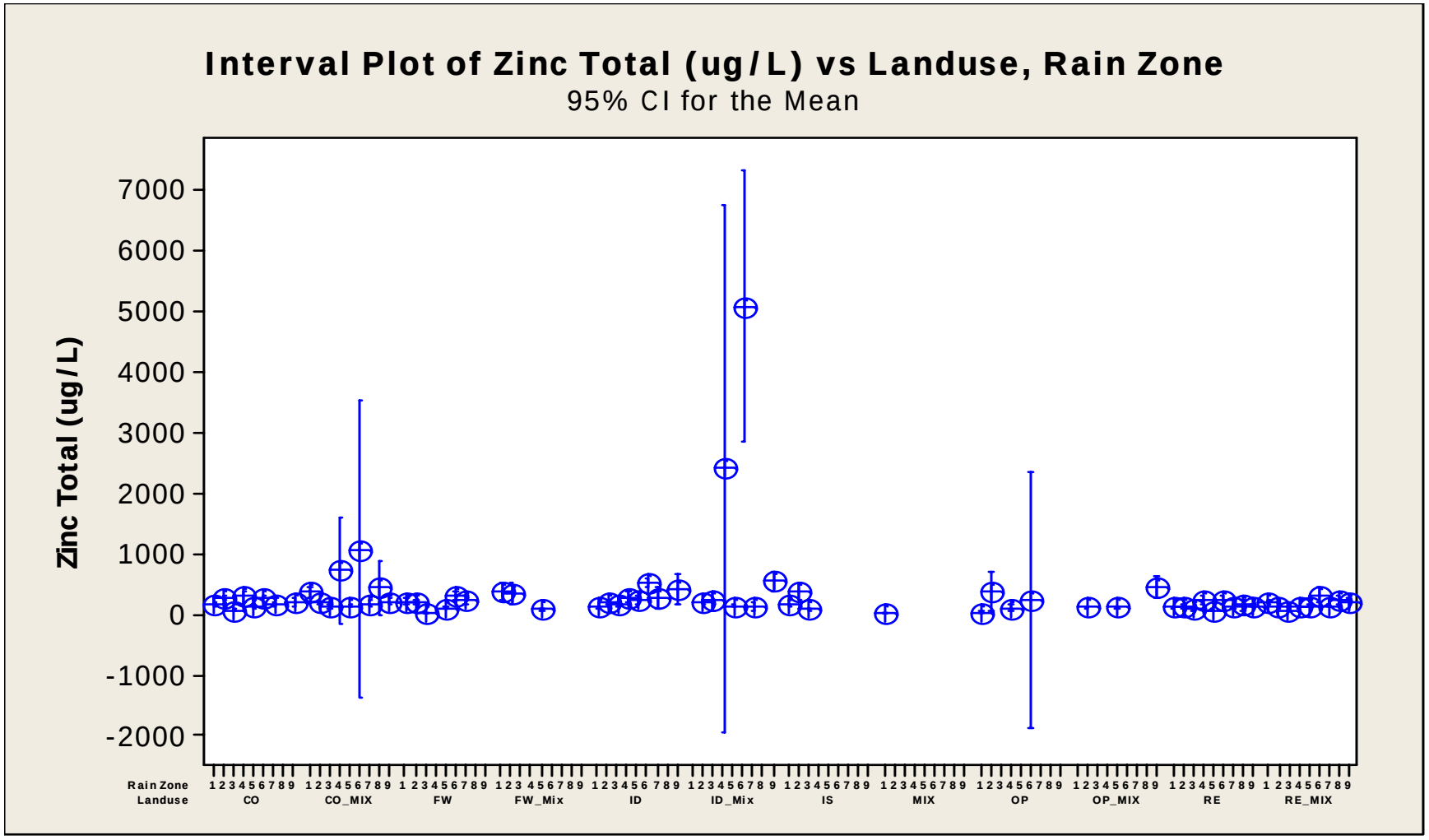

Fig. 72. Total Zinc Interval Plot

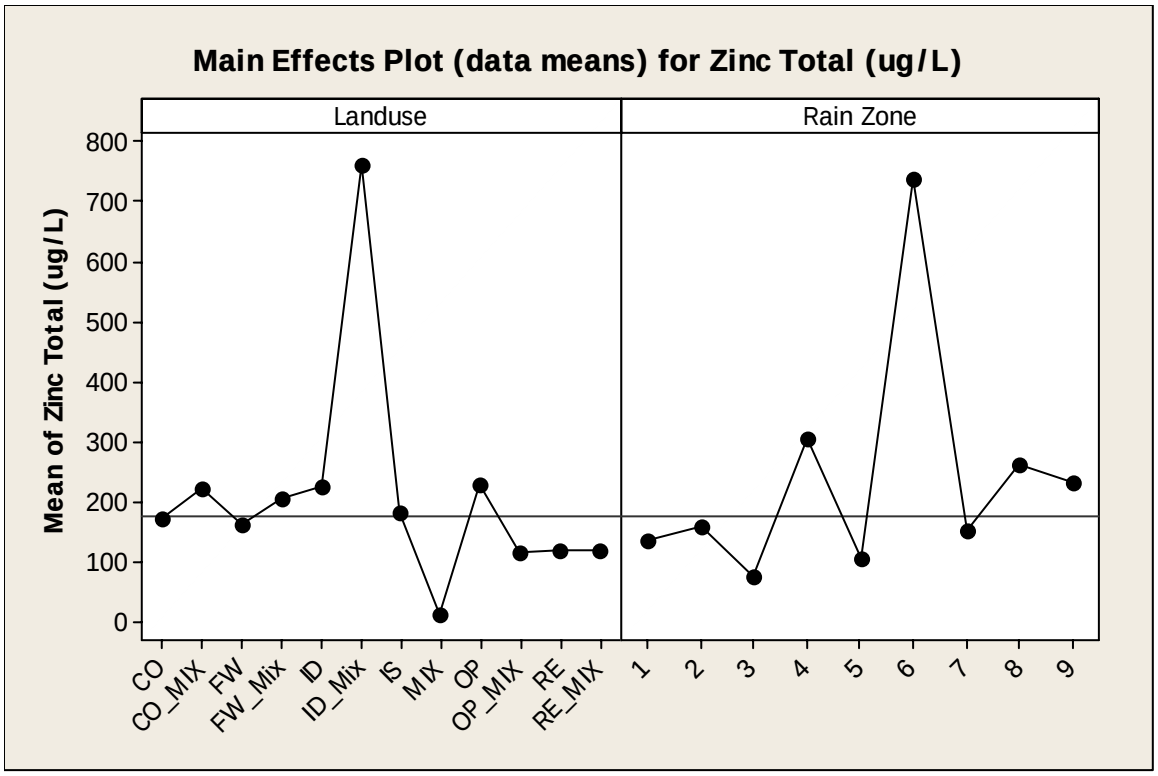

Fig. 73. Total Zinc Main Effects Plot

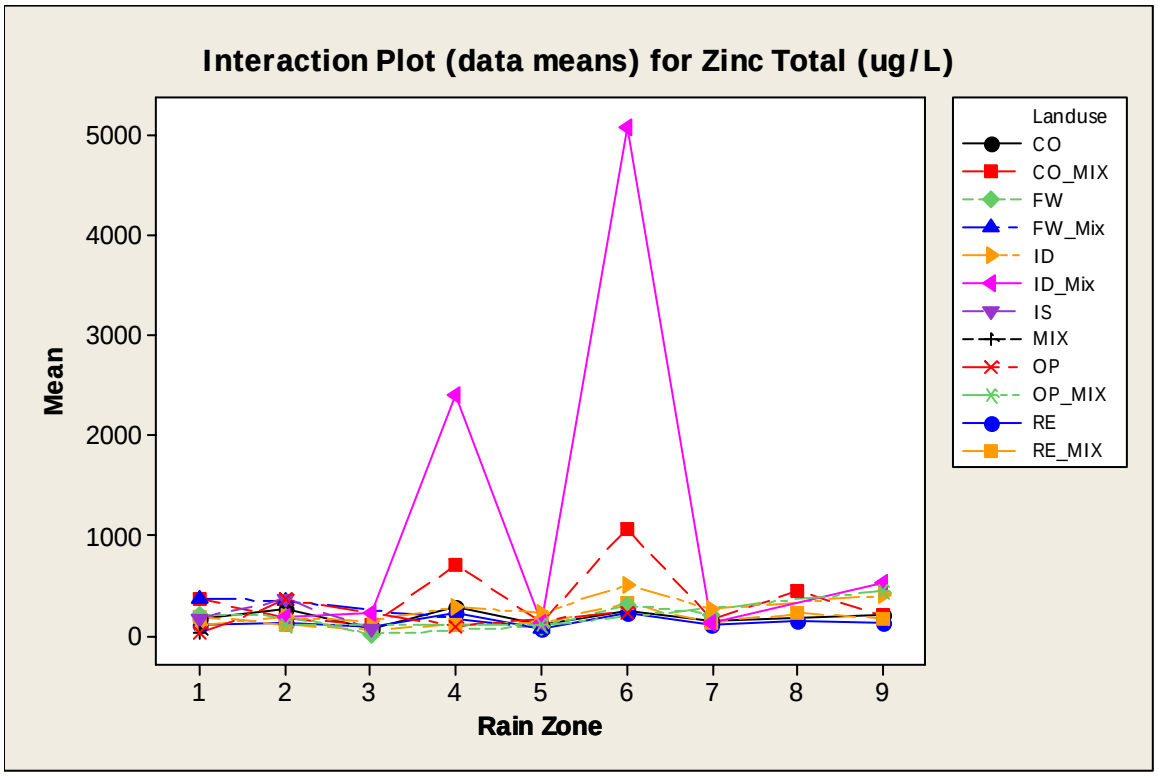

Fig. 74. Total Zinc Interaction Plot

3.11 Conclusions

Significantly higher concentrations of TSS, BOD_5, COD, and total phosphorus are observed in EPA Rain Zones 4, 6, and 9, compared to the other EPA Rain Zones. Concentrations of total copper and total zinc are higher in EPA Rain Zones 4 and 6, while NO_2+NO_3 concentrations are significantly higher in EPA Rain Zones 6, 8, and 9. COD and total phosphorus also show higher concentrations in EPA Rain Zone 8. Fecal Coliforms and total dissolved solids have higher concentrations in EPA Rain Zone 1.

As expected, metals concentrations are higher for industrial and commercial land uses, however EPA Rain Zone effects on pollutant concentrations appear to be more important. Lower concentrations for TDS, BOD_5, and Fecal Coliforms were also observed in industrial land use areas. Fecal Coliform concentrations are relatively high for residential and mixed residential land uses, and NO_2+NO_3 concentrations are higher for the freeway land use. Institutional land use areas show consistently low concentrations for the constituents examined. Table 24 and 25 show the significance of EPA Rain Zone and land use for each constituent.

Table 24. Significant EPA Rain Zone Categories

Constituent (total number of analyses available)	**EPA Rain Zones likely having high values compared to other EPA Rain Zones**	**EPA Rain Zones likely having low values compared to other EPA Rain Zones**
Conductivity (873)	1	
Hardness (1,176)	1	4, 5, and 6
Oil and grease (2,257)	4 and 5	
pH (2,376)	4 and 5	3, 6, and 9
Temperature (7,269)	3, 4, 5, and 6	7, 8, and 9
Total dissolved solids (3,548)	1	
Total suspended solids (6,747)	4, 6, and 9	2 and 3
BOD_5 (4,776)	4, 6, 8, and 9	3 and 5
COD (5,068)	6, 8, and 9	3 and 7
Fecal Coliforms (2,146)	1, 4 and 5	
Fecal Streptococcus (1,187)	5	3, 6, and 7
Ammonia (2,436)	6, 8, and 9	3 and 7
$NO_2 + NO_3$ (1,260)	6 and 9	
Total Nitrogen (682)	9	3 and 6
Total Kjeldahl Nitrogen (6,132)	8 and 9	3 and 7
Dissolved Phosphorus (2,987)	6	1, 3, and 5
Total Phosphorus (7,407)	6, 8, and 9	3 and 7
Total Cadmium (3,415)	3 ,4, and 9	
Total Copper (5,154)	4 and 6	3
Total Zinc (6,165)	4 and 6	3 and 5
Total Lead (5,945)	1, 6, and 9	3, 5, and 8

Table 25. Significant Land Use Categories

Constituent (total number of analyses available)	**Land uses likely having high values compared to other land uses**	**Land uses likely having low values compared to other land uses**
Conductivity (873)	FW mix, OP mix	OP
Hardness (1,176)	OP mix	
pH (2,376)	OP mix	
Total suspended solids (6,747)	CO mix, OP mix, RE mix	
COD (5,068)	CO mix and ID	OP and OP
Fecal Coliforms (2,146)	RE and RE mix	IS
Ammonia (2,436)	FW mix, and FW	OP, and OP mix
$NO_2 + NO_3$ (1,260)	FW	CO mix, IS, ID mix, and OP mix
Total Kjeldahl Nitrogen (6,132)	FW mix	OP, OP mix, and ID mix
Dissolved Phosphorus (2,987)	FW	
Total Phosphorus (7,407)	CO mix, OP mix, and RE mix	OP mix
Total Cadmium (3,415)	OP	IS and RE
Total Copper (5,154)	CO mix	OP
Total Zinc (6,165)	ID mix	
Total Lead (5,945)	CO mix and RE mix	

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Appendix A. Deleted Constituent Concentrations

ORDER	Landuse	Season	Database	LOCATION	Rain Zone	Date	Deleted Constituent	Concentration
131	CO	WI	MS4	Indiana	1	02/22/01	N02+NO3 (mg/l)-675	675
531	CO	WI	MS4	Maryland	2	01/24/02	Temperature (ºC)	323.3 ºF
367	RE	WI	MS4	Maryland	2	01/06/02	pH	0.01
527	CO	SU	MS4	Maryland	2	08/19/01	pH	0.8
905	ID	WI	MS4	Delaware	2	12/09/95	Phosphorous Dissolved (mg/l)	12
761	MIX	SP	MS4	Massachusetts	1	03/26/02	Total Coliform (colonies/100 ml)	>400,000
133	CO	WI	MS4	Indiana	1	02/22/01	Ammonia (mg/l)	44
856	RE	SP	USGS	Wisconsin	1	06/17/93	Nitrogen_Nitrate (mg/l)	<0.10
859	RE	FA	USGS	Wisconsin	1	11/12/93	Nitrogen_Nitrate (mg/l)	<0.10
874	ID	SU	USGS	Wisconsin	1	06/25/93	Nitrogen_Nitrate (mg/l)	<0.10
894	CO	FA	USGS	Wisconsin	1	10/09/93	Nitrogen_Nitrate (mg/l)	<0.10

*Note this data was a right-censored value and was reported as >400,000

Appendix B. Questionable Data

ORDER	Landuse	Season	Database	LOCATION_ID	Rain Zone	Date	Constituent	Concentration
249	RE	FA	MS4	Massachuetts	1	11/01/97	Nitrogen_Total_Organic (mg/l)	26.7
249	RE	FA	MS4	Massachuetts	1	11/01/97	Nitrogen Kjeldahl Total (mg/l)	27.2
14	RE	SP	MS4	Minnisota	1	05/08/02	Ammonia (mg/l)	4.48
14	RE	SP	MS4	Minnisota	1	05/08/02	Nitrogen Kjeldahl Total (mg/l)	3.02
1227	CO_ID	WI	MS4	VA	2	01/08/01	BOD5 (mg/l)	165
1227	CO_ID	WI	MS4	VA	2	01/08/01	COD (mg/l)	120
254	RE	WI	MS4	Massachuetts	1	02/12/98	Conductivity (uS/cm @25ºC)	1340
254	RE	WI	MS4	Massachuetts	1	02/12/98	TDS (mg/l)	2540
253	RE	WI	MS4	Massachuetts	1	01/23/98	Conductivity (uS/cm @25ºC)	1635
253	RE	WI	MS4	Massachuetts		01/23/98	TDS (mg/l)	5810
859	RE	FA	USGS	Wisconsin	1	11/12/93	Fecal Streptococcus (colonies/100 ml)	680000
1040	RE	SP	MS4	Florida	3	03/18/00	BOD5 (mg/l)	0.1
1044	CO	SP	MS4	Florida	3	03/18/00	BOD5 (mg/l)	0.1
255	RE	WI	MS4	Massachuetts	1	03/19/98	COD (mg/l)	0.005*
230	RE	SP	MS4	Massachuetts	1	03/03/02	Copper Total (ug/l)	9.2
230	RE	SP	MS4	Massachuetts	1	03/03/02	Copper Dissolved (ug/l)	18
253	RE	WI	MS4	Massachuetts	1	01/23/98	Zinc Total (ug/l)	9.5
253	RE	WI	MS4	Massachuetts	1	01/23/98	Zinc Dissolved (ug/l)	12.6
232	RE	SP	MS4	Massachusetts	1	04/28/02	Copper Total (ug/l)	1.3
232	RE	SP	MS4	Massachusetts	1	04/28/02	Copper Dissolved (ug/l)	5.4
235	OP	FA	MS4	Massachusetts	1	09/27/02	Copper Total (ug/l)	4.0*
235	OP	FA	MS4	Massachusetts	1	09/27/02	Copper Dissolved (ug/l)	10*

*Note these data were reported as left-censored data, < appears in the database.

Appendix C. NSQD 1.1 Comparisons

Constituent:	Conductivity (uS/cm @25ºC)		pH		Temperature (C)	
Databse	NSQD 1.1	NSQD 3 additional data	NSQD 1.1	NSQD 3 additional data	NSQD 1.1	NSQD 3 additional data
NUMBER OF OBSERVATIONS	685	188	1665	715	861	472
NUMBER OF SAMPLES WITH VALUES ABOVE DL	685	188	1665	711	861	472
PERCENTAGE WITH DETECTED VALUES	100	100	100	99	100	100
MINIMUM	17	7.0	3.4	3.7	0.5	-17
MAXIMUM	5600	8200	10	11	32	29
AVERAGE	200	470	7.5	7.3	17	14
MEDIAN	120	148	7.5	7.4	17	16
STANDARD DEVIATION	330	950	0.75	0.91	5.9	8.2
COEFFICIENT OF VARIATION	1.6	2.0	0.10	0.12	0.36	0.58

Constituent:	TDS (mg/l)		TSS (mg/l)		BOD5 (mg/l)	
Databse	NSQD 1.1	NSQD 3 additional data	NSQD 1.1	NSQD 3 additional data	NSQD 1.1	NSQD 3 additional data
NUMBER OF OBSERVATIONS	2956	592	3493	3287	3105	1674
NUMBER OF SAMPLES WITH VALUES ABOVE DL	2936	590	3420	3275	2987	1518
PERCENTAGE WITH DETECTED VALUES	99	99	98	99	96	91
MINIMUM	3.0	3.0	3.0	0.11*	1.00	0.10**
MAXIMUM	18000	8200	4800	11000	6900	430
AVERAGE	130	330	130	150	17	13
MEDIAN	80	92	59	65	8.6	8.0
STANDARD DEVIATION	430	870	230	350	130	20
COEFFICIENT OF VARIATION	3.4	2.6	1.8	2.4	7.4	1.6

***** One particular site in St. Charles Co., MD had relatively low values for TSS for all events

****** Two sites (2,6) in Broward Co, Fl both have low values for the same event, the two lowest values for BOD in the database. Site 6 has another low value of 0.8 for a different event

Constituent:	COD (mg/l)		DO (mg/l)		Oil and Grease Total (mg/l)	
Databse	NSQD 1.1	NSQD 3 additional data	NSQD 1.1	NSQD 3 additional data	NSQD 1.1	NSQD 3 additional data
NUMBER OF OBSERVATIONS	2750	2320	144	78	1834	425
NUMBER OF SAMPLES WITH VALUES ABOVE DL	2706	2307	144	78	1212	314
PERCENTAGE WITH DETECTED VALUES	98	99	100	100	66	74
MINIMUM	1.0	2.5	2.1	4	0.2	0.15
MAXIMUM	1300	820	12	12	11000	79
AVERAGE	79	76	7.7	8.5	35	5.9
MEDIAN	53	54	7.7	8.4	4.3	5.0
STANDARD DEVIATION	89	76	1.7	2.0	330	6.5
COEFFICIENT OF VARIATION	1.1	0.10	0.22	0.24	9.7	1.1

Constituent:	Fecal Coliform (colonies/100 ml)		Fecal Streptococcus (colonies/100 ml)		Total Coliform (colonies/100 ml)		Total E. Coli (colonies/100 ml)	
Databse	NSQD 1.1	NSQD 3 additional data	NSQD 1.1	NSQD 3 additional data	NSQD 1.1	NSQD 3 additional data	NSQD 1.1	NSQD 3 additional data
NUMBER OF OBSERVATIONS	1704	450	1141	46	83	92	67	93
NUMBER OF SAMPLES WITH VALUES ABOVE DL	1554	398	1073	46	75	66	64	83
PERCENTAGE WITH DETECTED VALUES	91	88	94	100	90	72	96	89
MINIMUM	1.0	2.0	20	700	230	5.0	10	6.0
MAXIMUM	5,200,000	3,600,000	6,000,000	680,000	900,000	260,000	66,000	55,000
AVERAGE	43,000	66,000	58,000	70,000	52,000	24,000	5400	5000
MEDIAN	5100	2100	17000	24000	12000	6400	1800	890
STANDARD DEVIATION	200,000	360,000	220,000	130,000	120,000	46,000	13,000	9600
COEFFICIENT OF VARIATION	4.6,	5.4	3.8	1.8	2.4	1.9	2.3	1.9

Constituent:	Ammonia (mg/l)		N02+NO3 (mg/l)		Nitrogen Total (mg/l)	
Databse	NSQD 1.1	NSQD 3 additional data	NSQD 1.1	NSQD 3 additional data	NSQD 1.1	NSQD 3 additional data
NUMBER OF OBSERVATIONS	1908	608	3075	2488	570	124
NUMBER OF SAMPLES WITH VALUES ABOVE DL	1361	475	2993	2474	521	123
PERCENTAGE WITH DETECTED VALUES	71	78	97	99	91	99
MINIMUM	0.010	0.040	0.010	0.0010*	0.20	0.20
MAXIMUM	12	4.5	18	66	90	8.1
AVERAGE	0.71	0.58	0.78	1.0	2.7	1.5
MEDIAN	0.44	0.44	0.60	0.59	1.9	1.3
STANDARD DEVIATION	0.98	0.53	0.76	2.4	4.5	1.3
COEFFICIENT OF VARIATION	1.4	0.92	0.97	2.4	1.7	0.81

*From BMP database

Constituent:	Nitrogen Kjeldahl Total (mg/l)		Phosphorous Dissolved (mg/l)		Phosphorous Total (mg/l)	
Databse	NSQD 1.1	NSQD 3 additional data	NSQD 1.1	NSQD 3 additional data	NSQD 1.1	NSQD 3 additional data
NUMBER OF OBSERVATIONS	3191	2965	2477	636	3285	4140
NUMBER OF SAMPLES WITH VALUES ABOVE DL	3051	2934	2109	409	3170	4062
PERCENTAGE WITH DETECTED VALUES	96	99	85	64	97	98
MINIMUM	0.050	0.010	0.0030	0.010	0.010	0.0030
MAXIMUM	66	27	7.0	3.2	15	80
AVERAGE	2.0	1.7	0.20	0.19	0.41	0.40
MEDIAN	1.4	1.2	0.13	0.12	0.27	0.223
STANDARD DEVIATION	2.6	1.8	0.31	0.31	0.62	1.4
COEFFICIENT OF VARIATION	1.3	1.1	1.6	1.7	1.5	3.6

Constituent:	Lead Total (ug/l)		Zinc Total (ug/l)		Zinc Dissolved (ug/l)	
Databse	NSQD 1.1	NSQD 3 additional data	NSQD 1.1	NSQD 3 additional data	NSQD 1.1	NSQD 3 additional data
NUMBER OF OBSERVATIONS	2949	3095	3007	3177	381	22
NUMBER OF SAMPLES WITH VALUES ABOVE DL	2290	2744	2904	3126	367	14
PERCENTAGE WITH DETECTED VALUES	78	89	97	98	96	64
MINIMUM	0.20	0.049	2.0	0.37	4.0	3.1
MAXIMUM	1200	19000	23000	15000	14000	13
AVERAGE	39	140	230	140	280	6.7
MEDIAN	17	50	116	69	52	6.5
STANDARD DEVIATION	72	530	740	410	1100	2.7
COEFFICIENT OF VARIATION	1.8	3.7	3.3	3.0	3.9	0.40

Constituent:	Cadmium Total (ug/l)		Chromium Total (ug/l)		Copper Total (ug/l)		Copper Dissolved (ug/l)	
Databse	NSQD 1.1	NSQD 3 additional data	NSQD 1.1	NSQD 3 additional data	NSQD 1.1	NSQD 3 additional data	NSQD 1.1	NSQD 3 additional data
NUMBER OF OBSERVATIONS	2574	1026	1598	152	2722	2443	411	22
NUMBER OF SAMPLES WITH VALUES ABOVE DL	1046	516	1122	57	2379	2165	341	16
PERCENTAGE WITH DETECTED VALUES	41	50	70	38	87	89	83	72
MINIMUM	0.040	0.050	0.50	2.0	0.60	0.17	1.0	0.090
MAXIMUM	270	330	220	29	1400	800	200	18
AVERAGE	3.8	3.0	11	6.6	31	29	14	2.3
MEDIAN	1.0	0.50	7.0	4.7	16	12	8.0	1.1
STANDARD DEVIATION	14	15	17	6.0	68	55	23	4.3
COEFFICIENT OF VARIATION	3.7	5.0	1.5	0.91	2.2	1.9	1.6	1.8

Constituent:	Total_Petroleum_hydrocarbon (mg/l)		Nitrogen_Nitrate (mg/l)		Nitrogen_Total_Organic (mg/l)	
Databse	NSQD 1.1	NSQD 3 additional data	NSQD 1.1	NSQD 3 additional data	NSQD 1.1	NSQD 3 additional data
NUMBER OF OBSERVATIONS	165	485	176	46	40	58
NUMBER OF SAMPLES WITH VALUES ABOVE DL	136	365	175	42	40	52
PERCENTAGE WITH DETECTED VALUES	82	75	99	91	100	90
MINIMUM	0.60	0.20	0.10	0.41	0.13	0.05
MAXIMUM	20	37	17	2.4	6.9	27
AVERAGE	3.7	3.4	1.3	0.85	1.5	1.5
MEDIAN	2.6	2.1	0.71	0.66	1.1	0.82
STANDARD DEVIATION	3.3	2.6	1.8	0.47	1.3	3.6
COEFFICIENT OF VARIATION	0.89	0.77	1.4	0.56	0.87	2.4

Appendix D Two-way Tables of Basic Statistics

Conductivity	(uS/cm @ 25C)	Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Commercial	Mean	590	*	*	*	133	141.1	136.7	*	217.3	250.6
	Median	205	*	*	*	88	93	130	*	167	111
	StDev	1061.5	*	*	*	158.1	171.2	59.7	*	143.5	555.7
	Count	24	0	0	0	27	26	16	0	9	102
	% above DL	100	0	0	0	100	100	100	0	100	100
	COV	1.80	-	-	-	1.19	1.21	0.44	-	0.66	2.22
Mixed Commercial	Mean	*	*	*	*	113.4	166.7	140.3	81.4	143.7	123.3
	Median	*	*	*	*	88	150	93	86.5	123.5	100
	StDev	*	*	*	*	69.8	76.4	147.1	51	57.4	93.5
	Count	0	0	0	0	30	3	15	5	6	59
	% above DL	0	0	0	0	100	100	100	100	100	100
	COV	-	-	-	-	0.62	0.46	1.05	0.63	0.40	0.76
Freeway	Mean	*	*	*	*	*	125.8	146.3	*	*	128.9
	Median	*	*	*	*	*	89	112	*	*	99
	StDev	*	*	*	*	*	137.4	85.9	*	*	130.7
	Count	0	0	0	0	0	73	13	0	0	86
	% above DL	0	0	0	0	0	100	100	0	0	100
	COV	-	-	-	-	-	1.09	0.59	-	-	1.01
Mixed Freeway	Mean	*	342.2	*	*	555.8	*	*	*	*	474.4
	Median	*	228.4	*	*	418	*	*	*	*	353
	StDev	*	241.4	*	*	310.3	*	*	*	*	299.1
	Count	0	8	0	0	13	0	0	0	0	21
	% above DL	0	100	0	0	100	0	0	0	0	100
	COV	-	0.71	-	-	0.56	-	-	-	-	0.63
Industrial	Mean	447.1	135.9	*	*	310.9	198.5	*	*	88.3	265.9
	Median	76.6	135	*	*	126.5	171.5	*	*	92	135
	StDev	1207.3	65	*	*	503.8	110.4	*	*	41.6	595.3
	Count	23	9	0	0	26	54	0	0	3	115
	% above DL	100	100	0	0	100	100	0	0	100	100
	COV	2.70	0.48	-	-	1.62	0.56	-	-	0.47	2.24
Mixed Industrial	Mean	*	*	*	*	155.7	278.6	*	*	143.1	169.5
	Median	*	*	*	*	108	232	*	*	107	118
	StDev	*	*	*	*	133.2	126.3	*	*	115.9	133.2
	Count	0	0	0	0	35	9	0	0	19	63
	% above DL	0	0	0	0	100	100	0	0	100	100
	COV	-	-	-	-	0.86	0.45	-	-	0.81	0.79

Conductivity	(µS/cm @ 25C)	Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Institutional	Mean	*	*	*	*	*	*	*	*	*	*
	Median	*	*	*	*	*	*	*	*	*	*
	StDev	*	*	*	*	*	*	*	*	*	*
	Count	0	0	0	0	0	0	0	0	0	0
	% above DL	0	0	0	0	0	0	0	0	0	0
	COV	-	-	-	-	-	-	-	-	-	-
MIX	Mean	299.3	*	*	*	*	*	*	*	*	299.3
	Median	190	*	*	*	*	*	*	*	*	190
	StDev	309.6	*	*	*	*	*	*	*	*	309.6
	Count	57	0	0	0	0	0	0	0	0	57
	% above DL	100	0	0	0	0	0	0	0	0	100
	COV	1.03	-	-	-	-	-	-	-	-	1.03
Open Space	Mean	74.5	*	*	*	*	75	*	*	*	74.6
	Median	73	*	*	*	*	75	*	*	*	75
	StDev	45.4	*	*	*	*	*	*	*	*	41.5
	Count	6	0	0	0	0	1	0	0	0	7
	% above DL	100	0	0	0	0	100	0	0	0	100
	COV	0.61	-	-	-	-	-	-	-	-	0.56
Mixed Open Space	Mean	*	*	*	*	400.7	*	*	*	1090.3	464.3
	Median	*	*	*	*	225	*	*	*	127	215
	StDev	*	*	*	*	435.2	*	*	*	2383.3	809.9
	Count	0	0	0	0	59	0	0	0	6	65
	% above DL	0	0	0	0	100	0	0	0	100	100
	COV	-	-	-	-	1.09	-	-	-	2.19	1.74
Residential	Mean	442.1	316.5	*	*	124.8	102.9	346.8	31	244.1	334.4
	Median	110	111.1	*	*	103	87.5	155	31	164	108.4
	StDev	985.1	505.9	*	*	68.9	51.4	528.4	5.2	220.5	780.8
	Count	111	10	0	0	29	20	14	2	7	193
	% above DL	100	100	0	0	100	100	100	100	100	100
	COV	2.23	1.60	-	-	0.55	0.50	1.52	0.17	0.90	2.33
Mixed Residential	Mean	81.1	*	80.7	*	213.6	91.1	*	139.1	420	187.2
	Median	70.1	*	80.7	*	160	76	*	119	84	112
	StDev	31.5	*	19.3	*	171.4	39.6	*	106.6	738	216
	Count	18	0	2	0	69	7	0	4	5	105
	% above DL	100	0	100	0	100	100	0	100	100	100
	COV	0.39	-	0.24	-	0.80	0.43	-	0.77	1.76	1.15
ALL	Mean	386.9	263.9	80.7	*	242.2	152.1	190.5	93.2	293.7	260.1
	Median	110	145.8	80.7	*	141	110	125	79.7	122	122
	StDev	855.7	337.9	19.3	*	303.5	131.7	281.8	78.3	815.9	540.2
	Count	239	27	2	0	288	193	58	11	55	873
	% above DL	100	100	100	0	100	100	100	100	100	100
	COV	2.21	1.28	0.24	-	1.25	0.87	1.48	0.84	2.78	2.08

DO (mg/L)		Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Commercial	Mean	7.888	*	*	*	*	7.417	8.345	*	*	7.808
	Median	8.72	*	*	*	*	7.15	7.7	*	*	7.9
	StDev	2.546	*	*	*	*	1.404	2.187	*	*	2.022
	Count	14	0	0	0	0	18	11	0	0	43
	% above DL	100	0	0	0	0	100	100	0	0	100
	COV	0.32	-	-	-	-	0.19	0.26	-	-	0.26
Mixed Commercial	Mean	*	*	*	*	*	*	7.9	9.18	*	8.38
	Median	*	*	*	*	*	*	8.1	8.51	*	8.2
	StDev	*	*	*	*	*	*	2.6	1.702	*	2.33
	Count	0	0	0	0	0	0	10	6	0	16
	% above DL	0	0	0	0	0	0	100	100	0	100
	COV	-	-	-	-	-	-	0.33	0.19	-	0.28
Freeway	Mean	*	*	*	*	*	*	8.225	*	*	8.225
	Median	*	*	*	*	*	*	8.65	*	*	8.65
	StDev	*	*	*	*	*	*	1.089	*	*	1.089
	Count	0	0	0	0	0	0	8	0	0	8
	% above DL	0	0	0	0	0	0	100	0	0	100
	COV	-	-	-	-	-	-	0.13	-	-	0.13
Mixed Freeway	Mean	7.475	*	*	*	*	*	*	*	*	7.475
	Median	7.475	*	*	*	*	*	*	*	*	7.475
	StDev	3.359	*	*	*	*	*	*	*	*	3.359
	Count	2	0	0	0	0	0	0	0	0	2
	% above DL	100	0	0	0	0	0	0	0	0	100
	COV	0.45	-	-	-	-	-	-	-	-	0.45
Industrial	Mean	5.3	*	*	*	*	7.386	*	*	*	7.279
	Median	5.3	*	*	*	*	7.3	*	*	*	7.3
	StDev	1.556	*	*	*	*	1.407	*	*	*	1.468
	Count	2	0	0	0	0	37	0	0	0	39
	% above DL	100	0	0	0	0	100	0	0	0	100
	COV	0.29	-	-	-	-	0.19	-	-	-	0.20
Mixed Industrial	Mean	*	*	*	*	*	*	*	*	*	*
	Median	*	*	*	*	*	*	*	*	*	*
	StDev	*	*	*	*	*	*	*	*	*	*
	Count	0	0	0	0	0	0	0	0	0	0
	% above DL	0	0	0	0	0	0	0	0	0	0
	COV	-	-	-	-	-	-	-	-	-	-

DO (mg/L)		Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Institutional	Mean	*	*	*	*	*	*	*	*	*	*
	Median	*	*	*	*	*	*	*	*	*	*
	StDev	*	*	*	*	*	*	*	*	*	*
	Count	0	0	0	0	0	0	0	0	0	0
	% above DL	0	0	0	0	0	0	0	0	0	0
	COV	-	-	-	-	-	-	-	-	-	-
MIX	Mean	8.332	*	*	*	*	*	*	*	*	8.332
	Median	8.27	*	*	*	*	*	*	*	*	8.27
	StDev	2.186	*	*	*	*	*	*	*	*	2.186
	Count	43	0	0	0	0	0	0	0	0	43
	% above DL	100	0	0	0	0	0	0	0	0	100
	COV	0.26	-	-	-	-	-	-	-	-	0.26
Open Space	Mean	*	*	*	*	*	7.3	*	*	*	7.3
	Median	*	*	*	*	*	7.3	*	*	*	7.3
	StDev	*	*	*	*	*	*	*	*	*	*
	Count	0	0	0	0	0	1	0	0	0	1
	% above DL	0	0	0	0	0	100	0	0	0	100
	COV	-	-	-	-	-	-	-	-	-	-
Mixed Open Space	Mean	*	*	*	*	*	*	*	*	*	*
	Median	*	*	*	*	*	*	*	*	*	*
	StDev	*	*	*	*	*	*	*	*	*	*
	Count	0	0	0	0	0	0	0	0	0	0
	% above DL	0	0	0	0	0	0	0	0	0	0
	COV	-	-	-	-	-	-	-	-	-	-
Residential	Mean	8.533	*	*	*	*	7.754	8.118	8.818	*	8.287
	Median	8.4	*	*	*	*	7.6	8.2	9.13	*	8.215
	StDev	1.944	*	*	*	*	1.174	1.294	1.52	*	1.626
	Count	25	0	0	0	0	13	11	5	0	54
	% above DL	100	0	0	0	0	100	100	100	0	100
	COV	0.23	-	-	-	-	0.15	0.16	0.17	-	0.20
Mixed Residential	Mean	6.75	*	8.5	*	*	8.25	*	8.158	*	8.059
	Median	6.75	*	8.5	*	*	8.75	*	8.035	*	8.585
	StDev	2.616	*	1.131	*	*	1.763	*	1.712	*	1.681
	Count	2	0	2	0	0	6	0	6	0	16
	% above DL	100	0	100	0	0	100	0	100	0	100
	COV	0.39	-	0.13	-	-	0.21	-	0.21	-	0.21
ALL	Mean	8.194	*	8.5	*	*	7.525	8.148	8.713	*	8.002
	Median	8.285	*	8.5	*	*	7.3	8.2	8.57	*	8.17
	StDev	2.206	*	1.131	*	*	1.384	1.859	1.612	*	1.87
	Count	88	0	2	0	0	75	40	17	0	222
	% above DL	100	0	100	0	0	100	100	100	0	100
	COV	0.27	-	0.13	-	-	0.18	0.23	0.19	-	0.23

Hardness (mg/L CaCO3)		Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Commercial	Mean	145.45	78.19	*	91.47	31.67	*	18.5	*	81.03	70.93
	Median	126	56	*	62	28	*	16	*	48.8	45
	StDev	73	67.5	*	64.1	11.57	*	14.57	*	84.44	70.46
	Count	28	68	0	3	39	0	26	0	25	189
	% above DL	100	100	0	100	100	0	100	0	100	100
	COV	0.50	0.86	-	0.70	0.37	-	0.79	-	1.04	0.99
Mixed Commercial	Mean	*	*	*	*	38.08	54.6	157.52	62.23	*	71.37
	Median	*	*	*	*	31.5	56	58	51.95	*	35.5
	StDev	*	*	*	*	20.64	51.09	229.22	44.22	*	127
	Count	0	0	0	0	60	5	25	8	0	98
	% above DL	0	0	0	0	100	80	100	100	0	99
	COV	-	-	-	-	0.54	0.94	1.46	0.71	-	1.78
Freeway	Mean	*	358	*	*	*	47.47	59.62	*	*	57.19
	Median	*	42	*	*	*	34	25	*	*	34
	StDev	*	556.01	*	*	*	43.41	117.34	*	*	105.95
	Count	0	3	0	0	0	99	25	0	0	127
	% above DL	0	100	0	0	0	100	100	0	0	100
	COV	-	1.55	-	-	-	0.91	1.97	-	-	1.85
Mixed Freeway	Mean	*	*	*	*	79.73	*	*	*	*	79.73
	Median	*	*	*	*	83	*	*	*	*	83
	StDev	*	*	*	*	22.53	*	*	*	*	22.53
	Count	0	0	0	0	12	0	0	0	0	12
	% above DL	0	0	0	0	100	0	0	0	0	100
	COV	-	-	-	-	0.28	-	-	-	-	0.28
Industrial	Mean	221.5	75.84	*	97.21	43.77	13.13	21.43	*	156.15	82.9
	Median	205.5	60.5	*	108	37	5	17.5	*	54.2	43
	StDev	93.86	78.05	*	33.09	23.6	12.88	16.22	*	229.47	112.89
	Count	16	38	0	9	43	8	20	0	19	153
	% above DL	100	100	0	100	100	38	100	0	100	97
	COV	0.42	1.03	-	0.34	0.54	0.98	0.76	-	1.47	1.36
Mixed Industrial	Mean	*	*	20.8	*	36.64	35.48	*	*	29.67	35.57
	Median	*	*	20.8	*	34	25	*	*	30	32.5
	StDev	*	*	7.64	*	15.76	29.66	*	*	11.69	19.99
	Count	0	0	2	0	63	25	0	0	6	96
	% above DL	0	0	100	0	100	80	0	0	100	95
	COV	-	-	0.37	-	0.43	0.84	-	-	0.39	0.56

Hardness (mg/L CaCO3)		Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Institutional	Mean	*	*	*	*	*	*	*	*	*	*
	Median	*	*	*	*	*	*	*	*	*	*
	StDev	*	*	*	*	*	*	*	*	*	*
	Count	0	0	0	0	0	0	0	0	0	0
	% above DL	0	0	0	0	0	0	0	0	0	0
	COV	-	-	-	-	-	-	-	-	-	-
MIX	Mean	37.92	*	*	*	*	*	*	*	*	37.92
	Median	27.75	*	*	*	*	*	*	*	*	27.75
	StDev	29.31	*	*	*	*	*	*	*	*	29.31
	Count	6	0	0	0	0	0	0	0	0	6
	% above DL	100	0	0	0	0	0	0	0	0	100
	COV	0.77	-	-	-	-	-	-	-	-	0.77
Open Space	Mean	12.85	164.43	*	*	*	*	*	*	*	94.47
	Median	12.85	150	*	*	*	*	*	*	*	41
	StDev	4.47	70.86	*	*	*	*	*	*	*	93.3
	Count	6	7	0	0	0	0	0	0	0	13
	% above DL	100	100	0	0	0	0	0	0	0	100
	COV	0.35	0.43	-	-	-	-	-	-	-	0.99
Mixed Open Space	Mean	*	14	*	*	114.99	*	*	*	*	110.66
	Median	*	7	*	*	66	*	*	*	*	64.2
	StDev	*	13.89	*	*	142.8	*	*	*	*	141.2
	Count	0	3	0	0	67	0	0	0	0	70
	% above DL	0	100	0	0	100	0	0	0	0	100
	COV	-	0.99	-	-	1.24	-	-	-	-	1.28
Residential	Mean	85.63	50.28	*	46.86	34.58	*	22.49	36.42	74.33	47.89
	Median	96.5	35	*	42.8	31.3	*	19.5	34.4	43.1	33
	StDev	61.69	51.88	*	26.05	13.38	*	16.56	21.74	94.85	49.81
	Count	22	89	0	16	64	0	26	6	21	244
	% above DL	91	100	0	100	100	0	100	100	100	99
	COV	0.72	1.03	-	0.56	0.39	-	0.74	0.60	1.28	1.04
Mixed Residential	Mean	*	51.63	106.98	*	51.67	11.2	15.98	105.98	94.43	56.33
	Median	*	41	37.6	*	43	5	11	56.9	34.95	39.7
	StDev	*	32.01	126.56	*	29.87	10.01	16.06	101.75	155.27	65.58
	Count	0	24	6	0	96	5	13	8	16	168
	% above DL	0	100	100	0	100	40	100	100	100	98
	COV	-	0.62	1.18	-	0.58	0.89	1.01	0.96	1.64	1.16
ALL	Mean	125.71	69.74	85.44	67.82	53.03	42.4	52.82	71.1	94.74	63.83
	Median	111	46	31.55	52.8	38	31.5	21	47.5	43.1	38
	StDev	93.7	88.5	114.2	40.2	64.73	40.74	121.52	71.08	143.53	87.98
	Count	78	232	8	28	444	142	135	22	87	1176
	% above DL	97	100	100	100	100	90	100	100	100	99
	COV	0.75	1.27	1.34	0.59	1.22	0.96	2.30	1.00	1.51	1.38

Oil and Grease (mg/L)		Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Commercial	Mean	5.218	6.836	4.044	4.067	44.524	7.897	3.68	*	5.361	9.703
	Median	5	3.8	1	2	4	4	2.55	*	2.5	3.4
	StDev	2.86	9.764	12.687	5.625	92.542	11.838	3.383	*	6.053	32.062
	Count	37	188	18	40	41	29	44	0	18	415
	% above DL	11	76	56	68	88	93	73	0	50	69
	COV	0.55	1.43	3.14	1.38	2.08	1.50	0.92	-	1.13	3.30
Mixed Commercial	Mean	*	10.833	*	*	45.68	*	4.127	3.775	5	25.378
	Median	*	3.25	*	*	3.5	*	3	2.975	3	3
	StDev	*	14.432	*	*	116.973	*	3.069	2.601	4.359	83.137
	Count	0	28	0	0	64	0	33	6	3	134
	% above DL	0	64	0	0	89	0	79	50	100	80
	COV	-	1.33	-	-	2.56	-	0.74	0.69	0.87	3.28
Freeway	Mean	*	5.092	*	*	*	5.055	8.283	*	*	5.633
	Median	*	5	*	*	*	3.5	8	*	*	5
	StDev	*	0.856	*	*	*	4.33	6.468	*	*	3.59
	Count	0	92	0	0	0	33	26	0	0	151
	% above DL	0	100	0	0	0	61	85	0	0	89
	COV	-	0.17	-	-	-	0.86	0.78	-	-	0.64
Mixed Freeway	Mean	5.145	5.672	*	*	34.308	*	*	*	*	24.233
	Median	5.145	5.6	*	*	3	*	*	*	*	4.525
	StDev	0.757	1.575	*	*	52.478	*	*	*	*	44.026
	Count	2	5	0	0	13	0	0	0	0	20
	% above DL	100	100	0	0	100	0	0	0	0	100
	COV	0.15	0.28	-	-	1.53	-	-	-	-	1.82
Industrial	Mean	5.33	5.457	0.875	252.858	25.207	6.127	4.65	*	3.75	37.641
	Median	5	2.75	0.5	1.07	2	4	4	*	2.5	3
	StDev	3.802	6.947	0.694	1657.88	74.205	5.621	3.484	*	2.598	576.028
	Count	25	146	8	44	46	55	29	0	12	365
	% above DL	16	64	25	59	59	85	91	0	33	63
	COV	0.71	1.27	0.79	6.56	2.94	0.92	0.75	-	0.69	15.30
Mixed Industrial	Mean	*	4.089	*	*	56.032	5.633	4.917	*	6.25	37.596
	Median	*	2.5	*	*	2	2	3.45	*	5.5	3
	StDev	*	4.311	*	*	113.397	6.12	5.139	*	3.079	93.505
	Count	0	9	0	0	63	9	6	0	12	99
	% above DL	0	33	0	0	71	100	100	0	100	75
	COV	-	1.05	-	-	2.02	1.09	1.05	-	0.49	2.49

Oil and Grease (mg/L)		Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Institutional	Mean	*	*	*	*	*	*	*	*	*	*
	Median	*	*	*	*	*	*	*	*	*	*
	StDev	*	*	*	*	*	*	*	*	*	*
	Count	0	0	0	0	0	0	0	0	0	0
	% above DL	0	0	0	0	0	0	0	0	0	0
	COV	-	-	-	-	-	-	-	-	-	-
MIX	Mean	7.833	*	*	*	*	*	*	*	*	7.833
	Median	8.4	*	*	*	*	*	*	*	*	8.4
	StDev	3.779	*	*	*	*	*	*	*	*	3.779
	Count	6	0	0	0	0	0	0	0	0	6
	% above DL	83	0	0	0	0	0	0	0	0	83
	COV	0.48	-	-	-	-	-	-	-	-	0.48
Open Space	Mean	2.7	1.48	*	0.758	*	0.5	*	*	*	1.383
	Median	2.5	1.1	*	0.5	*	0.5	*	*	*	0.95
	StDev	0.49	0.955	*	0.498	*	*	*	*	*	1.011
	Count	6	5	0	12	0	1	0	0	0	24
	% above DL	17	60	0	25	0	0	0	0	0	29
	COV	0.18	0.65	-	0.66	-	-	-	-	-	0.73
Mixed Open Space	Mean	*	2.431	*	*	75.134	*	*	*	5	56.64
	Median	*	2.5	*	*	2	*	*	*	6	2.5
	StDev	*	2.097	*	*	131.963	*	*	*	1.732	117.994
	Count	0	20	0	0	67	0	0	0	3	90
	% above DL	0	20	0	0	70	0	0	0	100	60
	COV	-	0.86	-	-	1.76	-	-	-	0.35	2.08
Residential	Mean	5.517	4.219	1.5	3.035	73.391	9.729	3.323	2.767	3.86	11.357
	Median	5	3	1.5	1	2	3	2.1	2.8	2.5	2.5
	StDev	7.4	4.65	0.882	4.672	366.565	29.983	4.597	0.742	2.185	118.963
	Count	36	388	10	66	69	24	56	6	15	670
	% above DL	25	61	40	64	65	79	71	83	53	61
	COV	1.34	1.10	0.59	1.54	4.99	3.08	1.38	0.27	0.57	10.47
Mixed Residential	Mean	2.335	8.138	*	2.324	49.474	3.917	5.103	6.886	4.291	21.036
	Median	2.335	2.5	*	1.75	4	2.5	3.3	5.8	2.5	2.6
	StDev	0.728	51.837	*	2.141	88.339	3.666	6.357	3.799	4.001	64.44
	Count	2	120	0	22	95	6	20	7	11	283
	% above DL	100	58	0	64	85	83	90	86	36	70
	COV	0.31	6.37	-	0.92	1.79	0.94	1.25	0.55	0.93	3.06
ALL	Mean	5.29	5.583	2.633	62.766	53.892	6.631	4.514	4.603	4.751	19.922
	Median	5	3.2	1	1.3	3	3.6	3.05	3.45	3	3
	StDev	4.915	19.021	8.976	810.721	171.313	13.334	4.714	3.197	3.939	244.895
	Count	114	1001	36	184	458	157	214	19	74	2257
	% above DL	24	78	39	61	77	81	79	74	58	67
	COV	0.93	3.41	3.41	12.92	3.18	2.01	1.04	0.69	0.83	12.29

pH		Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Commercial	Mean	7.488	7.512	7.644	7.538	7.704	6.737	7.363	*	6.878	7.439
	Median	7.67	7.47	7.66	7.62	7.7	6.7	7.4	*	6.9	7.5
	StDev	0.785	0.8195	0.5564	0.4748	0.438	0.6319	0.6622	*	0.2774	0.7361
	Count	65	94	15	21	41	27	27	0	9	299
	% above DL	100	100	100	100	100	100	100	0	100	100
	COV	0.10	0.11	0.07	0.06	0.06	0.09	0.09	-	0.04	0.10
Mixed Commercial	Mean	*	7.789	7.72	*	7.688	*	6.973	7.225	7.167	7.602
	Median	*	7.7	7.6	*	7.75	*	7	7.205	7.3	7.6
	StDev	*	0.5539	0.3564	*	0.5492	*	0.8035	0.2388	0.3215	0.6343
	Count	0	57	5	0	64	0	21	6	3	156
	% above DL	0	100	100	0	100	0	100	100	100	100
	COV	-	0.07	0.05	-	0.07	-	0.12	0.03	0.04	0.08
Freeway	Mean	6.767	7.916	*	*	*	7.06	7.23	*	*	7.447
	Median	6.6	7.89	*	*	*	7.085	7.86	*	*	7.4
	StDev	0.5686	0.6951	*	*	*	0.6996	1.3332	*	*	0.8565
	Count	3	91	0	0	0	98	13	0	0	205
	% above DL	100	100	0	0	0	100	100	0	0	100
	COV	0.08	0.09	-	-	-	0.10	0.18	-	-	0.12
Mixed Freeway	Mean	7	*	*	*	7.763	*	*	*	*	7.628
	Median	6.9	*	*	*	7.85	*	*	*	*	7.7
	StDev	0.5568	*	*	*	0.3277	*	*	*	*	0.4646
	Count	3	0	0	0	14	0	0	0	0	17
	% above DL	100	0	0	0	100	0	0	0	0	100
	COV	0.08	-	-	-	0.04	-	-	-	-	0.06
Industrial	Mean	7.675	7.369	6.805	7.92	7.982	7.684	7.34	*	6.967	7.516
	Median	7.73	7.33	6.6	7.7	8	7.7	7.4	*	6.9	7.545
	StDev	0.8457	0.8072	0.7855	0.6489	0.504	0.7219	0.3578	*	0.2082	0.8194
	Count	51	101	46	29	46	53	5	0	3	334
	% above DL	100	100	100	100	100	100	100	0	100	100
	COV	0.11	0.11	0.12	0.08	0.06	0.09	0.05	-	0.03	0.11
Mixed Industrial	Mean	*	8.008	7.229	*	7.663	7.071	7.776	*	6.933	7.672
	Median	*	8.1	7.05	*	7.61	7.1	7.6	*	6.7	7.8
	StDev	*	0.673	0.8067	*	0.5936	0.5559	0.9502	*	0.5565	0.7387
	Count	0	68	22	0	62	7	5	0	12	176
	% above DL	0	100	100	0	100	100	100	0	100	100
	COV	-	0.08	0.11	-	0.08	0.08	0.12	-	0.08	0.10

pH		Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Institutional	Mean	7.55	*	*	*	*	*	*	*	*	7.55
	Median	7.6	*	*	*	*	*	*	*	*	7.6
	StDev	0.1732	*	*	*	*	*	*	*	*	0.1732
	Count	4	0	0	0	0	0	0	0	0	4
	% above DL	100	0	0	0	0	0	0	0	0	100
	COV	0.02	-	-	-	-	-	-	-	-	0.02
MIX	Mean	6.819	*	*	*	*	*	*	*	*	6.819
	Median	6.9	*	*	*	*	*	*	*	*	6.9
	StDev	0.5582	*	*	*	*	*	*	*	*	0.5582
	Count	53	0	0	0	0	0	0	0	0	53
	% above DL	100	0	0	0	0	0	0	0	0	100
	COV	0.08	-	-	-	-	-	-	-	-	0.08
Open Space	Mean	*	7.757	*	7.454	*	8.3	*	*	*	7.61
	Median	*	7.7	*	7.6	*	8.3	*	*	*	7.7
	StDev	*	0.5593	*	0.6702	*	*	*	*	*	0.6353
	Count	0	7	0	11	0	1	0	0	0	19
	% above DL	0	100	0	100	0	100	0	0	0	100
	COV	-	0.07	-	0.09	-	-	-	-	-	0.08
Mixed Open Space	Mean	*	8.108	*	*	7.876	*	*	*	6.9	7.947
	Median	*	8.05	*	*	7.8	*	*	*	6.5	7.9
	StDev	*	0.5091	*	*	0.5345	*	*	*	0.781	0.5613
	Count	0	52	0	0	73	0	0	0	3	128
	% above DL	0	100	0	0	100	0	0	0	100	100
	COV	-	0.06	-	-	0.07	-	-	-	0.11	0.07
Residential	Mean	7.265	6.962	7.168	7.286	7.518	7.341	7.319	7.026	7.086	7.14
	Median	7.2	7.03	7.32	7.21	7.5	7.4	7.2	7.01	7.1	7.1
	StDev	0.8344	0.9393	0.641	0.7866	0.5816	0.5586	0.7132	0.1293	0.3288	0.8569
	Count	136	323	30	33	71	22	25	5	7	652
	% above DL	100	100	100	100	100	100	100	100	100	100
	COV	0.11	0.13	0.09	0.11	0.08	0.08	0.10	0.02	0.05	0.12
Mixed Residential	Mean	6.535	7.739	6.992	7.969	7.695	7.417	7.518	7.763	7.533	7.498
	Median	6.47	7.75	6.97	8.03	7.6	7.25	7.25	7.195	7.7	7.5
	StDev	0.4101	0.7233	0.5564	0.5385	0.4767	0.343	0.6928	1.3177	0.3786	0.7162
	Count	21	104	70	22	96	6	5	6	3	333
	% above DL	100	100	100	100	100	100	100	100	100	100
	COV	0.06	0.09	0.08	0.07	0.06	0.05	0.09	0.17	0.05	0.10
ALL	Mean	7.251	7.457	7.073	7.636	7.722	7.219	7.281	7.356	7.01	7.421
	Median	7.205	7.5	7	7.62	7.7	7.125	7.35	7.11	6.9	7.47
	StDev	0.8193	0.902	0.698	0.6982	0.5383	0.738	0.8226	0.8169	0.4436	0.8045
	Count	336	897	188	116	467	214	101	17	40	2376
	% above DL	100	100	100	100	100	100	100	100	100	100
	COV	0.11	0.12	0.10	0.09	0.07	0.10	0.11	0.11	0.06	0.11

Turbidity	(NTU)	Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Commercial	Mean	*	*	*	*	*	*	*	*	*	*
	Median	*	*	*	*	*	*	*	*	*	*
	StDev	*	*	*	*	*	*	*	*	*	*
	Count	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% above DL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	COV	-	-	-	-	-	-	-	-	-	-
Mixed Commercial	Mean	*	*	*	*	*	*	*	*	*	*
	Median	*	*	*	*	*	*	*	*	*	*
	StDev	*	*	*	*	*	*	*	*	*	*
	Count	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% above DL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	COV	-	-	-	-	-	-	-	-	-	-
Freeway	Mean	*	*	*	*	*	50.42	*	*	*	50.42
	Median	*	*	*	*	*	35.60	*	*	*	35.60
	StDev	*	*	*	*	*	40.90	*	*	*	40.90
	Count	0.00	0.00	0.00	0.00	0.00	25.00	0.00	0.00	0.00	25.00
	% above DL	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	100.00
	COV	-	-	-	-	-	0.81	-	-	-	0.81
Mixed Freeway	Mean	*	*	*	*	*	*	*	*	*	*
	Median	*	*	*	*	*	*	*	*	*	*
	StDev	*	*	*	*	*	*	*	*	*	*
	Count	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% above DL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	COV	-	-	-	-	-	-	-	-	-	-
Industrial	Mean	*	200.92	*	*	*	*	*	*	*	200.92
	Median	*	127.50	*	*	*	*	*	*	*	127.50
	StDev	*	198.21	*	*	*	*	*	*	*	198.21
	Count	0.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00
	% above DL	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
	COV	-	0.99	-	-	-	-	-	-	-	0.99
Mixed Industrial	Mean	*	*	*	*	*	118.18	*	*	*	118.18
	Median	*	*	*	*	*	65.00	*	*	*	65.00
	StDev	*	*	*	*	*	158.40	*	*	*	158.40
	Count	0.00	0.00	0.00	0.00	0.00	11.00	0.00	0.00	0.00	11.00
	% above DL	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	100.00
	COV	-	-	-	-	-	1.34	-	-	-	1.34

Turbidity	(NTU)	Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Institutional	Mean	*	*	*	*	*	*	*	*	*	*
	Median	*	*	*	*	*	*	*	*	*	*
	StDev	*	*	*	*	*	*	*	*	*	*
	Count	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% above DL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	COV	-	-	-	-	-	-	-	-	-	-
MIX	Mean	*	*	*	*	*	*	*	*	*	*
	Median	*	*	*	*	*	*	*	*	*	*
	StDev	*	*	*	*	*	*	*	*	*	*
	Count	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% above DL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	COV	-	-	-	-	-	-	-	-	-	-
Open Space	Mean	*	36.00	*	*	*	*	*	*	*	36.00
	Median	*	36.00	*	*	*	*	*	*	*	36.00
	StDev	*	*	*	*	*	*	*	*	*	*
	Count	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
	% above DL	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
	COV	-	-	-	-	-	-	-	-	-	-
Mixed Open Space	Mean	*	*	*	*	*	*	*	*	*	*
	Median	*	*	*	*	*	*	*	*	*	*
	StDev	*	*	*	*	*	*	*	*	*	*
	Count	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% above DL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	COV	-	-	-	-	-	-	-	-	-	-
Residential	Mean	*	*	*	*	*	*	*	*	*	*
	Median	*	*	*	*	*	*	*	*	*	*
	StDev	*	*	*	*	*	*	*	*	*	*
	Count	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% above DL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	COV	-	-	-	-	-	-	-	-	-	-
Mixed Residential	Mean	*	20.00	33.50	*	*	*	*	*	*	29.00
	Median	*	20.00	33.50	*	*	*	*	*	*	26.00
	StDev	*	*	10.61	*	*	*	*	*	*	10.82
	Count	0.00	1.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	3.00
	% above DL	0.00	100.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
	COV	-	-	0.32	-	-	-	-	-	-	0.37
ALL	Mean	*	172.10	33.50	*	*	71.13	*	*	*	93.86
	Median	*	105.50	33.50	*	*	50.00	*	*	*	55.00
	StDev	*	191.54	10.61	*	*	96.53	*	*	*	130.08
	Count	0.00	12.00	2.00	0.00	0.00	36.00	0.00	0.00	0.00	50.00
	% above DL	0.00	100.00	100.00	0.00	0.00	100.00	0.00	0.00	0.00	100.00
	COV	-	1.11	0.32	-	-	1.36	-	-	-	1.39

Temperature (°C)		Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Commercial	Mean	16.13	16.61	*	23.67	16.23	20.87	12.72	*	*	16.77
	Median	17.80	16.75	*	23.00	17.00	20.25	11.90	*	*	16.40
	StDev	6.29	6.58	*	2.08	4.76	7.13	4.54	*	*	6.31
	Count	21	38	0	3	41	26	21	0	0	150
	% above DL	100	100	0	100	100	100	100	0	0	100
	COV	0.39	0.40	-	0.09	0.29	0.34	0.36	-	-	0.38
Mixed Commercial	Mean	*	*	20.66	*	16.15	*	11.95	9.93	12.30	15.02
	Median	*	*	19.30	*	15.25	*	11.05	9.25	16.90	14.50
	StDev	*	*	4.31	*	5.14	*	3.70	3.91	7.97	5.38
	Count	0	0	5	0	64	0	20	6	3	98
	% above DL	0	0	100	0	100	0	100	100	100	100
	COV	-	-	0.21	-	0.32	-	0.31	0.39	0.65	0.36
Freeway	Mean	20.97	15.37	*	*	*	12.45	13.45	*	*	14.84
	Median	19.10	16.70	*	*	*	14.30	14.00	*	*	15.60
	StDev	3.95	7.81	*	*	*	3.70	5.64	*	*	7.12
	Count	3	81	0	0	0	18	13	0	0	115
	% above DL	100	100	0	0	0	100	100	0	0	100
	COV	0.19	0.51	-	-	-	0.30	0.42	-	-	0.48
Mixed Freeway	Mean	12.97	*	*	*	16.39	*	*	*	*	15.78
	Median	13.70	*	*	*	16.50	*	*	*	*	16.00
	StDev	4.35	*	*	*	5.08	*	*	*	*	5.01
	Count	3	0	0	0	14	0	0	0	0	17
	% above DL	100	0	0	0	100	0	0	0	0	100
	COV	0.34	-	-	-	0.31	-	-	-	-	0.32
Industrial	Mean	13.88	13.34	18.69	22.33	19.47	20.21	9.90	*	*	17.83
	Median	14.30	13.89	18.00	23.00	20.50	17.25	9.00	*	*	17.10
	StDev	7.41	9.19	6.55	4.60	5.84	6.40	2.70	*	*	7.61
	Count	6	41	7	9	47	52	5	0	0	167
	% above DL	100	100	100	100	100	100	100	0	0	100
	COV	0.53	0.69	0.35	0.21	0.30	0.32	0.27	-	-	0.43
Mixed Industrial	Mean	*	*	17.98	*	17.07	*	*	*	13.48	16.94
	Median	*	*	18.47	*	17.70	*	*	*	17.55	17.70
	StDev	*	*	4.91	*	5.95	*	*	*	8.16	6.00
	Count	0	0	12	0	63	0	0	0	6	81
	% above DL	0	0	100	0	100	0	0	0	100	100
	COV	-	-	0.27	-	0.35	-	-	-	0.61	0.35

Temperature (° C)		Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Institutional	Mean	12.10	*	*	*	*	*	*	*	*	12.10
	Median	12.60	*	*	*	*	*	*	*	*	12.60
	StDev	9.86	*	*	*	*	*	*	*	*	9.86
	Count	3	0	0	0	0	0	0	0	0	3
	% above DL	100	0	0	0	0	0	0	0	0	100
	COV	0.81	-	-	-	-	-	-	-	-	0.81
MIX	Mean	15.87	*	*	*	*	*	*	*	*	15.87
	Median	17.70	*	*	*	*	*	*	*	*	17.70
	StDev	6.58	*	*	*	*	*	*	*	*	6.58
	Count	63	0	0	0	0	0	0	0	0	63
	% above DL	100	0	0	0	0	0	0	0	0	100
	COV	0.41	-	-	-	-	-	-	-	-	0.41
Open Space	Mean	12.65	*	*	*	*	7.50	*	*	*	11.91
	Median	10.80	*	*	*	*	7.50	*	*	*	9.10
	StDev	6.17	*	*	*	*	*	*	*	*	5.96
	Count	6	0	0	0	0	1	0	0	0	7
	% above DL	100	0	0	0	0	100	0	0	0	100
	COV	0.49	-	-	-	-	-	-	-	-	0.50
Mixed Open Space	Mean	*	*	*	*	16.28	*	*	*	12.33	16.13
	Median	*	*	*	*	16.00	*	*	*	13.80	16.00
	StDev	*	*	*	*	4.74	*	*	*	8.10	4.89
	Count	0	0	0	0	73	0	0	0	3	76
	% above DL	0	0	0	0	100	0	0	0	100	100
	COV	-	-	-	-	0.29	-	-	-	0.66	0.30
Residential	Mean	14.92	13.27	16.02	19.71	18.10	19.54	11.35	11.22	*	14.81
	Median	14.00	14.44	15.66	20.00	18.00	17.25	10.35	13.30	*	15.40
	StDev	6.18	8.99	3.95	4.67	5.19	7.12	4.41	3.22	*	7.88
	Count	55	220	12	16	71	20	20	5	0	419
	% above DL	100	100	100	100	100	100	100	100	0	100
	COV	0.41	0.68	0.25	0.24	0.29	0.36	0.39	0.29	-	0.53
Mixed Residential	Mean	13.67	11.50	15.65	*	16.18	18.50	*	11.57	14.07	15.87
	Median	15.00	11.50	16.20	*	16.00	15.75	*	11.80	16.90	15.50
	StDev	5.13	*	6.46	*	5.02	7.47	*	2.73	8.13	5.39
	Count	3	1	20	0	98	6	0	6	3	137
	% above DL	100	100	100	0	100	100	0	100	100	100
	COV	0.38	-	0.41	-	0.31	0.40	-	0.24	0.58	0.34
ALL	Mean	15.32	14.05	17.05	20.98	16.94	18.92	12.12	10.89	13.13	15.78
	Median	16.30	15.61	17.20	21.00	17.00	16.50	11.70	10.80	16.90	16.00
	StDev	6.37	8.60	5.57	4.59	5.29	6.96	4.42	3.20	7.22	6.92
	Count	163	381	56	28	471	123	79	17	15	1333
	% above DL	100	100	100	100	100	100	100	100	100	100
	COV	0.42	0.61	0.33	0.22	0.31	0.37	0.36	0.29	0.55	0.44

TDS	(mg/L)	Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Commercial	Mean	371.4	162.5	63.8	151.7	54.4	122	66	*	137.7	175.3
	Median	114	76	51	95	47	83	53.5	*	120	77
	StDev	976.1	405	31.4	163.4	22.2	85.3	67.9	*	85.3	501.3
	Count	95	273	24	41	39	23	42	0	25	562
	% above DL	100	100	100	95	100	100	100	0	100	99
	COV	2.63	2.49	0.49	1.08	0.41	0.70	1.03	-	0.62	2.86
Mixed Commercial	Mean	*	91.1	112.2	154	71	92.7	398	150.7	107.7	121.7
	Median	*	71.5	56	143	55	82	137	147.5	93	71
	StDev	*	79.7	83	90.8	43.3	23.9	596.4	94.1	49.6	222.5
	Count	0	174	5	4	60	3	30	6	7	289
	% above DL	0	99	100	100	100	100	100	100	100	99
	COV	-	0.87	0.74	0.59	0.61	0.26	1.50	0.62	0.46	1.83
Freeway	Mean	124.3	566.6	*	*	*	93.1	85.1	*	*	144
	Median	78	574.5	*	*	*	78	57.5	*	*	80
	StDev	124.1	284.2	*	*	*	71.6	86.3	*	*	185.4
	Count	7	12	0	0	0	83	12	0	0	114
	% above DL	100	100	0	0	0	99	100	0	0	99
	COV	1.00	0.50	-	-	-	0.77	1.01	-	-	1.29
Mixed Freeway	Mean	210	*	*	*	174.6	*	*	*	*	181.7
	Median	250	*	*	*	175.5	*	*	*	*	177
	StDev	71	*	*	*	64.9	*	*	*	*	65.2
	Count	3	0	0	0	12	0	0	0	0	15
	% above DL	100	0	0	0	100	0	0	0	0	100
	COV	0.34	-	-	-	0.37	-	-	-	-	0.36
Industrial	Mean	510.5	199.4	84.6	174.8	85.6	138.1	76.7	*	406.9	212.2
	Median	102	77.5	60	126	71	134	70.5	*	154	88
	StDev	1262.3	834.5	74.4	210	46.5	67	44.1	*	454.4	713
	Count	76	198	69	50	43	60	24	0	19	539
	% above DL	100	99	98	100	100	100	100	0	100	99
	COV	2.47	4.19	0.88	1.20	0.54	0.49	0.57	-	1.12	3.36
Mixed Industrial	Mean	*	111.7	195.2	*	78.2	104.3	35.8	*	96.2	104.5
	Median	*	100	100	*	62	88	36	*	80.5	84.5
	StDev	*	69.2	190.3	*	54.3	55.8	9.8	*	53.3	84.5
	Count	0	95	17	0	63	13	6	0	20	214
	% above DL	0	100	100	0	98	100	100	0	100	99
	COV	-	0.62	0.97	-	0.69	0.53	0.27	-	0.55	0.81

TDS	(mg/L)	Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Institutional	Mean	137.7	65.7	*	*	*	*	*	*	*	83.7
	Median	135	52.5	*	*	*	*	*	*	*	61
	StDev	66	43.8	*	*	*	*	*	*	*	58.1
	Count	6	18	0	0	0	0	0	0	0	24
	% above DL	100	100	0	0	0	0	0	0	0	100
	COV	0.48	0.67	-	-	-	-	-	-	-	0.69
MIX	Mean	*	*	*	*	*	*	*	*	*	*
	Median	*	*	*	*	*	*	*	*	*	*
	StDev	*	*	*	*	*	*	*	*	*	*
	Count	0	0	0	0	0	0	0	0	0	0
	% above DL	0	0	0	0	0	0	0	0	0	0
	COV	-	-	-	-	-	-	-	-	-	-
Open Space	Mean	*	117	*	199.3	*	35	*	*	*	148.1
	Median	*	82.5	*	164.5	*	35	*	*	*	119
	StDev	*	91.1	*	120.7	*	*	*	*	*	110.8
	Count	0	26	0	18	0	1	0	0	0	45
	% above DL	0	96	0	100	0	100	0	0	0	98
	COV	-	0.78	-	0.61	-	-	-	-	-	0.75
Mixed Open Space	Mean	*	94.3	*	*	211.1	*	*	*	789.2	175.4
	Median	*	95	*	*	135	*	*	*	110	108.5
	StDev	*	41.1	*	*	270.2	*	*	*	1690.8	387.5
	Count	0	75	0	0	67	0	0	0	6	148
	% above DL	0	100	0	0	99	0	0	0	100	99
	COV	-	0.44	-	-	1.28	-	-	-	2.14	2.21
Residential	Mean	335.4	123.3	88	163.9	77.4	113.7	60.6	139.7	161.7	145.2
	Median	90.2	70	68	122.5	63	90	60	125	100	76
	StDev	948	354.2	51.5	151.2	35	65.3	34.8	82.7	194.5	437.5
	Count	133	636	55	74	64	41	51	7	23	1084
	% above DL	100	99	100	99	100	100	98	100	100	99
	COV	2.83	2.87	0.59	0.92	0.45	0.57	0.57	0.59	1.20	3.01
Mixed Residential	Mean	1090.4	97.1	147.1	162.4	115.6	58.7	72.1	258.6	162.7	154.6
	Median	69	82	87.5	166	79.5	59	40	198	88	84
	StDev	3896.5	64.4	206	89.5	121.4	36.6	72	148.6	218.9	802.2
	Count	21	247	71	22	96	9	18	8	22	514
	% above DL	95	100	100	100	100	89	89	100	100	99
	COV	3.57	0.66	1.40	0.55	1.05	0.62	1.00	0.57	1.35	5.19
ALL	Mean	422	131.6	110.1	166.8	106.5	110.2	121.2	188.1	212.2	158.1
	Median	98	77	72	124	73	98	58	165	101.5	81
	StDev	1376.2	392.2	136.4	160.7	133.1	71.1	272.8	123.4	439.8	530.3
	Count	341	1754	241	209	444	233	183	21	122	3548
	% above DL	99	99	99	99	99	99	98	100	100	99
	COV	3.26	2.98	1.24	0.96	1.25	0.65	2.25	0.66	2.07	3.35

TSS	(mg/L)	Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Commercial	Mean	135	86	59.5	234.8	67.3	132.1	81.1	*	226.5	110.9
	Median	88	42.46	25.5	37.2	29.5	106	48.5	*	152	50
	StDev	158.8	158.5	116.6	437.4	109.9	139.4	88.4	*	329.4	195.5
	Count	237	454	50	63	40	23	42	0	25	934
	% above DL	99	99	100	97	95	100	98	0	96	99
	COV	1.18	1.84	1.96	1.86	1.63	1.06	1.09	-	1.45	1.76
Mixed Commercial	Mean	376.1	121.3	46.6	236.5	129.9	128.8	83	139.4	284.3	171.4
	Median	256.5	61.72	45	175.5	59	117	70.5	106	274	82
	StDev	451.1	178.7	18	221.1	204.7	68.9	66.1	135.4	139.7	265.7
	Count	84	261	5	20	60	4	30	8	7	479
	% above DL	100	100	100	100	98	100	100	100	100	99
	COV	1.20	1.47	0.39	0.93	1.58	0.53	0.80	0.97	0.49	1.55
Freeway	Mean	97.1	81.2	36.2	*	*	180.9	150.9	*	*	113.3
	Median	93	36.29	24.6	*	*	96	108.5	*	*	53.34
	StDev	78.4	126.5	51.5	*	*	501.3	129.8	*	*	290.1
	Count	7	217	13	0	0	105	26	0	0	368
	% above DL	100	100	100	0	0	99	100	0	0	99
	COV	0.81	1.56	1.42	-	-	2.77	0.86	-	-	2.56
Mixed Freeway	Mean	24	110.2	*	*	144.2	*	*	*	*	116.7
	Median	28	110.86	*	*	93	*	*	*	*	88
	StDev	6.9	62.3	*	*	157.6	*	*	*	*	123.5
	Count	3	8	0	0	12	0	0	0	0	23
	% above DL	100	100	0	0	100	0	0	0	0	100
	COV	0.29	0.57	-	-	1.09	-	-	-	-	1.06
Industrial	Mean	177	78.3	95.7	191.1	244.9	492.8	182.7	*	290.7	160.2
	Median	85.75	52.06	38	88.5	167	297	114.5	*	130	75
	StDev	251	77.5	122.4	265	387.2	491.2	222.4	*	313	260.4
	Count	100	304	82	50	43	61	24	0	19	683
	% above DL	100	99	96	100	100	100	100	0	100	99
	COV	1.42	0.99	1.28	1.39	1.58	1.00	1.22	-	1.08	1.63
Mixed Industrial	Mean	*	169.3	123.7	89.9	95	132.7	91.3	*	425.7	155.8
	Median	*	78	67	55.9	72	93.5	107.5	*	335	84
	StDev	*	261.2	128.8	74.4	89.3	92.1	50	*	308.3	213.2
	Count	0	100	23	18	63	26	6	0	20	256
	% above DL	0	100	100	100	100	100	100	0	100	100
	COV	-	1.54	1.04	0.83	0.94	0.69	0.55	-	0.72	1.37

TSS	(mg/L)	Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Institutional	Mean	91.4	19.1	46.2	*	*	*	*	*	*	43.8
	Median	101	16.5	17	*	*	*	*	*	*	18
	StDev	63.4	16.8	74.8	*	*	*	*	*	*	63.2
	Count	8	18	27	0	0	0	0	0	0	53
	% above DL	100	94	100	0	0	0	0	0	0	98
	COV	0.69	0.88	1.62	-	-	-	-	-	-	1.44
MIX	Mean	57.4	*	*	*	*	*	*	*	*	57.4
	Median	42.5	*	*	*	*	*	*	*	*	42.5
	StDev	48.2	*	*	*	*	*	*	*	*	48.2
	Count	78	0	0	0	0	0	0	0	0	78
	% above DL	94	0	0	0	0	0	0	0	0	94
	COV	0.84	-	-	-	-	-	-	-	-	0.84
Open Space	Mean	26.4	25.1	*	369.6	*	330	*	*	*	84.4
	Median	24	11.75	*	300	*	330	*	*	*	18.25
	StDev	16.6	30.5	*	310	*	*	*	*	*	180.5
	Count	11	80	0	18	0	1	0	0	0	110
	% above DL	91	98	0	100	0	100	0	0	0	97
	COV	0.63	1.22	-	0.84	-	-	-	-	-	2.14
Mixed Open Space	Mean	191.3	116.8	*	*	192.9	*	*	*	846.3	186.9
	Median	50	62	*	*	98	*	*	*	826	68
	StDev	436.8	157.9	*	*	317.8	*	*	*	372.4	360.1
	Count	115	79	0	0	67	0	0	0	7	268
	% above DL	100	99	0	0	96	0	0	0	100	99
	COV	2.28	1.35	-	-	1.65	-	-	-	0.44	1.93
Residential	Mean	140.1	85.2	107.6	450.1	109.6	107.7	98.5	96.9	155.5	114.8
	Median	85	40	49.5	99.5	76	89	82.5	53	71	53
	StDev	168.1	142.1	172.2	768.4	106.3	74.9	87.5	113	228.3	226.6
	Count	332	1388	122	102	107	40	170	7	78	2346
	% above DL	99	99	99	99	100	100	100	100	100	99
	COV	1.20	1.67	1.60	1.71	0.97	0.70	0.89	1.17	1.47	1.97
Mixed Residential	Mean	123.4	135.3	112.3	75	148.8	241.8	167.8	173	1277.3	176.4
	Median	74	58	52.5	58	110	216	92	118	607.5	78
	StDev	133.9	231.9	149	56.9	131.7	207.1	334.2	132.3	2093.5	479.8
	Count	157	557	98	22	96	27	145	9	38	1149
	% above DL	100	99	97	100	99	100	100	100	97	99
	COV	1.09	1.71	1.33	0.76	0.89	0.86	1.99	0.76	1.64	2.72
ALL	Mean	155	96.7	94.6	289.8	138.7	234.2	126	139.6	455	136
	Median	80.5	45	38	91	78	120	87	88.5	156.5	61
	StDev	246.8	164.8	141.7	532.7	205.8	410.4	212.8	126.4	1040.9	295.4
	Count	1132	3466	420	293	488	287	443	24	194	6747
	% above DL	99	99	98	99	99	99	99	100	99	99
	COV	1.59	1.70	1.50	1.84	1.48	1.75	1.69	0.91	2.29	2.17

BOD_5	(mg/L)	Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Commercial	Mean	12.57	18.18	10.19	18.05	6.94	43.73	10.93	*	*	15.82
	Median	9	12	6.05	11.25	7.25	42	7	*	*	10
	StDev	11.18	23.03	13.21	18.93	3.08	29.14	10.14	*	*	19.47
	Count	204	410	50	54	40	15	42	0	0	815
	% above DL	83	98	98	96	100	100	93	0	0	94
	COV	0.89	1.27	1.30	1.05	0.44	0.67	0.93	-	-	1.23
Mixed Commercial	Mean	15.6	17.91	6.4	37.46	6.61	9	14.16	25	34.4	16
	Median	15	12	8	29	7	9	9.8	16	29	9.97
	StDev	8.5	31.01	3.29	27.74	2.75	*	19.43	22.29	14.83	25
	Count	46	192	5	7	58	1	30	7	5	351
	% above DL	100	98	100	100	100	100	97	71	100	98
	COV	0.54	1.73	0.51	0.74	0.42	-	1.37	0.89	0.43	1.56
Freeway	Mean	8.43	13.45	6.35	*	*	*	12.88	*	*	12.41
	Median	8	9.69	6.62	*	*	*	6.5	*	*	8.7
	StDev	4.05	13.12	2.83	*	*	*	17.76	*	*	13.36
	Count	7	91	13	0	0	0	26	0	0	137
	% above DL	86	99	100	0	0	0	85	0	0	96
	COV	0.48	0.98	0.45	-	-	-	1.38	-	-	1.08
Mixed Freeway	Mean	20.4	27.97	*	*	6.72	*	*	*	*	15.89
	Median	19.5	16.79	*	*	5.55	*	*	*	*	8.2
	StDev	2.38	27.95	*	*	3.38	*	*	*	*	18.88
	Count	3	8	0	0	12	0	0	0	0	23
	% above DL	100	100	0	0	100	0	0	0	0	100
	COV	0.12	1.00	-	-	0.50	-	-	-	-	1.19
Industrial	Mean	12.07	15.31	7.66	150	6.36	60.11	39.74	*	*	26.9
	Median	9	10	6	7.5	6.35	30	24	*	*	8.06
	StDev	13.43	17.37	10.7	987.31	2.27	68.79	38.25	*	*	280.56
	Count	83	298	82	49	46	25	27	0	0	610
	% above DL	82	97	89	94	100	92	100	0	0	94
	COV	1.11	1.13	1.40	6.58	0.36	1.14	0.96	-	-	10.43
Mixed Industrial	Mean	*	14.89	8.23	12.99	6.78	11.41	13.18	*	43.92	13.37
	Median	*	8	6	10.3	6.55	10	12.8	*	39	8
	StDev	*	28.99	8.12	8.8	3.59	7.49	7.48	*	20.95	22.1
	Count	0	97	23	8	62	7	6	0	13	216
	% above DL	0	100	70	100	100	100	83	0	100	96
	COV	-	1.95	0.99	0.68	0.53	0.66	0.57	-	0.48	1.65

BOD_5	(mg/L)	Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Institutional	Mean	4.47	9.06	12.89	*	*	*	*	*	*	10.55
	Median	4.2	7.5	13	*	*	*	*	*	*	9.3
	StDev	1	7.26	6.97	*	*	*	*	*	*	7.18
	Count	6	18	27	0	0	0	0	0	0	51
	% above DL	100	89	100	0	0	0	0	0	0	96
	COV	0.22	0.80	0.54	-	-	-	-	-	-	0.68
MIX	Mean	18.28	*	*	*	*	*	*	*	*	18.28
	Median	9.8	*	*	*	*	*	*	*	*	9.8
	StDev	29.16	*	*	*	*	*	*	*	*	29.16
	Count	78	0	0	0	0	0	0	0	0	78
	% above DL	54	0	0	0	0	0	0	0	0	54
	COV	1.60	-	-	-	-	-	-	-	-	1.60
Open Space	Mean	4.27	4.59	*	6.31	*	20	*	*	*	5.38
	Median	3	3.35	*	6	*	20	*	*	*	4
	StDev	3.42	3.58	*	4.03	*	*	*	*	*	4.23
	Count	11	24	0	18	0	1	0	0	0	54
	% above DL	91	88	0	83	0	100	0	0	0	87
	COV	0.80	0.78	-	0.64	-	-	-	-	-	0.79
Mixed Open Space	Mean	*	10.19	*	*	6.48	*	*	*	94.43	12.59
	Median	*	4.6	*	*	6.6	*	*	*	67	5.3
	StDev	*	32.45	*	*	2.97	*	*	*	85.54	34.36
	Count	0	73	0	0	65	0	0	0	7	145
	% above DL	0	97	0	0	95	0	0	0	100	97
	COV	-	3.18	-	-	0.46	-	-	-	0.91	2.73
Residential	Mean	14.19	13.42	7.3	19.03	8.82	34.67	9.34	29.33	*	13.43
	Median	7	8.099	6	13.5	7.4	23	6	14.5	*	8
	StDev	29.39	24.06	6.3	19.08	7.9	28.82	9.14	31.37	*	23.41
	Count	222	1021	86	80	85	21	58	6	0	1579
	% above DL	79	98	92	100	100	100	91	83	0	95
	COV	2.07	1.79	0.86	1.00	0.90	0.83	0.98	1.07	-	1.74
Mixed Residential	Mean	10.18	11.41	6.04	16.64	8.86	26.15	10.12	29.38	35.53	11.12
	Median	7	7.18	3.7	16.5	7.9	20	9.5	29.5	18	7.23
	StDev	9.94	14.92	7.17	8.97	5.34	19.3	5.32	19.91	36.52	14.18
	Count	87	329	131	22	93	10	18	8	19	717
	% above DL	100	99	80	100	100	90	100	88	100	96
	COV	0.98	1.31	1.19	0.54	0.60	0.74	0.53	0.68	1.03	1.28
ALL	Mean	13.31	14.38	7.69	44.93	7.48	40.72	14.95	27.9	47.25	15.31
	Median	8.2	9	5.6	10.4	7.2	22.5	8	18	34	8
	StDev	20.5	22.97	8.8	447.83	4.87	45.79	20.47	23.2	46.56	102.29
	Count	747	2561	417	238	461	80	207	21	44	4776
	% above DL	82	98	88	97	99	96	93	81	100	94
	COV	1.54	1.60	1.14	9.97	0.65	1.12	1.37	0.83	0.99	6.68

COD	(mg/L)	Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Commercial	Mean	70.1	87.59	71.86	69.75	50.51	231.5	59.83	*	*	84.46
	Median	50.7	65.37	43	49.25	45	205	43.5	*	*	57
	StDev	61.69	78.73	100.53	62.58	28.88	129.06	53.47	*	*	83.4
	Count	180	328	50	46	41	36	42	0	0	723
	% above DL	97	99	96	98	98	100	100	0	0	98
	COV	0.88	0.90	1.40	0.90	0.57	0.56	0.89	-	-	0.99
Mixed Commercial	Mean	95.9	107	40.4	109.61	62.07	*	67.93	179.75	197.14	97.49
	Median	77.5	71.5	43	94.75	51	*	49	170	180	70
	StDev	71.84	103.85	10.31	64.45	45.15	*	64.14	107.91	72.96	89.93
	Count	68	210	5	16	64	0	30	8	7	408
	% above DL	100	99	100	100	98	0	100	100	100	99
	COV	0.75	0.97	0.26	0.59	0.73	-	0.94	0.60	0.37	0.92
Freeway	Mean	61.8	67.64	66.8	*	84.29	146.79	99.09	*	*	87.63
	Median	50	58	66.05	*	59	110	47	*	*	64
	StDev	32.05	47	55.16	*	79.71	151.87	130.22	*	*	89.47
	Count	7	106	14	0	253	56	11	0	0	447
	% above DL	100	100	100	0	100	98	100	0	0	99
	COV	0.52	0.69	0.83	-	0.95	1.03	1.31	-	-	1.02
Mixed Freeway	Mean	88.4	*	*	*	44.08	*	*	*	*	52.95
	Median	95.2	*	*	*	44	*	*	*	*	47
	StDev	25.68	*	*	*	18.79	*	*	*	*	26.62
	Count	3	0	0	0	12	0	0	0	0	15
	% above DL	100	0	0	0	100	0	0	0	0	100
	COV	0.29	-	-	-	0.43	-	-	-	-	0.50
Industrial	Mean	107.92	72.22	44.95	121.9	48.54	251.52	104.17	*	*	95.62
	Median	65.3	59	32	57	35	235	84.5	*	*	58
	StDev	135.83	56.56	40.69	230.03	40.02	167.01	75.83	*	*	120.45
	Count	66	197	89	33	45	60	24	0	0	514
	% above DL	97	99	100	97	96	100	100	0	0	98
	COV	1.26	0.78	0.91	1.89	0.82	0.66	0.73	-	-	1.26
Mixed Industrial	Mean	*	53.98	40.13	56.7	47.86	*	68.67	*	225.71	62.34
	Median	*	40.7	33	57.95	38	*	71.5	*	215	42
	StDev	*	61.02	32.31	27.47	40.81	*	27.26	*	87.06	67.83
	Count	0	97	23	16	63	0	6	0	14	219
	% above DL	0	99	100	100	97	0	100	0	100	99
	COV	-	1.13	0.81	0.48	0.85	-	0.40	-	0.39	1.09

COD	(mg/L)	Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Institutional	Mean	31.4	67.89	43.3	*	*	*	*	*	*	50.21
	Median	30	44	35	*	*	*	*	*	*	35
	StDev	12.59	68.66	29.93	*	*	*	*	*	*	47.23
	Count	7	18	27	0	0	0	0	0	0	52
	% above DL	100	89	100	0	0	0	0	0	0	96
	COV	0.40	1.01	0.69	-	-	-	-	-	-	0.94
MIX	Mean	71.08	*	*	*	*	*	*	*	*	71.08
	Median	74	*	*	*	*	*	*	*	*	74
	StDev	11.03	*	*	*	*	*	*	*	*	11.03
	Count	6	0	0	0	0	0	0	0	0	6
	% above DL	100	0	0	0	0	0	0	0	0	100
	COV	0.16	-	-	-	-	-	-	-	-	0.16
Open Space	Mean	24.72	21.52	*	66.03	*	59	*	*	*	38.01
	Median	23.2	12	*	45.85	*	59	*	*	*	23.2
	StDev	8.51	22.03	*	103.79	*	*	*	*	*	64.64
	Count	11	23	0	18	0	1	0	0	0	53
	% above DL	100	57	0	100	0	100	0	0	0	81
	COV	0.34	1.02	-	1.57	-	-	-	-	-	1.70
Mixed Open Space	Mean	*	38.54	*	*	38.43	*	*	*	335.71	52.84
	Median	*	28.65	*	*	34.5	*	*	*	260	33
	StDev	*	41.29	*	*	28.07	*	*	*	231.43	86.69
	Count	0	72	0	0	66	0	0	0	7	145
	% above DL	0	100	0	0	92	0	0	0	100	97
	COV	-	1.07	-	-	0.73	-	-	-	0.69	1.64
Residential	Mean	55.53	73.12	42.68	91.49	72.68	162.11	48.02	118.86	87.82	70.08
	Median	40	54	30.3	66	56	135	37	112	70	50.9
	StDev	65.13	70.84	41.12	119.76	60.64	100.08	35.68	73.87	54.39	70.68
	Count	163	887	96	55	108	44	187	7	33	1580
	% above DL	99	99	98	98	100	100	99	100	100	99
	COV	1.17	0.97	0.96	1.31	0.83	0.62	0.74	0.62	0.62	1.01
Mixed Residential	Mean	66.89	70.86	30.59	85.23	64.07	93.78	48.88	292.11	223.71	68.77
	Median	56	49	24.3	74.5	57	90	37.2	295	190	49
	StDev	38.15	77.18	23.74	58.01	38.57	47.81	36.58	178.98	104.43	71.49
	Count	104	389	94	22	95	27	145	9	21	906
	% above DL	100	100	100	100	99	96	100	100	100	99
	COV	0.57	1.09	0.78	0.68	0.60	0.51	0.75	0.61	0.47	1.04
ALL	Mean	71.36	75.1	44.71	87.32	66.36	184.68	55.33	204.13	176.66	76.83
	Median	51	55	32	59.05	51	140	41	161.5	155.5	53
	StDev	73.11	74.63	50.28	122.12	60.34	144.8	49.15	146.83	125.97	83.23
	Count	615	2327	398	206	747	224	445	24	82	5068
	% above DL	98	99	99	99	98	99	99	100	100	99
	COV	1.02	0.99	1.12	1.40	0.91	0.78	0.89	0.72	0.71	1.08

Fecal Coliform (colonies/100mL)		Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Commercial	Mean	71965	17948	2692	51605	39724	10880	45713	*	19717	35931
	Median	1000	3000	1400	17500	8050	2700	1900	*	15000	3000
	StDev	348503	33645	3033	105442	111108	17072	161082	*	27035	159539
	Count	53	144	6	40	40	5	38	0	9	335
	% within DL	77	86	83	95	100	100	95	0	100	89
	COV	4.84	1.87	1.13	2.04	2.80	1.57	3.52	-	1.37	4.44
Mixed Commercial	Mean	*	7831	*	72625	41842	6000	18423	3480	30090	31296
	Median	*	4980	*	87000	8700	6000	3050	1895	30090	5900
	StDev	*	7550	*	48788	119197	4243	61943	4487	42299	94372
	Count	0	13	0	4	63	2	28	4	2	116
	% within DL	0	77	0	75	100	100	93	100	100	95
	COV	-	0.96	-	0.67	2.85	0.71	3.36	1.29	1.41	3.02
Freeway	Mean	12000	11338	*	*	*	7945	7061	*	*	8604
	Median	12000	2000	*	*	*	1700	2200	*	*	2000
	StDev	*	37209	*	*	*	16365	12852	*	*	22553
	Count	1	18	0	0	0	26	23	0	0	68
	% within DL	100	100	0	0	0	100	100	0	0	100
	COV	-	3.28	-	-	-	2.06	1.82	-	-	2.62
Mixed Freeway	Mean	1	43005	*	*	8999	*	*	*	*	14451
	Median	1	5105	*	*	730	*	*	*	*	1271
	StDev	0	78027	*	*	17561	*	*	*	*	37162
	Count	3	4	0	0	13	0	0	0	0	20
	% within DL	0	100	0	0	100	0	0	0	0	85
	COV	0.00	1.81	-	-	1.95	-	-	-	-	2.57
Industrial	Mean	88978	13151	6054	77767	99806	4681	5886	*	16807	39394
	Median	1325	1150	1100	1650	9850	4750	535	*	8100	1600
	StDev	541830	34255	10287	332335	375129	2842	15491	*	22162	259804
	Count	44	132	51	46	46	16	28	0	3	366
	% within DL	86	81	90	87	100	94	96	0	100	88
	COV	6.09	2.60	1.70	4.27	3.76	0.61	2.63	-	1.32	6.60
Mixed Industrial	Mean	*	4268	2290	*	13991	3180	55750	*	26087	15317
	Median	*	3100	730	*	6461	500	5750	*	5900	3450
	StDev	*	4952	3676	*	22587	6301	119940	*	47819	37400
	Count	0	3	14	0	63	6	6	0	12	104
	% within DL	0	100	93	0	100	100	100	0	100	99
	COV	-	1.16	1.61	-	1.61	1.98	2.15	-	1.83	2.44

Fecal Coliform (colonies/100mL)		Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Institutional	Mean	3100	*	*	*	*	*	*	*	*	3100
	Median	3400	*	*	*	*	*	*	*	*	3400
	StDev	1375	*	*	*	*	*	*	*	*	1375
	Count	3	0	0	0	0	0	0	0	0	3
	% within DL	100	0	0	0	0	0	0	0	0	100
	COV	0.44	-	-	-	-	-	-	-	-	0.44
MIX	Mean	6952	*	*	*	*	*	*	*	*	6952
	Median	975	*	*	*	*	*	*	*	*	975
	StDev	18380	*	*	*	*	*	*	*	*	18380
	Count	52	0	0	0	0	0	0	0	0	52
	% within DL	63	0	0	0	0	0	0	0	0	94
	COV	2.64	-	-	-	-	-	-	-	-	2.64
Open Space	Mean	14277	8730	*	35687	*	2500	*	*	*	25100
	Median	2150	4800	*	22000	*	2500	*	*	*	6000
	StDev	24384	8484	*	51438	*	*	*	*	*	41853
	Count	6	5	0	16	0	1	0	0	0	28
	% within DL	100	100	0	88	0	100	0	0	0	93
	COV	1.71	0.97	-	1.44	-	-	-	-	-	1.67
Mixed Open Space	Mean	*	11971	*	*	39939	*	*	*	480	33493
	Median	*	600	*	*	5900	*	*	*	480	3400
	StDev	*	38489	*	*	84300	*	*	*	283	77123
	Count	0	17	0	0	67	0	0	0	2	86
	% within DL	0	88	0	0	100	0	0	0	100	97
	COV	-	3.22	-	-	2.11	-	-	-	0.59	2.30
Residential	Mean	176884	16035	54192	51966	106601	12200	16612	8496	32373	62389
	Median	3000	2100	2800	47000	29000	2300	1600	4500	41000	4600
	StDev	680165	45761	229476	49204	180309	18020	44427	12269	25839	314115
	Count	121	285	27	69	70	3	48	5	6	634
	% within DL	85	89	100	80	100	100	98	100	100	90
	COV	3.85	2.85	4.23	0.95	1.69	1.48	2.67	1.44	0.80	5.03
Mixed Residential	Mean	228697	72717	4125	31705	75132	3310	41531	27042	5150	62171
	Median	5850	29547	1200	23000	17750	2700	3660	1700	5150	11105
	StDev	692317	139171	8234	34624	147800	2212	105275	52239	354	199439
	Count	18	104	61	22	95	7	20	5	2	334
	% within DL	89	71	87	95	100	86	85	100	100	94
	COV	3.03	1.91	2.00	1.09	1.97	0.67	2.53	1.93	0.07	3.21
ALL	Mean	112017	23712	13030	54752	59278	6503	23784	13686	22405	45119
	Median	1900	3000	1200	18000	11000	2550	1890	2250	6750	4000
	StDev	529780	67205	95269	170300	168674	11982	88805	31649	33681	227783
	Count	301	725	159	197	457	66	191	14	36	2146
	% within DL	80	88	91	87	100	97	95	100	100	91
	COV	4.73	2.83	7.31	3.11	2.85	1.84	3.73	2.31	1.50	5.05

Fecal Streptococcus (colonies/100mL)		Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Commercial	Mean	32800	31125	13400	43051	112377	7617	14118	*	19401	44272
	Median	3100	9200	6650	16000	26000	5950	1600	*	19000	12000
	StDev	55621	53758	14360	75269	223365	7865	42039	*	20464	113687
	Count	5	69	6	37	40	6	36	0	9	208
	% within DL	80	84	100	95	100	100	97	0	100	93
	COV	1.70	1.73	1.07	1.75	1.99	1.03	2.98	-	1.05	2.57
Mixed Commercial	Mean	*	357667	*	148667	33549	*	22014	*	28000	44388
	Median	*	45000	*	149000	14000	*	10450	*	28000	12000
	StDev	*	556342	*	68501	62465	*	43919	*	35355	115913
	Count	0	3	0	3	63	0	24	0	2	95
	% within DL	0	100	0	67	100	0	100	0	100	99
	COV	-	1.56	-	0.46	1.86	-	2.00	-	1.26	2.61
Freeway	Mean	32000	*	*	*	*	38093	10599	*	*	27459
	Median	32000	*	*	*	*	23000	2150	*	*	17000
	StDev	31113	*	*	*	*	37179	14933	*	*	32170
	Count	2	0	0	0	0	15	10	0	0	27
	% within DL	100	0	0	0	0	100	100	0	0	100
	COV	0.97	-	-	-	-	0.98	1.41	-	-	1.17
Mixed Freeway	Mean	26667	*	*	*	16702	*	*	*	*	18571
	Median	19000	*	*	*	10000	*	*	*	*	14500
	StDev	31214	*	*	*	19936	*	*	*	*	21541
	Count	3	0	0	0	13	0	0	0	0	16
	% within DL	67	0	0	0	100	0	0	0	0	94
	COV	1.17	-	-	-	1.19	-	-	-	-	1.16
Industrial	Mean	16178	50624	14767	14860	180825	12292	10670	*	32000	63828
	Median	13700	14000	2900	3800	17000	9800	2655	*	46000	12000
	StDev	17280	101933	21777	39220	892152	7991	14913	*	26000	432034
	Count	6	63	3	40	45	13	24	0	3	197
	% within DL	83	90	100	90	100	100	96	0	100	94
	COV	1.07	2.01	1.47	2.64	4.93	0.65	1.40	-	0.81	6.77
Mixed Industrial	Mean	*	7300	*	*	26420	*	13534	*	29242	25436
	Median	*	7300	*	*	10000	*	1600	*	19000	10666
	StDev	*	1273	*	*	68615	*	22481	*	30279	61113
	Count	0	2	0	0	63	0	6	0	12	83
	% within DL	0	100	0	0	100	0	83	0	100	99
	COV	-	0.17	-	-	2.60	-	1.66	-	1.04	2.40

Fecal Streptococcus (colonies/100mL)		Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Institutional	Mean	23000	*	*	*	*	*	*	*	*	23000
	Median	2400	*	*	*	*	*	*	*	*	2400
	StDev	36375	*	*	*	*	*	*	*	*	36375
	Count	3	0	0	0	0	0	0	0	0	3
	% within DL	9	106	27	0	0	0	0	0	0	142
	COV	1.58	-	-	-	-	-	-	-	-	1.58
MIX	Mean	*	*	*	*	*	*	*	*	*	*
	Median	*	*	*	*	*	*	*	*	*	*
	StDev	*	*	*	*	*	*	*	*	*	*
	Count	0	0	0	0	0	0	0	0	0	0
	% within DL	0	0	0	0	0	0	0	0	0	0
	COV	-	-	-	-	-	-	-	-	-	-
Open Space	Mean	*	39750	*	34117	*	9800	*	*	*	34548
	Median	*	41500	*	24000	*	9800	*	*	*	24900
	StDev	*	30624	*	34858	*	*	*	*	*	32717
	Count	0	6	0	15	0	1	0	0	0	22
	% within DL	0	100	0	87	0	100	0	0	0	95
	COV	-	0.77	-	1.02	-	-	-	-	-	0.95
Mixed Open Space	Mean	*	7508	*	*	91205	*	*	*	17500	82544
	Median	*	3850	*	*	24000	*	*	*	17500	21000
	StDev	*	10375	*	*	206648	*	*	*	21920	196823
	Count	0	6	0	0	67	0	0	0	2	75
	% within DL	0	100	0	0	100	0	0	0	100	100
	COV	-	1.38	-	-	2.27	-	-	-	1.25	2.38
Residential	Mean	68718	38936	36267	59107	110316	6633	10163	*	36900	58205
	Median	25000	20500	24600	24000	51269	5900	2500	*	27000	24000
	StDev	155259	55800	37295	79189	142463	2386	24541	*	35800	100170
	Count	19	70	3	66	70	3	46	0	6	283
	% within DL	95	80	100	79	100	100	96	0	100	89
	COV	2.26	1.43	1.03	1.34	1.29	0.36	2.41	-	0.97	1.72
Mixed Residential	Mean	22000	70471	*	43786	112951	4617	31616	*	23000	82932
	Median	6000	17100	*	31300	38000	2250	3900	*	23000	27000
	StDev	33045	139034	*	37415	215339	4531	93567	*	28284	174651
	Count	3	35	0	21	95	6	16	0	2	178
	% within DL	67	97	0	100	100	100	88	0	100	98
	COV	1.50	1.97	-	0.85	1.91	0.98	2.96	-	1.23	2.11
ALL	Mean	45018	46851	19458	43767	90330	18961	15143	*	27220	56784
	Median	16000	13600	7550	17000	24000	9550	3550	*	20500	16000
	StDev	109123	102950	23150	66869	321667	26040	41826	*	26823	210104
	Count	41	254	12	182	456	44	162	0	36	1187
	% within DL	88	87	100	87	100	100	95	0	100	94
	COV	2.42	2.20	1.19	1.53	3.56	1.37	2.76	-	0.99	3.70

E. Coli (colonies/100 mL)		Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Commercial	Mean	3461	*	*	*	*	*	10878	*	*	4944
	Median	1083	*	*	*	*	*	1910	*	*	1306
	StDev	6544	*	*	*	*	*	22532	*	*	11584
	Count	32	0	0	0	0	0	8	0	0	40
	% within DL	88	0	0	0	0	0	100	0	0	90
	COV	1.89	-	-	-	-	-	2.07	-	-	2.34
Mixed Commercial	Mean	*	*	*	*	*	*	3017	865	*	2131
	Median	*	*	*	*	*	*	3145	130	*	1830
	StDev	*	*	*	*	*	*	2273	1071	*	2128
	Count	0	0	0	0	0	0	10	7	0	17
	% within DL	0	0	0	0	0	0	90	100	0	94
	COV	-	-	-	-	-	-	0.75	1.24	-	1.00
Freeway	Mean	*	*	*	*	*	*	6002	*	*	6002
	Median	*	*	*	*	*	*	1900	*	*	1900
	StDev	*	*	*	*	*	*	13062	*	*	13062
	Count	0	0	0	0	0	0	13	0	0	13
	% within DL	0	0	0	0	0	0	100	0	0	100
	COV	-	-	-	-	-	-	2.18	-	-	2.18
Mixed Freeway	Mean	*	*	*	*	*	*	*	*	*	*
	Median	*	*	*	*	*	*	*	*	*	*
	StDev	*	*	*	*	*	*	*	*	*	*
	Count	0	0	0	0	0	0	0	0	0	0
	% within DL	0	0	0	0	0	0	0	0	0	0
	COV	-	-	-	-	-	-	-	-	-	-
Industrial	Mean	3439	*	*	*	*	*	2426	*	*	3270
	Median	211	*	*	*	*	*	2750	*	*	293
	StDev	6978	*	*	*	*	*	1917	*	*	6392
	Count	20	0	0	0	0	0	4	0	0	24
	% within DL	80	0	0	0	0	0	75	0	0	79
	COV	2.03	-	-	-	-	-	0.79	-	-	1.95
Mixed Industrial	Mean	*	*	*	*	*	*	*	*	*	*
	Median	*	*	*	*	*	*	*	*	*	*
	StDev	*	*	*	*	*	*	*	*	*	*
	Count	0	0	0	0	0	0	0	0	0	0
	% within DL	0	0	0	0	0	0	0	0	0	0
	COV	-	-	-	-	-	-	-	-	-	-

E. Coli (colonies/100 mL)		Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Institutional	Mean	*	*	*	*	*	*	*	*	*	*
	Median	*	*	*	*	*	*	*	*	*	*
	StDev	*	*	*	*	*	*	*	*	*	*
	Count	0	0	0	0	0	0	0	0	0	0
	% within DL	0	0	0	0	0	0	0	0	0	0
	COV	-	-	-	-	-	-	-	-	-	-
MIX	Mean	6477	*	*	*	*	*	*	*	*	6477
	Median	1155	*	*	*	*	*	*	*	*	1155
	StDev	10517	*	*	*	*	*	*	*	*	10517
	Count	6	0	0	0	0	0	0	0	0	6
	% within DL	100	0	0	0	0	0	0	0	0	100
	COV	1.62	-	-	-	-	-	-	-	-	1.62
Open Space	Mean	1556	*	*	*	*	*	*	*	*	1556
	Median	1100	*	*	*	*	*	*	*	*	1100
	StDev	1804	*	*	*	*	*	*	*	*	1804
	Count	5	0	0	0	0	0	0	0	0	5
	% within DL	100	0	0	0	0	0	0	0	0	100
	COV	1.16	-	-	-	-	-	-	-	-	1.16
Mixed Open Space	Mean	*	*	*	*	*	*	*	*	*	*
	Median	*	*	*	*	*	*	*	*	*	*
	StDev	*	*	*	*	*	*	*	*	*	*
	Count	0	0	0	0	0	0	0	0	0	0
	% within DL	0	0	0	0	0	0	0	0	0	0
	COV	-	-	-	-	-	-	-	-	-	-
Residential	Mean	7642	*	*	*	*	*	3541	2280	*	6165
	Median	809	*	*	*	*	*	600	900	*	800
	StDev	13081	*	*	*	*	*	6167	2693	*	11285
	Count	30	0	0	0	0	0	8	6	0	44
	% within DL	93	0	0	0	0	0	100	100	0	95
	COV	1.71	-	-	-	-	-	1.74	1.18	-	1.83
Mixed Residential	Mean	*	*	*	*	*	*	4971	10220	*	8311
	Median	*	*	*	*	*	*	1490	400	*	400
	StDev	*	*	*	*	*	*	8060	22968	*	18520
	Count	0	0	0	0	0	0	4	7	0	11
	% within DL	0	0	0	0	0	0	75	100	0	91
	COV	-	-	-	-	-	-	1.62	2.25	-	2.23
ALL	Mean	4897	*	*	*	*	*	5386	4564	*	4999
	Median	800	*	*	*	*	*	1900	600	*	1000
	StDev	9433	*	*	*	*	*	11874	13687	*	10711
	Count	93	0	0	0	0	0	47	20	0	160
	% within DL	89	0	0	0	0	0	94	100	0	92
	COV	1.93	-	-	-	-	-	2.20	3.00	-	2.14

Ammonia	(mg/L)	Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Commercial	Mean	0.5766	0.6225	0.15	0.2625	*	2.3039	0.4732	*	1.4711	0.6955
	Median	0.47	0.49	0.105	0.1	*	1.7	0.215	*	1.4	0.5
	StDev	0.5777	0.647	0.1154	0.2825	*	1.6169	0.7688	*	0.9441	0.8263
	Count	95	264	6	8	0	23	30	0	9	435
	% above DL	81	84	100	38	0	100	64	0	100	83
	COV	1.00	1.04	0.77	1.08	-	0.70	1.62	-	0.64	1.19
Mixed Commercial	Mean	*	0.5855	*	1.93	*	*	0.3653	1.3301	0.6043	0.6196
	Median	*	0.37	*	1.95	*	*	0.3	1.23	0.67	0.39
	StDev	*	0.6978	*	1.649	*	*	0.2495	1.0867	0.2844	0.7367
	Count	0	155	0	4	0	0	19	7	7	192
	% above DL	0	65	0	75	0	0	63	100	100	67
	COV	-	1.19	-	0.85	-	-	0.68	0.82	0.47	1.19
Freeway	Mean	0.6167	0.844	*	*	*	1.9621	0.4587	*	*	1.3954
	Median	0.5	0.7	*	*	*	1.39	0.3	*	*	0.85
	StDev	0.2858	0.3936	*	*	*	2.4284	0.4158	*	*	1.9968
	Count	6	10	0	0	0	56	23	0	0	95
	% above DL	17	50	0	0	0	100	57	0	0	79
	COV	0.46	0.47	-	-	-	1.24	0.91	-	-	1.43
Mixed Freeway	Mean	1.2257	*	*	*	*	*	*	*	*	1.2257
	Median	0.92	*	*	*	*	*	*	*	*	0.92
	StDev	0.648	*	*	*	*	*	*	*	*	0.648
	Count	3	0	0	0	0	0	0	0	0	3
	% above DL	100	0	0	0	0	0	0	0	0	100
	COV	0.53	-	-	-	-	-	-	-	-	0.53
Industrial	Mean	0.7161	0.5057	0.3375	0.5073	*	1.0549	0.4722	*	0.9367	0.6141
	Median	0.5	0.33	0.5	0.2	*	0.83	0.4	*	0.86	0.45
	StDev	1.21	0.4779	0.1903	0.5729	*	0.8783	0.4509	*	0.6285	0.7636
	Count	77	183	28	11	0	51	18	0	3	371
	% above DL	75	82	39	55	0	100	39	0	100	78
	COV	1.69	0.95	0.56	1.13	-	0.83	0.95	-	0.67	1.24
Mixed Industrial	Mean	*	0.2072	*	*	*	*	0.3792	*	0.944	0.3588
	Median	*	0.1	*	*	*	*	0.42	*	0.715	0.1
	StDev	*	0.2379	*	*	*	*	0.2849	*	0.6541	0.4572
	Count	0	78	0	0	0	0	6	0	20	104
	% above DL	0	15	0	0	0	0	50	0	100	34
	COV	-	1.15	-	-	-	-	0.75	-	0.69	1.27

Ammonia	(mg/L)	Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Institutional	Mean	0.5143	0.3614	*	*	*	*	*	*	*	0.4042
	Median	0.5	0.31	*	*	*	*	*	*	*	0.49
	StDev	0.0378	0.2069	*	*	*	*	*	*	*	0.1886
	Count	7	18	0	0	0	0	0	0	0	25
	% above DL	14	89	0	0	0	0	0	0	0	68
	COV	0.07	0.57	-	-	-	-	-	-	-	0.47
MIX	Mean	0.4049	*	*	*	*	*	*	*	*	0.4049
	Median	0.378	*	*	*	*	*	*	*	*	0.378
	StDev	0.2225	*	*	*	*	*	*	*	*	0.2225
	Count	6	0	0	0	0	0	0	0	0	6
	% above DL	100	0	0	0	0	0	0	0	0	100
	COV	0.55	-	-	-	-	-	-	-	-	0.55
Open Space	Mean	0.1183	0.2116	*	0.81	*	0.15	*	*	*	0.2838
	Median	0.13	0.25	*	0.25	*	0.15	*	*	*	0.25
	StDev	0.0933	0.0791	*	0.7741	*	0.1131	*	*	*	0.3702
	Count	6	19	0	5	0	2	0	0	0	32
	% above DL	67	0	0	40	0	100	0	0	0	25
	COV	0.79	0.37	-	0.96	-	0.75	-	-	-	1.30
Mixed Open Space	Mean	*	0.1337	*	*	*	*	*	*	1.3014	0.2488
	Median	*	0.1	*	*	*	*	*	*	1	0.1
	StDev	*	0.1248	*	*	*	*	*	*	1.226	0.5155
	Count	0	64	0	0	0	0	0	0	7	71
	% above DL	0	14	0	0	0	0	0	0	100	23
	COV	-	0.93	-	-	-	-	-	-	0.94	2.07
Residential	Mean	0.6295	0.4025	0.1	1.005	*	1.0965	0.4403	0.7144	0.6629	0.4704
	Median	0.5	0.29	0.06	0.92	*	0.96	0.15	0.68	0.47	0.3145
	StDev	0.6147	0.4217	0.0781	0.6177	*	0.7235	0.9236	0.1494	0.4627	0.5227
	Count	140	587	3	8	0	20	40	7	7	812
	% above DL	76	87	100	75	0	100	63	100	100	84
	COV	0.98	1.05	0.78	0.61	-	0.66	2.10	0.21	0.70	1.11
Mixed Residential	Mean	0.7746	0.2979	0.15	0.2533	*	0.6117	0.4906	3.9588	0.4886	0.4525
	Median	0.54	0.15	0.15	0.1	*	0.575	0.2	3.19	0.39	0.2
	StDev	0.632	0.3567	0.0707	0.2386	*	0.2947	0.9283	2.5636	0.2891	0.8386
	Count	21	214	2	15	0	6	17	8	7	290
	% above DL	86	60	50	40	0	100	59	100	100	63
	COV	0.82	1.20	0.47	0.94	-	0.48	1.89	0.65	0.59	1.85
ALL	Mean	0.6328	0.4343	0.2808	0.6135	*	1.5352	0.4471	2.0901	0.9388	0.5646
	Median	0.5	0.28	0.2	0.25	*	1.1	0.2	1.29	0.695	0.35
	StDev	0.762	0.4992	0.1911	0.7651	*	1.747	0.694	2.1652	0.754	0.8012
	Count	361	1592	39	51	0	158	153	22	60	2436
	% above DL	76	74	54	50	0	100	61	100	100	75
	COV	1.20	1.15	0.68	1.25	-	1.14	1.55	1.04	0.80	1.42

N02+NO3	(mg/L)	Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Commercial	Mean	0.7844	0.9216	0.202	0.9338	0.5382	1.2561	0.3938	*	1.5444	0.6903
	Median	0.63	0.68	0.104	0.75	0.5155	1.1	0.25	*	1.2	0.51
	StDev	0.599	1.0109	0.3376	0.6159	0.2479	0.8658	0.4402	*	0.9248	0.8218
	Count	189	433	270	25	40	33	42	0	9	1041
	% above DL	100	99	100	100	98	100	90	0	100	99
	COV	0.76	1.10	1.67	0.66	0.46	0.69	1.12	-	0.60	1.19
Mixed Commercial	Mean	0.8017	0.7778	*	0.6125	0.5288	*	0.5967	0.65	0.7429	0.7044
	Median	0.7	0.63	*	0.645	0.4135	*	0.39	0.65	0.8	0.56
	StDev	0.5257	0.5047	*	0.2945	0.3203	*	0.5213	0.5515	0.2699	0.477
	Count	35	173	0	4	72	0	30	2	7	323
	% above DL	100	99	0	100	99	0	93	100	100	99
	COV	0.66	0.65	-	0.48	0.61	-	0.87	0.85	0.36	0.68
Freeway	Mean	0.7886	2.2473	*	*	*	*	0.498	*	*	1.7902
	Median	0.58	1.385	*	*	*	*	0.26	*	*	1.09
	StDev	0.4531	4.5371	*	*	*	*	0.6231	*	*	3.9516
	Count	7	86	0	0	0	0	25	0	0	118
	% above DL	100	100	0	0	0	0	96	0	0	99
	COV	0.57	2.02	-	-	-	-	1.25	-	-	2.21
Mixed Freeway	Mean	0.6733	1.715	*	*	0.7168	*	*	*	*	1.0739
	Median	0.73	1.53	*	*	0.61	*	*	*	*	0.905
	StDev	0.5572	0.6458	*	*	0.4766	*	*	*	*	0.7232
	Count	3	8	0	0	11	0	0	0	0	22
	% above DL	100	100	0	0	100	0	0	0	0	100
	COV	0.83	0.38	-	-	0.66	-	-	-	-	0.67
Industrial	Mean	0.6635	0.7808	0.8091	0.8209	0.6815	1.844	0.264	*	0.7333	0.8315
	Median	0.564	0.6	0.43	0.727	0.67	1.7	0.15	*	0.9	0.613
	StDev	0.3871	0.6677	1.2277	0.4916	0.2976	0.9966	0.2659	*	0.3786	0.7938
	Count	98	256	63	31	46	62	43	0	3	602
	% above DL	99	99	92	100	100	100	79	0	100	97
	COV	0.58	0.86	1.52	0.60	0.44	0.54	1.01	-	0.52	0.95
Mixed Industrial	Mean	*	0.7578	0.2618	*	0.6679	*	0.5567	*	1.065	0.7102
	Median	*	0.6405	0.24	*	0.59	*	0.575	*	1	0.6
	StDev	*	0.4795	0.1591	*	0.4404	*	0.2666	*	0.438	0.4715
	Count	0	96	18	0	63	0	6	0	20	203
	% above DL	0	100	94	0	98	0	100	0	100	99
	COV	-	0.63	0.61	-	0.66	-	0.48	-	0.41	0.66

N02+NO3	(mg/L)	Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Institutional	Mean	0.9986	0.547	0.3646	*	*	*	*	*	*	0.5355
	Median	0.83	0.4144	0.3045	*	*	*	*	*	*	0.4059
	StDev	0.4588	0.4925	0.1851	*	*	*	*	*	*	0.4649
	Count	7	105	26	0	0	0	0	0	0	138
	% above DL	100	100	100	0	0	0	0	0	0	100
	COV	0.46	0.90	0.51	-	-	-	-	-	-	0.87
MIX	Mean	0.8367	*	*	*	*	*	*	*	*	0.8367
	Median	0.67	*	*	*	*	*	*	*	*	0.67
	StDev	0.8856	*	*	*	*	*	*	*	*	0.8856
	Count	78	0	0	0	0	0	0	0	0	78
	% above DL	91	0	0	0	0	0	0	0	0	91
	COV	1.06	-	-	-	-	-	-	-	-	1.06
Open Space	Mean	0.682	0.8736	*	0.7829	*	0.995	*	*	*	0.8141
	Median	0.665	0.24	*	0.49	*	0.995	*	*	*	0.495
	StDev	0.4701	0.9974	*	0.7448	*	0.5728	*	*	*	0.8174
	Count	10	25	0	17	0	2	0	0	0	54
	% above DL	100	72	0	100	0	100	0	0	0	87
	COV	0.69	1.14	-	0.95	-	0.58	-	-	-	1.00
Mixed Open Space	Mean	0.4187	0.6723	*	*	0.8402	*	*	*	1.1714	0.6104
	Median	0.292	0.6	*	*	0.665	*	*	*	1.2	0.482
	StDev	0.3471	0.6659	*	*	0.6168	*	*	*	0.4192	0.5573
	Count	126	78	0	0	67	0	0	0	7	278
	% above DL	100	95	0	0	100	0	0	0	100	99
	COV	0.83	0.99	-	-	0.73	-	-	-	0.36	0.91
Residential	Mean	0.7615	1.1439	0.8731	0.947	0.8781	1.2091	0.7825	0.48	1.8703	1.0596
	Median	0.607	0.61	0.5	0.8645	0.7	1.1	0.63	0.48	1.625	0.63
	StDev	0.6291	3.0135	1.1901	0.597	0.7855	0.5487	0.9091	*	1.5886	2.497
	Count	267	1198	60	54	107	43	59	1	32	1821
	% above DL	98	99	88	100	99	100	90	100	100	99
	COV	0.83	2.63	1.36	0.63	0.89	0.45	1.16	-	0.85	2.36
Mixed Residential	Mean	0.7939	0.9939	0.3706	0.7137	0.6888	1.0309	0.6367	2.46	0.61	0.8163
	Median	0.7	0.64	0.33	0.59	0.57	0.93	0.3	2.46	0.61	0.6
	StDev	0.4859	1.7483	0.2832	0.4907	0.5422	0.419	1.1317	*	0.2446	1.2785
	Count	149	417	124	21	95	23	18	1	22	870
	% above DL	99	99	96	100	100	100	94	100	100	99
	COV	0.61	1.76	0.76	0.69	0.79	0.41	1.78	-	0.40	1.57
ALL	Mean	0.7248	1.019	0.3887	0.8597	0.7118	1.4323	0.5346	1.06	1.2407	0.8685
	Median	0.59	0.63	0.22	0.745	0.6	1.2	0.3	0.76	1	0.5953
	StDev	0.582	2.2708	0.6732	0.5788	0.555	0.8577	0.6914	0.9894	1.088	1.7126
	Count	969	2875	561	152	501	163	223	4	100	5548
	% above DL	98	99	97	100	99	100	89	100	100	99
	COV	0.80	2.23	1.73	0.67	0.78	0.60	1.29	0.93	0.88	1.97

Total Nitrogen (mg/L)		Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Commercial	Mean	2.018	4.435	1.543	2.593	*	*	*	*	4.749	2.624
	Median	1.67	2.18	1.175	2.165	*	*	*	*	3.9	1.755
	StDev	1.269	5.507	1.553	1.757	*	*	*	*	2.573	2.797
	Count	12	13	32	26	0	0	0	0	9	92
	% above DL	100	100	94	100	0	0	0	0	100	99
	COV	0.63	1.24	1.01	0.68	-	-	-	-	0.54	1.07
Mixed Commercial	Mean	*	2.18	1.056	*	*	0.96	*	*	*	2.064
	Median	*	1.5	0.46	*	*	0.96	*	*	*	1.36
	StDev	*	2.856	0.932	*	*	0.339	*	*	*	2.739
	Count	0	63	5	0	0	2	0	0	0	70
	% above DL	0	89	100	0	0	100	0	0	0	90
	COV	-	1.31	0.88	-	-	0.35	-	-	-	1.33
Freeway	Mean	1.927	*	1.791	*	*	*	*	*	*	1.832
	Median	1.84	*	1.38	*	*	*	*	*	*	1.445
	StDev	0.96	*	1.148	*	*	*	*	*	*	1.072
	Count	6	0	14	0	0	0	0	0	0	20
	% above DL	100	0	100	0	0	0	0	0	0	100
	COV	0.50	-	0.64	-	-	-	-	-	-	0.59
Mixed Freeway	Mean	*	*	*	*	*	*	*	*	*	*
	Median	*	*	*	*	*	*	*	*	*	*
	StDev	*	*	*	*	*	*	*	*	*	*
	Count	0	0	0	0	0	0	0	0	0	0
	% above DL	0	0	0	0	0	0	0	0	0	0
	COV	-	-	-	-	-	-	-	-	-	-
Industrial	Mean	1.305	2.39	1.027	2.756	*	1.305	*	*	3.233	1.995
	Median	1.5	1.9	0.782	2.21	*	1.3	*	*	4.1	1.55
	StDev	0.572	1.992	0.807	2.642	*	0.509	*	*	1.767	2.017
	Count	6	11	24	29	0	4	0	0	3	77
	% above DL	100	100	96	100	0	100	0	0	100	99
	COV	0.44	0.83	0.79	0.96	-	0.39	-	-	0.55	1.01
Mixed Industrial	Mean	*	2.295	2.083	*	*	1.018	*	*	4.917	2.377
	Median	*	1.47	1.95	*	*	0.955	*	*	4.65	1.6
	StDev	*	2.866	1.684	*	*	0.548	*	*	2.465	2.784
	Count	0	72	4	0	0	6	0	0	6	88
	% above DL	0	83	100	0	0	100	0	0	100	86
	COV	-	1.25	0.81	-	-	0.54	-	-	0.50	1.17

Total Nitrogen (mg/L)		Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Institutional	Mean	1.563	*	*	*	*	*	*	*	*	1.563
	Median	1.4	*	*	*	*	*	*	*	*	1.4
	StDev	0.604	*	*	*	*	*	*	*	*	0.604
	Count	7	0	0	0	0	0	0	0	0	7
	% above DL	100	0	0	0	0	0	0	0	0	100
	COV	0.39	-	-	-	-	-	-	-	-	0.39
MIX	Mean	1.19	*	*	*	*	*	*	*	*	1.19
	Median	1.2	*	*	*	*	*	*	*	*	1.2
	StDev	0.495	*	*	*	*	*	*	*	*	0.495
	Count	5	0	0	0	0	0	0	0	0	5
	% above DL	100	0	0	0	0	0	0	0	0	100
	COV	0.42	-	-	-	-	-	-	-	-	0.42
Open Space	Mean	0.536	2.8	*	2.439	*	*	*	*	*	1.976
	Median	0.57	2.8	*	1.905	*	*	*	*	*	1.47
	StDev	0.296	0.566	*	1.694	*	*	*	*	*	1.608
	Count	5	2	0	12	0	0	0	0	0	19
	% above DL	80	100	0	100	0	0	0	0	0	95
	COV	0.55	0.20	-	0.69	-	-	-	-	-	0.81
Mixed Open Space	Mean	*	1.793	*	*	*	*	*	*	*	1.793
	Median	*	1.6	*	*	*	*	*	*	*	1.6
	StDev	*	1.571	*	*	*	*	*	*	*	1.571
	Count	0	55	0	0	0	0	0	0	0	55
	% above DL	0	87	0	0	0	0	0	0	0	87
	COV	-	0.88	-	-	-	-	-	-	-	0.88
Residential	Mean	2.391	2.247	1.327	2.954	*	*	*	*	4.243	2.241
	Median	2.3	2.545	1.16	2.75	*	*	*	*	3.9	1.88
	StDev	1.037	1.259	1.311	1.432	*	*	*	*	2.495	1.616
	Count	19	10	45	34	0	0	0	0	7	115
	% above DL	100	100	98	100	0	0	0	0	100	99
	COV	0.43	0.56	0.99	0.48	-	-	-	-	0.59	0.72
Mixed Residential	Mean	*	3.025	1.728	2.924	*	1.067	*	*	*	2.926
	Median	*	1.6	1.59	2.86	*	1.3	*	*	*	1.9
	StDev	*	8.855	0.435	0.981	*	0.493	*	*	*	7.849
	Count	0	105	4	22	0	3	0	0	0	134
	% above DL	0	93	100	100	0	100	0	0	0	95
	COV	-	2.93	0.25	0.34	-	0.46	-	-	-	2.68
ALL	Mean	1.81	2.51	1.401	2.775	*	1.097	*	*	4.466	2.329
	Median	1.67	1.6	1.18	2.4	*	1.2	*	*	3.9	1.61
	StDev	1.056	5.48	1.269	1.801	*	0.473	*	*	2.361	4.021
	Count	60	331	128	123	0	15	0	0	25	682
	% above DL	98	90	98	100	0	100	0	0	100	94
	COV	0.58	2.18	0.91	0.65	-	0.43	-	-	0.53	1.73

Total Kjeldahl Nitrogen (mg/L)		Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Commercial	Mean	1.58	1.865	0.904	1.501	1.14	4.408	1.506	*	3.189	1.672
	Median	1.215	1.39	0.756	1.2	0.865	3.7	0.84	*	2.6	1.17
	StDev	1.167	1.769	0.684	1.253	0.833	2.788	1.548	*	1.795	1.647
	Count	164	449	197	43	40	37	42	0	9	981
	% above DL	100	99	99	98	100	100	100	0	100	99
	COV	0.74	0.95	0.76	0.83	0.73	0.63	1.03	-	0.56	0.99
Mixed Commercial	Mean	1.388	2.215	0.65	4.283	0.982	1.42	1.38	3.317	1.771	1.844
	Median	1.28	1.74	0.32	4.94	0.8	1.42	1.1	3.11	1.7	1.4
	StDev	0.661	1.799	0.561	3.192	0.588	1.527	1.419	2.312	0.509	1.632
	Count	32	214	5	4	72	2	30	6	7	372
	% above DL	100	99	100	75	100	100	100	100	100	99
	COV	0.48	0.81	0.86	0.75	0.60	1.08	1.03	0.70	0.29	0.89
Freeway	Mean	1.1	2.412	*	*	2.023	3.24	1.715	*	*	2.415
	Median	1.025	1.875	*	*	1.531	1.945	1.4	*	*	1.705
	StDev	0.628	2.683	*	*	1.739	4.489	0.997	*	*	2.965
	Count	6	92	0	0	193	122	24	0	0	437
	% above DL	100	100	0	0	100	98	100	0	0	99
	COV	0.57	1.11	-	-	0.86	1.39	0.58	-	-	1.23
Mixed Freeway	Mean	3.607	7.36	*	*	1.597	*	*	*	*	3.967
	Median	3.06	3.465	*	*	1.53	*	*	*	*	2.28
	StDev	1.106	6.984	*	*	1.594	*	*	*	*	4.993
	Count	3	8	0	0	11	0	0	0	0	22
	% above DL	100	100	0	0	100	0	0	0	0	100
	COV	0.31	0.95	-	-	1.00	-	-	-	-	1.26
Industrial	Mean	1.884	1.59	1.488	1.608	1.039	4.614	2.022	*	2.5	1.925
	Median	1.48	1.1	1	1.405	0.825	3.85	1.7	*	3.1	1.3
	StDev	1.704	2.043	1.228	0.879	0.809	3.447	1.261	*	1.4	2.189
	Count	100	293	76	34	46	68	27	0	3	647
	% above DL	100	96	92	97	100	100	100	0	100	97
	COV	0.90	1.28	0.83	0.55	0.78	0.75	0.62	-	0.56	1.14
Mixed Industrial	Mean	*	2.377	0.986	1.347	1.116	0.626	0.901	*	2.545	1.671
	Median	*	1.4	0.761	1.15	0.8	0.52	0.905	*	2.35	1
	StDev	*	3.868	0.96	0.881	1.139	0.341	0.456	*	1.502	2.532
	Count	0	71	23	12	63	8	6	0	20	203
	% above DL	0	100	100	100	98	100	100	0	100	99
	COV	-	1.63	0.97	0.65	1.02	0.54	0.51	-	0.59	1.52

Total Kjeldahl Nitrogen (mg/L)		Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Institutional	Mean	0.707	1.329	1.117	*	*	*	*	*	*	1.135
	Median	0.5	1.35	0.91	*	*	*	*	*	*	0.94
	StDev	0.5	0.668	0.7	*	*	*	*	*	*	0.683
	Count	7	18	27	0	0	0	0	0	0	52
	% above DL	71	100	100	0	0	0	0	0	0	96
	COV	0.71	0.50	0.63	-	-	-	-	-	-	0.60
MIX	Mean	*	*	*	*	*	*	*	*	*	*
	Median	*	*	*	*	*	*	*	*	*	*
	StDev	*	*	*	*	*	*	*	*	*	*
	Count	0	0	0	0	0	0	0	0	0	0
	% above DL	0	0	0	0	0	0	0	0	0	0
	COV	-	-	-	-	-	-	-	-	-	-
Open Space	Mean	0.89	0.425	*	1.791	*	1.8	*	*	*	1.016
	Median	0.82	0.3	*	2.06	*	1.8	*	*	*	0.6
	StDev	0.115	0.21	*	1.419	*	0.283	*	*	*	1.061
	Count	6	25	0	18	0	2	0	0	0	51
	% above DL	100	52	0	94	0	100	0	0	0	75
	COV	0.13	0.49	-	0.79	-	0.16	-	-	-	1.04
Mixed Open Space	Mean	0.774	1.194	*	*	1.521	*	*	*	3.271	1.182
	Median	0.5	0.84	*	*	1	*	*	*	2.3	0.8
	StDev	0.743	1	*	*	1.569	*	*	*	2.111	1.263
	Count	93	47	0	0	67	0	0	0	7	214
	% above DL	100	96	0	0	88	0	0	0	100	95
	COV	0.96	0.84	-	-	1.03	-	-	-	0.65	1.07
Residential	Mean	1.918	1.771	1.543	2.348	2.308	4.002	1.106	3.099	3.734	1.851
	Median	1.46	1.3	1.1	2	1.6	3.45	0.8	2.89	2.8	1.31
	StDev	1.991	1.994	1.514	1.714	2.059	3.039	1.123	1.779	2.967	2.025
	Count	271	1405	67	52	89	44	186	7	44	2165
	% above DL	100	98	89	98	96	100	98	100	100	98
	COV	1.04	1.13	0.98	0.73	0.89	0.76	1.02	0.57	0.79	1.09
Mixed Residential	Mean	1.744	2.192	0.919	2.202	2.445	1.847	1.152	7.94	4.075	1.947
	Median	1.5	1.55	0.81	2.12	1.3	1.65	0.87	7.15	3.7	1.35
	StDev	1	2.37	0.756	0.754	6.825	1.379	0.992	4.943	1.905	2.85
	Count	152	421	95	22	95	30	145	8	20	988
	% above DL	100	99	82	100	95	100	99	100	100	97
	COV	0.57	1.08	0.82	0.34	2.79	0.75	0.86	0.62	0.47	1.46
ALL	Mean	1.65	1.883	1.098	1.921	1.749	3.562	1.257	5.005	3.347	1.85
	Median	1.305	1.36	0.87	1.7	1.2	2.6	0.9	3.67	2.7	1.3
	StDev	1.52	2.131	0.992	1.428	2.951	3.697	1.169	4.051	2.343	2.218
	Count	834	3043	490	185	676	313	460	21	110	6132
	% above DL	99	98	93	97	96	99	98	100	100	98
	COV	0.92	1.13	0.90	0.74	1.69	1.04	0.93	0.81	0.70	1.20

Dissolved Phosphorous (mg/L)		Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Commercial	Mean	0.0921	0.166	0.1288	0.2392	0.0493	0.42	0.1743	*	0.1978	0.1578
	Median	0.05	0.09	0.06	0.11	0.04	0.39	0.0315	*	0.15	0.09
	StDev	0.0601	0.197	0.2294	0.3142	0.0354	0.3306	0.4456	*	0.1136	0.2139
	Count	91	235	38	26	40	26	12	0	9	477
	% above DL	44	77	89	96	85	100	83	0	100	75
	COV	0.65	1.19	1.78	1.31	0.72	0.79	2.56	-	0.57	1.36
Mixed Commercial	Mean	*	0.2932	0.08	0.265	0.0984	*	0.093	*	0.1329	0.2313
	Median	*	0.14	0.08	0.265	0.067	*	0.093	*	0.12	0.11
	StDev	*	0.5921	0.0339	0.0645	0.0981	*	*	*	0.0713	0.4935
	Count	0	159	5	4	63	0	1	0	7	239
	% above DL	0	92	100	100	94	0	100	0	100	93
	COV	-	2.02	0.42	0.24	1.00	-	-	-	0.54	2.13
Freeway	Mean	0.1167	0.0559	0.0557	*	*	0.7466	*	*	*	0.3551
	Median	0.1	0.05	0.0346	*	*	0.197	*	*	*	0.0756
	StDev	0.0794	0.0125	0.0734	*	*	1.6304	*	*	*	1.1007
	Count	6	10	14	0	0	22	0	0	0	52
	% above DL	100	20	100	0	0	95	0	0	0	83
	COV	0.68	0.22	1.32	-	-	2.18	-	-	-	3.10
Mixed Freeway	Mean	*	*	*	*	0.0417	*	*	*	*	0.0417
	Median	*	*	*	*	0.03	*	*	*	*	0.03
	StDev	*	*	*	*	0.0383	*	*	*	*	0.0383
	Count	0	0	0	0	11	0	0	0	0	11
	% above DL	0	0	0	0	100	0	0	0	0	100
	COV	-	-	-	-	0.92	-	-	-	-	0.92
Industrial	Mean	0.0696	0.1782	0.0827	0.1414	0.0859	0.2906	0.0875	*	0.29	0.146
	Median	0.05	0.1	0.055	0.1	0.06	0.205	0.0875	*	0.13	0.085
	StDev	0.0554	0.3452	0.0995	0.1106	0.0766	0.2619	0.0728	*	0.2858	0.2456
	Count	70	163	76	33	46	52	2	0	3	445
	% above DL	38	83	87	91	100	98	100	0	100	81
	COV	0.80	1.94	1.20	0.78	0.89	0.90	0.83	-	0.99	1.68
Mixed Industrial	Mean	*	0.1971	0.1029	*	0.1125	*	0.0308	*	0.2316	0.1596
	Median	*	0.1	0.06	*	0.08	*	0.035	*	0.18	0.081
	StDev	*	0.4619	0.1205	*	0.1225	*	0.0191	*	0.1991	0.3332
	Count	0	95	21	0	63	0	6	0	19	204
	% above DL	0	91	57	0	92	0	67	0	100	88
	COV	-	2.34	1.17	-	1.09	-	0.62	-	0.86	2.09

Dissolved Phosphorous (mg/L)		Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Institutional	Mean	0.054	0.1085	*	*	*	*	*	*	*	0.0961
	Median	0.06	0.1	*	*	*	*	*	*	*	0.075
	StDev	0.0344	0.0687	*	*	*	*	*	*	*	0.0661
	Count	5	17	0	0	0	0	0	0	0	22
	% above DL	100	82	0	0	0	0	0	0	0	86
	COV	0.64	0.63	-	-	-	-	-	-	-	0.69
MIX	Mean	*	*	*	*	*	*	*	*	*	*
	Median	*	*	*	*	*	*	*	*	*	*
	StDev	*	*	*	*	*	*	*	*	*	*
	Count	0	0	0	0	0	0	0	0	0	0
	% above DL	0	0	0	0	0	0	0	0	0	0
	COV	-	-	-	-	-	-	-	-	-	-
Open Space	Mean	*	0.163	*	0.1911	*	0.18	*	*	*	0.1749
	Median	*	0.06	*	0.15	*	0.18	*	*	*	0.135
	StDev	*	0.1645	*	0.1423	*	*	*	*	*	0.1526
	Count	0	25	0	18	0	1	0	0	0	44
	% above DL	0	68	0	94	0	100	0	0	0	80
	COV	-	1.01	-	0.74	-	-	-	-	-	0.87
Mixed Open Space	Mean	*	0.1579	*	*	0.1253	*	*	*	0.1917	0.1444
	Median	*	0.0795	*	*	0.08	*	*	*	0.17	0.08
	StDev	*	0.1888	*	*	0.168	*	*	*	0.0884	0.1766
	Count	0	74	0	0	67	0	0	0	6	147
	% above DL	0	89	0	0	82	0	0	0	100	86
	COV	-	1.20	-	-	1.34	-	-	-	0.46	1.22
Residential	Mean	0.1579	0.193	0.1098	0.2912	0.2903	0.278	0.2981	*	0.2671	0.1982
	Median	0.1	0.14	0.053	0.285	0.27	0.205	0.04	*	0.2	0.14
	StDev	0.199	0.2155	0.1802	0.1913	0.1538	0.1547	0.5418	*	0.2514	0.2219
	Count	115	566	80	44	69	20	21	0	7	922
	% above DL	80	86	68	98	100	100	86	0	100	86
	COV	1.26	1.12	1.64	0.66	0.53	0.56	1.82	-	0.94	1.12
Mixed Residential	Mean	0.0843	0.1799	0.0815	0.2695	0.134	0.105	0.0232	*	0.26	0.1525
	Median	0.067	0.09	0.05	0.225	0.13	0.11	0.01	*	0.27	0.1
	StDev	0.0727	0.2246	0.0594	0.1747	0.0763	0.0497	0.0202	*	0.0967	0.1748
	Count	18	205	68	22	95	6	5	0	5	424
	% above DL	100	92	56	100	96	100	60	0	100	88
	COV	0.86	1.25	0.73	0.65	0.57	0.47	0.87	-	0.37	1.15
ALL	Mean	0.1111	0.1922	0.0955	0.2322	0.134	0.3845	0.1898	*	0.2196	0.1759
	Median	0.071	0.117	0.05445	0.18	0.09	0.21	0.036	*	0.17	0.1
	StDev	0.1359	0.3071	0.1408	0.2014	0.1342	0.7272	0.4332	*	0.1689	0.2945
	Count	305	1549	302	147	454	127	47	0	56	2987
	% above DL	62	85	74	96	93	98	81	0	100	84
	COV	1.22	1.60	1.47	0.87	1.00	1.89	2.28	-	0.77	1.67

Total Phosphorus (mg/L)		Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Commercial	Mean	0.179	0.2913	0.2487	0.311	0.2683	0.5691	0.3989	*	0.3767	0.2706
	Median	0.12	0.21	0.142	0.175	0.1105	0.48	0.256	*	0.32	0.17
	StDev	0.188	0.3189	0.3452	0.4018	0.6625	0.409	0.5734	*	0.287	0.3472
	Count	238	477	301	46	40	35	42	0	9	1188
	% above DL	92	95	99	100	98	100	98	0	100	96
	COV	1.05	1.09	1.39	1.29	2.47	0.72	1.44	-	0.76	1.28
Mixed Commercial	Mean	0.4294	0.5124	*	0.7725	0.8355	*	0.3671	0.5364	0.2829	0.5423
	Median	0.26	0.31	*	0.48	0.18	*	0.31	0.4835	0.29	0.285
	StDev	0.9405	0.6889	*	0.939	2.2956	*	0.2126	0.3363	0.1177	1.1386
	Count	84	236	0	11	72	0	30	8	7	448
	% above DL	100	99	0	100	100	0	100	100	100	99
	COV	2.19	1.34	-	1.22	2.75	-	0.58	0.63	0.42	2.10
Freeway	Mean	0.3275	0.9555	0.1649	*	0.5629	0.4831	0.3473	*	*	0.6411
	Median	0.3	0.42	0.125	*	0.18	0.27	0.28	*	*	0.25
	StDev	0.1594	1.2694	0.1217	*	5.2195	0.8	0.1982	*	*	3.3802
	Count	8	178	14	0	235	135	24	0	0	594
	% above DL	100	97	100	0	100	99	100	0	0	99
	COV	0.49	1.33	0.74	-	9.27	1.66	0.57	-	-	5.27
Mixed Freeway	Mean	0.4333	0.4325	*	*	0.2293	*	*	*	*	0.331
	Median	0.41	0.365	*	*	0.169	*	*	*	*	0.335
	StDev	0.0942	0.1991	*	*	0.2194	*	*	*	*	0.2187
	Count	3	8	0	0	11	0	0	0	0	22
	% above DL	100	100	0	0	100	0	0	0	0	100
	COV	0.22	0.46	-	-	0.96	-	-	-	-	0.66
Industrial	Mean	0.2973	0.3262	0.2031	0.2168	0.2515	1.3092	0.309	*	0.63	0.3798
	Median	0.2155	0.22	0.122	0.2	0.18	1.1	0.14	*	0.66	0.22
	StDev	0.2648	0.5293	0.1993	0.1322	0.2239	1.2109	0.3122	*	0.3161	0.5925
	Count	100	294	89	33	45	61	93	0	3	718
	% above DL	88	96	99	94	100	100	100	0	100	96
	COV	0.89	1.62	0.98	0.61	0.89	0.92	1.01	-	0.50	1.56
Mixed Industrial	Mean	*	0.3935	0.1789	0.6219	0.2602	*	0.1985	*	0.426	0.3518
	Median	*	0.26	0.14	0.385	0.19	*	0.218	*	0.315	0.23
	StDev	*	0.6208	0.1489	0.6349	0.3515	*	0.0788	*	0.3245	0.5055
	Count	0	100	19	16	63	0	6	0	20	224
	% above DL	0	96	84	100	98	0	100	0	100	96
	COV	-	1.58	0.83	1.02	1.35	-	0.40	-	0.76	1.44

Total Phosphorus (mg/L)		Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Institutional	Mean	0.2063	0.1365	0.169	*	*	*	*	*	*	0.1468
	Median	0.205	0.0915	0.16	*	*	*	*	*	*	0.1003
	StDev	0.0873	0.1442	0.0784	*	*	*	*	*	*	0.1322
	Count	8	105	27	0	0	0	0	0	0	140
	% above DL	100	99	100	0	0	0	0	0	0	99
	COV	0.42	1.06	0.46	-	-	-	-	-	-	0.90
MIX	Mean	0.2515	*	*	*	*	*	*	*	*	0.2515
	Median	0.215	*	*	*	*	*	*	*	*	0.215
	StDev	0.2106	*	*	*	*	*	*	*	*	0.2106
	Count	78	0	0	0	0	0	0	0	0	78
	% above DL	96	0	0	0	0	0	0	0	0	96
	COV	0.84	-	-	-	-	-	-	-	-	0.84
Open Space	Mean	0.1433	0.4746	*	1.1378	*	0.645	*	*	*	0.55
	Median	0.13	0.27	*	0.315	*	0.645	*	*	*	0.26
	StDev	0.0761	0.6229	*	3.5649	*	0.1626	*	*	*	1.5286
	Count	12	78	0	18	0	2	0	0	0	110
	% above DL	100	92	0	94	0	100	0	0	0	94
	COV	0.53	1.31	-	3.13	-	0.25	-	-	-	2.78
Mixed Open Space	Mean	0.1848	0.3412	*	*	0.3733	*	*	*	0.5986	0.2845
	Median	0.083	0.2	*	*	0.25	*	*	*	0.59	0.18
	StDev	0.3131	0.3955	*	*	0.4131	*	*	*	0.3087	0.3745
	Count	126	78	0	0	67	0	0	0	7	278
	% above DL	100	99	0	0	93	0	0	0	100	98
	COV	1.69	1.16	-	-	1.11	-	-	-	0.52	1.32
Residential	Mean	0.4053	0.4059	0.2601	0.8135	0.4443	0.635	0.266	0.7787	0.5443	0.4065
	Median	0.2908	0.27	0.1395	0.445	0.39	0.47	0.19	0.5	0.46	0.27
	StDev	0.4724	0.7343	0.4227	0.9924	0.2426	0.7322	0.3075	0.5715	0.3678	0.6502
	Count	396	1501	133	62	111	42	199	7	53	2504
	% above DL	99	98	92	98	100	100	99	100	100	98
	COV	1.17	1.81	1.63	1.22	0.55	1.15	1.16	0.73	0.68	1.60
Mixed Residential	Mean	0.3782	0.4442	0.1866	0.405	0.4928	0.384	0.3334	0.915	1.4545	0.4159
	Median	0.305	0.29	0.15	0.345	0.34	0.36	0.22	0.713	1.02	0.27
	StDev	0.3092	0.7225	0.1356	0.188	0.5564	0.2105	0.4072	0.8516	1.4271	0.6156
	Count	150	506	130	22	95	25	145	8	22	1103
	% above DL	100	99	85	100	100	100	100	100	100	98
	COV	0.82	1.63	0.73	0.46	1.13	0.55	1.22	0.93	0.98	1.48
ALL	Mean	0.3124	0.4158	0.2273	0.5756	0.4798	0.6752	0.3104	0.7418	0.6679	0.3997
	Median	0.22	0.25	0.142	0.305	0.23	0.4	0.215	0.53	0.46	0.24
	StDev	0.4273	0.7022	0.3061	1.2381	3.045	0.8857	0.3563	0.6185	0.7678	1.1424
	Count	1203	3561	713	208	739	300	539	23	121	7407
	% above DL	97	98	95	98	99	99	99	100	100	99
	COV	1.37	1.69	1.35	2.15	6.35	1.31	1.15	0.83	1.15	2.86

Total Cadmium (µg/L)		Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Commercial	Mean	0.682	2.025	1.224	7.718	0.667	0.654	0.892	*	2.2	1.798
	Median	0.5	0.5	0.2485	1	0.5	0.5	0.4	*	2	0.5
	StDev	0.887	3.344	1.412	17.013	0.311	0.419	1.025	*	1.92	4.646
	Count	93	271	26	26	39	26	36	0	25	542
	% above DL	19	56	65	35	3	15	53	0	28	42
	COV	1.30	1.65	1.15	2.20	0.47	0.64	1.15	-	0.87	2.58
Mixed Commercial	Mean	*	1.014	*	*	0.778	0.86	0.874	0.735	0.643	0.894
	Median	*	0.53	*	*	0.5	0.5	0.4	0.565	0.5	0.5
	StDev	*	1.393	*	*	0.545	0.873	1.442	0.562	0.244	1.138
	Count	0	93	0	0	63	5	30	8	7	206
	% above DL	0	54	0	0	16	100	73	63	29	46
	COV	-	1.37	-	-	0.70	1.02	1.65	0.76	0.38	1.27
Freeway	Mean	0.652	6.092	0.142	*	*	1.042	1.337	*	*	3.12
	Median	0.6	10	0.1	*	*	0.52	0.95	*	*	0.67
	StDev	0.248	4.87	0.07	*	*	1.06	1.478	*	*	4.121
	Count	5	82	14	0	0	69	26	0	0	196
	% above DL	100	90	100	0	0	68	81	0	0	82
	COV	0.38	0.80	0.49	-	-	1.02	1.11	-	-	1.32
Mixed Freeway	Mean	*	14.34	*	*	0.688	*	*	*	*	1.738
	Median	*	14.34	*	*	0.5	*	*	*	*	0.5
	StDev	*	*	*	*	0.466	*	*	*	*	3.813
	Count	0	1	0	0	12	0	0	0	0	13
	% above DL	0	100	0	0	100	0	0	0	0	100
	COV	-	-	-	-	0.68	-	-	-	-	2.19
Industrial	Mean	0.672	3.142	4.013	9.486	1.109	2.065	3.484	*	12.626	3.315
	Median	0.5	0.59	5	1	0.5	2	2.5	*	3	1
	StDev	0.635	22.051	3.171	16.704	1.366	1.459	3.675	*	23.901	15.654
	Count	71	233	69	29	46	63	25	0	19	555
	% above DL	28	51	30	52	33	84	80	0	53	49
	COV	0.94	7.02	0.79	1.76	1.23	0.71	1.05	-	1.89	4.72
Mixed Industrial	Mean	*	1.454	4.553	*	0.86	2.522	*	*	2.15	1.819
	Median	*	1	2.5	*	0.5	2	*	*	2	1
	StDev	*	1.43	9.153	*	0.668	1.798	*	*	1.548	3.365
	Count	0	47	19	0	63	27	0	0	20	176
	% above DL	0	83	16	0	17	100	0	0	80	269
	COV	-	0.98	2.01	-	0.78	0.71	-	-	0.72	1.85

Total Cadmium (µg/L)		Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Institutional	Mean	0.357	0.417	*	*	*	*	*	*	*	0.402
	Median	0.32	0.25	*	*	*	*	*	*	*	0.3
	StDev	0.175	0.297	*	*	*	*	*	*	*	0.269
	Count	6	18	0	0	0	0	0	0	0	24
	% above DL	100	17	0	0	0	0	0	0	0	38
	COV	0.49	0.71	-	-	-	-	-	-	-	0.67
MIX	Mean	*	*	*	*	*	*	*	*	*	*
	Median	*	*	*	*	*	*	*	*	*	*
	StDev	*	*	*	*	*	*	*	*	*	*
	Count	0	0	0	0	0	0	0	0	0	0
	% above DL	0	0	0	0	0	0	0	0	0	0
	COV	-	-	-	-	-	-	-	-	-	-
Open Space	Mean	*	0.211	*	25.008	*	1.25	*	*	*	9.877
	Median	*	0.23	*	8	*	1.25	*	*	*	0.38
	StDev	*	0.145	*	30.113	*	1.061	*	*	*	21.955
	Count	0	17	0	12	0	2	0	0	0	31
	% above DL	0	76	0	58	0	50	0	0	0	68
	COV	-	0.69	-	1.20	-	0.85	-	-	-	2.22
Mixed Open Space	Mean	*	1.576	*	*	0.786	*	*	*	4.857	1.256
	Median	*	0.755	*	*	0.5	*	*	*	2	0.5
	StDev	*	1.89	*	*	0.511	*	*	*	7.198	2.28
	Count	0	24	0	0	70	0	0	0	7	101
	% above DL	0	38	0	0	6	0	0	0	100	20
	COV	-	1.20	-	-	0.65	-	-	-	1.48	1.82
Residential	Mean	0.689	0.872	2.439	8.297	0.569	0.975	0.502	0.348	1.826	1.157
	Median	0.5	0.33	2.5	2.5	0.5	0.5	0.25	0.25	1.5	0.5
	StDev	0.776	1.256	2.188	16.541	0.181	1.24	0.666	0.326	1.952	3.361
	Count	121	771	70	35	69	20	46	6	23	1161
	% above DL	21	52	47	50	1	35	26	33	4	43
	COV	1.13	1.44	0.90	1.99	0.32	1.27	1.33	0.94	1.07	2.90
Mixed Residential	Mean	2.078	1.664	14.447	8.809	0.732	1.1	1.76	0.681	2.826	4.088
	Median	2.5	0.39	2.5	0.51	0.5	1	0.5	0.75	2.5	0.78
	StDev	1.103	2.532	41.55	20.787	0.594	0.799	2.818	0.376	3.813	18.62
	Count	14	151	71	22	96	11	13	9	23	410
	% above DL	43	34	37	32	28	64	69	67	22	35
	COV	0.53	1.52	2.88	2.36	0.81	0.73	1.60	0.55	1.35	4.55
ALL	Mean	0.738	1.716	5.924	10.162	0.771	1.46	1.285	0.613	3.898	2.171
	Median	0.5	0.5	2.5	1.75	0.5	1	0.5	0.45	2	0.5
	StDev	0.836	8.495	22.088	19.417	0.66	1.387	2.075	0.45	10.248	9.818
	Count	310	1708	269	124	458	223	176	23	124	3415
	% above DL	26	54	42	45	18	68	59	57	39	46
	COV	1.13	4.95	3.73	1.91	0.86	0.95	1.61	0.73	2.63	4.52

Total Copper (µg/L		Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Commercial	Mean	35.75	28.6	5.78	59	13.13	17.38	23.56	*	42.74	24.23
	Median	6.6	17.85	4	28.1	7.5	14	15.5	*	17	10
	StDev	73.42	41.39	7.33	80.59	16.92	14.58	24.31	*	71.51	46.53
	Count	145	372	255	47	38	35	42	0	25	959
	% above DL	59	93	98	85	97	100	95	0	68	89
	COV	2.05	1.45	1.27	1.37	1.29	0.84	1.03	-	1.67	1.92
Mixed Commercial	Mean	103.29	33.72	10	47.67	85.66	45.2	33.22	34.31	12.57	48.5
	Median	100	24.51	10	51	11	24	21	19.6	12	19.1
	StDev	40.44	32.7	0	16.92	259.34	53.56	46.05	43.5	2.76	136.48
	Count	7	134	5	9	71	5	30	8	7	276
	% above DL	100	93	0	100	99	100	90	88	100	93
	COV	0.39	0.97	0.00	0.35	3.03	1.18	1.39	1.27	0.22	2.81
Freeway	Mean	35.4	28.73	52.93	*	7.36	62.05	32	*	*	33.29
	Median	42	17.84	1.17	*	1.5	40	24	*	*	17.36
	StDev	16.88	56.69	194.01	*	13.13	88.78	25.77	*	*	71.77
	Count	5	95	14	0	105	101	26	0	0	346
	% above DL	100	99	100	0	100	100	100	0	0	99
	COV	0.48	1.97	3.67	-	1.78	1.43	0.81	-	-	2.16
Mixed Freeway	Mean	54	53.56	*	*	8.08	*	*	*	*	29.89
	Median	52	44.49	*	*	7.5	*	*	*	*	14
	StDev	5.29	30.38	*	*	2.94	*	*	*	*	29.03
	Count	3	8	0	0	12	0	0	0	0	23
	% above DL	100	100	0	0	100	0	0	0	0	100
	COV	0.10	0.57	-	-	0.36	-	-	-	-	0.97
Industrial	Mean	17.59	17.51	12.7	101.63	21.16	87.18	36.51	*	47.76	32.8
	Median	5.3	12.71	10	27.5	17.5	72	24	*	25	16
	StDev	33.54	26.73	12.23	233.76	13.33	73.58	28.06	*	60.61	75.42
	Count	83	248	84	44	44	69	51	0	19	642
	% above DL	69	87	65	95	100	100	100	0	79	86
	COV	1.91	1.53	0.96	2.30	0.63	0.84	0.77	-	1.27	2.30
Mixed Industrial	Mean	*	30.89	18.59	36.2	12.88	52.29	13.78	*	36.35	26.28
	Median	*	22.75	8.5	30	10	41.5	16.1	*	23	17
	StDev	*	24.74	21.23	9.07	10.52	26.77	7.54	*	27	24.17
	Count	0	46	22	5	63	24	6	0	20	186
	% above DL	0	96	55	100	94	100	83	0	100	91
	COV	-	0.80	1.14	0.25	0.82	0.51	0.55	-	0.74	0.92

Total Copper (µg/L		Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Institutional	Mean	33	8.41	8.87	*	*	*	*	*	*	12.03
	Median	31	5	7.7	*	*	*	*	*	*	7
	StDev	12.9	7.02	4.89	*	*	*	*	*	*	10.93
	Count	7	17	27	0	0	0	0	0	0	51
	% above DL	100	41	100	0	0	0	0	0	0	80
	COV	0.39	0.83	0.55	-	-	-	-	-	-	0.91
MIX	Mean	3.5	*	*	*	*	*	*	*	*	3.5
	Median	2.4	*	*	*	*	*	*	*	*	2.4
	StDev	4.55	*	*	*	*	*	*	*	*	4.55
	Count	77	0	0	0	0	0	0	0	0	77
	% above DL	92	0	0	0	0	0	0	0	0	92
	COV	1.30	-	-	-	-	-	-	-	-	1.30
Open Space	Mean	4.09	7.65	*	15.42	*	118.5	*	*	*	14.64
	Median	2	4.5	*	10	*	118.5	*	*	*	5
	StDev	3.95	9.36	*	15.14	*	129.4	*	*	*	32.95
	Count	6	22	0	12	0	2	0	0	0	42
	% above DL	33	82	0	67	0	100	0	0	0	71
	COV	0.97	1.22	-	0.98	-	1.09	-	-	-	2.25
Mixed Open Space	Mean	*	8.73	*	*	11.88	*	*	*	27.71	12.03
	Median	*	8.15	*	*	8	*	*	*	18	9
	StDev	*	5.15	*	*	12.1	*	*	*	19.41	11.97
	Count	0	30	0	0	70	0	0	0	7	107
	% above DL	0	80	0	0	94	0	0	0	100	91
	COV	-	0.59	-	-	1.02	-	-	-	0.70	1.00
Residential	Mean	24.16	25.44	13.28	56.45	9.38	17.17	12.18	13.55	26.58	24.59
	Median	11.55	11	8.9	20	8	7.5	8.64	10	21	10
	StDev	43.65	48.07	38.58	101.72	8.09	28.88	11.85	9.62	23.3	48.3
	Count	226	1061	99	80	68	41	80	6	80	1741
	% above DL	80	87	65	90	97	90	74	83	91	86
	COV	1.81	1.89	2.91	1.80	0.86	1.68	0.97	0.71	0.88	1.96
Mixed Residential	Mean	35.51	30.64	12.56	14.05	20.85	61.8	20.63	23.64	15.63	26.38
	Median	20	20.42	9	11.7	12	42	17.5	24.1	10	16
	StDev	33.96	35.52	20.47	7.26	36.72	60.73	12.29	9.68	20.52	34.44
	Count	85	299	127	22	96	25	18	9	23	704
	% above DL	100	92	65	91	99	100	100	89	52	88
	COV	0.96	1.16	1.63	0.52	1.76	0.98	0.60	0.41	1.31	1.31
ALL	Mean	25.95	26.07	10.88	58.74	22.33	55.82	24.14	24.72	30.23	26.96
	Median	10	15	6	20	9	34	18	20	18	12
	StDev	48.66	42.36	34.64	128.92	96.15	71.17	26.71	26.93	39.15	59.06
	Count	644	2332	633	219	567	302	253	23	181	5154
	% above DL	78	89	80	89	97	99	93	87	83	88
	COV	1.88	1.62	3.18	2.19	4.31	1.27	1.11	1.09	1.30	2.19

Total Lead (µg/L)		Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Commercial	Mean	11.86	33.16	4.11	51.53	30.15	18.5	38.06	*	69.89	23.08
	Median	2	14	2	31	16	11	19	*	72	8
	StDev	21.97	58.97	8.6	54.93	49.67	20.22	56.28	*	48.52	45.81
	Count	109	284	209	41	39	36	42	0	9	769
	% above DL	45	87	99	63	92	94	98	0	100	84
	COV	1.85	1.78	2.09	1.07	1.65	1.09	1.48	-	0.69	1.98
Mixed Commercial	Mean	*	19.21	12	25	36.99	121	61.68	61.35	80.57	33.3
	Median	*	10	10	25	21.5	50	44	42.3	64	15
	StDev	*	37.52	6.2	0	42.38	179.2	64.29	73.45	54.94	52.47
	Count	0	140	5	4	72	5	30	8	7	271
	% above DL	0	82	100	0	93	100	100	100	100	87
	COV	-	1.95	0.52	0.00	1.15	1.48	1.04	1.20	0.68	1.58
Freeway	Mean	26	57.43	*	*	87.84	72.43	55.41	*	*	71.99
	Median	20	100	*	*	67.5	28.5	32.5	*	*	46
	StDev	18.3	44.86	*	*	66.87	109.07	73.47	*	*	79.3
	Count	6	92	0	0	126	112	26	0	0	362
	% above DL	100	96	0	0	100	100	100	0	0	99
	COV	0.70	0.78	-	-	0.76	1.51	1.33	-	-	1.10
Mixed Freeway	Mean	*	91.7	*	*	12.83	*	*	*	*	18.9
	Median	*	91.7	*	*	9.5	*	*	*	*	10
	StDev	*	*	*	*	9.35	*	*	*	*	23.63
	Count	0	1	0	0	12	0	0	0	0	13
	% above DL	0	100	0	0	100	0	0	0	0	100
	COV	-	-	-	-	0.73	-	-	-	-	1.25
Industrial	Mean	7.66	21.88	17.95	85.28	36.99	139.22	40.88	*	370	43.02
	Median	2.25	7.2	10	25	25	85.5	30.1	*	130	15
	StDev	9.87	51.25	35.29	192.63	51.54	145.99	38.27	*	459.67	96.35
	Count	74	246	66	48	45	72	91	0	3	645
	% above DL	45	77	45	67	98	99	100	0	100	76
	COV	1.29	2.34	1.97	2.26	1.39	1.05	0.94	-	1.24	2.24
Mixed Industrial	Mean	*	18.17	15.02	*	27.95	165.56	20.77	*	125	45.65
	Median	*	12	10.5	*	16	150	20.15	*	91.5	17
	StDev	*	24.63	13.44	*	43.41	86.73	11.78	*	90.87	69.66
	Count	0	105	22	0	63	27	6	0	20	243
	% above DL	0	83	68	0	81	100	100	0	100	85
	COV	-	1.36	0.89	-	1.55	0.52	0.57	-	0.73	1.53

Total Lead (µg/L)		Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Institutional	Mean	21.65	6.82	*	*	*	*	*	*	*	10.53
	Median	19	4	*	*	*	*	*	*	*	5.75
	StDev	16.85	6.44	*	*	*	*	*	*	*	11.63
	Count	6	18	0	0	0	0	0	0	0	24
	% above DL	100	78	0	0	0	0	0	0	0	83
	COV	0.78	0.94	-	-	-	-	-	-	-	1.10
MIX	Mean	3.86	*	*	*	*	*	*	*	*	3.86
	Median	3.65	*	*	*	*	*	*	*	*	3.65
	StDev	2.06	*	*	*	*	*	*	*	*	2.06
	Count	72	0	0	0	0	0	0	0	0	72
	% above DL	64	0	0	0	0	0	0	0	0	64
	COV	0.53	-	-	-	-	-	-	-	-	0.53
Open Space	Mean	*	10.91	*	39.12	*	80	*	*	*	25.62
	Median	*	2.5	*	25	*	80	*	*	*	14.5
	StDev	*	22.13	*	29.27	*	98.99	*	*	*	34.31
	Count	0	23	0	17	0	2	0	0	0	42
	% above DL	0	70	0	6	0	100	0	0	0	45
	COV	-	2.03	-	0.75	-	1.24	-	-	-	1.34
Mixed Open Space	Mean	*	11.9	*	*	20.91	*	*	*	225	25.59
	Median	*	7	*	*	7	*	*	*	200	7
	StDev	*	19.1	*	*	57.55	*	*	*	106.26	63.39
	Count	0	78	0	0	70	0	0	0	7	155
	% above DL	0	72	0	0	74	0	0	0	100	74
	COV	-	1.61	-	-	2.75	-	-	-	0.47	2.48
Residential	Mean	49.9	15.54	39.53	28.48	13.46	29.71	16.67	5.28	19.3	23.73
	Median	6.35	4.9	12.5	20	7	25	9	6.35	10	6.23
	StDev	139.77	37.16	70.68	39.01	15.25	34.14	27.35	3.48	19.08	68.2
	Count	244	797	83	74	87	41	80	6	44	1456
	% above DL	68	75	65	66	94	70	94	67	100	75
	COV	2.80	2.39	1.79	1.37	1.13	1.15	1.64	0.66	0.99	2.87
Mixed Residential	Mean	25.97	20.46	9.92	21.85	32.33	70.64	63.48	23.54	88.57	23.92
	Median	18.9	9.05	5.93	14.65	20.5	82	53	27	110	12
	StDev	20.9	35.05	12.5	18.36	47.67	46.36	50.03	19.27	43.47	36.99
	Count	18	246	116	22	96	11	18	9	7	543
	% above DL	100	80	58	73	95	100	100	78	100	80
	COV	0.80	1.71	1.26	0.84	1.47	0.66	0.79	0.82	0.49	1.55
ALL	Mean	28.48	21.43	13.7	46.4	39.71	85.07	38.26	31.93	80.9	31.56
	Median	5	7.33	5	20	20	35.5	24	13.8	43	11
	StDev	97.65	42.79	34.8	101.45	55.6	113.77	48.75	48.9	117.02	67.52
	Count	529	2030	501	206	610	306	293	23	97	4595
	% above DL	61	79	75	60	92	95	98	83	100	80
	COV	3.43	2.00	2.54	2.19	1.40	1.34	1.27	1.53	1.45	2.14

Total Zinc (µg/L)		Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Commercial	Mean	157.4	259.6	59.6	278.7	98.3	242.9	152	*	202.8	174.3
	Median	60	171.1	39	198	63	225	90	*	148	96
	StDev	245.3	315.1	74.4	255.6	97.4	141.8	163.6	*	169.5	247.1
	Count	195	376	287	47	39	36	42	0	25	1047
	% above DL	98	100	100	100	100	100	100	0	97	99
	COV	1.56	1.21	1.25	0.92	0.99	0.58	1.08	-	0.84	1.42
Mixed Commercial	Mean	357.6	169.8	102	706.8	125.1	1062	157.7	433.7	204.3	223.7
	Median	230	130.8	110	281	99	200	115	306	190	140
	StDev	304.4	160.4	31.1	1451.5	94.8	1978.3	130.3	481.6	53.2	431.9
	Count	41	141	5	13	72	5	30	7	7	321
	% above DL	100	98	100	100	100	100	100	100	100	99
	COV	0.85	0.94	0.30	2.05	0.76	1.86	0.83	1.11	0.26	1.93
Freeway	Mean	205.4	189.8	7.5	*	89.8	300.8	211.4	*	*	162.1
	Median	210	106.4	6.2	*	50	200	178	*	*	100
	StDev	34.7	241.7	7.2	*	112.3	331	164.8	*	*	224.1
	Count	5	195	14	0	255	99	25	0	0	593
	% above DL	100	99	100	0	100	99	100	0	0	99
	COV	0.17	1.27	0.96	-	1.25	1.10	0.78	-	-	1.38
Mixed Freeway	Mean	367.7	342.5	*	*	72.8	*	*	*	*	205.1
	Median	370	291.4	*	*	63	*	*	*	*	130
	StDev	51.5	220.7	*	*	34.4	*	*	*	*	190.7
	Count	3	8	0	0	12	0	0	0	0	23
	% above DL	100	100	0	0	100	0	0	0	0	100
	COV	0.14	0.64	-	-	0.47	-	-	-	-	0.93
Industrial	Mean	104.6	173.8	148.4	276.6	224.5	504.3	261.5	*	397.4	225
	Median	45.4	115.3	120	194	128	430	137.9	*	266	140
	StDev	127.5	196.6	151.2	320.9	252.9	308.1	815.3	*	530.5	387.6
	Count	84	256	84	48	45	73	98	0	19	707
	% above DL	99	99	100	100	100	99	100	0	89	99
	COV	1.22	1.13	1.02	1.16	1.13	0.61	3.12	-	1.33	1.72
Mixed Industrial	Mean	*	178.8	217.7	2399.5	129	5065.8	116.5	*	530	760.5
	Median	*	163	87	550	105	3600	103.5	*	505	170
	StDev	*	90.4	380.2	4136.1	83.1	5502.9	55.6	*	347.6	2391.4
	Count	0	106	23	6	62	26	6	0	20	249
	% above DL	0	98	91	100	100	100	100	0	100	98
	COV	-	0.51	1.75	1.72	0.64	1.09	0.48	-	0.66	3.14

Total Zinc (µg/L)		Rain Zones									
Land Uses		1	2	3	4	5	6	7	8	9	All
Institutional	Mean	169	362.7	65.7	*	*	*	*	*	*	182.4
	Median	179	305	50	*	*	*	*	*	*	110
	StDev	40.5	295.5	44.6	*	*	*	*	*	*	221.4
	Count	7	18	27	0	0	0	0	0	0	52
	% above DL	100	100	100	0	0	0	0	0	0	100
	COV	0.24	0.81	0.68	-	-	-	-	-	-	1.21
MIX	Mean	14.9	*	*	*	*	*	*	*	*	14.9
	Median	12.5	*	*	*	*	*	*	*	*	12.5
	StDev	13.3	*	*	*	*	*	*	*	*	13.3
	Count	77	0	0	0	0	0	0	0	0	77
	% above DL	100	0	0	0	0	0	0	0	0	100
	COV	0.89	-	-	-	-	-	-	-	-	0.89
Open Space	Mean	13.9	355.3	*	92.6	*	225	*	*	*	228.2
	Median	6	21.5	*	60	*	225	*	*	*	40
	StDev	14.7	848.8	*	95.3	*	233.3	*	*	*	635.5
	Count	7	30	0	17	0	2	0	0	0	56
	% above DL	43	77	0	94	0	100	0	0	0	78
	COV	1.06	2.39	-	1.03	-	1.04	-	-	-	2.78
Mixed Open Space	Mean	*	105	*	*	100.2	*	*	*	438.6	118
	Median	*	99	*	*	60	*	*	*	340	80
	StDev	*	70.5	*	*	130.3	*	*	*	187.5	127.9
	Count	0	78	0	0	69	0	0	0	7	154
	% above DL	0	99	0	0	100	0	0	0	100	99
	COV	-	0.67	-	-	1.30	-	-	-	0.43	1.08
Residential	Mean	107.9	122.7	76.8	222.6	60.6	214.9	107.1	134	125.3	120.6
	Median	53.4	56	51.8	120	50	150	90	115.6	110	65.9
	StDev	160.1	499.9	84.4	377.8	41.7	242.7	74.6	80.6	119.5	393.9
	Count	236	1112	112	89	87	41	198	6	77	1958
	% above DL	97	97	96	96	100	98	99	100	97	97
	COV	1.48	4.07	1.10	1.70	0.69	1.13	0.70	0.60	0.95	3.27
Mixed Residential	Mean	186.3	105.1	47	106.4	126.1	312.7	129.4	219.1	169.9	121.1
	Median	150	80	34	90.3	100	210	106	219	110	90
	StDev	128.7	103.5	69.8	58.4	96.3	388.9	108.8	106.5	178.2	134.3
	Count	97	378	129	22	96	31	143	9	23	928
	% above DL	100	95	80	100	100	100	100	100	87	95
	COV	0.69	0.98	1.49	0.55	0.76	1.24	0.84	0.49	1.05	1.11
ALL	Mean	135.9	158	75.8	304.5	107.2	739	152.1	264.2	231.9	177.4
	Median	70	87.9	45	130	74	270	100.5	193.5	145.5	90
	StDev	194.5	373.7	116.9	820.3	120.2	2068.2	362.9	295.7	277.7	587.2
	Count	752	2698	681	242	737	313	542	22	178	6165
	% above DL	98	97	95	98	100	99	99	100	94	98
	COV	1.43	2.37	1.54	2.69	1.12	2.80	2.39	1.12	1.20	3.31

Appendix E One-Way ANOVA Analyses Examining Land Use and EPA Rain Zone Effects on Stormwater Quality in the NSQD

Summary of One-Way ANOVA Probability Values (P values <0.05 are indicated in bold)

Constituent (total number of analyses available)	**Significance of EPA Rain Zone Effects on Constituent Concentrations**	**Significance of Land Use Effects on Constituent Concentrations**
Conductivity (873)	**0.005**	**0.003**
Dissolved oxygen (222)	0.688	0.891
Hardness (1,176)	**<0.001**	**<0.001**
Oil and grease (2,257)	**0.028**	0.956
pH (2,376)	**<0.001**	**<0.001**
Turbidity (8,552)	0.75	0.138
Temperature (7,269)	**<0.001**	0.087
Total dissolved solids (3,548)	**<0.001**	0.49
Total suspended solids (6,747)	**<0.001**	**<0.001**
BOD_5 (4,776)	**<0.001**	0.493
COD (5,068)	**<0.001**	**<0.001**
Fecal Coliforms (2,146)	<**0.001**	**0.007**
Fecal Streptococcus (1,187)	**0.001**	0.331
E. Coli (160)	0.873	0.754
Ammonia (2,436)	<**0.001**	<**0.001**
$NO_2 + NO_3$ (1,260)	**0.001**	**<0.001**
Total Nitrogen (682)	**0.003**	0.826
Total Kjeldahl Nitrogen (6,132)	<**0.001**	<**0.001**
Dissolved Phosphorus (2,987)	<**0.001**	<**0.001**
Total Phosphorus (7,407)	<**0.001**	<**0.001**
Total Cadmium (3,415)	<**0.001**	<**0.001**
Total Copper (5,154)	<**0.001**	<**0.001**
Total Zinc (6,165)	<**0.001**	<**0.001**
Total Lead (5,945)	<**0.001**	<**0.001**

Significant EPA Rain Zone Categories

Constituent (total number of analyses available)	**EPA Rain Zones likely having high values compared to other EPA Rain Zones**	**EPA Rain Zones likely having low values compared to other EPA Rain Zones**
Conductivity (873)	1	
Hardness (1,176)	1	4, 5, and 6
Oil and grease (2,257)	4 and 5	
pH (2,376)	4 and 5	3, 6, and 9
Temperature (7,269)	3, 4, 5, and 6	7, 8, and 9
Total dissolved solids (3,548)	1	
Total suspended solids (6,747)	4, 6, and 9	2 and 3
BOD_5 (4,776)	4, 6, 8, and 9	3 and 5
COD (5,068)	6, 8, and 9	3 and 7
Fecal Coliforms (2,146)	1, 4 and 5	
Fecal Streptococcus (1,187)	5	3, 6, and 7
Ammonia (2,436)	6, 8, and 9	3 and 7
$NO_2 + NO_3$ (1,260)	6 and 9	
Total Nitrogen (682)	9	3 and 6
Total Kjeldahl Nitrogen (6,132)	8 and 9	3 and 7
Dissolved Phosphorus (2,987)	6	1, 3, and 5
Total Phosphorus (7,407)	6, 8, and 9	3 and 7
Total Cadmium (3,415)	3 ,4, and 9	
Total Copper (5,154)	4 and 6	3
Total Zinc (6,165)	4 and 6	3 and 5
Total Lead (5,945)	1, 6, and 9	3, 5, and 8

Significant Land Use Categories

Constituent (total number of analyses available)	**Land uses likely having high values compared to other land uses**	**Land uses likely having low values compared to other land uses**
Conductivity (873)	FW mix, OP mix	OP
Hardness (1,176)	OP mix	
pH (2,376)	OP mix	
Total suspended solids (6,747)	CO mix, OP mix, RE mix	
COD (5,068)	CO mix and ID	OP and OP
Fecal Coliforms (2,146)	RE and RE mix	IS
Ammonia (2,436)	FW mix, and FW	OP, and OP mix
$NO_2 + NO_3$ (1,260)	FW	CO mix, IS, ID mix, and OP mix
Total Kjeldahl Nitrogen (6,132)	FW mix	OP, OP mix, and ID mix
Dissolved Phosphorus (2,987)	FW	
Total Phosphorus (7,407)	CO mix, OP mix, and RE mix	OP mix
Total Cadmium (3,415)	OP	IS and RE
Total Copper (5,154)	CO mix	OP
Total Zinc (6,165)	ID mix	
Total Lead (5,945)	CO mix and RE mix	

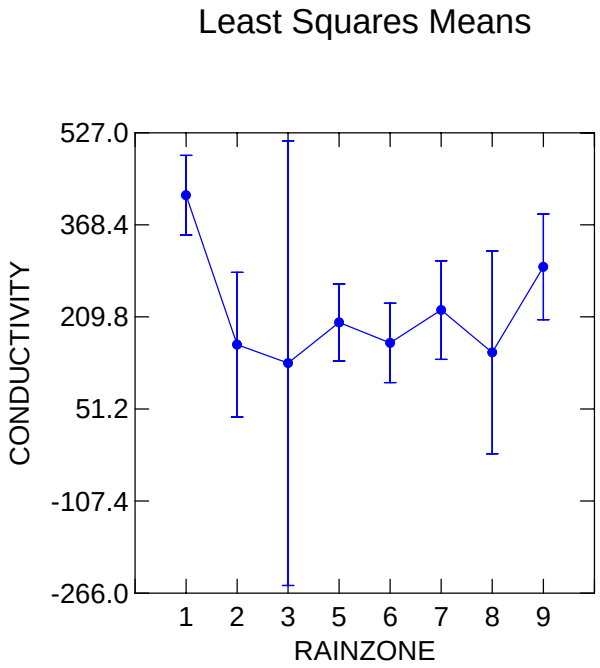
Conductivity (µS/cm @ 25C)

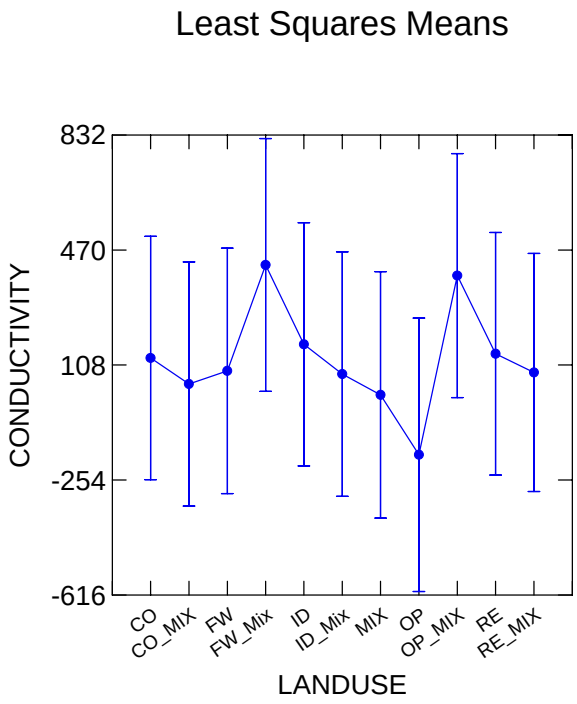
```
Effects coding used for categorical variables in model.

Categorical values encountered during processing are:
RAINZONE (9 levels)
          1,        2,        3,        4,        5,        6,        7,
          8,        9
LANDUSE$ (12 levels)
   CO, CO_MIX, FW, FW_Mix, ID, ID_Mix, IS, MIX, OP, OP_MIX, RE, RE_MIX
7729 case(s) deleted due to missing data.

The following effects have lost degrees of freedom.
```

Effect	Initial df	Lost df	Final df
RAINZONE	8	1	7
LANDUSE$	11	1	10

```
Dep Var: CONDUCTIVITY   N: 873   Multiple R: 0.238   Squared multiple R: 0.057

Analysis of Variance
```

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
RAINZONE	5713193	7	816170.5	2.908	0.005
LANDUSE$	7552695	10	755269.5	2.691	0.003
Error	2.40E+08	855	280661.7		






```
*** WARNING ***
Case           11 is an outlier        (Studentized Residual =       16.869)
Case           12 is an outlier        (Studentized Residual =        7.667)
Case           21 is an outlier        (Studentized Residual =        9.736)
Case           32 is an outlier        (Studentized Residual =        7.926)
Case           53 is an outlier        (Studentized Residual =        5.325)
Case           60 is an outlier        (Studentized Residual =        4.537)
Case         7257 is an outlier        (Studentized Residual =       11.088)

Durbin-Watson D Statistic          1.639
First Order Autocorrelation        0.177


Test for effect called:     CONSTANT
```

Test of Hypothesis

Source	SS	df	MS	F	P
Hypothesis	32445.98	1	32445.98	0.116	0.734
Error	2.40E+08	855	280661.7		

DO (mg/L)

```
Effects coding used for categorical variables in model.

Categorical values encountered during processing are:
RAINZONE (9 levels)
          1,        2,        3,        4,        5,        6,        7,
```

8, 9
LANDUSE$ (12 levels)
CO, CO_MIX, FW, FW_Mix, ID, ID_Mix, IS, MIX, OP, OP_MIX, RE, RE_MIX
8380 case(s) deleted due to missing data.

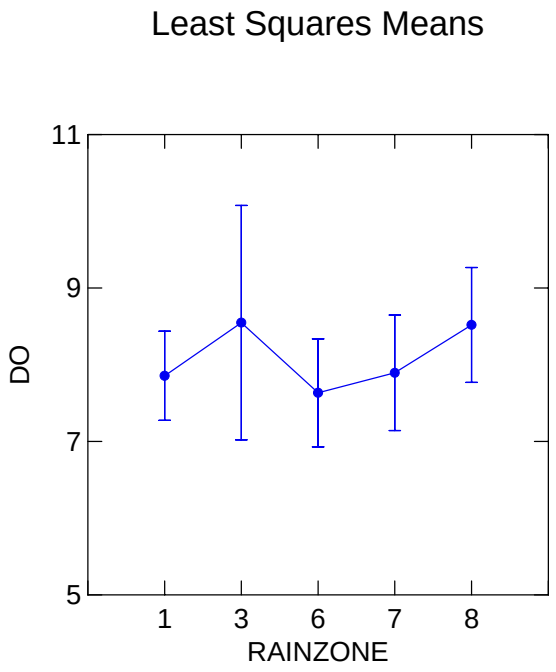
The following effects have lost degrees of freedom.

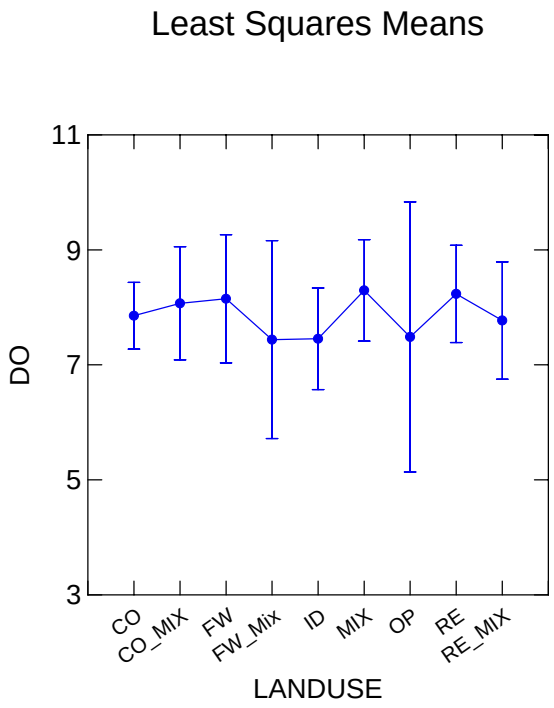
Effect	Initial df	Lost df	Final df
RAINZONE	8	4	4
LANDUSE$	11	3	8

Dep Var: DO N: 222 Multiple R: 0.235 Squared multiple R: 0.055

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
RAINZONE	7.892	4	1.973	0.565	0.688
LANDUSE$	12.509	8	1.564	0.448	0.891
Error	729.981	209	3.493		





Durbin-Watson D Statistic 1.807
First Order Autocorrelation 0.087

Test for effect called: CONSTANT

Test of Hypothesis

Source	SS	df	MS	F	P
Hypothesis	638.294	1	638.294	182.749	0
Error	729.981	209	3.493		

Hardness (mg/L CaCO3)

Effects coding used for categorical variables in model.

Categorical values encountered during processing are:
RAINZONE (9 levels)
1, 2, 3, 4, 5, 6, 7,
8, 9
LANDUSE$ (12 levels)
CO, CO_MIX, FW, FW_Mix, ID, ID_Mix, IS, MIX, OP, OP_MIX, RE, RE_MIX
7426 case(s) deleted due to missing data.

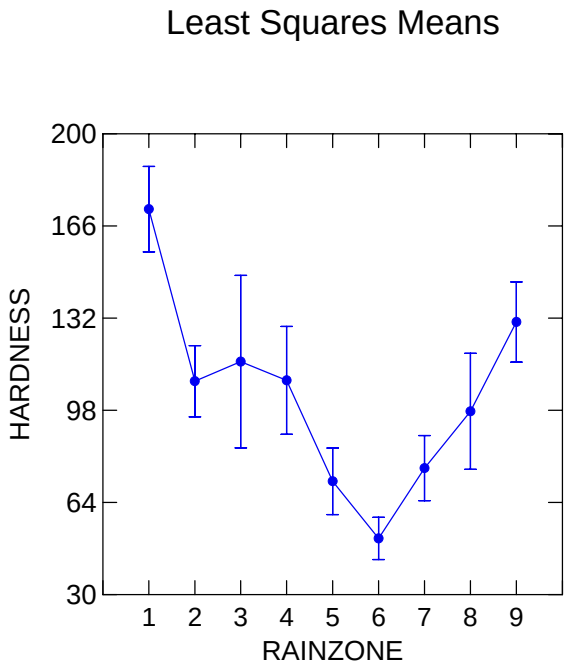
The following effects have lost degrees of freedom.

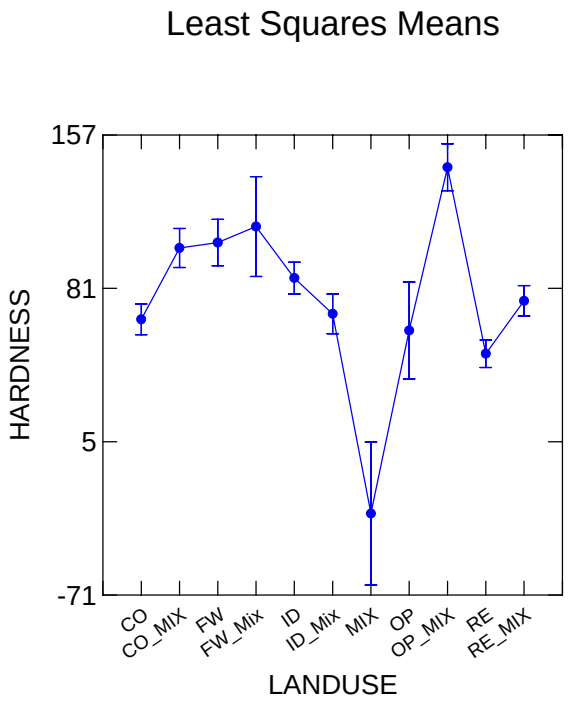
Effect	Initial df	Lost df	Final df
LANDUSE$	11	1	10

Dep Var: HARDNESS N: 1176 Multiple R: 0.353 Squared multiple R: 0.125

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
RAINZONE	738252.4	8	92281.55	13.413	0
LANDUSE$	606795.4	10	60679.54	8.82	0
Error	7960168	1157	6880.007		






```
*** WARNING ***
Case          6485 is an outlier          (Studentized Residual =       11.481)
Case          7321 is an outlier          (Studentized Residual =        5.363)
Case          7322 is an outlier          (Studentized Residual =       13.399)
Case          7391 is an outlier          (Studentized Residual =        6.618)
Case          7925 is an outlier          (Studentized Residual =        4.679)
Case          7930 is an outlier          (Studentized Residual =       11.836)
Case          8321 is an outlier          (Studentized Residual =        6.514)
Case          8340 is an outlier          (Studentized Residual =        5.794)
Case          8353 is an outlier          (Studentized Residual =        9.801)

Durbin-Watson D Statistic          1.518
First Order Autocorrelation        0.241


Test for effect called:     CONSTANT


Test of Hypothesis
```

Source	SS	df	MS	F	P
Hypothesis	560452.5	1	560452.5	81.461	0
Error	7960168	1157	6880.007		

Oil and Grease Total (mg/L)

```
Effects coding used for categorical variables in model.

Categorical values encountered during processing are:
```

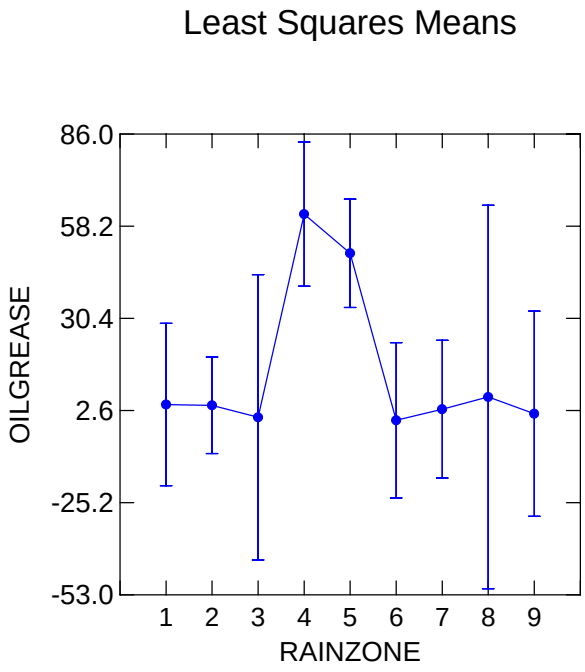
```
RAINZONE (9 levels)
          1,        2,        3,        4,        5,        6,        7,
          8,        9
LANDUSE$ (12 levels)
   CO, CO_MIX, FW, FW_Mix, ID, ID_Mix, IS, MIX, OP, OP_MIX, RE, RE_MIX
6345 case(s) deleted due to missing data.

The following effects have lost degrees of freedom.
```

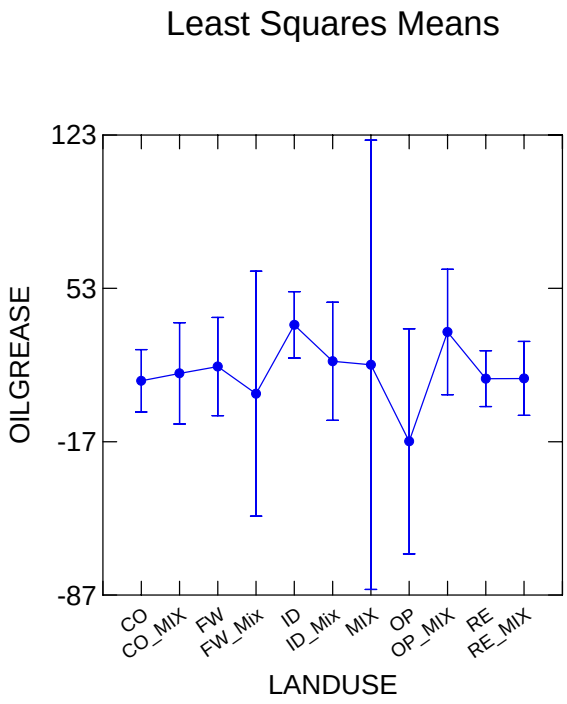
Effect	Initial df	Lost df	Final df
LANDUSE$	11	1	10

Dep Var: OILGREASE N: 2257 Multiple R: 0.103 Squared multiple R: 0.011

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
RAINZONE	1030226	8	128778.2	2.153	0.028
LANDUSE$	226972	10	22697.2	0.379	0.956
Error	1.34E+08	2238	59815.18		






```
*** WARNING ***
Case          7720 is an outlier          (Studentized Residual =      139.604)
Case          8098 is an outlier          (Studentized Residual =       12.423)

Durbin-Watson D Statistic          1.982
First Order Autocorrelation        0.009


Test for effect called:     CONSTANT

Test of Hypothesis
```

Source	SS	df	MS	F	P
Hypothesis	59082.12	1	59082.12	0.988	0.32
Error	1.34E+08	2238	59815.18		

pH

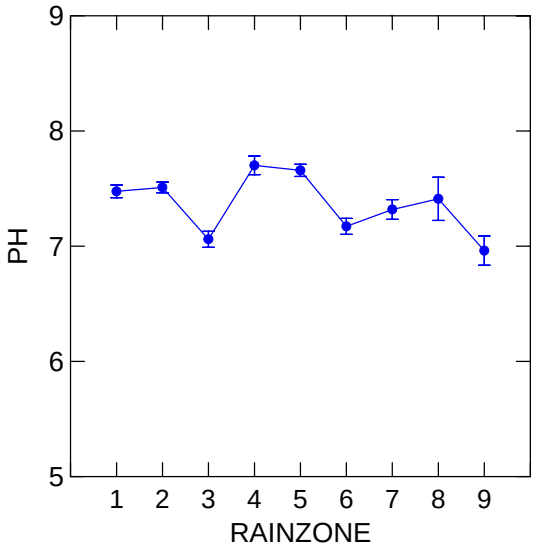
```
Effects coding used for categorical variables in model.

Categorical values encountered during processing are:
RAINZONE (9 levels)
          1,        2,        3,        4,        5,        6,        7,
          8,        9
LANDUSE$ (12 levels)
   CO, CO_MIX, FW, FW_Mix, ID, ID_Mix, IS, MIX, OP, OP_MIX, RE, RE_MIX
6226 case(s) deleted due to missing data.
```

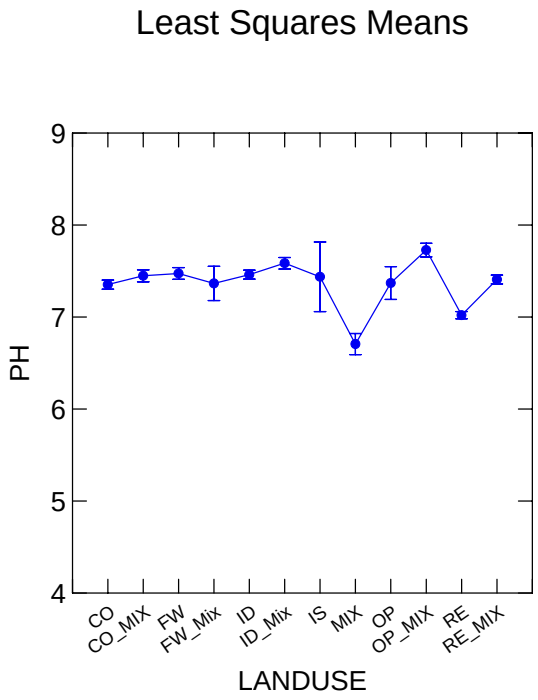
Dep Var: PH N: 2376 Multiple R: 0.369 Squared multiple R: 0.136

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
RAINZONE	79.892	8	9.987	17.717	0
LANDUSE$	110.097	11	10.009	17.757	0
Error	1328.007	2356	0.564		

Least Squares Means






```
*** WARNING ***
Case          383 is an outlier        (Studentized Residual =       -4.684)
Case         6520 is an outlier        (Studentized Residual =       -5.653)

Durbin-Watson D Statistic          1.225
First Order Autocorrelation        0.384


Test for effect called:     CONSTANT

Test of Hypothesis
```

Source	SS	df	MS	F	P
Hypothesis	13460.7	1	13460.7	23880.45	0
Error	1328.007	2356	0.564		

Turbidity (NTU)

```
Effects coding used for categorical variables in model.

Categorical values encountered during processing are:
RAINZONE (9 levels)
          1,        2,        3,        4,        5,        6,        7,
          8,        9
LANDUSE$ (12 levels)
   CO, CO_MIX, FW, FW_Mix, ID, ID_Mix, IS, MIX, OP, OP_MIX, RE, RE_MIX
```

8552 case(s) deleted due to missing data.

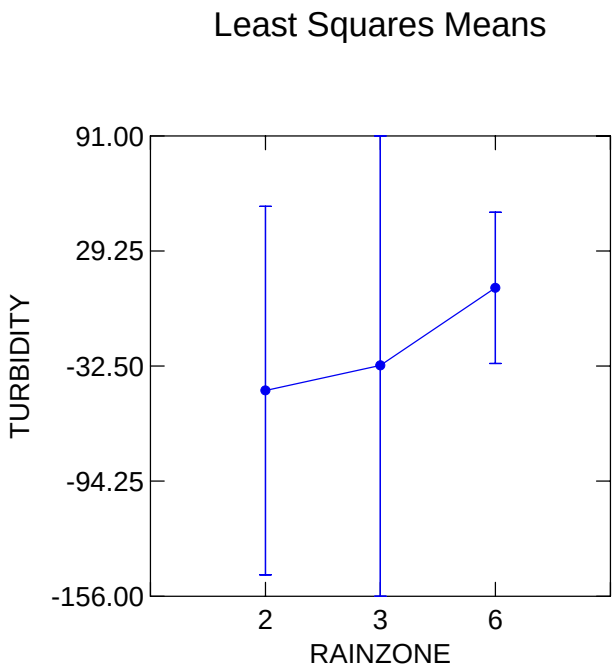
The following effects have lost degrees of freedom.

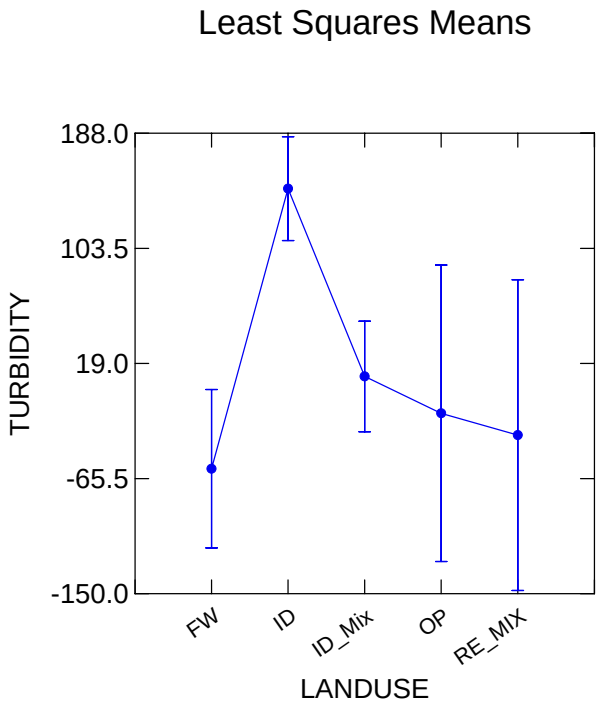
Effect	Initial df	Lost df	Final df
RAINZONE	8	6	2
LANDUSE$	11	8	3

Dep Var: TURBIDITY N: 50 Multiple R: 0.472 Squared multiple R: 0.222

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
RAINZONE	8474.126	2	4237.063	0.289	0.75
LANDUSE$	85033.79	3	28344.6	1.934	0.138
Error	644752.4	44	14653.46		






```
*** WARNING ***
Case          6880 is an outlier          (Studentized Residual =        7.849)
Case          8393 is an outlier          (Studentized Residual =        7.060)
Case          8397 is an outlier          (Studentized Residual =        3.756)

Durbin-Watson D Statistic          1.004
First Order Autocorrelation        0.492



Test for effect called:     CONSTANT

Test of Hypothesis
```

Source	SS	df	MS	F	P
Hypothesis	800.311	1	800.311	0.055	0.816
Error	644752.4	44	14653.46		

Temperature (ºC)

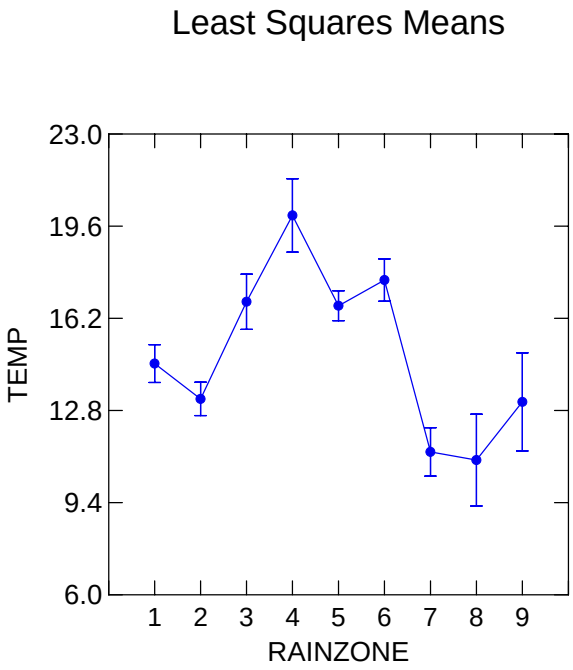
```
Effects coding used for categorical variables in model.

Categorical values encountered during processing are:
RAINZONE (9 levels)
          1,        2,        3,        4,        5,        6,        7,
          8,        9
LANDUSE$ (12 levels)
   CO, CO_MIX, FW, FW_Mix, ID, ID_Mix, IS, MIX, OP, OP_MIX, RE, RE_MIX
```

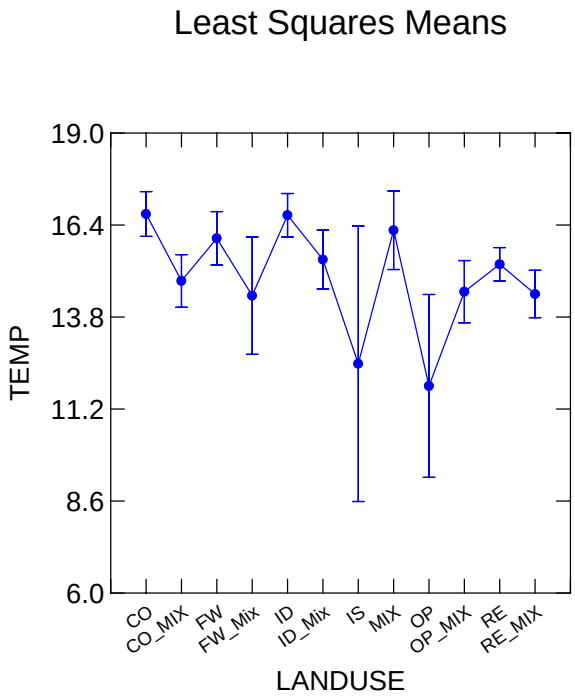
7269 case(s) deleted due to missing data.

Dep Var: TEMP N: 1333 Multiple R: 0.312 Squared multiple R: 0.097

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
RAINZONE	4549.976	8	568.747	12.956	0
LANDUSE$	782.913	11	71.174	1.621	0.087
Error	57640.65	1313	43.9		






```
*** WARNING ***
Case          458 is an outlier        (Studentized Residual =       -4.490)
Case          565 is an outlier        (Studentized Residual =       -4.826)

Durbin-Watson D Statistic          1.161
First Order Autocorrelation        0.419


Test for effect called:     CONSTANT
```

Test of Hypothesis

Source	SS	df	MS	F	P
Hypothesis	33617.29	1	33617.29	765.77	0
Error	57640.65	1313	43.9		

Total Dissolved Solids (mg/L)

```
Effects coding used for categorical variables in model.

Categorical values encountered during processing are:
RAINZONE (9 levels)
          1,        2,        3,        4,        5,        6,        7,
          8,        9
LANDUSE$ (12 levels)
   CO, CO_MIX, FW, FW_Mix, ID, ID_Mix, IS, MIX, OP, OP_MIX, RE, RE_MIX
5054 case(s) deleted due to missing data.
```

The following effects have lost degrees of freedom.

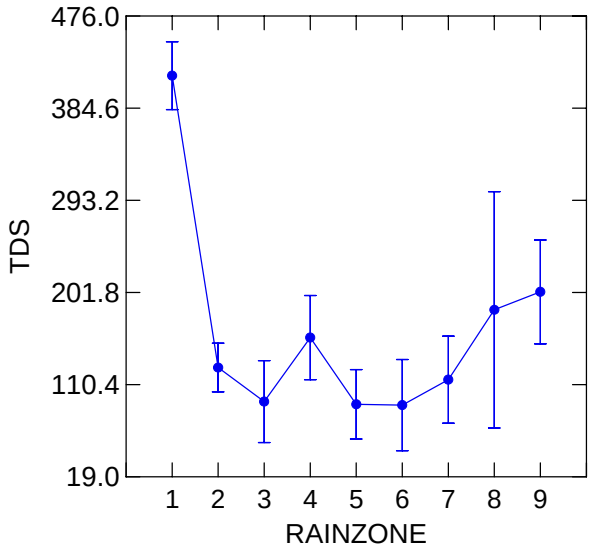
Effect	Initial df	Lost df	Final df
LANDUSE$	11	1	10

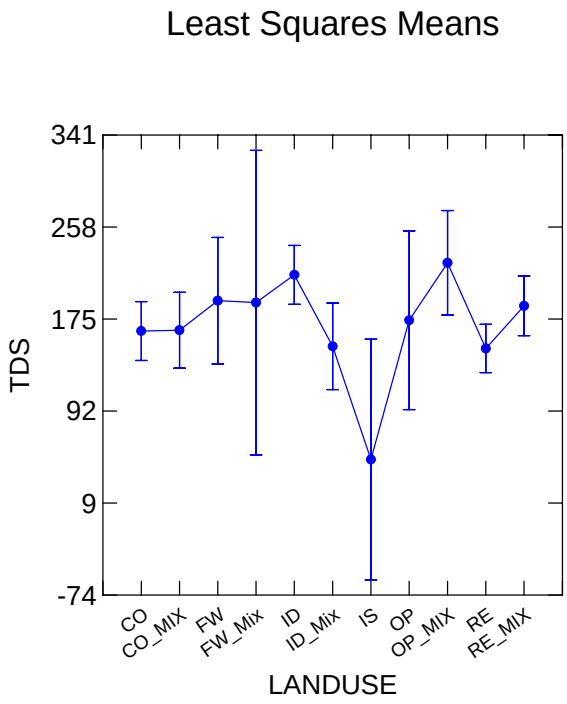
Dep Var: TDS N: 3548 Multiple R: 0.175 Squared multiple R: 0.031

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
RAINZONE	2.73E+07	8	3418067	12.473	0
LANDUSE$	2589980	10	258998	0.945	0.49
Error	9.67E+08	3529	274028		

Least Squares Means






```
*** WARNING ***
Case           55 is an outlier        (Studentized Residual =       15.417)
Case          196 is an outlier        (Studentized Residual =       13.450)
Case          197 is an outlier        (Studentized Residual =        8.771)
Case          198 is an outlier        (Studentized Residual =       10.803)
Case          199 is an outlier        (Studentized Residual =        4.922)
Case          228 is an outlier        (Studentized Residual =       11.085)
Case          229 is an outlier        (Studentized Residual =       11.388)
Case          253 is an outlier        (Studentized Residual =       10.511)
Case          926 is an outlier        (Studentized Residual =        6.320)
Case          927 is an outlier        (Studentized Residual =       12.476)
Case          940 is an outlier        (Studentized Residual =        7.549)
Case         1001 is an outlier        (Studentized Residual =        5.362)
Case         1002 is an outlier        (Studentized Residual =        5.207)
Case         1163 is an outlier        (Studentized Residual =        5.885)
Case         4869 is an outlier        (Studentized Residual =       22.545)
Case         5389 is an outlier        (Studentized Residual =        7.189)
Case         7257 is an outlier        (Studentized Residual =        7.716)
Case         7540 is an outlier        (Studentized Residual =       40.456)

Durbin-Watson D Statistic          1.515
First Order Autocorrelation        0.242


Test for effect called:     CONSTANT

Test of Hypothesis
```

Source	SS	df	MS	F	P
Hypothesis	1.05E+07	1	1.05E+07	38.31	0

Error	9.67E+08	3529	274028

Total Suspended Solids (mg/L)

Effects coding used for categorical variables in model.

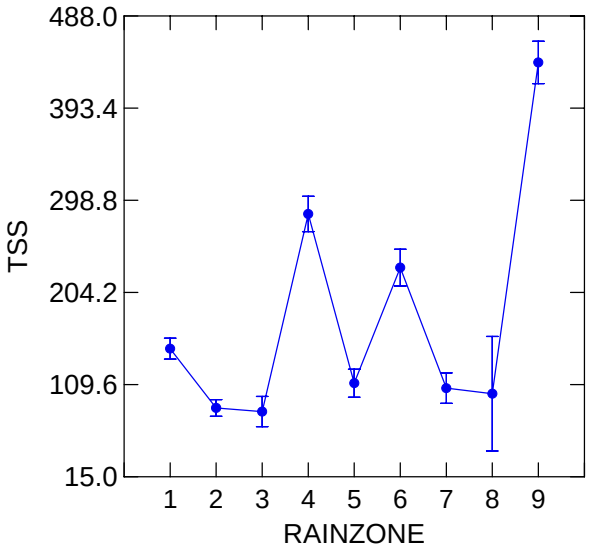
Categorical values encountered during processing are:
RAINZONE (9 levels)
1, 2, 3, 4, 5, 6, 7,
8, 9
LANDUSE$ (12 levels)
CO, CO_MIX, FW, FW_Mix, ID, ID_Mix, IS, MIX, OP, OP_MIX, RE, RE_MIX
1855 case(s) deleted due to missing data.

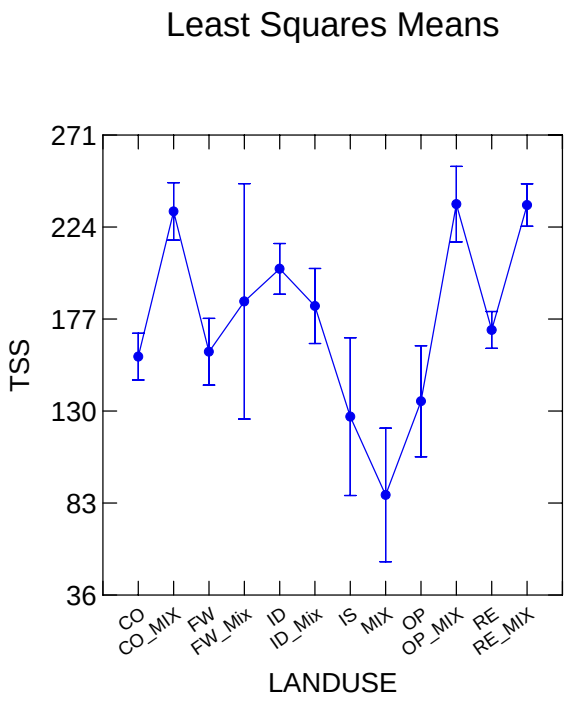
Dep Var: TSS N: 6747 Multiple R: 0.271 Squared multiple R: 0.073

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
RAINZONE	3.64E+07	8	4544391	56.045	0
LANDUSE$	7113579	11	646689	7.975	0
Error	5.45E+08	6727	81084.9		

Least Squares Means






```
*** WARNING ***
Case          3097 is an outlier          (Studentized Residual =        6.252)
Case          3099 is an outlier          (Studentized Residual =        5.221)
Case          3102 is an outlier          (Studentized Residual =        4.945)
Case          3103 is an outlier          (Studentized Residual =        5.841)
Case          3104 is an outlier          (Studentized Residual =        9.729)
Case          3105 is an outlier          (Studentized Residual =        7.490)
Case          3106 is an outlier          (Studentized Residual =        6.068)
Case          3107 is an outlier          (Studentized Residual =       13.873)
Case          3109 is an outlier          (Studentized Residual =        5.313)
Case          3110 is an outlier          (Studentized Residual =        8.217)
Case          3622 is an outlier          (Studentized Residual =        5.710)
Case          3689 is an outlier          (Studentized Residual =        7.033)
Case          4055 is an outlier          (Studentized Residual =        8.169)
Case          4107 is an outlier          (Studentized Residual =        4.935)
Case          4240 is an outlier          (Studentized Residual =        6.545)
Case          4260 is an outlier          (Studentized Residual =        4.875)
Case          4324 is an outlier          (Studentized Residual =       11.256)
Case          4366 is an outlier          (Studentized Residual =       39.965)
Case          4367 is an outlier          (Studentized Residual =       20.399)
Case          4370 is an outlier          (Studentized Residual =       11.381)
Case          4373 is an outlier          (Studentized Residual =        5.084)
Case          4377 is an outlier          (Studentized Residual =        8.071)
Case          4379 is an outlier          (Studentized Residual =       13.568)
Case          4380 is an outlier          (Studentized Residual =        9.936)
Case          4470 is an outlier          (Studentized Residual =        8.896)
Case          4508 is an outlier          (Studentized Residual =        9.415)
Case          4767 is an outlier          (Studentized Residual =        9.896)
Case          4769 is an outlier          (Studentized Residual =        5.413)
Case          4791 is an outlier          (Studentized Residual =        7.828)
Case          6302 is an outlier          (Studentized Residual =        5.038)
Case          6346 is an outlier          (Studentized Residual =        5.035)
Case          6354 is an outlier          (Studentized Residual =        7.979)
Case          7050 is an outlier          (Studentized Residual =       16.466)
```

```
Case         7061 is an outlier        (Studentized Residual =        5.242)
Case         7110 is an outlier        (Studentized Residual =        6.106)
Case         7113 is an outlier        (Studentized Residual =        7.311)
Case         7584 is an outlier        (Studentized Residual =        6.032)
Case         7606 is an outlier        (Studentized Residual =        7.487)
Case         7620 is an outlier        (Studentized Residual =        7.711)
Case         7979 is an outlier        (Studentized Residual =        8.318)
Case         8186 is an outlier        (Studentized Residual =        7.101)

Durbin-Watson D Statistic          1.291
First Order Autocorrelation        0.355



Test for effect called:     CONSTANT
```

Test of Hypothesis

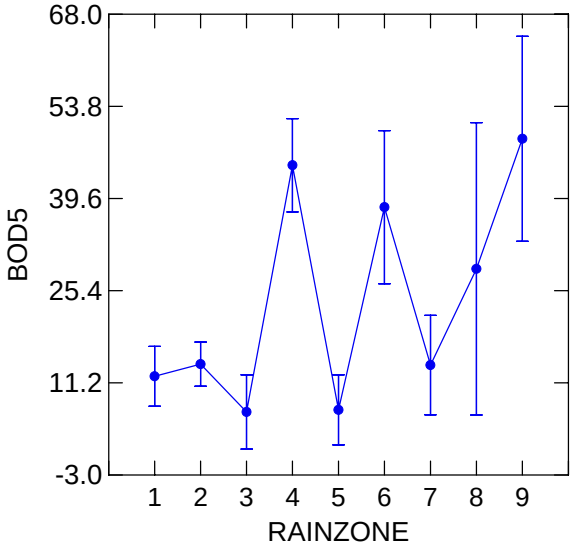
Source	SS	df	MS	F	P
Hypothesis	2.34E+07	1	2.34E+07	288.112	0
Error	5.45E+08	6727	81084.9		

BOD_5 (mg/L)

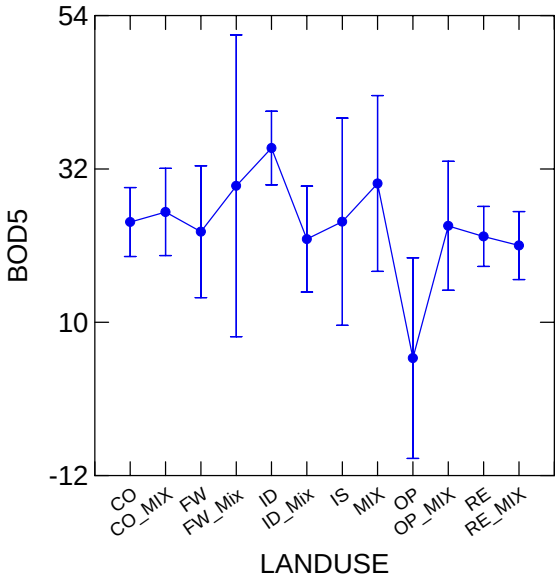
```
Effects coding used for categorical variables in model.

Categorical values encountered during processing are:
RAINZONE (9 levels)
          1,        2,        3,        4,        5,        6,        7,
          8,        9
LANDUSE$ (12 levels)
   CO, CO_MIX, FW, FW_Mix, ID, ID_Mix, IS, MIX, OP, OP_MIX, RE, RE_MIX
3826 case(s) deleted due to missing data.

Dep Var: BOD5   N: 4776   Multiple R: 0.097   Squared multiple R: 0.010

Analysis of Variance
```

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
RAINZONE	364044.3	8	45505.54	4.373	0
LANDUSE$	108484.6	11	9862.241	0.948	0.493
Error	4.95E+07	4756	10404.92		

Least Squares Means



Least Squares Means




```
*** WARNING ***
Case          7720 is an outlier          (Studentized Residual =      326.867)

Durbin-Watson D Statistic          1.999
```

First Order Autocorrelation 0.000

Test for effect called: CONSTANT

Test of Hypothesis

Source	SS	df	MS	F	P
Hypothesis	306331.9	1	306331.9	29.441	0
Error	4.95E+07	4756	10404.92		

COD (mg/L)

Effects coding used for categorical variables in model.

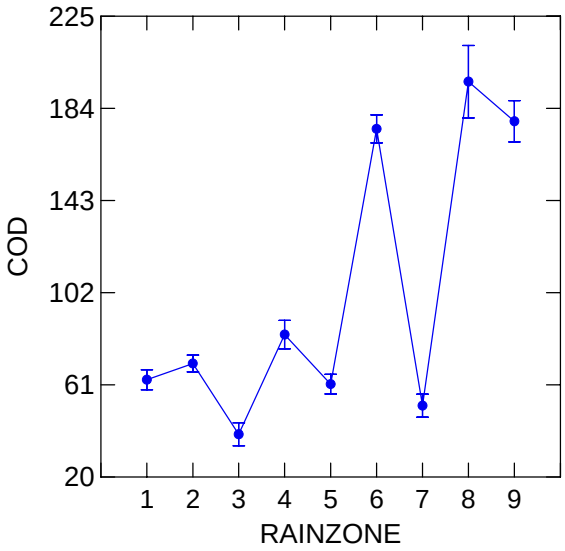
Categorical values encountered during processing are:
RAINZONE (9 levels)
1, 2, 3, 4, 5, 6, 7,
8, 9
LANDUSE$ (12 levels)
CO, CO_MIX, FW, FW_Mix, ID, ID_Mix, IS, MIX, OP, OP_MIX, RE, RE_MIX
3534 case(s) deleted due to missing data.

Dep Var: COD N: 5068 Multiple R: 0.386 Squared multiple R: 0.149

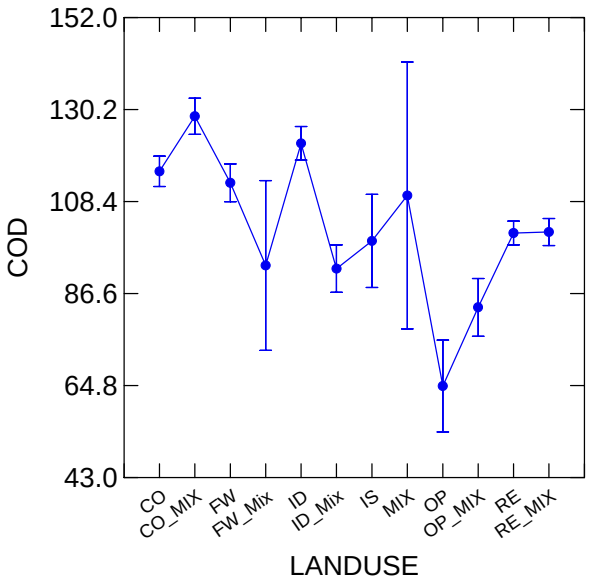
Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
RAINZONE	4399893	8	549986.6	92.956	0
LANDUSE$	677398.7	11	61581.7	10.408	0
Error	2.99E+07	5048	5916.617		

Least Squares Means



Least Squares Means




```
*** WARNING ***
Case          106 is an outlier        (Studentized Residual =        5.848)
Case          156 is an outlier        (Studentized Residual =        5.848)
Case          196 is an outlier        (Studentized Residual =        6.493)
```

```
Case          198 is an outlier        (Studentized Residual =        6.982)
Case          927 is an outlier        (Studentized Residual =        6.077)
Case         1044 is an outlier        (Studentized Residual =        7.273)
Case         2667 is an outlier        (Studentized Residual =        5.784)
Case         3152 is an outlier        (Studentized Residual =        6.669)
Case         3624 is an outlier        (Studentized Residual =        5.078)
Case         3638 is an outlier        (Studentized Residual =        5.379)
Case         3657 is an outlier        (Studentized Residual =        5.982)
Case         3726 is an outlier        (Studentized Residual =        5.550)
Case         3727 is an outlier        (Studentized Residual =        6.470)
Case         3804 is an outlier        (Studentized Residual =        9.679)
Case         3879 is an outlier        (Studentized Residual =        7.818)
Case         3882 is an outlier        (Studentized Residual =        8.282)
Case         4648 is an outlier        (Studentized Residual =        6.769)
Case         4769 is an outlier        (Studentized Residual =        5.108)
Case         4955 is an outlier        (Studentized Residual =        7.205)
Case         4963 is an outlier        (Studentized Residual =        7.196)
Case         5140 is an outlier        (Studentized Residual =        6.867)
Case         5685 is an outlier        (Studentized Residual =        6.562)
Case         6410 is an outlier        (Studentized Residual =        7.234)
Case         7043 is an outlier        (Studentized Residual =       10.912)
Case         7101 is an outlier        (Studentized Residual =        5.163)
Case         7110 is an outlier        (Studentized Residual =        5.820)
Case         7205 is an outlier        (Studentized Residual =        5.145)
Case         7219 is an outlier        (Studentized Residual =        9.349)
Case         7257 is an outlier        (Studentized Residual =        8.865)
Case         7301 is an outlier        (Studentized Residual =        5.743)
Case         7391 is an outlier        (Studentized Residual =        4.931)
Case         7702 is an outlier        (Studentized Residual =        5.667)
Case         7710 is an outlier        (Studentized Residual =        6.581)
Case         7720 is an outlier        (Studentized Residual =       15.435)
Case         7815 is an outlier        (Studentized Residual =        5.479)
Case         8572 is an outlier        (Studentized Residual =        5.411)

Durbin-Watson D Statistic          1.553
First Order Autocorrelation        0.223



Test for effect called:     CONSTANT

Test of Hypothesis
```

Source	SS	df	MS	F	P
Hypothesis	3783891	1	3783891	639.536	0
Error	2.99E+07	5048	5916.617		

Fecal Coliform (colonies/100 mL)

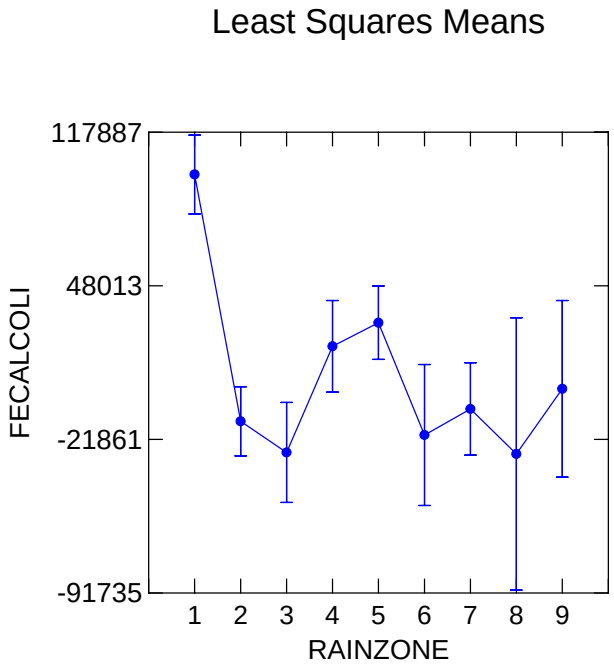
```
Effects coding used for categorical variables in model.

Categorical values encountered during processing are:
RAINZONE (9 levels)
          1,        2,        3,        4,        5,        6,        7,
          8,        9
LANDUSE$ (12 levels)
```

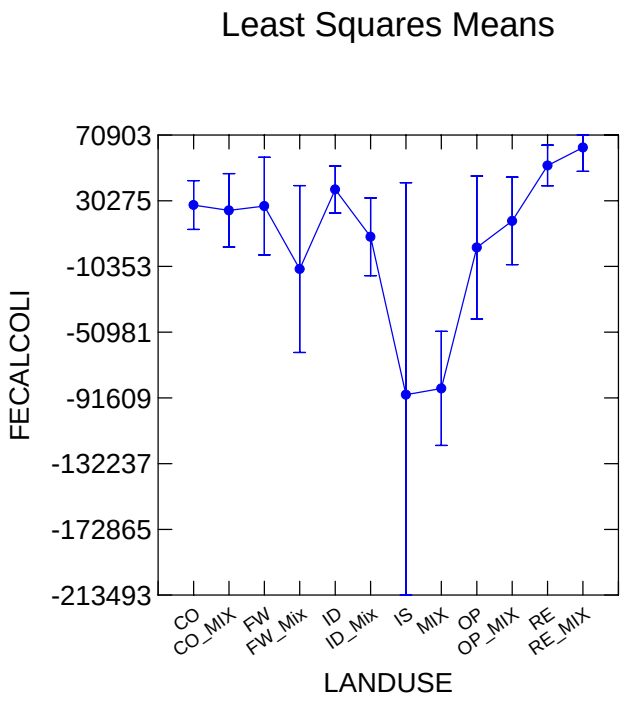
CO, CO_MIX, FW, FW_Mix, ID, ID_Mix, IS, MIX, OP, OP_MIX, RE, RE_MIX
6456 case(s) deleted due to missing data.

Dep Var: FECALCOLI N: 2146 Multiple R: 0.177 Squared multiple R: 0.031

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
RAINZONE	2.83E+12	8	3.54E+11	6.971	0
LANDUSE$	1.31E+12	11	1.19E+11	2.351	0.007
Error	1.08E+14	2126	5.07E+10		






```
*** WARNING ***
Case            18 is an outlier        (Studentized Residual =        6.771)
Case            19 is an outlier        (Studentized Residual =       15.156)
Case            30 is an outlier        (Studentized Residual =       16.406)
Case            37 is an outlier        (Studentized Residual =        5.744)
Case            39 is an outlier        (Studentized Residual =        9.219)
Case            49 is an outlier        (Studentized Residual =        5.491)
Case            50 is an outlier        (Studentized Residual =       10.427)
Case            69 is an outlier        (Studentized Residual =       12.969)
Case          6573 is an outlier        (Studentized Residual =       25.976)
Case          6611 is an outlier        (Studentized Residual =       12.933)
Case          7560 is an outlier        (Studentized Residual =        5.303)
Case          7715 is an outlier        (Studentized Residual =        9.596)
Case          7843 is an outlier        (Studentized Residual =       11.165)

Durbin-Watson D Statistic          1.770
First Order Autocorrelation        0.115


Test for effect called:     CONSTANT

Test of Hypothesis
```

Source	SS	df	MS	F	P
Hypothesis	7.48E+09	1	7.48E+09	0.148	0.701
Error	1.08E+14	2126	5.07E+10		

Fecal Streptococcus (colonies/100 mL)

Effects coding used for categorical variables in model.

Categorical values encountered during processing are:
RAINZONE (9 levels)
1, 2, 3, 4, 5, 6, 7,
8, 9
LANDUSE$ (12 levels)
CO, CO_MIX, FW, FW_Mix, ID, ID_Mix, IS, MIX, OP, OP_MIX, RE, RE_MIX
7415 case(s) deleted due to missing data.

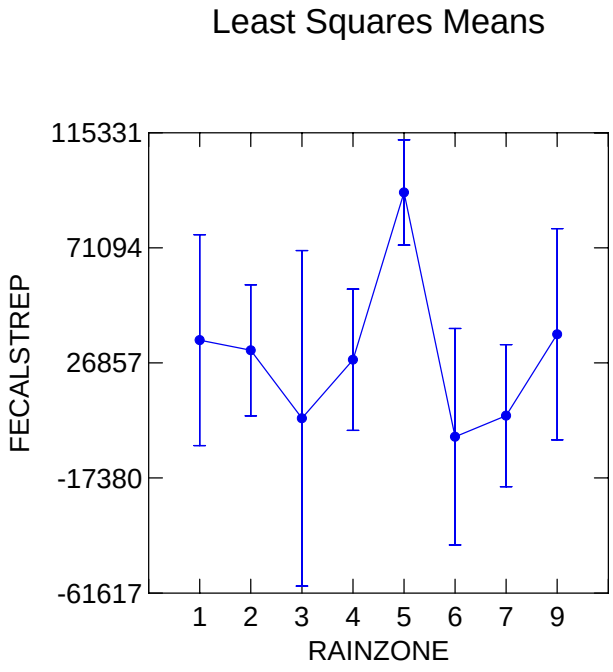
The following effects have lost degrees of freedom.

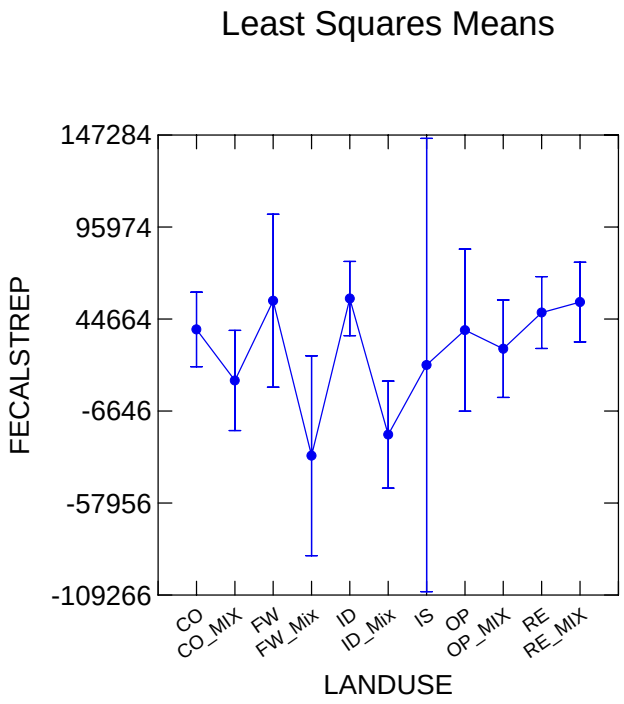
Effect	Initial df	Lost df	Final df
RAINZONE	8	1	7
LANDUSE$	11	1	10

Dep Var: FECALSTREP N: 1187 Multiple R: 0.167 Squared multiple R: 0.028

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
RAINZONE	1.09E+12	7	1.56E+11	3.577	0.001
LANDUSE$	4.95E+11	10	4.95E+10	1.137	0.331
Error	5.09E+13	1169	4.35E+10		






```
*** WARNING ***
Case          6410 is an outlier          (Studentized Residual =        4.809)
Case          7774 is an outlier          (Studentized Residual =        4.846)
Case          7960 is an outlier          (Studentized Residual =        5.899)
Case          7988 is an outlier          (Studentized Residual =       50.491)
Case          8023 is an outlier          (Studentized Residual =        8.324)

Durbin-Watson D Statistic          1.983
First Order Autocorrelation        0.009



Test for effect called:     CONSTANT
```

Test of Hypothesis

Source	SS	df	MS	F	P
Hypothesis	4.65E+10	1	4.65E+10	1.067	0.302
Error	5.09E+13	1169	4.35E+10		

Total E. Coli (colonies/100 mL)

```
Effects coding used for categorical variables in model.

Categorical values encountered during processing are:
RAINZONE (9 levels)
          1,        2,        3,        4,        5,        6,        7,
          8,        9
```

LANDUSE$ (12 levels)
CO, CO_MIX, FW, FW_Mix, ID, ID_Mix, IS, MIX, OP, OP_MIX, RE, RE_MIX
8442 case(s) deleted due to missing data.

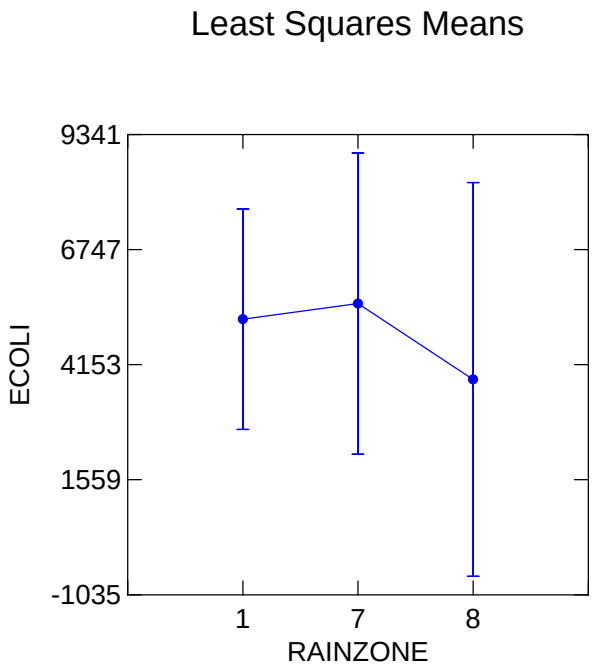
The following effects have lost degrees of freedom.

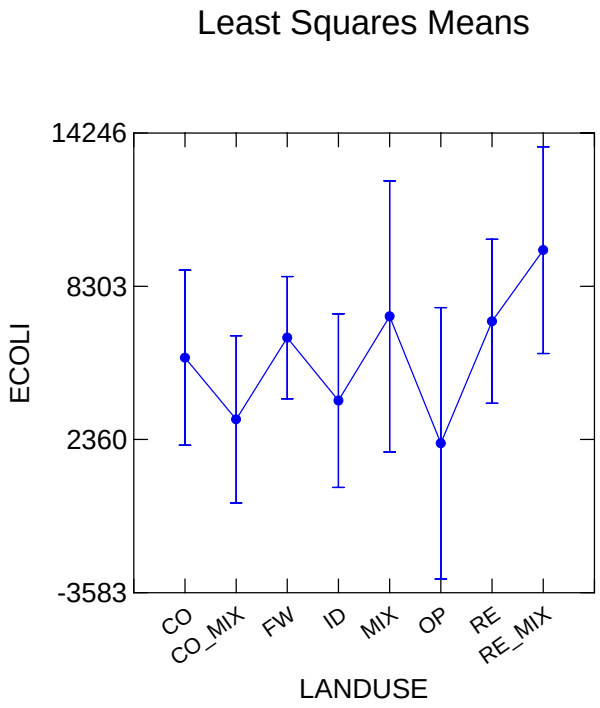
Effect	Initial df	Lost df	Final df
RAINZONE	8	6	2
LANDUSE$	11	4	7

Dep Var: ECOLI N: 160 Multiple R: 0.167 Squared multiple R: 0.028

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
RAINZONE	3.21E+07	2	1.60E+07	0.136	0.873
LANDUSE$	4.98E+08	7	7.11E+07	0.602	0.754
Error	1.77E+10	150	1.18E+08		






```
*** WARNING ***
Case           76 is an outlier        (Studentized Residual =        4.854)
Case         7299 is an outlier        (Studentized Residual =        5.853)
Case         7439 is an outlier        (Studentized Residual =        4.224)
Case         7501 is an outlier        (Studentized Residual =        6.643)

Durbin-Watson D Statistic          1.652
First Order Autocorrelation        0.108


Test for effect called:     CONSTANT
```

Test of Hypothesis

Source	SS	df	MS	F	P
Hypothesis	3.13E+08	1	3.13E+08	2.651	0.106
Error	1.77E+10	150	1.18E+08		

Ammonia (mg/L)

```
Effects coding used for categorical variables in model.

Categorical values encountered during processing are:
RAINZONE (9 levels)
          1,        2,        3,        4,        5,        6,        7,
          8,        9
```

LANDUSE$ (12 levels)
CO, CO_MIX, FW, FW_Mix, ID, ID_Mix, IS, MIX, OP, OP_MIX, RE, RE_MIX
6166 case(s) deleted due to missing data.

The following effects have lost degrees of freedom.

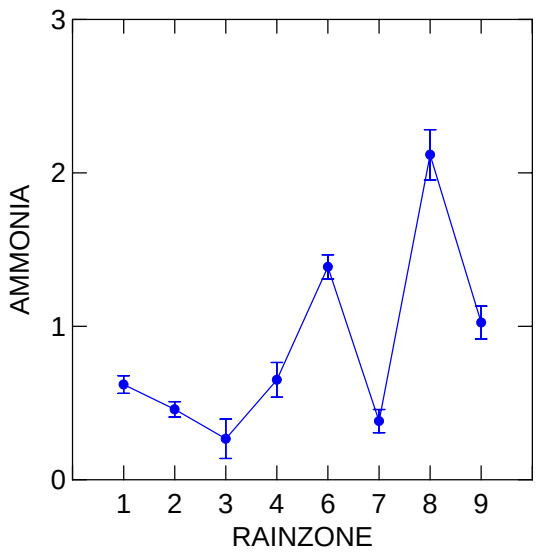
Effect	Initial df	Lost df	Final df
RAINZONE	8	1	7

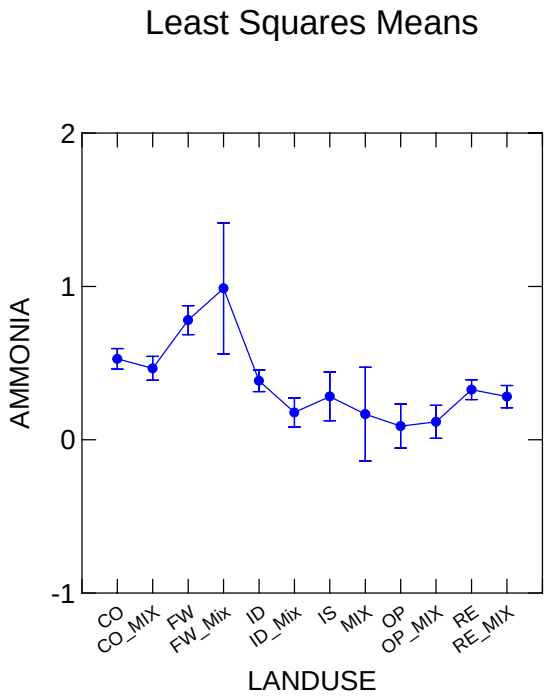
Dep Var: AMMONIA N: 2436 Multiple R: 0.424 Squared multiple R: 0.180

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
RAINZONE	180.112	7	25.73	48.531	0
LANDUSE$	39.058	11	3.551	6.697	0
Error	1281.447	2417	0.53		

Least Squares Means






```
*** WARNING ***
Case           14 is an outlier        (Studentized Residual =        5.419)
Case          923 is an outlier        (Studentized Residual =        5.107)
Case         5248 is an outlier        (Studentized Residual =        5.806)
Case         5490 is an outlier        (Studentized Residual =        4.909)
Case         6497 is an outlier        (Studentized Residual =        5.529)
Case         6821 is an outlier        (Studentized Residual =        6.090)
Case         7019 is an outlier        (Studentized Residual =       11.650)
Case         7021 is an outlier        (Studentized Residual =       12.951)
Case         7022 is an outlier        (Studentized Residual =       14.529)
Case         7057 is an outlier        (Studentized Residual =        6.430)
Case         7121 is an outlier        (Studentized Residual =        5.287)
Case         7138 is an outlier        (Studentized Residual =        5.229)
Case         7150 is an outlier        (Studentized Residual =        8.787)
Case         7299 is an outlier        (Studentized Residual =        5.798)
Case         7301 is an outlier        (Studentized Residual =       10.236)
Case         7309 is an outlier        (Studentized Residual =        5.092)
Case         7365 is an outlier        (Studentized Residual =        5.160)
Case         7521 is an outlier        (Studentized Residual =        7.351)
Case         7546 is an outlier        (Studentized Residual =        4.916)
Case         7548 is an outlier        (Studentized Residual =       13.133)
Case         8283 is an outlier        (Studentized Residual =        5.807)

Durbin-Watson D Statistic          1.440
First Order Autocorrelation        0.279


Test for effect called:     CONSTANT


Test of Hypothesis
```

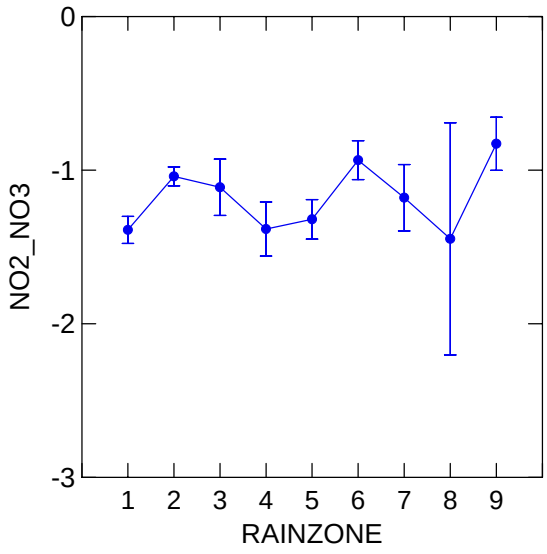
Source	SS	df	MS	F	P
Hypothesis	13.456	1	13.456	25.379	0
Error	1281.447	2417	0.53		

$NO_2 + NO_3$ (mg/L)

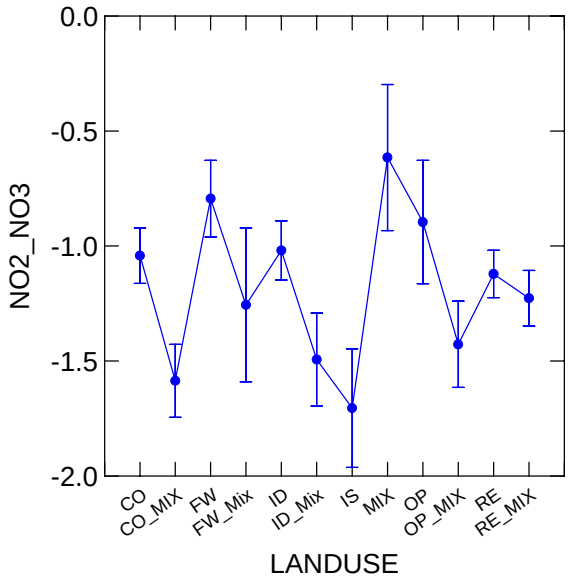
```
Effects coding used for categorical variables in model.

Categorical values encountered during processing are:
RAINZONE (9 levels)
          1,        2,        3,        4,        5,        6,        7,
          8,        9
LANDUSE$ (12 levels)
   CO, CO_MIX, FW, FW_Mix, ID, ID_Mix, IS, MIX, OP, OP_MIX, RE, RE_MIX
7342 case(s) deleted due to missing data.

Dep Var: NO2_NO3   N: 1260   Multiple R: 0.231   Squared multiple R: 0.054

Analysis of Variance
```

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
RAINZONE	29.173	8	3.647	3.234	0.001
LANDUSE$	41.9	11	3.809	3.378	0
Error	1398.43	1240	1.128		

Least Squares Means



Least Squares Means




```
*** WARNING ***
Case          2044 is an outlier          (Studentized Residual =       -4.591)
Case          4054 is an outlier          (Studentized Residual =       -4.500)

Durbin-Watson D Statistic          1.660
First Order Autocorrelation        0.170


Test for effect called:     CONSTANT
```

Test of Hypothesis

Source	SS	df	MS	F	P
Hypothesis	140.547	1	140.547	124.624	0
Error	1398.43	1240	1.128		

Total Nitrogen (mg/L)

```
Effects coding used for categorical variables in model.

Categorical values encountered during processing are:
RAINZONE (9 levels)
          1,        2,        3,        4,        5,        6,        7,
          8,        9
LANDUSE$ (12 levels)
   CO, CO_MIX, FW, FW_Mix, ID, ID_Mix, IS, MIX, OP, OP_MIX, RE, RE_MIX
```

7920 case(s) deleted due to missing data.

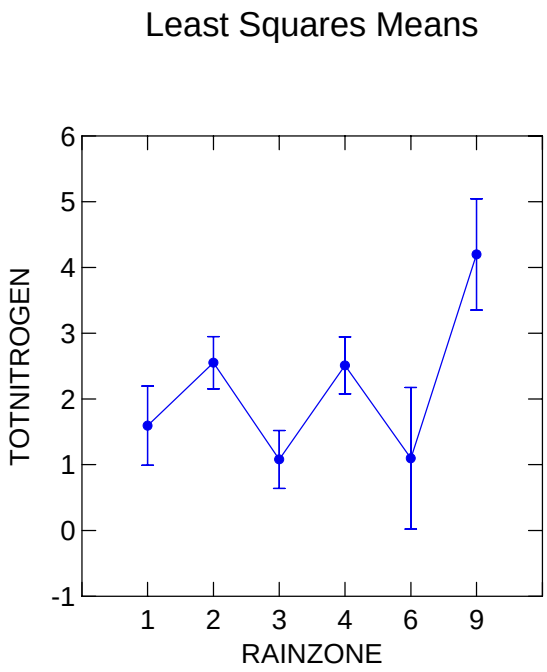
The following effects have lost degrees of freedom.

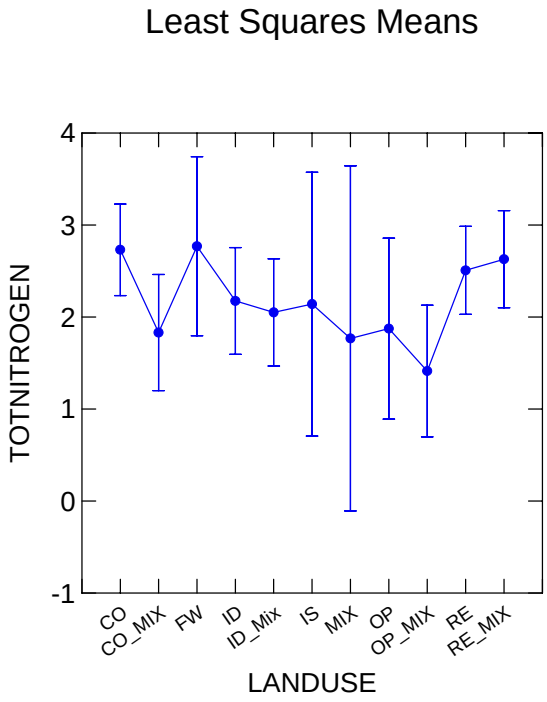
Effect	Initial df	Lost df	Final df
RAINZONE	8	3	5
LANDUSE$	11	1	10

Dep Var: TOTNITROGEN N: 682 Multiple R: 0.189 Squared multiple R: 0.036

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
RAINZONE	288.11	5	57.622	3.613	0.003
LANDUSE$	93.466	10	9.347	0.586	0.826
Error	10620.86	666	15.947		






```
*** WARNING ***
Case          6415 is an outlier          (Studentized Residual =        4.610)
Case          6560 is an outlier          (Studentized Residual =       41.539)

Durbin-Watson D Statistic          1.972
First Order Autocorrelation        0.014


Test for effect called:     CONSTANT

Test of Hypothesis
```

Source	SS	df	MS	F	P
Hypothesis	740.082	1	740.082	46.408	0
Error	10620.86	666	15.947		

Total Kjedahl Nitrogen (mg/L)

```
Effects coding used for categorical variables in model.

Categorical values encountered during processing are:
RAINZONE (9 levels)
          1,        2,        3,        4,        5,        6,        7,
          8,        9
LANDUSE$ (12 levels)
   CO, CO_MIX, FW, FW_Mix, ID, ID_Mix, IS, MIX, OP, OP_MIX, RE, RE_MIX
```

2470 case(s) deleted due to missing data.

The following effects have lost degrees of freedom.

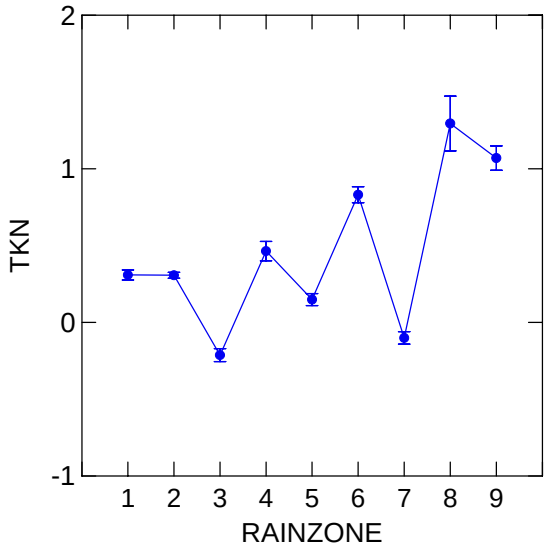
Effect	Initial df	Lost df	Final df
LANDUSE$	11	1	10

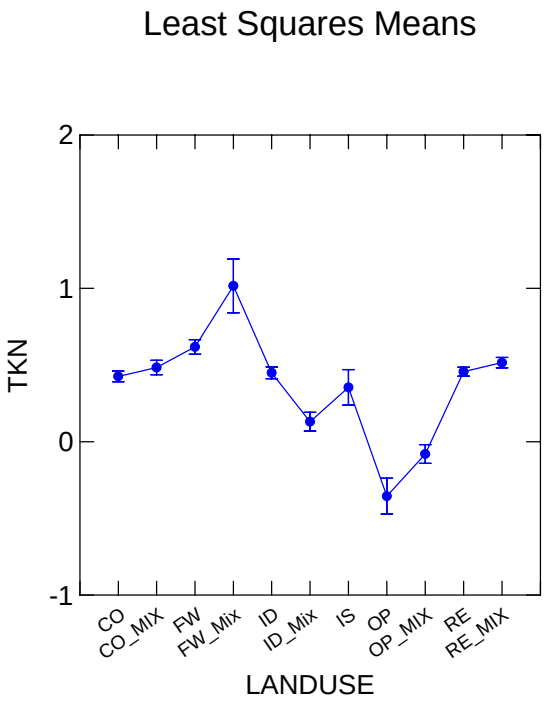
Dep Var: TKN N: 6132 Multiple R: 0.340 Squared multiple R: 0.116

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
RAINZONE	378.09	8	47.261	71.927	0
LANDUSE$	132.897	10	13.29	20.226	0
Error	4016.662	6113	0.657		

Least Squares Means






```
*** WARNING ***
Case          1173 is an outlier        (Studentized Residual =       -4.940)
Case          1587 is an outlier        (Studentized Residual =       -6.079)
Case          1614 is an outlier        (Studentized Residual =       -6.079)
Case          2211 is an outlier        (Studentized Residual =       -4.901)
Case          7466 is an outlier        (Studentized Residual =       -6.482)
Case          7472 is an outlier        (Studentized Residual =       -6.405)
Case          7478 is an outlier        (Studentized Residual =       -6.436)
Case          7484 is an outlier        (Studentized Residual =       -6.440)
Case          8037 is an outlier        (Studentized Residual =        4.936)

Durbin-Watson D Statistic          1.389
First Order Autocorrelation        0.305


Test for effect called:     CONSTANT

Test of Hypothesis
```

Source	SS	df	MS	F	P
Hypothesis	161.332	1	161.332	245.534	0
Error	4016.662	6113	0.657		

Dissolved Phosphorus (mg/L)

```
Effects coding used for categorical variables in model.
```

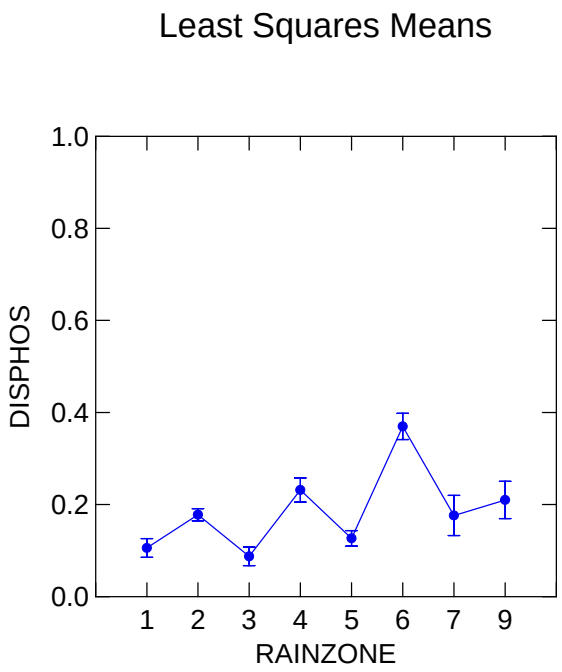
```
Categorical values encountered during processing are:
RAINZONE (9 levels)
          1,        2,        3,        4,        5,        6,        7,
          8,        9
LANDUSE$ (12 levels)
   CO, CO_MIX, FW, FW_Mix, ID, ID_Mix, IS, MIX, OP, OP_MIX, RE, RE_MIX
5615 case(s) deleted due to missing data.

The following effects have lost degrees of freedom.
```

Effect	Initial df	Lost df	Final df
RAINZONE	8	1	7
LANDUSE$	11	1	10

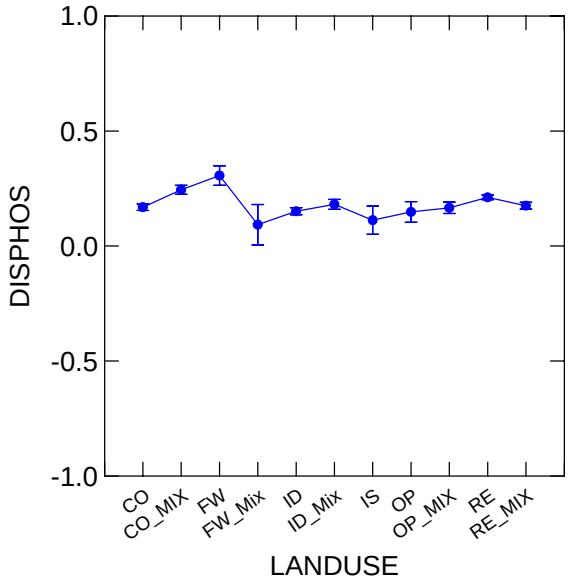
Dep Var: DISPHOS N: 2987 Multiple R: 0.230 Squared multiple R: 0.053

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
RAINZONE	9.534	7	1.362	16.486	0
LANDUSE$	3.175	10	0.318	3.843	0
Error	245.278	2969	0.083		



Least Squares Means




```
*** WARNING ***
Case          907 is an outlier        (Studentized Residual =       10.829)
Case          909 is an outlier        (Studentized Residual =        5.422)
Case          910 is an outlier        (Studentized Residual =        5.776)
Case          940 is an outlier        (Studentized Residual =       10.230)
Case         1226 is an outlier        (Studentized Residual =        9.796)
Case         5248 is an outlier        (Studentized Residual =        6.408)
Case         5249 is an outlier        (Studentized Residual =       19.247)
Case         5253 is an outlier        (Studentized Residual =        9.796)
Case         6517 is an outlier        (Studentized Residual =        5.069)
Case         7022 is an outlier        (Studentized Residual =       13.095)
Case         7048 is an outlier        (Studentized Residual =       25.077)
Case         7414 is an outlier        (Studentized Residual =        5.230)
Case         7420 is an outlier        (Studentized Residual =        4.731)
Case         7426 is an outlier        (Studentized Residual =        4.993)
Case         8567 is an outlier        (Studentized Residual =       15.206)

Durbin-Watson D Statistic          1.728
First Order Autocorrelation        0.136


Test for effect called:     CONSTANT

Test of Hypothesis
```

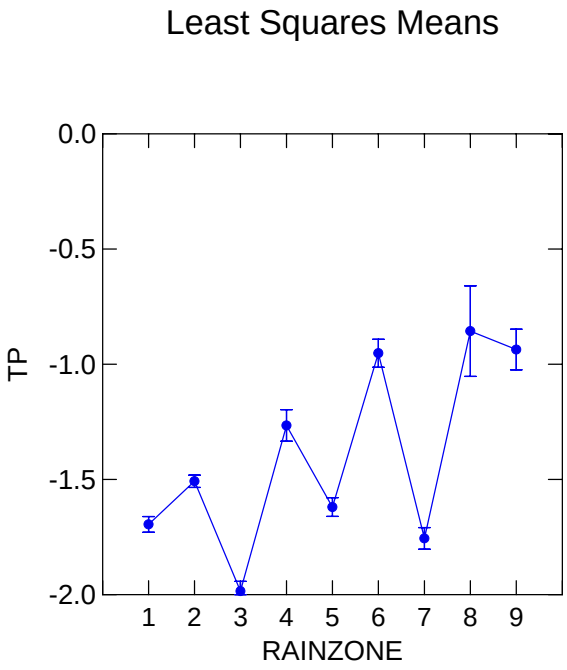
Source	SS	df	MS	F	P
Hypothesis	15.038	1	15.038	182.028	0
Error	245.278	2969	0.083		

Total Phosphorus (mg/L)

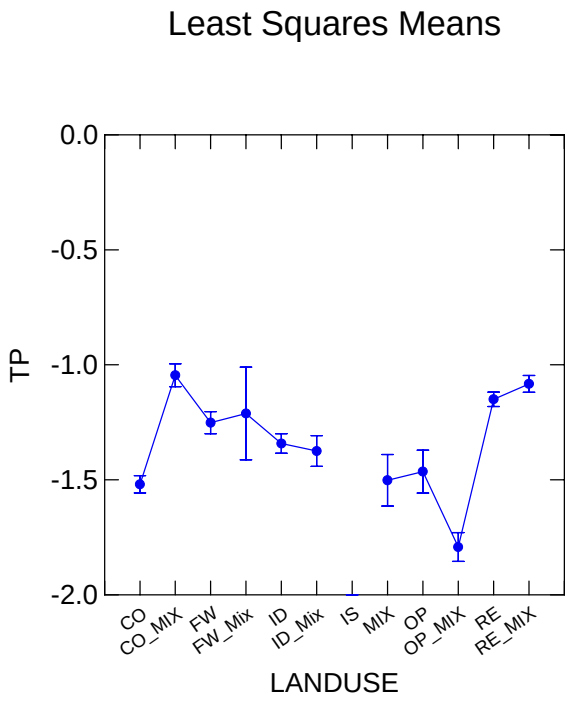
```
Effects coding used for categorical variables in model.

Categorical values encountered during processing are:
RAINZONE (9 levels)
          1,        2,        3,        4,        5,        6,        7,
          8,        9
LANDUSE$ (12 levels)
   CO, CO_MIX, FW, FW_Mix, ID, ID_Mix, IS, MIX, OP, OP_MIX, RE, RE_MIX
1195 case(s) deleted due to missing data.

Dep Var: TP   N: 7407   Multiple R: 0.328   Squared multiple R: 0.108
```

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
RAINZONE	349.203	8	43.65	50.067	0
LANDUSE$	329.691	11	29.972	34.378	0
Error	6440.283	7387	0.872		




```
Of 12 cases, 1 were excluded by making graph range less than data range.
```




```
*** WARNING ***
Case          2754 is an outlier          (Studentized Residual =         6.299)

Durbin-Watson D Statistic          1.224
First Order Autocorrelation        0.388


Test for effect called:     CONSTANT
```

Test of Hypothesis

Source	SS	df	MS	F	P
Hypothesis	1475.245	1	1475.245	1692.105	0
Error	6440.283	7387	0.872		

Cadmium (µg/L)

```
Effects coding used for categorical variables in model.

Categorical values encountered during processing are:
RAINZONE (9 levels)
          1,         2,         3,         4,         5,         6,         7,
          8,         9
LANDUSE$ (12 levels)
   CO, CO_MIX, FW, FW_Mix, ID, ID_Mix, IS, MIX, OP, OP_MIX, RE, RE_MIX
5187 case(s) deleted due to missing data.
```

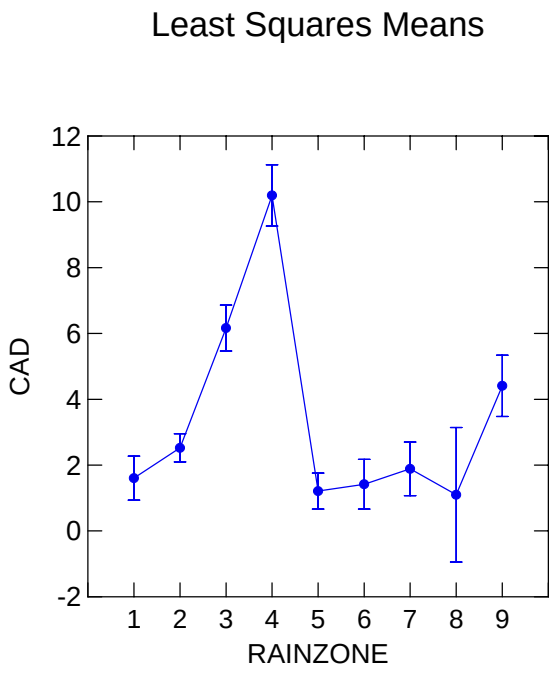
The following effects have lost degrees of freedom.

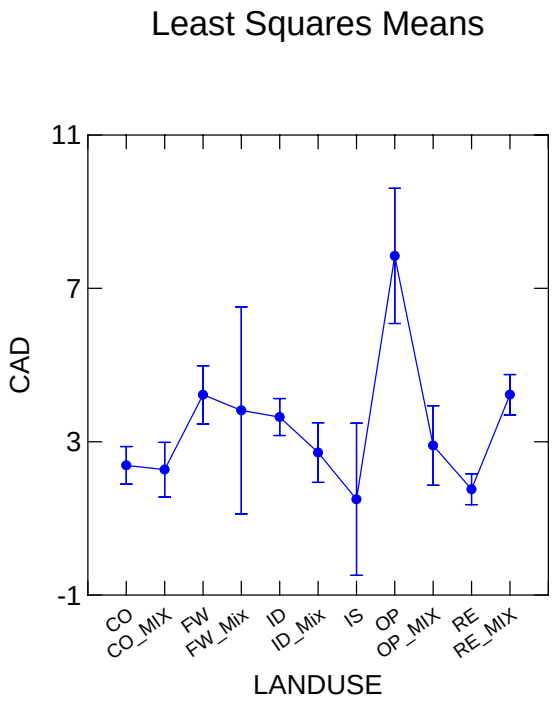
Effect	Initial df	Lost df	Final df
LANDUSE$	11	1	10

Dep Var: CAD N: 3415 Multiple R: 0.233 Squared multiple R: 0.054

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
RAINZONE	11834.94	8	1479.367	16.143	0
LANDUSE$	3601.787	10	360.179	3.93	0
Error	311220.8	3396	91.643		





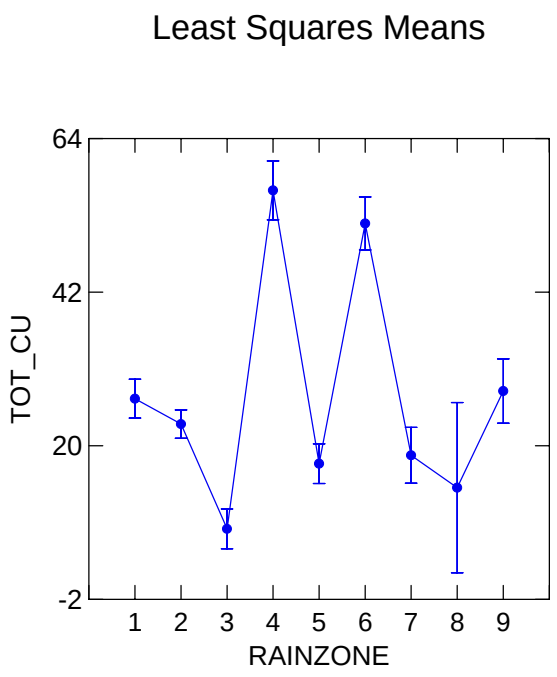

```
*** WARNING ***
Case          567 is an outlier        (Studentized Residual =       43.058)
Case         6639 is an outlier        (Studentized Residual =       32.011)
Case         6640 is an outlier        (Studentized Residual =       13.095)
Case         6661 is an outlier        (Studentized Residual =        9.409)
Case         6662 is an outlier        (Studentized Residual =       15.833)
Case         6664 is an outlier        (Studentized Residual =        7.186)
Case         7279 is an outlier        (Studentized Residual =       10.158)
Case         7652 is an outlier        (Studentized Residual =        6.227)
Case         7653 is an outlier        (Studentized Residual =        6.227)
Case         7670 is an outlier        (Studentized Residual =        5.222)
Case         7673 is an outlier        (Studentized Residual =        5.222)
Case         7689 is an outlier        (Studentized Residual =        7.494)
Case         7694 is an outlier        (Studentized Residual =        5.420)
Case         7695 is an outlier        (Studentized Residual =        7.558)
Case         7699 is an outlier        (Studentized Residual =        8.091)
Case         7700 is an outlier        (Studentized Residual =        5.917)

Durbin-Watson D Statistic          1.416
First Order Autocorrelation        0.292


Test for effect called:     CONSTANT

Test of Hypothesis
```

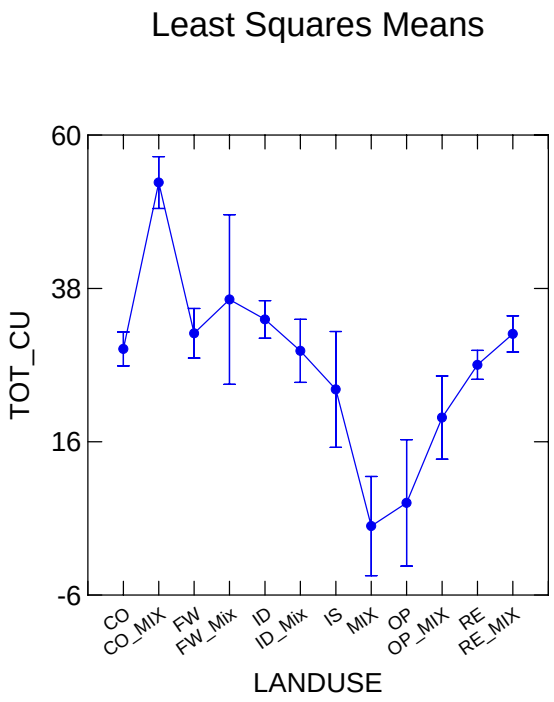
Source	SS	df	MS	F	P
Hypothesis	5132.111	1	5132.111	56.001	0
Error	311220.8	3396	91.643		

Total Copper (µg/L)

```
Effects coding used for categorical variables in model.

Categorical values encountered during processing are:
RAINZONE (9 levels)
          1,        2,        3,        4,        5,        6,        7,
          8,        9
LANDUSE$ (12 levels)
   CO, CO_MIX, FW, FW_Mix, ID, ID_Mix, IS, MIX, OP, OP_MIX, RE, RE_MIX
3448 case(s) deleted due to missing data.

Dep Var: TOT_CU   N: 5154   Multiple R: 0.224   Squared multiple R: 0.050

Analysis of Variance
```

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
RAINZONE	639166.2	8	79895.78	24.033	0
LANDUSE$	249423.8	11	22674.89	6.821	0
Error	1.71E+07	5134	3324.399		






```
*** WARNING ***
Case           35 is an outlier        (Studentized Residual =       12.771)
Case          567 is an outlier        (Studentized Residual =        5.407)
Case          618 is an outlier        (Studentized Residual =        8.983)
Case          858 is an outlier        (Studentized Residual =        7.671)
Case         1038 is an outlier        (Studentized Residual =       12.614)
Case         1865 is an outlier        (Studentized Residual =       13.146)
Case         3032 is an outlier        (Studentized Residual =        4.816)
Case         3087 is an outlier        (Studentized Residual =        4.816)
Case         3096 is an outlier        (Studentized Residual =        7.756)
Case         3102 is an outlier        (Studentized Residual =        7.756)
Case         3116 is an outlier        (Studentized Residual =        5.673)
Case         3117 is an outlier        (Studentized Residual =        6.427)
Case         3123 is an outlier        (Studentized Residual =        8.154)
Case         3124 is an outlier        (Studentized Residual =        4.956)
Case         3126 is an outlier        (Studentized Residual =        6.392)
Case         3128 is an outlier        (Studentized Residual =        7.624)
Case         3908 is an outlier        (Studentized Residual =        5.791)
Case         4086 is an outlier        (Studentized Residual =        9.521)
Case         6176 is an outlier        (Studentized Residual =        6.310)
Case         7120 is an outlier        (Studentized Residual =        4.909)
Case         7259 is an outlier        (Studentized Residual =        5.409)
Case         7604 is an outlier        (Studentized Residual =        5.674)
Case         7631 is an outlier        (Studentized Residual =       23.767)
Case         7633 is an outlier        (Studentized Residual =        5.565)
Case         7635 is an outlier        (Studentized Residual =        5.004)
Case         7639 is an outlier        (Studentized Residual =       11.070)
Case         7753 is an outlier        (Studentized Residual =        9.355)
Case         7912 is an outlier        (Studentized Residual =        4.844)
Case         8230 is an outlier        (Studentized Residual =       11.562)
Case         8231 is an outlier        (Studentized Residual =       19.003)
Case         8232 is an outlier        (Studentized Residual =        7.279)
Case         8233 is an outlier        (Studentized Residual =       20.949)
Case         8234 is an outlier        (Studentized Residual =       22.937)
```

Case 8235 is an outlier (Studentized Residual = 5.344)

Durbin-Watson D Statistic 1.153
First Order Autocorrelation 0.424

Test for effect called: CONSTANT

Source	SS	df	MS	F	P
Hypothesis	486053.7	1	486053.7	146.208	0
Error	1.71E+07	5134	3324.399		

Total Zinc (μg/L)

Effects coding used for categorical variables in model.

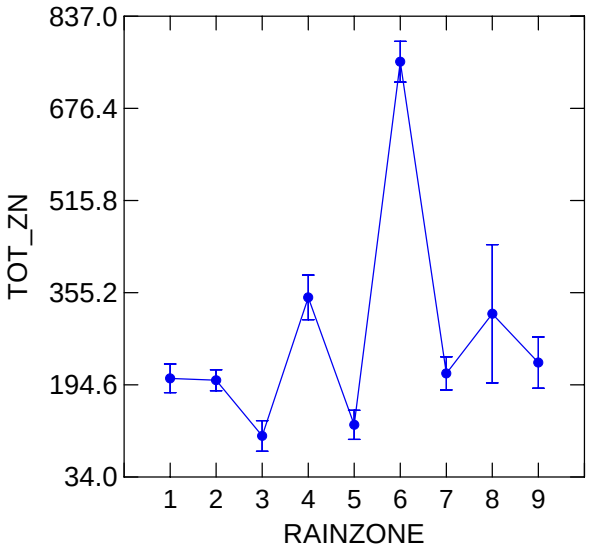
Categorical values encountered during processing are:
RAINZONE (9 levels)
1, 2, 3, 4, 5, 6, 7, 8, 9
LANDUSE$ (12 levels)
CO, CO_MIX, FW, FW_Mix, ID, ID_Mix, IS, MIX, OP, OP_MIX, RE, RE_MIX
2437 case(s) deleted due to missing data.

Dep Var: TOT_ZN N: 6165 Multiple R: 0.312 Squared multiple R: 0.097

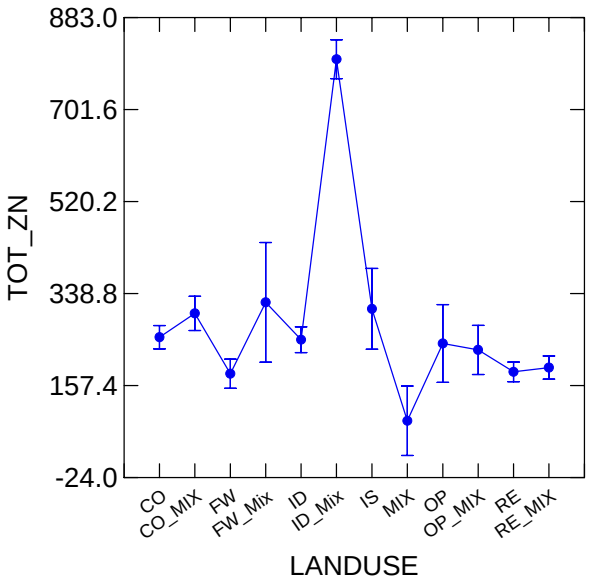
Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
RAINZONE	1.08E+08	8	1.35E+07	43.127	0
LANDUSE$	9.02E+07	11	8197400	26.259	0
Error	1.92E+09	6145	312171.5		

Least Squares Means



Least Squares Means




```
*** WARNING ***
Case          2018 is an outlier          (Studentized Residual =        6.043)
Case          3769 is an outlier          (Studentized Residual =       18.135)
Case          3821 is an outlier          (Studentized Residual =        9.283)
```

```
Case         3880 is an outlier        (Studentized Residual =        8.437)
Case         3882 is an outlier        (Studentized Residual =       27.707)
Case         3883 is an outlier        (Studentized Residual =        6.374)
Case         6020 is an outlier        (Studentized Residual =        5.158)
Case         6867 is an outlier        (Studentized Residual =        7.615)
Case         6868 is an outlier        (Studentized Residual =       32.507)
Case         6869 is an outlier        (Studentized Residual =        6.705)
Case         6870 is an outlier        (Studentized Residual =       17.906)
Case         6872 is an outlier        (Studentized Residual =       13.710)
Case         6875 is an outlier        (Studentized Residual =        5.437)
Case         6876 is an outlier        (Studentized Residual =       14.275)
Case         6879 is an outlier        (Studentized Residual =       15.925)
Case         6880 is an outlier        (Studentized Residual =       43.609)
Case         6881 is an outlier        (Studentized Residual =        9.443)
Case         6885 is an outlier        (Studentized Residual =        6.524)
Case         6893 is an outlier        (Studentized Residual =        6.888)
Case         7338 is an outlier        (Studentized Residual =       14.427)

Durbin-Watson D Statistic          1.098
First Order Autocorrelation        0.451



Test for effect called:     CONSTANT
```

Test of Hypothesis

Source	SS	df	MS	F	P
Hypothesis	5.38E+07	1	5.38E+07	172.383	0
Error	1.92E+09	6145	312171.5		

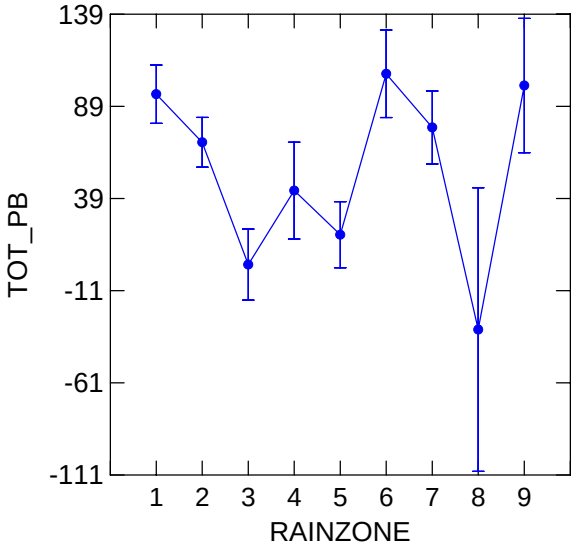
Total Lead (µg/L)

```
Effects coding used for categorical variables in model.

Categorical values encountered during processing are:
RAINZONE (9 levels)
          1,        2,        3,        4,        5,        6,        7,
          8,        9
LANDUSE$ (12 levels)
   CO, CO_MIX, FW, FW_Mix, ID, ID_Mix, IS, MIX, OP, OP_MIX, RE, RE_MIX
2657 case(s) deleted due to missing data.

Dep Var: TOT_PB   N: 5945   Multiple R: 0.126   Squared multiple R: 0.016
```

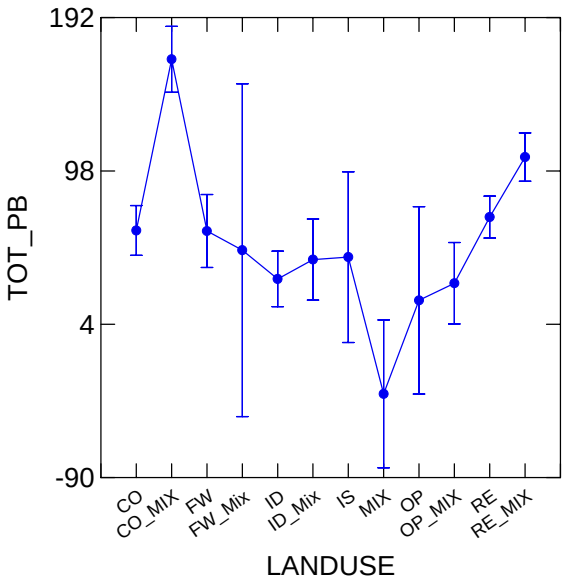
Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
RAINZONE	5367088	8	670886	5.086	0
LANDUSE$	7450419	11	677310.8	5.135	0
Error	7.82E+08	5925	131911.3		

Least Squares Means



Least Squares Means




```
*** WARNING ***
Case          3315 is an outlier          (Studentized Residual =        8.721)
Case          3622 is an outlier          (Studentized Residual =        8.285)
Case          3689 is an outlier          (Studentized Residual =        5.046)
```

```
Case         3715 is an outlier        (Studentized Residual =        6.825)
Case         3880 is an outlier        (Studentized Residual =       71.456)
Case         3882 is an outlier        (Studentized Residual =       29.542)
Case         3883 is an outlier        (Studentized Residual =       24.808)
Case         3884 is an outlier        (Studentized Residual =       27.406)
Case         4366 is an outlier        (Studentized Residual =        5.122)
Case         4796 is an outlier        (Studentized Residual =        4.951)
Case         4798 is an outlier        (Studentized Residual =        6.063)

Durbin-Watson D Statistic          1.295
First Order Autocorrelation        0.352


Test for effect called:     CONSTANT
```

Test of Hypothesis

Source	SS	df	MS	F	P
Hypothesis	1677617	1	1677617	12.718	0
Error	7.82E+08	5925	131911.3		

Appendix F. Interaction Tables for Selected Constituents

Conductivity (µS/cm @ 25C)

INTERACTIONS (γ_{ij})	EPA Rain Zone									
Land Uses	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Land Use Effects (α_i)**
Commercial	-47.5	-	-	-	-359.8	-261.6	-304.4	-	-327	-9.5
Mixed Commercial	-	-	-	-	-252.1	-108.7	-173.5	-135.1	-273.3	-136.8
Freeway	-	-	-	-	-	-155.2	-173.1	-	-	-131.2
Mixed Freeway	-	-396.1	-	-	-160.8	-	-	-	-	214.3
Industrial	-205.7	-393.9	-	-	-197.2	-219.5	-	-	-471.3	5.8
Mixed Industrial	-	-	-	-	-256	-43	-	-	-320.1	-90.6
Institutional	-	-	-	-	-	-	-	-	-	-
MIX*	-386.9	-	-	-	-	-	-	-	-	39.2
Open Space	-387	-	-	-	-	-151.7	-	-	-	-185.5
Mixed Open Space	-	-	-	-	-305.8	-	-	-	332.3	204.2
Residential	-279.2	-281.8	-	-	-451.8	-383.6	-178.1	-396.6	-384	74.3
Mixed Residential	-493	-	-187.2	-	-215.8	-248.2	-	-141.3	-60.9	-72.9
Rain Zone Interactions (β_j)	126.8	3.8	-179.4	-	-17.9	-108	-69.6	-166.9	33.6	

*Unspecified mixed land use from Worchester, Ma. and applies to all tables

DO (mg/L)

INTERACTIONS (γ_{ij})	EPA Rain Zone									
Land Uses	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Land Use Effects (α_i)**
Commercial	-8.114	-	-	-	-	-7.916	-7.611	-	-	-0.194
Mixed Commercial	-	-	-	-	-	-	-8.628	-7.913	-	0.378
Freeway	-	-	-	-	-	-	-8.148	-	-	0.223
Mixed Freeway	-8.194	-	-	-	-	-	-	-	-	-0.527
Industrial	-10.173	-	-	-	-	-7.418	-	-	-	-0.723
Mixed Industrial	-	-	-	-	-	-	-	-	-	-
Institutional	-	-	-	-	-	-	-	-	-	-
MIX	-8.194	-	-	-	-	-	-	-	-	0.33
Open Space	-	-	-	-	-	-7.525	-	-	-	-0.702
Mixed Open Space	-	-	-	-	-	-	-	-	-	-
Residential	-7.948	-	-	-	-	-8.058	-8.317	-8.182	-	0.285
Mixed Residential	-9.503	-	-8.059	-	-	-7.334	-	-8.614	-	0.057
Rain Zone Interactions (β_j)	0.192	-	0.498	-	-	-0.477	0.146	0.711	-	0

Hardness (mg/L CaCO3)

INTERACTIONS (γ_{ij})	EPA Rain Zone									
Land Uses	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Land Use Effects (α_i)**
Commercial	-51.19	-62.48	-	-47.28	-92.29	-	-105.25	-	-84.64	7.1
Mixed Commercial	-	-	-	-	-86.32	-59.17	33.33	-80.24	-	7.54
Freeway	-	231.07	-	-	-	-52.12	-50.39	-	-	-6.64
Mixed Freeway	-	-	-	-	-53.03	-	-	-	-	15.9
Industrial	12.89	-76.8	-	-53.51	-92.16	-112.17	-114.29	-	-21.49	19.07
Mixed Industrial	-	-	-100.21	-	-51.96	-42.49	-	-	-100.64	-28.26
Institutional	-	-	-	-	-	-	-	-	-	-
MIX	-125.71	-	-	-	-	-	-	-	-	-25.91
Open Space	-207.33	0.22	-	-	-	-	-	-	-	30.64
Mixed Open Space	-	-166.4	-	-	-48.7	-	-	-	-	46.83
Residential	-87.97	-67.35	-	-68.85	-66.34	-	-78.22	-82.57	-68.3	-15.94
Mixed Residential	-	-74.44	-34.79	-	-57.69	-87.53	-93.17	-21.45	-56.64	-7.5
Rain Zone Interactions (β_j)	61.88	5.91	21.61	3.99	-10.8	-21.43	-11.01	7.27	30.91	0

Oil and Grease Total (mg/L)

INTERACTIONS (γ_{ij})	EPA Rain Zone									
Land Uses	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Land Use Effects (α_i)**
Commercial	-51.19	-62.48	-	-47.28	-92.29	-	-105.25	-	-84.64	7.1
Mixed Commercial	-	-	-	-	-86.32	-59.17	33.33	-80.24	-	7.54
Freeway	-	231.07	-	-	-	-52.12	-50.39	-	-	-6.64
Mixed Freeway	-	-	-	-	-53.03	-	-	-	-	15.9
Industrial	12.89	-76.8	-	-53.51	-92.16	-112.17	-114.29	-	-21.49	19.07
Mixed Industrial	-	-	-100.21	-	-51.96	-42.49	-	-	-100.64	-28.26
Institutional	-	-	-	-	-	-	-	-	-	-
MIX	-125.71	-	-	-	-	-	-	-	-	-25.91
Open Space	-207.33	0.22	-	-	-	-	-	-	-	30.64
Mixed Open Space	-	-166.4	-	-	-48.7	-	-	-	-	46.83
Residential	-87.97	-67.35	-	-68.85	-66.34	-	-78.22	-82.57	-68.3	-15.94
Mixed Residential	-	-74.44	-34.79	-	-57.69	-87.53	-93.17	-21.45	-56.64	-7.5
Rain Zone Interactions (β_j)	61.88	5.91	21.61	3.99	-10.8	-21.43	-11.01	7.27	30.91	0

pH

INTERACTIONS (γ_{ij})	EPA Rain Zone									
Land Uses	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Land Use Effects (α_i)**
Commercial	-7.202	-7.384	-6.868	-7.537	-7.457	-7.921	-7.357	-	-7.571	0.018
Mixed Commercial	-	-7.27	-6.955	-	-7.636	-	-7.91	-7.733	-7.445	0.181
Freeway	-7.931	-6.988	-	-	-	-7.606	-7.498	-	-	0.026
Mixed Freeway	-7.879	-	-	-	-7.587	-	-	-	-	0.207
Industrial	-7.092	-7.604	-7.784	-7.232	-7.256	-7.051	-7.457	-	-7.559	0.095
Mixed Industrial	-	-7.121	-7.516	-	-7.731	-7.82	-7.177	-	-7.749	0.251
Institutional	-7.251	-	-	-	-	-	-	-	-	0.129
MIX	-7.251	-	-	-	-	-	-	-	-	-0.602
Open Space	-	-7.31	-	-7.792	-	-6.529	-	-	-	0.189
Mixed Open Space	-	-7.296	-	-	-7.793	-	-	-	-8.057	0.526
Residential	-7.126	-7.635	-7.045	-7.49	-7.344	-7.018	-7.102	-7.47	-7.064	-0.281
Mixed Residential	-8.214	-7.216	-7.579	-7.165	-7.525	-7.3	-7.261	-7.091	-6.975	0.077
Rain Zone Interactions (β_j)	-0.17	0.036	-0.348	0.215	0.301	-0.202	-0.14	-0.065	-0.411	

Turbidity (NTU)

INTERACTIONS (γ_{ij})	EPA Rain Zone									
Land Uses	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Land Use Effects (α_i)**
Commercial	-	-	-	-	-	-	-	-	-	-
Mixed Commercial	-	-	-	-	-	-	-	-	-	-
Freeway	-	-	-	-	-	-71.13	-	-	-	-43.44
Mixed Freeway	-	-	-	-	-	-	-	-	-	-
Industrial	-	-172.1	-	-	-	-	-	-	-	107.06
Mixed Industrial	-	-	-	-	-	-71.13	-	-	-	24.32
Institutional	-	-	-	-	-	-	-	-	-	-
MIX	-	-	-	-	-	-	-	-	-	-
Open Space	-	-172.1	-	-	-	-	-	-	-	-57.86
Mixed Open Space	-	-	-	-	-	-	-	-	-	-
Residential	-	-	-	-	-	-	-	-	-	-
Mixed Residential	-	-181.1	-29	-	-	-	-	-	-	-64.86
Rain Zone Interactions (β_j)	-	78.24	-60.36	-	-	-22.73	-	-	-	0

Temperature (ºC)

INTERACTIONS (γ_{ij})	EPA Rain Zone									
Land Uses	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Land Use Effects (α_i)**
Commercial	-15.96	-14.21	-	-14.08	-17.48	-14.82	-16.17	-	-	0.99
Mixed Commercial	-	-	-11.41	-	-15.81	-	-15.19	-15.98	-15.85	-0.76
Freeway	-9.19	-13.52	-	-	-	-21.31	-13.51	-	-	-0.94
Mixed Freeway	-18.13	-	-	-	-16.33	-	-	-	-	0
Industrial	-19.27	-18.54	-16.19	-16.48	-15.3	-16.54	-20.05	-	-	2.05
Mixed Industrial	-	-	-16.01	-	-16.81	-	-	-	-16.59	1.16
Institutional	-15.32	-	-	-	-	-	-	-	-	-3.68
MIX	-15.32	-	-	-	-	-	-	-	-	0.09
Open Space	-14.58	-	-	-	-	-23.33	-	-	-	-3.87
Mixed Open Space	-	-	-	-	-16.79	-	-	-	-16.93	0.35
Residential	-15.21	-15.59	-15.84	-16.08	-13.65	-14.19	-15.58	-14.48	-	-0.97
Mixed Residential	-17.52	-18.42	-17.27	-	-16.63	-16.29	-	-15.19	-14.93	0.09
Rain Zone Interactions (β_j)	-0.46	-1.73	1.27	5.2	1.16	3.14	-3.66	-4.89	-2.65	

Total Dissolved Solids (mg/L)

INTERACTIONS (γ_{ij})	EPA Rain Zone									
Land Uses	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Land Use Effects (α_i)**
Commercial	-225.9	-144.4	-221.6	-190.4	-227.4	-163.5	-230.5	-	-249.8	17.2
Mixed Commercial	-	-162.2	-119.6	-134.5	-157.2	-139.2	155.1	-159.1	-226.2	-36.4
Freeway	-441.7	291	-	-	-	-161.1	-180.1	-	-	-14.1
Mixed Freeway	-393.7	-	-	-	-113.6	-	-	-	-	23.6
Industrial	-123.7	-144.4	-237.7	-204.2	-233.1	-184.3	-256.7	-	-17.5	54.1
Mixed Industrial	-	-124.4	-19.4	-	-132.8	-110.4	-189.9	-	-220.5	-53.6
Institutional	-368	-149.6	-	-	-	-	-	-	-	-74.4
MIX	-	-	-	-	-	-	-	-	-	-
Open Space	-	-162.7	-	-115.6	-	-223.3	-	-	-	-10
Mixed Open Space	-	-212.7	-	-	-70.8	-	-	-	401.6	17.3
Residential	-231.8	-153.5	-167.3	-148.1	-174.3	-141.7	-205.8	-193.6	-195.7	-12.9
Mixed Residential	513.8	-189.1	-117.6	-159	-145.5	-206.1	-203.7	-84.1	-204.1	-3.5
Rain Zone Interactions (β_j)	263.9	-26.5	-48	8.7	-51.6	-47.9	-36.9	30	54.1	0

Total Suspended Solids (mg/L)

INTERACTIONS (γ_{ij})	EPA Rain Zone									
Land Uses	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Land Use Effects (α_i)**
Commercial	-130.9	-121.6	-146	-165.9	-182.3	-213	-155.8	-	-339.4	-25.1
Mixed Commercial	49.7	-146.8	-219.4	-224.7	-180.2	-276.8	-214.4	-171.6	-342.1	35.4
Freeway	-171.2	-128.8	-171.7	-	-	-166.6	-88.4	-	-	-22.7
Mixed Freeway	-247.7	-103.2	-	-	-111.2	-	-	-	-	-19.3
Industrial	-138.2	-178.6	-159.1	-258.9	-54	98.4	-103.5	-	-324.5	24.2
Mixed Industrial	-	-83.2	-126.7	-355.7	-199.5	-257.3	-190.5	-	-185.1	19.8
Institutional	-107.4	-121.4	-92.2	-	-	-	-	-	-	-92.2
MIX	-155	-	-	-	-	-	-	-	-	-78.6
Open Space	-213	-156	-	-4.6	-	11.4	-	-	-	-51.6
Mixed Open Space	-150.6	-166.8	-	-	-132.7	-	-	-	204.4	50.9
Residential	-129.7	-126.3	-101.8	45.5	-143.9	-241.3	-142.3	-157.5	-414.3	-21.2
Mixed Residential	-208	-137.8	-158.7	-391.2	-166.3	-168.8	-134.6	-143	645.9	40.4
Rain Zone Interactions (β_j)	19	-39.3	-41.4	153.8	2.7	98.2	-10	3.6	319	

BOD_5 (mg/L)

INTERACTIONS (γ_{ij})	EPA Rain Zone									
Land Uses	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Land Use Effects (α_i)**
Commercial	-16.56	-12.02	-13.32	-42.7	-16.36	-12.81	-19.84	-	-	0.51
Mixed Commercial	-13.71	-12.47	-17.29	-23.47	-16.87	-47.72	-16.79	-18.9	-28.85	0.69
Freeway	-17.29	-13.34	-13.75	-	-	-	-14.48	-	-	-2.9
Mixed Freeway	-8.8	-2.3	-	-	-16.65	-	-	-	-	0.58
Industrial	-28.14	-25.97	-26.93	78.17	-28.02	-7.51	-2.11	-	-	11.59
Mixed Industrial	-	-12.86	-12.83	-45.31	-14.07	-42.68	-15.14	-	-16.7	-1.94
Institutional	-19.39	-15.87	-5.35	-	-	-	-	-	-	-4.76
MIX	-13.31	-	-	-	-	-	-	-	-	2.97
Open Space	-14.42	-15.17	-	-44	-	-26.1	-	-	-	-9.93
Mixed Open Space	-	-16.78	-	-	-13.59	-	-	-	34.59	-2.72
Residential	-12.55	-14.39	-13.82	-39.33	-12.09	-19.48	-19.04	-12	-	-1.88
Mixed Residential	-14.25	-14.09	-12.77	-39.41	-9.74	-25.69	-15.95	-9.64	-22.84	-4.19
Rain Zone Interactions (β_j)	-2	-0.93	-7.62	29.62	-7.83	25.41	-0.36	12.59	31.94	0

COD (mg/L)

INTERACTIONS (γ_{ij})	EPA Rain Zone									
Land Uses	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Land Use Effects (α_i)**
Commercial	-85.72	-71.97	-57.31	-102.03	-100.31	-37.64	-79.96	-	-	7.63
Mixed Commercial	-72.95	-65.59	-101.8	-75.2	-101.78	-	-84.89	-121.87	-77.01	20.66
Freeway	-97.19	-95.09	-65.54	-	-69.7	-125.52	-43.87	-	-	10.8
Mixed Freeway	-35.91	-	-	-	-75.23	-	-	-	-	-23.88
Industrial	-59.06	-98.5	-95.38	-61.04	-113.44	-28.78	-46.78	-	-	18.79
Mixed Industrial	-	-83.46	-66.92	-92.96	-80.84	-	-49	-	-13.29	-14.49
Institutional	-90.17	-57.42	-51.62	-	-	-	-	-	-	-26.62
MIX	-71.36	-	-	-	-	-	-	-	-	-5.75
Open Space	-84.65	-91.59	-	-59.3	-	-163.69	-	-	-	-38.82
Mixed Open Space	-	-89.4	-	-	-80.77	-	-	-	106.21	-23.99
Residential	-85.91	-72.06	-72.11	-65.91	-63.76	-92.65	-77.39	-155.35	-158.92	-6.75
Mixed Residential	-73.24	-73.01	-82.89	-70.86	-71.06	-159.67	-75.22	19.21	-21.72	-8.06
Rain Zone Interactions (β_j)	-5.47	-1.73	-32.12	10.49	-10.47	107.85	-21.5	127.3	99.83	

Fecal Coliform (colonies/100 mL)

INTERACTIONS (γ_{ij})	EPA Rain Zone									
Land Uses	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Land Use Effects (α_i)**
Commercial	-75983	-41695	-46269	-39078	-55485	-31554	-14002	-	-38619	-9188
Mixed Commercial	-	-47177	-	-13423	-48732	-31799	-36657	-41502	-23611	-13823
Freeway	-108621	-20978	-	-	-	-7162	-25327	-	-	-36515
Mixed Freeway	-126467	4842	-	-	-64730	-	-	-	-	-30668
Industrial	-62433	-49955	-46370	-16379	1134	-41216	-57292	-	-44992	-5725
Mixed Industrial	-	-34761	-26057	-	-60604	-18640	16649	-	-11635	-29802
Institutional	-112017	-	-	-	-	-	-	-	-	-42019
MIX	-112017	-	-	-	-	-	-	-	-	-38167
Open Space	-122840	-40082	-	-44165	-	-29103	-	-	-	-20019
Mixed Open Space	-	-45234	-	-	-52832	-	-	-	-55418	-11626
Residential	2478	-70066	-21227	-65175	-15066	-56692	-69561	-67579	-52421	17270
Mixed Residential	54509	-13166	-71076	-85218	-46317	-65364	-44424	-48815	-79426	17052
Rain Zone Interactions (β_j)	66898	-21407	-32089	9633	14159	-38616	-21335	-31433	-22714	

Fecal Streptococcus (colonies/100 mL)

INTERACTIONS (γ_{ij})	EPA Rain Zone									
Land Uses	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Land Use Effects (α_i)**
Commercial	-56490	-59998	-50330	-44988	-22225	-55616	-45297	-	-52091	-12512
Mixed Commercial	-	266428	-	60512	-101169	-	-37517	-	-43608	-12396
Freeway	-40477	-	-	-	-	-8327	-32003	-	-	-29325
Mixed Freeway	-36922	-	-	-	-92199	-	-	-	-	-38213
Industrial	-92668	-60055	-68519	-92735	26667	-70497	-68301	-	-59048	7044
Mixed Industrial	-	-64987	-	-	-89346	-	-27045	-	-23414	-31348
Institutional	-45018	-	-	-	-	-	-	-	-	-33784
MIX	-	-	-	-	-	-	-	-	-	-
Open Space	-	-41649	-	-44198	-	-43709	-	-	-	-22236
Mixed Open Space	-	-121887	-	-	-81669	-	-	-	-92264	25760
Residential	-34505	-66120	-41396	-42865	-38219	-70533	-63185	-	-48525	1421
Mixed Residential	-105950	-59312	-	-82913	-60311	-97276	-66459	-	-87152	26148
Rain Zone Interactions (β_j)	-11766	-9933	-37326	-13017	33546	-37823	-41641	-	-29564	

Total E. Coli (colonies/100 mL)

INTERACTIONS (γ_{ij})	EPA Rain Zone									
Land Uses	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Land Use Effects (α_i)**
Commercial	-6380	-	-	-	-	-	548	-	-	-55
Mixed Commercial	-	-	-	-	-	-	-4500	-5830	-	-2868
Freeway	-	-	-	-	-	-	-5386	-	-	1003
Mixed Freeway	-	-	-	-	-	-	-	-	-	-
Industrial	-4728	-	-	-	-	-	-6230	-	-	-1729
Mixed Industrial	-	-	-	-	-	-	-	-	-	-
Institutional	-	-	-	-	-	-	-	-	-	-
MIX	-4897	-	-	-	-	-	-	-	-	1478
Open Space	-4897	-	-	-	-	-	-	-	-	-3443
Mixed Open Space	-	-	-	-	-	-	-	-	-	-
Residential	-3420	-	-	-	-	-	-8010	-8449	-	1166
Mixed Residential	-	-	-	-	-	-	-8726	-2655	-	3312
Rain Zone Interactions (β_j)	-102	-	-	-	-	-	387	-435	-	

Ammonia (mg/L)

INTERACTIONS (γ_{ij})	EPA Rain Zone									Land Use Effects
Land Uses	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**(α_i)**
Commercial	-0.7517	-0.5073	-0.8263	-1.0465	-	0.0732	-0.6694	-	-0.1632	0.1309
Mixed Commercial	-	-0.4684	-	0.6969	-	-	-0.7014	-1.3796	-0.9541	0.055
Freeway	-1.4115	-0.9857	-	-	-	-0.9685	-1.3838	-	-	0.8308
Mixed Freeway	-0.6328	-	-	-	-	-	-	-	-	0.6611
Industrial	-0.5308	-0.5427	-0.5574	-0.7203	-	-1.0944	-0.589	-	-0.6162	0.0495
Mixed Industrial	-	-0.5859	-	-	-	-	-0.4267	-	-0.3536	-0.2058
Institutional	-0.5227	-0.4771	-	-	-	-	-	-	-	-0.1604
MIX	-0.6328	-	-	-	-	-	-	-	-	-0.1597
Open Space	-0.7983	-0.5065	-	-0.0873	-	-1.669	-	-	-	-0.2808
Mixed Open Space	-	-0.5494	-	-	-	-	-	-	0.1138	-0.3158
Residential	-0.4737	-0.5022	-0.6512	-0.0789	-	-0.9091	-0.4772	-1.8461	-0.7463	-0.0942
Mixed Residential	-0.3107	-0.5889	-0.5833	-0.8127	-	-1.376	-0.409	1.4162	-0.9027	-0.1121
Rain Zone Interactions (β_j)	0.0682	-0.1303	-0.2838	0.0489	-	0.9706	-0.1175	1.5255	0.3742	

$NO_2 + NO_3$ (mg/L)

INTERACTIONS (γ_{ij})	EPA Rain Zone									
Land Uses	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Land Use Effects (α_i)**
Commercial	-0.6307	-0.7877	-0.877	-0.6162	-0.8639	-0.8665	-0.8311	-	-0.3866	-0.1782
Mixed Commercial	-0.6275	-0.9456	-	-0.9516	-0.8874	-	-0.6423	-1.1144	-1.2022	-0.1641
Freeway	-1.7264	-0.5619	-	-	-	-	-1.8268	-	-	0.9217
Mixed Freeway	-1.1254	-0.3779	-	-	-1.0689	-	-	-	-	0.2054
Industrial	-0.8928	-1.0697	-0.4111	-0.8703	-0.8618	-0.4198	-1.1021	-	-1.3389	-0.037
Mixed Industrial	-	-0.9714	-0.8371	-	-0.7541	-	-0.6881	-	-0.8859	-0.1583
Institutional	-0.2617	-1.0075	-0.5596	-	-	-	-	-	-	-0.333
MIX	-0.7248	-	-	-	-	-	-	-	-	-0.0318
Open Space	-0.8569	-0.9595	-	-0.8909	-	-1.2514	-	-	-	-0.0544
Mixed Open Space	-0.9165	-0.9571	-	-	-0.482	-	-	-	-0.6797	-0.2581
Residential	-1.0229	-0.9347	-0.5752	-0.9723	-0.8933	-1.2828	-0.8117	-1.6396	-0.43	0.1911
Mixed Residential	-0.7472	-0.8414	-0.8344	-0.9623	-0.8393	-1.2177	-0.7142	0.5837	-1.447	-0.0522
Rain Zone Interactions (β_j)	-0.1437	0.1505	-0.4798	-0.0088	-0.1567	0.5638	-0.3339	0.1915	0.3722	

Total Nitrogen (mg/L)

INTERACTIONS (γ_{ij})	EPA Rain Zone									
Land Uses	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Land Use Effects (α_i)**
Commercial	-2.416	-0.699	-2.482	-2.806	-	-	-	-	-2.341	0.295
Mixed Commercial	-	-2.394	-2.409	-	-	-2.201	-	-	-	-0.265
Freeway	-1.715	-	-1.442	-	-	-	-	-	-	-0.497
Mixed Freeway	-	-	-	-	-	-	-	-	-	-
Industrial	-2.5	-2.115	-2.369	-2.014	-	-1.787	-	-	-3.228	-0.334
Mixed Industrial	-	-2.592	-1.695	-	-	-2.456	-	-	-1.926	0.048
Institutional	-1.81	-	-	-	-	-	-	-	-	-0.766
MIX	-1.81	-	-	-	-	-	-	-	-	-1.139
Open Space	-3.25	-1.686	-	-2.312	-	-	-	-	-	-0.353
Mixed Open Space	-	-2.51	-	-	-	-	-	-	-	-0.536
Residential	-1.66	-2.504	-2.315	-2.062	-	-	-	-	-2.464	-0.088
Mixed Residential	-	-2.411	-2.599	-2.777	-	-2.956	-	-	-	0.597
Rain Zone Interactions (β_j)	-0.519	0.181	-0.928	0.446	-	-1.232	-	-	2.137	

Total Kjedahl Nitrogen (mg/L)

INTERACTIONS (γ_{ij})	EPA Rain Zone									
Land Uses	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Land Use Effects (α_i)**
Commercial	-1.742	-1.69	-1.866	-2.092	-2.281	-0.826	-1.423	-	-1.83	-0.178
Mixed Commercial	-2.106	-1.512	-2.292	0.518	-2.611	-3.986	-1.721	-3.532	-3.42	-0.006
Freeway	-2.965	-1.886	-	-	-2.141	-2.737	-1.957	-	-	0.565
Mixed Freeway	-2.01	1.51	-	-	-4.119	-	-	-	-	2.117
Industrial	-1.691	-2.218	-1.535	-2.238	-2.635	-0.873	-1.16	-	-2.772	0.075
Mixed Industrial	-	-1.177	-1.783	-2.245	-2.304	-4.607	-2.027	-	-2.473	-0.179
Institutional	-2.078	-1.689	-1.116	-	-	-	-	-	-	-0.715
MIX	-	-	-	-	-	-	-	-	-	-
Open Space	-1.776	-2.474	-	-1.146	-	-2.778	-	-	-	-0.834
Mixed Open Space	-2.058	-1.871	-	-	-1.41	-	-	-	-1.258	-0.668
Residential	-1.583	-1.963	-1.406	-1.424	-1.292	-1.411	-2.002	-3.757	-1.464	0.001
Mixed Residential	-1.853	-1.638	-2.126	-1.666	-1.251	-3.662	-2.052	0.988	-1.219	0.097
Rain Zone Interactions (β_j)	-0.2	0.033	-0.752	0.071	-0.101	1.712	-0.593	3.155	1.497	

Dissolved Phosphorus (mg/L)

INTERACTIONS (γ_{ij})	EPA Rain Zone									
Land Uses	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Land Use Effects (α_i)**
Commercial	-0.1768	-0.184	-0.1245	-0.1508	-0.2425	-0.1223	-0.1733	-	-0.1796	-0.0181
Mixed Commercial	-	-0.1303	-0.2468	-0.1985	-0.2669	-	-0.3281	-	-0.318	0.0554
Freeway	-0.3495	-0.4914	-0.3949	-	-	0.007	-	-	-	0.1792
Mixed Freeway	-	-	-	-	-0.134	-	-	-	-	-0.1342
Industrial	-0.1875	-0.16	-0.1588	-0.2368	-0.1941	-0.2399	-0.2483	-	-0.0756	-0.0299
Mixed Industrial	-	-0.1547	-0.1522	-	-0.1811	-	-0.3186	-	-0.1476	-0.0163
Institutional	-0.1532	-0.1798	-	-	-	-	-	-	-	-0.0798
MIX	-	-	-	-	-	-	-	-	-	-
Open Space	-	-0.2041	-	-0.216	-	-0.3794	-	-	-	-0.001
Mixed Open Space	-	-0.1787	-	-	-0.1531	-	-	-	-0.1723	-0.0315
Residential	-0.1514	-0.1974	-0.1839	-0.1392	-0.0419	-0.3047	-0.0899	-	-0.1507	0.0223
Mixed Residential	-0.1793	-0.1648	-0.1665	-0.1152	-0.1525	-0.432	-0.3191	-	-0.1121	-0.0234
Rain Zone Interactions (β_j)	-0.0648	0.0163	-0.0804	0.0563	-0.0419	0.2086	0.0139	-	0.0437	

Total Phosphorus (mg/L)

INTERACTIONS (γ_{ij})	EPA Rain Zone									
Land Uses	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Land Use Effects (α_i)**
Commercial	-0.404	-0.3951	-0.2492	-0.5352	-0.4821	-0.3767	-0.1821	-	-0.5618	-0.1291
Mixed Commercial	-0.4253	-0.4457	-	-0.3454	-0.1866	-	-0.4856	-0.7477	-0.9273	0.1426
Freeway	-0.626	-0.1014	-0.7035	-	-0.558	-0.8332	-0.6042	-	-	0.2414
Mixed Freeway	-0.2101	-0.3143	-	-	-0.5815	-	-	-	-	-0.0687
Industrial	-0.3949	-0.4694	-0.404	-0.7386	-0.6081	0.2542	-0.3812	-	-0.4177	-0.0199
Mixed Industrial	-	-0.3741	-0.4002	-0.3055	-0.5714	-	-0.4637	-	-0.5937	-0.0479
Institutional	-0.2529	-0.4261	-0.2051	-	-	-	-	-	-	-0.2529
MIX	-0.3124	-	-	-	-	-	-	-	-	-0.1482
Open Space	-0.7191	-0.4912	-	0.0122	-	-0.5802	-	-	-	0.1503
Mixed Open Space	-0.4121	-0.3591	-	-	-0.391	-	-	-	-0.3538	-0.1152
Residential	-0.3136	-0.4164	-0.3737	-0.1686	-0.442	-0.4467	-0.4509	-0.3696	-0.5301	0.0068
Mixed Residential	-0.3501	-0.3875	-0.4566	-0.5865	-0.4029	-0.7071	-0.3929	-0.2427	0.3707	0.0162
Rain Zone Interactions (β_j)	-0.0873	0.0161	-0.1724	0.1759	0.0801	0.2755	-0.0893	0.3421	0.2682	

Cadmium (μ/L)

INTERACTIONS (γ_{ij})	EPA Rain Zone									
Land Uses	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Land Use Effects (α_i)**
Commercial	-1.854	-1.489	-6.498	-4.242	-1.902	-2.604	-2.191	-	-3.496	-0.373
Mixed Commercial	-	-1.596	-	-	-0.887	-1.494	-1.305	-0.772	-4.149	-1.277
Freeway	-3.206	1.256	-8.902	-	-	-3.538	-3.068	-	-	0.949
Mixed Freeway	-	10.886	-	-	-1.821	-	-	-	-	-0.433
Industrial	-3.381	-1.889	-5.226	-3.991	-2.977	-2.71	-1.116	-	5.413	1.144
Mixed Industrial	-	-2.081	-3.19	-	-1.73	-0.757	-	-	-3.567	-0.352
Institutional	-0.783	-1.701	-	-	-	-	-	-	-	-1.769
MIX	-	-	-	-	-	-	-	-	-	-
Open Space	-	-11.382	-	4.969	-	-10.087	-	-	-	7.706
Mixed Open Space	-	-1.396	-	-	-1.241	-	-	-	-0.297	-0.915
Residential	-1.206	-2.001	-4.642	-3.022	-1.359	-1.642	-1.94	-1.422	-3.229	-1.014
Mixed Residential	-2.748	-4.14	4.435	-5.441	-4.127	-4.448	-3.613	-4.02	-5.16	1.917
Rain Zone Interactions (β_j)	-1.433	-0.455	3.753	7.991	-1.4	-0.711	-0.886	-1.558	1.727	

Total Copper (μg/L)

INTERACTIONS (γ_{ij})	EPA Rain Zone									
Land Uses	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Land Use Effects (α_i)**
Commercial	-14.43	-21.7	-29.33	-23.97	-33.43	-62.67	-24.81	-	-11.72	-2.73
Mixed Commercial	28.84	-40.85	-49.38	-59.57	14.83	-59.12	-39.42	-38.91	-66.16	21.54
Freeway	-23.84	-30.63	8.76	-	-48.26	-27.06	-25.43	-	-	6.33
Mixed Freeway	-1.84	-2.4	-	-	-44.14	-	-	-	-	2.93
Industrial	-41.16	-41.36	-30.98	10.09	-33.97	-1.44	-20.43	-	-15.27	5.84
Mixed Industrial	-	-21.46	-18.57	-48.82	-35.73	-29.81	-36.64	-	-20.16	-0.68
Institutional	-4.98	-29.69	-14.04	-	-	-	-	-	-	-14.93
MIX	-25.95	-	-	-	-	-	-	-	-	-23.46
Open Space	-36.5	-33.06	-	-57.96	-	48.04	-	-	-	-12.32
Mixed Open Space	-	-29.37	-	-	-22.48	-	-	-	-14.55	-14.93
Residential	-26.38	-25.22	-22.19	-26.88	-37.54	-63.24	-36.55	-35.76	-28.24	-2.37
Mixed Residential	-16.82	-21.81	-24.7	-71.07	-27.86	-20.4	-29.89	-27.46	-40.98	-0.58
Rain Zone Interactions (β_j)	-1.01	-0.89	-16.08	31.78	-4.63	28.86	-2.82	-2.24	3.27	

Total Lead (µg/L)

INTERACTIONS (γ_{ij})	EPA Rain Zone									
Land Uses	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Land Use Effects (α_i)**
Commercial	-39.7	-11.35	-32.67	-17.95	-32.64	-89.65	-23.28	-	-34.09	-8.48
Mixed Commercial	-	-35.52	-35	-54.7	-36.02	2.63	-9.88	-3.88	-33.63	1.74
Freeway	-74.47	-35.99	-	-	-23.86	-84.63	-54.84	-	-	40.43
Mixed Freeway	-	51.37	-	-	-45.78	-	-	-	-	-12.66
Industrial	-63.84	-42.57	-38.77	-4.14	-45.74	11.13	-40.4	-	246.08	11.46
Mixed Industrial	-	-48.91	-44.33	-	-57.41	34.84	-63.14	-	-1.55	14.09
Institutional	-17.36	-25.14	-	-	-	-	-	-	-	-21.03
MIX	-28.48	-	-	-	-	-	-	-	-	-27.7
Open Space	-	-36.14	-	-32.9	-	-30.69	-	-	-	-5.94
Mixed Open Space	-	-35.12	-	-	-44.39	-	-	-	118.51	-5.97
Residential	-2.31	-29.62	2.1	-41.65	-49.98	-79.09	-45.32	-50.38	-85.33	-7.83
Mixed Residential	-26.43	-24.89	-27.7	-48.47	-31.3	-38.35	1.3	-32.31	-16.25	-7.64
Rain Zone Interactions (β_j)	-3.08	-10.13	-17.86	14.84	8.15	53.51	6.7	0.37	49.34	

Total Zinc (µg/L)

INTERACTIONS (γ_{ij})	EPA Rain Zone									
Land Uses	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Land Use Effects (α_i)**
Commercial	-152.8	-72.7	-190.5	-200.1	-183.2	-670.4	-174.4	-	-203.4	-3.1
Mixed Commercial	-2	-211.9	-197.5	178.6	-205.8	99.3	-218.1	-54.2	-251.3	46.3
Freeway	-92.6	-130.3	-230.4	-	-179.5	-600.3	-102.8	-	-	-15.3
Mixed Freeway	26.7	-20.6	-	-	-239.5	-	-	-	-	27.7
Industrial	-256.3	-209.2	-152.4	-252.9	-107.7	-459.7	-115.6	-	-59.5	47.6
Mixed Industrial	-	-739.7	-618.6	1334.5	-738.7	3566.3	-796.1	-	-462.4	583.1
Institutional	-149.3	22.3	-192.5	-	-	-	-	-	-	5
MIX	-135.9	-	-	-	-	-	-	-	-	-162.5
Open Space	-350.2	-30.9	-	-440.1	-	-742.2	-	-	-	50.8
Mixed Open Space	-	-171	-	-	-125	-	-	-	88.7	-59.4
Residential	-148.6	-155.9	-119.6	-202.5	-167.2	-644.7	-165.6	-250.8	-227.2	-56.8
Mixed Residential	-70.7	-174	-149.9	-319.2	-102.2	-547.4	-143.8	-166.2	-183.1	-56.3
Rain Zone Interactions (β_j)	-41.5	-19.4	-101.6	127.1	-70.2	561.6	-25.3	86.8	54.5	