CITY OF BOULDER

PUBLIC WORKS/UTILITIES
P. O. Box 791
Boulder, CO 80306

Water Quality and Environmental Services

4049 75th St., Bldr, 80301
Fax# 303-413-7373
Administration – 303-413-7350
Stormwater Quality
Industrial Pretreatment
Wastewater/Environmental Lab

5605 63rd St., Bldr, 80301
Fax# 303-530-1137
Drinking Water 303-413-7400
Water Conservation 303-413-7407

September 15, 2008

Standards Framework Workgroup – Nonylphenol

Ridge Dorsey – Pretreatment Specialist
303-413-7361
dorseyr@bouldercolorado.gov

General Overview of Activities

Identify source control opportunities throughout the service area. See attached pages for details.

Evaluate discharge requests for NP. Recommend alternative product research.

Educate other Colorado sewer districts & municipalities through CIPCA.

Participate in CIPCA effluent monitoring study. See attached data.

September 15, 2008
City of Boulder Nonylphenol Preliminary Survey
Prepared for Standards Framework Workgroup
By Megan Monroe – Field Specialist

The city of Boulder has taken a proactive approach towards identifying areas within the city contributing to elevated nonylphenol concentrations at the WWTP. In collaboration with Larry Barber and the USGS, city staff is utilizing Elisa techniques to investigate concentrations within the city's system. Elisa analysis is a competitive antigen reaction, utilizing the 96 well plate format, allowing ~40 samples to be analyzed in one run. In comparison to GCMS, Elisa is relatively inexpensive and less time intensive. Although it is difficult to get exact, definitive concentrations by Elisa techniques, the analysis offers a feasible method for municipalities to quickly scan the system. In order to determine more definitive levels, GCMS can and will be utilized by the city of Boulder on areas/samples of concern that have been identified with Elisa.

In both March and July, the city of Boulder sampled ~20 sites within the city lines. Sites were selected based on historical/routine sampling locations (the Com/Dom sites) with known industrial impacts. Additional sites were selected above and below car washes, breweries and suspected areas with nonylphenol use.

Preliminary analysis has identified areas with elevated nonylphenol concentrations below breweries, car washes, and metal finishing/circuit board shops (SAE). After identifying areas of known concern, city staff has focused outreach efforts towards similar industries. Objectives of the outreach and education are to explain the issue, the concerns, and timeline of regulations. Secondly, as it is often difficult to quickly and clearly identify which products have NPs during site visits, outreach has aimed focus on working through industries to reach chemical supply companies. It is our hope that by educating industries and chemical supply companies, voluntary reduction can start immediately.

Steps for future:
-Continue monitoring areas of concern
-Utilize GCMS on elevated Elisa samples
-Continue outreach, encouraging voluntary reduction, emphasizing that regulations are rapidly coming down the line.

[redacted]

AP

Enzyme immunoassay for the quantitative analysis of AP

Zero Mean Abs. -0.009

Sample name	Site	Measured abs	dup	Mean of Abs	%B/Bo	Logit %B/Bo	Plate Concentration	Dilution Factor	Sample Concentration
1-1	IBM-001	-0.164		-0.164	18.22	-1.501	67.736		[illegible]
1-2	SAE	-0.817	-0.725	[illegible]	85.67	1.788	2262.293		2262.2934
1-3	Araph Car Wash	-0.709	-0.702	[illegible]	78.39	1.288	1328.014		1328.0136
4	Com Wilderness	-0.498		[illegible]	55.33	0.214	422.205		[illegible]
5	Celestial	0.135		[illegible]	-15.00	#NUM!	#NUM!		[illegible]
6	Com Longbow	-0.108		[illegible]	12.00	-1.992	40.117		[illegible]
7	Abv Avery	-0.723		[illegible]	80.33	1.407	1507.403		1507.4028
8	BC Ken	0.009		[illegible]	-1.00	#NUM!	#NUM!		[illegible]
9	Hain/WhiteWave	-0.392	-0.426	[illegible]	45.44	-0.183	276.485		[illegible]
10	Bel Avery	-0.762	-0.765	[illegible]	84.83	1.722	2107.858		2107.8584
11	Ball 003	0.025		[illegible]	-2.78	#NUM!	#NUM!		[illegible]
12	Rosche 002	-0.186		[illegible]	20.67	-1.345	80.018		[illegible]
13	BC aDC	-0.21		[illegible]	23.33	-1.190	94.460		[illegible]
14	BC 95	-0.156		[illegible]	17.33	-1.562	63.481		[illegible]
15	INF	-0.598	-0.6	[illegible]	66.56	0.688	700.010		700.0101
16	EFF	0.021	0.073	[illegible]	-5.22	#NUM!	#NUM!		[illegible]
17	Com Flat	-0.681		[illegible]	75.67	1.134	1126.860		1126.8596
18	Dom Wonder	-0.567		[illegible]	63.00	0.532	592.745		[illegible]
19	Univ 004	-0.326		[illegible]	36.22	-0.566	183.758		[illegible]
20	Dom Heatherwood	-0.480		[illegible]	53.33	0.134	387.416		[illegible]
21	Com East Pearl (3-18)	-0.780		[illegible]	86.67	1.872	2474.159		2474.1586
22	IPT Blank	-0.054	-0.049	-0.0515	5.72	-2.802	16.918		16.9181
23	Com East Pearl (3-26)	-0.787		[illegible]	87.44	1.941	2663.234		2663.2340
24	Univ 005 (3-26)	0.135	0.059	[illegible]	-10.78	#NUM!	#NUM!		[illegible]
25	Univ 005 (3-25)	0.136	0.177	[illegible]	-17.39	#NUM!	#NUM!		[illegible]
	[illegible]								
	[illegible]								
	[illegible]								
	[illegible]								
	[illegible]								
	[illegible]								
	[illegible]								

sample calculation

Batch #	2-IPT City of Boulder
Date:	16-Jul

AP

Enzyme immunoassay for the quantitative analysis of AP

Zero Mean Abs. 1.0665

Sample name	Site	Measured abs	dup	Mean of Abs	%B/Bo	Logit %B/Bo	Plate Concentration	Dilution Factor	Sample Concentration ug/l
1	Com East Pearl	0.141	0.142	0.1415	0.13	-6.624	8873.393	1.00	8873.3932
2	Arap Car Wash	0.116	0.097	0.1065	0.10	-6.908	18341.209	1.00	18341.2093
3	Celestial	0.723	1.076	0.8995	0.84	-4.767	77.631	1.00	77.6309
4	Abv Avery	0.091	0.093	0.092	0.09	-7.055	26656.859	1.00	26656.8594
5	Below Avery	0.103	0.102	0.1025	0.10	-6.946	20225.713	1.00	20225.7130
6	Com Wilderness	0.364	0.364	0.364	0.34	-5.677	791.478	1.00	791.4783
7	WWTP effluent	1.103	1.118	1.1105	1.04	-4.554	45.106	1.00	45.1060
8	WWTP Influent	0.357	0.352	0.3545	0.33	-5.703	846.939	1.00	846.9389
9	SAE	0.19	0.193	0.1915	0.18	-6.321	4094.139	1.00	4094.1388
10	IBM	0.848	0.861	0.8545	0.80	-4.819	88.592	1.00	88.5920
11	om Longbow-PRE flus	0.692	0.733	0.7125	0.67	-5.002	141.361	1.00	141.3605
12	om Longbow POST flu	0.751	0.784	0.7675	0.72	-4.927	116.769	1.00	116.7694
13				#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	1.00	#DIV/0!
14	blk	1.223		1.223	1.15	-4.457	35.164	1.00	35.1635
15	0 DUP	0.913		0.913	0.86	-4.752	74.710	1.00	74.7103
16	50ug/l DUP	1.087		1.087	1.02	-4.576	47.664	1.00	47.6642
17	280 ug/L DUP	0.713	0.5	0.6065	0.57	-5.164	213.787	1.00	213.7874
18	1000 ug/L DUP	0.469	0.492	0.4755	0.45	-5.408	399.099	1.00	399.0992
19	5000 ug/L Dup	0.136	0.159	0.1475	0.14	-6.582	7979.849	1.00	7979.8488

sample calculation

POTW Effluent Nonylphenol Sampling - CIPCA Study, June/July 2008

Sample ID	Nonylphenol ug/L	Tert octylphenol ug/L	Nonylphenol 1 ethoxylate ug/L	Nonylphenol 2 ethoxylate ug/L	Bisphenol A ug/L	Surrogate Std (2 ug/L) n-nonylphenol ug/L	Surrogate Std (2 ug/L) n-nonylphenol 1 ethoxylate ug/L
# 001	<0.5	<0.3	<1	<2	<0.4	1.5	1.7
# 002	<0.5	<0.3	<1	<2	<0.4	1.4	1.6
# 003	**2.3**	<0.3	**5.4**	**15.6**	<0.4	2.3	1.9
# 004	<0.5	<0.3	<1	<2	<0.4	0.6	1.4
# 005	<0.5	<0.3	<1	<2	<0.4	0.4	1.5
# 006	<0.5	<0.3	<1	<2	**0.5**	0.9	1.7
# 007	**2.4**	<0.3	**5.9**	**4.2**	<0.4	2	1.8
# 008	<0.5	<0.3	<1	<2	<0.4	1.3	1.9
# 009	<0.5	<0.3	<1	<2	<0.4	1.8	1.9
# 010	<0.5	<0.3	<1	<2	<0.4	1.1	1.9
# 011	<0.5	<0.3	<1	<2	<0.4	0.7	2
# 011 Duplicate	<0.5	<0.3	<1	<2	<0.4	0.3	1.9
# 012	<0.5	<0.3	<1	<2	<0.4	1.3	1.8
# 013	<0.5	<0.3	<1	<2	<0.4	1.8	1.8
# 014	**0.6**	<0.3	<1	<2	<0.4	1.4	1.7
# 015	**1.3**	<0.3	**1.7**	<2	<0.4	1.5	1.7
# 016	**0.5**	<0.3	**1.9**	<2	<0.4	1.2	1.9
# 017	<0.5	<0.3	**4.1**	<2	<0.4	0.6	1.8
# 018	**5.1**	<0.3	<1	<2	<0.4	2.1	2.2
# 019	<0.5	<0.3	<1	<2	<0.4	1.9	2.1
# 014 Field Blank	<0.5	<0.3	<1	<2	<0.4	1	1.2
# 014 Trip Blank	<0.5	<0.3	<1	<2	<0.4	0.2	1.3

Note: Surrogate recovery was outside the lab's acceptance range of 56% to 112% in samples 004, 005, 006, 011, and 017.