



MEMORANDUM



TO: Section Chiefs
Pollution Control Division

DATE: February 8, 2002

FROM: Wilbur Mayorga, P.E., Chief
Pollution Remediation Section

SUBJECT: Natural Background
Concentrations in
Miami-Dade County Soil

The results of the natural background concentration study for Miami-Dade County soils are provided in the table below for your information. The fourteen inorganic chemicals provided in the table were measured in 38 unsaturated surficial soil samples collected from unimpacted areas of Miami-Dade County. The University of Florida Center for Environmental and Human Toxicology statistically analyzed the results. The following summary provides the best statistical descriptor of the background results (i.e., the Minimum Variance Unbiased Estimate of the mean) for each of the chemicals analyzed:

Natural Background Concentrations in Miami-Dade County Soils

Chemical Name	Natural Background Concentration (mg/kg)	Chemical Name	Natural Background Concentration (mg/kg)
Arsenic	1.2	Lead	26
Aluminum	2656	Manganese	55
Barium	7	Mercury	0.08
Cadmium	0.1	Nickel	2.1
Chromium	6.8	Selenium*	<0.45
Copper	4.1	Silver*	<0.025
Iron	2176	Zinc	12

* The data for selenium and silver were not analyzed statistically because all of the selenium results were below the detection limit and silver was detected in only one sample.

If you have any question, please contact me at extension 6700.

pc Jose Gonzalez, P.E.
PRS Staff

Table 1. Soil Concentrations of Twelve Inorganics in Miami-Dade County Soils (mg/kg)

#	Surficial Soils	ID	As	Pb	Al	Ba	Cd	Cr	Cu	Fe	Mn	Hg	Ni	Zn
1	Viscaya	Vis1	0.600	33.15	2034.1	4.96	0.125	5.51	5.50	1301.9	49.42	0.1620	1.77	12.67
2	Viscaya 2	Vis2	0.710	268.50	3549.1	6.71	0.154	6.15	5.00	2167.5	97.66	0.2432	2.33	20.14
3	Virginia3	VK3	3.890	11.66	599.8	8.06	0.375	6.20	6.20	1675.3	17.06	0.1110	2.16	27.91
4	Matheson	Mat	0.500	0.20	908.4	4.67	0.049	3.70	6.90	947.9	6.65	0.0472	0.95	8.66
5	Cutler Natural	CN	0.890	17.16	2047.0	5.25	0.068	5.13	2.13	1104.3	27.18	0.0497	1.64	7.12
6	Oleta1	Ole1	0.510	0.26	341.0	6.30	0.160	1.92	4.62	725.2	17.81	0.2217	6.85	12.33
7	Oleta3	Ole3	1.860	41.92	223.0	4.67	0.090	1.97	1.57	700.0	10.80	0.0338	1.79	6.19
8	Oleta4	Ole4	1.290	35.24	381.0	4.22	0.062	2.51	1.64	801.5	7.55	0.0349	1.16	12.14
9	Greyhound1	Gry1	0.590	12.55	1488.6	7.57	0.131	3.43	7.60	1702.3	54.84	0.2250	1.10	19.97
10	Greyhound2	Gry2	0.340	36.59	645.9	6.63	0.073	1.89	3.13	1084.2	15.09	0.1222	1.38	12.56
11	Greyhound3	Gry3	2.580	37.67	674.7	7.56	0.367	10.64	6.40	801.4	24.95	0.1988	1.64	29.89
12	Greyhound4	Gry4	0.100	16.92	945.7	6.09	0.140	2.10	2.69	899.2	31.34	0.1528	1.30	15.84
13	County11	CL1	0.100	5.71	467.1	2.50	0.028	1.62	0.76	273.5	2.58	0.0115	0.58	4.80
14	County12	CL2	0.100	11.94	150.6	2.60	0.067	2.39	1.51	117.9	14.38	0.0141	0.48	7.17
15	Dolphin C	DC	0.100	5.05	91.4	1.48	0.016	0.60	0.35	99.4	1.31	0.0075	0.30	2.79
16	Madden1	Mad1	0.320	7.35	420.1	5.64	0.074	1.43	5.10	740.4	14.29	0.0242	0.74	11.84
17	Madden2	Mad2	0.100	5.13	757.8	6.05	0.075	2.17	6.10	675.1	16.30	0.0195	0.88	11.25
18	Madden3	Mad3	0.910	22.59	693.0	8.93	0.090	2.26	12.60	1404.9	24.31	0.0203	0.93	10.82
19	Madden4	Mad4	1.060	40.73	744.6	16.80	0.254	3.47	8.70	1446.9	40.59	0.0249	1.17	30.02
20	Madden5	Mad5	1.960	10.03	1018.8	6.74	0.066	3.32	2.65	1890.8	14.16	0.0148	1.24	7.73
21	Madden6	Mad6	2.600	23.25	715.2	10.50	0.074	2.94	3.23	1582.2	19.59	0.0158	1.81	3.89
22	Madden7	Mad7	1.620	5.96	677.2	7.27	0.070	2.49	2.57	1060.5	20.15	0.0124	1.48	5.77
23	Madden8	Mad8	1.920	12.46	751.5	7.69	0.065	2.05	2.67	1777.7	11.28	0.0149	0.92	4.00
24	Tamiami Complex No 5	Site 15	0.957	17.16	1660.3	3.81	0.017	3.30	1.71	2102.3	17.86	0.0078	0.96	4.19
25	L. and P. Thompson Park	Site 18	2.090	23.78	7965.4	4.86	0.035	18.82	3.95	4915.5	107.56	0.0277	3.17	5.49
26	Boystown	Site 14	0.620	11.66	2825.7	4.50	0.008	6.89	1.52	2755.2	12.45	0.0267	1.84	2.15
27	ME Thompson Campground	Site 3C	0.100	0.20	612.8	3.63	0.080	6.52	0.57	547.6	20.67	0.0035	1.63	0.72
28	ME Thompson Campground	Site 6C	0.662	0.26	574.4	2.52	0.037	4.86	0.51	525.5	12.50	0.0026	1.01	0.52
29	Deering Estate Addition	Site 13	0.374	94.38	3379.3	13.81	0.086	3.88	6.07	2491.9	276.53	0.0595	3.10	12.09
30	Deering Estate B	Site 12	0.573	11.72	4787.7	4.22	0.027	11.72	1.37	2978.4	44.10	0.0622	1.94	4.86
31	Deering Estate A	Site 11	0.655	6.41	3827.0	4.84	0.024	8.26	1.46	2243.4	36.48	0.0579	1.90	7.08
32	Shapper Creek Park B	Site 10	1.084	6.57	5344.3	8.11	0.023	13.09	1.32	2751.7	33.42	0.0518	2.87	6.30
33	East Greyhounds Park	Site 7	0.823	49.06	2364.2	9.43	0.094	5.67	4.22	2306.7	77.77	0.1400	1.26	19.18
34	Shapper Creek Park A	Site 9	0.177	7.87	3477.3	14.87	0.342	5.95	5.58	2274.5	49.38	0.1594	1.77	95.01
35	Matheson Hammock	Site 8	0.361	9.35	4044.7	11.04	0.063	9.09	2.82	2083.7	215.64	0.1139	2.27	6.23
36	L. and P. Thompson Park	Site 17	1.670	29.18	9689.0	6.95	0.025	23.62	2.82	8064.2	257.37	0.0202	4.45	4.17
37	Owaisa Bauer Park	Site 20	1.454	20.40	9355.1	9.85	0.078	23.22	7.20	4278.7	156.46	0.0836	5.48	5.28
38	Castellow Hammock Park	Site 19	2.929	33.99	23835.5	12.92	0.035	58.47	5.90	17280.4	220.48	0.0642	14.14	8.16

Table 2. Statistical Descriptors

Parameter	As	Pb	Al	Ba	Cd	Cr	Cu	Fe	Mn	Hg	Ni	Zn
n *	38	38	38	38	38	38	38	38	38	38	38	38
Minimum	ND	0.2	91.4	1.48	0.008	0.6	0.35	99.4	1.31	0.0026	0.3	0.52
Maximum	3.89	268.50	23836	16.80	0.37	58.47	12.60	17280	276.53	0.24	14.14	95.01
Arithmetic Mean	1.031	25.89	2739	6.95	0.096	7.35	3.86	2173	54.68	0.070	2.17	12.29
Arithmetic STD	0.911	44.34	4293	3.50	0.092	10.19	2.70	2922	72.89	0.070	2.39	15.70
Mean (ln transformed data)	-0.422	2.41	7.2	1.81	-2.707	1.52	1.06	7.2	3.32	-3.23	0.47	2.07
STD (ln transformed data)	1.070	1.60	1.2	0.52	0.873	0.91	0.84	1.0	1.19	1.184	0.72	0.97
Geomean	0.655	11.18	1293	6.14	0.067	4.55	2.90	1361	27.71	0.039	1.60	7.91
GeoSTD	2.915	4.93	3.4	1.69	2.394	2.49	2.32	2.7	3.29	3.27	2.06	2.63
95% of data	3.810	154.22	9734	14.51	0.280	20.5	11.6	6908	196.5	0.276	5.25	38.78
Skewness	1.289	4.737	3.594	1.024	2.049	3.808	1.025	4.145	2.043	1.162	3.810	4.215
CV	0.883	1.712	1.568	0.504	0.963	1.386	0.700	1.344	1.333	1.005	1.105	1.278
Distributional Test												
Shapiro-Wilk Test at 5% signif.												
Reject Normal?	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Reject Lognormal?	no**	no**	no	no	no	no	yes	no	no	no	no	no
Q-Q Plot Fit (LN or N)	LN**	LN**	LN	LN	LN	LN	LN	LN	LN	LN	LN	LN
UCL Statistics												
n	32	34	38	38	38	38	38	38	38	38	38	38
MVUE Mean	1.22	25.89	2656	7.01	0.10	6.80	4.08	2176	54.62	0.077	2.06	12.40
MVUE STD	1.01	26.90	4404	3.87	0.10	7.35	3.95	2613	86.36	0.121	1.65	14.44
95%LCL Bootstrap-t (parametric)	0.96	19.43	1730	6.05	0.07	5.14	3.16	1601	36.50	0.052	1.66	9.14
95%UCL Bootstrap-t (parametric)	1.55	34.89	4114	8.14	0.13	9.11	5.27	2996	83.13	0.116	2.57	17.02
95% UCL Bootstrap-t (PROUCL) (nonp)	1.53	65.49	4903	8.03	0.13	12.78	4.69	3968	82.01	0.090	3.48	20.83

All concentrations in mg/kg.
 NA = This statistic not applicable for this inorganic.
 ND = Non-detect
 * VK4 was removed before results were analyzed.
 ** Results were computed excluding the six non-detects for As and four lowest values for Pb.
 ***Default leachability values are currently not available.
 #Direct exposure value based on acute toxicity considerations