

Memorandum

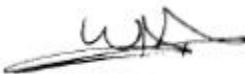
MIAMI-DADE
COUNTY

Date: April 3, 2014

To: Environmental Monitoring and Restoration Division (EMRD) Staff

From: Wilbur Mayorga, P.E., Chief
EMRD-DERM

Subject: Miami-Dade County Anthropogenic Background Study



Contaminant concentrations attributable to natural processes or regional or subregional anthropogenic impacts are an important consideration for responsible parties and personnel involved in the restoration of contaminated sites. There are only a few studies targeting background soil concentrations at the national, state or local level. Often the data from national or state-wide studies cannot be directly applied at the county or subregional level. In 2011, the EMRD initiated a study to determine anthropogenic background concentrations of several contaminants (including inorganic chemicals which occur naturally) commonly encountered in soil at contaminated sites in Miami-Dade County. The anthropogenic background study is intended to complement the two studies, previously conducted by the Division, which evaluated naturally occurring background soil concentrations (DERM 2002 and 2004) and to assist responsible parties and environmental restoration contractors.

Between 2011 and February 2014, the EMRD sampled surficial soils at over 160 locations throughout the urban corridor (inside the 2015 UDB) of the county. The locations were selected to be representative of county-wide heterogeneity with respect to development history (older urban centers as well as newer suburban areas), land use (public buildings-libraries, residents and public parks), geology (coastal ridge versus low lying areas to the south and west, etc.). Samples were collected as composites, each consisting of 5 to 9 subsamples. Where feasible, samples were obtained from the 0-6 inch and the 6-24 inch intervals at each location. The samples were analyzed for fourteen inorganic chemicals and the carcinogenic polycyclic aromatic hydrocarbons (PAHs) represented by benzo(a)pyrene toxicity equivalents. In addition, 10% of the samples were analyzed for polychlorinated biphenyls (PCBs) as well as organochlorine pesticides.

The study results are presented in the attached tables and figures. The statistical descriptors evaluated include the Minimum Variance Unbiased Estimate (MVUE) and the 95% Upper Confidence Limit (95% UCL). In most cases the data is not normally distributed; therefore, the mean is provided for illustration only.

The results indicate arsenic as the most significant contaminant. To further assist data users, historical on-file data for muck soils/organic soils typical of western, southeast and south Miami-Dade County was reviewed and evaluated and summary statistics with respect to arsenic concentrations for these muck soils are also presented. Additionally for completeness, the data summary for the previously published naturally occurring background concentrations for the barrier islands (DERM 2004) is also presented.

If you have any questions concerning the above please contact me.

pc: Lee Hefty, DERM Director
Jose Gonzales P.E., Director's Office
DERM Division Chiefs

**Table 1: MIAMI-DADE COUNTY ANTHROPOGENIC BACKGROUND STUDY
SUMMARY STATISTICS**

Contaminants with no exceedance of residential Soils Cleanup Target Levels

	Al			Ba			Cd			Cr		
	0 - 6"	6 - 24"	0-2ft*	0 - 6"	6 - 24"	0-2ft*	0 - 6"	6 - 24"	0-2 ft*	0 - 6"	6 - 24"	0-2 ft*
Number of Samples	148	140	140	153	140	140	148	141	141	150	140	140
Minimum	84	81.0	95.0	2.1	0.6	2.5	0.1	0.1	0.1	1.3	0.6	0.7
Maximum	9240	8780	8327	42.3	52.2	49.7	1.0	0.7	0.7	37.8	38.5	38.0
Mean	2320	2092	2129	11.6	8.6	9.3	0.3	0.1	0.2	12.0	9.6	10.2
MVUE	2372	2188	2179	11.6	8.6	9.2	0.3	0.1	0.2	12.1	9.9	10.4
95% UCL	2935	2548	2484	12.5	9.8	10.2	0.3	0.2	0.2	13.2	11.1	11.4

	Cu			Pb			Fe			Hg		
	0 - 6"	6 - 24"	0-2 ft*	0 - 6"	6 - 24"	0 - 2 ft*	0 - 6"	6 - 24"	0-2 ft*	0 - 6"	6 - 24"	0-2 ft*
Number of Samples	143	140	140	152	141	141	147	141	141	145	139	139
Minimum	1.2	0.2	0.5	0.3	0.3	0.3	119	56	86	0.02	0.02	0.02
Maximum	32.5	29.6	33.8	129	141	133	10900	10100	7892	0.8	0.8	0.8
Mean	9.2	5.7	6.6	24.3	16.1	18.4	2446	2019	2125	0.3	0.4	0.4
MVUE	9.2	6.2	6.7	25	16	17.6	2499	2111	2176	0.4	0.4	0.4
95% UCL	10.3	7.7	7.7	33.2	20.1	21.5	3014	2447	2455	0.4	0.4	0.4

	Mn			Ni			Zn			Ag		
	0 - 6"	6 - 24"	0-2 ft*	0 - 6"	6 - 24"	0-2 ft*	0 - 6"	6 - 24"	0-2 ft*	0-6"	6-24"	0 - 2 ft*
Number of Samples	140	139	139	142	139	139	140	138	138	148	136	136
Minimum	5.9	1	2.2	0.5	0.5	0.5	4	1	1.7	0.1	0.1	0.1
Maximum	243	196	206	8.9	5.9	5.9	168	154	143	5.1	5.1	5.1
Mean	15	31.6	36.3	2.1	1.9	1.9	37.2	21.6	25.5	1.0	0.9	1.0
MVUE	50.6	33.5	36.9	2.1	2	1.9	37.3	21.0	25.0	1.2	1.0	1.1
95% UCL	57.1	40.3	47.9	2.6	2.3	2.3	41.2	26.0	29.0	1.4	1.3	1.3

Concentrations in mg/kg

* weighted concentration

Outliers removed for data analysis

Data for Selenium not analyzed -94% of values below detection limit

PCB and Organochlorine pesticide data not analyzed statistically due to limited detections

**Table 2: MIAMI-DADE COUNTY ANTHROPOGENIC BACKGROUND STUDY
ARSENIC SUMMARY STATISTICS**

	Arsenic- County-Wide			Arsenic-North of SW 88 Street			Arsenic-South of SW 88Street		
	0 - 6"	6 - 24"	0-2 ft*	0 - 6"	6 - 24"	0-2 ft*	0 - 6"	6 - 24"	0-2 ft*
Number of Samples	153	142	142	111	100	100	40	39	39
Minimum	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Maximum	27.3	14.5	16.2	24.8	10.0	13.7	27.3	14.5	16.2
Mean	3.9	2.6	2.9	3.3	1.9	2.2	5.9	4.2	4.7
MVUE	4.2	2.9	3.0	3.5	2.1	2.3	7	5	5.2
95% UCL	5.6	3.5	3.7	4.8	2.6	2.8	10.6	7.1	7.9

Concentrations in mg/kg

Outliers removed for data analysis

* Weighted Concentration

**Table 3: MIAMI-DADE COUNTY ANTHROPOGENIC BACKGROUND
BaPTE SUMMARY STATISTICS**

	BaPTE		
	0 - 6"	6 - 24"	0-2 ft*
Number of Samples	146	143	140
Minimum	0.01	0.01	0.01
Maximum	1.38	1.79	1.5
Mean	0.13	0.09	0.1
MVUE	0.14	0.07	0.11
95% UCL	0.2	0.13	0.13

Concentrations in mg/kg

Outliers removed for data analysis

* Weighted Concentration

Table 4: Anthropogenic Background Study Data

Soil Concentrations mg/kg (0 to 6 inches and 6 to 24 inches)

Site Number	Silver (Ag)		Aluminum (Al)		Arsenic		Barium		Cadmium (Cd)		Chromium (Cr)		Copper (Cu)		Iron (Fe)		Mercury (Hg)		Manganese (Mn)		Nickel (Ni)		Lead (Pb)		Selenium (Se)		Zinc		BaPTE	
	0to6	6to24	0to6	6to24	0to6	6to24	0to6	6to24	0to6	6to24	0to6	6to24	0to6	6to24	0to6	6to24	0to6	6to24	0to6	6to24	0to6	6to24	0to6	6to24	0to6	6to24	0to6	6to24		
1	0.4	0.8	1280	1780	0.8	1.0	8.3	14.9	0.1	0.1	5.7	7.5	4.0	3.3	1050	1440	0.3	0.4	25.0	22.0	1.3	1.7	5.4	3.3	0.5	0.5	44.0	28.0	0.02	0.01
2	0.4	0.6	839	1080	0.9	0.8	7.7	5.1	0.2	0.1	4.4	4.8	3.0	0.3	1230	772	0.3	0.4	14.0	6.0	1.1	1.4	25.9	9.6	0.5	0.5	37.0	15.0	0.25	0.17
3	0.5	0.4	733	844	3.4	1.7	14.3	5.7	0.3	0.2	10.1	5.1	7.5	0.6	3330	674	0.3	0.3	56.0	12.0	2.0	1.1	61.8	15.1	0.5	0.5	47.0	15.0	1.38	0.23
4	0.7	0.4	911	571	2.6	1.0	12.8	22.3	0.6	0.4	11.0	5.2	11.7	23.5	2730	2460	0.3	0.3	42.0	24.0	2.6	1.2	154.0	126.0	0.5	0.5	88.0	103.0	0.16	0.06
5	0.4	0.8	1370	2030	3.1	2.6	11.0	17.9	0.2	0.3	5.7	8.6	10.2	8.8	2470	2120	0.3	0.3	65.0	53.0	2.0	4.4	58.5	86.3	0.5	0.5	42.0	53.0	0.22	0.09
6	0.8	0.6	1030	998	1.4	1.8	10.1	10.6	0.3	0.2	6.4	6.0	10.8	12.2	1880	3290	0.3	0.3	33.0	35.0	1.7	1.7	90.1	141.4	0.5	0.5	64.0	62.0	0.07	0.05
7	0.4	0.5	3210	2980	1.3	1.2	5.8	3.6	0.1	0.1	9.6	9.0	3.3	0.7	2540	2170	0.3	0.3	45.0	43.0	2.2	2.0	6.3	2.9	0.5	0.5	19.0	6.0	0.70	0.03
8	0.2	0.2	1230	1430	1.8	2.2	12.9	6.9	0.1	0.1	8.0	7.9	16.6	8.2	2050	1520	0.0	0.3	55.0	36.3	1.5	1.4	14.4	6.9	0.5	0.5	42.4	22.5	0.17	0.16
9	0.2	0.2	1280	1320	2.2	2.7	8.3	8.4	0.1	0.2	7.7	8.1	10.5	10.0	1490	2550	0.0	0.3	34.6	33.2	1.4	1.8	22.4	26.8	0.5	0.5	48.7	136.0	0.06	0.01
10	0.1	0.2	2440	3050	2.4	2.6	18.1	18.2	0.1	0.1	9.8	11.7	7.1	8.2	2940	3490	0.0	0.3	106.0	96.9	1.9	2.3	10.5	11.2	0.5	0.5	20.0	21.1	0.50	1.20
11	0.1	0.2	1050	1010	1.9	1.4	11.4	11.3	0.2	0.2	8.9	8.0	7.9	5.9	1430	1260	0.3	0.3	19.3	21.5	1.4	1.5	22.5	34.1	0.6	0.5	36.3	48.8	0.71	0.38
12	0.1	0.2	528	361	2.2	0.4	11.8	2.1	0.3	0.0	3.5	1.9	9.2	2.1	3050	518	0.1	0.3	47.1	6.8	1.2	0.4	67.0	7.3	0.5	0.5	68.1	8.0	0.41	0.03
13	0.2	0.2	746	322	0.4	0.3	6.5	3.3	0.1	0.0	5.3	2.4	5.1	2.2	830	404	0.0	0.3	17.4	11.2	1.2	0.7	8.7	4.2	0.5	0.5	20.9	7.9	0.09	0.01
14	0.2	0.2	1610	1030	2.7	1.6	13.4	7.0	0.2	0.1	13.5	9.2	13.0	5.1	1670	967	0.3	0.3	41.6	18.4	1.5	0.9	30.5	17.6	0.5	0.5	53.4	24.9	0.80	0.25
15	0.2	0.2	431	240	1.0	0.4	5.4	2.3	0.5	0.1	16.0	3.3	7.3	1.5	1090	443	0.2	0.3	24.7	6.3	1.8	0.8	42.1	9.1	0.6	0.5	78.1	16.1	0.02	0.11
16	0.7	1.3	1920	2200	2.2	2.7	12.3	7.4	0.1	0.1	7.5	8.5	11.3	4.8	2350	1830	0.4	0.7	33.0	18.0	1.6	1.7	4.9	2.8	0.5	0.5	12.0	6.0	0.02	0.01
17	5.0	4.0	6180	5280	3.5	2.5	17.7	14.3	0.1	0.1	15.9	13.6	4.2	1.8	2160	1260	0.4	0.4	16.0	7.4	3.4	3.4	5.4	2.8	0.5	0.5	9.7	5.2	0.08	0.01
18	0.6	0.7	2300	2590	2.6	2.9	8.0	7.1	0.2	0.2	8.0	9.9	6.0	5.1	2080	2370	0.4	0.5	29.0	24.5	1.4	2.0	31.0	35.4	0.5	0.5	61.1	42.8	0.04	0.02
19	0.3	0.2	1830	844	1.6	0.6	11.4	4.3	0.3	0.1	8.6	3.4	7.9	1.9	2230	797	0.4	0.3	20.0	6.0	1.8	0.8	24.0	8.7	0.5	0.5	40.0	18.0	0.02	0.01
20	0.8	1.0	1690	1710	5.2	6.1	25.6	42.0	0.8	0.7	13.3	17.4	19.8	18.4	5580	4500	0.6	0.6	41.6	42.1	3.1	4.5	96.2	67.3	0.5	0.5	154.0	126.0	0.77	1.79
21	2.3	1.8	2300	3150	5.7	4.1	11.0	8.4	0.5	0.2	20.2	12.9	6.9	2.9	4080	3240	0.8	0.6	55.0	31.0	1.7	1.8	13.8	4.5	0.5	0.5	20.0	10.0	0.04	7.27
22	0.4	0.4	1270	1980	3.0	2.2	15.0	11.1	0.4	0.1	7.0	9.2	7.1	3.9	4480	4310	0.6	0.5	36.5	20.3	1.2	1.3	61.0	23.3	0.5	0.5	113.0	35.8	0.10	0.06
23	0.1	0.2	1040	759	1.0	0.6	8.4	5.3	0.1	0.1	5.6	4.0	5.8	3.1	861	421	0.0	0.0	21.6	7.8	1.4	1.1	5.5	7.7	0.5	0.5	25.1	20.1	0.03	0.03
24	0.2	0.2	666	608	0.3	0.3	5.1	2.8	0.2	0.1	3.9	2.8	2.9	0.8	751	252	0.6	0.3	6.6	1.1	0.9	0.6	15.3	2.0	0.5	0.5	40.2	5.7	0.02	0.01
25	0.9	0.6	1260	8																										

Table 4: Anthropogenic Background Study Data

Soil Concentrations mg/kg (0 to 6 inches and 6 to 24 inches)

Site Number	Silver (Ag)		Aluminum (Al)		Arsenic		Barium		Cadmium (Cd)		Chromium (Cr)		Copper (Cu)		Iron (Fe)		Mercury (Hg)		Manganese (Mn)		Nickel (Ni)		Lead (Pb)		Selenium (Se)		Zinc		BaPTE	
	0to6	6to24	0to6	6to24	0to6	6to24	0to6	6to24	0to6	6to24	0to6	6to24	0to6	6to24	0to6	6to24	0to6	6to24	0to6	6to24	0to6	6to24	0to6	6to24	0to6	6to24	0to6	6to24		
63	1.9	1.8	3100	2990	5.6	4.5	7.0	5.2	0.2	0.1	13.0	10.8	4.4	2.9	1630	1670	0.7	0.6	54.0	45.0	2.6	2.1	14.6	7.0	0.5	0.5	28.0	14.0	0.02	0.01
64	0.2	0.2	1290	1630	1.2	1.5	12.6	10.1	0.2	0.1	9.0	8.3	8.4	5.9	1250	1500	0.1	0.6	29.6	27.9	1.6	2.2	87.0	22.9	0.5	0.5	45.0	28.0	0.15	0.31
65	0.8	1.1	3060	4950	3.0	3.3	8.0	5.3	0.2	0.1	10.6	16.8	5.7	2.7	2390	3530	0.4	0.6	25.0	23.0	5.6	4.4	25.9	13.4	0.5	0.5	20.0	9.0	0.04	0.01
66	0.1	0.2	1650	1370	2.3	1.1	7.6	4.6	0.3	0.2	15.4	11.8	8.3	4.5	2560	1380	0.1	0.3	22.7	11.4	1.1	1.1	25.2	17.2	0.5	0.5	65.6	99.2	0.27	0.14
67	0.6	1.0	7150	6200	4.2	4.4	5.6	5.1	0.4	0.3	25.3	24.2	10.4	9.4	4740	4000	0.4	0.5	161.0	137.0	4.6	4.1	10.9	8.5	0.5	0.5	16.0	15.0	0.02	0.02
68	0.6	1.1	3200	3320	2.5	2.2	6.0	3.6	0.3	0.1	19.6	12.3	4.1	0.4	3610	1900	0.4	0.4	35.0	9.0	2.1	1.6	10.0	2.3	0.5	0.5	16.0	3.0	0.55	0.10
69	0.3	0.2	862	377	1.0	0.3	37.1	12.3	0.8	0.2	6.4	2.6	31.0	11.3	1440	511	0.3	0.3	25.0	6.0	1.9	0.6	68.4	21.5	0.5	0.5	168.0	54.0	0.05	0.09
70	1.5	0.9	1370	1690	2.6	1.8	14.7	8.3	0.1	0.1	4.9	5.3	1.6	1.1	1340	719	0.5	0.4	28.0	12.0	1.1	1.1	2.5	2.2	0.5	0.5	9.0	5.0	0.02	0.02
71	1.6	1.1	8530	10050	5.4	3.9	8.6	8.1	0.4	0.2	35.4	33.7	8.2	4.4	4920	4840	0.5	0.4	89.0	50.0	4.7	5.4	3.9	2.8	0.5	0.5	15.0	7.0	0.02	0.01
72	1.5	1.4	24700	27600	6.0	5.7	25.2	29.1	0.2	0.1	55.5	62.9	10.3	2.4	13100	16100	0.5	0.5	258.0	273.0	11.5	12.7	23.6	11.2	0.5	0.5	45.0	9.0	0.14	0.03
73	0.1	0.2	3850	3120	9.2	5.7	11.4	9.1	0.2	0.1	19.2	16.1	11.6	7.8	3970	3320	0.0	0.3	43.5	32.1	3.7	3.1	22.6	14.3	0.5	0.5	30.8	19.2	0.01	0.02
74	0.2	0.3	4680	1780	1.8	2.8	10.9	5.9	0.2	0.1	13.6	10.4	6.6	4.6	4690	2040	0.3	0.3	25.2	14.9	1.6	2.6	17.7	14.6	0.5	0.5	32.4	25.0	0.09	0.05
75	0.7	0.3	5360	5520	2.4	1.9	10.8	11.2	0.1	0.1	22.4	22.8	3.3	1.5	1990	2210	0.5	0.4	18.0	19.0	3.7	3.5	9.9	4.2	0.5	0.5	12.0	3.0	0.08	0.01
76	0.5	0.4	3570	4640	2.5	2.1	4.4	3.3	0.1	0.1	12.6	15.7	3.5	1.2	3080	3440	0.4	0.3	25.0	16.0	2.2	2.8	14.4	6.2	0.5	0.5	14.0	5.0	0.06	0.03
77	2.5	2.9	2160	2170	6.1	5.2	16.1	14.0	0.2	0.1	8.7	8.7	2.4	1.4	3010	2290	0.8	0.8	45.0	39.0	1.6	1.7	3.0	1.7	0.5	0.5	10.0	7.0	0.02	0.01
78	1.2	0.7	6670	4090	3.3	1.2	16.0	6.6	0.2	0.1	19.2	14.3	4.1	0.5	5400	2580	0.3	0.4	19.0	8.0	3.5	2.1	12.6	3.1	0.5	0.5	15.0	3.0	0.02	0.01
79	1.8	na	1830	na	3.3	na	10.2	na	0.1	na	8.3	na	3.4	na	1250	na	0.5	na	26.0	na	2.1	na	9.0	na	0.5	na	18.0	na	0.03	na
80	2.8	1.8	4570	7140	16.2	5.8	17.5	17.8	0.6	0.2	14.9	21.0	7.4	3.2	10900	6810	0.6	0.5	68.0	34.0	2.6	2.8	79.4	53.9	0.5	0.5	40.0	17.0	0.00	0.01
81	0.1	0.2	774	1130	1.1	1.4	10.8	16.0	0.2	0.3	5.6	7.5	24.7	29.6	1400	2000	0.1	0.3	17.4	23.2	2.4	2.4	44.2	72.2	0.5	0.5	47.6	68.0	0.02	0.02
82	0.7	0.6	3020	3060	2.8	2.6	4.4	3.4	0.1	0.1	10.3	10.9	2.9	1.5	2240	2170	0.5	0.4	30.0	24.0	2.2	2.2	30.8	20.2	0.5	0.5	17.0	11.0	0.01	0.01
83	0.7	1.2	3820	4340	2.8	3.1	9.2	6.9	0.2	0.1	14.3	16.5	9.8	6.0	3010	2790	0.4	0.5	34.0	27.0	2.3	2.2	8.4	4.1	0.5	0.5	23.0	11.0	0.05	0.02
84	0.2	na	2660	2610	20.1	5.7	19.5	13.3	1.0	0.4	25.5	13.9	32.5	10.8	14600	3720	0.3	0.3	146.0	105.0	8.9	2.6	106.0	48.0	1.0	0.5	144.0	77.0	0.01	0.01
85	1.4	1.4	1460	2070	8.6	5.7	12.4	10.4	0.5	0.2	13.1	9.4	6.4	2.0	1830	1890	0.8	0.6	38.0	25.0	1.5	1.5	11.4	4.2	0.5	0.5	34.0	9.0	0.02	0.02
86	0.1	0.2	328	964	0.9	1.0	13.2	6.7	0.2	0.2	5.6	3.3	9.0	3.6	827	772	0.1	0.3	58.7	21.0	1.1	0.7	54.8	37.5	0.5	0.5	61.7	72.2	0.01	0.05
87	0.7																													

Table 4: Anthropogenic Background Study Data
Soil Concentrations mg/kg (0 to 6 inches and 6 to 24 inches)

Site Number	Silver (Ag)		Aluminum (Al)		Arsenic		Barium		Cadmium (Cd)		Chromium (Cr)		Copper (Cu)		Iron (Fe)		Mercury (Hg)		Manganese (Mn)		Nickel (Ni)		Lead (Pb)		Selenium (Se)		Zinc		BaPTE	
	0to6	6to24	0to6	6to24	0to6	6to24	0to6	6to24	0to6	6to24	0to6	6to24	0to6	6to24	0to6	6to24	0to6	6to24	0to6	6to24	0to6	6to24	0to6	6to24	0to6	6to24	0to6	6to24		
126	1.4	1.0	3280	4280	31.9	9.4	11.6	7.3	1.4	0.4	23.2	19.9	31.6	15.6	1920	2870	0.3	0.3	182.0	103.0	2.5	2.7	40.5	18.5	0.5	0.5	35.0	15.0	0.08	0.01
128	1.4	1.5	1870	2070	0.3	0.7	6.4	6.9	0.1	0.1	6.4	7.9	4.8	5.5	1380	1650	0.3	0.3	19.0	37.0	1.4	1.4	6.8	6.3	0.5	0.5	14.0	6.0	0.01	0.01
129	1.1	0.8	3300	4550	1.8	0.3	7.7	4.7	0.2	0.1	17.5	15.4	9.7	2.7	2500	3180	1.2	0.3	49.0	25.0	2.8	3.4	18.4	5.7	0.5	0.5	44.0	5.0	0.02	0.02
130	1.0	1.1	5480	4970	1.8	1.2	8.8	7.0	0.2	0.2	22.7	20.0	13.5	12.4	3610	3170	0.3	0.3	190.0	65.0	4.0	3.7	6.0	4.6	0.5	0.5	19.0	12.0	0.02	0.02
132	0.4	0.4	882	832	24.8	10.0	4.4	3.4	0.5	0.2	2.9	2.7	3.4	1.7	1190	974	0.3	0.3	47.0	9.0	0.9	0.8	16.6	2.5	0.5	0.5	10.0	3.0	0.01	0.01
133	0.6	0.4	3990	3080	2.2	1.7	17.8	28.0	0.2	0.4	12.2	12.9	13.7	28.6	4330	3720	0.3	0.3	33.0	44.0	2.7	3.4	40.9	73.4	0.5	0.5	111.0	154.0	0.55	0.38
134	0.7	0.9	2480	2290	0.3	0.3	4.7	2.9	0.1	0.1	12.4	9.7	12.0	5.3	2080	2070	0.3	0.3	52.0	22.0	1.3	1.6	3.6	1.4	0.5	0.5	6.0	2.0	0.01	0.01
135	0.2	0.2	1350	1500	0.9	0.7	9.6	2.8	0.3	0.1	9.7	6.0	9.4	0.8	1320	586	0.4	0.3	23.4	2.6	1.8	1.5	34.5	3.1	0.5	0.5	34.1	3.3	0.03	NA
136	0.2	0.2	1680	201	1.6	0.3	15.3	2.0	0.3	0.1	16.9	2.6	21.4	2.7	2810	411	0.3	0.3	71.0	8.7	1.8	0.5	34.3	4.5	0.5	0.5	44.0	5.9	0.17	0.03
137	4.5	4.3	915	537	1.2	0.6	5.0	2.7	0.1	0.1	5.4	2.7	8.4	5.9	673	472	0.3	0.3	207.0	19.4	1.7	0.7	10.6	4.6	0.5	0.5	44.0	13.0	na	na
138	5.9	5.6	1100	1200	3.3	3.0	15.6	8.3	0.2	0.2	7.0	6.8	4.8	4.5	983	1250	0.5	0.6	25.2	27.2	1.6	1.3	18.0	18.8	0.5	0.5	23.4	31.4	na	0.01
139	0.4	0.2	2000	546	1.7	0.4	17.9	5.6	0.1	0.1	9.2	3.2	18.8	4.2	1920	562	0.4	0.3	49.1	13.7	5.5	1.1	15.4	6.4	0.5	0.5	29.8	8.0	0.05	na
140	2.9	2.7	801	506	0.3	0.3	7.4	2.2	0.2	0.1	5.9	2.8	3.9	0.9	695	240	0.3	0.3	21.4	4.4	0.9	0.5	11.2	2.1	0.5	0.5	19.6	4.3	0.01	0.01
141	0.2	0.2	1970	1620	2.1	1.2	13.8	10.8	0.2	0.2	14.1	11.9	14.6	9.3	1630	947	0.0	0.3	89.6	59.7	1.9	1.7	7.7	4.3	0.5	0.5	31.9	18.8	0.04	0.02
142	1.9	0.2	1140	500	3.7	2.8	15.1	7.6	0.4	0.1	7.5	5.7	7.4	1.4	1680	550	0.0	0.3	62.0	28.4	2.0	1.4	5.7	2.8	5.6	4.2	65.4	6.1	0.39	0.09
143	0.2	0.2	1380	1370	4.1	1.9	15.2	9.0	0.3	0.1	29.1	10.1	16.0	4.5	1370	1040	0.1	0.3	47.8	37.3	2.2	1.9	5.3	1.5	0.5	0.5	47.7	7.3	0.05	0.02
144	0.2	0.2	1350	685	1.9	2.7	15.0	8.1	0.2	0.1	15.9	6.7	8.2	1.6	1510	653	0.1	0.3	39.6	26.8	2.0	1.4	7.9	3.1	0.5	4.1	23.1	5.5	0.01	0.01
145	1.9	1.7	3070	2300	3.1	2.1	12.9	7.8	0.5	0.1	13.4	9.0	14.7	2.7	1960	1570	0.6	0.6	53.2	25.1	2.3	1.8	17.6	3.8	0.5	0.5	22.7	3.6	0.10	0.03
146	1.3	1.2	1230	2570	3.5	2.4	6.0	2.5	0.3	0.1	11.4	7.9	11.2	2.0	1100	1400	0.6	0.5	70.9	11.0	1.2	1.6	12.5	2.7	0.5	0.5	26.5	6.2	0.01	na
147	2.3	3.2	2840	1630	5.1	2.8	29.0	14.5	0.2	0.1	10.0	7.9	10.2	3.7	3900	1880	0.6	0.6	138.0	62.0	2.8	2.2	4.7	0.4	0.5	0.5	30.0	16.0	0.06	0.02
148	0.4	0.4	2220	2940	1.0	1.1	7.5	6.2	0.2	0.1	9.3	9.9	8.9	7.8	1860	1970	0.3	0.3	57.0	54.0	2.6	2.2	7.0	21.2	0.5	0.5	77.0	49.0	0.06	0.01
149	0.9	1.1	1230	1860	1.4	1.8	6.2	4.8	0.3	0.1	15.1	8.9	4.4	0.3	1140	1520	0.4	0.4	38.0	22.0	1.8	2.2	11.6	0.7	0.5	0.5	29.0	5.0	0.01	0.04
150	0.3	0.2	2160	1120	1.3	0.6	15.0	4.7	0.2	0.1	6.9	4.0	6.6	1.1	2800	1180	0.3	0.3	57.0	21.0	2.2	0.9	46.8	10.9	0.5	0.5	46.0	10.0	0.03	na
151	0.4	0.2	5120	4420	1.1	1.0	8.7	3.8	0.1	0.1	15.9	12.8	4.6	1.8	2940	3320	0.3	0.3	49.0	33.0	3.2	2.8	11.3	7.0	0.5	0.5	22.0	9.0	0.13	0.01
152	1.5	2.1	1570	10																										

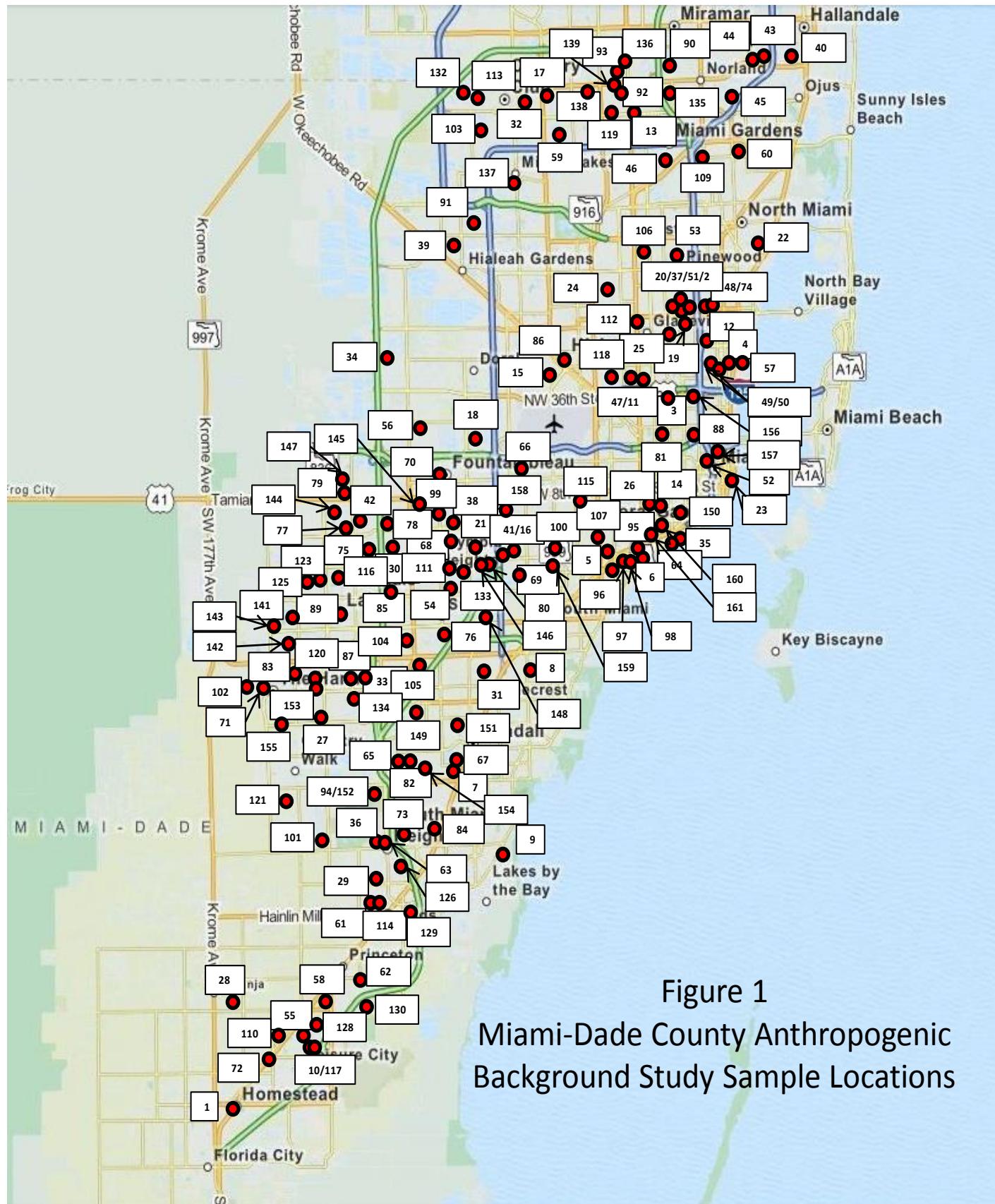
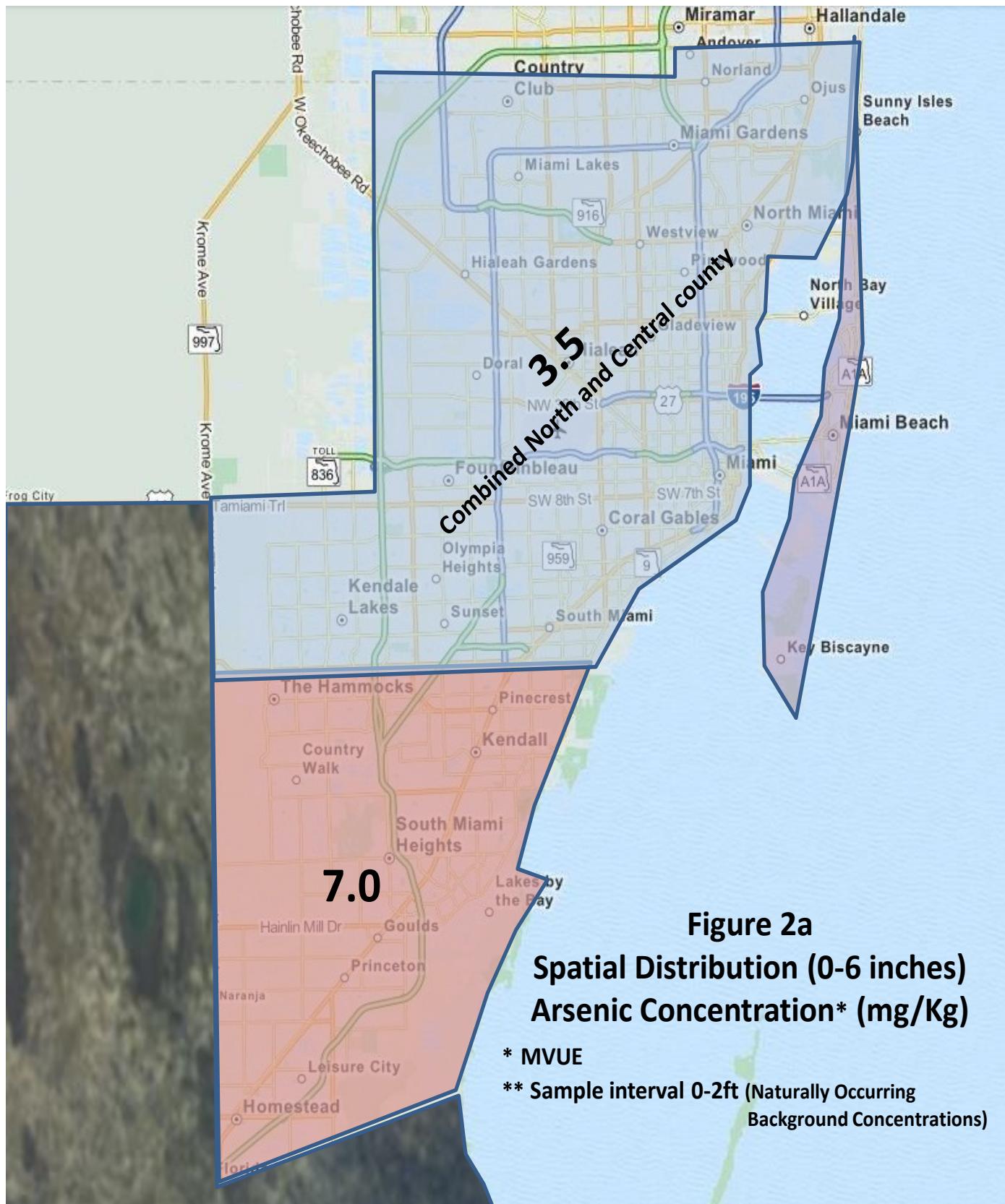
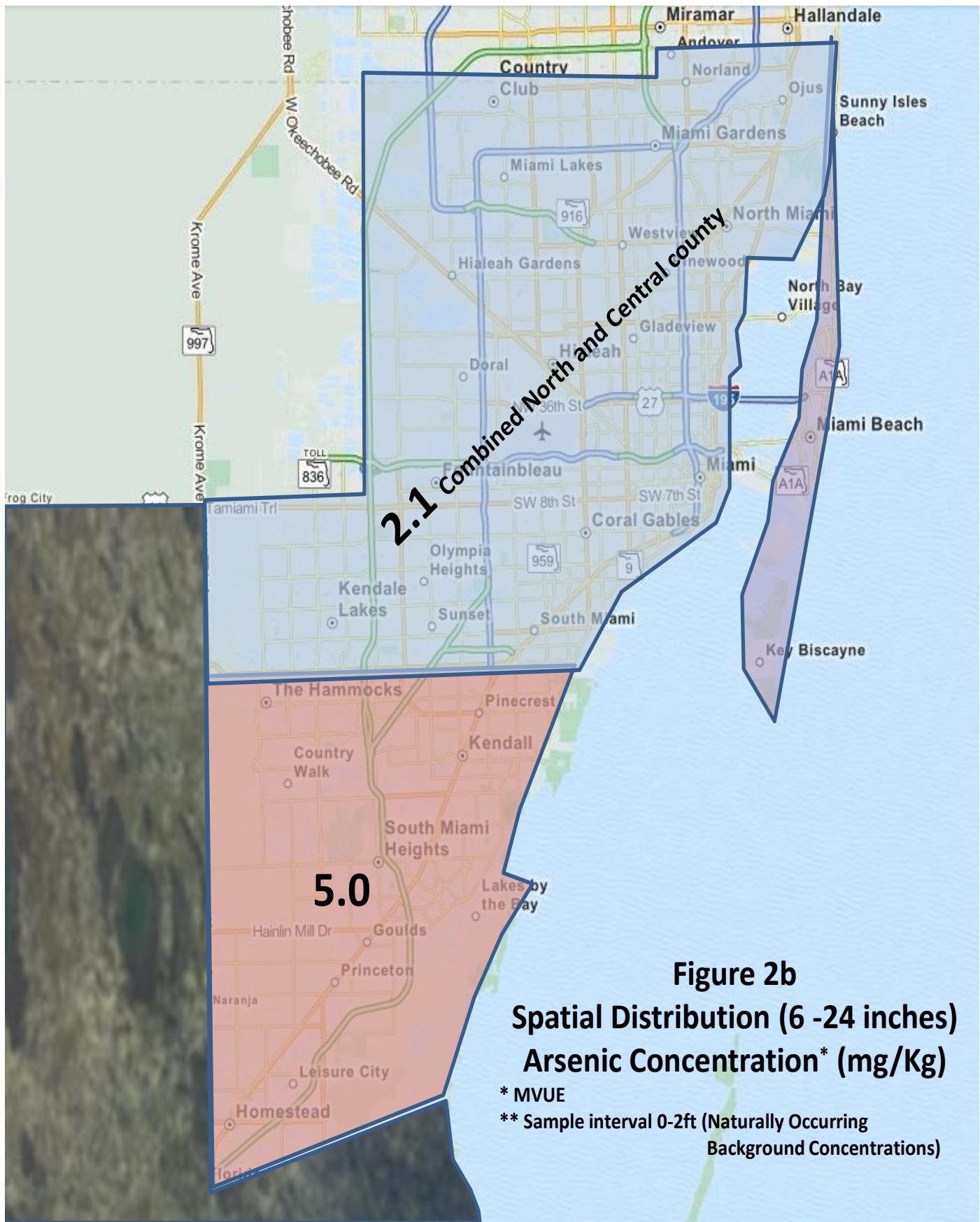


Figure 1
Miami-Dade County Anthropogenic
Background Study Sample Locations





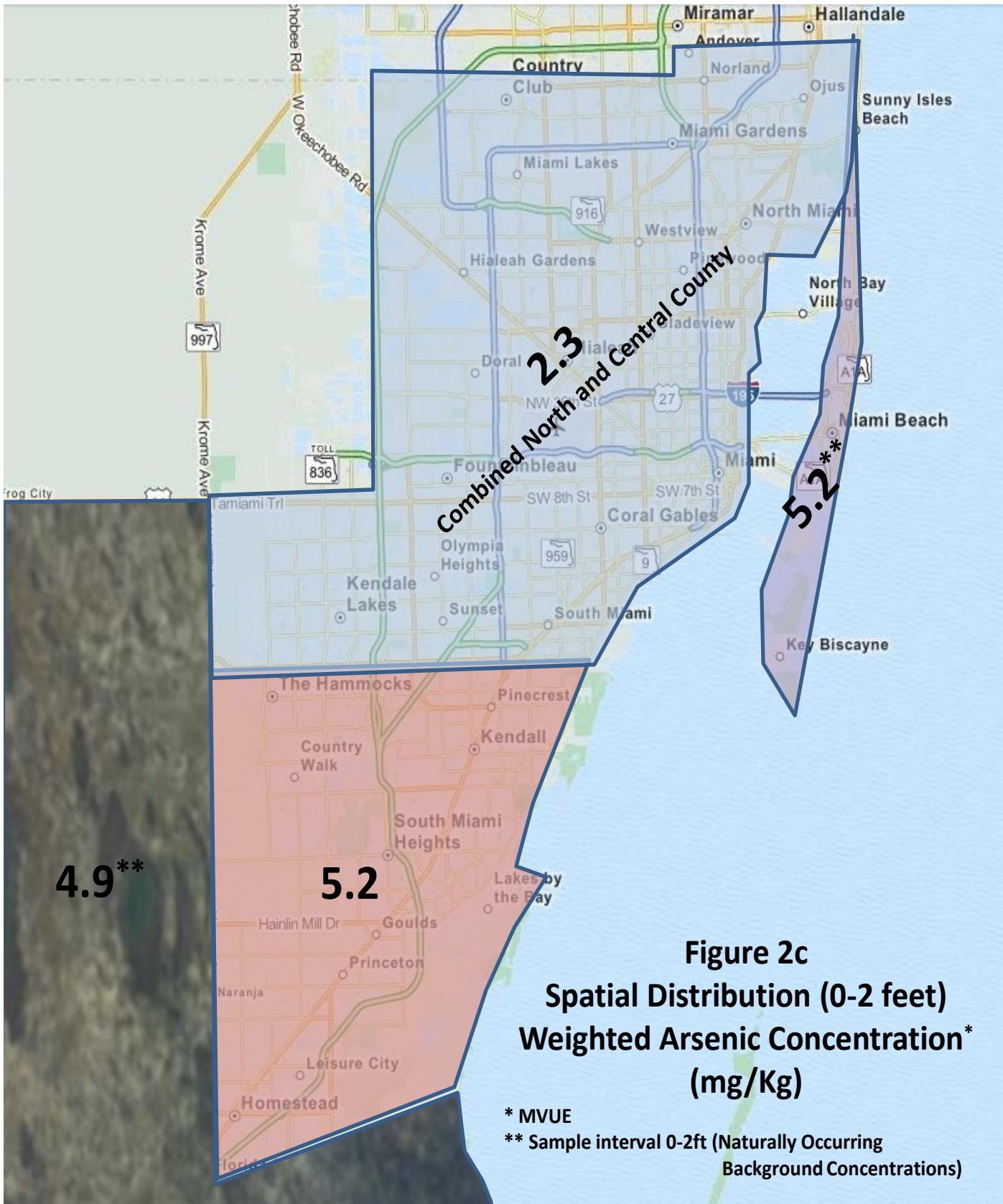


Table 5a: MIAMI-DADE COUNTY MUCK SOILS

	Arsenic (mg/kg)
	0 - 2ft
N	98
Minimum	0.7
Maximum	29
Mean	4.9
MVUE	4.9
95% UCL	5.5

Table 5b: BARRIER ISLANDS NATURALLY OCCURRING BACKGROUND CONCENTRATIONS (mg/kg)

Chemical Name	0-2 ft interval	
	0-1 ft interval	1-2 ft interval
Arsenic	5.2	
Aluminum	798.7	
Cadmium	0.3	
Iron	2050.7	
Selenium**	<0.5	
Zinc	13.1	
Silver*	0.4	
<hr/>		
Barium	8.1	5.9
Chromium	7.9	5.7
Copper	5.4*	2.3*
Lead	15	5.2*
Mercury	0.054	0.026*
Nickel	1.08*	0.66*

* Represents censored data sets. The data from these populations were censored to fit a lognormal distribution

** The data for selenium were not analyzed statistically because all results were below the detection limit