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CNC CHARLESTON
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ZONE D REFERENCE INFORMATION 1997 CNC CHARLESTON SC
12/1/1997
NAVFAC SOUTHERN

ZONE D BACKGROUND

MEMO

5-12-97

TO: Project Team members
FROM: EnSafe
RE: Zone D: Critical background reference values

Background reference values for Zone D are based on the following samples collected at grid locations in the zone: six upper interval soil, six lower interval soil, one shallow groundwater, and one deep groundwater. Reference values are among the lowest seen for any zone, for two primary reasons: (1) With the exception of one lower interval sample, aluminum and iron content of the soil samples are low, indicating sandy soil with fewer clay particles to which naturally occurring trace metal ions can sorb; (2) The small number of samples makes it less likely that concentrations near the top end of the background range were encountered in the samples. Background reference values for groundwater will be reviewed after results from four quarterly sampling events have been received.

Upper interval soil

Aluminum was detected in all six upper interval samples, with a maximum value of 6510 mg/kg in sample GDDSB00501. Twice the mean equals **8700 mg/kg**. Aluminum's residential RBC is 7800 mg/kg (noncarcinogenic; THQ = 0.1).

Arsenic was found in all six samples; the maximum value was 7.0 mg/kg in sample GDDSB00601 (mean of 7.4 mg/kg in the primary sample and 6.6 mg/kg in the field duplicate). Twice the mean for all samples is **5.55 mg/kg**. The residential RBC for arsenic is 0.43 mg/kg (carcinogenic). Although more than an order of magnitude higher than the residential RBC, the background reference value for arsenic is by far the lowest of any zone.

Beryllium was detected in a single sample, GDDSB00101 (0.13 mg/kg). The reported PQL value for sample GDDSB00601 (0.31U mg/kg) was removed from the dataset because one-half the nondetect value was higher than the single detected value. Twice the mean of the five remaining samples (using one-half the PQL for nondetects) is **0.19 mg/kg**. Beryllium's residential RBC is 0.15 mg/kg (carcinogenic).

Lower interval soil

Chromium was detected in all six lower interval samples. The maximum value was 40.7 mg/kg in GDDSB00502, which is the sample with the highest concentrations of aluminum and iron. Twice the mean equals **22.3 mg/kg**. The generic SSL (assuming DAF = 20) for hexachrome is

38 mg/kg; trivalent chromium is not of concern at any concentration. The only hexachrome analysis in Zone D was for sample GDDCB00601, in which it was not detected.

Thallium was detected only in sample GDDSB00602, at 0.68 mg/kg. Reported PQLs for the five nondetects ranged from 0.36U to 0.45U mg/kg. Twice the mean, using "½U" values for nondetects, is **0.57 mg/kg**. Thallium's generic SSL (assuming DAF = 20) is 0.7 mg/kg.

Shallow groundwater

The arsenic concentration of the sample from shallow monitoring well GDDGW001 was 2.7 µg/L. Twice this value, or 5.4 µg/L, serves as the background reference value. The tap water RBC for arsenic is 0.045 µg/L, while the MCL is 50 µg/L. As with most other chemicals in both media at both depths, the background value for arsenic in groundwater is the lowest of any of the zones.

The beryllium detection reported from the shallow well was 0.4 µg/L, resulting in a background reference value of **0.8 µg/L**. Beryllium's tap water RBC is 0.016 µg/L; its MCL is 4 µg/L.

Deep groundwater

An arsenic detection of 4.2 µg/L in deep grid well GDDGW01D produces a background reference value of **8.4 µg/L**. The tap water RBC for arsenic is 0.045 µg/L; its MCL is 50 µg/L.

Manganese was detected at 160 µg/L in the deep well sample, resulting in a background reference value of **320 µg/L**. The tap water RBC for manganese is 84 µg/L; it has no listed MCL.

Zone D: Background reference values for soil and groundwater

5-12-97

All background reference values for Zone D are based on twice the means of the grid sample concentrations. Since there are only one shallow and one deep background well, the background reference values for groundwater at each depth are simply twice the reported concentrations of inorganic chemicals in each well.

Inorganic chemical	Surface soil [mg/kg] (n = 6)	Subsurface soil [mg/kg] (n = 6)	Shallow GW [μ g/L] (n = 1)	Deep GW [μ g/L] (n = 1)
Aluminum	8700	10300	1410	ND
Antimony	0.92	ND	ND	ND
Arsenic	5.55	4.08	5.4	8.4
Barium	30.1	29.7	17.6	31.8
Beryllium	0.19	0.75	0.8	ND
Cadmium	0.07	0.38	ND	ND
Chromium	12.4	22.3	3.8	ND
Cobalt	9.46	2.89	ND	ND
Copper	40.6	ND	ND	ND
Lead	18.8	7.87	3.8	ND
Manganese	28.6	29.9	30.6	320
Mercury	0.05	0.05	ND	ND
Nickel	4.68	6.76	3.4	ND
Selenium	0.91	1.46	ND	ND
Silver	0.43	0.36	ND	ND
Thallium	ND	0.57	ND	ND
Tin	ND	ND	ND	ND
Vanadium	9.73	15.1	7.2	ND
Zinc	25.1	30.1	ND	ND
Cyanide	0.18	0.16	ND	ND

CHARLESTON - ZONE D
Background Sample Results
Surface Soil: Samples 1-6

SW846-META		SAMPLE ID ----->	GDD-S-B001-01	GDD-S-B002-01	GDD-S-B003-01	GDD-S-B004-01	GDD-S-B005-01	GDD-S-B006-01			
		ORIGINAL ID ----->	GDDS800101	GDDS800201	GDDS800301	GDDS800401	GDDS800501	GDDS800601			
		LAB SAMPLE ID ---->	26738.01	27259.01	27279.01	27228.03	27228.08	27228.01			
		ID FROM REPORT -->	GDDS800101	GDDS800201	GDDS800301	GDDS800401	GDDS800501	GDDS800601			
		SAMPLE DATE ----->	08/26/96	10/09/96	10/10/96	10/07/96	10/07/96	10/07/96			
		DATE EXTRACTED -->	09/06/96	10/14/96	10/14/96	10/14/96	10/14/96	10/14/96			
		DATE ANALYZED ---->	09/12/96	10/23/96	10/16/96	10/23/96	10/23/96	10/23/96			
		MATRIX ----->	Soil	Soil	Soil	Soil	Soil	Soil			
		UNITS ----->	MG/KG	MG/KG	MG/KG	MG/KG	MG/KG	MG/KG			
CAS #	Parameter	26738	VAL	27228	VAL	27228	VAL	27228	VAL	27228	VAL
7429-90-5	Aluminum (Al)	3560.		3690.		4020.		4530.		6510.	
7440-36-0	Antimony (Sb)	0.33	U	1.7	J	0.37	UJ	0.7	UJ	0.36	UJ
7440-38-2	Arsenic (As)	4.5		1.2		0.84	J	0.9	J	2.2	
7440-39-3	Barium (Ba)	12.1		19.6	J	11.1	J	9.7	J	18.2	J
7440-41-7	Beryllium (Be)	0.13	J	0.18	U	0.18	U	0.12	U	0.21	U
7440-43-9	Cadmium (Cd)	0.04	U	0.04	U	0.05	U	0.04	U	0.05	U
7440-70-2	Calcium (Ca)	2810.		1770.		344.		2570.		1380.	
7440-47-3	Chromium (Cr)	5.9		5.5	J	4.9	J	4.5	J	6.3	J
7440-48-4	Cobalt (Co)	0.34	J	1.6	J	8.1		0.42	J	17.1	
7440-50-8	Copper (Cu)	1.3	U	116.		0.98	U	0.97	U	1.5	U
7439-89-6	Iron (Fe)	2180.		2060.		966.		2230.		2400.	
7439-92-1	Lead (Pb)	3.1		18.7		2.2		6.3		5.1	
7439-95-4	Magnesium (Mg)	350.		203.		179.		157.		330.	
7439-96-5	Manganese (Mn)	10.7		17.2	J	5.	J	13.6	J	11.9	J
7439-97-6	Mercury (Hg)	0.04	U	0.04	U	0.04	U	0.03	U	0.04	U
7440-02-0	Nickel (Ni)	1.2	J	1.4	J	2.	J	1.4	J	3.6	J
7440-09-7	Potassium (K)	218.	U	215.	U	250.	U	205.	U	242.	U
7782-49-2	Selenium (Se)	0.33	U	0.32	U	0.4	J	0.49	J	0.4	J
7440-22-4	Silver (Ag)	0.21	U	0.42	J	0.27	J	0.26	J	0.23	U
7440-23-5	Sodium (Na)	170.	J	127.	U	131.	U	113.	U	258.	U
7440-28-0	Thallium (Tl)	0.37	U	0.37	U	0.42	U	0.35	U	0.41	U
7440-31-5	Tin (Sn)	0.69	U	6.6	U	1.1	U	0.69	U	1.2	U
7440-62-2	Vanadium (V)	6.3		2.5		2.2		5.3		3.8	
7440-66-6	Zinc (Zn)	6.8		13.6		3.8	U	9.1		6.8	U

CHARLESTON - ZONE D
Background Sample Results
Surface Soil: Samples 1-6

SW846-META		SAMPLE ID ----->	GDD-C-8006-01				
		ORIGINAL ID ----->	GDDC800601				
		LAB SAMPLE ID ---->	27229.01				
		ID FROM REPORT -->	GDDC800601				
		SAMPLE DATE ----->	10/07/96				
		DATE EXTRACTED -->	10/14/96				
		DATE ANALYZED ---->	10/23/96				
		MATRIX ----->	Soil				
		UNITS ----->	MG/KG				
CAS #	Parameter	27228	VAL				
7429-90-5	Aluminum (Al)	4040.					
7440-36-0	Antimony (Sb)	0.33	U				
7440-38-2	Arsenic (As)	6.6					
7440-39-3	Barium (Ba)	19.1					
7440-41-7	Beryllium (Be)	0.32	U				
7440-43-9	Cadmium (Cd)	0.08	J				
7440-70-2	Calcium (Ca)	13000.					
7440-47-3	Chromium (Cr)	10.5					
7440-48-4	Cobalt (Co)	0.95	J				
7440-50-8	Copper (Cu)	8.9	U				
7439-89-6	Iron (Fe)	6720.	J				
7439-92-1	Lead (Pb)	20.9					
7439-95-4	Magnesium (Mg)	771.					
7439-96-5	Manganese (Mn)	31.2					
7439-97-6	Mercury (Hg)	0.06					
7440-02-0	Nickel (Ni)	4.2					
7440-09-7	Potassium (K)	217.	U				
7782-49-2	Selenium (Se)	1.2					
7440-22-4	Silver (Ag)	0.21	U				
7440-23-5	Sodium (Na)	192.	U				
7440-28-0	Thallium (Tl)	0.37	U				
7440-31-5	Tin (Sn)	1.6	U				
7440-62-2	Vanadium (V)	9.1					
7440-66-6	Zinc (Zn)	40.1					

CHARLESTON - ZONE D
Background Sample Results
Subsurface Soil: Samples 1-6

SW846-META		SAMPLE ID ----->	GDD-S-B001-02	GDD-S-B002-02	GDD-S-B003-02	GDD-S-B004-02	GDD-S-B005-02	GDD-S-B006-02			
		ORIGINAL ID ----->	GDDSB00102	GDDSB00202	GDDSB00302	GDDSB00402	GDDSB00502	GDDSB00602			
		LAB SAMPLE ID -->	26738.02	27259.02	27279.02	27228.06	27228.09	27228.02			
		ID FROM REPORT -->	GDDSB00102	GDDSB00202	GDDSB00302	GDDSB00402	GDDSB00502	GDDSB00602			
		SAMPLE DATE ----->	08/26/96	10/09/96	10/10/96	10/07/96	10/07/96	10/07/96			
		DATE EXTRACTED -->	09/06/96	10/14/96	10/14/96	10/14/96	10/14/96	10/14/96			
		DATE ANALYZED -->	09/12/96	10/23/96	10/16/96	10/23/96	10/23/96	10/23/96			
		MATRIX ----->	Soil	Soil	Soil	Soil	Soil	Soil			
		UNITS ----->	MG/KG	MG/KG	MG/KG	MG/KG	MG/KG	MG/KG			
CAS #	Parameter	26738	VAL	27228	VAL	27228	VAL	27228	VAL	27228	VAL
7429-90-5	Aluminum (Al)	2850.		3160.		4450.		2920.		12800.	4600.
7440-36-0	Antimony (Sb)	0.46	U	0.51	UJ	0.32	UJ	0.32	UJ	0.4	UJ
7440-38-2	Arsenic (As)	1.6		1.2	J	1.	J	0.74	J	5.8	1.9
7440-39-3	Barium (Ba)	10.4		15.2	J	7.7	J	13.1	J	28.9	13.9
7440-41-7	Beryllium (Be)	0.12	J	0.31	U	0.2	U	0.14	U	0.83	0.96
7440-43-9	Cadmium (Cd)	0.05	U	0.05	U	0.04	U	0.04	U	0.3	0.76
7440-70-2	Calcium (Ca)	483.		870.		142.		544.		82400.	2300.
7440-47-3	Chromium (Cr)	5.3		8.1	J	5.4	J	2.5	J	40.7	4.8
7440-48-4	Cobalt (Co)	0.3	J	0.74	J	0.59	J	0.06	U	5.9	1.1
7440-50-8	Copper (Cu)	2.	U	1.4	U	0.94	U	0.6	U	6.2	2.6
7439-89-6	Iron (Fe)	1360.		1620.		916.		1890.		11100.	1920.
7439-92-1	Lead (Pb)	2.2		2.1		1.6		1.4		9.2	7.1
7439-95-4	Magnesium (Mg)	245.		310.		215.		102.		5290.	240.
7439-96-5	Manganese (Mn)	5.2		6.4	J	4.6	J	9.1	J	50.6	13.9
7439-97-6	Mercury (Hg)	0.04	U	0.04	U	0.04	U	0.04	U	0.05	0.04
7440-02-0	Nickel (Ni)	0.95	J	2.3	J	1.	J	0.84	J	11.9	3.3
7440-09-7	Potassium (K)	249.	U	252.	U	215.	U	212.	U	1240.	214.
7782-49-2	Selenium (Se)	0.37	U	0.6	J	0.32	U	0.34	J	1.9	1.2
7440-22-4	Silver (Ag)	0.24	U	0.24	U	0.2	U	0.2	U	0.25	0.5
7440-23-5	Sodium (Na)	179.	J	145.	U	122.	U	146.	U	1740.	180.
7440-28-0	Thallium (Tl)	0.42	U	0.43	U	0.37	U	0.36	U	0.45	0.68
7440-31-5	Tin (Sn)	1.1	U	1.2	U	1.2	U	0.53	U	1.4	1.7
7440-62-2	Vanadium (V)	3.7		4.2		1.9		2.		28.6	5.
7440-66-6	Zinc (Zn)	10.		12.8		3.5	U	11.		40.4	14.4

CHARLESTON - ZONE D
Background Sample Results
Shallow and Deep GW: Round 1 Only

SW846-META		SAMPLE ID -----> GDD-G-W001-01		GDD-G-W01D-01				
	ORIGINAL ID ----->	GDDGW00101		GDDGW01D01				
	LAB SAMPLE ID ---->	27553.01		27553.02				
	ID FROM REPORT -->	GDDGW00101		GDDGW01D01				
	SAMPLE DATE ----->	11/07/96		11/07/96				
	DATE EXTRACTED -->	11/18/96		11/18/96				
	DATE ANALYZED ---->	11/20/96		11/20/96				
	MATRIX ----->	Water		Water				
	UNITS ----->	UG/L		UG/L				
CAS #	Parameter	27553	VAL	27553	VAL			
7429-90-5	Aluminum (Al)	707.		18.	U			
7440-36-0	Antimony (Sb)	2.1	U	2.1	U			
7440-38-2	Arsenic (As)	2.7	J	4.2	J			
7440-39-3	Barium (Ba)	8.8		15.9				
7440-41-7	Beryllium (Be)	0.4	J	0.3	U			
7440-43-9	Cadmium (Cd)	0.5	U	0.5	U			
7440-70-2	Calcium (Ca)	13400.		54900.				
7440-47-3	Chromium (Cr)	1.9	J	0.8	U			
7440-48-4	Cobalt (Co)	0.9	U	0.9	U			
7440-50-8	Copper (Cu)	3.9	U	0.6	U			
7439-89-6	Iron (Fe)	2270.		547.				
7439-92-1	Lead (Pb)	1.9	J	1.7	U			
7439-95-4	Magnesium (Mg)	1680.		3290.				
7439-96-5	Manganese (Mn)	15.3		160.				
7439-97-6	Mercury (Hg)	0.1	U	0.1	U			
7440-02-0	Nickel (Ni)	1.7	J	0.8	U			
7440-09-7	Potassium (K)	2960.	J	1600.	U			
7782-49-2	Selenium (Se)	2.8	U	2.8	U			
7440-22-4	Silver (Ag)	1.2	U	1.2	U			
7440-23-5	Sodium (Na)	3000.		15300.				
7440-28-0	Thallium (Tl)	3.3	U	5.	U			
7440-31-5	Tin (Sn)	15.	U	13.	U			
7440-62-2	Vanadium (V)	3.6	J	0.5	U			
7440-66-6	Zinc (Zn)	12.1	U	5.3	U			