APPENDIX G

BASELINE CHEMICAL CHARACTERISTICS AND SCREENING CRITERIA FOR SOIL, SURFACE WATER, AND GROUND WATER AT KENNEDY SPACE CENTER SAMPLED IN PROXIMITY TO THE INTERNATIONAL SPACE RESEARCH PARK ALTERNATIVE SITES

Table G-1. Human Health Risk Based Soil Screening Criteria for the NASA Kennedy Space Center, Florida

Analyte	CAS #	Units	Human Health Criteria					
			Florida F.A.C. 62-777[1]				KSC Background [2]	
			SCTL Direct Exposure		Leachability based on:		Combined Soil Background	
			Residential	Industrial	GCTL	LY/PQ	Mean x 2	Range of Background
VOLATILE ORGANICS (SW5030/8260)								
1,1,1,2-Tetrachloroethane	630206	mg/kg	4	5.7	0.01	0.1		
1,1,1-Trichloroethane	71556	mg/kg	400	3300	1.9	19		
1,1,2,2-Tetrachloroethane	79345	mg/kg	0.7	1.1	0.002	0.02		
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon 113)	76131	mg/kg	13000	88000	27000	270000		
1,1,2-Trichloroethane	79005	mg/kg	1.3	1.8	0.03	0.3		
1,1-Dichloroethane	75343	mg/kg	290	2000	0.4	4		
1,1-Dichloroethene	75354	mg/kg	0.09	0.1	0.06	0.6		
1,2-Dichlorobenzene	95501	mg/kg	650	4600	17	170		
1,2-Dichloroethane	107062	mg/kg	0.5	0.7	0.01	0.1		
1,2-Dichloroethene (total)	540590	mg/kg						
1,2-Dichloropropane	78875	mg/kg	0.6	0.8	0.03	0.3		
1,3-Dichlorobenzene	541731	mg/kg	27	180	0.3	3		
1,4-Dichlorobenzene	106467	mg/kg	6	9	2.2	22		
2-Hexanone	591786	mg/kg	5.1	34	1.4	14		
Acetone	67641	mg/kg	780	5500	2.8	28		
Benzene	71432	mg/kg	1.1	1.6	0.007	0.07		
Bromodichloromethane	75274	mg/kg	1.4	2	0.004	0.04		
Bromoform	75252	mg/kg	48	84	0.03	0.3		
Bromomethane	74839	mg/kg	2.2	15	0.05	0.5		
Carbon Disulfide	75150	mg/kg	200	1400	5.6	56		
Carbon Tetrachloride	56235	mg/kg	0.4	0.6	0.04	0.4		
Chlorobenzene	108907	mg/kg	30	200	1.3	13		
Chloroethane	75003	mg/kg	2.9	4	0.06	230		
Chloroform	67663	mg/kg	0.4	0.5	0.03	0.3		
Chloromethane	74873	mg/kg	1.7	2.3	0.01	0.1		
cis-1,2-Dichloroethene	156592	mg/kg	19	130	0.4	4		
cis-1,3-Dichloropropene	10061015	mg/kg						
Dibromochloromethane	124481	mg/kg	1.4	2.1	0.003	0.03		

Table G-1 continued. Human Health Risk Based Soil Screening Criteria for the NASA Kennedy Space Center, Florida

			Human Health Criteria					
			Florida				KSC Background [2]	
			F.A.C. 62-777[1]					
Analyte	CAS #	Units	SCTL Direct Exposure		Leachability based on:		Combined Soil Background	
			Residential	Industrial	GCTL	LY/PQ	Mean x 2	Range of Background
Dichlorodifluoromethane	75718	mg/kg	56	370	44	440		
Ethylbenzene	100414	mg/kg	1100	8400	0.6	6		
Methyl ethyl ketone	78933	mg/kg	3100	21000	17	170		
Methyl isobutyl ketone	108101	mg/kg	220	1500	2.6	26		
Methylene chloride	75092	mg/kg	16	23	0.02	0.2		
Styrene	100425	mg/kg	2700	21000	3.6	36		
Tetrachloroethene (PCE)	127184	mg/kg	8.9	17	0.03	0.3		
Toluene	108883	mg/kg	380	2600	0.5	5		
trans-1,2-Dichloroethene	156605	mg/kg	31	210	0.7	7		
trans-1,3-Dichloropropene	10061026	mg/kg						
Trichloroethene	79016	mg/kg	6	8.5	0.03	0.3		
Trichlorofluoromethane	75694	mg/kg	200	1300	33	330		
Vinyl chloride	75014	mg/kg	0.03	0.04	0.007	0.07		
Xylenes, Total	1330207	mg/kg	5900	40000	0.2	2		
2,4-Dimethylphenol	105679	mg/kg	910	9800	1.7	17		
2,4-Dinitrophenol	51285	mg/kg	66	620	0.06	0.6		
2,4-Dinitrotoluene	121142	mg/kg	1.3	3.7	0.0008	0.008		
2,6-Dinitrotoluene	606202	mg/kg	1	2.1	0.0007	0.007		
2-Chloronaphthalene	91587	mg/kg	4000	49000	260	2600		
2-Chlorophenol	95578	mg/kg	82	640	0.7	7		
2-Nitroaniline	88744	mg/kg	5.7	66	0.3	3		
2-Nitrophenol	88755	mg/kg						
3,3'-Dichlorobenzidine	91941	mg/kg	2.1	6.3	0.4	4		
3-Nitroaniline	99092	mg/kg						
4,6-Dinitro-o-cresol	534521	mg/kg						
4-Bromophenyl phenyl ether	101553	mg/kg						
4-Chloro-3-methylphenol	59507	mg/kg	410	4400	0.4	4		
4-Chloroaniline	106478	mg/kg	190	2000	0.2	2		
4-Chlorophenyl phenyl ether	7005723	mg/kg						

Table G-1 continued. Human Health Risk Based Soil Screening Criteria for the NASA Kennedy Space Center, Florida

			Human Health Criteria					
			Florida F.A.C. 62-777[1]				KSC Background [2]	
Analyte	CAS #	Units	SCTL Direct Exposure		Leachability based on:		Combined Soil Background	
			Residential	Industrial	GCTL	LY/PQ	Mean x 2	Range of Background
4-Nitroaniline	100016	mg/kg	5.2	56	0.1	1		
4-Nitrophenol	100027	mg/kg	390	4400	0.3	3	ND	NA
Aniline	62533	mg/kg	14	100	0.03	0.3		
bis(2-Chloroethoxy)methane	111911	mg/kg						
bis(2-Chloroethyl)ether	111444	mg/kg	0.3	0.4	0.02	0.2		
bis(2-Chloroisopropyl)ether	108601	mg/kg	4.4	7.3	0.07	0.7		
bis(2-Ethylhexyl)phthalate	117817	mg/kg	76	280	3600	36000		
Butylbenzyl phthalate	85687	mg/kg	15000	320000	310	3100		
Carbazole	86748	mg/kg	53	190	0.6	6		
Di-n-butyl phthalate	84742	mg/kg	7300	140000	47	470		
Di-n-octyl phthalate	117840	mg/kg	1500	27000	480000	4700000		
Dibenzofuran	132649	mg/kg	280	5000	15	150		
Diethyl phthalate	84662	mg/kg	54000	920000	86	860		
Dimethyl phthalate	131113	mg/kg	590000	>1000000	380	3800		
Hexachlorobenzene	118741	mg/kg	0.5	1.1	2.2	22		
Hexachlorobutadiene	87683	mg/kg	6.3	12	1.1	11		
Hexachlorocyclopentadiene	77474	mg/kg	2.4	16	400	4000		
Hexachloroethane	67721	mg/kg	34	78	0.2	2		
Isophorone	78591	mg/kg	340	580	0.2	2		
N-Nitrosodi-n-propylamine	621647	mg/kg	0.09	0.2	0.04	0.4		
N-Nitrosodimethylamine	62759	mg/kg	0.009	0.02	0.008	0.09		
N-Nitrosodiphenylamine	86306	mg/kg	170	440	0.4	4		
Nitrobenzene	98953	mg/kg	14	120	0.03	0.3		
o-Cresol	95487	mg/kg	2400	28000	0.3	3		
p-Cresol	106445	mg/kg	250	3000	0.03	0.3		
Pentachlorophenol	87865	mg/kg	7.7	23	0.03	0.3	ND	NA
Phenol	108952	mg/kg	900	390000	0.05	0.5		

Table G-1 continued. Human Health Risk Based Soil Screening Criteria for the NASA Kennedy Space Center, Florida

			Human Health Criteria					
			Florida				KSC Background [2]	
			F.A.C. 62-777[1]					
Analyte	CAS #	Units	SCTL Direct Exposure		Leachability based on:		Combined Soil Background	
			Residential	Industrial	GCTL	LY/PQ	Mean x 2	Range of Background
Anthracene	120127	mg/kg	18000	260000	2500	25000	0.027	0.0085 - 0.115
Benzo(a)anthracene	56553	mg/kg	1.4	5	3.2	32	0.0049	0.0009 - 0.13
Benzo(a)pyrene	50328	mg/kg	0.1	0.5	8	80	0.0067	0.001 - 0.25
Benzo(b)fluoranthene	205992	mg/kg	1.4	4.8	10	100	0.0076	0.0015 - 0.22
Benzo(g,h,i)perylene	191242	mg/kg	2300	41000	32000	320000	0.0096	0.0017 - 0.19
Benzo(k)fluoranthene	207089	mg/kg	15	52	25	250	0.0058	0.001 - 0.12
Chrysene	218019	mg/kg	140	450	77	770	0.0062	0.0009 - 0.2
Dibenzo(a,h)anthracene	53703	mg/kg	0.1	0.5	30	300	0.0061	0.0017 - 0.059
Fluoranthene	206440	mg/kg	2900	48000	1200	12000	0.014	0.0017 - 0.54
Fluorene	86737	mg/kg	2200	28000	160	1600	0.0068	0.0017 - 0.17
Indeno(1,2,3-cd)pyrene	193395	mg/kg	1.5	5.3	28	280	0.0058	0.0009 - 0.21
Naphthalene	91203	mg/kg	40	270	1.7	17	0.059	0.0085 - 0.93
Phenanthrene	85018	mg/kg	2000	30000	250	2500	0.0082	0.0009 - 0.23
Pyrene	129000	mg/kg	2200	37000	880	8800	0.01	0.0009 - 0.32
POLYCHLORINATED BIPHENYLS (SW8082)								
Aroclor 1016	12674112	mg/kg	0.5				ND	NA
Aroclor 1221	11104282	mg/kg	0.5				ND	NA
Aroclor 1232	11141165	mg/kg	0.5				ND	NA
Aroclor 1242	53469219	mg/kg	0.5				ND	NA
Aroclor 1248	12672296	mg/kg	0.5				ND	NA
Aroclor 1254	11097691	mg/kg	0.5				ND	NA
Aroclor 1260	11096825	mg/kg	0.5				ND	NA
PCB, Total	1336363	mg/kg	0.5	2.1	17	170		
ORGANOCHLORINE PESTICIDES (SW8081A)								
4,4'-DDD	72548	mg/kg	4.6	18	4	40	0.0066	0.0017 - 0.096
4,4'-DDE	72559	mg/kg	3.3	13	18	180	0.016	0.0017 - 0.11
4,4'-DDT	50293	mg/kg	3.3	13	11	110	0.014	0.0017 - 0.096
Aldrin	309002	mg/kg	0.07	0.3	0.5	5	ND	NA
alpha-BHC	319846	mg/kg	0.2	0.5	0.0003	0.005	ND	NA

Table G-1 continued. Human Health Risk Based Soil Screening Criteria for the NASA Kennedy Space Center, Florida

			Human Health Criteria					
			Florida F.A.C. 62-777[1]				KSC Background [2]	
Analyte	CAS #	Units	SCTL Direct Exposure		Leachability based on:		Combined Soil Background	
			Residential	Industrial	GCTL	LY/PQ	Mean x 2	Range of Background
alpha-Chlordane	5103719	mg/kg					0.0048	0.0017 - 0.041
beta-BHC	319857	mg/kg	0.6	2.1	0.001	0.003	ND	NA
Chlordane	57749	mg/kg	3.1	12	9.6	96	0.0048	0.0017 - 0.062
delta-BHC	319868	mg/kg	22	420	0.2	2	ND	NA
Dieldrin	60571	mg/kg	0.07	0.3	0.004	0.04	0.0086	0.0017 - 0.19
Endosulfan (Mixed Isomers)	115297	mg/kg	410	6700	3.8	38		
Endosulfan I	959988	mg/kg					ND	NA
Endosulfan II	33213659	mg/kg					ND	NA
Endosulfan Sulfate	1031078	mg/kg					ND	NA
Endrin	72208	mg/kg	21	340	1	10	ND	NA
Endrin Aldehyde	7421934	mg/kg					ND	NA
Endrin Ketone	53494705	mg/kg					0.0043	0.0017 - 0.0105
gamma-BHC (Lindane)	58899	mg/kg	0.7	2.2	0.009	0.09	0.0044	0.0017 - 0.114
gamma-Chlordane	5103742	mg/kg	3.1	12	9.6	96	0.0048	0.0014 - 0.041
Heptachlor	76448	mg/kg	0.2	0.9	23	230	ND	NA
Heptachlor Epoxide	1024573	mg/kg	0.1	0.4	0.6	6	ND	NA
Methoxychlor	72435	mg/kg	370	7500	160	1600	ND	NA
Toxaphene	8001352	mg/kg	1	3.7	31	310	ND	NA
ORGANOCHLORINE PESTICIDES (SW8081A)								
Dicholrvos	62737	mg/kg	0.2	0.3	0.0005	0.005		
Disulfoton	298044	mg/kg	2.9	56	0.1	1		
Ethoprop	13194484	mg/kg	5.5	69	0.005	0.05		
Fensulfothion	115902	mg/kg	14	180	0.01	0.1		
Mevinphos	7786347	mg/kg	16	240	0.01	0.1		
Naled	300765	mg/kg	130	2100	0.1	1		
Parathion ethyl	56382	mg/kg	450	9100	10	100		
Phorate	298022	mg/kg	14	280	0.3	3		
Ronnel (fenchlorphos)	299843	mg/kg	3600	59000	1300	13000		

Table G-1 continued. Human Health Risk Based Soil Screening Criteria for the NASA Kennedy Space Center, Florida

			Human Health Criteria					
			Florida F.A.C. 62-777[1]				KSC Background [2]	
Analyte	CAS #	Units	SCTL Direct Exposure		Leachability based on:		Combined Soil Background	
			Residential	Industrial	GCTL	LY/PQ	Mean x 2	Range of Background
CHLORINATED PHENOXY ACID HERBICIDES (SW8151A)								
2,4,5-Trichlorophenoxyacetic acid (2,4,5-T)	93765	mg/kg	590	8300	0.4	4	ND	NA
2,4-Dichlorophenoxyacetic Acid (2,4-D)	94757	mg/kg	670	11000	0.7	7	0.016	0.005 - 0.62
2-(2,4,5-Trichlorophenoxy)propionic acid (2,4,5-TP) (Silvex)	93721	mg/kg	590	12000	5.4	54	0.018	0.005 - 0.32
2-Methyl-4-chlorophenoxy acetic acid (MCPA)	94746	mg/kg	30	440	0.02	0.2	ND	NA
4-(2,4-Dichlorophenoxy)butyric acid (2,4-DB)	94826	mg/kg					0.016	0.005 - 0.06
4-(2-Methyl-4-chlorophenoxy)butyric acid (MCPP)	7085190	mg/kg					ND	NA
Dalapon	75990	mg/kg					ND	NA
Dicamba	1918009	mg/kg	1800	24000	2.6	26	ND	NA
Dichloroprop	120365	mg/kg	270	3300	0.3	3	ND	NA
Dinoseb	88857	mg/kg	55	740	0.03	0.3	ND	NA
CARBAMATES AND UREA PESTICIDES (SW8318)								
Carbaryl	63252	mg/kg	6800	120000	8.7	87		
Carbofuran	1563662	mg/kg	58	430	0.2	2		
Chloropropham	101213	mg/kg	13000	200000	51	510		
Diuron	330541	mg/kg	130	2000	0.3	3		
Linuron	330552	mg/kg	130	2000	0.04	0.4		
Methomyl	16752775	mg/kg	22	150	1.2	12		
Oxamyl	23135220	mg/kg	1100	12000	0.9	9		
Propham	122429	mg/kg						
METALS (SW3005/6010/7471/7841)								
Aluminum	7429905	mg/kg	72000	>1000000			2889.23	26 - 22000
Antimony	7440360	mg/kg	26	240	5	50	ND	NA
Arsenic	7440382	mg/kg	0.8	3.7	29	290	1.51	0.2 - 8.5
Barium	7440393	mg/kg	110	87000	1600	16000	26.14	1.8 - 60
Beryllium	7440417	mg/kg	120	800	63	630	ND	NA
Cadmium	7440439	mg/kg	75	1300	8	80	1.24	0.1 - 3
Calcium	7440702	mg/kg					32932.47	38 - 260000
Chromium	7440473	mg/kg	210	420	38		9.09	0.5 - 34

Table G-1 continued. Human Health Risk Based Soil Screening Criteria for the NASA Kennedy Space Center, Florida

			Human Health Criteria					
			Florida F.A.C. 62-777[1]				KSC Background [2]	
Analyte	CAS #	Units	SCTL Direct Exposure		Leachability based on:		Combined Soil Background	
			Residential	Industrial	GCTL	LY/PQ	Mean x 2	Range of Background
Chromium III	16065831	mg/kg						
Chromium, Hexavalent	18540299	mg/kg	210	420	38	380		
Cobalt	7440484	mg/kg	4700	110000			ND	NA
Copper	7440508	mg/kg	110	76000			27.88	0.5 - 130
Iron	7439896	mg/kg	23000	480000			2567	24 - 16000
Lead	7439921	mg/kg	400	920			11.64	0.5 - 150
Magnesium	7439954	mg/kg					1098.43	12.5 - 11000
Manganese	7439965	mg/kg	1600	22000			51.5	0.5 - 200
Molybdenum	7439987	mg/kg	390	9700				
Nickel	7440020	mg/kg	110	28000	130	1300	ND	NA
Zinc	7440666	mg/kg	23000	560000	6000	60000	30.28	1.2 - 140
GENERAL CHEMISTRY PARAMETERS (FLPRO)								
Total Recoverable Petroleum Hydrocarbons	No Cas	mg/kg	340	2500	340	3400		
CYANIDE (EPA9010)								
Cyanide	57125	mg/kg	30	39000	40	400		

Abbreviations:

CAS # - Chemical Abstract System Number
GCTL - Groundwater Cleanup Target Levels for Resource Protection/Recovery
KSC - Kennedy Space Center
SCTL - Soil Cleanup Target Levels
LY/PQ - Low Yield/Poor Quality
mg/kg - milligrams per kilogram
USEPA - United Stated Environmental Protection Agency

Sources:

1 - Florida Department of Environmental Protection, May 26, 1999. Development of Soil Cleanup Target Levels (SCTLs) for Chapter 62-777, F.A.C.
4 - EPA Region IV Supplemental Guidance to RAGS: Region IV Bulletins, Ecological Risk Assessment, August 11,1999.
2 - KSC Background Values, Combined average for all nine types of soil samples collected in July 1999. Metals can be used for screening. Organics pertain only to Ecological Risk Assessment Step 3 and uncertainty analysis.

Table G-2. Background raw data for soil locations on Kennedy Space Center (Schmalzer *et al*. 2000)

		SSC163[1]	SSC164[1]	SSC025[2]		SSC026[2]		SSC101[2]	SSC102[2]	SSC165[4]	
		6/29/1998	6/29/1998	7/27/98		8/20/98		7/27/1998	7/27/1998	08/12/98	
	Units				duplicate		duplicate				duplicate
Organochlorine Pesticides (8081)											
4,4' - DDD	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
4,4' - DDE	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
4,4' - DDT	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Aldrin	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Alpha - BHC	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Beta - BHC	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Chlordane (alpha)	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Chlordane (gamma)	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Chlordane (total)	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Delta - BHC	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Dieldrin	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Endosulfan I	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Endosulfan II (beta)	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Endosulfan Sulfate	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Endrin	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Endrin Aldehyde	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Endrin Ketone	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Gamma - BHC (Lindane)	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Heptachlor	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Heptachlor Epoxide (a)	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
heptachlor Epoxide (b)	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Isodrin	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Methoxychlor	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Mirex	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Toxaphene	µg/Kg	<3.7	<3.5	<67	<75	<92	<93	<75	<76	<74	<89

Table G-2 continued. Background raw data for soil locations on Kennedy Space Center (Schmalzer *et al*. 2000)

		SSC163[1]	SSC164[1]	SSC025[2]		SSC026[2]		SSC101[2]	SSC102[2]	SSC165[4]	
		6/29/1998	6/29/1998	7/27/98		8/20/98		7/27/1998	7/27/1998	08/12/98	
	Units				duplicate		duplicate				duplicate
Organochlorine Pesticides (8081)											
4,4' - DDD	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
4,4' - DDE	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
4,4' - DDT	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Aldrin	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Alpha - BHC	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Beta - BHC	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Chlordane (alpha)	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Chlordane (gamma)	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Chlordane (total)	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Delta - BHC	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Dieldrin	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Endosulfan I	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Endosulfan II (beta)	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Endosulfan Sulfate	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Endrin	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Endrin Aldehyde	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Endrin Ketone	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Gamma - BHC (Lindane)	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Heptachlor	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Heptachlor Epoxide (a)	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
heptachlor Epoxide (b)	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Isodrin	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Methoxychlor	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Mirex	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Toxaphene	µg/Kg	<3.7	<3.5	<67	<75	<92	<93	<75	<76	<74	<89

Table G-2 continued. Background raw data for soil locations on Kennedy Space Center (Schmalzer *et al*. 2000)

	Units	SSC163[1] 6/29/1998	SSC164[1] 6/29/1998	SSC025[2] 7/27/98		SSC026[2] 8/20/98		SSC101[2] 7/27/1998	SSC102[2] 7/27/1998	SSC165[4] 08/12/98	
					duplicate		duplicate				duplicate
Aroclors (8082)											
PCB-1016/1242	µg/Kg	<37	<35	<34	<38	<46	<46	<38	<38	<37	<44
PCB-1221	µg/Kg	<37	<35	<34	<38	<46	<46	<38	<38	<37	<44
PCB-1232	µg/Kg	<37	<35	<34	<38	<46	<46	<38	<38	<37	<44
PCB-1248	µg/Kg	<37	<35	<34	<38	<46	<46	<38	<38	<37	<44
PCB-1254	µg/Kg	<37	<35	<34	<38	<46	<46	<38	<38	<37	<44
PCB-1260	µg/Kg	<37	<35	<34	<38	<46	<46	<38	<38	<37	<44
Chlorinated Herbicides (8151)											
2-(2,4,5-Trichlorophenoxy)propionic acid (2,4,5 - TP) (Silvex)	µg/Kg	<11	<10	<10	<11	<14	<14	<11	<12	<11	<14
2,4,5-Trichlorophenoxy acetic acid (2,4,5 - T)	µg/Kg	<11	<10	<10	<11	<14	<14	<11	<12	<11	<14
2,4-Dichlorophenoxy acetic acid (2,4 - D)	µg/Kg	<11	<10	<10	<11	<14	<14	<11	<12	<11	<14
3,5-DCBA	µg/Kg	<11	<10	<10	<11	<14	<14	<11	<12	<11	<14
4-(2,4-Dichlorophenoxy)butyric acid (2,4 - DB)	µg/Kg	<11	<10	<10	<11	<14	<14	<11	<12	<11	<14
4 - Nitrophenol	µg/Kg	<11	<10	<10	<11	<14	<14	<11	<12	<11	<14
Acifluorfen	µg/Kg	<11	<10	<10	<11	<14	<14	<11	<12	<11	<14
Bentazon	µg/Kg	<11	<10	<10	<11	<14	<14	<11	<12	<11	<14
Chloramben	µg/Kg	<11	<10	<10	<11	<14	<14	<11	<12	<11	<14
Dacthal	µg/Kg	<11	<10	<10	<11	<14	<14	<11	<12	<11	<14
Dalapon	µg/Kg	<11	<10	<10	<11	<14	<14	<11	<12	<11	<14
Dicamba	µg/Kg	<11	<10	<10	<11	<14	<14	<11	<12	<11	<14
Dichloroprop [2-(2,4-Dichlorophenoxy)proponic acid]	µg/Kg	<11	<10	<10	<11	<14	<14	<11	<12	<11	<14
Dinoseb	µg/Kg	<11	<10	<10	<11	<14	<14	<11	<12	<11	<14
MCPA	µg/Kg	<110	<100	<200	<230	<280	<280	<230	<230	<220	<270
MCPP	µg/Kg	<110	<100	<200	<230	<280	<280	<230	<230	<220	<270
Pentachlorophenol	µg/Kg	<11	<10	<10	<11	<14	<14	<11	<12	<11	<14
Picloram	µg/Kg	<11	<10	<10	<11	<14	<14	<11	<12	<11	<14

Table G-2 continued. Background raw data for soil locations on Kennedy Space Center (Schmalzer *et al*. 2000)

		SSC163[1]	SSC164[1]	SSC025[2]		SSC026[2]		SSC101[2]	SSC102[2]	SSC165[4]	
		6/29/1998	6/29/1998	7/27/98		8/20/98		7/27/1998	7/27/1998	08/12/98	
	Units				duplicate		duplicate				duplicate
PAH (8310)											
1 - Methylnaphthalene	µg/Kg	<19	<18	<17	<19	<23	<24	<19	<19	<19	<23
2 - Methylnaphthalene	µg/Kg	<19	<18	<17	<19	<23	<24	<19	<19	<19	<23
Acenaphthene	µg/Kg	<19	<18	<17	<19	<23	<24	<19	<19	<19	<23
Acenaphthylene	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.6	<3.8	<3.8	<3.7	<4.4
Anthracene	µg/Kg	<19	<18	<17	<19	<24	<24	<19	<20	<19	<23
Benzo(a)anthracene	µg/Kg	<1.9	**2.8**	<1.7	<1.9	<2.3	<2.4	<1.9	<1.9	**2.4 A**	<2.3
Benzo(a)pyrene	µg/Kg	<2	**5**	<2	<2	**3 A**	**6**	<2	<2	**2 A**	**3 A**
Benzo(b)fluoranthene	µg/Kg	<3	**7 A**	<3	<3	<4	<4	<3	<3	**4 A**	**4 A**
Benzo(g,h,i)perylene	µg/Kg	<3.7	**9.8 A**	<3.4	<3.8	<4.6	<4.7	<3.8	<3.8	**13**	**12 A**
Benzo(k)fluoranthene	µg/Kg	<2	**3 A**	<2	<2	<3	<3	<2	<2	<2	<3.0
Chrysene	µg/Kg	<1.9	**3.7**	<1.7	<1.9	**4.7**	**7.6**	<1.9	<1.9	<1.9	<2.3
Dibenzo(a,h)anthracene	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.7	<3.8	<3.8	<3.7	<4.5
Fluoranthene	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.7	<3.8	<3.8	<3.7	<4.5
Fluorene	µg/Kg	<3.7	<3.5	<3.4	<3.8	<4.6	<4.7	<3.8	<3.8	<3.7	<4.5
Indeno(1,2,3-cd)pyrene	µg/Kg	<1.9	**6.7**	<1.7	<1.9	<2.3	<2.4	<1.9	<1.9	**8.9**	**15**
Naphthalene	µg/Kg	<19	<18	<17	<19	<23	<24	<19	<19	<19	<23
Phenanthrene	µg/Kg	<1.9	<1.8	<1.7	<1.9	<2.3	<2.4	<1.9	<1.9	<1.9	<2.3
Pyrene	µg/Kg	<1.9	<1.8	<1.7	<1.9	<2.3	<2.4	<1.9	<1.9	<1.9	<2.3
Surrogates											
2,4-DCAA	%	56	44	116	120	132	132	56	68	112	132
2,4,5,6-TCMX	%	57	75	79	91	81	82	45	65	71	70
DBC	%	60	124	116	126	135	113	56	82	147	118
p-terphenyl	%	105	75	75	91	112	68	68	85	83	83
Metals											
Aluminum	mg/Kg	**7200**	**2400**	**31**	**26**	**42**	**31**	**430**	**320**	**2900**	**3600**
Antimony	mg/Kg	<2	<2	<2	<2	<3	<3	<2	<2	<2	<3.0
Arsenic	mg/Kg	<0.6	<0.5	<0.5	<0.6	<0.7	<0.7	<0.6	<0.6	<0.6	**0.70 A**

Table G-2 continued. Background raw data for soil locations on Kennedy Space Center (Schmalzer *et al*. 2000)

Metlas (continuted)	Units	SSC163[1] 6/29/1998	SSC164[1] 6/29/1998	SSC025[2] 7/27/98		SSC026[2] 8/20/98		SSC101[2] 7/27/1998	SSC102[2] 7/27/1998	SSC165[4] 08/12/98	
					duplicate		duplicate				duplicate
Barium	mg/Kg	<22	<21	<20	<23	<28	<28	<23	<23	<22	<27
Beryllium	mg/Kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Cadmium	mg/Kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Calcium	mg/Kg	**3800**	**1900**	**67**	**57**	**120**	**120**	**360**	**150**	**16000**	**24000**
Chromium (total)	mg/Kg	**20**	**17**	<1	<1	<1	<1	<1	<1	**12**	**15**
Cobalt	mg/Kg	<6	<5	<5	<6	<7	<7	<6	<6	<6	<7.0
Copper	mg/Kg	**100**	**100**	<5	<6	<7	<7	<6	<6	**110**	**110**
Iron	mg/Kg	**8000**	**2200**	**28**	**24**	**44**	**24**	**180**	**94**	**1800**	**2000**
Lead	mg/Kg	**8.2**	**8.9**	<1	<1	<1	<1	**2**	<1	**8.8**	**10**
Magnesium	mg/Kg	**560**	**180**	<26	<28	<35	<35	**110**	**88**	**510**	**660**
Manganese	mg/Kg	**99**	**130**	<1	<1	**2.4**	**2.1**	<1	<1	**160**	**150**
Mercury	mg/Kg	**0.026**	**0.019**	<0.01	<0.01	<0.01	<0.01	**0.01 A**	<0.01	**0.02**	**0.03**
Nickel	mg/Kg	<6	<5	<5	<6	<7	<7	<6	<6	<6	<7
Potassium	mg/Kg	**490**	<170	<26	<28	<35	<35	**32**	<29	**260**	**310**
Selenium	mg/Kg	<2	<2	<2	<2	<3	<3	<2	<2	<2	<3
Silver	mg/Kg	<2	<2	<2	<2	<3	<3	<2	<2	<2	<3
Sodium	mg/Kg	**31**	**17 A**	<26	<28	<35	<35	**40**	**51**	**31**	**36**
Thallium	mg/Kg	<1	<1	<1	<1	<1	<1	<1	<1	<6	<7
Vanadium	mg/Kg	**18**	**6.2**	<1	<1	<1	<1	**1**	<1	**4**	**4.6**
Zinc	mg/Kg	**58**	**25**	<5	<6	<22	<22	<6	<6	**71**	**76**

Table G-2 continued. Background raw data for soil locations on Kennedy Space Center (Schmalzer *et al*. 2000)

		SSC163[1] 6/29/1998	SSC164[1] 6/29/1998	SSC025[2] 7/27/98		SSC026[2] 8/20/98		SSC101[2] 7/27/1998	SSC102[2] 7/27/1998	SSC165[4] 08/12/98	
Other Parameters	**Units**				duplicate		duplicate				duplicate
Bulk Density	g/cm^3	1.2	1.1	1.1	1.1	0.92	0.91	0.7	1.1	1	1
CEC	meq/100g	23	10	2	1	0.47	0.88	22	19	31	29
Percent Solids	%	89	95	98	88	72	71	88	87	89	74
pH (lab)	S. U.	6.3	6	5.1	5.2	5.9	5.9	4.4	4.2	7.4	7.6
Resistivity	ohm-cm	48000	110000	1500000	1600000	45000	290000	93000	16000	32000	29000
Texture (No. 4)	%	100	100	100	100	100	100	100	100	99.9	100
Texture (No. 10)	%	99.8	100	99.9	99.9	99.8	99.8	99.8	99.8	99.78	99.9
Texture (No. 40)	%	94.4	98	97.9	90.3	96	96.1	74.7	72.6	96.8	97
Texture (No. 60)	%	83	91.4	68.2	68	55.3	55.4	20.6	19.6	89.7	89.9
Texture (No. 100)	%	50.2	57.8	14.2	14.2	8.5	8.6	7.2	8.4	52.8	57.2
Texture (No. 200)	%	18.1	12.3	1.3	1.5	1.5	1.6	4.6	6.4	20.7	19
Total Organic Carbon	mg/Kg	>26700	>26700	>26700	>26700	>26700	>26700	>26700	>26700	>26700	>26700

A = value is between the Method Detection Limit and the Practical Quanitation Level

[1] Located near Alternative 1 (Phases A-E)

[2] Located near Alternative 2 (Phases A-E)

[4] Located near Phase F

Table G-3. Human Health Risk Based Surface Water Screening Criteria for Metals on the NASA Kennedy Space Center, Florida

			Human Health Criteria			Background / Reference Values [3]					
			Florida		Regional/ Federal						
			F.A.C. 62-777 / F.A.C. 62-302 [1]		Federal	Facility-Specific (KSC)					
			SWCTL/SWQC		NWRQC [2]	General Industrial Areas		Parking/ Traffic Areas		Freshwater (chloride <1500 mg/l)	
	CAS #	Units	Class III Fresh Surface Water		Consumption of Organisms Only	Mean x 2	Range of Background	Mean x 2	Range of Background	Mean x 2	Range of Background
METALS (SW3005/3020/6010/6020/7470)											
Aluminum	7429905	µg/l				280	73 - 280	250	80 - 250	642	25 - 1400
Antimony	7440360	µg/l	4300	(a)	640					15	3 - 26
Arsenic	7440382	µg/l			0.14			7	3.8 - 7	ND	NA
Barium	7440393	µg/l				25	11 - 25			ND	NA
Beryllium	7440417	µg/l	0.13	(a)						ND	NA
Cadmium	7440439	µg/l								ND	NA
Calcium	7440702	µg/l				129000	12200 - 129000	104088	29900 - 129000	196760	22000 - 340000
Chromium (total)	7440473	µg/l								ND	NA
Chromium III	16065831	µg/l									
Chromium, Hexavalent	18540299	µg/l									
Cobalt	7440484	µg/l								ND	NA
Copper	7440508	µg/l								ND	NA
Iron	7439896	µg/l				606	76 - 780	410	49 - 490	996	50 - 2300
Lead	7439921	µg/l				7.4	2.4 - 11	20	2.1 - 25	8.6	3 - 13
Magnesium	7439954	µg/l				12140	900 - 20300	4280	650 - 5900	634276	2300 - 1400000
Manganese	7439965	µg/l			100	32	1.8 - 55	18.8	1.4 - 35	78	5 - 270
Mercury (total)	7439976	µg/l								ND	NA
Molybdenum	7439987	µg/l									
Nickel	7440020	µg/l			4600					ND	NA
Potassium	7440097	µg/l				6400	1800 - 22600			65184	2300 - 290000
Selenium	7782492	µg/l			4200					ND	NA
Silver	7440224	µg/l								ND	NA
Sodium	7440235	µg/l				56400	4200 - 125000	18200	1500 - 33800	1789353	9800 - 7700000
Thallium	7440280	µg/l	6.3	(a)	6.3					ND	NA
Vanadium	7440622	µg/l								ND	NA
Zinc	7440666	µg/l			26000			76	40 - 91	ND	NA

Table G-3 continued. Human Health Risk Based Surface Water Screening Criteria for Metals on the NASA Kennedy Space Center, Florida

			Human Health Criteria			Background / Reference Values [3]					
			Florida		Regional/ Federal						
			F.A.C. 62-777 / F.A.C. 62-302 [1]		Federal	Facility-Specific (KSC)					
			SWCTL/SWQC		NWRQC [2]	General Industrial Areas		Parking/ Traffic Areas		Freshwater (chloride <1500 mg/l)	
	CAS #	Units	Class III Fresh Surface Water		Consumption of Organisms Only	Mean x 2	Range of Background	Mean x 2	Range of Background	Mean x 2	Range of Background
GENERAL CHEMISTRY PARAMETERS											
Alkalinity (E130.2)	No CAS	mgCaCO3/l									
Biochemical Oxygen Demand, Ultimate (E405.1)	No CAS										
Chemical Oxygen Demand (E410.4)	No CAS										
Cyanide (SW9010/SW9012A)	57125	µg/l	_		220000						
Hardness, Total (E130.2)	No CAS	µg/l									
Sulfide	18496258	µg/l									
Total Dissolved Solids (E160.1)	No CAS	mg/l									
Total Recoverable Petroleum Hydrocarbons	No CAS	µg/l									
Total Suspended Solids (E160.2)	No CAS	mg/l									

Abbreviations:

CAS # - Chemical Abstract System Number
KSC - Kennedy Space Center
F.A.C. - Florida Administrative Code
µg/l - micrograms per liter
µg $CaCO_3$/l - micrograms calcium carbonate /liter
NRWQC - National Recommended Water Quality Criteria
SWCTL - Surface Water Cleanup Target Levels
USEPA - United States Environmental Protection Agency
SWQC - Surface Water Quality Criteria

Footnotes/Sources:

1 - Chapter 62-777 F.A.C. Surface Water Cleanup Target Levels (SWCTL) used where based on Human Heath endpoints. For constituents where the SWCTL is not based on human health endpoints, the values are Chapter 62-302 F.A.C. Surface Water Quality Criteria for Class III surface water based on Human Health endpoints.

3 - USEPA Region IV Ecological Risk Assessment Bulletin - Supplement to RAGS. August 11, 1999. Freshwater and Saltwater Screening Values for Hazardous Waste Sites.

2 - USEPA National Recommended Water Quality Criteria (NRWQC), April 1999. Office of Water, EPA 822-Z-99-001. Developed pursuant to section 304 (a) of the Clean Water Act.

3 - KSC Background/Reference Values:
- General Industrial - drainage swale surface water samples collected in Fall 2000. Used on a site specific basis.
- Parking/Traffic - drainage swale surface water samples collected in Fall 2000. Used on a site specific basis.
- Facility-specific tables of surface water background values maintained by Dynamac, Corp., current version, April, 2000.

2x means concentration not approved for use as background value.

4 - Must be calculated based on pH and temperature; refer to source document.

Table G-4. Background raw data for surface water locations on Kennedy Space Center (Schmalzer *et al*. 2000)

		AVE001[1] 7/22/1998	KPI001[4] 6/5/1998	JER001[2] 7/22/1998	TEL004[2] 9/3/1998
Organochlorine pesticides (8081)	**units**				
4,4' – DDD	µg/L	<0.05	<0.05	<0.05	<0.05
4,4' – DDE	µg/L	<0.05	<0.05	<0.05	<0.05
4,4' – DDT	µg/L	<0.05	<0.05	<0.05	<0.05
Aldrin	µg/L	<0.05	<0.05	<0.05	<0.05
Alpha – BHC	µg/L	<0.05	<0.05	<0.0 5	<0.05
Beta – BHC	µg/L	<0.05	<0.05	<0.05	<0.05
Chlordane (alpha)	µg/L	<0.05	<0.05	<0.05	<0.05
Chlordane (gamma)	µg/L	<0.05	<0.05	<0.05	<0.05
Chlordane (Total)	µg/L	<1	<1	<1	<1
Delta - BHC	µg/L	<0.05	<0.05	<0.05	<0.05
Dieldrin	µg/L	<0.05	<0.05	<0.05	<0.05
Endosulfan I	µg/L	<0.05	<0.05	<0.05	<0.05
Endosulfan II (beta)	µg/L	<0.05	<0.05	<0.05	<0.05
Endosulfan Sulfate	µg/L	<0.09	<0.05	<0.09	<0.09
Endrin	µg/L	<0.05	<0.05	<0.05	<0.05
Endrin Aldehyde	µg/L	<0.05	<0.05	<0.05	<0.05
Endrin Ketone	µg/L	<0.05	<0.05	<0.05	<0.05
Gamma - BHC (Lindane)	µg/L	<0.05	<0.05	<0.05	<0.05
Heptachlor	µg/L	<0.05	<0.05	<0.05	<0.05
Heptachlor Epoxide (a)	µg/L	<.050	<.050	<.050	<.050
Heptachlor Epoxide (b)	µg/L	<.050	<.050	<.050	<.050
Isodrin	µg/L	<0.05	<0.05	<0.05	<0.05
Methoxychlor	µg/L	<0.05	<0.05	<0.05	<0.05
Mirex	µg/L	<0.05	<0.05	<0.05	<0.05
Toxaphene	µg/L	<2	<2	<2	<2
Aroclors (8082)					
PCB-1016/1242	µg/L	<1	<1	<1	<1
PCB-1221	µg/L	<1	<1	<1	<1
PCB-1232	µg/L	<1	<1	<1	<1
PCB-1248	µg/L	<1	<1	<1	<1
PCB-1254	µg/L	<1	<1	<1	<1
PCB-1260	µg/L	<1	<1	<1	<1
Chlorinated Herbicides (8151)					
2-(2,4,5-Trichlorophenoxy)propionic acid (2,4,5 - TP) (Silvex)	µg/L	<0.5	<0.5	<0.5	<0.5
2,4,5-Trichlorophenoxy acetic acid (2,4,5 - T)	µg/L	<0.5	<0.5	<0.5	<0.5
2,4-Dichlorophenoxy acetic acid (2,4 - D)	µg/L	<0.5	<0.5	<0.5	<0.5
3,5-DCBA	µg/L	<0.5	<0.5	<0.5	<0.5
4-(2,4-Dichlorophenoxy)butyric acid (2,4 - DB)	µg/L	<0.5	<0.5	<0.5	<0.5
4 - Nitrophenol	µg/L	<0.5	<0.5	<0.5	<0.5
Acifluorfen	µg/L	<0.5	<0.5	<0.5	<0.5
Bentazon	µg/L	<0.5	<0.5	<0.5	<0.5
Chloramben	µg/L	<0.5	<0.5	<0.5	<0.5

Table G-4 continued. Background raw data for surface water locations on Kennedy Space Center (Schmalzer *et al*. 2000)

		AVE001[1] 7/22/1998	KPI001[4] 6/5/1998	JER001[2] 7/22/1998	TEL004[2] 9/3/1998
Chlorinated Herbicides (8151)					
Dacthal	µg/L	<0.5	<0.5	<0.5	<0.5
Dalapon	µg/L	<0.5	<0.5	<0.5	<0.5
Dicamba	µg/L	<0.5	<0.5	<0.5	<0.5
Dichloroprop [2-(2,4-Dichlorophenoxy)proponic acid]	µg/L	<0.5	<0.5	<0.5	<0.5
Dinoseb	µg/L	<0.5	<0.5	<0.5	<0.5
MCPA	µg/L	<10	<5	<10	<10
MCPP	µg/L	<10	<5	<10	<10
Pentachlorophenol	µg/L	<0.5	<0.5	<0.5	<0.5
Picloram	µg/L	<0.5	<0.5	<0.5	<0.5
PAHs (8310)					
1 - Methylnaphthalene	µg/L	<0.5	<1	<0.5	<0.5
2 - Methylnaphthalene	µg/L	<0.5	<1	<0.5	<0.5
Acenaphthene	µg/L	<0.5	<1	<0.5	<0.5
Acenaphthylene	µg/L	<0.1	<0.2	<0.1	<0.1
Anthracene	µg/L	<0.5	<1	<0.5	<0.5
Benzo(a)anthracene	µg/L	<0.05	<0.1	<0.05	<0.05
Benzo(a)pyrene	µg/L	<0.05	<0.1	<0.05	<0.05
Benzo(b)fluoranthene	µg/L	<0.1	<0.2	<0.1	<0.1
Benzo(g,h,i)perylene	µg/L	<0.1	<0.2	<0.1	<0.1
Benzo(k)fluoranthene	µg/L	<0.05	<0.1	<0.05	<0.05
Chrysene	µg/L	<0.05	<0.1	<0.05	<0.05
Dibenzo(a,h)anthracene	µg/L	<0.1	<0.2	<0.1	<0.1
Fluoranthene	µg/L	<0.1	<0.2	<0.1	<0.1
Fluorene	µg/L	<0.1	<0.2	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	µg/L	<0.05	<0.1	<0.05	<0.05
Napthalene	µg/L	<0.5	<1	<0.5	<0.5
Phenanthrene	µg/L	<0.05	<0.1	<0.05	<0.05
Pyrene	µg/L	<0.05	<0.1	<0.05	<0.05
Metals					
Aluminum	mg/L	<0.05	**0.097**	**0.083**	**0.22**
Antimony	mg/L	<0.006	**0.023**	<0.006	<0.006
Arsenic	mg/L	<0.01	<0.01	<0.01	<0.01
Barium	mg/L	<0.1	<0.1	<0.1	<0.1
Beryllium	mg/L	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001
Calcium	mg/L	**48**	**62**	**60**	**22**
Chloride (total)	mg/L	**76**	<50	**42**	**20**
Chromium (total)	mg/L	<0.01	<0.01	<0.01	<0.01
Cobalt	mg/L	<0.05	<0.05	<0.05	<0.05
Copper	mg/L	<0.004	<0.004	<0.004	<0.008
Iron	mg/L	**0.084**	**0.051**	**0.85**	***2.3****
Lead	mg/L	**0.005 A**	<0.005	**0.007 A**	<0.005
Magnesium	mg/L	**8.4**	**6**	**4**	**2.3**
Manganese	mg/L	**0.049**	<0.01	**0.02**	**0.27**

Table G-4 continued. Background raw data for surface water locations on Kennedy Space Center (Schmalzer *et al*. 2000)

		AVE001[1] 7/22/1998	KPI001[4] 6/5/1998	JER001[2] 7/22/1998	TEL004[2] 9/3/1998
Metals					
Mercury	mg/L	<0.0002	<0.0002	<0.0002	<0.0002
Nickel	mg/L	<0.01	<0.01	<0.01	<0.01
Potassium	mg/L	**7.5**	**2.7**	**7.7**	**4.2**
Selenium	mg/L	<0.01	<0.01	<0.01	<0.01
Silver	mg/L	<0.002	<0.0015	<0.002	<0.0005
Sodium	mg/L	**63**	**39**	**75**	**9.8**
Thallium	mg/L	<0.004	<0.002	<0.004	<0.006
Vanadium	mg/L	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	<0.1	<0.1	<0.1	<0.1
Other Parameters					
Dissolved Oxygen	mg/L	7.68	93.6	4.25	3.4
Total Dissolved Solids	mg/L	430	290	410	220
Total Organic Carbon	mg/L	19	16	55	68

* = value is and outlier and is not used in the analysis to develop the KSC Background screening values

A = value is between the Method Detection Limit and the Practical Quanitation Level

[1] Located near Alternative 1 (Phases A-E)

[2] Located near Alternative 2 (Phases A-E)

[4] Located near Phase F

Table G-5. Human Health Risk Based Ground Water Screening Criteria for Metals on the NASA Kennedy Space Center, Florida

			Human Health Criteria				Background			
			Florida				Baseline Comparison Values			
			F.A.C. 62-777 [1]				KSC [2]			
			GCTL				Mean x 2	Range of Background	Mean x 2	Range of Background
	CAS #	Units	Groundwater		LY/PQ	NADC	G2 (N=41)		G3 (N=16)	
METALS (SW3005/3020/6010/6020/7470)										
Aluminum	7429905	µg/l	200	(b)	2000	2000	370	25 - 1300	210	25 - 280
Antimony	7440360	µg/l	6	(a)	60	60	5	2.5 - 5	10	2.5 - 12
Arsenic	7440382	µg/l	50	(a)	500	500	30	5 - 96	20	5 - 28
Barium	7440393	µg/l	2000	(a)	20000	20000	ND	50 - 50	160	50 - 410
Beryllium	7440417	µg/l	4	(a)	40	40	1	0.5 - 3	ND	0.5 - 0.5
Cadmium	7440439	µg/l	5	(a)	50	50	2	0.5 - 9	ND	0.5 - 0.5
Calcium	7440702	µg/l					337530	300 - 670000	862500	170000 - 760000
Chromium	7440473	µg/l	100	(a)	1000	1000	10	5 - 19	ND	5 - 5
Chromium III	16065831	µg/l	100	(a)	1000	1000				
Chromium, Hexavalent	18540299	µg/l	100	(a)	1000	1000				
Cobalt	7440484	µg/l	420		4200	4200	ND	NA	ND	NA
Copper	7440508	µg/l	1000	(b)	10000	10000	60	25 - 280	60	9 - 100
Iron	7439896	µg/l	300	(b)	3000	3000	1680	25 - 2700	4000	25 - 10000
Lead	7439921	µg/l	15	(a)	150	150	7	2.5 - 28	9	2.5 - 13
Magnesium	7439954	µg/l					95290	250 - 210000	1946250	390000 - 1900000
Manganese	7439965	µg/l	50	(b)	500	500	90	5 - 260	260	5 - 460
Mercury (total)	7439976	µg/l	2	(a)	20	20	ND	NA	ND	NA
Molybdenum	7439987	µg/l	35		350	350				
Nickel	7440020	µg/l	100	(a)	1000	1000	12	5 - 31	ND	5 - 10
Potassium	7440097	µg/l					24930	250 - 120000	571750	90000 - 540000
Selenium	7782492	µg/l	50	(a)	500	500	11.6	5 - 27	20	5 - 50
Silver	7440224	µg/l	100	(b)	1000	1000	ND	5 - 5	10	5 - 10
Sodium	7440235	µg/l	160000	(a)	1600000	1600000	1017890	4100 - 3400000	16412500	3300000 - 15000000
Thallium	7440280	µg/l	2	(a)	20	20	2	1 - 3	ND	1 - 2
Vanadium	7440622	µg/l	49		490	490	10	5 - 13	ND	5 - 5
Zinc	7440666	µg/l	5000	(b)	50000	50000	110	50 - 230	ND	50 - 50

Table G-5 continued. Human Health Risk Based Ground Water Screening Criteria for Metals on the NASA Kennedy Space Center, Florida

Abbreviations:

CAS # - Chemical Abstract System Number
GCTL - Groundwater Cleanup Target Levels for Resource Protection/Recovery
KSC - Kennedy Space Center
NA - Not applicable
LY/PQ - Low Yield/Poor Quality
µg/l - micrograms per liter
FDEP Groundwater Classifications
G2 - total dissolved solids ≤ 10,000
G3 - total dissolved solids > 10,000

Footnotes:

(a) - Florida Primary Drinking Water Standard, FAC 65-550.
(b) - Florida Secondary Drinking Water Standard, FAC 65-550.
(c) - Practical Quantitation Limit

Sources:

1- Contaminant Cleanup Target Levels, Chapter 62-777 F.A.C.
2- KSC Background Values, Groundwater values were analyzed on 2 July 1999. G2 pertains to all KSC sites except Launch Complexes 39A and 39B, which are considered G3.
Launch Complexes Only. Metals can be used for the screening process. Organics pertain only to Ecological Risk Assessment Step 3 and uncertainty analysis.
2x means concentration not approved for use as background value.

Table G-6. Background raw data for surface water locations on Kennedy Space Center (Schmalzer *et al*. 2000)

		AVE001[1] 7/22/1998	KPI001[4] 6/5/1998	JER001[2] 7/22/1998	TEL004[2] 9/3/1998
Organochlorine pesticides (8081)	**units**				
4,4' - DDD	µg/L	<0.05	<0.05	<0.05	<0.05
4,4' - DDE	µg/L	<0.05	<0.05	<0.05	<0.05
4,4' - DDT	µg/L	<0.05	<0.05	<0.05	<0.05
Aldrin	µg/L	<0.05	<0.05	<0.05	<0.05
Alpha - BHC	µg/L	<0.05	<0.05	<0.0 5	<0.05
Beta - BHC	µg/L	<0.05	<0.05	<0.05	<0.05
Chlordane (alpha)	µg/L	<0.05	<0.05	<0.05	<0.05
Chlordane (gamma)	µg/L	<0.05	<0.05	<0.05	<0.05
Chlordane (Total)	µg/L	<1	<1	<1	<1
Delta - BHC	µg/L	<0.05	<0.05	<0.05	<0.05
Dieldrin	µg/L	<0.05	<0.05	<0.05	<0.05
Endosulfan I	µg/L	<0.05	<0.05	<0.05	<0.05
Endosulfan II (beta)	µg/L	<0.05	<0.05	<0.05	<0.05
Endosulfan Sulfate	µg/L	<0.09	<0.05	<0.09	<0.09
Endrin	µg/L	<0.05	<0.05	<0.05	<0.05
Endrin Aldehyde	µg/L	<0.05	<0.05	<0.05	<0.05
Endrin Ketone	µg/L	<0.05	<0.05	<0.05	<0.05
Gamma - BHC (Lindane)	µg/L	<0.05	<0.05	<0.05	<0.05
Heptachlor	µg/L	<0.05	<0.05	<0.05	<0.05
Heptachlor Epoxide (a)	µg/L	<.050	<.050	<.050	<.050
Heptachlor Epoxide (b)	µg/L	<.050	<.050	<.050	<.050
Isodrin	µg/L	<0.05	<0.05	<0.05	<0.05
Methoxychlor	µg/L	<0.05	<0.05	<0.05	<0.05
Mirex	µg/L	<0.05	<0.05	<0.05	<0.05
Toxaphene	µg/L	<2	<2	<2	<2
Aroclors (8082)					
PCB-1016/1242	µg/L	<1	<1	<1	<1
PCB-1221	µg/L	<1	<1	<1	<1
PCB-1232	µg/L	<1	<1	<1	<1
PCB-1248	µg/L	<1	<1	<1	<1
PCB-1254	µg/L	<1	<1	<1	<1
PCB-1260	µg/L	<1	<1	<1	<1
Chlorinated Herbicides (8151)					
2-(2,4,5-Trichlorophenoxy)propionic acid (2,4,5 - TP) (Silvex)	µg/L	<0.5	<0.5	<0.5	<0.5
2,4,5-Trichlorophenoxy acetic acid (2,4,5 - T)	µg/L	<0.5	<0.5	<0.5	<0.5
2,4-Dichlorophenoxy acetic acid (2,4 - D)	µg/L	<0.5	<0.5	<0.5	<0.5
3,5-DCBA	µg/L	<0.5	<0.5	<0.5	<0.5
4-(2,4-Dichlorophenoxy)butyric acid (2,4 - DB)	µg/L	<0.5	<0.5	<0.5	<0.5
4 - Nitrophenol	µg/L	<0.5	<0.5	<0.5	<0.5
Acifluorfen	µg/L	<0.5	<0.5	<0.5	<0.5
Bentazon	µg/L	<0.5	<0.5	<0.5	<0.5
Chloramben	µg/L	<0.5	<0.5	<0.5	<0.5

Table G-6 continued. Background raw data for surface water locations on Kennedy Space Center (Schmalzer *et al*. 2000)

		AVE001[1] 7/22/1998	KPI001[4] 6/5/1998	JER001[2] 7/22/1998	TEL004[2] 9/3/1998
Chlorinated Herbicides (8151)					
Dacthal	µg/L	<0.5	<0.5	<0.5	<0.5
Dalapon	µg/L	<0.5	<0.5	<0.5	<0.5
Dicamba	µg/L	<0.5	<0.5	<0.5	<0.5
Dichloroprop [2-(2,4-Dichlorophenoxy)proponic acid]	µg/L	<0.5	<0.5	<0.5	<0.5
Dinoseb	µg/L	<0.5	<0.5	<0.5	<0.5
MCPA	µg/L	<10	<5	<10	<10
MCPP	µg/L	<10	<5	<10	<10
Pentachlorophenol	µg/L	<0.5	<0.5	<0.5	<0.5
Picloram	µg/L	<0.5	<0.5	<0.5	<0.5
PAHs (8310)					
1 - Methylnaphthalene	µg/L	<0.5	<1	<0.5	<0.5
2 - Methylnaphthalene	µg/L	<0.5	<1	<0.5	<0.5
Acenaphthene	µg/L	<0.5	<1	<0.5	<0.5
Acenaphthylene	µg/L	<0.1	<0.2	<0.1	<0.1
Anthracene	µg/L	<0.5	<1	<0.5	<0.5
Benzo(a)anthracene	µg/L	<0.05	<0.1	<0.05	<0.05
Benzo(a)pyrene	µg/L	<0.05	<0.1	<0.05	<0.05
Benzo(b)fluoranthene	µg/L	<0.1	<0.2	<0.1	<0.1
Benzo(g,h,i)perylene	µg/L	<0.1	<0.2	<0.1	<0.1
Benzo(k)fluoranthene	µg/L	<0.05	<0.1	<0.05	<0.05
Chrysene	µg/L	<0.05	<0.1	<0.05	<0.05
Dibenzo(a,h)anthracene	µg/L	<0.1	<0.2	<0.1	<0.1
Fluoranthene	µg/L	<0.1	<0.2	<0.1	<0.1
Fluorene	µg/L	<0.1	<0.2	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	µg/L	<0.05	<0.1	<0.05	<0.05
Napthalene	µg/L	<0.5	<1	<0.5	<0.5
Phenanthrene	µg/L	<0.05	<0.1	<0.05	<0.05
Pyrene	µg/L	<0.05	<0.1	<0.05	<0.05
Metals					
Aluminum	mg/L	<0.05	**0.097**	**0.083**	**0.22**
Antimony	mg/L	<0.006	**0.023**	<0.006	<0.006
Arsenic	mg/L	<0.01	<0.01	<0.01	<0.01
Barium	mg/L	<0.1	<0.1	<0.1	<0.1
Beryllium	mg/L	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001
Calcium	mg/L	**48**	**62**	**60**	**22**
Chloride (total)	mg/L	**76**	<50	**42**	**20**
Chromium (total)	mg/L	<0.01	<0.01	<0.01	<0.01
Cobalt	mg/L	<0.05	<0.05	<0.05	<0.05
Copper	mg/L	<0.004	<0.004	<0.004	<0.008
Iron	mg/L	**0.084**	**0.051**	**0.85**	***2.3****
Lead	mg/L	**0.005 A**	<0.005	**0.007 A**	<0.005
Magnesium	mg/L	**8.4**	**6**	**4**	**2.3**
Manganese	mg/L	**0.049**	<0.01	**0.02**	**0.27**

Table G-6 continued. Background raw data for surface water locations on Kennedy Space Center (Schmalzer *et al*. 2000)

		AVE001[1] 7/22/1998	KPI001[4] 6/5/1998	JER001[2] 7/22/1998	TEL004[2] 9/3/1998
Metals					
Mercury	mg/L	<0.0002	<0.0002	<0.0002	<0.0002
Nickel	mg/L	<0.01	<0.01	<0.01	<0.01
Potassium	mg/L	**7.5**	**2.7**	**7.7**	**4.2**
Selenium	mg/L	<0.01	<0.01	<0.01	<0.01
Silver	mg/L	<0.002	<0.0015	<0.002	<0.0005
Sodium	mg/L	**63**	**39**	**75**	**9.8**
Thallium	mg/L	<0.004	<0.002	<0.004	<0.006
Vanadium	mg/L	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	<0.1	<0.1	<0.1	<0.1
Other Parameters					
Dissolved Oxygen	mg/L	7.68	93.6	4.25	3.4
Total Dissolved Solids	mg/L	430	290	410	220
Total Organic Carbon	mg/L	19	16	55	68

* = value is and outlier and is not used in the analysis to develop the KSC Background screening values

A = value is between the Method Detection Limit and the Practical Quanitation Level

[1] Located near Alternative 1 (Phases A-E)

[2] Located near Alternative 2 (Phases A-E)

[4] Located near Phase F