A

Appendix A

MAXIMUM ALLOWABLE METHOD QUANTITATION LIMITS

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Note: MQLs listed in this appendix are on a "dry-weight" basis.

Table A-1. Method Quantitation Limits for Metals by ICP (EPA Method 6010B)

Parameter	Method	Analyte	Water (mg/L)	Soil (mg/kg)
Metals	SW6010B	Aluminum	0.5	50
		Antimony	-	20
		Barium	0.01	1.0
		Beryllium	0.002	0.1
		Cadmium (Trace)	0.005	1.0
		Calcium	1.0	100
		Chromium	0.02	2.0
		Cobalt	0.02	2.0
		Copper	0.03	3.0
		Iron	0.2	15
		Lead (Trace)	0.01	5.0
		Magnesium	1.0	50
		Manganese	0.01	0.5
		Molybdenum	0.05	15
		Nickel	0.02	15
		Potassium	9.0	900
		Silver	0.05	5
		Sodium	2.0	100
		Tin	0.1	10
		Vanadium	0.015	10
		Zinc	0.02	10

Table A-2. Method Quantitation Limits for Metals by ICP/MS (EPA Method 6020)

Parameter	Method	Analyte	Water (mg/L)	Soil (mg/kg)
Metals	SW6020	Aluminum	0.05	10
		Antimony	0.05	5
		Arsenic	0.05	5
		Barium	0.005	0.5
		Beryllium	0.005	0.5
		Cadmium	0.001	1.0
		Calcium	0.5	50
		Chromium	0.01	1.0
		Cobalt	0.01	1.0
		Copper	0.01	0.5
		Iron	0.2	20
		Lead	0.005	0.5
		Magnesium	0.5	50
		Manganese	0.05	1.0
		Molybdenum	0.01	1.0
		Nickel	0.01	1.0
		Potassium	1.0	100
		Silver	0.01	1.0
		Sodium	1.0	100
		Thallium	0.001	10
		Tin	0.05	5
		Vanadium	0.005	0.5
		Zinc	0.02	2.0

Table A-3. Method Quantitation Limits for Metals by GFAA (EPA 7000 Series Methods)

Parameter	Method	Analyte	Water (mg/L)	Soil (mg/kg)
Metals	SW7041	Antimony	0.01	N/A
	SW7060A	Arsenic	0.004	0.4
	SW7421	Lead	0.005	5.0
	SW7740	Selenium	0.01	1.0
	SW7841	Thallium	0.005	4.0

Table A-4. Method Quantitation Limits for Mercury by CVAA (EPA Methods 7470A/7471A)

Parameter	Method	Analyte	Water (mg/L)	Soil (mg/kg)
Metals	SW7470A (water)	Mercury	0.001	N/A
	SW7471A (soil)	Mercury	N/A	0.1

Table A-5. Method Quantitation Limits for Hexavalent Chromium (EPA Method 7196A)

Parameter	Method	Analyte	Water (mg/L)	Soil (mg/kg)
Metals	SW7196A	Hexavalent Chromium	0.025	0.3

Table A-6. Method Quantitation Limits for Organic Lead (CA LUFT)

Parameter	Method	Analyte	Water (mg/L)	Soil (mg/kg)
Metals	CA LUFT	Organic Lead	0.2	0.50

Table A-7. Method Quantitation Limits for Total Petroleum Hydrocarbons by GC (EPA Method 8015B)

Parameter	Method	Analyte	Water (µg/L)	Soil (mg/kg)
Total Petroleum Hydrocarbons	SW8015B Purgeable Hydrocarbons	Gasoline Range Organics (GRO)	50	1.0
	SW8015B Extractable Hydrocarbons	Diesel Range Organics (DRO)	100	50
	SW8015B Extractable Hydrocarbons	Motor Oil (RRO)	500	500

Table A-8. Method Quantitation Limits for Aromatic and Halogenated Volatile Organics by GC (EPA Method 8021B)

Parameter	Method	Analyte	Water (µg/L)	Soil (mg/kg)
Aromatic and Halogenated Volatile Organic Compounds	SW8021B	Benzene	0.5	0.01
		Ethylbenzene	1.0	0.01
		Toluene	1.0	0.01
		m,p-Xylenes	2.0	0.01
		o-Xylene	1.0	0.01
		Bromodichloromethane	1.0	0.01
		Bromoform	1.0	0.01
		Bromomethane[1]	1.0	0.01
		Carbon tetrachloride	1.0	0.01
		Chlorobenzene	1.0	0.01
		Chloroethane[1]	2.0	0.02
		Chloroform	1.0	0.01
		Chloromethane[1]	1.0	0.01
		Dibromochloromethane	1.0	0.01
		1,2-Dichlorobenzene	1.0	0.01
		1,3-Dichlorobenzene	1.0	0.01
		1,4-Bichlorobenzene	1.0	0.01
		Dichlorodifluoromethane[1]	1.0	0.01
		1,1-Dichloroethane	1.0	0.01
		1,2-Dichloroethane	1.0	0.01
		1,1-Dichloroethene	1.0	0.01
		trans-1,2-Dichloroethene	1.0	0.01
		1,2-Dichloropropane	1.0	0.01
		cis-1,3-Dichloropropene	0.4	0.01
		trans-1,3-Dichloropropene	0.4	0.01
		Methyl tertiary-butyl ether (MTBE)	1.0	0.010
		Methylene Chloride	2.0	0.020
		1,1,2,2-Tetrachloroethane	1.0	0.01
		Tetrachloroethene	1.0	0.01
		1,1,1-Trichloroethane	1.0	0.01
		1,1,2-Trichloroethane	1.0	0.01
		Trichlorofluoromethane	1.0	0.01
		1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	1.0	0.01
		Trichloroethene	1.0	0.01
		Vinyl chloride[1]	1.0	0.01

1 Gaseous target analytes

Table A-9. Method Quantitation Limits for Phenols (EPA Method 8041)

Parameter	Method	Analyte	Water (µg/L)	Soil (mg/kg)
Phenols	SW8041	4-Chloro-3-methylphenol	10	1.7
		2-Chlorophenol	10	3.3
		2,4-Dichlorophenol	10	1.7
		2,4-Dimethylphenol	10	1.7
		2,4-Dinitrophenol	100	13.3
		2-Methyl-4,6-dinitrophenol	100	13.3
		2-Methylphenol	10	1.7
		3/4-Methylphenol	10	1.7
		2-Nitrophenol	10	3.3
		4-Nitrophenol	50	3.3
		Pentachlorophenol	5	2.5
		Phenol	10	1.7
		2,4,5-Trichlorophenol	10	1.7
		2,4,6-Trichlorophenol	10	1.7

Table A-10. Method Quantitation Limits for Organochlorine Pesticides (EPA Method 8081A)

Parameter	Method	Analyte	Water (µg/L)	Soil (mg/kg)
Organochlorine Pesticides	SW8081A	Aldrin	0.1	0.004
		a-BHC	0.2	0.004
		b-BHC	0.1	0.004
		d-BHC	0.1	0.004
		g-BHC(Lindane)	0.1	0.004
		a-Chlordane	0.1	0.004
		g-Chlordane	0.1	0.004
		4,4'-DDD	0.1	0.004
		4,4'-DDE	0.1	0.004
		4,4'-DDT	0.1	0.004
		Dieldrin	0.1	0.004
		Endosulfan I	0.2	0.008
		Endosulfan II	0.5	0.008
		Endosulfan sulfate	0.2	0.016
		Endrin	0.1	0.004
		Endrin aldehyde	0.1	0.016
		Endrin ketone	0.1	0.008
		Heptachlor	0.01	0.004
		Heptachlor epoxide	0.05	0.008
		Methoxychlor	1.0	0.080
		Toxaphene	2.0	0.160

Table A-11. Method Quantitation Limits for PCBs (EPA Method 8082)

Parameter	Method	Analyte	Water (µg/L)	Soil (mg/kg)
PCBs	SW 8082	Aroclor 1016	0.5	0.2
		Aroclor 1221	0.5	0.2
		Aroclor 1232	0.5	0.2
		Aroclor 1242	0.5	0.2
		Aroclor 1248	0.5	0.2
		Aroclor 1254	1.0	0.2
		Aroclor 1260	1.0	0.2

Table A-12. Method Quantitation Limits for Organophosphorus Pesticides (EPA Method 8141A)

Parameter	Method	Analyte	Water (µg/L)	Soil (mg/kg)
Organophosphorus Pesticides	SW8141A	Azinphos-methyl (Guthion)	2.0	0.2
		Bolstar	3.0	0.2
		Chlorpyrifos (Dursban)	2.0	0.2
		Coumaphos	2.0	0.2
		Demeton	10.0	0.6
		Diazinon	3.0	0.2
		Dichlorvos	5.0	0.2
		Dimethoate	5.0	0.2
		Disulfoton	2.0	0.2
		EPN	1.0	0.05
		Ethoprop	5.0	0.2
		Ethyl parathion	3.0	0.2
		Fensulfothion	3.0	0.2
		Fenthion	3.0	0.2
		Malathion	3.0	0.2
		Merphos	5.0	0.2
		Methyl parathion	2.0	0.2
		Mevinphos (Phosdrin)	3.0	0.2
		Naled	5.0	0.2
		Phorate (Thimet)	5.0	0.2
		Ronnel	2.0	0.2
		Sulfotepp	10.0	0.6
		Tetrachlorvinphos	10.0	0.6
		Tokuthion	3.0	0.2
		Trichloronate	4.0	0.2

Table A-13. Method Quantitation Limits for Chlorinated Herbicides (EPA Method 8151A)

Parameter	Method	Analyte	Water (µg/L)	Soil (mg/kg)
Chlorinated Herbicides	SW8151A	2,4-D	1.0	0.025
		2,4-DB	1.0	0.1
		Dalapon	5.0	0.1
		Dicamba	0.1	0.01
		Dichlorprop	0.5	0.05
		Dinoseb (DNBP)	0.5	0.05
		MCPA	100	5.0
		MCPP	100	5.0
		2,4,5-T	0.5	0.025
		2,4,5-TP (Silvex)	0.5	0.025

Table A-14. Method Quantitation Limits for Volatile Organic Compounds by GC/MS (EPA Method 8260B)

Parameter	Method	Analyte	Water* (µg/L)	Soil (mg/kg)
Volatile Organic Compounds	SW8260B	Acetone[2]	10.0	0.1
		Benzene	0.5	0.01
		Bromobenzene	1.0	0.01
		Bromochloromethane	1.0	0.01
		Bromodichloromethane	1.0	0.01
		Bromoform	1.0	0.01
		Bromomethane[1]	2.0	0.02
		2-Butanone (Methyl ethyl ketone)[2]	10.0	0.1
		n-Butylbenzene	1.0	0.01
		sec-Butylbenzene	1.0	0.01
		tert-Butylbenzene	1.0	0.01
		Carbon disulfide[2]	1.0	0.01
		Carbon tetrachloride	1.0	0.01
		Chlorobenzene	1.0	0.01
		Chlorodibromomethane	1.0	0.01
		Chloroethane[1]	2.0	0.02
		Chloroform	1.0	0.01
		Chloromethane[1]	2.0	0.02
		2-Chlorotoluene	1.0	0.01
		4-Chlorotoluene	1.0	0.01
		1,2-Dibromo-3-chloropropane	2.0	0.02
		1,2-Dibromoethane	1.0	0.01
		Dibromomethane	1.0	0.01
		1,2-Dichlorobenzene	1.0	0.01
		1,3-Dichlorobenzene	1.0	0.01
		1,4-Dichlorobenzene	1.0	0.01
		cis-1,4-dichloro-2-butene	5.0	0.05
		trans-1,4-dichloro-2-butene	5.0	0.05
		Dichlorodifluoromethane(Freon® 12)[1]	2.0	0.02
		1,1-Dichloroethane	2.0	0.02
		1,2-Dichloroethane	1.0	0.01

Table A-14. Method Quantitation Limits for Volatile Organic Compounds by GC/MS (EPA Method 8260B)

Parameter	Method	Analyte	Water* (µg/L)	Soil (mg/kg)
Volatile Organic Compounds	SW8260B	1,1-Dichloroethene	1.0	0.01
		cis-1,2-Dichloroethene	1.0	0.01
		trans-1,2-Dichloroethene	1.0	0.01
		1,2-Dichloropropane	1.0	0.01
		1,3-Dichloropropane	1.0	0.01
		2,2-Dichloropropane	1.0	0.01
		1,1-Dichloropropene	2.0	0.02
		cis-1,3-Dichloropropene	0.4	0.01
		trans-1,3-Dichloropropene	0.4	0.01
		1,4-Dioxane	1.0	0.01
		Ethylbenzene	1.0	0.01
		Ethyl methacrylate	2.0	0.02
		Hexachlorobutadiene	1.0	0.01
		2-Hexanone[2]	10	0.1
		Iodomethane	1.0	0.01
		Isopropylbenzene	1.0	0.01
		p-Isopropyltoluene	1.0	0.01
		Methylene Chloride	2	0.02
		4-Methyl-2-pentanone (MIBK)[2]	10	0.1
		Naphthalene	2.0	0.02
		Styrene	1.0	0.01
		1,1,1,2-Tetrachloroethane	1.0	0.01
		1,1,2,2-Tetrachloroethane	1.0	0.01
		Tetrachloroethene(PCE)	1.0	0.01
		Toluene	1.0	0.01
		1,2,3-Trichlorobenzene	1.0	0.01
		1,2,4-Trichlorobenzene	1.0	0.01
		1,1,1-Trichloroethane	1.0	0.01
		1,1,2-Trichloroethane	1.0	0.01
		Trichloroethene	1.0	0.01
		Trichlorofluoromethane(Freon® 11)[1]	1.0	0.01
		1,2,3-Trichloropropane	1.0	0.01
		1,1,2-Trichloro-1,2,2-trifluoroethane (Freon® 113)	4.0	0.04
		1,2,4-Trimethylbenzene	1.0	0.01
		1,3,5-Trimethylbenzene	1.0	0.01
		Vinyl acetate[2]	5.0	0.05
		Vinyl chloride[1]	1.0	0.01
		o-Xylene	1.0	0.01
		m, p-Xylenes	2.0	0.02
Oxygenates	SW8260B	Methyl tertiary butyl ether (MTBE)[2]	1.0	0.01
		Diisopropyl ether (DIPE)[2]	5.0	0.05
		Ethyl tertiary butyl ether (ETBE)[2]	5.0	0.05
		Tertiary amyl methyl ether (TAME)[2]	5.0	0.05

* MQLs listed based on 25 ml purge.
1 Gaseous target analytes
2 Poor purging efficiency

Table A-15. Method Quantitation Limits for Semivolatile Organic Compounds by GC/MS (EPA Method 8270C)

Parameter	Method	Analyte	Water (µg/L)	Soil (mg/kg)
Semivolatile Organic Compounds	SW8270C	Base/Neutral Extractables		
		Aniline	10	0.7
		Benzyl alcohol	10	0.7
		Bis(2-chlorethyl)ether	10	0.7
		Bis(2-chloroisopropyl)ether	20	0.7
		Bis(2-chlorethoxy)methane	10	0.7
		Bis(2-ethylhexyl)phthalate	10	0.7
		4-Bromophenyl phenyl ether	10	0.7
		Butyl benzyl phthalate	10	0.7
		4-Chloroaniline	10	0.7
		2-Chloronaphthalene	10	0.7
		4-Chlorophenyl phenyl ether	10	0.7
		Dibenzofuran	10	0.7
		Di-n-butylphthalate	10	0.7
		1,2-Dichlorobenzene	10	0.7
		1,3-Dichlorobenzene	10	0.7
		1,4-Dichlorobenzene	10	0.7
		3,3'-Dichlorobenzidine	20	0.7
		Diethyl phthalate	10	0.7
		Dimethyl phthalate	10	0.7
		2,4-Dinitrotoluene	10	0.7
		2,6-Dinitrotoluene	10	0.7
		Di-n-octyl phthalate	10	0.7
		Hexachlorobenzene	10	0.7
		Hexachlorobutadiene	10	0.7
		Hexachlorocyclopentadiene	40	0.7
		Hexachloroethane	10	0.7
		Isophorone	10	0.7
		2-Methylnaphthalene	10	0.7
		2-Nitroaniline	50	1.7
		3-Nitroaniline	50	1.7
		4-Nitroaniline	50	1.7
		Nitrobenzene	10	0.7
		N-nitrosodimethylamine	40	0.7
		N-nitrosodiphenylamine	10	0.7
		N-nitrosodipropylamine	10	0.7
		1,2,4-Trichlorobenzene	10	0.7
		Acid Extractables		
		Benzoic Acid	50	1.7
		4-Chloro-3-methylphenol	10	0.7
		2-Chlorophenol	10	0.7
		2,4-Dicholorphenol	10	0.7

Table A-15. Method Quantitation Limits for Semivolatile Organic Compounds by GC/MS (EPA Method 8270C)

Parameter	Method	Analyte	Water (µg/L)	Soil (mg/kg)
Semivolatile Organic Compounds	SW8270C	2,4-Dimethylphenol	10	0.7
		4,6-Dinitro-2-methylphenol	50	1.7
		2,4-Dinitrophenol	50	1.7
		2-Methylphenol	10	0.7
		4-Methylphenol	10	0.7
		2-Nitrophenol	10	0.7
		4-Nitrophenol	50	1.7
		Pentachlorophenol	50	1.7
		Phenol	10	0.7
		2,4,5-Trichlorophenol	50	1.7
		2,4,6-Tricholorphenol	10	0.7
		PAHs in SIM Mode		
		Acenaphthalene	5.0	1.0
		Acenaphthene	5.0	1.0
		Anthracene	5.0	1.0
		Benzo(a)anthracene	0.25	0.05
		Benzo(b)fluroanthene	0.25	0.05
		Benzo(k)fluroanthene	0.50	0.10
		Benzo(g,h,i)perylene	0.5	0.1
		Benzo(a)pyrene	0.25	0.05
		Chrysene	0.5	0.1
		Dibenzo(a,h)anthracene	0.5	0.1
		Fluoranthrene	0.5	0.1
		Fluorene	0.5	0.1
		Indeno(1,2,3-cd)pyrene	0.25	0.05
		Naphthalene	2.5	0.5
		Phenanthrene	1.0	0.2
		Pyrene	1.0	0.2

Table A-16. Method Quantitation Limits for Dioxins and Furans by Low Resolution GC/MS (EPA Method 8280A)

Parameter	Method	Analyte	Water (µg/L)	Soil (ug/kg)
Dioxins and Furans	SW8280A	Dioxins		
		2,3,7,8-TCDD	0.01	0.001
		1,2,3,7,8-PeCDD	0.025	0.0025
		1,2,3,4,7,8-HxCDD	0.025	0.0025
		1,2,3,6,7,8-HxCDD	0.025	0.0025
		1,2,3,7,8,9-HxCDD	0.025	0.0025
		1,2,3,4,6,7,8-HpCDD	0.025	0.0025
		OCDD	0.050	0.01
		Furans		
		2,3,7,8-TCDF	0.010	0.001
		1,2,3,7,8-PeCDF	0.025	0.0025
		2,3,4,7,8-PeCDF	0.025	0.0025
		1,2,3,4,7,8-HxCDF	0.025	0.0025
		1,2,3,6,7,8-HxCDF	0.025	0.0025
		2,3,4,6,7,8-HxCDF	0.025	0.0025
		1,2,3,7,8,9-HxCDF	0.025	0.0025
		1,2,3,4,6,7,8-HpCDF	0.025	0.0025
		1,2,3,4,7,8,9-HpCDF	0.025	0.0025
		OCDF	0.050	0.01

Table A-17. Method Quantitation Limits for Dioxins and Furans by High Resolution GC/MS (EPA Method 8290)

Parameter	Method	Analyte	Water (ng/L)	Soil (ng/kg)
Dioxins and Furans	SW8290	Dioxins		
		2,3,7,8-TCDD	0.02	0.002
		1,2,3,7,8-PeCDD	0.05	0.01
		1,2,3,4,7,8-HxCDD	0.05	0.01
		1,2,3,6,7,8-HxCDD	0.05	0.01
		1,2,3,7,8,9-HxCDD	0.05	0.01
		1,2,3,4,6,7,8- HpCDD	0.05	0.01
		OCDD	0.1	0.01
		Furans		
		2,3,7,8-TCDF	0.02	0.002
		1,2,3,7,8-PeCDF	0.05	0.01
		2,3,4,7,8-PeCDF	0.05	0.01
		1,2,3,4,7,8-HxCDF	0.05	0.01
		1,2,3,6,7,8-HxCDF	0.05	0.01
		2,3,4,6,7,8-HxCDF	0.05	0.01
		1,2,3,7,8,9-HxCDF	0.05	0.01
		1,2,3,4,6,7,8-HpCDF	0.05	0.01
		1,2,3,4,7,8,9-HpCDF	0.05	0.01
		OCDF	0.1	0.01

Table A-18. Method Quantitation Limits for Polynuclear Aromatic Hydrocarbons by HPLC (EPA Method 8310)

Parameter	Method	Analyte	Water (µg/L)	Soil (mg/kg)
Polynuclear Aromatic Hydrocarbons	SW8310	Acenaphthalene	5.0	1.0
		Acenaphthene	5.0	1.0
		Anthracene	5.0	1.0
		Benzo(a)anthracene	.25	0.05
		Benzo(b)fluoranthene	0.25	0.05
		Benzo(k)fluoranthene	.0.50	0.1
		Benzo(g,h,i)perylene	0.5	0.1
		Benzo(a)pyrene	.25	0.05
		Chrysene	0.5	0.1
		Dibenzo(a,h)anthracene	0.5	0.1
		Fluoranthrene	0.5	0.1
		Fluorene	0.5	0.1
		Indeno(1,2,3-cd)pyrene	0.25	0.05
		Naphthalene	2.5	0.5
		Phenanthrene	1.0	0.2
		Pyrene	1.0	0.2

Table A-19. Method Quantitation Limits for Nitroaromatics and Nitroamines by HPLC (EPA Method 8330)

Parameter	Method	Analyte	Water (µg/L)	Soil (mg/kg)
Nitroaromatics and Nitroamines	SW8330	2-Am-DNT	0.0008	0.4
		4-Am-DNT	0.0008	0.4
		1,3-Dinitrobenzene	0.0008	0.4
		2,4-Dinitrotoluene	0.0008	0.4
		2,6-Dinitrotoluene	0.0008	0.4
		HMX	0.0016	0.8
		Nitrobenzene	0.0008	0.4
		2-Nitrotoluene	0.0016	0.8
		3-Nitrotoluene	0.0008	0.4
		4-Nitrotoluene	0.0016	0.8
		RDX	0.0008	0.4
		Tetryl	0.0016	0.8
		sym-Trinitrobenzene	0.0008	0.4
		2,4,6-Trinitrotoluene	0.0008	0.4

Table A-20. Method Quantitation Limits for Nitroglycerine by HPLC (EPA Method 8332)

Parameter	Method	Water (µg/L)	Soil (mg/kg)
Nitroglycerine	SW8332	10.0	0.25

Table A-21. Method Quantitation Limits for Total Recoverable Petroleum Hydrocarbons (EPA Method 8440/1664)

Parameter	Method	Analyte	Water (mg/L)	Soil (mg/kg)
Total Recoverable Petroleum Hydrocarbons	SW8440 E1664	Total Recoverable Petroleum Hydrocarbons	5.0	20

Table A-22. Method Quantitation Limits for Total Cyanide (EPA Method 9012A or 9014)

Parameter	Method	Water (mg/L)	Soil (mg/kg)
Total Cyanide	SW9012A	0.01	0.5

Table A-23. Method Quantitation Limits for Total Organic Carbon (EPA Method 9060)

Parameter	Method	Water (mg/L)	Soil (mg/kg)
Total Organic Carbon	SW9060	5.0	N/A

Table A-24. Method Quantitation Limits for Total Dissolved Solids (EPA Method 160.1)

Parameter	Method	Water (mg/L)	Soil (mg/kg)
Total Dissolved Solids	160.1	20	N/A

Table A-25. Method Quantitation Limits for Anions by Ion Chromatography (EPA Method 300.0/9056)

Parameter	Method	Analyte	Water (mg/L)	Soil (mg/kg)
Anions	E300.0	Chloride	0.5	5.0
		Nitrite	0.2	2.0
		Nitrate	0.2	2.0
		Sulfate	2.0	20.0

Table A-26. Method Quantitation Limits for Alkalinity (EPA310/Standard Methods 2320C)

Parameter	Method	Analyte	Water (mg/L)	Soil (mg/kg)
Alkalinity	SM2320C	Bicarbonate Alkalinity	5.0	10
		Carbonate Alkalinity	5.0	10
		Hydroxide Alkalinity	5.0	10
		Total alkalinity	5.0	10

Table A-27. Method Quantitation Limits for Total Organic Carbon (Walkley Black)

Parameter	Method	Water (mg/L)	Soil (percent)
Total Organic Carbon	WBLACK	N/A	0.05

Table A-28. Method Quantitation Limits for Volatile Organic Compounds in Ambient Air and Soil Gas (EPA Method TO-15)[2]

Parameter	Method	Soil Gas (ppbv)
Acetone[1]	TO-15	2.0
Benzene	TO-15	0.5
Bromodichloromethane[1]	TO-15	2.0
Bromoform[1]	TO-15	2.0
Bromomethane	TO-15	0.5
2-Butanone (Methyl ethyl ketone)[1]	TO-15	2.0
1,3-Butadiene[1]	TO-15	2.0
Carbon Disulfide[1]	TO-15	2.0
Carbon Tetrachloride	TO-15	0.5
Chlorobenzene	TO-15	0.5
Chloroethane	TO-15	0.5
Chloroform	TO-15	0.5
Chloromethane	TO-15	0.5
3-Chloro-1-propene	TO-15	0.5
Chlorotoluene	TO-15	0.5
Cyclohexane[1]	TO-15	2.0
Dibromochloromethane[1]	TO-15	2.0
1,2 Dichlorobenzene	TO-15	0.5
1,3 Dichlorobenzene	TO-15	0.5
1,4 Dichlorobenzene	TO-15	0.5
Dichlorodifluoromethane (Freon 12)	TO-15	0.5
1,1 Dichloroethane	TO-15	0.5
1,2 Dichloroethane	TO-15	0.5
1,1 Dichloroethene	TO-15	0.5
Cis-1,2 Dichloroethene	TO-15	0.5
Trans-1,2 Dichloroethene1	TO-15	2.0
1,2 Dichloropropane	TO-15	0.5
Cis-1,2 Dichloropropene	TO-15	0.5
Cis-1,3 Dichloropropene	TO-15	0.5
trans-1,2 Dichloropropene	TO-15	0.5
trans-1,3 Dichloropropene	TO-15	0.5
1,2 Dichloro-1,1,2,2-tetraflouroethane (Freon 114)	TO-15	0.5
1,4-Dioxane[1]	TO-15	2.0
Ethanol[1]	TO-15	2.0
Ethylbenzene	TO-15	0.5
Ethylene dibromide	TO-15	0.5
4-Ethyltoluene[1]	TO-15	2.0
Heptane[1]	TO-15	2.0
Hexachlorobutadiene	TO-15	0.5

Table A-28. Method Quantitation Limits for Volatile Organic Compounds in Ambient Air and Soil Gas (EPA Method TO-15)[2] Continued

Parameter	Method	Soil Gas (ppbv)
Hexane1	TO-15	2.0
2-Hexanone1	TO-15	2.0
Methylene chloride	TO-15	0.5
4-Methyl-2-pentanone1	TO-15	2.0
Methyl tert-butyl ether1	TO-15	2.0
2-Propanol1	TO-15	2.0
Propylene1	TO-15	2.0
Styrene	TO-15	0.5
1,1,2,2-Tetrachloroethane	TO-15	0.5
Tetrachloroethene	TO-15	0.5
Tetrahydrofuran1	TO-15	2.0
Toluene	TO-15	0.5
1,2,4-Trichlorobenzene	TO-15	0.5
1,1,1-Trichloroethane	TO-15	0.5
1,1,2-Trichloroethane	TO-15	0.5
Trichloroethene	TO-15	0.5
Trichlorofluoromethane (Freon 11)	TO-15	0.5
1,2,4-Trimethylbenzene	TO-15	0.5
1,3,5-Trimethylbenzene	TO-15	0.5
1,1,2 Trichloro-1,2,2-triflouroethane (Freon 113)	TO-15	0.5
Vinyl Acetate1	TO-15	2.0
Vinyl Chloride	TO-15	0.10
o-xylene	TO-15	0.5
m- and p-xylene	TO-15	0.5

1 Poor Performer (e.g., polar compound) per Air Toxics internal LQAPP.
2 Maximum Quantitation limits listed are prior to dilution caused by pressurization of Summa® canisters.

Appendix B
Summary of Calibration, Internal Quality Control, and Corrective Action Procedures

C

Appendix C

CONTROL LIMITS

FOR MATRIX SPIKES, MATRIX SPIKE DUPLICATES, SURROGATE SPIKES, LABORATORY REPLICATES, LABORATORY CONTROL SAMPLES, AND LABORATORY CONTROL SAMPLE DUPLICATES

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Table C-1. Control Limits for Matrix Spikes, Matrix Spike Duplicates, and Laboratory Control Samples for Metals by ICP (EPA Method 6010B)

		Benicia Arsenal Control Limits			
		Percent Recovery (%)		Relative Percent Difference (%)	
		LCS/LCSD/MS/MSD		LCSD/MSD	
Analytical Method	Spiking Compounds	Water	Soil	Water	Soil
SW6010B	Aluminum	80-120	80-120*	20	20
	Antimony	N/A	70-125	N/A	20
	Barium	80-120	80-120	20	20
	Beryllium	80-120	80-120	20	20
	Cadmium (Trace)	80-120	80-120	20	20
	Calcium	80-120*	80-120*	20	20
	Chromium	80-120	80-120	20	20
	Cobalt	80-120	80-120	20	20
	Copper	80-120	80-120	20	20
	Iron	80-120	80-120*	20	20
	Lead (Trace)	80-120	80-120	20	20
	Magnesium	80-120*	80-120*	20	20
	Manganese	80-120	80-120*	20	20
	Molybdenum	80-120	80-120	20	20
	Nickel	80-120	80-120	20	20
	Potassium	80-120*	80-120*	20	20
	Silver	80-120	80-120	20	20
	Sodium	80-120*	80-120*	20	20
	Tin	80-120	80-120	20	20
	Vanadium	80-120	80-120	20	20
	Zinc	80-120	80-120	20	20

* Note: These analytes are not required for spiking for soil MS/MSD analyses unless specifically required by project-specific DQOs.

Table C-2. Control Limits for Matrix Spikes, Matrix Spike Duplicates and Laboratory Control Samples for Metals by ICP/MS (EPA Method 6020)

		Benicia Arsenal Control Limits			
		Percent Recovery (%)		Relative Percent Difference (%)	
		LCS/LCSD/MS/MSD		LCSD/MSD	
Analytical Method	Spiking Compounds	Water	Soil	Water	Soil
SW6020	Aluminum	80-120	80-120	20	20
	Antimony	80-120	80-120	20	20
	Arsenic	80-120	80-120	20	20
	Barium	80-120	80-120	20	20
	Beryllium	80-120	80-120	20	20
	Cadmium	80-120	80-120	20	20
	Calcium	80-120	80-120	20	20
	Chromium	80-120	80-120	20	20
	Cobalt	80-120	80-120	20	20
	Copper	80-120	80-120	20	20
	Lead	80-120	80-120	20	20
	Magnesium	80-120	80-120	20	20
	Manganese	80-120	80-120	20	20
	Molybdenum	80-120	80-120	20	20
	Nickel	80-120	80-120	20	20
	Potassium	80-120	80-120	20	20
	Silver	80-120	80-120	20	20
	Sodium	80-120	80-120	20	20
	Thallium	80-120	80-120	20	20
	Tin	80-120	80-120	20	20
	Vanadium	80-120	80-120	20	20
	Zinc	80-120	80-120	20	20

Table C-3. Control Limits for Matrix Spikes, Matrix Spike Duplicates and Laboratory Control Samples for Metals by GFAA, Mercury by CVAA, and Organic Lead (7000 Series Methods)

		Benicia Arsenal Control Limits			
		Percent Recovery (%)		Relative Percent Difference (%)	
		LCS/LCSD/MS/MSD		LCSD/MSD	
Analytical Method	Spiking Compounds	Water	Soil	Water	Soil
SW7041	Antimony	80-120	N/A	20	20
SW7060A	Arsenic	80-120	80-120	20	20
SW7131A	Cadmium	80-120	80-120	20	20
LUFT/SW7420	Lead, organic	65-135	65-135	30	30
SW7421	Lead	80-120	80-120	20	20
SW7470A (water) SW7471A (soil)	Mercury	80-120	80-120	20	20
SW7740	Selenium	80-120	80-120	20	20
SW7761	Silver	80-120	80-120	20	20
SW7841	Thallium	80-120	80-120	20	20

Table C-4. Control Limits for Matrix Spikes, Matrix Spike Duplicates, and Laboratory Control Samples for Hexavalent Chromium (EPA Method 7196A)

		Benicia Arsenal Control Limits			
		Percent Recovery (%)		Relative Percent Difference (%)	
		LCS/LCSD/MS/MSD		LCSD/MSD	
Analytical Method	Spiking Compounds	Water	Soil	Water	Soil
SW7196A	Hexavalent Chromium	75-125	75-125	20	20

Table C-5. Control Limits for Matrix Spikes, Matrix Spike Duplicates, Surrogate Spikes, and Laboratory Control Samples for Total Petroleum Hydrocarbons by GC (EPA Method 8015B)

		Benicia Arsenal Control Limits			
		Percent Recovery (%)		Relative Percent Difference (%)	
		LCS/LCSD/MS/MSD		LCSD/MSD	
Analytical Method	Spiking Compounds	Water	Soil	Water	Soil
SW8015B	Gasoline	65-135	60-140	30	30
	Surrogates:				
	4-BFB	65-135	65-135	N/A	N/A
	a,a,a-TFT	65-135	65-135	N/A	N/A
	Diesel	60-140	50-150	30	40
	Surrogates:				
	o-Terphenyl	60-140	50-150	N/A	N/A
	Benzo(a)pyrene	60-140	50-150	N/A	N/A

Note:
Surrogate standards may vary for different laboratories. A minimum of one surrogate will be used.

Table C-6. Control Limits for Matrix Spikes, Matrix Spike Duplicates, Surrogate Spikes, and Laboratory Control Samples for Aromatic and Halogenated Volatile Organics by GC (EPA Method 8021B)

		Benicia Arsenal Control Limits			
		Percent Recovery (%)		Relative Percent Difference (%)	
		LCS/LCSD/MS/MSD		LCSD/MSD	
Analytical Method	Spiking Compounds	Water	Soil	Water	Soil
SW8021B	Benzene	65-135	65-135	30	30
	Ethylbenzene	65-135	65-135	30	30
	Toluene	65-135	65-135	30	30
	m,p-Xylenes	65-135	65-135	30	30
	o-Xylenes	65-135	65-135	30	30
	Bromodichloromethane	65-135	65-135	30	30
	Bromoform	65-135	65-135	30	30
	Bromomethane[1]	65-135	65-135	30	30
	Carbon tetrachloride	65-135	65-135	30	30
	Chlorobenzene	65-135	65-135	30	30
	Chloroethane[1]	65-135	65-135	30	30

Table C-6. Control Limits for Matrix Spikes, Matrix Spike Duplicates, Surrogate Spikes, and Laboratory Control Samples for Aromatic and Halogenated Volatile Organics by GC (EPA Method 8021B) (Continued)

		Benicia Arsenal Control Limits			
		Percent Recovery (%)		Relative Percent Difference (%)	
		LCS/LCSD/MS/MSD		LCSD/MSD	
Analytical Method	Spiking Compounds	Water	Soil	Water	Soil
SW8021B	Chloroform	65-135	65-135	30	30
	Chloromethane[1]	65-135	65-135	30	30
	Dibromochloromethane	65-135	65-135	30	30
	1,2-Dichlorobenzene	65-135	65-135	30	30
	1,3-Dichlorobenzene	65-135	65-135	30	30
	1,4-Bichlorobenzene	65-135	65-135	30	30
	Dichlorodifluoromethane[1]	65-135	65-135	30	30
	1,1-Dichloroethane	65-135	65-135	30	30
	1,2-Dichloroethane	65-135	65-135	30	30
	1,1-Dichloroethene	65-135	65-135	30	30
	trans-1,2-Dichloroethene	65-135	65-135	30	30
	1,2-Dichloropropane	65-135	65-135	30	30
	cis-1,3-Dichloropropene	65-135	65-135	30	30
	trans-1,3-Dichloropropene	65-135	65-135	30	30
	Methyl tert-butyl ether (MTBE)	65-135	65-135	30	30
	Methylene Chloride	65-135	65-135	30	30
	1,1,2,2-Tetrachloroethane	65-135	65-135	30	30
	Tetrachloroethene	65-135	65-135	30	30
	1,1,1-Trichloroethane	65-135	65-135	30	30
	1,1,2-Trichloroethane	65-135	65-135	30	30
	Trichlorofluoromethane[1]	65-135	65-135	30	30
	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	65-135	65-135	30	30
	Trichloroethene	65-135	65-135	30	30
	Vinyl chloride[1]	65-135	65-135	30	30
	Surrogates[2]:				
	a,a,a-TFT	65-135	65-135	N/A	N/A
	Bromofluorobenzene	65-135	65-135	N/A	N/A
	2-Bromo-1-chloropropane	65-135	65-135	N/A	N/A
	1,4-Dichlorobutane	65-135	65-135	N/A	N/A

Notes:
1 Gaseous target analytes
2 At least 2 surrogates shall be used. Laboratory may use different surrogate as long as minimum accuracy limits are met.

Table C-7. Control Limits for Matrix Spikes, Matrix Spike Duplicates, Surrogate Spikes, and Laboratory Control Samples for Phenols by GC (EPA Method 8041)

		Benicia Arsenal Control Limits			
		Percent Recovery (%)		Relative Percent Difference (%)	
		LCS/LCSD/MS/MSD		LCSD/MSD	
Analytical Method	Spiking Compounds	Water	Soil	Water	Soil
SW8041	4-Chloro-3-methylphenol	65-135	65-135	30	30
	2-Chlorophenol	65-135	65-135	30	30
	2,4-Dichlorophenol	65-135	65-135	30	30
	2,4-Dimethylphenol	65-135	65-135	30	30
	4,6-Dinitro-2-methylphenol	65-135	65-135	30	30
	2,4-Dinitrophenol	65-135	65-135	30	30
	2-Nitrophenol	65-135	65-135	30	30
	4-Nitrophenol	65-135	65-135	30	30
	Pentachlorophenol	65-135	65-135	30	30
	Phenol	65-135	65-135	30	30
	2,4,6-Trichlorophenol	65-135	65-135	30	30
	Surrogate:				
	2,4-Dibromophenol	65-135	65-135	N/A	N/A

Table C-8. Control Limits for Matrix Spikes, Matrix Spike Duplicates, Surrogate Spikes, and Laboratory Control Samples for Pesticides by GC (EPA Method 8081A)

		Benicia Arsenal Control Limits			
		Percent Recovery (%)		Relative Percent Difference (%)	
		LCS / LCSD / MS / MSD		LCSD / MSD	
Analytical Method	Spiking Compounds	Water	Soil	Water	Soil
SW8081A	Aldrin	50-145	50-145	40	40
	a-BHC	50-145	50-145	40	40
	b-BHC	50-145	50-145	40	40
	d-BHC	50-145	50-145	40	40
	g-BHC (Lindane)	50-145	50-145	40	40
	a-Chlordane	50-145	50-145	40	40
	g-Chlordane	50-145	50-145	40	40
	4,4'-DDD	50-145	50-145	40	40
	4,4'-DDE	50-145	50-145	40	40
	4,4'-DDT	50-145	50-145	40	40
	Dieldrin	50-145	50-145	40	40
	Endosulfan I	50-145	50-145	40	40
	Endosulfan II	50-145	50-145	40	40
	Endosulfan Sulfate	50-145	50-145	40	40
	Endrin	50-145	50-145	40	40
	Endrin Aldehyde	50-145	50-145	40	40
	Endrin Ketone	50-145	50-145	40	40
	Heptachlor	50-145	50-145	40	40
	Heptachlor Epoxide	50-145	50-145	40	40
	Methoxychlor	50-145	50-145	40	40
	Surrogates:				
	Decachlorobiphenyl	50-145	50-145	N/A	N/A
	Tetrachloro-m-xylene	50-145	50-145	N/A	N/A

Table C-9. Control Limits for Matrix Spikes, Matrix Spike Duplicates, Surrogate Spikes, and Laboratory Control Samples for PCBs by GC (EPA Method 8082)

		Benicia Arsenal Control Limits			
		Percent Recovery (%)		Relative Percent Difference (%)	
		LCS / LCSD / MS / MSD		LCSD / MSD	
Analytical Method	Spiking Compounds	Water	Soil	Water	Soil
SW8082	1:1 mixture of Aroclor 1016 and Aroclor 1260	40-140	40-140	40	40
	Surrogates:				
	Decachlorobiphenyl	40-140	40-140	N/A	N/A
	Tetrachloro-m-xylene	40-140	40-140	N/A	N/A

Table C-10. Control Limits for Matrix Spikes, Matrix Spike Duplicates, Surrogate Spikes, and Laboratory Control Samples for Organophosphorus Pesticides by GC (EPA Method 8141A)

		Benicia Arsenal Control Limits			
		Percent Recovery (%)		Relative Percent Difference (%)	
		LCS/LCSD/MS/MSD		LCSD/MSD	
Analytical Method	Spiking Compounds	Water	Soil	Water	Soil
SW8141A	Azinphos-methyl (Guthion)	40-140	40-140	40	40
	Bolstar	40-140	40-140	40	40
	Chlorpyrifos (Dursban)	40-140	40-140	40	40
	Coumaphos	40-140	40-140	40	40
	Demeton	40-140	40-140	40	40
	Diazinon	40-140	40-140	40	40
	Dichlorvos	40-140	40-140	40	40
	Dimethoate	40-140	40-140	40	40
	Disulfoton	40-140	40-140	40	40
	EPN	40-140	40-140	40	40
	Ethoprop	40-140	40-140	40	40
	Ethyl parathion	40-140	40-140	40	40
	Fensulfothion	40-140	40-140	40	40
	Fenthion	40-140	40-140	40	40
	Malathion	40-140	40-140	40	40
	Merphos	40-140	40-140	40	40
	Methyl parathion	40-140	40-140	40	40
	Mevinphos (Phosdrin)	40-140	40-140	40	40
	Naled	40-140	40-140	40	40
	Phorate (Thimet)	40-140	40-140	40	40
	Ronnel	40-140	40-140	40	40
	Sulfotepp	40-140	40-140	40	40
	Tetrachlorvinphos	40-140	40-140	40	40
	Tokuthion	40-140	40-140	40	40
	Trichloronate	40-140	40-140	40	40
	Surrogate:				
	Ethion	40-140	40-140	N/A	N/A

Table C-11. Control Limits for Matrix Spikes, Matrix Spike Duplicates, Surrogate Spikes, and Laboratory Control Samples for Chlorinated Herbicides by GC (EPA Method 8151A)

		Benicia Arsenal Control Limits			
		Percent Recovery (%)		Relative Percent Difference (%)	
		LCS/LCSD/MS/MSD		LCSD/MSD	
Analytical Method	Spiking Compounds	Water	Soil	Water	Soil
SW8151A	2,4-D	55-135	55-135	30	40
	2,4-DB	55-135	55-135	30	40
	Dalapon	55-135	55-135	30	40
	Dicamba	55-135	55-135	30	40
	Dichlorprop	55-135	55-135	30	40
	Dinoseb (DNBP)	55-135	55-135	30	40
	MCPA	55-135	55-135	30	40
	MCPP	55-135	55-135	30	40
	2,4,5-T	55-135	55-135	30	40
	2,4,5-TP (Silvex)	55-135	55-135	30	40
	Surrogate:				
	2,4-DCAA	55-135	55-135	N/A	N/A

Table C-12. Control Limits for Matrix Spikes, Matrix Spike Duplicates, Surrogate Spikes, and Laboratory Control Samples for Volatile Organic Compounds by GC/MS (EPA Method 8260B)

		Benicia Arsenal Control Limits			
		Percent Recovery (%)		Relative Percent Difference (%)	
		LCS/LCSD/MS/MSD		LCSD/MSD	
Analytical Method	Spiking Compounds	Water	Soil	Water	Soil
SW8260B	Acetone[2]	65-135	65-135	30	30
	Benzene	70-130	70-130	25	25
	Bromobenzene	70-130	70-130	25	25
	Bromochloromethane	70-130	70-130	25	25
	Bromodichloromethane	70-130	70-130	25	25
	Bromoform	70-130	70-130	25	25
	Bromomethane[1]	70-130	70-130	25	25
	2-Butanone (Methyl ethyl ketone [MEK])[2]	65-135	65-135	30	30
	n-Butylbenzene	70-130	70-130	25	25
	sec-Butylbenzene	70-130	70-130	25	25
	tert-Butylbenzene	70-130	70-130	25	25
	Carbon disulfide[2]	65-135	65-135	30	30
	Carbon tetrachloride	70-130	70-130	25	25
	Chlorobenzene	70-130	70-130	25	25
	Chlorodibromomethane	70-130	70-130	25	25
	Chloroethane[1]	70-130	70-130	25	25
	Chloroform	70-130	70-130	25	25
	Chloromethane[1]	70-130	70-130	25	25
	2-Chlorotoluene	70-130	70-130	25	25
	4-Chlorotoluene	70-130	70-130	25	25
	1,2-Dibromo-3-chloropropane	70-130	70-130	25	25
	1,2-Dibromoethane	70-130	70-130	25	25
	Dibromomethane	70-130	70-130	25	25
	1,2-Dichlorobenzene	70-130	70-130	25	25
	1,3-Dichlorobenzene	70-130	70-130	25	25
	1,4-Dichlorobenzene	70-130	70-130	25	25
	cis-1,4-dichloro-2-butene	65-135	65-135	30	30
	trans-1,4-dichloro-2-butene	65-135	65-135	30	30
	Dichlorodifluoromethane(Freon® 12)[1]	70-130	70-130	25	25
	1,1-Dichloroethane	70-130	70-130	25	25
	1,2-Dichloroethane	70-130	70-130	25	25
	1,1-Dichloroethene	70-130	70-130	25	25
	cis-1,2-Dichloroethene	70-130	70-130	25	25
	trans-1,2-Dichloroethene	70-130	70-130	25	25
	1,2-Dichloropropane	70-130	70-130	25	25
	1,3-Dichloropropane	70-130	70-130	25	25
	2,2-Dichloropropane	70-130	70-130	25	25
	1,1-Dichloropropene	70-130	70-130	25	25
	cis-1,3-Dichloropropene	70-130	70-130	25	25
	trans-1,3-Dichloropropene	70-130	70-130	25	25

Table C-12. Control Limits for Matrix Spikes, Matrix Spike Duplicates, Surrogate Spikes, and Laboratory Control Samples for Volatile Organic Compounds by GC/MS (EPA Method 8260B) (Continued)

		Benicia Arsenal Control Limits			
		Percent Recovery (%)		Relative Percent Difference (%)	
		LCS/LCSD/MS/MSD		LCSD/MSD	
Analytical Method	Spiking Compounds	Water	Soil	Water	Soil
SW8260B	1,4-Dioxane	65-135	65-135	30	30
	Ethylbenzene	70-130	70-130	25	25
	Ethyl methacrylate[2]	65-135	65-135	30	30
	Hexachlorobutadiene	70-130	70-130	25	25
	2-Hexanone[2]	65-135	65-135	30	30
	Iodomethane	70-130	70-130	25	25
	Isopropylbenzene	70-130	70-130	25	25
	p-Isopropyltoluene	70-130	70-130	25	25
	Methylene Chloride	65-135	65-135	30	30
	4-Methyl-2-pentanone (MIBK)[2]	65-135	65-135	30	30
	Naphthalene	70-130	70-130	25	25
	Styrene	70-130	70-130	25	25
	1,1,1,2-Tetrachloroethane	70-130	70-130	25	25
	1,1,2,2-Tetrachloroethane	70-130	70-130	25	25
	Tetrachloroethene	70-130	70-130	25	25
	Toluene	70-130	70-130	25	25
	1,2,3-Trichlorobenzene	70-130	70-130	25	25
	1,2,4-Trichlorobenzene	70-130	70-130	25	25
	1,1,1-Trichloroethane	70-130	70-130	25	25
	1,1,2-Trichloroethane	70-130	70-130	25	25
	Trichloroethene	70-130	70-130	25	25
	Trichlorofluoromethane(Freon® 11)[1]	70-130	70-130	25	25
	1,2,3-Trichloropropane	70-130	70-130	25	25
	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	70-130	70-130	25	25
	1,2,4-Trimethylbenzene	70-130	70-130	25	25
	1,3,5-Trimethylbenzene	70-130	70-130	25	25
	Vinyl acetate[2]	65-135	65-135	30	30
	Vinyl chloride[1]	65-135	65-135	30	30
	o-Xylene	70-130	70-130	25	25
	m, p-Xylenes	70-130	70-130	25	25
	Methyl tertiary butyl ether[2] (MTBE)	65-135	65-135	30	30
	Diisopropyl ether[2] (DIPE)	65-135	65-135	30	30
	Ethyl tertiary butyl ether[2] (ETBE)	65-135	65-135	30	30
	Tertiary amyl methyl ether[2] (TAME)	65-135	65-135	30	30
	Surrogates:				
	4-Bromofluorobenzene	70-130	70-130	N/A	N/A
	1,2-Dichloroethane-d4	70-130	70-130	N/A	N/A
	Toluene-d8	70-130	70-130	N/A	N/A

Note: 1. Gaseous target analytes
2. Poor purging efficiency

Table C-13. Control Limits for Matrix Spikes, Matrix Spike Duplicates, Surrogate Spikes, and Laboratory Control Samples for Semivolatile Organic Compounds by GC/MS (EPA Method 8270C)

		Benicia Arsenal Control Limits			
		Percent Recovery (%)		Relative Percent Difference (%)	
		LCS/LCSD/MS/MSD		LCSD/MSD	
Analytical Method	Spiking Compounds	Water	Soil	Water	Soil
SW8270C	**Base/Neutral Extractables**				
	Aniline	35-125	35-125	35	35
	Benzyl alcohol	45-125	30-125	30	40
	Bis(2-chloroethyl)ether	25-125	25-125	40	40
	Bis(2-chloroisopropyl)ether	25-125	25-125	40	40
	Bis(2-chloroethoxy)methane	25-125	25-125	40	40
	Bis(2-ethylhexyl)phthalate	40-130	45-130	35	35
	4-Bromophenyl phenyl ether	35-125	35-125	35	35
	Butyl benzyl phthalate	40-130	45-130	35	35
	4-Chloroaniline	20-125	20-125	40	40
	2-Chloronaphthalene	35-125	35-125	35	35
	4-Chlorophenyl phenyl ether	35-125	35-125	35	35
	Dibenzofuran	50-125	50-125	30	30
	Di-n-butylphthalate	40-130	45-130	35	35
	1,2-dichlorobenzene	35-125	35-125	35	35
	1,3-Dichlorobenzene	35-125	35-125	35	35
	1,4-Dichlorobenzene	35-125	35-125	35	35
	3,3'-Dichlorobenzidine	20-125	20-125	40	40
	Diethyl phthalate	40-130	45-130	35	35
	Dimethyl phthalate	40-130	45-130	35	35
	2,4-Dinitrotoluene	40-125	40-125	35	35
	2,6-Dinitrotoluene	40-125	40-125	35	35
	Di-n-octyl phthalate	40-130	45-130	35	35
	Hexachlorobenzene	35-125	35-125	35	35
	Hexachlorobutadiene	25-125	25-125	40	40
	Hexachlorocyclopentadiene	25-125	25-125	40	40
	Hexachloroethane	25-125	25-125	40	40
	Isophorone	45-125	30-125	30	40
	2-Methylnaphthalene	40-130	40-130	35	35
	2-Nitroaniline	40-125	40-125	35	35
	3-Nitroaniline	40-125	40-125	35	35
	4-Nitroaniline	40-125	40-125	35	35
	Nitrobenzene	40-125	40-125	35	35
	N-nitrosodimethylamine	35-125	35-125	35	35
	N-nitrosodiphenylamine	35-125	35-125	35	35
	N-nitrosodipropylamine	35-125	35-125	35	35
	1,2,4-Trichlorobenzene	35-125	35-125	35	35
	Acid Extractables				
	Benzoic Acid	20-125	20-125	40	40
	4-Chloro-3-methylphenol	20-125	20-125	40	40
	2-Chlorophenol	20-125	20-125	40	40
	2,4-Dicholorphenol	20-125	20-125	40	40
	2,4-Dimethylphenol	20-125	20-125	40	40
	4,6-Dinitro-2-methylphenol	20-125	20-125	40	40

Table C-13. Control Limits for Matrix Spikes, Matrix Spike Duplicates, Surrogate Spikes, and Laboratory Control Samples for Semivolatile Organic Compounds by GC/MS (EPA Method 8270C) (Continued)

		Benicia Arsenal Control Limits			
		Percent Recovery (%)		Relative Percent Difference (%)	
		LCS/LCSD/MS/MSD		LCSD/MSD	
Analytical Method	Spiking Compounds	Water	Soil	Water	Soil
SW8270C	2,4-Dinitrophenol	20-125	20-125	40	40
	2-Methylphenol	20-125	20-125	40	40
	4-Methylphenol	20-125	20-125	40	40
	2-Nitrophenol	20-125	20-125	40	40
	4-Nitrophenol	20-125	20-125	40	40
	Pentachlorophenol	20-125	20-125	40	40
	Phenol	20-125	20-125	40	40
	2,4,5-Trichlorophenol	20-125	20-125	40	40
	2,4,6-Tricholorphenol	20-125	20-125	40	40
	PAHs in SIM Mode				
	Acenaphthalene	50-125	45-125	30	30
	Acenaphthene	50-125	45-125	30	30
	Anthracene	50-125	45-125	30	30
	Benzo(a)anthracene	50-125	45-125	30	30
	Benzo(b)fluroanthene	50-125	45-125	30	30
	Benzo(k)fluroanthene	50-125	45-125	30	30
	Benzo(g,h,I)perylene	50-125	45-125	30	30
	Benzo(a)pyrene	50-125	45-125	30	30
	Chrysene	50-125	45-125	30	30
	Dibenzo(a,h)anthracene	50-125	45-125	30	30
	Fluoranthene	50-125	45-125	30	30
	Fluorene	50-125	45-125	30	30
	Indeno(1,2,3-cd)pyrene	50-125	45-125	30	30
	Naphthalene	50-125	45-125	30	30
	Phenanthrene	50-125	45-125	30	30
	Pyrene	50-125	45-125	30	30
	Surrogates:				
	2-Fluorobiphenyl	35-135	35-135	N/A	N/A
	2-Fluorophenol	20-125	20-125	N/A	N/A
	Nitrobenzene-d5	40-125	40-125	N/A	N/A
	Phenol-d5	20-125	20-125	N/A	N/A
	Terphenyl-d14	35-135	35-135	N/A	N/A
	2,4,6-Tribromophenol	20-125	20-125	N/A	N/A

Table C-14. Control Limits for Matrix Spikes, Matrix Spike Duplicates, Internal Standards, and Laboratory Control Samples for Dioxins and Furans by Low Resolution GC/MS (EPA Method 8280A)

		Benicia Arsenal Control Limits				
		Percent Recovery (%)		Relative Percent Difference (%)		Isotopic Ratios
		LCS/LCSD/MS/MSD		LCSD/MSD		All Samples
Analytical Method	Spiking Compounds	Water	Soil	Water	Soil	Water and Soil
SW8280A	2,3,7,8-TCDD	50-150	50-150	40	40	0.65 – 0.89
	2,3,7,8-TCDF	50-150	50-150	40	40	0.65 – 0.89
	1,2,3,7,8-PeCDD	50-150	50-150	40	40	1.32 – 1.78
	1,2,3,7,8-PeCDF	50-150	50-150	40	40	1.32 – 1.78
	1,2,3,6,7,8-HxCDD	50-150	50-150	40	40	1.05 – 1.43
	1,2,3,6,7,8-HxCDF	50-150	50-150	40	40	1.05 – 1.43
	1,2,3,4,6,7,8-HpCDD	50-150	50-150	40	40	0.88 – 1.20
	1,2,3,4,6,7,8-HpCDF	50-150	50-150	40	40	0.88 – 1.20
	OCDD	50-150	50-150	40	40	0.76 – 1.02
	OCDF	50-150	50-150	40	40	0.76 – 1.02
	Internal Standards:					
	^{13}C-2,3,7,8-TCDD	50-150	50-150	40	40	0.65 – 0.89
	^{13}C-2,3,7,8-TCDF	50-150	50-150	40	40	0.65 – 0.89
	^{13}C-1,2,3,6,7,8-HxCDD	50-150	50-150	40	40	1.05 – 1.43
	^{13}C-1,2,3,4,6,7,8-HpCDD	50-150	50-150	40	40	0.88 – 1.20
	^{13}C-OCDD	50-150	50-150	40	40	0.76 – 1.01

Note: Isotopic ratio measurements are also evaluated for data acceptability.

Table C-15. Control Limits for Matrix Spikes, Matrix Spike Duplicates, Internal Standards and Laboratory Control Samples for Dioxins and Furans by High Resolution GC/MS (EPA Method 8290)

		Benicia Arsenal Control Limits				
		Percent Recovery (%)		Relative Percent Difference (%)		Isotopic Ratios
		LCS/LCSD/MS/MSD		LCSD/MSD		All Samples
Analytical Method	Spiking Compounds	Water	Soil	Water	Soil	Water and Soil
SW8290	2,3,7,8-TCDD	60-140	50-150	30	40	0.65 – 0.89
	2,3,7,8-TCDF	60-140	50-150	30	40	0.65 – 0.89
	1,2,3,7,8-PeCDD	60-140	50-150	30	40	1.32 – 1.78
	1,2,3,7,8-PeCDF	60-140	50-150	30	40	1.32 – 1.78
	2,3,4,7,8-PeCDF	60-140	50-150	30	40	1.32 – 1.78
	1,2,3,4,7,8-HxCDD	60-140	50-150	30	40	1.05 – 1.43
	1,2,3,6,7,8-HxCDD	60-140	50-150	30	40	1.05 – 1.43
	1,2,3,7,8,9-HxCDD	60-140	50-150	30	40	1.05 – 1.43
	1,2,3,4,7,8-HxCDF	60-140	50-150	30	40	1.05 – 1.43
	1,2,3,6,7,8-HxCDF	60-140	50-150	30	40	1.05 – 1.43
	1,2,3,7,8,9-HxCDF	60-140	50-150	30	40	1.05 – 1.43
	2,3,4,6,7,8-HxCDF	60-140	50-150	30	40	1.05 – 1.43
	1,2,3,4,6,7,8-HpCDD	60-140	50-150	30	40	0.88 – 1.20
	1,2,3,4,6,7,8-HpCDF	60-140	50-150	30	40	0.88 – 1.20
	1,2,3,4,7,8,9-HpCDF	60-140	50-150	30	40	0.88 – 1.20

Table C-16. Control Limits for Matrix Spikes, Matrix Spike Duplicates, Internal Standards and Laboratory Control Samples for Dioxins and Furans by High Resolution GC/MS (EPA Method 8290) (Continued)

		Benicia Arsenal Control Limits				
		Percent Recovery (%)		Relative Percent Difference (%)		Isotopic Ratios
		LCS/LCSD/MS/MSD		LCSD/MSD		All Samples
Analytical Method	Spiking Compounds	Water	Soil	Water	Soil	Water and Soil
SW8290	OCDD	60-140	50-150	30	40	0.76 – 1.02
	OCDF	60-140	50-150	30	40	0.76 – 1.02
	Internal Standards:					
	13C-2,3,7,8-TCDD	60-140	50-150	30	40	0.65 – 0.89
	^{13}C-2,3,7,8-TCDF	60-140	50-150	30	40	0.65 – 0.89
	^{13}C-1,2,3,7,8-PeCDD	60-140	50-150	30	40	1.32 – 1.78
	^{13}C-1,2,3,7,8-PeCDF	60-140	50-150	30	40	1.32 – 1.78
	^{13}C-1,2,3,6,7,8-HxCDD	60-140	50-150	30	40	1.05 – 1.43
	^{13}C-1,2,3,4,7,8-HxCDF	60-140	50-150	30	40	0.43 – 0.59
	^{13}C-1,2,3,4,6,7,8-HpCDD	60-140	50-150	30	40	0.88 – 1.20
	^{13}C-1,2,3,4,6,7,8-HpCDF	60-140	50-150	30	40	0.37 – 0.51
	^{13}C-OCDD	60-140	50-150	30	40	0.76 – 1.02

Note:
Isotopic ratio measurements are also evaluated for data acceptability.

Table C-17. Control Limits for Matrix Spikes, Matrix Spike Duplicates, Surrogate Spikes, and Laboratory Control Samples for Polynuclear Aromatic Hydrocarbons by HPLC (EPA Method 8310)

		Benicia Arsenal Control Limits			
		Percent Recovery (%)		Relative Percent Difference (%)	
		LCS/LCSD/MS/MSD		LCSD/MSD	
Analytical Method	Spiking Compounds	Water	Soil	Water	Soil
SW8310	Acenaphthalene	40-135	35-135	40	40
	Acenaphthene	40-135	35-135	40	40
	Anthracene	40-135	35-135	40	40
	Benzo(a)anthracene	40-135	35-135	40	40
	Benzo(b)fluoranthene	40-135	35-135	40	40
	Benzo(k)fluoranthene	40-135	35-135	40	40
	Benzo(g,h,i)perylene	40-135	35-135	40	40
	Benzo(a)pyrene	40-135	35-135	40	40
	Chrysene	40-135	35-135	40	40
	Dibenzo(a,h)anthracene	40-135	35-135	40	40
	Fluoranthrene	40-135	35-135	40	40
	Fluorene	40-135	35-135	40	40
	Indeno(1,2,3-cd)pyrene	40-135	35-135	40	40
	Naphthalene	40-135	35-135	40	40
	Phenanthrene	40-135	35-135	40	40
	Pyrene	40-135	35-135	40	40
	Surrogates:				
	p-Terphenyl	40-135	35-135	N/A	N/A
	2-methylnaphthalene	40-135	35-135	N/A	N/A

Note: At least one surrogate must be used

Table C-18. Control Limits for Matrix Spikes, Matrix Spike Duplicates, Surrogate Spikes, and Laboratory Control Samples for Nitroaromatics and Nitroamines by HPLC (EPA Method 8330)

		Benicia Arsenal Control Limits			
		Percent Recovery (%) LCS/LCSD/MS/MSD		Relative Percent Difference (%) LCSD/MSD	
Analytical Method	Spiking Compounds	Water	Soil	Water	Soil
SW8330	2-Am-DNT	50-140	40-140	35	40
	4-Am-DNT	50-140	40-140	35	40
	1,3-Dinitrobenzene	50-140	40-140	35	40
	2,4-Dinitrotoluene	50-140	40-140	35	40
	2,6-Dinitrotoluene	50-140	40-140	35	40
	HMX	50-140	40-140	35	40
	Nitrobenzene	50-140	40-140	35	40
	2-Nitrotoluene	50-140	40-140	35	40
	3-Nitrotoluene	50-140	40-140	35	40
	4-Nitrotoluene	50-140	40-140	35	40
	RDX	50-140	40-140	35	40
	Tetryl	50-140	40-140	35	40
	1,3,5-Trinitrobenzene	50-140	40-140	35	40
	2,4,6-trinitrotoluene	50-140	40-140	35	40
	Surrogate:				
	3,4-dinitrotoluene	50-140	40-140	NA	NA

Table C-19. Control Limits for Matrix Spikes, Matrix Spike Duplicates, and Laboratory Control Samples for Nitroglycerine by HPLC (EPA Method 8332)

		Benicia Arsenal Control Limits			
		Percent Recovery (%) LCS/LCSD/MS/MSD		Relative Percent Difference (%) LCSD/MSD	
Analytical Method	Spiking Compounds	Water	Soil	Water	Soil
SW8332	Nitroglycerine	65-135	65-135	30	30

Table C-20. Control Limits for Matrix Spikes, Matrix Spike Duplicates, Laboratory Replicates, and Laboratory Control Samples for Total Recoverable Hydrocarbons (EPA Method 8440/1664)

		Benicia Arsenal Control Limits			
		Percent Recovery (%) LCS/LCSD/MS/MSD		Relative Percent Difference (%) LCSD/MSD	
Analytical Method	Spiking Compounds	Water	Soil	Water	Soil
SW8440	Mixture*	65-135	65-135	30	30

* Three parts normal hexadecane, three parts isooctane, two parts chlorobenzene.

Table C-21. Control Limits for Matrix Spikes, Matrix Spike Duplicates, and Laboratory Control Samples for Anions by Ion Chromatography (EPA Method 300.0/9056)

		Benicia Arsenal Control Limits			
		Percent Recovery (%)		Relative Percent Difference (%)	
		LCS/LCSD/MS/MSD		LCSD/MSD	
Analytical Method	Spiking Compounds	Water	Soil	Water	Soil
E300.0	Chloride	80-120	80-120	20	20
	Nitrite-N	80-120	80-120	20	20
	Nitrate-N	80-120	80-120	20	20
	Sulfate	80-120	80-120	20	20

Table C-22. Control Limits for Laboratory Replicates and Laboratory Control Samples for Flashpoint/Ignitability (EPA Method 1010/1030)

		Benicia Arsenal Control Limits			
		Percent Recovery (%)		Relative Percent Difference (%)	
		LCS/LCSD		LCSD/LR	
Analytical Method	Spiking Compounds	Water	Soil	Water	Soil
SW1010/SW1030	Flashpoint/Ignitability	80-120	80-120	20	20

Table C-23. Control Limits for Matrix Spikes, Matrix Spike Duplicates, and Laboratory Control Samples for Total Cyanide (EPA Method 9012A/9014)

		Benicia Arsenal Control Limits			
		Percent Recovery (%)		Relative Percent Difference (%)	
		LCS/LCSD/MS/MSD		LCSD/MSD	
Analytical Method	Spiking Compounds	Water	Soil	Water	Soil
SW9012A/SW9014	Total Cyanide	80-120	80-120	20	20

Table C-24. Control Limits for Laboratory Replicates and Laboratory Control Samples for Total Dissolved Solids (EPA Method 160.1)

		Benicia Arsenal Control Limits			
		Percent Recovery (%)		Relative Percent Difference (%)	
		LCS/LCSD		LCSD/LR	
Analytical Method	Spiking Compounds	Water	Soil	Water	Soil
E160.1	Total Dissolved Solids	80-120	NA	20	NA

Table C-25. Control Limits for Matrix Spikes, Matrix Spike Duplicates, Laboratory Replicates and Laboratory Control Samples for Total Organic Carbon (EPA Methods 9060/WBLACK)

		Benicia Arsenal Control Limits			
		Percent Recovery (%)		Relative Percent Difference (%)	
		LCS/LCSD/MS/MSD		LCSD/MSD/LR	
Analytical Method	Spiking Compounds	Water	Soil	Water	Soil
SW9060/WBLACK	Total Organic Carbon	75-125	70-140	20	30

Table C-26. Control Limits for Laboratory Replicates and Laboratory Control Samples for pH (EPA Methods 9040B/9045C)

		Benicia Arsenal Control Limits			
		Percent Recovery (%)		Relative Percent Difference (%)	
		LCS/LCSD		LCSD/LR	
Analytical Method	Spiking Compounds	Water	Soil	Water	Soil
SW9040B/ 9045C	pH	±0.05 pH units	±0.05 pH units	±0.05 pH units	±0.1 pH units

Table C-27. Control Limits for Laboratory Replicates and Laboratory Control Samples for Alkalinity (EPA Methods 310/SM2320C)

		Benicia Arsenal Control Limits	
		Percent Recovery (%)	Relative Percent Difference (%)
		LCS/LCSD	LCSD/LR
Analytical Method	Spiking Compound	Water	Water
E310/SM2320C	Total Alkalinity	80-120	20

Table C-28. Control Limits for Laboratory Replicates, Surrogate Spikes, and Laboratory Control Samples for VOCs in Air (EPA Method TO-15)

	Benicia Arsenal Control Limits	
	Percent Recovery (%)	Relative Percent Difference (%)
Analyte	LCS/LCSD	LCSD/LR
1,1,2,2-Tetrachloroethane	70-130	25
1,1,2-Trichloroethane	70-130	25
1,1-Dichloroethane	70-130	25
1,1-Dichloroethene	70-130	25
1,2,4-Trichlorobenzene	70-130	25
1,2,4-Trimethylbenzene	70-130	25
1,2-Dibromoethane (EDB)	70-130	25
1,2-Dichlorobenzene	70-130	25
1,2-Dichloroethane	70-130	25
1,2-Dichloropropane	70-130	25
1,3,5-Trimethylbenzene	70-130	25
1,3-Dichlorobenzene	70-130	25
1,4-Dichlorobenzene	70-130	25
Benzene	70-130	25
Bromomethane	70-130	25
Carbon Tetrachloride	70-130	25
Chlorobenzene	70-130	25
Chloroethane	70-130	25
Chloroform	70-130	25
Chloromethane	70-130	25
Chlorotoluene (Benzyl Chloride)	70-130	25
cis-1,2-Dichloroethene	70-130	25
cis-1,3-Dichloropropene	70-130	25
Dichloromethane (Methylene Chloride)	70-130	25
Ethylbenzene	70-130	25
Freon 11 (Trichlorofluoromethane)	70-130	25
Freon 113 (Trichlorotrifluoroethane)	70-130	25
Freon 114	70-130	25
Freon 12 (Dichlorodifluoromethane)	70-130	25
Hexachlorobutadiene	70-130	25
m,p-Xylene	70-130	25
Methyl Chloroform (1,1,1-TCA)	70-130	25
o-Xylene	70-130	25
Styrene	70-130	25
Tetrachloroethene	70-130	25
Toluene	70-130	25
trans-1,3-Dichloropropene	70-130	25
Trichloroethene	70-130	25
Vinyl Chloride	70-130	25
1,3-Butadiene	60-140	30
1,4-Dioxane	60-140	30

Table C-27. Control Limits for Laboratory Replicates, Surrogate Spikes, and Laboratory Control Samples for VOCs in Air (EPA Method TO-15) Continued

	Benicia Arsenal Control Limits	
	Percent Recovery (%)	Relative Percent Difference (%)
Analyte	LCS/LCSD	LCSD/LR
2-Butanone (Methyl Ethyl Ketone)	60-140	30
2-Hexanone	60-140	30
4-Ethyltoluene	60-140	30
4-Methyl-2-Pentanone (MIBK)	60-140	30
Acetone	60-140	30
Bromodichloromethane	60-140	30
Bromoform	60-140	30
Carbon Disulfide	60-140	30
Cyclohexane	60-140	30
Dibromochloromethane	60-140	30
Ethanol	60-140	30
Heptane	60-140	30
Hexane	60-140	30
Isopropanol	60-140	30
Methy t-Butyl Ether (MTBE)	60-140	30
Propylene	60-140	30
Tetrahydrofuran	60-140	30
trans-1,2-Dichloroethene	60-140	30
Vinyl Acetate	60-140	30
Surrogates		
1,2-Dichloroethane-d_4	70-130	N/A
Toluene-d_8	70-130	N/A
4-Bromofluorobenzene	70-130	N/A

*Up to 10% allowed to exceed %R criterion

** Up to 20% allowed to exceed %R criterion (poor performers).

D

Appendix D

FLAGGING CONVENTION FOR DATA EVALUATION AND VALIDATION

LIST OF TABLES

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Table D-1. Flagging Conventions for Inorganic Methods

Quality Control Check	Evaluation	Flag	Samples Affected
Holding Time	Holding time exceeded for preparation or analysis by > 2 times	J- positive results UJ non-detected results	Sample only.
	Holding time exceeded for preparation or analysis by ≤ 2 times	J- positive results R non-detects	
Sample Preservation	Sample preservation requirements not met.	J- positive results UJ non-detects for all methods except mercury. R mercury non-detects	Sample only
Temperature blank	> 8°C	J- positive results for mercury UJ non-detects for mercury	Samples in same cooler
Initial (multipoint) calibration			
ICP Option 1 and all other methods	Correlation coefficient or curve <0.995 but >0.990	J positive results UJ non-detects	All associated samples in analysis batch
	Correlation coefficient of curve <0.990	R positive results R non-detects	All associated samples in analysis batch
	Intercept > MDL	UJ flag results >MDL but <1.5X intercept J+ flag ≥1.5X intercept but < 5X intercept	
	Intercept < -MDL	UJ non-detected results	
ICP Option 2	PQL Std <70% or >130%	J positive results < 2x PQL standard concentration	All associated samples in analysis batch
ICP and GFAAS	Triplicate exposures for ICP >5% RSD or duplicate injections for GFAAS >10% RPD (or required number of replicates not performed)	J positive results UJ non-detects	All associated samples in analysis batch
Calibration high standard check (ICP)	Recovery above UCL or below LCL	R positive result R non-detects.	All associated samples in analysis batch

Table D-1. Flagging Conventions for Inorganic Methods (Continued)

Quality Control Check	Evaluation	Flag	Samples Affected
Initial Calibration Verification (ICV):	Metals/Wet Chemistry:		
(Second Source)	%R ≤65%	J- positive values R non-detects	All associated samples in analysis for ICV
	%R between 65-LCL	J- positive values UJ non-detects	
	%R betweenUCL-135%	J+ positive results	
	%R≥135%	R positive results	
Continuing Calibration Verification	%R ≤65%	J- positive values R non-detects	Sample after failed CCV until next in control CCV
	%R between 65-LCL	J- positive values UJ non-detects	
	%R betweenUCL-135%	J+ positive results	
	%R≥135%	R positive results	
Interference check sample A (ICSA) (ICP only)	Spiked element %R > UCL	J+ positive results	All associated samples in analysis batch containing elevated concentrations of elements included in ICSA.
	Spiked element %R 50%-LCL	J- positive results UJ non-detects	
	Spiked element %R < 50%	R non-detects	
	Unspiked element > MDL	R positive results < 1.5x concentration found in ICSA J+ positive results >1.5x but < 5x concentration found in ICSA	
	Unspiked element < -MDL	UJ non-detects J- positive results < 5x above absolute value of concentration found in ICSA	

Table D-1. Flagging Conventions for Inorganic Methods (Continued)

Quality Control Check	Evaluation	Flag	Samples Affected
Laboratory Control Sample (LCS)			
	%R ≤ 50%	R positive/non-detects	Spiked compound only in all associated samples
	%R > 50% but < LCL	J- positive results UJ non-detects	Spiked compound only in all associated samples
	%R ≥ UCL but < 150%	J+ positive results	Spiked compound only in all associated samples
	%R ≥ UCL and > 150	R positive/non-detects	Spiked compound only in all associated samples
	RPD>CL	J positive results	Affected compounds in associated samples
Blanks: MB, ICB, CCB	If the value of the blank is > MDL, then multiply value by 5, convert to soil units if applicable	U flag positive results < calculated values	All samples in digestion batch (MB) All samples following unacceptable calibration blank until the next acceptable calibration blank.
	If the value of the blank is <-MDL, then multiply value by 5, convert to soil units if applicable	UJ flag non-detects J flag positive results < 5X absolute value of blank if above reported PQL	
Equipment Blank	Multiply by 5	U flag reported results < calculated values	All samples, same field team, matrix and date (water)
Field Duplicates	RPD > 40% water or RPD > 50% soil	Discuss impact in data quality assessment report	Field duplicate pair
Matrix Spike/Matrix Spike Duplicate (MS/MSD)	When sample concentration is > 2X spike concentration.	No evaluation required	
	% R ≤ 30%	J- positive R non-detects	Affected compound in native sample
	% R > 30% but < LCL	J- positive results UJ non-detects	Affected compound in native sample
	% R ≥ UCL but < 200%	J+ positive results	Affected compound in native sample

Table D-1. Flagging Conventions for Inorganic Methods (Continued)

Quality Control Check	Evaluation	Flag	Samples Affected
MS/MSD Continued	%R ≥ UCL and > 200%	R positive/non-detects	All compounds in native sample
	RPD > CL	J positive results	Affected compound >PQL in native sample
Laboratory Duplicate	RPD>CL	J positive results	Affected compound > PQL in native sample
Serial Dilution (ICP only)	If original concentration is > 50 times MDL and % difference > UCL	J positive results UJ non-detects	Affected compounds in all samples in digestion batch not reported form at least a 1:5 dilution if: analytical spike not performed or analytical spike %R<75% or >125%
Post Digestion Spike	If % recovery is < LCL or > UCL		
Method of Standard Additions	R <0.995 but ≥990	J positive results UJ non-detects	Sample
	R <0.990	J positive results R non-detects	
	If required but not performed	J positive results UJ non-detects	
MDL Study	Performed within the last 12 months or MDL check sample analyzed within the last 3 months prior to analysis	UJ non-detects	All associated samples in analysis batch
PQL	Concentration reported is <PQL but >MDL	J positive results	Sample
	Reported PQL is less than low standard	J positive results below low standard equivalent concentration.	

If a result is estimated with unknown bias (J lag) based on one criteria and flagged with known bias (J+ or J-) based on another criteria, the final flag applied shall not show bias.
If a result is rejected due to any criteria, the final flag applied shall be "R".
All screening data will initially flagged with an "S". If screening and associated definitive data are in very good agreement, the S flag shall be removed.
Professional judgment may be used and will supercede the flagging conventions in Table D-1.

Table D-2. Flagging Conventions for Organic Methods

Quality Control Check	Evaluation	Flag	Samples Affected
Holding Time for Properly Preserved Samples	Holding time exceeded for preparation or analysis by > 2 times	J positive results R non-detected results	Sample, MS/MSD
	Holding time exceeded for preparation or analysis by ≤ 2 times	J positive results UJ non-detects UJ VOA results hold time exceeded by 1-7 days R VOA results hold time exceeded by > 7 days	Sample, MS/MSD
Sample Preservation	Sample not preserved	J positive results UJ non-detects	Sample, MS/MSD
Temperature blank	> 6°C	J positive results (except PCBs, dioxins and furans) UJ non-detects (except PCBs, dioxins and furans)	Samples in same cooler
	> 10° C (Volatile Compounds)	R all results	
Bubbles present in volatiles	≥ 6 mm in size	J positive results UJ non-detects	Sample
Tune	Ion abundance criteria not met	J positive results UJ non-detects	All associated samples in analysis batch
Initial Calibration (ICAL)			
GC/MS:	RRF < requirements in Appendix B	J positive results R non-detects	Compound in all associated samples in analysis batch
GC, HPLC:	for multi-component target compounds, at least 3 peaks used with a RT window of ± 0.07 minutes each	J positive results UJ non-detects	Compound in all associated samples in analysis batch
GC/MS, GC, and HPLC	%RSD ≥ limits established in Appendix B and linear regression not performed	J positive results UJ non-detects	Compound in all associated samples in analysis batch
	If %RSD > 2 X control limit	R all positive and non-detects	Compound in all associated samples in analysis batch

Table D-2. Flagging Conventions for Organic Methods (continued)

Quality Control Check	Evaluation	Flag	Samples Affected
Initial Calibration (ICAL)	Linear regression:		
(continued)	Correlation coefficient of curve < 0.995 but ≥ 0.990	J positive results UJ non-detected results	Compound in all associated samples in analysis batch
	Correlation coefficient of curve < 0.990 %	R all positive and non-detects	
	Intercept > MDL	UJ flag results >MDL but <1.5X intercept J flags ≥1.5X intercept but < 5X intercept/	
	Intercept < -MDL	UJ non-detected results	
Calibration Verification ICV, CCV			
GC/MS:	RRF < requirements in Appendix B	J positive results R non-detects	Compound in all associated samples in analysis batch
GC/MS, GC, and HPLC	%D ≥ requirements in Appendix B	J positive results UJ non-detects	Compound in all associated samples in analysis batch
	If %D > 2X control limit	R all positive and non-detects	Compound in all associated samples in analysis batch
Laboratory Control Sample (LCS)	%R < 30%	J positive/R non-detects	Spiked compound only in all associated samples.
	%R > 30% but < LCL	J positive results UJ non-detects	Spiked compound only in all associated samples
	%R > UCL but < 150%	J positive results	Spiked compound only in all associated samples
	%R >UCL and >150% RPD > CL	R positive/non-detects J positive results	Spiked compound only in all associated samples. Affected compound in associated samples
Blanks: MB	Multiply value by 5 (common lab contaminants by 10)	U flag reported results < calculated values	All samples in preparation batch
Equipment blank	Multiply value by 5 (common lab contaminants by 10)	U flag reported results < calculated values	All samples, same field team, matrix and date (water)
Trip blank	Multiply value by 5 (common lab contaminants by 10)	U flag reported results < calculated values	All volatile water samples shipped in the same cooler (Qualitatively evaluate soil samples)

Table D-2. Flagging Conventions for Organic Methods (continued)

Quality Control Check	Evaluation	Flag	Samples Affected
Instrument blanks (following high concentration samples)	If analyzed as required, Multiply value by 5 (common lab contaminants by 10)	U flag reported results < calculated values	Sample immediately following the instrument blank.
	If not analyzed as required	U flag reported results < MQL	Next two samples after the high concentration sample for the analytes which exceeded 5x concentration of high standard.
Field duplicates	RPD > 40% water or RPD > 50% soil	Discuss impacts in data quality assessment report	Field duplicate pair
Surrogates:			
GC/MS SEMI-VOA	If two or more surrogates from the same chemical family group %R > UCL	J+ positive results	All associated compounds in sample
	If two or more surrogates from the same chemical family group %R < LCL and ≥ 10%	J- positive results UJ non-detects	All associated compounds in sample
	Any one at <10%	J- positive results R non-detects	All associated compounds in sample
GC and HPLC Method	%R > UCL	J+ positive results	All compound in associated samples
	%R < LCL and ≥ 10%	J- positive results UJ non-detects	All compound in associated samples
	%R < 10%	J- positive results R non-detects	All compound in associated samples
1st column/2nd column (or detector) precision	%D > 40%	J positive results	All affected compounds > PQL
Internal Standards (IS) (GS/MS)	RT change > UCL from daily CCAL	R positive/non-detects	All compound in associated samples
	IS extracted ion area counts <50% of ICAL (<60% for TO-15)	J- positive results UJ non-detects	All compound in associated samples
	IS extracted ion area counts > 200% of last ICAL (140% for TO-15)	J+ positive results UJ non-detects	All compound in associated samples

Table D-2. Flagging Conventions for Organic Methods (continued)

Quality Control Check	Evaluation	Flag	Samples Affected
Matrix Spike/Matrix Spike Duplicate (MS/MSD)	%R ≤ 10%	J positive/R non-detects	Affected compound in native sample MS/MSD
	%R > 10% but < LCL	J- positive results UJ non-detects	Affected compound in native sample MS/MSD
	%R > UCL but < 200%	J+ positive results	Affected compound in native sample MS/MSD
	%R > UCL and > 200%	R positive/non-detects	All compound in native sample
	RPD > CL	J positive results	Affected compound >PQL in native sample MS/MSD
	When sample concentration is > 2X spike concentration	No flagging required. Check to see if appropriate actions were taken.	
Retention Time Windows (RTW)	Analyte peak not within RTW	Report results as non-detect	All affected compounds
Breakdown check (Endrin and DDT) (SW8081)	% Breakdown for Endrin > 15%	J- positive endrin results, J+ positive endrin aldehyde, and endrin ketone results	Samples following the last in control standard
		R non-detects for endrin, if endrin aldehyde and endrin ketone are positive	Samples following the last in control standard
	% Breakdown for DDT > 15%	J- positive DDT results J+ positive results for DDD, and DDE results	Samples following the last control standard
		R non-detects for DDT if DDD and DDE are positive	Samples following the last in control standard
MDL Study	Performed within the last 12 months or MDL check sample run within the last 3 months prior to analysis	UJ non-detects	All associated samples in analysis batch
PQL	Concentration reported is <PQL but >MDL	J positive results	Sample
	Reported PQL is less than low standard	J positive results below low standard equivalent concentration.	

If a result is estimated with unknown bias (J lag) based on one criteria and flagged with known bias (J+ or J-) based on another criteria, the final flag applied shall not show bias.
If a result is rejected due to any criteria, the final flag applied shall be "R".
All screening data will initially flagged with an "S". If screening and associated definitive data are in very good agreement, the S flag shall be removed.
Professional judgment may be used and will supercede the flagging conventions in Table D-2.

E

Appendix E

AUTOMATED DATA REVIEW (ADR) ELECTRONIC DATA DELIVERABLE FILE SPECIFICATIONS

APPENDIX E
ADR ELECTRONIC DATA DELIVERABLE FILE SPECIFICATIONS

The EDD consists of three separate, comma-delimited ASCII text files or Excel CSV files (two, if instrument calibration information is not required by the project). Each file corresponds to a database table. The tables are identified as the Analytical Results Table (A1), Laboratory Instrument Table (A2), and Sample Analysis Table (A3). Each file follows the naming convention of using the Laboratory Reporting Batch ID (SDG) followed by the table identifier (A1, A2, or A3), and then a ".txt" or ".csv" extension. For example, the EDD file names for a laboratory reporting batch identified as SDG001 that includes instrument calibration data would be as follows.

SDG001A1.txt or SDG001A1.csv
SDG001A2.txt or SDG001A2.csv (A2 file is optional. Requirement for submission of the A2 file will be established for each specific project.)
SDG001A3.txt or SDG001A3.csv

Analytical Results Table (A1 File)

The Analytical Results table contains results and related information on an analyte level for field samples and associated quality control samples (excluding calibrations and tunes). A result record must exist for each analyte reported in a method (specified in the project library) for every field sample and laboratory method blank analyzed by that method. Laboratory control samples and matrix spikes must have a result record for every spiked analyte and surrogate (if applicable) specified in the project library. Table A1 lists the field names and descriptions for the Analytical Results Table (A1). The project library is a reference table that both the EDD error checker and validation applications use when processing the EDD. The project library is populated with information from the project QAPP.

Laboratory Instrument Table (A2 File)

The Laboratory Instrument table contains results and related information on an analyte level for instrument initial calibration standards, initial calibration verification standards, continuing calibration standards, and GC/MS tunes. A record must exist for each target analyte reported in a method (specified in the project library), for every calibration type (QCType) associated to samples reported in the EDD. Initial calibrations, initial calibration verifications, and associated samples are linked to each other using a unique Run Batch ID for every distinct initial calibration. Continuing calibrations and associated samples are linked to each other using a unique Analysis Batch ID for every distinct continuing calibration. GC/MS tunes are linked to initial and continuing calibrations (and hence samples) using the Run Batch and Analysis Batch IDs respectively. Depending on the level of validation required by the data user, the Laboratory Instrument table may not be requested in the deliverable. Table A2 lists field names and descriptions for the Laboratory Instrument Table (A2).

Sample Analysis Table (A3 File)

The Sample Analysis table contains information related to sample and QC analyses (excluding calibrations and tunes), analytical methods, batch IDs, and sample preparation on a sample basis. A record exists for each sample/method/matrix/analysis type combination. Table A3 lists field names and descriptions for the Sample Analysis Table (A3).

EDD Field Elements

The EDD Field Elements listed in Tables A1, A2, and A3 specify the type of electronic information from the analytical laboratories for populating the fields for each file. These include the field name and sequence, field name description, and field type and length for each table. Field elements in the EDD are sequenced according to the order they appear in Tables A1, A2, and A3. For example, in the Analytical Result table (the A1 file), the field "ClientSampleID" will always be the first piece of information to start a new line of data (or database record), followed by the fields "LabAnalysisRefMethodID", "AnalysisType", and so on.

The name, description, data type, character length, and standard value requirements for each field are listed in Tables A1, A2, and A3. Field standard values are listed in Table B. Table C lists standard values for methods and analytes. Certain fields in each file require information for a given combination of sample, matrix, method, analyte type, and calibration or QC type records. These are required fields. Tables D1, D2, and D3 indicates the required fields for each table according to the instrument category (method), matrix, analyte type, sample, and QC or calibration type record.

When creating an EDD as a text file, use the ASCII character set in a file of lines terminated by a carriage return and line feed. No characters are allowed after the carriage return and line feed. Enclose each data field in double quotes (") and separate each field by commas (comma delimited). Data fields with no information (null) may be represented by two consecutive commas. For example, in the Sample Analysis table, since the "Collected", "ShippingBatchID", and "Temperature" fields do not apply to laboratory generated QA/QC samples, the record for a Laboratory Control Sample by Method 8270C would be entered as follows. Note that the first two fields ("ProjectNumber" and "ProjectName") are omitted in this example.

...“LCSW100598",,"AQ","LCSW100598","LCS",,"8270C",... (and so on)

Do not pad fields with leading or trailing spaces if a field is populated with less than the maximum allowed number of characters. In the above example, although the "MatrixID" field can accommodate up to 10 characters, only 2 characters were entered in this field.

Table A1
Field Descriptions for the Analytical Results Table (Table A1)

Contains laboratory test results and related information for field and QC samples (excluding calibrations) on an analyte level.

Field Name	Field Name Description	Field Type	Field Length	Standard Value List
ClientSampleID	Client's identifier for a sample. If a sample is analyzed as a duplicate, matrix spike, or matrix spike duplicate, append suffixes DUP, MS, and MSD respectively to the Client Sample ID (i.e., MW01DUP, MW01MS, and MW01MSD). For the Method Blanks, LCS, and LCSD enter the unique Laboratory_Sample_ID. Do not append suffixes for dilutions, reanalyses, or reextacts. For example, MW01DL and MW01RE are not allowed.	Text	25	
LabAnalysisRefMethodID	Laboratory reference method (i.e., 8260B, 8270C, 6010B, etc). The Lab Analysis Ref Method ID is specified in the project library or QAPP.	Text	25	
AnalysisType	Defines the analysis type (i.e., Dilution, Reanalysis, etc.). This field is critical for distinguishing results from the same compound when multiple analyses are submitted for the same sample and method (i.e. dilutions, reextracts, etc).	Text	10	See Table B
LabSampleID	Laboratory tracking number for field samples and lab-generated QC samples such as method blank, LCS, and LCSD. Append suffixes DUP, MS, and MSD, without an intervening hyphen or space, for the sample duplicate, matrix spike, and matrix spike dup respectively (i.e., 9810001DUP, 9810001MS, and 9810001MSD). Suffixes may be applied to the Lab_Sample_ID to designate dilutions, reanalyses, etc. The Lab_Sample_ID must be unique for each Method Blank, LCS, and LCSD. Each Method Batch must contain records for a matrix spike for inorganic methods and a matrix spike and matrix spike duplicate for organic methods. Parent sample records must exist for each MS and MS/MSD. If an MS or MS/MSD is shared between two EDDs, records for the MS or MS/MSD and its parent sample must exist in the Analytical Results table for both EDDs.	Text	25	
LabID	Identification of the laboratory performing the analyses.	Text	7	See Table B
ClientAnalyteID	AFCEE PARLABEL or CAS #. If a AFCEE PARLABEL is not available, use a unique identifier provided by the Contractor. For TICs from GC/MS analyses, enter the CAS# as the Client Analyte ID. The Client Analyte ID for a particular target analyte is specified in the project library or QAPP. Each sample analysis (i.e., dilutions and reanalyses) must report the full target analyte list including surrogates, if applicable. (See Reportable_Result for flagging which result should be used by the client.) For the LCS, LCSD, MS, and MSD, only report the spike compounds for all methods, and surrogates for organic methods. For organics, surrogates must be reported for each analysis submitted (i.e. reanalyses and dilutions).	Text	12	
AnalyteName	Chemical name for the analyte (i.e., Benzene, Lead). The Analyte Name (AFCEE PARNAME) is specified in the project library or QAPP.	Text	60	
Result	Result value for the analyte. Entries must be numeric even though this is a text field. For nondetects of target analytes and spikes, do not enter "ND" or leave this field blank. If an analyte or spike was not detected, enter the detection limit value corrected for dilution and percent moisture as applicable.	Text	10	

Table A1
Field Descriptions for the Analytical Results Table (Table A1)

Contains laboratory test results and related information for field and QC samples (excluding calibrations) on an analyte level.

Field Name	Field Name Description	Field Type	Field Length	Standard Value List
ResultUnits	Units for Result (i.e., mg/Kg, ug/L, etc.). The result units to be reported for each target analyte and matrix in a given method are specified in the project library or QAPP.	Text	10	
Lab_Qualifiers	A string of single letter result qualifiers assigned by the lab based on client-defined rules and values. The "U" Lab Qualifier must be entered for all non detects. Other pertinent lab qualifiers may be entered with the "U" qualifier. Order is insignificant.	Text	7	See Table B
Detection_Limit	The detection limit value for the analyte being measured.	Text	10	
Detection_Limit_Type	Specifies the type of detection limit (i.e., MDL, IDL, etc.).	Text	10	See Table B
Retention_Time	The time expressed in decimal minutes between injection and detection for GC/MS TICs only.	Text	5	
Analyte_Type	Defines the type of result, such as surrogate, spike, internal standard, and target compound.	Text	30	See Table B
Percent_Recovery	The percent recovery value of a spike or surrogate compound Enter the recovery value as a numeric character. If the spike or surrogate was not recovered because of dilution, enter "DIL". If a spike or surrogate was not recovered because of matrix interference, enter "INT". If a spike or surrogate was not recovered because it was not added to the sample, enter "NS".	Text	5	See Table B
Relative_Percent_Difference	The relative percent difference (RPD) of two QC results, such as MS/MSD, LCS/LCSD, and sample duplicates. Report RPD in the Sample Duplicate, LCSD, and MSD records only. Calculate RPD based on sample concentrations rather than % recoveries for MS/MSD.	Number	Single	
Reporting_Limit	Reporting limit value for the measured analyte Factor in the dilution factor and percent moisture correction, if applicable. The Reporting Limit for each analyte and matrix in a given method is specified in the project library or QAPP.	Text	10	
Reporting_Limit_Type	Specifies the type of reporting limit (i.e., CRQL, PQL, SQL, RDL, etc). The Reporting Limit Type for each method and matrix is specified in the project library or QAPP.	Text	10	
Reportable_Result	This field indicates whether or not the laboratory chooses an individual analyte result as reportable. Enter "YES" if the result is reportable. Enter "NO" if the result is not reportable. This field applies to target analytes only. If only one analysis is submitted for a particular sample and method, enter "YES" for all target compounds (Analyte Type = TRG) and all TICs (Analyte Type = TIC, for GC/MS only). If two or more analyses are submitted for a particular sample and method (i.e., initial analysis, reanalysis and/or dilutions), enter "YES" from only one of the analyses for each target compound. For example: a sample was run a second time at dilution because benzene exceeded the calibration range in the initial, undiluted analysis. All target analytes are reported in each analysis. For the initial analysis, (Analysis Type = RES), enter "NO" for benzene and enter "YES" for all other compounds. For the diluted analysis (Analysis Type = DL), enter "YES" for benzene and enter "NO" for all other compounds. For TICs (Analyte Type = TIC), if more than one analysis is submitted for a particular sample and method, choose only one of the analyses where Reportable Result = YES for all TICs. For example, a sample was run a second time because one	Text	3	

Table A1
Field Descriptions for the Analytical Results Table (Table A1)

Contains laboratory test results and related information for field and QC samples (excluding calibrations) on an analyte level.

Field Name	Field Name Description	Field Type	Field Length	Standard Value List
	or more target compounds exceeded the calibration range in the undiluted analysis. Choose a particular analysis and enter "YES" for all TICS. In the other analysis enter "NO" for all TICs.			
PVCCode	Parameter Value Classification Code. Coded value representing whether the result is the initial (1C), confirmation (2C), or preferred (PR) result. Use the code "PR" for all results except gas chromatographic results or the GC/MS confirmation of those results (MS).	Text	2	
Parvq	Parameter Value Qualifier. Coded value qualifying the analytical results field (Result). This field should be filled in every record.	Text	2	See Table B
ResultUncert	Result Uncertainty. The uncertainty of a measured value due to a measuring technique, expressed as plus or minus some value. This field is used to report known measurement uncertainties such as the counting error associated with radiochemistry data. (Also used for reporting match quality, expressed as a percentage rather than a decimal, for GC/MS analysis of tentatively identified compounds (TICS).)	Text	10	
Expected	Expected Result Value. The target result for a spiked sample or duplicate. For matrix spikes, it should be the sum of the parent plus spike amounts. For duplicates, it should be the amount of the parent sample.	Text	10	
SpikeValue	Spiked Result Value. The amount of the record's analyte spiked into the sample. It is required for some lab-QC and ALL surrogate spike results. (Unlike the AFCEE EXPECTED field, the value reported here should not include the parent sample concentration for matrix spike samples and does not need to be filled in for replicate analyses.)	Text	10	

Table A2
Field Descriptions for the Laboratory Instrument Table (Table A2)

Contains information related to tuning and calibration of laboratory instruments on an analyte basis

Field Name	Field Name Description	Field Type	Field Length	Standard Value List
Instrument_ID	Laboratory instrument identification.	Text	15	
QC_Type	Type of instrument QC (i.e., Instrument_Performance_Check or type of calibration standard).	Text	10	See Appendix B
Analyzed	Analysis date/time for BFB, DFTPP, initial calibration verification standards, calibration verification standards, and continuing calibration standards. For the initial calibration, enter date and time of the last standard analyzed. Also, see comments about initial calibrations in the Alternate_Lab_Analysis_ID field name description.	Date/ Time	*	
Alternate_Lab_Analysis_ID	Common laboratory identification used for standards (i.e., VOA STD50, CCAL100, BFB50, etc). For initial calibration, enter ICAL. Information from the initial calibration is entered as one record for each analyte that summarizes the results of the initial calibration (i.e. %RSD, correlation coefficient, and avg. RF). Records are not entered for each individual standard within the initial calibration.	Text	12	
Lab_Analysis_ID	Unique identification of the raw data electronic file associated with the calibration standard or tune (i.e., 9812101MS.DV). Leave this field blank for the initial calibration. See comments about initial calibrations in the Alternate_Lab_Analysis_ID field description. This field is only applicable where an electronic instrument file is created as part of the analysis.	Text	15	
Lab_Analysis_Ref_Method_ID	Laboratory reference method (i.e., 8260B, 8270C, 6010B, etc.). The Lab Analysis Ref Method ID is specified in the project library or QAPP.	Text	25	
Client_Analyte_ID	CAS # or unique. If CAS # is not available, use a unique identifier provided by the Contractor. Records for each calibration must report the full target analyte list including surrogates as applicable. The target analyte list is specified for each method in the project library or QAPP.	Text	12	
Analyte_Name	Chemical name for the analyte (i.e., Benzene, Lead). The Analyte Name for each method is specified in the project library or QAPP.	Text	60	
Run_Batch	Unique identifier for a batch of analyses performed on one instrument under the control of one initial calibration and initial calibration verification. The Run Batch ID links both the initial calibration and initial calibration verification to subsequently analyzed and associated continuing calibrations, field samples, and QC analyses. For GC/MS methods, the Run_Batch ID also links a BFB or DFTPP tune and the initial calibration and initial calibration verification standards to associated samples and method QC analyses. Even though methods 6010B and 6020 are treated as individual metals methods, all the metals reported under one initial calibration can use the same Run Batch ID. A new and unique Run Batch ID must used with every new initial calibration.	Text	12	

Table A2
Field Descriptions for the Laboratory Instrument Table (Table A2)

Contains information related to tuning and calibration of laboratory instruments on an analyte basis

Field Name	Field Name Description	Field Type	Field Length	Standard Value List
Analysis_Batch	Unique laboratory identifier for a batch of analyses performed on one instrument and under the control of a continuing calibration or continuing calibration verification. The Analysis Batch ID links the continuing calibration or calibration verification to subsequently analyzed and associated field sample and QC analyses. For GC/MS methods, the Analysis Batch ID also links the BFB or DFTPP tune and the continuing calibrations to associated samples and method QC analyses. Even though methods 6010B and 6020 are treated as individual metals methods, all the metals reported under one continuing calibration can use the same Analysis Batch ID. A new and unique Analysis Batch ID must be used with every new continuing calibration or continuing calibration verification. For GC methods, only report opening standards, do not include closing standards (unless the closing standard functions as the opening standard for a subsequent set of analyses, in which case a new and unique Analysis Batch ID is assigned). When dual or confirmation columns/detectors are used, enter results from the primary column/detector only (this is similar to CLP Pesticide reporting).	Text	12	
Lab_Reporting_Batch	Unique laboratory identifier for a batch of samples including associated calibrations and method QC, reported as a group by the lab (i.e., lab work order #, log-in #, or SDG). Links all instrument calibrations, samples, and method QC reported as a group or SDG.	Text	12	
Percent_Relative_Standard_Deviation	The standard deviation as a percentage of the mean used to evaluate initial calibration linearity. Organic methods may use either %RSD or Correlation Coefficient. If applicable, enter the %RSD. Do not enter if the Correlation Coefficient is used.	Number	Single	
Correlation_Coefficient	The correlation coefficient resulting from linear regression of the initial calibration. For metals by ICAP, enter '1.0' if a two-point initial calibration was analyzed. Organic methods may use either %RSD or Correlation Coefficient. If applicable, enter the Correlation Coefficient. Do not enter if the %RSD is used.	Number	Single	
Relative_Response_Factor	This field applies to GC/MS only. Enter the relative response factor for continuing calibration analyte records. Enter the average relative response factor for initial calibration analyte records. Refer to comments about initial calibration records in the field description for Alternate_Lab_Analysis_ID.	Number	Single	
Percent_Difference (or Percent Recovery)	For organic methods, this field is the difference between 2 measured values expressed as a percentage. If %RSD is reported, enter the % difference between the average response factor of the initial calibration (IC) and the response factor of the initial calibration verification (ICV) or continuing calibration (CCV). If correlation coefficient is used, enter the % difference between the true value and the measured value. The Percent_Difference is expressed as a negative or positive value. Do not express Percent_Difference as an absolute value. Use a negative value if the CCV or ICV response factor is less than the IC average response factor or, in the case of correlation coefficient, the CCV or ICV measured value is less than the true value. Use a positive value if the CCV or ICV response factor is greater than the IC average response factor, or in the case of correlation coefficient, the CCV or ICV measured value is greater than the true value. For inorganic methods, this field is the recovery of an analyte expressed as a percentage of the true amount (i.e., %R for a metal in the continuing calibration or initial calibration verification by Method 6010B).	Number	Single	

Table A2
Field Descriptions for the Laboratory Instrument Table (Table A2)

Contains information related to tuning and calibration of laboratory instruments on an analyte basis

Field Name	Field Name Description	Field Type	Field Length	Standard Value List
Peak_ID_01	Identifies individual ions for GC/MS tuning compounds (i.e., BFB, DFTPP). For BFB, m/z = 50; For DFTPP, m/z = 51.	Number	Integer	
Percent_Ratio_01	Ion abundance ratios of the GC/MS tuning compounds reported as a percentage. Linked to an individual Peak_ID_01.	Number	Single	
Peak_ID_02	Identifies individual ions for GC/MS tuning compounds (i.e., BFB, DFTPP). For BFB, m/z = 75; For DFTPP, m/z = 68.	Number	Integer	
Percent_Ratio_02	Ion abundance ratios of the GC/MS tuning compounds reported as a percentage. Linked to an individual Peak_ID_02.	Number	Single	
Peak_ID_03	Identifies individual ions for GC/MS tuning compounds (i.e., BFB, DFTPP). For BFB, m/z = 95; For DFTPP, m/z = 69.	Number	Integer	
Percent_Ratio_03	Ion abundance ratios of the GC/MS tuning compounds reported as a percentage. Linked to an individual Peak_ID_03.	Number	Single	
Peak_ID_04	Identifies individual ions for GC/MS tuning compounds (i.e., BFB, DFTPP). For BFB, m/z = 96; For DFTPP, m/z = 70.	Number	Integer	
Percent_Ratio_04	Ion abundance ratios of the GC/MS tuning compounds reported as a percentage. Linked to an individual Peak_ID_04.	Number	Single	
Peak_ID_05	Identifies individual ions for GC/MS tuning compounds (i.e., BFB, DFTPP). For BFB, m/z = 173; For DFTPP, m/z = 127.	Number	Integer	
Percent_Ratio_05	Ion abundance ratios of the GC/MS tuning compounds reported as a percentage. Linked to an individual Peak_ID_05.	Number	Single	
Peak_ID_06	Identifies individual ions for GC/MS tuning compounds (i.e., BFB, DFTPP). For BFB, m/z = 174; For DFTPP, m/z = 197.	Number	Integer	
Percent_Ratio_06	Ion abundance ratios of the GC/MS tuning compounds reported as a percentage. Linked to an individual Peak_ID_06.	Number	Single	
Peak_ID_07	Identifies individual ions for GC/MS tuning compounds (i.e., BFB, DFTPP). For BFB, m/z = 175; For DFTPP, m/z = 198.	Number	Integer	
Percent_Ratio_07	Ion abundance ratios of the GC/MS tuning compounds reported as a percentage. Linked to an individual Peak_ID_07.	Number	Single	
Peak_ID_08	Identifies individual ions for GC/MS tuning compounds (i.e., BFB, DFTPP). For BFB, m/z = 176; For DFTPP, m/z = 199.	Number	Integer	
Percent_Ratio_08	Ion abundance ratios of the GC/MS tuning compounds reported as a percentage. Linked to an individual Peak_ID_08.	Number	Single	
Peak_ID_09	Identifies individual ions for GC/MS tuning compounds (i.e., BFB, DFTPP). For BFB, m/z = 177; For DFTPP, m/z = 275.	Number	Integer	
Percent_Ratio_09	Ion abundance ratios of the GC/MS tuning compounds reported as a percentage. Linked to an individual Peak_ID_09.	Number	Single	
Peak_ID_10	Identifies individual ions for GC/MS tuning compounds (i.e., DFTPP). For DFTPP, m/z = 365.	Number	Integer	
Percent_Ratio_10	Ion abundance ratios of the GC/MS tuning compounds reported as a percentage. Linked to an individual Peak_ID_10.	Number	Single	

Table A2
Field Descriptions for the Laboratory Instrument Table (Table A2)

Contains information related to tuning and calibration of laboratory instruments on an analyte basis

Field Name	Field Name Description	Field Type	Field Length	Standard Value List
Peak_ID_11	Identifies individual ions for GC/MS tuning compounds (i.e., DFTPP). For DFTPP, m/z = 441.	Number	Integer	
Percent_Ratio_11	Ion abundance ratios of the GC/MS tuning compounds reported as a percentage. Linked to an individual Peak_ID_11.	Number	Single	
Peak_ID_12	Identifies individual ions for GC/MS tuning compounds (i.e., DFTPP). For DFTPP, m/z = 442.	Number	Integer	
Percent_Ratio_12	Ion abundance ratios of the GC/MS tuning compounds reported as a percentage. Linked to an individual Peak_ID_12.	Number	Single	
Peak_ID_13	Identifies individual ions for GC/MS tuning compounds (i.e., DFTPP). For DFTPP, m/z = 443.	Number	Integer	
Percent_Ratio_13	Ion abundance ratios of the GC/MS tuning compounds reported as a percentage. Linked to an individual Peak_ID_13.	Number	Single	

* Date/time format is: MM/DD/YYYY hh:mm where MM = month, DD = day, YYYY = four digits of the year, hh = hour in 24 hour format, and mm = minutes.

Table A3
Field Description for the Sample Analysis (Table A3)

Contains information related to laboratory sample and QC analyses (excluding calibrations and tunes), analytical methods, batching information, and sample preparation

Field Name	Field Name Description	Field Type	Field Length	Standard Value List
Project_Number	Project number assigned by the client.	Text	30	
Project_Name	Project name assigned by the client.	Text	90	
Client_Sample_ID	Client's identifier for a sample. If a sample is analyzed as a duplicate, matrix spike, or matrix spike duplicate, append suffixes DUP, MS and MSD respectively to the Client Sample ID (i.e., MW01DUP, MW01MS, and MW01MSD). For the Method Blanks, LCS, and LCSD enter the unique Laboratory_Sample_ID. Do not append suffixes for dilutions, reanalyses, or reextracts. For example, MW01DL and MW01RE are not allowed.	Text	25	
Collected	Date/Time the sample of sample collection Leave this field blank for Method Blank, LCS, and LCSD. For Trip Blanks, enter the collection date of associated samples.	Date/ Time	*	
Matrix_ID	Sample matrix (i.e., AQ, SO, etc.)	Text	10	See Appendix B
Lab_Sample_ID	Laboratory tracking number for field samples and lab generated QC samples such as method blank, LCS, and LCSD Append suffixes DUP, MS and MSD, without an intervening hyphen or space, for the sample duplicate, matrix spike, and matrix spike dup respectively (i.e., 9810001DUP, 9810001MS, and 9810001MSD). Suffixes may be applied to the Lab_Sample_ID to designate dilutions, reanalyses, etc. The Lab_Sample_ID must be unique for each Method Blank, LCS, and LCSD. Each Method Batch must contain records for a matrix spike for inorganic methods and a matrix spike and matrix spike duplicate for organic methods. Parent sample records must exist for each MS and MS/MSD. If an MS or MS/MSD is shared between two EDDs, records for the MS or MS/MSD and its parent sample must exist in the Sample Analysis table for both EDDs.	Text	25	
QC_Type	This record identifies the type of quality control sample QC (i.e., Duplicate, LCS, Method Blank, MS, or MSD) For regular samples, leave this field blank.	Text	10	See Appendix B
Shipping_Batch_ID	Unique identifier assigned to a cooler or shipping container used to transport client or field samples. Links all samples to a cooler or shipping container. No entry for method blanks, LCS, and LCSD.	Text	25	
Temperature	Temperature (in centigrade degrees) of the sample as received.	Number	Single	
Lab_Analysis_Ref_Method_ID	Laboratory reference method (i.e., 8260B, 8270C, 6010B, etc.). The Lab Analysis Ref Method ID is specified in the project library or QAPP.	Text	25	
Preparation_Type	Preparation Method Number (i.e, 3010A, 3510C, 3550C, 5030B, etc.) For methods that do not have a specific preparation method number, use "Gen Prep".	Text	25	See Appendix B
Analysis_Type	Defines the analysis type (i.e., Dilution, Reanalysis, etc.). This field is critical for distinguishing samples when multiple analyses are submitted for the same sample and method (i.e. dilutions, reextracts, etc). Enter "RES" for initial sample records.	Text	10	See Appendix B
Prepared	Preparation date/time	Date/ Time	*	

Table A3
Field Description for the Sample Analysis (Table A3)

Contains information related to laboratory sample and QC analyses (excluding calibrations and tunes), analytical methods, batching information, and sample preparation

Field Name	Field Name Description	Field Type	Field Length	Standard Value List
Analyzed	Date and time of analysis	Date/ Time	*	
Lab_ID	Identification of the laboratory performing the analysis.	Text	7	See Appendix B
QC_Level	Level of analytical laboratory QC associated with the analysis (i.e., Certificate of Analysis).	Text	6	See Appendix B
Result_Basis	Wet or dry weight. If not applicable, use "NA".	Text	3	See Appendix B
Total_Or_Dissolved	This field indicates if the results related to this sample and method are expressed as total or dissolved. This field is applicable to samples analyzed for metals.	Text	3	See Appendix B
Dilution	Overall dilution of the sample aliquot. A value of one corresponds to nominal method conditions. Insert value of one for blanks, LCS, and LCSD. Dilution must be expressed as a whole number.	Number	Single	
Handling_Type	Type of leaching procedure (i.e., SPLP, TCLP, WET).	Text	10	See Appendix B
Handling_Batch	Unique laboratory identifier for a batch of samples prepared together for a leaching procedure (i.e., SPLP, TCLP, or WET preparation). Links samples with leaching blanks.	Text	12	
Leachate_Date	Leachate date (i.e., date for SPLP, TCLP, or WET preparation).	Date /Time	*	
Percent_Moisture	Percent of sample composed of water. Enter for soil and sediment samples only.	Number	Single	
Method_Batch	Unique laboratory identifier for a batch of samples of similar matrices analyzed by one method and treated as a group for field QC purposes. Links the matrix spike and/or matrix spike duplicate or laboratory duplicates to associated samples. Note, the Method_Batch association may coincide with the Preparation_Batch association. The Method_Batch is specifically used to link the MS, MS/MSD, or DUP to associated samples.	Text	12	
Preparation_Batch	Unique laboratory identifier for a batch of sample aliquots prepared together for analysis by one method. Links samples with method blanks and laboratory control samples. Note, the Preparation_Batch association may coincide with the Method_Batch association. The Preparation_Batch is specifically used to link the Method Blank and LCS to associated samples.	Text	12	
Run_Batch	Unique identifier for a batch of analyses performed on one instrument under the control of one initial calibration and initial calibration verification. Links both the initial calibration and initial calibration verification to subsequently analyzed and associated continuing calibrations, field samples, and QC analyses. For GC/MS methods, the "Run_Batch" also links a BFB or DFTPP tune and the initial calibration and initial calibration verification standards to associated samples and method QC analyses. Even though methods 6010B and 6020 are treated as individual metals methods, all sample/metal method records reported under one initial calibration can use the same Run Batch ID. A different and unique Run Batch ID must be used with every new initial calibration. The identifier entered in this field links a particular sample/method/analysis type record to a set of associated initial calibration and initial calibration verification records from Table A2.	Text	12	

Table A3
Field Description for the Sample Analysis (Table A3)

Contains information related to laboratory sample and QC analyses (excluding calibrations and tunes), analytical methods, batching information, and sample preparation

Field Name	Field Name Description	Field Type	Field Length	Standard Value List
Analysis_Batch	Unique laboratory identifier for a batch of analyses performed on one instrument and under the control of a continuing calibration or continuing calibration verification. Links the continuing calibration or calibration verification to subsequent, associated field sample and QC analyses. For GC/MS methods the "Analysis_Batch" also links the BFB or DFTPP tune and the continuing calibrations to associated samples and method QC analyses. Even though methods 6010B and 6020 are treated as individual metals methods, all sample/metal method records reported under one continuing calibration can use the same Analysis Batch ID. A different and unique Analysis Batch ID must be created with every new continuing calibration or continuing calibration verification. The identifier entered in this field links a particular sample/method/analysis type record to a set of associated continuing calibration records from Table A2.	Text	12	
Lab_Reporting_Batch	Unique laboratory identifier for a batch of samples including associated calibrations and method QC, reported as a group by the lab (i.e., lab work order #, log-in #, or SDG). Links all instrument calibrations, samples, and method QC reported as a group or SDG.	Text	12	
Lab_Receipt	Date the sample was received in the lab	Date/ Time	*	
Lab_Reported	Date the hardcopy data were reported by the lab	Date/ Time	*	
COCLine	Identifier for samples directly relating them to the Chain-of-Custody (COC) form that they are documented on; comprised of the COC form number concatenated with the individual **2 digit** COC line number. [For example, analyses performed on the container(s) collected and documented on line 6 of COC 123ABC would use the COCLine reference 123ABC06. For QC samples synthesized in the lab (e.g., method blanks and blank spikes), put "LABQC" in this field. For laboratory QC analyses of field samples (e.g., matrix spikes and lab replicates), insert the COCLine reference of the parent sample in this field with no appended suffixes.	Text	20	
PVCCode	Parameter Value Classification Code. Coded value representing whether the result is the initial (1C), confirmation (2C), or preferred (PR) result. Use the code "PR" for all results except gas chromatographic results or the GC/MS confirmation of those results (MS).	Text	2	
Instrument_ID	Laboratory instrument identification.	Text	15	

* Date/time format is: MM/DD/YYYY hh:mm where MM = month, DD = day, YYYY = four digits of the year, hh = hour in 24 hour format, and mm = minutes.

Table B
Standard Value List (SVL)

Field Name	Standard Value	Standard Value Description
Analysis_Type	DL	Dilution of the original sample
	DL2	Second dilution of the original sample
	DL3	Third dilution of the original sample
	DL4	Fourth dilution of the original sample
	RE	Reanalysis/re-extraction of sample
	RE2	Second reanalysis/re-extraction of sample
	RE3	Third reanalysis/re-extraction of sample
	RE4	Fourth reanalysis/re-extraction of the original sample
	RES	The initial or original sample.
Analyte_Name	Refer to QAPP and Project Library	Refer to QAPP and Project Library
Analyte_Type	IS	Internal standard as defined per CLP usage
	SPK	Spiked analyte
	SURR	Surrogate as defined as per CLP usage
	TIC	Tentatively identified compound for GC/MS analysis
	TRG	Target compound
Detection_Limit_Type	CRDL	Contract required detection limit
	IDL	Instrument detection limit
	MDA	Minimum detectable activity
	MDL	Method detection limit
Handling_Type	WET	Wet leaching procedure
	DIWET	Deionized water leaching procedure
	SPLP	Synthetic Precipitation Leaching Procedure
	TCLP	Toxicity Characteristic Leaching Procedure
Lab_Qualifiers	*	INORG: Duplicate analysis was not within control limits
	*	ORG: Surrogate values outside of contract required QC limits
	+	INORG: Correlation coefficient for the method of standard additions (MSA) was less than 0.995
	A	ORG: Tentatively identified compound (TIC) was a suspected aldol-condensation product
	B	INORG: Value less than contract required detection limit, but greater than or equal to instrument detection limit
	B	ORG: Compound is found in the associated blank as well as in the sample
	C	ORG: Analyte presence confirmed by GC/MS
	D	Result from an analysis at a secondary dilution factor
	E	INORG: Reported value was estimated because of the presence of interference
	E	ORG: Concentrations exceed the calibration range of the instrument
	H	Analysis performed outside method or client-specified holding time requirement
	J	Estimated value
	M	INORG: Duplicate injection precision was not met
	N	INORG: Spiked sample recovery was not within control limits
	N	ORG: Presumptive evidence of a compound
	P	ORG: Difference between results from two GC columns unacceptable (>25% Difference)
	S	Reported value was determined by the method of standard additions (MSA)
	U	Compound was analyzed for, but not detected. Analyte result was below the Reporting_Limit_Type.
	W	INORG: Post digestion spike was out of control limits
	X	Reserved for a lab-defined data qualifier
	Y	Reserved for a lab-defined data qualifier
	Z	Reserved for a lab-defined data qualifier
Lab_ID		List of contract laboratories. To be established by each contractor.

Table B
Standard Value List (SVL)

Field Name	Standard Value	Standard Value Description
Matrix_ID	AIR	Air
	AQ	Water
	ASH	Ash
	BIOTA	Biological matter
	FILTER	Filter
	LIQUID	Non-aqueous liquid
	OIL	Oil
	SED	Sediment
	SLUDGE	Sludge
	SO	Soil
	SOLID	Non-soil/sediment solid
	TISSUE	Tissue
	WASTE	Waste
Parvq	=	This is to be used for all quantitative results reported for analytes above the reporting limit.
	TR	Indicates an analyte concentration above the detection limit, but below the reporting limit. (i.e., a trace concentration)
	ND	Indicates that the parameter was analyzed for but was not detected above the detection limit. For radiochemistry results, values below the detection limit are meaningful and should be reported in the result field. These results should still be accompanied by a Parvq of "ND" and a qualifier of "U", unless directed otherwise in the statement of work.
	TI	Indicates a Tentatively Identified Compound.
	CE	Indicates that the compound co-elutes with another compound and that the reported concentration may represent a mixture of compounds.
	I	Indicates that interferences were present during the analysis and that the results may not be quantitative. Results associated with a Parvq of "I" should be reported with a flag of "J" in Lab_Qualifiers.
	S	Indicates that the result was obtained by the method of standard additions.
	>	Indicates that the result was obtained from an analyte response that exceeded the calibration range. Such results should be accompanied by a "J" flag in Lab_Qualifiers. This Parvq may also be used for reporting flashpoint data: ask for guidance if reporting flashpoint data.
	<	This Parvq has been discontinued with the exception of the reporting of some flashpoint data: ask for guidance prior to use of this Parvq.
Preparation_Type	3005A	Acid Digestion of Waters for Total Recoverable or Dissolved Metals by FLAA or ICP
	3010A	Acid of Aqueous Samples and Extracts for Total Metals by FLAA or ICP
	3015	Microwave Assisted Acid Digestion of Aqueous Samples and Extracts
	3020A	Acid Digestion of Aqueous Samples and Extracts for Total Metals by GFAA
	3031	Acid Digestion of Oils for Metals Analysis by AA or ICP
	3050B	Acid Digestion of Sediments, Sludges, and Soils
	3050B_MOD	Acid Digestion of Sediments, Sludges, and Soils (modified HCL additions)
	3051	Microwave Assisted Acid Digestion of Sediments, Sludges, Soils and Oils
	3052	Microwave Assisted Acid Digestion of Siliceous and Organically Based Matrices
	3060A	Alkaline Digestion for Hexavalent Chromium
	3510C	Separatory Funnel Liquid-Liquid Extraction
	3520C	Continuous Liquid-Liquid Extraction
	3535	Solid Phase Extraction
	3540C	Soxhlet Extraction
	3541	Automated Soxhlet Extraction
	3545	Pressurized Fluid Extraction
	3550B	Ultrasonic Extraction
	3560	Supercritical Fluid Extraction of Total Recoverable Petroleum Hydrocarbons
	5030B	Purge and Trap for Aqueous Samples
	5035	Closed-System Purge-and-Trap and Extraction for Volatile Organics in Soil and Waste Samples
	7060A	Sample Preparation for Arsenic by GFAAS
	7470A	Acid digestion of waters for Mercury analysis
	7471A	Acid digestion of soils and solids for Mercury analysis
	7740	Sample Preparation for Selenium by GFAAS

Table B
Standard Value List (SVL)

Field Name	Standard Value	Standard Value Description
	8280A	Toluene Soxhlet Extraction for Dioxin analysis of soils or Separatory Funnel Extraction for Dioxin analysis of waters
	8330	Nitroaromatics and Nitramines method specific sample preparation
	9010B	Total and Amenable Cyanide Distillation
	9012A	Total and Amenable Cyanide (Automated colorimetric, with off-line distillation)
	Gen Prep	Generic preparation type when a preparation method ID does not exist (used mostly for general chemistry methods)
	NONE	Sample analyzed directly with no required preparation.
QC_Level	COA	Certificate of Analysis (accuracy and precision, no calibration)
	COACAL	Certificate of Analysis (accuracy and precision including calibration)
QC_Type	MB	Analytical control consisting of all reagents and standards that is carried through the entire procedure (Method Blank)
	CV	(Calibration Verification) Analytical standard run at a specified frequency to verify the calibration of the analytical system
	CCV	(Continuing Calibration Verification) Analytical standard run every 12 hours to verify the calibration of the GC/MS system
	DUP	A second aliquot of a sample that is treated the same as the original aliquot to determine the precision of the method
	EB	Field equipment rinseate
	FB	(Field blank) Analyte-free water or solvent brought to the field in sealed containers and transported to lab with sample containers
	FD	Duplicate sample taken from a field sample
	IC	(Initial Calibration) Analysis of analytical standards for a series of different specified concentrations
	ICV	(Initial Calibration Verification) Analytical standard run at a specified frequency to verify the accuracy of the initial calibration of the analytical system
	IPC	(Instrument Performance Check) Analysis of DFTPP or BFB to evaluate the performance of the GC/MS system
	LCS	(Laboratory Control Sample) A control sample of known composition
	LCSD	(Laboratory Control Sample Duplicate) A duplicate control sample of known composition
	MS	(Matrix Spike) Aliquot of a matrix spiked with known quantities and subjected to the entire analytical procedure to measure recovery
	MSD	(Matrix Spike Duplicate) A second aliquot of the same matrix as the matrix spike that is spiked in order to determine the precision of the method
	MATB	(Material Blank) An analysis collected from a sample of a material used in the field to collect samples such as a filer used in field filtration of water samples or a material used for wipes of surfaces.
	PB	(Preparation Blank) Analytical control containing distilled, deionized water and reagents, and subjected to entire analytical procedure
	SB	(Storage Blank) Aliquot of analyte-free water or solvent stored with the samples as a check on contamination from the storage process
	TB	(Trip Blank) Analyte free water transported with sample bottles prior to and after sample collection
Reporting_Limit_Type	CRDL	Contract-required detection limit
	CRQL	Contract-required quantitation limit
	PQL	Practical quantitation limit
	SQL	Sample quantitation limit
	RDL	Reportable detection limit
Result_Basis	DRY	Result was calculated on a dry weight basis
	WET	Result was calculated on a wet weight basis
	NA	Basis not applicable to matrix of sample.
Result_Units*	ug/L	Micrograms per liter
	mg/L	Milligrams per liter
	ug/Kg	Micrograms per kilogram
	mg/Kg	Milligrams per kilogram
	pci/g	PicoCuries per gram
	pci/L	PicoCuries per liter
	pg/L	Picograms per liter

Table B
Standard Value List (SVL)

Field Name	Standard Value	Standard Value Description
	ng/Kg	Nanograms per kilogram
	ppbv	Parts per billion by volume
	ppmv	Parts per million by volume
Total_Or_Dissolved	DIS	Dissolved
	TOT	Total

*additional result units are acceptable by adding these to the standard value table

ADR Standard Values for Methods

A method name must exist in standard value table before it can be added to a project library. The project library controls what is accepted in the EDD. Table C lists all the methods built into the ADR standard value table. Additional methods can be added to this table if necessary. If a particular method specified in the QAPP or used by the laboratory is not listed in this table, it must be added to the standard value table before that method can be built into a project library. Methods added to a project library become standard values for the Lab Reference Method ID field (method field) in any EDD processed through the error checker when selecting that project library as reference.

Standard Values for Analytes

An AFCEE PARLABEL or CAS number and analyte name (AFCEE PARNAME) must exist in the standard value table before it can be added to a method in a project library. Additional analyte name records can be added if necessary. PARNAMES and PARLABELS added to a method within a project library become standard values for the Analyte Name and Client Analyte ID fields in any EDD processed through the error checker when selecting that project library as reference.

Table C Standard Values for Analytical Methods

(additional methods or variations on method names can be added to the standard value table)

Method	Description
524.2	Volatile Organic Compounds by GC/MS in Drinking Water
6010B	Metals by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Ag	Silver by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Al	Aluminum by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-As	Arsenic by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-B	Boron by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Ba	Barium by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Be	Beryllium by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Ca	Calcium by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Cd	Cadmium by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Co	Cobalt by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Cr	Chromium by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Cu	Copper by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Fe	Iron by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-K	Potassium by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Li	Lithium by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Mg	Magnesium by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Mn	Manganese by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Mo	Molybdenum by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Na	Sodium by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Ni	Nickel by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-P	Phosphorus by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Pb	Lead by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Sb	Antimony by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Se	Selenium by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Sn	Tin by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Sr	Strontium by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-TCLP	TCLP Metals by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Tl	Thallium by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-V	Vanadium by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Zn	Zinc by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6020	Metal by Inductively Coupled Plasma/Mass Spectrometry
7041	Antimony by Graphite Furnace Atomic Absorption
7060A	Arsenic by Graphite Furnace Atomic Absorption
7081	Barium by Graphite Furnace Atomic Absorption
7091	Beryllium by Graphite Furnace Atomic Absorption
7131A	Cadmium by Graphite Furnace Atomic Absorption
7191	Chromium by Graphite Furnace Atomic Absorption
7201	Cobalt by Graphite Furnace Atomic Absorption
7211	Copper by Graphite Furnace Atomic Absorption
7381	Iron by Graphite Furnace Atomic Absorption

Table C Standard Values for Analytical Methods

(additional methods or variations on method names can be added to the standard value table)

Method	Description
7421	Lead by Graphite Furnace Atomic Absorption
7461	Manganese by Graphite Furnace Atomic Absorption
7470A	Mercury by Graphite Furnace Atomic Absorption
7471A	Mercury by Graphite Furnace Atomic Absorption
7481	Molybdenum by Graphite Furnace Atomic Absorption
7521	Nickel by Graphite Furnace Atomic Absorption
7740	Selenium by Graphite Furnace Atomic Absorption
7761	Silver by Graphite Furnace Atomic Absorption
7841	Thallium by Graphite Furnace Atomic Absorption
7911	Vanadium by Graphite Furnace Atomic Absorption
7951	Zinc by Graphite Furnace Atomic Absorption
8011	1,2-Dibromoethane and 1,2-Dibromo-3-chloropropane by Microextraction and GC
8015B	Non-halogenated organics by GC using FID
8015B DRO	Diesel Range Organics by GC using FID
8015B Extractable TPH	Extractable Petroleum Hydrocarbons as Gasoline
8015B GRO	Gasoline Range Organics by GC using FID
8015B Purgeable TPH	Purgeable Petroleum Hydrocarbons as Diesel and Motor Oil
8021B	Aromatic and Halogenated Volatiles by GC using PID/ECD
8081A	Organochlorine Pesticides by GC using ECD
8082	Polychlorinated Biphenyls (PCBs) by GC using ECD or ELCD
8082 PCB Congeners	Polychlorinated Biphenyl Congeners by GC using ECD or ELCD
8141A	Organophosphorus Compounds by GC
8151A	Chlorinated Herbicides by GC using Methylation or Pentafluorobenzylation
8260B	Volatile Organic Compounds by GC/MS
8270C	Semi-Volatile Organic Compounds by GC/MS
8280A	Polychlorinated Dibenzo-p--Dioxins and Polychlorinated Dibenzofurans
8290	Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans
8310	Polynuclear Aromatic Hydrocarbons by HPLC
8330	Nitroaromatics and Nitramines (Explosives) by HPLC
9012A	Total and Amenable Cyanide (Automated colorimetric, with off-line distillation)
9014	Titrimetric and Manual Spectrophotometric Determinative Methods for Cyanide
9040	pH Electrometric Measurement
9045	Soil and Waste pH
9056	Determination of Inorganic Anions by Ion Chromatography
300.0	Determination of Inorganic Anions by Ion Chromatography
353.2	Determination of Total Nitrate-Nitrite by Colorimetry
160.1	Total Dissolved Samples
310.1	Alkalinity
415.1	Total Organic Carbon by combustion or oxidation
DHS Luft/7420	Organic lead
410.4	Chemical Oxygen Demand by Colorimetry
SM 2320-B	Titrimetric Determination of Carbonate, Bicarbonate, and Hydroxide Alkalinity

Table C Standard Values for Analytical Methods

(additional methods or variations on method names can be added to the standard value table)

Method	Description
SM 3500-Fe D#4	Determination of Iron by Colorimetry
SM 4500-CO2 D	Carbon Dioxide
351.2	Total Kjeldahl Nitrogen
7196A	Hexavalent Chromium (Colorimetric)

Table D1 (1 of 2)
Required Fields in the Analytical Results Table for GC/MS, GC, and HPLC Methods

	GC/MS Methods			GC and HPLC Methods		
Field	Regular Sample*	MS/MSD	Method Blank, LCS/LCSD	Regular Sample*	MS/MSD	Method Blank, LCS/LCSD
Client_Sample_ID	X	X	X	X	X	X
Lab_Analysis_Ref_Method_ID	X	X	X	X	X	X
Analysis_Type	X	X	X	X	X	X
Lab_Sample_ID	X	X	X	X	X	X
Lab_ID	X	X	X	X	X	X
Client_Analyte_ID	X	X	X	X	X	X
Analyte_Name	X	X	X	X	X	X
Result	X	X	X	X	X	X
Result_Units	X	X	X	X	X	X
Lab_Qualifiers	Q	Q	Q	Q	Q	Q
Detection Limit	X	X	X	X	X	X
Detection_Limit_Type	X	X	X	X	X	X
Retention_Time	T		T			
Analyte_Type	X	X	X	X	X	X
Percent_Recovery	S	R	R	S	R	R
Relative_Percent_Difference		D	D		D	D
Reporting_Limit	X	X	X	X	X	X
Reporting_Limit_Type	X	X	X	X	X	X
Reportable_Result	X	X	X	X	X	X

Key

- X Required Field
- D Required field for spiked compounds in the LCSD and MSD only
- Q Required field if laboratory has qualified result
- R Required field if Analyte_Type = "SPK" or "SURR"
- S Required field for surrogate compounds only
- T Required field for tentatively identified compounds by GC/MS only
- * Also includes Equipment Blanks, Field Blanks, and Trip Blanks

Table D1 (2 of 2)
Required Fields in the Analytical Results Table for ICAP, AA, and IC Methods

	ICAP and AA Methods			IC and Wet Chemistry Methods		
Field	Regular Sample*	Sample Duplicate, MS/MSD	Method Blank, LCS/LCSD	Regular Sample*	Sample Duplicate MS/MSD	Method Blank, LCS/LCSD
Client_Sample_ID	X	X	X	X	X	X
Lab_Analysis_Ref_Method_ID	X	X	X	X	X	X
Analysis_Type	X	X	X	X	X	X
Lab_Sample_ID	X	X	X	X	X	X
Lab_ID	X	X	X	X	X	X
Client_Analyte_ID	X	X	X	X	X	X
Analyte_Name	X	X	X	X	X	X
Result	X	X	X	X	X	X
Result_Units	X	X	X	X	X	X
Lab_Qualifiers	Q	Q	Q	Q	Q	Q
Detection Limit	X	X	X	X	X	X
Detection_Limit_Type	X	X	X	X	X	X
Retention_Time						
Analyte_Type	X	X	X	X	X	X
Percent_Recovery		S	S		S	S
Relative_Percent_Difference		R	R		R	R
Reporting_Limit	X	X	X	X	X	X
Reporting_Limit_Type	X	X	X	X	X	X
Reportable_Result	X	X	X	X	X	X

Key
- X Required field
- Q Required field if laboratory has qualified result
- R Required field for spiked compounds in LCSD or MSD, or target compounds in the Sample Duplicate only
- S Required field if Analyte_Type = "SPK"
- * Also includes Trip Blanks, Equipment Blanks, and Field Blanks

Table D2
Required Fields in the Laboratory Instrument Table

	GC/MS Tunes		Initial Calibration				Initial Calibration Verification				Calibration Verification, Continuing Calibration
Field	VOA	SVOA	GC/MS	GC HPLC	ICP/AA	IC*	GC/MS	GC HPLC	ICP/AA	IC*	ALL METHODS
Instrument_ID	X	X	X	X	X	X	X	X	X	X	X
QC_Type	X	X	X	X	X	X	X	X	X	X	X
Analyzed	X	X	X	X	X	X	X	X	X	X	X
Alternate_Lab_Analysis_ID	X	X	X	X	X	X	X	X	X	X	X
Lab_Analysis_ID	X	X					X	X	X	X	X
Lab_Analysis_Ref_Method_ID	X	X	X	X	X	X	X	X	X	X	X
Client_Analyte_ID	X	X	X	X	X	X	X	X	X	X	X
Analyte_Name	X	X	X	X	X	X	X	X	X	X	X
Run_Batch	X	X	X	X	X	X	X	X	X	X	X
Analysis_Batch	C	C									X
Lab_Reporting_Batch	X	X	X	X	X	X	X	X	X	X	X
Percent_Relative_Standard_Deviation			X	X							
Correlation_Coefficient			B	B	X	X					
Relative_Response_Factor			X				X				M
Percent_Difference							X	X	X	X	X
Peak_ID_01	X	X									
Percent_Ratio_01	X	X									
Peak_ID_02	X	X									
Percent_Ratio_02	X	X									
Peak_ID_03	X	X									
Percent_Ratio_03	X	X									
Peak_ID_04	X	X									
Percent_Ratio_04	X	X									
Peak_ID_05	X	X									
Percent_Ratio_05	X	X									
Peak_ID_06	X	X									
Percent_Ratio_06	X	X									
Peak_ID_07	X	X									
Percent_Ratio_07	X	X									
Peak_ID_08	X	X									
Percent_Ratio_08	X	X									
Peak_ID_09	X	X									
Percent_Ratio_09	X	X									
Peak_ID_10		X									
Percent_Ratio_10		X									
Peak_ID_11		X									
Percent_Ratio_11		X									
Peak_ID_12		X									
Percent_Ratio_12		X									
Peak_ID_13		X									
Percent_Ratio_13		X									

Key

X Required field (some fields are not applicable to some General (Wet) Chemistry tests)

B Required field if reporting best fit

C Required field if BFB or DFTPP associated with a continuing calibration only

M Required field for GC/MS continuing calibration only

*IC Includes Ion Chromatography and Classical or Wet Chemistry methods. Methods such as pH, Conductivity, and others do not use traditional calibration procedures; therefore, some fields marked as a required field under the "IC" column do not apply for these methods.

Table D3
Required Fields in the Sample Analysis Table

	GC, GC/MS, HPLC Methods		ICAP and AA Methods		IC and Wet Chemistry Methods	
Field	Method Blanks, LCS/LCSD	Regular Samples*, Sample Duplicate, MS/MSD	Method Blanks, LCS/LCSD	Regular Samples*, Sample Duplicate, MS/MSD	Method Blanks, LCS/LCSD	Regular Samples*, Sample Duplicate, MS/MSD
Client_Sample_ID	X	X	X	X	X	X
Collected		X		X		X
Matrix_ID	X	X	X	X	X	X
Lab_Sample_ID	X	X	X	X	X	X
QC_Type	X	Q	X	Q	X	X
Shipping_Batch_ID		X		X		X
Temperature		X				X
Lab_Analysis_Ref_Method_ID	X	X	X	X	X	X
Preparation_Type	X	X	X	X	X	X
Analysis_Type	X	X	X	X	X	X
Prepared	A	A	X	X	N	N
Analyzed	X	X	X	X	X	X
Lab_ID	X	X	X	X	X	X
QC_Level	X	X	X	X	X	X
Results_Basis		S		S		S
Total_Or_Dissolved			W	W		
Dilution	X	X	X	X	X	X
Handling_Type	L	L	L	L	L	L
Handling_Batch	L	L	L	L	L	L
Leachate_Date	L	L	L	L	L	L
Percent Moisture		S		S		S
Method_Batch	X	X	X	X	X	X
Preparation_Batch	X	X	X	X	X	X
Run_Batch	C	C	C	C	C	C
Analysis_Batch	C	C	C	C	C	C
Lab_Reporting_Batch	X	X	X	X	X	X
Lab_Receipt		X		X		X
Lab_Reported	X	X	X	X	X	X

Key

- X Required field
- A Required field for samples prepared by methanol extraction
- C Required field if Instrument Calibration Table (A2) is included in EDD
- L Required field if analysis performed on SPLP, TCLP, or WET extracts
- N Required field only for samples that require preparation before analysis
- Q Required field for Sample Duplicate, MS, and MSD only
- S Required field if "Matrix_ID" = "SO" or "SED"
- W Required field for aqueous samples only
- * Includes Trip Blanks, Equipment Blanks, and Field Blanks

Appendix F
Standard Operating Procedures

G

APPENDIX G

FORMS

LIST OF FORMS

Daily Quality Control Report
Daily Safety Briefing Form
Borehole/Well Construction Log
Monitoring Well Construction Diagram
Chain-of-Custody Record
Field Instrument Calibration Data Sheet
Sample Labels

USACE Daily Quality Control Report

Date: / / S M T W T F S	Reported by:	Site:	Location:
Weather:			

Summary of Events and Observations:

Summary of Subcontractor Activities:

Summary of Problems Encountered and Corrective Actions Taken:

Variances from FSIP:

Remarks:

Time and Materials	Location ID's					Daily Totals
Boring Depth:						ft.
Subcontractor Name:						
Rig Setup						hr.
Drilling						hr.
Subcontractor Standby						hr.
BC Standby						hr.
Decon						hr.
Grouting						hr.
Other						
Total Hours						
Cement (bag)						
Bentonite (lbs)						
Waste generated						(gal/yd)
Other						
Health and Safety Level (A,B,C, or D)						
Soil Sampling (collected/shipped)						
Water Sampling (collected/shipped)						
Soil Gas (collected/shipped)						

Equipment used see Sample Data Sheet

See Equipment Calibration Form for calibration records

FA/BC

Attachment B—Site Safety and Health Plan Site Activity and Safety Briefing

Name of Site Safety Officer	Signature of Site Safety Officer	
Project Name	Project Location	Project Number

Who attended the briefing?

Names of FA/BC Employees	**Names of Subcontractor(s) Employees**
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

What items were discussed?

- ☐ Site Safety and Health Plan
- ☐ Hazardous Site Conditions/Activities
- ☐ Specific Accident/Incident
- ☐ Changes/Solutions to Specific Accident(s)
- ☐ Protective Equipment to be Used
- ☐ Location of Emergency Telephone Number
- ☐ Emergency Hospital Route
- ☐ Work Schedule
- ☐ Other _____

Do any items require assistance from FA/BC Health and Safety staff? (If yes, describe the item and type of assistance required and contact the Health and Safety staff directly.)

☐ YES ☐ NO

_____

_____

_____

_____

NOTE: Place a copy of the completed form in the project file.

FORSGREN ASSOCIATES/BROWN AND CALDWELL

BOREHOLE/WELL LOG

LOCATION OF BORING

N W E S

SCALE:

CLIENT

LOCATION

PROJECT NAME

BORING NUMBER

JOB NUMBER

SHEET OF

DRILLING CONTRACTOR

RIG TYPE (CIRCLE ONE) OTHER _____

HSA DP MUD ARCH NONE

DRILLING METHOD, FLUID USED

SOIL SAMPLING METHOD (CIRCLE ONE) OTHER _____

SPLIT SPOON CC ACETATE NONE

MONITORING INSTRUMENT (CIRCLE ONE) OTHER _____

PID FID LEL RAD NONE

SURFACE CONDITIONS (CIRCLE ONE) OTHER _____

ASPHALT CONCRETE DIRT DRY WET

DRILLING	
START	FINISH
TIME	TIME
DATE	DATE

WELL CONSTRUCTION	
START	FINISH
TIME	TIME
DATE	DATE

FINE GRAINED AND ORGANIC SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, SIZE DISTRIBUTION, PLASTICITY, DRY STRENGTH, DILATANCY, TOUGHNESS, MOISTURE, ODOR, STRUCTURE, CONSISTENCY, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, CONTACT DESCRIPTION

COARSE GRAINED SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, GRADATION (g/s/f), SIZE DISTRIBUTION, PLASTICITY, SHAPE, ANGULARITY, MOISTURE, ODOR, STRUCTURE, CEMENTATION, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, MINERALOGY, CONTACT DESCRIPTION

WELL CONSTRUCTION		SOIL SAMPLING									
ANNULUS	CASING	SAMPLER USED	BLOWS/6" INTERVAL	INTERVAL SAMPLED	RECOVERY	ANALYTICAL SAMPLE (A,B,C)	WATER LEVEL (INTIAL/STATIC)	DEPTH (FEET)	INSTRUMENT READING (ppm)	USCS GROUP SYMBOL	SAMPLE TYPE: INTERVAL: DESCRIPTION
								0			
								5			
								0			
								5			
								0			

ANALYTICAL SAMPLE ID (SEE ABOVE FOR LOCATION)

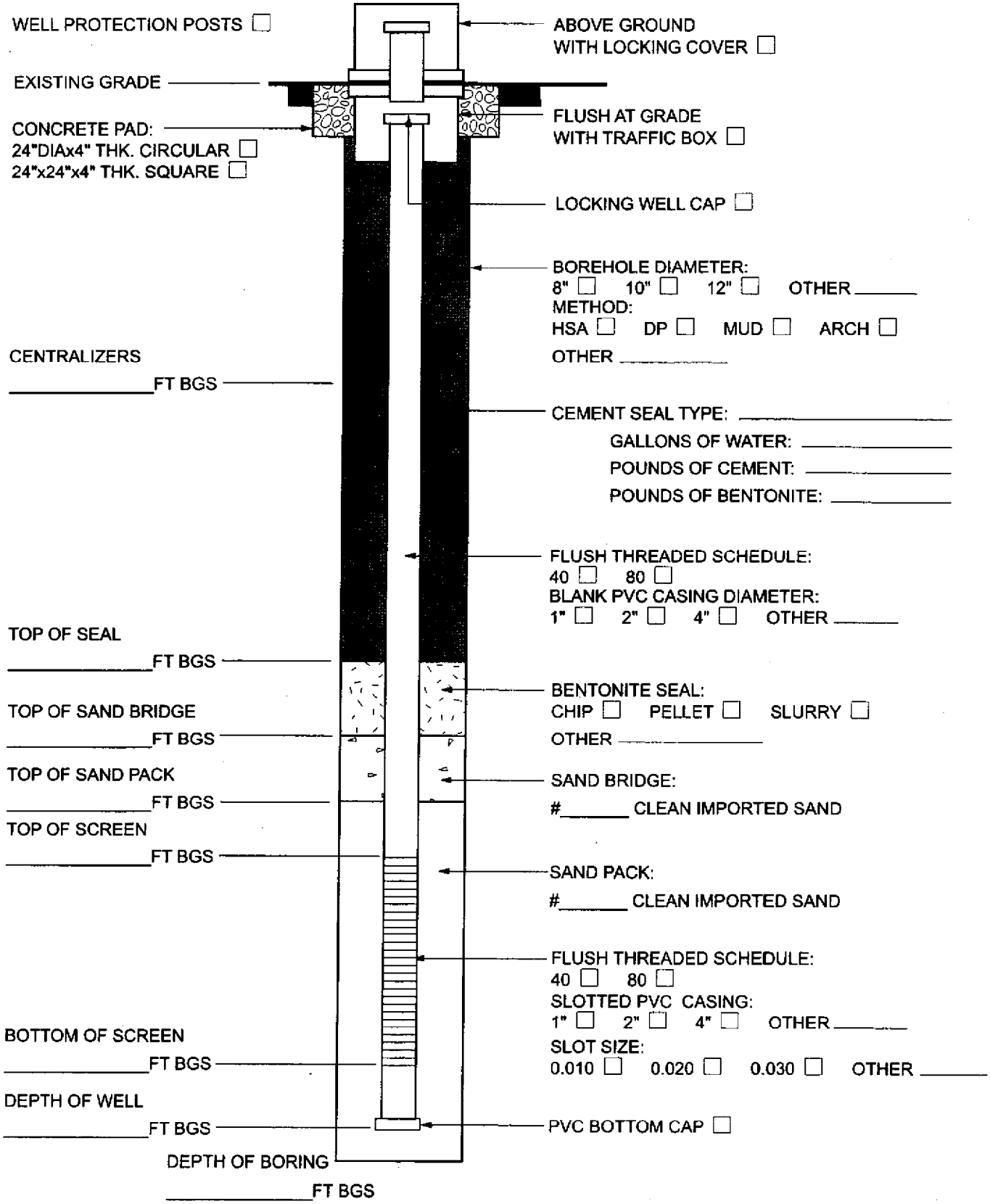
A _____ D _____

B _____ E _____

C F

P:\Special\DACW05-97-D-0035A_E\Field Activities\boringlogform.xls

ID: _____ DATE CONSTRUCTED: _____ SUPERVISED BY: _____



SECTION
NOT TO SCALE

Monitoring Well Construction Diagram

P:\US Army Corps\Benicia Arsenal\Field Activities\well-construct\WellConstForm.cdr

FA/BC
FORSGREN ASSOCIATES/BROWN AND CALDWELL
A JOINT VENTURE
2701 PROSPECT PARK DRIVE • RANCHO CORDOVA, CA 95670
916-444-0123 • FAX 916-635-8805

CHAIN OF CUSTODY RECORD

COC No. _____

PROJECT NAME:	LABORATORY NAME & ADDRESS:
PROJECT NUMBER:	

LINE NO.	SAMPLE I.D.	COLLECTION DATE	COLLECTION TIME	SAMPLER'S INITIALS	NUMBER OF CONTAINERS	CONTAINER SIZE AND TYPE	PRESERVATIVE	MATRIX CODE	ANALYSES REQUESTED	FIELD FILTERED	COC TRACK	TAT	SAMPLING METHOD	DEPTH (FT.) BEGIN / END	PID READING (ppm)
01														----	
02														----	
03														----	
04														----	
05														----	
06														----	
07														----	
08														----	
09														----	
10														----	

COLLECTED & RELEASED BY:	DATE / /	TIME :	COOLER I.D.:			COMMENTS (see note on back):
RECEIVED BY:	DATE / /	TIME :	RELINQUISHED BY:	DATE / /	TIME :	
RECORD RETURNED BY:	DATE / /	TIME :				
COURIER:			SHIPPING NUMBER:			

DISTRIBUTION: WHITE – PROJECT FILE • CANARY – LAB RECEIPT • PINK – DATA MANAGEMENT • GOLDENROD – FIELD

USE A BALLPOINT PEN, BLACK INK, AND PRESS FIRMLY. INSTRUCTIONS ARE ON THE BACK.

CALIBRATION DATA SHEET

Project Name: _____ Date/Time: _____

Project Number: _____ Temperature: _____

Relative Humidity: _____

Calibration Performed By: _____

instrument Type	Make	Model	Serial No.	Calibration Gas	Concentration	Instrument Reading	Span Setting (Hnu only)/Comments

Sampling Pump	Make	Model	Serial No.	Flow Rate Start stop	Calibrator	Serial NO.	Comments

Aerosol/Dust Monitor	Make	Model	Serial No.	Instrument zero'd before Operation		Comments
				Yes	No	
				Yes	No	
				Yes	No	
				Yes	No	
				Yes	No	
				Yes	No	

Sample Labels

FA/BC
FORSGREN ASSOCIATES/
BROWN and CALDWELL
A Joint Venture

2701 Prospect Park Drive
Rancho Cordova, CA 95670
(916) 444-0123
(916) 635-8805 fax

Client: _____
Project: _____
Project #_____ Samplers_____
Sample ID: _____
Container Type/size _____
Date _____ Time_____
Analysis _____
Analytes _____
Matrix _____ Preservative _____
Log# _____

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Client: USACE
Project: _____
Project # 00701 Samplers_____
Sample ID: _____
Container Type/size _____
Date _____ Time_____
Analysis _____
Analytes _____
Matrix _____ Preservative _____
Log# _____

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