



Summary of Sample Containers, Preservatives and Holding Time Requirements

Analytical Parameter	Method Reference	Container		Preservation	Holding Time	
		Water	Soil / Sed.		Water	Solid
Alkalinity	2320 B-97	500 mL HDPE ⁽¹⁾	4 oz. WMG	Cool 0 - 6°C	14 Days	14 Days
Ammonia (Colorimetric)	350.1 / 4500-NH3 H-97	500 mL HDPE	4 oz. WMG	Water: Cool 0 - 6°C, pH <2 with 9N H ₂ SO ₄ Solid: Cool 0 - 6°C	28 Days 48 Hr ⁽²⁾	7 Days ^(a)
Ammonia (ISE)	350.3 / 4500-NH3 D-97					
Anions (Cl ⁻ , Br ⁻ , F ⁻ , NO ₂ ⁻ , NO ₃ ⁻ , SO ₄ ⁻² , PO ₄ ⁻³)	300.0 / 9056 / 4110 B-00	500 mL HDPE	4 oz. WMG	(b)	(b)	28 Days
BETX	8021 / 8260	2 ea -40 mL vial ⁽¹⁾	2 oz. WMGS ⁽¹⁾	HCl to pH < 2.0 Cool 0 - 6°C	14 Days 7 Days ⁽²⁾	14 Days
Biological Oxygen Demand (BOD)	405.1 / 5210 B-01	1 Liter HDPE	2 oz. WMG	Cool 0 - 6°C	48 Hours	7 Days
Butyl Tin Species	8270 (SIM)	2 ea 500 mL AG	8 oz. WMG	Cool 0 - 6°C	7 Days	14 Days
Cation Exchange Capacity	9080 / MSA 8 & 9	--	4 oz. WMG	--	--	28 Days
Chemical Oxygen Demand (COD)	410.4 / 5220D-97	250 mL AG	4 oz. WMG	Cool 0 - 6°C, pH <2 with 1 mL 9N H ₂ SO ₄	28 Days	28 Days
Chloride (Colorimetric)	325.2 / 4500-CL E-97	500 mL HDPE	4 oz. WMG	Cool 0 - 6°C	28 Days	28 Days
Coliform, Fecal	SM 9222 D	Corning 4 oz	4 oz. WMG	Na ₂ S ₂ O ₃ (Sod. Thiosulf.) Tablet, Cool <10 °C	8 Hours	--
Coliform, Total	SM 9222 B / 9132					
Color	2120 B-01	500 mL HDPE	--	Cool 0 - 6°C	48 Hours	--
Conductivity	120.1 / 9050A 2510B / MSA 10	500 mL HDPE	4 oz. WMG	Cool 0 - 6°C	28 Days	28 Days
Calcium Carbonate Saturation	2330-00	500 mL HDPE	--	Cool 0 - 6°C	14 Days	--
Cyanide, Total or Amenable	335.4 / 9010C / 9014/ 4500-CN	500 mL HDPE	4 oz. WMG	Cool 0 - 6°C, If no S ₂ , preserve to pH >12 with 6N NaOH If S ₂ present, do not preserve, notify lab & ship immediately.	48 Hrs ⁽²⁾ 14 Days if treated	14 Days
Cyanide, Weak Acid Dissociable (WAD)	SM4500 CN I					
Dissolved Oxygen (Winkler Titration)	4500-O C-01	BOD bottle	--	Fixed in the Field	8 Hours	--
Dissolved Oxygen (Electrode) (ORP / Eh)	2580-B 97	BOD bottle	--	--	(c)	--
Extractable Petroleum Hydrocarbons (EPH)	WDOE-EPH (1997)	2 ea 500 mL AG	8 oz. WMG	Cool 0 - 6°C w/ 1:1 HCl, pH ≤ 2.0	7 Days 14 Day	14 Days
Fluoride (ISE)	340.2 / 9214 / 4500-F C-97	500 mL HDPE	4 oz. WMG	Cool 0 - 6°C	28 Days	28 Days
Glycols	EPA 8015 / EPA 5035	40 mL GV	4 oz. WMG	Cool 0 - 6°C	7 Days	14 Days
Grain Size (Gradation)	Ecology TAPE Laser Diffraction	1L HDPE	--	--	7 Days	--
Herbicides, Chlorinated	8151	2 ea 500 mL AG	8 oz. WMG	Cool 0 - 6°C	7 Days	14 Days
Hardness (Calculation)	6010 / 2340B	500 mL HDPE	--	5 mL 1:1 HNO ₃ ⁽³⁾	6 Months	--
Hexane Extractable Material (HEM) (HEM-SGT) – Oil & Grease	1664 / 9071 / 5520 G / 5520 D	1 Liter AG	4 oz. WMG	Cool 0 - 6°C, pH <2 with 5 mL 9N H ₂ SO ₄	28 Days	28 Days
Hexavalent Chromium (Cr ⁺⁶)	7196A / 3500-Cr B-01 / 3060A Extraction	500 mL HDPE	4 oz. WMG	Filter, adjust to pH 9.3 to 9.7 with NaOH or buffer, Cool 0 - 6°C	28 Days 24 Hrs ⁽²⁾	28 Days
Iron, Ferrous (Fe ⁺²)	3500 FE B-97	500 mL AG ⁽¹⁾	--	2 mL HCl conc per 100 mL of sample	(d)	--
Metals	6010 / 6020 / 200.7 / 200.8	500 mL HDPE	4 oz. WMG	Water- pH <2 with 1:1 HNO ₃ ⁽³⁾ Cool 0 - 6°C Solid- Cool 0 - 6°C	6 Months	6 Months



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		Water	Soil / Sed.		Water	Solid
Methane, Ethane, Ethene	RSK-175	3 ea 40 mL vial ⁽¹⁾	--	Cool 0 - 6°C	14 Days	--
Mercury	7470 / 7471 / 545.1 / 545.5	500 mL HDPE	4 oz. WMG	5 mL 1:1 HNO ₃ ⁽³⁾	28 Days	28 Days
Nitrate OR Nitrite (Colorimetric)	4500-NO3 I / 353.2	500 mL HDPE	4 oz. WMG	Cool 0 - 6°C	48 Hours	48 Hours
Nitrate + Nitrite (Colorimetric)	4500-NO3 I / 353.2	500 mL HDPE	4 oz. WMG	Cool 0 - 6°C + pH <2 with 2 mL 9N H ₂ SO ₄	28 Days	7 Days ^(a)
Organophosphorous Pesticides	8270-SIM	2 ea 500 mL AG	8 oz. WMG	Cool 0 - 6°C	7 Days	14 Days
Pentachlorophenol (PCP)	8041-Mod / 8270	2 ea 500 mL AG	8 oz. WMG	Cool 0 - 6°C	7 Days	14 Days
Pesticides or PCBs	8081 or 8082	2 ea 500 mL AG low PCB= 2 ea 1 liter AG	8 oz. WMG	Cool 0 - 6°C	7 Days	14 Days
Petroleum Hydrocarbon - Diesel (TPH-Dx) (DRO)	NWTPH-Dx / AK102	2 ea 500 mL AG	8 oz. WMG	Cool 0 - 6°C w/ 1:1 HCl, pH ≤ 2.0	7 Days 14 Day	14 Days
Petroleum Hydrocarbon – Motor Oil (TPH-Dx) (RRO)	NWTPH-Dx / AK103	2 ea 500 mL AG	8 oz. WMG	Cool 0 - 6°C	7 Days	14 Days
Petroleum Hydrocarbon Identification (HCID)	NWTPH-HCID / 8015-Mod	2 ea 500 mL AG	8 oz. WMG	Cool 0 - 6°C	7 Days	14 Days
Petroleum Hydrocarbons - Gasoline (AK 101)	AK 101, EPA 5035	2 ea 40 mL AGV ⁽¹⁾	4 oz. amber WMGS	Water- HCl to pH < 2, Cool 0 - 6°C Solid- Methanol Surrogate mix ⁽⁸⁾	14 Days	28 Days
Petroleum Hydrocarbon - Gasoline (NWTPH-G) (GRO)	NWTPH-G , EPA 5035	40 mL GV ⁽¹⁾	2 ea 40 mL GV	Water- HCl to pH < 2.0, Cool 0 - 6°C Solid- Methanol	14 Days 7 Days ⁽²⁾	14 Days
pH (Hydrogen Ion)	9040C / 4500 H+B / 9045D	500 mL HDPE	4 oz. WMG	--	(c)	14 Days
Phenols, GC/FID	8041-Mod	2 ea 500 mL AG	8 oz. WMG	Cool 0 - 6°C	7 Days	14 Days
Phenols	420.1 / 9065 / 5530D	250 mL AG	4 oz. WMG	Water- Cool 0 - 6°C + pH <2 with 2 mL 9N H ₂ SO ₄ Solid- Cool 0 - 6°C	28 Days	28 Days
Phosphorous, Total	365.2 / 4500-P E	500 mL HDPE	4 oz. WMG	Water- Cool 0 - 6°C + pH <2 with 2 mL 9N H ₂ SO ₄ Solid- Cool 0 - 6°C	28 Days	28 Days
Phosphorous, Ortho (Soluble Reactive Phosphorous) (SRP)	4500-P E	500 mL AG	4 oz. WMG	Filter, Cool 0 - 6°C	48 Hours	28 Days
Polynuclear Aromatic Hydrocarbon-(PAH)	8270 & 8270-SIM	2 ea 500 mL AG	8 oz. WMG	Cool 0 - 6°C	7 Days	14 Days
Polychlorinated Dibenzodioxins & Dibenzofurans	1613B / 8290A	2 ea 1 Liter AG	8 oz WMG (amber)	Water- Cool ≤ 4°C Soil- Freeze	1 Year	1 Year
Salinity	2520 B-00	500 mL HDPE	--	--	28 Days	--
Semivolatile Organics (SVOA)	8270	2 ea 500 mL AG	8 oz. WMG	Cool 0 - 6°C	7 Days	14 Days
Solids, Total (TS)	2540 B-97	1 Liter HDPE	--	Cool 0 - 6°C	7 Days ⁽⁶⁾	--
	2540 G-97 / PSEP(1986)	--	4 oz. WMG	Cool 0 - 6°C, Freeze (PSEP)	--	7 Days, Freeze 6 Mo. ⁽⁶⁾ (PSEP)
Solids, Total Suspended (TSS)	2540 D-97	1 Liter HDPE	--	Cool 0 - 6°C	7 Days	--
Solids, Total Dissolved (TDS)	2540 C-97	1 Liter HDPE	--	Cool 0 - 6°C	7 Days	--
Solids, Total Volatile (TVS)	160.4 / 2540 E	1 Liter HDPE	--	Cool 0 - 6°C	7 Days	--
	2540 G-97, PSEP(1986)	--	4 oz. WMG	Cool 0 - 6°C, Freeze	--	7 Days, Freeze 6 Mo. ⁽⁶⁾



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						(PSEP)
Solids, Settleable (SS)	2540 F-97	1 Liter HDPE	--	Cool 0 - 6°C	48 Hours	--
Solids, Volatile Suspended (TVSS)	2540 E-97	1 Liter HDPE	--	Cool 0 - 6°C	7 Days	--
Sulfate (Colorimetric)	375.2 / 9036 / 4500-SO4 G-97	500 mL HDPE	4 oz. WMG	Cool 0 - 6°C	28 Days	28 Days
Sulfide, Acid Volatile (AVS)	4500-S2 D-00	--	4 oz. WMGS ⁽¹⁾	Cool 0 - 6°C	--	14 Days
Sulfide, Acid Soluble	9030B / 9034	--	4 oz. WMGS ⁽¹⁾	Cool 0 - 6°C, 2N Zinc Acetate	--	7 Days
Sulfide, PSEP "Total"	PSEP(1986)	--	4 oz. WMGS ⁽¹⁾	Cool 0 - 6°C, 1N Zinc Acetate	--	7 Days
Sulfide (Colorimetric)	4500-S2 D-00 / 376.2	500 mL HDPE ⁽¹⁾	--	2 ml 1N Zinc Acetate + 1 mL 10N NaOH pH > 9.0	7 Days	--
Sulfide (Titrimetric)	4500-S2 F-00 / 9034					
Sulfite	4500-SO3B-00	500 mL HDPE	--	--	(d)	--
TCLP / SPLP- Metals and SVOA	EPA 1311 (TCLP), 1312 (SPLP)	WMG ⁽⁹⁾	WMG ⁽⁹⁾	Cool 0 - 6°C	(e)	(e)
TCLP - VOA	EPA 1311	40 mL GV ⁽¹⁾ (9)	WMGS ⁽⁹⁾	Water - pH < 2.0, Cool 0 - 6°C Soil - Cool 0 - 6°C	14 Days 7 Days ⁽²⁾	14 Days
Total Kjeldahl Nitrogen (TKN)	351.2 / 351.4 mod 4500-Norg D mod	500 mL HDPE	4 oz. WMG	Cool 0 - 6°C + pH < 2 with 2 mL 9N H ₂ SO ₄	28 Days	28 Days
Total Organic Carbon (TOC) (Aqueous)	5310 B-00 / 9060	250 mL AG	--	Cool 0 - 6°C + pH < 2 with 2 mL 9N H ₂ SO ₄	28 Days	--
Total Organic Carbon (TOC) (Solid)	Plumb, 1981 ⁽⁵⁾ / PSEP	--	4 oz. WMG	Cool 0 - 6°C, Freeze (PSEP)	--	14 Days, 6 Months (PSEP)
Turbidity	180.1 / 2130 B-01	500 mL HDPE	--	Cool 0 - 6°C	48 Hours	--
Volatile Petroleum Hydrocarbons (VPH)	WDOE-VPH (1997), EPA 5035	40 mL AGV ⁽¹⁾	40 mL AGV	Water- HCl to pH < 2.0, Cool 0 - 6°C Soil- Methanol	14 Days 7 Days ⁽²⁾	14 Days
Volatile Organic Compounds (VOA)	8260 / 8260-SIM, EPA 5035	40 mL GV ⁽¹⁾	3 ea 40 mL GV ⁽¹⁾	Water- HCl to pH < 2.0, Cool 0 - 6°C Soil- NaHSO ₄ (2 vials), Methanol (2 vials) ⁽⁷⁾	14 Days 7 Days ⁽²⁾	14 Days 2 Days ⁽²⁾
Volatile Organic Compounds (VOA) Drinking Water	524.3	3 ea 40 mL AGV ⁽¹⁾	--	Ascorbic and Maleic Acid, Cool 0 - 6°C	14 Days 24 Hours ⁽²⁾	--
Containers:		Preservation & Holding Times				
AG = Amber Glass Boston Round Bottle	HDPE = High Density Polyethylene	(a) = 7 days to extraction then 48 hr (28 days w/ preservation) to analysis				
AGV = Amber Glass Vial	AHDPE = Amber HDPE	(b) = Anions: Cl ⁻ , Br ⁻ , F ⁻ - no preservative with 28 days holding time				
GV = Glass Vial	WMG = Wide Mouth Glass Jar	SO ₄ ²⁻ - Cool ≤ 6°C - with 28 days holding time				
	WMGS = Wide Mouth Glass Jar with Septa	NO ₂ ⁻ , NO ₃ ⁻ , PO ₄ ³⁻ - Cool ≤ 6°C with 48 hour holding time				
		PO ₄ ³⁻ - requires filtering ≤ 15 min of sample collection (field filtration)				
		Use the most conservative preservation required for the targeted ions				
		(c) = Measure in Field or Analyze Immediately Upon Receipt in the Laboratory				
		(d) = Analyze Immediately Upon Receipt in the Laboratory				
(1) = No Headspace		(e) = Samples must be TCLP extracted within 14 days for SVOA, 28 days for Hg, and 180 days for other metals.				
(2) = When Unpreserved		(f) = When not specified by Geotech methods, ARI follows a 6 months holding time on sediment samples.				
(3) = Total Metals or field filtered samples only						
(4) = Draft Analytical Method for Determination of Acid Volatile Sulfide in Sediment, EPA 821-R-91-100						
(5) = Plumb, R. H. Jr., <i>Procedures for Handling and Chemical Analysis of Sediment & Water Samples</i> , May 1981, USACE Publication AD/A103788						
(6) = When requested as a separate analyte. TS to correct for dry weight has the same holding time as the analytical parameter						
(7) = VPH & gasoline require only two vials preserved with methanol						
(8) = AK 101 soil/sed will be field preserved using supplied 25ml of methanol including 1.2 ml of surrogate at 50 ug/ml.						



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(9) = Amount of sample required for TCLP/ SPLP varies. Lower percent wet solids requires greater sample volume for leaching. If multiple phases are collected each phase may need to be analyzed individually, requiring larger sample volumes.

Test Type	Geotechnical Parameters	Method Reference	Container				Minimum Sample Required	Holding Time (f)	
			Water	Soil	Sediment	Other			
Index	Atterberg Limits	ASTM D4318	--	Plastic Bag		--	4 oz.	--	
	Bulk Density (Wet/Dry Density)	ASTM D7263/ EPA 9100/ ASTM E1109	--	Core or Bag		--	4 oz.	--	
	Bulk Density of Aggregate	ASTM C29	--	Bag or Bucket	--	--	Varies with Particle Size	--	
	Carbonate Determination	ASTM D4373	--	Plastic Bag		--	2 oz.	--	
	Core Logging		--	Core		--	Core	--	
	Extrusion of Shelby Tube Samples		--	Core		--	Core	--	
	Grain Size (Gradation)	PSEP - Sieve/Pipette		--	Plastic Bag		--	7 oz.	6 months
		Sieve/ Hydrometer ASTM D421/422		--	Plastic Bag		--	8 oz.	--
		Sieve Only ASTM D422/C136		--	Plastic Bag		--	4 oz.	--
		Sieve Coarse Aggregate ASTM C136		--	Bag or Bucket		--	Varies with Particle Size	--
		% Fines Wet Wash ASTM D1140		--	Plastic Bag		--	4 oz.	--
		Gravel Sand Silt Clay Fractions PSEP/ASTM		--	Plastic Bag		--	7 oz.	6 months
		Salt Correction for PSEP grsz only		--	--	Plastic Bag	--		--
		Sedigraph		--	--	Plastic Bag	--	1 g	--
		Laser Diffraction - Ecology TAPE		2 ea 500ml HDPE	--	--	--	1L	7 Days
	Laser Diffraction - PSD Only		500ml HDPE	--	--	--	250 ml	--	
	Moisture Content	ASTM D2216	--	Plastic Bag		--	2 oz.	--	
	Organic Matter - Loss on Ignition (LOI)	ASTM D2974	--	Plastic Bag	--	--	2 oz.	--	
	Soil Classification	ASTM D2487	--	Plastic Bag		--	16 oz.	--	
	Specific Gravity	ASTM D854	--	Plastic Bag		--	4 oz,	--	
	Specific Gravity of Coarse Aggregate	ASTM C127/C128	--	Bag or Bucket	--	--	Varies with Particle Size	--	
	Porosity	API RP40/ EPA 9100	--	Core, Bag, Jar		--	8 oz	--	
		EM-1110-2-1906	--	Core, Bag, Jar		--	8 oz	--	
Soil Resistivity	AASHTO T288	--	Plastic Bag	--	--	16 oz	--		
Specific Gravity of Liquids	ASTM D1298 or D891	500 ml HDPE	--	--	--	500 ml	--		
Sediment Concentration in Water	ASTM D3977	500 ml HDPE	--	--	--	500 ml HDPE	7 days		
Specific Yield/ Centrifuge Moisture Equivalent	ASTM D425	--	Plastic Bag		--	1 oz	--		



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Test Type	Geotechnical Parameters	Method Reference	Container				Minimum Sample Required	Holding Time (f)
			Water	Soil	Sediment	Other		
Strength	CBR (California Bearing Ratio) Three points varying compactive effort	ASTM D1883	--	5 gal bucket	--	--	Full Bucket	--
	Proctor Standard/Modified	ASTM D698/1557	--	5 gal bucket	--	--	Full Bucket	--
	Collapse Potential	ASTM D5333	--	Core		--	Height: Diameter= 1.5x2.6in	--
	Consolidation	ASTM D2435 Method B	--	Core		--	Height: Diameter= 2x2.85in	--
	Expansion Index	ASTM D4829	--	Plastic Bag		--	64 oz	--
Strength	Swell, One Dimensional	ASTM D4546	--	Core		--	Height: Diameter= 1.5x2.6in	--
	Triaxial Compressive Strength	QU, Unconfined Compression ASTM D2166	--	Core		--	Height: Diameter Ratio = 2:1	--
		UU, Unconsolidated - Undrained, ASTM D2850	--	Core		--	Height: Diameter Ratio = 2:1	--
		CU, Consolidated- Undrained, ASTM D4767	--	3 Cores		--	Three 2:1 cores	--
		CU, Consolidated- Undrained, USBR 5750	--	1 Core		--	One 2:1 core	--
Permeability and Contaminant Transport	Hydraulic Conductivity (Permeability)	Rigid Wall, ASTM D2434	--	--	--	Sand-Core, Bag	Height: Diameter = 1.5:1	--
		Flex Wall, ASTM D5084	--	Core or Bag		--	Core min 1inx1in	--
	Effective Porosity	Rigid Wall	--	--	--	Sand- Core	Height :Diameter = 1.5:1	--
		Flex Wall	--	Core		--	Core min 1inx1in	--
	Column Leach Test	ASTM D4874	--	--	Ask Lab	--	64 oz.	--
	Microtoxicity	Ecology 100% Method	--	--	2 ea 32 oz. glass	--	2 ea 32 oz	14 days
		Serial Dilutions ASTM D5660	--	--	2 ea 32 oz. glass	--	2 ea 32 oz	14 days
USACE	USACE Dredge Material Testing	Column Settling	25 gal site water	--	5 gal bucket	--	25 gal site water / 5 gal sed	--
		DRET - Dredge Elutriate	Site Water	--	WMG	--	1 L site water / 10 g dry wt	Dependent On Chemistry Requested
		SET - Standard Elutriate	Site Water	--	WMG	--	Sed : Water = 1:4	Dependent On Chemistry Requested
		MET - Modified Elutriate	Site Water	--	WMG	--	1 L site water/ 150g dry wt	Dependent On Chemistry Requested
		Self Weight Consolidation	Site Water	--	5 gal buckets	--	6L site water / 2L solids	--
		SBLT, Sequential Batch Leach Test	Site Water	--	WMG	--	Sed : Water = 1:4	Dependent On Chemistry Requested
		PCLT, Pancake Leach Test	Site Water	--	WMG jars, Teflon bags	--	30L site water / 150 oz sed,	Dependent On Chemistry Requested
	Pore Water Extraction	Modified EPA-823-B-01-002 Methods	--	--	32 oz WMG (estimated)	--	Need enough sed to yield minimum pore water for requested analysis	7 days to extract, then 7 days to analyze