

Sample Packing Guide

Help us protect your samples during shipment. Following this guide helps ensure samples arrive in good condition and meet preservation and holding time requirements.

① Complete the Chain of Custody (COC)

Verify sample IDs, collection dates/times, requested analyses, turnaround time, project name, PO/Quote (if applicable), and ensure sample labels match the COC.

Tip: Email the electronic COC to your GEL Project Manager and include a printed copy inside the cooler.

② Prepare the Cooler

Place an absorbent pad in the bottom of the cooler. If shipping aqueous samples or using wet ice, install a plastic liner.

③ Secure Sample Containers

Tighten all lids. Protect glass containers with bubble wrap or similar cushioning and arrange containers to minimize movement.

④ Add Ice & Packing Material

Surround samples with sufficient wet ice. Double-bag ice whenever possible and fill remaining void space with packing material.

⑤ Include Documentation

Place the completed COC and supporting documentation inside a sealed plastic bag. Contact your GEL Project Manager before shipping hazardous or radioactive materials.

⑥ Seal & Ship

Tape around the top and bottom seams of the cooler, apply required shipping labels, and clearly identify the return address if the cooler should be returned.

✓ BEFORE YOU SEAL THE COOLER

- | | |
|--|--|
| ☐ COC completed and signed | ☐ Sufficient ice added |
| ☐ Sample labels match the COC | ☐ Empty space filled |
| ☐ Containers tightly sealed | ☐ Documentation sealed in plastic bag |
| ☐ Glass containers protected | ☐ Cooler securely taped and labeled |

Questions? Contact your GEL Project Manager before shipping if you have questions about sample preservation, hazardous materials, or project-specific requirements.

Parameter	Method	Matrix	Container ¹	Preservation	Holding Time ²	Water Min. Volume ⁵	Solid Min. Mass ⁵
<u>INORGANICS</u>							
Acidity	SM 2310B	Liquid	P,G	0 ≤ 6 °C	14 days	25 mL	NA
Adsorbable Organic Halides (AOX)	EPA 1650C	Liquid	G, amber	0 ≤ 6 °C, 0 HNO ₃ to pH < 2, zero headspace	>3 days and <6 months from collection	50 mL	NA
Alkalinity	EPA 310.1 (Modified) SM 2320B	Liquid	P,G	0 ≤ 6 °C	14 days	100 mL	NA
Biochemical Oxygen Demand (BOD) and Carbonaceous Oxygen Demand (CBOD)	EPA 405.1 SM 5210B	Liquid	P,G	0 ≤ 6 °C	48 hours	500 mL	NA
Bromide	EPA 300.0	Liquid Solid	P,G	None	28 days	10 mL	4 g
Bromide	SW-846 9056A	Liquid Solid	P,G	0 ≤ 6 °C	28 days	10 mL	4 g
Bromine by Bomb Calorimeter	SW-846 5050/9056A	Oil	P, G	0 ≤ 6 °C	None	NA	0.5 g
Carbon Dioxide	EPA 310.1 SM 4500-CO ₂ D	Liquid	P,G	0 ≤ 6 °C	14 days	100 mL	NA
Chemical Oxygen Demand (COD)	EPA 410.4 HACH 8000	Liquid	P,G	0 ≤ 6 °C, H ₂ SO ₄ to pH < 2	28 days	2 mL	NA
Chlorine by Bomb Calorimeter	SW-846 5050/9056A	Oil	P,G	0 ≤ 6 °C	None	NA	0.5 g
Chloride	EPA 300.0	Liquid Solid	P,G	None	28 days	10 mL	4 g
Chloride	SW-846 9056A	Liquid Solid	P,G	0 ≤ 6 °C	28 days	10 mL	4 g
Color	EPA 110.2 SM 2120B	Liquid	P,G	0 ≤ 6 °C	48 hours	50 mL	NA
Conductivity	EPA 120.1 SM 2510B	Liquid	P,G	0 ≤ 6 °C	28 days	15 mL	NA
Corrosivity by pH	EPA 150.1 SW-846 9040B or C SM 4500-H+ - 2011	Liquid	P,G	None	Immediate	10 mL	NA
Corrosivity by pH	EPA 150.1 SW-846 9045C or D SM 4500-H+ - 2011	Solid	P,G	None	Immediate	NA	5 g
Corrosivity by pH	SW-846 9041A	Oil	P,G	None	Immediate	NA	5 g

Parameter	Method	Matrix	Container ¹	Preservation	Holding Time ²	Water Min. Volume ⁵	Solid Min. Mass ⁵
Corrosivity to Steel	SW-846 1110/1110A (Mod)	Liquid	P,G	None	None	290 mL	NA
Cyanide, amenable to chlorination	EPA 335.1/335.4 SM 9010B or C/9012A or B SM 4500 CN-G	Liquid	P,G	0 ≤ 6 °C, NaOH to pH > 12, 0.6 g ascorbic acid ³	14 days ⁴	25 mL	NA
Cyanide, Reactive Releasable	SW-846 Chap 7.3.3	Liquid	G, amber	Zero headspace	7 days liquids,	10 mL	10 g
		Solid			28 days solids		
Cyanide, total, available, or free	EPA 335.4 SM 4500-CN-C-2016 SW-846 9010B or C/SW-846 9012A or B	Liquid Solid	P,G	0 ≤ 6 °C, NaOH to pH > 12, 0.6 g ascorbic acid ³	14 days ⁴	25 mL	1 g
Cyanide, Weak Acid Dissociable	EPA 335.4 SM 4500-CN-I-2011	Liquid	P,G	0 ≤ 6 °C, NaOH to pH > 12	14 days ⁴	25 mL	NA
		Solid	P,G	0 ≤ 6 °C	7 days	NA	1 g
Dissolved Oxygen	SM 4500 O-G	Liquid	G (BOD)	10 - 20° C, Zero headspace	Immediate	300 mL	NA
Extractable Organic Halides (EOX)	SW-846 9023	Solid or Oil	G, amber	Zero headspace, 0 ≤ 6 °C	28 days	NA	1 g
Flashpoint	SW-846 1020A	Oil Misc Solid	P,G	None	None	2 mL	2 g
Fluoride	EPA 300.0	Liquid	P,G	None	28 days	10 mL	NA
Fluoride	SW-846 9056A	Liquid Solid	P,G	0 ≤ 6 °C	28 days	10 mL	4 g
Fluorine by Bomb	SW-846 5050/9056A	Oil	P,G	0 ≤ 6 °C	None	NA	0.5 g
Hardness (EDTA titration)	EPA 130.2	Liquid	P,G	0 ≤ 6 °C, HNO ₃ to pH < 2	6 months	25 mL	NA
Hardness (calculation)	SM 2340B	Liquid	P,G	HNO ₃ to pH < 2	6 months	25 mL	NA
Hardness (EDTA titration)	SM 2340C	Liquid	P,G	HNO ₃ to pH < 2	6 months	25 mL	NA
Heating Value	ASTM 4809-13 ASTM D 240-14 ASTM E711-87(Mod)	Misc Liquid Oil	P,G	0 ≤ 6 °C	None	1 mL	0.5 g
Iodide	EPA 300.0 SW-846 9056A	Liquid Solid	P,G	0 ≤ 6 °C	None	10 mL	4 g

Parameter	Method	Matrix	Container ¹	Preservation	Holding Time ²	Water Min. Volume ⁵	Solid Min. Mass ⁵
Nitrogen-Ammonia	EPA 350.1 SM 4500 NH3-B SM 4500 NH3-B (Mod)	Liquid	P,G	0 ≤ 6 °C, H ₂ SO ₄ to pH < 2	28 days	5 mL	NA
Nitrogen-Ammonia	EPA 350.1	Solid	P,G	0 ≤ 6 °C	28 days	NA	1 g
Nitrate – Liquids	EPA 300.0 SW-846 9056A	Liquid	P,G	0 ≤ 6 °C	48 hours	10 mL	NA
Nitrate – Solids	SW-846 9056A	Solid	P,G	0 ≤ 6 °C	28 days for extraction, 48 hrs from extraction to analysis	NA	4 g
Nitrite - Liquids	EPA 300.0 SW-846 9056A	Liquid	P,G	0 ≤ 6 °C	48 hours	10 mL	NA
Nitrite - Solids	SW-846 9056A	Solid	P,G	0 ≤ 6 °C	28 days for extraction, 48 hrs from extraction to analysis	NA	4 g
Nitrate/Nitrite	EPA 353.2 SM 4500 NO ₃ F	Liquid	P,G	0 ≤ 6 °C, H ₂ SO ₄ to pH < 2	28 days	4 mL	NA
Nitrate/Nitrite	EPA 353.2	Solid	P,G	0 ≤ 6 °C	28 days	NA	4 g
Nitrogen - Total Kjeldahl and Organic	EPA 351.2 SM 4500 Norg	Liquid	P,G	0 ≤ 6 °C, H ₂ SO ₄ to pH < 2	28 days	20 mL	NA
Nitrogen - Total Kjeldahl and Organic	EPA 351.2 SM 4500 Norg	Solid	P,G	0 ≤ 6 °C	28 days	NA	1 g
Oil and Grease (Hexane Extractable Material or HEM)	EPA 1664A, B	Liquid	G	0 ≤ 6 °C, HCl or H ₂ SO ₄ to pH < 2	28 days	1000 mL	NA
Orthophosphate - Liquids	EPA 300.0 SW-846 9056A	Liquid	P,G	Field filter immediately, 0 ≤ 6 °C	48 hours	10 mL	NA
Orthophosphate – Solids	EPA 300.0 SW-846 9056A	Solid	P,G	0 ≤ 6 °C	28 days for extraction, 48 hrs from extraction to analysis	NA	4 g
Paint Filter Liquids Test	SW-846 9095B	Solid	Any	None	None	NA	100 g
Percent (%) Moisture Karl Fischer	ASTM E203	Liquid Solid	P,G	0 ≤ 6 °C	None	1 mL	1 g

Parameter	Method	Matrix	Container ¹	Preservation	Holding Time ²	Water Min. Volume ⁵	Solid Min. Mass ⁵
Total Phenols	EPA 420.4 SW-846 9066	Liquid	G, amber	0 ≤ 6 °C, H ₂ SO ₄ to pH < 2	28 days	50 mL	NA
Total Phenols	SW-846 9066	Solid	G, amber	0 ≤ 6 °C	28 days	NA	1 g
pH	EPA 150.1 SW-846 9040B, 9040C SM 4500-H	Liquid	P,G	None if within 15 mins of collection, 0 ≤ 6 °C when shipped to lab	Immediate	10 mL	NA
pH	EPA 150.1 SW-846 9045C, 9045D	Solid	P,G	None if within 15 mins of collection, 0 ≤ 6 °C when shipped to lab	Immediate	NA	5 g
pH	SW-846 9041A	Oil	P,G	None if within 15 mins of collection, 0 ≤ 6 °C when shipped to lab	Immediate	NA	5 g
Total Phosphorus	EPA 365.4 SM 4500 P H	Liquid	P,G	0 ≤ 6 °C, H ₂ SO ₄ to pH < 2	28 days	20 mL	NA
Total Phosphorus	EPA 365.4 Mod	Solid	P,G	0 ≤ 6 °C	28 days	NA	1 g
Residual Chlorine	SM 4500-Cl G	Liquid	P,G	0 ≤ 6 °C	Immediate	25 mL	NA
Residue, Total (Total Solids)	SM 2540 B	Liquid	P,G	0 ≤ 6 °C	7 days	100 mL	NA
Residue, Filterable (TDS)	EPA 160.1 SM 2540 C	Liquid	P,G	0 ≤ 6 °C	7 days	100 mL	NA
Residue, NonFilterable (TSS)	EPA 160.2 SM 2540 D	Liquid	P,G	0 ≤ 6 °C	7 days	1000 mL	NA
Residue, Volatile and Fixed (% Ash)	EPA 160.4/SM 2540E, G	Liquid Solid	P,G	0 ≤ 6 °C	7 days	100 mL	1 g
% Ash	ASTM D482	Oil	P, G	None	7 days	NA	5 g
Salinity	SM 2520B	Liquid	P,G	0 ≤ 6 °C	28 days	25 mL	NA
Specific Gravity	ASTM D5057	Liquid	P,G	0 ≤ 6 °C	None	5 mL	NA
Sulfate	EPA 300.0 SW-846 9056A	Liquid Solid	P,G	0 ≤ 6 °C	28 days	10 mL	4 g
Sulfide	EPA 376.2 SM 4500 S2D	Liquid	P,G	0 ≤ 6 °C, add ZnAc and NaOH to pH > 9	7 days	25 mL	NA

Parameter	Method	Matrix	Container ¹	Preservation	Holding Time ²	Water Min. Volume ⁵	Solid Min. Mass ⁵
Sulfide, Acid Soluble	SW-846 9030B/9034	Liquid	P,G	0 ≤ 6 °C, Zero Headspace, add ZnAc and NaOH to pH > 9 (Liquid)	7 days liquids,	200 mL	20 g
		Solid		Fill surface with 2 N ZnAc (solids)	365 days solids		
Sulfide, Reactive Releasable	SW-846 7.3.4	Liquid Solid	G, amber	Zero headspace, 0 ≤ 6 °C	7 days liquids,	10 mL	10 g
					28 days solids		
Sulfite	SM 4500	Liquid	P,G	EDTA ⁹	Immediate	50 mL	NA
Sulfur by Bomb	SW-846-5050/9056A	Oil	P,G	0 ≤ 6 °C	None	NA	0.5 g
Surfactants	EPA 425.1 SM 5540C	Liquid	P,G	0 ≤ 6 °C	48 hours	100 mL	NA
Total Organic Carbon (also DOC, TC, TIC)	EPA 415.1 SM 5310B SW-846-9060A	Liquid	G, amber	0 ≤ 6 °C, HCl or H ₂ SO ₄ to pH < 2 *0<6 if DOC lab filtration required	28 days	25 mL	NA
Total Organic Carbon (also DOC, TC, TIC)	SW-846-9060A	Solid	G, amber	0 ≤ 6 °C	28 days	NA	1 g
Total Organic Halides (TOX)	SW-846-9020B	Liquid	G	0 ≤ 6 °C, H ₂ SO ₄ to pH < 2, Zero headspace	28 days	50 mL	NA
Total Petroleum Hydrocarbons (SGT-HEM)	SW-846-1664A/B	Liquid	G	0 ≤ 6 °C, HCl or H ₂ SO ₄ to pH < 2	28 days	1000 mL	NA
Toxicity Characteristic leaching Procedure (TCLP) and	SW-846-1311 (TCLP) SW-846-1312 (SPLP)	Liquid	P,G depending on test	0 ≤6° C, depends on test	14 days VOA	2 L for full	105 g or 130 g for full TCLP list
Synthetic Precipitation Leaching Procedure (SPLP)					14 days SVOA	TCLP list	
		Solids			28 days Mercury,	or	
					180 days non-Hg metals	250 mL Metals only	
Turbidity	EPA 180.1 SM 2130B	Liquid	P,G	0 ≤ 6 °C	48 hours	50 mL	NA

Parameter	Method	Matrix	Container ¹	Preservation	Holding Time ²	Water Min. Volume ⁵	Solid Min. Mass ⁵
Viscosity	ASTM 2983 ASTM 2161	Liquid Oil	P,G	0 ≤ 6 °C	None	7 mL	NA
Metals – Liquids (except chromium VI, boron, silica and mercury)	EPA 200.7 EPA 200.8 SW-846-6010D SW-846-6020B	Liquid	P, (G as long as no B or Si is required)	HNO3 to pH < 2	6 months	50 mL	NA
Metals – Solids ⁸ (except chromium VI and mercury)	SW-846-6010D SW-846-6020B	Solid	P, (G as long as no B or Si is required)	None	6 months	NA	0.5g
Chromium VI – Liquids	SM 3500 Cr D SW-846-7196A	Liquid	P,G	0 ≤ 6 °C	24 hours	25 mL	NA
Chromium VI - Liquids	SM 3500 Cr D SW-846-7196A	Liquid	P,G	0 ≤ 6 °C, (NH ₄) ₂ SO ₄ , pH = 9.3 to 9.7	28 days when field filtered prior to preservative additions	25 mL	NA
Chromium VI - Solids ⁸	SW-846-7196A	Solid	P,G	0 ≤ 6 °C	30 days to digestion, 7 days from digestion to analysis	NA	1 g
Mercury - Liquids	EPA 245.1/245.2 SW-846-7470A	Liquid	P,G	HNO3 to pH < 2	28 days	20 mL	NA
Mercury - Solids ⁸	SW-846-7471B	Solid	P,G	0 ≤ 6 °C	28 days	NA	.25 g
Mercury – Low Level Liquids	EPA 1631E	Liquid	P,G	HCl or BrCl	90 days when preserved w/in 48 hrs or oxidized w/in 28 days	50 mL	NA
<u>ORGANICS</u>							
Method AK101- Solids ⁷	AK101	Solid	Amber G	4 ± 2 °C, zero headspace, methanol	14 days	NA	4 oz ⁷
Method AK101- Liquids	AK101	Liquid	Amber G	4 ± 2 °C, HCl < 2	14 days	40 mL	NA
Method AK102- Liquids	AK102	Liquid	Amber G	4 ± 2 °C, HCl or H ₂ SO ₄ to pH < 2	14 days for extraction 40 days after extraction for analysis	1000 mL	NA

Parameter	Method	Matrix	Container ¹	Preservation	Holding Time ²	Water Min. Volume ⁵	Solid Min. Mass ⁵
Method AK102/103-Solids	AK102/AK103	Solid	Amber G	4 ± 2 °C	14 days for extraction	NA	30 g
					40 days after extraction for analysis		
MADEP EPH - Liquids	Massachusetts EPH	Liquid	Amber G	4 ± 2 °C, HCl < 2	14 days	1000 mL	NA
MADEP EPH – Solids	Massachusetts EPH	Solid	Amber G	4 ± 2 °C	14 days for extraction	NA	30 g
					40 days after extraction for analysis		
BTEX – Liquids	EPA 624.1 SW-846-8260D	Liquid	G, teflon-lined septum	0 ≤ 6 °C, zero headspace, HCl to pH < 2, 0.008% Na ₂ S ₂ O ₃ ³	14 days ⁶	40 mL	NA
BTEX - Solids⁸	SW-846-8260D	Solid	G, teflon-lined septum	0 ≤ 6 °C	48 hours for preservation and 14 days for analysis	NA	5035 Kit
Volatiles - Drinking Water, Wastewater/groundwater (except 2-CLEVE, acrolein, acrylonitrile)	SM 6200B SW-846-8260D EPA 624.1	Liquid	G, teflon-lined cap	0 ≤ 6 °C, zero headspace, HCl to pH < 2	14 days	40 mL	NA
Volatiles (including 2 CLEVE) - Wastewater	SM 6200B SW-846-8260D EPA 624.1	Liquid	G, teflon-lined cap	0 ≤ 6 °C, zero headspace, unpreserved	7 days ⁶	40 mL	NA
Volatiles (acrolein, acrylonitrile)	SM 6200B SW-846-8260D	Liquid	G, teflon-lined cap	0 ≤ 6 °C, zero headspace, HCl to pH 4-5	7 days ⁶	40 mL	NA
Volatiles (acrolein)	EPA 624.1	Liquid	G, teflon-lined cap	0 ≤ 6 °C, zero headspace, unpreserved	3 days	40 mL	NA
Volatiles - Solids⁸	SW-846-5035A/8260D	Solid	5035 kit (2 water, 1 MeOH vial, 1 Moisture) or 3 EnCore Sampler	0 ≤ 6 °C	48 hours for preservation 14 days for analysis	NA	5035 Kit
Volatiles - Concentrated Waste	SW-846-5035A/8260D	Solid Oil	G, teflon-lined septum	None	14 days	40 mL	40 mL

Parameter	Method	Matrix	Container ¹	Preservation	Holding Time ²	Water Min. Volume ⁵	Solid Min. Mass ⁵
Base/Neutral and Acid Extractables and 1,4-Dioxane – Liquids	SW-846-8270E	Liquid	Amber G, teflon-lined cap	0 ≤ 6 °C, 0.008% Na ₂ S ₂ O ₃ ³	7 days for extraction, 40 days after extraction for analysis	1000 mL	NA
Base/Neutral and Acid Extractables and 1,4-Dioxane-Solids ⁸	SW-846-8270E	Solid	G, teflon-lined cap	0 ≤ 6 °C	14 days for extraction, 40 days after extraction for analysis	NA	30 g
Base/Neutral and Acid Extractables - Concentrated Waste	SW-846-8270E	Oil	G, teflon-lined cap	None	14 days for extraction, 40 days after extraction for analysis	1 mL	1 g
Dissolved Gases	RSK-175	Liquid	G, teflon-lined septum	0 ≤ 6 °C, HCl to pH < 2, zero headspace	14 days	40 mL	NA
TPH-GRO	SW-846-8015C/D NWTPH-Gx	Liquid	G, teflon-lined cap	0 ≤ 6 °C, HCl to pH < 2, zero headspace	14 days	40 mL	NA
TPH-GRO	SW-846-8015C/D NWTPH-Gx	Solid	40ml vial with MeOH	0 ≤ 6 °C	14 days	NA	5g
TPH-DRO - Liquids	SW-846-8015C/D NWTPH-Dx	Liquid	G, teflon-lined cap	0 ≤ 6 °C, HCl to pH < 2	7 days for extraction, 40 days after extraction for analysis	1000 mL	NA
TPH-DRO - Solids	SW-846-8015C/D NWTPH-Dx	Solid	G, teflon-lined cap	0 ≤ 6 °C	14 days for extraction, 40 days after extraction for analysis	NA	30 g
Chlorinated Herbicides - Liquids	SW-846-8151A	Liquid	Amber G, teflon-lined cap	0 ≤ 6 °C, 0.008% Na ₂ S ₂ O ₃ ³	7 days for extraction 40 days after extraction for analysis	1000 mL	NA
Chlorinated Herbicides - Solids ⁸	SW-846-8151A	Solid	G, teflon-lined cap	0 ≤ 6 °C	14 days for extraction 40 days after extraction	NA	50 g
Organochlorine Pesticides by SW-846 EPA 8081 Liquids	SW-846-8081B	Liquid	Amber G, teflon-lined cap	0 ≤ 6 °C 0.008% Na ₂ S ₂ O ₃ ³	7 days for extraction 40 days after extraction for analysis	1000 mL	NA

Parameter	Method	Matrix	Container ¹	Preservation	Holding Time ²	Water Min. Volume ⁵	Solid Min. Mass ⁵
Organochlorine Pesticides by SW-846 EPA 8081 Solids	SW-846-8081B	Solid	Amber G, teflon-lined cap	0 ≤ 6 °C	14 days for extraction 40 days after extraction	NA	30 g
Organochlorine Pesticides by EPA 608 only	EPA 608.3	Liquid	Amber G, teflon-lined cap	0 ≤ 6 °C,	Unpreserved Prep within 72 hrs	1000 mL	NA
				0.008% , Na ₂ S ₂ O ₃ ³ , NaOH and H ₂ SO ₄ preserve to pH 5.0 to 9.0 (for prep >72 hrs and <7days)	Preserved prep within 7 days, 40 days after extraction for analysis		
PCBs by EPA 608 only	EPA 608.3	Liquid	Amber G, teflon-lined cap	0 ≤ 6 °C, 0.008% Na ₂ S ₂ O ₃ ³	7 days for extraction 40 days after extraction for analysis	1000 mL	NA
PCBs - Liquids	SW-846-8082A	Liquid	Amber G, teflon-lined cap	0 ≤ 6 °C, 0.008% Na ₂ S ₂ O ₃ ³	365 days for extraction 40 days after extraction for analysis	1000 mL (RSV 250 mL)	NA
PCBs - Solids	SW-846-8082A	Solid	Amber G, teflon-lined cap	0 ≤ 6 °C	365 days for extraction 40 days after extraction for analysis	NA	30 g
PCBs in Oil	SW-846-8082A	Oil	G, teflon-lined cap	0 ≤ 6 °C	365 days	1 mL	1 g
Solvents, Glycols, Alcohols, Acetates - Liquids	SW-846-8015D	Liquid	G, teflon-lined septum	0 ≤ 6 °C, zero headspace or	7 days unpreserved,	40 mL	NA
				0 ≤ 6 °C, zero headspace, HCL to pH < 2	14 days preserved		
Solvents, Glycols, Alcohols, Acetates - Solids	SW-846-8015D	Solid	G, teflon-lined septum	0 ≤ 6 °C	14 days	NA	10 g
1,4-Dioxane in Drinking Water by EPA 522	EPA 522	Liquid	G, teflon-lined septum	<10 °C during transport, Sodium sulfite (50mg/L), sodium bisulfate (1g/L)	28 days for extraction at 0 ≤ 6 °C (not frozen)	100 mL	NA
					and 28 days after extraction for analysis at - 5° C, protected from light		

Parameter	Method	Matrix	Container ¹	Preservation	Holding Time ²	Water Min. Volume ⁵	Solid Min. Mass ⁵
1,4-Dioxane 8270E SIM	SW-846 8270E SIM	Liquid	G, teflon-lined septum	0 ≤ 6 °C	7 days for extraction and 40 days after extraction for analysis.	100 mL	NA
1,4-Dioxane by EPA 8270E SIM	SW-846-8270E SIM	Solids	G, teflon-lined septum	0 ≤ 6 °C	14 days to extraction (Solids)	NA	30 g
					40 days to analysis after extraction		
Dioxin Screen	EPA 625.1 SW-846-8270E	Liquid	G, teflon-lined cap	0 ≤ 6 °C	7 days for extraction, 40 days after extraction for analysis	1000 mL	NA
Dioxin Screen	SW-846-8270E	Solid	G, teflon-lined cap	0 ≤ 6 °C	7 days for extraction, 40 days after extraction for analysis	NA	30 g
EDB and DBCP	EPA 504.1 SW-846-8011	Liquid	G, teflon-lined septum	0 ≤ 6 °C, 0.4% Na ₂ S ₂ O ₃	14 days	40 mL	NA
Polynuclear Aromatic Hydrocarbons	EPA 625.1 SIM SW-846-8270E SIM	Liquid	Amber G, teflon-lined septum (Liquids), Teflon-lined cap (Solids)	0 ≤ 6 °C	7 days for extraction (Liquids)	1000 mL	30 g
	SW-846-8270E SIM	Solid			14 days to extraction (Solids)		
					40 days to analysis after extraction		
Nitroaromatics and Nitroamines	SW-846-8330B	Liquid	Amber G, teflon-lined septum0000	0 ≤ 6 °C	7 days for extraction (Liquids)	1000 mL	2 g
	SW-846-8330B	Solid			14 days to extraction (Solids)		
					40 days to analysis after extraction		
Nitroaromatics and Nitroamines by MIS Prep	SW-846 8330B	Solid	Protect from light	0 ≤ 6 °C until air drying	14 days for extraction,	NA	Entire Sample
				22 ± 4 °C (or cooler) after drying	40 days after extraction for analysis		

Parameter	Method	Matrix	Container ¹	Preservation	Holding Time ²	Water Min. Volume ⁵	Solid Min. Mass ⁵
RDX Breakdown	SW-846-8330B	Liquid	Amber G, teflon-lined septum for liquids and teflon-lined cap for solids	0 ≤ 6 °C	7 days for extraction (Liquids)	1000 mL	2 g
	SW-846-8330B	Solid			14 days to extraction (Solids)		
					40 days to analysis after extraction		
Low Level Perchlorate	SW-846-6850	Liquid	P	0 ≤ 6 °C	28 days	10 mL	
		Solid	Amber G	0 ≤ 6 °C	28 days for extraction		2 g
28 days after extraction for analysis							
Perfluorinated Alkyl Acids - Drinking Water by EPA 537.1	EPA 537.1 Ver 2	Drinking Water	PFAS-Free HDPE - unlined polyethylene screw cap; 2-250 mL	≤ 10 °C within 48 Hours of collection, add 5 g/L Trizma®	14 days for extraction	250 mL	NA
					28 days after extraction for analysis		NA
Perfluorinated Alkyl Acids - Drinking Water by EPA 533	EPA 533	Drinking Water	PFAS-free HDPE - unlined polyethylene screw cap; 2-250 mL	< 10 °C within 48 Hours of collection, ammonium acetate @ 1g/L	28 days from collection to extract	250 mL	NA
					28 days from extraction to analyze		NA
Perfluorinated Alkyl Acids - Liquids by DoD Compliant Table B-15	GEL 537 Modified	Liquid	PFAS-free HDPE - unlined polyethylene screw cap; 2-250 mL and Screening vial	0 ≤ 6 °C; may add 5 g/L Trizma®	14 days to extraction	250 mL	NA
					28 days after extraction for analysis		NA
Perfluorinated Alkyl Acids - Solids by DoD Compliant Table B-15	GEL 537 Modified	Solid	PFAS-free HDPE - unlined polyethylene screw cap	0 ≤ 6 °C	28 days from collection to extract and analyze	NA	10 g
		Tissue	PFAS-free HDPE - unlined polyethylene screw cap	Received frozen, stored at ≤ -10 °C		NA	

Parameter	Method	Matrix	Container ¹	Preservation	Holding Time ²	Water Min. Volume ⁵	Solid Min. Mass ⁵
Perfluorinated Alkyl Acids - Water by EPA 1633	EPA 1633	Liquid	PFAS-free HDPE - unlined polyethylene screw cap; 2-500 mL, 1-125 mL and Screening vial	0 ≤ 6 °C from collection until lab receipt, protect from light	90 days to extraction for frozen, 28 days for cooler, 90 days after extraction for analysis	500 mL	NA
Perfluorinated Alkyl Acids - Leachate by EPA 1633	EPA 1633	Leachate	PFAS-free HDPE - unlined polyethylene screw cap; 2-125 mL and Screening vial	0 ≤ 6 °C from collection until lab receipt, protect from light	90 days to extraction for frozen, 28 days for cooler, 90 days after extraction for analysis	100 mL	NA
Perfluorinated Alkyl Acids - Solids by EPA 1633	EPA 1633	Solid	PFAS-free HDPE - unlined polyethylene screw cap; 60 mL and moisture container	0 ≤ 6 °C from collection until lab receipt, protect from light	90 days to extraction, 90 days after extraction for analysis	NA	50 g
Perfluorinated Alkyl Acids - Tissue by EPA 1633	EPA 1633	Tissue	PFAS-free HDPE - unlined polyethylene screw cap	0 ≤ 6 °C from collection until lab receipt, but no more than 24 hours, ≤ -20 C upon lab receipt	90 days to extraction, 90 days after extraction for analysis	NA	Whole fish, cleaned, filleted or other tissue - 20 g
Perfluorinated Alkyl Acids - Water by EPA 1633A	EPA 1633A	Water	HDPE - unlined polyethylene screw cap; 2 - 500 mL, 1-125 mL and 1-Screening vial	0 ≤ 6 °C from collection until lab receipt, 0 ≤ 6 °C upon lab receipt	28 days to extraction, except NEtFOSE , NEtFOSAA , NMeFOSE , NMeFOSAA , which must be extracted within 7 days of collection., 90 days after extraction for analysis, except for 11-CI-PF3OUdS and 9-CI-PF3ONS , which must be analyzed within 28 days after extraction.	500 mL	NA

Parameter	Method	Matrix	Container ¹	Preservation	Holding Time ²	Water Min. Volume ⁵	Solid Min. Mass ⁵
Perfluorinated Alkyl Acids - Leachate by EPA 1633A	EPA 1633A	Leachate	HDPE - unlined polyethylene screw cap; 2 - 125 mL and Screening Vial	0 ≤ 6 °C from collection until lab receipt, 0 ≤ 6 °C upon lab receipt	28 days to extraction, except NEtFOSE , NEtFOSAA , NMeFOSE , NMeFOSAA , which must be extracted within 7 days of collection., 90 days after extraction for analysis. 90 days after extraction for analysis, except for 11-CI-PF3OUdS and 9-CI-PF3ONS , which must be analyzed within 28 days after extraction	100 mL	NA
Perfluorinated Alkyl Acids - Solids by EPA 1633A	EPA 1633A	Solids, Soils	HDPE - unlined polyethylene screw cap 60 mL and moisture container	0 ≤ 6 °C from collection until lab receipt, 0 ≤ 6 °C upon lab receipt	90 days to extraction, except NFHDA , which must be extracted within 3 days of collection, 90 days after extraction for analysis, except for 11-CI-PF3OUdS and 9-CI-PF3ONS , which must be analyzed within 28 days after extraction.	NA	50 g
Perfluorinated Alkyl Acids - Tissue by EPA 1633A	EPA 1633A	Tissue	HDPE - unlined polyethylene screw cap	0 ≤ 6 °C from collection until lab receipt, ≤ -20° C upon lab receipt	90 days to extraction, 90 days after extraction for analysis, except for 11-CI-PF3OUdS and 9-CI-PF3ONS , which must be analyzed within 28 days after extraction.	NA	Whole fish, cleaned, filleted or other tissue - 20 g

Parameter	Method	Matrix	Container ¹	Preservation	Holding Time ²	Water Min. Volume ⁵	Solid Min. Mass ⁵
<u>RADIOCHEMISTRY</u>							
Americium – Liquids	DOE EML HASL-300, Am-05-RC Modified	Liquid	P,G	HNO ₃ or HCl to pH < 2	6 months	100 mL	NA
Americium – Solids ⁸	DOE EML HASL-300, Am-05-RC Modified	Solid	P,G	None	6 months	NA	0.1 g
Calcium-45 – Liquids	GL-RAD-A-048	Liquid	P,G	HNO ₃ or HCl to pH < 2	6 months	50 mL	NA
Calcium-45 - Solids ⁸	GL-RAD-A-048	Solid	P,G	None	6 months	NA	0.1 g
Carbon-14 Liquids & Solids ⁸	EPA EERF C-01 Modified	Liquid Solid	P,G	None	6 months	100 mL	1.5 g
Chlorine-36 Liquids & Solids ⁸	GL-RAD-A-033	Liquid Solid	P,G	None	6 months	30 mL	0.5 g
Curium - Liquids	DOE EML HASL-300, Am-05-RC Modified	Liquid	P,G	HNO ₃ or HCl to pH < 2	6 months	100 mL	NA
Curium - Solids ⁸	DOE EML HASL-300, Am-05-RC Modified	Solid	P,G	None	6 months	NA	0.1 g
Gamma Isotopes - Liquids	EPA 901.1	Liquid	P,G	HNO ₃ or HCl to pH < 2	6 months	2000 mL	NA
Gamma Isotopes - Solids ⁸	DOE HASL 300, 4.5.2.3/Ga-01-R	Solid	P,G	None	6 months	NA	200 g
Gross Alpha & Beta – Liquids	EPA 900.0/SW-846 9310	Liquid	P,G	HNO ₃ or HCl to pH < 2	6 months	150 mL	NA
Gross Alpha & Beta - Drinking Water ¹⁰	EPA 900.0	Drinking Water	P,G	HNO ₃ or HCl to pH < 3	6 months	150 mL	NA
Gross Alpha & Beta - Solids ⁸	EPA 900.0/SW-846 9310/SM 7110B Modified	Solid	P,G	None	6 months	NA	0.1 g
Iodine-129 - Liquids & Solids ⁸	DOE EML HASL-300, I-01 Modified	Liquid Solid	P,G	None	6 months	1000 mL	0.1 g
Iodine -131 - Liquids	EPA 902.0/SM 7500-I B	Liquid	P,G	None	8 days	1000 mL	NA
Iodine-131 Drinking Water¹⁰	EPA 902.0 SM 7500-IB	Drinking Water	P,G	None	8 days	1000 mL	NA
Iron 55 -Liquids	DOE RESL Fe-1, Modified	Liquid	P,G	HNO ₃ or HCl to pH < 2	6 months	50 mL	NA
Iron 55 - Solids ⁸	DOE RESL Fe-1, Modified	Solid	P,G	None	6 months	NA	0.5 g

Parameter	Method	Matrix	Container ¹	Preservation	Holding Time ²	Water Min. Volume ⁵	Solid Min. Mass ⁵
Lead-210 – Liquids	DOE RP280 Modified	Liquid	P,G	HNO ₃ or HCl to pH < 2	6 months	400 mL	NA
Lead-210 - Solids ⁸	DOE RP280 Modified	Solid	P,G	None	6 months	NA	0.5 g
Neptunium - Liquids	ASTM C 1476-00 Modified	Liquid	P,G	HNO ₃ or HCl to pH < 2	6 months	100 mL	NA
Neptunium - Solids ⁸	ASTM C 1476-00 Modified	Solid	P,G	None	6 months	NA	0.1 g
Nickel-59 – Liquids	DOE RESL Ni-1	Liquid	P,G	HNO ₃ or HCl to pH < 2	6 months	500 mL	NA
Nickel-59 – Solids ⁸	DOE RESL Ni-1	Solid	P,G	None	6 months	NA	0.5 g
Nickel-63 - Liquids	DOE RESL Ni-1, Modified	Liquid	P,G	HNO ₃ or HCl to pH < 2	6 months	150 mL	NA
Nickel-63 - Solids ⁸	DOE RESL Ni-1, Modified	Solid	P,G	None	6 months	NA	1.5 g
Phosphorus-32 – Liquids	GL-RAD-A-019	Liquid	P,G	HNO ₃ or HCl to pH < 2	6 months	250 mL	NA
Phosphorus-32 - Solids ⁸	GL-RAD-A-019	Solid	P,G	None	6 months	NA	0.25 g
Plutonium – Liquids	DOE EML HASL-300, Pu-11-RC Modified	Liquid	P,G	HNO ₃ or HCl to pH < 2	6 months	100 mL	NA
Plutonium - Solids ⁸	DOE EML HASL-300, Pu-11-RC Modified	Solid	P,G	None	6 months	NA	0.1 g
Plutonium-241 – Liquids	DOE EML HASL-300, Pu-11-RC Modified	Liquid	P,G	HNO ₃ or HCl to pH < 2	6 months	400 mL	NA
Plutonium-241 - Solids ⁸	DOE EML HASL-300, Pu-11-RC Modified	Solid	P,G	None	6 months	NA	0.4 g
Polonium - Liquids	DOE EML HASL-300, Po-01 RC Modified	Liquid	P,G	HNO ₃ or HCl to pH < 2	6 months	100 mL	NA
Polonium - Solids ⁸	DOE EML HASL-300, Po-01 RC Modified	Solid	P,G	None	6 months	NA	0.1 g
Promethium-147/Samarium-151 – Liquids	EPA EERF PM-01-1 Modified	Liquid	P,G	HNO ₃ or HCl to pH < 2	6 months	250 mL	NA
Promethium-147/Samarium-151 - Solids ⁸	EPA EERF PM-01-1 Modified	Solid	P,G	None	6 months	NA	0.5 g
Radium-226 – Drinking Water ¹⁰	EPA 903.1	Drinking Water	P,G	HNO ₃ or HCl to pH < 2	6 months	1000 mL	NA

Parameter	Method	Matrix	Container ¹	Preservation	Holding Time ²	Water Min. Volume ⁵	Solid Min. Mass ⁵
Radium-226 – Liquids	EPA 903.1 Modified	Liquid	P,G	HNO ₃ or HCl to pH < 2	6 months	500 mL	NA
Radium-226 (Radon emanation) - Solids ⁸	EPA 903.1 Modified	Solid	P,G	None	6 months	NA	0.5 g
Radium-228 – Liquids	EPA 904.0/EPA 9320 Modified	Liquid	P,G	HNO ₃ or HCl to pH < 2	6 months	300 mL	NA
Ra-228 Drinking Water ¹⁰	EPA 904.0/EPA 9320	Drinking Water	P,G	HNO ₃ or HCl to pH < 3	6 months	1000 mL	NA
Radium-228 - Solids ⁸	EPA 904.0/EPA 9320 Modified	Solid	P,G	None	6 months	NA	0.1 g
Radon-222 – Liquids	SM 7500 Rn B	Liquid	G	None, Zero headspace	4 days	40 mL	NA
Selenium-79 – Liquids	NERC ORD	Liquid	P,G	HNO ₃ or HCl to pH < 2	6 months	100 mL	NA
Selenium-79 - Solids ⁸	NERC ORD	Solid	P,G	None	6 months	NA	0.5 g
Strontium-89/90 – Liquids	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified	Liquid	P,G	HNO ₃ or HCl to pH < 2	6 months	300 mL	NA
Strontium-89/90 - Drinking Water ¹⁰	EPA 905.0	Drinking Water	P,G	HNO ₃ or HCl to pH < 3	6 months	300 mL	NA
Strontium-89/90 - Solids ⁸	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified	Solid	P,G	None	6 months	NA	0.3g
Sulfur-35 - Liquids	NAS-NS-3054	Liquid	P,G	None	6 months	50 mL	NA
Sulfur-35 - Solids ⁸	NAS-NS-3054	Solid	P,G	None	6 months	NA	0.1 g
Technetium-99 – Liquids	DOE EML HASL-300, Tc-02-RC Modified	Liquid	P,G	HNO ₃ or HCl to pH < 2	6 months	300 mL	NA
Technetium-99 – Solids ⁸	DOE EML HASL-300, Tc-02-RC Modified	Solid	P,G	None	6 months	NA	1.2 g
Thorium – Liquids	DOE EML HASL-300, Th-01-RC Modified	Liquid	P,G	HNO ₃ or HCl to pH < 2	6 months	100 mL	NA
Thorium - Solids ⁸	DOE EML HASL-300, Th-01-RC Modified	Solid	P,G	None	6 months	NA	0.1 g

Parameter	Method	Matrix	Container ¹	Preservation	Holding Time ²	Water Min. Volume ⁵	Solid Min. Mass ⁵
Total Activity Liquids	GL-RAD-A-041	Liquid	P,G	HNO ₃ or HCl to pH < 2	6 months	300 mL	NA
Total Activity - Solids ⁸	GL-RAD-A-041	Solid	P,G	None	6 months	NA	0.5 g
Total Alpha Radium – Liquids	EPA 900.1 Modified	Liquid	P,G	HNO ₃ or HCl to pH < 2	6 months	300 mL	NA
Total Alpha Radium - Drinking Water ¹⁰	EPA 903.0/SW-846 9315	Drinking Water	P,G	HNO ₃ or HCl to pH < 2	6 months	300 mL	NA
Total Alpha Radium - Solids ⁸	EPA 900.1 Modified	Solid	P,G	None	6 months	NA	0.5 g
Tritium – Drinking Water ¹⁰	EPA 906.0	Drinking Water	G	None	6 months	50 mL	NA
Tritium – Liquids & Solids ⁸	EPA 906.0 Modified	Liquid Solid	P,G	None	6 months	50 mL	3 g
Uranium – Liquids	DOE EML HASL-300, U-02-RC Modified	Liquid	P,G	HNO ₃ or HCl to pH < 2	6 months	100 mL	NA
Uranium - Solids ⁸	DOE EML HASL-300, U-02-RC Modified	Solid	P,G	None	6 months	NA	0.1 g

¹ P = Polyethylene; G = Glass

² Samples should be analyzed as soon as possible after collection. The holding times listed are maximum times that samples may be held before analysis and be considered valid.

³ Used only in the presence of residual chlorine.

⁴ Maximum holding time is 24 hours when sulfide is present. All samples may be tested with lead acetate paper before pH adjustments in order to determine if sulfide is present. If present, remove by adding cadmium nitrate powder until a negative spot test is obtained. Filter sample and add NaOH to pH 12.

⁵ Minimum amounts of sample needed to prepare and analyze for the parameter. Some parameters may be combined into one analysis, others may need additional amount if quality control is being requested for site-specific samples. Please check with GELs Project Manager for proper sample amounts based on project specific requirements.

⁶ Volatiles Groundwater/Wastewater: If samples are to be analyzed for vinyl chloride, styrene, or 2-chloroethylvinyl ether (2-CLEVE) for soil or water, separate samples must be collected without acid preservation and analyzed within 7 days. For aqueous samples to be analyzed for acrolein and acrylonitrile, by EPA Method 624.1, the samples are not to be acidified and must be analyzed within 3 days of collection.

⁷ Solids Method AK101 2-4 oz amber wide-mouth jars tared and labeled, 1-4 oz amber wide-mouth jar labeled (evaporative loss), 2-25 mL 2.5 ppm surrogated P/T methanol tubes.

⁸ Solids matrix typically applies to soils, sludges and sediments. Some tests have been developed for filters, miscellaneous solid waste, plant and animal tissue, also referred to as solids. Contact GEL to verify a particular matrix for the test of interest.

⁹ 1 mL of 2.5% EDTA solution per 100mL sample

¹⁰ Samples preserved with reagents that are not provided by the laboratory must be accompanied by a radioactive free field blank sample that is preserved in the same manner as the submitted sample(s)