SCOPE OF ACCREDITATION TO ISO/IEC 17034:2016

ADVANCED ANALYTICAL SOLUTIONS, LLC
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REFERENCE MATERIAL PRODUCER

Valid To: July 31, 2024 Certificate Number: 2952.03

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this Reference Material Producer for the production of certified reference materials and reference materials of the following category:

Reference Material	Properties Characterized/ Concentration Range	Test Matrix	Measurement Technique(s)
Microbiology			
Coliforms –			
Total Coliform/E. Coli	(20 to 2400) CFU/100 mL (20 to 2400) MPN/100 mL	Waste Water	Membrane Filtration MPN
Fecal Coliform	(20 to 2400) CFU/100 mL (20 to 2400) MPN/100 mL	Waste Water	
Total Coliform/E. Coli	(20 to 200) CFU/1 00 mL (20 to 200) MPN/100 mL	Potable Water	
Fecal Coliform	(20 to 200) CFU/100 mL (20 to 200) MPN/100 mL	Potable Water	
Potable Coliforms	Presence (+)/Absence (-)	Potable Water	Enzyme Substrate
Enterococci	(20 to 2400) CFU/100 mL (20 to 2400) MPN/100 mL	Waste Water	Membrane Filtration MPN
HPC - Heterotrophic Plate Count	(5 to 500) CFU/mL (5 to 500) MPN/mL	Potable water	Membrane Filtration MPN

Reference Material	Properties Characterized/ Concentration Range	Test Matrix	Measurement Technique(s)
Inorganics			
Minerals –			
Alkalinity, Total ($CaCO_3$)	(10 to 20) mg/L	Waste Water	Titration
Potassium	(4.0 to 40) mg/L		ICP-MS
Sodium	(6.0 to 100) mg/L		ICP-MS
Specific Conductance	(200 to 930) µmhos/cm		Conductivity Meter
Anions –			
Chloride	(35 to 275) mg/L	Waste Water	IC
Fluoride	(0.3 to 4) mg/L		
Sulfate	(5.0 to 125) mg/L		
Hardness –			
Calcium	(3.5 to 110) mg/L	Waste Water	ICP-MS
Calcium Hardness as $CaCO_3$	(8.7 to 275) mg/L		Calculated
Hardness, Total ($CaCO_3$)	(17 to 440) mg/L		Calculated
Magnesium	(2.0 to 40) mg/L		ICP-MS
pH	(5 to 10) pH Units	Waste Water	pH meter

Reference Material	Concentration Range	Test Matrix	Measurement Technique(s)
Solids –			
Total Solids	(140 to 675) mg/L	Waste Water	Gravimetric
Dissolved Solids	(140 to 650) mg/L		Gravimetric
Suspended Solids	(23 to 100) mg/L		Gravimetric
Settleable Solids	(5.0 to 100) mg/L		Imhoff cone
Volatile Solids	(100 to 500) mg/L		Gravimetric
Simple Nutrients –			
Ammonia as N	(0.65 to 19) mg/L	Waste Water	Electrode
Nitrate as N	(0.25 to 40) mg/L		IC
Nitrate Plus Nitrite as N	(0.25 to 40) mg/L		
Orthophosphate as P	(0.5 to 5.5) mg/L		
Complex Nutrients –			
Total Kjeldahl-Nitrogen	(1.5 to 35) mg/L	Waste Water	Electrode
Total Phosphorus	(0.5 to 10) mg/L		ICP
Nitrite	(0.4 to 4.0) mg/L	Waste Water	IC
Oil & Grease	(20 to 100) mg/L	Waste Water	Gravimetric
Demands –			
5 Day BOD	(15 to 250) mg/L	Waste Water	Calculated
Carbonaceous BOD	(15 to 250) mg/L		
COD	(30 to 250) mg/L		Spectrometer
TOC	(6.0 to 100) mg/L		Calculated

Reference Material	Concentration Range	Test Matrix	Measurement Technique(s)
Hexavalent Chromium	(45 to 880) µg/L	Waste Water	Spectrometer
High Level Aluminum	(0.1 to 1) mg/L	Waste Water	ICP-MS
Total Petroleum Hydrocarbons	(20 to 170) mg/L	Waste Water	Gravimetric
Dissolved Oxygen	(6.0 to 14.0) mg/L	Waste Water	DO Meter
Trace Metals – Aluminum Antimony Arsenic Barium Beryllium Boron Cadmium Chromium, total Cobalt Copper Iron Lead Manganese Molybdenum Nickel Selenium Silver Strontium Thallium Tin Titanium Vanadium Zinc	 (200 to 4000) µg/L (95 to 900) µg/L (70 to 900) µg/L (100 to 2500) µg/L (8 to 900) µg/L (800 to 2000) µg/L (8 to 750) µg/L (17 to 1000) µg/L (28 to 1000) µg/L (40 to 900) µg/L (200 to 4000) µg/L (70 to 3000) µg/L (70 to 4000) µg/L (60 to 600) µg/L (80 to 3000) µg/L (90 to 2000) µg/L (26 to 600) µg/L (30 to 300) µg/L (60 to 900) µg/L (1000 to 5000) µg/L (80 to 300) µg/L (55 to 2000) µg/L (100 to 2000) µg/L	Waste Water	ICP-MS
Acidity	(650 to 1800) mg/L	Waste Water	Titration

Reference Material	Properties Characterized/ Concentration Range	Test Matrix	Measurement Technique(s)
Total Residual Chlorine	(0.3 to 3.0) mg/L	Waste Water	Spectrometer
Low-Level Residual Chlorine	(20 to 250) µg/L	Waste Water	Spectrometer
Color	(10 to 75) Color Units	Waste Water	Spectrometer
Total Cyanide	(0.1 to 1.0) mg/L	Waste Water	Spectrometer
Total Phenolics (4AAP)	(0.06 to 5) mg/L	Waste Water	4AAP
Silica as SiO_2	(50 to 250) mg/L	Waste Water	ICP
Sulfide	(1.0 to 10) mg/L	Waste water	Titration
Surfactants (MBAS)	(0.2 to 1.0) mg/L	Waste water	Spectrometer
Turbidity	(1.0 to 20) NTU	Waste water	Turbidity meter
Minerals –			
Alkalinity, Total ($CaCO_3$)	(25 to 200) mg/L	Potable water	Titration
Potassium	(10 to 40) mg/L		ICP-MS
Sodium	(12 to 24) mg/L		ICP-MS
Specific Conductance	(250 to 2500) µmhos/cm		Conductivity Meter
Hardness –			
Calcium	(30 to 90) mg/L	Potable Water	ICP-MS
Calcium Hardness as $CaCO_3$	(75 to 375) mg/L		Calculated
Hardness, Total ($CaCO_3$)	(83 to 307) mg/L		Calculated
Magnesium	(2.0 to 20) mg/L		ICP-MS

Reference Material	Properties Characterized/ Concentration Range	Test Matrix	Measurement Technique(s)
Anions –			
Chloride	(5 to 100) mg/L	Potable Water	IC
Fluoride	(1 to 8) mg/L		
Sulfate	(5.0 to 500) mg/L		
pH	(5 to 10) pH Units	Potable Water	pH meter
Solids –			
Total Solids	(140 to 675) mg/L	Potable Water	Gravimetric
Dissolved Solids	(200 to 450) mg/L		Gravimetric
Suspended Solids	(23 to 100) mg/L		Gravimetric
Settleable Solids	(5.0 to 100) mg/L		Imhoff cone
Trace Metals –			
Aluminum	(130 to 2500) µg/L	Potable Water	ICP-MS
Antimony	(6 to 50) µg/L		
Arsenic	(5 to 50) µg/L		
Barium	(500 to 300) µg/L		
Beryllium	(1 to 10) µg/L		
Boron	(800 to 2000) µg/L		
Cadmium	(2 to 50) µg/L		
Chromium, total	(10 to 20) µg/L		
Cobalt	(28 to 1000) µg/L		
Copper	(50 to 2000) µg/L		
Iron	(100 to 1800) µg/L		
Lead	(5 to 100) µg/L		
Manganese	(40 to 900) µg/L		
Molybdenum	(15 to 130) µg/L		
Nickel	(10 to 500) µg/L		
Selenium	(10 to 100) µg/L		
Silver	(26 to 600) µg/L		
Strontium	(20 to 300) µg/L		
Thallium	(2 to 10) µg/L		
Tin	(1000 to 5000) µg/L		
Vanadium	(315 to 2500) µg/L		
Zinc	(400 to 2500) µg/L		
Total Residual Chlorine	(0.3 to 3.0) mg/L	Potable Water	Spectrometer

Reference Material	Properties Characterized/ Concentration Range	Test Matrix	Measurement Technique(s)
Low-Level Residual Chlorine	(20 to 250) µg/L	Potable Water	Spectrometer
Mercury	(0.5 to 10) µg/L	Potable Water	FIMS
Hexavalent Chromium	(5 to 50) µg/L	Potable Water	Spectrometer
Simple Nutrients – Nitrate as N Nitrate Plus Nitrite as N Orthophosphate as P	 (3 to 10) mg/L (3.5 to 9) mg/L (0.5 to 5.5) mg/L	Potable Water	IC
Nitrite	(0.4 to 2.0) mg/L	Potable Water	IC
Cyanide	(0.1 to 0.5) mg/L	Potable Water	Spectrometer
Organic Carbon – Dissolved Organic Carbon (DOC) Total Organic Carbon	 (1.2 to 4.9) mg/L (1.2 to 4.9) mg/L	Potable Water	TOC
Color	(10 to 75) Color Units	Potable Water	Spectrometer
Silica as SiO_2	(50 to 250) mg/L	Potable Water	ICP
Sulfide	(1.0 to 10) mg/L	Potable Water	Titration
Surfactants (MBAS)	(0.05 to 1.0) mg/L	Potable Water	Spectrometer
Corrosivity	(-4 to +4) SI Units	Potable Water	Calculated

Certified Reference Material	Properties Characterized/ Concentration Range	Test matrix	Measurement Technique(s)
Turbidity	(0.5 to 8) NTU	Potable Water	Turbidity meter
UV 254 Absorbance	(0.02 to 0.7) cm-1	Potable Water	Calculated

Accredited Reference Material Producer

A2LA has accredited

ADVANCED ANALYTICAL SOLUTIONS, LLC

Parkersburg, WV

This accreditation covers the specific materials listed on the agreed upon Scope of Accreditation. This producer meets the requirements of ISO 17034:2016 *General Requirements for the Competence of Reference Material Producers.* This accreditation demonstrates technical competence for a defined scope and the operation of a quality management system.

Presented this 5th day of October 2023.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 2952.03
Valid to July 31, 2024

For reference materials to which this accreditation applies, please refer to the reference material producer's Scope of Accreditation.