

DATA REPORTING QUALIFIERS- INORGANIC

For reporting results, the following “ Results Qualifiers” are used:

J	Indicates the reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL), but greater than or equal to the Instrument Detection Limit (IDL).
U	Indicates the analyte was analyzed for, but not detected.
ND	Indicates the analyte was analyzed for, but not detected
E	Indicates the reported value is estimated because of the presence of interference
M	Indicates Duplicate injection precision not met.
N	Indicates the spiked sample recovery is not within control limits.
S	Indicates the reported value was determined by the Method of Standard Addition (MSA).
*	Indicates that the duplicate analysis is not within control limits.
+	Indicates the correlation coefficient for the MSA is less than 0.995.
D	Indicates the reported value is from a secondary analysis with a dilution factor. The original analysis exceeded the calibration range.
M	Method qualifiers “P” for ICP instrument “PM” for ICP when Microwave Digestion is used “CV” for Manual Cold Vapor AA “AV” for automated Cold Vapor AA “CA” for MIDI-Distillation Spectrophotometric “AS” for Semi -Automated Spectrophotometric “C” for Manual Spectrophotometric “T” for Titrimetric “NR” for analyte not required to be analyzed
OR	Indicates the analyte’s concentration exceeds the calibrated range of the instrument for that specific analysis.
Q	Indicates the LCS did not meet the control limits requirements
H	Sample Analysis Out Of Hold Time

LAB CHRONICLE

OrderID:	Q3323	OrderDate:	10/9/2025 2:32:00 PM
Client:	Langan Engineering and Environmental Services, Inc	Project:	Con Edison Richmond Terrace
Contact:	Gregory DelMastro	Location:	D31,VOA Ref. #2 Soil

LabID	ClientID	Matrix	Test	Method	Sample Date	Prep Date	Anal Date	Received
Q3323-01	SED-01-0-2	SOIL			10/09/25			10/09/25
			Mercury	7471B		10/13/25	10/13/25	
			Metals ICP-TAL	6010D		10/13/25	10/13/25	
Q3323-02	SED-02-0-2	SOIL			10/09/25			10/09/25
			Mercury	7471B		10/13/25	10/13/25	
			Metals ICP-TAL	6010D		10/13/25	10/13/25	
Q3323-03	SED-03-0-2	SOIL			10/09/25			10/09/25
			Mercury	7471B		10/13/25	10/13/25	
			Metals ICP-TAL	6010D		10/13/25	10/13/25	
Q3323-04	SED-04-0-2	SOIL			10/09/25			10/09/25
			Mercury	7471B		10/13/25	10/13/25	
			Metals ICP-TAL	6010D		10/13/25	10/13/25	
Q3323-05	SED-05-0-2	SOIL			10/09/25			10/09/25
			Mercury	7471B		10/13/25	10/13/25	
			Metals ICP-TAL	6010D		10/13/25	10/13/25	
Q3323-06	SED-06-0-2	SOIL			10/09/25			10/09/25
			Mercury	7471B		10/13/25	10/13/25	
			Metals ICP-TAL	6010D		10/13/25	10/13/25	
Q3323-07	SED-07-0-2	SOIL			10/09/25			10/09/25
			Mercury	7471B		10/13/25	10/13/25	
			Metals ICP-TAL	6010D		10/13/25	10/13/25	

Hit Summary Sheet
SW-846

SDG No.: Q3323 **Order ID:** Q3323
Client: Langan Engineering and Environmental Services, Inc **Project ID:** Con Edison Richmond Terrace

Sample ID	Client ID	Matrix	Parameter	Concentration	C	MDL	RDL	Units
Client ID : SED-01-0-2								
Q3323-01	SED-01-0-2	SOIL	Aluminum	8360		1.20	7.13	mg/Kg
Q3323-01	SED-01-0-2	SOIL	Arsenic	25.1		0.27	1.43	mg/Kg
Q3323-01	SED-01-0-2	SOIL	Barium	209		1.04	7.13	mg/Kg
Q3323-01	SED-01-0-2	SOIL	Beryllium	5.02		0.036	0.43	mg/Kg
Q3323-01	SED-01-0-2	SOIL	Cadmium	1.85		0.034	0.43	mg/Kg
Q3323-01	SED-01-0-2	SOIL	Calcium	7460		15.8	143	mg/Kg
Q3323-01	SED-01-0-2	SOIL	Chromium	68.8		0.067	0.71	mg/Kg
Q3323-01	SED-01-0-2	SOIL	Cobalt	16.8		0.14	2.14	mg/Kg
Q3323-01	SED-01-0-2	SOIL	Copper	522		0.31	1.43	mg/Kg
Q3323-01	SED-01-0-2	SOIL	Iron	32900		5.69	7.13	mg/Kg
Q3323-01	SED-01-0-2	SOIL	Lead	905		0.19	0.86	mg/Kg
Q3323-01	SED-01-0-2	SOIL	Magnesium	6270		17.1	143	mg/Kg
Q3323-01	SED-01-0-2	SOIL	Manganese	301		0.20	1.43	mg/Kg
Q3323-01	SED-01-0-2	SOIL	Mercury	0.54		0.011	0.019	mg/Kg
Q3323-01	SED-01-0-2	SOIL	Nickel	86.3		0.19	2.85	mg/Kg
Q3323-01	SED-01-0-2	SOIL	Potassium	1880		39.5	143	mg/Kg
Q3323-01	SED-01-0-2	SOIL	Selenium	2.49		0.37	1.43	mg/Kg
Q3323-01	SED-01-0-2	SOIL	Silver	1.86		0.17	0.71	mg/Kg
Q3323-01	SED-01-0-2	SOIL	Sodium	6480		25.4	143	mg/Kg
Q3323-01	SED-01-0-2	SOIL	Vanadium	23.9		0.36	2.85	mg/Kg
Q3323-01	SED-01-0-2	SOIL	Zinc	1560		0.33	2.85	mg/Kg
Client ID : SED-02-0-2								
Q3323-02	SED-02-0-2	SOIL	Aluminum	16200		1.30	7.72	mg/Kg
Q3323-02	SED-02-0-2	SOIL	Arsenic	40.0		0.29	1.54	mg/Kg
Q3323-02	SED-02-0-2	SOIL	Barium	286		1.13	7.72	mg/Kg
Q3323-02	SED-02-0-2	SOIL	Beryllium	34.6		0.039	0.46	mg/Kg
Q3323-02	SED-02-0-2	SOIL	Cadmium	3.67		0.037	0.46	mg/Kg
Q3323-02	SED-02-0-2	SOIL	Calcium	23900		17.1	154	mg/Kg
Q3323-02	SED-02-0-2	SOIL	Chromium	92.5		0.073	0.77	mg/Kg
Q3323-02	SED-02-0-2	SOIL	Cobalt	86.9		0.15	2.32	mg/Kg
Q3323-02	SED-02-0-2	SOIL	Copper	2990		0.34	1.54	mg/Kg
Q3323-02	SED-02-0-2	SOIL	Iron	92400		6.16	7.72	mg/Kg
Q3323-02	SED-02-0-2	SOIL	Lead	1980		0.20	0.93	mg/Kg
Q3323-02	SED-02-0-2	SOIL	Magnesium	9650		18.5	154	mg/Kg
Q3323-02	SED-02-0-2	SOIL	Manganese	1110		0.22	1.54	mg/Kg
Q3323-02	SED-02-0-2	SOIL	Mercury	0.19		0.012	0.021	mg/Kg
Q3323-02	SED-02-0-2	SOIL	Nickel	509		0.20	3.09	mg/Kg

Hit Summary Sheet
SW-846

SDG No.: Q3323

Order ID: Q3323

Client: Langan Engineering and Environmental Services, Inc

Project ID: Con Edison Richmond Terrace

Sample ID	Client ID	Matrix	Parameter	Concentration	C	MDL	RDL	Units
Q3323-02	SED-02-0-2	SOIL	Potassium	2070		42.8	154	mg/Kg
Q3323-02	SED-02-0-2	SOIL	Selenium	1.97		0.40	1.54	mg/Kg
Q3323-02	SED-02-0-2	SOIL	Sodium	6710		27.5	154	mg/Kg
Q3323-02	SED-02-0-2	SOIL	Vanadium	39.3		0.39	3.09	mg/Kg
Q3323-02	SED-02-0-2	SOIL	Zinc	9420	D	1.78	15.4	mg/Kg
Client ID : SED-03-0-2								
Q3323-03	SED-03-0-2	SOIL	Aluminum	6730		0.99	5.92	mg/Kg
Q3323-03	SED-03-0-2	SOIL	Arsenic	16.8		0.23	1.18	mg/Kg
Q3323-03	SED-03-0-2	SOIL	Barium	79.5		0.86	5.92	mg/Kg
Q3323-03	SED-03-0-2	SOIL	Beryllium	5.15		0.030	0.36	mg/Kg
Q3323-03	SED-03-0-2	SOIL	Cadmium	1.01		0.028	0.36	mg/Kg
Q3323-03	SED-03-0-2	SOIL	Calcium	13200		13.1	118	mg/Kg
Q3323-03	SED-03-0-2	SOIL	Chromium	27.1		0.056	0.59	mg/Kg
Q3323-03	SED-03-0-2	SOIL	Cobalt	16.5		0.12	1.78	mg/Kg
Q3323-03	SED-03-0-2	SOIL	Copper	428		0.26	1.18	mg/Kg
Q3323-03	SED-03-0-2	SOIL	Iron	35600		4.72	5.92	mg/Kg
Q3323-03	SED-03-0-2	SOIL	Lead	440		0.15	0.71	mg/Kg
Q3323-03	SED-03-0-2	SOIL	Magnesium	5040		14.2	118	mg/Kg
Q3323-03	SED-03-0-2	SOIL	Manganese	307		0.17	1.18	mg/Kg
Q3323-03	SED-03-0-2	SOIL	Mercury	0.45		0.010	0.019	mg/Kg
Q3323-03	SED-03-0-2	SOIL	Nickel	97.2		0.15	2.37	mg/Kg
Q3323-03	SED-03-0-2	SOIL	Potassium	1480		32.8	118	mg/Kg
Q3323-03	SED-03-0-2	SOIL	Selenium	0.93	J	0.31	1.18	mg/Kg
Q3323-03	SED-03-0-2	SOIL	Sodium	3250		21.1	118	mg/Kg
Q3323-03	SED-03-0-2	SOIL	Vanadium	51.4		0.30	2.37	mg/Kg
Q3323-03	SED-03-0-2	SOIL	Zinc	1240		0.27	2.37	mg/Kg
Client ID : SED-04-0-2								
Q3323-04	SED-04-0-2	SOIL	Aluminum	5140		0.99	5.89	mg/Kg
Q3323-04	SED-04-0-2	SOIL	Arsenic	25.8		0.22	1.18	mg/Kg
Q3323-04	SED-04-0-2	SOIL	Barium	83.8		0.86	5.89	mg/Kg
Q3323-04	SED-04-0-2	SOIL	Beryllium	1.06		0.029	0.35	mg/Kg
Q3323-04	SED-04-0-2	SOIL	Cadmium	1.39		0.028	0.35	mg/Kg
Q3323-04	SED-04-0-2	SOIL	Calcium	31400		13.1	118	mg/Kg
Q3323-04	SED-04-0-2	SOIL	Chromium	21.4		0.055	0.59	mg/Kg
Q3323-04	SED-04-0-2	SOIL	Cobalt	10.1		0.12	1.77	mg/Kg
Q3323-04	SED-04-0-2	SOIL	Copper	135		0.26	1.18	mg/Kg
Q3323-04	SED-04-0-2	SOIL	Iron	37200		4.70	5.89	mg/Kg
Q3323-04	SED-04-0-2	SOIL	Lead	402		0.15	0.71	mg/Kg
Q3323-04	SED-04-0-2	SOIL	Magnesium	61300		14.1	118	mg/Kg

Hit Summary Sheet
SW-846

SDG No.: Q3323

Order ID: Q3323

Client: Langan Engineering and Environmental Services, Inc

Project ID: Con Edison Richmond Terrace

Sample ID	Client ID	Matrix	Parameter	Concentration	C	MDL	RDL	Units
Q3323-04	SED-04-0-2	SOIL	Manganese	1540		0.17	1.18	mg/Kg
Q3323-04	SED-04-0-2	SOIL	Mercury	0.43		0.010	0.017	mg/Kg
Q3323-04	SED-04-0-2	SOIL	Nickel	35.6		0.15	2.35	mg/Kg
Q3323-04	SED-04-0-2	SOIL	Potassium	1740		32.6	118	mg/Kg
Q3323-04	SED-04-0-2	SOIL	Selenium	1.14	J	0.31	1.18	mg/Kg
Q3323-04	SED-04-0-2	SOIL	Sodium	5110		21.0	118	mg/Kg
Q3323-04	SED-04-0-2	SOIL	Vanadium	24.9		0.29	2.35	mg/Kg
Q3323-04	SED-04-0-2	SOIL	Zinc	617		0.27	2.35	mg/Kg
Client ID : SED-05-0-2								
Q3323-05	SED-05-0-2	SOIL	Aluminum	3580		0.94	5.62	mg/Kg
Q3323-05	SED-05-0-2	SOIL	Arsenic	24.8		0.21	1.12	mg/Kg
Q3323-05	SED-05-0-2	SOIL	Barium	36.1		0.82	5.62	mg/Kg
Q3323-05	SED-05-0-2	SOIL	Beryllium	1.19		0.028	0.34	mg/Kg
Q3323-05	SED-05-0-2	SOIL	Cadmium	6.12		0.027	0.34	mg/Kg
Q3323-05	SED-05-0-2	SOIL	Calcium	11200		12.5	112	mg/Kg
Q3323-05	SED-05-0-2	SOIL	Chromium	11.3		0.053	0.56	mg/Kg
Q3323-05	SED-05-0-2	SOIL	Cobalt	8.87		0.11	1.69	mg/Kg
Q3323-05	SED-05-0-2	SOIL	Copper	82.2		0.25	1.12	mg/Kg
Q3323-05	SED-05-0-2	SOIL	Iron	59300		4.48	5.62	mg/Kg
Q3323-05	SED-05-0-2	SOIL	Lead	131		0.15	0.67	mg/Kg
Q3323-05	SED-05-0-2	SOIL	Magnesium	9400		13.5	112	mg/Kg
Q3323-05	SED-05-0-2	SOIL	Manganese	275		0.16	1.12	mg/Kg
Q3323-05	SED-05-0-2	SOIL	Mercury	0.25		0.0090	0.016	mg/Kg
Q3323-05	SED-05-0-2	SOIL	Nickel	47.6		0.15	2.25	mg/Kg
Q3323-05	SED-05-0-2	SOIL	Potassium	1120		31.1	112	mg/Kg
Q3323-05	SED-05-0-2	SOIL	Selenium	0.73	J	0.29	1.12	mg/Kg
Q3323-05	SED-05-0-2	SOIL	Sodium	3530		20.0	112	mg/Kg
Q3323-05	SED-05-0-2	SOIL	Vanadium	65.3		0.28	2.25	mg/Kg
Q3323-05	SED-05-0-2	SOIL	Zinc	1150		0.26	2.25	mg/Kg
Client ID : SED-06-0-2								
Q3323-06	SED-06-0-2	SOIL	Aluminum	4970		0.92	5.48	mg/Kg
Q3323-06	SED-06-0-2	SOIL	Arsenic	31.2		0.21	1.10	mg/Kg
Q3323-06	SED-06-0-2	SOIL	Barium	49.0		0.80	5.48	mg/Kg
Q3323-06	SED-06-0-2	SOIL	Beryllium	1.99		0.027	0.33	mg/Kg
Q3323-06	SED-06-0-2	SOIL	Cadmium	4.38		0.026	0.33	mg/Kg
Q3323-06	SED-06-0-2	SOIL	Calcium	5050		12.2	110	mg/Kg
Q3323-06	SED-06-0-2	SOIL	Chromium	15.1		0.051	0.55	mg/Kg
Q3323-06	SED-06-0-2	SOIL	Cobalt	13.9		0.11	1.64	mg/Kg
Q3323-06	SED-06-0-2	SOIL	Copper	109		0.24	1.10	mg/Kg

Hit Summary Sheet
SW-846

SDG No.: Q3323

Order ID: Q3323

Client: Langan Engineering and Environmental Services, Inc

Project ID: Con Edison Richmond Terrace

Sample ID	Client ID	Matrix	Parameter	Concentration	C	MDL	RDL	Units
Q3323-06	SED-06-0-2	SOIL	Iron	146000	D	21.9	27.4	mg/Kg
Q3323-06	SED-06-0-2	SOIL	Lead	104		0.14	0.66	mg/Kg
Q3323-06	SED-06-0-2	SOIL	Magnesium	5460		13.1	110	mg/Kg
Q3323-06	SED-06-0-2	SOIL	Manganese	650		0.15	1.10	mg/Kg
Q3323-06	SED-06-0-2	SOIL	Mercury	0.14		0.0090	0.016	mg/Kg
Q3323-06	SED-06-0-2	SOIL	Nickel	61.1		0.14	2.19	mg/Kg
Q3323-06	SED-06-0-2	SOIL	Potassium	1950		30.3	110	mg/Kg
Q3323-06	SED-06-0-2	SOIL	Sodium	2370		19.5	110	mg/Kg
Q3323-06	SED-06-0-2	SOIL	Vanadium	241		0.27	2.19	mg/Kg
Q3323-06	SED-06-0-2	SOIL	Zinc	726		0.25	2.19	mg/Kg

Client ID : SED-07-0-2

Q3323-07	SED-07-0-2	SOIL	Aluminum	4110		0.92	5.45	mg/Kg
Q3323-07	SED-07-0-2	SOIL	Antimony	433		0.24	2.72	mg/Kg
Q3323-07	SED-07-0-2	SOIL	Arsenic	54.7		0.21	1.09	mg/Kg
Q3323-07	SED-07-0-2	SOIL	Barium	34.7		0.80	5.45	mg/Kg
Q3323-07	SED-07-0-2	SOIL	Beryllium	1.36		0.027	0.33	mg/Kg
Q3323-07	SED-07-0-2	SOIL	Cadmium	3.85		0.026	0.33	mg/Kg
Q3323-07	SED-07-0-2	SOIL	Calcium	5250		12.1	109	mg/Kg
Q3323-07	SED-07-0-2	SOIL	Chromium	34.8		0.051	0.55	mg/Kg
Q3323-07	SED-07-0-2	SOIL	Cobalt	25.0		0.11	1.63	mg/Kg
Q3323-07	SED-07-0-2	SOIL	Copper	3120		0.24	1.09	mg/Kg
Q3323-07	SED-07-0-2	SOIL	Iron	125000	D	21.7	27.2	mg/Kg
Q3323-07	SED-07-0-2	SOIL	Lead	4520		0.14	0.65	mg/Kg
Q3323-07	SED-07-0-2	SOIL	Magnesium	5770		13.1	109	mg/Kg
Q3323-07	SED-07-0-2	SOIL	Manganese	745		0.15	1.09	mg/Kg
Q3323-07	SED-07-0-2	SOIL	Mercury	0.64		0.0080	0.015	mg/Kg
Q3323-07	SED-07-0-2	SOIL	Nickel	207		0.14	2.18	mg/Kg
Q3323-07	SED-07-0-2	SOIL	Potassium	1040		30.2	109	mg/Kg
Q3323-07	SED-07-0-2	SOIL	Sodium	3240		19.4	109	mg/Kg
Q3323-07	SED-07-0-2	SOIL	Vanadium	387		0.27	2.18	mg/Kg
Q3323-07	SED-07-0-2	SOIL	Zinc	641		0.25	2.18	mg/Kg



SAMPLE DATA

Report of Analysis

Client: Langan Engineering and Environmental Services, Inc
Project: Con Edison Richmond Terrace
Client Sample ID: SED-01-0-2
Lab Sample ID: Q3323-01
Level (low/med): low

Date Collected: 10/09/25
Date Received: 10/09/25
SDG No.: Q3323
Matrix: SOIL
% Solid: 66.8

Cas	Parameter	Conc.	Qua.	DF	MDL	LOQ / CRQL	Units	Prep Date	Date Ana.	Ana Met.	Prep Met.
7429-90-5	Aluminum	8360		1	1.20	7.13	mg/Kg	10/13/25 10:40	10/13/25 15:22	6010D	SW3050
7440-36-0	Antimony	0.31	UN	1	0.31	3.56	mg/Kg	10/13/25 10:40	10/13/25 15:22	6010D	SW3050
7440-38-2	Arsenic	25.1	N	1	0.27	1.43	mg/Kg	10/13/25 10:40	10/13/25 15:22	6010D	SW3050
7440-39-3	Barium	209		1	1.04	7.13	mg/Kg	10/13/25 10:40	10/13/25 15:22	6010D	SW3050
7440-41-7	Beryllium	5.02	N	1	0.036	0.43	mg/Kg	10/13/25 10:40	10/13/25 15:22	6010D	SW3050
7440-43-9	Cadmium	1.85		1	0.034	0.43	mg/Kg	10/13/25 10:40	10/13/25 15:22	6010D	SW3050
7440-70-2	Calcium	7460		1	15.8	143	mg/Kg	10/13/25 10:40	10/13/25 15:22	6010D	SW3050
7440-47-3	Chromium	68.8	N	1	0.067	0.71	mg/Kg	10/13/25 10:40	10/13/25 15:22	6010D	SW3050
7440-48-4	Cobalt	16.8	N	1	0.14	2.14	mg/Kg	10/13/25 10:40	10/13/25 15:22	6010D	SW3050
7440-50-8	Copper	522	N	1	0.31	1.43	mg/Kg	10/13/25 10:40	10/13/25 15:22	6010D	SW3050
7439-89-6	Iron	32900		1	5.69	7.13	mg/Kg	10/13/25 10:40	10/13/25 15:22	6010D	SW3050
7439-92-1	Lead	905		1	0.19	0.86	mg/Kg	10/13/25 10:40	10/13/25 15:22	6010D	SW3050
7439-95-4	Magnesium	6270		1	17.1	143	mg/Kg	10/13/25 10:40	10/13/25 15:22	6010D	SW3050
7439-96-5	Manganese	301		1	0.20	1.43	mg/Kg	10/13/25 10:40	10/13/25 15:22	6010D	SW3050
7439-97-6	Mercury	0.54		1	0.011	0.019	mg/Kg	10/13/25 10:50	10/13/25 14:19	7471B	
7440-02-0	Nickel	86.3		1	0.19	2.85	mg/Kg	10/13/25 10:40	10/13/25 15:22	6010D	SW3050
7440-09-7	Potassium	1880		1	39.5	143	mg/Kg	10/13/25 10:40	10/13/25 15:22	6010D	SW3050
7782-49-2	Selenium	2.49	N	1	0.37	1.43	mg/Kg	10/13/25 10:40	10/13/25 15:22	6010D	SW3050
7440-22-4	Silver	1.86	N	1	0.17	0.71	mg/Kg	10/13/25 10:40	10/13/25 15:22	6010D	SW3050
7440-23-5	Sodium	6480		1	25.4	143	mg/Kg	10/13/25 10:40	10/13/25 15:22	6010D	SW3050
7440-28-0	Thallium	0.33	U	1	0.33	2.85	mg/Kg	10/13/25 10:40	10/13/25 15:22	6010D	SW3050
7440-62-2	Vanadium	23.9	N	1	0.36	2.85	mg/Kg	10/13/25 10:40	10/13/25 15:22	6010D	SW3050
7440-66-6	Zinc	1560		1	0.33	2.85	mg/Kg	10/13/25 10:40	10/13/25 15:22	6010D	SW3050

U = Not Detected

LOQ = Limit of Quantitation

MDL = Method Detection Limit

LOD = Limit of Detection

D = Dilution

Q = indicates LCS control criteria did not meet requirements

J = Estimated Value

B = Analyte Found in Associated Method Blank

* = indicates the duplicate analysis is not within control limits.

E = Indicates the reported value is estimated because of the presence of interference.

OR = Over Range

N = Spiked sample recovery not within control limits

Report of Analysis

Client: Langan Engineering and Environmental Services, Inc
Project: Con Edison Richmond Terrace
Client Sample ID: SED-02-0-2
Lab Sample ID: Q3323-02
Level (low/med): low

Date Collected: 10/09/25
Date Received: 10/09/25
SDG No.: Q3323
Matrix: SOIL
% Solid: 57.3

Cas	Parameter	Conc.	Qua.	DF	MDL	LOQ / CRQL	Units	Prep Date	Date Ana.	Ana Met.	Prep Met.
7429-90-5	Aluminum	16200		1	1.30	7.72	mg/Kg	10/13/25 10:40	10/13/25 15:26	6010D	SW3050
7440-36-0	Antimony	0.34	UN	1	0.34	3.86	mg/Kg	10/13/25 10:40	10/13/25 15:26	6010D	SW3050
7440-38-2	Arsenic	40.0	N	1	0.29	1.54	mg/Kg	10/13/25 10:40	10/13/25 15:26	6010D	SW3050
7440-39-3	Barium	286		1	1.13	7.72	mg/Kg	10/13/25 10:40	10/13/25 15:26	6010D	SW3050
7440-41-7	Beryllium	34.6	N	1	0.039	0.46	mg/Kg	10/13/25 10:40	10/13/25 15:26	6010D	SW3050
7440-43-9	Cadmium	3.67		1	0.037	0.46	mg/Kg	10/13/25 10:40	10/13/25 15:26	6010D	SW3050
7440-70-2	Calcium	23900		1	17.1	154	mg/Kg	10/13/25 10:40	10/13/25 15:26	6010D	SW3050
7440-47-3	Chromium	92.5	N	1	0.073	0.77	mg/Kg	10/13/25 10:40	10/13/25 15:26	6010D	SW3050
7440-48-4	Cobalt	86.9	N	1	0.15	2.32	mg/Kg	10/13/25 10:40	10/13/25 15:26	6010D	SW3050
7440-50-8	Copper	2990	N	1	0.34	1.54	mg/Kg	10/13/25 10:40	10/13/25 15:26	6010D	SW3050
7439-89-6	Iron	92400		1	6.16	7.72	mg/Kg	10/13/25 10:40	10/13/25 15:26	6010D	SW3050
7439-92-1	Lead	1980		1	0.20	0.93	mg/Kg	10/13/25 10:40	10/13/25 15:26	6010D	SW3050
7439-95-4	Magnesium	9650		1	18.5	154	mg/Kg	10/13/25 10:40	10/13/25 15:26	6010D	SW3050
7439-96-5	Manganese	1110		1	0.22	1.54	mg/Kg	10/13/25 10:40	10/13/25 15:26	6010D	SW3050
7439-97-6	Mercury	0.19		1	0.012	0.021	mg/Kg	10/13/25 10:50	10/13/25 14:21	7471B	
7440-02-0	Nickel	509		1	0.20	3.09	mg/Kg	10/13/25 10:40	10/13/25 15:26	6010D	SW3050
7440-09-7	Potassium	2070		1	42.8	154	mg/Kg	10/13/25 10:40	10/13/25 15:26	6010D	SW3050
7782-49-2	Selenium	1.97	N	1	0.40	1.54	mg/Kg	10/13/25 10:40	10/13/25 15:26	6010D	SW3050
7440-22-4	Silver	0.19	UN	1	0.19	0.77	mg/Kg	10/13/25 10:40	10/13/25 15:26	6010D	SW3050
7440-23-5	Sodium	6710		1	27.5	154	mg/Kg	10/13/25 10:40	10/13/25 15:26	6010D	SW3050
7440-28-0	Thallium	0.36	U	1	0.36	3.09	mg/Kg	10/13/25 10:40	10/13/25 15:26	6010D	SW3050
7440-62-2	Vanadium	39.3	N	1	0.39	3.09	mg/Kg	10/13/25 10:40	10/13/25 15:26	6010D	SW3050
7440-66-6	Zinc	9420	D	5	1.78	15.4	mg/Kg	10/13/25 10:40	10/13/25 16:42	6010D	SW3050

U = Not Detected

LOQ = Limit of Quantitation

MDL = Method Detection Limit

LOD = Limit of Detection

D = Dilution

Q = indicates LCS control criteria did not meet requirements

J = Estimated Value

B = Analyte Found in Associated Method Blank

* = indicates the duplicate analysis is not within control limits.

E = Indicates the reported value is estimated because of the presence of interference.

OR = Over Range

N = Spiked sample recovery not within control limits

Report of Analysis

Client: Langan Engineering and Environmental Services, Inc
Project: Con Edison Richmond Terrace
Client Sample ID: SED-03-0-2
Lab Sample ID: Q3323-03
Level (low/med): low

Date Collected: 10/09/25
Date Received: 10/09/25
SDG No.: Q3323
Matrix: SOIL
% Solid: 71.6

Cas	Parameter	Conc.	Qua.	DF	MDL	LOQ / CRQL	Units	Prep Date	Date Ana.	Ana Met.	Prep Met.
7429-90-5	Aluminum	6730		1	0.99	5.92	mg/Kg	10/13/25 10:40	10/13/25 15:31	6010D	SW3050
7440-36-0	Antimony	0.26	UN	1	0.26	2.96	mg/Kg	10/13/25 10:40	10/13/25 15:31	6010D	SW3050
7440-38-2	Arsenic	16.8	N	1	0.23	1.18	mg/Kg	10/13/25 10:40	10/13/25 15:31	6010D	SW3050
7440-39-3	Barium	79.5		1	0.86	5.92	mg/Kg	10/13/25 10:40	10/13/25 15:31	6010D	SW3050
7440-41-7	Beryllium	5.15	N	1	0.030	0.36	mg/Kg	10/13/25 10:40	10/13/25 15:31	6010D	SW3050
7440-43-9	Cadmium	1.01		1	0.028	0.36	mg/Kg	10/13/25 10:40	10/13/25 15:31	6010D	SW3050
7440-70-2	Calcium	13200		1	13.1	118	mg/Kg	10/13/25 10:40	10/13/25 15:31	6010D	SW3050
7440-47-3	Chromium	27.1	N	1	0.056	0.59	mg/Kg	10/13/25 10:40	10/13/25 15:31	6010D	SW3050
7440-48-4	Cobalt	16.5	N	1	0.12	1.78	mg/Kg	10/13/25 10:40	10/13/25 15:31	6010D	SW3050
7440-50-8	Copper	428	N	1	0.26	1.18	mg/Kg	10/13/25 10:40	10/13/25 15:31	6010D	SW3050
7439-89-6	Iron	35600		1	4.72	5.92	mg/Kg	10/13/25 10:40	10/13/25 15:31	6010D	SW3050
7439-92-1	Lead	440		1	0.15	0.71	mg/Kg	10/13/25 10:40	10/13/25 15:31	6010D	SW3050
7439-95-4	Magnesium	5040		1	14.2	118	mg/Kg	10/13/25 10:40	10/13/25 15:31	6010D	SW3050
7439-96-5	Manganese	307		1	0.17	1.18	mg/Kg	10/13/25 10:40	10/13/25 15:31	6010D	SW3050
7439-97-6	Mercury	0.45		1	0.010	0.019	mg/Kg	10/13/25 10:50	10/13/25 14:24	7471B	
7440-02-0	Nickel	97.2		1	0.15	2.37	mg/Kg	10/13/25 10:40	10/13/25 15:31	6010D	SW3050
7440-09-7	Potassium	1480		1	32.8	118	mg/Kg	10/13/25 10:40	10/13/25 15:31	6010D	SW3050
7782-49-2	Selenium	0.93	JN	1	0.31	1.18	mg/Kg	10/13/25 10:40	10/13/25 15:31	6010D	SW3050
7440-22-4	Silver	0.14	UN	1	0.14	0.59	mg/Kg	10/13/25 10:40	10/13/25 15:31	6010D	SW3050
7440-23-5	Sodium	3250		1	21.1	118	mg/Kg	10/13/25 10:40	10/13/25 15:31	6010D	SW3050
7440-28-0	Thallium	0.27	U	1	0.27	2.37	mg/Kg	10/13/25 10:40	10/13/25 15:31	6010D	SW3050
7440-62-2	Vanadium	51.4	N	1	0.30	2.37	mg/Kg	10/13/25 10:40	10/13/25 15:31	6010D	SW3050
7440-66-6	Zinc	1240		1	0.27	2.37	mg/Kg	10/13/25 10:40	10/13/25 15:31	6010D	SW3050

U = Not Detected

LOQ = Limit of Quantitation

MDL = Method Detection Limit

LOD = Limit of Detection

D = Dilution

Q = indicates LCS control criteria did not meet requirements

J = Estimated Value

B = Analyte Found in Associated Method Blank

* = indicates the duplicate analysis is not within control limits.

E = Indicates the reported value is estimated because of the presence of interference.

OR = Over Range

N = Spiked sample recovery not within control limits

Report of Analysis

Client: Langan Engineering and Environmental Services, Inc
Project: Con Edison Richmond Terrace
Client Sample ID: SED-04-0-2
Lab Sample ID: Q3323-04
Level (low/med): low

Date Collected: 10/09/25
Date Received: 10/09/25
SDG No.: Q3323
Matrix: SOIL
% Solid: 70.2

Cas	Parameter	Conc.	Qua.	DF	MDL	LOQ / CRQL	Units	Prep Date	Date Ana.	Ana Met.	Prep Met.
7429-90-5	Aluminum	5140		1	0.99	5.89	mg/Kg	10/13/25 10:40	10/13/25 15:35	6010D	SW3050
7440-36-0	Antimony	0.26	UN	1	0.26	2.94	mg/Kg	10/13/25 10:40	10/13/25 15:35	6010D	SW3050
7440-38-2	Arsenic	25.8	N	1	0.22	1.18	mg/Kg	10/13/25 10:40	10/13/25 15:35	6010D	SW3050
7440-39-3	Barium	83.8		1	0.86	5.89	mg/Kg	10/13/25 10:40	10/13/25 15:35	6010D	SW3050
7440-41-7	Beryllium	1.06	N	1	0.029	0.35	mg/Kg	10/13/25 10:40	10/13/25 15:35	6010D	SW3050
7440-43-9	Cadmium	1.39		1	0.028	0.35	mg/Kg	10/13/25 10:40	10/13/25 15:35	6010D	SW3050
7440-70-2	Calcium	31400		1	13.1	118	mg/Kg	10/13/25 10:40	10/13/25 15:35	6010D	SW3050
7440-47-3	Chromium	21.4	N	1	0.055	0.59	mg/Kg	10/13/25 10:40	10/13/25 15:35	6010D	SW3050
7440-48-4	Cobalt	10.1	N	1	0.12	1.77	mg/Kg	10/13/25 10:40	10/13/25 15:35	6010D	SW3050
7440-50-8	Copper	135	N	1	0.26	1.18	mg/Kg	10/13/25 10:40	10/13/25 15:35	6010D	SW3050
7439-89-6	Iron	37200		1	4.70	5.89	mg/Kg	10/13/25 10:40	10/13/25 15:35	6010D	SW3050
7439-92-1	Lead	402		1	0.15	0.71	mg/Kg	10/13/25 10:40	10/13/25 15:35	6010D	SW3050
7439-95-4	Magnesium	61300		1	14.1	118	mg/Kg	10/13/25 10:40	10/13/25 15:35	6010D	SW3050
7439-96-5	Manganese	1540		1	0.17	1.18	mg/Kg	10/13/25 10:40	10/13/25 15:35	6010D	SW3050
7439-97-6	Mercury	0.43		1	0.010	0.017	mg/Kg	10/13/25 10:50	10/13/25 14:32	7471B	
7440-02-0	Nickel	35.6		1	0.15	2.35	mg/Kg	10/13/25 10:40	10/13/25 15:35	6010D	SW3050
7440-09-7	Potassium	1740		1	32.6	118	mg/Kg	10/13/25 10:40	10/13/25 15:35	6010D	SW3050
7782-49-2	Selenium	1.14	JN	1	0.31	1.18	mg/Kg	10/13/25 10:40	10/13/25 15:35	6010D	SW3050
7440-22-4	Silver	0.14	UN	1	0.14	0.59	mg/Kg	10/13/25 10:40	10/13/25 15:35	6010D	SW3050
7440-23-5	Sodium	5110		1	21.0	118	mg/Kg	10/13/25 10:40	10/13/25 15:35	6010D	SW3050
7440-28-0	Thallium	0.27	U	1	0.27	2.35	mg/Kg	10/13/25 10:40	10/13/25 15:35	6010D	SW3050
7440-62-2	Vanadium	24.9	N	1	0.29	2.35	mg/Kg	10/13/25 10:40	10/13/25 15:35	6010D	SW3050
7440-66-6	Zinc	617		1	0.27	2.35	mg/Kg	10/13/25 10:40	10/13/25 15:35	6010D	SW3050

U = Not Detected

LOQ = Limit of Quantitation

MDL = Method Detection Limit

LOD = Limit of Detection

D = Dilution

Q = indicates LCS control criteria did not meet requirements

J = Estimated Value

B = Analyte Found in Associated Method Blank

* = indicates the duplicate analysis is not within control limits.

E = Indicates the reported value is estimated because of the presence of interference.

OR = Over Range

N = Spiked sample recovery not within control limits

Report of Analysis

Client: Langan Engineering and Environmental Services, Inc
Project: Con Edison Richmond Terrace
Client Sample ID: SED-05-0-2
Lab Sample ID: Q3323-05
Level (low/med): low

Date Collected: 10/09/25
Date Received: 10/09/25
SDG No.: Q3323
Matrix: SOIL
% Solid: 77.4

Cas	Parameter	Conc.	Qua.	DF	MDL	LOQ / CRQL	Units	Prep Date	Date Ana.	Ana Met.	Prep Met.
7429-90-5	Aluminum	3580		1	0.94	5.62	mg/Kg	10/13/25 10:40	10/13/25 15:39	6010D	SW3050
7440-36-0	Antimony	0.25	UN	1	0.25	2.81	mg/Kg	10/13/25 10:40	10/13/25 15:39	6010D	SW3050
7440-38-2	Arsenic	24.8	N	1	0.21	1.12	mg/Kg	10/13/25 10:40	10/13/25 15:39	6010D	SW3050
7440-39-3	Barium	36.1		1	0.82	5.62	mg/Kg	10/13/25 10:40	10/13/25 15:39	6010D	SW3050
7440-41-7	Beryllium	1.19	N	1	0.028	0.34	mg/Kg	10/13/25 10:40	10/13/25 15:39	6010D	SW3050
7440-43-9	Cadmium	6.12		1	0.027	0.34	mg/Kg	10/13/25 10:40	10/13/25 15:39	6010D	SW3050
7440-70-2	Calcium	11200		1	12.5	112	mg/Kg	10/13/25 10:40	10/13/25 15:39	6010D	SW3050
7440-47-3	Chromium	11.3	N	1	0.053	0.56	mg/Kg	10/13/25 10:40	10/13/25 15:39	6010D	SW3050
7440-48-4	Cobalt	8.87	N	1	0.11	1.69	mg/Kg	10/13/25 10:40	10/13/25 15:39	6010D	SW3050
7440-50-8	Copper	82.2	N	1	0.25	1.12	mg/Kg	10/13/25 10:40	10/13/25 15:39	6010D	SW3050
7439-89-6	Iron	59300		1	4.48	5.62	mg/Kg	10/13/25 10:40	10/13/25 15:39	6010D	SW3050
7439-92-1	Lead	131		1	0.15	0.67	mg/Kg	10/13/25 10:40	10/13/25 15:39	6010D	SW3050
7439-95-4	Magnesium	9400		1	13.5	112	mg/Kg	10/13/25 10:40	10/13/25 15:39	6010D	SW3050
7439-96-5	Manganese	275		1	0.16	1.12	mg/Kg	10/13/25 10:40	10/13/25 15:39	6010D	SW3050
7439-97-6	Mercury	0.25		1	0.0090	0.016	mg/Kg	10/13/25 10:50	10/13/25 14:34	7471B	
7440-02-0	Nickel	47.6		1	0.15	2.25	mg/Kg	10/13/25 10:40	10/13/25 15:39	6010D	SW3050
7440-09-7	Potassium	1120		1	31.1	112	mg/Kg	10/13/25 10:40	10/13/25 15:39	6010D	SW3050
7782-49-2	Selenium	0.73	JN	1	0.29	1.12	mg/Kg	10/13/25 10:40	10/13/25 15:39	6010D	SW3050
7440-22-4	Silver	0.14	UN	1	0.14	0.56	mg/Kg	10/13/25 10:40	10/13/25 15:39	6010D	SW3050
7440-23-5	Sodium	3530		1	20.0	112	mg/Kg	10/13/25 10:40	10/13/25 15:39	6010D	SW3050
7440-28-0	Thallium	0.26	U	1	0.26	2.25	mg/Kg	10/13/25 10:40	10/13/25 15:39	6010D	SW3050
7440-62-2	Vanadium	65.3	N	1	0.28	2.25	mg/Kg	10/13/25 10:40	10/13/25 15:39	6010D	SW3050
7440-66-6	Zinc	1150		1	0.26	2.25	mg/Kg	10/13/25 10:40	10/13/25 15:39	6010D	SW3050

U = Not Detected

LOQ = Limit of Quantitation

MDL = Method Detection Limit

LOD = Limit of Detection

D = Dilution

Q = indicates LCS control criteria did not meet requirements

J = Estimated Value

B = Analyte Found in Associated Method Blank

* = indicates the duplicate analysis is not within control limits.

E = Indicates the reported value is estimated because of the presence of interference.

OR = Over Range

N = Spiked sample recovery not within control limits

Report of Analysis

Client: Langan Engineering and Environmental Services, Inc
Project: Con Edison Richmond Terrace
Client Sample ID: SED-06-0-2
Lab Sample ID: Q3323-06
Level (low/med): low

Date Collected: 10/09/25
Date Received: 10/09/25
SDG No.: Q3323
Matrix: SOIL
% Solid: 80.8

Cas	Parameter	Conc.	Qua.	DF	MDL	LOQ / CRQL	Units	Prep Date	Date Ana.	Ana Met.	Prep Met.
7429-90-5	Aluminum	4970		1	0.92	5.48	mg/Kg	10/13/25 10:40	10/13/25 15:43	6010D	SW3050
7440-36-0	Antimony	0.24	UN	1	0.24	2.74	mg/Kg	10/13/25 10:40	10/13/25 15:43	6010D	SW3050
7440-38-2	Arsenic	31.2	N	1	0.21	1.10	mg/Kg	10/13/25 10:40	10/13/25 15:43	6010D	SW3050
7440-39-3	Barium	49.0		1	0.80	5.48	mg/Kg	10/13/25 10:40	10/13/25 15:43	6010D	SW3050
7440-41-7	Beryllium	1.99	N	1	0.027	0.33	mg/Kg	10/13/25 10:40	10/13/25 15:43	6010D	SW3050
7440-43-9	Cadmium	4.38		1	0.026	0.33	mg/Kg	10/13/25 10:40	10/13/25 15:43	6010D	SW3050
7440-70-2	Calcium	5050		1	12.2	110	mg/Kg	10/13/25 10:40	10/13/25 15:43	6010D	SW3050
7440-47-3	Chromium	15.1	N	1	0.051	0.55	mg/Kg	10/13/25 10:40	10/13/25 15:43	6010D	SW3050
7440-48-4	Cobalt	13.9	N	1	0.11	1.64	mg/Kg	10/13/25 10:40	10/13/25 15:43	6010D	SW3050
7440-50-8	Copper	109	N	1	0.24	1.10	mg/Kg	10/13/25 10:40	10/13/25 15:43	6010D	SW3050
7439-89-6	Iron	146000	D	5	21.9	27.4	mg/Kg	10/13/25 10:40	10/13/25 19:05	6010D	SW3050
7439-92-1	Lead	104		1	0.14	0.66	mg/Kg	10/13/25 10:40	10/13/25 15:43	6010D	SW3050
7439-95-4	Magnesium	5460		1	13.1	110	mg/Kg	10/13/25 10:40	10/13/25 15:43	6010D	SW3050
7439-96-5	Manganese	650		1	0.15	1.10	mg/Kg	10/13/25 10:40	10/13/25 15:43	6010D	SW3050
7439-97-6	Mercury	0.14		1	0.0090	0.016	mg/Kg	10/13/25 10:50	10/13/25 14:37	7471B	
7440-02-0	Nickel	61.1		1	0.14	2.19	mg/Kg	10/13/25 10:40	10/13/25 15:43	6010D	SW3050
7440-09-7	Potassium	1950		1	30.3	110	mg/Kg	10/13/25 10:40	10/13/25 15:43	6010D	SW3050
7782-49-2	Selenium	0.28	UN	1	0.28	1.10	mg/Kg	10/13/25 10:40	10/13/25 15:43	6010D	SW3050
7440-22-4	Silver	0.66	UDN	5	0.66	2.74	mg/Kg	10/13/25 10:40	10/13/25 19:05	6010D	SW3050
7440-23-5	Sodium	2370		1	19.5	110	mg/Kg	10/13/25 10:40	10/13/25 15:43	6010D	SW3050
7440-28-0	Thallium	0.25	U	1	0.25	2.19	mg/Kg	10/13/25 10:40	10/13/25 15:43	6010D	SW3050
7440-62-2	Vanadium	241	N	1	0.27	2.19	mg/Kg	10/13/25 10:40	10/13/25 15:43	6010D	SW3050
7440-66-6	Zinc	726		1	0.25	2.19	mg/Kg	10/13/25 10:40	10/13/25 15:43	6010D	SW3050

U = Not Detected

LOQ = Limit of Quantitation

MDL = Method Detection Limit

LOD = Limit of Detection

D = Dilution

Q = indicates LCS control criteria did not meet requirements

J = Estimated Value

B = Analyte Found in Associated Method Blank

* = indicates the duplicate analysis is not within control limits.

E = Indicates the reported value is estimated because of the presence of interference.

OR = Over Range

N = Spiked sample recovery not within control limits

Report of Analysis

Client: Langan Engineering and Environmental Services, Inc
Project: Con Edison Richmond Terrace
Client Sample ID: SED-07-0-2
Lab Sample ID: Q3323-07
Level (low/med): low

Date Collected: 10/09/25
Date Received: 10/09/25
SDG No.: Q3323
Matrix: SOIL
% Solid: 81.2

Cas	Parameter	Conc.	Qua.	DF	MDL	LOQ / CRQL	Units	Prep Date	Date Ana.	Ana Met.	Prep Met.
7429-90-5	Aluminum	4110		1	0.92	5.45	mg/Kg	10/13/25 10:40	10/13/25 15:47	6010D	SW3050
7440-36-0	Antimony	433	N	1	0.24	2.72	mg/Kg	10/13/25 10:40	10/13/25 15:47	6010D	SW3050
7440-38-2	Arsenic	54.7	N	1	0.21	1.09	mg/Kg	10/13/25 10:40	10/13/25 15:47	6010D	SW3050
7440-39-3	Barium	34.7		1	0.80	5.45	mg/Kg	10/13/25 10:40	10/13/25 15:47	6010D	SW3050
7440-41-7	Beryllium	1.36	N	1	0.027	0.33	mg/Kg	10/13/25 10:40	10/13/25 15:47	6010D	SW3050
7440-43-9	Cadmium	3.85		1	0.026	0.33	mg/Kg	10/13/25 10:40	10/13/25 15:47	6010D	SW3050
7440-70-2	Calcium	5250		1	12.1	109	mg/Kg	10/13/25 10:40	10/13/25 15:47	6010D	SW3050
7440-47-3	Chromium	34.8	N	1	0.051	0.55	mg/Kg	10/13/25 10:40	10/13/25 15:47	6010D	SW3050
7440-48-4	Cobalt	25.0	N	1	0.11	1.63	mg/Kg	10/13/25 10:40	10/13/25 15:47	6010D	SW3050
7440-50-8	Copper	3120	N	1	0.24	1.09	mg/Kg	10/13/25 10:40	10/13/25 15:47	6010D	SW3050
7439-89-6	Iron	125000	D	5	21.7	27.2	mg/Kg	10/13/25 10:40	10/13/25 19:09	6010D	SW3050
7439-92-1	Lead	4520		1	0.14	0.65	mg/Kg	10/13/25 10:40	10/13/25 15:47	6010D	SW3050
7439-95-4	Magnesium	5770		1	13.1	109	mg/Kg	10/13/25 10:40	10/13/25 15:47	6010D	SW3050
7439-96-5	Manganese	745		1	0.15	1.09	mg/Kg	10/13/25 10:40	10/13/25 15:47	6010D	SW3050
7439-97-6	Mercury	0.64		1	0.0080	0.015	mg/Kg	10/13/25 10:50	10/13/25 14:40	7471B	
7440-02-0	Nickel	207		1	0.14	2.18	mg/Kg	10/13/25 10:40	10/13/25 15:47	6010D	SW3050
7440-09-7	Potassium	1040		1	30.2	109	mg/Kg	10/13/25 10:40	10/13/25 15:47	6010D	SW3050
7782-49-2	Selenium	0.28	UN	1	0.28	1.09	mg/Kg	10/13/25 10:40	10/13/25 15:47	6010D	SW3050
7440-22-4	Silver	0.13	UN	1	0.13	0.55	mg/Kg	10/13/25 10:40	10/13/25 15:47	6010D	SW3050
7440-23-5	Sodium	3240		1	19.4	109	mg/Kg	10/13/25 10:40	10/13/25 15:47	6010D	SW3050
7440-28-0	Thallium	0.25	U	1	0.25	2.18	mg/Kg	10/13/25 10:40	10/13/25 15:47	6010D	SW3050
7440-62-2	Vanadium	387	N	1	0.27	2.18	mg/Kg	10/13/25 10:40	10/13/25 15:47	6010D	SW3050
7440-66-6	Zinc	641		1	0.25	2.18	mg/Kg	10/13/25 10:40	10/13/25 15:47	6010D	SW3050

U = Not Detected

LOQ = Limit of Quantitation

MDL = Method Detection Limit

LOD = Limit of Detection

D = Dilution

Q = indicates LCS control criteria did not meet requirements

J = Estimated Value

B = Analyte Found in Associated Method Blank

* = indicates the duplicate analysis is not within control limits.

E = Indicates the reported value is estimated because of the presence of interference.

OR = Over Range

N = Spiked sample recovery not within control limits



METAL CALIBRATION DATA

Metals

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Langan Engineering and Environmental Services.

SDG No.: Q3323

Contract: LANG01

Lab Code: ACE

Initial Calibration Source: EPA

Continuing Calibration Source: PLASMA-PURE

Sample ID	Analyte	Result ug/L	True Value	% Recovery	Acceptance Window (%R)	M	Analysis Date	Analysis Time	Run Number
ICV68	Mercury	4.11	4.0	103	90 - 110	CV	10/13/2025	13:49	LB137509

Metals

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Langan Engineering and Environmental Services.

SDG No.: Q3323

Contract: LANG01

Lab Code: ACE

Initial Calibration Source: EPA

Continuing Calibration Source: PLASMA-PURE

Sample ID	Analyte	Result ug/L	True Value	% Recovery	Acceptance Window (%R)	M	Analysis Date	Analysis Time	Run Number
CCV19	Mercury	4.80	5.0	96	90 - 110	CV	10/13/2025	13:54	LB137509
CCV20	Mercury	4.71	5.0	94	90 - 110	CV	10/13/2025	14:27	LB137509
CCV21	Mercury	4.74	5.0	95	90 - 110	CV	10/13/2025	14:57	LB137509
CCV22	Mercury	4.71	5.0	94	90 - 110	CV	10/13/2025	15:09	LB137509

Metals

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Langan Engineering and Environmental Services.

SDG No.: Q3323

Contract: LANG01

Lab Code: ACE

Initial Calibration Source: EPA

Continuing Calibration Source: Inorganic Ventures

Sample ID	Analyte	Result ug/L	True Value	% Recovery	Acceptance Window (%R)	M	Analysis Date	Analysis Time	Run Number
ICV01	Aluminum	7850	8000	98	90 - 110	P	10/13/2025	12:46	LB137518
	Antimony	4150	4000	104	90 - 110	P	10/13/2025	12:46	LB137518
	Arsenic	4000	4000	100	90 - 110	P	10/13/2025	12:46	LB137518
	Barium	7730	8000	97	90 - 110	P	10/13/2025	12:46	LB137518
	Beryllium	204	200	102	90 - 110	P	10/13/2025	12:46	LB137518
	Cadmium	1990	2000	99	90 - 110	P	10/13/2025	12:46	LB137518
	Calcium	19600	20000	98	90 - 110	P	10/13/2025	12:46	LB137518
	Chromium	816	800	102	90 - 110	P	10/13/2025	12:46	LB137518
	Cobalt	1950	2000	98	90 - 110	P	10/13/2025	12:46	LB137518
	Copper	1010	1000	100	90 - 110	P	10/13/2025	12:46	LB137518
	Iron	4010	4000	100	90 - 110	P	10/13/2025	12:46	LB137518
	Lead	3900	4000	98	90 - 110	P	10/13/2025	12:46	LB137518
	Magnesium	19700	20000	99	90 - 110	P	10/13/2025	12:46	LB137518
	Manganese	1950	2000	98	90 - 110	P	10/13/2025	12:46	LB137518
	Nickel	1950	2000	98	90 - 110	P	10/13/2025	12:46	LB137518
	Potassium	19700	20000	98	90 - 110	P	10/13/2025	12:46	LB137518
	Selenium	4040	4000	101	90 - 110	P	10/13/2025	12:46	LB137518
	Silver	957	1000	96	90 - 110	P	10/13/2025	12:46	LB137518
	Sodium	19400	20000	97	90 - 110	P	10/13/2025	12:46	LB137518
	Thallium	3770	4000	94	90 - 110	P	10/13/2025	12:46	LB137518
	Vanadium	2020	2000	101	90 - 110	P	10/13/2025	12:46	LB137518
	Zinc	2050	2000	103	90 - 110	P	10/13/2025	12:46	LB137518

Metals

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Langan Engineering and Environmental Services.

SDG No.: Q3323

Contract: LANG01

Lab Code: ACE

Initial Calibration Source: EPA

Continuing Calibration Source: Inorganic Ventures

Sample ID	Analyte	Result ug/L	True Value	% Recovery	Acceptance Window (%R)	M	Analysis Date	Analysis Time	Run Number
LLICV01	Aluminum	107	100	107	80 - 120	P	10/13/2025	12:51	LB137518
	Antimony	54.9	50.0	110	80 - 120	P	10/13/2025	12:51	LB137518
	Arsenic	20.8	20.0	104	80 - 120	P	10/13/2025	12:51	LB137518
	Barium	107	100	107	80 - 120	P	10/13/2025	12:51	LB137518
	Beryllium	6.60	6.0	110	80 - 120	P	10/13/2025	12:51	LB137518
	Cadmium	6.16	6.0	103	80 - 120	P	10/13/2025	12:51	LB137518
	Calcium	2130	2000	106	80 - 120	P	10/13/2025	12:51	LB137518
	Chromium	10.8	10.0	108	80 - 120	P	10/13/2025	12:51	LB137518
	Cobalt	31.0	30.0	103	80 - 120	P	10/13/2025	12:51	LB137518
	Copper	22.8	20.0	114	80 - 120	P	10/13/2025	12:51	LB137518
	Iron	108	100	108	80 - 120	P	10/13/2025	12:51	LB137518
	Lead	12.1	12.0	101	80 - 120	P	10/13/2025	12:51	LB137518
	Magnesium	2230	2000	112	80 - 120	P	10/13/2025	12:51	LB137518
	Manganese	21.5	20.0	108	80 - 120	P	10/13/2025	12:51	LB137518
	Nickel	41.7	40.0	104	80 - 120	P	10/13/2025	12:51	LB137518
	Potassium	1930	2000	96	80 - 120	P	10/13/2025	12:51	LB137518
	Selenium	21.8	20.0	109	80 - 120	P	10/13/2025	12:51	LB137518
	Silver	10.8	10.0	108	80 - 120	P	10/13/2025	12:51	LB137518
	Sodium	1930	2000	96	80 - 120	P	10/13/2025	12:51	LB137518
	Thallium	43.9	40.0	110	80 - 120	P	10/13/2025	12:51	LB137518
	Vanadium	39.9	40.0	100	80 - 120	P	10/13/2025	12:51	LB137518
	Zinc	45.6	40.0	114	80 - 120	P	10/13/2025	12:51	LB137518

Metals

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Langan Engineering and Environmental Services.

SDG No.: Q3323

Contract: LANG01

Lab Code: ACE

Initial Calibration Source: EPA

Continuing Calibration Source: Inorganic Ventures

Sample ID	Analyte	Result ug/L	True Value	% Recovery	Acceptance Window (%R)	M	Analysis Date	Analysis Time	Run Number
CCV01	Aluminum	9970	10000	100	90 - 110	P	10/13/2025	13:21	LB137518
	Antimony	4980	5000	100	90 - 110	P	10/13/2025	13:21	LB137518
	Arsenic	5020	5000	100	90 - 110	P	10/13/2025	13:21	LB137518
	Barium	9880	10000	99	90 - 110	P	10/13/2025	13:21	LB137518
	Beryllium	250	250	100	90 - 110	P	10/13/2025	13:21	LB137518
	Cadmium	2480	2500	99	90 - 110	P	10/13/2025	13:21	LB137518
	Calcium	24900	25000	100	90 - 110	P	10/13/2025	13:21	LB137518
	Chromium	1000	1000	100	90 - 110	P	10/13/2025	13:21	LB137518
	Cobalt	2470	2500	99	90 - 110	P	10/13/2025	13:21	LB137518
	Copper	1250	1250	100	90 - 110	P	10/13/2025	13:21	LB137518
	Iron	4910	5000	98	90 - 110	P	10/13/2025	13:21	LB137518
	Lead	4920	5000	98	90 - 110	P	10/13/2025	13:21	LB137518
	Magnesium	25000	25000	100	90 - 110	P	10/13/2025	13:21	LB137518
	Manganese	2500	2500	100	90 - 110	P	10/13/2025	13:21	LB137518
	Nickel	2480	2500	99	90 - 110	P	10/13/2025	13:21	LB137518
	Potassium	24300	25000	97	90 - 110	P	10/13/2025	13:21	LB137518
	Selenium	5050	5000	101	90 - 110	P	10/13/2025	13:21	LB137518
	Silver	1230	1250	99	90 - 110	P	10/13/2025	13:21	LB137518
	Sodium	24100	25000	96	90 - 110	P	10/13/2025	13:21	LB137518
	Thallium	5280	5000	106	90 - 110	P	10/13/2025	13:21	LB137518
	Vanadium	2500	2500	100	90 - 110	P	10/13/2025	13:21	LB137518
	Zinc	2520	2500	101	90 - 110	P	10/13/2025	13:21	LB137518
CCV02	Aluminum	10000	10000	100	90 - 110	P	10/13/2025	14:18	LB137518
	Antimony	5030	5000	101	90 - 110	P	10/13/2025	14:18	LB137518
	Arsenic	5070	5000	102	90 - 110	P	10/13/2025	14:18	LB137518
	Barium	9900	10000	99	90 - 110	P	10/13/2025	14:18	LB137518
	Beryllium	255	250	102	90 - 110	P	10/13/2025	14:18	LB137518
	Cadmium	2510	2500	100	90 - 110	P	10/13/2025	14:18	LB137518
	Calcium	25100	25000	101	90 - 110	P	10/13/2025	14:18	LB137518
	Chromium	1030	1000	103	90 - 110	P	10/13/2025	14:18	LB137518
	Cobalt	2500	2500	100	90 - 110	P	10/13/2025	14:18	LB137518
	Copper	1260	1250	101	90 - 110	P	10/13/2025	14:18	LB137518
	Iron	5070	5000	101	90 - 110	P	10/13/2025	14:18	LB137518
	Lead	4980	5000	100	90 - 110	P	10/13/2025	14:18	LB137518

Metals

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Langan Engineering and Environmental Services.

SDG No.: Q3323

Contract: LANG01

Lab Code: ACE

Initial Calibration Source: EPA

Continuing Calibration Source: Inorganic Ventures

Sample ID	Analyte	Result ug/L	True Value	% Recovery	Acceptance Window (%R)	M	Analysis Date	Analysis Time	Run Number
CCV02	Magnesium	25300	25000	101	90 - 110	P	10/13/2025	14:18	LB137518
	Manganese	2490	2500	100	90 - 110	P	10/13/2025	14:18	LB137518
	Nickel	2510	2500	100	90 - 110	P	10/13/2025	14:18	LB137518
	Potassium	25600	25000	102	90 - 110	P	10/13/2025	14:18	LB137518
	Selenium	5080	5000	102	90 - 110	P	10/13/2025	14:18	LB137518
	Silver	1270	1250	102	90 - 110	P	10/13/2025	14:18	LB137518
	Sodium	25200	25000	101	90 - 110	P	10/13/2025	14:18	LB137518
	Thallium	5300	5000	106	90 - 110	P	10/13/2025	14:18	LB137518
	Vanadium	2510	2500	100	90 - 110	P	10/13/2025	14:18	LB137518
	Zinc	2600	2500	104	90 - 110	P	10/13/2025	14:18	LB137518
CCV03	Aluminum	10200	10000	102	90 - 110	P	10/13/2025	16:04	LB137518
	Antimony	5000	5000	100	90 - 110	P	10/13/2025	16:04	LB137518
	Arsenic	5040	5000	101	90 - 110	P	10/13/2025	16:04	LB137518
	Barium	9870	10000	99	90 - 110	P	10/13/2025	16:04	LB137518
	Beryllium	264	250	106	90 - 110	P	10/13/2025	16:04	LB137518
	Cadmium	2540	2500	102	90 - 110	P	10/13/2025	16:04	LB137518
	Calcium	25400	25000	102	90 - 110	P	10/13/2025	16:04	LB137518
	Chromium	1050	1000	105	90 - 110	P	10/13/2025	16:04	LB137518
	Cobalt	2520	2500	101	90 - 110	P	10/13/2025	16:04	LB137518
	Copper	1270	1250	101	90 - 110	P	10/13/2025	16:04	LB137518
	Iron	5060	5000	101	90 - 110	P	10/13/2025	16:04	LB137518
	Lead	5010	5000	100	90 - 110	P	10/13/2025	16:04	LB137518
	Magnesium	25800	25000	103	90 - 110	P	10/13/2025	16:04	LB137518
	Manganese	2520	2500	101	90 - 110	P	10/13/2025	16:04	LB137518
	Nickel	2530	2500	101	90 - 110	P	10/13/2025	16:04	LB137518
	Potassium	25000	25000	100	90 - 110	P	10/13/2025	16:04	LB137518
	Selenium	5030	5000	100	90 - 110	P	10/13/2025	16:04	LB137518
	Silver	1280	1250	102	90 - 110	P	10/13/2025	16:04	LB137518
	Sodium	24000	25000	96	90 - 110	P	10/13/2025	16:04	LB137518
	Thallium	5310	5000	106	90 - 110	P	10/13/2025	16:04	LB137518
	Vanadium	2540	2500	102	90 - 110	P	10/13/2025	16:04	LB137518
	Zinc	2520	2500	101	90 - 110	P	10/13/2025	16:04	LB137518
CCV04	Aluminum	9980	10000	100	90 - 110	P	10/13/2025	17:02	LB137518
	Antimony	4970	5000	99	90 - 110	P	10/13/2025	17:02	LB137518

Metals

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Langan Engineering and Environmental Services.

SDG No.: Q3323

Contract: LANG01

Lab Code: ACE

Initial Calibration Source: EPA

Continuing Calibration Source: Inorganic Ventures

Sample ID	Analyte	Result ug/L	True Value	% Recovery	Acceptance Window (%R)	M	Analysis Date	Analysis Time	Run Number
CCV04	Arsenic	5020	5000	100	90 - 110	P	10/13/2025	17:02	LB137518
	Barium	9520	10000	95	90 - 110	P	10/13/2025	17:02	LB137518
	Beryllium	261	250	104	90 - 110	P	10/13/2025	17:02	LB137518
	Cadmium	2520	2500	101	90 - 110	P	10/13/2025	17:02	LB137518
	Calcium	24900	25000	100	90 - 110	P	10/13/2025	17:02	LB137518
	Chromium	1040	1000	104	90 - 110	P	10/13/2025	17:02	LB137518
	Cobalt	2490	2500	100	90 - 110	P	10/13/2025	17:02	LB137518
	Copper	1250	1250	100	90 - 110	P	10/13/2025	17:02	LB137518
	Iron	4970	5000	99	90 - 110	P	10/13/2025	17:02	LB137518
	Lead	4970	5000	99	90 - 110	P	10/13/2025	17:02	LB137518
	Magnesium	25400	25000	102	90 - 110	P	10/13/2025	17:02	LB137518
	Manganese	2450	2500	98	90 - 110	P	10/13/2025	17:02	LB137518
	Nickel	2500	2500	100	90 - 110	P	10/13/2025	17:02	LB137518
	Potassium	24200	25000	97	90 - 110	P	10/13/2025	17:02	LB137518
	Selenium	5010	5000	100	90 - 110	P	10/13/2025	17:02	LB137518
	Silver	1270	1250	101	90 - 110	P	10/13/2025	17:02	LB137518
	Sodium	23000	25000	92	90 - 110	P	10/13/2025	17:02	LB137518
	Thallium	5270	5000	106	90 - 110	P	10/13/2025	17:02	LB137518
	Vanadium	2500	2500	100	90 - 110	P	10/13/2025	17:02	LB137518
	Zinc	2550	2500	102	90 - 110	P	10/13/2025	17:02	LB137518
CCV05	Aluminum	9680	10000	97	90 - 110	P	10/13/2025	18:11	LB137518
	Antimony	4780	5000	96	90 - 110	P	10/13/2025	18:11	LB137518
	Arsenic	4820	5000	96	90 - 110	P	10/13/2025	18:11	LB137518
	Barium	9440	10000	94	90 - 110	P	10/13/2025	18:11	LB137518
	Beryllium	256	250	102	90 - 110	P	10/13/2025	18:11	LB137518
	Cadmium	2440	2500	97	90 - 110	P	10/13/2025	18:11	LB137518
	Calcium	24300	25000	97	90 - 110	P	10/13/2025	18:11	LB137518
	Chromium	1000	1000	100	90 - 110	P	10/13/2025	18:11	LB137518
	Cobalt	2410	2500	96	90 - 110	P	10/13/2025	18:11	LB137518
	Copper	1210	1250	97	90 - 110	P	10/13/2025	18:11	LB137518
	Iron	4740	5000	95	90 - 110	P	10/13/2025	18:11	LB137518
	Lead	4810	5000	96	90 - 110	P	10/13/2025	18:11	LB137518
	Magnesium	24700	25000	99	90 - 110	P	10/13/2025	18:11	LB137518
	Manganese	2440	2500	98	90 - 110	P	10/13/2025	18:11	LB137518

Metals

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Langan Engineering and Environmental Services.

SDG No.: Q3323

Contract: LANG01

Lab Code: ACE

Initial Calibration Source: EPA

Continuing Calibration Source: Inorganic Ventures

Sample ID	Analyte	Result ug/L	True Value	% Recovery	Acceptance Window (%R)	M	Analysis Date	Analysis Time	Run Number
CCV05	Nickel	2410	2500	96	90 - 110	P	10/13/2025	18:11	LB137518
	Potassium	23400	25000	94	90 - 110	P	10/13/2025	18:11	LB137518
	Selenium	4810	5000	96	90 - 110	P	10/13/2025	18:11	LB137518
	Silver	1210	1250	97	90 - 110	P	10/13/2025	18:11	LB137518
	Sodium	24300	25000	97	90 - 110	P	10/13/2025	18:11	LB137518
	Thallium	4990	5000	100	90 - 110	P	10/13/2025	18:11	LB137518
	Vanadium	2440	2500	98	90 - 110	P	10/13/2025	18:11	LB137518
	Zinc	2450	2500	98	90 - 110	P	10/13/2025	18:11	LB137518
CCV06	Aluminum	10400	10000	104	90 - 110	P	10/13/2025	18:56	LB137518
	Antimony	5140	5000	103	90 - 110	P	10/13/2025	18:56	LB137518
	Arsenic	5150	5000	103	90 - 110	P	10/13/2025	18:56	LB137518
	Barium	10100	10000	101	90 - 110	P	10/13/2025	18:56	LB137518
	Beryllium	267	250	107	90 - 110	P	10/13/2025	18:56	LB137518
	Cadmium	2540	2500	102	90 - 110	P	10/13/2025	18:56	LB137518
	Calcium	25900	25000	104	90 - 110	P	10/13/2025	18:56	LB137518
	Chromium	1060	1000	106	90 - 110	P	10/13/2025	18:56	LB137518
	Cobalt	2540	2500	102	90 - 110	P	10/13/2025	18:56	LB137518
	Copper	1280	1250	102	90 - 110	P	10/13/2025	18:56	LB137518
	Iron	5140	5000	103	90 - 110	P	10/13/2025	18:56	LB137518
	Lead	5040	5000	101	90 - 110	P	10/13/2025	18:56	LB137518
	Magnesium	26200	25000	105	90 - 110	P	10/13/2025	18:56	LB137518
	Manganese	2570	2500	103	90 - 110	P	10/13/2025	18:56	LB137518
	Nickel	2540	2500	101	90 - 110	P	10/13/2025	18:56	LB137518
	Potassium	26300	25000	105	90 - 110	P	10/13/2025	18:56	LB137518
	Selenium	5170	5000	103	90 - 110	P	10/13/2025	18:56	LB137518
	Silver	1290	1250	104	90 - 110	P	10/13/2025	18:56	LB137518
	Sodium	27100	25000	108	90 - 110	P	10/13/2025	18:56	LB137518
	Thallium	5040	5000	101	90 - 110	P	10/13/2025	18:56	LB137518
	Vanadium	2610	2500	104	90 - 110	P	10/13/2025	18:56	LB137518
	Zinc	2620	2500	105	90 - 110	P	10/13/2025	18:56	LB137518
CCV07	Aluminum	9810	10000	98	90 - 110	P	10/13/2025	19:46	LB137518
	Antimony	4840	5000	97	90 - 110	P	10/13/2025	19:46	LB137518
	Arsenic	4860	5000	97	90 - 110	P	10/13/2025	19:46	LB137518
	Barium	9600	10000	96	90 - 110	P	10/13/2025	19:46	LB137518

Metals

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Langan Engineering and Environmental Services.

SDG No.: Q3323

Contract: LANG01

Lab Code: ACE

Initial Calibration Source: EPA

Continuing Calibration Source: Inorganic Ventures

Sample ID	Analyte	Result ug/L	True Value	% Recovery	Acceptance Window (%R)	M	Analysis Date	Analysis Time	Run Number
CCV07	Beryllium	257	250	103	90 - 110	P	10/13/2025	19:46	LB137518
	Cadmium	2460	2500	98	90 - 110	P	10/13/2025	19:46	LB137518
	Calcium	24600	25000	98	90 - 110	P	10/13/2025	19:46	LB137518
	Chromium	1010	1000	101	90 - 110	P	10/13/2025	19:46	LB137518
	Cobalt	2430	2500	97	90 - 110	P	10/13/2025	19:46	LB137518
	Copper	1220	1250	98	90 - 110	P	10/13/2025	19:46	LB137518
	Iron	4860	5000	97	90 - 110	P	10/13/2025	19:46	LB137518
	Lead	4850	5000	97	90 - 110	P	10/13/2025	19:46	LB137518
	Magnesium	25100	25000	100	90 - 110	P	10/13/2025	19:46	LB137518
	Manganese	2480	2500	99	90 - 110	P	10/13/2025	19:46	LB137518
	Nickel	2430	2500	97	90 - 110	P	10/13/2025	19:46	LB137518
	Potassium	23800	25000	95	90 - 110	P	10/13/2025	19:46	LB137518
	Selenium	4860	5000	97	90 - 110	P	10/13/2025	19:46	LB137518
	Silver	1230	1250	99	90 - 110	P	10/13/2025	19:46	LB137518
	Sodium	24700	25000	99	90 - 110	P	10/13/2025	19:46	LB137518
	Thallium	4770	5000	95	90 - 110	P	10/13/2025	19:46	LB137518
	Vanadium	2480	2500	99	90 - 110	P	10/13/2025	19:46	LB137518
	Zinc	2420	2500	97	90 - 110	P	10/13/2025	19:46	LB137518

Metals

- 2b -

CRDL STANDARD FOR AA & ICP

Client: Langan Engineering and Environmental Services, Ir

SDG No.: Q3323

Contract: LANG01

Lab Code: ACE

Initial Calibration Source: _____

Continuing Calibration Source: _____

Sample ID	Analyte	Result ug/L	True Value ug/L	% Recovery	Acceptance Window (%R)	M	Analysis Date	Analysis Time	Run Number
CRI01	Aluminum	114	100	114	65 - 135	P	10/13/2025	13:00	LB137518
	Antimony	50.8	50.0	102	65 - 135	P	10/13/2025	13:00	LB137518
	Arsenic	21.4	20.0	107	65 - 135	P	10/13/2025	13:00	LB137518
	Barium	107	100	107	65 - 135	P	10/13/2025	13:00	LB137518
	Beryllium	6.58	6.0	110	65 - 135	P	10/13/2025	13:00	LB137518
	Cadmium	6.08	6.0	101	65 - 135	P	10/13/2025	13:00	LB137518
	Calcium	2160	2000	108	65 - 135	P	10/13/2025	13:00	LB137518
	Chromium	10.6	10.0	106	65 - 135	P	10/13/2025	13:00	LB137518
	Cobalt	30.5	30.0	102	65 - 135	P	10/13/2025	13:00	LB137518
	Copper	22.2	20.0	111	65 - 135	P	10/13/2025	13:00	LB137518
	Iron	112	100	112	65 - 135	P	10/13/2025	13:00	LB137518
	Lead	12.6	12.0	105	65 - 135	P	10/13/2025	13:00	LB137518
	Magnesium	2240	2000	112	65 - 135	P	10/13/2025	13:00	LB137518
	Manganese	21.5	20.0	108	65 - 135	P	10/13/2025	13:00	LB137518
	Nickel	40.8	40.0	102	65 - 135	P	10/13/2025	13:00	LB137518
	Potassium	2060	2000	103	65 - 135	P	10/13/2025	13:00	LB137518
	Selenium	22.6	20.0	113	65 - 135	P	10/13/2025	13:00	LB137518
	Silver	10.7	10.0	107	65 - 135	P	10/13/2025	13:00	LB137518
	Sodium	2090	2000	104	65 - 135	P	10/13/2025	13:00	LB137518
	Thallium	44.0	40.0	110	65 - 135	P	10/13/2025	13:00	LB137518
	Vanadium	44.8	40.0	112	65 - 135	P	10/13/2025	13:00	LB137518
	Zinc	46.1	40.0	115	65 - 135	P	10/13/2025	13:00	LB137518
CRA	Mercury	0.20	0.2	102	70 - 130	CV	10/13/2025	13:58	LB137509



284 Sheffield Street, Mountainside, New Jersey 07092, Phone : 908 789 8900,
Fax : 908 789 8922

Metals

- 3a -

INITIAL AND CONTINUING CALIBRATION BLANK SUMMARY

Client: Langan Engineering and Environmental Services, Ir

SDG No.: Q3323

Contract: LANG01

Lab Code: ACE

Sample ID	Analyte	Result ug/L	Acceptance Limit	Conc Qual	CRQL	M	Analysis Date	Analysis Time	Run Number
ICB68	Mercury	0.076	+/-0.2	U	0.20	CV	10/13/2025	13:51	LB137509

Metals

- 3a -

INITIAL AND CONTINUING CALIBRATION BLANK SUMMARY

Client: Langan Engineering and Environmental Services, Ir

SDG No.: Q3323

Contract: LANG01

Lab Code: ACE

Sample ID	Analyte	Result ug/L	Acceptance Limit	Conc Qual	CRQL	M	Analysis Date	Analysis Time	Run Number
CCB19	Mercury	0.076	+/-0.2	U	0.20	CV	10/13/2025	13:56	LB137509
CCB20	Mercury	0.076	+/-0.2	U	0.20	CV	10/13/2025	14:29	LB137509
CCB21	Mercury	0.076	+/-0.2	U	0.20	CV	10/13/2025	14:59	LB137509
CCB22	Mercury	0.076	+/-0.2	U	0.20	CV	10/13/2025	15:11	LB137509

Metals

- 3a -

INITIAL AND CONTINUING CALIBRATION BLANK SUMMARY

Client: Langan Engineering and Environmental Services, Ir

SDG No.: Q3323

Contract: LANG01

Lab Code: ACE

Sample ID	Analyte	Result ug/L	Acceptance Limit	Conc Qual	CRQL	M	Analysis Date	Analysis Time	Run Number
ICB01	Aluminum	11.3	+/-50	U	100	P	10/13/2025	12:55	LB137518
	Antimony	6.76	+/-25	U	50.0	P	10/13/2025	12:55	LB137518
	Arsenic	5.12	+/-10	U	20.0	P	10/13/2025	12:55	LB137518
	Barium	14.6	+/-50	U	100	P	10/13/2025	12:55	LB137518
	Beryllium	0.56	+/-3	U	6.00	P	10/13/2025	12:55	LB137518
	Cadmium	0.50	+/-3	U	6.00	P	10/13/2025	12:55	LB137518
	Calcium	234	+/-1000	U	2000	P	10/13/2025	12:55	LB137518
	Chromium	2.12	+/-5	U	10.0	P	10/13/2025	12:55	LB137518
	Cobalt	2.26	+/-15	U	30.0	P	10/13/2025	12:55	LB137518
	Copper	4.60	+/-10	U	20.0	P	10/13/2025	12:55	LB137518
	Iron	23.4	+/-50	U	100	P	10/13/2025	12:55	LB137518
	Lead	2.30	+/-6	U	12.0	P	10/13/2025	12:55	LB137518
	Magnesium	244	+/-1000	U	2000	P	10/13/2025	12:55	LB137518
	Manganese	5.94	+/-10	U	20.0	P	10/13/2025	12:55	LB137518
	Nickel	3.06	+/-20	U	40.0	P	10/13/2025	12:55	LB137518
	Potassium	918	+/-1000	U	2000	P	10/13/2025	12:55	LB137518
	Selenium	9.64	+/-10	U	20.0	P	10/13/2025	12:55	LB137518
	Silver	1.62	+/-5	U	10.0	P	10/13/2025	12:55	LB137518
	Sodium	868	+/-1000	U	2000	P	10/13/2025	12:55	LB137518
	Thallium	4.38	+/-20	U	40.0	P	10/13/2025	12:55	LB137518
	Vanadium	6.26	+/-20	U	40.0	P	10/13/2025	12:55	LB137518
	Zinc	16.7	+/-20	U	40.0	P	10/13/2025	12:55	LB137518

Metals

- 3a -

INITIAL AND CONTINUING CALIBRATION BLANK SUMMARY

Client: Langan Engineering and Environmental Services, Ir

SDG No.: Q3323

Contract: LANG01

Lab Code: ACE

Sample ID	Analyte	Result ug/L	Acceptance Limit	Conc Qual	CRQL	M	Analysis Date	Analysis Time	Run Number
CCB01	Aluminum	11.3	+/-50	U	100	P	10/13/2025	13:25	LB137518
	Antimony	6.76	+/-25	U	50.0	P	10/13/2025	13:25	LB137518
	Arsenic	5.12	+/-10	U	20.0	P	10/13/2025	13:25	LB137518
	Barium	14.6	+/-50	U	100	P	10/13/2025	13:25	LB137518
	Beryllium	0.56	+/-3	U	6.00	P	10/13/2025	13:25	LB137518
	Cadmium	0.50	+/-3	U	6.00	P	10/13/2025	13:25	LB137518
	Calcium	234	+/-1000	U	2000	P	10/13/2025	13:25	LB137518
	Chromium	2.12	+/-5	U	10.0	P	10/13/2025	13:25	LB137518
	Cobalt	2.26	+/-15	U	30.0	P	10/13/2025	13:25	LB137518
	Copper	4.60	+/-10	U	20.0	P	10/13/2025	13:25	LB137518
	Iron	23.4	+/-50	U	100	P	10/13/2025	13:25	LB137518
	Lead	2.30	+/-6	U	12.0	P	10/13/2025	13:25	LB137518
	Magnesium	244	+/-1000	U	2000	P	10/13/2025	13:25	LB137518
	Manganese	5.94	+/-10	U	20.0	P	10/13/2025	13:25	LB137518
	Nickel	3.06	+/-20	U	40.0	P	10/13/2025	13:25	LB137518
	Potassium	918	+/-1000	U	2000	P	10/13/2025	13:25	LB137518
	Selenium	9.64	+/-10	U	20.0	P	10/13/2025	13:25	LB137518
	Silver	1.62	+/-5	U	10.0	P	10/13/2025	13:25	LB137518
	Sodium	868	+/-1000	U	2000	P	10/13/2025	13:25	LB137518
	Thallium	4.38	+/-20	U	40.0	P	10/13/2025	13:25	LB137518
	Vanadium	6.26	+/-20	U	40.0	P	10/13/2025	13:25	LB137518
	Zinc	16.7	+/-20	U	40.0	P	10/13/2025	13:25	LB137518
CCB02	Aluminum	11.3	+/-50	U	100	P	10/13/2025	14:22	LB137518
	Antimony	6.76	+/-25	U	50.0	P	10/13/2025	14:22	LB137518
	Arsenic	5.12	+/-10	U	20.0	P	10/13/2025	14:22	LB137518
	Barium	14.6	+/-50	U	100	P	10/13/2025	14:22	LB137518
	Beryllium	0.56	+/-3	U	6.00	P	10/13/2025	14:22	LB137518
	Cadmium	0.50	+/-3	U	6.00	P	10/13/2025	14:22	LB137518
	Calcium	234	+/-1000	U	2000	P	10/13/2025	14:22	LB137518
	Chromium	2.12	+/-5	U	10.0	P	10/13/2025	14:22	LB137518
	Cobalt	2.26	+/-15	U	30.0	P	10/13/2025	14:22	LB137518
	Copper	4.60	+/-10	U	20.0	P	10/13/2025	14:22	LB137518
	Iron	23.4	+/-50	U	100	P	10/13/2025	14:22	LB137518
	Lead	2.30	+/-6	U	12.0	P	10/13/2025	14:22	LB137518
	Magnesium	244	+/-1000	U	2000	P	10/13/2025	14:22	LB137518
	Manganese	5.94	+/-10	U	20.0	P	10/13/2025	14:22	LB137518
	Nickel	3.06	+/-20	U	40.0	P	10/13/2025	14:22	LB137518
	Potassium	918	+/-1000	U	2000	P	10/13/2025	14:22	LB137518
	Selenium	9.64	+/-10	U	20.0	P	10/13/2025	14:22	LB137518

Metals

- 3a -

INITIAL AND CONTINUING CALIBRATION BLANK SUMMARY

Client: Langan Engineering and Environmental Services, Ir

SDG No.: Q3323

Contract: LANG01

Lab Code: ACE

Sample ID	Analyte	Result ug/L	Acceptance Limit	Conc Qual	CRQL	M	Analysis Date	Analysis Time	Run Number
CCB02	Silver	1.62	+/-5	U	10.0	P	10/13/2025	14:22	LB137518
	Sodium	868	+/-1000	U	2000	P	10/13/2025	14:22	LB137518
	Thallium	4.38	+/-20	U	40.0	P	10/13/2025	14:22	LB137518
	Vanadium	6.26	+/-20	U	40.0	P	10/13/2025	14:22	LB137518
	Zinc	16.7	+/-20	U	40.0	P	10/13/2025	14:22	LB137518
CCB03	Aluminum	11.3	+/-50	U	100	P	10/13/2025	16:08	LB137518
	Antimony	6.76	+/-25	U	50.0	P	10/13/2025	16:08	LB137518
	Arsenic	5.12	+/-10	U	20.0	P	10/13/2025	16:08	LB137518
	Barium	14.6	+/-50	U	100	P	10/13/2025	16:08	LB137518
	Beryllium	0.56	+/-3	U	6.00	P	10/13/2025	16:08	LB137518
	Cadmium	0.50	+/-3	U	6.00	P	10/13/2025	16:08	LB137518
	Calcium	234	+/-1000	U	2000	P	10/13/2025	16:08	LB137518
	Chromium	2.12	+/-5	U	10.0	P	10/13/2025	16:08	LB137518
	Cobalt	2.26	+/-15	U	30.0	P	10/13/2025	16:08	LB137518
	Copper	4.60	+/-10	U	20.0	P	10/13/2025	16:08	LB137518
	Iron	23.4	+/-50	U	100	P	10/13/2025	16:08	LB137518
	Lead	2.30	+/-6	U	12.0	P	10/13/2025	16:08	LB137518
	Magnesium	244	+/-1000	U	2000	P	10/13/2025	16:08	LB137518
	Manganese	5.94	+/-10	U	20.0	P	10/13/2025	16:08	LB137518
	Nickel	3.06	+/-20	U	40.0	P	10/13/2025	16:08	LB137518
	Potassium	918	+/-1000	U	2000	P	10/13/2025	16:08	LB137518
	Selenium	9.64	+/-10	U	20.0	P	10/13/2025	16:08	LB137518
	Silver	1.62	+/-5	U	10.0	P	10/13/2025	16:08	LB137518
	Sodium	868	+/-1000	U	2000	P	10/13/2025	16:08	LB137518
	Thallium	4.38	+/-20	U	40.0	P	10/13/2025	16:08	LB137518
	Vanadium	6.26	+/-20	U	40.0	P	10/13/2025	16:08	LB137518
	Zinc	16.7	+/-20	U	40.0	P	10/13/2025	16:08	LB137518
CCB04	Aluminum	11.3	+/-50	U	100	P	10/13/2025	17:06	LB137518
	Antimony	6.76	+/-25	U	50.0	P	10/13/2025	17:06	LB137518
	Arsenic	5.12	+/-10	U	20.0	P	10/13/2025	17:06	LB137518
	Barium	14.6	+/-50	U	100	P	10/13/2025	17:06	LB137518
	Beryllium	0.56	+/-3	U	6.00	P	10/13/2025	17:06	LB137518
	Cadmium	0.50	+/-3	U	6.00	P	10/13/2025	17:06	LB137518
	Calcium	234	+/-1000	U	2000	P	10/13/2025	17:06	LB137518
	Chromium	2.12	+/-5	U	10.0	P	10/13/2025	17:06	LB137518
	Cobalt	2.26	+/-15	U	30.0	P	10/13/2025	17:06	LB137518
	Copper	4.60	+/-10	U	20.0	P	10/13/2025	17:06	LB137518
	Iron	23.4	+/-50	U	100	P	10/13/2025	17:06	LB137518
	Lead	2.30	+/-6	U	12.0	P	10/13/2025	17:06	LB137518

Metals

- 3a -

INITIAL AND CONTINUING CALIBRATION BLANK SUMMARY

Client: Langan Engineering and Environmental Services, Ir

SDG No.: Q3323

Contract: LANG01

Lab Code: ACE

Sample ID	Analyte	Result ug/L	Acceptance Limit	Conc Qual	CRQL	M	Analysis Date	Analysis Time	Run Number
CCB04	Magnesium	244	+/-1000	U	2000	P	10/13/2025	17:06	LB137518
	Manganese	5.94	+/-10	U	20.0	P	10/13/2025	17:06	LB137518
	Nickel	3.06	+/-20	U	40.0	P	10/13/2025	17:06	LB137518
	Potassium	918	+/-1000	U	2000	P	10/13/2025	17:06	LB137518
	Selenium	9.64	+/-10	U	20.0	P	10/13/2025	17:06	LB137518
	Silver	1.62	+/-5	U	10.0	P	10/13/2025	17:06	LB137518
	Sodium	868	+/-1000	U	2000	P	10/13/2025	17:06	LB137518
	Thallium	4.38	+/-20	U	40.0	P	10/13/2025	17:06	LB137518
	Vanadium	6.26	+/-20	U	40.0	P	10/13/2025	17:06	LB137518
	Zinc	16.7	+/-20	U	40.0	P	10/13/2025	17:06	LB137518
CCB05	Aluminum	11.3	+/-50	U	100	P	10/13/2025	18:15	LB137518
	Antimony	6.76	+/-25	U	50.0	P	10/13/2025	18:15	LB137518
	Arsenic	5.12	+/-10	U	20.0	P	10/13/2025	18:15	LB137518
	Barium	14.6	+/-50	U	100	P	10/13/2025	18:15	LB137518
	Beryllium	0.56	+/-3	U	6.00	P	10/13/2025	18:15	LB137518
	Cadmium	0.50	+/-3	U	6.00	P	10/13/2025	18:15	LB137518
	Calcium	234	+/-1000	U	2000	P	10/13/2025	18:15	LB137518
	Chromium	2.12	+/-5	U	10.0	P	10/13/2025	18:15	LB137518
	Cobalt	2.26	+/-15	U	30.0	P	10/13/2025	18:15	LB137518
	Copper	4.60	+/-10	U	20.0	P	10/13/2025	18:15	LB137518
	Iron	23.4	+/-50	U	100	P	10/13/2025	18:15	LB137518
	Lead	2.30	+/-6	U	12.0	P	10/13/2025	18:15	LB137518
	Magnesium	244	+/-1000	U	2000	P	10/13/2025	18:15	LB137518
	Manganese	5.94	+/-10	U	20.0	P	10/13/2025	18:15	LB137518
	Nickel	3.06	+/-20	U	40.0	P	10/13/2025	18:15	LB137518
	Potassium	918	+/-1000	U	2000	P	10/13/2025	18:15	LB137518
	Selenium	9.64	+/-10	U	20.0	P	10/13/2025	18:15	LB137518
	Silver	1.62	+/-5	U	10.0	P	10/13/2025	18:15	LB137518
	Sodium	868	+/-1000	U	2000	P	10/13/2025	18:15	LB137518
	Thallium	5.12	+/-20	J	40.0	P	10/13/2025	18:15	LB137518
	Vanadium	6.26	+/-20	U	40.0	P	10/13/2025	18:15	LB137518
	Zinc	16.7	+/-20	U	40.0	P	10/13/2025	18:15	LB137518
CCB06	Aluminum	11.3	+/-50	U	100	P	10/13/2025	19:01	LB137518
	Antimony	6.76	+/-25	U	50.0	P	10/13/2025	19:01	LB137518
	Arsenic	5.12	+/-10	U	20.0	P	10/13/2025	19:01	LB137518
	Barium	14.6	+/-50	U	100	P	10/13/2025	19:01	LB137518
	Beryllium	0.56	+/-3	U	6.00	P	10/13/2025	19:01	LB137518
	Cadmium	0.50	+/-3	U	6.00	P	10/13/2025	19:01	LB137518
	Calcium	234	+/-1000	U	2000	P	10/13/2025	19:01	LB137518

Metals

- 3a -

INITIAL AND CONTINUING CALIBRATION BLANK SUMMARY

Client: Langan Engineering and Environmental Services, Ir

SDG No.: Q3323

Contract: LANG01

Lab Code: ACE

Sample ID	Analyte	Result ug/L	Acceptance Limit	Conc Qual	CRQL	M	Analysis Date	Analysis Time	Run Number
CCB06	Chromium	2.12	+/-5	U	10.0	P	10/13/2025	19:01	LB137518
	Cobalt	2.26	+/-15	U	30.0	P	10/13/2025	19:01	LB137518
	Copper	4.60	+/-10	U	20.0	P	10/13/2025	19:01	LB137518
	Iron	23.4	+/-50	U	100	P	10/13/2025	19:01	LB137518
	Lead	2.30	+/-6	U	12.0	P	10/13/2025	19:01	LB137518
	Magnesium	244	+/-1000	U	2000	P	10/13/2025	19:01	LB137518
	Manganese	5.94	+/-10	U	20.0	P	10/13/2025	19:01	LB137518
	Nickel	3.06	+/-20	U	40.0	P	10/13/2025	19:01	LB137518
	Potassium	918	+/-1000	U	2000	P	10/13/2025	19:01	LB137518
	Selenium	9.64	+/-10	U	20.0	P	10/13/2025	19:01	LB137518
	Silver	1.62	+/-5	U	10.0	P	10/13/2025	19:01	LB137518
	Sodium	868	+/-1000	U	2000	P	10/13/2025	19:01	LB137518
	Thallium	4.38	+/-20	U	40.0	P	10/13/2025	19:01	LB137518
	Vanadium	6.26	+/-20	U	40.0	P	10/13/2025	19:01	LB137518
	Zinc	16.7	+/-20	U	40.0	P	10/13/2025	19:01	LB137518
CCB07	Aluminum	12.6	+/-50	J	100	P	10/13/2025	19:50	LB137518
	Antimony	6.76	+/-25	U	50.0	P	10/13/2025	19:50	LB137518
	Arsenic	5.12	+/-10	U	20.0	P	10/13/2025	19:50	LB137518
	Barium	14.6	+/-50	U	100	P	10/13/2025	19:50	LB137518
	Beryllium	0.56	+/-3	U	6.00	P	10/13/2025	19:50	LB137518
	Cadmium	0.50	+/-3	U	6.00	P	10/13/2025	19:50	LB137518
	Calcium	234	+/-1000	U	2000	P	10/13/2025	19:50	LB137518
	Chromium	2.12	+/-5	U	10.0	P	10/13/2025	19:50	LB137518
	Cobalt	2.26	+/-15	U	30.0	P	10/13/2025	19:50	LB137518
	Copper	4.60	+/-10	U	20.0	P	10/13/2025	19:50	LB137518
	Iron	23.4	+/-50	U	100	P	10/13/2025	19:50	LB137518
	Lead	2.30	+/-6	U	12.0	P	10/13/2025	19:50	LB137518
	Magnesium	244	+/-1000	U	2000	P	10/13/2025	19:50	LB137518
	Manganese	5.94	+/-10	U	20.0	P	10/13/2025	19:50	LB137518
	Nickel	3.06	+/-20	U	40.0	P	10/13/2025	19:50	LB137518
	Potassium	918	+/-1000	U	2000	P	10/13/2025	19:50	LB137518
	Selenium	9.64	+/-10	U	20.0	P	10/13/2025	19:50	LB137518
	Silver	1.62	+/-5	U	10.0	P	10/13/2025	19:50	LB137518
	Sodium	868	+/-1000	U	2000	P	10/13/2025	19:50	LB137518
	Thallium	4.38	+/-20	U	40.0	P	10/13/2025	19:50	LB137518
	Vanadium	6.26	+/-20	U	40.0	P	10/13/2025	19:50	LB137518
	Zinc	16.7	+/-20	U	40.0	P	10/13/2025	19:50	LB137518

Metals
- 3b -
PREPARATION BLANK SUMMARY

Client: Langan Engineering and Environmental Servic

SDG No.: Q3323

Instrument: CV1

Sample ID	Analyte	Result (mg/Kg)	Acceptance Limit	Conc Qual	CRQL mg/Kg	M	Analysis Date	Analysis Time	Run
PB170072BL		SOLID		Batch Number:	PB170072		Prep Date:	10/13/2025	
	Mercury	0.0080	<0.014	U	0.014	CV	10/13/2025	14:06	LB137509

Metals
- 3b -
PREPARATION BLANK SUMMARY

Client: Langan Engineering and Environmental Servie

SDG No.: Q3323

Instrument: P4

Sample ID	Analyte	Result (mg/Kg)	Acceptance Limit	Conc Qual	CRQL mg/Kg	M	Analysis Date	Analysis Time	Run
PB170069BL	SOLID			Batch Number:	PB170069		Prep Date:	10/13/2025	
	Aluminum	0.84	<2.5	U	5.00	P	10/13/2025	15:07	LB137518
	Antimony	0.22	<1.25	U	2.50	P	10/13/2025	15:07	LB137518
	Arsenic	0.19	<0.5	U	1.00	P	10/13/2025	15:07	LB137518
	Barium	0.73	<2.5	U	5.00	P	10/13/2025	15:07	LB137518
	Beryllium	0.025	<0.15	U	0.30	P	10/13/2025	15:07	LB137518
	Cadmium	0.024	<0.15	U	0.30	P	10/13/2025	15:07	LB137518
	Calcium	11.1	<50	U	100	P	10/13/2025	15:07	LB137518
	Chromium	0.047	<0.25	U	0.50	P	10/13/2025	15:07	LB137518
	Cobalt	0.10	<0.75	U	1.50	P	10/13/2025	15:07	LB137518
	Copper	0.22	<0.5	U	1.00	P	10/13/2025	15:07	LB137518
	Iron	3.99	<2.5	U	5.00	P	10/13/2025	15:07	LB137518
	Lead	0.13	<0.3	U	0.60	P	10/13/2025	15:07	LB137518
	Magnesium	12.0	<50	U	100	P	10/13/2025	15:07	LB137518
	Manganese	0.14	<0.5	U	1.00	P	10/13/2025	15:07	LB137518
	Nickel	0.13	<1	U	2.00	P	10/13/2025	15:07	LB137518
	Potassium	27.7	<50	U	100	P	10/13/2025	15:07	LB137518
	Selenium	0.26	<0.5	U	1.00	P	10/13/2025	15:07	LB137518
	Silver	0.12	<0.25	U	0.50	P	10/13/2025	15:07	LB137518
	Sodium	17.8	<50	U	100	P	10/13/2025	15:07	LB137518
	Thallium	0.23	<1	U	2.00	P	10/13/2025	15:07	LB137518
	Vanadium	0.25	<1	U	2.00	P	10/13/2025	15:07	LB137518
	Zinc	0.23	<1	U	2.00	P	10/13/2025	15:07	LB137518

Metals
- 4 -
INTERFERENCE CHECK SAMPLE

Client: Langan Engineering and Environmental Services, Ir

SDG No.: Q3323

Contract: LANG01

Lab Code: ACE

ICS Source: EPA

Instrument ID: P4

Sample ID	Analyte	Result ug/L	True Value ug/L	% Recovery	Low Limit (ug/L)	High Limit (ug/L)	Analysis Date	Analysis Time	Run Number
ICSA01	Aluminum	258000	255000	101	216000	294000	10/13/2025	13:04	LB137518
	Antimony	1.12			-50	50	10/13/2025	13:04	LB137518
	Arsenic	12.5			-20	20	10/13/2025	13:04	LB137518
	Barium	6.08	6.0	101	-94	106	10/13/2025	13:04	LB137518
	Beryllium	0.99			-6	6	10/13/2025	13:04	LB137518
	Cadmium	1.68	1.0	168	-5	7	10/13/2025	13:04	LB137518
	Calcium	245000	245000	100	208000	282000	10/13/2025	13:04	LB137518
	Chromium	47.3	52.0	91	42	62	10/13/2025	13:04	LB137518
	Cobalt	2.15			-30	30	10/13/2025	13:04	LB137518
	Copper	15.6	2.0	780	-18	22	10/13/2025	13:04	LB137518
	Iron	100000	101000	99	85600	116500	10/13/2025	13:04	LB137518
	Lead	-2.87			-12	12	10/13/2025	13:04	LB137518
	Magnesium	261000	255000	102	216000	294000	10/13/2025	13:04	LB137518
	Manganese	7.87	7.0	112	-13	27	10/13/2025	13:04	LB137518
	Nickel	3.34	2.0	167	-38	42	10/13/2025	13:04	LB137518
	Potassium	-50.1			0	0	10/13/2025	13:04	LB137518
	Selenium	13.3			-20	20	10/13/2025	13:04	LB137518
	Silver	-1.68			-10	10	10/13/2025	13:04	LB137518
	Sodium	33.4			0	0	10/13/2025	13:04	LB137518
	Thallium	25.5			-40	40	10/13/2025	13:04	LB137518
	Vanadium	7.08			-40	40	10/13/2025	13:04	LB137518
	Zinc	3.18			-40	40	10/13/2025	13:04	LB137518
ICSAB01	Aluminum	251000	247000	102	209000	285000	10/13/2025	13:08	LB137518
	Antimony	599	618	97	525	711	10/13/2025	13:08	LB137518
	Arsenic	115	104	111	88.4	120	10/13/2025	13:08	LB137518
	Barium	495	537	92	437	637	10/13/2025	13:08	LB137518
	Beryllium	518	495	105	420	570	10/13/2025	13:08	LB137518
	Cadmium	1000	972	103	826	1120	10/13/2025	13:08	LB137518
	Calcium	237000	235000	101	199000	271000	10/13/2025	13:08	LB137518
	Chromium	558	542	103	460	624	10/13/2025	13:08	LB137518
	Cobalt	505	476	106	404	548	10/13/2025	13:08	LB137518
	Copper	491	511	96	434	588	10/13/2025	13:08	LB137518
	Iron	101000	99300	102	84400	114500	10/13/2025	13:08	LB137518
	Lead	45.6	49.0	93	37	61	10/13/2025	13:08	LB137518
	Magnesium	254000	248000	102	210000	286000	10/13/2025	13:08	LB137518
	Manganese	497	507	98	430	584	10/13/2025	13:08	LB137518
	Nickel	1000	954	105	810	1100	10/13/2025	13:08	LB137518
	Potassium	-50.1			0	0	10/13/2025	13:08	LB137518
	Selenium	59.2	46.0	129	26	66	10/13/2025	13:08	LB137518
	Silver	211	201	105	170	232	10/13/2025	13:08	LB137518
	Sodium	35.6			0	0	10/13/2025	13:08	LB137518
	Thallium	133	108	123	68	148	10/13/2025	13:08	LB137518

Metals

- 4 -

INTERFERENCE CHECK SAMPLE

Client: Langan Engineering and Environmental Services, Ir

SDG No.: Q3323

Contract: LANG01

Lab Code: ACE

ICS Source: EPA

Instrument ID: P4

Sample ID	Analyte	Result ug/L	True Value ug/L	% Recovery	Low Limit (ug/L)	High Limit (ug/L)	Analysis Date	Analysis Time	Run Number
ICSAB01	Vanadium	492	491	100	417	565	10/13/2025	13:08	LB137518
	Zinc	1070	952	112	809	1095	10/13/2025	13:08	LB137518



METAL

QC

DATA

metals
- 5a -
MATRIX SPIKE SUMMARY

client: Langan Engineering and Environmental Services, Inc. **level:** low **sdg no.:** Q3323
contract: LANG01 **lab code:** ACE
matrix: Solid **sample id:** Q3327-01 **client id:** HADLEY-ROAD-TPMS
Percent Solids for Sample: 88.2 **Spiked ID:** Q3327-01MS **Percent Solids for Spike Sample:** 88.2

Analyte	Units	Acceptance Limit %R	Spiked Result	C	Sample Result	C	Spike Added	% Recovery	Qual	M
Aluminum	mg/Kg	75 - 125	12300		12200		94.5	178		P
Antimony	mg/Kg	75 - 125	23.9		2.31	U	37.8	63	N	P
Arsenic	mg/Kg	75 - 125	28.6		3.70		37.8	66	N	P
Barium	mg/Kg	75 - 125	90.3		85.7		9.4	49		P
Beryllium	mg/Kg	75 - 125	7.60		1.01		9.4	70	N	P
Cadmium	mg/Kg	75 - 125	10.4		1.34		9.4	96		P
Calcium	mg/Kg	75 - 125	1740		1730		47.2	36		P
Chromium	mg/Kg	75 - 125	33.5		20.9		18.9	67	N	P
Cobalt	mg/Kg	75 - 125	32.9		26.4		9.4	69	N	P
Copper	mg/Kg	75 - 125	33.7		23.9		14.2	69	N	P
Iron	mg/Kg	75 - 125	29800		30700		140	-631		P
Lead	mg/Kg	75 - 125	71.0		26.0		47.2	95		P
Magnesium	mg/Kg	75 - 125	5930		5820		94.5	113		P
Manganese	mg/Kg	75 - 125	790		825		9.4	-381		P
Mercury	mg/Kg	80 - 120	0.25		0.013	J	0.28	85		CV
Nickel	mg/Kg	75 - 125	61.3		40.9		23.6	86		P
Potassium	mg/Kg	75 - 125	2390		2160		470	49		P
Selenium	mg/Kg	75 - 125	62.4		0.51	J	94.5	65	N	P
Silver	mg/Kg	75 - 125	1.69		0.46	U	3.5	48	N	P
Sodium	mg/Kg	75 - 125	1110		1050		140	47		P
Thallium	mg/Kg	75 - 125	81.5		0.23	J	94.5	86		P
Vanadium	mg/Kg	75 - 125	39.2		29.2		14.2	71	N	P
Zinc	mg/Kg	75 - 125	69.0		66.1		9.4	31		P

metals
- 5a -
MATRIX SPIKE DUPLICATE SUMMARY

client: Langan Engineering and Environmental Services, Inc. **level:** low **sdg no.:** Q3323
contract: LANG01 **lab code:** ACE
matrix: Solid **sample id:** Q3327-01 **client id:** HADLEY-ROAD-TPMSD
Percent Solids for Sample: 88.2 **Spiked ID:** Q3327-01MSD **Percent Solids for Spike Sample:** 88.2

Analyte	Units	Acceptance Limit %R	MSD Result	C	Sample Result	C	Spike Added	% Recovery	Qual	M
Aluminum	mg/Kg	75 - 125	11900		12200		98.6	-279		P
Antimony	mg/Kg	75 - 125	25.8		2.31	U	39.4	66	N	P
Arsenic	mg/Kg	75 - 125	30.5		3.70		39.4	68	N	P
Barium	mg/Kg	75 - 125	90.9		85.7		9.9	52		P
Beryllium	mg/Kg	75 - 125	8.02		1.01		9.9	71	N	P
Cadmium	mg/Kg	75 - 125	10.4		1.34		9.9	92		P
Calcium	mg/Kg	75 - 125	1740		1730		49.3	19		P
Chromium	mg/Kg	75 - 125	35.4		20.9		19.7	74	N	P
Cobalt	mg/Kg	75 - 125	31.3		26.4		9.9	49	N	P
Copper	mg/Kg	75 - 125	35.4		23.9		14.8	78		P
Iron	mg/Kg	75 - 125	31200		30700		150	368		P
Lead	mg/Kg	75 - 125	75.3		26.0		49.3	100		P
Magnesium	mg/Kg	75 - 125	5830		5820		98.6	10		P
Manganese	mg/Kg	75 - 125	752		825		9.9	-744		P
Mercury	mg/Kg	80 - 120	0.27		0.013	J	0.29	89		CV
Nickel	mg/Kg	75 - 125	61.0		40.9		24.6	82		P
Potassium	mg/Kg	75 - 125	2510		2160		490	71		P
Selenium	mg/Kg	75 - 125	66.6		0.51	J	98.6	67	N	P
Silver	mg/Kg	75 - 125	2.02		0.46	U	3.7	55	N	P
Sodium	mg/Kg	75 - 125	1180		1050		150	86		P
Thallium	mg/Kg	75 - 125	84.9		0.23	J	98.6	86		P
Vanadium	mg/Kg	75 - 125	39.8		29.2		14.8	72	N	P
Zinc	mg/Kg	75 - 125	71.5		66.1		9.9	55		P

Metals
- 5b -
POST DIGEST SPIKE SUMMARY

Client: <u>Langan Engineering and Environmental Sei</u>	SDG No.: <u>Q3323</u>	
Contract: <u>LANG01</u>	Lab Code: <u>ACE</u>	
Matrix: <u>Solid</u>	Level: <u>LOW</u>	Client ID: <u>HADLEY-ROAD-TPA</u>
Sample ID: <u>Q3327-01</u>	Spiked ID: <u>Q3327-01A</u>	

Analyte	Units	Acceptance Limit %R	Spiked Result	C	Sample Result	C	Spike Added	% Recovery	Qual	M
Antimony	mg/Kg	75 - 125	24.0		2.31	U	37.0	65	N	P
Arsenic	mg/Kg	75 - 125	28.7		3.70		37.0	67	N	P
Beryllium	mg/Kg	75 - 125	7.48		1.01		9.30	70	N	P
Chromium	mg/Kg	75 - 125	33.1		20.9		18.5	66	N	P
Cobalt	mg/Kg	75 - 125	34.2		26.4		9.30	84		P
Copper	mg/Kg	75 - 125	34.4		23.9		13.9	76		P
Selenium	mg/Kg	75 - 125	61.9		0.51	J	92.6	66	N	P
Silver	mg/Kg	75 - 125	1.56		0.46	U	3.50	45	N	P
Vanadium	mg/Kg	75 - 125	38.4		29.2		13.9	66	N	P

Metals

- 6 -

DUPLICATE SAMPLE SUMMARY

Client: Langan Engineering and Environmental Sei **Level:** LOW **SDG No.:** Q3323
Contract: LANG01 **Lab Code:** ACE
Matrix: Solid **Sample ID:** Q3327-01 **Client ID:** HADLEY-ROAD-TPDUP
Percent Solids for Sample: 88.2 **Duplicate ID** Q3327-01DUP **Percent Solids for Spike Sample:** 88.2

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M
Aluminum	mg/Kg	20	12200		13600		11		P
Antimony	mg/Kg	20	2.31	U	2.58	U			P
Arsenic	mg/Kg	20	3.70		4.17		12		P
Barium	mg/Kg	20	85.7		92.2		7		P
Beryllium	mg/Kg	20	1.01		1.12		10		P
Cadmium	mg/Kg	20	1.34		1.60		18		P
Calcium	mg/Kg	20	1730		1890		9		P
Chromium	mg/Kg	20	20.9		23.1		10		P
Cobalt	mg/Kg	20	26.4		29.0		9		P
Copper	mg/Kg	20	23.9		27.4		14		P
Iron	mg/Kg	20	30700		32500		6		P
Lead	mg/Kg	20	26.0		28.7		10		P
Magnesium	mg/Kg	20	5820		6480		11		P
Manganese	mg/Kg	20	825		891		8		P
Mercury	mg/Kg	20	0.013	J	0.012	J	8		CV
Nickel	mg/Kg	20	40.9		45.0		10		P
Potassium	mg/Kg	20	2160		2290		6		P
Selenium	mg/Kg	20	0.51	J	0.58	J	13		P
Silver	mg/Kg	20	0.46	U	0.52	U			P
Sodium	mg/Kg	20	1050		1070		2		P
Thallium	mg/Kg	20	0.23	J	0.49	J	71		P
Vanadium	mg/Kg	20	29.2		32.3		10		P
Zinc	mg/Kg	20	66.1		70.2		6		P

Metals

- 6 -

DUPLICATE SAMPLE SUMMARY

Client: Langan Engineering and Environmental Sei **Level:** LOW **SDG No.:** Q3323
Contract: LANG01 **Lab Code:** ACE
Matrix: Solid **Sample ID:** Q3327-01MS **Client ID:** HADLEY-ROAD-TPMSD
Percent Solids for Sample: 88.2 **Duplicate ID** Q3327-01MSD **Percent Solids for Spike Sample:** 88.2

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M
Aluminum	mg/Kg	20	12300		11900		3		P
Antimony	mg/Kg	20	23.9		25.8		8		P
Arsenic	mg/Kg	20	28.6		30.5		6		P
Barium	mg/Kg	20	90.3		90.9		1		P
Beryllium	mg/Kg	20	7.60		8.02		5		P
Cadmium	mg/Kg	20	10.4		10.4		0		P
Calcium	mg/Kg	20	1740		1740		0		P
Chromium	mg/Kg	20	33.5		35.4		6		P
Cobalt	mg/Kg	20	32.9		31.3		5		P
Copper	mg/Kg	20	33.7		35.4		5		P
Iron	mg/Kg	20	29800		31200		5		P
Lead	mg/Kg	20	71.0		75.3		6		P
Magnesium	mg/Kg	20	5930		5830		2		P
Manganese	mg/Kg	20	790		752		5		P
Mercury	mg/Kg	20	0.25		0.27		8		CV
Nickel	mg/Kg	20	61.3		61.0		0		P
Potassium	mg/Kg	20	2390		2510		5		P
Selenium	mg/Kg	20	62.4		66.6		7		P
Silver	mg/Kg	20	1.69		2.02		18		P
Sodium	mg/Kg	20	1110		1180		6		P
Thallium	mg/Kg	20	81.5		84.9		4		P
Vanadium	mg/Kg	20	39.2		39.8		2		P
Zinc	mg/Kg	20	69.0		71.5		4		P

Metals

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LABORATORY CONTROL SAMPLE SUMMARY

Client: Langan Engineering and Environmental Sei

SDG No.: Q3323

Contract: LANG01

Lab Code: ACE

Analyte	Units	True Value	Result	C	% Recovery	Acceptance Limits	M
PB170069BS							
Aluminum	mg/Kg	100	100		100	80 - 120	P
Antimony	mg/Kg	40.0	40.4		101	80 - 120	P
Arsenic	mg/Kg	40.0	39.8		100	80 - 120	P
Barium	mg/Kg	10.0	9.94		99	80 - 120	P
Beryllium	mg/Kg	10.0	10.4		104	80 - 120	P
Cadmium	mg/Kg	10.0	9.68		97	80 - 120	P
Calcium	mg/Kg	50.0	51.0	J	102	80 - 120	P
Chromium	mg/Kg	20.0	20.9		104	80 - 120	P
Cobalt	mg/Kg	10.0	9.84		98	80 - 120	P
Copper	mg/Kg	15.0	15.7		105	80 - 120	P
Iron	mg/Kg	150	151		101	80 - 120	P
Lead	mg/Kg	50.0	47.8		96	80 - 120	P
Magnesium	mg/Kg	100	100		100	80 - 120	P
Manganese	mg/Kg	10.0	10.1		101	80 - 120	P
Nickel	mg/Kg	25.0	24.8		99	80 - 120	P
Potassium	mg/Kg	500	484		97	80 - 120	P
Selenium	mg/Kg	100	100		100	80 - 120	P
Silver	mg/Kg	3.8	3.65		96	80 - 120	P
Sodium	mg/Kg	150	141		94	80 - 120	P
Thallium	mg/Kg	100	117		117	80 - 120	P
Vanadium	mg/Kg	15.0	15.1		101	80 - 120	P
Zinc	mg/Kg	10.0	10.8		108	80 - 120	P

Metals

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LABORATORY CONTROL SAMPLE SUMMARY

Client: Langan Engineering and Environmental Sei

SDG No.: Q3323

Contract: LANG01

Lab Code: ACE

Analyte	Units	True Value	Result	C	% Recovery	Acceptance Limits	M
PB170072BS Mercury	mg/Kg	0.28	0.25		88	80 - 120	CV

Metals
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ICP SERIAL DILUTIONS

SAMPLE NO.

HADLEY-ROAD-TPL

Lab Name: Alliance Contract: LANG01
Lab Code: ACE Lb No.: lb137518 Lab Sample ID : Q3327-01L SDG No.: Q3323
Matrix (soil/water): Solid Level (low/med): LOW
Concentration Units: mg/Kg

Analyte	Initial Sample Result (I)		Serial Dilution Result (S)		% Differ-ence		Q	M
		C		C				
Aluminum		12200		15500		27		P
Antimony		2.31	U	11.6	U			P
Arsenic		3.70		4.20	J	14		P
Barium		85.7		104		21		P
Beryllium		1.01		1.35	J	34		P
Cadmium		1.34		0.24	J	82		P
Calcium		1730		2270		32		P
Chromium		20.9		28.8		38		P
Cobalt		26.4		23.7		10		P
Copper		23.9		34.3		44		P
Iron		30700		38000		24		P
Lead		26.0		24.4		6		P
Magnesium		5820		7650		31		P
Manganese		825		1050		27		P
Mercury		0.013	J	0.071	U	100.0		CV
Nickel		40.9		38.1		7		P
Potassium		2160		2400		11		P
Selenium		0.51	J	4.63	U	100.0		P
Silver		0.46	U	2.31	U			P
Sodium		1050		1100		5		P
Thallium		0.23	J	9.26	U	100.0		P
Vanadium		29.2		38.2		31		P
Zinc		66.1		82.0		24		P



METAL PREPARATION & INSTRUMENT DATA

Metals

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ICP INTERELEMENT CORRECTION FACTORS

Client: Langan Engineering and Environmental Sei

SDG No.: Q3323

Contract: LANG01

Lab Code: ACE

Instrument ID: _____

Date: _____

Interelement Correction Factors (apparent ppb analyte/ppm interferent)

Analyte	Wave- Length (nm)	ICP Interelement Correction Factors For:				
		Al	Ca	Fe	Mg	Ag
Aluminum	396.100	0.0000000	-0.0002060	0.0000000	0.0000000	0.0000000
Antimony	206.833	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Arsenic	193.759	0.0000000	0.0000000	-0.0000440	0.0000000	0.0000000
Barium	493.409	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Beryllium	234.861	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Cadmium	226.502	0.0000000	0.0000000	0.0000930	0.0000000	0.0000000
Calcium	373.690	0.0000000	0.0000000	-0.0075970	0.0000000	0.0000000
Chromium	267.716	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Cobalt	228.616	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Copper	224.700	0.0000000	0.0000000	0.0007850	0.0000000	0.0000000
Iron	240.488	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Lead	220.353	-0.0000920	0.0000000	0.0000380	0.0000000	0.0000000
Magnesium	279.079	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Manganese	257.610	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Nickel	231.604	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Potassium	766.490	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Selenium	196.090	0.0000000	0.0000000	-0.0001440	0.0000000	0.0000000
Silver	328.068	0.0000000	0.0000000	-0.0001490	0.0000000	0.0000000
Sodium	589.592	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Thallium	190.856	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Vanadium	292.402	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Zinc	213.800	0.0000000	0.0000000	0.0001050	0.0000000	0.0000000

Metals

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ICP INTERELEMENT CORRECTION FACTORS

Client: Langan Engineering and Environmental Sei

SDG No.: Q3323

Contract: LANG01

Lab Code: ACE

Instrument ID: _____

Date: _____

Interelement Correction Factors (apparent ppb analyte/ppm interferent)

Analyte	Wave- Length (nm)	ICP Interelement Correction Factors For:				
		As	Ba	Be	Cd	Co
Aluminum	396.100	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Antimony	206.833	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Arsenic	193.759	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Barium	493.409	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Beryllium	234.861	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Cadmium	226.502	0.0000000	0.0000000	0.0000000	0.0000000	0.0002870
Calcium	373.690	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Chromium	267.716	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Cobalt	228.616	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Copper	224.700	0.0000000	0.0000000	0.0000000	0.0000000	0.0009530
Iron	240.488	0.0000000	0.0000000	0.0000000	0.0000000	-0.0039600
Lead	220.353	0.0000000	0.0003170	0.0000000	0.0000000	0.0000000
Magnesium	279.079	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Manganese	257.610	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Nickel	231.604	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Potassium	766.490	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Selenium	196.090	0.0000000	0.0000000	0.0000000	0.0000000	-0.0003570
Silver	328.068	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Sodium	589.592	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Thallium	190.856	0.0000000	0.0000000	0.0000000	0.0000000	0.0054900
Vanadium	292.402	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Zinc	213.800	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000

Metals

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ICP INTERELEMEN CORRECTION FACTORS

Client: Langan Engineering and Environmental Sei

SDG No.: Q3323

Contract: LANG01

Lab Code: ACE

Instrument ID: _____

Date: _____

Interement Correction Factors (apparent ppb analyte/ppm interferent)

Analyte	Wave- Length (nm)	ICP Interement Correction Factors For:				
		Cr	Cu	K	Mn	Mo
Aluminum	396.100	0.0000000	0.0000000	0.0000590	0.0000000	0.0396900
Antimony	206.833	0.0122000	0.0000000	0.0000000	0.0000000	0.0000000
Arsenic	193.759	-0.0029000	0.0000000	0.0000000	0.0000000	0.0004900
Barium	493.409	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Beryllium	234.861	0.0000000	0.0000000	0.0000000	-0.0000710	-0.0003400
Cadmium	226.502	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Calcium	373.690	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Chromium	267.716	0.0000000	0.0000000	0.0000070	0.0002200	0.0000000
Cobalt	228.616	0.0000000	0.0000000	0.0000000	0.0000000	-0.0007860
Copper	224.700	0.0000000	0.0000000	0.0000000	0.0006510	0.0020500
Iron	240.488	0.0000000	0.0000000	0.0000730	0.0000000	-0.0015250
Lead	220.353	0.0000000	0.0000000	0.0000000	0.0001400	-0.0008600
Magnesium	279.079	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Manganese	257.610	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Nickel	231.604	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Potassium	766.490	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Selenium	196.090	0.0000000	0.0000000	0.0000000	0.0007460	0.0000000
Silver	328.068	0.0000000	0.0000000	0.0000000	0.0000000	-0.0000120
Sodium	589.592	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Thallium	190.856	0.0000000	0.0000000	0.0000000	0.0017400	-0.0100400
Vanadium	292.402	-0.0025100	0.0000000	0.0000000	0.0000000	-0.0072000
Zinc	213.800	0.0000000	0.0009010	0.0000000	0.0000000	0.0000000

Metals

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ICP INTERELEMENT CORRECTION FACTORS

Client: Langan Engineering and Environmental Sei

SDG No.: Q3323

Contract: LANG01

Lab Code: ACE

Instrument ID: _____

Date: _____

Interelement Correction Factors (apparent ppb analyte/ppm interferent)

Analyte	Wave- Length (nm)	ICP Interelement Correction Factors For:				
		Na	Ni	Pb	Sb	Se
Aluminum	396.100	0.0000000	0.0000000	0.0012800	0.0000000	0.0000000
Antimony	206.833	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Arsenic	193.759	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Barium	493.409	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Beryllium	234.861	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Cadmium	226.502	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Calcium	373.690	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Chromium	267.716	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Cobalt	228.616	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Copper	224.700	0.0000000	-0.0047000	0.0036100	0.0000000	0.0000000
Iron	240.488	0.0000000	-0.0017000	0.0000000	0.0000000	0.0000000
Lead	220.353	0.0000000	0.0006580	0.0000000	0.0000000	0.0001290
Magnesium	279.079	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Manganese	257.610	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Nickel	231.604	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Potassium	766.490	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Selenium	196.090	0.0000000	0.0000000	0.0003330	0.0000000	0.0000000
Silver	328.068	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Sodium	589.592	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Thallium	190.856	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Vanadium	292.402	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Zinc	213.800	0.0000000	0.0067600	0.0000000	0.0000000	0.0000000

Metals

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ICP INTERELEMENT CORRECTION FACTORS

Client: Langan Engineering and Environmental Sei

SDG No.: Q3323

Contract: LANG01

Lab Code: ACE

Instrument ID: _____

Date: _____

Interelement Correction Factors (apparent ppb analyte/ppm interferent)

Analyte	Wave- Length (nm)	ICP Interelement Correction Factors For:				
		Sn	Ti	Tl	V	Zn
Aluminum	396.100	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Antimony	206.833	-0.0035600	-0.0007970	0.0000000	-0.0018900	0.0000000
Arsenic	193.759	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Barium	493.409	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Beryllium	234.861	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Cadmium	226.502	0.0000000	0.0000630	0.0001280	0.0000000	0.0000000
Calcium	373.690	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Chromium	267.716	0.0000000	0.0000000	0.0000000	0.0001110	0.0000000
Cobalt	228.616	0.0000000	0.0018800	0.0000000	0.0000000	0.0000000
Copper	224.700	0.0000000	0.0003840	0.0000000	0.0000000	0.0000000
Iron	240.488	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Lead	220.353	0.0000000	-0.0003610	0.0000000	0.0000000	0.0000000
Magnesium	279.079	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Manganese	257.610	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Nickel	231.604	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Potassium	766.490	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Selenium	196.090	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Silver	328.068	0.0000000	-0.0007420	0.0000000	0.0000000	0.0000000
Sodium	589.592	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Thallium	190.856	0.0000000	-0.0039700	0.0000000	-0.0115600	0.0000000
Vanadium	292.402	0.0000000	0.0005320	0.0000000	0.0000000	0.0000000
Zinc	213.800	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000



METAL PREPARATION & ANALYICAL SUMMARY

Metals

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SAMPLE PREPARATION SUMMARY

Client: Langan Engineering and Environmental Services, Inc. **SDG No.:** Q3323

Contract: LANG01 **Lab Code:** ACE **Method:**

Sample ID	Client ID	Sample Type	Matrix	Prep Date	Initial Sample Size(g)	Final Sample Volume (mL)	Percent Solids
Batch Number: PB170069							
PB170069BL	PB170069BL	MB	SOLID	10/13/2025	2.00	100.0	100.00
PB170069BS	PB170069BS	LCS	SOLID	10/13/2025	2.00	100.0	100.00
Q3323-01	SED-01-0-2	SAM	SOLID	10/13/2025	2.10	100.0	66.80
Q3323-02	SED-02-0-2	SAM	SOLID	10/13/2025	2.26	100.0	57.30
Q3323-03	SED-03-0-2	SAM	SOLID	10/13/2025	2.36	100.0	71.60
Q3323-04	SED-04-0-2	SAM	SOLID	10/13/2025	2.42	100.0	70.20
Q3323-05	SED-05-0-2	SAM	SOLID	10/13/2025	2.30	100.0	77.40
Q3323-06	SED-06-0-2	SAM	SOLID	10/13/2025	2.26	100.0	80.80
Q3323-07	SED-07-0-2	SAM	SOLID	10/13/2025	2.26	100.0	81.20
Q3327-01DUP	HADLEY-ROAD-TPDUP	DUP	SOLID	10/13/2025	2.20	100.0	88.20
Q3327-01MS	HADLEY-ROAD-TPMS	MS	SOLID	10/13/2025	2.40	100.0	88.20
Q3327-01MSD	HADLEY-ROAD-TPMSD	MSD	SOLID	10/13/2025	2.30	100.0	88.20

Metals

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SAMPLE PREPARATION SUMMARY

Client: Langan Engineering and Environmental Services, Inc. **SDG No.:** Q3323

Contract: LANG01 **Lab Code:** ACE **Method:**

Sample ID	Client ID	Sample Type	Matrix	Prep Date	Initial Sample Size(g)	Final Sample Volume (mL)	Percent Solids
Batch Number: PB170072							
PB170072BL	PB170072BL	MB	SOLID	10/13/2025	0.50	35.0	100.00
PB170072BS	PB170072BS	LCS	SOLID	10/13/2025	0.50	35.0	100.00
Q3323-01	SED-01-0-2	SAM	SOLID	10/13/2025	0.54	35.0	66.80
Q3323-02	SED-02-0-2	SAM	SOLID	10/13/2025	0.57	35.0	57.30
Q3323-03	SED-03-0-2	SAM	SOLID	10/13/2025	0.52	35.0	71.60
Q3323-04	SED-04-0-2	SAM	SOLID	10/13/2025	0.57	35.0	70.20
Q3323-05	SED-05-0-2	SAM	SOLID	10/13/2025	0.56	35.0	77.40
Q3323-06	SED-06-0-2	SAM	SOLID	10/13/2025	0.53	35.0	80.80
Q3323-07	SED-07-0-2	SAM	SOLID	10/13/2025	0.57	35.0	81.20
Q3327-01DUP	HADLEY-ROAD-TPDUP	DUP	SOLID	10/13/2025	0.55	35.0	88.20
Q3327-01MS	HADLEY-ROAD-TPMS	MS	SOLID	10/13/2025	0.56	35.0	88.20
Q3327-01MSD	HADLEY-ROAD-TPMSD	MSD	SOLID	10/13/2025	0.54	35.0	88.20

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ANALYSIS RUN LOG

Client: Langan Engineering and Environmental Sei

Contract: LANG01

Lab code: ACE

Sdg no.: Q3323

Instrument id number: _____

Method: _____

Run number: LB137509

Start date: 10/13/2025

End date: 10/13/2025

Lab sample id.	Client Sample Id	d/f	Time	Parameter list
S0	S0	1	1327	HG
S0.2	S0.2	1	1330	HG
S2.5	S2.5	1	1332	HG
S5	S5	1	1334	HG
S7.5	S7.5	1	1337	HG
S10	S10	1	1343	HG
ICV68	ICV68	1	1349	HG
ICB68	ICB68	1	1351	HG
CCV19	CCV19	1	1354	HG
CCB19	CCB19	1	1356	HG
CRA	CRA	1	1358	HG
PB170072BL	PB170072BL	1	1406	HG
PB170072BS	PB170072BS	1	1411	HG
Q3323-01	SED-01-0-2	1	1419	HG
Q3323-02	SED-02-0-2	1	1421	HG
Q3323-03	SED-03-0-2	1	1424	HG
CCV20	CCV20	1	1427	HG
CCB20	CCB20	1	1429	HG
Q3323-04	SED-04-0-2	1	1432	HG
Q3323-05	SED-05-0-2	1	1434	HG
Q3323-06	SED-06-0-2	1	1437	HG
Q3323-07	SED-07-0-2	1	1440	HG
Q3327-01DUP	HADLEY-ROAD-TPDUP	1	1449	HG
Q3327-01MS	HADLEY-ROAD-TPMS	1	1452	HG
Q3327-01MSD	HADLEY-ROAD-TPMSD	1	1454	HG
CCV21	CCV21	1	1457	HG
CCB21	CCB21	1	1459	HG
Q3327-01L	HADLEY-ROAD-TPL	5	1504	HG
CCV22	CCV22	1	1509	HG
CCB22	CCB22	1	1511	HG

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ANALYSIS RUN LOG

Client: Langan Engineering and Environmental Sei

Contract: LANG01

Lab code: ACE

Sdg no.: Q3323

Instrument id number:

Method:

Run number: LB137518

Start date: 10/13/2025

End date: 10/13/2025

Lab sample id.	Client Sample Id	d/f	Time	Parameter list
S0	S0	1	1212	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
S1	S1	1	1217	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
S2	S2	1	1221	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
S3	S3	1	1225	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
S4	S4	1	1229	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
S5	S5	1	1233	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
ICV01	ICV01	1	1246	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
LLICV01	LLICV01	1	1251	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
ICB01	ICB01	1	1255	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
CRI01	CRI01	1	1300	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
ICSA01	ICSA01	1	1304	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
ICSAB01	ICSAB01	1	1308	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
ICSA01	ICSA01	20	1312	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
ICSAB01	ICSAB01	20	1316	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
CCV01	CCV01	1	1321	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
CCB01	CCB01	1	1325	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
CCV02	CCV02	1	1418	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
CCB02	CCB02	1	1422	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
PB170069BL	PB170069BL	1	1507	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
PB170069BS	PB170069BS	1	1518	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
Q3323-01	SED-01-0-2	1	1522	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
Q3323-02	SED-02-0-2	1	1526	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V
Q3323-03	SED-03-0-2	1	1531	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
Q3323-04	SED-04-0-2	1	1535	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
Q3323-05	SED-05-0-2	1	1539	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
Q3323-06	SED-06-0-2	1	1543	Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
Q3323-07	SED-07-0-2	1	1547	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
CCV03	CCV03	1	1604	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
CCB03	CCB03	1	1608	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
Q3327-01DUP	HADLEY-ROAD-TPDUP	1	1620	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
Q3327-01L	HADLEY-ROAD-TPL	5	1625	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
Q3327-01MS	HADLEY-ROAD-TPMS	1	1629	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
Q3327-01MSD	HADLEY-ROAD-TPMSD	1	1633	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
Q3327-01A	HADLEY-ROAD-TPA	1	1637	Ag,As,Be,Co,Cr,Cu,Sb,Se,V
Q3323-02	SED-02-0-2	5	1642	Zn
CCV04	CCV04	1	1702	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
CCB04	CCB04	1	1706	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
CCV05	CCV05	1	1811	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
CCB05	CCB05	1	1815	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
CCV06	CCV06	1	1856	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
CCB06	CCB06	1	1901	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn

metals
- 14 -
ANALYSIS RUN LOG

Client: Langan Engineering and Environmental Sei

Contract: LANG01

Lab code: ACE

Sdg no.: Q3323

Instrument id number: _____

Method: _____

Run number: LB137518

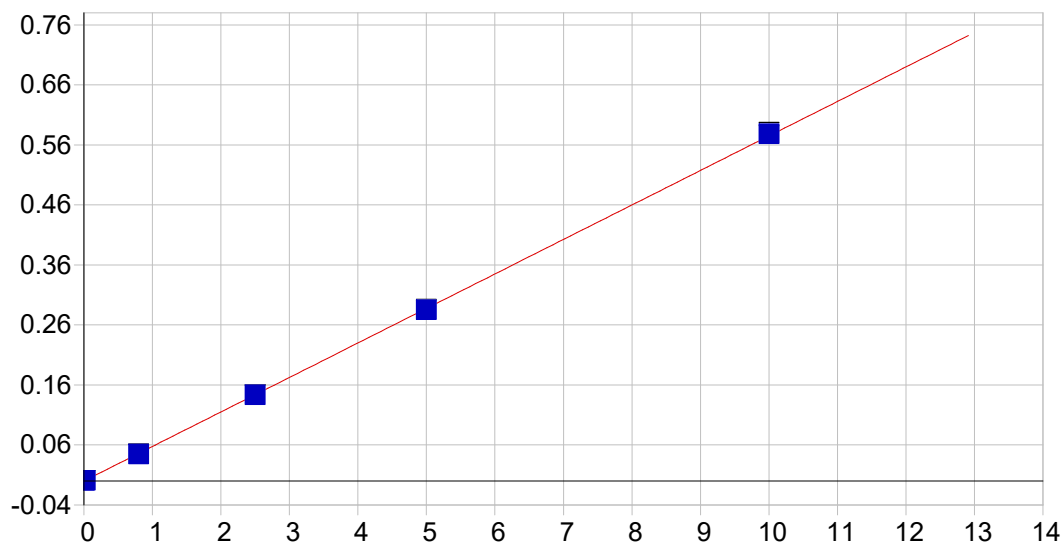
Start date: 10/13/2025

End date: 10/13/2025

Lab sample id.	Client Sample Id	d/f	Time	Parameter list
Q3323-06	SED-06-0-2	5	1905	Ag,Fe
Q3323-07	SED-07-0-2	5	1909	Fe
CCV07	CCV07	1	1946	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn
CCB07	CCB07	1	1950	Ag,Al,As,Ba,Be,Ca,Cd,Co,Cr,Cu,Fe,K,Mg,Mn,Na,Ni,Pb,Sb,Se,Tl,V,Zn



METAL RAW DATA

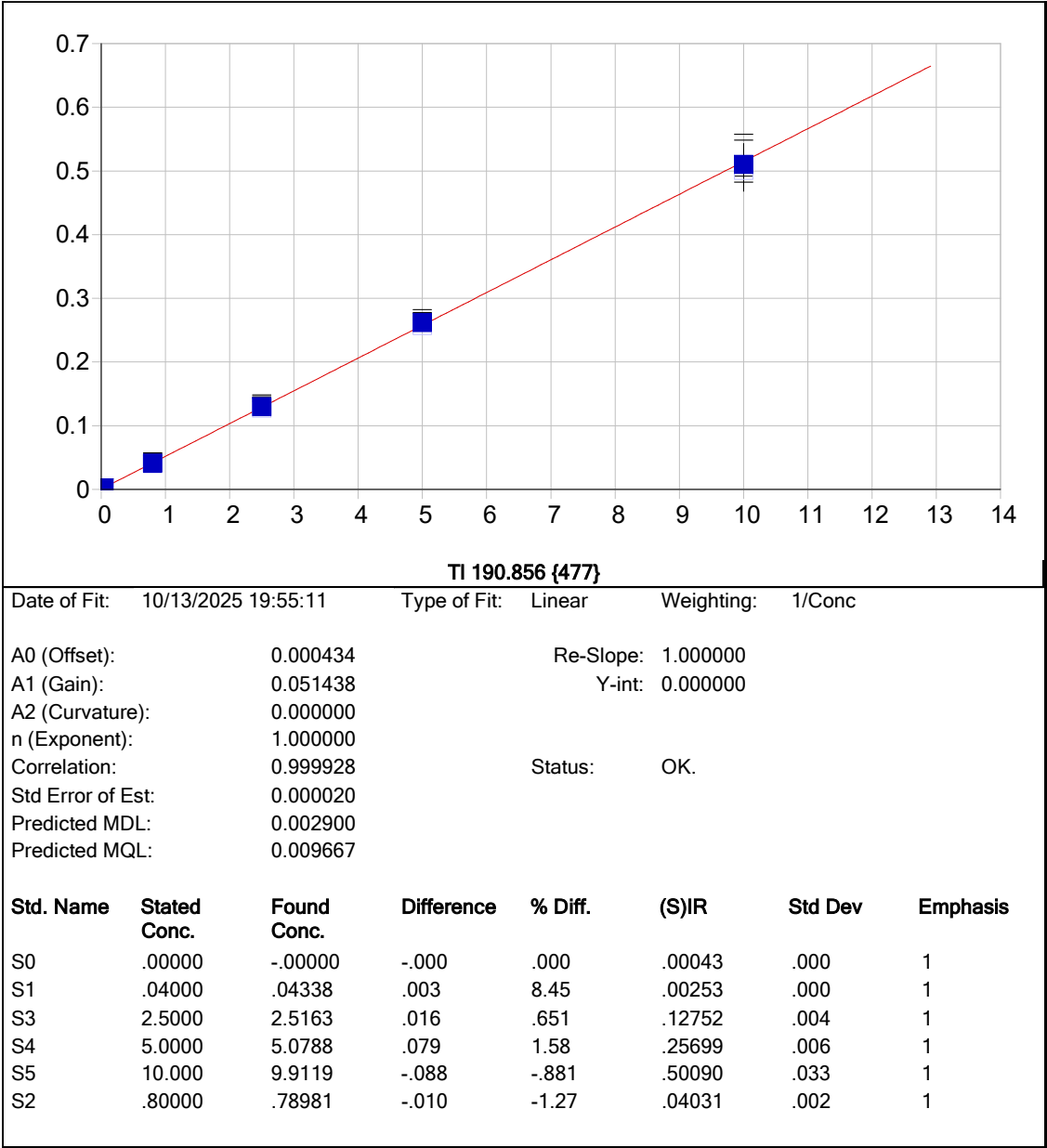


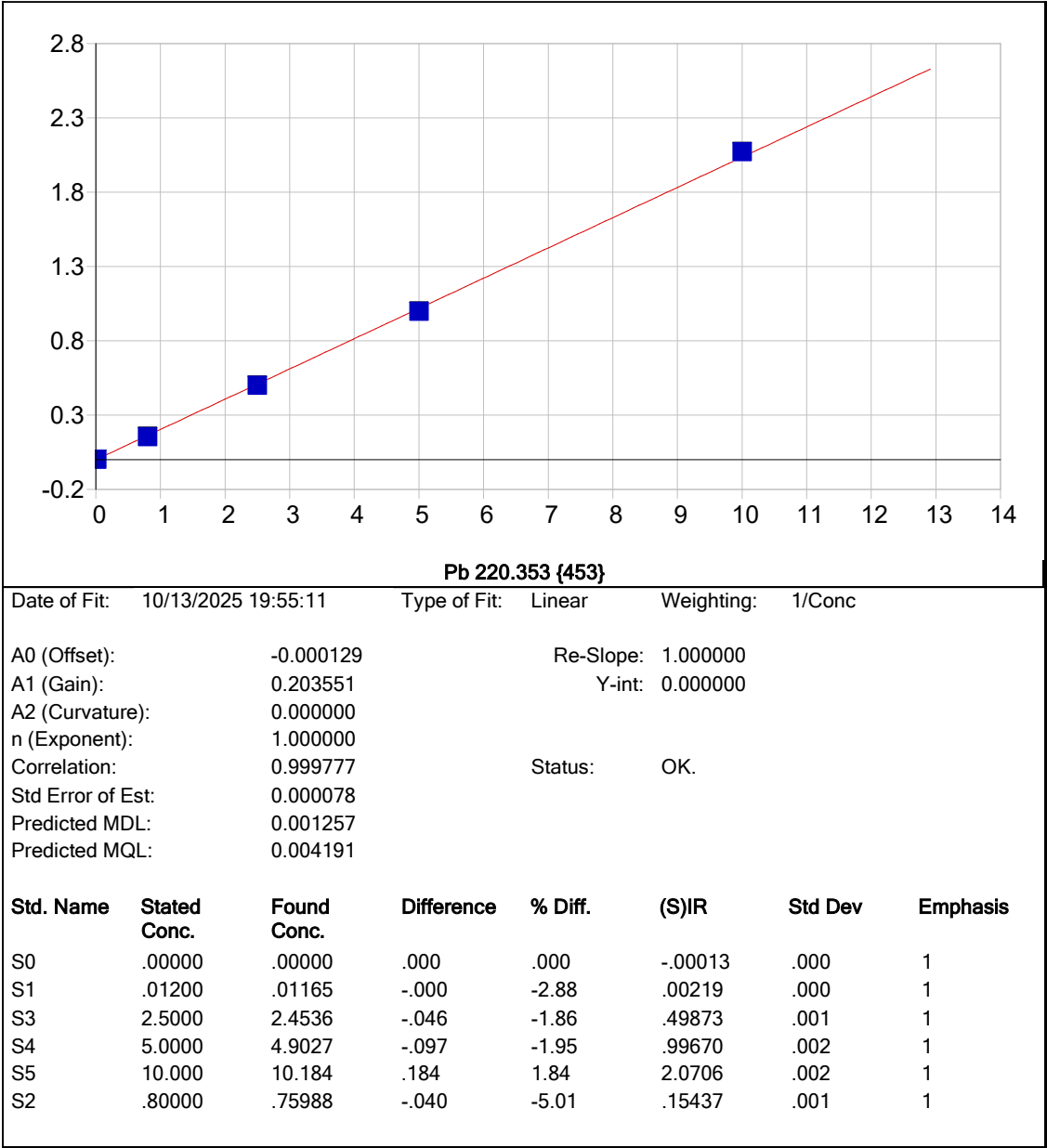
As 189.042 {479}

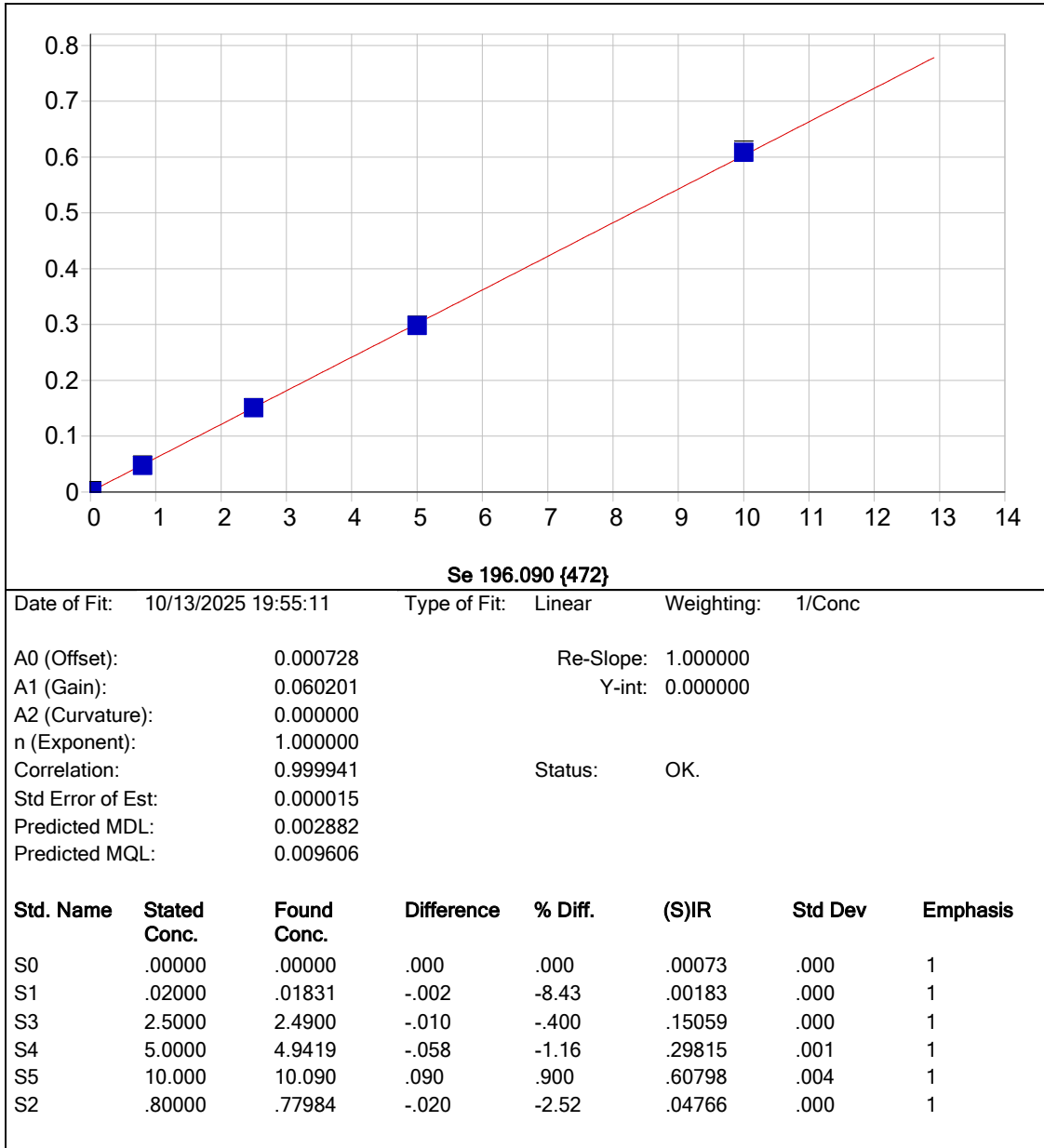
Date of Fit: 10/13/2025 19:55:11 Type of Fit: Linear Weighting: 1/Conc

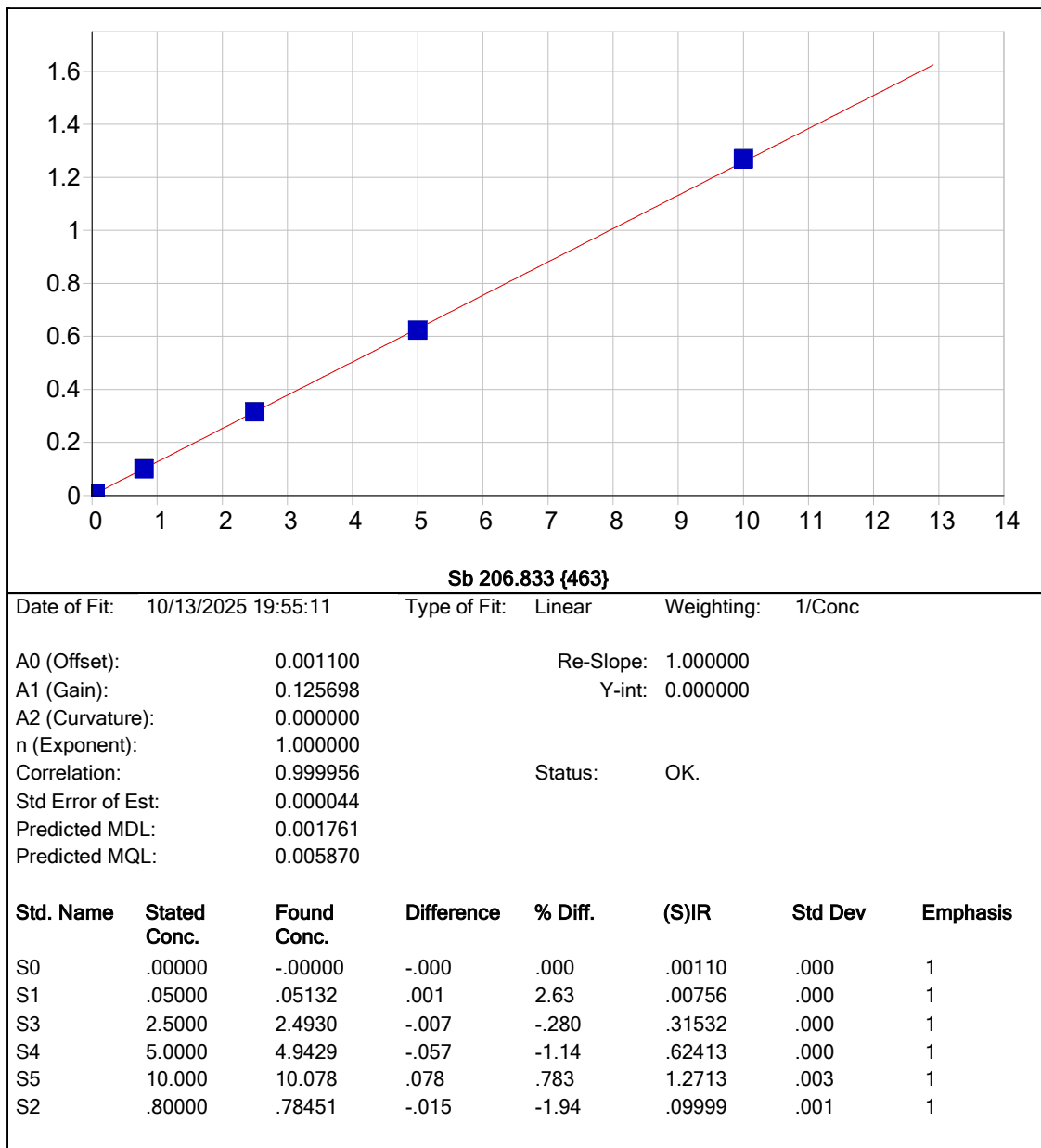
A0 (Offset): 0.000009 Re-Slope: 1.000000
A1 (Gain): 0.057484 Y-int: 0.000000
A2 (Curvature): 0.000000
n (Exponent): 1.000000
Correlation: 0.999962 Status: OK.
Std Error of Est: 0.000012
Predicted MDL: 0.002363
Predicted MQL: 0.007875

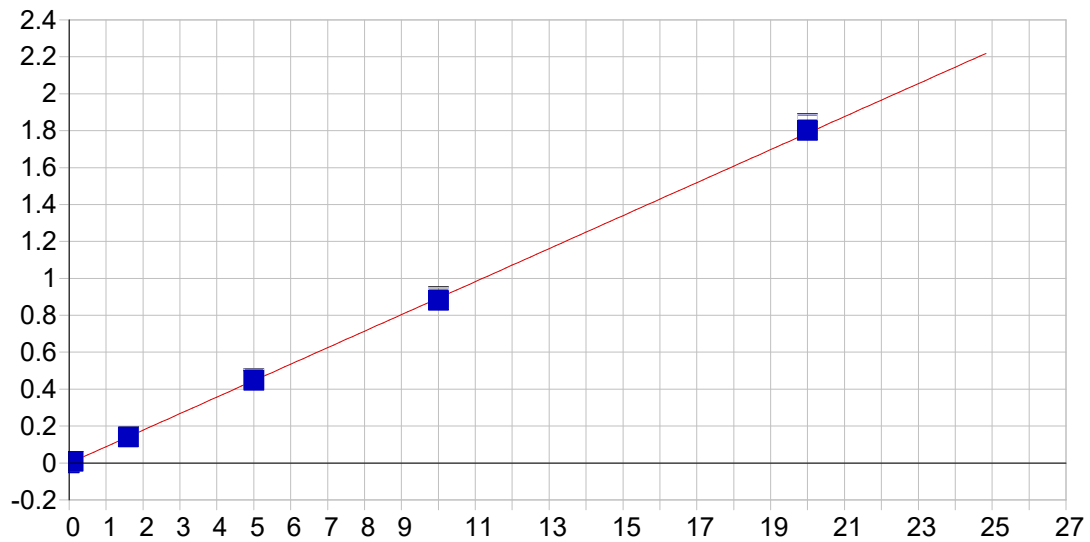
Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	-.00000	-.000	.000	.00001	.000	1
S1	.02000	.02123	.001	6.13	.00122	.000	1
S3	2.5000	2.4951	-.005	-.197	.14329	.001	1
S4	5.0000	4.9646	-.035	-.708	.28510	.001	1
S5	10.000	10.062	.062	.622	.57783	.003	1
S2	.80000	.77695	-.023	-2.88	.04462	.000	1









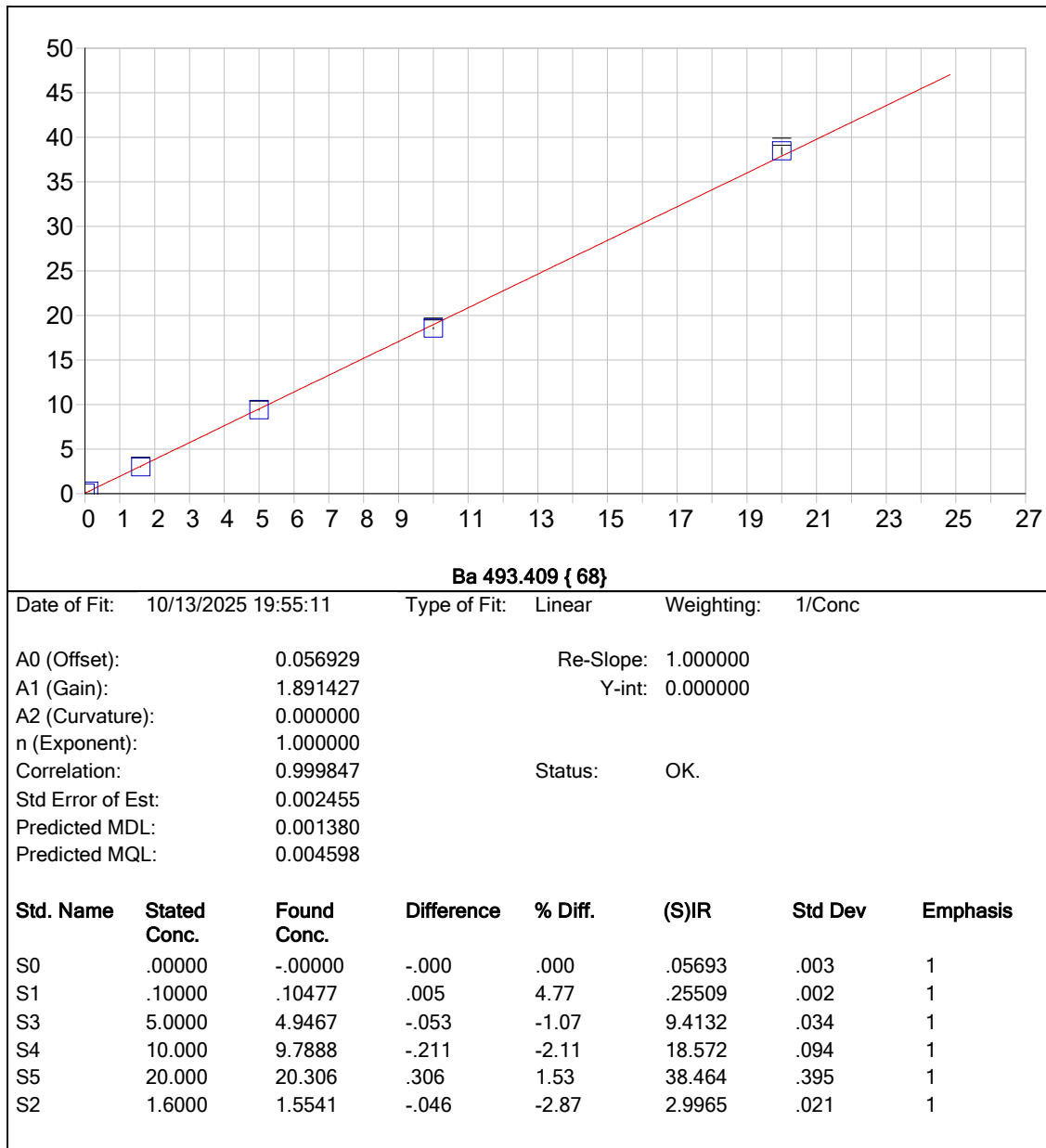


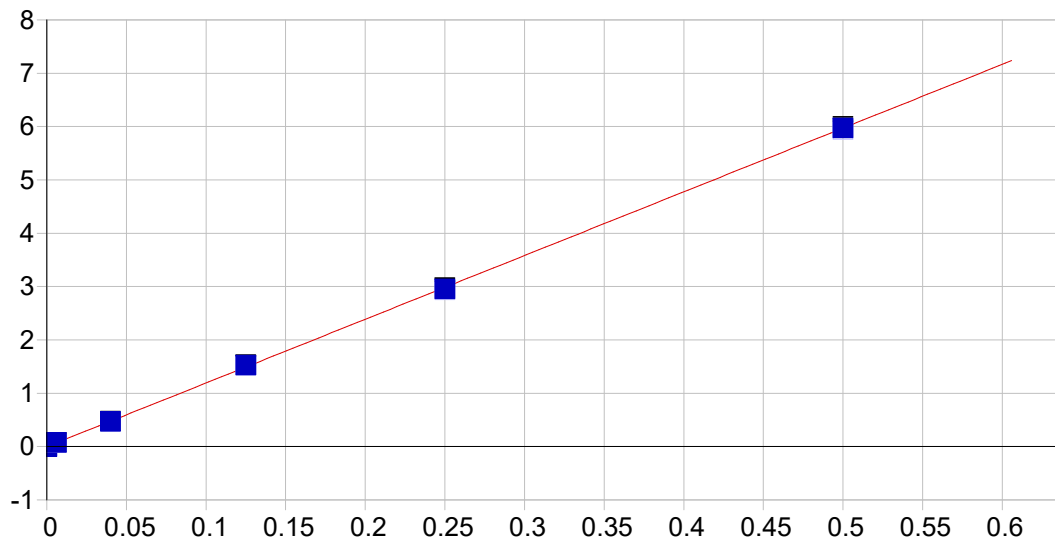
AI 396.152 { 85}

Date of Fit: 10/13/2025 19:55:11 Type of Fit: Linear Weighting: 1/Conc

A0 (Offset): -0.000896 Re-Slope: 1.000000
A1 (Gain): 0.089381 Y-int: 0.000000
A2 (Curvature): 0.000000
n (Exponent): 1.000000
Correlation: 0.999943 Status: OK.
Std Error of Est: 0.000072
Predicted MDL: 0.010944
Predicted MQL: 0.036481

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	-.00000	-.000	.000	-.00090	.001	1
S1	.10000	.10572	.006	5.72	.00925	.001	1
S3	5.0000	5.0119	.012	.237	.45574	.001	1
S4	10.000	9.8570	-.143	-1.43	.89747	.003	1
S5	20.000	20.158	.158	.792	1.8356	.004	1
S2	1.6000	1.5667	-.033	-2.08	.14191	.002	1



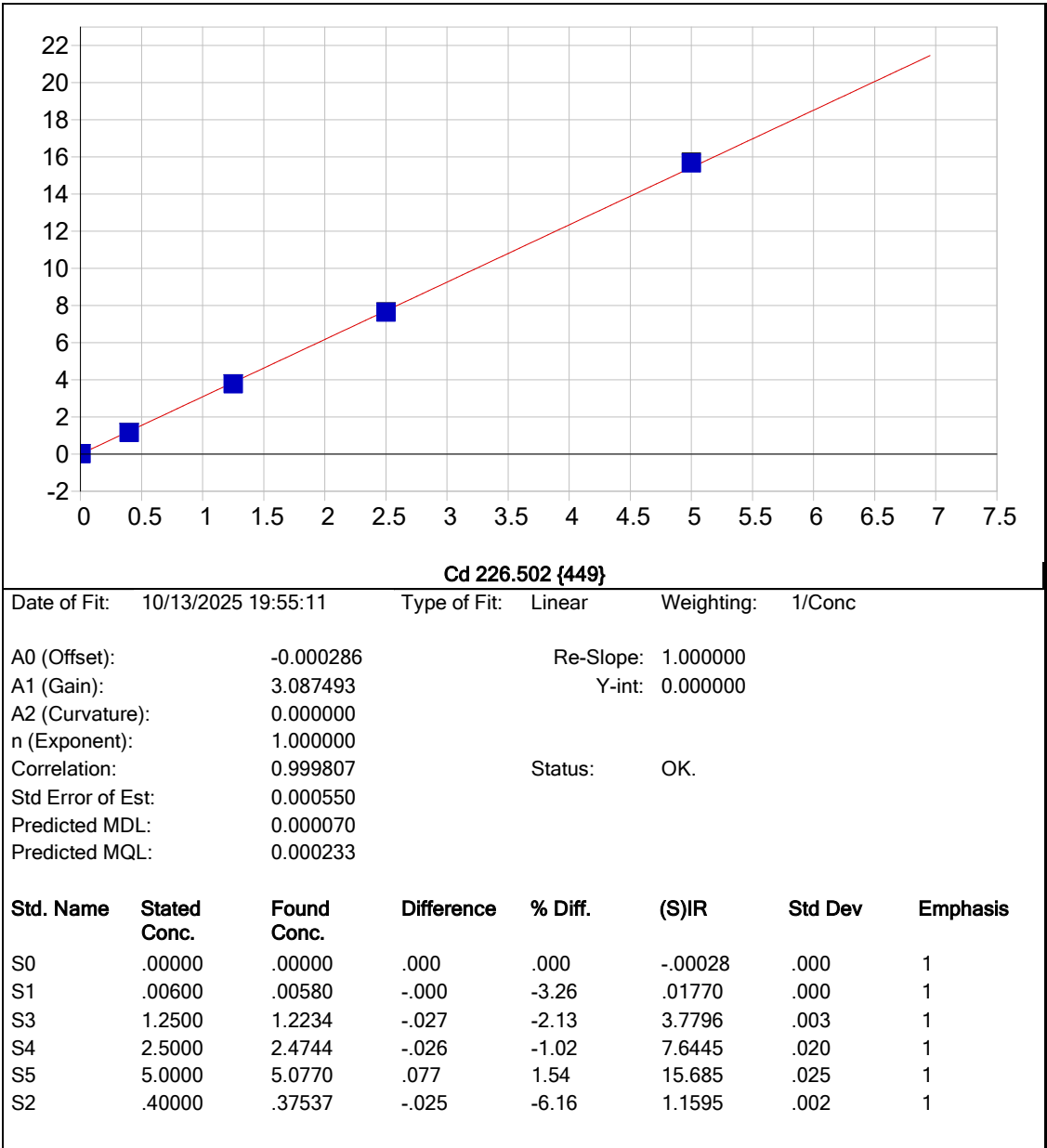


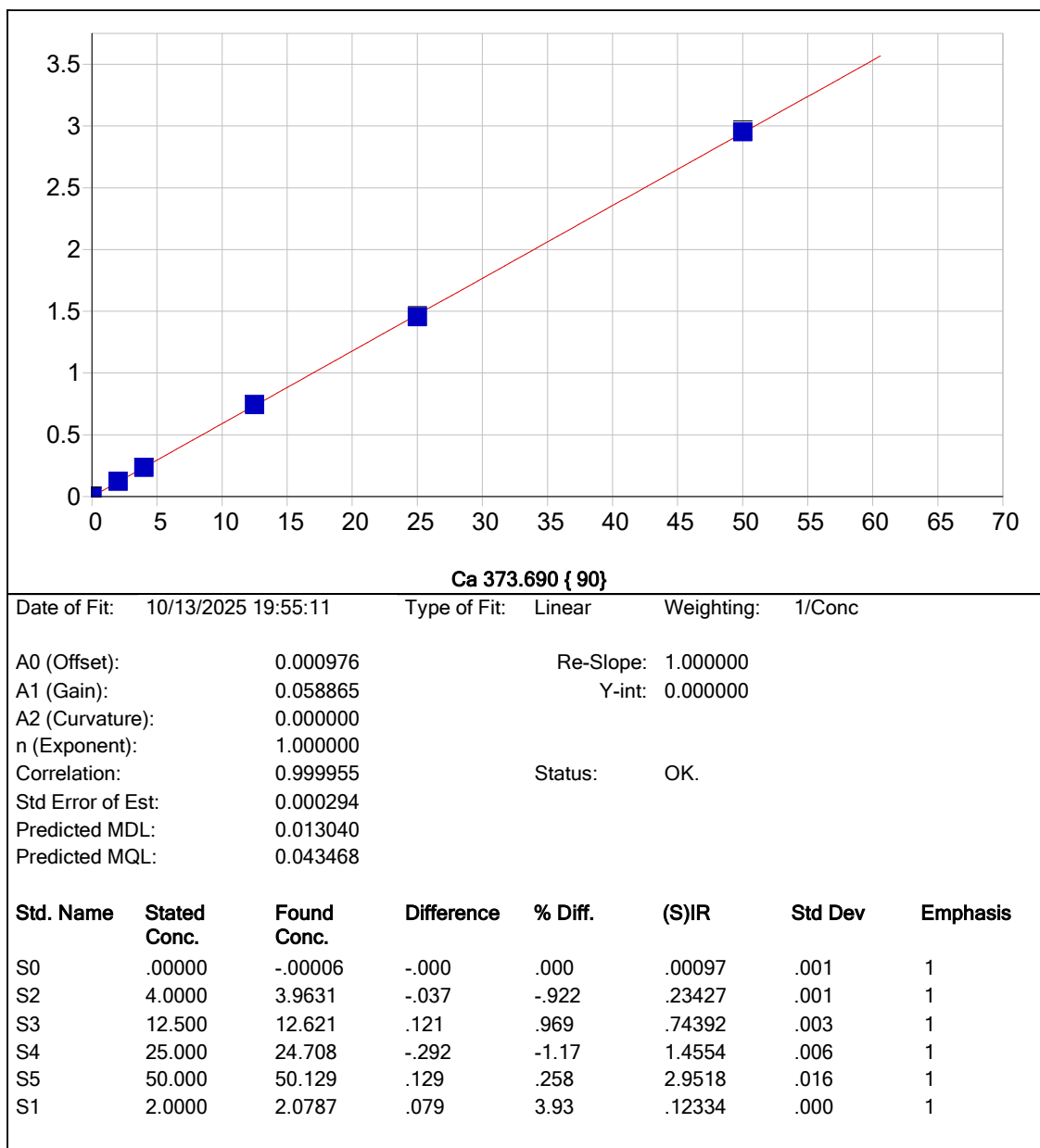
Be 234.861 {144}

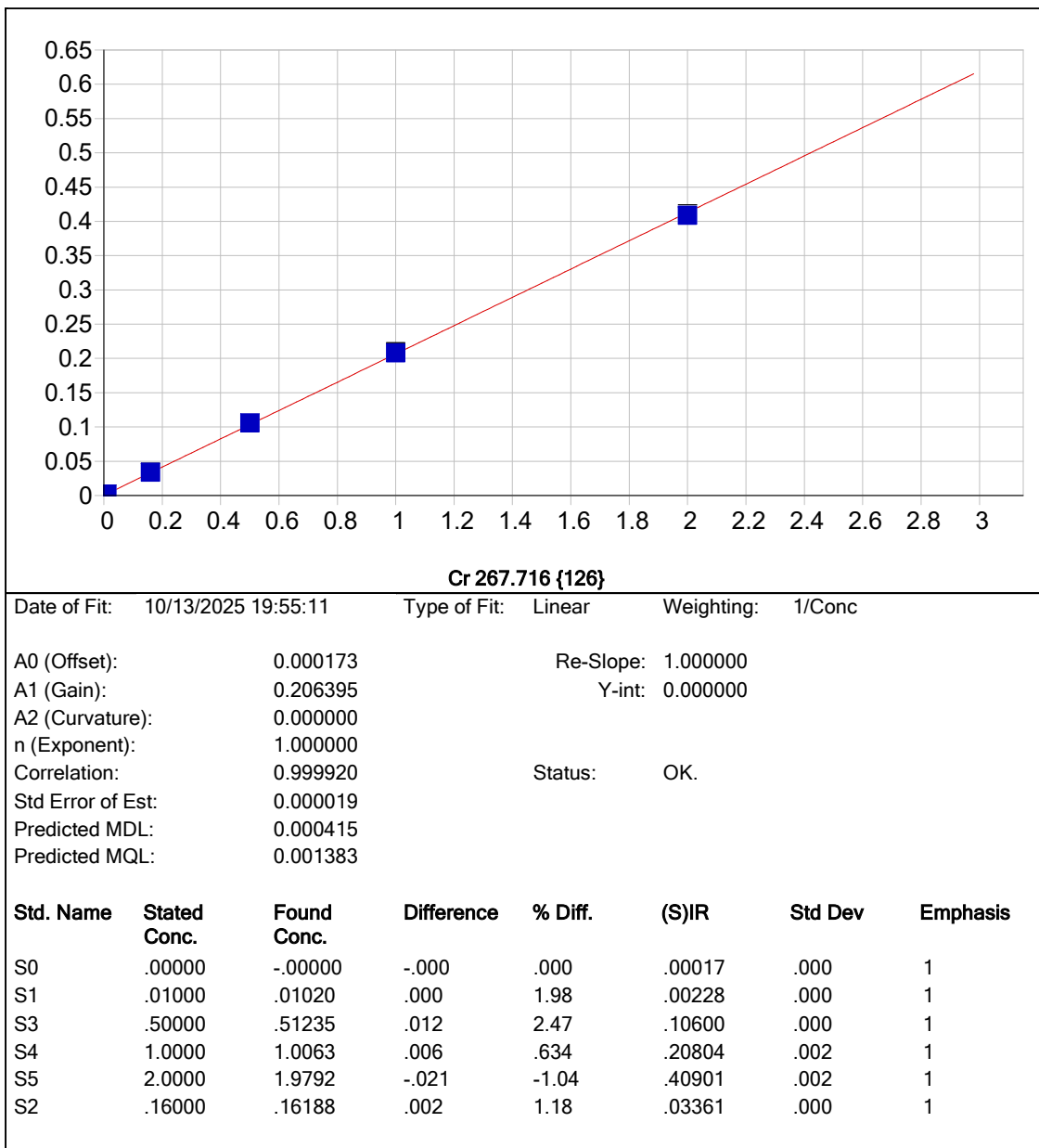
Date of Fit: 10/13/2025 19:55:11 Type of Fit: Linear Weighting: 1/Conc

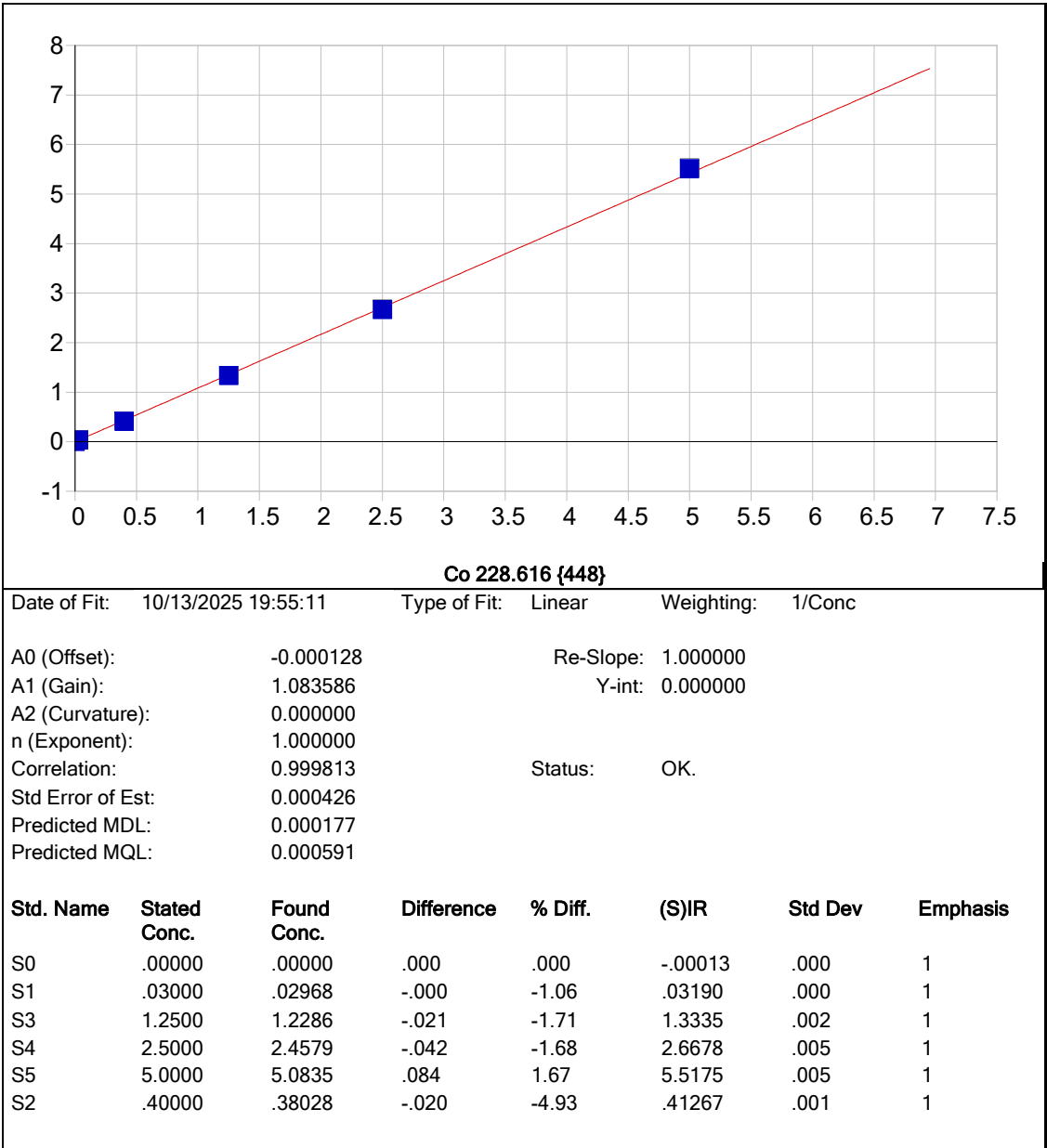
A0 (Offset): -0.002658 Re-Slope: 1.000000
A1 (Gain): 11.948727 Y-int: 0.000000
A2 (Curvature): 0.000000
n (Exponent): 1.000000
Correlation: 0.999936 Status: OK.
Std Error of Est: 0.000388
Predicted MDL: 0.000052
Predicted MQL: 0.000172

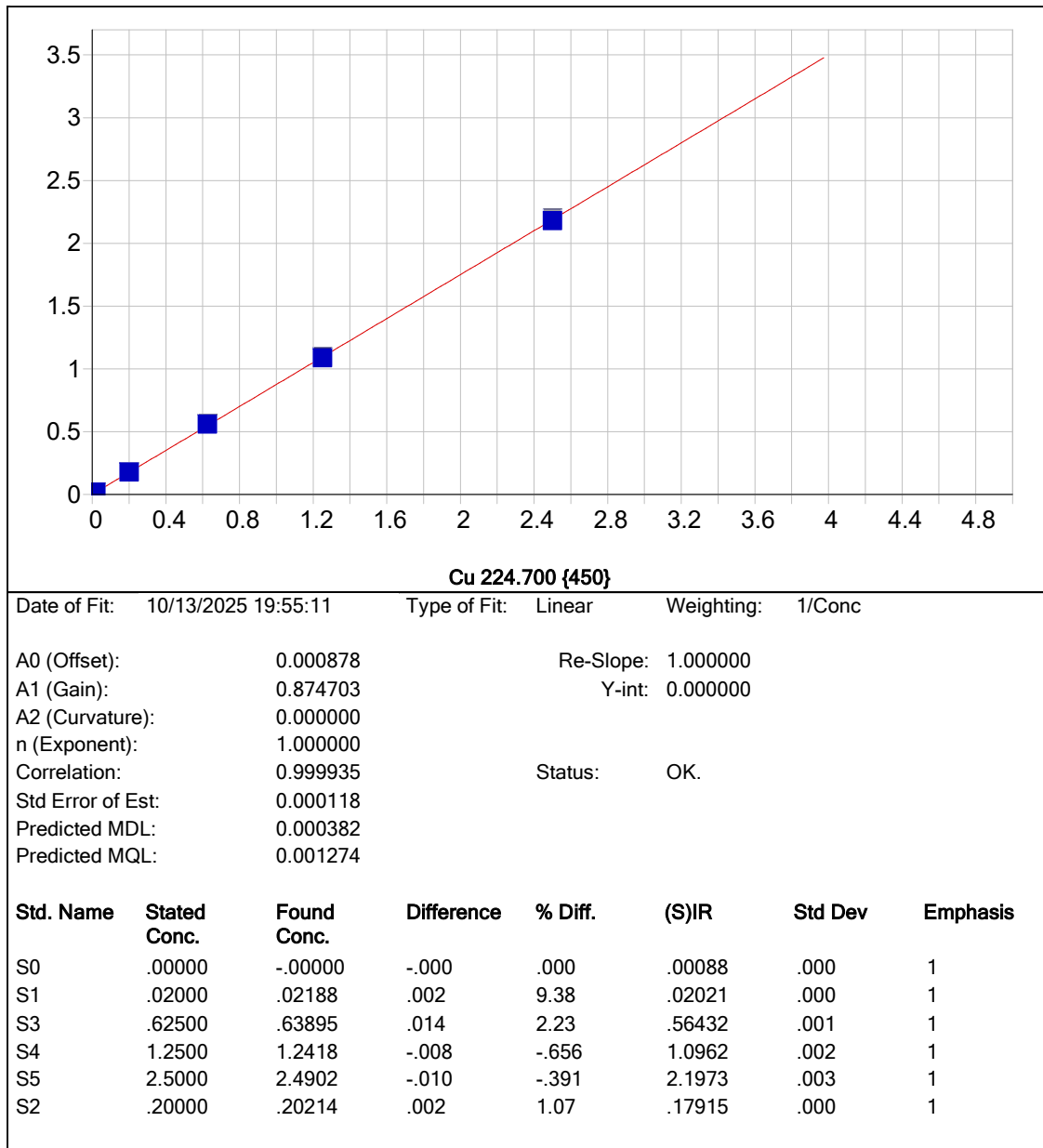
Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	-.00000	-.000	.000	-.00266	.000	1
S1	.00600	.00638	.000	6.25	.07298	.000	1
S3	.12500	.12775	.003	2.20	1.5171	.010	1
S4	.25000	.24720	-.003	-1.12	2.9377	.027	1
S5	.50000	.49995	-.000	-.009	5.9444	.033	1
S2	.04000	.03972	-.000	-.702	.46979	.002	1

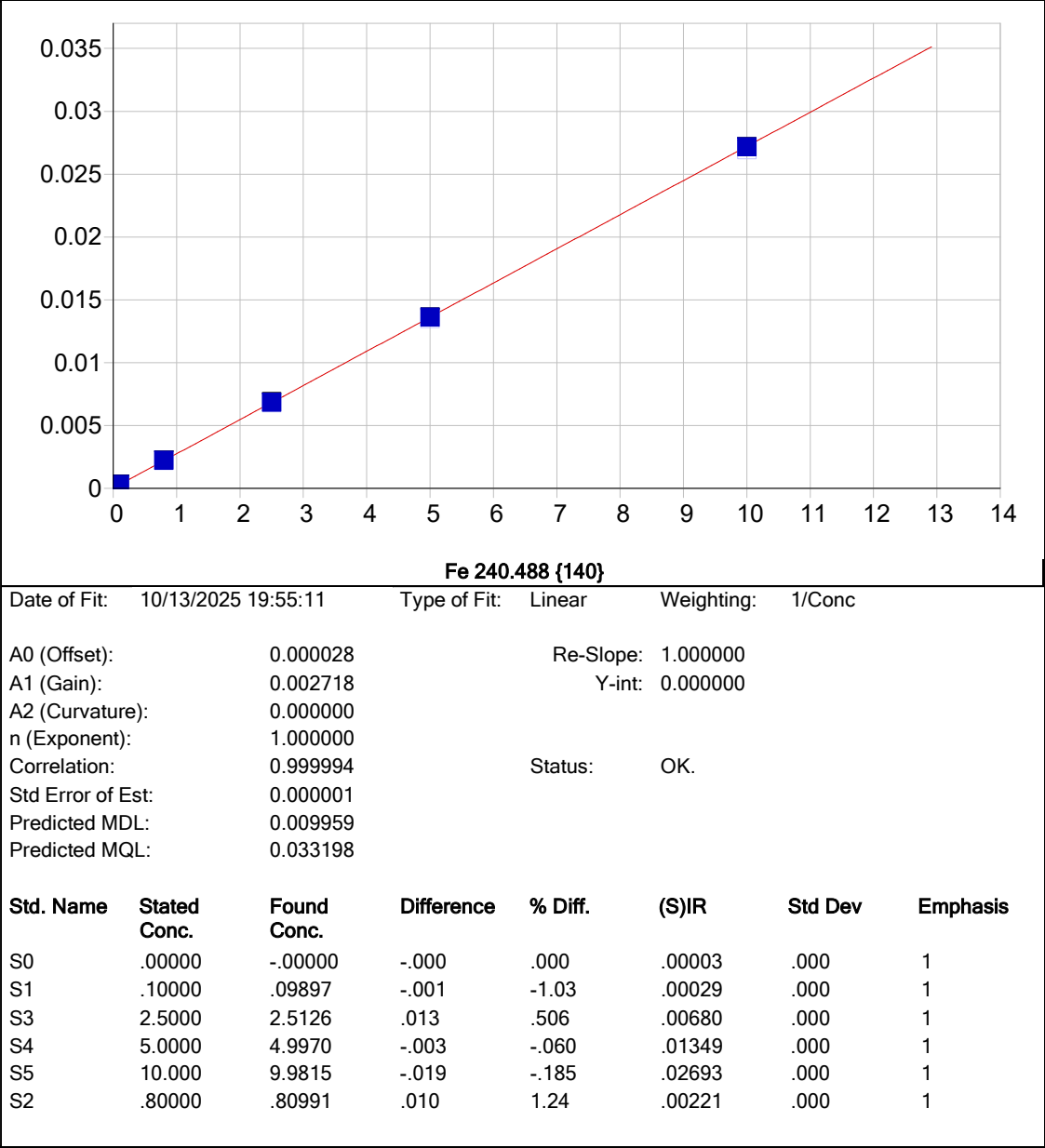


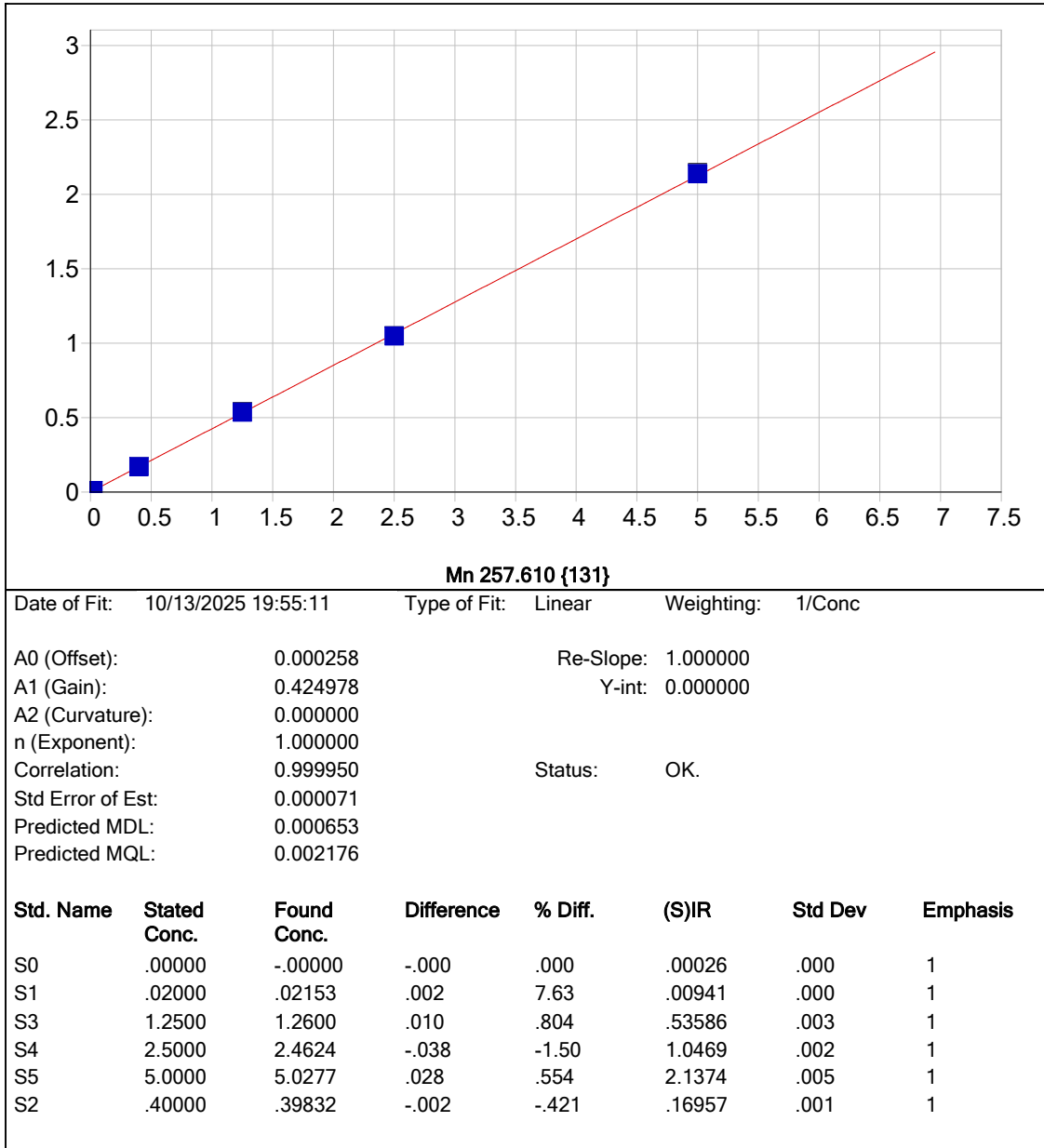






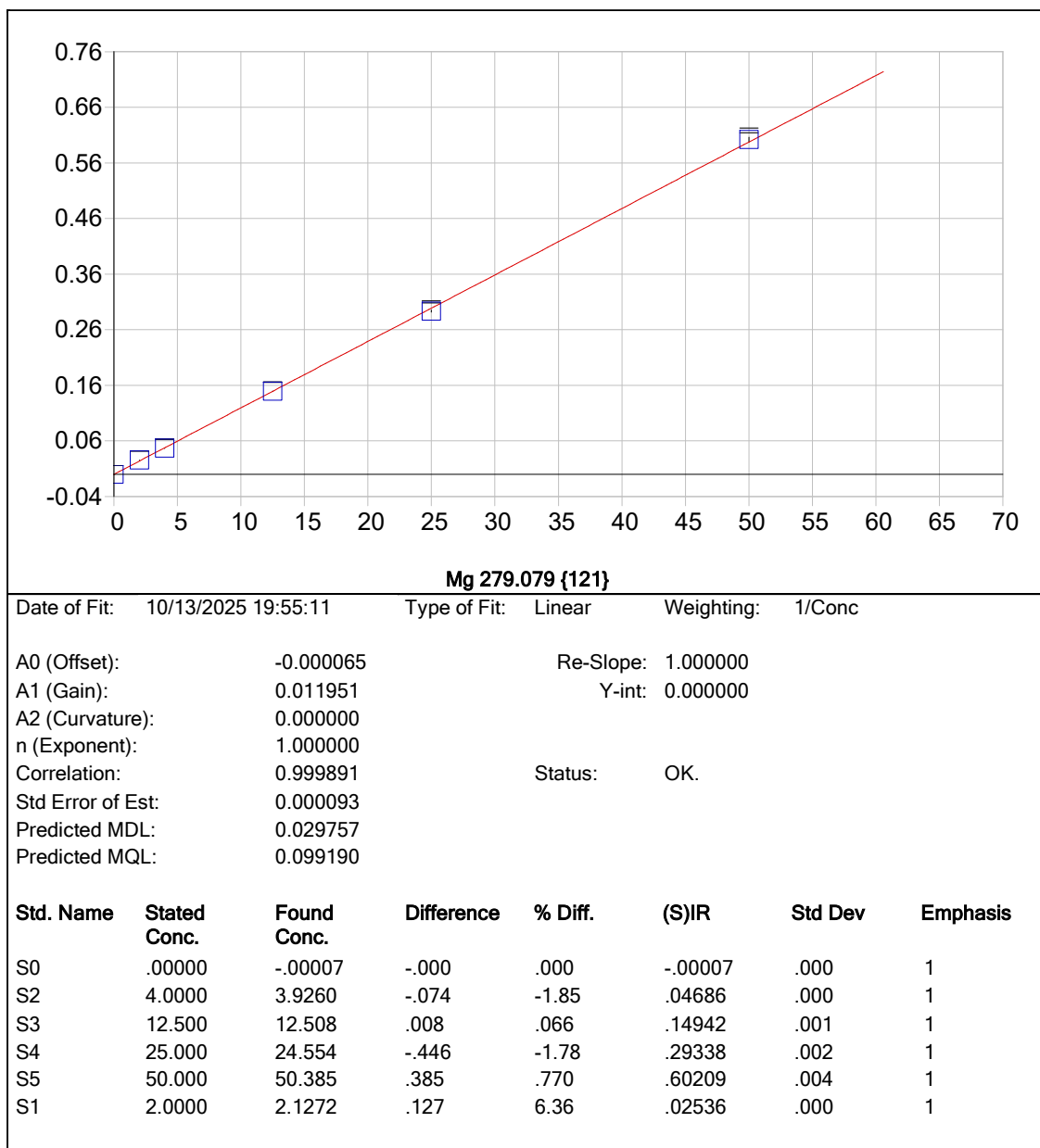


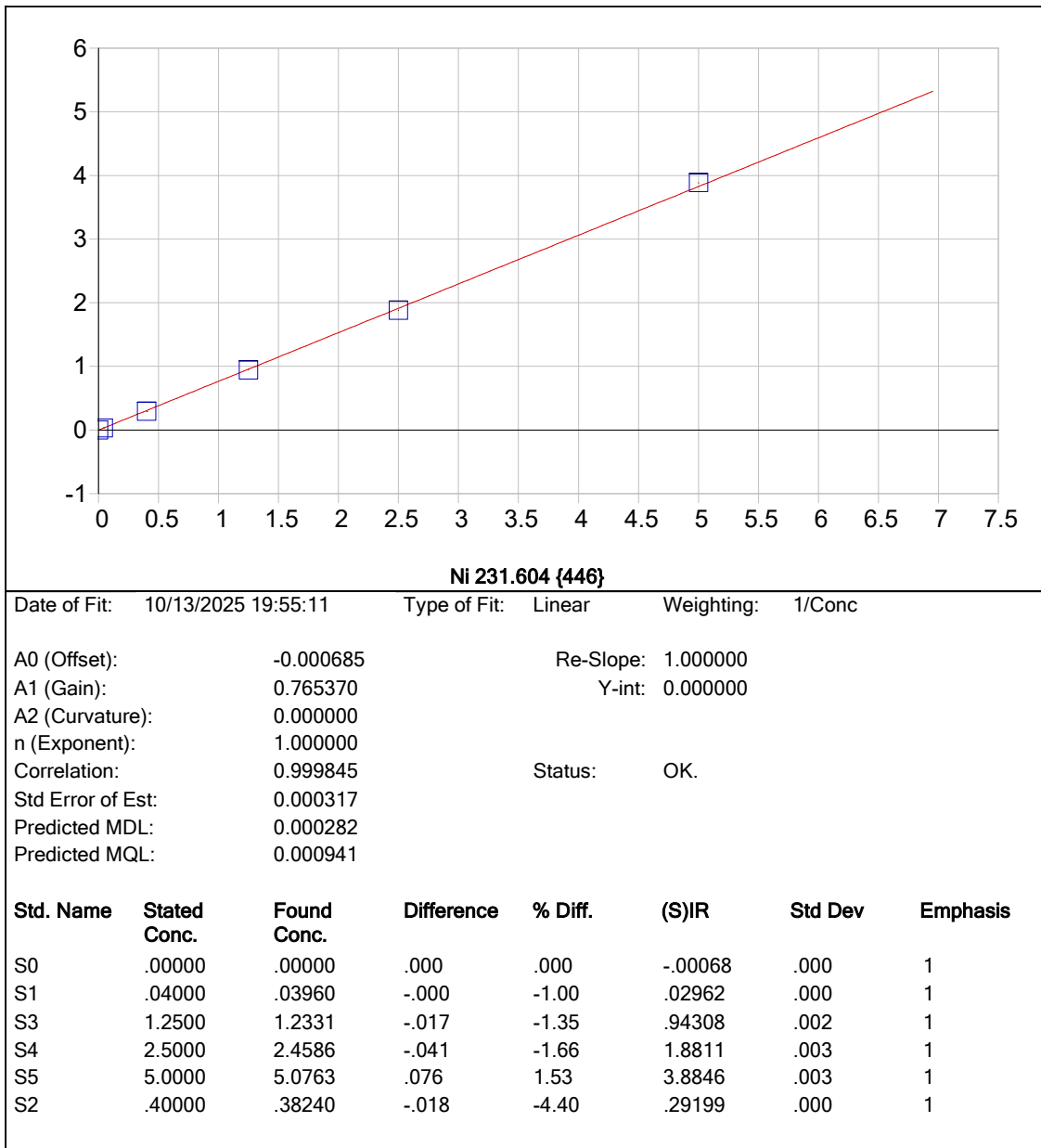


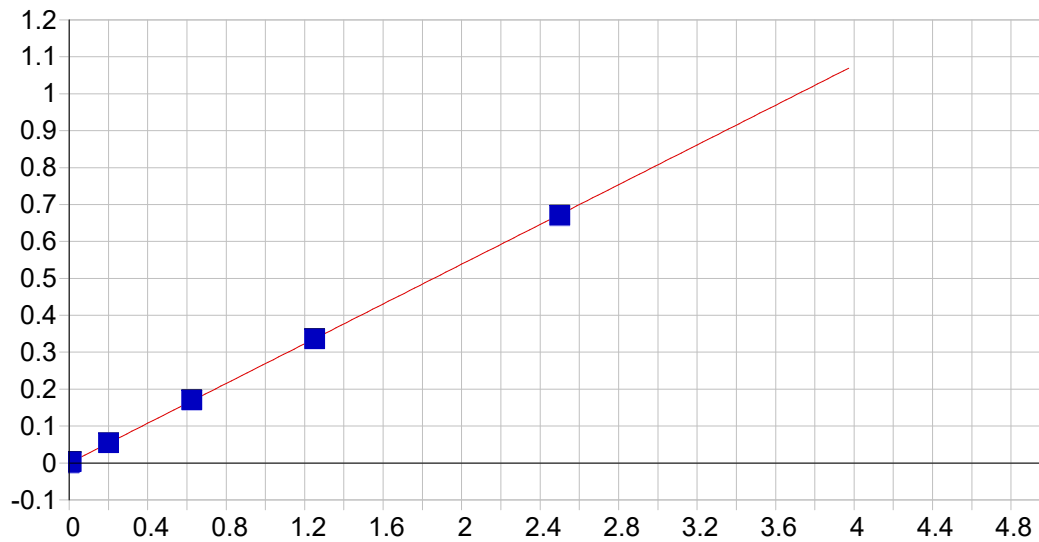


Date of Fit: 10/13/2025 19:55:11 Type of Fit: Linear Weighting: 1/Conc

A0 (Offset): 0.000258 Re-Slope: 1.000000
A1 (Gain): 0.424978 Y-int: 0.000000
A2 (Curvature): 0.000000
n (Exponent): 1.000000
Correlation: 0.999950 Status: OK.
Std Error of Est: 0.000071
Predicted MDL: 0.000653
Predicted MQL: 0.002176





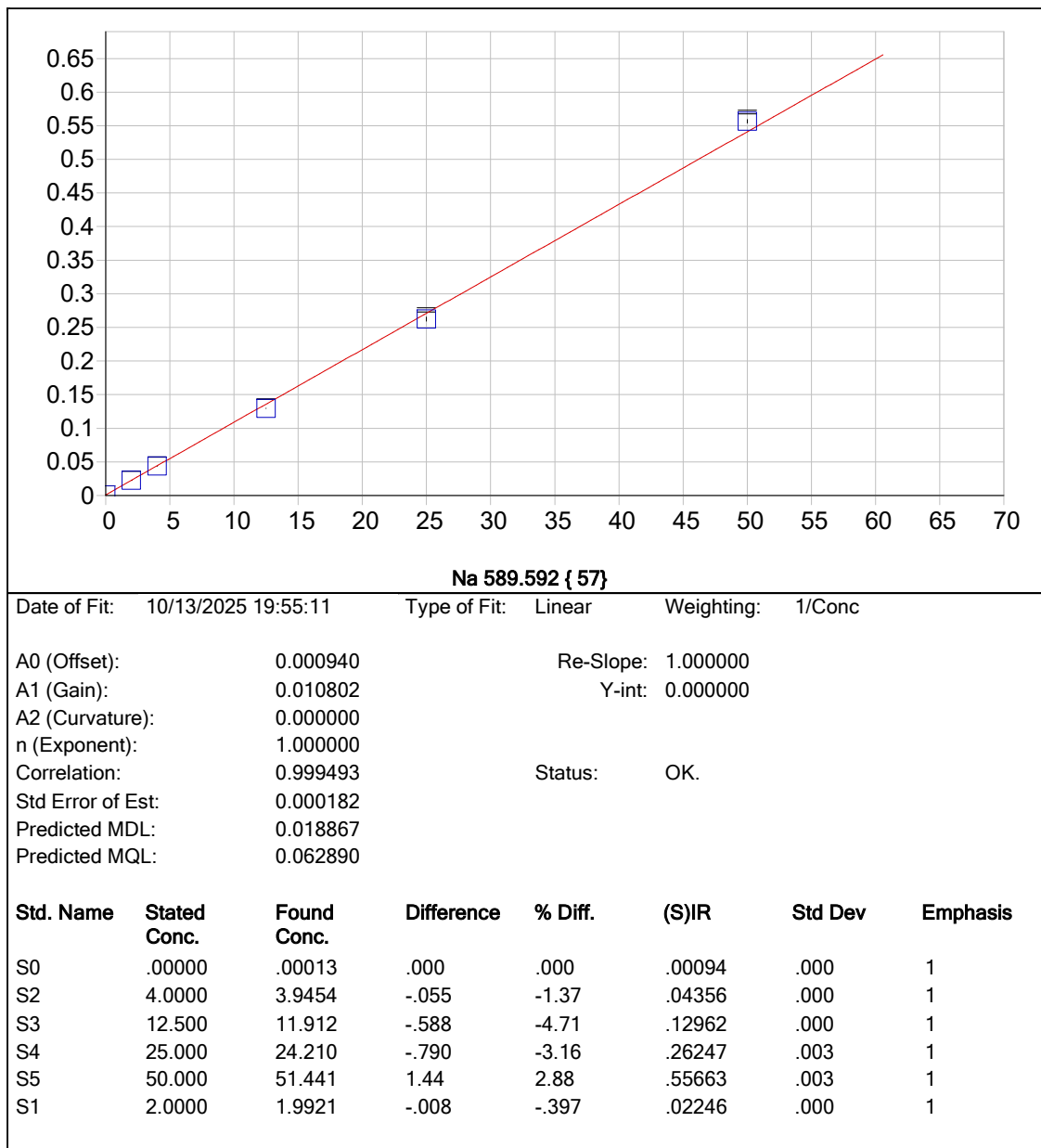


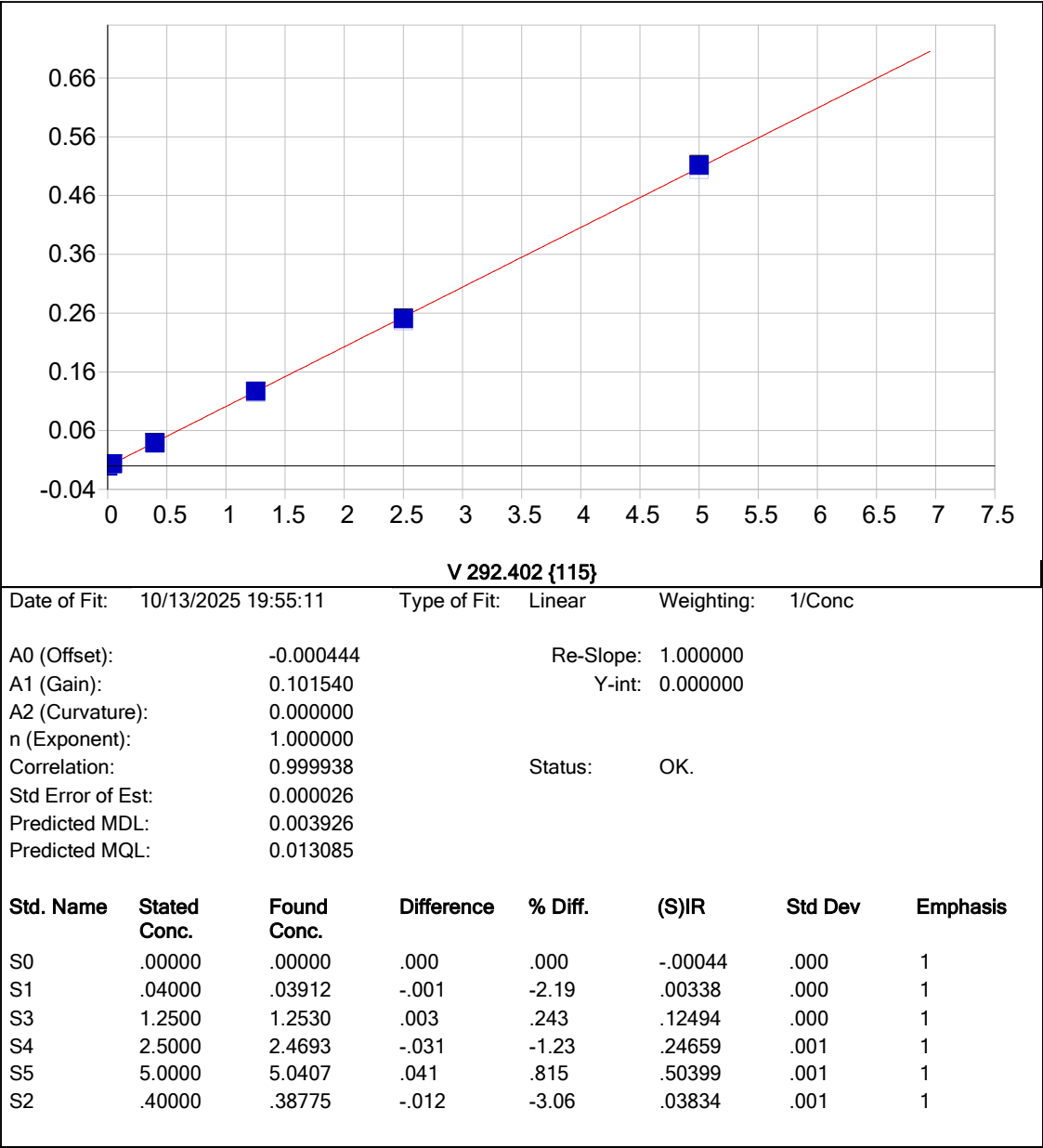
Ag 328.068 {103}

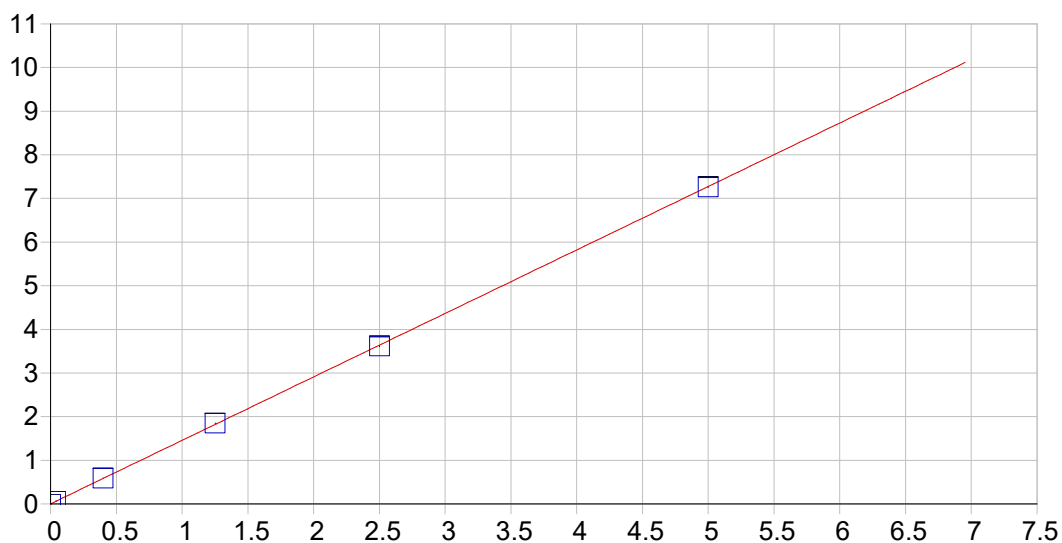
Date of Fit: 10/13/2025 19:55:11 Type of Fit: Linear Weighting: 1/Conc

A0 (Offset): -0.000045 Re-Slope: 1.000000
A1 (Gain): 0.269181 Y-int: 0.000000
A2 (Curvature): 0.000000
n (Exponent): 1.000000
Correlation: 0.999980 Status: OK.
Std Error of Est: 0.000014
Predicted MDL: 0.000519
Predicted MQL: 0.001729

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	-.00000	-.000	.000	-.00005	.000	1
S1	.01000	.01025	.000	2.54	.00270	.000	1
S3	.62500	.63325	.008	1.32	.16973	.000	1
S4	1.2500	1.2492	-.001	-.066	.33485	.001	1
S5	2.5000	2.4900	-.010	-.400	.66749	.001	1
S2	.20000	.20232	.002	1.16	.05420	.000	1





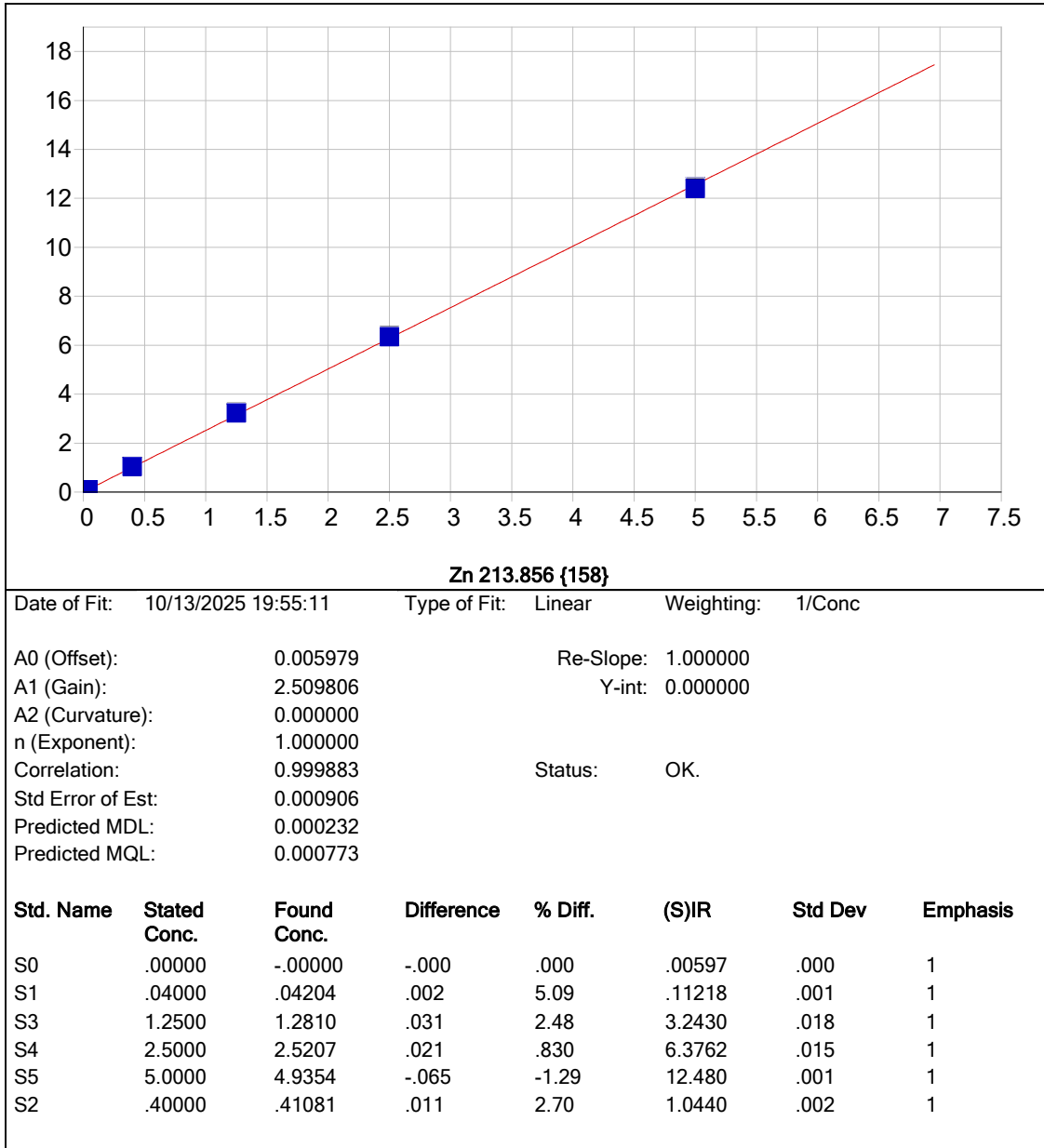


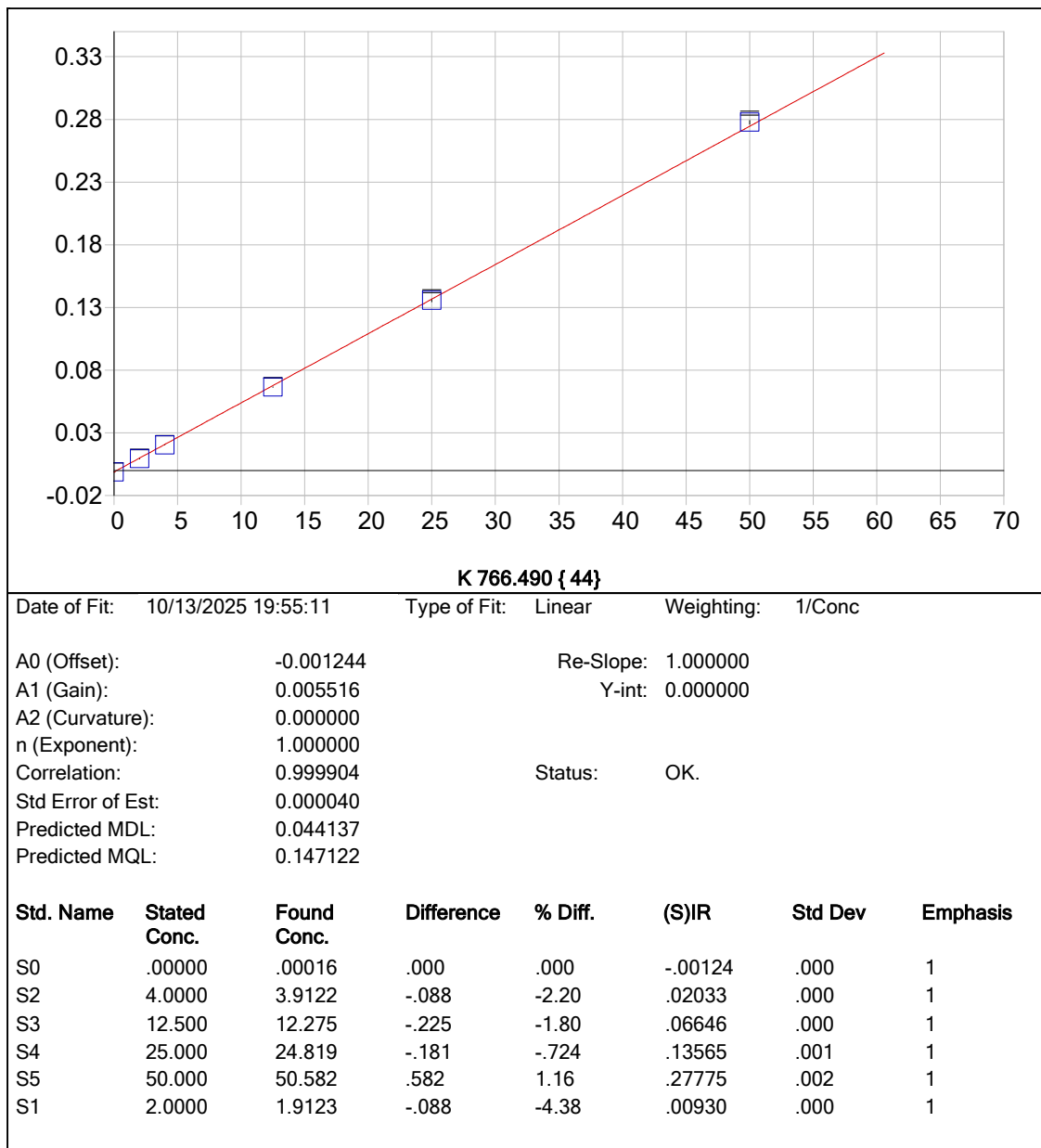
Zn 206.200 {464}

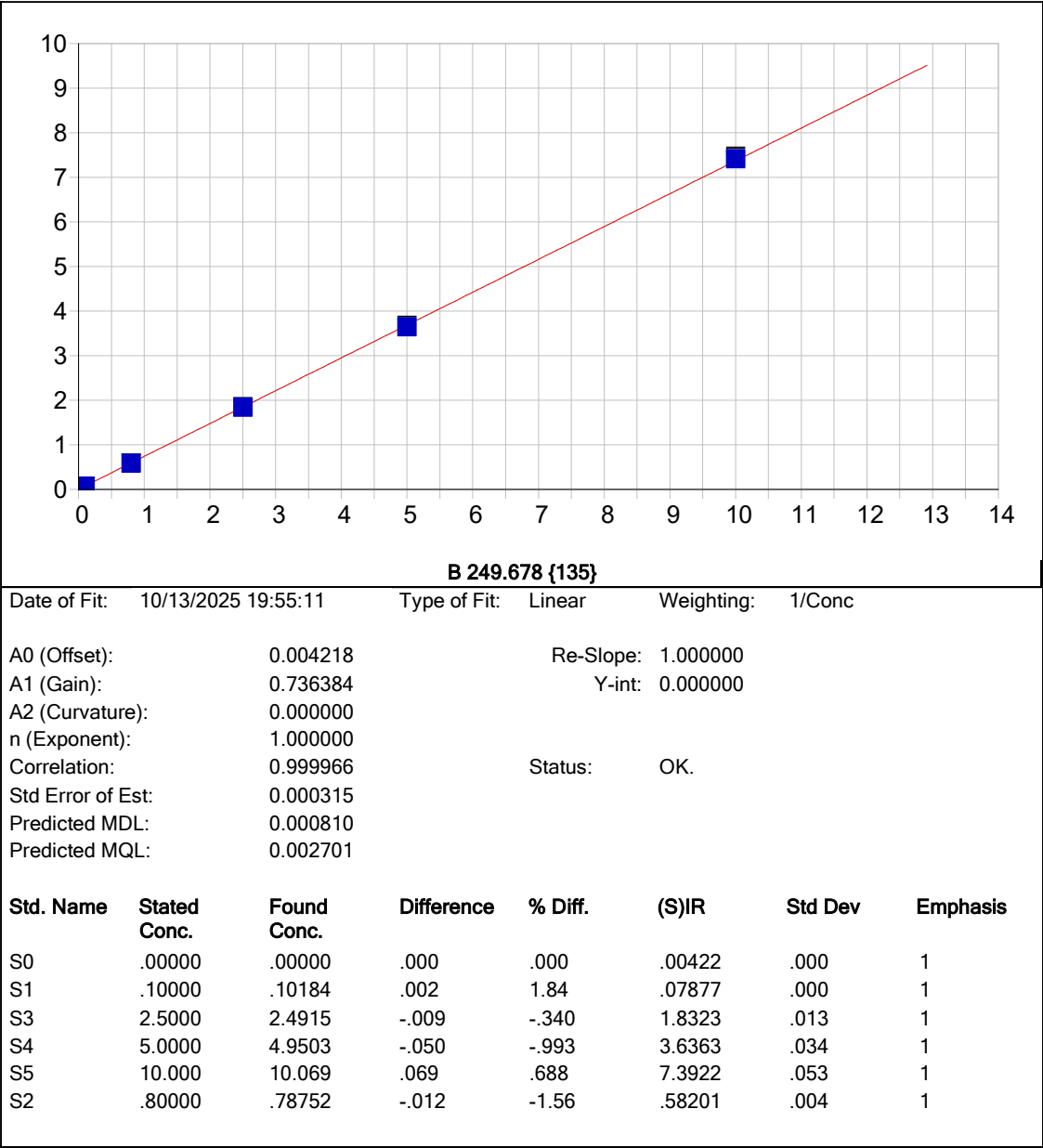
Date of Fit: 10/13/2025 19:55:11 Type of Fit: Linear Weighting: 1/Conc

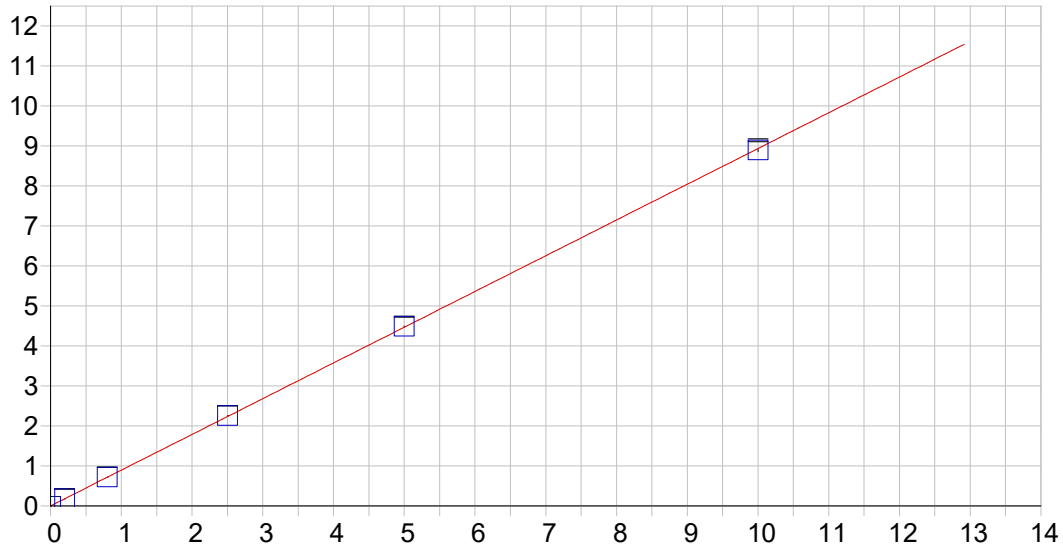
A0 (Offset):	0.001681	Re-Slope:	1.000000
A1 (Gain):	1.454657	Y-int:	0.000000
A2 (Curvature):	0.000000		
n (Exponent):	1.000000		
Correlation:	0.999967	Status:	OK.
Std Error of Est:	0.000279		
Predicted MDL:	0.000139		
Predicted MQL:	0.000464		

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	-.00000	-.000	.000	.00168	.000	1
S1	.04000	.04275	.003	6.87	.06387	.000	1
S3	1.2500	1.2678	.018	1.43	1.8459	.001	1
S4	2.5000	2.4831	-.017	-.676	3.6137	.013	1
S5	5.0000	4.9922	-.008	-.157	7.2636	.008	1
S2	.40000	.40417	.004	1.04	.58961	.002	1







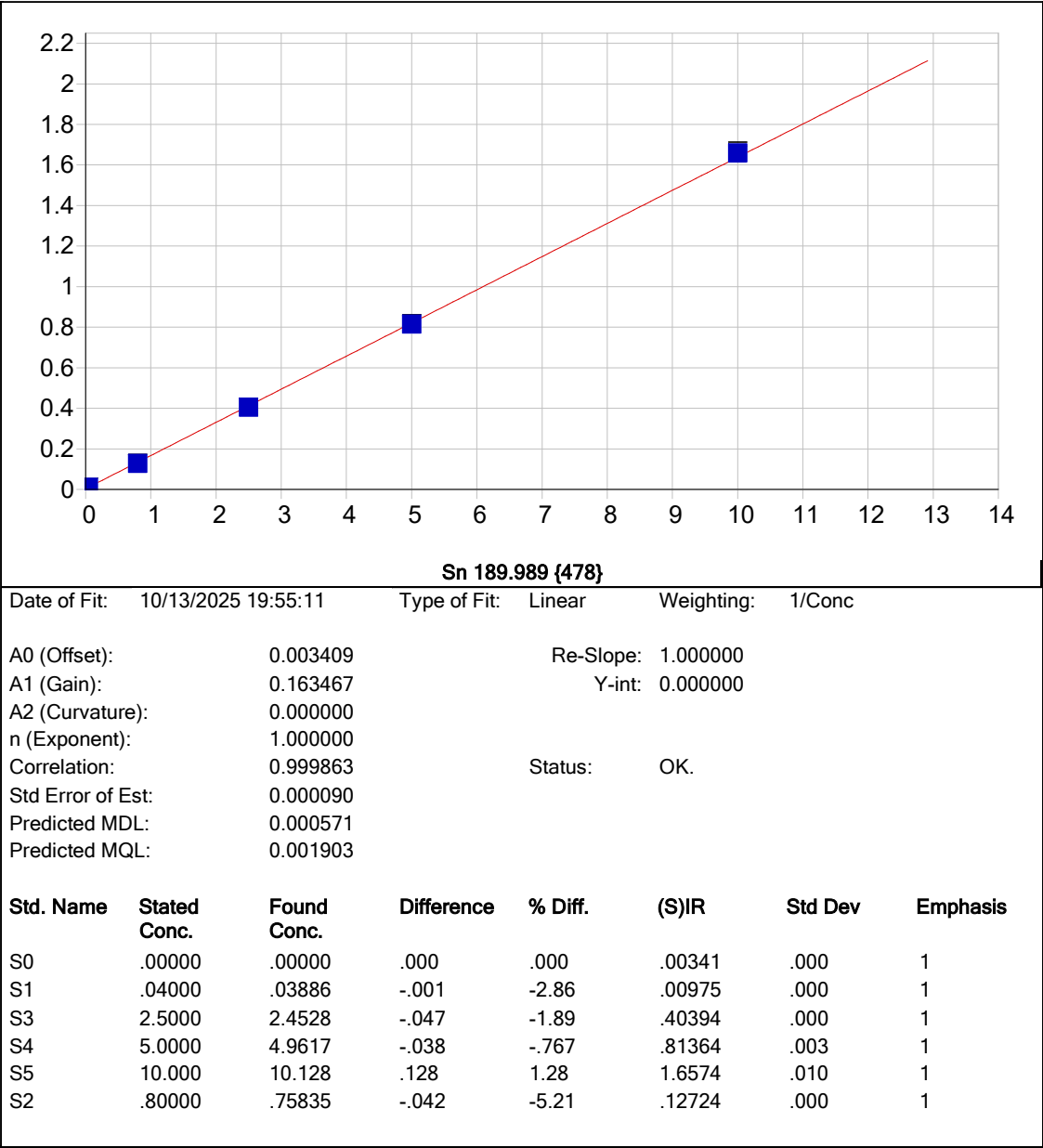


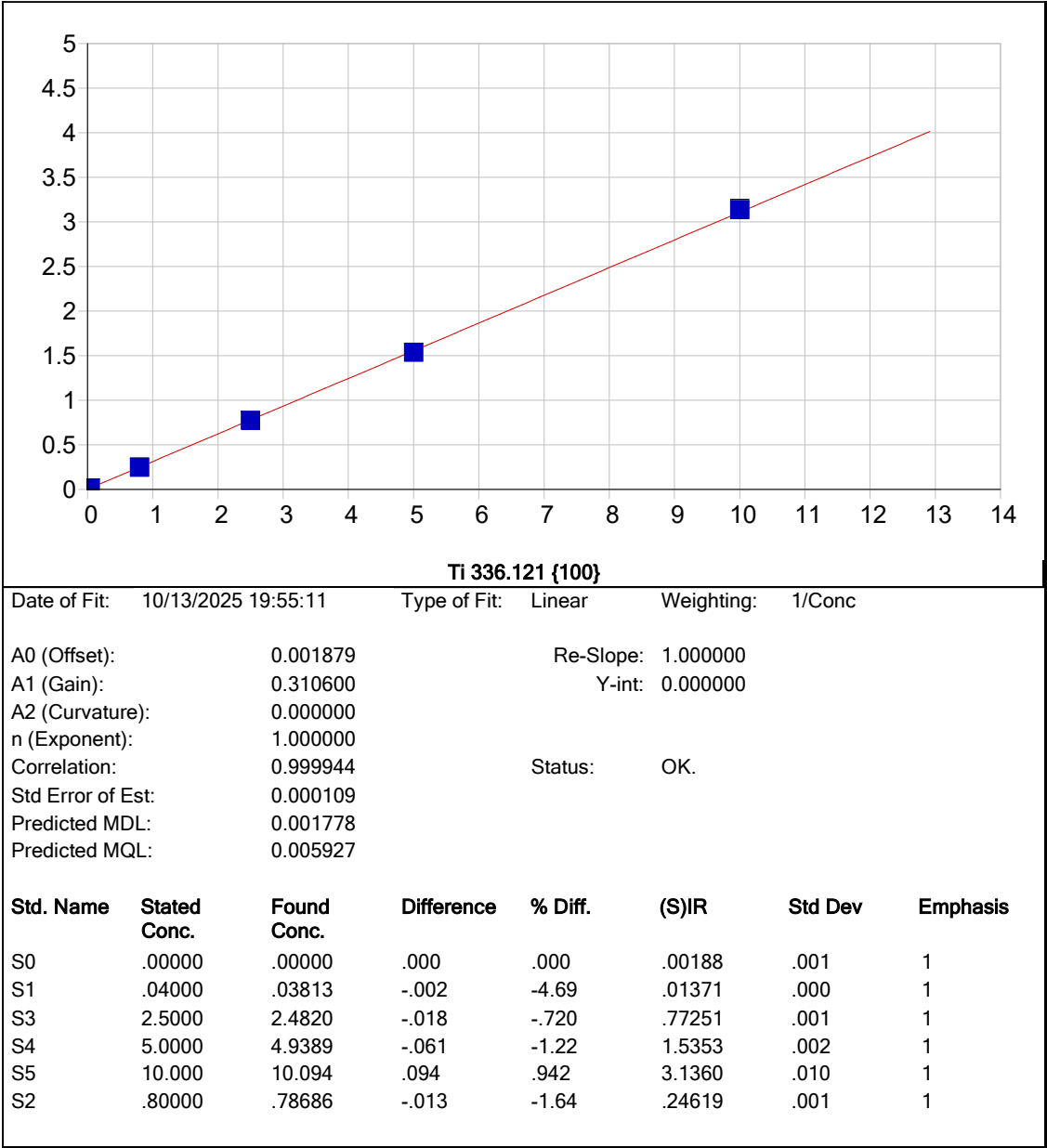
Mo 202.030 {467}

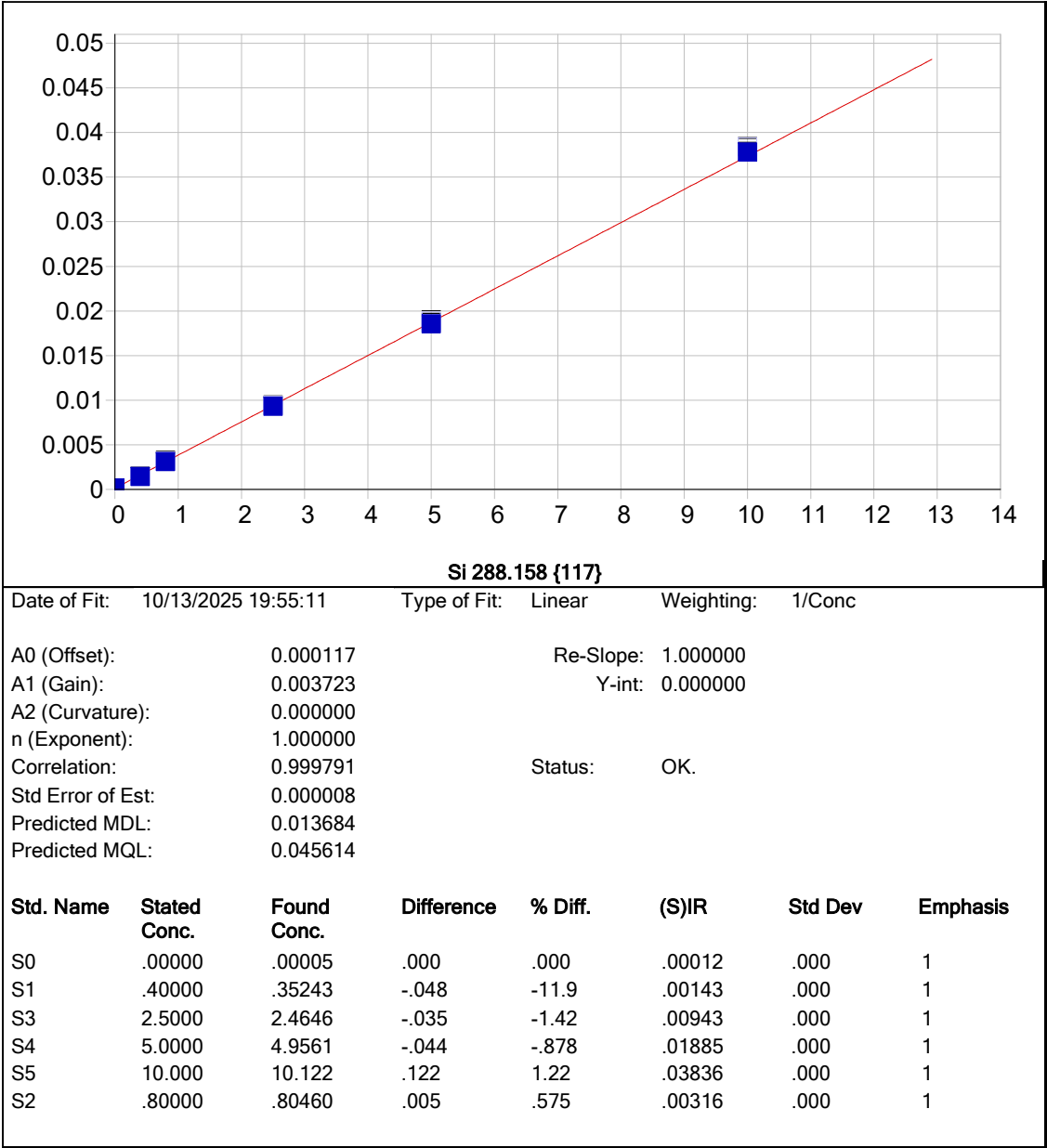
Date of Fit: 10/13/2025 19:55:11 Type of Fit: Linear Weighting: 1/Conc

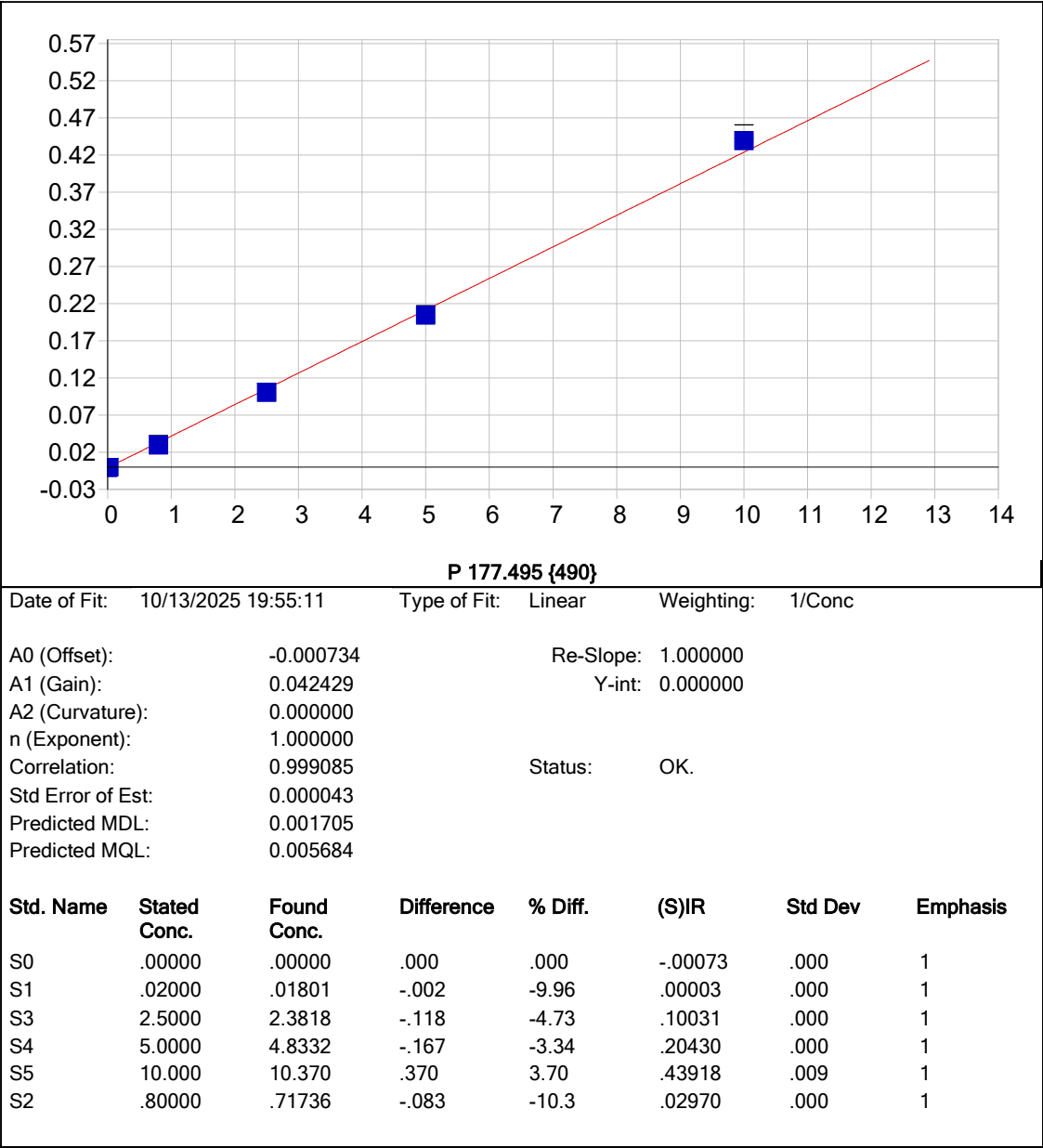
A0 (Offset): 0.000659 Re-Slope: 1.000000
A1 (Gain): 0.893716 Y-int: 0.000000
A2 (Curvature): 0.000000
n (Exponent): 1.000000
Correlation: 0.999986 Status: OK.
Std Error of Est: 0.000348
Predicted MDL: 0.000237
Predicted MQL: 0.000790

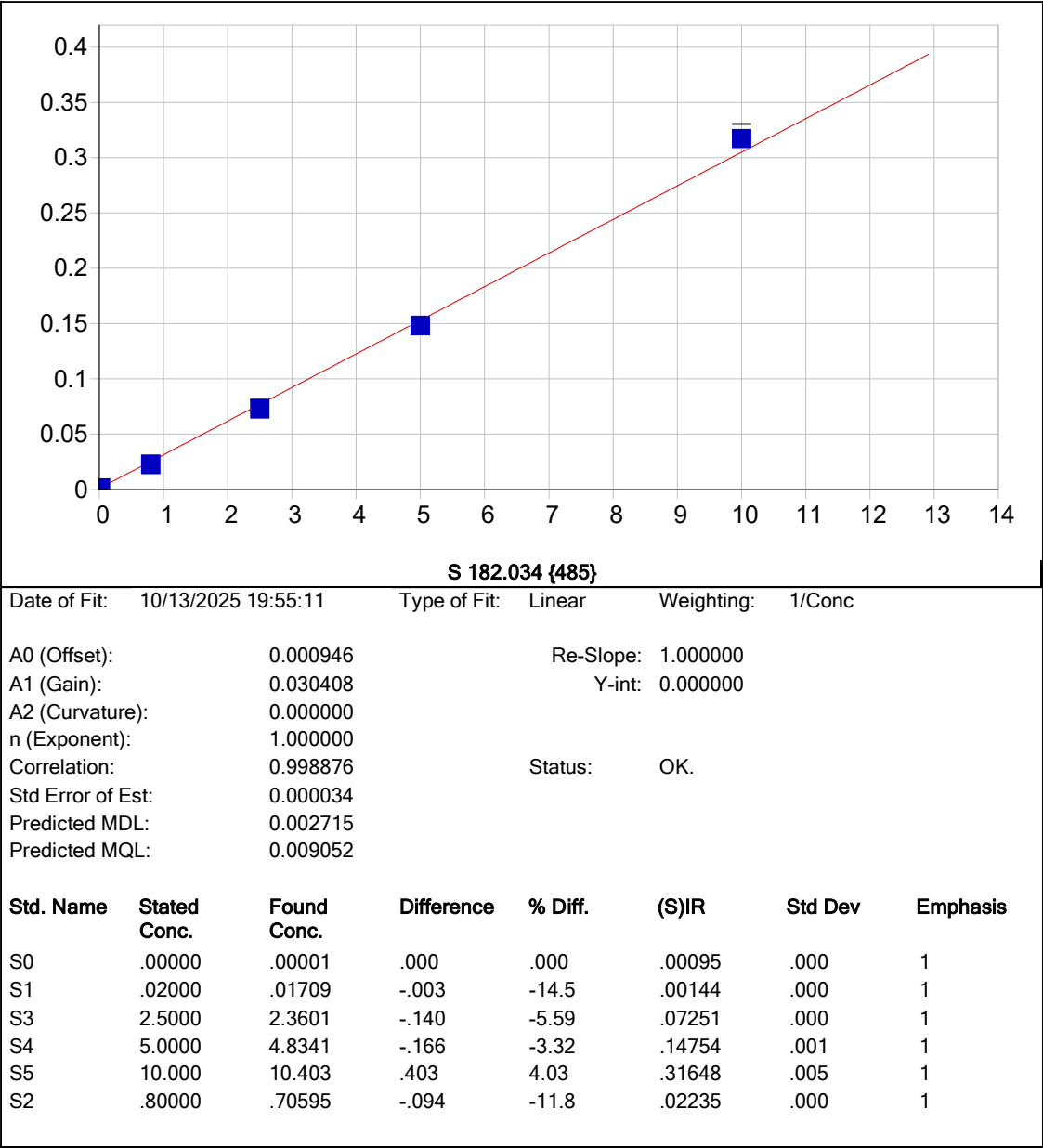
Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	-.00000	-.000	.000	.00066	.000	1
S1	.20000	.19929	-.001	-.354	.17877	.000	1
S3	2.5000	2.5224	.022	.896	2.2550	.001	1
S4	5.0000	5.0197	.020	.394	4.4869	.012	1
S5	10.000	9.9546	-.045	-.454	8.8973	.036	1
S2	.80000	.80394	.004	.493	.71916	.002	1

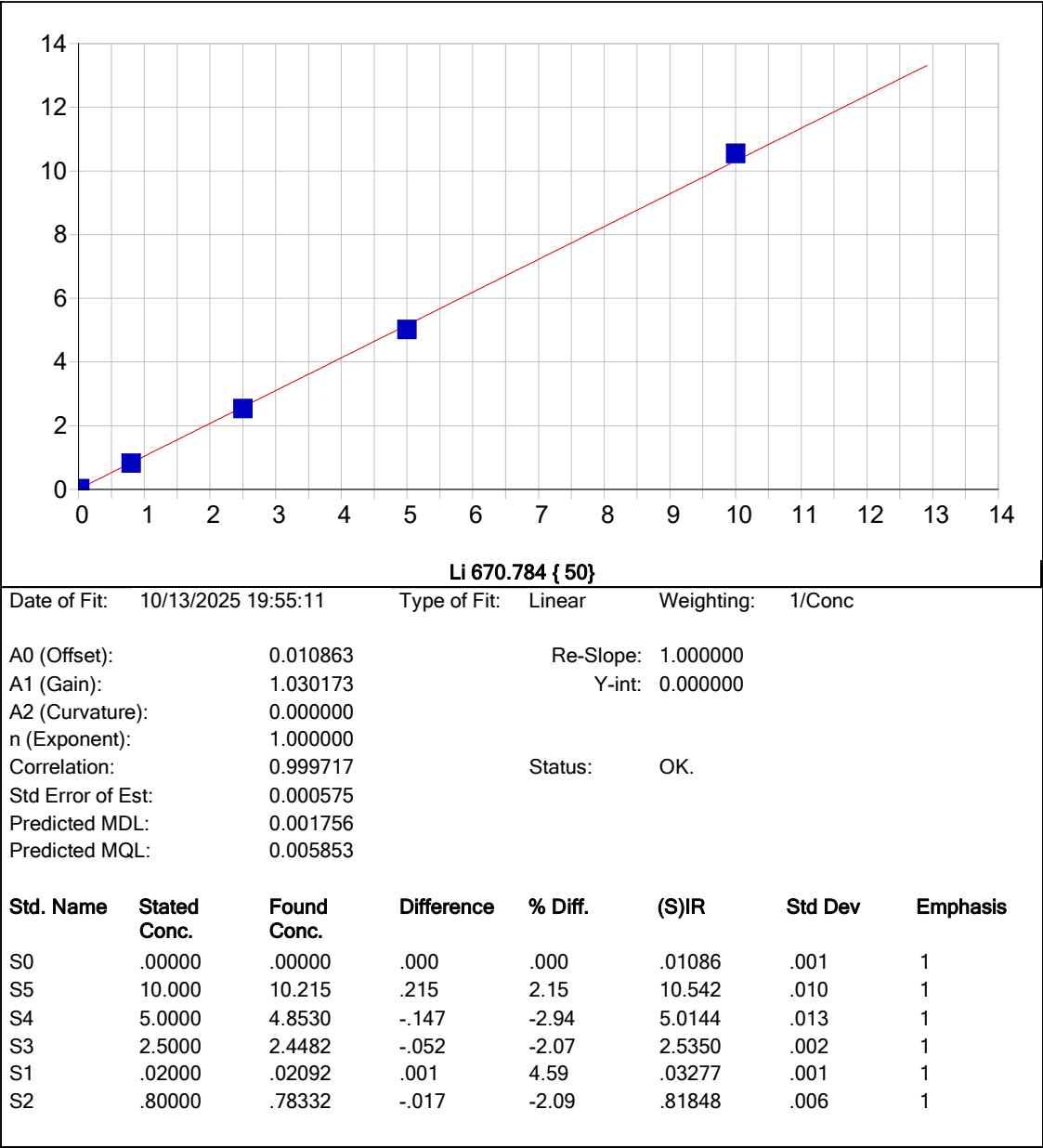


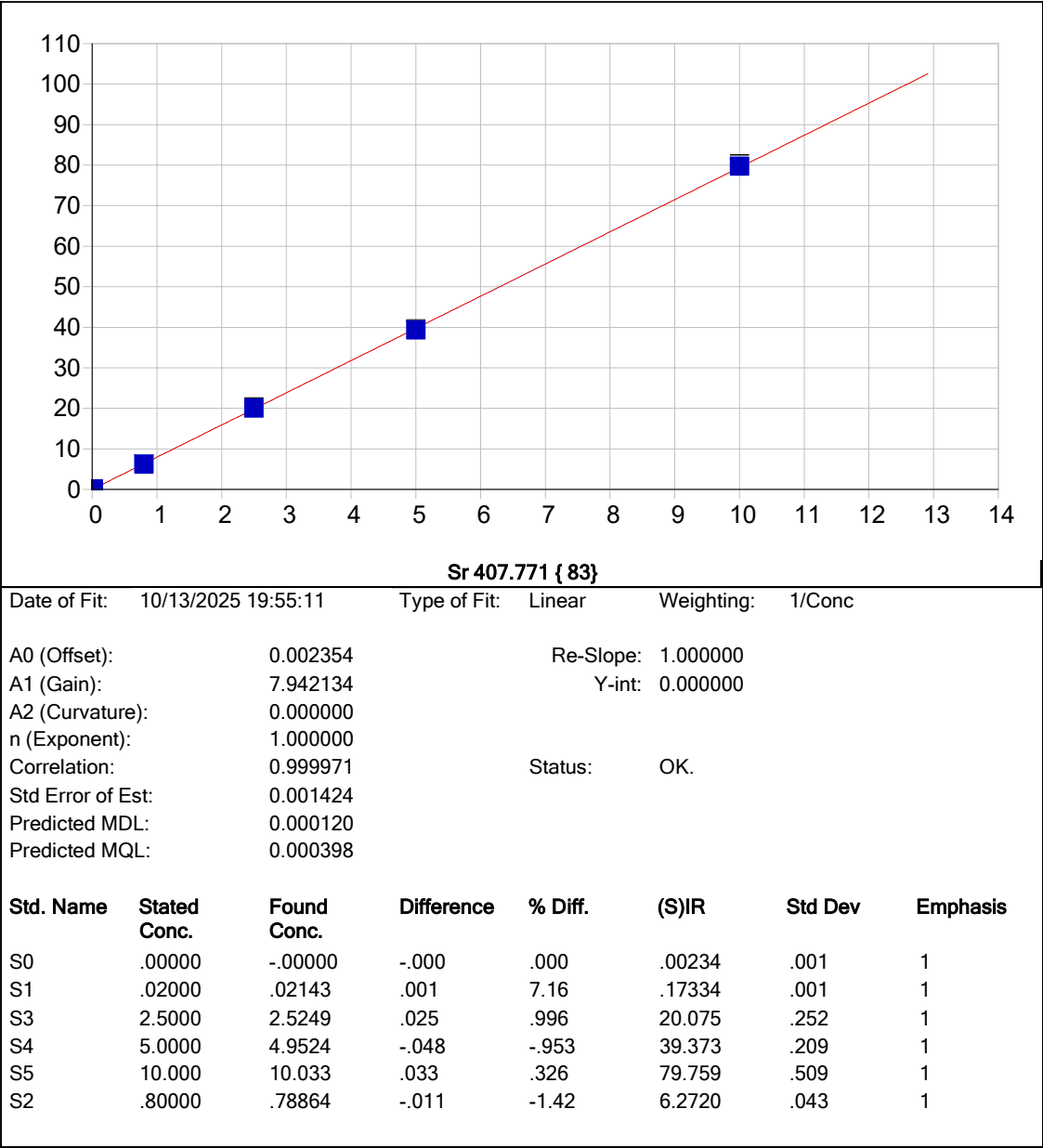


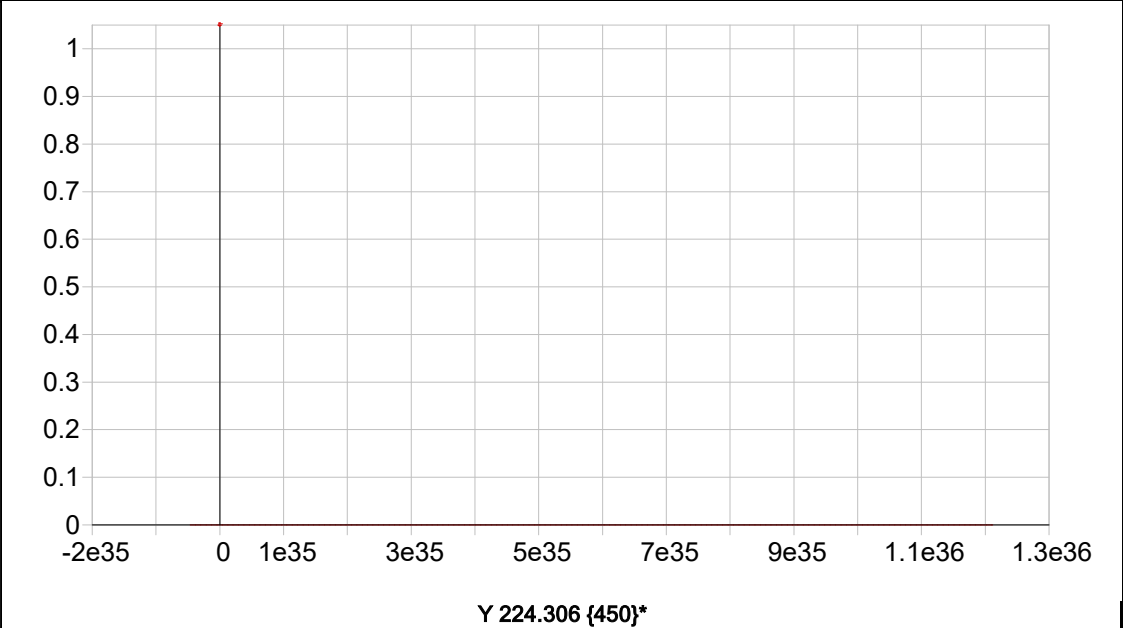






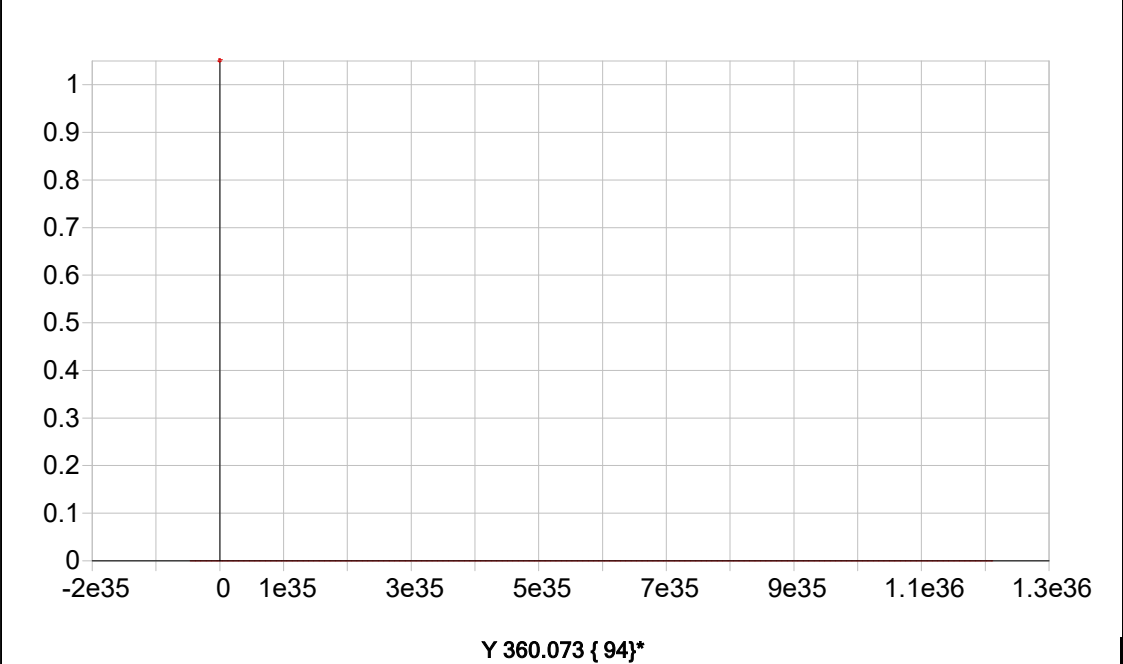




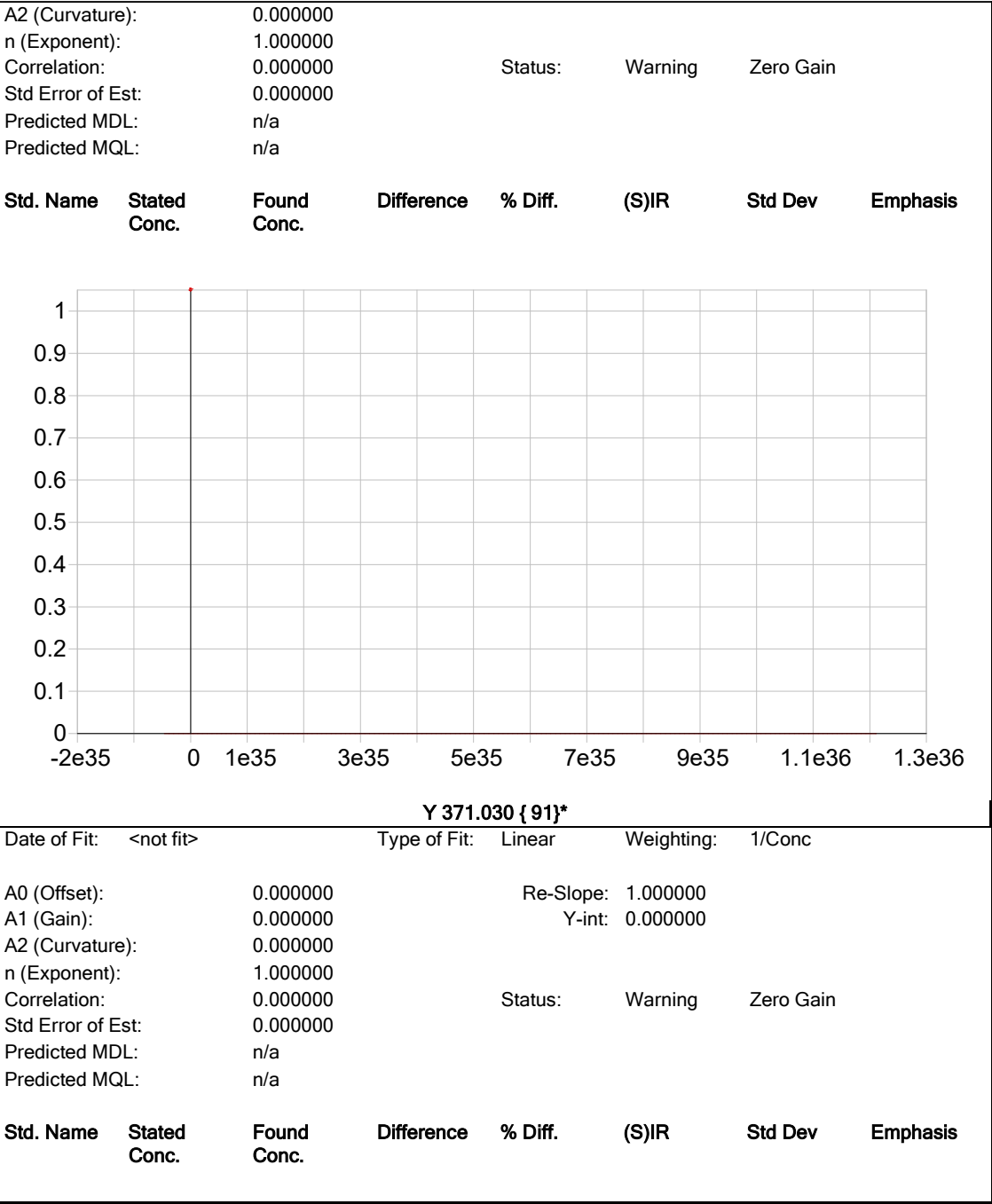


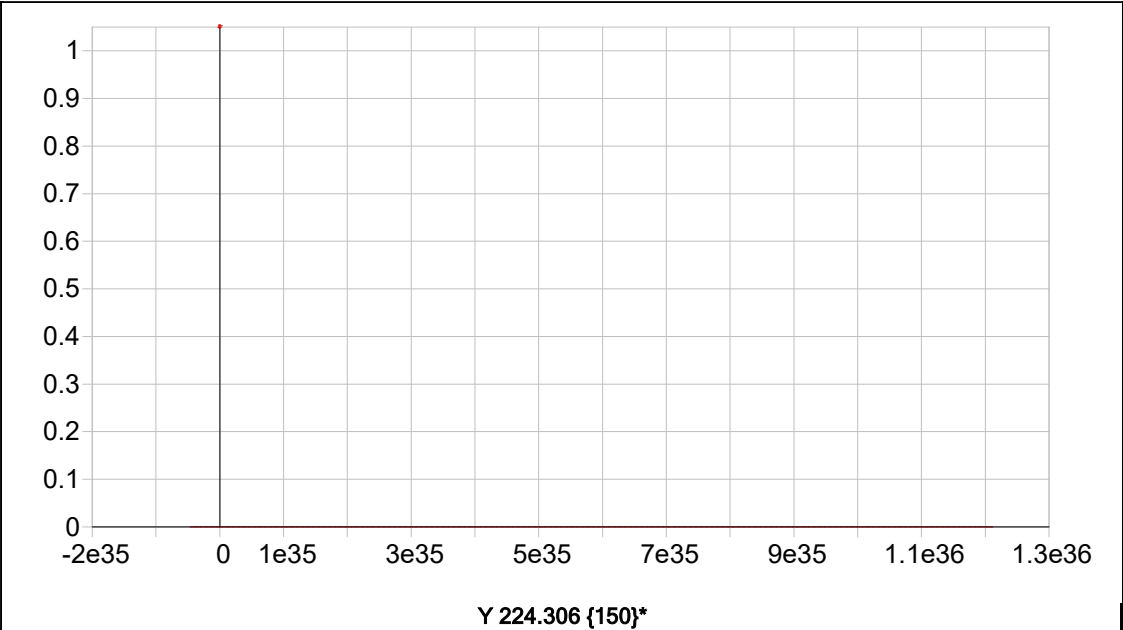
Date of Fit:	10/13/2025 19:55:11	Type of Fit:	Linear	Weighting:	1/Conc
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A1 (Gain):	0.000000	Y-int:	0.000000		
A2 (Curvature):	0.000000				
n (Exponent):	1.000000				
Correlation:	0.000000	Status:	Warning	Zero Gain	
Std Error of Est:	0.000000				
Predicted MDL:	n/a				
Predicted MQL:	n/a				

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
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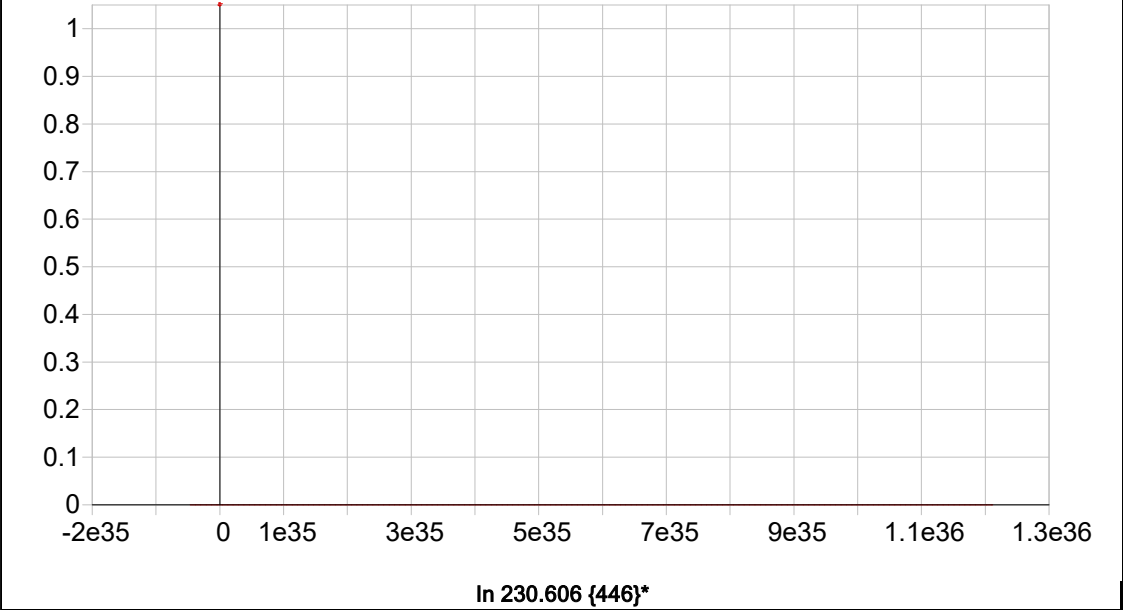
Date of Fit:	<not fit>	Type of Fit:	Linear	Weighting:	1/Conc
A0 (Offset):	0.000000	Re-Slope:	1.000000		
A1 (Gain):	0.000000	Y-int:	0.000000		





Date of Fit:	<not fit>	Type of Fit:	Linear	Weighting:	1/Conc
A0 (Offset):	0.000000		Re-Slope:	1.000000	
A1 (Gain):	0.000000		Y-int:	0.000000	
A2 (Curvature):	0.000000				
n (Exponent):	1.000000				
Correlation:	0.000000		Status:	Warning	Zero Gain
Std Error of Est:	0.000000				
Predicted MDL:	n/a				
Predicted MQL:	n/a				

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
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Date of Fit:	<not fit>	Type of Fit:	Linear	Weighting:	1/Conc
A0 (Offset):	0.000000	Re-Slope:	1.000000		
A1 (Gain):	0.000000	Y-int:	0.000000		

A2 (Curvature):		0.000000		Status:	Warning	Zero Gain	
n (Exponent):		1.000000					
Correlation:		0.000000					
Std Error of Est:		0.000000					
Predicted MDL:		n/a					
Predicted MQL:		n/a					
Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis

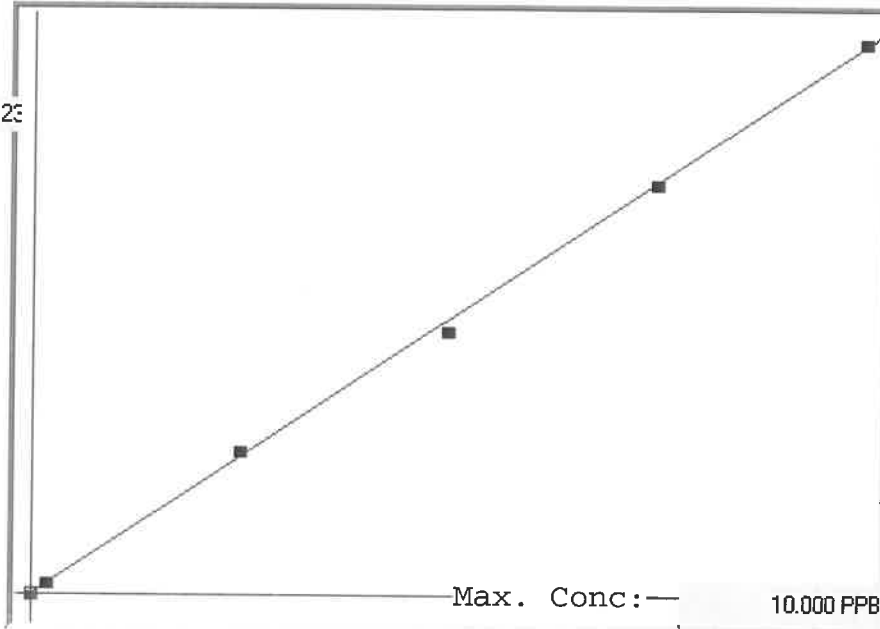
LB137509

7471B

INSTRUMENT ID:CV1

μ Abs.:

51123



Linear

A= 0.0000e+000

B= 1.9695e-004

C= -5.0279e-003

Rho= 0.9996627

Accept=Accepted

Std ID	Conc.	Calc.	Dev.	Mean	SD or %RSD	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0.0	0.000	0.006	0.006	58	0.000	58				
0.2	0.200	0.211	0.011	1096	0.0 %	1096				
2.5	2.500	2.615	0.115	13301	0.0 %	13301				
5.0	5.000	4.806	-0.194	24426	0.0 %	24426				
7.5	7.500	7.499	-0.001	38100	0.0 %	38100				
10.0	10.000	10.064	0.064	51123	0.0 %	51123				

LB137509 INSTRUMENT ID : CV1

Method: 7471B Operator: Admin Date of Analysis: 13 Oct 2025 12:55:21

Type	Sample ID	Extended ID	Conc.	µ Abs.	Units	Type	Std Conc	Method	Date
S	0.0 - 1	50	-	58	PPB	Std	0.0000	7471B	13 Oct 2025 13:27:59
S	0.2 - 1	50.2	-	1096	PPB	Std	0.2000	7471B	13 Oct 2025 13:30:21
S	2.5 - 1	52.5	-	13301	PPB	Std	2.5000	7471B	13 Oct 2025 13:32:38
S	5.0 - 1	55	-	24426	PPB	Std	5.0000	7471B	13 Oct 2025 13:34:55
S	7.5 - 1	57.5	-	38100	PPB	Std	7.5000	7471B	13 Oct 2025 13:37:29
S	10.0 - 1	510	-	51123	PPB	Std	10.0000	7471B	13 Oct 2025 13:43:23
U	ICV68 - 1	ICV68	4.1122	20905	PPB	SMPL	-7471B		13 Oct 2025 13:49:00
U	ICB68 - 1	ICB68	-0.0484	-220	PPB	SMPL	-7471B		13 Oct 2025 13:51:25
U	CCV19 - 1	CCV19	4.8029	24412	PPB	SMPL	-7471B		13 Oct 2025 13:54:03
U	CCB19 - 1	CCB19	-0.0484	-220	PPB	SMPL	-7471B		13 Oct 2025 13:56:18
U	CRA - 1	CRA	0.2035	1059	PPB	SMPL	-7471B		13 Oct 2025 13:58:59
U	HighStd - 1	HighStd	10.1200	51409	PPB	SMPL	-7471B		13 Oct 2025 14:01:14
U	ChkStd - 1	ChkStd	6.9920	35527	PPB	SMPL	-7471B		13 Oct 2025 14:03:29
U	PB170072BL - 1	PBS	-0.0639	-299	PPB	SMPL	-7471B		13 Oct 2025 14:06:19
U	PB170072BS - 1	LCSS	3.5088	17841	PPB	SMPL	-7471B		13 Oct 2025 14:11:42
U	Q3321-01 - 1	P001-DS-01	4.4323	22530	PPB	SMPL	-7471B		13 Oct 2025 14:14:05
U	Q3322-01 - 1	OR-02-100925	0.4462	2291	PPB	SMPL	-7471B		13 Oct 2025 14:16:44
U	Q3323-01 - 1	SED-01-0-2	5.5645	28279	PPB	SMPL	-7471B		13 Oct 2025 14:19:27
U	Q3323-02 - 1	SED-02-0-2	1.7356	8838	PPB	SMPL	-7471B		13 Oct 2025 14:21:45
U	Q3323-03 - 1	SED-03-0-2	4.8244	24521	PPB	SMPL	-7471B		13 Oct 2025 14:24:34
U	CCV20 - 1	CCV20	4.7068	23924	PPB	SMPL	-7471B		13 Oct 2025 14:27:06
U	CCB20 - 1	CCB20	-0.0610	-284	PPB	SMPL	-7471B		13 Oct 2025 14:29:49
U	Q3323-04 - 1	SED-04-0-2	4.8998	24904	PPB	SMPL	-7471B		13 Oct 2025 14:32:29
U	Q3323-05 - 1	SED-05-0-2	3.1182	15858	PPB	SMPL	-7471B		13 Oct 2025 14:34:45
U	Q3323-06 - 1	SED-06-0-2	1.7736	9031	PPB	SMPL	-7471B		13 Oct 2025 14:37:27
U	Q3323-07 - 1	SED-07-0-2	8.4136	42745	PPB	SMPL	-7471B		13 Oct 2025 14:40:04
U	Q3326-01 - 1	TP-1	-0.0168	-60	PPB	SMPL	-7471B		13 Oct 2025 14:42:35
U	Q3326-05 - 1	TP-2	0.3300	1701	PPB	SMPL	-7471B		13 Oct 2025 14:45:24
U	Q3327-01 - 1	HADLEY-ROAD-TP	0.1764	921	PPB	SMPL	-7471B		13 Oct 2025 14:47:41
U	Q3327-01DUP - 1	HADLEY-ROAD-TPDUP	0.1673	875	PPB	SMPL	-7471B		13 Oct 2025 14:49:58
U	Q3327-01MS - 1	HADLEY-ROAD-TPMS	3.5289	17943	PPB	SMPL	-7471B		13 Oct 2025 14:52:15
U	Q3327-01MSD - 1	HADLEY-ROAD-TPMSD	3.6982	18803	PPB	SMPL	-7471B		13 Oct 2025 14:54:30
U	CCV21 - 1	CCV21	4.7403	24094	PPB	SMPL	-7471B		13 Oct 2025 14:57:08
U	CCB21 - 1	CCB21	-0.0505	-231	PPB	SMPL	-7471B		13 Oct 2025 14:59:45
U	Q3332-01 - 1	100225-D	0.5683	2911	PPB	SMPL	-7471B		13 Oct 2025 15:02:26
U	Q3327-01LX5 - 1		-0.0017	17	PPB	SMPL	-7471B		13 Oct 2025 15:04:41
U	Q3327-01A - 1		3.5681	18142	PPB	SMPL	-7471B		13 Oct 2025 15:06:58
U	CCV22 - 1	CCV22	4.7141	23961	PPB	SMPL	-7471B		13 Oct 2025 15:09:14
U	CCB22 - 1	CCB22	-0.0576	-267	PPB	SMPL	-7471B		13 Oct 2025 15:11:52

SOP ID : M3050B-Digestion-20

SDG No : N/A

Matrix : SOIL

Pipette ID: ICP A

Balance ID : M SC-2

Filter paper ID : N/A

pH Strip ID : N/A

Hood ID : #3

Block ID: 1. HOT BLOCK #2 2. N/A

Start Digest Date: 10/13/2025 **Time :** 10:40 **Temp :** 96 °C

End Digest Date: 10/13/2025 **Time :** 12:42 **Temp :** 96 °C

Digestion tube ID: M6054

Block thermometer ID: MET-DIG. #2

Dig Technician Signature: *SRS*

Supervisor Signature: *[Signature]*

Temp : 1. 96°C 2. N/A

Standardized Name	MLS USED	STD REF. # FROM LOG
LFS-1	1.00	M6180
LFS-2	1.00	M6181
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A

Chemical Used	ML/SAMPLE USED	Lot Number
Conc. HNO3	5.00	M6158
1:1 HNO3	10.00	MP86978
30% H2O2	3.00	M6170
Conc. HCL	10.00	M6151
PTFE Boiling Stones	N/A	M5581
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A

Extraction Conformance/Non-Conformance Comments:

HOT BLOCK#2 CELL#35 96C

Date / Time	Prepped Sample Relinquished By/Location	Received By/Location
10/13/25 13:42	<i>SRS met dig</i>	<i>[Signature]</i>
	Preparation Group	Analysis Group

Lab Sample ID	Client Sample ID	pH	Initial Weight (g)	Final Vol (ml)	Color Before	Color After	Texture	Artifact	Comment	Prep Pos
PB170069BL	PBS069	N/A	2.00	100	Colorless	Yellow	Medium	No	N/A	8
PB170069BS	LCS069	N/A	2.00	100	Colorless	Yellow	Medium	No	M6180,M6181	9
Q3323-01	SED-01-0-2	N/A	2.10	100	Black	Yellow	Medium	No	N/A	10
Q3323-02	SED-02-0-2	N/A	2.26	100	Black	Yellow	Medium	No	N/A	11
Q3323-03	SED-03-0-2	N/A	2.36	100	Black	Yellow	Medium	No	N/A	12
Q3323-04	SED-04-0-2	N/A	2.42	100	Black	Yellow	Medium	No	N/A	13
Q3323-05	SED-05-0-2	N/A	2.30	100	Black	Yellow	Medium	No	N/A	14
Q3323-06	SED-06-0-2	N/A	2.26	100	Black	Yellow	Medium	No	N/A	15
Q3323-07	SED-07-0-2	N/A	2.26	100	Black	Yellow	Medium	No	N/A	16
Q3326-01	TP-1	N/A	2.16	100	Black	Yellow	Medium	No	N/A	17
Q3326-05	TP-2	N/A	2.40	100	Black	Yellow	Medium	No	N/A	18
Q3327-01	HADLEY-ROAD	N/A	2.45	100	Brown	Yellow	Medium	No	N/A	19
Q3327-01MS	HADLEY-ROADMS	N/A	2.40	100	Brown	Yellow	Medium	No	M6180,M6181	21
Q3327-01MSD	HADLEY-ROADMSD	N/A	2.30	100	Brown	Yellow	Medium	No	M6180,M6181	22
Q3327-01DUP	HADLEY-ROADDUP	N/A	2.20	100	Brown	Yellow	Medium	No	N/A	20

WORKLIST(Hardcopy Internal Chain)

Worklist Name : PB170069

Worklist ID : 192416

Department : Digestion

Date : 10-13-2025 09:40:39

Sample	Customer Sample	Matrix	Test	Preservative	Customer	Raw Sample Storage Location	Collect Date	Method
Q3323-01	SED-01-0-2	Solid	Metals ICP-TAL	Cool 4 deg C	LANG01	D31	10/09/2025	6010D
Q3323-02	SED-02-0-2	Solid	Metals ICP-TAL	Cool 4 deg C	LANG01	D31	10/09/2025	6010D
Q3323-03	SED-03-0-2	Solid	Metals ICP-TAL	Cool 4 deg C	LANG01	D31	10/09/2025	6010D
Q3323-04	SED-04-0-2	Solid	Metals ICP-TAL	Cool 4 deg C	LANG01	D31	10/09/2025	6010D
Q3323-05	SED-05-0-2	Solid	Metals ICP-TAL	Cool 4 deg C	LANG01	D31	10/09/2025	6010D
Q3323-06	SED-06-0-2	Solid	Metals ICP-TAL	Cool 4 deg C	LANG01	D31	10/09/2025	6010D
Q3323-07	SED-07-0-2	Solid	Metals ICP-TAL	Cool 4 deg C	LANG01	D31	10/09/2025	6010D
Q3326-01	TP-1	Solid	Metals ICP-TAL	Cool 4 deg C	PSEG03	D31	10/10/2025	6010D
Q3326-05	TP-2	Solid	Metals ICP-TAL	Cool 4 deg C	PSEG03	D31	10/10/2025	6010D
Q3327-01	HADLEY-ROAD-TP	Solid	Metals ICP-TAL	Cool 4 deg C	PSEG03	D31	10/10/2025	6010D

Date/Time

10/13/25

10:10

Raw Sample Received by:

SLegmct d19

Raw Sample Relinquished by:

CPCS n

Date/Time

10/13/2025

11:10

Raw Sample Received by:

CPCS n

Raw Sample Relinquished by:

SLegmct d19

SOP ID : M7471B-Mercury-19

SDG No : NA

Matrix : SOIL

Pipette ID: HG A

Balance ID : M SC-3

Filter paper ID : NA

pH Strip ID : NA

Hood ID : #1

Block ID: 1. HG HOT BLOCK#3 2. N/A

Start Digest Date: 10/13/2025 **Time :** 10:50 **Temp :** 95 °C

End Digest Date: 10/13/2025 **Time :** 11:20 **Temp :** 95 °C

Digestion tube ID: M5595

Block thermometer ID: HG-DIG#3

Dig Technician Signature: 

Supervisor Signature: 

Temp : 1. 95°C 2. N/A

Standard Name	MLS USED	STD REF. # FROM LOG
ICV	30mL	MP87536
CCV	30mL	MP87538
CRA	30mL	MP87540
Blank Spike	0.48mL	MP87528
Matrix Spike	0.48mL	MP87528

Chemical Used	ML/SAMPLE USED	Lot Number
AQUA REGIA	1.5mL	MP87542
KMnO4 (5%)	4.5mL	MP87072
Hydroxylamine HCL (12%)	2.4mL	MP87149
PTFE Boiling Stones	1.8mL	M5582
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A

LAB SAMPLE ID	CLIENT SAMPLE ID	Wt(g)/Vol(ml)	Comment
0.0 ppb	S0	30ml	MP87529
0.05 ppb	S0.05	N/A	N/A
0.2 ppb	S0.2	30ml	MP87530
2.5 ppb	S2.5	30ml	MP87531
5.0 ppb	S5.0	30ml	MP87533
7.5 ppb	S7.5	30ml	MP87534
10.0 ppb	S10.0	30ml	MP87535
ICV	ICV	30ml	MP87536
ICB	ICB	30ml	MP87537
CCV	CCV	30ml	MP87538
CCB	CCB	30ml	MP87539
CRI	CRI	30ml	MP87540
CHK STD	CHK STD	30ml	MP87541

Extraction Conformance/Non-Conformance Comments:

N/A		
Date / Time	Prepped Sample Relinquished By/Location	Received By/Location
10/13/2025 12:00	MB (Digestion Lab)	MB (Metal lab)
	Preparation Group	Analysis Group

Lab Sample ID	Client Sample ID	Initial Weight (g)	Final Vol (ml)	pH	Comment	Prep Pos
PB170072BL	PBS072	0.50	35	N/A	N/A	3-1
PB170072BS	LCS072	0.50	35	N/A	MP87528	2
Q3321-01	P001-DS-01	0.57	35	N/A	N/A	3
Q3322-01	OR-02-100925	0.56	35	N/A	N/A	4
Q3323-01	SED-01-0-2	0.54	35	N/A	N/A	5
Q3323-02	SED-02-0-2	0.57	35	N/A	N/A	6
Q3323-03	SED-03-0-2	0.52	35	N/A	N/A	7
Q3323-04	SED-04-0-2	0.57	35	N/A	N/A	8
Q3323-05	SED-05-0-2	0.56	35	N/A	N/A	9
Q3323-06	SED-06-0-2	0.53	35	N/A	N/A	10
Q3323-07	SED-07-0-2	0.57	35	N/A	N/A	11
Q3326-01	TP-1	0.56	35	N/A	N/A	12
Q3326-05	TP-2	0.52	35	N/A	N/A	13
Q3327-01	HADLEY-ROAD	0.56	35	N/A	N/A	14
Q3327-01MS	HADLEY-ROADMS	0.56	35	N/A	MP87528	16
Q3327-01MSD	HADLEY-ROADMSD	0.54	35	N/A	MP87528	17
Q3327-01DUP	HADLEY-ROADDUP	0.55	35	N/A	N/A	15
Q3332-01	100225-D	0.58	35	N/A	N/A	18

WORKLIST(Hardcopy Internal Chain)

WorkList Name : 101325_7471 WorkList ID : 192419 Department : Digestion Date : 10-13-2025 10:34:34

Sample	Customer Sample	Matrix	Test	Preservative	Customer	Raw Sample Storage Location	Collect Date	Method
Q3321-01	P001-DS-01	Solid	Mercury	Cool 4 deg C	ROYF02	D41	10/08/2025	7471B
Q3322-01	OR-02-100925	Solid	Mercury	Cool 4 deg C	PSEG05	D31	10/09/2025	7471B
Q3323-01	SED-01-0-2	Solid	Mercury	Cool 4 deg C	LANG01	D31	10/09/2025	7471B
Q3323-02	SED-02-0-2	Solid	Mercury	Cool 4 deg C	LANG01	D31	10/09/2025	7471B
Q3323-03	SED-03-0-2	Solid	Mercury	Cool 4 deg C	LANG01	D31	10/09/2025	7471B
Q3323-04	SED-04-0-2	Solid	Mercury	Cool 4 deg C	LANG01	D31	10/09/2025	7471B
Q3323-05	SED-05-0-2	Solid	Mercury	Cool 4 deg C	LANG01	D31	10/09/2025	7471B
Q3323-06	SED-06-0-2	Solid	Mercury	Cool 4 deg C	LANG01	D31	10/09/2025	7471B
Q3323-07	SED-07-0-2	Solid	Mercury	Cool 4 deg C	LANG01	D31	10/09/2025	7471B
Q3326-01	TP-1	Solid	Mercury	Cool 4 deg C	PSEG03	D31	10/10/2025	7471B
Q3326-05	TP-2	Solid	Mercury	Cool 4 deg C	PSEG03	D31	10/10/2025	7471B
Q3327-01	HADLEY-ROAD-TP	Solid	Mercury	Cool 4 deg C	PSEG03	D31	10/10/2025	7471B
Q3332-01	100225-D	Solid	Mercury	Cool 4 deg C	PSEG03	D41	10/10/2025	7471B

Date/Time 10/13/25 10:35
 Raw Sample Received by: MDG-LUG
 Raw Sample Relinquished by: MDG-LUG

Date/Time 10/13/25 11:05
 Raw Sample Received by: MDG-LUG
 Raw Sample Relinquished by: MDG-LUG

PERCENT SOLID

Supervisor: Iwona
Analyst: jignesh
Date: 10/15/2025

OVENTEMP IN Celsius(°C): 107
Time IN: 17:25
In Date: 10/10/2025
Weight Check 1.0g: 1.00
Weight Check 10g: 10.00
OvenID: M OVEN#1

OVENTEMP OUT Celsius(°C): 104
Time OUT: 08:40
Out Date: 10/11/2025
Weight Check 1.0g: 1.00
Weight Check 10g: 10.00
BalanceID: M SC-4
Thermometer ID: % SOLID-OVEN

QC:LB137490

Lab ID	Client SampleID	Dish #	Dish Wt(g) (A)	Sample Wt(g)	Dish + Sample Wt(g) (B)	Dish+Dry Sample Wt(g) (C)	% Solid	Comments
Q3323-01	SED-01-0-2	1	1.15	10.84	11.99	8.39	66.8	
Q3323-02	SED-02-0-2	2	1.19	10.07	11.26	6.96	57.3	
Q3323-03	SED-03-0-2	3	1.19	10.97	12.16	9.05	71.6	
Q3323-04	SED-04-0-2	4	1.13	11.34	12.47	9.09	70.2	
Q3323-05	SED-05-0-2	5	1.19	10.26	11.45	9.13	77.4	
Q3323-06	SED-06-0-2	6	1.13	10.78	11.91	9.84	80.8	
Q3323-07	SED-07-0-2	7	1.14	10.46	11.6	9.63	81.2	
Q3325-01	SVOC-GPC-BLANK	8	1.00	1.00	2.00	2.00	100.0	
Q3325-02	PEST-GPC-BLANK	9	1.00	1.00	2.00	2.00	100.0	
Q3325-03	PEST-GPC-BLANK-SPIKE	10	1.00	1.00	2.00	2.00	100.0	
Q3325-04	SVOC-GPC2-BLANK	11	1.00	1.00	2.00	2.00	100.0	
Q3325-05	PEST-GPC2-BLANK	12	1.00	1.00	2.00	2.00	100.0	
Q3325-06	PEST -GPC2-BLANK-SPIKE	13	1.00	1.00	2.00	2.00	100.0	
Q3326-01	TP-1	14	1.14	10.71	11.85	10.6	88.3	
Q3326-02	TP-1-EPH	15	1.16	10.31	11.47	10.28	88.5	
Q3326-03	TP-1-VOC	16	1.18	11.20	12.38	11.12	88.7	
Q3326-05	TP-2	17	1.11	10.49	11.6	10.35	88.1	
Q3326-06	TP-2-EPH	18	1.19	10.53	11.72	10.64	89.7	
Q3326-07	TP-2-VOC	19	1.14	10.84	11.98	10.86	89.7	
Q3327-01	HADLEY-ROAD-TP	20	1.15	10.77	11.92	10.65	88.2	
Q3329-01	106	21	1.00	1.00	2.00	2.00	100.0	WIPE SAMPLE
Q3332-01	100225-D	22	1.16	10.32	11.48	10.41	89.6	
Q3333-01	100725-A	23	1.00	1.00	2.00	2.00	100.0	WIPE SAMPLE
Q3334-01	100325	24	1.00	1.00	2.00	2.00	100.0	debris

$$\% \text{ Solid} = \frac{(C-A) * 100}{(B-A)}$$

WORKLIST(Hardcopy Internal Chain)

15120

WorkList Name : %1-101025 WorkList ID : 192391 Department : Wet-Chemistry Date : 10-10-2025 10:38:22

Sample	Customer Sample	Matrix	Test	Preservative	Customer	Raw Sample Storage Location	Collect Date	Method
Q3323-01	SED-01-0-2	Solid	Percent Solids	Cool 4 deg C	LANG01	D31	10/09/2025	Chemtech -SO
Q3323-02	SED-02-0-2	Solid	Percent Solids	Cool 4 deg C	LANG01	D31	10/09/2025	Chemtech -SO
Q3323-03	SED-03-0-2	Solid	Percent Solids	Cool 4 deg C	LANG01	D31	10/09/2025	Chemtech -SO
Q3323-04	SED-04-0-2	Solid	Percent Solids	Cool 4 deg C	LANG01	D31	10/09/2025	Chemtech -SO
Q3323-05	SED-05-0-2	Solid	Percent Solids	Cool 4 deg C	LANG01	D31	10/09/2025	Chemtech -SO
Q3323-06	SED-06-0-2	Solid	Percent Solids	Cool 4 deg C	LANG01	D31	10/09/2025	Chemtech -SO
Q3323-07	SED-07-0-2	Solid	Percent Solids	Cool 4 deg C	LANG01	D31	10/09/2025	Chemtech -SO
Q3325-01	SVOC-GPC-BLANK	Solid	Percent Solids	Cool 4 deg C	CHEM02	D31	10/03/2025	Chemtech -SO
Q3325-02	PEST-GPC-BLANK	Solid	Percent Solids	Cool 4 deg C	CHEM02	D31	10/03/2025	Chemtech -SO
Q3325-03	PEST-GPC-BLANK-SPIKE	Solid	Percent Solids	Cool 4 deg C	CHEM02	D31	10/03/2025	Chemtech -SO
Q3325-04	SVOC-GPC2-BLANK	Solid	Percent Solids	Cool 4 deg C	CHEM02	D31	10/03/2025	Chemtech -SO
Q3325-05	PEST-GPC2-BLANK	Solid	Percent Solids	Cool 4 deg C	CHEM02	D31	10/03/2025	Chemtech -SO
Q3325-06	PEST -GPC2-BLANK-SPIKE	Solid	Percent Solids	Cool 4 deg C	CHEM02	D31	10/03/2025	Chemtech -SO
Q3326-01	TP-1	Solid	Percent Solids	Cool 4 deg C	PSEG03	D31	10/10/2025	Chemtech -SO
Q3326-02	TP-1-EPH	Solid	Percent Solids	Cool 4 deg C	PSEG03	D31	10/10/2025	Chemtech -SO
Q3326-03	TP-1-VOC	Solid	Percent Solids	Cool 4 deg C	PSEG03	D31	10/10/2025	Chemtech -SO
Q3326-05	TP-2	Solid	Percent Solids	Cool 4 deg C	PSEG03	D31	10/10/2025	Chemtech -SO
Q3326-06	TP-2-EPH	Solid	Percent Solids	Cool 4 deg C	PSEG03	D31	10/10/2025	Chemtech -SO
Q3326-07	TP-2-VOC	Solid	Percent Solids	Cool 4 deg C	PSEG03	D31	10/10/2025	Chemtech -SO
Q3327-01	HADLEY-ROAD	Solid	Percent Solids	Cool 4 deg C	PSEG03	D31	10/10/2025	Chemtech -SO
Q3329-01	106	Solid	Percent Solids	Cool 4 deg C	PSEG03	D31	10/10/2025	Chemtech -SO

Date/Time 10/10/25 15:20
 Raw Sample Received by: [Signature]
 Raw Sample Relinquished by: [Signature]

27137490

WORKLIST(Hardcopy Internal Chain)

WorkList Name : %1-101025 WorkList ID : 192391 Department : Wet-Chemistry Date : 10-10-2025 10:38:22

Sample	Customer Sample	Matrix	Test	Preservative	Customer	Raw Sample Storage Location	Collect Date	Method
Q3332-01	100225-D	Solid	Percent Solids	Cool 4 deg C	PSEG03	D41	10/10/2025	Chemtech -SO
Q3333-01	100725-A	Solid	Percent Solids	Cool 4 deg C	PSEG03	D11	10/10/2025	Chemtech -SO
Q3334-01	100325	Solid	Percent Solids	Cool 4 deg C	PSEG03	D31	10/10/2025	Chemtech -SO

Date/Time 10/10/25 15:20
 Raw Sample Received by: [Signature]
 Raw Sample Relinquished by: [Signature]

Date/Time 10/10/25
 Raw Sample Received by: [Signature]
 Raw Sample Relinquished by: [Signature]

Instrument ID: CV1

Daily Analysis Runlog For Sequence/QC Batch ID # LB137509

Review By	jaswal	Review On	10/14/2025 12:31:04 PM
Supervise By	janvi	Supervise On	10/14/2025 12:32:11 PM

STD. NAME	STD REF.#
ICAL Standard	MP87529,MP87530,MP87531,MP87533,MP87534,MP87535
ICV Standard	MP87536
CCV Standard	MP87538
ICSA Standard	
CRI Standard	MP87540
LCS Standard	
Chk Standard	MP87537,MP87539,MP87541,MP875423

Sr#	SampleId	ClientID	QcType	Date	Comment	Operator	Status
1	S0	S0	CAL1	10/13/25 13:27		mohan	OK
2	S0.2	S0.2	CAL2	10/13/25 13:30		mohan	OK
3	S2.5	S2.5	CAL3	10/13/25 13:32		mohan	OK
4	S5	S5	CAL4	10/13/25 13:34		mohan	OK
5	S7.5	S7.5	CAL5	10/13/25 13:37		mohan	OK
6	S10	S10	CAL6	10/13/25 13:43		mohan	OK
7	ICV68	ICV68	ICV	10/13/25 13:49		mohan	OK
8	ICB68	ICB68	ICB	10/13/25 13:51		mohan	OK
9	CCV19	CCV19	CCV	10/13/25 13:54		mohan	OK
10	CCB19	CCB19	CCB	10/13/25 13:56		mohan	OK
11	CRA	CRA	CRDL	10/13/25 13:58		mohan	OK
12	HighStd	HighStd	HIGH STD	10/13/25 14:01		mohan	OK
13	ChkStd	ChkStd	SAM	10/13/25 14:03		mohan	OK
14	PB170072BL	PB170072BL	MB	10/13/25 14:06		mohan	OK
15	PB170072BS	PB170072BS	LCS	10/13/25 14:11		mohan	OK
16	Q3321-01	P001-DS-01	SAM	10/13/25 14:14		mohan	OK
17	Q3322-01	OR-02-100925	SAM	10/13/25 14:16		mohan	OK
18	Q3323-01	SED-01-0-2	SAM	10/13/25 14:19		mohan	OK

Instrument ID: CV1

Daily Analysis Runlog For Sequence/QC Batch ID # LB137509

Review By	jaswal	Review On	10/14/2025 12:31:04 PM
Supervise By	janvi	Supervise On	10/14/2025 12:32:11 PM
STD. NAME	STD REF.#		
ICAL Standard	MP87529,MP87530,MP87531,MP87533,MP87534,MP87535		
ICV Standard	MP87536		
CCV Standard	MP87538		
ICSA Standard			
CRI Standard	MP87540		
LCS Standard			
Chk Standard	MP87537,MP87539,MP87541,MP875423		

19	Q3323-02	SED-02-0-2	SAM	10/13/25 14:21		mohan	OK
20	Q3323-03	SED-03-0-2	SAM	10/13/25 14:24		mohan	OK
21	CCV20	CCV20	CCV	10/13/25 14:27		mohan	OK
22	CCB20	CCB20	CCB	10/13/25 14:29		mohan	OK
23	Q3323-04	SED-04-0-2	SAM	10/13/25 14:32		mohan	OK
24	Q3323-05	SED-05-0-2	SAM	10/13/25 14:34		mohan	OK
25	Q3323-06	SED-06-0-2	SAM	10/13/25 14:37		mohan	OK
26	Q3323-07	SED-07-0-2	SAM	10/13/25 14:40		mohan	OK
27	Q3326-01	TP-1	SAM	10/13/25 14:42		mohan	OK
28	Q3326-05	TP-2	SAM	10/13/25 14:45		mohan	OK
29	Q3327-01	HADLEY-ROAD-TP	SAM	10/13/25 14:47		mohan	OK
30	Q3327-01DUP	HADLEY-ROAD-TPD	DUP	10/13/25 14:49		mohan	OK
31	Q3327-01MS	HADLEY-ROAD-TPM	MS	10/13/25 14:52		mohan	OK
32	Q3327-01MSD	HADLEY-ROAD-TPM	MSD	10/13/25 14:54		mohan	OK
33	CCV21	CCV21	CCV	10/13/25 14:57		mohan	OK
34	CCB21	CCB21	CCB	10/13/25 14:59		mohan	OK
35	Q3332-01	100225-D	SAM	10/13/25 15:02		mohan	OK
36	Q3327-01L	HADLEY-ROAD-TPL	SD	10/13/25 15:04		mohan	OK
37	Q3327-01A	HADLEY-ROAD-TPA	PS	10/13/25 15:06		mohan	OK
38	CCV22	CCV22	CCV	10/13/25 15:09		mohan	OK

Instrument ID: CV1

Daily Analysis Runlog For Sequence/QC Batch ID # LB137509

Review By	jaswal	Review On	10/14/2025 12:31:04 PM
Supervise By	janvi	Supervise On	10/14/2025 12:32:11 PM
STD. NAME	STD REF.#		
ICAL Standard	MP87529,MP87530,MP87531,MP87533,MP87534,MP87535		
ICV Standard	MP87536		
CCV Standard	MP87538		
ICSA Standard			
CRI Standard	MP87540		
LCS Standard			
Chk Standard	MP87537,MP87539,MP87541,MP875423		

39	CCB22	CCB22	CCB	10/13/25 15:11		mohan	OK
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Instrument ID: P4

Daily Analysis Runlog For Sequence/QC Batch ID # LB137518

Review By	Janvi	Review On	10/15/2025 12:22:11 PM
Supervise By	jaswal	Supervise On	10/16/2025 5:03:11 AM
STD. NAME	STD REF.#		
ICAL Standard	MP87031,MP87038,MP87035,MP87034,MP87033,MP87032		
ICV Standard	MP87039,MP87038		
CCV Standard	MP87042		
ICSA Standard	MP87040,MP87041		
CRI Standard	MP87038		
LCS Standard			
Chk Standard	MP87043,MP87044,MP87045,MP87046,MP87049		

Sr#	SampleId	ClientID	QcType	Date	Comment	Operator	Status
1	S0	S0	CAL1	10/13/25 12:12		Jaswal	OK
2	S1	S1	CAL2	10/13/25 12:17		Jaswal	OK
3	S2	S2	CAL3	10/13/25 12:21		Jaswal	OK
4	S3	S3	CAL4	10/13/25 12:25		Jaswal	OK
5	S4	S4	CAL5	10/13/25 12:29		Jaswal	OK
6	S5	S5	CAL6	10/13/25 12:33		Jaswal	OK
7	ICV01	ICV01	ICV	10/13/25 12:46		Jaswal	OK
8	LLICV01	LLICV01	LLICV	10/13/25 12:51		Jaswal	OK
9	ICB01	ICB01	ICB	10/13/25 12:55		Jaswal	OK
10	CRI01	CRI01	CRDL	10/13/25 13:00		Jaswal	OK
11	ICSA01	ICSA01	ICSA	10/13/25 13:04		Jaswal	OK
12	ICSAB01	ICSAB01	ICSAB	10/13/25 13:08		Jaswal	OK
13	ICSA01DL	ICSA01DL	ICSA	10/13/25 13:12		Jaswal	OK
14	ICSAB01DL	ICSAB01DL	ICSAB	10/13/25 13:16		Jaswal	OK
15	CCV01	CCV01	CCV	10/13/25 13:21		Jaswal	OK
16	CCB01	CCB01	CCB	10/13/25 13:25		Jaswal	OK
17	PB170057BL	PB170057BL	MB	10/13/25 13:29		Jaswal	OK
18	PB170057BS	PB170057BS	LCS	10/13/25 13:33		Jaswal	OK

Instrument ID: P4

Daily Analysis Runlog For Sequence/QC Batch ID # LB137518

Review By	Janvi	Review On	10/15/2025 12:22:11 PM
Supervise By	jaswal	Supervise On	10/16/2025 5:03:11 AM
STD. NAME	STD REF.#		
ICAL Standard	MP87031,MP87038,MP87035,MP87034,MP87033,MP87032		
ICV Standard	MP87039,MP87038		
CCV Standard	MP87042		
ICSA Standard	MP87040,MP87041		
CRI Standard	MP87038		
LCS Standard			
Chk Standard	MP87043,MP87044,MP87045,MP87046,MP87049		

19	Q3318-04	3436	SAM	10/13/25 13:37		Jaswal	OK
20	Q3318-04DUP	3436DUP	DUP	10/13/25 13:41		Jaswal	OK
21	Q3318-04L	3436L	SD	10/13/25 13:45		Jaswal	OK
22	Q3318-04MS	3436MS	MS	10/13/25 13:50		Jaswal	OK
23	Q3318-04MSD	3436MSD	MSD	10/13/25 13:54		Jaswal	OK
24	Q3318-04A	3436A	PS	10/13/25 13:58	0.1ML OF EACH M6008 AND M6017 IN10ML SAMPLE.	Jaswal	OK
25	Q3297-10	TP1	SAM	10/13/25 14:03		Jaswal	OK
26	Q3297-20	TP2	SAM	10/13/25 14:07		Jaswal	OK
27	CCV02	CCV02	CCV	10/13/25 14:18		Jaswal	OK
28	CCB02	CCB02	CCB	10/13/25 14:22		Jaswal	OK
29	PB170069BL	PB170069BL	MB	10/13/25 15:07		Jaswal	OK
30	PB170069BS	PB170069BS	LCS	10/13/25 15:18		Jaswal	OK
31	Q3323-01	SED-01-0-2	SAM	10/13/25 15:22		Jaswal	OK
32	Q3323-02	SED-02-0-2	SAM	10/13/25 15:26	Zn high	Jaswal	Dilution
33	Q3323-03	SED-03-0-2	SAM	10/13/25 15:31		Jaswal	OK
34	Q3323-04	SED-04-0-2	SAM	10/13/25 15:35		Jaswal	OK
35	Q3323-05	SED-05-0-2	SAM	10/13/25 15:39		Jaswal	OK
36	Q3323-06	SED-06-0-2	SAM	10/13/25 15:43	Ag is oversaturated and Fe high	Jaswal	Dilution
37	Q3323-07	SED-07-0-2	SAM	10/13/25 15:47	Fe high	Jaswal	Dilution

Instrument ID: P4

Daily Analysis Runlog For Sequence/QC Batch ID # LB137518

Review By	Janvi	Review On	10/15/2025 12:22:11 PM
Supervise By	jaswal	Supervise On	10/16/2025 5:03:11 AM
STD. NAME	STD REF.#		
ICAL Standard	MP87031,MP87038,MP87035,MP87034,MP87033,MP87032		
ICV Standard	MP87039,MP87038		
CCV Standard	MP87042		
ICSA Standard	MP87040,MP87041		
CRI Standard	MP87038		
LCS Standard			
Chk Standard	MP87043,MP87044,MP87045,MP87046,MP87049		

38	Q3326-01	TP-1	SAM	10/13/25 15:51		Jaswal	OK
39	CCV03	CCV03	CCV	10/13/25 16:04		Jaswal	OK
40	CCB03	CCB03	CCB	10/13/25 16:08		Jaswal	OK
41	Q3326-05	TP-2	SAM	10/13/25 16:12		Jaswal	OK
42	Q3327-01	HADLEY-ROAD-TP	SAM	10/13/25 16:16		Jaswal	OK
43	Q3327-01DUP	HADLEY-ROAD-TPD	DUP	10/13/25 16:20		Jaswal	OK
44	Q3327-01L	HADLEY-ROAD-TPL	SD	10/13/25 16:25		Jaswal	OK
45	Q3327-01MS	HADLEY-ROAD-TPM	MS	10/13/25 16:29		Jaswal	OK
46	Q3327-01MSD	HADLEY-ROAD-TPM	MSD	10/13/25 16:33		Jaswal	OK
47	Q3327-01A	HADLEY-ROAD-TPA	PS	10/13/25 16:37	0.1ML OF EACH M6008 AND M6017 IN 10ML SAMPLE.	Jaswal	OK
48	Q3323-02DL	SED-02-0-2DL	SAM	10/13/25 16:42	5X For Zn	Jaswal	Confirms
49	PB170074BL	PB170074BL	MB	10/13/25 16:54		Jaswal	OK
50	PB170074BS	PB170074BS	LCS	10/13/25 16:58		Jaswal	OK
51	CCV04	CCV04	CCV	10/13/25 17:02		Jaswal	OK
52	CCB04	CCB04	CCB	10/13/25 17:06		Jaswal	OK
53	PB170062TB	PB170062TB	MB	10/13/25 17:20		Jaswal	OK
54	Q3321-02	P001-DS-01	SAM	10/13/25 17:24		Jaswal	OK
55	Q3326-04	TP-1	SAM	10/13/25 17:29		Jaswal	OK
56	Q3326-08	TP-2	SAM	10/13/25 17:33		Jaswal	OK

Instrument ID: P4

Daily Analysis Runlog For Sequence/QC Batch ID # LB137518

Review By	Janvi	Review On	10/15/2025 12:22:11 PM
Supervise By	jaswal	Supervise On	10/16/2025 5:03:11 AM
STD. NAME	STD REF.#		
ICAL Standard	MP87031,MP87038,MP87035,MP87034,MP87033,MP87032		
ICV Standard	MP87039,MP87038		
CCV Standard	MP87042		
ICSA Standard	MP87040,MP87041		
CRI Standard	MP87038		
LCS Standard			
Chk Standard	MP87043,MP87044,MP87045,MP87046,MP87049		

57	Q3327-02	HADLEY-ROAD-TP	SAM	10/13/25 17:38		Jaswal	OK
58	Q3327-02DUP	HADLEY-ROAD-TPD	DUP	10/13/25 17:42		Jaswal	OK
59	Q3327-02L	HADLEY-ROAD-TPL	SD	10/13/25 17:46		Jaswal	OK
60	Q3327-02MS	HADLEY-ROAD-TPM	MS	10/13/25 17:51		Jaswal	OK
61	Q3327-02MSD	HADLEY-ROAD-TPM	MSD	10/13/25 17:55		Jaswal	OK
62	Q3327-02A	HADLEY-ROAD-TPA	PS	10/13/25 17:59	0.1ML OF EACH M6008 AND M6017 IN10ML SAMPLE.	Jaswal	OK
63	CCV05	CCV05	CCV	10/13/25 18:11		Jaswal	OK
64	CCB05	CCB05	CCB	10/13/25 18:15		Jaswal	OK
65	PB170070BL	PB170070BL	MB	10/13/25 18:20		Jaswal	OK
66	PB170070BS	PB170070BS	LCS	10/13/25 18:24		Jaswal	OK
67	Q3331-04	RINGWOOD	SAM	10/13/25 18:31		Jaswal	OK
68	Q3331-04DUP	RINGWOODDUP	DUP	10/13/25 18:35		Jaswal	OK
69	Q3331-04L	RINGWOODL	SD	10/13/25 18:40		Jaswal	OK
70	Q3331-04MS	RINGWOODMS	MS	10/13/25 18:44		Jaswal	OK
71	Q3331-04MSD	RINGWOODMSD	MSD	10/13/25 18:48		Jaswal	OK
72	Q3331-04A	RINGWOODA	PS	10/13/25 18:52	0.1ML OF EACH M6008 AND M6017 IN10ML SAMPLE.	Jaswal	OK
73	CCV06	CCV06	CCV	10/13/25 18:56		Jaswal	OK
74	CCB06	CCB06	CCB	10/13/25 19:01		Jaswal	OK

Instrument ID: P4

Daily Analysis Runlog For Sequence/QC Batch ID # LB137518

Review By	Janvi	Review On	10/15/2025 12:22:11 PM
Supervise By	jaswal	Supervise On	10/16/2025 5:03:11 AM
STD. NAME	STD REF.#		
ICAL Standard	MP87031,MP87038,MP87035,MP87034,MP87033,MP87032		
ICV Standard	MP87039,MP87038		
CCV Standard	MP87042		
ICSA Standard	MP87040,MP87041		
CRI Standard	MP87038		
LCS Standard			
Chk Standard	MP87043,MP87044,MP87045,MP87046,MP87049		

75	Q3323-06DL	SED-06-0-2DL	SAM	10/13/25 19:05	5X For Ag, Fe	Jaswal	Confirms
76	Q3323-07DL	SED-07-0-2DL	SAM	10/13/25 19:09	5X For Fe	Jaswal	Confirms
77	LR-1	LR-1	HIGH STD	10/13/25 19:13		Jaswal	OK
78	LR-2	LR-2	HIGH STD	10/13/25 19:18		Jaswal	OK
79	LR-3	LR-3	HIGH STD	10/13/25 19:37		Jaswal	OK
80	CCV07	CCV07	CCV	10/13/25 19:46		Jaswal	OK
81	CCB07	CCB07	CCB	10/13/25 19:50		Jaswal	OK

Prep Standard - Chemical Standard Summary

Order ID : Q3323

Test : Mercury, Metals ICP-TAL

Prepbatch ID : PB170069, PB170072,

Sequence ID/Qc Batch ID: LB137509, LB137518,

Standard ID :

MP86978, MP87031, MP87032, MP87033, MP87034, MP87035, MP87036, MP87038, MP87039, MP87040, MP87041, MP87042, MP87043, MP87044, MP87045, MP87046, MP87049, MP87072, MP87149, MP87528, MP87529, MP87530, MP87531, MP87533, MP87534, MP87535, MP87536, MP87537, MP87538, MP87539, MP87540, MP87541, MP87542, MP875423,

Chemical ID :

M4916, M5062, M5467, M5581, M5582, M5658, M5748, M5751, M5798, M5799, M5800, M5801, M5814, M5820, M5884, M5962, M5969, M5971, M5979, M5985, M5998, M6021, M6023, M6026, M6027, M6028, M6030, M6032, M6077, M6128, M6137, M6138, M6140, M6142, M6144, M6145, M6151, M6158, M6159, M6160, M6161, M6162, M6163, M6164, M6165, M6170, M6171, M6174, M6176, M6177, M6178, M6179, M6180, M6181, M6182, M6184, M6187, M6196, M6200, W 3112,

Metals STANDARD PREPARATION LOG

<u>Recipe ID</u>	<u>NAME</u>	<u>NO.</u>	<u>Prep Date</u>	<u>Expiration Date</u>	<u>Prepared By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u>
169	1:1HNO3	MP86978	08/28/2025	11/27/2025	Sagar Kanani	None	None	Sarabjit Jaswal
								08/28/2025

FROM 1250.00000ml of M6162 + 1250.00000ml of W3112 = Final Quantity: 2500.000 ml

<u>Recipe ID</u>	<u>NAME</u>	<u>NO.</u>	<u>Prep Date</u>	<u>Expiration Date</u>	<u>Prepared By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u>
902	ICP AES CAL BLK (SO/ICB/CCB)	MP87031	09/02/2025	10/17/2025	Sarabjit Jaswal	None	None	Janvi Patel
								09/04/2025

FROM 125.00000ml of M6151 + 2350.00000ml of W3112 + 25.00000ml of M6187 = Final Quantity: 2500.000 ml



<u>Recipe ID</u>	<u>NAME</u>	<u>NO.</u>	<u>Prep Date</u>	<u>Expiration Date</u>	<u>Prepared By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u>
907	ICP AES STD S (S5)	MP87032	09/02/2025	10/17/2025	Sarabjit Jaswal	None	None	Janvi Patel 09/04/2025
<u>FROM</u>	5.00000ml of M5467 + 5.00000ml of M5820 + 5.00000ml of M5969 + 5.00000ml of M5971 + 5.00000ml of M5998 + 5.00000ml of M6077 + 5.00000ml of M6160 + 5.00000ml of M6174 + 5.00000ml of M6176 + 455.00000ml of MP87031 = Final Quantity: 500.000 ml							

<u>Recipe ID</u>	<u>NAME</u>	<u>NO.</u>	<u>Prep Date</u>	<u>Expiration Date</u>	<u>Prepared By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u>
910	ICP AES STD S4	MP87033	09/02/2025	10/17/2025	Sarabjit Jaswal	None	None	Janvi Patel
09/04/2025								
<u>FROM</u> 50.00000ml of MP87031 + 50.00000ml of MP87032 = Final Quantity: 100.000 ml								

Metals STANDARD PREPARATION LOG

<u>Recipe ID</u>	<u>NAME</u>	<u>NO.</u>	<u>Prep Date</u>	<u>Expiration Date</u>	<u>Prepared By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u>
909	ICP AES STD S3	MP87034	09/02/2025	10/17/2025	Sarabjit Jaswal	None	METALS_PIPETTE_3 (A)	Janvi Patel 09/04/2025

FROM 25.00000ml of MP87032 + 75.00000ml of MP87031 = Final Quantity: 100.000 ml

<u>Recipe ID</u>	<u>NAME</u>	<u>NO.</u>	<u>Prep Date</u>	<u>Expiration Date</u>	<u>Prepared By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u>
3913	ICP AES STD S2	MP87035	09/02/2025	10/17/2025	Sarabjit Jaswal	None	METALS_PIPETTE_3 (A)	Janvi Patel 09/04/2025

FROM 16.00000ml of MP87032 + 184.00000ml of MP87031 = Final Quantity: 200.000 ml

Metals STANDARD PREPARATION LOG

<u>Recipe ID</u>	<u>NAME</u>	<u>NO.</u>	<u>Prep Date</u>	<u>Expiration Date</u>	<u>Prepared By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u>
2950	ICP AES S1/CRI STOCK STD	MP87036	09/02/2025	10/17/2025	Sarabjit Jaswal	None	METALS_PIPETTE_3 (A)	Janvi Patel 09/04/2025

FROM 0.03000ml of M5798 + 0.03000ml of M6028 + 0.04000ml of M6137 + 0.05000ml of M5658 + 0.05000ml of M6030 + 0.05000ml of M6140 + 0.05000ml of M6159 + 0.06000ml of M6177 + 0.10000ml of M5751 + 0.10000ml of M5801 + 0.10000ml of M5820 + 0.10000ml of M5962 + 0.10000ml of M5971 + 0.10000ml of M6128 + 0.10000ml of M6176 + 0.15000ml of M5800 + 0.20000ml of M5799 + 0.20000ml of M6021 + 0.20000ml of M6023 + 0.20000ml of M6027 + 0.20000ml of M6145 + 0.25000ml of M5467 + 0.25000ml of M6160 + 0.50000ml of M5814 + 0.50000ml of M6032 + 1.00000ml of M5979 + 1.00000ml of M6138 + 1.00000ml of M6142 + 1.00000ml of M6144 + 1.00000ml of M6171 + 1.00000ml of M6178 + 2.00000ml of M5969 + 98.00000ml of MP87031 = Final Quantity: 100.000 ml

<u>Recipe ID</u>	<u>NAME</u>	<u>NO.</u>	<u>Prep Date</u>	<u>Expiration Date</u>	<u>Prepared By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u>
2951	ICP AES S1/CRI WORK STD	MP87038	09/02/2025	10/17/2025	Sarabjit Jaswal	None	METALS_PIPETTE_3 (A)	Janvi Patel 09/04/2025

FROM 2.00000ml of MP87036 + 98.00000ml of MP87031 = Final Quantity: 100.000 ml

Metals STANDARD PREPARATION LOG

<u>Recipe ID</u>	<u>NAME</u>	<u>NO.</u>	<u>Prep Date</u>	<u>Expiration Date</u>	<u>Prepared By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u>
4163	NEW ICV-060925	MP87039	09/02/2025	10/17/2025	Sarabjit Jaswal	None	METALS_PIPETTE_3 (A)	Janvi Patel 09/04/2025

FROM 0.40000ml of M6163 + 0.40000ml of M6164 + 0.40000ml of M6165 + 48.80000ml of MP87031 = Final Quantity: 50.000 ml

<u>Recipe ID</u>	<u>NAME</u>	<u>NO.</u>	<u>Prep Date</u>	<u>Expiration Date</u>	<u>Prepared By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u>
904	ICP AES ICSA SOLN	MP87040	09/02/2025	10/17/2025	Sarabjit Jaswal	None	METALS_PIPETTE_3 (A)	Janvi Patel 09/04/2025

FROM 25.00000ml of M6182 + 225.00000ml of MP87031 = Final Quantity: 250.000 ml

Metals STANDARD PREPARATION LOG

<u>Recipe ID</u>	<u>NAME</u>	<u>NO.</u>	<u>Prep Date</u>	<u>Expiration Date</u>	<u>Prepared By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u>
3494	ICP AES ICSAB SOLN-1	MP87041	09/02/2025	10/17/2025	Sarabjit Jaswal	None	None	Janvi Patel
								09/04/2025

FROM 10.00000ml of M6182 + 10.00000ml of M6184 + 80.00000ml of MP87031 = Final Quantity: 10000.000 ml

<u>Recipe ID</u>	<u>NAME</u>	<u>NO.</u>	<u>Prep Date</u>	<u>Expiration Date</u>	<u>Prepared By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u>
911	ICP AES CCV SOLN	MP87042	09/02/2025	10/17/2025	Sarabjit Jaswal	None	None	Janvi Patel
								09/04/2025

FROM 50.00000ml of MP87031 + 50.00000ml of MP87032 = Final Quantity: 100.000 ml

Metals STANDARD PREPARATION LOG

<u>Recipe ID</u>	<u>NAME</u>	<u>NO.</u>	<u>Prep Date</u>	<u>Expiration Date</u>	<u>Prepared By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u>
919	ICP AES INTERNAL STD	MP87043	09/02/2025	10/17/2025	Sarabjit Jaswal	None	None	Janvi Patel
								09/04/2025

FROM 1.00000ml of M6179 + 10.00000ml of M5985 + 200.00000ml of M6187 + 9800.00000ml of W3112 = Final Quantity: 10000.000 ml

<u>Recipe ID</u>	<u>NAME</u>	<u>NO.</u>	<u>Prep Date</u>	<u>Expiration Date</u>	<u>Prepared By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u>
903	ICP AES RINSE SOLN	MP87044	09/02/2025	10/17/2025	Sarabjit Jaswal	None	None	Janvi Patel
								09/04/2025

FROM 200.00000ml of M6187 + 9800.00000ml of W3112 = Final Quantity: 10000.000 ml

Metals STANDARD PREPARATION LOG

<u>Recipe ID</u>	<u>NAME</u>	<u>NO.</u>	<u>Prep Date</u>	<u>Expiration Date</u>	<u>Prepared By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u>
4225	LR-1	MP87045	09/02/2025	10/17/2025	Sarabjit Jaswal	None	METALS_PIPETTE_3 (A)	Janvi Patel 09/04/2025

FROM 11.50000ml of M6138 + 11.50000ml of M6144 + 11.50000ml of M6171 + 15.50000ml of MP87031 = Final Quantity: 50.000 ml

<u>Recipe ID</u>	<u>NAME</u>	<u>NO.</u>	<u>Prep Date</u>	<u>Expiration Date</u>	<u>Prepared By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u>
4226	LR-2	MP87046	09/02/2025	10/17/2025	Sarabjit Jaswal	None	METALS_PIPETTE_3 (A)	Janvi Patel 09/04/2025

FROM 13.50000ml of M6140 + 9.00000ml of M6142 + 9.50000ml of M6159 + 18.00000ml of MP87031 = Final Quantity: 50.000 ml



<u>Recipe ID</u>	<u>NAME</u>	<u>NO.</u>	<u>Prep Date</u>	<u>Expiration Date</u>	<u>Prepared By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u>
4227	LR-3	MP87049	09/02/2025	10/17/2025	Sarabjit Jaswal	None	None	Janvi Patel 09/04/2025
<u>FROM</u>	1.15000ml of M6026 + 1.25000ml of M5658 + 1.25000ml of M5748 + 1.50000ml of M6145 + 2.50000ml of M5751 + 2.50000ml of M6128 + 39.85000ml of MP87031 = Final Quantity: 50.000 ml							

<u>Recipe ID</u>	<u>NAME</u>	<u>NO.</u>	<u>Prep Date</u>	<u>Expiration Date</u>	<u>Prepared By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u>
65	POTASSIUM PERMANGANATE SOLUTION 5 %	MP87072	09/04/2025	03/04/2026	Mohan Bera	METALS_SCALE_3 (M SC-3)	None	Sarabjit Jaswal 09/04/2025
<u>FROM</u> 100.00000gram of M4916 + 2000.00000ml of W3112 = Final Quantity: 2000.000 ml								



<u>Recipe ID</u>	<u>NAME</u>	<u>NO.</u>	<u>Prep Date</u>	<u>Expiration Date</u>	<u>Prepared By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u>
67	SODIUM CHLORIDE - HYDROXYL- CHLORIDE SOLUTION	MP87149	09/09/2025	02/03/2026	Mohan Bera	METALS_SCALE_2 (M SC-2)	None	Sarabjit Jaswal
FROM 2000.00000ml of W3112 + 240.00000gram of M5884 + 240.00000ml of M6196 = Final Quantity: 2000.000 ml								

<u>Recipe ID</u>	<u>NAME</u>	<u>NO.</u>	<u>Prep Date</u>	<u>Expiration Date</u>	<u>Prepared By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u>
871	MERCURY INTERMEDIATE B 250PPB WORKING STD.	MP87528	10/13/2025	10/14/2025	Mohan Bera	None	METALS_PIPETTE_5 (HGA)	Sarabjit Jaswal 10/16/2025
<u>FROM</u>	1.00000ml of M6187 + 2.50000ml of M5062 + 96.50000ml of W3112 = Final Quantity: 100.000 ml							



<u>Recipe ID</u>	<u>NAME</u>	<u>NO.</u>	<u>Prep Date</u>	<u>Expiration Date</u>	<u>Prepared By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u>
1340	Hg 0.00 PPB STD	MP87529	10/13/2025	10/14/2025	Mohan Bera	None	METALS_PIPETTE_5 (HG	Sarabjit Jaswal
FROM 2.50000ml of M6187 + 247.50000ml of W3112 = Final Quantity: 250.000 ml								

<u>Recipe ID</u>	<u>NAME</u>	<u>NO.</u>	<u>Prep Date</u>	<u>Expiration Date</u>	<u>Prepared By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u>
1341	Hg 0.2 PPB STD	MP87530	10/13/2025	10/14/2025	Mohan Bera	None	METALS_PIPETTE_5 (HG)	Sarabjit Jaswal
FROM 2.50000ml of M6187 + 247.30000ml of W3112 + 0.20000ml of MP87528 = Final Quantity: 250.000 ml								



<u>Recipe ID</u>	<u>NAME</u>	<u>NO.</u>	<u>Prep Date</u>	<u>Expiration Date</u>	<u>Prepared By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u>
1342	Hg 2.5 PPB STD	MP87531	10/13/2025	10/14/2025	Mohan Bera	None	METALS_PIPETTE_5 (HG)	Sarabjit Jaswal
A) FROM 2.50000ml of M6187 + 245.00000ml of W3112 + 2.50000ml of MP87528 = Final Quantity: 250.000 ml								

<u>Recipe ID</u>	<u>NAME</u>	<u>NO.</u>	<u>Prep Date</u>	<u>Expiration Date</u>	<u>Prepared By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u>
1343	Hg 5.0 PPB STD	MP87533	10/13/2025	10/14/2025	Mohan Bera	None	METALS_PIPETTE_5 (HGA)	Sarabjit Jaswal 10/16/2025
<u>FROM</u>	2.50000ml of M6187 + 242.50000ml of W3112 + 5.00000ml of MP87528 = Final Quantity: 250.000 ml							



<u>Recipe ID</u>	<u>NAME</u>	<u>NO.</u>	<u>Prep Date</u>	<u>Expiration Date</u>	<u>Prepared By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u>
1344	Hg 7.5 PPB STD	MP87534	10/13/2025	10/14/2025	Mohan Bera	None	METALS_PIPETTE_5 (HG)	Sarabjit Jaswal
FROM 2.50000ml of M6187 + 7.50000ml of MP87528 = Final Quantity: 250.000 ml								

<u>Recipe ID</u>	<u>NAME</u>	<u>NO.</u>	<u>Prep Date</u>	<u>Expiration Date</u>	<u>Prepared By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u>
1345	Hg 10.0 PPB STD	MP87535	10/13/2025	10/14/2025	Mohan Bera	None	METALS_PIPETTE_5 (HG)	Sarabjit Jaswal
A) FROM 2.50000ml of M6187 + 237.50000ml of W3112 + 10.00000ml of MP87528 = Final Quantity: 250.000 ml								



<u>Recipe ID</u>	<u>NAME</u>	<u>NO.</u>	<u>Prep Date</u>	<u>Expiration Date</u>	<u>Prepared By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u>
1346	Hg ICV SOLUTION	MP87536	10/13/2025	10/14/2025	Mohan Bera	None	METALS_PIPETTE_5 (HG)	Sarabjit Jaswal
FROM 2.50000ml of M6161 + 2.50000ml of M6187 + 245.00000ml of W3112 = Final Quantity: 250.000 ml								

<u>Recipe ID</u>	<u>NAME</u>	<u>NO.</u>	<u>Prep Date</u>	<u>Expiration Date</u>	<u>Prepared By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u>
1351	ICB (Hg 0.00 PPB SOLUTION)	MP87537	10/13/2025	10/14/2025	Mohan Bera	None	METALS_PIPETTE_5 (HGA)	Sarabjit Jaswal 10/16/2025
<u>FROM</u> 2.50000ml of M6187 + 247.50000ml of W3112 = Final Quantity: 250.000 ml								



<u>Recipe ID</u>	<u>NAME</u>	<u>NO.</u>	<u>Prep Date</u>	<u>Expiration Date</u>	<u>Prepared By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u>
1358	CCV (Hg 5.0 PPB SOLUTION)	MP87538	10/13/2025	10/14/2025	Mohan Bera	None	METALS_PIPETTE_5 (HG)	Sarabjit Jaswal
A) FROM 485.00000ml of W3112 + 5.00000ml of M6187 + 10.00000ml of MP87528 = Final Quantity: 500.000 ml								

<u>Recipe ID</u>	<u>NAME</u>	<u>NO.</u>	<u>Prep Date</u>	<u>Expiration Date</u>	<u>Prepared By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u>
1352	CCB (Hg 0.00 PPB SOLUTION)	MP87539	10/13/2025	10/14/2025	Mohan Bera	None	METALS_PIPETTE_5 (HGA)	Sarabjit Jaswal 10/16/2025
<u>FROM</u> 495.00000ml of W3112 + 5.00000ml of M6187 = Final Quantity: 500.000 ml								



<u>Recipe ID</u>	<u>NAME</u>	<u>NO.</u>	<u>Prep Date</u>	<u>Expiration Date</u>	<u>Prepared By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u>
1349	CRA/CRI (Hg 0.2 PPB SOLUTION)	MP87540	10/13/2025	10/14/2025	Mohan Bera	None	METALS_PIPETTE_5 (HG)	Sarabjit Jaswal
FROM 2.50000ml of M6187 + 247.30000ml of W3112 + 0.20000ml of MP87528 = Final Quantity: 250.000 ml								

<u>Recipe ID</u>	<u>NAME</u>	<u>NO.</u>	<u>Prep Date</u>	<u>Expiration Date</u>	<u>Prepared By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u>
1350	CHK STD (Hg 7.0 PPB SOLUTION)	MP87541	10/13/2025	10/14/2025	Mohan Bera	None	METALS_PIPETTE_5 (HGA)	Sarabjit Jaswal 10/16/2025
<u>FROM</u>	2.50000ml of M6187 + 240.50000ml of W3112 + 7.00000ml of MP87528 = Final Quantity: 250.000 ml							



<u>Recipe ID</u>	<u>NAME</u>	<u>NO.</u>	<u>Prep Date</u>	<u>Expiration Date</u>	<u>Prepared By</u>	<u>ScaleID</u>	<u>PipetteID</u>	<u>Supervised By</u>
887	AQUA REGIA FOR HG ON 7471A	MP87542	10/13/2025	10/14/2025	Mohan Bera	None	None	Sarabjit Jaswal 10/16/2025
<u>FROM</u> 150.00000ml of M6200 + 50.00000ml of M6187 = Final Quantity: 200.000 ml								

CHEMICAL RECEIPT LOG BOOK

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-3227-05 / Potassium Permanganate (2.5kg)	210800	03/31/2026	11/30/2022 / mohan	07/28/2021 / mohan	M4916

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	MSHG-10PPM / MERCURY HCl 125mL 10ug/mL	S2-HG709270	09/22/2026	05/28/2022 / mohan	01/27/2022 / mohan	M5062

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57058 / Cerium, 1000PPM, 100ML	020623	02/06/2026	03/06/2023 / bin	03/01/2023 / bin	M5467

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
PCI Scientific Supply, Inc.	26397-103 / PTFE BOILING STONES	W126678	03/20/2026	03/20/2025 /	06/12/2023 / jaswal	M5581

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
PCI Scientific Supply, Inc.	26397-103 / PTFE BOILING STONES	W126678	12/31/2025	06/17/2023 / Al-Terek	06/12/2023 / jaswal	M5582

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58024 / Chromium, Cr, 500 ml, 1000 PPM	060523	06/05/2026	08/28/2023 / jaswal	08/25/2023 / jaswal	M5658

CHEMICAL RECEIPT LOG BOOK

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	/ Nickel (Ni) 1000PPM	091223	09/12/2026	01/02/2024 / bin	12/20/2023 / jaswal	M5748

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58029 / Cu, 1000 PPM, 500 ml	071723	07/17/2026	10/01/2024 / Jaswal	08/25/2023 / jaswal	M5751

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57004 / Be, 1000 PPM, 125 ml	102523	10/25/2026	02/09/2024 / bin	02/09/2024 / bin	M5798

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57050 / Sn, 1000 PPM, 125 ml	071123	07/11/2026	02/09/2024 / bin	02/09/2024 / bin	M5799

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57027 / CO, 1000 PPM, 125 ml	091923	09/19/2026	05/31/2024 / bin	02/09/2024 / bin	M5800

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57033 / As, 1000 PPM, 125 ml	111323	11/13/2026	02/09/2024 / bin	02/09/2024 / bin	M5801

CHEMICAL RECEIPT LOG BOOK

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57005 / B, 1000 PPM, 125 ml	071123	07/11/2026	03/26/2024 / Sohil	01/03/2024 / jaswal	M5814

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57015 / P, 1000 PPM, 125 ml	091123	09/11/2026	05/01/2024 / jaswal	02/09/2024 / jaswal	M5820

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-3624-05 / Sodium Chloride, Crystal (cs/4x2.5kg)	0000281938	07/06/2026	04/30/2024 / mohan	04/25/2024 / mohan	M5884

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57034 / Se, 1000 PPM, 125 ml	060624	06/06/2027	07/02/2024 / Jaswal	06/14/2024 / Jaswal	M5962

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57016 / S, 1000 PPM, 125 ml	122923	03/31/2026	03/31/2025 / kareem	06/11/2024 / Jaswal	M5969

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57003 / Li, 1000 PPM, 125 ml	061224	06/21/2027	06/06/2025 / Janvi	07/01/2024 / Jaswal	M5971

CHEMICAL RECEIPT LOG BOOK

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	CGTI1-1 / TITANIUM 125mL 1000ug/mL	T2-TI719972	08/05/2026	08/06/2025 / Janvi	02/22/2024 / Jaswal	M5979

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	CGIN10-5 / INDIUM 1 x 500 ml	U2-IN729349	02/21/2028	10/08/2024 / Jaswal	06/14/2024 / Jaswal	M5985

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	CLPP-CAL-3 / CLP CAL SOLUTION #3, 125mL	T2-MEB727800	07/30/2026	07/30/2025 / Janvi	02/22/2024 / kareem	M5998

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57023 / V, 1000 PPM, 125 ml	062424	06/24/2027	09/28/2024 / jaswal	08/05/2024 / Jaswal	M6021

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57081 / TI, 1000 PPM, 125 ml	0624724	06/27/2027	08/05/2024 / kareem	08/05/2024 / Jaswal	M6023

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57182 / Pb, 10000 PPM, 125 ml	110923	11/09/2026	12/05/2024 / janvi	08/05/2024 / Jaswal	M6026

CHEMICAL RECEIPT LOG BOOK

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57028 / Ni, 1000 PPM, 125 ml	062024	06/20/2027	06/04/2025 / Janvi	08/05/2024 / Jaswal	M6027

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57048 / Cd, 1000 PPM, 125 ml	070124	07/01/2027	08/05/2024 / kareem	08/05/2024 / Jaswal	M6028

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57047 / Ag, 1000 PPM, 125 ml	122823	12/28/2026	08/05/2024 / kareem	08/05/2024 / Jaswal	M6030

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57056 / Ba, 1000 PPM, 125 ml	010924	01/09/2027	01/14/2025 / Jaswal	08/05/2024 / Jaswal	M6032

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	Z9651Q / CHEM-CLP-4/.25L	V2-MEB746762	09/06/2029	01/23/2025 / kareem	09/19/2024 / kareem	M6077

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58025 / Mn, 1000 PPM, 500 ml	101124	10/11/2027	01/13/2025 / kareem	01/13/2025 / kareem	M6128

CHEMICAL RECEIPT LOG BOOK

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	CGSI1-1 / SILICON 125mL 1000ug/mL	V2-SI744713	07/10/2029	01/14/2025 / Jaswal	10/03/2024 / Jaswal	M6137

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58120 / Ca, 10000 PPM, 500 ml	121824	12/18/2027	04/17/2025 / Janvi	01/13/2025 / Jaswal	M6138

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58126 / Fe, 10000 PPM, 500 ml	011025	01/10/2028	06/25/2025 / Janvi	01/13/2025 / Jaswal	M6140

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58119 / K, 10000 PPM, 500 ml	103024	10/30/2027	05/06/2025 / JANVI	01/13/2025 / Jaswal	M6142

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58111 / Na, 10000 PPM, 500 ml	072424	07/24/2027	01/23/2025 / kareem	01/13/2025 / Jaswal	M6144

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58030 / Zinc, Zn, 500 ml, 1000 PPM	121724	12/17/2027	02/04/2025 /	01/13/2025 / Jaswal	M6145

CHEMICAL RECEIPT LOG BOOK

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-9530-33 / Hydrochloric Acid, Instra-Analyzed (cs/6x2.5L)	22G2862015	02/17/2026	02/18/2025 / Sagar	01/15/2025 / Sagar	M6151

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-9598-34 / Nitric Acid, Instra-Analyzed (cs/4x2.5L)	24D1062002	10/30/2025	03/10/2025 / Eman	02/02/2025 / Sagar	M6158

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58113 / Al, 10000 PPM, 500 ml	011325	03/18/2026	03/18/2025 / kareem	02/09/2025 / kareem	M6159

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57051 / Sb, 1000 PPM, 125 ml	071724	07/17/2027	03/24/2025 / kareem	10/18/2024 / kareem	M6160

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
EPA	ICV-5 / ICV (HG) STOCK SOLN	ICV 5 0415	12/31/2025	05/01/2025 / mohan	03/30/2024 / mohan	M6161

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-9598-34 / Nitric Acid, Instra-Analyzed (cs/4x2.5L)	24H0162012	11/27/2025	05/27/2025 / Sagar	04/27/2025 / Sagar	M6162

CHEMICAL RECEIPT LOG BOOK

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	QCP-CICV-1-125ML / EPA CLP ICP Verification Standard1	V2-MEB744107	06/08/2026	06/09/2025 / jaswal	06/06/2025 / jaswal	M6163

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	QCP-CICV-2-125ML / EPA CLP ICP Verification Standard2	U2-MEB733713	06/08/2026	06/09/2025 / jaswal	06/09/2025 / jaswal	M6164

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	QCP-CICV-3-125ML / EPA CLP ICP Verification Standard3	V2-MEB749572	06/08/2026	06/09/2025 / jaswal	06/09/2025 / jaswal	M6165

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-2186-03 / Hydrogen Peroxide (cs/4x4L)	24D1961001	10/16/2025	06/25/2025 /	05/20/2025 / Sagar	M6170

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	58112 / Mg, 10000 PPM, 500 ml	011525	01/15/2028	07/15/2025 /	02/13/2025 / Janvi	M6171

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	CLPP-CAL-1 / CLP CAL SOLUTION #1, 125mL	V2-MEB742428	07/31/2026	07/31/2025 / Janvi	05/05/2025 / Janvi	M6174

CHEMICAL RECEIPT LOG BOOK

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57038 / Sr, 1000 PPM, 125 ml	092724	09/27/2027	08/06/2025 / Janvi	08/06/2025 / Janvi	M6176

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	/ Lead (Pb) 1000PPM	031525	03/15/2028	08/06/2025 / Janvi	08/06/2025 / Janvi	M6177

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	57042 / Mo, 1000 PPM, 125 ml	080528	08/05/2028	08/06/2025 / Janvi	08/06/2025 / Janvi	M6178

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	CGY10-1 / YTTRIUM 125mL 10,000ug/mL	V2-Y740548	08/05/2026	08/06/2025 / Janvi	06/02/2024 / Janvi	M6179

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	WW-LFS-1 / Laboratory Fortified Stock Solution 1, 125 ml	W2-MEB752149	02/05/2026	08/06/2025 / Janvi	07/22/2025 / Janvi	M6180

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Inorganic Ventures	WW-LFS-2 / Laboratory Fortified Stock Solution 2, 125 ml	V2-MEB7433480	02/05/2026	08/06/2025 / Janvi	07/22/2025 / Janvi	M6181

CHEMICAL RECEIPT LOG BOOK

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
EPA	PART A / ICSA (ICP) STOCK SOLN	ICSA-1211	02/05/2026	08/06/2025 / Janvi	03/06/2024 / Janvi	M6182

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
EPA	PART B / ICSAB (ICP) STOCK SOLN	ICSB-0710	02/05/2026	08/06/2025 / Janvi	03/06/2024 / Janvi	M6184

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-9598-34 / Nitric Acid, Instra-Analyzed (cs/4x2.5L)	24H0162012	01/28/2026	08/29/2025 / Sagar	08/08/2025 / Sagar	M6187

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
PCI Scientific Supply, Inc.	H330-500 / HYDROXYLAMINE HYDROCHLORIDE ACS 500G	243373	02/03/2026	09/04/2025 / mohan	08/04/2025 / mohan	M6196

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	BA-9530-33 / Hydrochloric Acid, Instra-Analyzed (cs/6x2.5L)	24D1562005	02/10/2026	09/11/2025 / Sagar	08/25/2025 / Sagar	M6200

Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Seidler Chemical	DIW / DI Water	Daily Lab-Certified	07/03/2029	07/03/2024 / lwona	07/03/2024 / lwona	W3112



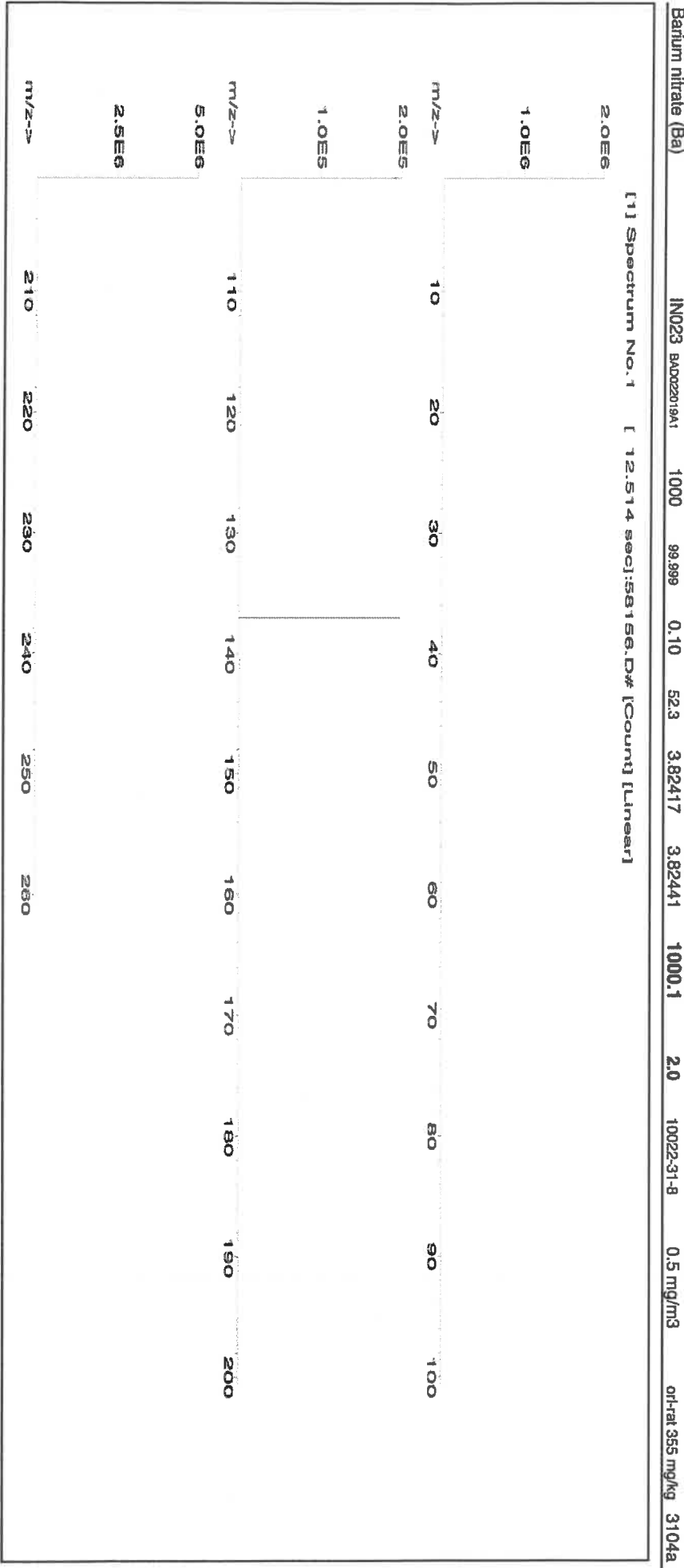
CERTIFIED WEIGHT REPORT:

Part Number: 57056
Lot Number: 010924
Description: Barium (Ba)
Solvent: Nitric Acid
Lot #

Expiration Date: 010927
Recommended Storage: Ambient (20 °C)
Nominal Concentration (µg/mL): 1000
NIST Test Number: 6UTB
Weight shown below was diluted to (mL): 2000.02
Balance Uncertainty: 5E-05
Flask Uncertainty: 0.058

<i>Giovanni Esposito</i>	
Formulated By:	Giovanni Esposito
010924	
<i>Pedro L. Renteria</i>	
Reviewed By:	Pedro L. Renteria
010924	

SDS Information									
Compound	Lot Number	Nominal Conc. (µg/mL)	Purity (%)	Uncertainty (%)	Assay (%)	Target Weight (g)	Actual Weight (g)	Actual Conc. (µg/mL)	Expanded Uncertainty +/- (µg/mL)
Barium nitrate (Ba)	IN023	BA0022019A1	1000	99.999	0.10	52.3	3.82417	3.82441	1000.1





Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

Trace Metals Verification by ICP-MS (µg/mL)

Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pr	<0.02	Se	<0.2	Tb	<0.02	W	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Te	<0.02	U	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02	Tl	<0.02	V	<0.02
Ba	T	Cs	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Th	<0.02	Yb	<0.02
Be	<0.01	Cr	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	S	<0.02	Sn	<0.02	Zn	<0.02
B	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02	Ti	<0.02	Zr	<0.02

(T) = Target analyte

Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



CERTIFIED WEIGHT REPORT:

Part Number:
Lot Number:
Description:

57048
070124
Cadmium (Cd)

Solvent: 24002546 Nitric Acid

R: 815/24

Lot #

2% 40.0 Nitric Acid (mL)

Expiration Date: 070127

Recommended Storage: Ambient (20 °C)

Nominal Concentration (µg/mL): 1000

NIST Test Number: 6UTB

SE-05 Balance Uncertainty

Weight shown below was diluted to (mL): 2000.07 0.100 Flask Uncertainty

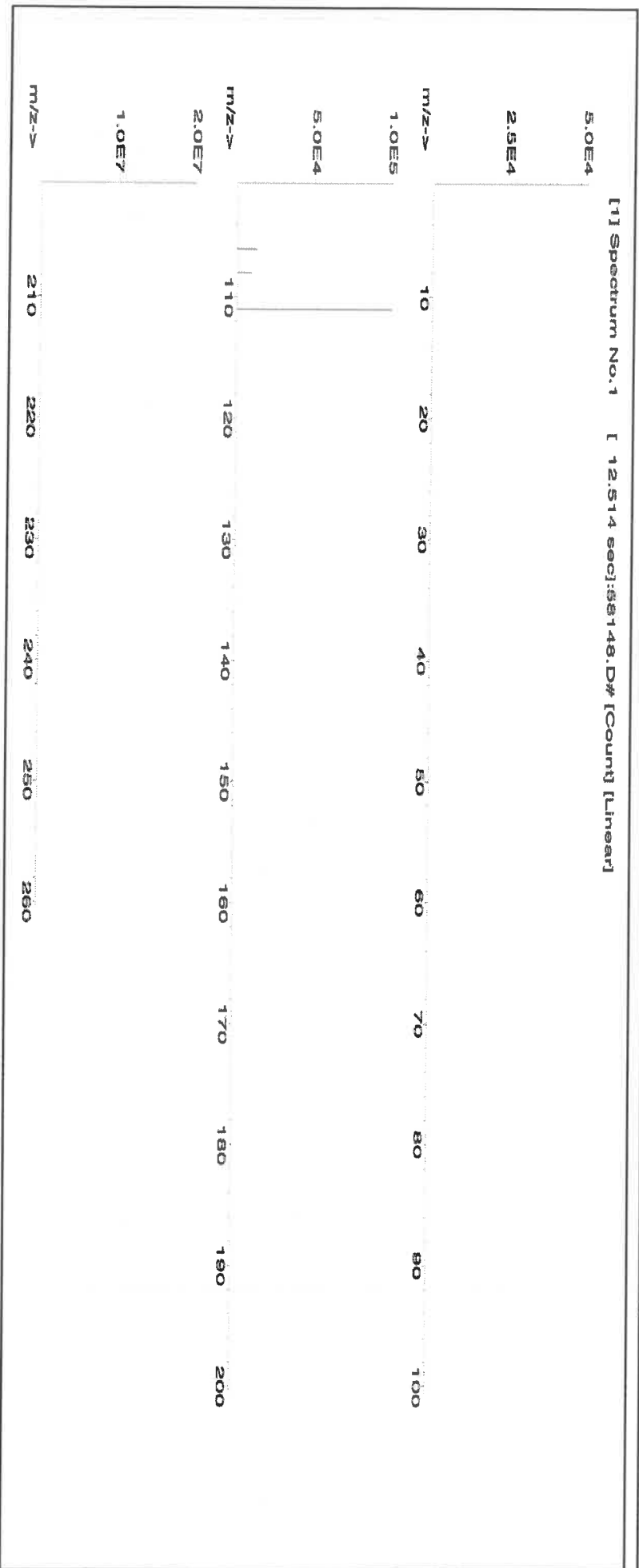
<i>Aleah O'Brady</i>	
Formulated By:	Aleah O'Brady
	070124
<i>Pedro L. Rentas</i>	
Reviewed By:	Pedro L. Rentas
	070124

Compound

Lot Number	Nominal Conc. (µg/mL)	Purity (%)	Uncertainty (%)	Assay (%)	Target Weight (g)	Actual Weight (g)	Actual Conc. (µg/mL)	Expanded Uncertainty +/- (µg/mL)	CAS#	OSHA PEL (TWA)	LD50	NIST SRM
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1. Cadmium nitrate tetrahydrate (Cd) IN024 CDM09221A1 1000 99.999 0.10 36.5 5.4797 5.4804 1000.1 2.0 10022-68-1 0.01 mg/m3 or-rat 60.2mg/kg 3108

[1] Spectrum No.1 [12.514 sec]:\$8148.D# [Count] [Linear]





Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

Trace Metals Verification by ICP-MS (µg/mL)

Al	<0.02	Cd	<0.2	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pt	<0.02	Se	<0.2	Tb	<0.02	W	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Te	<0.02	U	<0.02
As	<0.2	Ce	<0.02	Ba	<0.02	In	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02	Tl	<0.02	V	<0.02
Ba	<0.02	Cs	<0.02	Cd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Th	<0.02	Yb	<0.02
Be	<0.01	Cr	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Pr	<0.02	Sm	<0.02	S	<0.02	Sn	<0.02	Zn	<0.02
B	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02	Ti	<0.02	Zr	<0.02

(T) = Target analyte

Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



CERTIFIED WEIGHT REPORT:

Part Number: **57182**
Lot Number: **110923**
Description: **Lead (Pb)**

Solvent: **24002546 Nitric Acid**
Lot #: **24002546**

Expiration Date: **110926**
Recommended Storage: **Ambient (20 °C)**
Nominal Concentration (µg/mL): **10000**
NIST Test Number: **6UTB**

Weight shown below was diluted to (mL): **2000.02**
5E-05 Balance Uncertainty
0.058 Flask Uncertainty

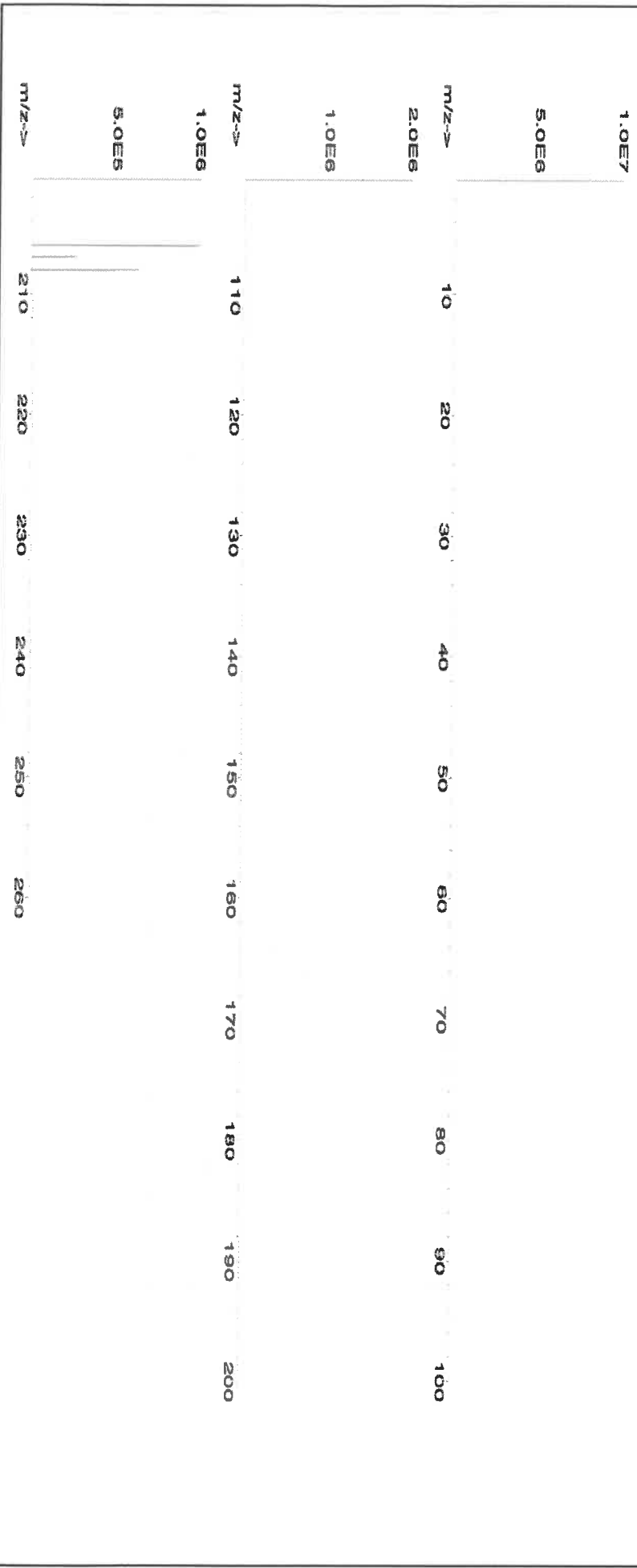
Formulated By:	Lawrence Barry
Reviewed By:	Pedro L. Rentas
	110923

Compound

RM#	Lot Number	Nominal Conc. (µg/mL)	Purity (%)	Uncertainty Purity (%)	Assay (%)	Target Weight (g)	Actual Weight (g)	Actual Conc. (µg/mL)	Expanded Uncertainty +/- (µg/mL)	CAS#	OSHA PEL (TWA)	LD50	NIST SRM
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1. Lead(II) nitrate (Pb) IN029 PED12016A1 10000 99.999 0.10 62.5 32.0006 32.0040 10001.1 20.0 10099-74-8 0.05 mg/m3 Inverse rat 83 mg/kg 3128

[1] Spectrum No.1 [17.284 sec]:58182.D# [Count] [Linear]





Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

Trace Metals Verification by ICP-MS ($\mu\text{g/mL}$)

Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pt	<0.02	Se	<0.2	Tb	<0.02	W	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Te	<0.02	U	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02	Tl	<0.02	V	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Th	<0.02	Yb	<0.02
Be	<0.01	Cr	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	S	<0.02	Sn	<0.02	Zn	<0.02
B	<0.02	Cu	<0.02	Au	<0.02	Pb	T	Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02	Ti	<0.02	Zr	<0.02

Physical Characterization:

(T)= Target analyte

Certified by:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

M4913-16

MS

Certificate of Analysis

1 Reagent Lane
 Fair Lawn, NJ 07410
 201.796.7100 tel
 201.796.1329 fax

Thermo Fisher Scientific's Quality System has been found to conform to Quality Management System
 Standard ISO9001:2015 by SAI Global Certificate Number CERT – 0120632

This is to certify that units of the lot number below were tested and found to comply with the specifications of the grade listed. Certain data have been supplied by third parties. Thermo Fisher Scientific expressly disclaims all warranties, expressed or implied, including the implied warranties of merchantability and fitness for a particular purpose. Products are for research use or further manufacturing. Not for direct administration to humans or animals. It is the responsibility of the final formulator and end user to determine suitability based upon the intended use of the end product. Products are tested to meet the analytical requirements of the noted grade. The following information is the actual analytical results obtained.

Catalog Number	P279	Quality Test / Release Date	01/12/2021
Lot Number	210306		
Description	POTASSIUM PERMANGANATE, A.C.S.		
Country of Origin	United States	Suggested Retest Date	Jan/2026

N/A			
Result Name	Units	Specifications	Test Value
APPEARANCE		REPORT	Dark purple to purple green crystals
ASSAY	%	>= 99	99.3
CHLORIDE & CHLORATE	%	<= 0.005	<0.005
IDENTIFICATION	PASS/FAIL	= PASS TEST	pass test
INSOLUBLE MATTER	%	<= 0.2	<0.2
MERCURY (Hg)	ppm	<= 0.05	<0.004
SULFATE (SO4)	%	<= 0.02	<0.02

Julian Burton

Julian Burton - Quality Control Manager – Fair Lawn

Note: The data listed is valid for all package sizes of this lot of this product, expressed as an extension of this catalog number listed above.
 If there are any questions with this certificate, please call at (800) 227-6701.

*Based on suggested storage condition.

300 Technology Drive
 Christiansburg, VA 24073 USA
 inorganicventures.com

MS062
 MS063
 MB

P: 800-669-6799/540-585-3030
 F: 540-585-3012
 info@inorganicventures.com

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



2.0 PRODUCT DESCRIPTION

Product Code: Single Analyte Mass Spec Solution
 Catalog Number: MSHG-10PPM
 Lot Number: S2-HG709270
 Matrix: 10% (v/v) HCl
 Value / Analyte(s): 10 µg/mL ea:
 Mercury
 Starting Material: Hg metal
 Starting Material Lot#: 1959
 Starting Material Purity: 99.9994%

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Value: 10.001 ± 0.053 µg/mL
Density: 1.020 g/mL (measured at 20 ± 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Hg	ICP Assay	3133	160921
Hg	EDTA	928	928
Hg	Calculated		See Sec. 4.2

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM/RM by Two or More Methods

Certified Value, $X_{CRM/RM}$, where two or more methods of characterization are used is the weighted mean of the results:

$$X_{CRM/RM} = \sum (w_i) (X_i)$$

X_i = mean of Assay Method i with standard uncertainty $u_{char i}$

w_i = the weighting factors for each method calculated using the inverse square of the variance.

$$w_i = (1/u_{char i}^2) / (\sum (1/u_{char i}^2))$$

$$CRM/RM \text{ Expanded Uncertainty } (\pm) = U_{CRM/RM} = k (u_{char}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$$

k = coverage factor = 2

$u_{char} = [\sum ((w_i)^2 (u_{char i})^2)]^{1/2}$ where $u_{char i}$ are the errors from each characterization method

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$$X_{CRM/RM} = (X_a) (u_{char a})$$

X_a = mean of Assay Method A with

$u_{char a}$ = the standard uncertainty of characterization Method A

$$CRM/RM \text{ Expanded Uncertainty } (\pm) = U_{CRM/RM} = k (u_{char a}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$$

k = coverage factor = 2

$u_{char a}$ = the errors from characterization

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

CRM/RMs are tested for trace metallic impurities by Axial ICP-OES and ICP-MS. The result from the most sensitive method for each element, is reported below. Solutions tested by ICP-MS were analyzed in an ULPA-Filtered Clean Room. An ULPA-Filter is 99.9985% efficient for the removal of particles down to 0.3 µm.

O	Ag	0.000011	M	Eu	<	0.000201	O	Na	0.000004	M	Se	<	0.015915	O	Zn	<	0.001510
O	Al	0.000001	O	Fe	0.000001	M	Nb	<	0.000201	O	Si	0.000005	M	Zr	<	0.000201	
M	As	<	0.000402	M	Ga	<	0.000201	M	Nd	<	0.000201	M	Sm	<	0.000201		
M	Au	<	0.003631	M	Gd	<	0.000201	M	Ni	<	0.000402	M	Sn	<	0.001007		
M	B	<	0.001208	M	Ge	<	0.000201	M	Os	<	0.000605	M	Sr	<	0.000201		
M	Ba	<	0.000201	M	Hf	<	0.000201	O	P	<	0.032370	M	Ta	<	0.000201		
M	Be	<	0.000201	s	Hg	<		M	Pb	<	0.000201	M	Tb	<	0.000201		
M	Bi	<	0.000201	M	Ho	<	0.000201	M	Pd	<	0.000403	M	Te	<	0.002216		
O	Ca	0.000007	M	In	<	0.000201	M	Pr	<	0.000201	M	Th	<	0.000201			
M	Cd	<	0.000201	M	Ir	<	0.000201	M	Pt	<	0.000402	M	Ti	<	0.000402		
M	Ce	<	0.000201	O	K	0.000020	M	Rb	<	0.000201	O	Tl	<	0.016508			
M	Co	<	0.000201	M	La	<	0.000201	M	Re	<	0.000201	M	Tm	<	0.000201		
O	Cr	<	0.003021	O	Li	<	0.000107	M	Rh	<	0.000201	M	U	<	0.008058		
M	Cs	<	0.001208	M	Lu	<	0.000201	M	Ru	<	0.000201	M	V	<	0.000201		
M	Cu	<	0.000402	O	Mg	0.000001	O	S	<	0.053950	M	W	<	0.000604			
M	Dy	<	0.000201	M	Mn	<	0.000604	M	Sb	<	0.001208	M	Y	<	0.000201		
M	Er	<	0.000201	M	Mo	0.000009	M	Sc	<	0.000201	M	Yb	<	0.000201			

M - Checked by ICP-MS O - Checked by ICP-OES i - Spectral Interference
n - Not Checked For s - Solution Standard Element

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit www.inorganicventures.com/TCT

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 200.59 +2 4 Hg(OH)(aq) 1+

Chemical Compatibility - Stable in HNO₃. Avoid basic media forming insoluble carbonate. The sulfide, basic carbonate, oxalate, phosphate, arsenite, arsenate and iodide are insoluble in water.

Stability - 2-100 ppb levels not stable in 1% HNO₃ / LDPE container, stable in 10% HNO₃ packaged in borosilicate glass. 1-100 ppm levels stable in 7% HNO₃ packaged in borosilicate glass. 1000-10,000 ppm solutions are chemically stable for years in 5-10% HNO₃ / LDPE container.

Hg Containing Samples (Preparation and Solution) - Metal (soluble in HNO₃); Oxide (Soluble in HNO₃); Ores and Organic based (The literature has more references to the preparation of Hg containing samples than any other element. Please consult the literature for your specific sample type, since such preparations are prone to error. Or e-mail our technical staff and we will contact you to discuss your particular sample preparation questions in further detail.).

Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/axial view):

Technique/Line	Estimated D.L.	Order	Interferences (underlined indicates severe)
ICP-MS 202 amu	9 ppt	n/a	186W16O
ICP-OES 184.950 nm	0.03 / 0.005 µg/mL	1	
ICP-OES 194.227 nm	0.03 / 0.005 µg/mL	1	V
ICP-OES 253.652 nm	0.1 / 0.03 µg/mL	1	Ta, Co, Th ,Rh , Fe, U

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va, 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

September 22, 2021

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- **September 22, 2026**

- The date after which this CRM/RM should not be used.
- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:

Uyen Truong
Supervisor, Product Documentation



Certificate Approved By:

Michael Booth
Director, Quality Control



Certifying Officer:

Paul Gaines
Chairman / Senior Technical Director





M5467 R: 03/01/23 (14)

CERTIFIED WEIGHT REPORT:

Part Number:
Lot Number:
Description:

57058
020623
Cerium (Ce)

Expiration Date:
Recommended Storage:
Nominal Concentration (µg/mL):
NIST Test Number:

020626
Ambient (20 °C)
1000
6UTB

Weight shown below was diluted to (mL):

1000.12 0.058 Balance Uncertainty
Flask Uncertainty

Solvent: 21110221 Nitric Acid

2% 20.0 Nitric Acid (mL)

Formulated By: Lawrence Barry 020623
Reviewed By: Pedro L. Rentas 020623

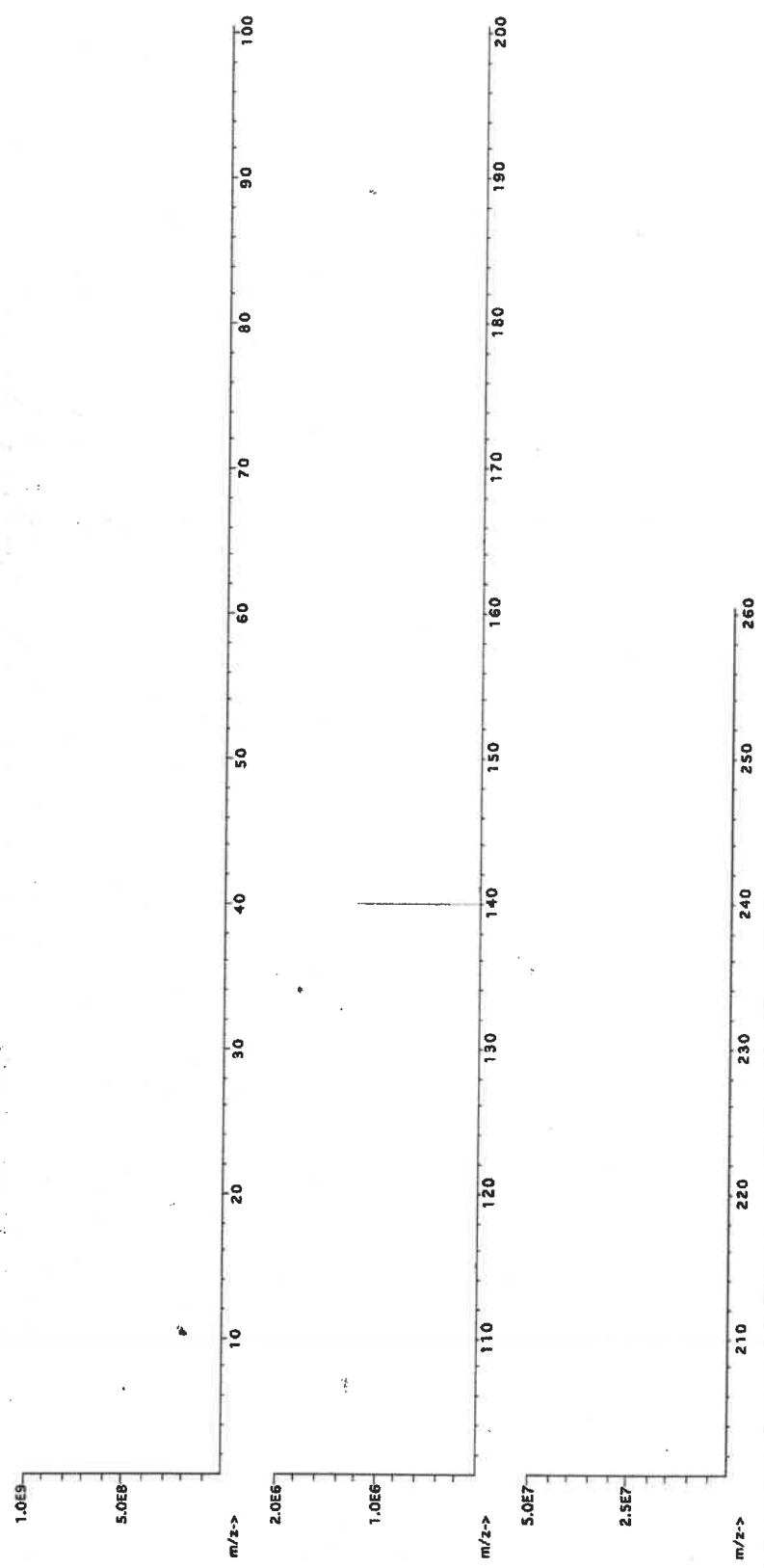
Expanded Uncertainty
+/- (µg/mL)

SDS Information
(Solvent Safety Info. On Attached pg.)
LD50

Actual Weight (g) Actual Conc. (µg/mL) CAS# OSHA PEL (TWA)

Compound	RM#	Lot Number	Nominal Conc. (µg/mL)	Purity (%)	Uncertainty Assay (%)	Target Weight (g)	Actual Weight (g)	Actual Conc. (µg/mL)	Expanded Uncertainty +/- (µg/mL)	CAS#	OSHA PEL (TWA)	LD50	SRM
1. Cerium nitrate hexahydrate (Ce)	IN146	Z512CEB1	1000	99.999	0.10	32.8	3.04919	1000.0	2.0	10294-41-4	NA	NA	NA

[1] Spectrum No.1 [43.472 sec]58158.D# [Count] [Linear]





Instrumental Analysis by Inductively Coupled Plasma Mass Spectroscopy (ICP-MS):

Trace Metals Verification by ICP-MS (µg/mL)

Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pr	<0.02	Se	<0.2	Tb	<0.02	W	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Tc	<0.02	U	<0.02
As	<0.2	Ce	T	Eu	<0.02	In	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02	Tl	<0.02	V	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Th	<0.02	Yb	<0.02
Be	<0.01	Cr	<0.02	Ga	<0.02	Fe	<0.02	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	S	<0.02	Sn	<0.02	Zn	<0.02
B	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02	Ti	<0.02	Zr	<0.02

(T) = Target analyte

Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



MATERIAL CERTIFICATE OF COMPLIANCE

DATE: JUNE 12, 2023

CUSTOMER: PCI SCIENTIFIC SUPPLY, INC

PURCHASE ORDER NO. 6054931

CATALOG NO. BOI5021-450L

PRODUCT DESCRIPTION: BOILING STONES, TFE, 454GMS

QUANTITY: 10 EACH

LOT NO. W126678

SPECIFICATION (S): Made from Virgin PTFE Resin

We certify that we have complied with the terms and conditions of the above Purchase Order and the Part Specifications in the manufacturing of the above product.



Laura Valencia
Quality Assurance Inspector

F:\J:\A\CF\PCISCI\COC-55118-BOI5021-061223



MATERIAL CERTIFICATE OF COMPLIANCE

DATE: JUNE 12, 2023

CUSTOMER: PCI SCIENTIFIC SUPPLY, INC

PURCHASE ORDER NO. 6054931

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Laura Valencia
Quality Assurance Inspector

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CERTIFIED WEIGHT REPORT:

Part Number: 58024
Lot Number: 060523
Description: Chromium (Cr)

Lot # 21110221
Solvent: Nitric Acid

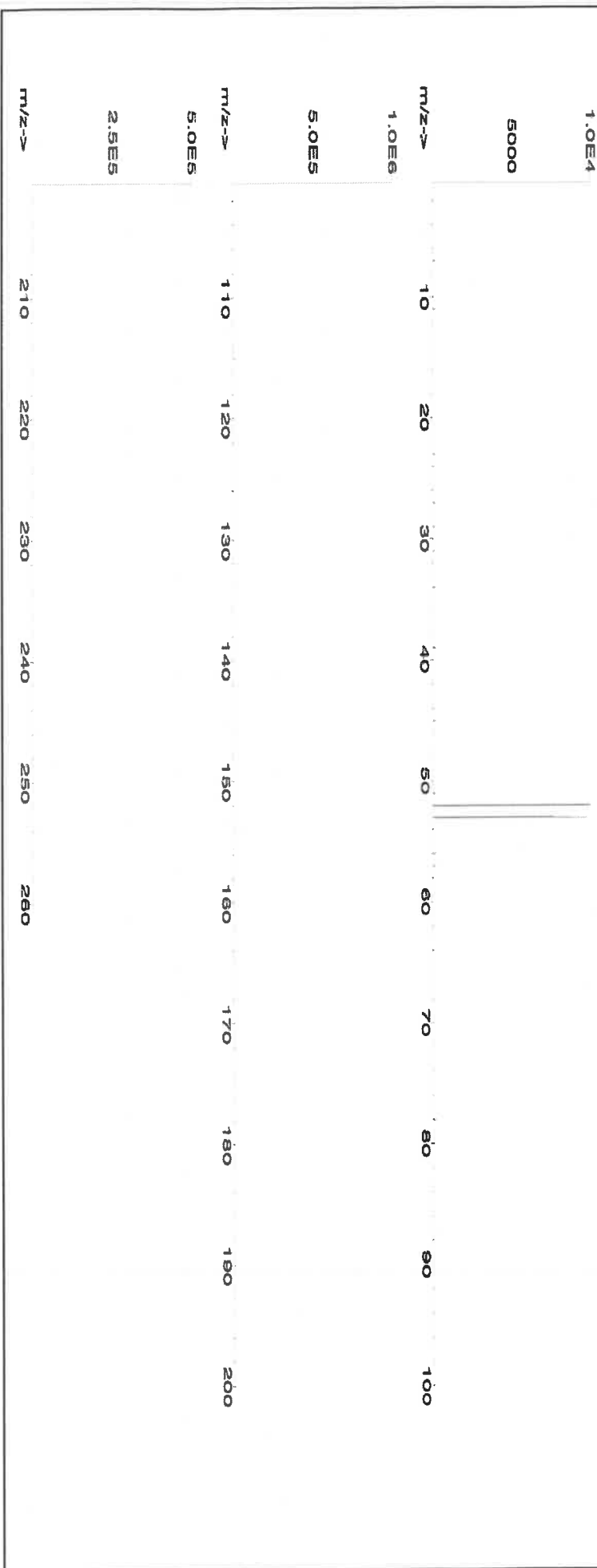
Formulated By:	Lawrence Barry
	060523
Reviewed By:	Pedro L. Ruelas
	060523

Expiration Date: 060526
Recommended Storage: Ambient (20 °C)
Nominal Concentration (µg/mL): 1000
NIST Test Number: 6UTB
Volume shown below was diluted to (mL): 2000.02
5E-05 Balance Uncertainty
0.058 Flask Uncertainty

Compound	Part Number	Lot Number	Dilution Factor	Initial Vol. (mL)	Uncertainty (mL)	Nominal Conc. (µg/mL)	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty +/- (µg/mL)	CAS#	OSHA PEL (TWA)	LD50	NIST SRM
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1. Chromium(III) nitrate nonahydrate (Cr) 58124 071122 0.1000 200.0 0.084 1000 10000.1 1000.0 2.2 7789-02-8 0.5 mg(Cr)/m3 or rat 3250 mg/kg 3112a

[1] Spectrum No.1 [31.393 sec]:57024.D# [Count] [Linear]





Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

Trace Metals Verification by ICP-MS (µg/mL)

Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pr	<0.02	Se	<0.2	Tb	<0.02	W	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Te	<0.02	U	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02	Tl	<0.02	V	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Th	<0.02	Yb	<0.02
Be	<0.01	Cr	T	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	S	<0.02	Sn	<0.02	Zn	<0.02
B	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02	Ti	<0.02	Zr	<0.02

(T) = Target analyte

Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



CERTIFIED WEIGHT REPORT:

Part Number: **57028**
Lot Number: **091223**
Description: **Nickel (NI)**

Lot # **24002546** Solvent: **Nitric Acid**

Expiration Date: **091226**

Recommended Storage: **Ambient (20 °C)**

Nominal Concentration (µg/mL): **1000**

NIST Test Number: **6U7B**

Volume shown below was diluted to (mL): **2000.02**

Balance Uncertainty: **5E-05**

Flask Uncertainty: **0.056**

2.0%

40.0 (mL)

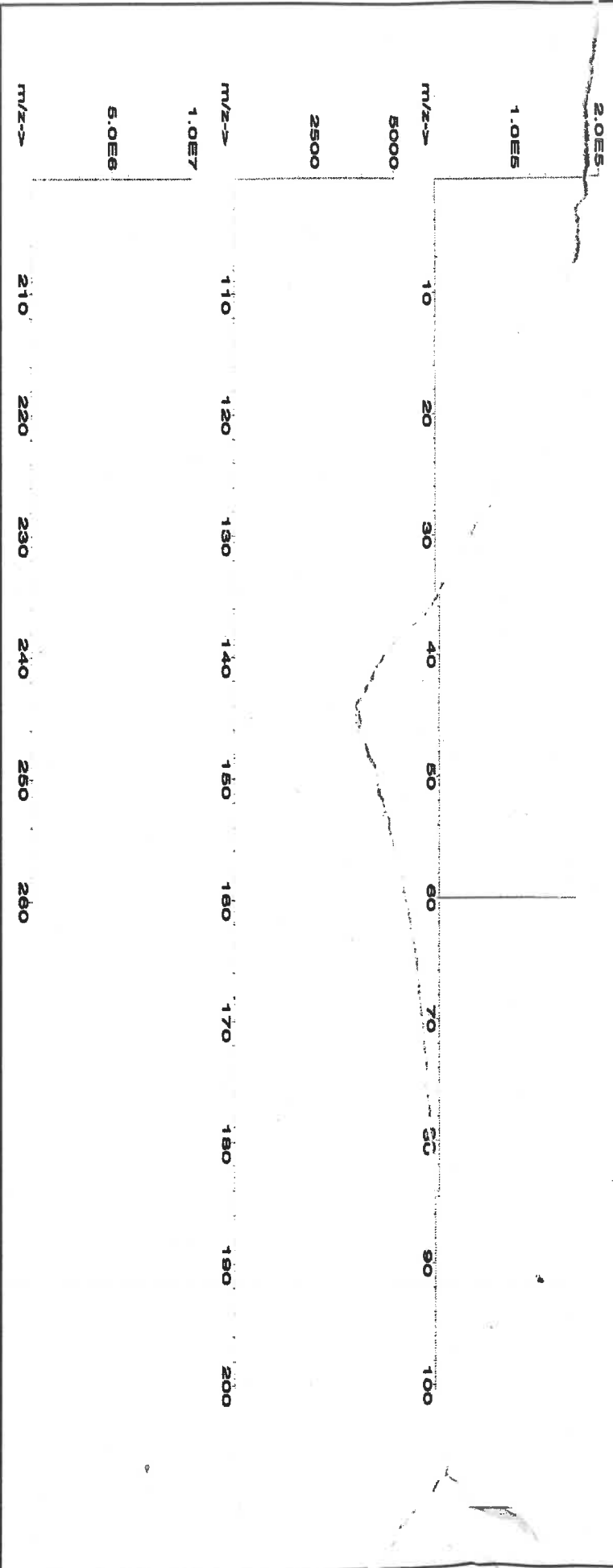
Nitric Acid

Formulated By:	<i>Lawrence Barry</i>	091223
Reviewed By:	<i>Pedro L. Rendas</i>	091223

Compound	Part Number	Lot Number	Dilution Factor	Initial Vol. (mL)	Uncertainty (mL)	Pipette (mL)	Nominal Conc. (µg/mL)	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty +/- (µg/mL)	CAS#	OSHA PEL (TWA)	LD50	NIST SRM
----------	-------------	------------	-----------------	-------------------	------------------	--------------	-----------------------	-----------------------	---------------------	----------------------------------	------	----------------	------	----------

1. Nickel(II) nitrate hexahydrate (NI) 58128 062023 0.1000 200.0 0.084 1000 10000.4 1000.0 2.2 13478-00-7 1 mg/m3 or-rel 1620 mg/kg 3136

[1] Spectrum No.1 [9.135 sec]:56028.D# [Count] [Linear]





Instrumental Analysis by Inductively Coupled Plasma Mass Spectroscopy (ICP-MS):

Trace Metals Verification by ICP-MS (µg/mL)

Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	T	Pr	<0.02	Se	<0.2	Tb	<0.02	W	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Te	<0.02	U	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02	Tl	<0.02	V	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Tb	<0.02	Yb	<0.02
Be	<0.01	Cr	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	S	<0.02	Sn	<0.02	Zn	<0.02
B	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02	Ti	<0.02	Zr	<0.02

(T) = Target analyte

Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



CERTIFIED WEIGHT REPORT:

Part Number: **58029**
Lot Number: **071723**
Description: **Copper (Cu)**

Lot #: **2110221**
Solvent: **Nitric Acid**

2.0% 40.0 Nitric Acid (mL)

Expiration Date: **071726**

Recommended Storage: **Ambient (20 °C)**

Nominal Concentration (µg/mL): **1000**

NIST Test Number: **6L7B**

Volume shown below was diluted to (mL): **2000.02** Balance Uncertainty **5E-05** Flask Uncertainty **0.058**

Formulated By:	Benson Chan	071723
Reviewed By:	Pedro L. Ruelas	071723

SDS Information

Compound	Part Number	Lot Number	Dilution Factor	Initial Vol. (mL)	Uncertainty (mL)	Nominal Conc. (µg/mL)	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty +/- (µg/mL)	CAS#	OSHA PEL (TWA)	LD50	NIST SRM
----------	-------------	------------	-----------------	-------------------	------------------	-----------------------	-----------------------	---------------------	----------------------------------	------	----------------	------	----------

1. Copper(II) nitrate trihydrate (Cu) 58129 022723 0.1000 200.0 0.084 1000 10000.5 1000.0 2.2 10031-43-3 1 mg/m3 or rat 794 mg/kg 3114

[1] Spectrum No.1 [33.422 sec]:58029.D# [Count] [Linear]

1.0E6	m/z-->	10	20	30	40	50	60	70	80	90	100
5.0E5	m/z-->	110	120	130	140	150	160	170	180	190	200
2.5E7	m/z-->	210	220	230	240	250	260				



Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

Trace Metals Verification by ICP-MS (µg/mL)

Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pr	<0.02	Se	<0.2	Tb	<0.02	W	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Te	<0.02	U	<0.02
As	<0.2	Ce	<0.02	Bu	<0.02	In	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02	Tl	<0.02	V	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Ru	<0.02	Na	<0.2	Th	<0.02	Yb	<0.02
Be	<0.01	Cr	<0.02	Ga	<0.02	La	<0.2	Hg	<0.2	P	<0.02	Sr	<0.02	S	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	Pb	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	Ta	<0.02	Sn	<0.02	Zn	<0.02
B	<0.02	Cu	T	Au	<0.02			Nd	<0.02	K	<0.2	Sc	<0.02			Ti	<0.02	Zr	<0.02

(T) = Target analyte

Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



CERTIFIED WEIGHT REPORT:

Part Number: 57004
Lot Number: 102523
Description: Beryllium (Be)

Lot # 24002546
Solvent: Nitric Acid

Expiration Date:

102526

2.0%

40.0 (mL)

Nitric Acid

Recommended Storage:
Nominal Concentration (µg/mL):

Ambient (20 °C)

1000

NIST Test Number:

6UTB

Volume shown below was diluted to (mL):

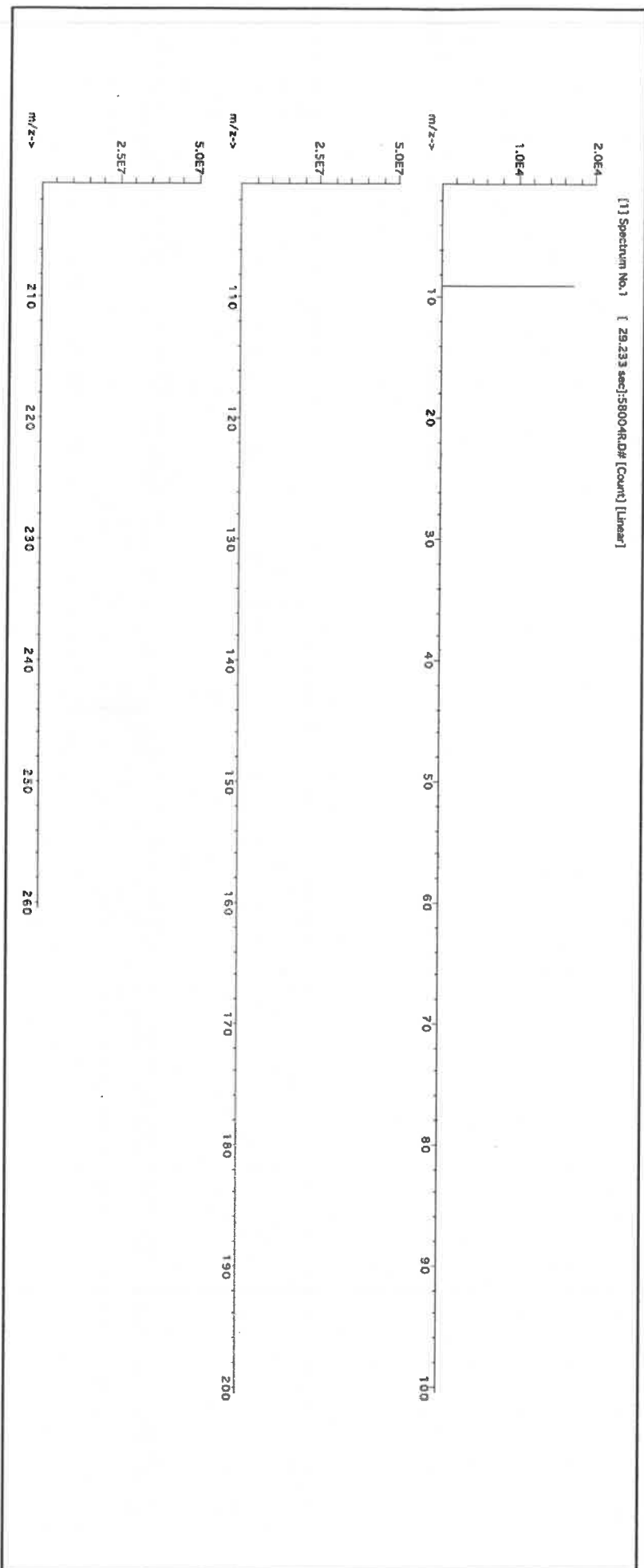
5E-05 Balance Uncertainty
0.058 Flask Uncertainty

Formulated By:	Benson Chan	102523
Reviewed By:	Pedro L. Rentas	102523

SDS Information

Compound	Part Number	Lot Number	Dilution Factor	Initial Vol. (mL)	Uncertainty Pipette (mL)	Nominal Conc. (µg/mL)	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty +/- (µg/mL)	CAS#	OSHA PEL (TWA)	LD50	NIST SRM
----------	-------------	------------	-----------------	-------------------	--------------------------	-----------------------	-----------------------	---------------------	----------------------------------	------	----------------	------	----------

1. Beryllium nitrate (Be)	58104	091423	0.1000	200.0	0.084	1000	10001.5	1000.0	2.2	13597-99-4	0.2µg/m3	intrinsc-rat 3.16mg/kg	NA
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Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

Trace Metals Verification by ICP-MS ($\mu\text{g/mL}$)

Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pt	<0.02	Se	<0.2	Tb	<0.02	W	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Tc	<0.02	U	<0.02
As	<0.02	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02	Ti	<0.02	V	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Th	<0.02	Yb	<0.02
Be	T	Cr	<0.02	Ga	<0.02	Fe	<0.02	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	S	<0.02	Ta	<0.02	Zn	<0.02
B	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.02	Sc	<0.02	Ta	<0.02	Tl	<0.02	Zr	<0.02

(T) = Target analyte

Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
 * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.

* All standard containers are meticulously cleaned prior to use.

* Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).

* Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.

* All Standards should be stored with caps tight and under appropriate laboratory conditions.

* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



Certified Reference Material CRM

CERTIFIED WEIGHT REPORT:

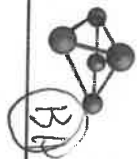
Part Number: 57050
Lot Number: 071123
Description: Tin (Sn)

Solvents: 21110221 Nitric Acid
22D0562008 Hydrochloric acid

Lot #

R-02509124

M599



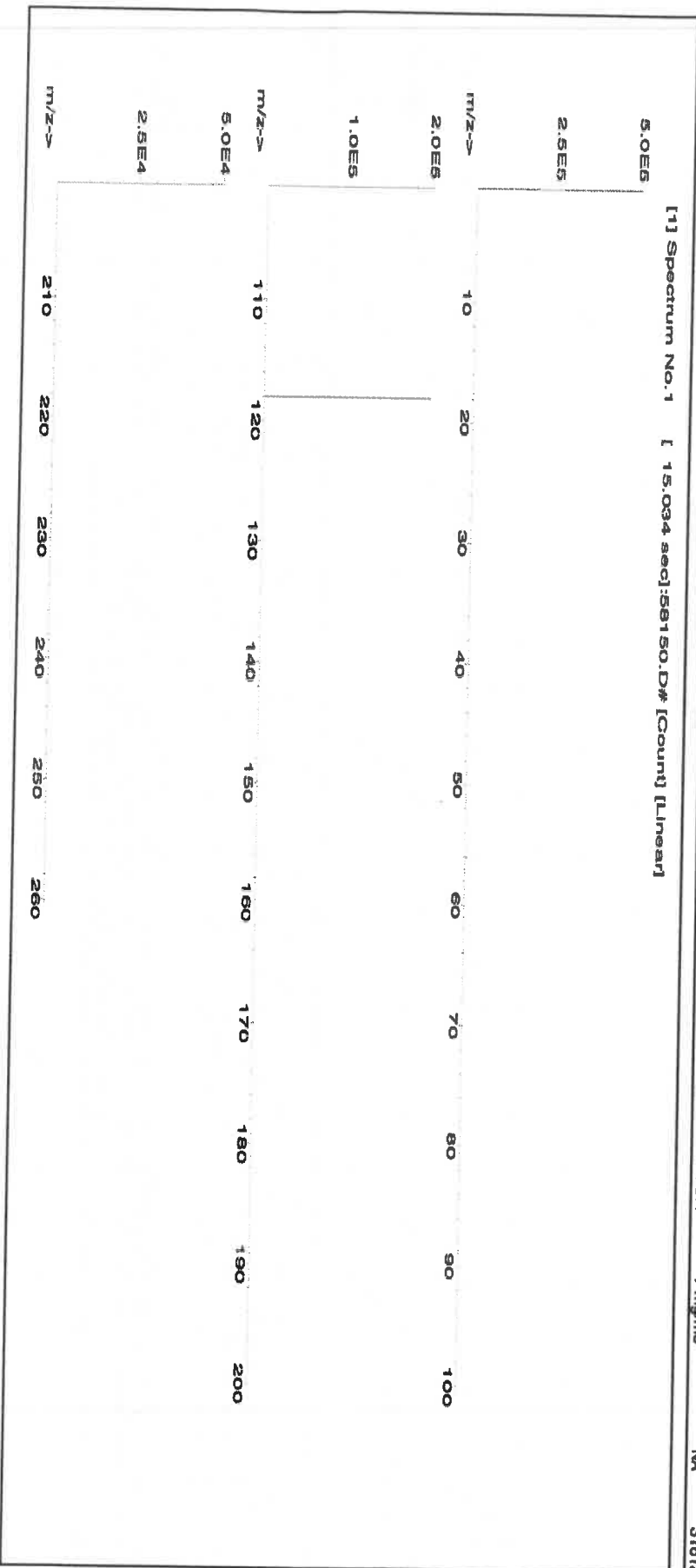
Expiration Date: 071126
Recommended Storage: Ambient (20 °C)
Nominal Concentration (µg/mL): 1000
NIST Test Number: 6UTB
Weight shown below was diluted to (mL): 499.93
5E-05 Balance Uncertainty
0.058 Flask Uncertainty

Formulated By: Benson Chan		071123
Reviewed By: Pedro L. Rientas		071123

SDS Information												
Compound	Lot	Nominal Conc. (µg/mL)	Purity (%)	Uncertainty (%)	Assay (%)	Target Weight (g)	Actual Weight (g)	Actual Conc. (µg/mL)	Expanded Uncertainty (%)	NIST		
										(Solvent Safety Info. On Attached pg.)		
RM#	Number											

1. Ammonium hexafluoroantimonate(V) (Sn) INO10 SMD042023A1 1000 99.999 0.10 44.2 1.13107 1.13286 1001.6 2.0 16919-24-7 7 mg/m3 NA 3161a

[1] Spectrum No. 1 [15.034 sec]:56150.D# [Count] [Linear]





Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

Trace Metals Verification by ICP-MS (µg/mL)

Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pr	<0.02	Se	<0.2	Tb	<0.02	W	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Te	<0.02	U	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02	Ti	<0.02	V	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<500	Th	<0.02	Yb	<0.02
Be	<0.01	Cr	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	S	<0.02	Ta	<0.02	Zn	<0.02
B	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02	Ti	<0.02	Zr	<0.02

(T) = Target analyte

Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



R: 02/09/24 115800 (54)

CERTIFIED WEIGHT REPORT:

Part Number: 57027
Lot Number: 091923
Description: Cobalt (Co)

Expiration Date: 091926
Recommended Storage: Ambient (20 °C)
Nominal Concentration (µg/mL): 1000
NIST Test Number: 6UTB
Volume shown below was diluted to (mL): 2000.02

Lot # 24002546
Solvent: Nitric Acid

2.0% Nitric Acid
40.0 (mL)

5E-05 Balance Uncertainty
0.058 Flask Uncertainty

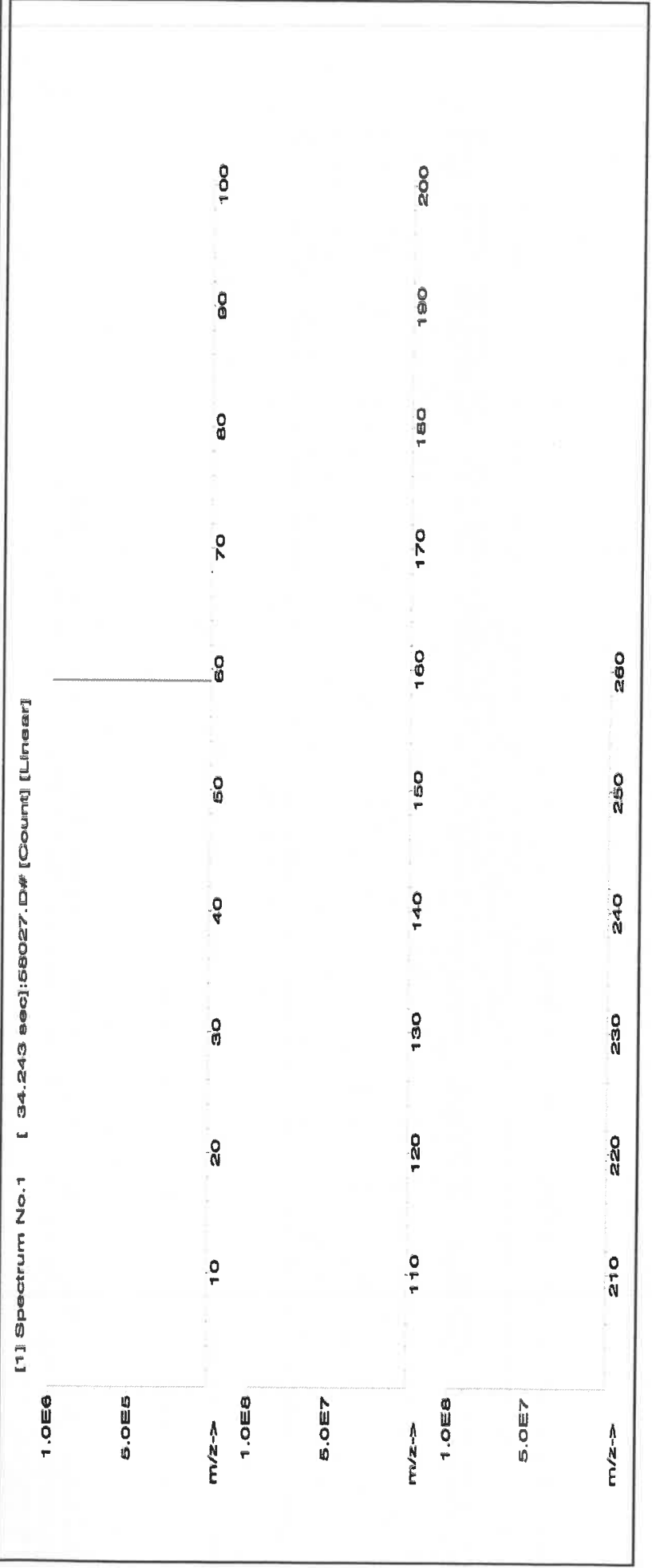
Formulated By:	Lawrence Barry
Reviewed By:	Pedro L. Rentas

SDS Information

Expanded Uncertainty +/- (µg/mL)
Final Conc. (µg/mL)
Initial Conc. (µg/mL)
Nominal Conc. (µg/mL)
Pipette (mL)
Initial Vol. (mL)
Dilution Factor
Part Number
Lot Number

(Solvent Safety Info. On Attached pg.)
CAS#
OSHA PEL (TWA)
LD50
NIST
SRM

1. Cobalt(II) nitrate hexahydrate (Co) 58127 050923 0.1000 200.0 0.084 1000 10000.0 1000.0 2.2 10026-22-9 0.02 mg/m3 orl-rat 691 mg/kg 3113





Instrumental Analysis by Inductively Coupled Plasma Mass Spectroscopy (ICP-MS):

Trace Metals Verification by ICP-MS (µg/mL)

Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pr	<0.02	Se	<0.2	Tb	<0.02	W	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Te	<0.02	U	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	<0.02	Os	<0.01	Rh	<0.02	Ag	<0.02	Tl	<0.02	V	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.2	Na	<0.02	Th	<0.02	Yb	<0.02
Be	<0.01	Cr	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	Co	T	Ge	<0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	S	<0.02	Sn	<0.02	Zn	<0.02
B	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02	Ti	<0.02	Zr	<0.02

(T)= Target analyte

Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
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- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



CERTIFIED WEIGHT REPORT:

Part Number:
Lot Number:
Description:

57033
111323
Arsenic (As)

Lot #
Solvent:

24002546
Nitric Acid

2.0%

80.0

Nitric Acid

Expiration Date:
Recommended Storage:
Nominal Concentration (µg/mL):

111326
Ambient (20 °C)
1000

NIST Test Number:
Volume shown below was diluted to (mL):

6UTB
4000.0

5E-05
Balance Uncertainty
0.06
Flask Uncertainty

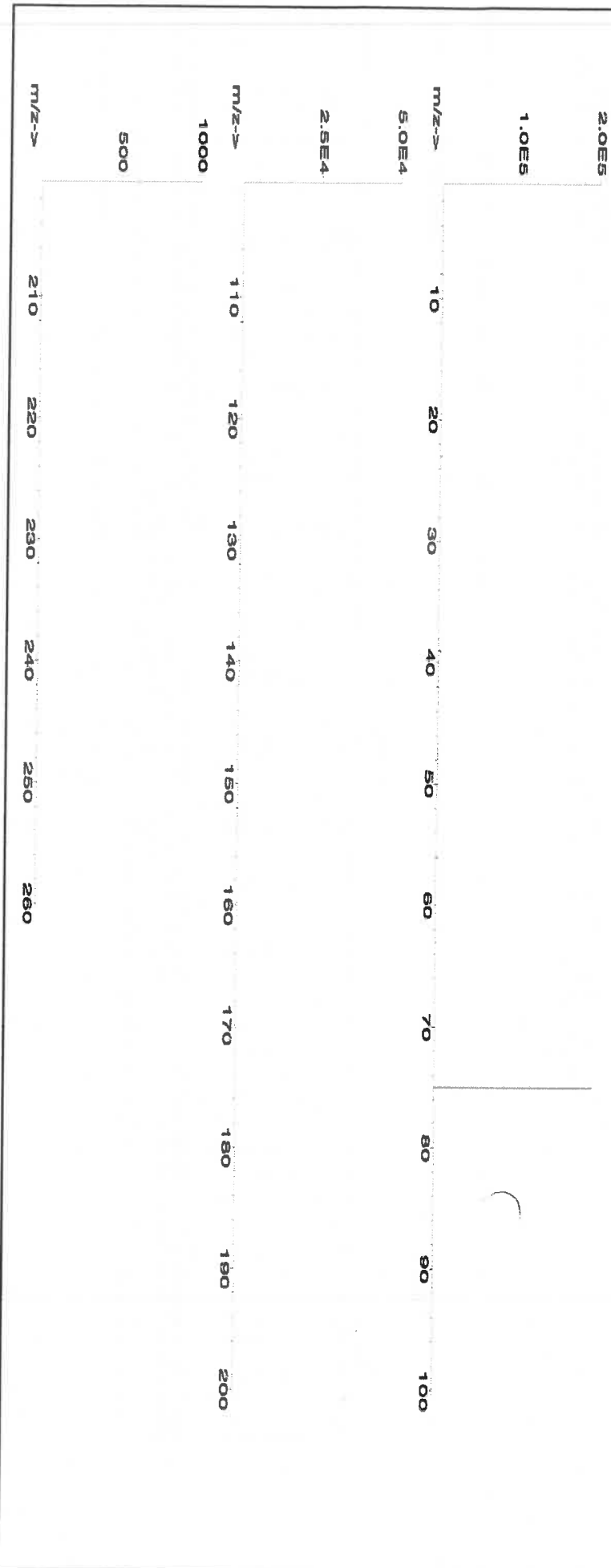
Formulated By:	Lawrence Barry	111323
Reviewed By:	Pedro L. Rendas	111323

Compound

Part Number	Lot Number	Dilution Factor	Initial Vol. (mL)	Uncertainty Pipette (mL)	Nominal Conc. (µg/mL)	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty +/- (µg/mL)	CAS#	OSHA PEL (TWA)	LD50	NIST SRM
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1. Arsenic (As)	58133	020522	0.1000	400.0	0.084	1000	10001.0	1000.0	2.0	7440-38-2	0.5 mg/m3	or-rat 500 mg/kg	3103a
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[1] Spectrum No. 1 [34.433 sec]:57033.D# [Count] [Linear]





Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

Trace Metals Verification by ICP-MS (µg/mL)

Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pt	<0.02	Se	<0.2	Tb	<0.02	W	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Te	<0.02	U	<0.02
As	T	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02	Tl	<0.02	V	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Tl _h	<0.02	Yb	<0.02
Bc	<0.01	Cr	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	Co	<0.02	Ge [*]	<0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	S	<0.02	Sn	<0.02	Zn	<0.02
B	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02	Ti	<0.02	Zr	<0.02

(T) = Target analyte

Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

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CERTIFIED WEIGHT REPORT:

Part Number: **57005**
Lot Number: **071123**
Description: **Boron (B)**

Solvent: MKB8697V Ammonium hydroxide

Lot #

AI: 021009124 M5814

Expiration Date: 071126
Recommended Storage: Ambient (20 °C)
Nominal Concentration (µg/mL): 1000
NIST Test Number: 6UTB

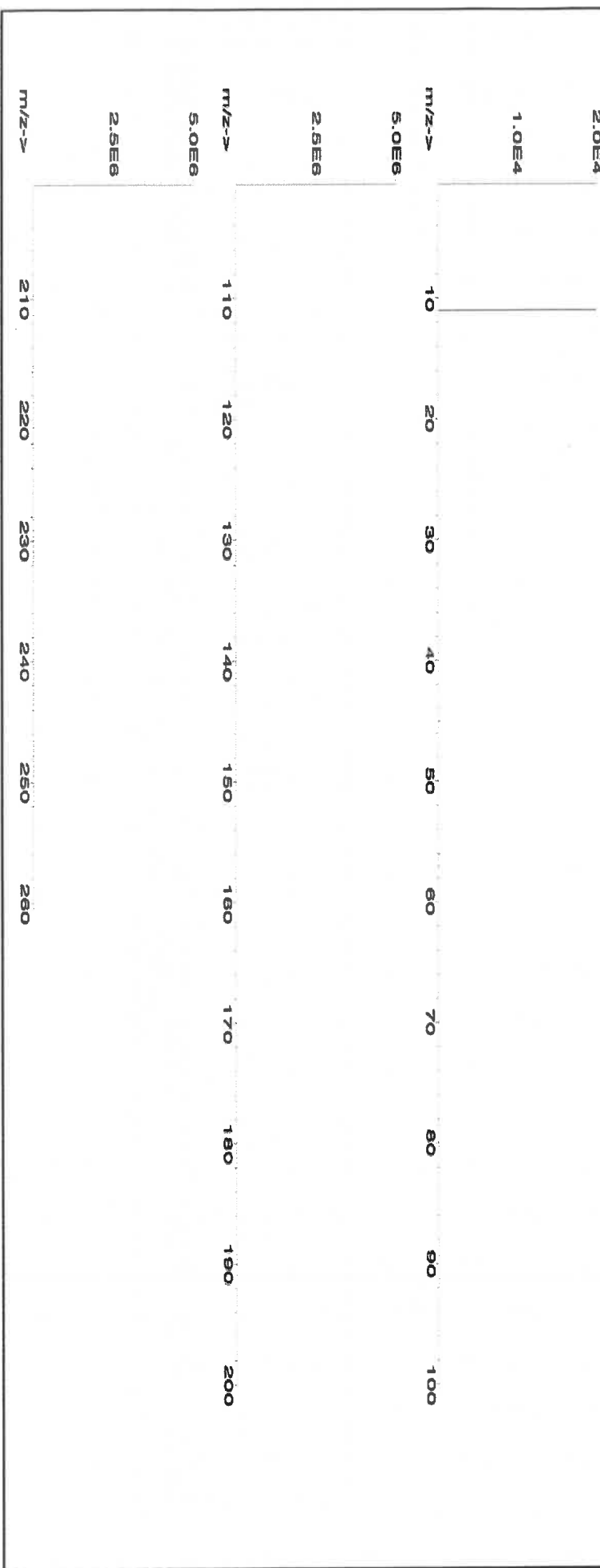
2.0% 40.0 Ammonium hydroxide (mL)

Weight shown below was diluted to (mL): 1999.48 0.058 Balance Uncertainty Flask Uncertainty

Formulated By:	Benson Chan
Reviewed By:	Pedro L. Rientas
	071123

SDS Information									
Compound	RM#	Lot Number	Nominal Conc. (µg/mL)	Purity (%)	Uncertainty Purity (%)	Assay (%)	Target Weight (g)	Actual Weight (g)	Actual Conc. (µg/mL)
1. Boric acid (B)	IN018	BV082018A1	1000	99.999	0.10	17.3	11.55772	11.56201	1000.4
							2.0	10043-35-3	2 mg/m3
								ort-nat	2660 mg/kg
									3107

[1] Spectrum No. 1 [12.275 sec]:56105.D# [Count] [Linear]





Instrumental Analysis by Inductively Coupled Plasma Mass Spectroscopy (ICP-MS):

Trace Metals Verification by ICP-MS (µg/mL)

Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pt	<0.02	Se	<0.2	Tb	<0.02	W	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Te	<0.02	U	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02	Tl	<0.02	V	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Th	<0.02	Yb	<0.02
Be	<0.01	Cr	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	S	<0.02	Sn	<0.02	Zn	<0.02
B	T	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02	Ti	<0.02	Zr	<0.02

(T) = Target analyte

Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



CERTIFIED WEIGHT REPORT:

Part Number: 57015
Lot Number: 091123
Description: Phosphorous (P)

Solvent: 24002546 Nitric Acid

Lot #

R: 02109124 M5820

Lawrence Barry
Formulated By: Lawrence Barry
091123

Pedro L. Rentas
Reviewed By: Pedro L. Rentas
091123

2% 40.0 (mL) Nitric Acid

Expiration Date: 091126
Recommended Storage: Ambient (20 °C)
Nominal Concentration (µg/mL): 1000
NIST Test Number: 6LJB

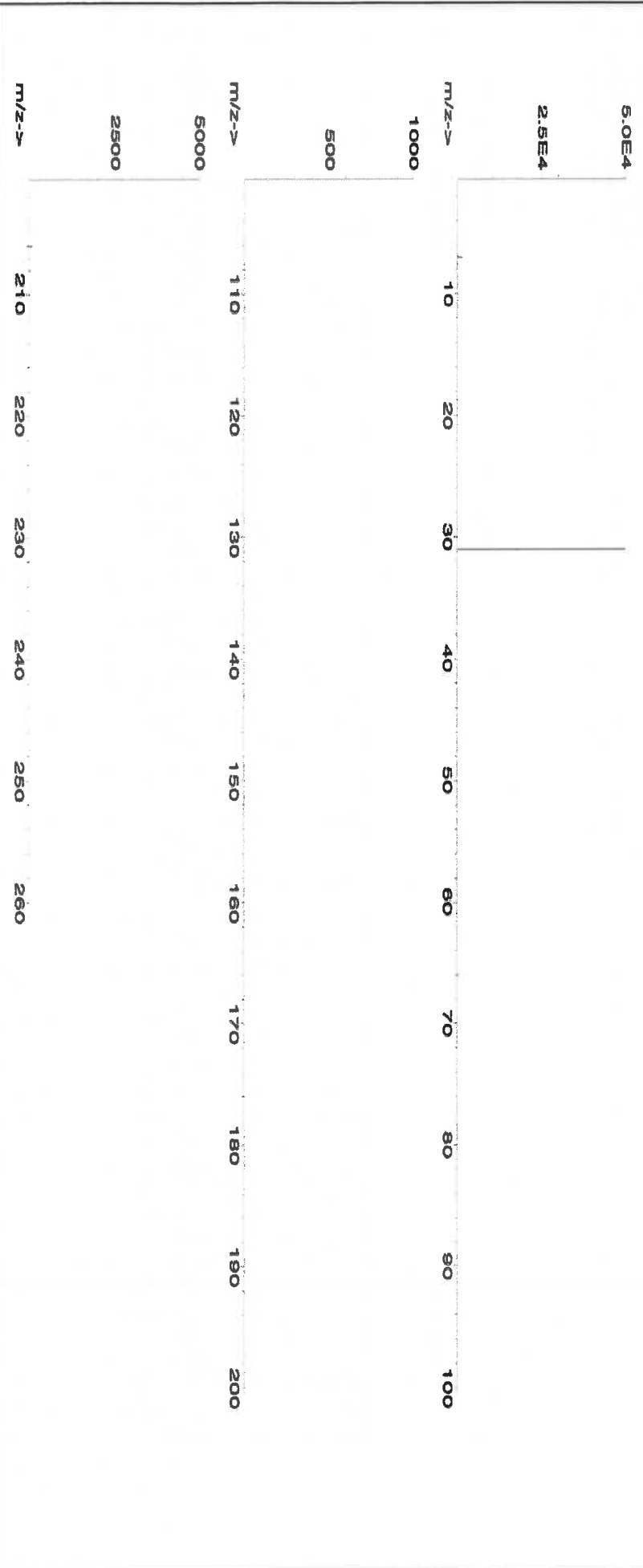
Weight shown below was diluted to (mL): 2000.02 5E-05 Balance Uncertainty 0.058 Flask Uncertainty

SDS Information

Compound	Lot Number	Nominal Conc. (µg/mL)	Purity (%)	Uncertainty Purity (%)	Assay (%)	Target Weight (g)	Actual Weight (g)	Actual Conc. (µg/mL)	Expanded Uncertainty +/- (µg/mL)	CAS#	OSHA PEL (TWA)	LD50	NIST SRM
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1. Ammonium dihydrogen phosphate (P) IN008 PVO62019A1 1000 99.999 0.10 27.5 7.2729 7.2730 1000.0 2.0 7722-76-1 5 mg/m3 xH-rat >2000mg/kg 3186

[1] Spectrum No.1 [12.074 sec]:58115.D# [Count] [Linear]





Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

Trace Metals Verification by ICP-MS (µg/mL)

Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pr	<0.02	Se	<0.2	Tb	<0.02	W	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Tc	<0.02	U	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02	Tl	<0.02	V	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Th	<0.02	Yb	<0.02
Be	<0.01	Cr	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	T	Ru	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sa	<0.02	S	<0.02	Sn	<0.02	Zn	<0.02
B	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02	Ti	<0.02	Zr	<0.02

(T) = Target analyte

Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
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- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

Sodium Chloride, Crystal
BAKER ANALYZED® A.C.S. Reagent



MS824
MB

Material No.: 3624-01

Batch No.: 0000281938

Manufactured Date: 2021-06-07

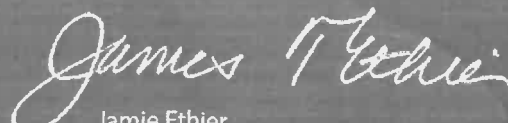
Retest Date: 2026-06-07

Revision No.: 1

Certificate of Analysis

Test	Specification	Result
Assay (NaCl) (by Ag titrn)	$\geq 99.0 \%$	100.0 %
pH of 5% Solution at 25°C	5.0 - 9.0	6.3
Insoluble Matter	$\leq 0.005 \%$	0.003 %
Iodide (I)	$\leq 0.002 \%$	< 0.002 %
Bromide (Br)	$\leq 0.01 \%$	< 0.01 %
Chlorate and Nitrate (as NO ₃)	$\leq 0.003 \%$	< 0.001 %
ACS - Phosphate (PO ₄)	$\leq 5 \text{ ppm}$	< 5 ppm
Sulfate (SO ₄)	$\leq 0.004 \%$	< 0.004 %
Barium (Ba)	Passes Test	Passes Test
ACS - Heavy Metals (as Pb)	$\leq 5 \text{ ppm}$	< 5 ppm
Iron (Fe)	$\leq 2 \text{ ppm}$	< 1 ppm
Calcium (Ca)	$\leq 0.002 \%$	< 0.001 %
Magnesium (Mg)	$\leq 0.001 \%$	< 0.001 %
Potassium (K)	$\leq 0.005 \%$	0.001 %

For Laboratory, Research, or Manufacturing Use
Meets Reagent Specifications for testing USP/NF monographs
Country of Origin: USA
Packaging Site: Paris Mfg Ctr & DC


Jamie Ethier
Vice President Global Quality

For questions on this Certificate of Analysis please contact Technical Services at 855.282.6867 or +1.610.386.1700

Avantor Performance Materials, LLC

100 Mansford Rd, Suite 200, Radnor, PA 19087. U.S.A. Phone 610.386.1700



Certified Reference Material CRM
M5962 **R10614124**



ANAB ISO 17034 Accredited
AR-1539 Certificate Number
https://AbsoluteStandards.com

CERTIFIED WEIGHT REPORT:

Part Number: 57034
Lot Number: 060624
Description: Selenium (Se)

Lot # 24002546
Solvent: Nitric Acid

2.0% 40.0 (mL) Nitric Acid

Expiration Date: 060627

Recommended Storage: Ambient (20 °C)

Nominal Concentration (µg/mL): 1000

NIST Test Number: 6UTB

Volume shown below was diluted to (mL): 2000.07

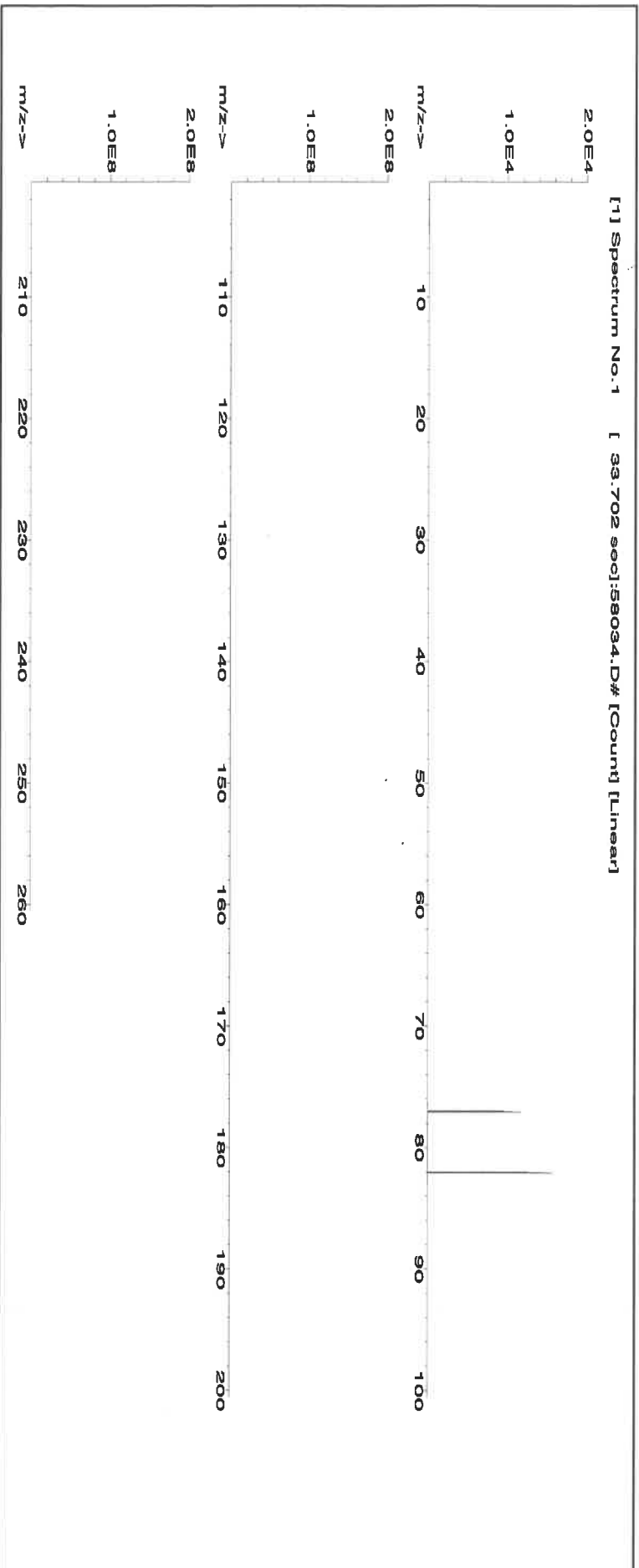
SE-05 Balance Uncertainty
0.100 Flask Uncertainty

Formulated By:	Benson Chan
	060624
Reviewed By:	Pedro L. Rantas
	060624

SDS Information

Compound	Part Number	Lot Number	Dilution Factor	Initial Vol. (mL)	Pipette (mL)	Nominal Conc. (µg/mL)	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty +/- (µg/mL)	(Solvent Safety Info. On Attached pg.)	CAS#	OSHA PEL (TWA)	LDSO	NIST SRM
----------	-------------	------------	-----------------	-------------------	--------------	-----------------------	-----------------------	---------------------	----------------------------------	--	------	----------------	------	----------

1. Selenium (Se)	58134	071223	0.1000	200.0	0.084	1000	10002.5	1000.0	2.2	7782-49-2	0.2 mg/m3	or-tral 6700 mg/kg	3149
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Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

Trace Metals Verification by ICP-MS (µg/mL)

Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pt	<0.02	Se	<0.02	Tb	<0.02	W	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Te	<0.02	U	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02	Tl	<0.02	V	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Ru	<0.02	Na	<0.2	Th	<0.02	Yb	<0.02
Be	<0.01	Cr	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Sr	<0.02	S	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	Ta	<0.02	Sn	<0.02	Zn	<0.02
B	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02			Ti	<0.02	Zr	<0.02

(T) = Target analyte

Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



CERTIFIED WEIGHT REPORT:

Part Number: 57016
Lot Number: 122923
Description: Sulfur (S)

Lot #
Solvent: 122923 ASTM Type 1 Water

Formulated By:	Benson Chan
122923	
Reviewed By:	Pedro L. Rentas
122923	

Expiration Date: 122926
Recommended Storage: Ambient (20 °C)
Nominal Concentration (µg/mL): 1000
NIST Test Number: 6UTB
Weight shown below was diluted to (mL): 4000.0
5E-05 Balance Uncertainty
0.06 Flask Uncertainty

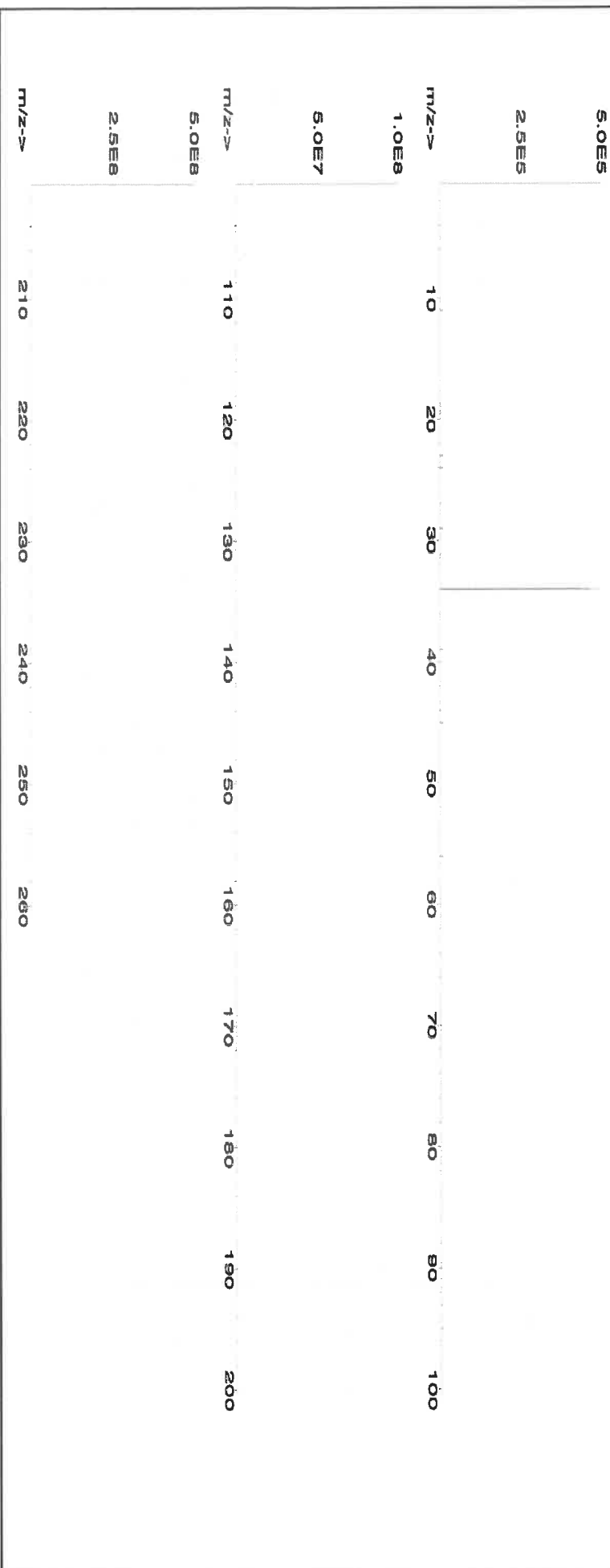
Compound	Lot Number	Nominal Conc. (µg/mL)	Purity (%)	Uncertainty (%)	Assay (%)	Target Weight (g)	Actual Weight (g)	Actual Conc. (µg/mL)	Expanded Uncertainty		NIST SRM
									±	(µg/mL)	

SDS Information

(Solvent Safety Info. On Attached pg.)
CAS# OSHA PEL (TWA) LD50

1. Ammonium sulfate (S) IN117 SLBR725V 1000 99.9 0.10 24.3 16.4979 16.4980 1000.0 2.0 7783-20-2 NA or-rel 4250mg/kg 3181

[1] Spectrum No. 1 [33.603 sec]:57016.D# [Count] [Linear]



Absolute Standards, Inc.
800-368-1131
www.absolutestandards.com



Certified Reference Material CRM

M5970 M5971

R. J. 10/12/24

ANAB ISO 17034 Accredited
AR-1539 Certificate Number
https://AbsoluteStandards.com

CERTIFIED WEIGHT REPORT:

Part Number: **57003**
Lot Number: **062124**
Description: **Lithium (Li)**
Expiration Date: **06/127**
Recommended Storage: **Ambient (20 °C)**
Nominal Concentration (µg/mL): **1000**
NIST Test Number: **6UTB**
Volume shown below was diluted to (mL): **250.11**
SE-05 Balance Uncertainty
0.016 Flask Uncertainty

Lot # **24002546**
Solvent: **Nitric Acid**

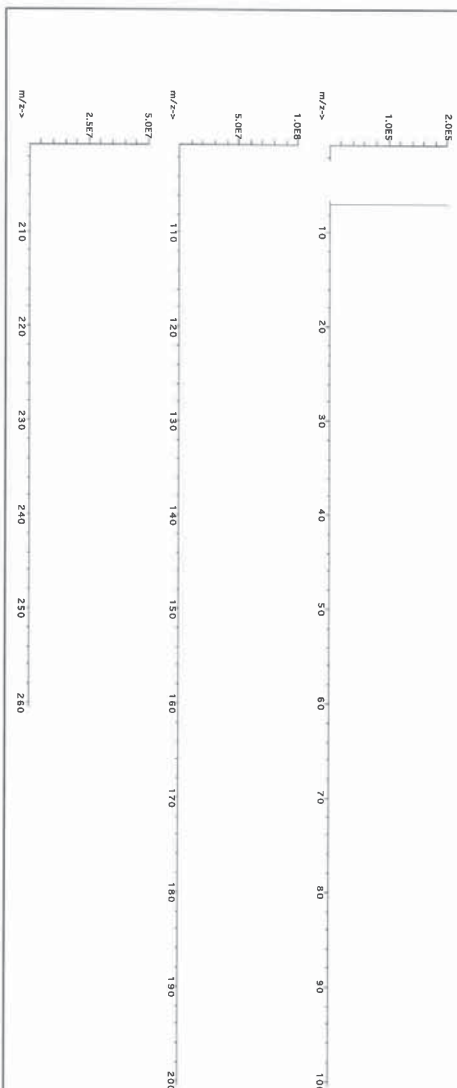
2.0% 5.0 (mL) Nitric Acid

Microvial Capable	
Formulated By:	Giovanni Esposito
Reviewed By:	Pedro L. Parias
CAS#	OSHA PEL (TWA)
LD50	
SN#	062124

Compound		Part		Lot		Dilution		Initial		Uncertainty		Nominal		Initial		Final		Expanded		SDS Information		NIST	
Number	Factor	Number	Factor	Number	Factor	Vol. (mL)	Pipette (mL)	Conc. (µg/mL)	Conc. (µg/mL)	Vol. (mL)	Pipette (mL)	Conc. (µg/mL)	Conc. (µg/mL)	Vol. (mL)	Pipette (mL)	Conc. (µg/mL)	Conc. (µg/mL)	Uncertainty	± (µg/mL)	CAS#	OSHA PEL (TWA)	LD50	SN#

1. Lithium nitrate (Li)	58103	070622	0.1000	25.0	0.004	1000	10000.4	1000.0	2.0	7790-68-4	5 mg/m3	01-Hal 1428 mg/kg	NA
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[1] Spectrum No. 1 [32.093 sec; 15000.00# Count; 1.00e4]



Certificate of Analysis

MS978, MS979



Refine your results. Redefine your industry.

300 Technology Drive
Christiansburg, VA 24073 USA
inorganicventures.com

R: 2/22/24

P: 800-669-6799/540-585-3030
F: 540-585-3012
info@inorganicventures.com

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



2.0 PRODUCT DESCRIPTION

Product Code: Single Analyte Custom Grade Solution

Catalog Number: CGT1

Lot Number: T2-T1719972

Matrix: 2% (v/v) HNO₃

Value / Analyte(s): tr. HF

Starting Material: 1 000 µg/mL ea.

Starting Material: Titanium

Starting Material: Ti Metal

Starting Material Lot#: 2094

Starting Material Purity: 99.9975%

Certified Value: 1002 ± 5 µg/mL

Density: 1.012 g/mL (measured at 20 ± 4 °C)

Assay Information:

Assay Method #1 1002 ± 4 µg/mL

ICP Assay NIST SRM 3162a Lot Number: 130925

- The Calculated Value is a value calculated from the weight of a starting material that has been certified directly vs. a National Institute of Standards and Technology (NIST) SRM/RM. See Sec 4.2 for balance traceability.

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM/RM by Two or More Methods
Certified Value, $X_{CRM/RM}$, where two or more methods of characterization are used is the weighted mean of the results:

$X_{CRM/RM} = \sum (X_i / U_{CRM/RM})$
 X_i = mean of Assay Method A with

$U_{CRM/RM}$ = the standard uncertainty of characterization Method A

$U_{CRM/RM} = \sqrt{U_{CRM/RM}^2 + U_{CRM/RM}^2}$

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$U_{CRM/RM} = \sqrt{U_{CRM/RM}^2 + U_{CRM/RM}^2}$

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

CRM/RMs are tested for trace metallic impurities by Axial ICP-OES and ICP-MS. The result from the most sensitive method for each element, is reported below. Solutions tested by ICP-MS were analyzed in an UHPA-filtered Clean Room. An UHPA-filter is 99.9985% efficient for the removal of particles down to 0.3 µm.

M Ag	<	0.000536	M Eu	<	0.000268	O Na	<	0.032670	M Se	<	0.001204	O Zn	<	0.003267
M Al	<	0.000872	O Fe	<	0.003225	O Nb	<	0.043560	O Si	<	0.004735	O Zr	<	0.043560
M As	<	0.008586	M Ga	<	0.000268	M Nd	<	0.000268	M Sm	<	0.000268			
M Au	<	0.004577	M Gd	<	0.000268	O Ni	<	0.010890	M Sn	<	0.000986			
O B	<	0.008929	M Ge	<	0.002146	M Os	<	0.000269	O Sr	<	0.000986			
M Ba	<	0.002683	M Hf	<	0.002161	O P	<	0.054450	M Ta	<	0.010560			
M Be	<	0.005366	M Hg	<	0.003231	M Pb	<	0.001073	M Tb	<	0.000268			
M Bi	<	0.001609	M Ho	<	0.000268	M Pd	<	0.000268	M Th	<	0.001341			
O Ca	<	0.000676	M In	<	0.002683	M Pr	<	0.000268	M Tl	<	0.053663			
M Cd	<	0.000268	M Ir	<	0.000269	M Pt	<	0.000536	S Tl	<				
M Co	<	0.000268	M K	<	0.001172	M Rb	<	0.000268	M Ti	<	0.000268			
M Cr	<	0.000752	O Li	<	0.000268	M Re	<	0.000268	M Tm	<	0.000268			
M Cs	<	0.000268	M Lu	<	0.000268	M Rh	<	0.000268	M U	<	0.000268			
O Cu	<	0.010890	O Mg	<	0.005445	I S	<	0.006976	M Y	<	0.002146			
M Dy	<	0.000268	O Mn	<	0.003267	M Sb	<	0.004900	M Yb	<	0.000536			
M Er	<	0.000268	M Mo	<	0.000774	O Sc	<							

6.0 INTENDED USE

- For the calibration of analytical instruments and validation of analytical methods as appropriate.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit www.inorganicventures.com/TCT

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 47.87 ± 4.6 Ti(F)₆-2 media. Unstable at ppm levels with metals that would pull F- away (i.e. Do not mix with Alkaline or Rare Earths or high levels of transition elements unless they are fluorinated). Stable with most inorganic anions with a tendency to hydrolyze forming the hydrated oxide in all dilute acids except HF.

Stability - 2-100 ppb levels stable (Alone or mixed with all other metals) as the Ti(F)₆-2 for months in 1% HNO₃ / LDPE container. 1-10,000 ppm single element solutions as the Ti(F)₆-2 chemically stable for years in 2-5% HNO₃ / trace HF in an LDPE container.

Ti Containing Samples (Preparation and Solution) - Metal (Soluble in H₂O / HF caution - powder reacts violently). Oxide - low temperature history anatase or rutile (Dissolved by heating in 1:1:1 H₂O / HF / H₂SO₄); K₂SiO₇ - no KF if silica not present); Organic Matrices (Dry ash at 450EC in P10 and dissolve by heating with 1:1:1 H₂O / HF / H₂SO₄ or fuse ash with pyrosulfate if oxide is as plastic pigment and likely in brookite crystaline form).

Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/axial view):

Technique/Line	Estimated D.L.	14 ppt
ICP-MS 48 amu	N/A	
ICP-OES 323.452 nm	0.0054 / 0.00092 µg/mL	
ICP-OES 334.941 nm	0.0038 / 0.00028 µg/mL	
ICP-OES 336.121 nm	0.0053 / 0.00034 µg/mL	
HF Note: This standard should not be prepared or stored in glass.		
		W, Mo, Co
		Nb, Ta, Cr, U
		Ce, Ar, Ni
		Ru
		(where X = Zr, Mo,
		14N17N2, 36Ar12C,
		48Ca, 196X=2
		14N16O18O,
		32S16O, 32S14N,
		N/A
		Order Interferences (underlined indicates severe)

8.0 HAZARDOUS INFORMATION

HF Note: This standard should not be prepared or stored in glass.

9.0 HOMOGENEITY

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous.

- Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, VA 24073, USA; Telephone: 800.868.6786; 540.585.3030; Fax: 540.585.3030; Email: info@inorganicventures.com; <http://www.inorganicventures.com>

11.0

CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

June 17, 2022

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- June 17, 2027

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date:

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0

NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Thomas Kozlikowski
Manager, Quality Control

TD9784

Certifying Officer:

Paul Gaines
Chairman / Senior Technical Director

Paul R. Gaines

Certificate of Analysis

300 Technology Drive
Christiansburg, VA 24073 USA
inorganicventures.com

P: 800-669-6799/540-585-3030
F: 540-585-3012
info@inorganicventures.com

M5985
R: 6/14/24

1.0 ACCREDITATION / REGISTRATION

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2.0 PRODUCT DESCRIPTION

Product Code: Single Analyte Custom Grade Solution
Catalog Number: CGIN10
Lot Number: U2-IN729349
Matrix: 5% (v/v) HNO₃
Value / Analyte(s): 10 000 µg/mL ea:
Indium
Starting Material: Indium Metal
Starting Material Lot#: 2511
Starting Material Purity: 99.9995%

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Value: 10022 ± 30 µg/mL
Density: 1.044 g/mL (measured at 20 ± 4 °C)

Assay Information:

Assay Method #1	10021 ± 56 µg/mL ICP Assay NIST SRM 3124a Lot Number: 110516
Assay Method #2	10035 ± 25 µg/mL EDTA NIST SRM 928 Lot Number: 928
Assay Method #3	10001 ± 33 µg/mL Calculated NIST SRM Lot Number: See Sec. 4.2

- The Calculated Value is a value calculated from the weight of a starting material that has been certified directly vs. a National Institute of Standards and Technology (NIST) SRM/RM. See Sec 4.2 for balance traceability.

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM/RM by Two or More Methods

Certified Value, $X_{CRM/RM}$, where two or more methods of characterization are used is the weighted mean of the results:

$$X_{CRM/RM} = \sum (w_i) (X_i)$$

X_i = mean of Assay Method i with standard uncertainty $u_{char i}$

w_i = the weighting factors for each method calculated using the inverse square of the variance:

$$w_i = (1/u_{char i}^2) / (\sum (1/u_{char i}^2))$$

$$CRM/RM \text{ Expanded Uncertainty } (k) = U_{CRM/RM} = k (u_{char}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$$

k = coverage factor = 2

$u_{char} = [\sum (w_i)^2 (u_{char i}^2)]^{1/2}$ where $u_{char i}$ are the errors from each characterization method

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$$X_{CRM/RM} = (X_a) (u_{char a})$$

X_a = mean of Assay Method A with

$u_{char a}$ = the standard uncertainty of characterization Method A

$$CRM/RM \text{ Expanded Uncertainty } (k) = U_{CRM/RM} = k (u_{char a}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$$

k = coverage factor = 2

$u_{char a}$ = the errors from characterization

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

CRM/RMs are tested for trace metallic impurities by Axial ICP-OES and ICP-MS. The result from the most sensitive method for each element, is reported below. Solutions tested by ICP-MS were analyzed in an ULPA-Filtered Clean Room. An ULPA-Filter is 99.9985% efficient for the removal of particles down to 0.3 µm.

M	Ag	<	0.000760	M	Eu	<	0.000760	O	Na	0.012771	M	Se	<	0.023000	M	Zn	<	0.006100
M	Al	0.003385	O	Fe	0.004462	M	Nb	<	0.000760	O	Si	0.024619	M	Zr	<	0.000760		
M	As	<	0.004600	M	Ga	<	0.000760	M	Nd	<	0.000760	M	Sm	<	0.000760			
M	Au	<	0.002300	M	Gd	<	0.000760	O	Ni	<	0.005100	M	Sn	<	0.000760			
O	B	0.003692	M	Ge	<	0.001600	M	Os	<	0.000760	O	Sr	<	0.000610				
M	Ba	<	0.001600	M	Hf	<	0.000760	n	P	<		M	Ta	<	0.000760			
O	Be	<	0.000130	M	Hg	<	0.003100	M	Pb	0.001400	M	Tb	<	0.000760				
M	Bi	<	0.000760	M	Ho	<	0.000760	M	Pd	<	0.001600	M	Te	<	0.000760			
O	Ca	0.004616	s	In	<			M	Pr	<	0.000760	M	Th	<	0.000760			
M	Cd	<	0.000760	M	Ir	<	0.000760	M	Pt	<	0.000760	O	Ti	<	0.001100			
M	Ce	<	0.000760	O	K	0.007078	M	Rb	<	0.000760	M	Tl	<	0.000760				
M	Co	<	0.000760	M	La	<	0.000760	M	Re	<	0.000760	M	Tm	<	0.000760			
O	Cr	<	0.001300	O	Li	<	0.000130	M	Rh	<	0.000760	M	U	<	0.000760			
M	Cs	<	0.000760	M	Lu	<	0.000760	M	Ru	<	0.000760	M	V	<	0.001600			
M	Cu	<	0.003800	O	Mg	0.000707	n	S	<		M	W	<	0.001600				
M	Dy	<	0.000760	O	Mn	0.000149	M	Sb	<	0.000760	M	Y	<	0.000760				
M	Er	<	0.000760	M	Mo	<	0.002300	M	Sc	<	0.000760	M	Yb	<	0.000760			

M - Checked by ICP-MS

O - Checked by ICP-OES

i - Spectral Interference

n - Not Checked For

s - Solution Standard Element

6.0 INTENDED USE

6.1 This standard is intended for the calibration of analytical instruments and validation of analytical methods as appropriate. This CRM may be used in connection with EPA Methods 6010, 6020 (all versions), Standard Methods 3120 B and USP <232> / ICH Q3D.

6.2 For products attaining traceability through Inorganic Ventures' Primary Certified Reference Materials (PCRM™) see the Limited License to Use PCRM™ in the Inorganic Ventures Terms and Conditions of Sale. <https://www.inorganicventures.com/terms-and-conditions-sale>. The Terms and Conditions contain information on the use of materials traceable to PCRM™ certified reference materials. This Limited License agreement is especially pertinent for laboratories accredited under ISO:17034.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.
- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.
- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit www.inorganicventures.com/TCT

Atomic Weight; Valence; Coordination Number; Chemical Form In Solution - 114.82 +3 6 In(H₂O)₆+3

Chemical Compatibility -Soluble in HCl, HNO₃, and H₂SO₄. Avoid neutral and basic media. Stable with most metals and inorganic anions. The oxalate, sulfide, carbonate, hydroxide and phosphate are insoluble in water.

Stability - 2-100 ppb levels stable for months in 1% HNO₃ / LDPE container. 1-10,000 ppm solutions chemically stable for years in 2-5% HNO₃ / LDPE container.

In Containing Samples (Preparation and Solution) -Metal (Best dissolved in HCl / HNO₃); Oxide (Soluble in mineral acids); Ores (Carbonate fusion in PtO followed by HCl dissolution); Organic Matrices (Sulfuric/peroxide digestion or dry ash and dissolution in dilute HCl).

Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/axial view):

Technique/Line	Estimated D.L.	Order	Interferences (underlined indicates severe)
ICP-MS 115 amu	1 ppt	n/a	115Sn, 99Ru16O
ICP-OES 158.583 nm	0.05 / 0.002 µg/mL	1	
ICP-OES 230.606 nm	0.1 / 0.03 µg/mL	1	Ni, Os
ICP-OES 325.609 nm	0.2 / 0.05 µg/mL	1	Mn, Mo, Th

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; Info@inorganicventures.com

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

February 21, 2023

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- February 21, 2028

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Thomas Kozikowski
Manager, Quality Control



Certifying Officer:

Paul Gaines
Chairman / Senior Technical Director



Certificate of Analysis

300 Technology Drive
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inorganicventures.com

R: 2/22/24
MS-997

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info@inorganicventures.com

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories".

Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



2.0 PRODUCT DESCRIPTION

Product Code: Multi Analyte Custom Grade Solution
Catalog Number: CLPP-CAL-3
Lot Number: T2-MEB727800
Matrix: 7% (v/v) HNO₃
Value / Analyte(s):
1 000 µg/mL ea:
Arsenic, Lead,
Selenium, Thallium,
500 µg/mL ea:
Cadmium

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE	CERTIFIED VALUE	ANALYTE	CERTIFIED VALUE
Arsenic, As	1 000 ± 7 µg/mL	Cadmium, Cd	500.0 ± 2.2 µg/mL
Lead, Pb	1 000 ± 4 µg/mL	Selenium, Se	1 000 ± 6 µg/mL
Thallium, Tl	1 000 ± 7 µg/mL		

Density: 1.042 g/mL (measured at 20 ± 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
As	ICP Assay	3103a	100818
As	Calculated		See Sec. 4.2
Cd	ICP Assay	3108	130116
Cd	EDTA	928	928
Pb	ICP Assay	3128	101026
Pb	EDTA	928	928
Se	ICP Assay	3149	100901
Tl	ICP Assay	3158	151215

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM/RM by Two or More Methods

Certified Value, $X_{\text{CRM/RM}}$, where two or more methods of characterization are used is the weighted mean of the results:

$$X_{\text{CRM/RM}} = \sum (w_i) (X_i)$$

X_i = mean of Assay Method i with standard uncertainty $u_{\text{char } i}$

w_i = the weighting factors for each method calculated using the inverse square of the variance:

$$w_i = (1/u_{\text{char } i})^2 / (\sum (1/u_{\text{char } i})^2)$$

$$\text{CRM/RM Expanded Uncertainty } (k) = U_{\text{CRM/RM}} = k (u_{\text{char}}^2 + u_{\text{bb}}^2 + u_{\text{ts}}^2 + u_{\text{ts}}^2)^{1/2}$$

k = coverage factor = 2

$u_{\text{char}} = [\sum (w_i)^2 (u_{\text{char } i})^2]^{1/2}$ where $u_{\text{char } i}$ are the errors from each characterization method

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{ts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{\text{CRM/RM}}$, where one method of characterization is used is the mean of individual results:

$$X_{\text{CRM/RM}} = (X_a) (u_{\text{char } a})$$

X_a = mean of Assay Method A with

$u_{\text{char } a}$ = the standard uncertainty of characterization Method A

$$\text{CRM/RM Expanded Uncertainty } (k) = U_{\text{CRM/RM}} = k (u_{\text{char } a}^2 + u_{\text{bb}}^2 + u_{\text{ts}}^2 + u_{\text{ts}}^2)^{1/2}$$

k = coverage factor = 2

$u_{\text{char } a}$ = the errors from characterization

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{ts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

N/A

6.0 INTENDED USE

6.1 This standard is intended for the calibration of analytical instruments and validation of analytical methods as appropriate. This CRM may be used in connection with EPA Methods 6010, 6020 (all versions), Standard Methods 3120 B and USP <232> / ICH Q3D.

6.2 For products attaining traceability through Inorganic Ventures' Primary Certified Reference Materials (PCRM™) see the Limited License to Use PCRM™ in the Inorganic Ventures Terms and Conditions of Sale. <https://www.inorganicventures.com/terms-and-conditions-sale>. The Terms and Conditions contain information on the use of materials traceable to PCRM™ certified reference materials. This Limited License agreement is especially pertinent for laboratories accredited under ISO:17034.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.
- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.
- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.
- For more information, visit www.inorganicventures.com/TCT

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

December 21, 2022

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- **December 21, 2027**

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Thomas Kozikowski
Manager, Quality Control



Certifying Officer:

Paul Gaines
Chairman / Senior Technical Director





Refine your results. Redefine your industry.

300 Technology Drive
Christiansburg, VA 24073 USA
inorganicventures.com

Certificate of Analysis

M6074
M6075
M6076
M6077

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F: 540-585-3012

info@inorganicventures.com

EXP: 9/6/2029

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



2.0 PRODUCT DESCRIPTION

Product Code: Multi Analyte Custom Grade Solution
Catalog Number: CHEM-CLP-4
Lot Number: V2-MEB746762
Matrix: 3% (v/v) HNO₃
3% (v/v) HF
Value / Analyte(s): 1 000 µg/mL ea:
Boron, Molybdenum,
Silicon, Tin,
Titanium

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE	CERTIFIED VALUE	ANALYTE	CERTIFIED VALUE
Boron, B	1 000 ± 5 µg/mL	Molybdenum, Mo	1 000 ± 5 µg/mL
Silicon, Si	1 000 ± 7 µg/mL	Tin, Sn	1 000 ± 5 µg/mL
Titanium, Ti	1 000 ± 6 µg/mL		

Density: 1.033 g/mL (measured at 20 ± 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
B	ICP Assay	3107	190605
B	Calculated		See Sec. 4.2
Mo	ICP Assay	traceable to 3134	U2-MO739068
Si	ICP Assay	Traceable to 3150	S2-SI702546
Sn	ICP Assay	3161a	140917
Ti	ICP Assay	traceable to 3162a	T2-TI725816

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM/RM by Two or More Methods

Certified Value, $X_{\text{CRM/RM}}$, where two or more methods of characterization are used is the weighted mean of the results:

$$X_{\text{CRM/RM}} = \sum (w_i) (X_i)$$

X_i = mean of Assay Method i with standard uncertainty $u_{\text{char } i}$

w_i = the weighting factors for each method calculated using the inverse square of the variance:

$$w_i = (1/u_{\text{char } i}^2) / (\sum (1/u_{\text{char } i}^2))$$

$$\text{CRM/RM Expanded Uncertainty } (\pm) = U_{\text{CRM/RM}} = k (u_{\text{char}}^2 + u_{\text{bb}}^2 + u_{\text{Its}}^2 + u_{\text{ts}}^2)^{1/2}$$

k = coverage factor = 2

$u_{\text{char}} = [\sum (w_i)^2 (u_{\text{char } i}^2)]^{1/2}$ where $u_{\text{char } i}$ are the errors from each characterization method

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{Its} = long term stability standard uncertainty (storage)

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Characterization of CRM/RM by One Method

Certified Value, $X_{\text{CRM/RM}}$, where one method of characterization is used is the mean of individual results:

$$X_{\text{CRM/RM}} = (X_a) (u_{\text{char } a})$$

X_a = mean of Assay Method A with

$u_{\text{char } a}$ = the standard uncertainty of characterization Method A

$$\text{CRM/RM Expanded Uncertainty } (\pm) = U_{\text{CRM/RM}} = k (u_{\text{char } a}^2 + u_{\text{bb}}^2 + u_{\text{Its}}^2 + u_{\text{ts}}^2)^{1/2}$$

k = coverage factor = 2

$u_{\text{char } a}$ = the errors from characterization

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{Its} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

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- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

N/A

6.0 INTENDED USE

6.1 This standard is intended for the calibration of analytical instruments and validation of analytical methods as appropriate. This CRM may be used in connection with EPA Methods 6010, 6020 (all versions), Standard Methods 3120 B and USP <232> / ICH Q3D.

6.2 For products attaining traceability through Inorganic Ventures' Primary Certified Reference Materials (PCRM™) see the Limited License to Use PCRM™ in the Inorganic Ventures Terms and Conditions of Sale. <https://www.inorganicventures.com/terms-and-conditions-sale>. The Terms and Conditions contain information on the use of materials traceable to PCRM™ certified reference materials. This Limited License agreement is especially pertinent for laboratories accredited under ISO:17034.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit www.inorganicventures.com/TCT

HF Note: This standard should not be prepared or stored in glass.

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

September 06, 2024

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- **September 06, 2029**

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Joseph Burns
Custom VS Manager



Certifying Officer:

Paul Gaines
Chairman / Senior Technical Director





CERTIFIED WEIGHT REPORT:

Part Number:
Lot Number:
Description:

58025
101124
Manganese (Mn)

R-71113128

Lot #
Solvent: 24002546 Nitric Acid

Expiration Date:

101127

2% 80.0 (mL) Nitric Acid

Recommended Storage:

Ambient (20 °C)

Nominal Concentration (µg/mL):

1000

NIST Test Number:

6UTB

SE-05 Balance Uncertainty

Weight shown below was diluted to (mL):

4000.2

0.10 Flask Uncertainty

<i>Giovanni Esposito</i>	
Formulated By:	Giovanni Esposito
Reviewed By:	<i>Pedro L. Renteria</i>
	101124

Compound

RM#	Lot Number	Nominal Conc. (µg/mL)	Purity (%)	Uncertainty Purity (%)	Assay (%)	Target Weight (g)	Actual Weight (g)	Actual Conc. (µg/mL)	Expanded Uncertainty +/- (µg/mL)	CAS#	OSHA PEL (TWA)	LD50	NIST SRM
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1. Manganese(II) nitrate hydrate (Mn) IN031 MMN02020A1 1000 99.999 0.10 20.8 19.2322 19.2344 1000.1 2.0 15710-66-4 5 mg/m3 or-rel >300mg/kg 3132

[1] Spectrum No.1 [34.243 sec]:57025.D# [Count] [Linear]

5.0E6													
2.5E6													
m/z->	10	20	30	40	50	60	70	80	90	100			
1.0E6													
5.0E7													
m/z->	110	120	130	140	150	160	170	180	190	200			
1.0E6													
5.0E7													
m/z->	210	220	230	240	250	260							



Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

Trace Metals Verification by ICP-MS (µg/mL)

Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pr	<0.02	Se	<0.2	Tb	<0.02	W	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Te	<0.02	U	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02	Tl	<0.02	V	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	<0.02	Mn	T	Pd	<0.02	Rb	<0.02	Na	<0.2	Th	<0.02	Yb	<0.02
Be	<0.01	Cr	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	S	<0.02	Sn	<0.02	Zn	<0.02
B	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02	Ti	<0.02	Zr	<0.02

(T) = Target analyte

Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

Certificate of Analysis

300 Technology Drive
Christiansburg, VA 24073 USA
inorganicventures.com

P: 800-669-6799/540-585-3030
F: 540-585-3012
info@inorganicventures.com

M6137
R-71013124

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



2.0 PRODUCT DESCRIPTION

Product Code: Single Analyte Custom Grade Solution
Catalog Number: CGSI1
Lot Number: V2-SI744713
Matrix: tr. HNO₃
tr. HF
Value / Analyte(s): 1 000 µg/mL ea:
Silicon
Starting Material: Silica
Starting Material Lot#: 1771
Starting Material Purity: 99.9981%

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Value: 999 ± 6 µg/mL
Density: 1.003 g/mL (measured at 20 ± 4 °C)

Assay Information:

Assay Method #1	999 ± 5 µg/mL ICP Assay NIST SRM Traceable to 3150 Lot Number: S2-SI702546
Assay Method #2	1000 ± 7 µg/mL Calculated NIST SRM Lot Number: See Sec. 4.2

- The Calculated Value is a value calculated from the weight of a starting material that has been certified directly vs. a National Institute of Standards and Technology (NIST) SRM/RM. See Sec 4.2 for balance traceability.

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM/RM by Two or More Methods

Certified Value, $X_{CRM/RM}$, where two or more methods of characterization are used is the weighted mean of the results:

$$X_{CRM/RM} = \sum (w_i) (X_i)$$

X_i = mean of Assay Method i with standard uncertainty $u_{char i}$

w_i = the weighting factors for each method calculated using the inverse square of the variance:

$$w_i = (1/u_{char i}^2) / (\sum (1/u_{char i}^2))$$

$$CRM/RM \text{ Expanded Uncertainty } (z) = U_{CRM/RM} = k (u_{char}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$$

k = coverage factor = 2

$u_{char} = [\sum (w_i)^2 (u_{char i}^2)]^{1/2}$ where $u_{char i}$ are the errors from each characterization method

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$$X_{CRM/RM} = (X_a) (u_{char a})$$

X_a = mean of Assay Method A with

$u_{char a}$ = the standard uncertainty of characterization Method A

$$CRM/RM \text{ Expanded Uncertainty } (z) = U_{CRM/RM} = k (u_{char a}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$$

k = coverage factor = 2

$u_{char a}$ = the errors from characterization

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

CRM/RMs are tested for trace metallic impurities by Axial ICP-OES and ICP-MS. The result from the most sensitive method for each element, is reported below. Solutions tested by ICP-MS were analyzed in an ULPA-Filtered Clean Room. An ULPA-Filter is 99.9985% efficient for the removal of particles down to 0.3 µm.

M	Ag	<	0.000310	M	Eu	<	0.000310	O	Na		0.001656	M	Se	<	0.022000	M	Zn	<	0.002500
M	Al		0.010787	M	Fe	<	0.027000	M	Nb	<	0.001300	s	Si	<		O	Zr	<	0.001900
M	As	<	0.001900	M	Ga	<	0.001300	M	Nd	<	0.000310	M	Sm	<	0.000310				
M	Au	<	0.000910	M	Gd	<	0.000310	M	Ni	<	0.005500	M	Sn		0.000096				
M	B		0.016180	M	Ge	<	0.001900	M	Os	<	0.000610	O	Sr		0.000092				
M	Ba		0.000096	M	Hf		0.000423	i	P	<		M	Ta		0.002542				
O	Be	<	0.000570	M	Hg	<	0.000610	M	Pb	<	0.000310	M	Tb	<	0.000310				
M	Bi	<	0.000310	M	Ho	<	0.000610	M	Pd	<	0.000610	M	Te	<	0.000910				
O	Ca		0.011557	M	In	<	0.000310	M	Pr	<	0.000310	M	Th	<	0.001900				
M	Cd	<	0.000310	M	Ir	<	0.000310	M	Pt	<	0.000310	M	Ti		0.001078				
M	Ce	<	0.000610	O	K		0.000577	M	Rb	<	0.009100	M	Tl	<	0.000310				
M	Co	<	0.001600	M	La	<	0.000310	M	Re	<	0.000310	M	Tm	<	0.000310				
M	Cr	<	0.010000	O	Li	<	0.000460	M	Rh	<	0.000310	M	U	<	0.000310				
M	Cs	<	0.000310	M	Lu	<	0.000310	M	Ru	<	0.000310	O	V	<	0.001300				
M	Cu	<	0.002500	O	Mg		0.001348	O	S	<	0.570000	M	W	<	0.001900				
M	Dy	<	0.000310	M	Mn	<	0.002500	M	Sb	<	0.000310	M	Y	<	0.000310				
M	Er	<	0.000310	M	Mo	<	0.000310	O	Sc	<	0.000590	M	Yb	<	0.000310				

M - Checked by ICP-MS

O - Checked by ICP-OES

i - Spectral Interference

n - Not Checked For

s - Solution Standard Element

6.0 INTENDED USE

6.1 This standard is intended for the calibration of analytical instruments and validation of analytical methods as appropriate. This CRM may be used in connection with EPA Methods 6010, 6020 (all versions), Standard Methods 3120 B and USP <232> / ICH Q3D.

6.2 For products attaining traceability through Inorganic Ventures' Primary Certified Reference Materials (PCRM™) see the Limited License to Use PCRM™ in the Inorganic Ventures Terms and Conditions of Sale, <https://www.inorganicventures.com/terms-and-conditions-sale>. The Terms and Conditions contain information on the use of materials traceable to PCRM™ certified reference materials. This Limited License agreement is especially pertinent for laboratories accredited under ISO:17034.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.
- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.
- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit www.inorganicventures.com/TCT

Atomic Weight; Valence; Coordination Number; Chemical Form In Solution - 28.09 +4 6 Si(OH)x(F)y2-

Chemical Compatibility -Soluble in HCl, HF, H3PO4 H2SO4 and HNO3 as the Si(OH)x(F)y2-. Avoid neutral to basic media. Unstable at ppm levels with metals that would pull F- away (i.e. Do not mix with Alkaline or Rare Earths, or high levels of transition elements unless they are fluorinated. Stable with most inorganic anions with a tendency to hydrolyze forming silicic acid (silicic acid is soluble up to ∼100 ppm in water) in all dilute acids except HF.

Stability - 2-100 ppb levels - stability unknown - (alone or mixed with all other metals) as the Si(OH)x(F)y2-. 1-10,000 ppm single element solutions as the Si(OH)x(F)y2- chemically stable for years in 2-5 % HNO3 / trace HF in a LDPE container.

Si Containing Samples (Preparation and Solution) -Metal (Soluble in 1:1:1 H2O / HF / HNO3); Oxide - SiO2, amorphous (dissolve by heating in 1:1:1 H2O / HF / HNO3); Oxide - quartz (fuse in Pt0 with Na2CO3); Geological Samples(fuse in Pt0with Na2CO3 followed by HCl solution of the fuseate); Organic Matrices containing silicates and non volatile silicon compounds (dry ash at 4500C in Pt0 and dissolve by gently warming with 1:1:1 H2O / HF / H2SO4 or fuse / ash with Na2CO3 and dissolve fuseate with HCl / H2O); Silicone Oils - dimethyl silicones depolymerize to form volatile monomer units when heated (Measure directly in alcoholic KOH / xylene mixture where sample is treated first with the KOH at 60-1000C to "unzip" the Si- O-Si polymeric structure or digest with conc. H2SO4 / H2O2 followed by cooling and dissolution of the dehydrated silica with HF.) Note that the direct analysis of silicone oils in an organic solvent will result in false high results due to high vapor pressure of volatile monomer units like hexamethylcyclotrisiloxane. The KOH forms the K2+Si(CH3)2O= salt which is not volatile at room temperature.

Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/axial view):

Technique/Line	Estimated D.L.	Order	Interferences (underlined indicates severe)
ICP-MS 28 amu	4000 - 8000 ppt	N/A	N2, 12C16O
ICP-OES 212.412 nm	0.02/0.01 µg/mL	1	Hf, Os, Mo, Ta
ICP-OES 251.611 nm	0.012/0.003 µg/mL	1	Ta, U, Zn, Th
ICP-OES 288.158 nm	0.03/0.004 µg/mL	1	Ta, Ce, Cr, Cd, Th

HF Note: This standard should not be prepared or stored in glass.

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; info@inorganicventures.com;

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

July 10, 2024

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- July 10, 2029

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:

Uyen Truong
Custom Processing Supervisor



Certificate Approved By:

Muzzammil Khan
Stock Laboratory Supervisor



Certifying Officer:

Paul Gaines
Chairman / Senior Technical Director





M6138

R → 11/13/25

CERTIFIED WEIGHT REPORT:

Part Number:

Lot Number:

Description:

58120

121824

Calcium (Ca)

Solvent:

24012496 Nitric Acid

Expiration Date:

121827

Recommended Storage:

Ambient (20 °C)

Nominal Concentration (µg/mL):

10000

NIST Test Number:

6UTB

Weight shown below was diluted to (mL):

4000.1

5E-05 Balance Uncertainty

0.15 Flask Uncertainty

<i>Giovanni Esposito</i>		
Formulated By:	Giovanni Esposito	121824
<i>Pedro L. Rentas</i>		
Reviewed By:	Pedro L. Rentas	121824

Expanded

Uncertainty

+/- (µg/mL)

Actual

Conc. (µg/mL)

Weight (g)

Target

Weight (g)

Assay

Purity (%)

Purity (%)

Nominal

Conc. (µg/mL)

10000

99.999

0.10

39.9

100.2537

100.2677

10001.4

20.0

471-34-1

5 mg/m3

on-rat >2000mg/kg

3109a

SDS Information

(Solvent Safety Info. On Attached pg.)

LD50

OSHA PEL (TWA)

CAS#

5 mg/m3

on-rat >2000mg/kg

3109a

NIST

SRM

1. Calcium carbonate (Ca)

IN014

CAD002028B3

[12.514 sec]:58120.D# [Count] [Linear]

[12.514 sec]:58120.D# [Count] [Linear]

2.OE4

1.OE4

m/z->

5.OE4

2.5E4

m/z->

1.OE5

5.OE4

m/z->



Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

Trace Metals Verification by ICP-MS ($\mu\text{g/mL}$)																	
Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pr	<0.02	Se	<0.2	Tb	<0.02
Sb	<0.02	Ca	T	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Te	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02	Tl	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Th	<0.02
Be	<0.01	Cr	<0.02	Ga	30	Fe	<0.02	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	S	<0.02	Sn	<0.02
B	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02	Ti	<0.02
																W	<0.02
																U	<0.02
																V	<0.02
																Yb	<0.02
																Y	<0.02
																Zn	<0.02
																Zr	<0.02

(T) = Target analyte

Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



CERTIFIED WEIGHT REPORT:

Part Number:
Lot Number:
Description:

58126
011025
Iron (Fe)

R-113125
M6140

Lot #
Solvent: 24012496 Nitric Acid

Expiration Date:

011028

2% 40.0 (mL) Nitric Acid

Recommended Storage:

Ambient (20 °C)

Nominal Concentration (µg/mL):

10000

NIST Test Number:

6U7B

Weight shown below was diluted to (mL):

2000.07

5E-05 Balance Uncertainty
0.100 Flask Uncertainty

Formulated By:	Benson Chan	011025
Reviewed By:	Pedro L. Renteria	011025

Compound

Lot
Number

Nominal
Conc. (µg/mL)

Purity
(%)

Uncertainty
(%)

Assay
(%)

Target
Weight (g)

Actual
Weight (g)

Actual
Conc. (µg/mL)

Expanded
Uncertainty
± (µg/mL)

CAS#
OSHA PEL (TWA)

SDS Information
(Solvent Safety Info. On Attached pg.)
LD50
NIST
SRM

1. Iron(III) nitrate nonahydrate (Fe)

IN028 FED082023A1

10000

99.999

0.10

13.0

153.8534

#####

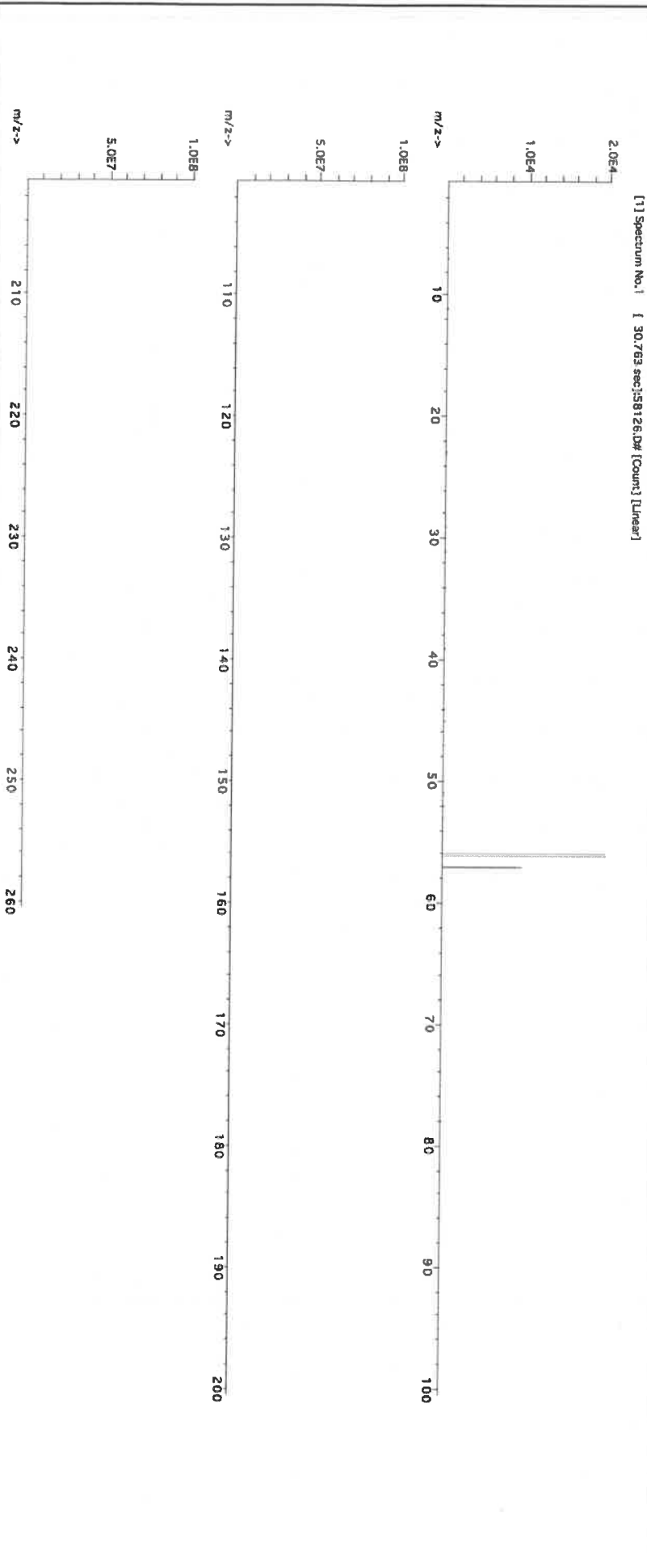
10000.2

20.0

7782-61-8

1 mg/m³

or-rel 3250mg/kg 3126A





CERTIFIED WEIGHT REPORT:

Part Number: 57119
Lot Number: 103024
Description: Potassium (K)

R-21113125

Solvent: 24002546 Nitric Acid
Lot #

Expiration Date: 103027
Recommended Storage: Ambient (20 °C)
Nominal Concentration (µg/mL): 10000
NIST Test Number: 6UTB

M6141
M6142
M6143

2% 80.0 (mL) Nitric Acid

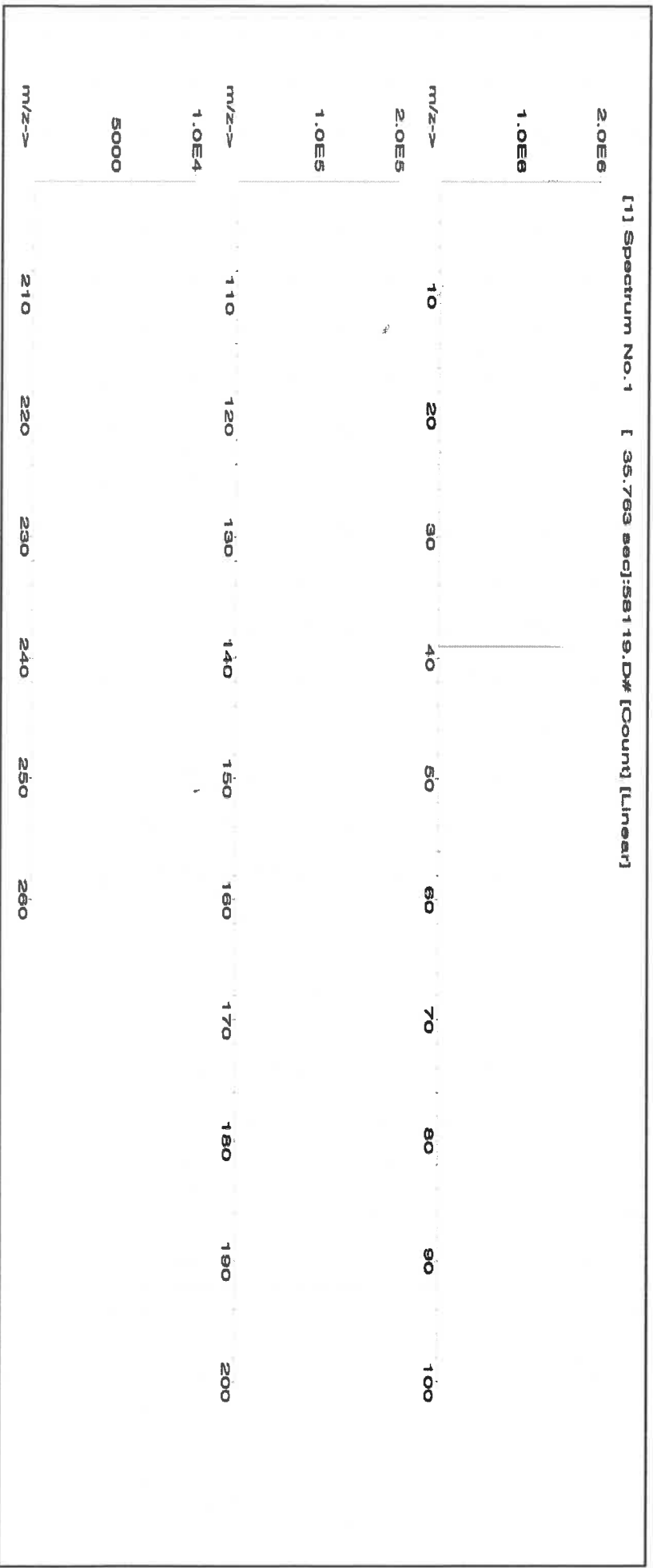
Weight shown below was diluted to (mL): 4000.1 0.15 Flask Uncertainty

<i>Giovanni Esposito</i>	
Formulated By:	Giovanni Esposito
Reviewed By:	Pedro L. Renteria
	103024

Compound	RM#	Lot Number	Nominal Conc. (µg/mL)	Purity (%)	Uncertainty Purity (%)	Assay (%)	Target Weight (g)	Actual Weight (g)	Actual Conc. (µg/mL)	Expanded Uncertainty +/- (µg/mL)	CAS#	OSHA PEL (TWA)	LD50	NIST SRM

1. Potassium nitrate (K) IN034 KD062022A1 10000 99.999 0.10 37.7 106.1040 ##### 10001.1 20.0 7757-79-1 5 mg/m3 orl-rat 3750 mg/kg 3141a

[1] Spectrum No. 1 [35.763 sec]:58119.D# [Count] [Linear]





Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

Trace Metals Verification by ICP-MS (µg/mL)

Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pt	<0.02	Se	<0.2	Tb	<0.02	W	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Te	<0.02	U	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02	Tl	<0.02	V	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Th	<0.02	Yb	<0.02
Be	<0.01	Cr	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	S	<0.02	Sn	<0.02	Zn	<0.02
B	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	K	T	Sc	<0.02	Ta	<0.02	Ti	<0.02	Zr	<0.02

(T) = Target analyte

Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



CERTIFIED WEIGHT REPORT:

Part Number: 58111
Lot Number: 072424
Description: Sodium (Na)

Lot # R-1113125
Solvent: 24002546 Nitric Acid

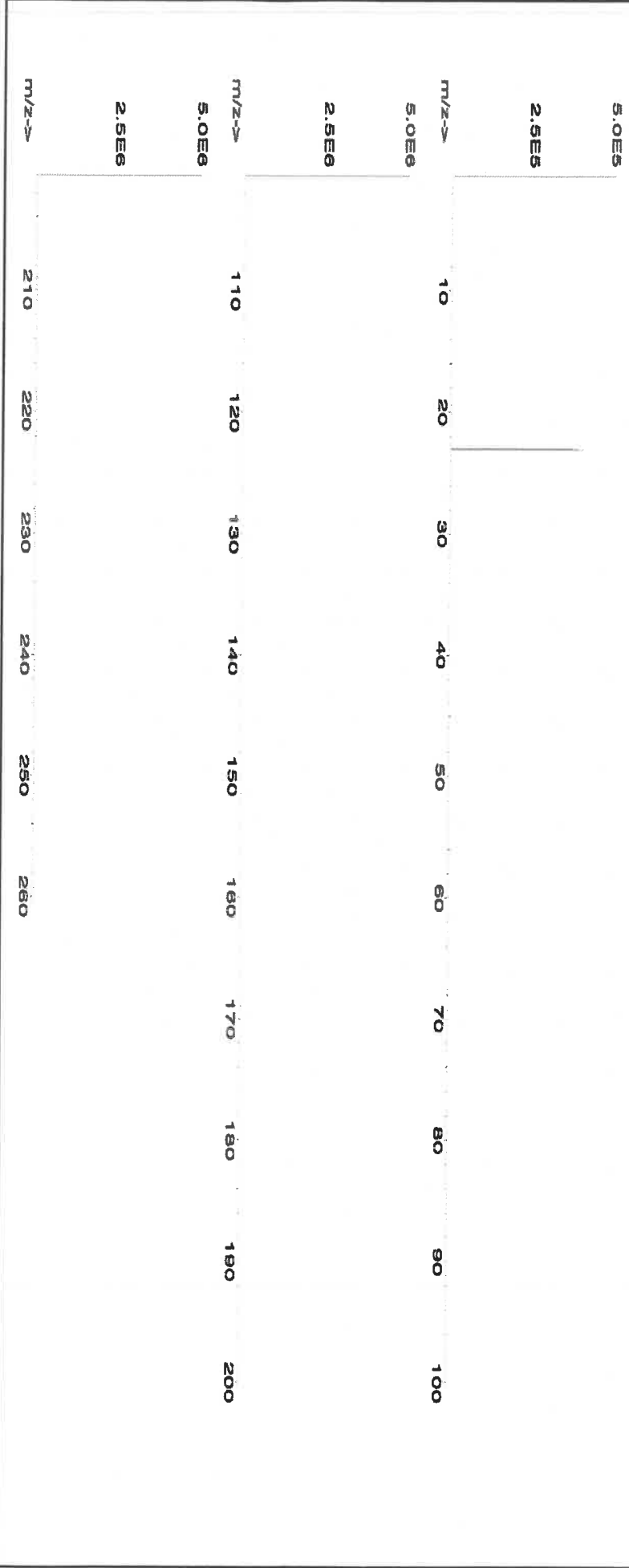
Expiration Date: 072427
Recommended Storage: Ambient (20 °C)
Nominal Concentration (µg/mL): 10000
NIST Test Number: 6UTB

Weight shown below was diluted to (mL): 4000.2
5E-05 Balance Uncertainty
0.10 Flask Uncertainty

Formulated By:	Benson Chan	072424
Reviewed By:	Pedro L. Renteria	072424

SDS Information									
Compound	Lot Number	Nominal Conc. (µg/mL)	Purity (%)	Uncertainty Purity (%)	Assay (%)	Target Weight (g)	Actual Weight (g)	Actual Conc. (µg/mL)	Expanded Uncertainty +/- (µg/mL)
1. Sodium nitrate (Na)	IN036 NAV01201511	10000	99.999	0.10	26.9	148.7096	#####	10000.0	20.0
								7631-99-4	5 mg/m3
									ort-rat 3430 mg/kg 3152a

[1] Spectrum No. 1 [8.935 sec]:58111.D# [Count] [Linear]





Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

Trace Metals Verification by ICP-MS (µg/mL)

Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pt	<0.02	Se	<0.2	Tb	<0.02	W	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Te	<0.02	U	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02	Tl	<0.02	V	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	T	Tl	<0.02	Yb	<0.02
Be	<0.01	Cr	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	S	<0.02	Sn	<0.02	Zn	<0.02
B	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02	Ti	<0.02	Zr	<0.02

(T) = Target analyte

Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

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Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

Trace Metals Verification by ICP-MS (µg/mL)

Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pt	<0.02	Se	<0.2	Tb	<0.02	W	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Te	<0.02	U	<0.02
As	<0.2	Ce	<0.02	Bu	<0.02	In	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02	Tl	<0.02	V	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Th	<0.02	Yb	<0.02
Be	<0.01	Cr	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	S	<0.02	Sn	<0.02	Zn	<0.02
B	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02	Ti	<0.02	Zr	<0.02

(T) = Target analyte

Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

Hydrochloric Acid, 36.5–38.0%
BAKER INSTRA-ANALYZED® Reagent
For Trace Metal Analysis

 **avantortm**



M6151

R → 11/15/25

Material No.: 9530-33
Batch No.: 22G2862015
Manufactured Date: 2022-06-15
Retest Date: 2027-06-14
Revision No.: 0

Certificate of Analysis

Test	Specification	Result
ACS – Assay (as HCl) (by acid–base titrn)	36.5 – 38.0 %	37.9 %
ACS – Color (APHA)	≤ 10	5
ACS – Residue after Ignition	≤ 3 ppm	< 1 ppm
ACS – Specific Gravity at 60°/60°F	1.185 – 1.192	1.191
ACS – Bromide (Br)	≤ 0.005 %	< 0.005 %
ACS – Extractable Organic Substances	≤ 5 ppm	< 1 ppm
ACS – Free Chlorine (as Cl ₂)	≤ 0.5 ppm	< 0.5 ppm
Phosphate (PO ₄)	≤ 0.05 ppm	< 0.03 ppm
Sulfate (SO ₄)	≤ 0.5 ppm	< 0.3 ppm
Sulfite (SO ₃)	≤ 0.8 ppm	0.3 ppm
Ammonium (NH ₄)	≤ 3 ppm	< 1 ppm
Trace Impurities – Arsenic (As)	≤ 0.010 ppm	< 0.003 ppm
Trace Impurities – Aluminum (Al)	≤ 10.0 ppb	1.3 ppb
Arsenic and Antimony (as As)	≤ 5.0 ppb	< 3.0 ppb
Trace Impurities – Barium (Ba)	≤ 1.0 ppb	0.2 ppb
Trace Impurities – Beryllium (Be)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities – Bismuth (Bi)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Boron (B)	≤ 20.0 ppb	< 5.0 ppb
Trace Impurities – Cadmium (Cd)	≤ 1.0 ppb	< 0.3 ppb
Trace Impurities – Calcium (Ca)	≤ 50.0 ppb	163.0 ppb
Trace Impurities – Chromium (Cr)	≤ 1.0 ppb	0.7 ppb
Trace Impurities – Cobalt (Co)	≤ 1.0 ppb	< 0.3 ppb
Trace Impurities – Copper (Cu)	≤ 1.0 ppb	< 0.1 ppb
Trace Impurities – Gallium (Ga)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities – Germanium (Ge)	≤ 3.0 ppb	< 2.0 ppb
Trace Impurities – Gold (Au)	≤ 4.0 ppb	0.6 ppb
Heavy Metals (as Pb)	≤ 100 ppb	< 50 ppb
Trace Impurities – Iron (Fe)	≤ 15 ppb	6 ppb

>>> Continued on page 2 >>>

Hydrochloric Acid, 36.5–38.0%
BAKER INSTRA-ANALYZED® Reagent
For Trace Metal Analysis

 **avantorsm**



Material No.: 9530-33
Batch No.: 22G2862015

Test	Specification	Result
Trace Impurities – Lead (Pb)	≤ 1.0 ppb	< 0.5 ppb
Trace Impurities – Lithium (Li)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities – Magnesium (Mg)	≤ 10.0 ppb	2.9 ppb
Trace Impurities – Manganese (Mn)	≤ 1.0 ppb	< 0.4 ppb
Trace Impurities – Mercury (Hg)	≤ 0.5 ppb	0.1 ppb
Trace Impurities – Molybdenum (Mo)	≤ 10.0 ppb	< 3.0 ppb
Trace Impurities – Nickel (Ni)	≤ 4.0 ppb	< 0.3 ppb
Trace Impurities – Niobium (Nb)	≤ 1.0 ppb	0.8 ppb
Trace Impurities – Potassium (K)	≤ 9.0 ppb	< 2.0 ppb
Trace Impurities – Selenium (Se), For Information Only		< 1.0 ppb
Trace Impurities – Silicon (Si)	≤ 100.0 ppb	< 10.0 ppb
Trace Impurities – Silver (Ag)	≤ 1.0 ppb	0.5 ppb
Trace Impurities – Sodium (Na)	≤ 100.0 ppb	2.3 ppb
Trace Impurities – Strontium (Sr)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities – Tantalum (Ta)	≤ 1.0 ppb	1.6 ppb
Trace Impurities – Thallium (Tl)	≤ 5.0 ppb	< 2.0 ppb
Trace Impurities – Tin (Sn)	≤ 5.0 ppb	4.0 ppb
Trace Impurities – Titanium (Ti)	≤ 1.0 ppb	1.5 ppb
Trace Impurities – Vanadium (V)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities – Zinc (Zn)	≤ 5.0 ppb	0.8 ppb
Trace Impurities – Zirconium (Zr)	≤ 1.0 ppb	0.3 ppb

>>> Continued on page 3 >>>

Hydrochloric Acid, 36.5–38.0%
BAKER INSTRA–ANALYZED® Reagent
For Trace Metal Analysis



Material No.: 9530-33
Batch No.: 22G2862015

Test	Specification	Result
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For Laboratory, Research, or Manufacturing Use
Product Information (not specifications):
Appearance (clear, fuming liquid)
Meets ACS Specifications
Storage Condition: Store below 25 °C.

Country of Origin: USA
Packaging Site: Phillipsburg Mfg Ctr & DC

A handwritten signature in cursive script that reads 'Jamie Ethier'.
Jamie Ethier
Vice President Global Quality

Nitric Acid 69%
CMOS

avantor™



R- 0210212025

m - 6158

Material No.: 9606-03
Batch No.: 24D1062002
Manufactured Date: 2024-03-26
Retest Date: 2029-03-25
Revision No.: 0

Certificate of Analysis

Test	Specification	Result
Assay (HNO ₃)	69.0 – 70.0 %	69.7 %
Appearance	Passes Test	Passes Test
Color (APHA)	≤ 10	5
Residue after Ignition	≤ 2 ppm	1 ppm
Chloride (Cl)	≤ 0.08 ppm	< 0.03 ppm
Phosphate (PO ₄)	≤ 0.10 ppm	< 0.03 ppm
Sulfate (SO ₄)	≤ 0.2 ppm	< 0.2 ppm
Trace Impurities – Aluminum (Al)	≤ 40.0 ppb	< 1.0 ppb
Arsenic and Antimony (as As)	≤ 5.0 ppb	< 2.0 ppb
Trace Impurities – Barium (Ba)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Beryllium (Be)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Bismuth (Bi)	≤ 20.0 ppb	< 10.0 ppb
Trace Impurities – Boron (B)	≤ 10.0 ppb	< 5.0 ppb
Trace Impurities – Cadmium (Cd)	≤ 50 ppb	< 1 ppb
Trace Impurities – Calcium (Ca)	≤ 50.0 ppb	2.3 ppb
Trace Impurities – Chromium (Cr)	≤ 30.0 ppb	< 1.0 ppb
Trace Impurities – Cobalt (Co)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Copper (Cu)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Gallium (Ga)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Germanium (Ge)	≤ 20 ppb	< 10 ppb
Trace Impurities – Gold (Au)	≤ 20 ppb	< 5 ppb
Heavy Metals (as Pb)	≤ 100 ppb	100 ppb
Trace Impurities – Iron (Fe)	≤ 40.0 ppb	< 1.0 ppb
Trace Impurities – Lead (Pb)	≤ 20.0 ppb	< 10.0 ppb
Trace Impurities – Lithium (Li)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Magnesium (Mg)	≤ 20 ppb	< 1 ppb
Trace Impurities – Manganese (Mn)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Nickel (Ni)	≤ 20.0 ppb	< 5.0 ppb

>>> Continued on page 2 >>>

Nitric Acid 69%
CMOS

 **avantor™**



Material No.: 9606-03
Batch No.: 24D1062002

Test	Specification	Result
Trace Impurities – Niobium (Nb)	≤ 50.0 ppb	< 1.0 ppb
Trace Impurities – Potassium (K)	≤ 50 ppb	16 ppb
Trace Impurities – Silicon (Si)	≤ 50 ppb	< 10 ppb
Trace Impurities – Silver (Ag)	≤ 20.0 ppb	< 1.0 ppb
Trace Impurities – Sodium (Na)	≤ 150.0 ppb	< 5.0 ppb
Trace Impurities – Strontium (Sr)	≤ 30.0 ppb	< 1.0 ppb
Trace Impurities – Tantalum (Ta)	≤ 10.0 ppb	< 5.0 ppb
Trace Impurities – Thallium (Tl)	≤ 10.0 ppb	< 5.0 ppb
Trace Impurities – Tin (Sn)	≤ 20.0 ppb	< 10.0 ppb
Trace Impurities – Titanium (Ti)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Vanadium (V)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Zinc (Zn)	≤ 20.0 ppb	< 1.0 ppb
Trace Impurities – Zirconium (Zr)	≤ 10.0 ppb	< 1.0 ppb
Particle Count – 0.5 µm and greater	≤ 60 par/ml	10 par/ml
Particle Count – 1.0 µm and greater	≤ 10 par/ml	3 par/ml

>>> Continued on page 3 >>>

Nitric Acid 69%
CMOS

 **avantor™**



Material No.: 9606-03
Batch No.: 24D1062002

Test	Specification	Result
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For Microelectronic Use

Country of Origin: USA
Packaging Site: Phillipsburg Mfg Ctr & DC



Jamie Croak
Director Quality Operations, Bioscience Production

Nitric Acid 69%
CMOS

 **avantorsTM**



m-6162

Material No.: 9606-03
Batch No.: 24H0162012
Manufactured Date: 2024-06-28
Retest Date: 2029-06-27
Revision No.: 0

R. Date :- 04/27/2025

Certificate of Analysis

Test	Specification	Result
Assay (HNO ₃)	69.0 – 70.0 %	69.7 %
Appearance	Passes Test	Passes Test
Color (APHA)	≤ 10	5
Residue after Ignition	≤ 2 ppm	< 1 ppm
Chloride (Cl)	≤ 0.08 ppm	0.03 ppm
Phosphate (PO ₄)	≤ 0.10 ppm	< 0.03 ppm
Sulfate (SO ₄)	≤ 0.2 ppm	< 0.2 ppm
Trace Impurities – Aluminum (Al)	≤ 40.0 ppb	< 1.0 ppb
Arsenic and Antimony (as As)	≤ 5.0 ppb	< 2.0 ppb
Trace Impurities – Barium (Ba)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Beryllium (Be)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Bismuth (Bi)	≤ 20.0 ppb	< 1.0 ppb
Trace Impurities – Boron (B)	≤ 10.0 ppb	0.1 ppb
Trace Impurities – Cadmium (Cd)	≤ 50 ppb	< 1 ppb
Trace Impurities – Calcium (Ca)	≤ 50.0 ppb	0.3 ppb
Trace Impurities – Chromium (Cr)	≤ 30.0 ppb	0.1 ppb
Trace Impurities – Cobalt (Co)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Copper (Cu)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Gallium (Ga)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Germanium (Ge)	≤ 20 ppb	< 1 ppb
Trace Impurities – Gold (Au)	≤ 20 ppb	< 1 ppb
Heavy Metals (as Pb)	≤ 100 ppb	< 50 ppb
Trace Impurities – Iron (Fe)	≤ 40.0 ppb	< 1.0 ppb
Trace Impurities – Lead (Pb)	≤ 20.0 ppb	< 1.0 ppb
Trace Impurities – Lithium (Li)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Magnesium (Mg)	≤ 20 ppb	< 1 ppb
Trace Impurities – Manganese (Mn)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Nickel (Ni)	≤ 20.0 ppb	< 1.0 ppb

>>> Continued on page 2 >>>

Nitric Acid 69%
CMOS

 **avantorsTM**



Material No.: 9606-03
Batch No.: 24H0162012

Test	Specification	Result
Trace Impurities – Niobium (Nb)	≤ 50.0 ppb	< 1.0 ppb
Trace Impurities – Potassium (K)	≤ 50 ppb	< 1 ppb
Trace Impurities – Silicon (Si)	≤ 50 ppb	1 ppb
Trace Impurities – Silver (Ag)	≤ 20.0 ppb	< 1.0 ppb
Trace Impurities – Sodium (Na)	≤ 150.0 ppb	< 1.0 ppb
Trace Impurities – Strontium (Sr)	≤ 30.0 ppb	< 1.0 ppb
Trace Impurities – Tantalum (Ta)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Thallium (Tl)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Tin (Sn)	≤ 20.0 ppb	< 1.0 ppb
Trace Impurities – Titanium (Ti)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Vanadium (V)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Zinc (Zn)	≤ 20.0 ppb	< 1.0 ppb
Trace Impurities – Zirconium (Zr)	≤ 10.0 ppb	< 1.0 ppb
Particle Count – 0.5 µm and greater	≤ 60 par/ml	13 par/ml
Particle Count – 1.0 µm and greater	≤ 10 par/ml	5 par/ml

>>> Continued on page 3 >>>

Nitric Acid 69%
CMOS

 **avantor™**



Material No.: 9606-03
Batch No.: 24H0162012

Test	Specification	Result
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For Microelectronic Use

Country of Origin: USA
Packaging Site: Phillipsburg Mfg Ctr & DC



Jamie Croak
Director Quality Operations, Bioscience Production

300 Technology Drive
Christiansburg, VA 24073 USA
inorganicventures.com

P: 800-669-6799/540-585-3030
F: 540-585-3012
info@inorganicventures.com

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



2.0 PRODUCT DESCRIPTION

Product Code:	Multi Analyte Custom Grade Solution		
Catalog Number:	QCP-CICV-1		
Lot Number:	V2-MEB744107		
Matrix:	7% (v/v) HNO ₃		
Value / Analyte(s):	2 500 µg/mL ea:		
	Calcium,	Potassium,	
	Magnesium,	Sodium,	
	1 000 µg/mL ea:		
	Aluminum,	Barium,	
	500 µg/mL ea:		
	Iron,		
	250 µg/mL ea:		
	Nickel,	Vanadium,	
	Zinc,	Cobalt,	
	Manganese,		
	125 µg/mL ea:		
	Silver,	Copper,	
	100 µg/mL ea:		
	Chromium,		
	25 µg/mL ea:		
	Beryllium		

Second Source: Whenever possible, this solution was manufactured from a second set of concentrates in our manufacturing facility.

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE	CERTIFIED VALUE	ANALYTE	CERTIFIED VALUE
Aluminum, Al	1 000 ± 4 µg/mL	Barium, Ba	1 000 ± 6 µg/mL
Beryllium, Be	24.98 ± 0.12 µg/mL	Calcium, Ca	2 500 ± 8 µg/mL
Chromium, Cr	99.9 ± 0.6 µg/mL	Cobalt, Co	250.2 ± 1.2 µg/mL
Copper, Cu	125.0 ± 0.5 µg/mL	Iron, Fe	500.0 ± 2.2 µg/mL
Magnesium, Mg	2 500 ± 11 µg/mL	Manganese, Mn	249.9 ± 1.1 µg/mL
Nickel, Ni	250.0 ± 1.2 µg/mL	Potassium, K	2 500 ± 11 µg/mL
Silver, Ag	125.0 ± 0.6 µg/mL	Sodium, Na	2 500 ± 11 µg/mL
Vanadium, V	250.0 ± 1.1 µg/mL	Zinc, Zn	249.9 ± 1.1 µg/mL

Density: 1.081 g/mL (measured at 20 ± 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Ag	ICP Assay	3151	160729
Ag	Volhard	999c	999c
Al	ICP Assay	3101a	140903
Al	EDTA	928	928
Ba	ICP Assay	3104a	140909
Ba	Gravimetric		See Sec. 4.2
Be	ICP Assay	3105a	090514
Be	Calculated		See Sec. 4.2
Ca	ICP Assay	3109a	130213
Ca	EDTA	928	928
Co	ICP Assay	3113	190630
Co	EDTA	928	928
Cr	ICP Assay	3112a	170630
Cu	ICP Assay	3114	120618
Cu	EDTA	928	928
Fe	ICP Assay	3126a	140812
Fe	EDTA	928	928
K	ICP Assay	3141a	140813
K	Gravimetric		See Sec. 4.2
Mg	ICP Assay	3131a	140110
Mg	EDTA	928	928
Mn	ICP Assay	3132	050429
Mn	EDTA	928	928
Na	ICP Assay	3152a	200413
Na	Gravimetric		See Sec. 4.2
Ni	ICP Assay	3136	120619
Ni	EDTA	928	928
V	ICP Assay	3165	160906
V	EDTA	928	928
Zn	ICP Assay	3168a	120629
Zn	EDTA	928	928

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM/RM by Two or More Methods

Certified Value, $X_{\text{CRM/RM}}$, where two or more methods of characterization are used is the weighted mean of the results:

$$X_{\text{CRM/RM}} = \sum (w_i) (X_i)$$

X_i = mean of Assay Method i with standard uncertainty $u_{\text{char } i}$

w_i = the weighting factors for each method calculated using the inverse square of the variance:

$$w_i = (1/u_{\text{char } i}^2) / (\sum (1/u_{\text{char } i}^2))$$

$$\text{CRM/RM Expanded Uncertainty } (\pm) = U_{\text{CRM/RM}} = k (u_{\text{char}}^2 + u_{\text{bb}}^2 + u_{\text{Its}}^2 + u_{\text{ts}}^2)^{1/2}$$

k = coverage factor = 2

$u_{\text{char}} = [\sum (w_i)^2 (u_{\text{char } i})^2]^{1/2}$ where $u_{\text{char } i}$ are the errors from each characterization method

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{Its} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{\text{CRM/RM}}$, where one method of characterization is used is the mean of individual results:

$$X_{\text{CRM/RM}} = (X_a) (u_{\text{char } a})$$

X_a = mean of Assay Method A with

$u_{\text{char } a}$ = the standard uncertainty of characterization Method A

$$\text{CRM/RM Expanded Uncertainty } (\pm) = U_{\text{CRM/RM}} = k (u_{\text{char } a}^2 + u_{\text{bb}}^2 + u_{\text{Its}}^2 + u_{\text{ts}}^2)^{1/2}$$

k = coverage factor = 2

$u_{\text{char } a}$ = the errors from characterization

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{Its} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

N/A

6.0 INTENDED USE

6.1 This standard is intended for the calibration of analytical instruments and validation of analytical methods as appropriate. This CRM may be used in connection with EPA Methods 6010, 6020 (all versions), Standard Methods 3120 B and USP <232> / ICH Q3D.

6.2 For products attaining traceability through Inorganic Ventures' Primary Certified Reference Materials (PCRM™) see the Limited License to Use PCRM™ in the Inorganic Ventures [Terms and Conditions of Sale](https://www.inorganicventures.com/terms-and-conditions-sale), <https://www.inorganicventures.com/terms-and-conditions-sale>. The Terms and Conditions contain information on the use of materials traceable to PCRM™ certified reference materials. This Limited License agreement is especially pertinent for laboratories accredited under ISO:17034.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit www.inorganicventures.com/TCT

Note: This solution contains Silver (Ag), please refer to our Sample Preparation Guide for more information (<https://www.inorganicventures.com/sample-preparation-guide/samples-containing-silver>)

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

May 22, 2024

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- **May 22, 2029**

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:

Justin Dirico
Stock Processing Supervisor



Certificate Approved By:

Jodie Wall
Stock VSM Coordinator



Certifying Officer:

Paul Gaines
Chairman / Senior Technical Director



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Christiansburg, VA 24073 USA
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F: 540-585-3012
info@inorganicventures.com

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



2.0 PRODUCT DESCRIPTION

Product Code: Multi Analyte Custom Grade Solution
Catalog Number: QCP-CICV-2
Lot Number: U2-MEB733713
Matrix: 3% (w/v) Tartaric acid
1% (v/v) HNO₃
Value / Analyte(s): 500 µg/mL ea:
Antimony

Second Source: Whenever possible, this solution was manufactured from a second set of concentrates in our manufacturing facility.

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE	CERTIFIED VALUE	ANALYTE	CERTIFIED VALUE
Antimony, Sb	500.0 ± 2.8 µg/mL		

Density: 1.017 g/mL (measured at 20 ± 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Sb	ICP Assay	3102a	140911

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM/RM by Two or More Methods

Certified Value, $X_{CRM/RM}$, where two or more methods of characterization are used is the weighted mean of the results:

$$X_{CRM/RM} = \sum (w_i) (X_i)$$

X_i = mean of Assay Method i with standard uncertainty $u_{char i}$

w_i = the weighting factors for each method calculated using the inverse square of the variance:

$$w_i = (1/u_{char i}^2) / (\sum (1/u_{char i}^2))$$

$$CRM/RM \text{ Expanded Uncertainty } (\pm) = U_{CRM/RM} = k (u_{char}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$$

k = coverage factor = 2

$u_{char} = [\sum (w_i)^2 (u_{char i}^2)]^{1/2}$ where $u_{char i}$ are the errors from each characterization method

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$$X_{CRM/RM} = (X_a) (u_{char a})$$

X_a = mean of Assay Method A with

$u_{char a}$ = the standard uncertainty of characterization Method A

$$CRM/RM \text{ Expanded Uncertainty } (\pm) = U_{CRM/RM} = k (u_{char a}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$$

k = coverage factor = 2

$u_{char a}$ = the errors from characterization

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{lts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

N/A

6.0 INTENDED USE

6.1 This standard is intended for the calibration of analytical instruments and validation of analytical methods as appropriate. This CRM may be used in connection with EPA Methods 6010, 6020 (all versions), Standard Methods 3120 B and USP <232> / ICH Q3D.

6.2 For products attaining traceability through Inorganic Ventures' Primary Certified Reference Materials (PCRM™) see the Limited License to Use PCRM™ in the Inorganic Ventures [Terms and Conditions of Sale](https://www.inorganicventures.com/terms-and-conditions-sale). <https://www.inorganicventures.com/terms-and-conditions-sale>. The Terms and Conditions contain information on the use of materials traceable to PCRM™ certified reference materials. This Limited License agreement is especially pertinent for laboratories accredited under ISO:17034.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit www.inorganicventures.com/TCT

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

June 01, 2023

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- **June 01, 2028**

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Thomas Kozikowski
Manager, Quality Control



Certifying Officer:

Paul Gaines
Chairman / Senior Technical Director



300 Technology Drive
 Christiansburg, VA 24073 USA
 inorganicventures.com

P: 800-669-6799/540-585-3030
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1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



2.0 PRODUCT DESCRIPTION

Product Code: Multi Analyte Custom Grade Solution
 Catalog Number: QCP-CICV-3
 Lot Number: V2-MEB749572
 Matrix: 7% (v/v) HNO₃
 Value / Analyte(s):
 500 µg/mL ea:
 Arsenic, Lead,
 Selenium, Thallium,
 250 µg/mL ea:
 Cadmium

Second Source: Whenever possible, this solution was manufactured from a second set of concentrates in our manufacturing facility.

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE	CERTIFIED VALUE	ANALYTE	CERTIFIED VALUE
Arsenic, As	500.0 ± 3.1 µg/mL	Cadmium, Cd	250.1 ± 1.1 µg/mL
Lead, Pb	500.0 ± 2.3 µg/mL	Selenium, Se	500.0 ± 3.2 µg/mL
Thallium, Tl	500.0 ± 3.0 µg/mL		

Density: 1.040 g/mL (measured at 20 ± 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
As	ICP Assay	3103a	100818
Cd	ICP Assay	3108	130116
Cd	EDTA	928	928
Pb	ICP Assay	3128	101026
Pb	EDTA	928	928
Se	ICP Assay	3149	100901
Tl	ICP Assay	3158	151215

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM/RM by Two or More Methods

Certified Value, $X_{\text{CRM/RM}}$, where two or more methods of characterization are used is the weighted mean of the results:

$$X_{\text{CRM/RM}} = \sum (w_i) (X_i)$$

X_i = mean of Assay Method i with standard uncertainty $u_{\text{char } i}$

w_i = the weighting factors for each method calculated using the inverse square of the variance:

$$w_i = (1/u_{\text{char } i}^2) / (\sum (1/u_{\text{char } i}^2))$$

$$\text{CRM/RM Expanded Uncertainty } (\pm) = U_{\text{CRM/RM}} = k (u_{\text{char}}^2 + u_{\text{bb}}^2 + u_{\text{Its}}^2 + u_{\text{ts}}^2)^{1/2}$$

k = coverage factor = 2

$u_{\text{char}} = [\sum (w_i)^2 (u_{\text{char } i})^2]^{1/2}$ where $u_{\text{char } i}$ are the errors from each characterization method

u_{bb} = bottle to bottle homogeneity standard uncertainty

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u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{\text{CRM/RM}}$, where one method of characterization is used is the mean of individual results:

$$X_{\text{CRM/RM}} = (X_a) (u_{\text{char } a})$$

X_a = mean of Assay Method A with

$u_{\text{char } a}$ = the standard uncertainty of characterization Method A

$$\text{CRM/RM Expanded Uncertainty } (\pm) = U_{\text{CRM/RM}} = k (u_{\text{char } a}^2 + u_{\text{bb}}^2 + u_{\text{Its}}^2 + u_{\text{ts}}^2)^{1/2}$$

k = coverage factor = 2

$u_{\text{char } a}$ = the errors from characterization

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- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

N/A

6.0 INTENDED USE

6.1 This standard is intended for the calibration of analytical instruments and validation of analytical methods as appropriate. This CRM may be used in connection with EPA Methods 6010, 6020 (all versions), Standard Methods 3120 B and USP <232> / ICH Q3D.

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7.1 Storage and Handling Recommendations

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- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit www.inorganicventures.com/TCT

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

January 02, 2025

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- **January 02, 2030**

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:

Justin Dirico
Stock Processing Supervisor



Certificate Approved By:

Jodie Wall
Stock VSM Coordinator



Certifying Officer:

Paul Gaines
Chairman / Senior Technical Director



Hydrogen Peroxide, 30%

CMOS

(Stabilized)

M-6170

avantor™



R.Date . 8-05/20/2025

Material No.: 2190-03

Batch No.: 24D1961001

Test	Specification	Result
Trace Impurities – Manganese (Mn)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Molybdenum (Mo)	≤ 10.0 ppb	< 5.0 ppb
Trace Impurities – Nickel (Ni)	≤ 10.0 ppb	< 5.0 ppb
Trace Impurities – Niobium (Nb)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Potassium (K)	≤ 600.0 ppb	176.7 ppb
Trace Impurities – Silicon (Si)	≤ 100.0 ppb	< 10.0 ppb
Trace Impurities – Silver (Ag)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Sodium (Na)	≤ 100.0 ppb	< 5.0 ppb
Trace Impurities – Strontium (Sr)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Tantalum (Ta)	≤ 10.0 ppb	< 5.0 ppb
Trace Impurities – Thallium (Tl)	≤ 50.0 ppb	< 5.0 ppb
Trace Impurities – Tin (Sn)	190.0 – 500.0 ppb	272.3 ppb
Trace Impurities – Titanium (Ti)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Vanadium (V)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Zinc (Zn)	≤ 50 ppb	< 1 ppb
Trace Impurities – Zirconium (Zr)	≤ 10.0 ppb	< 1.0 ppb
Particle Count – 0.2 µm and greater	≤ 1175 par/ml	202 par/ml
Particle Count – 0.5 µm and greater	≤ 100 par/ml	33 par/ml

>>> Continued on page 3 >>>

Hydrogen Peroxide, 30%

CMOS

(Stabilized)

 **avantorsm**



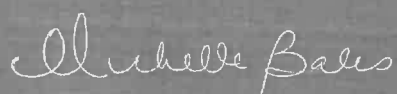
Material No.: 2190-03
Batch No.: 24D1961001

Test	Specification	Result
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For Microelectronic Use

Country of Origin: USA

Packaging Site: Paris Mfg Ctr & DC



Michelle Bales
Sr. Manager, Quality Assurance

Hydrogen Peroxide, 30%
CMOS
(Stabilized)



Material No.: 2190-03
Batch No.: 24D1961001
Manufactured Date: 2024-04-17
Expiration Date: 2025-10-16
Revision No.: 0

Certificate of Analysis

Test	Specification	Result
Assay (H ₂ O ₂)	30.0 – 32.0 %	31.6 %
Color (APHA)	≤ 10	< 5
Free Acid (μeq/g)	≤ 0.2	0.1
Residue after Evaporation	≤ 10 ppm	2 ppm
Ammonium (NH ₄)	≤ 3 ppm	< 3 ppm
Chloride (Cl)	≤ 0.2 ppm	< 0.2 ppm
Nitrate (NO ₃)	≤ 2 ppm	< 2 ppm
Phosphate (PO ₄)	≤ 1 ppm	1 ppm
Sulfate (SO ₄)	≤ 3 ppm	< 3 ppm
Trace Impurities – Aluminum (Al)	≤ 70.0 ppb	< 5.0 ppb
Arsenic and Antimony (as As)	≤ 10.0 ppb	< 10.0 ppb
Trace Impurities – Barium (Ba)	≤ 20.0 ppb	< 1.0 ppb
Trace Impurities – Beryllium (Be)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Bismuth (Bi)	≤ 20.0 ppb	< 10.0 ppb
Trace Impurities – Boron (B)	≤ 10.0 ppb	< 5.0 ppb
Trace Impurities – Cadmium (Cd)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Calcium (Ca)	≤ 50.0 ppb	< 1.0 ppb
Trace Impurities – Chromium (Cr)	≤ 20.0 ppb	1.5 ppb
Trace Impurities – Cobalt (Co)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Copper (Cu)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Gallium (Ga)	≤ 20.0 ppb	< 1.0 ppb
Trace Impurities – Germanium (Ge)	≤ 10.0 ppb	< 10.0 ppb
Trace Impurities – Gold (Au)	≤ 10.0 ppb	< 5.0 ppb
Heavy Metals (as Pb)	≤ 500.0 ppb	< 250.0 ppb
Trace Impurities – Iron (Fe)	≤ 50.0 ppb	4.6 ppb
Trace Impurities – Lead (Pb)	≤ 10.0 ppb	< 10.0 ppb
Trace Impurities – Lithium (Li)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Magnesium (Mg)	≤ 10.0 ppb	< 1.0 ppb

>>> Continued on page 2 >>>



Certified Reference Material CRM



ANAB ISO 17034 Accredited
AR-1539 Certificate Number
https://AbsoluteStandards.com

CERTIFIED WEIGHT REPORT:

Part Number: 58112
Lot Number: 011525
Description: Magnesium (Mg)
Solvent: 24012496 Nitric Acid

Expiration Date: 011528
Recommended Storage: Ambient (20 °C)
Nominal Concentration (µg/mL): 10000
NIST Test Number: 6UTB
Weight shown below was diluted to (mL): 2000.07
5E-05 Balance Uncertainty
0.100 Flask Uncertainty

Formulated By:	Benson Chan	011525
Reviewed By:	Pedro L. Rentas	011525

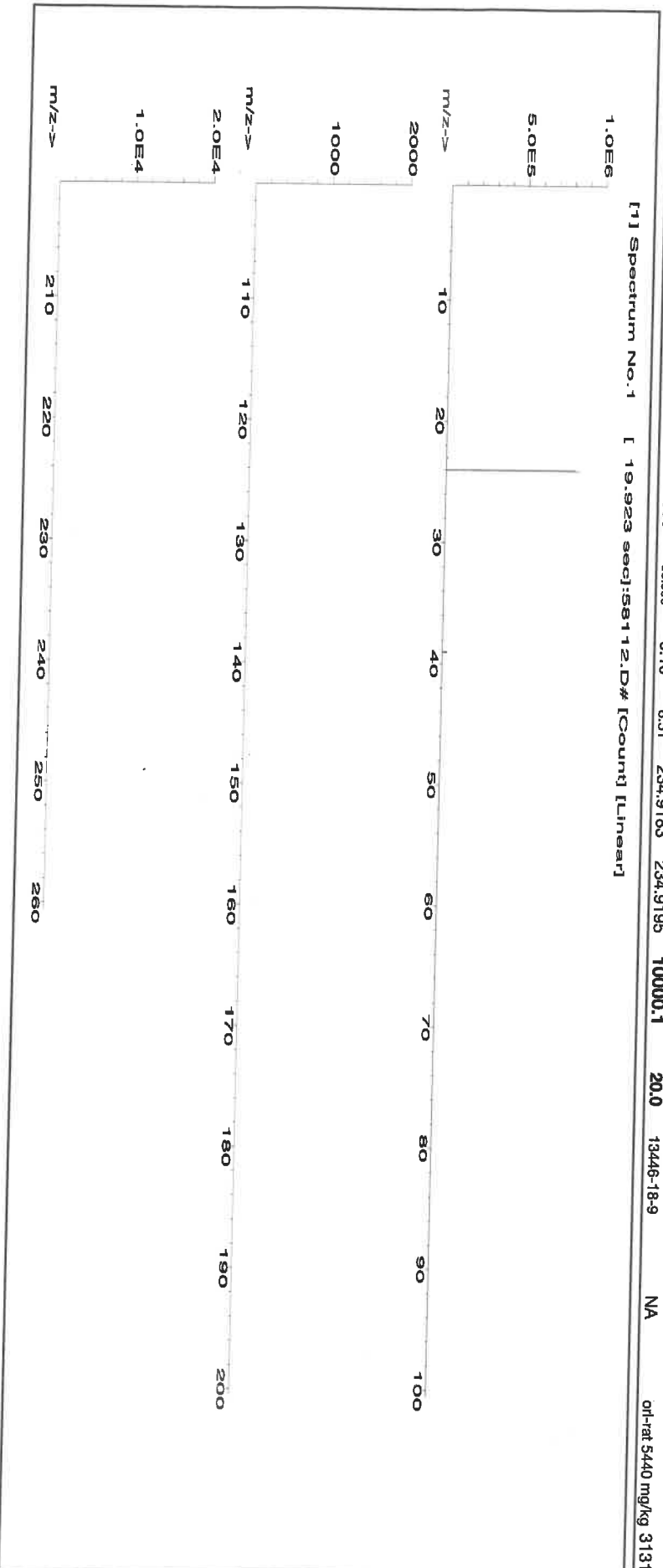
Compound

1. Magnesium nitrate hexahydrate (Mg) IN030 MGD05023A1 10000 99.999 0.10 8.51 234.9183 234.9195 10000.1 20.0 13446-18-9 NA off-ret 5440 mg/kg 3131a

Lot Number	Nominal Conc. (µg/mL)	Purity (%)	Uncertainty Purity (%)	Assay (%)	Target Weight (g)	Actual Weight (g)	Actual Conc. (µg/mL)	Expanded Uncertainty +/- (µg/mL)	CAS#	OSHA PEL (TWA)	LD50	NIST SRM
011525	10000	99.999	0.10	8.51	234.9183	234.9195	10000.1	20.0	13446-18-9	NA	off-ret 5440 mg/kg	3131a

SDS Information

(Solvent Safety Info. On Attached pg.)





Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

Trace Metals Verification by ICP-MS (µg/mL)

Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pr	<0.02	Se	<0.2	Tb	<0.02	W	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Te	<0.02	U	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	T	Os	<0.02	Rh	<0.02	Ag	<0.02	Tl	<0.02	V	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Th	<0.02	Yb	<0.02
Be	<0.01	Cr	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ku	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	S	<0.02	Sn	<0.02	Zn	<0.02
B	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02	Ti	<0.02	Zr	<0.02

(T) = Target analyte

Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

Certificate of Analysis

300 Technology Drive
Christiansburg, VA 24073 USA
inorganicventures.com

P: 800-669-6799/540-585-3030

F: 540-585-3012

info@inorganicventures.com

M6174
R → S1/S124

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



2.0 PRODUCT DESCRIPTION

Product Code:	Multi Analyte Custom Grade Solution	
Catalog Number:	CLPP-CAL-1	
Lot Number:	V2-MEB742428	
Matrix:	5% (v/v) HNO ₃	
Value / Analyte(s):	5 000 µg/mL ea:	
	Calcium,	Potassium,
	Magnesium,	Sodium,
	2 000 µg/mL ea:	
	Aluminum,	Barium,
	1 000 µg/mL ea:	
	Iron,	
	500 µg/mL ea:	
	Nickel,	Vanadium,
	Zinc,	Cobalt,
	Manganese,	
	250 µg/mL ea:	
	Silver,	Copper,
	200 µg/mL ea:	
	Chromium,	
	50 µg/mL ea:	
	Beryllium	

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE	CERTIFIED VALUE	ANALYTE	CERTIFIED VALUE
Aluminum, Al	2 000 ± 7 µg/mL	Barium, Ba	2 000 ± 9 µg/mL
Beryllium, Be	50.03 ± 0.30 µg/mL	Calcium, Ca	5 000 ± 16 µg/mL
Chromium, Cr	200.0 ± 1.1 µg/mL	Cobalt, Co	500.0 ± 2.3 µg/mL
Copper, Cu	250.0 ± 1.1 µg/mL	Iron, Fe	1 000 ± 4 µg/mL
Magnesium, Mg	5 000 ± 22 µg/mL	Manganese, Mn	499.9 ± 2.2 µg/mL
Nickel, Ni	500.1 ± 2.3 µg/mL	Potassium, K	5 000 ± 22 µg/mL
Silver, Ag	250.0 ± 1.1 µg/mL	Sodium, Na	5 000 ± 22 µg/mL
Vanadium, V	500.0 ± 2.2 µg/mL	Zinc, Zn	500.0 ± 2.2 µg/mL

Density: 1.117 g/mL (measured at 20 ± 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Ag	ICP Assay	3151	160729
Ag	Volhard	999c	999c
Al	ICP Assay	3101a	140903
Al	EDTA	928	928
Ba	ICP Assay	3104a	140909
Ba	Gravimetric		See Sec. 4.2
Be	ICP Assay	3105a	090514
Ca	ICP Assay	3109a	130213
Ca	EDTA	928	928
Co	ICP Assay	3113	190630
Co	EDTA	928	928
Cr	ICP Assay	3112a	170630
Cu	ICP Assay	3114	120618
Cu	EDTA	928	928
Fe	ICP Assay	3126a	140812
Fe	EDTA	928	928
K	ICP Assay	3141a	140813
K	Gravimetric		See Sec. 4.2
Mg	ICP Assay	3131a	140110
Mg	EDTA	928	928
Mn	ICP Assay	3132	050429
Mn	EDTA	928	928
Na	ICP Assay	3152a	200413
Na	Gravimetric		See Sec. 4.2
Ni	ICP Assay	3136	120619
Ni	EDTA	928	928
V	ICP Assay	3165	160906
V	EDTA	928	928
Zn	ICP Assay	3168a	120629
Zn	EDTA	928	928

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM/RM by Two or More Methods

Certified Value, $X_{\text{CRM/RM}}$, where two or more methods of characterization are used is the weighted mean of the results:

$$X_{\text{CRM/RM}} = \sum (w_i) (X_i)$$

X_i = mean of Assay Method i with standard uncertainty $u_{\text{char } i}$

w_i = the weighting factors for each method calculated using the inverse square of the variance:

$$w_i = (1/u_{\text{char } i})^2 / (\sum (1/u_{\text{char } i})^2)$$

$$\text{CRM/RM Expanded Uncertainty } (\pm) = U_{\text{CRM/RM}} = k (u_{\text{char}}^2 + u_{\text{bb}}^2 + u_{\text{Its}}^2 + u_{\text{ts}}^2)^{1/2}$$

k = coverage factor = 2

$u_{\text{char}} = [\sum (w_i)^2 (u_{\text{char } i})^2]^{1/2}$ where $u_{\text{char } i}$ are the errors from each characterization method

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{Its} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{\text{CRM/RM}}$, where one method of characterization is used is the mean of individual results:

$$X_{\text{CRM/RM}} = (X_a) (u_{\text{char } a})$$

X_a = mean of Assay Method A with

$u_{\text{char } a}$ = the standard uncertainty of characterization Method A

$$\text{CRM/RM Expanded Uncertainty } (\pm) = U_{\text{CRM/RM}} = k (u_{\text{char } a}^2 + u_{\text{bb}}^2 + u_{\text{Its}}^2 + u_{\text{ts}}^2)^{1/2}$$

k = coverage factor = 2

$u_{\text{char } a}$ = the errors from characterization

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{Its} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

N/A

6.0 INTENDED USE

6.1 This standard is intended for the calibration of analytical instruments and validation of analytical methods as appropriate. This CRM may be used in connection with EPA Methods 6010, 6020 (all versions), Standard Methods 3120 B and USP <232> / ICH Q3D.

6.2 For products attaining traceability through Inorganic Ventures' Primary Certified Reference Materials (PCRM™) see the Limited License to Use PCRM™ in the Inorganic Ventures [Terms and Conditions of Sale](https://www.inorganicventures.com/terms-and-conditions-sale). <https://www.inorganicventures.com/terms-and-conditions-sale>. The Terms and Conditions contain information on the use of materials traceable to PCRM™ certified reference materials. This Limited License agreement is especially pertinent for laboratories accredited under ISO:17034.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit www.inorganicventures.com/TCT

Note: This solution contains Silver (Ag), please refer to our Sample Preparation Guide for more information (<https://www.inorganicventures.com/sample-preparation-guide/samples-containing-silver>)

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; info@inorganicventures.com;

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

March 22, 2024

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- **March 22, 2029**

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:

Uyen Truong
Custom Processing Supervisor



Certificate Approved By:

Jodie Wall
Stock VSM Coordinator



Certifying Officer:

Paul Gaines
Chairman / Senior Technical Director





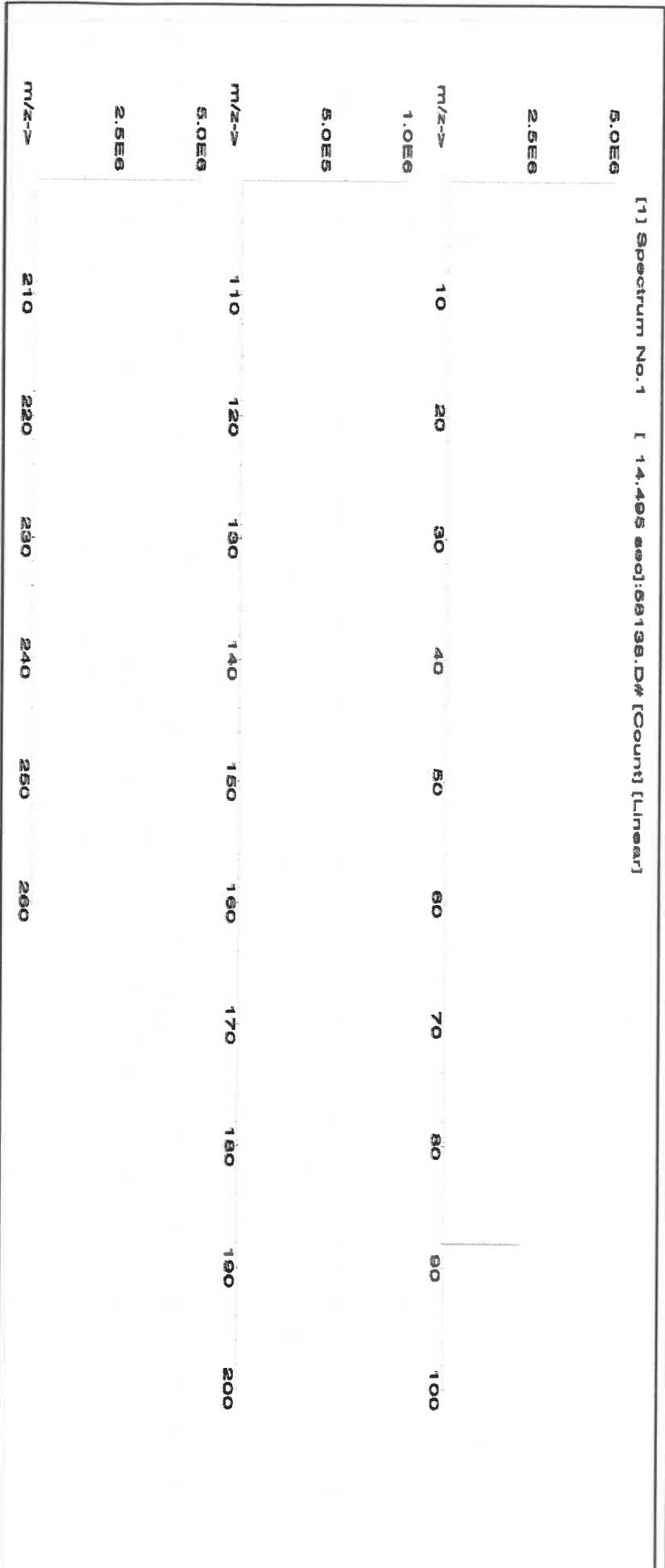
CERTIFIED WEIGHT REPORT:

Part Number: 57038 **Lot #** 24002546 **Solvent:** Nitric Acid
Lot Number: 092724
Description: Strontium (Sr)
Expiration Date: 092727 **2%** **40.0** **Nitric Acid**
Recommended Storage: Ambient (20 °C) **(mL)**
Nominal Concentration (µg/mL): 1000
NIST Test Number: 8UTB **5E-05** **Balance Uncertainty**
Weight shown below was diluted to (mL): 2000.07 **0.100** **Flask Uncertainty**

<i>[Signature]</i>	
Formulated By:	Benson Chan
	092724
<i>[Signature]</i>	
Reviewed By:	Pedro L. Rentas
	092724

SDS Information									
Compound	Lot	Nominal	Purity	Uncertainty	Assay	Target	Actual	Actual	Expanded
	Number	Conc. (µg/mL)	(%)	Purity (%)	(%)	Weight (g)	Weight (g)	Conc. (µg/mL)	Uncertainty
								+/- (µg/mL)	(Solvent Safety Info. On Attached pg.)
									CAS#
									OSHA PEL (TWA)
									LD50
									SRM

1. **Strontium nitrate (Sr)** **IN017 SR2022018A1** **1000** **99.997** **0.10** **41.2** **4.85470** **4.85481** **1000.0** **2.0** **10042-76-9** **NA** **or -rel >2000mg/kg 3153a**





Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

Trace Metals Verification by ICP-MS ($\mu\text{g/mL}$)

Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pt	<0.02	Se	<0.2	Tb	<0.02	W	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Te	<0.02	U	<0.02
As	<0.2	Ce	<0.02	Bu	<0.02	In	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02	Tl	<0.02	V	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Th	<0.02	Yb	<0.02
Be	<0.01	Cr	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	T	Tm	<0.02	Y	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	S	<0.02	Sn	<0.02	Zn	<0.02
B	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02	Ti	<0.02	Zr	<0.02

(T) = Target analyte

Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



CERTIFIED WEIGHT REPORT:

Part Number:
Lot Number:
Description:

57042
080525
Molybdenum (Mo)

57042
080525
Molybdenum (Mo)

57042
080525
Molybdenum (Mo)

Solvent:
Ammonium hydroxide
ASTM Type 1 Water

Expiration Date:

080528

Recommended Storage:

Ambient (15 - 30 °C)

Nominal Concentration (µg/mL):

1000

NIST Test Number:

6UTB

Volume shown below was diluted to (mL):

1999.41

5E-05

Balance Uncertainty

0.058

Fork Uncertainty

R → 8/6/25
M6177

0.5%

10.0

Ammonium hydroxide

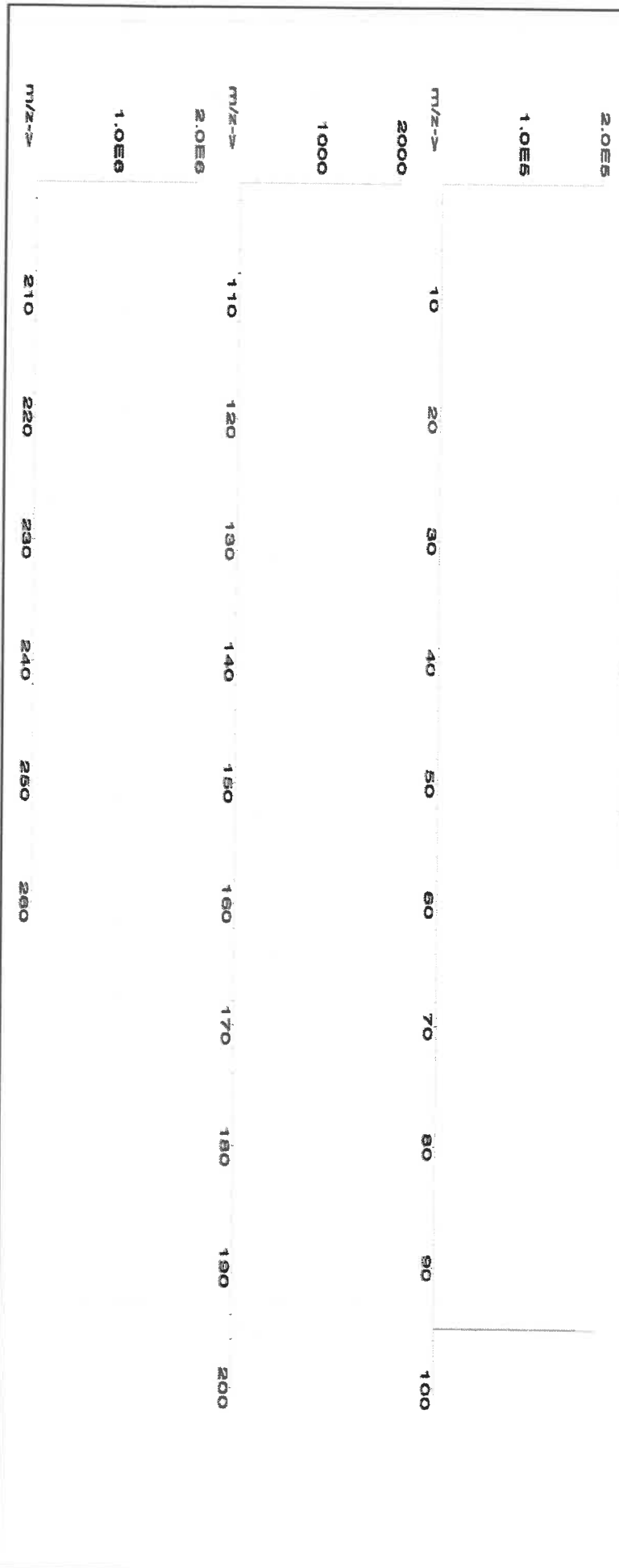
Formulated By:	Benson Chan	080525
Reviewed By:	Pedro L. Renteria	080525

SDS Information

Compound	Part Number	Lot Number	Dilution Factor	Initial Vol. (mL)	Uncertainty Pipette (mL)	Nominal Conc. (µg/mL)	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty +/- (µg/mL)	CAS#	OSHA PEL (TWA)	LD50	NIST SRM
----------	-------------	------------	-----------------	-------------------	--------------------------	-----------------------	-----------------------	---------------------	----------------------------------	------	----------------	------	----------

1. Ammonium molybdate (Mo) 58142 112322 0.1000 200.0 0.084 1000 10001.4 1000.5 2.2 13106-76-8 5 mg(Mo)/mL 0.1-0.333 mg/kg 3134

[1] Spectrum No. 1 [8.594 sec]:57042.D# [Count] [Linear]





Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

Trace Metals Verification by ICP-MS (µg/mL)															
Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pr	<0.02	Se	<0.2
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02
Ba	<0.02	Ce	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2
Be	<0.01	Cr	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Mo	T	Pt	<0.02	Sm	<0.02	S	<0.02
B	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Te	<0.02
														Tb	<0.02
														Ti	<0.02
														Th	<0.02
														Tm	<0.02
														Sn	<0.02
														Tl	<0.02
														U	<0.02
														V	<0.02
														Yb	<0.02
														Y	<0.02
														Zn	<0.02
														Zr	<0.02

(T) = Target analyte

Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware, and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated by an ISO17025 certified organization with weights traceable through NIST to the SI kilogram (see above).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).
- Rev 1.0, 2/25/2025



CERTIFIED WEIGHT REPORT:

Part Number:
Lot Number:
Description:

57082
031525
Lead (Pb)

Lot #

24014457 Nitric Acid

Expiration Date:

031528

Recommended Storage:

Ambient (20 °C)

2%

40.0

Nitric Acid

Nominal Concentration (µg/mL):

1000

NIST Test Number:

6UTB

Weight shown below was diluted to (mL):

2000.07

0.10 Flask Uncertainty

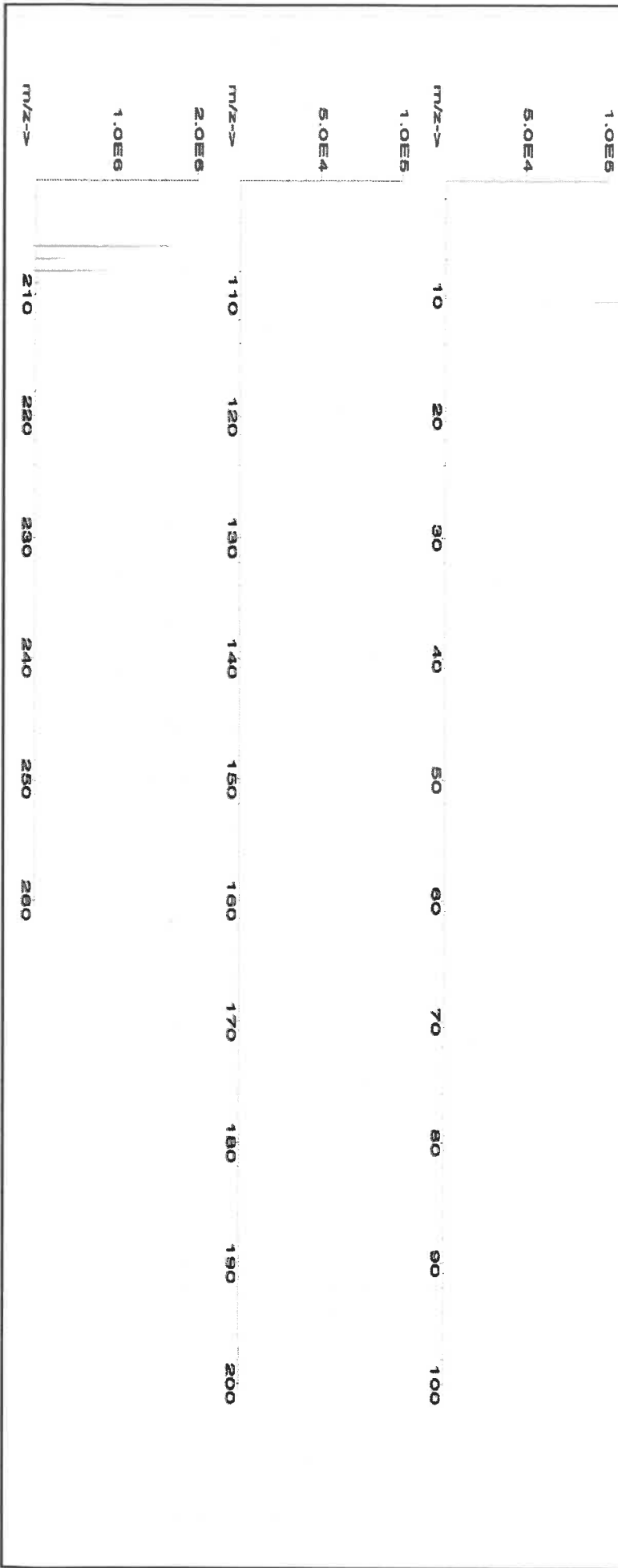
<i>Giovanni Esposito</i>	
Formulated By:	Giovanni Esposito
	031525
Reviewed By:	<i>Pedro L. Renteria</i>
	Pedro L. Renteria
	031525

SDS Information

Compound	Lot	Nominal	Purity	Uncertainty	Assay	Target	Actual	Actual	Uncertainty	(Solvent Safety Info. On Attached pg.)		NIST
	RM#	Number	Conc. (µg/mL)	(%)	Purity (%)	Weight (g)	Weight (g)	Conc. (µg/mL)	+/- (µg/mL)	CAS#	OSHA PEL (TWA)	LD50

1. Lead(II) nitrate (Pb) IN029 PBD122016A1 1000 99.999 0.10 62.5 3.20015 3.20067 1000.2 2.0 10099-74-8 0.05 mg/m3 Intra-rat 93 mg/kg 3128

[1] Spectrum No. 1 [14.144 sec]:58082.D# [Count] [Linear]





Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

Trace Metals Verification by ICP-MS ($\mu\text{g/mL}$)

Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pt	<0.02	Sc	<0.2	Tb	<0.02	W	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Tc	<0.02	U	<0.02
As	<0.2	Ce	<0.02	Bu	<0.02	In	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02	Tl	<0.02	V	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Th	<0.02	Yb	<0.02
Be	<0.01	Cr	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	S	<0.02	Sn	<0.02	Zn	<0.02
B	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.2	Se	<0.02	Ta	<0.02	Ti	<0.02	Zr	<0.02

(T) = Target analyte

Physical Characterization:

Certified by:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

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M6179
R → 612/24

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



2.0 PRODUCT DESCRIPTION

Product Code: Single Analyte Custom Grade Solution
Catalog Number: CGY10
Lot Number: V2-Y740548
Matrix: 2% (v/v) HNO₃
Value / Analyte(s): 10 000 µg/mL ea:
Yttrium
Starting Material: Yttrium Oxide
Starting Material Lot#: 2661 and 06230520YL
Starting Material Purity: 99.9984%

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Value: 10000 ± 30 µg/mL
Density: 1.032 g/mL (measured at 20 ± 4 °C)

Assay Information:

Assay Method #1	10011 ± 25 µg/mL EDTA NIST SRM 928 Lot Number: 928
Assay Method #2	9997 ± 50 µg/mL ICP Assay NIST SRM 3167a Lot Number: 190730
Assay Method #3	9984 ± 31 µg/mL Calculated NIST SRM Lot Number: See Sec. 4.2

- The Calculated Value is a value calculated from the weight of a starting material that has been certified directly vs. a National Institute of Standards and Technology (NIST) SRM/RM. See Sec 4.2 for balance traceability.

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM/RM by Two or More Methods

Certified Value, $X_{CRM/RM}$, where two or more methods of characterization are used is the weighted mean of the results:

$$X_{CRM/RM} = \sum (w_i) (X_i)$$

X_i = mean of Assay Method i with standard uncertainty $u_{char i}$

w_i = the weighting factors for each method calculated using the inverse square of the variance:

$$w_i = (1/u_{char i}^2) / (\sum (1/u_{char i}^2))$$

$$CRM/RM \text{ Expanded Uncertainty } (\pm) = U_{CRM/RM} = k (u_{char}^2 + u_{bb}^2 + u_{ts}^2 + u_{ts}^2)^{1/2}$$

k = coverage factor = 2

$u_{char} = [\sum (w_i)^2 (u_{char i}^2)]^{1/2}$ where $u_{char i}$ are the errors from each characterization method

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{ts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{CRM/RM}$, where one method of characterization is used is the mean of individual results:

$$X_{CRM/RM} = (X_a) (u_{char a})$$

X_a = mean of Assay Method A with

$u_{char a}$ = the standard uncertainty of characterization Method A

$$CRM/RM \text{ Expanded Uncertainty } (\pm) = U_{CRM/RM} = k (u_{char a}^2 + u_{bb}^2 + u_{ts}^2 + u_{ts}^2)^{1/2}$$

k = coverage factor = 2

$u_{char a}$ = the errors from characterization

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{ts} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

CRM/RMs are tested for trace metallic impurities by Axial ICP-OES and ICP-MS. The result from the most sensitive method for each element, is reported below. Solutions tested by ICP-MS were analyzed in an ULPA-Filtered Clean Room. An ULPA-Filter is 99.9985% efficient for the removal of particles down to 0.3 µm.

M	Ag	<	0.004600	M	Eu	0.009037	M	Na	0.086360	M	Se	<	0.005200	M	Zn	0.030125	
M	Al		0.014862	O	Fe	0.002410	M	Nb	<	0.000570	O	Si	0.024100	O	Zr	<	0.002600
M	As	<	0.003500	M	Ga	<	0.000570	M	Nd	0.000923	M	Sm	0.000461				
M	Au	<	0.001700	M	Gd	<	0.003500	M	Ni	<	0.005700	M	Sn	<	0.002300		
O	B		0.002209	M	Ge	<	0.005200	M	Os	<	0.001200	M	Sr	<	0.004600		
O	Ba	<	0.002500	M	Hf	<	0.000570	n	P	<		M	Ta	<	0.000570		
O	Be	<	0.001400	M	Hg	<	0.000570	M	Pb	0.005020	M	Tb	0.001044				
M	Bi	<	0.003500	M	Ho	0.009037	M	Pd	<	0.005100	M	Te	<	0.002300			
O	Ca		0.009841	M	In	<	0.002300	M	Pr	<	0.002300	M	Th	<	0.000570		
M	Cd	<	0.000570	M	Ir	<	0.000570	M	Pt	<	0.000570	M	Ti	<	0.003500		
M	Ce	<	0.002300	O	K	0.018677	M	Rb	<	0.000570	M	Tl	<	0.000570			
M	Co	<	0.000570	M	La	0.000461	M	Re	<	0.000570	M	Tm	<	0.003500			
M	Cr	<	0.004000	O	Li	<	0.009300	M	Rh	<	0.008000	M	U	<	0.000570		
M	Cs	<	0.000570	M	Lu	0.000582	M	Ru	<	0.000570	M	V	0.001265				
M	Cu		0.002610	O	Mg	0.001486	n	S	<		M	W	<	0.002300			
M	Dy		0.003815	M	Mn	0.000582	M	Sb	0.005422	s	Y	<					
M	Er		0.003615	M	Mo	<	0.005700	M	Sc	<	0.001200	M	Yb	0.001827			

M - Checked by ICP-MS

O - Checked by ICP-OES

i - Spectral Interference

n - Not Checked For

s - Solution Standard Element

6.0 INTENDED USE

6.1 This standard is intended for the calibration of analytical instruments and validation of analytical methods as appropriate. This CRM may be used in connection with EPA Methods 6010, 6020 (all versions), Standard Methods 3120 B and USP <232> / ICH Q3D.

6.2 For products attaining traceability through Inorganic Ventures' Primary Certified Reference Materials (PCRM™) see the Limited License to Use PCRM™ in the Inorganic Ventures [Terms and Conditions of Sale](https://www.inorganicventures.com/terms-and-conditions-sale). <https://www.inorganicventures.com/terms-and-conditions-sale>. The Terms and Conditions contain information on the use of materials traceable to PCRM™ certified reference materials. This Limited License agreement is especially pertinent for laboratories accredited under ISO:17034.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.
- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.
- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit www.inorganicventures.com/TCT

Atomic Weight; Valence; Coordination Number; Chemical Form In Solution - 88.91 +3 6 Y(OH)(H₂O)_{x+2}
Chemical Compatibility -Soluble in HCl, H₂SO₄ and HNO₃. Avoid HF, H₃PO₄ and neutral to basic media. Stable with most metals and inorganic anions forming an insoluble carbonate, oxide, oxalate, and fluoride. Avoid mixing with elements / solutions containing moderate amounts of fluoride.

Stability - 2-100 ppb levels stable for months in 1% HNO₃ / LDPE container. 1-10,000 ppm solutions chemically stable for years in 2-5% HNO₃ / LDPE container.

Y Containing Samples (Preparation and Solution) - Metal (Soluble in acids); Oxide (Dissolve by heating in H₂O / HNO₃); Ores (Carbonate fusion in PtO followed by HCl dissolution); Organic Matrices (Dry ash and dissolve in 1:1 H₂O / HCl or HNO₃).

Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/axial view):

Technique/Line	Estimated D.L.	Order	Interferences (underlined indicates severe)
ICP-MS 89 amu	0.8 ppt	N/A	<u>73Ge16O</u> , <u>178Hf+2</u>
ICP-OES 360.073 nm	0.005 / 0.000036 µg/mL	1	Ce, Th
ICP-OES 371.030 nm	0.004 / 0.00007 µg/mL	1	Ce
ICP-OES 377.433 nm	0.005 / 0.0009 µg/mL	1	Ta, Th

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

February 20, 2024

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- February 20, 2029

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:

Uyen Truong
Custom Processing Supervisor



Certificate Approved By:

Muzzammil Khan
Stock Laboratory Supervisor



Certifying Officer:

Paul Gaines
Chairman / Senior Technical Director



Certificate of Analysis

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1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



2.0 PRODUCT DESCRIPTION

Product Code:	Multi Analyte Custom Grade Solution
Catalog Number:	WW-LFS-1
Lot Number:	W2-MEB752149
Matrix:	5% (v/v) HNO ₃

M6180
R-37/22/23

Value / Analyte(s):	1 000 µg/mL ea:	
	Potassium,	
	600 µg/mL ea:	
	Phosphorus,	
	300 µg/mL ea:	
	Sodium,	Iron,
	200 µg/mL ea:	
	Magnesium,	Aluminum,
	Cerium,	Selenium,
	Thallium,	
	100 µg/mL ea:	
	Lead,	Calcium,
	80 µg/mL ea:	
	Arsenic,	
	70 µg/mL ea:	
	Mercury,	
	50 µg/mL ea:	
	Nickel,	
	40 µg/mL ea:	
	Chromium,	
	30 µg/mL ea:	
	Copper,	Boron,
	Vanadium,	
	20 µg/mL ea:	
	Zinc,	Strontium,
	Barium,	Beryllium,
	Cadmium,	Cobalt,
	Manganese,	Lithium,
	7.5 µg/mL ea:	
	Silver	

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE	CERTIFIED VALUE	ANALYTE	CERTIFIED VALUE
Aluminum, Al	200.2 ± 0.7 µg/mL	Arsenic, As	80.1 ± 0.5 µg/mL
Barium, Ba	20.02 ± 0.12 µg/mL	Beryllium, Be	20.02 ± 0.11 µg/mL
Boron, B	30.02 ± 0.15 µg/mL	Cadmium, Cd	20.04 ± 0.09 µg/mL
Calcium, Ca	100.1 ± 0.3 µg/mL	Cerium, Ce	200.2 ± 1.0 µg/mL
Chromium, Cr	40.02 ± 0.26 µg/mL	Cobalt, Co	20.03 ± 0.09 µg/mL
Copper, Cu	30.03 ± 0.13 µg/mL	Iron, Fe	300.3 ± 1.3 µg/mL
Lead, Pb	100.1 ± 0.5 µg/mL	Lithium, Li	20.03 ± 0.09 µg/mL
Magnesium, Mg	200.2 ± 0.9 µg/mL	Manganese, Mn	19.99 ± 0.09 µg/mL
Mercury, Hg	70.0 ± 0.3 µg/mL	Nickel, Ni	50.05 ± 0.22 µg/mL
Phosphorus, P	600.5 ± 2.9 µg/mL	Potassium, K	1 001 ± 4 µg/mL
Selenium, Se	200.2 ± 1.1 µg/mL	Silver, Ag	7.52 ± 0.03 µg/mL
Sodium, Na	300.3 ± 1.3 µg/mL	Strontium, Sr	20.02 ± 0.10 µg/mL
Thallium, Tl	200.2 ± 1.0 µg/mL	Vanadium, V	30.02 ± 0.13 µg/mL
Zinc, Zn	20.05 ± 0.09 µg/mL		

Density: 1.037 g/mL (measured at 20 ± 5 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Ag	ICP Assay	3151	160729
Ag	Volhard	999c	999c
Al	ICP Assay	3101a	140903
Al	EDTA	928	928
As	ICP Assay	3103a	100818
B	ICP Assay	3107	190605
B	Calculated		See Sec. 4.2
Ba	ICP Assay	3104a	140909
Ba	Gravimetric		See Sec. 4.2
Be	ICP Assay	3105a	090514
Ca	ICP Assay	3109a	130213
Ca	EDTA	928	928
Cd	ICP Assay	3108	130116
Cd	EDTA	928	928
Ce	ICP Assay	3110	160830
Ce	EDTA	928	928
Co	ICP Assay	3113	190630
Co	EDTA	928	928
Cr	ICP Assay	3112a	170630
Cu	ICP Assay	3114	120618
Cu	EDTA	928	928
Fe	ICP Assay	3126a	140812
Fe	EDTA	928	928
Hg	ICP Assay	3133	160921
Hg	EDTA	928	928
K	ICP Assay	3141a	140813
K	Gravimetric		See Sec. 4.2
Li	ICP Assay	3129a	100714
Li	Gravimetric		See Sec. 4.2
Mg	ICP Assay	3131a	140110
Mg	EDTA	928	928
Mn	ICP Assay	3132	050429
Mn	EDTA	928	928
Na	ICP Assay	3152a	200413
Na	Gravimetric		See Sec. 4.2
Ni	ICP Assay	3136	120619
Ni	EDTA	928	928
P	ICP Assay	3139a	060717
P	Acidimetric	84L	84L
Pb	ICP Assay	3128	101026
Pb	EDTA	928	928
Se	ICP Assay	3149	100901
Sr	EDTA	928	928
Sr	ICP Assay	Traceable to 3153a	K2-SR650985
Tl	ICP Assay	3158	151215
V	ICP Assay	3165	160906
V	EDTA	928	928
Zn	ICP Assay	3168a	120629
Zn	EDTA	928	928

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of $k = 2$.

Characterization of CRM/RM by Two or More Methods

Certified Value, $X_{\text{CRM/RM}}$, where two or more methods of characterization are used is the weighted mean of the results:

$$X_{\text{CRM/RM}} = \sum (w_i) (X_i)$$

X_i = mean of Assay Method i with standard uncertainty $u_{\text{char } i}$

w_i = the weighting factors for each method calculated using the inverse square of the variance:

$$w_i = (1/u_{\text{char } i}^2) / (\sum (1/u_{\text{char } i}^2))$$

$$\text{CRM/RM Expanded Uncertainty } (\pm) = U_{\text{CRM/RM}} = k (u_{\text{char}}^2 + u_{\text{bb}}^2 + u_{\text{ITS}}^2 + u_{\text{TS}}^2)^{1/2}$$

k = coverage factor = 2

$u_{\text{char}} = [\sum (w_i)^2 (u_{\text{char } i}^2)]^{1/2}$ where $u_{\text{char } i}$ are the errors from each characterization method

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{ITS} = long term stability standard uncertainty (storage)

u_{TS} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{\text{CRM/RM}}$, where one method of characterization is used is the mean of individual results:

$$X_{\text{CRM/RM}} = (X_a) (u_{\text{char } a})$$

X_a = mean of Assay Method A with

$u_{\text{char } a}$ = the standard uncertainty of characterization Method A

$$\text{CRM/RM Expanded Uncertainty } (\pm) = U_{\text{CRM/RM}} = k (u_{\text{char } a}^2 + u_{\text{bb}}^2 + u_{\text{ITS}}^2 + u_{\text{TS}}^2)^{1/2}$$

k = coverage factor = 2

$u_{\text{char } a}$ = the errors from characterization

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{ITS} = long term stability standard uncertainty (storage)

u_{TS} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

N/A

6.0 INTENDED USE

6.1 This standard is intended for the calibration of analytical instruments and validation of analytical methods as appropriate. This CRM may be used in connection with EPA Methods 6010, 6020 (all versions), Standard Methods 3120 B and USP <232> / ICH Q3D.

6.2 For products attaining traceability through Inorganic Ventures' Primary Certified Reference Materials (PCRM™) see the Limited License to Use PCRM™ in the Inorganic Ventures Terms and Conditions of Sale. <https://www.inorganicventures.com/terms-and-conditions-sale>. The Terms and Conditions contain information on the use of materials traceable to PCRM™ certified reference materials. This Limited License agreement is especially pertinent for laboratories accredited under ISO:17034.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 25° C to minimize the effects of transpiration. Use at 20° ± 5° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit www.inorganicventures.com/TCT

Note: This solution contains Silver (Ag), please refer to our Sample Preparation Guide for more information (<https://www.inorganicventures.com/sample-preparation-guide/samples-containing-silver>)

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

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11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

April 08, 2025

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- **April 08, 2029**

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:

Justin Dirico
Stock Processing Supervisor



Certificate Approved By:

Jodie Wall
Stock VSM Coordinator



Certifying Officer:

Paul Gaines
Chairman / Senior Technical Director



300 Technology Drive
Christiansburg, VA 24073 USA
inorganicventures.com

Certificate of Analysis

P: 800-669-6799/540-585-3030
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M6181
R → 7/22/28

1.0 ACCREDITATION / REGISTRATION

INORGANIC VENTURES is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



2.0 PRODUCT DESCRIPTION

Product Code: Multi Analyte Custom Grade Solution
Catalog Number: WW-LFS-2
Lot Number: V2-MEB743480
Matrix: 5% (v/v) HNO₃
tr. HF
Value / Analyte(s):
200 µg/mL ea:
Silica,
80 µg/mL ea:
Antimony,
70 µg/mL ea:
Tin,
40 µg/mL ea:
Molybdenum,
20 µg/mL ea:
Titanium

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ANALYTE	CERTIFIED VALUE	ANALYTE	CERTIFIED VALUE
Antimony, Sb	80.1 ± 0.5 µg/mL	Molybdenum, Mo	40.05 ± 0.22 µg/mL
Silica, SiO ₂	200.3 ± 1.4 µg/mL	Tin, Sn	70.1 ± 0.4 µg/mL
Titanium, Ti	20.03 ± 0.12 µg/mL		

Density: 1.025 g/mL (measured at 20 ± 4 °C)

Assay Information:

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Mo	ICP Assay	3134	130418
Sb	ICP Assay	3102a	140911
SiO ₂	Calculated		See Sec. 4.2
Sn	ICP Assay	3161a	140917
Ti	ICP Assay	traceable to 3162a	T2-TI725816

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Characterization of CRM/RM by Two or More Methods

Certified Value, $X_{\text{CRM/RM}}$, where two or more methods of characterization are used is the weighted mean of the results:

$$X_{\text{CRM/RM}} = \sum (w_i) (X_i)$$

X_i = mean of Assay Method i with standard uncertainty $u_{\text{char } i}$

w_i = the weighting factors for each method calculated using the inverse square of the variance:

$$w_i = (1/u_{\text{char } i})^2 / (\sum (1/u_{\text{char } i})^2)$$

$$\text{CRM/RM Expanded Uncertainty (z)} = U_{\text{CRM/RM}} = k (u_{\text{char}}^2 + u_{\text{bb}}^2 + u_{\text{Its}}^2 + u_{\text{ts}}^2)^{1/2}$$

k = coverage factor = 2

$u_{\text{char}} = [\sum ((w_i)^2 (u_{\text{char } i})^2)]^{1/2}$ where $u_{\text{char } i}$ are the errors from each characterization method

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{Its} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

Characterization of CRM/RM by One Method

Certified Value, $X_{\text{CRM/RM}}$, where one method of characterization is used is the mean of individual results:

$$X_{\text{CRM/RM}} = (X_a) (u_{\text{char } a})$$

X_a = mean of Assay Method A with

$u_{\text{char } a}$ = the standard uncertainty of characterization Method A

$$\text{CRM/RM Expanded Uncertainty (z)} = U_{\text{CRM/RM}} = k (u_{\text{char } a}^2 + u_{\text{bb}}^2 + u_{\text{Its}}^2 + u_{\text{ts}}^2)^{1/2}$$

k = coverage factor = 2

$u_{\text{char } a}$ = the errors from characterization

u_{bb} = bottle to bottle homogeneity standard uncertainty

u_{Its} = long term stability standard uncertainty (storage)

u_{ts} = transport stability standard uncertainty

4.0 TRACEABILITY TO NIST

- This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

4.1 Thermometer Calibration

- All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

4.2 Balance Calibration

- All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

4.3 Glassware Calibration

- An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES (µg/mL)

N/A

6.0 INTENDED USE

6.1 This standard is intended for the calibration of analytical instruments and validation of analytical methods as appropriate. This CRM may be used in connection with EPA Methods 6010, 6020 (all versions), Standard Methods 3120 B and USP <232> / ICH Q3D.

6.2 For products attaining traceability through Inorganic Ventures' Primary Certified Reference Materials (PCRM™) see the Limited License to Use PCRM™ in the Inorganic Ventures Terms and Conditions of Sale. <https://www.inorganicventures.com/terms-and-conditions-sale>. The Terms and Conditions contain information on the use of materials traceable to PCRM™ certified reference materials. This Limited License agreement is especially pertinent for laboratories accredited under ISO:17034.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

7.1 Storage and Handling Recommendations

- Store between approximately 4° - 30° C while in sealed TCT bag.

- While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

- After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

- For more information, visit www.inorganicventures.com/TCT

HF Note: This standard should not be prepared or stored in glass.

8.0 HAZARDOUS INFORMATION

- Please refer to the Safety Data Sheet for information regarding this CRM/RM.

9.0 HOMOGENEITY

- This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration

- QSR Certificate Number QSR-1034

10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"

- Chemical Testing - Accredited / A2LA Certificate Number 883.01

10.3 ISO 17034 "General Requirements for the Competence of Reference Material Producers"

- Reference Material Producer - Accredited / A2LA Certificate Number 883.02

Inorganic Ventures, 300 Technology Drive, Christiansburg, Va. 24073, USA; Telephone: 800.669.6799; 540.585.3030, Fax: 540.585.3012; inorganicventures.com; info@inorganicventures.com

11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

11.1 Certification Issue Date

May 07, 2024

- The certification is valid within the measurement uncertainty specified provided the CRM/RM is stored and handled in accordance with instructions given in Sec 7.1. This certification is nullified if instructions in Sec 7.1 are not followed or if the CRM/RM is damaged, contaminated, or otherwise modified.

11.2 Lot Expiration Date

- **May 07, 2029**

- The date after which this CRM/RM should not be used.

- The lot expiration date reflects the period of time that the stability of a CRM/RM can be supported by long term stability studies conducted on properly stored and handled CRM/RMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

11.3 Period of Validity

- Sealed TCT Bag Open Date: _____

- This CRM/RM should not be used longer than one year (or six months in the case of a 30 mL bottle) from the date of opening the aluminized bag or after the date given in Sec. 11.2, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instructions given in Sec. 7.1.

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:

Justin Dirico
Stock Processing Supervisor



Certificate Approved By:

Thomas Kozikowski
Stock VS Manager



Certifying Officer:

Paul Gaines
Chairman / Senior Technical Director





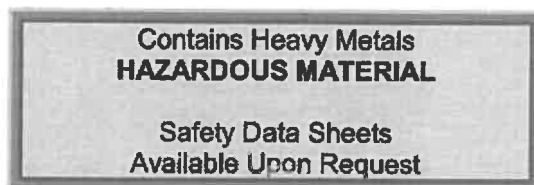
Instructions for QATS Reference Material: ICP-AES ICS

QATS LABORATORY INORGANIC REFERENCE MATERIAL
INTERFERENCE CHECK SAMPLE SET FOR ICP-AES (ICSA WITH ICSB)

NOTE: These instructions are for advisory purposes only. If any apparent conflict exists between these instructions and the analytical protocol or your contract, disregard these instructions.

APPLICATION: For use with the CLP SFAM01.0 SOW and revisions.

CAUTION: Read instructions carefully before opening bottle(s) and proceeding with the analyses.



M6182

(A) SAMPLE DESCRIPTION

Enclosed is a set of one (1) or more bottles of Aqueous Reference Material, each composed of metals at various concentrations and prepared with nitrate salts and oxy-acids of the respective elements in a 5% nitric acid matrix. **For the reference material source in reporting ICSA and ICSAB mixture use "USEPA". For the reference material lot number for the ICSA use "ICSA-1211" and for the ICSAB mixture use "ICSA-1211+ICSB-0710".**

CAUTION: The bottle(s) should be protected from light during storage to ensure the stability of silver which is contained in the ICSB solution. The bottle(s) should be stored at room temperature. **Do not allow the solution(s) to freeze.**

(B) BREAKAGE OR MISSING ITEMS

Check the contents of the shipment carefully for any broken, leaking, or missing items. Check that the seal is intact on each bottle. Refer to the enclosed chain of custody record. Report any problems to Mr. Keith Strout, APTIM Federal Services, LLC, at (702) 895-8722. If requested, return the chain-of-custody record with appropriate annotations and signatures to the address provided below.

QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY
APTIM Federal Services, LLC
2700 Chandler Avenue - Building C
Las Vegas, NV 89120

(C) ANALYSIS OF SAMPLES

The interference check sample set is to be used to verify inter-element and background correction factors of inductively-coupled plasma (ICP) spectrometers. This reference material set consists of two (2) concentrated solutions. The ICSA solution contains the four (4) interferent elements: Al, Ca, Fe, and Mg. The ICSB solution contains the analytes: Ag, As, Sb, Ba, Be,





QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY
"An ISO 9001:2015 Certified Program"

Instructions for QATS Reference Material: ICP-AES ICS

Cd, Co, Cr, Cu, Mn, Ni, Pb, Tl, Se, V, and Zn. This instruction sheet provides the nominal values for ICP-AES Part A and Part B target analytes when diluted as directed.

Using Class "A" glassware, preparation and analysis must be performed according to the following instructions:

ICSA-1211, Interferents: Pipet 10 mL of the ICSA solution into a 100 mL volumetric flask and dilute to volume with 2% v/v HNO₃. Analyze this ICSA solution by ICP-AES.

ICSB-0710, Analytes, mixed with ICSA-1211, Interferents: Pipet 10 mL of the ICSA solution and 10 mL of the ICSB solution into a 100 mL volumetric flask and dilute to volume with 2% v/v HNO₃. Analyze this ICSAB solution by ICP-AES.

(D) "CERTIFIED VALUE" CONCENTRATIONS OF QATS ICP-AES ICS SOLUTION(S)

The "Certified Value" concentrations of the elements, listed in Table 1 below, were derived from statistically pooled analysis results from the following sources, if available: QATS Laboratory, CLP laboratories, Quarterly Blind (QB)/Proficiency Testing (PT) events, CLP pre-award events, and external referee laboratories.

Table 1. "CERTIFIED VALUES" FOR INTERFERENCE CHECK SAMPLE ICP-AES ICSA-1211, AND ICSA-1211 MIXED WITH ICSB-0710

Element	CRQL	Part A (µg/L)	Low Limit (µg/L)	High Limit (µg/L)	Part A +Part B (µg/L)	Low Limit (µg/L)	High Limit (µg/L)
Al	200	255000	216000	294000	247000	209000	285000
Sb	60	(0.0)	-60.0	60.0	618	525	711
As	10	(0.0)	-10.0	10.0	104	88.4	120
Ba	200	(6.0)	-194	206	(537)	337	737
Be	5.0	(0.0)	-5.0	5.0	495	420	570
Cd	5.0	(1.0)	-4.0	6.0	972	826	1120
Ca	5000	245000	208000	282000	235000	199000	271000
Cr	10	(52.0)	42.0	62.0	542	460	624
Co	50	(0.0)	-50.0	50.0	476	404	548
Cu	25	(2.0)	-23.0	27.0	511	434	588
Fe	100	101000	85600	116500	99300	84400	114500
Pb	10	(0.0)	-10.0	10.0	(49.0)	39.0	59.0
Mg	5000	255000	216000	294000	248000	210000	286000
Mn	15	(7.0)	-8.0	22.0	507	430	584
Ni	40	(2.0)	-38.0	42.0	954	810	1100
Se	35	(0.0)	-35.0	35.0	(46.0)	11.0	81.0
Ag	10	(0.0)	-10.0	10.0	201	170	232
Tl	25	(0.0)	-25.0	25.0	(108)	83.0	133
V	50	(0.0)	-50.0	50.0	491	417	565
Zn	60	(0.0)	-60.0	60.0	952	809	1095

The acceptance ranges for all analytes in parentheses in the above table were determined using the listed certified value ± 1 times the associated CLP SOW CRQL. The acceptance ranges for all other analytes were determined using the certified value ± 15 percent of the listed certified value.



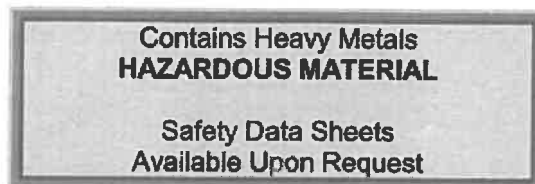
Instructions for QATS Reference Material: ICP-AES ICS

QATS LABORATORY INORGANIC REFERENCE MATERIAL
INTERFERENCE CHECK SAMPLE SET FOR ICP-AES (ICSA WITH ICSB)

NOTE: These instructions are for advisory purposes only. If any apparent conflict exists between these instructions and the analytical protocol or your contract, disregard these instructions.

APPLICATION: For use with the CLP SFAM01.0 SOW and revisions.

CAUTION: Read instructions carefully before opening bottle(s) and proceeding with the analyses.



M6184

(A) **SAMPLE DESCRIPTION**

Enclosed is a set of one (1) or more bottles of Aqueous Reference Material, each composed of metals at various concentrations and prepared with nitrate salts and oxy-acids of the respective elements in a 5% nitric acid matrix. **For the reference material source in reporting ICSA and ICSAB mixture use "USEPA". For the reference material lot number for the ICSA use "ICSA-1211" and for the ICSAB mixture use "ICSA-1211+ICSB-0710".**

CAUTION: The bottle(s) should be protected from light during storage to ensure the stability of silver which is contained in the ICSB solution. The bottle(s) should be stored at room temperature. **Do not allow the solution(s) to freeze.**

(B) **BREAKAGE OR MISSING ITEMS**

Check the contents of the shipment carefully for any broken, leaking, or missing items. Check that the seal is intact on each bottle. Refer to the enclosed chain of custody record. Report any problems to Mr. Keith Strout, APTIM Federal Services, LLC, at (702) 895-8722. If requested, return the chain-of-custody record with appropriate annotations and signatures to the address provided below.

QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY
APTIM Federal Services, LLC
2700 Chandler Avenue - Building C
Las Vegas, NV 89120

(C) **ANALYSIS OF SAMPLES**

The interference check sample set is to be used to verify inter-element and background correction factors of inductively-coupled plasma (ICP) spectrometers. This reference material set consists of two (2) concentrated solutions. The ICSA solution contains the four (4) interferent elements: Al, Ca, Fe, and Mg. The ICSB solution contains the analytes: Ag, As, Sb, Ba, Be,





Instructions for QATS Reference Material: ICP-AES ICS

Cd, Co, Cr, Cu, Mn, Ni, Pb, Tl, Se, V, and Zn. This instruction sheet provides the nominal values for ICP-AES Part A and Part B target analytes when diluted as directed.

Using Class "A" glassware, preparation and analysis must be performed according to the following instructions:

ICSA-1211, Interferents: Pipet 10 mL of the ICSA solution into a 100 mL volumetric flask and dilute to volume with 2% v/v HNO₃. Analyze this ICSA solution by ICP-AES.

ICSB-0710, Analytes, mixed with ICSA-1211, Interferents: Pipet 10 mL of the ICSA solution and 10 mL of the ICSB solution into a 100 mL volumetric flask and dilute to volume with 2% v/v HNO₃. Analyze this ICSAB solution by ICP-AES.

(D) "CERTIFIED VALUE" CONCENTRATIONS OF QATS ICP-AES ICS SOLUTION(S)

The "Certified Value" concentrations of the elements, listed in Table 1 below, were derived from statistically pooled analysis results from the following sources, if available: QATS Laboratory, CLP laboratories, Quarterly Blind (QB)/Proficiency Testing (PT) events, CLP pre-award events, and external referee laboratories.

Table 1. "CERTIFIED VALUES" FOR INTERFERENCE CHECK SAMPLE ICP-AES ICSA-1211, AND ICSA-1211 MIXED WITH ICSB-0710

Element	CRQL	Part A (µg/L)	Low Limit (µg/L)	High Limit (µg/L)	Part A +Part B (µg/L)	Low Limit (µg/L)	High Limit (µg/L)
Al	200	255000	216000	294000	247000	209000	285000
Sb	60	(0.0)	-60.0	60.0	618	525	711
As	10	(0.0)	-10.0	10.0	104	88.4	120
Ba	200	(6.0)	-194	206	(537)	337	737
Be	5.0	(0.0)	-5.0	5.0	495	420	570
Cd	5.0	(1.0)	-4.0	6.0	972	826	1120
Ca	5000	245000	208000	282000	235000	199000	271000
Cr	10	(52.0)	42.0	62.0	542	460	624
Co	50	(0.0)	-50.0	50.0	476	404	548
Cu	25	(2.0)	-23.0	27.0	511	434	588
Fe	100	101000	85600	116500	99300	84400	114500
Pb	10	(0.0)	-10.0	10.0	(49.0)	39.0	59.0
Mg	5000	255000	216000	294000	248000	210000	286000
Mn	15	(7.0)	-8.0	22.0	507	430	584
Ni	40	(2.0)	-38.0	42.0	954	810	1100
Se	35	(0.0)	-35.0	35.0	(46.0)	11.0	81.0
Ag	10	(0.0)	-10.0	10.0	201	170	232
Tl	25	(0.0)	-25.0	25.0	(108)	83.0	133
V	50	(0.0)	-50.0	50.0	491	417	565
Zn	60	(0.0)	-60.0	60.0	952	809	1095

The acceptance ranges for all analytes in parentheses in the above table were determined using the listed certified value $\pm$ 1 times the associated CLP SOW CRQL. The acceptance ranges for all other analytes were determined using the certified value $\pm$ 15 percent of the listed certified value.

Nitric Acid 69%
CMOS



M6187

R.D :- 08/08/25

Material No.: 9606-03
Batch No.: 24H0162012
Manufactured Date: 2024-06-28
Retest Date: 2029-06-27
Revision No.: 0

Certificate of Analysis

Test	Specification	Result
Assay (HNO ₃)	69.0 – 70.0 %	69.7 %
Appearance	Passes Test	Passes Test
Color (APHA)	≤ 10	5
Residue after Ignition	≤ 2 ppm	< 1 ppm
Chloride (Cl)	≤ 0.08 ppm	0.03 ppm
Phosphate (PO ₄)	≤ 0.10 ppm	< 0.03 ppm
Sulfate (SO ₄)	≤ 0.2 ppm	< 0.2 ppm
Trace Impurities – Aluminum (Al)	≤ 40.0 ppb	< 1.0 ppb
Arsenic and Antimony (as As)	≤ 5.0 ppb	< 2.0 ppb
Trace Impurities – Barium (Ba)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Beryllium (Be)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Bismuth (Bi)	≤ 20.0 ppb	< 1.0 ppb
Trace Impurities – Boron (B)	≤ 10.0 ppb	0.1 ppb
Trace Impurities – Cadmium (Cd)	≤ 50 ppb	< 1 ppb
Trace Impurities – Calcium (Ca)	≤ 50.0 ppb	0.3 ppb
Trace Impurities – Chromium (Cr)	≤ 30.0 ppb	0.1 ppb
Trace Impurities – Cobalt (Co)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Copper (Cu)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Gallium (Ga)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Germanium (Ge)	≤ 20 ppb	< 1 ppb
Trace Impurities – Gold (Au)	≤ 20 ppb	< 1 ppb
Heavy Metals (as Pb)	≤ 100 ppb	< 50 ppb
Trace Impurities – Iron (Fe)	≤ 40.0 ppb	< 1.0 ppb
Trace Impurities – Lead (Pb)	≤ 20.0 ppb	< 1.0 ppb
Trace Impurities – Lithium (Li)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Magnesium (Mg)	≤ 20 ppb	< 1 ppb
Trace Impurities – Manganese (Mn)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Nickel (Ni)	≤ 20.0 ppb	< 1.0 ppb

>>> Continued on page 2 >>>

Nitric Acid 69%
CMOS



Material No.: 9606-03
Batch No.: 24H0162012

Test	Specification	Result
Trace Impurities – Niobium (Nb)	≤ 50.0 ppb	< 1.0 ppb
Trace Impurities – Potassium (K)	≤ 50 ppb	< 1 ppb
Trace Impurities – Silicon (Si)	≤ 50 ppb	1 ppb
Trace Impurities – Silver (Ag)	≤ 20.0 ppb	< 1.0 ppb
Trace Impurities – Sodium (Na)	≤ 150.0 ppb	< 1.0 ppb
Trace Impurities – Strontium (Sr)	≤ 30.0 ppb	< 1.0 ppb
Trace Impurities – Tantalum (Ta)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Thallium (Tl)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Tin (Sn)	≤ 20.0 ppb	< 1.0 ppb
Trace Impurities – Titanium (Ti)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Vanadium (V)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities – Zinc (Zn)	≤ 20.0 ppb	< 1.0 ppb
Trace Impurities – Zirconium (Zr)	≤ 10.0 ppb	< 1.0 ppb
Particle Count – 0.5 µm and greater	≤ 60 par/ml	13 par/ml
Particle Count – 1.0 µm and greater	≤ 10 par/ml	5 par/ml

>>> Continued on page 3 >>>

Nitric Acid 69%
CMOS

 **avantor™**



Material No.: 9606-03
Batch No.: 24H0162012

Test	Specification	Result
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For Microelectronic Use

Country of Origin: USA
Packaging Site: Phillipsburg Mfg Ctr & DC



Jamie Croak
Director Quality Operations, Bioscience Production

Hydrochloric Acid, 36.5–38.0%
BAKER INSTRA-ANALYZED® Reagent
For Trace Metal Analysis



M6200
R.O → 08/25/25

Material No.: 9530-33
Batch No.: 24D1562005
Manufactured Date: 2024-03-18
Retest Date: 2029-03-17
Revision No.: 0

Certificate of Analysis

Test	Specification	Result
ACS – Assay (as HCl) (by acid-base titrn)	36.5 – 38.0 %	37.6 %
ACS – Color (APHA)	≤ 10	5
ACS – Residue after Ignition	≤ 3 ppm	< 1 ppm
ACS – Specific Gravity at 60°/60°F	1.185 – 1.192	1.192
ACS – Bromide (Br)	≤ 0.005 %	< 0.005 %
ACS – Extractable Organic Substances	≤ 5 ppm	< 1 ppm
ACS – Free Chlorine (as Cl ₂)	≤ 0.5 ppm	< 0.5 ppm
Phosphate (PO ₄)	≤ 0.05 ppm	0.03 ppm
Sulfate (SO ₄)	≤ 0.5 ppm	< 0.3 ppm
Sulfite (SO ₃)	≤ 0.8 ppm	0.3 ppm
Ammonium (NH ₄)	≤ 3 ppm	< 1 ppm
Trace Impurities – Arsenic (As)	≤ 0.010 ppm	< 0.003 ppm
Trace Impurities – Aluminum (Al)	≤ 10.0 ppb	< 5.0 ppb
Arsenic and Antimony (as As)	≤ 5.0 ppb	< 3.0 ppb
Trace Impurities – Barium (Ba)	≤ 1.0 ppb	< 1.0 ppb
Trace Impurities – Beryllium (Be)	≤ 1.0 ppb	< 1.0 ppb
Trace Impurities – Bismuth (Bi)	≤ 10.0 ppb	< 10.0 ppb
Trace Impurities – Boron (B)	≤ 20.0 ppb	2.2 ppb
Trace Impurities – Cadmium (Cd)	≤ 1.0 ppb	< 1.0 ppb
Trace Impurities – Calcium (Ca)	≤ 50.0 ppb	31.0 ppb
Trace Impurities – Chromium (Cr)	≤ 1.0 ppb	0.5 ppb
Trace Impurities – Cobalt (Co)	≤ 1.0 ppb	0.2 ppb
Trace Impurities – Copper (Cu)	≤ 1.0 ppb	< 0.1 ppb
Trace Impurities – Gallium (Ga)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities – Germanium (Ge)	≤ 3.0 ppb	< 2.0 ppb
Trace Impurities – Gold (Au)	≤ 4.0 ppb	< 0.2 ppb
Heavy Metals (as Pb)	≤ 100 ppb	< 50 ppb
Trace Impurities – Iron (Fe)	≤ 15 ppb	3 ppb

>>> Continued on page 2 >>>

Hydrochloric Acid, 36.5–38.0%
BAKER INSTRA-ANALYZED® Reagent
For Trace Metal Analysis



Material No.: 9530-33
Batch No.: 24D1562005

Test	Specification	Result
Trace Impurities – Lead (Pb)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities – Lithium (Li)	≤ 1.0 ppb	< 0.1 ppb
Trace Impurities – Magnesium (Mg)	≤ 10.0 ppb	2.2 ppb
Trace Impurities – Manganese (Mn)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities – Mercury (Hg)	≤ 0.5 ppb	< 0.1 ppb
Trace Impurities – Molybdenum (Mo)	≤ 10.0 ppb	< 5.0 ppb
Trace Impurities – Nickel (Ni)	≤ 4.0 ppb	0.2 ppb
Trace Impurities – Niobium (Nb)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities – Potassium (K)	≤ 9.0 ppb	< 1.0 ppb
Trace Impurities – Selenium (Se), For Information Only		< 1.0 ppb
Trace Impurities – Silicon (Si)	≤ 100.0 ppb	< 10.0 ppb
Trace Impurities – Silver (Ag)	≤ 1.0 ppb	< 0.3 ppb
Trace Impurities – Sodium (Na)	≤ 100.0 ppb	2.0 ppb
Trace Impurities – Strontium (Sr)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities – Tantalum (Ta)	≤ 1.0 ppb	< 0.9 ppb
Trace Impurities – Thallium (Tl)	≤ 5.0 ppb	< 2.0 ppb
Trace Impurities – Tin (Sn)	≤ 5.0 ppb	< 0.4 ppb
Trace Impurities – Titanium (Ti)	≤ 1.0 ppb	0.2 ppb
Trace Impurities – Vanadium (V)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities – Zinc (Zn)	≤ 5.0 ppb	< 0.2 ppb
Trace Impurities – Zirconium (Zr)	≤ 1.0 ppb	< 0.1 ppb

>>> Continued on page 3 >>>

Hydrochloric Acid, 36.5–38.0%
BAKER INSTRA–ANALYZED® Reagent
For Trace Metal Analysis



Material No.: 9530–33
Batch No.: 24D1562005

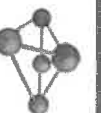
Test	Specification	Result
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For Laboratory, Research, or Manufacturing Use
Product Information (not specifications):
Appearance (clear, fuming liquid)
Meets ACS Specifications
Storage Condition: Store below 25 °C.

Country of Origin: USA
Packaging Site: Phillipsburg Mfg Ctr & DC

A handwritten signature in dark ink, appearing to read 'JCroak'.

Jamie Croak
Director Quality Operations, Bioscience Production



CERTIFIED WEIGHT REPORT:

Part Number: **57028**
Lot Number: **062024**
Description: **Nickel (NI)**

Lot # **24002546**
Solvent: **Nitric Acid**

Formulated By: *Benson Chan*
Reviewed By: *Pedro L. Rentes*

Benson Chan

062024

Expiration Date: **062027**

Recommended Storage: **Ambient (20 °C)**

Nominal Concentration (µg/mL): **1000**

NIST Test Number: **6UTB**

Balance Uncertainty

Volume shown below was diluted to (mL): **2000.07**

Flask Uncertainty

Expanded

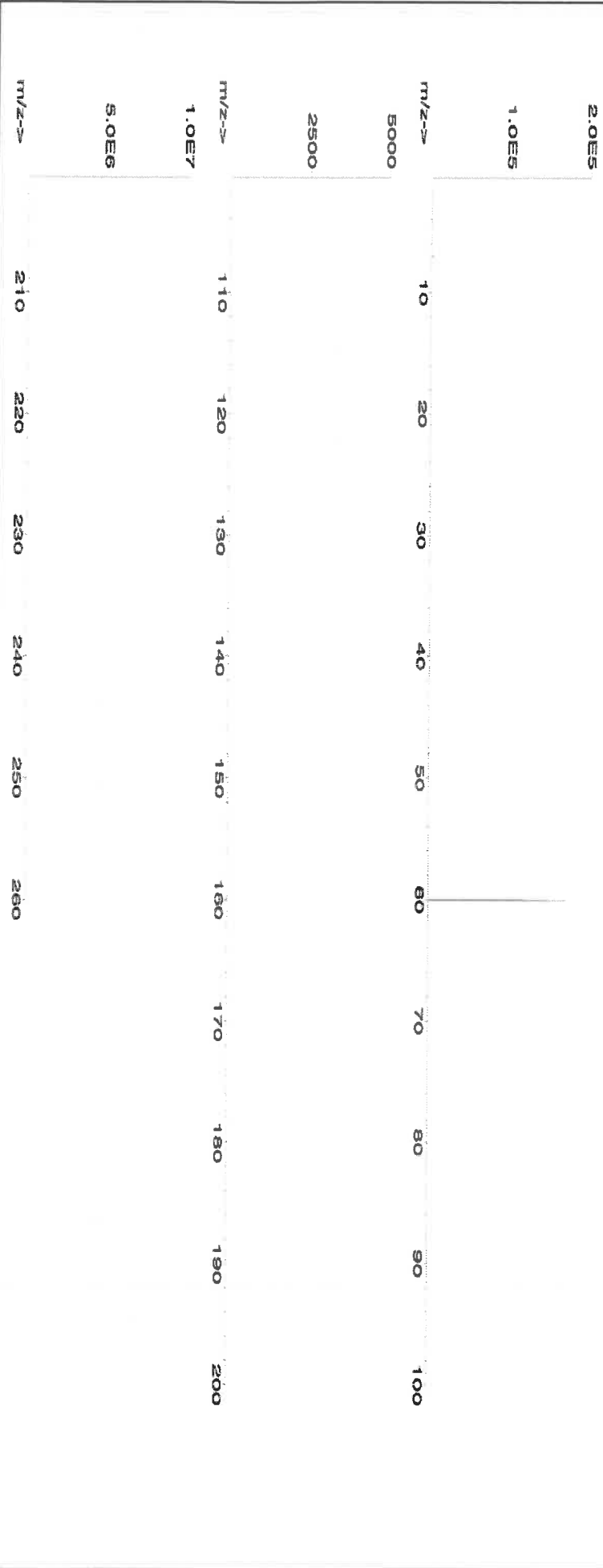
SDS Information

Compound

Part Number	Lot Number	Dilution Factor	Initial Vol. (mL)	Uncertainty (mL)	Conc. (µg/mL)	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Uncertainty (µg/mL)	CAS#	OSHA PEL (TWA)	LD50	NIST SRM
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1. Nickel(II) nitrate hexahydrate (NI) 58128 062023 0.1000 200.0 0.084 1000 10000.4 1000.0 2.2 13478-00-7 1 mg/m3 orl-rat 1620 mg/kg 3136

[1] Spectrum No.1 [9.136 sec]:58028.D# [Count] [Linear]





Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

Trace Metals Verification by ICP-MS (µg/mL)

Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	T	Pr	<0.02	Se	<0.2	Tb	<0.02	W	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Te	<0.02	U	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02	Tl	<0.02	V	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Th	<0.02	Yb	<0.02
Be	<0.01	Cr	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	S	<0.02	Sn	<0.02	Zn	<0.02
B	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02	Ti	<0.02	Zr	<0.02

(T) = Target analyte

Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



Certified Reference Material CRM

M6030



CERTIFIED WEIGHT REPORT:

Part Number: **57047**
Lot Number: **122823**
Description: **Silver (Ag)**

Lot #
Solvent: 24002546 Nitric Acid

Expiration Date: 122826
Recommended Storage: Ambient (20 °C)
Nominal Concentration (µg/mL): 1000
NIST Test Number: 6UTB

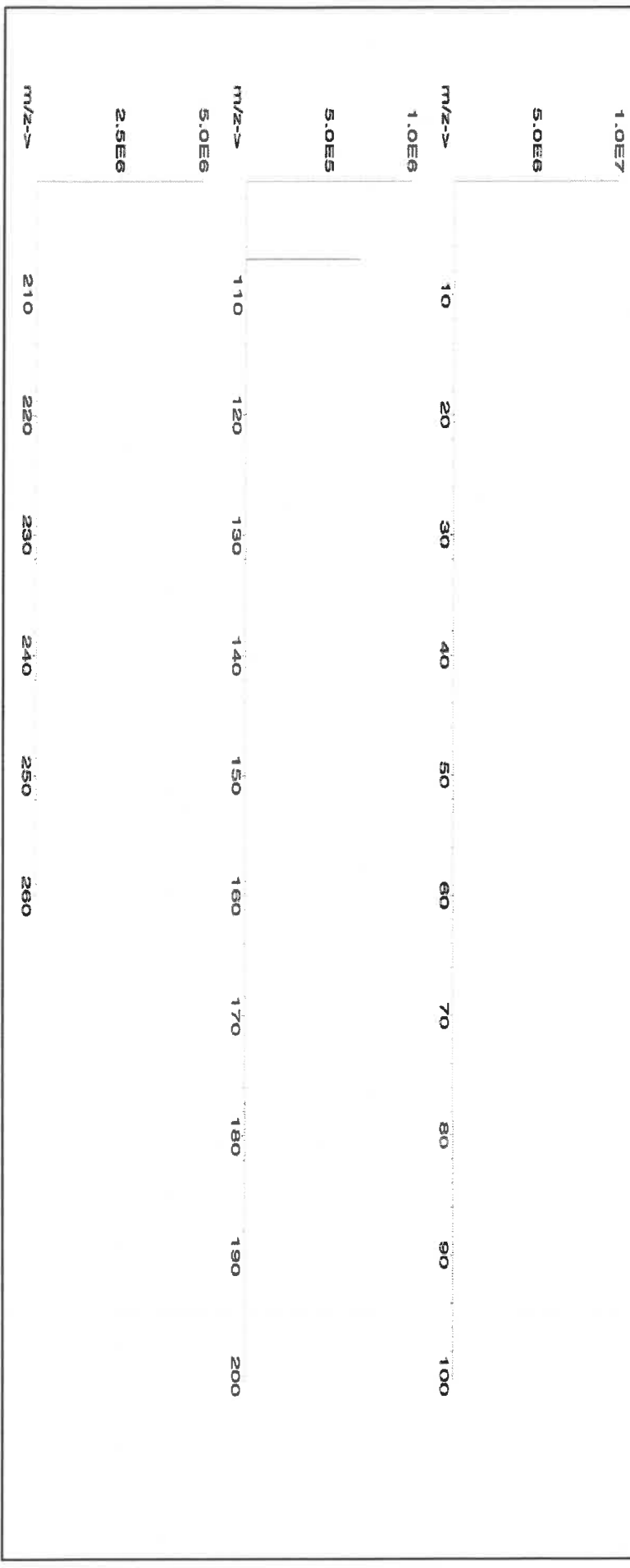
2% 80.0 (mL) Nitric Acid

Weight shown below was diluted to (mL): 4000.30
5E-05 Balance Uncertainty
0.058 Flask Uncertainty

Formulated By:	Benson Chan
Reviewed By:	Pedro L. Rentas
	122823

SDS Information									
Compound	RM#	Lot Number	Nominal Conc. (µg/mL)	Purity (%)	Uncertainty Purity (%)	Assay (%)	Target Weight (g)	Actual Weight (g)	Actual Conc. (µg/mL)
1. Silver nitrate (Ag)	IN035	J0612AGA1	1000.0	99.9996	0.10	63.7	6.27992	6.27998	1000.0
							2.0	7761-88-8	10 µg/mL
									NA
									3151

[1] Spectrum No. 1 [14.044 sec]:58147.D# [Count] [Linear]





Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

Trace Metals Verification by ICP-MS (µg/mL)

Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pt	<0.02	Se	<0.2	Tb	<0.02	W	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Te	<0.02	U	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	T	Tl	<0.02	V	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Th	<0.02	Yb	<0.02
Be	<0.01	Cr	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	S	<0.02	Sn	<0.02	Zn	<0.02
B	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02	Ti	<0.02	Zr	<0.02

(T)= Target analyte

Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

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- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

Printed: 9/27/2024, 11:20:14 PM



Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

Trace Metals Verification by ICP-MS (µg/mL)																			
Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pr	<0.02	Se	<0.02	Tb	<0.02	W	<0.02
Sb	T	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Tc	<0.02	U	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	<0.02	Os	<0.01	Rh	<0.02	Ag	<0.02	Ti	<0.02	V	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.02	Th	<0.02	Yb	<0.02
Be	<0.01	Cr	<0.02	Ga	<0.02	Fe	<0.02	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Pr	<0.02	Sm	<0.02	S	<0.02	Sn	<0.02	Zn	<0.02
B	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02	Ti	<0.02	Zr	<0.02

(T) = Target analyte

Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
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- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).



CERTIFIED WEIGHT REPORT:

Part Number: 57081
Lot Number: 062724
Description: Thallium (TI)

Lot #

Solvent: 24002546 Nitric Acid

2% 40.0 (mL) Nitric Acid

Expiration Date:

062727

Recommended Storage: Ambient (20 °C)

Nominal Concentration (µg/mL):

1000

NIST Test Number:

6UTB

Weight shown below was diluted to (mL):

2000.1

5E-05 Balance Uncertainty
0.10 Flask Uncertainty

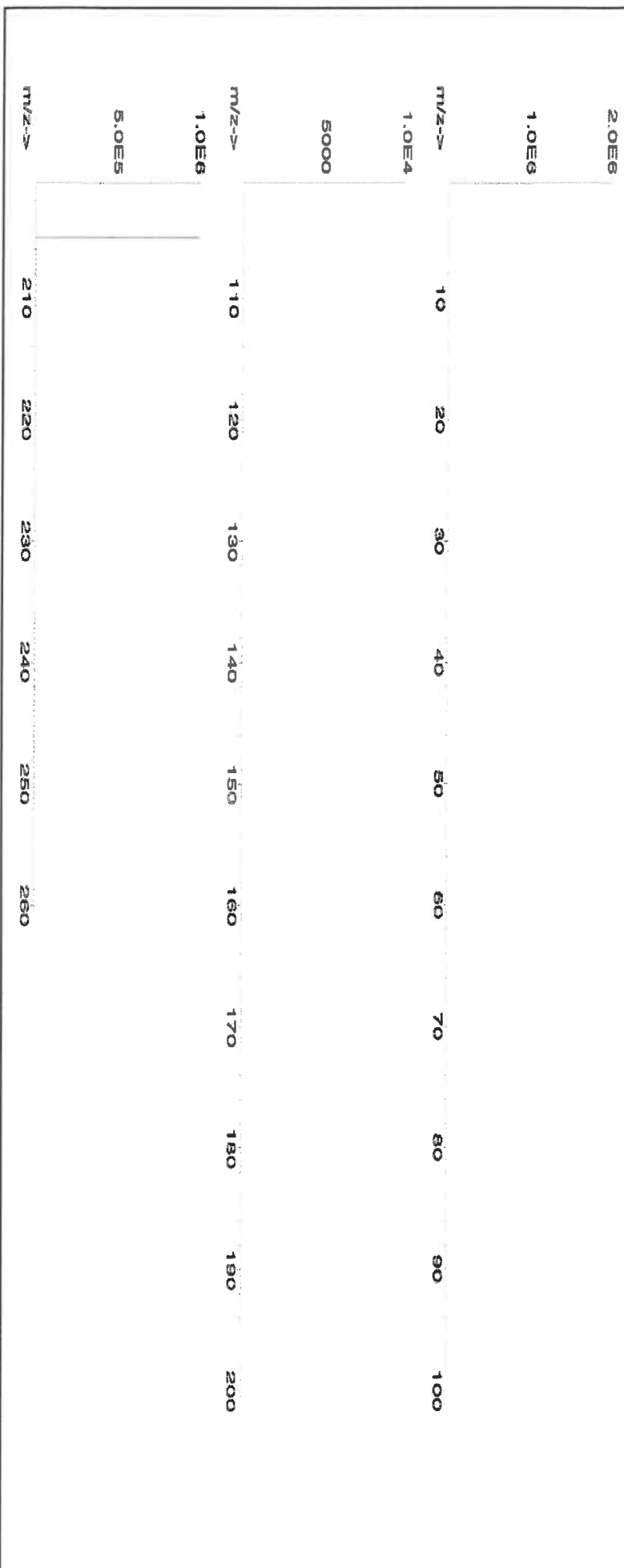
<i>Aleah O'Brady</i>	
Formulated By:	Aleah O'Brady
	062724
Reviewed By:	<i>Pedro L. Renias</i>
	Pedro L. Renias
	062724

SDS Information

Compound	Lot Number	Nominal Conc. (µg/mL)	Purity (%)	Uncertainty (%)	Assay (%)	Target Weight (g)	Actual Weight (g)	Actual Conc. (µg/mL)	Expanded Uncertainty +/- (µg/mL)	CAS#	OSHA PEL (TWA)	LD50	NIST SRM
----------	------------	-----------------------	------------	-----------------	-----------	-------------------	-------------------	----------------------	----------------------------------	------	----------------	------	----------

1. Thallium nitrate (TI) IN037 BCCF4399 1000 99.999 0.10 77.0 2.5975 2.5977 1000.1 2.0 10102-45-1 0.1 mg/m3 orl-mus 15mg/kg 3158

[1] Spectrum No.1 [14.044 sec]:57081.D# [Count] [Linear]





Instrumental Analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS):

Trace Metals Verification by ICP-MS (µg/mL)

Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pt	<0.02	Sc	<0.2	Tb	<0.02	W	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Te	<0.02	U	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02	Tl	T	V	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Tm	<0.02	Yb	<0.02
Be	<0.01	Cr	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Sn	<0.02	Y	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	S	<0.02	Ti	<0.02	Zn	<0.02
B	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02			Zr	<0.02

(T) = Target analyte

Physical Characterization:

Homogeneity: No heterogeneity was observed in the preparation of this standard.

Certified by:

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
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Certified Reference Material CRM

M6021



ANAB ISO 17034 Accredited
AR-1539 Certificate Number
<https://absolutestandards.com>

CERTIFIED WEIGHT REPORT:

Part Number: **57023**
Lot Number: **062424**
Description: **Vanadium (V)**

Lot # **24002546**
Solvent: **Nitric Acid**

<i>Aleah O'Brady</i>	
Formulated By:	Aleah O'Brady
Reviewed By:	Pedro L. Rantas
	062424

Expiration Date: **062427**
Recommended Storage: **Ambient (20 °C)**
Nominal Concentration (µg/mL): **1000**
NIST Test Number: **6UTB**

2.0%
40.0 (mL)
Nitric Acid

Volume shown below was diluted to (mL): **2000.3**

5E-05 Balance Uncertainty
0.06 Flask Uncertainty

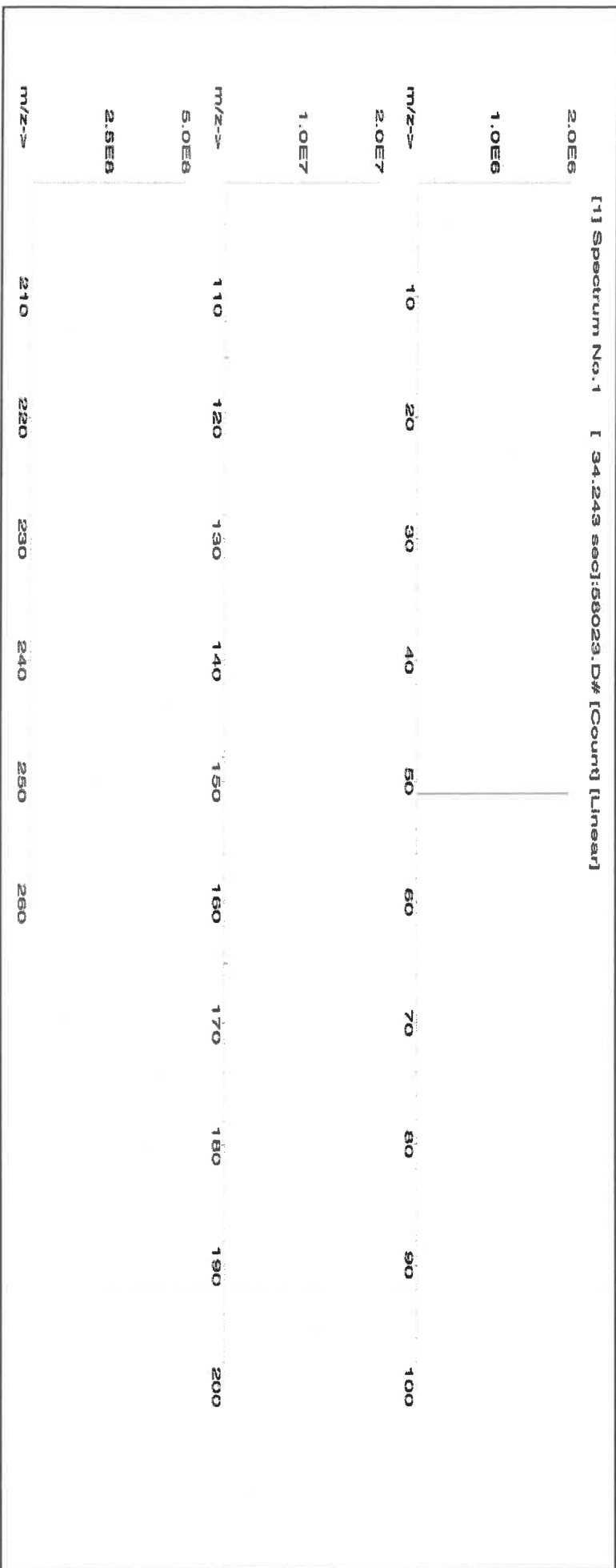
Compound	Part Number	Lot Number	Dilution Factor	Initial Vol. (mL)	Uncertainty (mL)	Nominal Conc. (µg/mL)	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty +/- (µg/mL)	CAS#	OSHA PEL (TWA)	LD50	NIST SRM

SDS Information

(Solvent Safety Info. On Attached pg.)

1. Ammonium metavanadate (V) 58123 021224 0.1000 200.0 0.084 1000 10000.3 1000.0 2.2 7803-55-6 0.05 mg/m3 0.1-1.5 mg/kg 3165

[1] Spectrum No.1 [34.243 sec]:58023.D# [Count] [Linear]





SHIPPING DOCUMENTS

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: **LANGAN**
ADDRESS: **1 North Broadway**
CITY: **White Plains** STATE: **NY** ZIP: **10601**
ATTENTION:
PHONE: **914-323-7414** FAX:

CLIENT PROJECT INFORMATION

PROJECT NAME: **Richmond Terrace - Site 163**
PROJECT NO.: **190134901** LOCATION: **Staten Island**
PROJECT MANAGER: **Gregory DelMastro**
e-mail: **gdelmastro@langan.com**
PHONE: **914-323-7414** FAX:

CLIENT BILLING INFORMATION

BILL TO: PO#: ADDRESS: **SAME**
CITY STATE: ZIP: ATTENTION: PHONE:

ANALYSIS

DATA TURNAROUND INFORMATION

FAX (RUSH) DAYS*
HARDCOPY (DATA PACKAGE): **21** DAYS*
EDD: DAYS*

*TO BE APPROVED BY CHEMTECH

STANDARD HARDCOPY TURNAROUND TIME IS 10 BUSINESS

DATA DELIVERABLE INFORMATION

☒ Level 1 (Results Only) ☐ Level 4 (QC + Full Raw Data)
☐ Level 2 (Results + QC) ☐ NJ Reduced ☐ US EPA CLP
☐ Level 3 (Results + QC) ☐ NYS ASP A ☐ NYS ASP B
+ Raw Data ☐ Other
☐ EDD FORMAT

VOCs (8260)
SVOCs (8270)
PAHs (8082A)
TAL Metals (6000/6000)
Pesticides (8081)

ALLIANCE SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE		SAMPLE COLLECTION		# OF BOTTLES	PRESERVATIVES									COMMENTS	
			COMP	GRAB	DATE	TIME		1	2	3	4	5	6	7	8	9		
1.	SED-01-0-2	S	X	X	10/9	8:45	6	X	X	X	X	X	X	X	X	X		
2.	SED-02-0-2	S	X	X		9:15	6	X	X	X	X	X	X	X	X	X		
3.	SED-03-0-2	S	X	X		9:30	6	X	X	X	X	X	X	X	X	X		
4.	SED-04-0-2	S	X	X		10:30	6	X	X	X	X	X	X	X	X	X		
5.	SED-05-0-2	S	X	X		11:00	6	X	X	X	X	X	X	X	X	X		
6.	SED-06-0-2	S	X	X		11:30	6	X	X	X	X	X	X	X	X	X		
7.	SED-07-0-2	S	X	X		12:00	6	X	X	X	X	X	X	X	X	X		
8.																		
9.																		
10.																		

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME: 10/9/25	RECEIVED BY: [Signature]	1430	Conditions of bottles or coolers at receipt: ☐ COMPLIANT ☐ NON COMPLIANT ☐ COOLER TEMP 3.2 °C
1. [Signature]			10-9-25	Comments:
RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:		
2.				
RELINQUISHED BY SAMPLER:	DATE/TIME: 10-9-25	RECEIVED BY:		
3. [Signature]				

Page ____ of ____

CLIENT: ☐ Hand Delivered ☐ Other

Shipment Complete
☐ YES ☐ NO

Laboratory Certification

Certified By	License No.
Connecticut	PH-0830
DOD ELAP (ANAB)	L2219
Maine	2024021
Maryland	296
New Hampshire	255425
New Jersey	20012
New York	11376
Pennsylvania	68-00548
Soil Permit	525-24-234-08441
Texas	TX-C25-00189
Virginia	460312

LOGIN REPORT/SAMPLE TRANSFER

Order ID : Q3323 LANG01

Order Date : 10/9/2025 2:32:00 PM

Project Mgr : Results only

Client Name : Langan Engineering and En

Project Name : Con Edison Richmond Terr

Report Type : Results Only ~~1000004~~

Client Contact : Gregory DelMastro

Receive DateTime : 10/9/2025 12:00:00 AM

EDD Type : Excel NY

Invoice Name : Langan Engineering and En

Purchase Order : 2044

Hard Copy Date :

Invoice Contact : Gregory DelMastro

Date Signoff :

LAB ID	CLIENT ID	MATRIX	SAMPLE DATE	SAMPLE TIME	TEST	TEST GROUP	METHOD	FAX DATE	DUE DATES
Q3323-01	SED-01-0-2	Solid	10/09/2025	08:45	VOC-TCLVOA-10		8260D	10 Bus. Days	10 Days
Q3323-02	SED-02-0-2	Solid	10/09/2025	09:15	VOC-TCLVOA-10		8260D	10 Bus. Days	
Q3323-03	SED-03-0-2	Solid	10/09/2025	09:30	VOC-TCLVOA-10		8260D	10 Bus. Days	
Q3323-04	SED-04-0-2	Solid	10/09/2025	10:30	VOC-TCLVOA-10		8260D	10 Bus. Days	
Q3323-05	SED-05-0-2	Solid	10/09/2025	11:00	VOC-TCLVOA-10		8260D	10 Bus. Days	
Q3323-06	SED-06-0-2	Solid	10/09/2025	11:30	VOC-TCLVOA-10		8260D	10 Bus. Days	
Q3323-07	SED-07-0-2	Solid	10/09/2025	12:00	VOC-TCLVOA-10		8260D	10 Bus. Days	

LOGIN REPORT/SAMPLE TRANSFER

Order ID : Q3323 LANG01	Order Date : 10/9/2025 2:32:00 PM	Project Mgr :
Client Name : Langan Engineering and En	Project Name : Con Edison Richmond Terr	Report Type : Results Only
Client Contact : Gregory DelMastro	Receive DateTime : 10/9/2025 12:00:00 AM	EDD Type : Excel NY
Invoice Name : Langan Engineering and En	Purchase Order : ¹⁸ 20:44	Hard Copy Date :
Invoice Contact : Gregory DelMastro		Date Signoff :

LAB ID	CLIENT ID	MATRIX	SAMPLE DATE	SAMPLE TIME	TEST	TEST GROUP	METHOD	FAX DATE	DUE DATES
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Relinquished By : CR
Date / Time : 10/10/25 11:10

Received By : JK
Date / Time : 10/10/25 1110

Storage Area : VOA Refridgerator Room