

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

#### **Cover Page**

Order ID:	Q2669
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**Project ID:** Transfer Station-SPDES

**Client:** Tully Environmental, Inc

**Lab Sample Number** 

**Client Sample Number** 

Q2669-01 001 WILLETS PT BLVD (JUNE) Q2669-02 002 35th Ave (JUNE)

I certify that the data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the laboratory manager or his designee, as verified by the following signature.

Signature :		
orginatar c i	Date:	7/23/2025

NYDOH CERTIFICATION NO - 11376

NJDEP CERTIFICATION NO - 20012



#### 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 OR	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  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
Н	Sample Analysis Out Of Hold Time





APPENDIX A

#### **QA REVIEW GENERAL DOCUMENTATION**

Project #: Q2669

	Completed
For thorough review, the report must have the following:	
GENERAL:	
Are all original paperwork present (chain of custody, record of communication, airbill, sample management lab chronicle, login page)	✓
Check chain-of-custody for proper relinquish/return of samples	<b>→</b>
Is the chain of custody signed and complete	✓
Check internal chain-of-custody for proper relinquish/return of samples /sample extracts	<del>'</del> <del>'</del> <del>'</del> <del>'</del>
Collect information for each project id from server. Were all requirements followed	<u> </u>
COVER PAGE:	
Do numbers of samples correspond to the number of samples in the Chain of Custody on login page	<u> </u>
Do lab numbers and client Ids on cover page agree with the Chain of Custody	<u> </u>
CHAIN OF CUSTODY:	
Do requested analyses on Chain of Custody agree with form I results	<u> </u>
Do requested analyses on Chain of Custody agree with the log-in page	<u> </u>
Were the correct method log-in for analysis according to the Analytical Request and Chain of Castody	<u> </u>
Were the samples received within hold time	<u> </u>
Were any problems found with the samples at arrival recorded in the Sample Management Laboratory Chronicle	<u> </u>
ANALYTICAL:	
Was method requirement followed?	<u> </u>
Was client requirement followed?	<u> </u>
Does the case narrative summarize all QC failure?	<u>'</u> <u>'</u> <u>'</u> _'
All runlogs and manual integration are reviewed for requirements	<u> </u>
All manual calculations and /or hand notations verified	<u> </u>

<b>QA Review Signature:</b>	KETAN PATEL	Date:	07/23/2025
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#### LAB CHRONICLE

OrderID: Q2669

Client: Tully Environmental, Inc

Contact: Dean Devoe

**OrderDate:** 7/22/2025 11:14:00 AM

**Project:** Transfer Station-SPDES

Location: O33,VOA Lab

LabID	ClientID	Matrix	Test	Method	Sample Date	Prep Date	Anal Date	Received
Q2669-01	001 WILLETS PT BLVD (JUNE)	Water			07/21/25			07/22/25
	(50.11)		Metals Group 10	200.7		07/22/25	07/23/25	
Q2669-02	002 35th Ave (JUNE)	Water			07/21/25			07/22/25
			Metals Group 10	200.7		07/22/25	07/23/25	



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#### Hit Summary Sheet SW-846

**SDG No.:** Q2669 **Order ID:** Q2669

Client: Tully Environmental, Inc Project ID: Transfer Station-SPDES

Sample ID	Client ID	Matrix	Parameter	Concentration	C	MDL	RDL	Units
Client ID:	001 WILLETS PT BLVD (JU	JNE)						
Q2669-01	001 WILLETS PT BLVD (JU	UNE Water	Copper	49.7		1.89	10.0	ug/L
Q2669-01	001 WILLETS PT BLVD (Л	UNE Water	Iron	13100		18.0	50.0	ug/L
Q2669-01	001 WILLETS PT BLVD (JU	UNE Water	Lead	44.8		1.21	6.00	ug/L
Client ID:	002 35th Ave (JUNE)							
Q2669-02	002 35th Ave (JUNE)	Water	Copper	43.6		1.89	10.0	ug/L
Q2669-02	002 35th Ave (JUNE)	Water	Iron	13000		18.0	50.0	ug/L
Q2669-02	002 35th Ave (JUNE)	Water	Lead	41.1		1.21	6.00	ug/L



### SAMPLE DATA



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#### **Report of Analysis**

Client: Tully Environmental, Inc Date Collected: 07/21/25 Project: Transfer Station-SPDES Date Received: 07/22/25 Client Sample ID: 001 WILLETS PT BLVD (JUNE) SDG No.: Q2669 Lab Sample ID: Q2669-01 Matrix: Water % Solid: Level (low/med): low 0

Cas	Parameter	Conc.	Qua. DF	MDL	LOQ / CRQL	Units	Prep Date	Date Ana.	Ana Met.	Prep Met.
7440-50-8	Copper	49.7	1	1.89	10.0	ug/L	07/22/25 12:50	07/23/25 14:02	EPA 200.7	
7439-89-6	Iron	13100	1	18.0	50.0	ug/L	07/22/25 12:50	07/23/25 14:02	EPA 200.7	
7439-92-1	Lead	44.8	1	1.21	6.00	ug/L	07/22/25 12:50	07/23/25 14:02	EPA 200.7	

Color Before: Colorless Clarity Before: Clear Texture:

Color After: Colorless Clarity After: Clear Artifacts:

Comments: Metals Group 10

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



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#### **Report of Analysis**

Client: Tully Environmental, Inc Date Collected: 07/21/25 Project: Transfer Station-SPDES Date Received: 07/22/25 Client Sample ID: 002 35th Ave (JUNE) SDG No.: Q2669 Lab Sample ID: Q2669-02 Matrix: Water % Solid: Level (low/med): low 0

Cas	Parameter	Conc.	Qua. DF	MDL	LOQ / CRQL	Units	Prep Date	Date Ana.	Ana Met.	Prep Met.
7440-50-8	Copper	43.6	1	1.89	10.0	ug/L	07/22/25 12:50	07/23/25 14:06	EPA 200.7	
7439-89-6	Iron	13000	1	18.0	50.0	ug/L	07/22/25 12:50	07/23/25 14:06	EPA 200.7	
7439-92-1	Lead	41.1	1	1.21	6.00	ug/L	07/22/25 12:50	07/23/25 14:06	EPA 200.7	

Color Before: Colorless Clarity Before: Clear Texture:

Color After: Colorless Clarity After: Clear Artifacts:

Comments: Metals Group 10

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



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#### Metals

#### - 2a -

#### INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Tully	y Environmental,	Inc		SDG No.:	Q2669	
Contract:	TULL01		<u> </u>	Lab Code:	ACE	
Initial Calibrati	ion Source:	EPA	<u> </u>			
Continuing Cal	ibration Source:	Inorganic Ventures				

Sample ID	Analyte	Result ug/L	True Value	% Recovery	Acceptance Window (%R)		M	Analysis Date	Analysis Time	Run Number
ICV01	Copper Iron	1010 4000	1000 4000	101 100	95 - 105 95 - 105	P P		07/23/2025 07/23/2025	12:57 12:57	LB136588 LB136588
	Lead	3970	4000	99	95 - 105	P		07/23/2025	12:57	LB136588



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#### Metals

#### - 2a -

#### INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: T	ully Environmental,	Inc	_	SDG No.:	Q2669
Contract:	TULL01		_	Lab Code:	ACE
Initial Calibi	ration 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	Copper	21.5	20.0	108	80 - 120	P		07/23/2025	13:02	LB136588
	Iron	113	100	112	80 - 120	P		07/23/2025	13:02	LB136588
	Lead	11.0	12.0	91	80 - 120	P		07/23/2025	13:02	LB136588





#### Metals

#### - 2a - INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client:	Tully Environmental, Inc	SDG No.:	Q2669	
Contract	TIII.1.01	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	Copper	1270	1250	101	90 - 110	P	07/23/2025	13:42	LB136588
	Iron	4930	5000	99	90 - 110	P	07/23/2025	13:42	LB136588
	Lead	4940	5000	99	90 - 110	P	07/23/2025	13:42	LB136588
CCV02	Copper	1280	1250	102	90 - 110	P	07/23/2025	14:35	LB136588
	Iron	5060	5000	101	90 - 110	P	07/23/2025	14:35	LB136588
	Lead	4940	5000	99	90 - 110	P	07/23/2025	14:35	LB136588
CCV03	Copper	1240	1250	100	90 - 110	P	07/23/2025	15:57	LB136588
	Iron	4990	5000	100	90 - 110	P	07/23/2025	15:57	LB136588
	Lead	4800	5000	96	90 - 110	P	07/23/2025	15:57	LB136588
CCV04	Copper	1240	1250	99	90 - 110	P	07/23/2025	17:00	LB136588
	Iron	4890	5000	98	90 - 110	P	07/23/2025	17:00	LB136588
	Lead	4860	5000	97	90 - 110	P	07/23/2025	17:00	LB136588
CCV05	Copper	1260	1250	101	90 - 110	P	07/23/2025	17:49	LB136588
	Iron	4940	5000	99	90 - 110	P	07/23/2025	17:49	LB136588
	Lead	4930	5000	98	90 - 110	P	07/23/2025	17:49	LB136588
CCV06	Copper	1260	1250	101	90 - 110	P	07/23/2025	18:43	LB136588
	Iron	5070	5000	101	90 - 110	P	07/23/2025	18:43	LB136588
	Lead	4880	5000	98	90 - 110	P	07/23/2025	18:43	LB136588
CCV07	Copper	1240	1250	99	90 - 110	P	07/23/2025	19:38	LB136588
	Iron	4900	5000	98	90 - 110	P	07/23/2025	19:38	LB136588
	Lead	4820	5000	96	90 - 110	P	07/23/2025	19:38	LB136588
CCV08	Copper	1230	1250	98	90 - 110	P	07/23/2025	19:55	LB136588
	Iron	4890	5000	98	90 - 110	P	07/23/2025	19:55	LB136588
	Lead	4810	5000	96	90 - 110	P	07/23/2025	19:55	LB136588



Tully Environmental, Inc

21.6

101

11.3

TULL01

**Client:** 

CRI01

Copper

Iron

Lead

**Contract:** 

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SDG No.:

Lab Code:

65 - 135

65 - 135

65 - 135

P

P

Q2669

ACE

07/23/2025

07/23/2025

07/23/2025

14:53

14:53

14:53

LB136588

LB136588

LB136588

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20.0

100

12.0

#### Metals

#### - 2b -CRDL STANDARD FOR AA & ICP

Initial Calibr	ation Source:								
Continuing C	alibration Sour	ce:		_					
Sample ID	Analyte	Result ug/L	True Value ug/L	% Recovery	Acceptance Window (%R)	M	Analysis Date	Analysis Time	Run Number
Sample 1D	Timaryte	ug/L	ug/L	Recovery	William (7010)	141	Date	Time	Trumber

108

101

94



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#### Metals

#### - 3a - INITIAL AND CONTINUING CALIBRATION BLANK SUMMARY

Client: Tully Environmental, Inc SDG No.: Q2669

Contract: TULL01 Lab Code: ACE

Sample ID	Analyte	Result ug/L	Acceptance Limit	Conc Qual	CRQL	M	Analysis Date	Analysis Time	Run Number
ICB01	Copper Iron Lead	4.60 23.4 2.30	+/-10 +/-50 +/-6	U U	20.0 100 12.0		07/23/2025 07/23/2025 07/23/2025	13:16 13:16 13:16	LB136588 LB136588 LB136588



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#### **Metals** - 3a -

#### INITIAL AND CONTINUING CALIBRATION BLANK SUMMARY

Client: Tully Environmental, Inc SDG No.: Q2669

Contract: TULL01 Lab Code: ACE

Sample ID	Analyte	Result ug/L	Acceptance Limit	Conc Qual	CRQL	M	Analysis Date	Analysis Time	Run Number
CCB01	Copper	4.60	+/-10	U	20.0	P	07/23/2025	13:46	LB136588
	Iron	23.4	+/-50	U	100	P	07/23/2025	13:46	LB136588
	Lead	2.30	+/-6	U	12.0	P	07/23/2025	13:46	LB136588
CCB02	Copper	4.60	+/-10	U	20.0	P	07/23/2025	14:44	LB136588
	Iron	23.4	+/-50	U	100	P	07/23/2025	14:44	LB136588
	Lead	2.30	+/-6	U	12.0	P	07/23/2025	14:44	LB136588
CCB03	Copper	4.60	+/-10	U	20.0	P	07/23/2025	16:01	LB136588
	Iron	23.4	+/-50	U	100	P	07/23/2025	16:01	LB136588
	Lead	2.30	+/-6	U	12.0	P	07/23/2025	16:01	LB136588
CCB04	Copper	4.60	+/-10	U	20.0	P	07/23/2025	17:04	LB136588
	Iron	26.5	+/-50	J	100	P	07/23/2025	17:04	LB136588
	Lead	2.30	+/-6	U	12.0	P	07/23/2025	17:04	LB136588
CCB05	Copper	4.60	+/-10	U	20.0	P	07/23/2025	17:57	LB136588
	Iron	23.4	+/-50	U	100	P	07/23/2025	17:57	LB136588
	Lead	2.30	+/-6	U	12.0	P	07/23/2025	17:57	LB136588
CCB06	Copper	4.60	+/-10	U	20.0	P	07/23/2025	18:51	LB136588
	Iron	23.4	+/-50	U	100	P	07/23/2025	18:51	LB136588
	Lead	2.30	+/-6	U	12.0	P	07/23/2025	18:51	LB136588
CCB07	Copper	4.60	+/-10	U	20.0	P	07/23/2025	19:47	LB136588
	Iron	23.4	+/-50	U	100	P	07/23/2025	19:47	LB136588
	Lead	2.30	+/-6	U	12.0	P	07/23/2025	19:47	LB136588
CCB08	Copper	4.60	+/-10	U	20.0	P	07/23/2025	20:04	LB136588
	Iron	23.4	+/-50	U	100	P	07/23/2025	20:04	LB136588
	Lead	2.30	+/-6	U	12.0	P	07/23/2025	20:04	LB136588





Metals
- 3b -

#### PREPARATION BLANK SUMMARY

Client: Tully Environmental, Inc SDG No.: Q2669

**Instrument:** P4

		Result	Acceptance	Conc	CRQL		Analysis A	Analysis	
Sample ID	Analyte	(ug/L)	Limit	Qual	ug/L	M	Date	Time	Run
PB168955BL		WATER		Batch Number:	PB168955		Prep Date:	07/22/20	)25
	Copper	1.89	<5	U	10.0	P	07/23/2025	13:54	LB136588
	Iron	18.0	<25	U	50.0	P	07/23/2025	13:54	LB136588
	Lead	1.21	<3	U	6.00	P	07/23/2025	13:54	LB136588





Metals - 4 -INTERFERENCE CHECK SAMPLE

Client: Tully Environmental, Inc SDG No.: Q2669

Contract: TULL01 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	Copper	20.3	2.0	1015	-18	22	07/23/2025	13:25	LB136588
	Iron	102000	101000	101	85600	116500	07/23/2025	13:25	LB136588
	Lead	-3.36			-12	12	07/23/2025	13:25	LB136588
ICSAB01	Copper	479	511	94	434	588	07/23/2025	13:29	LB136588
	Iron	99600	99300	100	84400	114500	07/23/2025	13:29	LB136588
	Lead	39.7	49.0	81	37	61	07/23/2025	13:29	LB136588
ICSA	Copper	49.8	2.0	2490	-18	22	07/23/2025	13:33	LB136588
	Iron	97900	101000	97	85600	116500	07/23/2025	13:33	LB136588
	Lead	-6.68			-12	12	07/23/2025	13:33	LB136588
ICSAB	Copper	499	511	98	434	588	07/23/2025	13:37	LB136588
	Iron	97000	99300	98	84400	114500	07/23/2025	13:37	LB136588
	Lead	32.7	49.0	67	37	61	07/23/2025	13:37	LB136588



## METAL QC DATA



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#### metals - 5a -MATRIX SPIKE SUMMARY

client: Tully Environmental, Inc level: low sdg no.: Q2669

contract: TULL01 lab code: ACE

matrix: Water sample id: Q2653-01 client id: WASTEWATER Q3MS

Percent Solids	s for Sample:	NA	Spiked ID	): Q2653	3-01MS	Percent Sol	ids for Spike Sa	ample:	NA	
Analyte	Units	Acceptance Limit %R	Spiked Result	Sampl C Result		Spike Added	% Recovery	Qual	M	
Copper	ug/L	75 - 125	312	179		150	89		P	
Iron	ug/L	75 - 125	1430	31.3	J	1500	93		P	
Lead	пσ/Г.	75 - 125	416	6.00	II	500	83		р	



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#### metals - 5a -MATRIX SPIKE DUPLICATE SUMMARY

client: Tully Environmental, Inc level: low sdg no.: Q2669

contract: TULL01 lab code: ACE

matrix: Water sample id: Q2653-01 client id: WASTEWATER Q3MSD

Percent Solid	s for Sample:	NA	Spiked II	): Q2653	-01MSD	Percent Sol	ids for Spike Sa	ample:	NA	
Analyte	Units	Acceptance Limit %R	MSD Result	Sampl C Result		Spike Added	% Recovery	Qual	M	
Copper	ug/L	75 - 125	301	179		150	82		P	
Iron	ug/L	75 - 125	1360	31.3	J	1500	89		P	
Lead	ug/L	75 - 125	394	6.00	U	500	79		P	



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#### Metals - 5b -

Client:	Tully Environn	nental, Inc				SDG No	Q2669			
Contract:	TULL01					Lab Coo	de: ACE		_	
Matrix:			Level:	LOW		Client I	D:			_
Sample ID:	1		Spiked ID:							
Analyte	Units	Acceptance Limit %R	C	Sample Result	C	Spike Added	% Recovery	Qual	M	



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#### Metals

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#### **DUPLICATE SAMPLE SUMMARY**

Client: Tully Environmental, Inc Level: LOW SDG No.: Q2669

Contract: TULL01 Lab Code: ACE

Matrix: Water Sample ID: Q2653-01 Client ID: WASTEWATER Q3DUP

Percent Solids for Sample: NA Duplicate ID Q2653-01DUP Percent Solids for Spike Sample: NA

		Acceptance	Sample		Duplicate				
Analyte	Units	Limit	Result	C	Result	C	RPD	Qual	M
Copper	ug/L	20	179		182		2		P
Iron	ug/L	20	31.3	J	32.7	J	4		P
Lead	ug/L	20	6.00	U	6.00	U			P



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#### Metals

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#### **DUPLICATE SAMPLE SUMMARY**

Client: Tully Environmental, Inc Level: LOW SDG No.: Q2669

Contract: TULL01 Lab Code: ACE

Matrix: Water Sample ID: Q2653-01MS Client ID: WASTEWATER Q3MSD

Percent Solids for Sample: NA Duplicate ID Q2653-01MSD Percent Solids for Spike Sample: NA

Analyte	Units	Acceptance Limit	Sample Result	C	Duplicate Result	C	RPD	Qual	M
Copper	ug/L	20	312		301	l	4		P
Iron	ug/L	20	1430		1360	)	5		P
Lead	ug/L	20	416		394	1	5		P



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#### Metals

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#### LABORATORY CONTROL SAMPLE SUMMARY

Client: Tully Environmental, Inc SDG No.: Q2669

Contract: TULL01 Lab Code: ACE

Analyte	Units	True Value	Result C	% Recovery	Acceptance Limits	M
PB168955BS						
Copper	ug/L	150	156	104	85 - 115	P
Iron	ug/L	1500	1510	101	85 - 115	P
Lead	ug/L	500	472	94	85 - 115	P



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#### Metals

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#### ICP SERIAL DILUTIONS

SAMPLE NO.

Lab Name:	Alliance	е		Contract:	TULL01	_
Lab Code:	ACE		<b>Lb No.:</b> 1b136588	Lab Sample ID: Q2653-01L	SDG No.:	Q2669
Matrix (soil/	water):	Water		Level (low/med):	LOW	
			<b>Concentration Units:</b>	ug/L		
		Initial	Sample	Serial Dilution	W Diff	er-

Analyte	Initial Sample Result (I)	C		Serial Dilution Result (S)	C		% Differ- ence	Q	M
Copper	179		ij	195			9		P
Iron	31.3	J	П	250	U	Γ	100.0		P
Lead	6.00	U	Ц	30.0	U	L			P



# METAL PREPARATION & INSTRUMENT DATA



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

8900, Fax: 908 789 8922

#### Metals - 11 -ICP INTERELEMENT CORRECTION FACTORS

Client:	Tully Environmental, Inc	SDG No.:	Q2669
Contract:	TULL01	Lab Code:	ACE
Instrument	ID:	Date:	

Interelement Correction Factors (apparent ppb analyte/ppm interferent )

	Wave-	ICP Interelement Correction Factors For:						
Analyte	Length (nm)	Al	Ca	Fe	Mg	Ag		
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		



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#### Metals - 11 -

#### ICP INTERELEMENT CORRECTION FACTORS

Client:	Tully Environmental, Inc	SDG No.:	Q2669
Contract:	TULL01	Lab Code:	ACE
Instrument	ID:	Date:	
Interelement	Correction Factors (apparent ppb analyte/p	opm interferent )	

	Wave-	ICP Interelement Correction Factors For:							
Analyte	Length (nm)	As	Ba	Be	Cd	Co			
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			



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#### Metals - 11 -ICP INTERELEMENT CORRECTION FACTORS

Client:	Tully Environmental, Inc	SDG No.:	Q2669
Contract:	TULL01	Lab Code:	ACE
Instrument	ID:	Date:	
Interelement	t Correction Factors (apparent ppb analyte/p	opm interferent )	

ereiement	Correction	ractors	(apparent	ppo	anaiyte/ppm	interierent )	

	Wave-	ICP Interelement Correction Factors For:							
Analyte	Length (nm)	Cr	Cu	K	Mn	Мо			
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			



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#### Metals - 11 -ICP INTERELEMENT CORRECTION FACTORS

Client:	Tully Environmental, Inc	SDG No.:	Q2669
Contract:	TULL01	Lab Code:	ACE
Instrument	ID:	Date:	

Interelement Correction Factors (apparent ppb analyte/ppm interferent )

	Wave-	ICP I	nterelement Corre	ection Factors Fo	r:	
Analyte	Length (nm)	Na	Ni	Pb	Sb	Se
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



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#### Metals - 11 -ICP INTERELEMENT CORRECTION FACTORS

Client:	Tully Environmental, Inc	SDG No.:	Q2669
Contract:	TULL01	Lab Code:	ACE
Instrument	ID:	Date:	

Interelement Correction Factors (apparent ppb analyte/ppm interferent )

	Wave-	ICP I	nterelement Corre	ection Factors Fo	r:	
Analyte	Length (nm)	Sn	Ti	Tl	V	Zn
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



# METAL PREPARATION & ANALYICAL SUMMARY



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

Fax: 908 789 8922

#### Metals - 13 -SAMPLE PREPARATION SUMMARY

Client: Tully Environmental, Inc	SDG No.:	Q2669
----------------------------------	----------	-------

Contract: TULL01 Lab Code: ACE Method:

Sample ID	Client ID	Sample Type	Matrix	Prep Date	Initial Sample Size(mL)	Final Sample Volume (mL)	Percent Solids
Batch Number:	PB168955						
PB168955BL	PB168955BL	MB	WATER	07/22/2025	50.0	25.0	
PB168955BS	PB168955BS	LCS	WATER	07/22/2025	50.0	25.0	
Q2653-01DUP	WASTEWATER Q3DUP	DUP	WATER	07/22/2025	50.0	25.0	
Q2653-01MS	WASTEWATER Q3MS	MS	WATER	07/22/2025	50.0	25.0	
Q2653-01MSD	WASTEWATER Q3MSD	MSD	WATER	07/22/2025	50.0	25.0	
Q2669-01	001 WILLETS PT BLVD (JUNE)	SAM	WATER	07/22/2025	50.0	25.0	
Q2669-02	002 35th Ave (JUNE)	SAM	WATER	07/22/2025	50.0	25.0	



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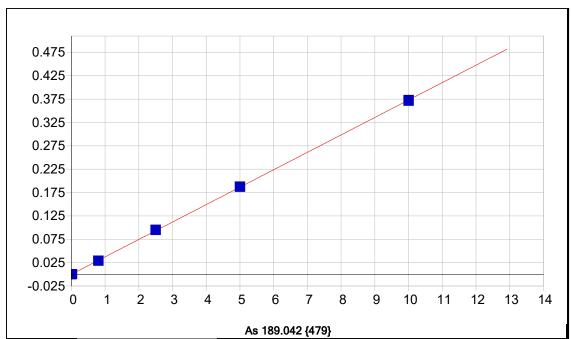
#### metals - 14 -ANALYSIS RUN LOG

Client:	Tully Environmenta	l, Inc			Contract:	TULL01	
Lab code:	ACE				Sdg no.:	Q2669	
Instrument	id number:		Method:	_	Run numbe	r: LB136588	
						<u></u>	

Start date: 07/23/2025 End date: 07/23/2025 **Client Sample Id** d/f Time Lab sample id. Parameter list 1128 Cu,Fe,Pb S1S1 1132 Cu,Fe,Pb S2 S2 1137 Cu,Fe,Pb S3 S3 1141 Cu,Fe,Pb S4 S4 1145 Cu,Fe,Pb S5 S5 1149 Cu,Fe,Pb ICV01 ICV01 1257 Cu,Fe,Pb 1302 LLICV01 LLICV01 Cu,Fe,Pb ICB01 ICB01 1316 Cu,Fe,Pb ICSA01 ICSA01 1325 Cu,Fe,Pb ICSAB01 ICSAB01 1329 Cu,Fe,Pb ICSA **ICSA** 20 1333 Cu,Fe,Pb **ICSAB ICSAB** 20 1337 Cu,Fe,Pb CCV01 CCV01 1342 Cu,Fe,Pb CCB01 CCB01 1346 Cu,Fe,Pb PB168955BL PB168955BL 1354 Cu,Fe,Pb PB168955BS 1358 PB168955BS Cu,Fe,Pb Q2669-01 1402 001 WILLETS PT BLVD (JUNE Cu,Fe,Pb Q2669-02 002 35th Ave (JUNE) 1406 Cu,Fe,Pb O2653-01DUP WASTEWATER Q3DUP 1415 Cu,Fe,Pb Q2653-01L 1419 WASTEWATER Q3L Cu,Fe,Pb Q2653-01MS WASTEWATER Q3MS 1423 Cu,Fe,Pb Q2653-01MSD WASTEWATER Q3MSD 1427 Cu,Fe,Pb CCV02 CCV02 1435 Cu,Fe,Pb CCB02 CCB02 1444 Cu,Fe,Pb CRI01 CRI01 1453 Cu,Fe,Pb CCV03 CCV03 1557 Cu,Fe,Pb CCB03 CCB03 1601 Cu,Fe,Pb CCV04 CCV04 1700 Cu,Fe,Pb CCB04 1704 CCB04 Cu,Fe,Pb CCV05 CCV05 1749 Cu,Fe,Pb 1757 CCB05 CCB05 Cu,Fe,Pb CCV06 CCV06 1843 Cu,Fe,Pb CCB06 CCB06 1851 Cu,Fe,Pb CCV07 CCV07 1938 Cu,Fe,Pb CCB07 CCB07 1947 Cu,Fe,Pb CCV08 CCV08 1 1955 Cu,Fe,Pb CCB08 CCB08 2004 Cu,Fe,Pb



### METAL RAW DATA



Date of Fit: 7/24/2025 2:40:38 Type of Fit: Linear Weighting: 1/Conc

A0 (Offset): -0.000028 Re-Slope: 1.000000 A1 (Gain): 0.037315 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

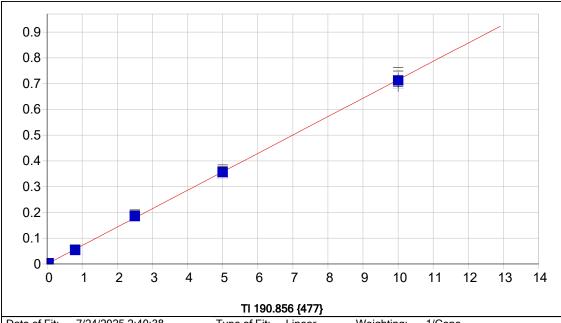
Correlation: 0.999955 Status: OK.

 Std Error of Est:
 0.000008

 Predicted MDL:
 0.002981

 Predicted MQL:
 0.009936

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00000	.000	.000	00003	.000	1
S1	.02000	.01959	000	-2.03	.00070	.000	1
S3	2.5000	2.5436	.044	1.75	.09479	.000	1
S4	5.0000	5.0225	.022	.449	.18718	.000	1
S5	10.000	9.9562	044	438	.37109	.001	1
S2	.80000	.77809	022	-2.74	.02897	.000	1



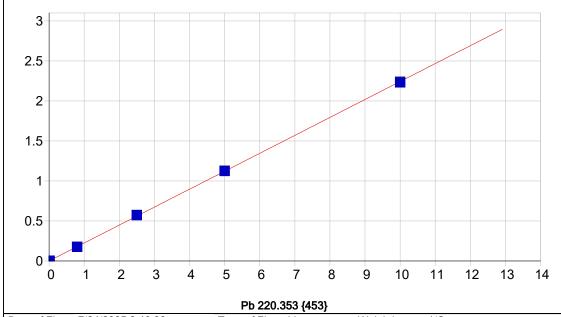
A0 (Offset): 0.000122 Re-Slope: 1.000000 Y-int: 0.000000 A1 (Gain): 0.071458

A2 (Curvature): 0.000000 n (Exponent): 1.000000

Correlation: 0.999822 OK. Status:

Std Error of Est: 0.000044 Predicted MDL: 0.001887 Predicted MQL: 0.006289

s	td. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
s	0	.00000	.00000	.000	.000	.00012	.000	1
S	:1	.04000	.03879	001	-3.04	.00271	.000	1
S	3	2.5000	2.5968	.097	3.87	.18240	.005	1
S	4	5.0000	4.9775	022	449	.34924	.010	1
S	5	10.000	9.9698	030	302	.69941	.030	1
S	2	.80000	.75710	043	-5.36	.05317	.000	1



A0 (Offset): 0.000195 Re-Slope: 1.000000 A1 (Gain): 0.224207 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

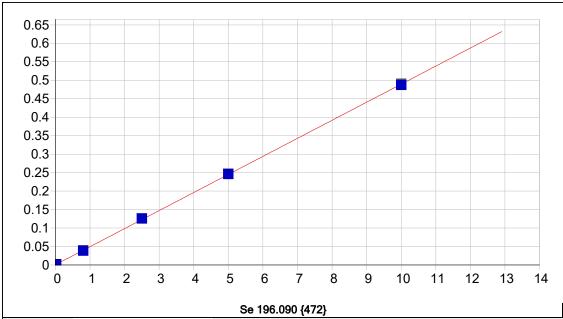
Correlation: 0.999966 Status: OK.

 Std Error of Est:
 0.000033

 Predicted MDL:
 0.001260

 Predicted MQL:
 0.004199

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00000	.000	.000	.00020	.000	1
S1	.01200	.01196	000	350	.00282	.000	1
S3	2.5000	2.5465	.046	1.86	.57056	.002	1
S4	5.0000	5.0083	.008	.166	1.1219	.003	1
S5	10.000	9.9568	043	432	2.2303	.006	1
S2	.80000	.78849	012	-1.44	.17680	.001	1



A0 (Offset): 0.000634 Re-Slope: 1.000000 A1 (Gain): 0.048887 Y-int: 0.000000

A2 (Curvature): 0.000000

n (Exponent): 1.000000

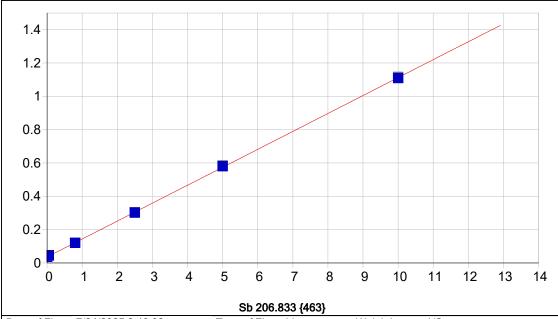
Correlation: 0.999905 Status: OK.

 Std Error of Est:
 0.000016

 Predicted MDL:
 0.003834

 Predicted MQL:
 0.012782

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00001	.000	.000	.00063	.000	1
S1	.02000	.01468	005	-26.6	.00135	.000	1
S3	2.5000	2.5544	.054	2.17	.12547	.000	1
S4	5.0000	5.0197	.020	.394	.24596	.001	1
S5	10.000	9.9531	047	469	.48707	.003	1
S2	.80000	.77815	022	-2.73	.03866	.000	1



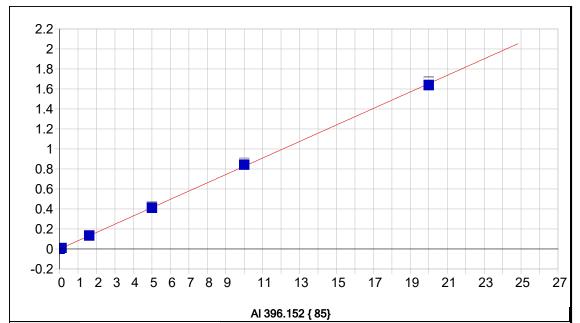
A0 (Offset): 0.035912 Re-Slope: 1.000000 A1 (Gain): 0.107642 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

Correlation: 0.999453 Status: OK.

Std Error of Est: 0.000132
Predicted MDL: n/a
Predicted MQL: n/a

Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
.00000	00003	000	.000	.03591	.000	1
.05000	.08052	.031	61.0	.04459	.000	1
2.5000	2.4655	034	-1.38	.30204	.001	1
5.0000	5.0524	.052	1.05	.58122	.002	1
10.000	9.9704	030	296	1.1121	.004	1
.80000	.78126	019	-2.34	.12024	.001	1
	Conc. .00000 .05000 2.5000 5.0000 10.000	Conc.         Conc.           .00000        00003           .05000         .08052           2.5000         2.4655           5.0000         5.0524           10.000         9.9704	Conc.         Conc.           .00000        00003        000           .05000         .08052         .031           2.5000         2.4655        034           5.0000         5.0524         .052           10.000         9.9704        030	Conc.         Conc.           .00000        00003        000         .000           .05000         .08052         .031         61.0           2.5000         2.4655        034         -1.38           5.0000         5.0524         .052         1.05           10.000         9.9704        030        296	Conc.         Conc.           .00000        00003        000         .000         .03591           .05000         .08052         .031         61.0         .04459           2.5000         2.4655        034         -1.38         .30204           5.0000         5.0524         .052         1.05         .58122           10.000         9.9704        030        296         1.1121	Conc.         Conc.           .00000        00003        000         .000         .03591         .000           .05000         .08052         .031         61.0         .04459         .000           2.5000         2.4655        034         -1.38         .30204         .001           5.0000         5.0524         .052         1.05         .58122         .002           10.000         9.9704        030        296         1.1121         .004



A0 (Offset): -0.000133 Re-Slope: 1.000000 A1 (Gain): 0.082670 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

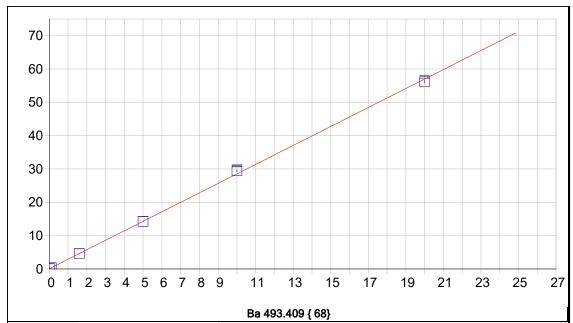
Correlation: 0.999878 Status: OK.

 Std Error of Est:
 0.000097

 Predicted MDL:
 0.011608

 Predicted MQL:
 0.038694

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00002	000	.000	00013	.000	1
S1	.10000	.11982	.020	19.8	.01041	.001	1
S3	5.0000	4.9808	019	384	.41965	.001	1
S4	10.000	10.183	.183	1.83	.85775	.001	1
S5	20.000	19.807	193	967	1.6694	.003	1
S2	1.6000	1.6086	.009	.537	.13542	.001	1



A0 (Offset): 0.071285 Re-Slope: 1.000000 A1 (Gain): 2.846384 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

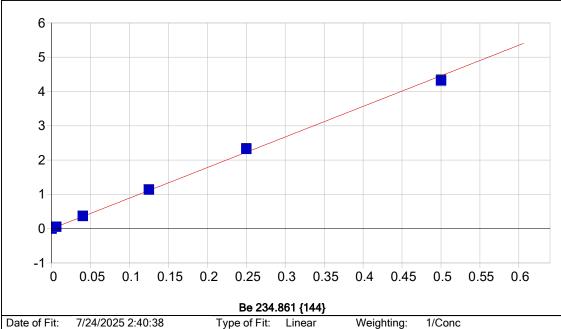
Correlation: 0.999807 Status: OK.

 Std Error of Est:
 0.004145

 Predicted MDL:
 0.000853

 Predicted MQL:
 0.002842

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	.07128	.002	1
S1	.10000	.10173	.002	1.73	.36084	.003	1
S3	5.0000	4.9705	029	590	14.219	.002	1
S4	10.000	10.317	.317	3.17	29.437	.270	1
S5	20.000	19.726	274	-1.37	56.219	.418	1
S2	1.6000	1.5847	015	954	4.5821	.006	1



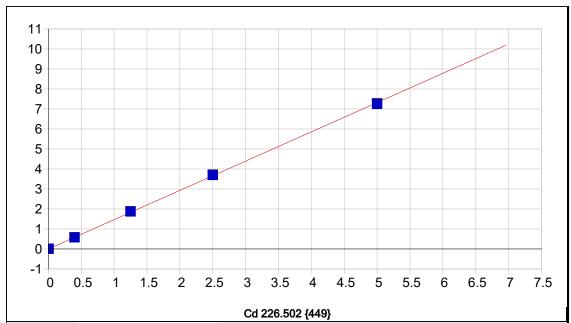
A0 (Offset): -0.001361 Re-Slope: 1.000000 A1 (Gain): Y-int: 0.000000 8.919864

A2 (Curvature): 0.000000 n (Exponent): 1.000000

Correlation: 0.999377 OK. Status:

Std Error of Est: 0.000902 Predicted MDL: 0.000067 Predicted MQL: 0.000224

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	00137	.001	1
S1	.00600	.00645	.000	7.56	.05580	.001	1
S3	.12500	.12785	.003	2.28	1.1341	.004	1
S4	.25000	.26110	.011	4.44	2.3177	.015	1
S5	.50000	.48422	016	-3.16	4.2978	.025	1
S2	.04000	.04137	.001	3.43	.36608	.004	1



A0 (Offset): -0.000997 Re-Slope: 1.000000 A1 (Gain): 1.464049 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

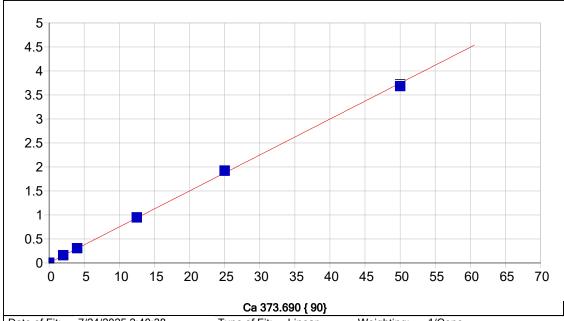
Correlation: 0.999912 Status: OK.

 Std Error of Est:
 0.000176

 Predicted MDL:
 0.000178

 Predicted MQL:
 0.000592

Std.	Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0		.00000	.00000	.000	.000	00100	.000	1
S1		.00600	.00567	000	-5.46	.00734	.000	1
S3		1.2500	1.2789	.029	2.31	1.8727	.003	1
S4		2.5000	2.5277	.028	1.11	3.7023	.016	1
S5		5.0000	4.9512	049	976	7.2529	.031	1
S2		.40000	.39249	008	-1.88	.57403	.002	1



A0 (Offset): 0.002635 Re-Slope: 1.000000 A1 (Gain): 0.074861 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

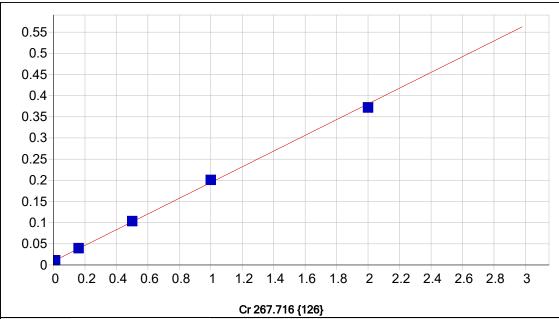
Correlation: 0.999821 Status: OK.

 Std Error of Est:
 0.000749

 Predicted MDL:
 0.010712

 Predicted MQL:
 0.035706

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00015	000	.000	.00262	.000	1
S2	4.0000	4.0597	.060	1.49	.30655	.001	1
S3	12.500	12.590	.090	.722	.94516	.001	1
S4	25.000	25.594	.594	2.38	1.9186	.005	1
S5	50.000	49.168	832	-1.66	3.6834	.037	1
S1	2.0000	2.0887	.089	4.43	.15900	.000	1



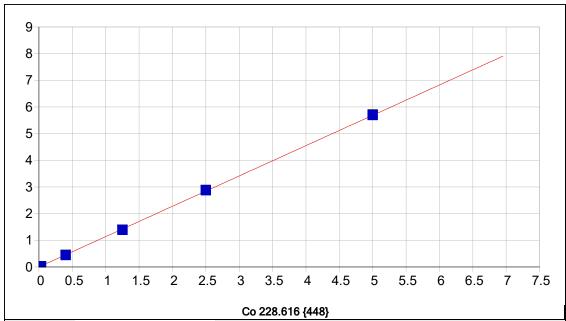
A0 (Offset): 0.008955 Re-Slope: 1.000000 A1 (Gain): 0.185865 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

Correlation: 0.999487 Status: OK.

Std Error of Est: 0.000044
Predicted MDL: n/a
Predicted MQL: n/a

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	.00895	.000	1
S1	.01000	.01365	.004	36.5	.01149	.000	1
S3	.50000	.50794	.008	1.59	.10340	.000	1
S4	1.0000	1.0328	.033	3.28	.20099	.000	1
S5	2.0000	1.9520	048	-2.40	.37192	.001	1
S2	.16000	.16359	.004	2.25	.03937	.000	1



A0 (Offset): 0.000306 Re-Slope: 1.000000 A1 (Gain): 1.137266 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

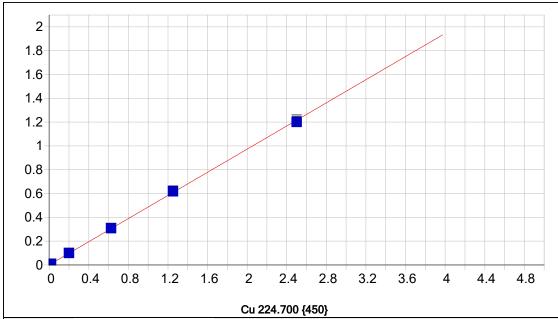
Correlation: 0.999941 Status: OK.

 Std Error of Est:
 0.000251

 Predicted MDL:
 0.000189

 Predicted MQL:
 0.000630

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00000	.000	.000	.00031	.000	1
S1	.03000	.02966	000	-1.15	.03389	.000	1
S3	1.2500	1.2244	026	-2.05	1.3951	.002	1
S4	2.5000	2.5276	.028	1.11	2.8797	.005	1
S5	5.0000	5.0080	.008	.161	5.7054	.017	1
S2	.40000	.39030	010	-2.42	.44496	.003	1



A0 (Offset): 0.000821 Re-Slope: 1.000000 A1 (Gain): 0.486257 Y-int: 0.000000

A2 (Curvature): 0.000000

n (Exponent): 1.000000

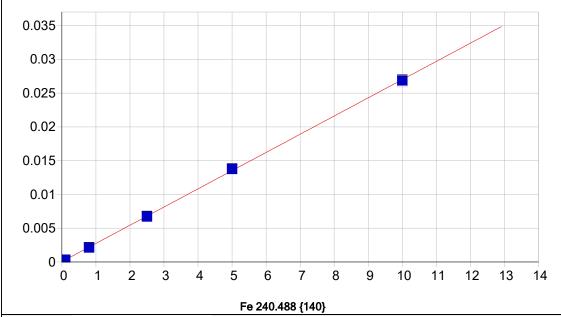
Correlation: 0.999902 Status: OK.

 Std Error of Est:
 0.000081

 Predicted MDL:
 0.000555

 Predicted MQL:
 0.001850

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	.00082	.000	1
S1	.02000	.02109	.001	5.45	.01122	.000	1
S3	.62500	.63181	.007	1.09	.31144	.000	1
S4	1.2500	1.2698	.020	1.58	.62506	.000	1
S5	2.5000	2.4684	032	-1.27	1.2147	.005	1
S2	.20000	.20395	.004	1.97	.10108	.001	1



A0 (Offset): 0.000044 Re-Slope: 1.000000 A1 (Gain): 0.002695 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

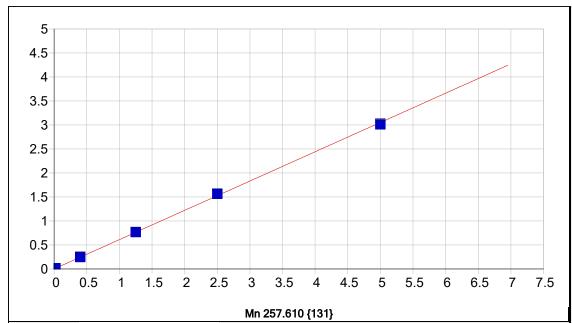
Correlation: 0.999904 Status: OK.

 Std Error of Est:
 0.000002

 Predicted MDL:
 0.008854

 Predicted MQL:
 0.029512

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	.00004	.000	1
S1	.10000	.10593	.006	5.93	.00033	.000	1
S3	2.5000	2.4759	024	964	.00666	.000	1
S4	5.0000	5.0951	.095	1.90	.01366	.000	1
S5	10.000	9.9483	052	517	.02663	.000	1
S2	.80000	.77474	025	-3.16	.00211	.000	1



A0 (Offset): 0.000643 Re-Slope: 1.000000 A1 (Gain): 0.610286 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

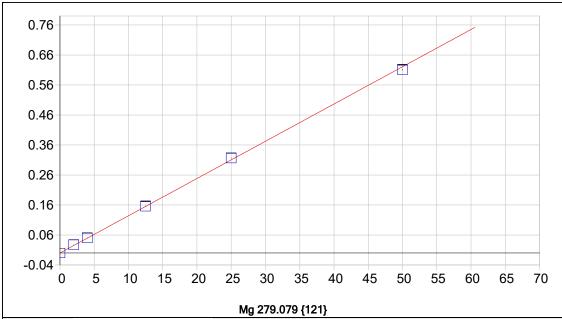
Correlation: 0.999860 Status: OK.

 Std Error of Est:
 0.000169

 Predicted MDL:
 0.000502

 Predicted MQL:
 0.001672

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	.00064	.000	1
S1	.02000	.02125	.001	6.27	.01362	.000	1
S3	1.2500	1.2533	.003	.266	.76568	.001	1
S4	2.5000	2.5607	.061	2.43	1.5637	.005	1
S5	5.0000	4.9305	069	-1.39	3.0103	.014	1
S2	.40000	.40416	.004	1.04	.24734	.001	1



A0 (Offset): -0.000111 Re-Slope: 1.000000 A1 (Gain): 0.012416 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

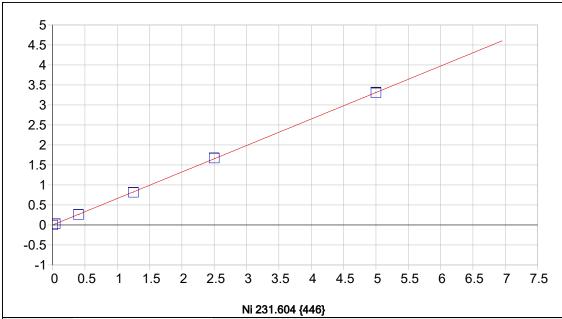
Correlation: 0.999752 Status: OK.

 Std Error of Est:
 0.000146

 Predicted MDL:
 0.028188

 Predicted MQL:
 0.093960

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00026	000	.000	00011	.000	1
S2	4.0000	4.0513	.051	1.28	.05019	.000	1
S3	12.500	12.546	.046	.372	.15567	.001	1
S4	25.000	25.473	.473	1.89	.31617	.000	1
S5	50.000	49.210	790	-1.58	.61090	.001	1
S1	2.0000	2.2196	.220	11.0	.02745	.000	1



A0 (Offset): -0.000619 Re-Slope: 1.000000 A1 (Gain): 0.662217 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

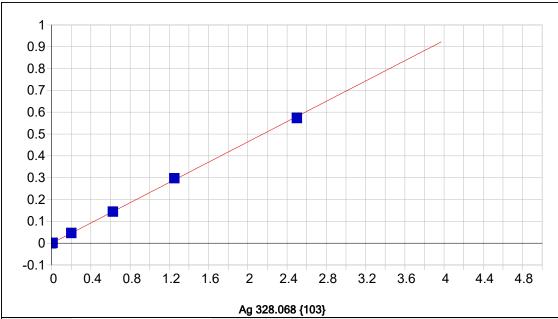
Correlation: 0.999963 Status: OK.

 Std Error of Est:
 0.000134

 Predicted MDL:
 0.000345

 Predicted MQL:
 0.001149

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	00062	.000	1
S1	.04000	.04095	.001	2.38	.02650	.000	1
S3	1.2500	1.2306	019	-1.55	.81430	.001	1
S4	2.5000	2.5264	.026	1.06	1.6724	.004	1
S5	5.0000	4.9977	002	045	3.3090	.011	1
S2	.40000	.39429	006	-1.43	.26049	.001	1



A0 (Offset): -0.000774 Re-Slope: 1.000000 A1 (Gain): 0.232449 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

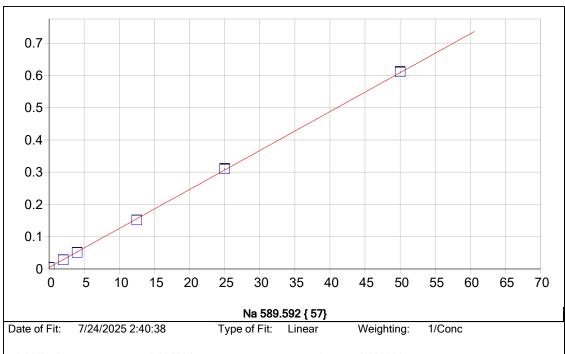
Correlation: 0.999863 Status: OK.

 Std Error of Est:
 0.000032

 Predicted MDL:
 0.000531

 Predicted MQL:
 0.001771

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00000	.000	.000	00077	.000	1
S1	.01000	.00936	001	-6.38	.00138	.000	1
S3	.62500	.62452	000	077	.14369	.000	1
S4	1.2500	1.2818	.032	2.55	.29577	.000	1
S5	2.5000	2.4687	031	-1.25	.57025	.001	1
S2	.20000	.20064	.001	.318	.04564	.000	1



A0 (Offset): 0.004904 Re-Slope: 1.000000 A1 (Gain): 0.012073 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

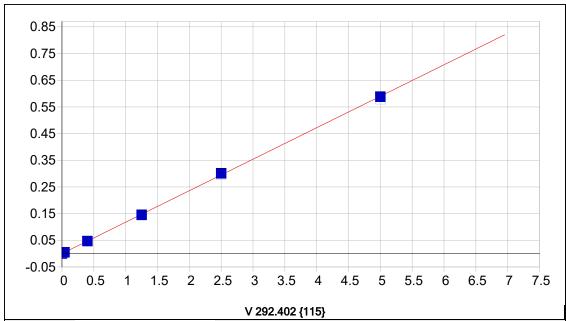
Correlation: 0.999874 Status: OK.

 Std Error of Est:
 0.000101

 Predicted MDL:
 0.014486

 Predicted MQL:
 0.048285

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00016	.000	.000	.00491	.000	1
S2	4.0000	3.8369	163	-4.08	.05123	.000	1
S3	12.500	12.152	348	-2.79	.15161	.000	1
S4	25.000	25.327	.327	1.31	.31067	.001	1
S5	50.000	50.242	.242	.483	.61146	.001	1
S1	2.0000	1.9428	057	-2.86	.02836	.000	1



A0 (Offset): -0.000181 Re-Slope: 1.000000 A1 (Gain): 0.118006 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

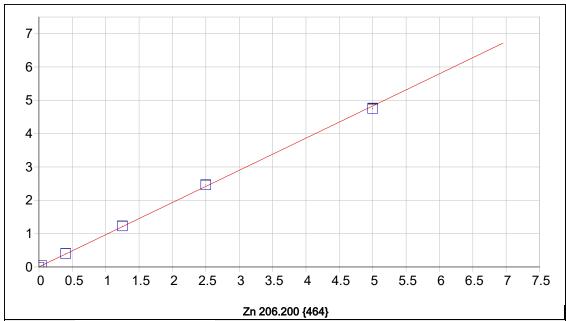
Correlation: 0.999922 Status: OK.

 Std Error of Est:
 0.000034

 Predicted MDL:
 0.003237

 Predicted MQL:
 0.010790

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00000	.000	.000	00018	.000	1
S1	.04000	.03875	001	-3.13	.00422	.000	1
S3	1.2500	1.2304	020	-1.57	.14286	.000	1
S4	2.5000	2.5474	.047	1.90	.29613	.001	1
S5	5.0000	4.9781	022	437	.57867	.002	1
S2	.40000	.39529	005	-1.18	.04578	.000	1



A0 (Offset): 0.001757 Re-Slope: 1.000000 A1 (Gain): 0.965850 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

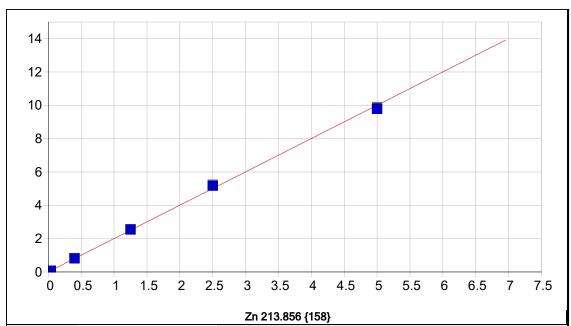
Correlation: 0.999838 Status: OK.

 Std Error of Est:
 0.000408

 Predicted MDL:
 0.000173

 Predicted MQL:
 0.000575

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	.00175	.000	1
S1	.04000	.04195	.002	4.86	.04227	.000	1
S3	1.2500	1.2685	.018	1.48	1.2269	.001	1
S4	2.5000	2.5486	.049	1.94	2.4633	.005	1
S5	5.0000	4.9190	081	-1.62	4.7528	.013	1
S2	.40000	.41193	.012	2.98	.39962	.002	1



A0 (Offset): 0.004431 Re-Slope: 1.000000 A1 (Gain): 2.000877 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

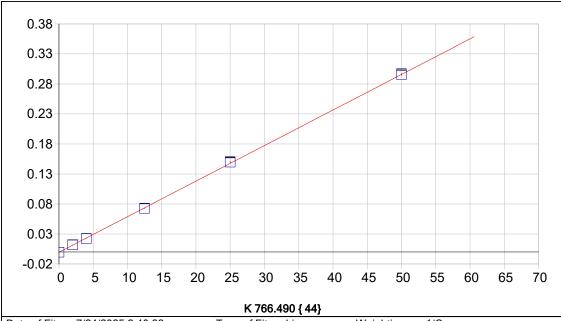
Correlation: 0.999690 Status: OK.

 Std Error of Est:
 0.001178

 Predicted MDL:
 0.000285

 Predicted MQL:
 0.000951

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	.00442	.000	1
S1	.04000	.04180	.002	4.50	.08863	.001	1
S3	1.2500	1.2673	.017	1.38	2.5575	.002	1
S4	2.5000	2.5843	.084	3.37	5.2100	.016	1
S5	5.0000	4.8888	111	-2.22	9.8560	.032	1
S2	.40000	.40782	.008	1.95	.82599	.002	1



A0 (Offset): -0.000466 Re-Slope: 1.000000 A1 (Gain): 0.005926 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

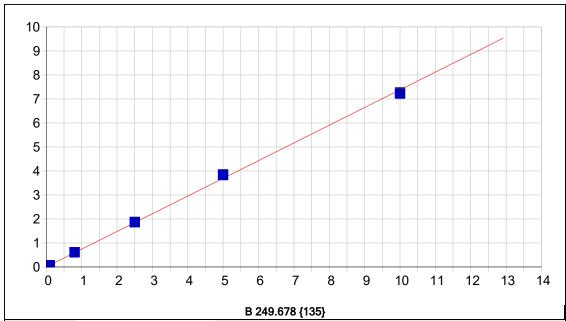
Correlation: 0.999911 Status: OK.

 Std Error of Est:
 0.000042

 Predicted MDL:
 0.034549

 Predicted MQL:
 0.115164

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00002	.000	.000	00047	.000	1
S2	4.0000	3.8338	166	-4.15	.02225	.000	1
S3	12.500	12.303	197	-1.58	.07244	.000	1
S4	25.000	25.332	.332	1.33	.14965	.001	1
S5	50.000	49.964	036	071	.29561	.001	1
S1	2.0000	2.0671	.067	3.35	.01178	.000	1



A0 (Offset): 0.004501 Re-Slope: 1.000000 A1 (Gain): 0.737552 Y-int: 0.000000

A2 (Curvature): 0.000000

n (Exponent): 1.000000

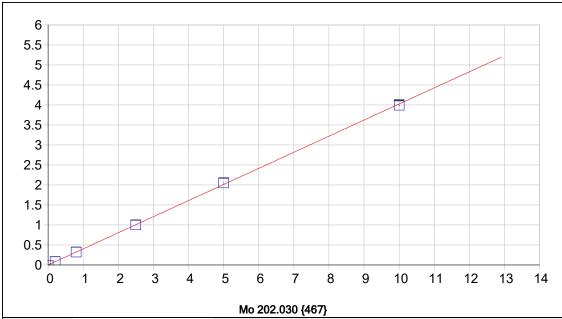
Correlation: 0.999668 Status: OK.

 Std Error of Est:
 0.000994

 Predicted MDL:
 0.000848

 Predicted MQL:
 0.002826

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00001	000	.000	.00450	.000	1
S1	.10000	.10400	.004	4.00	.08077	.000	1
S3	2.5000	2.5189	.019	.757	1.8557	.008	1
S4	5.0000	5.1847	.185	3.69	3.8152	.024	1
S5	10.000	9.7803	220	-2.20	7.1914	.051	1
S2	.80000	.81202	.012	1.50	.60128	.004	1



A0 (Offset): 0.000336 Re-Slope: 1.000000 A1 (Gain): 0.402328 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

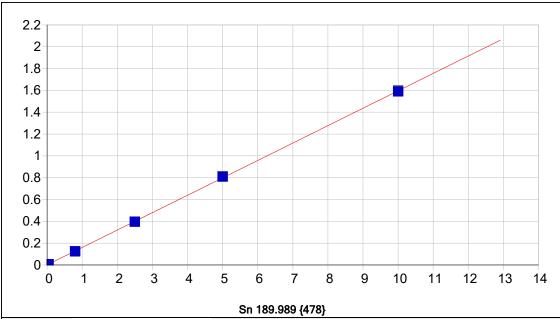
Correlation: 0.999931 Status: OK.

 Std Error of Est:
 0.000351

 Predicted MDL:
 0.000407

 Predicted MQL:
 0.001358

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	.00033	.000	1
S1	.20000	.20294	.003	1.47	.08198	.000	1
S3	2.5000	2.4810	019	761	.99851	.001	1
S4	5.0000	5.0940	.094	1.88	2.0498	.004	1
S5	10.000	9.9232	077	768	3.9927	.015	1
S2	.80000	.79894	001	133	.32177	.001	1



A0 (Offset): 0.000604 Re-Slope: 1.000000 A1 (Gain): 0.159546 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

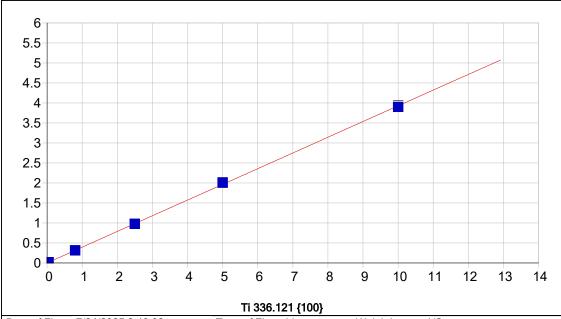
Correlation: 0.999952 Status: OK.

 Std Error of Est:
 0.000052

 Predicted MDL:
 0.000636

 Predicted MQL:
 0.002121

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	.00060	.000	1
S1	.04000	.04140	.001	3.50	.00720	.000	1
S3	2.5000	2.4750	025	998	.39508	.001	1
S4	5.0000	5.0695	.070	1.39	.80861	.001	1
S5	10.000	9.9723	028	277	1.5900	.005	1
S2	.80000	.78170	018	-2.29	.12519	.001	1



A0 (Offset): 0.001629 Re-Slope: 1.000000 A1 (Gain): 0.392614 Y-int: 0.000000

A1 (Gain): 0.392614
A2 (Curvature): 0.000000
n (Exponent): 1.000000

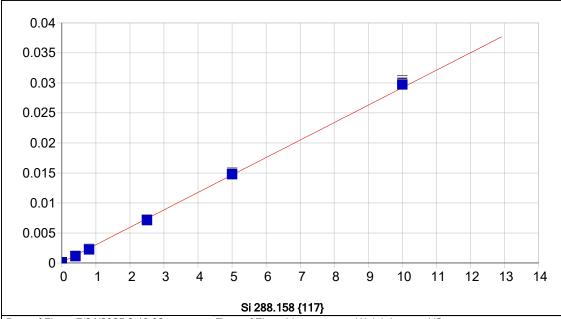
Correlation: 0.999924 Status: OK.

 Std Error of Est:
 0.000160

 Predicted MDL:
 0.001491

 Predicted MQL:
 0.004968

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00000	.000	.000	.00163	.000	1
S1	.04000	.03879	001	-3.03	.01685	.001	1
S3	2.5000	2.4779	022	886	.97411	.001	1
S4	5.0000	5.0998	.100	2.00	2.0032	.007	1
S5	10.000	9.9324	068	676	3.8998	.031	1
S2	.80000	.79121	009	-1.10	.31216	.001	1



A0 (Offset): 0.000121 Re-Slope: 1.000000 A1 (Gain): 0.002909 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

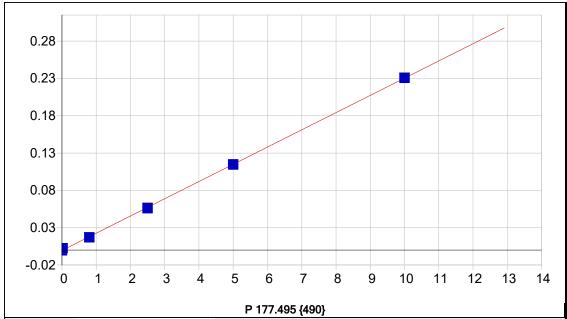
Correlation: 0.999471 Status: OK.

 Std Error of Est:
 0.000010

 Predicted MDL:
 0.013804

 Predicted MQL:
 0.046015

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00009	.000	.000	.00012	.000	1
S1	.40000	.34606	054	-13.5	.00113	.000	1
S3	2.5000	2.4068	093	-3.73	.00723	.000	1
S4	5.0000	5.0390	.039	.780	.01500	.000	1
S5	10.000	10.178	.178	1.78	.03016	.000	1
S2	.80000	.72982	070	-8.77	.00228	.000	1



A0 (Offset): -0.000555 Re-Slope: 1.000000 A1 (Gain): 0.023092 Y-int: 0.000000

A2 (Curvature): 0.000000

n (Exponent): 1.000000

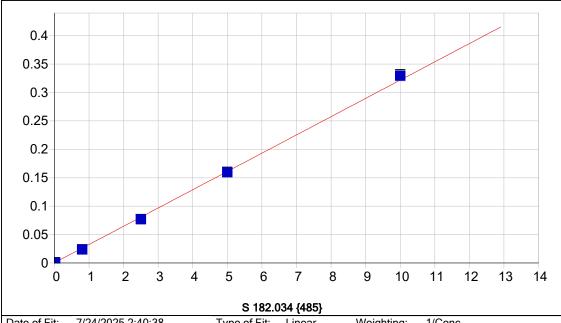
Correlation: 0.986160 Status: OK.

 Std Error of Est:
 0.000091

 Predicted MDL:
 0.003039

 Predicted MQL:
 0.010131

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00010	000	.000	00056	.000	1
S1	.02000	.12135	.101	507.	.00225	.000	1
S3	2.5000	2.4480	052	-2.08	.05597	.000	1
S4	5.0000	4.9828	017	345	.11449	.000	1
S5	10.000	10.012	.012	.117	.23060	.000	1
S2	.80000	.75600	044	-5.50	.01690	.000	1



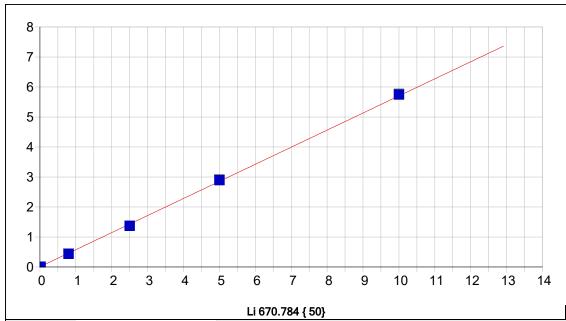
A0 (Offset): 0.000321 Re-Slope: 1.000000 Y-int: 0.000000 A1 (Gain): 0.032157

A2 (Curvature): 0.000000 n (Exponent): 1.000000

Correlation: 0.999487 OK. Status:

Std Error of Est: 0.000024 Predicted MDL: 0.002832 Predicted MQL: 0.009439

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00000	.000	.000	.00032	.000	1
S1	.02000	.02030	.000	1.51	.00095	.000	1
S3	2.5000	2.3787	121	-4.85	.07660	.000	1
S4	5.0000	4.9590	041	821	.15937	.000	1
S5	10.000	10.236	.236	2.36	.32865	.003	1
S2	.80000	.72582	074	-9.27	.02359	.000	1



A0 (Offset): 0.005301 Re-Slope: 1.000000 A1 (Gain): 0.569527 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

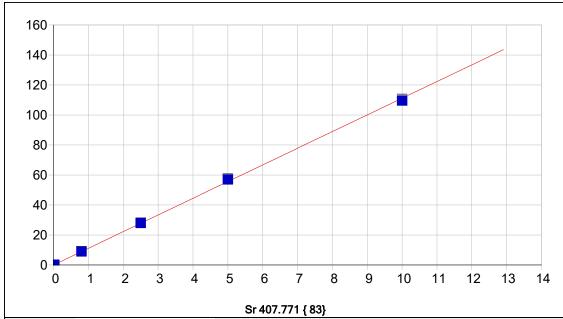
Correlation: 0.999772 Status: OK.

 Std Error of Est:
 0.000285

 Predicted MDL:
 0.003427

 Predicted MQL:
 0.011424

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	.00000	.000	.000	.00530	.002	1
S5	10.000	10.079	.079	.791	5.7485	.017	1
S4	5.0000	5.0672	.067	1.34	2.8927	.010	1
S3	2.5000	2.3941	106	-4.23	1.3695	.002	1
S1	.02000	.01635	004	-18.2	.01480	.001	1
S2	.80000	.76325	037	-4.59	.44022	.001	1



A0 (Offset): 0.001139 Re-Slope: 1.000000 A1 (Gain): 11.115098 Y-int: 0.000000

A2 (Curvature): 0.000000 n (Exponent): 1.000000

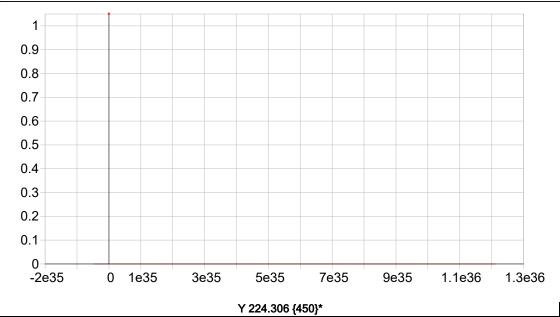
Correlation: 0.999848 Status: OK.

 Std Error of Est:
 0.004547

 Predicted MDL:
 0.000091

 Predicted MQL:
 0.000303

Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
S0	.00000	00000	000	.000	.00113	.001	1
S1	.02000	.02064	.001	3.22	.23166	.001	1
S3	2.5000	2.5141	.014	.564	27.972	.157	1
S4	5.0000	5.1258	.126	2.52	57.028	.379	1
S5	10.000	9.8508	149	-1.49	109.60	.966	1
S2	.80000	.80869	.009	1.09	8.9983	.012	1



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

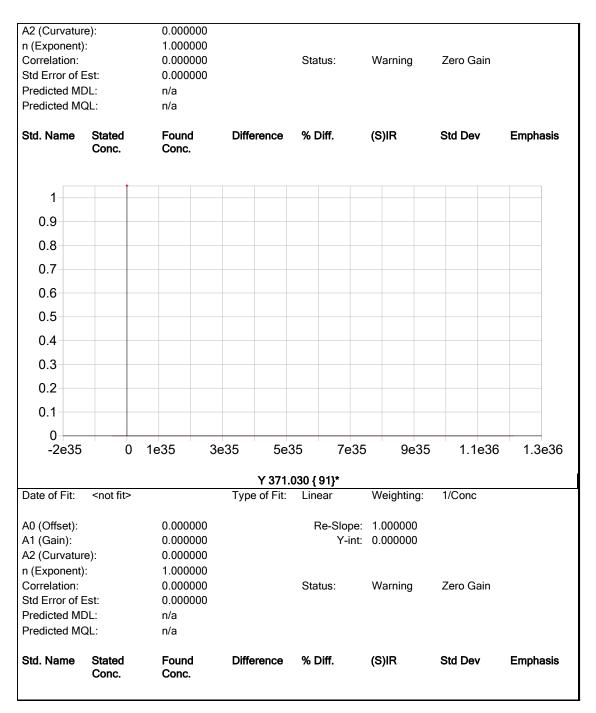
Predicted MQL: n/a

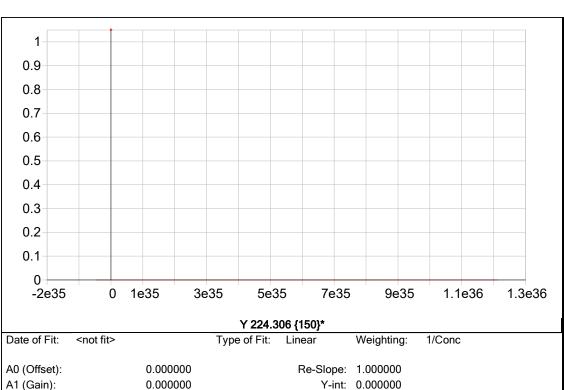
Std. Name	Stated Conc.	Found Conc.	Difference	% Diff.	(S)IR	Std Dev	Emphasis
1							
0.9							
8.0							
0.7							
0.6							
0.5							
0.4							
0.3							
0.2							
0.1							
0 -2e35	0	1e35 3	3e35 5e3	35 7	e35 9e	e35 1.1e36	3 1.3e3

Y 360.073 { 94}\*

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





0.000000

Found

A2 (Curvature): 0.000000 n (Exponent): 1.000000

Correlation: 0.000000 Status: Warning Zero Gain

Difference

Std Error of Est: 0.000000 Predicted MDL: n/a Predicted MQL: n/a

Stated

Std. Name

1								
0.9								
0.8								
0.7								
0.6								
0.5								
0.4								
0.3								
0.2								
0.1								
0 -2e35	0	1e35	3e3	5e35	35	35	e36	1.3e3

In 230.606 {446}\*

% Diff.

(S)IR

Std Dev

**Emphasis** 

Date of Fit: <not fit> Type of Fit: Linear Weighting: 1/Conc A0 (Offset): 0.000000 Re-Slope: 1.000000 0.000000 Y-int: 0.000000 A1 (Gain):

Reviewed By: On: Inst Id :P4 LB :LB136588

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



SOP ID:

M200.7-Trace Elements-22

SDG No: Matrix:

N/A

WATER

ICP A

Pippete ID: Balance ID: N/A

Filter paper ID: N/A

#3

pH Strip ID:

**Hood ID:** 

Block ID:

M6069

1. HOT BLOCK #1 2. N/A

Start Digest Date: **End Digest Date:** 

Digestion tube ID:

07/22/2025

Time: 12:50

Temp: 96 °C

07/22/2025 Time: 15:55

**Temp:** 96 °C

M5595

Block thermometer ID:

MET-DIG. #1

Dig Technician Signature: ડાન્છ.

Supervisor Signature:

Temp:

96°C

2. N/A

Standared Name	MLS USED	STD REF. # FROM LOG	
LFS-1	0.25	M6007	
LFS-2	0.25	M6015	
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	3.00	M6158
1:1 HCL	5.00	MP85156
N/A	N/A	N/A

## **Extraction Conformance/Non-Conformance Comments:**

HOT BLOCK#1 CELL#50 96C

Date / Time	Prepped Sample Relinquished By/Location	Received By/Location
07/22/25 16:55	SI-3. met. dis	an about took
	Preparation Group	Analysis Group



Lab Sample ID	Client Sample ID	рН	Initial Vol (ml)	Final Vol (ml)	Color Before	Color After	Clarity Before	Clarity After	Comment	Prep Pos
PB168955BL	PBW955	<2	50	25	Colorless	Colorless	Clear	Clear	N/A	1
PB168955BS	LCS955	<2	50	25	Colorless	Coloriess	Clear	Clear	M6007,M6015	2
Q2653-01MS	WASTEWATER Q3MS	<2	50	25	Coloriess	Colorless	Clear	Clear	M6007,M6015	5
Q2653-01MSD	WASTEWATER Q3MSD	<2	50	25	Colorless	Colorless	Clear	Clear	M6007,M6015	6
Q2653-01DUP	WASTEWATER Q3DUP	<2	50	25	Colorless	Colorless	Clear	Clear	N/A	4
Q2653-01	WASTEWATER Q3	<2	50	25	Colorless	Colorless	Clear	Clear	N/A	3
Q2669-01	001 WILLETS PT BLVD	<2	50	25	Colorless	Colorless	Clear	Clear	N/A	7
Q2669-02	002 35TH AVE (JUNE)	<2	50	25	Coloriess	Colorless	Clear	Clear	N/A	8

## WORKLIST(Hardcopy Internal Chain)

WorkList ID: 190872

WorkList Name: PB168955

Sample Q2669-02 Q2669-01 Q2653-01 001 WILLETS PT BLVD (JUNE) Water **Customer Sample** WASTEWATER Q3 Matrix Water Test Metals Group 10 Metals Group5 Preservative 1:1 HNO3 to pH < 2 1:1 HNO3 to pH < 2 Department: Digestion Customer TULL01 METE01 Storage 033 052 Location Raw Sample Date: 07-22-2025 12:14:58 Collect Date Method 07/21/2025 200.7 07/21/2025

002 35th Ave (JUNE)

Water

Metals Group 10

1:1 HNO3 to pH < 2

TULL01

033

07/21/2025 200.7

200.7

Date/Time

07/22/25

Raw Sample Received by:

Raw Sample Relinquished by:

12°30

Date/Time 07127125

Raw Sample Received by:

13:30

Page 1 of 1

Raw Sample Relinquished by:



**Instrument ID:** 

P4

Review By .	Janvi	Review On	7/24/2025 9:47:08 AM
Supervise By		Supervise On	
STD. NAME	STD REF.#		
ICAL Standard	MP86452,MP86453,MP	86454,MP86455,MP86456,MP86458	
ICV Standard	MP86494		
CCV Standard	MP86462		
ICSA Standard	MP86460,MP86495		
CRI Standard	MP86458		
LCS Standard			
Chk Standard	MP86463,MP86464		

Sr#	SampleId	ClientID	QcType	Date	Comment	Operator	Status
1	S0	S0	CAL1	07/23/25 11:28		Jaswal	ОК
2	S1	S1	CAL2	07/23/25 11:32		Jaswal	ОК
3	S2	S2	CAL3	07/23/25 11:37		Jaswal	ОК
4	S3	S3	CAL4	07/23/25 11:41		Jaswal	ОК
5	S4	S4	CAL5	07/23/25 11:45		Jaswal	ОК
6	S5	S5	CAL6	07/23/25 11:49		Jaswal	ОК
7	ICV01	ICV01	ICV	07/23/25 12:57		Jaswal	ОК
8	LLICV01	LLICV01	LLICV	07/23/25 13:02		Jaswal	ОК
9	ICB01	ICB01	ICB	07/23/25 13:16		Jaswal	ОК
10	ICSA01	ICSA01	ICSA	07/23/25 13:25		Jaswal	ОК
11	ICSAB01	ICSAB01	ICSAB	07/23/25 13:29		Jaswal	ОК
12	ICSADL	ICSADL	ICSA	07/23/25 13:33		Jaswal	ОК
13	ICSABDL	ICSABDL	ICSAB	07/23/25 13:37		Jaswal	ОК
14	CCV01	CCV01	CCV	07/23/25 13:42		Jaswal	ОК
15	CCB01	CCB01	ССВ	07/23/25 13:46		Jaswal	ОК
16	PB168955BL	PB168955BL	MB	07/23/25 13:54		Jaswal	ОК
17	PB168955BS	PB168955BS	LCS	07/23/25 13:58		Jaswal	ОК
18	Q2669-01	001 WILLETS PT BLV	SAM	07/23/25 14:02		Jaswal	ОК



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**Instrument ID:** P4

Review By	Janvi	Review On	7/24/2025 9:47:08 AM
Supervise By		Supervise On	
STD. NAME	STD REF.#		
ICAL Standard	MP86452,MP86453,MF	P86454,MP86455,MP86456,MP86	458
ICV Standard	MP86494		
CCV Standard	MP86462		
ICSA Standard	MP86460,MP86495		
CRI Standard	MP86458		
LCS Standard			
Chk Standard	MP86463,MP86464		

	i	i		i		1	
19	Q2669-02	002 35th Ave (JUNE)	SAM	07/23/25 14:06		Jaswal	ок
20	Q2653-01	WASTEWATER Q3	SAM	07/23/25 14:11		Jaswal	ок
21	Q2653-01DUP	WASTEWATER Q3DL	DUP	07/23/25 14:15		Jaswal	ок
22	Q2653-01L	WASTEWATER Q3L	SD	07/23/25 14:19		Jaswal	ок
23	Q2653-01MS	WASTEWATER Q3MS	MS	07/23/25 14:23		Jaswal	ок
24	Q2653-01MSD	WASTEWATER Q3MS	MSD	07/23/25 14:27		Jaswal	ОК
25	Q2653-01A	WASTEWATER Q3A	PS	07/23/25 14:31	0.1ml of M6004,M6013 in 10ml sample	Jaswal	ОК
26	CCV02	CCV02	CCV	07/23/25 14:35		Jaswal	ок
27	CCB02	CCB02	ССВ	07/23/25 14:44		Jaswal	ок
28	CRI01	CRI01	CRDL	07/23/25 14:53		Jaswal	ок
29	Q2639-09	OU4-TS-42-071725	SAM	07/23/25 15:01		Jaswal	ок
30	Q2649-21DL	WC-6DL	SAM	07/23/25 15:06	5X for Ag	Jaswal	Confirms
31	Q2649-17	WC-5	SAM	07/23/25 15:10		Jaswal	ОК
32	Q2649-17DUP	WC-5DUP	DUP	07/23/25 15:14		Jaswal	ОК
33	Q2649-17L	WC-5L	SD	07/23/25 15:18		Jaswal	ок
34	Q2649-17MS	WC-5MS	MS	07/23/25 15:22		Jaswal	ОК
35	Q2649-17MSD	WC-5MSD	MSD	07/23/25 15:26		Jaswal	ок
36	Q2649-17A	WC-5A	PS	07/23/25 15:30	0.1ml of M6004,M6013 in 10ml sample	Jaswal	ОК
37	PB168974BL	PB168974BL	MB	07/23/25 15:34		Jaswal	ОК
	l			l .		<u> </u>	



**Instrument ID:** P4

Review By	Janvi	Review On	7/24/2025 9:47:08 AM
Supervise By		Supervise On	
STD. NAME	STD REF.#		
ICAL Standard	MP86452,MP86	453,MP86454,MP86455,MP86456,N	MP86458
ICV Standard	MP86494		
CCV Standard	MP86462		
ICSA Standard	MP86460,MP86	495	
CRI Standard	MP86458		
LCS Standard			
Chk Standard	MP86463,MP86	464	

38	CCV03	CCV03	CCV	07/23/25 15:57		Jaswal	ок
39	CCB03	CCB03	ССВ	07/23/25 16:01		Jaswal	ок
40	Q2660-05DL	MOO-25-0220DL	SAM	07/23/25 16:10	NOT USE	Jaswal	Not Ok
41	Q2660-05DUPDL	MOO-25-0220DUPDL	DUP	07/23/25 16:14	NOT USE	Jaswal	Not Ok
42	Q2660-05LDL	MOO-25-0220LDL	SD	07/23/25 16:19	NOT USE	Jaswal	Not Ok
43	Q2660-05MSDL	MOO-25-0220MSDL	MS	07/23/25 16:23	NOT USE	Jaswal	Not Ok
44	Q2660-05MSDDL	MOO-25-0220MSDDL	MSD	07/23/25 16:27	NOT USE	Jaswal	Not Ok
45	Q2660-05ADL	MOO-25-0220ADL	PS	07/23/25 16:32	NOT USE	Jaswal	Not Ok
46	PB168974BS	PB168974BS	LCS	07/23/25 16:36		Jaswal	ок
47	FE 500PPM	FE 500PPM	SAM	07/23/25 16:40		Jaswal	ок
48	Q2660-02	MOO-25-0205	SAM	07/23/25 16:45		Jaswal	ок
49	Q2660-04	MOO-25-0218	SAM	07/23/25 16:49		Jaswal	ок
50	CCV04	CCV04	CCV	07/23/25 17:00		Jaswal	ок
51	CCB04	CCB04	ССВ	07/23/25 17:04		Jaswal	ок
52	Q2666-01	SBT-GARDEN-SOIL	SAM	07/23/25 17:16		Jaswal	ок
53	Q2668-01	TP-2	SAM	07/23/25 17:21		Jaswal	ок
54	Q2668-05	TP-3	SAM	07/23/25 17:25		Jaswal	ок
55	Q2668-09	TP-1	SAM	07/23/25 17:29		Jaswal	ок
56	Q2674-01	TR-04-072225	SAM	07/23/25 17:33		Jaswal	ок
57	Q2674-01DUP	TR-04-072225DUP	DUP	07/23/25 17:37		Jaswal	OK



**Instrument ID:** 

P4

Review By	Janvi	Review On	7/24/2025 9:47:08 AM
Supervise By		Supervise On	
STD. NAME	STD REF.#		
ICAL Standard	MP86452,MP86453,M	P86454,MP86455,MP86456,M	IP86458
ICV Standard	MP86494		
CCV Standard	MP86462		
ICSA Standard	MP86460,MP86495		
CRI Standard	MP86458		
LCS Standard			
Chk Standard	MP86463,MP86464		

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58	Q2674-01L	TR-04-072225L	SD	07/23/25 17:41		Jaswal	OK
59	Q2674-01MS	TR-04-072225MS	MS	07/23/25 17:45		Jaswal	ОК
60	CCV05	CCV05	CCV	07/23/25 17:49		Jaswal	ок
61	CCB05	CCB05	ССВ	07/23/25 17:57		Jaswal	ок
62	Q2674-01MSD	TR-04-072225MSD	MSD	07/23/25 18:02		Jaswal	ок
63	Q2674-01A	TR-04-072225A	PS	07/23/25 18:06	0.1ml of M6004,M6013 in 10ml sample	Jaswal	ОК
64	Q2675-01	SU-03-07222025	SAM	07/23/25 18:10		Jaswal	ок
65	Q2676-01	HD-01-07222025	SAM	07/23/25 18:14		Jaswal	ок
66	Q2676-03	HD-02-07222025	SAM	07/23/25 18:18		Jaswal	ок
67	Q2677-01	OK-02-07222025	SAM	07/23/25 18:22		Jaswal	ок
68	Q2677-03	OK-03-07222025	SAM	07/23/25 18:26		Jaswal	ок
69	PB168953TB	PB168953TB	МВ	07/23/25 18:30		Jaswal	ОК
70	PB168976BL	PB168976BL	МВ	07/23/25 18:34		Jaswal	ОК
71	PB168976BS	PB168976BS	LCS	07/23/25 18:39		Jaswal	ок
72	CCV06	CCV06	CCV	07/23/25 18:43		Jaswal	ОК
73	CCB06	CCB06	ССВ	07/23/25 18:51		Jaswal	ОК
74	Q2655-02	SOIL	SAM	07/23/25 18:55		Jaswal	ОК
75	Q2668-04	TP-2	SAM	07/23/25 19:00		Jaswal	ок
76	Q2668-08	TP-3	SAM	07/23/25 19:04		Jaswal	ОК



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**Instrument ID:** P4

Review By	Janvi	Review On	7/24/2025 9:47:08 AM
Supervise By		Supervise On	
STD. NAME	STD REF.#		
ICAL Standard	MP86452,MP86453,MP	86454,MP86455,MP86456,MP86458	
ICV Standard	MP86494		
CCV Standard	MP86462		
ICSA Standard	MP86460,MP86495		
CRI Standard	MP86458		
LCS Standard			
Chk Standard	MP86463,MP86464		

77	Q2668-12	TP-1	SAM	07/23/25 19:09		Jaswal	ок
78	Q2672-02	AUD-25-0123-0127	SAM	07/23/25 19:13		Jaswal	ок
79	Q2672-04	AUD-25-0128-0132	SAM	07/23/25 19:17		Jaswal	ок
80	Q2672-04DUP	AUD-25-0128-0132DL	DUP	07/23/25 19:22		Jaswal	ок
81	Q2672-04L	AUD-25-0128-0132L	SD	07/23/25 19:26		Jaswal	ок
82	Q2672-04MS	AUD-25-0128-0132M	MS	07/23/25 19:30		Jaswal	ок
83	Q2672-04MSD	AUD-25-0128-0132M	MSD	07/23/25 19:34		Jaswal	ок
84	CCV07	CCV07	CCV	07/23/25 19:38		Jaswal	ок
85	CCB07	CCB07	ССВ	07/23/25 19:47		Jaswal	ок
86	Q2672-04A	AUD-25-0128-0132A	PS	07/23/25 19:51	0.1ml of M6004,M6013 in 10ml sample	Jaswal	OK
87	CCV08	CCV08	CCV	07/23/25 19:55		Jaswal	ок
88	CCB08	CCB08	ССВ	07/23/25 20:04		Jaswal	ок



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8900, Fax: 908 789 8922

## **Prep Standard - Chemical Standard Summary**

Order ID: Q2669

Test: Metals Group 10

Prepbatch ID: PB168955,

Sequence ID/Qc Batch ID: LB136588,LB136588,

### Standard ID:

MP85156, MP86452, MP86453, MP86454, MP86455, MP86456, MP86457, MP86458, MP86460, MP86462, MP86463, MP86464, MP86494, MP86495, MP86494, MP86495, MP86496, M

## Chemical ID:

M5467, M5499, M5658, M5747, M5748, M5751, M5798, M5799, M5800, M5801, M5811, M5814, M5816, M5820, M5942, M5962, M5970, M5984, M5985, M5996, M5997, M6007, M6015, M6021, M6023, M6028, M6030, M6032, M6058, M6076, M6077, M6127, M6128, M6137, M6142, M6144, M6145, M6146, M6151, M6152, M6155, M6158, M6159, M6162, M6163, M6164, M6165, W3112,





## Metals STANDARD PREPARATION LOG

Recipe ID 170	NAME 1:1HCL	NO. MP85156	Prep Date 04/07/2025	<u> </u>	Prepared By  Kareem Khairalla	ScaleID None	PipetteID None	Supervised By Sarabjit Jaswal 04/07/2025
FROM	1250 00000ml of MC151 + 1250 0000	001 614/04	  40		20			

|--|

Recipe				Expiration	Prepared			Supervised By
<u>ID</u>	<u>NAME</u>	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Sarabjit Jaswal
902	ICP AES CAL BLK ( SO/ICB/CCB)	MP86452	07/18/2025	08/08/2025	Janvi Patel		METALS_PIP	
							ETTE_1 (ICP	07/23/2025

FROM 125.00000ml of M6151 + 2350.00000ml of W3112 + 25.00000ml of M6162 = Final Quantity: 2500.000 ml



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## **Metals STANDARD PREPARATION LOG**

Recipe				Expiration	Prepared			Supervised By		
<u>ID</u>	NAME	NO.	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Sarabjit Jaswal		
907	ICP AES STD S ( S5 )	MP86453	07/18/2025	08/08/2025	Janvi Patel	None	METALS_PIP			
							ETTE_1 (ICP	07/23/2025		
	A)									

**FROM** 

5.00000ml of M5467 + 5.0000ml of M5470 + 5.0000ml of M5816 + 5.0000ml of M5820 + 5.0000ml of M5996 + 5.0000ml of M5997 + 5.0000ml of M6077 + 5.0000ml of M6146 + 455.0000ml of MP86452 = Final Quantity: 500.000 ml

Recipe				Expiration	Prepared			Supervised By
<u>ID</u>	NAME	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Sarabjit Jaswal
910	ICP AES STD S4	MP86454	07/18/2025	08/08/2025	Janvi Patel		METALS_PIP	
							ETTE_1 (ICP	07/23/2025
			<u> </u>				A)	

**FROM** 50.00000ml of MP86452 + 50.00000ml of MP86453 = Final Quantity: 100.000 ml



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## **Metals STANDARD PREPARATION LOG**

Recipe ID	<u>NAME</u>	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
909	ICP AES STD S3	MP86455	07/18/2025	08/08/2025	Janvi Patel		METALS_PIP ETTE_1 (ICP	
							A)	

**FROM** 25.00000ml of MP86453 + 75.00000ml of MP86452 = Final Quantity: 100.000 ml

Recipe				Expiration	Prepared			Supervised By
<u>ID</u>	<u>NAME</u>	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Sarabjit Jaswal
3913	ICP AES STD S2	MP86456	07/18/2025	08/08/2025	Janvi Patel		METALS_PIP	
							ETTE_1 (ICP	07/23/2025

FROM 16.00000ml of MP86453 + 184.00000ml of MP86452 = Final Quantity: 200.000 ml



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## Metals STANDARD PREPARATION LOG

Recipe				Expiration	Prepared			Supervised By
<u>ID</u>	<u>NAME</u>	<u>NO.</u>	Prep Date	<u>Date</u>	<u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Sarabjit Jaswal
2950	ICP AES S1/CRI STOCK STD	MP86457	07/18/2025	08/08/2025	Janvi Patel	None	METALS_PIP	
							ETTE_1 (ICP	07/23/2025

**FROM** 

 $0.03000 \text{ml of M5798} + 0.03000 \text{ml of M6028} + 0.04000 \text{ml of M6137} + 0.05000 \text{ml of M5658} + 0.05000 \text{ml of M5811} + 0.05000 \text{ml} \\ 0.05000 \text{ml of M6030} + 0.05000 \text{ml of M6159} + 0.06000 \text{ml of M5747} + 0.10000 \text{ml of M5470} + 0.10000 \text{ml of M5751} + 0.10000 \text{ml of M5801} + 0.10000 \text{ml of M5820} + 0.10000 \text{ml of M5962} + 0.10000 \text{ml of M5970} + 0.10000 \text{ml of M6128} + 0.15000 \text{ml of M5800} + 0.20000 \text{ml of M5748} + 0.20000 \text{ml of M5799} + 0.20000 \text{ml of M6021} + 0.20000 \text{ml of M6023} + 0.20000 \text{ml of M6145} + 0.25000 \text{ml of M6146} + 0.50000 \text{ml of M6142} + 1.00000 \text{ml of M6142} + 1.00000 \text{ml of M6144} + 2.00000 \text{ml of M5816} + 89.29000 \text{ml of MP86452} = Final Quantity: 100.000 \text{ml}$ 

Recipe ID	NAME_	NO.	Prep Date	Expiration Date	<u>Prepared</u> <u>By</u>	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
2951	ICP AES S1/CRI WORK STD	MP86458	07/18/2025	08/08/2025	Janvi Patel		METALS_PIP ETTE_1 (ICP	
							A)	

**FROM** 2.00000ml of MP86457 + 98.00000ml of MP86452 = Final Quantity: 100.000 ml



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## Metals STANDARD PREPARATION LOG

Recipe ID	NAME_	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipettelD</u>	Supervised By Sarabjit Jaswal
904	ICP AES ICSA SOLN	MP86460	07/18/2025	08/08/2025	Janvi Patel		METALS_PIP ETTE_1 (ICP	
							A)	

**FROM** 25.00000ml of M6152 + 225.00000ml of MP86452 = Final Quantity: 250.000 ml

Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
911	ICP AES CCV SOLN	MP86462	07/18/2025	08/08/2025	Janvi Patel		METALS_PIP ETTE_1 (ICP	•

**FROM** 50.00000ml of MP86452 + 50.00000ml of MP86453 = Final Quantity: 100.000 ml



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## **Metals STANDARD PREPARATION LOG**

Recipe ID	NAME	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal		
919	ICP AES INTERNAL STD	MP86463	07/18/2025	08/08/2025	Janvi Patel		METALS_PIP ETTE_1 (ICP			
	A)									

FROM 1.00000ml of M5984 + 10.00000ml of M5985 + 1969.00000ml of W3112 + 20.00000ml of M6162 = Final Quantity: 2000.000 ml

Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipettelD</u>	Supervised By Sarabjit Jaswal
903	ICP AES RINSE SOLN	MP86464	07/18/2025	08/08/2025	Janvi Patel		METALS_PIP ETTE_1 (ICP	•

**FROM** 200.0000ml of M6162 + 9800.0000ml of W3112 = Final Quantity: 10000.000 ml



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## **Metals STANDARD PREPARATION LOG**

Recipe ID	NAME	NO.	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipetteID</u>	Supervised By Sarabjit Jaswal
4163	NEW ICV-060925	MP86494	07/18/2025	08/08/2025	Janvi Patel		METALS_PIP ETTE_1 (ICP	•
							A)	

FROM 0.20000ml of M6058 + 0.40000ml of M6163 + 0.40000ml of M6164 + 0.40000ml of M6165 + 98.60000ml of MP86452 = Final Quantity: 50.000 ml

Recipe ID	NAME	<u>NO.</u>	Prep Date	Expiration Date	Prepared By	<u>ScaleID</u>	<u>PipettelD</u>	Supervised By Sarabjit Jaswal
3494	ICP AES ICSAB SOLN-1	MP86495	07/18/2025	08/08/2025	Janvi Patel		METALS_PIP ETTE_1 (ICP	•

FROM 0.10000ml of M6076 + 10.00000ml of M6152 + 10.00000ml of M6155 + 79.90000ml of MP86452 = Final Quantity: 100.000 ml



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 #
Absolute Standards, Inc.	57038 / Sr, 1000 PPM, 125 ml	082922	08/29/2025	04/14/2025 / jaswal	03/16/2023 / jaswal	M5470
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	031523	03/15/2026	04/17/2025 / Janvi	03/17/2023 / bin	M5499
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	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
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute Standards, Inc.	/ Lead (Pb) 1000PPM	100923	10/09/2026	05/20/2024 / Jaswal	12/20/2023 / jaswal	M5747
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
Absolute	/ 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
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #



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.	57016 / S, 1000 PPM, 125 ml	122923	12/29/2026	05/20/2024 / Jaswal	02/09/2024 / jaswal	M5816
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 #
Inorganic Ventures	CGTI1-1 / TITANIUM 125mL 1000ug/mL	T2-TI719972	06/17/2027	06/18/2024 / Jaswal	02/22/2024 / Jaswal	M5942
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date /	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.	57003 / Li, 1000 PPM, 125	061224	06/21/2027	07/01/2024 / Jaswal	07/01/2024 / Jaswal	M5970



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	02/20/2029	08/05/2024 / kareem	06/14/2024 / Jaswal	M5984
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-1 / CLP CAL SOLUTION #1, 125mL	T2-MEB714417	01/27/2027	05/07/2024 / JANVI	02/22/2024 / kareem	M5996
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	12/21/2027	02/03/2025 / JANVI	02/22/2024 / kareem	M5997
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	T2-MEB723367	05/27/2026	05/27/2025 / Janvi	05/14/2024 / Jaswal	M6007
		ı		1	L	Chemtech
Supplier	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Lot #



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.	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 /	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 /	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	CHEM-QC-4 / CHEM-QC-4, Second Source, 1000 ug/ml, B, Mo, Si, Sn, Ti	V2-MEB746173	01/29/2026	01/29/2025 / JANVI	08/22/2024 / Jaswal	M6058



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	01/01/2026	01/01/2025 / kareem	09/19/2024 / kareem	M6076
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.	58112 / Mg, 10000 PPM, 500 ml	112124	11/21/2027	01/13/2025 / kareem	01/13/2025 / kareem	M6127
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
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 #
	58119 / K, 10000 PPM,	103024	10/30/2027	05/06/2025 /	01/13/2025 /	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
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	01/31/2025 / kareem	10/18/2024 / kareem	M6146
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	08/18/2025	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 #
EPA	PART A / ICSA (ICP) STOCK SOLN	ICSA-1211	08/24/2025	02/24/2025 / kareem	04/20/2021 / kareem	M6152
	ItemCode / ItemName	Lot #	Expiration Date	Date Opened / Opened By	Received Date / Received By	Chemtech Lot #
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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	03/25/2029	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 / AI, 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 #
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
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	05/22/2029	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	06/01/2028	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	QCP-CICV-3-125ML / EPA	V2-MEB749572	01/02/2030	06/09/2025 /	06/09/2025 /	M6165



Fax: 908 789 8922

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 / Iwona	W3112



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

R1815/24

CERTIFIED WEIGHT REPORT: 1. Barium nitrate (Ba) Nominal Concentration (µg/mL): Weight shown below was diluted to (mL): Recommended Storage: **NIST Test Number: Expiration Date:** Part Number: Lot Number: Description: IN023 BAD022019A1 RV# 57056 010924 Barium (Ba) **6UTB** 1000 Ambient (20 °C) 010927 Number Pot Conc. (µg/mL) 2000.02 Nominal 1000 0.058 Flask Uncertainty 99.999 5E-05 Balance Uncertainty Purity Uncertainty Assay 3 Purity (%) 0,10 Solvent: 24002546 52.3 8 2% Weight (g) 3.82417 Target Lot # 40.0 Nitric Acid Weight (g) Conc. (µg/mL) 3.82441 Nitric Acid Actual 1000.1 Actual +/- (µg/mL) Reviewed By: Formulated By: Uncertainty Expanded Giovannie 2.0 10022-31-B CAS# (Solvent Safety Info. On Attached pg.)
# OSHA PEL (TWA) LD50 Giovanni Esposito Pedro L. Rentas であるとん SDS Information 0.5 mg/m3 orl-rat 355 mg/kg 3104a 010924 010924 NIST SRM

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

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## 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 certifed (+/-) 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).

Absolute Standards, Inc. 800-368-1131

www.absolutestandards.com



## Certified Reference Material CRM

R 815/24

Solvent:

24002546

Nitric Acid

Lot #

M6028

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

CERTIFIED WEIGHT REPORT:

Part Number:

57048 070124

Lot Number: Description:

Cadmium (Cd)

Nominal Concentration (µg/mL):

NIST Test Number:

6UTB

1000

Recommended Storage:

**Expiration Date:** 

070127 Ambient (20 °C)

Weight shown below was dliuted to (mL):

2000.07

0.100 Flask Uncertainty 5E-05 Balance Uncertainty

2%

40.0 (mL) Nitric Acid

Formulated By:

Alban PROBAN

Aleah O'Brady

070124

Reviewed By:

Pedro L. Rentas

070124

Expanded

Weight (g) Conc. (µg/mL) Uncertainty

Cadmium nitrate tetrahydrate (Cd)

IN024 CDM092021A1

1000

99.999

0.10

36.5

5.4797

5.4804

1000.1

2.0

10022-68-1

0.01 mg/m3

orl-rat 60.2mg/kg

3108

RM#

Number Lot

Conc. (µg/mL)

8

8

Weight (g)

Target

Actual

Actual

Nominal

Purity

Uncertainty Assay Purity (%)

+/- (µg/mL)

CAS#

**SDS Information** 

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

**NIST** SRM

m/z-> -z/m m/z-> 1.0E7 2.0E7 5.OE4 1.0E5 2.5E4 5.0M4 [1] Spectrum No.1 010 110 0 220 120 20 [ 12.514 sec]:58148.D# [Count] [Linear] 230 130 30 240 140 40 N00 150 50 2000 160 60 170 70 180 80 061 Ö 200 100

1 of 2

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

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

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## 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 certifed (+/-) 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).

Part # 57048

2 of 2

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Certified Reference Material CRM

M5810 M5811

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

CERTIFIED WEIGHT REPORT

Part Number: Lot Number: Description:

58126 051523 Iron (Fe)

R: 01/03/24

Solvent: 21110221 Lot # Nitric Acid

Formulated By:

J. Brans

であるから

5.0%

250.0 

Nitric Acid

Giovanni Esposito

051523

Reviewed By:

Pedro L. Rentas

051523

Purity Uncertainty Assay 0.12 Flask Uncertainty Expanded SDS Information

Weight (g) Target Weight (g) Conc. (µg/mL) +/- (µg/mL) CAS#

IN346 2302010-500 10000 99.995 0.10 100.0 50.0034 50.0111 10001.5 20.0 7439-89-6

1. Iron (Fe)

Compound

RM#

Number E E

Conc. (µg/mL)

36

Purity (%)

8

Nominal

Nominal Concentration (µg/mL):

NIST Test Number:

**BTUB** 10000

5E-05 Balance Uncertainty

Recommended Storage:

Ambient (20 °C) 051526

**Expiration Date:** 

Weight shown below was diluted to (mL):

5000.1

Uncertainty

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

LD50

SRM

5 mg/m3 orl-rat 7500mg/kg 3126a

70 BO 90

100

m/2->

10

20

30

40

S O

60

1.054

2.0E4

[1] Spectrum No.1 [ 30.763 sec]:58126.D# [Count] [Linear]

1.0E8

200

m/z->

110

120

130

5.0E7

1.0E8-

5.0E7

230 240

250

260

1 of 2

Lot # 051523

T/2->

210

220

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

	Sb Sb Ba Ba Ba	
	40.02 40.02 40.02 40.02	
	5 8 ប	
	40.22 40.22 40.02 40.03 40.10	
	A C C C E E Dy	
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	Ho Ho FL	
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70.00	8 8 8 8 8 8	) J
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20.02	40.22 40.22 40.22 40.22	
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L		
<0.02	40.02 40.02 40.02 40.02 40.02	
	Zi Z	40,02         Dy         40,02         Hf         40,02         Li         40,02         Ni         40,10         Pr         40,02         Se         40,2         Tb         40,02           40,02         Eu         40,02         Ho         40,02         Lu         40,02         Nb         40,02         Re         40,02         Si         40,02         Tb         40,02           40,02         Gd         40,02         Li         40,02         Mg         40,10         Pd         40,02         Rb         40,02         Ti         40,02           40,10         Gg         40,02         Fe         40,2         Pg         40,02         Rb         40,02         Ng         40,02         Ng         40,02         Ng         40,02         Ng         40,02         Ti         40,02         Ng         40,02         Ng         40,02         Ng         40,02         Ng         40,02         Ng         40,02         Ti         40,02         Ng         40,02 </td

(I) = larger 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

\* 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 certifed (+/-) 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).

## M6000,M6001,M6002,M6003,M6004,M6005,M6006,M6007,M6008



## **Certificate of Analysis**

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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:

WW-LFS-1

Lot Number:

T2-MEB723367

Matrix:

5% (v/v) HNO3

Value / Analyte(s):

1 000 μg/mL ea: Potassium, 600 μg/mL ea: Phosphorus, 300 μg/mL ea:

Iron,

200 μg/mL ea:

Sodium,

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 Aluminum, Al	CERTIFIED VALUE 200.0 ± 0.7 µg/mL	ANALYTE Arsenic, As	CERTIFIED VALUE 80.0 ± 0.7 µg/mL
Barium, Ba	20.00 ± 0.09 μg/mL	Beryllium, Be	20.00 ± 0.13 μg/mL
Boron, B	30.00 ± 0.18 μg/mL	Cadmlum, Cd	20.00 ± 0.09 µg/mL
Calcium, Ca	100.0 ± 0.4 μg/mL	Cerium, Ce	200.0 ± 0.8 µg/mL
Chromium, Cr	40.00 ± 0.30 μg/mL	Cobalt, Co	20.00 ± 0.10 μg/mL
Copper, Cu	30.00 ± 0.13 μg/mL	Iron, Fe	300.0 ± 1.3 μg/mL
Lead, Pb	100.0 ± 0.4 μg/mL	Lithium, Li	20.00 ± 0.08 µg/mL
Magneslum, Mg	200.0 ± 0.8 μg/mL	Manganese, Mn	20.00 ± 0.08 µg/mL
Mercury, Hg	70.0 ± 0.3 µg/mL	Nickel, Ni	50.00 ± 0.22 μg/mL
Phosphorus, P	600.0 ± 2.7 μg/mL	Potassium, K	1 000 ± 4 µg/mL
Selenium, Se	200.0 ± 1.3 μg/mL	Silver, Ag	7.50 ± 0.03 µg/mL
Sodium, Na	300.0 ± 1.4 μg/mL	Strontium, Sr	20.01 ± 0.08 μg/mL
Thailium, Ti	200.0 ± 1.4 μg/mL	Vanadium, V	30.00 ± 0.13 μg/mL
Zinc, Zn	20.00 ± 0.09 μg/mL		

1.034 g/mL (measured at 20  $\pm$  4 °C) Density:

**Assay Information:** 

ANALYTE	METHOD	NIST SRM#	SRM LOT#
Ag	ICP Assay	3151	160729
Ag	Volhard	999c	999c
Ag	Calculated		See Sec. 4.2
Al	ICP Assay	3101a	140903
Al	EDTA	928	928
As	ICP Assay	3103a	100818
В	ICP Assay	3107	190605
Ва	ICP Assay	3104a	140909
Ва	Gravimetric		See Sec. 4.2
Ве	ICP Assay	3105a	090514
Ca	ICP Assay	3109a	130213
Ca	EDTA	928	928
Cd	ICP Assay	3108	130116
Cd	EDTA	928	928
Се	ICP Assay	3110	090504
Се	EDTA	928	928
Со	ICP Assay	3113	190630
Со	EDTA	928	928
Cr	ICP Assay	3112a	170630
Cu	ICP Assay	3114	121207
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	Traceable to 3152A	S2-NA700842
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
TI	ICP Assay	3158	151215
V	IC Assay	3165	160906
V	EDTA	928	928
Zn	ICP Assay	3168a	120629
Zn	EDTA	928	928

Page 4 of 6

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<sub>CRM/RM</sub>, where two or more methods of characterization are used is the weighted mean of the results:

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

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

w<sub>i</sub> = the weighting factors for each method calculated using the inverse square of the variance:

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

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k \left\{ u^2_{char} + u^2_{bb} + u^2_{lts} + u^2_{ts} \right\}^{1/2}$ 

k = coverage factor = 2

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

ubb = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

### Characterization of CRM/RM by One Method

Certified Value, X<sub>CRMRM</sub>, where one method of characterization is used is the mean of individual results:

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

X<sub>a</sub> = mean of Assay Method A with

uchar a = the standard uncertainty of characterization Method A

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k (u^2_{chara} + u^2_{bb} + u^2_{tts} + u^2_{ts})^{1/2}$ 

k = coverage factor = 2

uchar a = the errors from characterization

u<sub>bb</sub> = bottle to bottle homogeneity standard uncertainty

u<sub>lts</sub> = long term stability standard uncertainty (slorage) u<sub>ts</sub> = 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

- 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

Low Silver Note: This solution contains "LOW" levels of Silver. Please store this entire bottle inside a sealed glass jar.

## 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

August 30, 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

- August 30, 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 CRMRM can be supported by long term stability studies conducted on properly stored and handled CRMRMs. Lot expiration is limited primarily by transpiration (loss of water from the solution) and infrequently by chemical stability.

## 11.3 Period of Validity

<ul> <li>Sealed TCT Bag Open Date</li> </ul>	
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- 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

DD978hi.



# 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-2

Lot Number:

U2-MEB731108

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:

## 3.0 **CERTIFIED VALUES AND UNCERTAINTIES**

**ANALYTE** Antimony, Sb **CERTIFIED VALUE** 80.1 ± 0.6 µg/mL

Titanium

**ANALYTE** Molybdenum, Mo **CERTIFIED VALUE** 40.03 ± 0.18 µg/mL

Silica, SIQ2

200.2 ± 1.3 μg/mL

Tin, Sn

 $70.0 \pm 0.4 \, \mu g/mL$ 

Titanium, Ti

20.01 ± 0.13 µg/mL

Density:

1.025 g/mL (measured at 20 ± 4 °C)

# **Assay Information:**

ANALYTE Mo	METHOD ICP Assay	NIST SRM# 3134	SRM LOT# 130418
Мо	Calculated		See Sec. 4.2
Sb	ICP Assay	3102a	140911
SiO2	ICP Assay	3150	130912
Sn	ICP Assay	3161a	140917
П	ICP Assay	3162a	130925
Ti	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<sub>CRM/RM</sub>, where two or more methods of characterization are used is the weighted mean of the results:

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

X<sub>i</sub> = mean of Assay Method i with standard uncertainty u<sub>char i</sub>

 $\mathbf{w_j}$  = the weighting factors for each method calculated using the inverse square of the variance:

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

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} \simeq k \left\{ u^2_{char} + u^2_{bb} + u^2_{lts} + u^2_{ts} \right\}^{\frac{1}{2}}$ 

k = coverage factor = 2

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

ubb = bottle to bottle homogeneity standard uncertainty

u<sub>lts</sub> = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

## Characterization of CRM/RM by One Method

Certified Value, X<sub>CRM/RM</sub>, where one method of characterization is used is the mean of Individual results:

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

X<sub>a</sub> = mean of Assay Method A with

uchar a = the standard uncertainty of characterization Method A

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k \left(u^2_{char} + u^2_{bb} + u^2_{bs} + u^2_{ts}\right)^{1/2}$ 

k = coverage factor = 2

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

ubb = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage)

uts = 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/Δ

# 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 <u>Terms and Conditions of Sale.</u>
  <a href="https://www.inorganicventures.com/terms-and-conditions-sale">https://www.inorganicventures.com/terms-and-conditions-sale</a>. 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  $4^{\circ}$   $24^{\circ}$  C to minimize the effects of transpiration. Use at  $20^{\circ} \pm 4^{\circ}$  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"

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# 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

March 17, 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

- March 17, 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

<ul> <li>Sealed TCT Bag Open Date</li> </ul>	
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- 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 3D978hi.

**Certifying Officer:** 

Paul Gaines
Chairman / Senior Technical I

Chairman / Senior Technical Director

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



# Certified Reference Material CRM

R: 03/01/23(12)



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

									-			
CENTIFIED WEIGHT REPORT:						Lot #			)			
Part Number: Lot Number:		57058			Solven	t: 2111022	Solvent: 21110221 Nitric Acid		T	Errore Br		
Description:		Cerlum (Ce)	3							0	K	
Section 2		00000			2%		Nitric Acid	-	Formulated By.	: Lawrence Barry	020623	Lon
Recommended Storage: Nominal Concentration (ug/mL):		020626 Ambient (20 °C) 1000	(Ç)			(JE)			1/2	to Herris	1	
NIST Test Number: 6UTB Weight shown below was diluted to (mL):	dilute	6UTB of to (mL):	1000.12	3E-05 E	5E-05 Balance Uncertainty 0.058 Flask Uncertainty		:		Reviewed By:	Pedro L. Rentas	29020	
		Ę		Purity 1	Nominal Purity Uncertainty Assay.	y Target	Actual	Actual	Expanded Uncertainty	SDS Information (Solvent Safety Info. On Attached pg.)	ation Attached pg.)	NIST
Compound	25. 25.		Number Conc. (ug/mL) (%) Purity (%) (%)	3	Purity (%) (%)		Weight (g)	Conc. (ug/mL)	Weight (g) Weight (g) Conc. (ug/ml.) +/- (ug/ml.) CAS#	CAS# OSHA PEL (TWA)	1D50	SRM

Compound	RM#	Lot	Nominal Conc. (vg/mL)	Purity (%)	Purity Uncertainty Assay (%) Purity (%) (%)	Assay (%)	Target Weight (g)	Actual Weight (g)	Actual Actual Uncertainty Weight (g) Conc. (µg/mL) +/- (µg/mL)	Uncertainty +/- (ug/mL)	SS	(Solvent Safety Info. On Attached pg.) CAS# OSHA PEL (TWA) LD50	ched pg.) LD50	NIST
Cerium nitrate hexahydrate (Ce)	1N146	IN146 Z512CEB1	1000	99.989	0.10	32.8	3.04919	3.04921 1000.0	1000.0	20	II ==	₹Z	ď Z	AN
[1] Spectrum N	lo.1 [ 43.472	sec]:58158.D#	[1] Spectrum No.1 [ 43.472 sec]:58158.D# [Count] [Linear]							Ш				$\  \cdot \ $
1.0€9_														
- 1.4 m) <b>1</b>														
5.0E8														
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# Certified Reference Material CRM





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

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

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Physical Characterization:

(T)= Target analyte

Certified by:

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



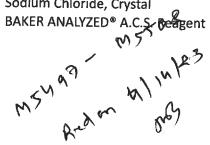
\* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.

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Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above). Standards are certifed (+/-) 0.5% of the stated value, unless otherwise stated.

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Sodium Chloride, Crystal







Material No.: 3624-01

Batch No.: 0000281938

Manufactured Date: 2021-06-07

Retest Date: 2026-06-07

Revision No.: 2

# Certificate of Analysis

Test	Specification	Result
Assay (NaCl) (by Ag titrn)	≥ 99.0 %	100.0 %
pH of 5% Solution at 25°C	5.0 - 9.0	6.3
Insoluble Matter	≤ 0.005 %	0.003 %
lodide (I)	≤ 0.002 %	< 0.002 %
Bromide (Br)	≤ 0.01 %	< 0.01 %
Chlorate and Nitrate (as NO₃)	≤ 0.003 %	< 0.001 %
ACS - Phosphate (PO <sub>4</sub> )	≤ 5 ppm	< 5 ppm
Sulfate (SO <sub>4</sub> )	≤ 0.004 %	< 0.004 %
Barium (Ba)	Passes Test	Passes Test
ACS - Heavy Metals (as Pb)	≤ 5 ppm	< 5 ppm
Iron (Fe)	≤ 2 ppm	< 1 ppm
Calcium (Ca)	≤ 0.002 %	< 0.001 %
Magnesium (Mg)	≤ 0.001 %	< 0.001 %
Potassium (K)	≤ 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



# Absolute Standards, Inc. 800-368-1131

www.absolutestandards.com



# Certified Reference Material CRM

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

CERTIFIED WEIGHT REPORT: Nominal Concentration (µg/mL): Recommended Storage: Volume shown below was diluted to (mL): NIST Test Number: **Expiration Date:** Part Number: Lot Number: Description: Part **BTU9** 1000 58024 060523 Ambient (20 °C) 060526 Chromium (Cr) Lot 2000.02 Dilution 0.058 5E-05 Initial Flask Uncertainty Balance Uncertainty Uncertainty 21110221 Nominal Lot # 2.0% Nitric Acid Solvent: (III) Initial 40.0 Nitric Acid Final Formulated By: Reviewed By: Uncertainty Expanded Lavense (Solvent Safety Info. On Attached pg.) Pedro L. Rentas Lawrence Barry **SDS Information** 060523 060523

Chromium(III) nitrate nonahydrate (Cr) 58124

071122

0.1000

200.0

0.084

1000

10000.1

1000.0

12

7789-02-8

0.5 mg(Cr)/m3

ori-rat 3250 mg/kg 3112a

Compound

Number

Number

Factor

Vol. (mL) Pipette (mL) Conc. (µg/mL)

Conc. (µg/mL) Conc. (µg/mL)

+/- (µg/mL)

CAS#

OSHA PEL (TWA)

LD50

TSIN SRM

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Part # 58024



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

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(I)= larget 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.
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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).

# Absolute Standards, Inc. 800-368-1131

www.absolutestandards.com

CERTIFIED WEIGHT REPORT:

Part Number: **Lot Number:** Description:

57082 100923 Lead (Pb)



Certified Reference Material CRM

MSTHT

R: 12/20/23

Lot #

Solvent: 24002546 Nitric Acid

2% 60.0 Nitric Acid

1000 Ambient (20 °C)

Recommended Storage:

**Expiration Date:** 

100926

Nominal Concentration (µg/mL): Weight shown below was diluted to (mL): **NIST Test Number: BTU9** 3000.41 0.06 Flask Uncertainty 5E-05 Balance Uncertainty Reviewed By:

Lot

Nominal

Purity

Uncertainty Assay

**PV#** Number Conc. (µg/mL) (%) Purity (%) (%) Weight (g) Conc. (µg/mL) +/- (µg/mL) CAS# (Solvent Safety Info. On Attached pg.) OSHA PEL (TWA) SRM

Formulated By: Lawrence Barry 100923

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		intryns-rat 93 mg/kg
		3128

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# Physical Characterization:

(1)= Target analyte

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

Certified by:

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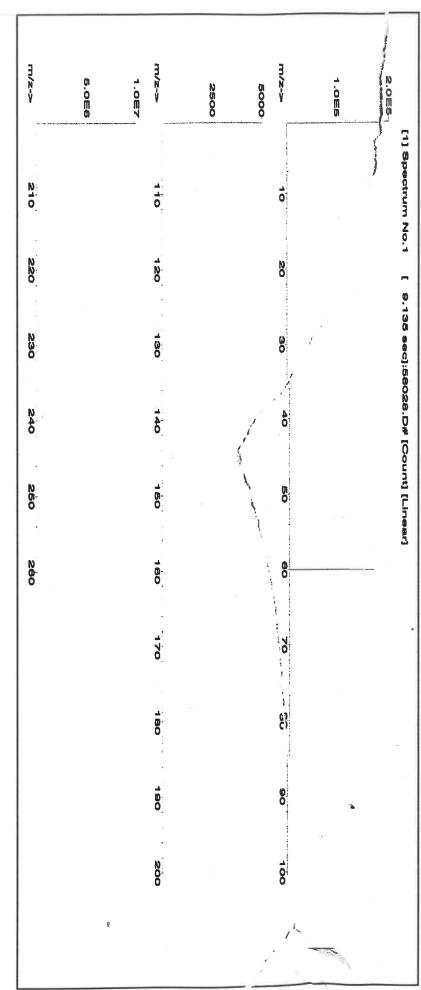


# Certified Reference Material CRM

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

CERTIFIED WEIGHT REPORT: Nickel(II) nitrate hexahydrate (Ni) Nominal Concentration (µg/mL): m/z-> 1.005 2.OMS Recommended Storage: Volume shown below was diluted to (mL): NIST Test Number: **Expiration Date:** Part Number: Lot Number: Description: [1] Spectrum No.1 ō 58128 Number Part **BTUB** 1000 57028 091223 Ambient (20 °C) 091226 Nickel (NI) 062023 ĕ 0 [ 9.135 sec]:58028.D# [Count] [Linear] 2000.02 0.1000 Dilution Factor 12/20/23 000 Vol. (mL) Pipette (mL) Conc. (ug/mL) 200.0 0.058 5E-05 Balance Uncertainty Flask Uncertainty Uncertainty 0.084 24002546 M5748 Lot # Nominal 2.0% 8 Ci O Conc. (ug/ml.) Conc. (ug/ml.) Nitric Acid Solvent: 10000.4 E 40.0 0 Nitric Acid 1000.0 Formulated By: Reviewed By: +/- (µg/ml\_ Uncertainty Expanded 12 (C) 13478-00-7 CAS# (Solvent Safety Info. On Attached pg.)

# OSHA PEL (TWA) LD50 OSHA PEL (TWA) Pedro L. Rentas Lawrence Barry 00 SDS Information mg/m3 100 orl-rat 1620 mg/kg 091223 091223 3136 NEST NEST SR



Part # 57028

800-368-1131

Absolute Standards, Inc.

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

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# Physical Characterization:

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

Certified by:

\* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
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# 800-368-1131 Absolute Standards, Inc.

www.absolutestandards.com

CERTIFIED WEIGHT REPORT



Certified Reference Material CRM

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

R:8/25) Lot # Solvent:

21110221

Nitric Acid

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

Recommended Storage: **Expiration Date:** Ambient (20 °C) 071726 2.0%

(mL)

40.0

Nitric Acid

Formulated By:

Benson Chan

071723

Nominal Concentration (µg/mL): Volume shown below was diluted to (mL): **NIST Test Number:** 1000 **BTU9** 2000.02 0.058 5E-05 Flask Uncertainty Balance Uncertainty Reviewed By: Pedro L. Rentas

Part

Lot

Dilution

Initia

Uncertainty

Nominal

Initial

 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 ori-rat 794 mg/kg

Number Number Factor Val. (mL) Pipette (mL) Conc. (µg/mL) Conc. (µg/mL) Conc. (µg/mL) +/- (µg/mL) CAS# OSHA PEL (TWA) LDSO 3114 SRM

Final Uncertainty Expanded (Solvent Safety Info. On Attached pg.) SDS Information TSIN

071723

5.0E5 1.0E6 [1] Spectrum No.1 [ 33.422 sec]:58029.D# [Count] [Linear]

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

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(I) = larget analyte

# Physical Characterization:

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

Certified by:

2 of 2

<sup>\*</sup> 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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ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com

# CERTIFIED WEIGHT REPORT:

02/09/24 Lot #

24002546

Nitric Acid Solvent:

Part Number: Lot Number: Description: 57004 102523

Beryllium (Be)

Nominal Concentration (µg/mL): Recommended Storage: NIST Test Number: 1000 Ambient (20 °C)

**Expiration Date:** 

102526

BTU<sub>9</sub>

Volume shown below was diluted to (mL): 2000.02

0.058

Flask Uncertainty Balance Uncertainty

5E-05

Number

Number Lot

Vol. (mL.)

Part

Dilution Factor

hitia

Uncertainty

Nominal

(IE) 40.0

2.0%

Nitric Acid

Benson Chan

102523

Formulated By:

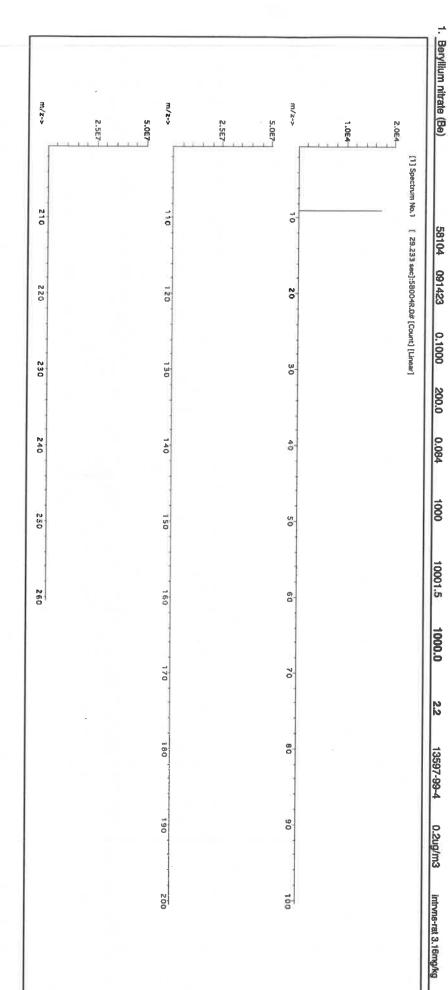
Pedro L. Rentas

102523

Reviewed By:

Pipette (mL) Conc. (µg/mL) Conc. (µg/mL) Conc. (µg/mL) Final +/- (µg/mL) Uncertainty Expanded CAS# (Solvent Safety Info. On Attached pg.) OSHA PEL (TWA) SDS Information LD50 NIST SRM

₹



Part # 57004





Absolute Standards, Inc.

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800-368-1131



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

40.02 Cd 40.02 Dy 40.02 Cg 40.02 Br 40.02 Cg 40.02 Br 40.02 Cg 40.02 Gd T Cr 40.02 Gd 40.02 Co 40.02 Gg
40.02 Cd 40.02 40.02 Cc 40.02 40.02 Cc 40.02 7 Cr 40.02 40.02 Cc 40.02 40.02 Cc 40.02 40.02 Cc 40.02 40.02 Cc 40.02
40.02 Cd 40.02 40.02 Cc 40.02 40.02 Cc 40.02 7 Cr 40.02 40.02 Cc 40.02 40.02 Cc 40.02 40.02 Cc 40.02 40.02 Cc 40.02
40.02 40.02 40.02 40.02 40.02 40.02
a B B B B S B

(T) = Target analyte

# Physical Characterization:

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

# Certified by:



All standard containers are meticulously cleaned prior to use.

2 of 2

<sup>\*</sup> The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.

<sup>\*</sup> 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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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



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# CERTIFIED WEIGHT REPORT:

Part Number:

57050 071123 Tin (Sn) 202109 Salvents: 21110221 Lot # 1224 Nitric Acid

22D0562008

Hydrochloric acid

3 6% 10.0 30.0 Hydrochloric acid Nitric Acid Formulated By:

Benson Chan

071123

Nominal Concentration (µg/mL):

1000

Ambient (20 °C) 071126

Recommended Storage:

Expiration Date:

Description: Lot Number:

Reviewed By: Pedro L. Rentas

Weight shown below was diluted to (mL): **NIST Test Number: BTU9** 499.93 0.058 Flask Uncertainty 5E-05 Balance Uncertainty 071123

1. Ammonium hexafluorostannate(IV) (Sn) [1] Spectrum No.1 IN010 SND042023A1 RM# Number ρţ Conc. (µg/mL) Nominal 1000 (%) Uncertainty Assay
Purity (%) (%) 0.10 44.2 1.13107 Weight (g) Target 1.13286 Weight (g) Conc. (ug/ml.) Actual 1001.6 Actual +/- (µg/mL) Uncertainty Expanded 2.0 CAS# SDS Information
(Solvent Safety Info. On Attached pg.)
LD50 7 mg/m3 ₹ 3161a SRM

m/z-> ---x/m --Z/111 2.5E4 5.0E4 1.0ES 2.0E6 2.5E5 S.OEG 210 110 0 120 220 N [ 15.034 sec]:58150.D# [Count] [Linear] 230 130 8 240 140 40 250 150 Ö 160 260 60 170 70 180 80 190 90 200 100

1 of 2

Part # 57050

Lot # 071123



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

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

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(I) = larget analyte

# Physical Characterization:

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

Certified by:

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

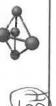
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\* Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, D.C. (1994).

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800-368-1131 www.absolutestandards.com	Do.			8	Certified Re	d Reference A	Certified Reference Material CRM $[02]$ of $[25]$	MASON			AR-150 https://ak	ANAB ISO 17034 Accredited AR-1539 Certificate Number https://Absolutestandards.com	creditec Numbe rds.con
CERTIFIED WEIGHT REPORT:						Fot#	Solvent:						
Part Number:		57027				24002546	Nitric Acid			2			
Lot Number: Description:		091923 Cobalt (Co)	ī						C fam	) may	D.		
1						2.0%	40.0	Nitric Acid	Formulated By:	Lawr	Lawrence Barry	091923	
Expiration Date:		091926					(Jw.)		1	\	0		
Recommended Storage:		Ambient (20 °C)	<b>်</b>						N.	X			
Nominal Concentration (ug/ml.):		1000							Leens	1	4		
NIST Test Number:		eUTB		5E-05	Balance Uncertainty	<b>\$</b>			Reviewed By:	Pedn	Pedro L. Rentas	091923	
Volume shown below was diluted to (mL):	r was dilute	d to (mL):	2000.02	0.058	0.058 Flask Uncertainty								
									Expanded	S	SDS Information		
	Part	ĕ	Dilution	Initial	Uncertainty	Nominal	Initial	Final	Uncertainty	(Solvent Sal	(Solvent Safety Info. On Attached pg.)	hed pg.)	NIST
Compound	Number	Number	Factor	Vol. (mL)	Vol. (ml.) Pipette (ml.) Conc. (µg/ml.)	nc. (ug/mL)	Conc. (µg/mL) Conc. (µg/mL) +/- (µg/mL)	Conc. (µg/ml.)		CAS# OSHA	OSHA PEL (TWA)	LDSO	SRM

[1] Speatrum No.1									Sulfill too willing	0110
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5.0E7										
TVZ-> 110 120	130	140	150	100	170	180		0	500	
5.0E7										

1 of 2

260

280

240

230

220

010

W/z->

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# Certified Reference Material CRM





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

							Trace M	etals	Verifical	tion	by ICP-M	4S (F	g/mL)						
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(T)= Target analyte

# Physical Characterization:

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



<sup>\*</sup> 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.



Lot # 091923

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).

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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).

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# 02/00/24 Certified Reference Material CRM

W 580



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CERTIFIED WEIGHT REPORT: Nominal Concentration (µg/mL): Recommended Storage: NIST Test Number: Expiration Date: Part Number: Description: Lot Number: 57033 111323 Arsenic (As) **BTUB** 1000 111326 Ambient (20 °C) 5E-05 Balance Uncertainty 24002546 Lot# 2.0% Nitric Acid Solvent: 80.0 Nitric Acid Formulated By: Reviewed By: Therence Pedro L. Rentas Lawrence Barry

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

orl-rat 500 mg/kg 3103a

Number Part

Number Lot

Vol. (mL)

Pipette (mL) Conc. (µg/mL)

Conc. (µg/mL) Conc. (µg/mL)

+/- (µg/ml.) Uncertainty Expanded

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

LD50

NIST SRM

SDS Information

111323

111323

Dilution Factor

initial

Uncertainty

Nominal

Initial

Final

Compound

Volume shown below was diluted to (mL):

4000.0

0.06

Flask Uncertainty

-z/x->	500	m/z->	N IN IN	m/z-> 5.0≣4	1.0厘5	2.0E5
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						Z 0.1
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		A second		er West A best		90]:570
240		140		ò		33.D#
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Part # 57033

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

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Certified by:



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Part # 57033

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# Certified Reference Material CRM

M.5814

R - 02 00 124

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CERTIFIED WEIGHT REPORT: 1. Boric acid (B) Nominal Concentration (µg/mL): Recommended Storage: 17/Z-V <-Z/111 m/z-> Weight shown below was diluted to (mL): 2.5EG 5.0E6 2.5E6 S.OE6 1.0E4 2.0≡4 **NIST Test Number: Expiration Date:** Part Number: Lot Number: Description: [1] Spectrum No.1 110 1210 0 IN018 BV092016A1 RM# 57005 071123 1000 Ambient (20 °C) 071126 Boron (B) Number Ĕ 120 220 Ŋ [ 12.275 sec]:58105.D# [Count] [Linear] Conc. (µg/mL) 1999.48 Nominal 100 130 230 30 0.058 Flask Uncertainty Purity 5E-05 Balance Uncertainty 8 Uncertainty Assay Purity (%) 0.10 140 240 40 Solvent: MKBQ8597V Ammonium hydroxide 17.3 2.0% 3 11.55772 Weight (g) 150 Target 250 (I) O 40.0 Weight (g) Ammonium hydroxide 11.56201 Actual 200 160 60 Conc. (µg/mL) 1000.4 Actual 170 70 Formulated By: +/- (µg/mL) Reviewed By: Uncertainty Expanded 120 180 10043-35-3 80 CAS# (Solvent Safety Info. On Attached pg.)
# OSHA PEL (TWA) LD50 Benson Chan Pedro L. Rentas OSHA PEL (TWA) tento **SDS Information** 190 90 2 mg/m3 200 100 orl-rat 2660 mg/kg 3107 071123 071123 NIST SRM

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

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

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	Z		
	4400 4400 4400 4400 4400 4400 4400 440		
		_	

# Physical Characterization:

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

Certified by:

- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated. 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).
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# R1 02/09/124 Certified Reference Material CRM

M5816

CERTIFIED WEIGHT REPORT

Part Number:

Lot Number: Description:

57016 122923

Solvent:

122923

**ASTM Type 1 Water** 

Lot #

**Expiration Date:** 122926 Sulfur (S)

Nominal Concentration (µg/mL): NIST Test Number: 1000

Recommended Storage:

Ambient (20 °C)

Weight shown below was diluted to (mL): 4000.0 5E-05 Balance Uncertainty 0.06 Flask Uncertainty

Nominal

Purity

Uncertainty Assay

Target

Actual

Uncertainty

Expanded

Reviewed By:

Pedro L. Rentas

122923

tento

Formulated By:

Benson Chan

122923

 Ammonium sulfate (S) IN117 SLBR7225V <del></del> Number Conc. (µg/mL) 1000 99.9 38 Purity (%) 0.10 24.3 38 Weight (g) 16.4979 Weight (g) Conc. (µg/mL) 16.4980 1000.0 +/- (µg/mL) 20 7783-20-2 CAS# SDS Information
(Solvent Safety Info. On Attached pg.)
LD50 ¥ orl-rat 4250mg/kg 3181 SRM

1/Z-V m/z-> m/z-> N.SES S.OEB 5.OE7 1.0**E**8 N. SES 5.0E5 [1] Spectrum No. 1 210 110 0 120 ななり 0 [ 33.603 sec]:57016.D# [Count] [Linear] 130 230 30 140 240 40 250 150 000 160 200 00 170 0 180 80 190 00 200 100

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Part # 57016

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

(I) = larget analyte

# **Physical Characterization:**

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

Certified by:

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# Certified Reference Material CRM

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CERTIFIED WEIGHT REPORT:

Part Number: Lot Number: Description:

> 57015 091123

Solvent: 24002546 Lot # Nitric Acid

Nitric Acid

Formulated By:

Lawrence Barry

091123

(JE) 40.0

2%

Nominal Concentration (µg/mL):

**NIST Test Number:** 

BITUB 1000 Recommended Storage:

**Expiration Date:** 

091126

Phosphorous (P)

Ambient (20 °C)

Weight shown below was diluted to (mL):

2000.02

0.058 Flask Uncertainty

5E-05 Balance Uncertainty

Lot

Nominal

Purity

Uncertainty Assay

Target

Actual

Uncertainty

Expanded

**SDS** information

Reviewed By:

Pedro L. Rentas

rento

091123

 Ammonium dihydrogen phosphate (P) IN008 Pvos2018A1 [1] Spectrum No.1 RM# Number [ 12.074 sec]:58115.D# [Count] [Linear] Conc. (µg/mL) 1000 99.999 3 Purity (%) 0.10 27.5 3 Weight (g) 7.2729 Weight (g) Conc. (µg/mL) 7.2730 1000.0 +/- (µg/mL) 2.0 7722-76-1 CAS# (Solvent Safety Info. On Attached pg.)
# OSHA PEL (TWA) LD50 5 mg/m3 rl-rat >2000mg/ki 3186 SRM

000

100

1000

500

Part # 57015



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

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

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	<b>40.02</b>	70.02	3	<b>∆0,02</b>	2000	3	<b>∆</b> 0.02	2	200	20.02	300			
	Zr	2	7	<u>~</u>	16	\$	\ -		9	*				
	40.02	20.02	3	20.02	70.0>	3	<u>6</u> 0.02		A) (2)	20.02				

# 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 certifed (+/-) 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

R: 02/22/24 M.5942

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:** 

Single Analyte Custom Grade Solution

Catalog Number:

CGTI1

Lot Number:

T2-TI719972

Matrix:

2% (v/v) HNO3

tr. HF

Value / Analyte(s):

1 000 µg/mL ea:

Titanium

Starting Material:

Ti Metal

Starting Material Lot#:

2094

Starting Material Purity: 99.9975%

## 3.0 **CERTIFIED VALUES AND UNCERTAINTIES**

**Certified Value:** 

 $1002 \pm 5 \mu g/mL$ 

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<sub>CRM/RM</sub>, where two or more methods of characterization are used is the weighted mean of the results:

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

 $\mathbf{X}_{i}$  = mean of Assay Method i with standard uncertainty  $u_{char}$  i

wi = the weighting factors for each method calculated using the inverse square of

 $w_i = (1/u_{chari})^2 / (\Sigma(1/(u_{chari})^2))$ 

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k \left(u^2_{char} + u^2_{bb} + u^2_{lts} + u^2_{ts}\right)^{1/2}$ 

k = coverage factor = 2

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

ubb = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

# Characterization of CRM/RM by One Method

Certified Value, X<sub>CRM/RM</sub>, where one method of characterization is used is the mean of individual results:

X<sub>CRM/RM</sub> = (X<sub>a</sub>) (u<sub>char a</sub>)

X<sub>n</sub> = mean of Assay Method A with

uchar a = the standard uncertainty of characterization Method A

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

k = coverage factor = 2

uchar a = the errors from characterization

ubb = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage) uts = 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	<	0.000536	М	Eu	<	0.000268	0	Na	<	0.032670	M	Se		0.001204	0	Zn	<	0.003267
	0	Αl		0.000872	0	Fe		0.003225	0	Nb	<	0.043560	0	Si		0.004735	0	Zr	<	0.043560
	М	As	<	0.008586	M	Ga	<	0.000268	M	Nd	<	0.000268	M	Sm	<	0.000268				
	М	Au	<	0.004577	M	Gd	<	0.000268	0	Ni	<	0.010890	M	Sn		0.000096				
	0	В	<	0.008929	M	Ge	<	0.002146	M	Os	<	0.000269	0	Sr		0.000096				
	М	Ba	<	0.002683	M	Hf		0.002161	0	P	<	0.054450	M	Ta		0.010560				
	M	Ве	<	0.005366	М	Hg	<	0.003231	M	Pb	<	0.001073	M	Tb	<	0.000268				
	M	Bi	<	0.001609	M	Ηо	<	0.000268	М	Pd	<	0.000268	M	Te	<	0.001341				
	0	Ca		0.000676	M	In	<	0.002683	M	Pr	<	0.000268	M	Th	<	0.053663				
	M	Cd	<	0.000268	M	lr	<	0.000269	M	Pt	<	0.000536	s	Ti	<					
	М	Ce	<	0.000268	M	K		0.001172	M	Rb	<	0.000268	M	TI	<	0.000268				
	М	Co	<	0.004293	М	Lа	<	0.000268	M	Re	<	0.000268	M	Tm	<	0.000268				
	М	Cr		0.000752	0	Li	<	0.027225	M	Rh	<	0.000268	M	U	<	0.000268				
	М	Cs	<	0.000268	М	Lu	<	0.000268	M	Ru	<	0.000269	M	V	<	0.019855				
-	0	Cu	<	0.010890	0	Mg	<	0.005445	i	S	<		M	W		0.000473				
	М	Dy	<	0.000268	0	Mn	<	0.003267	M:	Sb	<	0.006976	M	Υ	<	0.002146				
	М	Er	<	0.000268	M	Мо		0.000774	0	Sc	<	0.004900	M	Yb	<	0.000536				

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  $4^{\circ}$   $24^{\circ}$  C to minimize the effects of transpiration. Use at  $20^{\circ} \pm 4^{\circ}$  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 Chemical Compatibility - Soluble in concentrated HCl, HF, H3PO4 H2SO4 and HNO3. 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 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); Oxide - high temperature history (~800EC) brookite (fuse in Pt0 with K2S2O7); Ores (fuse in Pt0 with KF + K2S2O7 - no KF if silica not present); Organic Matrices (Dry ash at 450EC in Pt0 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 crystalline form).

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 48 amu	14 ppt	N/A	32S16O, 32S14N,
			14N16O18O,
			14N17N2, 36Ar12C,
			48Ca, [96X=2
			(where X = Zr, Mo,
			Ru)]
ICP-OES 323.452 nm	0.0054 / 0.00092 µg/mL	1	Ce, Ar, Ni
ICP-OES 334.941 nm	0.0038 / 0.000028 µg/mL	1	Nb, Ta, Cr, U
ICP-OES 336.121 nm	0.0053 / 0.000034 µg/mL	1	W, Mo, Co

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

# CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY

## 11.1 Certification Issue Date

June 17, 2022

11.0

- 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

<ul> <li>Sealed TCT Bag Open Date:</li> </ul>	
---	--

- 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

2009784.

**Certifying Officer:** 

**Paul Gaines** Chairman / Senior Technical Director

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



# Certified Reference Material CRM

M5962 R! 06/14/24



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

m/z->		į,	m/z->		10 c	÷ is	1. Selenium (Se)	Compound		<		Nominal Co	Re			CERTIFIED WEIGHT REPORT	מדודודה שובום
210	1.008	2.008	110	1.008	/z-> 10	[1] Spectrum No.1				Volume shown below was diluted to (mL):	NIST Test Number:	Nominal Concentration (µg/mL):	Expiration Date: Recommended Storage:		Lot Number: Description:	Part Number:	1 11000H
0			0		Ū	Z	58134	Number	Part	as dilute	_				in in in	_	
220			120		N 0	r.	071223	Number	Lot	d to (mL):	6UTB	1000	Ambient (20 °C)	76007	060624 Selenium (Se)	57034	
Ŋ			<u></u>		ω	3.702	0.1000	Factor	Dilution	2000.07			<u>ර</u> ೆ		Se)		
230			130		90	sec]:58	200.0	Val. (mL	Initial	0.100	5E-05						
240			140		40	33.702 sec]:58034.D# [Count] [Linear]	0.084	Vol. (mL) Pipette (mL) Conc. (µg/mL)	Uncertainty	Flask Uncertainty	Balance Uncertainty						
250			150		50	Count) [L	1000	Conc. (µg/mL)	Nominal	ťγ	ainty			2.0%	24007540	24002546	
260			160		. 60	inear	10002.5	Conc. (µg/mL	Initial				(m_)	40.0	Na Contraction	Solvent:	
o							1000.0	Conc. (µg/mL) Conc. (µg/mL)	Final					Nitric Acid			(1)
			170		70		2.2	.) +/- (µg/mL)	Uncertainty	Expanded	Reviewed By:	100	N	Formulated By:			10
			180		80		7782-49-2	C	(So		y:	100	11	By:			
			190		90		2 0.2 mg/m3	OSHA PEL (TWA)	(Solvent Safety Info. On Attached pg.)	SDS Information	Pedro L. Rentas	achie		Benson Chan	M		
			200		100			NA)	). On Atta	rmation	ntas	,	/	בֿן			
			-		J		orl-rat 6700 mg/kg	LDS0	ched pg.)		060624			060624			
							3149	SRM	NIST		4			4		_	

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

							I race M	1etals	Verifica	ition	oy ICP-M	S (H	g/mL)						
Αl	<0.02	CG	<0.02	Dγ	<0.02	HH	<0.02	<u> </u>	<0.02	Z.	<0.02	Pr	<0.02	Se	-1	16	40.02	W	40,02
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As	<0.2	ಕಿ	<0.02	핕	<0.02	Ы	<0.02	Mg	<0.01	°	<0.02	Rh	40.02	Ag	<0.02	∄	40.02	۷	<0.02
Ва	<0.02	င္တ	<0.02	æ	<0.02	H.	<0.02	Mn	<0.02	Pd	<0.02	₽.	<0.02	Na	<0.2	Ħ	<0.02	4	<0.02
Ве	40.01	ť	40.02	G	<0.02	Fe	<0.2	Hg	A02	P	<0.02	Ru	40.02	Sr	<0.02	Tm	<0.02	¥	<0.02
Bi	40.02	င္ပ	<0.02	ଫୁ	<0.02	Ľ	<0.02	Mo	<0.02	7	<0.02	Sm	40.02	S	<0.02	Sn	40.02	Zn	<0.02
В	<0.02	Cι	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	×	40.2	Sc	<0.02	Ta	<0.02	Ħ	<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 certifed (+/-) 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: Lithium nitrate (Li) Nominal Concentration (µg/mL): m/z-> Recommended Storage: Volume shown below was diluted to (mL): NIST Test Number: **Expiration Date** [1] Spectrum No.1 [ 32.093 sec]:58003.D# [Count] [Linear] Description: 210 10 Part Lot Number Number 58103 070622 0.1000 57003 062124 Lithium (Li) 6UTB 062127 Ambient (20 °C) 1000 220 120 20 250.11 230 25.0 0.004 Initial Uncertainty Nominal Initial Final

Vol. (mL) Pipette (ml.) Conc. (µg/mL) Conc. (µg/mL) Conc. (µg/mL) 0.016 Flask Uncertainty 5E-05 Balance Uncertainty HEBSON OF PSON 240 40 1000 24002546 Lot# 2.0% 250 150 50 Nitric Acid Solvent: 10000.4 (mL) 260 1000.0 Nitric Acid 7/01/24 Formulated By: Reviewed By: +/- (µg/mL) Uncertainty Giovannie Capacito 2.0 7790-69-4 5 mg/m3 orl-rat 1426 mg/kg NA SDS Information
(Solvent Safety Info. On Attached pg.)
CAS# OSHA PEL (TWA) LD50 Pedro L. Rentas Giovanni Esposito 9 0 062124 062124 SRM

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

**\$** 

Certified Reference Material CRM

20

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

Part # 57003 Lot # 062124

1 of 2

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



## Certified Reference Material CRM



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

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

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×	7	Þ	Ы	os Os	ß	N		tion	١
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Ta	s	Sr	Na	Ag	2	9 5	e	ı	١
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11	Sn	Tm	H	II	1 10	1	7		I
<0.02	<0.02	<0.02	<0.02	20.02	20.02	3	<0.02		
12	Zn	×	Ϋ́	<	: 0	1	W		
20.02	40.02	<0.02	<0.02	20.02	200	2000	<0.02		

(T) = Target analyte

### Physical Characterization:

Al Sh As Ba Ba Bi

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

Certified by:

	Puri	굺
	Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in	certif
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the preparation of all standards.

\* All standard containers are meticulously cleaned prior to use.

\* All standards on prepared gravimetrically using balances that are calibrated with weights traceable to NIST (see above).

\* Standards are prepared gravimetrically using balances that are calibrated.

\* 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

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Part # 57003 Lot # 062124

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2 of 2



### Certificate of Analysis

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com

### M5984 R:6/14/24

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:

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  $\pm$  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.

Certified Value, X<sub>CRM/RM</sub>, where two or more methods of characterization are used is the weighted mean of the results:

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

X<sub>i</sub> = mean of Assay Method i with standard uncertainty uchar i

w<sub>i</sub> = the weighting factors for each method calculated using the inverse square of

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

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k (u^2_{char} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$ 

k = coverage factor = 2

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

ubb = bottle to bottle homogeneity standard uncertainty

uits = long term stability standard uncertainty (storage)

uts = 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.

Characterization of CRM/RM by One Method

is used is the mean of individual results:

X<sub>a</sub> = mean of Assay Method A with

u<sub>bb</sub> = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage)

XCRM/RM = (Xa) (uchar a)

k = coverage factor = 2

uchar a = the errors from characterization

uts = transport stability standard uncertainty

Certified Value, X<sub>CRM/RM</sub>, where one method of characterization

ucher a = the standard uncertainty of characterization Method A

CRM/RM Expanded Uncertainty (2) =  $U_{CRM/RM} = k (u^2_{chara} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$ 

### 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	М	Eu		0.009037	M	Na		0.086360	M	Se	<	0.005200	M	Zn		0.030125
M	A!		0.014862	0	Fe		0.002410	M	Nb	<	0.000570	0	Si		0.024100	0	Zr	<	0.002600
M	As	<	0.003500	M	Ga	<	0.000570	М	Nd		0.000923	M	Sm		0.000461				
M	Au	<	0.001700	M	Gd	<	0.003500	М	Ni	<	0.005700	M	Sn	<	0.002300				
0	В		0.002209	M	Ge	<	0.005200	М	Os	<	0.001200	M	Sr	<	0.004600				
0	Ba	<	0.002500	М	Hf	<	0.000570	n	Р	<		M	Ta	<	0.000570				
0	Be	<	0.001400	M	Hg	<	0.000570	М	Pb		0.005020	M	Tb		0.001044				
М	Bi	<	0.003500	M	Но		0.009037	M	Pd	<	0.005100	М	Te	<	0.002300				
0	Ca		0.009841	M	In	<	0.002300	M	Pr	<	0.002300	М	Th	<	0.000570				
M	Cd	<	0.000570	М	Ir	<	0.000570	М	Pt	<	0.000570	М	Ti	<	0.003500				
М	Ce	<	0.002300	0	K		0.018677	М	Rb	<	0.000570	М	TI	<	0.000570				
М	Co	<	0.000570	М	La		0.000461	М	Re	<	0.000570	М	Tm	<	0.003500				
М	Cr	<	0.004000	0	Li	<	0.009300	M	Rh	<	0.008000	М	U	<	0.000570				
M	Cs	<	0.000570	М	Lu		0.000582	M	Ru	<	0.000570	М	٧		0.001265				
М	Cu		0.002610	0	Mg		0.001486	n	S	<		М	W	<	0.002300				
М	Dy		0.003815	М	Mn		0.000582	М	Sb		0.005422	s	Υ	<					
М	Er		0.003615	М	Мо	<	0.005700	М	Sc	<	0.001200	М	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. 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  $4^{\circ}$   $24^{\circ}$  C to minimize the effects of transpiration. Use at  $20^{\circ} \pm 4^{\circ}$  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 Pt0 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	73Ge16O, 178Hf+2
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: 540.565.3012; 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:	
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- 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**  Mayor May

### **Certificate Approved By:**

Muzzammii Khan Stock Laboratory Supervisor

**Certifying Officer:** 

Paul Gaines Chairman / Senior Technical Director



### Certificate of Analysis

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com

### M5985 R:6/14/24

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:

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:** 

 $10022 \pm 30 \mu g/mL$ 

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.

Certified Value, X<sub>CRM/RM</sub>, where two or more methods of characterization are used is the weighted mean of the results:

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

X<sub>i</sub> = mean of Assay Method i with standard uncertainty uchar i

w<sub>i</sub> = the weighting factors for each method calculated using the inverse square of

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

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k \left(u^2_{char} + u^2_{bb} + u^2_{lts} + u^2_{ts}\right)^{1/2}$ 

k = coverage factor = 2

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

ubb = bottle to bottle homogeneity standard uncertainty

u<sub>lts</sub> = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

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

Characterization of CRM/RM by One Method

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

X<sub>a</sub> = mean of Assay Method A with

uchar a = the standard uncertainty of characterization Method A

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k \left(u^2_{chara} + u^2_{bb} + u^2_{lts} + u^2_{ls}\right)^{1/2}$ 

k = coverage factor = 2

u<sub>char a</sub> = the errors from characterization

ubb = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage)

uts = 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.

М	Ag	<	0.000760	М	Eu	<	0.000760	0	Na		0.012771	M	Se	<	0.023000	М	Zn	<	0.006100
М	Al		0.003385	0	Fe		0.004462	М	Nb	<	0.000760	0	Si		0.024619	М	Zr	<	0.000760
М	As	<	0.004600	М	Ga	<	0.000760	М	Nd	<	0.000760	М	Sm	<	0.000760				
М	Au	<	0.002300	М	Gd	<	0.000760	0	Ni	<	0.005100	М	Sn	<	0.000760				
0	В		0.003692	М	Ge	<	0.001600	М	Os	<	0.000760	0	Sr	<	0.000610				
М	Ba	<	0.001600	M	Hf	<	0.000760	n	Р	<		М	Ta	<	0.000760				
0	Be	<	0.000130	M	Hg	<	0.003100	M	Pb		0.001400	М	Tb	<	0.000760				
M	Bi	<	0.000760	М	Но	<	0.000760	М	Pd	<	0.001600	М	Te	<	0.000760				
0	Ca		0.004616	8	In	<		М	Pr	<	0.000760	М	Th	<	0.000760				
M	Cd	<	0.000760	М	lr	<	0.000760	M	Pt	<	0.000760	0	π	<	0.001100				
М	Ce	<	0.000760	0	K		0.007078	М	Rb	<	0.000760	М	TI	<	0.000760				
М	Co	<	0.000760	М	La	<	0.000760	М	Re	<	0.000760	М	Tm	<	0.000760				
0	Сг	<	0.001300	0	Li	<	0.000130	М	Rh	<	0.000760	М	U	<	0.000760				
М	Cs	<	0.000760	M	Lu	<	0.000760	М	Ru	<	0.000760	М	٧	<	0.001600				
М	Cu	<	0.003800	0	Mg		0.000707	n	S	<		М	W	<	0.001600				
М	Dy	<	0.000760	0	Mn		0.000149	M	Sb	<	0.000760	М	Υ	<	0.000760				
М	Er	<	0.000760	М	Мо	<	0.002300	М	Sc	<	0.000760	M	Yb	<	0.000760				

n - Not Checked For s - Solution Standard Element

M - Checked by ICP-MS O - Checked by ICP-OES

i - Spectral Interference

### **INTENDED USE** 6.0

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 <u>Terms and Conditions of Sale.</u> <a href="https://www.inorganicventures.com/terms-and-conditions-sale">https://www.inorganicventures.com/terms-and-conditions-sale</a>. 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 Pt0 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

0 TOT D 0	n Date:	
- Sealed TCT Bag Ope	en 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 20178hi



### Certificate of Analysis

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com R: 2/22/24 M5996

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:

CLPP-CAL-1

Lot Number:

T2-MEB714417

Matrix:

5% (v/v) HNO3

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 Aluminum, Al	CERTIFIED VALUE 2 000 ± 7 µg/mL	ANALYTE Barlum, Ba	CERTIFIED VALUE 2 000 ± 9 µg/mL
Beryllium, Be	50.00 ± 0.26 μg/mL	Calcium, Ca	5 000 ± 22 μg/mL
Chromium, Cr	200.0 ± 1.0 μg/mL	Cobalt, Co	500.0 ± 2.4 μg/mL
Copper, Cu	250.0 ± 1.0 μg/mL	iron, Fe	1 000 ± 4 µg/mL
Magnesium, Mg	5 000 ± 20 μg/mL	Manganese, Mn	500.0 ± 2.0 μg/mL
Nickel, Ni	500.0 ± 2.2 μg/mL	Potassium, K	5 000 ± 19 μg/mL
Silver, Ag	250.0 ± 1.1 μg/mL	Sodium, Na	5 000 ± 18 μg/mL
Vanadium, V	499.7 ± 2.2 μg/mL	Zinc, Zn	500.0 ± 2.2 μg/mL

**Density:** 1.118 g/mL (measured at  $20 \pm 4$  °C)

### **Assay Information:**

SS	say 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
	Ва	ICP Assay	3104a	140909
	Ba	Gravimetric		See Sec. 4.2
	Ве	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
	Cr	Calculated		See Sec. 4.2
	Cu	ICP Assay	3114	121207
	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	120715
	Na	Gravimetric		See Sec. 4.2
	Ni	ICP Assay	3136	120619
	Ni	EDTA	928	928
	V	IC 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.

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

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

Xi = mean of Assay Method i with standard uncertainty uchar i

w<sub>i</sub> = the weighting factors for each method calculated using the Inverse square of the variance:

 $w_i = (1/u_{char_i})^2 / (\Sigma (1/(u_{char_i})^2))$ 

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

k = coverage factor = 2

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

ubb = bottle to bottle homogeneity standard uncertainty

u<sub>lts</sub> = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

### Characterization of CRM/RM by One Method

Certified Value, X<sub>CRM/RM</sub>, where one method of characterization is used is the mean of individual results:

XCRM/RM = (Xn) (uchar n)

X<sub>a</sub> = mean of Assay Method A with

uchar a = the standard uncertainty of characterization Method A

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k \left(u_{chars}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2\right)^{1/2}$ 

k = coverage factor = 2

uchar a = the errors from characterization

ubb = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage)

uts = 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

- 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  $4^{\circ}$   $24^{\circ}$  C to minimize the effects of transpiration. Use at  $20^{\circ} \pm 4^{\circ}$  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 CRWRM.

### 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 27, 2022

- The certification is valid within the measurement uncertainty specified provided the CRWRM 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 27, 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

<ul> <li>Sealed TCT Bag Open Date:</li> </ul>	
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- 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 DD9784.

### **Certifying Officer:**

Paul Gaines Chairman / Senior Technical Director



### Certificate of Analysis

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com R:2/22/24 M5-997

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: 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, ΤΙ 1 000 ± 7 μg/mL

**Density:** 1.042 g/mL (measured at  $20 \pm 4$  °C)

### **Assay Information:**

<b>ANALYTE</b> As	METHOD ICP Assay	<b>NIST SRM#</b> 3103a	SRM LOT# 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
TI	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.

Certified Value, X<sub>CRM/RM</sub>, where two or more methods of characterization are used is the weighted mean of the results:

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

X<sub>i</sub> = mean of Assay Method i with standard uncertainty u<sub>char i</sub>

w<sub>i</sub> = the weighting factors for each method calculated using the inverse square of the variance;

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

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k (u^2_{char} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$ 

k = coverage factor = 2

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

ubb = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

### Characterization of CRM/RM by One Method

Certified Value, X<sub>CRIMRM</sub>, where one method of characterization is used is the mean of individual results:

XCRM/RM = (Xa) (uchar a)

X<sub>a</sub> = mean of Assay Method A with

uchar a = the standard uncertainty of characterization Method A

CRM/RM Expanded Uncertainty (1) =  $U_{CRM/RM} \approx k \left(u^2_{chara} + u^2_{bb} + u^2_{ts} + u^2_{ts}\right)^{1/2}$ 

k = coverage factor = 2

uchar a = the errors from characterization

u<sub>bb</sub> = bottle to bottle homogeneity standard uncertainty

uits = long term stability standard uncertainty (storage)

uts = 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 <u>Terms and Conditions of Sale.</u>

  <a href="https://www.inorganicventures.com/terms-and-conditions-sale">https://www.inorganicventures.com/terms-and-conditions-sale</a>. 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  $20^{\circ} \pm 4^{\circ}$  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

<ul> <li>Sealed TCT Bag Open Date:</li> </ul>	
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### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

**Certificate Approved By:** 

Thomas Kozikowski Manager, Quality Control DD9784.

**Certifying Officer:** 

Paul Gaines Chairman / Senior Technical Director

<sup>-</sup> 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.



Certificate of Analysis

300 Technology Drive Christiansburg, VA 24073 USA inorganicventures.com

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### **ACCREDITATION / REGISTRATION** 1.0

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-MEB746172

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** Boron, B

**CERTIFIED VALUE** 

**ANALYTE** Molybdenum, Mo **CERTIFIED VALUE** 

1 000 ± 5 µg/mL

Silicon, Si

1 000 ± 5 µg/mL 1 000 ± 7 µg/mL

Tin. Sn

1 000 ± 5 µg/ml.

Titanium, Ti

1 000 ± 6 μg/mL

Density:

1.032 g/mL (measured at 20 ± 4 °C)

### Assav Information:

,			
ANALYTE	METHOD	NIST SRM#	SRM LOT#
В	ICP Assay	3107	190605
В	Calculated		See Sec. 4.2
Мо	ICP Assay	traceable to 3134	U2-MO739068
Si	ICP Assay	Traceable to 3150	S2-S1702546
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.

Certified Value, X<sub>CRWRM</sub>, where two or more methods of characterization are used is the weighted mean of the results:

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

X<sub>i</sub> = mean of Assay Method i with standard uncertainty uchar i

 $\mathbf{w}_{i}$  = the weighting factors for each method calculated using the inverse square of the variance:

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

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k \left(u^2_{char} + u^2_{bb} + u^2_{its} + u^2_{bs}\right)^{1/2}$ 

k = coverage factor = 2

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

ubb = bottle to bottle homogeneity standard uncertainty

utts = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

### 4.0 TRACEABILITY TO NIST

 $X_a = mean$  of Assay Method A with  $u_{char} = the$  standard uncertainty of characterization Method A  $CRM/RM = the standard uncertainty ($^{\pm}$) = U_{CRM/RM} = k \left(u^2_{char} + u^2_{bb} + u^2_{tts} + u^2_{ts}\right)^{\frac{1}{2}} \\ k = coverage factor = 2 \\ u_{char} = the errors from characterization \\ u_{bb} = bottle to bottle homogeneity standard uncertainty \\ u_{lts} = long term stability standard uncertainty (storage) \\ u_{tg} = transport stability standard uncertainty$ 

Characterization of CRM/RM by One Method

is used is the mean of individual results:

X<sub>CRM/RM</sub> = (X<sub>a</sub>) (u<sub>char a</sub>)

Certified Value, X<sub>CRM/RM</sub>, where one method of characterization

- 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 <u>Terms and Conditions of Sale.</u>

  <a href="https://www.inorganicventures.com/terms-and-conditions-sale">https://www.inorganicventures.com/terms-and-conditions-sale</a>. 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.lnorganicventures.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

August 12, 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

- August 12, 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

- 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.

Paul R Sains

### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

**Certificate Approved By:** 

Joseph Burns Custom VS Manager

**Certifying Officer:** 

Paul Gaines Chairman / Senior Technical Director



300 Technology Drive Christiansburg, VA 24073 USA

inorganicventures.com

Certificate of Analysis

M6074

M6075 M6076 M6077

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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 Boron, B **CERTIFIED VALUE** 

ANALYTE Molybdenum, Mo **CERTIFIED VALUE** 

1 000 ± 5 μg/mL

Silicon, Si

1 000 ± 5 µg/mL

Tin, Sn

1 000 ± 5 µg/mL

Titanium, Ti

1 000 ± 7 μg/mL

1 000 I 5 pg/mL

1 000 ± 6 µg/mL

Density:

1.033 g/mL (measured at 20  $\pm$  4 °C)

### **Assay Information:**

ANALYTE	METHOD	NIST SRM#	SRM LOT#
В	ICP Assay	3107	190605
В	Calculated		See Sec. 4.2
Мо	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.

Certified Value, X<sub>CRM/RM</sub>, where two or more methods of characterization are used is the weighted mean of the results:

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

X<sub>i</sub> = mean of Assay Method i with standard uncertainty u<sub>char i</sub>

w<sub>i</sub> = the weighting factors for each method calculated using the inverse square of the variance:

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

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k (u^2_{char} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$ 

k = coverage factor = 2

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

ubb = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

### Characterization of CRM/RM by One Method

Certified Value, X<sub>CRW/RM</sub>, where one method of characterization is used is the mean of individual results:

X<sub>CRM/RM</sub> = (X<sub>a</sub>) (u<sub>char a</sub>)

X<sub>a</sub> = mean of Assay Method A with

uchar a = the standard uncertainty of characterization Method A

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

k = coverage factor = 2

uchar a = the errors from characterization

ubb = bottle to bottle homogeneity standard uncertainty

uits = long term stability standard uncertainty (storage)

uts = 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.

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

### **INTENDED USE** 6.0

- 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  $4^{\circ}$   $24^{\circ}$  C to minimize the effects of transpiration. Use at  $20^{\circ} \pm 4^{\circ}$  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

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

<ul> <li>Sealed TCT</li> </ul>	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.

Paul R Sains

### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Approved By:

Joseph Burns Custom VS Manager

**Certifying Officer:** 

Paul Gaines Chairman / Senior Technical Director



300 Technology Drive Christiansburg, VA 24073 USA

inorganicventures.com

Certificate of Analysis

M6074

M6075 M6076 M6077

P: 800-669-6799/540-585-3030 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 Boron, B **CERTIFIED VALUE** 

ANALYTE Molybdenum, Mo **CERTIFIED VALUE** 

1 000 ± 5 μg/mL

Silicon, Si

1 000 ± 5 µg/mL

Tin, Sn

1 000 ± 5 µg/mL

Titanium, Ti

1 000 ± 7 μg/mL

1 000 I 5 pg/mL

1 000 ± 6 µg/mL

Density:

1.033 g/mL (measured at 20  $\pm$  4 °C)

### **Assay Information:**

ANALYTE	METHOD	NIST SRM#	SRM LOT#
В	ICP Assay	3107	190605
В	Calculated		See Sec. 4.2
Мо	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.

Certified Value, X<sub>CRM/RM</sub>, where two or more methods of characterization are used is the weighted mean of the results:

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

X<sub>i</sub> = mean of Assay Method i with standard uncertainty u<sub>char i</sub>

w<sub>i</sub> = the weighting factors for each method calculated using the inverse square of the variance:

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

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k (u^2_{char} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$ 

k = coverage factor = 2

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

ubb = bottle to bottle homogeneity standard uncertainty

ults = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

### Characterization of CRM/RM by One Method

Certified Value, X<sub>CRW/RM</sub>, where one method of characterization is used is the mean of individual results:

X<sub>CRM/RM</sub> = (X<sub>a</sub>) (u<sub>char a</sub>)

X<sub>a</sub> = mean of Assay Method A with

uchar a = the standard uncertainty of characterization Method A

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

k = coverage factor = 2

uchar a = the errors from characterization

ubb = bottle to bottle homogeneity standard uncertainty

uits = long term stability standard uncertainty (storage)

uts = 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.

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

### **INTENDED USE** 6.0

- 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  $4^{\circ}$   $24^{\circ}$  C to minimize the effects of transpiration. Use at  $20^{\circ} \pm 4^{\circ}$  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.

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- 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.

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- 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 06, 2024

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- 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

<ul> <li>Sealed TCT</li> </ul>	Bag Open Date:	

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Paul R Sains

### 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 Reference Material CRM



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

m/z->	1.0 m 4	1000	m/z-> 2000	6.0E6	1.0E8	Compound RM# Number  1. Magnesium nitrate hexahydrate (Mg) IN030 маровгогаал	Nominal Concentration (µg/mL): NIST Test Number: Weight shown below wa	Expiration Date:	Par Lo
N 10			ō		[1] Spectrum No.1	nydrate (Mg)	NIST Test Number: 6UTB Weight shown below was diluted to (mL):	Expiration Date: nended Storage:	Part Number: Lot Number: Description:
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Part # 58112

1 of 2

www.absolutestandards.com

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

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(I) = larget 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 certifed (+/-) 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).

Part # 58112

2 of 2

www.absolutestandards.com

Part Number:

Lot Number:



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

CERTIFIED WEIGHT REPORT:

Formulated By: Diovannie Giovanni Esposito 2 Septe 101124

Pedro L. Rentas

101124

Recommended Storage: **Expiration Date:** Description: 101124

Manganese (Mn)

Ambient (20 °°)

Manganese (20 °°) 1000

Nominal Concentration (µg/mL): Weight shown below was diluted to (mL): **NIST Test Number:** ETUB ត្ត 4000.2 Nominal 0.10 Flask Uncertainty 5E-05 Balance Uncertainty Purity Uncertainty Assay Target Actual Actual Reviewed By: Uncertainty Expanded (Solvent Safety Info. On Attached pg.)

RM#

Number

Conc. (µg/mL)

8

Purity (%)

8

Weight (g)

Weight (g) Conc. (µg/ml.)

+/- (µg/mL)

CAS#

OSHA PEL (TWA)

LD50

SRM NIST T SDS Information

 Manganese(II) nitrate hydrate (Mn) IN031 MNM082020A1 1000 99.999 0.10 20.8 19.2322 19.2344 1000.1 2. 0 15710-66-4 5 mg/m3 orl-rat >300mg/kg 3132

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

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

Г							Trace Me	etals	Verifica	tion	by ICP-	SM	(µg/mL)						
A	40.02	2	40.02	Dγ	40.02	H	<0.02	<u>E</u>	<0.02	Z	<0.02	꾸	<0.02	Se	40.2	<u>4</u>	<0.02	*	<0.02
dS	<0.02	ರಿ	<0.2	뎍	<0.02	Н	<0.02	Ę	40.02	ş	<0.02	Re	<0.02	ž.	40.02	Te	<0.02	c	<0.02
As	40.2	င္ပ	40.02	띹	<0.02	In	<0.02	Mg	40.01	0°	<0.02	쫑	<0.02	A	8,02	1	<0.02	<	40.02
Ba	40.02	ς,	<0.02	ନୁ	40.02	F.	40.02	Mn	H	Pd	<0.02	<b>&amp;</b>	40.02	Z	40,2	1	<0.02	충	<b>&lt;</b> 0.02
Ве	40.01	ť	40.02	ଦ୍ମ	40.02	7,	40.2	Hg	<0.2	Þ	<0.02	Ru	40.02	Sr	0.02	Tm	<0.02	×	<0.02
Bi	0.02	ဝ	<0.02	ନ୍ମ	40.02	La	<0.02	Mo	40.02	7	40.02	Sm	<0.02	S	A.02	Sn	<0.02	Zn	<b>60.02</b>
B	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	×	40.2	S	<0.02	Ta	40.02	크	<0.02	Zr	<0.02
									}										

(T) = Target analyte

## Physical Characterization:

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

### Certified by:

Jon T. Mills

- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm delonized 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 certifed (+/-) 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

M6137

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:

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.

Certified Value, X<sub>CRM/RM</sub>, where two or more methods of characterization are used is the weighted mean of the results:

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

 $\mathbf{X_i}$  = mean of Assay Method  $\mathbf{i}$  with standard uncertainty  $\mathbf{u}_{char}$   $\mathbf{i}$  $\mathbf{w}_{i}$  = the weighting factors for each method calculated using the inverse square of the variance:

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

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k (u^2_{char} + u^2_{bb} + u^2_{its} + u^2_{bs})^{1/2}$ 

k = coverage factor = 2

 $u_{char} = [\Sigma((w_i)^2 (u_{char})^2)]^{\frac{1}{2}}$  where  $u_{char}$  are the errors from each characterization method ubb = bottle to bottle homogeneity standard uncertainty

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uts = transport stability standard uncertainty

### Characterization of CRM/RM by One Method

Certified Value, X<sub>CRM/RM</sub>, where one method of characterization is used is the mean of individual results:

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

X, = mean of Assay Method A with

uchar a = the standard uncertainty of characterization Method A

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k (u_{chara}^2 + u_{bb}^2 + u_{its}^2 + u_{ts}^2)^{1/2}$ 

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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.

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

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	0	Na		0.001656	M	Se	<	0.022000	М	Zn	<	0.002500
M	Al		0.010787	М	Fe	<	0.027000	М	Nb	<	0.001300	s	Si	<		0	Zr	<	0.001900
М	As	<	0.001900	М	Ga	<	0.001300	M	Nd	<	0.000310	М	Sm	<	0.000310				
М	Au	<	0.000910	М	Gd	<	0.000310	M	Ni	<	0.005500	М	Sn		0.000096				
M	В		0.016180	M	Ge	<	0.001900	M	Os	<	0.000610	0	Sr		0.000092				
M	Ba		0.000096	M	Hf		0.000423	i	Р	<		M	Ta		0.002542				
0	Be	<	0.000570	M	Hg	<	0.000610	M	Pb	<	0.000310	М	Tb	<	0.000310				
M	Bi	<	0.000310	М	Но	<	0.000610	M	Pd	<	0.000610	M	Te	<	0.000910				
0	Ca		0.011557	M	ln	<	0.000310	M	Pr	<	0.000310	М	Th	<	0.001900				
M	Cd	<	0.000310	M	lr	<	0.000310	M	Pt	<	0.000310	М	Ti		0.001078				
M	Ce	<	0.000610	0	K		0.000577	M	Rb	<	0.009100	М	TI	<	0.000310				
M	Co	<	0.001600	M	La	<	0.000310	M	Re	<	0.000310	М	Tm	<	0.000310				
М	Cr	<	0.010000	0	Li	<	0.000460	M	Rh	<	0.000310	М	U	<	0.000310				
М	Cs	<	0.000310	M	Lu	<	0.000310	M	Ru	<	0.000310	0	V	<	0.001300				
М	Cu	<	0.002500	0	Mg		0.001348	0	S	<	0.570000	М	W	<	0.001900				
M	Dy	<	0.000310	М	Mn	<	0.002500	M	Sb	<	0.000310	М	Υ	<	0.000310				
M	Er	<	0.000310	M	Мо	<	0.000310	0	Sc	<	0.000590	М	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 <u>Terms and Conditions of Sale</u>, <a href="https://www.inorganicventures.com/terms-and-conditions-sale">https://www.inorganicventures.com/terms-and-conditions-sale</a>. 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  $4^{\circ}$   $24^{\circ}$  C to minimize the effects of transpiration. Use at  $20^{\circ} \pm 4^{\circ}$  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 Welght; 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

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, amorphic (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 HCI 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 HCI / 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.

### **QUALITY STANDARD DOCUMENTATION** 10.0

### 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

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

- 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.

### NAMES AND SIGNATURES OF CERTIFYING OFFICERS 12.0 Certificate Prepared By:

**Uyen Truong** Custom Processing Supervisor

Mayyand Man
Paul R. Laine

### Certificate Approved By:

Muzzammil Khan Stock Laboratory Supervisor

**Certifying Officer:** 

**Paul Gaines** Chairman / Senior Technical Director

Absolute Standards, Inc. 800-368-1131

www.absolutestandards.com



## Certified Reference Material CRM

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

CERTIFIED WEIGHT REPORT: 1. Potassium nitrate (K) Compound Nominal Concentration (µg/mL): Weight shown below was diluted to (mL): Recommended Storage: **NIST Test Number: Expiration Date:** Part Number: Lot Number: Description: IN034 KD062022A1 BTU9 57119 103024 Potassium (K) M6141 10000 103027 Ambient (20 °C) Number 5 Conc. (µg/mL) 4000.1 10000 716142 Nominal R->1/13/25 0.15 Flask Uncertainty 99.999 5E-05 Balance Uncertainty Purity 8 Uncertainty Purity (%) 0.10 Solvent: 24002546 Assay 37.7 E 2% Weight (g) 106.1040 Target 80.0 Lot # Nitric Acid Nitric Acid ###### Weight (g) Conc. (µg/mL) Actual 10001.1 Actual Reviewed By: Formulated By: +/- (µg/mL) Uncertainty Expanded 20,0 Tieranie. 7757-79-1 CAS# (Solvent Safety Info. On Attached pg.) Pedro L. Rentas Giovanni Esposito からからかん OSHA PEL (TWA) **SDS Information** 5 mg/m3 orl-rat 3750 mg/kg 3141a LD50 103024 103024 SRM NIST

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

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

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(i) = larget 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 certifed (+/-) 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



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

CERTIFIED WEIGHT REPORT: 1. Sodium nitrate (Na) Neminal Concentration (µg/mL): Recommended Storage: Weight shown below was diluted to (mL): m/z-> m/z-> M/X-Y NIST Test Number: 2.5E6 5.0E6 2.500 5.0E6 2.5E5 5.0E5 **Expiration Date:** Part Number: Lot Number: Description: [1] Spectrum No.1 210 110 IN036 NAV01201511 0 RM# **6UTB** 072427 58111 072424 10000 Ambient (20 °C) Sodium (Na) Number Lot 120 220 NO [ 8.935 sec]:58111.D# [Count] [Linear] Conc. (µg/mL) 10000 4000.2 Nominal M6144 R->1/13/2 Solvent: 130 30 99.999 5E-05 Balance Uncertainty Purity 0.10 Flask Uncertainty (96) Uncertainty Assay Purity (%) 0.10 240 140 4 26.9 8 2% 24002546 Nitric Acid 148.7096 Weight (g) Target (mL) 250 150 50 ###### Weight (g) Conc. (µg/mL) Nitric Acid Actual 160 260 0 10000.0 Actual 170 70 +/- (µg/mL) Uncertainty Reviewed By: Formulated By: Expanded 20.0 7631-99-4 180 80 CAS# (Solvent Safety Info. On Attached pg.) Pedro L. Rentas Benson Chan OSHA PEL (TWA) **SDS** Information 180 90 5 mg/m3 200 100 orl-rat 3430 mg/kg 3152a 072424 072424 TSIN MES.

Printed: 1/10/2025, 4:48:22 PM

1 of 2



## www.absolutestandards.com

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

8	В	Be	Ba	As	Sb	<u>&gt;</u>		1
<0.02	<0.02	40.01	<0.02	40.2	<0.02	<0.02		
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Ta	Ç2	Sr	Z	Age	S	Se.		
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11	Sn	Tm	Th.	1	Te	4T		
40,02	40.02	<0.02	<0.02	<0.02	<0.02	<0.02		
122	Zn	×	\$	<	C	W		
<0.02	40.02	<0.02	<0.02	<0.02	<0.02	<0.02		

(T) = Target analyte

### Physical Characterization:

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

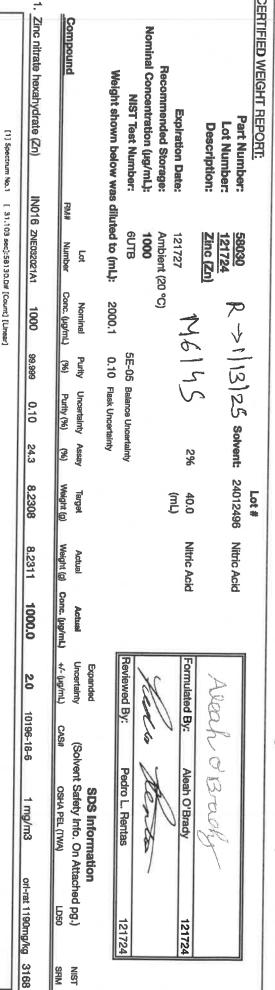
Certified by:

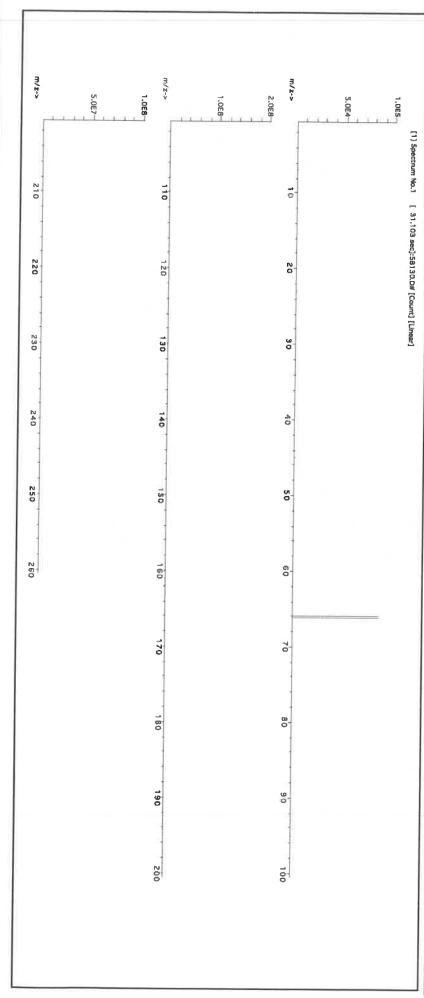
- \* The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- \* Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- All standard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

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

## Www.absolutestandards.com CERTIFIED WEIGHT REPORT:





Part # 58030



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

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(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 certifed (+/-) 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).

Part # 58030

Hydrochloric Acid, 36.5-38.0%

BAKER INSTRA-ANALYZED® Reagent
For Trace Metal Analysis





M6151

R-> 1/15/25

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 HCI) (by acid-base titrn)	36.5 - 38.0 %	
ACS - Color (APHA)	50.5 - 36.0 % ≤ 10	37.9 %
ACS - Residue after Ignition	≤ 3 ppm	5
ACS - Specific Gravity at 60°/60°F		< 1 ppm
ACS – Bromide (Br)	1.185 - 1.192	1.191
ACS - Extractable Organic Substances	≤ 0.005 %	< 0.005 %
ACS - Free Chlorine (as Cl2)	≤ 5 ppm	< 1 ppm
Phosphate (PO <sub>4</sub> )	≤ 0.5 ppm	< 0.5 ppm
Sulfate (SO <sub>4</sub> )	≤ 0.05 ppm	< 0.03 ppm
Sulfite (SO₃)	≤ 0.5 ppm	< 0.3 ppm
Ammonium (NH <sub>4</sub> )	≤ 0.8 ppm	0.3 ppm
Trace Impurities - Arsenic (As)	≤ 3 ppm	< 1 ppm
Trace Impurities - Aluminum (AI)	≤ 0.010 ppm	< 0.003 ppm
Arsenic and Antimony (as As)	≤ 10.0 ppb	1.3 ppb
Trace Impurities - Barium (Ba)	≤ 5.0 ppb	< 3.0 ppb
Trace Impurities - Beryllium (Be)	≤ 1.0 ppb	0.2 ppb
Trace Impurities - Bismuth (Bi)	≤ 1.0 ppb	< 0.2 ppb
Trace Impurities – Boron (B)	≤ 10.0 ppb	< 1.0 ppb
Trace Impurities - Cadmium (Cd)	≤ 20.0 ppb	< 5.0 ppb
Trace Impurities - Calcium (Ca)	≤ 1.0 ppb	< 0.3 ppb
	≤ 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
Frace Impurities – Gold (Au)	≤ 4.0 ppb	0.6 ppb
Heavy Metals (as Pb)	≤ 100 ppb	< 50 ppb
Frace 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





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 (TI)	≤ 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
Frace Impurities – Zirconium (Zr)	≤ 1.0 ppb	0.3 ppb

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





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

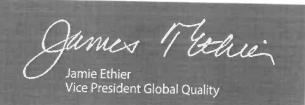
Test

Specification

Result

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







R-02/02/2025

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

Assay (HNOs) Appearance Appearance Appearance Passes Test Passes Test Passes Test Color (APHA) Residue after Ignition Chloride (Cl) Phosphate (POa) Sulfate (SOa) Sulfate (SOa) Sulfate (SOa) Arsenic and Antimony (as As) Arsenic in and Antimony (as As) Arsenic and Antimony (as As) Arsenic and Antimony (as As) Arsenic and Interest Bairum (Ba) Arace Impurities - Beryllium (Ba) Arace Impurities - Beryllium (Ba) Arace Impurities - Boron (B) Arace Impurities - Cadmium (Cd) Arace Impurities - Cadmium (Cd) Arace Impurities - Calcium (Ca) Arace Impurities - Calcium (Ca) Arace Impurities - Calcium (Ca) Arace Impurities - Color (Co) Arace Impurities - Calcium (Ca) Arace Impurities - Color (Cu) Arace Impurities - Color (Cu) Arace Impurities - Color (Cu) Arace Impurities - Color (Au) Arace Impurities - Color (Au) Arace Impurities - Color (Au) Arace Impurities - Lead (Pb) Arace Impurities - Lithium (Li) Arace Impurities - Manganese (Mn) Arace Impurities - Nickel (Ni) Arace Impurities - Manganese (Mn) Arace Impurities - Nickel (Ni) Arace Impurities - Manganese (Mn) Arace Impurities - Nickel (Ni) Ar	Test	Specification	Result
Appearance Color (APHA)  Residue after Ignition  Chloride (Cl)  Phosphate (POa)  Sulfate (SOa)  Trace Impurities - Barium (Ba)  Trace Impurities - Cobalt (Co)  Trace Impurities - Lead (Pb)  Trace Impur	Assay (HNO3)		
Second Capera	Appearance		
Residue after Ignition	Color (APHA)		
Chloride (Cf)  Phosphate (PO <sub>4</sub> )  Sulfate (SO <sub>4</sub> )  Sulfate (SO <sub>4</sub> )  Trace Impurities – Aluminum (AI)  Arsenic and Antimony (as As)  Trace Impurities – Beryllium (Ba)  Trace Impurities – Beryllium (Be)  Trace Impurities – Beryllium (Be)  Trace Impurities – Boron (B)  Trace Impurities – Cadrium (Cd)  Trace Impurities – Cadrium (Cd)  Trace Impurities – Cadrium (Ca)  Trace Impurities – Cadrium (Ca)  Trace Impurities – Cobalt (Co)  Trace Impurities – Cobalt (Co)  Trace Impurities – Cobalt (Co)  Trace Impurities – Copper (Cu)  Trace Impurities – Gallium (Ga)  Trace Impurities – Gold (Au)  Expression of (A	Residue after Ignition		5
Phosphate (PO <sub>4</sub> )         ≤ 0.10 ppm         < 0.03 ppm	Chloride (CI)		1 ppm
Sulfate (SO <sub>4</sub> ) ≤ 0.2 ppm < 0.2 ppm  Trace Impurities - Aluminum (AI) ≤ 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 < 1.0 ppb  Trace Impurities - Chromium (Cr) < 30.0 ppb < 1.0 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 - Gold (Au) < 20 ppb < 10 ppb  Trace Impurities - Gold (Au) < 20 ppb < 100 ppb  Trace Impurities - Lithium (E) < 10.0 ppb < 1.0 ppb  Trace Impurities - Lithium (Li) < 10.0 ppb < 1.0 ppb  Trace Impurities - Lithium (Li) < 10.0 ppb < 1.0 ppb  Trace Impurities - Lithium (Li) < 10.0 ppb < 1.0 ppb  Trace Impurities - Mangaese (Mn) < 10.0 ppb < 1.0 ppb	Phosphate (PO <sub>4</sub> )		< 0.03 ppm
Trace Impurities - Aluminum (AI)       ≤ 40.0 ppb       < 1.0 ppb	Sulfate (SO <sub>4</sub> )	• •	< 0.03 ppm
Arsenic and Antimony (as As)	Trace Impurities - Aluminum (AI)		
Trace Impurities - Barium (Ba)       ≤ 10.0 ppb       < 1.0 ppb		• •	• •
Trace Impurities – Beryllium (Be)  Trace Impurities – Bismuth (Bi)  Trace Impurities – Boron (B)  Trace Impurities – Cadmium (Cd)  Trace Impurities – Cadmium (Cd)  Trace Impurities – Calcium (Ca)  Trace Impurities – Chromium (Cr)  Trace Impurities – Chromium (Cr)  Trace Impurities – Cobalt (Co)  Trace Impurities – Cobalt (Co)  Trace Impurities – Copper (Cu)  Trace Impurities – Copper (Cu)  Trace Impurities – Gallium (Ga)  Trace Impurities – Gallium (Ga)  Trace Impurities – Gold (Au)  Trace Impurities – Gold (Au)  Express of the substitute of the			• •
Trace Impurities – Bismuth (Bi)		• •	< 1.0 ppb
Trace Impurities – Boron (B)			< 1.0 ppb
Trace Impurities - Cadmium (Cd)  Frace Impurities - Calcium (Ca)  Frace Impurities - Chromium (Cr)  Frace Impurities - Chromium (Cr)  Frace Impurities - Cobalt (Co)  Frace Impurities - Copper (Cu)  Frace Impurities - Callium (Ga)  Frace Impurities - Gallium (Ga)  Frace Impurities - Germanium (Ge)  Frace Impurities - Gold (Au)  Frace Impurities - Gold (Au)  Frace Impurities - Fron (Fe)  Frace Impurities - Lead (Pb)  Frace Impurities - Lithium (Li)  Frace Impurities - Magnesium (Mg)  Frace Impurities - Manganese (Mn)  Frace Impurities - Nickel (Ni)			• •
Trace Impurities – Calcium (Ca)		• •	< 5.0 ppb
Trace Impurities - Chromium (Cr)  Trace Impurities - Cobalt (Co)  Trace Impurities - Copper (Cu)  Trace Impurities - Copper (Cu)  Trace Impurities - Gallium (Ga)  Trace Impurities - Garmanium (Ge)  Trace Impurities - Gold (Au)  Heavy Metals (as Pb)  Trace Impurities - Iron (Fe)  Trace Impurities - Lead (Pb)  Trace Impurities - Lead (Pb)  Trace Impurities - Lithium (Li)  Trace Impurities - Magnesium (Mg)  Trace Impurities - Magnesium (Mg)  Trace Impurities - Manganese (Mn)  Trace Impurities - Magnesium (Mg)  Trace Impurities - Manganese (Mn)  Trace Impurities - Nickel (Ni)		• ,	< 1 ppb
Trace Impurities – Cobalt (Co)			2.3 ppb
Trace Impurities - Copper (Cu)  Trace Impurities - Gallium (Ga)  Trace Impurities - Germanium (Ge)  Trace Impurities - Gold (Au)  Example 10.0 ppb			< 1.0 ppb
Trace Impurities – Gallium (Ga)  Trace Impurities – Germanium (Ge)  Trace Impurities – Gold (Au)  Heavy Metals (as Pb)  Trace Impurities – Iron (Fe)  Trace Impurities – Lead (Pb)  Trace Impurities – Lead (Pb)  Trace Impurities – Lithium (Li)  Trace Impurities – Magnesium (Mg)  Trace Impurities – Magnese (Mn)  Trace Impurities – Nickel (Ni)		• •	< 1.0 ppb
Trace Impurities – Germanium (Ge)  Trace Impurities – Gold (Au)  Heavy Metals (as Pb)  Trace Impurities – Iron (Fe)  Trace Impurities – Lead (Pb)  Trace Impurities – Lead (Pb)  Trace Impurities – Lithium (Li)  Trace Impurities – Magnesium (Mg)  Trace Impurities – Magnesium (Mg)  Trace Impurities – Manganese (Mn)  Trace Impurities – Nickel (Ni)		• •	< 1.0 ppb
Trace Impurities – Gold (Au)  4 20 ppb  5 ppb  6 5 ppb  7 Trace Impurities – Iron (Fe)  6 40.0 ppb  6 20.0 ppb  7 Trace Impurities – Lithium (Li)  6 10.0 ppb  7 Trace Impurities – Magnesium (Mg)  7 Trace Impurities – Manganese (Mn)  7 Trace Impurities – Manganese (Mn)  7 Trace Impurities – Mickel (Ni)	· •		< 1.0 ppb
Heavy Metals (as Pb)    Second Policy   Second Policy		• • •	< 10 ppb
Trace Impurities – Iron (Fe)  \$\leq\$ 40.0 ppb \$\leq\$ 40.0 ppb \$\leq\$ 20.0 ppb \$\leq\$ 20.0 ppb \$\leq\$ 10.0 ppb \$\leq\$ 10.0 ppb \$\leq\$ 10.0 ppb \$\leq\$ 10.0 ppb \$\leq\$ 20 ppb \$\leq\$ 20 ppb \$\leq\$ 20 ppb \$\leq\$ 20 ppb \$\leq\$ 21.0 ppb \$\leq\$ 10.0 ppb \$\leq\$ 20 ppb \$\leq\$ 21.0 ppb			< 5 ppb
Trace Impurities – Lead (Pb)  ≤ 20.0 ppb  ≤ 20.0 ppb  < 10.0 ppb  < 10.0 ppb  < 1.0 ppb		• •	100 ppb
Frace Impurities – Lithium (Li)  Frace Impurities – Magnesium (Mg)  Frace Impurities – Manganese (Mn)  Frace Impurities – Manganese (Mn)  Frace Impurities – Nickel (Ni)  Frace Impurities – Nickel (Ni)		• •	< 1.0 ppb
Frace Impurities – Magnesium (Mg)  Frace Impurities – Manganese (Mn)  ≤ 20 ppb  ≤ 1.0 ppb  < 1 ppb  < 1.0 ppb  < 1.0 ppb		• •	< 10.0 ppb
Frace Impurities – Manganese (Mn) ≤ 10.0 ppb < 1.0 ppb			< 1.0 ppb
race Impurities – Nickel (Ni)			< 1 ppb
≤ 20.0 ppb < 5.0 ppb		• •	< 1.0 ppb
	THERET (INI)	≤ 20.0 ppb	< 5.0 ppb

>>> Continued on page 2 >>>





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

Test	Specification	D 1
Trace Impurities – Niobium (Nb)		Result
Trace Impurities – Potassium (K)	≤ 50.0 ppb	< 1.0 ppb
Trace Impurities – Silicon (Si)	≤ 50 ppb	16 ppb
	≤ 50 ppb	< 10 ppb
Trace Impurities – Silver (Ag)	≤ 20.0 ppb	< 1.0 ppb
Trace Impurities - Sodium (Na)	≤ 150.0 ppb	
Trace Impurities - Strontium (Sr)	≤ 30.0 ppb	< 5.0 ppb
Trace Impurities – Tantalum (Ta)		< 1.0 ppb
Trace Impurities – Thallium (TI)	≤ 10.0 ppb	< 5.0 ppb
Trace Impurities – Tin (Sn)	≤ 10.0 ppb	< 5.0 ppb
	≤ 20.0 ppb	< 10.0 ppb
Trace Impurities – Titanium (Ti)	≤ 10.0 ppb	< 1.0 ppb
Frace Impurities – Vanadium (V)	≤ 10.0 ppb	
Frace Impurities – Zinc (Zn)	≤ 20.0 ppb	< 1.0 ppb
race Impurities – Zirconium (Zr)		< 1.0 ppb
Particle Count – 0.5 µm and greater	≤ 10.0 ppb	< 1.0 ppb
Particle Count – 1.0 µm and greater	≤ 60 par/mi	10 par/ml
and greater	≤ 10 par/ml	3 par/ml

Nitric Acid 69% **CMOS** 





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

Test Specification Result

For Microelectronic Use

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

Jamie Croak Director Quality Operations, Bioscience Production





M-6162

R. Date & 0412712025

Material No.: 9606-03 Batch No.: 24H0162012 Manufactured Date: 2024-06-28

Retest Date: 2029-06-27 Revision No.: 0

### Certificate of Analysis

Assay (HNOs) Appearance Passes Test Passes Test Passes Test Color (APHA)  Residue after Ignition  S 2 ppm  Chloride (Cl)  Choride (Cl)  Choride (SOa)  Sulfate (SOa)  Sulfate (SOa)  Arsenic and Antimony (as As)  Trace Impurities - Barlum (Ba)  Trace Impurities - Barlum (Ba)  Trace Impurities - Barlum (Cd)  Trace Impurities - Barlum (Cd)  Trace Impurities - Coper (Cu)  Trace Impurities - Coper (Cu)  Trace Impurities - Coper (Cu)  Trace Impurities - Cold (Au)  Frace Impurities - Gold (Au)  Frace Impurities - Iron (Fe)  Trace Impurities - Iron (Fe)  Trace Impurities - Lind must (Magnesia (Magnesia (Magnesia))  Frace Impurities - Lead (Pb)  Trace Impurities - Lind (Fe)  Trace Impurities - Coper (Cu)  Trace Impurit	Test	Specification	Result
Appearance Color (APHA)	Assay (HNO3)	69.0 – 70.0 %	69.7 %
Color (APHA)       ≤ 10       5         Residue after Ignition       ≤ 2 ppm       < 1 ppm	Appearance		
Residue after Ignition       ≤ 2 ppm       < 1 ppm	Color (APHA)	≤ 10	
Chloride (CI)       ≤ 0.08 ppm       0.03 ppm         Phosphate (PO4)       ≤ 0.10 ppm       < 0.03 ppm	Residue after Ignition	≤ 2 ppm	
Phosphate (PO₄)         ≤ 0.10 ppm         < 0.03 ppm	Chloride (CI)	≤ 0.08 ppm	
Sulfate (SO <sub>4</sub> )       ≤ 0.2 ppm       < 0.2 ppm	Phosphate (PO <sub>4</sub> )	≤ 0.10 ppm	• •
Trace Impurities - Aluminum (Al)       ≤ 40.0 ppb       < 1.0 ppb	Sulfate (SO <sub>4</sub> )	≤ 0.2 ppm	
Arsenic and Antimony (as As)    \$\leq\$ 5.0 ppb	Trace Impurities - Aluminum (Al)	≤ 40.0 ppb	• •
Trace Impurities – Barium (Ba)	Arsenic and Antimony (as As)	≤ 5.0 ppb	
Trace Impurities – Beryllium (Be)  Trace Impurities – Bismuth (Bi)  Trace Impurities – Boron (B)  Trace Impurities – Cadmium (Cd)  Trace Impurities – Calcium (Ca)  Trace Impurities – Calcium (Ca)  Trace Impurities – Chromium (Cr)  Trace Impurities – Cobalt (Co)  Trace Impurities – Cobalt (Co)  Trace Impurities – Copper (Cu)  Trace Impurities – Copper (Cu)  Trace Impurities – Callium (Ga)  Trace Impurities – Gallium (Ga)  Trace Impurities – Gallium (Ga)  Trace Impurities – Germanium (Ge)  Trace Impurities – Gold (Au)  Heavy Metals (as Pb)  Trace Impurities – Iron (Fe)  Trace Impurities – Lead (Pb)  Trace Impurities – Lead (Pb)  Trace Impurities – Magnesium (Mg)  Trace Impurities – Manganese (Mn)  Trace Impurities – Mickel (Ni)  ■ 20 ppb  ■ 21.0 ppb  ▼ 1.0 ppb	Trace Impurities - Barium (Ba)	≤ 10.0 ppb	
Trace Impurities – Bismuth (Bi)    \$\leq 20.0 ppb	Trace Impurities - Beryllium (Be)	≤ 10.0 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	Trace Impurities - Bismuth (Bi)	≤ 20.0 ppb	• •
Trace Impurities - Cadmium (Cd) ≤ 50 ppb 0.3 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  Trace Impurities - Gold (Au) ≤ 20 ppb < 1.0 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 < 1.0 ppb  Trace Impurities - Magnesee (Mn) ≤ 10.0 ppb < 1.0 ppb	Trace Impurities - Boron (B)	≤ 10.0 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  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 - Magnesium (Mg) ≤ 20 ppb < 1.0 ppb	Trace Impurities - Cadmium (Cd)	≤ 50 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 - Magnesium (Mg) ≤ 20 ppb < 1.0 ppb  Trace Impurities - Magnesium (Mg) ≤ 20 ppb < 1.0 ppb	Trace Impurities - Calcium (Ca)		• •
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 - Magnesee (Mn) ≤ 10.0 ppb < 1.0 ppb	Trace Impurities - Chromium (Cr)	≤ 30.0 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 - Cobalt (Co)	≤ 10.0 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 – Magnesium (Mg) ≤ 20 ppb < 1 ppb  Trace Impurities – Manganese (Mn) ≤ 10.0 ppb	Trace Impurities - Copper (Cu)	≤ 10.0 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 - Gallium (Ga)	≤ 10.0 ppb	
Trace Impurities - Gold (Au)       ≤ 20 ppb       < 1 ppb	Trace Impurities - Germanium (Ge)	≤ 20 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 - Gold (Au)	≤ 20 ppb	• •
Trace Impurities – Iron (Fe)       ≤ 40.0 ppb       < 1.0 ppb	Heavy Metals (as Pb)	≤ 100 ppb	
Trace Impurities – Lead (Pb)       ≤ 20.0 ppb       < 1.0 ppb	Trace Impurities - Iron (Fe)	≤ 40.0 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 - Lead (Pb)	≤ 20.0 ppb	• • • • • • • • • • • • • • • • • • • •
Trace Impurities – Magnesium (Mg) ≤ 20 ppb < 1 ppb  Trace Impurities – Manganese (Mn) ≤ 10.0 ppb < 1.0 ppb  Trace Impurities – Mickel (Ni)	Trace Impurities - Lithium (Li)	≤ 10.0 ppb	. ,
Trace Impurities - Manganese (Mn) ≤ 10.0 ppb < 1.0 ppb	Trace Impurities – Magnesium (Mg)	≤ 20 ppb	• •
Trace Impurities Mickel (Ni)	Trace Impurities - Manganese (Mn)	≤ 10.0 ppb	
	Trace Impurities – Nickel (Ni)	≤ 20.0 ppb	< 1.0 ppb

>>> Continued on page 2 >>>





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	< i 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 (TI)	≤ 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

Nitric Acid 69% **CMOS** 





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

Test Specification Result

For Microelectronic Use

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



### 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

### 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) HNO3

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 Aluminum, Al	CERTIFIED VALUE 1 000 ± 4 µg/mL	ANALYTE Barium, Ba	CERTIFIED VALUE 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  $\pm$  4 °C)

### **Assay Information:**

133	ay iiiioiiiiatioii.			
	ANALYTE	METHOD	NIST SRM#	SRM LOT#
	Ag	ICP Assay	3151	160729
	Ag	Volhard	999c	999c
	Al	ICP Assay	3101a	140903
	Al	EDTA	928	928
	Ва	ICP Assay	3104a	140909
	Ва	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<sub>CRM/RM</sub>, where two or more methods of characterization are used is the weighted mean of the results:

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

X<sub>i</sub> = mean of Assay Method i with standard uncertainty u<sub>char i</sub>

w<sub>i</sub> = the weighting factors for each method calculated using the inverse square of the variance:

 $\mathbf{w_i} = (1/\mathsf{u_{char\;i}})^2 \, / \, (\Sigma (1/(\mathsf{u_{char\;i}})^2)$ 

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM}$  = k ( $u_{char}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2$ )<sup>1/2</sup>

k = coverage factor = 2

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

 $egin{align*} \mathbf{u_{bb}} = \mathbf{bottle} \ \mathbf{to} \ \mathbf{bottle} \ \mathbf{homogeneity} \ \mathbf{standard} \ \mathbf{uncertainty} \ \mathbf{u_{lts}} = \mathbf{long} \ \mathbf{term} \ \mathbf{stability} \ \mathbf{standard} \ \mathbf{uncertainty} \ (\mathbf{storage}) \ \end{aligned}$ 

uts = 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:

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

Xa = mean of Assay Method A with

u<sub>char a</sub> = the standard uncertainty of characterization Method A

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

k = coverage factor = 2

u<sub>char a</sub> = the errors from characterization

 $\mathbf{u_{bb}}$  = bottle to bottle homogeneity standard uncertainty  $\mathbf{u_{lts}}$  = long term stability standard uncertainty (storage)

uts = 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 <u>Terms and Conditions of Sale</u>, <a href="https://www.inorganicventures.com/terms-and-conditions-sale">https://www.inorganicventures.com/terms-and-conditions-sale</a>. 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  $4^{\circ}$   $24^{\circ}$  C to minimize the effects of transpiration. Use at  $20^{\circ} \pm 4^{\circ}$  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 <a href="https://www.inorganicventures.com/TCT">www.inorganicventures.com/TCT</a>

**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:	

### NAMES AND SIGNATURES OF CERTIFYING OFFICERS 12.0 **Certificate Prepared By:**

Justin Dirico Stock Processing Supervisor

Juster Dilies Juster Wall Parel R. Laines

**Certificate Approved By:** 

Jodie Wall Stock VSM Coordinator

**Certifying Officer:** 

Paul Gaines Chairman / Senior Technical Director

<sup>-</sup> 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.



### 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

### 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  $\pm$  2.8  $\mu$ g/mL

**Density:** 1.017 g/mL (measured at 20  $\pm$  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<sub>CRM/RM</sub>, where two or more methods of characterization are used is the weighted mean of the results:

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

X<sub>i</sub> = mean of Assay Method i with standard uncertainty u<sub>char i</sub>

 $\mathbf{w}_i$  = the weighting factors for each method calculated using the inverse square of

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

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k (u^2_{char} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$ 

 $\mathbf{u}_{\mathbf{char}} = [\Sigma((\mathbf{w}_i)^2 (\mathbf{u}_{\mathbf{char}})^2)]^{1/2}$  where  $\mathbf{u}_{\mathbf{char}}$  are the errors from each characterization method

 $\mathbf{u_{bb}}$  = bottle to bottle homogeneity standard uncertainty  $\mathbf{u_{lts}}$  = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty

### Characterization of CRM/RM by One Method

Certified Value, X<sub>CRM/RM</sub>, where one method of characterization is used is the mean of individual results:

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

X<sub>a</sub> = mean of Assay Method A with

u<sub>char a</sub> = the standard uncertainty of characterization Method A

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

k = coverage factor = 2

 $\mathbf{u}_{\mathbf{char}\;\mathbf{a}}$  = the errors from characterization

 $egin{align*} \mathbf{u_{bb}} &= \mathrm{bottle} \ \mathrm{to} \ \mathrm{bottle} \ \mathrm{homogeneity} \ \mathrm{standard} \ \mathrm{uncertainty} \ \mathbf{u_{lts}} &= \mathrm{long} \ \mathrm{term} \ \mathrm{stability} \ \mathrm{standard} \ \mathrm{uncertainty} \ (\mathrm{storage}) \ \end{aligned}$ 

u<sub>ts</sub> = 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 <u>Terms and Conditions of Sale</u>, <a href="https://www.inorganicventures.com/terms-and-conditions-sale">https://www.inorganicventures.com/terms-and-conditions-sale</a>. 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  $4^{\circ}$   $24^{\circ}$  C to minimize the effects of transpiration. Use at  $20^{\circ} \pm 4^{\circ}$  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 <a href="www.inorganicventures.com/TCT">www.inorganicventures.com/TCT</a>

### 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

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:	
· Scalcu ICI Dau Obcii Dalc.	

- 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

20178Ci.



### 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

### 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 us/ral. see

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  $\pm$  3.1  $\mu$ g/mL Cadmium, Cd 250.1  $\pm$  1.1  $\mu$ g/mL Lead, Pb 500.0  $\pm$  2.3  $\mu$ g/mL Selenium, Se 500.0  $\pm$  3.2  $\mu$ g/mL

Thallium, TI 500.0  $\pm$  3.0  $\mu$ g/mL

**Density:** 1.040 g/mL (measured at 20  $\pm$  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
TI	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<sub>CRM/RM</sub>, where two or more methods of characterization are used is the weighted mean of the results:

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

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w<sub>i</sub> = the weighting factors for each method calculated using the inverse square of the variance:

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

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM}$  = k ( $u_{char}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2$ )<sup>1/2</sup>

k = coverage factor = 2

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

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u<sub>ts</sub> = 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:

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

Xa = mean of Assay Method A with

 $\mathbf{u}_{\mathbf{char}\ \mathbf{a}}$  = the standard uncertainty of characterization Method A

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

k = coverage factor = 2

u<sub>char a</sub> = the errors from characterization

 $\mathbf{u_{bb}}$  = bottle to bottle homogeneity standard uncertainty  $\mathbf{u_{lts}}$  = long term stability standard uncertainty (storage)

uts = 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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### 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.
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### 7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

### 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  $4^{\circ}$   $24^{\circ}$  C to minimize the effects of transpiration. Use at  $20^{\circ} \pm 4^{\circ}$  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

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

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:	
Ocalca IOI	Day Open Date.	

### NAMES AND SIGNATURES OF CERTIFYING OFFICERS 12.0 **Certificate Prepared By:**

Justin Dirico Stock Processing Supervisor

Juster Dilies Juster Wall Parel R. Laines

**Certificate Approved By:** 

Jodie Wall Stock VSM Coordinator

**Certifying Officer:** 

Paul Gaines Chairman / Senior Technical Director

<sup>-</sup> 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.

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

## Certified Reference Material CRM

M6030



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

CERTIFIED WEIGHT REPORT: Part Number: 57047 122823 R = 8 | 5 | 24 Lot #

Solvent: 24002546

Nitric Acid

Ambient (20 °C) Silver (Ag) 122826 2% <u>E</u> 80.0 Nitric Acid

Formulated By:

Benson Chan

122823

122823

Recommended Storage:

**Expiration Date:** 

Lot Number:

Description:

Nominal Concentration (µg/mL): NIST Test Number: Weight shown below was diluted to (mL): 1000 **6UTB** 헏 4000.30 Nominal 0.058 Flask Uncertainty Purity Uncertainty Assay 5E-05 Balance Uncertainty Target Actual Actual Uncertainty Reviewed By: Expanded (Solvent Safety Info. On Attached pg.) Pedro L. Rentas SDS Information

1. Silver nitrate (Ag) Compound IN035 J0612AGA1 RM# Number Conc. (µg/mL) 1000.0 8 Purity (%) 0.10 63.7 38 Weight (g) 6.27992 Weight (g) Conc. (µg/mL) 6.27998 1000.0 +/- (µg/mL) 2.0 7761-88-B CAS# 10 ug/m3 Z 3151 NIST SRM

[1] Spectrum No.1 [ 14.044 sec]:58147.D# [Count] [Linear]

www.absolutestandards.com



							race Me	letals	Verificat	tion	by ICP-I	S	$\mu$ g/mL)						
Name of	Will Will Street						The No. of the												
Ą	<0.02	${\mathfrak L}$	<0.02	Dy	<0.02	H	<0.02	Ľ	<0.02	Z	<0.02	7	<0.02	Se	40.2	귱	<0.02	W	<0.02
Sb.	<0.02	င္က	40.2	咭	40.02	Но	<0.02	Ľ.	<0.02	¥	40.02	Re	<b>∆</b> 0.02	S:	<b>6</b> .02	근	<b>∆</b> .02	┙	40.02
As	40.2	င္စ	<0.02	땰	40.02	'n	<0.02	Mg	<0.01	တ္တ	40.02	Rh.	<0.02	Ag	1	∄	<b>∆</b> 0.02	<	<0.02
Ва	<0.02	రి	40,02	82	<0.02	듁	40.02	Mn	40.02	Pd	<0.02	<b>25</b>	40.02	Z	<b>4</b> 0.2	∄	<u>\$</u>	상	<0.02
Ве	40.01	Ω	<0.02	හු	<0.02	ਲ	40.2	Hg	40.2	P	40.02	Ru	<b>∆</b> 0.02	Ş,	A0.02	Ħ	<0.02	Κ.	<0.02
₿.	<0.02	င္ပ	<0.02	႙ၟ	<0.02	2	<0.02	Mo	<0.02	77	<b>∆</b> .02	Sm	40.02	Ś	40.02	S	A).02	Zn	A) ()2
В	<0.02	Cî	<0.02	Au	<0.02	РЬ	<0.02	Z	<0.02	×	40.2	ç	40.02	교	<0.02	Ħ	40.02	72	<0.02

Physical Characterization:

(T)= Target analyte

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 certifed (+/-) 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).

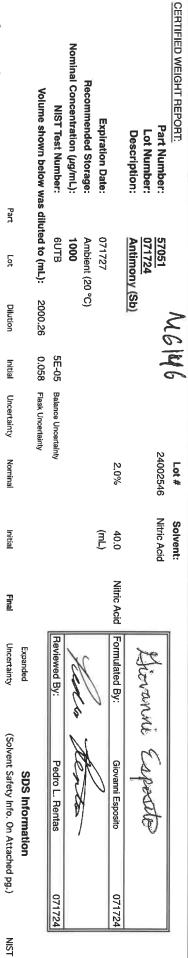
Lot # 071724

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



### R:10/18/24 Certified Reference Material CRM

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



Compound

Number

Number

Factor

Vol. (mL) Pipette (mL) Conc. (µg/mL)

Conc. (µg/mL) Conc. (µg/mL)

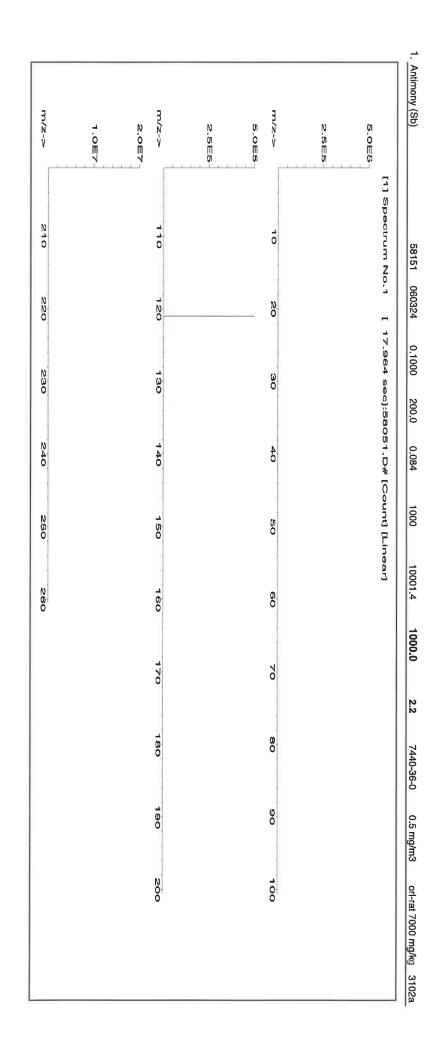
+/- (µg/mL)

CAS#

OSHA PEL (TWA)

LD50

SRM



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

	l		П		Н			Trace M	etals	Verifica		by ICP-M	S(µs	/mL)						
		3																		
	<u>A1</u>	<0.02	5	<0.02	Dy	<0.02	Hf	<0.02	Ľ	<0.02	Z	<0.02	Pr	<0.02	Se	<0.2	Тb	<0.02	W	<0.02
	-Sb	Т	೧	<0.2	턴	<0.02	Но	<0.02	Lu	<0.02	¥	<0.02	Re	<0.02	Si	40.02	Te	<0.02	q	<0.02
_	As	<0.2	င္ပ	<0.02	En	<0.02	ln	<0.02	Mg	<0.01	ွ	<0.02	R.	<0.02	A <sub>69</sub>	<0.02	⊒	<0.02	<	<0.02
	Ва	<0.02	ზ	<0.02	8	<0.02	lr	<0.02	Mn	<0.02	Pd	<0.02	RЬ	<0.02	Na	40.2	∄	<0.02	ΥЪ	<0.02
_	Be	<0.01	υ	<0.02	G	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	×	<0.02
	<u>B</u> .	<0.02	င္ပ	<0.02	င္စ	<0.02	La	<0.02	Мо	<0.02	Pt	<0.02	Sm	<0.02	s	<0.02	Sn	<0.02	Zn	<0.02
_	В	<0.02	5	<0.02	Au	<0.02	Pb	<0.02	M	<0.02	×	<0.2	Sc	<0.02	Ta	<0.02	11	<0.02	Zr	<0.02
										(T) – Target analyte	et analy	ďρ								

(I) = larget 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 certifed (+/-) 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).

### QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY "Ap 150 9001:2015 Certified Program"

"An ISO 9001:2015 Certified Program"



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.

Read instructions carefully before opening bottle(s) and proceeding with the

analyses.

N6152

Contains Heavy Metals HAZARDOUS MATERIAL

Safety Data Sheets Available Upon Request

### (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 and 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,

Page 1 of 2

RM ICP-AES ICSA-1211 B-0710 SFAM.docx

QATS Form 20-007F189R01, 01-17-2023

The Quality Assurance Technical Support (QATS) contract is operated by APTIM Federal Services, LLC.



### 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 HNO $_3$ . 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 HNO<sub>3</sub>. 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.

"CERTIFIED VALUES" FOR INTERFERENCE CHECK SAMPLE ICP-AES ICSA-1211, AND ICSA-1211 MIXED WITH ICSB-0710	Table 1.

HgiH timid (J\by)	Low Limit (Llgl)	A դեգ 4 Դեգ+ (J\նч)	High timid (L\g4)	Low Limit (µg/L)	A hsq (J\gy)	свог	Element
285000	209000	247000	294000	216000	S22000	200	IA
117	979	818	0.09	0.09-	(0.0)	09	9S
120	4.88	104	0.01	0.01-	(0.0)	01	sA
737	337	(537)	506	<b>₽6</b> 1-	(0.9)	200	Ba
078	420	495	0.3	0.8-	(0.0)	0.8	Be
1120	928	279	0.8	0.4-	(0.1)	0.8	Cd
271000	199000	532000	282000	208000	242000	2000	БЭ
429	091	242	0.28	42.0	(0.23)	01	Cr
848	<b>40</b>	974	0.03	0.03-	(0.0)	90	0)
883	434	119	0.72	0.62-	(0.2)	52	ng
114500	84400	99300	116500	00998	101000	100	Fe
0.63	39.0	(0.64)	0.01	0.01-	(0.0)	01	dЯ
286000	210000	248000	294000	216000	S22000	2000	вМ
<del>1</del> 89	430	703	22.0	0.8-	(0.7)	વા	uΜ
1100	018	<del>1</del> 96	42.0	0.86-	(0.2)	07	!N
0.18	0.11	(0.94)	35.0	0.35-	(0.0)	35	əS
232	021	201	0.01	0.01-	(0.0)	01	₽A
133	0.88	(801)	0.82	0.82-	(0.0)	52	ΙΤ
999	714	167	0.08	0.03-	(0.0)	09	٨
4095	608	796	0.08	0.08-	(0.0)	09	uZ

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.



### QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY "An ISO 9001:2015 Certified Program"

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.

Contains Heavy Metals
HAZARDOUS MATERIAL

Safety Data Sheets Available Upon Request M6153

### (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".

<u>CAUTION:</u> 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.

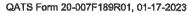
QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY
APTIM Federal Services, LLC
2700 Chandler Avenue - Building C
Las Vegas, NV 89120

### (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,

Page 1 of 2











### QUALITY ASSURANCE TECHNICAL SUPPORT LABORATORY "An ISO 9001:2015 Certified Program"

### **APTIM**

### 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 HNO<sub>3</sub>. 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 HNO<sub>3</sub>. 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
Ва	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
TI	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.

a			
- 8			



### Certificate of Analysis

ustry. R: 8/5/24

M6019

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:** 

Single Analyte Custom Grade Solution

Catalog Number:

CGSR1

Lot Number:

U2-SR730227

Matrix:

0.1% (v/v) HNO3

Value / Analyte(s):

1 000 μg/mL ea:

Strontium

Starting Material:

SrCO3

Starting Material Lot#:

M2-2192

Starting Material Purity:

99.9993%

### 3.0 CERTIFIED VALUES AND UNCERTAINTIES

**Certified Value:** 

1001 ± 3 µg/mL

Density:

1.000 g/mL (measured at 20 ± 4 °C)

### Assay Information:

Assay Method #1

998 ± 4 µg/mL

ICP Assay NIST SRM Traceable to 3153a Lot Number: K2-SR650985

Assay Method #2

1001 ± 3 µg/mL

EDTA NIST SRM 928 Lot Number: 928

Assay Method #3

1001 ± 2 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<sub>CRM/RM</sub>, where two or more methods of characterization are used is the weighted mean of the results:

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

X<sub>i</sub> = mean of Assay Method i with standard uncertainty uchar i

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

 $\mathbf{w_i} = (1/u_{\mathrm{char}\,i})^2/(\Sigma(1/(u_{\mathrm{char}\,i})^2)$ 

CRM/RM Expanded Uncertainty (±) =  $U_{CRM/RM} = k (u^2_{char} + u^2_{bb} + u^2_{lts} + u^2_{ts})^{1/2}$ 

k = coverage factor = 2

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

ubb = bottle to bottle homogeneity standard uncertainty

uits = long term stability standard uncertainty (storage)

uts = transport stability standard uncertainty (stora

### 4.0 TRACEABILITY TO NIST

Characterization of CRM/RM by One Method

X<sub>a</sub> = mean of Assay Method A with

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

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

- 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  $0.3 \ \mu m$ .

М	Ag	<	0.001980	М	Eu	<	0.000495	0	Na		0.000200	М	Se	<	0.013862	0	Zn		0.000143
0	Al		0.000370	0	Fe		0.000410	M	Nb	<	0.000495	i	Si	<		М	Zr	<	0.000495
M	As	<	0.000495	М	Ga	<	0.000495	М	Nd	<	0.000495	M	Sm	<	0.000495				
M	Au	<	0.000989	М	Gd	<	0.000495	0	Ni	<	0.007631	M	Sn	<	0.000990				
M	В	<	0.039606	М	Ge	<	0.000495	М	Os	<	0.000494	s	Sr	<					
М	Ba		0.006486	M	Hf	<	0.000495	i	Р	<		М	Ta	<	0.000495				
М	Be	<	0.000990	M	Hg	<	0.000989	M	Pb	<	0.002970	М	Tb	<	0.000495				
М	Bi	<	0.000495	M	Но	<	0.000495	М	Pd	<	0.003957	М	Te	<	0.027724				
0	Ca		0.004255	M	ln	<	0.000495	M	Pr	<	0.000495	М	Th	<	0.000990				
M	Cd		0.001339	M	lr	<	0.000494	M	Pt	<	0.002970	М	Tī	<	0.005940				
М	Çe	<	0.004950	0	K	<	0.008184	М	Rb	<	0.002970	М	TI	<	0.000495				
М	Co	<	0.000495	M	La	<	0.000495	М	Re	<	0.000495	М	Tm	<	0.000495				
0	Cr	<	0.003207	0	Li	<	0.000884	0	Rh	<	0.012829	М	U	<	0.001485				
M	Cs	<	0.000990	M	Lu	<	0.002970	М	Ru	<	0.000989	М	٧	<	0.001980				
M	Cu		0.000099	0	Mg		0.000064	i	S	<		М	W	<	0.003960				
М	Dy	<	0.000495	0	Mn		0.000066	М	Sb	<	0.014852	0	Υ	<	0.000995				
М	Er	<	0.000495	М	Мо	<	0.001980	М	Sc	<	0.001980	М	Yb	<	0.000495				

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, <a href="https://www.inorganicventures.com/terms-and-conditions-sale">https://www.inorganicventures.com/terms-and-conditions-sale</a>. 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  $4^{\circ}$   $24^{\circ}$  C to minimize the effects of transpiration. Use at  $20^{\circ} \pm 4^{\circ}$  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 - 87.62 +2 6 Sr(H2O)6+2 Chemical Compatibility - Soluble in HCl, and HNO3. Avoid H2SO4, HF and neutral to basic media. Stable with most metals and inorganic anions forming insoluble silicate, carbonate, hydroxide, oxide, fluoride, sulfate, oxalate, chromate, arsenate and tungstate in neutral aqueous media.

**Stability -** 2-100 ppb levels stable for months in 1% HNO3 / LDPE container. 1-10,000 ppm solutions chemically stable for years in 1 - 3.5% HNO3 / LDPE container.

**Sr Containing Samples (Preparation and Solution) -**Metal (Best dissolved in diluted HNO3); Ores (Carbonate fusion in Pt0 followed by HCl dissolution); Organic Matrices (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 88 amu	1200 ppt	N/A	72Ge16O, 176Yb+2,
			176Lu+2 , 176Hf+2
ICP-OES 407.771 nm	0.0004 / 0.00006 µg/mL	1	U, Ce
ICP-OES 421.552 nm	0.0008 / 0.00004 μg/mL	1	Rb
ICP-OES 460.733 nm	0.07 / 0.003 μg/mL	1	Се

### 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, Ve. 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

March 03, 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

- March 03, 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:	
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- 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 20178hi

## Absolute Standards, Inc. 800-368-1131

www.absolutestandards.com



## Certified Reference Material CRM

M6023

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

		Weight shown below was diluted to (mL):	NIST Test Number:	Nominal Concentration (µg/mL):	Recommended Storage:	Expiration Date:		Description:	Lot Number:	Part Number:	CERTIFIED WEIGHT REPORT:
Lot		ted to (mL):	8TUB	1000	Ambient (20 °C)	062727		Thalllum (TI)	062724	57081	
Nominal		2000.1			င္ပိ						
Purity Uncertainty Assay		0.10 Flask Uncertainty	5E-05 Balance Uncertainty				2%			Solvent:	
Target						(mL)	40.0			Solvent: 24002546	Lot #
Actual							Nitric Acid			Nitric Acid	
Actual											
Uncertainty	Expanded		Reviewed By:	Juna	1		Formulated By:	4	TO SE	>	
(Solvent Safety Info. On Attached pg.)	SDS Information		Pedro L. Rentas	" freshies	A A		Aleah O'Brady	0	San O Basin	7	
ched pg.) NIST			062724				062724			,	
7											

RW#

Number

Conc. (µg/mL) (%)

Purity (%) (%)

Weight (g) Weight (g) Conc. (µg/mL) +/- (µg/mL)

CAS#

OSHA PEL (TWA)

LD50

SRM

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Part # 57081



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

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

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## Physical Characterization:

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 certifed (+/-) 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).

### 800-368-1131 Absolute Standards, Inc.

www.absolutestandards.com



## Certified Reference Material CRM

M6021

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

CERTIFIED WEIGHT REPORT: Part Number: Lot Number: 57023 062424 Solvent:

24002546 Nitric Acid

**Expiration Date:** Description: 062427 Vanadium (V) 2.0% (III) 40.0

Nitric Acid

Formulated By:

Aleah O'Brady

062424

062424

AND CORDA

Recommended Storage: **6UTB** 1000 Ambient (20 °C) 5E-05 **Balance Uncertainty** 

Nominal Concentration (µg/mL): Volume shown below was diluted to (mL): **NIST Test Number:** 2000.3 0.06 Flask Uncertainty Reviewed By: Expanded Pedro L. Rentas **SDS Information** 

orl-rat 58.1mg/kg 3165	2.2 7803-55-6 0.05 mg/m3	7803-55-6	2.2	1000.0	1 11	1000	0.084	0.1000 200.0	1 1	58123 021224	58123	Ammonium metavanadate (V)
	# OSHA PEL (TWA)	CAS#	+/- (ug/mL)	Conc. (ua/mL) +/- (ua/mL)	Conc. (ua/mL)	Vol. (mL) Pipette (mL) Conc. (ua/mL)	Pipette (mL)	Vol. (mL)	Factor	Number	Number	Compound
Attac	(Solvent Safety Info. On Attached pg.)	(Solver	Uncertainty	Final	Initial	Nominal	Uncertainty	Initial	Dilution	Lot	Part	

m/z->	2,588	5.0E8	1.007	m/z-> 2.0E7	1.006	2.006
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220		200		20		
230		130		30		
240		140		<b>a</b>		
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260		160		60		
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Part # 57023

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

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## Physical Characterization:

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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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- \* Standards are certifed (+/-) 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).



### SHIPPING DOCUMENTS



### 284 Sheffield Street, Mountainside, NJ 07092 (908) 789-8900 Fax: (908) 788-9222 www.chemtech.net

Alliance Project Number:

0 2669

TECHN	ICAL G	ROUP		CHAIN OF CUSTO	ODY R	≀ECOF	₹D			CO	C Nu	mber	r:						
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COMPANY: Tully I	Environmental I	Inc.		PROJECT NAME: Tran	nsfer St	ation SF	PDES			BILL	TO: Sa	ame						PO#	
ADDRESS: 57 Sea	aview Blvd			PROJECT #: 252113			LOCATIO	N:		ADDF	RESS:								
CITY: Pt Washingt		STATE: NY	ZIP: 11050	PROJECT MANAGER:	:					CITY:								STAT	TE: ZIP:
ATTENTION: Dea	in Devoe			E-MAIL:						ATTE	NTION	۷:						PHO	NE:
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RELINQUISHED BY 3.		DATE/TIME	RECEIVED FOR LA	AB BY	P	age	of		SHIPPEI ALLI	D VIA: (IANCE:		T: □ Ha □ Picke			□ Ove	-			Shipment Complete  YES NO
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From: Dean Devoe <DDevoe@tullyconstruction.com>

Sent: Tuesday, July 22, 2025 12:50 PM

Re: melted ice Subject:

EXTERNAL EMAIL - This email was sent by a person from outside your organization. Exercise caution when clicking links, opening attachments or taking further action, before validating its authenticity.

**Secured by Check Point** 

Please proceed.

Sent from my Verizon, Samsung Galaxy smartphone Get Outlook for Android

From: Deepak Parmar < Deepak.Parmar@alliancetg.com>

Sent: Tuesday, July 22, 2025 11:41:05 AM

To: Dean Devoe <DDevoe@tullyconstruction.com>

Subject: melted ice

EXTERNAL EMAIL - This email was sent by a person from outside your organization. Exercise caution when clicking links, opening attachments or taking further action, before validating its authenticity.

**Secured by Check Point** 

### Good morning,

sample received with melted ice with Temp 17.5 cel on 7/22/2025 let us know how to proceed with analysis?

### Thanks & Regards,



**Deepak Parmar** Sr. Project Manager **An Alliance Technical Group Company** Main: 908-789-8900

Direct: 908-728-3154

GROUP Address: 284 Sheffield St, Ste 1, Mountainside, NJ 07092

www.alliancetg.com



### Laboratory Certification

Certified By	License No.			
CAS EPA CLP Contract	68HERH20D0011			
Connecticut	PH-0830			
DOD ELAP (ANAB)	L2219			
Maine	2024021			
Maryland	296			
New Hampshire	255424 Rev 1			
New Jersey	20012			
New York	11376			
Pennsylvania	68-00548			
Soil Permit	525-24-234-08441			
Texas	T104704488			

QA Control Code: A2070148



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

Fax: 908 789 8922

### LOGIN REPORT/SAMPLE TRANSFER

Order ID: Q2669

TULL01

Order Date: 7/22/2025 11:14:00 AM

Project Mgr:

Client Name: Tully Environmental, Inc

Project Name: Transfer Station-SPDES

Report Type: Results Only

Client Contact: Dean Devoe

Receive DateTime: 7/22/2025 11:05:00 AM

**EDD Type:** EXCEL NOCLEANUP

Invoice Name: Tully Environmental, Inc

Purchase Order:

Hard Copy Date:

Invoice Contact: Dean Devoe

Date Signoff:

LAB ID	CLIENT ID	MATRIX SAMPLE DATE	SAMPLE TIME	TEST	TEST GROUP	METHOD		FAX DATE	DUE DATES
Q2669-01	001 WILLETS PT BLVD (JUNE)	Water 07/21/2025	11:30						
				VOC-BTEX		624.1	1 Bus. Day		
Q2669-02	002 35th Ave (JUNE)	Water 07/21/2025	11:30						
				VOC-BTEX		624.1	1 Bus. Day		

Relinguished By:

Date / Time : 3-72225

Storage Area: VOA Refridgerator Room