



Analytical Reference Material ARM

CERTIFIED WEIGHT REPORT:

Part Number: 57005
Lot Number: 111611
Description: Boron (B)
Expiration Date: 111614
Nominal Concentration (µg/mL): 1000

Lot # Y47057
Solvent(s): Ammonium hydroxide
2.0%
40.0 (mL)
Storage: 20 °C
5E-05 Balance Uncertainty
0.100 Flask Uncertainty

Formulated By:	Pat Scaturchio
Reviewed By:	Pedro L. Rentas
	111611

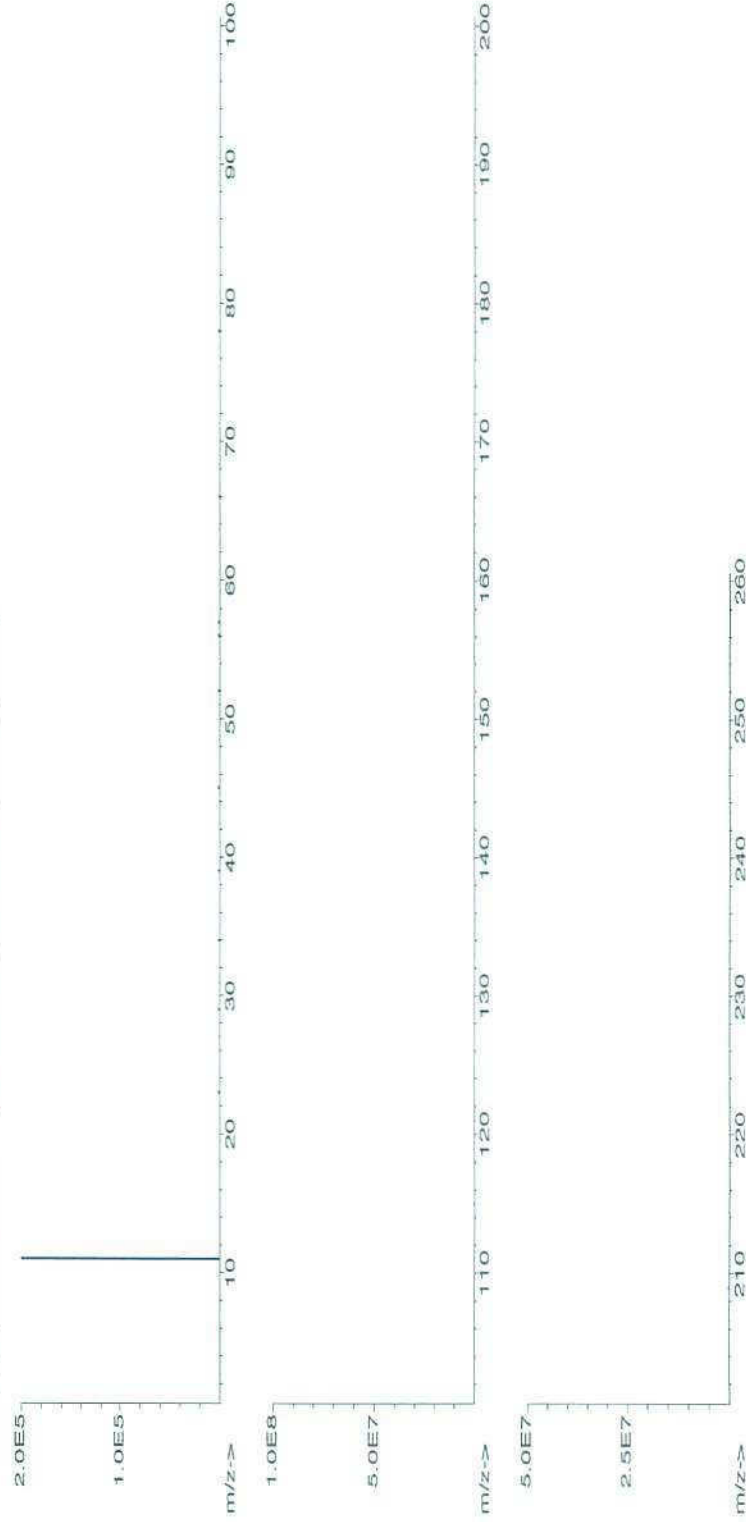
Volume shown below was diluted to (mL):

MSDS Information

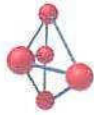
Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Uncertainty	Pipette	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty (+/-)	(Solvent Safety Info. On Attached pg.)	CAS#	LD50	NIST SRM
----------	-------------	------------	-----------------	----------------	-------------	---------	-----------------------	---------------------	----------------------------	--	------	------	----------

1. Boric acid (B)	58105	031510	0.1000	200.0	0.013	10000.9	1000.2	0.00201	10043-35-3	N/A	ori-rat 2660mg/kg	3107
-------------------	-------	--------	--------	-------	-------	---------	--------	---------	------------	-----	-------------------	------

[1] Spectrum No. 1 [34.583 sec]:56005.D# [Count] [Linear]



- * 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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



Analytical Reference Material ARM

CERTIFIED WEIGHT REPORT:

Part Number:
Lot Number:
Description:

57038
111611
Strontium (Sr)

Lot #
Solvent(s):

Expiration Date:

111614

2.0%
Nitric Acid

Storage: 20 °C

Nominal Concentration (µg/mL):

1000

5E-05 Balance Uncertainty
0.100 Flask Uncertainty

Volume shown below was diluted to (mL):

1999.68

40.0 (mL)
Nitric Acid

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

111611
111611

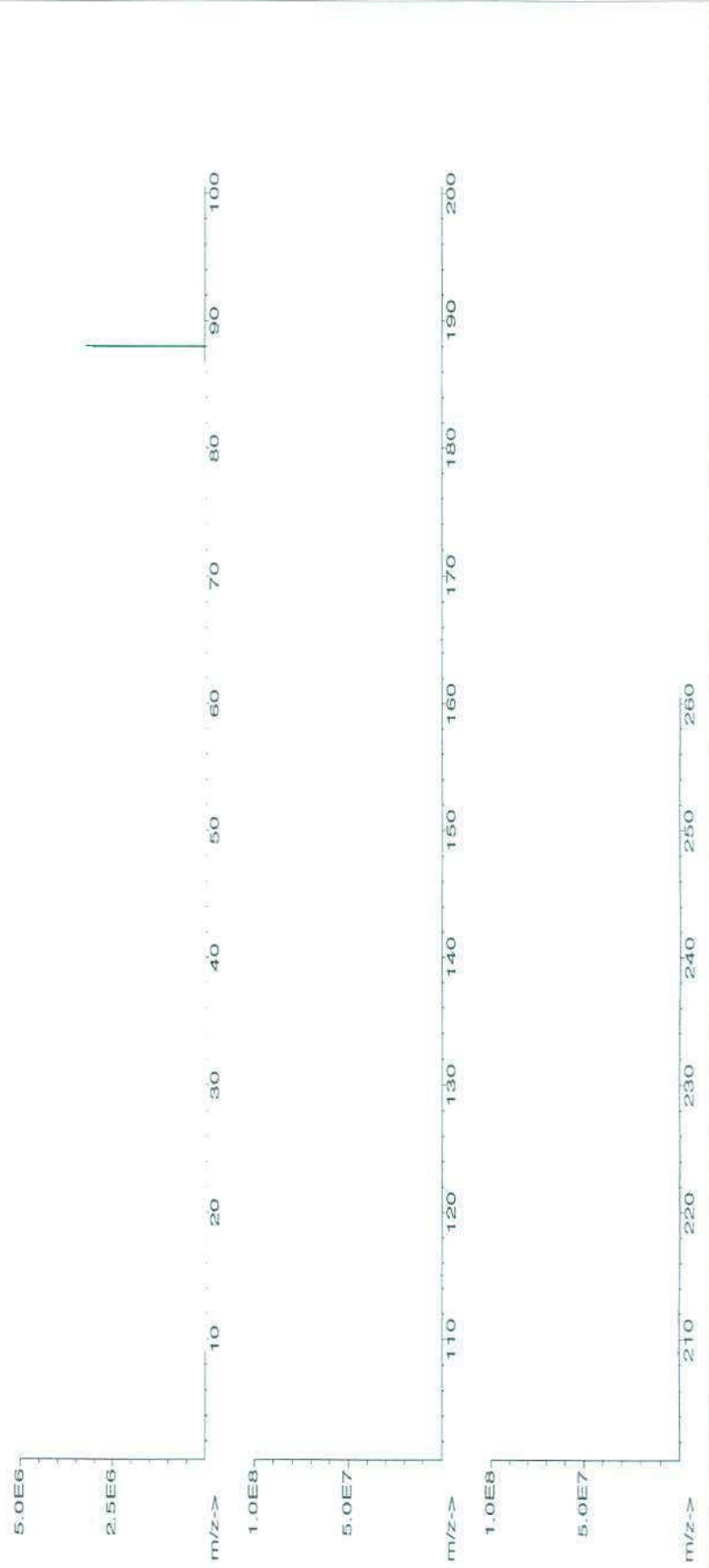
MSDS Information

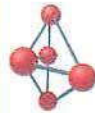
(Solvent Safety Info. On Attached pg.)
CASH OSHA PEL (TWA) LD50 SRM

Compound

1. Strontium nitrate (Sr) 58138 040511 0.1000 200.0 0.013 10001.2 1000.3 0.00201 10042-76-9 N/A orl-rat 2750mg/kg 3153a (+/-)

[1] Spectrum No. 1 [34.243 sec]:57038.D# [Count] [Linear]





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

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

(T)= Target analyte

Physical Characterization:

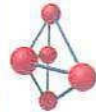
Analyzed Density of Solution (g/mL): 1.011

Temperature (°C): 19.0

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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



Analytical Reference Material ARM

CERTIFIED WEIGHT REPORT:

Part Number: **57050**
Lot Number: **111611**
Description: **Tin (Sn)**

Expiration Date: **111614**
Nominal Concentration (µg/mL): **1000**

Lot # **C142199** Solvent(s): **Nitric Acid**
TO3072 **Hydrochloric acid**

2.0% **40.0** **Nitric Acid**
6.0% **120.0** **Hydrochloric acid**
Storage: **20 °C** **(mL)**

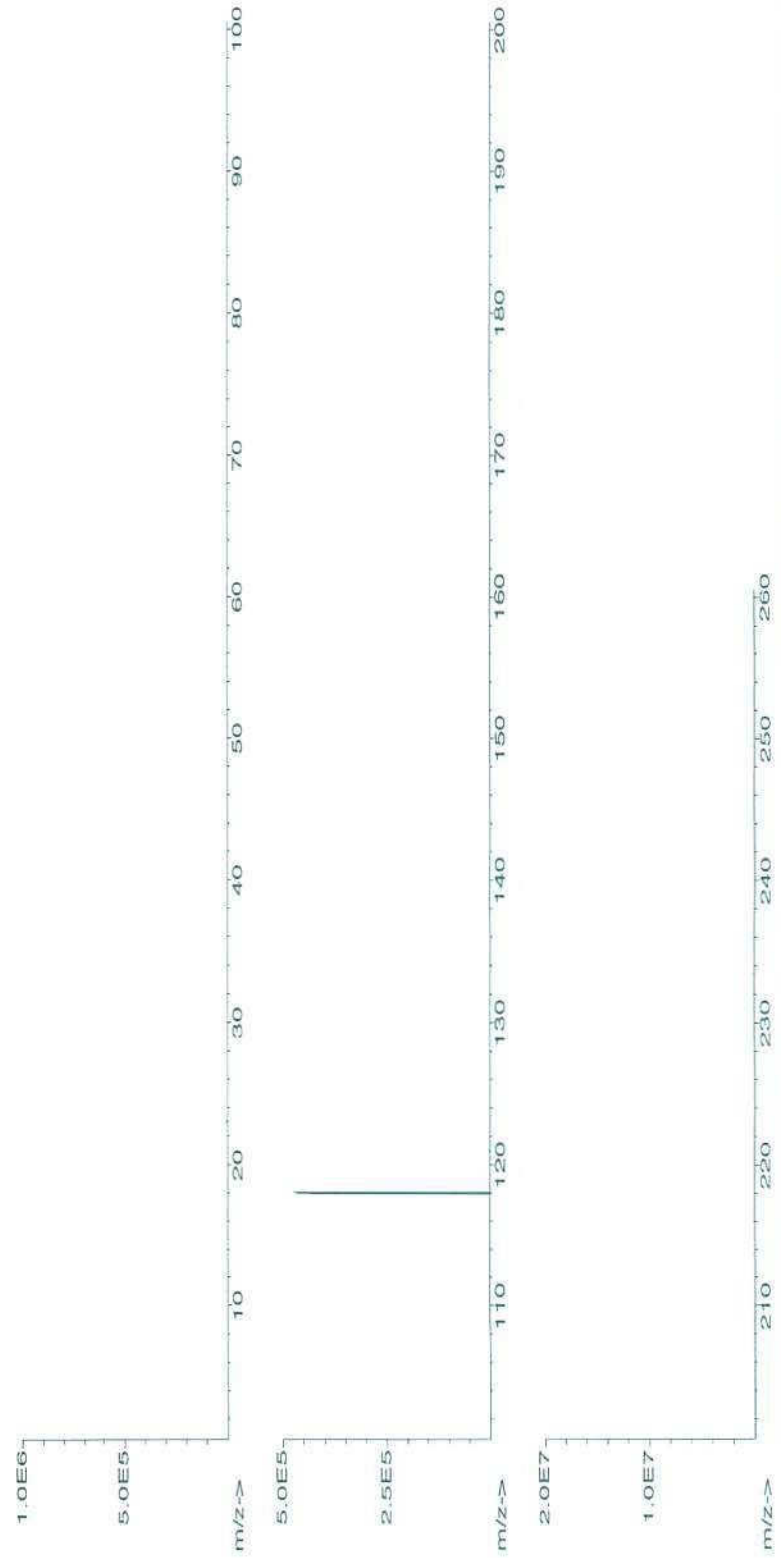
5E-05 **Balance Uncertainty**
0.100 **Flask Uncertainty**

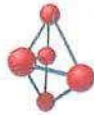
Volume shown below was diluted to (mL): **1999.68**

MSDS Information

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Initial Concentration (µg/mL)	Final Concentration (µg/mL)	Expanded Uncertainty (+/-)	(Solvent Safety Info. On Attached pq.)	CAS#	OSHA PEL (TWA)	LD50	NIST SRM
1. Ammonium hexafluorostannate (IV) (Sn)	58150	101411	0.1000	200.0	0.013	10001.8	0.00201	16919-24-7	7 mg/m3	N/A		3161a

[1] Spectrum No.1 [16.634 sec]:57050.D# [Count] [Linear]





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

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

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

(T)= Target analyte

Physical Characterization:

Analyzed Density of Solution (g/mL):

1.020

Temperature (°C):

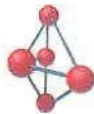
21.2

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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).





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

Trace Metals Verification by ICP-MS (µg/mL)																			
Al	0.44	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pr	<0.02	Se	<0.2	Tb	<0.02	W	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	La	<0.02	Nb	<0.02	Re	<0.02	Si	*	Te	<0.02	U	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02	Tl	<0.02	V	<0.02
Ba	<0.02	Co	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Th	<0.02	Yb	<0.02
Be	<0.01	Cr	<0.02	Ga	<0.02	Fe	<0.02	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	Cu	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	H	<0.02	Sn	<0.02	S	<0.02	So	<0.02	Zn	<0.02
B	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02	Ti	0.26	Zr	<0.02

(*) = Target Element

Physical Characterization:

Analyzed Density of Solution (g/mL): 1.038

Temperature (°C): 22.0

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, (NIST Test #: 732/245790).

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

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

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



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

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

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

Physical Characterization:

Analyzed Density of Solution (g/mL): 1.059

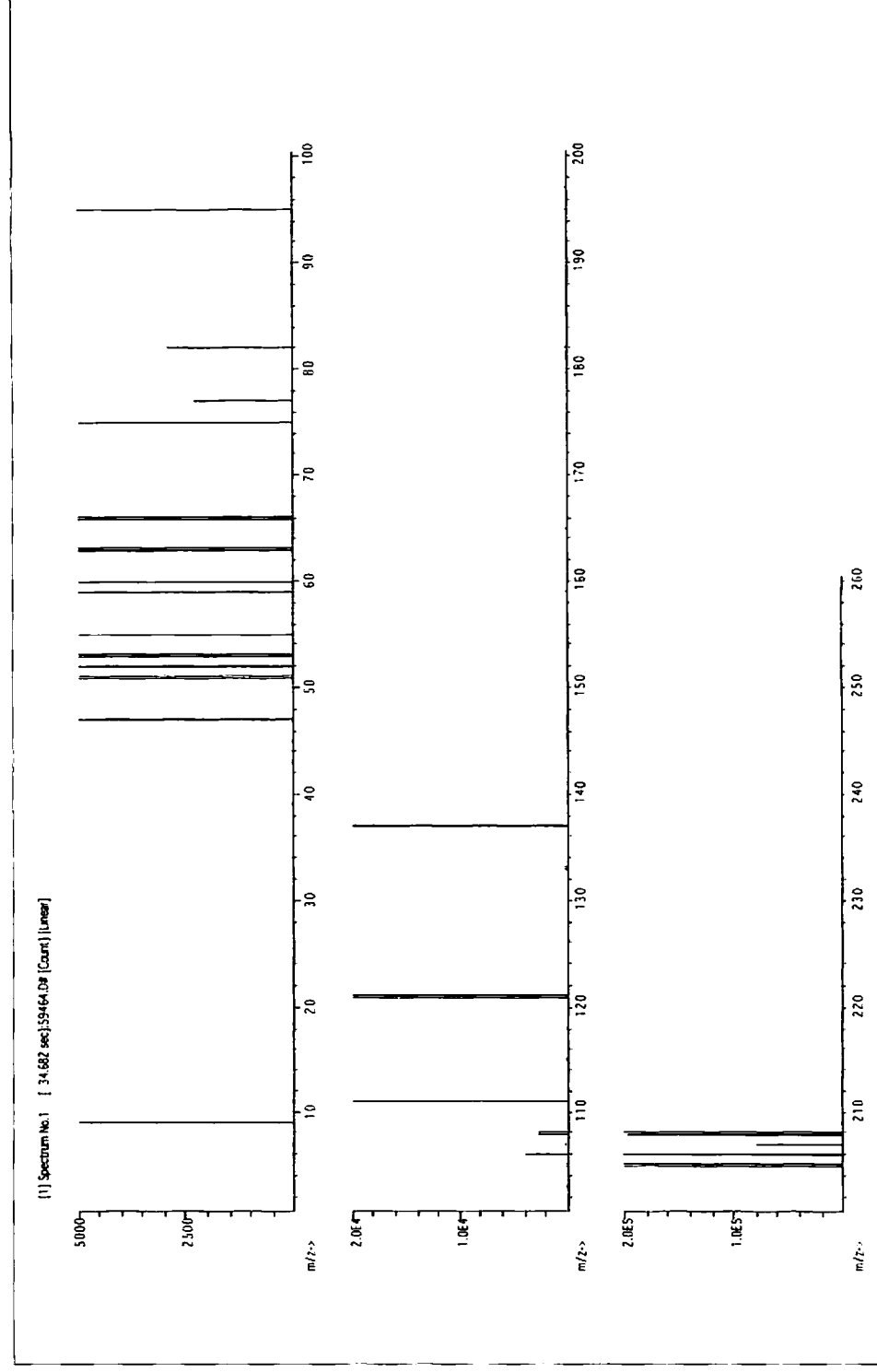
Temperature ($^{\circ}\text{C}$): 21.1

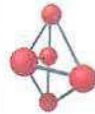
Homogeneity: No heterogeneity was observed in the preparation of this standard.

(*) = Target Element

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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).





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

Trace Metals Verification by ICP-MS (µg/mL)																	
Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Ho	<0.02	Li	<0.02	Ni	<0.02	Pr	<0.02	Se	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Os	<0.02	Ir	<0.02	La	<0.02	Nb	<0.02	Rh	<0.02	Si	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Fe	<0.02	Mg	<0.02	Os	<0.02	Rb	<0.02	Ag	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	<0.02	Ge	<0.02	Mn	<0.02	Pd	<0.02	Ru	<0.02	Na	<0.02
Be	<0.01	Cr	<0.02	Ga	<0.02	Fe	<0.02	Mo	<0.02	Hg	<0.2	P	<0.02	Sr	<0.02	Sr	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Pb	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	S	<0.02
B	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02			Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02

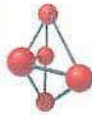
(T)= Target analyte

Physical Characterization:

Analyzed Density of Solution (g/mL): 1.011
Temperature (°C): 20.0
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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



Analytical Reference Material ARM

CERTIFIED WEIGHT REPORT:

Part Number: 58034
Lot Number: 012112
Description: Selenium (Se)

Expiration Date: 012115

Nominal Concentration (µg/mL): 1000

Storage: 20 °C

5E-05 Balance Uncertainty
0.100 Flask Uncertainty

Volume shown below was diluted to (mL): 1999.68

Lot # C142199
Solvent: Nitric Acid

2.0%
40.0 (mL)
Nitric Acid

<i>Pat Scaturchio</i>	
Formulated By:	Pat Scaturchio 012112
<i>Pedro L. Rentas</i>	
Reviewed By:	Pedro L. Rentas 012112

MSDS Information

NIST SRM

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

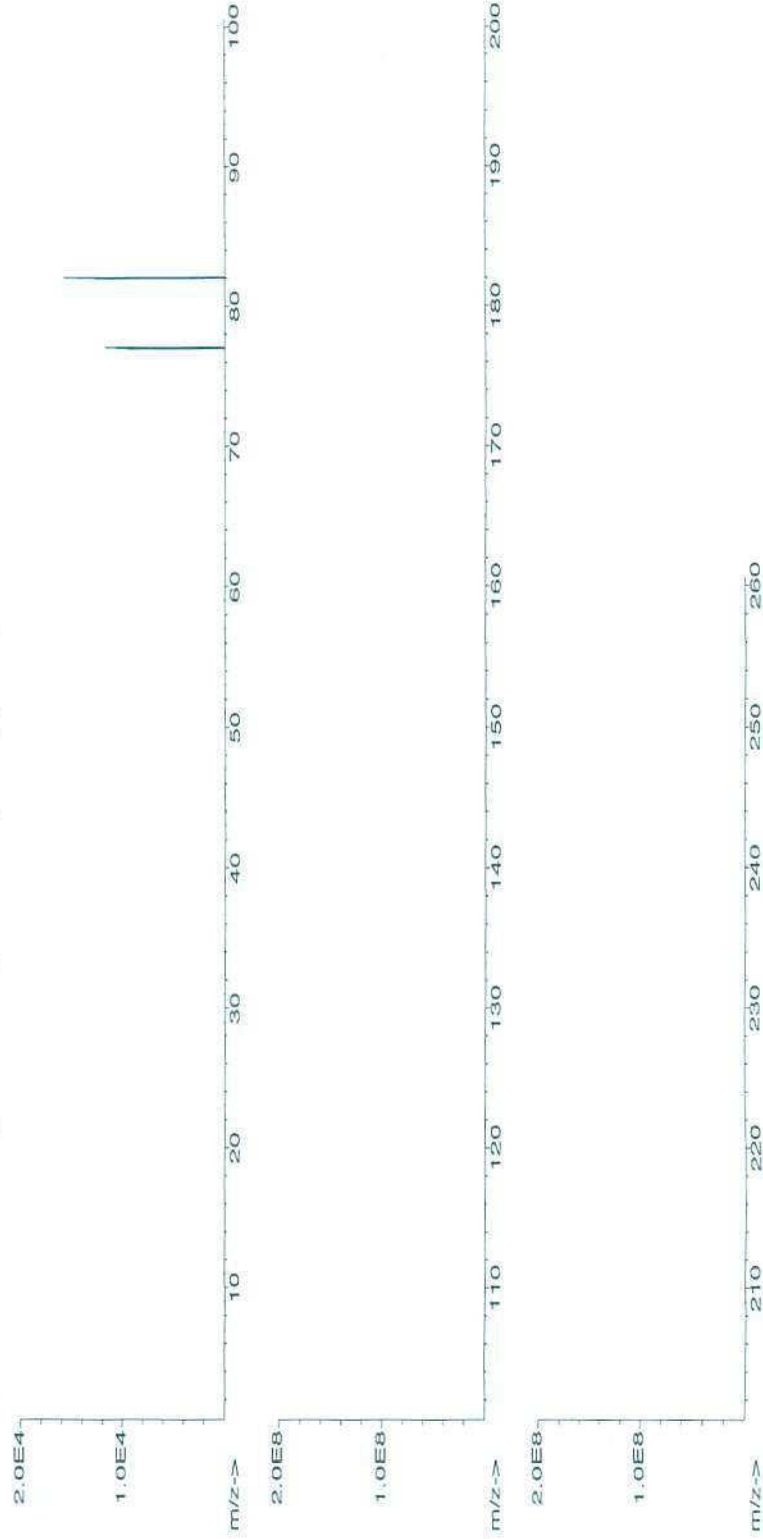
Expanded Uncertainty
Conc. (µg/mL) Initial Conc. (µg/mL)

Final Conc. (µg/mL)
Conc. (µg/mL) Pipette
Initial Volume

Part Number Lot Number
Dilution Factor

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty (+/-)	Conc. (µg/mL)	Conc. (µg/mL)	Conc. (µg/mL)	NIST SRM
1. Selenium (IV) oxide (Se)	58134	101110	0.1000	200.0	0.013	10000.5	0.00201	0.2 mg/m3	0.2 mg/m3	N/A	3149

[1] Spectrum No. 1 [33.702 sec]:58034.D# [Count] [Linear]





Analytical Reference Material ARM

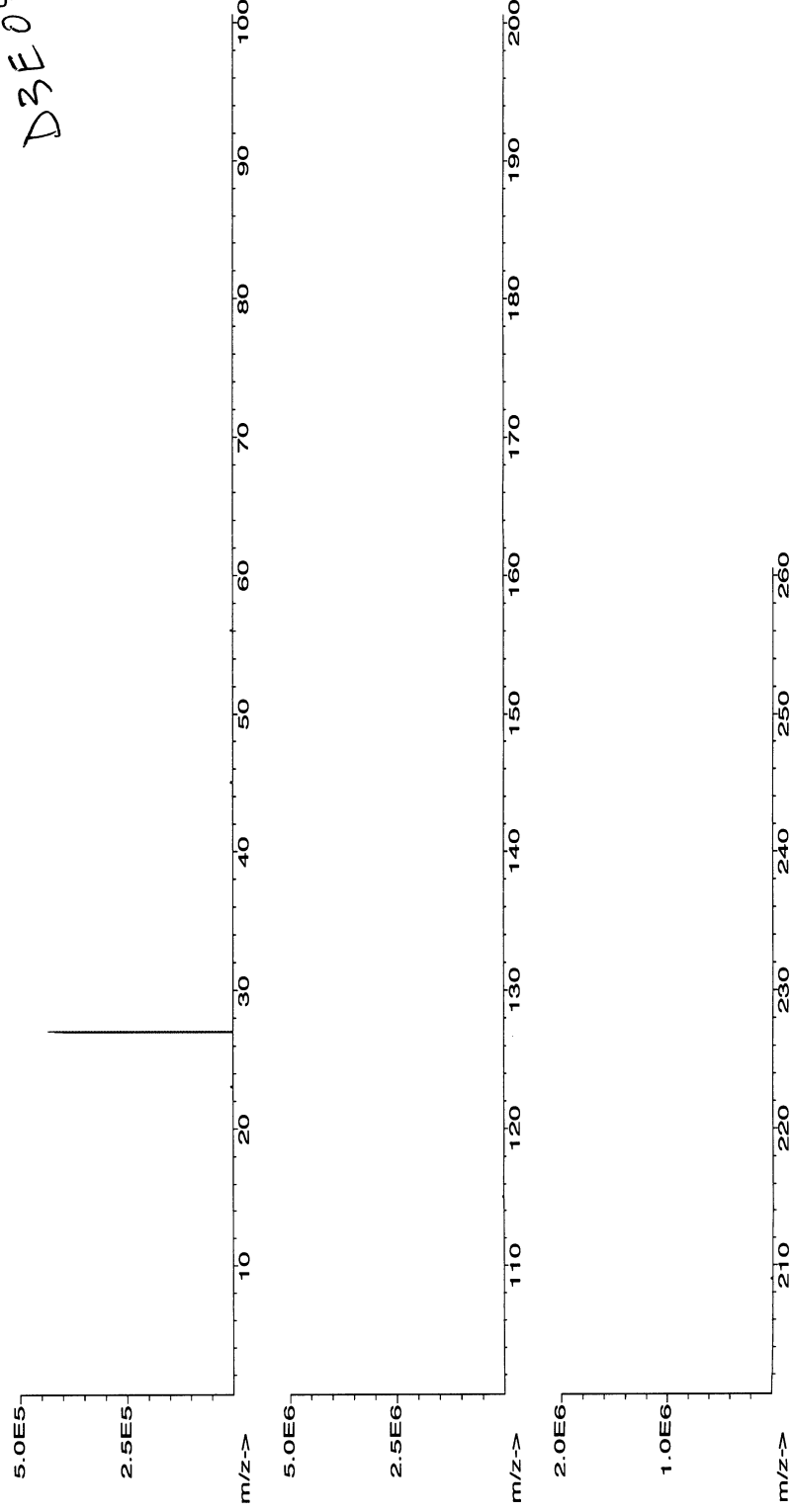
CERTIFIED WEIGHT REPORT:

Part Number: 58113
Lot Number: 050313
Description: Aluminum (Al)
Expiration Date: 050316
Nominal Concentration (µg/mL): 10000
Storage: 20 °C
Solvent: C257285 Nitric Acid
Lot #
Weight shown below was diluted to (mL): 1000.99
5E-05 Balance Uncertainty
0.100 Flask Uncertainty

<i>Gabriel Holland</i>	
Formulated By:	Gabriel Holland 050313
<i>Pedro L. Rentas</i>	
Reviewed By:	Pedro L. Rentas 050313

MSDS Information									
Compound	Lot Number	RM#	Nominal Conc. (µg/mL)	Purity	Uncertainty (%)	Assay	Target Weight (g)	Actual Weight (g)	Actual Conc. (µg/mL)
1. Aluminum Nitrate Nonahydrate (Al)	IN022	R1207ALAGR2	10000.0	99.995	0.10	7.10	140.9921	140.9939	10000.1
							0.00201	07784-27-2	5 mg/m3
							ori-rat 284 mg/kg 3101a		
							(±)		
							Expanded Uncertainty	CAS#	LD50
							OSHA PEL (TWA)		
							NIST SRM		
							Solvent Safety Info. On Attached pg.)		

[1] Spectrum No.1 [15.014 sec]:58113.D# [Count] [Linear]





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

Trace Metals Verification by ICP-MS (µg/L)												
Al	T	Cd	Dy	Hf	Li	Ni	Pr	Se	Tb	Te	W	<0.02
Sb	<0.02	Ca	Er	<0.02	Lu	<0.02	Re	Si	<0.2	<0.02	U	<0.02
As	<0.2	Ce	<0.02	In	<0.02	Os	<0.02	Ag	<0.02	Tl	V	<0.02
Ba	<0.02	Cs	<0.02	Ir	<0.02	Pd	<0.02	Na	<0.2	Th	Yb	<0.02
Be	<0.01	Cr	<0.02	Fe	<0.2	P	<0.02	Sr	<0.02	Tm	Y	<0.02
B	<0.02	Co	<0.02	Ge	<0.02	Mo	<0.02	S	<0.02	Sn	Zn	<0.02
Bi	<0.02	Cu	<0.02	Pb	<0.02	K	<0.2	Ta	<0.02	Ti	Zr	<0.02

(T)= Target analyte

Physical Characterization:

Certified by:

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

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: 58120
Lot Number: 050313
Description: Calcium (Ca)
Expiration Date: 050316
Nominal Concentration (µg/mL): 10000
Storage: 20 °C
Solvent: C257285 Nitric Acid
Lot #
Weight shown below was diluted to (mL): 1999.68 5E-05 Balance Uncertainty
0.100 Flask Uncertainty

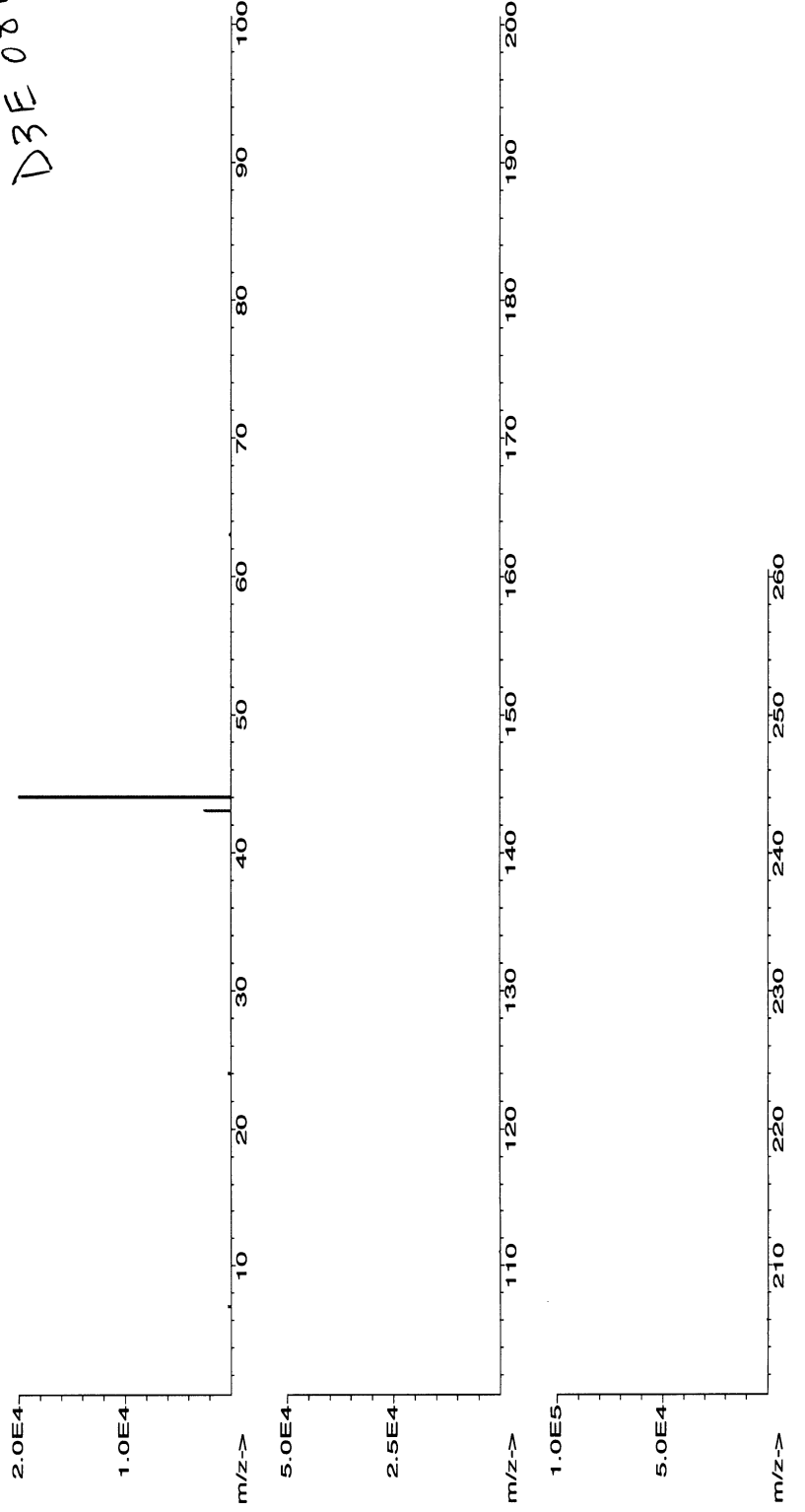
<i>Gabriel Helland</i>	
Formulated By:	Gabriel Helland
050313	
<i>Pedro L. Rentas</i>	
Reviewed By:	Pedro L. Rentas
050313	

MSDS Information

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

1. Calcium carbonate (Ca)	IN014	D212CAA1	10000.0	99.999	0.10	40.0	49.9926	49.9940	10000.3	0.00200	00471-34-1	7 mg/m3	N/A		3109a
---------------------------	-------	----------	---------	--------	------	------	---------	---------	---------	---------	------------	---------	-----	--	-------

[1] Spectrum No. 1 [12.514 sec]:58120.D# [Count] [Linear]





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

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

(T)= Target analyte

Physical Characterization:

Certified by:

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

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: 58126
Lot Number: 050313
Description: Iron (Fe)
Expiration Date: 050316
Nominal Concentration (µg/mL): 10000

Lot # C257285
Solvent: Nitric Acid
5% Nitric Acid
Storage: 20 °C
5E-05 Balance Uncertainty
0.100 Flask Uncertainty

Weight shown below was diluted to (mL): 1999.68

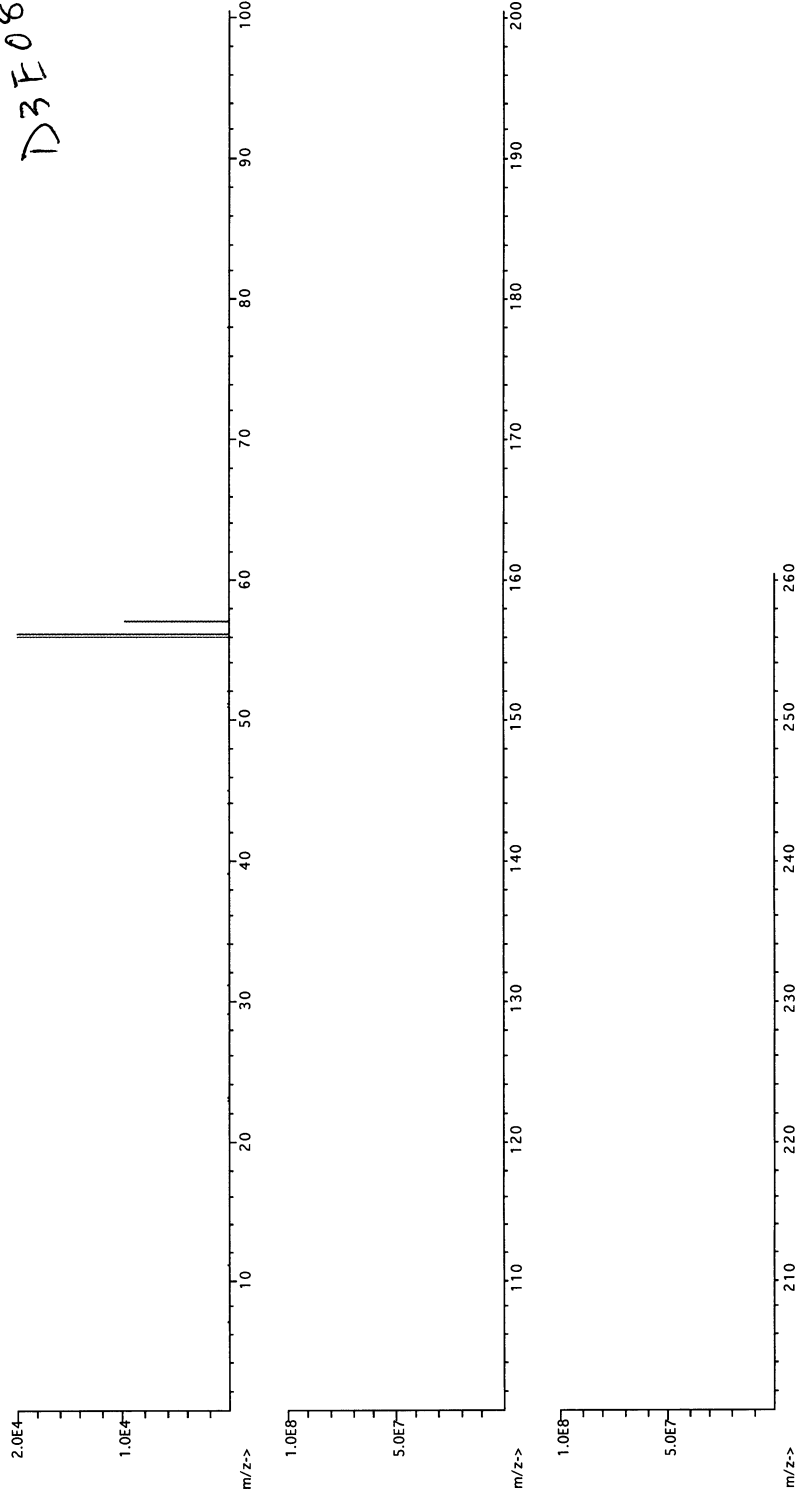
<i>Lawrence Barry</i>	
Formulated By:	Lawrence Barry
050313	
<i>Pedro L. Rentas</i>	
Reviewed By:	Pedro L. Rentas
050313	

MSDS Information

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

1. Iron (Fe)	IN346 AH14-157FEX	10000.0	99.999	0.10	100.0	19.9970	20.0030	10003.0	0.00200	07439-89-6	5 mg/m3	30 gm/kg	3126A
--------------	-------------------	---------	--------	------	-------	---------	---------	---------	---------	------------	---------	----------	-------

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





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

Trace Metals Verification by ICP-MS (µg/L)																	
Al	<0.5	Cd	<0.1	Dy	<0.12	Hf	<0.1	Li	<0.1	Ni	130	Pr	<0.1	Se	<0.5	Tb	<0.1
Sb	20	Ca	<5	Er	<0.1	Ho	<0.1	Lu	<0.1	Nb	<0.1	Re	<0.1	Si	<50	Te	<0.1
As	<0.3	Ce	<0.1	Eu	<0.1	In	<0.1	Mg	<3	Os	<0.1	Rh	<0.1	Ag	<0.1	Ti	<0.1
Ba	<0.1	Cs	<1	Gd	<0.1	Ir	<0.1	Mn	120	Pd	<0.1	Rb	<0.1	Na	<5	Th	<0.1
Be	<0.1	Cr	35	Ga	<0.1	Fe	T	Hg	<0.2	P	<0.1	Ru	<0.1	Sr	<0.1	Tm	<0.1
Bi	<0.1	Co	130	Ge	<0.1	La	<0.1	Mo	15	Pr	<0.1	Sm	<0.1	S	<5	Sn	<0.1
B	<5	Cu	<0.5	Au	<0.1	Pb	<0.3	Nd	<0.1	K	<5	Sc	<0.1	Ta	<0.1	Tl	10
																Zn	<10
																Zr	<0.1

(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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: 58119
Lot Number: 050313
Description: Potassium (K)
Expiration Date: 050316
Nominal Concentration (µg/mL): 10000
Storage: 20 °C
Solvent: C257285 Nitric Acid
Lot #
2% 40.0 Nitric Acid (mL)
5E-05 Balance Uncertainty
0.100 Flask Uncertainty

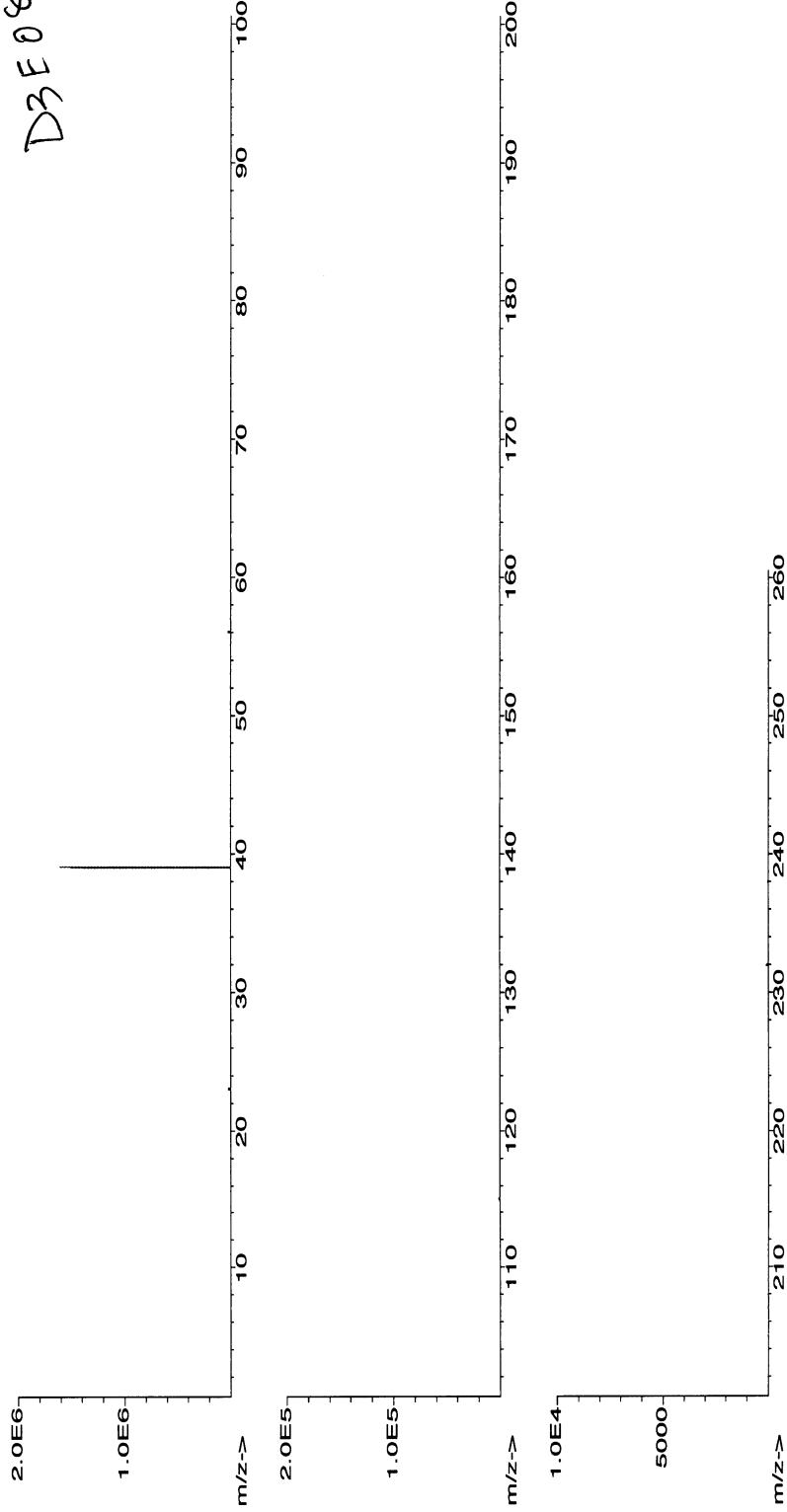
Weight shown below was diluted to (mL): 1999.68

MSDS Information

Compound	RM#	Lot Number	Nominal Conc. (µg/mL)	Purity	Uncertainty	Assay (%)	Target Weight (g)	Actual Weight (g)	Actual Conc. (µg/mL)	Expanded Uncertainty	CAS#	(Solvent Safety Info. On Attached pg.)	NIST
1. Potassium nitrate (K)	IN034	KB1011KA1	10000.0	99.999	0.10	38.7	51.6719	51.6784	10001.3	0.00200	07757-79-1	5 mg/m3	or-rat 3015 mg/kg 3141a

(+/-)

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





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

Trace Metals Verification by ICP-MS (µg/L)																	
Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pt	<0.02	Se	<0.2	Tb	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Te	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	<0.02	Os	<0.01	Rh	<0.02	Ag	<0.02	Ti	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Th	<0.02
Be	<0.01	Cr	<0.02	Ga	<0.2	Fe	<0.02	Hg	<0.2	P	<0.2	Ru	<0.02	Sr	<0.02	Tm	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	S	<0.02	Sn	<0.02
B	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.02	Sc	<0.02	Ta	<0.02	Ti	<0.02
																Zr	<0.02

Physical Characterization:

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

(T)= Target analyte

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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: 58112
Lot Number: 050313
Description: Magnesium (Mg)
Expiration Date: 050316
Nominal Concentration (µg/mL): 10000
Storage: 20 °C
Solvent: C257285 Nitric Acid
Lot #
2% 40.0 Nitric Acid (mL)
5E-05 Balance Uncertainty
0.100 Flask Uncertainty

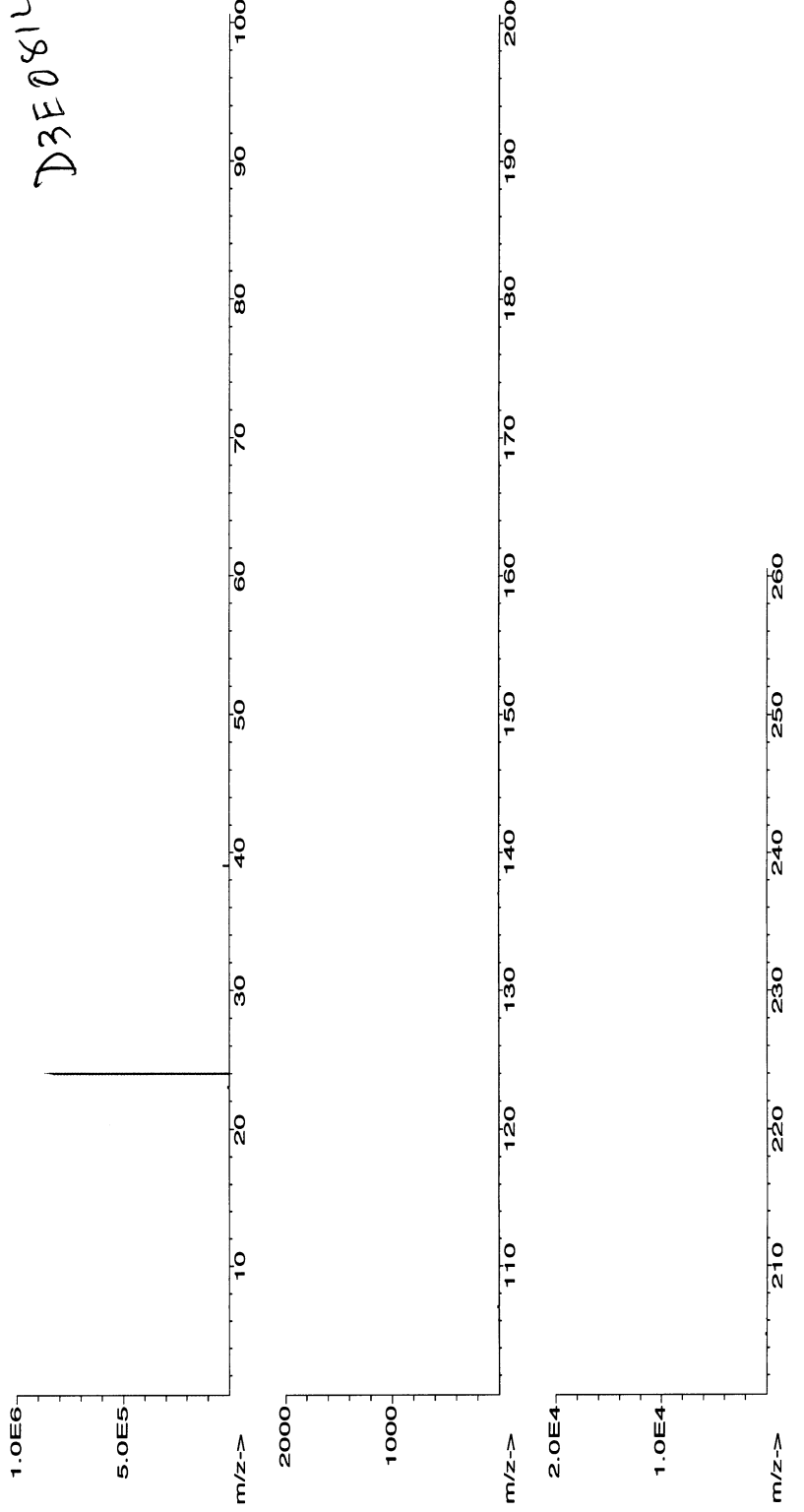
Weight shown below was diluted to (mL): 1999.68

MSDS Information

Compound	RM#	Lot Number	Nominal Conc. (µg/mL)	Purity	Uncertainty	Assay (%)	Target Weight (g)	Actual Weight (g)	Actual Conc. (µg/mL)	Expanded Uncertainty	CAS#	(Solvent Safety Info. On Attached pg.)	LD50	NIST SRM
----------	-----	------------	-----------------------	--------	-------------	-----------	-------------------	-------------------	----------------------	----------------------	------	--	------	----------

1. Magnesium Nitrate Hexahydrate (Mg) IN030 R111MGB1R 10000.0 99.99 0.10 9.60 208.3212 208.3421 **10001.0** 0.00200 13446-18-9 7 mg/m3 N/A 3131a

[1] Spectrum No.1 [19.923 sec]:58112.D# [Count] [Linear]





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

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

Physical Characterization:

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

(T) = Target analyte

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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



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

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

Physical Characterization:

(T)= Target analyte

Certified by:

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

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number:	58111
Lot Number:	050313
Description:	Sodium (Na)

Expiration Date: 050316

Nominal Concentration ($\mu\text{g/mL}$): 10000

Storage: 20 °C

Weight shown below was diluted to (mL):

Solvent:	C257285	Lot #	Nitric Acid
2%	40.0		Nitric Acid
	(mL)		

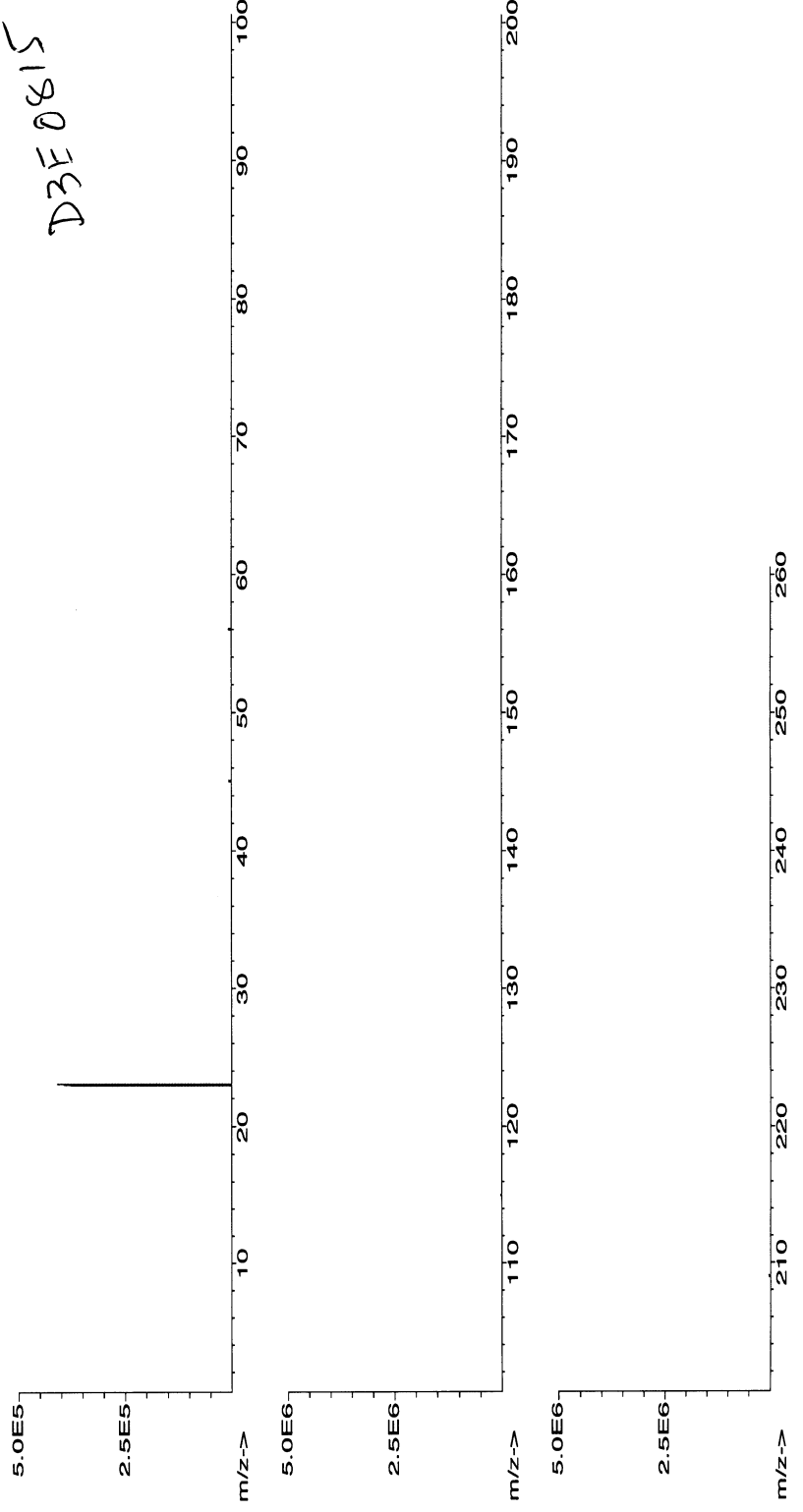
Gabriel Hellmond	Gabriel Hellmond	050313
<i>Pedro L. Rentas</i>	<i>Pedro L. Rentas</i>	050313

MSDS Information

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

1. Sodium nitrate (Na)	IN036	R806NAA1R	10000.0	99.999	0.10	27.0	74.0631	74.0634	0.00200	07631-99-4	5 mg/m3	3152a
											ort-rat 3236 mg/kg	

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





CERTIFIED WEIGHT REPORT:

Part Number:

Lot Number: 050313

Description:

6 Component

Expiration Date:

Solvent: C257285

25.0 Nitric Acid
(mL)

Storage: 20 °C

5000

5E-05 Balance Uncertainty

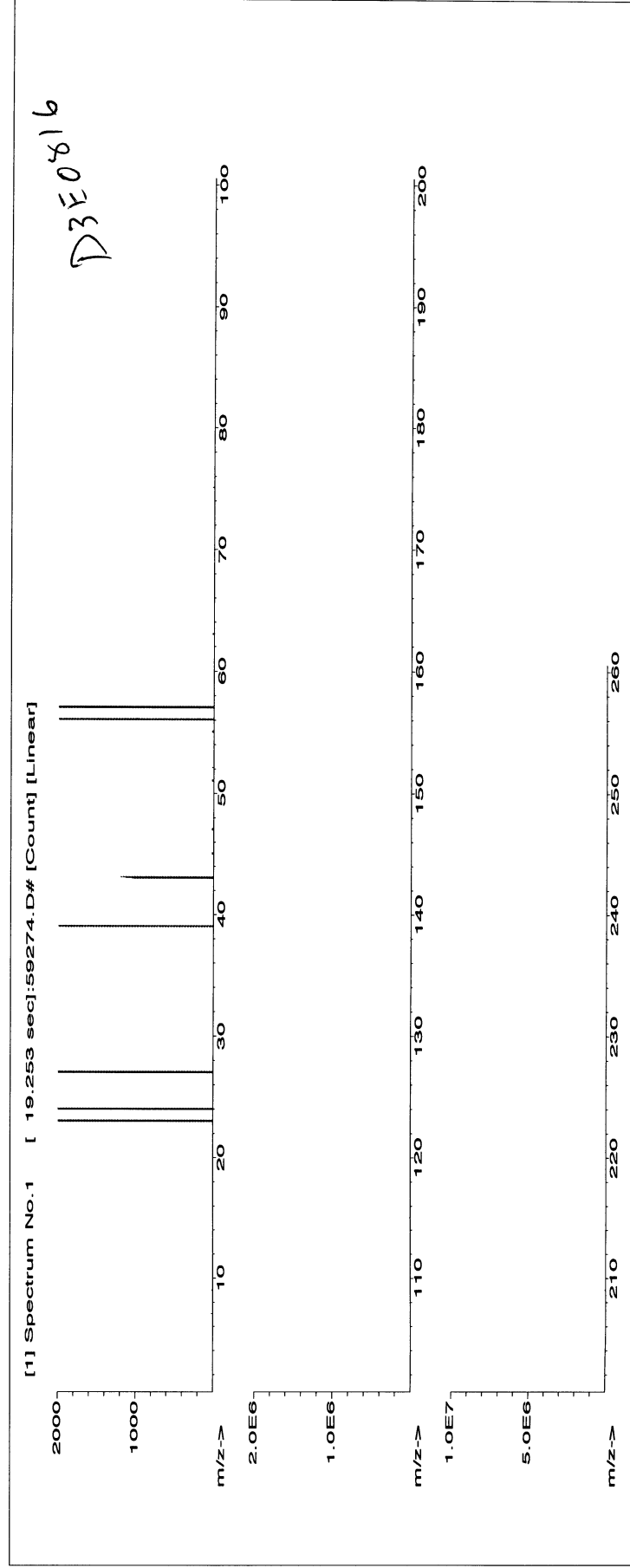
0.100 Flask Uncertainty

Weights shown below were diluted to (mL):

QUESTION

MSDS Information

Compound		RM#	Lot		Nominal		Uncertainty		Assay	Target	Actual	Actual	(Solvent Safety Info. On Attached pg.)		NIST	
			Number		Conc. (µg/mL)	Purity	Purity	(%)	Weight (g)	Weight (g)	Conc. (µg/mL)	Uncertainty	CAS#	: OSHA PEL (TWA)	LD50	SRM
1. Aluminum Nitrate Nonahydrate (Al)		IN022	C1207ALAP22		5000.0	99.995	0.10	7.10	35.2057	35.2070	5000.2	0.00204	07784-27-2	5 mg/m3	ori-rat 264 mg/kg	3101a
2. Calcium carbonate (Ca)		IN014	D212CAAI1		5000.0	99.999	0.10	40.0	6.2488	6.2489	5000.1	0.00204	00471-34-1	7 mg/m3	N/A	3109a
3. Iron (III) Nitrate Nonahydrate (Fe)		IN028	CW108FEAI1R		5000.0	99.999	0.10	13.8	18.1123	18.1124	5000.0	0.00204	07782-61-8	7 mg/m3	N/A	3126A
4. Magnesium Nitrate Hexahydrate (Mg)		IN030	R111MGB1R		5000.0	99.99	0.10	9.60	26.0388	26.0389	5000.0	0.00204	13446-18-9	7 mg/m3	N/A	3131a
5. Potassium nitrate (K)		IN034	KB1011KA1		5000.0	99.999	0.10	38.7	6.4587	6.4587	5000.1	0.00204	07751-79-1	5 mg/m3	ori-rat 3015 mg/kg	3141a
6. Sodium nitrate (Na)		IN036	R809NAA1R		5000.0	99.999	0.10	27.0	9.2574	9.2575	5000.0	0.00204	07631-99-4	5 mg/m3	ori-rat 3236 mg/kg	3152a





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

Trace Metals Verification by ICP-MS (µg/L)																			
Al	T	Cd	Dy	Hf	Li	Ni	Pr	Se	Tb	W	<0.02								
Sb	<0.02	Ca	Er	Ho	<0.02	Nb	Re	Si	Tc	U	<0.02								
As	<0.2	Ce	Eu	In	<0.02	Os	Rh	Ag	Ti	V	<0.02								
Ba	<0.02	Cs	Gd	Ir	<0.02	Pd	Rb	Na	Th	Yb	<0.02								
Be	<0.01	Cr	Ga	Fe	T	P	Ru	Sr	Tm	Y	<0.02								
Bi	<0.02	Co	Ge	La	<0.02	Pt	Sm	S	Sn	Zn	<0.02								
B	<0.02	Cu	Au	Pb	<0.02	K	Sc	Ta	Tl	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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: 58028
Lot Number: 050313
Description: Nickel (Ni)

Lot # C257285
Solvent: Nitric Acid

Expiration Date: 050316
Nominal Concentration (µg/mL): 1000
Storage: 20 °C

2.0%
40.0
(mL)

<i>Lawrence Barry</i>	
Formulated By:	Lawrence Barry
050313	
<i>Pedro L. Rentas</i>	
Reviewed By:	Pedro L. Rentas
050313	

Volume shown below was diluted to (mL): 1999.68

5E-05 Balance Uncertainty
0.100 Flask Uncertainty

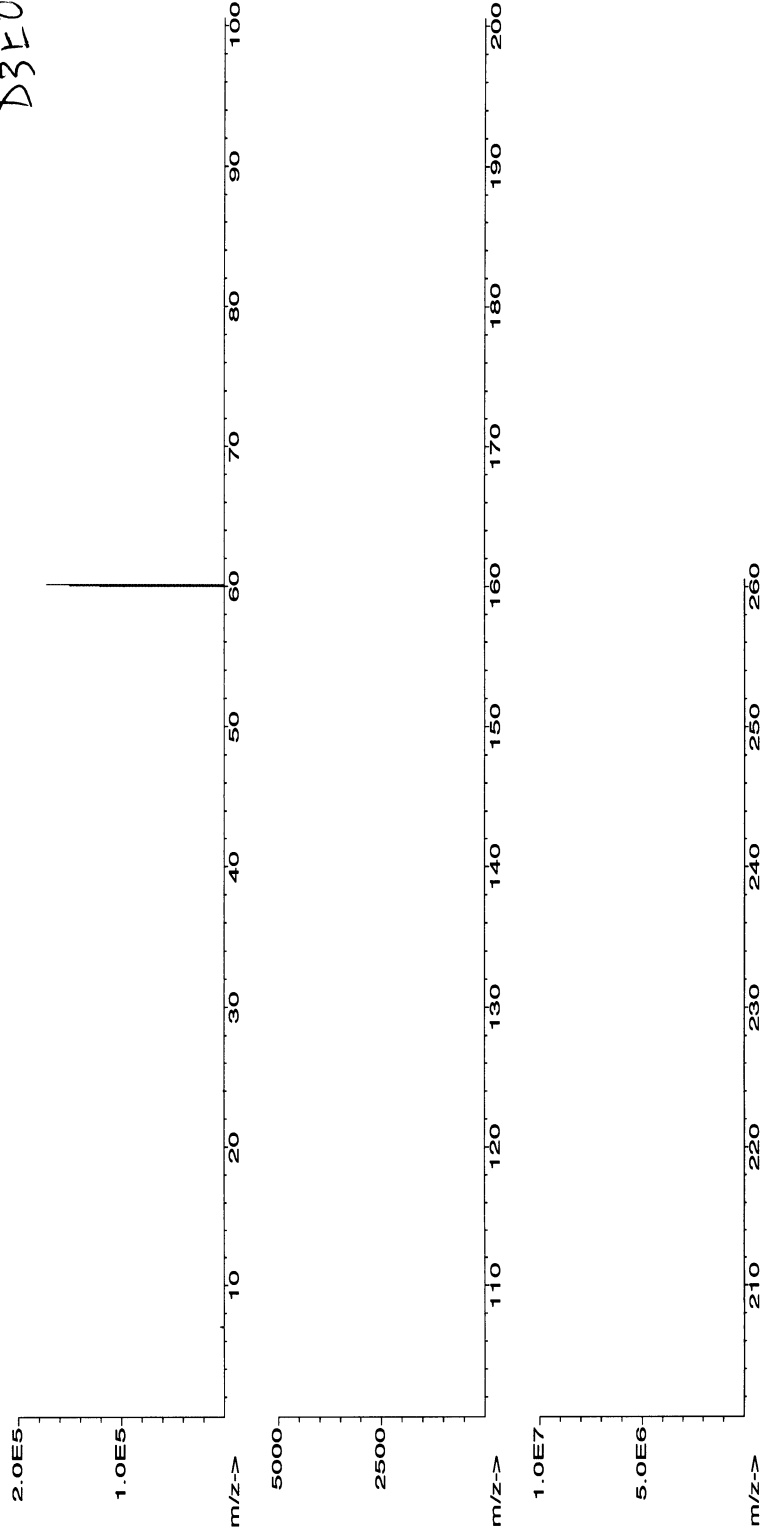
MSDS Information

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Uncertainty Pipette	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty	CAS#	(Solvent Safety Info. On Attached pg.)	NIST SRM
----------	-------------	------------	-----------------	----------------	---------------------	-----------------------	---------------------	----------------------	------	--	----------

1. Nickel nitrate (II) Hexahydrate (Ni)	58128	010612	0.1000	200.0	0.013	10001.1	1000.3	0.00201	13478-00-7	1 mg/m3 or-rat 1620 mg/kg	3136
---	-------	--------	--------	-------	-------	---------	--------	---------	------------	---------------------------	------

(+/-)

[1] Spectrum No.1 [9.135 sec]:58028.D# [Count] [Linear]





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

Trace Metals Verification by ICP-MS (µg/L)																	
Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pt	<0.02	Se	<0.2	Tb	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Te	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	<0.02	Os	<0.02	Rh	<0.02	Ag	<0.02	Tl	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Th	<0.02
Be	<0.01	Cr	<0.02	Ga	<0.02	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	S	<0.02	Sn	<0.02
B	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02	Ti	<0.02

Physical Characterization:

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

(T)= Target analyte

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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: 57005
Lot Number: 050313
Description: Boron (B)

Expiration Date: 050316
Nominal Concentration (µg/mL): 1000

Storage: 20 °C

Volume shown below was diluted to (mL):

Lot # Y47057 **Solvent:** Ammonium hydroxide
2.0% **40.0** **Ammonium hydroxide**
(mL)
5E-05 **Balance Uncertainty**
0.100 **Flask Uncertainty**

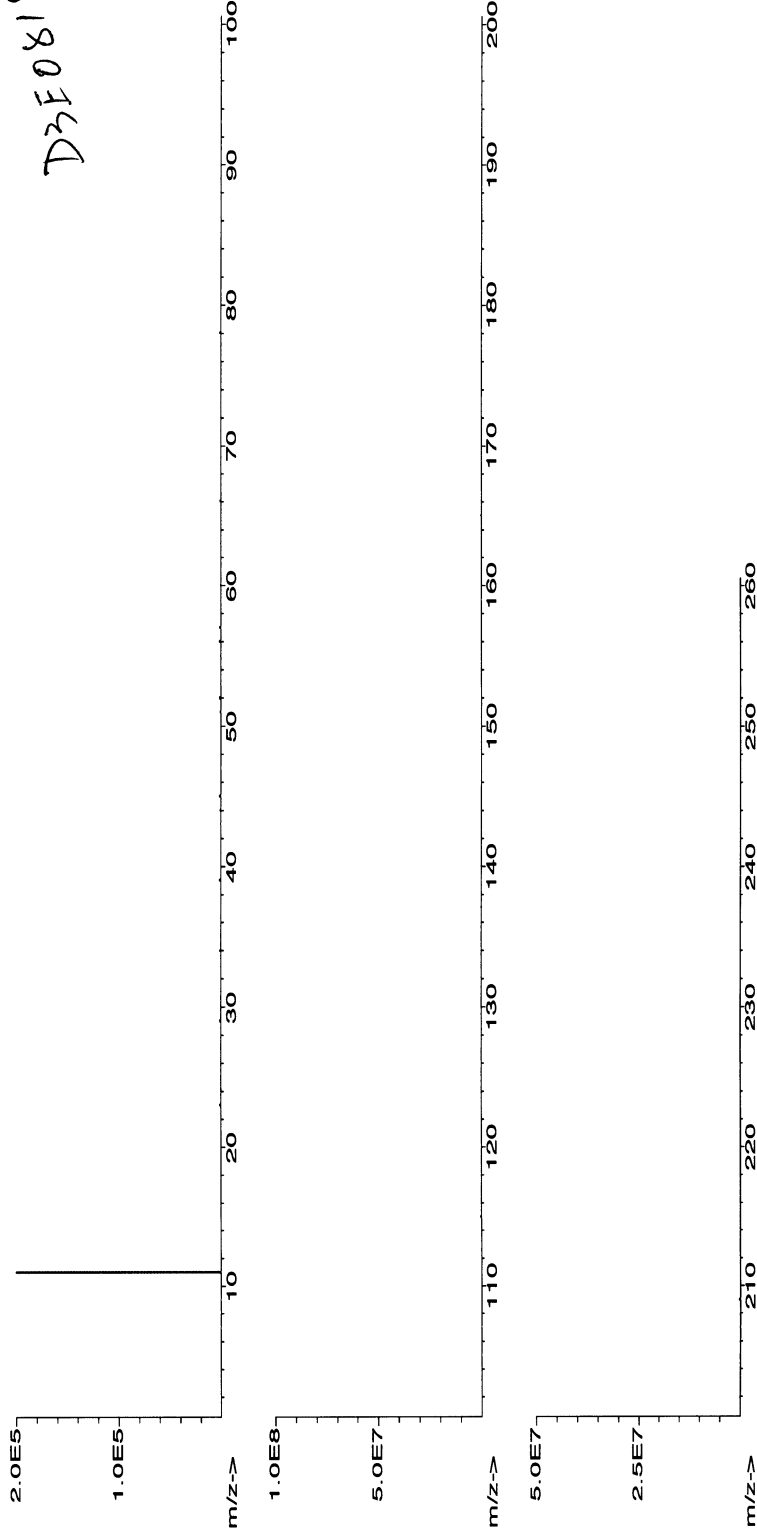
<i>Lawrence Barry</i>	
Formulated By:	Lawrence Barry
050313	
<i>Pedro L. Rentas</i>	
Reviewed By:	Pedro L. Rentas
050313	

MSDS Information

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Uncertainty	Pipette	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty	CAS#	(Solvent Safety Info. On Attached pg.)	NIST SRM
----------	-------------	------------	-----------------	----------------	-------------	---------	-----------------------	---------------------	----------------------	------	--	----------

1. Boric acid (B)	58105	110111	0.1000	200.0	0.013	10001.3	1000.3	0.00201	10043-35-3	N/A	orl-rat 2660mg/kg	3107
-------------------	-------	--------	--------	-------	-------	---------	--------	---------	------------	-----	-------------------	------

[1] Spectrum No.1 [34.583 sec]:56005.D# [Count] [Linear]





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

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

(T)= Target analyte

Physical Characterization:

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

Certified by:

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: 57038
Lot Number: 050313
Description: Strontium (Sr)

Lot # C257285
Solvent: Nitric Acid

Expiration Date: 050316
Nominal Concentration (µg/mL): 1000
Storage: 20 °C

2.0%
40.0
(mL)

<i>Lawrence Barry</i>	
Formulated By:	Lawrence Barry
050313	
<i>Pedro L. Rentas</i>	
Reviewed By:	Pedro L. Rentas
050313	

Volume shown below was diluted to (mL): 1999.68

5E-05 Balance Uncertainty
0.100 Flask Uncertainty

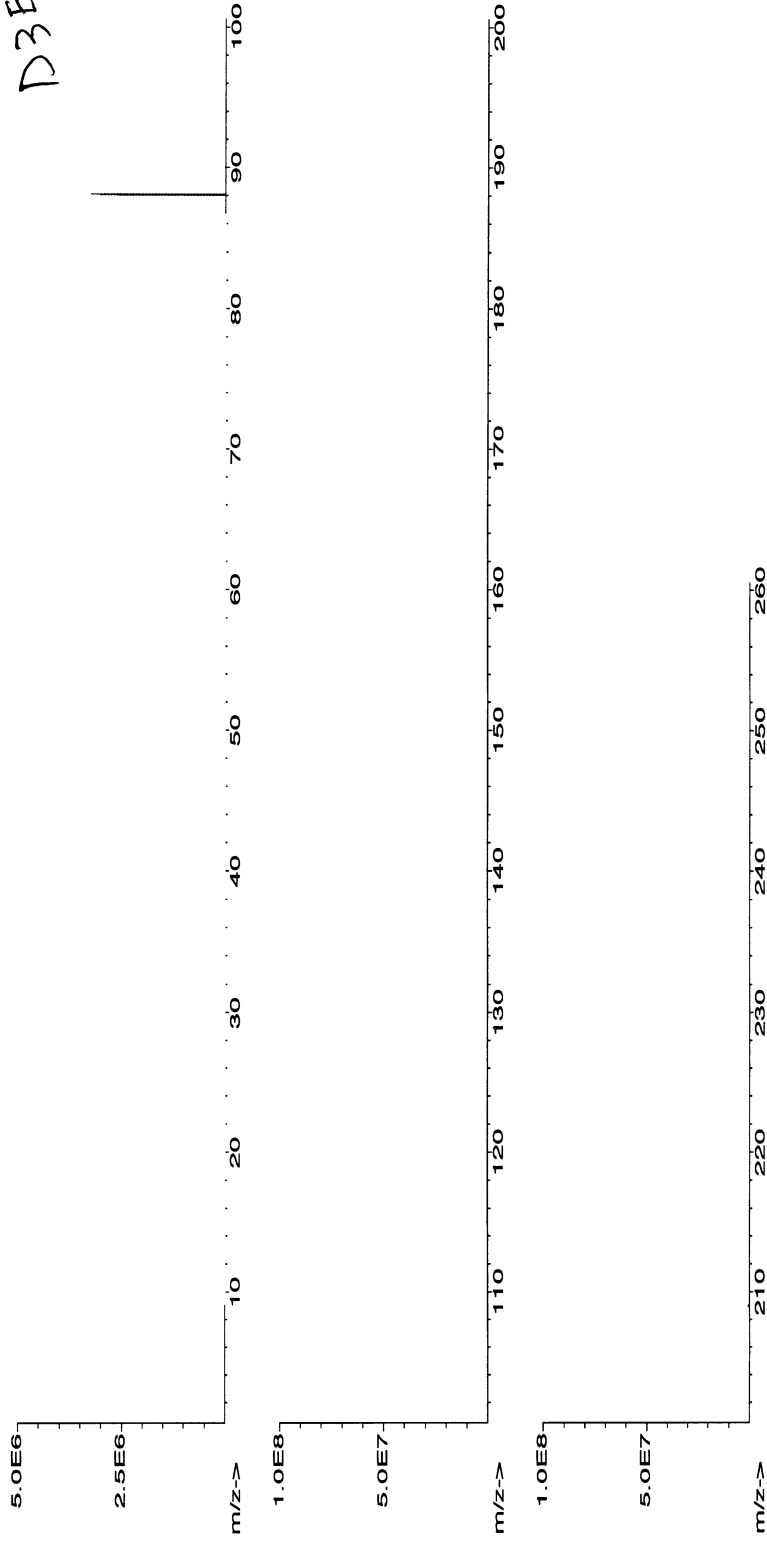
MSDS Information

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Uncertainty Pipette	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty	CAS#	(Solvent Safety Info. On Attached pg.)	NIST SRM
----------	-------------	------------	-----------------	----------------	---------------------	-----------------------	---------------------	----------------------	------	--	----------

(+/-)

1. Strontium nitrate (Sr)	58138	111212	0.1000	200.0	0.013	10001.2	1000.3	0.00211	10042-76-9	N/A	orl-rat 2750mg/kg 3153a
---------------------------	-------	--------	--------	-------	-------	---------	--------	---------	------------	-----	-------------------------

[1] Spectrum No.1 [34.243 sec]:57038.D# [Count] [Linear]





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

Trace Metals Verification by ICP-MS (µg/L)																	
Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pt	<0.02	Se	<0.2	Tb	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Te	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	<0.02	Os	<0.02	Rh	<0.02	Ag	<0.02	Tl	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Ru	<0.02	Na	<0.2	Th	<0.02
Be	<0.01	Cr	<0.02	Ga	<0.2	Fe	<0.02	Hg	<0.2	P	<0.02	Sm	<0.02	Sr	T	Tm	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sn	<0.02	S	<0.02	Sn	<0.02
B	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02	Ti	<0.02

Physical Characterization:

(T)= Target analyte

Certified by:

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

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: 57050
Lot Number: 050313
Description: 1In (Sn)

Lot #
C142199
TO3072

Solvents:
Nitric Acid
Hydrochloric acid

Expiration Date: 050316
Nominal Concentration (µg/mL): 1000

Storage: 20 °C
2.0% Nitric Acid
6.0% Hydrochloric acid
40.0
120.0
(mL)

Volume shown below was diluted to (mL):

1999.68 5E-05 Balance Uncertainty
0.100 Flask Uncertainty

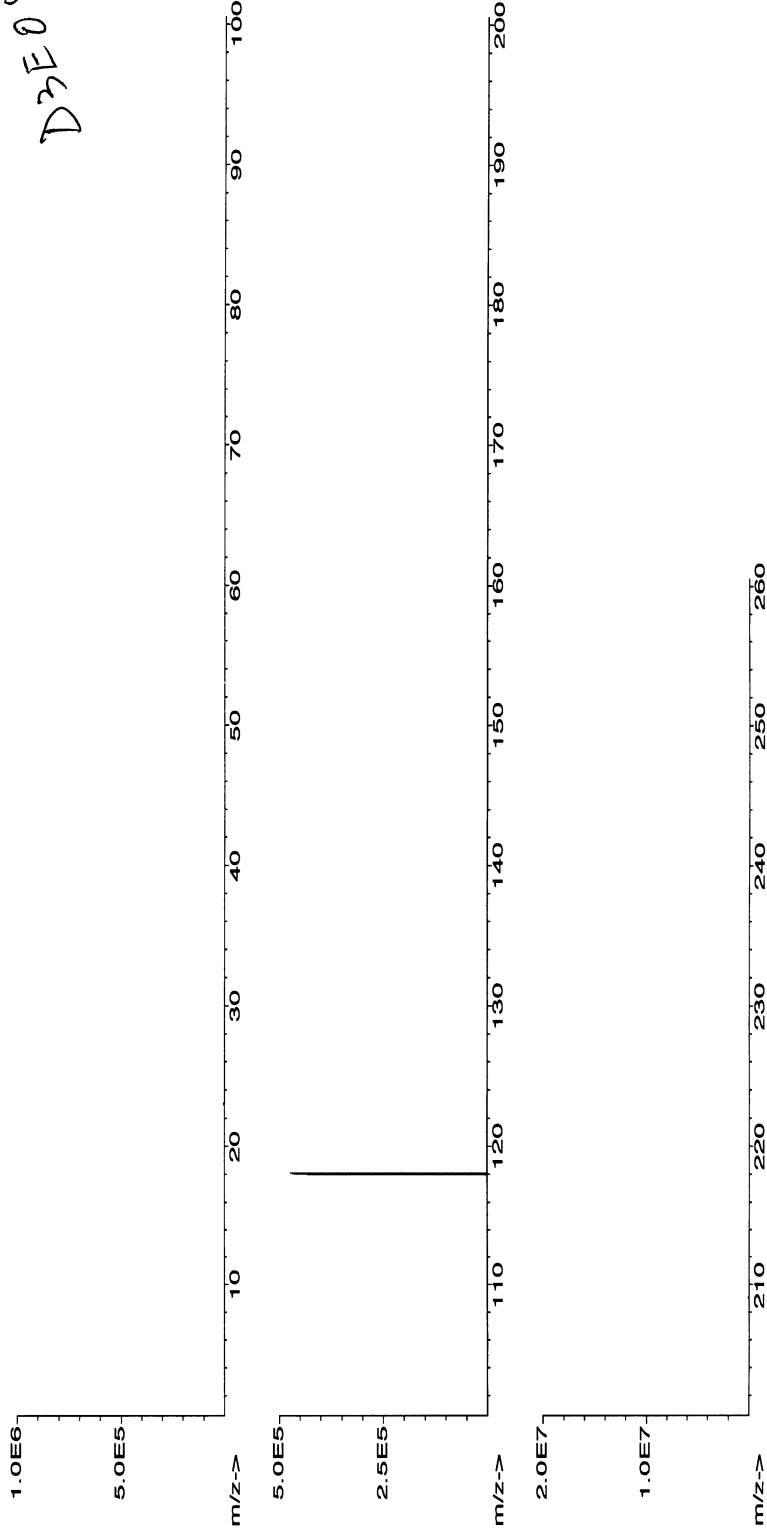
<i>Lawrence Barry</i>	
Formulated By:	Lawrence Barry 050313
<i>Pedro L. Rentas</i>	
Reviewed By:	Pedro L. Rentas 050313

MSDS Information

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

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Initial Concentration (µg/mL)	Final Concentration (µg/mL)	Expanded Uncertainty (+/-)	CAS#	OSHA PEL (TWA)	LD50
1. Ammonium hexafluorostannate (IV) (Sn)	58150	101411	0.1000	200.0	0.013	10001.8	0.00201	16919-24-7	7 mg/m3	N/A
						1000.3				3161a

[1] Spectrum No.1 [16.634 sec]:57050.D# [Count] [Linear]





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

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

(T)= Target analyte

Physical Characterization:

Analyzed Density of Solution (g/mL):

#REF!

Temperature ($^{\circ}\text{C}$):

#REF!

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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



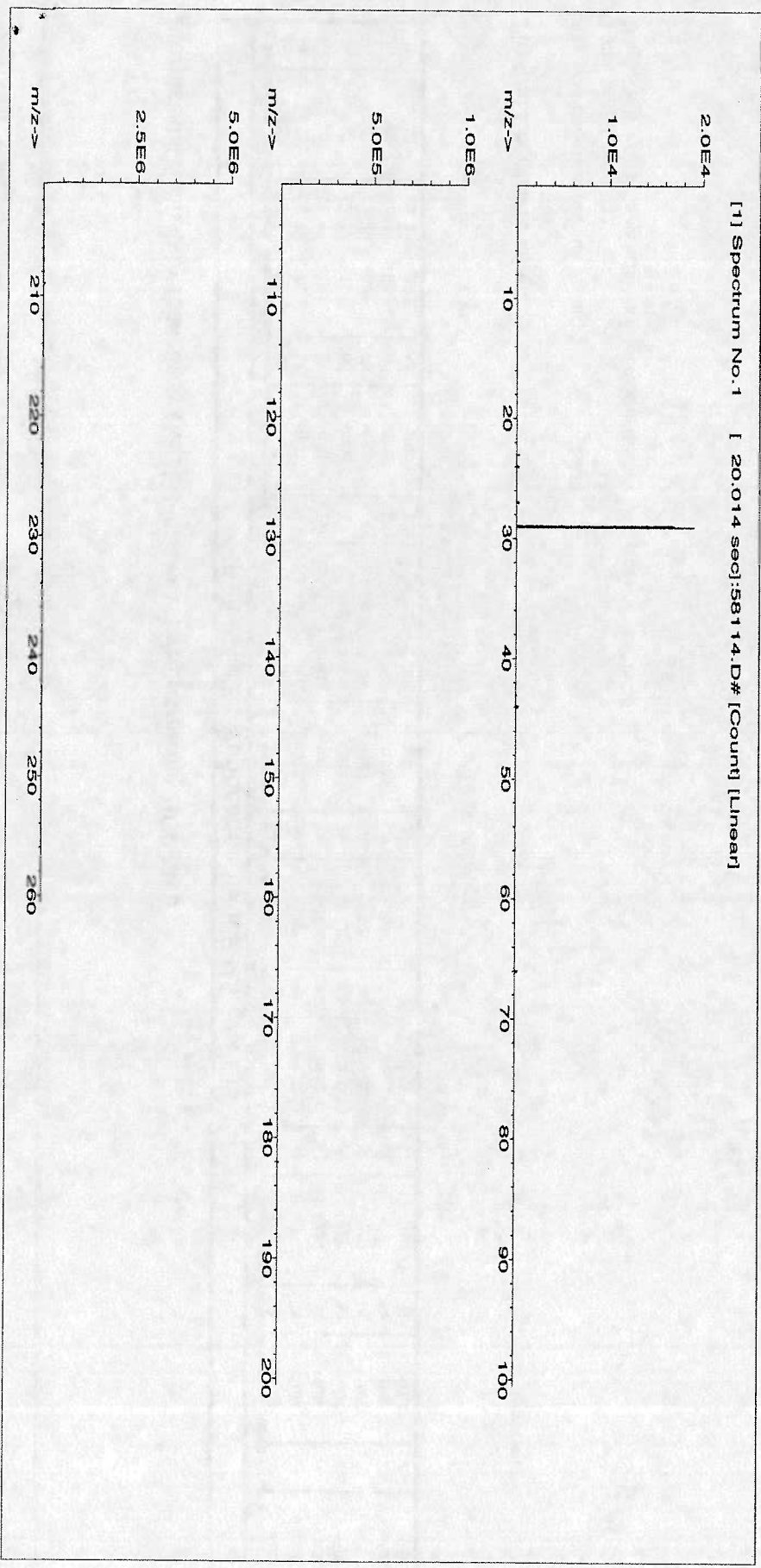
CERTIFIED WEIGHT REPORT

Part Number:	56114	Lot #	
Lot Number:	120712	Solvent:	C142199 Nitric Acid
Description:	Silicon (Si)		
Expiration Date:	120715	Storage:	20 °C
Nominal Concentration (µg/mL):	10000	Balance Uncertainty	5E-05
		Flesh Uncertainty	0.100
Weight shown below was diluted to (mL):	1999.68	Assay	2% 40.0 (mL) Nitric Acid

<i>Lawrence Barry</i>	
Formulated By:	Lawrence Barry
Reviewed By:	<i>Pedro L. Rentes</i>
	Pedro L. Rentes
	120712

MSDS Information

Compound	Lot	Nominal Conc. (µg/mL)	Purity	Uncertainty	Assay	Target Weight (g)	Actual Weight (g)	Actual Conc. (µg/mL)	Expanded Uncertainty	(Solute Safety Info. On Attached pg.)	NIST SRM
1. Ammonium hexafluorosilicate (Si)	IN009 W6095IA1	10000.0	99.999	0.10	15.7	127.3696	127.3987	10001.5	0.00200	16919-19-0	N/A





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

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

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

(T) = Target analyte

Physical Characterization:

Analyzed Density of Solution (g/mL):

1.038

Temperature (°C):

22.6

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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).

Certificate of Analysis

Product Description:

Name: **Cesium Ionization Buffer**
Part Number: **IB-CS-B5**
Lot Number: **1116106**
Starting Source: **Cesium Carbonate**
Material Purity: **99.999%**
Matrix: **1% HNO₃**

Reference Value: **5% (50,000 µg/mL) Cs**

Preparation Information:

The highest purity source materials were purchased from qualified vendors per ISO 9001:2008 guidelines and assayed by ICP-OES for conformity prior to use. This standard was prepared using methods developed at NIST for the preparation of SRM Spectrometric Standard Solutions. Sub-boiling distilled high-purity acid has been used to place the materials in solution and to stabilize the standard. The matrix is as noted above in 18 megaohm deionized water.

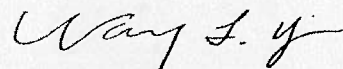
Packaging and Storage Conditions:

The product is packaged in a pre-cleaned polyethylene bottle which should be stored under normal laboratory conditions and kept tightly capped when not in use.

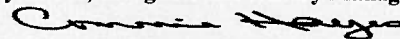
Preparation Date: June 10, 2011

Shipped Date: July 31, 2013

Expiration Date: Not Applicable



Vanny T. Yib, Inorganic Laboratory Manager



Connie Hayes, Quality Manager



Theodore Rains, PhD, President

June 13, 2011

Certificate Issue Date

NOTICE: HPS products are intended for laboratory use only. All products should be handled and used by trained professional personnel. The responsibility for the safe handling and use of these products rests solely with the buyer and/or user. The data and information as stated was furnished by the manufacturer of the product. The information provided in this certificate pertains only to the lot number specified. None of the information provided in this certificate may be used, reproduced or transmitted in any form or by any means without written approval from High Purity Standards.



A Waters Company

Reference Materials

▪ Certificate of Analysis ▪

Product:	Metals in Soil	D311905	D311906
Catalog Number:	540	Metals in Soil - Certified Reference Material	Metals in Soil - Certified Reference Material
Lot No.:	D080-540	Expires: 07/31/2016	Expires: 07/19/2016
Certificate Issue Date:	April 12, 2013	Prepared On: 09/19/2013	Prepared On: 09/19/2013
Expiration Date:	July 31, 2016		
Revision Number:	Original		

CERTIFICATION

Parameter	Total Concentration	Certified Value ¹	Uncertainty ²	QC Performance Acceptance Limits ³	PT Performance Acceptance Limits ⁴
	mg/kg	mg/kg	%	mg/kg	mg/kg
Aluminum	68100	8840	6.12	4780 - 12900	3710 - 14000
Antimony	232	88.2	23.0	D.L. - 204	23.2 - 255
Arsenic	114	99.6	11.0	80.5 - 119	69.0 - 130
Barium	742	310	8.83	258 - 362	230 - 391
Beryllium	79.5	72.3	15.5	59.4 - 85.1	53.4 - 91.2
Boron	173	144	4.76	106 - 182	86.3 - 201
Cadmium	207	182	13.3	149 - 215	134 - 230
Calcium	25400	6790	6.30	5610 - 7980	5040 - 8540
Chromium	376	136	15.4	109 - 164	95.7 - 177
Cobalt	150	128	4.37	106 - 149	94.9 - 160
Copper	124	102	9.10	82.7 - 121	75.8 - 129
Iron	42900	12600	17.6	5180 - 19900	3900 - 21200
Lead	121	115	20.9	94.1 - 137	82.9 - 148
Magnesium	9180	3010	10.6	2320 - 3700	1990 - 4030
Manganese	906	323	6.68	266 - 379	242 - 404
Mercury	21.5	19.9	33.9	13.8 - 25.9	10.2 - 29.5
Molybdenum	167	133	7.22	102 - 164	93.8 - 182
Nickel	195	153	16.5	126 - 180	112 - 193
Potassium	19800	2840	8.11	2020 - 3670	1760 - 3920
Selenium	171	150	18.7	116 - 184	101 - 199
Silver	44.7	40.4	29.8	30.3 - 50.4	26.6 - 54.0
Sodium	19800	2760	10.8	1960 - 3560	1820 - 3700
Strontium	222	102	11.8	82.5 - 122	71.8 - 132
Thallium	200	174	8.21	137 - 212	120 - 229

ISO/IEC GUIDE 34:2009

ISO/IEC 17025:2005



Page 1 of 4 Lot: D080-540



A Waters Company

Reference Materials

▪ **Certificate of Analysis** ▪

Parameter	Total Concentration	Certified Value ¹	Uncertainty ²	QC Performance Acceptance Limits ³	PT Performance Acceptance Limits ⁴
	mg/kg	mg/kg	%	mg/kg	mg/kg
Tin	118	102	3.61	77.6 - 126	57.9 - 145
Titanium	3310	262	14.1	70.1 - 453	13.3 - 510
Vanadium	184	97.6	12.3	75.2 - 120	63.6 - 132
Zinc	177	161	17.9	130 - 192	110 - 212

ANALYTICAL VERIFICATION

Parameter	Certified Value ¹	Proficiency Testing Study			NIST Traceability	
		Mean	Recovery ⁵	n	SRM Number	Recovery
	mg/kg	mg/kg	%			%
Aluminum	8840	8840	100	175	-	-
Antimony	88.2	88.2	100	186	-	-
Arsenic	99.6	99.6	100	219	-	-
Barium	310	310	100	194	-	-
Beryllium	72.3	72.3	100	190	-	-
Boron	144	144	100	135	-	-
Cadmium	182	182	100	220	-	-
Calcium	6790	6790	100	162	-	-
Chromium	136	136	100	217	-	-
Cobalt	128	128	100	172	-	-
Copper	102	102	100	215	-	-
Iron	12600	12600	100	178	-	-
Lead	115	115	100	233	-	-
Magnesium	3010	3010	100	167	-	-
Manganese	323	323	100	183	-	-
Mercury	19.9	19.9	100	151	-	-
Molybdenum	133	133	100	184	-	-
Nickel	153	153	100	214	-	-
Potassium	2840	2840	100	168	-	-
Selenium	150	150	100	209	-	-
Silver	40.4	40.4	100	196	-	-

Page 2 of 4 Lot: D080-540

16341 Table Mountain Pkwy • Golden, CO 80403 • T: 800.372.0122 • 303.431.8454 • www.eraqc.com



A Waters Company

Reference Materials

▪ Certificate of Analysis ▪

Parameter	Certified Value ¹	Proficiency Testing Study		NIST Traceability		
		Mean	Recovery ⁵	n	SRM Number	Recovery
	mg/kg	mg/kg	%			%
Sodium	2760	2760	100	159	-	-
Strontium	102	102	100	106	-	-
Thallium	174	174	100	187	-	-
Tin	102	102	100	129	-	-
Titanium	262	262	100	126	-	-
Vanadium	97.6	97.6	100	177	-	-
Zinc	161	161	100	214	-	-



A Waters Company

Reference Materials

• Certificate of Analysis •

1. The Certified Values are equal to the mean recoveries for the parameters as determined in an interlaboratory round robin study based on all applicable digestion techniques reported in the study. The Certified Values are based on an "as received" basis, assuming 100% solids content. The certified values are monitored and purchasers will be notified of any significant changes resulting in recertification or withdrawal of this certified reference material during the period of validity of this certificate.
2. The stated Uncertainty is the total propagated uncertainty at the 95% confidence interval. The uncertainty is based on the preparation and internal analytical verification of the product by ERA, multiplied by a coverage factor. The uncertainty applies to the product as supplied and does not take into account any required or optional dilution and/or preparations the laboratory may perform while using this product.
3. The QC Performance Acceptance Limits (QC PALs™) are based on actual historical data collected in ERA's Proficiency Testing program. The QC PALs™ reflect any inherent biases in the methods used to establish the limits and closely approximate a 95% confidence interval of the performance that experienced laboratories should achieve using accepted environmental methods. Use the QC PALs™ to realistically evaluate your performance against your peers.
4. The PT Performance Acceptance Limits (PT PALs™) are calculated using the regression equations and fixed acceptance criteria specified in the NELAC proficiency testing requirements. Use the PT PALs™ when analyzing this QC standard alongside USEPA and NELAC compliant PT standards. Please note that many PT study acceptance limits are concentration dependent (some non-linearly) and, therefore, the acceptance limits of this QC standard and any PT standard may differ relative to their difference in concentrations.
5. The PT Data/Traceability data include the mean value, percent recovery and number of data points reported by the laboratories in our Proficiency Testing study compared to the Certified Values. In addition, where NIST Standard Reference Materials (SRMs) are available, each analyte has been analytically traced to the NIST SRM listed. This product is traceable to the lot numbers of its starting materials. All gravimetric and volumetric measurements related to its manufacture are traceable to NIST through an unbroken chain of comparisons.
Traceability Recovery (%) = [(% recovery certified standard)/(% recovery NIST SRM)]*100
The traceability data shown were compiled by analyzing the ERA standards or their associated stock solutions against the applicable NIST SRMs.
6. The Total Concentrations are equal to the background concentrations in the blank soil matrix (measured using neutron activation, XRF, and total acid digestion techniques), plus the amount of each analyte spiked onto the soil. For Trace Metals, the values listed are only "Theoretical Values" based upon the methodologies listed.
7. For additional information on this product such as intended use, instructions for use, level of homogeneity, and safety information, please refer to the provided Instruction Sheet

If you have any questions or need technical assistance, please call ERA technical assistance at 1-800-372-0122 or send an email to info@eraqc.com.

Certifying Officer

Tom Widera

Quality Officer

Kristina Sanchez

ISO/IEC GUIDE 34:2009



REFERENCE MATERIAL PRODUCTION
CERTIFICATE NO. 1179-08

ISO/IEC 17025:2005



CHEMICAL TESTING LABORATORY
CERTIFICATE NO. 1774-02

Page 4 of 4 Lot: D080-540



A Waters Company

Reference Materials

▪ Certificate of Analysis ▪

Product:	Metals in Soil	D311905	D311906
Catalog Number:	540	Metals in Soil - Certified Reference Material	Metals in Soil - Certified Reference Material
Lot No.:	D080-540	Expires: 07/31/2016	Expires: 07/19/2016
Certificate Issue Date:	April 12, 2013	Prepared On: 09/19/2013	Prepared On: 09/19/2013
Expiration Date:	July 31, 2016		
Revision Number:	Original		

CERTIFICATION

Parameter	Total Concentration	Certified Value ¹	Uncertainty ²	QC Performance Acceptance Limits ³	PT Performance Acceptance Limits ⁴
	mg/kg	mg/kg	%	mg/kg	mg/kg
Aluminum	68100	8840	6.12	4780 - 12900	3710 - 14000
Antimony	232	88.2	23.0	D.L. - 204	23.2 - 255
Arsenic	114	99.6	11.0	80.5 - 119	69.0 - 130
Barium	742	310	8.83	258 - 362	230 - 391
Beryllium	79.5	72.3	15.5	59.4 - 85.1	53.4 - 91.2
Boron	173	144	4.76	106 - 182	86.3 - 201
Cadmium	207	182	13.3	149 - 215	134 - 230
Calcium	25400	6790	6.30	5610 - 7980	5040 - 8540
Chromium	376	136	15.4	109 - 164	95.7 - 177
Cobalt	150	128	4.37	106 - 149	94.9 - 160
Copper	124	102	9.10	82.7 - 121	75.8 - 129
Iron	42900	12600	17.6	5180 - 19900	3900 - 21200
Lead	121	115	20.9	94.1 - 137	82.9 - 148
Magnesium	9180	3010	10.6	2320 - 3700	1990 - 4030
Manganese	906	323	6.68	266 - 379	242 - 404
Mercury	21.5	19.9	33.9	13.8 - 25.9	10.2 - 29.5
Molybdenum	167	133	7.22	102 - 164	93.8 - 182
Nickel	195	153	16.5	126 - 180	112 - 193
Potassium	19800	2840	8.11	2020 - 3670	1760 - 3920
Selenium	171	150	18.7	116 - 184	101 - 199
Silver	44.7	40.4	29.8	30.3 - 50.4	26.6 - 54.0
Sodium	19800	2760	10.8	1960 - 3560	1820 - 3700
Strontium	222	102	11.8	82.5 - 122	71.8 - 132
Thallium	200	174	8.21	137 - 212	120 - 229

ISO/IEC GUIDE 34:2009

ISO/IEC 17025:2005



Page 1 of 4 Lot: D080-540



A Waters Company

Reference Materials

▪ **Certificate of Analysis** ▪

Parameter	Total Concentration	Certified Value ¹	Uncertainty ²	QC Performance Acceptance Limits ³	PT Performance Acceptance Limits ⁴
	mg/kg	mg/kg	%	mg/kg	mg/kg
Tin	118	102	3.61	77.6 - 126	57.9 - 145
Titanium	3310	262	14.1	70.1 - 453	13.3 - 510
Vanadium	184	97.6	12.3	75.2 - 120	63.6 - 132
Zinc	177	161	17.9	130 - 192	110 - 212

ANALYTICAL VERIFICATION

Parameter	Certified Value ¹	Proficiency Testing Study			NIST Traceability	
		Mean	Recovery ⁵	n	SRM Number	Recovery
	mg/kg	mg/kg	%			%
Aluminum	8840	8840	100	175	-	-
Antimony	88.2	88.2	100	186	-	-
Arsenic	99.6	99.6	100	219	-	-
Barium	310	310	100	194	-	-
Beryllium	72.3	72.3	100	190	-	-
Boron	144	144	100	135	-	-
Cadmium	182	182	100	220	-	-
Calcium	6790	6790	100	162	-	-
Chromium	136	136	100	217	-	-
Cobalt	128	128	100	172	-	-
Copper	102	102	100	215	-	-
Iron	12600	12600	100	178	-	-
Lead	115	115	100	233	-	-
Magnesium	3010	3010	100	167	-	-
Manganese	323	323	100	183	-	-
Mercury	19.9	19.9	100	151	-	-
Molybdenum	133	133	100	184	-	-
Nickel	153	153	100	214	-	-
Potassium	2840	2840	100	168	-	-
Selenium	150	150	100	209	-	-
Silver	40.4	40.4	100	196	-	-

Page 2 of 4 Lot: D080-540

16341 Table Mountain Pkwy • Golden, CO 80403 • T: 800.372.0122 • 303.431.8454 • www.eraqc.com



A Waters Company

Reference Materials

▪ Certificate of Analysis ▪

Parameter	Certified Value ¹	Proficiency Testing Study		NIST Traceability		
		Mean	Recovery ⁵	n	SRM Number	Recovery
	mg/kg	mg/kg	%			%
Sodium	2760	2760	100	159	-	-
Strontium	102	102	100	106	-	-
Thallium	174	174	100	187	-	-
Tin	102	102	100	129	-	-
Titanium	262	262	100	126	-	-
Vanadium	97.6	97.6	100	177	-	-
Zinc	161	161	100	214	-	-



A Waters Company

Reference Materials

• Certificate of Analysis •

1. The Certified Values are equal to the mean recoveries for the parameters as determined in an interlaboratory round robin study based on all applicable digestion techniques reported in the study. The Certified Values are based on an "as received" basis, assuming 100% solids content. The certified values are monitored and purchasers will be notified of any significant changes resulting in recertification or withdrawal of this certified reference material during the period of validity of this certificate.
2. The stated Uncertainty is the total propagated uncertainty at the 95% confidence interval. The uncertainty is based on the preparation and internal analytical verification of the product by ERA, multiplied by a coverage factor. The uncertainty applies to the product as supplied and does not take into account any required or optional dilution and/or preparations the laboratory may perform while using this product.
3. The QC Performance Acceptance Limits (QC PALs™) are based on actual historical data collected in ERA's Proficiency Testing program. The QC PALs™ reflect any inherent biases in the methods used to establish the limits and closely approximate a 95% confidence interval of the performance that experienced laboratories should achieve using accepted environmental methods. Use the QC PALs™ to realistically evaluate your performance against your peers.
4. The PT Performance Acceptance Limits (PT PALs™) are calculated using the regression equations and fixed acceptance criteria specified in the NELAC proficiency testing requirements. Use the PT PALs™ when analyzing this QC standard alongside USEPA and NELAC compliant PT standards. Please note that many PT study acceptance limits are concentration dependent (some non-linearly) and, therefore, the acceptance limits of this QC standard and any PT standard may differ relative to their difference in concentrations.
5. The PT Data/Traceability data include the mean value, percent recovery and number of data points reported by the laboratories in our Proficiency Testing study compared to the Certified Values. In addition, where NIST Standard Reference Materials (SRMs) are available, each analyte has been analytically traced to the NIST SRM listed. This product is traceable to the lot numbers of its starting materials. All gravimetric and volumetric measurements related to its manufacture are traceable to NIST through an unbroken chain of comparisons.
Traceability Recovery (%) = [(% recovery certified standard)/(% recovery NIST SRM)]*100
The traceability data shown were compiled by analyzing the ERA standards or their associated stock solutions against the applicable NIST SRMs.
6. The Total Concentrations are equal to the background concentrations in the blank soil matrix (measured using neutron activation, XRF, and total acid digestion techniques), plus the amount of each analyte spiked onto the soil. For Trace Metals, the values listed are only "Theoretical Values" based upon the methodologies listed.
7. For additional information on this product such as intended use, instructions for use, level of homogeneity, and safety information, please refer to the provided Instruction Sheet

If you have any questions or need technical assistance, please call ERA technical assistance at 1-800-372-0122 or send an email to info@eraqc.com.

Certifying Officer

Tom Widera

Quality Officer

Kristina Sanchez

ISO/IEC GUIDE 34:2009



REFERENCE MATERIAL PRODUCTION
CERTIFICATE NO. 1179-08

ISO/IEC 17025:2005



CHEMICAL TESTING LABORATORY
CERTIFICATE NO. 1774-02



CERTIFIED WEIGHT REPORT:

Part Number: 58051
Lot Number: 103113
Description: Antimony (Sb)

Lot # C363101
Solvent: Nitric Acid

Expiration Date: 103116
Nominal Concentration (µg/mL): 1000

Storage: 20 °C
2.0% Nitric Acid
40.0 (mL)

Volume shown below was diluted to (mL): 1999.68
5E-05 Balance Uncertainty
0.100 Flask Uncertainty

Formulated By:	Lawrence Barry	103113
Reviewed By:	Pedro L. Rentas	103113

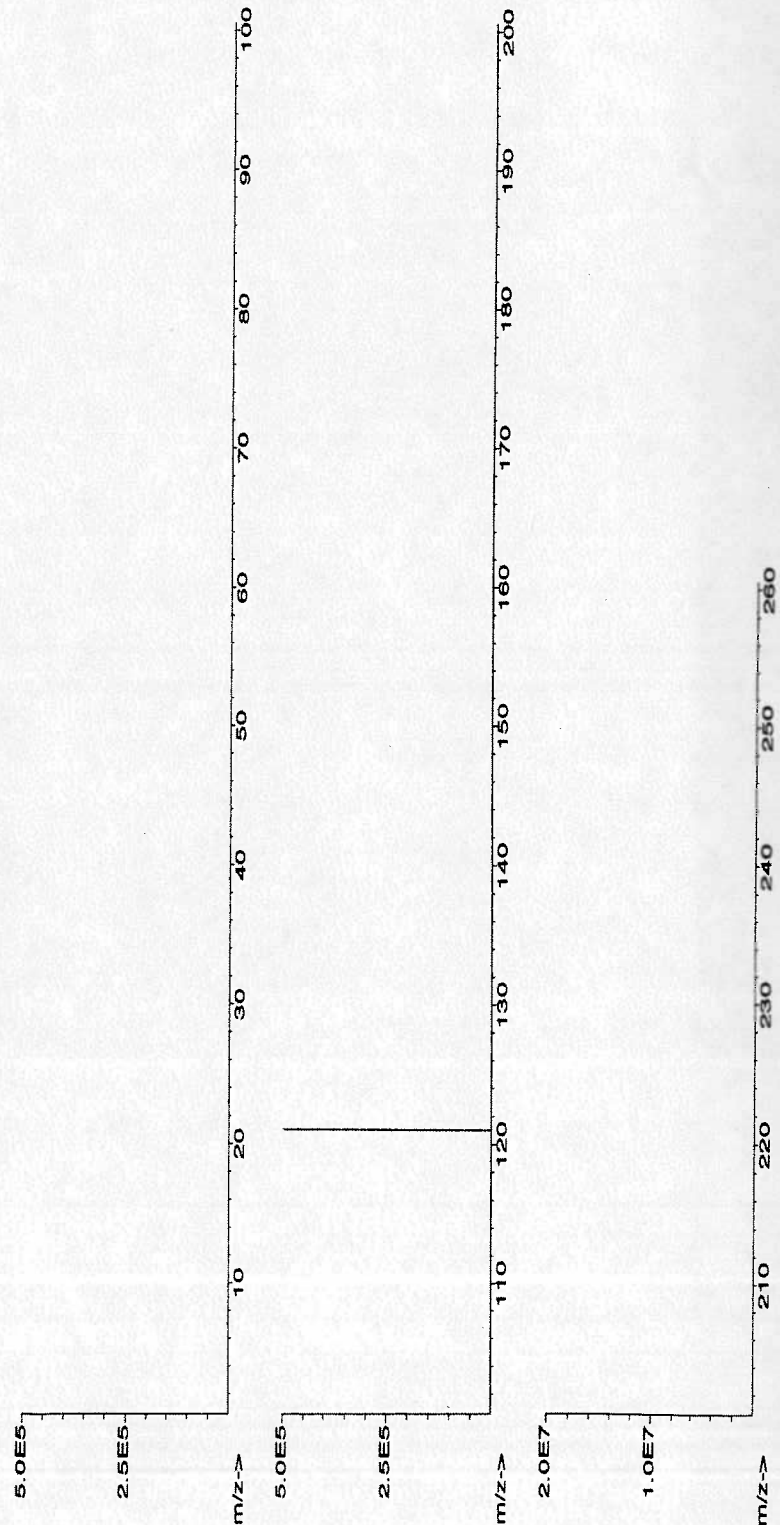
MSDS Information

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

NIST
SRM

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Initial Uncertainty	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty (+/-)	Final Conc. (µg/mL)	5.0 mg/m3	N/A	3102a
1. Antimony Oxide (Sb)	58151	062813	0.0998	199.6	0.013	10018.0	1000.0	0.00201	07440-36-0	5.0 mg/m3	N/A	3102a

[1] Spectrum No.1 [17.964 sec]:58051.D# [Count] [Linear]





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

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

Physical Characterization:

(T)= Target analyte

Certified by:

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

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: 58029
Lot Number: 103113
Description: Copper (Cu)

Lot # C257285
Solvent: Nitric Acid

Expiration Date: 103116

2.0%

40.0 (mL) Nitric Acid

Nominal Concentration (µg/mL): 1000

Storage: 20 °C

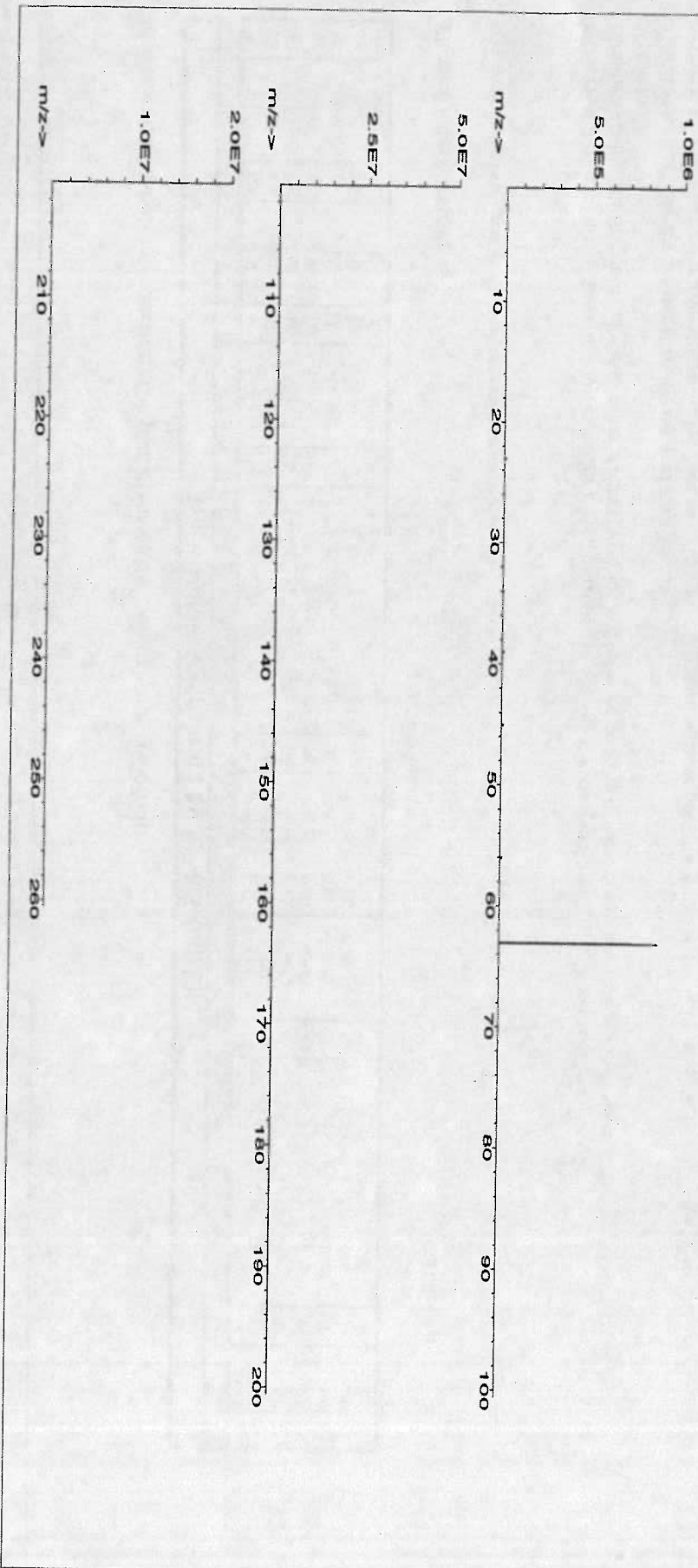
Volume shown below was diluted to (mL): 1999.68
5E-05 Balance Uncertainty
0.100 Flask Uncertainty

<i>Lawrence Barry</i>	
Formulated By:	Lawrence Barry
103113	
<i>Pedro L. Renteria</i>	
Reviewed By:	Pedro L. Renteria
103113	

MSDS Information

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Uncertainty Pipette	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty	(Solvent Safety Info. On Attached pg.)	NIST SRM
1. Copper (II) nitrate trihydrate (Cu)	58129	111212	0.1000	200.0	0.013	10001.5	1000.3	0.00201	10031-43-3	N/A
							(+/-)			0.01-0.1 940 mg/kg
										3114

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





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

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

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

(T)=Target analyte

Certified by:

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

Physical Characterization:

- * 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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



Analytical Reference Material ARM

CERTIFIED WEIGHT REPORT

Part Number: 58081
Lot Number: 103113
Description: Thallium (II)

Lot # C257285
Solvent: Nitric Acid

Expiration Date: 103116
Nominal Concentration (µg/mL): 1000

Storage: 20 °C
2.0% Nitric Acid 40.0 (mL)

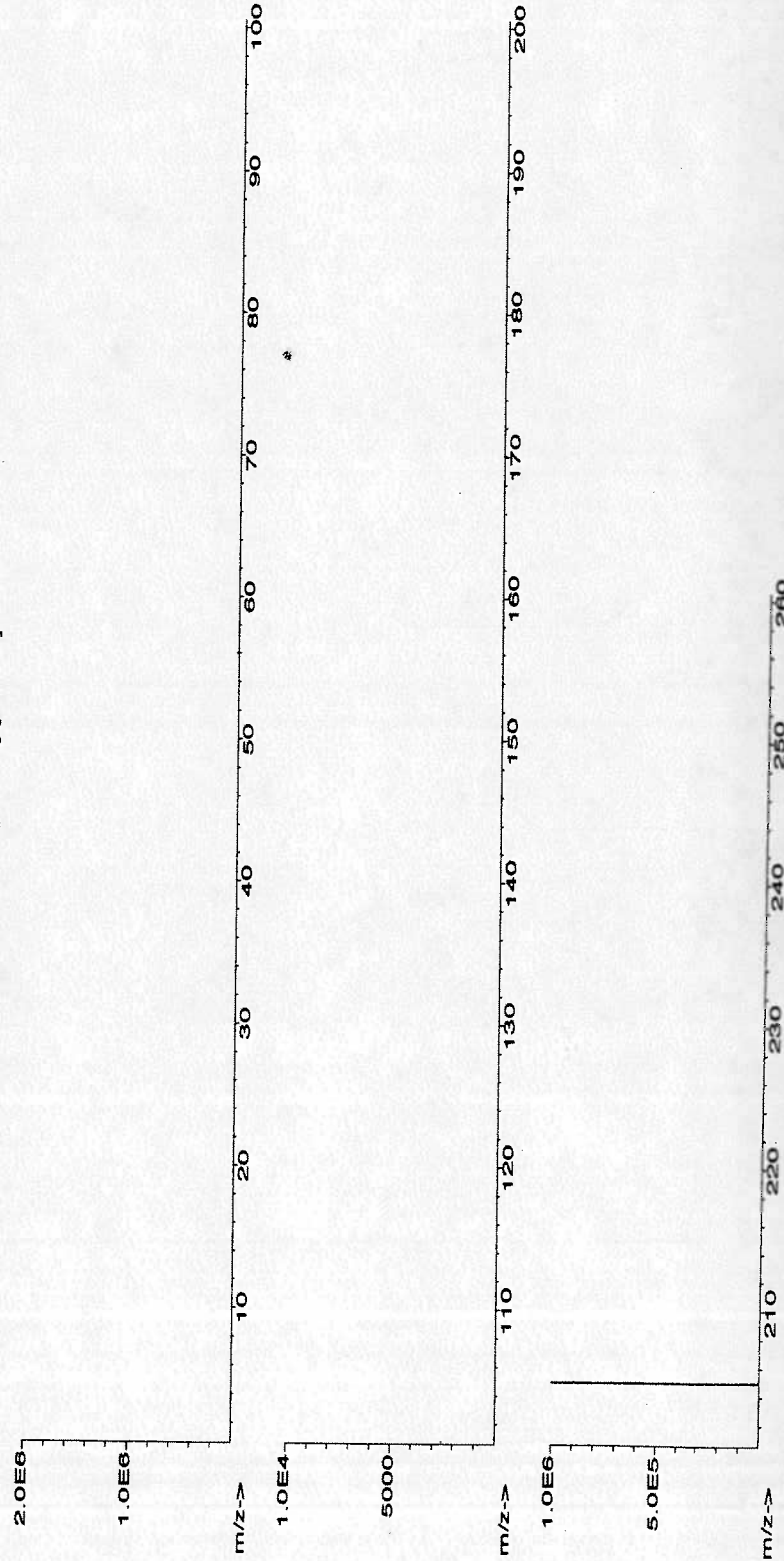
Volume shown below was diluted to (mL): 1999.68
5E-05 Balance Uncertainty 0.100 Flask Uncertainty

<i>Lawrence Barry</i>	
Formulated By:	Lawrence Barry
	103113
<i>Pedro L. Rentas</i>	
Reviewed By:	Pedro L. Rentas
	103113

MSDS Information

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Uncertainty Pipette	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty (+/-)	(Solvent Safety Info. On Attached pg.)	CAS#	OSHA PEL (TWA)	LD50	NIST SRM
1. Thallium nitrate (II)	58181	051613	0.1000	200.0	0.013	10000.6	1000.2	0.00215	10102-45-1	5 mg/m3	N/A		3158

[1] Spectrum No.1 [14.044 sec]:57081.D# [Count] [Linear]





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

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

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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



Analytical Reference Material ARM

CERTIFIED WEIGHT REPORT

Part Number: **58039**
Lot Number: **103113**
Description: **Yttrium (Y)**

Lot # **C363101**
Solvent: **Nitric Acid**

Expiration Date: **103116**
Nominal Concentration ($\mu\text{g/mL}$): **1000**
Storage: **20 °C**

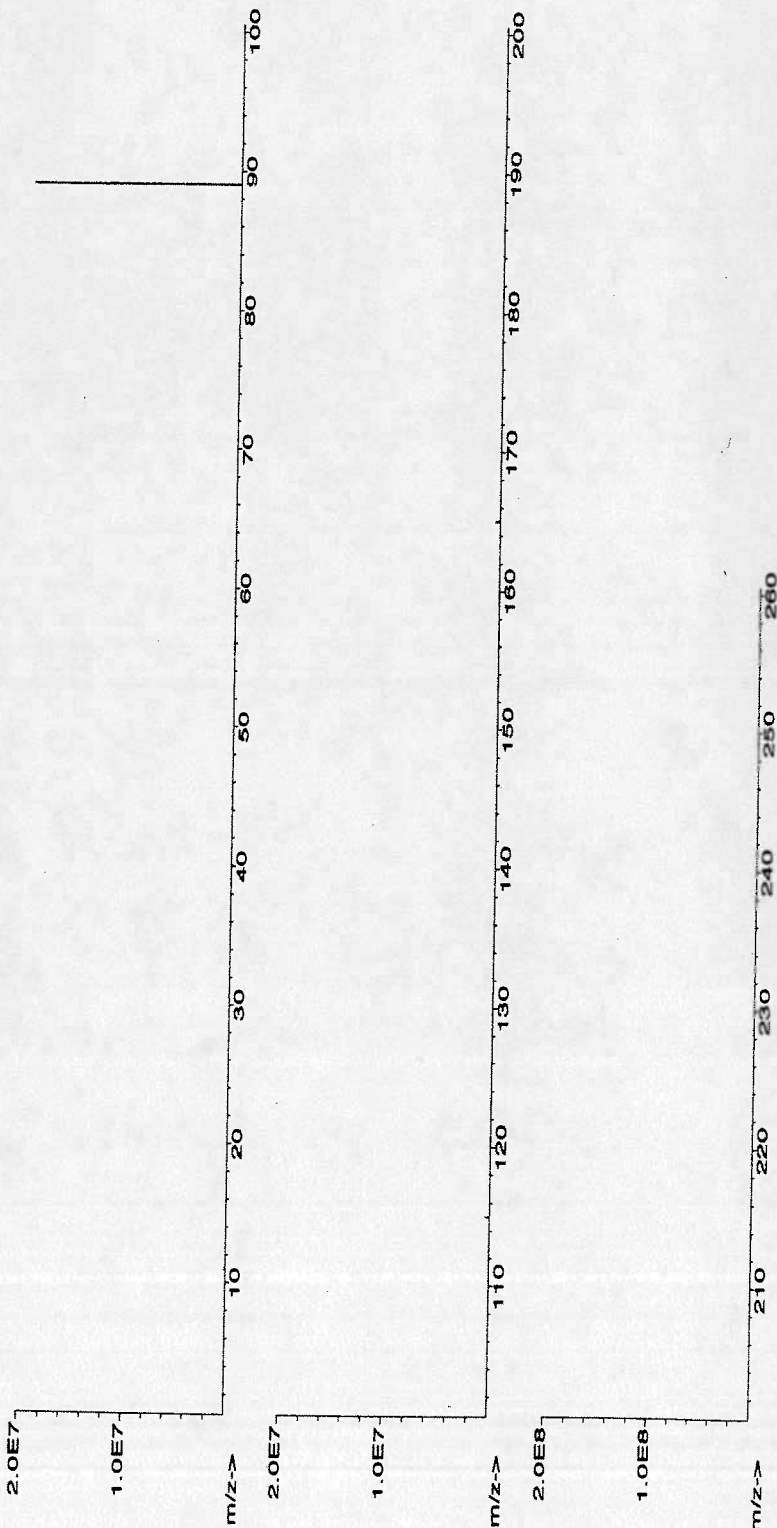
Volume shown below was diluted to (mL):
5E-05 Balance Uncertainty
0.100 Flask Uncertainty
1999.68

<i>Lawrence Barry</i>	
Formulated By:	Lawrence Barry
<i>Pedro L. Rentas</i>	
Reviewed By:	Pedro L. Rentas
103113	

MSDS Information

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Uncertainty Pipette	Initial Conc. ($\mu\text{g/mL}$)	Final Conc. ($\mu\text{g/mL}$)	Expanded Uncertainty	(Solvent Safety Info. On Attached pg.)		NIST SRM
									CAS#	LD50	
1. Yttrium (III) Oxide (Y)	58139	030813	0.1000	200.0	0.013	10001.5	1000.3	0.00204 (+/-)	01314-36-9	N/A	N/A

[1] Spectrum No.1 [37.002 sec]:58039.D.# [Count] [Linear]





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

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

Physical Characterization:

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

(T)= Target analyte

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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



Reference Materials Producer
Cert #2495.01

SPEXertificate®

Certificate of Reference Material



Chemical Testing
Cert #2495.02

Catalog Number: ZEPANJ-7-100

Lot No. 21-157CR

Description: Custom Claritas Standard

Matrix: 10% HNO₃ / Tr. Tart. Acid / Tr. HF

This CLARITAS PPT® Certified Reference Material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICP-OES, DCP, AA, ICP-MS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

The CRM is prepared from high purity single element concentrates of individual elements using Class A laboratory ware to give precise concentrations.

Instrumental Analysis by ICP Spectrometer:

Analyte	Labeled	Uncertainty	SRM	Analyte	Labeled	Uncertainty	SRM
Ag	250 mg/L	±1 mg/L	3151*	Ni	250 mg/L	±1 mg/L	3136*
As	250 mg/L	±1 mg/L	3103a*	Pb	250 mg/L	±1 mg/L	3128*
B	250 mg/L	±1 mg/L	3107*	Sb	250 mg/L	±1 mg/L	3102a*
Ba	250 mg/L	±1 mg/L	3104a*	Se	250 mg/L	±1 mg/L	3149*
Be	250 mg/L	±1 mg/L	3105a*	Sn	250 mg/L	±1 mg/L	3161a*
Cd	250 mg/L	±1 mg/L	3108*	Sr	250 mg/L	±1 mg/L	3153a*
Co	250 mg/L	±1 mg/L	3113*	Ti	250 mg/L	±1 mg/L	3162a*
Cr	250 mg/L	±1 mg/L	3112a*	Tl	250 mg/L	±1 mg/L	3158*
Cu	250 mg/L	±1 mg/L	3114*	V	250 mg/L	±1 mg/L	3165*
Mn	250 mg/L	±1 mg/L	3132*	Zn	250 mg/L	±1 mg/L	3168a*
Mo	250 mg/L	±1 mg/L	3134*				

* - indicates NIST SRM

† - indicates SPEX CertiPrep CRM (when NIST SRM is not available)

SPEX CertiPrep Reference Multi: Lot# ALL8

Trace Metallic Impurities in the Actual Solution via ICP-MS Analysis:

Element	µg/L	Element	µg/L	Element	µg/L	Element	µg/L	Element	µg/L	Element	µg/L
Al	90	Eu	<5	In	<2	Nb	7	Rh	15	Th	0.3
Au	4	Fe	90	Ir	<4	Nd	<2	Ru	<10	Tm	<0.7
Bi	3	Ga	<7	K	70	P	<400	Sc	<1	U	<0.5
Ca	<150	Gd	0.6	La	40	Pd	<80	Si	<400	W	50
Ce	4	Ge	<10	Li	<10	Pr	4	Sm	20	Y	4
Cs	3	Hf	<2	Lu	<0.2	Pt	<2	Ta	7	Yb	<0.7
Dy	<0.01	Hg	<5	Mg	70	Rb	<1	Tb	<0.3	Zr	100
Er	<0.1	Ho	<0.2	Na	100	Re	<0.01	Te	<30		

D3L0906

ICP CAL 1 Trace Stock 250 mg/L

Received on: 11/30/2013

Opened: 12/09/2013; Exp.: 11/23/2014

D3L0907

ICP CAL 1 Trace Spike 250 mg/L

Received on: 11/30/2013

Opened: 12/09/2013; Exp.: 11/30/2014

Balances are calibrated regularly with weight sets traceable to NIST#s 32856, 32867 and others. This CRM is guaranteed stable and accurate to ±0.5% of the labeled value. This includes uncertainty components due to preparation, measurement, homogeneity, short-term and long-term stability, as well as transpiration loss. This guarantee is valid for a period of one year from the date of certification only when the material is unopened and stored under ambient laboratory conditions.

Date of Certification: NOV 2013

Certifying Officer: Ray Wilfong

©2013 SPEX CERTIPREP, INC.

Report of Certification

This Certified Reference Material (CRM) has been prepared and certified under an ISO 9001:2008, ISO 17025:2005, and ISO Guide 34:2009 quality system consistent with the following guides:

- ISO 9001: Quality management systems – Requirements – certified by UL-DQS
- ISO 17025: General requirements for the competence of testing and calibration laboratories – accredited by A2LA
- ISO Guide 34: General requirements for the competence of reference material producers – accredited by A2LA
- ISO Guide 31: Reference Materials – Contents of certificates and labels
- ISO Guide 35: 2006 Reference Materials – General & Statistical Principles for Certification
- Guide To The Expression Of Uncertainty In Measurement 1997
- EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
- ASTM Guide D6362-98
- NIST Technical Note 1297
- ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
- ISO/REMCO N280

Material Source:

All analytes and matrix materials are obtained and verified by SPEX CertiPrep from pre-qualified vendors as per ISO 9001:2008, ISO 17025:2005, and ISO Guide 34:2009 guidelines. Vendor identifications are proprietary, however sources of all materials used in the preparation and testing of SPEX CertiPrep CRMs are tracked and documented. For further assistance, please contact the Sales Support Department at crmsales@spexcsp.com.

Instructions for Use:

Primary usage of this CRM is in neat form or diluted serially with matrix of a purity at or greater than the purity of the original matrix solution. If dilution is required the diluent must be compatible with all certified analytes and contain stabilizers appropriate for the period of intended use. The CRM can also be used as a spike or with a spike, again with appropriate compatibility considerations. All solutions should be thoroughly mixed, by shaking, prior to use and never pipetted directly from the bottle. All surfaces that come in contact with the solution must be thoroughly cleaned and leached prior to use. Dilutions should be performed only with Class A volumetric glassware.

Method of Preparation:

Clean laboratory procedures and techniques have been used throughout the preparation. All materials, equipment, analytical instrumentation and personnel have been qualified prior to use. The highest purity acids applicable, 18 megohm, double deionized water, acid-leached triple-rinsed bottles (where appropriate), and Class A/calibrated volumetrics have been used in all preparations.

Homogeneity:

The homogeneity of the CRM has been confirmed by procedures consistent with ISO 17025:2005, ISO Guide 34:2009, and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed to prove homogeneity in accordance with our internal procedure 4600-HOMOGEN-1A. Since the product is highly homogeneous, any sample size taken for analysis would be within the uncertainty budget. This is consistent with the intended use of the CRM.

Statistical Estimator and Confidence Limits:

The certified value 'X' listed on the reverse of this document is at the 95% level of confidence and can be expressed as:

- $X = x \pm U$ where x = certified value, U = expanded uncertainty, x = property value
- $U = k u_c$ where $k = 2$ is the coverage factor at the 95% confidence level
- u_c is obtained by combining the individual element standard uncertainty components u_i , and $u_c = \sqrt{\sum u_i^2}$

Certification Traveler Report:

All certified values reported were derived from the Traveler Report (SPEX CertiPrep's traceability documentation) identified by the lot number of this CRM. During the stated period of validity, the purchaser will be notified if this product is recalled due to any significant changes in the stability of the solution. For further assistance, please contact the Sales Support Department at crmsales@spexcsp.com.

Legal Notice:

SPEX CertiPrep reference materials are not for any cosmetic, drug or household application and are to be used only by qualified individuals who are trained in appropriate procedures. No claims against SPEX CertiPrep, Inc. of any kind whatsoever, whether based on breach of warranty, alleged negligence, or otherwise, with respect to this Reference Material shall be greater than the purchase price. In no event shall SPEX CertiPrep, Inc. be liable for any loss of profits or any incidental, special, or consequential damages.



CERTIFIED WEIGHT REPORT:

Part Number: **58047**
Lot Number: **020514**
Description: **Silver (Ag)**

Lot # **C363101**
Solvent: **Nitric Acid**

Expiration Date: **020517**

2.0%

40.0 (mL) Nitric Acid

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

Storage: **20 °C**

Volume shown below was diluted to (mL): **1999.78**

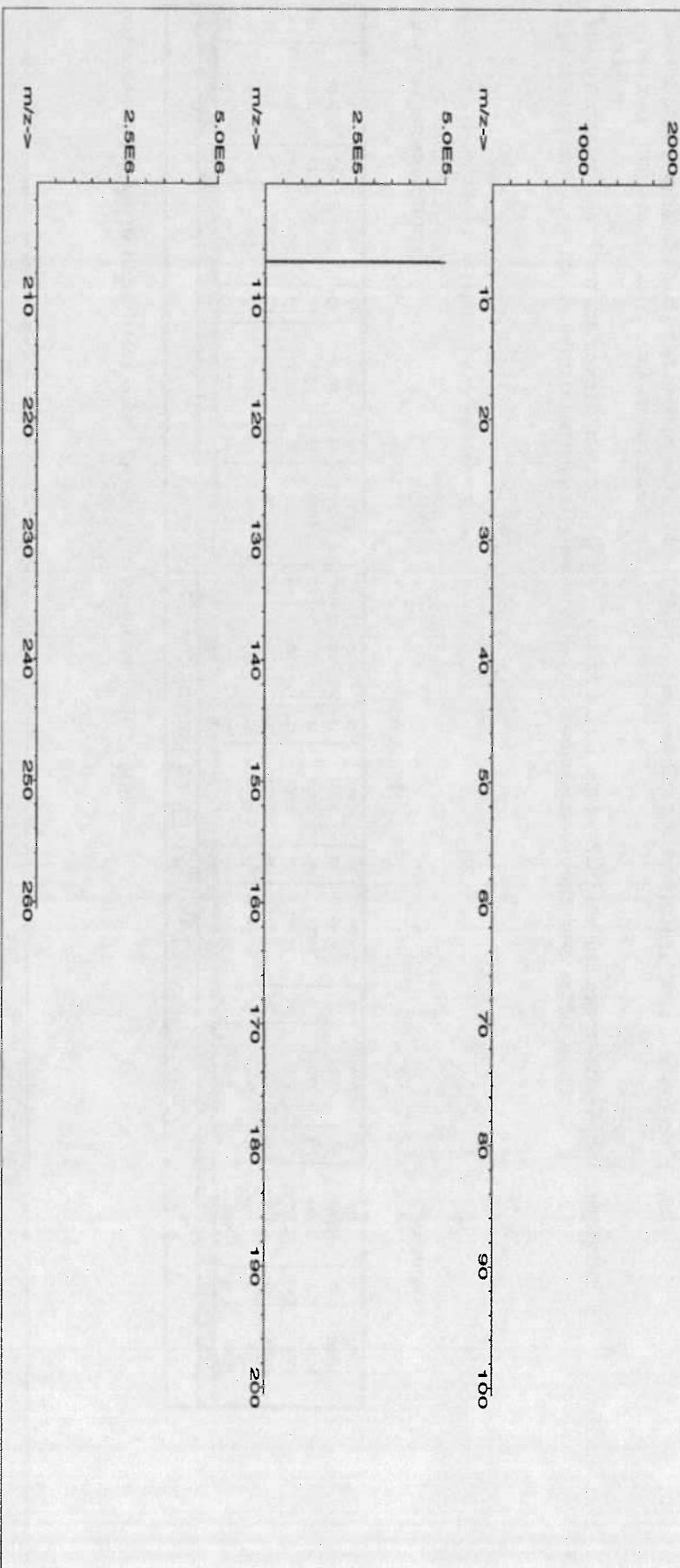
5E-05 Balance Uncertainty
0.100 Flask Uncertainty

Formulated By:	<i>Paul Barron</i>	020514
Reviewed By:	<i>Pedro L. Renteria</i>	020514

MSDS Information

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Uncertainty Pipette	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty (+/-)	CAS#	(Solvent Safety Info. On Attached pg.)	LD50	NIST SRM
1. Silver nitrate (Ag)	58147	020514	0.1000	200.0	0.013	10002.5	1000.4	0.00201	07761-86-8	10 µg/m3	N/A	3151

[1] Spectrum No. 1 [10.014 sec]:58047.D# [Count] [Linear]





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

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

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

(T) = Target analyte

Certified by:

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

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: **59371**
Lot Number: **020514**
Description: **ICP Mix #1**

Lot #
C363101
SZBC2600V
Solvants: Nitric Acid
Hydrofluoric acid

Expiration Date: **020517**
17 Components

5.0%

25.0
Trace
Nitric Acid
Hydrofluoric acid
(mL)

Nominal Concentration (µg/mL): **100**

Storage: 20 °C

Volumes shown below were diluted to (mL):
500.10
0.100
Balance Uncertainty
Flask Uncertainty

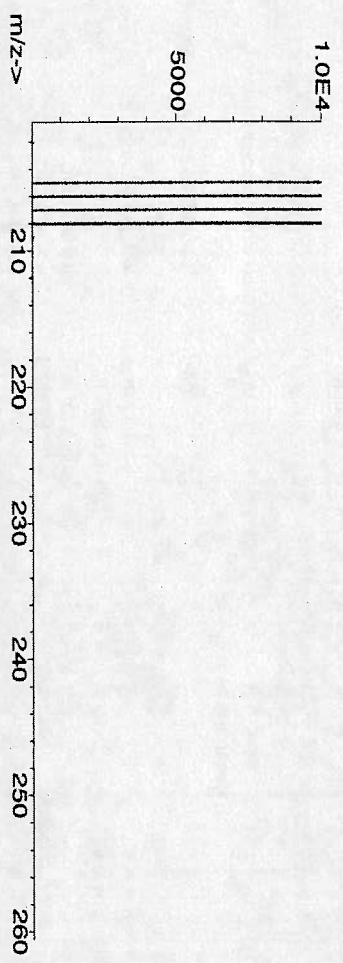
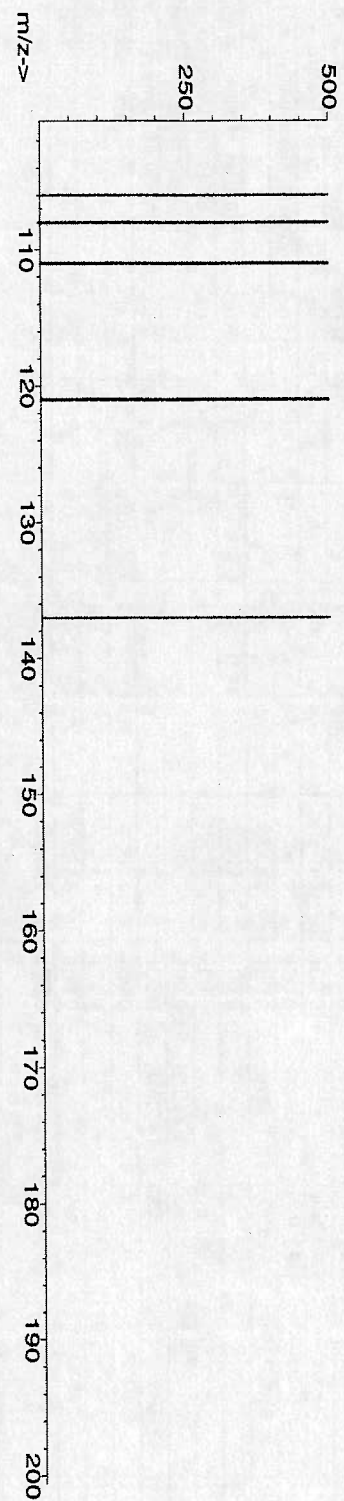
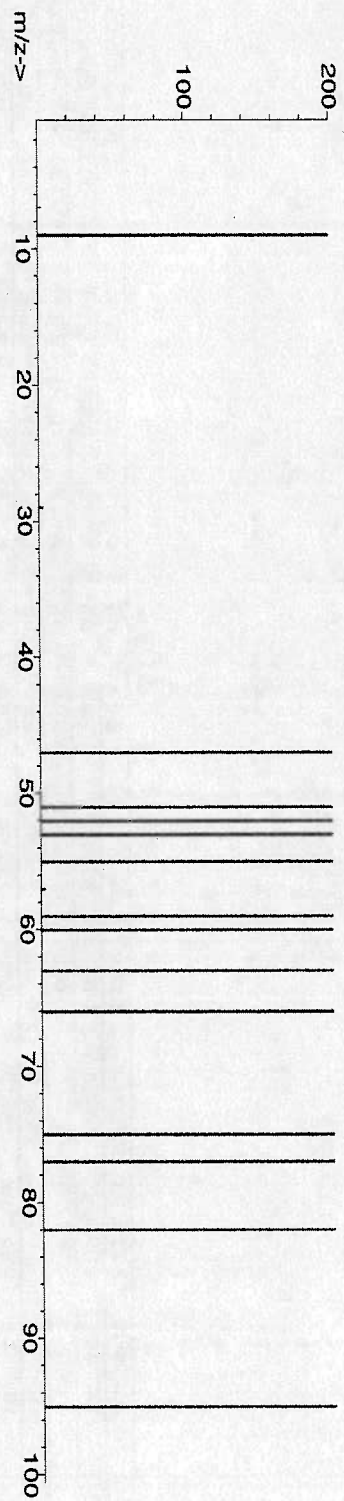
Formulated By:	Paul Barron	020514
Reviewed By:	Pedro L. Renteria	020514

MSDS Information

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Uncertainty	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty (+/-)	(Solvent Safety Info. On Attached pg.)	NIST SRM
1. Antimony Oxide (Sb)	58151	062813	0.0100	5.0	0.025	10018.0	100.2	0.01021	07440-36-0 5.0 mg/m3	N/A 3102a
2. Arsenic (As)	58133	110812	0.0100	5.0	0.025	10001.2	100.0	0.01021	07440-38-2 0.2 mg/m3	N/A 3103a
3. Barium nitrate (Ba)	58156	121013	0.0100	5.0	0.025	10001.4	100.0	0.00200	10022-31-8 0.5 mg/m3	off-rat 355 mg/kg 3104a
4. Beryllium acetate (Be)	58104	051713	0.0100	5.0	0.025	10001.4	100.0	0.00201	19049-40-2 0.002 µg/m3	N/A 3105a
5. Cadmium nitrate tetrahydrate (Cd)	58148	042513	0.0100	5.0	0.025	10000.0	100.0	0.00200	10022-68-1 0.2 mg/m3	N/A 3108
6. Chromium (III) nitrate nonahydrate (Cr)	58124	100813	0.0100	5.0	0.025	10001.3	100.0	0.00200	07789-02-8 0.5 mg(Cr)/m3	off-rat 3250 mg/kg 3112a
7. Cobalt nitrate Hexahydrate (Co)	58127	062113	0.0100	5.0	0.025	10001.1	100.0	0.00204	10026-22-9 5 mg/m3	off-rat 694 mg/kg 3113
8. Copper (II) nitrate trihydrate (Cu)	58129	012814	0.0100	5.0	0.025	10000.2	100.0	0.00200	10031-43-3 N/A	off-rat 940 mg/kg 3114
9. Lead (II) Nitrate (Pb)	58182	060313	0.0100	5.0	0.025	10001.5	100.0	0.00200	10099-74-8 0.05 mg/m3	500 mg/kg 3128
10. Manganese (II) nitrate Hydrate (Mn)	58125	110513	0.0100	5.0	0.025	10001.0	100.0	0.00200	15710-66-4 5 mg/m3	N/A 3132
11. Ammonium molybdate (Mo)	58142	072613	0.0100	5.0	0.025	10001.3	100.0	0.00200	12054-85-2 5 mg(Mo)/m3	off-rat 1620 mg/kg 3134
12. Nickel (II) nitrate Hexahydrate (Ni)	58128	022213	0.0100	5.0	0.025	10001.6	100.0	0.00200	13478-00-7 1 mg/m3	off-rat 333 mg/kg 3136
13. Selenium (IV) oxide (Se)	58134	100412	0.0100	5.0	0.025	10001.4	100.0	0.00200	07746-08-4 0.2 mg/m3	N/A 3149
14. Thallium nitrate (Tl)	58181	051613	0.0100	5.0	0.025	10000.6	100.0	0.00201	10102-45-1 5 mg/m3	N/A 3158
15. Ammonium hexafluoroantimonate (Tl)	58122	111513	0.0100	5.0	0.025	10001.3	100.0	0.00201	16962-40-6 N/A	N/A 3162a
16. Ammonium Metavanadate (V)	58123	120913	0.0100	5.0	0.025	10001.4	100.0	0.00201	07803-55-6 1.0 mg/m3	off-rat 630 mg/kg 3165
17. Zinc nitrate hydrate (Zn)	58130	042313	0.0100	5.0	0.025	10001.5	100.0	0.00200	13778-30-8 1 mg/m3	off-rat 1190mg/kg 3168



[1] Spectrum No. 1 [16.634 sec]:59371.D# [Count] [Linear]





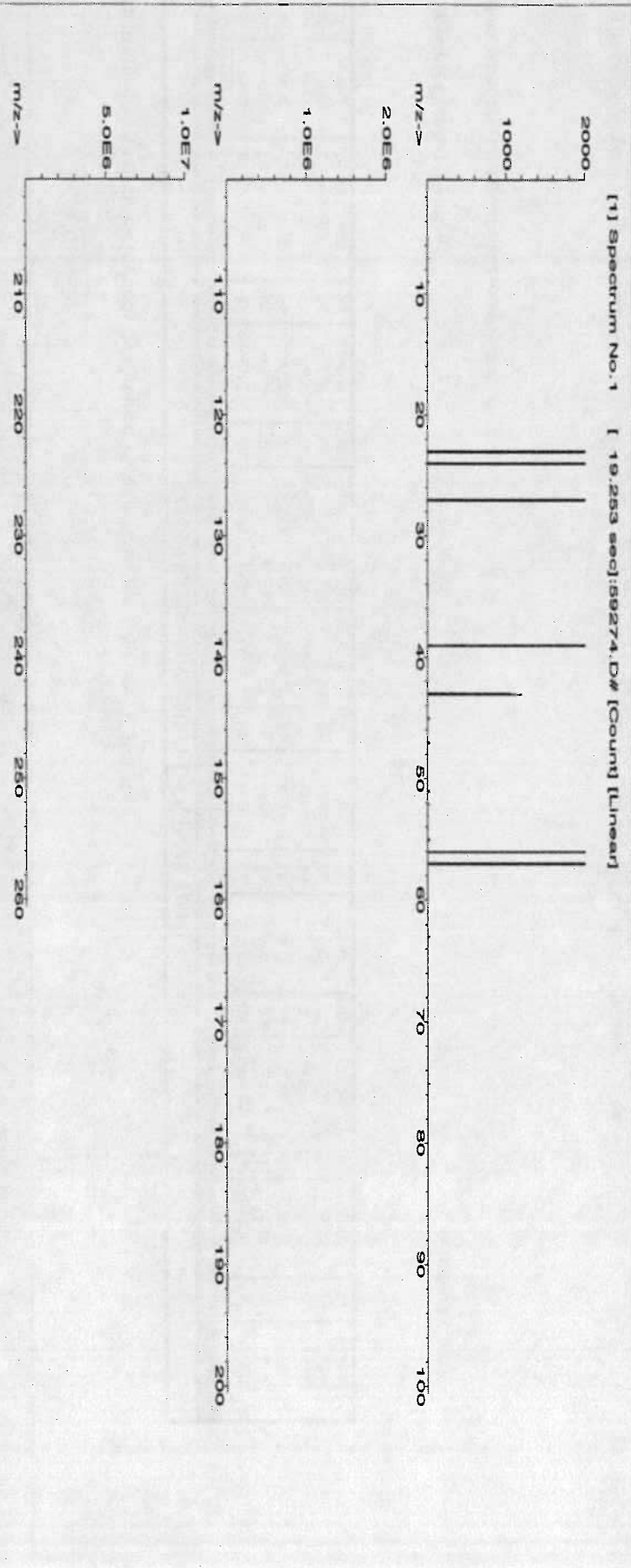
CERTIFIED WEIGHT REPORT

Part Number: 59274
Lot Number: 020514
Description: ICP Mix #2
Expiration Date: 020517
Nominal Concentration (µg/mL): 5000
Storage: 20 °C
Solvent: C363101 Nitric Acid
5% 50.0 mL Nitric Acid
SE-05 Balance Uncertainty
Weights shown below were diluted to (mL): 999.86 0.116 Flask Uncertainty

<i>Signature</i>	
Formulated By:	Lawrence Barry
Reviewed By:	Pedro L. Renteria
	020514

MSDS Information

Compound	Lot	Nominal Conc. (µg/mL)	Purity	Uncertainty Assay (%)	Target Weight (g)	Actual Weight (g)	Actual Conc. (µg/mL)	Expanded Uncertainty (+/-)	(Solvent Safety Info. On Attached pg.)	NIST SRM
1. Aluminum Nitrate Nonahydrate (Al)	IN022 C1807ALAS2	5000.0	99.995	0.10	7.10	70.4160	70.4163	0.00201	07784-27-2	5 mg/m3 or-rel 264 mg/kg 3101a
2. Calcium carbonate (Ca)	IN014 D0613CAA1	5000.0	99.999	0.10	40.7	12.2834	12.2837	0.00201	00471-34-1	7 mg/m3 N/A 3109a
3. Iron (III) Nitrate Nonahydrate (Fe)	IN028 C4108FEA1R2	5000.0	99.999	0.10	13.8	36.2271	36.2273	0.00201	07782-61-8	7 mg/m3 N/A 3126a
4. Magnesium Nitrate Hexahydrate (Mg)	IN030 D1112MG42	5000.0	99.9995	0.10	9.60	52.0762	52.0768	0.00201	13446-18-9	7 mg/m3 N/A 3131a
5. Potassium nitrate (K)	IN034 K511KD2	5000.0	99.999	0.10	38.7	12.9182	12.9185	0.00201	07757-79-1	5 mg/m3 or-rel 3015 mg/kg 3141a
6. Sodium nitrate (Na)	IN036 R06NAASR	5000.0	99.999	0.10	27.0	18.5161	18.5162	0.00201	07631-99-4	5 mg/m3 or-rel 3236 mg/kg 3152a





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

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

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

(T) = Target analyte

Physical Characterization:

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

Certified by:

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: 58033
Lot Number: 020514
Description: Arsenic (As)

Lot # C363101
Solvent: Nitric Acid

Expiration Date: 020517

Storage: 20 °C

Nominal Concentration (µg/mL): 1000

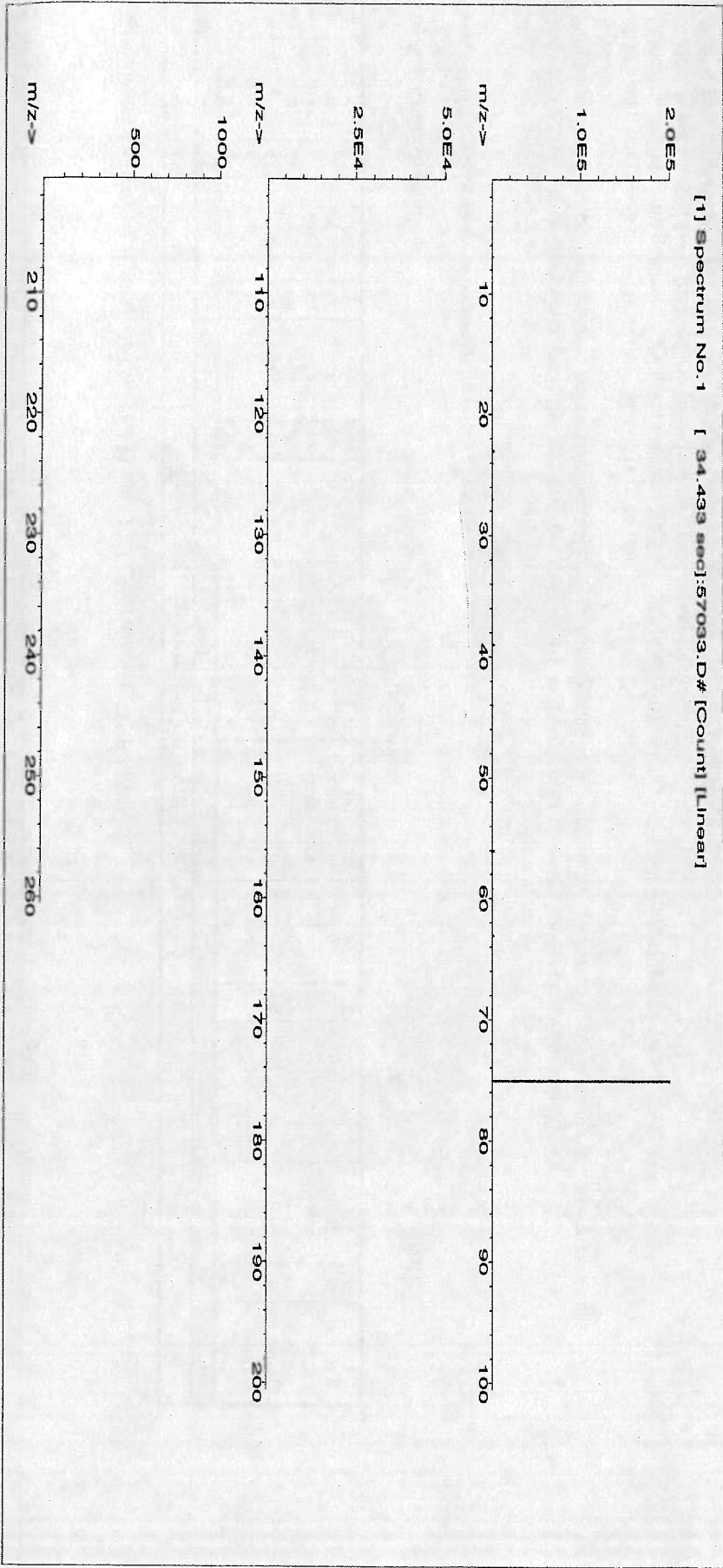
Volume shown below was diluted to (mL): 1999.88

Formulated By: <i>Gabriel Helland</i>		020514
Reviewed By: <i>Pedro L. Renteria</i>		020514

MSDS Information

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

1. Arsenic (As)	58133	110812	0.1000	200.0	0.013	10001.2	1000.3	0.00201	07440-38-2	0.2 mg/m ³	N/A	3103A
-----------------	-------	--------	--------	-------	-------	---------	--------	---------	------------	-----------------------	-----	-------





CERTIFIED WEIGHT REPORT:

Part Number:
Lot Number:
Description:

58004
020514
Beryllium (Be)

Lot #
C363101
Solvent:

Nitric Acid

2.0%

40.0 (mL)
Nitric Acid

Expiration Date:

020517

Storage: 20 °C

Nominal Concentration (µg/mL):

1000

Volume shown below was diluted to (mL):

1999.98

SE-05 Balance Uncertainty
0.080 Flask Uncertainty

Formulated By: <i>Gabriel Helland</i>		020514
Reviewed By: <i>Pedro L. Rentas</i>		020514

MSDS Information

(Solvent Safety Info. On Attached pg.)

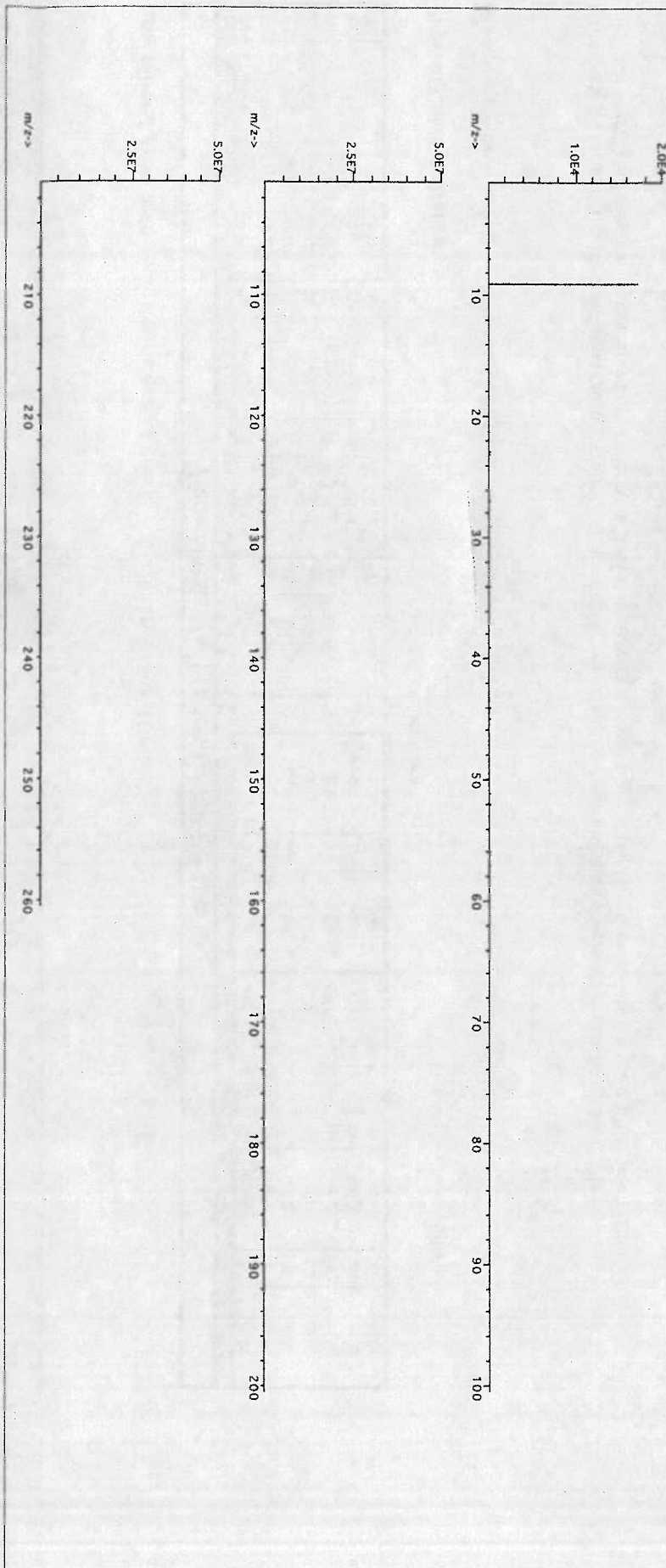
CAS# : OSHA PEL (TWA)

LD50

NIST
SRM

1. Beryllium acetate (Be)	58104	051713	0.1000	200.0	0.013	10001.4	1000.2	0.00202	18048-40-2	0.002 ug/m3	N/A	3105a
---------------------------	-------	--------	--------	-------	-------	---------	--------	---------	------------	-------------	-----	-------

[1] Spectrum No.1 [29.233 sec]:S:58004B.D# [Count] [Linear]





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

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

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

(T) = Target analyte

Physical Characterization:

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

Certified by:

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: **58082**
Lot Number: **020514**
Description: **Lead (Pb)**

Lot # **C363101**
Solvent: **Nitric Acid**

Expiration Date: **020517**

2.0%

40.0 (mL)

Nitric Acid

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

Storage: 20 °C

Volume shown below was diluted to (mL): **1999.98**

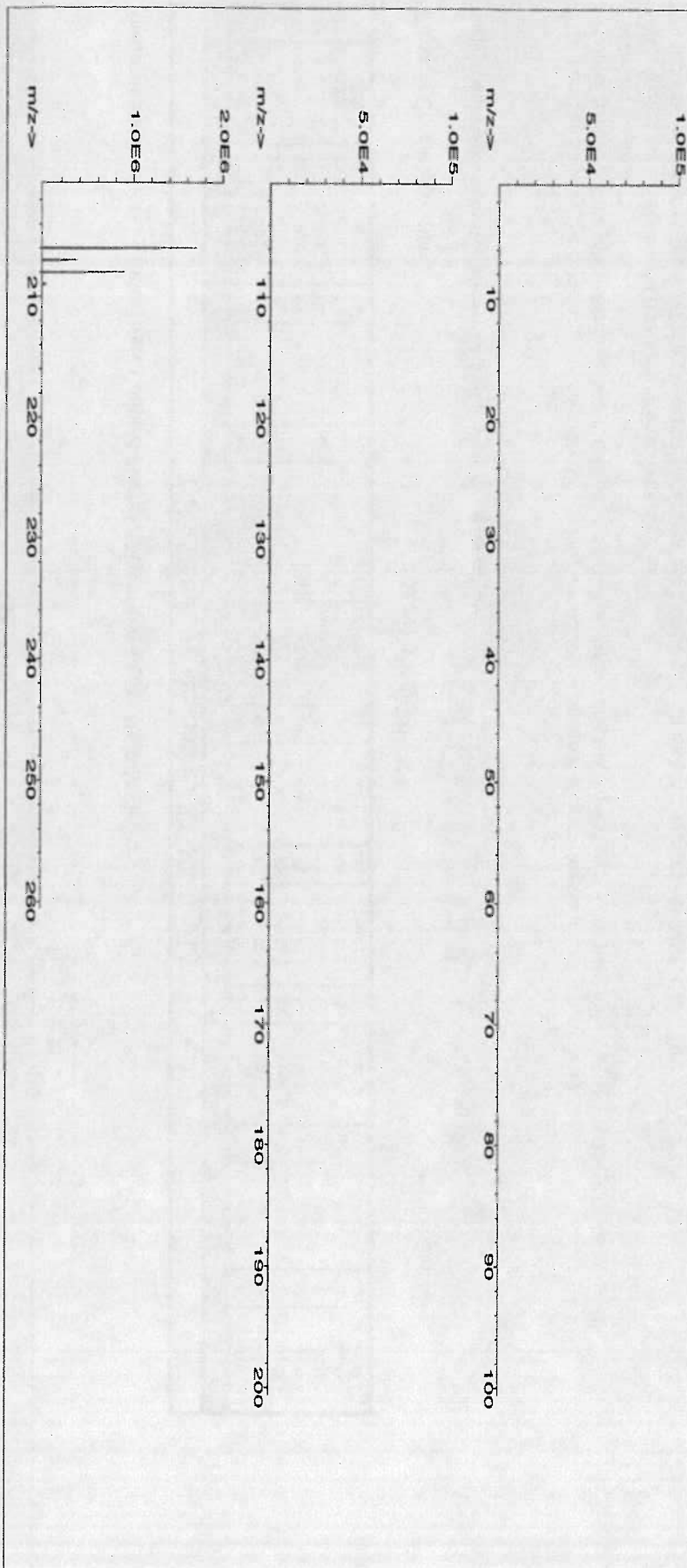
SE-05 Balance Uncertainty
0.090 Flask Uncertainty

Formulated By:	Lawrence Barry
	020514
Reviewed By:	Pedro L. Rientas
	020514

MSDS Information

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Uncertainty	Pipette	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty (+/-)	CAS#	OSHA PEL (TWA)	LD50	NIST SRM
1. Lead (II) Nitrate (Pb)	58182	060313	0.1000	200.0	0.013		10001.5	1000.2	0.00201	10099-74-8	0.05 mg/m3	500 mg/kg	3128

[1] Spectrum No. 1 [14.144 sec]:58082.D# [Count] [Linear]





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

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

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

(T) = Target analyte

Certified by:

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

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: **58042**
Lot Number: **020514**
Description: **Molybdenum (Mo)**

Lot # **Y47057** Solvent: **Ammonium hydroxide**

Expiration Date: **020517**

0.5%

10.0 (mL)

Ammonium hydroxide

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

Storage: **20 °C**

Volume shown below was diluted to (mL):

1999.98

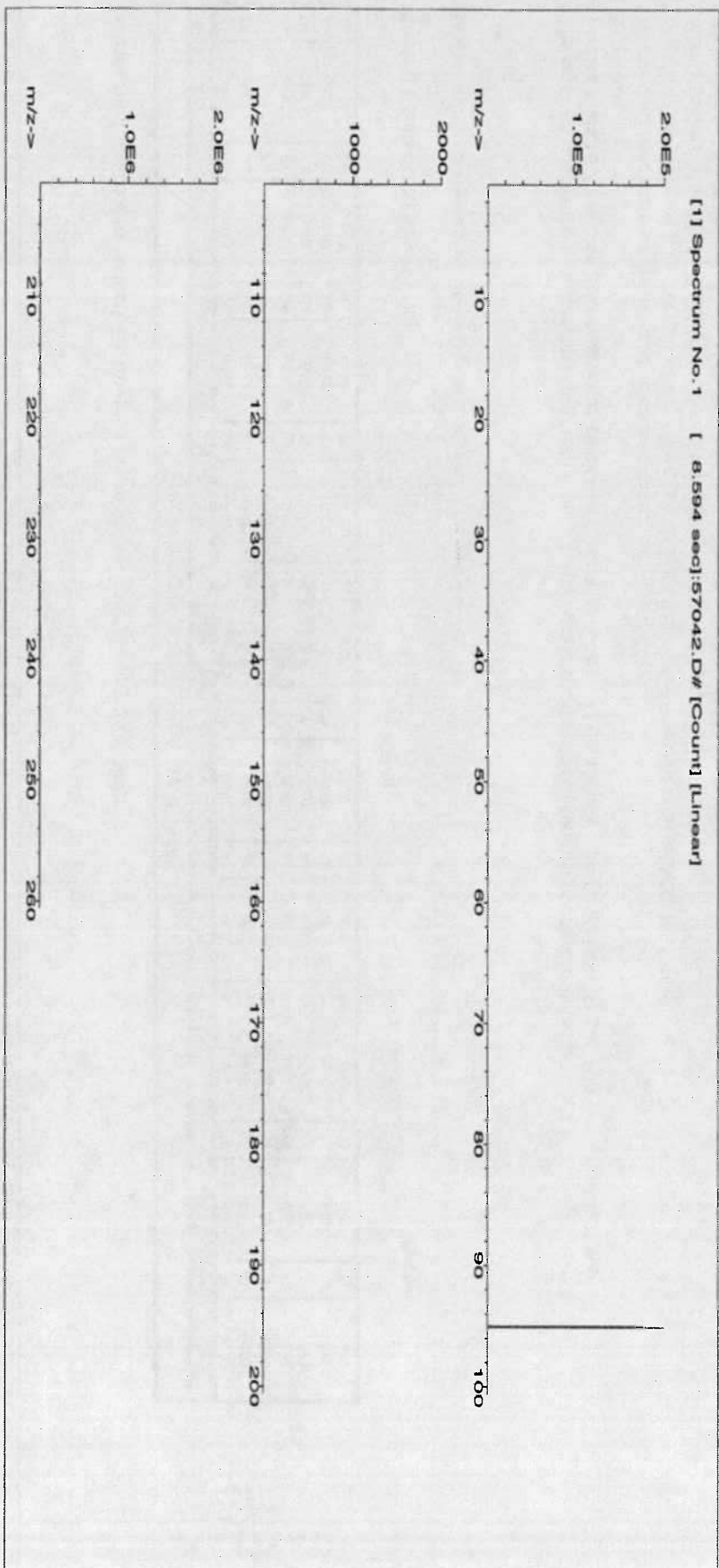
0.090

Balance Uncertainty
Flask Uncertainty

Formulated By: <i>Lawrence Barry</i>		020514
Reviewed By: <i>Pedro L. Rentas</i>		020514

MSDS Information

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Uncertainty Pipette	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty (+/-)	(Solvent Safety Info. On Attached pg.)	NIST SRM
1. Ammonium molybdate (Mo)	58142	072613	0.1000	200.0	0.013	10001.28	1000.1	0.00201	12054-85-2 5 mg(Mo)/m3 or-fat 333 mg/kg	3134





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

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

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

(T)= Target analyte

Physical Characterization:

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

Certified by:

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST, (NIST Test #: 732/245/790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



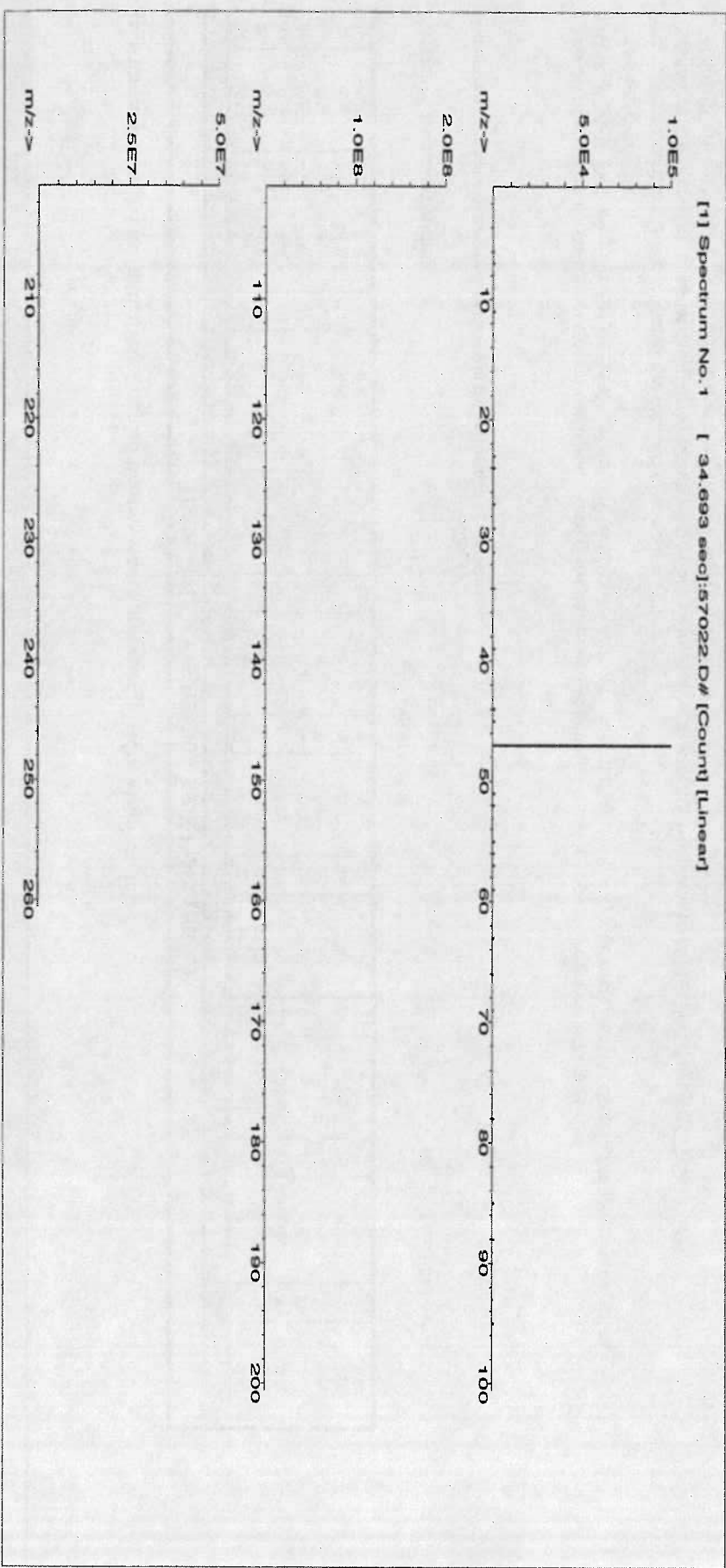
CERTIFIED WEIGHT REPORT:

Part Number: **58022** Lot # **C363101** Solvent: **Nitric Acid**
Lot Number: **020514**
Description: **Titanium (Ti)** 2.0%
Expiration Date: **020517** Storage: **20 °C** 40.0 (mL) Nitric Acid
Nominal Concentration (µg/mL): **1000**
Volume shown below was diluted to (mL): **1999.98** 5E-05 Balance Uncertainty
0.090 Flask Uncertainty

Formulated By: <i>Lawrence Barry</i>		020514
Reviewed By: <i>Pedro L. Rentas</i>		020514

MSDS Information

Compound	Part	Lot	Dilution	Initial	Uncertainty	Initial	Final	Expanded	(Solvent Safety Info. On Attached pg.)		NIST	
	Number	Number	Factor	Volume	Pipette	Conc. (µg/mL)	Conc. (µg/mL)	Uncertainty	CAS#	OSHA PEL (TVN)		LD50
1. Ammonium hexafluoroantimonate (Ti)	58122	111513	0.1000	200.0	0.013	10001.3	1000.1	0.00202	16962-40-6	N/A	N/A	3162a





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

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

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

(T) = Target analyte

Certified by:

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

Physical Characterization:

- * 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, (NIST Test #: 732/245/90).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: **58023**
Lot Number: **020514**
Description: **Vanadium (V)**

Lot #
C363101
Solvent: Nitric Acid

Expiration Date: 020517

2.0%

40.0 (ml)
Nitric Acid

Storage: 20 °C

Nominal Concentration (µg/ml): 1000

Volume shown below was diluted to (ml):

1999.78

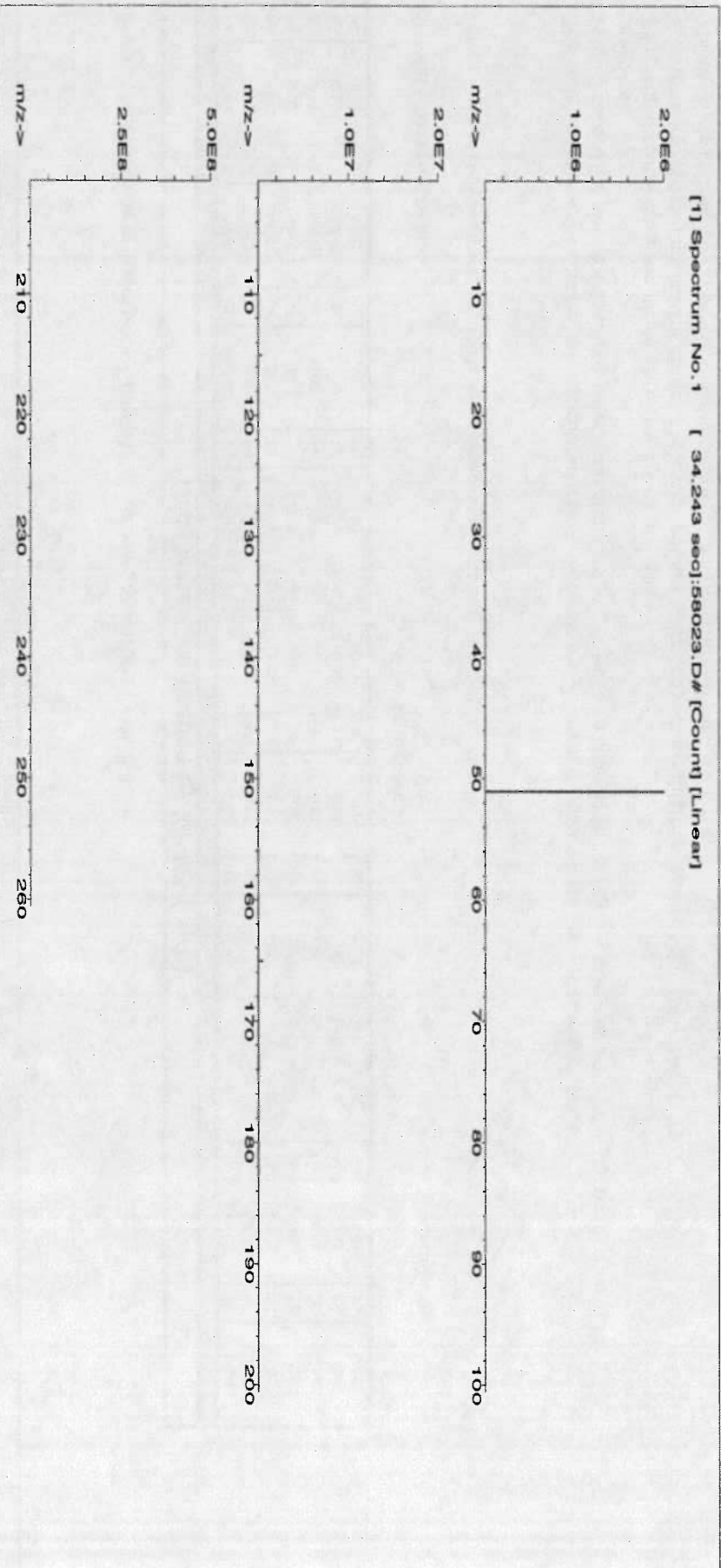
0.100

Balance Uncertainty
Flask Uncertainty

Formulated By:	Lawrence Barry	020514
Reviewed By:	Pedro L. Reritas	020514

MSDS Information

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Uncertainty	Initial Conc. (µg/ml)	Final Conc. (µg/ml)	Expanded Uncertainty	(Solvent Safety Info. On Attached pg.)	NIST SRM
1. Ammonium Metavanadate (V)	58123	042613	0.1000	200.0	0.013	10001.4	1000.2	0.00202	07803-55-6 1.0 mg/m3 or rat 630 mg/kg	3165





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

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

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

(T) = Target analyte

Certified by:

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

Physical Characterization:

- * 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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: **58047**
Lot Number: **020514**
Description: **Silver (Ag)**

Lot #
C363101
Solvent:
Nitric Acid

Expiration Date: 020517

2.0%

40.0 (mL)
Nitric Acid

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

Storage: 20 °C

Volume shown below was diluted to (mL):

1999.78

SE-05 Balance Uncertainty
0.100 Flask Uncertainty

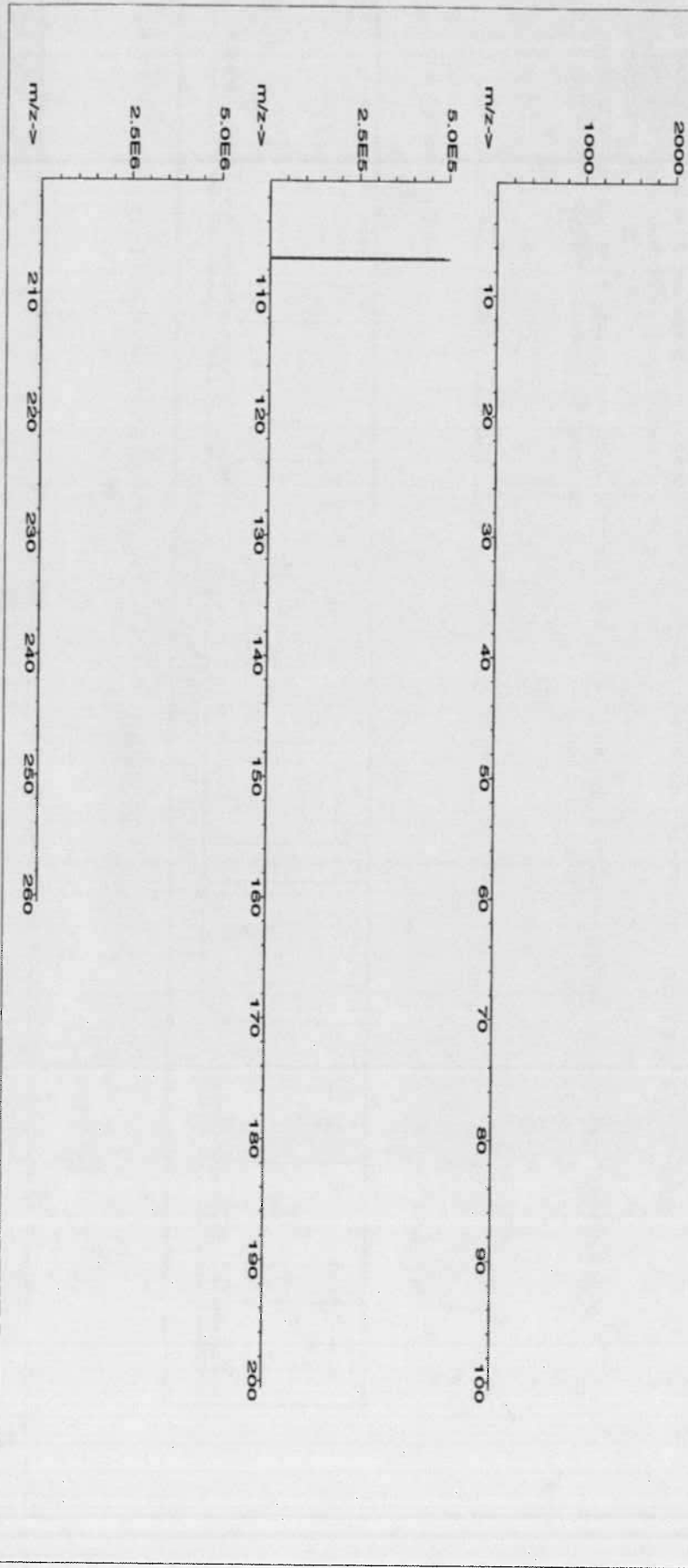
Formulated By:	Paul Barron	020514
Reviewed By:	Pedro L. Renteria	020514

MSDS Information

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

1. Silver nitrate (Ag)	58147	020514	0.1000	200.0	0.013	10002.5	1000.4	0.00201	07761-88-8	10 µg/m3	N/A	3151
------------------------	-------	--------	--------	-------	-------	---------	--------	---------	------------	----------	-----	------

[1] Spectrum No. 1 [10.014 sec]:58047.D# [Count] [Linear]





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

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

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

(T)= Target analyte

Certified by:

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

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: **58027**
Lot Number: **021814**
Description: **Cobalt (Co)**

Lot #
C363101

Solvent:
Nitric Acid

Expiration Date: 021817

2.0%

40.0 (mL)

Nitric Acid

Nominal Concentration (µg/mL): 1000

Storage: 20 °C

Volume shown below was diluted to (mL):

1999.98

0.090

Balance Uncertainty
Flask Uncertainty

Formulated By: <i>Gabriel Helland</i>	
Reviewed By: <i>Pedro L. Rentas</i>	Gabriel Helland
	021814
	021814

Compound

1. Cobalt nitrate Hexahydrate (Co) 58127 062113 0.1000 200.0 0.013 10001.1 1000.1 0.00205 10026-22-9 5 mg/m3 or/rat 694 mg/kg 3113

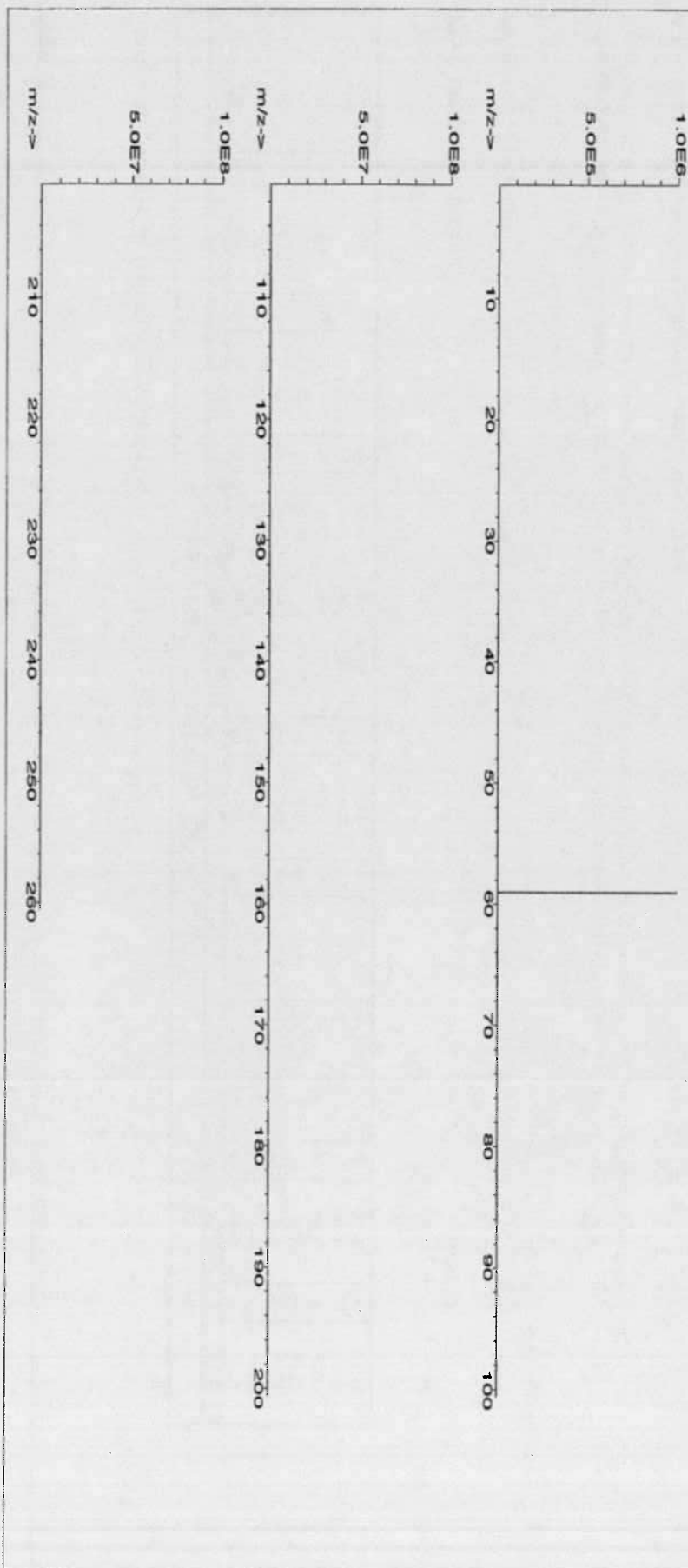
(+/-)

MSDS Information

(Solvent Safety Info. On Attached pg.)

NIST SRM

[1] Spectrum No. 1 [34.243 sec]:58027.D# [Count] [Linear]





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

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

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

(T) = Target analyte

Physical Characterization:

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

Certified by:

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: **58048**
Lot Number: **021914**
Description: **Cadmium (Cd)**

Lot #
C363101

Solvent:
Nitric Acid

Expiration Date: 021917

2.0%

40.0 (mL)

Nitric Acid

Nominal Concentration (µg/mL): 1000

Storage: 20 °C

Volume shown below was diluted to (mL): 1999.98

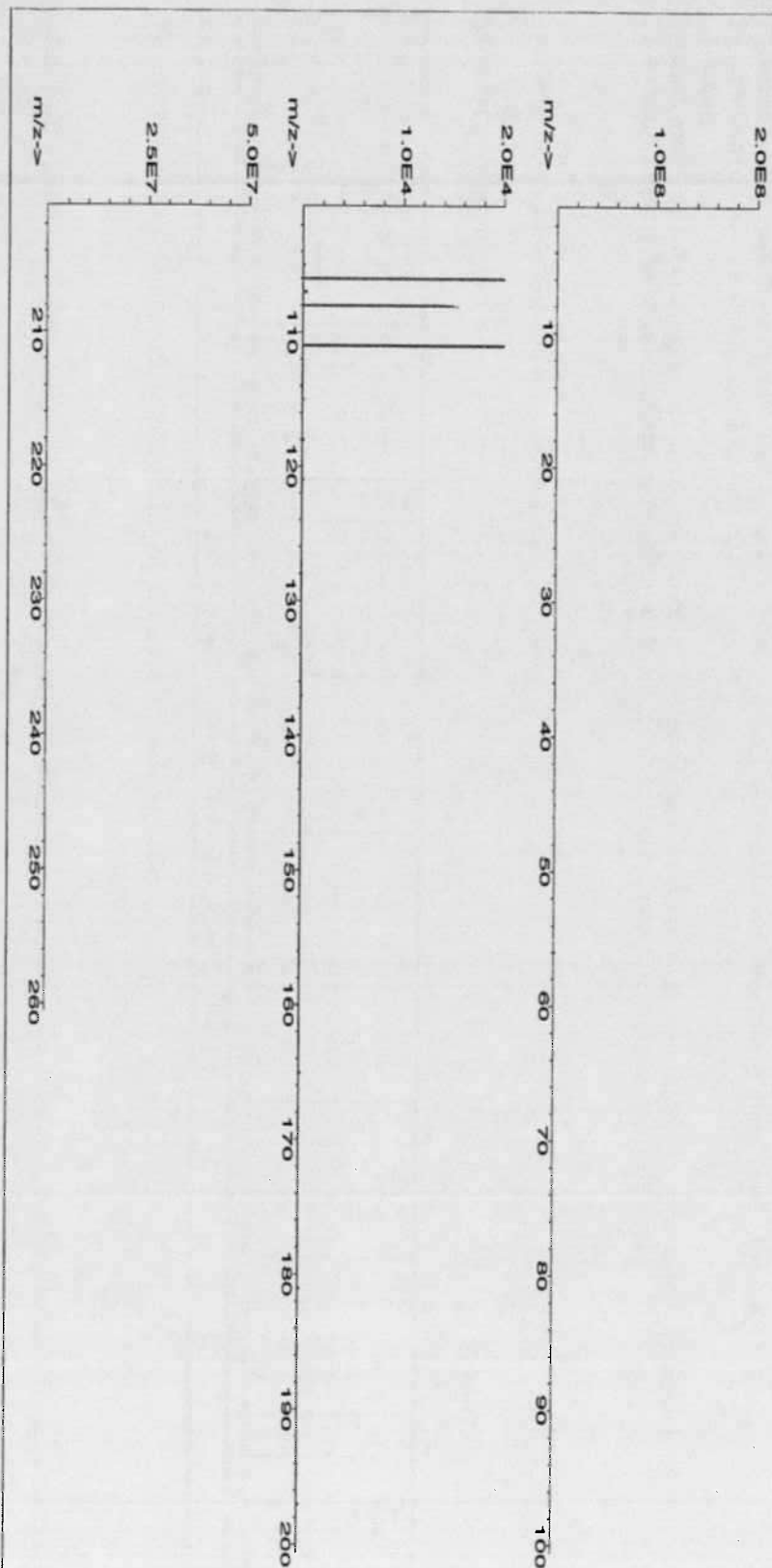
SE-05 Balance Uncertainty
0.090 Flask Uncertainty

Formulated By:	<i>Gabriel Heiland</i>
Reviewed By:	<i>Pedro L. Ruelas</i>
	Gabriel Heiland
	Pedro L. Ruelas
	021914

MSDS Information

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Uncertainty Pipette	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty (+/-)	(Solvent Safety Info. On Attached pg.)	NIST SRM
1. Cadmium nitrate tetrahydrate (Cd)	58148	042513	0.1000	200.0	0.013	10000.0	1000.0	0.00201	10022-68-1 0.2 mg/m3	N/A 3108

[1] Spectrum No. 1 [33.363 sec]:57048.D# [Count] [Linear]





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

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

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

(T)= Target analyte

Certified by:

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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: **58056**
Lot Number: **031714**
Description: **Barium (Ba)**

Lot #
C363101

Solvent:
Nitric Acid

Expiration Date: 031717

2.0%

40.0 (mL)

Nitric Acid

Nominal Concentration (µg/mL): 1000

Storage: 20 °C

Volume shown below was diluted to (mL):

1999.98

0.090

Balance Uncertainty
Flask Uncertainty

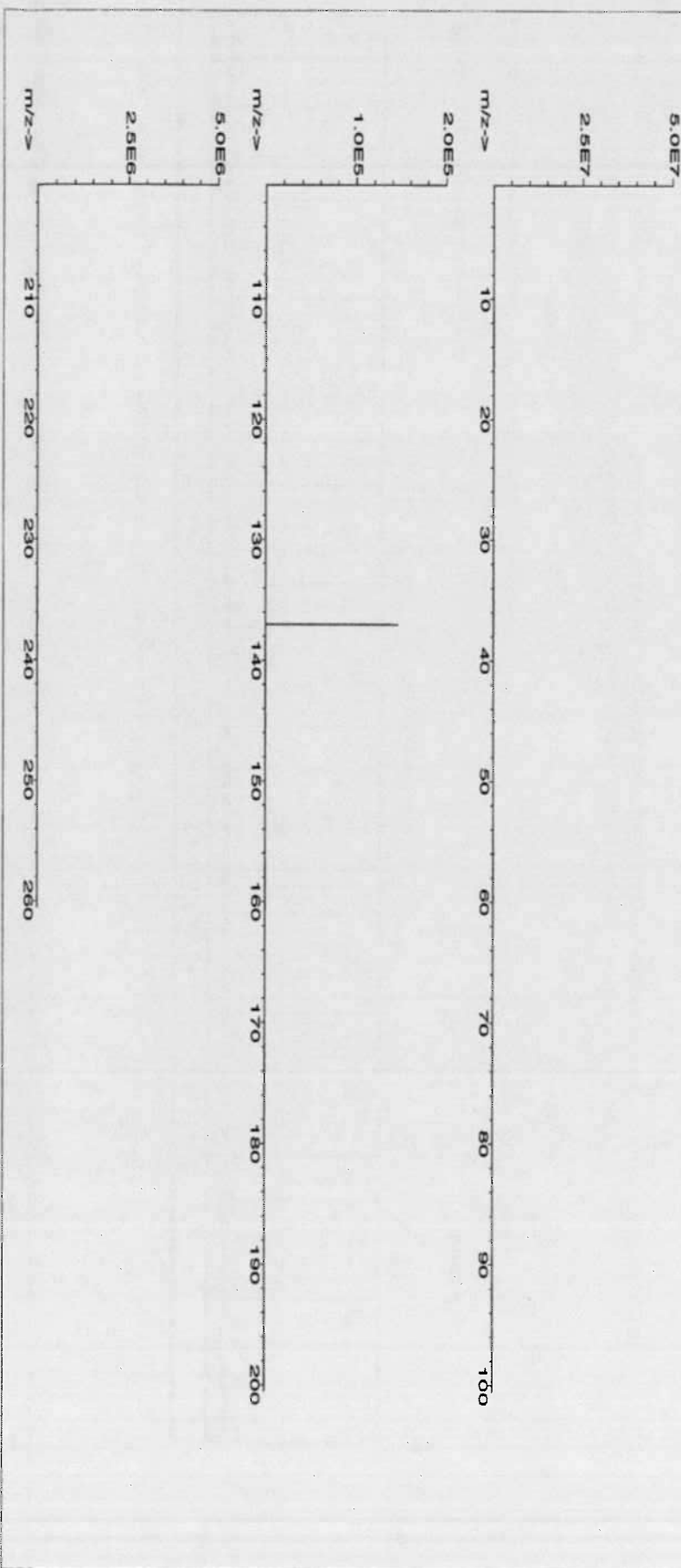
Formulated By:	Lawrence Barry	031714
Reviewed By:	Pedro L. Rentas	031714

MSDS Information

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

1. Barium nitrate (Ba) 58156 121013 0.1000 200.0 0.013 10001.4 1000.2 0.00201 10022-31-8 0.5 mg/m3 orat 355 mg/kg 3104e

[1] Spectrum No. 1 [19.234 sec]:57056Q.D# [Count] [Linear]





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

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

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

(T)= Target analyte

Physical Characterization:

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

Certified by:

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: **58024**
Lot Number: **032114**
Description: **Chromium (Cr)**

Lot # **C363101**
Solvent: **Nitric Acid**

Expiration Date: **032117**

2.0%

40.0 (mL)
Nitric Acid

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

Storage: **20 °C**

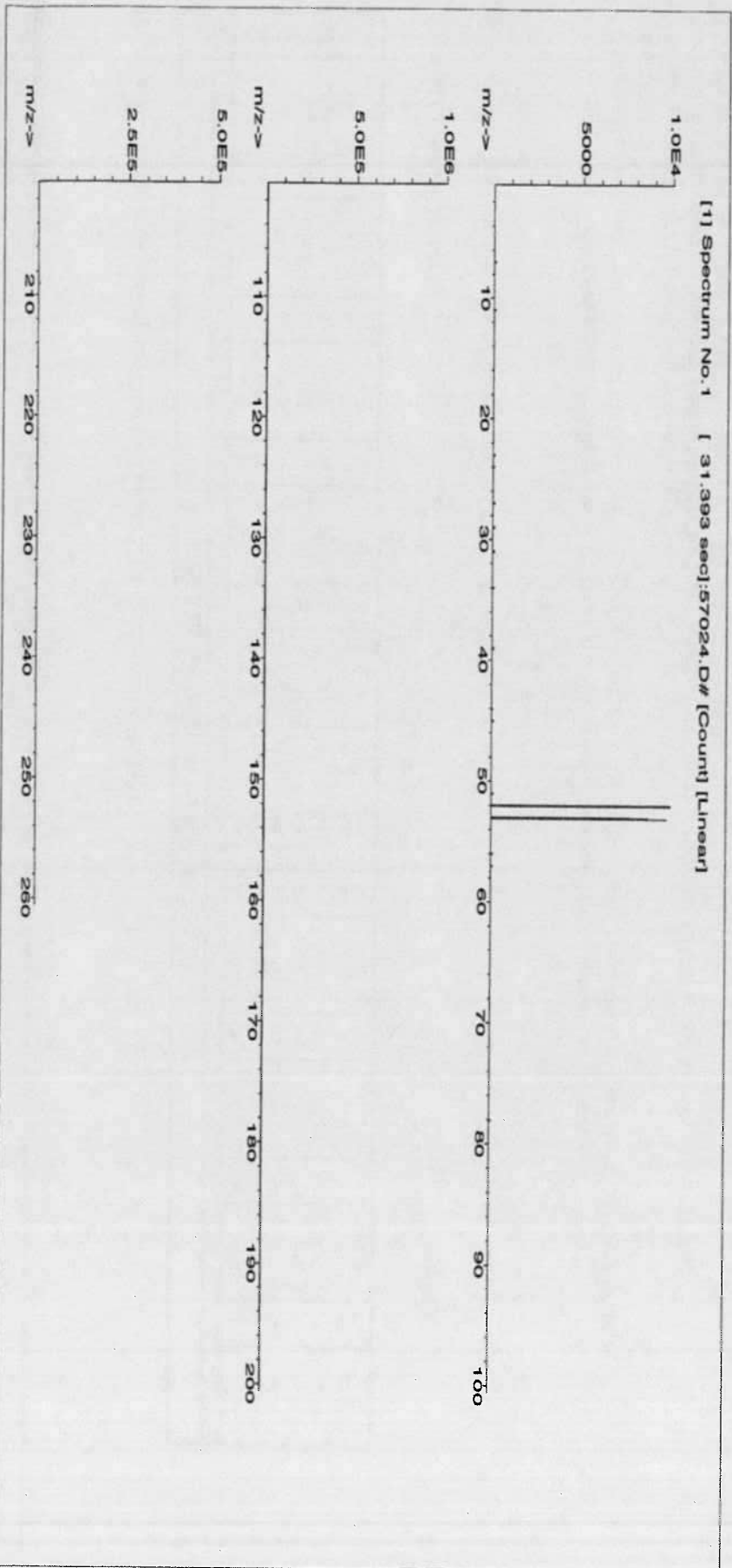
Volume shown below was diluted to (mL): **1999.98**

SE-05 Balance Uncertainty
0.090 Flask Uncertainty

<i>Lawrence Barry</i>	
Formulated By:	Lawrence Barry
Reviewed By:	<i>Pedro L. Rentias</i>
	032114

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Uncertainty Pipette	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty (+/-)	(Solvent Safety Info. On Attached pg.)	NIST SRM
----------	-------------	------------	-----------------	----------------	---------------------	-----------------------	---------------------	----------------------------	--	----------

1. Chromium (III) nitrate nonahydrate (Cr)	58124	100813	0.100	200.0	0.013	10001.3	1000.1	0.00201	07789-02-8 0.5 mg(Cr)/m3 off-rat 3250 mg/kg	3112a
--	-------	--------	-------	-------	-------	---------	--------	---------	---	-------





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

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

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

(T)= Target analyte

Certified by:

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

Physical Characterization:

- * 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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



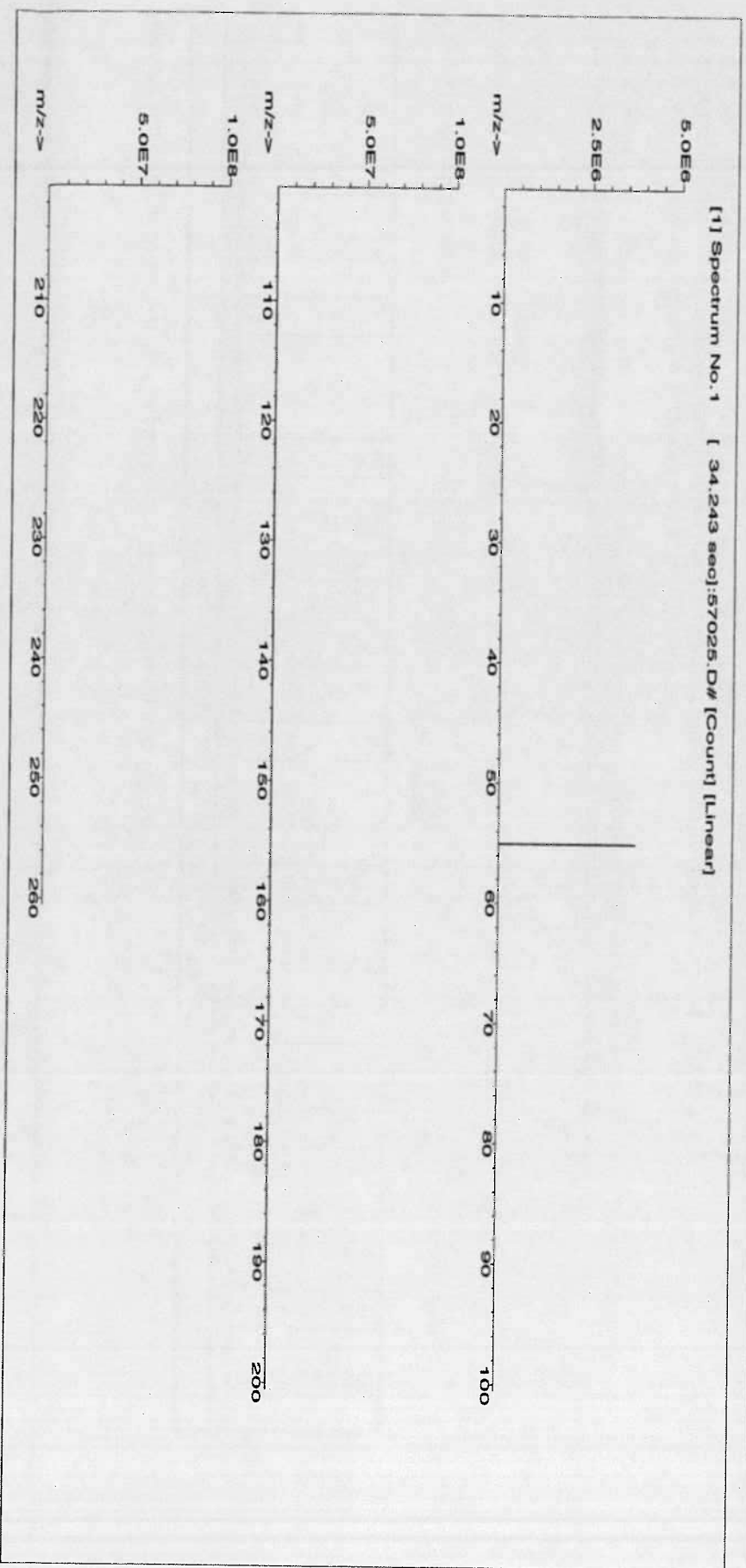
CERTIFIED WEIGHT REPORT:

Part Number: **58025** Lot # **C363101** Solvent: **Nitric Acid**
Lot Number: **121313** Description: **Manganese (Mn)** 2.0%
Expiration Date: **121316** Storage: **20 °C** 40.0 (mL)
Nominal Concentration (µg/mL): **1000** Nitric Acid
Volume shown below was diluted to (mL): **1999.98** SE-05 Balance Uncertainty
0.090 Flask Uncertainty

Formulated By: <i>Lawrence Barry</i>	
Reviewed By: <i>Pedro L. Renteria</i>	
121313	

MSDS Information

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Uncertainty Pipette	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty	CAS#	OSHA PEL (TWA)	LD50	SRM
Manganese (II) nitrate Hydrate (Mn)	58125	110513	0.1000	200.0	0.013	10001.0	1000.1	0.00201	15710-66-4	5 mg/m3	N/A	3132





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

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

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

(T) = Target analyte

Certified by:

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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: **58030**
Lot Number: **042914**
Description: **Zinc (Zn)**

Lot # **C363101**
Solvent: **Nitric Acid**

Expiration Date: **042917**

2.0%

40.0 (mL) Nitric Acid

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

Storage: 20 °C

Volume shown below was diluted to (mL): **1999.98**

5E-05 Balance Uncertainty
0.090 Flask Uncertainty

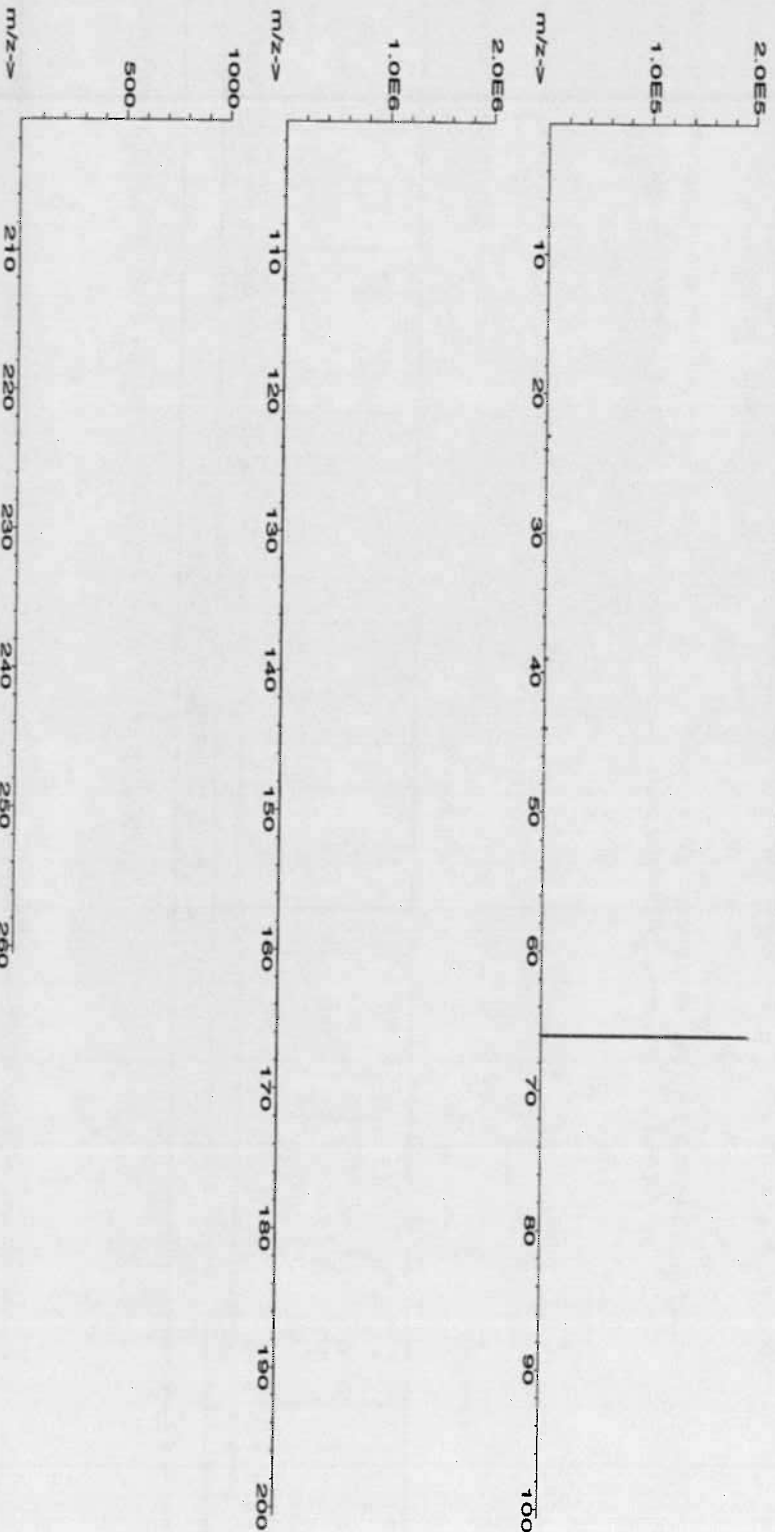
Formulated By:	Lawrence Barry	042914
Reviewed By:	Pedro L. Renteria	042914

MSDS Information

(Solvent Safety Info. On Attached pg.)

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Uncertainty Pipette	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty (+/-)	CAS#	OSHA PEL (TWA)	LDS#	NIST SRM
1. Zinc nitrate hydrate (Zn)	58130	042314	0.1000	200.0	0.013	10001.6	1000.2	0.00202	13778-30-8	1 mg/m3	or-rel 1190mg/kg	3168

[1] Spectrum No. 1 [32.814 sec]:57030.D# [Count] [Linear]





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

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

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

(T) = Target analyte

Certified by:

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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).

Analytical Standard Record
U.S.E.P.A Region 2 Laboratory
D4E0703

Description:	ICP Cal Blank/ICB/CCB	Expires:	05/07/2015
Standard Type:	Calibration Standard	Prepared:	05/07/2014
Solvent:	2% HNO3 + 5% HCL	Prepared By:	Rolando Recto
Final Volume (mls):	2500	Department:	Metals ESAT
Vials:	1	Last Edit:	05/07/2014 14:51 by RR

HCL D4A0704
HNO3 D3G1849

Analyte	CAS Number	Concentration	Units
Molybdenum	7439-98-7	0	ug/mL
Antimony	7440-36-0	0	ug/mL
Arsenic	7440-38-2	0	ug/mL
Barium	7440-39-3	0	ug/mL
Beryllium	7440-41-7	0	ug/mL
Boron	7440-42-8	0	ug/mL
Cadmium	7440-43-9	0	ug/mL
Calcium	7440-70-2	0	ug/mL
Chromium	7440-47-3	0	ug/mL
Cobalt	7440-48-4	0	ug/mL
Copper	7440-50-8	0	ug/mL
Iron 2599R	7439-89-6	0	ug/mL
Lead	7439-92-1	0	ug/mL
Aluminum 3961R	7429-90-5	0	ug/mL
Manganese	7439-96-5	0	ug/mL
Zinc	7440-66-6	0	ug/mL
Nickel	7440-02-0	0	ug/mL
Potassium	7440-09-7	0	ug/mL
Selenium	7782-49-2	0	ug/mL
Silicon 2881A	7440-21-3	0	ug/mL
Silicon 2881R	7440-21-3	0	ug/mL
Silver	7440-22-4	0	ug/mL
Sodium	7440-23-5	0	ug/mL
Strontium		0	ug/mL
Thallium	7440-28-0	0	ug/mL
Tin	7440-31-5	0	ug/mL
Titanium	7440-32-6	0	ug/mL
Vanadium	7440-62-2	0	ug/mL
Magnesium	7439-95-4	0	ug/mL

Reviewed By

Date

Analytical Standard Record
U.S.E.P.A Region 2 Laboratory
D4E0703

Reviewed By

Date

Analytical Standard Record
U.S.E.P.A Region 2 Laboratory
D4E0704

Description:	ICP Cal Std Mid	Expires:	05/07/2015
Standard Type:	Calibration Standard	Prepared:	05/07/2014
Solvent:	ICP Blank Solution	Prepared By:	Rolando Recto
Final Volume (mls):	10000	Department:	Metals ESAT
Vials:	1	Last Edit:	05/07/2014 11:50 by RR

HCL D4A0704
HNO3 D3G1849

Analyte	CAS Number	Concentration	Units
Nickel	7440-02-0	0.5	ppm
Antimony	7440-36-0	0.5	ppm
Arsenic	7440-38-2	0.5	ppm
Barium	7440-39-3	0.5	ppm
Beryllium	7440-41-7	0.5	ppm
Boron	7440-42-8	0.5	ppm
Cadmium	7440-43-9	0.5	ppm
Calcium	7440-70-2	0.5	ppm
Chromium	7440-47-3	0.5	ppm
Cobalt	7440-48-4	0.5	ppm
Copper	7440-50-8	0.5	ppm
Iron	7439-89-6	0.5	ppm
Lead	7439-92-1	0.5	ppm
Magnesium	7439-95-4	0.5	ppm
Aluminum	7429-90-5	0.5	ppm
Silicon 2881R	7440-21-3	0.5	ppm
Vanadium	7440-62-2	0.5	ppm
Titanium	7440-32-6	0.5	ppm
Tin	7440-31-5	0.5	ppm
Thallium	7440-28-0	0.5	ppm
Strontium		0.5	ppm
Manganese	7439-96-5	0.5	ppm
Silver	7440-22-4	0.05	ppm
Molybdenum	7439-98-7	0.5	ppm
Silicon 2881A	7440-21-3	0.5	ppm
Silicon 2516A	7440-21-3	0.5	ppm
Silicon	7440-21-3	0.5	ppm
Selenium	7782-49-2	0.5	ppm
Potassium	7440-09-7	0.5	ppm
Zinc	7440-66-6	0.5	ppm

Reviewed By

Date

Analytical Standard Record
U.S.E.P.A Region 2 Laboratory
D4E0704

Sodium	7440-23-5	0.5	ppm
--------	-----------	-----	-----

Parent Standards used in this standard:						
Standard	Description	Prepared	Prepared By	Expires	Last Edit	(mls)
D1K1805	Silicon, Stock, 10,000 ppm	11/17/2011	** Vendor **	11/16/2014	09/12/2012 09:17 by RL	0.5
D1K1804	Tin, Stock, 1000 ppm	11/17/2011	** Vendor **	11/16/2014	11/18/2011 15:36 by RR	5
D1K1803	Strontium, Stock, 1000 ppm	11/17/2011	** Vendor **	11/16/2014	11/18/2011 15:35 by RR	5
D1K1802	Boron, Stock, 1000 ppm	11/17/2011	** Vendor **	11/16/2014	11/18/2011 15:31 by RR	5
D1K1806	ICP Stock I, Trace 500 mg/L	11/17/2011	** Vendor **	11/16/2014	11/18/2011 15:37 by RR	10
D3E0816	ICP Stock II, Salts 5000 mg/L	05/08/2013	** Vendor **	05/03/2016	05/19/2013 17:41 by MLS	1
D4B1115	ICP Stock III, Ag 1000 mg/L	02/11/2014	** Vendor **	02/05/2017	02/11/2014 15:08 by RR	0.5

Reviewed By	Date
-------------	------

Analytical Standard Record
U.S.E.P.A Region 2 Laboratory
D4E0705

Description:	ICP Cal Std High	Expires:	05/07/2015
Standard Type:	Calibration Standard	Prepared:	05/07/2014
Solvent:	ICP Blank Solution	Prepared By:	Rolando Recto
Final Volume (mls):	1000	Department:	Metals ESAT
Vials:	1	Last Edit:	05/07/2014 11:53 by RR

HCL D4A0704
HNO3 D3G1849

Analyte	CAS Number	Concentration	Units
Nickel	7440-02-0	10	ppm
Antimony	7440-36-0	10	ppm
Arsenic	7440-38-2	10	ppm
Barium	7440-39-3	10	ppm
Beryllium	7440-41-7	10	ppm
Boron	7440-42-8	10	ppm
Cadmium	7440-43-9	10	ppm
Calcium	7440-70-2	10	ppm
Chromium	7440-47-3	10	ppm
Cobalt	7440-48-4	10	ppm
Copper	7440-50-8	10	ppm
Iron	7439-89-6	10	ppm
Lead	7439-92-1	10	ppm
Magnesium	7439-95-4	10	ppm
Aluminum	7429-90-5	10	ppm
Silicon 2881R	7440-21-3	10	ppm
Vanadium	7440-62-2	10	ppm
Titanium	7440-32-6	10	ppm
Tin	7440-31-5	10	ppm
Thallium	7440-28-0	10	ppm
Strontium		10	ppm
Manganese	7439-96-5	10	ppm
Silver	7440-22-4	1	ppm
Molybdenum	7439-98-7	10	ppm
Silicon 2881A	7440-21-3	10	ppm
Silicon 2516A	7440-21-3	10	ppm
Silicon	7440-21-3	10	ppm
Selenium	7782-49-2	10	ppm
Potassium	7440-09-7	10	ppm
Zinc	7440-66-6	10	ppm

Reviewed By

Date

Analytical Standard Record
U.S.E.P.A Region 2 Laboratory
D4E0705

Sodium	7440-23-5	10	ppm
--------	-----------	----	-----

Parent Standards used in this standard:						
Standard	Description	Prepared	Prepared By	Expires	Last Edit	(mls)
D1K1806	ICP Stock I, Trace 500 mg/L	11/17/2011	** Vendor **	11/16/2014	11/18/2011 15:37 by RR	20
D1K1805	Silicon, Stock, 10,000 ppm	11/17/2011	** Vendor **	11/16/2014	09/12/2012 09:17 by RL	1
D1K1804	Tin, Stock, 1000 ppm	11/17/2011	** Vendor **	11/16/2014	11/18/2011 15:36 by RR	10
D1K1803	Strontium, Stock, 1000 ppm	11/17/2011	** Vendor **	11/16/2014	11/18/2011 15:35 by RR	10
D1K1802	Boron, Stock, 1000 ppm	11/17/2011	** Vendor **	11/16/2014	11/18/2011 15:31 by RR	10
D3E0816	ICP Stock II, Salts 5000 mg/L	05/08/2013	** Vendor **	05/03/2016	05/19/2013 17:41 by MLS	2
D4B1115	ICP Stock III, Ag 1000 mg/L	02/11/2014	** Vendor **	02/05/2017	02/11/2014 15:08 by RR	1

Reviewed By	Date
-------------	------

Analytical Standard Record
U.S.E.P.A Region 2 Laboratory
D4E0706

Description:	ICP ICV/CCV	Expires:	05/07/2015
Standard Type:	Calibration Standard	Prepared:	05/07/2014
Solvent:	ICP Blank Solution	Prepared By:	Rolando Recto
Final Volume (mls):	1000	Department:	Metals ESAT
Vials:	1	Last Edit:	05/07/2014 11:57 by RR

HCL D4A0704
HNO3 D3G1849

Analyte	CAS Number	Concentration	Units
Nickel	7440-02-0	0.2	ppm
Antimony	7440-36-0	0.2	ppm
Arsenic	7440-38-2	0.2	ppm
Barium	7440-39-3	0.2	ppm
Beryllium	7440-41-7	0.2	ppm
Boron	7440-42-8	0.2	ppm
Cadmium	7440-43-9	0.2	ppm
Calcium	7440-70-2	5	ppm
Chromium	7440-47-3	0.2	ppm
Cobalt	7440-48-4	0.2	ppm
Copper	7440-50-8	0.2	ppm
Iron	7439-89-6	5	ppm
Lead	7439-92-1	0.2	ppm
Magnesium	7439-95-4	5	ppm
Aluminum	7429-90-5	5	ppm
Silicon 2881R	7440-21-3	5	ppm
Vanadium	7440-62-2	0.2	ppm
Titanium	7440-32-6	0.2	ppm
Tin	7440-31-5	0.2	ppm
Thallium	7440-28-0	0.2	ppm
Strontium		0.2	ppm
Manganese	7439-96-5	0.2	ppm
Silver	7440-22-4	0.2	ppm
Molybdenum	7439-98-7	0.2	ppm
Silicon 2881A	7440-21-3	5	ppm
Silicon 2516A	7440-21-3	5	ppm
Silicon	7440-21-3	5	ppm
Selenium	7782-49-2	0.2	ppm
Potassium	7440-09-7	5	ppm
Zinc	7440-66-6	0.2	ppm

Reviewed By

Date

Analytical Standard Record
U.S.E.P.A Region 2 Laboratory
D4E0706

Sodium	7440-23-5	5	ppm
--------	-----------	---	-----

Parent Standards used in this standard:

Standard	Description	Prepared	Prepared By	Expires	Last Edit	(mls)
D3E0818	Boron, Stock, 1000 ppm	05/08/2013	** Vendor **	05/03/2016	05/19/2013 17:43 by MLS	0.2
D3E0819	Strontium, Stock, 1000 ppm	05/08/2013	** Vendor **	05/03/2016	05/19/2013 17:44 by MLS	0.2
D3E0820	Tin, Stock, 1000 ppm	05/08/2013	** Vendor **	05/03/2016	05/19/2013 17:46 by MLS	0.2
D3G1022	Silicon, Stock, 10,000 ppm	07/03/2013	** Vendor **	12/07/2015	07/10/2013 15:41 by RR	0.5
D4B1116	ICP Stock IV, Trace 100 mg/L	02/11/2014	** Vendor **	02/05/2017	02/11/2014 16:02 by RR	2
D4B1117	ICP Stock V, Salts 5000 mg/L	02/11/2014	** Vendor **	02/05/2017	02/11/2014 16:02 by RR	1
D4E0609	ICP Stock VI, Ag 1000 mg/L	05/06/2014	** Vendor **	02/05/2017	05/06/2014 16:16 by RR	0.2

Reviewed By

Date

Analytical Standard Record
U.S.E.P.A Region 2 Laboratory
D4E0707

Description:	ICP 100XRL	Expires:	05/07/2015
Standard Type:	Analyte Spike	Prepared:	05/07/2014
Solvent:	ICP Blank Solution	Prepared By:	Rolando Recto
Final Volume (mls):	250	Department:	Metals ESAT
Vials:	1	Last Edit:	05/07/2014 12:36 by RR

HCL D4A0704
HNO3 D3G1849

Analyte	CAS Number	Concentration	Units
Cadmium	7440-43-9	0.3	ppm
Aluminum	7429-90-5	10	ppm
Iron 2599R	7439-89-6	5	ppm
Iron 2599A	7439-89-6	5	ppm
Iron	7439-89-6	5	ppm
Copper	7440-50-8	1	ppm
Cobalt	7440-48-4	2	ppm
Magnesium	7439-95-4	50	ppm
Calcium	7440-70-2	50	ppm
Magnesium 2852	7439-95-4	50	ppm
Boron	7440-42-8	1	ppm
Beryllium	7440-41-7	0.3	ppm
Barium	7440-39-3	10	ppm
Arsenic	7440-38-2	0.8	ppm
Antimony	7440-36-0	2	ppm
Aluminum 3961R	7429-90-5	10	ppm
Aluminum 3961A	7429-90-5	10	ppm
Chromium	7440-47-3	0.5	ppm
Silicon 2881A	7440-21-3	50	ppm
Vanadium	7440-62-2	2	ppm
Titanium	7440-32-6	1	ppm
Tin	7440-31-5	1	ppm
Thallium	7440-28-0	2	ppm
Strontium		1	ppm
Sodium	7440-23-5	100	ppm
Lead	7439-92-1	0.8	ppm
Silicon 2881R	7440-21-3	50	ppm
Zinc	7440-66-6	2	ppm
Silicon 2516A	7440-21-3	50	ppm
Silicon	7440-21-3	50	ppm

Reviewed By

Date

Analytical Standard Record
U.S.E.P.A Region 2 Laboratory
D4E0707

Selenium	7782-49-2	2	ppm
Potassium	7440-09-7	50	ppm
Nickel	7440-02-0	2	ppm
Molybdenum	7439-98-7	1	ppm
Manganese	7439-96-5	0.5	ppm
Silver	7440-22-4	0.5	ppm

Parent Standards used in this standard:						
Standard	Description	Prepared	Prepared By	Expires	Last Edit	(mls)
D1K1804	Tin, Stock, 1000 ppm	11/17/2011	** Vendor **	11/16/2014	11/18/2011 15:36 by RR	0.25
D1K1803	Strontium, Stock, 1000 ppm	11/17/2011	** Vendor **	11/16/2014	11/18/2011 15:35 by RR	0.25
D1K1802	Boron, Stock, 1000 ppm	11/17/2011	** Vendor **	11/16/2014	11/18/2011 15:31 by RR	0.25
D1K1805	Silicon, Stock, 10,000 ppm	11/17/2011	** Vendor **	11/16/2014	09/12/2012 09:17 by RL	1.25
D2A3116	Selenium, Stock, 1000 ppm	01/31/2012	** Vendor **	01/21/2015	02/08/2012 14:18 by RR	0.5
D3E0817	Nickel. Stock, 1000 ppm	05/08/2013	** Vendor **	05/03/2016	05/19/2013 17:42 by MLS	0.5
D3K0717	Antimony. Stock, 1000 ppm	11/07/2013	** Vendor **	10/31/2016	11/07/2013 17:06 by RR	0.5
D3K0718	Copper, Stock, 1000 ppm	11/07/2013	** Vendor **	10/31/2016	11/07/2013 17:07 by RR	0.25
D3K0719	Thallium. Stock, 1000 ppm	11/07/2013	** Vendor **	10/31/2016	11/07/2013 17:08 by RR	0.5
D3E0810	Aluminum, Stock, 10,000 ppm	05/08/2013	** Vendor **	05/03/2016	05/17/2013 14:27 by MLS	0.25
D3E0811	Calcium, Stock, 10,000 ppm	05/08/2013	** Vendor **	05/03/2016	05/19/2013 17:34 by MLS	1.25
D3E0812	Iron, Stock, 10,000 ppm	05/08/2013	** Vendor **	05/03/2016	05/19/2013 17:36 by MLS	0.125
D3E0813	Potassium, Stock, 10,000 ppm	05/08/2013	** Vendor **	05/03/2016	05/19/2013 17:37 by MLS	1.25
D3E0814	Magnesium, Stock, 10,000 ppm	05/08/2013	** Vendor **	05/03/2016	02/24/2014 15:05 by WR	1.25
D3E0815	Sodium, Stock, 10,000 ppm	05/08/2013	** Vendor **	05/03/2016	05/19/2013 17:40 by MLS	2.5
D4B1115	ICP Stock III, Ag 1000 mg/L	02/11/2014	** Vendor **	02/05/2017	02/11/2014 15:08 by RR	0.125
D4B1118	Arsenic, Stock, 1000 ppm	02/11/2014	** Vendor **	02/05/2017	02/11/2014 15:11 by RR	0.2
D4B1119	Beryllium, Stock, 1000 ppm	02/11/2014	** Vendor **	02/05/2017	02/11/2014 15:12 by RR	0.075
D4B1120	Lead, Stock, 1000 ppm	02/11/2014	** Vendor **	02/05/2017	02/11/2014 15:13 by RR	0.2
D4B1121	Molybdenum, Stock, 1000 ppm	02/11/2014	** Vendor **	02/05/2017	02/11/2014 15:13 by RR	0.25
D4B1122	Titanium, Stock, 1000 ppm	02/11/2014	** Vendor **	02/05/2017	02/11/2014 15:14 by RR	0.25
D4B1123	Vanadium. Stock, 1000 ppm	02/11/2014	** Vendor **	02/05/2017	02/11/2014 15:15 by RR	0.5
D4E0610	Cobalt, Stock, 1000 ppm	05/06/2014	** Vendor **	02/18/2017	05/06/2014 16:16 by RR	0.5
D4E0611	Cadmium, Stock, 1000 ppm	05/06/2014	** Vendor **	02/19/2017	05/06/2014 16:17 by RR	0.075
D4E0612	Barium, Stock, 1000 ppm	05/06/2014	** Vendor **	03/17/2017	05/06/2014 16:17 by RR	2.5
D4E0613	Chromium, Stock, 1000 ppm	05/06/2014	** Vendor **	03/21/2017	05/06/2014 16:17 by RR	0.125
D4E0614	Manganese, Stock, 1000 ppm	05/06/2014	** Vendor **	12/13/2016	05/06/2014 16:17 by RR	0.125
D4E0616	Zinc, Stock, 1000 ppm	05/06/2014	** Vendor **	04/29/2017	05/06/2014 16:18 by RR	0.5

Reviewed By

Date

Analytical Standard Record
U.S.E.P.A Region 2 Laboratory
D4E0708

Description:	ICP RL (LCV1,LCV3)	Expires:	05/07/2015
Standard Type:	Calibration Standard	Prepared:	05/07/2014
Solvent:	2%HNO3, 5%HCL	Prepared By:	Rolando Recto
Final Volume (mls):	500	Department:	Metals ESAT
Vials:	1	Last Edit:	05/07/2014 12:38 by RR

HCL D4A0704
HNO3 D3G1849

Analyte	CAS Number	Concentration	Units
Cadmium	7440-43-9	0.003	ppm
Aluminum	7429-90-5	0.1	ppm
Iron 2599R	7439-89-6	0.05	ppm
Iron 2599A	7439-89-6	0.05	ppm
Iron	7439-89-6	0.05	ppm
Copper	7440-50-8	0.01	ppm
Cobalt	7440-48-4	0.02	ppm
Magnesium	7439-95-4	0.5	ppm
Calcium	7440-70-2	0.5	ppm
Magnesium 2852	7439-95-4	0.5	ppm
Boron	7440-42-8	0.01	ppm
Beryllium	7440-41-7	0.003	ppm
Barium	7440-39-3	0.1	ppm
Arsenic	7440-38-2	0.008	ppm
Antimony	7440-36-0	0.02	ppm
Aluminum 3961R	7429-90-5	0.1	ppm
Aluminum 3961A	7429-90-5	0.1	ppm
Chromium	7440-47-3	0.005	ppm
Silicon 2881A	7440-21-3	0.5	ppm
Vanadium	7440-62-2	0.02	ppm
Titanium	7440-32-6	0.01	ppm
Tin	7440-31-5	0.01	ppm
Thallium	7440-28-0	0.02	ppm
Strontium		0.01	ppm
Sodium	7440-23-5	1	ppm
Lead	7439-92-1	0.008	ppm
Silicon 2881R	7440-21-3	0.5	ppm
Zinc	7440-66-6	0.02	ppm
Silicon 2516A	7440-21-3	0.5	ppm
Silicon	7440-21-3	0.5	ppm

Reviewed By

Date

Analytical Standard Record
U.S.E.P.A Region 2 Laboratory
D4E0708

Selenium	7782-49-2	0.02	ppm
Potassium	7440-09-7	0.5	ppm
Nickel	7440-02-0	0.02	ppm
Molybdenum	7439-98-7	0.01	ppm
Manganese	7439-96-5	0.005	ppm
Silver	7440-22-4	0.005	ppm

Parent Standards used in this standard:						
Standard	Description	Prepared	Prepared By	Expires	Last Edit	(mls)
D4E0707	ICP 100XRL	05/07/2014	Rolando Recto	05/07/2015	05/07/2014 12:36 by RR	5

Reviewed By

Date

Analytical Standard Record
U.S.E.P.A Region 2 Laboratory
D4E0709

Description:	ICP 2RL (LCV2,LCV4)	Expires:	05/07/2015
Standard Type:	Calibration Standard	Prepared:	05/07/2014
Solvent:	2%HNO3, 5%HCL	Prepared By:	Rolando Recto
Final Volume (mls):	500	Department:	Metals ESAT
Vials:	1	Last Edit:	05/07/2014 12:38 by RR

HCL D4A0704
HNO3 D3G1849

Analyte	CAS Number	Concentration	Units
Cadmium	7440-43-9	0.006	ppm
Aluminum	7429-90-5	0.2	ppm
Iron 2599R	7439-89-6	0.1	ppm
Iron 2599A	7439-89-6	0.1	ppm
Iron	7439-89-6	0.1	ppm
Copper	7440-50-8	0.02	ppm
Cobalt	7440-48-4	0.04	ppm
Magnesium	7439-95-4	1	ppm
Calcium	7440-70-2	1	ppm
Magnesium 2852	7439-95-4	1	ppm
Boron	7440-42-8	0.02	ppm
Beryllium	7440-41-7	0.006	ppm
Barium	7440-39-3	0.2	ppm
Arsenic	7440-38-2	0.016	ppm
Antimony	7440-36-0	0.04	ppm
Aluminum 3961R	7429-90-5	0.2	ppm
Aluminum 3961A	7429-90-5	0.2	ppm
Chromium	7440-47-3	0.01	ppm
Silicon 2881A	7440-21-3	1	ppm
Vanadium	7440-62-2	0.04	ppm
Titanium	7440-32-6	0.02	ppm
Tin	7440-31-5	0.02	ppm
Thallium	7440-28-0	0.04	ppm
Strontium		0.02	ppm
Sodium	7440-23-5	2	ppm
Lead	7439-92-1	0.016	ppm
Silicon 2881R	7440-21-3	1	ppm
Zinc	7440-66-6	0.04	ppm
Silicon 2516A	7440-21-3	1	ppm
Silicon	7440-21-3	1	ppm

Reviewed By

Date

Analytical Standard Record
U.S.E.P.A Region 2 Laboratory
D4E0709

Selenium	7782-49-2	0.04	ppm
Potassium	7440-09-7	1	ppm
Nickel	7440-02-0	0.04	ppm
Molybdenum	7439-98-7	0.02	ppm
Manganese	7439-96-5	0.01	ppm
Silver	7440-22-4	0.01	ppm

Parent Standards used in this standard:						
Standard	Description	Prepared	Prepared By	Expires	Last Edit	(mls)
D4E0707	ICP 100XRL	05/07/2014	Rolando Recto	05/07/2015	05/07/2014 12:36 by RR	10

Reviewed By

Date

Analytical Standard Record
U.S.E.P.A Region 2 Laboratory
D4E0710

Description:	ICP IFA	Expires:	05/07/2015
Standard Type:	Calibration Standard	Prepared:	05/07/2014
Solvent:	ICP BLANK	Prepared By:	Rolando Recto
Final Volume (mls):	1000	Department:	Metals ESAT
Vials:	1	Last Edit:	05/07/2014 12:39 by RR

HCL D4A0704
HNO3 D3G1849

Analyte	CAS Number	Concentration	Units
Sodium	7440-23-5	300	mg/L
Magnesium 2852	7439-95-4	300	mg/L
Magnesium	7439-95-4	300	mg/L
Iron 2599R	7439-89-6	300	mg/L
Iron 2599A	7439-89-6	300	mg/L
Iron	7439-89-6	300	mg/L
Calcium	7440-70-2	300	mg/L
Aluminum 3961R	7429-90-5	300	mg/L
Aluminum 3961A	7429-90-5	300	mg/L
Aluminum	7429-90-5	300	mg/L

Parent Standards used in this standard:						
Standard	Description	Prepared	Prepared By	Expires	Last Edit	(mls)
D3E0810	Aluminum, Stock, 10,000 ppm	05/08/2013	** Vendor **	05/03/2016	05/17/2013 14:27 by MLS	30
D3E0811	Calcium, Stock, 10,000 ppm	05/08/2013	** Vendor **	05/03/2016	05/19/2013 17:34 by MLS	30
D3E0812	Iron, Stock, 10,000 ppm	05/08/2013	** Vendor **	05/03/2016	05/19/2013 17:36 by MLS	30
D3E0814	Magnesium, Stock, 10,000 ppm	05/08/2013	** Vendor **	05/03/2016	02/24/2014 15:05 by WR	30
D3E0815	Sodium, Stock, 10,000 ppm	05/08/2013	** Vendor **	05/03/2016	05/19/2013 17:40 by MLS	30

Reviewed By

Date

STANDARD & REAGENT PREPARATION LOG
USEPA REGION 2 LABORATORY
DEPARTMENT: **Metals ESAT**

Solution ID: **D4F3015**
Solution Name: **ICP Internal Std. + Modifier**
Preparer: **Rolando Recto**
Expiration Date: **06/30/2015**
Final Volume (ml): **2500**
Solvent/Lot #: **2%HNO3(D2L1218), 5%HCL(D3G1848)**
Date Prepared: **06/30/2014**

Source ID	Description	Vendor/Vendor Lot #	Initial Concentration ppm	Final Concentration ppm	Initial Aliquot (ml)
D3H0504	ICP Matrix Modifier, 5% Cesium	High Purity/1116106	50000	2000	100
D3K0720	Yttrium Stock 1000 ppm	Absolute/P58039L103113	1000	5	12.5



Reference Materials Producer
Cert #2495.01

SPEXertificate®

Certificate of Reference Material



Chemical Testing
Cert #2495.02

Catalog Number: ZEPANJ-17-500
Description: Custom Claritas Standard
Matrix: 5% HNO₃ / Tr. HF

Lot No. 7-88WL

This CLARITAS PPT® Certified Reference Material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICP-OES, DCP, AA, ICP-MS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

The CRM is prepared from high purity single element concentrates of individual elements using Class A laboratory ware to give precise concentrations.

Instrumental Analysis by ICP Spectrometer:

Analyte	Labeled	Uncertainty	SRM	Analyte	Labeled	Uncertainty	SRM
Al	250 µg/mL	±1 µg/mL	3101a*	Mg	250 µg/mL	±1 µg/mL	3131a*
Ca	250 µg/mL	±1 µg/mL	3109a*	Na	250 µg/mL	±1 µg/mL	3152a*
Fe	250 µg/mL	±1 µg/mL	3126a*	Si	250 µg/mL	±1 µg/mL	3150*
K	250 µg/mL	±1 µg/mL	3141a*				

* - indicates NIST SRM

† - indicates SPEX CertiPrep CRM (when NIST SRM is not available)

SPEX CertiPrep Reference Multi: Lot# ALL8

Trace Metallic Impurities in the Actual Solution via ICP-MS Analysis:

Element	µg/L	Element	µg/L	Element	µg/L	Element	µg/L	Element	µg/L	Element	µg/L
Ag	<3	Cs	<0.3	Ho	<0.1	Ni	<5	Sb	<2	Ti	<10
As	<4	Cu	<4	In	<1	P	<200	Sc	<30	Tl	<0.3
Au	<1	Dy	<0.6	Ir	<1	Pb	<0.4	Se	<60	Tm	<0.2
B	<10	Er	<0.01	La	<0.3	Pd	<0.8	Sm	<0.4	U	<0.5
Ba	<3	Eu	<0.1	Li	<2	Pr	<0.1	Sn	<2	V	<0.2
Be	<2	Ga	0.7	Lu	<0.01	Pt	<0.01	Sr	<0.7	W	<2
Bi	0.09	Gd	<0.3	Mn	<0.6	Rb	8	Ta	30	Y	<0.4
Cd	<0.09	Ge	<4	Mo	<0.01	Re	<0.2	Tb	<0.01	Yb	<0.5
Ce	<0.4	Hf	<0.01	Nb	<2	Rh	<0.5	Te	<2	Zn	<10
Co	2	Hg	<0.9	Nd	<0.01	Ru	<0.7	Th	<0.5	Zr	<2
Cr	<0.5										

Balances are calibrated regularly with weight sets traceable to NIST#s 32856, 32867 and others. This CRM is guaranteed stable and accurate to ±0.5% of the labeled value. This includes uncertainty components due to preparation, measurement, homogeneity, short-term and long-term stability, as well as transpiration loss. This guarantee is valid for a period of one year from the date of certification only when the material is unopened and stored under ambient laboratory conditions.

Date of Certification:

AUG 2014

Certifying Officer:

Long Hui Fan

Report of Certification

This Certified Reference Material (CRM) has been prepared and certified under an ISO 9001:2008, ISO 17025:2005, and ISO Guide 34:2009 quality system consistent with the following guides:

- ISO 9001: Quality management systems – Requirements – certified by UL-DQS
- ISO 17025: General requirements for the competence of testing and calibration laboratories – accredited by A2LA
- ISO Guide 34: General requirements for the competence of reference material producers – accredited by A2LA
- ISO Guide 31: Reference Materials – Contents of certificates and labels
- ISO Guide 35: Reference Materials – General & Statistical Principles for Certification
- Guide To The Expression Of Uncertainty In Measurement 1997
- EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
- ASTM Guide D6362-98
- NIST Technical Note 1297
- ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
- ISO/REMCO N280

Material Source:

All analytes and matrix materials are obtained and verified by SPEX CertiPrep from pre-qualified vendors as per ISO 9001:2008, ISO 17025:2005, and ISO Guide 34:2009 guidelines. Vendor identifications are proprietary, however sources of all materials used in the preparation and testing of SPEX CertiPrep CRMs are tracked and documented. For further assistance, please contact the Sales Support Department at crmsales@spexcsp.com.

Instructions for Use:

Primary usage of this CRM is in neat form or diluted serially with matrix of a purity at or greater than the purity of the original matrix solution. If dilution is required the diluent must be compatible with all certified analytes and contain stabilizers appropriate for the period of intended use. The CRM can also be used as a spike or with a spike, again with appropriate compatibility considerations. All solutions should be thoroughly mixed, by shaking, prior to use and never pipetted directly from the bottle. All surfaces that come in contact with the solution must be thoroughly cleaned and leached prior to use. Dilutions should be performed only with Class A volumetric glassware.

Method of Preparation:

Clean laboratory procedures and techniques have been used throughout the preparation. All materials, equipment, analytical instrumentation and personnel have been qualified prior to use. The highest purity acids applicable, 18 megohm, double deionized water, acid-leached triple-rinsed bottles (where appropriate), and Class A/calibrated volumetrics have been used in all preparations.

Homogeneity:

The homogeneity of the CRM has been confirmed by procedures consistent with ISO 17025:2005, ISO Guide 34:2009, and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed to prove homogeneity in accordance with our internal procedure 4600-HOMOGEN-1A. Since the product is highly homogeneous, any sample size taken for analysis would be within the uncertainty budget. This is consistent with the intended use of the CRM.

Statistical Estimator and Confidence Limits:

The certified value 'X' listed on the reverse of this document is at the 95% level of confidence and can be expressed as:

- $X = x \pm U$ where X = certified value, U = expanded uncertainty, x = property value
- $U = k u_c$ where $k = 2$ is the coverage factor at the 95% confidence level
- u_c is obtained by combining the individual element standard uncertainty components u_i , and $u_c = \sqrt{\sum u_i^2}$

Certification Traveler Report:

All certified values reported were derived from the Traveler Report (SPEX CertiPrep's traceability documentation) identified by the lot number of this CRM. During the stated period of validity, the purchaser will be notified if this product is recalled due to any significant changes in the stability of the solution. For further assistance, please contact the Sales Support Department at crmsales@spexcsp.com.

Legal Notice:

SPEX CertiPrep reference materials are not for any cosmetic, drug or household application and are to be used only by qualified individuals who are trained in appropriate procedures. No claims against SPEX CertiPrep, Inc. of any kind whatsoever, whether based on breach of warranty, alleged negligence, or otherwise, with respect to this Reference Material shall be greater than the purchase price. In no event shall SPEX CertiPrep, Inc. be liable for any loss of profits or any incidental, special, or consequential damages.

STANDARD & REAGENT PREPARATION LOG
USEPA REGION 2 LABORATORY
DEPARTMENT: **Metals ESAT**

Solution ID: **D4I1108**
Solution Name: **ICP Internal Std. + Modifier**
Preparer: **Rolando Recto**
Expiration Date: **09/11/2015**
Final Volume (ml): **2500**
Solvent/Lot #: **2%HNO3(D4F2704), 5%HCL(D4F2703)**
Date Prepared: **09/11/2014**

Source ID	Description	Vendor/Vendor Lot #	Initial Concentration ppm	Final Concentration ppm	Initial Aliquot (ml)
D3H0504	ICP Matrix Modifier, 5% Cesium	High Purity/1116106	50000	2000	100
D3K0720	Yttrium Stock 1000 ppm	Absolute/P58039L103113	1000	5	12.5



Analytical Reference Material ARM

CERTIFIED WEIGHT REPORT:

Part Number: 57005
Lot Number: 111611
Description: Boron (B)
Expiration Date: 111614
Nominal Concentration (µg/mL): 1000

Lot # Y47057
Solvent(s): Ammonium hydroxide
2.0%
40.0 (mL)
Storage: 20 °C
5E-05 Balance Uncertainty
0.100 Flask Uncertainty

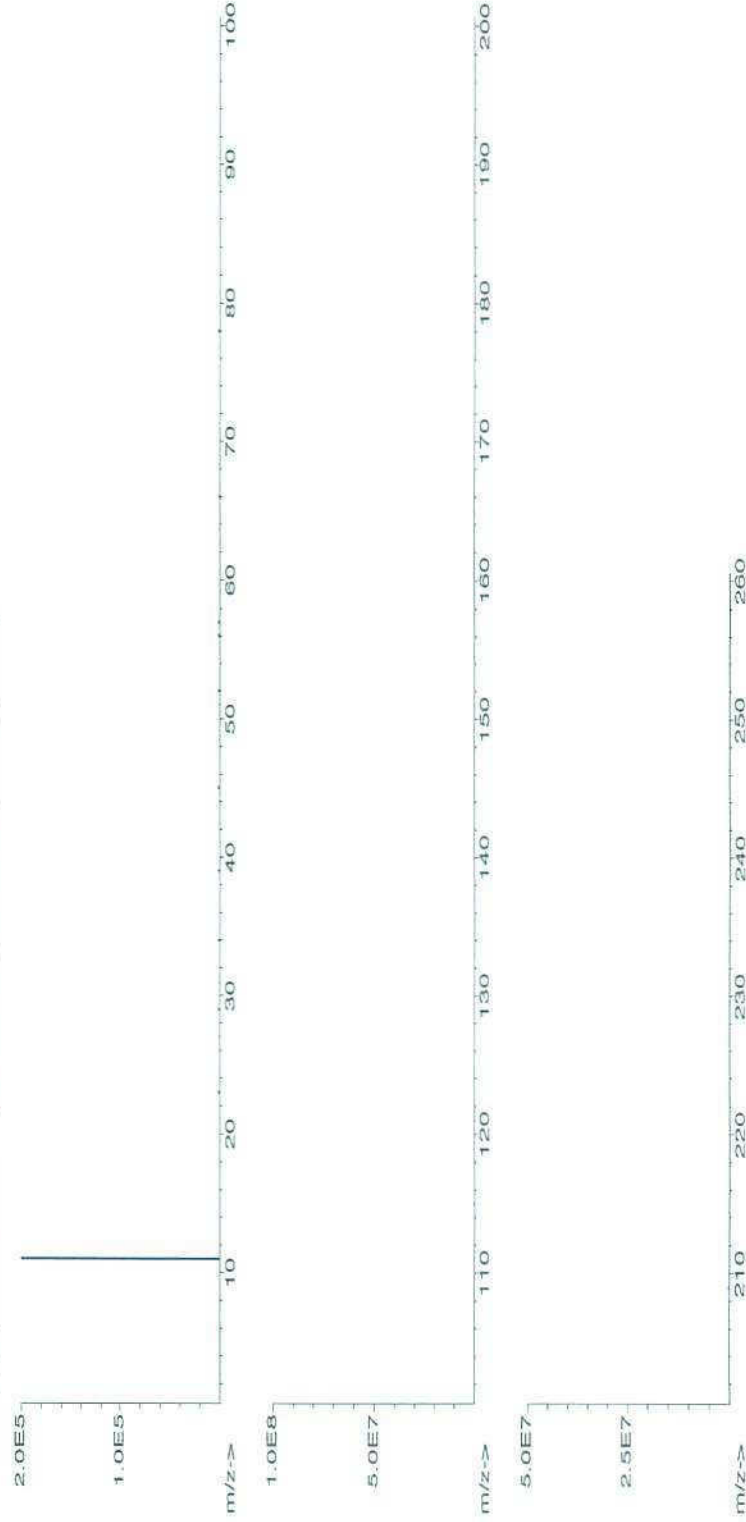
Formulated By:	Pat Scaturchio
Reviewed By:	Pedro L. Rentas
	111611

Volume shown below was diluted to (mL):

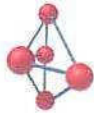
MSDS Information

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Initial Concentration (µg/mL)	Final Concentration (µg/mL)	Expanded Uncertainty (+/-)	(Solvent Safety Info. On Attached pg.)	CAS#	LD50	NIST SRM
1. Boric acid (B)	58105	031510	0.1000	200.0	10000.9	1000.2	0.00201	10043-35-3	N/A	orl-rat 2660mg/kg	3107

[1] Spectrum No. 1 [34.583 sec]:56005.D# [Count] [Linear]



- * 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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



Analytical Reference Material ARM

CERTIFIED WEIGHT REPORT:

Part Number: **57038**
Lot Number: **111611**
Description: **Strontium (Sr)**

Expiration Date: **111614**
Nominal Concentration (µg/mL): **1000**

Storage: **20 °C**
Solvent(s): **Nitric Acid**

Lot #: **C142199**
Formulated By: **Lawrence Barry**
Reviewed By: **Pedro L. Rentas**

Volume shown below was diluted to (mL): **1999.68**
Dilution Factor: **0.1000**
Initial Volume: **200.0**
Final Concentration: **1000.3**

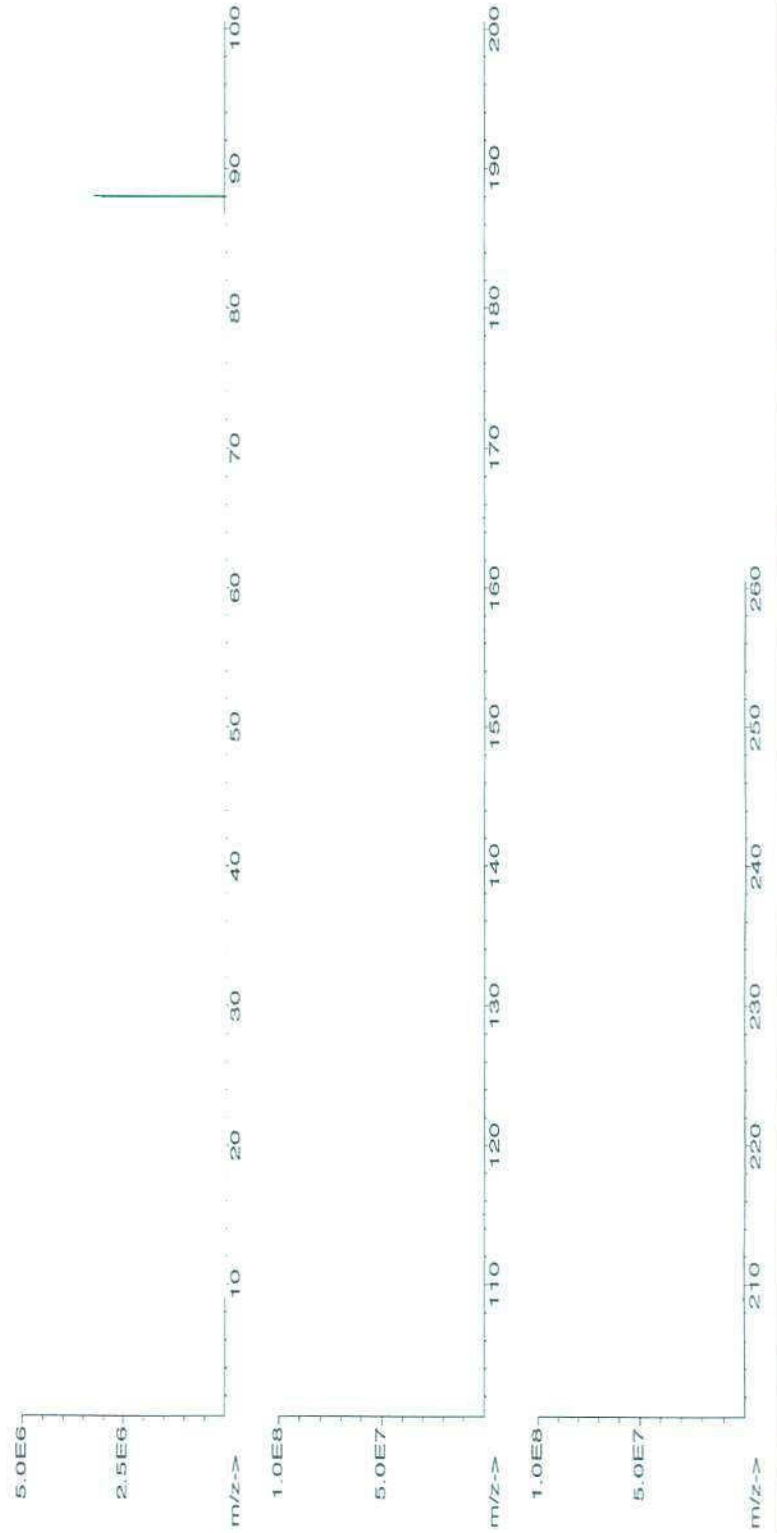
Balance Uncertainty: **5E-05**
Pipette Uncertainty: **0.100**

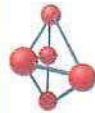
MSDS Information

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Uncertainty	Initial Concentration (µg/mL)	Final Concentration (µg/mL)	Expanded Uncertainty	(+/-)	CAS#	OSHA PEL (TWA)	LD50	(Solvent Safety Info. On Attached pg.)	NIST SRM
----------	-------------	------------	-----------------	----------------	-------------	-------------------------------	-----------------------------	----------------------	-------	------	----------------	------	--	----------

1. Strontium nitrate (Sr) 58138 040511 0.1000 200.0 0.013 10001.2 1000.3 0.00201 10042-76-9 N/A orl-rat 2750mg/kg 3153a

[1] Spectrum No. 1 [34.243 sec]:57038.D# [Count] [Linear]





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

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

(T)= Target analyte

Physical Characterization:

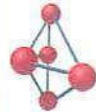
Analyzed Density of Solution (g/mL): 1.011

Temperature (°C): 19.0

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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



Analytical Reference Material ARM

CERTIFIED WEIGHT REPORT:

Part Number: **57050**
Lot Number: **111611**
Description: **Tin (Sn)**
Expiration Date: **111614**
Nominal Concentration (µg/mL): **1000**

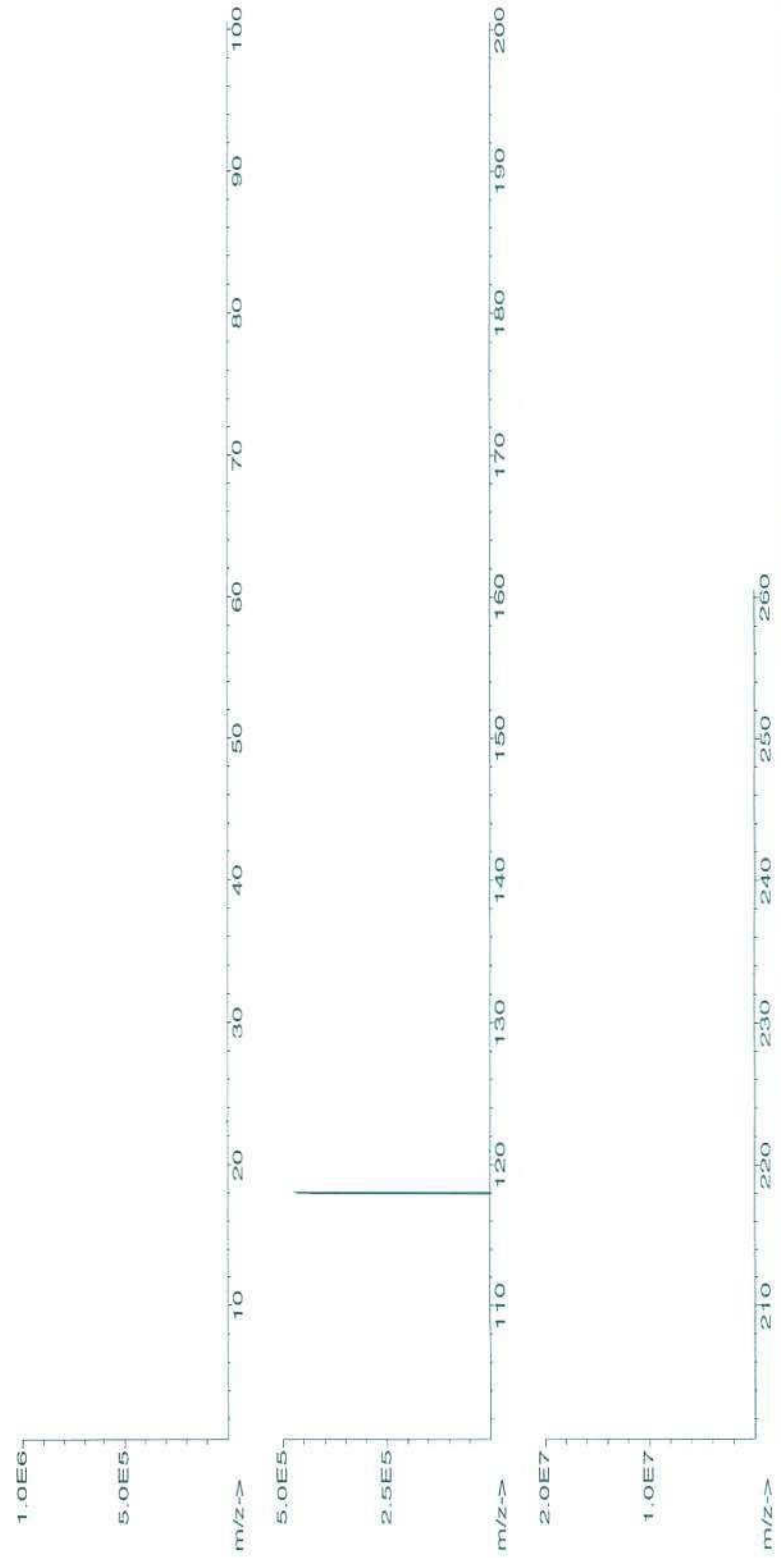
Lot # **C142199**
Solvent(s): **Nitric Acid**
TO3072
Hydrochloric acid
2.0%
6.0%
40.0
120.0
Nitric Acid
Hydrochloric acid
Storage: 20 °C
5E-05
Balance Uncertainty
0.100
Flask Uncertainty

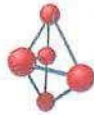
Volume shown below was diluted to (mL): **1999.68**

MSDS Information

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Initial Concentration (µg/mL)	Final Concentration (µg/mL)	Expanded Uncertainty (+/-)	(Solvent Safety Info. On Attached pq.)	CAS#	OSHA PEL (TWA)	LD50	NIST SRM
1. Ammonium hexafluorostannate (IV) (Sn)	58150	101411	0.1000	200.0	0.013	10001.8	0.00201	16919-24-7	7 mg/m3	N/A		3161a

[1] Spectrum No.1 [16.634 sec]:57050.D# [Count] [Linear]





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

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

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

(T)= Target analyte

Physical Characterization:

Analyzed Density of Solution (g/mL):

1.020

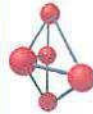
Temperature (°C):

21.2

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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



Analytical Reference Material ARM

CERTIFIED WEIGHT REPORT:

Part Number:
Lot Number:
Description:

56114
111611
Silicon (Si)

Expiration Date:
Nominal Concentration (µg/mL):

111614
10000

Storage: 20 °C

5E-05 Balance Uncertainty
0.100 Flask Uncertainty

Weight shown below was diluted to (mL):

1999.68

Solvent(s): C142199 Nitric Acid

2% 40.0 (mL) Nitric Acid

<i>Pat Scaturchio</i>	
Formulated By:	Pat Scaturchio
<i>Pedro L. Rentas</i>	
Reviewed By:	Pedro L. Rentas
111611	

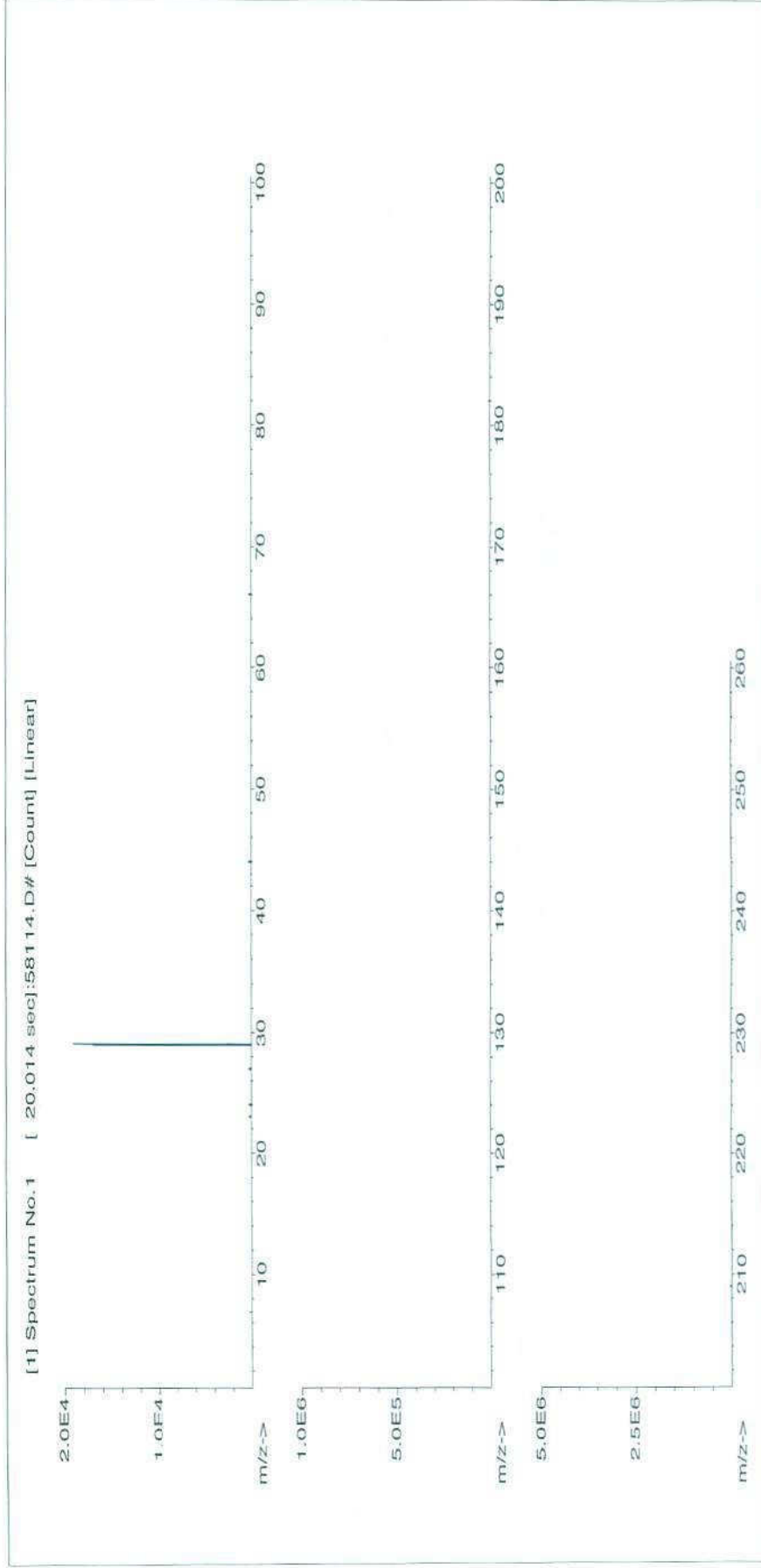
MSDS Information

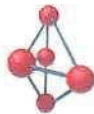
(Solvent Safety Info. On Attached pg.)
CAS# OSHA PEL (TWA) LD50

NIST
SRM

Compound	RM#	Lot Number	Nominal Conc. (µg/mL)	Purity	Uncertainty	Assay (%)	Target Weight (g)	Actual Weight (g)	Actual Conc. (µg/mL)	Expanded Uncertainty (+/-)	CAS#	OSHA PEL (TWA)	LD50	NIST	SRM
1. Ammonium hexafluorosilicate (Si)	IND09	CW709SIA1	10000.0	99.999	0.10	15.7	127.3696	127.3894	10001.6	0.00200	16919, 19, 0	N/A	N/A	N/A	N/A

[1] Spectrum No. 1 [20.014 sec]:58114.D# [Count] [Linear]





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

Trace Metals Verification by ICP-MS (µg/mL)																			
Al	0.44	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pr	<0.02	Se	<0.2	Tb	<0.02	W	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Ta	<0.02	Nb	<0.02	Re	<0.02	Si	*	Te	<0.02	U	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	<0.01	Os	<0.02	Rh	<0.02	Ag	<0.02	Ti	<0.02	V	<0.02
Ba	<0.02	Co	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Th	<0.02	Yb	<0.02
Be	<0.01	Cr	<0.02	Ga	2.90	Fe	<0.02	P	<0.2	Pt	<0.02	Ku	<0.02	Sr	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	Cu	<0.02	Ge	<0.02	La	<0.02	Hg	<0.02	K	<0.02	Mo	<0.02	S	<0.02	Sn	<0.02	Zn	<0.02
B	<0.02		<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02		<0.2	Sc	<0.02	Ta	<0.02	Tl	0.26	Zr	<0.02

(*) = Target Element

Physical Characterization:

Analyzed Density of Solution (g/mL): 1.038

Temperature (°C): 22.0

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, (NIST Test #: 732/245790).

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

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

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



CERTIFIED WEIGHT REPORT:

Part Number:

Lot Number:

Description:

17 Components

Expiration Date:

Nominal Concentration (µg/mL):

Lot #

C142199

J03A19

5.0%

Nitric Acid

Hydrofluoric acid

25.0

Nitric Acid

Trace

Hydrofluoric acid

(mL)

Storage:

20 °C

SE-05

Balance Uncertainty

0.100

Flask Uncertainty

499.90

Volumes shown below were diluted to (mL):

500

Formulated By:	Pat Scaturchio
Reviewed By:	Pedro L. Rentas
111611	

MSDS Information

(Solvent Safety Info. On Attached pg.)

NIST

SRM

Expanded

Uncertainty

(+/-)

Conc. (µg/mL)

Final

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Compound

Part

Lot

Number

Number

Dilution

Factor

Initial

Volume

Pipette

Uncertainty

Initial

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

Conc. (µg/mL)

1. Antimony Oxide (Sb) 58151 122810 0.0500 25.0 0.011 10005.0 500.4 0.00220 07440-36-0 5.0 mg/m3 N/A 3102a

2. Arsenic (As) 58133 102811 0.0500 25.0 0.011 10001.0 500.2 0.00220 07440-38-2 0.2 mg/m3 N/A 3103a

3. Barium nitrate (Ba) 58156 062210 0.0500 25.0 0.011 10001.6 500.2 0.00200 10022-31-8 0.5 mg/m3 orl-rat 355 mg/kg 3104a

4. Beryllium acetate (Be) 58104 030411 0.0500 25.0 0.011 10001.2 500.2 0.00201 19049-40-2 0.002 µg/m3 N/A 3105a

5. Cadmium nitrate tetrahydrate (Cd) 58148 080610 0.0500 25.0 0.011 10001.0 500.2 0.00200 10022-68-1 0.2 mg/m3 N/A 3108

6. Chromium (III) nitrate nonahydrate (Cr) 58124 100311 0.0500 25.0 0.011 10001.1 500.2 0.00200 07789-02-8 0.5 mg(Cr)/m3 orl-rat 3250 mg/kg 3112a

7. Cobalt nitrate Hexahydrate (Co) 58127 080210 0.0500 25.0 0.011 10001.3 500.2 0.00200 10026-22-9 5 mg/m3 orl-rat 694 mg/kg 3113

8. Copper (II) nitrate trihydrate (Cu) 58129 100311 0.0500 25.0 0.011 10001.1 500.2 0.00204 10031-43-3 N/A orl-rat 940 mg/kg 3114

9. Lead (II) Nitrate (Pb) 58182 062211 0.0500 25.0 0.011 10001.2 500.2 0.00200 10099-74-8 0.05 mg/m3 500 mg/kg 3128

10. Manganese (II) nitrate Hydrate (Mn) 58125 080911 0.0500 25.0 0.011 10001.2 500.2 0.00200 15710-66-4 5 mg/m3 N/A 3132

11. Ammonium molybdate (Mo) 58142 021811 0.0500 25.0 0.011 10001.0 500.2 0.00200 13106-76-8 5 mg(Mo)/m3 orl-rat 333 mg/kg 3134

12. Nickel nitrate (II) Hexahydrate (Ni) 58128 020911 0.0500 25.0 0.011 10002.3 500.2 0.00200 13478-00-7 1 mg/m3 orl-rat 1620 mg/kg 3136

13. Selenium (IV) oxide (Se) 58134 101110 0.0500 25.0 0.011 10000.5 500.1 0.00200 07746-08-4 0.2 mg/m3 N/A 3149

14. Thallium nitrate (Tl) 58181 052410 0.0500 25.0 0.011 10001.0 500.2 0.00200 10102-45-1 5 mg/m3 N/A 3158

15. Ammonium hexafluoroantimonate (Ti) 58122 061311 0.0500 25.0 0.011 10001.2 500.2 0.00201 16962-40-6 N/A N/A 3162a

16. Ammonium Metavanadate (V) 58123 010411 0.0500 25.0 0.011 10001.5 500.2 0.00201 07803-55-6 1.0 mg/m3 orl-rat 630 mg/kg 3165

17. Zinc nitrate (Zn) 58130 060711 0.0500 25.0 0.011 10001.1 500.2 0.00200 10196-18-6 1 mg/m3 orl-rat 1190mg/kg 3168



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

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

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

Physical Characterization:

Analyzed Density of Solution (g/mL): 1.059

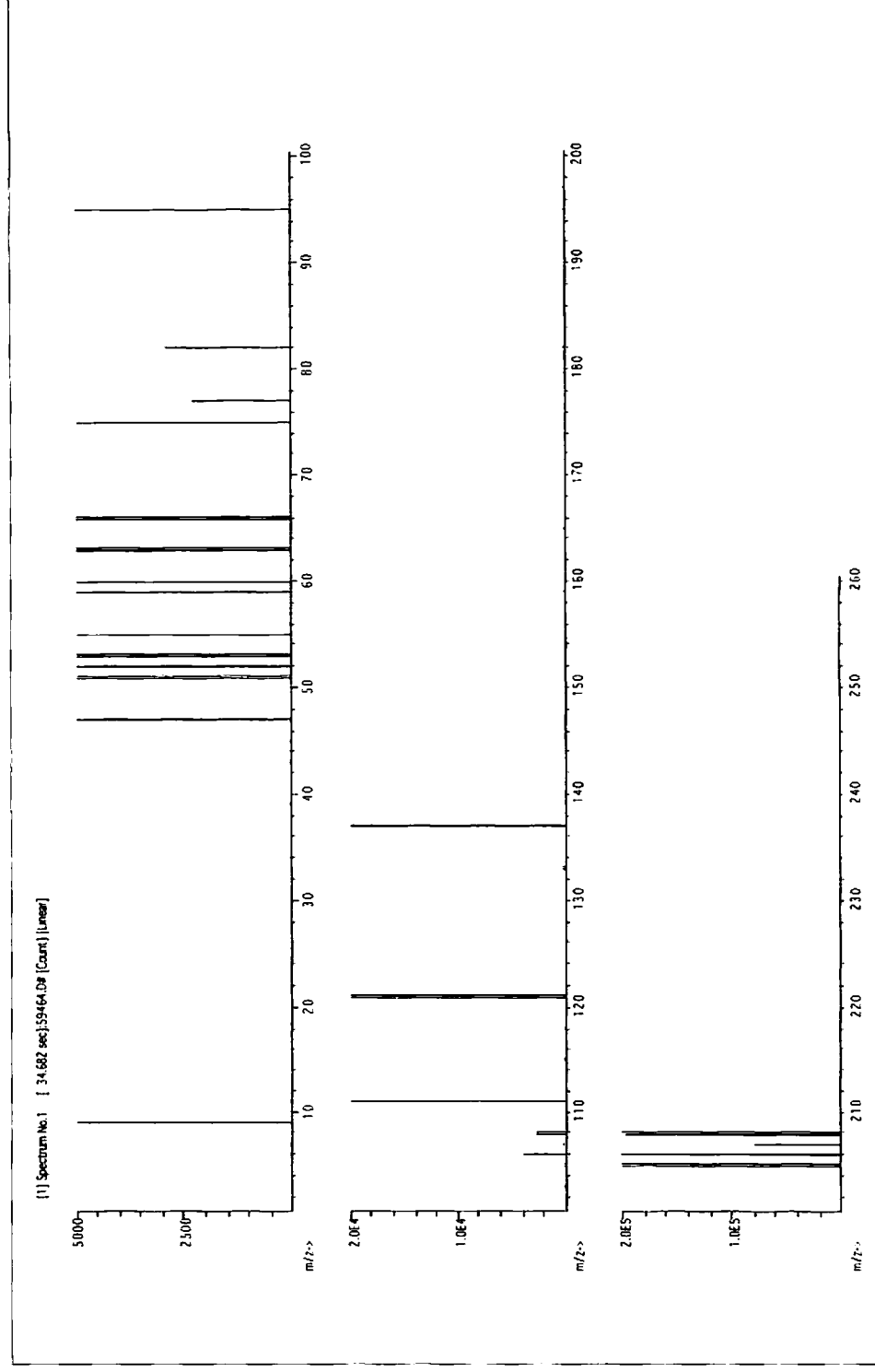
Temperature ($^{\circ}\text{C}$): 21.1

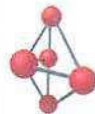
Homogeneity: No heterogeneity was observed in the preparation of this standard.

(*) = Target Element

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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).





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

Trace Metals Verification by ICP-MS (µg/mL)																	
Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Ho	<0.02	Li	<0.02	Ni	<0.02	Pr	<0.02	Se	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Os	<0.02	Ir	<0.02	La	<0.02	Nb	<0.02	Rh	<0.02	Si	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Fe	<0.02	Mg	<0.02	Os	<0.02	Rb	<0.02	Ag	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	<0.02	Ge	<0.02	Mn	<0.02	Pd	<0.02	Ru	<0.02	Na	<0.02
Be	<0.01	Cr	<0.02	Ga	<0.02	Fe	<0.02	Mo	<0.02	Hg	<0.2	P	<0.2	Sr	<0.02	Sr	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Pb	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	S	<0.02
B	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02			Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02

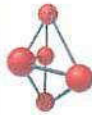
(T)= Target analyte

Physical Characterization:

Analyzed Density of Solution (g/mL): 1.011
Temperature (°C): 20.0
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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



Analytical Reference Material ARM

CERTIFIED WEIGHT REPORT:

Part Number: 58034
Lot Number: 012112
Description: Selenium (Se)

Expiration Date: 012115

Nominal Concentration (µg/mL): 1000

Storage: 20 °C

5E-05 Balance Uncertainty
0.100 Flask Uncertainty

Volume shown below was diluted to (mL): 1999.68

Lot # C142199
Solvent: Nitric Acid

2.0%
40.0 (mL)
Nitric Acid

	Formulated By:	Pat Scaturchio	012112
	Reviewed By:	Pedro L. Rentas	012112

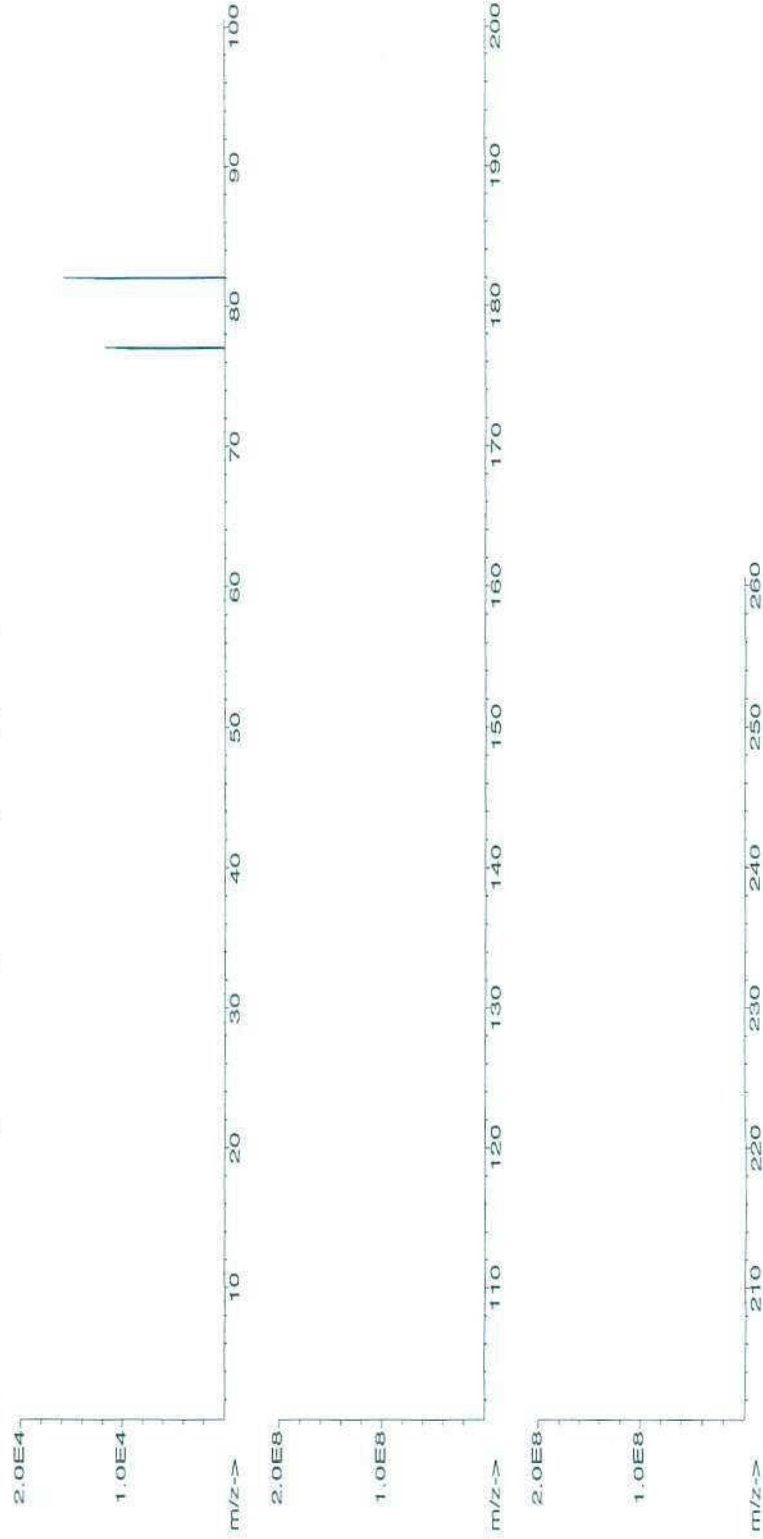
MSDS Information

NIST SRM

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

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Uncertainty Pipette	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty (+/-)	07746-08-4	0.2 mg/m3	N/A	3149
1. Selenium (IV) oxide (Se)	58134	101110	0.1000	200.0	0.013	10000.5	1000.2	0.00201				

[1] Spectrum No. 1 [33.702 sec]:58034.D# [Count] [Linear]





Analytical Reference Material ARM

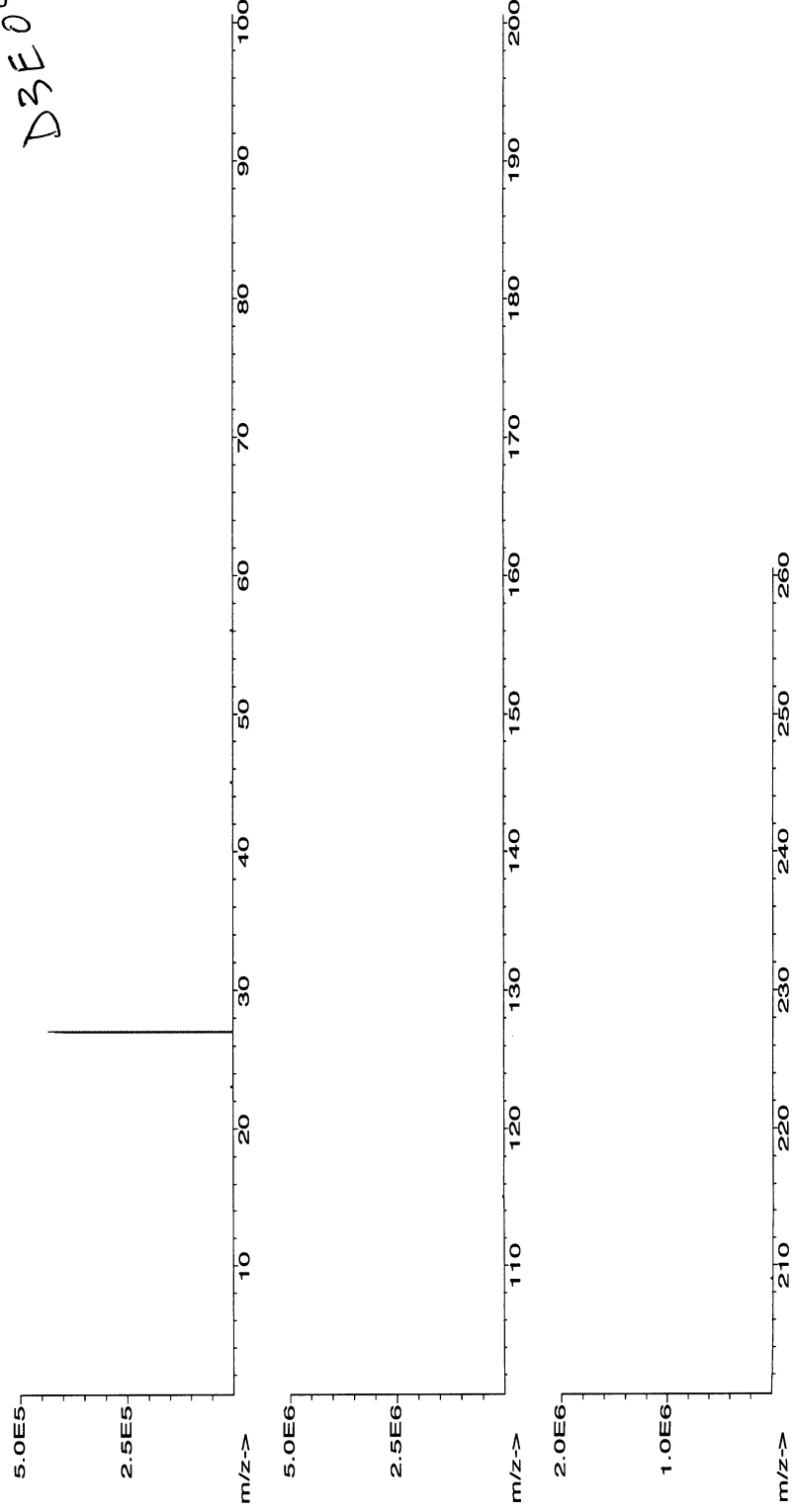
CERTIFIED WEIGHT REPORT:

Part Number: 58113
Lot Number: 050313
Description: Aluminum (Al)
Expiration Date: 050316
Nominal Concentration (µg/mL): 10000
Storage: 20 °C
Solvent: C257285 Nitric Acid
Lot #
Weight shown below was diluted to (mL): 1000.99
5E-05 Balance Uncertainty
0.100 Flask Uncertainty

<i>Gabriel Holland</i>	
Formulated By:	Gabriel Holland 050313
<i>Pedro L. Rentas</i>	
Reviewed By:	Pedro L. Rentas 050313

MSDS Information									
Compound	Lot Number	RM#	Nominal Conc. (µg/mL)	Purity	Uncertainty (%)	Assay	Target Weight (g)	Actual Weight (g)	Actual Conc. (µg/mL)
1. Aluminum Nitrate Nonahydrate (Al)	IN022	R1207ALAGR2	10000.0	99.995	0.10	7.10	140.9921	140.9939	10000.1
							0.00201	07784-27-2	5 mg/m3
							(±)		
							ori-rat 284 mg/kg 3101a		
							Expanded Uncertainty	CAS#	LD50
							OSHA PEL (TWA)		
							NIST SRM		

[1] Spectrum No. 1 [15.014 sec]:58113.D# [Count] [Linear]





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

Trace Metals Verification by ICP-MS (µg/L)												
Al	T	Cd	Dy	Hf	Li	Ni	Pr	Se	Tb	Te	W	<0.02
Sb	<0.02	Ca	Er	<0.02	Lu	<0.02	Re	Si	<0.2	<0.02	<0.02	<0.02
As	<0.2	Ce	Eu	<0.02	Mg	Os	Rh	Ag	<0.02	<0.02	U	<0.02
Ba	<0.02	Cs	Gd	<0.02	Mn	Pd	Rb	Na	<0.2	<0.02	Yb	<0.02
Be	<0.01	Cr	Ga	<0.02	Hg	P	Ru	Sr	<0.02	<0.02	Y	<0.02
Bi	<0.02	Co	Ge	<0.02	Mo	Pt	Sm	S	<0.02	<0.02	Zn	<0.02
B	<0.02	Cu	Au	<0.02	Nd	K	Sc	Ta	<0.02	<0.02	Zr	<0.02

(T)= Target analyte

Physical Characterization:

Certified by:

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

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: 58120 **Lot #** C257285 **Solvent:** Nitric Acid
Lot Number: 050313
Description: Calcium (Ca)
Expiration Date: 050316 **Storage:** 20 °C
Nominal Concentration (µg/mL): 10000
 5E-05 Balance Uncertainty
 0.100 Flask Uncertainty

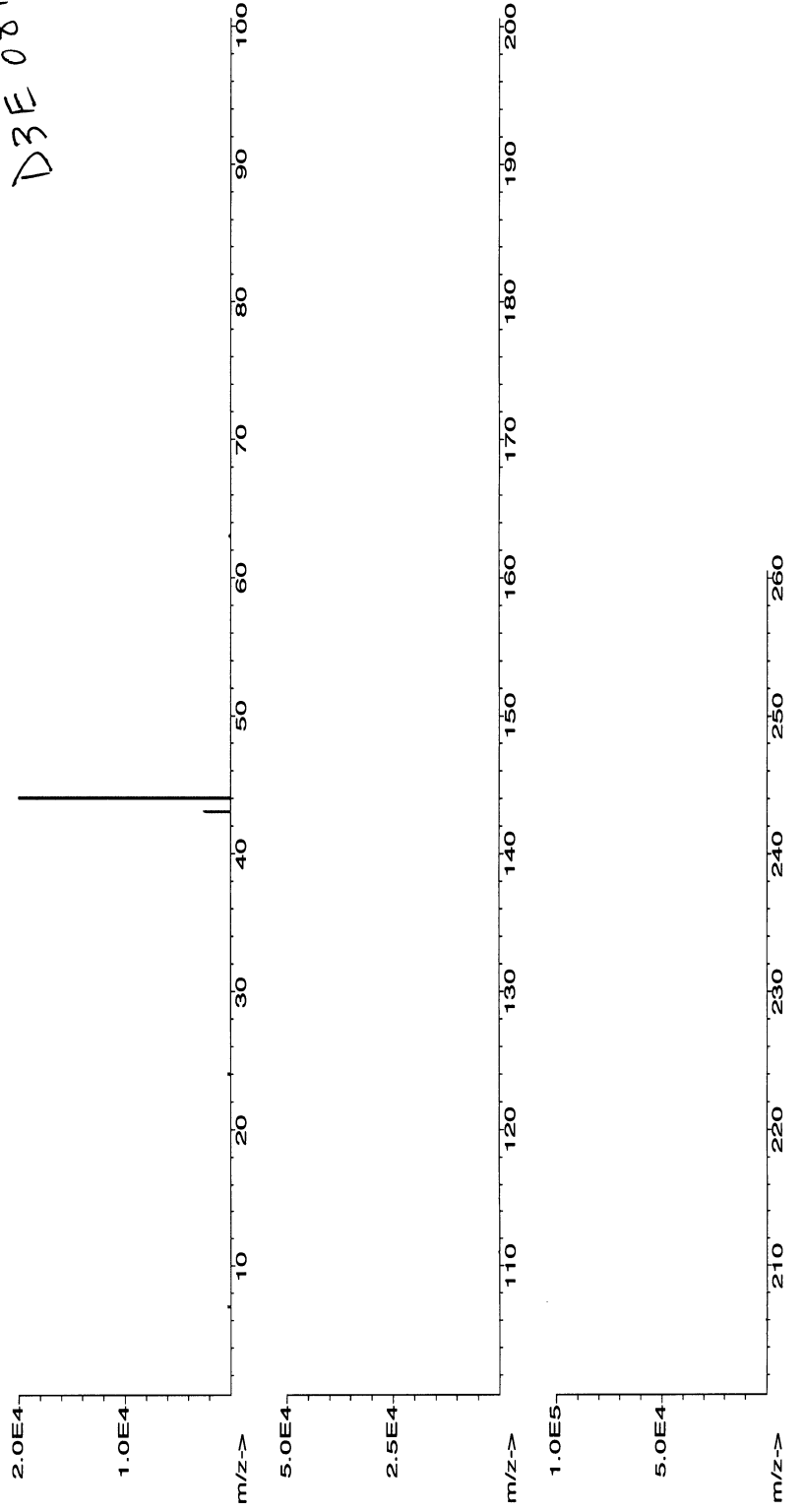
Weight shown below was diluted to (mL): 1999.68

MSDS Information

Compound	RM#	Lot Number	Nominal Conc. (µg/mL)	Purity	Uncertainty Assay (%)	Target Weight (g)	Actual Weight (g)	Actual Conc. (µg/mL)	Expanded Uncertainty (+/-)	CAS#	OSHA PEL (TWA)	LD50	(Solvent Safety Info. On Attached pg.)	NIST SRM
1. Calcium carbonate (Ca)	IN014	D212CAA1	10000.0	99.999	0.10	40.0	49.9926	49.9940	10000.3	0.00200	00471-34-1	7 mg/m3	N/A	3109a

<i>Gabriel Helland</i>	
Formulated By:	Gabriel Helland
050313	
<i>Pedro L. Rentas</i>	
Reviewed By:	Pedro L. Rentas
050313	

[1] Spectrum No. 1 [12.514 sec]:58120.D# [Count] [Linear]





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

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

Physical Characterization:

(T)= Target analyte

Certified by:

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

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: 58126
Lot Number: 050313
Description: Iron (Fe)
Expiration Date: 050316
Nominal Concentration (µg/mL): 10000

Lot # C257285
Solvent: Nitric Acid
5% Nitric Acid
Storage: 20 °C
5E-05 Balance Uncertainty
0.100 Flask Uncertainty

Weight shown below was diluted to (mL): 1999.68

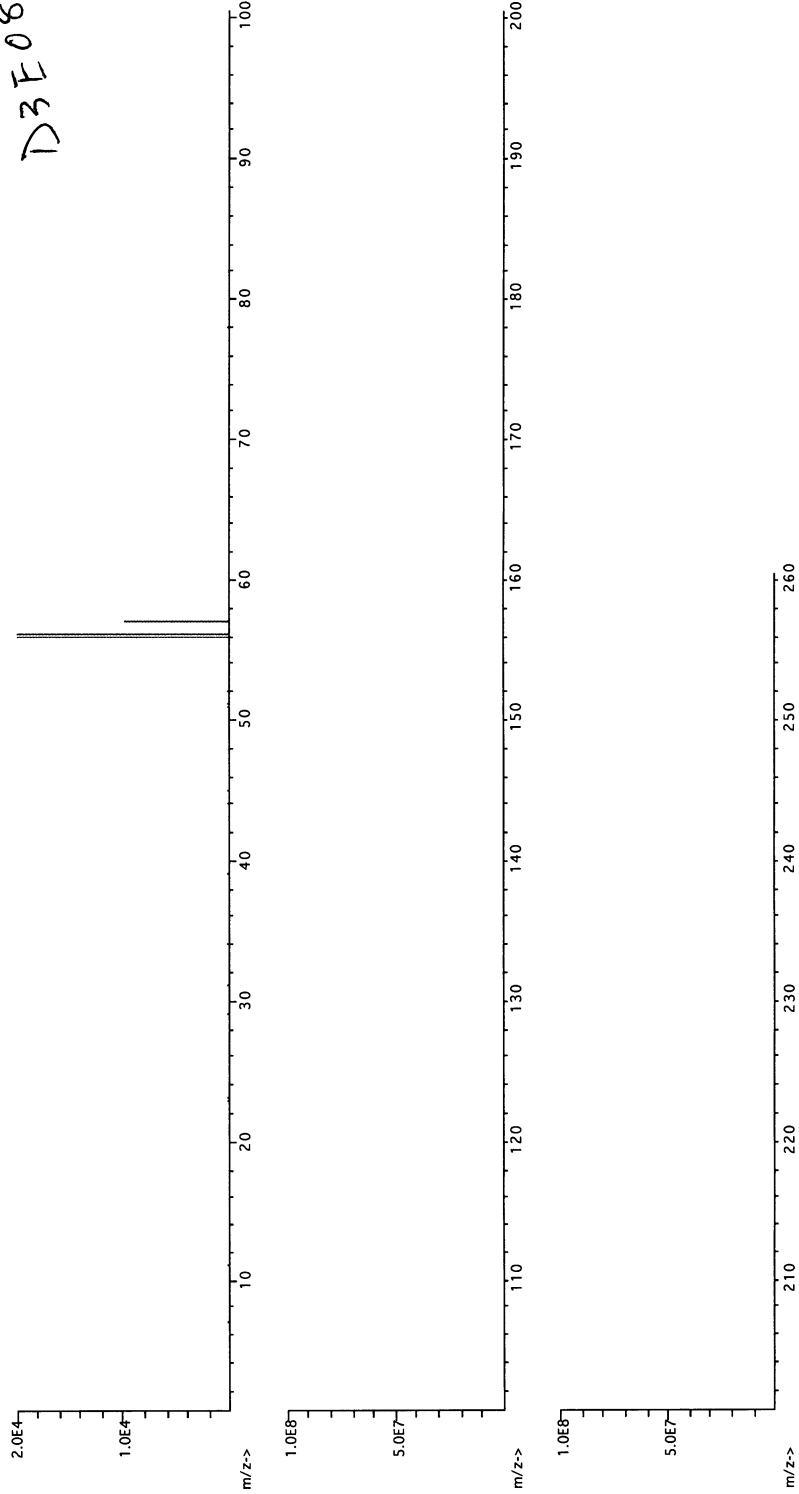
<i>Lawrence Barry</i>	
Formulated By:	Lawrence Barry
050313	
<i>Pedro L. Rentas</i>	
Reviewed By:	Pedro L. Rentas
050313	

MSDS Information

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

1. Iron (Fe)	IN346 AH14-157FEX	10000.0	99.999	0.10	100.0	19.9970	20.0030	10003.0	0.00200	07439-89-6	5 mg/m3	30 gm/kg	3126A
--------------	-------------------	---------	--------	------	-------	---------	---------	---------	---------	------------	---------	----------	-------

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





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

Trace Metals Verification by ICP-MS (µg/L)																	
Al	<0.5	Cd	<0.1	Dy	<0.12	Hf	<0.1	Li	<0.1	Ni	130	Pr	<0.1	Se	<0.5	Tb	<0.1
Sb	20	Ca	<5	Er	<0.1	Ho	<0.1	Lu	<0.1	Nb	<0.1	Re	<0.1	Si	<50	Te	<0.1
As	<0.3	Ce	<0.1	Eu	<0.1	In	<0.1	Mg	<3	Os	<0.1	Rh	<0.1	Ag	<0.1	Ti	<0.1
Ba	<0.1	Cs	<1	Gd	<0.1	Ir	<0.1	Mn	120	Pd	<0.1	Rb	<0.1	Na	<5	Th	<0.1
Be	<0.1	Cr	35	Ga	<0.1	Fe	T	Hg	<0.2	P	<0.1	Ru	<0.1	Sr	<0.1	Tm	<0.1
Bi	<0.1	Co	130	Ge	<0.1	La	<0.1	Mo	15	Pt	<0.1	Sm	<0.1	S	<5	Sn	<0.1
B	<5	Cu	<0.5	Au	<0.1	Pb	<0.3	Nd	<0.1	K	<5	Sc	<0.1	Ta	<0.1	Tl	<0.1
																W	<0.1
																U	<0.5
																V	<0.3
																Yb	<0.1
																Y	<0.1
																Zn	<10
																Zr	<0.1

(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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: 58119
Lot Number: 050313
Description: Potassium (K)
Expiration Date: 050316
Nominal Concentration (µg/mL): 10000
Storage: 20 °C
Solvent: C257285 Nitric Acid
Lot #
2% 40.0 Nitric Acid (mL)
5E-05 Balance Uncertainty
0.100 Flask Uncertainty

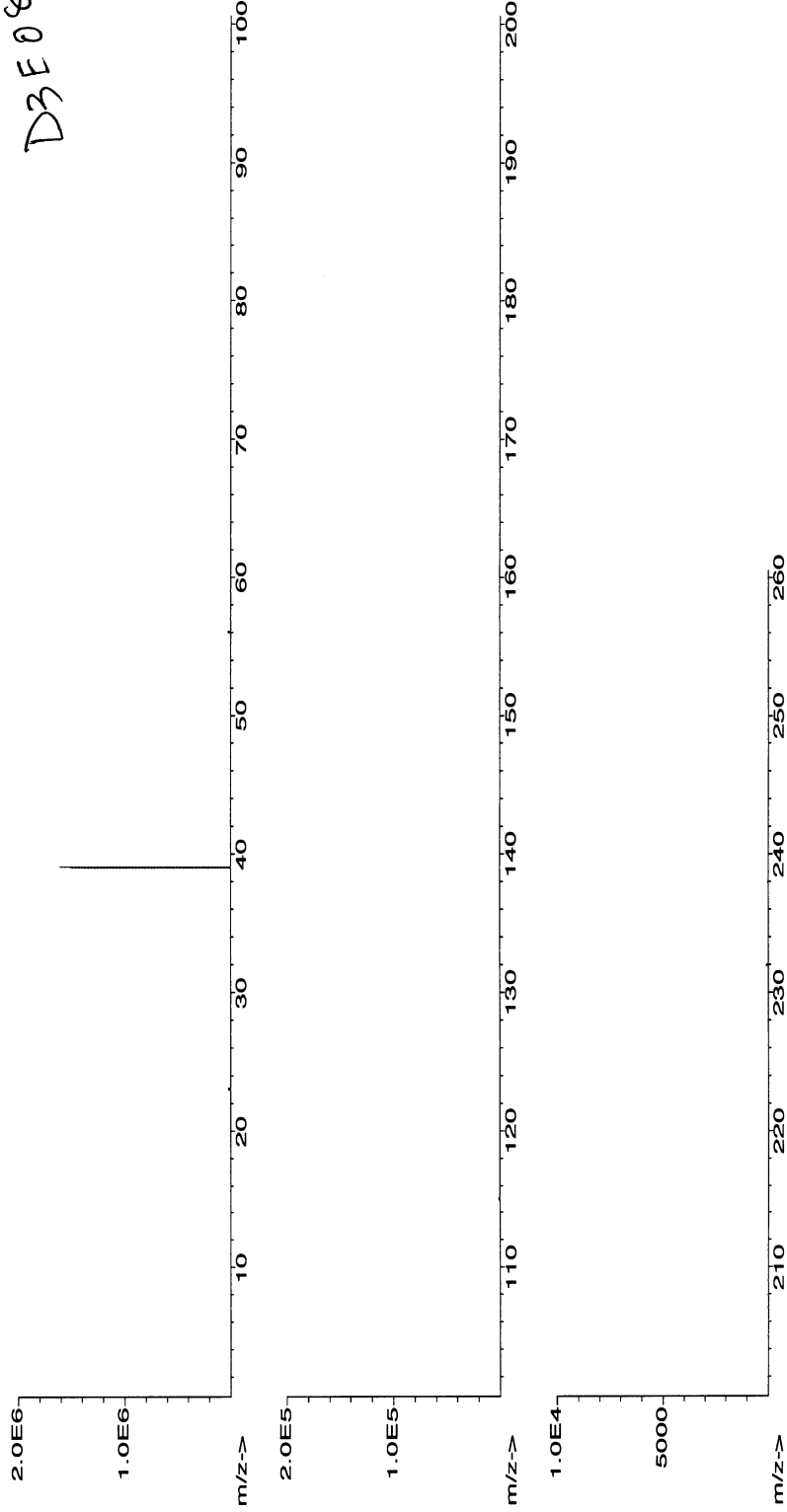
Weight shown below was diluted to (mL): 1999.68

MSDS Information

Compound	RM#	Lot Number	Nominal Conc. (µg/mL)	Purity	Uncertainty	Assay (%)	Target Weight (g)	Actual Weight (g)	Actual Conc. (µg/mL)	Expanded Uncertainty	CAS#	(Solvent Safety Info. On Attached pg.)	NIST
1. Potassium nitrate (K)	IN034	KB1011KA1	10000.0	99.999	0.10	38.7	51.6719	51.6784	10001.3	0.00200	07757-79-1	5 mg/m3 or-rat 3015 mg/kg 3141a	
										(+/-)			
											OSHA PEL (TWA)	LD50	SRM

<i>Lawrence Barry</i>	
Formulated By:	Lawrence Barry 050313
<i>Pedro L. Rentas</i>	
Reviewed By:	Pedro L. Rentas 050313

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





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

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

Physical Characterization:

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

(T)= Target analyte

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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: 58112
Lot Number: 050313
Description: Magnesium (Mg)
Expiration Date: 050316
Nominal Concentration (µg/mL): 10000
Storage: 20 °C
Solvent: C257285 Nitric Acid
2% 40.0 (mL) Nitric Acid
5E-05 Balance Uncertainty
0.100 Flask Uncertainty

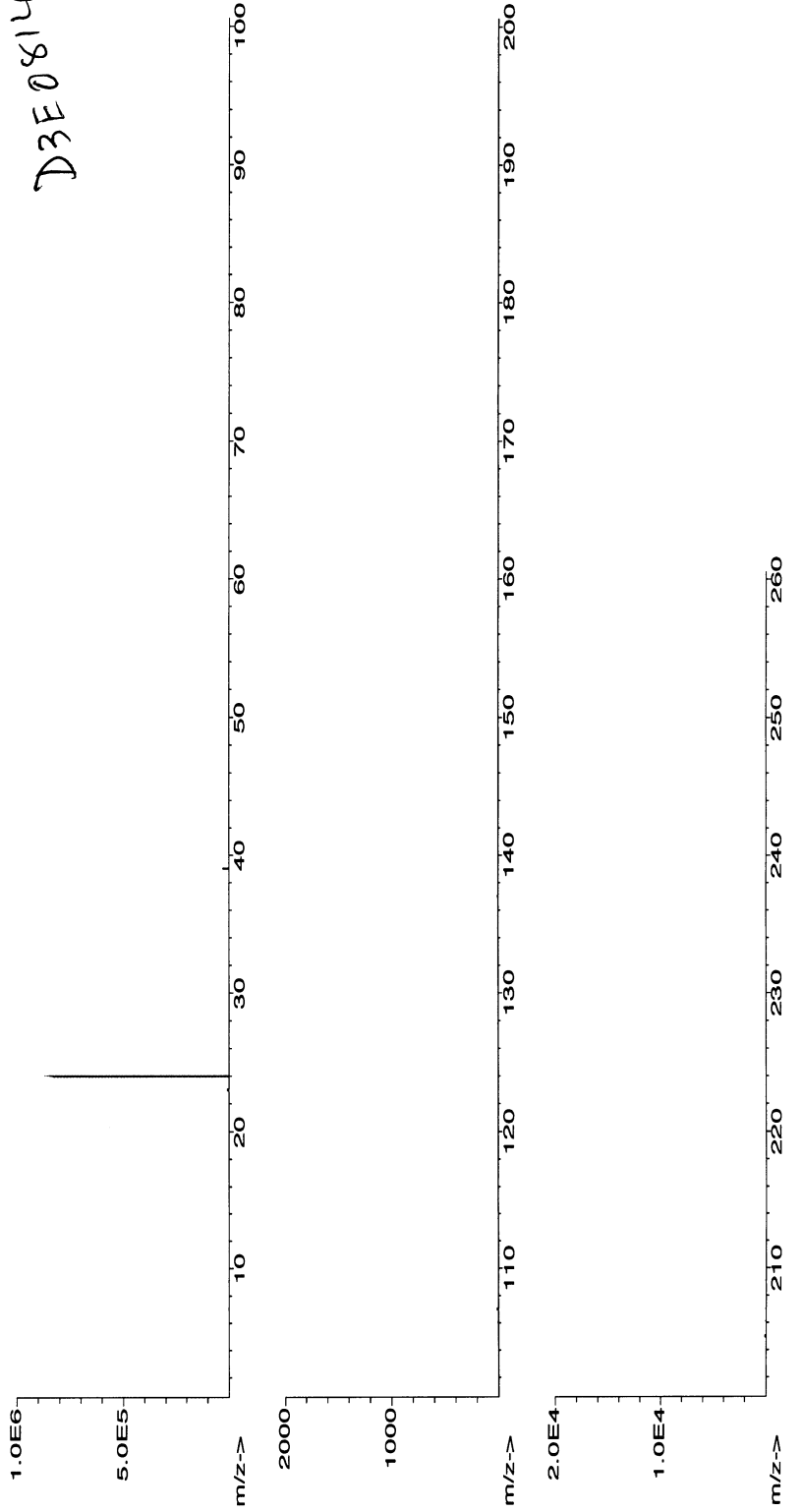
Weight shown below was diluted to (mL): 1999.68

MSDS Information

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

1. Magnesium Nitrate Hexahydrate (Mg) IN030 R111MGB1R 10000.0 99.99 0.10 9.60 208.3212 208.3421 **10001.0** 0.00200 13446-18-9 7 mg/m3 N/A 3131a

[1] Spectrum No.1 [19.923 sec]:58112.D# [Count] [Linear]





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

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

Physical Characterization:

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

(T) = Target analyte

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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



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

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

(T)= Target analyte

Physical Characterization:

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

Certified by:

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: 58111
Lot Number: 050313
Description: Sodium (Na)
Expiration Date: 050316
Nominal Concentration (µg/mL): 10000
Storage: 20 °C
Solvent: C257285 Nitric Acid
Lot #
2% 40.0 Nitric Acid (mL)
5E-05 Balance Uncertainty
0.100 Flask Uncertainty

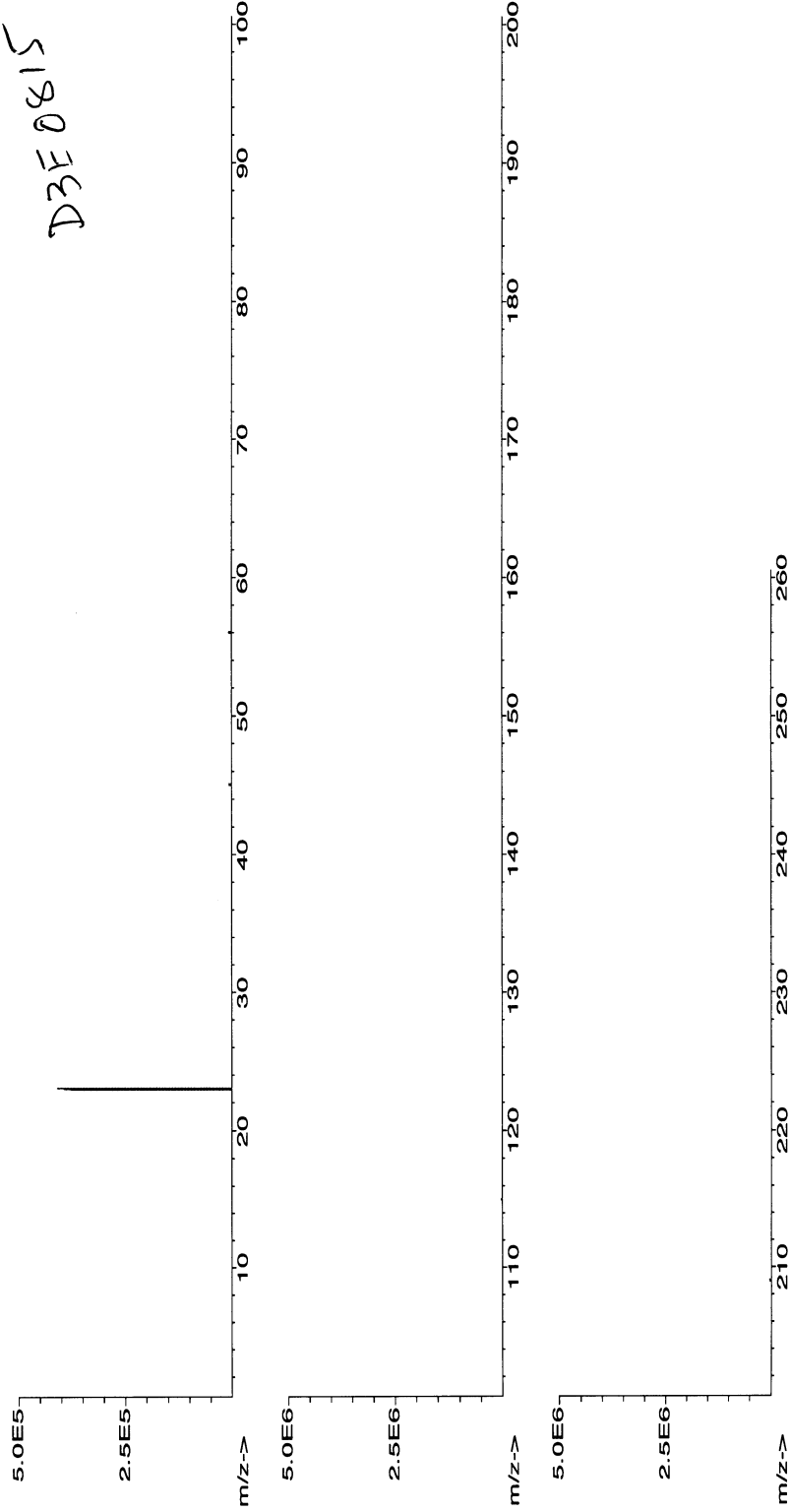
Weight shown below was diluted to (mL): 1999.68

MSDS Information

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

1. Sodium nitrate (Na) IN036 R806NAA1R 10000.0 99.999 0.10 27.0 74.0631 74.0634 10000.0 0.00200 07631-99-4 5 mg/m3 or-rat 3236 mg/kg 3152a

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





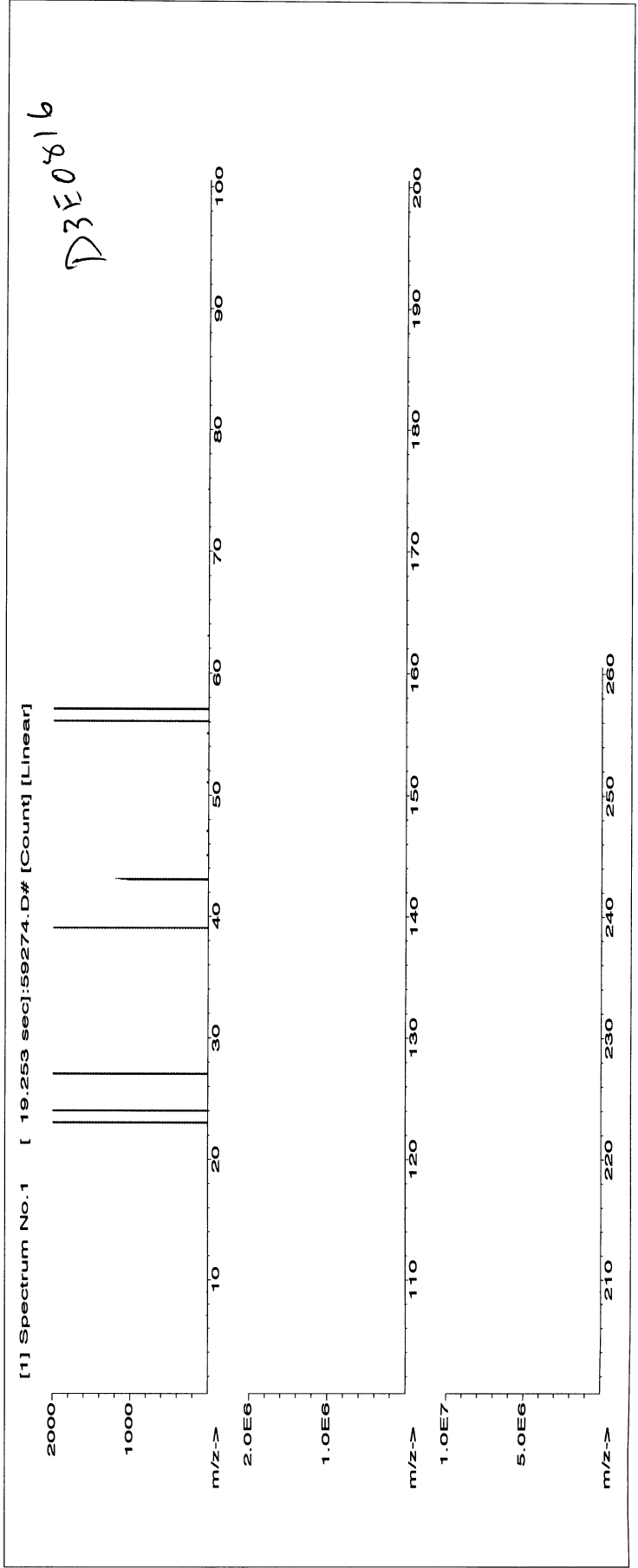
CERTIFIED WEIGHT REPORT:

Part Number: 59274
Lot Number: 050313
Description: ICP Mix #2
6 Components
050316
Expiration Date:
Nominal Concentration (µg/mL): 5000
Solvent: C257285 Nitric Acid
5% 25.0 Nitric Acid (mL)
Storage: 20 °C
5E-05 Balance Uncertainty
0.100 Flask Uncertainty

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

Weights shown below were diluted to (mL):

MSDS Information														
Compound	RM#	Lot Number	Nominal Conc. (ug/mL)	Uncertainty Assay		Target Weight (g)	Actual Weight (g)	Actual Conc. (ug/mL)	Expanded Uncertainty (+/-)	(Solvent Safety Info. On Attached pg.)	NIST SRM			
				Purity (%)	Purity							CAS#	OSHA PEL (TWA)	LD50
1. Aluminum Nitrate Nonahydrate (Al)	IN022	C1207AL2R2	5000.0	99.995	0.10	7.10	35.2057	35.2070	5000.2	0.00204	07784-27-2	5 mg/m3	ori-rat 264 mg/kg 3101a	
2. Calcium carbonate (Ca)	IN014	D212CAA1	5000.0	99.999	0.10	40.0	6.2488	6.2489	5000.1	0.00204	00471-34-1	7 mg/m3	N/A	3109a
3. Iron (III) Nitrate Nonahydrate (Fe)	IN028	CW108FEA1R2	5000.0	99.999	0.10	13.8	18.1123	18.1124	5000.0	0.00204	07782-61-8	7 mg/m3	N/A	3126a
4. Magnesium Nitrate Hexahydrate (Mg)	IN030	R111MGB1R	5000.0	99.99	0.10	9.60	26.0388	26.0389	5000.0	0.00204	13446-18-9	7 mg/m3	N/A	3131a
5. Potassium nitrate (K)	IN034	KB1011KA1	5000.0	99.999	0.10	38.7	6.4587	6.4587	5000.1	0.00204	07757-79-1	5 mg/m3	ori-rat 3015 mg/kg 3141a	
6. Sodium nitrate (Na)	IN036	R806NAA1R	5000.0	99.999	0.10	27.0	9.2574	9.2575	5000.0	0.00204	07631-99-4	5 mg/m3	ori-rat 3236 mg/kg 3152a	





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

Trace Metals Verification by ICP-MS (µg/L)																	
Al	T	Cd	Dy	Hf	Li	Ni	Pr	Se	Tb	W	<0.02						
Sb	<0.02	Ca	Er	Ho	<0.02	Nb	Re	Si	Tc	U	<0.02						
As	<0.2	Ce	Eu	In	<0.02	Os	Rh	Ag	Ti	V	<0.02						
Ba	<0.02	Cs	Gd	Ir	<0.02	Pd	Rb	Na	Th	Yb	<0.02						
Be	<0.01	Cr	Ga	Fe	T	P	Ru	Sr	Tm	Y	<0.02						
Bi	<0.02	Co	Ge	La	<0.02	Pt	Sm	S	Sn	Zn	<0.02						
B	<0.02	Cu	Au	Pb	<0.02	K	Sc	Ta	Tl	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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: **58028**
Lot Number: **050313**
Description: **Nickel (Ni)**

Lot #
C257285

Solvent:
Nitric Acid

Expiration Date: 050316

2.0%
40.0 (mL)

Nitric Acid

Storage: 20 °C

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

Volume shown below was diluted to (mL): 1999.68
5E-05 Balance Uncertainty
0.100 Flask Uncertainty

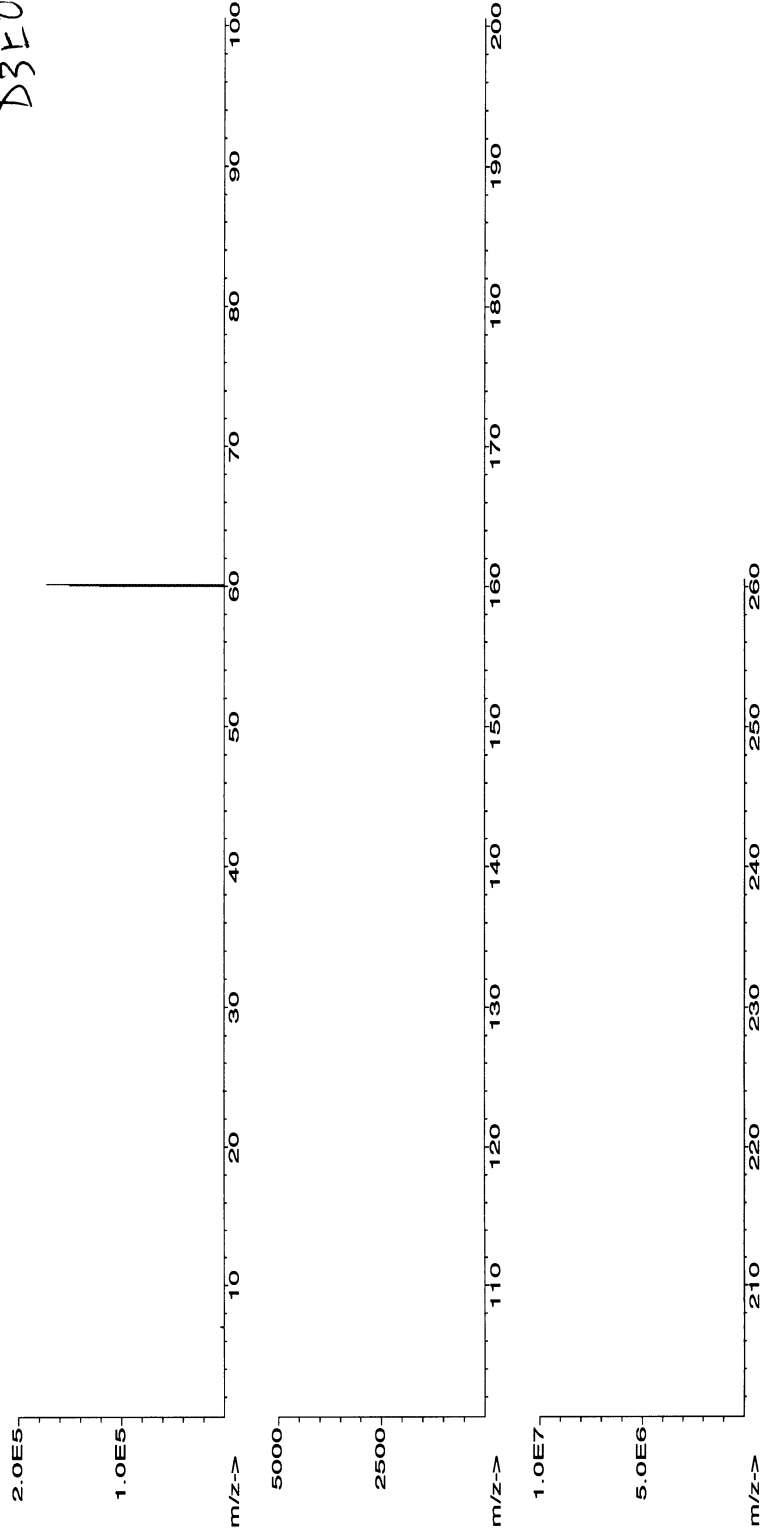
Formulated By:	Lawrence Barry
Reviewed By:	Pedro L. Rentas

MSDS Information

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

1. Nickel nitrate (II) Hexahydrate (Ni)	58128	010612	0.1000	200.0	0.013		10001.1	1000.3	0.00201	13478-00-7	1 mg/m3	or-rat 1620 mg/kg	3136
---	-------	--------	--------	-------	-------	--	---------	--------	---------	------------	---------	-------------------	------

[1] Spectrum No.1 [9.135 sec]:58028.D# [Count] [Linear]





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

Trace Metals Verification by ICP-MS (µg/L)																	
Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pt	<0.02	Se	<0.2	Tb	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Te	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	<0.02	Os	<0.02	Rh	<0.02	Ag	<0.02	Tl	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Rb	<0.02	Na	<0.2	Th	<0.02
Be	<0.01	Cr	<0.02	Ga	<0.2	Fe	<0.2	Hg	<0.2	P	<0.02	Ru	<0.02	Sr	<0.02	Tm	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sm	<0.02	S	<0.02	Sn	<0.02
B	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02	Ti	<0.02

Physical Characterization:

(T)= Target analyte

Certified by:

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

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: 57005
Lot Number: 050313
Description: Boron (B)

Expiration Date: 050316
Nominal Concentration (µg/mL): 1000

Storage: 20 °C

Volume shown below was diluted to (mL):

Lot # Y47057 **Solvent:** Ammonium hydroxide
2.0% **40.0** **Ammonium hydroxide**
(mL)
5E-05 **Balance Uncertainty**
0.100 **Flask Uncertainty**

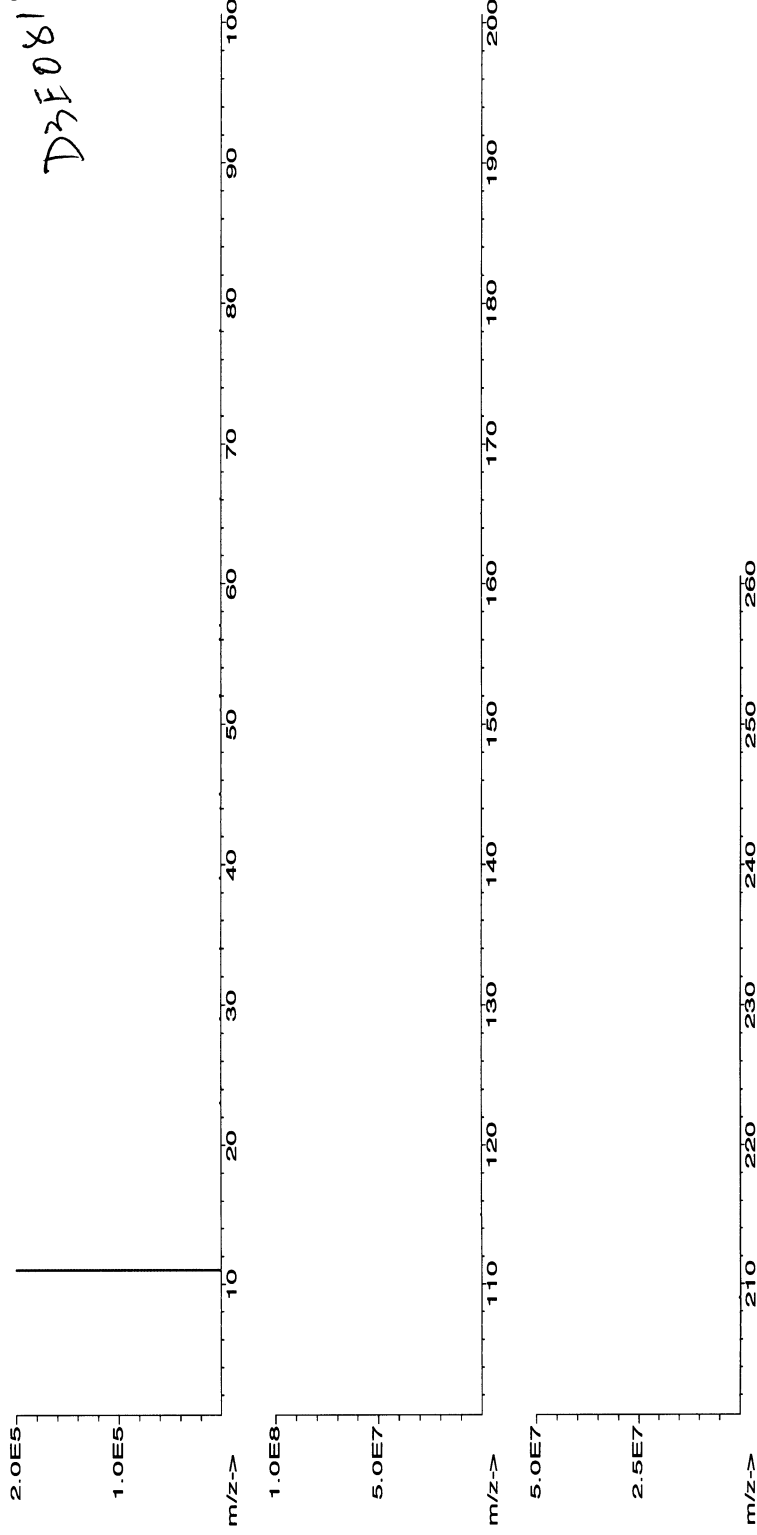
<i>Lawrence Barry</i>	
Formulated By:	Lawrence Barry
050313	
<i>Pedro L. Rentas</i>	
Reviewed By:	Pedro L. Rentas
050313	

MSDS Information

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Uncertainty	Pipette	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty	CAS#	(Solvent Safety Info. On Attached pg.)	NIST SRM
----------	-------------	------------	-----------------	----------------	-------------	---------	-----------------------	---------------------	----------------------	------	--	----------

1. Boric acid (B)	58105	110111	0.1000	200.0	0.013	10001.3	1000.3	0.00201	10043-35-3	N/A	orl-rat 2660mg/kg	3107
-------------------	-------	--------	--------	-------	-------	---------	--------	---------	------------	-----	-------------------	------

[1] Spectrum No.1 [34.583 sec]:56005.D# [Count] [Linear]





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

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

(T)= Target analyte

Physical Characterization:

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

Certified by:

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: 57038
Lot Number: 050313
Description: Strontium (Sr)

Lot # C257285
Solvent: Nitric Acid

Expiration Date: 050316
Nominal Concentration (µg/mL): 1000
Storage: 20 °C

2.0% Nitric Acid
40.0 (mL)

Volume shown below was diluted to (mL): 1999.68
5E-05 Balance Uncertainty
0.100 Flask Uncertainty

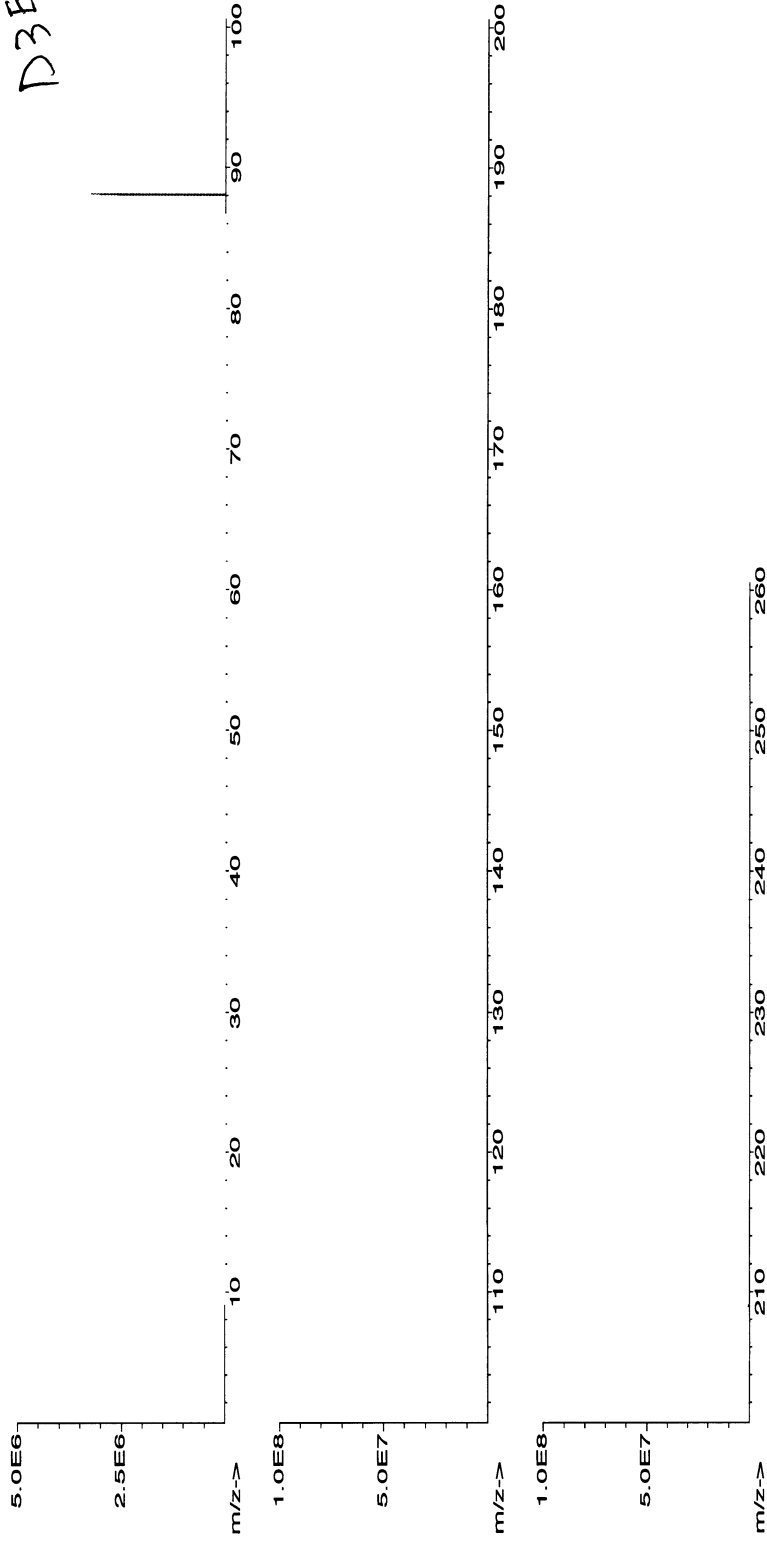
<i>Lawrence Barry</i>	
Formulated By:	Lawrence Barry 050313
<i>Pedro L. Rentas</i>	
Reviewed By:	Pedro L. Rentas 050313

MSDS Information

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Uncertainty	Pipette	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty	(Solvent Safety Info. On Attached pg.)	
										CAS#	LD50

1. Strontium nitrate (Sr) 58138 111212 0.1000 200.0 0.013 10001.2 1000.3 0.00211 10042-76-9 N/A orl-rat 2750mg/kg 3153a

[1] Spectrum No.1 [34.243 sec]:57038.D# [Count] [Linear]





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

Trace Metals Verification by ICP-MS (µg/L)																	
Al	<0.02	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pt	<0.02	Se	<0.2	Tb	<0.02
Sb	<0.02	Ca	<0.2	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Re	<0.02	Si	<0.02	Te	<0.02
As	<0.2	Ce	<0.02	Eu	<0.02	In	<0.02	Mg	<0.02	Os	<0.02	Rh	<0.02	Ag	<0.02	Tl	<0.02
Ba	<0.02	Cs	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Ru	<0.02	Na	<0.2	Th	<0.02
Be	<0.01	Cr	<0.02	Ga	<0.2	Fe	<0.02	Hg	<0.2	P	<0.02	Sm	<0.02	Sr	T	Tm	<0.02
Bi	<0.02	Co	<0.02	Ge	<0.02	La	<0.02	Mo	<0.02	Pt	<0.02	Sn	<0.02	S	<0.02	Sn	<0.02
B	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Nd	<0.02	K	<0.2	Sc	<0.02	Ta	<0.02	Ti	<0.02

Physical Characterization:

(T)= Target analyte

Certified by:

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

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: 57050
Lot Number: 050313
Description: IIn (Sn)

Lot #
C142199
TO3072

Solvents:
Nitric Acid
Hydrochloric acid

Expiration Date: 050316
Nominal Concentration (µg/mL): 1000

Storage: 20 °C
2.0% Nitric Acid
6.0% Hydrochloric acid
40.0
120.0
(mL)

Volume shown below was diluted to (mL):

1999.68 5E-05 Balance Uncertainty
0.100 Flask Uncertainty

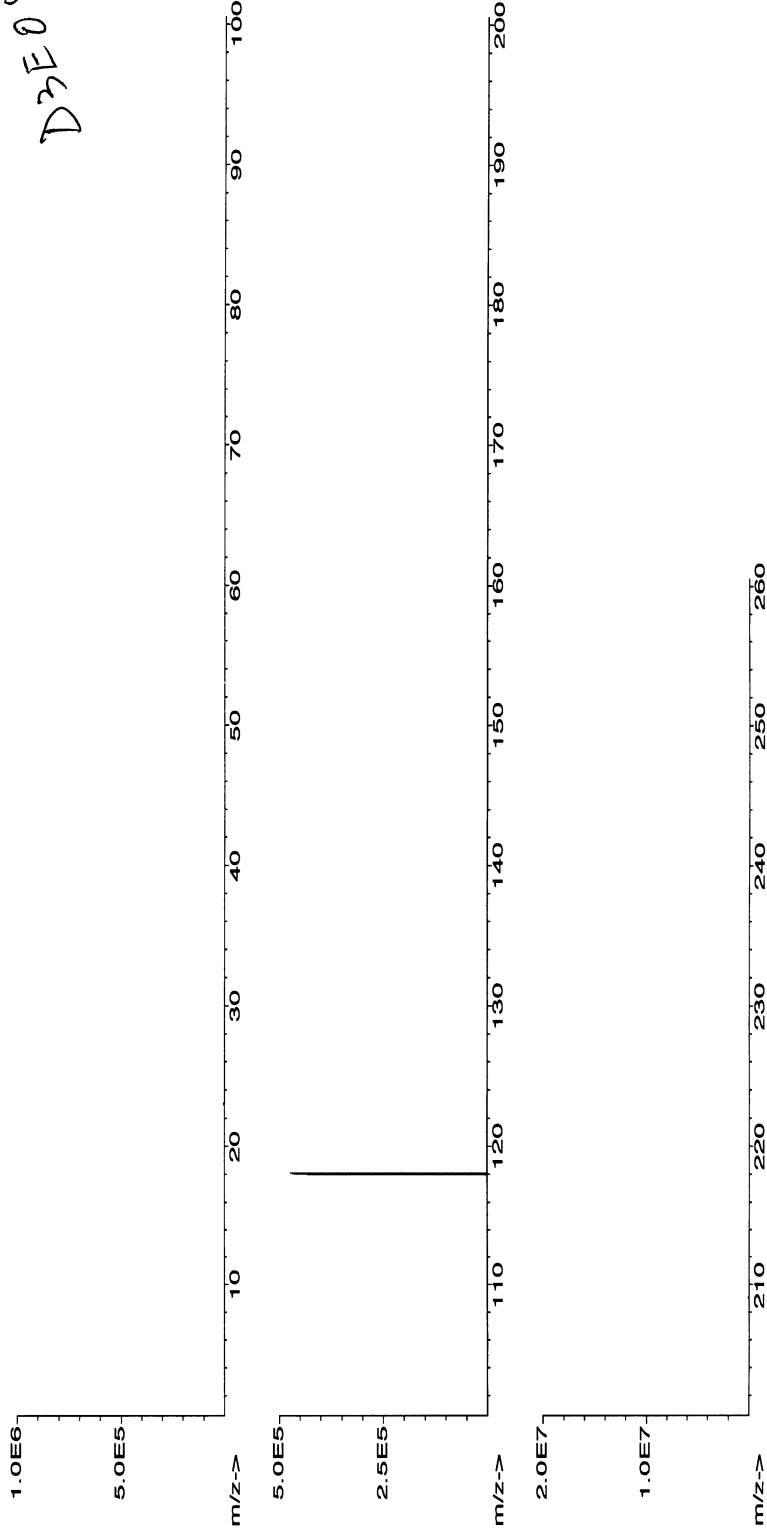
<i>Lawrence Barry</i>	
Formulated By:	Lawrence Barry
050313	
<i>Pedro L. Rentas</i>	
Reviewed By:	Pedro L. Rentas
050313	

MSDS Information

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

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Initial Concentration (µg/mL)	Final Concentration (µg/mL)	Expanded Uncertainty (+/-)	CAS#	OSHA PEL (TWA)	LD50
1. Ammonium hexafluorostannate (IV) (Sn)	58150	101411	0.1000	200.0	0.013	1000.3	0.00201	16919-24-7	7 mg/m3	N/A
										3161a

[1] Spectrum No.1 [16.634 sec]:57050.D# [Count] [Linear]





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

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

(T)= Target analyte

Physical Characterization:

Analyzed Density of Solution (g/mL):

#REF!

Temperature (°C):

#REF!

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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT

Part Number: **56114**
Lot Number: **120712**
Description: **Silicon (Si)**

Lot #
Solvent: **C142199** Nitric Acid

Expiration Date: **120715**

2% 40.0 (mL) Nitric Acid

Nominal Concentration (µg/mL): **10000**

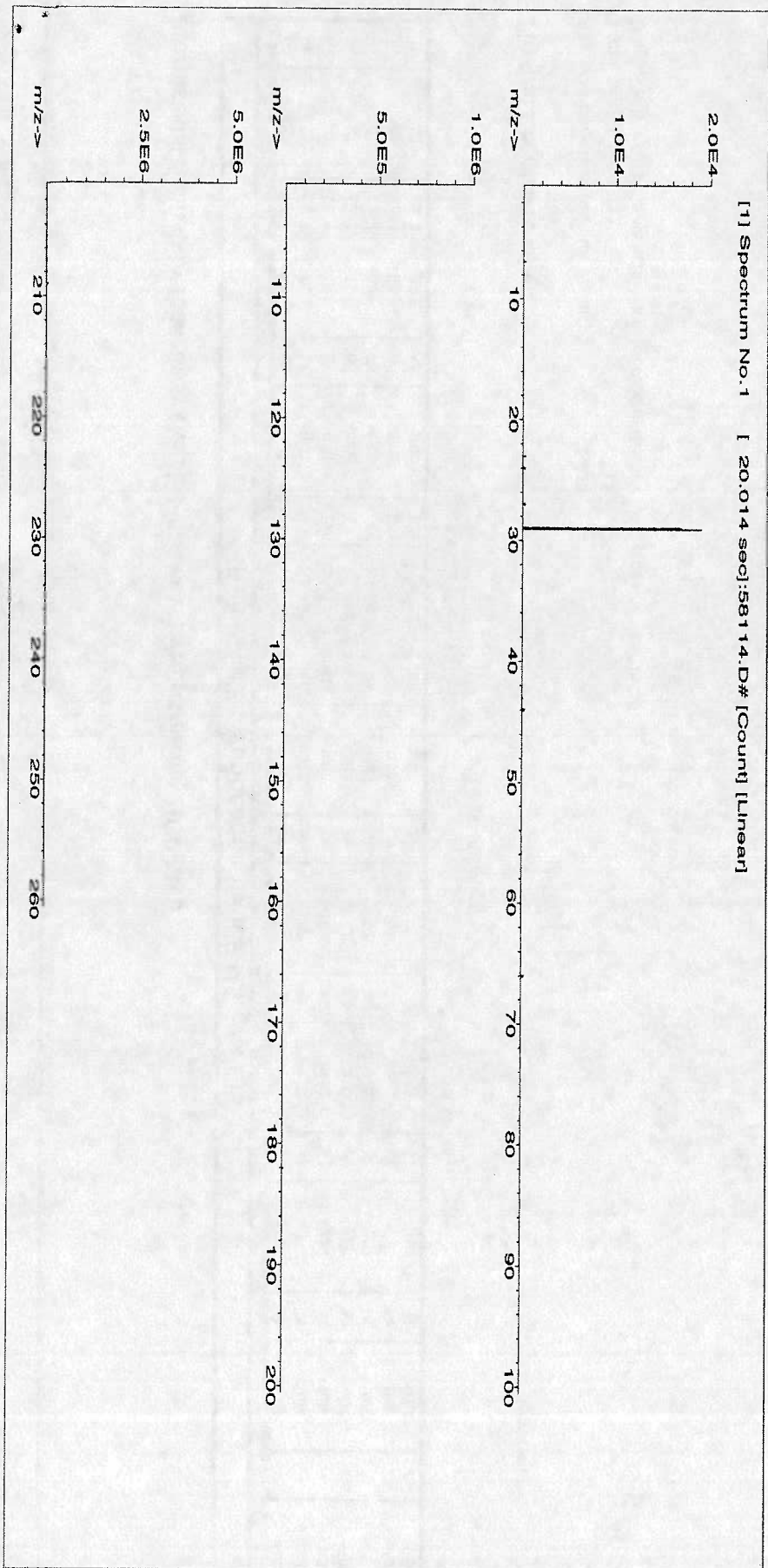
Storage: 20 °C

Weight shown below was diluted to (mL): **1999.68** 0.100 Flask Uncertainty

<i>Lawrence Barry</i>	
Formulated By:	Lawrence Barry
Reviewed By:	<i>Pedro L. Rentas</i>
	120712

MSDS Information

Compound	RM#	Lot Number	Nominal Conc. (µg/mL)	Purity	Uncertainty Purity (%)	Assay	Target Weight (g)	Actual Weight (g)	Actual Conc. (µg/mL)	Expanded Uncertainty (+/-)	CAS#	OSHA PEL (TWA)	LDSO	NIST SRM
1. Ammonium hexafluorosilicate (Si)	IN009	W60951A1	10000.0	99.999	0.10	15.7	127.3696	127.3987	10001.5	0.00200	16919-19-0	N/A	N/A	N/A





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

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

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

(T) = Target analyte

Physical Characterization:

Analyzed Density of Solution (g/mL):

1.038

Temperature (°C):

22.6

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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).

Certificate of Analysis

Product Description:

Name: **Cesium Ionization Buffer**
Part Number: **IB-CS-B5**
Lot Number: **1116106**
Starting Source: **Cesium Carbonate**
Material Purity: **99.999%**
Matrix: **1% HNO₃**

Reference Value: **5% (50,000 µg/mL) Cs**

Preparation Information:

The highest purity source materials were purchased from qualified vendors per ISO 9001:2008 guidelines and assayed by ICP-OES for conformity prior to use. This standard was prepared using methods developed at NIST for the preparation of SRM Spectrometric Standard Solutions. Sub-boiling distilled high-purity acid has been used to place the materials in solution and to stabilize the standard. The matrix is as noted above in 18 megaohm deionized water.

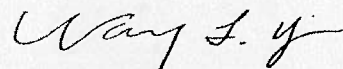
Packaging and Storage Conditions:

The product is packaged in a pre-cleaned polyethylene bottle which should be stored under normal laboratory conditions and kept tightly capped when not in use.

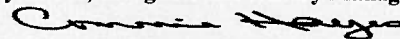
Preparation Date: June 10, 2011

Shipped Date: July 31, 2013

Expiration Date: Not Applicable



Vanny T. Yib, Inorganic Laboratory Manager



Connie Hayes, Quality Manager



Theodore Rains, PhD, President

June 13, 2011

Certificate Issue Date

NOTICE: HPS products are intended for laboratory use only. All products should be handled and used by trained professional personnel. The responsibility for the safe handling and use of these products rests solely with the buyer and/or user. The data and information as stated was furnished by the manufacturer of the product. The information provided in this certificate pertains only to the lot number specified. None of the information provided in this certificate may be used, reproduced or transmitted in any form or by any means without written approval from High Purity Standards.



A Waters Company

Reference Materials

▪ Certificate of Analysis ▪

Product:	Metals in Soil	D311905	D311906
Catalog Number:	540	Metals in Soil - Certified Reference Material	Metals in Soil - Certified Reference Material
Lot No.:	D080-540	Expires: 07/31/2016	Expires: 07/19/2016
Certificate Issue Date:	April 12, 2013	Prepared On: 09/19/2013	Prepared On: 09/19/2013
Expiration Date:	July 31, 2016		
Revision Number:	Original		

CERTIFICATION

Parameter	Total Concentration	Certified Value ¹	Uncertainty ²	QC Performance Acceptance Limits ³	PT Performance Acceptance Limits ⁴
	mg/kg	mg/kg	%	mg/kg	mg/kg
Aluminum	68100	8840	6.12	4780 - 12900	3710 - 14000
Antimony	232	88.2	23.0	D.L. - 204	23.2 - 255
Arsenic	114	99.6	11.0	80.5 - 119	69.0 - 130
Barium	742	310	8.83	258 - 362	230 - 391
Beryllium	79.5	72.3	15.5	59.4 - 85.1	53.4 - 91.2
Boron	173	144	4.76	106 - 182	86.3 - 201
Cadmium	207	182	13.3	149 - 215	134 - 230
Calcium	25400	6790	6.30	5610 - 7980	5040 - 8540
Chromium	376	136	15.4	109 - 164	95.7 - 177
Cobalt	150	128	4.37	106 - 149	94.9 - 160
Copper	124	102	9.10	82.7 - 121	75.8 - 129
Iron	42900	12600	17.6	5180 - 19900	3900 - 21200
Lead	121	115	20.9	94.1 - 137	82.9 - 148
Magnesium	9180	3010	10.6	2320 - 3700	1990 - 4030
Manganese	906	323	6.68	266 - 379	242 - 404
Mercury	21.5	19.9	33.9	13.8 - 25.9	10.2 - 29.5
Molybdenum	167	133	7.22	102 - 164	93.8 - 182
Nickel	195	153	16.5	126 - 180	112 - 193
Potassium	19800	2840	8.11	2020 - 3670	1760 - 3920
Selenium	171	150	18.7	116 - 184	101 - 199
Silver	44.7	40.4	29.8	30.3 - 50.4	26.6 - 54.0
Sodium	19800	2760	10.8	1960 - 3560	1820 - 3700
Strontium	222	102	11.8	82.5 - 122	71.8 - 132
Thallium	200	174	8.21	137 - 212	120 - 229

ISO/IEC GUIDE 34:2009

ISO/IEC 17025:2005



Page 1 of 4 Lot: D080-540



A Waters Company

Reference Materials

▪ **Certificate of Analysis** ▪

Parameter	Total Concentration	Certified Value ¹	Uncertainty ²	QC Performance Acceptance Limits ³	PT Performance Acceptance Limits ⁴
	mg/kg	mg/kg	%	mg/kg	mg/kg
Tin	118	102	3.61	77.6 - 126	57.9 - 145
Titanium	3310	262	14.1	70.1 - 453	13.3 - 510
Vanadium	184	97.6	12.3	75.2 - 120	63.6 - 132
Zinc	177	161	17.9	130 - 192	110 - 212

ANALYTICAL VERIFICATION

Parameter	Certified Value ¹	Proficiency Testing Study			NIST Traceability	
		Mean	Recovery ⁵	n	SRM Number	Recovery
	mg/kg	mg/kg	%			%
Aluminum	8840	8840	100	175	-	-
Antimony	88.2	88.2	100	186	-	-
Arsenic	99.6	99.6	100	219	-	-
Barium	310	310	100	194	-	-
Beryllium	72.3	72.3	100	190	-	-
Boron	144	144	100	135	-	-
Cadmium	182	182	100	220	-	-
Calcium	6790	6790	100	162	-	-
Chromium	136	136	100	217	-	-
Cobalt	128	128	100	172	-	-
Copper	102	102	100	215	-	-
Iron	12600	12600	100	178	-	-
Lead	115	115	100	233	-	-
Magnesium	3010	3010	100	167	-	-
Manganese	323	323	100	183	-	-
Mercury	19.9	19.9	100	151	-	-
Molybdenum	133	133	100	184	-	-
Nickel	153	153	100	214	-	-
Potassium	2840	2840	100	168	-	-
Selenium	150	150	100	209	-	-
Silver	40.4	40.4	100	196	-	-

Page 2 of 4 Lot: D080-540

16341 Table Mountain Pkwy • Golden, CO 80403 • T: 800.372.0122 • 303.431.8454 • www.eraqc.com



A Waters Company

Reference Materials

▪ Certificate of Analysis ▪

Parameter	Certified Value ¹	Proficiency Testing Study		NIST Traceability		
		Mean	Recovery ⁵	n	SRM Number	Recovery
	mg/kg	mg/kg	%			%
Sodium	2760	2760	100	159	-	-
Strontium	102	102	100	106	-	-
Thallium	174	174	100	187	-	-
Tin	102	102	100	129	-	-
Titanium	262	262	100	126	-	-
Vanadium	97.6	97.6	100	177	-	-
Zinc	161	161	100	214	-	-



A Waters Company

Reference Materials

• Certificate of Analysis •

1. The Certified Values are equal to the mean recoveries for the parameters as determined in an interlaboratory round robin study based on all applicable digestion techniques reported in the study. The Certified Values are based on an "as received" basis, assuming 100% solids content. The certified values are monitored and purchasers will be notified of any significant changes resulting in recertification or withdrawal of this certified reference material during the period of validity of this certificate.
2. The stated Uncertainty is the total propagated uncertainty at the 95% confidence interval. The uncertainty is based on the preparation and internal analytical verification of the product by ERA, multiplied by a coverage factor. The uncertainty applies to the product as supplied and does not take into account any required or optional dilution and/or preparations the laboratory may perform while using this product.
3. The QC Performance Acceptance Limits (QC PALs™) are based on actual historical data collected in ERA's Proficiency Testing program. The QC PALs™ reflect any inherent biases in the methods used to establish the limits and closely approximate a 95% confidence interval of the performance that experienced laboratories should achieve using accepted environmental methods. Use the QC PALs™ to realistically evaluate your performance against your peers.
4. The PT Performance Acceptance Limits (PT PALs™) are calculated using the regression equations and fixed acceptance criteria specified in the NELAC proficiency testing requirements. Use the PT PALs™ when analyzing this QC standard alongside USEPA and NELAC compliant PT standards. Please note that many PT study acceptance limits are concentration dependent (some non-linearly) and, therefore, the acceptance limits of this QC standard and any PT standard may differ relative to their difference in concentrations.
5. The PT Data/Traceability data include the mean value, percent recovery and number of data points reported by the laboratories in our Proficiency Testing study compared to the Certified Values. In addition, where NIST Standard Reference Materials (SRMs) are available, each analyte has been analytically traced to the NIST SRM listed. This product is traceable to the lot numbers of its starting materials. All gravimetric and volumetric measurements related to its manufacture are traceable to NIST through an unbroken chain of comparisons.
Traceability Recovery (%) = [(% recovery certified standard)/(% recovery NIST SRM)]*100
The traceability data shown were compiled by analyzing the ERA standards or their associated stock solutions against the applicable NIST SRMs.
6. The Total Concentrations are equal to the background concentrations in the blank soil matrix (measured using neutron activation, XRF, and total acid digestion techniques), plus the amount of each analyte spiked onto the soil. For Trace Metals, the values listed are only "Theoretical Values" based upon the methodologies listed.
7. For additional information on this product such as intended use, instructions for use, level of homogeneity, and safety information, please refer to the provided Instruction Sheet

If you have any questions or need technical assistance, please call ERA technical assistance at 1-800-372-0122 or send an email to info@eraqc.com.

Certifying Officer

Tom Widera

Quality Officer

Kristina Sanchez

ISO/IEC GUIDE 34:2009



REFERENCE MATERIAL PRODUCTION
CERTIFICATE NO. 1179-08

ISO/IEC 17025:2005



CHEMICAL TESTING LABORATORY
CERTIFICATE NO. 1774-02



A Waters Company

Reference Materials

▪ Certificate of Analysis ▪

Product:	Metals in Soil	D311905	D311906
Catalog Number:	540	Metals in Soil - Certified Reference Material	Metals in Soil - Certified Reference Material
Lot No.:	D080-540	Expires: 07/31/2016	Expires: 07/19/2016
Certificate Issue Date:	April 12, 2013	Prepared On: 09/19/2013	Prepared On: 09/19/2013
Expiration Date:	July 31, 2016		
Revision Number:	Original		

CERTIFICATION

Parameter	Total Concentration	Certified Value ¹	Uncertainty ²	QC Performance Acceptance Limits ³	PT Performance Acceptance Limits ⁴
	mg/kg	mg/kg	%	mg/kg	mg/kg
Aluminum	68100	8840	6.12	4780 - 12900	3710 - 14000
Antimony	232	88.2	23.0	D.L. - 204	23.2 - 255
Arsenic	114	99.6	11.0	80.5 - 119	69.0 - 130
Barium	742	310	8.83	258 - 362	230 - 391
Beryllium	79.5	72.3	15.5	59.4 - 85.1	53.4 - 91.2
Boron	173	144	4.76	106 - 182	86.3 - 201
Cadmium	207	182	13.3	149 - 215	134 - 230
Calcium	25400	6790	6.30	5610 - 7980	5040 - 8540
Chromium	376	136	15.4	109 - 164	95.7 - 177
Cobalt	150	128	4.37	106 - 149	94.9 - 160
Copper	124	102	9.10	82.7 - 121	75.8 - 129
Iron	42900	12600	17.6	5180 - 19900	3900 - 21200
Lead	121	115	20.9	94.1 - 137	82.9 - 148
Magnesium	9180	3010	10.6	2320 - 3700	1990 - 4030
Manganese	906	323	6.68	266 - 379	242 - 404
Mercury	21.5	19.9	33.9	13.8 - 25.9	10.2 - 29.5
Molybdenum	167	133	7.22	102 - 164	93.8 - 182
Nickel	195	153	16.5	126 - 180	112 - 193
Potassium	19800	2840	8.11	2020 - 3670	1760 - 3920
Selenium	171	150	18.7	116 - 184	101 - 199
Silver	44.7	40.4	29.8	30.3 - 50.4	26.6 - 54.0
Sodium	19800	2760	10.8	1960 - 3560	1820 - 3700
Strontium	222	102	11.8	82.5 - 122	71.8 - 132
Thallium	200	174	8.21	137 - 212	120 - 229

ISO/IEC GUIDE 34:2009

ISO/IEC 17025:2005



Page 1 of 4 Lot: D080-540



A Waters Company

Reference Materials

▪ **Certificate of Analysis** ▪

Parameter	Total Concentration	Certified Value ¹	Uncertainty ²	QC Performance Acceptance Limits ³	PT Performance Acceptance Limits ⁴
	mg/kg	mg/kg	%	mg/kg	mg/kg
Tin	118	102	3.61	77.6 - 126	57.9 - 145
Titanium	3310	262	14.1	70.1 - 453	13.3 - 510
Vanadium	184	97.6	12.3	75.2 - 120	63.6 - 132
Zinc	177	161	17.9	130 - 192	110 - 212

ANALYTICAL VERIFICATION

Parameter	Certified Value ¹	Proficiency Testing Study			NIST Traceability	
		Mean	Recovery ⁵	n	SRM Number	Recovery
	mg/kg	mg/kg	%			%
Aluminum	8840	8840	100	175	-	-
Antimony	88.2	88.2	100	186	-	-
Arsenic	99.6	99.6	100	219	-	-
Barium	310	310	100	194	-	-
Beryllium	72.3	72.3	100	190	-	-
Boron	144	144	100	135	-	-
Cadmium	182	182	100	220	-	-
Calcium	6790	6790	100	162	-	-
Chromium	136	136	100	217	-	-
Cobalt	128	128	100	172	-	-
Copper	102	102	100	215	-	-
Iron	12600	12600	100	178	-	-
Lead	115	115	100	233	-	-
Magnesium	3010	3010	100	167	-	-
Manganese	323	323	100	183	-	-
Mercury	19.9	19.9	100	151	-	-
Molybdenum	133	133	100	184	-	-
Nickel	153	153	100	214	-	-
Potassium	2840	2840	100	168	-	-
Selenium	150	150	100	209	-	-
Silver	40.4	40.4	100	196	-	-

Page 2 of 4 Lot: D080-540

16341 Table Mountain Pkwy • Golden, CO 80403 • T: 800.372.0122 • 303.431.8454 • www.eraqc.com



A Waters Company

Reference Materials

▪ Certificate of Analysis ▪

Parameter	Certified Value ¹	Proficiency Testing Study		NIST Traceability		
		Mean	Recovery ⁵	n	SRM Number	Recovery
	mg/kg	mg/kg	%			%
Sodium	2760	2760	100	159	-	-
Strontium	102	102	100	106	-	-
Thallium	174	174	100	187	-	-
Tin	102	102	100	129	-	-
Titanium	262	262	100	126	-	-
Vanadium	97.6	97.6	100	177	-	-
Zinc	161	161	100	214	-	-



A Waters Company

Reference Materials

• Certificate of Analysis •

1. The Certified Values are equal to the mean recoveries for the parameters as determined in an interlaboratory round robin study based on all applicable digestion techniques reported in the study. The Certified Values are based on an "as received" basis, assuming 100% solids content. The certified values are monitored and purchasers will be notified of any significant changes resulting in recertification or withdrawal of this certified reference material during the period of validity of this certificate.
2. The stated Uncertainty is the total propagated uncertainty at the 95% confidence interval. The uncertainty is based on the preparation and internal analytical verification of the product by ERA, multiplied by a coverage factor. The uncertainty applies to the product as supplied and does not take into account any required or optional dilution and/or preparations the laboratory may perform while using this product.
3. The QC Performance Acceptance Limits (QC PALs™) are based on actual historical data collected in ERA's Proficiency Testing program. The QC PALs™ reflect any inherent biases in the methods used to establish the limits and closely approximate a 95% confidence interval of the performance that experienced laboratories should achieve using accepted environmental methods. Use the QC PALs™ to realistically evaluate your performance against your peers.
4. The PT Performance Acceptance Limits (PT PALs™) are calculated using the regression equations and fixed acceptance criteria specified in the NELAC proficiency testing requirements. Use the PT PALs™ when analyzing this QC standard alongside USEPA and NELAC compliant PT standards. Please note that many PT study acceptance limits are concentration dependent (some non-linearly) and, therefore, the acceptance limits of this QC standard and any PT standard may differ relative to their difference in concentrations.
5. The PT Data/Traceability data include the mean value, percent recovery and number of data points reported by the laboratories in our Proficiency Testing study compared to the Certified Values. In addition, where NIST Standard Reference Materials (SRMs) are available, each analyte has been analytically traced to the NIST SRM listed. This product is traceable to the lot numbers of its starting materials. All gravimetric and volumetric measurements related to its manufacture are traceable to NIST through an unbroken chain of comparisons.
Traceability Recovery (%) = [(% recovery certified standard)/(% recovery NIST SRM)]*100
The traceability data shown were compiled by analyzing the ERA standards or their associated stock solutions against the applicable NIST SRMs.
6. The Total Concentrations are equal to the background concentrations in the blank soil matrix (measured using neutron activation, XRF, and total acid digestion techniques), plus the amount of each analyte spiked onto the soil. For Trace Metals, the values listed are only "Theoretical Values" based upon the methodologies listed.
7. For additional information on this product such as intended use, instructions for use, level of homogeneity, and safety information, please refer to the provided Instruction Sheet

If you have any questions or need technical assistance, please call ERA technical assistance at 1-800-372-0122 or send an email to info@eraqc.com.

Certifying Officer

Tom Widera

Quality Officer

Kristina Sanchez

ISO/IEC GUIDE 34:2009



REFERENCE MATERIAL PRODUCTION
CERTIFICATE NO. 1179-08

ISO/IEC 17025:2005



CHEMICAL TESTING LABORATORY
CERTIFICATE NO. 1774-02

Page 4 of 4 Lot: D080-540



CERTIFIED WEIGHT REPORT:

Part Number: 58051
Lot Number: 103113
Description: Antimony (Sb)

Lot # C363101
Solvent: Nitric Acid

Expiration Date: 103116
Nominal Concentration (µg/mL): 1000

Storage: 20 °C
2.0% 40.0 (mL)
Nitric Acid

Volume shown below was diluted to (mL): 1999.68
5E-05 Balance Uncertainty
0.100 Flask Uncertainty

Formulated By:	Lawrence Barry	103113
Reviewed By:	Pedro L. Rentas	103113

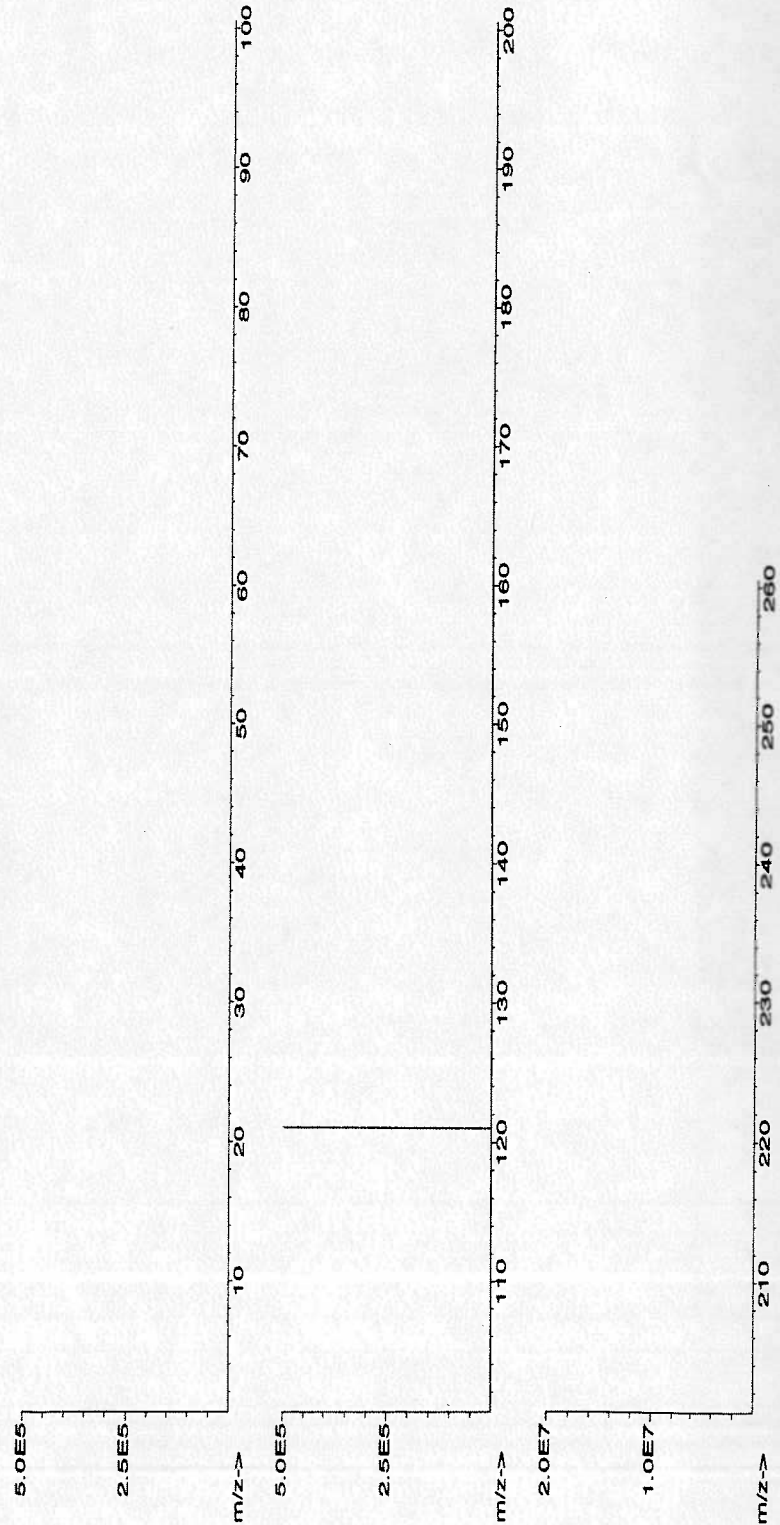
MSDS Information

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

NIST
SRM

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Initial Uncertainty	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty	(+/-)	07440-36-0	5.0 mg/m3	N/A	3102a
1. Antimony Oxide (Sb)	58151	062813	0.0998	199.6	0.013	10018.0	1000.0	0.00201					

[1] Spectrum No.1 [17.964 sec]:58051.D# [Count] [Linear]





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

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

Physical Characterization:

(T)= Target analyte

Certified by:

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

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: **58029**
Lot Number: **103113**
Description: **Copper (Cu)**

Lot #
C257285

Solvent:
Nitric Acid

Expiration Date: 103116

2.0%

40.0 (mL)

Storage: 20 °C

Nitric Acid

Nominal Concentration (µg/mL): 1000

Volume shown below was diluted to (mL): 1999.68

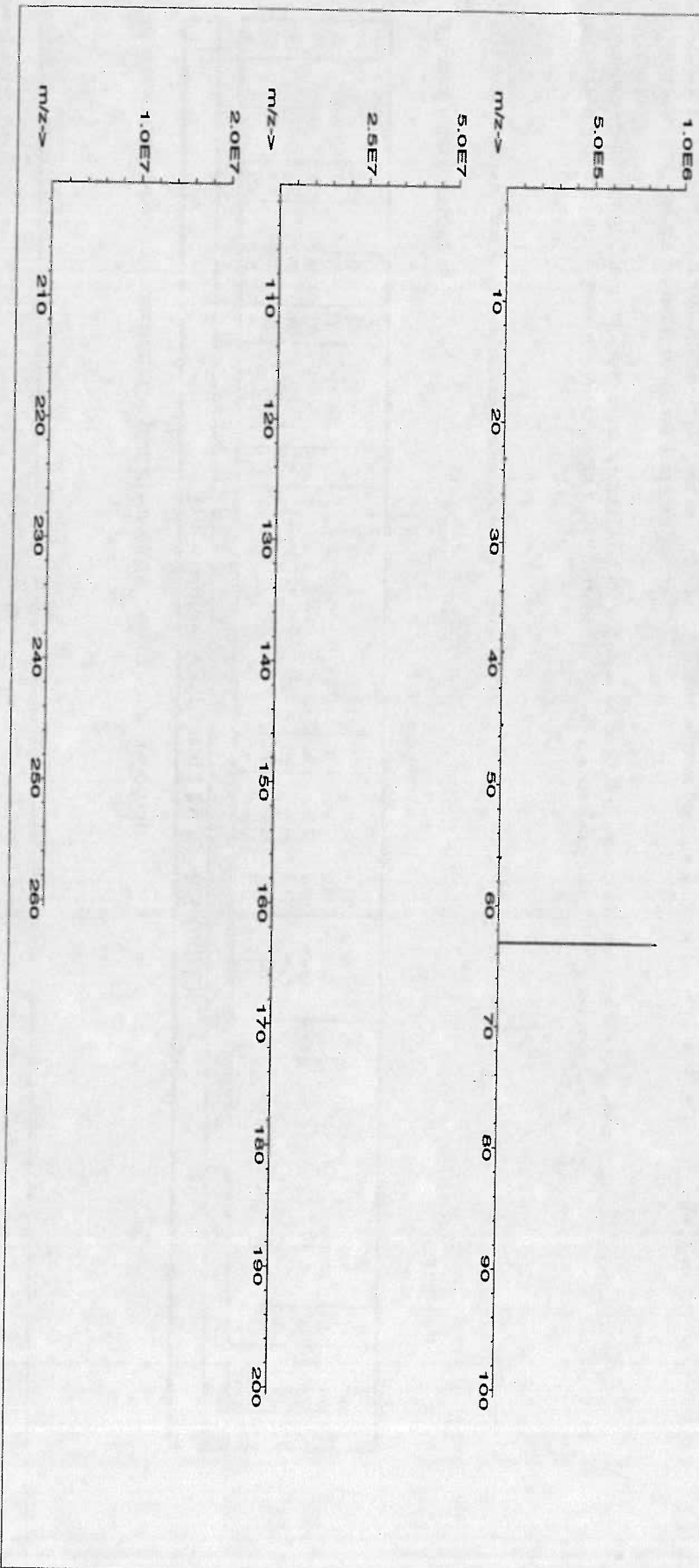
SE-05 Balance Uncertainty
0.100 Flask Uncertainty

<i>Lawrence Barry</i>	
Formulated By:	Lawrence Barry
103113	
<i>Pedro L. Renteria</i>	
Reviewed By:	Pedro L. Renteria
103113	

MSDS Information

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Uncertainty Pipette	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty	(Solvent Safety Info. On Attached pq.)	NIST SRM
1. Copper (II) nitrate trihydrate (Cu)	58129	111212	0.1000	200.0	0.013	10001.5	1000.3	0.00201 (+/-)	10031-43-3	N/A
										0.01-0.1 940 mg/kg 3114

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





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

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

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

(T)=Target analyte

Certified by:

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

Physical Characterization:

- * 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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



Analytical Reference Material ARM

CERTIFIED WEIGHT REPORT

Part Number: 58081
Lot Number: 103113
Description: Thallium (II)

Lot # C257285
Solvent: Nitric Acid

Expiration Date: 103116
Nominal Concentration (µg/mL): 1000

Storage: 20 °C
2.0% 40.0 (mL)

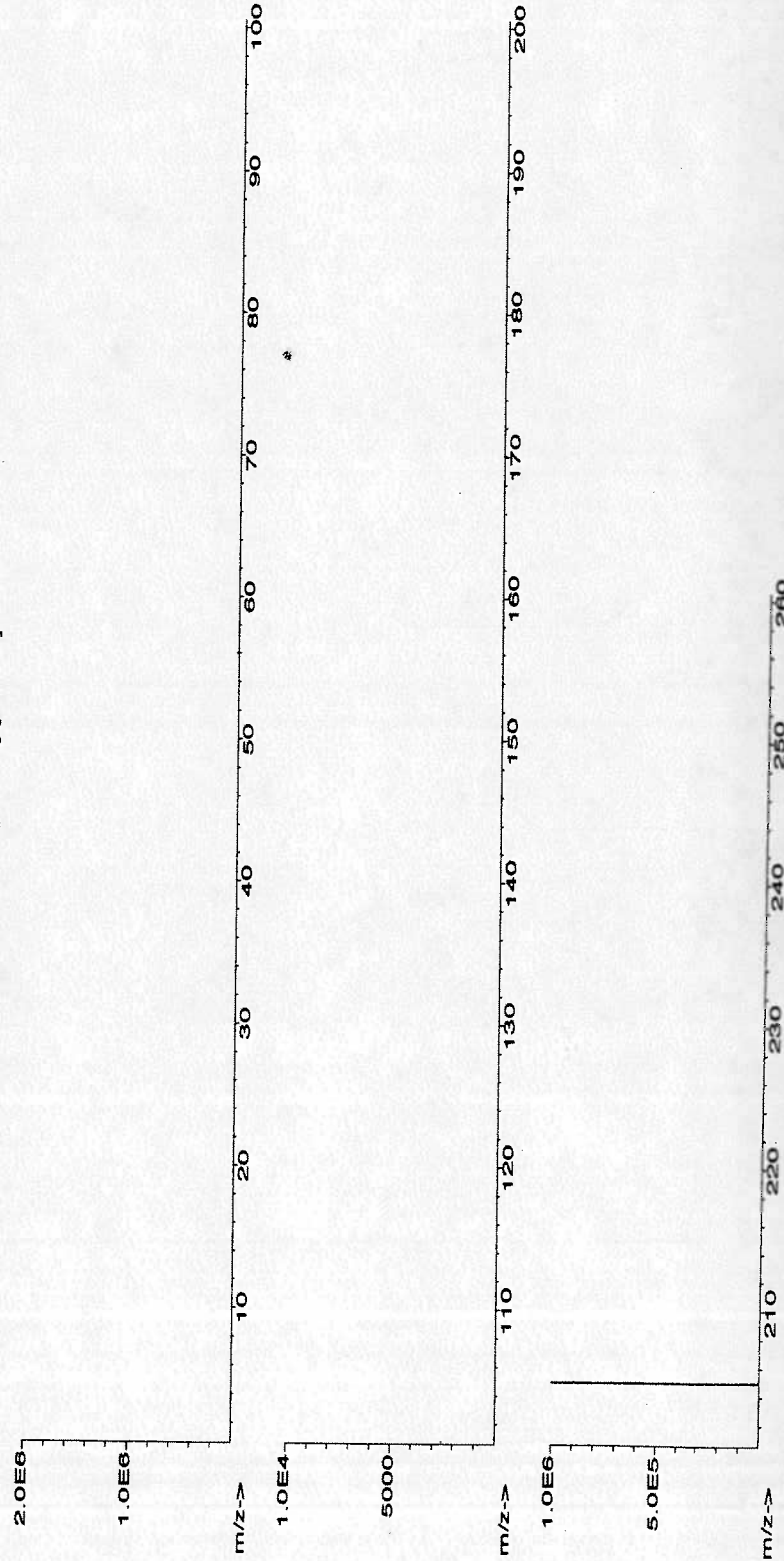
Volume shown below was diluted to (mL): 1999.68
5E-05 Balance Uncertainty
0.100 Flask Uncertainty

<i>Lawrence Barry</i>	
Formulated By:	Lawrence Barry
	103113
<i>Pedro L. Rentas</i>	
Reviewed By:	Pedro L. Rentas
	103113

MSDS Information

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Uncertainty Pipette	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty (+/-)	(Solvent Safety Info. On Attached pg.)	CAS#	OSHA PEL (TWA)	LD50	NIST SRM
1. Thallium nitrate (II)	58181	051613	0.1000	200.0	0.013	10000.6	1000.2	0.00215	10102-45-1	5 mg/m3	N/A		3158

[1] Spectrum No.1 [14.044 sec]:57081.D# [Count] [Linear]





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

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

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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



Analytical Reference Material ARM

CERTIFIED WEIGHT REPORT

Part Number: **58039**
Lot Number: **103113**
Description: **Yttrium (Y)**

Lot # **C363101**
Solvent: **Nitric Acid**

Expiration Date: **103116**
Nominal Concentration ($\mu\text{g/mL}$): **1000**
Storage: **20 °C**

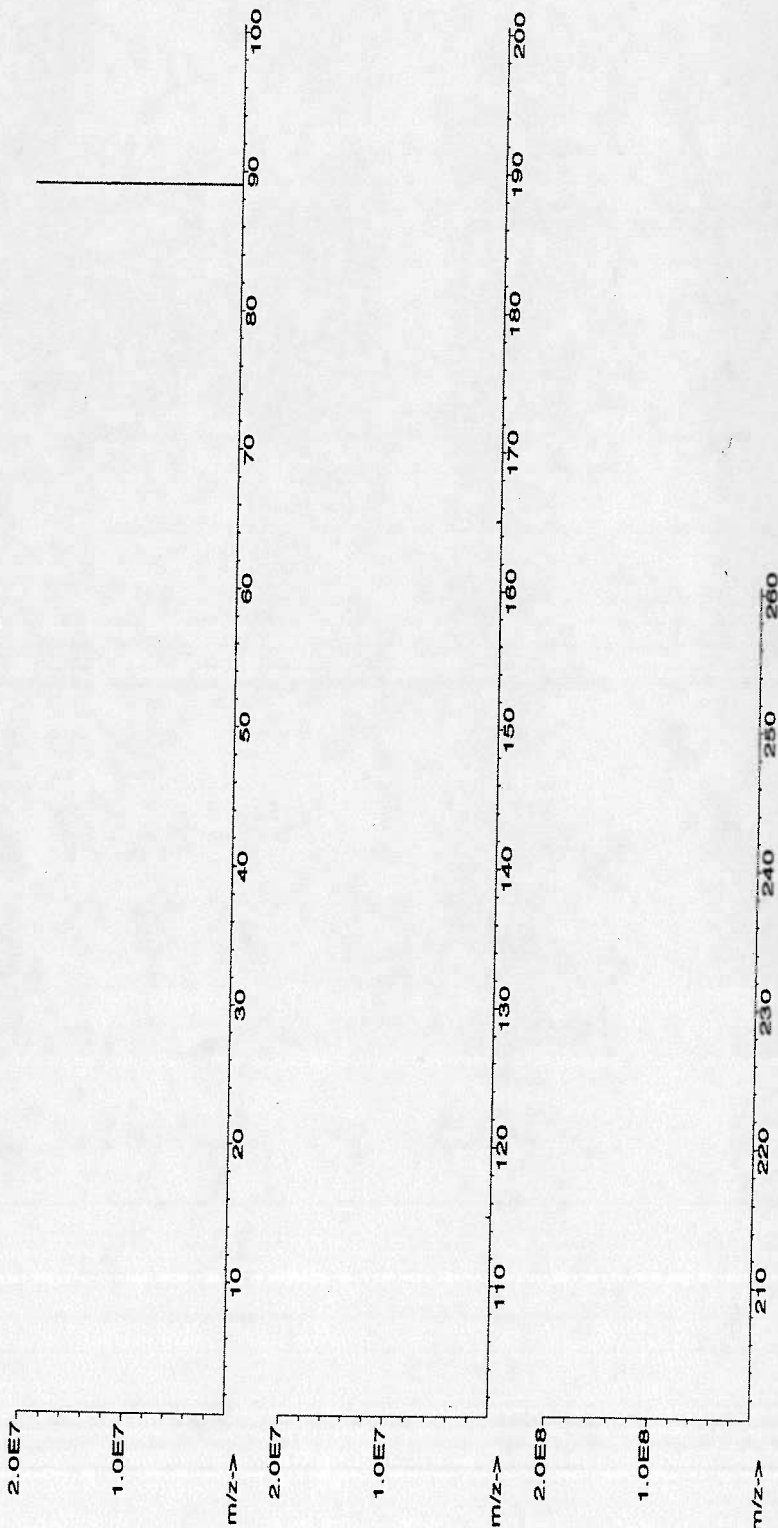
Volume shown below was diluted to (mL):
5E-05 Balance Uncertainty
0.100 Flask Uncertainty
1999.68

<i>Lawrence Barry</i>	
Formulated By:	Lawrence Barry
<i>Pedro L. Rentas</i>	
Reviewed By:	Pedro L. Rentas
103113	

MSDS Information

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Uncertainty Pipette	Initial Conc. ($\mu\text{g/mL}$)	Final Conc. ($\mu\text{g/mL}$)	Expanded Uncertainty (+/-)	MSDS Information	
									(Solvent Safety Info. On Attached pg.)	NIST SRM
1. Yttrium (III) Oxide (Y)	58139	030813	0.1000	200.0	0.013	10001.5	1000.3	0.00204	01314-36-9	N/A
										N/A

[1] Spectrum No.1 [37.002 sec]:58039.D.# [Count] [Linear]





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

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

Physical Characterization:

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

(T)= Target analyte

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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



Reference Materials Producer
Cert #2495.01

SPEXertificate®

Certificate of Reference Material



Chemical Testing
Cert #2495.02

Catalog Number: ZEPANJ-7-100

Lot No. 21-157CR

Description: Custom Claritas Standard

Matrix: 10% HNO₃ / Tr. Tart. Acid / Tr. HF

This CLARITAS PPT® Certified Reference Material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICP-OES, DCP, AA, ICP-MS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

The CRM is prepared from high purity single element concentrates of individual elements using Class A laboratory ware to give precise concentrations.

Instrumental Analysis by ICP Spectrometer:

Analyte	Labeled	Uncertainty	SRM	Analyte	Labeled	Uncertainty	SRM
Ag	250 mg/L	±1 mg/L	3151*	Ni	250 mg/L	±1 mg/L	3136*
As	250 mg/L	±1 mg/L	3103a*	Pb	250 mg/L	±1 mg/L	3128*
B	250 mg/L	±1 mg/L	3107*	Sb	250 mg/L	±1 mg/L	3102a*
Ba	250 mg/L	±1 mg/L	3104a*	Se	250 mg/L	±1 mg/L	3149*
Be	250 mg/L	±1 mg/L	3105a*	Sn	250 mg/L	±1 mg/L	3161a*
Cd	250 mg/L	±1 mg/L	3108*	Sr	250 mg/L	±1 mg/L	3153a*
Co	250 mg/L	±1 mg/L	3113*	Ti	250 mg/L	±1 mg/L	3162a*
Cr	250 mg/L	±1 mg/L	3112a*	Tl	250 mg/L	±1 mg/L	3158*
Cu	250 mg/L	±1 mg/L	3114*	V	250 mg/L	±1 mg/L	3165*
Mn	250 mg/L	±1 mg/L	3132*	Zn	250 mg/L	±1 mg/L	3168a*
Mo	250 mg/L	±1 mg/L	3134*				

* - indicates NIST SRM

† - indicates SPEX CertiPrep CRM (when NIST SRM is not available)

SPEX CertiPrep Reference Multi: Lot# ALL8

Trace Metallic Impurities in the Actual Solution via ICP-MS Analysis:

Element	µg/L	Element	µg/L	Element	µg/L	Element	µg/L	Element	µg/L	Element	µg/L
Al	90	Eu	<5	In	<2	Nb	7	Rh	15	Th	0.3
Au	4	Fe	90	Ir	<4	Nd	<2	Ru	<10	Tm	<0.7
Bi	3	Ga	<7	K	70	P	<400	Sc	<1	U	<0.5
Ca	<150	Gd	0.6	La	40	Pd	<80	Si	<400	W	50
Ce	4	Ge	<10	Li	<10	Pr	4	Sm	20	Y	4
Cs	3	Hf	<2	Lu	<0.2	Pt	<2	Ta	7	Yb	<0.7
Dy	<0.01	Hg	<5	Mg	70	Rb	<1	Tb	<0.3	Zr	100
Er	<0.1	Ho	<0.2	Na	100	Re	<0.01	Te	<30		

D3L0906

ICP CAL 1 Trace Stock 250 mg/L

Received on: 11/30/2013

Opened: 12/09/2013; Exp.: 11/23/2014

D3L0907

ICP CAL 1 Trace Spike 250 mg/L

Received on: 11/30/2013

Opened: 12/09/2013; Exp.: 11/30/2014

Balances are calibrated regularly with weight sets traceable to NIST#s 32856, 32867 and others. This CRM is guaranteed stable and accurate to ±0.5% of the labeled value. This includes uncertainty components due to preparation, measurement, homogeneity, short-term and long-term stability, as well as transpiration loss. This guarantee is valid for a period of one year from the date of certification only when the material is unopened and stored under ambient laboratory conditions.

Date of Certification: NOV 2013

Certifying Officer: Ray Wilfong

©2013 SPEXpert Inc.

Report of Certification

This Certified Reference Material (CRM) has been prepared and certified under an ISO 9001:2008, ISO 17025:2005, and ISO Guide 34:2009 quality system consistent with the following guides:

- ISO 9001: Quality management systems – Requirements – certified by UL-DQS
- ISO 17025: General requirements for the competence of testing and calibration laboratories – accredited by A2LA
- ISO Guide 34: General requirements for the competence of reference material producers – accredited by A2LA
- ISO Guide 31: Reference Materials – Contents of certificates and labels
- ISO Guide 35: 2006 Reference Materials – General & Statistical Principles for Certification
- Guide To The Expression Of Uncertainty In Measurement 1997
- EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
- ASTM Guide D6362-98
- NIST Technical Note 1297
- ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
- ISO/REMCO N280

Material Source:

All analytes and matrix materials are obtained and verified by SPEX CertiPrep from pre-qualified vendors as per ISO 9001:2008, ISO 17025:2005, and ISO Guide 34:2009 guidelines. Vendor identifications are proprietary, however sources of all materials used in the preparation and testing of SPEX CertiPrep CRMs are tracked and documented. For further assistance, please contact the Sales Support Department at crmsales@spexcsp.com.

Instructions for Use:

Primary usage of this CRM is in neat form or diluted serially with matrix of a purity at or greater than the purity of the original matrix solution. If dilution is required the diluent must be compatible with all certified analytes and contain stabilizers appropriate for the period of intended use. The CRM can also be used as a spike or with a spike, again with appropriate compatibility considerations. All solutions should be thoroughly mixed, by shaking, prior to use and never pipetted directly from the bottle. All surfaces that come in contact with the solution must be thoroughly cleaned and leached prior to use. Dilutions should be performed only with Class A volumetric glassware.

Method of Preparation:

Clean laboratory procedures and techniques have been used throughout the preparation. All materials, equipment, analytical instrumentation and personnel have been qualified prior to use. The highest purity acids applicable, 18 megohm, double deionized water, acid-leached triple-rinsed bottles (where appropriate), and Class A/calibrated volumetrics have been used in all preparations.

Homogeneity:

The homogeneity of the CRM has been confirmed by procedures consistent with ISO 17025:2005, ISO Guide 34:2009, and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed to prove homogeneity in accordance with our internal procedure 4600-HOMOGEN-1A. Since the product is highly homogeneous, any sample size taken for analysis would be within the uncertainty budget. This is consistent with the intended use of the CRM.

Statistical Estimator and Confidence Limits:

The certified value 'X' listed on the reverse of this document is at the 95% level of confidence and can be expressed as:

- $X = x \pm U$ where x = certified value, U = expanded uncertainty, x = property value
- $U = k u_c$ where $k = 2$ is the coverage factor at the 95% confidence level
- u_c is obtained by combining the individual element standard uncertainty components u_i , and $u_c = \sqrt{\sum u_i^2}$

Certification Traveler Report:

All certified values reported were derived from the Traveler Report (SPEX CertiPrep's traceability documentation) identified by the lot number of this CRM. During the stated period of validity, the purchaser will be notified if this product is recalled due to any significant changes in the stability of the solution. For further assistance, please contact the Sales Support Department at crmsales@spexcsp.com.

Legal Notice:

SPEX CertiPrep reference materials are not for any cosmetic, drug or household application and are to be used only by qualified individuals who are trained in appropriate procedures. No claims against SPEX CertiPrep, Inc. of any kind whatsoever, whether based on breach of warranty, alleged negligence, or otherwise, with respect to this Reference Material shall be greater than the purchase price. In no event shall SPEX CertiPrep, Inc. be liable for any loss of profits or any incidental, special, or consequential damages.



CERTIFIED WEIGHT REPORT:

Part Number: **58047**
Lot Number: **020514**
Description: **Silver (Ag)**

Lot #
C363101
Solvent:
Nitric Acid

Expiration Date: 020517

2.0%

40.0 (mL)
Nitric Acid

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

Storage: 20 °C

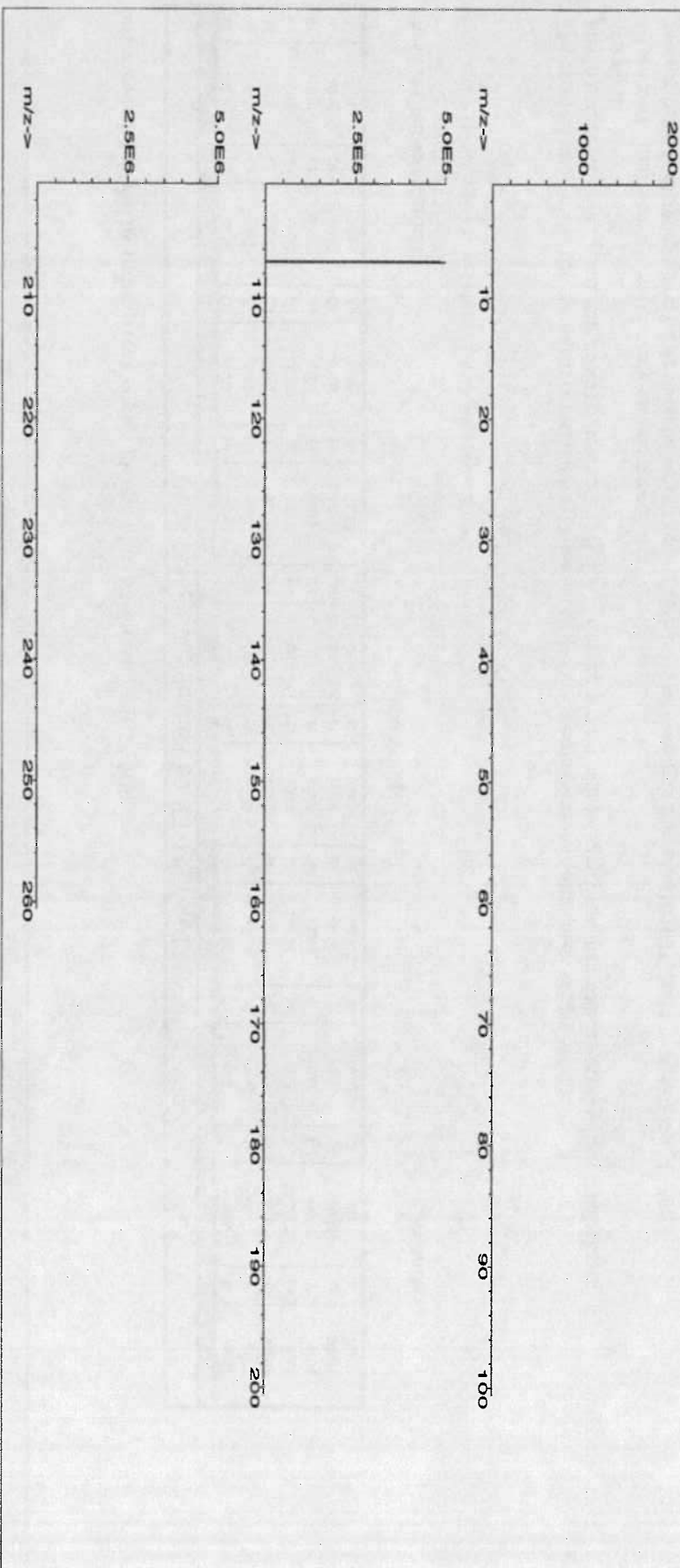
Volume shown below was diluted to (mL): 1999.78
5E-05 Balance Uncertainty
0.100 Flask Uncertainty

Formulated By:	Paul Barron	020514
Reviewed By:	Pedro L. Renteria	020514

MSDS Information

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Uncertainty Pipette	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty (+/-)	(Solvent Safety Info. On Attached pg.)	CAS#	OSHA PEL (TWA)	LD50	NIST SRM
1. Silver nitrate (Ag)	58147	020514	0.1000	200.0	0.013	10002.5	1000.4	0.00201	07761-86-8	10 µg/m3	N/A	3151	

[1] Spectrum No. 1 [10.014 sec]:58047.D# [Count] [Linear]





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

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

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

(T) = Target analyte

Certified by:

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

Physical Characterization:

- * 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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: **59371**
Lot Number: **020514**
Description: **ICP Mix #1**

Lot #
C363101
SZBC2600V
Solvants: Nitric Acid
Hydrofluoric acid

Expiration Date: 020517
17 Components

5.0%

25.0
Trace
Nitric Acid
Hydrofluoric acid
(mL)

Nominal Concentration (µg/mL): 100

Storage: 20 °C

Volumes shown below were diluted to (mL): 500 10 0.100
Balance Uncertainty
Flask Uncertainty

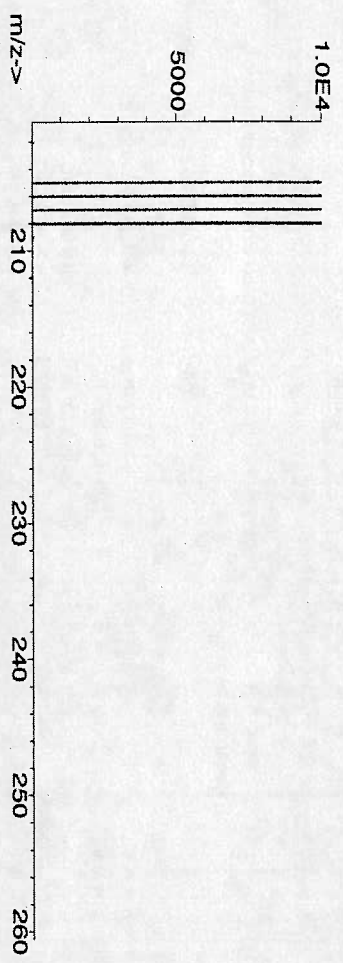
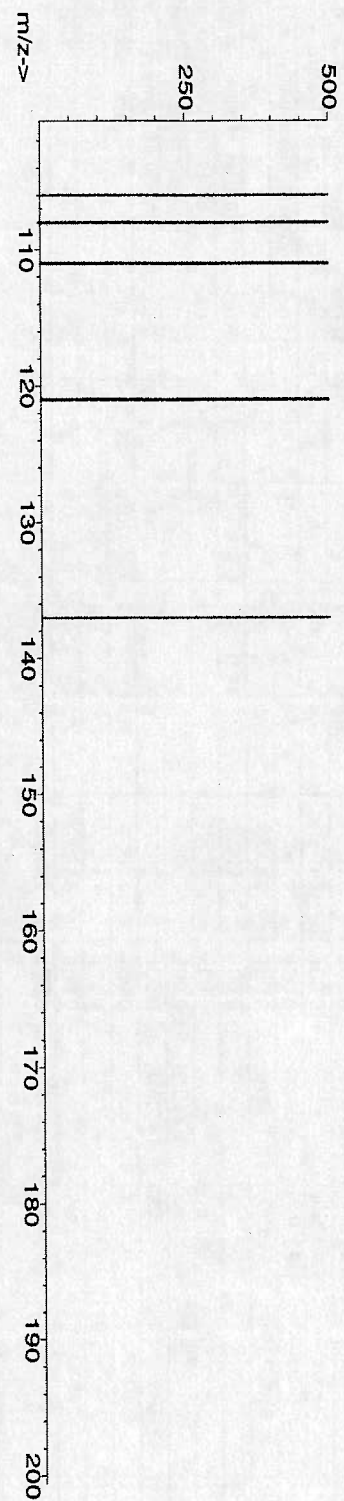
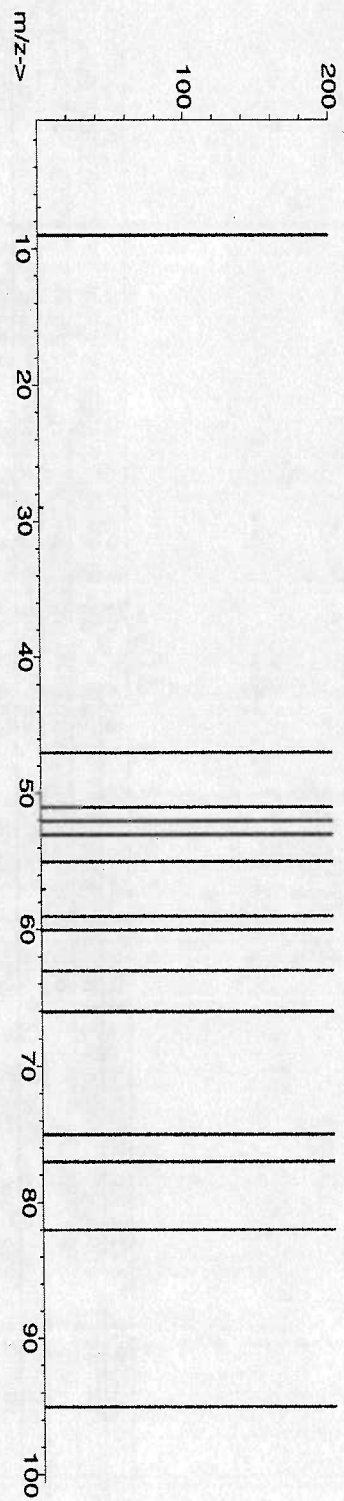
Formulated By:	Paul Barron	020514
Reviewed By:	Pedro L. Renteria	020514

MSDS Information

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Uncertainty	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty (+/-)	(Solvent Safety Info. On Attached pg.)	CAS#	OSHA PEL (TWA)	LD50	NIST SRM
1. Antimony Oxide (Sb)	58151	062813	0.0100	5.0	0.025	10018.0	100.2	0.01021	07440-36-0	5.0 mg/m3	N/A	N/A	3102a
2. Arsenic (As)	58133	110812	0.0100	5.0	0.025	10001.2	100.0	0.01021	07440-38-2	0.2 mg/m3	N/A	N/A	3103a
3. Barium nitrate (Ba)	58156	121013	0.0100	5.0	0.025	10001.4	100.0	0.00200	10022-31-8	0.5 mg/m3	off-rat 355 mg/kg	3104a	3105a
4. Beryllium acetate (Be)	58104	051713	0.0100	5.0	0.025	10001.4	100.0	0.00201	19049-40-2	0.002 µg/m3	N/A	N/A	3105a
5. Cadmium nitrate tetrahydrate (Cd)	58148	042513	0.0100	5.0	0.025	10000.0	100.0	0.00200	10022-68-1	0.2 mg/m3	N/A	N/A	3108
6. Chromium (III) nitrate nonahydrate (Cr)	58124	100813	0.0100	5.0	0.025	10001.3	100.0	0.00200	07789-02-8	0.5 mg(Cr)/m3	off-rat 3250 mg/kg	3112a	3113
7. Cobalt nitrate Hexahydrate (Co)	58127	062113	0.0100	5.0	0.025	10001.1	100.0	0.00204	10026-22-9	5 mg/m3	off-rat 694 mg/kg	3113	3114
8. Copper (II) nitrate trihydrate (Cu)	58129	012814	0.0100	5.0	0.025	10000.2	100.0	0.00200	10031-43-3	N/A	off-rat 940 mg/kg	3114	3128
9. Lead (II) Nitrate (Pb)	58182	060313	0.0100	5.0	0.025	10001.5	100.0	0.00200	10099-74-8	0.05 mg/m3	500 mg/kg	3128	3132
10. Manganese (II) nitrate Hydrate (Mn)	58125	110513	0.0100	5.0	0.025	10001.0	100.0	0.00200	15710-66-4	5 mg/m3	N/A	N/A	3132
11. Ammonium molybdate (Mo)	58142	072613	0.0100	5.0	0.025	10001.3	100.0	0.00200	12054-85-2	5 mg(Mo)/m3	off-rat 1620 mg/kg	3134	3136
12. Nickel (II) nitrate Hexahydrate (Ni)	58128	022213	0.0100	5.0	0.025	10001.6	100.0	0.00200	13478-00-7	1 mg/m3	off-rat 333 mg/kg	3134	3136
13. Selenium (IV) oxide (Se)	58134	100412	0.0100	5.0	0.025	10001.4	100.0	0.00200	07746-08-4	0.2 mg/m3	N/A	N/A	3149
14. Thallium nitrate (Tl)	58181	051613	0.0100	5.0	0.025	10000.6	100.0	0.00201	10102-45-1	5 mg/m3	N/A	N/A	3158
15. Ammonium hexafluorotellurate (Tl)	58122	111513	0.0100	5.0	0.025	10001.3	100.0	0.00201	16962-40-6	N/A	N/A	N/A	3162a
16. Ammonium Metavanadate (V)	58123	120913	0.0100	5.0	0.025	10001.4	100.0	0.00201	07803-55-6	1.0 mg/m3	off-rat 630 mg/kg	3165	3168
17. Zinc nitrate hydrate (Zn)	58130	042313	0.0100	5.0	0.025	10001.5	100.0	0.00200	13778-30-8	1 mg/m3	off-rat 1190mg/kg	3168	



[1] Spectrum No. 1 [16.634 sec]:59371.D# [Count] [Linear]





CERTIFIED WEIGHT REPORT

Part Number: 59274
Lot Number: 020514
Description: ICP Mix #2
Expiration Date: 020517
Nominal Concentration (µg/mL): 5000
Storage: 20 °C
Solvent: C363101 Nitric Acid
Lot #
5% 50.0 Nitric Acid (mL)

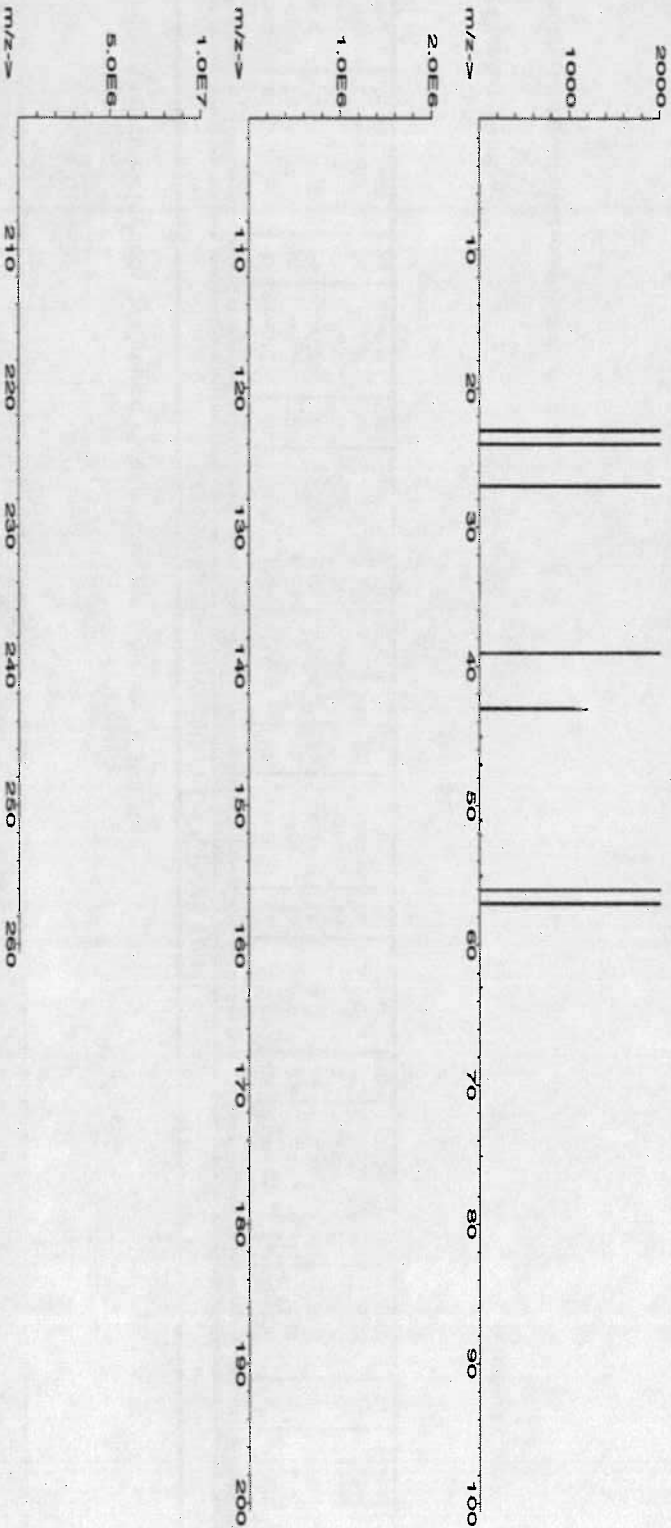
Weights shown below were diluted to (mL): 999.86 0.116 Flask Uncertainty

<i>Signature</i>	
Formulated By:	Lawrence Barry
Reviewed By:	Pedro L. Renteria
	020514

MSDS Information

Compound	Lot	Nominal Conc. (µg/mL)	Purity	Uncertainty Purity (%)	Assay	Target Weight (g)	Actual Weight (g)	Actual Conc. (µg/mL)	Expanded Uncertainty (+/-)	(Solvent Safety Info. On Attached pg.)	NIST SRM
1. Aluminum Nitrate Nonahydrate (Al)	IN022 C1807ALAS2	5000.0	99.995	0.10	7.10	70.4160	70.4163	5000.0	0.00201	07784-27-2	5 mg/m3 or-rel 264 mg/kg 3101a
2. Calcium carbonate (Ca)	IN014 D0613CAA1	5000.0	99.999	0.10	40.7	12.2834	12.2837	5000.1	0.00201	00471-34-1	7 mg/m3 N/A 3109a
3. Iron (III) Nitrate Nonahydrate (Fe)	IN028 C4108FEA1R2	5000.0	99.999	0.10	13.8	36.2271	36.2273	5000.0	0.00201	07782-61-8	7 mg/m3 N/A 3126a
4. Magnesium Nitrate Hexahydrate (Mg)	IN030 D1112MG42	5000.0	99.9995	0.10	9.60	52.0762	52.0768	5000.1	0.00201	13446-18-9	7 mg/m3 N/A 3131a
5. Potassium nitrate (K)	IN034 K511KD2	5000.0	99.999	0.10	38.7	12.9182	12.9185	5000.1	0.00201	07757-79-1	5 mg/m3 or-rel 3015 mg/kg 3141a
6. Sodium nitrate (Na)	IN036 R808NAA8	5000.0	99.999	0.10	27.0	18.5161	18.5162	5000.0	0.00201	07631-99-4	5 mg/m3 or-rel 3236 mg/kg 3152a

[1] Spectrum No. 1 [19.253 sec]:59274.D# [Count] [Linear]





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

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

Al	T	Cd	<0.02	Dy	<0.02	Hf	<0.02	Li	<0.02	Ni	<0.02	Pt	<0.02	Se	<0.2	Tb	<0.02	W	<0.02
Sb	<0.02	Ca	T	Er	<0.02	Ho	<0.02	Lu	<0.02	Nb	<0.02	Rh	<0.02	Si	<0.02	Te	<0.02	U	<0.02
As	<0.2	Ce	<0.02	Ga	<0.02	In	<0.02	Mg	T	Os	<0.02	Ru	<0.02	Ag	<0.02	Ti	<0.02	V	<0.02
Ba	<0.02	Co	<0.02	Gd	<0.02	Ir	<0.02	Mn	<0.02	Pd	<0.02	Sr	<0.02	Na	T	Th	<0.02	Yb	<0.02
Be	<0.01	Cr	<0.02	Ge	<0.02	La	T	Hg	<0.2	P	<0.02	Sm	<0.02	S	<0.02	Tm	<0.02	Y	<0.02
Bi	<0.02	Cu	<0.02	Au	<0.02	Pb	<0.02	Mo	<0.02	K	<0.02	Sc	<0.02	Ta	<0.02	Sn	<0.02	Zn	<0.02
B	<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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: **58033**
Lot Number: **020514**
Description: **Arsenic (As)**

Lot # **C363101**
Solvent: **Nitric Acid**

Expiration Date: **020517**

2.0%

40.0 (mL)
Nitric Acid

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

Storage: **20 °C**

Volume shown below was diluted to (mL): **1999.88**

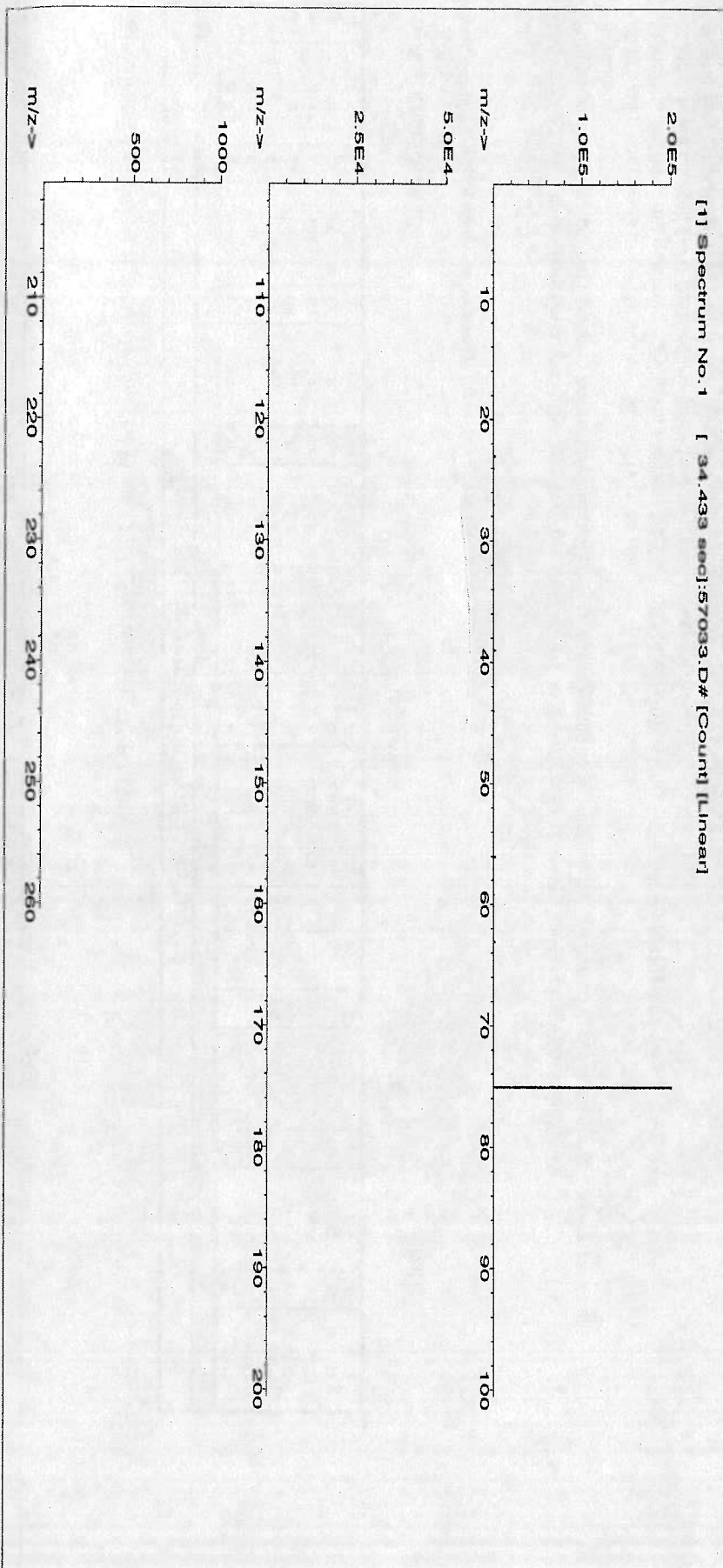
5E-05 Balance Uncertainty
0.100 Flask Uncertainty

Formulated By: <i>Gabriel Helland</i>		020514
Reviewed By: <i>Pedro L. Renteria</i>		020514

MSDS Information

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Uncertainty Pipette	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty (+/-)	(Solvent Safety Info. On Attached pg.)	LD50	SRM
----------	-------------	------------	-----------------	----------------	---------------------	-----------------------	---------------------	----------------------------	--	------	-----

1. Arsenic (As)	58133	110812	0.1000	200.0	0.013	10001.2	1000.3	0.00201	07440-38-2	0.2 mg/m ³	N/A	3103A
-----------------	-------	--------	--------	-------	-------	---------	--------	---------	------------	-----------------------	-----	-------





CERTIFIED WEIGHT REPORT:

Part Number:
Lot Number:
Description:

58004
020514
Beryllium (Be)

Lot #
C363101
Solvent:

Nitric Acid

2.0%

40.0
(mL)

Nitric Acid

Formulated By: *Gabriel Helland*
Reviewed By: *Pedro L. Rentas*

Gabriel Helland

020514

Reviewed By: *Pedro L. Rentas*
020514

Expiration Date:
020517

Storage: 20 °C

SE-05 Balance Uncertainty
0.080 Flask Uncertainty

Volume shown below was diluted to (mL):

1999.98

0.080

Flask Uncertainty

MSDS Information

(Solvent Safety Info. On Attached pg.)

CAS# : 0514 PEL (TWA)

LD50

NIST

SRM

1. Beryllium acetate (Be)

58104 051713

0.1000

200.0

0.013

10001.4

1000.2

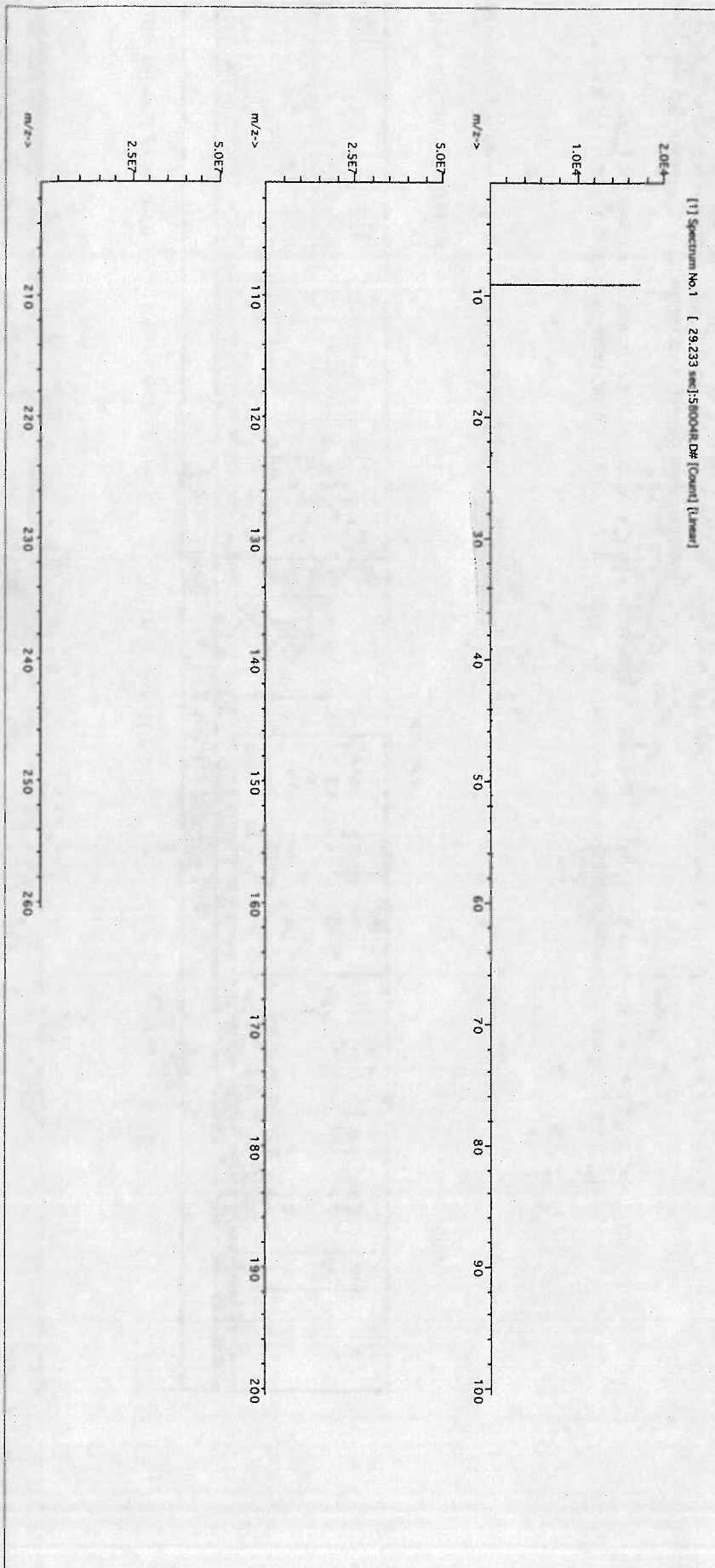
0.00202

18048-40-2

0.002 ug/m3

N/A

3105a





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

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

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

(T) = Target analyte

Physical Characterization:

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

Certified by:

[Signature]

- * 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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: **58082**
Lot Number: **020514**
Description: **Lead (Pb)**

Lot # **C363101**
Solvent: **Nitric Acid**

Expiration Date: **020517**

2.0%

40.0 (mL)

Nitric Acid

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

Storage: 20 °C

Volume shown below was diluted to (mL): **1999.98**

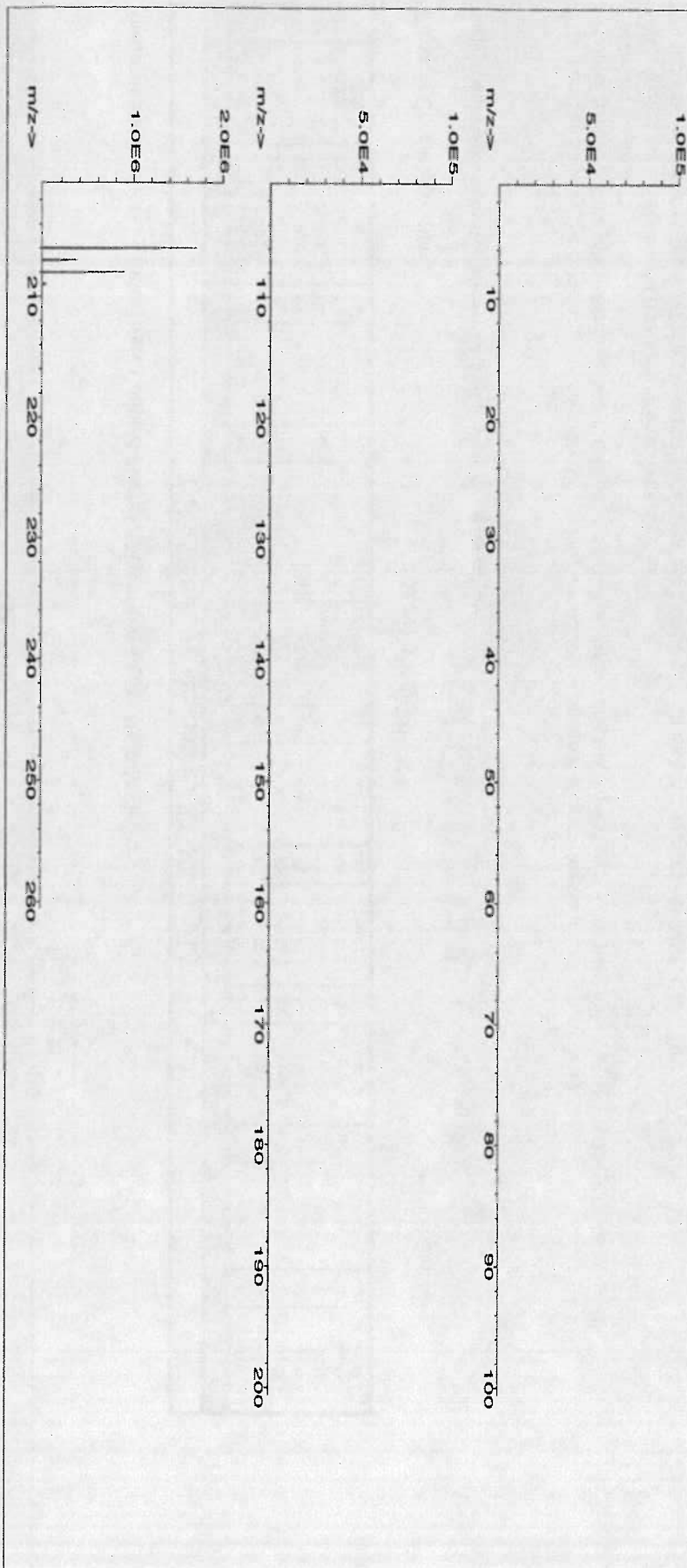
SE-05 Balance Uncertainty
0.090 Flask Uncertainty

Formulated By:	Lawrence Barry
	020514
Reviewed By:	Pedro L. Rientas
	020514

MSDS Information

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Uncertainty	Pipette	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty (+/-)	CAS#	OSHA PEL (TWA)	LD50	NIST SRM
1. Lead (II) Nitrate (Pb)	58182	060313	0.1000	200.0	0.013		10001.5	1000.2	0.00201	10099-74-8	0.05 mg/m3	500 mg/kg	3128

[1] Spectrum No. 1 [14.144 sec]:58082.D# [Count] [Linear]





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

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

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

(T) = Target analyte

Certified by:

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

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: **58042**
Lot Number: **020514**
Description: **Molybdenum (Mo)**

Lot # **Y47057** Solvent: **Ammonium hydroxide**

Expiration Date: **020517**

0.5%

10.0 (mL)

Ammonium hydroxide

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

Storage: **20 °C**

Volume shown below was diluted to (mL):

1999.98

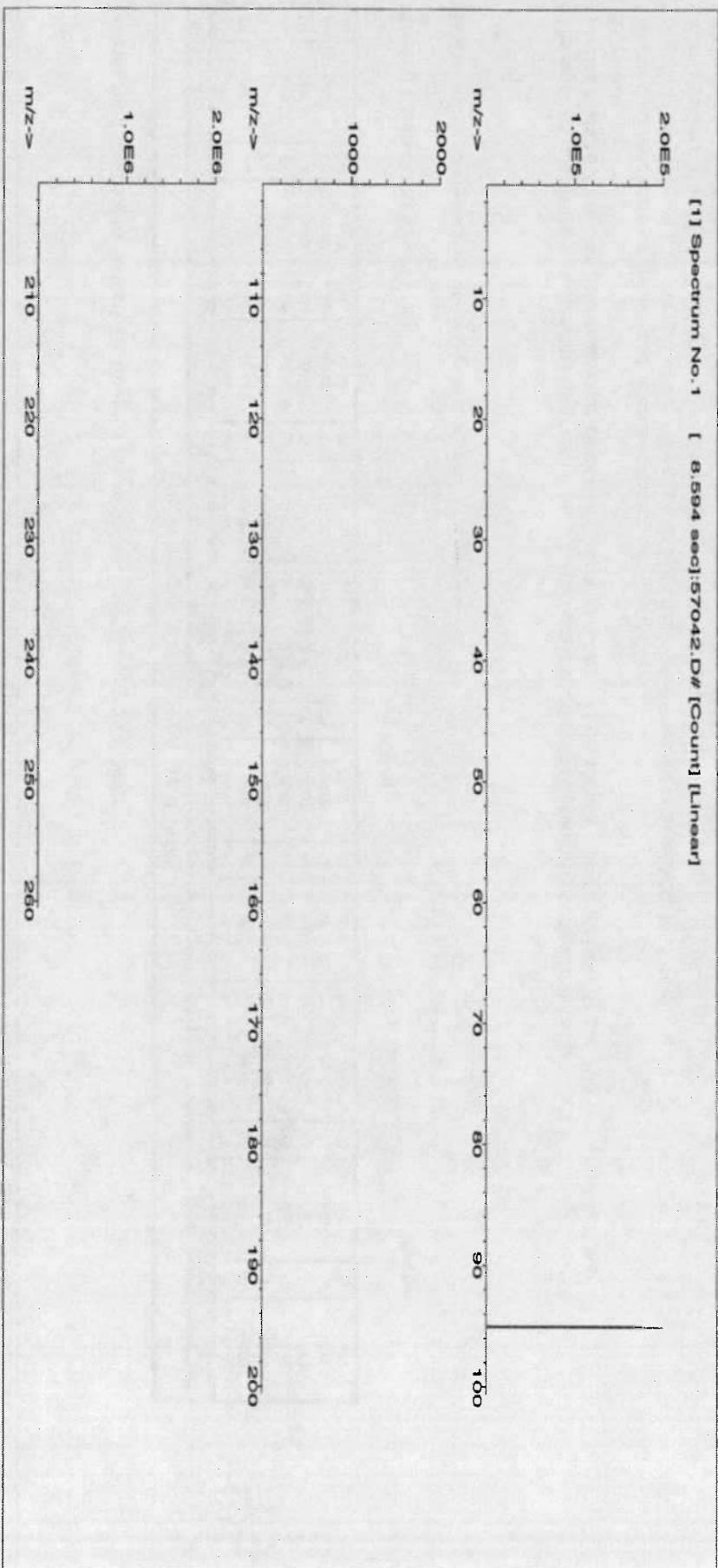
0.090

Balance Uncertainty
Flask Uncertainty

Formulated By: <i>Lawrence Barry</i>		020514
Reviewed By: <i>Pedro L. Rentas</i>		020514

MSDS Information

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Uncertainty Pipette	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty (+/-)	(Solvent Safety Info. On Attached pg.)	NIST SRM
1. Ammonium molybdate (Mo)	58142	072613	0.1000	200.0	0.013	10001.28	1000.1	0.00201	12054-85-2 5 mg(Mo)/m3 or-ral 333 mg/kg	3134





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

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

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

(T)= Target analyte

Physical Characterization:

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

John P. [Signature]

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, (NIST Test #: 732/245/790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: **58022**
Lot Number: **020514**
Description: **Titanium (Ti)**

Lot # **C363101**
Solvent: **Nitric Acid**

2.0%

Expiration Date: **020517**

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

Storage: **20 °C**

40.0 (mL)
Nitric Acid

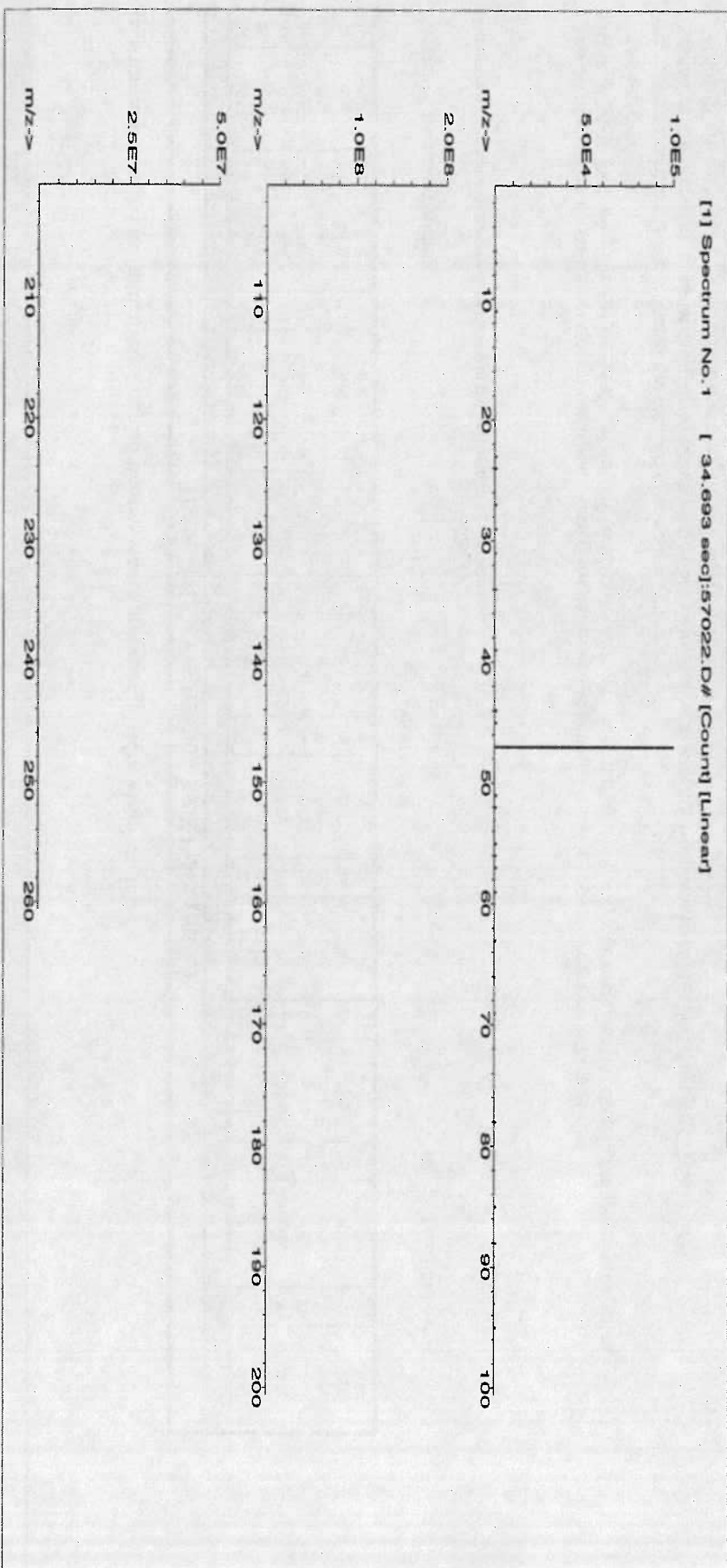
Volume shown below was diluted to (mL): **1999.98**

5E-05 Balance Uncertainty
0.090 Flask Uncertainty

<i>Lawrence Barry</i>	
Formulated By:	Lawrence Barry
Reviewed By:	<i>Pedro L. Rentas</i>
	Pedro L. Rentas
	020514

MSDS Information

Compound	Part	Lot	Dilution	Initial	Uncertainty	Pipette	Initial	Final	Expanded	(Solvent Safety Info. On Attached pg.)		
	Number	Number	Factor	Volume			Conc. (µg/mL)	Conc. (µg/mL)	Uncertainty	CAS#	: OSHA PEL (TWA)	LD50
1. Ammonium hexafluoroantimonate (Ti)	58122	111513	0.1000	200.0	0.013		10001.3	1000.1	0.00202	16962-40-6	N/A	N/A
									(+/-)			





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

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

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

(T) = Target analyte

Certified by:

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

Physical Characterization:

- * 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, (NIST Test #: 732/245/90).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: **58023**
Lot Number: **020514**
Description: **Vanadium (V)**

Lot #
C363101
Solvent: Nitric Acid

Expiration Date: 020517

2.0%

40.0 (mL)

Nitric Acid

Nominal Concentration (µg/mL): 1000

Storage: 20 °C

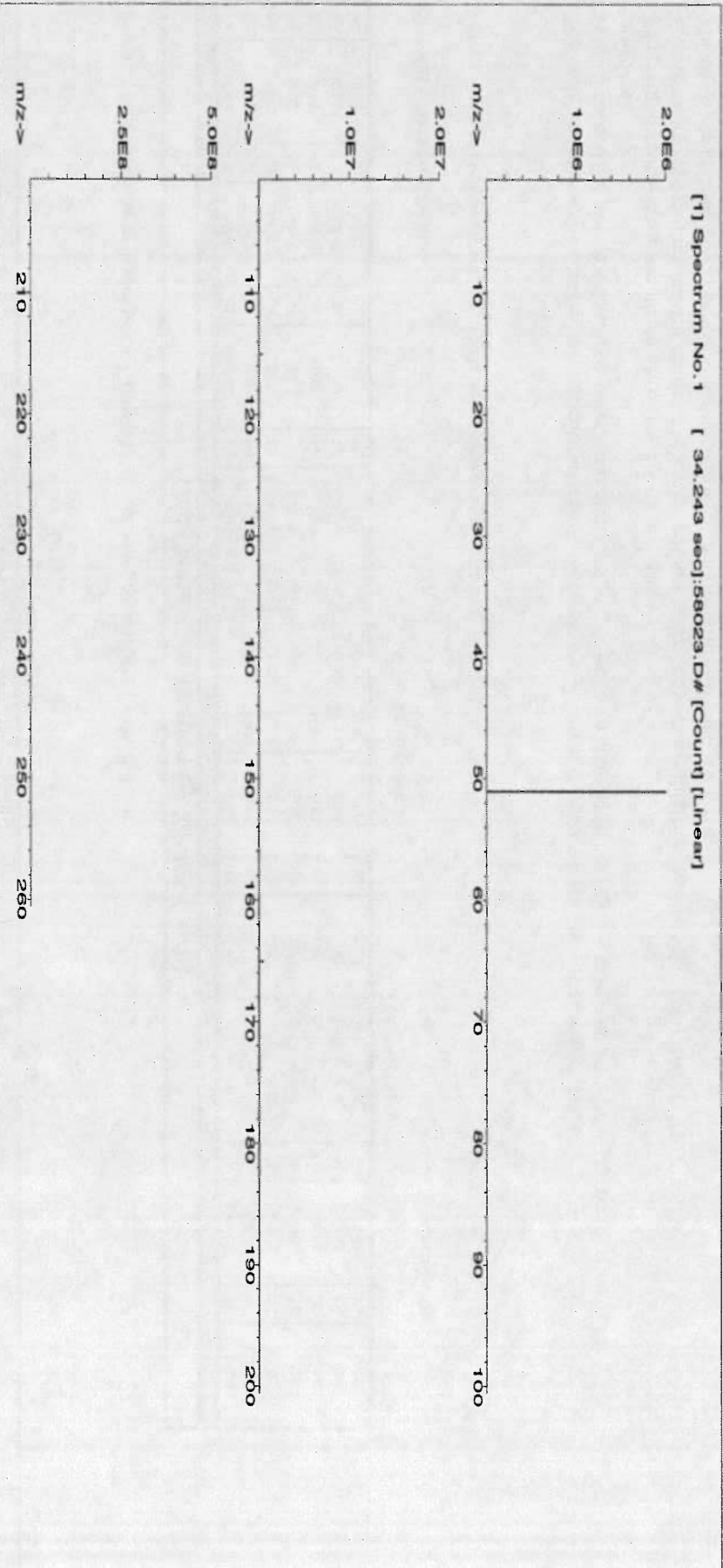
Volume shown below was diluted to (mL): 1999.78

5E-05 Balance Uncertainty
0.100 Flask Uncertainty

Formulated By:	Lawrence Barry	020514
Reviewed By:	Pedro L. Reritas	020514

MSDS Information

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Uncertainty Pipette	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty (+/-)	(Solvent Safety Info. On Attached pg.)	NIST SRM
1. Ammonium Metavanadate (V)	58123	042613	0.1000	200.0	0.013	10001.4	1000.2	0.00202	07803-55-6 1.0 mg/m3 or rat 630 mg/kg	3165





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

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

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

(T) = Target analyte

Certified by:

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

Physical Characterization:

- * 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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: **58047**
Lot Number: **020514**
Description: **Silver (Ag)**

Lot #
C363101

Solvent:
Nitric Acid

Expiration Date: 020517

2.0%

40.0 (mL)

Nominal Concentration (µg/mL): 1000

Storage: 20 °C

Volume shown below was diluted to (mL):

1999.78 5E-05 Balance Uncertainty
0.100 Flask Uncertainty

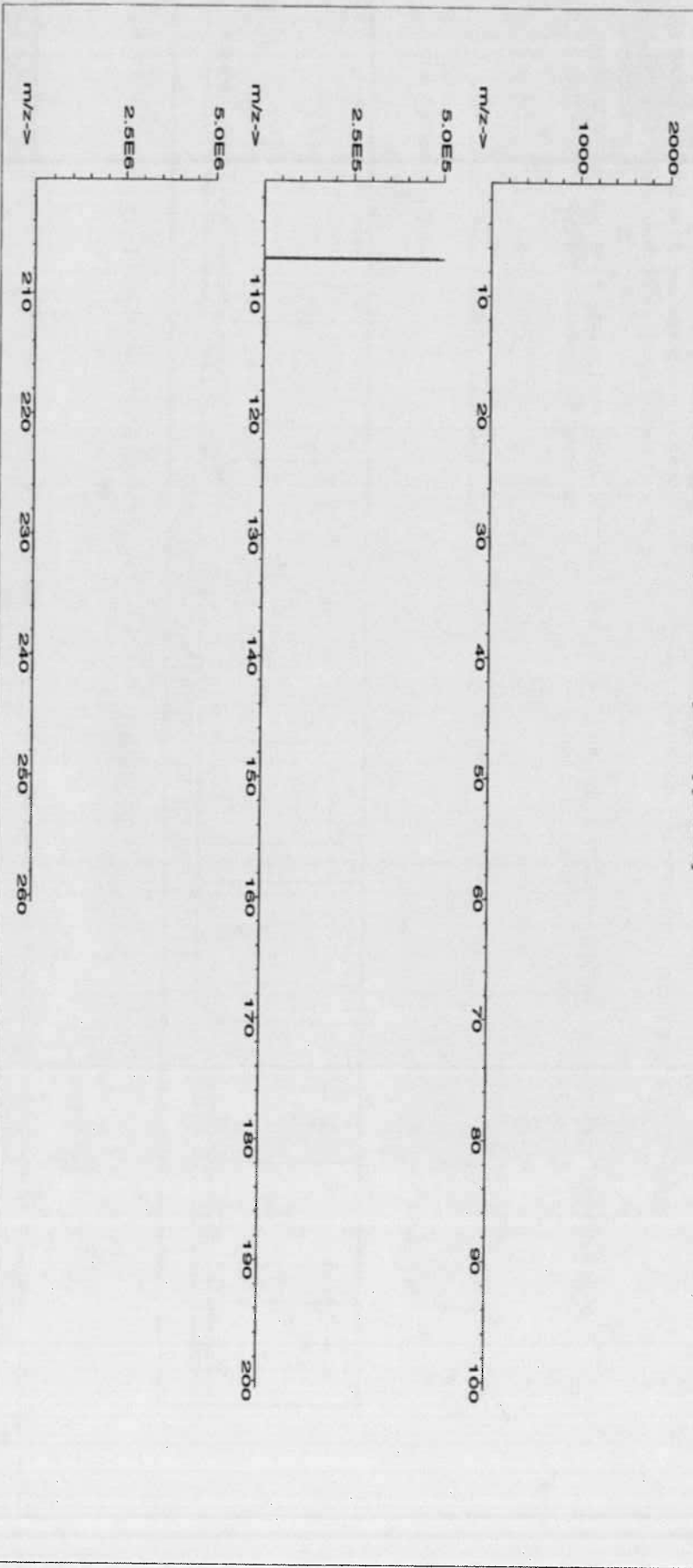
Formulated By:	Paul Barron	020514
Reviewed By:	Pedro L. Renteria	020514

MSDS Information

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

1. Silver nitrate (Ag)	58147	020514	0.1000	200.0	0.013	10002.5	1000.4	0.00201	07761-88-8	10 µg/m3	N/A	3151
------------------------	-------	--------	--------	-------	-------	---------	--------	---------	------------	----------	-----	------

[1] Spectrum No. 1 [10.014 sec]:58047.D# [Count] [Linear]





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

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

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

(T)= Target analyte

Certified by:

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

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: **58027**
Lot Number: **021814**
Description: **Cobalt (Co)**

Lot #
C363101

Solvent:
Nitric Acid

Expiration Date: 021817

2.0%

40.0 (mL)

Nitric Acid

Nominal Concentration (µg/mL): 1000

Storage: 20 °C

Volume shown below was diluted to (mL):

1999.98

0.090

Balance Uncertainty
Flask Uncertainty

Formulated By: <i>Gabriel Helland</i>	
Reviewed By: <i>Pedro L. Rentas</i>	Gabriel Helland
	021814
	021814

Compound

1. Cobalt nitrate Hexahydrate (Co) 58127 062113 0.1000 200.0 0.013 10001.1 1000.1 0.00205 10026-22-9 5 mg/m3 or/rat 694 mg/kg 3113

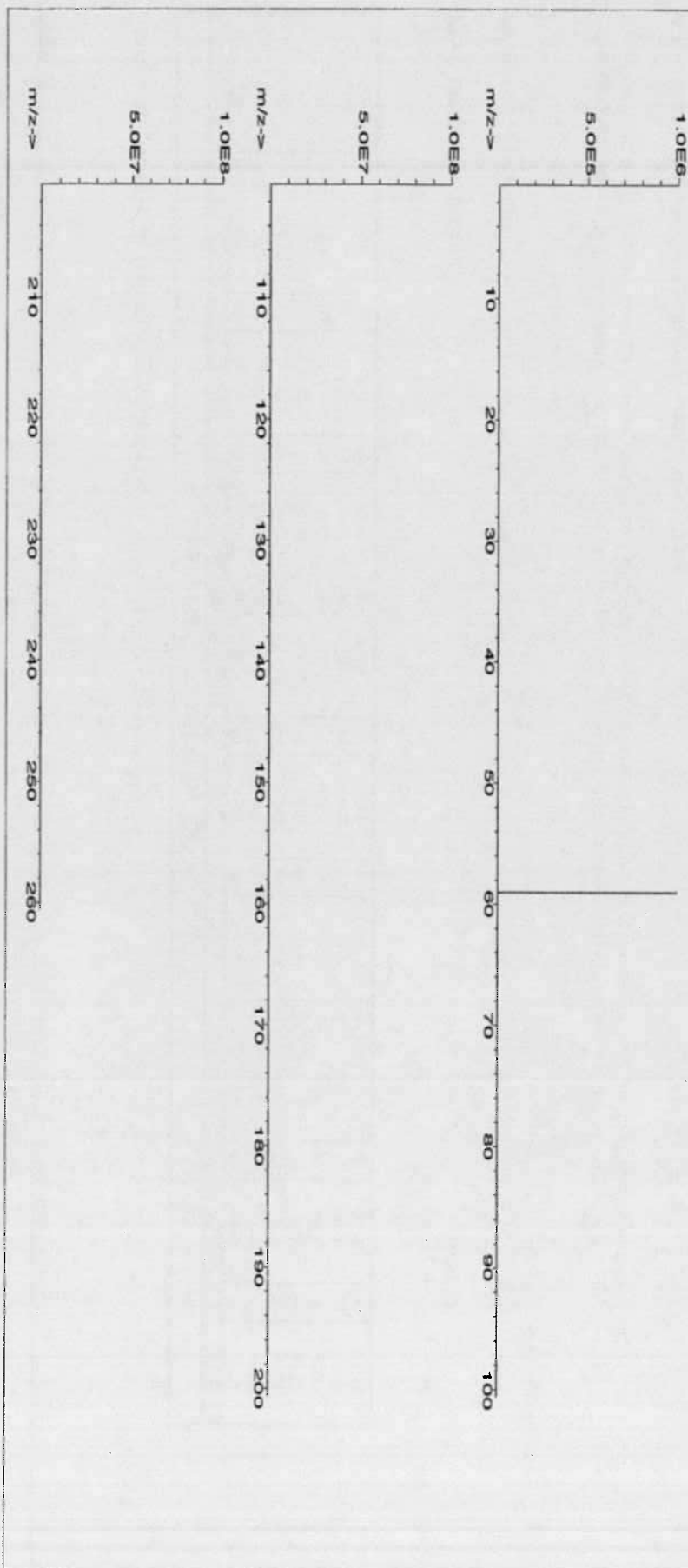
(+/-)

MSDS Information

(Solvent Safety Info. On Attached pg.)

NIST SRM

[1] Spectrum No. 1 [34.243 sec]:58027.D# [Count] [Linear]





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

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

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

(T) = Target analyte

Physical Characterization:

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

Certified by:

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: **58048**
Lot Number: **021914**
Description: **Cadmium (Cd)**

Lot # **C363101**
Solvent: **Nitric Acid**

Expiration Date: **021917**
Storage: **20 °C**
2.0%
40.0 (mL)
Nitric Acid

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

Volume shown below was diluted to (mL): **1999.98**

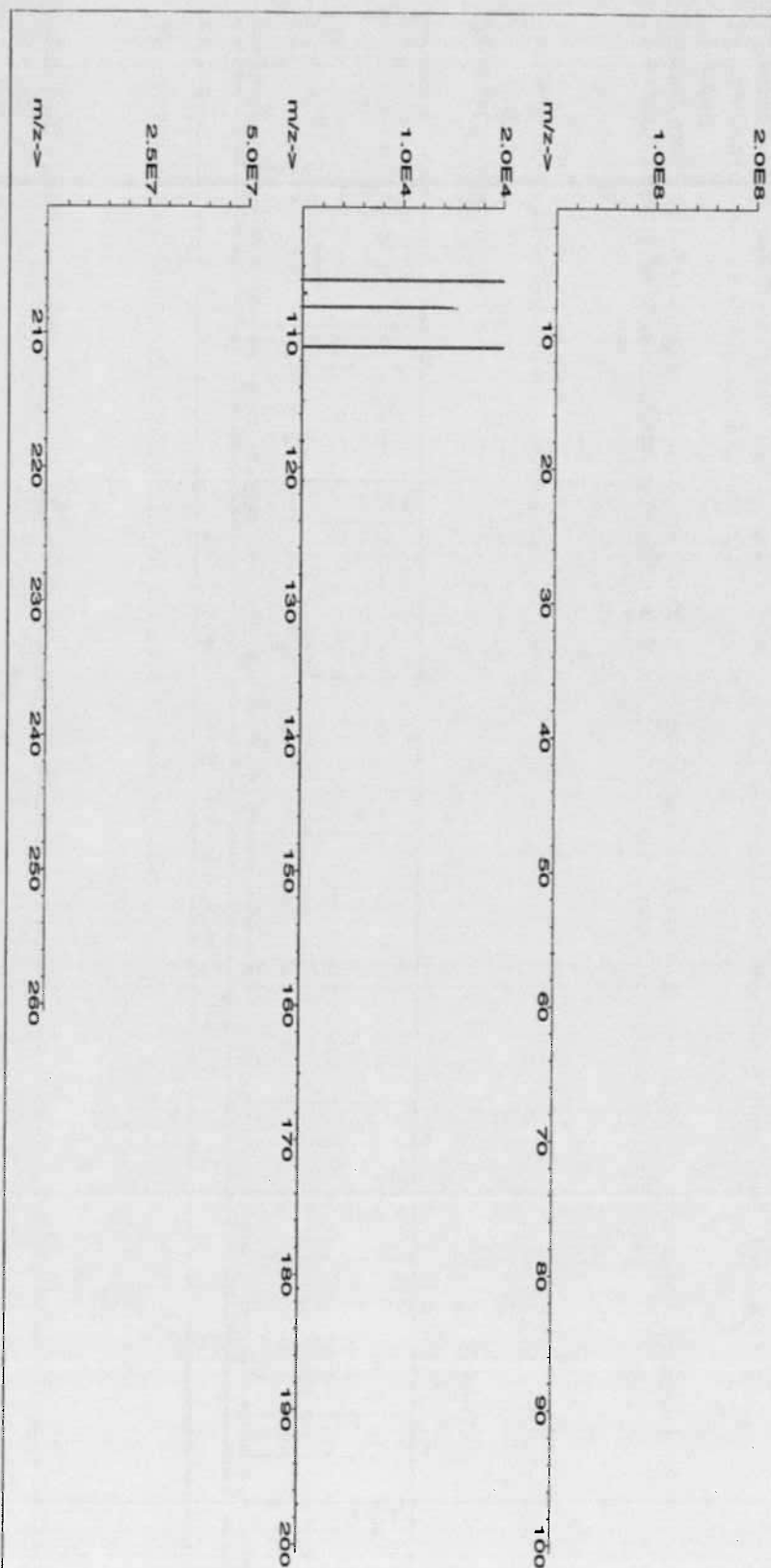
SE-05 Balance Uncertainty
0.090 Flask Uncertainty

Formulated By:	<i>Gabriel Heiland</i>
Reviewed By:	<i>Pedro L. Ruelas</i>
Gabriel Heiland	021914
Pedro L. Ruelas	021914

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Uncertainty Pipette	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty (+/-)	(Solvent Safety Info. On Attached pg.)	NIST SRM
----------	-------------	------------	-----------------	----------------	---------------------	-----------------------	---------------------	----------------------------	--	----------

1. Cadmium nitrate tetrahydrate (Cd)	58148	042513	0.1000	200.0	0.013	10000.0	1000.0	0.00201	10022-68-1 0.2 mg/m3	N/A 3108
--------------------------------------	-------	--------	--------	-------	-------	---------	--------	---------	----------------------	----------

[1] Spectrum No. 1 [33.363 sec]:57048.D# [Count] [Linear]





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

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

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

(T)= Target analyte

Certified by:

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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: **58056**
Lot Number: **031714**
Description: **Barium (Ba)**

Lot # **C363101**
Solvent: **Nitric Acid**

Expiration Date: **031717**

2.0%

40.0 (mL)
Nitric Acid

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

Storage: **20 °C**

Volume shown below was diluted to (mL):

1999.98

0.090

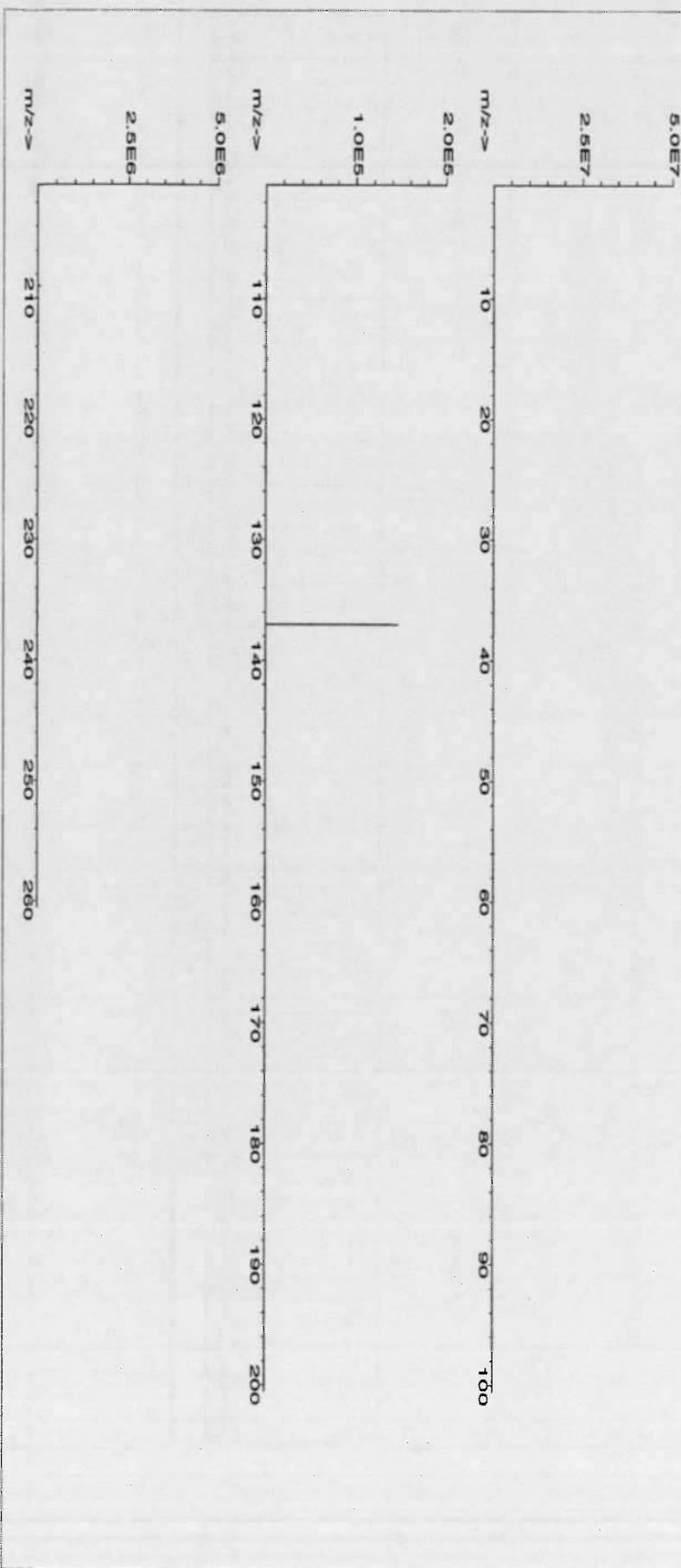
Balance Uncertainty
Flask Uncertainty

Formulated By:	<i>Lawrence Barry</i>	031714
Reviewed By:	<i>Pedro L. Rentas</i>	031714

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Uncertainty Pipette	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty (+/-)	(Solvent Safety Info. On Attached pg.)	NIST SRM
----------	-------------	------------	-----------------	----------------	---------------------	-----------------------	---------------------	----------------------------	--	----------

1. Barium nitrate (Ba)	58156	121013	0.1000	200.0	0.013	10001.4	1000.2	0.00201	10022-31-8 0.5 mg/m3 or/ral 355 mg/kg	3104a
------------------------	-------	--------	--------	-------	-------	---------	--------	---------	---------------------------------------	-------

[1] Spectrum No. 1 [19.234 sec]:57056Q.D# [Count] [Linear]





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

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

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

(T)= Target analyte

Physical Characterization:

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

Certified by:

- * The certified value is the concentration calculated from gravimetric and volumetric measurements unless otherwise stated.
- * Purified acids, 18.2 megohm deionized water, calibrated Class A glassware and the highest purity raw materials are used in the preparation of all standards.
- * All standard containers are meticulously cleaned prior to use.
- * Standards are prepared gravimetrically using balances that are calibrated with weights traceable to NIST, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number:
Lot Number:
Description:

58024
032114
Chromium (Cr)

Lot #
C363101
Solvent:
Nitric Acid

Expiration Date:

032117

2.0%

40.0
(mL)

Storage: 20 °C

Nitric Acid

Nominal Concentration (µg/mL):

1000

Volume shown below was diluted to (mL):

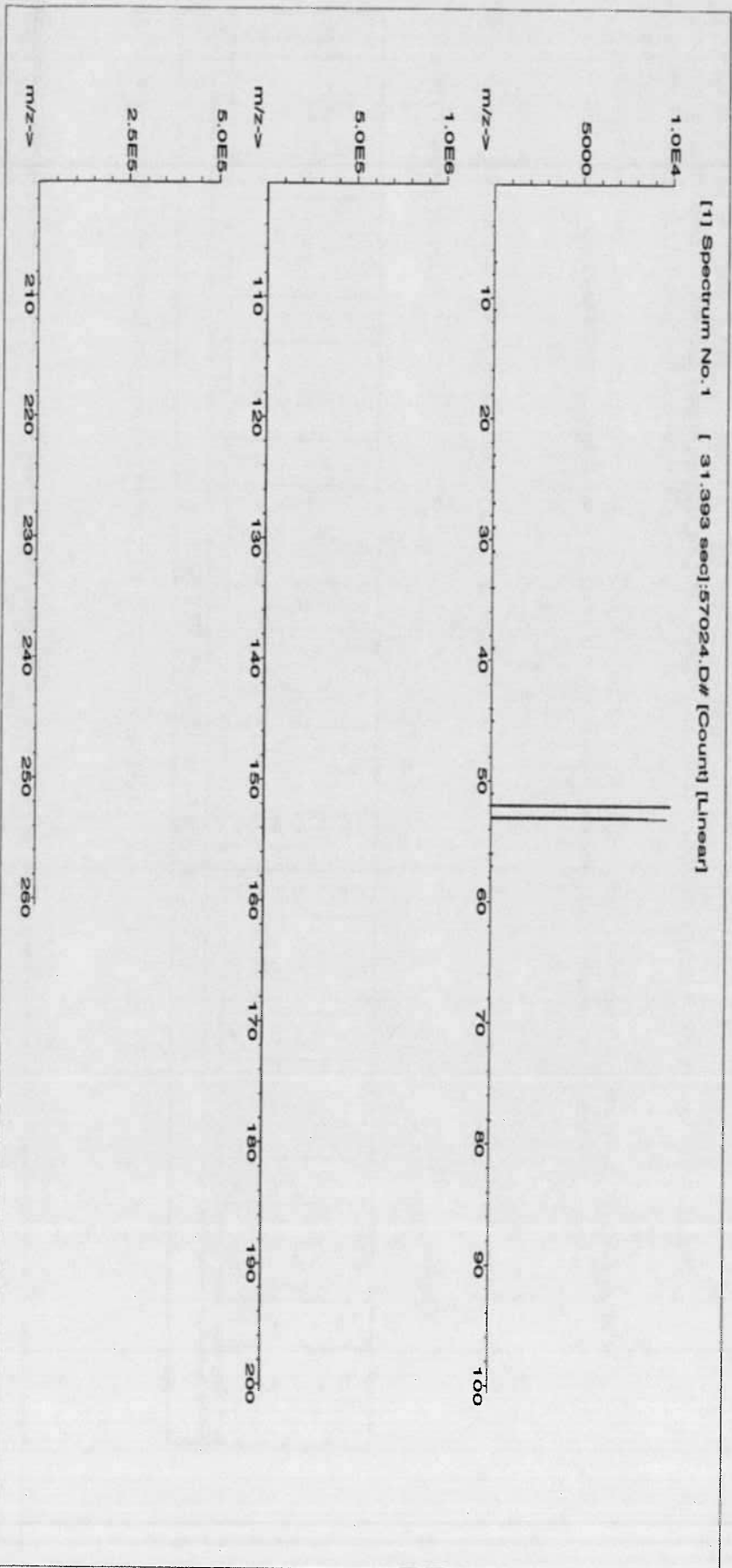
1999.98

5E-05 Balance Uncertainty
0.090 Flask Uncertainty

Formulated By: <i>Lawrence Barry</i>		032114
Reviewed By: <i>Pedro L. Rentias</i>		032114

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Uncertainty Pipette	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty (+/-)	(Solvent Safety Info. On Attached pg.)	NIST SRM
----------	-------------	------------	-----------------	----------------	---------------------	-----------------------	---------------------	----------------------------	--	----------

1. Chromium (III) nitrate nonahydrate (Cr)	58124	100813	0.100	200.0	0.013	10001.3	1000.1	0.00201	07789-02-8 0.5 mg(Cr)/m3 off-rat 3250 mg/kg	3112a
--	-------	--------	-------	-------	-------	---------	--------	---------	---	-------





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

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

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

(T)= Target analyte

Certified by:

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

Physical Characterization:

- * 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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

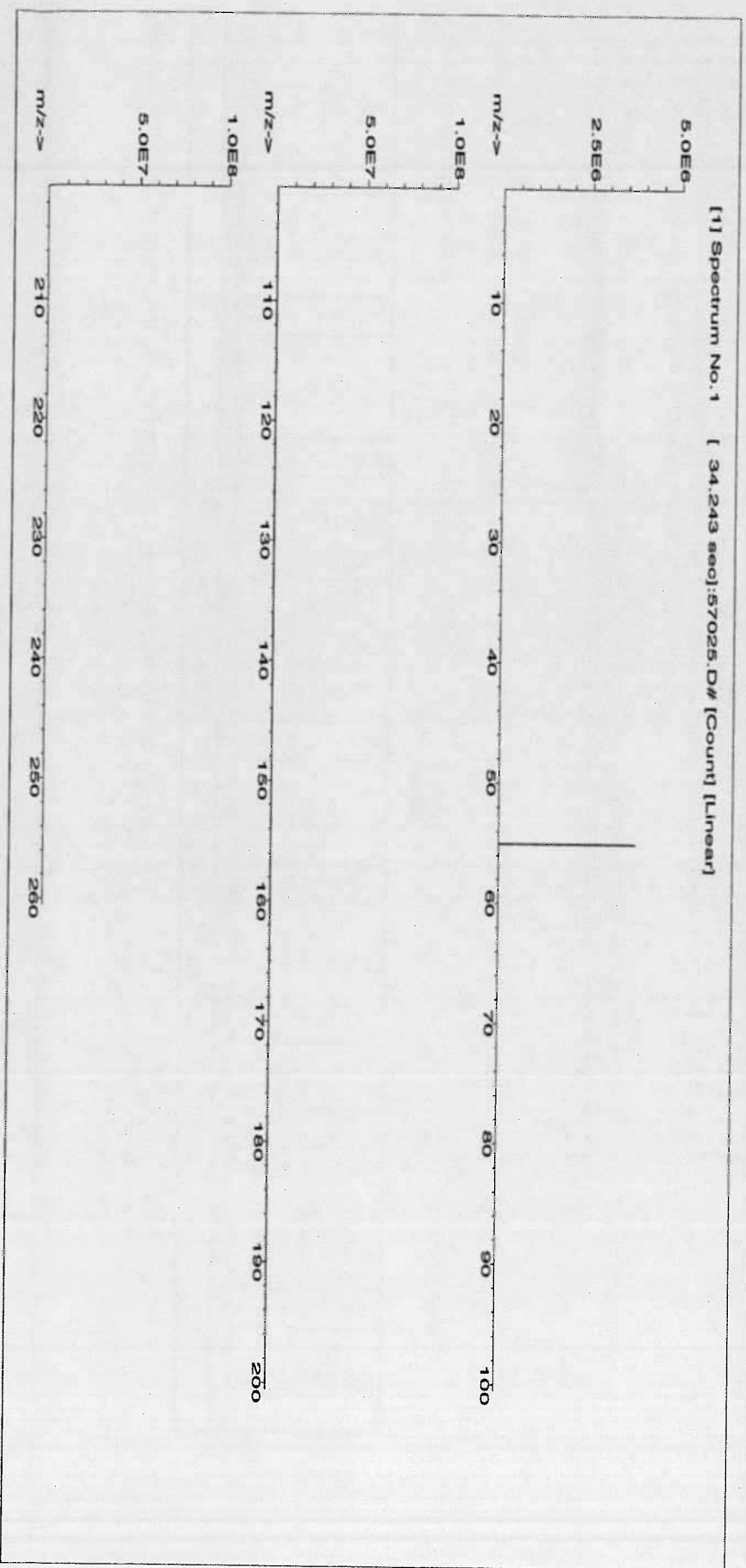
Part Number: 58025
Lot Number: 121313
Description: Manganese (Mn)
Expiration Date: 121316
Storage: 20 °C
Nominal Concentration (µg/mL): 1000
Volume shown below was diluted to (mL): 1999.98
SE-05 Balance Uncertainty
0.090 Flask Uncertainty

Lot # C363101
Solvent: Nitric Acid

Formulated By: Lawrence Barry	
Reviewed By: Pedro L. Renteria	
121313	

MSDS Information

Compound	Part Number	Lot Number	Dilution Factor	Initial Volume	Uncertainty Pipette	Initial Conc. (µg/mL)	Final Conc. (µg/mL)	Expanded Uncertainty	CAS#	OSHA PEL (TWA)	LD50	SRM
Manganese (II) nitrate Hydrate (Mn)	58125	110513	0.1000	200.0	0.013	10001.0	1000.1	0.00201	15710-66-4	5 mg/m3	N/A	3132





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

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

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

(T) = Target analyte

Certified by:

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

Physical Characterization:

- * 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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).



CERTIFIED WEIGHT REPORT:

Part Number: **58030**
Lot Number: **042914**
Description: **Zinc (Zn)**

Lot # **C363101**
Solvent: **Nitric Acid**

Expiration Date: **042917**

2.0%

40.0 (mL) Nitric Acid

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

Storage: 20 °C

Volume shown below was diluted to (mL): **1999.98**

5E-05 Balance Uncertainty
0.090 Flask Uncertainty

<i>Lawrence Barry</i>	
Formulated By:	Lawrence Barry
	042914
<i>Pedro L. Renteria</i>	
Reviewed By:	Pedro L. Renteria
	042914

MSDS Information

(Solvent Safety Info. On Attached pg.)

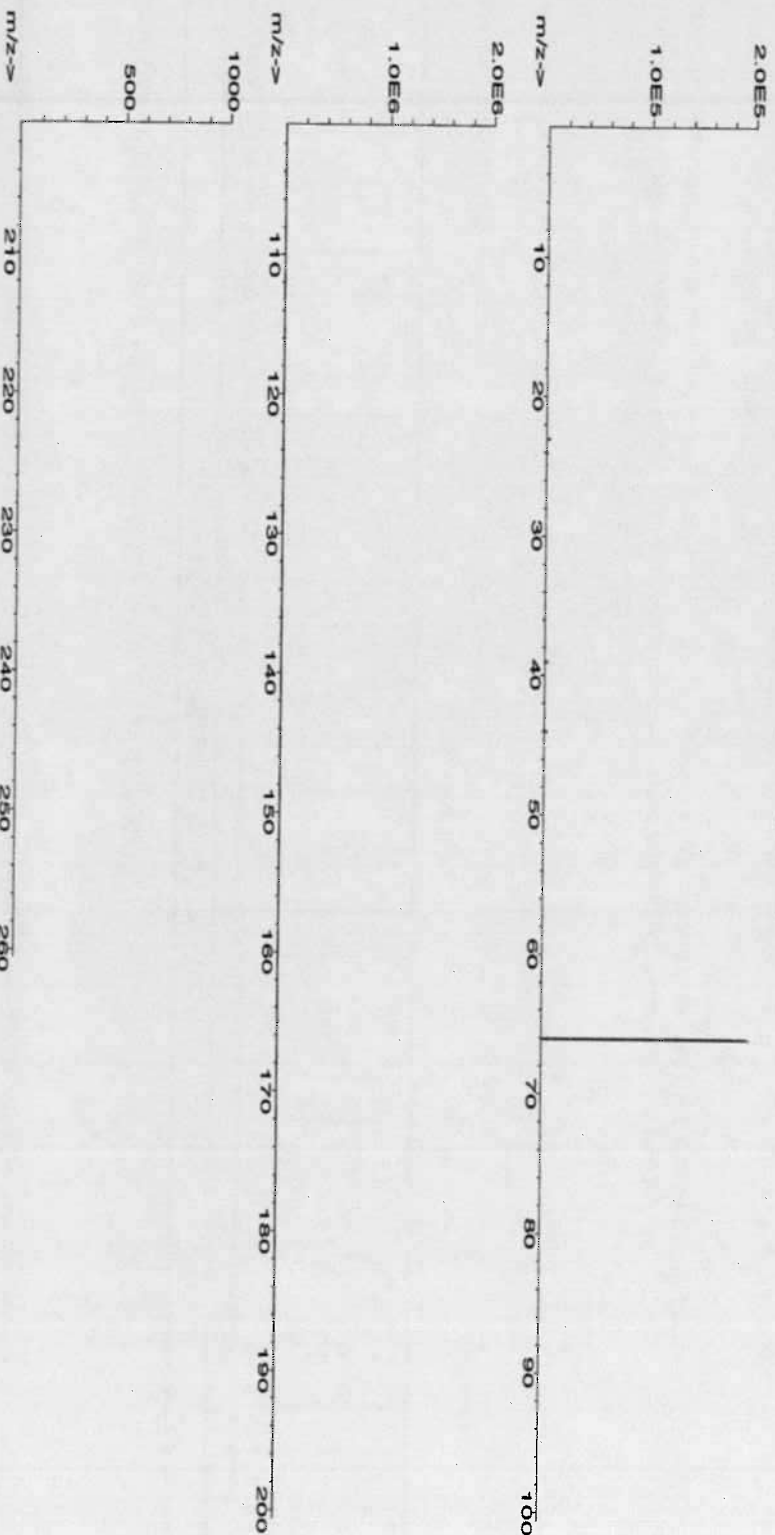
CAS# 13778-30-8 OSHA PEL (TWA)

LD50

NIST SRM

1. Zinc nitrate hydrate (Zn) 58130 042314 0.1000 200.0 0.013 10001.6 1000.2 0.00202 13778-30-8 1 mg/m3 or-lat 1190mg/kg 3168

[1] Spectrum No. 1 [32.814 sec]:57030.D# [Count] [Linear]





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

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

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

(T) = Target analyte

Certified by:

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, (NIST Test #: 732/245790).
- * Standards are certified (+/-) 0.5% of the stated value, unless otherwise stated.
- * All Standards should be stored with caps tight and under appropriate laboratory conditions.
- * Uncertainty Reference: Taylor, B.N. and Kuyat, C.E., "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Result," NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC, (1994).

Analytical Standard Record
U.S.E.P.A Region 2 Laboratory
D4E0703

Description:	ICP Cal Blank/ICB/CCB	Expires:	05/07/2015
Standard Type:	Calibration Standard	Prepared:	05/07/2014
Solvent:	2% HNO3 + 5% HCL	Prepared By:	Rolando Recto
Final Volume (mls):	2500	Department:	Metals ESAT
Vials:	1	Last Edit:	05/07/2014 14:51 by RR

HCL D4A0704
HNO3 D3G1849

Analyte	CAS Number	Concentration	Units
Molybdenum	7439-98-7	0	ug/mL
Antimony	7440-36-0	0	ug/mL
Arsenic	7440-38-2	0	ug/mL
Barium	7440-39-3	0	ug/mL
Beryllium	7440-41-7	0	ug/mL
Boron	7440-42-8	0	ug/mL
Cadmium	7440-43-9	0	ug/mL
Calcium	7440-70-2	0	ug/mL
Chromium	7440-47-3	0	ug/mL
Cobalt	7440-48-4	0	ug/mL
Copper	7440-50-8	0	ug/mL
Iron 2599R	7439-89-6	0	ug/mL
Lead	7439-92-1	0	ug/mL
Aluminum 3961R	7429-90-5	0	ug/mL
Manganese	7439-96-5	0	ug/mL
Zinc	7440-66-6	0	ug/mL
Nickel	7440-02-0	0	ug/mL
Potassium	7440-09-7	0	ug/mL
Selenium	7782-49-2	0	ug/mL
Silicon 2881A	7440-21-3	0	ug/mL
Silicon 2881R	7440-21-3	0	ug/mL
Silver	7440-22-4	0	ug/mL
Sodium	7440-23-5	0	ug/mL
Strontium		0	ug/mL
Thallium	7440-28-0	0	ug/mL
Tin	7440-31-5	0	ug/mL
Titanium	7440-32-6	0	ug/mL
Vanadium	7440-62-2	0	ug/mL
Magnesium	7439-95-4	0	ug/mL

Reviewed By

Date

Analytical Standard Record
U.S.E.P.A Region 2 Laboratory
D4E0703

Reviewed By

Date

Analytical Standard Record
U.S.E.P.A Region 2 Laboratory
D4E0704

Description:	ICP Cal Std Mid	Expires:	05/07/2015
Standard Type:	Calibration Standard	Prepared:	05/07/2014
Solvent:	ICP Blank Solution	Prepared By:	Rolando Recto
Final Volume (mls):	10000	Department:	Metals ESAT
Vials:	1	Last Edit:	05/07/2014 11:50 by RR

HCL D4A0704
HNO3 D3G1849

Analyte	CAS Number	Concentration	Units
Nickel	7440-02-0	0.5	ppm
Antimony	7440-36-0	0.5	ppm
Arsenic	7440-38-2	0.5	ppm
Barium	7440-39-3	0.5	ppm
Beryllium	7440-41-7	0.5	ppm
Boron	7440-42-8	0.5	ppm
Cadmium	7440-43-9	0.5	ppm
Calcium	7440-70-2	0.5	ppm
Chromium	7440-47-3	0.5	ppm
Cobalt	7440-48-4	0.5	ppm
Copper	7440-50-8	0.5	ppm
Iron	7439-89-6	0.5	ppm
Lead	7439-92-1	0.5	ppm
Magnesium	7439-95-4	0.5	ppm
Aluminum	7429-90-5	0.5	ppm
Silicon 2881R	7440-21-3	0.5	ppm
Vanadium	7440-62-2	0.5	ppm
Titanium	7440-32-6	0.5	ppm
Tin	7440-31-5	0.5	ppm
Thallium	7440-28-0	0.5	ppm
Strontium		0.5	ppm
Manganese	7439-96-5	0.5	ppm
Silver	7440-22-4	0.05	ppm
Molybdenum	7439-98-7	0.5	ppm
Silicon 2881A	7440-21-3	0.5	ppm
Silicon 2516A	7440-21-3	0.5	ppm
Silicon	7440-21-3	0.5	ppm
Selenium	7782-49-2	0.5	ppm
Potassium	7440-09-7	0.5	ppm
Zinc	7440-66-6	0.5	ppm

Reviewed By

Date

Analytical Standard Record
U.S.E.P.A Region 2 Laboratory
D4E0704

Sodium	7440-23-5	0.5	ppm
--------	-----------	-----	-----

Parent Standards used in this standard:						
Standard	Description	Prepared	Prepared By	Expires	Last Edit	(mls)
D1K1805	Silicon, Stock, 10,000 ppm	11/17/2011	** Vendor **	11/16/2014	09/12/2012 09:17 by RL	0.5
D1K1804	Tin, Stock, 1000 ppm	11/17/2011	** Vendor **	11/16/2014	11/18/2011 15:36 by RR	5
D1K1803	Strontium, Stock, 1000 ppm	11/17/2011	** Vendor **	11/16/2014	11/18/2011 15:35 by RR	5
D1K1802	Boron, Stock, 1000 ppm	11/17/2011	** Vendor **	11/16/2014	11/18/2011 15:31 by RR	5
D1K1806	ICP Stock I, Trace 500 mg/L	11/17/2011	** Vendor **	11/16/2014	11/18/2011 15:37 by RR	10
D3E0816	ICP Stock II, Salts 5000 mg/L	05/08/2013	** Vendor **	05/03/2016	05/19/2013 17:41 by MLS	1
D4B1115	ICP Stock III, Ag 1000 mg/L	02/11/2014	** Vendor **	02/05/2017	02/11/2014 15:08 by RR	0.5

Reviewed By	Date
-------------	------

Analytical Standard Record
U.S.E.P.A Region 2 Laboratory
D4E0705

Description:	ICP Cal Std High	Expires:	05/07/2015
Standard Type:	Calibration Standard	Prepared:	05/07/2014
Solvent:	ICP Blank Solution	Prepared By:	Rolando Recto
Final Volume (mls):	1000	Department:	Metals ESAT
Vials:	1	Last Edit:	05/07/2014 11:53 by RR

HCL D4A0704
HNO3 D3G1849

Analyte	CAS Number	Concentration	Units
Nickel	7440-02-0	10	ppm
Antimony	7440-36-0	10	ppm
Arsenic	7440-38-2	10	ppm
Barium	7440-39-3	10	ppm
Beryllium	7440-41-7	10	ppm
Boron	7440-42-8	10	ppm
Cadmium	7440-43-9	10	ppm
Calcium	7440-70-2	10	ppm
Chromium	7440-47-3	10	ppm
Cobalt	7440-48-4	10	ppm
Copper	7440-50-8	10	ppm
Iron	7439-89-6	10	ppm
Lead	7439-92-1	10	ppm
Magnesium	7439-95-4	10	ppm
Aluminum	7429-90-5	10	ppm
Silicon 2881R	7440-21-3	10	ppm
Vanadium	7440-62-2	10	ppm
Titanium	7440-32-6	10	ppm
Tin	7440-31-5	10	ppm
Thallium	7440-28-0	10	ppm
Strontium		10	ppm
Manganese	7439-96-5	10	ppm
Silver	7440-22-4	1	ppm
Molybdenum	7439-98-7	10	ppm
Silicon 2881A	7440-21-3	10	ppm
Silicon 2516A	7440-21-3	10	ppm
Silicon	7440-21-3	10	ppm
Selenium	7782-49-2	10	ppm
Potassium	7440-09-7	10	ppm
Zinc	7440-66-6	10	ppm

Reviewed By

Date

Analytical Standard Record
U.S.E.P.A Region 2 Laboratory
D4E0705

Sodium	7440-23-5	10	ppm
--------	-----------	----	-----

Parent Standards used in this standard:						
Standard	Description	Prepared	Prepared By	Expires	Last Edit	(mls)
D1K1806	ICP Stock I, Trace 500 mg/L	11/17/2011	** Vendor **	11/16/2014	11/18/2011 15:37 by RR	20
D1K1805	Silicon, Stock, 10,000 ppm	11/17/2011	** Vendor **	11/16/2014	09/12/2012 09:17 by RL	1
D1K1804	Tin, Stock, 1000 ppm	11/17/2011	** Vendor **	11/16/2014	11/18/2011 15:36 by RR	10
D1K1803	Strontium, Stock, 1000 ppm	11/17/2011	** Vendor **	11/16/2014	11/18/2011 15:35 by RR	10
D1K1802	Boron, Stock, 1000 ppm	11/17/2011	** Vendor **	11/16/2014	11/18/2011 15:31 by RR	10
D3E0816	ICP Stock II, Salts 5000 mg/L	05/08/2013	** Vendor **	05/03/2016	05/19/2013 17:41 by MLS	2
D4B1115	ICP Stock III, Ag 1000 mg/L	02/11/2014	** Vendor **	02/05/2017	02/11/2014 15:08 by RR	1

Reviewed By

Date

Analytical Standard Record
U.S.E.P.A Region 2 Laboratory
D4E0706

Description:	ICP ICV/CCV	Expires:	05/07/2015
Standard Type:	Calibration Standard	Prepared:	05/07/2014
Solvent:	ICP Blank Solution	Prepared By:	Rolando Recto
Final Volume (mls):	1000	Department:	Metals ESAT
Vials:	1	Last Edit:	05/07/2014 11:57 by RR

HCL D4A0704
HNO3 D3G1849

Analyte	CAS Number	Concentration	Units
Nickel	7440-02-0	0.2	ppm
Antimony	7440-36-0	0.2	ppm
Arsenic	7440-38-2	0.2	ppm
Barium	7440-39-3	0.2	ppm
Beryllium	7440-41-7	0.2	ppm
Boron	7440-42-8	0.2	ppm
Cadmium	7440-43-9	0.2	ppm
Calcium	7440-70-2	5	ppm
Chromium	7440-47-3	0.2	ppm
Cobalt	7440-48-4	0.2	ppm
Copper	7440-50-8	0.2	ppm
Iron	7439-89-6	5	ppm
Lead	7439-92-1	0.2	ppm
Magnesium	7439-95-4	5	ppm
Aluminum	7429-90-5	5	ppm
Silicon 2881R	7440-21-3	5	ppm
Vanadium	7440-62-2	0.2	ppm
Titanium	7440-32-6	0.2	ppm
Tin	7440-31-5	0.2	ppm
Thallium	7440-28-0	0.2	ppm
Strontium		0.2	ppm
Manganese	7439-96-5	0.2	ppm
Silver	7440-22-4	0.2	ppm
Molybdenum	7439-98-7	0.2	ppm
Silicon 2881A	7440-21-3	5	ppm
Silicon 2516A	7440-21-3	5	ppm
Silicon	7440-21-3	5	ppm
Selenium	7782-49-2	0.2	ppm
Potassium	7440-09-7	5	ppm
Zinc	7440-66-6	0.2	ppm

Reviewed By

Date

Analytical Standard Record
U.S.E.P.A Region 2 Laboratory
D4E0706

Sodium	7440-23-5	5	ppm
--------	-----------	---	-----

Parent Standards used in this standard:						
Standard	Description	Prepared	Prepared By	Expires	Last Edit	(mls)
D3E0818	Boron, Stock, 1000 ppm	05/08/2013	** Vendor **	05/03/2016	05/19/2013 17:43 by MLS	0.2
D3E0819	Strontium, Stock, 1000 ppm	05/08/2013	** Vendor **	05/03/2016	05/19/2013 17:44 by MLS	0.2
D3E0820	Tin, Stock, 1000 ppm	05/08/2013	** Vendor **	05/03/2016	05/19/2013 17:46 by MLS	0.2
D3G1022	Silicon, Stock, 10,000 ppm	07/03/2013	** Vendor **	12/07/2015	07/10/2013 15:41 by RR	0.5
D4B1116	ICP Stock IV, Trace 100 mg/L	02/11/2014	** Vendor **	02/05/2017	02/11/2014 16:02 by RR	2
D4B1117	ICP Stock V, Salts 5000 mg/L	02/11/2014	** Vendor **	02/05/2017	02/11/2014 16:02 by RR	1
D4E0609	ICP Stock VI, Ag 1000 mg/L	05/06/2014	** Vendor **	02/05/2017	05/06/2014 16:16 by RR	0.2

Reviewed By

Date

Analytical Standard Record
U.S.E.P.A Region 2 Laboratory
D4E0707

Description:	ICP 100XRL	Expires:	05/07/2015
Standard Type:	Analyte Spike	Prepared:	05/07/2014
Solvent:	ICP Blank Solution	Prepared By:	Rolando Recto
Final Volume (mls):	250	Department:	Metals ESAT
Vials:	1	Last Edit:	05/07/2014 12:36 by RR

HCL D4A0704
HNO3 D3G1849

Analyte	CAS Number	Concentration	Units
Cadmium	7440-43-9	0.3	ppm
Aluminum	7429-90-5	10	ppm
Iron 2599R	7439-89-6	5	ppm
Iron 2599A	7439-89-6	5	ppm
Iron	7439-89-6	5	ppm
Copper	7440-50-8	1	ppm
Cobalt	7440-48-4	2	ppm
Magnesium	7439-95-4	50	ppm
Calcium	7440-70-2	50	ppm
Magnesium 2852	7439-95-4	50	ppm
Boron	7440-42-8	1	ppm
Beryllium	7440-41-7	0.3	ppm
Barium	7440-39-3	10	ppm
Arsenic	7440-38-2	0.8	ppm
Antimony	7440-36-0	2	ppm
Aluminum 3961R	7429-90-5	10	ppm
Aluminum 3961A	7429-90-5	10	ppm
Chromium	7440-47-3	0.5	ppm
Silicon 2881A	7440-21-3	50	ppm
Vanadium	7440-62-2	2	ppm
Titanium	7440-32-6	1	ppm
Tin	7440-31-5	1	ppm
Thallium	7440-28-0	2	ppm
Strontium		1	ppm
Sodium	7440-23-5	100	ppm
Lead	7439-92-1	0.8	ppm
Silicon 2881R	7440-21-3	50	ppm
Zinc	7440-66-6	2	ppm
Silicon 2516A	7440-21-3	50	ppm
Silicon	7440-21-3	50	ppm

Reviewed By

Date

Analytical Standard Record
U.S.E.P.A Region 2 Laboratory
D4E0707

Selenium	7782-49-2	2	ppm
Potassium	7440-09-7	50	ppm
Nickel	7440-02-0	2	ppm
Molybdenum	7439-98-7	1	ppm
Manganese	7439-96-5	0.5	ppm
Silver	7440-22-4	0.5	ppm

Parent Standards used in this standard:						
Standard	Description	Prepared	Prepared By	Expires	Last Edit	(mls)
D1K1804	Tin, Stock, 1000 ppm	11/17/2011	** Vendor **	11/16/2014	11/18/2011 15:36 by RR	0.25
D1K1803	Strontium, Stock, 1000 ppm	11/17/2011	** Vendor **	11/16/2014	11/18/2011 15:35 by RR	0.25
D1K1802	Boron, Stock, 1000 ppm	11/17/2011	** Vendor **	11/16/2014	11/18/2011 15:31 by RR	0.25
D1K1805	Silicon, Stock, 10,000 ppm	11/17/2011	** Vendor **	11/16/2014	09/12/2012 09:17 by RL	1.25
D2A3116	Selenium, Stock, 1000 ppm	01/31/2012	** Vendor **	01/21/2015	02/08/2012 14:18 by RR	0.5
D3E0817	Nickel. Stock, 1000 ppm	05/08/2013	** Vendor **	05/03/2016	05/19/2013 17:42 by MLS	0.5
D3K0717	Antimony. Stock, 1000 ppm	11/07/2013	** Vendor **	10/31/2016	11/07/2013 17:06 by RR	0.5
D3K0718	Copper, Stock, 1000 ppm	11/07/2013	** Vendor **	10/31/2016	11/07/2013 17:07 by RR	0.25
D3K0719	Thallium. Stock, 1000 ppm	11/07/2013	** Vendor **	10/31/2016	11/07/2013 17:08 by RR	0.5
D3E0810	Aluminum, Stock, 10,000 ppm	05/08/2013	** Vendor **	05/03/2016	05/17/2013 14:27 by MLS	0.25
D3E0811	Calcium, Stock, 10,000 ppm	05/08/2013	** Vendor **	05/03/2016	05/19/2013 17:34 by MLS	1.25
D3E0812	Iron, Stock, 10,000 ppm	05/08/2013	** Vendor **	05/03/2016	05/19/2013 17:36 by MLS	0.125
D3E0813	Potassium, Stock, 10,000 ppm	05/08/2013	** Vendor **	05/03/2016	05/19/2013 17:37 by MLS	1.25
D3E0814	Magnesium, Stock, 10,000 ppm	05/08/2013	** Vendor **	05/03/2016	02/24/2014 15:05 by WR	1.25
D3E0815	Sodium, Stock, 10,000 ppm	05/08/2013	** Vendor **	05/03/2016	05/19/2013 17:40 by MLS	2.5
D4B1115	ICP Stock III, Ag 1000 mg/L	02/11/2014	** Vendor **	02/05/2017	02/11/2014 15:08 by RR	0.125
D4B1118	Arsenic, Stock, 1000 ppm	02/11/2014	** Vendor **	02/05/2017	02/11/2014 15:11 by RR	0.2
D4B1119	Beryllium, Stock, 1000 ppm	02/11/2014	** Vendor **	02/05/2017	02/11/2014 15:12 by RR	0.075
D4B1120	Lead, Stock, 1000 ppm	02/11/2014	** Vendor **	02/05/2017	02/11/2014 15:13 by RR	0.2
D4B1121	Molybdenum, Stock, 1000 ppm	02/11/2014	** Vendor **	02/05/2017	02/11/2014 15:13 by RR	0.25
D4B1122	Titanium, Stock, 1000 ppm	02/11/2014	** Vendor **	02/05/2017	02/11/2014 15:14 by RR	0.25
D4B1123	Vanadium. Stock, 1000 ppm	02/11/2014	** Vendor **	02/05/2017	02/11/2014 15:15 by RR	0.5
D4E0610	Cobalt, Stock, 1000 ppm	05/06/2014	** Vendor **	02/18/2017	05/06/2014 16:16 by RR	0.5
D4E0611	Cadmium, Stock, 1000 ppm	05/06/2014	** Vendor **	02/19/2017	05/06/2014 16:17 by RR	0.075
D4E0612	Barium, Stock, 1000 ppm	05/06/2014	** Vendor **	03/17/2017	05/06/2014 16:17 by RR	2.5
D4E0613	Chromium, Stock, 1000 ppm	05/06/2014	** Vendor **	03/21/2017	05/06/2014 16:17 by RR	0.125
D4E0614	Manganese, Stock, 1000 ppm	05/06/2014	** Vendor **	12/13/2016	05/06/2014 16:17 by RR	0.125
D4E0616	Zinc, Stock, 1000 ppm	05/06/2014	** Vendor **	04/29/2017	05/06/2014 16:18 by RR	0.5

Reviewed By

Date

Analytical Standard Record
U.S.E.P.A Region 2 Laboratory
D4E0708

Description:	ICP RL (LCV1,LCV3)	Expires:	05/07/2015
Standard Type:	Calibration Standard	Prepared:	05/07/2014
Solvent:	2%HNO3, 5%HCL	Prepared By:	Rolando Recto
Final Volume (mls):	500	Department:	Metals ESAT
Vials:	1	Last Edit:	05/07/2014 12:38 by RR

HCL D4A0704
HNO3 D3G1849

Analyte	CAS Number	Concentration	Units
Cadmium	7440-43-9	0.003	ppm
Aluminum	7429-90-5	0.1	ppm
Iron 2599R	7439-89-6	0.05	ppm
Iron 2599A	7439-89-6	0.05	ppm
Iron	7439-89-6	0.05	ppm
Copper	7440-50-8	0.01	ppm
Cobalt	7440-48-4	0.02	ppm
Magnesium	7439-95-4	0.5	ppm
Calcium	7440-70-2	0.5	ppm
Magnesium 2852	7439-95-4	0.5	ppm
Boron	7440-42-8	0.01	ppm
Beryllium	7440-41-7	0.003	ppm
Barium	7440-39-3	0.1	ppm
Arsenic	7440-38-2	0.008	ppm
Antimony	7440-36-0	0.02	ppm
Aluminum 3961R	7429-90-5	0.1	ppm
Aluminum 3961A	7429-90-5	0.1	ppm
Chromium	7440-47-3	0.005	ppm
Silicon 2881A	7440-21-3	0.5	ppm
Vanadium	7440-62-2	0.02	ppm
Titanium	7440-32-6	0.01	ppm
Tin	7440-31-5	0.01	ppm
Thallium	7440-28-0	0.02	ppm
Strontium		0.01	ppm
Sodium	7440-23-5	1	ppm
Lead	7439-92-1	0.008	ppm
Silicon 2881R	7440-21-3	0.5	ppm
Zinc	7440-66-6	0.02	ppm
Silicon 2516A	7440-21-3	0.5	ppm
Silicon	7440-21-3	0.5	ppm

Reviewed By

Date

Analytical Standard Record
U.S.E.P.A Region 2 Laboratory
D4E0708

Selenium	7782-49-2	0.02	ppm
Potassium	7440-09-7	0.5	ppm
Nickel	7440-02-0	0.02	ppm
Molybdenum	7439-98-7	0.01	ppm
Manganese	7439-96-5	0.005	ppm
Silver	7440-22-4	0.005	ppm

Parent Standards used in this standard:						
Standard	Description	Prepared	Prepared By	Expires	Last Edit	(mls)
D4E0707	ICP 100XRL	05/07/2014	Rolando Recto	05/07/2015	05/07/2014 12:36 by RR	5

Reviewed By

Date

Analytical Standard Record
U.S.E.P.A Region 2 Laboratory
D4E0709

Description:	ICP 2RL (LCV2,LCV4)	Expires:	05/07/2015
Standard Type:	Calibration Standard	Prepared:	05/07/2014
Solvent:	2%HNO3, 5%HCL	Prepared By:	Rolando Recto
Final Volume (mls):	500	Department:	Metals ESAT
Vials:	1	Last Edit:	05/07/2014 12:38 by RR

HCL D4A0704
HNO3 D3G1849

Analyte	CAS Number	Concentration	Units
Cadmium	7440-43-9	0.006	ppm
Aluminum	7429-90-5	0.2	ppm
Iron 2599R	7439-89-6	0.1	ppm
Iron 2599A	7439-89-6	0.1	ppm
Iron	7439-89-6	0.1	ppm
Copper	7440-50-8	0.02	ppm
Cobalt	7440-48-4	0.04	ppm
Magnesium	7439-95-4	1	ppm
Calcium	7440-70-2	1	ppm
Magnesium 2852	7439-95-4	1	ppm
Boron	7440-42-8	0.02	ppm
Beryllium	7440-41-7	0.006	ppm
Barium	7440-39-3	0.2	ppm
Arsenic	7440-38-2	0.016	ppm
Antimony	7440-36-0	0.04	ppm
Aluminum 3961R	7429-90-5	0.2	ppm
Aluminum 3961A	7429-90-5	0.2	ppm
Chromium	7440-47-3	0.01	ppm
Silicon 2881A	7440-21-3	1	ppm
Vanadium	7440-62-2	0.04	ppm
Titanium	7440-32-6	0.02	ppm
Tin	7440-31-5	0.02	ppm
Thallium	7440-28-0	0.04	ppm
Strontium		0.02	ppm
Sodium	7440-23-5	2	ppm
Lead	7439-92-1	0.016	ppm
Silicon 2881R	7440-21-3	1	ppm
Zinc	7440-66-6	0.04	ppm
Silicon 2516A	7440-21-3	1	ppm
Silicon	7440-21-3	1	ppm

Reviewed By

Date

Analytical Standard Record
U.S.E.P.A Region 2 Laboratory
D4E0709

Selenium	7782-49-2	0.04	ppm
Potassium	7440-09-7	1	ppm
Nickel	7440-02-0	0.04	ppm
Molybdenum	7439-98-7	0.02	ppm
Manganese	7439-96-5	0.01	ppm
Silver	7440-22-4	0.01	ppm

Parent Standards used in this standard:						
Standard	Description	Prepared	Prepared By	Expires	Last Edit	(mls)
D4E0707	ICP 100XRL	05/07/2014	Rolando Recto	05/07/2015	05/07/2014 12:36 by RR	10

Reviewed By

Date

Analytical Standard Record
U.S.E.P.A Region 2 Laboratory
D4E0710

Description:	ICP IFA	Expires:	05/07/2015
Standard Type:	Calibration Standard	Prepared:	05/07/2014
Solvent:	ICP BLANK	Prepared By:	Rolando Recto
Final Volume (mls):	1000	Department:	Metals ESAT
Vials:	1	Last Edit:	05/07/2014 12:39 by RR

HCL D4A0704
HNO3 D3G1849

Analyte	CAS Number	Concentration	Units
Sodium	7440-23-5	300	mg/L
Magnesium 2852	7439-95-4	300	mg/L
Magnesium	7439-95-4	300	mg/L
Iron 2599R	7439-89-6	300	mg/L
Iron 2599A	7439-89-6	300	mg/L
Iron	7439-89-6	300	mg/L
Calcium	7440-70-2	300	mg/L
Aluminum 3961R	7429-90-5	300	mg/L
Aluminum 3961A	7429-90-5	300	mg/L
Aluminum	7429-90-5	300	mg/L

Parent Standards used in this standard:						
Standard	Description	Prepared	Prepared By	Expires	Last Edit	(mls)
D3E0810	Aluminum, Stock, 10,000 ppm	05/08/2013	** Vendor **	05/03/2016	05/17/2013 14:27 by MLS	30
D3E0811	Calcium, Stock, 10,000 ppm	05/08/2013	** Vendor **	05/03/2016	05/19/2013 17:34 by MLS	30
D3E0812	Iron, Stock, 10,000 ppm	05/08/2013	** Vendor **	05/03/2016	05/19/2013 17:36 by MLS	30
D3E0814	Magnesium, Stock, 10,000 ppm	05/08/2013	** Vendor **	05/03/2016	02/24/2014 15:05 by WR	30
D3E0815	Sodium, Stock, 10,000 ppm	05/08/2013	** Vendor **	05/03/2016	05/19/2013 17:40 by MLS	30

Reviewed By

Date

STANDARD & REAGENT PREPARATION LOG
USEPA REGION 2 LABORATORY
DEPARTMENT: **Metals ESAT**

Solution ID: **D4F3015**
Solution Name: **ICP Internal Std. + Modifier**
Preparer: **Rolando Recto**
Expiration Date: **06/30/2015**
Final Volume (ml): **2500**
Solvent/Lot #: **2%HNO3(D2L1218), 5%HCL(D3G1848)**
Date Prepared: **06/30/2014**

Source ID	Description	Vendor/Vendor Lot #	Initial Concentration ppm	Final Concentration ppm	Initial Aliquot (ml)
D3H0504	ICP Matrix Modifier, 5% Cesium	High Purity/1116106	50000	2000	100
D3K0720	Yttrium Stock 1000 ppm	Absolute/P58039L103113	1000	5	12.5



Reference Materials Producer
Cert #2495.01

SPEXertificate®

Certificate of Reference Material



Chemical Testing
Cert #2495.02

Catalog Number: ZEPANJ-17-500
Description: Custom Claritas Standard
Matrix: 5% HNO₃ / Tr. HF

Lot No. 7-88WL

This CLARITAS PPT® Certified Reference Material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICP-OES, DCP, AA, ICP-MS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

The CRM is prepared from high purity single element concentrates of individual elements using Class A laboratory ware to give precise concentrations.

Instrumental Analysis by ICP Spectrometer:

Analyte	Labeled	Uncertainty	SRM	Analyte	Labeled	Uncertainty	SRM
Al	250 µg/mL	±1 µg/mL	3101a*	Mg	250 µg/mL	±1 µg/mL	3131a*
Ca	250 µg/mL	±1 µg/mL	3109a*	Na	250 µg/mL	±1 µg/mL	3152a*
Fe	250 µg/mL	±1 µg/mL	3126a*	Si	250 µg/mL	±1 µg/mL	3150*
K	250 µg/mL	±1 µg/mL	3141a*				

* - indicates NIST SRM

† - indicates SPEX CertiPrep CRM (when NIST SRM is not available)

SPEX CertiPrep Reference Multi: Lot# ALL8

Trace Metallic Impurities in the Actual Solution via ICP-MS Analysis:

Element	µg/L	Element	µg/L	Element	µg/L	Element	µg/L	Element	µg/L	Element	µg/L
Ag	<3	Cs	<0.3	Ho	<0.1	Ni	<5	Sb	<2	Ti	<10
As	<4	Cu	<4	In	<1	P	<200	Sc	<30	Tl	<0.3
Au	<1	Dy	<0.6	Ir	<1	Pb	<0.4	Se	<60	Tm	<0.2
B	<10	Er	<0.01	La	<0.3	Pd	<0.8	Sm	<0.4	U	<0.5
Ba	<3	Eu	<0.1	Li	<2	Pr	<0.1	Sn	<2	V	<0.2
Be	<2	Ga	0.7	Lu	<0.01	Pt	<0.01	Sr	<0.7	W	<2
Bi	0.09	Gd	<0.3	Mn	<0.6	Rb	8	Ta	30	Y	<0.4
Cd	<0.09	Ge	<4	Mo	<0.01	Re	<0.2	Tb	<0.01	Yb	<0.5
Ce	<0.4	Hf	<0.01	Nb	<2	Rh	<0.5	Te	<2	Zn	<10
Co	2	Hg	<0.9	Nd	<0.01	Ru	<0.7	Th	<0.5	Zr	<2
Cr	<0.5										

Balances are calibrated regularly with weight sets traceable to NIST#s 32856, 32867 and others. This CRM is guaranteed stable and accurate to ±0.5% of the labeled value. This includes uncertainty components due to preparation, measurement, homogeneity, short-term and long-term stability, as well as transpiration loss. This guarantee is valid for a period of one year from the date of certification only when the material is unopened and stored under ambient laboratory conditions.

Date of Certification:

AUG 2014

Certifying Officer:

Long Rinfan

Report of Certification

This Certified Reference Material (CRM) has been prepared and certified under an ISO 9001:2008, ISO 17025:2005, and ISO Guide 34:2009 quality system consistent with the following guides:

- ISO 9001: Quality management systems – Requirements – certified by UL-DQS
- ISO 17025: General requirements for the competence of testing and calibration laboratories – accredited by A2LA
- ISO Guide 34: General requirements for the competence of reference material producers – accredited by A2LA
- ISO Guide 31: Reference Materials – Contents of certificates and labels
- ISO Guide 35: Reference Materials – General & Statistical Principles for Certification
- Guide To The Expression Of Uncertainty In Measurement 1997
- EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
- ASTM Guide D6362-98
- NIST Technical Note 1297
- ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
- ISO/REMCO N280

Material Source:

All analytes and matrix materials are obtained and verified by SPEX CertiPrep from pre-qualified vendors as per ISO 9001:2008, ISO 17025:2005, and ISO Guide 34:2009 guidelines. Vendor identifications are proprietary, however sources of all materials used in the preparation and testing of SPEX CertiPrep CRMs are tracked and documented. For further assistance, please contact the Sales Support Department at crmsales@spexcsp.com.

Instructions for Use:

Primary usage of this CRM is in neat form or diluted serially with matrix of a purity at or greater than the purity of the original matrix solution. If dilution is required the diluent must be compatible with all certified analytes and contain stabilizers appropriate for the period of intended use. The CRM can also be used as a spike or with a spike, again with appropriate compatibility considerations. All solutions should be thoroughly mixed, by shaking, prior to use and never pipetted directly from the bottle. All surfaces that come in contact with the solution must be thoroughly cleaned and leached prior to use. Dilutions should be performed only with Class A volumetric glassware.

Method of Preparation:

Clean laboratory procedures and techniques have been used throughout the preparation. All materials, equipment, analytical instrumentation and personnel have been qualified prior to use. The highest purity acids applicable, 18 megohm, double deionized water, acid-leached triple-rinsed bottles (where appropriate), and Class A/calibrated volumetrics have been used in all preparations.

Homogeneity:

The homogeneity of the CRM has been confirmed by procedures consistent with ISO 17025:2005, ISO Guide 34:2009, and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed to prove homogeneity in accordance with our internal procedure 4600-HOMOGEN-1A. Since the product is highly homogeneous, any sample size taken for analysis would be within the uncertainty budget. This is consistent with the intended use of the CRM.

Statistical Estimator and Confidence Limits:

The certified value 'X' listed on the reverse of this document is at the 95% level of confidence and can be expressed as:

- $X = x \pm U$ where X = certified value, U = expanded uncertainty, x = property value
- $U = k u_c$ where $k = 2$ is the coverage factor at the 95% confidence level
- u_c is obtained by combining the individual element standard uncertainty components u_i , and $u_c = \sqrt{\sum u_i^2}$

Certification Traveler Report:

All certified values reported were derived from the Traveler Report (SPEX CertiPrep's traceability documentation) identified by the lot number of this CRM. During the stated period of validity, the purchaser will be notified if this product is recalled due to any significant changes in the stability of the solution. For further assistance, please contact the Sales Support Department at crmsales@spexcsp.com.

Legal Notice:

SPEX CertiPrep reference materials are not for any cosmetic, drug or household application and are to be used only by qualified individuals who are trained in appropriate procedures. No claims against SPEX CertiPrep, Inc. of any kind whatsoever, whether based on breach of warranty, alleged negligence, or otherwise, with respect to this Reference Material shall be greater than the purchase price. In no event shall SPEX CertiPrep, Inc. be liable for any loss of profits or any incidental, special, or consequential damages.

STANDARD & REAGENT PREPARATION LOG
USEPA REGION 2 LABORATORY
DEPARTMENT: **Metals ESAT**

Solution ID: **D4I1108**
Solution Name: **ICP Internal Std. + Modifier**
Preparer: **Rolando Recto**
Expiration Date: **09/11/2015**
Final Volume (ml): **2500**
Solvent/Lot #: **2%HNO3(D4F2704), 5%HCL(D4F2703)**
Date Prepared: **09/11/2014**

Source ID	Description	Vendor/Vendor Lot #	Initial Concentration ppm	Final Concentration ppm	Initial Aliquot (ml)
D3H0504	ICP Matrix Modifier, 5% Cesium	High Purity/1116106	50000	2000	100
D3K0720	Yttrium Stock 1000 ppm	Absolute/P58039L103113	1000	5	12.5