Certificate of Analysis

FAC#: 313340
Document #: 2225558
Date: 05/29/2013

DESCRIPTION: CLP Semivolatiles Calibration Mix

CATALOG NO.: 506508 MFG DATE: Feb-2012
LOT NO.: LB90140 EXPIRATION DATE: Feb-2015

SOLVENT: METHYLENE CHLORIDE:BENZENE 3:1

ANALYTE (1)	CAS NUMBER	PERCENT PURITY(2)	WEIGHT(3) CONCENTRATION	ANALYTICAL(4) CONCENTRATION	STD DEV	SUPELCO LOT NO
DIBENZOFURAN	132-64-9	98.9	1000	994	+/- 87.2	LB78814
DIETHYL PHTHALATE	84-66-2	99.2	1000	1005	+/- 195.2	LB60384
DIMETHYL PHTHALATE	131-11-3	99.9	1000	1015	+/- 45.6	LB30494
FLUORANTHENE	206-44-0	99.5	1000	982	+/- 43.4	LB36331
FLUORENE	86-73-7	98.5	1000	958	+/- 123.7	LB82164
HEXACHLOROBENZENE	118-74-1	99.9	1000	997	+/- 43.4	LB87401
HEXACHLOROBUTADIENE	87-68-3	96.2	1000	956	+/- 58.3	LB67777
HEXACHLOROCYCLOPENTADIENE	77-47-4	97.2	1000	1008	+/- 132.2	LB84590
HEXACHLOROETHANE	67-72-1	99.9	1000	940	+/- 22.5	LB29072
INDENO (1,2,3-CD) PYRENE	193-39-5	99.7	1000	1057	+/- 42.4	LB87713
ISOPHORONE	78-59-1	99.1	1000	964	+/- 54.6	LB45460
N-NITROSODI-N-PROPYLAMINE	621-64-7	99.9	1000	941	+/- 58.8	LB79763
N-NITROSODIMETHYLAMINE	62-75-9	99.9	1000	1052	+/- 40.2	LB83854
NAPHTHALENE	91-20-3	99.9	1000	944	+/- 48.7	LB77841
NITROBENZENE	98-95-3	99.9	1000	943	+/- 45.9	LB47070
PENTACHLOROPHENOL	87-86-5	99.9	1000	1010	+/- 17.2	LB84380
PHENANTHRENE	85-01-8	99.1	1000	989	+/- 9.9	LB68872
PHENOL	108-95-2	99.9	1000	998	+/- 107.2	LB57703
PYRENE	129-00-0	97.5	1000	981	+/- 20.6	LB70761

(1) Listed in alphabetical order.
(2) Determined by capillary GC-FID, unless otherwise noted.
a) HPLC UV-254NM
(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.
(4) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.

Elwood Doughty
Quality Control Supervisor

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

Certificate of Analysis

DESCRIPTION: CLP Semivolatiles Calibration Mix

CATALOG NO.: 506508
LOT NO.: LB90140

MFG DATE: Feb-2012
EXPIRATION DATE: Feb-2015

SOLVENT: METHYLENE CHLORIDE:BENZENE 3:1

ANALYTE (1)	CAS NUMBER	PERCENT PURITY(2)	WEIGHT(3) CONCENTRATION	ANALYTICAL(4) CONCENTRATION	STD DEV	SUPELCO LOT NO
1,2-DICHLOROBENZENE	95-50-1	99.9	1000	955	+/- 38.1	LA96474
1,2,4-TRICHLOROBENZENE	120-82-1	99.5	1000	964	+/- 49.4	LB48083
1,3-DICHLOROBENZENE	541-73-1	99.9	1000	948	+/- 36.5	LB68066
1,4-DICHLOROBENZENE	106-46-7	99.9	1000	949	+/- 42.7	LB69983
2-CHLORONAPHTHALENE	91-58-7	99.4	1000	1002	+/- 13.4	LB48170
2-CHLOROPHENOL	95-57-8	99.6	1000	950	+/- 72.9	LB83266
2-METHYL-4,6-DINITROPHENOL	534-52-1	99.9	1000	989	+/- 193.2	LB31592
2-METHYLNAPHTHALENE	91-57-6	98.3	1000	952	+/- 76.4	LB44448
2-METHYLPHENOL	95-48-7	99.8	1000	960	+/- 44.0	LB30223
2-NITROANILINE	88-74-4	99.9	1000	978	+/- 22.0	LB49936
2-NITROPHENOL	88-75-5	99.9	1000	957	+/- 43.3	LB44736
2,4-DICHLOROPHENOL	120-83-2	98.8	1000	963	+/- 53.7	LB76837
2,4-DIMETHYLPHENOL	105-67-9	99.9	1000	950	+/- 27.2	LB88935
2,4-DINITROPHENOL	51-28-5	98.6	1000	1000	+/- 134.6	LB28389
2,4-DINITROTOLUENE	121-14-2	96.0	1000	997	+/- 108.4	LB46632
2,4,5-TRICHLOROPHENOL	95-95-4	99.9	1000	979	+/- 99.7	LB35288
2,4,6-TRICHLOROPHENOL	88-06-2	99.9	1000	978	+/- 104.0	LB65559
2,6-DINITROTOLUENE	606-20-2	99.9	1000	973	+/- 48.9	LB79891
3-NITROANILINE	99-09-2	99.9	1000	971	+/- 72.5	LB73829

(1) Listed in alphabetical order.
(2) Determined by capillary GC-FID, unless otherwise noted.
a) HPLC UV-254NM
(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.
(4) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.

Elwood Doughty
Quality Control Supervisor

SUPELCO® Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

Certificate of Analysis

DESCRIPTION: CLP Semivolatiles Calibration Mix

CATALOG NO.: 506508 MFG DATE: Feb-2012
LOT NO.: LB90140 EXPIRATION DATE: Feb-2015

SOLVENT: METHYLENE CHLORIDE:BENZENE 3:1

ANALYTE (1)	CAS NUMBER	PERCENT PURITY(2)	WEIGHT(3) CONCENTRATION	ANALYTICAL(4)	STD DEV	SUPELCO LOT NO
4-BROMOPHENYLPHENYL ETHER	101-55-3	98.8	1000	1029	+/- 13.0	LB63786
4-CHLORO-3-METHYLPHENOL	59-50-7	99.9	1000	953	+/- 62.2	LB83265
4-CHLOROANILINE	106-47-8	99.9	1000	969	+/- 32.4	LB82916
4-CHLOROPHENYLPHENYL ETHER	7005-72-3	99.9	1000	982	+/- 132.6	LB72185
4-METHYLPHENOL	106-44-5	99.9	1000	956	+/- 40.5	LB32518
4-NITROANILINE	100-01-6	99.9	1000	957	+/- 171.4	LB42566
4-NITROPHENOL	100-02-7	99.9	1000	1000	+/- 74.3	LB83255

(1) Listed in alphabetical order.
(2) Determined by capillary GC-FID, unless otherwise noted.
a) HPLC UV-254NM
(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.
(4) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.

Elwood Doughty
Quality Control Supervisor

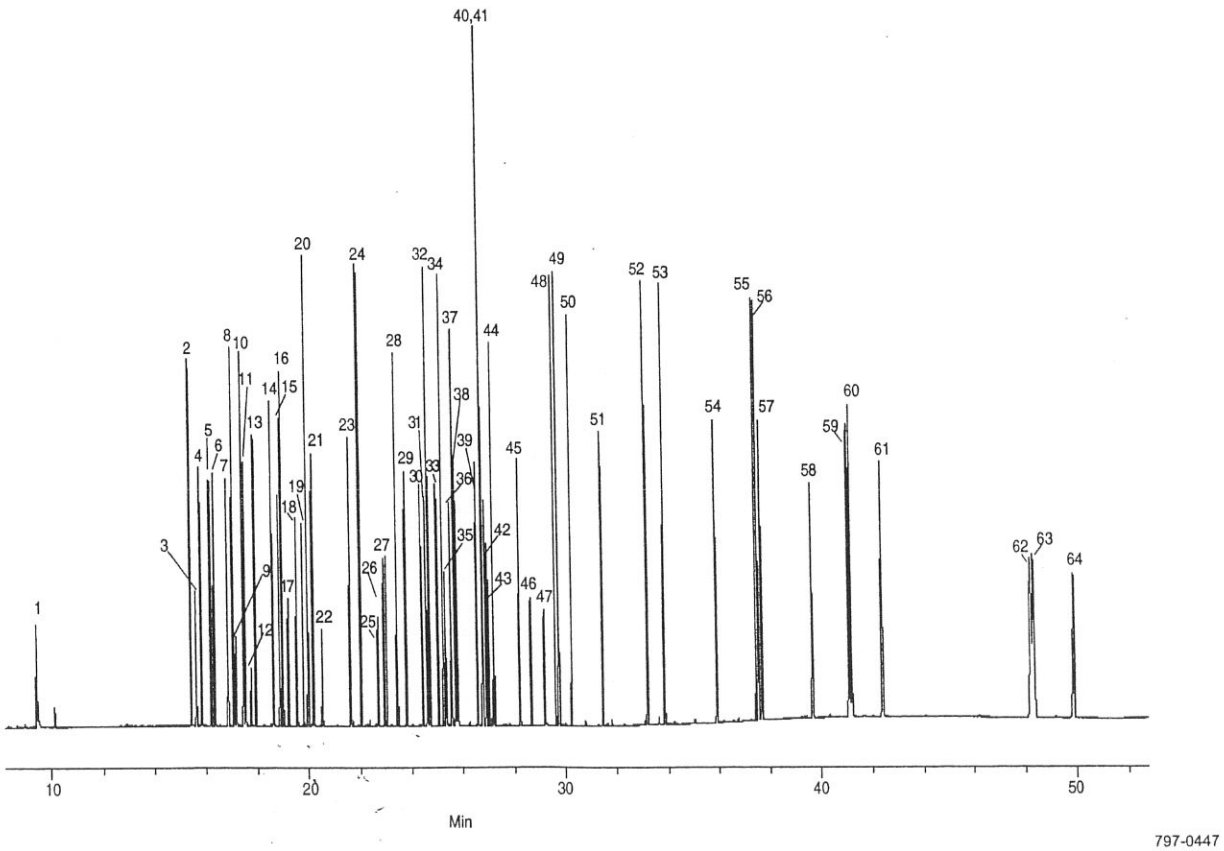
SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

CLP Semivolatile Calibration Mix

Catalog No. 506508

This mixture contains 1000µg/mL of each of the following components in methylene chloride:benzene (3:1):

1. N-Nitrosodimethylamine
2. Phenol
3. Bis(2-chloroethyl)ether
4. 2-Chlorophenol
5. 1,3-Dichlorobenzene
6. 1,4-Dichlorobenzene
7. 1,2-Dichlorobenzene
8. 2-Methylphenol
9. Bis(2-chloroisopropyl)ether
10. 4-Methylphenol
11. N-Nitrosodi-n-propylamine
12. Hexachloroethane
13. Nitrobenzene
14. Isophorone
15. 2-Nitrophenol
16. 2,4-Dimethylphenol
17. Bis(2-chloroethoxy)methane
18. 2,4-Dichlorophenol
19. 1,2,4-Trichlorobenzene
20. Naphthalene
21. 4-Chloroaniline
22. Hexachlorobutadiene
23. 4-Chloro-3-methylphenol
24. 2-Methylnaphthalene
25. Hexachlorocyclopentadiene
26. 2,4,6-Trichlorophenol
27. 2,4,5-Trichlorophenol
28. 2-Chloronaphthalene
29. 2-Nitroaniline
30. Dimethyl phthalate
31. 2,6-Dinitrotoluene
32. Acenaphthylene
33. 3-Nitroaniline
34. Acenaphthene
35. 2,4-Dinitrophenol
36. 4-Nitrophenol
37. Dibenzofuran
38. 2,4-Dinitrotoluene
39. Diethyl phthalate
40. Fluorene
41. 4-Chlorophenylphenyl ether
42. 4-Nitroaniline
43. 2-Methyl-4,6-dinitrophenol
44. Azobenzene
45. 4-Bromophenylphenyl ether
46. Hexachlorobenzene
47. Pentachlorophenol
48. Phenanthrene
49. Anthracene
50. Carbazole
51. Di-n-butyl phthalate
52. Fluoranthene
53. Pyrene
54. Butylbenzyl phthalate
55. Benzo(a)anthracene
56. Chrysene
57. Bis(2-ethylhexyl)phthalate
58. Di-n-octyl phthalate
59. Benzo(b)fluoranthene
60. Benzo(k)fluoranthene
61. Benzo(a)pyrene
62. Indeno(1,2,3-cd)pyrene
63. Dibenzo(a,h)anthracene
64. Benzo(ghi)perylene



Column: **SPB™-5, 60m x 0.25mm ID, 0.25µm film**
Catalog No.: **24036**
Oven: 35°C (4 min) to 300°C at 8°C/min (hold 20 min)
Carrier: helium, 30cm/sec (1.85mL/min)
Det.: FID, 320°C
Inj.: 1µL, split 50:1, 300°C

Analytical Reference Materials

8270 Internal Standard

Catalog # 567684

Lot # A093676

110 Benner Circle Bellefonte, PA 16823-8812
(814) 353-1300

FOR LABORATORY USE ONLY. READ MSDS PRIOR TO USE.

RAW MATERIAL TEST INFORMATION AVAILABLE UPON REQUEST

MANUFACTURED UNDER RESTEK'S ISO 9001 REGISTERED QUALITY SYSTEM

RESTEK

110 Benner Circle
Bellefonte, PA 16823-8812
Tel: (800)356-1688
Fax: (814)353-1309

www.restek.com

ISO Guide 34 Accredited
Reference Material Producer
Certificate #3222.01

ISO/IEC 17025 Accredited
Testing Laboratory
Certificate #3222.02

Certificate of Analysis

FOR LABORATORY USE ONLY-READ MSDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 567684 **Lot No.:** A093676

Description : 8270 Internal Standard

8270 Internal Standard 2,000µg/mL, Methylene Chloride, 5mL/ampul

Container Size : 5 mL **Pkg Amt:** > 5 mL

Expiration Date : February 2018 **Storage:** 10°C or colder

Handling: Sonication required. Mix is photosensitive.

C E R T I F I E D V A L U E S

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	1,4-Dichlorobenzene-d4	2,000.0 µg/mL	+/- 11.6282	µg/mL	Gravimetric
	CAS # 3855-82-1		+/- 92.7158	µg/mL	Unstressed
	Purity 99%		+/- 101.3766	µg/mL	Stressed
2	Naphthalene-d8	2,000.0 µg/mL	+/- 11.6282	µg/mL	Gravimetric
	CAS # 1146-65-2		+/- 92.7158	µg/mL	Unstressed
	Purity 99%		+/- 101.3766	µg/mL	Stressed
3	Acenaphthene-d10	2,000.0 µg/mL	+/- 11.6282	µg/mL	Gravimetric
	CAS # 15067-26-2		+/- 92.7163	µg/mL	Unstressed
	Purity 97%		+/- 101.3771	µg/mL	Stressed
4	Phenanthrene-d10	2,000.0 µg/mL	+/- 11.6282	µg/mL	Gravimetric
	CAS # 1517-22-2		+/- 92.7158	µg/mL	Unstressed
	Purity 99%		+/- 101.3766	µg/mL	Stressed
5	Chrysene-d12	2,000.0 µg/mL	+/- 11.6281	µg/mL	Gravimetric
	CAS # 1719-03-5		+/- 92.7150	µg/mL	Unstressed
	Purity 98%		+/- 101.3758	µg/mL	Stressed
6	Perylene-d12	2,000.0 µg/mL	+/- 11.6282	µg/mL	Gravimetric
	CAS # 1520-96-3		+/- 92.7158	µg/mL	Unstressed
	Purity 99%		+/- 101.3766	µg/mL	Stressed

Solvent: Methylene Chloride
CAS # 75-09-2
Purity 99%

Column:
30m x .25mm x .25um
Rtx-5 (cat.#10223)

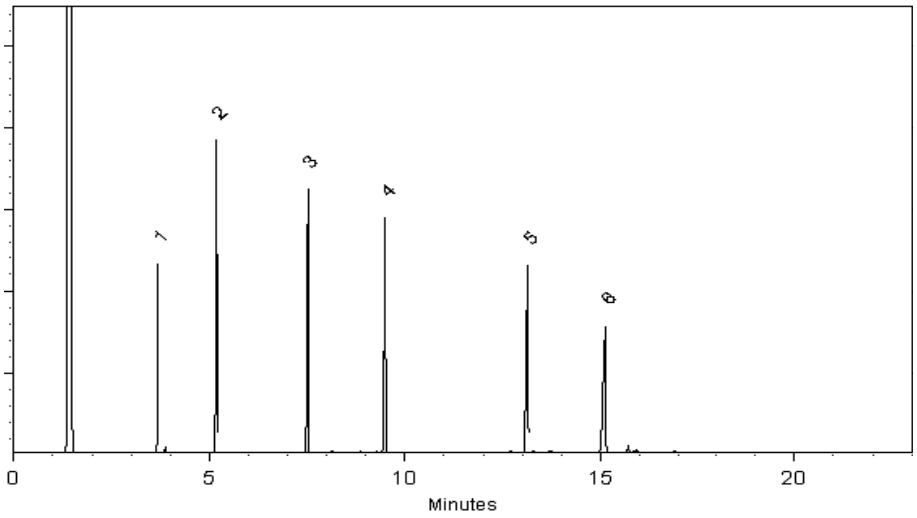
Carrier Gas:
hydrogen-constant pressure 10 psi.

Temp. Program:
75°C (hold 1 min.) to 330°C
@ 20°C/min. (hold 10 min.)

Inj. Temp:
250°C

Det. Temp:
330°C

Det. Type:
FID



Jodi E. Breon - QA Analyst

Date Passed: 27-Feb-2013 **Balance:** 1128342313

Manufactured under Restek's ISO 9001:2008 Registered Quality System Certificate #FM 80397

General Certified Reference Material Notes

Expiration Notes:

- Expiration date of the unopened ampul stored at the recommended storage condition is the last day of the month listed in the expiration date field.
- Uncertainty, concentration, and expiration of the CRM are based on the unopened product being stored according to the recommended condition found in the storage field.

Purity Notes:

- Purity and/or chemical identity are determined by one or more of the following techniques: GC/FID, HPLC, GC/μECD, GC/MS, LC/MS, RI, and/or melting point.
- Compounds with a listed purity of less than 99% have been weight corrected to compensate for impurities and/or salts. A correction factor is used to calculate the amount of compound necessary to achieve the desired concentration of the parent compound in solution.
- Purity of isomeric compounds is reported as the sum of the isomers.
- Purity values are rounded to the nearest whole number.

Certified Uncertainty Value Notes:

- The uncertainties are determined in accordance with ISO Guides 34 and 35. The certified combined stressed uncertainty value (includes gravimetric uncertainty, homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty and were combined using the following formula:

$$U_{combined\ stressed} = k\sqrt{U^2_{gravimetric} + U^2_{homogeneity} + U^2_{storage\ stability} + U^2_{shipping\ stability}}$$

  k is a coverage factor of 2, which gives a level of confidence of approximately 95%.
- It is important to note that the shipping stability uncertainty was obtained under temperature extremes for specific time intervals; therefore, the certified combined stressed uncertainty value should only be applied to the product if it was stored at non-standard temperature conditions up to and including 7 days. Contact Restek Technical Service at www.restek.com/Contact-Us for use recommendations if your shipment was in-transit for more than 7 days at non-standard temperature conditions.
- Apply the certified combined unstressed uncertainty value if the product was received under standard shipping conditions. Apply the certified combined stressed uncertainty value if the product was received under non-standard conditions as specified below.

Label Conditions	Standard Conditions	Non-Standard Conditions
25°C Nominal (Room Temperature)	< 60°C	≥ 60°C up to 7 days
10°C or colder (Refrigerate)	< 40°C	≥ 40°C up to 7 days
0°C or colder (Freezer)	< 25°C	≥ 25°C up to 7 days

- Separate (not combined) uncertainty values for gravimetric uncertainty are also displayed on the certificate, if needed, separate homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty values are available by contacting Restek Technical Service at www.restek.com/Contact-Us.
- The packaged amount is the minimum sample size for which uncertainty is valid. The ampules are over-filled to ensure that the minimum packaged amount can be sufficiently transferred.

Manufacturing Notes:

- Concentration is based upon gravimetric preparation using either a balance whose calibration has been verified daily using NIST traceable weights, and/or dilutions with Class A glassware.

Handling Notes:

- Samples should be transferred into deactivated vials for handling and storage. Restek supplies deactivated vials along with most standards packed in 2 mL ampules. Due to space constraints, Restek does not supply vials for larger volume ampules. Restek sells DMDCS for the purpose of glassware deactivation as catalog number 31840, which includes complete instructions. Restek will also deactivate larger volume vials from our inventory as a custom ordered item. Contact your Restek sales or customer service representative for details.
- If any undissolved material is visible inside the ampul, sonicate the unopened ampul until the material is completely dissolved.

RESTEK

Chemical Standard Batch Sheet
Lot #: A093676

Catalog #: 567684	**Target:** 2000 ug/mL	
Description: 8270 Internal Standard		
Solvent: Methylene Chloride	**Solvent Lot:** 127788	**Final Volume:** 3,000 ml

Made by: Matt Hepfer	**Date:** 2/21/2013 8:40:29AM		
Tested by: Diane Shaffer	**Date:** 2/26/2013 5:33:26PM		
Pass	**By:** Jodi Breon	**Date:** 2/27/2013 10:27:25A	
Packaged by: Alexandria Pavkovich / Kendra Swope	**Date:** 2/25/2013 11:10:21A	**No. Units:** 536	**Pkg Size:** 5 mL
Balance Used: BEDEARMBALPC1 XP205	**Serial #:** 1128342313		

Compound	CAS	Storage Location	Lot #	Purity	Target Conc(ug/mL)	Target	Actual	Calc Conc(ug/mL)
1,4-Dichlorobenzene-d4	3855-82-1	R0487	PR-18488	0.99	2,000.00	6,000.00 mg	6,000.00 mg	2,000.0
Acenaphthene-d10	15067-26-2	R0622	PR-21070	0.97	2,000.00	6,185.57 mg	6,185.60 mg	2,000.0
Perylene-d12	1520-96-3	R0625	PR-16756	0.99	2,000.00	6,000.00 mg	6,000.00 mg	2,000.0
Phenanthrene-d10	1517-22-2	R0626	PR-23065	0.99	2,000.00	6,000.00 mg	6,000.00 mg	2,000.0
Chrysene-d12	1719-03-5	R0629	PR-19986	0.98	2,000.00	6,122.45 mg	6,122.40 mg	2,000.0
Naphthalene-d8	1146-65-2	R0637	PR-20449	0.99	2,000.00	6,000.00 mg	6,000.00 mg	2,000.0

QA Report: 8270 Internal Standard (Cat.#567684)

	Runs of Lot # A092941						Runs of Lot # A093676							
COMPONENT	Run #1	Run #2	Run #3	AVG	STD DEV	% RSD	Run #1	Run #2	Run #3	AVG	STD DEV	% RSD	%D MEAN	P/F
1,4-Dichlorobenzene-d4	1707725	1691509	1832715	1743983	77271	4.43	1818667	1695868	1666128	1726888	80862	4.68	0.98	PASS
Naphthalene-d8	3234819	3204806	3466056	3301894	142959	4.33	3529518	3279008	3219085	3342537	164679	4.93	-1.23	PASS
Acenaphthene-d10	3221545	3195302	3426436	3281094	126552	3.86	3494536	3259946	3199625	3318036	155801	4.70	-1.13	PASS
Phenanthrene-d10	3330464	3301583	3508286	3380111	111938	3.31	3604992	3371788	3312856	3429879	154489	4.50	-1.47	PASS
Chrysene-d12	3408655	3362327	3549037	3440006	97223	2.83	3689863	3452532	3401636	3514677	153835	4.38	-2.17	PASS
Perylene-d12	3240766	3212984	3292620	3248790	40420	1.24	3452007	3281176	3242641	3325275	111432	3.35	-2.35	PASS

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

Recd 3/21/11 mt

Base/Neutrals Surrogate Standard Mixture

Product Number: ISM-280N **Page:** 1 of 1

Lot Number: CH-0184 **Lot Issue Date:** 21-Jan-2011 **Expiration Date:** 28-Feb-2014

This Certified Reference Material (RM) was manufactured and verified in accordance with ULTRA's ISO 9001 registered quality system, and the analyte concentrations were verified by our ISO 17025 accredited laboratory. The true value and uncertainty value at the 95% confidence level for each analyte, determined gravimetrically, is listed below.

Analyte	CAS#	Analyte Lot	True Value
2-fluorobiphenyl	000321-60-8	MKAA3698	1002 ± 5 µg/mL
nitrobenzene-d5	004165-60-0	PR-16900/0303	1002 ± 5 µg/mL
p-terphenyl-d14	001718-51-0	PR-15513/0210	1002 ± 5 µg/mL

Matrix: methylene chloride (dichloromethane)

Storage: Store at Room Temperature (18-25° C)

ULTRA uses balances calibrated with weights traceable to NIST in compliance with ANSI/NCSL Z-540-1 and ISO 9001, and calibrated Class A glassware in the manufacturing of these standards.

ACCREDITED

ISO 17025:2005 Accredited A2LA Cert. No. 0851-01

ISO 9001:2008 Registered TUV USA, Inc. Cert. No. 09-1009

250 Smith Street, North Kingstown, RI 02852 USA
401-294-9400 Fax: 295-2330
www.ultrasci.com

William J. Leahy
Quality Assurance Manager

05/29/2013

Certificate of Analysis

Acids Surrogate Standard Mixture

Product Number: ISM-290N **Page:** 1 of 1

Lot Number: CH-2873 **Lot Issue Date:** 16-Sep-2011 **Expiration Date:** 30-Sep-2014

This Certified Reference Material (RM) was manufactured and verified in accordance with ULTRA's ISO 9001 registered quality system, and the analyte concentrations were verified by our ISO 17025 accredited laboratory. The true value and uncertainty value at the 95% confidence level for each analyte, determined gravimetrically, is listed below.

Analyte	CAS#	Analyte Lot	True Value
2-fluorophenol	000367-12-4	RM03347	2004 ± 10 µg/mL
phenol-d5	004165-62-2	RM02038	2005 ± 10 µg/mL
2,4,6-tribromophenol	000118-79-6	RM01307	2004 ± 10 µg/mL

Matrix: methanol (methyl alcohol)

Storage: Store at Room Temperature (18-25° C)

ULTRA uses balances calibrated with weights traceable to NIST in compliance with ANSI/NCSL Z-540-1 and ISO 9001, and calibrated Class A glassware in the manufacturing of these standards.

ACCREDITED
ISO 17025:2005 Accredited A2LA Cert. No. 0851-01

ISO 9001:2008 Registered TUV USA, Inc. Cert. No. 09-1009

250 Smith Street, North Kingstown, RI 02852 USA
401-294-9400 Fax: 295-2330
wwww.ultrasci.com

William J. Leary
Quality Assurance Manager

05/29/2013

660 Tower Lane • P.O. Box 599 • West Chester, PA 19381-0599
1-800-452-9994 • 1-610-692-3026 • Fax 1-610-692-8729
info@chemservice.com • www.chemservice.com

CERTIFICATE OF ANALYSIS

3,5-Dimethylphenol

CATALOG NUMBER	N-10796-2G
LOT NUMBER	558500
DATE CERTIFIED	07/17/12
EXPIRATION DATE	07/31/17
CAS NUMBER	108-68-9
MOLECULAR FORMULA	C8H10O
MOLECULAR WEIGHT	122.16
STORAGE	Store in a cool dry place.
HANDLING	See MSDS.
INTENDED USE	For laboratory use only.

Analytical Test	Value
% PURITY (GC/FID)	99.5

Chem Service, Inc. guarantees the purity to be +/- 0.5% deviation prior to the expiration date shown on the label and exclusive of any customer contamination.

Certified By:

John Conrad

John Conrad
CSM/TC

COA Form
Revision 7/2011

ISO 9001
Certificate Number: 31610

ISO/IEC 17025
Accreditation Number: 63520

660 Tower Lane • P.O. Box 599 • West Chester, PA 19381-0599
1-800-452-9994 • 1-610-692-3026 • Fax 1-610-692-8729
info@chemservice.com • www.chemservice.com

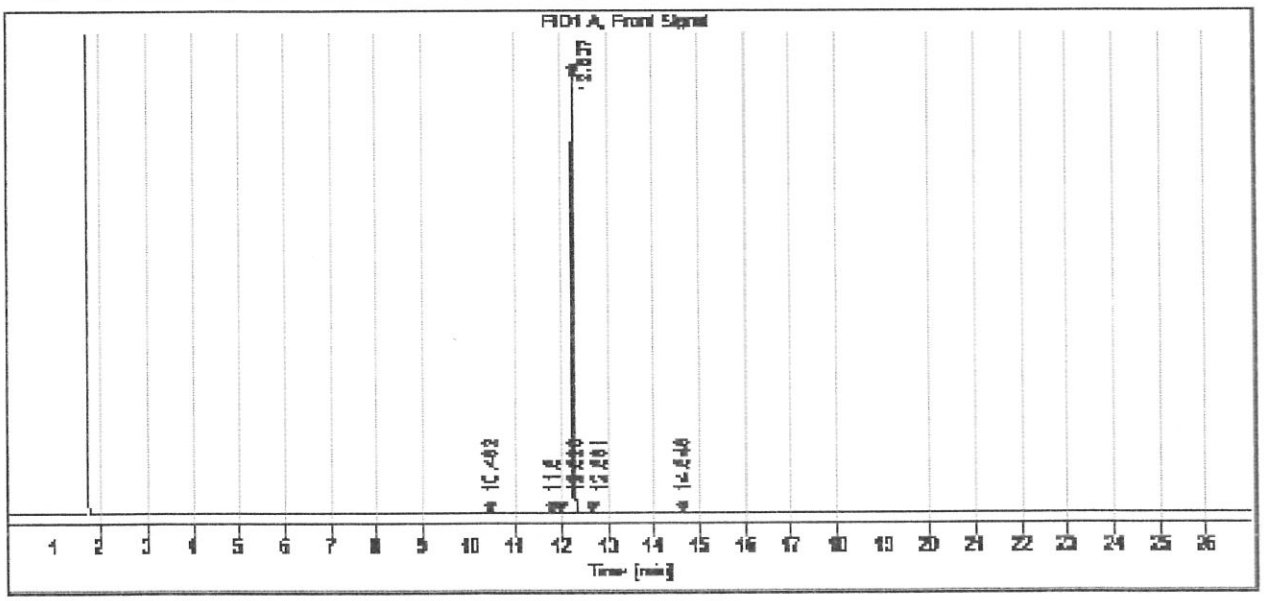
CERTIFICATE OF ANALYSIS

Gas Chromatography / Flame Ionization Detector (GC/FID)

Data file: C:\CHEM32\2\DATA\0712\SIG1012340.D

Sample name: N-10796 in CH3OH

Instrument:	GC 2	**Sample type:**	Sample
Injection date:	7/16/2012 4:04:59 PM	**Location:**	Vial 7
Acq. method:	MIX1.M	**Injection volume:**	1.0uL
Column name:	DB-5 (30m x 0.53mm x 1.5um)		



Signal: FID1 A, Front Signal

RT [min]	Type	Width [min]	Area	Height	Area%
10.462	BB	0.0298	3.5462	1.4248	0.04
11.800	BB	0.0288	2.5139	1.0546	0.03
12.026	BB	0.0294	4.5678	2.0020	0.05
12.307	BB	0.0353	9797.1592	4077.6702	99.77
12.681	VB	0.0335	9.4613	4.2503	0.10
14.648	BV	0.0251	2.4625	1.2318	0.03
		Sum	9819.7109		

Certificate of Analysis

Benzo[e]pyrene

Product Number: RAH-081 **Page:** 1 of 1

Lot Number: RM02846 **Lot Issue Date:** 8/8/2011 **Expiration Date:** 31-Jan-2015

This reference material has been prepared under ULTRA's ISO 9001 quality system, verified by ULTRA's ISO 17025 accredited laboratory, and found to meet the specifications stated below.

Compound	CAS #	Purity
benzo[e]pyrene	000192-97-2	99.5 %

The estimated uncertainty of a single measurement of the assay can be expected to be 0.5% relative at a confidence level of 95%.

Storage: Store at Room Temperature (18-25° C)

Balances used to measure the weight of the material in the container are calibrated with weights traceable to NIST in compliance with ANSI/NCSL Z-540-1 and ISO 9001.

250 Smith Street, North Kingstown, RI 02852 USA
401-294-9400 Fax: 401-295-2330
www.ultrasci.com

William J. Leary
Quality Assurance Manager

05/29/2013

Certificate of Composition

4x/mL
REC 1/28/13

DESCRIPTION: TEST AMERICA

QUOTE 21612606 LOT NO.: LB97402 MFG DATE: Dec-2012

EXP 12/31/13

SOLVENT: METHANOL

ANALYTE (1)	CAS NUMBER	PERCENT PURITY (2)	WEIGHT CONCENTRATION (3)	SUPELCO LOT NO
PROPYLENE OXIDE	75-56-9	99.9	10004 +/- 50.0	LB79736

(1) Listed in alphabetical order.

(2) Determined by capillary GC-FID, unless otherwise noted.

(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.

Duane Funk

Duane Funk
Quality Manager

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

Certificate of Composition

4x/mL
REC 1/28/13

DESCRIPTION: TEST AMERICA

QUOTE 21612606 LOT NO.: LB97402 MFG DATE: Dec-2012

EXP 12/31/13

SOLVENT: METHANOL

ANALYTE (1)	CAS NUMBER	PERCENT PURITY (2)	WEIGHT CONCENTRATION (3)	SUPELCO LOT NO
PROPYLENE OXIDE	75-56-9	99.9	10004 +/- 50.0	LB79736

(1) Listed in alphabetical order.

(2) Determined by capillary GC-FID, unless otherwise noted.

(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.

Duane Funk

Duane Funk
Quality Manager

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

RS Celite x 1 9

Certificate of Analysis

DESCRIPTION: 1-Chlorohexane

MFG. DATE: Nov 2011

CATALOG NO.: 442258 (1)

LOT NO.: LB89038V EXP. DATE: Nov 2014

CAS NUMBER: 544-10-5 MOLECULAR FORMULA: C6H13CL

MOLECULAR WEIGHT: 120.5

PHYSICAL PROPERTIES	ASSAY	
FTIR	Matches: SEA 207	Lib. No.: 334
GC - Mass Spec	Matches: NIST	Lib. No.: 3729
Purity (2)	99.9%	
Refractive index	1.4197 @ 20.0 deg C	

Note: Supelco guarantees the purity of this chemical standard +/- 0.5% deviation prior to the expiration date shown on the label. This guarantee is exclusive of any contamination caused by the customer.

(1) This product is packaged from R300770 Lot number LB18907.

(2) Determined by GC-FID unless otherwise noted.

Elwood Doughty
Quality Control Supervisor

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

Rcd 4/2/13 JM

Certificate of Analysis

DESCRIPTION: Ethylene Oxide

CATALOG NO.: 48838 MFG DATE: Feb-2013

LOT NO.: LB98333 EXPIRATION DATE: Feb-2014

SOLVENT: METHANOL

ANALYTE	CAS NUMBER	PERCENT PURITY(1)	WEIGHT(2) CONCENTRATION	ANALYTICAL(3) CONCENTRATION	STD DEV	SUPELCO LOT NO
ETHYLENE OXIDE	75-21-8	99.9	50000	51345	+/- 336.3	LB95261

(1) Determined by capillary GC-FID, unless otherwise noted.

(2) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.

(3) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.

Duane Funk

Duane Funk
Quality Manager

SUPELCO®
Solutions within.™
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

Certificate of Analysis

DESCRIPTION: 502/524 Volatile Organics Calibration Mix

CATALOG NO.: 502111 MFG DATE: May-2012
LOT NO.: LB92760 EXPIRATION DATE: May-2014

SOLVENT: METHANOL

ANALYTE (1)	CAS NUMBER	PERCENT PURITY(2)	WEIGHT(3) CONCENTRATION	ANALYTICAL(4) CONCENTRATION	STD DEV	SUPELCO LOT NO
BENZENE	71-43-2	99.9	2000	2000	+/- 24.2	LB82075
BROMOBENZENE	108-86-1	99.9	2000	1992	+/- 16.7	LB29791
BROMOCHLOROMETHANE	74-97-5	99.9	2000	1986	+/- 14.0	LB39040
BROMODICHLOROMETHANE	75-27-4	99.4	2000	1966	+/- 13.4	LB78267
BROMOFORM	75-25-2	96.5	2000	1978	+/- 11.2	LB80493
CARBON TETRACHLORIDE	56-23-5	99.9	2000	2042	+/- 14.1	LA55583
CHLOROBENZENE	108-90-7	99.9	2000	1972	+/- 10.5	LB72110
CHLOROFORM	67-66-3	99.0	2000	2000	+/- 10.3	LB80388
CIS 1,3-DICHLOROPROPENE (Z)	10061-01-5	99.9	2000	2016	+/- 16.3	LB83581
CIS-1,2-DICHLOROETHYLENE	156-59-2	99.9	2000	2000	+/- 15.4	LB73428
CUMENE	98-82-8	99.9	2000	1992	+/- 5.8	LB80606
DIBROMOCHLOROMETHANE	124-48-1	99.9	2000	1965	+/- 26.4	LB70128
DIBROMOMETHANE	74-95-3	99.0	2000	2000	+/- 32.8	LB81118
ETHYLBENZENE	100-41-4	99.9	2000	1976	+/- 7.5	LB69556
HEXACHLOROBUTADIENE	87-68-3	96.2	2000	2011	+/- 56.2	LB67777
M-XYLENE (5)	108-38-3	99.9	2000	*****		LB59656
METHYLENE CHLORIDE	75-09-2	99.9	2000	2070	+/- 21.4	LB87197
N-BUTYLBENZENE	104-51-8	99.9	2000	2011	+/- 27.5	LB81630
N-PROPYLBENZENE	103-65-1	99.9	2000	1994	+/- 6.0	LB69017

(1) Listed in alphabetical order.
(2) Determined by capillary GC-FID, unless otherwise noted.
(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.
(4) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.
(5) These products coelute and are not quantified in the final mix.

Elwood Doughty
Quality Control Supervisor

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

x4 6/25/12

Certificate of Analysis

DESCRIPTION: 502/524 Volatile Organics Calibration Mix

CATALOG NO.: 502111 MFG DATE: May-2012
LOT NO.: LB92760 EXPIRATION DATE: May-2014

SOLVENT: METHANOL

ANALYTE (1)	CAS NUMBER	PERCENT PURITY(2)	WEIGHT(3) CONCENTRATION	ANALYTICAL(4) CONCENTRATION	STD DEV	SUPELCO LOT NO
1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	98.0	2000	2011	+/- 32.4	LB06608
1,2-DIBROMOETHANE	106-93-4	99.9	2000	1983	+/- 17.5	LB42792
1,2-DICHLOROBENZENE	95-50-1	99.9	2000	1971	+/- 21.0	LA96474
1,2-DICHLOROETHANE	107-06-2	99.9	2000	2036	+/- 15.6	LB74294
1,2-DICHLOROPROPANE	78-87-5	99.9	2000	1992	+/- 24.8	LB08115
1,2,3-TRICHLOROBENZENE	87-61-6	99.9	2000	2016	+/- 54.5	LA50762
1,2,3-TRICHLOROPROPANE	96-18-4	99.9	2000	2022	+/- 21.9	LB65457
1,2,4-TRICHLOROBENZENE	120-82-1	99.5	2000	2005	+/- 44.0	LB48083
1,2,4-TRIMETHYLBENZENE	95-63-6	99.6	2000	2009	+/- 15.2	LB60016
1,3-DICHLOROBENZENE	541-73-1	99.9	2000	1984	+/- 20.3	LB68066
1,3-DICHLOROPROPANE	142-28-9	99.9	2000	2011	+/- 16.0	LB52235
1,3,5-TRIMETHYLBENZENE	108-67-8	99.3	2000	2000	+/- 11.3	LB82157
1,4-DICHLOROBENZENE	106-46-7	99.9	2000	1984	+/- 20.3	LB69983
2-CHLOROTOLUENE	95-49-8	99.6	2000	2003	+/- 15.0	LB25577
2,2-DICHLOROPROPANE	594-20-7	99.9	2000	2006	+/- 11.4	LB83285
4-CHLOROTOLUENE	106-43-4	99.7	2000	1995	+/- 16.6	LB05252

(1) Listed in alphabetical order.
(2) Determined by capillary GC-FID, unless otherwise noted.
(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.
(4) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.
(5) These products coelute and are not quantified in the final mix.

Elwood Doughty
Quality Control Supervisor

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

Certificate of Analysis

DESCRIPTION: 502/524 Volatile Organics Calibration Mix

CATALOG NO.: 502111 MFG DATE: May-2012
LOT NO.: LB92760 EXPIRATION DATE: May-2014

SOLVENT: METHANOL

ANALYTE (1)	CAS NUMBER	PERCENT PURITY(2)	WEIGHT(3) CONCENTRATION	ANALYTICAL(4) CONCENTRATION		STD DEV	SUPELCO LOT NO
NAPHTHALENE	91-20-3	99.9	2000	2011	+/-	50.0	LB77841
O-XYLENE	95-47-6	99.9	2000	1993	+/-	11.6	LB63785
P-ISOPROPYLTOLUENE	99-87-6	99.9	2000	1998	+/-	16.0	LB40003
P-XYLENE (5)	106-42-3	99.9	2000	*****			LB73203
SEC-BUTYLBENZENE	135-98-8	99.9	2000	2006	+/-	19.5	LB77150
STYRENE	100-42-5	99.9	2000	2003	+/-	14.6	LB82481
TERT-BUTYLBENZENE	98-06-6	99.9	2000	2013	+/-	13.1	LB40373
TETRACHLOROETHENE	127-18-4	99.1	2000	2000	+/-	20.3	LB67182
TOLUENE	108-88-3	99.9	2000	1996	+/-	10.7	LB82521
TRANS 1,3-DICHLOROPROPENE (E)	10061-02-6	99.4	2000	1994	+/-	5.6	LB85426
TRANS-1,2-DICHLOROETHYLENE	156-60-5	99.9	2000	2143	+/-	25.3	LB82639
TRICHLOROETHYLENE	79-01-6	98.6	2000	2029	+/-	19.0	LB56674
1,1-DICHLOROETHANE	75-34-3	99.9	2000	2093	+/-	4.7	LB68167
1,1-DICHLOROETHYLENE	75-35-4	99.9	2000	2192	+/-	24.0	LB81745
1,1-DICHLOROPROPENE	563-58-6	94.1	2000	1994	+/-	6.0	LB84378
1,1,1-TRICHLOROETHANE	71-55-6	96.6	2000	2018	+/-	11.7	LB85558
1,1,1,2-TETRACHLOROETHANE	630-20-6	99.7	2000	1986	+/-	28.8	LB75001
1,1,2-TRICHLOROETHANE	79-00-5	99.9	2000	2000	+/-	21.6	LB87978
1,1,2,2-TETRACHLOROETHANE	79-34-5	99.9	2000	1986	+/-	14.2	LB51327

(1) Listed in alphabetical order.
(2) Determined by capillary GC-FID, unless otherwise noted.
(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.
(4) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.
(5) These products coelute and are not quantified in the final mix.

Elwood Doughty
Quality Control Supervisor

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

84 05/12/2

Certificate of Analysis

DESCRIPTION: 502/524 Volatile Organics Calibration Mix

CATALOG NO.: 502111 MFG DATE: May-2012
LOT NO.: LB92760 EXPIRATION DATE: May-2014

SOLVENT: METHANOL

ANALYTE (1)	CAS NUMBER	PERCENT PURITY(2)	WEIGHT(3) CONCENTRATION	ANALYTICAL(4) CONCENTRATION	STD DEV	SUPELCO LOT NO
BENZENE	71-43-2	99.9	2000	2000	+/- 24.2	LB82075
BROMOBENZENE	108-86-1	99.9	2000	1992	+/- 16.7	LB29791
BROMOCHLOROMETHANE	74-97-5	99.9	2000	1986	+/- 14.0	LB39040
BROMODICHLOROMETHANE	75-27-4	99.4	2000	1966	+/- 13.4	LB78267
BROMOFORM	75-25-2	96.5	2000	1978	+/- 11.2	LB80493
CARBON TETRACHLORIDE	56-23-5	99.9	2000	2042	+/- 14.1	LA55583
CHLOROBENZENE	108-90-7	99.9	2000	1972	+/- 10.5	LB72110
CHLOROFORM	67-66-3	99.0	2000	2000	+/- 10.3	LB80388
CIS 1,3-DICHLOROPROPENE (Z)	10061-01-5	99.9	2000	2016	+/- 16.3	LB83581
CIS-1,2-DICHLOROETHYLENE	156-59-2	99.9	2000	2000	+/- 15.4	LB73428
CUMENE	98-82-8	99.9	2000	1992	+/- 5.8	LB80606
DIBROMOCHLOROMETHANE	124-48-1	99.9	2000	1965	+/- 26.4	LB70128
DIBROMOMETHANE	74-95-3	99.0	2000	2000	+/- 32.8	LB81118
ETHYLBENZENE	100-41-4	99.9	2000	1976	+/- 7.5	LB69556
HEXACHLOROBUTADIENE	87-68-3	96.2	2000	2011	+/- 56.2	LB67777
M-XYLENE (5)	108-38-3	99.9	2000	*****		LB59656
METHYLENE CHLORIDE	75-09-2	99.9	2000	2070	+/- 21.4	LB87197
N-BUTYLBENZENE	104-51-8	99.9	2000	2011	+/- 27.5	LB81630
N-PROPYLBENZENE	103-65-1	99.9	2000	1994	+/- 6.0	LB69017

(1) Listed in alphabetical order.
(2) Determined by capillary GC-FID, unless otherwise noted.
(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.
(4) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.
(5) These products coelute and are not quantified in the final mix.

Elwood Doughty
Quality Control Supervisor

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

x4 6/25/12

Certificate of Analysis

DESCRIPTION: 502/524 Volatile Organics Calibration Mix

CATALOG NO.: 502111 MFG DATE: May-2012
LOT NO.: LB92760 EXPIRATION DATE: May-2014

SOLVENT: METHANOL

ANALYTE (1)	CAS NUMBER	PERCENT PURITY(2)	WEIGHT(3) CONCENTRATION	ANALYTICAL(4) CONCENTRATION	STD DEV	SUPELCO LOT NO
1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	98.0	2000	2011	+/- 32.4	LB06608
1,2-DIBROMOETHANE	106-93-4	99.9	2000	1983	+/- 17.5	LB42792
1,2-DICHLOROBENZENE	95-50-1	99.9	2000	1971	+/- 21.0	LA96474
1,2-DICHLOROETHANE	107-06-2	99.9	2000	2036	+/- 15.6	LB74294
1,2-DICHLOROPROPANE	78-87-5	99.9	2000	1992	+/- 24.8	LB08115
1,2,3-TRICHLOROBENZENE	87-61-6	99.9	2000	2016	+/- 54.5	LA50762
1,2,3-TRICHLOROPROPANE	96-18-4	99.9	2000	2022	+/- 21.9	LB65457
1,2,4-TRICHLOROBENZENE	120-82-1	99.5	2000	2005	+/- 44.0	LB48083
1,2,4-TRIMETHYLBENZENE	95-63-6	99.6	2000	2009	+/- 15.2	LB60016
1,3-DICHLOROBENZENE	541-73-1	99.9	2000	1984	+/- 20.3	LB68066
1,3-DICHLOROPROPANE	142-28-9	99.9	2000	2011	+/- 16.0	LB52235
1,3,5-TRIMETHYLBENZENE	108-67-8	99.3	2000	2000	+/- 11.3	LB82157
1,4-DICHLOROBENZENE	106-46-7	99.9	2000	1984	+/- 20.3	LB69983
2-CHLOROTOLUENE	95-49-8	99.6	2000	2003	+/- 15.0	LB25577
2,2-DICHLOROPROPANE	594-20-7	99.9	2000	2006	+/- 11.4	LB83285
4-CHLOROTOLUENE	106-43-4	99.7	2000	1995	+/- 16.6	LB05252

(1) Listed in alphabetical order.
(2) Determined by capillary GC-FID, unless otherwise noted.
(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.
(4) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.
(5) These products coelute and are not quantified in the final mix.

Elwood Doughty
Quality Control Supervisor

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

Certificate of Analysis

DESCRIPTION: 502/524 Volatile Organics Calibration Mix

CATALOG NO.: 502111 MFG DATE: May-2012
LOT NO.: LB92760 EXPIRATION DATE: May-2014

SOLVENT: METHANOL

ANALYTE (1)	CAS NUMBER	PERCENT PURITY(2)	WEIGHT(3) CONCENTRATION	ANALYTICAL(4) CONCENTRATION	STD DEV	SUPELCO LOT NO
NAPHTHALENE	91-20-3	99.9	2000	2011	+/- 50.0	LB77841
O-XYLENE	95-47-6	99.9	2000	1993	+/- 11.6	LB63785
P-ISOPROPYLTOLUENE	99-87-6	99.9	2000	1998	+/- 16.0	LB40003
P-XYLENE (5)	106-42-3	99.9	2000	*****		LB73203
SEC-BUTYLBENZENE	135-98-8	99.9	2000	2006	+/- 19.5	LB77150
STYRENE	100-42-5	99.9	2000	2003	+/- 14.6	LB82481
TERT-BUTYLBENZENE	98-06-6	99.9	2000	2013	+/- 13.1	LB40373
TETRACHLOROETHENE	127-18-4	99.1	2000	2000	+/- 20.3	LB67182
TOLUENE	108-88-3	99.9	2000	1996	+/- 10.7	LB82521
TRANS 1,3-DICHLOROPROPENE (E)	10061-02-6	99.4	2000	1994	+/- 5.6	LB85426
TRANS-1,2-DICHLOROETHYLENE	156-60-5	99.9	2000	2143	+/- 25.3	LB82639
TRICHLOROETHYLENE	79-01-6	98.6	2000	2029	+/- 19.0	LB56674
1,1-DICHLOROETHANE	75-34-3	99.9	2000	2093	+/- 4.7	LB68167
1,1-DICHLOROETHYLENE	75-35-4	99.9	2000	2192	+/- 24.0	LB81745
1,1-DICHLOROPROPENE	563-58-6	94.1	2000	1994	+/- 6.0	LB84378
1,1,1-TRICHLOROETHANE	71-55-6	96.6	2000	2018	+/- 11.7	LB85558
1,1,1,2-TETRACHLOROETHANE	630-20-6	99.7	2000	1986	+/- 28.8	LB75001
1,1,2-TRICHLOROETHANE	79-00-5	99.9	2000	2000	+/- 21.6	LB87978
1,1,2,2-TETRACHLOROETHANE	79-34-5	99.9	2000	1986	+/- 14.2	LB51327

(1) Listed in alphabetical order.
(2) Determined by capillary GC-FID, unless otherwise noted.
(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.
(4) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.
(5) These products coelute and are not quantified in the final mix.

Elwood Doughty
Quality Control Supervisor

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

Certificate of Analysis

Rec 7/13/12
3 x 1mL

DESCRIPTION: Iodomethane

CATALOG NO.: 506052 MFG DATE: May-2012

LOT NO.: LB92349 EXPIRATION DATE: May-2013

ANALYTE	CAS NUMBER	PERCENT PURITY(1)	WEIGHT(2) CONCENTRATION	ANALYTICAL(3)	STD DEV	SUPELCO LOT NO
IODOMETHANE	74-88-4	99.9	2000	1967	+/- 20.9	LB45475

(1) Determined by capillary GC-FID, unless otherwise noted.

(2) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.

(3) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.

Elwood Doughty
Quality Control Supervisor

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

Rec 6/11/12
$ 10 x 1mL

RESTEK

110 Benner Circle
Bellefonte, PA 16823-8812
Tel: (800)356-1688
Fax: (814)353-1309

www.Restek.com

Certificate of Analysis

FOR LABORATORY USE ONLY-READ MSDS PRIOR TO USE.

Catalog No. : 561149 **Lot No.:** A082824

Description : Customs Freons Standard

Container Size : [5] 2 mL **Pkg Amt:** [5] > 2 mL

Expiration Date : [1] July 2016 **Storage:** 0°C or colder

Elution Order	Compound	CAS #	Percent Purity [2]	Grav. Conc. (weight/volume) [3]	Grav.Uncert. (95% C.L.; K=2) [4]
1	Chlorotrifluoroethylene	79-38-9	99%	2,016.5 ug/mL	+/- 32.6978 ug/mL
2	2-Chloro-1,1,1-trifluoroethane (HCFC-133a)	75-88-7	99%	2,009.2 ug/mL	+/- 86.3197 ug/mL
Solvent:	P&T Methanol	67-56-1	99%		

Column:
60m x .25mm x 1.4um
Rtx-502.2 (cat.#10916)

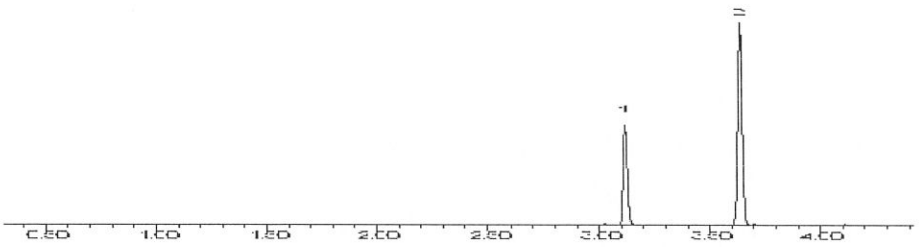
Carrier Gas:
helium-constant flow 2.0 mL/min.

Temp. Program:
40°C (hold 6 min.) to 100°C
@ 6°C/min.

Inj. Temp:
200°C

Det. Temp:
250°C

Det. Type:
MSD



x4
3/25/13 DM

RESTEK

110 Benner Circle
Bellefonte, PA 16823-8812
Tel: (800)356-1688
Fax: (814)353-1309

www.restek.com

ACCREDITED
ISO Guide 34 Accredited
Reference Material Producer
Certificate #3222.01

ilac-MRA

ACCREDITED
ISO/IEC 17025 Accredited
Testing Laboratory
Certificate #3222.02

Certificate of Analysis

FOR LABORATORY USE ONLY-READ MSDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 567641.sec **Lot No.:** A093733

Description : 8260 List 1 / Std #1 MegaMix

8260 List 1 / Std #1 MegaMix 1,000-50,000 µg/ml, P&T Methanol, 1 ml/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : February 2016 **Storage:** 0°C or colder

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	Diethyl ether (ethyl ether)	2,000.0 µg/mL	+/- 11.6282	µg/mL	Gravimetric
	CAS # 60-29-7.SEC		+/- 44.2531	µg/mL	Unstressed
	Purity 99%		+/- 44.4335	µg/mL	Stressed
2	1,1,2-Trichlorotrifluoroethane (CFC-113)	2,000.0 µg/mL	+/- 11.6282	µg/mL	Gravimetric
	CAS # 76-13-1.SEC		+/- 44.2531	µg/mL	Unstressed
	Purity 99%		+/- 44.4335	µg/mL	Stressed
3	1,1-Dichloroethene	2,000.0 µg/mL	+/- 11.6282	µg/mL	Gravimetric
	CAS # 75-35-4.SEC		+/- 44.2531	µg/mL	Unstressed
	Purity 99%		+/- 44.4335	µg/mL	Stressed
4	tert-Butanol (TBA)	20,000.0 µg/mL	+/- 116.2756	µg/mL	Gravimetric
	CAS # 75-65-0.SEC		+/- 442.5291	µg/mL	Unstressed
	Purity 99%		+/- 444.3332	µg/mL	Stressed
5	Iodomethane (methyl iodide)	2,000.0 µg/mL	+/- 11.6284	µg/mL	Gravimetric
	CAS # 74-88-4.SEC		+/- 44.2540	µg/mL	Unstressed
	Purity 97%		+/- 44.4344	µg/mL	Stressed
6	Allyl chloride (3-chloropropene)	2,000.0 µg/mL	+/- 11.6281	µg/mL	Gravimetric
	CAS # 107-05-1.SEC		+/- 44.2527	µg/mL	Unstressed
	Purity 98%		+/- 44.4331	µg/mL	Stressed
7	Methyl acetate	10,000.0 µg/mL	+/- 58.1378	µg/mL	Gravimetric
	CAS # 79-20-9.SEC		+/- 221.2646	µg/mL	Unstressed
	Purity 99%		+/- 222.1666	µg/mL	Stressed
8	Carbon disulfide	2,000.0 µg/mL	+/- 11.6281	µg/mL	Gravimetric
	CAS # 75-15-0.SEC		+/- 44.2527	µg/mL	Unstressed
	Purity 98%		+/- 44.4331	µg/mL	Stressed
9	Methylene chloride (dichloromethane)	2,000.0 µg/mL	+/- 11.6282	µg/mL	Gravimetric
	CAS # 75-09-2.SEC		+/- 44.2531	µg/mL	Unstressed
	Purity 99%		+/- 44.4335	µg/mL	Stressed

10	Acrylonitrile	20,000.0	µg/mL	+/-	116.2756	µg/mL	Gravimetric
	CAS # 107-13-1.SEC			+/-	442.5291	µg/mL	Unstressed
	Purity 99%			+/-	444.3332	µg/mL	Stressed
11	Methyl-tert-butyl ether (MTBE)	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 1634-04-4.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
12	cis-1,2-Dichloroethene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 156-59-2.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
13	n-Hexane (C6)	2,000.1	µg/mL	+/-	11.6286	µg/mL	Gravimetric
	CAS # 110-54-3.SEC			+/-	44.2549	µg/mL	Unstressed
	Purity 98%			+/-	44.4353	µg/mL	Stressed
14	1,1-Dichloroethane	2,000.0	µg/mL	+/-	11.6284	µg/mL	Gravimetric
	CAS # 75-34-3.SEC			+/-	44.2540	µg/mL	Unstressed
	Purity 97%			+/-	44.4344	µg/mL	Stressed
15	2,2-Dichloropropane	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 594-20-7.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
16	trans-1,2-Dichloroethene	2,000.0	µg/mL	+/-	11.6284	µg/mL	Gravimetric
	CAS # 156-60-5.SEC			+/-	44.2540	µg/mL	Unstressed
	Purity 97%			+/-	44.4344	µg/mL	Stressed
17	Chloroform	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 67-66-3.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
18	Isobutanol (2-Methyl-1-propanol)	50,000.0	µg/mL	+/-	290.6891	µg/mL	Gravimetric
	CAS # 78-83-1.SEC			+/-	1,106.3228	µg/mL	Unstressed
	Purity 99%			+/-	1,110.8331	µg/mL	Stressed
19	Bromochloromethane	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 74-97-5.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
20	Tetrahydrofuran	4,000.0	µg/mL	+/-	23.2563	µg/mL	Gravimetric
	CAS # 109-99-9.SEC			+/-	88.5061	µg/mL	Unstressed
	Purity 99%			+/-	88.8670	µg/mL	Stressed
21	1,1,1-Trichloroethane	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 71-55-6.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
22	Cyclohexane	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 110-82-7.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
23	1,1-Dichloropropene	2,010.5	µg/mL	+/-	11.6890	µg/mL	Gravimetric
	CAS # 563-58-6.SEC			+/-	44.4847	µg/mL	Unstressed
	Purity 98%			+/-	44.6661	µg/mL	Stressed
24	Carbon tetrachloride	2,000.1	µg/mL	+/-	11.6286	µg/mL	Gravimetric
	CAS # 56-23-5.SEC			+/-	44.2549	µg/mL	Unstressed
	Purity 98%			+/-	44.4353	µg/mL	Stressed
25	n-Heptane (C7)	2,000.1	µg/mL	+/-	11.6288	µg/mL	Gravimetric
	CAS # 142-82-5.SEC			+/-	44.2553	µg/mL	Unstressed
	Purity 99%			+/-	44.4357	µg/mL	Stressed
26	Benzene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 71-43-2.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
27	1,2-Dichloroethane	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 107-06-2.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
28	Trichloroethene	2,000.1	µg/mL	+/-	11.6286	µg/mL	Gravimetric
	CAS # 79-01-6.SEC			+/-	44.2549	µg/mL	Unstressed
	Purity 98%			+/-	44.4353	µg/mL	Stressed

29	Methylcyclohexane	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 108-87-2.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
30	1,2-Dichloropropane	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 78-87-5.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
31	1,4-Dioxane	40,000.0	µg/mL	+/-	232.5513	µg/mL	Gravimetric
	CAS # 123-91-1.SEC			+/-	885.0582	µg/mL	Unstressed
	Purity 99%			+/-	888.6665	µg/mL	Stressed
32	Dibromomethane	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 74-95-3.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
33	Bromodichloromethane	2,000.1	µg/mL	+/-	11.6290	µg/mL	Gravimetric
	CAS # 75-27-4.SEC			+/-	44.2562	µg/mL	Unstressed
	Purity 97%			+/-	44.4366	µg/mL	Stressed
34	cis-1,3-Dichloropropene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 10061-01-5.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
35	Toluene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 108-88-3.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
36	Ethyl methacrylate	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 97-63-2.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
37	trans-1,3-Dichloropropene	2,000.0	µg/mL	+/-	11.6281	µg/mL	Gravimetric
	CAS # 10061-02-6.SEC			+/-	44.2527	µg/mL	Unstressed
	Purity 98%			+/-	44.4331	µg/mL	Stressed
38	1,1,2-Trichloroethane	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 79-00-5.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
39	1,3-Dichloropropane	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 142-28-9.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
40	Tetrachloroethene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 127-18-4.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
41	Dibromochloromethane	2,000.1	µg/mL	+/-	11.6290	µg/mL	Gravimetric
	CAS # 124-48-1.SEC			+/-	44.2562	µg/mL	Unstressed
	Purity 97%			+/-	44.4366	µg/mL	Stressed
42	1,2-Dibromoethane (EDB)	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 106-93-4.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
43	Chlorobenzene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 108-90-7.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
44	1,1,1,2-Tetrachloroethane	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 630-20-6.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
45	m-Xylene	1,000.0	µg/mL	+/-	5.8141	µg/mL	Gravimetric
	CAS # 108-38-3.SEC			+/-	22.1265	µg/mL	Unstressed
	Purity 99%			+/-	22.2167	µg/mL	Stressed
46	p-Xylene	1,000.0	µg/mL	+/-	5.8141	µg/mL	Gravimetric
	CAS # 106-42-3.SEC			+/-	22.1265	µg/mL	Unstressed
	Purity 99%			+/-	22.2167	µg/mL	Stressed
47	o-Xylene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 95-47-6.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed

48	Ethylbenzene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 100-41-4.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
49	Styrene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 100-42-5.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
50	Isopropylbenzene (cumene)	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 98-82-8.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
51	Bromoform	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 75-25-2.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
52	1,1,2,2-Tetrachloroethane	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 79-34-5.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
53	1,2,3-Trichloropropane	2,000.0	µg/mL	+/-	11.6281	µg/mL	Gravimetric
	CAS # 96-18-4.SEC			+/-	44.2527	µg/mL	Unstressed
	Purity 98%			+/-	44.4331	µg/mL	Stressed
54	trans-1,4-Dichloro-2-butene	2,000.0	µg/mL	+/-	11.6284	µg/mL	Gravimetric
	CAS # 110-57-6.SEC			+/-	44.2540	µg/mL	Unstressed
	Purity 97%			+/-	44.4344	µg/mL	Stressed
55	n-Propylbenzene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 103-65-1.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
56	Bromobenzene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 108-86-1.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
57	1,3,5-Trimethylbenzene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 108-67-8.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
58	2-Chlorotoluene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 95-49-8.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
59	4-Chlorotoluene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 106-43-4.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
60	tert-Butylbenzene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 98-06-6.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
61	1,2,4-Trimethylbenzene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 95-63-6.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
62	sec-Butylbenzene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 135-98-8.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
63	4-Isopropyltoluene (p-cymene)	2,000.1	µg/mL	+/-	11.6285	µg/mL	Gravimetric
	CAS # 99-87-6.SEC			+/-	44.2545	µg/mL	Unstressed
	Purity 96%			+/-	44.4349	µg/mL	Stressed
64	1,3-Dichlorobenzene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 541-73-1.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
65	1,4-Dichlorobenzene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 106-46-7.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
66	n-Butylbenzene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 104-51-8.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed

67	1,2-Dichlorobenzene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 95-50-1.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
68	1,2-Dibromo-3-chloropropane	2,000.0	µg/mL	+/-	11.6284	µg/mL	Gravimetric
	CAS # 96-12-8.SEC			+/-	44.2540	µg/mL	Unstressed
	Purity 97%			+/-	44.4344	µg/mL	Stressed
69	1,2,4-Trichlorobenzene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 120-82-1.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
70	Hexachlorobutadiene	2,000.0	µg/mL	+/-	11.6284	µg/mL	Gravimetric
	CAS # 87-68-3.SEC			+/-	44.2540	µg/mL	Unstressed
	Purity 97%			+/-	44.4344	µg/mL	Stressed
71	Naphthalene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 91-20-3.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
72	1,2,3-Trichlorobenzene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 87-61-6.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed

Solvent: P&T Methanol
CAS # 67-56-1
Purity 99%

Column:
60m x .25mm x 1.4um
Rtx-502.2 (cat.#10916)

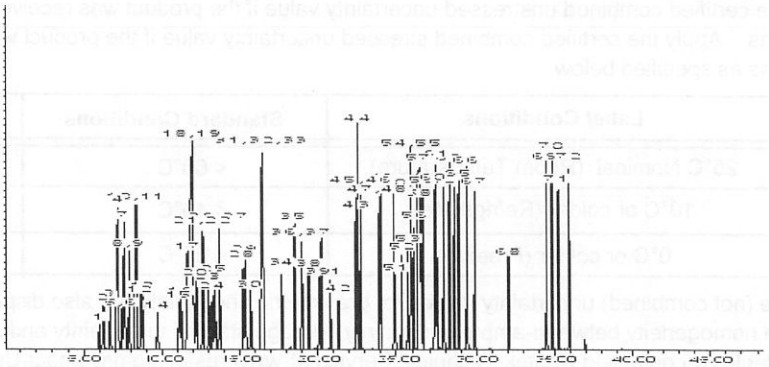
Carrier Gas:
helium-constant pressure 30 psi

Temp. Program:
40°C (hold 6 min.) to 240°C
@ 6°C/min. (hold 10 min.)

Inj. Temp:
200°C

Det. Temp:
250°C

Det. Type:
MSD



Jennifer L. Pollino - QC Analyst

Date Passed: 01-Mar-2013 **Balance:** 1127510105

Manufactured under Restek's ISO 9001:2008
Registered Quality System
Certificate #FM 80397

General Certified Reference Material Notes

Expiration Notes:

- Expiration date of the unopened ampul stored at the recommended storage condition is the last day of the month listed in the expiration date field.
- Uncertainty, concentration, and expiration of the CRM are based on the unopened product being stored according to the recommended condition found in the storage field.

Purity Notes:

- Purity and/or chemical identity are determined by one or more of the following techniques: GC/FID, HPLC, GC/μECD, GC/MS, LC/MS, RI, and/or melting point.
- Compounds with a listed purity of less than 99% have been weight corrected to compensate for impurities and/or salts. A correction factor is used to calculate the amount of compound necessary to achieve the desired concentration of the parent compound in solution.
- Purity of isomeric compounds is reported as the sum of the isomers.
- Purity values are rounded to the nearest whole number.

Certified Uncertainty Value Notes:

- The uncertainties are determined in accordance with ISO Guides 34 and 35. The certified combined stressed uncertainty value (includes gravimetric uncertainty, homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty and were combined using the following formula:

$$U_{combined\ stressed} = k\sqrt{U^2_{gravimetric} + U^2_{homogeneity} + U^2_{storage\ stability} + U^2_{shipping\ stability}}$$

  k is a coverage factor of 2, which gives a level of confidence of approximately 95%.
- It is important to note that the shipping stability uncertainty was obtained under temperature extremes for specific time intervals; therefore, the certified combined stressed uncertainty value should only be applied to the product if it was stored at non-standard temperature conditions up to and including 7 days. Contact Restek Technical Service at www.restek.com/Contact-Us for use recommendations if your shipment was in-transit for more than 7 days at non-standard temperature conditions.
- Apply the certified combined unstressed uncertainty value if the product was received under standard shipping conditions. Apply the certified combined stressed uncertainty value if the product was received under non-standard conditions as specified below.

Label Conditions	Standard Conditions	Non-Standard Conditions
25°C Nominal (Room Temperature)	< 60°C	≥ 60°C up to 7 days
10°C or colder (Refrigerate)	< 40°C	≥ 40°C up to 7 days
0°C or colder (Freezer)	< 25°C	≥ 25°C up to 7 days

- Separate (not combined) uncertainty values for gravimetric uncertainty are also displayed on the certificate, if needed, separate homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty values are available by contacting Restek Technical Service at www.restek.com/Contact-Us.
- The packaged amount is the minimum sample size for which uncertainty is valid. The ampules are over-filled to ensure that the minimum packaged amount can be sufficiently transferred.

Manufacturing Notes:

- Concentration is based upon gravimetric preparation using either a balance whose calibration has been verified daily using NIST traceable weights, and/or dilutions with Class A glassware.

Handling Notes:

- Samples should be transferred into deactivated vials for handling and storage. Restek supplies deactivated vials along with most standards packed in 2 mL ampules. Due to space constraints, Restek does not supply vials for larger volume ampules. Restek sells DMDCS for the purpose of glassware deactivation as catalog number 31840, which includes complete instructions. Restek will also deactivate larger volume vials from our inventory as a custom ordered item. Contact your Restek sales or customer service representative for details.
- If any undissolved material is visible inside the ampul, sonicate the unopened ampul until the material is completely dissolved.

12/26/12
x2

RESTEK

110 Benner Circle
Bellefonte, PA 16823-8812
Tel: (800)356-1688
Fax: (814)353-1309

www.restek.com

ACCREDITED
ISO Guide 34 Accredited
Reference Material Producer
Certificate #3222.01

ilac-MRA

ACCREDITED
ISO/IEC 17025 Accredited
Testing Laboratory
Certificate #3222.02

Certificate of Composition

FOR LABORATORY USE ONLY-READ MSDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 567650 **Lot No.:** A092213

Description : 8260/624 Surrogate Mix

8260/624 Surrogate Mix 2500 ug/ml, P&T Methanol, 5 ml/ampul

Container Size : 5 mL **Pkg Amt:** > 5 mL

Expiration Date : December 2017 **Storage:** 0°C or colder

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	Dibromofluoromethane	2,500.0 µg/mL	+/- 14.6714	µg/mL	Gravimetric
	CAS # 1868-53-7		+/- 30.2004	µg/mL	Unstressed
	Purity 99%		+/- 34.0606	µg/mL	Stressed
2	1,2-Dichloroethane-d4	2,500.0 µg/mL	+/- 14.6714	µg/mL	Gravimetric
	CAS # 17060-07-0		+/- 30.2004	µg/mL	Unstressed
	Purity 99%		+/- 34.0606	µg/mL	Stressed
3	Toluene-d8	2,500.0 µg/mL	+/- 14.6714	µg/mL	Gravimetric
	CAS # 2037-26-5		+/- 30.2004	µg/mL	Unstressed
	Purity 99%		+/- 34.0606	µg/mL	Stressed
4	1-Bromo-4-fluorobenzene (BFB)	2,500.0 µg/mL	+/- 14.6714	µg/mL	Gravimetric
	CAS # 460-00-4		+/- 30.2004	µg/mL	Unstressed
	Purity 99%		+/- 34.0606	µg/mL	Stressed

Solvent: P&T Methanol
CAS # 67-56-1
Purity 99%

Column:
105m x .53mm x 3.0um
Rtx-502.2 (cat.#10910)

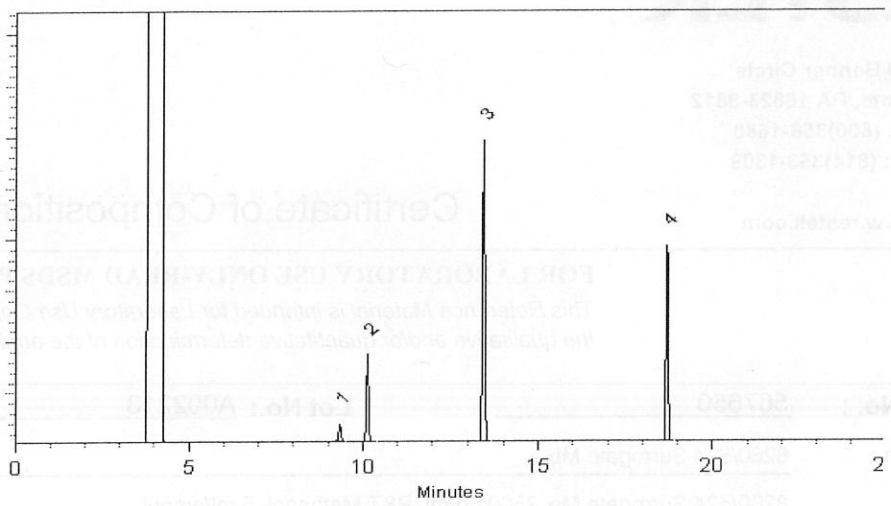
Carrier Gas:
hydrogen-constant pressure 11.0 psi.

Temp. Program:
40°C (hold 2 min.) to 240°C
@ 8°C/min. (hold 5 min.)

Inj. Temp:
200°C

Det. Temp:
250°C

Det. Type:
FID



Jennifer L. Pollino - QC Analyst

Date Passed: 05-Dec-2012 **Balance:** 1125113331

Manufactured under Restek's ISO 9001:2008
Registered Quality System
Certificate #FM 80397

General Certified Reference Material Notes

Expiration Notes:

- Expiration date of the unopened ampul stored at the recommended storage condition is the last day of the month listed in the expiration date field.
- Uncertainty, concentration, and expiration of the CRM are based on the unopened product being stored according to the recommended condition found in the storage field.

Purity Notes:

- Purity and/or chemical identity are determined by one or more of the following techniques: GC/FID, HPLC, GC/μECD, GC/MS, LC/MS, RI, and/or melting point.
- Compounds with a listed purity of less than 99% have been weight corrected to compensate for impurities and/or salts. A correction factor is used to calculate the amount of compound necessary to achieve the desired concentration of the parent compound in solution.
- Purity of isomeric compounds is reported as the sum of the isomers.
- Purity values are rounded to the nearest whole number.

Certified Uncertainty Value Notes:

- The uncertainties are determined in accordance with ISO Guides 34 and 35. The certified combined stressed uncertainty value (includes gravimetric uncertainty, homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty and were combined using the following formula:

$$U_{combined\ stressed} = k\sqrt{U^2_{gravimetric} + U^2_{homogeneity} + U^2_{storage\ stability} + U^2_{shipping\ stability}}$$

  k is a coverage factor of 2, which gives a level of confidence of approximately 95%.
- It is important to note that the shipping stability uncertainty was obtained under temperature extremes for specific time intervals; therefore, the certified combined stressed uncertainty value should only be applied to the product if it was stored at non-standard temperature conditions up to and including 7 days. Contact Restek Technical Service at www.restek.com/Contact-Us for use recommendations if your shipment was in-transit for more than 7 days at non-standard temperature conditions.
- Apply the certified combined unstressed uncertainty value if the product was received under standard shipping conditions. Apply the certified combined stressed uncertainty value if the product was received under non-standard conditions as specified below.

Label Conditions	Standard Conditions	Non-Standard Conditions
25°C Nominal (Room Temperature)	< 60°C	≥ 60°C up to 7 days
10°C or colder (Refrigerate)	< 40°C	≥ 40°C up to 7 days
0°C or colder (Freezer)	< 25°C	≥ 25°C up to 7 days

- Separate (not combined) uncertainty values for gravimetric uncertainty are also displayed on the certificate, if needed, separate homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty values are available by contacting Restek Technical Service at www.restek.com/Contact-Us.
- The packaged amount is the minimum sample size for which uncertainty is valid. The ampules are over-filled to ensure that the minimum packaged amount can be sufficiently transferred.

Manufacturing Notes:

- Concentration is based upon gravimetric preparation using either a balance whose calibration has been verified daily using NIST traceable weights, and/or dilutions with Class A glassware.

Handling Notes:

- Samples should be transferred into deactivated vials for handling and storage. Restek supplies deactivated vials along with most standards packed in 2 mL ampules. Due to space constraints, Restek does not supply vials for larger volume ampules. Restek sells DMDCS for the purpose of glassware deactivation as catalog number 31840, which includes complete instructions. Restek will also deactivate larger volume vials from our inventory as a custom ordered item. Contact your Restek sales or customer service representative for details.
- If any undissolved material is visible inside the ampul, sonicate the unopened ampul until the material is completely dissolved.

× 16
5/7/13

RESTEK

110 Benner Circle
Bellefonte, PA 16823-8812
Tel: (800)356-1688
Fax: (814)353-1309

www.restek.com

ACCREDITED
ISO Guide 34 Accredited
Reference Material Producer
Certificate #3222.01

ilac-MRA

ACCREDITED
ISO/IEC 17025 Accredited
Testing Laboratory
Certificate #3222.02

Certificate of Analysis

FOR LABORATORY USE ONLY-READ MSDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 567650 **Lot No.:** A093505

Description : 8260 Surrogate Standard

8260 Surrogate Standard 2,500 ug/ml, P&T Methanol, 5 ml/ampul

Container Size : 5 mL **Pkg Amt:** > 5 mL

Expiration Date : February 2018 **Storage:** 0°C or colder

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	Dibromofluoromethane	2,500.0 µg/mL	+/- 14.5352	µg/mL	Gravimetric
	CAS # 1868-53-7		+/- 30.1344	µg/mL	Unstressed
	Purity 99%		+/- 34.0022	µg/mL	Stressed
2	1,2-Dichloroethane-d4	2,500.0 µg/mL	+/- 14.5352	µg/mL	Gravimetric
	CAS # 17060-07-0		+/- 30.1344	µg/mL	Unstressed
	Purity 99%		+/- 34.0022	µg/mL	Stressed
3	Toluene-d8	2,500.0 µg/mL	+/- 14.5352	µg/mL	Gravimetric
	CAS # 2037-26-5		+/- 30.1344	µg/mL	Unstressed
	Purity 99%		+/- 34.0022	µg/mL	Stressed
4	1-Bromo-4-fluorobenzene (BFB)	2,500.0 µg/mL	+/- 14.5352	µg/mL	Gravimetric
	CAS # 460-00-4		+/- 30.1344	µg/mL	Unstressed
	Purity 99%		+/- 34.0022	µg/mL	Stressed

Solvent: P&T Methanol
CAS # 67-56-1
Purity 99%

Column:
105m x .53mm x 3.0um
Rtx-502.2 (cat.#10910)

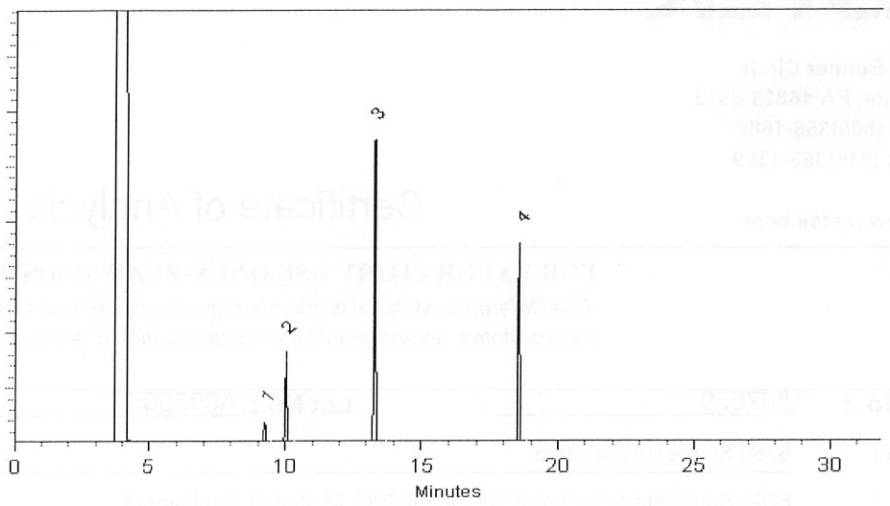
Carrier Gas:
hydrogen-constant pressure 11.0 psi.

Temp. Program:
40°C (hold 2 min.) to 240°C
@ 8°C/min. (hold 5 min.)

Inj. Temp:
200°C

Det. Temp:
250°C

Det. Type:
FID



Diane Shaffer
Diane Shaffer - QAAnalyst

Date Passed: 15-Feb-2013 **Balance:** B251644995

Manufactured under Restek's ISO 9001:2008
Registered Quality System
Certificate #FM 80397

General Certified Reference Material Notes

Expiration Notes:

- Expiration date of the unopened ampul stored at the recommended storage condition is the last day of the month listed in the expiration date field.
- Uncertainty, concentration, and expiration of the CRM are based on the unopened product being stored according to the recommended condition found in the storage field.

Purity Notes:

- Purity and/or chemical identity are determined by one or more of the following techniques: GC/FID, HPLC, GC/μECD, GC/MS, LC/MS, RI, and/or melting point.
- Compounds with a listed purity of less than 99% have been weight corrected to compensate for impurities and/or salts. A correction factor is used to calculate the amount of compound necessary to achieve the desired concentration of the parent compound in solution.
- Purity of isomeric compounds is reported as the sum of the isomers.
- Purity values are rounded to the nearest whole number.

Certified Uncertainty Value Notes:

- The uncertainties are determined in accordance with ISO Guides 34 and 35. The certified combined stressed uncertainty value (includes gravimetric uncertainty, homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty and were combined using the following formula:

$$U_{combined\ stressed} = k\sqrt{U^2_{gravimetric} + U^2_{homogeneity} + U^2_{storage\ stability} + U^2_{shipping\ stability}}$$

  k is a coverage factor of 2, which gives a level of confidence of approximately 95%.
- It is important to note that the shipping stability uncertainty was obtained under temperature extremes for specific time intervals; therefore, the certified combined stressed uncertainty value should only be applied to the product if it was stored at non-standard temperature conditions up to and including 7 days. Contact Restek Technical Service at www.restek.com/Contact-Us for use recommendations if your shipment was in-transit for more than 7 days at non-standard temperature conditions.
- Apply the certified combined unstressed uncertainty value if the product was received under standard shipping conditions. Apply the certified combined stressed uncertainty value if the product was received under non-standard conditions as specified below.

Label Conditions	Standard Conditions	Non-Standard Conditions
25°C Nominal (Room Temperature)	< 60°C	≥ 60°C up to 7 days
10°C or colder (Refrigerate)	< 40°C	≥ 40°C up to 7 days
0°C or colder (Freezer)	< 25°C	≥ 25°C up to 7 days

- Separate (not combined) uncertainty values for gravimetric uncertainty are also displayed on the certificate, if needed, separate homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty values are available by contacting Restek Technical Service at www.restek.com/Contact-Us.
- The packaged amount is the minimum sample size for which uncertainty is valid. The ampules are over-filled to ensure that the minimum packaged amount can be sufficiently transferred.

Manufacturing Notes:

- Concentration is based upon gravimetric preparation using either a balance whose calibration has been verified daily using NIST traceable weights, and/or dilutions with Class A glassware.

Handling Notes:

- Samples should be transferred into deactivated vials for handling and storage. Restek supplies deactivated vials along with most standards packed in 2 mL ampules. Due to space constraints, Restek does not supply vials for larger volume ampules. Restek sells DMDCS for the purpose of glassware deactivation as catalog number 31840, which includes complete instructions. Restek will also deactivate larger volume vials from our inventory as a custom ordered item. Contact your Restek sales or customer service representative for details.
- If any undissolved material is visible inside the ampul, sonicate the unopened ampul until the material is completely dissolved.

5/14/13 x8

RESTEK CERTIFIED REFERENCE MATERIAL

ACCREDITED
ISO Guide 34 Accredited
Reference Material Producer
Certificate #3222.01

110 Benner Circle
Bellefonte, PA 16823-8812
Tel: (800)356-1688
Fax: (814)353-1309

www.restek.com

Gravimetric Certificate

ilac-MRA

ACCREDITED
ISO/IEC 17025 Accredited
Testing Laboratory
Certificate #3222.02

FOR LABORATORY USE ONLY-READ SDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 568034.sec **Lot No.:** A094981

Description : Denver Main Add Ons Standard

Denver Main Add Ons Standard 1,000-30,000 µg/ml, P&T Methanol/Water (90:10), 1 ml/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : October 31, 2014 **Storage:** 0°C or colder

CERTIFIED VALUES

Component #	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)	
1	1-Chlorohexane	999.6 µg/mL	+/- 10.0697 µg/mL	Gravimetric
	CAS # 544-10-5.SEC (Lot 1376600)		+/- 80.2594 µg/mL	Unstressed
	Purity 98%		+/- 80.2983 µg/mL	Stressed
2	2-Butanol (sec-butyl alcohol)	30,044.0 µg/mL	+/- 278.0328 µg/mL	Gravimetric
	CAS # 78-92-2.SEC (Lot 3S7SC)		+/- 2,409.3134 µg/mL	Unstressed
	Purity 99%		+/- 2,410.4839 µg/mL	Stressed
3	2-Pentanone	4,004.0 µg/mL	+/- 37.2350 µg/mL	Gravimetric
	CAS # 107-87-9.SEC (Lot OGH01)		+/- 321.1131 µg/mL	Unstressed
	Purity 99%		+/- 321.2690 µg/mL	Stressed

Solvent: P&T Methanol/Water (90:10)
CAS # 67-56-1/7732-18-5
Purity 99%

Michael J Maye

Date Mixed: 24-Apr-2013 **Balance:** 1128353505

Manufactured under Restek's ISO 9001:2008
Registered Quality System
Certificate #FM 80397

General Certified Reference Material Notes

Expiration Notes:

- Expiration date valid for unopened ampul stored in compliance with the recommended conditions.
- Uncertainty, concentration, and expiration of the CRM are based on the unopened product being stored according to the recommended condition found in the storage field.

Purity Notes:

- Purity and/or chemical identity are determined by one or more of the following techniques: GC/FID, HPLC, GC/μECD, GC/MS, LC/MS, RI, and/or melting point.
- Compounds with a listed purity of less than 99% have been weight corrected to compensate for impurities and/or salts. A correction factor is used to calculate the amount of compound necessary to achieve the desired concentration of the parent compound in solution.
- Purity of isomeric compounds is reported as the sum of the isomers.
- Purity values are rounded to the nearest whole number.

Certified Uncertainty Value Notes:

- The uncertainties are determined in accordance with ISO Guides 34 and 35. The certified combined stressed uncertainty value (includes gravimetric uncertainty, homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty and were combined using the following formula:

$$U_{combined\ stressed} = k\sqrt{U^2_{gravimetric} + U^2_{homogeneity} + U^2_{storage\ stability} + U^2_{shipping\ stability}}$$

  k is a coverage factor of 2, which gives a level of confidence of approximately 95%.
- It is important to note that the shipping stability uncertainty was obtained under temperature extremes for specific time intervals; therefore, the certified combined stressed uncertainty value should only be applied to the product if it was stored at non-standard temperature conditions up to and including 7 days. Contact Restek Technical Service at www.restek.com/Contact-Us for use recommendations if your shipment was in-transit for more than 7 days at non-standard temperature conditions.
- Apply the certified combined unstressed uncertainty value if the product was received under standard shipping conditions. Apply the certified combined stressed uncertainty value if the product was received under non-standard conditions as specified below.

Label Conditions	Standard Conditions	Non-Standard Conditions
25°C Nominal (Room Temperature)	< 60°C	≥ 60°C up to 7 days
10°C or colder (Refrigerate)	< 40°C	≥ 40°C up to 7 days
0°C or colder (Freezer)	< 25°C	≥ 25°C up to 7 days

- Separate (not combined) uncertainty values for gravimetric uncertainty are also displayed on the certificate, if needed, separate homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty values are available by contacting Restek Technical Service at www.restek.com/Contact-Us.
- The packaged amount is the minimum sample size for which uncertainty is valid. The ampules are over-filled to ensure that the minimum packaged amount can be sufficiently transferred.

Manufacturing Notes:

- Concentration is based upon gravimetric preparation using either a balance whose calibration has been verified daily using NIST traceable weights, and/or dilutions with Class A glassware.

Handling Notes:

- Samples should be transferred into deactivated vials for handling and storage. Restek supplies deactivated vials along with most standards packed in 2 mL ampules. Due to space constraints, Restek does not supply vials for larger volume ampules. Restek sells DMDCS for the purpose of glassware deactivation as catalog number 31840, which includes complete instructions. Restek will also deactivate larger volume vials from our inventory as a custom ordered item. Contact your Restek sales or customer service representative for details.
- If any undissolved material is visible inside the ampul, sonicate the unopened ampul until the material is completely dissolved.

Rcd 3/12/12

Certificate of Composition

DESCRIPTION: Volatile Organic Compound Mix 6

CATALOG NO.: 5M06036 MFG DATE: Jan-2012

LOT NO.: LB89967 EXPIRATION DATE: Apr-2013

SOLVENT: METHANOL

ANALYTE (1)	CAS NUMBER	PERCENT PURITY (2)	WEIGHT CONCENTRATION (3)	SUPELCO LOT NO
BROMOMETHANE	74-83-9	99.9 (a)	2000	LB68220
CHLOROETHANE	75-00-3	99.9 (a)	2000	LB55667
CHLOROMETHANE	74-87-3	99.9 (a)	2000	LB64986
DICHLORODIFLUOROMETHANE	75-71-8	99.9 (a)	2000	LB68837
TRICHLOROFLUOROMETHANE	75-69-4	99.9 (a)	2000	LA91320
VINYL CHLORIDE	75-01-4	99.9 (a)	2000	LB89571

(1) Listed in alphabetical order.

(2) Determined by capillary GC-FID, unless otherwise noted.
a) GC; detector HALL

(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.

Elwood Doughty
QA Manager

SUPELCO Analytical
595 North Harrison Road • Bellefonte, PA
16823-0048 USA • Phone (814) 359-3441

Rcd 6/22/12 x 4

Certificate of Composition

DESCRIPTION: **Chloroprene in Methanol, 2000ug/mL**

CATALOG # : **861145**

MFG DATE: **MARCH-2012**

LOT # : **LB91215**

EXPIRATION DATE: **APRIL-2013**

SOLVENT: **METHANOL**

ANALYTE	CAS #	PERCENT PURITY (1)	CONCENTRATION WEIGHT (2)	SUPELCO LOT#
Chloroprene	126-99-8	99.0	2000.0	LB91214

(1) Determined by GC-FID unless otherwise noted.

(2) Weight of analyte in solution (+/-0.5%); Concentration in ug/ml unless otherwise noted. Weights of analytes less than 98% pure are corrected for impurities. Certified weights are not applicable to ampuls stored after opening, even if resealed.

Elwood Doughty
QA Manager

SUPELCO Analytical
595 North Harrison Road • Bellefonte, PA
16823-0048 USA • Phone (814) 359-3441

X4

Certificate of Analysis

DESCRIPTION: 2-Chloroethylvinyl ether

CATALOG NO.: 861206 MFG DATE: May-2011

LOT NO.: LB85070 EXPIRATION DATE: May-2014

SOLVENT: METHANOL

ANALYTE	CAS NUMBER	PERCENT PURITY(1)	WEIGHT(2) CONCENTRATION	ANALYTICAL(3) CONCENTRATION	STD DEV	SUPELCO LOT NO
2-CHLOROETHYL VINYL ETHER	110-75-8	99.9 (a)	2000	1878	+/- 4.9	LB79614

(1) Determined by capillary GC-FID, unless otherwise noted.
a) GC; detector HALL

(2) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.

(3) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.

Elwood Doughty
Quality Control Supervisor

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

DM 12/21/12

Certificate of Analysis

DESCRIPTION: 8260 Internal Standards Mix 2

CATALOG NO.: 861184 MFG DATE: Mar-2012

LOT NO.: LB91482 EXPIRATION DATE: Mar-2015

SOLVENT: METHANOL

ANALYTE (1)	CAS NUMBER	PERCENT PURITY(2)	WEIGHT(3) CONCENTRATION	ANALYTICAL(4) CONCENTRATION		STD DEV	SUPELCO LOT NO
CHLOROBENZENE-D5	3114-55-4	99.9	250.1	246.5	+/-	0.23	LB81159
FLUOROBENZENE	462-06-6	99.9	250.1	246.5	+/-	0.19	LB86106
1,4-DICHLOROBENZENE-D4	3855-82-1	98.7	250.1	249.7	+/-	0.30	LB82415

(1) Listed in alphabetical order.

(2) Determined by capillary GC-FID, unless otherwise noted.

(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.

(4) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.

Elwood Doughty
Quality Control Supervisor

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

x4 DL 10/22/12

Certificate of Analysis

VOC Mixture

Product Number: DWM-589N **Page:** 1 of 3

Lot Number: CH-3339 **Lot Issue Date:** 19-Oct-2011 **Expiration Date:** 30-Nov-2014

This Certified Reference Material (RM) was manufactured and verified in accordance with ULTRA's ISO 9001 registered quality system, and the analyte concentrations were verified by our ISO 17025 accredited laboratory. The true value and uncertainty value at the 95% confidence level for each analyte, determined gravimetrically, is listed below.

Analyte	CAS#	Analyte Lot	True Value
bromochloromethane	000074-97-5	RM00009	2006 ± 10 µg/mL
bromodichloromethane	000075-27-4	10529HD	2006 ± 10 µg/mL
bromoform	000075-25-2	RM01801	2006 ± 10 µg/mL
carbon tetrachloride	000056-23-5	RM00012	2006 ± 10 µg/mL
chloroform	000067-66-3	RM01693	2006 ± 10 µg/mL
dibromochloromethane	000124-48-1	07705AN	2006 ± 10 µg/mL
dibromomethane	000074-95-3	RM02090	2006 ± 10 µg/mL
methylene chloride	000075-09-2	RM01647	2006 ± 10 µg/mL
1,2-dibromoethane	000106-93-4	RM00018	2006 ± 10 µg/mL
1,1-dichloroethane	000075-34-3	RM00019	2006 ± 10 µg/mL
1,2-dichloroethane	000107-06-2	RM02111	2006 ± 10 µg/mL
1,1-dichloroethene	000075-35-4	RM01356	2006 ± 10 µg/mL
cis-1,2-dichloroethene	000156-59-2	RM01500	2006 ± 10 µg/mL
trans-1,2-dichloroethene	000156-60-5	01306HD	2006 ± 10 µg/mL
1,1,1,2-tetrachloroethane	000630-20-6	RM02567	2006 ± 10 µg/mL
1,1,2,2-tetrachloroethane	000079-34-5	RM02540	2006 ± 10 µg/mL
tetrachloroethene	000127-18-4	RM00026	2006 ± 10 µg/mL
1,1,1-trichloroethane	000071-55-6	RM00027	2006 ± 10 µg/mL
1,1,2-trichloroethane	000079-00-5	RM02575	2006 ± 10 µg/mL

ULTRA uses balances calibrated with weights traceable to NIST in compliance with ANSI/NCSL Z-540-1 and ISO 9001, and calibrated Class A glassware in the manufacturing of these standards.

ACCREDITED
ISO 17025:2005 Accredited A2LA Cert. No. 0851-01
ISO 9001:2008 Registered TUV USA, Inc. Cert. No. 09-1009

250 Smith Street, North Kingstown, RI 02852 USA
401-294-9400 Fax: 295-2330
wwww.ultrasci.com

William J. Leary
Quality Assurance Manager

Certificate of Analysis

VOC Mixture

Product Number: DWM-589N **Page:** 2 of 3

Lot Number: CH-3339 **Lot Issue Date:** 19-Oct-2011 **Expiration Date:** 30-Nov-2014

This Certified Reference Material (RM) was manufactured and verified in accordance with ULTRA's ISO 9001 registered quality system, and the analyte concentrations were verified by our ISO 17025 accredited laboratory. The true value and uncertainty value at the 95% confidence level for each analyte, determined gravimetrically, is listed below.

trichloroethene	000079-01-6	RM00029	2006 ± 10 µg/mL
1,2-dibromo-3-chloropropane	000096-12-8	RM02088	2006 ± 10 µg/mL
1,2-dichloropropane	000078-87-5	RM02091	2006 ± 10 µg/mL
1,3-dichloropropane	000142-28-9	RM02080	2006 ± 10 µg/mL
2,2-dichloropropane	000594-20-7	01104EE	2006 ± 10 µg/mL
1,1-dichloropropene	000563-58-6	RM01234	2006 ± 10 µg/mL
cis-1,3-dichloropropene	010061-01-5	RM01442	2006 ± 10 µg/mL
trans-1,3-dichloropropene	010061-02-6	RM01443	2006 ± 10 µg/mL
hexachlorobutadiene	000087-68-3	RM02247	2004 ± 10 µg/mL
1,2,3-trichloropropane	000096-18-4	RM02562	2006 ± 10 µg/mL
benzene	000071-43-2	RM03830	2006 ± 10 µg/mL
n-butylbenzene	000104-51-8	RM01802	2006 ± 10 µg/mL
sec-butylbenzene	000135-98-8	RM01800	2006 ± 10 µg/mL
tert-butylbenzene	000098-06-6	RM01814	2006 ± 10 µg/mL
ethylbenzene	000100-41-4	RM00783	2006 ± 10 µg/mL
isopropylbenzene	000098-82-8	RM02285	2006 ± 10 µg/mL
4-isopropyltoluene	000099-87-6	RM00046	2006 ± 10 µg/mL
naphthalene	000091-20-3	RM02406	2006 ± 10 µg/mL
n-propylbenzene	000103-65-1	RM02468	2006 ± 10 µg/mL

ULTRA uses balances calibrated with weights traceable to NIST in compliance with ANSI/NCSL Z-540-1 and ISO 9001, and calibrated Class A glassware in the manufacturing of these standards.

ACCREDITED
ISO 17025:2005 Accredited A2LA Cert. No. 0851-01
ISO 9001:2008 Registered TUV USA, Inc. Cert. No. 09-1009

250 Smith Street, North Kingstown, RI 02852 USA
401-294-9400 Fax: 295-2330
wwww.ultrasci.com

William J. Leary
Quality Assurance Manager

Certificate of Analysis

VOC Mixture

Product Number: DWM-589N **Page:** 3 of 3

Lot Number: CH-3339 **Lot Issue Date:** 19-Oct-2011 **Expiration Date:** 30-Nov-2014

This Certified Reference Material (RM) was manufactured and verified in accordance with ULTRA's ISO 9001 registered quality system, and the analyte concentrations were verified by our ISO 17025 accredited laboratory. The true value and uncertainty value at the 95% confidence level for each analyte, determined gravimetrically, is listed below.

styrene	000100-42-5	LR-11228MQ	2006 ± 10 µg/mL
toluene	000108-88-3	RM02555	2006 ± 10 µg/mL
1,2,4-trimethylbenzene	000095-63-6	RM00050	2006 ± 10 µg/mL
1,3,5-trimethylbenzene	000108-67-8	RM02563	2006 ± 10 µg/mL
o-xylene	000095-47-6	RM00052	2006 ± 10 µg/mL
m-xylene	000108-38-3	RM00053	2006 ± 10 µg/mL
p-xylene	000106-42-3	RM02647	2006 ± 10 µg/mL
bromobenzene	000108-86-1	RM00056	2006 ± 10 µg/mL
chlorobenzene	000108-90-7	RM01874	2006 ± 10 µg/mL
2-chlorotoluene	000095-49-8	NT00290	2006 ± 10 µg/mL
4-chlorotoluene	000106-43-4	RM01866	2006 ± 10 µg/mL
1,2-dichlorobenzene	000095-50-1	RM00060	2006 ± 10 µg/mL
1,3-dichlorobenzene	000541-73-1	RM00061	2006 ± 10 µg/mL
1,4-dichlorobenzene	000106-46-7	RM01501	2006 ± 10 µg/mL
1,2,3-trichlorobenzene	000087-61-6	RM02563	2006 ± 10 µg/mL
1,2,4-trichlorobenzene	000120-82-1	RM00063	2006 ± 10 µg/mL

Matrix: methanol (methyl alcohol)

Storage: Store at < 4° C

ULTRA uses balances calibrated with weights traceable to NIST in compliance with ANSI/NCSL Z-540-1 and ISO 9001, and calibrated Class A glassware in the manufacturing of these standards.

ACCREDITED
ISO 17025:2005 Accredited A2LA Cert. No. 0851-01
ISO 9001:2008 Registered TUV USA, Inc. Cert. No. 09-1009

250 Smith Street, North Kingstown, RI 02852 USA
401-294-9400 Fax: 295-2330
wwww.ultrasci.com

William J. Leary
Quality Assurance Manager

Rec 12/31/12 -DY X 5

125 Market Street
New Haven, CT 06513
USA

AccuStandard® Inc.

Tel (203)786-5290
Fax (203)786-5287
www.AccuStandard.com

CERTIFICATE OF ANALYSIS

Catalog No: S-635-1S
Description: 1,2-Dichloro-1,1,2-trifluoroethane

Lot: 212121140
Solvent: Methanol

Date Certified: Dec 11, 2012
Expiration: Dec 11, 2022
Sample Size: 1 mL
Storage Condition: Freeze (<-10° C)
Hazards: POISON

[X] Included on ISO/IEC 17025 Scope of Accreditation
[X] Included on ISO Guide 34 Scope of Accreditation

Component	CAS #	Purity % (GC/FID)	Prepared Concentration[1] (µg/mL)	Certified Analyte Concentration[2] (µg/mL)
1,2-Dichloro-1,1,2-trifluoroethane	354-23-4	99	2000	1980

AccuStandard follows U.S. conventions in reporting numerical values on both certificates and labels:

A comma (,) is used to separate units of one-thousand or greater.
A period (.) is used as a decimal place marker.

1. All weights are traceable through NIST, Test No.822-275872-11
2. Certified Analyte Concentration = Purity x Prepared Concentration. The Uncertainty associated with the gravimetric values reported on this certificate is ±0.24%. The CRM Uncertainty calculated for this product is ±5%. These values are the expanded uncertainty and represent an estimated standard deviation equal to the positive square root of the total variation of the uncertainty of components. A normal distribution is assumed and a coverage factor of K=2 is chosen using approximately a 95% confidence level.
3. A product with a suffix (-1A, -2B, etc. or -01, -02, etc.) on its lot# has had its expiration date extended and is identical to the same lot# without the suffix.

For use in routine laboratory analysis.

See reverse side for additional information
Refer to the MSDS for additional safety information

Certified by: R. Cooper
Russ Cooper, QC Manager

INORGANIC VENTURES™
300 Technology Drive
Christiansburg, VA 24073 • USA
inorganicventures.com

CERTIFICATE OF ANALYSIS

tel: 800.669.6799 • 540.585.3030
fax: 540.585.3012
info@inorganicventures.com

1.0 **INORGANIC VENTURES** is an ISO Guide 34 "General Requirements for the Competence of Reference Material Producers" and ISO 9001 registered manufacturer. Our manufacturing laboratory is accredited to ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories."

ACCREDITED Testing Laboratory Certificate 883.01

ACCREDITED Reference Material Producer Certificate 883.02

2.0 **DESCRIPTION OF CRM** **1000 µg/mL Lead in 0.5% (v/v) HNO3**

Catalog Number:	CGPB1-1, CGPB1-2, and CGPB1-5
Lot Number:	**F2-PB03035**
Starting Material:	Pb(NO3)2
Starting Material Purity (%):	99.9998
Starting Material Lot No:	1717
Matrix:	0.5% (v/v) HNO3

1892189
ID: 1000 Pb_00011
Exp:03/01/14 Prpd:HEB Opn:02/18/13
1000 Pb IV

3.0 **CERTIFIED VALUES AND UNCERTAINTIES**

Certified Concentration: 1,001 ± 5 µg/mL - weighted mean

Certified Density: 1.002 g/mL (measured at 20 ± 1°C)

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

$$\text{Certified Value } (\bar{x}) = \frac{\Sigma x_i}{n}$$

$$\text{Uncertainty } (\pm) = \frac{2\,[(\Sigma s_i)^2]^{1/2}}{(n)^{1/2}}$$

($\bar{x}$) = mean
x_i = individual results
n = number of measurements
Σs_i = The summation of all significant estimated errors (Most common are the errors from instrumental measurement, weighing, dilution to volume and the fixed error reported on the NIST SRM certificate of analysis)

4.0 **TRACEABILITY TO NIST AND VALUES OBTAINED BY INDEPENDENT METHODS**

· "Property of the result of a measurement or the value of a standard whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons all having stated uncertainties." (ISO VIM, 2nd ed., 1993, definition 6.10)

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

4.1 **Assay Method #1** **1,000 ± 3 µg/mL**
ICP Assay NIST SRM 3128 Lot Number: 101026

Assay Method #2 **1,002 ± 3 µg/mL**
EDTA NIST SRM 928 Lot Number: 928

4.2 **BALANCE CALIBRATION** - All analytical balances are calibrated yearly by an A2LA accredited calibration laboratory and are traceable to a class E 2 analytical weight set with NIST Traceability. All balances are checked daily using an in-house procedure. The weights used for testing are annually compared to master weights and are traceable to the National Institute of Standards and Technology (NIST).

4.3 **THERMOMETER CALIBRATION** - All thermometers are NIST traceable through thermometers that are calibrated by an A2LA accredited calibration laboratory.

4.4 **GLASSWARE CALIBRATION** - An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM's.

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

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

O	Al	0.000477	M	Dy	< 0.017590	O	Li	0.000136	M	Pr	< 0.000880	M	Te	< 0.087952
M	Sb	< 0.001466	M	Er	< 0.014659	M	Lu	< 0.001173	M	Re	< 0.002932	M	Tb	< 0.000880
M	As	< 0.029317	M	Eu	< 0.008795	O	Mg	0.000102	O	Rh	< 0.009000	O	Tl	< 0.022000
O	Ba	0.000545	M	Gd	< 0.002932	M	Mn	< 0.011727	M	Rb	< 0.002932	M	Th	< 0.002932
M	Be	< 0.001466	M	Ga	< 0.002932	O	Hg	< 0.015000	M	Ru	< 0.005863	M	Tm	< 0.001173
O	Bi	< 0.020000	M	Ge	< 0.017590	M	Mo	< 0.005863	M	Sm	< 0.002932	M	Sn	< 0.014659
O	B	< 0.040000	M	Au	< 0.008795	M	Nd	< 0.005863	M	Sc	< 0.029317	M	Ti	< 0.146587
M	Cd	< 0.008795	M	Hf	< 0.005863	O	Ni	< 0.003000	M	Se	< 0.023454	M	W	< 0.029317
O	Ca	0.000682	M	Ho	< 0.001466	M	Nb	< 0.001466	O	Si	< 0.003400	M	U	< 0.005863
M	Ce	< 0.014659	M	In	< 0.029317	n	Os		M	Ag	< 0.005863	M	V	< 0.005863
M	Cs	< 0.000880	M	Ir	< 0.014659	M	Pd	< 0.014659	O	Na	< 0.006000	M	Yb	< 0.002932
M	Cr	< 0.014659	O	Fe	0.000545	O	P	< 0.005000	O	Sr	0.000204	M	Y	< 0.117270
M	Co	< 0.008795	M	La	< 0.001466	M	Pt	< 0.005863	O	S	< 0.100000	O	Zn	< 0.000200
M	Cu	< 0.017590	s	Pb		O	K	< 0.001800	M	Ta	< 0.020522	M	Zr	< 0.014659

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

6.0 INTENDED USE

For the calibration of analytical instruments including but not limited to the following:
HPLC, IC, TLC, ISE, IR, NMR, UV/VIS, MS, Capillary Eletrophoresis, Potentiometry, Wet Chemistry and Voltammetry
For the validation of analytical methods
For the preparation of "working reference samples"
For interference studies and the determination of correction coefficients
For detection limit and linearity studies
For additional intended uses, contact Technical Staff

This CRM was manufactured using 18 megohm doubly deionized water that has been filtered through a 0.2 micron filter.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

Storage & Handling - Keep tightly sealed when not in use. Store and use at 20 ± 4°C. Do not pipet from container. Do not return portions removed for pipetting to container.

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 207.2; +2; 6; $Pb(H_2O)_{6}^{+2}$

Chemical Compatibility - Soluble in HCl, HF and HNO_3. Avoid H_2SO_4. Stable with most metals and inorganic anions forming insoluble carbonate, borate, sulfate, sulfite, sulfide, phosphate, oxalate, chromate, tannate, iodate, and cyanide in neutral aqueous media.

Stability - 2-100 ppb levels stable for months in 1% HNO_3 / LDPE container. 1-10,000 ppm solutions chemically stable for years in 2-5% HNO_3 / LDPE container.

Pb Containing Samples (Preparation and Solution) - Metal (Best dissolved in 1:1 H_2O / HNO_3); Oxides (The many different Pb oxides are soluble in HNO_3 with the exception of PbO_2 which is soluble in HCl or HF); Ores and Alloys (Best attacked using 1:1 H_2O / HNO_3); Organic Matrices (Dry ash and dissolve in dilute HCl.).

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

Technique/Line	Estimated D.L.	Order	Type	Interferences (underlined indicates severe)
ICP-OES 168.215 nm	0.03 / 0.003 µg/mL	1	ion	Co
ICP-OES 220.353 nm	0.04 / 0.006 µg/mL	1	ion	Bi, Nb
ICP-OES 217.000 nm	0.09 / 0.03 µg/mL	1	atom	W, Ir, Hf, Sb, Th
ICP-MS 208 amu	5 ppt	n/a	M+	192Pt16O, 192Os16O

Uranium Note: If uranium is present in this standard, it is natural abundance unless specified in Section 3.0.

8.0 HAZARDOUS INFORMATION - Please refer to the enclosed Material Safety Data sheet for information regarding this CRM.

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration
- QMI File Number 010105

10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration"
- Chemical Testing - Accredited A2LA Certificate Number 883.01

10.3 ISO/IEC Guide 34 "General Requirements for the Competence of Reference Material Producers"
- Reference Materials Production - Accredited A2LA Certificate Number 883.02

10.4 10CFR50 Appendix B - Nuclear Regulatory Commission
- Domestic Licensing of Production and Utilization Facilities

10.5 10CFR21 - Nuclear Regulatory Commission
- Reporting Defects and Non-Compliance

11.0 DATE OF CERTIFICATION AND PERIOD OF VALIDITY

11.1 Shelf Life - The period of time during which the concentration of the analyte(s) in a properly packaged, unopened, and unused standard stored under environmentally controlled and monitored conditions will remain within the specified uncertainty range. Shelf life is limited primarily by transpiration (loss of water from the solution) and infrequently, by chemical instability.

11.2 Expiration Date - The date after which a CRM should not be used. Routine laboratory use of a CRM increases transpiration losses and the chance of contamination which affect the integrity of the CRM and limit its useful life. Manufacturer concurs with state and federal regulatory agencies' recommendations that solution standards be assigned a one-year expiration date.

11.3 Chemical Stability - Studies have been conducted on this or similar CRMs and it has been demonstrated that this CRM is chemically stable for a period of not less than two years provided the "Storage & Handling" conditions are followed that are described in section 7.0.

Certification Date: February 10, 2012

Expiration Date: EXPIRES 01 MAR 2014

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:	Danny Feeny Product Documentation Technician	
Certificate Approved By:	Brian Alexander PhD., Quality Control Supervisor	
Certifying Officer:	Paul Gaines PhD., Senior Technical Director	

INORGANIC VENTURES™
300 Technology Drive
Christiansburg, VA 24073 • USA
inorganicventures.com

CERTIFICATE OF ANALYSIS

tel: 800.669.6799 • 540.585.3030
fax: 540.585.3012
info@inorganicventures.com

1.0 **INORGANIC VENTURES** is an ISO Guide 34 "General Requirements for the Competence of Reference Material Producers" and ISO 9001 registered manufacturer. Our manufacturing laboratory is accredited to ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories."

ACCREDITED Testing Laboratory Certificate 883.01

ACCREDITED Reference Material Producer Certificate 883.02

2.0 **DESCRIPTION OF CRM** **1000 µg/mL Zirconium in tr. HF**

Catalog Number:	CGZR1-1, CGZR1-2, and CGZR1-5
Lot Number:	**F2-ZR01094**
Starting Material:	ZrO2
Starting Material Purity (%):	99.9947
Starting Material Lot No:	1765
Matrix:	tr. HF

1956326
ID: 1000 Zr_00005
Exp:04/01/14 Prpd:HEB Opn:03/25/13
1000 Zr IV

3.0 **CERTIFIED VALUES AND UNCERTAINTIES**

Certified Concentration: 999 ± 5 µg/mL - weighted mean

Certified Density: 1.000 g/mL (measured at 20 ± 1°C)

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

$$\text{Certified Value } (\bar{x}) = \frac{\Sigma x_i}{n}$$

$$\text{Uncertainty } (\pm) = 2\,[\,\Sigma(s_i)^2\,]^{1/2}$$

$(\bar{x})$ = mean
x_i = individual results
n = number of measurements
2 = the coverage factor.
$[\,\Sigma(s_i)^2\,]^{1/2}$ = The square root of the sum of the squares of the most common errors (where 's' stands for the standard deviation) from instrumental measurement, density, NIST SRM uncertainty, weighing, dilution to volume, homogeneity, long term stability and short term stability.

4.0 **TRACEABILITY TO NIST AND VALUES OBTAINED BY INDEPENDENT METHODS**

· "Property of the result of a measurement or the value of a standard whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons all having stated uncertainties." (ISO ViM, 2nd ed., 1993, definition 6.10)

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

4.1 **Assay Method #1** **999 ± 3 µg/mL**
ICP Assay NIST SRM 3169 Lot Number: 071226

Assay Method #2 **999 ± 3 µg/mL**
Calculated NIST SRM Lot Number: See Sec. 4.2

4.2 **BALANCE CALIBRATION -** All analytical balances are calibrated yearly by an A2LA accredited calibration laboratory and are traceable to a class E 2 analytical weight set with NIST Traceability. All balances are checked daily using an in-house procedure. The weights used for testing are annually compared to master weights and are traceable to the National Institute of Standards and Technology (NIST).

4.3 **THERMOMETER CALIBRATION -** All thermometers are NIST traceable through thermometers that are calibrated by an A2LA accredited calibration laboratory.

4.4 **GLASSWARE CALIBRATION -** An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM's.

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

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

O	Al	< 0.006034	M	Dy	< 0.014723	O	Li	< 0.000201	M	Pr	< 0.000736	M	Te	< 0.073617
M	Sb	< 0.001227	M	Er	< 0.012270	M	Lu	< 0.000982	M	Re	< 0.002454	M	Tb	< 0.000736
M	As	< 0.024539	M	Eu	< 0.007362	O	Mg	0.003514	M	Rh	< 0.002454	M	Tl	< 0.002454
M	Ba	< 0.024539	M	Gd	< 0.002454	O	Mn	< 0.006704	M	Rb	0.000396	M	Th	< 0.002454
O	Be	< 0.670443	M	Ga	< 0.002454	O	Hg	< 0.073749	M	Ru	< 0.004908	M	Tm	< 0.000982
M	Bi	< 0.000982	M	Ge	< 0.014723	O	Mo	< 0.670443	M	Sm	< 0.002454	M	Sn	0.000693
M	B	< 0.171774	M	Au	< 0.007362	M	Nd	< 0.004908	O	Sc	< 0.001073	O	Ti	< 0.268177
O	Cd	0.020272	M	Hf	0.019786	O	Ni	< 0.019443	M	Se	< 0.019631	M	W	< 0.024539
O	Ca	0.018921	M	Ho	< 0.001227	O	Nb	< 0.134089	O	Si	< 1.340886	M	U	< 0.004908
M	Ce	< 0.012270	M	In	< 0.024539	n	Os		O	Ag	< 0.670443	M	V	< 0.004908
M	Cs	< 0.000736	M	Ir	< 0.012270	i	Pd		O	Na	0.010542	M	Yb	< 0.002454
O	Cr	< 0.014750	O	Fe	0.005136	O	P	< 0.032181	M	Sr	< 0.001227	O	Y	< 0.006704
M	Co	< 0.007362	M	La	< 0.001227	M	Pt	< 0.004908	O	S	< 0.469310	O	Zn	< 0.067044
M	Cu	0.000722	M	Pb	< 0.007362	O	K	0.005406	M	Ta	0.000989	s	Zr	

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

6.0 INTENDED USE

For the calibration of analytical instruments including but not limited to the following:
HPLC, IC, TLC, ISE, IR, NMR, UV/VIS, MS, Capillary Eletrophoresis, Potentiometry, Wet Chemistry and Voltammetry
For the validation of analytical methods
For the preparation of "working reference samples"
For interference studies and the determination of correction coefficients
For detection limit and linearity studies
For additional intended uses, contact Technical Staff

This CRM was manufactured using 18 megohm doubly deionized water that has been filtered through a 0.2 micron filter.

4.2 BALANCE CALIBRATION - All analytical balances are calibrated yearly by an A2LA accredited calibration laboratory and are traceable to a class E 2 analytical weight set with NIST Traceability. All balances are checked daily using an in-house procedure. The weights used for testing are annually compared to master weights and are traceable to the National Institute of Standards and Technology (NIST).

4.3 THERMOMETER CALIBRATION - All thermometers are NIST traceable through thermometers that are calibrated by an A2LA accredited calibration laboratory.

4.4 GLASSWARE CALIBRATION - An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM's.

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

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

O	Al	< 0.006034	M	Dy	< 0.014723	O	Li	< 0.000201	M	Pr	< 0.000736
M	Sb	< 0.001227	M	Er	< 0.012270	M	Lu	< 0.000982	M	Re	< 0.002454
M	As	< 0.024539	M	Eu	< 0.007362	O	Mg	0.003514	M	Rh	< 0.002454
M	Ba	< 0.024539	M	Gd	< 0.002454	O	Mn	< 0.006704	M	Rb	0.000396
O	Be	< 0.670443	M	Ga	< 0.002454	O	Hg	< 0.073749	M	Ru	< 0.004908
M	Bi	< 0.000982	M	Ge	< 0.014723	O	Mo	< 0.670443	M	Sm	< 0.002454
M	B	< 0.171774	M	Au	< 0.007362	M	Nd	< 0.004908	O	Sc	< 0.001073
O	Cd	0.020272	M	Hf	0.019786	O	Ni	< 0.019443	M	Se	< 0.019631
O	Ca	0.018921	M	Ho	< 0.001227	O	Nb	< 0.134089	O	Si	< 1.340886
M	Ce	< 0.012270	M	In	< 0.024539	n	Os		O	Ag	< 0.670443
M	Cs	< 0.000736	M	Ir	< 0.012270	i	Pd		O	Na	0.010542
O	Cr	< 0.014750	O	Fe	0.005136	O	P	< 0.032181	M	Sr	< 0.001227
M	Co	< 0.007362	M	La	< 0.001227	M	Pt	< 0.004908	O	S	< 0.469310
M	Cu	0.000722	M	Pb	< 0.007362	O	K	0.005406	M	Ta	0.000989

M	Te	<	0.073617
M	Tb	<	0.000736
M	Tl	<	0.002454
M	Th	<	0.002454
M	Tm	<	0.000982
M	Sn		0.000693
O	Ti	<	0.268177
M	W	<	0.024539
M	U	<	0.004908
M	V	<	0.004908
M	Yb	<	0.002454
O	Y	<	0.006704
O	Zn	<	0.067044
s	Zr		

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

6.0 INTENDED USE

For the calibration of analytical instruments including but not limited to the following:
HPLC, IC, TLC, ISE, IR, NMR, UV/VIS, MS, Capillary Eletrophoresis, Potentiometry, Wet Chemistry and Voltammetry
For the validation of analytical methods
For the preparation of "working reference samples"
For interference studies and the determination of correction coefficients
For detection limit and linearity studies
For additional intended uses, contact Technical Staff

This CRM was manufactured using 18 megohm doubly deionized water that has been filtered through a 0.2 micron filter.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

Storage & Handling - Keep tightly sealed when not in use. Store and use at 20 ± 4°C. Do not pipet from container. Do not return portions removed for pipetting to container.
Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 91.224; +4; **6**,*7*,*8*; Zr(F)6-2
Chemical Compatibility - Soluble in concentrated HCl, HF, H2SO4 (very hot) and HNO3. Avoid H3PO4 and neutral to basic media. Unstable at ppm levels with metals that would pull F- away (i.e. Do not mix with Alkaline or Rare Earths or high levels of transition elements unless they are fluorinated). Stable with most inorganic anions but precipitation with phosphate, oxalate, and tartrate with a tendency to hydrolyze forming the hydrated oxide in all dilute acids except HF .
Stability - 2-100 ppb levels stable (alone or mixed with all other metals that are at comparable levels) as the Zr(F)6-2 + Zr(OH)4F2-2 for months in 1% HNO3 / LDPE container. 1-10,000 ppm single element solutions as the Zr(F)6-2 chemically stable for years in 2-5% HNO3 / trace HF in an LDPE container.
Zr Containing Samples (Preparation and Solution) - Metal (Soluble in H2O / HF / HNO3); Oxide - unlike TiO2 the ZrO2 is best fused in one of the following ways (Na2O2 in Ni0, Na2CO3 in Pt0 or Borax in Pt0); Organic Matrices (Dry ash at 450 0C in Pt0 and dissolve by fusing with Na2CO3 and dissolving in HF / HNO3 / H2O).
Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/axial view):

Technique/Line	Estimated D.L.	Order	Type	Interferences (underlined indicates severe)
ICP-OES 343.823 nm	0.007 / 0.0004 µg/mL	1	ion	Hf, Nb
ICP-OES 339.198 nm	0.008 / 0.0007 µg/mL	1	ion	Th, Mo
ICP-OES 272.261 nm	0.018 / 0.001 µg/mL	1	ion	Cr, V, Th, W
ICP-MS 90 amu	2 ppt	n/a	M+	74Ge16O, 74Se16O, [180X+2 (where X = Hf, Ta, W)]

HF Note: This standard should not be prepared or stored in glass.
Uranium Note: If uranium is present in this standard, it is natural abundance unless specified in Section 3.0.

8.0 HAZARDOUS INFORMATION - Please refer to the enclosed Material Safety Data sheet for information regarding this CRM.

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

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration
- QMI File Number 010105

10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration"
- Chemical Testing - Accredited A2LA Certificate Number 883.01

10.3 ISO/IEC Guide 34 "General Requirements for the Competence of Reference Material Producers"
- Reference Materials Production - Accredited A2LA Certificate Number 883.02

10.4 10CFR50 Appendix B - Nuclear Regulatory Commission
- Domestic Licensing of Production and Utilization Facilities

10.5 10CFR21 - Nuclear Regulatory Commission
- Reporting Defects and Non-Compliance

11.0 DATE OF CERTIFICATION AND PERIOD OF VALIDITY

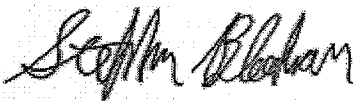
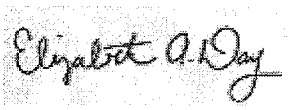
11.1 Shelf Life - The period of time during which the concentration of the analyte(s) in a properly packaged, unopened, and unused standard stored under environmentally controlled and monitored conditions will remain within the specified uncertainty range. Shelf life is limited primarily by transpiration (loss of water from the solution) and infrequently, by chemical instability.

11.2 Expiration Date - The date after which a CRM should not be used. Routine laboratory use of a CRM increases transpiration losses and the chance of contamination which affect the integrity of the CRM and limit its useful life. Manufacturer concurs with state and federal regulatory agencies' recommendations that solution standards be assigned a one-year expiration date.

11.3 Chemical Stability - Studies have been conducted on this or similar CRMs and it has been demonstrated that this CRM is chemically stable for a period of not less than two years provided the "Storage & Handling" conditions are followed that are described in section 7.0.

Certification Date: November 02, 2012
Expiration Date: EXPIRES 01 APR 2014

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:	Stephan Blaakman Product Documentation Technician	
Certificate Approved By:	Beth Day Quality Assurance Specialist	
Certifying Officer:	Paul Gaines PhD., Senior Technical Director	

INORGANIC VENTURES™
300 Technology Drive
Christiansburg, VA 24073 • USA
inorganicventures.com

CERTIFICATE OF ANALYSIS

tel: 800.669.6799 • 540.585.3030
fax: 540.585.3012
info@inorganicventures.com

1.0 **INORGANIC VENTURES** is an ISO Guide 34 "General Requirements for the Competence of Reference Material Producers" and ISO 9001 registered manufacturer. Our manufacturing laboratory is accredited to ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories."

ACCREDITED Testing Laboratory Certificate 883.01

ACCREDITED Reference Material Producer Certificate 883.02

2.0 **DESCRIPTION OF CRM** **10000 µg/mL Silicon in 1% (v/v) HNO3 / 1.4% (v/v) HF**

Catalog Number:	CGSI10-1, CGSI10-2, and CGSI10-5
Lot Number:	**F2-SI03018**
Starting Material:	SiO2
Starting Material Purity (%):	99.9993
Starting Material Lot No:	1551
Matrix:	1% (v/v) HNO3 / 1.4% (v/v) HF

1956330
ID: 10000 Si_00008
Exp:04/01/14 Prpd:HEB Opn:03/25/13
10000 Si IV

3.0 **CERTIFIED VALUES AND UNCERTAINTIES**

Certified Concentration: 9,992 ± 51 µg/mL - weighted mean

Certified Density: 1.046 g/mL (measured at 20 ± 1°C)

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

$$\text{Certified Value } (\bar{x}) = \frac{\Sigma x_i}{n}$$

$(\bar{x})$ = mean
x_i = individual results
n = number of measurements

$$\text{Uncertainty } (\pm) = 2\,[\,\Sigma(s_i)^2\,]^{1/2}$$

2 = the coverage factor.
$[\,\Sigma(s_i)^2\,]^{1/2}$ = The square root of the sum of the squares of the most common errors (where 's' stands for the standard deviation) from instrumental measurement, density, NIST SRM uncertainty, weighing, dilution to volume, homogeneity, long term stability and short term stability.

4.0 **TRACEABILITY TO NIST AND VALUES OBTAINED BY INDEPENDENT METHODS**

· "Property of the result of a measurement or the value of a standard whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons all having stated uncertainties." (ISO VIM, 2nd ed., 1993, definition 6.10)

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

4.1 **Assay Method #1** **9,982 ± 28 µg/mL**
ICP Assay NIST SRM 3150 Lot Number: 071204

Assay Method #2 **10,000 ± 30 µg/mL**
Calculated NIST SRM Lot Number: See Sec. 4.2

4.2 **BALANCE CALIBRATION** - All analytical balances are calibrated yearly by an A2LA accredited calibration laboratory and are traceable to a class E 2 analytical weight set with NIST Traceability. All balances are checked daily using an in-house procedure. The weights used for testing are annually compared to master weights and are traceable to the National Institute of Standards and Technology (NIST).

4.3 **THERMOMETER CALIBRATION** - All thermometers are NIST traceable through thermometers that are calibrated by an A2LA accredited calibration laboratory.

4.4 **GLASSWARE CALIBRATION** - An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM's.

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

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

O	Al	< 0.005154	M	Dy	< 0.014460	O	Li	< 0.000034	M	Pr	< 0.000723	M	Te	< 0.072301
M	Sb	< 0.001205	M	Er	< 0.012050	M	Lu	< 0.000964	M	Re	< 0.002410	M	Tb	< 0.000723
M	As	< 0.024100	M	Eu	< 0.007230	O	Mg	0.002058	M	Rh	< 0.002410	M	Tl	< 0.002410
M	Ba	< 0.024100	M	Gd	< 0.002410	M	Mn	< 0.009640	M	Rb	< 0.002410	M	Th	< 0.002410
O	Be	< 0.000344	M	Ga	< 0.002410	O	Hg	< 0.018898	M	Ru	< 0.004820	M	Tm	< 0.000964
M	Bi	< 0.000964	M	Ge	< 0.014460	M	Mo	< 0.004820	M	Sm	< 0.002410	M	Sn	0.006736
n	B		M	Au	< 0.007230	M	Nd	< 0.004820	O	Sc	< 0.000344	O	Ti	0.006860
M	Cd	< 0.007230	M	Hf	< 0.004820	O	Ni	< 0.003951	M	Se	< 0.019280	O	W	< 0.006872
O	Ca	0.030870	M	Ho	< 0.001205	M	Nb	< 0.001205	s	Si		M	U	< 0.004820
M	Ce	< 0.012050	M	In	< 0.024100	n	Os		M	Ag	< 0.004820	O	V	< 0.001546
M	Cs	< 0.000723	M	Ir	< 0.012050	M	Pd	< 0.012050	n	Na		M	Yb	< 0.002410
O	Cr	< 0.002577	O	Fe	0.006860	O	P	< 0.008590	O	Sr	< 0.000120	M	Y	< 0.096401
M	Co	< 0.007230	M	La	< 0.001205	M	Pt	< 0.004820	O	S	< 0.042951	O	Zn	< 0.000344
O	Cu	< 0.001718	M	Pb	< 0.007230	O	K	0.027440	O	Ta	< 0.010308	M	Zr	< 0.012050

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

6.0 INTENDED USE

For the calibration of analytical instruments including but not limited to the following:
HPLC, IC, TLC, ISE, IR, NMR, UV/VIS, MS, Capillary Eletrophoresis, Potentiometry, Wet Chemistry and Voltammetry
For the validation of analytical methods
For the preparation of "working reference samples"
For interference studies and the determination of correction coefficients
For detection limit and linearity studies
For additional intended uses, contact Technical Staff

This CRM was manufactured using 18 megohm doubly deionized water that has been filtered through a 0.2 micron filter.

4.2 BALANCE CALIBRATION - All analytical balances are calibrated yearly by an A2LA accredited calibration laboratory and are traceable to a class E 2 analytical weight set with NIST Traceability. All balances are checked daily using an in-house procedure. The weights used for testing are annually compared to master weights and are traceable to the National Institute of Standards and Technology (NIST).

4.3 THERMOMETER CALIBRATION - All thermometers are NIST traceable through thermometers that are calibrated by an A2LA accredited calibration laboratory.

4.4 GLASSWARE CALIBRATION - An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM's.

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

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

O	Al	< 0.005154	M	Dy	< 0.014460	O	Li	< 0.000034	M	Pr	< 0.000723
M	Sb	< 0.001205	M	Er	< 0.012050	M	Lu	< 0.000964	M	Re	< 0.002410
M	As	< 0.024100	M	Eu	< 0.007230	O	Mg	0.002058	M	Rh	< 0.002410
M	Ba	< 0.024100	M	Gd	< 0.002410	M	Mn	< 0.009640	M	Rb	< 0.002410
O	Be	< 0.000344	M	Ga	< 0.002410	O	Hg	< 0.018898	M	Ru	< 0.004820
M	Bi	< 0.000964	M	Ge	< 0.014460	M	Mo	< 0.004820	M	Sm	< 0.002410
n	B		M	Au	< 0.007230	M	Nd	< 0.004820	O	Sc	< 0.000344
M	Cd	< 0.007230	M	Hf	< 0.004820	O	Ni	< 0.003951	M	Se	< 0.019280
O	Ca	0.030870	M	Ho	< 0.001205	M	Nb	< 0.001205	s	Si	
M	Ce	< 0.012050	M	In	< 0.024100	n	Os		M	Ag	< 0.004820
M	Cs	< 0.000723	M	Ir	< 0.012050	M	Pd	< 0.012050	n	Na	
O	Cr	< 0.002577	O	Fe	0.006860	O	P	< 0.008590	O	Sr	< 0.000120
M	Co	< 0.007230	M	La	< 0.001205	M	Pt	< 0.004820	O	S	< 0.042951
O	Cu	< 0.001718	M	Pb	< 0.007230	O	K	0.027440	O	Ta	< 0.010308

M	Te	< 0.072301
M	Tb	< 0.000723
M	Tl	< 0.002410
M	Th	< 0.002410
M	Tm	< 0.000964
M	Sn	0.006736
O	Ti	0.006860
O	W	< 0.006872
M	U	< 0.004820
O	V	< 0.001546
M	Yb	< 0.002410
M	Y	< 0.096401
O	Zn	< 0.000344
M	Zr	< 0.012050

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

6.0 INTENDED USE

For the calibration of analytical instruments including but not limited to the following:
HPLC, IC, TLC, ISE, IR, NMR, UV/VIS, MS, Capillary Eletrophoresis, Potentiometry, Wet Chemistry and Voltammetry
For the validation of analytical methods
For the preparation of "working reference samples"
For interference studies and the determination of correction coefficients
For detection limit and linearity studies
For additional intended uses, contact Technical Staff

This CRM was manufactured using 18 megohm doubly deionized water that has been filtered through a 0.2 micron filter.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

Storage & Handling - Keep tightly sealed when not in use. Store and use at 20 ± 4°C. Do not pipet from container. Do not return portions removed for pipetting to container.
Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 28.0855; +4; 6; Si(OH)x(F)y2-
Chemical Compatibility - Soluble in HCl, HF, H3PO4 H2SO4 and HNO3 as the Si(OH)x(F)y2-. Avoid neutral to basic media. Unstable at ppm levels with metals that would pull F- away (i.e. Do not mix with Alkaline or Rare Earths, or high levels of transition elements unless they are fluorinated). Stable with most inorganic anions with a tendency to hydrolyze forming silicic acid (silicic acid is soluble up to ~100 ppm in water) in all dilute acids except HF.
Stability - 2-100 ppb levels - stability unknown - (alone or mixed with all other metals) as the Si(OH)x(F)y2-. 1-10,000 ppm single element solutions as the Si(OH)x(F)y2- chemically stable for years in 2-5 % HNO3 / trace HF in a LDPE container.
Si Containing Samples (Preparation and Solution) - Metal (Soluble in 1:1:1 H2O / HF / HNO3); Oxide - SiO2, amorphic (Dissolve by heating in 1:1:1 H2O / HF / HNO3); Oxide - quartz (Fuse in Pt0 with Na2CO3); Geological Samples (Fuse in Pt0with Na2CO3 followed by HCl solution of the fuseate); Organic Matrices containing silicates and non volatile silicon compounds (Dry ash at 450□C in Pt0 and dissolve by gently warming with 1:1:1 H2O / HF / H2SO4 or fuse / ash with Na2CO3 and dissolve fuseate with HCl / H2O); Silicone Oils - dimethyl silicones depolymerize to form volatile monomer units when heated (Measure directly in alcoholic KOH / xylene mixture where sample is treated first with the KOH at 60-100 □C to "unzip" the Si-O-Si polymeric structure or digest with concentrated H2SO4/H2O2 followed by cooling and dissolution of the dehydrated silica with HF.) Note that the direct analysis of silicone oils in an organic solvent will result in false high results due to high vapor pressure of volatile monomer units like hexamethylcyclotrisiloxane. The KOH forms the K2+Si(CH3)2O= salt which is not volatile at room temperature.
Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/axial view):

Technique/Line	Estimated D.L.	Order	Type	Interferences (underlined indicates severe)
ICP-OES 251.611 nm	0.012 / 0.003 µg/mL	1	ion	Ta, U, Zn, Th
ICP-OES 212.412 nm	0.02 / 0.01 µg/mL	1	ion	Hf, Os, Mo, Ta
ICP-OES 288.158 nm	0.03 / 0.004 µg/mL	1	ion	Ta, Ce, Cr, Cd, Th
ICP-MS 28 amu	4000 - 8000 ppt	n/a	M+	14N2, 12C16O

HF Note: This standard should not be prepared or stored in glass.
Uranium Note: If uranium is present in this standard, it is natural abundance unless specified in Section 3.0.

8.0 HAZARDOUS INFORMATION - Please refer to the enclosed Material Safety Data sheet for information regarding this CRM.

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

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration
- QMI File Number 010105

10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration"
- Chemical Testing - Accredited A2LA Certificate Number 883.01

10.3 ISO/IEC Guide 34 "General Requirements for the Competence of Reference Material Producers"
- Reference Materials Production - Accredited A2LA Certificate Number 883.02

10.4 10CFR50 Appendix B - Nuclear Regulatory Commission
- Domestic Licensing of Production and Utilization Facilities

10.5 10CFR21 - Nuclear Regulatory Commission
- Reporting Defects and Non-Compliance

11.0 DATE OF CERTIFICATION AND PERIOD OF VALIDITY

11.1 Shelf Life - The period of time during which the concentration of the analyte(s) in a properly packaged, unopened, and unused standard stored under environmentally controlled and monitored conditions will remain within the specified uncertainty range. Shelf life is limited primarily by transpiration (loss of water from the solution) and infrequently, by chemical instability.

11.2 Expiration Date - The date after which a CRM should not be used. Routine laboratory use of a CRM increases transpiration losses and the chance of contamination which affect the integrity of the CRM and limit its useful life. Manufacturer concurs with state and federal regulatory agencies' recommendations that solution standards be assigned a one-year expiration date.

11.3 Chemical Stability - Studies have been conducted on this or similar CRMs and it has been demonstrated that this CRM is chemically stable for a period of not less than two years provided the "Storage & Handling" conditions are followed that are described in section 7.0.

Certification Date: August 27, 2012
Expiration Date:

EXPIRES
01 APR 2014

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:	Zach Saunders Product Documentation Technician	Zachary Saunders
Certificate Approved By:	Beth Day Quality Assurance Specialist	Elizabeth A. Day
Certifying Officer:	Paul Gaines PhD., Senior Technical Director	Paul R Gaines

125 Market Street
New Haven, CT 06513
USA

AccuStandard® Inc.

Tel (203)786-5290
Fax (203)786-5287
www.AccuStandard.com

CERTIFICATE OF ANALYSIS

CATALOG NO: S-8087-2.5X
DESCRIPTION: Custom Standard
LOT: 212111159
SOLVENT: Dichloromethane

EXPIRATION: Nov 8 , 2015
DATE CERTIFIED: Nov 8, 2012
SAMPLE SIZE: 1 mL
STORAGE CONDITION: Refrig (0-5° C)
HAZARDS: HARMFUL

Refer to the MSDS for additional safety information

[X] Included on ISO/IEC 17025 Scope of Accreditation
[X] Included on ISO Guide 34 Scope of Accreditation

Component	Cas Number	Purity % (GC/MS)	Prepared Concentration[1] (µg/mL)	Certified Analyte Concentration[2] (µg/mL)
o-Terphenyl	84-15-1	100	5001	5001
n-Octacosane	630-02-4	99.9	5002	4997

2 Components

1. All weights are traceable through NIST, Test No. 822-275872-11
2. Certified Analyte Concentration = Purity x Prepared Concentration. The Uncertainty associated with the gravimetric values reported on this certificate is ±0.24%. The CRM Uncertainty calculated for this product is ±5%. Those values are the expanded uncertainty and represent an estimated standard deviation equal to the positive square root of the total variation of the uncertainty of components. A normal distribution is assumed and a coverage factor of K=2 is chosen using approximately a 95% confidence level.
3. A product with a suffix (-1A, -2B, etc. or -01, -02, etc.) on its lot# has had its expiration date extended and is identical to the same lot# without the suffix.

For use in routine laboratory analysis.

Certified by: R. Cooper
Russ Cooper, QC Manager

125 Market Street
New Haven, CT 06513
USA

AccuStandard® Inc.

Tel (203)786-5290
Fax (203)786-5287
www.AccuStandard.com

CERTIFICATE OF ANALYSIS

CATALOG NO: S-8087-2.5X
DESCRIPTION: Custom Standard
LOT: 212111159
SOLVENT: Dichloromethane

EXPIRATION: Nov 8 , 2015
DATE CERTIFIED: Nov 8, 2012
SAMPLE SIZE: 1 mL
STORAGE CONDITION: Refrig (0-5° C)
HAZARDS: HARMFUL

Refer to the MSDS for additional safety information

[X] Included on ISO/IEC 17025 Scope of Accreditation
[X] Included on ISO Guide 34 Scope of Accreditation

Component	Cas Number	Purity % (GC/MS)	Prepared Concentration[1] (µg/mL)	Certified Analyte Concentration[2] (µg/mL)
o-Terphenyl	84-15-1	100	5001	5001
n-Octacosane	630-02-4	99.9	5002	4997

2 Components

1. All weights are traceable through NIST, Test No. 822-275872-11
2. Certified Analyte Concentration = Purity x Prepared Concentration. The Uncertainty associated with the gravimetric values reported on this certificate is ±0.24%. The CRM Uncertainty calculated for this product is ±5%. Those values are the expanded uncertainty and represent an estimated standard deviation equal to the positive square root of the total variation of the uncertainty of components. A normal distribution is assumed and a coverage factor of K=2 is chosen using approximately a 95% confidence level.
3. A product with a suffix (-1A, -2B, etc. or -01, -02, etc.) on its lot# has had its expiration date extended and is identical to the same lot# without the suffix.

For use in routine laboratory analysis.

Certified by: R. Cooper
Russ Cooper, QC Manager

5

110 Benner Circle
Bellefonte, PA 16823-8812
Tel: (800)356-1688
Fax: (814)353-1309

www.Restek.com

Certificate of Analysis

FOR LABORATORY USE ONLY-READ MSDS PRIOR TO USE.

Catalog No. : 30237 **Lot No.:** A084889

Description : Certified BTEX in Unleaded Gas Composite

VOA Mix, UST Method, Cert.BTEX in unleaded gas, 5,500µg/ml, P&T MeOH, 1ml/ampule

Container Size : [5,1] 2 mL **Pkg Amt:** [5] > 1 mL

Expiration Date : December 2018 **Storage:** 0°C or colder

Elution Order	Compound	CAS #	Percent Purity [2]	Grav. Conc. (weight/volume) [3]	Grav.Uncert. (95% C.L.; K=2) [4]
1	Unleaded Gasoline Composite (certified)	8006-61-9	----%	5,500.0 ug/mL	+/- 32.2037 ug/mL
Solvent:	P&T Methanol	67-56-1	99%		

Column:
60m x .25mm x 1.4um
Rtx-502.2 (cat.#10916)

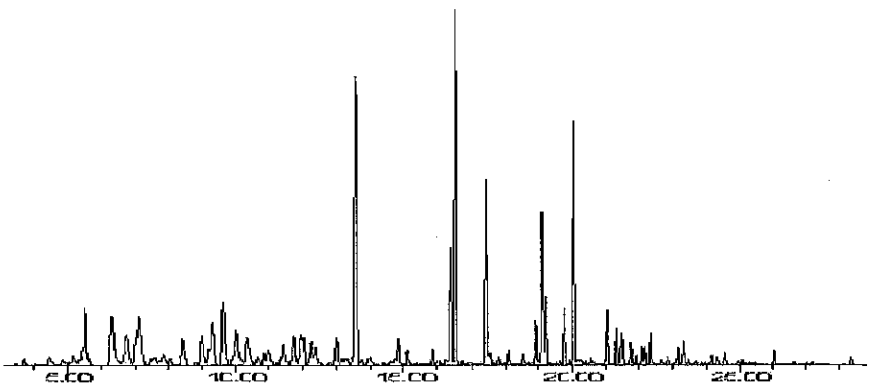
Carrier Gas:
helium-constant pressure 30 psi

Temp. Program:
40°C (hold 2 min.) to 240°C
@ 8°C/min. (hold 5 min.)

Inj. Temp:
200°C

Det. Temp:
250°C

Det. Type:
MSD



Rec'd
11/12/12

Report Date: 01-May-2013 11:34:35 Chrom Revision: 2.0 03-Jan-2013 09:16:44

Preliminary Report

TestAmerica Denver

Recovery Report

Data File:	\\Denchrom\ChromData\SGC_U\20130430-11130.b\04300002.D		
Lims ID:	8015Surr_80	Client ID:	
Inject. Date:	30-Apr-2013 16:35:06	Dil. Factor:	1.0000
Sample Type:	Client		
Sample ID:	8015Surr_80		
Misc. Info.:			
Operator:	MB	Instrument ID:	SGC_U
Injection Vol:	1.0 ul	ALS Bottle#:	2
Lims Batch ID:	11130	Lims Sample ID:	2
Detector:	GC FID1B		
Method:	\\Denchrom\ChromData\SGC_U\20130430-11130.b\DRO_U.m		
Last Update:	01-May-2013 11:34:26	Calib Date:	24-Apr-2013 16:24:11
Quant Method:	External Standard	Quant By:	Initial Calibration
Last ICal File:	\\Denchrom\ChromData\SGC_U\20130424-10941.b\04240009.D		
Limit Group:	GCSV - DRO		
Integrator:	Falcon		
Column Type:	RTX-1 (30.32)	Column Dia:	0.25 mm
Process Host:	DENPC248		

Compound	Amount Added	Amount Recovered	% Rec.
$ 1 o-Terphenyl	20.0	18.1	90.66
$ 2 n-Octacosane	20.0	18.4	91.91

5-1-13

Reagent ID: 8015Surrogate_00080

		Expiration Date:	10/29/2013
Description:	20 ug/mL 8015 Surrogate	Laboratory:	TestAmerica Denver
No. of Bottles:	2	Prepared By:	Curley, Nick
Storage Location:	North Prep	Solvent:	90:10 Acetone:MeCl2
Reagent Volume:	500.000 mL	Solvent Lot:	90Ace10MeCl2_00013
Creation Date:	04/29/2013		
Container(s):	2018798, 2018799		
Comment:	Take 2mL 8015 SurStock (S-8087-2.5X) and dilute to 500mL in 90:10 ACETONE/MeCl2. 6 month expiration.		

Reagent Analyte Information

Analyte	Source ID	Source Expiration Date	Source Conc.	Source Conc. Units	Final Conc.	Final Conc. Units
n-Octacosane	8015 SurStock_00118	11/08/2015	5000.000	ug/mL	20.00000	ug/mL
o-Terphenyl	8015 SurStock_00118	11/08/2015	5000.000	ug/mL	20.00000	ug/mL
n-Octacosane	8015 SurStock_00119	11/08/2015	5000.000	ug/mL	20.00000	ug/mL
o-Terphenyl	8015 SurStock_00119	11/08/2015	5000.000	ug/mL	20.00000	ug/mL

Source Reagents

Reagent	Description	Type	Expiration	Vendor	Vendor Lot #	Vendor Cat Lot #	Volume Used	Volume Units
8015 SurStock_00118	DenCustom Standard S-8087-2.5X	ASTD	11/08/15	AccuStandard	212111159	S-8087-2.5X	1.00000	mL
8015 SurStock_00119	DenCustom Standard S-8087-2.5X	ASTD	11/08/15	AccuStandard	212111159	S-8087-2.5X	1.00000	mL

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

12
Rec'd 12/4/12

alpha,alpha,alpha-Trifluorotoluene Solution

Product Number: STS-220N **Page:** 1 of 1

Lot Number: CE-1903A **Lot Issue Date:** 28-Jun-2011 **Expiration Date:** 31-Jul-2014

This Certified Reference Material (RM) was manufactured and verified in accordance with ULTRA's ISO 9001 registered quality system, and the analyte concentrations were verified by our ISO 17025 accredited laboratory. The true value and uncertainty value at the 95% confidence level for each analyte, determined gravimetrically, is listed below.

Analyte	CAS#	Analyte Lot	True Value
a,a,a-trifluorotoluene	000098-08-8	TS 11520AS	2010 ± 10 µg/mL

Matrix: methanol (methyl alcohol)

Storage: Store at < 4° C

ULTRA uses balances calibrated with weights traceable to NIST in compliance with ANSI/NCSL Z-540-1 and ISO 9001, and calibrated Class A glassware in the manufacturing of these standards.

ACCREDITED
ISO 17025:2005 Accredited A2LA Cert. No. 0851-01
ISO 9001:2008 Registered TUV USA, Inc. Cert. No. 09-1009

250 Smith Street, North Kingstown, RI 02852 USA
401-294-9400 Fax: 295-2330
wwww.ultrasci.com

William J. Leary
Quality Assurance Manager

05/29/2013

10

125 Market Street
New Haven, CT 06513
USA

AccuStandard® Inc.

Tel (203)786-5290
Fax (203)786-5287
www.AccuStandard.com

CERTIFICATE OF ANALYSIS

Rec'd 3/1/13

Catalog No: M-602-SS-10X
Description: α,α,α-Trifluorotoluene

Lot: 213021313
Solvent: Methanol

Date Certified: Feb 22, 2013
Expiration: Feb 22, 2023
Sample Size: 1 mL
Storage Condition: Ambient
Hazards: HIGHLY FLAMMABLE

[X] Included on ISO/IEC 17025 Scope of Accreditation
[X] Included on ISO Guide 34 Scope of Accreditation

Component	CAS #	Purity % (GC/MS)	Prepared Concentration[1] (µg/mL)	Certified Analyte Concentration[2] (µg/mL)
a,a,a-Trifluorotoluene	98-08-8	99.9	2002	2000

AccuStandard follows U.S. conventions in reporting numerical values on both certificates and labels:

A comma (,) is used to separate units of one-thousand or greater.
A period (.) is used as a decimal place marker.

1. All weights are traceable through NIST, Test No.822-275872-11
2. Certified Analyte Concentration = Purity x Prepared Concentration. The Uncertainty associated with the gravimetric values reported on this certificate is ±0.24%. The CRM Uncertainty calculated for this product is ±5%. These values are the expanded uncertainty and represent an estimated standard deviation equal to the positive square root of the total variation of the uncertainty of components. A normal distribution is assumed and a coverage factor of K=2 is chosen using approximately a 95% confidence level.
3. A product with a suffix (-1A, -2B, etc. or -01, -02, etc.) on its lot# has had its expiration date extended and is identical to the same lot# without the suffix.

For use in routine laboratory analysis.

See reverse side for additional information
Refer to the MSDS for additional safety information

Certified by: R. Cooper
Russ Cooper, QC Manager

AccuStandard is accredited to ISO Guide 34, ISO/IEC 17025 and certified to ISO 9001

OR-ORG/INO-001
Rev. 7/11

10

125 Market Street
New Haven, CT 06513
USA

AccuStandard® Inc.

Tel (203)786-5290
Fax (203)786-5287
www.AccuStandard.com

CERTIFICATE OF ANALYSIS

Catalog No: M-602-SS-10X
Description: α,α,α-Trifluorotoluene

Lot: 213021313
Solvent: Methanol

Date Certified: Feb 22, 2013
Expiration: Feb 22, 2023
Sample Size: 1 mL
Storage Condition: Ambient
Hazards: HIGHLY FLAMMABLE

[X] Included on ISO/IEC 17025 Scope of Accreditation
[X] Included on ISO Guide 34 Scope of Accreditation

Component	CAS #	Purity % (GC/MS)	Prepared Concentration[1] (µg/mL)	Certified Analyte Concentration[2] (µg/mL)
a,a,a-Trifluorotoluene	98-08-8	99.9	2002	2000

Rec'd 4/16/13 TH

AccuStandard follows U.S. conventions in reporting numerical values on both certificates and labels:

A comma (,) is used to separate units of one-thousand or greater.
A period (.) is used as a decimal place marker.

1. All weights are traceable through NIST, Test No.822-275872-11
2. Certified Analyte Concentration = Purity x Prepared Concentration. The Uncertainty associated with the gravimetric values reported on this certificate is ±0.24%. The CRM Uncertainty calculated for this product is ±5%. These values are the expanded uncertainty and represent an estimated standard deviation equal to the positive square root of the total variation of the uncertainty of components. A normal distribution is assumed and a coverage factor of K=2 is chosen using approximately a 95% confidence level.
3. A product with a suffix (-1A, -2B, etc. or -01, -02, etc.) on its lot# has had its expiration date extended and is identical to the same lot# without the suffix.

For use in routine laboratory analysis.

See reverse side for additional information
Refer to the MSDS for additional safety information

Certified by: R. Cooper
Russ Cooper, QC Manager

AccuStandard is accredited to ISO Guide 34, ISO/IEC 17025 and certified to ISO 9001

OR-ORG/INO-001
Rev. 7/11

125 Market Street
New Haven, CT 06513
USA

AccuStandard®, Inc.

Tel (203)786-5290
Fax (203)786-5287
Website AccuStandard.com

CERTIFICATE OF ANALYSIS

Catalog No: M-8015B/5031-10
Description: 1,4-Dioxane
Lot: 211061176
Solvent: Water

9-16-11

Date Certified: Jun 24, 2011
Expiration: Jun 24, 2021
Sample Size: 1 mL
Storage Condition: Ambient
Hazards: IRRITANT

[X] Included on ISO/IEC 17025 Scope of Accreditation
[X] Included on ISO Guide 34 Scope of Accreditation

Component	CAS #	Purity % (GC/MS)	Prepared Concentration[1] (mg/mL)	Certified Analyte Concentration[2] (mg/mL)
p-Dioxane	123-91-1	99.7	10.00	9.97

AccuStandard follows U.S. conventions in reporting numerical values on both certificates and labels:

A comma (,) is used to separate units of one-thousand or greater.
A period (.) is used as a decimal place marker.

1. All weights are traceable through NIST, Test No822/272103-05
2. Certified Analyte Concentration = Purity x Prepared Concentration. The Uncertainty associated with the gravimetric values reported on this certificate is ±0.24%. The CRM Uncertainty calculated for this product is ±5%. These values are the expanded uncertainty and represent an estimated standard deviation equal to the positive square root of the total variation of the uncertainty of components. A normal distribution is assumed and a coverage factor of K=2 is chosen using approximately a 95% confidence level.
3. A product with a suffix (-1A, -2B, etc. or -01, -02, etc.) on its lot# has had its expiration date extended and is identical to the same lot# without the suffix.

For use in routine laboratory analysis.

See reverse side for additional information
Refer to the MSDS for additional safety information

Certified by: R. Cooper
Russ Cooper, QC Manager

125 Market Street
New Haven, CT 06513
USA

AccuStandard®, Inc.

Tel (203)786-5290
Fax (203)786-5287
Website AccuStandard.com

CERTIFICATE OF ANALYSIS

Catalog No: M-8015B/5031-10
Description: 1,4-Dioxane
Lot: 211061176
Solvent: Water

9-16-11

Date Certified: Jun 24, 2011
Expiration: Jun 24, 2021
Sample Size: 1 mL
Storage Condition: Ambient
Hazards: IRRITANT

[X] Included on ISO/IEC 17025 Scope of Accreditation
[X] Included on ISO Guide 34 Scope of Accreditation

Component	CAS #	Purity % (GC/MS)	Prepared Concentration[1] (mg/mL)	Certified Analyte Concentration[2] (mg/mL)
p-Dioxane	123-91-1	99.7	10.00	9.97

AccuStandard follows U.S. conventions in reporting numerical values on both certificates and labels:

A comma (,) is used to separate units of one-thousand or greater.
A period (.) is used as a decimal place marker.

1. All weights are traceable through NIST, Test No822/272103-05
2. Certified Analyte Concentration = Purity x Prepared Concentration. The Uncertainty associated with the gravimetric values reported on this certificate is ±0.24%. The CRM Uncertainty calculated for this product is ±5%. These values are the expanded uncertainty and represent an estimated standard deviation equal to the positive square root of the total variation of the uncertainty of components. A normal distribution is assumed and a coverage factor of K=2 is chosen using approximately a 95% confidence level.
3. A product with a suffix (-1A, -2B, etc. or -01, -02, etc.) on its lot# has had its expiration date extended and is identical to the same lot# without the suffix.

For use in routine laboratory analysis.

See reverse side for additional information
Refer to the MSDS for additional safety information

Certified by: R. Cooper
Russ Cooper, QC Manager

Certificate of Analysis

DESCRIPTION: HC 8270 LCS Spike Mix

CATALOG NO.: 40032-U
LOT NO.: LB97647

MFG DATE: Jan-2013
EXPIRATION DATE: Jan-2014

SOLVENT: METHANOL:BENZ:DCM (80:1.25:18.75)

ANALYTE (1)	CAS NUMBER	PERCENT PURITY(2)	WEIGHT(3) CONCENTRATION	ANALYTICAL(4)		STD DEV	SUPELCO LOT NO
ACENAPHTHENE	83-32-9	99.9	200.0	196.5	+/-	23.01	LB82590
ACENAPHTHYLENE	208-96-8	99.9	200.0	204.1	+/-	20.55	LB84923
ANILINE	62-53-3	99.9	200.0	221.6	+/-	13.21	LA41596
ANTHRACENE	120-12-7	99.5	200.0	199.6	+/-	11.32	LB77576
AZOBENZENE	103-33-3	99.9	200.0	202.7	+/-	9.46	LB91797
BENZO (A) ANTHRACENE	56-55-3	99.9 (a)	200.0	200.1	+/-	13.34	LB89579
BENZO (A) PYRENE	50-32-8	99.9 (a)	200.0	200.4	+/-	15.09	LB90586
BENZO (B) FLUORANTHENE	205-99-2	97.3	200.0	200.8	+/-	13.97	LB96148
BENZO (G,H,I) PERYLENE	191-24-2	99.3	200.0	217.3	+/-	3.46	LB92103
BENZO (K) FLUORANTHENE	207-08-9	99.9	200.0	198.2	+/-	15.47	LB85440
BENZOIC ACID	65-85-0	99.9	200.0	221.1	+/-	16.62	LB85791
BENZYL ALCOHOL	100-51-6	99.9	200.0	216.0	+/-	1.33	LB48374
BENZYL BUTYL PHTHALATE	85-68-7	98.6	200.0	198.7	+/-	21.33	LB60340
BIS (2-CHLOROETHOXY) METHANE	111-91-1	98.1	200.0	216.6	+/-	5.36	LB46081
BIS (2-CHLOROETHYL) ETHER	111-44-4	99.9	200.0	226.8	+/-	25.66	LB84286
BIS (2-CHLOROISOPROPYL) ETHER	108-60-1	96.8	200.0	215.1	+/-	15.09	LB95928
BIS (2-ETHYLHEXYL) PHTHALATE	117-81-7	99.7	200.0	197.2	+/-	20.97	LB58359
BIS-2-ETHYLHEXYL ADIPATE	103-23-1	99.7	200.0	195.2	+/-	22.97	LB31993
CARBAZOLE	86-74-8	98.2	200.0	196.8	+/-	11.18	LB80615

(1) Listed in alphabetical order.
(2) Determined by capillary GC-FID, unless otherwise noted.
a) HPLC UV-254NM
(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.
(4) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.
(5) These products coelute and are not quantified in the final mix.

Duane Funk

Duane Funk
Quality Manager

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

Certificate of Analysis

DESCRIPTION: HC 8270 LCS Spike Mix

CATALOG NO.: 40032-U
LOT NO.: LB97647

MFG DATE: Jan-2013
EXPIRATION DATE: Jan-2014

SOLVENT: METHANOL:BENZ:DCM (80:1.25:18.75)

ANALYTE (1)	CAS NUMBER	PERCENT PURITY(2)	WEIGHT(3) CONCENTRATION	ANALYTICAL(4) CONCENTRATION		STD DEV	SUPELCO LOT NO
CHRYSENE	218-01-9	98.9	200.0	199.8	+/-	13.59	LB92051
DI-N-BUTYL PHTHALATE	84-74-2	99.5	200.0	196.8	+/-	13.79	LB64921
DI-N-OCTYL PHTHALATE	117-84-0	99.9	200.0	195.6	+/-	23.53	LB88733
DIBENZ (A,H) ANTHRACENE	53-70-3	99.9	200.0	218.8	+/-	5.52	LB87229
DIBENZOFURAN	132-64-9	98.9	200.0	200.0	+/-	35.56	LB78814
DIETHYL PHTHALATE	84-66-2	99.2	200.0	199.0	+/-	12.61	LB60384
DIMETHYL PHTHALATE	131-11-3	99.9	200.0	202.9	+/-	12.42	LB30494
FLUORANTHENE	206-44-0	98.4	200.0	199.6	+/-	12.33	LB83499
FLUORENE	86-73-7	99.1	200.0	205.2	+/-	7.66	LB89630
HEXACHLOROBENZENE	118-74-1	99.9	200.0	200.0	+/-	11.37	LB88881
HEXACHLOROBUTADIENE	87-68-3	98.5	200.0	222.8	+/-	17.35	LB75566
HEXACHLOROCYCLOPENTADIENE	77-47-4	98.8	200.0	230.2	+/-	9.30	LB95525
HEXACHLOROETHANE	67-72-1	99.9	200.0	217.2	+/-	6.90	LB29072
INDENO (1,2,3-CD) PYRENE	193-39-5	99.9	200.0	219.0	+/-	9.02	LB90242
ISOPHORONE	78-59-1	99.1	200.0	214.5	+/-	1.61	LB45460
N-NITROSODI-N-PROPYLAMINE	621-64-7	99.9	200.0	196.8	+/-	12.90	LB89233
N-NITROSODIMETHYLAMINE	62-75-9	99.9	200.0	222.9	+/-	27.48	LB93267
N-NITROSODIPHENYLAMINE	86-30-6	96.58	200.0	196.8	+/-	12.90	LB17295
NAPHTHALENE	91-20-3	99.9	200.0	220.9	+/-	14.12	LB83148

(1) Listed in alphabetical order.
(2) Determined by capillary GC-FID, unless otherwise noted.
a) HPLC UV-254NM
(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.
(4) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.
(5) These products coelute and are not quantified in the final mix.

Duane Funk

Duane Funk
Quality Manager

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

Certificate of Analysis

DESCRIPTION: HC 8270 LCS Spike Mix

CATALOG NO.: 40032-U
LOT NO.: LB97647

MFG DATE: Jan-2013
EXPIRATION DATE: Jan-2014

SOLVENT: METHANOL:BENZ:DCM (80:1.25:18.75)

ANALYTE (1)	CAS NUMBER	PERCENT PURITY(2)	WEIGHT(3) CONCENTRATION	ANALYTICAL(4) CONCENTRATION		STD DEV	SUPELCO LOT NO
NITROBENZENE	98-95-3	99.9	200.0	218.4	+/-	10.53	LB47070
PENTACHLOROPHENOL	87-86-5	99.9	200.0	200.0	+/-	23.60	LB75554
PHENANTHRENE	85-01-8	99.0	200.0	199.0	+/-	10.87	LB92396
PHENOL	108-95-2	99.9	200.0	214.4	+/-	9.80	LB57703
PYRENE	129-00-0	97.5	200.0	199.5	+/-	12.65	LB70761
PYRIDINE (LOW WATER)	110-86-1	99.9	200.0	228.1	+/-	25.84	LB55487
1-METHYLNAPHTHALENE	90-12-0	98.6	200.1	216.6	+/-	4.49	LB86459
1,2-DICHLOROBENZENE	95-50-1	99.9	200.0	219.8	+/-	18.38	LA96474
1,2,-DINITROBENZENE	528-29-0	99.9	200.0	200.0	+/-	21.24	LB89413
1,2,4-TRICHLOROBENZENE	120-82-1	99.5	200.0	210.3	+/-	20.69	LB48083
1,3-DICHLOROBENZENE	541-73-1	99.9	200.0	227.0	+/-	25.92	LB68066
1,3-DINITROBENZENE	99-65-0	99.9 (a)	200.0	200.9	+/-	15.86	LB80492
1,4-DICHLOROBENZENE	106-46-7	99.9	200.0	223.5	+/-	24.02	LB83282
1,4-DINITROBENZENE	100-25-4	99.9	200.0	209.2	+/-	25.69	LB86704
2-CHLORONAPHTHALENE	91-58-7	99.9	200.0	213.6	+/-	0.99	LB86449
2-CHLOROPHENOL	95-57-8	99.6	200.0	212.0	+/-	7.43	LB83266
2-METHYL-4,6-DINITROPHENOL	534-52-1	99.9	200.0	197.8	+/-	26.09	LB31592
2-METHYLNAPHTHALENE	91-57-6	98.3	200.0	215.0	+/-	6.53	LB44448
2-METHYLPHENOL	95-48-7	99.8	200.0	209.7	+/-	5.52	LB30223

(1) Listed in alphabetical order.

(2) Determined by capillary GC-FID, unless otherwise noted.
a) HPLC UV-254NM

(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.

(4) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.

(5) These products coelute and are not quantified in the final mix.

Duane Funk

Duane Funk
Quality Manager

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

Certificate of Analysis

DESCRIPTION: HC 8270 LCS Spike Mix

CATALOG NO.: 40032-U
LOT NO.: LB97647

MFG DATE: Jan-2013
EXPIRATION DATE: Jan-2014

SOLVENT: METHANOL:BENZ:DCM (80:1.25:18.75)

ANALYTE (1)	CAS NUMBER	PERCENT PURITY(2)	WEIGHT(3) CONCENTRATION	ANALYTICAL(4) CONCENTRATION		STD DEV	SUPELCO LOT NO
2-NITROANILINE	88-74-4	99.9	200.0	202.9	+/-	26.92	LB49936
2-NITROPHENOL	88-75-5	99.9	200.0	224.6	+/-	5.26	LB44736
2,3,4,6-TETRACHLOROPHENOL	58-90-2	99.9	200.0	199.2	+/-	14.62	LB91612
2,3,5,6-TETRACHLOROPHENOL	935-95-5	99.9	200.0	203.3	+/-	18.03	LB57701
2,4-DICHLOROPHENOL	120-83-2	98.8	200.0	213.7	+/-	4.36	LB76837
2,4-DIMETHYLPHENOL	105-67-9	99.9	200.0	207.6	+/-	3.47	LB88935
2,4-DINITROPHENOL	51-28-5	99.9	200.0	205.3	+/-	5.77	LB92092
2,4-DINITROTOLUENE	121-14-2	96.0	200.0	201.5	+/-	18.66	LB46632
2,4,5-TRICHLOROPHENOL	95-95-4	99.9	200.0	214.8	+/-	16.41	LB35288
2,4,6-TRICHLOROPHENOL	88-06-2	99.9	200.0	208.4	+/-	13.50	LB65559
2,6-DINITROTOLUENE	606-20-2	99.9	200.0	211.3	+/-	5.06	LB79891
3-METHYLPHENOL (5)	108-39-4	99.9	200.0	*****			LB83715
3-NITROANILINE	99-09-2	99.9	200.0	210.9	+/-	5.79	LB73829
3,3-DICHLOROBENZIDINE	91-94-1	99.9	200.0	196.9	+/-	19.49	LB94134
4-BROMOPHENYLPHENYL ETHER	101-55-3	98.5	200.0	198.8	+/-	10.69	LB85575
4-CHLORO-3-METHYLPHENOL	59-50-7	99.9	200.0	207.9	+/-	14.23	LB83265
4-CHLOROANILINE	106-47-8	99.9	200.0	214.8	+/-	4.76	LB82916
4-CHLOROPHENYLPHENYL ETHER	7005-72-3	99.9	200.0	202.5	+/-	10.21	LB72185
4-METHYLPHENOL (5)	106-44-5	99.9	200.0	*****			LB32518

(1) Listed in alphabetical order.
(2) Determined by capillary GC-FID, unless otherwise noted.
a) HPLC UV-254NM
(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.
(4) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.
(5) These products coelute and are not quantified in the final mix.

Duane Funk

Duane Funk
Quality Manager

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

Certificate of Analysis

DESCRIPTION: HC 8270 LCS Spike Mix

CATALOG NO.: 40032-U
LOT NO.: LB97647

MFG DATE: Jan-2013
EXPIRATION DATE: Jan-2014

SOLVENT: METHANOL:BENZ:DCM (80:1.25:18.75)

ANALYTE (1)	CAS NUMBER	PERCENT PURITY(2)	WEIGHT(3) CONCENTRATION	ANALYTICAL(4) CONCENTRATION		STD DEV	SUPELCO LOT NO
4-NITROANILINE	100-01-6	99.9	200.0	194.1	+/-	19.49	LB42566
4-NITROPHENOL	100-02-7	99.9	200.0	195.1	+/-	24.69	LB83255

(1) Listed in alphabetical order.
(2) Determined by capillary GC-FID, unless otherwise noted.
a) HPLC UV-254NM
(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.
(4) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.
(5) These products coelute and are not quantified in the final mix.

Duane Funk

Duane Funk
Quality Manager

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

Certificate of Analysis

DESCRIPTION: HC 8270 LCS Spike Mix

CATALOG NO.: 40032-U
LOT NO.: LB97647

MFG DATE: Jan-2013
EXPIRATION DATE: Jan-2014

SOLVENT: METHANOL:BENZ:DCM (80:1.25:18.75)

ANALYTE (1)	CAS NUMBER	PERCENT PURITY(2)	WEIGHT(3) CONCENTRATION	ANALYTICAL(4)		STD DEV	SUPELCO LOT NO
ACENAPHTHENE	83-32-9	99.9	200.0	196.5	+/-	23.01	LB82590
ACENAPHTHYLENE	208-96-8	99.9	200.0	204.1	+/-	20.55	LB84923
ANILINE	62-53-3	99.9	200.0	221.6	+/-	13.21	LA41596
ANTHRACENE	120-12-7	99.5	200.0	199.6	+/-	11.32	LB77576
AZOBENZENE	103-33-3	99.9	200.0	202.7	+/-	9.46	LB91797
BENZO (A) ANTHRACENE	56-55-3	99.9 (a)	200.0	200.1	+/-	13.34	LB89579
BENZO (A) PYRENE	50-32-8	99.9 (a)	200.0	200.4	+/-	15.09	LB90586
BENZO (B) FLUORANTHENE	205-99-2	97.3	200.0	200.8	+/-	13.97	LB96148
BENZO (G,H,I) PERYLENE	191-24-2	99.3	200.0	217.3	+/-	3.46	LB92103
BENZO (K) FLUORANTHENE	207-08-9	99.9	200.0	198.2	+/-	15.47	LB85440
BENZOIC ACID	65-85-0	99.9	200.0	221.1	+/-	16.62	LB85791
BENZYL ALCOHOL	100-51-6	99.9	200.0	216.0	+/-	1.33	LB48374
BENZYL BUTYL PHTHALATE	85-68-7	98.6	200.0	198.7	+/-	21.33	LB60340
BIS (2-CHLOROETHOXY) METHANE	111-91-1	98.1	200.0	216.6	+/-	5.36	LB46081
BIS (2-CHLOROETHYL) ETHER	111-44-4	99.9	200.0	226.8	+/-	25.66	LB84286
BIS (2-CHLOROISOPROPYL) ETHER	108-60-1	96.8	200.0	215.1	+/-	15.09	LB95928
BIS (2-ETHYLHEXYL) PHTHALATE	117-81-7	99.7	200.0	197.2	+/-	20.97	LB58359
BIS-2-ETHYLHEXYL ADIPATE	103-23-1	99.7	200.0	195.2	+/-	22.97	LB31993
CARBAZOLE	86-74-8	98.2	200.0	196.8	+/-	11.18	LB80615

(1) Listed in alphabetical order.
(2) Determined by capillary GC-FID, unless otherwise noted.
a) HPLC UV-254NM
(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.
(4) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.
(5) These products coelute and are not quantified in the final mix.

Duane Funk

Duane Funk
Quality Manager

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

Certificate of Analysis

DESCRIPTION: HC 8270 LCS Spike Mix

CATALOG NO.: 40032-U
LOT NO.: LB97647

MFG DATE: Jan-2013
EXPIRATION DATE: Jan-2014

SOLVENT: METHANOL:BENZ:DCM (80:1.25:18.75)

ANALYTE (1)	CAS NUMBER	PERCENT PURITY(2)	WEIGHT(3) CONCENTRATION	ANALYTICAL(4) CONCENTRATION		STD DEV	SUPELCO LOT NO
CHRYSENE	218-01-9	98.9	200.0	199.8	+/-	13.59	LB92051
DI-N-BUTYL PHTHALATE	84-74-2	99.5	200.0	196.8	+/-	13.79	LB64921
DI-N-OCTYL PHTHALATE	117-84-0	99.9	200.0	195.6	+/-	23.53	LB88733
DIBENZ (A,H) ANTHRACENE	53-70-3	99.9	200.0	218.8	+/-	5.52	LB87229
DIBENZOFURAN	132-64-9	98.9	200.0	200.0	+/-	35.56	LB78814
DIETHYL PHTHALATE	84-66-2	99.2	200.0	199.0	+/-	12.61	LB60384
DIMETHYL PHTHALATE	131-11-3	99.9	200.0	202.9	+/-	12.42	LB30494
FLUORANTHENE	206-44-0	98.4	200.0	199.6	+/-	12.33	LB83499
FLUORENE	86-73-7	99.1	200.0	205.2	+/-	7.66	LB89630
HEXACHLOROBENZENE	118-74-1	99.9	200.0	200.0	+/-	11.37	LB88881
HEXACHLOROBUTADIENE	87-68-3	98.5	200.0	222.8	+/-	17.35	LB75566
HEXACHLOROCYCLOPENTADIENE	77-47-4	98.8	200.0	230.2	+/-	9.30	LB95525
HEXACHLOROETHANE	67-72-1	99.9	200.0	217.2	+/-	6.90	LB29072
INDENO (1,2,3-CD) PYRENE	193-39-5	99.9	200.0	219.0	+/-	9.02	LB90242
ISOPHORONE	78-59-1	99.1	200.0	214.5	+/-	1.61	LB45460
N-NITROSODI-N-PROPYLAMINE	621-64-7	99.9	200.0	196.8	+/-	12.90	LB89233
N-NITROSODIMETHYLAMINE	62-75-9	99.9	200.0	222.9	+/-	27.48	LB93267
N-NITROSODIPHENYLAMINE	86-30-6	96.58	200.0	196.8	+/-	12.90	LB17295
NAPHTHALENE	91-20-3	99.9	200.0	220.9	+/-	14.12	LB83148

(1) Listed in alphabetical order.
(2) Determined by capillary GC-FID, unless otherwise noted.
a) HPLC UV-254NM
(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.
(4) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.
(5) These products coelute and are not quantified in the final mix.

Duane Funk

Duane Funk
Quality Manager

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

Certificate of Analysis

DESCRIPTION: HC 8270 LCS Spike Mix

CATALOG NO.: 40032-U
LOT NO.: LB97647

MFG DATE: Jan-2013
EXPIRATION DATE: Jan-2014

SOLVENT: METHANOL:BENZ:DCM (80:1.25:18.75)

ANALYTE (1)	CAS NUMBER	PERCENT PURITY(2)	WEIGHT(3) CONCENTRATION	ANALYTICAL(4) CONCENTRATION		STD DEV	SUPELCO LOT NO
NITROBENZENE	98-95-3	99.9	200.0	218.4	+/-	10.53	LB47070
PENTACHLOROPHENOL	87-86-5	99.9	200.0	200.0	+/-	23.60	LB75554
PHENANTHRENE	85-01-8	99.0	200.0	199.0	+/-	10.87	LB92396
PHENOL	108-95-2	99.9	200.0	214.4	+/-	9.80	LB57703
PYRENE	129-00-0	97.5	200.0	199.5	+/-	12.65	LB70761
PYRIDINE (LOW WATER)	110-86-1	99.9	200.0	228.1	+/-	25.84	LB55487
1-METHYLNAPHTHALENE	90-12-0	98.6	200.1	216.6	+/-	4.49	LB86459
1,2-DICHLOROBENZENE	95-50-1	99.9	200.0	219.8	+/-	18.38	LA96474
1,2,-DINITROBENZENE	528-29-0	99.9	200.0	200.0	+/-	21.24	LB89413
1,2,4-TRICHLOROBENZENE	120-82-1	99.5	200.0	210.3	+/-	20.69	LB48083
1,3-DICHLOROBENZENE	541-73-1	99.9	200.0	227.0	+/-	25.92	LB68066
1,3-DINITROBENZENE	99-65-0	99.9 (a)	200.0	200.9	+/-	15.86	LB80492
1,4-DICHLOROBENZENE	106-46-7	99.9	200.0	223.5	+/-	24.02	LB83282
1,4-DINITROBENZENE	100-25-4	99.9	200.0	209.2	+/-	25.69	LB86704
2-CHLORONAPHTHALENE	91-58-7	99.9	200.0	213.6	+/-	0.99	LB86449
2-CHLOROPHENOL	95-57-8	99.6	200.0	212.0	+/-	7.43	LB83266
2-METHYL-4,6-DINITROPHENOL	534-52-1	99.9	200.0	197.8	+/-	26.09	LB31592
2-METHYLNAPHTHALENE	91-57-6	98.3	200.0	215.0	+/-	6.53	LB44448
2-METHYLPHENOL	95-48-7	99.8	200.0	209.7	+/-	5.52	LB30223

(1) Listed in alphabetical order.

(2) Determined by capillary GC-FID, unless otherwise noted.
a) HPLC UV-254NM

(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.

(4) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.

(5) These products coelute and are not quantified in the final mix.

Duane Funk

Duane Funk
Quality Manager

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

Certificate of Analysis

DESCRIPTION: HC 8270 LCS Spike Mix

CATALOG NO.: 40032-U
LOT NO.: LB97647

MFG DATE: Jan-2013
EXPIRATION DATE: Jan-2014

SOLVENT: METHANOL:BENZ:DCM (80:1.25:18.75)

ANALYTE (1)	CAS NUMBER	PERCENT PURITY(2)	WEIGHT(3) CONCENTRATION	ANALYTICAL(4) CONCENTRATION		STD DEV	SUPELCO LOT NO
2-NITROANILINE	88-74-4	99.9	200.0	202.9	+/-	26.92	LB49936
2-NITROPHENOL	88-75-5	99.9	200.0	224.6	+/-	5.26	LB44736
2,3,4,6-TETRACHLOROPHENOL	58-90-2	99.9	200.0	199.2	+/-	14.62	LB91612
2,3,5,6-TETRACHLOROPHENOL	935-95-5	99.9	200.0	203.3	+/-	18.03	LB57701
2,4-DICHLOROPHENOL	120-83-2	98.8	200.0	213.7	+/-	4.36	LB76837
2,4-DIMETHYLPHENOL	105-67-9	99.9	200.0	207.6	+/-	3.47	LB88935
2,4-DINITROPHENOL	51-28-5	99.9	200.0	205.3	+/-	5.77	LB92092
2,4-DINITROTOLUENE	121-14-2	96.0	200.0	201.5	+/-	18.66	LB46632
2,4,5-TRICHLOROPHENOL	95-95-4	99.9	200.0	214.8	+/-	16.41	LB35288
2,4,6-TRICHLOROPHENOL	88-06-2	99.9	200.0	208.4	+/-	13.50	LB65559
2,6-DINITROTOLUENE	606-20-2	99.9	200.0	211.3	+/-	5.06	LB79891
3-METHYLPHENOL (5)	108-39-4	99.9	200.0	*****			LB83715
3-NITROANILINE	99-09-2	99.9	200.0	210.9	+/-	5.79	LB73829
3,3-DICHLOROBENZIDINE	91-94-1	99.9	200.0	196.9	+/-	19.49	LB94134
4-BROMOPHENYLPHENYL ETHER	101-55-3	98.5	200.0	198.8	+/-	10.69	LB85575
4-CHLORO-3-METHYLPHENOL	59-50-7	99.9	200.0	207.9	+/-	14.23	LB83265
4-CHLOROANILINE	106-47-8	99.9	200.0	214.8	+/-	4.76	LB82916
4-CHLOROPHENYLPHENYL ETHER	7005-72-3	99.9	200.0	202.5	+/-	10.21	LB72185
4-METHYLPHENOL (5)	106-44-5	99.9	200.0	*****			LB32518

(1) Listed in alphabetical order.
(2) Determined by capillary GC-FID, unless otherwise noted.
a) HPLC UV-254NM
(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.
(4) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.
(5) These products coelute and are not quantified in the final mix.

Duane Funk

Duane Funk
Quality Manager

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

Certificate of Analysis

DESCRIPTION: HC 8270 LCS Spike Mix

CATALOG NO.: 40032-U
LOT NO.: LB97647

MFG DATE: Jan-2013
EXPIRATION DATE: Jan-2014

SOLVENT: METHANOL:BENZ:DCM (80:1.25:18.75)

ANALYTE (1)	CAS NUMBER	PERCENT PURITY(2)	WEIGHT(3) CONCENTRATION	ANALYTICAL(4) CONCENTRATION		STD DEV	SUPELCO LOT NO
4-NITROANILINE	100-01-6	99.9	200.0	194.1	+/-	19.49	LB42566
4-NITROPHENOL	100-02-7	99.9	200.0	195.1	+/-	24.69	LB83255

(1) Listed in alphabetical order.
(2) Determined by capillary GC-FID, unless otherwise noted.
a) HPLC UV-254NM
(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.
(4) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.
(5) These products coelute and are not quantified in the final mix.

Duane Funk

Duane Funk
Quality Manager

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

Certificate of Analysis

DESCRIPTION: HC 8270 LCS Spike Mix

CATALOG NO.: 40032-U
LOT NO.: LB97647

MFG DATE: Jan-2013
EXPIRATION DATE: Jan-2014

SOLVENT: METHANOL:BENZ:DCM (80:1.25:18.75)

ANALYTE (1)	CAS NUMBER	PERCENT PURITY(2)	WEIGHT(3) CONCENTRATION	ANALYTICAL(4)		STD DEV	SUPELCO LOT NO
ACENAPHTHENE	83-32-9	99.9	200.0	196.5	+/-	23.01	LB82590
ACENAPHTHYLENE	208-96-8	99.9	200.0	204.1	+/-	20.55	LB84923
ANILINE	62-53-3	99.9	200.0	221.6	+/-	13.21	LA41596
ANTHRACENE	120-12-7	99.5	200.0	199.6	+/-	11.32	LB77576
AZOBENZENE	103-33-3	99.9	200.0	202.7	+/-	9.46	LB91797
BENZO (A) ANTHRACENE	56-55-3	99.9 (a)	200.0	200.1	+/-	13.34	LB89579
BENZO (A) PYRENE	50-32-8	99.9 (a)	200.0	200.4	+/-	15.09	LB90586
BENZO (B) FLUORANTHENE	205-99-2	97.3	200.0	200.8	+/-	13.97	LB96148
BENZO (G,H,I) PERYLENE	191-24-2	99.3	200.0	217.3	+/-	3.46	LB92103
BENZO (K) FLUORANTHENE	207-08-9	99.9	200.0	198.2	+/-	15.47	LB85440
BENZOIC ACID	65-85-0	99.9	200.0	221.1	+/-	16.62	LB85791
BENZYL ALCOHOL	100-51-6	99.9	200.0	216.0	+/-	1.33	LB48374
BENZYL BUTYL PHTHALATE	85-68-7	98.6	200.0	198.7	+/-	21.33	LB60340
BIS (2-CHLOROETHOXY) METHANE	111-91-1	98.1	200.0	216.6	+/-	5.36	LB46081
BIS (2-CHLOROETHYL) ETHER	111-44-4	99.9	200.0	226.8	+/-	25.66	LB84286
BIS (2-CHLOROISOPROPYL) ETHER	108-60-1	96.8	200.0	215.1	+/-	15.09	LB95928
BIS (2-ETHYLHEXYL) PHTHALATE	117-81-7	99.7	200.0	197.2	+/-	20.97	LB58359
BIS-2-ETHYLHEXYL ADIPATE	103-23-1	99.7	200.0	195.2	+/-	22.97	LB31993
CARBAZOLE	86-74-8	98.2	200.0	196.8	+/-	11.18	LB80615

(1) Listed in alphabetical order.
(2) Determined by capillary GC-FID, unless otherwise noted.
a) HPLC UV-254NM
(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.
(4) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.
(5) These products coelute and are not quantified in the final mix.

Duane Funk

Duane Funk
Quality Manager

SUPELCO® Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

Certificate of Analysis

DESCRIPTION: HC 8270 LCS Spike Mix

CATALOG NO.: 40032-U
LOT NO.: LB97647

MFG DATE: Jan-2013
EXPIRATION DATE: Jan-2014

SOLVENT: METHANOL:BENZ:DCM (80:1.25:18.75)

ANALYTE (1)	CAS NUMBER	PERCENT PURITY(2)	WEIGHT(3) CONCENTRATION	ANALYTICAL(4) CONCENTRATION		STD DEV	SUPELCO LOT NO
CHRYSENE	218-01-9	98.9	200.0	199.8	+/-	13.59	LB92051
DI-N-BUTYL PHTHALATE	84-74-2	99.5	200.0	196.8	+/-	13.79	LB64921
DI-N-OCTYL PHTHALATE	117-84-0	99.9	200.0	195.6	+/-	23.53	LB88733
DIBENZ (A,H) ANTHRACENE	53-70-3	99.9	200.0	218.8	+/-	5.52	LB87229
DIBENZOFURAN	132-64-9	98.9	200.0	200.0	+/-	35.56	LB78814
DIETHYL PHTHALATE	84-66-2	99.2	200.0	199.0	+/-	12.61	LB60384
DIMETHYL PHTHALATE	131-11-3	99.9	200.0	202.9	+/-	12.42	LB30494
FLUORANTHENE	206-44-0	98.4	200.0	199.6	+/-	12.33	LB83499
FLUORENE	86-73-7	99.1	200.0	205.2	+/-	7.66	LB89630
HEXACHLOROBENZENE	118-74-1	99.9	200.0	200.0	+/-	11.37	LB88881
HEXACHLOROBUTADIENE	87-68-3	98.5	200.0	222.8	+/-	17.35	LB75566
HEXACHLOROCYCLOPENTADIENE	77-47-4	98.8	200.0	230.2	+/-	9.30	LB95525
HEXACHLOROETHANE	67-72-1	99.9	200.0	217.2	+/-	6.90	LB29072
INDENO (1,2,3-CD) PYRENE	193-39-5	99.9	200.0	219.0	+/-	9.02	LB90242
ISOPHORONE	78-59-1	99.1	200.0	214.5	+/-	1.61	LB45460
N-NITROSODI-N-PROPYLAMINE	621-64-7	99.9	200.0	196.8	+/-	12.90	LB89233
N-NITROSODIMETHYLAMINE	62-75-9	99.9	200.0	222.9	+/-	27.48	LB93267
N-NITROSODIPHENYLAMINE	86-30-6	96.58	200.0	196.8	+/-	12.90	LB17295
NAPHTHALENE	91-20-3	99.9	200.0	220.9	+/-	14.12	LB83148

(1) Listed in alphabetical order.
(2) Determined by capillary GC-FID, unless otherwise noted.
a) HPLC UV-254NM
(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.
(4) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.
(5) These products coelute and are not quantified in the final mix.

Duane Funk

Duane Funk
Quality Manager

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

Certificate of Analysis

DESCRIPTION: HC 8270 LCS Spike Mix

CATALOG NO.: 40032-U
LOT NO.: LB97647

MFG DATE: Jan-2013
EXPIRATION DATE: Jan-2014

SOLVENT: METHANOL:BENZ:DCM (80:1.25:18.75)

ANALYTE (1)	CAS NUMBER	PERCENT PURITY(2)	WEIGHT(3) CONCENTRATION	ANALYTICAL(4) CONCENTRATION		STD DEV	SUPELCO LOT NO
NITROBENZENE	98-95-3	99.9	200.0	218.4	+/-	10.53	LB47070
PENTACHLOROPHENOL	87-86-5	99.9	200.0	200.0	+/-	23.60	LB75554
PHENANTHRENE	85-01-8	99.0	200.0	199.0	+/-	10.87	LB92396
PHENOL	108-95-2	99.9	200.0	214.4	+/-	9.80	LB57703
PYRENE	129-00-0	97.5	200.0	199.5	+/-	12.65	LB70761
PYRIDINE (LOW WATER)	110-86-1	99.9	200.0	228.1	+/-	25.84	LB55487
1-METHYLNAPHTHALENE	90-12-0	98.6	200.1	216.6	+/-	4.49	LB86459
1,2-DICHLOROBENZENE	95-50-1	99.9	200.0	219.8	+/-	18.38	LA96474
1,2,-DINITROBENZENE	528-29-0	99.9	200.0	200.0	+/-	21.24	LB89413
1,2,4-TRICHLOROBENZENE	120-82-1	99.5	200.0	210.3	+/-	20.69	LB48083
1,3-DICHLOROBENZENE	541-73-1	99.9	200.0	227.0	+/-	25.92	LB68066
1,3-DINITROBENZENE	99-65-0	99.9 (a)	200.0	200.9	+/-	15.86	LB80492
1,4-DICHLOROBENZENE	106-46-7	99.9	200.0	223.5	+/-	24.02	LB83282
1,4-DINITROBENZENE	100-25-4	99.9	200.0	209.2	+/-	25.69	LB86704
2-CHLORONAPHTHALENE	91-58-7	99.9	200.0	213.6	+/-	0.99	LB86449
2-CHLOROPHENOL	95-57-8	99.6	200.0	212.0	+/-	7.43	LB83266
2-METHYL-4,6-DINITROPHENOL	534-52-1	99.9	200.0	197.8	+/-	26.09	LB31592
2-METHYLNAPHTHALENE	91-57-6	98.3	200.0	215.0	+/-	6.53	LB44448
2-METHYLPHENOL	95-48-7	99.8	200.0	209.7	+/-	5.52	LB30223

(1) Listed in alphabetical order.

(2) Determined by capillary GC-FID, unless otherwise noted.
a) HPLC UV-254NM

(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.

(4) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.

(5) These products coelute and are not quantified in the final mix.

Duane Funk

Duane Funk
Quality Manager

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

Certificate of Analysis

DESCRIPTION: HC 8270 LCS Spike Mix

CATALOG NO.: 40032-U
LOT NO.: LB97647

MFG DATE: Jan-2013
EXPIRATION DATE: Jan-2014

SOLVENT: METHANOL:BENZ:DCM (80:1.25:18.75)

ANALYTE (1)	CAS NUMBER	PERCENT PURITY(2)	WEIGHT(3) CONCENTRATION	ANALYTICAL(4) CONCENTRATION		STD DEV	SUPELCO LOT NO
2-NITROANILINE	88-74-4	99.9	200.0	202.9	+/-	26.92	LB49936
2-NITROPHENOL	88-75-5	99.9	200.0	224.6	+/-	5.26	LB44736
2,3,4,6-TETRACHLOROPHENOL	58-90-2	99.9	200.0	199.2	+/-	14.62	LB91612
2,3,5,6-TETRACHLOROPHENOL	935-95-5	99.9	200.0	203.3	+/-	18.03	LB57701
2,4-DICHLOROPHENOL	120-83-2	98.8	200.0	213.7	+/-	4.36	LB76837
2,4-DIMETHYLPHENOL	105-67-9	99.9	200.0	207.6	+/-	3.47	LB88935
2,4-DINITROPHENOL	51-28-5	99.9	200.0	205.3	+/-	5.77	LB92092
2,4-DINITROTOLUENE	121-14-2	96.0	200.0	201.5	+/-	18.66	LB46632
2,4,5-TRICHLOROPHENOL	95-95-4	99.9	200.0	214.8	+/-	16.41	LB35288
2,4,6-TRICHLOROPHENOL	88-06-2	99.9	200.0	208.4	+/-	13.50	LB65559
2,6-DINITROTOLUENE	606-20-2	99.9	200.0	211.3	+/-	5.06	LB79891
3-METHYLPHENOL (5)	108-39-4	99.9	200.0	*****			LB83715
3-NITROANILINE	99-09-2	99.9	200.0	210.9	+/-	5.79	LB73829
3,3-DICHLOROBENZIDINE	91-94-1	99.9	200.0	196.9	+/-	19.49	LB94134
4-BROMOPHENYLPHENYL ETHER	101-55-3	98.5	200.0	198.8	+/-	10.69	LB85575
4-CHLORO-3-METHYLPHENOL	59-50-7	99.9	200.0	207.9	+/-	14.23	LB83265
4-CHLOROANILINE	106-47-8	99.9	200.0	214.8	+/-	4.76	LB82916
4-CHLOROPHENYLPHENYL ETHER	7005-72-3	99.9	200.0	202.5	+/-	10.21	LB72185
4-METHYLPHENOL (5)	106-44-5	99.9	200.0	*****			LB32518

(1) Listed in alphabetical order.
(2) Determined by capillary GC-FID, unless otherwise noted.
a) HPLC UV-254NM
(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.
(4) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.
(5) These products coelute and are not quantified in the final mix.

Duane Funk

Duane Funk
Quality Manager

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

Certificate of Analysis

DESCRIPTION: HC 8270 LCS Spike Mix

CATALOG NO.: 40032-U
LOT NO.: LB97647

MFG DATE: Jan-2013
EXPIRATION DATE: Jan-2014

SOLVENT: METHANOL:BENZ:DCM (80:1.25:18.75)

ANALYTE (1)	CAS NUMBER	PERCENT PURITY(2)	WEIGHT(3) CONCENTRATION	ANALYTICAL(4) CONCENTRATION		STD DEV	SUPELCO LOT NO
4-NITROANILINE	100-01-6	99.9	200.0	194.1	+/-	19.49	LB42566
4-NITROPHENOL	100-02-7	99.9	200.0	195.1	+/-	24.69	LB83255

(1) Listed in alphabetical order.
(2) Determined by capillary GC-FID, unless otherwise noted.
a) HPLC UV-254NM
(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.
(4) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.
(5) These products coelute and are not quantified in the final mix.

Duane Funk

Duane Funk
Quality Manager

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

Certificate of Analysis

DESCRIPTION: HC 8270 LCS Spike Mix

CATALOG NO.: 40032-U
LOT NO.: LB97647

MFG DATE: Jan-2013
EXPIRATION DATE: Jan-2014

SOLVENT: METHANOL:BENZ:DCM (80:1.25:18.75)

ANALYTE (1)	CAS NUMBER	PERCENT PURITY(2)	WEIGHT(3) CONCENTRATION	ANALYTICAL(4)		STD DEV	SUPELCO LOT NO
ACENAPHTHENE	83-32-9	99.9	200.0	196.5	+/-	23.01	LB82590
ACENAPHTHYLENE	208-96-8	99.9	200.0	204.1	+/-	20.55	LB84923
ANILINE	62-53-3	99.9	200.0	221.6	+/-	13.21	LA41596
ANTHRACENE	120-12-7	99.5	200.0	199.6	+/-	11.32	LB77576
AZOBENZENE	103-33-3	99.9	200.0	202.7	+/-	9.46	LB91797
BENZO (A) ANTHRACENE	56-55-3	99.9 (a)	200.0	200.1	+/-	13.34	LB89579
BENZO (A) PYRENE	50-32-8	99.9 (a)	200.0	200.4	+/-	15.09	LB90586
BENZO (B) FLUORANTHENE	205-99-2	97.3	200.0	200.8	+/-	13.97	LB96148
BENZO (G,H,I) PERYLENE	191-24-2	99.3	200.0	217.3	+/-	3.46	LB92103
BENZO (K) FLUORANTHENE	207-08-9	99.9	200.0	198.2	+/-	15.47	LB85440
BENZOIC ACID	65-85-0	99.9	200.0	221.1	+/-	16.62	LB85791
BENZYL ALCOHOL	100-51-6	99.9	200.0	216.0	+/-	1.33	LB48374
BENZYL BUTYL PHTHALATE	85-68-7	98.6	200.0	198.7	+/-	21.33	LB60340
BIS (2-CHLOROETHOXY) METHANE	111-91-1	98.1	200.0	216.6	+/-	5.36	LB46081
BIS (2-CHLOROETHYL) ETHER	111-44-4	99.9	200.0	226.8	+/-	25.66	LB84286
BIS (2-CHLOROISOPROPYL) ETHER	108-60-1	96.8	200.0	215.1	+/-	15.09	LB95928
BIS (2-ETHYLHEXYL) PHTHALATE	117-81-7	99.7	200.0	197.2	+/-	20.97	LB58359
BIS-2-ETHYLHEXYL ADIPATE	103-23-1	99.7	200.0	195.2	+/-	22.97	LB31993
CARBAZOLE	86-74-8	98.2	200.0	196.8	+/-	11.18	LB80615

(1) Listed in alphabetical order.
(2) Determined by capillary GC-FID, unless otherwise noted.
a) HPLC UV-254NM
(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.
(4) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.
(5) These products coelute and are not quantified in the final mix.

Duane Funk

Duane Funk
Quality Manager

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

Certificate of Analysis

DESCRIPTION: HC 8270 LCS Spike Mix

CATALOG NO.: 40032-U
LOT NO.: LB97647

MFG DATE: Jan-2013
EXPIRATION DATE: Jan-2014

SOLVENT: METHANOL:BENZ:DCM (80:1.25:18.75)

ANALYTE (1)	CAS NUMBER	PERCENT PURITY(2)	WEIGHT(3) CONCENTRATION	ANALYTICAL(4) CONCENTRATION		STD DEV	SUPELCO LOT NO
CHRYSENE	218-01-9	98.9	200.0	199.8	+/-	13.59	LB92051
DI-N-BUTYL PHTHALATE	84-74-2	99.5	200.0	196.8	+/-	13.79	LB64921
DI-N-OCTYL PHTHALATE	117-84-0	99.9	200.0	195.6	+/-	23.53	LB88733
DIBENZ (A,H) ANTHRACENE	53-70-3	99.9	200.0	218.8	+/-	5.52	LB87229
DIBENZOFURAN	132-64-9	98.9	200.0	200.0	+/-	35.56	LB78814
DIETHYL PHTHALATE	84-66-2	99.2	200.0	199.0	+/-	12.61	LB60384
DIMETHYL PHTHALATE	131-11-3	99.9	200.0	202.9	+/-	12.42	LB30494
FLUORANTHENE	206-44-0	98.4	200.0	199.6	+/-	12.33	LB83499
FLUORENE	86-73-7	99.1	200.0	205.2	+/-	7.66	LB89630
HEXACHLOROBENZENE	118-74-1	99.9	200.0	200.0	+/-	11.37	LB88881
HEXACHLOROBUTADIENE	87-68-3	98.5	200.0	222.8	+/-	17.35	LB75566
HEXACHLOROCYCLOPENTADIENE	77-47-4	98.8	200.0	230.2	+/-	9.30	LB95525
HEXACHLOROETHANE	67-72-1	99.9	200.0	217.2	+/-	6.90	LB29072
INDENO (1,2,3-CD) PYRENE	193-39-5	99.9	200.0	219.0	+/-	9.02	LB90242
ISOPHORONE	78-59-1	99.1	200.0	214.5	+/-	1.61	LB45460
N-NITROSODI-N-PROPYLAMINE	621-64-7	99.9	200.0	196.8	+/-	12.90	LB89233
N-NITROSODIMETHYLAMINE	62-75-9	99.9	200.0	222.9	+/-	27.48	LB93267
N-NITROSODIPHENYLAMINE	86-30-6	96.58	200.0	196.8	+/-	12.90	LB17295
NAPHTHALENE	91-20-3	99.9	200.0	220.9	+/-	14.12	LB83148

(1) Listed in alphabetical order.
(2) Determined by capillary GC-FID, unless otherwise noted.
a) HPLC UV-254NM
(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.
(4) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.
(5) These products coelute and are not quantified in the final mix.

Duane Funk

Duane Funk
Quality Manager

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

Certificate of Analysis

DESCRIPTION: HC 8270 LCS Spike Mix

CATALOG NO.: 40032-U
LOT NO.: LB97647

MFG DATE: Jan-2013
EXPIRATION DATE: Jan-2014

SOLVENT: METHANOL:BENZ:DCM (80:1.25:18.75)

ANALYTE (1)	CAS NUMBER	PERCENT PURITY(2)	WEIGHT(3) CONCENTRATION	ANALYTICAL(4) CONCENTRATION		STD DEV	SUPELCO LOT NO
NITROBENZENE	98-95-3	99.9	200.0	218.4	+/-	10.53	LB47070
PENTACHLOROPHENOL	87-86-5	99.9	200.0	200.0	+/-	23.60	LB75554
PHENANTHRENE	85-01-8	99.0	200.0	199.0	+/-	10.87	LB92396
PHENOL	108-95-2	99.9	200.0	214.4	+/-	9.80	LB57703
PYRENE	129-00-0	97.5	200.0	199.5	+/-	12.65	LB70761
PYRIDINE (LOW WATER)	110-86-1	99.9	200.0	228.1	+/-	25.84	LB55487
1-METHYLNAPHTHALENE	90-12-0	98.6	200.1	216.6	+/-	4.49	LB86459
1,2-DICHLOROBENZENE	95-50-1	99.9	200.0	219.8	+/-	18.38	LA96474
1,2,-DINITROBENZENE	528-29-0	99.9	200.0	200.0	+/-	21.24	LB89413
1,2,4-TRICHLOROBENZENE	120-82-1	99.5	200.0	210.3	+/-	20.69	LB48083
1,3-DICHLOROBENZENE	541-73-1	99.9	200.0	227.0	+/-	25.92	LB68066
1,3-DINITROBENZENE	99-65-0	99.9 (a)	200.0	200.9	+/-	15.86	LB80492
1,4-DICHLOROBENZENE	106-46-7	99.9	200.0	223.5	+/-	24.02	LB83282
1,4-DINITROBENZENE	100-25-4	99.9	200.0	209.2	+/-	25.69	LB86704
2-CHLORONAPHTHALENE	91-58-7	99.9	200.0	213.6	+/-	0.99	LB86449
2-CHLOROPHENOL	95-57-8	99.6	200.0	212.0	+/-	7.43	LB83266
2-METHYL-4,6-DINITROPHENOL	534-52-1	99.9	200.0	197.8	+/-	26.09	LB31592
2-METHYLNAPHTHALENE	91-57-6	98.3	200.0	215.0	+/-	6.53	LB44448
2-METHYLPHENOL	95-48-7	99.8	200.0	209.7	+/-	5.52	LB30223

(1) Listed in alphabetical order.

(2) Determined by capillary GC-FID, unless otherwise noted.
a) HPLC UV-254NM

(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.

(4) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.

(5) These products coelute and are not quantified in the final mix.

Duane Funk

Duane Funk
Quality Manager

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

Certificate of Analysis

DESCRIPTION: HC 8270 LCS Spike Mix

CATALOG NO.: 40032-U
LOT NO.: LB97647

MFG DATE: Jan-2013
EXPIRATION DATE: Jan-2014

SOLVENT: METHANOL:BENZ:DCM (80:1.25:18.75)

ANALYTE (1)	CAS NUMBER	PERCENT PURITY(2)	WEIGHT(3) CONCENTRATION	ANALYTICAL(4) CONCENTRATION		STD DEV	SUPELCO LOT NO
2-NITROANILINE	88-74-4	99.9	200.0	202.9	+/-	26.92	LB49936
2-NITROPHENOL	88-75-5	99.9	200.0	224.6	+/-	5.26	LB44736
2,3,4,6-TETRACHLOROPHENOL	58-90-2	99.9	200.0	199.2	+/-	14.62	LB91612
2,3,5,6-TETRACHLOROPHENOL	935-95-5	99.9	200.0	203.3	+/-	18.03	LB57701
2,4-DICHLOROPHENOL	120-83-2	98.8	200.0	213.7	+/-	4.36	LB76837
2,4-DIMETHYLPHENOL	105-67-9	99.9	200.0	207.6	+/-	3.47	LB88935
2,4-DINITROPHENOL	51-28-5	99.9	200.0	205.3	+/-	5.77	LB92092
2,4-DINITROTOLUENE	121-14-2	96.0	200.0	201.5	+/-	18.66	LB46632
2,4,5-TRICHLOROPHENOL	95-95-4	99.9	200.0	214.8	+/-	16.41	LB35288
2,4,6-TRICHLOROPHENOL	88-06-2	99.9	200.0	208.4	+/-	13.50	LB65559
2,6-DINITROTOLUENE	606-20-2	99.9	200.0	211.3	+/-	5.06	LB79891
3-METHYLPHENOL (5)	108-39-4	99.9	200.0	*****			LB83715
3-NITROANILINE	99-09-2	99.9	200.0	210.9	+/-	5.79	LB73829
3,3-DICHLOROBENZIDINE	91-94-1	99.9	200.0	196.9	+/-	19.49	LB94134
4-BROMOPHENYLPHENYL ETHER	101-55-3	98.5	200.0	198.8	+/-	10.69	LB85575
4-CHLORO-3-METHYLPHENOL	59-50-7	99.9	200.0	207.9	+/-	14.23	LB83265
4-CHLOROANILINE	106-47-8	99.9	200.0	214.8	+/-	4.76	LB82916
4-CHLOROPHENYLPHENYL ETHER	7005-72-3	99.9	200.0	202.5	+/-	10.21	LB72185
4-METHYLPHENOL (5)	106-44-5	99.9	200.0	*****			LB32518

(1) Listed in alphabetical order.
(2) Determined by capillary GC-FID, unless otherwise noted.
a) HPLC UV-254NM
(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.
(4) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.
(5) These products coelute and are not quantified in the final mix.

Duane Funk

Duane Funk
Quality Manager

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

Certificate of Analysis

DESCRIPTION: HC 8270 LCS Spike Mix

CATALOG NO.: 40032-U
LOT NO.: LB97647

MFG DATE: Jan-2013
EXPIRATION DATE: Jan-2014

SOLVENT: METHANOL:BENZ:DCM (80:1.25:18.75)

ANALYTE (1)	CAS NUMBER	PERCENT PURITY(2)	WEIGHT(3) CONCENTRATION	ANALYTICAL(4) CONCENTRATION		STD DEV	SUPELCO LOT NO
4-NITROANILINE	100-01-6	99.9	200.0	194.1	+/-	19.49	LB42566
4-NITROPHENOL	100-02-7	99.9	200.0	195.1	+/-	24.69	LB83255

(1) Listed in alphabetical order.
(2) Determined by capillary GC-FID, unless otherwise noted.
a) HPLC UV-254NM
(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.
(4) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.
(5) These products coelute and are not quantified in the final mix.

Duane Funk

Duane Funk
Quality Manager

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

Report Date: 16-Apr-2013 11:59:04 Chrom Revision: 2.0 20-Mar-2013 02:55:22

Preliminary Report

TestAmerica Denver

LCS, Lab Control Sample Report

Data File:	\\Denchrom\ChromData\SMS_Y\20130416-10621.b\Y4017.D		
Lims ID:	8270LCS080_048	Client ID:	
Inject. Date:	16-Apr-2013 10:02:30	Dil. Factor:	1.0000
Sample Type:	LCS		
Sample ID:	8270LCS_048		
Misc. Info.:	STD VER =STD VER		
Operator:	hoffmanm	Instrument ID:	SMS_Y
Injection Vol:	0.5 ul	ALS Bottle#:	6
Lims Batch ID:	10621	Lims Sample ID:	6
Detector:	MS SCAN		
Method:	\\Denchrom\ChromData\SMS_Y\20130416-10621.b\SMSY_8270C.m		
Method Label:	8270C / 625		
Last Update:	16-Apr-2013 11:57:22	Calib Date:	10-Apr-2013 11:08:30
Quant Method:	Internal Standard	Quant By:	Initial Calibration
Last ICal File:	\\Denchrom\ChromData\SMS_Y\20130410-10454.b\Y3869.D		
Limit Group:	MSSV - 8270C_625		
Integrator:	RTE	ID Type:	Deconvolution ID
Column Type:	VF-5ms	Column Dia:	0.50 mm
Process Host:	DENPC246		

Compound	Amount Added	Amount Recovered	%Rec
27 1,4-Dioxane	80.0	37.6	46.97
28 N-Nitrosodimethylamine	80.0	58.7	73.33
29 Pyridine	80.0	60.4	75.46
40 Phenol	80.0	69.4	86.72
43 Aniline	80.0	61.4	76.79
45 Bis(2-chloroethyl)ether	80.0	64.7	80.93
48 2-Chlorophenol	80.0	66.5	83.12
49 1,3-Dichlorobenzene	80.0	55.1	68.88
50 1,4-Dichlorobenzene	80.0	56.9	71.14
51 Benzyl alcohol	80.0	71.3	89.16
52 1,2-Dichlorobenzene	80.0	58.5	73.12
54 2-Methylphenol	80.0	68.1	85.16
55 2,2'-oxybis[1-chloropropane]	80.0	61.1	76.38
58 3-Methylphenol	160.0	142.6	89.15
59 4-Methylphenol	160.0	142.6	89.15
60 3 & 4 Methylphenol	160.0	142.6	89.15
61 N-Nitrosodi-n-propylamine	80.0	71.4	89.23
66 Hexachloroethane	80.0	58.5	73.16
67 Nitrobenzene	80.0	66.8	83.47
71 Isophorone	80.0	74.1	92.63

Preliminary Report

Data File: \\Denchrom\ChromData\SMS_Y\20130416-10621.b\Y4017.D

Compound	Amount Added	Amount Recovered	%Rec
73 2,4-Dimethylphenol	80.0	71.3	89.14
74 2-Nitrophenol	80.0	75.8	94.74
77 Benzoic acid	80.0	79.1	98.84
78 Bis(2-chloroethoxy)methane	80.0	70.6	88.19
82 2,4-Dichlorophenol	80.0	73.6	91.99
84 1,2,4-Trichlorobenzene	80.0	65.1	81.41
87 Naphthalene	80.0	67.2	83.97
88 4-Chloroaniline	80.0	72.7	90.94
91 Hexachlorobutadiene	80.0	61.2	76.52
97 4-Chloro-3-methylphenol	80.0	79.7	99.59
101 2-Methylnaphthalene	80.0	68.5	85.67
103 1-Methylnaphthalene	80.0	72.7	90.81
105 Hexachlorocyclopentadiene	80.0	81.7	102.14
108 2,4,6-Trichlorophenol	80.0	78.2	97.77
110 2,4,5-Trichlorophenol	80.0	81.6	101.97
114 2-Chloronaphthalene	80.0	74.4	92.98
116 2-Nitroaniline	80.0	86.2	107.71
119 Dimethyl phthalate	80.0	79.7	99.63
121 2,6-Dinitrotoluene	80.0	83.8	104.74
122 Acenaphthylene	80.0	79.7	99.68
123 3-Nitroaniline	80.0	82.7	103.34
124 Acenaphthene	80.0	75.5	94.34
126 2,4-Dinitrophenol	80.0	75.8	94.77
127 4-Nitrophenol	80.0	88.0	110.06
130 2,4-Dinitrotoluene	80.0	91.2	113.95
132 Dibenzofuran	80.0	76.8	96.03
139 Diethyl phthalate	80.0	81.4	101.69
142 4-Chlorophenyl phenyl ether	80.0	78.8	98.51
143 Fluorene	80.0	76.7	95.82
146 4-Nitroaniline	80.0	92.6	115.71
147 4,6-Dinitro-2-methylphenol	80.0	84.0	105.00
150 N-Nitrosodiphenylamine	68.3	67.4	98.73
151 1,2-Diphenylhydrazine	80.9	81.9	101.30
164 4-Bromophenyl phenyl ether	80.0	80.6	100.69
165 Hexachlorobenzene	80.0	77.0	96.20

Preliminary Report

Data File: \\Denchrom\ChromData\SMS_Y\20130416-10621.b\Y4017.D

Compound	Amount Added	Amount Recovered	%Rec
171 Pentachlorophenol	80.0	81.1	101.41
176 Phenanthrene	80.0	78.0	97.55
177 Anthracene	80.0	79.6	99.56
178 Carbazole	80.0	80.1	100.16
181 Di-n-butyl phthalate	80.0	85.4	106.79
188 Fluoranthene	80.0	80.3	100.40
191 Pyrene	80.0	78.3	97.88
198 Butyl benzyl phthalate	80.0	84.5	105.61
203 Bis(2-ethylhexyl) phthalate	80.0	85.2	106.47
205 3,3'-Dichlorobenzidine	80.0	77.3	96.61
206 Benzo[a]anthracene	80.0	79.1	98.88
207 Chrysene	80.0	76.1	95.07
209 Di-n-octyl phthalate	80.0	82.2	102.79
211 Benzo[b]fluoranthene	80.0	79.0	98.74
212 Benzo[k]fluoranthene	80.0	75.6	94.55
215 Benzo[a]pyrene	80.0	75.0	93.75
221 Dibenz(a,h)anthracene	80.0	59.8	74.80
222 Indeno[1,2,3-cd]pyrene	80.0	75.9	94.81
223 Benzo[g,h,i]perylene	80.0	71.9	89.90

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

8270Surrogate_00058

Reagent ID: 8270Surrogate_00058

		Expiration Date:	05/07/2014
Description:	8270 Surrogate 100/150 ug/ml	Laboratory:	TestAmerica Denver
No. of Bottles:	4	Prepared By:	Jones, Brad
Storage Location:	North Prep	Solvent:	ACETONE
Reagent Volume:	1000.000 mL	Solvent Lot:	Acetone_00046
Creation Date:	05/07/2013		
Container(s):	2038557, 2038558, 2038559, 2038560		
Comment:	Take 100 mL 8270 surrogate stock and dilute to 1000 mL in Acetone. One year expiration date. Split into 4x250mL bottles. Requires solvent exchange to MeCl2 prior to subr n for verification.		

Reagent Analyte Information

Analyte	Source ID	Source Expiration Date	Source Conc.	Source Conc. Units	Final Conc.	Final Conc. Units
2,4,6 - Tribromophenol	8270SurrStock_00063	05/31/2015	1500.000	ug/mL	150.00000	ug/mL
2,4,6-Tribromophenol	8270SurrStock_00063	05/31/2015	1500.000	ug/mL	150.00000	ug/mL
2-Fluorobiphenyl	8270SurrStock_00063	05/31/2015	1000.000	ug/mL	100.00000	ug/mL
2-Fluorophenol	8270SurrStock_00063	05/31/2015	1500.000	ug/mL	150.00000	ug/mL
Nitrobenzene-d5	8270SurrStock_00063	05/31/2015	1000.000	ug/mL	100.00000	ug/mL
Phenol-d5	8270SurrStock_00063	05/31/2015	1500.000	ug/mL	150.00000	ug/mL
Phenol-d6	8270SurrStock_00063	05/31/2015	1500.000	ug/mL	150.00000	ug/mL
Terphenyl-d14	8270SurrStock_00063	05/31/2015	1000.000	ug/mL	100.00000	ug/mL
2,4,6 - Tribromophenol	8270SurrStock_00064	05/31/2015	1500.000	ug/mL	150.00000	ug/mL
2,4,6-Tribromophenol	8270SurrStock_00064	05/31/2015	1500.000	ug/mL	150.00000	ug/mL
2-Fluorobiphenyl	8270SurrStock_00064	05/31/2015	1000.000	ug/mL	100.00000	ug/mL
2-Fluorophenol	8270SurrStock_00064	05/31/2015	1500.000	ug/mL	150.00000	ug/mL
Nitrobenzene-d5	8270SurrStock_00064	05/31/2015	1000.000	ug/mL	100.00000	ug/mL
Phenol-d5	8270SurrStock_00064	05/31/2015	1500.000	ug/mL	150.00000	ug/mL
Phenol-d6	8270SurrStock_00064	05/31/2015	1500.000	ug/mL	150.00000	ug/mL
Terphenyl-d14	8270SurrStock_00064	05/31/2015	1000.000	ug/mL	100.00000	ug/mL

Exchanged 1 mL 8270Surrogate_00058 with $MeCl_2$. Used pipette I 5-8-13

Source Reagents

Reagent	Description	Type	Expiration	Vendor	Vendor Lot #	Vendor Cat Lot #	Volume Used	Volume Units
8270SurrStock_00063	1000/1500 ug/ml	ASTD	05/31/15	Supelco	LB92759	861142	90.00000	mL
8270SurrStock_00064	1000/1500 ug/ml	ASTD	05/31/15	Supelco	LB92759	861142	10.00000	mL

Preliminary Report

TestAmerica Denver
Recovery Report

Data File:	\\Denchrom\ChromData\SMS_K\20130513-11567.b\K1474.D		
Lims ID:	8270Surrogate_00058	Client ID:	
Inject. Date:	13-May-2013 13:02:30	Dil. Factor:	1.0000
Sample Type:	Client		
Sample ID:	8270Surrogate_00058		
Misc. Info.:			
Operator:	KIEKELD	Instrument ID:	SMS_K
Injection Vol:	0.5 ul	ALS Bottle#:	5
Lims Batch ID:	11567	Lims Sample ID:	6
Detector:	MS SCAN		
Method:	\\Denchrom\ChromData\SMS_K\20130513-11567.b\SMSK_8270C.m		
Method Label:	8270C / 625		
Last Update:	13-May-2013 13:33:48	Calib Date:	29-Apr-2013 16:29:30
Quant Method:	Internal Standard	Quant By:	Initial Calibration
Last ICal File:	\\Denchrom\ChromData\SMS_K\20130429-11069.b\K1231.D		
Limit Group:	MSSV - 8270C_625		
Integrator:	RTE	ID Type:	Deconvolution ID
Column Type:	VF-5ms	Column Dia:	0.50 mm
Process Host:	DENPC307		

Compound	Amount Added	Amount Recovered	% Rec.
$ 7 2-Fluorophenol	150.0	135.7	90.48
$ 8 Phenol-d5	150.0	138.8	92.50
$ 9 Nitrobenzene-d5	100.0	90.9	90.93
$ 11 2-Fluorobiphenyl	100.0	90.5	90.52
$ 12 2,4,6-Tribromophenol	150.0	143.8	95.86
$ 13 Terphenyl-d14	100.0	97.2	97.19

Certificate of Composition

DESCRIPTION: Semi-Volatile Acid/Base Surrogate Spike (High)

CATALOG NO.: 861142 MFG DATE: May-2012

LOT NO.: LB92759 EXPIRATION DATE: May-2015

SOLVENT: METHYLENE CHLORIDE

ANALYTE (1)	CAS NUMBER	PERCENT PURITY (2)	WEIGHT CONCENTRATION (3)	SUPELCO LOT NO
NITROBENZENE-D5	4165-60-0	99.9	1000	LB47918
P-TERPHENYL-D14	1718-51-0	99.9	1000	LB83130
PHENOL-D6	13127-88-3	99.9	1500	LB85441
1,2-DICHLOROBENZENE-D4	2199-69-1	99.9	1000	LB83146
2-CHLOROPHENOL D4	93951-73-6	99.4	1500	LB74323
2-FLUOROBIPHENYL	321-60-8	99.9	1000	LB83498
2-FLUOROPHENOL	367-12-4	99.9	1500	LB83825
2,4,6-TRIBROMOPHENOL	118-79-6	99.9	1500	LB81262

(1) Listed in alphabetical order.

(2) Determined by capillary GC-FID, unless otherwise noted.

(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.

Elwood Doughty
QA Manager

SUPELCO® Analytical
595 North Harrison Road • Bellefonte, PA
16823-0048 USA • Phone (814) 359-3441

Certificate of Composition

DESCRIPTION: Semi-Volatile Acid/Base Surrogate Spike (High)

CATALOG NO.: 861142 MFG DATE: May-2012

LOT NO.: LB92759 EXPIRATION DATE: May-2015

SOLVENT: METHYLENE CHLORIDE

ANALYTE (1)	CAS NUMBER	PERCENT PURITY (2)	WEIGHT CONCENTRATION (3)	SUPELCO LOT NO
NITROBENZENE-D5	4165-60-0	99.9	1000	LB47918
P-TERPHENYL-D14	1718-51-0	99.9	1000	LB83130
PHENOL-D6	13127-88-3	99.9	1500	LB85441
1,2-DICHLOROBENZENE-D4	2199-69-1	99.9	1000	LB83146
2-CHLOROPHENOL D4	93951-73-6	99.4	1500	LB74323
2-FLUOROBIPHENYL	321-60-8	99.9	1000	LB83498
2-FLUOROPHENOL	367-12-4	99.9	1500	LB83825
2,4,6-TRIBROMOPHENOL	118-79-6	99.9	1500	LB81262

(1) Listed in alphabetical order.

(2) Determined by capillary GC-FID, unless otherwise noted.

(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.

Elwood Doughty
QA Manager

SUPELCO® Analytical
595 North Harrison Road • Bellefonte, PA
16823-0048 USA • Phone (814) 359-3441

Certificate of Composition

DESCRIPTION: Semi-Volatile Acid/Base Surrogate Spike (High)

CATALOG NO.: 861142 MFG DATE: May-2012

LOT NO.: LB92759 EXPIRATION DATE: May-2015

SOLVENT: METHYLENE CHLORIDE

ANALYTE (1)	CAS NUMBER	PERCENT PURITY (2)	WEIGHT CONCENTRATION (3)	SUPELCO LOT NO
NITROBENZENE-D5	4165-60-0	99.9	1000	LB47918
P-TERPHENYL-D14	1718-51-0	99.9	1000	LB83130
PHENOL-D6	13127-88-3	99.9	1500	LB85441
1,2-DICHLOROBENZENE-D4	2199-69-1	99.9	1000	LB83146
2-CHLOROPHENOL D4	93951-73-6	99.4	1500	LB74323
2-FLUOROBIPHENYL	321-60-8	99.9	1000	LB83498
2-FLUOROPHENOL	367-12-4	99.9	1500	LB83825
2,4,6-TRIBROMOPHENOL	118-79-6	99.9	1500	LB81262

(1) Listed in alphabetical order.

(2) Determined by capillary GC-FID, unless otherwise noted.

(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.

Elwood Doughty
QA Manager

SUPELCO® Analytical
595 North Harrison Road • Bellefonte, PA
16823-0048 USA • Phone (814) 359-3441

Sample Name: 1820001@100 Acquired: 12/31/2012 16:16:15 Type: Unk
Method: 6500_026(v6) Mode: CONC Corr. Factor: 1.000000
User: bowenh Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al1670	As1890	B_2089	Ba4554
Line	328.068 {103}	167.079 {502}	189.042 {478}	208.959 {461}	455.403 { 74}
Units	ppm	ppm	ppm	ppm	ppm
Avg	W .98576	-.00262	.00096	.00085	.48416
Stddev	.00031	.00022	.00050	.00032	.00078
%RSD	.03148	8.4811	51.793	38.051	.16185
#1	.98598	-.00247	.00061	.00107	.48361
#2	.98554	-.00278	.00131	.00062	.48472
Check ?	Chk Warn	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	.10000				
Low Limit	-.01000				

Elem	Be3130	Bi2230	Ca3179	Cd2288	Co2286
Line	313.042 {108}	223.061 {451}	317.933 {106}	228.802 {447}	228.616 {447}
Units	ppm	ppm	ppm	ppm	ppm
Avg	.46411	.00100	.01370	.96566	.51059
Stddev	.00154	.00169	.00299	.00051	.00028
%RSD	.33269	169.91	21.834	.05278	.05438
#1	.46302	.00219	.01582	.96530	.51079
#2	.46520	-.00020	.01159	.96602	.51040
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit					
Low Limit					

Elem	Cr2055	Cu3247	Fe2599	K_7664	Li6707
Line	205.552 {464}	324.754 {104}	259.940 {130}	766.490 { 44}	670.784 { 50}
Units	ppm	ppm	ppm	ppm	ppm
Avg	.49135	.50784	.00631	.01660	.00180
Stddev	.00037	.00025	.00113	.03373	.00114
%RSD	.07541	.04991	17.850	203.19	63.149
#1	.49109	.50802	.00551	.04045	.00261
#2	.49162	.50766	.00710	-.00725	.00100
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit					
Low Limit					

Sample Name: 1820001@100 Acquired: 12/31/2012 16:16:15 Type: Unk
Method: 6500_026(v6) Mode: CONC Corr. Factor: 1.000000
User: bowenh Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Mg2790	Mn2576	Mo2020	Na5895	Ni2316
Line	279.079 {121}2	257.610 {131}	202.030 {467}	589.592 { 57}	231.604 {446}
Units	ppm	ppm	ppm	ppm	ppm
Avg	.00774	.48747	-.00114	.03252	1.0206
Stddev	.00209	.00117	.00006	.01128	.0020
%RSD	27.010	.24010	5.3116	34.677	.19237
#1	.00922	.48830	-.00119	.04050	1.0192
#2	.00627	.48665	-.00110	.02455	1.0220
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit					
Low Limit					

Elem	P_1782	Pb2203	S_1820	Sb2068	Se1960
Line	178.284 {489}	220.353 {453}	182.034 {485}	206.833 {463}	196.090 {472}
Units	ppm	ppm	ppm	ppm	ppm
Avg	.00033	1.0484	-.00253	.00450	-.00206
Stddev	.00088	.0027	.00056	.00110	.00288
%RSD	267.83	.25817	22.245	24.441	139.93
#1	-.00029	1.0503	-.00213	.00528	-.00410
#2	.00095	1.0465	-.00293	.00372	-.00002
Check ?	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass
High Limit					
Low Limit					

Elem	Si2881	Sn1899	Sr4077	Th2837	Ti3349
Line	288.158 {117}	189.989 {477}	407.771 { 83}	283.730 {119}	334.904 {101}
Units	ppm	ppm	ppm	ppm	ppm
Avg	.01929	.00041	.00020	.00173	.00008
Stddev	.00644	.00056	.00002	.00159	.00030
%RSD	33.398	135.69	11.552	91.746	386.46
#1	.01474	.00002	.00022	.00061	-.00013
#2	.02385	.00081	.00019	.00285	.00029
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit					
Low Limit					

Sample Name: 1820001@100 Acquired: 12/31/2012 16:16:15 Type: Unk
Method: 6500_026(v6) Mode: CONC Corr. Factor: 1.000000
User: bowenh Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Tl1908	U_3701	V_2924	Zn2062	Zr3391
Line	190.856 {477}	370.152 { 91}	292.402 {115}	206.200 {163}	339.198 { 99}
Units	ppm	ppm	ppm	ppm	ppm
Avg	.00093	-.00249	.46654	.96356	-.00319
Stddev	.00028	.01573	.00158	.00003	.00128
%RSD	29.614	631.31	.33822	.00326	40.253
#1	.00113	.00863	.46766	.96358	-.00228
#2	.00074	-.01361	.46543	.96353	-.00410
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit					
Low Limit					

Int. Std.	Y_2243	Y_3600	Y_3774
Line	224.306 {450}	360.073 { 94}	377.433 { 89}
Units	Cts/S	Cts/S	Cts/S
Avg	6883.0	84549.	6537.3
Stddev	8.3	237.	35.0
%RSD	.12068	.28055	.53563
#1	6877.1	84381.	6562.1
#2	6888.9	84717.	6512.6

1820001

ID: ANALYTES B_00006
Exp:12/01/13 Prpd:HEB Opn:12/27/12
ICP ANALYTES B SPEX

SPEXertificate®

Certificate of Reference Material

ACCREDITED
Reference Materials Producer
CERT #2495.01
Chemical Testing
CERT #2495.02

Catalog Number: INT-B1 **Lot No.** 7-166YPY

Description: Analytes B

Matrix: 5% HNO_3

This **ASSURANCE®** 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. See side 2 for details of certification.

Instrumental Analysis by ICP Spectrometer:

Analyte	Labeled	Measured	Uncertainty	SRM	Analyte	Labeled	Measured	Uncertainty	SRM
Ag	100 mg/L	99.4 mg/L	±0.5 mg/L	3151*	Be	50 mg/L	49.7 mg/L	±0.3 mg/L	3105a*
Cd	100 mg/L	98.2 mg/L	±0.5 mg/L	3108*	Co	50 mg/L	50.3 mg/L	±0.3 mg/L	3113*
Ni	100 mg/L	99.9 mg/L	±0.5 mg/L	3136*	Cr	50 mg/L	49.8 mg/L	±0.3 mg/L	3112a*
Pb	100 mg/L	99.7 mg/L	±0.5 mg/L	3128*	Cu	50 mg/L	50.3 mg/L	±0.3 mg/L	3114*
Zn	100 mg/L	100 mg/L	±0.5 mg/L	3168a*	Mn	50 mg/L	49.5 mg/L	±0.3 mg/L	3132*
Ba	50 mg/L	49.2 mg/L	±0.3 mg/L	3104a*	V	50 mg/L	49.8 mg/L	±0.3 mg/L	3165*

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

SPEX CertiPrep Reference Multi: Lot# 22-145JB,42-11AS,33-87AS,10-186JB

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 certified (measured) value. This includes uncertainty components due to preparation, measurement, homogeneity, short-term and long-term stability as well as transpiration loss. No measured concentration of any individual component exceeds ±2% of the labeled value. This guarantee is valid for a period of one year from the date of certification only when the material is kept tightly capped and stored under ambient laboratory conditions.

Date of Certification: DEC 2012 Certifying Officer: Vanaja Sivakumar

05/29/2013

ERA

A Waters Company

Certificate of Analysis

PRODUCT:	1000 mg/L Hexavalent Chromium
CATALOG NUMBER:	019
LOT NUMBER:	160412
ISSUE DATE:	April 23, 2012
REVISION DATE:	Original
STARTING MATERIAL:	Potassium Dichromate ($K_2Cr_2O_7$)
CERTIFIED CONCENTRATION[1]:	1000 mg/L
UNCERTAINTY[2]:	0.6%
MATRIX:	18 megohm deionized water
DENSITY:	0.9999 ± 0.0008 g/mL at 22.0°C and 768 mm Hg
TRACEABILITY[3]:	100%
NIST/SRM:	SRM 136f Potassium Dichromate
VERIFICATION METHOD:	Spectrophotometry
STORAGE:	Store at 20-25°C

1. The **Certified Concentration** is the actual made-to concentration confirmed by ERA analytical verification.

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 which is equal to the student t factor at a 95% confidence interval at n-1 degrees of freedom. The uncertainty applies to the product as supplied and does not take into account any required or optional dilutions and/or preparations the laboratory may perform while using this product.

3. 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.

This standard **expires 4/2015**. 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.

This product is intended to be used as either a calibration standard or a quality control check of the entire analytical process for the analytes/matrix included in the standard.

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

Certifying Officer: Tom Widera

ACCREDITED
REFERENCE MATERIAL PRODUCER
CERT # 1539.03

16341 Table Mtn Pkwy, Golden, CO 80403 800-372-0122 fax: 303-421-0159 www.eraqc.com

HACH COMPANY

P.O.Box 389
Loveland, CO 80539
(970) 669-3050

An ISO 9001 Certified Company

Certificate of Analysis

COMMODITY:**Chromium Reference Standard Solution 1000**
COMMODITY NUMBER: **14664-42** MANUFACTURE DATE: **11/7/2012** DATE OF ANALYSIS: **11/7/2012**
LOT NUMBER: **A2314**

TEST	*SPECIFICATIONS*	*RESULTS*
Hexavalent Chromium Concentration	995 to 1005 ppm	1001.1 ppm
pH of the solution	12 to 14	12.3

The expiration date is Nov 2017

The item 1466442 is traceable to NIST standards SRM 136f Potassium Dichromate LOT N/A.

Certified by _____

Scott Als
Analytical Services Chemist

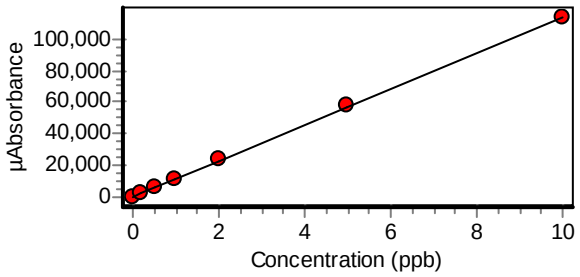
Report Generated By CETAC QuickTrace
Analyst: FredetteN
Worksheet file: C:\Program Files\QuickTrace\Worksheets\March 2013\130327taa.wsz
Date Started: 3/27/2013 3:33:21 PM
Comment:

Results

Sample Name	Type	Date/Time	Conc (ppb)	µAbs	%RSD	Flags	Wt.	Vol.	ODF
Cal Blank	STD	03/27/13 04:25:38 pm	0.000	-32	5.91		1.00	1.00	1.00
Std1	STD	03/27/13 04:27:55 pm	0.200	2286	0.26		1.00	1.00	1.00
Std2	STD	03/27/13 04:30:14 pm	0.500	5710	0.16		1.00	1.00	1.00
Std3	STD	03/27/13 04:32:33 pm	1.000	11245	0.17		1.00	1.00	1.00
Std4	STD	03/27/13 04:34:52 pm	2.000	23360	0.27		1.00	1.00	1.00
Std5	STD	03/27/13 04:37:12 pm	5.000	57703	0.19		1.00	1.00	1.00
Std6	STD	03/27/13 04:39:33 pm	10.000	113077	0.15		1.00	1.00	1.00

Calibration

Equation: A = 197.151 + 11335.260C
R2: 0.99987
SEE: 518.6737
Flags:



ICV 1960038	ICV	03/27/13 04:42:50 pm	4.117	46859	0.18		1.00	1.00	1.00
% Recovery 102.91									
ICB	ICB	03/27/13 04:45:08 pm	-0.022	-49	6.58		1.00	1.00	1.00
CRA 1960040	CRDL	03/27/13 04:47:25 pm	0.188	2325	0.23		1.00	1.00	1.00
% Recovery 93.87									

Sample Name	Type	Date/Time	Conc (ppb)	µAbs	%RSD	Flags	Wt.	Vol. ODF
CCV 1960039	CCV	03/27/13 04:49:46 pm	5.027	57183	0.16		1.00	1.00
% Recovery 100.55							1.00	
CCB	CCB	03/27/13 04:52:03 pm	-0.022	-55	8.49		1.00	1.00
							1.00	
MB 280-166853/1-A	UNK	03/27/13 04:54:20 pm	-0.018	-8	3.97		1.00	1.00
							1.00	
LCS 280-166853/2-A	UNK	03/27/13 04:56:37 pm	4.950	56312	0.30		1.00	1.00
							1.00	
280-40327-D-1-D	UNK	03/27/13 04:58:55 pm	-0.013	48	4.81		1.00	1.00
							1.00	
280-40327-D-1-E MS	UNK	03/27/13 05:01:13 pm	4.867	55360	0.13		1.00	1.00
							1.00	
280-40327-D-1-F MSD	UNK	03/27/13 05:03:31 pm	4.911	55863	0.12		1.00	1.00
							1.00	
280-39957-G-1-K	UNK	03/27/13 05:05:50 pm	-0.020	-26	9.25		1.00	1.00
							1.00	
MB 280-166447/1-A	UNK	03/27/13 05:08:09 pm	-0.019	-17	18.31		1.00	1.00
							1.00	
LCS 280-166447/2-A	UNK	03/27/13 05:10:28 pm	4.928	56060	0.17		1.00	1.00
							1.00	
280-40014-B-1-B	UNK	03/27/13 05:12:48 pm	-0.020	-29	10.84		1.00	1.00
							1.00	
280-40049-AG-13-A	UNK	03/27/13 05:15:07 pm	-0.018	-4	132.73		1.00	1.00
							1.00	
CCV 1960039	CCV	03/27/13 05:17:27 pm	4.997	56835	0.20		1.00	1.00
% Recovery 99.93							1.00	
CCB	CCB	03/27/13 05:19:45 pm	-0.021	-42	2.84		1.00	1.00
							1.00	
280-40049-AG-13-A sd@5	UNK	03/27/13 05:22:05 pm	-0.020	-27	8.27		1.00	1.00
							1.00	
280-40049-AG-13-B MS	UNK	03/27/13 05:24:25 pm	4.257	48450	0.31		1.00	1.00
							1.00	
280-40049-AG-13-C MSD	UNK	03/27/13 05:26:42 pm	4.318	49147	0.47		1.00	1.00
							1.00	

Sample Name	Type	Date/Time	Conc (ppb)	µAbs	%RSD	Flags	Wt.	Vol.	ODF
280-40049-U-15-A	UNK	03/27/13 05:28:59 pm	-0.044	-298	1.63		1.00	1.00	1.00
280-40049-U-15-B MS	UNK	03/27/13 05:31:16 pm	2.413	27546	0.31		1.00	1.00	1.00
280-40049-U-15-C MSD	UNK	03/27/13 05:33:34 pm	2.374	27108	0.42		1.00	1.00	1.00
280-40049-K-17-A	UNK	03/27/13 05:35:52 pm	-0.031	-159	1.50		1.00	1.00	1.00
280-40049-K-18-B	UNK	03/27/13 05:38:10 pm	-0.018	-11	85.68		1.00	1.00	1.00
280-40049-H-19-C	UNK	03/27/13 05:40:29 pm	-0.017	4	162.51		1.00	1.00	1.00
280-40082-J-2-B	UNK	03/27/13 05:42:47 pm	-0.016	20	21.25		1.00	1.00	1.00
CCV 1960039 % Recovery 100.32	CCV	03/27/13 05:45:08 pm	5.016	57054	0.16		1.00	1.00	1.00
CCB	CCB	03/27/13 05:47:25 pm	-0.021	-46	2.36		1.00	1.00	1.00
280-40161-B-2-A	UNK	03/27/13 05:49:44 pm	-0.011	75	6.66		1.00	1.00	1.00
280-40161-B-5-A	UNK	03/27/13 05:52:03 pm	-0.018	-6	45.75		1.00	1.00	1.00
280-40161-B-7-A	UNK	03/27/13 05:54:23 pm	-0.017	-1	269.29		1.00	1.00	1.00
MB 280-166442/1-A	UNK	03/27/13 05:56:43 pm	-0.018	-6	36.78		1.00	1.00	1.00
LCS 280-166442/2-A	UNK	03/27/13 05:59:00 pm	4.836	55013	0.25		1.00	1.00	1.00
280-40014-A-1-H	UNK	03/27/13 06:01:17 pm	-0.018	-11	45.00		1.00	1.00	1.00
280-40014-A-2-C	UNK	03/27/13 06:03:34 pm	-0.018	-10	42.75		1.00	1.00	1.00
280-40049-AB-13-J	UNK	03/27/13 06:05:52 pm	-0.016	17	15.37		1.00	1.00	1.00

Sample Name	Type	Date/Time	Conc (ppb)	µAbs	%RSD	Flags	Wt.	Vol.	ODF
280-40049-AB-13-J sd@5	UNK	03/27/13 06:08:10 pm	-0.021	-43	7.84		1.00	1.00	1.00
280-40049-AB-13-K MS	UNK	03/27/13 06:10:28 pm	4.253	48405	0.52		1.00	1.00	1.00
CCV 1960039	CCV	03/27/13 06:12:48 pm	4.991	56774	0.36		1.00	1.00	1.00
% Recovery 99.82									
CCB	CCB	03/27/13 06:15:05 pm	-0.024	-73	3.95		1.00	1.00	1.00
280-40049-AB-13-L MSD	UNK	03/27/13 06:17:24 pm	4.184	47628	0.25		1.00	1.00	1.00
280-40049-P-15-G	UNK	03/27/13 06:19:43 pm	-0.041	-266	1.02		1.00	1.00	1.00
280-40049-P-15-H MS	UNK	03/27/13 06:22:02 pm	2.369	27049	0.26		1.00	1.00	1.00
280-40049-P-15-I MSD	UNK	03/27/13 06:24:21 pm	2.303	26306	0.73		1.00	1.00	1.00
280-40049-H-16-B	UNK	03/27/13 06:26:41 pm	-0.038	-237	0.69		1.00	1.00	1.00
280-40049-H-17-A	UNK	03/27/13 06:29:01 pm	-0.006	131	0.89		1.00	1.00	1.00
280-40049-H-18-B	UNK	03/27/13 06:31:18 pm	-0.015	24	38.23		1.00	1.00	1.00
280-40049-H-19-B	UNK	03/27/13 06:33:35 pm	-0.016	21	35.93		1.00	1.00	1.00
280-40049-H-20-B	UNK	03/27/13 06:35:53 pm	-0.018	-4	58.28		1.00	1.00	1.00
280-40082-I-2-F	UNK	03/27/13 06:38:10 pm	-0.014	43	9.30		1.00	1.00	1.00
CCV 1960039	CCV	03/27/13 06:40:30 pm	4.966	56486	0.16		1.00	1.00	1.00
% Recovery 99.32									
CCB	CCB	03/27/13 06:42:48 pm	-0.025	-90	1.08		1.00	1.00	1.00
280-40082-E-4-B	UNK	03/27/13 06:45:06 pm	-0.023	-60	9.71		1.00	1.00	1.00

Sample Name	Type	Date/Time	Conc (ppb)	µAbs	%RSD	Flags	Wt.	Vol.	ODF
280-40160-I-1-C	UNK	03/27/13 06:47:24 pm	0.003	236	2.12		1.00	1.00	1.00
280-40161-C-1-C	UNK	03/27/13 06:49:42 pm	-0.016	13	14.22		1.00	1.00	1.00
280-40161-C-2-C	UNK	03/27/13 06:52:01 pm	-0.010	82	0.82		1.00	1.00	1.00
280-40161-C-4-C	UNK	03/27/13 06:54:20 pm	-0.021	-43	7.15		1.00	1.00	1.00
280-40161-C-5-C	UNK	03/27/13 06:56:40 pm	-0.020	-27	30.98		1.00	1.00	1.00
280-40161-C-7-C	UNK	03/27/13 06:59:00 pm	-0.021	-37	6.13		1.00	1.00	1.00
280-40161-C-9-C	UNK	03/27/13 07:01:19 pm	-0.022	-55	2.33		1.00	1.00	1.00
MB 280-166821/1-A	UNK	03/27/13 07:03:37 pm	-0.022	-52	0.32		1.00	1.00	1.00
LCS 280-166821/2-A	UNK	03/27/13 07:05:55 pm	4.797	54571	0.22		1.00	1.00	1.00
CCV 1960039 % Recovery 98.24	CCV	03/27/13 07:08:15 pm	4.912	55877	0.24		1.00	1.00	1.00
CCB	CCB	03/27/13 07:10:32 pm	-0.026	-100	2.25		1.00	1.00	1.00
280-40184-A-1-D	UNK	03/27/13 07:12:50 pm	-0.022	-48	2.35		1.00	1.00	1.00
280-40184-A-1-E MS	UNK	03/27/13 07:15:07 pm	4.836	55014	0.29		1.00	1.00	1.00
280-40184-A-1-F MSD	UNK	03/27/13 07:17:25 pm	4.743	53956	0.79		1.00	1.00	1.00
280-40184-A-2-B	UNK	03/27/13 07:19:44 pm	-0.020	-33	11.53		1.00	1.00	1.00
280-40184-A-3-B	UNK	03/27/13 07:22:02 pm	-0.023	-60	2.02		1.00	1.00	1.00
280-40184-A-4-B	UNK	03/27/13 07:24:21 pm	-0.022	-47	1.10		1.00	1.00	1.00

Sample Name	Type	Date/Time	Conc (ppb)	µAbs	%RSD	Flags	Wt.	Vol.	ODF
280-40184-A-5-B	UNK	03/27/13 07:26:40 pm	-0.022	-54	6.69		1.00	1.00	1.00
280-40184-A-6-B	UNK	03/27/13 07:28:59 pm	-0.022	-55	6.57		1.00	1.00	1.00
280-40306-C-1-A	UNK	03/27/13 07:31:19 pm	-0.015	23	4.08		1.00	1.00	1.00
280-40306-C-2-A	UNK	03/27/13 07:33:39 pm	0.041	664	0.52		1.00	1.00	1.00
CCV 1960039	CCV	03/27/13 07:35:59 pm	4.854	55220	0.23		1.00	1.00	1.00
% Recovery 97.08									
CCB	CCB	03/27/13 07:38:16 pm	-0.024	-80	2.44		1.00	1.00	1.00
280-40306-C-3-A	UNK	03/27/13 07:40:34 pm	-0.018	-2	101.74		1.00	1.00	1.00
280-40306-C-4-A	UNK	03/27/13 07:42:52 pm	-0.019	-16	8.72		1.00	1.00	1.00
280-40306-C-5-A	UNK	03/27/13 07:45:11 pm	-0.019	-16	19.92		1.00	1.00	1.00
280-40197-A-4-C	UNK	03/27/13 07:47:29 pm	-0.019	-21	13.41		1.00	1.00	1.00
280-40197-A-6-C	UNK	03/27/13 07:49:47 pm	-0.019	-16	23.40		1.00	1.00	1.00
LB 280-166444/1-G	UNK	03/27/13 07:52:05 pm	-0.008	111	1.97		1.00	1.00	1.00
LCS 280-166444/2-G	UNK	03/27/13 07:54:24 pm	5.167	58763	1.03		1.00	1.00	1.00
280-40243-A-1-I	UNK	03/27/13 07:56:42 pm	-0.010	85	0.42		1.00	1.00	1.00
280-40244-A-1-C	UNK	03/27/13 07:59:02 pm	-0.019	-18	7.64		1.00	1.00	1.00
280-40244-A-2-D	UNK	03/27/13 08:01:21 pm	-0.020	-35	3.70		1.00	1.00	1.00
CCV 1960039	CCV	03/27/13 08:03:41 pm	4.855	55230	1.07		1.00	1.00	1.00
% Recovery 97.10									

Sample Name	Type	Date/Time	Conc (ppb)	µAbs	%RSD	Flags	Wt.	Vol.	ODF
CCB	CCB	03/27/13 08:05:58 pm	-0.022	-49	5.02		1.00	1.00	1.00
280-40248-A-2-E	UNK	03/27/13 08:08:18 pm	-0.015	31	4.62		1.00	1.00	1.00
280-40248-A-3-G	UNK	03/27/13 08:10:38 pm	-0.019	-17	14.98		1.00	1.00	1.00
280-40248-A-4-E	UNK	03/27/13 08:12:56 pm	-0.019	-18	12.38		1.00	1.00	1.00
280-40279-C-1-G	UNK	03/27/13 08:15:15 pm	-0.011	68	3.20		1.00	1.00	1.00
280-40280-E-1-L	UNK	03/27/13 08:17:33 pm	0.031	552	0.90		1.00	1.00	1.00
280-40280-E-1-L sd@5	UNK	03/27/13 08:19:51 pm	-0.010	88	3.48		1.00	1.00	1.00
280-40280-E-1-M MS	UNK	03/27/13 08:22:10 pm	0.528	6183	6.93	s	1.00	1.00	1.00
280-40280-E-1-N MSD	UNK	03/27/13 08:24:28 pm	0.419	4948	0.66		1.00	1.00	1.00
LB 280-165163/1-F	UNK	03/27/13 08:26:47 pm	-0.018	-11	17.24		1.00	1.00	1.00
LCS 280-165163/2-F	UNK	03/27/13 08:29:06 pm	5.417	61594	0.16		1.00	1.00	1.00
CCV 1960039 % Recovery 97.26	CCV	03/27/13 08:31:26 pm	4.863	55323	0.16		1.00	1.00	1.00
CCB	CCB	03/27/13 08:33:43 pm	-0.023	-69	5.93		1.00	1.00	1.00
280-39981-A-3-L	UNK	03/27/13 08:36:02 pm	-0.021	-45	3.19		1.00	1.00	1.00
280-39981-A-3-L sd@5	UNK	03/27/13 08:38:22 pm	-0.022	-54	4.13		1.00	1.00	1.00
280-39981-A-3-M MS	UNK	03/27/13 08:40:41 pm	5.320	60503	0.76		1.00	1.00	1.00
280-39981-A-3-N MSD	UNK	03/27/13 08:43:01 pm	5.063	57586	0.22		1.00	1.00	1.00

Sample Name	Type	Date/Time	Conc (ppb)	µAbs	%RSD	Flags	Wt.	Vol.	ODF
LB 280-165617/1-F	UNK	03/27/13 08:45:20 pm	-0.021	-40	2.47		1.00	1.00	1.00
LCS 280-165617/2-G	UNK	03/27/13 08:47:38 pm	5.143	58494	0.25		1.00	1.00	1.00
280-40034-E-1-R	UNK	03/27/13 08:49:57 pm	-0.023	-61	4.10		1.00	1.00	1.00
280-40034-E-1-R sd@5	UNK	03/27/13 08:52:16 pm	-0.022	-52	2.89		1.00	1.00	1.00
280-40034-E-1-S MS	UNK	03/27/13 08:54:34 pm	5.429	61742	0.12		1.00	1.00	1.00
280-40034-E-1-T MSD	UNK	03/27/13 08:56:53 pm	4.987	56730	0.09		1.00	1.00	1.00
CCV 1960039 % Recovery 96.45	CCV	03/27/13 08:59:13 pm	4.822	54859	0.21		1.00	1.00	1.00
CCB	CCB	03/27/13 09:01:30 pm	-0.024	-75	1.31		1.00	1.00	1.00
LB3 280-166282/1-D	UNK	03/27/13 09:03:49 pm	-0.019	-20	19.27		1.00	1.00	1.00
LCS 280-166282/2-D	UNK	03/27/13 09:06:08 pm	4.799	54591	0.22		1.00	1.00	1.00
280-40195-A-1-G	UNK	03/27/13 09:08:27 pm	-0.021	-38	4.21		1.00	1.00	1.00
280-40195-A-2-G	UNK	03/27/13 09:10:46 pm	-0.021	-41	4.99		1.00	1.00	1.00
280-40195-A-2-G sd@5	UNK	03/27/13 09:13:06 pm	-0.022	-52	3.51		1.00	1.00	1.00
280-40195-A-2-H MS	UNK	03/27/13 09:15:26 pm	4.834	54987	0.17		1.00	1.00	1.00
280-40195-A-2-I MSD	UNK	03/27/13 09:17:45 pm	4.844	55109	0.11		1.00	1.00	1.00
MB 280-166437/1-A	UNK	03/27/13 09:20:04 pm	-0.024	-71	3.35		1.00	1.00	1.00
LCS 280-166437/2-A	UNK	03/27/13 09:22:23 pm	4.806	54675	1.12		1.00	1.00	1.00

Sample Name	Type	Date/Time	Conc (ppb)	µAbs	%RSD	Flags	Wt.	Vol.	ODF
LCSD 280-166437/3-A	UNK	03/27/13 09:24:42 pm	4.819	54821	0.28		1.00	1.00	1.00
CCV 1960039	CCV	03/27/13 09:27:02 pm	4.821	54841	0.25		1.00	1.00	1.00
% Recovery 96.41									
CCB	CCB	03/27/13 09:29:19 pm	-0.022	-51	5.89		1.00	1.00	1.00
280-40247-A-1-B	UNK	03/27/13 09:31:38 pm	-0.008	106	2.25		1.00	1.00	1.00
280-40247-A-2-B	UNK	03/27/13 09:33:57 pm	0.069	984	0.14		1.00	1.00	1.00
280-40247-A-3-B	UNK	03/27/13 09:36:16 pm	0.004	247	1.05		1.00	1.00	1.00
280-40247-A-4-B	UNK	03/27/13 09:38:35 pm	0.067	958	0.19		1.00	1.00	1.00
280-40247-A-5-B	UNK	03/27/13 09:40:54 pm	0.006	264	0.48		1.00	1.00	1.00
280-40247-A-6-B	UNK	03/27/13 09:43:13 pm	-0.009	96	3.31		1.00	1.00	1.00
280-40247-A-7-B	UNK	03/27/13 09:45:33 pm	0.016	383	1.77		1.00	1.00	1.00
280-40247-A-8-B	UNK	03/27/13 09:47:53 pm	0.127	1640	0.20		1.00	1.00	1.00
280-40247-A-9-B	UNK	03/27/13 09:50:12 pm	-0.003	167	1.37		1.00	1.00	1.00
CCV 1960039	CCV	03/27/13 09:52:32 pm	4.832	54963	0.19		1.00	1.00	1.00
% Recovery 96.63									
CCB	CCB	03/27/13 09:54:49 pm	-0.023	-59	2.76		1.00	1.00	1.00
Ultra stock @ 5ppb	UNK	03/27/13 09:57:08 pm	4.874	55449	0.17		1.00	1.00	1.00
Inorganic Venture stock @ 4ppb	UNK	03/27/13 09:59:28 pm	4.033	45915	0.24		1.00	1.00	1.00
CCV 1960039	CCV	03/27/13 10:01:48 pm	4.949	56291	0.34		1.00	1.00	1.00
% Recovery 98.97									

Sample Name	Type	Date/Time	Conc (ppb)	µAbs	%RSD	Flags	Wt.	Vol. ODF
CCB	CCB	03/27/13 10:04:05 pm	-0.023	-68	3.74		1.00 1.00	1.00

Analysis Parameters

Instrument M-7500 Mercury Analyzer

Conditions

Gas flow (mL/min)	Sample Uptake (s)	Rinse (s)	Read delay (s)	Replicates (#)	Replicate time (s)	Pump speed (%)	Wavelength (nm)
100	40.00	90.00	63.00	4	1.50	50	253.65

Instrumental Zero

Zero before first sample: No

Zero periodically: Yes

Before each calibration.

Baseline Correction

#1 Start time (s)	#1 End time (s)	#2 Start time (s)	#2 End time (s)
20.00	24.00		

Standby Mode

Enabled: Yes

Standby Options: pump slow

Autodilution

Enabled: No

Condition:

Tube # range:

If no autodilution tubes remaining

Calibration

Settings

Algorithm	Through blank	Weighted fit	Cal. Type	Racalibration rate	Reslope rate	Reslope standard
Linear	No	No	Normal	0	0	N/A

Limits

Calibration slope		Reslope		Coeff. of Determination
Lower (%)	Upper (%)	Lower (%)	Upper (%)	
20	150	75	125	0.99500

Error action: Flag and continue

QC

GLP Override: Yes

QC Tests

CCB

Concentration (ppb)
0.1000

Failure flag: Q

Error action for manually inserted QC: Stop analysis

ICB

Concentration (ppb)
0.0500

Failure flag: Z

Error action for manually inserted QC: Stop analysis

CCV

Concentration (ppb)	Low Limit %	High Limit %
5.0000	80.0000	120.0000

Failure flag: Q

Error action for manually inserted QC: Stop analysis

ICV

Concentration (ppb)	Low Limit %	High Limit %
4.0000	94.6000	110.4000

Failure flag: Q

Error action for manually inserted QC: Stop analysis

CRDL

Concentration (ppb)	Low Limit %	High Limit %
0.2000	50.0000	150.0000

Failure flag: Y

Error action for manually inserted QC: Stop analysis

INORGANIC VENTURES™
300 Technology Drive
Christiansburg, VA 24073 • USA
inorganicventures.com

CERTIFICATE OF ANALYSIS

tel: 800.669.6799 • 540.585.3030
fax: 540.585.3012
info@inorganicventures.com

1.0 **INORGANIC VENTURES** is an ISO Guide 34 "General Requirements for the Competence of Reference Material Producers" and ISO 9001 registered manufacturer. Our manufacturing laboratory is accredited to ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories."

ACCREDITED Testing Laboratory Certificate 883.01

ACCREDITED Reference Material Producer Certificate 883.02

2.0 DESCRIPTION OF CRM — 100 µg/mL Mercury in 10% (v/v) HCl

Catalog Number:	MSHG-100PPM
Lot Number:	F2-HG02098
Starting Material:	Hg metal
Starting Material Purity (%):	99.9991
Starting Material Lot No:	R307HGA1
Matrix:	10% (v/v) HCl

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Concentration: 99.83 ± 0.48 µg/mL

Certified Density: 1.021 g/mL (measured at 20 ± 1°C)

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

Certified Value $(\bar{x}) = \frac{\Sigma x_i}{n}$

$(\bar{x})$ = mean

x_i = individual results

n = number of measurements

Uncertainty $(\pm) = 2\,[\,\Sigma(s_i)^2\,]^{1/2}$

2 = the coverage factor.

$[\,\Sigma(s_i)^2\,]^{1/2}$ = The square root of the sum of the squares of the most common errors (where 's' stands for the standard deviation) from instrumental measurement, density, NIST SRM uncertainty, weighing, dilution to volume, homogeneity, long term stability and short term stability.

4.0 TRACEABILITY TO NIST AND VALUES OBTAINED BY INDEPENDENT METHODS

- "Property of the result of a measurement or the value of a standard whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons all having stated uncertainties." (ISO VIM, 2nd ed., 1993, definition 6.10)
- This product is Traceable to NIST via an unbroken chain of comparisons to the following NIST SRMs:

4.1 ELEMENT	METHOD	NIST SRM#	SRM LOT#
Hg	ICP Assay	3133	061204
Hg	EDTA	928	928

4.2 **BALANCE CALIBRATION** - All analytical balances are calibrated yearly by an accredited calibration laboratory and are traceable to a class E 2 analytical weight set with NIST Traceability. All balances are checked daily using an in-house procedure. The weights used for testing are annually compared to master weights and are traceable to the National Institute of Standards and Technology (NIST).

4.3 **THERMOMETER CALIBRATION** - All thermometers are NIST traceable through thermometers that are calibrated by an A2LA accredited calibration laboratory.

4.4 **GLASSWARE CALIBRATION** - An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM's.

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

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

M	Ag	< 0.0020020	M	Cu	< 0.0060050	M	La	< 0.0005000	M	Pr	< 0.0003000	M	Ta	< 0.0070060
O	Al	< 0.0000900	M	Dy	< 0.0060050	O	Li	< 0.0000200	M	Pt	< 0.0020020	M	Tb	< 0.0003000
M	As	< 0.0100080	M	Er	< 0.0050040	M	Lu	< 0.0004000	M	Rb	< 0.0010010	M	Te	< 0.0300250
M	Au	< 0.0030030	M	Eu	< 0.0030030	O	Mg	< 0.0000300	M	Re	< 0.0010010	M	Th	< 0.0010010
M	B	< 0.0700590	O	Fe	< 0.0011000	M	Mn	< 0.0040030	M	Rh	< 0.0010010	M	Ti	< 0.0500420
M	Ba	< 0.0100080	M	Ga	< 0.0010010	M	Mo	< 0.0020020	M	Ru	< 0.0020020	O	Tl	< 0.0060000
M	Be	< 0.0005000	M	Gd	< 0.0010010	O	Na	< 0.0001000	O	S	0.0011030	M	Tm	< 0.0004000
M	Bi	< 0.0004000	O	Ge	< 0.0180000	M	Nb	< 0.0005000	M	Sb	< 0.0005000	M	U	< 0.0020020
O	Ca	0.0000300	M	Hf	< 0.0020020	M	Nd	< 0.0020020	M	Sc	< 0.0100080	M	V	< 0.0020020
O	Cd	< 0.0046000	s	Hg		O	Ni	< 0.0010000	M	Se	< 0.0080070	M	W	< 0.0100080
M	Ce	< 0.0050040	M	Ho	< 0.0005000	n	Os		O	Si	< 0.0034000	M	Y	< 0.0400330
M	Co	< 0.0030030	M	In	< 0.0100080	O	P	< 0.0026000	M	Sm	< 0.0010010	M	Yb	< 0.0010010
M	Cr	< 0.0050040	M	Ir	< 0.0050040	M	Pb	< 0.0030030	M	Sn	< 0.0050040	M	Zn	< 0.0200170
M	Cs	< 0.0003000	O	K	< 0.0020000	O	Pd	< 0.0038000	M	Sr	< 0.0005000	M	Zr	< 0.0050040

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

6.0 INTENDED USE

For the calibration of analytical instruments including but not limited to the following:
HPLC, IC, TLC, ISE, IR, NMR, UV/VIS, MS, Capillary Electrophoresis, Potentiometry, Wet Chemistry and Voltammetry
For the validation of analytical methods
For the preparation of "working reference samples"
For interference studies and the determination of correction coefficients
For detection limit and linearity studies
For additional intended uses, contact Technical Staff

This CRM was manufactured using 18 megohm doubly deionized water that has been filtered through a 0.2 micron filter.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

Storage & Handling - Keep tightly sealed when not in use. Store and use at 20 ± 4°C. Do not pipet from container. Do not return portions removed for pipetting to container.
Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 200.59; +2; **4** ; Hg(OH)(aq) 1+
Chemical Compatibility - Stable in HNO3. Avoid basic media forming insoluble carbonate. The sulfide, basic carbonate, oxalate, phosphate, arsenite, arsenate and iodide are insoluble in water. .
Stability - 2-100 ppb levels **not stable** in 1% HNO3 / LDPE container, ***stable*** in 10% HNO3 packaged in borosilicate glass. 1-100 ppm levels stable in 7% HNO3 packaged in borosilicate glass. 1000-10,000 ppm solutions are chemically stable for years in 5-10% HNO3 / LDPE container.
Hg Containing Samples (Preparation and Solution) - Metal (soluble in HNO3); Oxide (Soluble in HNO3); Ores and Organic based (The literature has more references to the preparation of Hg containing samples than any other element. Please consult the literature for your specific sample type, since such preparations are prone to error. Or e-mail our technical staff and we will contact you to discuss your particular sample preparation questions in further detail.).
Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/axial view):

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

Uranium Note: If uranium is present in this standard, it is natural abundance unless specified in Section 3.0.

8.0 HAZARDOUS INFORMATION - Please refer to the enclosed Material Safety Data sheet for information regarding this CRM.

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration
- SAI Global File Number 010105

10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration"
- Chemical Testing - Accredited A2LA Certificate Number 883.01

10.3 ISO/IEC Guide 34 "General Requirements for the Competence of Reference Material Producers"
- Reference Materials Production - Accredited A2LA Certificate Number 883.02

10.4 10CFR50 Appendix B - Nuclear Regulatory Commission
- Domestic Licensing of Production and Utilization Facilities

10.5 10CFR21 - Nuclear Regulatory Commission
- Reporting Defects and Non-Compliance

11.0 DATE OF CERTIFICATION AND PERIOD OF VALIDITY

11.1 Shelf Life - The period of time during which the concentration of the analyte(s) in a properly packaged, unopened, and unused standard stored under environmentally controlled and monitored conditions will remain within the specified uncertainty range. Shelf life is limited primarily by transpiration (loss of water from the solution) and infrequently, by chemical instability.

11.2 Expiration Date - The date after which a CRM should not be used. Routine laboratory use of a CRM increases transpiration losses and the chance of contamination which affect the integrity of the CRM and limit its useful life. Manufacturer concurs with state and federal regulatory agencies' recommendations that solution standards be assigned a one-year expiration date.

11.3 Chemical Stability - Studies have been conducted on this or similar CRMs and it has been demonstrated that this CRM is chemically stable for a period of not less than two years provided the "Storage & Handling" conditions are followed that are described in section 7.0.

Certification Date: **September 25, 2012**

Expiration Date: EXPIRES 01 APR 2014

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By: Stephan Blaakman
Product Documentation Technician

Certificate Approved By: Brian Alexander
PhD., Quality Control Supervisor

Certifying Officer: Paul Gaines
PhD., Senior Technical Director

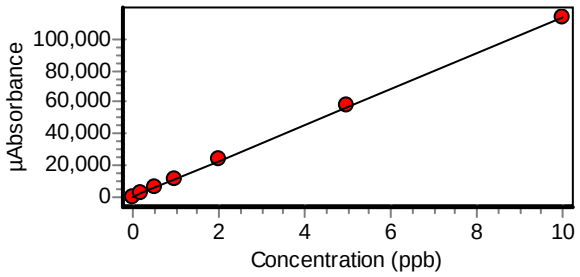
Report Generated By CETAC QuickTrace
Analyst: FredetteN
Worksheet file: C:\Program Files\QuickTrace\Worksheets\March 2013\130327taa.wsz
Date Started: 3/27/2013 3:33:21 PM
Comment:

Results

Sample Name	Type	Date/Time	Conc (ppb)	µAbs	%RSD	Flags	Wt.	Vol.	ODF
Cal Blank	STD	03/27/13 04:25:38 pm	0.000	-32	5.91		1.00	1.00	1.00
Std1	STD	03/27/13 04:27:55 pm	0.200	2286	0.26		1.00	1.00	1.00
Std2	STD	03/27/13 04:30:14 pm	0.500	5710	0.16		1.00	1.00	1.00
Std3	STD	03/27/13 04:32:33 pm	1.000	11245	0.17		1.00	1.00	1.00
Std4	STD	03/27/13 04:34:52 pm	2.000	23360	0.27		1.00	1.00	1.00
Std5	STD	03/27/13 04:37:12 pm	5.000	57703	0.19		1.00	1.00	1.00
Std6	STD	03/27/13 04:39:33 pm	10.000	113077	0.15		1.00	1.00	1.00

Calibration

Equation: A = 197.151 + 11335.260C
R2: 0.99987
SEE: 518.6737
Flags:



ICV 1960038	ICV	03/27/13 04:42:50 pm	4.117	46859	0.18		1.00	1.00	1.00
% Recovery 102.91									
ICB	ICB	03/27/13 04:45:08 pm	-0.022	-49	6.58		1.00	1.00	1.00
CRA 1960040	CRDL	03/27/13 04:47:25 pm	0.188	2325	0.23		1.00	1.00	1.00
% Recovery 93.87									

Sample Name	Type	Date/Time	Conc (ppb)	µAbs	%RSD	Flags	Wt.	Vol. ODF
CCV 1960039	CCV	03/27/13 04:49:46 pm	5.027	57183	0.16		1.00	1.00
% Recovery 100.55							1.00	
CCB	CCB	03/27/13 04:52:03 pm	-0.022	-55	8.49		1.00	1.00
							1.00	
MB 280-166853/1-A	UNK	03/27/13 04:54:20 pm	-0.018	-8	3.97		1.00	1.00
							1.00	
LCS 280-166853/2-A	UNK	03/27/13 04:56:37 pm	4.950	56312	0.30		1.00	1.00
							1.00	
280-40327-D-1-D	UNK	03/27/13 04:58:55 pm	-0.013	48	4.81		1.00	1.00
							1.00	
280-40327-D-1-E MS	UNK	03/27/13 05:01:13 pm	4.867	55360	0.13		1.00	1.00
							1.00	
280-40327-D-1-F MSD	UNK	03/27/13 05:03:31 pm	4.911	55863	0.12		1.00	1.00
							1.00	
280-39957-G-1-K	UNK	03/27/13 05:05:50 pm	-0.020	-26	9.25		1.00	1.00
							1.00	
MB 280-166447/1-A	UNK	03/27/13 05:08:09 pm	-0.019	-17	18.31		1.00	1.00
							1.00	
LCS 280-166447/2-A	UNK	03/27/13 05:10:28 pm	4.928	56060	0.17		1.00	1.00
							1.00	
280-40014-B-1-B	UNK	03/27/13 05:12:48 pm	-0.020	-29	10.84		1.00	1.00
							1.00	
280-40049-AG-13-A	UNK	03/27/13 05:15:07 pm	-0.018	-4	132.73		1.00	1.00
							1.00	
CCV 1960039	CCV	03/27/13 05:17:27 pm	4.997	56835	0.20		1.00	1.00
% Recovery 99.93							1.00	
CCB	CCB	03/27/13 05:19:45 pm	-0.021	-42	2.84		1.00	1.00
							1.00	
280-40049-AG-13-A sd@5	UNK	03/27/13 05:22:05 pm	-0.020	-27	8.27		1.00	1.00
							1.00	
280-40049-AG-13-B MS	UNK	03/27/13 05:24:25 pm	4.257	48450	0.31		1.00	1.00
							1.00	
280-40049-AG-13-C MSD	UNK	03/27/13 05:26:42 pm	4.318	49147	0.47		1.00	1.00
							1.00	

Sample Name	Type	Date/Time	Conc (ppb)	µAbs	%RSD	Flags	Wt.	Vol.	ODF
280-40049-U-15-A	UNK	03/27/13 05:28:59 pm	-0.044	-298	1.63		1.00	1.00	1.00
280-40049-U-15-B MS	UNK	03/27/13 05:31:16 pm	2.413	27546	0.31		1.00	1.00	1.00
280-40049-U-15-C MSD	UNK	03/27/13 05:33:34 pm	2.374	27108	0.42		1.00	1.00	1.00
280-40049-K-17-A	UNK	03/27/13 05:35:52 pm	-0.031	-159	1.50		1.00	1.00	1.00
280-40049-K-18-B	UNK	03/27/13 05:38:10 pm	-0.018	-11	85.68		1.00	1.00	1.00
280-40049-H-19-C	UNK	03/27/13 05:40:29 pm	-0.017	4	162.51		1.00	1.00	1.00
280-40082-J-2-B	UNK	03/27/13 05:42:47 pm	-0.016	20	21.25		1.00	1.00	1.00
CCV 1960039 % Recovery 100.32	CCV	03/27/13 05:45:08 pm	5.016	57054	0.16		1.00	1.00	1.00
CCB	CCB	03/27/13 05:47:25 pm	-0.021	-46	2.36		1.00	1.00	1.00
280-40161-B-2-A	UNK	03/27/13 05:49:44 pm	-0.011	75	6.66		1.00	1.00	1.00
280-40161-B-5-A	UNK	03/27/13 05:52:03 pm	-0.018	-6	45.75		1.00	1.00	1.00
280-40161-B-7-A	UNK	03/27/13 05:54:23 pm	-0.017	-1	269.29		1.00	1.00	1.00
MB 280-166442/1-A	UNK	03/27/13 05:56:43 pm	-0.018	-6	36.78		1.00	1.00	1.00
LCS 280-166442/2-A	UNK	03/27/13 05:59:00 pm	4.836	55013	0.25		1.00	1.00	1.00
280-40014-A-1-H	UNK	03/27/13 06:01:17 pm	-0.018	-11	45.00		1.00	1.00	1.00
280-40014-A-2-C	UNK	03/27/13 06:03:34 pm	-0.018	-10	42.75		1.00	1.00	1.00
280-40049-AB-13-J	UNK	03/27/13 06:05:52 pm	-0.016	17	15.37		1.00	1.00	1.00

Sample Name	Type	Date/Time	Conc (ppb)	µAbs	%RSD	Flags	Wt.	Vol.	ODF
280-40049-AB-13-J sd@5	UNK	03/27/13 06:08:10 pm	-0.021	-43	7.84		1.00	1.00	1.00
280-40049-AB-13-K MS	UNK	03/27/13 06:10:28 pm	4.253	48405	0.52		1.00	1.00	1.00
CCV 1960039	CCV	03/27/13 06:12:48 pm	4.991	56774	0.36		1.00	1.00	1.00
% Recovery 99.82									
CCB	CCB	03/27/13 06:15:05 pm	-0.024	-73	3.95		1.00	1.00	1.00
280-40049-AB-13-L MSD	UNK	03/27/13 06:17:24 pm	4.184	47628	0.25		1.00	1.00	1.00
280-40049-P-15-G	UNK	03/27/13 06:19:43 pm	-0.041	-266	1.02		1.00	1.00	1.00
280-40049-P-15-H MS	UNK	03/27/13 06:22:02 pm	2.369	27049	0.26		1.00	1.00	1.00
280-40049-P-15-I MSD	UNK	03/27/13 06:24:21 pm	2.303	26306	0.73		1.00	1.00	1.00
280-40049-H-16-B	UNK	03/27/13 06:26:41 pm	-0.038	-237	0.69		1.00	1.00	1.00
280-40049-H-17-A	UNK	03/27/13 06:29:01 pm	-0.006	131	0.89		1.00	1.00	1.00
280-40049-H-18-B	UNK	03/27/13 06:31:18 pm	-0.015	24	38.23		1.00	1.00	1.00
280-40049-H-19-B	UNK	03/27/13 06:33:35 pm	-0.016	21	35.93		1.00	1.00	1.00
280-40049-H-20-B	UNK	03/27/13 06:35:53 pm	-0.018	-4	58.28		1.00	1.00	1.00
280-40082-I-2-F	UNK	03/27/13 06:38:10 pm	-0.014	43	9.30		1.00	1.00	1.00
CCV 1960039	CCV	03/27/13 06:40:30 pm	4.966	56486	0.16		1.00	1.00	1.00
% Recovery 99.32									
CCB	CCB	03/27/13 06:42:48 pm	-0.025	-90	1.08		1.00	1.00	1.00
280-40082-E-4-B	UNK	03/27/13 06:45:06 pm	-0.023	-60	9.71		1.00	1.00	1.00

Sample Name	Type	Date/Time	Conc (ppb)	µAbs	%RSD	Flags	Wt.	Vol.	ODF
280-40160-I-1-C	UNK	03/27/13 06:47:24 pm	0.003	236	2.12		1.00	1.00	1.00
280-40161-C-1-C	UNK	03/27/13 06:49:42 pm	-0.016	13	14.22		1.00	1.00	1.00
280-40161-C-2-C	UNK	03/27/13 06:52:01 pm	-0.010	82	0.82		1.00	1.00	1.00
280-40161-C-4-C	UNK	03/27/13 06:54:20 pm	-0.021	-43	7.15		1.00	1.00	1.00
280-40161-C-5-C	UNK	03/27/13 06:56:40 pm	-0.020	-27	30.98		1.00	1.00	1.00
280-40161-C-7-C	UNK	03/27/13 06:59:00 pm	-0.021	-37	6.13		1.00	1.00	1.00
280-40161-C-9-C	UNK	03/27/13 07:01:19 pm	-0.022	-55	2.33		1.00	1.00	1.00
MB 280-166821/1-A	UNK	03/27/13 07:03:37 pm	-0.022	-52	0.32		1.00	1.00	1.00
LCS 280-166821/2-A	UNK	03/27/13 07:05:55 pm	4.797	54571	0.22		1.00	1.00	1.00
CCV 1960039 % Recovery 98.24	CCV	03/27/13 07:08:15 pm	4.912	55877	0.24		1.00	1.00	1.00
CCB	CCB	03/27/13 07:10:32 pm	-0.026	-100	2.25		1.00	1.00	1.00
280-40184-A-1-D	UNK	03/27/13 07:12:50 pm	-0.022	-48	2.35		1.00	1.00	1.00
280-40184-A-1-E MS	UNK	03/27/13 07:15:07 pm	4.836	55014	0.29		1.00	1.00	1.00
280-40184-A-1-F MSD	UNK	03/27/13 07:17:25 pm	4.743	53956	0.79		1.00	1.00	1.00
280-40184-A-2-B	UNK	03/27/13 07:19:44 pm	-0.020	-33	11.53		1.00	1.00	1.00
280-40184-A-3-B	UNK	03/27/13 07:22:02 pm	-0.023	-60	2.02		1.00	1.00	1.00
280-40184-A-4-B	UNK	03/27/13 07:24:21 pm	-0.022	-47	1.10		1.00	1.00	1.00

Sample Name	Type	Date/Time	Conc (ppb)	µAbs	%RSD	Flags	Wt.	Vol.	ODF
280-40184-A-5-B	UNK	03/27/13 07:26:40 pm	-0.022	-54	6.69		1.00	1.00	1.00
280-40184-A-6-B	UNK	03/27/13 07:28:59 pm	-0.022	-55	6.57		1.00	1.00	1.00
280-40306-C-1-A	UNK	03/27/13 07:31:19 pm	-0.015	23	4.08		1.00	1.00	1.00
280-40306-C-2-A	UNK	03/27/13 07:33:39 pm	0.041	664	0.52		1.00	1.00	1.00
CCV 1960039	CCV	03/27/13 07:35:59 pm	4.854	55220	0.23		1.00	1.00	1.00
% Recovery 97.08									
CCB	CCB	03/27/13 07:38:16 pm	-0.024	-80	2.44		1.00	1.00	1.00
280-40306-C-3-A	UNK	03/27/13 07:40:34 pm	-0.018	-2	101.74		1.00	1.00	1.00
280-40306-C-4-A	UNK	03/27/13 07:42:52 pm	-0.019	-16	8.72		1.00	1.00	1.00
280-40306-C-5-A	UNK	03/27/13 07:45:11 pm	-0.019	-16	19.92		1.00	1.00	1.00
280-40197-A-4-C	UNK	03/27/13 07:47:29 pm	-0.019	-21	13.41		1.00	1.00	1.00
280-40197-A-6-C	UNK	03/27/13 07:49:47 pm	-0.019	-16	23.40		1.00	1.00	1.00
LB 280-166444/1-G	UNK	03/27/13 07:52:05 pm	-0.008	111	1.97		1.00	1.00	1.00
LCS 280-166444/2-G	UNK	03/27/13 07:54:24 pm	5.167	58763	1.03		1.00	1.00	1.00
280-40243-A-1-I	UNK	03/27/13 07:56:42 pm	-0.010	85	0.42		1.00	1.00	1.00
280-40244-A-1-C	UNK	03/27/13 07:59:02 pm	-0.019	-18	7.64		1.00	1.00	1.00
280-40244-A-2-D	UNK	03/27/13 08:01:21 pm	-0.020	-35	3.70		1.00	1.00	1.00
CCV 1960039	CCV	03/27/13 08:03:41 pm	4.855	55230	1.07		1.00	1.00	1.00
% Recovery 97.10									

Sample Name	Type	Date/Time	Conc (ppb)	µAbs	%RSD	Flags	Wt.	Vol.	ODF
CCB	CCB	03/27/13 08:05:58 pm	-0.022	-49	5.02		1.00	1.00	1.00
280-40248-A-2-E	UNK	03/27/13 08:08:18 pm	-0.015	31	4.62		1.00	1.00	1.00
280-40248-A-3-G	UNK	03/27/13 08:10:38 pm	-0.019	-17	14.98		1.00	1.00	1.00
280-40248-A-4-E	UNK	03/27/13 08:12:56 pm	-0.019	-18	12.38		1.00	1.00	1.00
280-40279-C-1-G	UNK	03/27/13 08:15:15 pm	-0.011	68	3.20		1.00	1.00	1.00
280-40280-E-1-L	UNK	03/27/13 08:17:33 pm	0.031	552	0.90		1.00	1.00	1.00
280-40280-E-1-L sd@5	UNK	03/27/13 08:19:51 pm	-0.010	88	3.48		1.00	1.00	1.00
280-40280-E-1-M MS	UNK	03/27/13 08:22:10 pm	0.528	6183	6.93	s	1.00	1.00	1.00
280-40280-E-1-N MSD	UNK	03/27/13 08:24:28 pm	0.419	4948	0.66		1.00	1.00	1.00
LB 280-165163/1-F	UNK	03/27/13 08:26:47 pm	-0.018	-11	17.24		1.00	1.00	1.00
LCS 280-165163/2-F	UNK	03/27/13 08:29:06 pm	5.417	61594	0.16		1.00	1.00	1.00
CCV 1960039 % Recovery 97.26	CCV	03/27/13 08:31:26 pm	4.863	55323	0.16		1.00	1.00	1.00
CCB	CCB	03/27/13 08:33:43 pm	-0.023	-69	5.93		1.00	1.00	1.00
280-39981-A-3-L	UNK	03/27/13 08:36:02 pm	-0.021	-45	3.19		1.00	1.00	1.00
280-39981-A-3-L sd@5	UNK	03/27/13 08:38:22 pm	-0.022	-54	4.13		1.00	1.00	1.00
280-39981-A-3-M MS	UNK	03/27/13 08:40:41 pm	5.320	60503	0.76		1.00	1.00	1.00
280-39981-A-3-N MSD	UNK	03/27/13 08:43:01 pm	5.063	57586	0.22		1.00	1.00	1.00

Sample Name	Type	Date/Time	Conc (ppb)	µAbs	%RSD	Flags	Wt.	Vol.	ODF
LB 280-165617/1-F	UNK	03/27/13 08:45:20 pm	-0.021	-40	2.47		1.00	1.00	1.00
LCS 280-165617/2-G	UNK	03/27/13 08:47:38 pm	5.143	58494	0.25		1.00	1.00	1.00
280-40034-E-1-R	UNK	03/27/13 08:49:57 pm	-0.023	-61	4.10		1.00	1.00	1.00
280-40034-E-1-R sd@5	UNK	03/27/13 08:52:16 pm	-0.022	-52	2.89		1.00	1.00	1.00
280-40034-E-1-S MS	UNK	03/27/13 08:54:34 pm	5.429	61742	0.12		1.00	1.00	1.00
280-40034-E-1-T MSD	UNK	03/27/13 08:56:53 pm	4.987	56730	0.09		1.00	1.00	1.00
CCV 1960039 % Recovery 96.45	CCV	03/27/13 08:59:13 pm	4.822	54859	0.21		1.00	1.00	1.00
CCB	CCB	03/27/13 09:01:30 pm	-0.024	-75	1.31		1.00	1.00	1.00
LB3 280-166282/1-D	UNK	03/27/13 09:03:49 pm	-0.019	-20	19.27		1.00	1.00	1.00
LCS 280-166282/2-D	UNK	03/27/13 09:06:08 pm	4.799	54591	0.22		1.00	1.00	1.00
280-40195-A-1-G	UNK	03/27/13 09:08:27 pm	-0.021	-38	4.21		1.00	1.00	1.00
280-40195-A-2-G	UNK	03/27/13 09:10:46 pm	-0.021	-41	4.99		1.00	1.00	1.00
280-40195-A-2-G sd@5	UNK	03/27/13 09:13:06 pm	-0.022	-52	3.51		1.00	1.00	1.00
280-40195-A-2-H MS	UNK	03/27/13 09:15:26 pm	4.834	54987	0.17		1.00	1.00	1.00
280-40195-A-2-I MSD	UNK	03/27/13 09:17:45 pm	4.844	55109	0.11		1.00	1.00	1.00
MB 280-166437/1-A	UNK	03/27/13 09:20:04 pm	-0.024	-71	3.35		1.00	1.00	1.00
LCS 280-166437/2-A	UNK	03/27/13 09:22:23 pm	4.806	54675	1.12		1.00	1.00	1.00

Sample Name	Type	Date/Time	Conc (ppb)	µAbs	%RSD	Flags	Wt.	Vol.	ODF
LCSD 280-166437/3-A	UNK	03/27/13 09:24:42 pm	4.819	54821	0.28		1.00	1.00	1.00
CCV 1960039	CCV	03/27/13 09:27:02 pm	4.821	54841	0.25		1.00	1.00	1.00
% Recovery 96.41									
CCB	CCB	03/27/13 09:29:19 pm	-0.022	-51	5.89		1.00	1.00	1.00
280-40247-A-1-B	UNK	03/27/13 09:31:38 pm	-0.008	106	2.25		1.00	1.00	1.00
280-40247-A-2-B	UNK	03/27/13 09:33:57 pm	0.069	984	0.14		1.00	1.00	1.00
280-40247-A-3-B	UNK	03/27/13 09:36:16 pm	0.004	247	1.05		1.00	1.00	1.00
280-40247-A-4-B	UNK	03/27/13 09:38:35 pm	0.067	958	0.19		1.00	1.00	1.00
280-40247-A-5-B	UNK	03/27/13 09:40:54 pm	0.006	264	0.48		1.00	1.00	1.00
280-40247-A-6-B	UNK	03/27/13 09:43:13 pm	-0.009	96	3.31		1.00	1.00	1.00
280-40247-A-7-B	UNK	03/27/13 09:45:33 pm	0.016	383	1.77		1.00	1.00	1.00
280-40247-A-8-B	UNK	03/27/13 09:47:53 pm	0.127	1640	0.20		1.00	1.00	1.00
280-40247-A-9-B	UNK	03/27/13 09:50:12 pm	-0.003	167	1.37		1.00	1.00	1.00
CCV 1960039	CCV	03/27/13 09:52:32 pm	4.832	54963	0.19		1.00	1.00	1.00
% Recovery 96.63									
CCB	CCB	03/27/13 09:54:49 pm	-0.023	-59	2.76		1.00	1.00	1.00
Ultra stock @ 5ppb	UNK	03/27/13 09:57:08 pm	4.874	55449	0.17		1.00	1.00	1.00
Inorganic Venture stock @ 4ppb	UNK	03/27/13 09:59:28 pm	4.033	45915	0.24		1.00	1.00	1.00
CCV 1960039	CCV	03/27/13 10:01:48 pm	4.949	56291	0.34		1.00	1.00	1.00
% Recovery 98.97									

Sample Name	Type	Date/Time	Conc (ppb)	µAbs	%RSD	Flags	Wt.	Vol. ODF
CCB	CCB	03/27/13 10:04:05 pm	-0.023	-68	3.74		1.00 1.00	1.00

Analysis Parameters

Instrument M-7500 Mercury Analyzer

Conditions

Gas flow (mL/min)	Sample Uptake (s)	Rinse (s)	Read delay (s)	Replicates (#)	Replicate time (s)	Pump speed (%)	Wavelength (nm)
100	40.00	90.00	63.00	4	1.50	50	253.65

Instrumental Zero

Zero before first sample: No

Zero periodically: Yes

Before each calibration.

Baseline Correction

#1 Start time (s)	#1 End time (s)	#2 Start time (s)	#2 End time (s)
20.00	24.00		

Standby Mode

Enabled: Yes

Standby Options: pump slow

Autodilution

Enabled: No

Condition:

Tube # range:

If no autodilution tubes remaining

Calibration

Settings

Algorithm	Through blank	Weighted fit	Cal. Type	Racalibration rate	Reslope rate	Reslope standard
Linear	No	No	Normal	0	0	N/A

Limits

Calibration slope		Reslope		Coeff. of Determination
Lower (%)	Upper (%)	Lower (%)	Upper (%)	
20	150	75	125	0.99500

Error action: Flag and continue

QC

GLP Override: Yes

QC Tests

CCB

Concentration (ppb)
0.1000

Failure flag: Q

Error action for manually inserted QC: Stop analysis

ICB

Concentration (ppb)
0.0500

Failure flag: Z

Error action for manually inserted QC: Stop analysis

CCV

Concentration (ppb)	Low Limit %	High Limit %
5.0000	80.0000	120.0000

Failure flag: Q

Error action for manually inserted QC: Stop analysis

ICV

Concentration (ppb)	Low Limit %	High Limit %
4.0000	94.6000	110.4000

Failure flag: Q

Error action for manually inserted QC: Stop analysis

CRDL

Concentration (ppb)	Low Limit %	High Limit %
0.2000	50.0000	150.0000

Failure flag: Y

Error action for manually inserted QC: Stop analysis

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

*** ULTRAgrade™ Solution**
Mercury ICP Standard
1000 µg/mL

Catalog Number: ICP-080
Lot Number: P00139
Job Number: J00014228
Lot Issue Date: 02/10/2012
Expiration Date: 03/31/2019

Starting Material:	Mercuric Nitrate
Starting Material Purity:	99.999%
Starting Material Lot No.:	NT04717
Matrix:	2% nitric acid in low TOC water (< 50 ppb)
Atomic Weight Hg:	200.61

* light sensitive

Certified Value: 1002 ± 2 µg/mL

This Certified Reference Material (CRM) was manufactured and verified in accordance with ULTRA's ISO 9001 registered quality system. The analyte concentrations were verified by our ISO 17025 accredited laboratory to be within ± 2.5%, when compared to calibration standards independently prepared using NIST SRM(s). The certified value and uncertainty value at the 95% confidence level for each analyte is determined gravimetrically.

Classical Wet Assay Method: Theoretical, based on gravimetric measurements

Confirmation by Inductively Coupled Plasma Spectroscopy (ICP / ICP-MS) vs. NIST SRM 3133

ULTRA uses purified acids, 18 megohm double deionized water, calibrated Class A glassware and cleaned bottles in the manufacture of ULTRAgrade standards. Balances used in the manufacture of this standard are calibrated with weights traceable to NIST in compliance with ANSI/NCSL Z-540-1 and ISO 9001.

Trace Metallic Impurities in Solution Standard in µg/mL:

*	Al	<0.005	ND	*	Ga	<0.005	ND	n	Nb			n	S		
*	Sb	<0.005	ND	n	Ge			n	Os			n	Ta		
*	As	<0.005	ND	n	Au			*	Pd	<0.005	ND	n	Te		
*	Ba	<0.005	ND	n	Hf			*	P	<0.005	ND	n	Tb		
*	Be	<0.005	ND	n	Ho			*	Pt	<0.005	ND	*	Tl	<0.005	ND
*	Bi	<0.005	ND	*	In	<0.005	ND	*	K	<0.005	ND	n	Th		
*	B	<0.005	ND	n	Ir			n	Pr			n	Tm		
*	Cd	<0.005	ND	*	Fe	<0.005	ND	n	Re			*	Sn	<0.005	ND
*	Ca	<0.005	ND	*	La	<0.005	ND	n	Rh			*	Ti	<0.005	ND
n	Ce			*	Pb	<0.005	ND	n	Rb			n	W		
n	Cs			*	Li	<0.005	ND	n	Ru			n	U		
*	Cr	<0.005	ND	n	Lu			n	Sm			*	V	<0.005	ND
*	Co	<0.005	ND	*	Mg	<0.005	ND	n	Sc			n	Yb		
*	Cu	<0.005	ND	*	Mn	<0.005	ND	*	Se	<0.005	ND	n	Y		
n	Dy			s	Hg			*	Si	<0.005	ND	*	Zn	<0.005	ND
*	Er	<0.005	ND	*	Mo	<0.005	ND	*	Ag	<0.005	ND	n	Zr		
*	Eu	<0.005	ND	n	Nd			*	Na	<0.005	ND				
*	Gd	<0.005	ND	*	Ni	<0.005	ND	*	Sr	<0.005	ND				

* - element checked for
ND - not detected

i - spectral interference
D - detected

n - not checked for
s - solution standard element

Density of Solution (measured at 20.00°C ± 0.05°C): 1.0102 g/mL

ACCREDITED

ISO 17025:2005
Accredited
A2LA
Cert. No. 0851.01

ISO 9001:2000
Registered
TUV USA, Inc.
Cert. No. 06-1004

William J. Leary
Quality Assurance Manager

250 Smith Street, North Kingstown, RI 02852 USA
Ph: 401-294-9400 * Fax: 401-295-2330
www.ultrasci.com

05/29/2013

Sample Name: x1998782@100 Acquired: 4/19/2013 14:50:02 Type: Unk
Method: 6500_026(v6) Mode: CONC Corr. Factor: 1.000000
User: bowenh Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al1670	As1890	B_2089	Ba4554	Be3130	Bi2230	Ca3179	Cd2288
Line	328.068 {103}	167.079 {502}	189.042 {478}	208.959 {461}	455.403 { 74}	313.042 {108}	223.061 {451}	317.933 {106}	228.802 {447}
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.00012**	**-.00014**	**.00203**	**.00611**	**-.00002**	**.00001**	**-.00306**	**.03403**	**-.00007**
Stddev	.00019	.00032	.00075	.00063	.00104	.00009	.00097	.00170	.00001
%RSD	160.19	220.98	36.953	10.230	5652.9	1293.4	31.725	4.9896	7.3736
#1	.00002	-.00037	.00150	.00655	-.00075	-.00006	-.00374	.03283	-.00008
#2	-.00025	.00008	.00256	.00567	.00071	.00007	-.00237	.03523	-.00007
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu3247	Fe2599	K_7664	Li6707	Mg2790	Mn2576	Mo2020
Line	228.616 {447}	205.552 {464}	324.754 {104}	259.940 {130}	766.490 { 44}	670.784 { 50}	279.079 {121}2	257.610 {131}	202.030 {467}
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.00019**	**-.00002**	**.00020**	**.00021**	**.02742**	**.00182**	**.02179**	**.00002**	**.00382**
Stddev	.00015	.00009	.00023	.00695	.02699	.00010	.00030	.00003	.00038
%RSD	78.321	382.03	114.55	3342.6	98.426	5.3766	1.3944	125.94	9.8637
#1	-.00029	-.00008	.00004	.00512	.00834	.00175	.02200	.00004	.00356
#2	-.00008	.00004	.00036	-.00470	.04650	.00189	.02157	.00000	.00409
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2316	P_1782	Pb2203	S_1820	Sb2068	Se1960	Si2881	Sn1899
Line	589.592 { 57}	231.604 {446}	178.284 {489}	220.353 {453}	182.034 {485}	206.833 {463}	196.090 {472}	288.158 {117}	189.989 {477}
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.58901**	**.00219**	**.00196**	**.00078**	**.32890**	**.00268**	**.00755**	**.02412**	**.00068**
Stddev	.02305	.00011	.00145	.00121	.00049	.00054	.00155	.01988	.00043
%RSD	3.9127	5.2412	74.242	154.44	.14967	20.254	20.482	82.435	62.471
#1	.60531	.00227	.00299	.00163	.32855	.00306	.00646	.03818	.00038
#2	.57271	.00211	.00093	-.00007	.32925	.00230	.00865	.01006	.00099
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Sr4077	Th2837	Ti3349	Tl1908	U_3701	V_2924	Zn2062	Zr3391
Line	407.771 { 83}	283.730 {119}	334.904 {101}	190.856 {477}	370.152 { 91}	292.402 {115}	206.200 {163}	339.198 { 99}
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.00182**	**-.00014**	**.00021**	**W 10.657**	**-.01411**	**.00018**	**.00200**	**-.00115**
Stddev	.00022	.00135	.00010	.021	.01121	.00022	.00033	.00221
%RSD	12.276	959.47	47.090	.19426	79.433	117.98	16.554	191.90
#1	.00198	.00081	.00028	10.642	-.00619	.00034	.00223	.00041
#2	.00166	-.00109	.00014	10.671	-.02204	.00003	.00176	-.00271
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Warn	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit				5.0000				
Low Limit				-.01000				

Int. Std.	Y_2243	Y_3600	Y_3774
Line	224.306 {450}	360.073 { 94}	377.433 { 89}
Units	Cts/S	Cts/S	Cts/S
Avg	**6957.9**	**89083.**	**2528.7**
Stddev	30.1	67.	22.6
%RSD	.43232	.07553	.89254
#1	6979.2	89036.	2512.8
#2	6936.6	89131.	2544.7

HIGH-PURITY STANDARDS
www.highpuritystandards.com

P.O. Box 41727
Charleston, SC 29423
Phone (843) 767-7900
Fax (843) 767-7906

Certificate of Analysis

Product Description:

1998782
ID: ICP ISAB 1B_00005
Exp:04/11/14 Prpd:HEB Opn:04/18/13
ICP ICSAB STD 1 SOL B H

Name:	ICS-AB STD #1
Part Number:	**SM-606-037** Solution B
Lot Number:	**1309814**
Matrix:	2% HNO_3
Purity:	99.99%

Certified Values:

Element	(mg/L)	SRM ID	SRM Lot#
Tl	1000 ± 5	3158	993012

The Certified values are based on gravimetric and volumetric preparation, and verified against SRM 3100 series developed by National Institute of Standards and Technology (NIST) via inductively coupled plasma optical emission spectrometry (ICP-OES) using an internal laboratory developed method. The uncertainty in the certified value is calculated for a 95% confidence interval and coverage factor *k* is about 2
* Refer to Traceability Information, Section d

Preparation Information:

The standard is generally prepared from single element standard solutions that are ISO Guide 34 certified reference materials. Highest purity source materials were purchased from qualified vendors per ISO 9001:2008 guidelines and assayed by ICP-OES for conformity prior to use. 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.

Traceability Information:

The traceability of this standard is maintained through an unbroken chain of comparisons to appropriate standards with suitable procedure and measurement uncertainties. The maintenance of the base and derived units of International System of Units (SI) with traceability of measurement results (contemporary metrology) to SI ensures their comparability over time as follows.

a. **Standard Weight and Analytical Balance**
The standard weights (NBS weights Inventory No 20231A) are calibrated every two years by South Carolina Metrology Laboratory that is a participant in "NIST Weights and Measures Measurement Assurance Program" with a certificate of measurement traceability to NIST primary standards.
The balances are calibrated yearly by the ISO 17025 accredited metrology service, and are verified weekly by an in-house method using standard weights.

b. **Volumetric Device**
The calibration of volumetric vessels is checked annually using the NBS 602 method.

High-Purity Standards is certified to ISO 9001:2008 and accredited to ISO/IEC 17025:2005 and ISO Guide 34:2009.

c. **Thermometer**
The standard thermometers are calibrated every year by the ISO 17025 accredited metrology service. The thermometers used in-house are verified against the standard thermometers yearly.

d. **Calibration Standards**
The Calibration Standards are traceable to SRM 3100 Series Spectrometric Standard Solutions or second sources.

Packaging and Storage Conditions:

The standard is packaged in a pre-cleaned polyethylene bottle. To maintain the integrity of this product, the solution should be kept tightly capped and stored under normal laboratory conditions.

Refer to Material Safety Datasheet (MSDS) for hazardous information.

Expiration Information:

The expiry date is guaranteed to be valid for twelve months from the shipping date provided. For this reason, standards from the same lot may have different expiration dates.

Preparation Date:	**April 8, 2013**
Shipped Date:	**April 11, 2013**
Expiration Date:	**April 11, 2014**
Certificate Issue Date:	**April 8, 2013**

Quality Information:

ISO/IEC 17025:2005 Accreditation
Certificate Number AT-1529

Vanny T. Yib,
Inorganic Laboratory Manager

Angel Sellers
Quality Manager

Sample Name: x1998781@100 Acquired: 4/19/2013 14:47:39 Type: Unk
Method: 6500_026(v6) Mode: CONC Corr. Factor: 1.000000
User: bowenh Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al1670	As1890	B_2089	Ba4554	Be3130	Bi2230	Ca3179	Cd2288
Line	328.068 {103}	167.079 {502}	189.042 {478}	208.959 {461}	455.403 { 74}	313.042 {108}	223.061 {451}	317.933 {106}	228.802 {447}
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00050	-.00018	2.0213	1.9820	-.00027	-.00004	-.00036	.00378	.00212
Stddev	.00021	.00002	.0050	.0026	.00016	.00002	.00046	.00558	.00008
%RSD	42.547	10.801	.24923	.13026	60.883	68.305	127.63	147.68	3.9707
#1	.00035	-.00016	2.0177	1.9802	-.00038	-.00005	-.00003	.00773	.00218
#2	.00065	-.00019	2.0248	1.9838	-.00015	-.00002	-.00068	-.00017	.00206
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu3247	Fe2599	K_7664	Li6707	Mg2790	Mn2576	Mo2020
Line	228.616 {447}	205.552 {464}	324.754 {104}	259.940 {130}	766.490 { 44}	670.784 { 50}	279.079 {121}2	257.610 {131}	202.030 {467}
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00031	-.00012	.00055	.00062	50.140	1.0051	.00119	-.00003	.99449
Stddev	.00018	.00005	.00012	.00006	.300	.0046	.00278	.00001	.00030
%RSD	56.468	38.328	21.536	10.444	.59750	.45364	233.37	48.274	.03006
#1	.00044	-.00009	.00063	.00066	50.352	1.0083	-.00077	-.00004	.99470
#2	.00019	-.00015	.00046	.00057	49.929	1.0018	.00315	-.00002	.99428
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na8183	Ni2316	P_1782	Pb2203	S_1820	Sb2068	Se1960	Si2881	Sn1899
Line	818.326 { 41}	231.604 {446}	178.284 {489}	220.353 {453}	182.034 {485}	206.833 {463}	196.090 {472}	288.158 {117}	189.989 {477}
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	49.388	-.00043	1.9814	-.00014	-.00586	1.0058	W 5.1427	.04861	.00082
Stddev	.247	.00032	.0072	.00022	.00064	.0061	.0170	.00683	.00043
%RSD	.49916	74.349	.36452	164.60	10.969	.60361	.33085	14.061	52.391
#1	49.563	-.00066	1.9763	-.00029	-.00631	1.0015	5.1307	.04378	.00052
#2	49.214	-.00021	1.9865	.00002	-.00540	1.0101	5.1547	.05344	.00113
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Warn	Chk Pass	Chk Pass
High Limit							5.0000		
Low Limit							-.00500		

Elem	Sr4077	Th2837	Ti3349	Tl1908	U_3701	V_2924	Zn2062	Zr3391
Line	407.771 { 83}	283.730 {119}	334.904 {101}	190.856 {477}	370.152 { 91}	292.402 {115}	206.200 {163}	339.198 { 99}
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.99778	.00032	.00035	.00047	.00492	.00020	.00184	-.00337
Stddev	.00537	.00300	.00013	.00151	.04355	.00062	.00020	.00279
%RSD	.53792	925.63	36.823	322.19	884.33	300.82	11.134	82.869
#1	1.0016	-.00180	.00026	.00153	.03572	-.00023	.00169	-.00534
#2	.99398	.00244	.00044	-.00060	-.02587	.00064	.00198	-.00139
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit								
Low Limit								

Int. Std.	Y_2243	Y_3600	Y_3774
Line	224.306 {450}	360.073 { 94}	377.433 { 89}
Units	Cts/S	Cts/S	Cts/S
Avg	6890.2	88175.	2530.1
Stddev	5.0	426.	18.3
%RSD	.07239	.48318	.72516
#1	6886.7	87873.	2517.1
#2	6893.7	88476.	2543.1

HIGH-PURITY STANDARDS
www.highpuritystandards.com

P.O. Box 41727
Charleston, SC 29423
Phone (843) 767-7900
Fax (843) 767-7906

Certificate of Analysis

Product Description:

Name:	ICS-AB STD #1
Part Number:	**SM-606-037**
	Solution A
Lot Number:	**1309813**
Matrix:	20% HCl
Purity:	99.96% - 99.9999%

1998781
ID: ICP ISAB STD1_00005
Exp:04/11/14 Prpd:HEB Opn:04/18/13
ICAP ICSAB STD 1 SOL A

Certified Values:

Element	(mg/L)	SRM ID	SRM Lot#	Element	(mg/L)	SRM ID	SRM Lot#
Sb	100.0 ± 0.6	3102a	061229	P	200.0 ± 1.2	3139a	060717
As	200 ± 2	3103a	100818	K	5000 ± 25	3141a	051220
B	200.0 ± 1.2	3107	070514	Se	500 ± 5	3149	100901
Li	100.0 ± 0.6	3129a	100714	Na	5000 ± 25	3152a	010728
Mo	100.0 ± 0.6	3134	891307	Sr	100.0 ± 0.5	3153a	990906

The Certified values are based on gravimetric and volumetric preparation, and verified against SRM 3100 series developed by National Institute of Standards and Technology (NIST) via inductively coupled plasma optical emission spectrometry (ICP-OES) using an internal laboratory developed method. The uncertainty in the certified value is calculated for a 95% confidence interval and coverage factor *k* is about 2
* Refer to Traceability Information, Section d

Preparation Information:

The standard is generally prepared from single element standard solutions that are ISO Guide 34 certified reference materials. Highest purity source materials were purchased from qualified vendors per ISO 9001:2008 guidelines and assayed by ICP-OES for conformity prior to use. 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.

Traceability Information:

The traceability of this standard is maintained through an unbroken chain of comparisons to appropriate standards with suitable procedure and measurement uncertainties. The maintenance of the base and derived units of International System of Units (SI) with traceability of measurement results (contemporary metrology) to SI ensures their comparability over time as follows.

a. **Standard Weight and Analytical Balance**
The standard weights (NBS weights Inventory No 20231A) are calibrated every two years by South Carolina Metrology Laboratory that is a participant in "NIST Weights and Measures Measurement Assurance Program" with a certificate of measurement traceability to NIST primary standards.
The balances are calibrated yearly by the ISO 17025 accredited metrology service, and are verified weekly by an in-house method using standard weights.

High-Purity Standards is certified to ISO 9001:2008 and accredited to ISO/IEC 17025:2005 and ISO Guide 34:2009.

b. **Volumetric Device**
The calibration of volumetric vessels is checked annually using the NBS 602 method.

c. **Thermometer**
The standard thermometers are calibrated every year by the ISO 17025 accredited metrology service. The thermometers used in-house are verified against the standard thermometers yearly.

d. **Calibration Standards**
The Calibration Standards are traceable to SRM 3100 Series Spectrometric Standard Solutions or second sources.

Packaging and Storage Conditions:

The standard is packaged in a pre-cleaned polyethylene bottle. To maintain the integrity of this product, the solution should be kept tightly capped and stored under normal laboratory conditions.

Refer to Material Safety Datasheet (MSDS) for hazardous information.

Expiration Information:

The expiry date is guaranteed to be valid for twelve months from the shipping date provided. For this reason, standards from the same lot may have different expiration dates.

Preparation Date:	**April 8, 2013**
Shipped Date:	**April 11, 2013**
Expiration Date:	**April 11, 2014**
Certificate Issue Date:	**April 8, 2013**

Quality Information:

ISO/IEC 17025:2005 Accreditation
Certificate Number AT-1529

Vanny T. Yib,
Inorganic Laboratory Manager

Angel Sellers
Quality Manager

Sample Name: x1998783@100 Acquired: 4/19/2013 14:52:29 Type: Unk
Method: 6500_026(v6) Mode: CONC Corr. Factor: 1.000000
User: bowenh Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al1670	As1890	B_2089	Ba4554	Be3130	Bi2230	Ca3179	Cd2288
Line	328.068 {103}	167.079 {502}	189.042 {478}	208.959 {461}	455.403 { 74}	313.042 {108}	223.061 {451}	317.933 {106}	228.802 {447}
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.00084**	**-.00030**	**.00215**	**.00404**	**-.00028**	**-.00016**	**-.00836**	**.00475**	**-.00015**
Stddev	.00098	.00009	.00071	.00020	.00046	.00005	.00033	.00142	.00017
%RSD	117.42	28.992	33.081	4.8702	163.50	30.928	3.9090	29.846	111.72
#1	-.00153	-.00036	.00265	.00417	.00004	-.00012	-.00813	.00575	-.00003
#2	-.00014	-.00024	.00164	.00390	-.00061	-.00019	-.00859	.00374	-.00027
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Co2286	Cr2055	Cu3247	Fe2599	K_7664	Li6707	Mg2790	Mn2576	Mo2020
Line	228.616 {447}	205.552 {464}	324.754 {104}	259.940 {130}	766.490 { 44}	670.784 { 50}	279.079 {121}2	257.610 {131}	202.030 {467}
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.00018**	**-.00012**	**.00033**	**-.00214**	**-.11983**	**.00221**	**-.00018**	**-.00002**	**.00010**
Stddev	.00008	.00005	.00004	.00379	.02555	.00064	.00164	.00001	.00009
%RSD	44.323	40.820	13.439	177.21	21.322	28.917	908.31	65.938	97.981
#1	.00012	-.00009	.00036	.00054	-.13790	.00266	-.00134	-.00003	.00003
#2	.00023	-.00016	.00030	-.00482	-.10176	.00176	.00098	-.00001	.00016
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Na5895	Ni2316	P_1782	Pb2203	S_1820	Sb2068	Se1960	Si2881	Sn1899
Line	589.592 { 57}	231.604 {446}	178.284 {489}	220.353 {453}	182.034 {485}	206.833 {463}	196.090 {472}	288.158 {117}	189.989 {477}
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**-.08468**	**-.00009**	**.00175**	**.00019**	**-.00309**	**.00330**	**-.00225**	**.04270**	**9.7859**
Stddev	.01128	.00022	.00127	.00015	.00019	.00023	.00003	.00828	.0111
%RSD	13.327	254.50	72.709	81.343	6.1232	6.8292	1.3922	19.395	.11352
#1	-.09266	-.00024	.00264	.00008	-.00296	.00314	-.00227	.03684	9.7780
#2	-.07670	.00007	.00085	.00030	-.00322	.00346	-.00223	.04855	9.7937
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	None	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit									
Low Limit									

Elem	Sr4077	Th2837	Ti3349	Tl1908	U_3701	V_2924	Zn2062	Zr3391
Line	407.771 { 83}	283.730 {119}	334.904 {101}	190.856 {477}	370.152 { 91}	292.402 {115}	206.200 {163}	339.198 { 99}
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	**.00012**	**-.00145**	**.94066**	**.00593**	**.01310**	**.00021**	**.00133**	**-.00050**
Stddev	.00013	.00024	.00050	.00147	.02461	.00016	.00017	.00244
%RSD	106.31	16.205	.05296	24.815	187.92	77.147	12.620	488.20
#1	.00003	-.00162	.94102	.00489	.03050	.00009	.00121	.00123
#2	.00021	-.00129	.94031	.00697	-.00431	.00032	.00145	-.00223
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit								
Low Limit								

Int. Std.	Y_2243	Y_3600	Y_3774
Line	224.306 {450}	360.073 { 94}	377.433 { 89}
Units	Cts/S	Cts/S	Cts/S
Avg	**6872.4**	**88430.**	**2503.7**
Stddev	25.1	304.	8.4
%RSD	.36516	.34386	.33432
#1	6890.2	88215.	2497.8
#2	6854.7	88645.	2509.6

HIGH-PURITY STANDARDS
www.highpuritystandards.com

P.O. Box 41727
Charleston, SC 29423
Phone (843) 767-7900
Fax (843) 767-7906

Certificate of Analysis

1998783
ID: ICP ISAB STD2_00005
Exp:04/11/14 Prpd:HEB Opn:04/18/13
ICP ICSAB STD 2 HP

Product Description:

Name:	ICS-AB STD #2
Part Number:	**SM-606-038**
Lot Number:	**1309815**
Matrix:	20% HCl
Purity:	99.98% - 99.9999%

Certified Values:

Element	(mg/L)	SRM ID	SRM Lot#	Element	(mg/L)	SRM ID	SRM Lot#
Sn	1000 ± 6	3161a	070330	Ti	100.0 ± 0.6	3162a	060808

The Certified values are based on gravimetric and volumetric preparation, and verified against SRM 3100 series developed by National Institute of Standards and Technology (NIST) via inductively coupled plasma optical emission spectrometry (ICP-OES) using an internal laboratory developed method. The uncertainty in the certified value is calculated for a 95% confidence interval and coverage factor *k* is about 2
* Refer to Traceability Information, Section d

Preparation Information:

The standard is generally prepared from single element standard solutions that are ISO Guide 34 certified reference materials. Highest purity source materials were purchased from qualified vendors per ISO 9001:2008 guidelines and assayed by ICP-OES for conformity prior to use. 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.

Traceability Information:

The traceability of this standard is maintained through an unbroken chain of comparisons to appropriate standards with suitable procedure and measurement uncertainties. The maintenance of the base and derived units of International System of Units (SI) with traceability of measurement results (contemporary metrology) to SI ensures their comparability over time as follows.

a. **Standard Weight and Analytical Balance**
The standard weights (NBS weights Inventory No 20231A) are calibrated every two years by South Carolina Metrology Laboratory that is a participant in "NIST Weights and Measures Measurement Assurance Program" with a certificate of measurement traceability to NIST primary standards.
The balances are calibrated yearly by the ISO 17025 accredited metrology service, and are verified weekly by an in-house method using standard weights.

b. **Volumetric Device**
The calibration of volumetric vessels is checked annually using the NBS 602 method.

High-Purity Standards is certified to ISO 9001:2008 and accredited to ISO/IEC 17025:2005 and ISO Guide 34:2009.

c. **Thermometer**
The standard thermometers are calibrated every year by the ISO 17025 accredited metrology service. The thermometers used in-house are verified against the standard thermometers yearly.

d. **Calibration Standards**
The Calibration Standards are traceable to SRM 3100 Series Spectrometric Standard Solutions or second sources.

Packaging and Storage Conditions:

The standard is packaged in a pre-cleaned polyethylene bottle. To maintain the integrity of this product, the solution should be kept tightly capped and stored under normal laboratory conditions.

Refer to Material Safety Datasheet (MSDS) for hazardous information.

Expiration Information:

The expiry date is guaranteed to be valid for twelve months from the shipping date provided. For this reason, standards from the same lot may have different expiration dates.

Preparation Date:	**April 8, 2013**
Shipped Date:	**April 11, 2013**
Expiration Date:	**April 11, 2014**
Certificate Issue Date:	**April 8, 2013**

Quality Information:

ISO/IEC 17025:2005 Accreditation
Certificate Number AT-1529

Vanny T. Yib,
Inorganic Laboratory Manager

Angel Sellers
Quality Manager

INORGANIC™ VENTURES

300 Technology Drive
Christiansburg, VA 24073 · USA
inorganicventures.com

tel: 800.669.6799 · 540.585.3030
fax: 540.585.3012
info@inorganicventures.com

CERTIFICATE OF ANALYSIS

1.0 **INORGANIC VENTURES** is an ISO Guide 34 "General Requirements for the Competence of Reference Material Producers" and ISO 9001 registered manufacturer. Our manufacturing laboratory is accredited to ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories."

ACCREDITED Testing Laboratory Certificate 883.01

ACCREDITED Reference Material Producer Certificate 883.02

2.0 **DESCRIPTION OF CRM** **Custom Solution**

Catalog No.: STLDEN-SPK-2A

Lot Number: **G2-MEB455133**

Matrix: 3% HNO3(v/v), 0.5% HF(v/v)

2007016
ID: ICP SPK 2A_00059
Exp:05/01/14 Prpd:HEB Opn:04/23/13
ICP PREP SPIKE 2A IV

1,000 µg/mL ea:
Si,

200 µg/mL ea:
Sn,

100 µg/mL ea:
B, Mo, Ti,

50 µg/mL ea:
Sb, Zr

3.0 **CERTIFIED VALUES AND UNCERTAINTIES**

ELEMENT	CERTIFIED VALUE	ELEMENT	CERTIFIED VALUE	ELEMENT	CERTIFIED VALUE
Antimony, Sb	50.00 ± 0.38 µg/mL	Boron, B	100.0 ± 0.7 µg/mL	Molybdenum, Mo	100.0 ± 0.7 µg/mL
Silicon, Si	1,000 ± 7 µg/mL	Tin, Sn	200.0 ± 1.4 µg/mL	Titanium, Ti	100.0 ± 0.7 µg/mL
Zirconium, Zr	50.00 ± 0.33 µg/mL				

Certified Density: 1.021 g/mL (measured at 20 ± 1° C)

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

$$\text{Certified Value } (\bar{x}) = \frac{\Sigma x_i}{n}$$

$(\bar{x})$ = mean
x_i = individual results
n = number of measurements

$$\text{Uncertainty } (\pm) = 2\,[\,\Sigma(s_i)^2\,]^{1/2}$$

2 = the coverage factor.
$[\,\Sigma(s_i)^2\,]^{1/2}$ = The square root of the sum of the squares of the most common errors (where 's' stands for the standard deviation) from instrumental measurement, density, NIST SRM uncertainty, weighing, dilution to volume, homogeneity, long term stability and short term stability.

4.0 TRACEBILITY TO NIST AND VALUES OBTAINED BY INDEPENDENT METHODS

· "Property of the result of a measurement or the value of a standard whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons all having stated uncertainties." (ISO VIM, 2nd ed., 1993, definition 6.10)

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

- The Calculated Value is a value calculated from the weight of a starting material that has been certified directly vs. a NIST SRM/RM. See section 4.2 for balance traceability.

4.1 ASSAY INFORMATION

ELEMENT	METHOD	NIST SRM#	SRM LOT#
B	ICP Assay	3107	070514
Mo	Calculated		See Sec. 4.2
Mo	ICP Assay	3134	891307
Sb	Calculated		See Sec. 4.2
Sb	ICP Assay	3102A	061229
Si	Calculated		See Sec. 4.2
Si	ICP Assay	3150	071204
Sn	Calculated		See Sec. 4.2
Sn	ICP Assay	3161a	070330
Ti	ICP Assay	3162a	060808
Zr	Calculated		See Sec. 4.2
Zr	ICP Assay	3169	071226

4.2 BALANCE CALIBRATION - All analytical balances are calibrated yearly by an accredited calibration laboratory and are traceable to a class E 2 analytical weight set with NIST Traceability. All balances are checked daily using an in-house procedure. The weights used for testing are annually compared to master weights and are traceable to the National Institute of Standards and Technology (NIST).

4.3 THERMOMETER CALIBRATION - All thermometers are NIST traceable through thermometers that are calibrated by an A2LA accredited calibration laboratory.

4.4 GLASSWARE CALIBRATION - An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM's.

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

6.0 INTENDED USE

For the calibration of analytical instruments including but not limited to the following:
HPLC, IC, TLC, ISE, IR, NMR, UV/VIS, MS, Capillary Electrophoresis, Potentiometry, Wet Chemistry and Voltammetry
For the validation of analytical methods
For the preparation of "working reference samples"
For interference studies and the determination of correction coefficients
For detection limit and linearity studies
For additional intended uses, contact Technical Staff

This CRM was manufactured using 18 megohm doubly deionized water that has been filtered through a 0.2 micron filter.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

Storage & Handling - Keep **Tightly** sealed when not in use. Store and use at 20 ± 4°C. **Do Not** pipette from the container. **Do Not** return portions removed from pipetting to container.

Element Specific Information - For specific information regarding any element: Contact technical staff.

Uranium Note: If uranium is present in this standard, it is natural abundance unless specified in Section 3.0.

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

8.0 HAZARDOUS INFORMATION - Please refer to the enclosed Material Safety Data sheet for information regarding this CRM.

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

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration
- SAI Global File Number 010105

10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration"
- Chemical Testing - Accredited A2LA Certificate Number 883.01

10.3 ISO/IEC Guide 34 "General Requirements for the Competence of Reference Material Producers"
- Reference Materials Production - Accredited A2LA Certificate Number 883.02

10.4 10CFR50 Appendix B - Nuclear Regulatory Commission
- Domestic Licensing of Production and Utilization Facilities

10.5 10CFR21 - Nuclear Regulatory Commission
- Reporting Defects and Non-Compliance

11.0 DATE OF CERTIFICATION AND PERIOD OF VALIDITY

11.1 Shelf Life - The period of time during which the concentration of the analyte(s) in a properly packaged, unopened, and unused standard stored under environmentally controlled and monitored conditions will remain within the specified uncertainty range. Shelf life is limited primarily by transpiration (loss of water from the solution) and infrequently, by chemical instability. Transpiration studies of chemically-stable solutions performed at the manufacturer's facility show a CRM shelf-life of twenty one months for solutions packaged in 125-mL low density polyethylene bottles. When stored under special conditions that minimize transpiration and instability, the shelf life can be extended past this limit.

11.2 Expiration Date - The date after which a CRM should not be used. Routine laboratory use of a CRM increases transpiration losses and the chance of contamination which affect the integrity of the CRM and limit its useful life. Manufacturer concurs with state and federal regulatory agencies' recommendations that solution standards be assigned a one-year expiration date.

11.3 Chemical Stability - Studies have been conducted on this or similar CRMs and it has been demonstrated that this CRM is chemically stable for a period of not less than two years provided the "Storage & Handling" conditions are followed that are described in section 7.0.

Certification Date: January 14, 2013

Expiration Date: EXPIRES 01 JAN 2014

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By: Donna Senn
Product Documentation Technician

Certificate Approved By: Brian Alexander
PhD., Technical Process Director

Certifying Officer: Paul Gaines
PhD., Senior Technical Director

INORGANIC VENTURES™
300 Technology Drive
Christiansburg, VA 24073 · USA
inorganicventures.com

tel: 800.669.6799 · 540.585.3030
fax: 540.585.3012
info@inorganicventures.com

CERTIFICATE OF ANALYSIS

1.0 **INORGANIC VENTURES** is an ISO Guide 34 "General Requirements for the Competence of Reference Material Producers" and ISO 9001 registered manufacturer. Our manufacturing laboratory is accredited to ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories."

ACCREDITED Testing Laboratory Certificate 883.01

ACCREDITED Reference Material Producer Certificate 883.02

2.0 **DESCRIPTION OF CRM** **Custom Solution**

Catalog No.: STLDEN-SPK-3A

Lot Number: **G2-MEB465153**

Matrix: 3% HNO3(v/v)

2007019
ID: ICP SPK 3A_00061
Exp:05/01/14 Prpd:HEB Opn:04/23/13
ICP PREP SPIKE 3A IV

5,000 µg/mL ea:
Ca, K, Mg, Na,

1,000 µg/mL ea:
P,

200 µg/mL ea:
Al, Ba, Bi, Se, Tl, U,

100 µg/mL ea:
As, Fe, Li, Sr, Th,

50 µg/mL ea:
Co, Mn, Ni, Pb, V, Zn,

25 µg/mL ea:
Cu,

20 µg/mL ea:
Cr3,

10 µg/mL ea:
Cd,

5 µg/mL ea:
Ag, Be

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ELEMENT	CERTIFIED VALUE	ELEMENT	CERTIFIED VALUE	ELEMENT	CERTIFIED VALUE
Aluminum, Al	200.1 ± 1.3 µg/mL	Arsenic, As	100.0 ± 0.7 µg/mL	Barium, Ba	200.0 ± 1.3 µg/mL
Beryllium, Be	5.004 ± 0.034 µg/mL	Bismuth, Bi	200.0 ± 1.3 µg/mL	Cadmium, Cd	10.00 ± 0.07 µg/mL
Calcium, Ca	5,000 ± 35 µg/mL	Chromium+3, Cr3	20.02 ± 0.13 µg/mL	Cobalt, Co	49.99 ± 0.33 µg/mL
Copper, Cu	24.98 ± 0.17 µg/mL	Iron, Fe	100.0 ± 0.6 µg/mL	Lead, Pb	49.99 ± 0.33 µg/mL
Lithium, Li	100.0 ± 0.7 µg/mL	Magnesium, Mg	5,000 ± 33 µg/mL	Manganese, Mn	50.02 ± 0.32 µg/mL
Nickel, Ni	49.99 ± 0.33 µg/mL	Phosphorus, P	1,000 ± 7 µg/mL	Potassium, K	5,000 ± 37 µg/mL
Selenium, Se	200.0 ± 1.3 µg/mL	Silver, Ag	4.996 ± 0.032 µg/mL	Sodium, Na	5,000 ± 34 µg/mL
Strontium, Sr	100.1 ± 0.6 µg/mL	Thallium, Tl	200.0 ± 1.3 µg/mL	Thorium, Th	100.0 ± 0.7 µg/mL
Uranium, U	200.0 ± 1.4 µg/mL	Vanadium, V	49.98 ± 0.35 µg/mL	Zinc, Zn	50.04 ± 0.33 µg/mL

Certified Density: 1.083 g/mL (measured at 20 ° C)

05/29/2013

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

Certified Value $(\bar{x}) = \frac{\sum x_i}{n}$

Uncertainty $(\pm) = 2\,[\,\Sigma(s_i)^2\,]^{1/2}$

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

2 = the coverage factor.

$[\,\Sigma(s_i)^2\,]^{1/2}$ = The square root of the sum of the squares of the most common errors (where 's' stands for the standard deviation) from instrumental measurement, density, NIST SRM uncertainty, weighing, dilution to volume, homogeneity, long term stability and short term stability.

Certified Abundance: The 235U in this standard is depleted. The Certified abundances in Atom % are as follows:

IV's Certified Abundance

Isotope		Atom%
Uranium	238U	99.6 ± 0.1
	235U	0.42 ± 0.05

4.0 TRACEBILITY TO NIST AND VALUES OBTAINED BY INDEPENDENT METHODS

· "Property of the result of a measurement or the value of a standard whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons all having stated uncertainties." (ISO VIM, 2nd ed., 1993, definition 6.10)

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

- The Calculated Value is a value calculated from the weight of a starting material that has been certified directly vs. a NIST SRM/RM. See section 4.2 for balance traceability.

ELEMENT	METHOD	NIST SRM#	SRM LOT#
Ag	ICP Assay	3151	992212
Ag	Volhard	999b	999b
Al	ICP Assay	3101a	060502
Al	EDTA	928	928
As	Calculated		See Sec. 4.2
As	ICP Assay	3103a	010713
Ba	Gravimetric		See Sec. 4.2
Ba	ICP Assay	3104a	070222
Be	Calculated		See Sec. 4.2
Be	ICP Assay	3105a	892707
Bi	Calculated		See Sec. 4.2
Bi	ICP Assay	3106	991212
Ca	ICP Assay	3109a	050825
Ca	EDTA	928	928
Cd	ICP Assay	3108	060531
Cd	EDTA	928	928
Co	ICP Assay	3113	00630
Co	EDTA	928	928
Cr3	Calculated		See Sec. 4.2
Cr3	ICP Assay	3112a	030730
Cu	ICP Assay	3114	011017
Cu	EDTA	928	928
Fe	ICP Assay	3126a	051031
Fe	EDTA	928	928
K	Gravimetric		See Sec. 4.2
K	ICP Assay	3141a	051220
Li	Gravimetric		See Sec. 4.2
Li	ICP Assay	3129a	100714
Mg	ICP Assay	3131a	050302
Mg	EDTA	928	928
Mn	ICP Assay	3132	050429
Mn	EDTA	928	928
Na	Gravimetric		See Sec. 4.2
Na	ICP Assay	3152a	010728
Ni	ICP Assay	3136	000612
Ni	EDTA	928	928
P	ICP Assay	3139a	060717
P	Acidimetric	84L	84L
Pb	ICP Assay	3128	101026
Pb	EDTA	928	928
Se	Calculated		See Sec. 4.2
Se	ICP Assay	3149	992106
Sr	ICP Assay	3153a	990906
Sr	EDTA	928	928
Th	ICP Assay	3159	992912

Th	EDTA	928	928
Tl	Calculated		See Sec. 4.2
Tl	ICP Assay	3158	993012
U	Calculated		See Sec. 4.2
U	ICP Assay	3164	891509
V	ICP Assay	3165	992706
V	EDTA	928	928
Zn	ICP Assay	3168a	080123
Zn	EDTA	928	928

4.2 BALANCE CALIBRATION - All analytical balances are calibrated yearly by an accredited calibration laboratory and are traceable to a class E 2 analytical weight set with NIST Traceability. All balances are checked daily using an in-house procedure. The weights used for testing are annually compared to master weights and are traceable to the National Institute of Standards and Technology (NIST).

4.3 THERMOMETER CALIBRATION - All thermometers are NIST traceable through thermometers that are calibrated by an A2LA accredited calibration laboratory.

4.4 GLASSWARE CALIBRATION - An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM's.

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

6.0 INTENDED USE

For the calibration of analytical instruments including but not limited to the following:
HPLC, IC, TLC, ISE, IR, NMR, UV/VIS, MS, Capillary Electrophoresis, Potentiometry, Wet Chemistry and Voltammetry
For the validation of analytical methods
For the preparation of "working reference samples"
For interference studies and the determination of correction coefficients
For detection limit and linearity studies
For additional intended uses, contact Technical Staff

This CRM was manufactured using 18 megohm doubly deionized water that has been filtered through a 0.2 micron filter.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

Storage & Handling - Keep **Tightly** sealed when not in use. Store and use at 20 ± 4°C. **Do Not** pipette from the container. **Do Not** return portions removed from pipetting to container.

Element Specific Information - For specific information regarding any element: Contact technical staff.

Uranium Note: If uranium is present in this standard, it is natural abundance unless specified in Section 3.0.

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

8.0 HAZARDOUS INFORMATION - Please refer to the enclosed Material Safety Data sheet for information regarding this CRM.

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

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration
- SAI Global File Number 010105

10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration"
- Chemical Testing - Accredited A2LA Certificate Number 883.01

10.3 ISO/IEC Guide 34 "General Requirements for the Competence of Reference Material Producers"
- Reference Materials Production - Accredited A2LA Certificate Number 883.02

10.4 10CFR50 Appendix B - Nuclear Regulatory Commission
- Domestic Licensing of Production and Utilization Facilities

10.5 10CFR21 - Nuclear Regulatory Commission
- Reporting Defects and Non-Compliance

11.0 DATE OF CERTIFICATION AND PERIOD OF VALIDITY

11.1 Shelf Life - The period of time during which the concentration of the analyte(s) in a properly packaged, unopened, and unused standard stored under environmentally controlled and monitored conditions will remain within the specified uncertainty range. Shelf life is limited primarily by transpiration (loss of water from the solution) and infrequently, by chemical instability. Transpiration studies of chemically-stable solutions performed at the manufacturer's facility show a CRM shelf-life of twenty one months for solutions packaged in 125-mL low density polyethylene bottles. When stored under special conditions that minimize transpiration and instability, the shelf life can be extended past this limit.

11.2 Expiration Date - The date after which a CRM should not be used. Routine laboratory use of a CRM increases transpiration losses and the chance of contamination which affect the integrity of the CRM and limit its useful life. Manufacturer concurs with state and federal regulatory agencies' recommendations that solution standards be assigned a one-year expiration date.

11.3 Chemical Stability - Studies have been conducted on this or similar CRMs and it has been demonstrated that this CRM is chemically stable for a period of not less than two years provided the "Storage & Handling" conditions are followed that are described in section 7.0.

Certification Date: March 20, 2013

Expiration Date: EXPIRES 01 MAY 2014

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By: Zach Saunders
Product Documentation Technician

Certificate Approved By: Brian Alexander
PhD., Technical Process Director

Certifying Officer: Paul Gaines
PhD., Senior Technical Director

Sample Name: X1806909@100 Acquired: 12/26/2012 17:05:36 Type: Unk
Method: 6500_025(v35) Mode: CONC Corr. Factor: 1.000000
User: ltrudell Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280	Al3092	As1890	B_2089	Ba4554
Line	328.068 {103}	309.271 {109}	189.042 {478}	208.959 {461}	455.403 { 74}
Units	ppm	ppm	ppm	ppm	ppm
Avg	-.00020	50.198	.00238	.00083	.00082
Stddev	.00146	.349	.00004	.00025	.00023
%RSD	721.07	.69445	1.6852	30.761	28.467
#1	-.00124	49.952	.00235	.00065	.00065
#2	.00083	50.445	.00241	.00101	.00098
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit					
Low Limit					

Elem	Be3130	Bi2230	Ca3179	Cd2288	Co2286
Line	313.042 {108}	223.061 {451}	317.933 {106}	228.802 {447}	228.616 {447}
Units	ppm	ppm	ppm	ppm	ppm
Avg	-.00013	-.00170	45.642	.00055	-.00010
Stddev	.00007	.00105	.429	.00001	.00019
%RSD	50.899	61.437	.93890	1.7547	195.18
#1	-.00018	-.00096	45.339	.00056	-.00024
#2	-.00008	-.00244	45.945	.00054	.00004
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit					
Low Limit					

Elem	Cr2055	Cu3247	Fe2599	K_7664	Li6707
Line	205.552 {464}	324.754 {104}	259.940 {130}	766.490 { 44}	670.784 { 50}
Units	ppm	ppm	ppm	ppm	ppm
Avg	.00034	-.00269	17.743	.00869	.00236
Stddev	.00027	.00001	.158	.03518	.00216
%RSD	80.058	.48589	.89263	404.87	91.408
#1	.00053	-.00268	17.631	-.01619	.00083
#2	.00015	-.00270	17.855	.03356	.00389
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit					
Low Limit					

Sample Name: X1806909@100 Acquired: 12/26/2012 17:05:36 Type: Unk
Method: 6500_025(v35) Mode: CONC Corr. Factor: 1.000000
User: ltrudell Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Mg2790	Mn2576	Mo2020	Na5895	Ni2316
Line	279.079 {121}2	257.610 {131}	202.030 {467}	589.592 { 57}	231.604 {446}
Units	ppm	ppm	ppm	ppm	ppm
Avg	45.420	.00003	-.00009	.25839	-.00037
Stddev	.075	.00006	.00023	.01146	.00012
%RSD	.16413	226.75	253.04	4.4355	32.513
#1	45.367	.00007	.00007	.26650	-.00028
#2	45.472	-.00002	-.00025	.25029	-.00045
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit					
Low Limit					

Elem	P_1782	Pb2203	S_1820	Sb2068	Se1960
Line	178.284 {489}	220.353 {453}	182.034 {485}	206.833 {463}	196.090 {472}
Units	ppm	ppm	ppm	ppm	ppm
Avg	-.00811	.00068	.01262	.00101	-.00197
Stddev	.00044	.00051	.00212	.00185	.00836
%RSD	5.4414	75.013	16.780	183.51	424.60
#1	-.00780	.00105	.01411	-.00030	-.00788
#2	-.00843	.00032	.01112	.00231	.00394
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit					
Low Limit					

Elem	Si2881	SiO2	Sn1899	Sr4077	Th2837
Line	288.158 {117}	288.158 {117}2	189.989 {477}	407.771 { 83}	283.730 {119}
Units	ppm	ppm	ppm	ppm	ppm
Avg	.00549	.01175	-.00022	.00025	.00177
Stddev	.00029	.00061	.00058	.00018	.00011
%RSD	5.2308	5.2308	261.14	74.000	6.1527
#1	.00570	.01219	.00019	.00038	.00185
#2	.00529	.01132	-.00063	.00012	.00170
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit					
Low Limit					

Sample Name: X1806909@100 Acquired: 12/26/2012 17:05:36 Type: Unk
Method: 6500_025(v35) Mode: CONC Corr. Factor: 1.000000
User: ltrudell Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ti3349	Tl1908	U_3701	V_2924	Zn2062
Line	334.904 {101}	190.856 {477}	370.152 { 91}	292.402 {115}	206.200 {163}
Units	ppm	ppm	ppm	ppm	ppm
Avg	-.00059	-.00036	.02290	.00100	.00132
Stddev	.00002	.00040	.01322	.00020	.00030
%RSD	2.9784	110.90	57.744	19.621	22.478
#1	-.00060	-.00008	.03225	.00086	.00153
#2	-.00057	-.00065	.01355	.00113	.00111
Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit					
Low Limit					

Elem	Zr3391
Line	339.198 { 99}
Units	ppm
Avg	-.00242
Stddev	.00289
%RSD	119.80
#1	-.00037
#2	-.00446
Check ?	Chk Pass
High Limit	
Low Limit	

Int. Std.	Y_2243	Y_3600	Y_3774
Line	224.306 {450}	360.073 { 94}	377.433 { 89}
Units	Cts/S	Cts/S	Cts/S
Avg	6106.6	62134.	4937.4
Stddev	26.8	494.	13.9
%RSD	.43837	.79436	.28174
#1	6087.7	62483.	4947.2
#2	6125.6	61785.	4927.5

INORGANIC VENTURES™
300 Technology Drive
Christiansburg, VA 24073 • USA
inorganicventures.com

CERTIFICATE OF ANALYSIS

tel: 800.669.6799 • 540.585.3030
fax: 540.585.3012
info@inorganicventures.com

1.0 **INORGANIC VENTURES** is an ISO Guide 34 "General Requirements for the Competence of Reference Material Producers" and ISO 9001 registered manufacturer. Our manufacturing laboratory is accredited to ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories."

ACCREDITED Testing Laboratory Certificate 883.01

ACCREDITED Reference Material Producer Certificate 883.02

2.0 **DESCRIPTION OF CRM** Stock Solution

Catalog No.: CLPP-ICS-A

Lot Number: **F2-MEB414132**

Matrix: 2% HNO3(v/v)

1809609
ID: Icp stk ICSA_00007
Exp:01/01/14 Prpd:HEB Opn:12/19/12
ICP stock ICSA solution

5,000 µg/mL ea:
Al, Ca, Mg,

2,000 µg/mL ea:
Fe

3.0 CERTIFIED VALUES AND UNCERTAINTIES

ELEMENT	CERTIFIED VALUE	ELEMENT	CERTIFIED VALUE	ELEMENT	CERTIFIED VALUE
Aluminum, Al	5,000 ± 35 µg/mL	Calcium, Ca	5,000 ± 32 µg/mL	Iron, Fe	2,000 ± 10 µg/mL
Magnesium, Mg	5,000 ± 33 µg/mL				

Certified Density: 1.085 g/mL (measured at 20 ± 1° C)

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

$$\text{Certified Value } (\bar{x}) = \frac{\Sigma x_i}{n}$$

$$\text{Uncertainty } (\pm) = 2\,[\,\Sigma(s_i)^2\,]^{1/2}$$

$(\bar{x})$ = mean
x_i = individual results
n = number of measurements
2 = the coverage factor.
$[\,\Sigma(s_i)^2\,]^{1/2}$ = The square root of the sum of the squares of the most common errors (where 's' stands for the standard deviation) from instrumental measurement, density, NIST SRM uncertainty, weighing, dilution to volume, homogeneity, long term stability and short term stability.

4.0 TRACEBILITY TO NIST AND VALUES OBTAINED BY INDEPENDENT METHODS

· "Property of the result of a measurement or the value of a standard whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons all having stated uncertainties." (ISO VIM, 2nd ed., 1993, definition 6.10)

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

4.1 ASSAY INFORMATION

ELEMENT	METHOD	NIST SRM#	SRM LOT#	ELEMENT	METHOD	NIST SRM#	SRM LOT#
Al	ICP Assay	3101a	060502	Al	EDTA	928	928
Ca	ICP Assay	3109a	050825	Ca	EDTA	928	928
Fe	ICP Assay	3126a	051031	Fe	EDTA	928	928
Mg	ICP Assay	3131a	050302	Mg	EDTA	928	928

4.2 BALANCE CALIBRATION - All analytical balances are calibrated yearly by an A2LA accredited calibration laboratory and are traceable to a class E 2 analytical weight set with NIST Traceability. All balances are checked daily using an in-house procedure. The weights used for testing are annually compared to master weights and are traceable to the National Institute of Standards and Technology (NIST).

4.3 THERMOMETER CALIBRATION - All thermometers are NIST traceable through thermometers that are calibrated by an A2LA accredited calibration laboratory.

4.4 GLASSWARE CALIBRATION - An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM's.

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

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

s	Al		M	Dy	< 0.006003	O	Li	0.016000	M	Pr	< 0.000300	M	Te	< 0.030013
M	Sb	< 0.000500	M	Er	< 0.005002	M	Lu	< 0.000400	M	Re	< 0.001000	M	Tb	< 0.000300
M	As	< 0.010004	M	Eu	< 0.003001	s	Mg		M	Rh	< 0.001000	M	Tl	< 0.001000
O	Ba	< 0.000300	M	Gd	< 0.001000	O	Mn	< 0.000030	M	Rb	< 0.001000	M	Th	< 0.001000
O	Be	< 0.000600	M	Ga	< 0.001000	O	Hg	< 0.015000	M	Ru	< 0.002001	M	Tm	< 0.000400
M	Bi	0.007003	i	Ge		M	Mo	< 0.002001	M	Sm	< 0.001000	M	Sn	< 0.005002
O	B	< 0.000600	O	Au	< 0.003000	M	Nd	< 0.002001	O	Sc	< 0.000023	O	Ti	< 0.001300
M	Cd	< 0.003001	M	Hf	< 0.002001	O	Ni	< 0.002300	O	Se	< 0.050000	M	W	< 0.010004
s	Ca		M	Ho	< 0.000500	M	Nb	< 0.000500	O	Si	< 0.003400	M	U	< 0.002001
O	Ce	< 0.006000	M	In	< 0.010004	n	Os		O	Ag	< 0.006700	O	V	< 0.002700
M	Cs	< 0.000300	M	Ir	< 0.005002	M	Pd	< 0.005002	O	Na	0.020000	M	Yb	< 0.001000
O	Cr	< 0.001500	s	Fe		O	P	< 0.002500	O	Sr	0.017000	O	Y	< 0.000700
O	Co	< 0.001200	M	La	< 0.000500	M	Pt	< 0.002001	O	S	< 0.025000	M	Zn	0.090040
O	Cu	< 0.003000	M	Pb	0.012005	O	K	< 0.005000	M	Ta	< 0.007003	M	Zr	< 0.005002

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

6.0 INTENDED USE

For the calibration of analytical instruments including but not limited to the following:
HPLC, IC, TLC, ISE, IR, NMR, UV/VIS, MS, Capillary Electrophoresis, Potentiometry, Wet Chemistry and Voltammetry
For the validation of analytical methods
For the preparation of "working reference samples"
For interference studies and the determination of correction coefficients
For detection limit and linearity studies
For additional intended uses, contact Technical Staff

This CRM was manufactured using 18 megohm doubly deionized water that has been filtered through a 0.2 micron filter.

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

Storage & Handling - Keep **Tightly** sealed when not in use. Store and use at 20 ± 4°C. **Do Not** pipette from the container. **Do Not** return portions removed from pipetting to container.

Element Specific Information - For specific information regarding any element: Contact technical staff.

Uranium Note: If uranium is present in this standard, it is natural abundance unless specified in Section 3.0.

8.0 HAZARDOUS INFORMATION - Please refer to the enclosed Material Safety Data sheet for information regarding this CRM.

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001 Quality Management System Registration
- QMI File Number 010105

10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration"
- Chemical Testing - Accredited A2LA Certificate Number 883.01

10.3 ISO/IEC Guide 34 "General Requirements for the Competence of Reference Material Producers"
- Reference Materials Production - Accredited A2LA Certificate Number 883.02

10.4 10CFR50 Appendix B - Nuclear Regulatory Commission
- Domestic Licensing of Production and Utilization Facilities

10.5 10CFR21 - Nuclear Regulatory Commission
- Reporting Defects and Non-Compliance

11.0 DATE OF CERTIFICATION AND PERIOD OF VALIDITY

11.1 Shelf Life - The period of time during which the concentration of the analyte(s) in a properly packaged, unopened, and unused standard stored under environmentally controlled and monitored conditions will remain within the specified uncertainty range. Shelf life is limited primarily by transpiration (loss of water from the solution) and infrequently, by chemical instability. Transpiration studies of chemically-stable solutions performed at the manufacturer's facility show a CRM shelf-life of twenty one months for solutions packaged in 125-mL low density polyethylene bottles. When stored under special conditions that minimize transpiration and instability, the shelf life can be extended past this limit.

11.2 Expiration Date - The date after which a CRM should not be used. Routine laboratory use of a CRM increases transpiration losses and the chance of contamination which affect the integrity of the CRM and limit its useful life. Manufacturer concurs with state and federal regulatory agencies' recommendations that solution standards be assigned a one-year expiration date.

11.3 Chemical Stability - Studies have been conducted on this or similar CRMs and it has been demonstrated that this CRM is chemically stable for a period of not less than two years provided the "Storage & Handling" conditions are followed that are described in section 7.0.

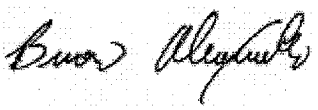
Certification Date: May 03, 2012

Expiration Date: EXPIRES 01 JAN 2014

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By: Stephan Blaakman
Product Documentation Technician

Certificate Approved By: Brian Alexander
PhD., Quality Control Supervisor



Certifying Officer: Paul Gaines
PhD., Senior Technical Director

Analytical Reference Materials

8270 Internal Standard

Catalog # 567684

Lot # A093676

110 Benner Circle Bellefonte, PA 16823-8812
(814) 353-1300

FOR LABORATORY USE ONLY. READ MSDS PRIOR TO USE.

RAW MATERIAL TEST INFORMATION AVAILABLE UPON REQUEST

MANUFACTURED UNDER RESTEK'S ISO 9001 REGISTERED QUALITY SYSTEM

RESTEK

110 Benner Circle
Bellefonte, PA 16823-8812
Tel: (800)356-1688
Fax: (814)353-1309

www.restek.com

ACCREDITED
ISO Guide 34 Accredited
Reference Material Producer
Certificate #3222.01

ACCREDITED
ISO/IEC 17025 Accredited
Testing Laboratory
Certificate #3222.02

Certificate of Analysis

FOR LABORATORY USE ONLY-READ MSDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 567684 **Lot No.:** A093676

Description : 8270 Internal Standard

8270 Internal Standard 2,000µg/mL, Methylene Chloride, 5mL/ampul

Container Size : 5 mL **Pkg Amt:** > 5 mL

Expiration Date : February 2018 **Storage:** 10°C or colder

Handling: Sonication required. Mix is photosensitive.

C E R T I F I E D V A L U E S

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	1,4-Dichlorobenzene-d4	2,000.0 µg/mL	+/- 11.6282	µg/mL	Gravimetric
	CAS # 3855-82-1		+/- 92.7158	µg/mL	Unstressed
	Purity 99%		+/- 101.3766	µg/mL	Stressed
2	Naphthalene-d8	2,000.0 µg/mL	+/- 11.6282	µg/mL	Gravimetric
	CAS # 1146-65-2		+/- 92.7158	µg/mL	Unstressed
	Purity 99%		+/- 101.3766	µg/mL	Stressed
3	Acenaphthene-d10	2,000.0 µg/mL	+/- 11.6282	µg/mL	Gravimetric
	CAS # 15067-26-2		+/- 92.7163	µg/mL	Unstressed
	Purity 97%		+/- 101.3771	µg/mL	Stressed
4	Phenanthrene-d10	2,000.0 µg/mL	+/- 11.6282	µg/mL	Gravimetric
	CAS # 1517-22-2		+/- 92.7158	µg/mL	Unstressed
	Purity 99%		+/- 101.3766	µg/mL	Stressed
5	Chrysene-d12	2,000.0 µg/mL	+/- 11.6281	µg/mL	Gravimetric
	CAS # 1719-03-5		+/- 92.7150	µg/mL	Unstressed
	Purity 98%		+/- 101.3758	µg/mL	Stressed
6	Perylene-d12	2,000.0 µg/mL	+/- 11.6282	µg/mL	Gravimetric
	CAS # 1520-96-3		+/- 92.7158	µg/mL	Unstressed
	Purity 99%		+/- 101.3766	µg/mL	Stressed

Solvent: Methylene Chloride
CAS # 75-09-2
Purity 99%

Column:
30m x .25mm x .25um
Rtx-5 (cat.#10223)

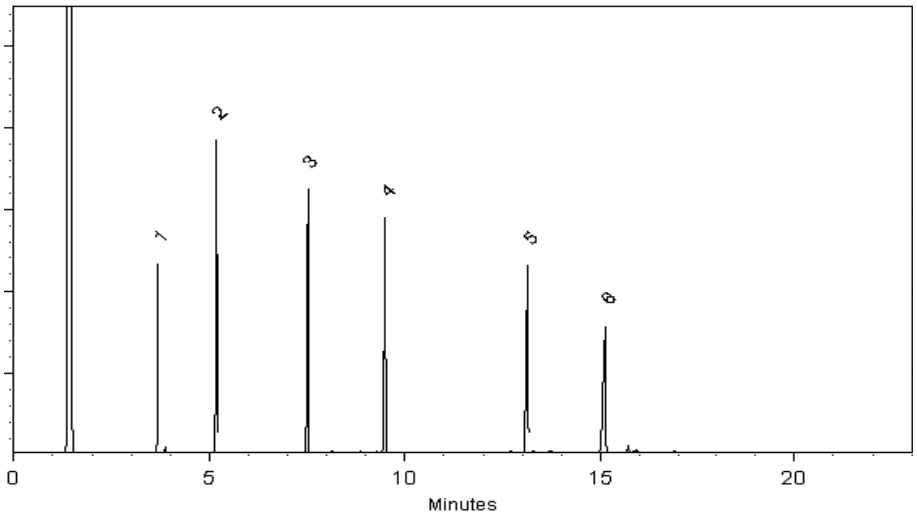
Carrier Gas:
hydrogen-constant pressure 10 psi.

Temp. Program:
75°C (hold 1 min.) to 330°C
@ 20°C/min. (hold 10 min.)

Inj. Temp:
250°C

Det. Temp:
330°C

Det. Type:
FID



Jodi E. Breon - QA Analyst

Date Passed: 27-Feb-2013 **Balance:** 1128342313

Manufactured under Restek's ISO 9001:2008 Registered Quality System Certificate #FM 80397

General Certified Reference Material Notes

Expiration Notes:

- Expiration date of the unopened ampul stored at the recommended storage condition is the last day of the month listed in the expiration date field.
- Uncertainty, concentration, and expiration of the CRM are based on the unopened product being stored according to the recommended condition found in the storage field.

Purity Notes:

- Purity and/or chemical identity are determined by one or more of the following techniques: GC/FID, HPLC, GC/μECD, GC/MS, LC/MS, RI, and/or melting point.
- Compounds with a listed purity of less than 99% have been weight corrected to compensate for impurities and/or salts. A correction factor is used to calculate the amount of compound necessary to achieve the desired concentration of the parent compound in solution.
- Purity of isomeric compounds is reported as the sum of the isomers.
- Purity values are rounded to the nearest whole number.

Certified Uncertainty Value Notes:

- The uncertainties are determined in accordance with ISO Guides 34 and 35. The certified combined stressed uncertainty value (includes gravimetric uncertainty, homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty and were combined using the following formula:

$$U_{combined\ stressed} = k\sqrt{U^2_{gravimetric} + U^2_{homogeneity} + U^2_{storage\ stability} + U^2_{shipping\ stability}}$$

  k is a coverage factor of 2, which gives a level of confidence of approximately 95%.
- It is important to note that the shipping stability uncertainty was obtained under temperature extremes for specific time intervals; therefore, the certified combined stressed uncertainty value should only be applied to the product if it was stored at non-standard temperature conditions up to and including 7 days. Contact Restek Technical Service at www.restek.com/Contact-Us for use recommendations if your shipment was in-transit for more than 7 days at non-standard temperature conditions.
- Apply the certified combined unstressed uncertainty value if the product was received under standard shipping conditions. Apply the certified combined stressed uncertainty value if the product was received under non-standard conditions as specified below.

Label Conditions	Standard Conditions	Non-Standard Conditions
25°C Nominal (Room Temperature)	< 60°C	≥ 60°C up to 7 days
10°C or colder (Refrigerate)	< 40°C	≥ 40°C up to 7 days
0°C or colder (Freezer)	< 25°C	≥ 25°C up to 7 days

- Separate (not combined) uncertainty values for gravimetric uncertainty are also displayed on the certificate, if needed, separate homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty values are available by contacting Restek Technical Service at www.restek.com/Contact-Us.
- The packaged amount is the minimum sample size for which uncertainty is valid. The ampules are over-filled to ensure that the minimum packaged amount can be sufficiently transferred.

Manufacturing Notes:

- Concentration is based upon gravimetric preparation using either a balance whose calibration has been verified daily using NIST traceable weights, and/or dilutions with Class A glassware.

Handling Notes:

- Samples should be transferred into deactivated vials for handling and storage. Restek supplies deactivated vials along with most standards packed in 2 mL ampules. Due to space constraints, Restek does not supply vials for larger volume ampules. Restek sells DMDCS for the purpose of glassware deactivation as catalog number 31840, which includes complete instructions. Restek will also deactivate larger volume vials from our inventory as a custom ordered item. Contact your Restek sales or customer service representative for details.
- If any undissolved material is visible inside the ampul, sonicate the unopened ampul until the material is completely dissolved.

RESTEK

Chemical Standard Batch Sheet
Lot #: A093676

Catalog #: 567684	**Target:** 2000 ug/mL	
Description: 8270 Internal Standard		
Solvent: Methylene Chloride	**Solvent Lot:** 127788	**Final Volume:** 3,000 ml

Made by: Matt Hepfer	**Date:** 2/21/2013 8:40:29AM			
Tested by: Diane Shaffer	**Date:** 2/26/2013 5:33:26PM			
Pass	**By:** Jodi Breon		**Date:** 2/27/2013 10:27:25A	
Packaged by: Alexandria Pavkovich / Kendra Swope	**Date:** 2/25/2013 11:10:21A	**No. Units:** 536	**Pkg Size:**	5 mL
Balance Used: BEDEARMBALPC1 XP205	**Serial #:** 1128342313			

Compound	CAS	Storage Location	Lot #	Purity	Target Conc(ug/mL)	Target	Actual	Calc Conc(ug/mL)
1,4-Dichlorobenzene-d4	3855-82-1	R0487	PR-18488	0.99	2,000.00	6,000.00 mg	6,000.00 mg	2,000.0
Acenaphthene-d10	15067-26-2	R0622	PR-21070	0.97	2,000.00	6,185.57 mg	6,185.60 mg	2,000.0
Perylene-d12	1520-96-3	R0625	PR-16756	0.99	2,000.00	6,000.00 mg	6,000.00 mg	2,000.0
Phenanthrene-d10	1517-22-2	R0626	PR-23065	0.99	2,000.00	6,000.00 mg	6,000.00 mg	2,000.0
Chrysene-d12	1719-03-5	R0629	PR-19986	0.98	2,000.00	6,122.45 mg	6,122.40 mg	2,000.0
Naphthalene-d8	1146-65-2	R0637	PR-20449	0.99	2,000.00	6,000.00 mg	6,000.00 mg	2,000.0

QA Report: 8270 Internal Standard (Cat.#567684)

	Runs of Lot # A092941						Runs of Lot # A093676							
COMPONENT	Run #1	Run #2	Run #3	AVG	STD DEV	% RSD	Run #1	Run #2	Run #3	AVG	STD DEV	% RSD	%D MEAN	P/F
1,4-Dichlorobenzene-d4	1707725	1691509	1832715	1743983	77271	4.43	1818667	1695868	1666128	1726888	80862	4.68	0.98	PASS
Naphthalene-d8	3234819	3204806	3466056	3301894	142959	4.33	3529518	3279008	3219085	3342537	164679	4.93	-1.23	PASS
Acenaphthene-d10	3221545	3195302	3426436	3281094	126552	3.86	3494536	3259946	3199625	3318036	155801	4.70	-1.13	PASS
Phenanthrene-d10	3330464	3301583	3508286	3380111	111938	3.31	3604992	3371788	3312856	3429879	154489	4.50	-1.47	PASS
Chrysene-d12	3408655	3362327	3549037	3440006	97223	2.83	3689863	3452532	3401636	3514677	153835	4.38	-2.17	PASS
Perylene-d12	3240766	3212984	3292620	3248790	40420	1.24	3452007	3281176	3242641	3325275	111432	3.35	-2.35	PASS

Certificate of Analysis

Acids Surrogate Standard Mixture

Product Number: ISM-290N **Page:** 1 of 1

Lot Number: CH-2873 **Lot Issue Date:** 16-Sep-2011 **Expiration Date:** 30-Sep-2014

This Certified Reference Material (RM) was manufactured and verified in accordance with ULTRA's ISO 9001 registered quality system, and the analyte concentrations were verified by our ISO 17025 accredited laboratory. The true value and uncertainty value at the 95% confidence level for each analyte, determined gravimetrically, is listed below.

Analyte	CAS#	Analyte Lot	True Value
2-fluorophenol	000367-12-4	RM03347	2004 ± 10 µg/mL
phenol-d5	004165-62-2	RM02038	2005 ± 10 µg/mL
2,4,6-tribromophenol	000118-79-6	RM01307	2004 ± 10 µg/mL

Matrix: methanol (methyl alcohol)

Storage: Store at Room Temperature (18-25° C)

ULTRA uses balances calibrated with weights traceable to NIST in compliance with ANSI/NCSL Z-540-1 and ISO 9001, and calibrated Class A glassware in the manufacturing of these standards.

ACCREDITED
ISO 17025:2005 Accredited A2LA Cert. No. 0851-01

ISO 9001:2008 Registered TUV USA, Inc. Cert. No. 09-1009

250 Smith Street, North Kingstown, RI 02852 USA
401-294-9400 Fax: 295-2330
wwww.ultrasci.com

William J. Leary
Quality Assurance Manager

05/29/2013

Certificate of Composition

4x/mL
REC 1/28/13

DESCRIPTION: TEST AMERICA

QUOTE 21612606 LOT NO.: LB97402 MFG DATE: Dec-2012

EXP 12/31/13

SOLVENT: METHANOL

ANALYTE (1)	CAS NUMBER	PERCENT PURITY (2)	WEIGHT CONCENTRATION (3)	SUPELCO LOT NO
PROPYLENE OXIDE	75-56-9	99.9	10004 +/- 50.0	LB79736

(1) Listed in alphabetical order.

(2) Determined by capillary GC-FID, unless otherwise noted.

(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.

Duane Funk

Duane Funk
Quality Manager

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

Certificate of Composition

4x/mL
REC 1/28/13

DESCRIPTION: TEST AMERICA

QUOTE 21612606 LOT NO.: LB97402 MFG DATE: Dec-2012

EXP 12/31/13

SOLVENT: METHANOL

ANALYTE (1)	CAS NUMBER	PERCENT PURITY (2)	WEIGHT CONCENTRATION (3)	SUPELCO LOT NO
PROPYLENE OXIDE	75-56-9	99.9	10004 +/- 50.0	LB79736

(1) Listed in alphabetical order.

(2) Determined by capillary GC-FID, unless otherwise noted.

(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.

Duane Funk

Duane Funk
Quality Manager

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

Rcd 4/2/13

Certificate of Analysis

DESCRIPTION: Ethylene Oxide

CATALOG NO.: 48838 MFG DATE: Feb-2013

LOT NO.: LB98333 EXPIRATION DATE: Feb-2014

SOLVENT: METHANOL

ANALYTE	CAS NUMBER	PERCENT PURITY(1)	WEIGHT(2) CONCENTRATION	ANALYTICAL(3) CONCENTRATION	STD DEV	SUPELCO LOT NO
ETHYLENE OXIDE	75-21-8	99.9	50000	51345	+/- 336.3	LB95261

(1) Determined by capillary GC-FID, unless otherwise noted.

(2) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.

(3) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.

Duane Funk

Duane Funk
Quality Manager

SUPELCO®
Solutions within.™
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

x4
3/25/13 DM

RESTEK

110 Benner Circle
Bellefonte, PA 16823-8812
Tel: (800)356-1688
Fax: (814)353-1309

www.restek.com

ACCREDITED
ISO Guide 34 Accredited
Reference Material Producer
Certificate #3222.01

ilac-MRA

ACCREDITED
ISO/IEC 17025 Accredited
Testing Laboratory
Certificate #3222.02

Certificate of Analysis

FOR LABORATORY USE ONLY-READ MSDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 567641.sec **Lot No.:** A093733

Description : 8260 List 1 / Std #1 MegaMix

8260 List 1 / Std #1 MegaMix 1,000-50,000 µg/ml, P&T Methanol, 1 ml/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : February 2016 **Storage:** 0°C or colder

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	Diethyl ether (ethyl ether)	2,000.0 µg/mL	+/- 11.6282	µg/mL	Gravimetric
	CAS # 60-29-7.SEC		+/- 44.2531	µg/mL	Unstressed
	Purity 99%		+/- 44.4335	µg/mL	Stressed
2	1,1,2-Trichlorotrifluoroethane (CFC-113)	2,000.0 µg/mL	+/- 11.6282	µg/mL	Gravimetric
	CAS # 76-13-1.SEC		+/- 44.2531	µg/mL	Unstressed
	Purity 99%		+/- 44.4335	µg/mL	Stressed
3	1,1-Dichloroethene	2,000.0 µg/mL	+/- 11.6282	µg/mL	Gravimetric
	CAS # 75-35-4.SEC		+/- 44.2531	µg/mL	Unstressed
	Purity 99%		+/- 44.4335	µg/mL	Stressed
4	tert-Butanol (TBA)	20,000.0 µg/mL	+/- 116.2756	µg/mL	Gravimetric
	CAS # 75-65-0.SEC		+/- 442.5291	µg/mL	Unstressed
	Purity 99%		+/- 444.3332	µg/mL	Stressed
5	Iodomethane (methyl iodide)	2,000.0 µg/mL	+/- 11.6284	µg/mL	Gravimetric
	CAS # 74-88-4.SEC		+/- 44.2540	µg/mL	Unstressed
	Purity 97%		+/- 44.4344	µg/mL	Stressed
6	Allyl chloride (3-chloropropene)	2,000.0 µg/mL	+/- 11.6281	µg/mL	Gravimetric
	CAS # 107-05-1.SEC		+/- 44.2527	µg/mL	Unstressed
	Purity 98%		+/- 44.4331	µg/mL	Stressed
7	Methyl acetate	10,000.0 µg/mL	+/- 58.1378	µg/mL	Gravimetric
	CAS # 79-20-9.SEC		+/- 221.2646	µg/mL	Unstressed
	Purity 99%		+/- 222.1666	µg/mL	Stressed
8	Carbon disulfide	2,000.0 µg/mL	+/- 11.6281	µg/mL	Gravimetric
	CAS # 75-15-0.SEC		+/- 44.2527	µg/mL	Unstressed
	Purity 98%		+/- 44.4331	µg/mL	Stressed
9	Methylene chloride (dichloromethane)	2,000.0 µg/mL	+/- 11.6282	µg/mL	Gravimetric
	CAS # 75-09-2.SEC		+/- 44.2531	µg/mL	Unstressed
	Purity 99%		+/- 44.4335	µg/mL	Stressed

10	Acrylonitrile	20,000.0	µg/mL	+/-	116.2756	µg/mL	Gravimetric
	CAS # 107-13-1.SEC			+/-	442.5291	µg/mL	Unstressed
	Purity 99%			+/-	444.3332	µg/mL	Stressed
11	Methyl-tert-butyl ether (MTBE)	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 1634-04-4.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
12	cis-1,2-Dichloroethene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 156-59-2.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
13	n-Hexane (C6)	2,000.1	µg/mL	+/-	11.6286	µg/mL	Gravimetric
	CAS # 110-54-3.SEC			+/-	44.2549	µg/mL	Unstressed
	Purity 98%			+/-	44.4353	µg/mL	Stressed
14	1,1-Dichloroethane	2,000.0	µg/mL	+/-	11.6284	µg/mL	Gravimetric
	CAS # 75-34-3.SEC			+/-	44.2540	µg/mL	Unstressed
	Purity 97%			+/-	44.4344	µg/mL	Stressed
15	2,2-Dichloropropane	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 594-20-7.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
16	trans-1,2-Dichloroethene	2,000.0	µg/mL	+/-	11.6284	µg/mL	Gravimetric
	CAS # 156-60-5.SEC			+/-	44.2540	µg/mL	Unstressed
	Purity 97%			+/-	44.4344	µg/mL	Stressed
17	Chloroform	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 67-66-3.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
18	Isobutanol (2-Methyl-1-propanol)	50,000.0	µg/mL	+/-	290.6891	µg/mL	Gravimetric
	CAS # 78-83-1.SEC			+/-	1,106.3228	µg/mL	Unstressed
	Purity 99%			+/-	1,110.8331	µg/mL	Stressed
19	Bromochloromethane	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 74-97-5.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
20	Tetrahydrofuran	4,000.0	µg/mL	+/-	23.2563	µg/mL	Gravimetric
	CAS # 109-99-9.SEC			+/-	88.5061	µg/mL	Unstressed
	Purity 99%			+/-	88.8670	µg/mL	Stressed
21	1,1,1-Trichloroethane	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 71-55-6.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
22	Cyclohexane	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 110-82-7.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
23	1,1-Dichloropropene	2,010.5	µg/mL	+/-	11.6890	µg/mL	Gravimetric
	CAS # 563-58-6.SEC			+/-	44.4847	µg/mL	Unstressed
	Purity 98%			+/-	44.6661	µg/mL	Stressed
24	Carbon tetrachloride	2,000.1	µg/mL	+/-	11.6286	µg/mL	Gravimetric
	CAS # 56-23-5.SEC			+/-	44.2549	µg/mL	Unstressed
	Purity 98%			+/-	44.4353	µg/mL	Stressed
25	n-Heptane (C7)	2,000.1	µg/mL	+/-	11.6288	µg/mL	Gravimetric
	CAS # 142-82-5.SEC			+/-	44.2553	µg/mL	Unstressed
	Purity 99%			+/-	44.4357	µg/mL	Stressed
26	Benzene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 71-43-2.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
27	1,2-Dichloroethane	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 107-06-2.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
28	Trichloroethene	2,000.1	µg/mL	+/-	11.6286	µg/mL	Gravimetric
	CAS # 79-01-6.SEC			+/-	44.2549	µg/mL	Unstressed
	Purity 98%			+/-	44.4353	µg/mL	Stressed

29	Methylcyclohexane	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 108-87-2.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
30	1,2-Dichloropropane	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 78-87-5.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
31	1,4-Dioxane	40,000.0	µg/mL	+/-	232.5513	µg/mL	Gravimetric
	CAS # 123-91-1.SEC			+/-	885.0582	µg/mL	Unstressed
	Purity 99%			+/-	888.6665	µg/mL	Stressed
32	Dibromomethane	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 74-95-3.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
33	Bromodichloromethane	2,000.1	µg/mL	+/-	11.6290	µg/mL	Gravimetric
	CAS # 75-27-4.SEC			+/-	44.2562	µg/mL	Unstressed
	Purity 97%			+/-	44.4366	µg/mL	Stressed
34	cis-1,3-Dichloropropene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 10061-01-5.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
35	Toluene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 108-88-3.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
36	Ethyl methacrylate	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 97-63-2.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
37	trans-1,3-Dichloropropene	2,000.0	µg/mL	+/-	11.6281	µg/mL	Gravimetric
	CAS # 10061-02-6.SEC			+/-	44.2527	µg/mL	Unstressed
	Purity 98%			+/-	44.4331	µg/mL	Stressed
38	1,1,2-Trichloroethane	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 79-00-5.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
39	1,3-Dichloropropane	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 142-28-9.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
40	Tetrachloroethene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 127-18-4.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
41	Dibromochloromethane	2,000.1	µg/mL	+/-	11.6290	µg/mL	Gravimetric
	CAS # 124-48-1.SEC			+/-	44.2562	µg/mL	Unstressed
	Purity 97%			+/-	44.4366	µg/mL	Stressed
42	1,2-Dibromoethane (EDB)	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 106-93-4.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
43	Chlorobenzene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 108-90-7.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
44	1,1,1,2-Tetrachloroethane	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 630-20-6.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
45	m-Xylene	1,000.0	µg/mL	+/-	5.8141	µg/mL	Gravimetric
	CAS # 108-38-3.SEC			+/-	22.1265	µg/mL	Unstressed
	Purity 99%			+/-	22.2167	µg/mL	Stressed
46	p-Xylene	1,000.0	µg/mL	+/-	5.8141	µg/mL	Gravimetric
	CAS # 106-42-3.SEC			+/-	22.1265	µg/mL	Unstressed
	Purity 99%			+/-	22.2167	µg/mL	Stressed
47	o-Xylene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 95-47-6.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed

48	Ethylbenzene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 100-41-4.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
49	Styrene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 100-42-5.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
50	Isopropylbenzene (cumene)	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 98-82-8.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
51	Bromoform	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 75-25-2.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
52	1,1,2,2-Tetrachloroethane	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 79-34-5.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
53	1,2,3-Trichloropropane	2,000.0	µg/mL	+/-	11.6281	µg/mL	Gravimetric
	CAS # 96-18-4.SEC			+/-	44.2527	µg/mL	Unstressed
	Purity 98%			+/-	44.4331	µg/mL	Stressed
54	trans-1,4-Dichloro-2-butene	2,000.0	µg/mL	+/-	11.6284	µg/mL	Gravimetric
	CAS # 110-57-6.SEC			+/-	44.2540	µg/mL	Unstressed
	Purity 97%			+/-	44.4344	µg/mL	Stressed
55	n-Propylbenzene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 103-65-1.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
56	Bromobenzene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 108-86-1.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
57	1,3,5-Trimethylbenzene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 108-67-8.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
58	2-Chlorotoluene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 95-49-8.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
59	4-Chlorotoluene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 106-43-4.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
60	tert-Butylbenzene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 98-06-6.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
61	1,2,4-Trimethylbenzene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 95-63-6.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
62	sec-Butylbenzene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 135-98-8.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
63	4-Isopropyltoluene (p-cymene)	2,000.1	µg/mL	+/-	11.6285	µg/mL	Gravimetric
	CAS # 99-87-6.SEC			+/-	44.2545	µg/mL	Unstressed
	Purity 96%			+/-	44.4349	µg/mL	Stressed
64	1,3-Dichlorobenzene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 541-73-1.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
65	1,4-Dichlorobenzene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 106-46-7.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
66	n-Butylbenzene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 104-51-8.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed

67	1,2-Dichlorobenzene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 95-50-1.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
68	1,2-Dibromo-3-chloropropane	2,000.0	µg/mL	+/-	11.6284	µg/mL	Gravimetric
	CAS # 96-12-8.SEC			+/-	44.2540	µg/mL	Unstressed
	Purity 97%			+/-	44.4344	µg/mL	Stressed
69	1,2,4-Trichlorobenzene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 120-82-1.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
70	Hexachlorobutadiene	2,000.0	µg/mL	+/-	11.6284	µg/mL	Gravimetric
	CAS # 87-68-3.SEC			+/-	44.2540	µg/mL	Unstressed
	Purity 97%			+/-	44.4344	µg/mL	Stressed
71	Naphthalene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 91-20-3.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed
72	1,2,3-Trichlorobenzene	2,000.0	µg/mL	+/-	11.6282	µg/mL	Gravimetric
	CAS # 87-61-6.SEC			+/-	44.2531	µg/mL	Unstressed
	Purity 99%			+/-	44.4335	µg/mL	Stressed

Solvent: P&T Methanol
CAS # 67-56-1
Purity 99%

Column:
60m x .25mm x 1.4um
Rtx-502.2 (cat.#10916)

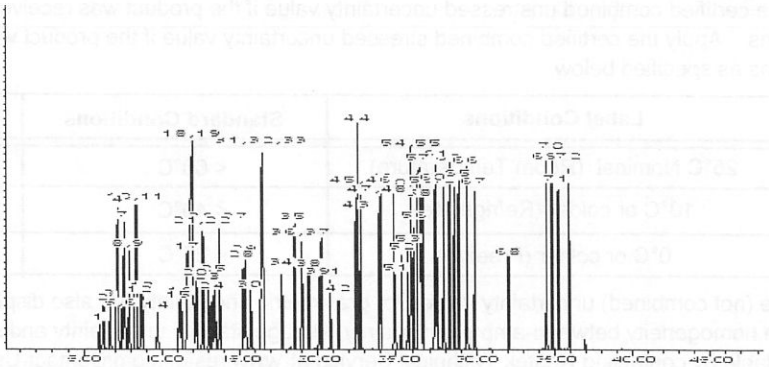
Carrier Gas:
helium-constant pressure 30 psi

Temp. Program:
40°C (hold 6 min.) to 240°C
@ 6°C/min. (hold 10 min.)

Inj. Temp:
200°C

Det. Temp:
250°C

Det. Type:
MSD



Jennifer L. Pollino - QC Analyst

Date Passed: 01-Mar-2013 **Balance:** 1127510105

Manufactured under Restek's ISO 9001:2008
Registered Quality System
Certificate #FM 80397

General Certified Reference Material Notes

Expiration Notes:

- Expiration date of the unopened ampul stored at the recommended storage condition is the last day of the month listed in the expiration date field.
- Uncertainty, concentration, and expiration of the CRM are based on the unopened product being stored according to the recommended condition found in the storage field.

Purity Notes:

- Purity and/or chemical identity are determined by one or more of the following techniques: GC/FID, HPLC, GC/μECD, GC/MS, LC/MS, RI, and/or melting point.
- Compounds with a listed purity of less than 99% have been weight corrected to compensate for impurities and/or salts. A correction factor is used to calculate the amount of compound necessary to achieve the desired concentration of the parent compound in solution.
- Purity of isomeric compounds is reported as the sum of the isomers.
- Purity values are rounded to the nearest whole number.

Certified Uncertainty Value Notes:

- The uncertainties are determined in accordance with ISO Guides 34 and 35. The certified combined stressed uncertainty value (includes gravimetric uncertainty, homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty and were combined using the following formula:

$$U_{combined\ stressed} = k\sqrt{U^2_{gravimetric} + U^2_{homogeneity} + U^2_{storage\ stability} + U^2_{shipping\ stability}}$$

  k is a coverage factor of 2, which gives a level of confidence of approximately 95%.
- It is important to note that the shipping stability uncertainty was obtained under temperature extremes for specific time intervals; therefore, the certified combined stressed uncertainty value should only be applied to the product if it was stored at non-standard temperature conditions up to and including 7 days. Contact Restek Technical Service at www.restek.com/Contact-Us for use recommendations if your shipment was in-transit for more than 7 days at non-standard temperature conditions.
- Apply the certified combined unstressed uncertainty value if the product was received under standard shipping conditions. Apply the certified combined stressed uncertainty value if the product was received under non-standard conditions as specified below.

Label Conditions	Standard Conditions	Non-Standard Conditions
25°C Nominal (Room Temperature)	< 60°C	≥ 60°C up to 7 days
10°C or colder (Refrigerate)	< 40°C	≥ 40°C up to 7 days
0°C or colder (Freezer)	< 25°C	≥ 25°C up to 7 days

- Separate (not combined) uncertainty values for gravimetric uncertainty are also displayed on the certificate, if needed, separate homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty values are available by contacting Restek Technical Service at www.restek.com/Contact-Us.
- The packaged amount is the minimum sample size for which uncertainty is valid. The ampules are over-filled to ensure that the minimum packaged amount can be sufficiently transferred.

Manufacturing Notes:

- Concentration is based upon gravimetric preparation using either a balance whose calibration has been verified daily using NIST traceable weights, and/or dilutions with Class A glassware.

Handling Notes:

- Samples should be transferred into deactivated vials for handling and storage. Restek supplies deactivated vials along with most standards packed in 2 mL ampules. Due to space constraints, Restek does not supply vials for larger volume ampules. Restek sells DMDCS for the purpose of glassware deactivation as catalog number 31840, which includes complete instructions. Restek will also deactivate larger volume vials from our inventory as a custom ordered item. Contact your Restek sales or customer service representative for details.
- If any undissolved material is visible inside the ampul, sonicate the unopened ampul until the material is completely dissolved.

12/26/12
x2

RESTEK

110 Benner Circle
Bellefonte, PA 16823-8812
Tel: (800)356-1688
Fax: (814)353-1309

www.restek.com

ACCREDITED
ISO Guide 34 Accredited
Reference Material Producer
Certificate #3222.01

ilac-MRA

ACCREDITED
ISO/IEC 17025 Accredited
Testing Laboratory
Certificate #3222.02

Certificate of Composition

FOR LABORATORY USE ONLY-READ MSDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 567650 **Lot No.:** A092213

Description : 8260/624 Surrogate Mix

8260/624 Surrogate Mix 2500 ug/ml, P&T Methanol, 5 ml/ampul

Container Size : 5 mL **Pkg Amt:** > 5 mL

Expiration Date : December 2017 **Storage:** 0°C or colder

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	Dibromofluoromethane	2,500.0 µg/mL	+/- 14.6714	µg/mL	Gravimetric
	CAS # 1868-53-7		+/- 30.2004	µg/mL	Unstressed
	Purity 99%		+/- 34.0606	µg/mL	Stressed
2	1,2-Dichloroethane-d4	2,500.0 µg/mL	+/- 14.6714	µg/mL	Gravimetric
	CAS # 17060-07-0		+/- 30.2004	µg/mL	Unstressed
	Purity 99%		+/- 34.0606	µg/mL	Stressed
3	Toluene-d8	2,500.0 µg/mL	+/- 14.6714	µg/mL	Gravimetric
	CAS # 2037-26-5		+/- 30.2004	µg/mL	Unstressed
	Purity 99%		+/- 34.0606	µg/mL	Stressed
4	1-Bromo-4-fluorobenzene (BFB)	2,500.0 µg/mL	+/- 14.6714	µg/mL	Gravimetric
	CAS # 460-00-4		+/- 30.2004	µg/mL	Unstressed
	Purity 99%		+/- 34.0606	µg/mL	Stressed

Solvent: P&T Methanol
CAS # 67-56-1
Purity 99%

Column:
105m x .53mm x 3.0um
Rtx-502.2 (cat.#10910)

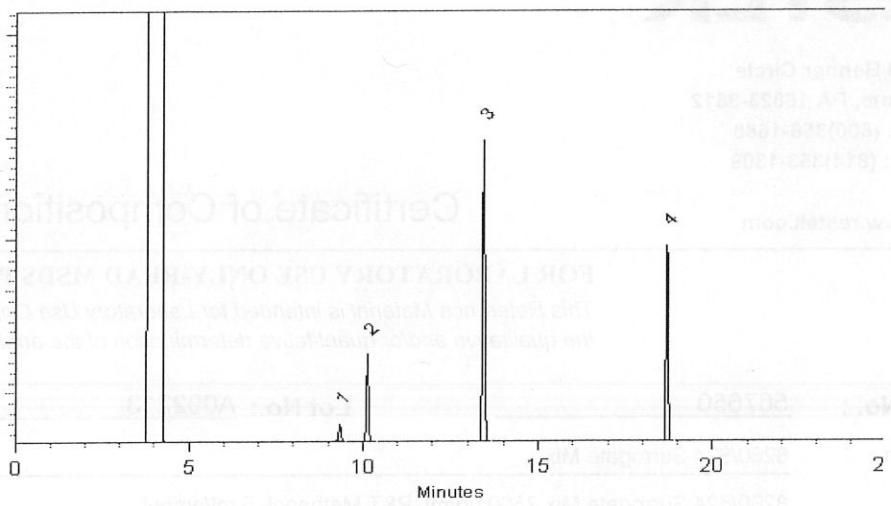
Carrier Gas:
hydrogen-constant pressure 11.0 psi.

Temp. Program:
40°C (hold 2 min.) to 240°C
@ 8°C/min. (hold 5 min.)

Inj. Temp:
200°C

Det. Temp:
250°C

Det. Type:
FID



Jennifer L. Pollino - QC Analyst

Date Passed: 05-Dec-2012 **Balance:** 1125113331

Manufactured under Restek's ISO 9001:2008
Registered Quality System
Certificate #FM 80397

General Certified Reference Material Notes

Expiration Notes:

- Expiration date of the unopened ampul stored at the recommended storage condition is the last day of the month listed in the expiration date field.
- Uncertainty, concentration, and expiration of the CRM are based on the unopened product being stored according to the recommended condition found in the storage field.

Purity Notes:

- Purity and/or chemical identity are determined by one or more of the following techniques: GC/FID, HPLC, GC/μECD, GC/MS, LC/MS, RI, and/or melting point.
- Compounds with a listed purity of less than 99% have been weight corrected to compensate for impurities and/or salts. A correction factor is used to calculate the amount of compound necessary to achieve the desired concentration of the parent compound in solution.
- Purity of isomeric compounds is reported as the sum of the isomers.
- Purity values are rounded to the nearest whole number.

Certified Uncertainty Value Notes:

- The uncertainties are determined in accordance with ISO Guides 34 and 35. The certified combined stressed uncertainty value (includes gravimetric uncertainty, homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty and were combined using the following formula:

$$U_{combined\ stressed} = k\sqrt{U^2_{gravimetric} + U^2_{homogeneity} + U^2_{storage\ stability} + U^2_{shipping\ stability}}$$

  k is a coverage factor of 2, which gives a level of confidence of approximately 95%.
- It is important to note that the shipping stability uncertainty was obtained under temperature extremes for specific time intervals; therefore, the certified combined stressed uncertainty value should only be applied to the product if it was stored at non-standard temperature conditions up to and including 7 days. Contact Restek Technical Service at www.restek.com/Contact-Us for use recommendations if your shipment was in-transit for more than 7 days at non-standard temperature conditions.
- Apply the certified combined unstressed uncertainty value if the product was received under standard shipping conditions. Apply the certified combined stressed uncertainty value if the product was received under non-standard conditions as specified below.

Label Conditions	Standard Conditions	Non-Standard Conditions
25°C Nominal (Room Temperature)	< 60°C	≥ 60°C up to 7 days
10°C or colder (Refrigerate)	< 40°C	≥ 40°C up to 7 days
0°C or colder (Freezer)	< 25°C	≥ 25°C up to 7 days

- Separate (not combined) uncertainty values for gravimetric uncertainty are also displayed on the certificate, if needed, separate homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty values are available by contacting Restek Technical Service at www.restek.com/Contact-Us.
- The packaged amount is the minimum sample size for which uncertainty is valid. The ampules are over-filled to ensure that the minimum packaged amount can be sufficiently transferred.

Manufacturing Notes:

- Concentration is based upon gravimetric preparation using either a balance whose calibration has been verified daily using NIST traceable weights, and/or dilutions with Class A glassware.

Handling Notes:

- Samples should be transferred into deactivated vials for handling and storage. Restek supplies deactivated vials along with most standards packed in 2 mL ampules. Due to space constraints, Restek does not supply vials for larger volume ampules. Restek sells DMDCS for the purpose of glassware deactivation as catalog number 31840, which includes complete instructions. Restek will also deactivate larger volume vials from our inventory as a custom ordered item. Contact your Restek sales or customer service representative for details.
- If any undissolved material is visible inside the ampul, sonicate the unopened ampul until the material is completely dissolved.

× 16
5/7/13

RESTEK

110 Benner Circle
Bellefonte, PA 16823-8812
Tel: (800)356-1688
Fax: (814)353-1309

www.restek.com

ACCREDITED
ISO Guide 34 Accredited
Reference Material Producer
Certificate #3222.01

ilac-MRA

ACCREDITED
ISO/IEC 17025 Accredited
Testing Laboratory
Certificate #3222.02

Certificate of Analysis

FOR LABORATORY USE ONLY-READ MSDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 567650 **Lot No.:** A093505

Description : 8260 Surrogate Standard

8260 Surrogate Standard 2,500 ug/ml, P&T Methanol, 5 ml/ampul

Container Size : 5 mL **Pkg Amt:** > 5 mL

Expiration Date : February 2018 **Storage:** 0°C or colder

CERTIFIED VALUES

Elution Order	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)		
1	Dibromofluoromethane	2,500.0 µg/mL	+/- 14.5352	µg/mL	Gravimetric
	CAS # 1868-53-7		+/- 30.1344	µg/mL	Unstressed
	Purity 99%		+/- 34.0022	µg/mL	Stressed
2	1,2-Dichloroethane-d4	2,500.0 µg/mL	+/- 14.5352	µg/mL	Gravimetric
	CAS # 17060-07-0		+/- 30.1344	µg/mL	Unstressed
	Purity 99%		+/- 34.0022	µg/mL	Stressed
3	Toluene-d8	2,500.0 µg/mL	+/- 14.5352	µg/mL	Gravimetric
	CAS # 2037-26-5		+/- 30.1344	µg/mL	Unstressed
	Purity 99%		+/- 34.0022	µg/mL	Stressed
4	1-Bromo-4-fluorobenzene (BFB)	2,500.0 µg/mL	+/- 14.5352	µg/mL	Gravimetric
	CAS # 460-00-4		+/- 30.1344	µg/mL	Unstressed
	Purity 99%		+/- 34.0022	µg/mL	Stressed

Solvent: P&T Methanol
CAS # 67-56-1
Purity 99%

Column:
105m x .53mm x 3.0um
Rtx-502.2 (cat.#10910)

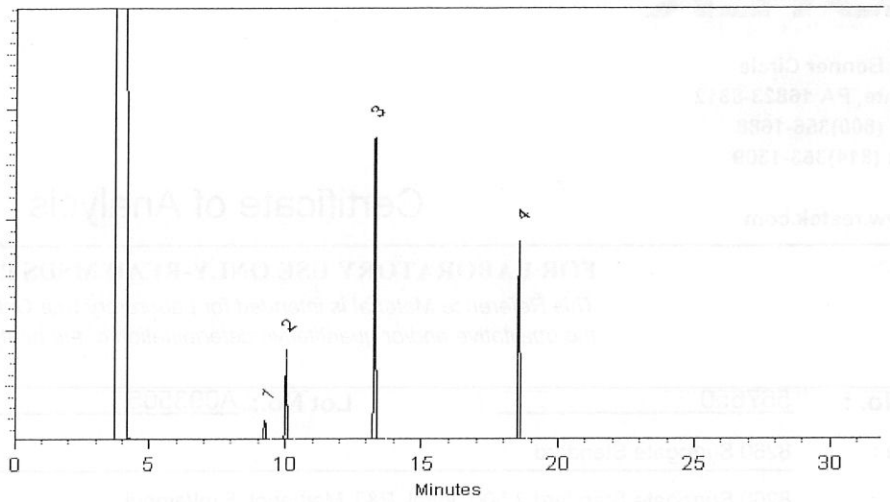
Carrier Gas:
hydrogen-constant pressure 11.0 psi.

Temp. Program:
40°C (hold 2 min.) to 240°C
@ 8°C/min. (hold 5 min.)

Inj. Temp:
200°C

Det. Temp:
250°C

Det. Type:
FID



Diane Shaffer
Diane Shaffer - QAAnalyst

Date Passed: 15-Feb-2013 **Balance:** B251644995

Manufactured under Restek's ISO 9001:2008
Registered Quality System
Certificate #FM 80397

General Certified Reference Material Notes

Expiration Notes:

- Expiration date of the unopened ampul stored at the recommended storage condition is the last day of the month listed in the expiration date field.
- Uncertainty, concentration, and expiration of the CRM are based on the unopened product being stored according to the recommended condition found in the storage field.

Purity Notes:

- Purity and/or chemical identity are determined by one or more of the following techniques: GC/FID, HPLC, GC/μECD, GC/MS, LC/MS, RI, and/or melting point.
- Compounds with a listed purity of less than 99% have been weight corrected to compensate for impurities and/or salts. A correction factor is used to calculate the amount of compound necessary to achieve the desired concentration of the parent compound in solution.
- Purity of isomeric compounds is reported as the sum of the isomers.
- Purity values are rounded to the nearest whole number.

Certified Uncertainty Value Notes:

- The uncertainties are determined in accordance with ISO Guides 34 and 35. The certified combined stressed uncertainty value (includes gravimetric uncertainty, homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty and were combined using the following formula:

$$U_{combined\ stressed} = k\sqrt{U^2_{gravimetric} + U^2_{homogeneity} + U^2_{storage\ stability} + U^2_{shipping\ stability}}$$

  k is a coverage factor of 2, which gives a level of confidence of approximately 95%.
- It is important to note that the shipping stability uncertainty was obtained under temperature extremes for specific time intervals; therefore, the certified combined stressed uncertainty value should only be applied to the product if it was stored at non-standard temperature conditions up to and including 7 days. Contact Restek Technical Service at www.restek.com/Contact-Us for use recommendations if your shipment was in-transit for more than 7 days at non-standard temperature conditions.
- Apply the certified combined unstressed uncertainty value if the product was received under standard shipping conditions. Apply the certified combined stressed uncertainty value if the product was received under non-standard conditions as specified below.

Label Conditions	Standard Conditions	Non-Standard Conditions
25°C Nominal (Room Temperature)	< 60°C	≥ 60°C up to 7 days
10°C or colder (Refrigerate)	< 40°C	≥ 40°C up to 7 days
0°C or colder (Freezer)	< 25°C	≥ 25°C up to 7 days

- Separate (not combined) uncertainty values for gravimetric uncertainty are also displayed on the certificate, if needed, separate homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty values are available by contacting Restek Technical Service at www.restek.com/Contact-Us.
- The packaged amount is the minimum sample size for which uncertainty is valid. The ampules are over-filled to ensure that the minimum packaged amount can be sufficiently transferred.

Manufacturing Notes:

- Concentration is based upon gravimetric preparation using either a balance whose calibration has been verified daily using NIST traceable weights, and/or dilutions with Class A glassware.

Handling Notes:

- Samples should be transferred into deactivated vials for handling and storage. Restek supplies deactivated vials along with most standards packed in 2 mL ampules. Due to space constraints, Restek does not supply vials for larger volume ampules. Restek sells DMDCS for the purpose of glassware deactivation as catalog number 31840, which includes complete instructions. Restek will also deactivate larger volume vials from our inventory as a custom ordered item. Contact your Restek sales or customer service representative for details.
- If any undissolved material is visible inside the ampul, sonicate the unopened ampul until the material is completely dissolved.

5/14/13 x8

RESTEK CERTIFIED REFERENCE MATERIAL

ACCREDITED
ISO Guide 34 Accredited
Reference Material Producer
Certificate #3222.01

110 Benner Circle
Bellefonte, PA 16823-8812
Tel: (800)356-1688
Fax: (814)353-1309

www.restek.com

Gravimetric Certificate

ilac-MRA

ACCREDITED
ISO/IEC 17025 Accredited
Testing Laboratory
Certificate #3222.02

FOR LABORATORY USE ONLY-READ SDS PRIOR TO USE.

This Reference Material is intended for Laboratory Use Only as a standard for the qualitative and/or quantitative determination of the analyte(s) listed.

Catalog No. : 568034.sec **Lot No.:** A094981

Description : Denver Main Add Ons Standard

Denver Main Add Ons Standard 1,000-30,000 µg/ml, P&T Methanol/Water (90:10), 1 ml/ampul

Container Size : 2 mL **Pkg Amt:** > 1 mL

Expiration Date : October 31, 2014 **Storage:** 0°C or colder

CERTIFIED VALUES

Component #	Compound	Grav. Conc. (weight/volume)	Expanded Uncertainty (95% C.L.; K=2)	
1	1-Chlorohexane	999.6 µg/mL	+/- 10.0697 µg/mL	Gravimetric
	CAS # 544-10-5.SEC (Lot 1376600)		+/- 80.2594 µg/mL	Unstressed
	Purity 98%		+/- 80.2983 µg/mL	Stressed
2	2-Butanol (sec-butyl alcohol)	30,044.0 µg/mL	+/- 278.0328 µg/mL	Gravimetric
	CAS # 78-92-2.SEC (Lot 3S7SC)		+/- 2,409.3134 µg/mL	Unstressed
	Purity 99%		+/- 2,410.4839 µg/mL	Stressed
3	2-Pentanone	4,004.0 µg/mL	+/- 37.2350 µg/mL	Gravimetric
	CAS # 107-87-9.SEC (Lot OGH01)		+/- 321.1131 µg/mL	Unstressed
	Purity 99%		+/- 321.2690 µg/mL	Stressed

Solvent: P&T Methanol/Water (90:10)
CAS # 67-56-1/7732-18-5
Purity 99%

Michael J Maye

Date Mixed: 24-Apr-2013 **Balance:** 1128353505

Manufactured under Restek's ISO 9001:2008
Registered Quality System
Certificate #FM 80397

General Certified Reference Material Notes

Expiration Notes:

- Expiration date valid for unopened ampul stored in compliance with the recommended conditions.
- Uncertainty, concentration, and expiration of the CRM are based on the unopened product being stored according to the recommended condition found in the storage field.

Purity Notes:

- Purity and/or chemical identity are determined by one or more of the following techniques: GC/FID, HPLC, GC/μECD, GC/MS, LC/MS, RI, and/or melting point.
- Compounds with a listed purity of less than 99% have been weight corrected to compensate for impurities and/or salts. A correction factor is used to calculate the amount of compound necessary to achieve the desired concentration of the parent compound in solution.
- Purity of isomeric compounds is reported as the sum of the isomers.
- Purity values are rounded to the nearest whole number.

Certified Uncertainty Value Notes:

- The uncertainties are determined in accordance with ISO Guides 34 and 35. The certified combined stressed uncertainty value (includes gravimetric uncertainty, homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty and were combined using the following formula:

$$U_{combined\ stressed} = k\sqrt{U^2_{gravimetric} + U^2_{homogeneity} + U^2_{storage\ stability} + U^2_{shipping\ stability}}$$

  k is a coverage factor of 2, which gives a level of confidence of approximately 95%.
- It is important to note that the shipping stability uncertainty was obtained under temperature extremes for specific time intervals; therefore, the certified combined stressed uncertainty value should only be applied to the product if it was stored at non-standard temperature conditions up to and including 7 days. Contact Restek Technical Service at www.restek.com/Contact-Us for use recommendations if your shipment was in-transit for more than 7 days at non-standard temperature conditions.
- Apply the certified combined unstressed uncertainty value if the product was received under standard shipping conditions. Apply the certified combined stressed uncertainty value if the product was received under non-standard conditions as specified below.

Label Conditions	Standard Conditions	Non-Standard Conditions
25°C Nominal (Room Temperature)	< 60°C	≥ 60°C up to 7 days
10°C or colder (Refrigerate)	< 40°C	≥ 40°C up to 7 days
0°C or colder (Freezer)	< 25°C	≥ 25°C up to 7 days

- Separate (not combined) uncertainty values for gravimetric uncertainty are also displayed on the certificate, if needed, separate homogeneity between-ampul uncertainty, storage stability uncertainty and shipping stability uncertainty values are available by contacting Restek Technical Service at www.restek.com/Contact-Us.
- The packaged amount is the minimum sample size for which uncertainty is valid. The ampules are over-filled to ensure that the minimum packaged amount can be sufficiently transferred.

Manufacturing Notes:

- Concentration is based upon gravimetric preparation using either a balance whose calibration has been verified daily using NIST traceable weights, and/or dilutions with Class A glassware.

Handling Notes:

- Samples should be transferred into deactivated vials for handling and storage. Restek supplies deactivated vials along with most standards packed in 2 mL ampules. Due to space constraints, Restek does not supply vials for larger volume ampules. Restek sells DMDCS for the purpose of glassware deactivation as catalog number 31840, which includes complete instructions. Restek will also deactivate larger volume vials from our inventory as a custom ordered item. Contact your Restek sales or customer service representative for details.
- If any undissolved material is visible inside the ampul, sonicate the unopened ampul until the material is completely dissolved.

DH 12/21/12

Certificate of Analysis

DESCRIPTION: 8260 Internal Standards Mix 2

CATALOG NO.: 861184 MFG DATE: Mar-2012

LOT NO.: LB91482 EXPIRATION DATE: Mar-2015

SOLVENT: METHANOL

ANALYTE (1)	CAS NUMBER	PERCENT PURITY(2)	WEIGHT(3) CONCENTRATION	ANALYTICAL(4) CONCENTRATION		STD DEV	SUPELCO LOT NO
CHLOROBENZENE-D5	3114-55-4	99.9	250.1	246.5	+/-	0.23	LB81159
FLUOROBENZENE	462-06-6	99.9	250.1	246.5	+/-	0.19	LB86106
1,4-DICHLOROBENZENE-D4	3855-82-1	98.7	250.1	249.7	+/-	0.30	LB82415

(1) Listed in alphabetical order.

(2) Determined by capillary GC-FID, unless otherwise noted.

(3) NIST traceable weights are used to verify balance calibration with the preparation of each lot. Concentration of analyte in solution is ug/ml +/- 0.5%, uncertainty based upon balance and Class A volumetric glassware. Weights are corrected for analytes less than 98% pure.

(4) Determined by chromatographic analysis against an independently prepared reference lot. Mean of replicate injections.

Elwood Doughty
Quality Control Supervisor

SUPELCO Analytical
595 North Harrison Road
Bellefonte, PA 16823-0048 USA
Phone (814) 359-3441

Rec 12/31/12 -DY X 5

125 Market Street
New Haven, CT 06513
USA

AccuStandard® Inc.

Tel (203)786-5290
Fax (203)786-5287
www.AccuStandard.com

CERTIFICATE OF ANALYSIS

Catalog No: S-635-1S
Description: 1,2-Dichloro-1,1,2-trifluoroethane

Lot: 212121140
Solvent: Methanol

Date Certified: Dec 11, 2012
Expiration: Dec 11, 2022
Sample Size: 1 mL
Storage Condition: Freeze (<-10° C)
Hazards: POISON

[X] Included on ISO/IEC 17025 Scope of Accreditation
[X] Included on ISO Guide 34 Scope of Accreditation

Component	CAS #	Purity % (GC/FID)	Prepared Concentration[1] (µg/mL)	Certified Analyte Concentration[2] (µg/mL)
1,2-Dichloro-1,1,2-trifluoroethane	354-23-4	99	2000	1980

AccuStandard follows U.S. conventions in reporting numerical values on both certificates and labels:

A comma (,) is used to separate units of one-thousand or greater.
A period (.) is used as a decimal place marker.

1. All weights are traceable through NIST, Test No.822-275872-11
2. Certified Analyte Concentration = Purity x Prepared Concentration. The Uncertainty associated with the gravimetric values reported on this certificate is ±0.24%. The CRM Uncertainty calculated for this product is ±5%. These values are the expanded uncertainty and represent an estimated standard deviation equal to the positive square root of the total variation of the uncertainty of components. A normal distribution is assumed and a coverage factor of K=2 is chosen using approximately a 95% confidence level.
3. A product with a suffix (-1A, -2B, etc. or -01, -02, etc.) on its lot# has had its expiration date extended and is identical to the same lot# without the suffix.

For use in routine laboratory analysis.

See reverse side for additional information
Refer to the MSDS for additional safety information

Certified by: R. Cooper
Russ Cooper, QC Manager

Certification Summary

Client: Colorado Oil&Gas Conservation Commision
Project/Site: Tatonka Culverwell

TestAmerica Job ID: 280-42446-2

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Denver	A2LA	DoD ELAP		2907.01
TestAmerica Denver	A2LA	ISO/IEC 17025		2907.01
TestAmerica Denver	Alaska (UST)	State Program	10	UST-30
TestAmerica Denver	Arizona	State Program	9	AZ0713
TestAmerica Denver	Arkansas DEQ	State Program	6	88-0687
TestAmerica Denver	California	State Program	9	2513
TestAmerica Denver	Colorado	State Program	8	N/A
TestAmerica Denver	Connecticut	State Program	1	PH-0686
TestAmerica Denver	Florida	NELAP	4	E87667
TestAmerica Denver	Idaho	State Program	10	CO00026
TestAmerica Denver	Illinois	NELAP	5	200017
TestAmerica Denver	Iowa	State Program	7	370
TestAmerica Denver	Kansas	NELAP	7	E-10166
TestAmerica Denver	Louisiana	NELAP	6	30785
TestAmerica Denver	Maine	State Program	1	CO0002
TestAmerica Denver	Maryland	State Program	3	268
TestAmerica Denver	Minnesota	NELAP	5	8-999-405
TestAmerica Denver	Nevada	State Program	9	CO0026
TestAmerica Denver	New Hampshire	NELAP	1	205310
TestAmerica Denver	New Jersey	NELAP	2	CO004
TestAmerica Denver	New Mexico	State Program	6	CO00026
TestAmerica Denver	New York	NELAP	2	11964
TestAmerica Denver	North Carolina DENR	State Program	4	358
TestAmerica Denver	North Dakota	State Program	8	R-034
TestAmerica Denver	Oklahoma	State Program	6	8614
TestAmerica Denver	Oregon	NELAP	10	CO200001
TestAmerica Denver	Pennsylvania	NELAP	3	68-00664
TestAmerica Denver	South Carolina	State Program	4	72002
TestAmerica Denver	Texas	NELAP	6	T104704183-08-TX
TestAmerica Denver	USDA	Federal		P330-08-00036
TestAmerica Denver	Utah	NELAP	8	QUAN5
TestAmerica Denver	Virginia	NELAP	3	460232
TestAmerica Denver	Washington	State Program	10	C583
TestAmerica Denver	West Virginia DEP	State Program	3	354
TestAmerica Denver	Wisconsin	State Program	5	999615430
TestAmerica Denver	Wyoming (UST)	A2LA	8	

Accreditation may not be offered or required for all methods and analytes reported in this package Please contact your project manager for the laboratory's current list of certified methods and analytes.

Method 8260B

Volatile Organic Compounds (GC/MS) by Method 8260B

FORM I
GC/MS VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Denver | Job No.: 280-42446-2

SDG No.:

Client Sample ID: 0516131315 | Lab Sample ID: 280-42446-5

Matrix: Solid | Lab File ID: P9055.D

Analysis Method: 8260B | Date Collected: 05/16/2013 13:15

Sample wt/vol: 4.963(g) | Date Analyzed: 05/21/2013 18:57

Soil Aliquot Vol: 20 (mL) | Dilution Factor: 1

Soil Extract Vol.: 1000(mL) | GC Column: DB-624 (60.25) ID: 0.25(mm)

% Moisture: | Level: (low/med) Medium

Analysis Batch No.: 175392 | Units: ug/Kg

CAS NO.	COMPOUND NAME	RESULT	Q	RL
71-43-2	Benzene	ND		250
100-41-4	Ethylbenzene	ND		250
108-88-3	Toluene	ND		250
179601-23-1	m-Xylene & p-Xylene	ND		250
95-47-6	o-Xylene	ND		130

CAS NO.	SURROGATE	%REC	Q	LIMITS
17060-07-0	1,2-Dichloroethane-d4 (Surr)	87		50-139
2037-26-5	Toluene-d8 (Surr)	86		68-143
460-00-4	4-Bromofluorobenzene (Surr)	82		62-133
1868-53-7	Dibromofluoromethane (Surr)	97		60-133

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\Denchrom\ChromData\VMS_P\20130521-11811.b\P9055.D
Lims ID: 280-42446-D-5-A
Client ID: 0516131315
Inject. Date: 21-May-2013 18:57:30
Dil. Factor: 1.0000
Sample Type: Client
Sample ID: 280-42446-d-5-a
Misc. Info.:
Operator: SEIFERTJ
Instrument ID: VMS_P
Purge Vol: 20.000 mL
ALS Bottle#: 37
Lims Batch ID: 175392
Lims Sample ID: 38
Detector: MS SCAN

Method: \\Denchrom\ChromData\VMS_P\20130521-11811.b\MLE_VMSP_8260.m
Last Update: 22-May-2013 08:01:04
Calib Date: 09-May-2013 14:01:30
Quant Method: Internal Standard
Quant By: Initial Calibration
Last ICal File: \\Denchrom\ChromData\VMS_P\20130509-11450.b\P8497.D
Limit Group: MSV - 8260B Water and Solid
Integrator: RTE
ID Type: Deconvolution ID
Column Type: DB-624 (60.25)
Column Dia: 0.25 mm
Process Host: DENPC251

First Level Reviewer: seifertj
Date: 22-May-2013 07:29:21

Compound	Sig	RT	EXP RT	DLT RT	Q	Response	On-Col Amt ug/l	Flags
* 1 Fluorobenzene	96	7.967	7.968	-0.001	98	1774345	12.5	
* 2 Chlorobenzene-d5	119	10.219	10.213	0.006	89	354263	12.5	
* 3 1,4-Dichlorobenzene-d4	152	12.100	12.093	0.007	97	492471	12.5	
$ 4 BFB	95		5.381					1
$ 5 Dibromofluoromethane (Surr)	111	7.423	7.418	0.005	57	267285	9.68	
$ 6 1,2-Dichloroethane-d4 (Surr)	65	7.724	7.718	0.006	0	249171	8.73	
$ 7 Toluene-d8 (Surr)	98	9.125	9.126	-0.001	94	1223906	8.56	
$ 8 4-Bromofluorobenzene (Surr)	95	11.106	11.100	0.006	87	358635	8.24	
21 2-Butoxyethanol TIC	1		0.000					
9 2,4-Dimethylpentane	1		0.000					
11 2,3-Dimethylpentane	1		0.000					
12 2,2,3-Trimethylbutane	1		0.000					
13 2,2-Dimethylpentane	1		0.000					
10 n-Nonyl Aldehyde	1		0.000					
14 n-Heptane	43		0.000					
16 1,3,5-Trichlorobenzene	180		0.000					
17 3-Ethylpentane	1		0.000					
18 3,3-Dimethylpentane	1		0.000					
15 Dimethyl disulfide	1		0.000					
19 3-Methylhexane	1		0.000					
20 2-Methylhexane	1		0.000					
22 Chlorotrifluoroethene	116		4.091					
23 Dichlorodifluoromethane	85		4.147					
24 1,2-Dichloro-1,1,2,2-tetrafluoro	85		4.301					
26 Chloromethane	50		4.370					
27 Vinyl chloride	62		4.538					
25 2-Chloro-1,1,1-Trifluoroethane	118		4.580					
28 Ethylene oxide	43		4.888					
29 Bromomethane	94		4.915					
30 Chloroethane	64		4.985					

Compound	Sig	RT	EXP RT	DLT RT	Q	Response	On-Col Amt ug/l	Flags
31 Dichlorofluoromethane	67		5.139					
32 Trichlorofluoromethane	101		5.264					
33 Ethanol	45		5.278					
34 Propene oxide TIC	58		5.334					
36 1,2-Dichloro-1,1,2-trifluoroetha	117		5.405					
35 Ethyl ether	59		5.419					
37 1,1,1-Trifluoro-2,2-dichloroetha	83		5.447					
38 Propene oxide	58		5.530					
39 Acrolein	56		5.585					
40 1,1,2-Trichloro-1,2,2-trifluoroe	151		5.673					
41 Acetone	43		5.693					
42 Isopropyl alcohol	45		5.716					
43 1,1-Dichloroethene	96		5.721					
44 Iodomethane	142		5.907					
45 Methyl acetate	43		5.930					
46 Acetonitrile	41		5.943					
47 3-Chloro-1-propene	41		5.980					
48 Carbon disulfide	76		5.995					
49 2-Methyl-2-propanol	59		6.036					
50 Methylene Chloride	84	6.086	6.086	0.0	96	40951	0.7783	
52 Acrylonitrile	53		6.250					
51 Methyl tert-butyl ether	73		6.252					
53 trans-1,2-Dichloroethene	96		6.300					
54 Hexane	57		6.452					
56 Isopropyl ether	87		6.565					
55 Vinyl acetate	43		6.566					
57 1,1-Dichloroethane	63		6.629					
58 2-Chloro-1,3-butadiene	53		6.701					
59 Tert-butyl ethyl ether	59		6.853					
60 Ethyl acetate	43		7.010					
61 2-Butanone (MEK)	43		7.030					
63 cis-1,2-Dichloroethene	96		7.073					
64 2,2-Dichloropropane	77		7.101					
65 Propionitrile	54		7.101					
66 Methacrylonitrile	41		7.216					
67 Chlorobromomethane	128		7.280					
68 Chloroform	83		7.287					
69 Tetrahydrofuran	42		7.310					
70 Isobutyl alcohol	41		7.487					
71 1,1,1-Trichloroethane	97		7.502					
72 Cyclohexane	56		7.561					
73 1,1-Dichloropropene	75		7.602					
74 Carbon tetrachloride	117		7.638					
62 sec-Butyl Alcohol	45		7.761					139
75 Tert-amyl methyl ether	73		7.761					
76 1,2-Dichloroethane	62		7.781					
77 Benzene	78		7.788					
78 n-Butanol	56		7.995					
79 Trichloroethene	95		8.245					
80 2-Pentanone	43		8.290					
81 Methyl methacrylate	100		8.369					
82 Methylcyclohexane	55		8.419					

Compound	Sig	RT	EXP RT	DLT RT	Q	Response	On-Col Amt ug/l	Flags
83 1,2-Dichloropropane	63		8.431					
84 1,4-Dioxane	88		8.481					
85 Dibromomethane	93		8.538					
86 Dichlorobromomethane	83		8.603					
87 2-Chloroethyl vinyl ether	63		8.733					
88 2-Nitropropane	41		8.740					
89 cis-1,3-Dichloropropene	75		8.910					
90 4-Methyl-2-pentanone (MIBK)	43		8.960					
91 Toluene	91	9.175	9.175	0.0	87	39770	0.2227	
92 Ethyl methacrylate	69		9.248					
93 trans-1,3-Dichloropropene	75		9.282					
94 1,1,2-Trichloroethane	97		9.439					
95 2-Hexanone	43		9.554					19
96 1,3-Dichloropropane	76		9.582					
97 Tetrachloroethene	164		9.590					
98 Chlorodibromomethane	129		9.775					
99 Tetrahydrothiophene	60		9.820					
100 Ethylene Dibromide	107		9.911					
101 1-Chlorohexane	91		10.119					
102 Chlorobenzene	112		10.240					
103 Ethylbenzene	106		10.269					
104 1,1,1,2-Tetrachloroethane	131		10.276					
105 m-Xylene & p-Xylene	106		10.347					
107 o-Xylene	106		10.669					
106 Styrene	104		10.676					
108 Bromoform	173		10.891					
109 Isopropylbenzene	105		10.934					
110 cis-1,4-Dichloro-2-butene	53		10.971					
111 Cyclohexanone	55		11.091					
112 1,1,2,2-Tetrachloroethane	83		11.155					
113 trans-1,4-Dichloro-2-butene	53		11.193					
114 1,2,3-Trichloropropane	110		11.234					
115 N-Propylbenzene	120		11.263					
116 Bromobenzene	156		11.277					19
117 1,3,5-Trimethylbenzene	105		11.370					
118 2-Chlorotoluene	126		11.391					
119 4-Chlorotoluene	126		11.477					
120 tert-Butylbenzene	119		11.677					
121 1,2,4-Trimethylbenzene	105		11.713					
122 sec-Butylbenzene	134		11.863					
123 4-Isopropyltoluene	119		11.956					
124 1,3-Dichlorobenzene	146		12.049					
125 1,2,3-Trimethylbenzene	105		12.108					
126 1,4-Dichlorobenzene	146		12.121					
127 n-Butylbenzene	91		12.342					
128 1,2-Dichlorobenzene	146		12.500					
129 1,2-Dibromo-3-Chloropropane	157		13.293					
130 1,2,4-Trichlorobenzene	180		14.301					
131 Hexachlorobutadiene	225		14.437					
132 Naphthalene	128		14.709					
133 1,2,3-Trichlorobenzene	180		15.045					
S 134 Trihalomethanes, Total	1				0		0	

Compound	Sig	RT	EXP RT	DLT RT	Q	Response	On-Col Amt ug/l	Flags
S 135 Xylenes, Total (URS)	1				0		0	
S 136 Total BTEX	1				0		0.2227	
S 137 1,3-Dichloropropene, Total	1				0		0	
S 138 1,2-Dichloroethene, Total	1				0		0	
S 139 Xylenes, Total	106				0		0	
S 140 1,2-Dichloroethene, Total (URS)	96				0		0	
T 141 Dichloroacetonitrile TIC	74		1.000					1
T 142 2,3-dichloro-1-propene TIC	75		1.000					1

QC Flag Legend

Processing Flags
1 - Missing Peaks
3 - Failed RT Window Test
9 - Failed A Reference Spectral Test

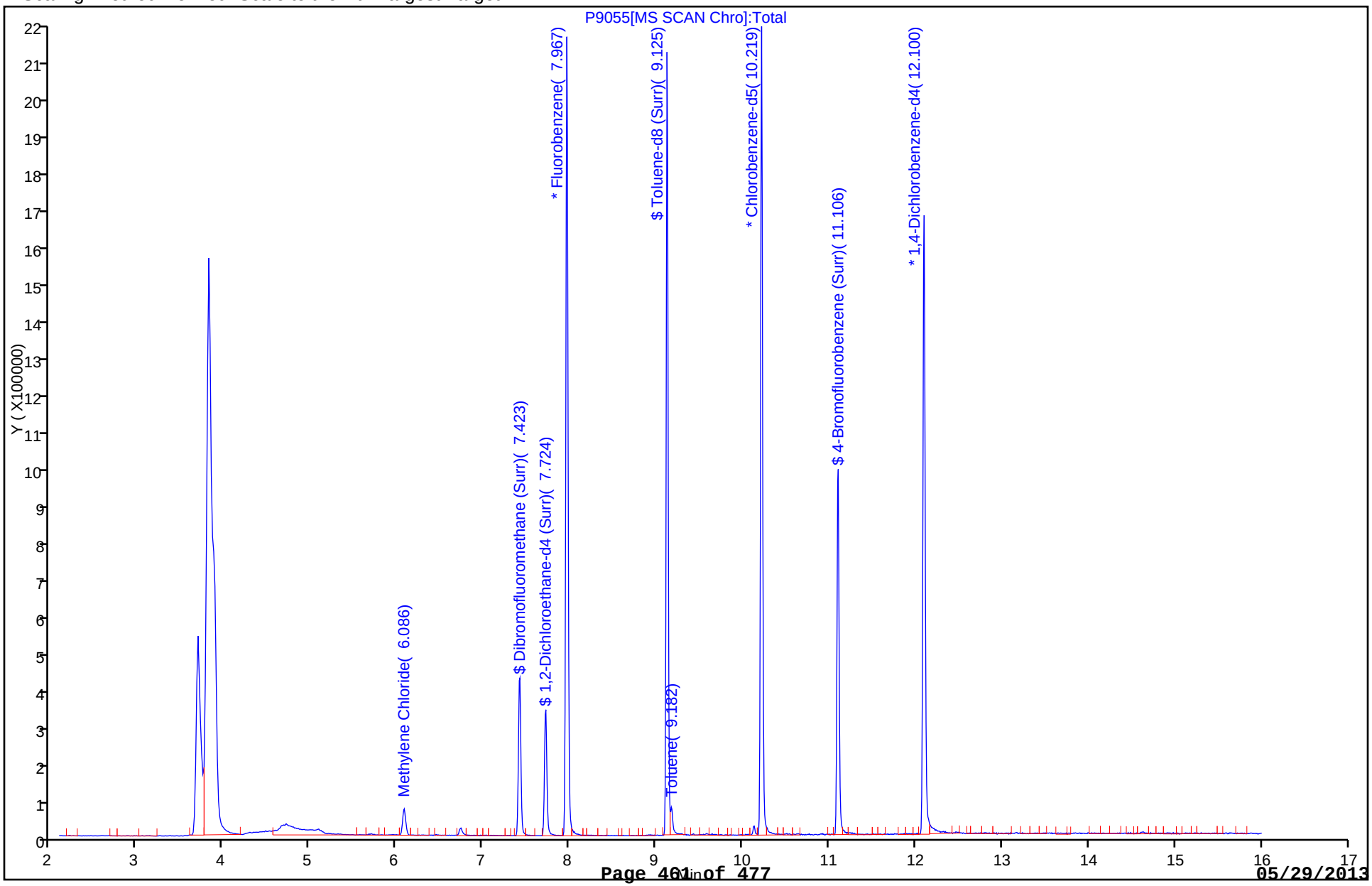
Report Date: 22-May-2013 08:47:16 Chrom Revision: 2.0 25-Apr-2013 12:05:30

TestAmerica Denver

Data File: \\Denchrom\ChromData\VMS_P\20130521-11811.b\P9055.D

Injection Date:	21-May-2013 18:57:30	Limit Group:	MSV - 8260B Water and Solid
Client ID:	0516131315	Instrument ID:	VMS_P
Lims Batch ID:	175392	Lims Sample ID:	38
Operator ID:	SEIFERTJ	Purge Vol:	20.000 mL
Column Type:	DB-624 (60.25)	Column Dia:	0.25 mm

Y Scaling: Method Defined: Scale to the Nth Largest Target: 1



Method 8270C

Semivolatile Organic Compounds (GC/MS) by Method 8270C

FORM I
GC/MS SEMI VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Denver | Job No.: 280-42446-2

SDG No.:

Client Sample ID: 0516131315 | Lab Sample ID: 280-42446-5

Matrix: Solid | Lab File ID: K1762.D

Analysis Method: 8270C | Date Collected: 05/16/2013 13:15

Extract. Method: 3550C | Date Extracted: 05/21/2013 18:30

Sample wt/vol: 30.0(g) | Date Analyzed: 05/24/2013 16:22

Con. Extract Vol.: 1000(uL) | Dilution Factor: 1

Injection Volume: 0.5(uL) | Level: (low/med) Low

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 175805 | Units: ug/Kg

CAS NO.	COMPOUND NAME	RESULT	Q	RL
85-01-8	Phenanthrene	ND		330
129-00-0	Pyrene	ND		330
83-32-9	Acenaphthene	ND		330
208-96-8	Acenaphthylene	ND		330
120-12-7	Anthracene	ND		330
56-55-3	Benzo[a]anthracene	ND		330
205-99-2	Benzo[b]fluoranthene	ND		330
207-08-9	Benzo[k]fluoranthene	ND		330
191-24-2	Benzo[g,h,i]perylene	ND		330
50-32-8	Benzo[a]pyrene	ND		330
218-01-9	Chrysene	ND		330
53-70-3	Dibenz(a,h)anthracene	ND		330
206-44-0	Fluoranthene	ND		330
86-73-7	Fluorene	ND		330
193-39-5	Indeno[1,2,3-cd]pyrene	ND		330
91-20-3	Naphthalene	ND		330
90-12-0	1-Methylnaphthalene	ND		330
91-57-6	2-Methylnaphthalene	ND		330

CAS NO.	SURROGATE	%REC	Q	LIMITS
321-60-8	2-Fluorobiphenyl	73		50-120
4165-60-0	Nitrobenzene-d5	74		50-120
1718-51-0	Terphenyl-d14	89		55-120

TestAmerica Denver
Target Compound Quantitation Report

Data File: \\Denchrom\ChromData\SMS_K\20130524-11951.b\K1762.D
Lims ID: 280-42446-B-5-B
Client ID: 0516131315
Inject. Date: 24-May-2013 16:22:30
Dil. Factor: 1.0000
Sample Type: Client
Sample ID: 280-42446-B-5-B
Misc. Info.:
Operator: KIEKELD
Instrument ID: SMS_K
Injection Vol: 0.5 ul
ALS Bottle#: 19
Lims Batch ID: 175805
Lims Sample ID: 40
Detector: MS SCAN

Method: \\Denchrom\ChromData\SMS_K\20130524-11951.b\SMSK_8270C.m
Method Label: 8270C / 625
Last Update: 28-May-2013 11:46:40
Calib Date: 19-May-2013 14:28:30
Quant Method: Internal Standard
Quant By: Initial Calibration
Last ICal File: \\Denchrom\ChromData\SMS_K\20130519-11768.b\K1658.D
Limit Group: MSSV - 8270C_625
Integrator: RTE
ID Type: Deconvolution ID
Column Type: VF-5ms
Column Dia: 0.50 mm
Process Host: DENPC307

First Level Reviewer: kiekeld
Date: 28-May-2013 11:41:35

Compound	Sig	RT	ADJ RT	DLT RT	Q	Response	On-Col Amt ug/ml	Flags
* 1 1,4-Dichlorobenzene-d4	152	4.534	4.540	-0.006	91	385024	40.0	
* 2 Naphthalene-d8	136	5.774	5.774	0.0	100	1463438	40.0	
* 3 Acenaphthene-d10	164	7.525	7.525	0.0	99	914741	40.0	
* 4 Phenanthrene-d10	188	9.023	9.023	0.0	99	1525491	40.0	
* 5 Chrysene-d12	240	13.142	13.136	0.006	81	1452165	40.0	
* 6 Perylene-d12	264	17.173	17.173	0.0	99	1299212	40.0	
$ 9 Nitrobenzene-d5	82	5.069	5.075	-0.006	98	1098054	73.9	
$ 11 2-Fluorobiphenyl	172	6.826	6.832	-0.006	83	2110908	73.2	
$ 13 Terphenyl-d14	244	10.962	10.962	0.0	100	2534044	89.0	
79 Naphthalene	128		5.798					9
93 2-Methylnaphthalene	142		6.474					
96 1-Methylnaphthalene	142		6.579					
114 Acenaphthylene	152		7.390					
117 Acenaphthene	153		7.560					
135 Fluorene	166		8.078					
168 Phenanthrene	178		9.053					
169 Anthracene	178		9.100					
179 Fluoranthene	202		10.422					9
182 Pyrene	202		10.763					
198 Benzo[a]anthracene	228		13.125					
199 Chrysene	228		13.213					
203 Benzo[b]fluoranthene	252		16.045					9
204 Benzo[k]fluoranthene	252		16.121					9
207 Benzo[a]pyrene	252		17.003					
213 Dibenz(a,h)anthracene	278		20.410					
214 Indeno[1,2,3-cd]pyrene	276		20.334					
215 Benzo[g,h,i]perylene	276		21.104					

QC Flag Legend

Processing Flags
9 - Failed A Reference Spectral Test

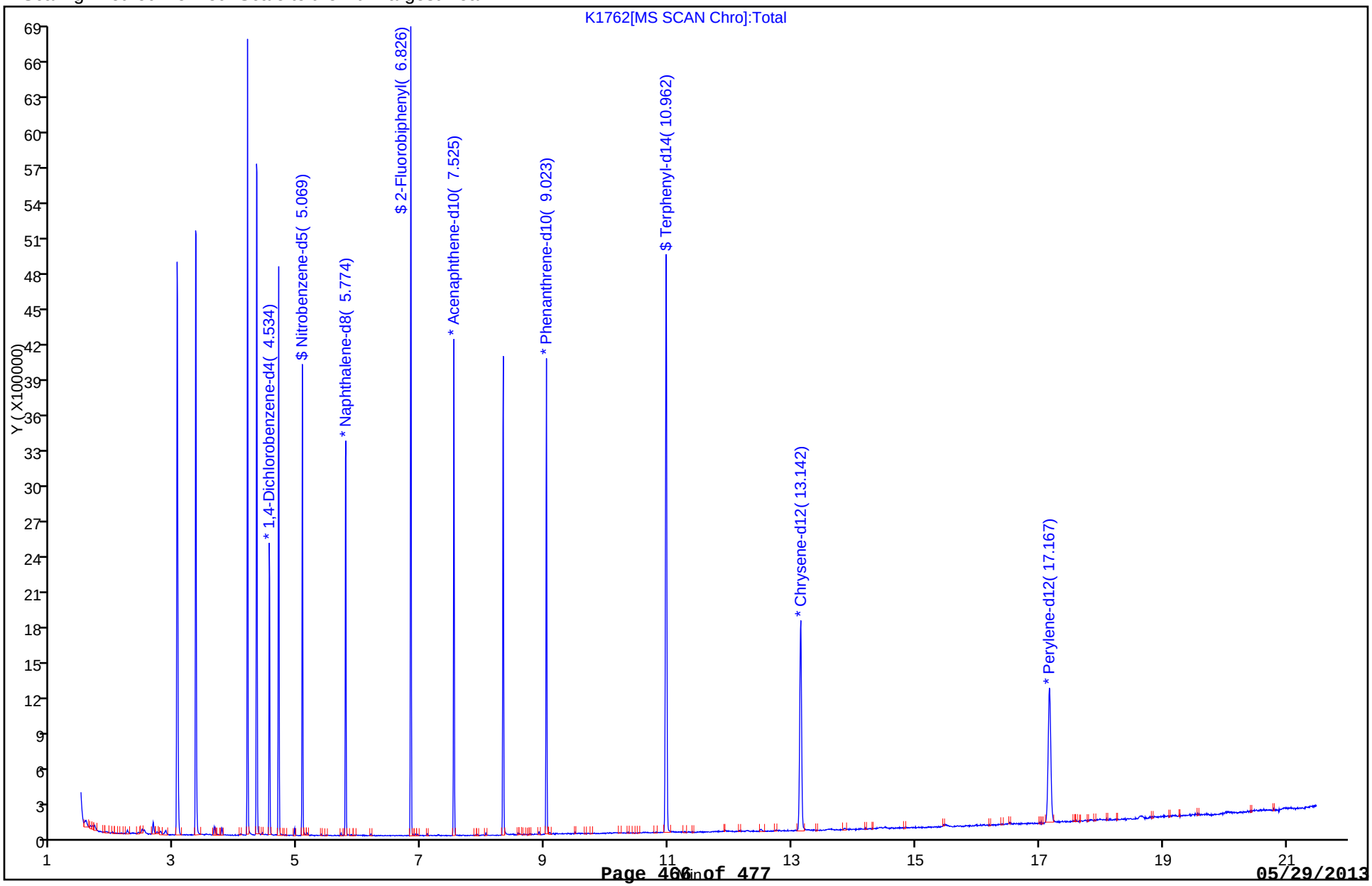
Report Date: 28-May-2013 11:47:05 Chrom Revision: 2.0 25-Apr-2013 12:05:30

TestAmerica Denver

Data File: \\Denchrom\ChromData\SMS_K\20130524-11951.b\K1762.D

Injection Date:	24-May-2013 16:22:30	Limit Group:	MSSV - 8270C_625
Client ID:	0516131315	Instrument ID:	SMS_K
Lims Batch ID:	175805	Lims Sample ID:	40
Operator ID:	KIEKELD	Injection Vol:	0.5 ul
Column Type:	VF-5ms	Column Dia:	0.50 mm

Y Scaling: Method Defined: Scale to the Nth Largest Peak: 1



Method 8015B - GRO

Gasoline Range Organics (GC) by Method 8015B

FORM I
GASOLINE RANGE ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Denver Job No.: 280-42446-2

SDG No.:

Client Sample ID: 0516131315 Lab Sample ID: 280-42446-5

Matrix: Solid Lab File ID: 108F0801.D

Analysis Method: 8015B Date Collected: 05/16/2013 13:15

Sample wt/vol: 10.03(g) Date Analyzed: 05/21/2013 13:59

Soil Aliquot Vol: 0.1 (mL) Dilution Factor: 1

Soil Extract Vol.: 10(mL) GC Column: RTX 502.2 (105) ID: 0.53(mm)

% Moisture: Level: (low/med) Medium

Analysis Batch No.: 175231 Units: mg/Kg

CAS NO.	COMPOUND NAME	RESULT	Q	RL
8006-61-9	Gasoline Range Organics (GRO)-C6-C10	ND		1.2

CAS NO.	SURROGATE	%REC	Q	LIMITS
98-08-8	a,a,a-Trifluorotoluene	90		77-123

TestAmerica Denver
Target Compound Quantitation Report

Data File:	\\Denchrom\ChromData\VGC_L\20130521-11817.b\108F0801.D		
Lims ID:	280-42446-C-5-A	Client ID:	0516131315
Inject. Date:	21-May-2013 13:59:15	Dil. Factor:	1.0000
Sample Type:	Client		
Sample ID:	280-2062307,46-5		
Misc. Info.:			
Operator:	TM	Instrument ID:	VGC_L
Purge Vol:	5.000 mL	ALS Bottle#:	108
Lims Batch ID:	175231	Lims Sample ID:	6
Detector:	GC FID1B		
Method:	\\Denchrom\ChromData\VGC_L\20130521-11817.b\GRO_L.m		
Last Update:	21-May-2013 16:31:37	Calib Date:	09-Jan-2013 14:24:37
Quant Method:	External Standard	Quant By:	Initial Calibration
Last ICal File:	\\Denchrom\ChromData\VGC_L\20130110-7868.b\116F0801.D		
Limit Group:	GCV - GRO		
Integrator:	Falcon		
Column Type:		Column Dia:	
Process Host:	DENPC369		

First Level Reviewer: mooret Date: 21-May-2013 16:29:06

	RT	EXP RT	DLT RT	Response	On-Col Amt ug/l	Flags
1	Pentane					1
	5.767					
2	2-Methylpentane					
	7.397	7.247	0.150	3945	0	
$ 3	a,a,a-Trifluorotoluene					
	12.383	12.327	0.056	198892	26.9	
A 4	C6-C10					
	13.824	7.017 - 20.632		33281	-5.57	
A 6	Gasoline					
	15.134	7.017 - 23.252		13977090	2047.1	E
A 5	C6-C12					
	15.134	7.017 - 23.252		13977090	2047.1	E
$ 8	1-Chloro-4-fluorobenzene					
	16.977	16.930	0.047	196264	25.4	
$ 7	Chlorobenzene					1
	17.230					
9	1,2,4-Trimethylbenzene					1
	20.457					
10	Dodecane					1
	23.127					

QC Flag Legend

Processing Flags
1 - Missing Peaks
E - Exceeded Maximum Amount

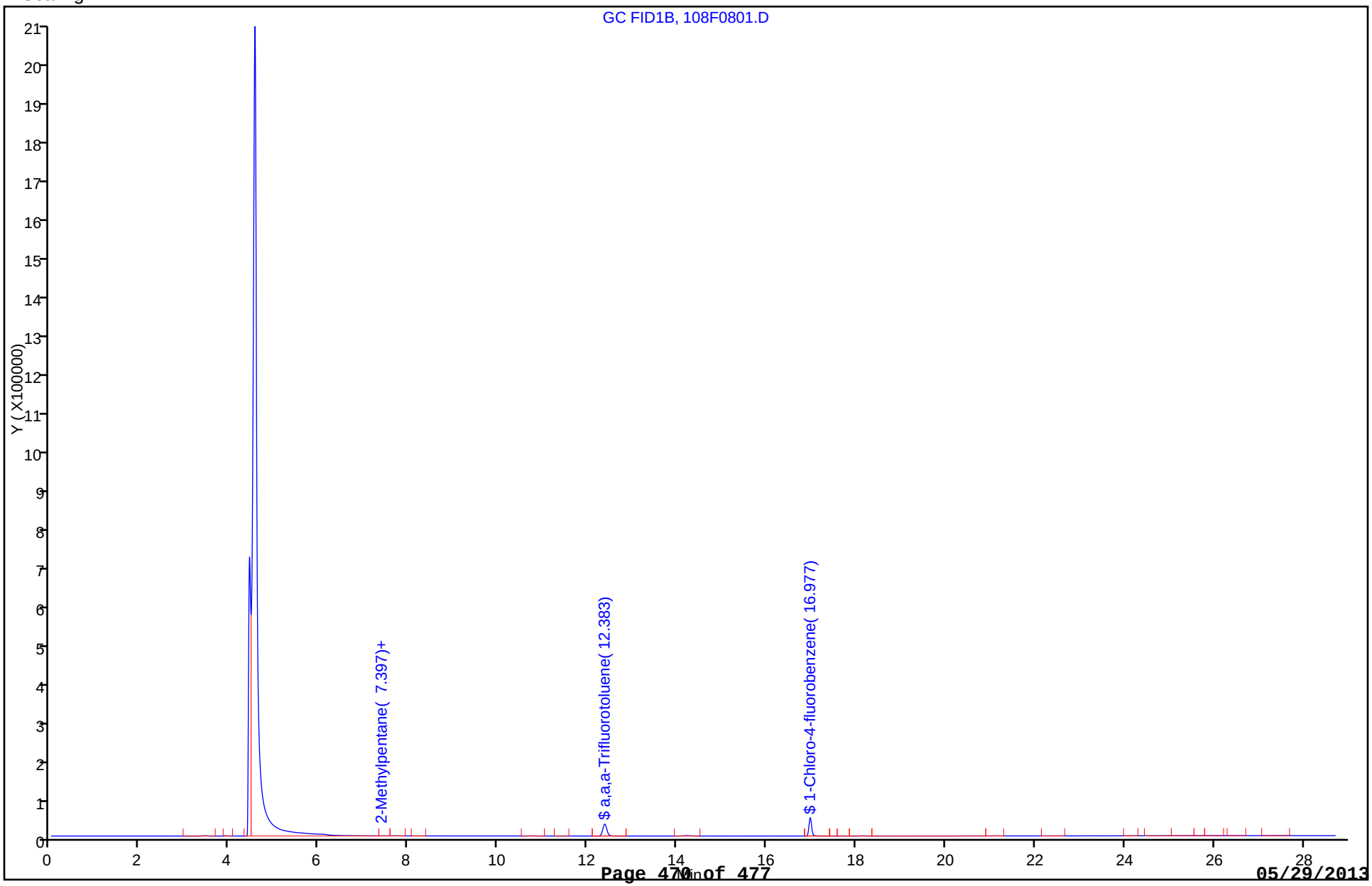
Report Date: 21-May-2013 16:31:41 Chrom Revision: 2.0 25-Apr-2013 12:05:30

TestAmerica Denver

Data File: \\Denchrom\ChromData\VGC_L\20130521-11817.b\108F0801.D

Injection Date:	21-May-2013 13:59:15	Limit Group:	GCV - GRO
Client ID:	0516131315	Instrument ID:	VGC_L
Lims Batch ID:	175231	Lims Sample ID:	6
Operator ID:	TM	Purge Vol:	5.000 mL
Column Type:		Column Dia:	

Y Scaling:



Method 8015B - DRO

Diesel Range Organics (DRO) (GC) by Method 8015B

FORM I
DIESEL RANGE ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Denver | Job No.: 280-42446-2

SDG No.:

Client Sample ID: 0516131315 | Lab Sample ID: 280-42446-5

Matrix: Solid | Lab File ID: 05230020.D

Analysis Method: 8015B | Date Collected: 05/16/2013 13:15

Extraction Method: 3546 | Date Extracted: 05/21/2013 17:40

Sample wt/vol: 31.1(g) | Date Analyzed: 05/23/2013 18:22

Con. Extract Vol.: 1000(uL) | Dilution Factor: 1

Injection Volume: 1(uL) | GC Column: RTX-1 (30.32) ID: 0.25(mm)

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 175601 | Units: mg/Kg

CAS NO.	COMPOUND NAME	RESULT	Q	RL
STL00255	C10-C36	ND		3.9

CAS NO.	SURROGATE	%REC	Q	LIMITS
84-15-1	o-Terphenyl	76		49-115

TestAmerica Denver
Target Compound Quantitation Report

Data File:	\\Denchrom\ChromData\SGC_U\20130523-11907.b\05230020.D		
Lims ID:	280-42446-B-5-A	Client ID:	0516131315
Inject. Date:	23-May-2013 18:22:46	Dil. Factor:	1.0000
Sample Type:	Client		
Sample ID:	280-42446-B-5-A		
Misc. Info.:			
Operator:	MB	Instrument ID:	SGC_U
Injection Vol:	1.0 ul	ALS Bottle#:	20
Lims Batch ID:	175601	Lims Sample ID:	20
Detector:	GC FID1B		
Method:	\\Denchrom\ChromData\SGC_U\20130523-11907.b\DRO_U.m		
Last Update:	24-May-2013 08:45:28	Calib Date:	24-Apr-2013 16:24:11
Quant Method:	External Standard	Quant By:	Initial Calibration
Last ICal File:	\\Denchrom\ChromData\SGC_U\20130424-10941.b\04240009.D		
Limit Group:	GCSV - DRO		
Integrator:	Falcon		
Column Type:	RTX-1 (30.32)	Column Dia:	0.25 mm
Process Host:	DENPC248		

RT	EXP RT	DLT RT	Response	On-Col Amt ug/ml	Flags
$ 1 o-Terphenyl					
5.707	5.710	-0.003	49810	15.1	
A 15 C10-C36					
5.422	1.520	- 9.323	90436	34.5	

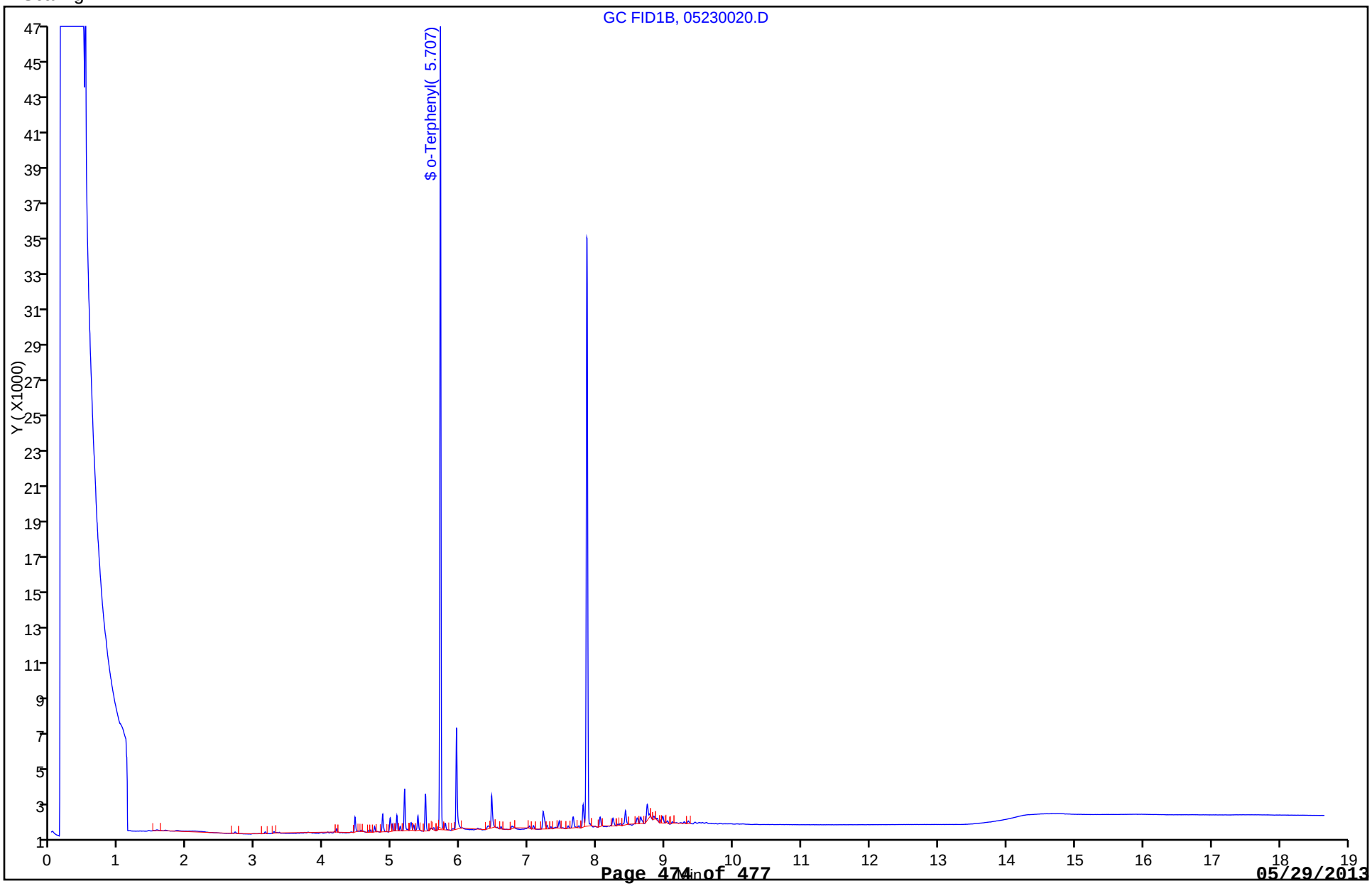
Report Date: 24-May-2013 08:45:29 Chrom Revision: 2.0 03-Jan-2013 09:16:44

TestAmerica Denver

Data File: \\Denchrom\ChromData\SGC_U\20130523-11907.b\05230020.D

Injection Date:	23-May-2013 18:22:46	Limit Group:	GCSV - DRO
Client ID:	0516131315	Instrument ID:	SGC_U
Lims Batch ID:	175601	Lims Sample ID:	20
Operator ID:	MB	Injection Vol:	1.0 ul
Column Type:	RTX-1 (30.32)	Column Dia:	0.25 mm

Y Scaling:



Shipping and Receiving Documents

Chain of Custody Record

Sampler ID _____

Temperature on Receipt 5.6 °C 5/17/13

Drinking Water? Yes ☐ No ☑

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TAL-4124-280 (0508)

Client	Project Manager	Date	Chain of Custody Number
COGCC	Alex Fischer	5/16/13	173369
Address	**Telephone Number (Area Code)/Fax Number**	**Lab Number**	**Page 1 of 1**
1120 Lincoln Street Suite 801	303-894-2100 x 5738		
City / **State** / **Zip Code**	**Site Contact**	**Lab Contact**	
Denver / CO / 80203			
Project Name and Location (State)	**Carrier/Waybill Number**		
Tatonka Lulverwell			
Contract/Purchase Order/Quote No.			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed.	Soil	Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Analysis: BTEX	GRO	DRO/RRO/Metals	Carbonate/pH	Sulfate/Cr III/Cr IV	Special Instructions/ Conditions of Receipt
@5161315	5/16/13	13:15				X	4						1	1	1	1		

Page 476 of 477

Possible Hazard Identification
☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal
☐ Return To Client ☑ Disposal By Lab ☐ Archive For _____ Months
(A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required
☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☑ 21 Days ☐ Other _____

QC Requirements (Specify)

	Relinquished By	Date	Time	Received By	Date	Time
1.		5/17/13	1641		5/17/13	1641
2.						
3.						

Comments

05/29/2013

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy

Login Sample Receipt Checklist

Client: Colorado Oil&Gas Conservation Commision

Job Number: 280-42446-2

Login Number: 42446

List Source: TestAmerica Denver

List Number: 1

Creator: Bindel, Aaron M

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	