010001

SOUTHWEST RESEARCH INSTITUTE
NUCLEAR PROJECT
CLIENT: Division 20
TASK ORDER: 051219-5
SRR: 28420
SDG: 271245
CASE: L. Yang
VTSR: December 16, 2005
PROJECT#: 06002.01.322

FINAL REPORT

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

010002

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 12/16/05

Matrix: Liquid

Project No.: 06002.01.322

Task Order: 051219-5

SRR: 28420

Method: ICP SW846 6010B

Client ID	Lab Sample ID	Potassium Result (mg/L)	Sodium Result (mg/L)
Prep Blank	PBW-M20H1	<1.50	<1.50
Lab Control	LCSW-M20H1	99.4	98.0
True Value	-----	100	100
Recovery	-----	99.4%	98.0%
Cond.A-130°C 12/9/05	271245	<1.50	2.35
Duplicate result	271245	<1.50	2.64
RPD	-----	0.00%	11.6%
Spike result	271245	103	105
Spike added	-----	100	100
Recovery	-----	103%	103%
Cond.A-150°C 12/12/05	271246	<1.50	<1.50
Cond.A-180°C 12/13/05	271247	3.64	4.09
Cond.A-210°C 12/15/05	271248	13.2	20.4
Cond.A-230°C 12/15/05	271249	27.3	23.9
Reporting Limit:		1.50 mg/L	1.50 mg/L

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SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

010003

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 12/16/05

Matrix: Solid

Project No.: 06002.01.322

Task Order: 051219-5

SRR: 28420

Method: ICP SW846 6010B

Client ID	Lab Sample ID	Potassium Result (mg/Kg)	Sodium Result (mg/Kg)
Prep Blank	PBW-M19E2	<30.0	<30.0
Lab Control	LCSW-M19E2	1960	1950
True Value	-----	2000	2000
Recovery	-----	98.0%	97.5%
Sol.A-230°C 12/15/05	271250	154000	170000
Duplicate result	271250	152000	173000
RPD	-----	1.31%	1.75%
Spike result	271250	157000	169000
Spike added	-----	1905	1905
Recovery	-----	157%	-52.5%

Reporting Limit: 30.0 mg/Kg 30.0 mg/Kg

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SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

010004

Sample ID
Cond.A-130°C 12/9/05

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 12/16/05

Matrix: Liquid

Project No.: 06002.01.322

Lab System ID: 271245

SRR: 28420

Method: IC - EPA 300

Task Order: 051219-5

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	<0.1	0.1
Chloride	0.681	0.1
Fluoride	0.112	0.1
Nitrate-N	0.396	0.1
Nitrite-N	1.23	0.1
Phosphate-P	<0.1	0.1
Sulfate	<0.1	0.1

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SOUTHWEST RESEARCH INSTITUTE

DUPLICATE SUMMARY 010005

Sample ID
Cond.A-130°C 12/9/05

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 12/16/05

Matrix: Liquid

Project No.: 06002.01.322

Lab System ID: 271245

SRR: 28420

Method: IC - EPA 300

Task Order: 051219-5

Analysis	Sample Result (mg/L)	Duplicate Result (mg/L)	RPD
Bromide	<0.1	<0.1	0.00%
Chloride	0.681	0.934	31.3%
Fluoride	0.112	0.113	0.89%
Nitrate-N	0.396	0.411	3.72%
Nitrite-N	1.23	1.22	0.82%
Phosphate-P	<0.1	<0.1	0.00%
Sulfate	<0.1	<0.1	0.00%

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SOUTHWEST RESEARCH INSTITUTE

MATRIX SPIKE SUMMARY

010006

Sample ID
Cond.A-130°C 12/9/05

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 12/16/05

Matrix: Liquid

Project No.: 06002.01.322

Lab System ID: 271245

SRR: 28420

Method: IC - EPA 300

Task Order: 051219-5

Analysis	Sample Result (mg/L)	Spike Result (mg/L)	Spike Added (mg/L)	Recovery
Bromide	<0.1	4.05	4.00	101%
Chloride	0.681	2.59	2.00	95.5%
Fluoride	0.112	0.860	1.00	74.8%
Nitrate-N	0.396	1.20	0.904	88.9%
Nitrite-N	1.23	2.73	1.59	94.3%
Phosphate-P	<0.1	1.92	1.91	101%
Sulfate	<0.1	4.03	4.00	101%

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SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

010007

Sample ID
Cond.A-150°C 12/12/05

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 12/16/05

Matrix: Liquid

Project No.: 06002.01.322

Lab System ID: 271246

SRR: 28420

Method: IC - EPA 300

Task Order: 051219-5

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	<0.1	0.1
Chloride	0.358	0.1
Fluoride	0.118	0.1
Nitrate-N	0.450	0.1
Nitrite-N	0.330	0.1
Phosphate-P	<0.1	0.1
Sulfate	<0.1	0.1

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SAMPLE ANALYSIS DATA SHEET 010008

Sample ID
Cond.A-180°C 12/13/05

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 12/16/05

Matrix: Liquid

Project No.: 06002.01.322

Lab System ID: 271247

SRR: 28420

Method: IC - EPA 300

Task Order: 051219-5

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	<0.1	0.1
Chloride	1.58	0.1
Fluoride	0.155	0.1
Nitrate-N	8.69	0.1
Nitrite-N	1.33	0.1
Phosphate-P	0.596	0.1
Sulfate	<0.1	0.1

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SAMPLE ANALYSIS DATA SHEET

010009

Sample ID
Cond.A-210°C 12/15/05

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 12/16/05

Matrix: Liquid

Project No.: 06002.01.322

Lab System ID: 271248

SRR: 28420

Method: IC - EPA 300

Task Order: 051219-5

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	<2	2
Chloride	116	2
Fluoride	2.19	2
Nitrate-N	204	2
Nitrite-N	2.37	2
Phosphate-P	2.47	2
Sulfate	<2	2

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SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

010010

Sample ID
Cond.A-230°C 12/15/05

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 12/16/05

Matrix: Liquid

Project No.: 06002.01.322

Lab System ID: 271249

SRR: 28420

Method: IC - EPA 300

Task Order: 051219-5

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	13.7	2
Chloride	420	10
Fluoride	2.29	2
Nitrate-N	310	2
Nitrite-N	3.42	2
Phosphate-P	3.98	2
Sulfate	<2	2

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SAMPLE ANALYSIS DATA SHEET

010011

Sample ID
Sol.A-230°C 12/15/05

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Solid

Lab System ID: 271250

Method: IC - EPA 300

Client: Division 20

Date Received: 12/16/05

Project No.: 06002.01.322

SRR: 28420

Task Order: 051219-5

Analysis	Sample Result (mg/Kg)	Reporting Limit (mg/Kg)
Bromide	<981	981
Chloride	108000	1960
Fluoride	<981	981
Nitrate-N	107000	1960
Nitrite-N	<981	981
Phosphate-P	18300	981
Sulfate	<981	981

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SOUTHWEST RESEARCH INSTITUTE

DUPLICATE SUMMARY

010012

Sample ID
Sol.A-230°C 12/15/05

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 12/16/05

Matrix: Solid

Project No.: 06002.01.322

Lab System ID: 271250

SRR: 28420

Method: IC - EPA 300

Task Order: 051219-5

Analysis	Sample Result (mg/Kg)	Duplicate Result (mg/Kg)	RPD
Bromide	<981	<892	0.00%
Chloride	108000	110000	1.83%
Fluoride	<981	<981	0.00%
Nitrate-N	107000	107000	0.00%
Nitrite-N	<981	<892	0.00%
Phosphate-P	18300	18700	2.16%
Sulfate	<981	<892	0.00%

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SOUTHWEST RESEARCH INSTITUTE

MATRIX SPIKE SUMMARY

010013

Sample ID
Sol.A-230°C 12/15/05

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 12/16/05

Matrix: Solid

Project No.: 06002.01.322

Lab System ID: 271250

SRR: 28420

Method: IC - EPA 300

Task Order: 051219-5

Analysis	Sample Result (mg/Kg)	Spike Result (mg/Kg)	Spike Added (mg/Kg)	Recovery
Bromide	<981	19900	19600	102%
Chloride	108000	137000	19600	148%
Fluoride	<981	4400	4900	89.8%
Nitrate-N	107000	116000	8858	102%
Nitrite-N	<981	7590	7800	97.3%
Phosphate-P	18300	28200	9340	106%
Sulfate	<981	19400	19600	99.0%

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SOUTHWEST RESEARCH INSTITUTE

LABORATORY CONTROL SAMPLE

010014

Sample ID
LCSW - 12/20/05

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: NA

Matrix: Liquid

Project No.: 06002.01.322

Lab System ID: NA

SRR: 28420

Method: IC - EPA 300

Task Order: 051219-5

Analysis	Sample Result (mg/L)	True Value (mg/L)	Recovery
Bromide	391	400	97.8%
Chloride	200	200	100%
Fluoride	95.0	100	95.0%
Nitrate-N	83.2	90.4	92.0%
Nitrite-N	153	159	96.2%
Phosphate-P	188	191	98.4%
Sulfate	388	400	97.0%

NA- Not Applicable.

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SOUTHWEST RESEARCH INSTITUTE

LABORATORY CONTROL SAMPLE

010015

Sample ID
LCSW - 12/21/05

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: NA

Matrix: Liquid

Project No.: 06002.01.322

Lab System ID: NA

SRR: 28420

Method: IC - EPA 300

Task Order: 051219-5

Analysis	Sample Result (mg/L)	True Value (mg/L)	Recovery
Bromide	402	400	101%
Chloride	204	200	102%
Fluoride	95.8	100	95.8%
Nitrate-N	86.1	90.4	95.2%
Nitrite-N	155	159	97.5%
Phosphate-P	194	191	102%
Sulfate	396	400	99.0%

NA- Not Applicable.

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SOUTHWEST RESEARCH INSTITUTE

BLANK SUMMARY

010016

Sample ID
PBW - M19E3

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: NA

Matrix: Solid

Project No.: 06002.01.322

Lab System ID: NA

SRR: 28420

Method: IC - EPA 300

Task Order: 051219-5

Analysis	Sample Result (mg/Kg)	Reporting Limit (mg/Kg)
Bromide	<10	10
Chloride	<10	10
Fluoride	<10	10
Nitrate-N	<10	10
Nitrite-N	<10	10
Phosphate-P	<10	10
Sulfate	<10	10

NA- Not Applicable.

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SOUTHWEST RESEARCH INSTITUTE

BLANK SUMMARY

010017

Sample ID
PBW - 12/20/05

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: NA

Matrix: Liquid

Project No.: 06002.01.322

Lab System ID: NA

SRR: 28420

Method: IC - EPA 300

Task Order: 051219-5

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	<0.1	0.1
Chloride	<0.1	0.1
Fluoride	<0.1	0.1
Nitrate-N	<0.1	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	<0.1	0.1
Sulfate	<0.1	0.1

NA- Not Applicable.

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SOUTHWEST RESEARCH INSTITUTE

BLANK SUMMARY

010018

Sample ID
PBW - 12/21/05

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: NA

Matrix: Liquid

Project No.: 06002.01.322

Lab System ID: NA

SRR: 28420

Method: IC - EPA 300

Task Order: 051219-5

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Bromide	<0.1	0.1
Chloride	<0.1	0.1
Fluoride	<0.1	0.1
Nitrate-N	<0.1	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	<0.1	0.1
Sulfate	<0.1	0.1

NA- Not Applicable.

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010019

SOUTHWEST RESEARCH INSTITUTE
NUCLEAR PROJECT
CLIENT: Division 20
TASK ORDER: 051219-5
SRR: 28420
SDG: 271245
CASE: L. Yang
VTSR: December 16, 2005
PROJECT#: 06002.01.322

Task Orders/01-QPP-015

Southwest Research Institute

Laboratory Task Order

TO #: 051219-5 Revision: 0

SDG: 271245
VTSR: 12/16/05
CASE: CNWRA

SRR #'s: 28420
Client(s): Div. 20

Project(s): 06002.01.322
Manager(s): SPIES, RADONNA
To PM: 12/22/05
To QA: 12/27/05
To Client: 12/29/05

010020

Instructions

DIVISION 20 - CNWRA. 1-WEEK TAT. Using 6-day TAT for PM/preliminary, 11-day TAT for DRG/QAU; 13-day TAT hardcopy; subject to change.

Work is 10 CFR 50 Appendix B, 10 CFR Part 21, contact MARK EHNSTROM (ext. 3530) or CHARLIE BUTCHER (ext. 5928, pager 271-5172) or JO ANN BOYD (ext. 2169) BEFORE STARTING ANY WORK ON THIS TASK ORDER.

** NOTE ** Somewhere on your data, please make a notation indicating WHO and WHEN Mark Ehnstrom or Charlie Butcher or Jo Ann Boyd were contacted. This will help facilitate the final package to QA.

SIX samples received for NO3, CL, by IC analyses and Na an K by ICP analysis. Point of Contact is LIETAI YANG (x2483, lietai.yang@swri.org).

CONTACT PM WITH ANY ADDITIONAL QUESTIONS.

Documents Related to this task order: 20500[COC 28420]

Test: DIG-MISCACIDS
Section: METALPREP
Holding: 180 days from CED
Digestion Miscellaneous Acids
Cnt: 1

System ID	Type	Cont	Matrix	Customer ID	CED	Method Date
271250		1	Solid	Cond.A-230 °C 12/15/05	15 Dec 05	13 Jun 06

Test: DIL-DILUTION
Section: METALPREP
Holding: 28 days from CED
Prep, Dilution
Cnt: 5

System ID	Type	Cont	Matrix	Customer ID	CED	Method Date
271245		1	Liquid	Cond.A-130 °C 12/9/05	09 Dec 05	06 Jan 06
271246		1	Liquid	Cond.A-150 °C 12/12/05	12 Dec 05	09 Jan 06
271247		1	Liquid	Cond.A-180 °C 12/13/05	13 Dec 05	10 Jan 06
271248		1	Liquid	Cond.A-210 °C 12/15/05	15 Dec 05	12 Jan 06
271249		1	Liquid	Cond.A-230 °C 12/15/05	15 Dec 05	12 Jan 06

Test: IC-SWRI
Section: WETCHEM
Holding: 28 days from CED
Ion Chromatography by SwRI Method - Chloride and Nitrate
Cnt: 6

System ID	Type	Cont	Matrix	Customer ID	CED	Method Date
271245		1	Liquid	Cond.A-130 °C 12/9/05	09 Dec 05	06 Jan 06
271246		1	Liquid	Cond.A-150 °C 12/12/05	12 Dec 05	09 Jan 06
271247		1	Liquid	Cond.A-180 °C 12/13/05	13 Dec 05	10 Jan 06
271248		1	Liquid	Cond.A-210 °C 12/15/05	15 Dec 05	12 Jan 06
271249		1	Liquid	Cond.A-230 °C 12/15/05	15 Dec 05	12 Jan 06
271250		1	Solid	Cond.A-230 °C 12/15/05	15 Dec 05	12 Jan 06

Test: ICP-SWRI
Section: METALS
Holding: 180 days from CED
ICP Analysis by SwRI Method - Sodium and Potassium
Cnt: 6

System ID	Type	Cont	Matrix	Customer ID	CED	Method Date
271245		1	Liquid	Cond.A-130 °C 12/9/05	09 Dec 05	07 Jun 06
271246		1	Liquid	Cond.A-150 °C 12/12/05	12 Dec 05	10 Jun 06
271247		1	Liquid	Cond.A-180 °C 12/13/05	13 Dec 05	11 Jun 06
271248		1	Liquid	Cond.A-210 °C 12/15/05	15 Dec 05	13 Jun 06
271249		1	Liquid	Cond.A-230 °C 12/15/05	15 Dec 05	13 Jun 06

Southwest Research Institute

Laboratory Task Order

TO #: 051219-5 Revision: 0

SDG: 271245
VTSR: 12/16/05
CASE: CNWRA

SRR #'s: 28420
Client(s): Div. 20

Project(s): 06002.01.322
Manager(s): SPIES, RADONNA
To PM: 12/22/05
To QA: 12/27/05
To Client: 12/29/05

010021

System ID	Type	Cont	Matrix	Customer ID	CED	Method Date
271250		1	Solid	Cond.A-230 °C 12/15/05	15 Dec 05	13 Jun 06

010022

Southwest Research Institute

Sample Receipt

Sample Receipt Number: 28420

VTSR: 12/16/05

Time: 14:45:00

Project: 06002.01.322
Case #: L. Yang
Client: Div. 20

Manager: SPIES, RADONNA
Logged in by: Dino.Roman
Creation Date: 12/16/05

Notes

Samples were hand delivered intact at 22.0 °C

Parameters: Analysis/see Task Order.

See chain of custody as part of the SRR system for more information. Contact R. Spies at X3242 for questions.
*** Dino.Roman Dec 16 2005 4:50PM ***

System ID	Customer ID	CED	Matrix	Containers	Special Reqs.
271245	Cond.A-130 °C 12/9/05	12/09/05	Liquid	1	
271246	Cond.A-150 °C 12/12/05	12/12/05	Liquid	1	
271247	Cond.A-180 °C 12/13/05	12/13/05	Liquid	1	
271248	Cond.A-210 °C 12/15/05	12/15/05	Liquid	1	
271249	Cond.A-230 °C 12/15/05	12/15/05	Liquid	1	
271250	Cond.A-230 °C 12/15/05	12/15/05	Solid	1	
Containers: 6				**Samples: 6**	

These documents are associated with this receipt: 20500[COC 28420]

Thermometer: 027
Temperature: 22.0

Client: Div. 20

SR#: 28420

FRM-002

Page Printed: 22 Dec 2005 15:28:14
ver (11/18/2005)

01-QPP-015 010023
Division 01
Revision 5
June 2004

Document No._____

Division 01

Chemistry and Chemical
Engineering Division

QUALITY PROJECT PLAN FOR

PERFORMANCE OF CHEMICAL ANALYSES FOR COMMERCIAL NUCLEAR POWER PLANTS WITHIN THE DEPARTMENT OF ANALYTICAL AND ENVIRONMENTAL CHEMISTRY

SOUTHWEST RESEARCH INSTITUTE
Chemistry and Chemical Engineering Division
6220 CULEBRA ROAD, SAN ANTONIO, TEXAS 78238

QUALITY PROJECT PLAN FOR PERFORMANCE OF CHEMICAL ANALYSES FOR COMMERCIAL NUCLEAR POWER PLANTS WITHIN THE DEPARTMENT OF ANALYTICAL AND ENVIONMENTAL CHEMISTRY

SwRI AUTHORIZATION SIGNATORIES

This is to certify that this Quality Project Plan of Southwest Research Institute (SwRI) has been reviewed and approved by the following personnel:

JO ANN BOYD Quality Assurance Manager	(210) 522-2169	6/4/04 **DATE**
REZA KARIMI Director, Department of Analytical and Environmental Chemistry	(210) 522-2412	6/4/04 **DATE**
MICHAEL G. MACNAUGHTON Vice President, Chemistry and Chemical Engineering Division	(210) 522-5162	6/4/04 **DATE**
CHRISTOPHER HOBSON Quality Assurance Engineer	(210) 522-5838	6/4/2004 **DATE**

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PERFORMANCE OF CHEMICAL ANALYSES FOR COMMERCIAL NUCLEAR POWER PLANTS WITHIN THE DEPARTMENT OF ANALYTICAL AND ENVIRONMENTAL CHEMISTRY

1.0 INTRODUCTION

This Quality Project Plan (QPP) defines the Quality Assurance (QA) program requirements for personnel providing the chemical analyses for commercial nuclear power plants. Southwest Research Institute (SwRI) ***Program Quality Plan (PQP-Nuclear)***, *Nuclear Services* shall implement the QA requirements. Project activities controlled by the PQP-Nuclear shall be accomplished as specified by the appropriate sections of **01-QAP-004**, *Quality Assurance Plan for Analytical and Environmental Services* and/or nationally recognized testing methods as specified on individual purchase orders. This QPP shall be applied to all projects initiated for nuclear utilities in the Department of Analytical and Environmental Chemistry. If, as a result of complexity, duration, or other factors, it is determined that a unique, project-specific quality plan is required, the project QAE shall notify the Project Manager and a project-specific quality plan shall be generated in accordance with **SOP-01-4.2.1**, *Preparation and Revision of Documented Procedures*.

2.0 SCOPE

This Quality Project Plan shall be applied to the chemical analyses performed for commercial nuclear power plants by the Department of Analytical and Environmental Chemistry within the Chemistry and Chemical Engineering Division. Although the majority of the work performed for nuclear facilities resides within the Department of Analytical and Environmental Chemistry, other departments within the division may utilize this Quality Project Plan as deemed necessary when nuclear projects are conducted.

3.0 REFERENCES

3.1 *SwRI Quality System Manual – 2000*

3.2 *10 CFR 50, Appendix B, ASME NQA-1*

3.3 *SwRI Program Quality Plan (PQP-Nuclear), Nuclear Services*

3.4 01-QAP-004, *Quality Assurance Plan for Analytical and Environmental Services*

4.0 APPLICABLE SECTIONS OF SwRI PROGRAM QUALITY PLAN (PQP-NUCLEAR)

4.1 Indoctrination and Training

4.1.1 Personnel performing duties affecting quality shall receive quality training to the *SwRI Program Quality Plan (PQP-Nuclear), Nuclear Services* prior to performing any work on projects for nuclear utilities. This training will be conducted either by Institute Quality Systems (IQS) or Division 01 Quality Assurance personnel and documentation shall be evident in the personnel training files maintained in Division

01 Quality Assurance.

4.1.2 Indoctrination and training of personnel shall be conducted in accordance with **SOP-01-6.2.1**, *Qualification and Training.*

4.2 Qualification of Personnel

4.2.1 Testing personnel shall be designated as qualified to perform applicable project activities as specified in **SOP-01-6.2.1**, *Qualification and Training.*

4.2.2 During the performance of each testing process, testing personnel shall have access to the necessary documented procedures, i.e., QPP, QAP, Task Order, Division Quality System Standard Operating Procedures (SOPs), and applicable test/analytical procedures (TAPs) available for ready reference.

4.2.3 Any person who has not performed testing activities associated with any particular method being used for nuclear utilities projects for a period of one year shall be reevaluated prior to the conduct of the test.

4.2.4 Quality Assurance personnel witnessing the testing process for nuclear utilities shall have documented evidence of qualifications maintained by Institute Quality Systems or Division 01 Quality Assurance.

4.3 Design Control

Not applicable to activities conducted within the Department of Analytical and Environmental Chemistry.

4.4 Right of Access

4.4.1 Procurement documents shall provide for access to the suppliers' facilities and records for surveillance, inspection, or audit by SwRI and clients.

4.4.2 Where appropriate, quality clause **Q32** shall be noted on the procurement documents to indicate that right of access for inspection and surveillance of activities associated with the order shall be afforded to SwRI and clients.

4.5 Control of Supplier-Generated Documents

4.5.1 Client documents shall be controlled in accordance with **SOP-01-4.2.1**, *Preparation and Revision of Documented Procedures.* These procedures provide the requirements for the preparation, review, approval, issue, distribution, and revision of documents controlled by the Chemistry and Chemical Engineering Division.

4.5.2 Documents may be controlled as Plans or Work Instructions and shall be accessible through the Division Intranet link, ***Contract Requirements*** as PDF files.

4.5.3 Nationally recognized test methods shall be of the most current issue or as specified in the purchase order. Task orders shall identify the applicable test methods to be used on the nuclear project.

4.6 Acceptance of Services Only

Not applicable to activities conducted within the Department of Analytical and Environmental Chemistry.

4.7 Commercial Grade Items

4.7.1 Where an item is to be incorporated into a test or deliverable to a client, and that item is not subject to design or specification requirements that are unique to nuclear facilities, used in applications other then nuclear facilities, and procured from the supplier on the specifications set forth in the manufacturers' published product and description, the item shall be considered "commercial grade".

4.7.2 Chemical reagents and standards used for testing purposes shall be ordered to specific chemical grades and certificates of analysis shall be required with each lot.

4.7.3 Controls for procurement planning, supplier selection, supplier performance evaluation, and acceptance of procured items and services other than chemical reagents and standards shall be as identified in **SOP-01-7.4.1**, *Purchasing*, and any referenced document within that procedure.

4.7.4 Receipt inspection of chemical reagents, standards, and test items for use on nuclear safety-related projects shall be performed by department personnel and documented on the *SwRI Receipt Traveler* or **FRM-109**, *Item Receipt Report*, as specified in **SOP-01-8.2.4**, *Monitoring and Measurement*. Any discrepancy such as a damaged container or container label shall be documented on the form and the client shall be contacted for disposition.

4.7.5 Prior or acceptance of a commercial grade item, the receipt inspection shall determine the following:

(a) Damage was not sustained during shipment;

(b) The item has satisfied the specified acceptance criteria; and

(c) Specified documentation, as applicable to the item, was received and is acceptable.

4.7.6 Receipt inspection of chemical reagents and standards shall also consist of verification of chemical type, grade, container integrity, certificate of analysis, and shelf life, where applicable. Upon acceptance of chemical reagents and standards, the containers shall be labeled with the following:

(a) Chemical name;

(b) Chemical grade;

(c) Lot code;

(d) Date received; and

(e) Shelf life, when applicable.

4.7.7 Expired shelf life items shall not be used for testing purposes.

4.7.8 Lot codes of chemical reagents and standards used during equipment standardization and testing shall be recorded on the individual testing data sheets to provide traceability.

4.7.9 Samples supplied to SwRI for testing shall be received by the Sample Custodian and logged into the laboratory logbook. Sample documentation and sample custody shall be maintained in accordance with **TAP-01-0407-001**, *Sample Receipt Inspection*, and **TAP-01-0407-035**, *Organic and Inorganic Sample Security*.

4.7.10 Samples supplied to SwRI for testing shall be labeled with the following:

(a) Sample control number;

(b) Purchase order number;

(c) Purchase order line item number, as applicable;

(d) Task order number;

(e) Nuclear QA label; and

(f) Sample retention date, when applicable.

4.7.11 In the event that samples are damaged upon receipt, a ***Sample Discrepancy Record*** shall be generated from the Division Intranet.

4.7.12 The testing task order shall list the project number, tests required, test methods required, and shall be labeled *Nuclear Quality*.

4.7.13 Identification and traceability shall be maintained in accordance with **SOP-01-7.5.1**, *Item Identification and Traceability*.

4.8 Inspection

4.8.1 Inspection for acceptance shall be performed by qualified persons other than those who conduct or directly supervise the work being inspected.

4.8.2 Institute Quality System (IQS) personnel shall perform surveillance activities as required to ensure compliance with the contract and this Quality Project Plan. Specific areas in which IQS may perform surveillance activities include, but are not limited to, the following:

(a) Receiving inspection and labeling of chemical reagents, standards, and testing samples;

(b) Testing processes;

(c) Calibration and major equipment;

(d) Sample and record retention; and

(e) Test records.

4.9 Inspection and Testing

4.9.1 Required tests for acceptance shall be conducted under appropriate environmental conditions using the tools and equipment necessary to conduct the test in a manner to fulfill test requirements and acceptance criteria.

4.9.2 Tests shall be conducted, controlled, and verified in accordance with **SOP-01-8.2.4**, *Monitoring and Measurement.*

4.9.3 Controls for measuring and test equipment shall be as specified in **SOP-01-7.6.1**, *Control of Measuring and Test Equipment.*

4.9.4 Controls for identification, segregation, reporting, and resolution of nonconforming items and conditions shall be as specified in **SOP-01-8.3.1**, *Nonconformance Reporting.*

4.10 Handling, Storage, Packaging, Preservation, and Delivery

4.10.1 Controls for handling, storage, packaging, preservation, and delivery of items are identified in **SOP-01-7.5.3**, *Handling, Storage, Packaging, Protection, and Delivery of Items.*

4.10.2 Samples specified on the purchase order to be returned to the client shall be prepared and packaged as specified on the purchase order. Each package shall be marked legibly and indelibly with the purchase order/release number and line item number(s) relevant to the package.

4.11 Quality Assurance Records

4.11.1 Quality assurance records shall furnish documentary evidence that items or activities meet specified quality requirements. Documents that ensure this evidence include **TAP-01-0407-014**, *Inventory of Case File Purges*, and **SOP-01-4.2.4**, *Storage and Maintenance of Quality Records*. These documents and this QPP ensure that QA records shall be legible, identifiable, retrievable, and maintained in dual storage.

4.11.2 Records shall be traceable to associated items and activities and shall accurately reflect the work accomplished or information required.

4.11.3 Documents shall be considered valid records only if stamped, initialed or signed and dated by authorized personnel or otherwise authenticated.

4.11.4 Records of test analyses performed by the Department of Analytical and Environmental Chemistry are classified as *nonpermanent* and shall be retained for a minimum of five years. Nonpermanent records are those required to show evidence that an activity was performed in accordance with the applicable requirements, but need not be retained for the life of the item. Based on the use of the final data, the client shall be responsible for determining and implementing permanent storage requirements.

4.11.5 In order to satisfy duplicate storage requirements, one copy of the QA record shall maintained by the Project Manager in Building 70 and a separate copy shall be maintained in the Division Quality Assurance Archives in Building 201. Storage requirements shall be as stated in **SOP-01-4.2.4**, *Storage and Maintenance of Quality Records*, to ensure protection against the risk of damage or destruction.

4.12 10 CFR, Part 21

4.12.1 SwRI procurement documents shall include requirements for reporting and approving disposition of supplier nonconformances and, when required, compliance to 10 CFR, Part 21.

4.12.2 The Manager of Institute Quality Assurance or Director of Institute Quality Systems shall determine if a nonconforming condition is reportable under 10 CFR, Part 21, and initiate reporting and condition in accordance with the SwRI Operating Policies and Procedures (OPP). Safety hazards or defects that could create a substantial safety hazard shall be reported. Substantial safety hazard means a loss of safety function to the extent that there is a major reduction in the degree of protection provided to public health and safety.

4.13 Certified Test Report

The Project Manager and Institute Quality Assurance Manager as complying with all contractual requirements shall certify test reports. The certified test report shall reference the purchase order/release number, the test methods performed, and the purchase

order/release line item number.

4.14 Valid Documents List

The Department of Analytical and Environmental Chemistry task order shall specify all applicable documents and appropriate document revision level for each document. The task order shall then serve as the Valid Documents List (VDL) for each individual project.

5.0 HISTORY OF REVISIONS

Versions 0 through 3 of this plan are maintained on record in Division 01 Quality Assurance.

Revision 4
Title of document changed from the Standard Project Quality Plan *SPQP-CH/AN* to Quality Project Plan, *QPP-015*
Extensive revision to comply with Project Quality Plan PQP-Nuclear, *Nuclear Services*, which replaces SwRI NQAPM, *Nuclear Quality Assurance Program Manual.*

Revision 5
Revised 4.1.1 to include designated Division 01 QA staff to conduct pertinent nuclear training sessions to the SwRI Program Quality Plan (PQP-Nuclear), *Nuclear Services*
Revised step 4.2.4 to include Division QA as an entity along with IQS, to maintain documented evidence of qualifications

QA GROUP

Southwest Research Institute®

PERSONNEL SIGNATURE SHEET FOR PLANS

010033

I have read, and understand the document listed below. By affixing my signature below, I am aware that I am responsible for abiding by and following the requirements identified in the plan specified below. If I become aware of any deviations from this document, I will inform my supervisor.

QPP-015, Performance of Chemical Analyses for Commercial Nuclear Power Plants within the Dept of Analytical & Environmental Chemistry (Rev 5/June 04)

(Document Title and Number)

Printed Name	Signature	Date	Extension
David A Pineda	DAVID A. ANEDA	6.7.2004	2776
Roger Presas	Roger Presas	6/7/04	3682
Jeanette Garcia	Jeanette Garcia	6/7/04	6569
CYNTHIA A. SAUCEDA	Cynthia Saucedo	06/07/2004	5896
JOE MORIN	Joe Morin	6/7/04	~~70250~~ 2792
DINO ROMAN	D Roman	6/7/04	X 3128
Priscilla Brockhouse	Priscilla Brockhouse	6/7/04	6078
MARGARET ACEVEDO	M. Acevedo	6-7-04	3725
Marissa A Rodriguez	Marissa A Rodriguez	6/7/04	2474

Supervisor's/Manager's Signatures

The personnel whose signatures appear above have been trained and certified in the contents of this document:

010034

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PERSONNEL SIGNATURE SHEET FOR PLANS

I have read, and understand the document listed below. By affixing my signature below, I am aware that I am responsible for abiding by and following the requirements identified in the plan specified below. If I become aware of any deviations from this document, I will inform my supervisor.

QPP-015, Performance of Chemical Analyses for Commercial Nuclear Power Plants within the Dept of Analytical & Environmental Chemistry (Rev 5/June 04)

(Document Title and Number)

Printed Name	Signature	Date	Extension
ROBERT M. ACOSTA		06/04/04	x6847
Pamela R. Piccini		6/4/04	x2167
Charles R Cartwright		06/04/04	x5924
Jason D. HERRERA		6/4/04	2186
SHRADDHA QUARDER		6/4/04	8641

Supervisor's/Manager's Signatures

The personnel whose signatures appear above have been trained and certified in the contents of this document:

METALS / Inog / Vetchem

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010035

PERSONNEL SIGNATURE SHEET FOR PLANS

I have read, and understand the document listed below. By affixing my signature below, I am aware that I am responsible for abiding by and following the requirements identified in the plan specified below. If I become aware of any deviations from this document, I will inform my supervisor.

QPP-015, Performance of Chemical Analyses for Commercial Nuclear Power Plants within the Dept of Analytical & Environmental Chemistry (Rev 5/June 04)

(Document Title and Number)

Printed Name	Signature	Date	Extension
Radonna Spies	RSpies	6/14/04	x 3242
Valerie DeJesus	Valerie DeJesus	06/14/04	x 3129
Carolina Orduña	COrduña	6/21/04	3146
Darian Harris	DH	6-21-04	12974
Jackie Ranger	JRanger	6/21/04	3320
Warren A. Naegeli	Warren A. Naegeli	6/21/04	5792
Michael Hardy	Michael Hardy	6/21/04	6079
JAMES TITTER	James Titter	21-JUNE-2004	2487
JAMES VOOS	James Voos	06/21/04	5897
Khaled Edrisi	Khaled Edrisi	6-21-04	6630
John Wilks	John Wilks	6-21-04	V-01 2536
Bernie Villasenor	B. Villasenor	6-21-04	x 2762
Daniel Ramirez	Daniel Ramirez	6/21/04	x3867
Terence O'Brien	Terence O'Brien	6/21/04	x 3066

Supervisor's/Manager's Signatures

The personnel whose signatures appear above have been trained and certified in the contents of this document:

[signature]	Mike Vann	6-21-04	5428

SOUTHWEST RESEARCH INSTITUTE
NUCLEAR PROJECT
CLIENT: Division 20
TASK ORDER: 051219-5
SRR: 28420
SDG: 271245
CASE: L. Yang
VTSR: December 16, 2005
PROJECT#: 06002.01.322

Chain of Custody/Login Paperwork

20500

SAMPLE LIST/CHAIN OF CUSTODY

Southwest Research Institute
Chemistry and Chemical Engineering Division
6220 Culebra Road
San Antonio, Texas 78238-5166

Requested Turnaround:
- 2 Weeks
- 3 Weeks
- ✓ Other: 1 week

Shipper Name/Address:

Client: Lietai Yang, Div. 20

Client Purchase Order/Other ID: 06002.01.322.1.20

Site/Zone ID:

SwRI Contact:

Analyses Requested

Sample ID	Sample Collection Date (mm/dd/yy)	Sample Collection Time	Matrix Type	Sample Type	# of Containers	Na	K	Cl	NO_3
✓ Cond. A-130°C 12/9/05	12/9/05		↓			↓	↓	↓	↓
Cond. A-150°C 12/12/05	12/12/05								
Cond. A-180°C 12/13/05	12/13/05								
Cond. A-210°C 12/15/05	12/15/05								
Cond. A-230°C 12/15/05	12/15/05								
Sol. A-230°C 12/15/05	12/15/05		Sd						

REMARKS

Preservation
- **a** = HCl to pH <2
- **b** = HNO_3 to pH <2
- **c** = H_2SO_4 to pH <2
- **d** = NaOH to pH >12
- **e** = Cool (4°C±2°C)
- **f** = Other (specify)

Matrix Types:
- **A** – Air
- **B** – Biota
- **D** - Dust
- **E** – Emission/Stack
- **L** - Liquid
- **P** – Product
- **Sd** - Solid
- **S** – Soil
- **SED** – Sediment
- **T** - Tissue
- **W** - Water
- **WP** - Wipe

Sample Types:
- **D** - Duplicate
- **ER** – Equipment Rinsate
- **ES** – Environmental Sample
- **FB** – Field Blank
- **FD** – Field Duplicate
- **MS** – Matrix Spike
- **MSD** – Matrix Spike Dup
- **TB** – Trip Blank

Temp: ~~027~~ 22.0C DR 12/16/05

Therm #: 027

Relinquished by (Print/Signature)	Date	Time
Lietai Yang	12/16/05	14:30
Received by (Print/Signature)	Date	Time
Relinquished by (Print/Signature)	Date	Time
Received by (Print/Signature)	Date	Time
Relinquished by (Print/Signature)	Date	Time

SwRI Project#: see above

Received by SwRI Lab: (Signature)

Date	Time
12/16/05	1445

Samples Disposed:

Date	Time

Samples Disposed by:

010037

SAMPLE LOG-IN SHEET

010038

Lab Name
Southwest Research Institute

Received By (Print Name)
DINO ROMAN

Received By (Signature) Art Aguilar for

Page 1 of 1

Log-in Date
12/16/2005

Case Number
L. Yang

Sample Delivery Group No.

SAS Number
N/A

Remarks: 06002.01.322

			EPA Sample #	Sample Tag #	Corresponding Assigned Lab #	Remarks: Condition of Sample Shipment, etc
1.	Custody Seal(s)	Present/Absent* Intact/Broken	Cond.A-130 °C 12/9/05	None	271245	Intact
2	Custody Seal Nos.	N/A	Cond.A-150 °C 12/12/05	None	271246	Intact
			Cond.A-180 °C 12/13/05	None	271247	Intact
3.	Chain-of Custody Records	Present/Absent*	Cond.A-210 °C 12/15/05	None	271248	Intact
4.	Traffic Reports or Packing Lists	Present/Absent*	Cond.A-230 °C 12/15/05	None	271249	Intact
5.	Airbill	Airbill/Sticker Present/Absent*	Cond.A-230 °C 12/15/05	None	271250	Intact
6.	Airbill No.	HAND DELIVERED				
7.	Sample Tags	Present/Absent*				
	Sample Tag Numbers	Listed/Not listed on Chain of Custody				
8.	Sample Condition	Intact/Broken*/ Leaking				
9.	Cooler Temperature	22.0C				
10.	Does Information on custody records, traffic reports, and sample tags agree?	Yes/No*				
11.	Date Received at Lab	12/16/2005				
12.	Time Received	14:45:00				

Sample Transfer

Fraction	Fraction
Area # Inorg Cabinet 1	Area #
By DINO ROMAN	By
On 12/16/2005	On

* Contact SMO and attach record of resolution

Reviewed By Art Aguilar

Date 12.19.05

Logbook No. Sample Receipt (28420)

Logbook Page No. 5653 Section 2 of 2

FORM DC-1

OLMO4.2

010039

SOUTHWEST RESEARCH INSTITUTE
NUCLEAR PROJECT
CLIENT: Division 20
TASK ORDER: 051219-5
SRR: 28420
SDG: 271245
CASE: L. Yang
VTSR: December 16, 2005
PROJECT#: 06002.01.322

Copies of Login Book

Sample Login Book

Dec 16, 2005

010040

SwRI Login Area
Division 1

Sample Receipt: 28420	Project: 06002.01.322	Client: Div. 20
VTSR Date: Dec 16, 2005	VTSR Time: 14:45:00	Manager: SPIES, RADONNA

System ID	Customer Sample ID	Matrix
271245	Cond.A-130 °C 12/9/05	Liquid
271246	Cond.A-150 °C 12/12/05	Liquid
271247	Cond.A-180 °C 12/13/05	Liquid
271248	Cond.A-210 °C 12/15/05	Liquid
271249	Cond.A-230 °C 12/15/05	Liquid
271250	Cond.A-230 °C 12/15/05	Solid

Number of samples for today: 20

Number of Containers for today: 21

010041

SOUTHWEST RESEARCH INSTITUTE
NUCLEAR PROJECT
CLIENT: Division 20
TASK ORDER: 051219-5
SRR: 28420
SDG: 271245
CASE: L. Yang
VTSR: December 16, 2005
PROJECT#: 06002.01.322

RAW DATA

271250 for K

$$\frac{82.407\ ug/ml \times df\ 20 \times 50ml}{0.5357g} = 153830\ mg/kg$$

$= 154000\ mg/kg$

DIV. 20
TO#051219-5
Project No. 06002.01.322
Prep. Page 62-230, 62-232

12-21-05

Sample ID	Element	Result	Qual (C)	Qual (Q)	Units	RL	%RPD	%Recovery	TV	rl	mg/kg	sigwt	Dilution	Calc RL	ug/ml	Date	Time
pbw-M19E2	K_766	30.0	U		mg/kg	30				0.300	2.587680386	2.59	1	30	0.025876804	12/20/05	2:27 PM
pbw-M19E2	Na589	30.0	U		mg/kg	30				0.300	-13.48247749	-13.5	1	30	-0.134824775	12/20/05	2:27 PM
lcsw-M19E2	K_766	1960			mg/kg	30		98.0%	2000	0.300	1959.590931	1960	1	30	19.59590931	12/20/05	2:29 PM
lcsw-M19E2	Na589	1950			mg/kg	30		97.5%	2000	0.300	1949.830739	1950	1	30	19.49830739	12/20/05	2:29 PM
271250	K_766	154000	✓		mg/kg	560				0.300	153830.1356 ✓	154000	20	560.015	82.40680362	12/20/05	2:32 PM
271250	Na589	170000			mg/kg	560				0.300	169905.4443	170000	20	560.015	91.0183465	12/20/05	2:32 PM
271250d	K_766	152000			mg/kg	553	1.3%			0.300	152301.8387	152000	20	553.097	82.60851731	12/20/05	2:34 PM
271250d	Na589	173000			mg/kg	553	1.7%			0.300	173181.6923	173000	20	553.097	93.93374988	12/20/05	2:34 PM
271250s	K_766	157000		N	mg/kg	572		157.5%	1905	0.300	156843.9354	157000	20	571.537	82.32738172	12/20/05	2:36 PM
271250s	Na589	169000		N	mg/kg	572		-52.5%	1905	0.300	168524.0003	169000	20	571.537	88.45824774	12/20/05	2:36 PM
pbw-M20H1	K_766	1.50	U		mg/L	1.5				0.300	0.425194146	0.425	1	1.5	0.085038829	12/20/05	2:46 PM
pbw-M20H1	Na589	1.50	U		mg/L	1.5				0.300	-0.731607848	-0.732	1	1.5	-0.14632157	12/20/05	2:46 PM
lcsw-M20H1	K_766	99.4			mg/L	1.5		99.4%	100	0.300	99.35311786	99.4	1	1.5	19.87062357	12/20/05	2:47 PM
lcsw-M20H1	Na589	98.0			mg/L	1.5		98.0%	100	0.300	97.99195422	98	1	1.5	19.59839084	12/20/05	2:47 PM
271245	K_766	1.50	U		mg/L	1.5				0.300	1.458639654	1.46	1	1.5	0.291727931	12/20/05	2:50 PM
271245	Na589	2.35			mg/L	1.5				0.300	2.348163824	2.35	1	1.5	0.469632765	12/20/05	2:50 PM
271245d	K_766	1.50	U		mg/L	1.5	0.0%			0.300	0.593565757	0.594	1	1.5	0.118713151	12/20/05	2:52 PM
271245d	Na589	2.64			mg/L	1.5	11.6%			0.300	2.643286561	2.64	1	1.5	0.528657312	12/20/05	2:52 PM
271245s	K_766	103			mg/L	1.5		103.0%	100	0.300	102.7917761	103	1	1.5	20.55835522	12/20/05	2:54 PM
271245s	Na589	105			mg/L	1.5		102.7%	100	0.300	104.6209652	105	1	1.5	20.92419304	12/20/05	2:54 PM
271246	K_766	1.50	U		mg/L	1.5				0.300	-0.201005435	-0.201	1	1.5	-0.040201087	12/20/05	2:57 PM
271246	Na589	1.50	U		mg/L	1.5				0.300	0.782959918	0.783	1	1.5	0.156591984	12/20/05	2:57 PM
271247	K_766	3.64			mg/L	1.5				0.300	3.639588681	3.64	1	1.5	0.727917736	12/20/05	3:00 PM
271247	Na589	4.09			mg/L	1.5				0.300	4.091738125	4.09	1	1.5	0.818347625	12/20/05	3:00 PM
271248	K_766	13.2			mg/L	1.5				0.300	13.17232105	13.2	1	1.5	2.63446421	12/20/05	3:03 PM
271248	Na589	20.4			mg/L	1.5				0.300	20.41835341	20.4	1	1.5	4.083670682	12/20/05	3:03 PM
271249	K_766	27.3			mg/L	1.5				0.300	27.30924636	27.3	1	1.5	5.461849273	12/20/05	3:06 PM
271249	Na589	23.9	✓		mg/L	1.5				0.300	23.91196635	23.9	1	1.5	4.78239327	12/20/05	3:06 PM

271249 for Na

$$\frac{4.7824\ ug/ml \times 5ml}{1ml} = 23.9\ mg/L$$

12/21/05

010042

☐ 200.7 TAP No. 01-0406-028 Rev2/Mar02

☑ 6010B TAP No. 01-0406-130 Rev4/Oct05

☐ Other_____

QC STD. ID's	
CCV	05MW1
CRI	05MW1
ICSA	05MW1
ICSAB	05MW2

ICP CAL.STD. ID's	
Std0	05MW1
Std1	05MW1
Std2	
Std3	
Std4	
Std5	
Std6	

010043

K Na

PROJ. NO.	PROJECT	TO#	DATE	MATRIX	LOGBK PG
06002.01.322	DIV. 20	051219-5	12-20-05	Solid	62-230
					62 232

INSTRUMENT: Spectro FILENAME: 051220B

12-20-05

File converted to wsl? ☐

010044

:VOLUTION by Micro-Active Australia Pty Ltd 2:03:18 PM December 20, 2005

:eep last result visible enabled ...
:tarting run ...
:reating high priority queue entries ...
:ACKGROUND CORRECTED INTENSITIES
dentity 1 : BLK_SC Identity 2 : Type : STD
'eight : 1.0000 Volume : 1.00 Printed : 1:59:04 PM December 20, 2005

	K_766	Na589	Sc361
# 1	23.0	129.0	3942.0
# 2	20.0	104.0	3850.0
ean	21.5	116.5	3896.0
D	2.1	17.7	65.1
RSD	9.9	15.2	1.7

NTENSITIES
dentity 1 : BLK_SC Identity 2 : Type : STD
eight : 1.0000 Volume : 1.00 Printed : 1:59:04 PM December 20, 2005

	K_766	Na589	Sc361
# 1	0.0	0.0	3942.0
# 2	0.0	0.0	3850.0
ean	0.0	0.0	3896.0
D	0.0	0.0	65.1
RSD	8.2	13.5	1.7

ACKGROUND CORRECTED INTENSITIES
dentity 1 : CLP_STD1_SC Identity 2 : Type : STD
eight : 1.0000 Volume : 1.00 Printed : 2:01:56 PM December 20, 2005

	K_766	Na589
# 1	3915.5	21784.0
# 2	3795.5	21292.0
ean	3855.5	21538.0
D	84.9	347.9
RSD	2.2	1.6

NTENSITIES
dentity 1 : CLP_STD1_SC Identity 2 : Type : STD
eight : 1.0000 Volume : 1.00 Printed : 2:01:56 PM December 20, 2005

	K_766	Na589
# 1	1.0	5.6
# 2	1.0	5.7
ean	1.0	5.7
)	0.0	0.0
RSD	0.1	0.4

12/21/05

12-20-05

VOLUTION by Micro-Active Australia Pty Ltd 2:11:48 PM December 20, 2005 010045

ACKGROUND CORRECTED INTENSITIES
dentity 1 : CLP_CCV_SC Identity 2 : Type : CV
eight : 1.0000 Volume : 1.00 Printed : 2:04:48 PM December 20, 2005

	K_766	Na589	Sc	Sc361
# 1	1616.0	13239.5	3867.0	3867.0
# 2	1580.0	12981.5	3797.0	3797.0
ean	1598.0	13110.5	3832.0	3832.0
D	25.5	182.4	49.5	49.5
RSD	1.6	1.4	1.3	1.3

PPARENT CONCENTRATIONS
dentity 1 : CLP_CCV_SC Identity 2 : Type : CV
eight : 1.0000 Volume : 1.00 Printed : 2:04:48 PM December 20, 2005

	K_766	Na589	Sc	Sc361
	ppm	ppm		ppm
# 1	20.4467	30.1176	3867.000	99.2545
# 2	20.3586	30.0747	3797.000	97.4550
ean	20.4026	30.0962	3832.000	98.3548
D	0.0623	0.0303	49.497	1.2724
RSD	0.3054	0.1007	1.292	1.2937

hecking calibration verification ...
dentity 1 : CLP_CCV_SC Identity 2 :

eport name	Low limit	Value	High limit
_766	18.000	20.403	22.000
a589	27.000	30.096	33.000

ACKGROUND CORRECTED INTENSITIES
dentity 1 : Calibration blank Identity 2 : Type : CB
eight : 1.0000 Volume : 1.00 Printed : 2:08:40 PM December 20, 2005

	K_766	Na589	Sc	Sc361
# 1	26.0	168.0	3813.0	3813.0
# 2	31.0	113.0	3815.0	3815.0
ean	28.5	140.5	3814.0	3814.0
D	3.5	38.9	1.4	1.4
RSD	12.4	27.7	0.0	0.0

PPARENT CONCENTRATIONS
dentity 1 : Calibration blank Identity 2 : Type : CB
eight : 1.0000 Volume : 1.00 Printed : 2:08:40 PM December 20, 2005

	K_766	Na589	Sc	Sc361
	ppm	ppm		ppm
# 1	0.0645	0.1256	3813.000	97.8663
# 2	0.1293 L	-0.0025	3815.000	97.9177
ean	0.0969	0.0616	3814.000	97.8920
D	0.0458	0.0906	1.414	0.0364
RSD	47.3032	147.1811	0.037	0.0371

ecking calibration blank ...

_766	0.250	0.097
a589	0.250	0.062
c361	0.000	97.892

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ACKGROUND CORRECTED INTENSITIES
VOLUTION by Micro-Active Australia Pty Ltd 2:17:48 PM December 20, 2005

dentity 1 : CRI Identity 2 : Type : CV
eight : 1.0000 Volume : 1.00 Printed : 2:11:34 PM December 20, 2005

	K_766	Na589	Sc	Sc361
# 1	13.5	104.0	3841.0	3841.0
# 2	25.5	110.0	3735.0	3735.0
ean	19.5	107.0	3788.0	3788.0
D	8.5	4.2	75.0	75.0
RSD	43.5	4.0	2.0	2.0

PPARENT CONCENTRATIONS
dentity 1 : CRI Identity 2 : Type : CV
eight : 1.0000 Volume : 1.00 Printed : 2:11:34 PM December 20, 2005

	K_766 ppm	Na589 ppm	Sc	Sc361 ppm
# 1 L	-0.0994 L	-0.0251	3841.000	98.5861
# 2	0.0649 L	-0.0040	3735.000	95.8612
ean L	-0.0172 L	-0.0145	3788.000	97.2237
D	0.1161	0.0149	74.953	1.9268
RSD	674.1171	102.4728	1.979	1.9818

hecking calibration verification ...
dentity 1 : CRI Identity 2 :

eport name	Low limit	Value	High limit	
_766	0.900	-0.017	1.100	Failed
a589	0.900	-0.015	1.100	Failed

ACKGROUND CORRECTED INTENSITIES
dentity 1 : ICSA Identity 2 : Type : INTRF
eight : 1.0000 Volume : 1.00 Printed : 2:14:26 PM December 20, 2005

	K_766	Na589	Sc	Sc361
# 1	28.5	100.5	3749.0	3749.0
# 2	18.5	107.5	3692.0	3692.0
ean	23.5	104.0	3720.5	3720.5
D	7.1	4.9	40.3	40.3
RSD	30.1	4.8	1.1	1.1

PPARENT CONCENTRATIONS
dentity 1 : ICSA Identity 2 : Type : INTRF
eight : 1.0000 Volume : 1.00 Printed : 2:14:26 PM December 20, 2005

	K_766 ppm	Na589 ppm	Sc	Sc361 ppm
# 1	0.1033 L	-0.0275	3749.000	96.2211
# 2 L	-0.0252 L	-0.0070	3692.000	94.7558
ean	0.0391 L	-0.0172	3720.500	95.4884
D	0.0908	0.0145	40.305	1.0361
RSD	232.5337	84.1750	1.083	1.0851

ACKGROUND CORRECTED INTENSITIES
dentity 1 : ICSAB Identity 2 : Type : ICSAB
eight : 1.0000 Volume : 1.00 Printed : 2:17:18 PM December 20, 2005

# 1	34.0	99.0	3712.0	3712.0
# 2	16.0	133.0	3694.0	3694.0
ean	25.0	116.0	3703.0	3703.0

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D	12.7	24.0	12.7	12.7
RSD	50.9	20.7	0.3	0.3

PPARENT CONCENTRATIONS
dentity 1 : ICSAB Identity 2 : Type : ICSAB
eight : 1.0000 Volume : 1.00 Printed : 2:17:18 PM December 20, 2005

	K_766 ppm	Na589 ppm	Sc	Sc361 ppm
# 1	0.1805 L	-0.0287	3712.000	95.2699
# 2 L	-0.0589	0.0541	3694.000	94.8072
ean	0.0608	0.0127	3703.000	95.0386
D	0.1693	0.0586	12.728	0.3272
RSD	278.2549	459.9975	0.344	0.3443

ıecking interference check standard ...
dentity 1 : ICSAB Identity 2 :

eport name	Low limit	Value	High limit	
_766	0.000	0.061	0.000	Failed
a589	0.000	0.013	0.000	Failed

ACKGROUND CORRECTED INTENSITIES
dentity 1 : CLP_CCV_SC Identity 2 : Type : CV
eight : 1.0000 Volume : 1.00 Printed : 2:21:10 PM December 20, 2005

	K_766	Na589	Sc	Sc361
# 1	1572.0	13153.5	3849.5	3849.5
# 2	1571.0	12889.5	3773.5	3773.5
ean	1571.5	13021.5	3811.5	3811.5
)	0.7	186.7	53.7	53.7
RSD	0.0	1.4	1.4	1.4

'PARENT CONCENTRATIONS
dentity 1 : CLP_CCV_SC Identity 2 : Type : CV
eight : 1.0000 Volume : 1.00 Printed : 2:21:12 PM December 20, 2005

	K_766 ppm	Na589 ppm	Sc	Sc361 ppm
# 1	19.9741	30.0575	3849.500	98.8046
# 2	20.3688	30.0473	3773.500	96.8509
ean	20.1715	30.0524	3811.500	97.8278
)	0.2791	0.0072	53.740	1.3815
SD	1.3835	0.0239	1.410	1.4122

ecking calibration verification ...
entity 1 : CLP_CCV_SC Identity 2 :

port name	Low limit	Value	High limit
766	18.000	20.171	22.000
589	27.000	30.052	33.000

CKGROUND CORRECTED INTENSITIES
entity 1 : Calibration blank Identity 2 : Type : CB
ight : 1.0000 Volume : 1.00 Printed : 2:25:04 PM December 20, 2005

	K_766	Na589	Sc	Sc361

lean	12.5	107.0	3862.5	3862.5
SD	9.2	12.0	40.3	40.3
CRSD	73.5	11.2	1.0	1.0

:VOLUTION by Micro-Active Australia Pty Ltd 2:29:50 PM December 20, 2005

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APPARENT CONCENTRATIONS
Identity 1 : Calibration blank Identity 2 : Type : CB
Weight : 1.0000 Volume : 1.00 Printed : 2:25:04 PM December 20, 2005

	K_766 ppm	Na589 ppm	Sc	Sc361 ppm
# 1 L	-0.0315 L	-0.0019	3891.000	99.8715
# 2 L	-0.1960 L	-0.0374	3834.000	98.4062
lean L	-0.1138 L	-0.0197	3862.500	99.1388
SD	0.1163	0.0251	40.305	1.0361
RSD	102.2571	127.4653	1.043	1.0451

hecking calibration blank ...
dentity 1 : Calibration blank Identity 2 :

eport name	CRDL	Value
_766	0.250	-0.114
a589	0.250	-0.020
c361	0.000	99.139

ACKGROUND CORRECTED INTENSITIES
dentity 1 : pbw-M19E2 Identity 2 : pg62-230 Type : SAMPLE
eight : 1.0000 Volume : 1.00 Printed : 2:27:56 PM December 20, 2005

	K_766	Na589	Sc	Sc361
# 1	31.0	83.0	3994.0	3994.0
# 2	17.0	34.0	3936.0	3936.0
ean	24.0	58.5	3965.0	3965.0
D	9.9	34.6	41.0	41.0
RSD	41.2	59.2	1.0	1.0

PPARENT CONCENTRATIONS
dentity 1 : pbw-M19E2 Identity 2 : pg62-230 Type : SAMPLE
eight : 1.0000 Volume : 1.00 Printed : 2:27:56 PM December 20, 2005

	K_766 ppm	Na589 ppm	Sc	Sc361 ppm
# 1	0.1112 L	-0.0809	3994.000 H	102.5193
# 2 L	-0.0595 L	-0.1887	3936.000 H	101.0283
ean	0.0259 L	-0.1348	3965.000 H	101.7738
D	0.1207	0.0762	41.012	1.0543
RSD	466.4248	56.5161	1.034	1.0359

ACKGROUND CORRECTED INTENSITIES
dentity 1 : lcsw-M19E2 Identity 2 : pg62-230 Type : SAMPLE
eight : 1.0000 Volume : 1.00 Printed : 2:29:40 PM December 20, 2005

	K_766	Na589	Sc	Sc361
# 1	1584.5	8808.5	3939.5	3939.5
# 2	1574.5	8747.5	3943.5	3943.5
ean	1579.5	8778.0	3941.5	3941.5
)	7.1	43.1	2.8	2.8
RSD	0.4	0.5	0.1	0.1

APPARENT CONCENTRATIONS

Weight : 1.0000 Volume : 1.00 Printed : 2:29:40 PM December 20, 2005

	K_766 ppm	Na589 ppm	Sc	Sc361 ppm

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# 1	19.6689	19.5770	3939.500 H	101.1183
# 2	19.5229	19.4196	3943.500 H	101.2211
Mean	19.5959	19.4983	3941.500 H	101.1697
SD	0.1032	0.1113	2.828	0.0727
%RSD	0.5267	0.5708	0.072	0.0719

BACKGROUND CORRECTED INTENSITIES
Identity 1 : 271250 df20 Identity 2 : pg62-230 Type : SAMPLE
Weight : 1.0000 Volume : 1.00 Printed : 2:32:46 PM December 20, 2005

	K_766	Na589	Sc	Sc361
# 1	6484.0	39896.0	3888.0	3888.0
# 2	6346.0	39245.0	3806.0	3806.0
Mean	6415.0	39570.5	3847.0	3847.0
SD	97.6	460.3	58.0	58.0
%RSD	1.5	1.2	1.5	1.5

APPARENT CONCENTRATIONS
Identity 1 : 271250 df20 Identity 2 : pg62-230 Type : SAMPLE
Weight : 1.0000 Volume : 1.00 Printed : 2:32:46 PM December 20, 2005

	K_766 ppm	Na589 ppm	Sc	Sc361 ppm
# 1 H	82.4149 H	90.7963	3888.000	99.7943
# 2 H	82.3987 H	91.2404	3806.000	97.6864
Mean H	82.4068 H	91.0183	3847.000	98.7404
SD	0.0115	0.3140	57.983	1.4906
%RSD	0.0140	0.3449	1.507	1.5096

BACKGROUND CORRECTED INTENSITIES
Identity 1 : 271250d df20 Identity 2 : pg62-230 Type : SAMPLE
Weight : 1.0000 Volume : 1.00 Printed : 2:34:30 PM December 20, 2005

	K_766	Na589	Sc	Sc361
# 1	6525.5	41394.5	3901.5	3901.5
# 2	6591.5	41900.5	3945.5	3945.5
Mean	6558.5	41647.5	3923.5	3923.5
SD	46.7	357.8	31.1	31.1
%RSD	0.7	0.9	0.8	0.8

APPARENT CONCENTRATIONS
Identity 1 : 271250d df20 Identity 2 : pg62-230 Type : SAMPLE
Weight : 1.0000 Volume : 1.00 Printed : 2:34:30 PM December 20, 2005

	K_766 ppm	Na589 ppm	Sc	Sc361 ppm
# 1 H	82.6562 H	93.8897	3901.500 H	100.1414
# 2 H	82.5608 H	93.9778	3945.500 H	101.2725
Mean H	82.6085 H	93.9337	3923.500 H	100.7069
SD	0.0675	0.0623	31.113	0.7998
%RSD	0.0817	0.0663	0.793	0.7942

BACKGROUND CORRECTED INTENSITIES

	K_766	Na589	Sc	Sc361
# 1	6596.0	39592.5	3968.0	3968.0
# 2	6538.0	39229.5	3916.0	3916.0

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lean	6567.0	39411.0	3942.0	3942.0
SD	41.0	256.7	36.8	36.8
RSD	0.6	0.7	0.9	0.9

PPARENT CONCENTRATIONS
dentity 1 : 271250s df20 Identity 2 : pg62-230 Type : SAMPLE
eight : 1.0000 Volume : 1.00 Printed : 2:36:12 PM December 20, 2005

	K_766 ppm	Na589 ppm	Sc	Sc361 ppm
# 1 H	82.1473 H	88.2817	3968.000 H	101.8509
# 2 H	82.5074 H	88.6348	3916.000 H	100.5141
ean H	82.3274 H	88.4582	3942.000 H	101.1825
D	0.2546	0.2497	36.770	0.9452
RSD	0.3093	0.2823	0.933	0.9342

ACKGROUND CORRECTED INTENSITIES
dentity 1 : CLP_CCV_SC Identity 2 : Type : CV
eight : 1.0000 Volume : 1.00 Printed : 2:39:20 PM December 20, 2005

	K_766	Na589	Sc	Sc361
# 1	1581.5	13031.0	3836.5	3836.5
# 2	1562.5	12991.0	3820.5	3820.5
ean	1572.0	13011.0	3828.5	3828.5
D	13.4	28.3	11.3	11.3
RSD	0.9	0.2	0.3	0.3

PPARENT CONCENTRATIONS
dentity 1 : CLP_CCV_SC Identity 2 : Type : CV
eight : 1.0000 Volume : 1.00 Printed : 2:39:20 PM December 20, 2005

	K_766 ppm	Na589 ppm	Sc	Sc361 ppm
# 1	20.1655	29.8769	3836.500	98.4704
# 2	20.0045	29.9102	3820.500	98.0591
ean	20.0850	29.8935	3828.500	98.2648
D	0.1138	0.0236	11.314	0.2908
RSD	0.5668	0.0788	0.296	0.2960

hecking calibration verification ...
dentity 1 : CLP_CCV_SC Identity 2 :

eport name	Low limit	Value	High limit
_766	18.000	20.085	22.000
a589	27.000	29.894	33.000

ACKGROUND CORRECTED INTENSITIES
dentity 1 : Calibration blank Identity 2 : Type : CB
eight : 1.0000 Volume : 1.00 Printed : 2:43:12 PM December 20, 2005

	K_766	Na589	Sc	Sc361
# 1	36.5	105.5	3882.0	3882.0
# 2	32.5	101.5	3818.0	3818.0
ean	34.5	103.5	3850.0	3850.0

APPARENT CONCENTRATIONS
Identity 1 : Calibration blank Identity 2 : Type : CB
Weight : 1.0000 Volume : 1.00 Printed : 2:43:12 PM December 20, 2005 010051
EVOLUTION by Micro-Active Australia Pty Ltd 2:48:18 PM December 20, 2005

	K_766 ppm	Na589 ppm	Sc	Sc361 ppm
# 1	0.1926 L	-0.0242	3882.000	99.6401
# 2	0.1484 L	-0.0294	3818.000	97.9949
Mean	0.1705 L	-0.0268	3850.000	98.8175
SD	0.0312	0.0037	45.255	1.1634
RSD	18.3016	13.8555	1.175	1.1773

Checking calibration blank ...
Identity 1 : Calibration blank Identity 2 :

Report name	CRDL	Value
K_766	0.250	0.171
Na589	0.250	-0.027
Sc361	0.000	98.817

BACKGROUND CORRECTED INTENSITIES
Identity 1 : pbw-M20H1 Identity 2 : Type : SAMPLE
Weight : 1.0000 Volume : 1.00 Printed : 2:46:06 PM December 20, 2005

	K_766	Na589	Sc	Sc361
# 1	41.0	58.5	4226.0	4226.0
# 2	20.0	54.5	4197.0	4197.0
Mean	30.5	56.5	4211.5	4211.5
SD	14.8	2.8	20.5	20.5
RSD	48.7	5.0	0.5	0.5

APPARENT CONCENTRATIONS
Identity 1 : pbw-M20H1 Identity 2 : Type : SAMPLE
Weight : 1.0000 Volume : 1.00 Printed : 2:46:06 PM December 20, 2005

	K_766 ppm	Na589 ppm	Sc	Sc361 ppm
# 1	0.2074 L	-0.1425	4226.000 H	108.4833
# 2 L	-0.0373 L	-0.1501	4197.000 H	107.7378
Mean	0.0850 L	-0.1463	4211.500 H	108.1105
SD	0.1731	0.0054	20.506	0.5271
RSD	203.5255	3.6770	0.487	0.4876

BACKGROUND CORRECTED INTENSITIES
Identity 1 : lcsw-M20H1 Identity 2 : Type : SAMPLE
Weight : 1.0000 Volume : 1.00 Printed : 2:47:48 PM December 20, 2005

	K_766	Na589	Sc	Sc361
# 1	1594.0	8845.0	3921.5	3921.5
# 2	1577.0	8626.0	3883.5	3883.5
Mean	1585.5	8735.5	3902.5	3902.5
SD	12.0	154.9	26.9	26.9
RSD	0.8	1.8	0.7	0.7

APPARENT CONCENTRATIONS
Identity 1 : lcsw-M20H1 Identity 2 : Type : SAMPLE
Weight : 1.0000 Volume : 1.00 Printed : 2:47:48 PM December 20, 2005

# 1	19.8805	19.7507	3921.500 H	100.6555
# 2	19.8607	19.4461	3883.500	99.6787
Mean	19.8706	19.5984	3902.500 H	100.1671

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SD	0.0140	0.2154	26.870	0.6907
%RSD	0.0706	1.0989	0.689	0.6896

BACKGROUND CORRECTED INTENSITIES
Identity 1 : 271245 Identity 2 : Type : SAMPLE
Weight : 1.0000 Volume : 1.00 Printed : 2:50:56 PM December 20, 2005

	K_766	Na589	Sc	Sc361
# 1	42.5	314.5	3831.5	3831.5
# 2	44.5	317.5	3799.5	3799.5
Mean	43.5	316.0	3815.5	3815.5
SD	1.4	2.1	22.6	22.6
%RSD	3.3	0.7	0.6	0.6

APPARENT CONCENTRATIONS
Identity 1 : 271245 Identity 2 : Type : SAMPLE
Weight : 1.0000 Volume : 1.00 Printed : 2:50:56 PM December 20, 2005

	K_766 ppm	Na589 ppm	Sc	Sc361 ppm
# 1	0.2764	0.4631	3831.500	98.3419
# 2	0.3071	0.4762	3799.500	97.5193
Mean	0.2917	0.4696	3815.500	97.9306
SD	0.0217	0.0093	22.627	0.5817
%RSD	7.4489	1.9787	0.593	0.5940

BACKGROUND CORRECTED INTENSITIES
Identity 1 : 271245d Identity 2 : Type : SAMPLE
Weight : 1.0000 Volume : 1.00 Printed : 2:52:40 PM December 20, 2005

	K_766	Na589	Sc	Sc361
# 1	32.5	338.5	3922.5	3922.5
# 2	29.5	362.5	3912.5	3912.5
Mean	31.0	350.5	3917.5	3917.5
SD	2.1	17.0	7.1	7.1
%RSD	6.8	4.8	0.2	0.2

APPARENT CONCENTRATIONS
Identity 1 : 271245d Identity 2 : Type : SAMPLE
Weight : 1.0000 Volume : 1.00 Printed : 2:52:40 PM December 20, 2005

	K_766 ppm	Na589 ppm	Sc	Sc361 ppm
# 1	0.1372	0.5005	3922.500 H	100.6812
# 2	0.1002	0.5569	3912.500 H	100.4242
Mean	0.1187	0.5287	3917.500 H	100.5527
SD	0.0261	0.0399	7.071	0.1818
%RSD	22.0201	7.5430	0.180	0.1808

BACKGROUND CORRECTED INTENSITIES
Identity 1 : 271245s Identity 2 : Type : SAMPLE
Weight : 1.0000 Volume : 1.00 Printed : 2:54:24 PM December 20, 2005

	K_766	Na589	Sc	Sc361
# 1	1621.5	9229.0	3859.0	3859.0

lean	1624.5	9232.0	3866.5	3866.5
SD	4.2	151.3	10.6	10.6
RSD	0.3	1.6	0.3	0.3

EVOLUTION by Micro-Active Australia Pty Ltd 3:03:18 PM December 20, 2005

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APPARENT CONCENTRATIONS
Identity 1 : 271245s Identity 2 : Type : SAMPLE
Weight : 1.0000 Volume : 1.00 Printed : 2:54:24 PM December 20, 2005

	K_766 ppm	Na589 ppm	Sc	Sc361 ppm
# 1	20.5603	21.2109	3859.000	99.0488
# 2	20.5564	20.6375	3874.000	99.4344
lean	20.5584	20.9242	3866.500	99.2416
SD	0.0027	0.4054	10.607	0.2727
RSD	0.0133	1.9376	0.274	0.2747

BACKGROUND CORRECTED INTENSITIES
Identity 1 : 271246 Identity 2 : Type : SAMPLE
Weight : 1.0000 Volume : 1.00 Printed : 2:57:16 PM December 20, 2005

	K_766	Na589	Sc	Sc361
# 1	13.5	175.5	3848.0	3848.0
# 2	22.5	188.5	3809.0	3809.0
lean	18.0	182.0	3828.5	3828.5
SD	6.4	9.2	27.6	27.6
RSD	35.4	5.1	0.7	0.7

APPARENT CONCENTRATIONS
dentity 1 : 271246 Identity 2 : Type : SAMPLE
Weight : 1.0000 Volume : 1.00 Printed : 2:57:16 PM December 20, 2005

		K_766 ppm	Na589 ppm	Sc	Sc361 ppm
# 1	L	-0.0997	0.1394	3848.000	98.7661
# 2		0.0193	0.1738	3809.000	97.7635
ean	L	-0.0402	0.1566	3828.500	98.2648
D		0.0841	0.0243	27.577	0.7089
RSD		209.1993	15.5480	0.720	0.7214

ACKGROUND CORRECTED INTENSITIES
dentity 1 : 271247 Identity 2 : Type : SAMPLE
eight : 1.0000 Volume : 1.00 Printed : 3:00:14 PM December 20, 2005

	K_766	Na589	Sc	Sc361
# 1	77.0	456.0	3817.5	3817.5
# 2	77.0	475.0	3806.5	3806.5
ean	77.0	465.5	3812.0	3812.0
D	0.0	13.4	7.8	7.8
RSD	0.0	2.9	0.2	0.2

PPARENT CONCENTRATIONS
dentity 1 : 271247 Identity 2 : Type : SAMPLE
eight : 1.0000 Volume : 1.00 Printed : 3:00:14 PM December 20, 2005

	K_766 ppm	Na589 ppm	Sc	Sc361 ppm
# 1	0.7265	0.7947	3817.500	97.9820
# 2	0.7204	0.8420	3806.500	97.6992

Mean	0.7279	0.8183	3812.000	97.8406
SD	0.0020	0.0335	7.778	0.2000
%RSD	0.2807	4.0921	0.204	0.2044

010054

EVOLUTION by Micro-Active Australia Pty Ltd 3:09:18 PM December 20, 2005

BACKGROUND CORRECTED INTENSITIES
Identity 1 : 271248 Identity 2 : Type : SAMPLE
Weight : 1.0000 Volume : 1.00 Printed : 3:03:06 PM December 20, 2005

	K_766	Na589	Sc	Sc361
# 1	228.5	1905.0	3861.0	3861.0
# 2	221.5	1855.0	3811.0	3811.0
Mean	225.0	1880.0	3836.0	3836.0
SD	4.9	35.4	35.4	35.4
%RSD	2.2	1.9	0.9	0.9

APPARENT CONCENTRATIONS
Identity 1 : 271248 Identity 2 : Type : SAMPLE
Weight : 1.0000 Volume : 1.00 Printed : 3:03:06 PM December 20, 2005

	K_766	Na589	Sc	Sc361
	ppm	ppm		ppm
# 1	2.6608	4.1132	3861.000	99.1003
# 2	2.6082	4.0542	3811.000	97.8149
Mean	2.6345	4.0837	3836.000	98.4576
SD	0.0372	0.0417	35.355	0.9089
%RSD	1.4111	1.0213	0.922	0.9231

BACKGROUND CORRECTED INTENSITIES
Identity 1 : 271249 Identity 2 : Type : SAMPLE
Weight : 1.0000 Volume : 1.00 Printed : 3:06:00 PM December 20, 2005

	K_766	Na589	Sc	Sc361
# 1	446.0	2229.5	3853.5	3853.5
# 2	441.0	2132.5	3814.5	3814.5
Mean	443.5	2181.0	3834.0	3834.0
SD	3.5	68.6	27.6	27.6
%RSD	0.8	3.1	0.7	0.7

APPARENT CONCENTRATIONS
Identity 1 : 271249 Identity 2 : Type : SAMPLE
Weight : 1.0000 Volume : 1.00 Printed : 3:06:00 PM December 20, 2005

	K_766	Na589	Sc	Sc361
	ppm	ppm		ppm
# 1	5.4650	4.8690	3853.500	98.9075
# 2	5.4587	4.6958	3814.500	97.9049
Mean	5.4618	4.7824	3834.000	98.4062
SD	0.0045	0.1225	27.577	0.7089
%RSD	0.0818	2.5605	0.719	0.7204

BACKGROUND CORRECTED INTENSITIES
Identity 1 : CLP_CCV_SC Identity 2 : Type : CV
Weight : 1.0000 Volume : 1.00 Printed : 3:08:52 PM December 20, 2005

	K_766	Na589	Sc	Sc361
# 1	1544.0	12968.5	3832.5	3832.5
# 2	1542.0	12799.5	3775.5	3775.5
Mean	1543.0	12884.0	3804.0	3804.0

RSD	0.1	0.9	1.1	1.1

PPARENT CONCENTRATIONS
dentity 1 : CLP_CCV_SC Identity 2 : Type : CV
VOLUTION by Micro-Active Australia Pty Ltd 3:15:48 PM December 20, 2005

010055

eight : 1.0000 Volume : 1.00 Printed : 3:08:52 PM December 20, 2005

	K_766 ppm	Na589 ppm	Sc	Sc361 ppm
# 1	19.7017	29.7636	3832.500	98.3676
# 2	19.9770	29.8197	3775.500	96.9023
ean	19.8394	29.7917	3804.000	97.6350
D	0.1947	0.0397	40.305	1.0361
RSD	0.9812	0.1332	1.060	1.0612

hecking calibration verification ...
dentity 1 : CLP_CCV_SC Identity 2 :

eport name	Low limit	Value	High limit
_766	18.000	19.839	22.000
a589	27.000	29.792	33.000

ACKGROUND CORRECTED INTENSITIES
dentity 1 : Calibration blank Identity 2 : Type : CB
eight : 1.0000 Volume : 1.00 Printed : 3:12:44 PM December 20, 2005

	K_766	Na589	Sc	Sc361
# 1	18.5	58.0	3834.0	3834.0
# 2	11.5	108.0	3796.0	3796.0
ean	15.0	83.0	3815.0	3815.0
D	4.9	35.4	26.9	26.9
RSD	33.0	42.6	0.7	0.7

PPARENT CONCENTRATIONS
dentity 1 : Calibration blank Identity 2 : Type : CB
eight : 1.0000 Volume : 1.00 Printed : 3:12:44 PM December 20, 2005

	K_766 ppm	Na589 ppm	Sc	Sc361 ppm
# 1 L	-0.0344 L	-0.1311	3834.000	98.4062
# 2 L	-0.1234 L	-0.0129	3796.000	97.4293
ean L	-0.0789 L	-0.0720	3815.000	97.9177
)	0.0630	0.0836	26.870	0.6907
RSD	79.8051	116.1204	0.704	0.7054

ecking calibration blank ...
dentity 1 : Calibration blank Identity 2 :

port name	CRDL	Value
_766	0.250	-0.079
589	0.250	-0.072
361	0.000	97.918

CKGROUND CORRECTED INTENSITIES
entity 1 : CRI Identity 2 : Type : CV
ight : 1.0000 Volume : 1.00 Printed : 3:15:36 PM December 20, 2005

	K_766	Na589	Sc	Sc361
1	8.0	90.0	3833.5	3833.5
2	18.0	109.0	3747.5	3747.5
an	13.0	99.5	3790.5	3790.5

010056

APPARENT CONCENTRATIONS
Identity 1 : CRI Identity 2 : Type : CV
Weight : 1.0000 Volume : 1.00 Printed : 3:15:36 PM December 20, 2005
EVOLUTION by Micro-Active Australia Pty Ltd 3:21:48 PM December 20, 2005

		K_766 ppm		Na589 ppm	Sc	Sc361 ppm
# 1	L	-0.1701	L	-0.0570	3833.500	98.3933
# 2	L	-0.0355	L	-0.0072	3747.500	96.1825
Mean	L	-0.1028	L	-0.0321	3790.500	97.2879
SD		0.0952		0.0352	60.811	1.5633
RSD		92.6351		109.5342	1.604	1.6068

Checking calibration verification ...
Identity 1 : CRI Identity 2 :

Report name	Low limit	Value	High limit	
K_766	0.900	-0.103	1.100	Failed
Na589	0.900	-0.032	1.100	Failed

BACKGROUND CORRECTED INTENSITIES
Identity 1 : ICSA Identity 2 : Type : INTRF
Weight : 1.0000 Volume : 1.00 Printed : 3:18:30 PM December 20, 2005

	K_766	Na589	Sc	Sc361
# 1	17.5	95.5	3722.5	3722.5
# 2	24.5	83.5	3710.5	3710.5
Mean	21.0	89.5	3716.5	3716.5
SD	4.9	8.5	8.5	8.5
RSD	23.6	9.5	0.2	0.2

APPARENT CONCENTRATIONS
Identity 1 : ICSA Identity 2 : Type : INTRF
Weight : 1.0000 Volume : 1.00 Printed : 3:18:30 PM December 20, 2005

		K_766 ppm		Na589 ppm	Sc	Sc361 ppm
# 1	L	-0.0405	L	-0.0377	3722.500	95.5398
# 2		0.0538	L	-0.0657	3710.500	95.2314
Mean		0.0066	L	-0.0517	3716.500	95.3856
SD		0.0667		0.0198	8.485	0.2181
RSD		1007.0489		38.2635	0.228	0.2287

BACKGROUND CORRECTED INTENSITIES
Identity 1 : ICSAB Identity 2 : Type : ICSAB
Weight : 1.0000 Volume : 1.00 Printed : 3:21:22 PM December 20, 2005

	K_766	Na589	Sc	Sc361
# 1	22.5	85.5	3729.0	3729.0
# 2	26.5	91.5	3632.0	3632.0
Mean	24.5	88.5	3680.5	3680.5
SD	2.8	4.2	68.6	68.6
RSD	11.5	4.8	1.9	1.9

APPARENT CONCENTRATIONS
Identity 1 : ICSAB Identity 2 : Type : ICSAB
Weight : 1.0000 Volume : 1.00 Printed : 3:21:22 PM December 20, 2005

	K_766 ppm	Na589 ppm	Sc	Sc361 ppm

# 2	0.0881 L	-0.0418	3632.000	93.2134
lean	0.0568 L	-0.0518	3680.500	94.4602
SD	0.0443	0.0142	68.589	1.7632
RSD	77.8601	27.4076	1.864	1.8666

010057

EVOLUTION by Micro-Active Australia Pty Ltd 3:29:20 PM December 20, 2005

Checking interference check standard ...
Identity 1 : ICSAB Identity 2 :

Report name	Low limit	Value	High limit	
_766	0.000	0.057	0.000	Failed
la589	0.000	-0.052	0.000	Failed

BACKGROUND CORRECTED INTENSITIES
Identity 1 : CLP_CCV_SC Identity 2 : Type : CV
Weight : 1.0000 Volume : 1.00 Printed : 3:25:14 PM December 20, 2005

	K_766	Na589	Sc	Sc361
# 1	1558.0	13065.5	3845.5	3845.5
# 2	1538.0	12804.5	3781.5	3781.5
lean	1548.0	12935.0	3813.5	3813.5
SD	14.1	184.6	45.3	45.3
RSD	0.9	1.4	1.2	1.2

PPARENT CONCENTRATIONS
dentity 1 : CLP_CCV_SC Identity 2 : Type : CV
eight : 1.0000 Volume : 1.00 Printed : 3:25:14 PM December 20, 2005

	K_766 ppm	Na589 ppm	Sc	Sc361 ppm
# 1	19.8147	29.8859	3845.500	98.7018
# 2	19.8924	29.7837	3781.500	97.0566
ean	19.8536	29.8348	3813.500	97.8792
D	0.0550	0.0723	45.255	1.1634
RSD	0.2769	0.2422	1.187	1.1886

hecking calibration verification ...
dentity 1 : CLP_CCV_SC Identity 2 :

eport name	Low limit	Value	High limit
_766	18.000	19.854	22.000
a589	27.000	29.835	33.000

ACKGROUND CORRECTED INTENSITIES
dentity 1 : Calibration blank Identity 2 : Type : CB
eight : 1.0000 Volume : 1.00 Printed : 3:29:10 PM December 20, 2005

	K_766	Na589	Sc	Sc361
# 1	34.5	125.0	3878.5	3878.5
# 2	38.5	86.0	3759.5	3759.5
ean	36.5	105.5	3819.0	3819.0
D	2.8	27.6	84.1	84.1
RSD	7.7	26.1	2.2	2.2

PPARENT CONCENTRATIONS
dentity 1 : Calibration blank Identity 2 : Type : CB
eight : 1.0000 Volume : 1.00 Printed : 3:29:10 PM December 20, 2005

	K_766 ppm	Na589 ppm	Sc	Sc361 ppm
# 1	0.1674	0.0206	3878.500	99.5501

Mean	0.2008 L	-0.0209	3819.000	98.0206
SD	0.0472	0.0587	84.146	2.1631
%RSD	23.4953	281.4103	2.203	2.2068

010058

EVOLUTION by Micro-Active Australia Pty Ltd 3:39:48 PM December 20, 2005

Checking calibration blank ...
Identity 1 : Calibration blank Identity 2 :

Report name	CRDL	Value
_766	0.250	0.201
Na589	0.250	-0.021
Sc361	0.000	98.021

TRACE METALS PREPARATORY LABORATORY DIGESTION LOG

SOUTHWEST RESEARCH INSTITUTE
SAN ANTONIO, TEXAS 78228

BOOK / PAGE: 62 230

CLIENT(S): Div. 20
TASK ORDER(S): 051219-5 SDG(S): 271245 010059
PROJECT NO(S): 06002.01.322
METHOD: 3005A___3050B___3050B-7.5___3010A___3020A___7760A___7740A___$HClO_4$___$HClO_4/H_2SO_4$___
Microwave___Fusion___Teflon___Rock___OTHER HNO3
MATRIX: Water___Soil___Biota___Solid ✓ Liquid___TCLP Ext___OTHER___
INSTRUMENT: GFAA___ICP ✓ ICP-MS___IC___FLAA___HYDRIDE___OTHER___
ACID INORG #: HNO_3# 5484 HCl#___ H_2SO_4#___ $HClO_4$#___ HF#___ H_2O_2#___
INTERNAL STD: Sc @ 10 PPM___Be @ 10 PPM___SOURCE:___INORG#___EXP:___AMT:___
Oven/Hotplate/Block ID: 1 Temperature (°C): 95°C

SAMPLE IDENTIFICATION	pH	WT (g)	I.V. (mL)	F.V. (mL)	
PBW-M19E2				50	
LCSW-M19E2 *				↓	
271250		0.5357			
↓ d		0.5424			
271250S **		0.5249			
				5197	VOS 03/02/06
* Spiked 1 ml, and ** 500µl Spike-1 (Spex, # 5175, Exp. 4/06)					
200µl ICAL-1 (Spex, # 5288, Exp. 6/06)					
Balance # 12					
~~Pipet~~ KE 12/19/05					
pipette:					
200µl TMK-2					
500µl TMF5					
- wt. 0.5g into a centrifuge tube,					
- added 2ml HNO_3 heat on the digestion block, for 30min.					
- Adj. volume to 50ml w/DI-water					
		12-19-05 KE			
					LOCATION:
					S6 B5

PREPARED BY: [signature] DATE: 12-19-05
REVIEWED BY: [signature] DATE: 12-20-05
DISPOSAL INT/DATE/LOC: ___

FRM-191 (Rev 4/Jan 05)

TRACE METALS PREPARATORY LABORATORY DIGESTION LOG

SOUTHWEST RESEARCH INSTITUTE
SAN ANTONIO, TEXAS 78228

BOOK / PAGE: 62 232

010060

CLIENT(S): Div. 20
TASK ORDER(S): 051218-5 SDG(S): 271245
PROJECT NO(S): 06002.01.322
METHOD: 3005A___3050B___3050B-7.5___3010A___3020A___7760A___7740A___$HClO_4$___$HClO_4/H_2SO_4$___
Microwave___Fusion___Teflon___Rock___OTHER dilutions
MATRIX: Water___Soil___Biota___Solid___Liquid ✓ TCLP Ext___OTHER___
INSTRUMENT: GFAA___ICP ✓ ICP-MS___IC___FLAA___HYDRIDE___OTHER___
ACID INORG #: HNO_3# 5484 HCl# 5476 H_2SO_4#___ $HClO_4$#___ HF#___ H_2O_2#___
INTERNAL STD: Sc @ 10 PPM ✓ Be @ 10 PPM___SOURCE: IV INORG# 5484 EXP: 10/1/06 AMT: 50uL
Oven/Hotplate/ Block ID: N/A Temperature (°C): N/A

Sample Identification		df	WT(g)	I.V.(ml)	F.V.(ml)
PBW-M20H1		1		5	5
LCSW-L15H1*		1		5	5
271245		5		1	5
271245d		5		1	5
271245s*		5		1	5
271246		5		1	5
271247		5		1	5
271248		5		1	5
271249		5		1	5

*20uL ICAL-1 Spex#5288 exp. 06/06
PBW&LCSW are prepared as 10mls 1%HNO_3 / 5% HCL

12-20-05

Contacted Chris Butler
& Mary Ebnisson
12-19-05 2:42 pm
12-20-05

LOCATION:
N/A

PREPARED BY: DATE: 12-20-05
REVIEWED BY: DATE: 12-21-05
DISPOSAL INT/DATE/LOC:

FRM-191 (Rev 4/Jan 05)

BOOK/ PAGE 19 232

SOUTHWEST RESEARCH INSTITUTE®
6220 Culebra Rd
San Antonio, Texas 78228

010061

SPECTRO ICP DAILY LOG

ANALYST [signature]

DATE 12-20-05

POWER: 5200

FLOWS:
Aux 40
Coolant 60
Mass Flow Controller 886

CURRENT	PROPOSED	
5136	5151	Na
4771	4789	Fe
4960	4978	Sr

QC PREP DATE:	
CCV/ICV	05M01
CRI	05M01
ICSA	05M01
ICSAB	05M12

CLP_STD1_SC	05M01
CLP_STD2_SC	
CLP_STD3_SC	
CLP_STD4_SC	
CLP_STD5_SC	
BLK_SC	05M01

FILE	CLIENT	TO#	PROJECT NO.	METHOD	PREP PAGE
051220	CH2M-20-6	051214-5/6	11543.12.006	200.7	62-223
051220A	DIV 20	051219-5	06002.01.322	6010B	62-230/232

12-20-05

COMMENTS:

MAINTENANCE:

Cleaned Torch: _____ YES
Changed Pump Tubing: ✓ YES
Cleaned Optics: _____ YES
Polished Optics: _____ YES

OTHER:

REVIEWED BY: [signature]

DATE: 12/21/05

ICP Calibration Blank/ICB/CCB Solution

010062

ID: BLK- 05M01

Date Prepared: 12-1-05 Prepared By: [illegible]

Make up as needed in 1000ml volumetric flask.

Added ✓ 10 ml HNO3 INORG #: 5455

Added ✓ 50 ml HCL INORG #: 5422

Added ✓ 1000ul of 10000ppm Sc (INORG. VENT.) EXP. Date: 5-1-06 INORG #: 5175

ICP Calibration Blank/ICB/CCB Solution

ID: BLK-

Date Prepared:_____ Prepared By:_____

Make up as needed in 1000ml volumetric flask.

Added_____ 10 ml HNO3 INORG #:_____

Added_____ 50 ml HCL INORG #:_____

Added_____ 1000ul of 10000ppm Sc (INORG. VENT.) EXP. Date: _____INORG #:_____

ICP Calibration Blank/ICB/CCB Solution

ID: BLK-

Date Prepared:_____ Prepared By:_____

Make up as needed in 1000ml volumetric flask.

Added_____ 10 ml HNO3 INORG #:_____

Added_____ 50 ml HCL INORG #:_____

Added_____ 1000ul of 10000ppm Sc (INORG. VENT.) EXP. Date: _____INORG #:_____

ICP Calibration Blank/ICB/CCB Solution

ID: BLK-

Date Prepared:_____ Prepared By:_____

Make up as needed in 1000ml volumetric flask.

Added_____ 10 ml HNO3 INORG #:_____

Added_____ 50 ml HCL INORG #:_____

Added_____ 1000ul of 10000ppm Sc (INORG. VENT.) EXP. Date: _____INORG #:_____

ICP ICV/CCV SOLUTION

010063

CCV- 05 mol

Date Prepared: 12-1-05 Prepared By: [illegible]

HNO3 INORG #: 5455 HCl INORG #: 5422

Make up as needed in 1000ml volumetric flask in 1% HNO3 AND 5% HCl.

Element	Std Conc (ppm)	Amt added	Check	Source	Inorg #	Stock Conc (ppm)	Exp Date
Sc	10	1ml	✓	INORGVENT	5175	10000	5-1-06
B	5	5ml	✓	SPEX	4966	1000	1-15-06
Li	5	5ml	✓	SPEX	5327	1000	8-15-06
Mo	5	5ml	✓	SPEX	5326	1000	8-15-06
P	5	5ml	✓	SPEX	5280	1000	6-30-06
Si	5	5ml	✓	SPEX	5038	1000	2-28-06
Ti	5	5ml	✓	SPEX	5040	1000	2-28-06
Sr	5	5ml	✓	SPEX	5246	1000	5-30-06
Sn	5	5ml	✓	SPEX	5037	1000	2-28-06
Bi	5	5ml	✓	SPEX	5432	1000	10-15-06
La	5	5ml	✓	SPEX	5325	1000	8-15-06
Y	5	5ml	✓	SPEX	5431	1000	10-15-06
Pd	1	1ml	✓	SPEX	4967	1000	1-15-06
S	1	1ml	✓	SPEX	5296	1000	7-15-06
Th	1	1ml	✓	SPEX	5358	1000	8-30-06
U	1	1ml	✓	SPEX	5279	1000	6-30-06
W	1	1ml	✓	SPEX	5314	1000	7-30-06
Zr	5	5ml	✓	SPEX	5039	1000	2-28-06
Na	10	1ml	✓	SPEX	4998	10000	1-30-06
ICV-2A	vary	10ml	✓	SPEX	5429	mix	10-15-06
ICV-2B	vary	1ml	✓	SPEX	5430	mix	10-15-06
ICV-2C	vary	10ml	✓	SPEX	5428	mix	10-15-06

Expiration Date: 1-15-06

010064

ICP Calibration Standards

Date Prepared: 12-1-05 Prepared By: DL

HNO3 INORG #: 5455 HCl INORG #: 5422

Make up as needed in 500 ml volumetric flasks in 1% HNO3 and 5% HCl.

Prepared	Standard Name	Element	Std Conc (ppm)	Added ml	Check	Source	INORG #	Stock Conc (ppm)	Exp Date
12-1-05	STD1- 05M01	Al	50	2.50	✓	INORVENT	5405	10000	10-1-06
		Ca	50	2.50	✓	INORVENT	4988	10000	2-1-06
		Fe	50	2.50	✓	INORVENT	5044	10000	3-1-06
		K	50	2.50	✓	INORVENT	5471	10000	12-1-06
		Mg	25	1.25	✓	INORVENT	5312	10000	8-1-06
		Na	50	2.50	✓	INORVENT	5310	10000	8-1-06
		Li	10	5.00	✓	INORVENT	5244	1000	6-1-06
		Sc	10	0.500	✓	INORVENT	5175	10000	5-1-06
12-1-05	STD2- 05M01	Ba	10	5.00	✓	INORVENT	5027	1000	3-1-06
		Be	5	2.50	✓	INORVENT	5253	1000	6-1-06
		Cr	10	5.00	✓	INORVENT	5470	1000	12-1-06
		Cu	10	5.00	✓	INORVENT	5049	1000	3-1-06
		Ni	10	5.00	✓	INORVENT	5043	1000	3-1-06
		Sc	10	0.500	✓	INORVENT	5175	10000	5-1-06
12-1-05	STD3- 05M01	Cd	10	5.00	✓	INORVENT	5041	1000	3-1-06
		Co	10	5.00	✓	INORVENT	5044	1000	3-1-06
		Mn	10	5.00	✓	INORVENT	4989	1000	2-1-06
		V	10	5.00	✓	INORVENT	5472	1000	12-1-06
		Zn	10	5.00	✓	INORVENT	4915	1000	1-1-06
		Sc	10	0.500	✓	INORVENT	5175	10000	5-1-06
12-1-05	STD4- 05M01	Ag	2	1.00	✓	INORVENT	5406	1000	10-1-06
		As	10	5.00	✓	INORVENT	4987	1000	2-1-06
		Pb	10	5.00	✓	INORVENT	5255	1000	6-1-06
		Sb	10	5.00	✓	INORVENT	5042	1000	3-1-06
		Se	10	5.00	✓	INORVENT	5313	1000	8-1-06
		TL	10	5.00	✓	INORVENT	4990	1000	2-1-06
		Sc	10	0.500	✓	INORVENT	5175	10000	5-1-06
12-1-05	STD5- 05M01	B	10	5.00	✓	INORVENT	5047	1000	3-1-06
		Mo	10	5.00	✓	INORVENT	5050	1000	3-1-06
		P	10	5.00	✓	INORVENT	5254	1000	6-1-06
		Si	10	5.00	✓	INORVENT	5046	1000	3-1-06
		Ti	10	5.00	✓	INORVENT	5474	1000	12-1-06
		Sr	10	5.00	✓	INORVENT	5243	1000	6-1-06
		Sn	10	5.00	✓	INORVENT	5174	1000	5-1-06
		Bi	5	2.50	✓	INORVENT	5309	1000	8-1-06
		Sc	10	0.500	✓	INORVENT	5175	10000	5-1-06
12-1-05	STD6- 05M01	La	10	5.00	✓	INORVENT	5407	1000	10-1-06
		Na	1	0.05	✓	INORVENT	5310	10000	8-1-06
		Pd	10	5.00	✓	INORVENT	5045	1000	3-1-06
		S	10	5.00	✓	INORVENT	4917	1000	1-1-06
		Th	10	5.00	✓	INORVENT	5469	1000	12-1-06
		U	10	5.00	✓	INORVENT	5408	1000	10-1-06
		W	5	2.50	✓	INORVENT	5308	1000	8-1-06
		Y	10	5.00	✓	INORVENT	5200	1000	3-1-06
		Zr	10	5.00	✓	INORVENT	5311	1000	8-1-06
		SC	10	0.500	✓	INORVENT	5175	10000	5-1-06

Expiration Dates:

STD1: 2-1-06 STD4: 2-1-06

STD2: 2-1-06 STD5: 2-1-06

STD3: 1-1-06 STD6: 1-1-06

Div 20
06002.01.322
TO# 051219-5

✓ William A. Naegel
12/22/05

Analyst: RSS RSS
Method: EPA 300
TAP 01-0406-042 Rev
Sig Fig: 3

010065

Date Analyzed	System ID	Analyte	Conc. mg/L	Weight g	FV ml	RESULT mg/Kg	Qual	DL	TV	%REC %RPD
12/20/05	PBW-M19E3	Fluoride	0.000	1.0	50	10	U	10		
12/20/05	PBW-M19E3	Chloride	0.037	1.0	50	10	U	10		
12/20/05	PBW-M19E3	Nitrite-N	0.000	1.0	50	10	U	10		
12/20/05	PBW-M19E3	Bromide	0.000	1.0	50	10	U	10		
12/20/05	PBW-M19E3	Nitrate-N	0.000	1.0	50	10	U	10		
12/20/05	PBW-M19E3	Phosphate-P	0.092	1.0	50	10	U	10		
12/20/05	PBW-M19E3	Sulfate	0.000	1.0	50	10	U	10		
12/20/05	271250	Fluoride	0.000	1.0194	50	981	U	981		
12/21/05	271250	Chloride	2211.305	1.0194	50	108000		1960		
12/20/05	271250	Nitrite-N	0.000	1.0194	50	981	U	981		
12/20/05	271250	Bromide	0.000	1.0194	50	981	U	981		
12/21/05	271250	Nitrate-N	2176.692	1.0194	50	107000		1960		
12/20/05	271250	Phosphate-P	373.608	1.0194	50	18300		981		
12/20/05	271250	Sulfate	0.000	1.0194	50	981	U	981		
12/20/05	271250D	Fluoride	0.000	1.0194	50	981	U	981		0.00%
12/21/05	271250D	Chloride	2464.516	1.1208	50	110000		1780		1.83%
12/20/05	271250D	Nitrite-N	0.000	1.1208	50	892	U	892		0% ~~9.50%~~
12/20/05	271250D	Bromide	0.000	1.1208	50	892	U	892		0% ~~9.50%~~
12/21/05	271250D	Nitrate-N	2392.584	1.1208	50	107000		1780		0.00%
12/20/05	271250D	Phosphate-P	419.901	1.1208	50	18700		892		2.16%
12/20/05	271250D	Sulfate	0.000	1.1208	50	892	U	892		0% ~~9.50%~~
12/20/05	271250S	Fluoride	89.699	1.0194	50	4400		981	4900	89.8%
12/21/05	271250S	Chloride	2802.948	1.0194	50	137000		1960	19600	148%
12/20/05	271250S	Nitrite-N	154.646	1.0194	50	7590		981	7800	97.3%
12/20/05	271250S	Bromide	406.635	1.0194	50	19900		981	19600	102%
12/21/05	271250S	Nitrate-N	2358.152	1.0194	50	116000		1960	8858	102%
12/20/05	271250S	Phosphate-P	574.656	1.0194	50	28200		981	9340	106%
12/20/05	271250S	Sulfate	396.393	1.0194	50	19400		981	19600	99.0%

RSS 12/22/05

U = Undetected

TRACE METALS PREPARATORY LABORATORY DIGESTION LOG

SOUTHWEST RESEARCH INSTITUTE
SAN ANTONIO, TEXAS 78228

BOOK / PAGE: 62 231

010066

CLIENT(S): Div. 20
TASK ORDER(S): 051219-5 SDG(S): 271245
PROJECT NO(S): 06002.01.322
METHOD: 3005A___3050B___3050B-7.5___3010A___3020A___7760A___7740A___$HClO_4$___$HClO_4/H_2SO_4$___
Microwave___Fusion___Teflon___Rock___OTHER water diss.
MATRIX: Water___Soil___Biota___Solid ✓ Liquid___TCLP Ext___OTHER___
INSTRUMENT: GFAA___ICP___ICP-MS___IC ✓ FLAA___HYDRIDE___OTHER___
ACID INORG #: HNO_3# N/A HCl# N/A H_2SO_4#___ $HClO_4$#___ HF#___ H_2O_2#___
INTERNAL STD: Sc @ 10 PPM___Be @ 10 PPM___SOURCE:___INORG#___EXP:___AMT:___
Oven/Hotplate/ Block ID: N/A Temperature (°C):___

SAMPLE IDENTIFICATION	pH	WT (g)	I.V. (mL)	F.V. (mL)	
PBW-M19E3				50	
271250		1.0194		↓	
↓ d		1.1208		↓	
- wt. 1g into a centrifuge tube,					
- adj. volume to 50ml w/ DI-water.					
		12-19-05 KE			
					LOCATION:
					SG B5

PREPARED BY: [signature] DATE: 12-19-05
REVIEWED BY: [signature] DATE: 12-20-05
DISPOSAL INT/DATE/LOC: ___

FRM-191 (Rev 4/Jan 05)

Div 20
06002.01.322
TO# 051219-5

Analyst: RSS
Method: 300
Sig Fig: 3
TAP#: 01-0406-042 Rev. 4

010067

Date Analyzed	System ID	Analyte	Conc. mg/L	RESULT mg/L	Qual	DL	TV	%REC %RPD
12/21/05	271245	Fluoride	0.112	0.112		0.1		
12/21/05	271245	Chloride	0.681	0.681		0.1		
12/21/05	271245	Nitrite-N	1.231	1.23		0.1		
12/21/05	271245	Bromide	0.000	0.1	U	0.1		
12/21/05	271245	Nitrate-N	0.396	0.396		0.1		
12/21/05	271245	Phosphate-P	0.000	0.1	U	0.1		
12/21/05	271245	Sulfate	0.063	0.1	U	0.1		
12/21/05	271245D	Fluoride	0.113	0.113		0.1		0.89%
12/21/05	271245D	Chloride	0.934	0.934		0.1		31.3%
12/21/05	271245D	Nitrite-N	1.216	1.22		0.1		0.82%
12/21/05	271245D	Bromide	0.000	0.1	U	0.1		0.00%
12/21/05	271245D	Nitrate-N	0.411	0.411		0.1		3.72%
12/21/05	271245D	Phosphate-P	0.000	0.1	U	0.1		0.00%
12/21/05	271245D	Sulfate	0.077	0.1	U	0.1		0.00%
12/21/05	271245S	Fluoride	0.860	0.860		0.1	1	74.8%
12/21/05	271245S	Chloride	2.593	2.59		0.1	2	95.5%
12/21/05	271245S	Nitrite-N	2.727	2.73		0.1	1.59	94.3%
12/21/05	271245S	Bromide	4.049	4.05		0.1	4	101%
12/21/05	271245S	Nitrate-N	1.204	1.20		0.1	0.904	88.9%
12/21/05	271245S	Phosphate-P	1.918	1.92		0.1	1.91	101%
12/21/05	271245S	Sulfate	4.025	4.03		0.1	4	101%
12/21/05	271246	Fluoride	0.118	0.118		0.1		
12/21/05	271246	Chloride	0.358	0.358		0.1		
12/21/05	271246	Nitrite-N	0.330	0.330		0.1		
12/21/05	271246	Bromide	0.000	0.1	U	0.1		
12/21/05	271246	Nitrate-N	0.450	0.450		0.1		
12/21/05	271246	Phosphate-P	0.066	0.1	U	0.1		
12/21/05	271246	Sulfate	0.059	0.1	U	0.1		
12/21/05	271247	Fluoride	0.155	0.155		0.1		
12/21/05	271247	Chloride	1.582	1.58		0.1		
12/21/05	271247	Nitrite-N	1.331	1.33		0.1		
12/21/05	271247	Bromide	0.080	0.1	U	0.1		
12/21/05	271247	Nitrate-N	8.687	8.69		0.1		
12/21/05	271247	Phosphate-P	0.596	0.596		0.1		
12/21/05	271247	Sulfate	0.098	0.1	U	0.1		
12/20/05	271248	Fluoride	2.187	2.19		2		
12/20/05	271248	Chloride	115.655	116		2		
12/20/05	271248	Nitrite-N	2.372	2.37		2		
12/20/05	271248	Bromide	0.000	2	U	2		
12/20/05	271248	Nitrate-N	203.821	204		2		
12/20/05	271248	Phosphate-P	2.468	2.47		2		
12/20/05	271248	Sulfate	0.776	2	U	2		
12/20/05	271249	Fluoride	2.286	2.29		2		
12/21/05	271249	Chloride	420.050	420		10		
12/20/05	271249	Nitrite-N	3.422	3.42		2		
12/20/05	271249	Bromide	13.703	13.7		2		
12/20/05	271249	Nitrate-N	310.009	310		2		
12/20/05	271249	Phosphate-P	3.984	3.98		2		
12/20/05	271249	Sulfate	0.000	2	U	2		

U = Undetected

Div 20
06002.01.322
TO# 051219-5

Analyst: RSS
Method: 300
Sig Fig: 3
TAP#: 01-0406-042 Rev. 4

010068

Date Analyzed	System ID	Analyte	Conc. mg/L	RESULT mg/L	Qual	DL	TV	%REC %RPD
12/20/05	ICV (LCS)	Fluoride	94.985	95		0	100	95.0%
12/20/05	ICV (LCS)	Chloride	199.707	200		0.1	200	100%
12/20/05	ICV (LCS)	Nitrite-N	152.990	153		0.1	159	96.2%
12/20/05	ICV (LCS)	Bromide	390.662	391		0.1	400	97.8%
12/20/05	ICV (LCS)	Nitrate-N	83.191	83.2		0.1	90.4	92.0%
12/20/05	ICV (LCS)	Phosphate-P	187.544	188		0.1	191	98.4%
12/20/05	ICV (LCS)	Sulfate	388.074	388		0.1	400	97.0%
12/20/05	ICB (PB)	Fluoride	0.000	0.1	U	0.1		
12/20/05	ICB (PB)	Chloride	0.000	0.1	U	0.1		
12/20/05	ICB (PB)	Nitrite-N	0.000	0.1	U	0.1		
12/20/05	ICB (PB)	Bromide	0.000	0.1	U	0.1		
12/20/05	ICB (PB)	Nitrate-N	0.000	0.1	U	0.1		
12/20/05	ICB (PB)	Phosphate-P	0.000	0.1	U	0.1		
12/20/05	ICB (PB)	Sulfate	0.000	0.1	U	0.1		
12/20/05	CCV	Fluoride	97.883	97.9		0.1	100	97.9%
12/20/05	CCV	Chloride	210.028	210		0.1	200	105%
12/20/05	CCV	Nitrite-N	157.699	158		0.1	159	99.4%
12/20/05	CCV	Bromide	401.414	401		0.1	400	100%
12/20/05	CCV	Nitrate-N	84.881	84.9		0.1	90.4	93.9%
12/20/05	CCV	Phosphate-P	189.168	189		0.1	191	99.0%
12/20/05	CCV	Sulfate	390.957	391		0.1	400	97.8%
12/20/05	CCB	Fluoride	0.000	0.1	U	0.1		
12/20/05	CCB	Chloride	0.036	0.1	U	0.1		
12/20/05	CCB	Nitrite-N	0.000	0.1	U	0.1		
12/20/05	CCB	Bromide	0.000	0.1	U	0.1		
12/20/05	CCB	Nitrate-N	0.000	0.1	U	0.1		
12/20/05	CCB	Phosphate-P	0.076	0.1	U	0.1		
12/20/05	CCB	Sulfate	0.000	0.1	U	0.1		
12/20/05	CCV	Fluoride	99.628	99.6		0.1	100	99.6%
12/20/05	CCV	Chloride	207.729	208		0.1	200	104%
12/20/05	CCV	Nitrite-N	155.013	155		0.1	159	97.5%
12/20/05	CCV	Bromide	399.986	400		0.1	400	100%
12/20/05	CCV	Nitrate-N	85.118	85.1		0.1	90.4	94.1%
12/20/05	CCV	Phosphate-P	190.901	191		0.1	191	100%
12/20/05	CCV	Sulfate	394.742	395		0.1	400	98.8%
12/20/05	CCB	Fluoride	0.000	0.1	U	0.1		
12/20/05	CCB	Chloride	0.038	0.1	U	0.1		
12/20/05	CCB	Nitrite-N	0.000	0.1	U	0.1		
12/20/05	CCB	Bromide	0.000	0.1	U	0.1		
12/20/05	CCB	Nitrate-N	0.000	0.1	U	0.1		
12/20/05	CCB	Phosphate-P	0.000	0.1	U	0.1		
12/20/05	CCB	Sulfate	0.090	0.1	U	0.1		
12/21/05	ICV (LCS)	Fluoride	95.822	95.8		0	100	95.8%
12/21/05	ICV (LCS)	Chloride	203.581	204		0.1	200	102%
12/21/05	ICV (LCS)	Nitrite-N	154.921	155		0.1	159	97.5%
12/21/05	ICV (LCS)	Bromide	401.732	402		0.1	400	100.5%
12/21/05	ICV (LCS)	Nitrate-N	86.075	86.1		0.1	90.4	95.2%
12/21/05	ICV (LCS)	Phosphate-P	193.644	194		0.1	191	101.6%
12/21/05	ICV (LCS)	Sulfate	396.278	396		0.1	400	99.0%
12/21/05	ICB (PB)	Fluoride	0.000	0.1	U	0.1		
12/21/05	ICB (PB)	Chloride	0.047	0.1	U	0.1		
12/21/05	ICB (PB)	Nitrite-N	0.000	0.1	U	0.1		
12/21/05	ICB (PB)	Bromide	0.000	0.1	U	0.1		

U = Undetected

Div 20
06002.01.322
TO# 051219-5

Analyst: RSS
Method: 300
Sig Fig: 3
TAP#: 01-0406-042 Rev. 4

010069

Date Analyzed	System ID	Analyte	Conc. mg/L	RESULT mg/L	Qual	DL	TV	%REC %RPD
12/21/05	ICB (PB)	Nitrate-N	0.000	0.1	U	0.1		
12/21/05	ICB (PB)	Phosphate-P	0.000	0.1	U	0.1		
12/21/05	ICB (PB)	Sulfate	0.000	0.1	U	0.1		
12/21/05	CCV	Fluoride	97.459	97.5		0.1	100	97.5%
12/21/05	CCV	Chloride	206.748	207		0.1	200	104%
12/21/05	CCV	Nitrite-N	156.139	156		0.1	159	98.1%
12/21/05	CCV	Bromide	407.268	407		0.1	400	102%
12/21/05	CCV	Nitrate-N	86.900	86.9		0.1	90.4	96.1%
12/21/05	CCV	Phosphate-P	193.094	193		0.1	191	101%
12/21/05	CCV	Sulfate	401.138	401		0.1	400	100%
12/21/05	CCB	Fluoride	0.000	0.1	U	0.1		
12/21/05	CCB	Chloride	0.035	0.1	U	0.1		
12/21/05	CCB	Nitrite-N	0.000	0.1	U	0.1		
12/21/05	CCB	Bromide	0.000	0.1	U	0.1		
12/21/05	CCB	Nitrate-N	0.000	0.1	U	0.1		
12/21/05	CCB	Phosphate-P	0.000	0.1	U	0.1		
12/21/05	CCB	Sulfate	0.000	0.1	U	0.1		

U = Undetected

Schedule File: C:\PeakNet\schedule\21DEC05.sch

Line	Sample	Sample Type	Level	Method	Data File	Dilution
1	ICV	Sample		anions051116.met	051220_a001.dxd	20
2	ICB	Sample		anions051116.met	051220_002.dxd	1
3	271245	Sample		anions051116.met	051220_003.dxd	1
4	271245D	Sample		anions051116.met	051220_004.dxd	1
5	271245S	Sample		anions051116.met	051220_005.dxd	1
6	271246	Sample		anions051116.met	051220_006.dxd	1
7	271247	Sample		anions051116.met	051220_007.dxd	1
8	271249 DF100	Sample		anions051116.met	051220_008.dxd	100
9	271250 DF200	Sample		anions051116.met	051220_009.dxd	200
10	271250D DF200	Sample		anions051116.met	051220_010.dxd	200
11	271250S DF200	Sample		anions051116.met	051220_011.dxd	200
12	CCV	Sample		anions051116.met	051220_012.dxd	20
13	CCB	Sample		anions051116.met	051220_013.dxd	1

010070

Default Method Path: C:\PEAKNET\METHOD
Default Data Path: C:\PEAKNET\DATA\051221
Comment:
DIV 20 06002.01.322 TO#051219-5

XELUANT - 17.0 uS
1.0 mM SODIUM BICARBONATE (INORG #2626) & 3.5 mM SI\ODIUM CARBONATE (INORG#3757)

ICV Sources:
1) SPEX LOT#28-164AS (INORG#5467)
   F = 100 mg/L
   Cl = 200 mg/L
   Br = 400 mg/L
   NO3N = 90.4 mg/L
   PO4P = 191 mg/L
   SO4 = 400 mg/L
2) 128-01-IC5
   NO2N 159 mg/L

R Spies
12/21/05

Sample Name : ICV
Dilution Factor : 20.00
Injection Number : 1
Data File Name : c:\peaknet\data\051221\051220_A001.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\21dec05.sch

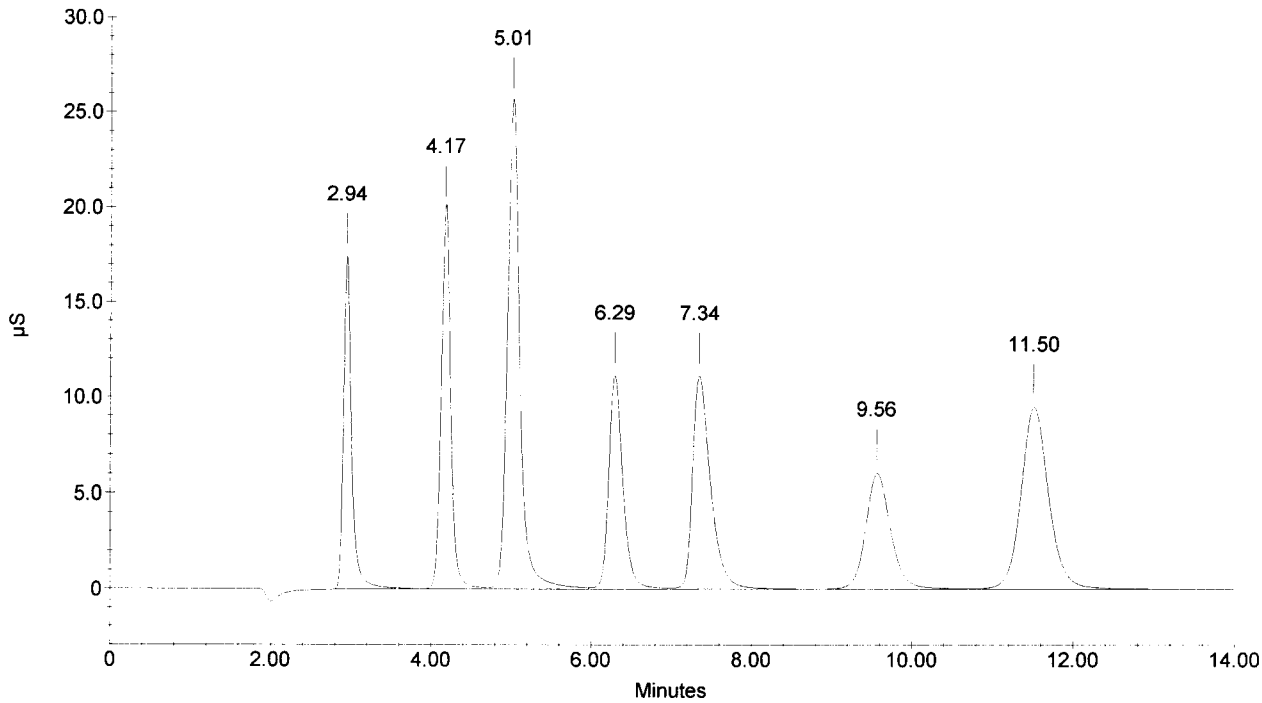
Date Time Collected : 12/21/05 3:40:15 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010071

Peak Information : All Components

Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	Bl. Code	%Delta
1	2.94	FLUORIDE	95.822	173684	1220081	2	-2.21
2	4.17	CHLORIDE	203.581	198735	1647479	2	-2.11
3	5.01	NITRITE-N	154.921	255703	2790269	2	-2.53
4	6.29	BROMIDE	401.732	110807	1368058	2	-2.33
5	7.34	NITRATE-N	86.075	110559	1743957	2	-0.36
6	9.56	PHOSPHATE-P	193.644	59972	1315700	2	-2.48
7	11.50	SULFATE	396.278	94263	2264875	2	-2.60
	0.00		---total(s)--- 1532.053		12350419		

ICV



Sample Name : ICB
Dilution Factor : 1.00
Injection Number : 2
Data File Name : c:\peaknet\data\051221\051220_002.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\21dec05.sch

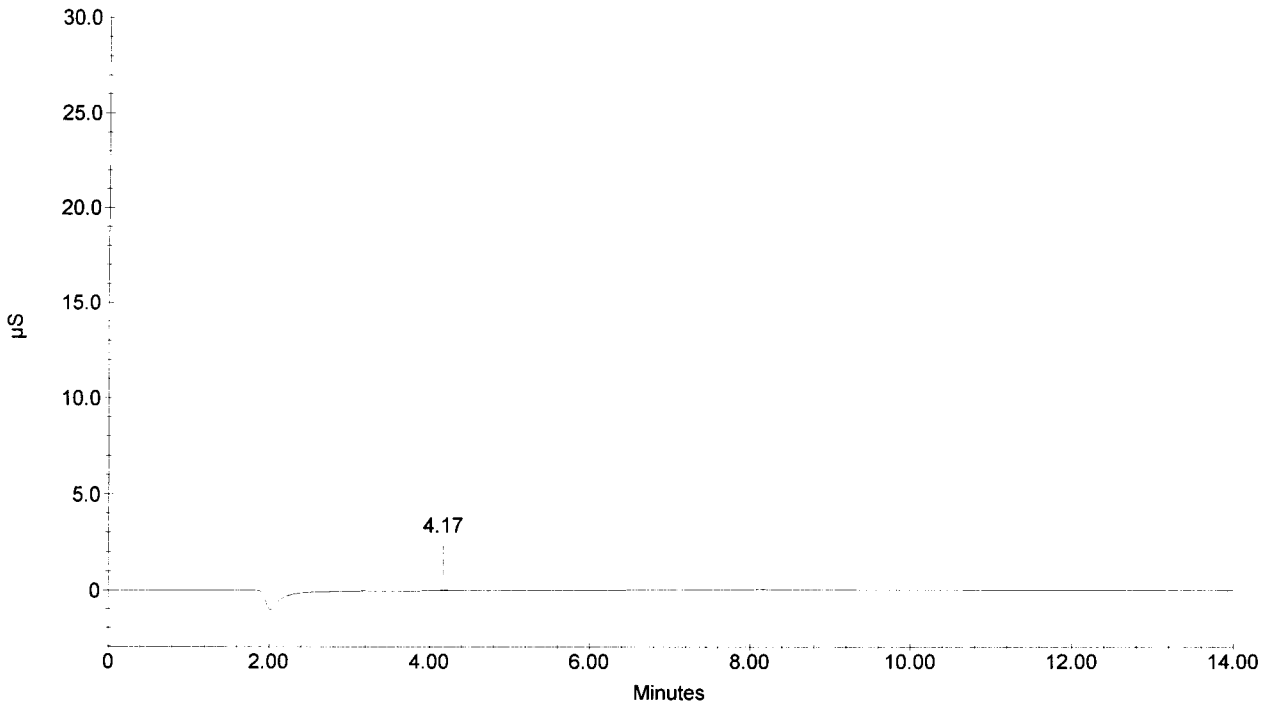
Date Time Collected : 12/21/05 3:56:55 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#01994
System Operator : RSPIES

010072

Peak Information : All Components

Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	Bl. Code	%Delta
1	4.17	CHLORIDE	0.047	346	2585	1	-2.11
1	4.17	CHLORIDE	0.047	346	2585	1	-2.11
		NITRITE-N					
		BROMIDE					
		NITRATE-N					
		PHOSPHATE-P					
		SULFATE					
			---total(s)---				
	0.00		0.093		5170		

ICB



Sample Name : 271245
Dilution Factor : 1.00
Injection Number : 3
Data File Name : c:\peaknet\data\051221\051220_003.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\21dec05.sch

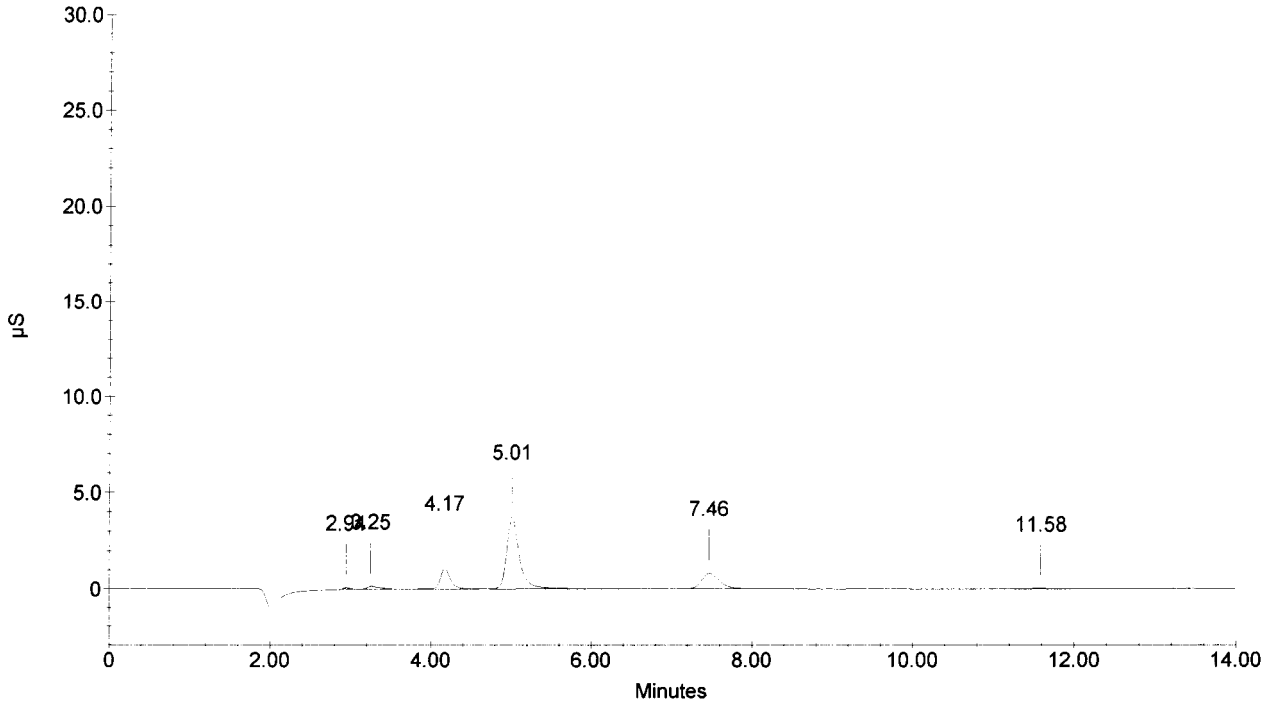
Date Time Collected : 12/21/05 4:13:37 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010073

Peak Information : All Components

Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	Bl. Code	%Delta
1	2.94	FLUORIDE	0.112 ✓	870	4819	1	-2.21
3	4.17	CHLORIDE	0.681 ✓	11022	98857	2	-2.11
4	5.01	NITRITE-N	1.231 ✓	37376	416733	2	-2.53
		BROMIDE	✓				
5	7.46	NITRATE-N	0.396 ✓	8173	126518	1	1.27
		PHOSPHATE-P	✓				
6	11.58	SULFATE	0.063 ✓	227	4440	1	-1.92
			---total(s)---				
	0.00		2.483		651368		

271245



Sample Name : 271245D
Dilution Factor : 1.00
Injection Number : 4
Data File Name : c:\peaknet\data\051221\051220_004.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\21dec05.sch

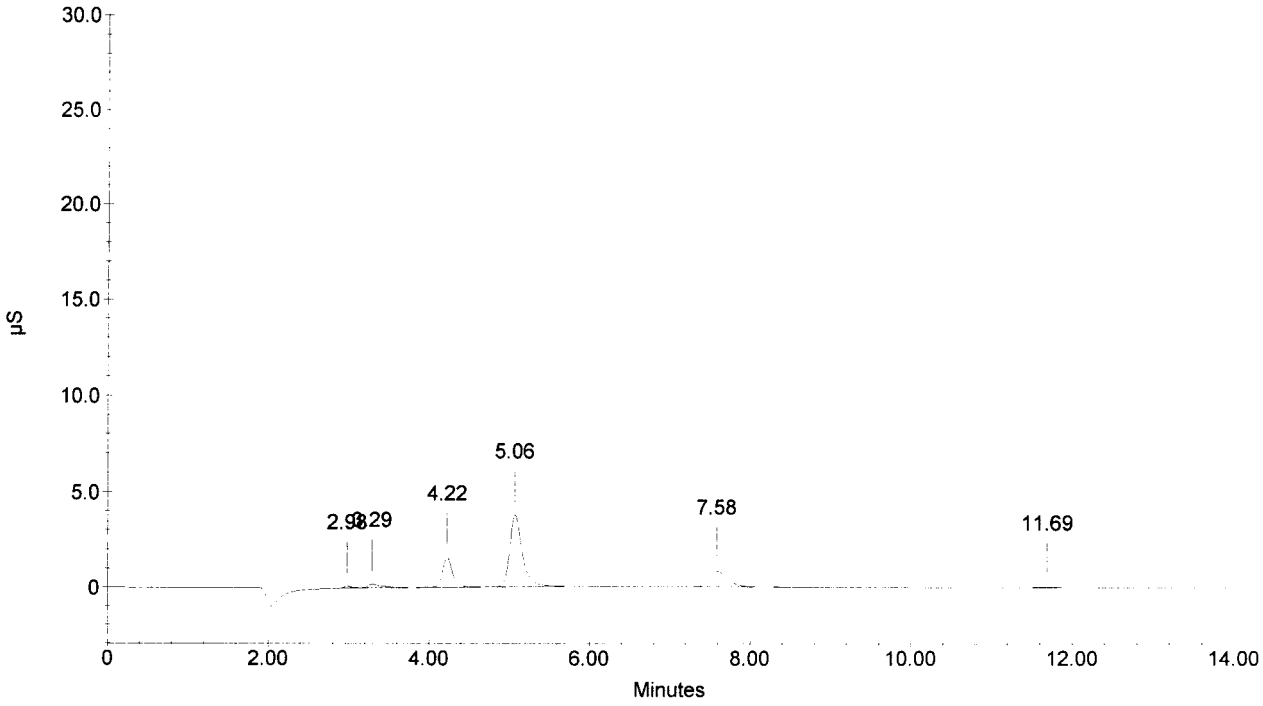
Date Time Collected : 12/21/05 4:30:21 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010074

Peak Information : All Components

Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	Bl. Code	%Delta
1	2.98	FLUORIDE	0.113 ✓	881	4874	1	-0.89
3	4.22	CHLORIDE	0.934 ✓	15838	137557	1	-0.86
4	5.06	NITRITE-N	1.216 ✓	37084	411071	1	-1.49
		BROMIDE	✓				
5	7.58	NITRATE-N	0.411 ✓	8203	132648	1	2.89
		PHOSPHATE-P	✓				
6	11.69	SULFATE	0.077 ✓	249	5891	1	-1.02
			---total(s)---				
	0.00		2.750		692041		

271245D



Sample Name : 271245S
Dilution Factor : 1.00
Injection Number : 5
Data File Name : c:\peaknet\data\051221\051220_005.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\21dec05.sch

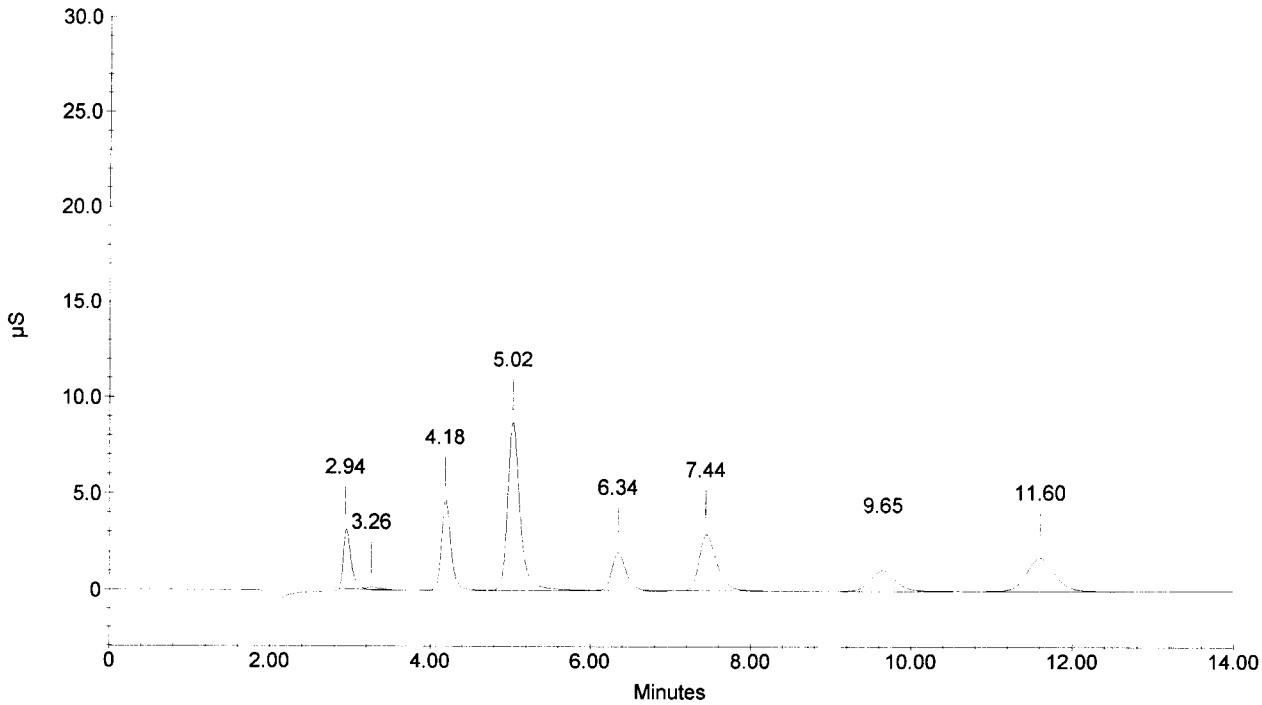
Date Time Collected : 12/21/05 4:47:04 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010075

Peak Information : All Components

Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	Bl. Code	%Delta
1	2.94	FLUORIDE	0.860	29562	197867	3	-2.21
3	4.18	CHLORIDE	2.593	46101	394007	2	-1.80
4	5.02	NITRITE-N	2.727	86592	956281	2	-2.27
5	6.34	BROMIDE	4.049	19899	254494	2	-1.50
6	7.44	NITRATE-N	1.204	28896	453724	2	0.90
7	9.65	PHOSPHATE-P	1.918	10758	242629	1	-1.53
8	11.60	SULFATE	4.025	17355	428036	1	-1.81
			---total(s)---				
	0.00		17.376		2927038		

271245S



Sample Name : 271246
Dilution Factor : 1.00
Injection Number : 6
Data File Name : c:\peaknet\data\051221\051220_006.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\21dec05.sch

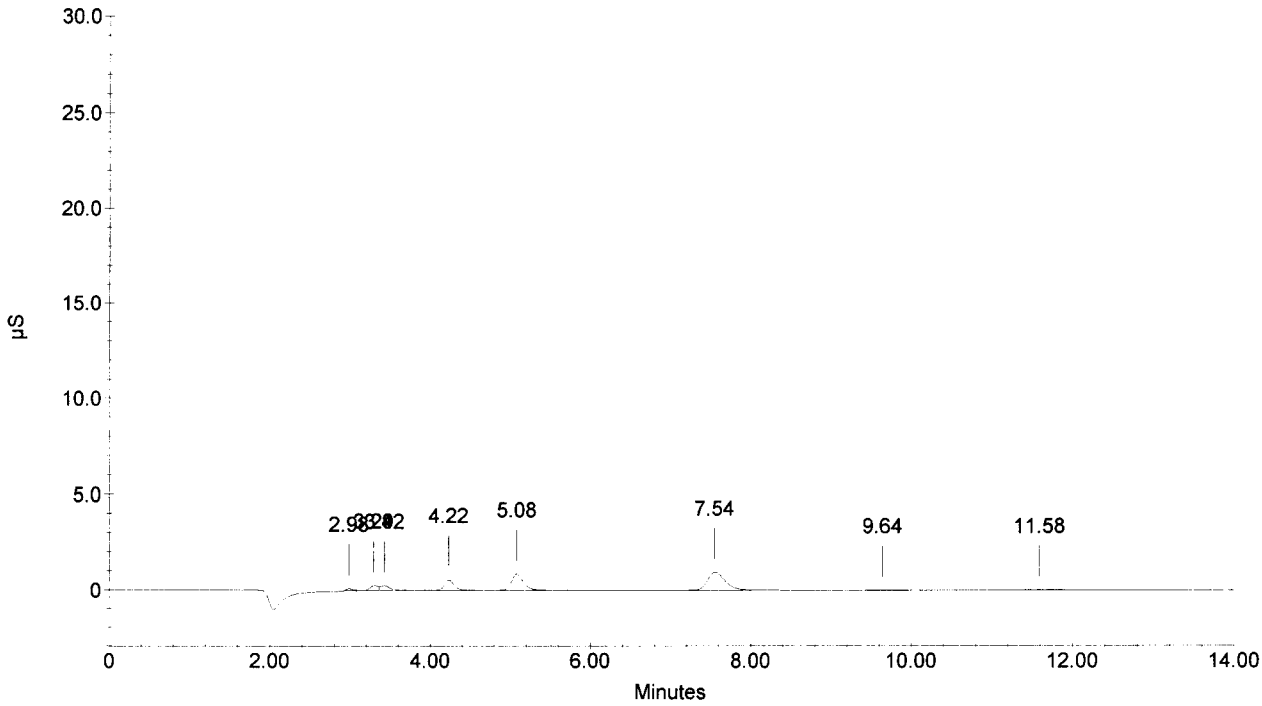
Date Time Collected : 12/21/05 5:03:48 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010076

Peak Information : All Components

Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	Bl. Code	%Delta
1	2.98	FLUORIDE	0.118 ✓	1083	6259	1	-0.89
4	4.22	CHLORIDE	0.358 ✓	5558	49760	1	-0.86
5	5.08	NITRITE-N	0.330 ✓	8622	92836	1	-1.23
		BROMIDE	✓				
6	7.54	NITRATE-N	0.450 ✓	9422	148291	1	2.35
7	9.64	PHOSPHATE-P	0.066 ✓	119	2752	1	-1.67
8	11.58	SULFATE	0.059 ✓	168	4011	1	-1.92
			---total(s)---				
	0.00		1.380		303909		

271246



Sample Name : 271247
Dilution Factor : 1.00
Injection Number : 7
Data File Name : c:\peaknet\data\051221\051220_007.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\21dec05.sch

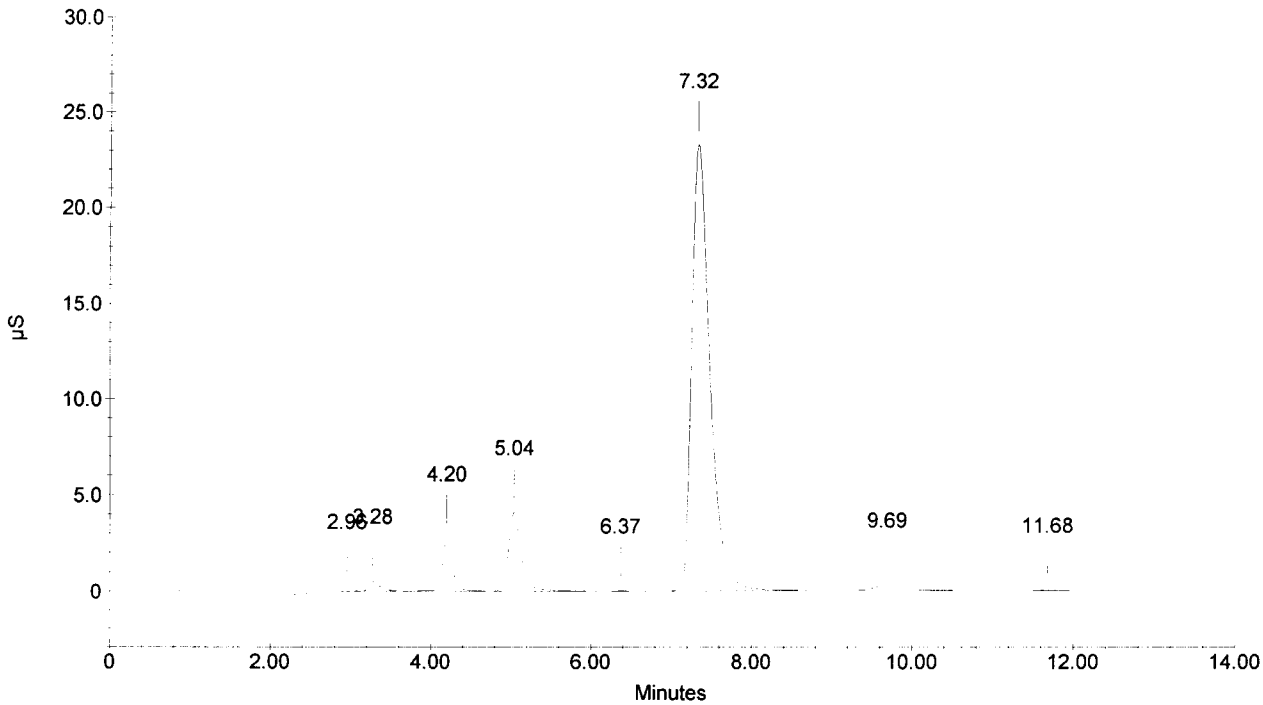
Date Time Collected : 12/21/05 5:20:31 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010077

Peak Information : All Components

Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	Bl. Code	%Delta
1	2.96	FLUORIDE	0.155	2614	15885	1	-1.77
3	4.20	CHLORIDE	1.582	27303	237024	2	-1.49
4	5.04	NITRITE-N	1.331	40951	452574	2	-2.01
5	6.37	BROMIDE	0.080	252	2599	1	-1.09
6	7.32	NITRATE-N	8.687	232995	3679186	1	-0.72
7	9.69	PHOSPHATE-P	0.596	2839	70816	1	-1.12
8	11.68	SULFATE	0.098	348	8172	1	-1.13
			---total(s)---				
	0.00		12.529		4466255		

271247



Sample Name : 271249 DF100
Dilution Factor : 100.00
Injection Number : 8
Data File Name : c:\peaknet\data\051221\051220_008.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\21dec05.sch

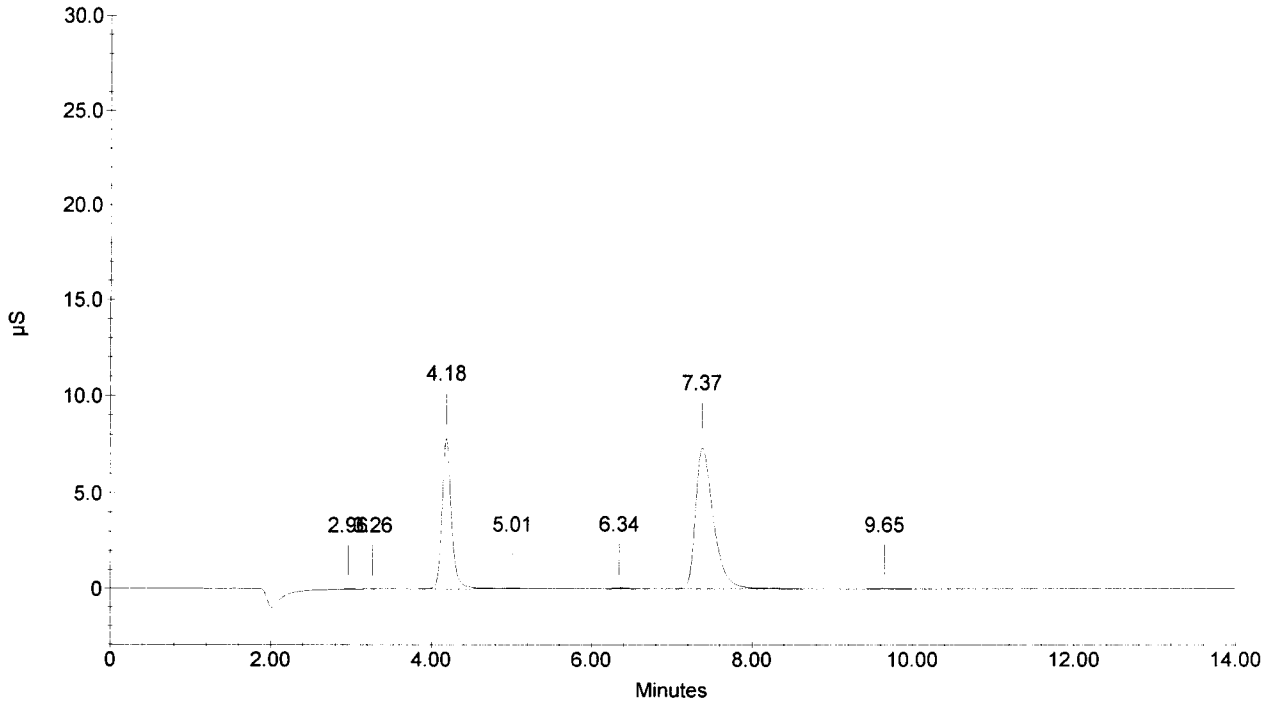
Date Time Collected : 12/21/05 5:37:16 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010078

Peak Information : All Components

Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	Bl. Code	%Delta
1	2.96	FLUORIDE	9.693	162	812	1	-1.77
3	4.18	CHLORIDE	420.050	78197	648125	3	-1.80
4	5.01	NITRITE-N	8.357	432	4683	4	-2.53
5	6.34	BROMIDE	15.886	618	7553	1	-1.50
6	7.37	NITRATE-N	290.210	73338	1153174	1	0.00
7	9.65	PHOSPHATE-P	8.057	217	4656	1	-1.53
		SULFATE					
			---total(s)---				
	0.00		752.252		1819004		

271249 DF100



Sample Name : 271250 DF200
Dilution Factor : 200.00
Injection Number : 9
Data File Name : c:\peaknet\data\051221\051220_009.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\21dec05.sch

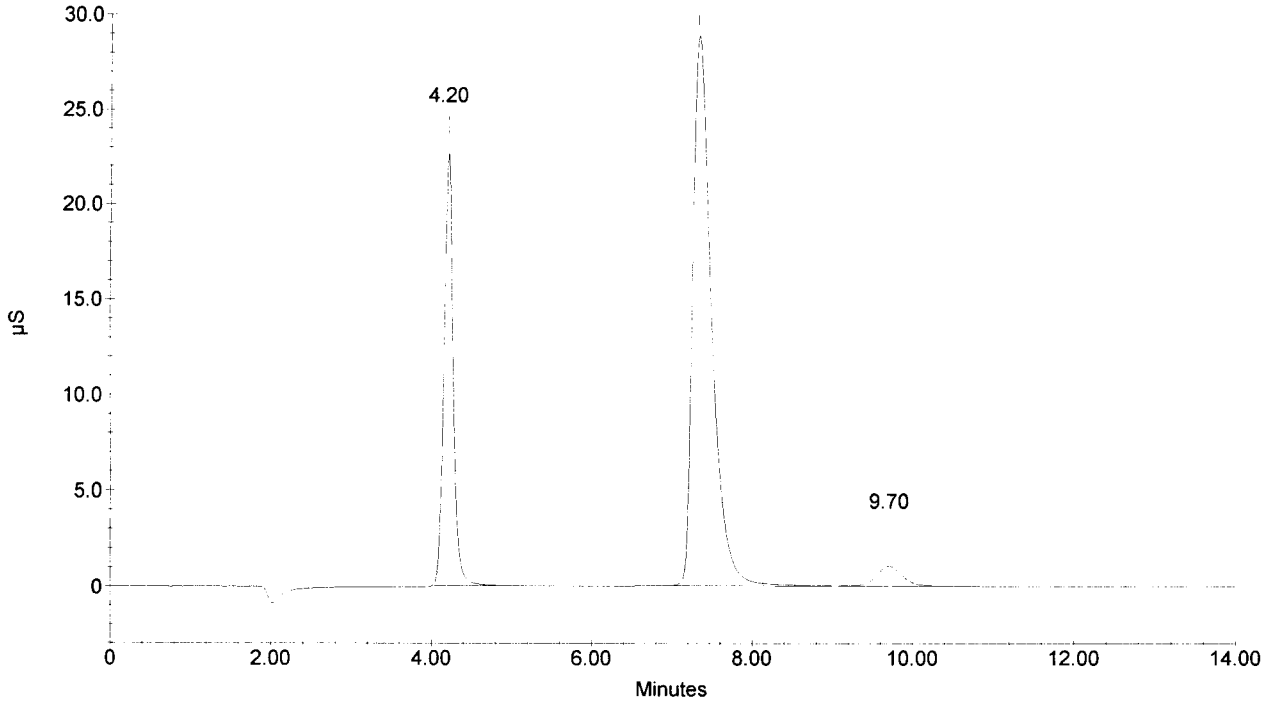
Date Time Collected : 12/21/05 5:53:59 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010079

Peak Information : All Components

Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	Bl. Code	%Delta
1	4.20	CHLORIDE	2211.305	223421	1802373	1	-1.49
1	4.20	CHLORIDE	2211.305	223421	1802373	1	-1.49
		NITRITE-N					
		BROMIDE					
2	7.32	NITRATE-N	2176.692	287296	4705904	2	-0.72
3	9.70	PHOSPHATE-P	372.744	10425	235523	2	-0.99
		SULFATE					
			---total(s)---				
	0.00		6972.045		8546172		

271250 DF200



Sample Name : 271250D DF200
Dilution Factor : 200.00
Injection Number : 10
Data File Name : c:\peaknet\data\051221\051220_010.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\21dec05.sch

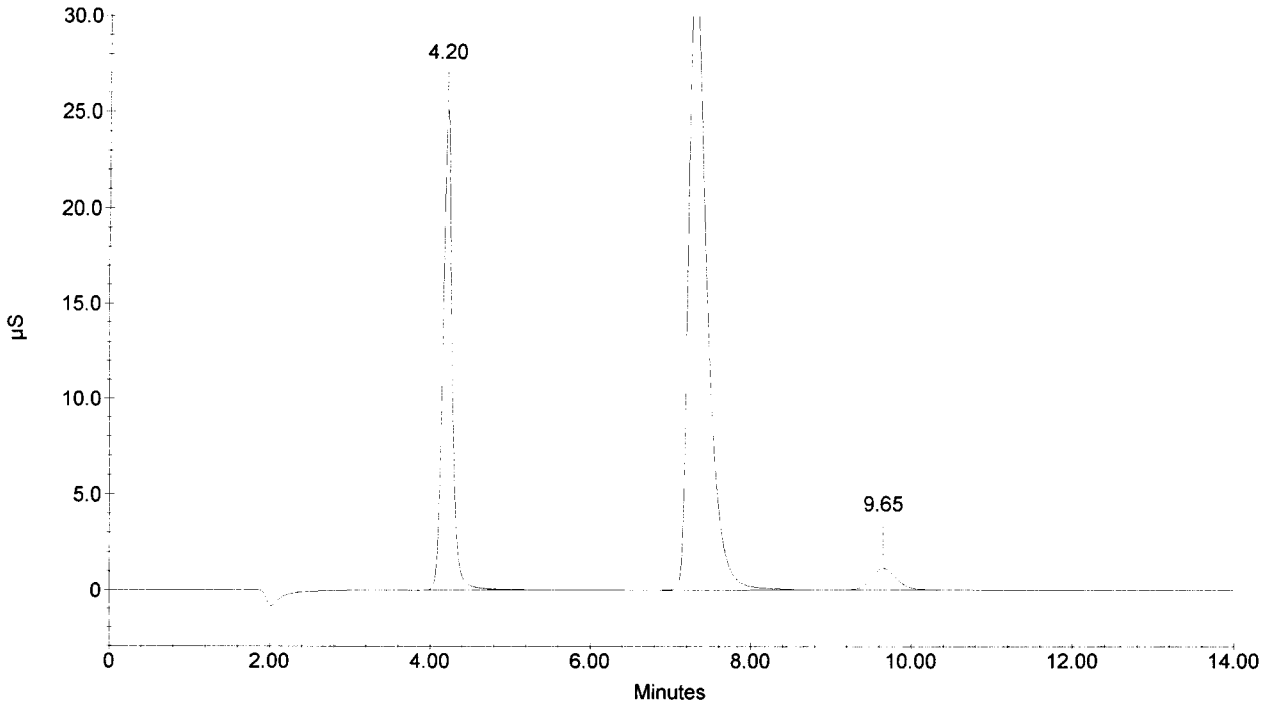
Date Time Collected : 12/21/05 6:10:41 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010080

Peak Information : All Components

Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	Bl. Code	%Delta
1	4.20	CHLORIDE	2464.516	247514	2030095	1	-1.49
1	4.20	CHLORIDE	2464.516	247514	2030095	1	-1.49
		NITRITE-N					
		BROMIDE					
2	7.28	NITRATE-N	2392.584	324996	5226562	2	-1.27
3	9.65	PHOSPHATE-P	413.717	11649	262379	2	-1.53
		SULFATE					
			---total(s)---				
	0.00		7735.333		9549131		

271250D DF200



Sample Name : 271250S DF200
Dilution Factor : 200.00
Injection Number : 11
Data File Name : c:\peaknet\data\051221\051220_011.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\21dec05.sch

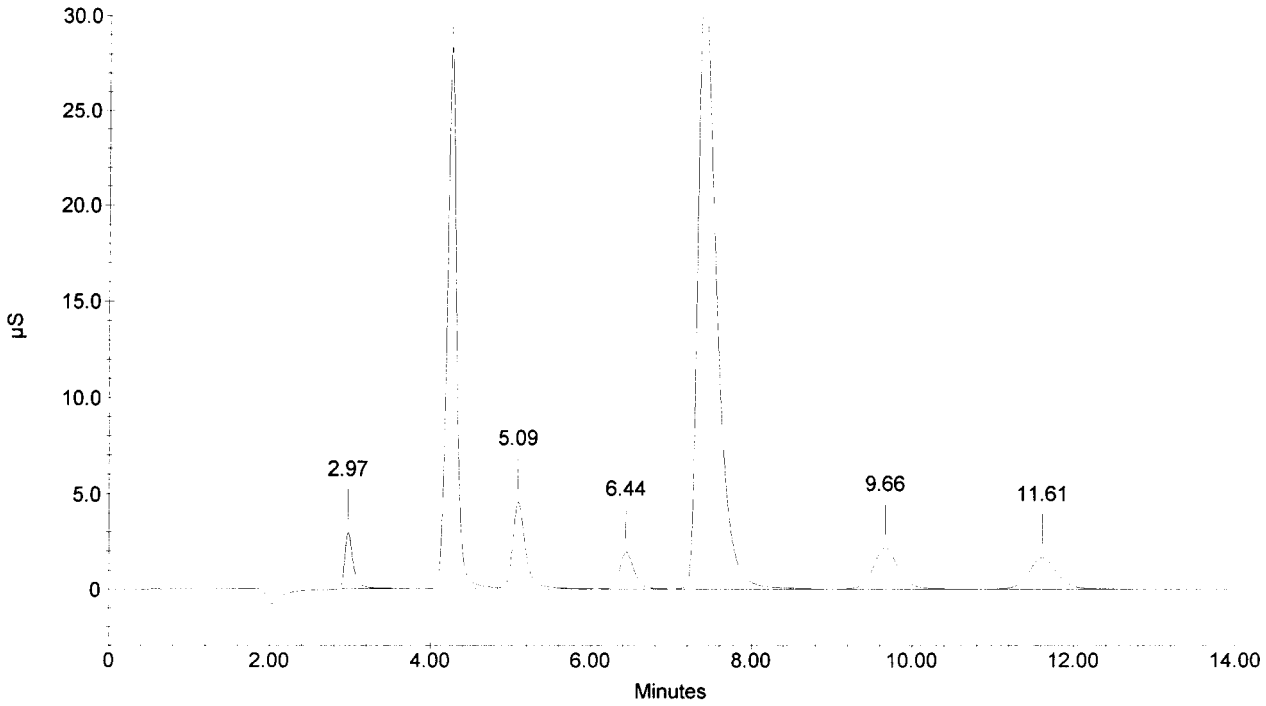
Date Time Collected : 12/21/05 6:27:25 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010081

Peak Information : All Components

Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	Bl. Code	%Delta
1	2.97	FLUORIDE	183.023	29047	212008	1	-1.33
2	4.25	CHLORIDE	2802.948	281825	2342821	2	-0.23
3	5.09	NITRITE-N	304.981	45400	522394	2	-0.97
4	6.44	BROMIDE	790.013	19333	248098	2	-0.05
5	7.38	NITRATE-N	2358.152	316464	5142774	2	0.18
6	9.66	PHOSPHATE-P	743.239	21818	480971	1	-1.39
7	11.61	SULFATE	763.420	16584	405472	1	-1.69
			---total(s)---				
	0.00		7945.776		9354538		

271250S DF200



Sample Name : CCV
Dilution Factor : 20.00
Injection Number : 12
Data File Name : c:\peaknet\data\051221\051220_012.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\21dec05.sch

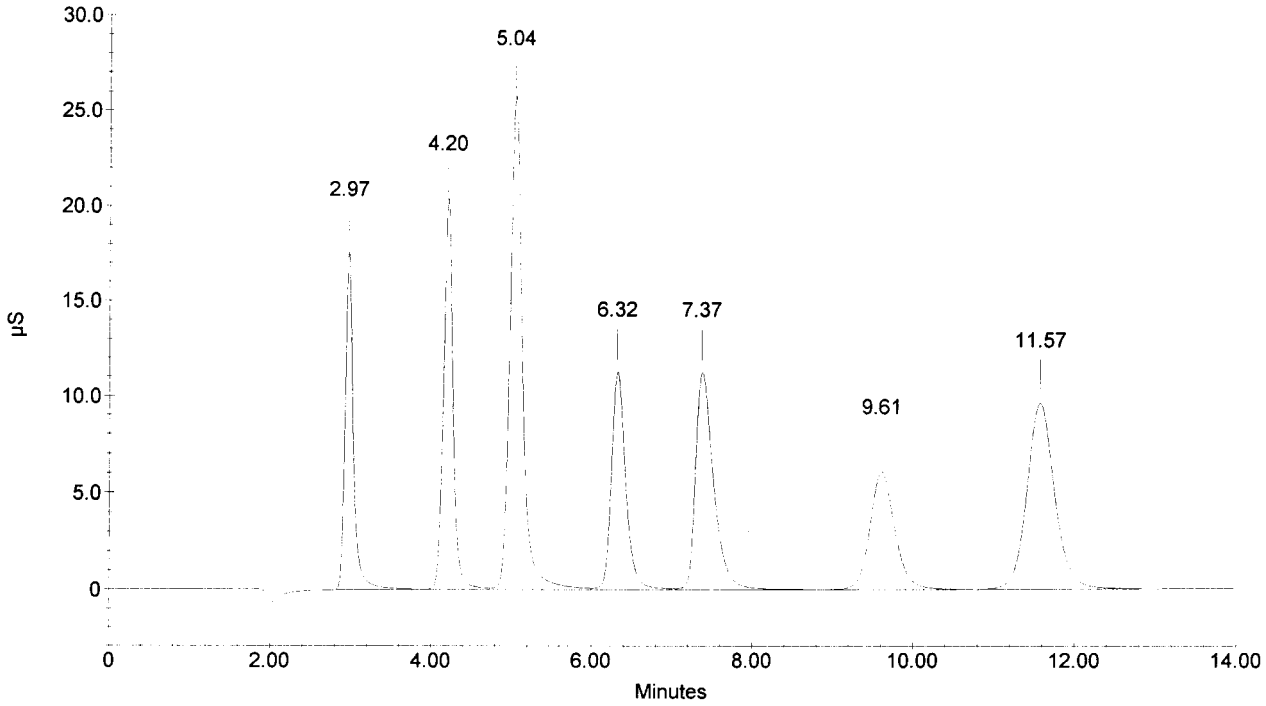
Date Time Collected : 12/21/05 6:44:07 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010082

Peak Information : All Components

Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	Bl. Code	%Delta
1	2.97	FLUORIDE	97.459	175400	1241508	2	-1.33
2	4.20	CHLORIDE	206.748	199245	1675257	2	-1.49
3	5.04	NITRITE-N	156.139	254529	2812743	2	-2.01
4	6.32	BROMIDE	407.268	112024	1388911	2	-1.92
5	7.37	NITRATE-N	86.900	111797	1761524	2	0.00
6	9.61	PHOSPHATE-P	193.094	60759	1311684	1	-1.94
7	11.57	SULFATE	401.138	95866	2295364	1	-2.03
			---total(s)---				
	0.00		1548.745		12486991		

CCV



Sample Name : CCB
Dilution Factor : 1.00
Injection Number : 13
Data File Name : c:\peaknet\data\051221\051220_013.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\21dec05.sch

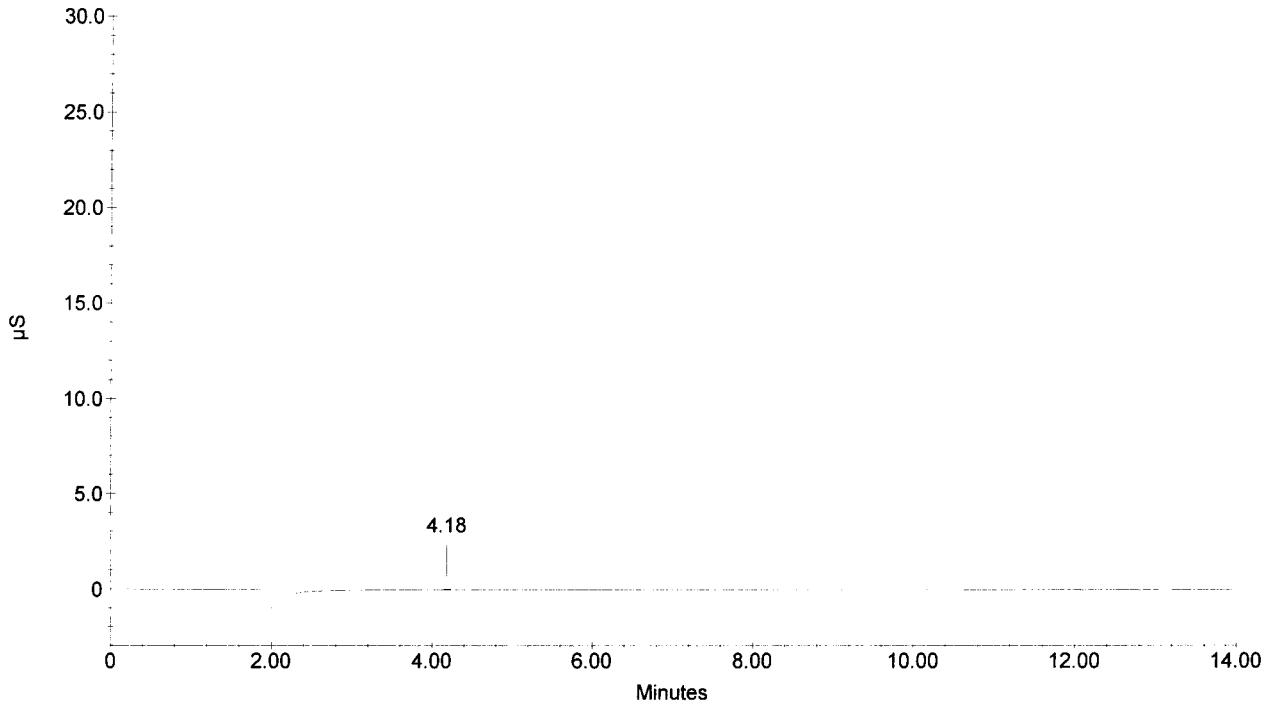
Date Time Collected : 12/21/05 7:00:50 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010083

Peak Information : All Components

Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	Bl. Code	%Delta
1	4.18	CHLORIDE	0.035	122	892	1	-1.80
1	4.18	CHLORIDE	0.035	122	892	1	-1.80
		NITRITE-N					
		BROMIDE					
		NITRATE-N					
		PHOSPHATE-P					
		SULFATE					
			---total(s)---				
	0.00		0.071		1784		

CCB



Schedule File: C:\PeakNet\schedule\20DEC05.sch

Line	Sample	Sample Type	Level	Method	Data File	Dilution
1	ICV	Sample		anions051116.met	051215_001.dxd	20
2	ICB	Sample		anions051116.met	051215_002.dxd	1
3	271245 DF20	Sample		anions051116.met	051215_003.dxd	20
4	271245D DF20	Sample		anions051116.met	051215_004.dxd	20
5	271245S DF20	Sample		anions051116.met	051215_005.dxd	20
6	271246 DF20	Sample		anions051116.met	051215_006.dxd	20
7	271247 DF20	Sample		anions051116.met	051215_007.dxd	20
8	271248 DF20	Sample		anions051116.met	051215_008.dxd	20
9	271249 DF20	Sample		anions051116.met	051215_009.dxd	20
10	PBW-M19E3	Sample		anions051116.met	051215_010.dxd	1
11	271250 DF100	Sample		anions051116.met	051215_011.dxd	100
12	271250D DF100	Sample		anions051116.met	051215_012.dxd	100
13	CCV	Sample		anions051116.met	051215_013.dxd	20
14	CCB	Sample		anions051116.met	051215_014.dxd	1
15	271250S DF100	Sample		anions051116.met	051215_015.dxd	100
16	CCV	Sample		anions051116.met	051215_016.dxd	20
17	CCB	Sample		anions051116.met	051215_017.dxd	1

010084

Default Method Path: C:\PEAKNET\METHOD
Default Data Path: C:\PEAKNET\DATA\051220
Comment:
DIV 20 06002.01.322 TO#051219-5

Y - ELUANT - 17.0 uS
1.0 mM SODIUM BICARBONATE (INORG #2626) & 3.5 mM SI\ODIUM CARBONATE (INORG#3757)

ICV Sources:
1) SPEX LOT#28-164AS (INORG#5467)
   F = 100 mg/L
   Cl = 200 mg/L
   Br = 400 mg/L
   NO3N = 90.4 mg/L
   PO4P = 191 mg/L
   SO4 = 400 mg/L
2) 128-01-IC5
   NO2N 159 mg/L

R Spies
12/20/05

Sample Name : ICV
Dilution Factor : 20.00
Injection Number : 1
Data File Name : c:\peaknet\data\051220\051215_001.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\20dec05.sch

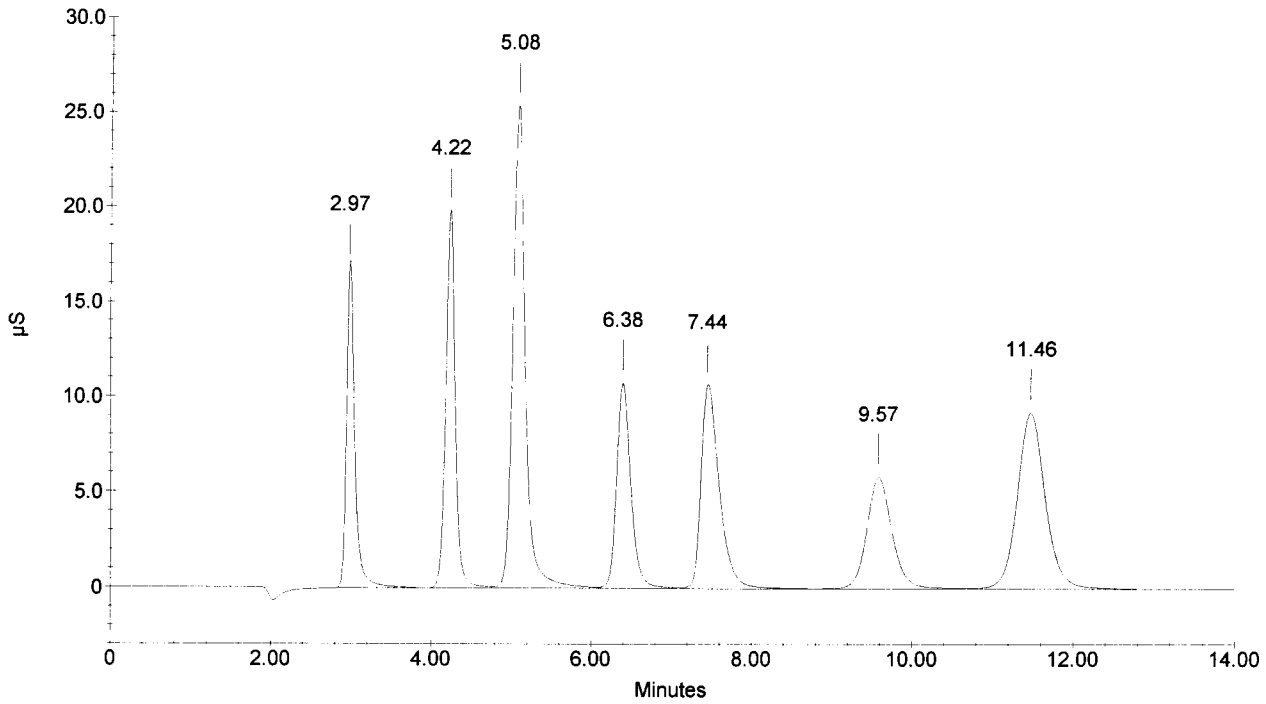
Date Time Collected : 12/20/05 6:05:45 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010085

Peak Information : All Components

Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	Bl. Code	%Delta
1	2.97	FLUORIDE	94.985	168166	1209138	2	-1.33
2	4.22	CHLORIDE	199.707	197963	1613594	2	-0.86
3	5.08	NITRITE-N	152.990	253747	2754649	2	-1.23
4	6.38	BROMIDE	390.662	107140	1326554	2	-0.88
5	7.44	NITRATE-N	83.191	105894	1682600	2	0.90
6	9.57	PHOSPHATE-P	187.544	57676	1271206	2	-2.35
7	11.46	SULFATE	388.074	91910	2213583	2	-2.94
			---total(s)---				
	0.00		1497.154		12071325		

ICV



Sample Name : ICB
Dilution Factor : 1.00
Injection Number : 2
Data File Name : c:\peaknet\data\051220\051215_002.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\20dec05.sch

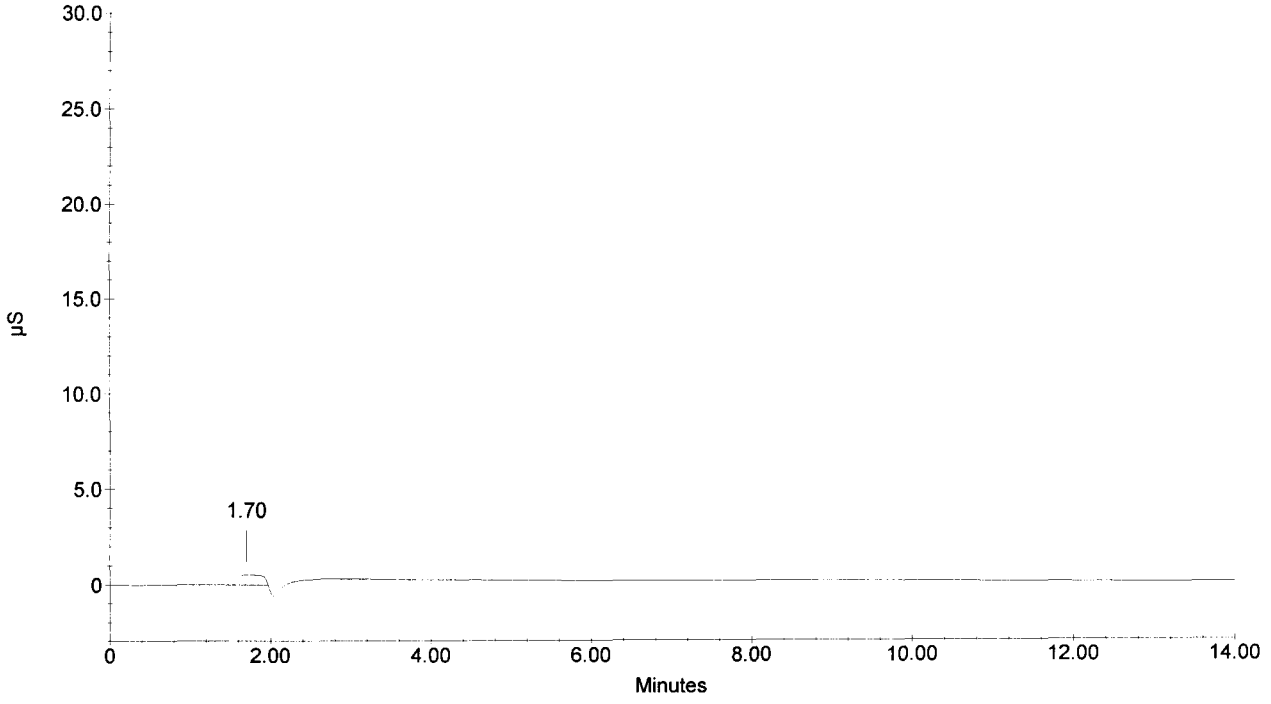
Date Time Collected : 12/20/05 6:22:26 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010086

Peak Information : All Components

Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	Bl. Code	%Delta
1	1.70		0.000	5359	110250	1	
		CHLORIDE					
		NITRITE-N					
		BROMIDE					
		NITRATE-N					
		PHOSPHATE-P					
		SULFATE					
			---total(s)---				
	0.00		0.000		110250		

ICB



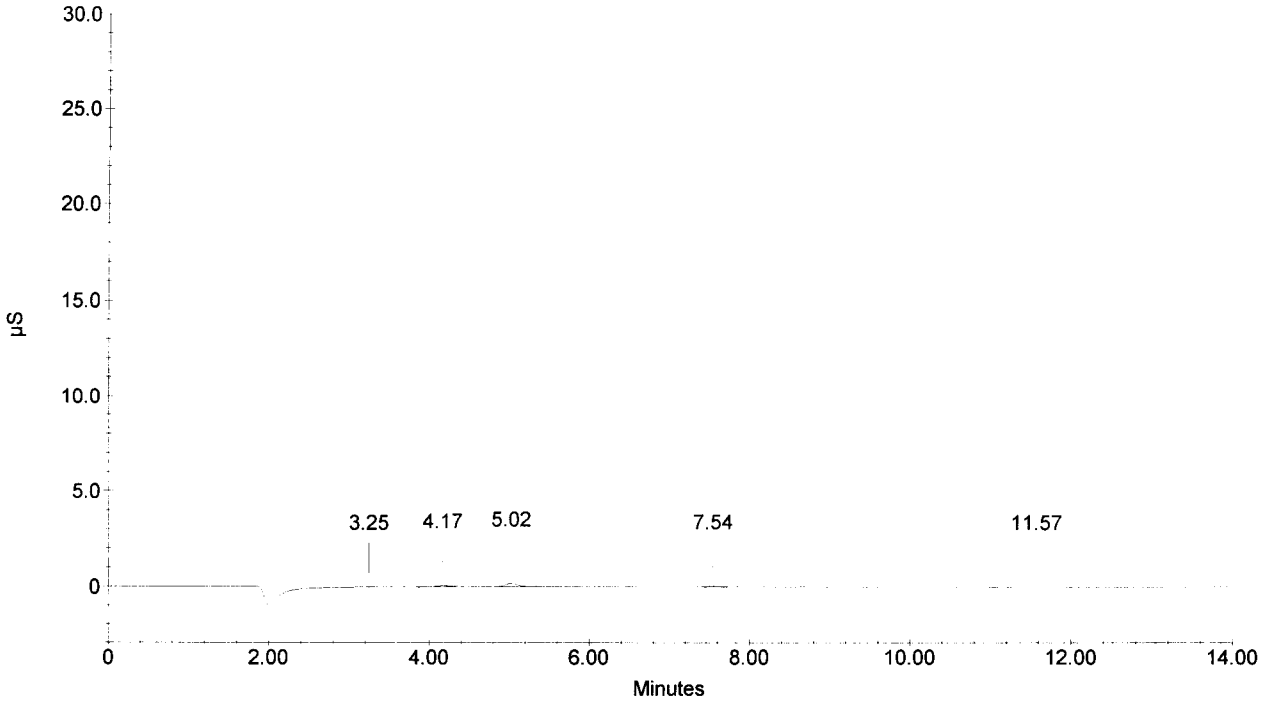
Sample Name : 271245 DF20
Dilution Factor : 20.00
Injection Number : 3
Data File Name : c:\peaknet\data\051220\051215_003.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\20dec05.sch

Date Time Collected : 12/20/05 6:39:08 PM 010087
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

Peak Information : All Components

Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	Bl. Code	%Delta
1	3.25	FLUORIDE	1.911	73	462	1	7.97
2	4.17	CHLORIDE	1.594	741	7609	1	-2.11
3	5.02	NITRITE-N BROMIDE	2.460	1717	18812	1	-2.27
4	7.54	NITRATE-N PHOSPHATE-P	1.879	376	5353	1	2.35
5	11.57	SULFATE	0.729	107	1640	1	-2.03
			---total(s)---				
	0.00		8.574		33876		

271245 DF20



Sample Name : 271245D DF20
Dilution Factor : 20.00
Injection Number : 4
Data File Name : c:\peaknet\data\051220\051215_004.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\20dec05.sch

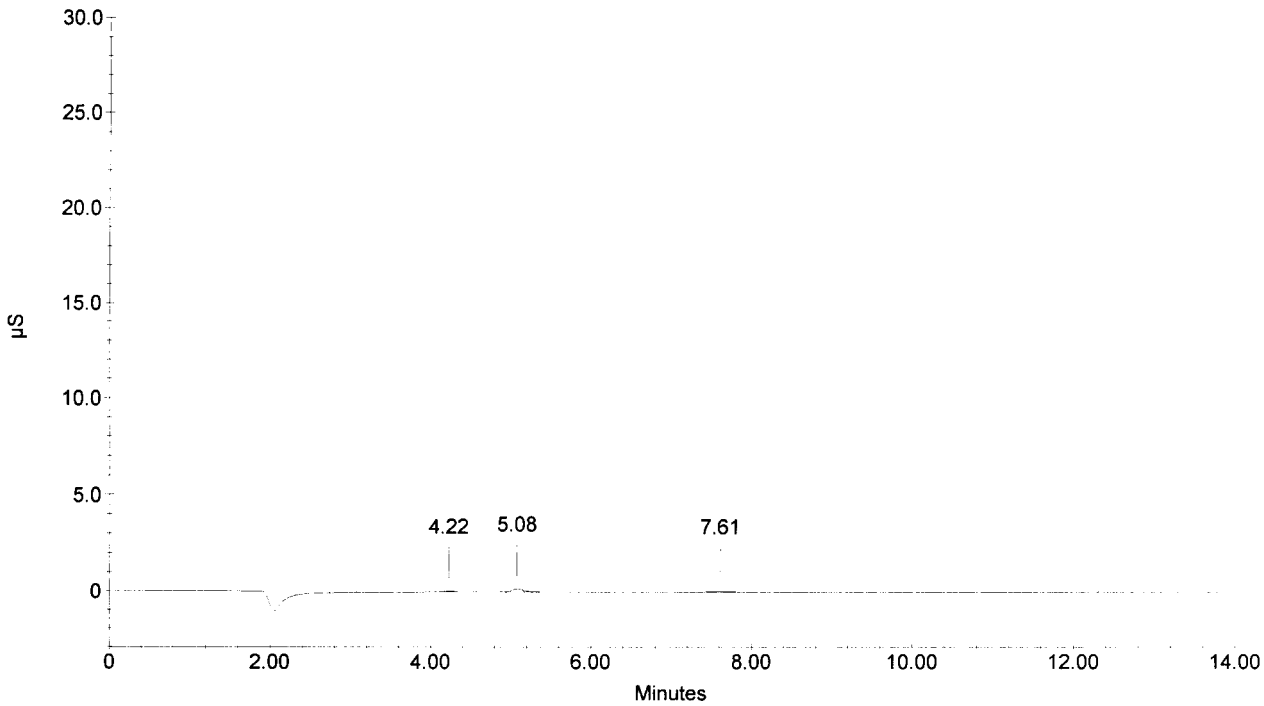
Date Time Collected : 12/20/05 6:55:50 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010088

Peak Information : All Components

Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	Bl. Code	%Delta
1	4.22	CHLORIDE	1.191	564	4560	1	-0.86
1	4.22	CHLORIDE	1.191	564	4560	1	-0.86
2	5.08	NITRITE-N BROMIDE	2.411	1711	17923	1	-1.23
3	7.61	NITRATE-N PHOSPHATE-P SULFATE	1.872	361	5209	1	3.26
			---total(s)---				
	0.00		6.665		32252		

271245D DF20



Sample Name : 271245S DF20
Dilution Factor : 20.00
Injection Number : 5
Data File Name : c:\peaknet\data\051220\051215_005.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\20dec05.sch

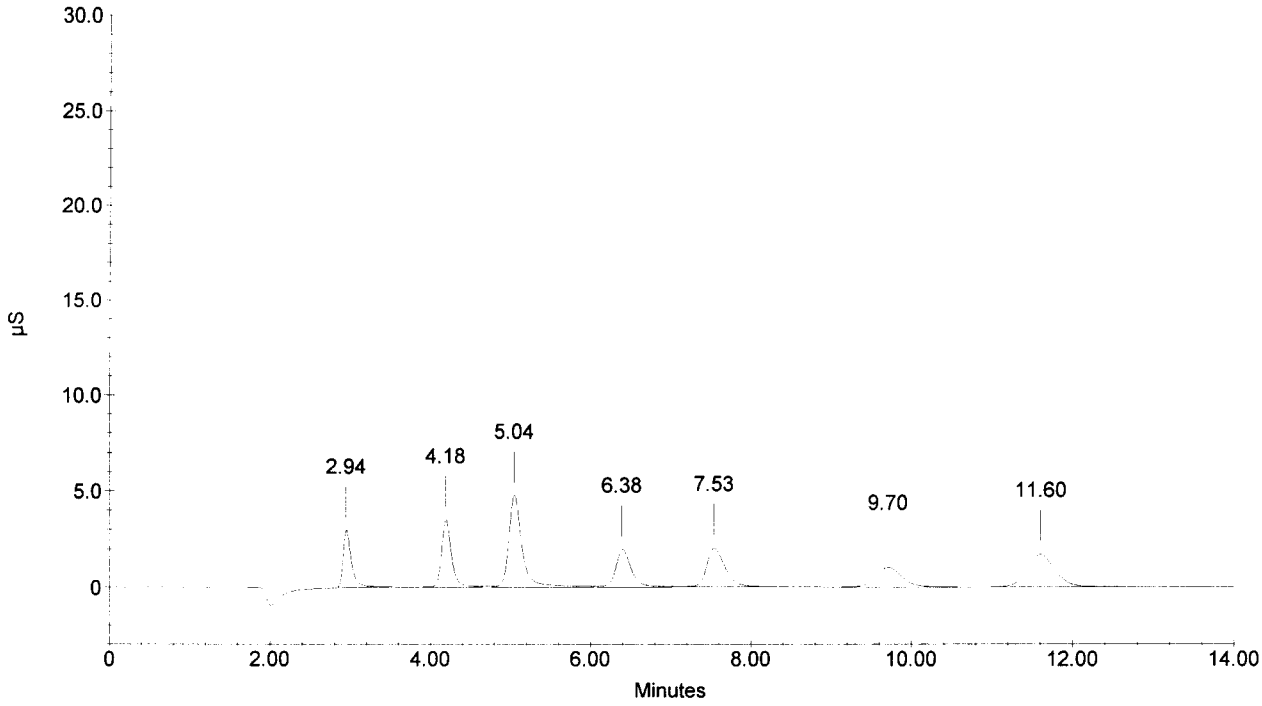
Date Time Collected : 12/20/05 7:12:32 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010089

Peak Information : All Components

Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	Bl. Code	%Delta
1	2.94	FLUORIDE	18.015	29215	208300	1	-2.21
2	4.18	CHLORIDE	40.360	34796	304521	2	-1.80
3	5.04	NITRITE-N	32.583	47363	559952	2	-2.01
4	6.38	BROMIDE	86.001	19408	270679	2	-0.88
5	7.53	NITRATE-N	17.990	20117	329965	2	2.17
6	9.70	PHOSPHATE-P	36.938	10287	233320	2	-0.99
7	11.60	SULFATE	78.707	17064	418296	2	-1.81
			---total(s)---				
	0.00		310.594		2325033		

271245S DF20



Sample Name : 271246 DF20
Dilution Factor : 20.00
Injection Number : 6
Data File Name : c:\peaknet\data\051220\051215_006.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\20dec05.sch

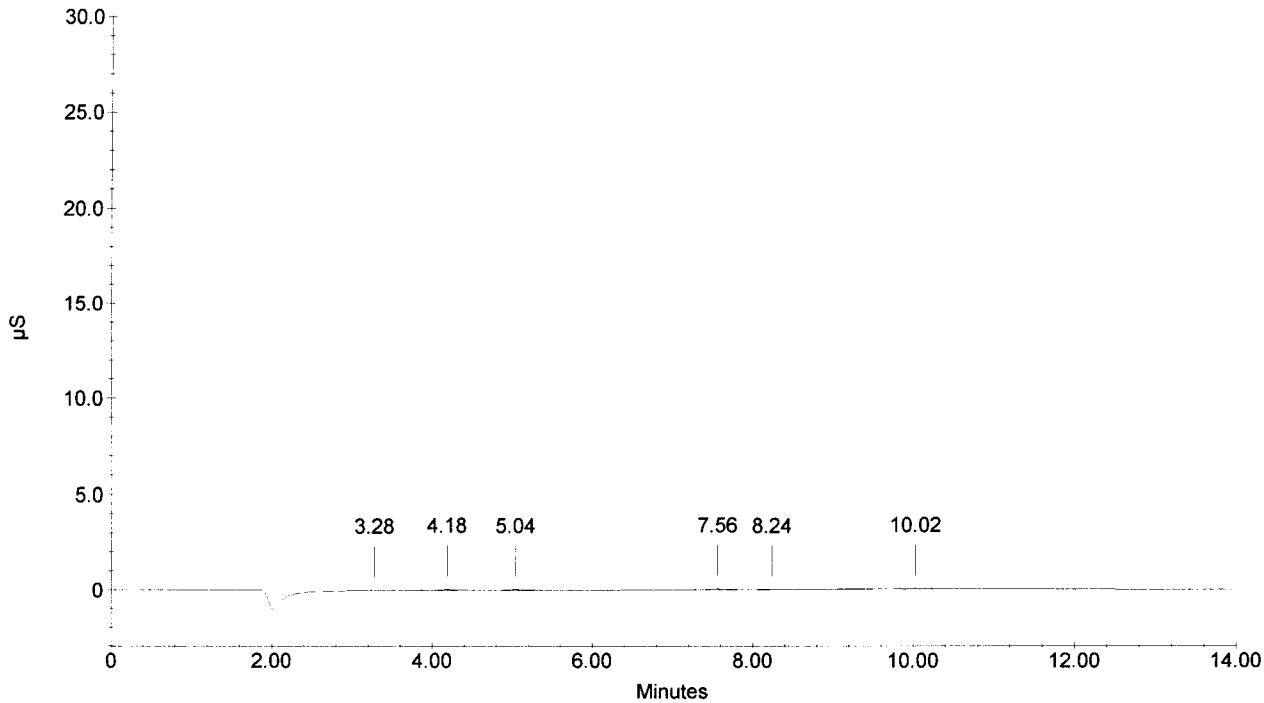
Date Time Collected : 12/20/05 7:29:15 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010090

Peak Information : All Components

Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	Bl. Code	%Delta
1	3.28	FLUORIDE	1.977	108	1312	1	8.86
2	4.18	CHLORIDE	1.299	484	5372	1	-1.80
3	5.04	NITRITE-N BROMIDE	1.657	429	4421	1	-2.01
4	7.56	NITRATE-N	1.930	430	6388	1	2.53
6	10.02	PHOSPHATE-P SULFATE	2.654	185	11334	2	2.28
			---total(s)---				
	0.00		9.517		28827		

271246 DF20



Sample Name : 271247 DF20
Dilution Factor : 20.00
Injection Number : 7
Data File Name : c:\peaknet\data\051220\051215_007.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\20dec05.sch

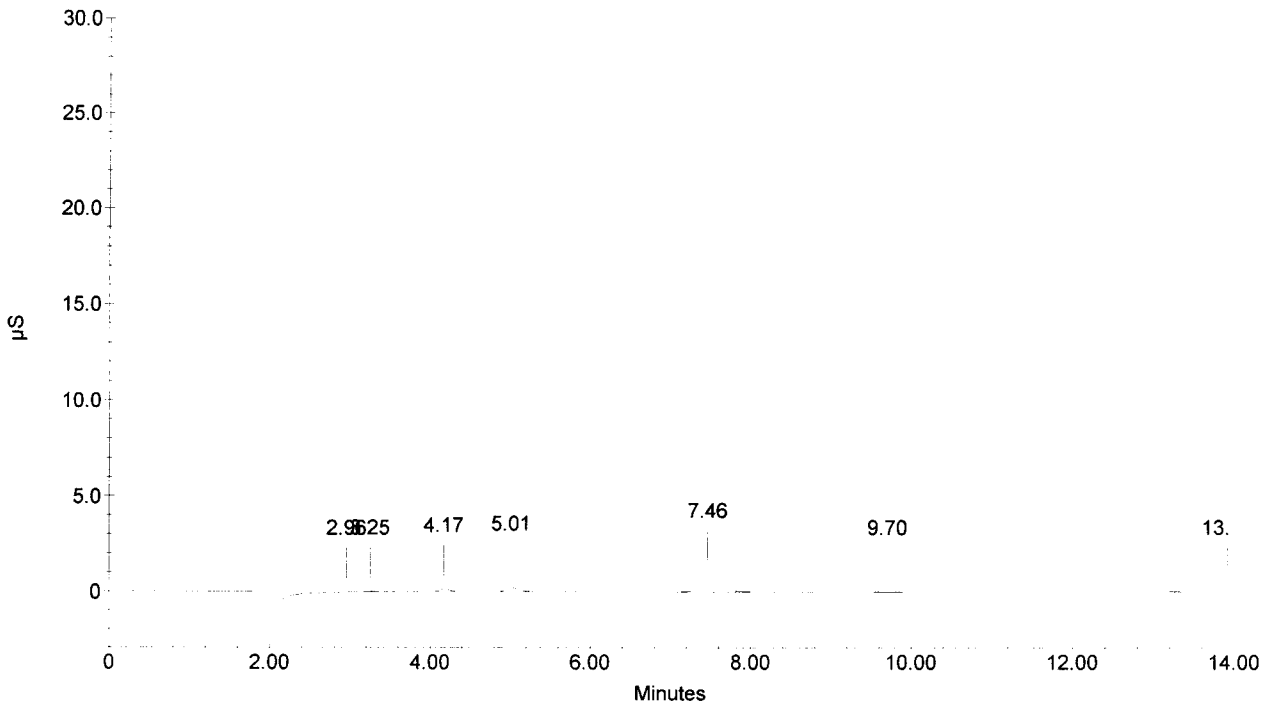
Date Time Collected : 12/20/05 7:46:00 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010091

Peak Information : All Components

Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	Bl. Code	%Delta
1	2.96	FLUORIDE	1.896	67	267	1	-1.77
3	4.17	CHLORIDE	2.084	1352	11313	1	-2.11
4	5.01	NITRITE-N	2.632	2100	21893	1	-2.53
		BROMIDE					
5	7.46	NITRATE-N	8.747	9100	143290	1	1.27
6	9.70	PHOSPHATE-P	1.451	174	3631	1	-0.99
		SULFATE					
			---total(s)---				
	0.00		16.810		180394		

271247 DF20



Sample Name : 271248 DF20
Dilution Factor : 20.00
Injection Number : 8
Data File Name : c:\peaknet\data\051220\051215_008.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\20dec05.sch

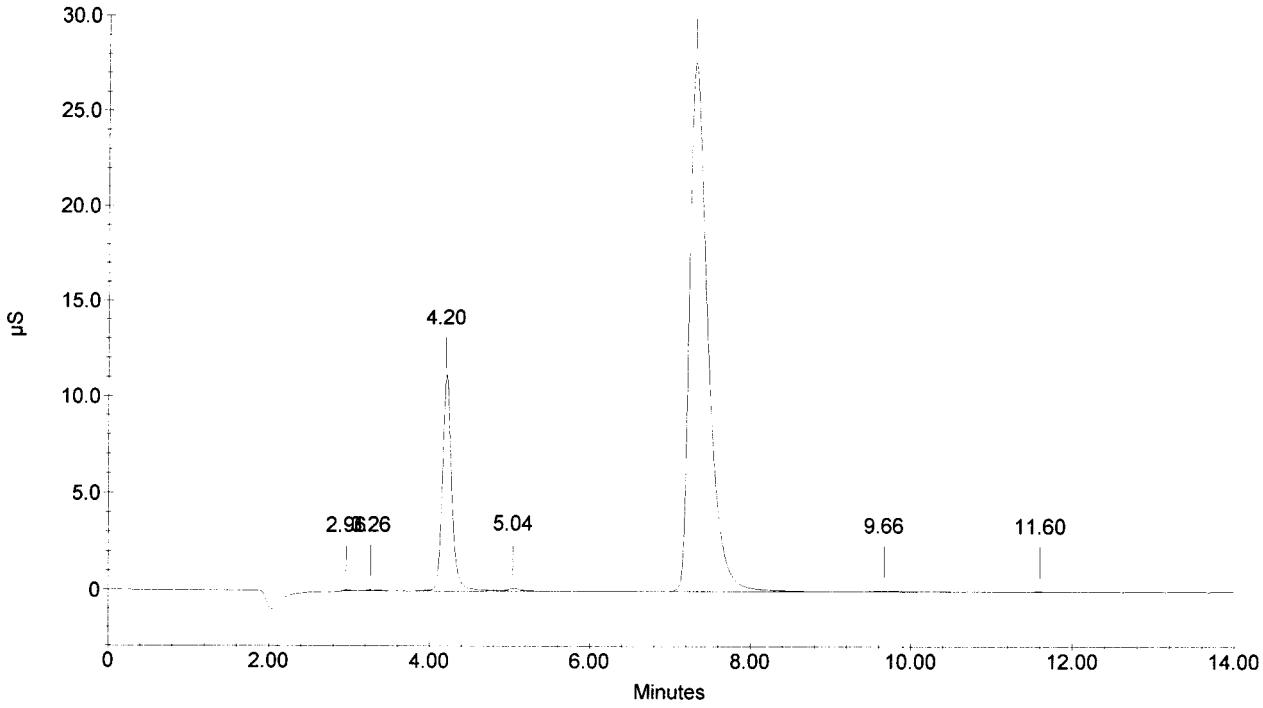
Date Time Collected : 12/20/05 8:02:42 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010092

Peak Information : All Components

Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	Bl. Code	%Delta
1	2.96	FLUORIDE	2.187 ✓	662	4019	2	-1.77
3	4.20	CHLORIDE	115.655 ✓	108174	903863	2	-1.49
4	5.04	NITRITE-N	2.372 ✓	1437	17223	2	-2.01
		BROMIDE	✓				
5	7.30	NITRATE-N	203.821 ✓	275863	4377654	1	-0.90
6	9.66	PHOSPHATE-P	2.468 ✓	411	10141	1	-1.39
7	11.60	SULFATE	0.776 ✓	109	1886	1	-1.81
		---total(s)---					
	0.00		327.278		5314785		

271248 DF20



Sample Name : 271249 DF20
Dilution Factor : 20.00
Injection Number : 9
Data File Name : c:\peaknet\data\051220\051215_009.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\20dec05.sch

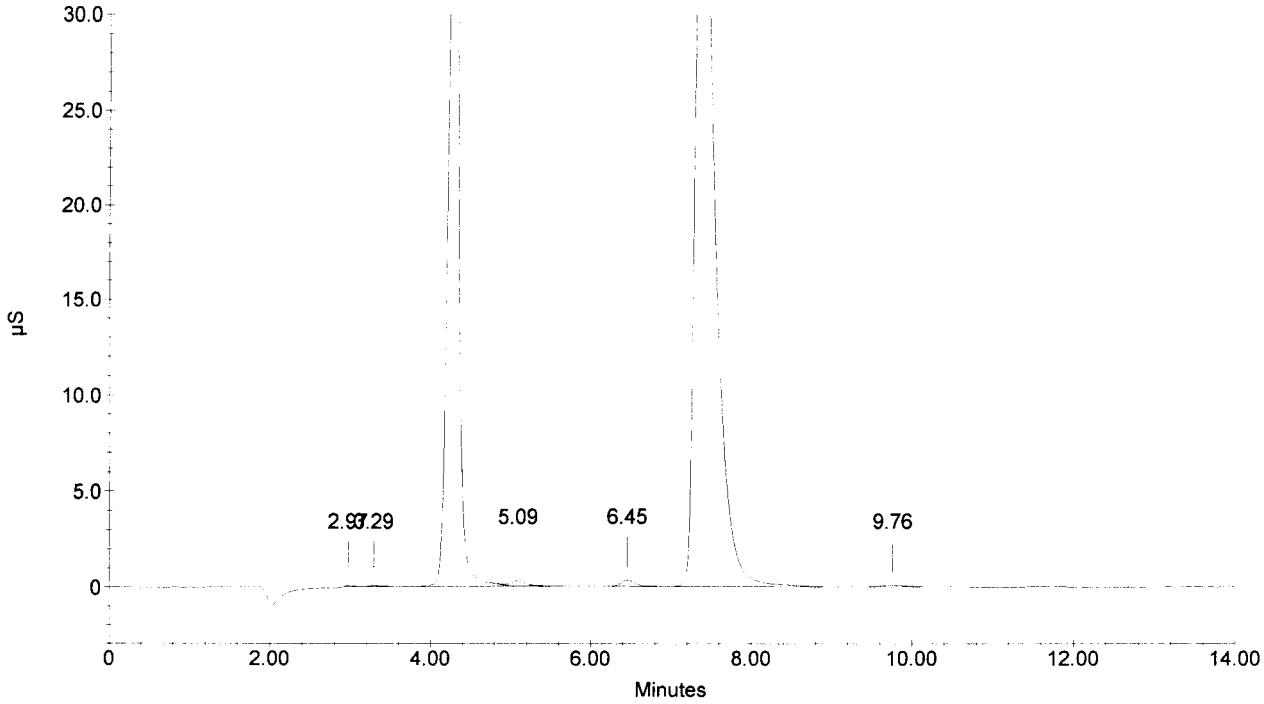
Date Time Collected : 12/20/05 8:19:24 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010093

Peak Information : All Components

Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	Bl. Code	%Delta
1	2.97	FLUORIDE	2.286 ✓	866	5295	1	-1.33
3	4.28	CHLORIDE	443.557	490844	4021363	3	0.39
4	5.09	NITRITE-N	3.422 ✓	2808	36034	4	-0.97
5	6.45	BROMIDE	13.703 ✓	3247	40512	1	0.16
6	7.36	NITRATE-N	310.009 ✓	428779	7017803	1	-0.18
7	9.76	PHOSPHATE-P	3.984 ✓	879	19860	1	-0.44
		SULFATE					
			---total(s)---				
	0.00		776.961		11140867		

271249 DF20



Sample Name : PBW-M19E3
Dilution Factor : 1.00
Injection Number : 10
Data File Name : c:\peaknet\data\051220\051215_010.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\20dec05.sch

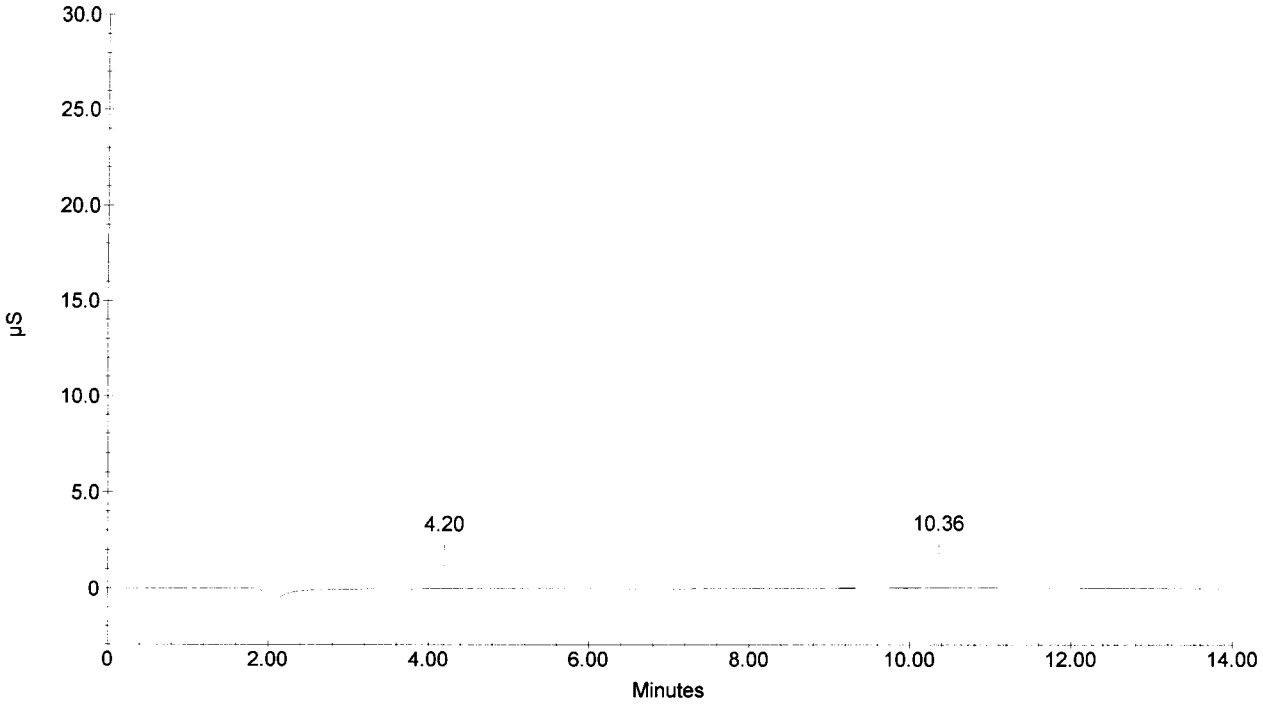
Date Time Collected : 12/20/05 8:36:08 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010094

Peak Information : All Components

Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	Bl. Code	%Delta
1	4.20	CHLORIDE	0.037	157	1148	1	-1.49
1	4.20	CHLORIDE	0.037	157	1148	1	-1.49
		NITRITE-N					
		BROMIDE					
		NITRATE-N					
2	10.36	PHOSPHATE-P	0.092	91	6061	1	5.68
		SULFATE					
			---total(s)---				
	0.00		0.166		8357		

PBW-M19E3



Sample Name : 271250 DF100
Dilution Factor : 100.00
Injection Number : 11
Data File Name : c:\peaknet\data\051220\051215_011.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\20dec05.sch

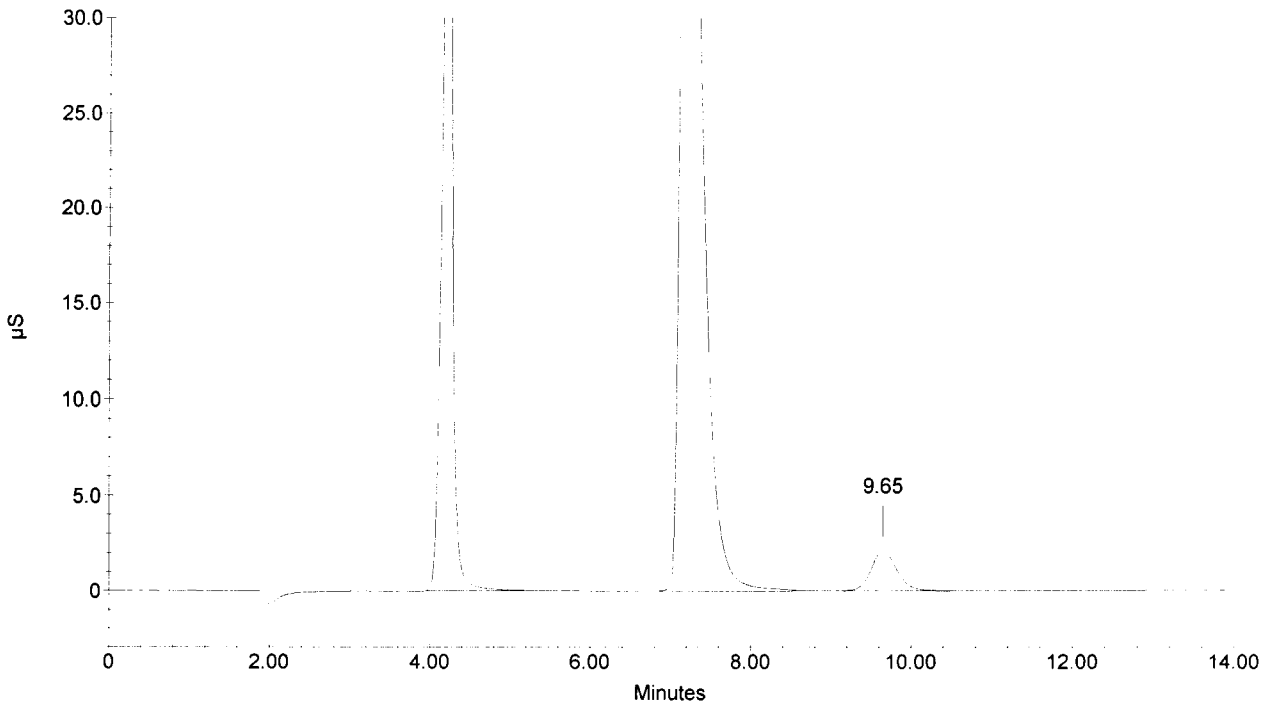
Date Time Collected : 12/20/05 8:52:50 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010095

Peak Information : All Components

Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	Bl. Code	%Delta
1	4.20	CHLORIDE	2252.316	491709	4100200	1	-1.49
1	4.20	CHLORIDE	2252.316	491709	4100200	1	-1.49
		NITRITE-N					
		BROMIDE					
2	7.18	NITRATE-N	2125.599	617276	10288814	2	-2.53
3	9.65	PHOSPHATE-P	373.608	21694	483639	2	-1.53
		SULFATE					
			---total(s)---				
	0.00		7003.839		18972853		

271250 DF100



Sample Name : 271250D DF100
Dilution Factor : 100.00
Injection Number : 12
Data File Name : c:\peaknet\data\051220\051215_012.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\20dec05.sch

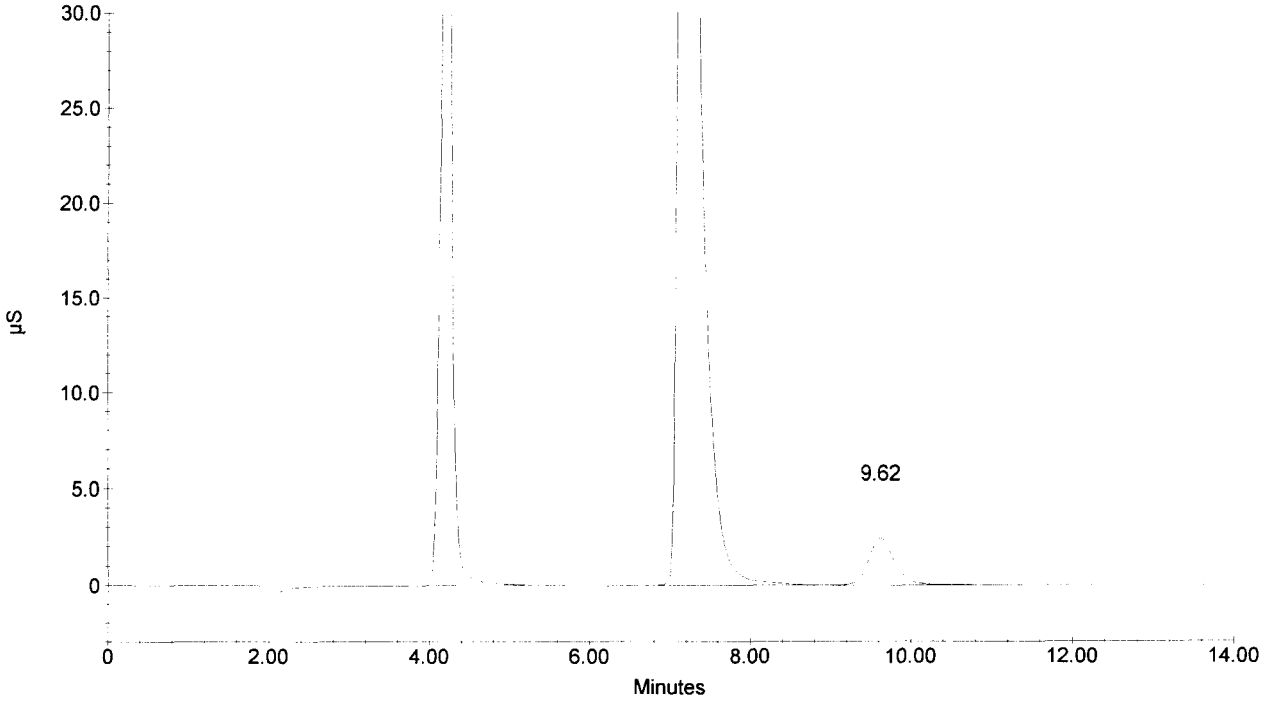
Date Time Collected : 12/20/05 9:09:31 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010096

Peak Information : All Components

Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	Bl. Code	%Delta
1	4.21	CHLORIDE	2399.753	539098	4446055	1	-1.17
1	4.21	CHLORIDE	2399.753	539098	4446055	1	-1.17
		NITRITE-N					
		BROMIDE					
2	7.17	NITRATE-N	2318.878	682486	11521488	2	-2.71
3	9.62	PHOSPHATE-P	419.901	24248	545932	2	-1.80
		SULFATE					
			---total(s)---				
	0.00		7538.285		20959530		

271250D DF100



Sample Name : CCV
Dilution Factor : 20.00
Injection Number : 13
Data File Name : c:\peaknet\data\051220\051215_013.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\20dec05.sch

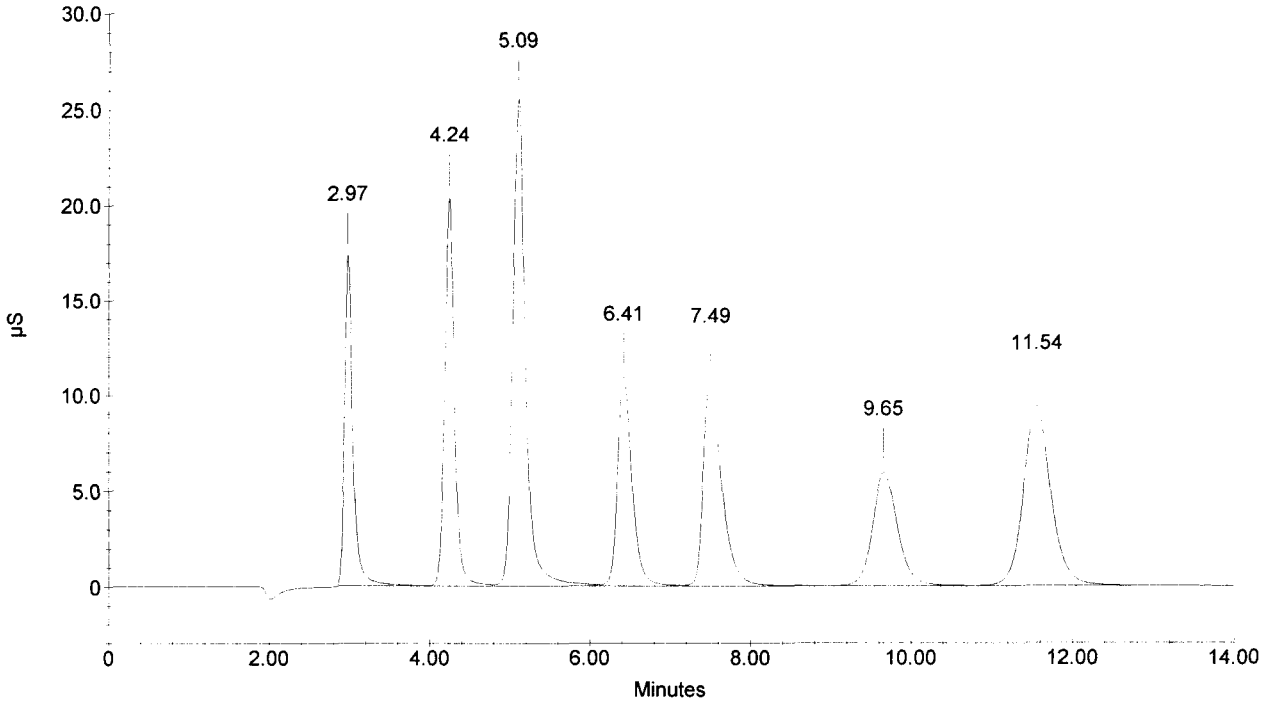
Date Time Collected : 12/20/05 9:26:15 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010097

Peak Information : All Components

Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	Bl. Code	%Delta
1	2.97	FLUORIDE	97.883	172241	1247053	2	-1.33
2	4.24	CHLORIDE	210.028	203107	1704110	2	-0.55
3	5.09	NITRITE-N	157.699	252208	2841531	2	-0.97
4	6.41	BROMIDE	401.414	108825	1366864	2	-0.47
5	7.49	NITRATE-N	84.881	107842	1718544	2	1.63
6	9.65	PHOSPHATE-P	189.168	59103	1283032	2	-1.53
7	11.54	SULFATE	390.957	93730	2231583	2	-2.26
	0.00		---total(s)--- 1532.030		12392717		

CCV



Sample Name : CCB
Dilution Factor : 1.00
Injection Number : 14
Data File Name : c:\peaknet\data\051220\051215_014.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\20dec05.sch

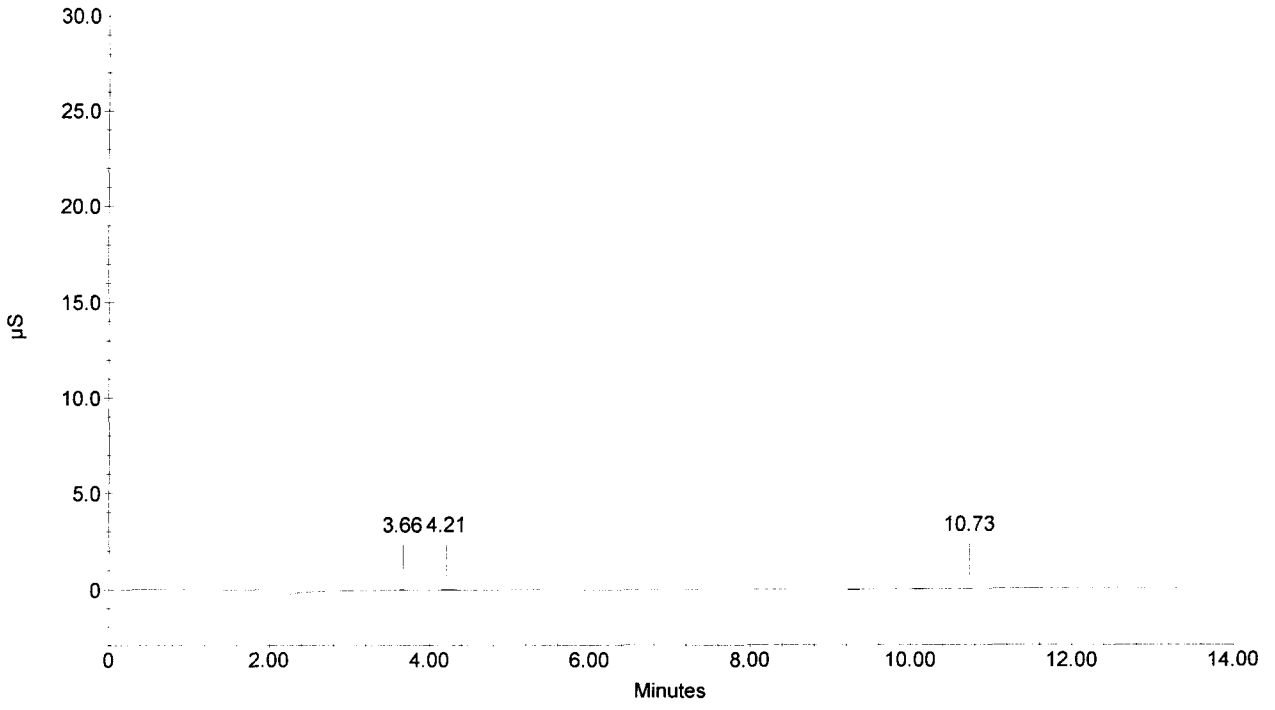
Date Time Collected : 12/20/05 9:42:58 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010098

Peak Information : All Components

Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	Bl. Code	%Delta
1	3.66		0.000	76	887	1	
2	4.21	CHLORIDE NITRITE-N BROMIDE NITRATE-N	0.036	148	986	1	-1.17
3	10.73	PHOSPHATE-P SULFATE	0.076	64	4021	1	9.49
	0.00		---total(s)--- 0.112		5894		

CCB



Sample Name : 271250S DF100
Dilution Factor : 100.00
Injection Number : 15
Data File Name : c:\peaknet\data\051220\051215_015.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\20dec05.sch

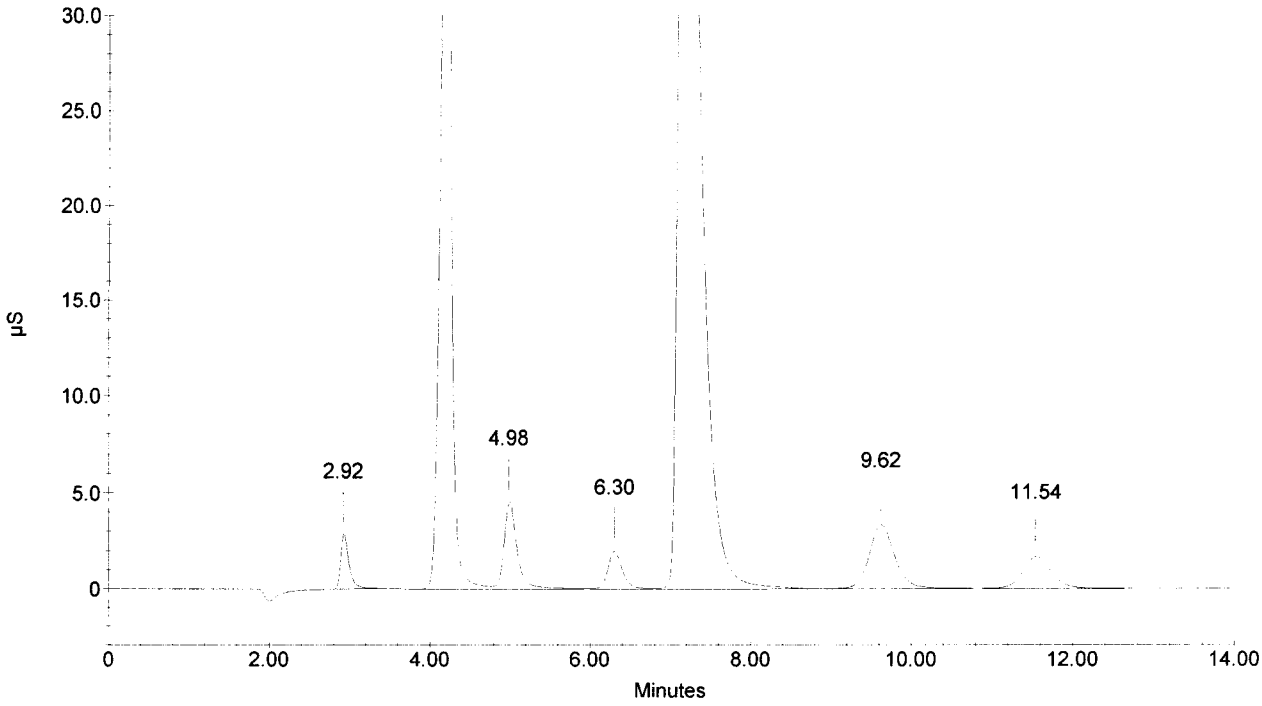
Date Time Collected : 12/20/05 9:59:41 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010099

Peak Information : All Components

Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	Bl. Code	%Delta
1	2.92	FLUORIDE	89.699	27835	207324	1	-3.10
2	4.20	CHLORIDE	2395.482	536230	4435814	2	-1.49
3	4.98	NITRITE-N	154.646	44922	530159	2	-3.05
4	6.30	BROMIDE	406.635	19817	255593	2	-2.12
5	7.17	NITRATE-N	2173.740	632727	10588261	2	-2.71
6	9.62	PHOSPHATE-P	574.656	33450	757057	2	-1.80
7	11.54	SULFATE	396.393	16951	421394	2	-2.26
			---total(s)---				
	0.00		6191.251		17195601		

271250S DF100



Sample Name : CCV
Dilution Factor : 20.00
Injection Number : 16
Data File Name : c:\peaknet\data\051220\051215_016.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\20dec05.sch

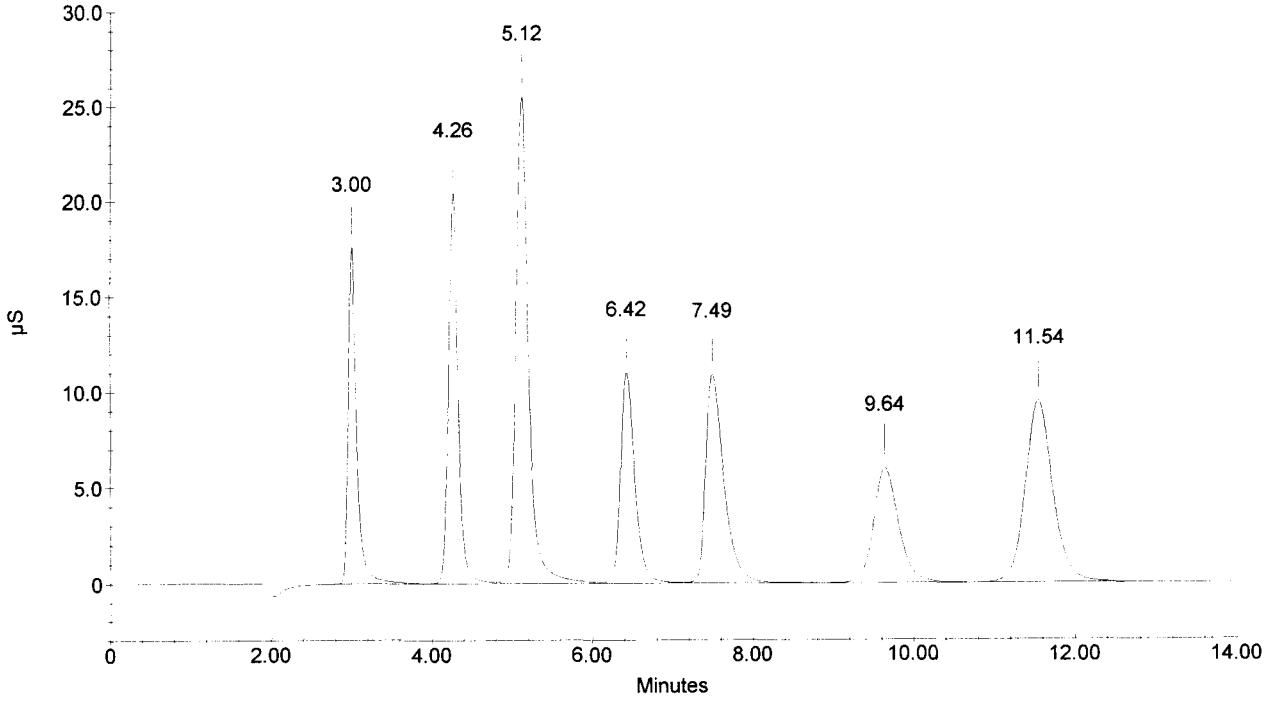
Date Time Collected : 12/20/05 10:16:23 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010100

Peak Information : All Components

Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	Bl. Code	%Delta
1	3.00	FLUORIDE	99.628	175052	1269907	2	-0.44
2	4.26	CHLORIDE	207.729	203806	1683881	2	0.08
3	5.12	NITRITE-N	155.013	254772	2791963	2	-0.45
4	6.42	BROMIDE	399.986	109715	1361494	2	-0.26
5	7.49	NITRATE-N	85.118	108775	1723568	2	1.63
6	9.64	PHOSPHATE-P	190.901	59531	1295669	2	-1.67
7	11.54	SULFATE	394.742	94593	2255256	2	-2.26
			---total(s)---				
	0.00		1533.117		12381740		

CCV



Sample Name : CCB
Dilution Factor : 1.00
Injection Number : 17
Data File Name : ...\051215_017.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\20dec05.sch

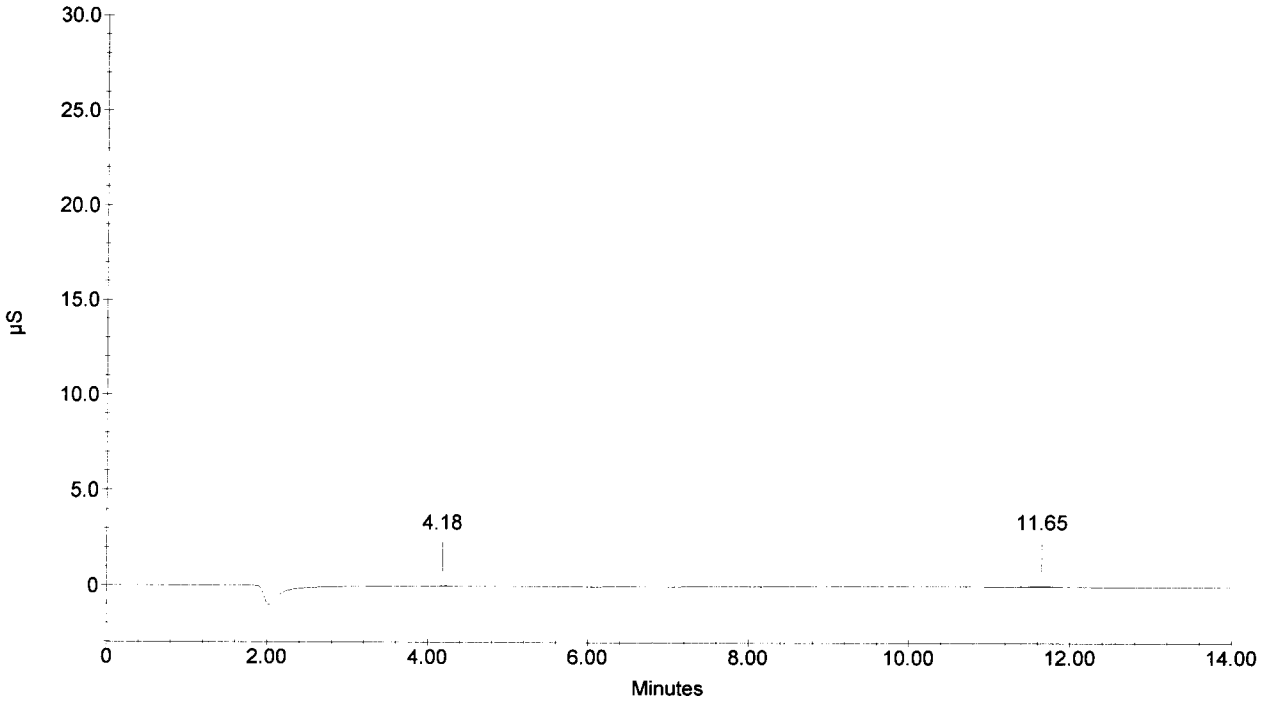
Date Time Collected : 12/20/05 10:33:07 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010101

Peak Information : All Components

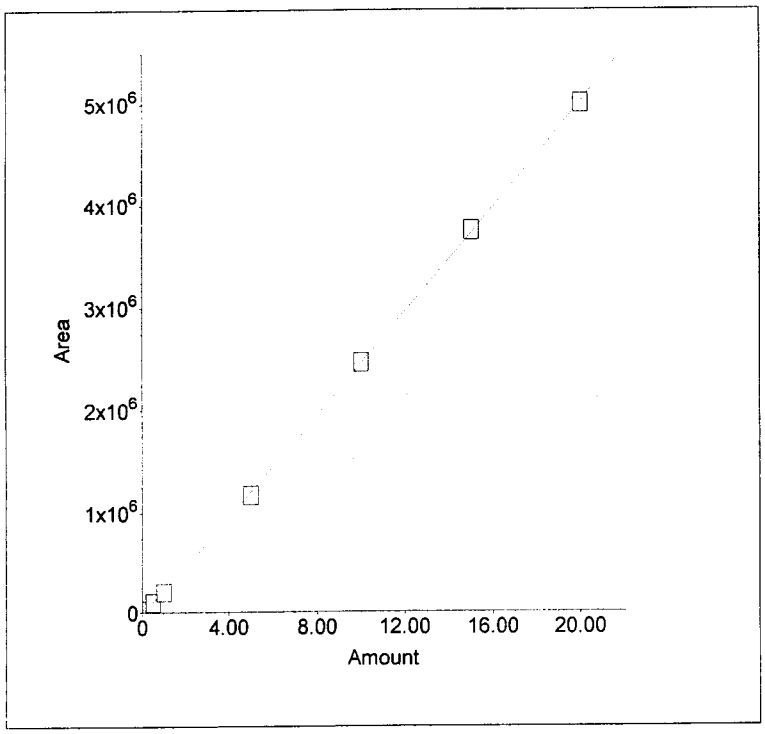
Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	Bl. Code	%Delta
1	4.18	CHLORIDE	0.038	170	1331	1	-1.80
1	4.18	CHLORIDE	0.038	170	1331	1	-1.80
		NITRITE-N					
		BROMIDE					
		NITRATE-N					
		PHOSPHATE-P					
2	11.65	SULFATE	0.090	325	7275	1	-1.35
			---total(s)---				
	0.00		0.166		9937		

CCB

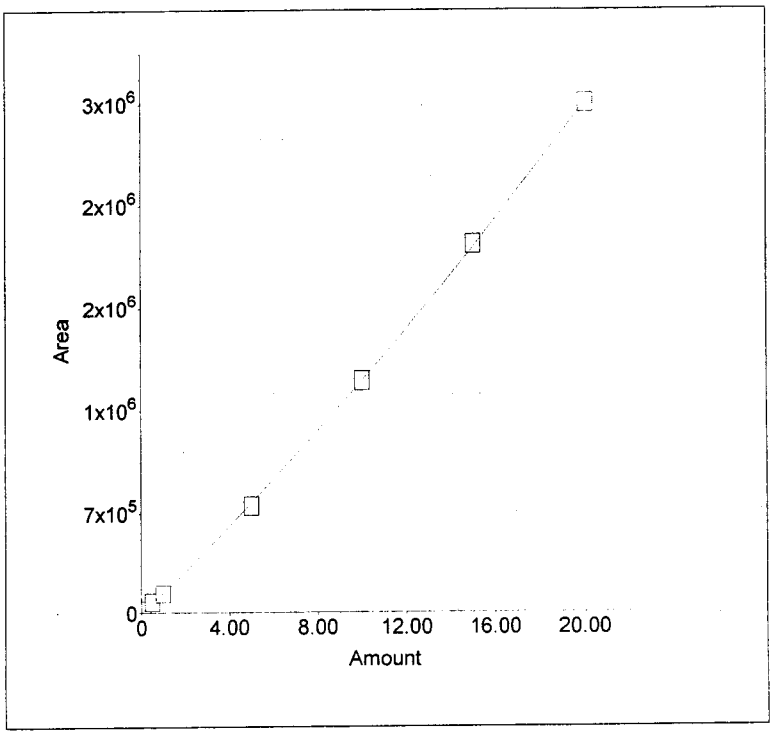


Method:C:\PEAKNET\METHOD\ANIONS051116.MET Updated:11/16/05 8:31:50 PM Total:7

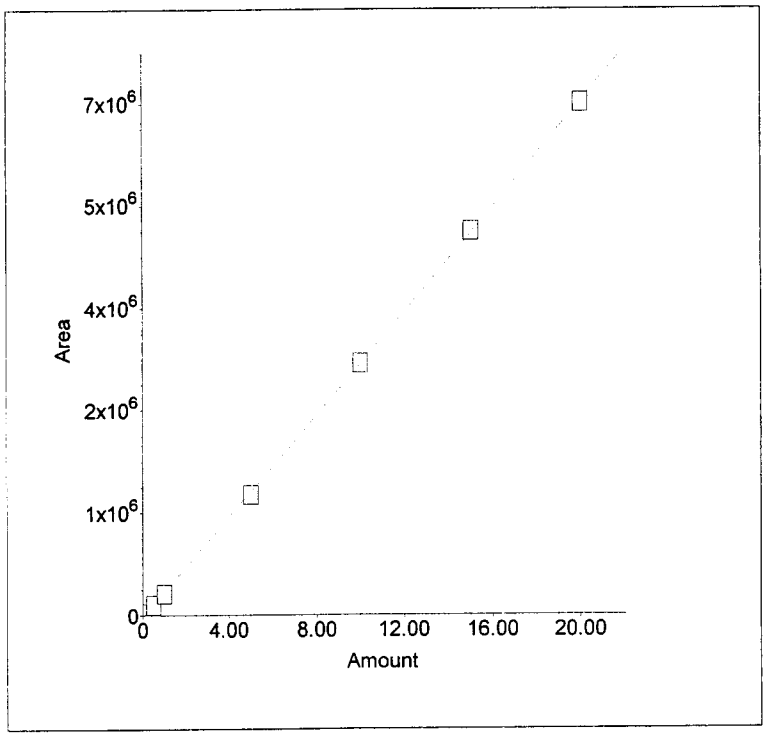
1. Component:FLUORIDE
Standard:External Fit Type:Quadratic
Origin:Include Calibration:Area
r^2=0.999881
Amt=-2.390323e-014*Resp²+
3.879166e-006*Resp+0.09377



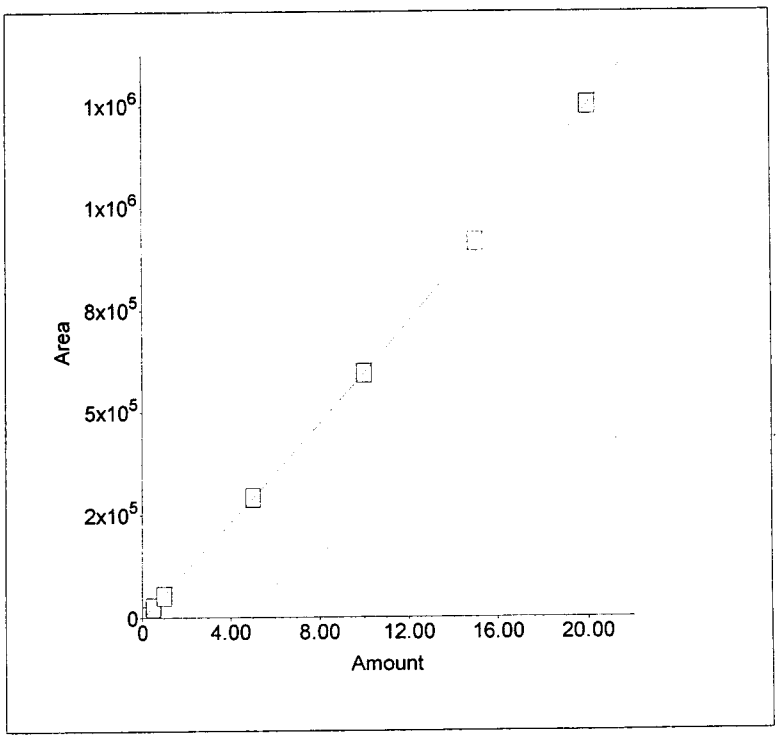
2. Component:CHLORIDE
Standard:External Fit Type:Quadratic
Origin:Include Calibration:Area
r^2=0.999891
Amt=-2.750837e-013*Resp²+
6.613910e-006*Resp+0.0294 010102



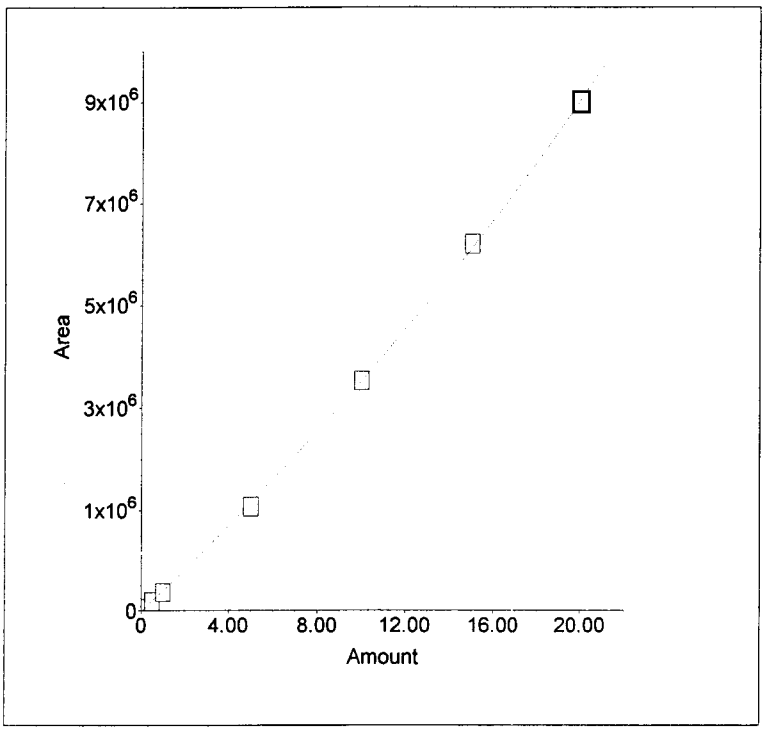
3. Component:NITRITE-N
Standard:External Fit Type:Quadratic
Origin:Include Calibration:Area
r^2=0.999912
Amt=-1.467710e-014*Resp²+
2.791785e-006*Resp+0.0705



4. Component:BROMIDE
Standard:External Fit Type:Quadratic
Origin:Include Calibration:Area
r^2=0.999989
Amt=-9.942909e-013*Resp²+
1.601506e-005*Resp+0.03796

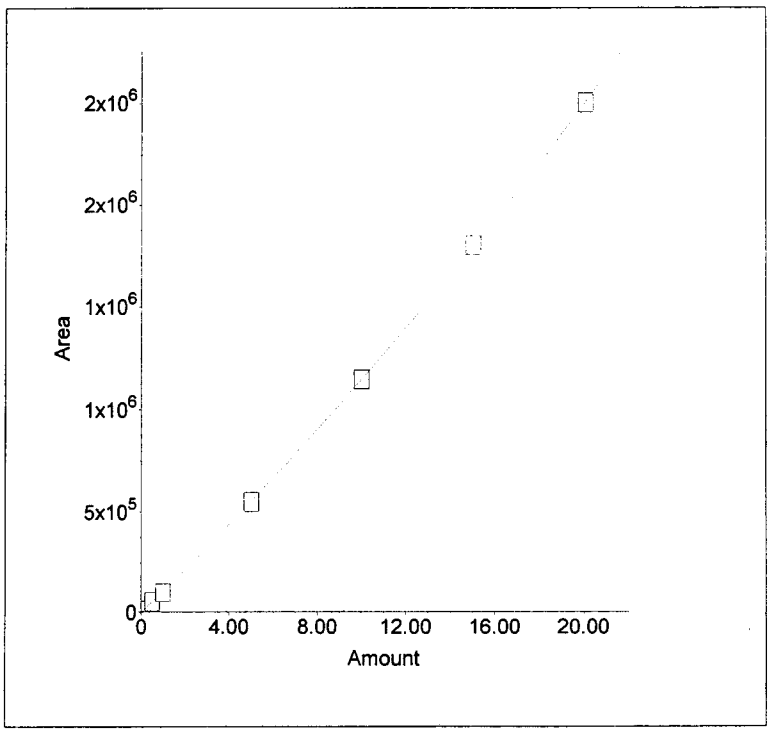


5. Component:NITRATE-N
Standard:External Fit Type:Quadratic
Origin:Include Calibration:Area
r^2=0.999840
Amt=-4.254071e-014*Resp²+
2.495793e-006*Resp+0.08058

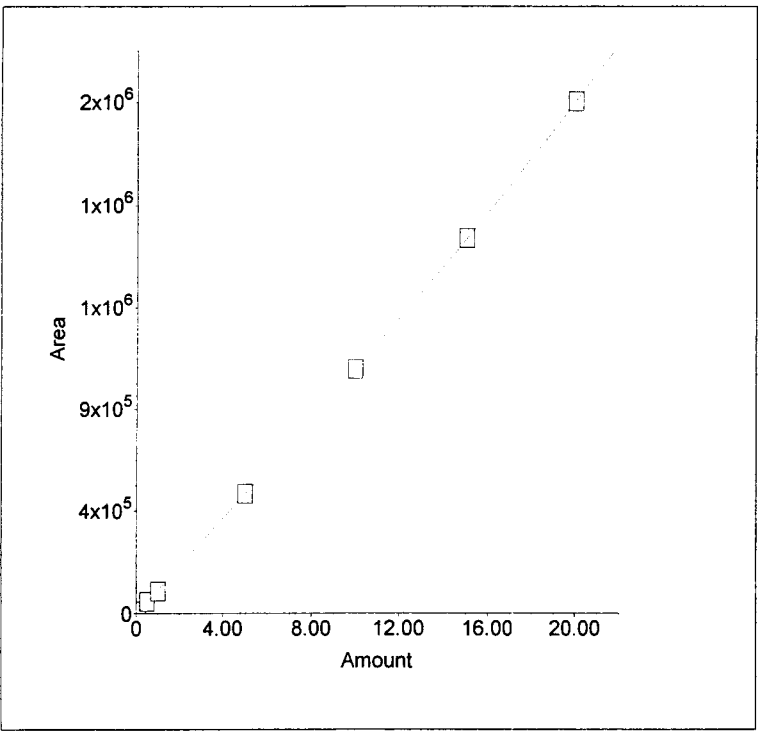


6. Component:PHOSPHATE-P
Standard:External Fit Type:Quadratic
Origin:Include Calibration:Area
r^2=0.999980
Amt=-3.703917e-013*Resp²+
7.812696e-006*Resp+0.0442

010103



7. Component:SULFATE
Standard:External Fit Type:Quadratic
Origin:Include Calibration:Area
r^2=0.999987
Amt=-3.352536e-013*Resp²+
9.498428e-006*Resp+0.02088



Sample Name : 0PPM 115-08-IC5
Dilution Factor : 1.00
Injection Number : 1
Data File Name : c:\peaknet\data\051116\051116_A001.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\051116.sch

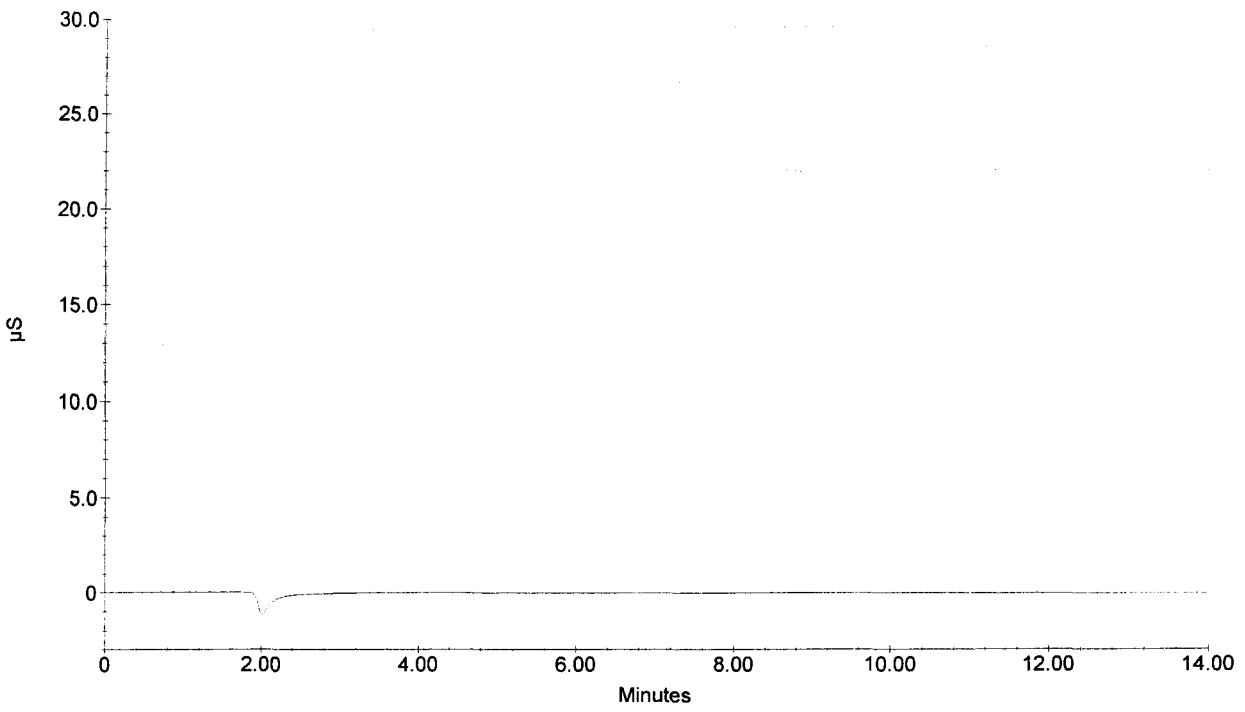
Date Time Collected : 11/16/05 6:05:05 PM
Date Time Updated : 11/16/05 6:21:37 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010104

Peak Information : All Components

Peak Number	Peak Retention Time	Component Name	Concentration, ppm (ppm)	Peak Area	Peak Height
0	0.00	(null)	0.00	0	0
		CHLORIDE			
		NITRITE-N			
		BROMIDE			
		NITRATE-N			
		PHOSPHATE-P			
		SULFATE			

0PPM 115-08-IC5



Sample Name : 0.1PPM 115-07-IC5
Dilution Factor : 1.00
Injection Number : 2
Data File Name : c:\peaknet\data\051116\051116_002.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\051116.sch

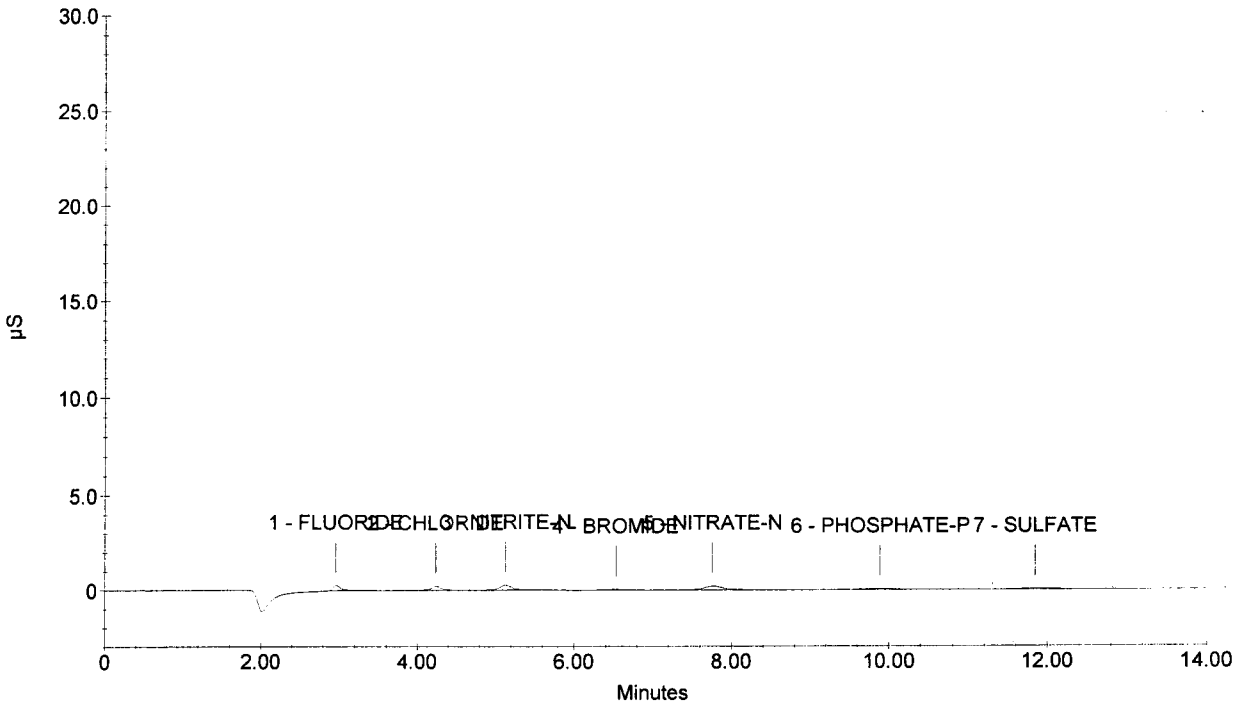
Date Time Collected : 11/16/05 6:21:46 PM
Date Time Updated : 11/16/05 6:38:19 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010105

Peak Information : All Components

Peak Number	Peak Retention Time	Component Name	Concentration, ppm (ppm)	Peak Area	Peak Height
1	2.96	FLUORIDE	0.10	16520	2524
2	4.24	CHLORIDE	0.10	17650	2073
3	5.13	NITRITE-N	0.10	28123	2547
4	6.53	BROMIDE	0.10	4650	389
5	7.76	NITRATE-N	0.10	33559	2009
6	9.89	PHOSPHATE-P	0.10	8257	398
7	11.85	SULFATE	0.10	9941	454

0.1PPM 115-07-IC5



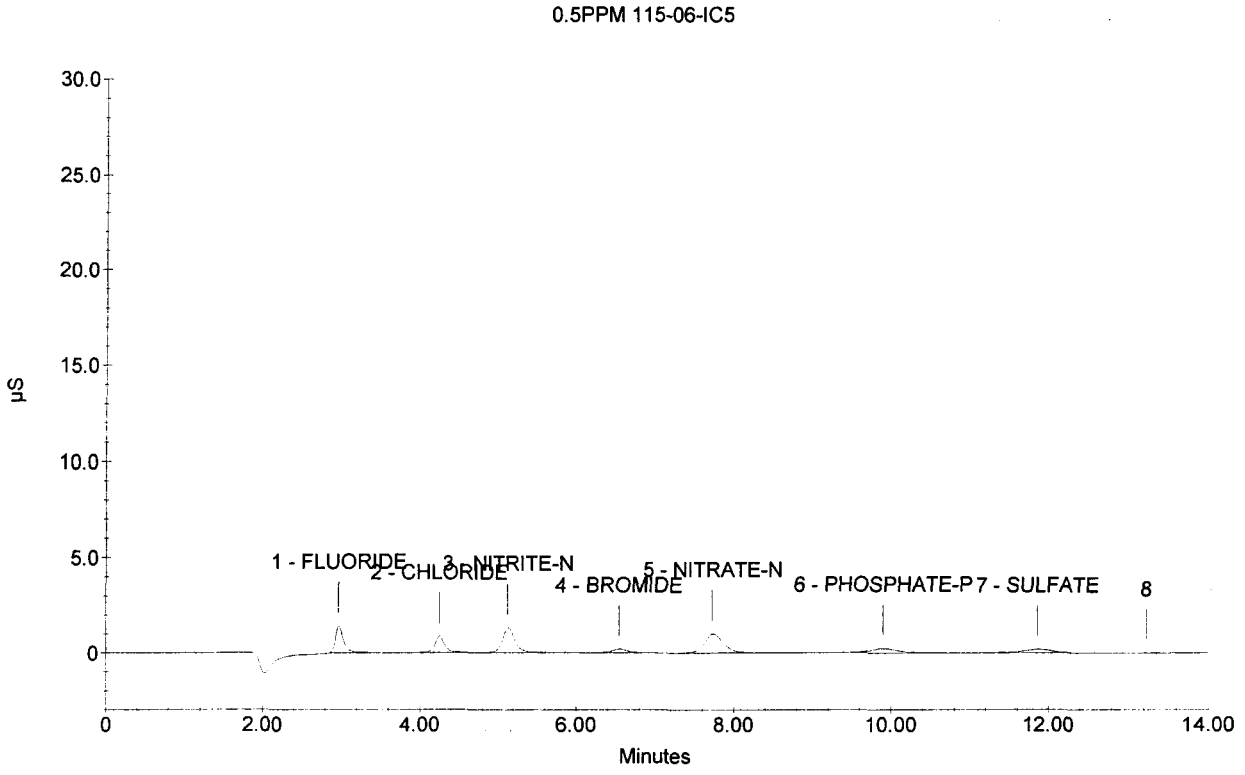
Sample Name : 0.5PPM 115-06-IC5
Dilution Factor : 1.00
Injection Number : 3
Data File Name : c:\peaknet\data\051116\051116_003.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\051116.sch

Date Time Collected : 11/16/05 6:38:30 PM
Date Time Updated : 11/16/05 6:55:02 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010106

Peak Information : All Components

Peak Number	Peak Retention Time	Component Name	Concentration, ppm (ppm)	Peak Area	Peak Height
1	2.97	FLUORIDE	0.50	99544	14197
2	4.25	CHLORIDE	0.50	78285	8650
3	5.13	NITRITE-N	0.50	152069	13151
4	6.54	BROMIDE	0.50	27286	2090
5	7.73	NITRATE-N	0.50	171023	10083
6	9.90	PHOSPHATE-P	0.50	60420	2366
7	11.86	SULFATE	0.50	52492	1948



Sample Name : 1PPM 115-05-IC5
Dilution Factor : 1.00
Injection Number : 4
Data File Name : c:\peaknet\data\051116\051116_004.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\051116.sch

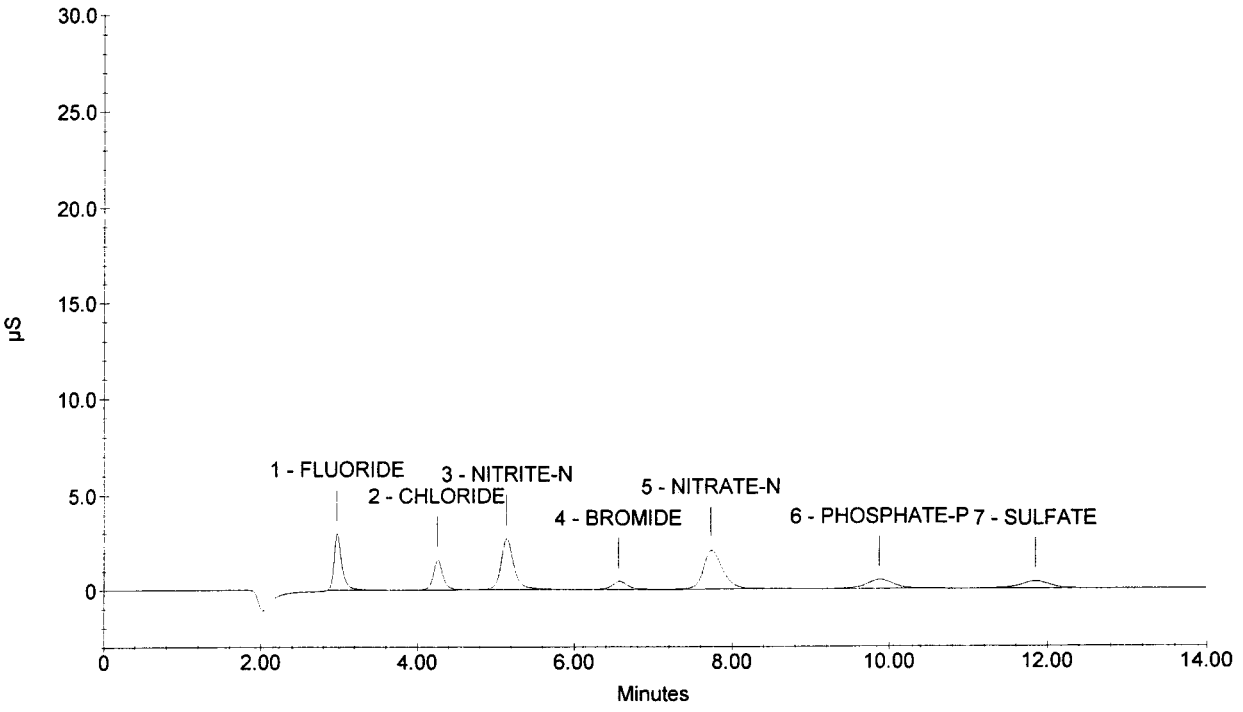
Date Time Collected : 11/16/05 6:55:12 PM
Date Time Updated : 11/16/05 7:11:46 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010107

Peak Information : All Components

Peak Number	Peak Retention Time	Component Name	Concentration, ppm (ppm)	Peak Area	Peak Height
1	2.97	FLUORIDE	1.00	214439	29828
2	4.25	CHLORIDE	1.00	140340	15915
3	5.14	NITRITE-N	1.00	310951	27027
4	6.56	BROMIDE	1.00	57817	4266
5	7.73	NITRATE-N	1.00	346267	20417
6	9.88	PHOSPHATE-P	1.00	115938	4806
7	11.85	SULFATE	1.00	97911	3769

1PPM 115-05-IC5



Sample Name : 5PPM 115-04-IC5
Dilution Factor : 1.00
Injection Number : 5
Data File Name : c:\peaknet\data\051116\051116_005.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\051116.sch

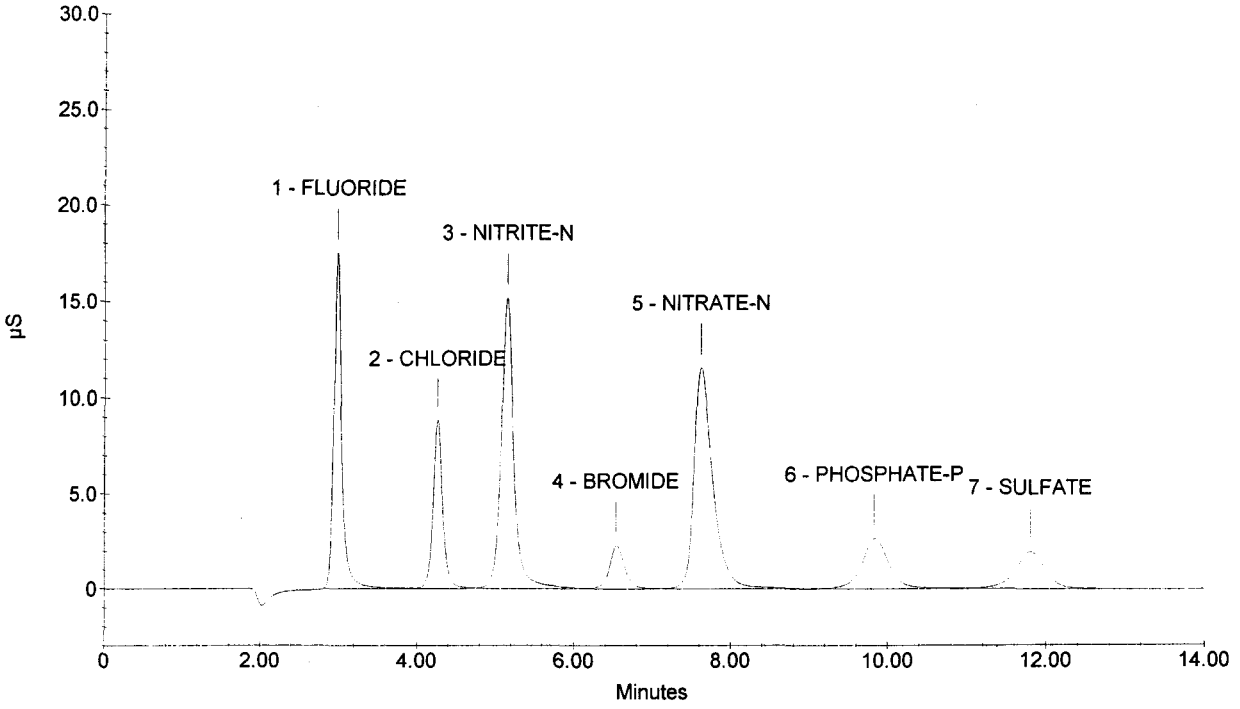
Date Time Collected : 11/16/05 7:12:06 PM
Date Time Updated : 11/16/05 7:28:39 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010108

Peak Information : All Components

Peak Number	Peak Retention Time	Component Name	Concentration, ppm (ppm)	Peak Area	Peak Height
1	2.98	FLUORIDE	5.00	1240719	174788
2	4.25	CHLORIDE	5.00	755822	86741
3	5.14	NITRITE-N	5.00	1739855	151536
4	6.53	BROMIDE	5.00	317492	23072
5	7.61	NITRATE-N	5.00	1968165	115546
6	9.82	PHOSPHATE-P	5.00	650857	26746
7	11.80	SULFATE	5.00	533476	19943

5PPM 115-04-IC5



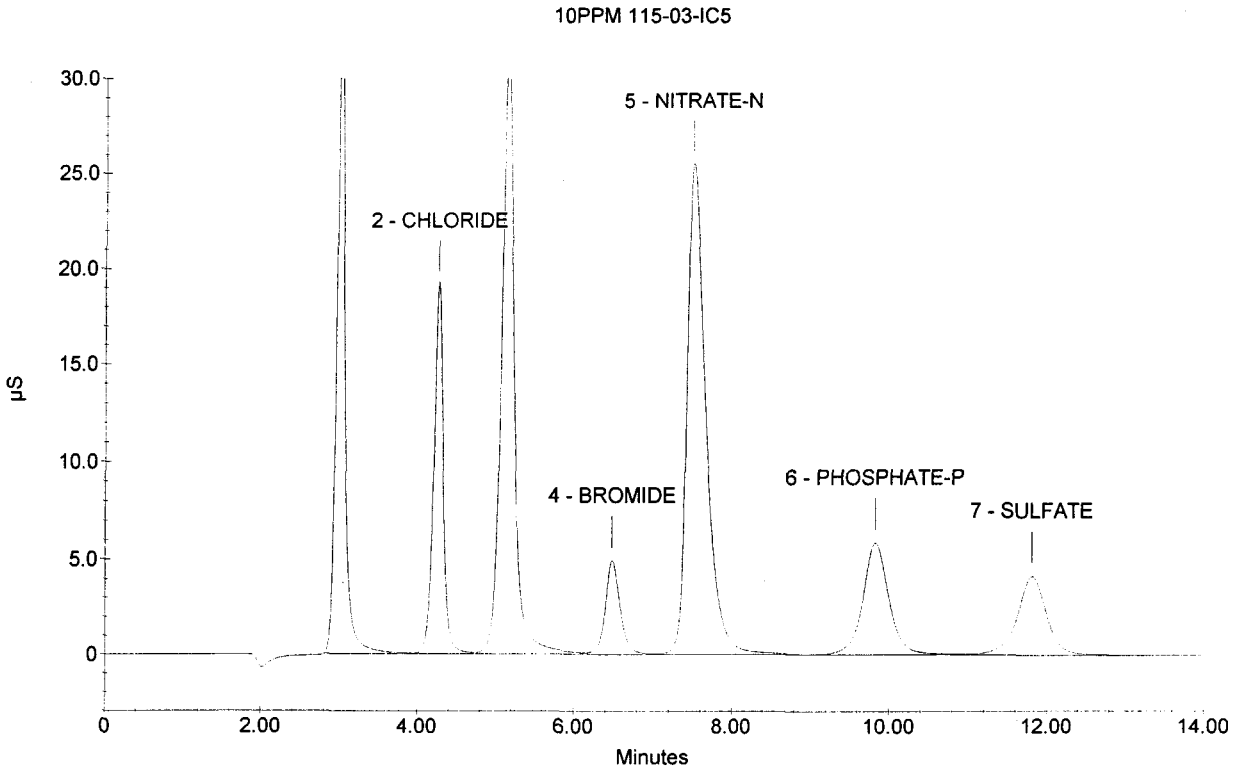
Sample Name : 10PPM 115-03-IC5
Dilution Factor : 1.00
Injection Number : 6
Data File Name : c:\peaknet\data\051116\051116_006.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\051116.sch

Date Time Collected : 11/16/05 7:28:58 PM
Date Time Updated : 11/16/05 7:45:31 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010109

Peak Information : All Components

Peak Number	Peak Retention Time	Component Name	Concentration, ppm (ppm)	Peak Area	Peak Height
1	2.98	FLUORIDE	10.00	2603044	355519
2	4.25	CHLORIDE	10.00	1613190	191194
3	5.13	NITRITE-N	10.00	3634302	316599
4	6.48	BROMIDE	10.00	647461	49126
5	7.49	NITRATE-N	10.00	4292412	254592
6	9.82	PHOSPHATE-P	10.00	1360845	58433
7	11.81	SULFATE	10.00	1091194	41534



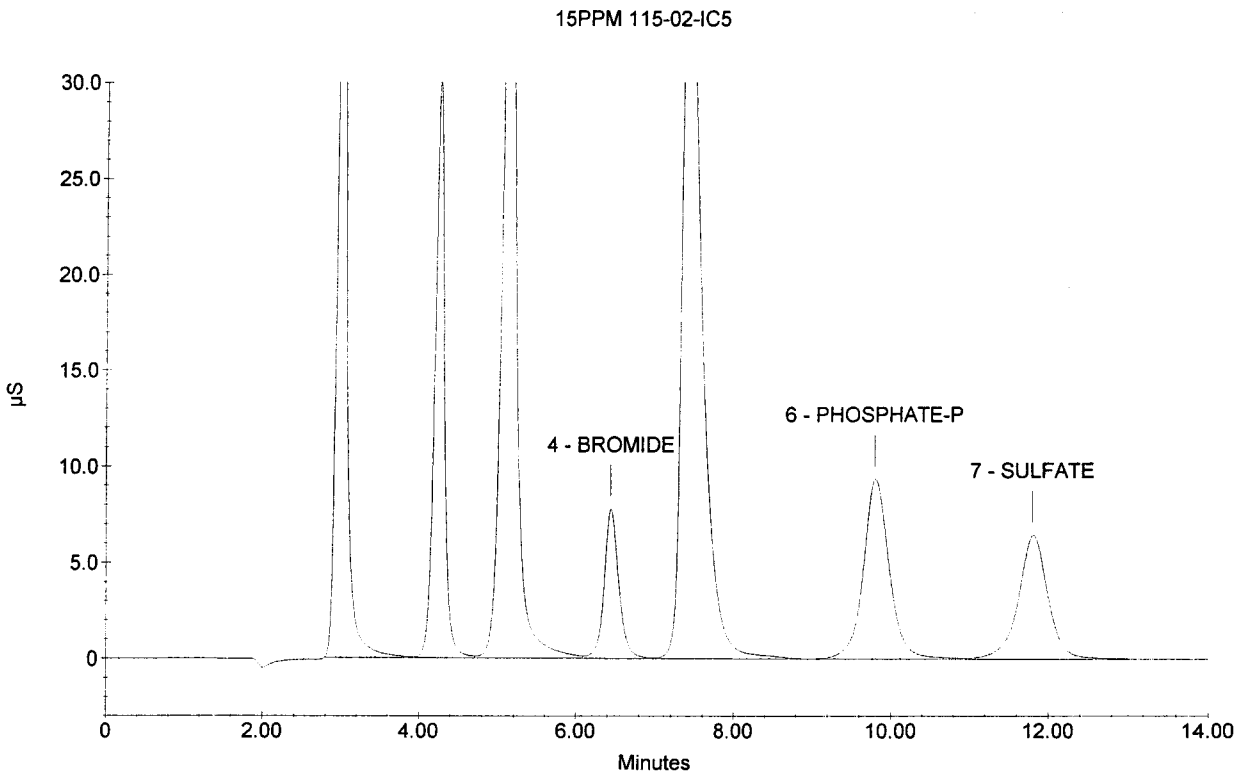
Sample Name : 15PPM 115-02-IC5
Dilution Factor : 1.00
Injection Number : 7
Data File Name : c:\peaknet\data\051116\051116_007.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\051116.sch

Date Time Collected : 11/16/05 7:45:53 PM
Date Time Updated : 11/16/05 8:02:25 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010110

Peak Information : All Components

Peak Number	Peak Retention Time	Component Name	Concentration, ppm (ppm)	Peak Area	Peak Height
1	3.00	FLUORIDE	15.00	3965828	524280
2	4.25	CHLORIDE	15.00	2555092	299420
3	5.13	NITRITE-N	15.00	5542814	470296
4	6.44	BROMIDE	15.00	995994	77442
5	7.41	NITRATE-N	15.00	6827190	402276
6	9.80	PHOSPHATE-P	15.00	2136334	93257
7	11.80	SULFATE	15.00	1680094	64281



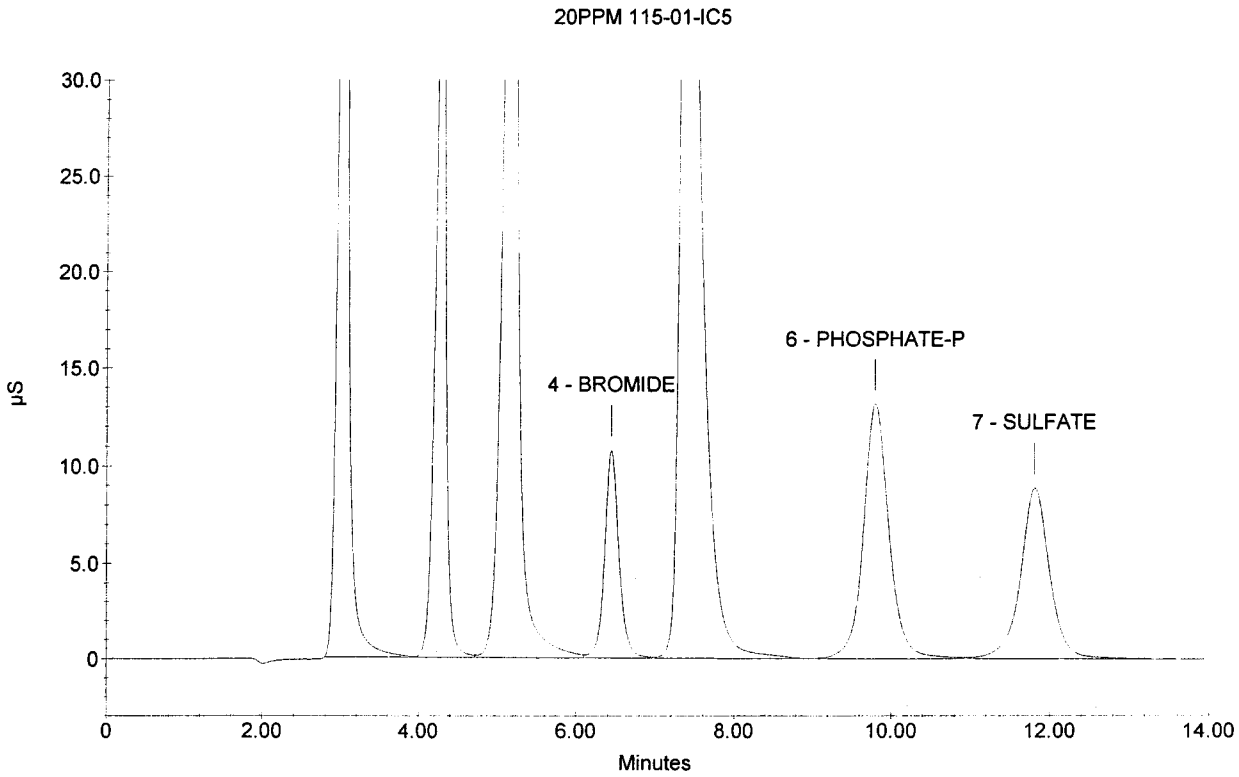
Sample Name : 20PPM 115-01-IC5
Dilution Factor : 1.00
Injection Number : 8
Data File Name : c:\peaknet\data\051116\051116_008.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\051116.sch

Date Time Collected : 11/16/05 8:02:35 PM
Date Time Updated : 11/16/05 8:19:09 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010111

Peak Information : All Components

Peak Number	Peak Retention Time	Component Name	Concentration, ppm (ppm)	Peak Area	Peak Height
1	3.01	FLUORIDE	20.00	5289226	665312
2	4.26	CHLORIDE	20.00	3528116	402942
3	5.14	NITRITE-N	20.00	7408735	598708
4	6.44	BROMIDE	20.00	1361527	107400
5	7.37	NITRATE-N	20.00	9490085	545948
6	9.80	PHOSPHATE-P	20.00	2969974	131230
7	11.81	SULFATE	20.00	2286449	88474



Sample Name : ICV
Dilution Factor : 20.00
Injection Number : 9
Data File Name : ...\051116_009.DXD
Method File Name : C:\PeakNet\method\ANIONS051116.met
Schedule File Name : c:\peaknet\schedule\051116.sch

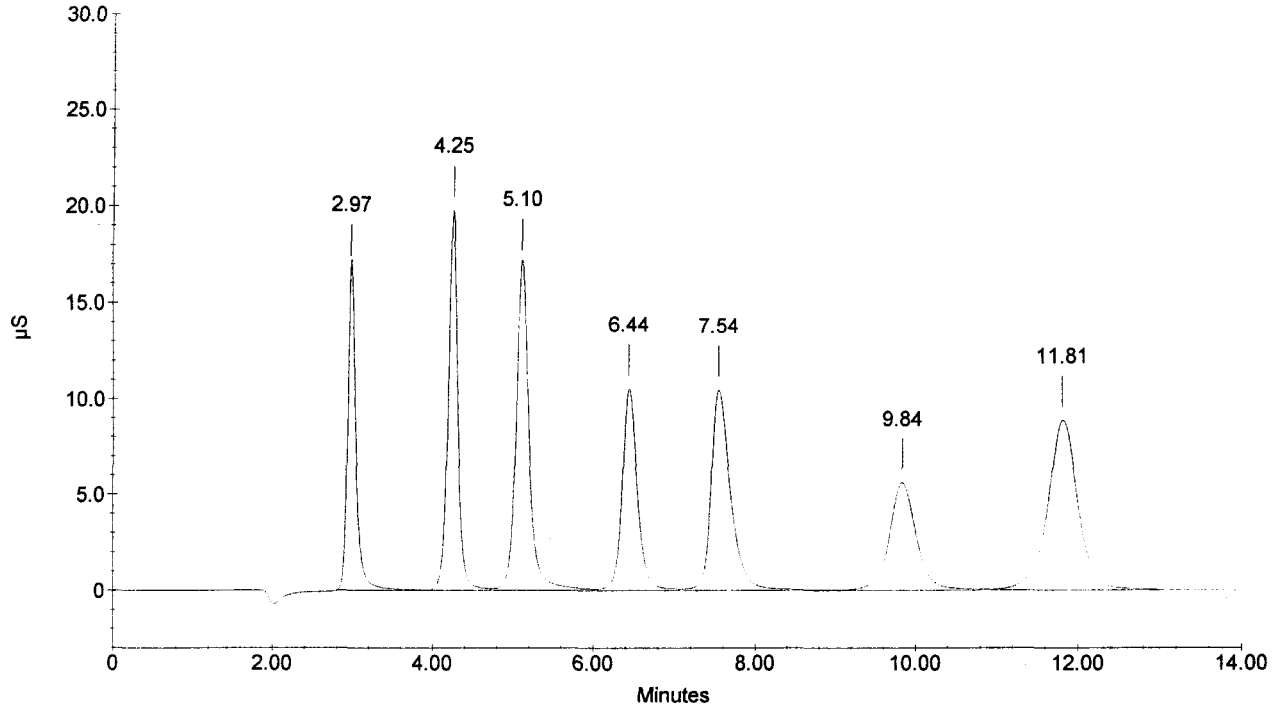
Date Time Collected : 11/16/05 8:19:33 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010112

Peak Information : All Components

Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	Bl. Code	%Delta
1	2.97	FLUORIDE	96.141	167051	1224254	2	-1.33
2	4.25	CHLORIDE	204.683	197471	1657137	2	-0.23
3	5.10	NITRITE-N	109.072	169893	1948137	2	-0.71
4	6.44	BROMIDE	402.064	105103	1369309	2	-0.05
5	7.54	NITRATE-N	86.221	104327	1747068	2	2.35
6	9.84	PHOSPHATE-P	192.414	55866	1306716	2	0.37
7	11.81	SULFATE	400.058	88555	2288583	2	0.00
	0.00		---total(s)--- 1490.653		11541204		

ICV



Sample Name : ICB
Dilution Factor : 1.00
Injection Number : 10
Data File Name : c:\peaknet\data\051116\051116_010.DXD
Method File Name : c:\peaknet\method\anions051116.met
Schedule File Name : c:\peaknet\schedule\051116.sch

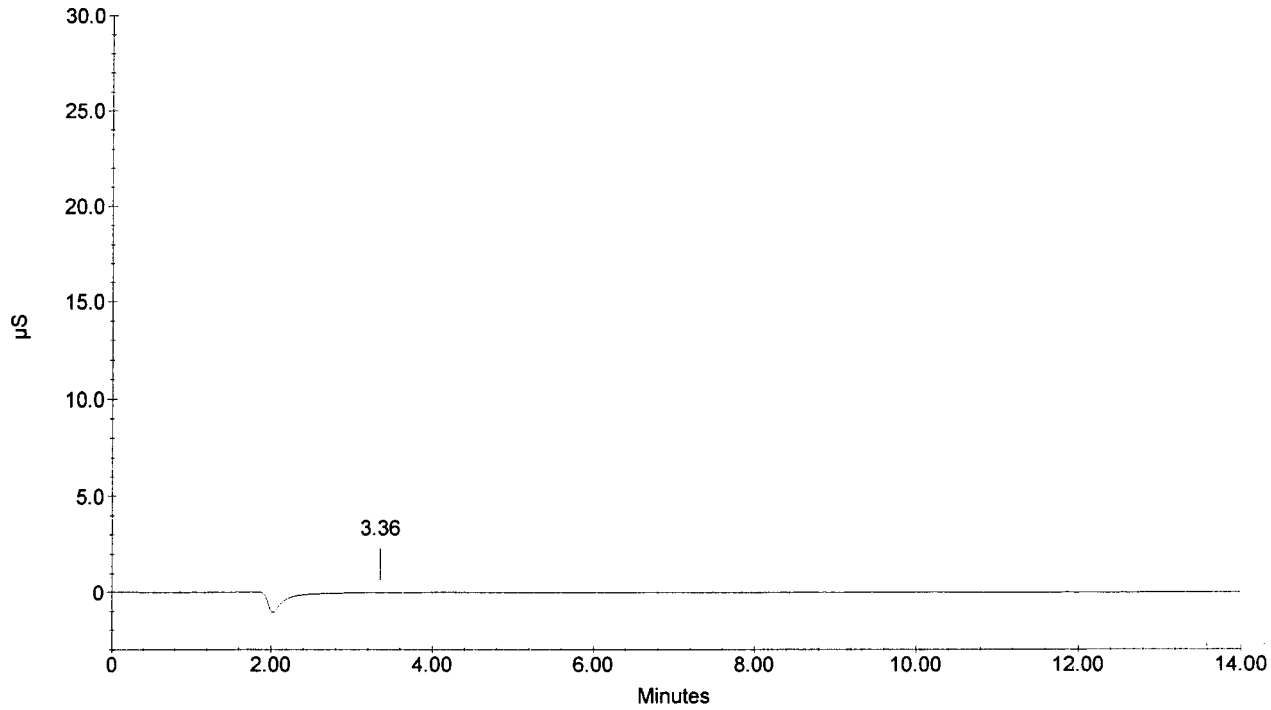
Date Time Collected : 11/16/05 8:36:25 PM
System Name : Dx-500
Detector Name : Conductivity Detector
Column Type : AS14-SN#018097 AG14-#019940
System Operator : RSPIES

010113

Peak Information : All Components

Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	Bl. Code	%Delta
1	3.36		0.000	43	429	1	
		CHLORIDE					
		NITRITE-N					
		BROMIDE					
		NITRATE-N					
		PHOSPHATE-P					
		SULFATE					
			---total(s)---				
	0.00		0.000		429		

ICB



TITLE Anions Calibration Curve

PROJECT NO. NA-115

BOOK NO. 105

Work continued from Page

x incorrect entry

115-01-IC5 20ppm Anions 010114

Anions	Std vol, mL	Std. Conc; mg/L	Inorg#	Exp.
(*) Fluoride	0.2mL	1000mg/L	4951	1/15/2006
(*) Chloride			4950	1/15/2006
(*) Nitrite N			5076	RSS ~~4/15~~ 3/30/06
(*) Bromide			5275	6/30/06
(*) Nitrate N			4952	1/15/06
(*) Phosphate P			4953	1/15/06
(*) Sulfate			5305	7/30/06

(*) Std A's located in Office 52.

Diluted to 10mL DI H_2O.

115-02-IC5 15ppm
3mL ~~103~~-01-IC5 115 RSS 11/16/05 incorrect entry + 1mL DI H_2O.

115-03-IC5 10ppm
2mL 115-01-IC5 + 2mL DI H_2O.

115-04-IC5 5ppm
2mL 115-03-IC5 + 2mL DI H_2O.

115-05-IC5 1ppm
1mL 115-04-IC5 + 4mL DI H_2O.

115-06-IC5 0.5ppm
2mL 115-05-IC5 + 2mL DI H_2O.

115-07-IC5 0.1ppm
1mL 115-06-IC5 + 4mL DI H_2O

115-08-IC5 0ppm
DI H_2O.

Eppendorfs
5000 J
1000 J
200 J
Eppendorf Logbook Located in Lab 47.

DI water Logbook located in Lab 49.

www.scientificbinders88yrs.com

Work continued to Page

SIGNATURE R Spence **DATE** 11/16/05

DISCLOSED TO AND UNDERSTOOD BY Monica G. Thrall **DATE** **WITNESS** **DATE** 12/12/06

128 PROJECT NO. —
BOOK NO. 105

TITLE Nitrite-N

Work continued from Page

010115

128-01-105 Nitrite-N, 159 mg/L

0.0470 g sodium nitrate (Inorg # 2921) diluted to 60 mL DI H_2O.
Balance # 12.

RSpies 12/20/05

Work continued to Page

www.scientificbindery88yrs.com

SIGNATURE RSpies

DATE 12/20/05

DISCLOSED TO AND UNDERSTOOD BY

DATE 01/18/06

WITNESS

DATE

010116

SOUTHWEST RESEARCH INSTITUTE
NUCLEAR PROJECT
CLIENT: Division 20
TASK ORDER: 051219-5
SRR: 28420
SDG: 271245
CASE: L. Yang
VTSR: December 16, 2005
PROJECT#: 06002.01.322

Certificates of Analysis

010117

Fisher Scientific

TRACEMETAL GRADE NITRIC ACID
CERTIFICATE OF ANALYSIS

B McKelvey

Dr. B. McKelvey
QA/QC Manager

CATALOG NUMBER: A509
LOT NUMBER: 1105042
RELEASE DATE: July, 2005
EXPIRY DATE: July, 2008

Tests	Maximum Specification	Actual Value	Units
ASSAY (HNO_3, w/w):	67 - 70%	70%	% by w/w
Color:	10	<10	APHA

Analyte	Maximum Specification	Actual Value (in ppb)	Analyte	Maximum Specification	Actual Value (in ppb)
Aluminum (Al)	1 ppb	<0.5	Neodymium (Nd)	0.5 ppb	<0.1
Antimony (Sb)	1 ppb	<0.1	Nickel (Ni)	1 ppb	<0.1
Arsenic (As)	1 ppb	<0.1	Niobium (Nb)	0.5 ppb	<0.1
Barium (Ba)	1 ppb	<0.1	Palladium (Pd)	0.5 ppb	<0.1
Beryllium (Be)	1 ppb	<0.1	Platinum (Pt)	0.5 ppb	<0.1
Bismuth (Bi)	1 ppb	<0.1	Potassium (K)	1 ppb	<0.2
Boron (B)	1 ppb	<0.5	Praseodymium (Pr)	0.5 ppb	<0.1
Cadmium (Cd)	1 ppb	<0.1	Rhenium (Re)	0.5 ppb	<0.1
Calcium (Ca)	1 ppb	<0.5	Rhodium (Rh)	0.5 ppb	<0.1
Cerium (Ce)	0.5 ppb	<0.1	Rubidium (Rb)	0.5 ppb	<0.1
Cesium (Cs)	0.5 ppb	<0.1	Ruthenium (Ru)	0.5 ppb	<0.1
Chromium (Cr)	1 ppb	<0.5	Samarium (Sm)	0.5 ppb	<0.1
Cobalt (Co)	1 ppb	<0.1	Scandium (Sc)	0.5 ppb	<0.1
Copper (Cu)	1 ppb	<0.1	Selenium (Se)	1 ppb	<0.1
Dysprosium (Dy)	0.5 ppb	<0.1	Silver (Ag)	1 ppb	<0.1
Erbium (Er)	0.5 ppb	<0.1	Sodium (Na)	1 ppb	<0.2
Europium (Eu)	0.5 ppb	<0.1	Strontium (Sr)	1 ppb	<0.1
Gadolinium (Gd)	0.5 ppb	<0.1	Tantalum (Ta)	Information Only	<0.1
Gallium (Ga)	0.5 ppb	<0.1	Tellurium (Te)	0.5 ppb	<0.1
Germanium (Ge)	0.5 ppb	<0.1	Terbium (Tb)	0.5 ppb	<0.1
Gold (Au)	0.5 ppb	<0.1	Thallium (Tl)	0.5 ppb	<0.1
Hafnium (Hf)	0.5 ppb	<0.1	Thorium (Th)	1 ppb	<0.1
Holmium (Ho)	0.5 ppb	<0.1	Thulium (Tm)	0.5 ppb	<0.1
Indium (In)	0.5 ppb	<0.1	Tin (Sn)	1 ppb	<0.1
Iron (Fe)	1 ppb	<0.5	Titanium (Ti)	1 ppb	<0.1
Lanthanum (La)	0.5 ppb	<0.1	Tungsten (W)	0.5 ppb	<0.1
Lead (Pb)	1 ppb	<0.1	Uranium (U)	1 ppb	<0.1
Lithium (Li)	1 ppb	<0.1	Vanadium (V)	1 ppb	<0.1
Lutetium (Lu)	0.5 ppb	<0.1	Ytterbium (Yb)	0.5 ppb	<0.1
Magnesium (Mg)	1 ppb	<0.2	Yttrium (Y)	0.5 ppb	<0.1
Manganese (Mn)	1 ppb	<0.1	Zinc (Zn)	1 ppb	<0.2
Mercury (Hg)	1 ppb	<0.2	Zirconium (Zr)	1 ppb	<0.1
Molybdenum (Mo)	1 ppb	<0.1			

Analyte	Maximum Specification	Actual Value (in ppm)	Analyte	Maximum Specification	Actual Value (in ppm)
Chloride (Cl)	0.2 ppm	<0.2	Total Sulfur (S)	0.3 ppm	<0.3
Total Phosphorus (P)	0.01 ppm	<0.01			

Element concentrations are at the point of bottling. Concentrations of some elements in particular, Ca, Si, K, Na, B, Al, Mg & Mn will increase due to storage in glass bottles.

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 121605
DATE EXPIRED: 7/1/2008 OK
DATE OPENED: 12/13/5
INORG: 5484/75481 PO: F56643

010118

Fisher Scientific

TRACEMETAL GRADE NITRIC ACID
CERTIFICATE OF ANALYSIS

B McKelvey

Dr. B. McKelvey
QA/QC Manager

CATALOG NUMBER: A509
LOT NUMBER: 1105040
RELEASE DATE: May, 2005
EXPIRY DATE: May, 2008

Tests	Maximum Specification	Actual Value	Units
ASSAY (HNO_3, w/w):	67 - 70%	70%	% by w/w
Color:	10	<10	APHA

Analyte	Maximum Specification	Actual Value (in ppb)	Analyte	Maximum Specification	Actual Value (in ppb)
Aluminum (Al)	1 ppb	<0.5	Neodymium (Nd)	0.5 ppb	<0.1
Antimony (Sb)	1 ppb	<0.1	Nickel (Ni)	1 ppb	<0.1
Arsenic (As)	1 ppb	<0.1	Niobium (Nb)	0.5 ppb	<0.1
Barium (Ba)	1 ppb	<0.1	Palladium (Pd)	0.5 ppb	<0.1
Beryllium (Be)	1 ppb	<0.1	Platinum (Pt)	0.5 ppb	<0.1
Bismuth (Bi)	1 ppb	<0.1	Potassium (K)	1 ppb	<0.2
Boron (B)	1 ppb	<0.5	Praseodymium (Pr)	0.5 ppb	<0.1
Cadmium (Cd)	1 ppb	<0.1	Rhenium (Re)	0.5 ppb	<0.1
Calcium (Ca)	1 ppb	<0.5	Rhodium (Rh)	0.5 ppb	<0.1
Cerium (Ce)	0.5 ppb	<0.1	Rubidium (Rb)	0.5 ppb	<0.1
Cesium (Cs)	0.5 ppb	<0.1	Ruthenium (Ru)	0.5 ppb	<0.1
Chromium (Cr)	1 ppb	<0.5	Samarium (Sm)	0.5 ppb	<0.1
Cobalt (Co)	1 ppb	<0.1	Scandium (Sc)	0.5 ppb	<0.1
Copper (Cu)	1 ppb	<0.1	Selenium (Se)	1 ppb	<0.1
Dysprosium (Dy)	0.5 ppb	<0.1	Silver (Ag)	1 ppb	<0.1
Erbium (Er)	0.5 ppb	<0.1	Sodium (Na)	1 ppb	<0.2
Europium (Eu)	0.5 ppb	<0.1	Strontium (Sr)	1 ppb	<0.1
Gadolinium (Gd)	0.5 ppb	<0.1	Tantalum (Ta)	Information Only	<0.1
Gallium (Ga)	0.5 ppb	<0.1	Tellurium (Te)	0.5 ppb	<0.1
Germanium (Ge)	0.5 ppb	<0.1	Terbium (Tb)	0.5 ppb	<0.1
Gold (Au)	0.5 ppb	<0.1	Thallium (Tl)	0.5 ppb	<0.1
Hafnium (Hf)	0.5 ppb	<0.1	Thorium (Th)	1 ppb	<0.1
Holmium (Ho)	0.5 ppb	<0.1	Thulium (Tm)	0.5 ppb	<0.1
Indium (In)	0.5 ppb	<0.1	Tin (Sn)	1 ppb	<0.1
Iron (Fe)	1 ppb	<0.5	Titanium (Ti)	1 ppb	<0.1
Lanthanum (La)	0.5 ppb	<0.1	Tungsten (W)	0.5 ppb	<0.1
Lead (Pb)	1 ppb	<0.1	Uranium (U)	1 ppb	<0.1
Lithium (Li)	1 ppb	<0.1	Vanadium (V)	1 ppb	<0.1
Lutetium (Lu)	0.5 ppb	<0.1	Ytterbium (Yb)	0.5 ppb	<0.1
Magnesium (Mg)	1 ppb	<0.2	Yttrium (Y)	0.5 ppb	<0.1
Manganese (Mn)	1 ppb	<0.1	Zinc (Zn)	1 ppb	<0.2
Mercury (Hg)	1 ppb	<0.2	Zirconium (Zr)	1 ppb	<0.1
Molybdenum (Mo)	1 ppb	<0.1			

INORGANIC LABS/RADCHEM LABS
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Element concentrations are at the point of bottling. Concentrations of some elements in particular, Ca, Si, K, Na, B, Al, Mg & Mn will increase due to storage in glass bottles.

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TRACEMETAL GRADE HYDROCHLORIC ACID
CERTIFICATE OF ANALYSIS

B McKelvey
Dr. B. McKelvey
QA/QC Manager

CATALOG NUMBER: A508
LOT NUMBER: 4105050
RELEASE DATE: July, 2005
EXPIRY DATE: July, 2008

Tests	Maximum Specification	Actual Value	Units
ASSAY (HCl, w/w):	34 - 37%	36%	% by w/w
Color:	10	<10	APHA

Analyte	Maximum Specification	Actual Value (in ppb)	Analyte	Maximum Specification	Actual Value (in ppb)
Aluminum (Al)	1 ppb	<0.5	Neodymium (Nd)	0.5 ppb	<0.1
Antimony (Sb)	1 ppb	<0.1	Nickel (Ni)	1 ppb	<0.1
Arsenic (As)	1 ppb	<0.1	Niobium (Nb)	0.5 ppb	<0.1
Barium (Ba)	1 ppb	<0.1	Palladium (Pd)	Information Only	<0.5
Beryllium (Be)	1 ppb	<0.1	Platinum (Pt)	Information Only	<0.5
Bismuth (Bi)	1 ppb	<0.1	Potassium (K)	1 ppb	<0.1
Boron (B)	1 ppb	<0.5	Praseodymium (Pr)	0.5 ppb	<0.1
Cadmium (Cd)	1 ppb	<0.1	Rhenium (Re)	0.5 ppb	<0.1
Calcium (Ca)	1 ppb	<0.5	Rhodium (Rh)	0.5 ppb	<0.1
Cerium (Ce)	0.5 ppb	<0.1	Rubidium (Rb)	0.5 ppb	<0.1
Cesium (Cs)	0.5 ppb	<0.1	Ruthenium (Ru)	0.5 ppb	<0.1
Chromium (Cr)	1 ppb	<0.1	Samarium (Sm)	0.5 ppb	<0.1
Cobalt (Co)	1 ppb	<0.1	Scandium (Sc)	0.5 ppb	<0.1
Copper (Cu)	1 ppb	<0.1	Selenium (Se)	1 ppb	<0.1
Dysprosium (Dy)	0.5 ppb	<0.1	Silver (Ag)	1 ppb	<0.1
Erbium (Er)	0.5 ppb	<0.1	Sodium (Na)	1 ppb	<0.5
Europium (Eu)	0.5 ppb	<0.1	Strontium (Sr)	1 ppb	<0.1
Gadolinium (Gd)	0.5 ppb	<0.1	Tantalum (Ta)	Information Only	<1
Gallium (Ga)	0.5 ppb	<0.1	Tellurium (Te)	0.5 ppb	<0.1
Gold (Au)	0.5 ppb	<0.1	Terbium (Tb)	0.5 ppb	<0.1
Hafnium (Hf)	0.5 ppb	<0.1	Thallium (Tl)	0.5 ppb	<0.1
Holmium (Ho)	0.5 ppb	<0.1	Thorium (Th)	1 ppb	<0.1
Indium (In)	0.5 ppb	<0.1	Thulium (Tm)	0.5 ppb	<0.1
Iron (Fe)	1 ppb	<0.5	Tin (Sn)	1 ppb	<0.1
Lanthanum (La)	0.5 ppb	<0.1	Titanium (Ti)	1 ppb	<0.1
Lead (Pb)	1 ppb	<0.1	Tungsten (W)	0.5 ppb	<0.1
Lithium (Li)	1 ppb	<0.1	Uranium (U)	1 ppb	<0.1
Lutetium (Lu)	0.5 ppb	<0.1	Vanadium (V)	1 ppb	<0.1
Magnesium (Mg)	1 ppb	<0.5	Ytterbium (Yb)	0.5 ppb	<0.1
Manganese (Mn)	1 ppb	<0.1	Yttrium (Y)	0.5 ppb	<0.1
Mercury (Hg)	1 ppb	<0.2	Zinc (Zn)	1 ppb	<0.5
Molybdenum (Mo)	1 ppb	<0.1	Zirconium (Zr)	1 ppb	<0.1

Analyte	Maximum Specification	Actual Value (in ppm)	Analyte	Maximum Specification	Actual Value (in ppm)
Bromide (Br)	10 ppm	<10	Total Sulphur (S)	0.3 ppm	<0.3
Total Phosphorus (P)	0.01 ppm	<0.01	Free Chlorine (Cl2)	0.5 ppm	<0.5

Element concentrations are at the point of bottling. Concentrations of some elements in particular, Ca, Si, K, Na, B, Al, Mg & Mn will increase due to storage in glass bottles.

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010120

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TRACEMETAL GRADE HYDROCHLORIC ACID CERTIFICATE OF ANALYSIS

B McKelvey
Dr. B. McKelvey
QA/QC Manager

CATALOG NUMBER: A508
LOT NUMBER: 4105031
RELEASE DATE: July, 2005
EXPIRY DATE: July, 2008

Tests	Maximum Specification	Actual Value	Units
ASSAY (HCl, w/w):	34 - 37%	36%	% by w/w
Color:	10	<10	APHA

Analyte	Maximum Specification	Actual Value (in ppb)	Analyte	Maximum Specification	Actual Value (in ppb)
Aluminum (Al)	1 ppb	<0.5	Neodymium (Nd)	0.5 ppb	<0.1
Antimony (Sb)	1 ppb	<0.1	Nickel (Ni)	1 ppb	<0.1
Arsenic (As)	1 ppb	<0.1	Niobium (Nb)	0.5 ppb	<0.1
Barium (Ba)	1 ppb	<0.1	Palladium (Pd)	Information Only	<0.5
Beryllium (Be)	1 ppb	<0.1	Platinum (Pt)	Information Only	<0.5
Bismuth (Bi)	1 ppb	<0.1	Potassium (K)	1 ppb	<0.1
Boron (B)	1 ppb	<0.5	Praseodymium (Pr)	0.5 ppb	<0.1
Cadmium (Cd)	1 ppb	<0.1	Rhenium (Re)	0.5 ppb	<0.1
Calcium (Ca)	1 ppb	<0.5	Rhodium (Rh)	0.5 ppb	<0.1
Cerium (Ce)	0.5 ppb	<0.1	Rubidium (Rb)	0.5 ppb	<0.1
Cesium (Cs)	0.5 ppb	<0.1	Ruthenium (Ru)	0.5 ppb	<0.1
Chromium (Cr)	1 ppb	<0.1	Samarium (Sm)	0.5 ppb	<0.1
Cobalt (Co)	1 ppb	<0.1	Scandium (Sc)	0.5 ppb	<0.1
Copper (Cu)	1 ppb	<0.1	Selenium (Se)	1 ppb	<0.1
Dysprosium (Dy)	0.5 ppb	<0.1	Silver (Ag)	1 ppb	<0.1
Erbium (Er)	0.5 ppb	<0.1	Sodium (Na)	1 ppb	<0.5
Europium (Eu)	0.5 ppb	<0.1	Strontium (Sr)	1 ppb	<0.1
Gadolinium (Gd)	0.5 ppb	<0.1	Tantalum (Ta)	Information Only	<1
Gallium (Ga)	0.5 ppb	<0.1	Tellurium (Te)	0.5 ppb	<0.1
Gold (Au)	0.5 ppb	<0.1	Terbium (Tb)	0.5 ppb	<0.1
Hafnium (Hf)	0.5 ppb	<0.1	Thallium (Tl)	0.5 ppb	<0.1
Holmium (Ho)	0.5 ppb	<0.1	Thorium (Th)	1 ppb	<0.1
Indium (In)	0.5 ppb	<0.1	Thulium (Tm)	0.5 ppb	<0.1
Iron (Fe)	1 ppb	<0.5	Tin (Sn)	1 ppb	<0.1
Lanthanum (La)	0.5 ppb	<0.1	Titanium (Ti)	1 ppb	<0.1
Lead (Pb)	1 ppb	<0.1	Tungsten (W)	0.5 ppb	<0.1
Lithium (Li)	1 ppb	<0.1	Uranium (U)	1 ppb	<0.1
Lutetium (Lu)	0.5 ppb	<0.1	Vanadium (V)	1 ppb	<0.1
Magnesium (Mg)	1 ppb	<0.5	Ytterbium (Yb)	0.5 ppb	<0.1
Manganese (Mn)	1 ppb	<0.1	Yttrium (Y)	0.5 ppb	<0.1
Mercury (Hg)	1 ppb	<0.2	Zinc (Zn)	1 ppb	<0.5
Molybdenum (Mo)	1 ppb	<0.1	Zirconium (Zr)	1 ppb	<0.1

Analyte	Maximum Specification	Actual Value (in ppm)	Analyte	Maximum Specification	Actual Value (in ppm)
Bromide (Br)	10 ppm	<10	Total Sulphur (S)	0.3 ppm	<0.3
Total Phosphorus (P)	0.01 ppm	<0.01	Free Chlorine (Cl2)	0.5 ppm	<0.5

Element concentrations are at the point of bottling. Concentrations of some elements in particular, Ca, Si, K, Na, B, Al, Mg & Mn will increase due to storage in glass bottles.

INORGANIC LABS/RADCHEM LABS
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Certificate of Reference Material

Catalog Number: SPIKE-1 **Lot No.:** 28-176AS
Description: **Spike Sample Standard 1**
Matrix: 5% Nitric Acid/tr Tartaric Acid - HF

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 ICPOES, DCP, AA, ICPMS, 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 concentration.

Refer to side 2 for details of measurement uncertainties.

Instrumental Analysis by ICP Spectrometer:

Element	Labeled (mg/L)	Measured (mg/L)	NIST SRM	Element	Labeled (mg/L)	Measured (mg/L)	NIST SRM
Al	200	198.56	3101a	Pb	50	50.06	3128
As	200	197.01	3103a	Sb	50	48.62	3102a
Ba	200	199.49	3104a	V	50	49.87	3165
Se	200	198.51	3149	Zn	50	49.70	3168a
TL	200	199.25	3158	Cu	25	25.15	3114
Fe	100	98.90	3126a	Cr	20	19.81	3112a
Co	50	50.04	3113	Ag	5	4.96	3151
Mn	50	49.90	3132	Be	5	4.92	3105a
Ni	50	50.16	3136	Cd	5	4.96	3108

Spex Reference Multi: Lot #4-24BD, 2-61BD, 17-55AS, 16-68AS

INORGANIC LABS/RADCHEM LABS
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DATE EXPIRED: 4/30/09
DATE OPENED: 4/18/05
INORG: 5197 PO: 55160

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% on the average of all the certified concentrations with no single component exceeding +/- 2%. This guarantee is valid for a period of one year from the date of certification only when the material is kept tightly capped and transported and stored under laboratory conditions.

1 of 2
5197

Date of Certification: APR. - - 2005 Certifying Officer: N. Kocherlakota

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Report of Certification

This Certified Reference Material has been prepared and certified under an ISO 9001 system consistent with the following guides:
Guide To The Expression Of Uncertainty In Measurement 1995
EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
ASTM Guide D6362-98
ISO Guide 34: Quality system guidelines for the production of reference materials.
ISO Guide 17025: Certification of reference materials, general and statistical principles
ISO Guide 31: Contents of certificates of reference materials
NIST Technical Note 1297
ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
ISO/REMCO N280

Material Source:

All analytes and matrix materials are obtained and verified by SPEX CertiPrep from pre-qualified vendors as per ISO 9000 guidelines. Vendor identifications are proprietary, however sources of all materials used in the preparation and testing of SPEX CertiPrep CRMs are tracked and documented. For further information contact CRM Sales.

Instructions for Use:

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

Method of Preparation:

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

Homogeneity:

The Homogeneity of the CRM has been confirmed by procedures consistent with ISO guide 17025, ISO/REMCO N280 and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed for the certified values by procedures consistent with the intended use of the CRM.
The mathematical expression $k_s=s^2m$ is employed to determine the sampling size
s = relative standard deviation in % for one component of the sample. (ie. The sub-sampling uncertainty)
m = the sub-sampling mass
k_s = mass of sub-sample necessary to ensure a relative sub-sampling error of 1% (68% confidence level) in a single determination

Statistical estimator and Confidence limits:

The certified value 'x' listed on the reverse of this document is at the 95% level of confidence and can be expressed as
X = x+/-U where X =True value (Labeled Value), U= Expanded uncertainty
$U=ku_c$ where k=2 is the coverage factor at the 95% confidence level
u_c is obtained by combining the individual element standard uncertainty components u_i and $u_c=\sqrt{\Sigma u_i^2}$

Certification Traveler Report:

All certified values reported were derived from Traveler Report (Spex CertiPrep's traceability documentation) identified by the lot number of this CRM. For further information contact CRM Sales.

Legal Notice:

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010123

SPEXertificate™

Certificate of Reference Material

Catalog Number: ICAL-1 **Lot No.:** 28-64AS
Description: **Instrument Calibration Standard 1**
Matrix: 5% Nitric Acid

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 ICPOES, DCP, AA, ICPMS, 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 concentration.

Refer to side 2 for details of measurement uncertainties.

Instrumental Analysis by ICP Spectrometer:

Element	Labeled (mg/L)	Measured (mg/L)	NIST SRM
Ca	5,000	5011.87	3109a
K	5,000	5011.80	3141a
Mg	5,000	5020.86	3131a
Na	5,000	4995.13	3152a

Spex Reference Multi: Lot #6-28VY, 6-104VY, 25-178AS-REF

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% on the average of all the certified concentrations with no single element exceeding +/-2%. This includes uncertainty of measurements and other effects, such as transpiration losses. This guarantee is valid for a period of one year from the date of certification only when the material is kept tightly capped and transported and stored under laboratory conditions.

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 6/30/05
DATE EXPIRED: 6/30/06
DATE OPENED: 6/30/05
INORG: 5288 PO: 155205

Date of Certification: _____ Certifying Officer: N. Kocherlakota

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Report of Certification

This Certified Reference Material has been prepared and certified under an ISO 9001 system consistent with the following guides:
Guide To The Expression Of Uncertainty In Measurement 1995
EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
ASTM Guide D6362-98
ISO Guide 34: Quality system guidelines for the production of reference materials.
ISO Guide 17025: Certification of reference materials, general and statistical principles
ISO Guide 31: Contents of certificates of reference materials
NIST Technical Note 1297
ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
ISO/REMCO N280

Material Source:

All analytes and matrix materials are obtained and verified by SPEX CertiPrep from pre-qualified vendors as per ISO 9000 guidelines. Vendor identifications are proprietary, however sources of all materials used in the preparation and testing of SPEX CertiPrep CRMs are tracked and documented. For further information contact CRM Sales.

Instructions for Use:

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

Method of Preparation:

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

Homogeneity:

The Homogeneity of the CRM has been confirmed by procedures consistent with ISO guide 17025, ISO/REMCO N280 and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed for the certified values by procedures consistent with the intended use of the CRM.
The mathematical expression $k_s = s^2 m$ is employed to determine the sampling size
s = relative standard deviation in % for one component of the sample. (ie. The sub-sampling uncertainty)
m = the sub-sampling mass
k_s = mass of sub-sample necessary to ensure a relative sub-sampling error of 1% (68% confidence level) in a single determination

Statistical estimator and Confidence limits:

The certified value 'x' listed on the reverse of this document is at the 95% level of confidence and can be expressed as
$X = x +/- U$ where X =True value (Labeled Value), U= Expanded uncertainty
$U = ku_c$ where $k=2$ is the coverage factor at the 95% confidence level
u_c is obtained by combining the individual element standard uncertainty components u_i and $u_c = \sqrt{\Sigma u_i^2}$

Certification Traveler Report:

All certified values reported were derived from Traveler Report (Spex CertiPrep's traceability documentation) identified by the lot number of this CRM. For further information contact CRM Sales.

Legal Notice:

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e-mail: ivsales@ivstandards.com • website: www.ivstandards.com

certificate of analysis

1.0 **Inorganic Ventures / IV Labs is an ISO Guide 34-2000 Certified Reference Material (CRM) Manufacturer: Certificate #883-02.** The certificate is designed and the certified value(s) and uncertainty(ies) are determined in accordance with ISO Guide 31-2000 (Reference Materials - Contents of certificates and label(s), ISO Guide 34-2000 "Quality System Guidelines for the Production of Reference Materials," and ISO Guide 35-1989 "Certification of Reference Materials - General and Statisical Principles."

2.0 **DESCRIPTION OF CRM** Custom-Grade **1000 µg/mL Scandium in 5% (abs) HNO_3**

Catalog Number:	CGSC1-1, CGSC1-2, and CGSC1-5
Lot Number:	**X-SC02063**
Starting Material:	Sc_2O_3
Starting Material Purity (%):	99.996919
Starting Material Lot No	BSC-632-1-5736
Matrix:	5% (abs) HNO_3

3.0 **CERTIFIED VALUES AND UNCERTAINTIES**

Certified Concentration: 1007 ± 2 µg/mL

Certified Density: 1.037 g/mL (measured at 22° C)

The Certified Value is the ICP value. The following equations are used in the calculations of the certified value and the uncertainty:

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

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

$(\bar{x})$ = 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.)

The independent samples t-test was used to determine if there is agreement between the above assay methods at the 95% confidence interval. Both methods were compared and showed agreement within the stated uncertainties. This agreement is a confirmation of the accuracy of this CRM.

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 IV product is Traceable to NIST via direct comparison to NIST SRMs. The uncertainties for each certified value are reported, taking into account the SRM uncertainty error and the measurement, weighing and volume dilution errors.

4.1 **Assay Method #1** **1007 ± 2 µg/mL**
ICP Assay NIST SRM 3148a Lot Number: 792111

Assay Method #2 **1006 ± 2 µg/mL**
EDTA NIST SRM 928 Lot Number: 392110

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 9/23/05
DATE EXPIRED: 10/1/06
DATE OPENED: 9/27/05
INORG: 5404 PO: DR0696435

pg. 10 of 1
5404

4.2 **BALANCE CALIBRATION** - All balances are checked daily using in-house procedure number 6-IMM-001. The weights used for testing are annually compared to Gerhart Scale Corporation's master weights and are traceable to the National Institute of Standards and Technology (NIST). The NIST Traceability numbers are 692476 - Class 1 and 692476A - Class 2. The NIST test number is 822/260017-98. All analytical balances are calibrated every 4 months by Gerhart Scale Corp. of South Amboy. The balances are calibrated with a class 1 and/or class 2 analytical weight set. These weights are tested annually by a NIST / NVLAP accredited calibration lab. The NIST test number is 822/260017-98.

4.3 **THERMOMETER CALIBRATION** - The thermometers used in the determination of the final densities are calibrated vs standard thermometer No. 903-2680 which was certified in accordance with the procedures outlined by ASTM E77-87 and NIST Monograph 150 using NIST Test Nos. and Std Nos.: 769543, 217368/769543, 217368/P14452, 176240/P14452, 176240. The in-house procedure No. is 2-QC-001.Thermometers which are not calibrated vs standard thermometer No. 903-2680 are traceable to NIST Identification Nos. 92564, 119016, 471047 and NIST test report Nos. 811/258522, 811/2557078, and 236090.

4.4 **GLASSWARE CALIBRATION** - In-house procedure 3-QC-002 is used to calibrate all Class A Glassware used in the manufacture and quality control of Custom Grade Standards.

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.

O	Al	< 0.00100	M	Dy	< 0.00598	M	Li	< 0.00997	M	Pr	< 0.00030	M	Te	< 0.02990
M	Sb	< 0.00050	M	Er	< 0.00498	M	Lu	< 0.00040	M	Re	< 0.00100	M	Tb	< 0.00030
M	As	< 0.00997	M	Eu	< 0.00299	O	Mg	0.00010	M	Rh	< 0.00100	M	Tl	< 0.00100
M	Ba	< 0.00997	M	Gd	< 0.00100	M	Mn	< 0.00399	M	Rb	< 0.00100	M	Th	0.01175
M	Be	< 0.00050	M	Ga	< 0.00100	O	Hg	< 0.01000	M	Ru	< 0.00199	M	Tm	< 0.00040
M	Bi	< 0.00040	M	Ge	< 0.00598	M	Mo	< 0.00199	M	Sm	< 0.00100	M	Sn	< 0.00498
M	B	< 0.06976	M	Au	< 0.00299	M	Nd	< 0.00199	s	Sc		O	Ti	< 0.00100
M	Cd	< 0.00299	M	Hf	< 0.00199	O	Ni	< 0.00090	M	Se	< 0.00797	M	W	< 0.00997
O	Ca	0.01149	M	Ho	< 0.00050	M	Nb	< 0.00050	O	Si	0.00200	M	U	< 0.00199
M	Ce	< 0.00498	M	In	< 0.00997	n	Os		M	Ag	< 0.00199	M	V	< 0.00199
M	Cs	< 0.00030	M	Ir	< 0.00498	M	Pd	< 0.00498	O	Na	< 0.09000	M	Yb	< 0.00100
O	Cr	0.00047	O	Fe	0.00037	n	P		M	Sr	< 0.00050	O	Y	< 0.00100
M	Co	< 0.00299	M	La	< 0.00050	M	Pt	< 0.00199	O	S	< 0.02500	O	Zn	0.00060
O	Cu	< 0.00140	M	Pb	< 0.00299	O	K	< 0.10000	M	Ta	< 0.00698	O	Zr	0.02298

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:
ICP-MS, ICP-OES, FAAS, GFAA, XRF, and DCP
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 IV Technical Staff

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 - 44.95591; +3; 6; $Sc(H_2O)_6^{+3}$

Chemical Compatibility - Soluble in HCl, H_2SO_4 and HNO_3. Avoid HF, H_3PO_4 and neutral to basic media. Stable with most metals and inorganic anions forming an insoluble carbonate, oxide, oxalate, and fluoride. Avoid mixing with elements / solutions containing moderate amounts of fluoride. The fluoride is soluble in excess HF forming ScF_6^{3-} (not recommended for standard preparations).

Stability - 2-100 ppb levels stable for months in 1% HNO_3 / LDPE container. 1-10,000 ppm solutions chemically stable for years in 5-10% HNO_3 / LDPE container. Small atomic radius increases hydrolysis requiring higher acid levels than other Rare Earths.

Sc Containing Samples (Preparation and Solution) - Metal (Soluble in acids); Oxide (Dissolve by heating in H_2O / HNO_3); Ores (Carbonate fusion in Pt^0 followed by HCl dissolution); Organic Matrices (Dry ash and dissolve in 1:1 H_2O / HCl or HNO_3), (Aqua Regia or nitric / perchloric / sulfuric acid digestions can be used. **Exercise caution when using perchloric acid.**)

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	335.373 nm	0.004 / 0.00002 µg/mL	1	ion	
ICP-OES	337.215 nm	0.004 / 0.00002 µg/mL	1	ion	Ti, U, Ni, Rh
ICP-OES	424.683 nm	0.003 / 0.00002 µg/mL	1	ion	Ce
ICP-MS	45 amu	2.3 ppt	n/a	M^+	$^{16}O_2{}^{12}CH$, $^{29}Si^{16}O$, $^{90}Zr^{+2}$

8.0 HAZARDOUS INFORMATION

- Please refer to the enclosed Material Saftey Data sheet for information regarding this CRM.

9.0 HOMOGENEITY

- This solution was mixed according to procedure IV-MPM-004 and is guaranteed to be homogeneous.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001:2000 Quality Management System Registration - QMI Certificate Number 010105

Recognized by:

Registrar Accreditation Board (ANSI-RAB)
Standards Council of Canada (SCC)
Dutch Council for Accreditation (RVA)
Entidad Mexicana de Acreditacion, a.c.(EMA)

Members of IQ Net International Certification Network:

Argentina (IRAM), Australia (QAS), Austria (ÖQS), Belgium (Avinter), Brazil (FCAV), Canada (QMI), Hong Kong (HKQAA), Columbia (ICONTEC), Czech Republic (CQS), Denmark (DS), Finland (SFS), France (AFAQ), Germany (DQS), Greece (ELOT), Hungary (MSZT), Ireland (NSAI), Israel (SII), Italy (CISQ), Japan (JQA), Korea (KSA-QA), Netherlands (KEMA), Norway (NCS), Poland(PCBC), Portugal (APCER), Singapore (PSB), Slovenia (SIQ), Spain (AENOR), Switzerland (SQS)

10.2 ISO/IEC 17025 - 1999 "General Requirements for the Competence of Testing and Calibration" - Chemical Testing - Accredited A2LA Certificate Number 883.01

10.3 ISO/IEC Guide 34 - 2000 "General Requirements for the Competence of Reference Material Producers" - Reference Materials Production - Accredited A2LA Certificate Number 883.02

A2LA Mutual Recognition Agreement Partners:

Australia (NATA), Austria (BmwA), Belgium (BELTEST) (BKO-OBE), Canada (SCC), Chinese Taipei (CNLA), Czech Republic (NAO), Denmark (DANAK), Finland (FINAS), France (COFRAC), Germany (DAR), Hong Kong (HKAS, Ireland (NAB), Italy (SIT) (SINAL), Japan (JAB) (JNLA), Republic of Korea (KOLAS), The Netherlands (RvA), New Zealand (IANZ), Norway (NA), Portugal (IPQ), Singapore (SAC-SINGLAS), Spain (ENAC), Sweden (SWEDAC), Switzerland (SAS), United Kingdom (UKAS) and United States (NVLAP) (ICBO ES)

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

10.6 MIL-STD-45662A (Obsolete/Observed)

010128

11.0 DATE OF CERTIFICATION AND PERIOD OF VALIDITY

11.1 IV 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 (P-SP01020) of chemically-stable solutions performed at Inorganic Ventures / IV Labs indicate a CRM shelf-life of four years for solutions packaged in 500-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.
Inorganic Ventures / IV Labs concurs with state and federal regulatory agencies' recommendations that solution standards be assigned a one-year expiration date.

Certification Date: December 14, 2004

Expiration Date: EXPIRES 1/2006

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:	Nick Maida, QA Administrator	Nicholas Maida
Certificate Approved By:	Katalin Le, QC Manager	Katalin Le
Certifying Officer:	Paul Gaines, Chemist, Senior Technical Director	Paul R Gaines

010129

inorganic ventures / iv labs

195 lehigh avenue, suite 4, lakewood, nj 08701 usa
phone: 800-669-6799 • 732-901-1900 • fax: 732-901-1903
e-mail: ivsales@ivstandards.com • website: www.ivstandards.com

certificate of analysis

1.0 **Inorganic Ventures / IV Labs is an ISO Guide 34-2000 Certified Reference Material (CRM) Manufacturer: Certificate #883-02.** The certificate is designed and the certified value(s) and uncertainty(ies) are determined in accordance with ISO Guide 31-2000 (Reference Materials - Contents of certificates and label(s), ISO Guide 34-2000 "Quality System Guidelines for the Production of Reference Materials," and ISO Guide 35-1989 "Certification of Reference Materials - General and Statisical Principles."

2.0 DESCRIPTION OF CRM

Custom-Grade **10000 µg/mL Scandium in 5% (abs) HNO_3**

Catalog Number:	CGSC10-1, CGSC10-2, and CGSC10-5
Lot Number:	**X-SC02061**
Starting Material:	Sc_2O_3
Starting Material Purity (%):	99.996918
Starting Material Lot No	BSC-632-1-5736
Matrix:	5% (abs) HNO_3

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Concentration: 10,007 ± 21 µg/mL

Certified Density: 1.071 g/mL (measured at 22° C)

The Certified Value is based upon the most precise method used to analyze this CRM. The following equations are used in the calculation of the certified value and the uncertainty:

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

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

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

The independent samples t-test was used to determine if there is agreement between the above assay methods at the 95% confidence interval. Both methods were compared and showed agreement within the stated uncertainties. This agreement is a confirmation of the accuracy of this CRM.

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 IV product is Traceable to NIST via direct comparison to NIST SRMs. The uncertainties for each certified value are reported, taking into account the SRM uncertainty error and the measurement, weighing and volume dilution errors.

4.1 **Assay Method #1** **10,005 ± 26 µg/mL**
ICP Assay NIST SRM 3148a Lot Number: 792111

Assay Method #2 **10,007 ± 21 µg/mL**
EDTA NIST SRM 928 Lot Number: 880710

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 3/31/05
DATE EXPIRED: 3/1/06
DATE OPENED: 3/31/05
INORG: 5175 PO: 3/1/06

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5175

4.2 **BALANCE CALIBRATION** - All balances are checked daily using in-house procedure number 6-IMM-001. The weights used for testing are annually compared to Gerhart Scale Corporation's master weights and are traceable to the National Institute of Standards and Technology (NIST). The NIST Traceability numbers are 692476 - Class 1 and 692476A - Class 2. The NIST test number is 822/260017-98. All analytical balances are calibrated every 4 months by Gerhart Scale Corp. of South Amboy. The balances are calibrated with a class 1 and/or class 2 analytical weight set. These weights are tested annually by a NIST / NVLAP accredited calibration lab. The NIST test number is 822/260017-98.

4.3 **THERMOMETER CALIBRATION** - The thermometers used in the determination of the final densities are calibrated vs standard thermometer No. 903-2680 which was certified in accordance with the procedures outlined by ASTM E77-87 and NIST Monograph 150 using NIST Test Nos. and Std Nos.: 769543, 217368/769543, 217368/P14452, 176240/P14452, 176240. The in-house procedure No. is 2-QC-001.Thermometers which are not calibrated vs standard thermometer No. 903-2680 are traceable to NIST Identification Nos. 92564, 119016, 471047 and NIST test report Nos. 811/258522, 811/2557078, and 236090.

4.4 **GLASSWARE CALIBRATION** - In-house procedure 3-QC-002 is used to calibrate all Class A Glassware used in the manufacture and quality control of Custom Grade Standards.

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.

O	Al	< 0.00100	M	Dy	< 0.00598	M	Li	< 0.00997	M	Pr	< 0.00030	M	Te	< 0.02990
M	Sb	< 0.00050	M	Er	< 0.00498	M	Lu	< 0.00040	M	Re	< 0.00100	M	Tb	< 0.00030
M	As	< 0.00997	M	Eu	< 0.00299	O	Mg	0.00100	M	Rh	< 0.00100	M	Tl	< 0.00100
M	Ba	< 0.00997	M	Gd	< 0.00100	M	Mn	< 0.00399	M	Rb	< 0.00100	M	Th	0.11759
M	Be	< 0.00050	M	Ga	< 0.00100	O	Hg	< 0.01000	M	Ru	< 0.00199	M	Tm	< 0.00040
M	Bi	< 0.00040	M	Ge	< 0.00598	M	Mo	< 0.00199	M	Sm	< 0.00100	M	Sn	< 0.00498
M	B	< 0.06976	M	Au	< 0.00299	M	Nd	< 0.00199	s	Sc		O	Ti	< 0.00100
M	Cd	< 0.00299	M	Hf	< 0.00199	O	Ni	< 0.00090	M	Se	< 0.00797	M	W	< 0.00997
O	Ca	0.11500	M	Ho	< 0.00050	M	Nb	< 0.00050	O	Si	0.02000	M	U	< 0.00199
M	Ce	< 0.00498	M	In	< 0.00997	n	Os		M	Ag	< 0.00199	M	V	< 0.00199
M	Cs	< 0.00030	M	Ir	< 0.00498	M	Pd	< 0.00498	O	Na	< 0.09000	M	Yb	< 0.00100
O	Cr	0.00470	O	Fe	0.00370	n	P		M	Sr	< 0.00050	O	Y	< 0.00100
M	Co	< 0.00299	M	La	< 0.00050	M	Pt	< 0.00199	O	S	< 0.02500	O	Zn	0.00600
O	Cu	< 0.00140	M	Pb	< 0.00299	O	K	< 0.10000	M	Ta	< 0.00698	O	Zr	0.23000

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:
ICP-MS, ICP-OES, FAAS, GFAA, XRF, and DCP
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 IV Technical Staff

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 - 44.95591; +3; 6; $Sc(H_2O)_6^{+3}$

Chemical Compatibility - Soluble in HCl, H_2SO_4 and HNO_3. Avoid HF, H_3PO_4 and neutral to basic media. Stable with most metals and inorganic anions forming an insoluble carbonate, oxide, oxalate, and fluoride. Avoid mixing with elements / solutions containing moderate amounts of fluoride. The fluoride is soluble in excess HF forming ScF_6^{3-} (not recommended for standard preperations)

Stability - 2-100 ppb levels stable for months in 1% HNO_3 / LDPE container. 1-10,000 ppm solutions chemically stable for years in 5-10% HNO_3 / LDPE container. Small atomic radius increases hydrolysis requiring higher acid levels than other Rare Earths.

Sc Containing Sample Preparation and Solution) - Metal (Soluble in acids); Oxide (Dissolve by heating in H_2O / HNO_3); Ores (Carbonate fusion in Pt° followed by HCl dissolution); Organic Matrices (Dry ash and dissolve in 1:1 H_2O / HCl or HNO_3), (Aqua Regia or nitric / perchloric / sulfuric acid digestions can be used. **Exercise caution when using perchloric acid.**)

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 at ≈ concs.)
ICP-OES 335.373 nm	0.004 / 0.00002 µg/mL	1	ion	
ICP-OES 337.215 nm	0.004 / 0.00002 µg/mL	1	ion	Ti, U, Ni, Rh
ICP-OES 424.683 nm	0.003 / 0.00002 µg/mL	1	ion	Ce
ICP-MS 45 amu	2.3 ppt	n/a	M'	$^{16}O_2{}^{12}CH$, $^{28}Si^{16}O$, $^{90}Zr^{12}$

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

9.0 HOMOGENEITY - This solution was mixed according to procedure IV-MPM-004 and is guaranteed to be homogeneous.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001:2000 Quality Management System Registration - QMI Certificate Number 010105

Recognized by:

Registrar Accreditation Board (ANSI-RAB)
Standards Council of Canada (SCC)
Dutch Council for Accreditation (RVA)
Entidad Mexicana de Acreditacion, a.c.(EMA)

Members of IQ Net International Certification Network:

Argentina (IRAM), Australia (QAS), Austria (ÖQS), Belgium (Avinter), Brazil (FCAV), Canada (QMI), Hong Kong (HKQAA), Columbia (ICONTEC), Czech Republic (CQS), Denmark (DS), Finland (SFS), France (AFAQ), Germany (DQS), Greece (ELOT), Hungary (MSZT), Ireland (NSAI), Israel (SII), Italy (CISQ), Japan (JQA), Korea (KSA-QA), Netherlands (KEMA), Norway (NCS), Poland(PCBC), Portugal (APCER), Singapore (PSB), Slovenia (SIQ), Spain (AENOR), Switzerland (SQS)

10.2 ISO/IEC 17025 - 1999 "General Requirements for the Competence of Testing and Calibration" - Chemical Testing - Accredited A2LA Certificate Number 883.01

10.3 ISO/IEC Guide 34 - 2000 "General Requirements for the Competence of Reference Material Producers" - Reference Materials Production - Accredited A2LA Certificate Number 883.02

A2LA Mutual Recognition Agreement Partners:

Australia (NATA), Austria (BmwA), Belgium (BELTEST) (BKO-OBE), Canada (SCC), Chinese Taipei (CNLA), Czech Republic (NAO), Denmark (DANAK), Finland (FINAS), France (COFRAC), Germany (DAR), Hong Kong (HKAS, Ireland (NAB), Italy (SIT) (SINAL), Japan (JAB) (JNLA), Republic of Korea (KOLAS), The Netherlands (RvA), New Zealand (IANZ), Norway (NA), Portugal (IPQ), Singapore (SAC-SINGLAS), Spain (ENAC), Sweden (SWEDAC), Switzerland (SAS), United Kingdom (UKAS) and United States (NVLAP) (ICBO ES)

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

10.6 MIL-STD-45662A (Obsolete/Observed)

11.0 DATE OF CERTIFICATION AND PERIOD OF VALIDITY

11.1 IV 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 (P-SP01020) of chemically-stable solutions performed at Inorganic Ventures / IV Labs indicate a CRM shelf-life of four years for solutions packaged in 500-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.
Inorganic Ventures / IV Labs concurs with state and federal regulatory agencies' recommendations that solution standards be assigned a one-year expiration date.

Certification Date: July 01, 2004

Expiration Date: EXPIRES 01/2006

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:	Nick Maida, QA Administrator	Nicholas Maida
Certificate Approved By:	Katalin Le, QC Manager	Katalin Le
Certifying Officer:	Paul Gaines, Chemist, Senior Technical Director	Paul R Gaines

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SPEXertificate™

Certificate of Reference Material

Catalog Number: PLB9-2X/2Y/2T **Lot No.** 10-119B

Description: 1000 mg/L Boron

Matrix: H2O

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 ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 1001 mg/L

Uncertainty Associated with Measurement: +/- 3.0 mg/L

Certified Value is Traceable to: NIST SRM 3107

The CRM is prepared gravimetrically using high purity (NH4)2B4O7-4H2O Lot# 08001E. The certified value listed is the average of values obtained by classical wet assay and ICP spectrometer analysis

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 1001 mg/L

Method: Titration with Sodium Hydroxide using Phenolphthalein as indicator. Sodium Hydroxide standardized against Potassium Biphthalate NIST SRM #84k

Instrumental Analysis by ICP spectrometer: 1001 mg/L

Uncertified Properties:

Density: 1.001 @ 22.3 Degrees Celsius

Trace Metallic Impurities in the Actual Solution via ICP / ICPMS Analysis:

Element	mg/L	Element	mg/L	Element	mg/L
Al	0.06	Cu	<0.001	Pb	<0.001
As	<0.001	Fe	0.001	Re	<0.001
Ag	0.002	Ga	<0.001	Rb	<0.001
Ba	<0.001	In	<0.001	Sr	<0.001
Be	<0.001	K	<0.06	Sb	<0.001
Bi	0.03	Li	<0.001	Si	0.01
Cd	<0.001	Mn	<0.001	Ti	<0.001
Co	<0.001	Mo	<0.001	Tl	<0.001
Ca	0.001	Mg	<0.001	V	0.003
Cr	<0.001	Na	0.01	Zr	<0.001
		Ni	0.001	Zn	0.004

Balances are calibrated regularly with weight sets traceable to NIST #32856, #32857 and others. This CRM is guaranteed stable to +/-0.5% of the certified concentration inclusive of uncertainty of measurements and other effects, such as transpiration losses, for a period of one year from the date of certification. This guarantee is valid only when the material is kept tightly capped and transported and stored under laboratory conditions.

Date of Certification: JAN '05 Certifying Officer: N. Kocherlakota

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 01/17/05
DATE EXPIRED: 01/15/2006 W03
DATE OPENED: 01/19/05
INORG: 4966 PO: F55130

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Report of Certification

010134

This Certified Reference Material has been prepared and certified under an ISO 9001 system consistent with the following guides:
Guide To The Expression Of Uncertainty In Measurement 1995
EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
ASTM Guide D6362-98
ISO Guide 34: Quality system guidelines for the production of reference materials.
ISO Guide 17025: Certification of reference materials, general and statistical principles
ISO Guide 31: Contents of certificates of reference materials
NIST Technical Note 1297
ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
ISO/REMCO N280

Material Source:

All analytes and matrix materials are obtained and verified by SPEX CertiPrep from pre-qualified vendors as per ISO 9000 guidelines. Vendor identifications are proprietary, however sources of all materials used in the preparation and testing of SPEX CertiPrep CRMs are tracked and documented. For further information contact CRM Sales.

Instructions for Use:

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

Method of Preparation:

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

Homogeneity:

The Homogeneity of the CRM has been confirmed by procedures consistent with ISO guide 17025, ISO/REMCO N280 and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed for the certified values by procedures consistent with the intended use of the CRM.
The mathematical expression $k_s = s^2 m$ is employed to determine the sampling size
s = relative standard deviation in % for one component of the sample. (ie. The sub-sampling uncertainty)
m = the sub-sampling mass
k_s = mass of sub-sample necessary to ensure a relative sub-sampling error of 1% (68% confidence level) in a single determination

Statistical estimator and Confidence limits:

The certified value 'x' listed on the reverse of this document is at the 95% level of confidence and can be expressed as
X = x+/-U where X =True value (Labeled Value), U= Expanded uncertainty
$U = ku_c$ where k=2 is the coverage factor at the 95% confidence level
u_c is obtained by combining the individual element standard uncertainty components u_i and $u_c = \sqrt{\Sigma u_i^2}$

Certification Traveler Report:

All certified values reported were derived from Traveler Report (Spex CertiPrep's traceability documentation) identified by the lot number of this CRM. For further information contact CRM Sales.

Legal Notice:

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SPEXertificate ™

Certificate of Reference Material

Catalog Number: PLLI2-2X/2Y **Lot No.** 11-120LI

Description: 1000 mg/L Lithium

Matrix: 2% HNO3

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 ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 1002 mg/L

Uncertainty Associated with Measurement: +/- 3.0 mg/L

Certified Value is Traceable to: NIST SRM #3129a

The CRM is prepared gravimetrically using high purity Lithium Carbonate Lot# 03021A. The certified value listed is the average of values obtained by classical wet assay and ICP spectrometer analysis

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 1003 mg/L

Method: Evaporate to dryness Fume with Sulfuric Acid. Ignite and weigh as Li2SO4

Instrumental Analysis by ICP spectrometer: 1001 mg/L

Uncertified Properties:

Density: 1.013 @ 24.6 Degrees Celsius

Trace Metallic Impurities in the Actual Solution via ICP / ICPMS Analysis:

Element	mg/L	Element	mg/L	Element	mg/L
Al	<0.001	Cu	0.02	Pb	0.008
Ag	<0.001	Fe	0.04	Rb	<0.001
As	0.06	Ga	<0.001	Re	<0.001
Bi	<0.001	In	<0.001	Sr	0.004
Be	<0.001	K	<0.20	Sb	0.004
B	<0.001	Li	<0.001	Si	<0.100
Ba	0.004	Mg	0.004	Tl	<0.001
Cr	<0.001	Mo	0.007	Ti	<0.001
Co	<0.001	Mn	0.004	V	0.006
Ca	0.012	Ni	<0.001	Zn	0.03
Cd	<0.001	Na	0.100	Zr	<0.001

Balances are calibrated regularly with weight sets traceable to NIST #32856, #32857 and others. This CRM is guaranteed stable to +/-0.5% of the certified concentration inclusive of uncertainty of measurements and other effects, such as transpiration losses, for a period of one year from the date of certification. This guarantee is valid only when the material is kept tightly capped and transported and stored under laboratory conditions.

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 8/4/05
DATE EXPIRED: 8/5/10
DATE OPENED: 8/6/05
INORG: S327 PO: FS2483

Date of Certification: AUG - 2005 Certifying Officer: N. Kocholakota

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Report of Certification

This Certified Reference Material has been prepared and certified under an ISO 9001 system consistent with the following guides:
Guide To The Expression Of Uncertainty In Measurement 1995
EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
ASTM Guide D6362-98
ISO Guide 34: Quality system guidelines for the production of reference materials.
ISO Guide 17025: Certification of reference materials, general and statistical principles
ISO Guide 31: Contents of certificates of reference materials
NIST Technical Note 1297
ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
ISO/REMCO N280

Material Source:

All analytes and matrix materials are obtained and verified by SPEX CertiPrep from pre-qualified vendors as per ISO 9000 guidelines. Vendor identifications are proprietary, however sources of all materials used in the preparation and testing of SPEX CertiPrep CRMs are tracked and documented. For further information contact CRM Sales.

Instructions for Use:

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

Method of Preparation:

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

Homogeneity:

The Homogeneity of the CRM has been confirmed by procedures consistent with ISO guide 17025, ISO/REMCO N280 and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed for the certified values by procedures consistent with the intended use of the CRM.
The mathematical expression $k_s=s^2m$ is employed to determine the sampling size
s = relative standard deviation in % for one component of the sample. (ie. The sub-sampling uncertainty)
m = the sub-sampling mass
k_s = mass of sub-sample necessary to ensure a relative sub-sampling error of 1% (68% confidence level) in a single determination

Statistical estimator and Confidence limits:

The certified value 'x' listed on the reverse of this document is at the 95% level of confidence and can be expressed as
X = x+/-U where X =True value (Labeled Value), U= Expanded uncertainty
$U=ku_c$ where k=2 is the coverage factor at the 95% confidence level
u_c is obtained by combining the individual element standard uncertainty components u_i and $u_c=\sqrt{\Sigma u_i^2}$

Certification Traveler Report:

All certified values reported were derived from Traveler Report (Spex CertiPrep's traceability documentation) identified by the lot number of this CRM. For further information contact CRM Sales.

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Certificate of Reference Material

Catalog Number: PLMO9-2X/2Y/2T **Lot No.** 11-51MO
Description: 1000 mg/L Molybdenum
Matrix: H2O

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 ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 1000 mg/L
Uncertainty Associated with Measurement: +/-3.0 mg/L
Certified Value is Traceable to: NIST SRM #3134

The CRM is prepared gravimetrically using high purity (NH4)6(Mo)7(O)24-4H2OLot# 03011C. The certified value listed is the average of values obtained by classical wet assay and ICP spectrometer analysis

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 1000 mg/L

Method: Precipitation using 8-Hydroxy Quinoline. Filter, dry, and weigh as MoO2(C9H6NO)2.

Instrumental Analysis by ICP spectrometer: 1001 mg/L
Uncertified Properties:

Density: 09989 @23.7 Degrees Celsius

Trace Metallic Impurities in the Actual Solution via ICP / ICPMS Analysis:

Element	mg/L	Element	mg/L	Element	mg/L
As	0.03	Cu	0.003	Pb	<0.001
Ag	<0.002	Fe	0.110	Rb	<0.001
Al	<0.002	Ga	<0.001	Re	0.030
Ba	<0.001	In	<0.001	Sr	<0.001
Be	<0.002	K	0.060	Sb	<0.001
B	<0.007	Li	<0.003	Si	<0.200
Bi	<0.001	Mn	0.002	Ti	0.003
Cd	<0.100	Mg	<0.001	Tl	<0.001
Ca	0.010	Ni	<0.001	V	0.004
Cr	<0.003	Na	<0.002	Zr	<0.001
Co	<0.001			Zn	0.006

Balances are calibrated regularly with weight sets traceable to NIST #32856, #32857 and others. This CRM is guaranteed stable to +/-0.5% of the certified concentration inclusive of uncertainty of measurements and other effects, such as transpiration losses, for a period of one year from the date of certification. This guarantee is valid only when the material is kept tightly capped and transported and stored under laboratory conditions.

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DATE RECEIVED: 8/4/05
DATE EXPIRED: 8/15/06
DATE OPENED: 8/5/05
INORG: 53240 PO: 152683

Date of Certification: AUG - 2005 Certifying Officer: N. Kochetakota

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Report of Certification

This Certified Reference Material has been prepared and certified under an ISO 9001 system consistent with the following guides:
Guide To The Expression Of Uncertainty In Measurement 1995
EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
ASTM Guide D6362-98
ISO Guide 34: Quality system guidelines for the production of reference materials.
ISO Guide 17025: Certification of reference materials, general and statistical principles
ISO Guide 31: Contents of certificates of reference materials
NIST Technical Note 1297
ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
ISO/REMCO N280

Material Source:

All analytes and matrix materials are obtained and verified by SPEX CertiPrep from pre-qualified vendors as per ISO 9000 guidelines. Vendor identifications are proprietary, however sources of all materials used in the preparation and testing of SPEX CertiPrep CRMs are tracked and documented. For further information contact CRM Sales.

Instructions for Use:

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

Method of Preparation:

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

Homogeneity:

The Homogeneity of the CRM has been confirmed by procedures consistent with ISO guide 17025, ISO/REMCO N280 and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed for the certified values by procedures consistent with the intended use of the CRM.
The mathematical expression $k_s=s^2m$ is employed to determine the sampling size
s = relative standard deviation in % for one component of the sample. (ie. The sub-sampling uncertainty)
m = the sub-sampling mass
k_s = mass of sub-sample necessary to ensure a relative sub-sampling error of 1% (68% confidence level) in a single determination

Statistical estimator and Confidence limits:

The certified value 'x' listed on the reverse of this document is at the 95% level of confidence and can be expressed as
X = x+/-U where X =True value (Labeled Value), U= Expanded uncertainty
$U=ku_c$ where k=2 is the coverage factor at the 95% confidence level
u_c is obtained by combining the individual element standard uncertainty components u_i and $u_c=\sqrt{\Sigma u_i^2}$

Certification Traveler Report:

All certified values reported were derived from Traveler Report (Spex CertiPrep's traceability documentation) identified by the lot number of this CRM. For further information contact CRM Sales.

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SPEXertificate ™

Certificate of Reference Material

Catalog Number: PLP9-2X/2Y/2T **Lot No.** 11-90P

Description: 1000 mg/L Phosphorus

Matrix: H2O

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 ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 1000 mg/L

Uncertainty Associated with Measurement: +/- 3.0 mg/L

Certified Value is Traceable to: NIST SRM #3139a

The CRM is prepared gravimetrically using high purity (NH4)H2(PO4) Lot# 049411. The certified value listed is the average of values obtained by classical wet assay and ICP spectrometer analysis

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 999 mg/L

Method: Precipitation using Magnesia Mixture. Filter, ignite and weigh as Mg2P2O7.

Instrumental Analysis by ICP spectrometer: 1000 mg/L

Uncertified Properties:

Density: 1.000 @ 24.3 Degrees Celsius

Trace Metallic Impurities in the Actual Solution via ICP / ICPMS Analysis:

Element	mg/L	Element	mg/L	Element	mg/L
As	<0.001	Cu	<0.001	Pb	<0.001
Ag	<0.009	Fe	0.02	Re	<0.001
Al	0.02	Ga	<0.001	Rb	<0.001
B	<0.002	In	<0.001	Si	0.01
Be	<0.001	K	<0.20	Sb	0.02
Ba	<0.001	Li	<0.001	Sr	<0.001
Bi	<0.001	Mo	0.002	Ti	0.006
Cr	<0.001	Mn	<0.001	Tl	0.003
Ca	0.025	Mg	0.002	V	<0.001
Cd	<0.001	Ni	<0.001	Zn	0.60
Co	<0.001	Na	0.009	Zr	<0.001

Balances are calibrated regularly with weight sets traceable to NIST #32856, #32857 and others. This CRM is guaranteed stable to +/-0.5% of the certified concentration inclusive of uncertainty of measurements and other effects, such as transpiration losses, for a period of one year from the date of certification. This guarantee is valid only when the material is kept tightly capped and transported and stored under laboratory conditions.

Date of Certification: _____ Certifying Officer: N. Kocherlakota

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 6/30/05
DATE EXPIRED: 6/30/09
DATE OPENED: 6/30/05
INORG: 5280 PO: 65205

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Report of Certification

This Certified Reference Material has been prepared and certified under an ISO 9001 system consistent with the following guides:
Guide To The Expression Of Uncertainty In Measurement 1995
EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
ASTM Guide D6362-98
ISO Guide 34: Quality system guidelines for the production of reference materials.
ISO Guide 17025: Certification of reference materials, general and statistical principles
ISO Guide 31: Contents of certificates of reference materials
NIST Technical Note 1297
ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
ISO/REMCO N280

Material Source:

All analytes and matrix materials are obtained and verified by SPEX CertiPrep from pre-qualified vendors as per ISO 9000 guidelines. Vendor identifications are proprietary, however sources of all materials used in the preparation and testing of SPEX CertiPrep CRMs are tracked and documented. For further information contact CRM Sales.

Instructions for Use:

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

Method of Preparation:

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

Homogeneity:

The Homogeneity of the CRM has been confirmed by procedures consistent with ISO guide 17025, ISO/REMCO N280 and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed for the certified values by procedures consistent with the intended use of the CRM.
The mathematical expression $k_s=s^2m$ is employed to determine the sampling size
s = relative standard deviation in % for one component of the sample. (ie. The sub-sampling uncertainty)
m = the sub-sampling mass
k_s = mass of sub-sample necessary to ensure a relative sub-sampling error of 1% (68% confidence level) in a single determination

Statistical estimator and Confidence limits:

The certified value 'x' listed on the reverse of this document is at the 95% level of confidence and can be expressed as
X = x+/-U where X =True value (Labeled Value), U= Expanded uncertainty
$U=ku_c$ where k=2 is the coverage factor at the 95% confidence level
u_c is obtained by combining the individual element standard uncertainty components u_i and $u_c=\sqrt{\Sigma u_i^2}$

Certification Traveler Report:

All certified values reported were derived from Traveler Report (Spex CertiPrep's traceability documentation) identified by the lot number of this CRM. For further information contact CRM Sales.

Legal Notice:

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DATE RECEIVED: 2/28/05
DATE EXPIRED: 2/28/2006 TK
DATE OPENED: 2/28/05
INORG: 5038 PO: F55148

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Certificate of Reference Material

Catalog Number: PLSI9-2X/2Y/2T **Lot No.** 11-33SI

Description: 1000 mg/L Silicon

Matrix: H2O / 0.4% F-

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 ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 1001.5 mg/L

Uncertainty Associated with Measurement: +/- 3.0 mg/L

Certified Value is Traceable to: NIST SRM #3150

The CRM is prepared gravimetrically using high purity (NH4)2SiF6 Lot# 02021D. The certified value listed is the average of values obtained by classical wet assay and ICP spectrometer analysis

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 1004 mg/L

Method: Precipitation using Ammonium Molybdate and 8-Hydroxy Quinoline. Filter, dry, and weigh as (C9H7ON)4[Si(Mo12O40)]

Instrumental Analysis by ICP spectrometer: 999 mg/L

Uncertified Properties:

Density: 1.001 @ 23.7 Degrees Celsius

Trace Metallic Impurities in the Actual Solution via ICP / ICPMS Analysis:

Element	mg/L	Element	mg/L	Element	mg/L
Al	0.003	Cu	<0.001	Pb	<0.001
Ag	<0.001	Fe	0.02	Rb	<0.001
As	<0.06	Ga	<0.001	Re	<0.001
Ba	<0.001	In	<0.001	Sr	<0.001
Be	<0.001	K	0.14	Sb	<0.001
B	<0.004	Li	0.008	Ti	<0.001
Bi	<0.001	Mo	<0.001	Tl	<0.001
Cd	<0.001	Mg	<0.001	V	<0.001
Ca	0.016	Mn	<0.001	Zn	0.002
Cr	<0.001	Na	0.003	Zr	0.002
Co	<0.001	Ni	<0.004		

Balances are calibrated regularly with weight sets traceable to NIST #32856, #32857 and others. This CRM is guaranteed stable to +/-0.5% of the certified concentration inclusive of uncertainty of measurements and other effects, such as transpiration losses, for a period of one year from the date of certification. This guarantee is valid only when the material is kept tightly capped and transported and stored under laboratory conditions.

Date of Certification: FEB '05 Certifying Officer: N. Kocherlakota

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Report of Certification

This Certified Reference Material has been prepared and certified under an ISO 9001 system consistent with the following guides:
Guide To The Expression Of Uncertainty In Measurement 1995
EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
ASTM Guide D6362-98
ISO Guide 34: Quality system guidelines for the production of reference materials.
ISO Guide 17025: Certification of reference materials, general and statistical principles
ISO Guide 31: Contents of certificates of reference materials
NIST Technical Note 1297
ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
ISO/REMCO N280

Material Source:

All analytes and matrix materials are obtained and verified by SPEX CertiPrep from pre-qualified vendors as per ISO 9000 guidelines. Vendor identifications are proprietary, however sources of all materials used in the preparation and testing of SPEX CertiPrep CRMs are tracked and documented. For further information contact CRM Sales.

Instructions for Use:

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

Method of Preparation:

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

Homogeneity:

The Homogeneity of the CRM has been confirmed by procedures consistent with ISO guide 17025, ISO/REMCO N280 and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed for the certified values by procedures consistent with the intended use of the CRM.
The mathematical expression $k_s=s^2m$ is employed to determine the sampling size
s = relative standard deviation in % for one component of the sample. (ie. The sub-sampling uncertainty)
m = the sub-sampling mass
k_s = mass of sub-sample necessary to ensure a relative sub-sampling error of 1% (68% confidence level) in a single determination

Statistical estimator and Confidence limits:

The certified value 'x' listed on the reverse of this document is at the 95% level of confidence and can be expressed as
X = x+/-U where X =True value (Labeled Value), U= Expanded uncertainty
$U=ku_c$ where k=2 is the coverage factor at the 95% confidence level
u_c is obtained by combining the individual element standard uncertainty components u_i and $u_c=\sqrt{\Sigma u_i^2}$

Certification Traveler Report:

All certified values reported were derived from Traveler Report (Spex CertiPrep's traceability documentation) identified by the lot number of this CRM. For further information contact CRM Sales.

Legal Notice:

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DATE RECEIVED: 3/06/05
DATE EXPIRED: 3/05/06
DATE OPENED: 3/08/05
INORG: 5040 PO: F55748

SPEXertificate™

Certificate of Reference Material

Catalog Number: PLTI9-2X/2Y/2T **Lot No.** 10-172TI
Description: 1000 mg/L Titanium
Matrix: H2O/ 0.24% F-

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 ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 998 mg/L
Uncertainty Associated with Measurement: +/- 3.0 mg/L
Certified Value is Traceable to: NIST SRM #3162a

The CRM is prepared gravimetrically using high purity (NH4)TiF6 Lot# 02021E. The certified value listed is the average of values obtained by classical wet assay and ICP spectrometer analysis

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 999 mg/L

Method: Precipitation using Ammonium Hydroxide. Filter, ignite and weigh as TiO2.

Instrumental Analysis by ICP spectrometer: 997 mg/L

Uncertified Properties:

Density: 1.000 @ 23.7 Degrees Celsius

Trace Metallic Impurities in the Actual Solution via ICP / ICPMS Analysis:

Element	mg/L	Element	mg/L	Element	mg/L
Al	0.004	Cu	0.04	Pb	<0.001
As	<0.001	Fe	0.002	Rb	<0.001
Ag	<0.001	Ga	<0.001	Re	<0.001
B	<0.004	In	<0.001	Si	3.0
Ba	<0.001	K	<0.10	Sr	<0.001
Be	<0.001	Li	<0.001	Sb	<0.001
Bi	<0.001	Mg	<0.003	Tl	<0.001
Ca	0.012	Mn	<0.001	V	<0.001
Cr	<0.07	Mo	<0.001	Zr	0.004
Cd	<0.001	Na	0.02	Zn	0.004
Co	0.002	Ni	<0.001		

Balances are calibrated regularly with weight sets traceable to NIST #32856, #32857 and others. This CRM is guaranteed stable to +/-0.5% of the certified concentration inclusive of uncertainty of measurements and other effects, such as transpiration losses, for a period of one year from the date of certification. This guarantee is valid only when the material is kept tightly capped and transported and stored under laboratory conditions.

Date of Certification: FEB '05 Certifying Officer: N. Kocherlakota

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Report of Certification

This Certified Reference Material has been prepared and certified under an ISO 9001 system consistent with the following guides:
Guide To The Expression Of Uncertainty In Measurement 1995
EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
ASTM Guide D6362-98
ISO Guide 34: Quality system guidelines for the production of reference materials.
ISO Guide 17025: Certification of reference materials, general and statistical principles
ISO Guide 31: Contents of certificates of reference materials
NIST Technical Note 1297
ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
ISO/REMCO N280

Material Source:

All analytes and matrix materials are obtained and verified by SPEX CertiPrep from pre-qualified vendors as per ISO 9000 guidelines. Vendor identifications are proprietary, however sources of all materials used in the preparation and testing of SPEX CertiPrep CRMs are tracked and documented. For further information contact CRM Sales.

Instructions for Use:

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

Method of Preparation:

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

Homogeneity:

The Homogeneity of the CRM has been confirmed by procedures consistent with ISO guide 17025, ISO/REMCO N280 and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed for the certified values by procedures consistent with the intended use of the CRM.
The mathematical expression $k_s = s^2 m$ is employed to determine the sampling size
s = relative standard deviation in % for one component of the sample. (ie. The sub-sampling uncertainty)
m = the sub-sampling mass
k_s = mass of sub-sample necessary to ensure a relative sub-sampling error of 1% (68% confidence level) in a single determination

Statistical estimator and Confidence limits:

The certified value 'x' listed on the reverse of this document is at the 95% level of confidence and can be expressed as
X = x+/-U where X =True value (Labeled Value), U= Expanded uncertainty
$U = ku_c$ where k=2 is the coverage factor at the 95% confidence level
u_c is obtained by combining the individual element standard uncertainty components u_i and $u_c = \sqrt{\Sigma u_i^2}$

Certification Traveler Report:

All certified values reported were derived from Traveler Report (Spex CertiPrep's traceability documentation) identified by the lot number of this CRM. For further information contact CRM Sales.

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010145

SPEXertificate ™

Certificate of Reference Material

Catalog Number: PLSR2-2X/2Y/2T **Lot No.** 10-130SR

Description: 1000 mg/L Strontium in 2% HNO3

Matrix: 2% HNO3

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 ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 1000 mg/L

Uncertainty Associated with Measurement: +/- 3.0 mg/L

Certified Value is Traceable to: NIST SRM #3153a

The CRM is prepared gravimetrically using high purity Strontium Carbonate Lot# 09031B. The certified value listed is the average of values obtained by classical wet assay and ICP spectrometer analysis

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 1000 mg/L

Method: EDTA titration using Methyl Thymol Blue as indicator. EDTA standardized against Pb(NO3)2 NIST SRM #928.

Instrumental Analysis by ICP spectrometer: 1000 mg/L

Uncertified Properties:

Density: 1.010 @ 23.5 Degrees Celsius

Trace Metallic Impurities in the Actual Solution via ICP / ICPMS Analysis:

Element	mg/L	Element	mg/L	Element	mg/L
Al	0.002	Cu	<0.001	Pb	<0.001
As	<0.001	Fe	0.006	Rb	<0.001
Ag	<0.001	Ga	<0.001	Re	<0.001
B	<0.001	In	<0.001	Si	0.012
Ba	0.02	K	0.20	Sr	<0.001
Be	<0.001	Li	<0.001	Sb	<0.001
Bi	<0.001	Mg	<0.001	Ti	<0.001
Ca	0.016	Mn	<0.001	Tl	<0.001
Cr	0.003	Mo	<0.001	V	0.003
Cd	<0.001	Na	0.004	Zr	
Co	<0.001	Ni	<0.001	Zn	<0.001

Balances are calibrated regularly with weight sets traceable to NIST #32856, #32857 and others. This CRM is guaranteed stable to +/-0.5% of the certified concentration inclusive of uncertainty of measurements and other effects, such as transpiration losses, for a period of one year from the date of certification. This guarantee is valid only when the material is kept tightly capped and transported and stored under laboratory conditions.

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 5/24/05
DATE EXPIRED: 5/30/06
DATE OPENED: 5/24/05
INORG: 5246 PO: F55180

5246
1 of 2

Date of Certification: MAY - 2005 Certifying Officer: N. Kocherakota

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Report of Certification

This Certified Reference Material has been prepared and certified under an ISO 9001 system consistent with the following guides:
Guide To The Expression Of Uncertainty In Measurement 1995
EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
ASTM Guide D6362-98
ISO Guide 34: Quality system guidelines for the production of reference materials.
ISO Guide 17025: Certification of reference materials, general and statistical principles
ISO Guide 31: Contents of certificates of reference materials
NIST Technical Note 1297
ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
ISO/REMCO N280

Material Source:

All analytes and matrix materials are obtained and verified by SPEX CertiPrep from pre-qualified vendors as per ISO 9000 guidelines. Vendor identifications are proprietary, however sources of all materials used in the preparation and testing of SPEX CertiPrep CRMs are tracked and documented. For further information contact CRM Sales.

Instructions for Use:

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

Method of Preparation:

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

Homogeneity:

The Homogeneity of the CRM has been confirmed by procedures consistent with ISO guide 17025, ISO/REMCO N280 and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed for the certified values by procedures consistent with the intended use of the CRM.
The mathematical expression $k_s=s^2m$ is employed to determine the sampling size
s = relative standard deviation in % for one component of the sample. (ie. The sub-sampling uncertainty)
m = the sub-sampling mass
k_s = mass of sub-sample necessary to ensure a relative sub-sampling error of 1% (68% confidence level) in a single determination

Statistical estimator and Confidence limits:

The certified value 'x' listed on the reverse of this document is at the 95% level of confidence and can be expressed as
X = x+/-U where X =True value (Labeled Value), U= Expanded uncertainty
$U=ku_c$ where k=2 is the coverage factor at the 95% confidence level
u_c is obtained by combining the individual element standard uncertainty components u_i and $u_c=\sqrt{\Sigma u_i^2}$

Certification Traveler Report:

All certified values reported were derived from Traveler Report (Spex CertiPrep's traceability documentation) identified by the lot number of this CRM. For further information contact CRM Sales.

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Certificate of Reference Material

Catalog Number: PLSR2-2X/2Y/2T **Lot No.** 10-130SR

Description: 1000 mg/L Strontium in 2% HNO3

Matrix: 2% HNO3

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 ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 1000 mg/L

Uncertainty Associated with Measurement: +/- 3.0 mg/L

Certified Value is Traceable to: NIST SRM #3153a

The CRM is prepared gravimetrically using high purity Strontium Carbonate Lot# 09031B. The certified value listed is the average of values obtained by classical wet assay and ICP spectrometer analysis

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 1000 mg/L

Method: EDTA titration using Methyl Thymol Blue as indicator. EDTA standardized against Pb(NO3)2 NIST SRM #928.

Instrumental Analysis by ICP spectrometer: 1000 mg/L

Uncertified Properties:

Density: 1.010 @ 23.5 Degrees Celsius

Trace Metallic Impurities in the Actual Solution via ICP / ICPMS Analysis:

Element	mg/L	Element	mg/L	Element	mg/L
Al	0.002	Cu	<0.001	Pb	<0.001
As	<0.001	Fe	0.006	Rb	<0.001
Ag	<0.001	Ga	<0.001	Re	<0.001
B	<0.001	In	<0.001	Si	0.012
Ba	0.02	K	0.20	Sr	<0.001
Be	<0.001	Li	<0.001	Sb	<0.001
Bi	<0.001	Mg	<0.001	Ti	<0.001
Ca	0.016	Mn	<0.001	Tl	<0.001
Cr	0.003	Mo	<0.001	V	0.003
Cd	<0.001	Na	0.004	Zr	
Co	<0.001	Ni	<0.001	Zn	<0.001

Balances are calibrated regularly with weight sets traceable to NIST #32856, #32857 and others. This CRM is guaranteed stable to +/-0.5% of the certified concentration inclusive of uncertainty of measurements and other effects, such as transpiration losses, for a period of one year from the date of certification. This guarantee is valid only when the material is kept tightly capped and transported and stored under laboratory conditions.

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 5/26/05
DATE EXPIRED: 5/30/06 (No)
DATE OPENED: 5/24/05
INORG: 5246 PO: 155180

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1 of 2

Date of Certification: MAY - 2005 Certifying Officer: N. Kocherlakota

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Report of Certification

This Certified Reference Material has been prepared and certified under an ISO 9001 system consistent with the following guides:
Guide To The Expression Of Uncertainty In Measurement 1995
EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
ASTM Guide D6362-98
ISO Guide 34: Quality system guidelines for the production of reference materials.
ISO Guide 17025: Certification of reference materials, general and statistical principles
ISO Guide 31: Contents of certificates of reference materials
NIST Technical Note 1297
ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
ISO/REMCO N280

Material Source:

All analytes and matrix materials are obtained and verified by SPEX CertiPrep from pre-qualified vendors as per ISO 9000 guidelines. Vendor identifications are proprietary, however sources of all materials used in the preparation and testing of SPEX CertiPrep CRMs are tracked and documented. For further information contact CRM Sales.

Instructions for Use:

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

Method of Preparation:

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

Homogeneity:

The Homogeneity of the CRM has been confirmed by procedures consistent with ISO guide 17025, ISO/REMCO N280 and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed for the certified values by procedures consistent with the intended use of the CRM.
The mathematical expression $k_s = s^2 m$ is employed to determine the sampling size
s = relative standard deviation in % for one component of the sample. (ie. The sub-sampling uncertainty)
m = the sub-sampling mass
k_s = mass of sub-sample necessary to ensure a relative sub-sampling error of 1% (68% confidence level) in a single determination

Statistical estimator and Confidence limits:

The certified value 'x' listed on the reverse of this document is at the 95% level of confidence and can be expressed as
X = x+/-U where X =True value (Labeled Value), U= Expanded uncertainty
$U = ku_c$ where k=2 is the coverage factor at the 95% confidence level
u_c is obtained by combining the individual element standard uncertainty components u_i and $u_c = \sqrt{\Sigma u_i^2}$

Certification Traveler Report:

All certified values reported were derived from Traveler Report (Spex CertiPrep's traceability documentation) identified by the lot number of this CRM. For further information contact CRM Sales.

Legal Notice:

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Certificate of Reference Material

Catalog Number: PLBI4-2X/2Y **Lot No.** 11-136BI

Description: 1000 mg/L Bismuth

Matrix: 10% HNO3

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 ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 1003 mg/L

Uncertainty Associated with Measurement: +/- 3.0 mg/L

Certified Value is Traceable to: NIST SRM #3106

The CRM is prepared gravimetrically using high purity Bismuth Metal Lot# 07931E. The certified value listed is the average of values obtained by classical wet assay and ICP spectrometer analysis

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 1003 mg/L

Method: EDTA titration using Xylenol Orange as indicator. EDTA standardized against Pb(NO3)2 NIST SRM #928.

Instrumental Analysis by ICP spectrometer: 1002 mg/L

Uncertified Properties:

Density: 1.052 @ 25.1 Degrees Celsius

Trace Metallic Impurities in the Actual Solution via ICP / ICPMS Analysis:

Element	mg/L	Element	mg/L	Element	mg/L
As	<0.001	Cu	<0.001	Pb	0.002
Al	0.002	Fe	0.01	Rb	<0.001
Ag	<0.04	Ga	<0.001	Re	<0.001
B	<0.03	In	<0.001	Sb	<0.001
Ba	<0.001	K	0.01	Si	0.027
Be	<0.002	Li	<0.001	Sr	<0.001
Cr	<0.001	Mo	<0.001	Tl	<0.001
Co	<0.001	Mn	<0.001	Ti	<0.001
Cd	<0.001	Mg	<0.001	V	<0.001
Ca	0.04	Ni	0.002	Zr	<0.001
		Na	0.003	Zn	0.05

Balances are calibrated regularly with weight sets traceable to NIST #32856, #32857 and others. This CRM is guaranteed stable to +/-0.5% of the certified concentration inclusive of uncertainty of measurements and other effects, such as transpiration losses, for a period of one year from the date of certification. This guarantee is valid only when the material is kept tightly capped and transported and stored under laboratory conditions.

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 10/17/05
DATE EXPIRED: 10/15/06
DATE OPENED: 10/17/05
INORG: 9432 PO: 2000030

Date of Certification: OCT - 2005 Certifying Officer: N. Kocherlakota

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Report of Certification

This Certified Reference Material has been prepared and certified under an ISO 9001 system consistent with the following guides:
Guide To The Expression Of Uncertainty In Measurement 1995
EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
ASTM Guide D6362-98
ISO Guide 34: Quality system guidelines for the production of reference materials.
ISO Guide 17025: Certification of reference materials, general and statistical principles
ISO Guide 31: Contents of certificates of reference materials
NIST Technical Note 1297
ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
ISO/REMCO N280

Material Source:

All analytes and matrix materials are obtained and verified by SPEX CertiPrep from pre-qualified vendors as per ISO 9000 guidelines. Vendor identifications are proprietary, however sources of all materials used in the preparation and testing of SPEX CertiPrep CRMs are tracked and documented. For further information contact CRM Sales.

Instructions for Use:

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

Method of Preparation:

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

Homogeneity:

The Homogeneity of the CRM has been confirmed by procedures consistent with ISO guide 17025, ISO/REMCO N280 and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed for the certified values by procedures consistent with the intended use of the CRM.
The mathematical expression $k_s=s^2m$ is employed to determine the sampling size
s = relative standard deviation in % for one component of the sample. (ie. The sub-sampling uncertainty)
m = the sub-sampling mass
k_s = mass of sub-sample necessary to ensure a relative sub-sampling error of 1% (68% confidence level) in a single determination

Statistical estimator and Confidence limits:

The certified value 'x' listed on the reverse of this document is at the 95% level of confidence and can be expressed as
X = x+/-U where X =True value (Labeled Value), U= Expanded uncertainty
$U=ku_c$ where k=2 is the coverage factor at the 95% confidence level
u_c is obtained by combining the individual element standard uncertainty components u_i and $u_c=\sqrt{\Sigma u_i^2}$

Certification Traveler Report:

All certified values reported were derived from Traveler Report (Spex CertiPrep's traceability documentation) identified by the lot number of this CRM. For further information contact CRM Sales.

Legal Notice:

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Certificate of Reference Material

Catalog Number: PLLA2-2X/2Y **Lot No.** 11-32LA

Description: 1000 mg/L Lanthanum

Matrix: 2% HNO3

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 ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 1000 mg/L

Uncertainty Associated with Measurement: +/- 3.0 mg/L

Certified Value is Traceable to: NIST SRM #3127a

The CRM is prepared gravimetrically using high purity Lanthanum Oxide Lot# 11901J. The certified value listed is the average of values obtained by classical wet assay and ICP spectrometer analysis

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 1001 mg/L

Method: EDTA titration using Methyl Thymol Blue as indicator. EDTA standardized against Pb(NO3)2 NIST SRM #928.

Instrumental Analysis by ICP spectrometer: 999 mg/L

Uncertified Properties:

Density: 1.011 @ 21.8 Degrees Celsius

Trace Metallic Impurities in the Actual Solution via ICP / ICPMS Analysis:

Element	mg/L	Element	mg/L	Element	mg/L
Ce	0.007	Lu	<0.001	Tm	<0.001
Ca	12.00	Mn	<0.003	Ti	0.01
Dy	<0.001	Mo	<0.001	Tl	0.02
Er	<0.001	Nd	<0.001	Ta	<0.001
Eu	<0.001	Ni	<0.003	Tb	<0.001
Fe	0.02	Na	0.08	Th	<0.001
Ga	<0.001	Pr	<0.001	V	<0.001
Gd	<0.10	Rb	<0.001	W	<0.001
Hf	<0.001	Sc	0.003	Yb	<0.001
Ho	<0.001	Sm	<0.001	Y	0.003
In	<0.001			Zr	<0.001

Balances are calibrated regularly with weight sets traceable to NIST #32856, #32857 and others. This CRM is guaranteed stable to +/-0.5% of the certified concentration inclusive of uncertainty of measurements and other effects, such as transpiration losses, for a period of one year from the date of certification. This guarantee is valid only when the material is kept tightly capped and transported and stored under laboratory conditions.

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 8/4/05
DATE EXPIRED: 8/15/06
DATE OPENED: 8/5/05
INORG: 5325 PO: F52423

Date of Certification: AUG - 2005 Certifying Officer: N. Kocherlakota

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Report of Certification

This Certified Reference Material has been prepared and certified under an ISO 9001 system consistent with the following guides:
Guide To The Expression Of Uncertainty In Measurement 1995
EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
ASTM Guide D6362-98
ISO Guide 34: Quality system guidelines for the production of reference materials.
ISO Guide 17025: Certification of reference materials, general and statistical principles
ISO Guide 31: Contents of certificates of reference materials
NIST Technical Note 1297
ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
ISO/REMCO N280

Material Source:

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Instructions for Use:

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Method of Preparation:

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

Homogeneity:

The Homogeneity of the CRM has been confirmed by procedures consistent with ISO guide 17025, ISO/REMCO N280 and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed for the certified values by procedures consistent with the intended use of the CRM.
The mathematical expression $k_s=s^2m$ is employed to determine the sampling size
s = relative standard deviation in % for one component of the sample. (ie. The sub-sampling uncertainty)
m = the sub-sampling mass
k_s = mass of sub-sample necessary to ensure a relative sub-sampling error of 1% (68% confidence level) in a single determination

Statistical estimator and Confidence limits:

The certified value 'x' listed on the reverse of this document is at the 95% level of confidence and can be expressed as
X = x+/-U where X =True value (Labeled Value), U= Expanded uncertainty
$U=ku_c$ where k=2 is the coverage factor at the 95% confidence level
u_c is obtained by combining the individual element standard uncertainty components u_i and $u_c=\sqrt{\Sigma u_i^2}$

Certification Traveler Report:

All certified values reported were derived from Traveler Report (Spex CertiPrep's traceability documentation) identified by the lot number of this CRM. For further information contact CRM Sales.

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010153

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Certificate of Reference Material

Catalog Number: PLY2-2X/2Y/2T **Lot No.** 11-84Y

Description: 1,000 mg/L Yttrium

Matrix: 2% HNO3

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 ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 999 mg/L

Uncertainty Associated with Measurement: +/- 3.0 mg/L

Certified Value is Traceable to: NIST SRM #3167

The CRM is prepared gravimetrically using high purity Yttrium Oxide Lot# 04041A. The certified value listed is the average of values obtained by classical wet assay and ICP spectrometer analysis

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 1000 mg/L

Method: EDTA titration using Methyl Thymol Blue as indicator. EDTA standardized against Pb(NO3)2 NIST SRM #928.

Instrumental Analysis by ICP spectrometer: 997 mg/L

Uncertified Properties:

Density: 1.011 @ 24.0 Degrees Celsius

Trace Metallic Impurities in the Actual Solution via ICP / ICPMS Analysis:

Element	mg/L	Element	mg/L	Element	mg/L
Ca	0.02	Lu	<0.001	Tm	<0.001
Ce	<0.001	La	<0.001	Ti	<0.001
Dy	<0.001	Mn	<0.001	Tl	<0.001
Er	<0.001	Mo	<0.001	Tb	<0.001
Eu	<0.001	Nd	<0.001	Th	<0.001
Fe	0.005	Na	0.001	Ta	<0.001
Ga	<0.001	Ni	<0.001	V	<0.001
Gd	<0.001	Pr	<0.001	W	<0.001
Ho	<0.001	Rb	<0.001	Yb	<0.001
Hf	<0.001	Sm	<0.001	Zr	<0.001
In	<0.001	Sc	<0.001		

Balances are calibrated regularly with weight sets traceable to NIST #32856, #32857 and others. This CRM is guaranteed stable to +/-0.5% of the certified concentration inclusive of uncertainty of measurements and other effects, such as transpiration losses, for a period of one year from the date of certification. This guarantee is valid only when the material is kept tightly capped and transported and stored under laboratory conditions.

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 10/17/05
DATE EXPIRED: 10/15/06
DATE OPENED: 10/17/05
INORG: SJ PO: 20070030

Date of Certification: OCT - 2005 Certifying Officer: N. Kocherlakota

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Report of Certification

This Certified Reference Material has been prepared and certified under an ISO 9001 system consistent with the following guides:
Guide To The Expression Of Uncertainty In Measurement 1995
EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
ASTM Guide D6362-98
ISO Guide 34: Quality system guidelines for the production of reference materials.
ISO Guide 17025: Certification of reference materials, general and statistical principles
ISO Guide 31: Contents of certificates of reference materials
NIST Technical Note 1297
ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
ISO/REMCO N280

Material Source:

All analytes and matrix materials are obtained and verified by SPEX CertiPrep from pre-qualified vendors as per ISO 9000 guidelines. Vendor identifications are proprietary, however sources of all materials used in the preparation and testing of SPEX CertiPrep CRMs are tracked and documented. For further information contact CRM Sales.

Instructions for Use:

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

Method of Preparation:

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

Homogeneity:

The Homogeneity of the CRM has been confirmed by procedures consistent with ISO guide 17025, ISO/REMCO N280 and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed for the certified values by procedures consistent with the intended use of the CRM.
The mathematical expression $k_s=s^2m$ is employed to determine the sampling size
s = relative standard deviation in % for one component of the sample. (ie. The sub-sampling uncertainty)
m = the sub-sampling mass
k_s = mass of sub-sample necessary to ensure a relative sub-sampling error of 1% (68% confidence level) in a single determination

Statistical estimator and Confidence limits:

The certified value 'x' listed on the reverse of this document is at the 95% level of confidence and can be expressed as
X = x+/-U where X =True value (Labeled Value), U= Expanded uncertainty
$U=ku_c$ where k=2 is the coverage factor at the 95% confidence level
u_c is obtained by combining the individual element standard uncertainty components u_i and $u_c=\sqrt{\Sigma u_i^2}$

Certification Traveler Report:

All certified values reported were derived from Traveler Report (Spex CertiPrep's traceability documentation) identified by the lot number of this CRM. For further information contact CRM Sales.

Legal Notice:

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

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Certificate of Reference Material

Catalog Number: PLPD3-2X/2Y **Lot No.** 9-99PD

Description: 1000 mg/L Palladium

Matrix: 10% HCl

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 ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 999 mg/L

Uncertainty Associated with Measurement: +/-3.0 mg/L

Certified Value is Traceable to: NIST SRM #3138

The CRM is prepared gravimetrically using high purity Palladium Metal Lot# 06021C. The certified value listed is the average of values obtained by classical wet assay and ICP spectrometer analysis

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 999 mg/L

Method: Precipitation using Dimethyl Glyoxime. Filter, dry, and weigh as Pd(C4H7O2N2)2.

Instrumental Analysis by ICP spectrometer: 1000 mg/L

Uncertified Properties:

Density: 1.017 @ 24.2 Degrees Celsius

Trace Metallic Impurities in the Actual Solution via ICP / ICPMS Analysis:

Element	mg/L	Element	mg/L	Element	mg/L
Al	0.002	Fe	0.033	Re	<0.001
Au	0.002	Ga	<0.001	Rh	<0.001
Ag	<0.001	Ir	<0.001	Rb	<0.001
B	<0.001	In	<0.001	Ru	<0.001
Be	<0.001	Mg	0.001	Sn	<0.001
Bi	<0.001	Mn	<0.001	Te	<0.001
Ca	0.006	Na	0.005	Ti	<0.001
Cd	<0.001	Ni	0.001	W	<0.001
Co	<0.001	Pb	0.002	Zr	<0.001
Cr	<0.002	Pt	0.008	Zn	0.06
Cu	0.002				

Balances are calibrated regularly with weight sets traceable to NIST #32856, #32857 and others. This CRM is guaranteed stable to +/-0.5% of the certified concentration inclusive of uncertainty of measurements and other effects, such as transpiration losses, for a period of one year from the date of certification. This guarantee is valid only when the material is kept tightly capped and transported and stored under laboratory conditions.

Date of Certification: JAN '05 Certifying Officer: N. Kocherlakota

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DATE RECEIVED: 01/17/05
DATE EXPIRED: 01/15/2006 WS
DATE OPENED: 01/19/05
INORG: 4967 PO: F55130

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Report of Certification

This Certified Reference Material has been prepared and certified under an ISO 9001 system consistent with the following guides:
Guide To The Expression Of Uncertainty In Measurement 1995
EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
ASTM Guide D6362-98
ISO Guide 34: Quality system guidelines for the production of reference materials.
ISO Guide 17025: Certification of reference materials, general and statistical principles
ISO Guide 31: Contents of certificates of reference materials
NIST Technical Note 1297
ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
ISO/REMCO N280

Material Source:

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Instructions for Use:

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

Method of Preparation:

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

Homogeneity:

The Homogeneity of the CRM has been confirmed by procedures consistent with ISO guide 17025, ISO/REMCO N280 and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed for the certified values by procedures consistent with the intended use of the CRM.
The mathematical expression $k_s = s^2 m$ is employed to determine the sampling size
s = relative standard deviation in % for one component of the sample. (ie. The sub-sampling uncertainty)
m = the sub-sampling mass
k_s = mass of sub-sample necessary to ensure a relative sub-sampling error of 1% (68% confidence level) in a single determination

Statistical estimator and Confidence limits:

The certified value 'x' listed on the reverse of this document is at the 95% level of confidence and can be expressed as
X = x+/-U where X =True value (Labeled Value), U= Expanded uncertainty
$U = ku_c$ where k=2 is the coverage factor at the 95% confidence level
u_c is obtained by combining the individual element standard uncertainty components u_i and $u_c = \sqrt{\Sigma u_i^2}$

Certification Traveler Report:

All certified values reported were derived from Traveler Report (Spex CertiPrep's traceability documentation) identified by the lot number of this CRM. For further information contact CRM Sales.

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DATE EXPIRED: 7/31/2006 DR
DATE OPENED: 7/7/05
INORG: 5896 PO: 55203

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Certificate of Reference Material

Catalog Number: PLS9-2X/2Y/2T **Lot No.** 11-63S

Description: 1000 mg/L Sulfur

Matrix: H2O

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 ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 1001.5 mg/L

Uncertainty Associated with Measurement: +/- 3.0 mg/L

Certified Value is Traceable to: NIST SRM #3154

The CRM is prepared gravimetrically using high purity Ammonium Sulfate Lot# 05891M. The certified value listed is the average of values obtained by classical wet assay and ICP spectrometer analysis

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 1003 mg/L

Method: Precipitation using Barium Chloride. Filter, ignite and weigh as BaSO4.

Instrumental Analysis by ICP spectrometer: 1000 mg/L

Uncertified Properties:

Density: 1000 @ 23.2 Degrees Celsius

Trace Metallic Impurities in the Actual Solution via ICP / ICPMS Analysis:

Element	mg/L	Element	mg/L	Element	mg/L
Ag	<0.001	Cu	<0.001	Pb	<0.001
Al	<0.001	Fe	0.01	Re	<0.001
As	<0.001	Ga	<0.001	Rb	<0.001
Be	<0.002	In	<0.001	Si	0.033
Ba	<0.001	K	0.009	Sb	<0.001
B	<0.001	Li	<0.001	Sr	<0.001
Bi	<0.001	Mg	0.004	Ti	<0.001
Cd	<0.001	Mn	<0.001	Tl	0.02
Co	<0.001	Mo	<0.001	V	<0.002
Ca	0.015	Na	0.01	Zn	0.03
Cr	<0.005	Ni	<0.001	Zr	<0.001

Balances are calibrated regularly with weight sets traceable to NIST #32856, #32857 and others. This CRM is guaranteed stable to +/-0.5% of the certified concentration inclusive of uncertainty of measurements and other effects, such as transpiration losses, for a period of one year from the date of certification. This guarantee is valid only when the material is kept tightly capped and transported and stored under laboratory conditions.

Date of Certification: JUL - 2005 Certifying Officer: N. Kocherlakota

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Certificate of Reference Material

Catalog Number: PLTH2-2X/2Y **Lot No.** 11-82TH

Description: 1000 mg/L Thorium

Matrix: 2% HNO3

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 ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 1000 mg/L

Uncertainty Associated with Measurement: +/- 3.0 mg/L

Certified Value is Traceable to: NIST SRM #3159

The CRM is prepared gravimetrically using high purity Th(NO3)4-4H2O Lot# 01851R. The certified value listed is the average of values obtained by classical wet assay and ICP spectrometer analysis

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 1001 mg/L

Method: EDTA titration using Xylenol Orange as indicator. EDTA standardized against Pb(NO3)2 NIST SRM #928.

Instrumental Analysis by ICP spectrometer: 999 mg/L

Uncertified Properties:

Density: 1.010 @ 24.1 Degrees Celsius

Trace Metallic Impurities in the Actual Solution via ICP / ICPMS Analysis:

Element	mg/L	Element	mg/L	Element	mg/L
Ca	<0.02	Lu	<0.001	Th	<0.001
Ce	0.01	La	0.003	Tb	<0.001
Dy	<0.001	Mo	<0.001	Tm	<0.001
Er	<0.001	Mn	<0.001	Ta	<0.001
Eu	<0.001	Na	0.04	Tl	<0.001
Fe	<0.01	Nd	0.003	Ti	<0.001
Gd	<0.001	Ni	<0.001	V	<0.001
Ga	<0.001	Pr	<0.001	W	<0.001
Hf	<0.001	Rb	<0.001	Y	0.002
Ho	<0.0001	Sm	<0.001	Yb	<0.001
In	<0.001	Sc	<0.001	Zr	0.001

Balances are calibrated regularly with weight sets traceable to NIST #32856, #32857 and others. This CRM is guaranteed stable to +/-0.5% of the certified concentration inclusive of uncertainty of measurements and other effects, such as transpiration losses, for a period of one year from the date of certification. This guarantee is valid only when the material is kept tightly capped and transported and stored under laboratory conditions.

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DATE RECEIVED: 8/31/05
DATE EXPIRED: 8/30/06
DATE OPENED: 8/31/05
INORG: 5358 PO: 0000 4005

Date of Certification: AUG - 2005 Certifying Officer: N. Kocherlakota

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Report of Certification

This Certified Reference Material has been prepared and certified under an ISO 9001 system consistent with the following guides:
Guide To The Expression Of Uncertainty In Measurement 1995
EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
ASTM Guide D6362-98
ISO Guide 34: Quality system guidelines for the production of reference materials.
ISO Guide 17025: Certification of reference materials, general and statistical principles
ISO Guide 31: Contents of certificates of reference materials
NIST Technical Note 1297
ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
ISO/REMCO N280

Material Source:

All analytes and matrix materials are obtained and verified by SPEX CertiPrep from pre-qualified vendors as per ISO 9000 guidelines. Vendor identifications are proprietary, however sources of all materials used in the preparation and testing of SPEX CertiPrep CRMs are tracked and documented. For further information contact CRM Sales.

Instructions for Use:

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

Method of Preparation:

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

Homogeneity:

The Homogeneity of the CRM has been confirmed by procedures consistent with ISO guide 17025, ISO/REMCO N280 and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed for the certified values by procedures consistent with the intended use of the CRM.
The mathematical expression $k_s=s^2m$ is employed to determine the sampling size
s = relative standard deviation in % for one component of the sample. (ie. The sub-sampling uncertainty)
m = the sub-sampling mass
k_s = mass of sub-sample necessary to ensure a relative sub-sampling error of 1% (68% confidence level) in a single determination

Statistical estimator and Confidence limits:

The certified value 'x' listed on the reverse of this document is at the 95% level of confidence and can be expressed as
X = x+/-U where X =True value (Labeled Value), U= Expanded uncertainty
$U=ku_c$ where k=2 is the coverage factor at the 95% confidence level
u_c is obtained by combining the individual element standard uncertainty components u_i and $u_c=\sqrt{\Sigma u_i^2}$

Certification Traveler Report:

All certified values reported were derived from Traveler Report (Spex CertiPrep's traceability documentation) identified by the lot number of this CRM. For further information contact CRM Sales.

Legal Notice:

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Certificate of Reference Material

Catalog Number: PLU2-2X/2Y **Lot No.** 11-124U

Description: 1000 mg/L Uranium

Matrix: 2% HNO3

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 ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 1000 mg/L

Uncertainty Associated with Measurement: +/- 3.0 mg/L

Certified Value is Traceable to: NIST SRM #3164

The CRM is prepared gravimetrically using high purity Triuranium Octaoxide Lot# 04001D. The certified value listed is the average of values obtained by classical wet assay and ICP spectrometer analysis

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 1001 mg/L

Method: Evaporate to dryness. Ignite and weigh as U3O8.

Instrumental Analysis by ICP spectrometer: 999 mg/L

Uncertified Properties:

Density: 1.009 @ 23.9 Degrees Celsius

Trace Metallic Impurities in the Actual Solution via ICP / ICPMS Analysis:

Element	mg/L	Element	mg/L	Element	mg/L
Al	0.01	Cu	0.01	Pb	0.04
Ag	<0.005	Fe	0.20	Re	<0.001
As	0.05	Ga	<0.001	Rb	<0.001
Bi	<0.001	In	<0.001	Si	<0.01
Ba	0.005	K	0.03	Sb	0.004
Be	<0.001	Li	<0.001	Sr	0.003
B	<0.001	Mg	0.003	Tl	0.001
Ca	0.05	Mn	0.004	Ti	0.006
Cd	<0.001	Mo	0.006	V	0.005
Co	0.001	Ni	<0.001	Zr	<0.003
Cr	<0.002	Na	0.10	Zn	0.007

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 4/30/05
DATE EXPIRED: 4/30/06
DATE OPENED: 10/30/05
INORG: 5279 PO: 155205

Balances are calibrated regularly with weight sets traceable to NIST #32856, #32857 and others. This CRM is guaranteed stable to +/-0.5% of the certified concentration inclusive of uncertainty of measurements and other effects, such as transpiration losses, for a period of one year from the date of certification. This guarantee is valid only when the material is kept tightly capped and transported and stored under laboratory conditions.

Date of Certification: _____ Certifying Officer: N. Kocherlakota

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Report of Certification

This Certified Reference Material has been prepared and certified under an ISO 9001 system consistent with the following guides:
Guide To The Expression Of Uncertainty In Measurement 1995
EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
ASTM Guide D6362-98
ISO Guide 34: Quality system guidelines for the production of reference materials.
ISO Guide 17025: Certification of reference materials, general and statistical principles
ISO Guide 31: Contents of certificates of reference materials
NIST Technical Note 1297
ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
ISO/REMCO N280

Material Source:

All analytes and matrix materials are obtained and verified by SPEX CertiPrep from pre-qualified vendors as per ISO 9000 guidelines. Vendor identifications are proprietary, however sources of all materials used in the preparation and testing of SPEX CertiPrep CRMs are tracked and documented. For further information contact CRM Sales.

Instructions for Use:

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

Method of Preparation:

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

Homogeneity:

The Homogeneity of the CRM has been confirmed by procedures consistent with ISO guide 17025, ISO/REMCO N280 and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed for the certified values by procedures consistent with the intended use of the CRM.
The mathematical expression $k_s=s^2m$ is employed to determine the sampling size
s = relative standard deviation in % for one component of the sample. (ie. The sub-sampling uncertainty)
m = the sub-sampling mass
k_s = mass of sub-sample necessary to ensure a relative sub-sampling error of 1% (68% confidence level) in a single determination

Statistical estimator and Confidence limits:

The certified value 'x' listed on the reverse of this document is at the 95% level of confidence and can be expressed as
X = x+/-U where X =True value (Labeled Value), U= Expanded uncertainty
$U=ku_c$ where k=2 is the coverage factor at the 95% confidence level
u_c is obtained by combining the individual element standard uncertainty components u_i and $u_c=\sqrt{\Sigma u_i^2}$

Certification Traveler Report:

All certified values reported were derived from Traveler Report (Spex CertiPrep's traceability documentation) identified by the lot number of this CRM. For further information contact CRM Sales.

Legal Notice:

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010162

SPEXertificate ™

Certificate of Reference Material

Catalog Number: PLW9-2X/2Y **Lot No.** 11-83W

Description: 1000 mg/L Tungsten

Matrix: H2O

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 ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 1003 mg/L

Uncertainty Associated with Measurement: +/- 3.0 mg/L

Certified Value is Traceable to: NIST SRM #3163

The CRM is prepared gravimetrically using high purity Ammonium Tungstate Lot# M0600W. The certified value listed is the average of values obtained by classical wet assay and ICP spectrometer analysis

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 1002 mg/L

Method: Fume with Sulfuric Acid to dryness. Ignite and weigh as WO3.

Instrumental Analysis by ICP spectrometer: 1003 mg/L

Uncertified Properties:

Density: 1.000 @ 19.6 Degrees Celsius

Trace Metallic Impurities in the Actual Solution via ICP / ICPMS Analysis:

Element	mg/L	Element	mg/L	Element	mg/L
Ag	<0.005	Cu	<0.001	Pb	<0.001
Al	0.006	Fe	0.001	Rb	<0.001
As	0.003	Ga	<0.001	Re	0.006
B	<0.003	In	<0.001	Sr	<0.001
Be	<0.001	K	<0.10	Sb	<0.001
Bi	<0.001	Li	<0.001	Si	0.52
Ba	<0.001	Mo	<0.001	Tl	<0.001
Ca	0.005	Mn	<0.001	Ti	<0.001
Cr	<0.001	Mg	<0.001	V	<0.001
Cd	<0.001	Ni	<0.001	Zr	<0.001
Co	<0.001	Na	0.09	Zn	0.005

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 7/26/05
DATE EXPIRED: 7/30/06
DATE OPENED: 7/28/05
INORG: 534 PO: 155213

Balances are calibrated regularly with weight sets traceable to NIST #32856, #32857 and others. This CRM is guaranteed stable to +/-0.5% of the certified concentration inclusive of uncertainty of measurements and other effects, such as transpiration losses, for a period of one year from the date of certification. This guarantee is valid only when the material is kept tightly capped and transported and stored under laboratory conditions.

Date of Certification: JUL - 2005 Certifying Officer: N. Kocherlakota

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Report of Certification

This Certified Reference Material has been prepared and certified under an ISO 9001 system consistent with the following guides:
Guide To The Expression Of Uncertainty In Measurement 1995
EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
ASTM Guide D6362-98
ISO Guide 34: Quality system guidelines for the production of reference materials.
ISO Guide 17025: Certification of reference materials, general and statistical principles
ISO Guide 31: Contents of certificates of reference materials
NIST Technical Note 1297
ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
ISO/REMCO N280

Material Source:

All analytes and matrix materials are obtained and verified by SPEX CertiPrep from pre-qualified vendors as per ISO 9000 guidelines. Vendor identifications are proprietary, however sources of all materials used in the preparation and testing of SPEX CertiPrep CRMs are tracked and documented. For further information contact CRM Sales.

Instructions for Use:

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

Method of Preparation:

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

Homogeneity:

The Homogeneity of the CRM has been confirmed by procedures consistent with ISO guide 17025, ISO/REMCO N280 and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed for the certified values by procedures consistent with the intended use of the CRM.
The mathematical expression $k_s=s^2m$ is employed to determine the sampling size
s = relative standard deviation in % for one component of the sample. (ie. The sub-sampling uncertainty)
m = the sub-sampling mass
k_s = mass of sub-sample necessary to ensure a relative sub-sampling error of 1% (68% confidence level) in a single determination

Statistical estimator and Confidence limits:

The certified value 'x' listed on the reverse of this document is at the 95% level of confidence and can be expressed as
X = x+/-U where X =True value (Labeled Value), U= Expanded uncertainty
$U=ku_c$ where k=2 is the coverage factor at the 95% confidence level
u_c is obtained by combining the individual element standard uncertainty components u_i and $u_c=\sqrt{\Sigma u_i^2}$

Certification Traveler Report:

All certified values reported were derived from Traveler Report (Spex CertiPrep's traceability documentation) identified by the lot number of this CRM. For further information contact CRM Sales.

Legal Notice:

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

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INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 2/28/05
DATE EXPIRED: 2/28/06 DK
DATE OPENED: 2/28/05
INORG: S039 PO: F55748

SPEXertificate™

Certificate of Reference Material

Catalog Number: PLZR2-2X/2Y/2T **Lot No.** 11-69ZR

Description: 1000 mg/L Zirconium

Matrix: 2% HNO3

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 ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 1004 mg/L

Uncertainty Associated with Measurement: +/- 3.0 mg/L

Certified Value is Traceable to: NIST SRM #3169

The CRM is prepared gravimetrically using high purity Zirconyl Nitrate Lot# 02041A. The certified value listed is the average of values obtained by classical wet assay and ICP spectrometer analysis

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 1004 mg/L

Method: Fume with Sulfuric Acid to dryness. Ignite and weigh as ZrO2.

Instrumental Analysis by ICP spectrometer: 1004 mg/L

Uncertified Properties:

Density: 1.011 @ 22.6 Degrees Celsius

Trace Metallic Impurities in the Actual Solution via ICP / ICPMS Analysis:

Element	mg/L	Element	mg/L	Element	mg/L
As	<0.001	Cu	<0.001	Pb	<0.001
Ag	0.03	Fe	0.02	Re	<0.001
Al	0.004	Ga	<0.001	Rb	<0.001
Ba	<0.002	In	<0.001	Sb	<0.001
Be	<0.001	K	<0.20	Sr	<0.001
Bi	0.15	Li	<0.001	Si	<0.10
B	<0.004	Mn	<0.001	Tl	<0.001
Cr	<0.001	Mg	<0.001	Ti	<0.003
Cd	<0.001	Mo	<0.001	V	<0.001
Co	<0.002	Ni	<0.001	Zn	0.001
Ca	<0.001	Na	0.004		

Balances are calibrated regularly with weight sets traceable to NIST #32856, #32857 and others. This CRM is guaranteed stable to +/-0.5% of the certified concentration inclusive of uncertainty of measurements and other effects, such as transpiration losses, for a period of one year from the date of certification. This guarantee is valid only when the material is kept tightly capped and transported and stored under laboratory conditions.

Date of Certification: FEB '05 Certifying Officer: N. Kocherlakota

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Report of Certification

This Certified Reference Material has been prepared and certified under an ISO 9001 system consistent with the following guides:
Guide To The Expression Of Uncertainty In Measurement 1995
EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
ASTM Guide D6362-98
ISO Guide 34: Quality system guidelines for the production of reference materials.
ISO Guide 17025: Certification of reference materials, general and statistical principles
ISO Guide 31: Contents of certificates of reference materials
NIST Technical Note 1297
ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
ISO/REMCO N280

Material Source:

All analytes and matrix materials are obtained and verified by SPEX CertiPrep from pre-qualified vendors as per ISO 9000 guidelines. Vendor identifications are proprietary, however sources of all materials used in the preparation and testing of SPEX CertiPrep CRMs are tracked and documented. For further information contact CRM Sales.

Instructions for Use:

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

Method of Preparation:

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

Homogeneity:

The Homogeneity of the CRM has been confirmed by procedures consistent with ISO guide 17025, ISO/REMCO N280 and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed for the certified values by procedures consistent with the intended use of the CRM.
The mathematical expression $k_s=s^2m$ is employed to determine the sampling size
s = relative standard deviation in % for one component of the sample. (ie. The sub-sampling uncertainty)
m = the sub-sampling mass
k_s = mass of sub-sample necessary to ensure a relative sub-sampling error of 1% (68% confidence level) in a single determination

Statistical estimator and Confidence limits:

The certified value 'x' listed on the reverse of this document is at the 95% level of confidence and can be expressed as
X = x+/-U where X =True value (Labeled Value), U= Expanded uncertainty
$U=ku_c$ where k=2 is the coverage factor at the 95% confidence level
u_c is obtained by combining the individual element standard uncertainty components u_i and $u_c=\sqrt{\Sigma u_i^2}$

Certification Traveler Report:

All certified values reported were derived from Traveler Report (Spex CertiPrep's traceability documentation) identified by the lot number of this CRM. For further information contact CRM Sales.

Legal Notice:

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DATE RECEIVED: 1/31/05
DATE EXPIRED: 1/30/2006
DATE OPENED: 1/31/05
INORG: 4998 PO: F55139

SPEXertificate™

Certificate of Reference Material

Catalog Number: PLNA2-3X/3Y **Lot No.** V9-56NA

Description: 10,000 mg/L Sodium

Matrix: 5% HNO3

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 ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 9984 mg/L

Uncertainty Associated with Measurement: +/- 30.0 mg/L

Certified Value is Traceable to: NIST SRM # 3152a

The CRM is prepared gravimetrically using high purity Sodium Carbonate Lot# 05031C. The certified value listed is the average of values obtained by classical wet assay and ICP spectrometer analysis

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 9983 mg/L

Method: Evaporate to dryness. Fume with Sulfuric Acid. Ignite and weigh as Na2SO4.

Instrumental Analysis by ICP spectrometer: 9985 mg/L

Uncertified Properties:

Density: 1.048 @ 23.1 Degrees Celsius

Trace Metallic Impurities in the Actual Solution via ICP / ICPMS Analysis:

Element	mg/L	Element	mg/L	Element	mg/L
Al	<0.001	Cu	0.01	Pb	0.009
As	<0.01	Fe	0.02	Re	<0.001
Ag	<0.02	Ga	<0.001	Rb	<0.001
B	<0.05	In	<0.001	Sr	<0.002
Ba	0.01	K	2.50	Sb	<0.001
Be	<0.009	Li	<0.002	Si	0.14
Bi	0.001	Mg	0.20	Ti	<0.02
Ca	0.75	Mn	0.001	Tl	<0.001
Cr	<0.02	Mo	<0.001	V	0.002
Cd	<0.001	Ni	<0.006	Zr	<0.01
Co	<0.001			Zn	0.02

Balances are calibrated regularly with weight sets traceable to NIST #32856, #32857 and others. This CRM is guaranteed stable to +/-0.5% of the certified concentration inclusive of uncertainty of measurements and other effects, such as transpiration losses, for a period of one year from the date of certification. This guarantee is valid only when the material is kept tightly capped and transported and stored under laboratory conditions.

Date of Certification: JAN -- 2005 Certifying Officer: N. Kocherlakota

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Report of Certification

This Certified Reference Material has been prepared and certified under an ISO 9001 system consistent with the following guides:
Guide To The Expression Of Uncertainty In Measurement 1995
EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
ASTM Guide D6362-98
ISO Guide 34: Quality system guidelines for the production of reference materials.
ISO Guide 17025: Certification of reference materials, general and statistical principles
ISO Guide 31: Contents of certificates of reference materials
NIST Technical Note 1297
ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
ISO/REMCO N280

Material Source:

All analytes and matrix materials are obtained and verified by SPEX CertiPrep from pre-qualified vendors as per ISO 9000 guidelines. Vendor identifications are proprietary, however sources of all materials used in the preparation and testing of SPEX CertiPrep CRMs are tracked and documented. For further information contact CRM Sales.

Instructions for Use:

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

Method of Preparation:

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

Homogeneity:

The Homogeneity of the CRM has been confirmed by procedures consistent with ISO guide 17025, ISO/REMCO N280 and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed for the certified values by procedures consistent with the intended use of the CRM.
The mathematical expression $k_s = s^2 m$ is employed to determine the sampling size
s = relative standard deviation in % for one component of the sample. (ie. The sub-sampling uncertainty)
m = the sub-sampling mass
k_s = mass of sub-sample necessary to ensure a relative sub-sampling error of 1% (68% confidence level) in a single determination

Statistical estimator and Confidence limits:

The certified value 'x' listed on the reverse of this document is at the 95% level of confidence and can be expressed as
X = x+/-U where X =True value (Labeled Value), U= Expanded uncertainty
$U = ku_c$ where k=2 is the coverage factor at the 95% confidence level
u_c is obtained by combining the individual element standard uncertainty components u_i, and $u_c = \sqrt{\Sigma u_i^2}$

Certification Traveler Report:

All certified values reported were derived from Traveler Report (Spex CertiPrep's traceability documentation) identified by the lot number of this CRM. For further information contact CRM Sales.

Legal Notice:

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Certificate of Reference Material

Catalog Number: ICV-2A **Lot No.:** 29-175AS
Description: **Initial Calibration Verification Standard II**
Matrix: 5% Nitric Acid

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 ICPOES, DCP, AA, ICPMS, 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 concentration.

Instrumental Analysis by ICP Spectrometer:

Element	Labeled (mg/L)	Measured (mg/L)	NIST SRM	Element	Labeled (mg/L)	Measured (mg/L)	NIST SRM
Ca	2,000	1,995.81	3109a	Ni	500	499.54	3136
K	2,000	1,995.56	3141a	V	500	499.79	3165
Mg	2,000	1,995.61	3131a	Cr	200	199.97	3112a
Na	2,000	1,995.63	3152a	Cu	200	199.98	3114
Al	1,000	989.06	3101a	Ag	100	99.44	3151
Ba	1,000	999.68	3104a	Be	100	99.16	3105a
Fe	1,000	995.89	3126a	Mn	100	100.03	3132
Co	500	500.41	3113	Zn	100	100.06	3168a

Spex Reference Multi: Lot # 1-58GM, 15-37AS, 11-171AS REF

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 10/14/05
DATE EXPIRED: 10/15/06
DATE OPENED: 10/14/05
INORG: 5129 PO: 0000003

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% on the average of all the certified concentrations with no single component exceeding +/- 2%. This guarantee is valid for a period of one year from the date of certification only when the material is kept tightly capped and transported and stored under laboratory conditions.

Date of Certification: OCT. -- 2005 Certifying Officer: N. Kocherlakota

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Report of Certification

This Certified Reference Material has been prepared and certified under an ISO 9001 system consistent with the following guides:
Guide To The Expression Of Uncertainty In Measurement 1995
EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
ASTM Guide D6362-98
ISO Guide 34: Quality system guidelines for the production of reference materials.
ISO Guide 17025: Certification of reference materials, general and statistical principles
ISO Guide 31: Contents of certificates of reference materials
NIST Technical Note 1297
ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
ISO/REMCO N280

Material Source:

All analytes and matrix materials are obtained and verified by SPEX CertiPrep from pre-qualified vendors as per ISO 9000 guidelines. Vendor identifications are proprietary, however sources of all materials used in the preparation and testing of SPEX CertiPrep CRMs are tracked and documented. For further information contact CRM Sales.

Instructions for Use:

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

Method of Preparation:

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

Homogeneity:

The Homogeneity of the CRM has been confirmed by procedures consistent with ISO guide 17025, ISO/REMCO N280 and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed for the certified values by procedures consistent with the intended use of the CRM.
The mathematical expression $k_s=s^2m$ is employed to determine the sampling size
s = relative standard deviation in % for one component of the sample. (ie. The sub-sampling uncertainty)
m = the sub-sampling mass
k_s = mass of sub-sample necessary to ensure a relative sub-sampling error of 1% (68% confidence level) in a single determination

Statistical estimator and Confidence limits:

The certified value 'x' listed on the reverse of this document is at the 95% level of confidence and can be expressed as
X = x+/-U where X =True value (Labeled Value), U= Expanded uncertainty
$U=ku_c$ where k=2 is the coverage factor at the 95% confidence level
u_c is obtained by combining the individual element standard uncertainty components u_i and $u_c = \sqrt{\Sigma u_i^2}$

Certification Traveler Report:

All certified values reported were derived from Traveler Report (Spex CertiPrep's traceability documentation) identified by the lot number of this CRM. For further information contact CRM Sales.

Legal Notice:

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

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010170

SPEXertificate ™

Certificate of Reference Material

Catalog Number: PLSB7-2X/2Y/2T **Lot No.** 11-02SB

Description: 1000 mg/L Antimony

Matrix: H2O / 0.6% Tart.Acid/tr.HNO3

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 ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 997 mg/L

Uncertainty Associated with Measurement: +/- 3.0 mg/L

Certified Value is Traceable to: NIST SRM #3102a

The CRM is prepared gravimetrically using high purity Antimony Metal Lot# 01041A. The certified value listed is the average of values obtained by classical wet assay and ICP spectrometer analysis

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 997 mg/L

Method: Evaporate to dryness. Fume with nitric acid. Ignite and weigh as Sb2O4.

Instrumental Analysis by ICP spectrometer: 997 mg/L

Uncertified Properties:

Density: 1.003 @ 31.6 Degrees Celsius

Trace Metallic Impurities in the Actual Solution via ICP / ICPMS Analysis:

Element	mg/L	Element	mg/L	Element	mg/L
Al	0.02	Cu	0.002	Pb	0.002
Ag	<0.001	Fe	35.00	Rb	<0.001
As	0.03	Ga	<0.001	Re	<0.001
Ba	0.005	In	<0.001	Sr	0.001
B	<0.50	K	0.90	Si	0.08
Bi	0.003	Li	<0.004	Ti	0.004
Be	<0.001	Mo	<0.001	Tl	0.01
Cr	<0.01	Mg	0.07	V	<0.004
Ca	4.00	Mn	<0.003	Zr	<0.001
Co	<0.001	Ni	<0.001	Zn	2.00
Cd	<0.001	Na	0.03		

Balances are calibrated regularly with weight sets traceable to NIST #32856, #32857 and others. This CRM is guaranteed stable to +/-0.5% of the certified concentration inclusive of uncertainty of measurements and other effects, such as transpiration losses, for a period of one year from the date of certification. This guarantee is valid only when the material is kept tightly capped and transported and stored under laboratory conditions.

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 10/4/05
DATE EXPIRED: 10/5/06
DATE OPENED: 10/4/05
INORG: 5430 PO: 0000010604

Date of Certification: OCT. - - 2005 Certifying Officer: N. Kocherlakota

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Report of Certification

This Certified Reference Material has been prepared and certified under an ISO 9001 system consistent with the following guides:
Guide To The Expression Of Uncertainty In Measurement 1995
EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
ASTM Guide D6362-98
ISO Guide 34: Quality system guidelines for the production of reference materials.
ISO Guide 17025: Certification of reference materials, general and statistical principles
ISO Guide 31: Contents of certificates of reference materials
NIST Technical Note 1297
ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
ISO/REMCO N280

Material Source:

All analytes and matrix materials are obtained and verified by SPEX CertiPrep from pre-qualified vendors as per ISO 9000 guidelines. Vendor identifications are proprietary, however sources of all materials used in the preparation and testing of SPEX CertiPrep CRMs are tracked and documented. For further information contact CRM Sales.

Instructions for Use:

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

Method of Preparation:

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

Homogeneity:

The Homogeneity of the CRM has been confirmed by procedures consistent with ISO guide 17025, ISO/REMCO N280 and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed for the certified values by procedures consistent with the intended use of the CRM.
The mathematical expression $k_s=s^2m$ is employed to determine the sampling size
s = relative standard deviation in % for one component of the sample. (ie. The sub-sampling uncertainty)
m = the sub-sampling mass
k_s = mass of sub-sample necessary to ensure a relative sub-sampling error of 1% (68% confidence level) in a single determination

Statistical estimator and Confidence limits:

The certified value 'x' listed on the reverse of this document is at the 95% level of confidence and can be expressed as
X = x+/-U where X =True value (Labeled Value), U= Expanded uncertainty
$U=ku_c$ where k=2 is the coverage factor at the 95% confidence level
u_c is obtained by combining the individual element standard uncertainty components u_i and $u_c=\sqrt{\Sigma u_i^2}$

Certification Traveler Report:

All certified values reported were derived from Traveler Report (Spex CertiPrep's traceability documentation) identified by the lot number of this CRM. For further information contact CRM Sales.

Legal Notice:

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SPECertificate™

Certificate of Reference Material

Catalog Number: ICV-2C **Lot No.:** 29-176AS
Description: **Initial Calibration Verification Standard II**
Matrix: 5% Nitric Acid

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 ICPOES, DCP, AA, ICPMS, 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 concentration.

Refer to side 2 for details of measurement uncertainties.

Instrumental Analysis by ICP Spectrometer:

Element	Labeled (mg/L)	Measured (mg/L)	NIST SRM
As	500	499.69	3103a
Pb	500	499.61	3128
Se	500	499.91	3149
TL	500	499.92	3158
Cd	100	99.90	3108

Spex Reference Multi: Lot #11-34AS, 1-57MG, 15-39AS Reff

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 10/14/05
DATE EXPIRED: 10/15/06
DATE OPENED: 10/14/05
INORG: 5428 PO: D070023

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% on the average of all the certified concentrations with no single element exceeding +/- 2%. This includes uncertainty of measurements and other effects, such as transpiration losses. This guarantee is valid for a period of one year from the date of certification only when the material is kept tightly capped and transported and stored under laboratory conditions.

Date of Certification: OCT. -- 2005 Certifying Officer: N. Kocherlakota

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Report of Certification

This Certified Reference Material has been prepared and certified under an ISO 9001 system consistent with the following guides:
Guide To The Expression Of Uncertainty In Measurement 1995
EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
ASTM Guide D6362-98
ISO Guide 34: Quality system guidelines for the production of reference materials.
ISO Guide 17025: Certification of reference materials, general and statistical principles
ISO Guide 31: Contents of certificates of reference materials
NIST Technical Note 1297
ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
ISO/REMCO N280

Material Source:

All analytes and matrix materials are obtained and verified by SPEX CertiPrep from pre-qualified vendors as per ISO 9000 guidelines. Vendor identifications are proprietary, however sources of all materials used in the preparation and testing of SPEX CertiPrep CRMs are tracked and documented. For further information contact CRM Sales.

Instructions for Use:

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

Method of Preparation:

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

Homogeneity:

The Homogeneity of the CRM has been confirmed by procedures consistent with ISO guide 17025, ISO/REMCO N280 and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed for the certified values by procedures consistent with the intended use of the CRM.
The mathematical expression $k_s=s^2m$ is employed to determine the sampling size
s = relative standard deviation in % for one component of the sample. (ie. The sub-sampling uncertainty)
m = the sub-sampling mass
k_s = mass of sub-sample necessary to ensure a relative sub-sampling error of 1% (68% confidence level) in a single determination

Statistical estimator and Confidence limits:

The certified value 'x' listed on the reverse of this document is at the 95% level of confidence and can be expressed as
X = x+/-U where X =True value (Labeled Value), U= Expanded uncertainty
$U=ku_c$ where k=2 is the coverage factor at the 95% confidence level
u_c is obtained by combining the individual element standard uncertainty components u_i and $u_c=\sqrt{\Sigma u_i^2}$

Certification Traveler Report:

All certified values reported were derived from Traveler Report (Spex CertiPrep's traceability documentation) identified by the lot number of this CRM. For further information contact CRM Sales.

Legal Notice:

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

ISO 9001
CERTIFIED

SPEX CertiPrep
203 Norcross Avenue • Metuchen, NJ 08840 USA
732-549-7144 • 1-800-LAB-SPEX • Fax: 732.603.9647 • CRMSales@spexcsp.com • www.spexcsp.com

010174

inorganic ventures / iv labs

195 lehigh avenue, suite 4, lakewood, nj 08701 usa
phone: 800-669-6799 • 732-901-1900 • fax: 732-901-1903
e-mail: ivsales@ivstandards.com • website: www.ivstandards.com

certificate of analysis

1.0 **Inorganic Ventures / IV Labs is an ISO Guide 34-2000 Certified Reference Material (CRM) Manufacturer: Certificate #883-02.** The certificate is designed and the certified value(s) and uncertainty(ies) are determined in accordance with ISO Guide 31-2000 (Reference Materials - Contents of certificates and label(s), ISO Guide 34-2000 "Quality System Guidelines for the Production of Reference Materials," and ISO Guide 35-1989 "Certification of Reference Materials - General and Statisical Principles."

2.0 **DESCRIPTION OF CRM** Custom-Grade **10000 µg/mL Aluminum in 5% (abs) HNO_3**

Catalog Number:	CGAL10-1, CGAL10-2, and CGAL10-5
Lot Number:	**X-AL04021**
Starting Material:	Al metal
Starting Material Purity (%):	99.997990
Starting Material Lot No	607116
Matrix:	5% (abs) HNO_3

3.0 **CERTIFIED VALUES AND UNCERTAINTIES**

Certified Concentration: 10,030 ± 19 µg/mL

Certified Density: 1.071 g/mL (measured at 22° C)

The Certified Value is based upon the most precise method used to analyze this CRM. The following equations are used in the calculation of the certified value and the uncertainty:

Certified Value $(\bar{x}) = \frac{\Sigma x_i}{n}$ — $(\bar{x})$ = mean; x_i = individual results; n = number of measurements

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

The independent samples t-test was used to determine if there is agreement between the above assay methods at the 95% confidence interval. Both methods were compared and showed agreement within the stated uncertainties. This agreement is a confirmation of the accuracy of this CRM.

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 IV product is Traceable to NIST via direct comparison to NIST SRMs. The uncertainties for each certified value are reported, taking into account the SRM uncertainty error and the measurement, weighing and volume dilution errors.

4.1 **Assay Method #1** **10,030 ± 19 µg/mL**
ICP Assay NIST SRM 3101a Lot Number: 010808

Assay Method #2 **10,022 ± 21 µg/mL**
EDTA NIST SRM 928 Lot Number: 392110

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 9/23/05
DATE EXPIRED: 10/1/06
DATE OPENED: 9/27/05
INORG: 5405 PO: D2060460435

pg. 1 of 1
5405

4.2 **BALANCE CALIBRATION** - All balances are checked daily using in-house procedure number 6-IMM-001. The weights used for testing are annually compared to Gerhart Scale Corporation's master weights and are traceable to the National Institute of Standards and Technology (NIST). The NIST Traceability numbers are 692476 - Class 1 and 692476A - Class 2. The NIST test number is 822/260017-98. All analytical balances are calibrated every 4 months by Gerhart Scale Corp. of South Amboy. The balances are calibrated with a class 1 and/or class 2 analytical weight set. These weights are tested annually by a NIST / NVLAP accredited calibration lab. The NIST test number is 822/260017-98.

4.3 **THERMOMETER CALIBRATION** - The thermometers used in the determination of the final densities are calibrated vs standard thermometer No. 903-2680 which was certified in accordance with the procedures outlined by ASTM E77-87 and NIST Monograph 150 using NIST Test Nos. and Std Nos.: 769543, 217368/769543, 217368/P14452, 176240/P14452, 176240. The in-house procedure No. is 2-QC-001.Thermometers which are not calibrated vs standard thermometer No. 903-2680 are traceable to NIST Identification Nos. 92564, 119016, 471047 and NIST test report Nos. 811/258522, 811/2557078, and 236090.

4.4 **GLASSWARE CALIBRATION** - In-house procedure 3-QC-002 is used to calibrate all Class A Glassware used in the manufacture and quality control of Custom Grade Standards.

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	< 0.03378	O	Li	< 0.00020	M	Pr	< 0.00169	M	Te	< 0.16892
M	Sb	< 0.00282	M	Er	< 0.02815	M	Lu	< 0.00225	M	Re	< 0.00563	M	Tb	< 0.00169
M	As	< 0.05631	M	Eu	< 0.01689	O	Mg	0.00498	M	Rh	< 0.00563	M	Tl	< 0.00563
M	Ba	< 0.05631	M	Gd	< 0.00563	M	Mn	< 0.02252	M	Rb	< 0.00563	M	Th	< 0.00563
O	Be	< 0.00017	M	Ga	< 0.00563	O	Hg	< 0.00700	M	Ru	< 0.01126	M	Tm	< 0.00225
M	Bi	< 0.00225	M	Ge	< 0.03378	M	Mo	< 0.01126	M	Sm	< 0.00563	M	Sn	< 0.02815
O	B	0.01173	M	Au	< 0.01689	M	Nd	< 0.01126	M	Sc	< 0.05631	O	Ti	0.00213
M	Cd	< 0.01689	M	Hf	< 0.01126	O	Ni	< 0.00600	M	Se	< 0.04505	M	W	< 0.05631
O	Ca	0.01013	M	Ho	< 0.00282	M	Nb	< 0.00282	O	Si	0.07462	M	U	< 0.01126
M	Ce	< 0.02815	M	In	< 0.05631	n	Os		M	Ag	< 0.01126	M	V	< 0.01126
M	Cs	< 0.00169	M	Ir	< 0.02815	M	Pd	< 0.02815	O	Na	0.06396	M	Yb	< 0.00563
O	Cr	0.00533	O	Fe	0.00586	O	P	< 0.03000	M	Sr	< 0.00282	M	Y	< 0.22523
M	Co	< 0.01689	M	La	< 0.00282	M	Pt	< 0.01126	O	S	< 0.10000	M	Zn	0.00450
M	Cu	< 0.03378	M	Pb	< 0.01689	O	K	0.01208	M	Ta	< 0.03942	M	Zr	< 0.02815

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:
ICP-MS, ICP-OES, FAAS, GFAA, XRF, and DCP
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 IV Technical Staff

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 - 26.98154; +3; 6; $Al(H_2O)_6^{+3}$

Chemical Compatibility - Soluble in HCl, HNO_3, HF and H_2SO_4. Avoid neutral media. Soluble in strongly basic NaOH forming the $Al(OH)_4(H_2O)_2^{1-}$ species. Stable with most metals and inorganic anions. The phosphate is insoluble in water and only slightly soluble in acid.

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.

Al Containing Samples (Preparation and Solution) - Metal (Best dissolved in HCl / HNO_3); α- Al_2O_3 (Na_2CO_3 fusion in Pt°); γ- Al_2O_3 (Soluble in acids such as HCl); Ores (Carbonate fusion in Pt° followed by HCl dissolution); Organic Matrices (sulfuric/peroxide digestion or nitric / sulfuric / perchloric acid decomposition, or dry ash and dissolution in dilute HCl.

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

Technique/Line	Estimated D.L.	Order	Type	Interferences (underlined indicates severe)
ICP-OES 394.401 nm	0.05 / 0.006 µg/mL	1	atom	U, Ce
ICP-OES 396.152 nm	0.03 / 0.006 µg/mL	1	atom	Mo, Zr, Ce
ICP-OES 167.078 nm	0.1 / 0.009 µg/mL	1	ion	Fe
ICP-MS 27 amu	30 ppt	n/a	M^+	$^{12}C^{15}N$, $^{13}C^{14}N$, $^{1}H^{12}C^{14}N$, $^{11}B^{16}O$, $^{54}Cr^{2+}$, $^{54}Fe^{2+}$

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

9.0 HOMOGENEITY - This solution was mixed according to procedure IV-MPM-004 and is guaranteed to be homogeneous.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001:2000 Quality Management System Registration - QMI Certificate Number 010106

Recognized by:
Registrar Accreditation Board (ANSI-RAB)
Standards Council of Canada (SCC)
Dutch Council for Accreditation (RVA)
Entidad Mexicana de Acreditacion, a.c.(EMA)

Members of IQ Net International Certification Network:
Argentina (IRAM), Australia (QAS), Austria (ÖQS), Belgium (Avinter), Brazil (FCAV), Canada (QMI), Hong Kong (HKQAA), Columbia (ICONTEC), Czech Republic (CQS), Denmark (DS), Finland (SFS), France (AFAQ), Germany (DQS), Greece (ELOT), Hungary (MSZT), Ireland (NSAI), Israel (SII), Italy (CISQ), Japan (JQA), Korea (KSA-QA), Netherlands (KEMA), Norway (NCS), Poland(PCBC), Portugal (APCER), Singapore (PSB), Slovenia (SIQ), Spain (AENOR), Switzerland (SQS)

10.2 ISO/IEC 17025 - 1999 "General Requirements for the Competence of Testing and Calibration"
- Chemical Testing - Accredited A2LA Certificate Number 883.01

10.3 ISO/IEC Guide 34 - 2000 "General Requirements for the Competence of Reference Material Producers"
- Reference Materials Production - Accredited A2LA Certificate Number 883.02
A2LA Mutual Recognition Agreement Partners:
Australia (NATA), Austria (BmwA), Belgium (BELTEST) (BKO-OBE), Canada (SCC), Chinese Taipei (CNLA), Czech Republic (NAO), Denmark (DANAK), Finland (FINAS), France (COFRAC), Germany (DAR), Hong Kong (HKAS, Ireland (NAB), Italy (SIT) (SINAL), Japan (JAB) (JNLA), Republic of Korea (KOLAS), The Netherlands (RvA), New Zealand (IANZ), Norway (NA), Portugal (IPQ), Singapore (SAC-SINGLAS), Spain (ENAC), Sweden (SWEDAC), Switzerland (SAS), United Kingdom (UKAS) and United States (NVLAP) (ICBO ES)

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

10.6 MIL-STD-45662A (Obsolete/Observed)

11.0 DATE OF CERTIFICATION AND PERIOD OF VALIDITY

11.1 IV 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 (P-SP01020) of chemically-stable solutions performed at Inorganic Ventures / IV Labs indicate a CRM shelf-life of four years for solutions packaged in 500-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.
Inorganic Ventures / IV Labs concurs with state and federal regulatory agencies' recommendations that solution standards be assigned a one-year expiration date.

Certification Date: December 28, 2004

Expiration Date: EXPIRES 1 2006

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:	Nick Maida, QA Administrator	Nicholas Maida
Certificate Approved By:	Katalin Le, QC Manager	Katalin Le
Certifying Officer:	Paul Gaines, Chemist, Senior Technical Director	Paul R Gaines

010178

inorganic ventures / iv labs

195 lehigh avenue, suite 4, lakewood, nj 08701 usa
phone: 800-669-6799 • 732-901-1900 • fax: 732-901-1903
e-mail: ivsales@ivstandards.com • website: www.ivstandards.com

certificate of analysis

1.0 **Inorganic Ventures / IV Labs is an ISO Guide 34-2000 Certified Reference Material (CRM) Manufacturer: Certificate #883-02.** The certificate is designed and the certified value(s) and uncertainty(ies) are determined in accordance with ISO Guide 31-2000 (Reference Materials - Contents of certificates and label(s), ISO Guide 34-2000 "Quality System Guidelines for the Production of Reference Materials," and ISO Guide 35-1989 "Certification of Reference Materials - General and Statisical Principles."

2.0 **DESCRIPTION OF CRM** Custom-Grade **10000 µg/mL Calcium in 1.4% (abs) HNO_3**

Catalog Number:	CGCA10-1, CGCA10-2, and CGCA10-5
Lot Number:	**X-CA03030**
Starting Material:	CaO
Starting Material Purity (%):	99.999155
Starting Material Lot No	C27L01
Matrix:	1.4% (abs) HNO_3

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 11/27/05
DATE EXPIRED: 3/1/06 DR
DATE OPENED: 11/28/05
INORG: 4988 PO: F55133

3.0 **CERTIFIED VALUES AND UNCERTAINTIES**

Certified Concentration: 10,035 ± 24 µg/mL

Certified Density: 1.037 g/mL (measured at 22° C)

The Certified Value is based upon the most precise method used to analyze this CRM. The following equations are used in the calculation of the certified value and the uncertainty:

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

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

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

The independent samples t-test was used to determine if there is agreement between the above assay methods at the 95% confidence interval. Both methods were compared and showed agreement within the stated uncertainties. This agreement is a confirmation of the accuracy of this CRM.

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 IV product is Traceable to NIST via direct comparison to NIST SRMs. The uncertainties for each certified value are reported, taking into account the SRM uncertainty error and the measurement, weighing and volume dilution errors.

4.1 **Assay Method #1** **10,035 ± 24 µg/mL**
EDTA NIST SRM 928 Lot Number: 392110

Assay Method #2 **10,046 ± 65 µg/mL**
ICP Assay NIST SRM 3109a Lot Number: 000622

4.2 **BALANCE CALIBRATION** - All balances are checked daily using in-house procedure number 6-IMM-001. The weights used for testing are annually compared to Gerhart Scale Corporation's master weights and are traceable to the National Institute of Standards and Technology (NIST). The NIST Traceability numbers are 692476 - Class 1 and 692476A - Class 2. The NIST test number is 822/260017-98. All analytical balances are calibrated every 4 months by Gerhart Scale Corp. of South Amboy. The balances are calibrated with a class 1 and/or class 2 analytical weight set. These weights are tested annually by a NIST / NVLAP accredited calibration lab. The NIST test number is 822/260017-98.

4.3 **THERMOMETER CALIBRATION** - The thermometers used in the determination of the final densities are calibrated vs standard thermometer No. 903-2680 which was certified in accordance with the procedures outlined by ASTM E77-87 and NIST Monograph 150 using NIST Test Nos. and Std Nos.: 769543, 217368/769543, 217368/P14452, 176240/P14452, 176240. The in-house procedure No. is 2-QC-001.Thermometers which are not calibrated vs standard thermometer No. 903-2680 are traceable to NIST Identification Nos. 92564, 119016, 471047 and NIST test report Nos. 811/258522, 811/2557078, and 236090.

4.4 **GLASSWARE CALIBRATION** - In-house procedure 3-QC-002 is used to calibrate all Class A Glassware used in the manufacture and quality control of Custom Grade Standards.

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.

O	Al	0.00069	M	Dy	< 0.04098	O	Li	< 0.00002	M	Pr	< 0.00205	M	Te	< 0.20492
M	Sb	< 0.00342	M	Er	< 0.03415	M	Lu	< 0.00273	M	Re	< 0.00683	M	Tb	< 0.00205
M	As	< 0.06831	M	Eu	< 0.02049	O	Mg	0.05295	M	Rh	< 0.00683	M	Tl	< 0.00683
O	Ba	0.00065	M	Gd	< 0.00683	O	Mn	0.00038	M	Rb	< 0.00683	M	Th	< 0.00683
O	Be	< 0.00009	M	Ga	< 0.00683	O	Hg	< 0.01100	M	Ru	< 0.01366	M	Tm	< 0.00273
M	Bi	< 0.00273	M	Ge	< 0.04098	M	Mo	< 0.01366	M	Sm	< 0.00683	M	Sn	< 0.03415
O	B	< 0.00054	M	Au	< 0.02049	M	Nd	< 0.01366	O	Sc	< 0.00002	M	Ti	< 0.34153
O	Cd	< 0.00450	M	Hf	< 0.01366	O	Ni	< 0.00230	O	Se	< 0.00620	M	W	< 0.06831
s	Ca		M	Ho	< 0.00342	M	Nb	< 0.00342	O	Si	0.00132	M	U	< 0.01366
M	Ce	< 0.03415	O	In	< 0.00200	n	Os		M	Ag	< 0.01366	O	V	< 0.00090
M	Cs	< 0.00205	M	Ir	< 0.03415	M	Pd	< 0.03415	O	Na	0.01000	M	Yb	< 0.00683
O	Cr	0.00103	O	Fe	< 0.00110	O	P	< 0.00480	O	Sr	0.03530	M	Y	< 0.27323
O	Co	< 0.00120	M	La	< 0.00342	M	Pt	< 0.01366	O	S	0.00412	O	Zn	0.02353
O	Cu	< 0.00400	M	Pb	< 0.02049	O	K	< 0.00170	M	Ta	< 0.04782	M	Zr	< 0.03415

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:
ICP-MS, ICP-OES, FAAS, GFAA, XRF, and DCP
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 IV Technical Staff

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4988

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 - 40.078; +2; 6; $Ca(H_2O)_6^{+2}$

Chemical Compatibility - Soluble in HCl and HNO_3. Avoid H_2SO_4, HF, H_3PO_4 and neutral to basic media. Stable with most metals and inorganic anions forming insoluble silicate, carbonate, hydroxide, oxide, fluoride, sulfate, oxalate, chromate, arsenate and tungstate in neutral aqueous media.

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

Ca Containing Samples (Preparation and Solution) - Metal (best dissolved in diluted HNO_3); Ores (Carbonate fusion in Pt* followed by HCl dissolution); Organic Matrices (dry ash and dissolution in dilute HCl. Do not heat when dissolving to avoid precipitation of SiO_2) .The oxide, hydroxide, carbonate, phosphate, and fluoride of calcium are soluble in % levels of HCl or HNO_3. The sulfates (gypsum, anhydrite, etc.), certain silicates and complex compounds require fusion with Na_2CO_3 followed by HCl / water dissolution. Contamination is a very real problem when analyzing for trace levels.

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 at* concs.)
ICP-OES	393.366 nm	0.0002 / 0.00004 µg/mL	1	ion	U, Ce
ICP-OES	396.847 nm	0.0005 / 0.00006 µg/mL	1	ion	Th
ICP-OES	422.673 nm	0.01 / 0.001 µg/mL	1	atom	Ge
ICP-MS	44 amu	1200 ppt	n/a	M+	$^{16}O_2$, ^{12}C, $^{28}Si^{16}O$, $^{44}Sr^{2+}$

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

9.0 HOMOGENEITY - This solution was mixed according to procedure IV-MPM-004 and is guaranteed to be homogeneous.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001:2000 Quality Management System Registration - QMI Certificate Number 010105

Recognized by:

Registrar Accreditation Board (ANSI-RAB)
Standards Council of Canada (SCC)
Dutch Council for Accreditation (RVA)
Entidad Mexicana de Acreditacion, a.c.(EMA)

Members of IQ Net International Certification Network:

Argentina (IRAM), Australia (QAS), Austria (ÖQS), Belgium (Avinter) , Brazil (FCAV), Canada (QMI), Hong Kong (HKQAA), Columbia (ICONTEC), Czech Republic (CQS), Denmark (DS), Finland (SFS), France (AFAQ), Germany (DQS), Greece (ELOT), Hungary (MSZT), Ireland (NSAI), Israel (SII), Italy (CISQ), Japan (JQA), Korea (KSA-QA), Netherlands (KEMA), Norway (NCS), Poland(PCBC), Portugal (APCER), Singapore (PSB), Slovenia (SIQ), Spain (AENOR), Switzerland (SQS)

10.2 ISO/IEC 17025 - 1999 "General Requirements for the Competence of Testing and Calibration" - Chemical Testing - Accredited A2LA Certificate Number 883.01

10.3 ISO/IEC Guide 34 - 2000 "General Requirements for the Competence of Reference Material Producers" - Reference Materials Production - Accredited A2LA Certificate Number 883.02

A2LA Mutual Recognition Agreement Partners:

Australia (NATA), Austria (BmwA), Belgium (BELTEST) (BKO-OBE), Canada (SCC), Chinese Taipei (CNLA), Czech Republic (NAO), Denmark (DANAK), Finland (FINAS), France (COFRAC), Germany (DAR), Hong Kong (HKAS, Ireland (NAB), Italy (SIT) (SINAL), Japan (JAB) (JNLA), Republic of Korea (KOLAS), The Netherlands (RvA), New Zealand (IANZ), Norway (NA), Portugal (IPQ), Singapore (SAC-SINGLAS), Spain (ENAC), Sweden (SWEDAC), Switzerland (SAS), United Kingdom (UKAS) and United States (NVLAP) (ICBO ES)

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

10.6 MIL-STD-45662A (Obsolete/Observed)

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11.0 DATE OF CERTIFICATION AND PERIOD OF VALIDITY

11.1 IV 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 (P-SP01020) of chemically-stable solutions performed at Inorganic Ventures / IV Labs indicate a CRM shelf-life of four years for solutions packaged in 500-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.
Inorganic Ventures / IV Labs concurs with state and federal regulatory agencies' recommendations that solution standards be assigned a one-year expiration date.

Certification Date: September 20, 2004

Expiration Date: EXPIRES 1 2006

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:	Nick Maida, QA Administrator	Nicholas Maida
Certificate Approved By:	Katalin Le, QC Manager	Katalin Le
Certifying Officer:	Paul Gaines, Chemist, Senior Technical Director	Paul R Gaines

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inorganic ventures / iv labs

195 lehigh avenue, suite 4, lakewood, nj 08701 usa
phone: 800-669-6799 • 732-901-1900 • fax: 732-901-1903
e-mail: ivsales@ivstandards.com • website: www.ivstandards.com

certificate of analysis

1.0 **Inorganic Ventures / IV Labs is an ISO Guide 34-2000 Certified Reference Material (CRM) Manufacturer: Certificate #883-02.** The certificate is designed and the certified value(s) and uncertainty(ies) are determined in accordance with ISO Guide 31-2000 (Reference Materials - Contents of certificates and label(s), ISO Guide 34-2000 "Quality System Guidelines for the Production of Reference Materials," and ISO Guide 35-1989 "Certification of Reference Materials - General and Statisical Principles."

2.0 **DESCRIPTION OF CRM** Custom-Grade **10000 µg/mL Iron in 4.8% (abs) HNO_3**

Catalog Number:	CGFE10-1, CGFE10-2, and CGFE10-5
Lot Number:	**X-FE03041**
Starting Material:	Fe metal
Starting Material Purity (%):	99.998667
Starting Material Lot No	23387
Matrix:	4.8% (abs) HNO_3

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 2/28/05
DATE EXPIRED: 3/1/2006
DATE OPENED: 2/28/05
INORG: 5048 PO: F55148

3.0 **CERTIFIED VALUES AND UNCERTAINTIES**

Certified Concentration: 10,041 ± 21 µg/mL

Certified Density: 1.061 g/mL (measured at 22° C)

The Certified Value is based upon the most precise method used to analyze this CRM. The following equations are used in the calculation of the certified value and the uncertainty:

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

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

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

The independent samples t-test was used to determine if there is agreement between the above assay methods at the 95% confidence interval. Both methods were compared and showed agreement within the stated uncertainties. This agreement is a confirmation of the accuracy of this CRM.

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 IV product is Traceable to NIST via direct comparison to NIST SRMs. The uncertainties for each certified value are reported, taking into account the SRM uncertainty error and the measurement, weighing and volume dilution errors.

4.1 **Assay Method #1** **10,041 ± 21 µg/mL**
EDTA NIST SRM 928 Lot Number: 880710

Assay Method #2 **10,017 ± 40 µg/mL**
ICP Assay NIST SRM 3126a Lot Number: 000606

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4.2 **BALANCE CALIBRATION** - All balances are checked daily using in-house procedure number 6-IMM-001. The weights used for testing are annually compared to Gerhart Scale Corporation's master weights and are traceable to the National Institute of Standards and Technology (NIST). The NIST Traceability numbers are 692476 - Class 1 and 692476A - Class 2. The NIST test number is 822/260017-98. All analytical balances are calibrated every 4 months by Gerhart Scale Corp. of South Amboy. The balances are calibrated with a class 1 and/or class 2 analytical weight set. These weights are tested annually by a NIST / NVLAP accredited calibration lab. The NIST test number is 822/260017-98.

4.3 **THERMOMETER CALIBRATION** - The thermometers used in the determination of the final densities are calibrated vs standard thermometer No. 903-2680 which was certified in accordance with the procedures outlined by ASTM E77-87 and NIST Monograph 150 using NIST Test Nos. and Std Nos.: 769543, 217368/769543, 217368/P14452, 176240/P14452, 176240. The in-house procedure No. is 2-QC-001.Thermometers which are not calibrated vs standard thermometer No. 903-2680 are traceable to NIST Identification Nos. 92564, 119016, 471047 and NIST test report Nos. 811/258522, 811/2557078, and 236090.

4.4 **GLASSWARE CALIBRATION** - In-house procedure 3-QC-002 is used to calibrate all Class A Glassware used in the manufacture and quality control of Custom Grade Standards.

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.

O	Al	< 0.00270	M	Dy	< 0.02528	O	Li	< 0.00003	M	Pr	< 0.00126	M	Te	< 0.12640
M	Sb	< 0.00211	M	Er	< 0.02107	M	Lu	< 0.00169	M	Re	< 0.00421	M	Tb	< 0.00126
M	As	< 0.04213	M	Eu	< 0.01264	O	Mg	< 0.00006	M	Rh	< 0.00421	M	Tl	< 0.00421
M	Ba	< 0.04213	M	Gd	< 0.00421	O	Mn	< 0.05000	M	Rb	< 0.00421	M	Th	< 0.00421
O	Be	< 0.00005	M	Ga	< 0.00421	O	Hg	< 0.01100	M	Ru	< 0.00843	M	Tm	< 0.00169
M	Bi	< 0.00169	I	Ge		M	Mo	< 0.00843	M	Sm	< 0.00421	M	Sn	< 0.02107
O	B	< 0.00090	M	Au	< 0.01264	M	Nd	< 0.00843	M	Sc	< 0.04213	M	Ti	< 0.21066
M	Cd	< 0.01264	M	Hf	< 0.00843	O	Ni	< 0.00230	M	Se	< 0.03371	M	W	< 0.04213
O	Ca	0.03107	M	Ho	< 0.00211	M	Nb	< 0.00211	O	Si	0.01673	M	U	< 0.00843
M	Ce	< 0.02107	M	In	< 0.04213	n	Os		M	Ag	< 0.00843	M	V	< 0.00843
M	Cs	< 0.00126	M	Ir	< 0.02107	M	Pd	< 0.02107	O	Na	0.00956	M	Yb	< 0.00421
M	Cr	< 0.02107	s	Fe		I	P		M	Sr	< 0.00211	M	Y	< 0.16853
O	Co	0.01195	M	La	< 0.00211	M	Pt	< 0.00843	O	S	< 0.07200	M	Zn	0.08761
M	Cu	< 0.02528	M	Pb	< 0.01264	O	K	0.00239	M	Ta	< 0.02949	M	Zr	< 0.02107

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:
ICP-MS, ICP-OES, FAAS, GFAA, XRF, and DCP
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 IV Technical Staff

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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 - 55.847; +3; 6; $Fe(H_2O)_6^{3+}$

Chemical Compatibility - Stable in HCl, HNO_3, H_2SO_4, HF and H_3PO_4. Avoid basic media. Stable with most metals and inorganic anions in acidic 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 1-5% HNO_3 / LDPE container.

Fe Containing Samples (Preparation and Solution) - Metal (Soluble in HCl); Oxides (If the oxide has been at a high temperature then Na_2CO_3 fusion in Pt* followed by HCl dissolution otherwise dissolve in dilute HCl); Ores (See Oxides above using only the fusion approach).

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 at ≈ concs.)
ICP-OES	238.204 nm	0.005 / 0.001 µg/mL	1	ion	Ru, Co
ICP-OES	239.562 nm	0.005 / 0.001 µg/mL	1	ion	Co, W, Cr
ICP-OES	259.940 nm	0.006 / 0.001 µg/mL	1	ion	Hf, Nb
ICP-MS	56 amu	970 ppt	n/a	M⁺	$^{40}Ar^{15}N^{1}H$, $^{40}Ar^{16}O$, $^{38}Ar^{17}O^{1}H$, $^{38}Ar^{18}O$, $^{37}Cl^{18}O^{1}H$, $^{40}Ca^{16}O$

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

9.0 HOMOGENEITY - This solution was mixed according to procedure IV-MPM-004 and is guaranteed to be homogeneous.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001:2000 Quality Management System Registration - QMI Certificate Number 010105
Recognized by:
Registrar Accreditation Board (ANSI-RAB)
Standards Council of Canada (SCC)
Dutch Council for Accreditation (RVA)
Entidad Mexicana de Acreditacion, a.c.(EMA)
Members of IQ Net International Certification Network:
Argentina (IRAM), Australia (QAS), Austria (ÖQS), Belgium (Avinter), Brazil (FCAV), Canada (QMI), Hong Kong (HKQAA), Columbia (ICONTEC), Czech Republic (CQS), Denmark (DS), Finland (SFS), France (AFAQ), Germany (DQS), Greece (ELOT), Hungary (MSZT), Ireland (NSAI), Israel (SII), Italy (CISQ), Japan (JQA), Korea (KSA-QA), Netherlands (KEMA), Norway (NCS), Poland(PCBC), Portugal (APCER), Singapore (PSB), Slovenia (SIQ), Spain (AENOR), Switzerland (SQS)

10.2 ISO/IEC 17025 - 1999 "General Requirements for the Competence of Testing and Calibration" - Chemical Testing - Accredited A2LA Certificate Number 883.01

10.3 ISO/IEC Guide 34 - 2000 "General Requirements for the Competence of Reference Material Producers" - Reference Materials Production - Accredited A2LA Certificate Number 883.02
A2LA Mutual Recognition Agreement Partners:
Australia (NATA), Austria (BmwA), Belgium (BELTEST) (BKO-OBE), Canada (SCC), Chinese Taipei (CNLA), Czech Republic (NAO), Denmark (DANAK), Finland (FINAS), France (COFRAC), Germany (DAR), Hong Kong (HKAS, Ireland (NAB), Italy (SIT) (SINAL), Japan (JAB) (JNLA), Republic of Korea (KOLAS), The Netherlands (RvA), New Zealand (IANZ), Norway (NA), Portugal (IPQ), Singapore (SAC-SINGLAS), Spain (ENAC), Sweden (SWEDAC), Switzerland (SAS), United Kingdom (UKAS) and United States (NVLAP) (ICBO ES)

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

10.6 MIL-STD-45662A (Obsolete/Observed)

11.0 DATE OF CERTIFICATION AND PERIOD OF VALIDITY

11.1 IV 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 (P-SP01020) of chemically-stable solutions performed at Inorganic Ventures / IV Labs indicate a CRM shelf-life of four years for solutions packaged in 500-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.
Inorganic Ventures / IV Labs concurs with state and federal regulatory agencies' recommendations that solution standards be assigned a one-year expiration date.

Certification Date: July 22, 2004

Expiration Date: EXPIRES 1 MAR 2006

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:	Nick Malda, QA Administrator	Nicholas Malda
Certificate Approved By:	Katalin Le, QC Manager	Katalin Le
Certifying Officer:	Paul Gaines, Chemist, Senior Technical Director	Paul R Gaines

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inorganic ventures / iv labs

195 lehigh avenue, suite 4, lakewood, nj 08701 usa
phone: 800-669-6799 • 732-901-1900 • fax: 732-901-1903
e-mail: ivsales@ivstandards.com • website: www.ivstandards.com

certificate of analysis

1.0 **Inorganic Ventures / IV Labs is an ISO Guide 34-2000 Certified Reference Material (CRM) Manufacturer: Certificate #883-02.** The certificate is designed and the certified value(s) and uncertainty(ies) are determined in accordance with ISO Guide 31-2000 (Reference Materials - Contents of certificates and label(s), ISO Guide 34-2000 "Quality System Guidelines for the Production of Reference Materials," and ISO Guide 35-1989 "Certification of Reference Materials - General and Statisical Principles."

2.0 DESCRIPTION OF CRM

Custom-Grade **10000 µg/mL Potassium in 1.4% (abs) HNO3**

Catalog Number:	CGK10-1, CGK10-2, and CGK10-5
Lot Number:	**Y-K02129**
Starting Material:	KNO3
Starting Material Purity (%):	99.998112
Starting Material Lot No:	B19P01
Matrix:	1.4% (abs) HNO3

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 11/28/05
DATE EXPIRED: 12/01/06 (2)
DATE OPENED: 11/29/05
INORG: 5471 PO: D20924720

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Concentration: 9983 ± 5 µg/mL 9759 ± 5 µg/g

Certified Density: 1.023 g/mL (measured at 22° C)

The Certified Value is based upon the most precise method used to analyze this CRM. The following equations are used in the calculation of the certified value and the uncertainty:

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

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

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

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 IV 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** **9926 ± 36 µg/mL 9703 ± 35 µg/g**
ICP Assay NIST SRM 3141a Lot Number: 891312

Assay Method #2 **9983 ± 5 µg/mL 9759 ± 5 µg/g**
Gravimetric NIST SRM Lot Number: See Sec. 4.2

4.2 **BALANCE CALIBRATION** - All balances are checked daily using in-house procedure number 6-IMM-001. The weights used for testing are annually compared to Gerhart Scale Corporation's master weights and are traceable to the National Institute of Standards and Technology (NIST). The NIST Traceability numbers are 692476 - Class 1 and 692476A - Class 2. The NIST test number is 822/260017-98. All analytical balances are calibrated every 4 months by Gerhart Scale Corp. of South Amboy. The balances are calibrated with a class 1 and/or class 2 analytical weight set. These weights are tested annually by a NIST / NVLAP accredited calibration lab. The NIST test number is 822/260017-98.

4.3 **THERMOMETER CALIBRATION** - The thermometers used in the determination of the final densities are calibrated vs standard thermometer No. 903-2680 which was certified in accordance with the procedures outlined by ASTM E77-87 and NIST Monograph 150 using NIST Test Nos. and Std Nos.: 769543, 217368/769543, 217368/P14452, 176240/P14452, 176240. The in-house procedure No. is 2-QC-001.Thermometers which are not calibrated vs standard thermometer No. 903-2680 are traceable to NIST Identification Nos. 92564, 119016, 471047 and NIST test report Nos. 811/258522, 811/2557078, and 236090.

4.4 **GLASSWARE CALIBRATION** - In-house procedure 3-QC-002 is used to calibrate all Class A glassware used in the manufacture 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	0.00072	M	Dy	< 0.00597	O	Li	< 0.00001	M	Pr	< 0.00030	M	Te	< 0.02986
M	Sb	< 0.00050	M	Er	< 0.00498	M	Lu	< 0.00040	M	Re	< 0.00100	M	Tb	< 0.00030
M	As	< 0.00995	M	Eu	< 0.00299	O	Mg	0.00068	M	Rh	< 0.00100	M	Tl	< 0.00100
M	Ba	< 0.00995	M	Gd	< 0.00100	O	Mn	0.00020	M	Rb	0.55238	M	Th	< 0.00100
O	Be	< 0.00003	M	Ga	< 0.00100	O	Hg	< 0.00255	M	Ru	< 0.00199	M	Tm	< 0.00040
M	Bi	< 0.00040	O	Ge	< 0.00026	M	Mo	< 0.00199	M	Sm	< 0.00100	M	Sn	< 0.00498
O	B	< 0.00010	O	Au	< 0.00051	M	Nd	< 0.00199	O	Sc	< 0.00002	O	Ti	< 0.00012
M	Cd	< 0.00299	M	Hf	< 0.00199	O	Ni	< 0.00039	O	Se	< 0.00851	M	W	< 0.00995
O	Ca	0.00357	M	Ho	< 0.00050	M	Nb	< 0.00050	O	Si	< 0.00058	M	U	< 0.00199
M	Ce	< 0.00498	M	In	< 0.00995	n	Os		M	Ag	< 0.00199	O	V	< 0.00015
M	Cs	< 0.00030	M	Ir	< 0.00498	M	Pd	< 0.00498	O	Na	0.15315	M	Yb	< 0.00100
M	Cr	< 0.00498	O	Fe	0.00048	O	P	< 0.00043	M	Sr	< 0.00050	M	Y	< 0.03981
M	Co	< 0.00299	M	La	< 0.00050	M	Pt	< 0.00199	O	S	< 0.01225	O	Zn	0.00068
M	Cu	< 0.00597	M	Pb	0.08559	s	K		M	Ta	< 0.00697	M	Zr	< 0.00498

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:
ICP-MS, ICP-OES, FAAS, GFAA, XRF, and DCP
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 IV Technical Staff

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 - 29.0983; +1; (6); K^+(aq)
(Coordination Number in parentheses is assumed, not certain.)

Chemical Compatibility - Soluble in HCl, HNO_3, H_2SO_4 and HF aqueous matrices. Avoid use of $HClO_4$ due to insolubility of the perchlorate. Stable with all metals and inorganic anions except ClO_4^-.

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

K Containing Samples (Preparation and Solution) - Metal (Dissolves very rapidly in water); Ores (Sodium carbonate fusion in Pt^0 followed by HCl dissolution-blank levels of K in sodium carbonate critical); Organic Matrices (Sulfuric/peroxide digestion)

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	766.490 nm	0.4 / 0.001 µg/mL	1	atom	2nd order radiation from R.E.s on some optical designs
ICP-OES	771.531 nm	1.0 / 0.03 µg/mL	1	atom	2nd order radiation from R.E.s on some optical designs
ICP-OES	404.721 nm	1.1 / 0.05 µg/mL	1	atom	U, Ce,
ICP-MS	39 amu	10 ppt	n/a	M^+	^{38}ArH, $^{23}Na^{16}O$, ^{78}Se

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 procedure IV-MPM-004 and is guaranteed to be homogeneous.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001:2000 Quality Management System Registration - QMI Certificate Number 010105
Recognized by:
Registrar Accreditation Board (ANSI-RAB)
Standards Council of Canada (SCC)
Dutch Council for Accreditation (RVA)
Entidad Mexicana de Acreditacion, a.c.(EMA)
Members of IQ Net International Certification Network:
Argentina (IRAM), Australia (QAS), Austria (ÖQS), Belgium (Avinter) , Brazil (FCAV), Canada (QMI), Hong Kong (HKQAA), Columbia (ICONTEC), Czech Republic (CQS), Denmark (DS), Finland (SFS), France (AFAQ), Germany (DQS), Greece (ELOT), Hungary (MSZT), Ireland (NSAI), Israel (SII), Italy (CISQ), Japan (JQA), Korea (KSA-QA), Netherlands (KEMA), Norway (NCS), Poland(PCBC), Portugal (APCER), Singapore (PSB), Slovenia (SIQ), Spain (AENOR), Switzerland (SQS)

10.2 ISO/IEC 17025 - 1999 "General Requirements for the Competence of Testing and Calibration"
- Chemical Testing - Accredited A2LA Certificate Number 883.01

10.3 ISO/IEC Guide 34 - 2000 "General Requirements for the Competence of Reference Material Producers"
- Reference Materials Production - Accredited A2LA Certificate Number 883.02
A2LA Mutual Recognition Agreement Partners:
Australia (NATA), Austria (BmwA), Belgium (BELTEST) (BKO-OBE), Canada (SCC), Chinese Taipei (CNLA), Czech Republic (NAO), Denmark (DANAK), Finland (FINAS), France (COFRAC), Germany (DAR), Hong Kong (HKAS, Ireland (NAB), Italy (SIT) (SINAL), Japan (JAB) (JNLA), Republic of Korea (KOLAS), The Netherlands (RvA), New Zealand (IANZ), Norway (NA), Portugal (IPQ), Singapore (SAC-SINGLAS), Spain (ENAC), Sweden (SWEDAC), Switzerland (SAS), United Kingdom (UKAS) and United States (NVLAP) (ICBO ES)

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

10.6 MIL-STD-45662A (Obsolete/Observed)

11.0 DATE OF CERTIFICATION AND PERIOD OF VALIDITY

11.1 IV 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 (P-SP01020) of chemically-stable solutions performed at Inorganic Ventures Labs indicate a CRM shelf-life of four years for solutions packaged in 500-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.
Inorganic Ventures Labs concurs with state and federal regulatory agencies' recommendations that solution standards be assigned a one-year expiration date.

Certification Date: October 17, 2005

Expiration Date:

EXPIRES
01/2006

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By: Nick Maida, QA Administrator Nicholas Maida

Certificate Approved By: Katalin Le, QC Manager Katalin Le

Certifying Officer: Paul Gaines, PhD., Technical Director Paul R Gaines

010190

inorganic ventures / iv labs

195 lehigh avenue, suite 4, lakewood, nj 08701 usa
phone: 800-669-6799 • 732-901-1900 • fax: 732-901-1903
e-mail: ivsales@ivstandards.com • website: www.ivstandards.com

certificate of analysis

1.0 **Inorganic Ventures / IV Labs is an ISO Guide 34-2000 Certified Reference Material (CRM) Manufacturer: Certificate #883-02.** The certificate is designed and the certified value(s) and uncertainty(ies) are determined in accordance with ISO Guide 31-2000 (Reference Materials - Contents of certificates and label(s), ISO Guide 34-2000 "Quality System Guidelines for the Production of Reference Materials," and ISO Guide 35-1989 "Certification of Reference Materials - General and Statisical Principles."

2.0 DESCRIPTION OF CRM

Custom-Grade **10000 µg/mL Magnesium in 1.4% (abs) HNO_3**

Catalog Number:	CGMG10-1, CGMG10-2, and CGMG10-5
Lot Number:	**X-MG03018**
Starting Material:	Mg metal
Starting Material Purity (%):	99.994984
Starting Material Lot No	91191
Matrix:	1.4% (abs) HNO_3

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Concentration: 10,039 ± 31 µg/mL

Certified Density: 1.051 g/mL (measured at 22° C)

The Certified Value is the instrument analysis value. The following equations are used in the calculation of the certified value and the uncertainty:

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

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

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

The independent samples t-test was used to determine if there is agreement between the above assay methods at the 95% confidence interval. Both methods were compared and showed agreement within the stated uncertainties. This agreement is a confirmation of the accuracy of this CRM.

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 IV product is Traceable to NIST via direct comparison to NIST SRMs. The uncertainties for each certified value are reported, taking into account the SRM uncertainty error and the measurement, weighing and volume dilution errors.

4.1 **Assay Method #1** **10,039 ± 31 µg/mL**
ICP Assay NIST SRM 3131a Lot Number: 991107

Assay Method #2 **10,079 ± 21 µg/mL**
EDTA NIST SRM 928 Lot Number: 880710

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 7/22/05
DATE EXPIRED: 8/1/06
DATE OPENED: 7/22/05
INORG: 5312 PO: F55213

Pg. 1 of 4
5312

4.2 **BALANCE CALIBRATION** - All balances are checked daily using in-house procedure number 6-IMM-001. The weights used for testing are annually compared to Gerhart Scale Corporation's master weights and are traceable to the National Institute of Standards and Technology (NIST). The NIST Traceability numbers are 692476 - Class 1 and 692476A - Class 2. The NIST test number is 822/260017-98. All analytical balances are calibrated every 4 months by Gerhart Scale Corp. of South Amboy. The balances are calibrated with a class 1 and/or class 2 analytical weight set. These weights are tested annually by a NIST / NVLAP accredited calibration lab. The NIST test number is 822/260017-98.

4.3 **THERMOMETER CALIBRATION** - The thermometers used in the determination of the final densities are calibrated vs standard thermometer No. 903-2680 which was certified in accordance with the procedures outlined by ASTM E77-87 and NIST Monograph 150 using NIST Test Nos. and Std Nos.: 769543, 217368/769543, 217368/P14452, 176240/P14452, 176240. The in-house procedure No. is 2-QC-001.Thermometers which are not calibrated vs standard thermometer No. 903-2680 are traceable to NIST Identification Nos. 92564, 119016, 471047 and NIST test report Nos. 811/258522, 811/2557078, and 236090.

4.4 **GLASSWARE CALIBRATION** - In-house procedure 3-QC-002 is used to calibrate all Class A Glassware used in the manufacture and quality control of Custom Grade Standards.

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.

O	Al		0.04714	M	Dy	<	0.03601	O	Li		0.00623	M	Pr	<	0.00180	M	Te	<	0.18002
M	Sb	<	0.00300	M	Er	<	0.03000	M	Lu	<	0.00240	M	Re	<	0.00600	M	Tb	<	0.00180
M	As	<	0.06001	M	Eu	<	0.01800	s	Mg			M	Rh	<	0.00600	M	Tl	<	0.00600
M	Ba	<	0.06001	M	Gd	<	0.00600	O	Mn		0.07408	M	Rb	<	0.00600	M	Th	<	0.00600
O	Be	<	0.00017	M	Ga	<	0.00600	O	Hg	<	0.00900	M	Ru	<	0.01200	M	Tm	<	0.00240
M	Bi	<	0.00240	M	Ge	<	0.03601	M	Mo	<	0.01200	M	Sm	<	0.00600	M	Sn	<	0.03000
O	B		0.00303	M	Au	<	0.01800	M	Nd	<	0.01200	M	Sc	<	0.06001	O	Ti		0.09765
M	Cd	<	0.01800	M	Hf	<	0.01200	O	Ni		0.01229	M	Se	<	0.04801	M	W	<	0.06001
O	Ca		0.14984	M	Ho	<	0.00300	M	Nb	<	0.00300	O	Si		0.02357	M	U	<	0.01200
M	Ce	<	0.03000	M	In	<	0.06001	n	Os			M	Ag	<	0.01200	M	V	<	0.01200
M	Cs	<	0.00180	M	Ir	<	0.03000	M	Pd	<	0.03000	O	Na		0.02189	M	Yb	<	0.00600
O	Cr		0.02189	O	Fe		0.03704	O	P	<	0.01600	M	Sr	<	0.00300	M	Y		0.02021
M	Co	<	0.01800	M	La	<	0.00300	M	Pt	<	0.01200	n	S			O	Zn		0.00572
O	Cu		0.00674	O	Pb		0.02694	O	K	<	0.05000	M	Ta	<	0.04201	M	Zr	<	0.03000

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:
ICP-MS, ICP-OES, FAAS, GFAA, XRF, and DCP
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 IV Technical Staff

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 - 24.305; +2; 6; $Mg(H_2O)_6^{+2}$

Chemical Compatibility - Soluble in HCl, HNO_3, and H_2SO_4 avoid HF, H_3PO_4 and neutral to basic media. Stable with most metals and inorganic anions forming insoluble silicates, carbonates, hydroxides, oxides, and tungstates in neutral and slightly acidic 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 1-10% HNO_3 / LDPE container.

Mg Containing Samples (Preparation and Solution) - Metal (Best dissolved in diluted HNO_3); Oxide (Readily soluble in above compatible aqueous acidic solutions); Ores (Carbonate fusion in Pt[3] followed by HCl dissolution); Organic Matrices (Sulfuric / peroxide digestion or nitric / sulfuric / perchloric acid decomposition, or dry ash and dissolution in dilute HCl).

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

Technique/Line		Estimated D.L.	Order	Type	Interferences (underlined indicates severe at • concs.)
ICP-OES	279.553 nm	0.0002 / 0.00003 µg/mL	1	ion	Th
ICP-OES	280.270 nm	0.0003 / 0.00005 µg/mL	1	ion	U, V
ICP-OES	285.213 nm	0.002 / 0.00003 µg/mL	1	atom	U, Hf, Cr, Zr
ICP-MS	24 amu	42 ppt	n/a	M'	$^{7}Li^{16}O$, $^{48}Ti^{12}$, $^{48}Ca^{12}$

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

9.0 HOMOGENEITY - This solution was mixed according to procedure IV-MPM-004 and is guaranteed to be homogeneous.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001:2000 Quality Management System Registration - QMI Certificate Number 010105
Recognized by:
Registrar Accreditation Board (ANSI-RAB)
Standards Council of Canada (SCC)
Dutch Council for Accreditation (RVA)
Entidad Mexicana de Acreditacion, a.c.(EMA)
Members of IQ Net International Certification Network:
Argentina (IRAM), Australia (QAS), Austria (ÖQS), Belgium (Avinter), Brazil (FCAV), Canada (QMI), Hong Kong (HKQAA), Columbia (ICONTEC), Czech Republic (CQS), Denmark (DS), Finland (SFS), France (AFAQ), Germany (DQS), Greece (ELOT), Hungary (MSZT), Ireland (NSAI), Israel (SII), Italy (CISQ), Japan (JQA), Korea (KSA-QA), Netherlands (KEMA), Norway (NCS), Poland(PCBC), Portugal (APCER), Singapore (PSB), Slovenia (SIQ), Spain (AENOR), Switzerland (SQS)

10.2 ISO/IEC 17025 - 1999 "General Requirements for the Competence of Testing and Calibration"
- Chemical Testing - Accredited A2LA Certificate Number 883.01

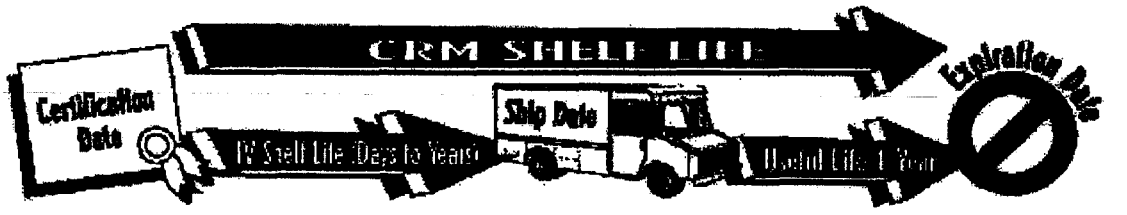
10.3 ISO/IEC Guide 34 - 2000 "General Requirements for the Competence of Reference Material Producers"
- Reference Materials Production - Accredited A2LA Certificate Number 883.02
A2LA Mutual Recognition Agreement Partners:
Australia (NATA), Austria (BmwA), Belgium (BELTEST) (BKO-OBE), Canada (SCC), Chinese Taipei (CNLA), Czech Republic (NAO), Denmark (DANAK), Finland (FINAS), France (COFRAC), Germany (DAR), Hong Kong (HKAS, Ireland (NAB), Italy (SIT) (SINAL), Japan (JAB) (JNLA), Republic of Korea (KOLAS), The Netherlands (RvA), New Zealand (IANZ), Norway (NA), Portugal (IPQ), Singapore (SAC-SINGLAS), Spain (ENAC), Sweden (SWEDAC), Switzerland (SAS), United Kingdom (UKAS) and United States (NVLAP) (ICBO ES)

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

10.6 MIL-STD-45662A (Obsolete/Observed)

11.0 DATE OF CERTIFICATION AND PERIOD OF VALIDITY



11.1 IV 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 (P-SP01020) of chemically-stable solutions performed at Inorganic Ventures / IV Labs indicate a CRM shelf-life of four years for solutions packaged in 500-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.
Inorganic Ventures / IV Labs concurs with state and federal regulatory agencies' recommendations that solution standards be assigned a one-year expiration date.

Certification Date: April 15, 2004

Expiration Date:

EXPIRES
152006

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:	JoAnn Struthers, QA Administrative Assistant	JoAnn Struthers
Certificate Approved By:	Katalin Le, QC Manager	Katalin Le
Certifying Officer:	Paul Gaines, Chemist, Senior Technical Director	Paul R Gaines

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inorganic ventures / iv labs

195 lehigh avenue, suite 4, lakewood, nj 08701 usa
phone: 800-669-6799 • 732-901-1900 • fax: 732-901-1903
e-mail: ivsales@ivstandards.com • website: www.ivstandards.com

certificate of analysis

1.0 **Inorganic Ventures / IV Labs is an ISO Guide 34-2000 Certified Reference Material (CRM) Manufacturer: Certificate #883-02.** The certificate is designed and the certified value(s) and uncertainty(ies) are determined in accordance with ISO Guide 31-2000 (Reference Materials - Contents of certificates and label(s), ISO Guide 34-2000 "Quality System Guidelines for the Production of Reference Materials," and ISO Guide 35-1989 "Certification of Reference Materials - General and Statisical Principles."

2.0 **DESCRIPTION OF CRM** Custom-Grade **10000 µg/mL Sodium in 1.4% (abs) HNO3**

Catalog Number:	CGNA10-1, CGNA10-2, and CGNA10-5
Lot Number:	**X-QNA02148**
Starting Material:	Na2CO3
Starting Material Purity (%):	99.999819
Starting Material Lot No:	42063
Matrix:	1.4% (abs) HNO3

3.0 **CERTIFIED VALUES AND UNCERTAINTIES**

Certified Concentration: 10,006 ± 6 µg/mL

Certified Density: 1.032 g/mL (measured at 22° C)

The Certified Value is based upon the most precise method used to analyze this CRM. The following equations are used in the calculation of the certified value and the uncertainty:

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

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

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

$\sum s_i$ = 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.)

The independent samples t-test was used to determine if there is agreement between the above assay methods at the 95% confidence interval. Both methods were compared and showed agreement within the stated uncertainties. This agreement is a confirmation of the accuracy of this CRM.

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 IV 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** **10,019 ± 33 µg/mL**
ICP Assay NIST SRM 3152a Lot Number: 990907

Assay Method #2 **10,006 ± 6 µg/mL**
Gravimetric NIST SRM Lot Number: See Sec. 4.2

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 7/22/05
DATE EXPIRED: 8/1/06
DATE OPENED: 7/22/05 (0)
INORG: 5310 PO: F55213

1 of 4
5310

4.2 **BALANCE CALIBRATION** - All balances are checked daily using in-house procedure number 6-IMM-001. The weights used for testing are annually compared to Gerhart Scale Corporation's master weights and are traceable to the National Institute of Standards and Technology (NIST). The NIST Traceability numbers are 692476 - Class 1 and 692476A - Class 2. The NIST test number is 822/260017-98. All analytical balances are calibrated every 4 months by Gerhart Scale Corp. of South Amboy. The balances are calibrated with a class 1 and/or class 2 analytical weight set. These weights are tested annually by a NIST / NVLAP accredited calibration lab. The NIST test number is 822/260017-98.

4.3 **THERMOMETER CALIBRATION** - The thermometers used in the determination of the final densities are calibrated vs standard thermometer No. 903-2680 which was certified in accordance with the procedures outlined by ASTM E77-87 and NIST Monograph 150 using NIST Test Nos. and Std Nos.: 769543, 217368/769543, 217368/P14452, 176240/P14452, 176240. The in-house procedure No. is 2-QC-001.Thermometers which are not calibrated vs standard thermometer No. 903-2680 are traceable to NIST Identification Nos. 92564, 119016, 471047 and NIST test report Nos. 811/258522, 811/2557078, and 236090.

4.4 **GLASSWARE CALIBRATION** - In-house procedure 3-QC-002 is used to calibrate all Class A Glassware used in the manufacture and quality control of Custom Grade Standards.

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.

O	Al	< 0.00090	M	Dy	< 0.00600	O	Li	< 0.00003	M	Pr	< 0.00030	M	Te	< 0.02998
M	Sb	< 0.00050	M	Er	< 0.00500	M	Lu	< 0.00040	M	Re	< 0.00100	M	Tb	< 0.00030
M	As	< 0.00999	M	Eu	< 0.00300	O	Mg	0.00010	M	Rh	< 0.00100	M	Tl	< 0.00100
M	Ba	< 0.00999	M	Gd	< 0.00100	O	Mn	< 0.00003	M	Rb	< 0.00100	M	Th	< 0.00100
O	Be	< 0.00020	M	Ga	< 0.00100	O	Hg	< 0.01500	M	Ru	< 0.00200	M	Tm	< 0.00040
M	Bi	< 0.00040	O	Ge	< 0.00150	M	Mo	< 0.00200	M	Sm	< 0.00100	M	Sn	< 0.00500
O	B	< 0.00060	O	Au	< 0.00300	M	Nd	< 0.00200	O	Sc	< 0.00002	O	Ti	< 0.00070
M	Cd	< 0.00300	M	Hf	< 0.00200	O	Ni	< 0.00230	O	Se	< 0.05000	M	W	< 0.00999
O	Ca	0.00050	M	Ho	< 0.00050	M	Nb	< 0.00050	O	Si	< 0.00340	M	U	< 0.00200
M	Ce	< 0.00500	M	In	< 0.00999	n	Os		M	Ag	< 0.00200	O	V	< 0.00090
M	Cs	< 0.00030	M	Ir	< 0.00500	M	Pd	< 0.00500	S	Na		M	Yb	< 0.00100
M	Cr	< 0.00500	O	Fe	< 0.00110	O	P	< 0.04000	M	Sr	< 0.00050	M	Y	< 0.03997
M	Co	< 0.00300	M	La	< 0.00050	M	Pt	< 0.00200	O	S	< 0.07200	O	Zn	0.00250
O	Cu	< 0.00140	M	Pb	< 0.00300	O	K	0.04000	M	Ta	< 0.00700	M	Zr	< 0.00500

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:
ICP-MS, ICP-OES, FAAS, GFAA, XRF, and DCP
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 IV Technical Staff

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 - 22.98977; +1; (6); Na^{+}(aq) largely ionic in nature (Coordination Number in parentheses is assumed, not certain.)

Chemical Compatibility - Soluble in HCl, HNO_3, H_2SO_4 and HF aqueous matrices. Stable with all metals and inorganic anions.

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

Na Containing Samples (Preparation and Solution) - Metal (Dissolves very rapidly in water); Ores (Lithium carbonate fusion in graphite crucible followed by HCl dissolution - blank levels of Na in lithium carbonate critical); Organic Matrices (Sulfuric / peroxide digestion or nitric/sulfuric/perchloric acid decomposition).

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	589.595 nm	0.07 / 0.00009 µg/mL	1	atom	2nd order radiation from R.E.s on some optical designs
ICP-OES	588.995 nm	0.03 / 0.006 µg/mL	1	atom	2nd order radiation from R.E.s on some optical designs
ICP-OES	330.237 nm	2.0 / 0.09 µg/mL	1	atom	Pd, Zn
ICP-MS	23 amu	310 ppt	n/a	M^{+}	$^{46}Ti^{+2}$, $^{46}Ca^{+2}$

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

9.0 HOMOGENEITY - This solution was mixed according to procedure IV-MPM-004 and is guaranteed to be homogeneous.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001:2000 Quality Management System Registration - QMI Certificate Number 010105

Recognized by:

Registrar Accreditation Board (ANSI-RAB)
Standards Council of Canada (SCC)
Dutch Council for Accreditation (RVA)
Entidad Mexicana de Acreditacion, a.c.(EMA)

Members of IQ Net International Certification Network:

Argentina (IRAM), Australia (QAS), Austria (ÖQS), Belgium (Avinter), Brazil (FCAV), Canada (QMI), Hong Kong (HKQAA), Columbia (ICONTEC), Czech Republic (CQS), Denmark (DS), Finland (SFS), France (AFAQ), Germany (DQS), Greece (ELOT), Hungary (MSZT), Ireland (NSAI), Israel (SII), Italy (CISQ), Japan (JQA), Korea (KSA-QA), Netherlands (KEMA), Norway (NCS), Poland(PCBC), Portugal (APCER), Singapore (PSB), Slovenia (SIQ), Spain (AENOR), Switzerland (SQS)

10.2 ISO/IEC 17025 - 1999 "General Requirements for the Competence of Testing and Calibration"

- Chemical Testing - Accredited A2LA Certificate Number 883.01

10.3 ISO/IEC Guide 34 - 2000 "General Requirements for the Competence of Reference Material Producers"

- Reference Materials Production - Accredited A2LA Certificate Number 883.02

A2LA Mutual Recognition Agreement Partners:

Australia (NATA), Austria (BmwA), Belgium (BELTEST) (BKO-OBE), Canada (SCC), Chinese Taipei (CNLA), Czech Republic (NAO), Denmark (DANAK), Finland (FINAS), France (COFRAC), Germany (DAR), Hong Kong (HKAS, Ireland (NAB), Italy (SIT) (SINAL), Japan (JAB) (JNLA), Republic of Korea (KOLAS), The Netherlands (RvA), New Zealand (IANZ), Norway (NA), Portugal (IPQ), Singapore (SAC-SINGLAS), Spain (ENAC), Sweden (SWEDAC), Switzerland (SAS), United Kingdom (UKAS) and United States (NVLAP) (ICBO ES)

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

10.6 MIL-STD-45662A (Obsolete/Observed)

010197

11.0 DATE OF CERTIFICATION AND PERIOD OF VALIDITY

11.1 IV 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 (P-SP01020) of chemically-stable solutions performed at Inorganic Ventures / IV Labs indicate a CRM shelf-life of four years for solutions packaged in 500-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.
Inorganic Ventures / IV Labs concurs with state and federal regulatory agencies' recommendations that solution standards be assigned a one-year expiration date.

Certification Date: October 11, 2004

Expiration Date: EXPIRES 10 2006

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By: Nick Maida, QA Administrator

Certificate Approved By: Katalin Le, QC Manager

Certifying Officer: Paul Gaines, Chemist, Senior Technical Director

Nicholas Maida

Katalin Le

Paul R Gaines

010198

inorganic ventures / iv labs

195 lehigh avenue, suite 4, lakewood, nj 08701 usa
phone: 800-669-6799 • 732-901-1900 • fax: 732-901-1903
e-mail: ivsales@ivstandards.com • website: www.ivstandards.com

certificate of analysis

1.0 **Inorganic Ventures / IV Labs is an ISO Guide 34-2000 Certified Reference Material (CRM) Manufacturer: Certificate #883-02.** The certificate is designed and the certified value(s) and uncertainty(ies) are determined in accordance with ISO Guide 31-2000 (Reference Materials - Contents of certificates and label(s), ISO Guide 34-2000 "Quality System Guidelines for the Production of Reference Materials," and ISO Guide 35-1989 "Certification of Reference Materials - General and Statisical Principles."

2.0 **DESCRIPTION OF CRM** Custom-Grade **1000 µg/mL Lithium in 0.07% (abs) HNO_3**

Catalog Number:	CGLI1-1, CGLI1-2, and CGLI1-5
Lot Number:	**X-LI02079**
Starting Material:	Li_2CO_3
Starting Material Purity (%):	99.997165
Starting Material Lot No	1123
Matrix:	0.07% (abs) HNO_3

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 5/19/05
DATE EXPIRED: 6/1/06
DATE OPENED: 5/19/05
INORG: 5244 PO: 55180

3.0 **CERTIFIED VALUES AND UNCERTAINTIES**

Certified Concentration: 999 ± 3 µg/mL

Certified Density: 1.004 g/mL (measured at 22° C)

The Certified Value is the ICP value. The following equations are used in the calculations of the certified value and the uncertainty:

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

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

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

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.)

The independent samples t-test was used to determine if there is agreement between the above assay methods at the 95% confidence interval. Both methods were compared and showed agreement within the stated uncertainties. This agreement is a confirmation of the accuracy of this CRM.

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 IV product is Traceable to NIST via direct comparison to NIST SRMs. The uncertainties for each certified value are reported, taking into account the SRM uncertainty error and the measurement, weighing and volume dilution errors.

4.1 **Assay Method #1** **999 ± 1 µg/mL**
Gravimetric NIST SRM Lot Number: See Sec. 4.2

Assay Method #2 **999 ± 3 µg/mL**
ICP Assay NIST SRM 3129a Lot Number: 000505

5244
1 of 4

4.2 **BALANCE CALIBRATION** - All balances are checked daily using in-house procedure number 6-IMM-001. The weights used for testing are annually compared to Gerhart Scale Corporation's master weights and are traceable to the National Institute of Standards and Technology (NIST). The NIST Traceability numbers are 692476 - Class 1 and 692476A - Class 2. The NIST test number is 822/260017-98. All analytical balances are calibrated every 4 months by Gerhart Scale Corp. of South Amboy. The balances are calibrated with a class 1 and/or class 2 analytical weight set. These weights are tested annually by a NIST / NVLAP accredited calibration lab. The NIST test number is 822/260017-98.

4.3 **THERMOMETER CALIBRATION** - The thermometers used in the determination of the final densities are calibrated vs standard thermometer No. 903-2680 which was certified in accordance with the procedures outlined by ASTM E77-87 and NIST Monograph 150 using NIST Test Nos. and Std Nos.: 769543, 217368/769543, 217368/P14452, 176240/P14452, 176240. The in-house procedure No. is 2-QC-001.Thermometers which are not calibrated vs standard thermometer No. 903-2680 are traceable to NIST Identification Nos. 92564, 119016, 471047 and NIST test report Nos. 811/258522, 811/2557078, and 236090.

4.4 **GLASSWARE CALIBRATION** - In-house procedure 3-QC-002 is used to calibrate all Class A Glassware used in the manufacture and quality control of Custom Grade Standards.

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.

O	Al	0.00120	M	Dy	< 0.01199	S	Li		M	Pr	< 0.00060	M	Te	< 0.05994
M	Sb	< 0.00100	M	Er	< 0.00999	M	Lu	< 0.00080	M	Re	< 0.00200	M	Tb	< 0.00060
M	As	< 0.01998	M	Eu	< 0.00599	O	Mg	0.00650	M	Rh	< 0.00200	M	Tl	< 0.00200
M	Ba	< 0.01998	M	Gd	< 0.00200	O	Mn	0.00006	M	Rb	< 0.00200	M	Th	< 0.00200
O	Be	< 0.00020	M	Ga	< 0.00200	O	Hg	< 0.01500	M	Ru	< 0.00400	M	Tm	< 0.00080
M	Bi	< 0.00080	M	Ge	< 0.01199	M	Mo	< 0.00400	M	Sm	< 0.00200	O	Sn	< 0.00600
O	B	0.00020	M	Au	< 0.00599	M	Nd	< 0.00400	M	Sc	< 0.01998	O	Tl	< 0.00070
M	Cd	< 0.00599	M	Hf	< 0.00400	O	Ni	< 0.00230	M	Se	< 0.01598	O	W	< 0.00400
O	Ca	0.04050	M	Ho	< 0.00100	M	Nb	< 0.00100	O	Si	0.04650	M	U	< 0.00400
M	Ce	< 0.00999	O	In	< 0.00400	n	Os		M	Ag	< 0.00400	O	V	0.00009
M	Cs	< 0.00060	M	Ir	< 0.00999	M	Pd	< 0.00999	O	Na	0.03200	M	Yb	< 0.00200
M	Cr	< 0.00999	O	Fe	0.00200	O	P	< 0.00250	O	Sr	0.00026	M	Y	< 0.07992
M	Co	< 0.00599	M	La	< 0.00100	M	Pt	< 0.00400	O	S	0.01250	O	Zn	0.00145
O	Cu	0.00100	M	Pb	< 0.00599	O	K	0.00950	M	Ta	< 0.01399	M	Zr	< 0.00999

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:
ICP-MS, ICP-OES, FAAS, GFAA, XRF, and DCP
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 IV Technical Staff

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2 of 4

010200

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 - 6.941; +1; (6); Li^+(aq) large effective radius due to hydration sphere (Coordination Number in parentheses is assumed, not certain.)

Chemical Compatibility - Soluble in HCl, HNO_3, H_2SO_4 and HF aqueous matrices. Stable with all metals and inorganic anions.

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

Li Containing Samples (Preparation and Solution) - Metal (Dissolves very rapidly in water); Ores (Sodium carbonate fusion in Pt followed by HCl dissolution-blank levels of Li in sodium carbonate critical); Organic Matrices (Sulfuric / peroxide digestion or nitric / sulfuric / perchloric acid decomposition).

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 670.784 nm	0.002 / 0.00002 µg/mL	1	atom	2nd order radiation from R.E.s on some optical designs
ICP-OES 460.286 nm	0.9 / 0.04 µg/mL	1	atom	Zr, Th
ICP-OES 323.261 nm	1.1 / 0.05 µg/mL	1	atom	Sb, Th, Ni
ICP-MS 7 amu	10 ppt		n/a	M

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

9.0 HOMOGENEITY - This solution was mixed according to procedure IV-MPM-004 and is guaranteed to be homogeneous.

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001:2000 Quality Management System Registration - QMI Certificate Number 010105

Recognized by:
Registrar Accreditation Board (ANSI-RAB)
Standards Council of Canada (SCC)
Dutch Council for Accreditation (RVA)
Entidad Mexicana de Acreditacion, a.c.(EMA)

Members of IQ Net International Certification Network:
Argentina (IRAM), Australia (QAS), Austria (ÖQS), Belgium (Avinter), Brazil (FCAV), Canada (QMI), Hong Kong (HKQAA), Columbia (ICONTEC), Czech Republic (CQS), Denmark (DS), Finland (SFS), France (AFAQ), Germany (DQS), Greece (ELOT), Hungary (MSZT), Ireland (NSAI), Israel (SII), Italy (CISQ), Japan (JQA), Korea (KSA-QA), Netherlands (KEMA), Norway (NCS), Poland(PCBC), Portugal (APCER), Singapore (PSB), Slovenia (SIQ), Spain (AENOR), Switzerland (SQS)

10.2 ISO/IEC 17025 - 1999 "General Requirements for the Competence of Testing and Calibration" - Chemical Testing - Accredited A2LA Certificate Number 883.01

10.3 ISO/IEC Guide 34 - 2000 "General Requirements for the Competence of Reference Material Producers" - Reference Materials Production - Accredited A2LA Certificate Number 883.02

A2LA Mutual Recognition Agreement Partners:
Australia (NATA), Austria (BmwA), Belgium (BELTEST) (BKO-OBE), Canada (SCC), Chinese Taipei (CNLA), Czech Republic (NAO), Denmark (DANAK), Finland (FINAS), France (COFRAC), Germany (DAR), Hong Kong (HKAS, Ireland (NAB), Italy (SIT) (SINAL), Japan (JAB) (JNLA), Republic of Korea (KOLAS), The Netherlands (RvA), New Zealand (IANZ), Norway (NA), Portugal (IPQ), Singapore (SAC-SINGLAS), Spain (ENAC), Sweden (SWEDAC), Switzerland (SAS), United Kingdom (UKAS) and United States (NVLAP) (ICBO ES)

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

10.6 MIL-STD-45662A (Obsolete/Observed)

11.0 DATE OF CERTIFICATION AND PERIOD OF VALIDITY

11.1 IV 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 (P-SP01020) of chemically-stable solutions performed at Inorganic Ventures / IV Labs indicate a CRM shelf-life of four years for solutions packaged in 500-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.
Inorganic Ventures / IV Labs concurs with state and federal regulatory agencies' recommendations that solution standards be assigned a one-year expiration date.

Certification Date: December 10, 2004

Expiration Date: EXPIRES 01/2006

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:	Nick Makda, QA Administrator	Nicholas Makda
Certificate Approved By:	Katalin Le, QC Manager	Katalin Le
Certifying Officer:	Paul Gaines, Chemist, Senior Technical Director	Paul R Gaines

010202

SIGMA-ALDRICH

Certificate of Analysis

Product Name	Sodium nitrite, ≥99.99%
Product Number	431605
Product Brand	Sigma-Aldrich
CAS Number	7632-00-0
Molecular Formula	$NaNO_2$
Molecular Weight	69.00

TEST	SPECIFICATION	LOT 06721HI RESULTS
APPEARANCE	OFF-WHITE TO PALE YELLOW CRYSTALS OR POWDER	OFF WHITE CRYSTALS
TITRATION	97.0% NANO2 (MINIMUM) (WITH KMNO4)	102.7% NANO2 (WITH KMNO4)
TRACE ANALYSIS, ICP	100 PPM (MAXIMUM) TOTAL METALLIC IMPURITIES	ZN 2.0 PPM
		CA 1.2
		TL 0.9
		B,PD 0.8
		AG 0.7
		PT 0.6
		MG 0.3
		FE,BI,AL 0.1 PPM
ICP ASSAY	CONFIRMS SODIUM COMPONENT.	CONFIRMS SODIUM COMPONENT
INSOLUBLE MATTER	0.01% (MAXIMUM) (C=10%, H2O)	0.004% *
CALCIUM	0.01% (MAXIMUM)	0.001% *
CHLORIDE	0.005% (MAXIMUM)	0.003% *
IRON	0.001% (MAXIMUM)	0.0001% *
HEAVY METALS	0.001% (MAXIMUM) (AS PB)	0.001% AS PB *
POTASSIUM	0.005% (MAXIMUM)	0.0005% *
SULFATE	0.01% (MAXIMUM)	0.002% *
	APPROVED FEBRUARY 22, 1999 JSB	* SUPPLIER CERTIFICATE
	OR	* SUPPLIER CERTIFICATE
	APPROVED FEBRUARY 22, 1999 JSB	MEETS OR EXCEEDS ALL ACS 9TH ED REQUIREMENTS
	OR	MEETS OR EXCEEDS ALL ACS 9TH ED REQUIREMENTS
QUALITY CONTROL ACCEPTANCE DATE		AUGUST 2000

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 7/16/01
DATE EXPIRED: 7/16/2012
DATE OPENED: 7/16/01
INORG: 2921 PO: N/A

pg 1 of 2

010203

Ronnie J. Martin, Supervisor
Quality Control
Milwaukee, Wisconsin USA

pg 2 of 2

010204

SPEXertificate™

Certificate of Reference Material

Catalog Number: ICMIX2-100 **Lot No.:** 28-164AS
Description: **IC Instrument Check Standard 2**
Matrix: H_2O

This **ASSURANCE** ®certified reference material, CRM, is intended primarily for use as a calibration standard or quality control standard for Ion Chromatography instrumentation. 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 ion concentrates of individual elements using Class A laboratory ware to give precise concentration.
Refer to side 2 for details of measurement uncertainties.

Instrumental Analysis by ION Chromatography:

Analyte	Labeled (mg/L)	Measured (mg/L)	NIST SRM
F^-	100	100	3183
Cl^-	200	196	3182
Br^-	400	400	3184
NO_3^-	400	402	3185
HPO_4^{-2}	600	596	3186
SO_4^{-2}	400	400	3181

Spex Reference Multi: Lot #IC-6-186VY

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 11/17/05
DATE EXPIRED: 11/30/06 (D)
DATE OPENED: 11/18/05
INORG: 5467 PO: DRESSER 7H

Balances are calibrated regularly with weight sets traceable to NIST#s 32856, 32867 and other. This CRM is guaranteed stable and accurate to +/- 0.5% on the average of all the certified concentrations with no single component exceeding +/- 2%. This guarantee is valid for a period of one year from the date of certification only when the material is kept tightly capped and transported and stored under laboratory conditions.

Date of Certification: NOV. – 2005 Certifying Officer: N. Kocherlakota

© 2004 SPEX CertiPrep, Inc.

Report of Certification

This Certified Reference Material has been prepared and certified under an ISO 9001 system consistent with the following guides:
Guide To The Expression Of Uncertainty In Measurement 1995
EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
ASTM Guide D6362-98
ISO Guide 34: Quality system guidelines for the production of reference materials.
ISO Guide 17025: Certification of reference materials, general and statistical principles
ISO Guide 31: Contents of certificates of reference materials
NIST Technical Note 1297
ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
ISO/REMCO N280

Material Source:

All analytes and matrix materials are obtained and verified by SPEX CertiPrep from pre-qualified vendors as per ISO 9000 guidelines. Vendor identifications are proprietary, however sources of all materials used in the preparation and testing of SPEX CertiPrep CRMs are tracked and documented. For further information contact CRM Sales.

Instructions for Use:

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

Method of Preparation:

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

Homogeneity:

The Homogeneity of the CRM has been confirmed by procedures consistent with ISO guide 17025, ISO/REMCO N280 and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed for the certified values by procedures consistent with the intended use of the CRM.
The mathematical expression $k_s=s^2m$ is employed to determine the sampling size
s = relative standard deviation in % for one component of the sample. (ie. The sub-sampling uncertainty)
m = the sub-sampling mass
k_s = mass of sub-sample necessary to ensure a relative sub-sampling error of 1% (68% confidence level) in a single determination

Statistical estimator and Confidence limits:

The certified value 'x' listed on the reverse of this document is at the 95% level of confidence and can be expressed as
X = x+/-U where X =True value (Labeled Value), U= Expanded uncertainty
$U=ku_c$ where k=2 is the coverage factor at the 95% confidence level
u_c is obtained by combining the individual element standard uncertainty components u_i and $u_c=\sqrt{\Sigma u_i^2}$

Certification Traveler Report:

All certified values reported were derived from Traveler Report (Spex CertiPrep's traceability documentation) identified by the lot number of this CRM. For further information contact CRM Sales.

Legal Notice:

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

ISO 9001
CERTIFIED

SPEX CertiPrep
203 Norcross Avenue • Metuchen, NJ 08840 USA
732-549-7144 • 1-800-LAB-SPEX • Fax: 732-603-9647 • CRMSales@spexcsp.com • www.spexcsp.com

010266

1001 West Saint Paul Avenue
Milwaukee, WI 53233 USA
Tel.: 800-558-9160 • (414) 273-3850
Fax: 800-962-9591 • (414) 273-4979
e-mail: aldrich@sial.com

ALDRICH®

Certificate of Analysis

SOUTHWEST RESEARCH INST
DANNY RAMIREZ
6220 CULEBRA RD
SAN ANTONIO TX 78238

PO NBR: 130686E

INORGANICS LAB 27/28/29/30/34
DATE RECEIVED: 1/9/2001
DATE EXPIRED: 1/9/2012 DR
DATE OPENED: 1/9/2001
INCRS: 2626 PO: 130686E

PRODUCT NUMBER: 236527-500G

LOT NUMBER: 15308EI

PRODUCT NAME: SODIUM HYDROGENCARBONATE, 99.7+%, A.C.S. REAGENT

FORMULA: NAHCO3

FORMULA WEIGHT: 84.01

APPEARANCE	WHITE POWDER
TITRATION	100.3 % (WITH HCL)
ICP ASSAY	CONFIRMS SODIUM COMPONENT
INSOLUBLE MATTER	0.001% *
CALCIUM	0.0050%
CHLORIDE	0.0014% *
IRON	< 0.0001% *
HEAVY METALS	<5PPM (AS PB) *
POTASSIUM	<0.0020 % *
MAGNESIUM	0.00025%
AMMONIUM	<5PPM *
PHOSPHATE	<0.001% *
CALCIUM, MAGNESIUM & R2O3 PRECIPITATE	0.016% *

CONTINUED ON NEXT PAGE

ALDRICH CHEMICAL COMPANY
DAVID SWESSEL
JANUARY 5, 2001

Sigma-Aldrich, Inc. warrants that its products conform to the information contained in this and other Sigma-Aldrich publications. Purchaser must determine the suitability of the product(s) for their particular use. Additional terms and conditions may apply. Please see reverse side of the invoice or packing slip.

Aldrich brand products are sold exclusively through Sigma-Aldrich, Inc.

Organics and Inorganics for Chemical Synthesis.

We are Committed to the Success of our Customers through Science, Technology and Service.

010207

SIGMA-ALDRICH

Certificate of Analysis

Product Name	Sodium carbonate, ACS reagent (primary standard), anhydrous 99.95-100.05% as dry basis
Product Number	22,348-4
Product Brand	ALDRICH
CAS Number	497-19-8
Molecular Formula	CNa_2O_3
Molecular Weight	105.99

TEST	**LOT 04922MO RESULTS**
APPEARANCE	WHITE GRANULAR POWDER
TITRATION	99.97% (WITH HCL)
LOSS ON DRYING	<0.1% (285 DEG C) *
ICP ASSAY	CONFIRMS SODIUM COMPONENT
INSOLUBLE MATTER	<0.002 (10%, H2O) *
AMMONIUM HYDROXIDE PRECIPITATE	0.002% *
CALCIUM	0.004% *
CHLORIDE	0.0006% *
IRON	<3 PPM *
HEAVY METALS	<3 PPM (AS PB) *
POTASSIUM	0.0005% *
MAGNESIUM	0.002% *
NITROGEN COMPOUNDS	<0.001% *
PHOSPHATE	0.0005% *
SULFUR COMPOUNDS	<0.003% *
SILICA	<0.005% *
	* SUPPLIER DATA
	MEETS REQUIREMENTS OF ACS 9TH ED
QUALITY CONTROL	DECEMBER, 2001
ACCEPTANCE DATE	

Ronnie J. Martin, Supervisor
Quality Control
Milwaukee, Wisconsin USA

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 11/11/02
DATE EXPIRED: 11/11/2012
DATE OPENED: 11/11/02
INORG: 3757 PO: 334588E

010208

SPEXertificate™

Certificate of Reference Material

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 01/09/05
DATE EXPIRED: 01/15/2006 YES
DATE OPENED: 01/11/05
INORG: 4951 PO: F55119

Catalog Number: AS-F9-2X/2Y **Lot No.** 27-122AS
Description: 1000 mg/L Fluoride
Matrix: H2O

This **ASSURANCE**® certified reference material, CRM, is intended primarily for use as a calibration standard or quality control standard for Ion Chromatography instrumentation. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 998 mg/L
Uncertainty Associated with Measurement: +/- 3.0 mg/L
Certified Value is Traceable to: NIST SRM 3183

The CRM is prepared gravimetrically using high purity Sodium Fluoride Lot# M44142 . The certified value listed is the average of values obtained by classical wet assay and Ion Chromatography analysis.

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 997 mg/L:
Method: Potentiometric using Fluoride combination electrode

Instrumentation Analysis By Ion Chromatography: 999 mg/L:

Uncertified Properties:

Trace Ionic Impurities in the Actual Solution via IC Analysis:

Ion	mg/L	Ion	mg/L
Br	<0.2	NO3	<0.2
Cl	<10	PO4	<1
NO2	<0.2	SO4	<0.5

Balances are calibrated regularly with weight sets traceable to NIST #32856, #32857 and others. This CRM is guaranteed stable to +/-0.5% of the certified concentration inclusive of uncertainty of measurements and other effects, such as transpiration losses, for a period of one year from the date of certification. This guarantee is valid only when the material is kept tightly capped and transported and stored under laboratory conditions.

Date of Certification: JAN. -- 2005 Certifying Officer: N. Kocherlakota

© 2004 SPEX CertiPrep, Inc.

Report of Certification

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ISO Guide 31: Contents of certificates of reference materials
NIST Technical Note 1297
ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
ISO/REMCO N280

Material Source:

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Method of Preparation:

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

Homogeneity:

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The mathematical expression $k_s=s^2m$ is employed to determine the sampling size
s = relative standard deviation in % for one component of the sample. (ie. The sub-sampling uncertainty)
m = the sub-sampling mass
k_s = mass of sub-sample necessary to ensure a relative sub-sampling error of 1% (68% confidence level) in a single determination

Statistical estimator and Confidence limits:

The certified value 'x' listed on the reverse of this document is at the 95% level of confidence and can be expressed as
X = x+/-U where X =True value (Labeled Value), U= Expanded uncertainty
$U=ku_c$ where k=2 is the coverage factor at the 95% confidence level
u_c is obtained by combining the individual element standard uncertainty components u_i and $u_c=\sqrt{\Sigma u_i^2}$

Certification Traveler Report:

All certified values reported were derived from Traveler Report (Spex CertiPrep's traceability documentation) identified by the lot number of this CRM. For further information contact CRM Sales.

Legal Notice:

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010210

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Certificate of Reference Material

Catalog Number: AS-CL9-2X/2Y **Lot No.:**26-150AS
Description: 1000 mg/L of Chloride
Matrix: Water

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 01/10/05
DATE EXPIRED: 01/15/2006 VOL
DATE OPENED: 01/11/05
INORG: 4950 PO: F55119

This **ASSURANCE** ®certified reference material, CRM, is intended primarily for use as a calibration standard or quality control standard for Ion Chromatography instrumentation. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: Chloride (Cl^-): 998 mg/L ± 3 mg/L
Traceable to: NIST SRM 3182

The CRM is prepared gravimetrically using high purity Sodium Chloride (NaCl) Lot#02001F. The certified value listed is the average of values obtained by classical wet assay and Ion Chromatography analysis.

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 998 mg/L
Method: Gravimetric analysis by precipitation using Silver Nitrate, filtering, drying and weighing as AgCl.

Instrumental Analysis by Ion Chromatography: 997 mg/L

Trace Anion Impurities in the Actual Solution via IC Analysis:

Component	mg/L	Component	mg/L
F^-	<0.05	NO_3^-	<0.15
PO_4^{3-}	<0.15	Br^-	<0.2
SO_4^{2-}	<0.15	NO_2^-	<0.2

Balances are calibrated regularly with weight sets traceable to NIST#s 32856, 32867 and others. This CRM is guaranteed stable to +/- 0.5% of the certified concentration inclusive of uncertainty of measurements and other effects, such as transpiration losses, for a period of one year from the date of certification. This guarantee is valid only when the material is kept tightly capped and transported and stored under laboratory conditions.

Date of Certification: JAN. -- 2005 Certifying Officer: N. Kocherlakota

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010211

Report of Certification

This Certified Reference Material has been prepared and certified under an ISO 9001 system consistent with the following guides:
Guide To The Expression Of Uncertainty In Measurement 1995
EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
ASTM Guide D6362-98
ISO Guide 34: Quality system guidelines for the production of reference materials.
ISO Guide 17025: Certification of reference materials, general and statistical principles
ISO Guide 31: Contents of certificates of reference materials
NIST Technical Note 1297
ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
ISO/REMCO N280

Material Source:

All analytes and matrix materials are obtained and verified by SPEX CertiPrep from pre-qualified vendors as per ISO 9000 guidelines. Vendor identifications are proprietary, however sources of all materials used in the preparation and testing of SPEX CertiPrep CRMs are tracked and documented. For further information contact CRM Sales.

Instructions for Use:

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

Method of Preparation:

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

Homogeneity:

The Homogeneity of the CRM has been confirmed by procedures consistent with ISO guide 17025, ISO/REMCO N280 and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed for the certified values by procedures consistent with the intended use of the CRM.
The mathematical expression $k_s=s^2m$ is employed to determine the sampling size
s = relative standard deviation in % for one component of the sample. (ie. The sub-sampling uncertainty)
m = the sub-sampling mass
k_s = mass of sub-sample necessary to ensure a relative sub-sampling error of 1% (68% confidence level) in a single determination

Statistical estimator and Confidence limits:

The certified value 'x' listed on the reverse of this document is at the 95% level of confidence and can be expressed as
X = x+/-U where X =True value (Labeled Value), U= Expanded uncertainty
$U=ku_c$ where k=2 is the coverage factor at the 95% confidence level
u_c is obtained by combining the individual element standard uncertainty components u_i and $u_c=\sqrt{\Sigma u_i^2}$

Certification Traveler Report:

All certified values reported were derived from Traveler Report (Spex CertiPrep's traceability documentation) identified by the lot number of this CRM. For further information contact CRM Sales.

Legal Notice:

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010212

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Certificate of Reference Material

Catalog Number: AS-NO_2N9-2X/2Y **Lot No.:** 27-141AS
Description: 1000 mg/L of Nitrite-N
Matrix: H_2O

This **ASSURANCE** ®certified reference material, CRM, is intended primarily for use as a calibration standard or quality control standard for Ion Chromatography instrumentation. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: Nitrite-N (NO_2^--N): 994 mg/L ± 3 mg/L
Traceable to: SPEX CRM #0902NO2

The CRM is prepared gravimetrically using high purity Sodium Nitrite ($NaNO_2$) Lot#0791R. The certified value listed is the average of values obtained by classical wet assay and Ion Chromatography analysis.

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 999 mg/L
Method: Titrimetric analysis using $KMnO_4$. KMnO4 standardized with As_2O_3 NIST SRM #83d.

Instrumental Analysis by Ion Chromatography: 995 mg/L

Trace Anion Impurities in the Actual Solution via IC Analysis:

Element	mg/L
F^-	<0.4
SO_4^{-2}	<0.4
PO_4^{-3}	<0.8
Cl^-	<20
Br^-	<20
NO_3^-	<40

Balances are calibrated regularly with weight sets traceable to NIST#s 32856, 32867 and others. This CRM is guaranteed stable to +/- 0.5% of the certified concentration inclusive of uncertainty of measurements and other effects, such as transpiration losses, for a period of one year from the date of certification. This guarantee is valid only when the material is kept tightly capped and transported and stored under laboratory conditions.

Date of Certification: MAR. – – 2005 Certifying Officer: N. Kocherakota

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 03/21/05
DATE EXPIRED: 03/30/2006 WS
DATE OPENED: 03/21/05
INORG: 5076 PO: F55155

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Report of Certification

This Certified Reference Material has been prepared and certified under an ISO 9001 system consistent with the following guides:
Guide To The Expression Of Uncertainty In Measurement 1995
EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
ASTM Guide D6362-98
ISO Guide 34: Quality system guidelines for the production of reference materials.
ISO Guide 17025: Certification of reference materials, general and statistical principles
ISO Guide 31: Contents of certificates of reference materials
NIST Technical Note 1297
ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
ISO/REMCO N280

Material Source:

All analytes and matrix materials are obtained and verified by SPEX CertiPrep from pre-qualified vendors as per ISO 9000 guidelines. Vendor identifications are proprietary, however sources of all materials used in the preparation and testing of SPEX CertiPrep CRMs are tracked and documented. For further information contact CRM Sales.

Instructions for Use:

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

Method of Preparation:

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

Homogeneity:

The Homogeneity of the CRM has been confirmed by procedures consistent with ISO guide 17025, ISO/REMCO N280 and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed for the certified values by procedures consistent with the intended use of the CRM.
The mathematical expression $k_s=s^2m$ is employed to determine the sampling size
s = relative standard deviation in % for one component of the sample. (ie. The sub-sampling uncertainty)
m = the sub-sampling mass
k_s = mass of sub-sample necessary to ensure a relative sub-sampling error of 1% (68% confidence level) in a single determination

Statistical estimator and Confidence limits:

The certified value 'x' listed on the reverse of this document is at the 95% level of confidence and can be expressed as
X = x+/-U where X =True value (Labeled Value), U= Expanded uncertainty
$U=ku_c$ where k=2 is the coverage factor at the 95% confidence level
u_c is obtained by combining the individual element standard uncertainty components u_i and $u_c = \sqrt{\Sigma u_i^2}$

Certification Traveler Report:

All certified values reported were derived from Traveler Report (Spex CertiPrep's traceability documentation) identified by the lot number of this CRM. For further information contact CRM Sales.

Legal Notice:

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Certificate of Reference Material

Catalog Number: AS-BR9-2X/2Y **Lot No.:** 27-142AS
Description: 1000 mg/L of Bromide
Matrix: H_2O

This **ASSURANCE** ®certified reference material, CRM, is intended primarily for use as a calibration standard or quality control standard for Ion Chromatography instrumentation. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: Bromide (Br^-): 998.5 mg/L ± 3 mg/L
Traceable to: NIST SRM 3184

The CRM is prepared gravimetrically using high purity Sodium Bromide (NaBr) Lot#04931B
The certified value listed is the average of values obtained by classical wet assay and Ion Chromatography analysis.

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 1001 mg/L
Method: Gravimetric analysis by precipitation using Silver Nitrate, filtering, drying and weighing as AgBr.

Instrumental Analysis by Ion Chromatography: 996 mg/L

Trace Anion Impurities in the Actual Solution via IC Analysis:

Ion	mg/L
F^-	<0.02
NO_2^-	<0.05
NO_3^-	<0.05
PO_4^{-3}	<0.20
Cl^-	<1.50
SO_4^{-2}	<0.05

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 6/28/05
DATE EXPIRED: 6/30/06
DATE OPENED: 6/28/05
INORG: 5275 PO: DL03741177

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 concentration value for a period of one year from the date of certification. This guarantee is valid only when the material is kept tightly capped and transported and stored under laboratory conditions.

Date of Certification: JUN. -- -- 2005 Certifying Officer: N. Kocherlakota

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Report of Certification

This Certified Reference Material has been prepared and certified under an ISO 9001 system consistent with the following guides:
Guide To The Expression Of Uncertainty In Measurement 1995
EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
ASTM Guide D6362-98
ISO Guide 34: Quality system guidelines for the production of reference materials.
ISO Guide 17025: Certification of reference materials, general and statistical principles
ISO Guide 31: Contents of certificates of reference materials
NIST Technical Note 1297
ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
ISO/REMCO N280

Material Source:

All analytes and matrix materials are obtained and verified by SPEX CertiPrep from pre-qualified vendors as per ISO 9000 guidelines. Vendor identifications are proprietary, however sources of all materials used in the preparation and testing of SPEX CertiPrep CRMs are tracked and documented. For further information contact CRM Sales.

Instructions for Use:

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

Method of Preparation:

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

Homogeneity:

The Homogeneity of the CRM has been confirmed by procedures consistent with ISO guide 17025, ISO/REMCO N280 and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed for the certified values by procedures consistent with the intended use of the CRM.
The mathematical expression $k_s=s^2m$ is employed to determine the sampling size
s = relative standard deviation in % for one component of the sample. (ie. The sub-sampling uncertainty)
m = the sub-sampling mass
k_s = mass of sub-sample necessary to ensure a relative sub-sampling error of 1% (68% confidence level) in a single determination

Statistical estimator and Confidence limits:

The certified value 'x' listed on the reverse of this document is at the 95% level of confidence and can be expressed as
X = x+/-U where X =True value (Labeled Value), U= Expanded uncertainty
$U=ku_c$ where k=2 is the coverage factor at the 95% confidence level
u_c is obtained by combining the individual element standard uncertainty components u_i and $u_c=\sqrt{\Sigma u_i^2}$

Certification Traveler Report:

All certified values reported were derived from Traveler Report (Spex CertiPrep's traceability documentation) identified by the lot number of this CRM. For further information contact CRM Sales.

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Certificate of Reference Material

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 01/10/05
DATE EXPIRED: 01/15/2006 WOS
DATE OPENED: 01/11/05
INORG: 4952 PO: F55119

Catalog Number: AS-NO_3N9-2X/2Y **Lot No.:** 27-120AS
Description: 1000 mg/L of Nitrate-N
Matrix: H_2O

This **ASSURANCE** ®certified reference material, CRM, is intended primarily for use as a calibration standard or quality control standard for Ion Chromatography instrumentation. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: Nitrate-N (NO_3^--N): 1002.5 mg/L ± 3 mg/L
Traceable to: NIST SRM 3185

The CRM is prepared gravimetrically using high purity Sodium Nitrate ($NaNO_3$) Lot#M14156. The certified value listed is the average of values obtained by classical wet assay and Ion Chromatography analysis.

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 1001 mg/L
Method: Gravimetric analysis by precipitation using Nitron Acetate, filtering, drying and weighing as Nitron Nitrate ($C_{20}H_{17}N_4.NO_3$).

Instrumental Analysis by Ion Chromatography: 1004 mg/L

Trace Anion Impurities in the Actual Solution via IC Analysis:

Element	mg/L
F^-	<0.05
Cl^-	<0.2
NO_2^-	<0.2
Br^-	<0.5
SO_4^-	<0.5
PO_4^{3-}	<2.0

Balances are calibrated regularly with weight sets traceable to NIST#s 32856, 32867 and others. This CRM is guaranteed stable to +/- 0.5% of the certified concentration inclusive of uncertainty of measurements and other effects, such as transpiration losses, for a period of one year from the date of certification. This guarantee is valid only when the material is kept tightly capped and transported and stored under laboratory conditions.

Date of Certification: JAN. -- 2005 Certifying Officer: N. Kochotakota

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Report of Certification

010217

This Certified Reference Material has been prepared and certified under an ISO 9001 system consistent with the following guides:
Guide To The Expression Of Uncertainty In Measurement 1995
EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
ASTM Guide D6362-98
ISO Guide 34: Quality system guidelines for the production of reference materials.
ISO Guide 17025: Certification of reference materials, general and statistical principles
ISO Guide 31: Contents of certificates of reference materials
NIST Technical Note 1297
ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
ISO/REMCO N280

Material Source:

All analytes and matrix materials are obtained and verified by SPEX CertiPrep from pre-qualified vendors as per ISO 9000 guidelines. Vendor identifications are proprietary, however sources of all materials used in the preparation and testing of SPEX CertiPrep CRMs are tracked and documented. For further information contact CRM Sales.

Instructions for Use:

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

Method of Preparation:

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

Homogeneity:

The Homogeneity of the CRM has been confirmed by procedures consistent with ISO guide 17025, ISO/REMCO N280 and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed for the certified values by procedures consistent with the intended use of the CRM.
The mathematical expression $k_s = s^2 m$ is employed to determine the sampling size
s = relative standard deviation in % for one component of the sample. (ie. The sub-sampling uncertainty)
m = the sub-sampling mass
k_s = mass of sub-sample necessary to ensure a relative sub-sampling error of 1% (68% confidence level) in a single determination

Statistical estimator and Confidence limits:

The certified value 'x' listed on the reverse of this document is at the 95% level of confidence and can be expressed as
X = x+/-U where X =True value (Labeled Value), U= Expanded uncertainty
$U = ku_c$ where k=2 is the coverage factor at the 95% confidence level
u_c is obtained by combining the individual element standard uncertainty components u_i and $u_c = \sqrt{\Sigma u_i^2}$

Certification Traveler Report:

All certified values reported were derived from Traveler Report (Spex CertiPrep's traceability documentation) identified by the lot number of this CRM. For further information contact CRM Sales.

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010218

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Certificate of Reference Material

Catalog Number: AS-PO_4P9-2X/2Y **Lot No.:** 27-23AS
Description: 1000 mg/L of Phosphate-Phosphorus
Matrix: H2O

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 01/11/05
DATE EXPIRED: 01/15/2006 V03
DATE OPENED: 01/11/05
INORG: 4953 PO: F5519

This **ASSURANCE** ®certified reference material, CRM, is intended primarily for use as a calibration standard or quality control standard for Ion Chromatography instrumentation. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: Phosphate-Phosphorus (P): 1002.5 mg/L ± 3 mg/L
Traceable to: NIST SRM 3186

The CRM is prepared gravimetrically using high purity (99.999%) Potassium Dihydrogen Orthophosphate (KH_2PO_4) Lot#07991C. The certified value listed is the average of values obtained by classical wet assay and Ion Chromatography analysis.

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 1003 mg/L
Method: Gravimetric analysis by precipitation using Magnesia Mixture, filtering, drying and weighing as $Mg_2P_2O_7$.

Instrumental Analysis by Ion Chromatography: 1002 mg/L

Trace Anion Impurities in the Actual Solution via IC Analysis:

Element	mg/L	Element	mg/L
F^-	<0.1	NO_3^-	<0.2
Br^-	<0.1	NO_2^-	<0.2
SO_4^{-2}	<0.1	Cl^-	<2.0

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 concentration value for a period of one year from the date of certification. This guarantee is valid only when the material is kept tightly capped and transported and stored under laboratory conditions.

Date of Certification: JAN. -- 2005 Certifying Officer: N. Kocherakota

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Report of Certification 010219

This Certified Reference Material has been prepared and certified under an ISO 9001 system consistent with the following guides:
Guide To The Expression Of Uncertainty In Measurement 1995
EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
ASTM Guide D6362-98
ISO Guide 34: Quality system guidelines for the production of reference materials.
ISO Guide 17025: Certification of reference materials, general and statistical principles
ISO Guide 31: Contents of certificates of reference materials
NIST Technical Note 1297
ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
ISO/REMCO N280

Material Source:

All analytes and matrix materials are obtained and verified by SPEX CertiPrep from pre-qualified vendors as per ISO 9000 guidelines. Vendor identifications are proprietary, however sources of all materials used in the preparation and testing of SPEX CertiPrep CRMs are tracked and documented. For further information contact CRM Sales.

Instructions for Use:

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

Method of Preparation:

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

Homogeneity:

The Homogeneity of the CRM has been confirmed by procedures consistent with ISO guide 17025, ISO/REMCO N280 and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed for the certified values by procedures consistent with the intended use of the CRM.
The mathematical expression $k_s = s^2 m$ is employed to determine the sampling size
s = relative standard deviation in % for one component of the sample. (ie. The sub-sampling uncertainty)
m = the sub-sampling mass
k_s = mass of sub-sample necessary to ensure a relative sub-sampling error of 1% (68% confidence level) in a single determination

Statistical estimator and Confidence limits:

The certified value 'x' listed on the reverse of this document is at the 95% level of confidence and can be expressed as
$X = x +/- U$ where X =True value (Labeled Value), U= Expanded uncertainty
$U = ku_c$ where k=2 is the coverage factor at the 95% confidence level
u_c is obtained by combining the individual element standard uncertainty components u_i and $u_c = \sqrt{\Sigma u_i^2}$

Certification Traveler Report:

All certified values reported were derived from Traveler Report (Spex CertiPrep's traceability documentation) identified by the lot number of this CRM. For further information contact CRM Sales.

Legal Notice:

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010220

SPEXertificate ™

Certificate of Reference Material

Catalog Number: AS-SO49-2X/2Y **Lot No.** 28-26AS

Description: 1000 mg/L Sulfate

Matrix: H2O

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 ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 1000.5 mg/L

Uncertainty Associated with Measurement: +/- 3.0 mg/L

Certified Value is Traceable to: NIST SRM 3181

The CRM is prepared gravimetrically using high purity Potassium Sulfate Lot# X34146 . The certified value listed is the average of values obtained by classical wet assay and ICP spectrometer analysis

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 1000 mg/L

Method: Precipitated using Barium Chloride, filtered, ignited and weighed as BaSO4

Instrumental Analysis by ICP spectrometer: 1001 mg/L

Uncertified Properties:

Trace Metallic Impurities in the Actual Solution via ICP / ICPMS Analysis:

Element	mg/L	Element	mg/L
Cl^-	<0.01	Br^-	<0.01
F^-	<0.005	$NO3^-$	<0.01
$NO2^-$	<0.01	$PO4^-$	<0.10

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 7/19/05
DATE EXPIRED: 7/30/06
DATE OPENED: 7/19/05 (D)
INORG: 5305 PD: 02044844

Balances are calibrated regularly with weight sets traceable to NIST #32856, #32857 and others. This CRM is guaranteed stable to +/-0.5% of the certified concentration inclusive of uncertainty of measurements and other effects, such as transpiration losses, for a period of one year from the date of certification. This guarantee is valid only when the material is kept tightly capped and transported and stored under laboratory conditions.

Date of Certification: JUL. -- 2005 Certifying Officer: N. Kocherlakota

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010221

SOUTHWEST RESEARCH INSTITUTE
NUCLEAR PROJECT
CLIENT: Division 20
TASK ORDER: 051219-5
SRR: 28420
SDG: 271245
CASE: L. Yang
VTSR: December 16, 2005
PROJECT#: 06002.01.322

Pipette Calibrations

Book/Page 04 029

010222

SwRI - Div. 01, Inorganic Labs' Fixed Volume Pipette Verification Log

Balance #: 34 Thermometer #: G011 diH20 Temperature (°C): 21

Eppendorf #	True Value (µL)	1st Reading (g)	2nd Reading (g)	3rd Reading (g)
Lab30	1000	1.0099	1.0078	1.0101
TMA1	1000	1.0065	1.0072	1.0045
TMA2	1000	.9857 ~~1.0046~~	.9828 ~~1.0068~~	.9869 ~~1.0039~~ 11-23-05 x3
TMA3	1000	NOT	FOUND	
TMA6	1000	1.0088	1.0016	1.0018
TMB1	900	.9004	.9021	.9002
TMC1	800	.8004	.8003	.8001
TMDD1	750	.7577	.7556	.7504
TMD1	700	.7078	.7030	.6994
TMD2	700	.7052	.7048	.7045
TME1	600	.6009	.6004	.6021
TMF2	500	.4999	.4998	.5007
TMF5	500	.5068	.5061	.5073
ICF1	500	.5036	.5040	.5031
L30-500	500	.5082	.5064	.5028
TMG3	400	.4016	.4001	.4003
TMH1	300	OUT OF	SERVICE	
TMH2	300	.3032	.3008	.2997
TMJ1	250	.2525	.2546	.2516
TMJ2	250	.2513	.2509	.2502
TMJ3	250	.2539	.2518	.2563
TMK2	200	.2017	.2038	.2020
TML1	150	.1513	.1501	.1511
TMM1	120	.1210	.1214	.1208
TMN3	100	OUT OF	SERVICE	
ICN1	100	.1019	.1011	.1010
TMQ1	80	11-23-05 x2 ~~NOT~~ .0802	~~FOUND~~ .0804	.0799
TMR1	70	OUT OF	SERVICE	
TMS1	60	OUT OF	SERVICE	
LAB-30A	50	OUT OF	SERVICE	
TMU1	40	.0400	.0400	.0397
TMU2	40	.0401	.0398	.0399
TMV1	30	.0300	.0299	.0300
L30-20	20	.0204	.0200	.0198
TMW1	25	.0252	.0251	.0254
TMY1	15	OUT OF	SERVICE	

Analyst: John Wilk Date: 11-23-05

Reviewed by: [signature] Date: 11-28-05

FRM-243-b (Rev 3/Mar 03)

Book/Page: 04 030

010223

SwRI - Div. 01, Inorganic Labs' Fixed Volume Pipette Verification Log

JW 11-23-05

(Space provide for Inorganic Laboratories' Fixed Volume Pipette Verification Spreadsheet)

SwRI - Div. 01, Inorganic Labs' Fixed Volume Pipette Spreadsheet

Eppendorf #	True Value (uL)	1st Reading (g)	2nd Reading (g)	3rd Reading (g)	Avg Wt (g)	% of True Value
Lab30	1000	1.0099	1.0078	1.0101	1.01	100.93
TMA1	1000	0.9857	0.9828	0.9869	0.99	98.51
TMA2	1000	1.0046	1.0068	1.0039	1.01	100.51
TMA3	1000	NOT	FOUND			
TMA6	1000	1.0088	1.0016	1.0018	1.00	100.41
TMB1	900	0.9004	0.9021	0.9002	0.90	100.10
TMC1	800	0.8004	0.8003	0.8001	0.80	100.03
TMDD1	750	0.7577	0.7556	0.7504	0.75	100.61
TMD1	700	0.7078	0.7030	0.6994	0.70	100.49
TMD2	700	0.7052	0.7048	0.7045	0.70	100.69
TME1	600	0.6009	0.6004	0.6021	0.60	100.19
TMF2	500	0.4999	0.4998	0.5007	0.50	100.03
TMF5	500	0.5068	0.5061	0.5073	0.51	101.35
ICF1	500	0.5036	0.5040	0.5028	0.50	100.69
L30-500	500	0.5082	0.5064	0.5028	0.51	101.16
TMG3	400	0.4016	0.4001	0.4003	0.40	100.17
TMH1	300	OUT	OF	SERVICE		
TMH2	300	0.3032	0.3008	0.2997	0.30	100.41
TMJ1	250	0.2525	0.2546	0.2516	0.25	101.16
TMJ2	250	0.2513	0.2509	0.2502	0.25	100.32
TMJ3	250	0.2539	0.2518	0.2563	0.25	101.60
TMK2	200	0.2017	0.2038	0.2020	0.20	101.25
TML1	150	0.1513	0.1501	0.1511	0.15	100.56
TMM1	120	0.1210	0.1214	0.1208	0.12	100.89
TMN3	100	OUT	OF	SERVICE		
ICN1	100	0.1019	0.1011	0.1010	0.10	101.33
TMQ1	80	0.0802	0.0804	0.0799	0.08	100.21
TMR1	70	OUT	OF	SERVICE		
TMS1	60	OUT	OF	SERVICE		
LAB-30A	50	OUT	OF	SERVICE		
TMU1	40	0.0400	0.0400	0.0397	0.04	99.75
TMU2	40	0.0401	0.0398	0.0399	0.04	99.83
TMV1	30	0.0300	0.0299	0.0300	0.03	99.89
L30-20	20	0.0204	0.0200	0.0198	0.02	100.33
TMW1	25	0.0252	0.0251	0.0254	0.03	100.93
TMY1	15	OUT	OF	SERVICE		

Note: TMA2-1000 needed lubricating because the barrel and plungers were sticking. JW
TMQ1 was relocated 11-23-05, reads 100.21% accurately JW

FRM-246 (Rev 1/Mar 03)

Book/page: 08 035

010224

SwRI – Div. 01, Inorganic Labs' Adjustable Volume Pipette Verification Log

(Space provided for Inorganic Laboratories' Adjustable Volume Pipette Verification Spreadsheet)

11-4-05

SwRI – Div. 01, Inorganic Laboratory Adjustable Pipette Verification Spreadsheet

Eppendorf #	True Value (µL)	1st Reading (g)	2nd Reading (g)	3rd Reading (g)	Avg Wt (g)	% of True Value
	20	0.0199	0.0200	0.0200	0.020	99.83
ADJ200-A	100	0.0985	0.0990	0.1022	0.100	99.90
	200	0.1991	0.1994	0.1997	0.199	99.70
	20					
ADJ200-C	100	OUT	OF	SERVICE		
	200					
	20	0.0202	0.0200	0.0203	0.020	100.83
ADJ200-D	100	0.0984	0.0991	0.0988	0.099	98.77
	200	0.1978	0.1984	0.1983	0.198	99.08
	20					
ADJ200-G	100					
	200					
	20					
ADJ200-H	100					
	200					
	20					
ADJ200-J	100					
	200					
	20					
ADJ200-K	100	NOT	IN USE-	GLOVEBOX		
	200					
	20					
ADJ200	100					
	200					
	20					
ADJ200	100					
	200					

FRM-247a (Rev 4/Apr 04)

Book/page: 08 036

SwRI Div. 01 – Inorganic Laboratory Adjustable Pipette Verification Log 010225

Balance #: 34 Thermometer #: G011 diH20 Temperature (° C) 21

20 µL – 200 µL

Eppendorf #	True Value (µL)	1st Reading (g)	2nd Reading (g)	3rd Reading (g)
	20	.0199	.0200	.0200
ADJ200-A	100	.0985	.0990	.1022
	200	.1991	.1994	.1997
	20			
ADJ200-C	100	OUT	OF	SERVICE
	200			
	20	.0202	.0200	.0203
ADJ200-D	100	.0984	.0991	.0988
	200	.1978	.1984	.1983
	20			
ADJ200-G	100			
	200			
	20			
ADJ200-H	100		11-18-05	
	200			
	20			
ADJ200-J	100			
	200			
	20			
ADJ200-K	100	NOT	IN USE —	GLOVEBOX
	200			
	20			
ADJ200	100		11-18-05	
	200			

Analyst: John Willis Date: 11-18-05

Reviewed by: [illegible] Date: 12/21/05

Book/page: 08 037

SwRI – Div. 01, Inorganic Labs' Adjustable Volume Pipette Verification Log

(Space provided for Inorganic Laboratories' Adjustable Volume Pipette Verification Spreadsheet)

010226

SwRI – Div. 01, Inorganic Laboratory Adjustable Pipette Verification Spreadsheet

Eppendorf #	True Value (µL)	1st Reading (g)	2nd Reading (g)	3rd Reading (g)	Avg Wt (g)	% of True Value
	20					
ADJ200-A	100					
	200					
	20					
ADJ200-C	100					
	200					
	20					
ADJ200-D	100					
	200					
	20	0.0199	0.0199	0.0198	0.0199	99.33
ADJ200-G	100	0.1013	0.1011	0.1005	0.1010	100.97
	200	0.1989	0.1990	0.1992	0.1990	99.52
	20	0.0203	0.0201	0.0201	0.0202	100.83
ADJ200-H	100	0.0995	0.0997	0.0996	0.0996	99.60
	200	0.1999	0.1993	0.1994	0.1995	99.77
	20	0.0203	0.0201	0.0202	0.0202	101.00
ADJ200-J	100	0.0996	0.0996	0.0993	0.0995	99.50
	200	0.1993	0.1992	0.1990	0.1992	99.58

JV 12/01/05

JV 12/01/05

Book/page: 08 038

SwRI Div. 01 – Inorganic Laboratory Adjustable Pipette Verification Log 010227

Balance #: 16 Thermometer #: G011 diH20 Temperature (° C) 21°C

20 µL – 200 µL

Eppendorf #	True Value (µL)	1st Reading (g)	2nd Reading (g)	3rd Reading (g)
	20			
ADJ200-A	100			
	200			
	20			
ADJ200-C	100			
	200			
	20			
ADJ200-D	100			
	200			
	20	0.0199	0.0199	0.0198
ADJ200-G	100	0.1013	0.1011	0.1005
	200	0.1989	0.1990	0.1992
	20	0.0203	0.0201	0.0201
ADJ200-H	100	0.0995	0.0997	0.0996
	200	0.1999	0.1993	0.1994
	20	0.0203	0.0201	0.0202
ADJ200-J	100	0.0996	0.0996	0.0993
	200	0.1993	0.1992	0.1990
	20			
ADJ200-K	100			
	200			
	20			
ADJ200	100			
	200			

T.V. 12/01/05

T.V. 12/01/05

Analyst: [signature] Date: 12/01/05

Reviewed by: [signature] Date: 12/21/05

Book/page: 08 095

SwRI – Div. 01, Inorganic Labs' Adjustable Volume Pipette Verification Log

(Space provided for Inorganic Laboratories' Adjustable Volume Pipette Verification Spreadsheet)

JW 1-18-05

010228

SwRI – Div. 01, Inorganic Laboratory Adjustable Pipette Verification Spreadsheet

Eppendorf #	True Value (µL)	1st Reading (g)	2nd Reading (g)	3rd Reading (g)	Avg Wt (g)	% of True Value
	100	0.1006	0.1005	0.1008	0.101	100.63
ADJ1000-C	500	0.4926	0.4925	0.4943	0.494	98.86
	1000	0.9964	1.0052	1.0026	1.001	100.14
	100	0.1007	0.0999	0.1001	0.100	100.23
ADJ1000-D	500	0.4929	0.4952	0.4971	0.495	99.01
	1000	0.9946	0.9942	0.9936	0.994	99.41
	100	0.1008	0.1010	0.1011	0.101	100.97
ADJ1000-E	500	0.4976	0.4971	0.4980	0.498	99.51
	1000	1.0036	0.9972	1.0011	1.001	100.06
	100	0.1017	0.1012	0.1018	0.102 (.102)	101.57
ADJ1000-F	500	0.4969	0.4978	0.4986	0.498	99.55
	1000	0.9993	1.0003	0.9985	0.999	99.94
	100					
ADJ1000-G	500					
	1000					
	100					
ADJ1000-H	500					
	1000					
	100					
ADJ1000-J	500					
	1000					
	100					
ADJ1000-K	500	NOT	IN USE-	GLOVEBOX		
	1000					
	100					
ADJ1000	500					
	1000					

JW x4 12-21-05

FRM-247b (Rev 3/Apr 04)

Book/page: 08 096

SwRI Div. 01 – Inorganic Laboratory Adjustable Pipette Verification Log 010229

Balance #: 34 Thermometer #: G011 diH20 Temperature (° C) 21

	Eppendorf #	True Value (µL)	1st Reading (g)	2nd Reading (g)	3rd Reading (g)
100 µL – 1000 µL		100	.1006	.1005	.1008
	ADJ1000-C	500	.4926	.4925	.4943
		1000	.9964	1.0052	1.0026
		100	.1007	.0999	.1001
	ADJ1000-D	500	.4929	.4952	.4971
		1000	.9946	.9942	.9936
		100	.1008	.1010	.1011
	ADJ1000-E	500	.4976	.4971	.4980
		1000	1.0036	.9972	1.0011
		100	.1017	.1012	.1018
	ADJ1000-F	500	.4969	.4978	.4986
		1000	.9993	1.0003	.9985
		100			
	ADJ1000-G	500			
		1000			
		100			
	ADJ1000-H	500			
		1000			
		100			
	ADJ1000-J	500			
		1000			
		100			
	ADJ1000-K	500	NOT	in use – glovebox	
		1000			
		100			
	ADJ1000	500			
		1000			

gw 11-18-05

Analyst: John Wilks Date: 11-18-~~04~~ 05 WDS 02/02/06

Reviewed by: [illegible] Date: 12/2/05

FRM-244 (b) (Rev 4/Apr 04)

Book/page: 08 097

SwRI – Div. 01, Inorganic Labs' Adjustable Volume Pipette Verification Log

(Space provided for Inorganic Laboratories' Adjustable Volume Pipette Verification Spreadsheet)

010230

SwRI – Div. 01, Inorganic Laboratory Adjustable Pipette Verification Spreadsheet

Eppendorf #	True Value (µL)	1st Reading (g)	2nd Reading (g)	3rd Reading (g)	Avg Wt (g)	% of True Value
	100				0.000	0.00
ADJ1000-C	500				0.000	0.00
	1000				0.000	0.00
	100				0.000	0.00
ADJ1000-D	500				0.000	0.00
	1000				0.000	0.00
	100				0.000	0.00
ADJ1000-E	500				0.000	0.00
	1000				0.000	0.00
	100				0.000	0.00
ADJ1000-F	500				0.000	0.00
	1000				0.000	0.00
	100	0.0988	0.0984	0.0989	0.099	98.70
ADJ1000-G	500	0.4990	0.4983	0.4978	0.498	99.67
	1000	0.9948	0.9957	0.9963	0.996	99.56
	100	0.0987	0.0983	0.0989	0.099	98.63
ADJ1000-H	500	0.4923	0.4943	0.4939	0.494	98.70
	1000	0.9859	0.9879	0.9903	0.988	98.80
	100	0.1002	0.1022	0.1027	0.102	101.70
ADJ1000-J	500	0.4972	0.4978	0.4983	0.498	99.55
	1000	0.9901	0.9951	0.9945	0.993	99.32
	100				0.000	0.00
ADJ1000	500				0.000	0.00
	1000				0.000	0.00
	100				0.000	0.00
ADJ1000	500				0.000	0.00
	1000				0.000	0.00

JV 12/01/05

JV 12/01/05

JV 12/01/05

Book/page: 08 098

SwRI Div. 01 – Inorganic Laboratory Adjustable Pipette Verification Log 010231

Balance #: 16 Thermometer #: G 011 diH20 Temperature (° C) 21.0

100 µL – 1000 µL

Eppendorf #	True Value (µL)	1st Reading (g)	2nd Reading (g)	3rd Reading (g)
	100			
ADJ1000-C	500			
	1000			
	100			
ADJ1000-D	500			
	1000			
	100			
ADJ1000-E	500			
	1000			
	100			
ADJ1000-F	500			
	1000			
	100	0.0988	0.0984	0.0989
ADJ1000-G	500	0.4990	0.4983	0.4978
	1000	0.9948	0.9957	0.9963
	100	0.0987	0.0983	0.0989
ADJ1000-H	500	0.4923	0.4943	0.4939
	1000	0.9859	0.9879	0.9903
	100	0.1082	0.1022	0.1027
ADJ1000-J	500	0.4972	0.4978	0.4983
	1000	0.9901	0.9951	0.9945
	100			
ADJ1000-K	500			
	1000			
	100			
ADJ1000	500			
	1000			

Analyst: Date: 12/01/05

Reviewed by: Date: 12/21/05

Book/page: 08 155

SwRI – Div. 01, Inorganic Labs' Adjustable Volume Pipette Verification Log

(Space provided for Inorganic Laboratories' Adjustable Volume Pipette Verification Spreadsheet) 010232

1-18-05

SwRI – Div. 01, Inorganic Laboratory Adjustable Pipette Verification Spreadsheet

Eppendorf #	True Value (µL)	1st Reading (g)	2nd Reading (g)	3rd Reading (g)	Avg Wt (g)	% of True Value
	500	0.4940	0.4989	0.4993	0.497	99.48
ADJ5000-C	2500	2.4980	2.4976	2.4981	2.498	99.92
	5000	5.0261	5.0106	5.0099	5.016	100.31
	500					
ADJ5000-G	2500	OUT	OF	SERVICE		
	5000					
	500					
ADJ5000-H	2500	OUT	OF	SERVICE		
	5000					
	500	0.4994	0.5037	0.5031	0.502	100.41
ADJ5000-I	2500	2.4983	2.4989	2.4978	2.498	99.93
	5000	4.9899	5.0093	5.0049	5.001	100.03
	500					
ADJ5000-J	2500					
	5000					
	500					
ADJ5000-K	2500					
	5000					
	500					
ADJ5000-L	2500					
	5000					
	500					
ADJ5000-M	2500	NOT	IN USE-	GLOVEBOX		
	5000					
	500	0.4952	0.4966	0.4966	0.496	99.23
ADJ5000-N	2500	2.4982	2.4984	2.5006	2.499	99.96
	5000	5.0333	5.0114	5.0118	5.019	100.38
	500	0.4992	0.5000	0.4981	0.499	99.82
ADJ5000	2500	2.4988	2.4852	2.4967	2.494	99.74
	5000	5.0008	4.9954	4.9904	4.996	99.91
	500					
ADJ5000	2500					
	5000					

FRM-247c (Rev 3/Apr 04)

Book/page: 08 156

SwRI Div. 01 – Inorganic Laboratory Adjustable Pipette Verification Log 010233

Balance #: 34 Thermometer #: G011 diH20 Temperature (° C) 21

500 µL – 5000 µL

Eppendorf #	True Value (µL)	1st Reading (g)	2nd Reading (g)	3rd Reading (g)
	500	.4940	.4989	.4993
ADJ5000-C	2500	2.4980	2.4976	2.4981
	5000	5.0261	5.0106	5.0099
	500			
ADJ5000-G	2500	OUT	OF	SERVICE
	5000			
	500			
ADJ5000-H	2500	OUT	OF	SERVICE
	5000			
	500	.4994	.5037	.5031
ADJ5000-I	2500	2.4983	~~2.4998~~ 4989	2.4978
	5000	4.9899	5.0093 12-21-05	5.0049
	500			
ADJ5000-J	2500			
	5000			
	500			
ADJ5000-K	2500		11/18/05	
	5000			
	500			
ADJ5000-L	2500			
	5000			
	500			
ADJ5000-M	2500	NOT	in use	- Glovebox
	5000			
	500	.4952	.4966	.4966
ADJ5000-N	2500	2.4982	2.4984	2.5006
	5000	5.0333	5.0114	5.0118
	500	.4992	.5000	.4981
ADJ5000-O	2500	2.4988	2.4852	2.4967
	5000	5.0008	4.9954	4.9904
	500			
ADJ5000	2500		11-18-05	
	5000			

Analyst: John Willis Date: 11-18-05

Reviewed by: Dale [illegible] Date: 12/21/05

FRM-244 (c) (Rev 3/Apr 04)

Book/page: 08 157

SwRI – Div. 01, Inorganic Labs' Adjustable Volume Pipette Verification Log

(Space provided for Inorganic Laboratories' Adjustable Volume Pipette Verification Spreadsheet)

010234

SwRI – Div. 01, Inorganic Laboratory Adjustable Pipette Verification Spreadsheet

Eppendorf #	True Value (µL)	1st Reading (g)	2nd Reading (g)	3rd Reading (g)	Avg Wt (g)	% of True Value
	500				0.000	0.00
ADJ5000-C	2500				0.000	0.00
	5000				0.000	0.00
	500				0.000	0.00
ADJ5000-G	2500				0.000	0.00
	5000				0.000	0.00
	500				0.000	0.00
ADJ5000-H	2500				0.000	0.00
	5000				0.000	0.00
	500				0.000	0.00
ADJ5000-I	2500				0.000	0.00
	5000				0.000	0.00
	500	0.5009	0.5003	0.5022	0.501	100.23
ADJ5000-J	2500	2.5099	2.5010	2.5087	2.507	100.26
	5000	5.0105	5.0111	5.0101	5.011	100.21
	500	0.5005	0.5019	0.5022	0.502	100.31
ADJ5000-K	2500	2.5009	2.5001	2.5007	2.501	100.02
	5000	5.0201	5.0191	5.0187	5.019	100.39
	500	0.5072	0.5066	0.5052	0.506	101.27
ADJ5000-L	2500	2.4903	2.4909	2.4909	2.491	99.63
	5000	4.9833	4.9799	4.9758	4.980	99.59

JV 12/01/05

JV 12/01/05

Book/page: 08 158

SwRI Div. 01 – Inorganic Laboratory Adjustable Pipette Verification Log 010235

Balance #: 16 Thermometer #: G 011 diH20 Temperature (° C) 21°C

500 µL – 5000 µL

Eppendorf #	True Value (µL)	1st Reading (g)	2nd Reading (g)	3rd Reading (g)
	500			
ADJ5000-C	2500			
	5000			
	500			
ADJ5000-G	2500			
	5000			
	500			
ADJ5000-H	2500		JV. 12/01/05	
	5000			
	500			
ADJ5000-I	2500			
	5000			
	500	0.5009	0.5003	.5022
ADJ5000-J	2500	2.5044	2.5010 JV 12/01/05	2.5087
	5000	5.0105	5.0111	5.0101
	500	0.5005	5.019 JV 12/01/05	5.022
ADJ5000-K	2500	2.5009	2.5001	2.5007
	5000	5.0201	5.0191	5.0187
	500	0.5072	0.5066	0.5052
ADJ5000-L	2500	2.4903	2.4909	2.4909
	5000	4.9833	4.9799	4.9758
	500			
ADJ5000-M	2500			
	5000			
	500		JV 12/01/05	
ADJ5000-N	2500			
	5000			
	500			
ADJ5000	2500			
	5000			
	500			
ADJ5000	2500			
	5000			

Analyst: [signature] Date: 12/01/05

Reviewed by: [signature] Date: 12/21/05

FRM-244 (c) (Rev 3/Apr 04)

Book/page: 08 038

SwRI Div. 01 – Inorganic Laboratory Adjustable Pipette Verification Log

010236

Balance #: 16 Thermometer #: G011 diH20 Temperature (° C) 21°C

	Eppendorf #	True Value (µL)	1st Reading (g)	2nd Reading (g)	3rd Reading (g)
20 µL – 200 µL		20			
	ADJ200-A	100			
		200			
		20			
	ADJ200-C	100			
		200			
		20			
	ADJ200-D	100			
		200			
		20	0.0199	0.0199	0.0198
	ADJ200-G	100	0.1013	0.1011	0.1005
		200	0.1989	0.1990	0.1992
		20	0.0203	0.0201	0.0201
	ADJ200-H	100	0.0995	0.0997	0.0996
		200	0.1999	0.1993	0.1994
		20	0.0203	0.0201	0.0202
	ADJ200-J	100	0.0996	0.0996	0.0993
		200	0.1993	0.1992	0.1990
		20			
	ADJ200-K	100			
		200			
		20			
	ADJ200	100			
		200			

rjv. 12/01/05

JV. 12/01/05

Analyst: [signature] Date: 12/01/05

Reviewed by: [signature] Date: 12/21/05

Book/page: 08 037

SwRI – Div. 01, Inorganic Labs' Adjustable Volume Pipette Verification Log

(Space provided for Inorganic Laboratories' Adjustable Volume Pipette Verification Spreadsheet)

010237

SwRI – Div. 01, Inorganic Laboratory Adjustable Pipette Verification Spreadsheet

Eppendorf #	True Value (µL)	1st Reading (g)	2nd Reading (g)	3rd Reading (g)	Avg Wt (g)	% of True Value
	20					
ADJ200-A	100					
	200					
	20					
ADJ200-C	100					
	200					
	20					
ADJ200-D	100					
	200					
	20	0.0199	0.0199	0.0198	0.0199	99.33
ADJ200-G	100	0.1013	0.1011	0.1005	0.1010	100.97
	200	0.1989	0.1990	0.1992	0.1990	99.52
	20	0.0203	0.0201	0.0201	0.0202	100.83
ADJ200-H	100	0.0995	0.0997	0.0996	0.0996	99.60
	200	0.1999	0.1993	0.1994	0.1995	99.77
	20	0.0203	0.0201	0.0202	0.0202	101.00
ADJ200-J	100	0.0996	0.0996	0.0993	0.0995	99.50
	200	0.1993	0.1992	0.1990	0.1992	99.58

TV. 12/01/03

TV 12/01/03

Book/page: 08 093

SwRI Div. 01 – Inorganic Laboratory Adjustable Pipette Verification Log

Balance #: 16 Thermometer #: G 011 diH20 Temperature (° C) 21.0

010238

100 µL – 1000 µL

Eppendorf #	True Value (µL)	1st Reading (g)	2nd Reading (g)	3rd Reading (g)
	100			
ADJ1000-C	500			
	1000			
	100			
ADJ1000-D	500			
	1000			
	100			
ADJ1000-E	500			
	1000			
	100			
ADJ1000-F	500			
	1000			
	100	0.0988	0.0984	0.0989
ADJ1000-G	500	0.4990	0.4983	0.4978
	1000	0.9948	0.9957	0.9963
	100	0.0987	0.0983	0.0989
ADJ1000-H	500	0.4923	0.4943	0.4939
	1000	0.9859	0.9879	0.9903
	100	0.1002	0.1022	0.1027
ADJ1000-J	500	0.4972	0.4978	0.4983
	1000	0.9948	0.9951	0.9945
	100			
ADJ1000-K	500			
	1000			
	100			
ADJ1000	500			
	1000			

Analyst: Date: 12/01/05

Reviewed by: Date: 12/21/05

Book/page: 08 097

SwRI – Div. 01, Inorganic Labs' Adjustable Volume Pipette Verification Log

(Space provided for Inorganic Laboratories' Adjustable Volume Pipette Verification Spreadsheet)

010239

SwRI – Div. 01, Inorganic Laboratory Adjustable Pipette Verification Spreadsheet

Eppendorf #	True Value (µL)	1st Reading (g)	2nd Reading (g)	3rd Reading (g)	Avg Wt (g)	% of True Value
	100				0.000	0.00
ADJ1000-C	500				0.000	0.00
	1000				0.000	0.00
	100				0.000	0.00
ADJ1000-D	500				0.000	0.00
	1000				0.000	0.00
	100				0.000	0.00
ADJ1000-E	500				0.000	0.00
	1000				0.000	0.00
	100				0.000	0.00
ADJ1000-F	500				0.000	0.00
	1000				0.000	0.00
	100	0.0988	0.0984	0.0989	0.099	98.70
ADJ1000-G	500	0.4990	0.4983	0.4978	0.498	99.67
	1000	0.9948	0.9957	0.9963	0.996	99.56
	100	0.0987	0.0983	0.0989	0.099	98.63
ADJ1000-H	500	0.4923	0.4943	0.4939	0.494	98.70
	1000	0.9859	0.9879	0.9903	0.988	98.80
	100	0.1002	0.1022	0.1027	0.102	101.70
ADJ1000-J	500	0.4972	0.4978	0.4983	0.498	99.55
	1000	0.9901	0.9951	0.9945	0.993	99.32
	100				0.000	0.00
ADJ1000	500				0.000	0.00
	1000				0.000	0.00
	100				0.000	0.00
ADJ1000	500				0.000	0.00
	1000				0.000	0.00

JV 12/01/05

JV 12/01/05

JV 12/01/05

Book/page: 08 158

SwRI Div. 01 – Inorganic Laboratory Adjustable Pipette Verification Log

Balance #: 16 Thermometer #: G 011 diH20 Temperature (° C) 21°C

~~010240~~

500 µL – 5000 µL

Eppendorf #	True Value (µL)	1st Reading (g)	2nd Reading (g)	3rd Reading (g)
	500			
ADJ5000-C	2500			
	5000			
	500			
ADJ5000-G	2500			
	5000			
	500			
ADJ5000-H	2500		JV. 12/01/05	
	5000			
	500			
ADJ5000-I	2500			
	5000			
	500	0.5004	0.5003	.5022
ADJ5000-J	2500	2.5044	2.5010 JV 12/01/05	2.5087
	5000	5.0105	5.0117	5.0101
	500	0.5005	5.0194 JV 12/01/05	.5022
ADJ5000-K	2500	2.5004	2.5001	2.5007
	5000	5.0201	5.0191	5.0187
	500	0.5072	0.5066	0.5052
ADJ5000-L	2500	2.4903	2.4909	2.4909
	5000	4.9833	4.9749	4.9758
	500			
ADJ5000-M	2500			
	5000			
	500		JV 12/01/05	
ADJ5000-N	2500			
	5000			
	500			
ADJ5000	2500			
	5000			
	500			
ADJ5000	2500			
	5000			

Analyst: [signature] Date: 12/01/05

Reviewed by: [signature] Date: 12/21/05

FRM-244 (c) (Rev 3/Apr 04)

Book/page: 08 157

SwRI – Div. 01, Inorganic Labs' Adjustable Volume Pipette Verification Log

(Space provided for Inorganic Laboratories' Adjustable Volume Pipette Verification Spreadsheet)

010241

SwRI – Div. 01, Inorganic Laboratory Adjustable Pipette Verification Spreadsheet

Eppendorf #	True Value (µL)	1st Reading (g)	2nd Reading (g)	3rd Reading (g)	Avg Wt (g)	% of True Value
	500				0.000	0.00
ADJ5000-C	2500				0.000	0.00
	5000				0.000	0.00
	500				0.000	0.00
ADJ5000-G	2500				0.000	0.00
	5000				0.000	0.00
	500				0.000	0.00
ADJ5000-H	2500				0.000	0.00
	5000				0.000	0.00
	500				0.000	0.00
ADJ5000-I	2500				0.000	0.00
	5000				0.000	0.00
	500	0.5009	0.5003	0.5022	0.501	100.23
ADJ5000-J	2500	2.5099	2.5010	2.5087	2.507	100.26
	5000	5.0105	5.0111	5.0101	5.011	100.21
	500	0.5005	0.5019	0.5022	0.502	100.31
ADJ5000-K	2500	2.5009	2.5001	2.5007	2.501	100.02
	5000	5.0201	5.0191	5.0187	5.019	100.39
	500	0.5072	0.5066	0.5052	0.506	101.27
ADJ5000-L	2500	2.4903	2.4909	2.4909	2.491	99.63
	5000	4.9833	4.9799	4.9758	4.980	99.59

TV 12/01/05

TV 12/01/05

SOUTHWEST RESEARCH INSTITUTE
NUCLEAR PROJECT
CLIENT: Division 20
TASK ORDER: 051219-5
SRR: 28420
SDG: 271245
CASE: L. Yang
VTSR: December 16, 2005
PROJECT#: 06002.01.322

010242

Balance Calibrations

#1-SN: 99-JS0526-15
#2-SN: 99-JS0031-1

Southwest Research Institute®
Division 01
BALANCE VERIFICATION LOG

BALANCE #:	LOCATION:	SERIAL #:	TOLERANCE:	COMMENTS:
12	Bldg. 70 Lab 47	1122510787	±0.0005	
Date	**Std Wt (g)**	**Recorded Wt (g)**	**Operator**	
12-16-05	2.0000	2.0001	KE	1
"	100.0000	99.9998	"	2
12-19-05	2.0000	1.9999	KE	1
"	100.0000	99.9996	"	2
12-22-05	2.0000	1.9999	KE	1
"	100.0000	100.0000	"	2

If balance is out of limits, clean the balance and re-calibrate using Class "S" weights.
If balance is still out of limits, place a "DO NOT USE" sign on it and call (DQA) for service.

FRM-112 (Rev 2/Aug 03)

010243

#1 - SN: 99-J50624-5
#2 - SN: 5537

Southwest Research Institute®
Division 01
BALANCE VERIFICATION LOG

BALANCE #:	LOCATION:	SERIAL #:	TOLERANCE:	COMMENTS:
19	Bldg. 70 Lab 47	0068597	±0.05	
Date	**Std Wt (g)**	**Recorded Wt (g)**	**Operator**	
12-14-05	10.00	10.01	KE	1
"	400.04	399.99	"	2
12-15-05	10.00	10.01	KE	1
"	400.04	399.96	"	2
12-16-05	10.00	10.00	KE	1
"	400.04	399.95	"	2
12-19-05	10.00	10.00	KE	1
"	400.04	399.95	"	2
12-20-05	10.00	10.01	KE	1
"	400.04	399.93	"	2

If balance is out of limits, clean the balance and re-calibrate using Class "S" weights.
If balance is still out of limits, place a "DO NOT USE" sign on it and call (DQA) for service.

FRM-112 (Rev 2/Aug 03)

010244

#1 - SN: 99-J50526-15
#2 - SN: 99-J50031-1

Southwest Research Institute®
Division 01
BALANCE VERIFICATION LOG

BALANCE #:	LOCATION:	SERIAL #:	TOLERANCE:	COMMENTS:
34	Bldg. 70 Lab 47	1116031935	±0.0005/0.00005	
Date	**Std Wt (g)**	**Recorded Wt (g)**	**Operator**	
13-DEC-2005	2.0000	2.0000	JT	1
13-DEC-2005	100.0000	100.0000	JT	2
12-14-05	2.0000	2.0000	KE	1
"	100.0000	100.0002	"	2
12-15-05	2.0000	2.0000	KE	1
"	100.0000	99.9996	"	2
12-16-05	2.0000	2.0000	KE	1
"	100.0000	99.9999	"	2
12-19-05	2.0000	2.0000	KE	1
~	100.0000	99.9999	"	2

If balance is out of limits, clean the balance and re-calibrate using Class "S" weights.
If balance is still out of limits, place a "DO NOT USE" sign on it and call (DQA) for service.

FRM-112 (Rev 2/Aug 03)

010245

#1 - SN: 99-J50526-15
#2 - SN: 99-J50031-1

Southwest Research Institute
Division 01
BALANCE VERIFICATION LOG

BALANCE #:	LOCATION:	SERIAL #:	TOLERANCE:	COMMENTS:
34	Bldg. 70 Lab 47	1116031935	±0.0005/0.00005	
Date	**Std Wt (g)**	**Recorded Wt (g)**	**Operator**	
12-20-05	2.0000	1.9999	KE	1
"	100.0000	100.0000	"	2
12-21-05	2.0000	2.0000	KE	1
"	100.0000	99.9998	"	2
12-22-05	2.0000	1.9999	KE	1
"	100.0000	99.9995	"	2
12-23-05	2.0000	2.0000	KE	1
"	100.0000	100.0004	"	2
12-27-05 JW	~~200.00~~ 2.0000	1.9999	JW	1
	100.0000	99.9999		2

If balance is out of limits, clean the balance and re-calibrate using Class "S" weights.
If balance is still out of limits, place a "DO NOT USE" sign on it and call (DQA) for service.

FRM-112 (Rev 2/Aug 03)

010246

#1-SN: 99-JS0526-15
#2-SN: 99-JS0031-1

Southwest Research Institute®
Division 01

BALANCE VERIFICATION LOG

BALANCE #:	LOCATION:	SERIAL #:	TOLERANCE:	COMMENTS:
12	Bldg. 70 Lab 47	1122510787	±0.0005	
Date	**Std Wt (g)**	**Recorded Wt (g)**	**Operator**	
12-16-05	2.0000	2.0001	KE	1
"	100.0000	99.9998	"	2
12-19-05	2.0000	1.9999	KE	1
"	100.0000	99.9996	"	2
12-21-05	2.0000	1.9999	KE	1
"	100.0000	100.0000	"	2
12-22-05	2.0000	1.9998	KE	1
"	100.0000	99.9999	"	2
12-23-05	2.0000	1.9999	KE	1
"	100.0000	100.0003	"	2

If balance is out of limits, clean the balance and re-calibrate using Class "S" weights.
If balance is still out of limits, place a "DO NOT USE" sign on it and call (DQA) for service.

FRM-112 (Rev 2/Aug 03)

010247

#1 - SN: 99-J50526-15
#2 - SN: 99-J50031-1

Southwest Research Institute®
Division 01
BALANCE VERIFICATION LOG

BALANCE #:	LOCATION:	SERIAL #:	TOLERANCE:	COMMENTS:
34	Bldg. 70 Lab 47	1116031935	±0.0005/0.00005	
Date	**Std Wt (g)**	**Recorded Wt (g)**	**Operator**	
13-DEC-2005	2.0000	2.0000	JT	1
13-DEC-2005	100.0000	100.0000	JT	2
12-14-05	2.0000	2.0000	KE	1
"	100.0000	100.0002	"	2
12-15-05	2.0000	2.0000	KE	1
"	100.0000	99.9996	"	2
12-16-05	2.0000	2.0000	KE	1
"	100.0000	99.9999	"	2
12-19-05	2.0000	2.0000	KE	1
"	100.0000	99.9999	"	2

If balance is out of limits, clean the balance and re-calibrate using Class "S" weights.
If balance is still out of limits, place a "DO NOT USE" sign on it and call (DQA) for service.

FRM-112 (Rev 2/Aug 03)

010248

010249

SOUTHWEST RESEARCH INSTITUTE
NUCLEAR PROJECT
CLIENT: Division 20
TASK ORDER: 051219-5
SRR: 28420
SDG: 271245
CASE: L. Yang
VTSR: December 16, 2005
PROJECT#: 06002.01.322

DI Water Verification

D.I. WATER SYSTEM NOTEBOOK
SOUTHWEST RESEARCH INSTITUTE
BUILDING 70

040029

Contact U.S. Filter (1-800-466-7873) for repairs/exchanges. (Make sure to have a P.O.)

HIGH PURITY SYSTEM (HP) 010250

DATE / TIME	INITIALS	RESISTIVITY MONITOR (M OHMS)	RESISTIVITY MONITOR QC LT.	QC LIGHTS QC 1	QC LIGHTS QC 2	USAGE (GALS)	COMMENTS
11/29/05 730	DR	18.01	✓	✓	✓	12708.4	—
11/30/05 9pm	DR	18.02	✓	✓	✓	12728.6	—
12/1/05 730pm	DR	18.03	✓	✓	✓	12744.2	—
12/2/05 710pm	DR	18.02	✓	✓	✓	12766.7	—
12/5/05 738pm	DR	18.03	✓	✓	✓	12789.8	—
12/6/05 640pm	DR	18.02	✓	✓	✓	12809.1	—
12/7/05 7pm	DR	18.02	✓	✓	✓	12837.4	—
12/8/05 705pm	DR	18.03	✓	✓	✓	12868.0	✓
12/9/05 530pm	DR	18.02	✓	✓	✓	12899.4	✓
12/12/05 710pm	DR	18.02	✓	✓	✓	12923.2	—
12/13/05 657pm	DR	18.01	✓	✓	✓	12948.0	—
12/14/05 633pm	DR	18.02	✓	✓	✓	12975.4	—
12/15/05 541pm	DR	18.02	✓	✓	✓	13003.3	—
12/16/05 510pm	DR	18.03	✓	✓	✓	13011.0	—
12/19/05 7pm	DR	18.02	✓	✓	✓	13021.0	—
12/20/05 915pm	DR	18.02	✓	✓	✓	13037.6	✓

Legend: Check = Green (OK); X = Red (call for service)

LOW PURITY SYSTEM (LP)

DATE / TIME	INITIALS	QC LIGHTS QC 1	QC LIGHTS QC 2	USAGE (GALS)	COMMENTS
11/29/05 731	DR	X	13 ✓	31005.0	slight usage.
11/30/05 701pm	DR	✓	12 ✓	31008.3	✓
12/1/05 731pm	DR	X	12.5 ✓	31009.5	slight usage
12/2/05 711pm	DR	✓	13 ✓	31009.9	✓
12/5/05 739pm	DR	✓	13.5 ✓	~~3100~~ 31011.3	✓
12/6/05 641pm	DR	X	13 ✓	DR 12/15/05 31011.3	no usage
12/7/05 701pm	DR	X	13.5 ✓	31011.4	slight usage
12/8/05 706pm	DR	X	12.5 ✓	31011.4	no usage
12/9/05 531pm	DR	X	12.5 ✓	31011.4	no usage
12/12/05 721pm	DR	X	13 ✓	31011.9	slight usage
12/13/05 653pm	DR	✓	10.5 ✓	31013.4	✓
12/14/05 621pm	DR	✓	11.5 ✓	31014.5	✓
12/15/05 541pm	DR	✓	11 ✓	31015.6	✓
12/16/05 511pm	DR	X	11.5 ✓	31017.4	slight usage
12/19/05 721pm	DR	✓	11 ✓	31020.1	—
12/20/05 915pm	DR	X	10.5 ✓	31020.3	slight usage

Legend: Check = Green (OK); X = Red (call for service)

D.I. WATER SYSTEM NOTEBOOK
SOUTHWEST RESEARCH INSTITUTE
BUILDING 70

C40028

Contact U.S. Filter (1-800-466-7873) for repairs/exchanges. (Make sure to have a P.O.)

010251

HIGH PURITY SYSTEM (HP)

DATE / TIME	INITIALS	RESISTIVITY MONITOR (M OHMS)	RESISTIVITY MONITOR QC LT.	QC LIGHTS QC 1	QC LIGHTS QC 2	USAGE (GALS)	COMMENTS
11/3/05 723pm	DR	18.03	✓	✓	✓	12221.7	✓
11/4/05 755pm	DR	18.02	✓	✓	✓	12273.4	✓
11/7/05 [illegible]	DR	18.03	✓	✓	✓	12294.8	✓
11/8/05 745pm	DR	18.02	✓	✓	✓	12308.2	✓
11/9/05 820pm	DR	18.01	✓	✓	✓	12336.4	✓
11/10/05 8pm	DR	18.01	✓	✓	✓	12346.1	✓
11/11/05 630pm	DR	18.02	✓	✓	✓	12362.9	✓
11/14/05 621pm	DR	18.01	✓	X	✓	12372.8	✓ need to get P.O. for Service call
11/15/05 930pm	DR	18.02	✓	X	✓	12417.9	U.S. Filter called
11/16/05 830pm	DR	18.03	✓	✓	✓	12465.0	Mixed Bed and Carbon Exchange. ALL OK
11/17/05 7pm	DR	18.02	✓	✓	✓	12549.2	✓
11/18/05 705pm	DR	18.03	✓	✓	✓	12581.8	✓
11/21/05 723pm	DR	18.02	✓	✓	✓	12619.3	✓
11/22/05 610pm	DR	18.02	✓	✓	✓	12650.7	✓
11/23/05 450pm	DR	18.02	✓	✓	✓	12672.3	✓
11/28/05 550pm	DR	18.03	✓	✓	✓	12678.7	✓

Legend: Check = Green (OK); X = Red (call for service)

LOW PURITY SYSTEM (LP)

DATE / TIME	INITIALS	QC LIGHTS QC 1	QC LIGHTS QC 2	USAGE (GALS)	COMMENTS
11/3/05 724pm	DR	✓	✓ 6.5	30940.3	✓
11/4/05 759pm	DR	X	✓ 7	30940.5	slight usage
11/7/05 721pm	DR	X	✓ 6.5	30941.5	slight usage
11/8/05 716pm	DR	X	✓ 6.5	30941.5	no usage
11/9/05 821pm	DR	X	✓ 6.5	30943.5	might be due for tank x-change
11/10/05 801pm	DR	X	✓ 6	30944.8	slight usage
11/11/05 631pm	DR	✓	✓ 6.5	30945.5	✓
11/14/05 624pm	DR	X	✓ 6.5	30945.8	need P.O. for Service call
11/15/05 931pm	DR	X	✓ 6	30948.9	U.S. Filter called
11/16/05 838pm	DR	✓	✓ 13.5	30979.2	Carbon, Mixed Bed x-change. ALL OK
11/17/05 701pm	DR	✓	✓ 13.5	30989.0	✓
11/18/05 706pm	DR	✓	✓ 14	30990.1	✓
11/21/05 723pm	DR	✓	✓ 14	30998.0	✓
11/22/05 611pm	DR	X	✓ 14.5	30998.0	no usage
11/23/05 451pm	DR	X	✓ 14.5	30998.0	no usage
11/28/05 551pm	DR	✓	✓ 12	31001.5	✓

DR

Legend: Check = Green (OK); X = Red (call for service)

D.I. WATER SYSTEM NOTEBOOK
SOUTHWEST RESEARCH INSTITUTE
BUILDING 70

C40029

Contact U.S. Filter (1-800-466-7873) for repairs/exchanges. (Make sure to have a P.O.)

010252

HIGH PURITY SYSTEM (HP)

DATE / TIME	INITIALS	RESISTIVITY MONITOR (M OHMS)	RESISTIVITY MONITOR QC LT.	QC LIGHTS QC 1	QC LIGHTS QC 2	USAGE (GALS)	COMMENTS
11/29/05 730	DR	18.01	✓	✓	✓	12708.4	✓
11/30/05 9pm	DR	18.02	✓	✓	✓	12728.6	✓
12/1/05 730pm	DR	18.03	✓	✓	✓	12744.2	✓
12/2/05 710pm	DR	18.02	✓	✓	✓	12766.7	✓
12/5/05 738pm	DR	18.03	✓	✓	✓	12789.8	✓
12/6/05 640pm	DR	18.02	✓	✓	✓	12809.1	✓
12/7/05 7pm	DR	18.02	✓	✓	✓	12837.4	✓
12/8/05 705pm	DR	18.03	✓	✓	✓	12868.0	✓
12/9/05 530pm	DR	18.02	✓	✓	✓	12899.4	✓
12/12/05 710pm	DR	18.02	✓	✓	✓	12923.2	✓
12/13/05 658pm	DR	18.01	✓	✓	✓	12948.0	✓
12/14/05 603pm	DR	18.02	✓	✓	✓	12975.4	✓
12/15/05 541pm	DR	18.02	✓	✓	✓	13003.3	✓
12/16/05 510pm	DR	18.03	✓	✓	✓	13011.0	✓
12/19/05 730pm	DR	18.02	✓	✓	✓	13021.0	✓
12/20/05 915pm	DR	18.02	✓	✓	✓	13037.6	✓

Legend: Check = Green (OK); X = Red (call for service)

LOW PURITY SYSTEM (LP)

DATE / TIME	INITIALS	QC LIGHTS QC 1	QC LIGHTS QC 2	USAGE (GALS)	COMMENTS
11/29/05 731	DR	X	13 ✓	31005.0	slight usage
11/30/05 701pm	DR	✓	12 ✓	31008.3	✓
12/1/05 731pm	DR	X	12.5 ✓	31009.5	slight usage
12/2/05 711pm	DR	✓	13 ✓	31009.9	✓
12/5/05 739pm	DR	✓	13.5 ✓	~~31008~~ 31011.3	✓
12/6/05 641pm	DR	X	13 ✓	DR 12/5/05 31011.3	no usage
12/7/05 701pm	DR	X	13.5 ✓	31011.4	slight usage
12/8/05 706pm	DR	X	12.5 ✓	31011.4	no usage
12/9/05 531pm	DR	X	12.5 ✓	31011.4	no usage
12/12/05 721pm	DR	X	13 ✓	31011.9	slight usage
12/13/05 653pm	DR	✓	10.5 ✓	31013.4	✓
12/14/05 621pm	DR	✓	11.5 ✓	31014.5	✓
12/15/05 58pm	DR	✓	11 ✓	31015.6	✓
12/16/05 511pm	DR	X	11.5 ✓	31017.4	slight usage
12/19/05 731pm	DR	✓	11 ✓	31020.1	✓
12/20/05 916pm	DR	X	10.5 ✓	31020.3	slight usage

Legend: Check = Green (OK); X = Red (call for service)

SOUTHWEST RESEARCH INSTITUTE
NUCLEAR PROJECT
CLIENT: Division 20
TASK ORDER: 051219-5
SRR: 28420
SDG: 271245
CASE: L. Yang
VTSR: December 16, 2005
PROJECT#: 06002.01.322

010253

SURVEILLANCE REPORTS
From Division 30

010254

Institute Quality Assurance Surveillance Report

Project Number: 20-06002	**Report Number:** ~~2005-SR-0955~~ 2006-SR-0031 2/14/06 **Page 1 of 1**

Surveillance Scope: Review of a Division 01 test package for Div. 20, the Center for Nuclear Waste Regulatory Analysis. This is a Nuclear Surveillance.

Reference Documents: Documentation test packages for Task Orders 051021-6, 051110-8, and 051219-5

Starting Date: 2006-02-07 **Ending Date:** 2006-02-07

Institute QA Representative: Mark R. Ehnstrom MRE

Person(s) Conducting Test/Exam/Procedure: R. Presas

Satisfactory Findings

The data packages were reviewed for test activities performed in Division 01. The test activities were performed on a total of 23 samples provided by Dr. L. Yang of Division 20. A Laboratory Task Order form was used as a cover sheet for each package. The Laboratory Task Order form made reference to 10CFR 50, Appendix B and to 10CFR Part 21. A "Sample List/Chain of Custody" form was also used to assure positive control and responsibility for the samples. Data contained in the packages included:

- Calibration records on the specific instrumentation used during testing
- Certificates of Analysis
- Reports of Certificates
- Certificates of Reference Materials

When appropriate, test documentation was provided which showed traceability back to the National Institute of Standards. Test results had been reviewed by Division 01 supervisory personnel. Personnel training records were reviewed and were found to be satisfactory.

Unsatisfactory Findings: None

Nonconformance Report Number: N/A **CAR/SCAR Number:** N/A

Attachments: None

Recommendations/Actions: N/A

Equipment Calibration: See above.

Approved: _____
Institute Quality Assurance

Date: 2 · 14 · 2006

Distribution: Original – IQS Records
CC: M.R.Ehnstrom (30)
PM – R. Presas (01)
J. Boyd (01)

SwRI® Form QA-125-3