SOUTHWEST RESEARCH INSTITUTE NUCLEAR PROJECT CLIENT: Division 20 TASK ORDER: 040521-5 SRR: 25943 SDG: 245101 CASE: CNWRA VTSR: May 20, 2004 PROJECT#: 06002.01.141

FINAL REPORT

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Task Order: 040521-5

Lab System ID: 245101

	Sample	Reporting
Analysis	Result (mg/L)	Limit (mg/L)
Bromide	<0.1	0.1
Chloride	6.74	0.1
Fluoride	1.84	0.1
Nitrate-N	0.922	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	0.0205	0.01
Sulfate	28.8	0.1

Sample ID Anion 1A

Client: Division 20

Date Received: 05/20/04

Project No.: 06002.01.141

SOUTHWEST RESEARCH INSTITUTE DUPLICATE SUMMARY

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Task Order: 040521-5

Lab System ID: 245101

010003 Sample ID Anion 1A

Client: Division 20

Date Received: 05/20/04

Project No.: 06002.01.141

	Sample	Duplicate	
Analysis	Result (mg/L)	Result (mg/L)	RPD
Bromide	<0.1	<0.1	0.00%
Chloride	6.74	6.72	0.30%
Fluoride	1.84	1.83	0.54%
Nitrate-N	0.922	0.916	0.65%
Nitrite-N	<0.1	<0.1	0.00%
Phosphate-P	0.0205	0.0306	39.5%
Sulfate	28.8	28.7	0.35%

SOUTHWEST RESEARCH INSTITUTE MATRIX SPIKE SUMMARY 010004

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Task Order: 040521-5

Lab System ID: 245101

Sample ID Anion 1A

Client: Division 20

Date Received: 05/20/04

Project No.: 06002.01.141

	Sample	Spike	Spike	
Analysis	Result (mg/L)	Result (mg/L)	Added (mg/L)	Recovery
Bromide	<0.1	4.11	4.00	103%
Chloride	6.74	8.66	2.00	96.0%
Fluoride	1.84	2.83	1.00	99.0%
Nitrate-N	0.922	1.72	0.904	88.3%
Nitrite-N	<0.1	0.933	1.00	93.3%
Phosphate-P	0.0205	0.273	0.250	101%
Sulfate	28.8	32.4	4.00	90.0%

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Task Order: 040521-5

Lab System ID: 245102

	Sample	Reporting
Analysis	Result (mg/L)	Limit (mg/L)
Bromide	<0.1	0.1
Chloride	5.85	0.1
Fluoride	1.73	0.1
Nitrate-N	0.735	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	0.0679	0.01
Sulfate	22.1	0.1

Sample ID Anion 2A

Client: Division 20

Date Received: 05/20/04

Project No.: 06002.01.141

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Task Order: 040521-5

Lab System ID: 245103

	Sample	Reporting
Analysis	Result (mg/L)	Limit (mg/L)
Bromide	7.98	0.1
Chloride	3.91	0.1
Fluoride	1.99	0.1
Nitrate-N	1.59	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	4.44	0.01
Sulfate	7.67	0.1

Sample ID Anion 3A

Client: Division 20

Date Received: 05/20/04

Project No.: 06002.01.141

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Task Order: 040521-5

Lab System ID: 245104

Sample ID Anion 4A

Client: Division 20

Date Received: 05/20/04

Project No.: 06002.01.141

	Sample	Reporting		
Analysis	Result (mg/L)	Limit (mg/L)		
Bromide	<0.1	0.1		
Chloride	10.2	0.1		
Fluoride	<0.1	0.1		
Nitrate-N	0.374	0.1		
Nitrite-N	<0.1	0.1		
Phosphate-P	< 0.01	0.01		
Sulfate	<0.1	0.1		

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Task Order: 040521-5

Lab System ID: 245105

	Sample	Reporting
Analysis	Result (mg/L)	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	< 0.01	0.01
Sulfate	<0.1	0.1

Sample ID Anion 5A

Client: Division 20

Date Received: 05/20/04

Project No.: 06002.01.141

SOUTHWEST RESEARCH INSTITUTE SAMPLE ANALYSIS DATA SHEET

010009

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Task Order: 040521-5

Lab System ID: 245106

Sample ID Anion 6A

Client: Division 20

Date Received: 05/20/04

Project No.: 06002.01.141

	Sample	Reporting
Analysis	Result (mg/L)	Limit (mg/L)
Bromide	<0.1	0.1
Chloride	6.70	0.1
Fluoride	1.79	0.1
Nitrate-N	0.902	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	0.027	0.01
Sulfate	28.8	0.1

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Task Order: 040521-5

Lab System ID: 245107

Sample ID Anion 7A

Client: Division 20

Date Received: 05/20/04

Project No.: 06002.01.141

	Sample	Reporting
Analysis	Result (mg/L)	Limit (mg/L)
Bromide	<0.1	0.1
Chloride	5.98	0.1
Fluoride	1.69	0.1
Nitrate-N	0.733	0.1
Nitrite-N	<0.1	0.1
Phosphate-P	0.0673	0.01
Sulfate	22.2	0.1

SOUTHWEST RESEARCH INSTITUTE LABORATORY CONTROL SAMPLE 010011

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Task Order: 040521-5

Lab System ID: NA

Sample ID LCSW

Client: Division 20

Date Received: NA

Project No.: 06002.01.141

SRR: 25943

	Sample	True	
Analysis	Result (mg/L)	Value (mg/L)	Recovery
Bromide	408	400	102%
Chloride	206	200	103%
Fluoride	102	100	102%
Nitrate-N	84.3	90.4	93.3%
Nitrite-N	97.0	100	97.0%
Phosphate-P	2.50	2.31	108%
Sulfate	398	400	99.5%

NA- Not Applicable.

SOUTHWEST RESEARCH INSTITUTE BLANK SUMMARY 010

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Task Order: 040521-5

Lab System ID: NA

010012

Sample ID PBW

Client: Division 20

Date Received: NA

Project No.: 06002.01.141

SRR: 25943

	Sample	Reporting
Analysis	Result (mg/L)	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	< 0.01	0.01
Sulfate	<0.1	0.1

NA- Not Applicable.

SOUTHWEST RESEARCH INSTITUTE NUCLEAR PROJECT CLIENT: Division 20 TASK ORDER: 040521-5 SRR: 25943 SDG: 245101 CASE: CNWRA VTSR: May 20, 2004 PROJECT#: 06002.01.141

Task Orders/01-QPP-015

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Laboratory Task Order

TO #: 040521-5 Revision: 1

SDG: 245101 VTSR: 05/20/04 CASE: CNWRA SRR #'s: 25943 Client(s): DIV 20 Project(s): 06002.01.141 Manager(s): DAMMANN, MIKE To PM: 06/16/04 To QA: 07/26/04 To Client: 07/27/04 010014

Instructions DIVISION 20 - CNWRA. 30-day TAT. Using 27-day TAT for report/PM, QAU, 28-day TAT for hardcopy (subject to change). Point of Contact is Brad Werling (x6565). Analysis for Anions by IC except Phosphate. Phosphate required by Method 365.3. Work is 10 CFR 50, Part 21, Appendix B. CONTACT Charlie Butcher (ext. 5928, pager 271-5172) BEFORE STARTING ANY WORK ON THIS TASK ORDER. CONTACT PM WITH ANY QUESTIONS. revision 1: updated task order. (dr072304)

Documents Related to this task order: 10688[COC 25943]

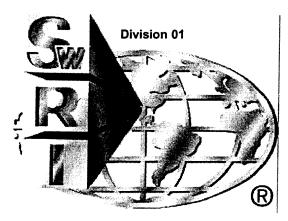
Test: IC-SWR Section: WET		8	olding: 28 days from CED on Chromatography by SwRI Method (EXCEPT PHOSPHATE)						Cnt: 7	
System ID	Туре	Cont	Matrix	Customer ID		CED)	Meth	nod D	ate
245101		1	Water	Anion 1A	20	May	04	17	Jun	04
245102		1	Water	Anion 2A	20	May	04	17	Jun	04
245103		1	Water	Anion 3A	20	May	04	17	Jun	04
245104		1	Water	Anion 4A	20	May	04	17	Jun	04
245105		1	Water	Anion 5A	20	May	04	17	Jun	04
245106		1	Water	Anion 6A	20	May	04	17	Jun	04
245107		1	Water	Anion 7A	20	May	04	17	Jun	04

Test: PO4_365.3 Section: WETCHEM Holding: 2 days from CED

Section: WETCHEM		Phosphate by Method 365.3 Cnt: 7							
System ID	Туре	Cont	Matrix	Customer ID	CED	Method Date			
245101		1	Water	Anion 1A	20 May 04	22 May 04			
245102		1	Water	Anion 2A	20 May 04	22 May 04			
245103		1	Water	Anion 3A	20 May 04	22 May 04			
245104		1	Water	Anion 4A	20 May 04	22 May 04			
245105		1	Water	Anion 5A	20 May 04	22 May 04			
245106		1	Water	Anion 6A	20 May 04	22 May 04			
245107		1	Water	Anion 7A	20 May 04	22 May 04			

CONTROLLED COPY IF STAMF IS NOT RED, THIS DOCUMENT IS UNCONTROLLED

01-QPP-015 Division 01 Revision 4 November 2002 Document No.



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

DIV. 20 SRR #25943 PROJECT #06002.01.141 CASE: CNWRA VTSR: 05/20/04 1500

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

CHEMISTRY AND CHEMICAL ENGINEERING DIVISION **Division 01 Quality Project Plan**

01-QPP-015 Division 01 Rev 4/November 2002 Page i

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:

(210) 522-2169

JΩ

ANN BOYD **Quality Assurance Manager**

REZA KARIMI

(210) 522-2412 Director, Department of Analytical and Environmental Chemistry

MICHAEL G. MACNAUGHTON (210) 522-5162 Vice President, Chemistry and Chemical Engineering Division

CHRISTOPHER HOBSON Quality Assurance Engineer (210) 522-5838

130/02 10

30/02 DATE 10

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CHEMISTRY AND CHEMICAL ENGINEERING DIVISION Division 01 Quality Project Plan

- 1

01-QPP-015 Division 01 Rev 4/Nov 2002 Page ii

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TABLE OF CONTENTS

Page

:

1.0 INT	RODUCTION	1
2.0 SC	OPE	1
3.0 REF	FERENCES	1
4.0 API	PLICABLE SECTIONS OF SWRI PROGRAM QUALITY PLAN (PQP-NUCLEAR)	1
4.1	Indoctrination and Training	1
4.2	Qualification of Personnel	
4.3	Design Control	
4.4	Right of Access	
4.5	Control of Supplier-Generated Documents	
4.6	Acceptance of Services Only	2
4.7	Commercial Grade Items.	
4.8	Inspection	
4.9	Inspection and Testing	
4.10		
4.11		
4.12		
4.13		
4.14		
5.0 HIS	TORY OF REVISIONS	6

CHEMISTRY AND CHEMICAL ENGINEERING DIVISION Division 01 Quality Project Plan 01-QPP-015 Division 01 Rev 4/Nov 2002 Page 1 of 6

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. Institute Quality Systems (IQS) personnel shall perform this training and documentation shall be evident in the personnel training files maintained in Division Quality Assurance.
- 4.1.2 Indoctrination and training of personnel shall be conducted in accordance with **SOP-01-6.2.1**, *Qualification and Training*.

Southwest Research Institute Proprietary

CHEMISTRY AND CHEMICAL ENGINEERING DIVISION Division 01 Quality Project Plan

01-QPP-015 Division 01 Rev 4/Nov 2002 Page 2 of 6

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, Work 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.

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. Work 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.

Southwest Research Institute Proprietary

CHEMISTRY AND CHEMICAL ENGINEERING DIVISION Division 01 Quality Project Plan 01-QPP-015 Division 01 Rev 4/Nov 2002 Page 3 of 6

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.

CHEMISTRY AND CHEMICAL ENGINEERING DIVISION Division 01 Quality Project Plan

01-QPP-015 Division 01 Rev 4/Nov 2002 Page 4 of 6

- 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) Work 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 work 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

CHEMISTRY AND CHEMICAL ENGINEERING DIVISION Division 01 Quality Project Plan

01-QPP-015 Division 01 Rev 4/Nov 2002 Page 5 of 6

(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.

CHEMISTRY AND CHEMICAL ENGINEERING DIVISION Division 01 Quality Project Plan 01-QPP-015 Division 01 Rev 4/Nov 2002 Page 6 of 6

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 work order shall specify all applicable documents and appropriate document revision level for each document. The work order shall then serve as the Valid Documents List (VDL) for each individual project.

5.0 HISTORY OF REVISIONS

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*.

SOUTHWEST RESEARCH INSTITUTE NUCLEAR PROJECT CLIENT: Division 20 TASK ORDER: 040521-5 SRR: 25943 SDG: 245101 CASE: CNWRA VTSR: May 20, 2004 PROJECT#: 06002.01.141

Chain of Custody/Login Paperwork

Client Shipper Name Address Address CN W R F CN W R F C N W R F C S L C	13612 01				SAMPLE LIST/CHAIN OF CUSTODY Southwest Research Institute Chemistry and Chemical Engineering Division 6220 Culebra Road San Antonio, Texas 78238-5166 Client Purchase Order/Other ID Site/Zone Analyses Requested				sion	ID		C 2 We 3 We Other SwRI Cont	eks H H KS		
Anion IA 1 05 Anion IA 1 05 Anion 3A 1 Anion 4A 1 Anion 5A 1 Anion 5A 1 Anion 5A 1 Anion 7A 1	(mm/dd/yy) Sample Collection Time	K Matrix Type	Sample Type	X X X X X Anions by 10	X X X X X X Phasphater		nal Loca	ted <u>T.L</u>	/. 20 #25943 06002. CNWR	01.141 A		Samples	Preservation $a = HCI to b = HNO_{2}c = H_{2}SOd = NaOHe = Cool (c)T = OtherNucleaRelatoRelatoReconstruction of the second s$		ty e OA
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 Temp: 22.0 C Comments: 628/1341-13	Sample T D - Duplica ER – Equin ES – Envir FB – Field FD – Field MS – Matr MSD – Ma TB – Trip F	ate pment Rir ronmental Blank Duplicate ix Spike trix Spike Blank	l Sample e	Rece Relin Rece	with an an arrived by (Print) quished by (P ived by (Print/	Print/Signature) VSignature) Print/Signature) VSignature)	Minar	n Ju	crett		Date	Time Time Time Time	SwRI Projecti 20.060 Received b (Signature) Date 29.04 Date Samples Die Date	202.01. y Swifti Lab: Time Time Sposed: Time	\geq

Div 01 COC Form 01-01-001, Rev 8/02

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Address Brack	Her A - D	-lin DII - 5	50	0			SAMPLE LIST/CHAIN OF CUSTODY Southwest Research Institute Chemistry and Chemical Engineering Division 6220 Culebra Road San Antonio, Texas 78238-5166 Client Purchase Order/Other ID Site/Zone				search Institute cal Engineering Division lebra Road			ID		Requested Turnaround: 2 Weeks 3 Weeks Cother: <u>4</u> SwRI Contact
Client																
			1	Т				1	T	Analyses	Request	ed				Mike Dammann
Sample ID	Sample Collection Date (mm/dd/yy)	Sample Collection Time	Matrix Type	Sample Type	# of Containers	SE	llenests ICP		Exact (Origina		<u>T.O.</u> Somf	0405	21-6		Entract B	REMARKSPreservation $a = HCl to pH <2$ $c = H_2SO_4 to pH <2$ $d = NaOH to pH > 12$ $e = Cool (4^{\circ}C \pm 2^{\circ}C)$ $f = Other (specify)$
Cation 1A/0	5/20/177		W		1	X										
Cation 211	1				1	X					<u> </u>				+	Nuclear Datety
Cation 3A1						X									╂──┠─	related use
Cation 441												I				appropriate QA procedures
(ation 5A1								<u>}</u>			DIV.					Procedures
Cation 6A1							X SRR #25943 X PROJECT #06002.01.141									
Lation 7.41								 			-CT #06 ASE: C		1.141			POC-Bad Herling
Lation SA!								<u> </u>				0/04 15	500			×6565 fox 5184
Lation 911						x		· · · · · · · · · · · · · · · · · · ·					 		╂	······································
Lation TA					/											
Matrix Types:	S	ample T	vpes:			Belina	 uished by (F	rint/Signat	uro)							
A – Air B – Biota	D	- Duplic		inaata		005	ian	•		M	. Λ.	icket	1	Date	Time	SwRI Project#:
D - Dust	E	S – Envi	ironmenta	al Sampl	е		red by (Print			mana	in qu	ucceo	4	Date	Time	20,06002,01.141 Received by SurRitati
E – Emission/Stack		B – Field D – Field		te					•		Ú			Duio		(Signature)
P – Product Sd - Solid	MS – Matrix Spike Relinquished by (Print/Signature) MSD – Matrix Spike Dup						Relinquished by (Print/Signature)				Date	Time (Th/			
S – Soil		ISD – Ma B – Trip		e Dup									Clater Time			
SED – Sediment T - Tissue						Dessi	Peceived by (Print/Cigneture)									
W - Water						necelv	Received by (Print/Signature) Date Tim					Time	5 20 04 15 00 Samples Disposed:			
WP - Wipe Temp: 22.0°C	TI	herm #:	021										Date Time			
Comments:						Relinq	uished by (P	rint/Signatu	ure)					Date	Time	
628/134.	136															Samples Disposed by:

Div 01 COC Form 01-01-001, Rev 8/02

Page _____ of _____

010026

SAMPLE LOG-IN SHEET

010027

Lat	o Name					
-		earch Institute				Page 1 of 1
Red	ceived By (Print Name)	0				Log-in Date 05/21/2004
Red	DINO ROMAN ceived By (Signature)	\bigcirc				
		V/C	1			
	se Number CNWRA		Sample Delivery Gro	up No.		SAS Number \mathcal{N}/\mathcal{A}
Rei	marks: 06002.01.141			Corre	sponding	Remarks: Condition of Sample
			EPA Sample #	Sample Tag #	Assigned Lab #	Shipment, etc
1.	Custody Seal(s)	Present Absent* Intact/Broken	Anion 1A	None	245101	Intact
2.	Custody Seal Nos.	<u> </u>	Anion 2A	None	245102	Intact
		W]FT	Anion 3A	None	245103	Intact
3.	Chain-of Custody Records	resent Absent*	Anion 4A	None	245104	Intact
4. 5.	Traffic Reports or Packing Lists Airbill	Present Absent	Anion 5A	None	245105	Intact
J.		resen Absent*	Anion 6A	None	245106	Intact
6.	Airbill No.	HAND DELIVERED	Anion 7A	None	245107	Intact
			Cation 1A	None	245108	Intact
7.	Sample Tags	Present Absent	Cation 2A	None	245109	Intact
	Sample Tag Numbers	Listed Not listed on Chain of	Cation 3A	None	245110	Intact
8.	Sample Condition	Custody	Cation 4A	None	245111	Intact
o. 9.	Sample Condition Cooler Temperature	Leaking 22.0C	Cation 5A	None	245112	Intact
9. 10.	·	res No*	Cation 6A	None	245113	Intact
	on custody records, traffic	Ŭ	Cation 7A	None	245114	Intact
	reports, and sample tags agree?		Cation 8A	None	245115	Intact
11.	Date Received at Lab	05/20/2004	Cation 9A	None	245116	Intact
1 2 .	Time Received	15:00:00		Event Conu		
			/	Exact Copy		
			<u> </u>	Original Located	7-0.04052	-6
Frac	tion	Praction			7-0.040521 9mp 7-2	7-04
	Inorg					
Area	* R13	Area #				
By D	INO ROMAN	Ву)
On 0!	5/20/2004	On				
•••••	Contact SMO and attach record	d of resolution	N	1		
	/			Logbook No.	Comple Dess'	+ /250423
Date	(YNTREA)	A. SAUCEDA		Logbook Page No.	Sample Receip	
	03,63,6	~~~~			50789 (SECTED 4 05.25.24	x 1 a- 2)
			FORM DC-1		4 05.25.26	0LMO4.2
					, , , , , , , , , , , , , , , , , , , ,	- 1

SOUTHWEST RESEARCH INSTITUTE NUCLEAR PROJECT CLIENT: Division 20 TASK ORDER: 040521-5 SRR: 25943 SDG: 245101 CASE: CNWRA VTSR: May 20, 2004 PROJECT#: 06002.01.141

Copies of Login Book

Sample Login Book May 21, 2004

010029

SwRI Login Area Division 1

Sample Receipt: 25942 VTSR Date: May 21, 2004		Project: 06355.24.00X VTSR Time: 08:15:00	Client: INEEL Manager: DAMMANN, MIKE
System ID	Customer Sample ID		Matrix
245099	TRA764052004CA1		Water
245100	TRA764052004CA2		Water

Sample Receipt: 25943 VTSR Date: May 20, 2004		Project: 06002.01.141 VTSR Time: 15:00:00	Manager: D/	Client: DIV 20 : DAMMANN, MIKE	
System ID	Customer Sample ID			Matrix	
245101	Anion 1A			Water	
245102	Anion 2A			Water	
245103	Anion 3A	· · · · · · · · · · · · · · · · · · ·		Water	
245104	Anion 4A			Water	
245105	Anion 5A			Water	
245106	Anion 6A			Water	
245107	Anion 7A			Water	
245108	Cation 1A			Water	
245109	Cation 2A			Water	
245110	Cation 3A			Water	
245111	Cation 4A			Water	
245112	Cation 5A			Water	
245113	Cation 6A			Water	
245114	Cation 7A			Water	
245115	Cation 8A			Water	
245116	Cation 9A			Water	

Sample Receipt: 25944 VTSR Date: May 20, 2004		Project: 06002.01.141 VTSR Time: 15:00:00	C Manager: DAM	lient: DIV 20 MANN, MIKE
System ID	Customer Sample ID			Matrix
245117	UFUA-CE-D			Water
245118	UFUA-CE-S			Water
245119	UFUA-GCMS-D			Water

SOUTHWEST RESEARCH INSTITUTE NUCLEAR PROJECT CLIENT: Division 20 TASK ORDER: 040521-5 SRR: 25943 SDG: 245101 CASE: CNWRA VTSR: May 20, 2004 PROJECT#: 06002.01.141

RAW DATA

Southwest Research Institute

Electronic Bench Sheet Phosphate - WATERS

mg/L

Project #: 06002.01.141 Client: Div. 20 Method: 365.3 WO#: 040521-5

Standardization:

Standard mg/L	Calc mg/L	Absorbance @650
0.000	-0.0	0.000
0.01	0.0	0.019
0.05	0.0	0.097
0.10	0.1	0.193
0.50	0.5	0.901
1.00	1.0	1.680

Regression Output:Constant-0.00849Std Err of Y Est0.015597R Squared0.9988No. of Observations6Degrees of Freedom4X Coefficient(s)0.59203Std Err of Coef.0.01031

Date: 06/11/04

MDL: 0.010

SIg Figs: 3

Analyst: Michael Hardy

NOTES: Phosphate std. = SPEX 7-145VY TV = 1000mg/L PO₄-P ICV/CCV = ERA 99114(Nutrients) TV = 2.31 mg/L PO₄-P

Final Volume Colored:

10 ml

Seq #	Sample ID	Aliquot Vol	Abs	PO4P	Comments
		ml	@650	mg/L	
1	ICV	2	0.860	2.50	108% R, TV = 2.31 mg/L
2	ICB	10	0.002	<0.01	
3	LLC	10	0.040	0.0152	76.0% R, TV = 0.020 mg/L
4	245101	10	0.049	0.0205	_
5	245101D	10	0.066	0.0306	39.5% RPD
6	245101S	10	0.475	0.273	101% R, TV = 0.250 mg/L
7	245102	10	0.129	0.0679	
8	245103	1	0.764	4.44	
9	245104	10	0.021	<0.01	
10	245105	10	0.003	<0.01	
11	245106	10	0.060	0.027	
12	245107	10	0.128	0.0673	
13	CCV	2	0.814	2.37	103% R, TV = 2.31 mg/L
14	ССВ	10	-0.003	<0.01	VOIDCell Dirty
15	ССВ	10	-0.001	<0.01	

Page1

Southwest Research Institute 010032 Logbook: Phosphate
Analysis / Method: <u>Phosphate</u> 365.3 Project# <u>06002.01.141</u> Client: <u>Div.20</u> WO# <u>040521-5</u>
space provided for spectrophotometer printouts Ammonium Molybelicte / Antimony Potassium Tartvate Dissolved 0.1003 g Antimony Potassium Tartvate (Aldvich Lot #: 03929CV) and 3.9972 g Ammonium Molybeliate (Fisher Lot # 975140) in 400 mL DI and diluted to 500 mL with DI
- Sulfwie Acid (IIN) Added 62 mL concentrated HSSO4 (Fisher Lot # 036110) to DOML DI and diluted to 200 mL with DI.
- Ascorbie Acid Dissolved 2.9977 g ascorbie acid in 40 mL DI and diluted (Fisher Lot # 035244) to 50 mL with DI water. Then added U.I mL acetone (FisherLet # 038638)
Balance # 16 P.pettes: 5000 J 1000 H 200 H
(continued on 03 070)
Analyst Signature: Reviewed by: Logbook #/ Page # 03 069 Date: 6/11/04 Date: 6/21/04 Date: 6/21/04

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FRM-317 (Rev 0/Sept 02)

Southwest Research Institute 010033 Logbook: Phosphate Analysis / Method: hosphate 365.3 Project# _06002.0(.141 Client: V. 20 WO# 040521-5 Continued from 03 069) STANDARD CURVE L INREGR 1.242 . 162 1.100 Intercept=0.015 Slope=1.687 Corr.Coef.=0.999 StdDev=0.026329 11 JUN 2004 10:26:20 STANDARD CURVE Application: LINREGR Model: P04 Test name: ABS Correction: NONE Wavelength: 650.0 m9/L Units: Slope=1.687 Intercept=0.015 StdDev=0.026329 Corr.Coef.=0.999 ABS CONC Std 0.000 0.00000 1 0.010000 0.019 2 0.097 3 0.050000 0.193 4 0.10000 0.901 5 0.50000 1.680 6 1.0000 (continued on 03 071) Date: 6/11/04 Analyst Signature: Reviewed by: Date: 03 070 Logbook #/ Page #

FRM-317 (Rev 0/Sept 02)

Southwest Research Institute 010034 Logbook: Phosphate Project# 06002.01.141 365.3 Analysis / Method: Khosoha wo# 040521-5 Client: Div.20 space provided for spectrophotometer printouts Continued from 03 070) ID ABS CONC 1:5 ICV 0.860 0.50092 IDABS CONC ICB -0.002 -0.00765ID ABS CONC LLC 0.040 0.014870 ID ABS CONC 245101 0.049 0.020205 IDABS CONC 245101D 0.066 0.030282 ID ABS CONC 2451015 0.475 0.27272 ID ABS CONC 245102 0.129 0.067625 ID ABS CONC 245103 1:10 0.764 0.44402 ID ABS CONC 245104 0.021 6/11/04 0.003608 ID ABS ÇONC 245105 0.003 -0.00706 ID ABS 245106 0.060 0.028725 ID ABS CONC 245107 0.128 0.067032 ID ABS CONC 1:5 CCV 0.814 0.47366 IDABS CONC CCB VOID -0.003 -0.01062 ID CELL DIRTY ABS CONC **ČCB** -0.001 -0.00943

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Analyst Signature: 6 Date: Reviewed by: Date: <u>ີ</u> ເປີ 071 Logbook #/ Page #

FRM-317 (Rev 0/Sept 02)

Southwest Research Institute

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Dionex DX500 Ion Chromatography Daily Log

010035

Book/Page: 12 003

mo Analyst: Conductivity: 17.9

6/23/04 Date:

Analytical Method Project # **TO** # Client <>> 06 002.01.081 300 -0616-DIV20 => 0600 a.01.141 2 > 06002.01.141 \leftarrow ¥0542.02.002 Db 9 antera 0582704000 1 ¢

Loop: Column: Comments:

Calibration:

Method:

0622 anion 04

IC

V/CCV/MS:	
1 st Source SPEX (norg, 4518	2 nd Source NITTLE N
Lot #: 25-145AS	Lot #: 178-01-104
CCV Conc: 1;20	CCV Conc: 1:20
MS Conc: ;100	MS Conc: (:100
ELUENT SOLUTION PREP: 	$5.5 \qquad FV = 2.0L \text{ DI H20} \\ mM \text{ Sodium Carbonate}$
Weight: 0.1689 NaHCO3 Source: Aldrich	Weight: 0.74199 Na ₂ HCO ₃ Source: 0.74199 Na ₂ HCO ₃
Lot: <u>15308EI</u> Balance #12 Other Eluent:	Lot: LOGM34
mA-Autoregen (ASRS) Other Regen:	

7/2/04

FRM-226 (Rev 3/Mar 03) Page 2 of 2

5000L [000] Eppendor

200.1

DIV 20 06002.01.141 TO#040521-5

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7/23/04 04 7

Analyst: RSS Method: EPA 300

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			Conc	RESULT				% Rec	. ,
	System ID	Analyte	mg/L	mg/L	Qual	DL	ΤV	or RPD	
06/23/04	245101	Fluoride	1.837	1.84		0.1			010036
06/23/04	245101	Chloride	6.743	6.74		0.1			010030
06/23/04	245101	Nitrite-N	0.026	0.1		0.1			
06/23/04	245101	Bromide	0.036	0.1	U	0.1			
06/23/04		Nitrate-N	0.922	0.922		0.1			
06/23/04		Sulfate	28.792	28.8		0.1			
06/23/04	245101D	Fluoride	1.828	1.83		0.1		0.49%	
06/23/04	245101D	Chloride	6.721	6.72		0.1		0.33%	
06/23/04	245101D	Nitrite-N	0.024	0.1		0.1		0.00%	
06/23/04	245101D	Bromide	0.029	0.1	U	0.1		0.00%	
06/23/04	245101D	Nitrate-N	0.916	0.916		0.1		0.65%	
06/23/04	245101D	Sulfate	28.673	28.7		0.1		0.41%	
06/23/04	245101S	Fluoride	2.828	2.83		0.1	1	99.1%	
06/23/04	245101S	Chloride	8.662	8.66		0.1	2	96.0%	
	245101S	Nitrite-N	0.933	0.933		0.1	1	93.3%	
	245101S	Bromide	4.111	4.11		0.1	4	103%	
	245101S	Nitrate-N	1.722	1.72		0.1	0.904	88.5%	
06/23/04	245101S	Sulfate	32.376	32.4		0.1	4	89.6%	
06/23/04		Fluoride	1.728	1.73		0.1			
06/23/04		Chloride	5.853	5.85		0.1			
06/23/04		Nitrite-N	0.000	0.1		0.1			
06/23/04		Bromide	0.039	0.1	U	0.1			
06/23/04		Nitrate-N	0.735	0.735		0.1			
06/23/04		Sulfate	22.118	22.1		0.1			
06/23/04		Fluoride	1.992	1.99		0.1			
06/23/04		Chloride	3.911	3.91		0.1			
06/23/04		Nitrite-N	0.000	0.1	υ	0.1			
06/23/04		Bromide	7.983	7.98		0.1			
06/23/04		Nitrate-N	1.588	1.59		0.1			
06/23/04		Sulfate	7.674	7.67		0.1			
06/23/04		Fluoride	0.000	0.1	U	0.1			
06/23/04		Chloride	10.233	10.2		0.1			
06/23/04		Nitrite-N	0.000	0.1		0.1		·····	
06/23/04		Bromide	0.000	0.1	U	0.1			
06/23/04		Nitrate-N	0.374	0.374		0.1			
06/23/04		Sulfate	0.000	0.1		0.1			
06/23/04		Fluoride	0.000	0.1		0.1			
06/23/04		Chloride	0.057	0.1 0.1		0.1			
06/23/04		Nitrite-N	0.000	0.1		0.1			
06/23/04		Bromide	0.000	0.1		0.1			
06/23/04 06/23/04		Nitrate-N Sulfate	0.000 0.087	0.1		0.1 0.1			
					0				
06/23/04 06/23/04		Fluoride Chloride	<u>1.791</u> 6.704	1.79 6.70		0.1			
06/23/04		Nitrite-N	0.027	0.1	11	0.1			
06/23/04				0.1		0.1			
06/23/04		Bromide Nitrate-N	0.040	0.1	.	0.1			
06/23/04		Sulfate	28.785	28.8		0.1			
06/23/04		Fluoride	1.687	20.0		0.1			
06/23/04		Chloride	5.980	5.98		0.1			
06/23/04		Nitrite-N	0.000	0.1		0.1			
06/23/04		Bromide	0.000		U U	0.1			
06/23/04	······································	Nitrate-N	0.733	0.733	<u> </u>	0.1			
06/23/04	the second se	Sulfate	22.230	22.2		0.1			
00/20/04									
	L	l							

U = UNDETECTED

DIV 20 06002.01.141 TO#040521.5 Analyst: RSS Method: EPA 300

010038

06/23/04 ICV Bromide 408.169 408 0.1 400 06/23/04 ICV Nitrate-N 84.273 84.3 0.1 90.4 06/23/04 ICV Sulfate 397.780 398 0.1 400 06/23/04 ICV Sulfate 397.780 398 0.1 400 06/23/04 CCV-1 Fluoride 102.699 103 0.1 100 06/23/04 CCV-1 Chloride 207.722 208 0.1 200 06/23/04 CCV-1 Nitrite-N 98.498 98.5 0.1 100 06/23/04 CCV-1 Nitrite-N 98.498 98.5 0.1 100 06/23/04 CCV-1 Bromide 413.437 413 0.1 400 06/23/04 CCV-1 Nitrate-N 85.785 85.8 0.1 90.4 06/23/04 CCV-1 Sulfate 401.578 402 0.1 400 06/23/04 CC	PD 102% 103% 97.0% 102% 93.2% 99.4%
06/23/04 ICV Fluoride 101.959 102 0.1 100 06/23/04 ICV Chloride 206.149 206 0.1 200 06/23/04 ICV Nitrite-N 96.954 97.0 0.1 100 06/23/04 ICV Bromide 408.169 408 0.1 400 06/23/04 ICV Nitrate-N 84.273 84.3 0.1 90.4 06/23/04 ICV Sulfate 397.780 398 0.1 400 06/23/04 CCV-1 Fluoride 102.699 103 0.1 100 06/23/04 CCV-1 Chloride 207.722 208 0.1 200 06/23/04 CCV-1 Nitrate-N 98.498 98.5 0.1 100 06/23/04 CCV-1 Nitrate-N 85.785 85.8 0.1 90.4 06/23/04 CCV-1 Sulfate 401.578 402 0.1 400 06/23/04 CCV-	103% 97.0% 102% 93.2%
06/23/04 ICV Chloride 206.149 206 0.1 200 06/23/04 ICV Nitrite-N 96.954 97.0 0.1 100 06/23/04 ICV Bromide 408.169 408 0.1 400 06/23/04 ICV Nitrate-N 84.273 84.3 0.1 90.4 06/23/04 ICV Sulfate 397.780 398 0.1 400 06/23/04 ICV Sulfate 397.780 398 0.1 400 06/23/04 CCV-1 Fluoride 102.699 103 0.1 100 06/23/04 CCV-1 Rhirite-N 98.498 98.5 0.1 100 06/23/04 CCV-1 Nitrite-N 98.498 98.5 0.1 400 06/23/04 CCV-1 Nitrate-N 85.785 85.8 0.1 90.4 06/23/04 CCV-2 Fluoride 101.420 101 0.1 100 06/23/04 CCV	103% 97.0% 102% 93.2%
06/23/04 ICV Nitrite-N 96.954 97.0 0.1 100 06/23/04 ICV Bromide 408.169 408 0.1 400 06/23/04 ICV Nitrate-N 84.273 84.3 0.1 90.4 06/23/04 ICV Sulfate 397.780 398 0.1 400 06/23/04 ICV Sulfate 397.780 398 0.1 400 06/23/04 CCV-1 Fluoride 102.699 103 0.1 100 06/23/04 CCV-1 Chloride 207.722 208 0.1 200 06/23/04 CCV-1 Nitrite-N 98.498 98.5 0.1 100 06/23/04 CCV-1 Bromide 413.437 413 0.1 400 06/23/04 CCV-1 Nitrate-N 85.785 85.8 0.1 90.4 06/23/04 CCV-2 Fluoride 101.420 101 0.1 100 06/23/04 CCV	97.0% 102% 93.2%
06/23/04 ICV Bromide 408.169 408 0.1 400 06/23/04 ICV Nitrate-N 84.273 84.3 0.1 90.4 06/23/04 ICV Sulfate 397.780 398 0.1 400 06/23/04 ICV Sulfate 397.780 398 0.1 400 06/23/04 CCV-1 Fluoride 102.699 103 0.1 100 06/23/04 CCV-1 Chloride 207.722 208 0.1 200 06/23/04 CCV-1 Nitrite-N 98.498 98.5 0.1 100 06/23/04 CCV-1 Bromide 413.437 413 0.1 400 06/23/04 CCV-1 Nitrate-N 85.785 85.8 0.1 90.4 06/23/04 CCV-2 Fluoride 101.420 101 0.1 100 06/23/04 CCV-2 Nitrite-N 97.671 97.7 0.1 100 06/23/04 C	102%) 3.2%
06/23/04 ICV Nitrate-N 84.273 84.3 0.1 90.4 06/23/04 ICV Sulfate 397.780 398 0.1 400 06/23/04 CCV-1 Fluoride 102.699 103 0.1 100 06/23/04 CCV-1 Chloride 207.722 208 0.1 200 06/23/04 CCV-1 Nitrite-N 98.498 98.5 0.1 100 06/23/04 CCV-1 Nitrite-N 98.498 98.5 0.1 100 06/23/04 CCV-1 Bromide 413.437 413 0.1 400 06/23/04 CCV-1 Nitrate-N 85.785 85.8 0.1 90.4 06/23/04 CCV-1 Sulfate 401.578 402 0.1 400 06/23/04 CCV-2 Fluoride 101.420 101 0.1 100 06/23/04 CCV-2 Nitrite-N 97.671 97.7 0.1 100 06/23/04	93.2%
06/23/04 ICV Sulfate 397.780 398 0.1 400 06/23/04 CCV-1 Fluoride 102.699 103 0.1 100 06/23/04 CCV-1 Chloride 207.722 208 0.1 200 06/23/04 CCV-1 Nitrite-N 98.498 98.5 0.1 100 06/23/04 CCV-1 Bromide 413.437 413 0.1 400 06/23/04 CCV-1 Bromide 413.437 413 0.1 400 06/23/04 CCV-1 Nitrate-N 85.785 85.8 0.1 90.4 06/23/04 CCV-1 Sulfate 401.578 402 0.1 400 06/23/04 CCV-2 Fluoride 205.650 206 0.1 200 06/23/04 CCV-2 Nitrite-N 97.671 97.7 0.1 100 06/23/04 CCV-2 Bromide 409.123 409 0.1 400 06/23/04 <t< td=""><td></td></t<>	
06/23/04 CCV-1 Fluoride 102.699 103 0.1 100 06/23/04 CCV-1 Chloride 207.722 208 0.1 200 06/23/04 CCV-1 Nitrite-N 98.498 98.5 0.1 100 06/23/04 CCV-1 Bromide 413.437 413 0.1 400 06/23/04 CCV-1 Bromide 413.437 413 0.1 400 06/23/04 CCV-1 Nitrate-N 85.785 85.8 0.1 90.4 06/23/04 CCV-1 Sulfate 401.578 402 0.1 400 06/23/04 CCV-2 Fluoride 101.420 101 0.1 100 06/23/04 CCV-2 CV-2 Nitrite-N 97.671 97.7 0.1 100 06/23/04 CCV-2 Nitrate-N 84.619 84.6 0.1 90.4 06/23/04 CCV-2 Sulfate 400.359 400 0.1 400 <	10 /0/
06/23/04 CCV-1 Chloride 207.722 208 0.1 200 06/23/04 CCV-1 Nitrite-N 98.498 98.5 0.1 100 06/23/04 CCV-1 Bromide 413.437 413 0.1 400 06/23/04 CCV-1 Bromide 413.437 413 0.1 400 06/23/04 CCV-1 Nitrate-N 85.785 85.8 0.1 90.4 06/23/04 CCV-1 Sulfate 401.578 402 0.1 400 06/23/04 CCV-2 Fluoride 101.420 101 0.1 100 06/23/04 CCV-2 CV-2 Chloride 205.650 206 0.1 200 06/23/04 CCV-2 Nitrite-N 97.671 97.7 0.1 100 06/23/04 CCV-2 Bromide 409.123 409 0.1 400 06/23/04 CCV-2 Nitrate-N 84.619 84.6 0.1 90.4 <	13.470
06/23/04 CCV-1 Nitrite-N 98.498 98.5 0.1 100 06/23/04 CCV-1 Bromide 413.437 413 0.1 400 06/23/04 CCV-1 Nitrate-N 85.785 85.8 0.1 90.4 06/23/04 CCV-1 Sulfate 401.578 402 0.1 400 06/23/04 CCV-2 Fluoride 101.420 101 0.1 100 06/23/04 CCV-2 Fluoride 205.650 206 0.1 200 06/23/04 CCV-2 Nitrite-N 97.671 97.7 0.1 100 06/23/04 CCV-2 Nitrite-N 97.671 97.7 0.1 400 06/23/04 CCV-2 Bromide 409.123 409 0.1 400 06/23/04 CCV-2 Nitrate-N 84.619 84.6 0.1 90.4 06/23/04 ICB Fluoride 0.000 0.1 0.1 0.1 06/23/04	103%
06/23/04 CCV-1 Bromide 413.437 413 0.1 400 06/23/04 CCV-1 Nitrate-N 85.785 85.8 0.1 90.4 06/23/04 CCV-1 Sulfate 401.578 402 0.1 400 06/23/04 CCV-2 Fluoride 101.420 101 0.1 100 06/23/04 CCV-2 Chloride 205.650 206 0.1 200 06/23/04 CCV-2 Chloride 205.650 206 0.1 200 06/23/04 CCV-2 Nitrite-N 97.671 97.7 0.1 100 06/23/04 CCV-2 Bromide 409.123 409 0.1 400 06/23/04 CCV-2 Nitrate-N 84.619 84.6 0.1 90.4 06/23/04 ICB Fluoride 0.000 0.1 U 0.1 06/23/04 ICB Nitrite-N 0.000 0.1 U 0.1 06/23/04 ICB<	104%
06/23/04 CCV-1 Nitrate-N 85.785 85.8 0.1 90.4 06/23/04 CCV-1 Sulfate 401.578 402 0.1 400 06/23/04 CCV-2 Fluoride 101.420 101 0.1 100 06/23/04 CCV-2 Fluoride 205.650 206 0.1 200 06/23/04 CCV-2 Nitrite-N 97.671 97.7 0.1 100 06/23/04 CCV-2 Nitrite-N 97.671 97.7 0.1 100 06/23/04 CCV-2 Nitrate-N 84.619 84.6 0.1 90.4 06/23/04 CCV-2 Nitrate-N 84.619 84.6 0.1 90.4 06/23/04 ICB Fluoride 0.000 0.1 U 0.1 06/23/04 ICB Chloride 0.005 0.1 U 0.1 06/23/04 ICB Nitrite-N 0.000 0.1 U 0.1 06/23/04 ICB </td <td>98.5%</td>	98.5%
06/23/04 CCV-1 Sulfate 401.578 402 0.1 400 06/23/04 CCV-2 Fluoride 101.420 101 0.1 100 06/23/04 CCV-2 Fluoride 205.650 206 0.1 200 06/23/04 CCV-2 Nitrite-N 97.671 97.7 0.1 100 06/23/04 CCV-2 Nitrite-N 97.671 97.7 0.1 100 06/23/04 CCV-2 Bromide 409.123 409 0.1 400 06/23/04 CCV-2 Nitrate-N 84.619 84.6 0.1 90.4 06/23/04 CCV-2 Nitrate-N 84.619 84.6 0.1 400 06/23/04 ICB Fluoride 0.000 0.1 U 0.1 06/23/04 ICB Nitrite-N 0.000 0.1 U 0.1 06/23/04 ICB Nitrate-N 0.000 0.1 U 0.1 06/23/04 ICB	103%
06/23/04 CCV-2 Fluoride 101.420 101 0.1 100 06/23/04 CCV-2 Chloride 205.650 206 0.1 200 06/23/04 CCV-2 Nitrite-N 97.671 97.7 0.1 100 06/23/04 CCV-2 Nitrite-N 97.671 97.7 0.1 100 06/23/04 CCV-2 Bromide 409.123 409 0.1 400 06/23/04 CCV-2 Nitrate-N 84.619 84.6 0.1 90.4 06/23/04 CCV-2 Sulfate 400.359 400 0.1 400 06/23/04 ICB Fluoride 0.000 0.1 U 0.1 06/23/04 ICB Chloride 0.005 0.1 U 0.1 06/23/04 ICB Nitrite-N 0.000 0.1 U 0.1 06/23/04 ICB Bromide 0.000 0.1 U 0.1 06/23/04 ICB	94.9%
06/23/04 CCV-2 Chloride 205.650 206 0.1 200 06/23/04 CCV-2 Nitrite-N 97.671 97.7 0.1 100 06/23/04 CCV-2 Bromide 409.123 409 0.1 400 06/23/04 CCV-2 Bromide 409.123 409 0.1 400 06/23/04 CCV-2 Nitrate-N 84.619 84.6 0.1 90.4 06/23/04 CCV-2 Sulfate 400.359 400 0.1 400 06/23/04 ICB Fluoride 0.000 0.1 U 0.1 06/23/04 ICB Chloride 0.005 0.1 U 0.1 06/23/04 ICB Nitrite-N 0.000 0.1 U 0.1 06/23/04 ICB Bromide 0.000 0.1 U 0.1 06/23/04 ICB Nitrate-N 0.000 0.1 U 0.1 06/23/04 ICB Sul	100%
06/23/04 CCV-2 Nitrite-N 97.671 97.7 0.1 100 06/23/04 CCV-2 Bromide 409.123 409 0.1 400 06/23/04 CCV-2 Nitrate-N 84.619 84.6 0.1 90.4 06/23/04 CCV-2 Nitrate-N 84.619 84.6 0.1 90.4 06/23/04 CCV-2 Sulfate 400.359 400 0.1 400 06/23/04 ICB Fluoride 0.000 0.1 U 0.1 06/23/04 ICB Chloride 0.000 0.1 U 0.1 06/23/04 ICB Nitrite-N 0.000 0.1 U 0.1 06/23/04 ICB Bromide 0.000 0.1 U 0.1 06/23/04 ICB Nitrate-N 0.000 0.1 U 0.1 06/23/04 ICB Nitrate-N 0.000 0.1 U 0.1 06/23/04 ICB Sulfa	101%
06/23/04 CCV-2 Bromide 409.123 409 0.1 400 06/23/04 CCV-2 Nitrate-N 84.619 84.6 0.1 90.4 06/23/04 CCV-2 Sulfate 400.359 400 0.1 400 06/23/04 CCV-2 Sulfate 400.359 400 0.1 400 06/23/04 ICB Fluoride 0.000 0.1 U 0.1 06/23/04 ICB Chloride 0.005 0.1 U 0.1 06/23/04 ICB Nitrite-N 0.000 0.1 U 0.1 06/23/04 ICB Bromide 0.000 0.1 U 0.1 06/23/04 ICB Bromide 0.000 0.1 U 0.1 06/23/04 ICB Nitrate-N 0.000 0.1 U 0.1 06/23/04 ICB Sulfate 0.004 0.1 U 0.1 06/23/04 ICB-1 Fluoride	103%
06/23/04 CCV-2 Nitrate-N 84.619 84.6 0.1 90.4 06/23/04 CCV-2 Sulfate 400.359 400 0.1 400 06/23/04 ICB Fluoride 0.000 0.1 U 0.1 06/23/04 ICB Fluoride 0.000 0.1 U 0.1 06/23/04 ICB Chloride 0.005 0.1 U 0.1 06/23/04 ICB Nitrite-N 0.000 0.1 U 0.1 06/23/04 ICB Bromide 0.000 0.1 U 0.1 06/23/04 ICB Bromide 0.000 0.1 U 0.1 06/23/04 ICB Nitrate-N 0.000 0.1 U 0.1 06/23/04 ICB Sulfate 0.004 0.1 U 0.1 06/23/04 ICB-1 Fluoride 0.000 0.1 U 0.1	7.7%
06/23/04 CCV-2 Sulfate 400.359 400 0.1 400 06/23/04 ICB Fluoride 0.000 0.1 U 0.1 400 06/23/04 ICB Fluoride 0.000 0.1 U 0.1 400 06/23/04 ICB Chloride 0.005 0.1 U 0.1 400 06/23/04 ICB Nitrite-N 0.000 0.1 U 0.1 400 06/23/04 ICB Bromide 0.000 0.1 U 0.1 400 06/23/04 ICB Nitrate-N 0.000 0.1 U 0.1 400 06/23/04 ICB Sulfate 0.004 0.1 U 0.1 400 06/23/04 ICB Sulfate 0.004 0.1 U 0.1 400 400 06/23/04 ICB-1 Fluoride 0.000 0.1 U 0.1 400 400 400 400 400	102%
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06/23/04 ICB Chloride 0.005 0.1 U 0.1 06/23/04 ICB Nitrite-N 0.000 0.1 U 0.1 06/23/04 ICB Bromide 0.000 0.1 U 0.1 06/23/04 ICB Bromide 0.000 0.1 U 0.1 06/23/04 ICB Nitrate-N 0.000 0.1 U 0.1 06/23/04 ICB Sulfate 0.004 0.1 U 0.1 06/23/04 ICB Sulfate 0.004 0.1 U 0.1 06/23/04 ICB-1 Fluoride 0.000 0.1 U 0.1	100%
06/23/04 ICB Nitrite-N 0.000 0.1 U 0.1 06/23/04 ICB Bromide 0.000 0.1 U 0.1 06/23/04 ICB Bromide 0.000 0.1 U 0.1 06/23/04 ICB Nitrate-N 0.000 0.1 U 0.1 06/23/04 ICB Sulfate 0.004 0.1 U 0.1 06/23/04 ICB Sulfate 0.000 0.1 U 0.1 06/23/04 ICB-1 Fluoride 0.000 0.1 U 0.1	
06/23/04 ICB Bromide 0.000 0.1 U 0.1 06/23/04 ICB Nitrate-N 0.000 0.1 U 0.1 06/23/04 ICB Nitrate-N 0.000 0.1 U 0.1 06/23/04 ICB Sulfate 0.004 0.1 U 0.1 06/23/04 ICB Sulfate 0.000 0.1 U 0.1 06/23/04 ICB-1 Fluoride 0.000 0.1 U 0.1	
06/23/04 ICB Nitrate-N 0.000 0.1 U 0.1 06/23/04 ICB Sulfate 0.004 0.1 U 0.1 06/23/04 ICB Sulfate 0.004 0.1 U 0.1 06/23/04 CCB-1 Fluoride 0.000 0.1 U 0.1	
06/23/04 ICB Sulfate 0.004 0.1 U 0.1 06/23/04 CCB-1 Fluoride 0.000 0.1 U 0.1	
06/23/04 CCB-1 Fluoride 0.000 0.1 U 0.1	
06/23/04 CCB-1 Chloride 0.002 0.1 U 0.1	
06/23/04 CCB-1 Nitrite-N 0.000 0.1 U 0.1	
06/23/04 CCB-1 Bromide 0.000 0.1 U 0.1	
06/23/04 CCB-1 Nitrate-N 0.000 0.1 U 0.1	
06/23/04 CCB-1 Sulfate 0.015 0.1 U 0.1	
06/23/04 CCB-2 Fluoride 0.000 0.1 U 0.1	
06/23/04 CCB-2 Chloride 0.005 0.1 U 0.1	
06/23/04 CCB-2 Nitrite-N 0.000 0.1 U 0.1	
06/23/04 CCB-2 Bromide 0.000 0.1 U 0.1	
06/23/04 CCB-2 Nitrate-N 0.000 0.1 U 0.1	
06/23/04 CCB-2 Sulfate 0.021 0.1 U 0.1	

U = UNDETECTED

Schedule File: C:\PeakNet\schedule\23jun04.SCH

Line	Sample	Sample Type	Level	Method	Data File	Dilution
1	ICV	Sample		anions040622.met	040623 001.dxd	20
2	ICB	Sample		anions040622.met	040623_002.dxd	1010039
3	245101	Sample		anions040622.met	040623_003.dxd	1010033
4	245101D	Sample		anions040622.met	040623_004.dxd	1
	245101S	Sample		anions040622.met	040623_005.dxd	1
5 6	245102	Sample		anions040622.met	040623_006.dxd	1
7	245103	Sample		anions040622.met	040623_007.dxd	1
8	245104	Sample		anions040622.met	040623_008.dxd	1
9	245105	Sample		anions040622.met	040623_009.dxd	1
10	245106	Sample		anions040622.met	040623_010.dxd	1 1
11	245107	Sample		anions040622.met anions040622.met	040623_011.dxd 040623_012.dxd	20
12 13	CCV CCB	Sample Sample		anions040622.met	040623_012.dxd	1
13	245101	Sample		anions040622.met	040623_014.dxd	10
15	245101D	Sample		anions040622.met	040623_015.dxd	10
16	245101S	Sample		anions040622.met	040623_016.dxd	10
17	245102	Sample		anions040622.met	040623_017.dxd	10
18	245103	Sample		anions040622.met	040623 018.dxd	10
19	245104	Sample		anions040622.met	040623_019.dxd	10
20	245105	Sample		anions040622.met	040623_020.dxd	10
21	245106	Sample		anions040622.met	040623 ⁻ 021.dxd	10
22	245107	Sample		anions040622.met	040623_022.dxd	10
23	CCV	Sample		anions040622.met	040623_023.dxd	20
24	ССВ	Sample		anions040622.met	040623_024.dxd	1
25	246040	Sample		anions040622.met	040623_025.dxd	1
26	246040D	Sample		anions040622.met	040623_026.dxd	1
27	246040S	Sample		anions040622.met	040623_027.dxd	1
28	246041	Sample		anions040622.met	040623_028.dxd	1
29	246042	Sample		anions040622.met	040623_029.dxd	1
30	246043	Sample		anions040622.met anions040622.met	040623_030.dxd	1 1
31 32	246044 246045	Sample		anions040622.met	040623_031.dxd 040623_032.dxd	1
32 33	246040D-R	Sample Sample		anions040622.met	040623_033.dxd	1
33 34	CCV	Sample		anions040622.met	040623_034.dxd	20
35	CCB	Sample		anions040622.met	040623_035.dxd	1
36	246146	Sample		anions040622.met	040623_036.dxd	20
37	246146D	Sample		anions040622.met	040623_037.dxd	20
38	246146S	Sample		anions040622.met	040623_038.dxd	20
39	246147	Sample		anions040622.met	040623_039.dxd	20
40	246148	Sample		anions040622.met	040623_040.dxd	20
41	246149	Sample		anions040622.met	040623_041.dxd	20
42	246150	Sample		anions040622.met	040623_042.dxd	20
43	246151	Sample		anions040622.met	040623_043.dxd	20
44	246152	Sample		anions040622.met	040623_044.dxd	20
45	246153	Sample		anions040622.met	040623_045.dxd	20
46	CCV	Sample		anions040622.met	040623_046.dxd	20
47	CCB	Sample		anions040622.met	040623_047.dxd	1
48	246046	Sample		anions040622.met	040623_048.dxd	50
49	246046D	Sample		anions040622.met	040623_049.dxd	50 50
50	246046S	Sample		anions040622.met	040623_050.dxd	50 50
51	246047	Sample		anions040622.met anions040622.met	040623_051.dxd 040623_052.dxd	50 50
52 53	246048 246049	Sample Sample		anions040622.met	040623_053.dxd	50
53 54	246050	Sample		anions040622.met	040623_054.dxd	50
54 55	246050	Sample		anions040622.met	040623_055.dxd	50
56	246052	Sample		anions040622.met	040623_056.dxd	50
57	246053	Sample		anions040622.met	040623_057.dxd	50
58	CCV	Sample		anions040622.met	040623_058.dxd	20
59	CCB	Sample		anions040622.met	040623_059.dxd	1
60	246054	Sample		anions040622.met	040623_060.dxd	50
61	246055	Sample		anions040622.met	040623_061.dxd	50
62	246056	Sample		anions040622.met	040623_062.dxd	50
63	246057	Sample		anions040622.met	040623_063.dxd	50
PeakN	let 5.1		P	age 1 of 2		6/25/04 3:49:1

Schedule File: C:\PeakNet\schedule\23jun04.SCH

DIV 20 06002.01.081 TO#040616-1 LACANTERA 05827.04.006 040611-1

Line	Sample	Sample Type	Level	Method	Data File	Dilution
64 65 66 67 68 69 70 71 72 73	246058 246059 246060 CCV CCB 245860 245861 CCV CCB CCB	Sample Sample Sample Sample Sample Sample Sample Sample Sample		anions040622.met anions040622.met anions040622.met anions040622.met anions040622.met anions040622.met anions040622.met anions040622.met anions040622.met astop.met	040623_064.dxd 040623_065.dxd 040623_066.dxd 040623_067.dxd 040623_068.dxd 040623_069.dxd 040623_070.dxd 040623_071.dxd 040623_072.dxd 040623_072.dxd 040610	50 50 40 1 0 0 4 0 1 100 20 1 1
Defau Comn DIV 20 DIV 20 DIV 20	It Method Path: C:\PEAKN It Data Path: C:\PEAKNET nent: 0 06002.01.141 TO#04052 0 06002.01.141 TO#0406 0 10542.02.002 TO#0406 0 06002.01.081 TO#0406	NDATA\040623 21-5 15-8 17-9			RSpills 6123104	

KVICCV Spex 25-145AS (Inorg # 4578) NO2N 178-01-164 Spikes: 5DML of Spex · NO2N into 5ml sample/sample dilution

Sample Name : ICV Dilution Factor : 20.00 Injection Number : 1 Data File Name : c:\peaknet\data\040623\040623_001.DXD Method File Name : c:\peaknet\method\anions040622.met Schedule File Name : c:\peaknet\schedule\23jun04.sch Date Time Collected : 6/23/04 11:03:53 AM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018 06 00 4 1 System Operator : RSS

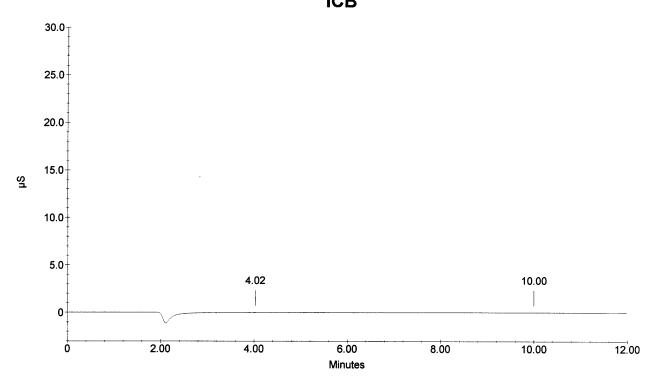
			Peak Inforr	mation : All Compo	onents			
Pk. Num	Ret Time	Component Name	Co	ncentration (ppm)	Height	Area	BI. Code	%Delta
1	2.85	FLUORIDE		101.959	182716	1274348	2	-1.38
2	3.92	CHLORIDE		206.149	195883	1711245	2	-3.29
3	4.62	NITRITE-N		96.954	181453	1817169	2	-2.05
4	5.70	BROMIDE		408.169	133054	1506297	2	-1.67
5		NITRATE-N		84.273	133182	1816876	2	0.25
6		PHOSPHATE-P		195.422	75328	1395263	2	-0.47
7	9.92	SULFATE		397.780	122306	2440518	2	-0.93
	0.00			total(s) 1490.707	<u> </u>	11961716		
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	ł							
	25.0							
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0 0 2.00 4.00 6.00 8.00 10.00 12.00 Minutes

: PeakNet 5.1

Sample Name : ICB Dilution Factor : 1.00 Injection Number : 2 Data File Name : c:\peaknet\data\040623\040623_002.DXD Method File Name : c:\peaknet\method\anions040622.met Schedule File Name : c:\peaknet\schedule\23jun04.sch Date Time Collected : 6/23/04 11:18:30 AM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018096 System Operator : RSS

			Peak Information : All Compo	onents			
Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	BI. Code	%Delta
1	4.02	CHLORIDE	0.005	94	781	1	-0.66
1	4.02	CHLORIDE NITRITE-N BROMIDE NITRATE-N PHOSPHATE-P	0.005	94	781		-0.66
2	10.00	SULFATE	0.004	59	500	1	-0.13
			total(s)				
	0.00		0.014 ICB	• ••••	2061		



Sample Name : 245101 Dilution Factor : 1.00 Injection Number : 3 Data File Name : ...\040623_003.DXD Method File Name : c:\peaknet\method\anions040622.met Schedule File Name : c:\peaknet\schedule\23jun04.sch

Pk.

1

2

3

4

5

6

7

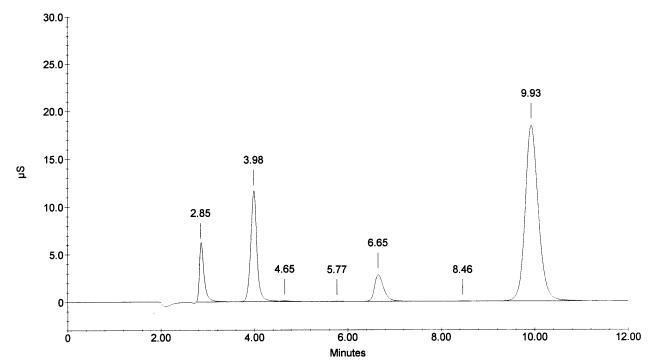
Num

Date Time Collected : 6/23/04 11:33:12 AM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018096 System Operator : RSS 010043

Peak Information : All Components Concentration Height Area Bl. %Delta **Ret Time** Component Name (ppm) Code 1.837 / 2.85 FLUORIDE 59792 437576 1 -1.38 6.743 115202 1087679 3 -1.65 3.98 CHLORIDE 0.026 -1.48 848 9757 4 4.65 NITRITE-N 5.77 BROMIDE 0.036 238 2364 1 -0.52 6.65 NITRATE-N 0.922 28151 387402 1 1.68 988 1 0.16 8.46 PHOSPHATE-P 0.007 88 28.792 9.93 SULFATE 184222 3620937 1 -0.80

	total(s)		
0.00	38.362	5546702	

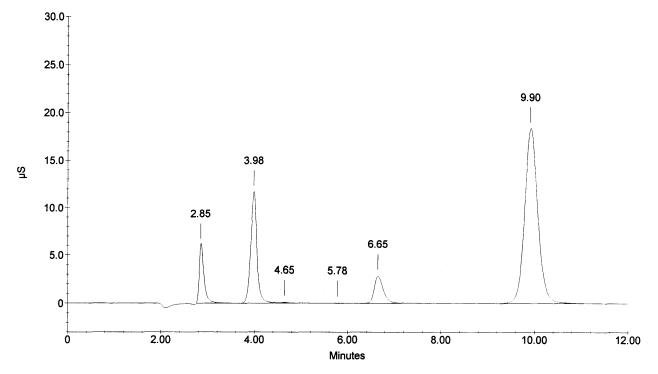




Sample Name : 245101D Dilution Factor : 1.00 Injection Number : 4 Data File Name : ...\040623_004.DXD Method File Name : c:\peaknet\method\anions040622.met Schedule File Name : c:\peaknet\schedule\23jun04.sch Date Time Collected : 6/23/04 11:47:54 AM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018096 System Operator : RSS

			Peak Information : All Compon	ents			
Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	BI. Code	%Delta
<u>.</u> 1	2.85	FLUORIDE	1.828	60231	435582	2	-1.38
2	3.98	CHLORIDE	6.721	116219	1083982	3	-1.65
3	4.65	NITRITE-N	0.024	819	9106	4	-1.48
4	5.78	BROMIDE	0.029	207	1876	1	-0.29
5	6.65	NITRATE-N PHOSPHATE-P	0.916	28088	384908	1	1.68
6	9.90	SULFATE	28.673 🗸	182977	3604749	1	-1.07
	10-1 - 11		total(s)		91, f		
	0.00		38.191		5520204		
			0454040	· · · · · · · · · · · · · · · · · · ·			

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Sample Name : 245101S Dilution Factor : 1.00 Injection Number : 5 Data File Name : ...\040623_005.DXD Method File Name : c:\peaknet\method\anions040622.met Schedule File Name : c:\peaknet\schedule\23jun04.sch Date Time Collected : 6/23/04 12:02:36 PM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018096 System Operator : RSS

			Peak Inform	nation : All Compo	onents			
Pk. Num	Ret Time	Component Name	Co	ncentration (ppm)	Height	Area	BI. Code	%Delta
1	2.86	FLUORIDE		2.828 🗸	98116	683926	1	-0.92
2		CHLORIDE		8.662	153002	1418623		-1.65
3	4.64	NITRITE-N		0.933	33884	349815		-1.77
4		BROMIDE		4.111	23732	273094		-0.98
5		NITRATE-N		1.722	53064	728030		0.87
6		PHOSPHATE-P		1.878	13009	252198		0.00
7	9.92	SULFATE		32.376	210165	4114637	2	-0.93
	0.00			total(s) 52.510		7820323		
L				245101S	an a			
	30.0							
	25.0					9.92		
	1							
	20.0		3.98			\wedge		
	ł		3.98					
<u>v</u>	15.0+							
=	-	2.86						
	10.0		1					
	10.0+	A		6.60				
	‡		4.64	ł				
	5.0+			5.74	8.45			
	0.0				0.45			
	Ī			\wedge	\sim			
	o‡				`>	\rightarrow		

 	<u></u>				
 2.00	4.00	6.00	8.00	10.00	12.00
		Minutes			

Sample Name : 245102 Dilution Factor : 1.00 Injection Number : 6 Data File Name : ...\040623_006.DXD Method File Name : c:\peaknet\method\anions040622.met Schedule File Name : c:\peaknet\schedule\23jun04.sch Date Time Collected : 6/23/04 12:17:19 PM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018096 System Operator : RSS

			Peak I	nformation : All Compor	nents			
Pk. Num	Ret Time	Component Name		Concentration (ppm)	Height	Area	BI. Code	%Delta
1	2.85	FLUORIDE		1.728 🖌	55196	411069		-1.38
2	4.00	CHLORIDE NITRITE-N		5.853	104080	937766	2	-1.32
3	5.77	BROMIDE		0.039	241	2558	1	-0.52
4		NITRATE-N		0.735	22744	308475		1.48
5	8.49	PHOSPHATE-P		0.016	130	2090	1	0.47
6	9.94	SULFATE		22.118	138347	2730316	1	-0.67
	0.00			total(s) 30.489		4392275		
				245102				
	30.0							
	25.0							
	20.0							
	15.0+					9.94		
Su	13.0		4.00			Ń		
	Ŧ					/\		
	10.0		- A					
	Ť	2.8	5					
	†	 *		6.64				
	5.0-			5.77	8.49			
	1	/\			0.43			
	o							
	0	2.00	4.00	6.00	8.00	10.00	12.0	n
	v	2.00	7.00	Minutes	0.00		12.0	-

Sample Name : 245103 Dilution Factor : 1.00 Injection Number : 7 Data File Name : ...\040623_007.DXD Method File Name : c:\peaknet\method\anions040622.met Schedule File Name : c:\peaknet\schedule\23jun04.sch Date Time Collected : 6/23/04 12:32:01 PM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018096 System Operator : RSS

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010047

			Peak	Information : All Comp	onents			
Pk. Num	Ret Time	Component Name	1	Concentration (ppm)	Height	Area	BI. Code	%Delta
1		FLUORIDE		1.992	66068	475686		-1.38
2	3.92	CHLORIDE NITRITE-N		3.911	69953	617670	1	-3.29
3	5.73	BROMIDE		7.983	47578	542155	2	-1.21
4		NITRATE-N		1.588	48690	670847		1.07
5		PHOSPHATE-P		3.874	27623	527681		0.00
6	9.96	SULFATE		7.674	44582	912904	2	-0.53
	0.00			total(s) 27.020		3746942		
				245103				
	30.0							
	25.0							
	20.0+							
	20.0							
	15.0-							
Su	2							
	10.0+	2	.85 3.92					
				5.73 6.61		9.96		
	5.0		À A		8.45			
	5.0			\wedge \wedge		\wedge		
	ţ		\mathbb{N}					
	0					<u> </u>		
	0	2.00	4.00	6.00	8.00	10.00	12	.00

Minutes

Sample Name : 245104 Dilution Factor : 1.00 Injection Number : 8 Data File Name : ...\040623_008.DXD Method File Name : c:\peaknet\method\anions040622.met Schedule File Name : c:\peaknet\schedule\23jun04.sch Date Time Collected : 6/23/04 12:46:42 PM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018096 System Operator : RSS 010048

Peak Information : All Components Ret Time Component Name Concentration Height Area BI. %Delta Pk. Num (ppm) Code 3.94 CHLORIDE 10.233 * 198047 1697858 1 -2.63 1 3.94 CHLORIDE 10.233 198047 1697858 1 -2.63 1 NITRITE-N / BROMIDE -0.374 🗸 2 6.66 NITRATE-N 11453 156491 1 1.89 PHOSPHATE-P SULFATE 🖌 ---total(s)----0.00 20.840 3552207 245104 30.0 25.0 3.94 20.0-15.0 ų 10.0-5.0 6.66

> 6.00 Minutes

8.00

0

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2.00

4.00

12.00

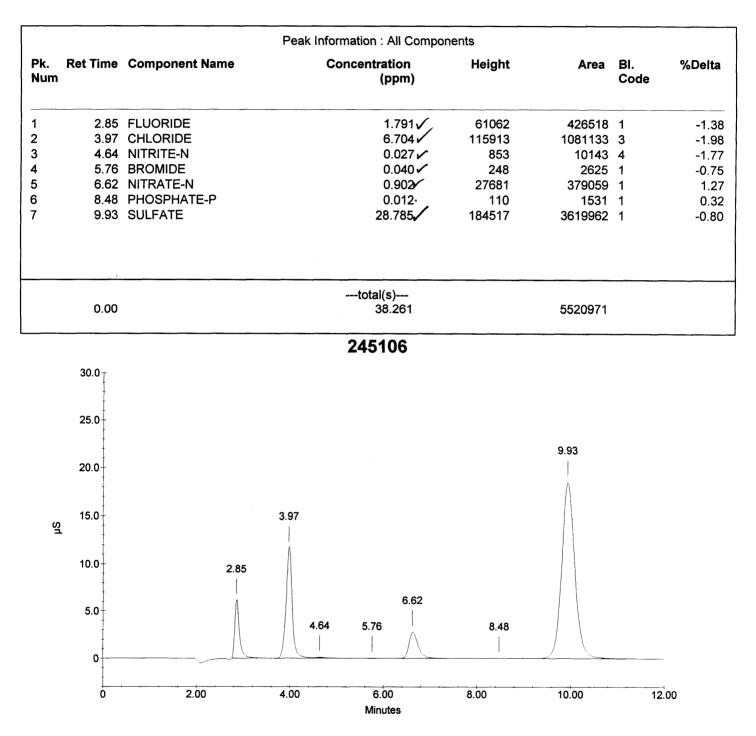
10.00

Sample Name : 245105 Dilution Factor : 1.00 Injection Number : 9 Data File Name : ...\040623_009.DXD Method File Name : c:\peaknet\method\anions040622.met Schedule File Name : c:\peaknet\schedule\23jun04.sch Date Time Collected : 6/23/04 1:01:24 PM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018096 System Operator : RSS

010049

			Peak Inform	nation : All Compo	nents			
Pk. Num	Ret Time	Component Name	Сог	ncentration (ppm)	Height	Area	Bl. Code	%Delta
1 1		CHLORIDE / CHLORIDE		0.057	1072 1072	8751 8751		-3.29 -3.29
-		NITRITE-N / BROMIDE / NITRATE-N /						
2	9.96	PHOSPHATE-P SULFATE /		0.087	537	10208	1	-0.53
	0.00			total(s) 0.201		27710	<u> </u>	
<u></u> ,			·····	·				
				245105				
	30.0							
	25.0							
	20.0							
Su	15.0-							
	10.0							
	-							
	5.0+		3.92			9.96		
						1		
	0							
	ò	2.00	4.00	6.00 Minutes	8.00	10.00	12.0	0

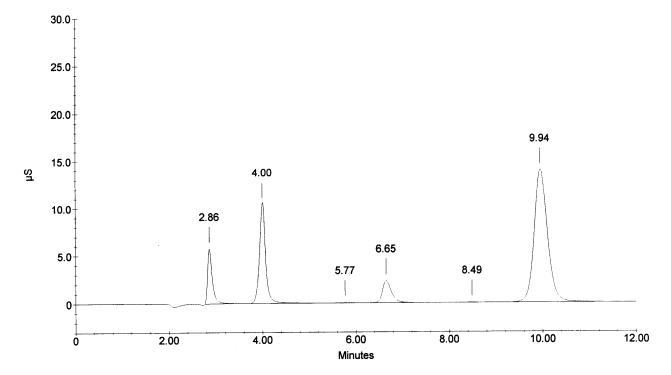
Current Date : 6/23/0 Current Time : 16:13:5 Sample Name : 245106 Dilution Factor : 1.00 Injection Number : 10 Data File Name : ...\040623_010.DXD Method File Name : c:\peaknet\method\anions040622.met Schedule File Name : c:\peaknet\schedule\23jun04.sch Date Time Collected : 6/23/04 1:16:05 PM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018096 System Operator : RSS



Sample Name : 245107 Dilution Factor : 1.00 Injection Number : 11 Data File Name : ...\040623_011.DXD Method File Name : c:\peaknet\method\anions040622.met Schedule File Name : c:\peaknet\schedule\23jun04.sch Date Time Collected : 6/23/04 1:30:46 PM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018096 System Operator : RSS 010051

			Peak Information : All Compone	ents			
Pk. Num		Component Name	Concentration (ppm)	Height	Area	BI. Code	%Delta
1	2.86	FLUORIDE	1.687 🖌	57144	400940	1	-0.92
2	4.00		5.980 -	103634	958977	1	-1.32
3	5.77	BROMIDE	0.031 🗸	202	2003	1	-0.52
4	6.65	NITRATE-N	0.733 /	22670	307747		1.68
5	8.49	PHOSPHATE-P	0.018	125	2353	1	0.47
6	9.94	SULFATE	22.230	138743	2745016	1	-0.67
	0.00		total(s) 30.678		4417036		





Sample Name : CCV Dilution Factor : 20.00 Injection Number : 12 Data File Name : c:\peaknet\data\040623\040623_012.DXD Method File Name : c:\peaknet\method\anions040622.met Schedule File Name : c:\peaknet\schedule\23jun04.sch

Date Time Collected : 6/23/04 1:45:28 PM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018096 System Operator : RSS

010052

			Peak Info	ormation : All Compo	onents			
Pk. Num	Ret Time	Component Name	c	Concentration (ppm)	Height	Area	BI. Code	%Delta
1	2.86	FLUORIDE		102.699	184273	1284260	2	-0.92
2	3.93	CHLORIDE		207.722	196596	1725450		-2.96
3		NITRITE-N		98.498	184204	1846103		-1.77
4	5.72	BROMIDE		413.437	135093	1528838		-1.44
5	6.57			85.785	134902	1850593		0.46
6		PHOSPHATE-P		197.601	76121	1412141		-0.32
7	9.93	SULFATE		401.578	123341	2465068	2	-0.80
****	0.00			total(s) 1507.320		12112452		
				CCV	<u> </u>			
	30.0							
	25.0							
	ł	2.8	3.93 36 ∣ 4.64					
	20.0	2.0						
	Ť			5.72 6.57				
	15.0+					9.93		
<u>v</u>	2			Ι Ι Α Α				
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	40.0				8.42	11		

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2.00

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6.00 Minutes 8.00

12.00

10.00

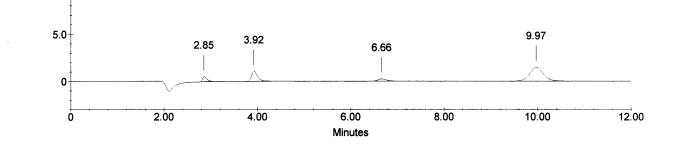
Sample Name : CCB Dilution Factor : 1.00 Injection Number : 13 Data File Name : c:\peaknet\data\040623\040623_013.DXD Method File Name : c:\peaknet\method\anions040622.met Schedule File Name : c:\peaknet\schedule\23jun04.sch Date Time Collected : 6/23/04 2:00:09 PM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018096 System Operator : RSS

			Peak Infor	mation : All Compo	onents			
Pk. Num	Ret Time	Component Name	Co	oncentration (ppm)	Height	Area	BI. Code	%Delta
1 1		CHLORIDE CHLORIDE NITRITE-N BROMIDE NITRATE-N	-	0.002 0.002	46 46	329 329		-0.99 -0.99
2	10.00	PHOSPHATE-P SULFATE		0.015	96	1748	1	-0.13
	0.00	<u></u>		total(s) 0.019		2406		
				ССВ				
	30.0 [⊤]							
	25.0							
	20.0							
Si	15.0							
	10.0							
	5.0-		4.01			10.00		
	0							
	0	2.00	4.00	6.00 Minutes	8.00	10.00	12	00

Sample Name : 245101 Dilution Factor : 10.00 Injection Number : 14 Data File Name : ...\040623_014.DXD Method File Name : c:\peaknet\method\anions040622.met Schedule File Name : c:\peaknet\schedule\23jun04.sch Date Time Collected : 6/23/04 2:14:51 PM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018096 System Operator : RSS

010054

			Peak Information : All Compo	onents			
Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	BI. Code	%Delta
1	2.85	FLUORIDE	1.500	5123	34837	1	-1.38
2	3.92	CHLORIDE NITRITE-N BROMIDE	6.390	10612	98641	1	-3.29
3	6.66	NITRATE-N PHOSPHATE-P	0.778	2403	32497	1	1.89
4	9.97	SULFATE	26.105	14817	306850	1	-0.40
		но с. 					
	0.00		total(s) 34.773		472825		
			245101				
	30.0						
	25.0						
	20.0						
Su	15.0						



10.0

Sample Name : 245101D Dilution Factor : 10.00 Injection Number : 15 Data File Name : c:\peaknet\data\040623\040623_015.DXD Method File Name : c:\peaknet\method\anions040622.met Schedule File Name : c:\peaknet\schedule\23jun04.sch

Date Time Collected : 6/23/04 2:29:32 PM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018096 System Operator : RSS

			Peak I	nformation : All Compo	onents			
Pk. Num	Ret Time	Component Name		Concentration (ppm)	Height	Area	Bl. Code	%Delta
1 2		FLUORIDE CHLORIDE		1. 454 6.301	5241 10761	33766		-0.92
2	0.90	NITRITE-N BROMIDE		0.301	10761	97258	1	-2.96
3		NITRATE-N PHOSPHATE-P		0.797	2515	33272		1.89
4	9.98	SULFATE		27.018	15431	317651	1	-0.27
	0.00			total(s) 35.570	- 11 ⁻	481947		
	30.0 _T			245101D				
	50.0							
	25.0							
	20.0							
	15.0-							
Sц	. [
	10.0							
	5.0	2.86	3.93	6.66		9.98		
	0							
		~			······			_
	0	2.00	4.00	6.00 Minutes	8.00	10.00	12.0	10

Sample Name : 245101S Dilution Factor : 10.00

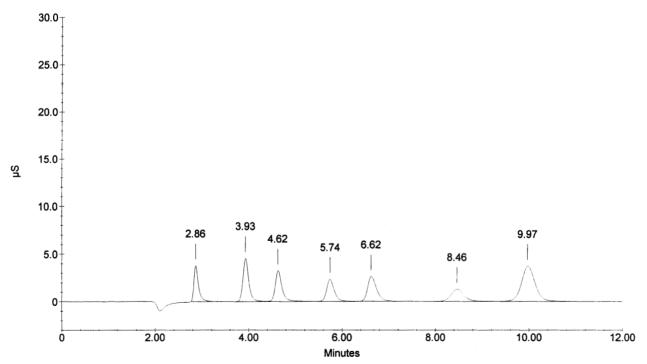
Injection Number : 16

Data File Name : c:\peaknet\data\040623\040623_016.DXD Method File Name : c:\peaknet\method\anions040622.met Schedule File Name : c:\peaknet\schedule\23jun04.sch Date Time Collected : 6/23/04 2:44:13 PM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018096 System Operator : RSS

010056

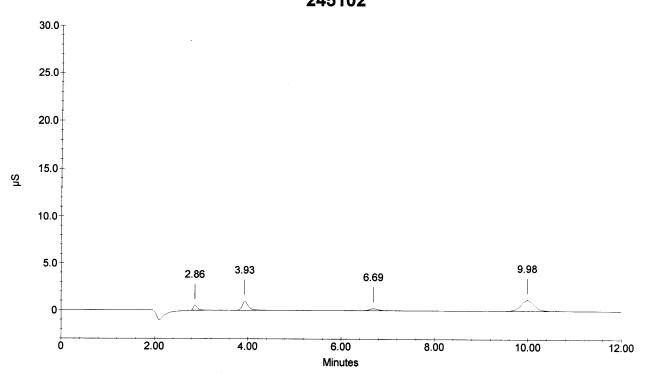
			Peak Information : All Compo	onents			
Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	Bl. Code	%Delta
1	2.86	FLUORIDE	11.034	37758	259978	1	-0.92
2	3.93	CHLORIDE	25.692	45497	401923	2	-2.96
3	4.62	NITRITE-N	8.873	32261	332591	2	-2.05
4	5.74	BROMIDE	40.305	23287	267658	2	-0.98
5	6.62	NITRATE-N	8.402	25958	352910	2	1.27
6	8.46	PHOSPHATE-P	18.684	12944	250854	2	0.16
7	9.97	SULFATE	63.603	36989	754266	2	-0.40
			total(s)				
	0.00		176.593		2620180		

245101S



Current Date : 6/23/0 Current Time : 14:58:4 Sample Name : 245102 Dilution Factor : 10.00 Injection Number : 17 Data File Name : c:\peaknet\data\040623\040623_017.DXD Method File Name : c:\peaknet\method\anions040622.met Schedule File Name : c:\peaknet\schedule\23jun04.sch Date Time Collected : 6/23/04 2:58:55 PM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018096 System Operator : RSS

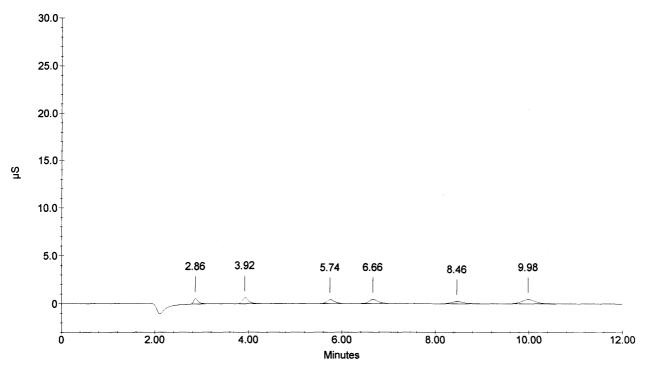
010057 Peak Information : All Components Pk. **Ret Time Component Name** Concentration Height %Delta Area BI. Num (ppm) Code 1 2.86 FLUORIDE 1.373 4926 31875 1 -0.92 2 3.93 CHLORIDE 5.745 9498 88646 1 -2.96 **NITRITE-N** BROMIDE 3 6.69 NITRATE-N 0.657 2059 27420 1 2.29 PHOSPHATE-P 4 9.98 SULFATE 20.076 11600 235644 1 -0.27 ---total(s)----0.00 27.850 383585 245102



Sample Name : 245103 Dilution Factor : 10.00 Injection Number : 18 Data File Name : c:\peaknet\data\040623\040623_018.DXD Method File Name : c:\peaknet\method\anions040622.met Schedule File Name : c:\peaknet\schedule\23jun04.sch

Date Time Collected : 6/23/04 3:13:36 PM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018096 10058 System Operator : RSS

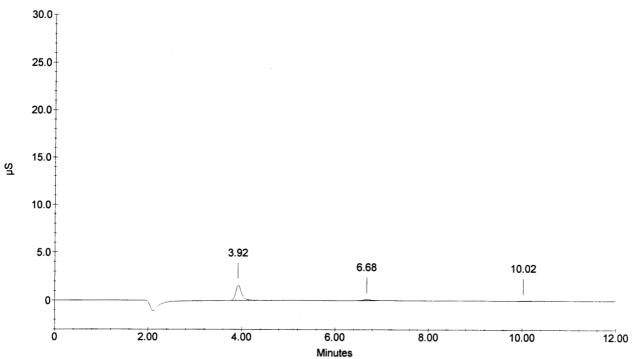
			Peak Information : All Compo	onents			
Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	Bl. Code	%Deita
1	2.86	FLUORIDE	1.671	5815	38807	1	-0.92
2	3.92	CHLORIDE NITRITE-N	3.893	6410	59996	1	-3.29
3	5.74	BROMIDE	7.292	4171	47577	1	-0.98
4	6.66	NITRATE-N	1.400	4335	58515	1	1.89
5	8.46	PHOSPHATE-P	3.586	2413	47639	1	0.16
6	9.98	SULFATE	7.968	4543	93261	1	-0.27
	0.00		total(s) 25,810		345796		
	0.00		25.810	· <u> </u>	345796		



Sample Name : 245104 Dilution Factor : 10.00 Injection Number : 19 Data File Name : c:\peaknet\data\040623\040623_019.DXD Method File Name : c:\peaknet\method\anions040622.met Schedule File Name : c:\peaknet\schedule\23jun04.sch

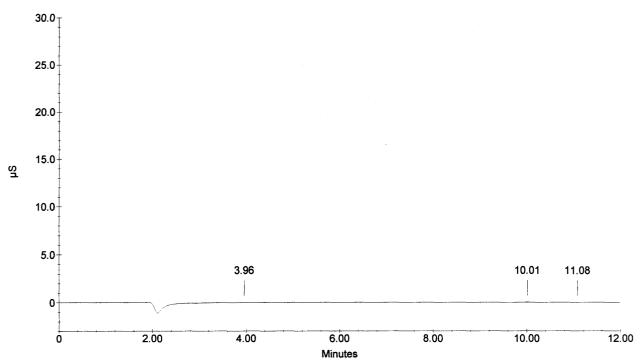
Date Time Collected : 6/23/04 3:28:18 PM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018096 System Operator : RSS

			Peak Information : All Compo	onents			
Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	BI. Code	%Delta
1	3.92	CHLORIDE	8.902	15671	137656	1	-3.29
1	3.92	CHLORIDE NITRITE-N BROMIDE	8.902	15671	137656	1	-3.29
2	6.68		0.335	1060	14006	1	2.09
3	10.02	SULFATE	0.133	90	1549	1	0.13
	0.00		total(s) 18.272		290867		
			245104			ŧ	



Sample Name : 245105 Dilution Factor : 10.00 Injection Number : 20 Data File Name : c:\peaknet\data\040623\040623_020.DXD Method File Name : c:\peaknet\method\anions040622.met Schedule File Name : c:\peaknet\schedule\23jun04.sch Date Time Collected : 6/23/04 3:43:02 PM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018096 System Operator : RSS

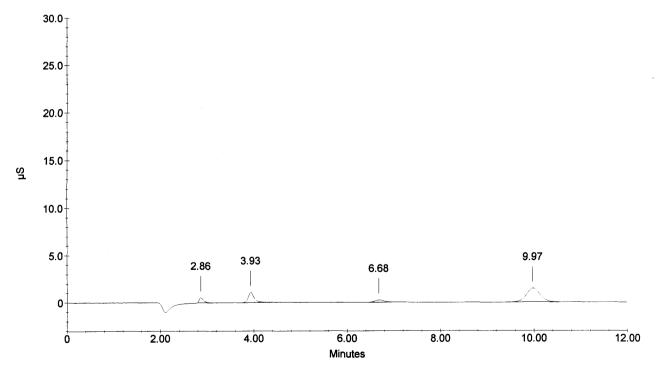
			Peak Information : All Compo	onents			
Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	BI. Code	%Delta
1	3.96	CHLORIDE	0.046	107	712	1	-2.30
1	3.96	CHLORIDE NITRITE-N BROMIDE NITRATE-N PHOSPHATE-P	0.046	107	712	1	-2.30
2	10.01		0.100	95	1172	1	0.00
	0.00		total(s)		2596		
	0.00 30.0 _T		0.193 245105		2596		



Sample Name : 245106 Dilution Factor : 10.00 Injection Number : 21 Data File Name : ...\040623_021.DXD Method File Name : c:\peaknet\method\anions040622.met Schedule File Name : c:\peaknet\schedule\23jun04.sch Date Time Collected : 6/23/04 3:57:43 PM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018096 System Operator : RSS

			Peak Information : All Compo	onents			
Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	BI. Code	%Delta
1	2.86	FLUORIDE	1.486	5275	34509	1	-0.92
2	3.93		6.336	10682	97803	1	-2.96
3	6.68	NITRATE-N PHOSPHATE-P	0.762	2378	31836	1	2.09
4	9.97	SULFATE	25.598	14697	300854	1	-0.40
<u></u>			total(s)				
	0.00		34.182		465003		

245106

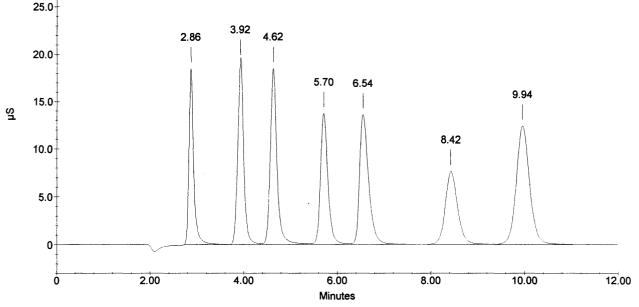


Sample Name : 245107 Dilution Factor : 10.00 Injection Number : 22 Data File Name : c:\peaknet\data\040623\040623_022.DXD Method File Name : c:\peaknet\method\anions040622.met Schedule File Name : c:\peaknet\schedule\23jun04.sch Date Time Collected : 6/23/04 4:12:36 PM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018096 System Operator : RSS 010062

			Peak In	formation : All Compo	onents			
Pk. Num	Ret Time	Component Name		Concentration (ppm)	Height	Area	BI. Code	%Delta
1 2		FLUORIDE CHLORIDE		1.364 5.617	4875 9497	31673 86667		-0.92 -2.96
		NITRITE-N BROMIDE						
3	6.66	NITRATE-N PHOSPHATE-P		0.664	2042	27731	1	1.89
4	9.98	SULFATE		23.726	13633	278732	1	-0.27
	0.00			total(s) 31.372	v	424803		
				245107				
	30.0							
	25.0							
	20.0							
	15.0-							
Si	L [10.0+							
	10.0							
	5.0	2.86	3.93	6.66		9.98		
	0 		 					
	0	2.00	4.00	6.00 Minutes	8.00	10.00	12.	00

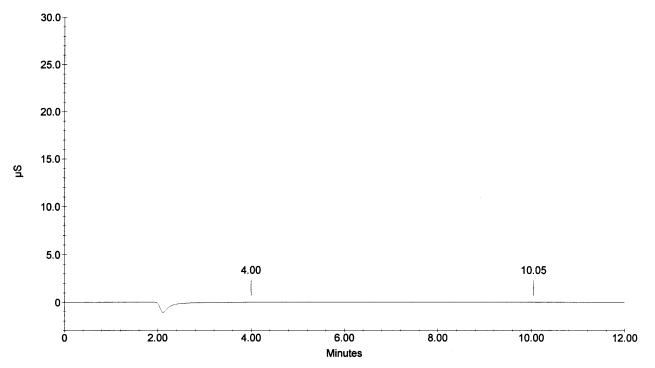
Sample Name : CCV Dilution Factor : 20.00 Injection Number : 23 Data File Name : c:\peaknet\data\040623\040623_023.DXD Method File Name : c:\peaknet\method\anions040622.met Schedule File Name : c:\peaknet\schedule\23jun04.sch Date Time Collected : 6/23/04 4:27:19 PM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018096 System Operator : RSS

Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	BI. Code	%Delta
1	2.86	FLUORIDE	101.420	184248	1267129	2	-0.92
2	3.92	CHLORIDE	205.650	191942	1706746	2	-3.29
3	4.62	NITRITE-N	97.671	184376	1830598	2	-2.05
4	5.70	BROMIDE	409.123	136649	1510372	2	-1.67
5	6.54	NITRATE-N	84.619	135387	1824589	2	0.05
3	8.42	PHOSPHATE-P	195.984	75844	1399610	2	-0.32
7	9.94	SULFATE	400.359	123461	2457185	2	-0.67
<u> </u>	0.00		total(s) 1494.826		11996229		
		- <u></u>	CCV				<u> </u>



Sample Name : CCB Dilution Factor : 1.00 Injection Number : 24 Data File Name : c:\peaknet\data\040623\040623_024.DXD Method File Name : c:\peaknet\method\anions040622.met Schedule File Name : c:\peaknet\schedule\23jun04.sch Date Time Collected : 6/23/04 4:42:09 PM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018096 System Operator : RSS

Peak Information : All Components								
Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	BI. Code	%Delta	
1	4.00	CHLORIDE	0.005	88	707	1	-1.32	
1	4.00	NITRITE-N BROMIDE NITRATE-N	0.005	88	707	1	-1.32	
2	10.05	PHOSPHATE-P SULFATE	0.021	138	2423	1	0.40	
	0.00		total(s) 0.030		3837			
			ССВ					



nons **PROJECT NO.** TITLE BOOK NO. 104 Work continued from Page 010065 SWRID 77-01-1C4 Anions - 20ppm Mux + 60ppm SOy (STD1) Inorg # Spex # Exp. Date Conc Anon Std. Vol. 5 Sous 25-5AS 1/15/05 4388 4387 1000 mg/L 02ml uordo 1/15/05 7-14714 londo 15801 3/15/05 7/QU 000/ * 10 NI trate 1 27-128 AS 6/15/05 m4389 1/15/05 25-65AS 115705 4390 7-14514 rasnhati P 6/15/2005 3000 ¥ 27-98AS RSS 6/22/04 15 (STD 2)-02-164 15ppm 45ppm 504 mIDIH2C 177-01-104 (STD 3) 77-03-164 10ppm Anions + 30ppm SO4 2m1 177-01-104 + 2ml DI HO 20 STD 4) 77-04-164 5pm An uno + 15ppm SO4 2ml 177-03-164 + 2ml DIH20. 4 1 ppm Anions, 3ppm, SO4 (STD 5) 177-04-1C4 + 4ml DI +120 25 1 0.5 ppm Aniono · 1.5 ppm SO4 (STD6) 177-05-104 · 2ml DI H2O. 77-06-124 0,1 pm Ancom escolarion 0.3 ppm SOr (STD7) 77-06-104 +48ml DIH20. 30 Oppm (STD 8) 35 -ICH Oppon-5000 L Eppendorf 1000J 200 DISCLOSE 7/1/04 B 200 P ©

178 PROJECT NO.

BOOK NO.

Work continued from Page

010066

SwRI® 178-01-104 Nitrite N, 100 mg/L 0.0493g. Sodium nitrite (Fisher, Lot # 944033 100 mg # 0277) deluted to 100 ml DI H20. Balance #12. 5 10 15 20 25 30 35 Work continued to Page /88vrs.con www.scientific ™b/aa/04 SIGNATÚRE DISCLOS WITNESS DAT

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Southwest Research Institute

Dionex DX500 Ion Chromatography Daily Log

010067

ner Analyst: Conductivity:

6/22/04 Date:

Client
Calumation (wwwProject #TO #Analytical MethodEPA 300
SW846 9056———SW846 9056—9056

0622 Loop: Method: + # 015-02-087 Calibration: Column: Comments: ICV/CCV/MS: nnra#451R 2nd Source 1st Source Lot #: Lot #: CCV Conc: CCV Conc: MS Conc: MS Conc: **ELUENT SOLUTION PREP:** FV = 2.0L DI H203.5 .0 mM Sodium Bicarbonate & mM Sodium Carbonate Weight: NaHCO₃ Weight: Na₂CO₃ Source: Source: 308 EI Lot: Lot: Bulance#12 Other Eluent: mA-Autoregen (ASRS) Other Regen: øs, tppendorfs: 5000. 1-12/04 FRM-226 (Rev 3/Mar 03) Page 2 of 2

11 20í

Schedule File: C:\PeakNet\schedule\040622.sch

Line	Sample	Sample Type	Level	Method	Data File	Dilution
1	STD 8 177-08-IC4	Calibration St	1	anions040622.met	040622_001.dxd	1
2	STD 7 177-07-IC4	Calibration St	2	anions040622.met	040622_002.dxd	1
3	STD 6 177-06-IC4	Calibration St	3	anions040622.met	040622_003.dxd	1 010068
4	STD 5 177-05-IC4	Calibration St	4	anions040622.met	040622_004.dxd	1
5	STD 4 177-04-IC4	Calibration St	5	anions040622.met	040622_005.dxd	1
6	STD 3 177-03-IC4	Calibration St	6	anions040622.met	040622_006.dxd	1
7	STD 2 177-02-IC4	Calibration St	7	anions040622.met	040622_007.dxd	1
8	STD 1 177-01-IC4	Calibration St	8	anions040622.met	040622_008.dxd	1
9	STD 9 177-09-IC4	Calibration St	1	anions040622.met	040622_009.dxd	1
10	ICV	Sample		anions040622.met	040622_010.dxd	20
11	ICB	Sample		anions040622.met	040622_011.dxd	1

Default Method Path: C:\PEAKNET\METHOD Default Data Path: C:\PEAKNET\DATA\040622 Comment: EPA300 & SW 846 9056

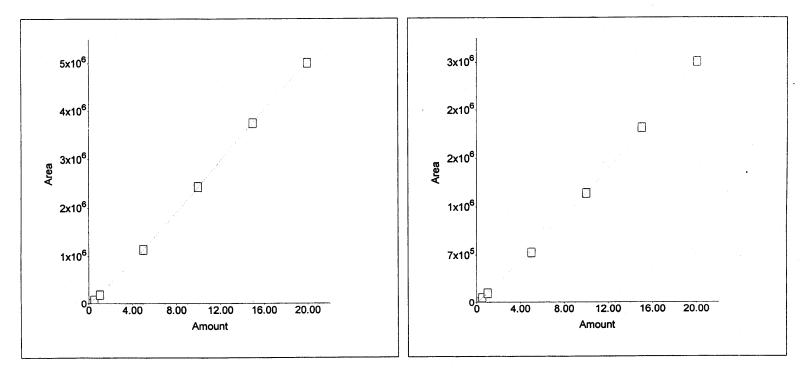
ICV = Spex 25-145AS (Inorg # 4578) NOZN 178-01-1C4



Method:C:\PEAKNET\METHOD\ANIONS040622.MET Updated:6/22/04 3:53:38 PM Total:7

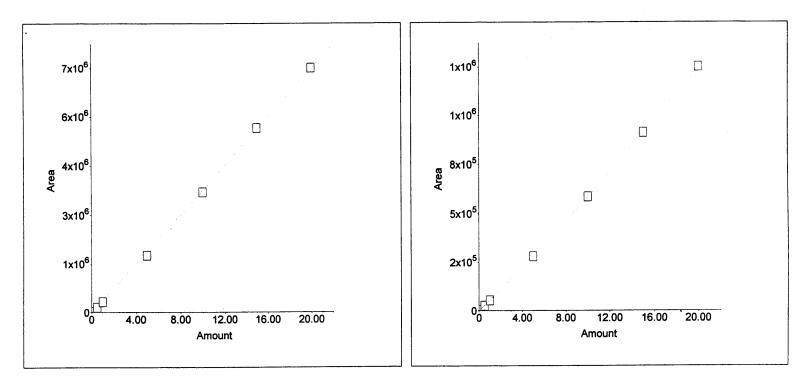
```
1. Component:FLUORIDE
Standard:External Fit Type:Cubic
Origin:Force Calibration:Area
r<sup>2</sup>=0.999953
Amt=3.044799e-020*Resp<sup>3</sup>+
    -2.870275e-013*Resp<sup>2</sup>+
    4.316773e-006*Resp+0
```

2. Component:CHLORIDE Standard:External Fit Type:Quadratic Origin:Force Calibration:Area r²=0.999821 Amt=-2.817856e-013*Resp²+ 6.505570e-006*Resp+0 010069



3. Component:NITRITE-N
Standard:External Fit Type:Linear
Origin:Force Calibration:Area
r²=0.999621
Amt=2.668e-006*Resp+0

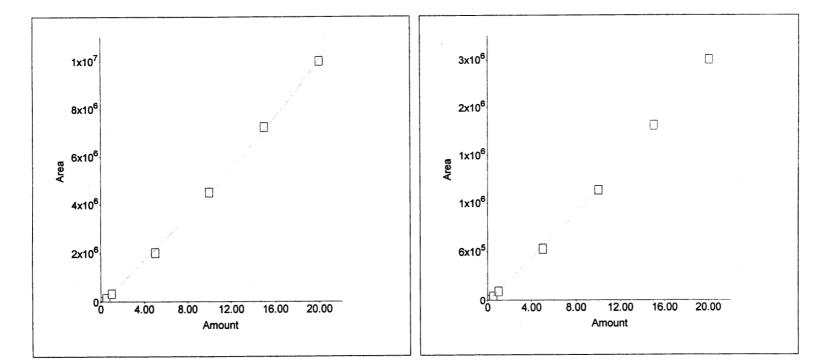
4. Component:BROMIDE
Standard:External Fit Type:Quadratic
Origin:Force Calibration:Area
r²=0.999954
Amt=-1.218708e-012*Resp²+
1.538449e-005*Resp+0



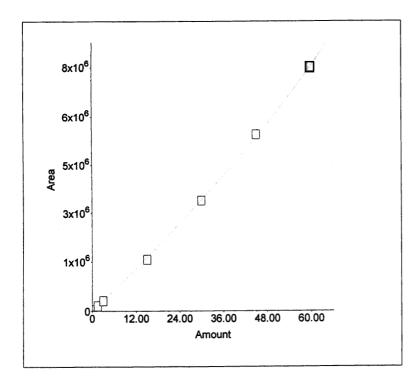
Method:C:\PEAKNET\METHOD\ANIONS040622.MET Updated:6/22/04 3:53:38 PM Total:7

```
5. Component:NITRATE-N
Standard:External Fit Type:Quadratic
Origin:Force Calibration:Area
r<sup>2</sup>=0.999492
Amt=-4.209966e-014*Resp<sup>2</sup>+
2.395673e-006*Resp+0
```

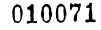
```
6. Component:PHOSPHATE-P
Standard:External Fit Type:Quadratic
Origin:Force Calibration:Area
r<sup>2</sup>=0.999784
Amt=-3.890673e-013*Resp<sup>2</sup>+
7.545921e-006*Resp+0 010070
```



7. Component:SULFATE
Standard:External Fit Type:Quadratic
Origin:Force Calibration:Area
r²=0.999728
Amt=-1.677817e-013*Resp²+
 8.558970e-006*Resp+0

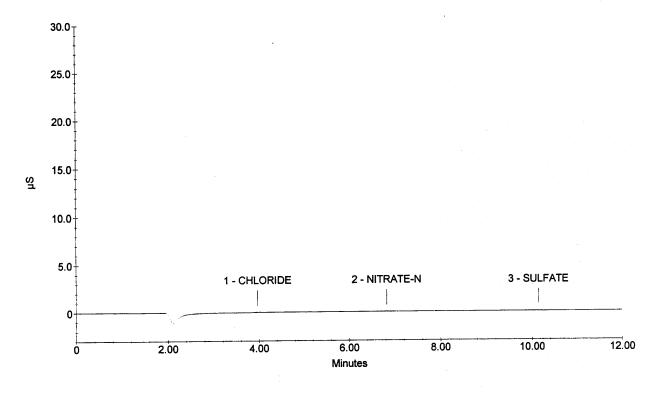


Sample Name : STD 8 177-08-IC4 Dilution Factor : 1.00 Injection Number : 1 Data File Name : c:\peaknet\data\040622\040622_001.DXD Method File Name : ...\ANIONS040622.met Schedule File Name : c:\peaknet\schedule\040622.sch Date Time Collected : 6/22/04 11:40:54 AM Date Time Updated : 6/22/04 3:48:55 PM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018096 System Operator : RSS



Peak Information : All Components					
Peak Number	Peak Retention Time	Component Name	Concentration, ppm (ppm)	Peak Area	Peak Height
1	3.97	CHLORIDE	0.00	1106	133
1	3.97	CHLORIDE NITRITE-N BROMIDE	0.00	1106	133
2	6.82	NITRATE-N PHOSPHATE-P	0.00	2572	205
3	10.14	SULFATE	0.00	4850	220

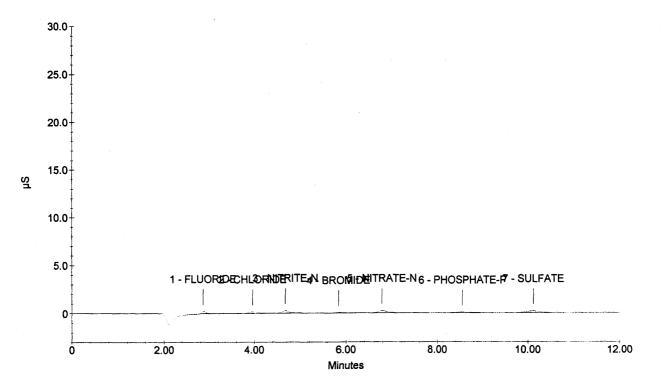
STD 8 177-08-IC4



Sample Name : STD 7 177-07-IC4 Dilution Factor : 1.00 Injection Number : 2 Data File Name : c:\peaknet\data\040622\040622_002.DXD Method File Name : ...\ANIONS040622.met Schedule File Name : c:\peaknet\schedule\040622.sch Date Time Collected : 6/22/04 11:55:33 AM Date Time Updated : 6/22/04 3:48:59 PM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018096 010072 System Operator : RSS

Peak Information : All Components						
Peak Number	Peak Retention Time	Component Name	Concentration, ppm (ppm)	Peak Area	Peak Height	
1	2.86	FLUORIDE	0.10	15684	2442	
2	3.96	CHLORIDE	0.10	16211	1759	
3	4.68	NITRITE-N	0.10	28066	2890	
4	5.84	BROMIDE	0.10	5624	498	
5	6.78	NITRATE-N	0.10	31824	2358	
6	8.56	PHOSPHATE-P	0.10	11247	601	
7	10.12	SULFATE	0.30	38142	1876	

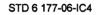
STD 7 177-07-IC4

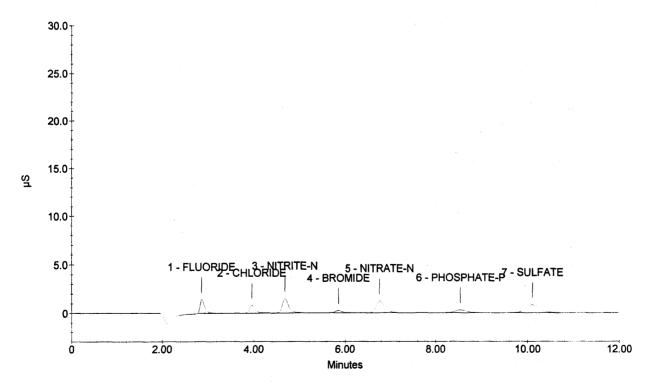


Sample Name : STD 6 177-06-IC4 Dilution Factor : 1.00 Injection Number : 3 Data File Name : c:\peaknet\data\040622\040622_003.DXD Method File Name : ...\ANIONS040622.met Schedule File Name : c:\peaknet\schedule\040622.sch Date Time Collected : 6/22/04 12:10:15 PM Date Time Updated : 6/22/04 3:49:04 PM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018096 System Operator : RSS

0	10	07	73
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Peak Information : All Components							
Peak Number	Peak Retention Time	Component Name	Concentration, ppm (ppm)	Peak Area	Peak Height		
1	2.86	FLUORIDE	0.50	99663	14259		
2	3.96	CHLORIDE	0.50	75370	8219		
3	4.68	NITRITE-N	0.50	153456	15191		
4	5.85	BROMIDE	0.50	29766	2560		
5	6.76	NITRATE-N	0.50	170413	12313		
6	8.54	PHOSPHATE-P	0.50	56740	2997		
7	10.10	SULFATE	1.50	173676	8397		

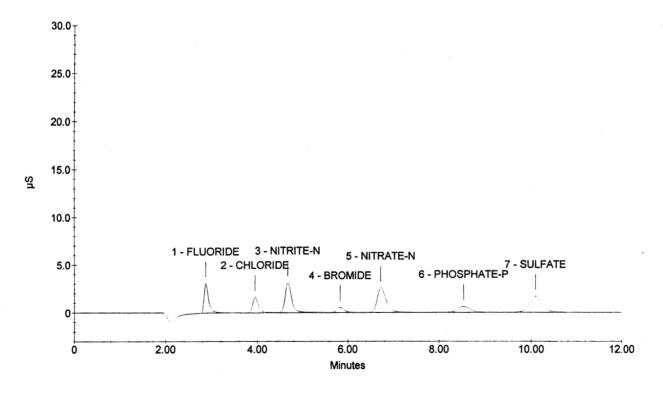




Sample Name : STD 5 177-05-IC4 Dilution Factor : 1.00 Injection Number : 4 Data File Name : c:\peaknet\data\040622\040622_004.DXD Method File Name : ...\4NIONS040622.met Schedule File Name : c:\peaknet\schedule\040622.sch Date Time Collected : 6/22/04 12:24:55 PM Date Time Updated : 6/22/04 3:49:08 PM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018096 System Operator : RSS

Peak Information : All Components							
Peak Number	Peak Retention Time	Component Name	Concentration, ppm (ppm)	Peak Area	Peak Height		
1	2.86	FLUORIDE	1.00	214673	30598		
2	3.94	CHLORIDE	1.00	147584	16282		
3	4.66	NITRITE-N	1.00	324429	31240		
4	5.82	BROMIDE	1.00	61824	5247		
5	6.72	NITRATE-N	1.00	351545	25507		
6	8.53	PHOSPHATE-P	1.00	120558	6282		
7	10.09	SULFATE	3.00	343827	16699		

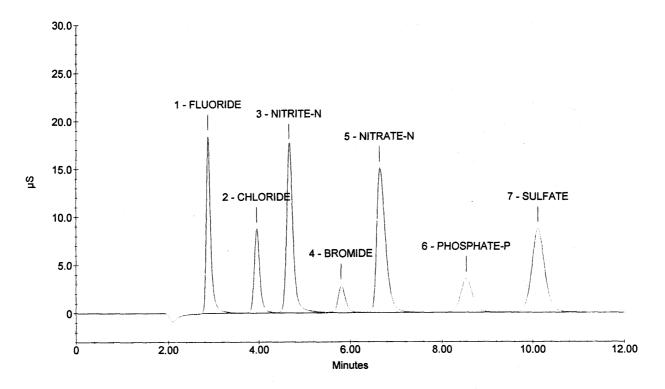
STD 5 177-05-IC4



Sample Name : STD 4 177-04-IC4 Dilution Factor : 1.00 Injection Number : 5 Data File Name : c:\peaknet\data\040622\040622_005.DXD Method File Name : ...\ANIONS040622.met Schedule File Name : c:\peaknet\schedule\040622.sch Date Time Collected : 6/22/04 12:39:36 PM Date Time Updated : 6/22/04 3:49:11 PM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018096 System Operator : RSS 010075

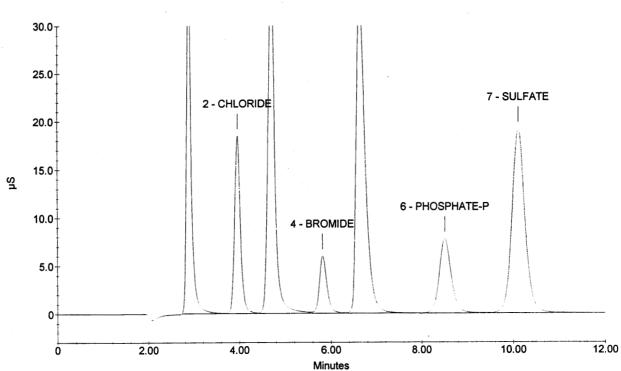
Peak Information : All Components							
Peak Number	Peak Retention Time	Component Name	Concentration, ppm (ppm)	Peak Area	Peak Height		
	2.88	FLUORIDE	5.00	1249311	183737		
2	3.94	CHLORIDE	5.00	764286	86778		
3	4.66	NITRITE-N	5.00	1763018	173760		
4	5.80	BROMIDE	5.00	328544	28053		
5	6.64	NITRATE-N	5.00	2040797	149957		
6	8.53	PHOSPHATE-P	5.00	663949	35154		
7	10.10	SULFATE	15.00	1739219	86511		





Sample Name : STD 3 177-03-IC4 Dilution Factor : 1.00 Injection Number : 6 Data File Name : c:\peaknet\data\040622\040622_006.DXD Method File Name : ...\ANIONS040622.met Schedule File Name : c:\peaknet\schedule\040622.sch Date Time Collected : 6/22/04 12:54:16 PM Date Time Updated : 6/22/04 3:49:15 PM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018096 System Operator : RSS 010076

Peak Information : All Components							
Peak Number	Peak Retention Time	Component Name	Concentration, ppm (ppm)	Peak Area	Peak Heigh		
1	2.88	FLUORIDE	10.00	2665804	366427		
2	3.96	CHLORIDE	10.00	1655893	184330		
3	4.69	NITRITE-N	10.00	3707012	357947		
4	5.81	BROMIDE	10.00	688272	59797		
5	6.61	NITRATE-N	10.00	4547116	328131		
6	8.50	PHOSPHATE-P	10.00	1428173	77538		
7	10.09	SULFATE	30.00	3773275	191012		

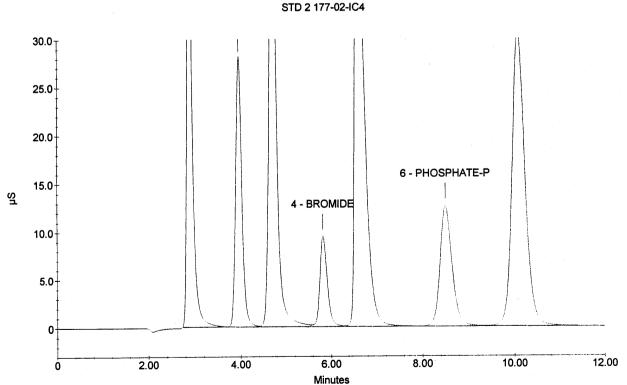


STD 3 177-03-IC4

Sample Name : STD 2 177-02-IC4 **Dilution Factor : 1.00** Injection Number: 7 Data File Name : c:\peaknet\data\040622\040622_007.DXD Method File Name : ...\ANIONS040622.met Schedule File Name : c:\peaknet\schedule\040622.sch

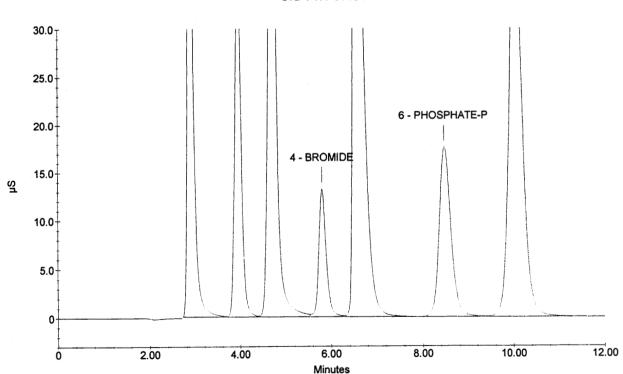
Date Time Collected : 6/22/04 1:08:57 PM Date Time Updated : 6/22/04 3:49:18 PM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018096 010077 System Operator : RSS

Peak Number	Peak Retention Time	Peak Information	Concentration, ppm (ppm)	Peak Area	Peak Height
1	2.89	FLUORIDE	15.00	4096803	546794
2	3.96	CHLORIDE	15.00	2631927	278791
3	4.72	NITRITE-N	15.00	5660428	528607
4	5.81	BROMIDE	15.00	1070216	94254
5	6.58	NITRATE-N	15.00	7296057	514667
6	8.49	PHOSPHATE-P	15.00	2279473	125893
7	10.06	SULFATE	45.00	6051191	306767
-					



Sample Name : STD 1 177-01-IC4 Dilution Factor : 1.00 Injection Number : 8 Data File Name : c:\peaknet\data\040622\040622_008.DXD Method File Name : ...\ANIONS040622.met Schedule File Name : c:\peaknet\schedule\040622.sch Date Time Collected : 6/22/04 1:23:39 PM Date Time Updated : 6/22/04 3:49:22 PM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018096 System Operator : RSS

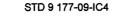
Peak Information : All Components								
Peak Number	Peak Retention Time	Component Name	Concentration, ppm (ppm)	Peak Area	Peak Height			
1	2.89	FLUORIDE	20.00	5470798	682986			
2	3.96	CHLORIDE	20.00	3633847	373479			
3	4.72	NITRITE-N	20.00	7518140	667759			
4	5.80	BROMIDE	20.00	1468576	131327			
5	6.54	NITRATE-N	20.00	10087786	701908			
6	8.45	PHOSPHATE-P	20.00	3151553	175123			
7	10.01	SULFATE	60.00	8338830	422992			

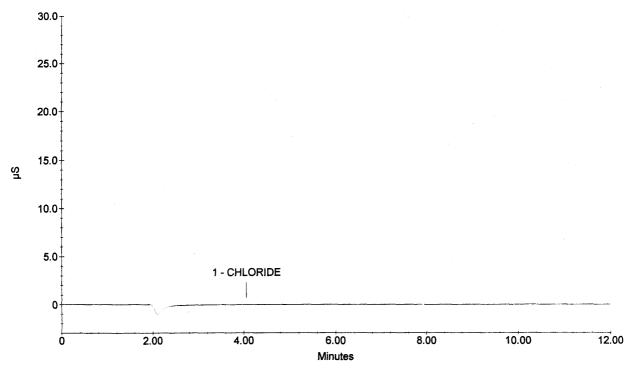


STD 1 177-01-IC4

Sample Name : STD 9 177-09-IC4 Dilution Factor : 1.00 Injection Number : 9 Data File Name : c:\peaknet\data\040622\040622_009.DXD Method File Name : ...\ANIONS040622.met Schedule File Name : c:\peaknet\schedule\040622.sch Date Time Collected : 6/22/04 1:46:11 PM Date Time Updated : 6/22/04 3:49:26 PM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018096 System Operator : RSS 010079

Peak Information : All Components							
Peak Number	Peak Retention Time	Component Name	Concentration, ppm (ppm)	Peak Area	Peak Height		
1	4.05	CHLORIDE	0.00	763	67		
1	4.05	CHLORIDE NITRITE-N BROMIDE NITRATE-N PHOSPHATE-P SULFATE	0.00	763	67		



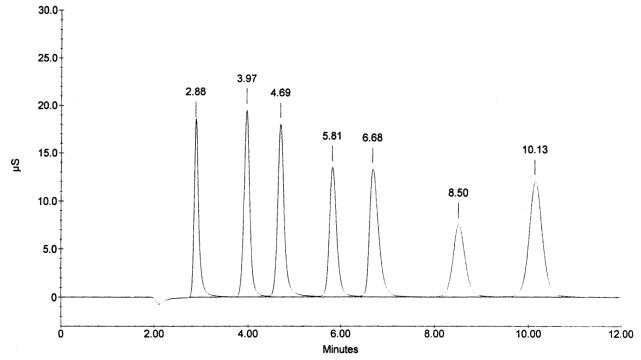


Sample Name : ICV Dilution Factor: 20.00 Injection Number: 10 Data File Name : ...\040622_010.DXD Method File Name : C:\PeakNet\method\ANIONS040622.met Schedule File Name : c:\peaknet\schedule\040622.sch

Date Time Collected : 6/22/04 3:20:43 PM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018096 System Operator : RSS

010080

Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	BI. Code	%Delta
 1	2.88	FLUORIDE	102.318	180581	1279152	2	-0.46
2	3.97	CHLORIDE	206.674	194415	1715979		-1.98
3	4.69	NITRITE-N	97.137	179452	1820599		-0.64
4	5.81	BROMIDE	411.331	133818	1519813	_	0.17
5	6.68	NITRATE-N	85.162	131899	1836684		2.09
6	8.50	PHOSPHATE-P	195.509	74697	1395936		0.63
7	10.13	SULFATE	397.367	119590	2437852	2	1.20
	0.00		total(s) 1495.497	· .	12006014		
			ICV				



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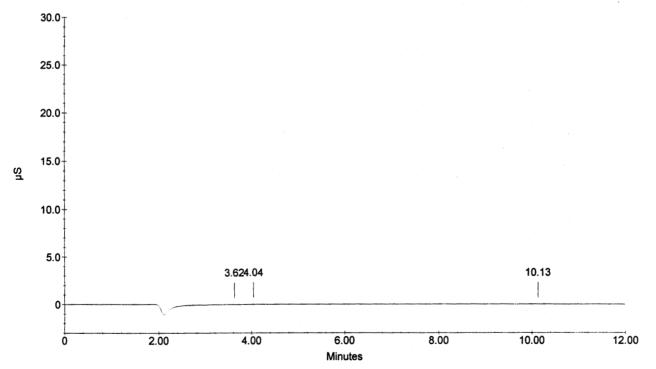
Sample Name : ICB Dilution Factor: 1.00 Injection Number : 11 Data File Name : ...\040622_011.DXD Method File Name : C:\PeakNet\method\ANIONS040622.met System Operator : RSS Schedule File Name : c:\peaknet\schedule\040622.sch

Date Time Collected : 6/22/04 3:35:42 PM System Name : Dx-500 Detector Name : Conductivity Detector Column Type : AS14-#015724 AG14-#1018096

010081

	Peak Information : All Components								
Pk. Num	Ret Time	Component Name	Concentration (ppm)	Height	Area	BI. Code	%Delta		
1	3.62		0.000	58	679	1			
2	4.04	CHLORIDE NITRITE-N BROMIDE NITRATE-N PHOSPHATE-P	0.016	181	2433	1	-0.33		
3	10.13	SULFATE	0.006	56	671	1	1.20		
			1						
	0.00		total(s) 0.022		3783				





SOUTHWEST RESEARCH INSTITUTE NUCLEAR PROJECT CLIENT: Division 20 TASK ORDER: 040521-5 SRR: 25943 SDG: 245101 CASE: CNWRA VTSR: May 20, 2004 PROJECT#: 06002.01.141

Certificates of Analysis



ATTN: MICHAEL HARDY FAX: 210 522 3649 LLM 010083 3050 Spruce Street Saint Louis, Missouri 63105 USA Telephone (800) 521-8958 + (314) 771-5765 Fax (800) 325-5052 • (314) 77-5757 Visit Us At www.sigma-aldrich.com

Certificate of Analysis

T0 912105223649

PRODUCT NUMBER: 24479-1

LOT NUMBER: 03929CV

PRODUCT NAME: POTASSIUMANTIMONYLL-TARTRATEHYDRATE,
99+\$

FORMULA: C4H4K07SB,XH2O

FORMULA WEIGHT: 324.92

APPEARANCE	WHITE POWDER AND CHUNKS
INFRARED SPECTRUM	CONFORMS TO STRUCTURE.
OPTICAL ROTATION	+141.21 DEGREES (C=2%, H2O)
TITRATION	36.9% SB (WITH IODINE)

ALDRICH CHEMICAL COMPANY RONNIE MARTIN JUNE 18, 2004

We are Committed to the success of our Customers, Employees and Shareholders through leadership in Life Science, High Technology and Service. .

Fisher Scientific Company

Chemical Manufacturing Division

Certificate of Analysis

010084

1 Reagent Lane

Fair Lawn, NJ 07410

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Catalog Number	A674	Report Date	7/21/97	Mfg. Date	7/14/97
Lot Number	975140	Sample ID	A674975	140.B1.	
Description	AMMONIUM MOLYBDATE,	A.C.S.			

This is to certify that units of the above mentioned lot number were tested and found to comply with the specifications of the grade listed. The following are the actual analytical results obtained:

Result Name	Units	Test Value
APPEARANCE	PASS/FAIL	PASS WHITE CRYSTALS
ARS/PHOS/SILICATE %	%	0.0010
ASSAY	%	82.0000
CHLORIDE	%	0.0007
HEAVY METALS	%	0.0003
IDENTIFICATION		PASS
INSOLUBLE MATTER	%	0.0020
MAGNESIUM & CATIONS-%	%	0.016
NITRATE	PASS/FAIL	PASS
PHOSPHATE (PO4)	PPM	2.500
SULFATE (SO4)	%	0.0070

CERTIFIED BY Gla Lab Manager Fair Lawn Lab Manager BPF

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Chemical Manufacturing Division

Certificate of Analysis

Fisher Scientific's Quality System is Certified to ISO9002 (1994) standard by DNV Cert. # 96-HOU-AQ-8052

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Fairlawn, NJ 07410

Phone: (201) 796-7100 Fax: (201) 796-1329

Catalog Number	A300	Report Date	9/26/03	Mfg. Date	9/10/03
Lot Number	036110	Sample ID	A300036	6110.B1.	
Description	SULFURIC ACID, CERTIF	IED ACS			

This is to certify that units of the above mentioned lot number were tested and found to comply with the specifications of the grade listed. Certain data have been supplied by third parties. Fisher Scientific expressly disclaims all warranties, expressed or implied, including the implied warranties of merchantability and fitness for a particular purpose. Unless otherwise stated, these products are not intended for dialysis, parenteral or injectable use without further processing. The following are the actual analytical results obtained:

Result Name	Specifications	Units	Test Value
ALUMINUM (AI)	0.2 Maximum	PPM	0.001
AMMONIUM (NH4)	1 Maximum	PPM	0.750
APPEARANCE	Colorless and free from suspended or insoluble matter	REPORT	CLEAR COLORLESS LIQUID
ARSENIC (As)	0.004 Maximum	PPM	<0.001
ASSAY	95.0 to 98.0	w/w %	95.8000
BORON (B)	0.01 Maximum	PPM	<0.0010
CALCIUM (Ca)	0.3 Maximum	PPM	0.007
CHLORIDE	0.1 Maximum	PPM	<0.100
CHROMIUM (Cr)	0.2 Maximum	PPM	0.001
COLOR	10 Maximum	APHA	5
COPPER (Cu)	0.1 Maximum	PPM	<0.001
GOLD (Au)	0.3 Maximum	PPM	<0.001
HEAVY METALS(AS Pb)	0.8 Maximum	PPM	0.16
IDENTIFICATION	Pass test	PASS/FAIL	PASS
IRON (Fe)	0.2 Maximum	PPM	0.006
SUBS. REDUCING KMNO4	2 Maximum	PPM(AS SO2)	<2
LEAD (Pb)	0.3 Maximum	PPM	<0.001
MAGNESIUM (Mg)	0.3 Maximum	PPM	0.002

CERTIFIED BY

.ab Manager Fair

Joel Bo

Lab Manager BPF

Fisher Scientific Company

Chemical Manufacturing Division

1 Reagent Lane

Fairlawn, NJ 07410

Phone: (201) 796-7100 Fax: (201) 796-1329

Certificate of Analysis

Fisher Scientific's Quality System is Certified to ISO9002 (1994) standard by DNV Cert. # 96-HOU-AQ-8052

010086

Catalog Number	A300	Report Date	9/26/03	Mfg. Date	9/10/03
Lot Number	036110	Sample ID	A300036	6110.B1.	
Description	SULFURIC ACID, CERTIFI	ED ACS			

FOULD .

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Result Name	Specifications	Units	Test Value
MANGANESE (Mn)	0.2 Maximum	PPM	0.001
MERCURY (Hg)	5 Maximum	PPB	<1.000
NICKEL (Ni)	0.1 Maximum	PPM	0.001
NITRATE (NO3)	0.2 Maximum	PPM	0.050
PHOSPHATE (PO4)	0.5 Maximum	PPM	0.100
POTASSIUM (K)	0.3 Maximum	PPM	0.001
RESIDUE AFTER IGNIT.	3 Maximum	PPM	<0.10
SODIUM (Na)	0.3 Maximum	PPM	0.001
TIN (Sn)	0.2 Maximum	PPM	<0.001
TITANIUM (TI)	0.3 Maximum	PPM	<0.001
ZINC (Zn)	0.2 Maximum	PPM	<0.001

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Lab Manager BPF

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Chemical Manufacturing Division

Certificate of Analysis

Fisher Scientific's Quality System is Certified to ISO9002 (1994) standard by DNV Cert. # 96-HOU-AQ-8052

1 Reagent Lane

Fairlawn, NJ 07410

Phone: (201) 796-7100 Fax: (201) 796-1329

Catalog Number	A61	Report Date	7/17/03	Mfg. Date	7/1/03
Lot Number	035244	Sample ID	A61035	244.B1.	
Description	L-ASCORBIC ACID, A.C.S.	L			

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Result Name	Specifications	Units	Test Value
APPEARANCE	White crystalline powder	REPORT	FINE WHITE CRYSTALS
ASSAY	99.0 Minimum	%	99.7000
HEAVY METALS(AS Pb)	0.002 Maximum	%	0.0006
IDENTIFICATION	Pass test	PASS/FAIL	PASS
IGNITION RESIDUE	0.1 Maximum	%	0.03000
IRON	0.001 Maximum	%	0.00040
SPECIFIC ROTATION	+20.5 - +21.5	DEGREES (+ OR -)	21.100
APPEARANCE	White crystalline powder	REPORT	FINE WHITE CRYSTALS
ASSAY	99.0 Minimum	%	99.7000
HEAVY METALS(AS Pb)	0.002 Maximum	%	0.0006
IGNITION RESIDUE	0.1 Maximum	%	0.03000
IRON	0.001 Maximum	%	0.00040
SPECIFIC ROTATION	20.5 to 21.5	DEGREE S (+ OR -)	21.100

010087

Chemical Manufacturing Division

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Certificate of Analysis

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Fisher Scientific Company

Catalog Number	A929	Report Date	2/20/04	Mfg. Date	2/6/04
Lot Number	038638	Sample ID	A929038	3638.B1.	
Description	ACETONE-OPTIMA				

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Result Name	Specifications	Units	Test Value
ALDEHYDE	0.002 Maximum	%	0.00050
APPEARANCE	Clear colorless liquid	REPORT	CLEAR, COLORLESS LIQUID
ASSAY	99.5 Minimum	%	99.7000
COLOR	5 Maximum	APHA	5
DENSITY @ 25 DEG C	0.7857 Maximum	GM/ML	0.7856
EVAPORATION RESIDUE	1 Maximum	PPM	0.40
FLUORESCENCE BKG-PPB	1 Maximum	PPB	<1.00
IDENTIFICATION	Pass test	PASS/FAIL	PASS
ISOPROPYL ALCOHOL	0.05 Maximum	%	0.010
SUBS. REDUCING KMNO4	Pass test	PASS/FAIL	PASS
METHANOL	0.05 Maximum	%	0.030
OPT.ABSORBANCE @ 330	1.00 Maximum	ABSORBANCE UNITS	0.5900
OPT.ABSORBANCE @ 340	0.06 Maximum	ABSORBANCE UNITS	0.0400
OPT.ABSORBANCE @ 350	0.010 Maximum	ABSORBANCE UNITS	0.0020
OPT ABS 400 - 350 NM	0.01 Maximum	ABSORBANCE UNITS	0.002
PESTICIDE RESIDUE AN	10 Maximum	NG/L	10.0000

CERTIFIED BY Joel Bal Lab Manager BPF

Fisher Scientific Company

Chemical Manufacturing Division

1 Reagent Lane

Fairlawn, NJ 07410

Phone: (201) 796-7100 Fax: (201) 796-1329

Certificate of Analysis

Fisher Scientific's Quality System is Certified to ISO9002 (1994) standard by DNV Cert, # 96-HOU-AQ-8052

Catalog Number A929 Report Date 2/20/04 Mfg. Date 2/6/04 Lot Number 038638 Sample ID A929..038638.B1. A029..038638.B1. Description ACETONE-OPTIMA ACETONE-OPTIMA ACETONE-OPTIMA ACETONE-OPTIMA

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Result Name	Specifications	Units	Test Value
REFRACTIVE INDEX @25	1.3555 - 1.3580		1.3561
TITRATABLE ACID	0.0003 Maximum	mEq/g	0.000 30
TITRATABLE BASE	0.0006 Maximum	mEq/g	<0.00010
WATER (H2O)	0.5 Maximum	%	0.300
SOLUBILITY IN WATER	Pass test	PASS/FAIL	PASS

CERTIFIED BY

Lab Manager Fair Lawn

Joel Bal Lab Manager BPF

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

010089



Lot No. 25-5AS

010090

NORG:

OPENED

JORGANIC

KADCHEM LABS

Catalog Number:AS-F9-2X/2YDescription:1000 mg/L FluorideMatrix: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 relevent to the certified properties listed below.

Certified Value: 998 mg/L

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

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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:

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 $k_1 = s^2 m$ 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, where k=2 is the coverage factor at the 95% confidence level

ue is obtained by combining the individual element standard uncertainty components u_i and $u_{ee} \sqrt{\Sigma u_i^2}$

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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010091



010092

Catalog Number:AS-CL9-2X/2YDescription:1000 mg/L ChlorideMatrix: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: 997 mg/L

Uncertainty Associated with Measurement: +/- 3 mg/L Certified Value is Traceable to: NIST SRM 3182

The CRM is prepared gravimetrically using high puritySodium Chloride Lot# 004723. 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: Gravimetry: Precipitation using AgNO3, filtering, drying and weighing as AgCl.

Instrumentation Analysis By Ion Chromatography:997 mg/L

Uncertified Properties:

Trace Ionic Impurities in the Actual Solution via IC Analysis:

Element	mg/L	Element	mg/L
F	<0.05	Br	<0.1
PO4	<0.05	NO3	<0.1
SO4	<0.05	NO2	<0.2

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.

JAN - - 2004

Date of Certification:

Certifying Officer: N. Kochertakota

Lot No. 7-147VY

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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:

010093

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, = 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, 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 $u_{cc} \sqrt{\Sigma u_i^2}$

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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ABS

Catalog Number: AS-NO2N9-2X/2Y **Description:** 1000 mg/L Nitrite-N H20 Matrix:

Lot No. 7-158VY

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: 1001.5 mg/L

Uncertainty Associated with Measurement: +/- 3.0 mg/L Certified Value is Traceable to: **SPEX CRM 0902**

The CRM is prepared gravimetrically using high purity Sodium Nitrite 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: 1000mg/L

Method: Titration with KMNO4 that was standardized against Sodium Oxalate NIST SRM 40h.

Instrumentation Analysis By Ion Chromatography: 1003 mg/L

Uncertified Properties:

Trace Ionic Impurities in the Actual Solution via IC Analysis:

lon	mg/L	Ion	mg/L	
Br	<20	NO3	<40	
Cl	<20	PO4	<0.8	
F	<0.4	SO4	<0.4	

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:

MAR -- 2004 Certifying Officer: N. Kochevta.kota

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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:

010095

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 $k = s^2 m$ 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, where k=2 is the coverage factor at the 95% confidence level

u, is obtained by combining the individual element standard uncertainty components u_i and $u_e \sqrt{\Sigma u_i^2}$

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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Lot No. 27-128AS

NORG:

AUU

Catalog Number: AS-BR9-2X/2Y **Description:** 1000 mg/L Bromide H2O Matrix:

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: 1003.5 mg/L

Uncertainty Associated with Measurement: +/- 3.0 mg/L Certified Value is Traceable to: NIST SRM 3184

The CRM is prepared gravimetrically using high purity Sodium Bromide Lot# 017400 . The certified value listed is the average of values obtained by classical wet assay and lon Chromatography analysis.

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 1003 mg/L:

Method: Precipitation using Silver Nitrate, filter, dry and weigh as AgBr.

Instrumentation Analysis By Ion Chromatography: 1004 mg/L:

Uncertified Properties:

Trace Ionic Impurities in the Actual Solution via IC Analysis:

lon	mg/L	lon	mg/L	
Cl	<1.50	NO3	<0.05	
F	<0.02	P04	<0.20	
NO2	<0.05	SO4	<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.

Date of Certification:

JUN

Certifying Officer: N. Kochertakola

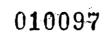
C 2004 SPEX CertiPrep, Inc.

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 megohin, 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 $k = s^2 m$ 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, where k=2 is the coverage factor at the 95% confidence level

 u_e is obtained by combining the individual element standard uncertainty components u_i and $u_e \sqrt{2}u_i^2$

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:

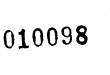
SPEX CertiPrep reference materials are not for any cosmetic, drug or household application and are to be used only by qualified individuals who are trained in appropriate procedures. No claims against SPEX CertiPrep, Inc. of any kind whatsoever, whether based on breach of warranty, alleged negligence, 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.





SPEXertificate Certificate of Reference Material

Lot No. 25-65AS



NORG:

OPENED

XPIRED

ABS/RADCHEM LABS

Catalog Number:AS-NO3N9-2X/2YDescription:1000 mg/L Nitrate NitrogenMatrix: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 relevent to the certified properties listed below.

Certified Value: 1003.5 mg/L

Uncertainty Associated with Measurement: +/- 3.0 mg/L Certified Value is Traceable to: NIST SRM 3185

The CRM is prepared gravimetrically using high purity Sodium Nitrate 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: 1004 mg/L

Method: Precipitate using Nitron Acetate, filter, dry and weigh as C20H16N4HNO3

Instrumentation Analysis By Ion Chromatography: 1003 mg/L

Uncertified Properties:

Trace Ionic Impurities in the Actual Solution via IC Analysis:

JAN -

Ion	mg/L	Ion	mg/L
Br	<0.5	NO2	⊲0.2
CI	⊲0.2	PO4	<2.0
F	<0.05	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:

Certifying Officer: N. Kocherlakola

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Report of Certification

010099

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 $k = s^2 m$ 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, = 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, where k=2 is the coverage factor at the 95% confidence level

ue 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.



010100

NORGANIC

RAUCHEN

2847

SPCXertificate

Certificate of Reference Material

Catalog Number: AS-PO4P9-2X/2Y Description: 1000 mg/L Phosphate-P Matrix: H2O Lot No. 7-145VY

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 relevent to the certified properties listed below.

Certified Value: 998 mg/L

Uncertainty Associated with Measurement: +/- 3 mg/L Certified Value is Traceable to: NIST SRM #318b

The CRM is prepared gravimetrically using high purityKH2PO4 Lot# V35142 . 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: Precipitation using Magnesia Mixture. Filter, ignite, and weigh as Mg2P2O7

Instrumentation Analysis By Ion Chromatography:998 mg/L

Uncertified Properties:

Trace Ionic Impurities in the Actual Solution via IC Analysis:

Element	mg/L	Element	mg/L
Cl	<3.0	Br	<0.3
F	<0.2	NO3	<0.5
NO2	<0.3	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 - - 200

Certifying Officer: N. Kochertakol

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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:

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EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition ASTM Guide D6362-98

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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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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 $k_i = s^2 m$ 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. = 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=kue where k=2 is the coverage factor at the 95% confidence level

ue is obtained by combining the individual element standard uncertainty components u_i and u_r , $\sqrt{\Sigma}u_i^2$

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.

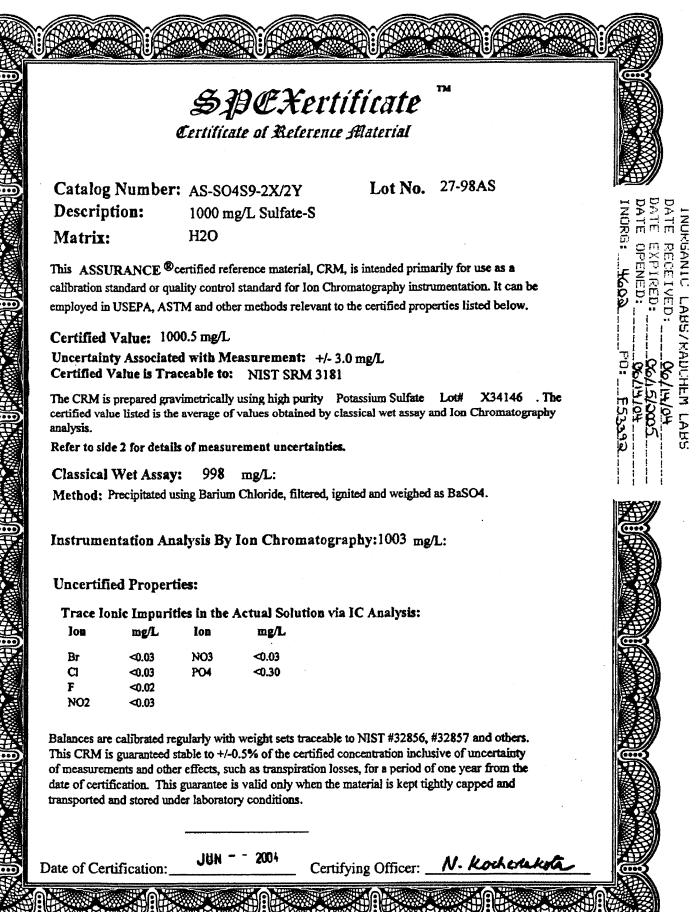
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010102



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EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement - Second Edition ASTM Guide D6362-98

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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:

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Homogeneity:

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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)

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 $k_e = mass$ of sub-sample necessary to ensure a relative sub-sampling error of 1% (68% confidence level) in a single determination

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U=kue where k=2 is the coverage factor at the 95% confidence level

 u_{i} is obtained by combining the individual element standard uncertainty components u_{i} and u_{i} , $\sqrt{\Sigma u_{i}^{2}}$.

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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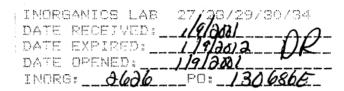


1001 West Saint Paul Avenue Milwaukee, WI 53233 USA Tel.: 800-558-9160 • (414) 273-3850 Fax: 800-962-9591 • (414) 273-4979 e-mail: aldrich@sial.com

Certificate of Analysis

SOUTHWEST RESEARCH INST DANNY RAMIREZ 6220 CULEBRA RD SAN ANTONIO TX 78238

PO NBR: 130686E



PRODUCT NUMBER: 236527-500G

LOT NUMBER: 15308EI

PRODUCT NAME: SODIUM HYDROGENCARBONATE, 99.7+%, A.C.S. REAGENT

FORMULA: NAHCO3

APPEARANCE

FORMULA WEIGHT: 84.01

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**

CONTINUED ON NEXT PAGE

0.016%

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.

Certificate of Analysis

THE RIGHT CHEMICALS THE RIGHT CHEMISTRY

INORGANIC LABS/RADCHEM LABS DATE RECEIVED: 02/27/03 DATE EXPIRED: 02/27/2013 VOS DATE OPENED: 04/10/03 INORG: 4033 PO: 330/76E

Sodium carbonate, ACS primary standard, 99.95-100.05% (dried basis)

Stock Number: 33377 Lot Number: L06M34

Analysis

Test	Limits	Results
Assay (dried basis)	99.95 - 100.05 %	100.0 %
Insoluble	0.01 % max	< 0.01 %
Loss on heating (285°C)	1.0 % max	< 0.05 %
Chloride	0.001 % max	< 0.001 %
Nitrogen compounds	0.001 % max	< 0.001 %
Phosphate	0.001 % max	< 0.001 %
Silica	0.005 % max	< 0.005 %
Sulfur compounds	0.003 % max	< 0.003 %
NH₄OH precipitate	0.01 % max	< 0.01 %
Potassium	0.005 % max	< 0.001 %
Calcium	0.02 % max	< 0.01 %
Magnesium	0.004 % max	< 0.004 %
Heavy metals (as Pb)	0.0005 % max	< 0.0005
•		%
Iron	0.0005 % max	< 0.0005
		%

Traceable to NIST? Yes

Certified by:

Quality Control:





30 Bond Street • Ward Hill, MA 01835-8099 USA • Telephone: (978) 521-6300 • Fax: (978) 521-6350 Toll-free Catalog Sales: (800) 343-0660 • Technical Services: (800) 343-7276 • Specialty/Bulk Sales: (888) 343-8025 www.alfa.com • email: info@alfa.com

010106



Certificate of Reference Material

Catalog Number: Description: Matrix:

Lot No.: 25-145AS **ICMIX2-100** IC Instrument Check Standard 2 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	200	3182
Br	400	399	3184
NO3-	400	402	3185
HPO4-2	600	600	3186
SO4 ⁻²	400	399	3181

Spex Reference Multi: Lot #IC6-77VY

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: _____Certifying Officer: N. Kocherta kota

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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

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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:

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Homogeneity:

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The mathematical expression $k=s^2m$ 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, where k=2 is the coverage factor at the 95% confidence level

 u_e is obtained by combining the individual element standard uncertainty components u_i and $u_e \sqrt{\Sigma u_i^2}$

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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178 PROJECT NO. BOOK NO.

TITLE Nitnte.N

010108

Work continued from Page

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35 🗹	rw.scientificbirdecv88yrs.com	n			Work contin	ued to Page
SH Di C	SCLOSED TO AND UND	RSTDOD/BY		WITNESS	., .,	6/22/04 date

FROM: Fisher Scientific TO: Extension PAGES: 2

FISHER SCIENTIFIC CHEMICAL DIVISION One Reagent Lane, Fair Lawn, NJ 07410 010109

ANALYTICAL CONTROL LABORATORY ANALYSIS _____

Name & Grade: SODIUM NITRITE, A.C.S. Catalog Number: 5347 Lot Number: 944033 P.O./ Other Customer ID:

Date of Testing/Mfg: 07/14/94

This is to certify that units of the above mentioned lot number were tested and found to comply with the specifications of the grade listed. The following are the actual analytical results obtained:

Test	Unit	Result
APPEARANCE	PASS/FAIL	PASS-WHITE CRYSTS W/YEL TINT
ASSAY	%	99.5000
CALCIUM IN 🛠	8	0.0030
CHLORIDE	%	0.0020
FLUORIDE (F)	PPM	0.400
HEAVY METALS	Я	0.0003
IDENTIFICATION		PASS
INSOLUBLE MATTER	ኧ	0.0020
IRON	%	0.00030
POTASSIUM	%	0.00100
SULFATE (SO4)	%	0.0020

Approved by: Frederick H. Turk, or Edgar E. Hess, BPF Analytical QA Supv. FL Analytical QA Supv.

Date: 07/18/94 (Signed and dated original is on file)

NOTE: The data listed is valid for all package sizes of this lot of product, expressed as a extension of the catalog number listed above. If there are any questions with this certificate, please call Steven P. Davis, Analytical QA Manager, at (201) 703-3149.

Ref. No. 5347..944033.B1.

Location: FL

010110

SOUTHWEST RESEARCH INSTITUTE NUCLEAR PROJECT CLIENT: Division 20 TASK ORDER: 040521-5 SRR: 25943 SDG: 245101 CASE: CNWRA VTSR: May 20, 2004 PROJECT#: 06002.01.141

Pipette Calibrations

Book/page:

093 06

SwRI – Div. 01, Inorganic Labs' Adjustable Volume Pipette Verification Log

(Space provided for Inorganic Laboratories' Adjustable Volume Pipette Verification Spreadsheet) 010111

Women a. Maegel: 06/11/04 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					
ADJ1000-C	500					
	1000					
	100					
ADJ1000-D	500					
	1000					
	100					
ADJ1000-E	500					
	1000					
	100					
ADJ1000-F	500					
	1000					
	100	0.1019	0.1011	0.1020	0.102	101.67
ADJ1000-G	500	0.4943	0.4978	0.5000	0.497	99.47
	1000	1.0098	1.0072	1.0066	1.008	100.79
	100	0.0998	0.1000	0.0992	0.100	99.67
ADJ1000-H	500	0.4918	0.4936	0.4959	0.494	98.75
	1000	0.9820	0.9863	0.9876	0.985	98.53
	100	0.0991	0.1001	0.1003	0.100	99.83
ADJ1000-J	500	0.4967	0.4955	0.4965	0.496	99.25
	1000	0.9927	0.9936	0.9923	0.993	99.29
	100					
ADJ1000	500					
	1000					
	100					
ADJ1000-K	500					
	1000					

FRM-247b (Rev 2/Oct 03)

SwRI Div. 01 – Inorganic Laboratory Adjustable Pipette Verification Log010112

Balance #:		Thermometer #	·	diH20 Tempera	ture (° C)
	Eppendorf #	True Value (µL)	1 st Reading (g)	2 nd Reading (g)	3 rd Reading (g)
		100			
	ADJ1000-C	500			
		1000			
		100			
	ADJ1000-D	500		104	
		1000		ILL	
		100		Diet	
	ADJ1000-E	500	A	200	
		1000	241	<u>۷</u>	
		100	to.		
	ADJ1000-F	500			
000		. 1000			
		100	0.1019	0.1011	0.1020
	ADJ1000-G	500	D.4943	0.4978	0.5000
│╹╻ <u>┝</u>		1000	1,0098	1.0072	1. DOldo
3		100	0.0998	0.1000	0.0992
	ADJ1000-H	500	0.4918	0.4936	0.4959
100		1000	0.9820	0.9863	0.9816
		100	0.0991	0.1001	0.1003
	ADJ1000-J	500	0.4967	0.4955	0.4965
		1000	0.9927	0.9736	0,9923
	,	100			
	ADJ1000-K	500			4
┝──┣		1000		Dott	
		100	A	N	
	ADJ1000	500	tor'	·	
		1000	· · · · · · · · · · · · · · · · · · ·		

Nacaeli Analyst: Reviewed by:

Date: Date:

Book/page:_

06 093

SwRI – Div. 01, Inorganic Labs' Adjustable Volume Pipette Verification Log

(Space provided for Inorganic Laboratories' Adjustable Volume Pipette Verification Spreadsheet)

010113

Women a. Macgeli^{*} OG/11/04 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				I i i i i i i i i i i i i i i i i i i i	
ADJ1000-C	500					
	1000					
	100					
ADJ1000-D	500					
	1000					
	100					
ADJ1000-E	500					
	1000					
	100					
ADJ1000-F	500					
	1000					
	100	0.1019	0.1011	0.1020	0.102	101.67
ADJ1000-G	500	0.4943	0.4978	0.5000	0.497	99.47
	1000	1.0098	1.0072	1.0066	1.008	100.79
	100	0.0998	0.1000	0.0992	0.100	99.67
ADJ1000-H	500	0.4918	0.4936	0.4959	0.494	98.75
	1000	0.9820	0.9863	0.9876	0 .985	98.53
	100	0.0991	0.1001	0.1003	0.100	99.83
ADJ1000-J	500	0.4967	0.4955	0.4965	0.496	99.25
	1000	0.9927	0.9936	0.9923	0.993	99.29
	100					
ADJ1000	500					
	1000					
	100					
ADJ1000-K	500					
	1000					

FRM-247b (Rev 2/Oct 03)

ance #:	_ Thermometer #	·	diH20 Tempera	•
Eppendorf #	True Value (µL)	1 st Reading (g)	2 nd Reading (g)	3 rd Reading (g)
	100			
ADJ1000-C	500			
	1000			
	100			
ADJ1000-D	500		10	
	1000		litte	
	100		Diet	
ADJ1000-E	500		20	
	1000	1	V	
	100	to.		
ADJ1000-F	500			
	. 1000			
	100	0.1019	0.1011	0.1020
ADJ1000-G	500	D.4943	0.4978	0.5000
	1000	1,0098	1.0072	1. Doldo
	100	0.0998	0.1000	0.0992
ADJ1000-H	500	0.4918	0.4936	0.4957
	1000	0.9820	0.9863	0.98/16
	100	0.0991	0.1001	0.1003
ADJ1000-J	500	0.4967	0.4955	0.4965
	1000	0.9927	0.9936	0.9923
	100	*		
ADJ1000-K	500			<u>by</u>
	1000		Dott	Y I
	100	1 A	N	
ADJ1000	500	tot!		· · · · · · · · · · · · · · · · · · ·
	1000	×		+

Maggeli-Analyst: Reviewed by:

SwRI - Div. 01, Inorganic Labs' Adjustable Volume Pipette Verification Log

(Space provided for Inorganic Laboratories' Adjustable Volume Pipette Verification Spreadsheet)

010115

Warran a. Maegeli Dle/11/04

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					
ADJ5000-C	2500					
	5000					
	500					
ADJ5000-G	2500					
	5000					
	500				[
ADJ5000-H	2500					[
	5000					
	500					
ADJ5000-I	2500					[
	5000					
	500	0.5006	0.5040	0.5058	0.503	100.69
ADJ5000-J	2500	2.4968	2.4974	2.4999	2.498	99.92
	5000	4.9870	4.9977	4.9976	4.994	99.88
	500	0.4948	0.4954	0.4962	0.495	99.09
ADJ5000-K	2500	2.4969	2.4949	2.4960	2.496	99.84
	5000	5.0356	5.0067	5.0094	5.017	100.34
	500	0.5017	0.5005	0.5019	0.501	100.27
ADJ5000-L	2500 5000	2.4897 4.9800	2.4897 4.9833	2.4894	2.490 4.984	99.58 99.67
		4.9800	4.9833	4.9877	4.904	99.07
	500					
ADJ5000	2500 5000					
	500					
ADJ5000	2500 5000					
	500					
ADJ5000	2500					
	5000					
	500					
ADJ5000-M	2500					
	5000					

FRM-247c (Rev 2/Mar 03)

SwRI Div. 01 – Inorganic Laboratory Adjustable Pipette Verification Log 010116

diH20 Temperature (° C)_ Thermometer #: Balance #: . . 2nd Reading (g) 3rd Reading (g) 1st Reading (g) Eppendorf # True Value (µL) 500 ADJ5000-C 2500 5000 500 ADJ5000-G 2500 5000 500 ADJ5000-H 2500 5000 500 ADJ5000-I 2500 5000 0.5006 0.5040 0.5058 500 5000 4974 2.4999 ADJ5000-J 4968 2500 5 5000 .9977 9870 .9976 4 4948 4962 0.4954 500 ADJ5000-K 4949 2500 491,6 49100 1 5000 0356 ,006 0094 500 5005 5019 5017 4897 ADJ5000-L 2500 489 4294 500 5000 9833 98 L 9800 500 ADJ5000-M 2500 5000 500 ADJ5000-N 2500 5000 500 ADJ5000 2500 5000 500 ADJ5000 2500 5000

aggol Analyst: Reviewed by:

Date: ()/Date:

FRM-244 (c) (Rev 3/Apr 04)

				Book/pa	_{ge:} 06 098
	SwRI Div. 01	– Inorganic Labor	atory Adjustable	e Pipette Verifica	ation Log 01011
Ba	lance #:	Thermometer #	: Croit	diH20 Tempera	ture (° C)
Г	Eppendorf #	True Value (µL)	1 st Reading (g)	2 nd Reading (g)	3 rd Reading (g)
		100			
	ADJ1000-C	500			
		1000			
-		100			
	ADJ1000-D	500		1.104	
		1000		. 15	
	· · · · · · · · · · · · · · · · · · ·	100	eta		
	ADJ1000-E	500	ti di	X	
[1000			
		100			
O	ADJ1000-F	500			
000		1000			
2	·	100	0.0987	0.0989	0.0484
	ADJ1000-G	500	0.5034	0.5041	0.5009
".[1000	0.9925	0.4884	0.9907
		100	0.0990	0.09,45	0.0483
	ADJ1000-H	500	0.44138	0.44760	04941
100		1000	1.0006	<u> </u>	0.9711
$\left \begin{array}{c} \\ \end{array} \right $		100	0.0984	0.0011	0.0.7.14
	ADJ1000-J	500	0.5005	0.562	<u>0.5013</u>
	•	1000	1.0041	1.003	1.00.26
		100			
	ADJ1000-K	500	ļ	the second	
		1000		21/24	
	<u></u>	100	.1-1-		
	ADJ1000	500			
		1000			

Analyst Reviewed by

Date: 6/21/04 04 Date:

7

SwRI – Div. 01, Inorganic Labs' Adjustable Volume Pipette Verification Log

(Space provided for Inorganic Laboratories' Adjustable Volume Pipette Verification Spreadsheet)

010118

6/21/04

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	0.0987	0.0989	0.0984	0.099	98.67
ADJ1000-G	500	0.5034	0.5047	0.5009	0.503	100.60
	1000	0.9925	0.9884	0.9907	0.991	99.05
	100	0.0990	0.0985	0.0983	0.099	98.60
ADJ1000-H	500	0.4938	0.4960	0.4941	0.495	98.93
	1000	1.0006	1.0019	0.9991	1.001	100.05
	100	0.0986	0.0997	0.0994	0.099	99.23
ADJ1000-J	500	0.5005	0.5021	0.5013	0.501	100.26
	1000	1.0041	1.0031	1.0026	1.003	100.33
	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

FRM-247b (Rev 2/Oct 03)

010120

Book/page: 06 158 SwRI Div. 01 – Inorganic Laboratory Adjustable Pipette Verification Log

Balance #: _____ 4 6

Thermometer #:_ Goii

diH20 Temperature (° C) 2

2nd Reading (g) 3rd Reading (g) 1st Reading (g) True Value (µL) Eppendorf # 500 ADJ5000-C 2500 5000 500 ADJ5000-G 2500 5000 500 J-ADJ5000-H 2500 5000 500 ADJ5000-I 2500 5000 500 .5044 0.5020 0.50% 5000 2.5021 5.0183 25104 ADJ5000-J 2500 2.5087 5.0327 5000 5,0216 0.49.59 500 0.4417 0.4967 ADJ5000-K 2500 50106 2.5013 25039 5.0391 5.0283 5000 5.0327 500 0.5047 0.5037 0.5011 ADJ5000-L 2.4905 2.4889 2.4922 2500 500 5000 5.0511 5.0481 5.0496 500 ADJ5000-M 2500 5000 102 500 $\left| \mathcal{F} \right|$ ADJ5000-N 2500 5000 500 ADJ5000 2500 5000 500 ADJ5000 2500 5000

Analyst Reviewed by:

Date: $\frac{6}{7/7}$

FRM-244 (c) (Rev 3/Apr 04)

Book/page:_

06 157

SwRI – Div. 01, Inorganic Labs' Adjustable Volume Pipette Verification Log

(Space provided for Inorganic Laboratories' Adjustable Volume Pipette Verification Spreadsheet)

Ć 6/21/04

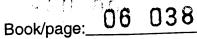
010122

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	0.5044	0.5020	0.5036	0.503	100.67
ADJ5000-J	2500	2.5087	2.5021	2.5104	2.507	100.28
	5000	5.0216	5.0183	5.0227	5.021	100.42
	500	0.4917	0.4959	0.4967	0.495	98.95
ADJ5000-K	2500	2.5066	2.5013	2.5039	2.504	100.16
	5000	5.0327	5.0391	5.0283	5.033	100.67
	500	0.5047	0.5011	0.5032	0.503	100.60
ADJ5000-L	2500	2.4905	2.4889	2.4922	2.491	99.62
	5000	5.0511	5.0481	5.0496	5.050	100.99
	500				0.000	0.00
ADJ5000	2500			,	0.000	0.00
	5000	· ·			0.000	0.00
	500				0.000	0.00
ADJ5000	2500				0.000	0.00
	5000				0.000	0.00
	500				0.000	0.00
ADJ5000	2500				0.000	0.00
	5000				0.000	0.00
	500				0.000	0.00
ADJ5000	2500				0.000	0.00
	5000				0.000	0.00

FRM-247c (Rev 2/Mar 03)

010124



SwRI Div. 01 – Inorganic Laboratory Adjustable Pipette Verification Log

Bal	lance #:6	Thermometer #		diH20 Tempera	
Г	Eppendorf #	True Value (µL)	1 st Reading (g)	2 nd Reading (g)	3 rd Reading (g)
		20	•		
F	ADJ200-A	100			
F		200			
f		20		102-101	
·	ADJ200-C	100		621	
F		200	h		
F		20		.	
, t	ADJ200-D	100			
3		200			
		20	0,0205	0.0203	0.0204
200	ADJ200-G	100	0.0996	0.1011	0.1021
N		200	0.1986	0.1974	0.2003
		20		10	
	ADJ200-H	100	POULD	NOT EIND	
L		200			
20		20	0.0202	0.0203	0.0202
2	ADJ200-J	100	0.0991	0.1005	0.0989
		200	0.2013	0.2041	0.2027
		20	-		
	ADJ200-K	100		- intot -	
		200		02104	
		20		FT	
	ADJ200	100			
		200			1

Analyst: Reviewed by:

Date: Date:

Book/page:_

06 037

SwRI – Div. 01, Inorganic Labs' Adjustable Volume Pipette Verification Log

(Space provided for Inorganic Laboratories' Adjustable Volume Pipette Verification Spreadsheet)

010125

6/21/04

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				0.000	0.00
ADJ200-A	100				0.000	0.00
	200				0.000	0.00
	20				0.000	0.00
ADJ200-C	100				0.000	0.00
	200				0.000	. 0.00
	20				0.000	0.00
ADJ200-D	100				0.000	0.00
	200				0.000	0.00
	20	0.0205	0.0203	0.0204	0.020	102.00
ADJ200-G	100	0.0996	0.1011	0.1021	0.101	100.93
	200	0.1986	0.1974	0.2003	0.199	99.38
	20				0.000	0.00
ADJ200-H	100				0.000	0.00
	200				0.000	0.00
	20	0.0202	0.0203	0.0202	0.020	101.17
ADJ200-J	100	0.0991	0.1005	0.0989	0.100	99.50
	200	0.2013	0.2041	0.2027	0.203	101.35
	20	•			0.000	0.00
ADJ200	100				0.000	0.00
	200				0.000	0.00
	20				0.000	0.00
ADJ200	100				0.000	0.00
	200				0.000	0.00
	20				0.000	0.00
ADJ200	100				0.000	0.00
	200				0.000	0.00

FRM-247a (Rev 3/Oct 03)

SOUTHWEST RESEARCH INSTITUTE NUCLEAR PROJECT CLIENT: Division 20 TASK ORDER: 040521-5 SRR: 25943 SDG: 245101 CASE: CNWRA VTSR: May 20, 2004 PROJECT#: 06002.01.141

Balance Calibrations

Southwest Research Institute[®] Division 01 BALANCE VERIFICATION LOG

BALANCE #:	LOCATION:	SERIAL #:	TOLERANCE:	COMMENTS:
16	Bldg. 70 Lab 27	P37987	±0.0005	
Date	Std Wt (g)	Recorded Wt (g)	Operator	JN: 99 - JS0526-15
6-3-04	2.0000	1.9999	KE	*
6-4-04	2.0000	2.0000	KE	N
6-7-04	2.0000	2.0000	KE	~
6-8-04	2.0000	2.0000	KE	N
6-9-04	2.0000	2.0000	KE	N
6-10-04	2.0000	2.0000	ILE	~
6-11-04	2.0000	2,0000	KE	~
6/1				

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.

6/11/04

6/11/04

Page 1 of 30

FRM-112 (Rev 2/Aug 03)

010127

Southwest Research Institute Division 01 BALANCE VERIFICATION LOG

BALANCE #:	LOCATION:	SERIAL #:	TOLERANCE:	COMMENTO
12	Bldg. 70 Lab 27	1122510787	±0.0005	COMMENTS:
Date	Std Wt (g)	Recorded Wt (g)	Operator	
6-17-04	2.0000	2.0000	KE	5N: 19-J50526 15
4-18-04	2.0000	2.0000	KE	JN: 17-J30526 75
6-21-04	2,0000	2.0000	KE	<u> </u>
6-22-04	2.0000	2.0601	KE	N
6-23-04	2.0000	2-6000	KE	
6-24-04	2.0000	2.0000	KE	~
6-25-04	2.0000	1,9999	de la	~ //
6-26-04	2.0000	2.0000	46	N
628-04	5.0000	2.0000	Oie	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
6.29.00	2-0000	2,0000	KE	r

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.

Page 2 of 30

FRM-112 (Rev 2/Aug 03)

010128

SOUTHWEST RESEARCH INSTITUTE NUCLEAR PROJECT CLIENT: Division 20 TASK ORDER: 040521-5 SRR: 25943 SDG: 245101 CASE: CNWRA VTSR: May 20, 2004 PROJECT#: 06002.01.141

DI Water Verification

D.I. WATER SYSTEM NOTEBOOK SOUTHWEST RESEARCH INSTITUTE BUILDING 70



Contact U.S. Filter (1-800-466-7873) for repairs/exchanges. (Make sure to have a P.O.)

HIGH PURITY SYSTEM (HP)

010130

		RESISTIVITY	MONITOR	QC LI	GHTS	USAGE ^	
DATE / TIME	INITIALS	(M OHMS)	QC LT.	QC 1	QC 2	(GALS)	COMMENTS
Staylou Goopm	DR	18.04	V	V	J	1903.8	ALLOK
125/04 6:491M	DR	18,64	L	レ	ν	1946,3	
5/26/04 G.VIAM	DR	16.04	~	V	$\boldsymbol{\mathcal{V}}$	1974.6	L
Statley Risten	OR	15,04	V	V	L	199 2.2	
chilor 649m	OR	18,04	L		u	2012,0	
6/2/04 6.16pm	DR	18,04		V	-	2029,5	
6/3/04 6:20 pm	DR	18.04	レ	~	$\overline{}$	2044,4	<u> </u>
6/4/04 Sitsom	DR	18,04	V	V	$\overline{\mathcal{V}}$	20547	
6/7/04 5.53 pm	OR	15.05	V	V	~	2072.0	
618/04 J.Stim	DR	18.05	5	V	\checkmark	2086,5	
19/04 7:10pm	DR	18.04	\checkmark	V	V	2123,7	
Glisloy 7:30 m	DR	18.05	$ $	V	-	2136,8	12
Glulay Gilson	DR	15.04		L	~	2145,4	~ ~
6/14/04 6:20pm		18.05		1		2156.2	12
6115164 5.180m		18.04			V	2170.2	
4116/14 70M	DR	18.05		2		2187.0	

Legend: Check = Green (OK); X = Red (call for service)

LOW PURITY SYSTEM (LP)

		QC LI	GHTS	USAGE	
DATE / TIME	INITIALS	QC 1	QC 2	(GALS)	COMMENTS
stayloy Giodom	pR	V(14,5)	\checkmark	910.7	RUUL
Startley Ciygon	DR	v (15,0)		911.6	V
Elogloy Gillom	OK	V (15.0)		912.1	
5/22/04 8:561M	DR	- (15,0)	レ	912.3	
6/1/64 6:490m	DR	V (15.0)	V	912,9	
clador Gillom	PR	V (16.0)	\checkmark	913,7	
6/3/04 Gidoom	DR	V (16.5)	~	913.9	
614/04 5:430M	DR	1/16.5)	5	914.0	
6/7/04 5:530m	DR	V (1.0)		914.0	
Gloloy Pistom	DR	× (18,1)		914,5	need to rall USE: 1tur P.O.
GI9/64 Dilopr	pR	X	(17.5)	915.0	nul P.O.
Glidley 7:30pm	DR	X	(17.5) V	925.1	P.O. Regived. USFilter walked
Gluber 6:18 pm	DR	X	(125) ~	917.3	Sneed V.O
6/14/04 6:200 m	PR		(14,0)	920.5	trank Filter Anchange. All OK.
Glishy Silkom	DR		(15.6)	921.7	
6/16/04 2pm	PiR		(15,5) V	923.2	1

Legend: Check = Green (OK); X = Red (call for service)

FRM-019 (Rev 0/Jan 04)

D.I. WATER SYSTEM NOTEBOOK SOUTHWEST RESEARCH INSTITUTE BUILDING 70



Contact U.S. Filter (1-800-466-7873) for repairs/exchanges. (Make sure to have a P.O.) 010131

HIGH PURITY SYSTEM (HP)

		RESISTIVITY	MONITOR	QC LI	GHTS	USAGE	T
DATE / TIME	INITIALS	(M OHMS)	QC LT.	QC 1	QC 2	(GALS)	COMMENTS
6/17/04 5:380m	OR	18.04	V	レ	\checkmark	2190,5	-
6/18/14 6:30pm	OR	18.06	L	-)	2199,8	
6/21/04 Sillom	DR	18.05	L	J)	2239,7	<u> </u>
abolog station	DR	18.05	\mathcal{L}	\mathcal{L}	\checkmark	2763,3	$\overline{}$
Way Sistem	DR	18.05	V	~	V	2307.8	
6124/04 2:15m	Ju	18.04	>	١		2320.8	
6/25/04 4:391	Der	18.07	~		\checkmark	2380.5	V
6/28/14 30m	Opr	18.05	V		\checkmark	2522.7	L
Waglay Gildon	OR	18.04	L	V	\checkmark	2607.8	\sim
4/30/14 Rom	DR	18,03	5	V	\mathcal{L}	2666,7	
Floy 4520M	DR	18,03	V	V	\checkmark	2694,6	
Add F. Joh	DR	15.04	L	V	\checkmark	2745.6	~
		RS	2				

Legend: Check = Green (OK); X = Red (call for service)

LOW PURITY SYSTEM (LP)

		QC L	IGHTS	USAGE	
DATE / TIME IN	ITIALS	QC 1	QC 2	(GALS)	COMMENTS
6/12/04 51380m	OR	>	(15) U	923.3	
6/18/04 6:300m	DR	\checkmark	(15.5)	923.4	
Glarloy Station	DR	レ	(16)	923.6	
6/22/04 Sillom	DR	С С	(16.5) V	923.8	<u> </u>
GOSTOY SISCOM	PR	X	(17) V	929,5	rul 1.0, call USFilter
6 24/04 2:4700	Sw	X	(17.5) V	930.2	M: Filter called (Reidlo)
6/25/04 4:41pm	De	X	(18) ~	930.4	Waiting on U.S. Filter
Glasloy 3pm	Opr		(15,5)	935,6	tranklinch Angel All oK.
6129/04 6:130m	pR	\checkmark	(15.5) ~	935.8	
Gladiy Rom	DR	V	(16)	936.1	
7/1/64 4:50m	DR	\checkmark	(14) /	936.3	
Ma LEIF YOLEF	DR	\checkmark	(16.5) V	955.4	
		QSS			

Legend: Check = Green (OK); X = Red (call for service)

FRM-019 (Rev 0/Jan 04)

010001

SOUTHWEST RESEARCH INSTITUTE NUCLEAR PROJECT CLIENT: Division 20 TASK ORDER: 040521-6 SRR: 25943 SDG: 245108 CASE: CNWRA VTSR: May 20, 2004 PROJECT#: 06002.01.141

FINAL REPORT

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 245108

010002

Client: Division 20

Date Received: 05/20/04

Project No.: 20.06002.01.141

Sample ID Cation 1A

SRR: 25943

TO: 040521-6

	Sample	Reporting
Analysis	Result (mg/L)	Limit (mg/L)
Aluminum	< 0.05	0.05
Antimony	< 0.02	0.02
Arsenic	0.006	0.005
Barium	0.011	0.005
Beryllium	< 0.005	0.005
Bismuth	<0.01	0.01
Boron	0.145	0.05
Cadmium	< 0.005	0.005
Calcium	13.6	0.05
Chromium	< 0.015	0.015
Cobalt	< 0.005	0.005
Copper	< 0.005	0.005
Iron	<0.1	0.1
Lanthanum	< 0.005	0.005
Lead	< 0.005	0.005
Lithium	0.042	0.01
Magnesium	1.34	0.05
Manganese	< 0.005	0.005
Molybdenum	< 0.01	0.01
Nickel	< 0.01	0.01
Palladium	< 0.005	0.005
Phosphorus	< 0.02	0.02
Potassium	3.59	0.2
Selenium	< 0.015	0.015
Silicon	19.7	0.05
Silver	< 0.005	0.005
Sodium	51.7	0.2
Strontium	0.075	0.005
Sulfur	9.43	0.05
Thallium	< 0.02	0.02
Thorium	< 0.015	0.015
Tin	< 0.01	0.01
Titanium	< 0.005	0.005
Tungsten	< 0.01	0.01
Uranium	<0.1	0.1
Vanadium	0.013	0.005
Yttrium	< 0.005	0.005
Zinc	< 0.005	0.005
Zirconium	< 0.005	0.005

PAGE 1 OF 13

SOUTHWEST RESEARCH INSTITUTE DUPLICATE SUMMARY

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 245108

010003

Client: Division 20

Date Received: 05/20/04

Project No.: 20.06002.01.141

Sample ID Cation 1A

SRR: 25943

TO: 040521-6

	Sample	Duplicate	
Analysis	Result (mg/L)	Result (mg/L)	RPD
Aluminum	< 0.05	< 0.05	0.00%
Antimony	< 0.02	< 0.02	0.00%
Arsenic	0.006	0.009	32.9%
Barium	0.011	0.010	2.39%
Beryllium	< 0.005	< 0.005	0.00%
Bismuth	< 0.01	< 0.01	0.00%
Boron	0.145	0.140	3.57%
Cadmium	< 0.005	< 0.005	0.00%
Calcium	13.6	13.2	2.87%
Chromium	< 0.015	<0.015	0.00%
Cobalt	< 0.005	< 0.005	0.00%
Copper	< 0.005	< 0.005	0.00%
Iron	<0.1	<0.1	0.00%
Lanthanum	< 0.005	< 0.005	0.00%
Lead	< 0.005	< 0.005	0.00%
Lithium	0.042	0.043	1.90%
Magnesium	1.34	1.31	2.74%
Manganese	< 0.005	< 0.005	0.00%
Molybdenum	< 0.01	< 0.01	0.00%
Nickel	< 0.01	< 0.01	0.00%
Palladium	< 0.005	< 0.005	0.00%
Phosphorus	< 0.02	< 0.02	0.00%
Potassium	3.59	3.58	0.31%
Selenium	< 0.015	< 0.015	0.00%
Silicon	19.7	19.1	2.96%
Silver	< 0.005	< 0.005	0.00%
Sodium	51.7	51.8	0.15%
Strontium	0.075	0.073	2.71%
Sulfur	9.43	9.20	2.41%
Thallium	< 0.02	< 0.02	0.00%
Thorium	< 0.015	< 0.015	0.00%
Tin	<0.01	< 0.01	0.00%
Titanium	< 0.005	< 0.005	0.00%
Tungsten	< 0.01	< 0.01	0.00%
Uranium	<0.1	<0.1	0.00%
Vanadium	0.013	0.013	1.51%
Yttrium	< 0.005	< 0.005	0.00%
Zinc	< 0.005	< 0.005	0.00%
Zirconium	< 0.005	< 0.005	0.00%

PAGE 2 OF 13

SOUTHWEST RESEARCH INSTITUTE MATRIX SPIKE SUMMARY

010004

Sample ID Cation 1A

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 245108

Client: Division 20

Date Received: 05/20/04

Project No.: 20.06002.01.141

SRR: 25943

TO: 040521-6

	Sample	Spike	Spike	
Analysis	Result (mg/L)	Result (mg/L)	Added (mg/L)	Recovery
Aluminum	< 0.05	1.94	2	97.0%
Antimony	< 0.02	0.501	0.5	100.3%
Arsenic	0.006	2.03	2	101.1%
Barium	0.011	2.01	2	99.9%
Beryllium	< 0.005	0.049	0.05	97.8%
Bismuth	NA	NA	NA	NA
Boron	NA	NA	NA	NA
Cadmium	< 0.005	0.049	0.05	98.4%
Calcium	13.6	33.8	20	100.9%
Chromium	< 0.015	0.195	0.2	97.6%
Cobalt	< 0.005	0.498	0.5	99.6%
Copper	< 0.005	0.251	0.25	100.5%
Iron	<0.1	1.06	1	106.0%
Lanthanum	NA	NA	NA	NA
Lead	< 0.005	0.494	0.5	98.8%
Lithium	NA	NA	NA	NA
Magnesium	1.34	21.8	20	102.1%
Manganese	< 0.005	0.501	0.5	100.1%
Molybdenum	NA	NA	NA	NA
Nickel	< 0.01	0.482	0.5	96.5%
Palladium	NA	NA	NA	NA
Phosphorus	NA	NA	NA	NA
Potassium	3.59	24.1	20	102.8%
Selenium	< 0.015	2.17	2	108.6%
Silicon	NA	NA	NA	NA
Silver	< 0.005	0.050	0.05	100.9%
Sodium	51.7	72.1	20	102.0%
Strontium	NA	NA	NA	NA
Sulfur	NA	NA	NA	NA
Thallium	< 0.02	2.08	2	104.0%
Thorium	NA	NA	NA	NA
Tin	NA	NA	NA	NA
Titanium	NA	NA	NA	NA
Tungsten	NA	NA	NA	NA
Uranium	NA	NA	NA	NA
Vanadium	0.013	0.507	0.5	98.8%
Yttrium	NA	NA	NA	NA
Zinc	< 0.005	0.508	0.5	101.7%
Zirconium	NA	NA	NA	NA

NA- Not Applicable.

PAGE 3 OF 13

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 245109

Sample ID Cation 2A

Client: Division 20

Date Received: 05/20/04

Project No.: 20.06002.01.141

SRR: 25943

TO: 040521-6

	Sample	Reporting
Analysis	Result (mg/L)	Limit (mg/L)
Aluminum	0.084	0.05
Antimony	< 0.02	0.02
Arsenic	0.017	0.005
Barium	0.007	0.005
Beryllium	< 0.005	0.005
Bismuth	< 0.01	0.01
Boron	0.167	0.05
Cadmium	< 0.005	0.005
Calcium	6.69	0.05
Chromium	< 0.015	0.015
Cobalt	< 0.005	0.005
Copper	< 0.005	0.005
Iron	<0.1	0.1
Lanthanum	< 0.005	0.005
Lead	< 0.005	0.005
Lithium	0.089	0.01
Magnesium	0.550	0.05
Manganese	< 0.005	0.005
Molybdenum	< 0.01	0.01
Nickel	< 0.01	0.01
Palladium	< 0.005	0.005
Phosphorus	0.033	0.02
Potassium	2.76	0.2
Selenium	< 0.015	0.015
Silicon	25.6	0.05
Silver	< 0.005	0.005
Sodium	77.2	0.2
Strontium	0.031	0.005
Sulfur	7.36	0.05
Thallium	< 0.02	0.02
Thorium	< 0.015	0.015
Tin	< 0.01	0.01
Titanium	< 0.005	0.005
Tungsten	< 0.01	0.01
Uranium	<0.1	0.1
Vanadium	< 0.005	0.005
Yttrium	< 0.005	0.005
Zinc	<0.005	0.005
Zirconium	< 0.005	0.005

PAGE 4 OF 13

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 245110

Sample ID

Client: Division 20

Date Received: 05/20/04

Project No.: 20.06002.01.141

Cation 3A

SRR: 25943

TO: 040521-6

	Sample	Reporting
Analysis	Result (mg/L)	Limit (mg/L)
Aluminum	< 0.05	0.05
Antimony	< 0.02	0.02
Arsenic	0.007	0.005
Barium	0.011	0.005
Beryllium	< 0.005	0.005
Bismuth	< 0.01	0.01
Boron	0.141	0.05
Cadmium	< 0.005	0.005
Calcium	13.6	0.05
Chromium	< 0.015	0.015
Cobalt	< 0.005	0.005
Copper	< 0.005	0.005
Iron	<0.1	0.1
Lanthanum	< 0.005	0.005
Lead	< 0.005	0.005
Lithium	0.044	0.01
Magnesium	1.34	0.05
Manganese	< 0.005	0.005
Molybdenum	< 0.01	0.01
Nickel	< 0.01	0.01
Palladium	< 0.005	0.005
Phosphorus	0.027	0.02
Potassium	3.71	0.2
Selenium	< 0.015	0.015
Silicon	19.6	0.05
Silver	< 0.005	0.005
Sodium	52.8	0.2
Strontium	0.075	0.005
Sulfur	9.46	0.05
Thallium	< 0.02	0.02
Thorium	< 0.015	0.015
Tin	0.017	0.01
Titanium	< 0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	0.013	0.005
Yttrium	< 0.005	0.005
Zinc	< 0.005	0.005
Zirconium	< 0.005	0.005

PAGE 5 OF 13

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 245111

Sample ID Cation 4A

Client: Division 20

Date Received: 05/20/04

Project No.: 20.06002.01.141

SRR: 25943

TO: 040521-6

	Sample	Reporting
Analysis	Result (mg/L)	Limit (mg/L)
Aluminum	0.396	0.05
Antimony	< 0.02	0.02
Arsenic	0.010	0.005
Barium	0.008	0.005
Beryllium	< 0.005	0.005
Bismuth	< 0.01	0.01
Boron	0.171	0.05
Cadmium	< 0.005	0.005
Calcium	6.97	0.05
Chromium	< 0.015	0.015
Cobalt	< 0.005	0.005
Copper	< 0.005	0.005
Iron	0.138	0.1
Lanthanum	< 0.005	0.005
Lead	< 0.005	0.005
Lithium	0.093	0.01
Magnesium	0.604	0.05
Manganese	< 0.005	0.005
Molybdenum	< 0.01	0.01
Nickel	< 0.01	0.01
Palladium	< 0.005	0.005
Phosphorus	0.039	0.02
Potassium	2.89	0.2
Selenium	< 0.015	0.015
Silicon	27.0	0.05
Silver	< 0.005	0.005
Sodium	80.3	0.2
Strontium	0.033	0.005
Sulfur	7.42	0.05
Thallium	< 0.02	0.02
Thorium	< 0.015	0.015
Tin	0.023	0.01
Titanium	< 0.005	0.005
Tungsten	< 0.01	0.01
Uranium	<0.1	0.1
Vanadium	< 0.005	0.005
Yttrium	< 0.005	0.005
Zinc	< 0.005	0.005
Zirconium	< 0.005	0.005

PAGE 6 OF 13

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 245112

Sample IN 100C8

Client: Division 20

Date Received: 05/20/04

Project No.: 20.06002.01.141

SRR: 25943

TO: 040521-6

	Sample	Reporting
Analysis	Result (mg/L)	Limit (mg/L)
Aluminum	< 0.05	0.05
Antimony	< 0.02	0.02
Arsenic	< 0.005	0.005
Barium	< 0.005	0.005
Beryllium	< 0.005	0.005
Bismuth	< 0.01	0.01
Boron	< 0.05	0.05
Cadmium	< 0.005	0.005
Calcium	10.0	0.05
Chromium	< 0.015	0.015
Cobalt	< 0.005	0.005
Copper	< 0.005	0.005
Iron	10.1	0.1
Lanthanum	< 0.005	0.005
Lead	< 0.005	0.005
Lithium	< 0.01	0.01
Magnesium	9.84	0.05
Manganese	< 0.005	0.005
Molybdenum	< 0.01	0.01
Nickel	< 0.01	0.01
Palladium	< 0.005	0.005
Phosphorus	< 0.02	0.02
Potassium	9.08	0.2
Selenium	< 0.015	0.015
Silicon	< 0.05	0.05
Silver	< 0.005	0.005
Sodium	8.94	0.2
Strontium	< 0.005	0.005
Sulfur	< 0.05	0.05
Thallium	< 0.02	0.02
Thorium	< 0.015	0.015
Tin	< 0.01	0.01
Titanium	< 0.005	0.005
Tungsten	< 0.01	0.01
Uranium	<0.1	0.1
Vanadium	< 0.005	0.005
Yttrium	< 0.005	0.005
Zinc	< 0.005	0.005
Zirconium	< 0.005	0.005

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 245113

010009 Sample ID

Client: Division 20

Date Received: 05/20/04

Project No.: 20.06002.01.141

Cation 6A

SRR: 25943

TO: 040521-6

	Sample	Reporting
Analysis	Result (mg/L)	Limit (mg/L)
Aluminum	0.075	0.05
Antimony	0.096	0.02
Arsenic	0.092	0.005
Barium	0.101	0.005
Beryllium	0.097	0.005
Bismuth	< 0.01	0.01
Boron	< 0.05	0.05
Cadmium	0.100	0.005
Calcium	9.96	0.05
Chromium	0.097	0.015
Cobalt	0.099	0.005
Copper	0.096	0.005
Iron	10.1	0.1
Lanthanum	< 0.005	0.005
Lead	0.099	0.005
Lithium	< 0.01	0.01
Magnesium	9.77	0.05
Manganese	0.101	0.005
Molybdenum	0.092	0.01
Nickel	0.098	0.01
Palladium	< 0.005	0.005
Phosphorus	< 0.02	0.02
Potassium	8.99	0.2
Selenium	0.094	0.015
Silicon	< 0.05	0.05
Silver	0.100	0.005
Sodium	8.91	0.2
Strontium	9.91	0.005
Sulfur	< 0.05	0.05
Thallium	0.103	0.02
Thorium	0.091	0.015
Tin	< 0.01	0.01
Titanium	< 0.005	0.005
Tungsten	< 0.01	0.01
Uranium	<0.1	0.1
Vanadium	0.098	0.005
Yttrium	< 0.005	0.005
Zinc	0.099	0.005
Zirconium	< 0.005	0.005

PAGE 8 OF 13

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 245114

010010 Sample ID

Client: Division 20

Date Received: 05/20/04

Project No.: 20.06002.01.141

Cation 7A

SRR: 25943

TO: 040521-6

	Sample	Reporting
Analysis	Result (mg/L)	Limit (mg/L)
Aluminum	< 0.05	0.05
Antimony	< 0.02	0.02
Arsenic	< 0.005	0.005
Barium	< 0.005	0.005
Beryllium	< 0.005	0.005
Bismuth	< 0.01	0.01
Boron	< 0.05	0.05
Cadmium	< 0.005	0.005
Calcium	< 0.05	0.05
Chromium	< 0.015	0.015
Cobalt	< 0.005	0.005
Copper	< 0.005	0.005
Iron	<0.1	0.1
Lanthanum	< 0.005	0.005
Lead	< 0.005	0.005
Lithium	< 0.01	0.01
Magnesium	< 0.05	0.05
Manganese	< 0.005	0.005
Molybdenum	< 0.01	0.01
Nickel	< 0.01	0.01
Palladium	< 0.005	0.005
Phosphorus	< 0.02	0.02
Potassium	<0.2	0.2
Selenium	< 0.015	0.015
Silicon	< 0.05	0.05
Silver	< 0.005	0.005
Sodium	<0.2	0.2
Strontium	< 0.005	0.005
Sulfur	< 0.05	0.05
Thallium	< 0.02	0.02
Thorium	< 0.015	0.015
Tin	<0.01	0.01
Titanium	< 0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	< 0.005	0.005
Yttrium	< 0.005	0.005
Zinc	< 0.005	0.005
Zirconium	< 0.005	0.005

PAGE 9 OF 13

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 245115

010011

Sample ID Cation 8A

Client: Division 20

Date Received: 05/20/04

Project No.: 20.06002.01.141

SRR: 25943

TO: 040521-6

	Sample	Reporting
Analysis	Result (mg/L)	Limit (mg/L)
Aluminum	0.336	0.05
Antimony	< 0.02	0.02
Arsenic	0.005	0.005
Barium	0.012	0.005
Beryllium	< 0.005	0.005
Bismuth	< 0.01	0.01
Boron	0.142	0.05
Cadmium	< 0.005	0.005
Calcium	14.0	0.05
Chromium	< 0.015	0.015
Cobalt	< 0.005	0.005
Copper	< 0.005	0.005
Iron	0.182	0.1
Lanthanum	< 0.005	0.005
Lead	< 0.005	0.005
Lithium	0.043	0.01
Magnesium	1.42	0.05
Manganese	< 0.005	0.005
Molybdenum	< 0.01	0.01
Nickel	< 0.01	0.01
Palladium	< 0.005	0.005
Phosphorus	0.037	0.02
Potassium	3.69	0.2
Selenium	< 0.015	0.015
Silicon	20.7	0.05
Silver	< 0.005	0.005
Sodium	52.3	0.2
Strontium	0.077	0.005
Sulfur	9.50	0.05
Thallium	< 0.02	0.02
Thorium	< 0.015	0.015
Tin	< 0.01	0.01
Titanium	< 0.005	0.005
Tungsten	< 0.01	0.01
Uranium	<0.1	0.1
Vanadium	0.014	0.005
Yttrium	< 0.005	0.005
Zinc	<0.005	0.005
Zirconium	<0.005	0.005

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: 245116

010012

Client: Division 20

Date Received: 05/20/04

Project No.: 20.06002.01.141

Sample ID Cation 9A

SRR: 25943

TO: 040521-6

	Sample	Reporting
Analysis	Result (mg/L)	Limit (mg/L)
Aluminum	0.498	0.05
Antimony	< 0.02	0.02
Arsenic	< 0.005	0.005
Barium	0.008	0.005
Beryllium	< 0.005	0.005
Bismuth	< 0.01	0.01
Boron	0.172	0.05
Cadmium	< 0.005	0.005
Calcium	7.31	0.05
Chromium	< 0.015	0.015
Cobalt	< 0.005	0.005
Copper	< 0.005	0.005
Iron	0.167	0.1
Lanthanum	< 0.005	0.005
Lead	< 0.005	0.005
Lithium	0.100	0.01
Magnesium	0.640	0.05
Manganese	< 0.005	0.005
Molybdenum	< 0.01	0.01
Nickel	< 0.01	0.01
Palladium	< 0.005	0.005
Phosphorus	0.039	0.02
Potassium	2.96	0.2
Selenium	< 0.015	0.015
Silicon	27.8	0.05
Silver	< 0.005	0.005
Sodium	85.3	0.2
Strontium	0.036	0.005
Sulfur	7.57	0.05
Thallium	< 0.02	0.02
Thorium	< 0.015	0.015
Tin	0.027	0.01
Titanium	< 0.005	0.005
Tungsten	< 0.01	0.01
Uranium	<0.1	0.1
Vanadium	< 0.005	0.005
Yttrium	< 0.005	0.005
Zinc	< 0.005	0.005
Zirconium	< 0.005	0.005

PAGE 11 OF 13

SOUTHWEST RESEARCH INSTITUTE LABORATORY CONTROL SAMPLE 010013

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: NA

Sample ID LCSW - F15W1 / F15E2

Client: Division 20

Date Received: NA

Project No.: 20.06002.01.141

SRR: 25943

TO: 040521-6

	Sample	True	
Analysis	Result (mg/L)	Value (mg/L)	Recovery
Aluminum	1.91	2	95.4%
Antimony	0.490	0.5	97.9%
Arsenic	1.99	2	99.7%
Barium	2.01	2	100.6%
Beryllium	0.049	0.05	98.8%
Bismuth	NA	NA	NA
Boron	NA	NA	NA
Cadmium	0.050	0.05	99.3%
Calcium	21.0	20	104.8%
Chromium	0.208	0.2	104.2%
Cobalt	0.499	0.5	99.8%
Copper	0.252	0.25	100.8%
Iron	1.14	1	114.1%
Lanthanum	NA	NA	NA
Lead	0.497	0.5	99.4%
Lithium	NA	NA	NA
Magnesium	20.7	20	103.4%
Manganese	0.504	0.5	100.7%
Molybdenum	NA	NA	NA
Nickel	0.498	0.5	99.6%
Palladium	NA	NA	NA
Phosphorus	NA	NA	NA
Potassium	19.2	20	95.8%
Selenium	2.04	2	101.8%
Silicon	NA	NA	NA
Silver	0.050	0.05	101.0%
Sodium	19.1	20	95.3%
Strontium	NA	NA	NA
Sulfur	NA	NA	NA
Thallium	2.06	2	102.9%
Thorium	NA	NA	NA
Tin	NA	NA	NA
Titanium	NA	NA	NA
Tungsten	NA	NA	NA
Uranium	NA	NA	NA
Vanadium	0.498	0.5	99.6%
Yttrium	NA	NA	NA
Zinc	0.497	0.5	99.4%
Zirconium	NA	NA	NA

NA- Not Applicable.

PAGE 12 OF 13

SOUTHWEST RESEARCH INSTITUTE BLANK SUMMARY

Lab Name: Southwest Research Institute

Lab Code: SwRI

Matrix: Water

Lab System ID: NA

010014

Sample ID PBW - F15E1 / F15E2

Client: Division 20

Date Received: NA

Project No.: 20.06002.01.141

SRR: 25943

TO: 040521-6

	Sample	Reporting
Analysis	Result (mg/L)	Limit (mg/L)
Aluminum	< 0.05	0.05
Antimony	< 0.02	0.02
Arsenic	< 0.005	0.005
Barium	< 0.005	0.005
Beryllium	< 0.005	0.005
Bismuth	< 0.01	0.01
Boron	< 0.05	0.05
Cadmium	< 0.005	0.005
Calcium	< 0.05	0.05
Chromium	< 0.015	0.015
Cobalt	< 0.005	0.005
Copper	< 0.005	0.005
Iron	<0.1	0.1
Lanthanum	< 0.005	0.005
Lead	< 0.005	0.005
Lithium	<0.01	0.01
Magnesium	< 0.05	0.05
Manganese	< 0.005	0.005
Molybdenum	< 0.01	0.01
Nickel	< 0.01	0.01
Palladium	< 0.005	0.005
Phosphorus	< 0.02	0.02
Potassium	<0.2	0.2
Selenium	< 0.015	0.015
Silicon	< 0.05	0.05
Silver	< 0.005	0.005
Sodium	<0.2	0.2
Strontium	< 0.005	0.005
Sulfur	< 0.05	0.05
Thallium	< 0.02	0.02
Thorium	< 0.015	0.015
Tin	< 0.01	0.01
Titanium	< 0.005	0.005
Tungsten	<0.01	0.01
Uranium	<0.1	0.1
Vanadium	< 0.005	0.005
Yttrium	< 0.005	0.005
Zinc	< 0.005	0.005
Zirconium	< 0.005	0.005

NA- Not Applicable.

PAGE 13 OF 13

010015

SOUTHWEST RESEARCH INSTITUTE NUCLEAR PROJECT CLIENT: Division 20 TASK ORDER: 040521-6 SRR: 25943 SDG: 245108 CASE: CNWRA VTSR: May 20, 2004 PROJECT#: 06002.01.141

Task Orders/01-QPP-015

Laboratory Task Order

TO #: 040521-6 Revision: 1

SDG: 245108 VTSR: 05/20/04 CASE: CNWRA SRR #'s: 25943 Client(s): DIV 20 Project(s): 06002.01.141 Manager(s): DAMMANN, MIKE To PM: 06/16/04 To QA: 07/26/04 To Client: 07/27/04 010016

Instructions DIVISION 20 - CNWRA. 30-day TAT. Using 27-day TAT for report/PM, QAU, 28-day TAT for hardcopy (subject to change). Point of Contact is Brad Werling (x6565). Analysis for Major and Minor elements by ICP. Work is 10 CFR 50, Part 21, Appendix B. CONTACT Charlie Butcher (ext. 5928, pager 271-5172) BEFORE STARTING ANY WORK ON THIS TASK ORDER. CONTACT PM WITH ANY QUESTIONS. revision 1: updated task order. (dr072304)

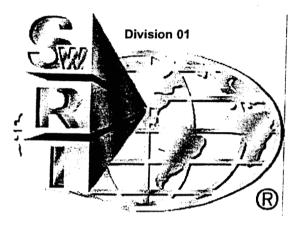
Documents Related to this task order: 10688[COC 25943]

Test: DIL-DILUTION Holding: 28 days from CED Cnt: 9 Section: METALPREP Prep, Dilution Method Date **Customer ID** CED Matrix System ID Туре Cont 17 Jun 04 20 May 04 245108 Water Cation 1A 1 17 Jun 04 20 May 04 245109 Water Cation 2A 1 17 Jun 04 Cation 3A 20 May 04 245110 1 Water 20 May 04 17 Jun 04 245111 1 Water Cation 4A Water Cation 5A 20 May 04 17 Jun 04 245112 1 245113 1 Water Cation 6A 20 May 04 17 Jun 04 20 May 04 17 Jun 04 245114 1 Water Cation 7A 20 May 04 17 Jun 04 1 Water Cation 8A 245115 20 May 04 17 Jun 04 Water Cation 9A 245116 1

Holding: 180 days from CED Test: ICP-SWRI Cnt: 9 ICP Analysis by SwRI Method Section: METALS Cont Matrix Customer ID CED **Method Date** System ID Туре Water 245108 Cation 1A 20 May 04 16 Nov 04 1 Water Cation 2A 20 May 04 16 Nov 04 245109 1 Cation 3A 20 May 04 16 Nov 04 245110 1 Water 20 May 04 16 Nov 04 Cation 4A 245111 1 Water 20 May 04 16 Nov 04 Cation 5A 245112 1 Water 20 May 04 16 Nov 04 1 Water Cation 6A 245113 16 Nov 04 20 May 04 Water Cation 7A 245114 1 16 Nov 04 20 May 04 Water Cation 8A 245115 1 16 Nov 04 20 May 04 245116 1 Water Cation 9A

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01-QPP-015 Division 01 Revision 4 November 2002



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

DIV. 20 SRR #25943 PROJECT #06002.01.141 CASE: CNWRA VTSR: 05/20/04 1500

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

CHEMISTRY AND CHEMICAL ENGINEERING DIVISION Division 01 Quality Project Plan 01-QPP-015 Division 01 Rev 4/November 2002 Page i

010018

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:

ÁNN BOYD JΩ

Quality Assurance Manager

(210) 522-2169

REZA

REZA KARIMI (210) 522-2412 Director, Department of Analytical and Environmental Chemistry

WICHAEL G. MACNAUGHTON (210) 522-5162 Vice President, Chemistry and Chemical Engineering Division

CHRISTOPHER HOBSON Quality Assurance Engineer

(210) 522-5838

CHEMISTRY AND CHEMICAL ENGINEERING DIVISION Division 01 Quality Project Plan

01-QPP-015 Division 01 Rev 4/Nov 2002 Page ii

.

TABLE OF CONTENTS

		Pa	ge
1.0	INTRO	DDUCTION	1
2.0	SCOF	۶E	1
3.0	REFE	RENCES	1
4.0	APPL	ICABLE SECTIONS OF SWRI PROGRAM QUALITY PLAN (PQP-NUCLEAR)	1
	4.1	Indoctrination and Training	1
	4.2	Qualification of Personnel	
	4.3	Design Control	
	4.4	Right of Access	
	4.5	Control of Supplier-Generated Documents	2
	4.6	Acceptance of Services Only	2
	4.7	Commercial Grade Items	
	4.8	Inspection	
	4.9	Inspection and Testing	
	4.10	Handling, Storage, Packaging, Preservation, and Delivery	5
	4.11	Quality Assurance Records	5
	4.12	10 CFR, Part 21	
	4.13	Certified Test Report	
	4.14	Valid Documents List	
5.0	HISTO	RY OF REVISIONS	6

CHEMISTRY AND CHEMICAL ENGINEERING DIVISION Division 01 Quality Project Plan 01-QPP-015 Division 01 Rev 4/Nov 2002 Page 1 of 6

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. Institute Quality Systems (IQS) personnel shall perform this training and documentation shall be evident in the personnel training files maintained in Division Quality Assurance.
- 4.1.2 Indoctrination and training of personnel shall be conducted in accordance with SOP-01-6.2.1, *Qualification and Training*.

CHEMISTRY AND CHEMICAL ENGINEERING DIVISION Division 01 Quality Project Plan

01-QPP-015 Division 01 Rev 4/Nov 2002 Page 2 of 6

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, Work 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.

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. Work 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.

CHEMISTRY AND CHEMICAL ENGINEERING DIVISION Division 01 Quality Project Plan

01-QPP-015 Division 01 Rev 4/Nov 2002 Page'3 of 6

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.

CHEMISTRY AND CHEMICAL ENGINEERING DIVISION Division 01 Quality Project Plan

01-QPP-015 Division 01 Rev 4/Nov 2002 Page 4 of 6

- 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) Work 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 work 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

CHEMISTRY AND CHEMICAL ENGINEERING DIVISION Division 01 Quality Project Plan

01-QPP-015 Division 01 Rev 4/Nov 2002 Page'5 of 6

(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.

CHEMISTRY AND CHEMICAL ENGINEERING DIVISION Division 01 Quality Project Plan

01-QPP-015 Division 01 Rev 4/Nov 2002 Page 6 of 6

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 work order shall specify all applicable documents and appropriate document revision level for each document. The work order shall then serve as the Valid Documents List (VDL) for each individual project.

5.0 HISTORY OF REVISIONS

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.

SOUTHWEST RESEARCH INSTITUTE NUCLEAR PROJECT CLIENT: Division 20 TASK ORDER: 040521-6 SRR: 25943 SDG: 245108 CASE: CNWRA VTSR: May 20, 2004 PROJECT#: 06002.01.141

Chain of Custody/Login Paperwork

Client Shipper Name/ Address Brad H Address Brad BLD BLD	erling -Div -57	20		2	ent Purchase	So Chemistry	uthwest Re and Chemi 6220 Cu Antonio, To	esearch In cal Engine lebra Road exas 7823	eering Division d <u>88-5166</u> Site/2		SwRI Conta	uks	
Sample ID Sample ID Anion IA 105/2 Anion 2A1 Anion 3A1 Anion 5A1 Anion 5A1 Anion 5A1 Anion 5A1 Anion 78 Anion 7A		Sample Type	# of Containers	Anions by l except they	X X X X X X I haspucte by 365. S		PRO	DI ^N SRR JECT # CASE:	V. 20 #25943 :06002.01 CNWRA /20/04 15		Semples	Preservation a = HCl to $b = HNO_3 t$ $c = H_2SO_4$ d = NaOH e = Cool (4) T = Other (1) Nuclear Relate Appendix economics POC	pH <2 o pH <2 to pH <2 to pH >12
Matrix Types:A - AirB - BiotaD - DustE - Emission/StackL - LiquidP - ProductSd - SolidS - SoilSED - SedimentT - TissueW - WaterWP - WipeTemp: 22.0 CComments: $628/1341 - 13$	Sample Type D - Duplicate ER – Equipme ES – Environm FB – Field Bla FD – Field Bla MS – Matrix S MSD – Matrix TB – Trip Blan	ent Rinsate nental Sampl Ink plicate pike Spike Dup		Received b	ed by (Print/S Strint/Signa ed by (Print/Signa by (Print/Signa ed by (Print/Signa	ignature)	Mina	n Ju	crett	Date S 2 J 04 Date Date Date Date	Time Time Time Time	SwRI Project#: 20.060 Received by (Signature) Date 52964 Samples Dis Date Samples Dis	Time ISCO Posed: Time

Div 01 COC Form 01-01-001, Rev 8/02

Page _____ of _____

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t		<u> </u>						Client Purchase Order/Other ID Site/Zone II								Swhi Contact						
Client						r		Analyses Requested								Mike Dammann						
Samp						# of Containers	Analysis of Lajor + Minor								Entract	REMARKS Preservation a = HCl to pH <2						
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	on 2A1	1					X									related use						
(ati	on 3A1						X									appropriate QA						
Cati	on 441						X	X DIV. 20								related use appropriate QA Procedures						
Cati	on 5A1						X					SRR #2) –						
Cati	00 6A1						X						6002.01.14	1		POC-Bad Herling 16565 Fax 5184						
Cati	on 7A1						X				CASE: CNWRA VTSR: 05/20/04 1500					×6565 fax 5184						
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65	628/134-136												cample's Disposed by:									

Div 01 COC Form 01-01-001, Rev 8/02

Page _____ of _____

SAMPLE LOG-IN SHEET

010029

Lab	Name Southwest Rese	earch Institute				Page 1 of 1
Rec	eived By (Print Name) DINO ROMAN	2				Log-in Date 05/21/2004
Rec	eived By (Signature)	DIL				
Cas	e Number 🔍 CNWRA	<i>y</i>	Sample Delivery Gro	oup No.		SAS Number
Ren	narks: 06002.01.141			Corr	esponding	Remarks: Condition of Sample
1.	Custody Seal(s)	Present Absent*	EPA Sample #	Sample Tag #	Assigned Lab #	Shipment, etc
1.	Custoury Sourisy	Intact/Broken	Anion 1A	None	245101	Intact
2.	Custody Seal Nos.	-wla-	Anion 2A	None	245102	Intact
			Anion 3A	None	245103	Intact
3.	Chain-of Custody Records	resent Absent*	Anion 4A	None	245104	Intact
4.	Traffic Reports or Packing Lists	Present Absent	Anion 5A	None	245105	Intact
5.	Airbill	Airbill/Sticker resent Absent*	Anion 6A	None	245106	Intact
6.	Airbill No.	HAND DELIVERED	Anion 7A	None	245107	Intact
			Cation 1A	None	245108	Intact
7.	Sample Tags	Present Absent	Cation 2A	None	245109	Intact
	Sample Tag Numbers	Listed Not listed on Chain of	Cation 3A	None	245110	Intact
		Custody	Cation 4A	None	245111	Intact
8.	Sample Condition	<pre>ntad/Broken*/ Leaking</pre>	Cation 5A	None	245112	Intact
9. 10.	Cooler Temperature Does Information	22.0C	Cation 6A	None	245113	Intact
10.	on custody records, traffic	NO.	Cation 7A	None	245114	Intact
-	reports, and sample tags agree?		Cation 8A	None	245115	Intact
11.		05/20/2004	Cation 9A	None	245116	Intact
12.	Time Received	15:00:00				
			$\left(\right)$			
	Sample	Transfer				
Frac	tion Juons	Prection				
Area	1 [#] R13	Area #				
By D	INO ROMAN	Ву				
On 0	5/20/2004	On				
*	Contact SMO and attach recor	d of resolution		· · · · · · · · · · · · · · · · · · ·		
	iewed By	4. SAUCEDA		Logbook No.	Sample Recei	and the second s
Date	05.25.2	004		Logbook Page No.	50789 (SECTZ	on la=3)

4 05.25.2004

OLMO4.2

SOUTHWEST RESEARCH INSTITUTE NUCLEAR PROJECT CLIENT: Division 20 TASK ORDER: 040521-6 SRR: 25943 SDG: 245108 CASE: CNWRA VTSR: May 20, 2004 PROJECT#: 06002.01.141

Copies of Login Book

Sample Login Book May 21, 2004

SwRI Login Area Division 1

Sample Receipt: 25942 /TSR Date: May 21, 2004 System ID Customer Sample ID 245099 TRA764052004CA1		Project: 06355.24.00X VTSR Time: 08:15:00	Client: INEEL Manager: DAMMANN, MIKE
System ID	Customer Sample ID		Matrix
245099	TRA764052004CA1		Water
245100	TRA764052004CA2		Water

Sample Rece VTSR Date:	eipt: 25943 May 20, 2004	Project: 06002.01.141 VTSR Time: 15:00:00	Client: D Manager: DAMMANN,		
System ID	Customer Sample ID			Matrix	
245101	Anion 1A			Water	
245102	Anion 2A			Water	
245103	Anion 3A			Water	
245104	Anion 4A			Water	
245105	Anion 5A			Water	
245106	Anion 6A			Water	
245107	Anion 7A			Water	
245108	Cation 1A			Water	
245109	Cation 2A			Water	
245110	Cation 3A			Water	
245111	Cation 4A			Water	
245112	Cation 5A			Water	
245113	Cation 6A			Water	
245114	Cation 7A			Water	
245115	Cation 8A			Water	
245116	Cation 9A			Water	

Sample Rece VTSR Date:	eipt: 25944 May 20, 2004	Project: 06002.01.141 VTSR Time: 15:00:00	Client: DIV 20 Manager: DAMMANN, MIKE
System ID	Customer Sample ID		Matrix
245117	UFUA-CE-D		Water
245118	UFUA-CE-S		Water
245119	UFUA-GCMS-D		Water

SOUTHWEST RESEARCH INSTITUTE NUCLEAR PROJECT CLIENT: Division 20 TASK ORDER: 040521-6 SRR: 25943 SDG: 245108 CASE: CNWRA VTSR: May 20, 2004 PROJECT#: 06002.01.141

RAW DATA

e 3										
Div 20								0	$\mathbf{Q}_{\mathbf{r}}$	\bigcap
to#040415-2, 04	0521-6								rep 101	
06002.01.141						0	10033	y Cu	NOM!	- 0
									NK'	
system id	elem	result	qual	units	rl	tv	rec	ug/ml	Velate	time
0.40000	A =0000#	0.005			0.005			0.00000	00/15/04	10.44
243222"	Ag3280"	0.005		mg/L	0.005			-0.00032		
243222"	Al3082" As1890"	0.05		mg/L	0.05		++	-0.01361	06/15/04"	<u>12:44"</u> 12:44"
243222"	B_2496"	1.69	0	mg/L	0.005		++	1.68823		12:44
243222"	Ba4934"	0.297		mg/L mg/L	0.005		++	0.29658		12:44
243222"	Be3130"	0.297	<u> </u>	mg/L	0.005			0.29038		12:44
243222"	Bi2230"	0.005		mg/L	0.003		++	0.00299		12:44
243222"	Ca3179"	29.1	<u> </u>	mg/L	0.01		+	29.10540		12:44"
243222"	Cd2265"	0.005	11	mg/L	0.005		1	0.00040		12:44"
243222"	Co2286"	0.005	the second s	mg/L	0.005		++	0.00247		12:44"
243222"	Cr2677"	0.015	the second s	mg/L	0.015		++	-0.00069		12:44"
243222"	Cu3247"	0.005		mg/L	0.005		11	-0.00064		12:44"
243222"	Fe2714"	0.1		mg/L	0.1		1	0.08023		12:44"
243222"	K_766	0.414	<u> </u>	mg/L	0.2		1		06/15/04	13:18:25
243222"	La3988"	0.005	U	mg/L	0.005		1	-0.00017		12:44"
243222"	Li670	0.01		mg/L	0.01				06/15/04	13:18:25
243222"	Mg2790"	0.098	<u> </u>	mg/L	0.05			0.09757	06/15/04"	12:44"
243222"	Mn2576"	0.005	U	mg/L	0.005			0.00408	06/15/04"	12:44"
243222"	Mo2020"	0.01		mg/L	0.01		1	0.00148	and the second se	12:44"
243222"	Na589	3.64		mg/L	0.2		11	3.6375	·	13:18:25
243222"	Ni2316"	0.059		mg/L	0.01			0.05876	06/15/04"	12:44"
243222"	P_1782"	0.02	U	mg/L	0.02			-0.00263	06/15/04"	12:44"
243222"	Pb220"	0.005	U	mg/L	0.005			0.00144	06/15/04"	12:44"
243222"	Pd3404"	0.005	U	mg/L	0.005			-0.00181	06/15/04"	12:44"
243222"	S_1820"	24.9		mg/L	0.05			24.93973	06/15/04"	12:44"
243222"	Sb2068"	0.02	U	mg/L	0.02			0.00192	06/15/04"	12:44"
243222"	Se196"	0.015	U	mg/L	0.015			0.00261	06/15/04"	12:44"
243222"	Si2881"	0.274		mg/L	0.05			0.27400	06/15/04"	12:44"
243222"	Sn1899"	0.01	U	mg/L	0.01			-0.00092	06/15/04"	12:44"
243222"	Sr4215"	0.212		mg/L	0.005			0.21215	06/15/04"	12:44"
243222"	Th2837"	0.015	U	mg/L	0.015			-0.00138	06/15/04"	12:44"
243222"	Ti3349"	0.005	U	mg/L	0.005			0.00007	06/15/04"	12:44"
243222"	TI1908"	0.02	U	mg/L	0.02			0.00223	06/15/04"	12:44"
243222"	U_4090"	0.1		mg/L	0.1			0.00820	06/15/04"	12:44"
243222"	V_2924"	0.005	the second s	mg/L	0.005			0.00016	06/15/04"	12:44"
243222"	W_2079"	0.01		mg/L	0.01		1	-0.00129	06/15/04"	12:44"
243222"	Y_3710"	0.005	U	mg/L	0.005	i 		-0.00015	06/15/04"	12:44"
243222"	Zn2062"	0.112		mg/L	0.005		<u> </u>	0.11164	06/15/04"	12:44"
243222"	Zr3496"	0.005		mg/L	0.005			0.00013	06/15/04"	12:44"
243223"	Ag3280"	0.005		mg/L	0.005		ļ	-0.00038	06/15/04"	12:48"
243223"	AI3082"	0.05		mg/L	0.05		<u> </u>	-0.01765	06/15/04"	12:48"
243223"	As1890"	0.005	U	mg/L	0.005			0.00189	06/15/04"	12:48"
243223"	B_2496"	0.138		mg/L	0.05			0.13826	06/15/04"	12:48"
243223"	Ba4934"	0.007		mg/L	0.005			0.00717	06/15/04"	12:48"
243223"	Be3130"	0.005		mg/L	0.005		┦────┤	0.00005	06/15/04"	12:48"
243223"	Bi2230"	0.01	U	mg/L	0.01			-0.00022	06/15/04"	12:48"
243223"	Ca3179"	17.8		mg/L	0.05		↓	17.75094	06/15/04"	12:48"
243223"	Cd2265"	0.005		mg/L	0.005		<u>↓</u>	0.00016	06/15/04"	12:48"
243223"	Co2286"	0.005		mg/L	0.005		<u>↓</u> ↓	0.00098	06/15/04"	12:48"
243223"	Cr2677"	0.015	the second s	mg/L	0.015		<u> </u>	-0.00085	06/15/04"	12:48"
243223"	Cu3247"	0.005		mg/L	0.005		↓	-0.00097	06/15/04"	12:48"
243223"	Fe2714"	0.1	U	mg/L	0.1		↓	0.00866	06/15/04"	12:48"
243223"	K_766	5.08		mg/L	0.2	<u></u>	↓	كرانا فيستعد والتقارف والمتحد والمتحد والمتحد والمتحد والمتحد والمتحد والمتحد والمتحد والمحد والمحد والمحد والم	06/15/04	13:22:00
243223"	La3988"	0.005	U	mg/L	0.005			-0.00020	06/15/04"	12:48"

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system id	elem	result	qual	units	rl	tv	rec	ug/ml	date	time
243223"	Li670	0.035		mg/L	0.01				06/15/04	13:22:00
243223"	Mg2790"	2.78		mg/L	0.05			2.78323	06/15/04"	12:48"
243223"	Mn2576"	0.025		mg/L	0.005			0.02539	06/15/04"	12:48"
243223"	Mo2020"	0.01	U	mg/L	0.01			0.00309	06/15/04"	12:48"
243223"	Na589	34.9		mg/L	0.2				06/15/04	13:22:00
243223"	Ni2316"	0.01	U	mg/L	0.01			0.00083	06/15/04"	12:48"
243223"	P_1782"	0.020		mg/L	0.02			0.02024	06/15/04"	12:48"
243223"	Pb220"	0.005	U	mg/L	0.005			0.00131	06/15/04"	12:48"
243223"	Pd3404"	0.005	U	mg/L	0.005			-0.00121	06/15/04"	12:48"
243223"	S_1820"	6.81		mg/L	0.05			6.80944	06/15/04"	12:48"
243223"	Sb2068"	0.02	U	mg/L	0.02			0.00168	06/15/04"	12:48"
243223"	Se196"	0.015	U	mg/L	0.015			0.00645	06/15/04"	12:48"
243223"	Si2881"	19.5		mg/L	0.05			19.50259	06/15/04"	12:48"
243223"	Sn1899"	0.015		mg/L	0.01			0.01464	06/15/04"	12:48"
243223"	Sr4215"	0.079		mg/L	0.005			0.07866	06/15/04"	12:48"
243223"	Th2837"	0.015	U	mg/L	0.015			-0.00249	06/15/04"	12:48"
243223"	Ti3349"	0.005	U	mg/L	0.005			-0.00034	06/15/04"	12:48"
243223"	TI1908"	0.02	U	mg/L	0.02			-0.01242	06/15/04"	12:48*
243223"	U_4090"	0.1	U	mg/L	0.1			0.01111	06/15/04"	12:48"
243223"	V_2924"	0.005		mg/L	0.005			0.00168	06/15/04"	12:48"
243223"	W_2079"	0.01		mg/L	0.01			-0.00276	the second se	12:48"
243223"	Y_3710"	0.005	the second s	mg/L	0.005			-0.00006		12:48"
243223"	Zn2062"	0.005		mg/L	0.005			0.00027	06/15/04"	12:48"
243223"	Zr3496"	0.005	_	mg/L	0.005	L		-0.00010		12:48"
243224"	Ag3280"	0.005	_	mg/L	0.005			-0.00011	06/15/04"	12:53"
243224"	AI3082"	0.05		mg/L	0.05	ļ		-0.01335	06/15/04"	12:53"
243224"	As1890"	0.005		mg/L	0.005			0.00055	06/15/04"	12:53"
243224"	B_2496"	0.05		mg/L	0.05	ļ		-0.00189	06/15/04"	12:53"
243224"	Ba4934"	0.005		mg/L	0.005			0.00020	06/15/04"	12:53"
243224"	Be3130"	0.005		mg/L	0.005	ļ		0.00002	06/15/04"	12:53*
243224"	Bi2230"	0.01	_	mg/L	0.01	ļ		0.00227	06/15/04"	12:53"
243224"	Ca3179"	5.00		mg/L	0.05	_		4.99723	06/15/04"	12:53"
243224"	Cd2265"	0.005		mg/L	0.005			0.00045	06/15/04"	12:53"
243224"	Co2286"	0.005		mg/L	0.005			0.00012		12:53"
243224"	Cr2677"	0.015		mg/L	0.015			-0.00022		
243224"	Cu3247*	0.005		mg/L	0.005	_		-0.00044		
243224"	Fe2714"	0.1		mg/L	0.1			-0.00309		
243224"	K_766	0.2	the second s	mg/L	0.2	the second s			06/15/04	13:25:03
243224"	La3988"	0.005	_	mg/L	0.005				06/15/04"	
243224"	Li670	0.01		mg/L	0.01				06/15/04	13:25:03
243224"	Mg2790"	0.05		mg/L	0.05			0.00021		the second se
243224"	Mn2576"	0.005		mg/L	0.005	_		-0.00001		
243224"	Mo2020"	0.01		mg/L	0.01	_		0.00020		
243224"	Na589	8.86		mg/L	0.2				06/15/04	13:25:03 12:53"
243224"	Ni2316"	0.01		mg/L	0.01			0.00076		
243224"	P_1782"	0.02		mg/L	0.02			0.00764		12:53" 12:53"
243224"	Pb220"	0.005		mg/L	0.005			-0.00136	the second se	
243224"	Pd3404"	0.005		mg/L	0.005			-0.00047		
243224"	S_1820"	0.05		mg/L	0.05			-0.03086	the second division of	
243224"	Sb2068"	0.02		mg/L	0.02			-0.00051		
243224"	Se196"	0.015		mg/L	0.015			-0.00264		
243224"	Si2881"	0.05		mg/L	0.05	_		0.03229		
243224"	Sn1899"	0.01		mg/L	0.01			-0.00062		
243224"	Sr4215"	0.005	U	mg/L	0.005	<u> </u>		0.00013	06/15/04"	12.00

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system id	elem	result	qual	units	rl	tv	rec	ug/ml	date	time
243224"	Th2837"	0.015		mg/L	0.015			0.00156	06/15/04"	12:53"
243224"	Ti3349"	0.005	U	mg/L	0.005			0.00005	06/15/04"	12:53"
243224"	TI1908"	0.02	U	mg/L	0.02			-0.00021	06/15/04"	12:53"
243224"	U_4090"	0.1		mg/L	0.1			-0.00951	06/15/04"	12:53"
243224"	V_2924"	0.005	U	mg/L	0.005			0.00051	06/15/04"	12:53"
243224"	W_2079"	0.01	U	mg/L	0.01			0.00089	06/15/04"	12:53"
243224"	Y_3710"	0.005	U	mg/L	0.005			-0.00002	06/15/04"	12:53"
243224"	Zn2062"	0.005	U	mg/L	0.005			0.00031	06/15/04"	12:53"
243224"	Zr3496"	0.005	U	mg/L	0.005			0.00030	06/15/04"	12:53"
243225"	Ag3280"	0.005	U	mg/L	0.005			0.00010	06/15/04"	12:58"
243225"	AI3082"	0.05		mg/L	0.05			-0.00267	06/15/04"	12:58"
243225"	As1890"	0.005	U	mg/L	0.005			-0.00013	06/15/04"	12:58"
243225"	B_2496"	1.23		mg/L	0.05			1.23179	06/15/04"	12:58"
243225"	Ba4934"	0.183		mg/L	0.005			0.18317	06/15/04"	12:58"
243225"	Be3130"	0.005		mg/L	0.005			0.00004	06/15/04"	12:58"
243225"	Bi2230"	0.01	U	mg/L	0.01			0.00648	06/15/04"	12:58"
243225"	Ca3179"	0.248		mg/L	0.05			0.24774	06/15/04"	12:58"
243225"	Cd2265"	0.005		mg/L	0.005			0.00046	06/15/04"	12:58"
243225"	Co2286"	0.005	U	mg/L	0.005			0.00073	06/15/04"	12:58"
243225"	Cr2677"	0.015		mg/L	0.015			-0.00068	06/15/04"	12:58"
243225"	Cu3247"	0.005		mg/L	0.005			-0.00057	06/15/04"	12:58"
243225"	Fe2714"		U	mg/L	0.1			-0.00081	06/15/04"	12:58"
243225"	K_766	0.2		mg/L	0.2				06/15/04	13:28:07
243225"	La3988"	0.005		mg/L	0.005			0.00015	06/15/04"	12:58"
243225"	Li670	0.01		mg/L	0.01				06/15/04	13:28:07
243225"	Mg2790"	0.05		mg/L	0.05			0.03015	06/15/04"	12:58"
243225"	Mn2576"	0.005		mg/L	0.005			0.00111	06/15/04"	12:58"
243225"	Mo2020"	0.01	U	mg/L	0.01			0.00059	06/15/04"	12:58"
243225"	Na589	2.89		mg/L	0.2				06/15/04	13:28:07
243225"	Ni2316"	0.016		mg/L	0.01			0.01570	06/15/04"	12:58"
243225"	P_1782"	0.02		mg/L	0.02			0.00390	06/15/04"	12:58"
243225"	Pb220"	0.005		mg/L	0.005			0.00026	06/15/04"	12:58"
243225"	Pd3404"	0.005	U	mg/L	0.005			-0.00138	06/15/04"	12:58"
243225"	S_1820"	0.432		mg/L	0.05			0.43194	06/15/04"	12:58"
243225"	Sb2068"	0.02		mg/L	0.02			-0.00289	06/15/04"	12:58"
243225"	Se196"	0.015	U	mg/L	0.015			-0.00026	06/15/04"	12:58"
243225"	Si2881"	0.465		mg/L	0.05		L	0.46477	06/15/04"	12:58"
243225"	Sn1899"	0.01		mg/L	0.01			0.00157	06/15/04"	12:58"
243225"	Sr4215"	0.005		mg/L	0.005			0.00141	06/15/04"	12:58"
243225"	Th2837"	0.015		mg/L	0.015			-0.00143	06/15/04"	12:58"
243225"	Ti3349"	0.005		mg/L	0.005			0.00019	06/15/04"	12:58"
243225"	TI1908"	0.02		mg/L	0.02			0.00190	06/15/04"	12:58"
243225"	U_4090"	0.1		mg/L	0.1	<u></u>		0.02786	06/15/04"	12:58"
243225"	V_2924"	0.005		mg/L	0.005			0.00002	06/15/04"	12:58"
243225"	W_2079"	0.01		mg/L	0.01		I	0.00147	06/15/04"	12:58"
243225"	Y_3710"	0.005	U	mg/L	0.005			-0.00003	06/15/04"	12:58"
243225"	Zn2062"	0.032		mg/L	0.005			0.03244	06/15/04"	12:58"
243225"	Zr3496"	0.005		mg/L	0.005			0.00043	06/15/04"	12:58"
243225d"	Ag3280"	0.005		mg/L	0.005			-0.00014	06/15/04"	13:03"
243225d"	Al3082"	0.05		mg/L	0.05			-0.00843	06/15/04"	13:03"
243225d"	As1890"	0.005	U	mg/L	0.005			0.00085	06/15/04"	13:03"
243225d"	B_2496"	1.22		mg/L	0.05			1.21835	06/15/04"	13:03"
243225d"	Ba4934"	0.182		mg/L	0.005			0.18163	06/15/04"	13:03"
243225d"	Be3130"	0.005	U	mg/L	0.005			0.00003	06/15/04"	13:03"

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system id	elem	result	qual	units	rl	tv	rec	ug/ml	date	time
243225d"	Bi2230"	0.01	υ	mg/L	0.01			0.00118	06/15/04"	13:03"
243225d"	Ca3179"	0.242		mg/L	0.05			0.24219	06/15/04"	13:03"
243225d"	Cd2265"	0.005	U	mg/L	0.005			0.00047	06/15/04"	13:03"
243225d"	Co2286"	0.005	U	mg/L	0.005			0.00105	06/15/04"	13:03"
243225d"	Cr2677"	0.015		mg/L	0.015			0.00036	06/15/04"	13:03"
243225d"	Cu3247"	0.005	U	mg/L	0.005			-0.00053	06/15/04"	13:03"
243225d"	Fe2714"	0.1	U	mg/L	0.1			0.00182		13:03"
243225d"	K_766	NA								
243225d"	La3988"	0.005	υ	mg/L	0.005			0.00020	06/15/04"	13:03"
243225d"	Li670	NA								
243225d"	Mg2790"	0.05	U	mg/L	0.05			0.02957	06/15/04"	13:03"
243225d"	Mn2576"	0.005		mg/L	0.005			0.00102		13:03"
243225d"	Mo2020"	0.01	the second s	mg/L	0.01			0.00030		13:03"
243225d"	Na589	NA								
243225d"	Ni2316"	0.015		mg/L	0.01		-	0.01478	06/15/04"	13:03"
243225d"	P 1782"	0.02	U	mg/L	0.02			0.00196		13:03"
243225d"	Pb220"	0.005		mg/L	0.005			-0.00177	06/15/04"	13:03"
243225d"	Pd3404"	0.005		mg/L	0.005			-0.00187	06/15/04"	13:03"
243225d"	S_1820"	0.419		mg/L	0.05			0.41930	06/15/04"	13:03"
243225d"	Sb2068"	0.02	U	mg/L	0.02			0.00243	06/15/04"	13:03"
243225d"	Se196"	0.015		mg/L	0.015			-0.00019	06/15/04"	13:03"
243225d"	Si2881"	0.456		mg/L	0.05			0.45600	06/15/04"	13:03"
243225d"	Sn1899"	0.01	U	mg/L	0.01			0.00194	06/15/04"	13:03"
243225d"	Sr4215"	0.005	U	mg/L	0.005			0.00137	06/15/04"	13:03"
243225d"	Th2837"	0.015		mg/L	0.015			-0.00183	06/15/04"	13:03"
243225d"	Ti3349"	0.005	U	mg/L	0.005			0.00022	06/15/04"	13:03"
243225d"	TI1908"	0.02	U	mg/L	0.02			0.00119	06/15/04"	13:03"
243225d"	U_4090"	0.1	U	mg/L	0.1			0.00385	06/15/04"	13:03"
243225d"	V_2924"	0.005	U	mg/L	0.005			0.00058	06/15/04"	13:03"
243225d"	W_2079"	0.01	U	mg/L	0.01			-0.00072	06/15/04"	13:03*
243225d"	Y_3710"	0.005	U	mg/L	0.005			-0.00004	06/15/04"	13:03"
243225d"	Zn2062"	0.032		mg/L	0.005			0.03180	06/15/04"	13:03"
243225d"	Zr3496"	0.005	U	mg/L	0.005			0.00006	06/15/04"	13:03"
243226"	Ag3280"	0.005	U	mg/L	0.005			-0.00034	06/15/04"	
243226"	AI3082"	0.05	U	mg/L	0.05			0.00284	06/15/04"	
243226"	As1890"	0.005	U	mg/L	0.005			-0.00922	06/15/04"	13:07"
243226"	B_2496"	2.09		mg/L	0.05			2.09115	06/15/04"	13:07"
243226"	Ba4934"	0.273		mg/L	0.005			0.27330	06/15/04"	13:07"
243226"	Be3130"	0.005	U	mg/L	0.005			0.00007	06/15/04"	13:07"
243226"	Bi2230"	0.01	U	mg/L	0.01			-0.00344	06/15/04"	13:07"
243226"	Ca3179"	0.202		mg/L	0.05			0.20178	06/15/04"	13:07"
243226"	Cd2265"	0.005	U	mg/L	0.005			0.00016	06/15/04"	13:07"
243226"	Co2286"	0.005		mg/L	0.005			0.00078	06/15/04"	13:07"
243226"	Cr2677"	0.015	U	mg/L	0.015			-0.00023	06/15/04"	13:07"
243226"	Cu3247"	0.005	U	mg/L	0.005			-0.00033	06/15/04"	13:07"
243226"	Fe2714"	0.1	U	mg/L	0.1			-0.00830	06/15/04"	13:07"
243226"	K_766	0.316		mg/L	0.2			0.3161	06/15/04	13:31:11
243226"	La3988"	0.005	U	mg/L	0.005			-0.00032	06/15/04"	13:07"
243226"	Li670	0.01	U	mg/L	0.01			0.0033	06/15/04	13:31:11
243226"	Mg2790"	0.05		mg/L	0.05			0.02926	06/15/04"	13:07"
243226"	Mn2576"	0.005	U	mg/L	0.005			0.00111	06/15/04"	13:07"
243226"	Mo2020"	0.01		mg/L	0.01			-0.00119	06/15/04"	13:07"
243226"	Na589	4.49		mg/L	0.2			4.4891	06/15/04	13:31:11
243226"	Ni2316"	0.036		mg/L	0.01			0.03557	06/15/04"	13:07"

Div 20
to#040415-2, 040521-6
06002.01.141

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system id	elem	result	qual	units	rl	tv	rec	ug/ml	date	time
System is										
243226"	P 1782"	0.059		mg/L	0.02			0.05896	06/15/04"	13:07"
243226"	Pb220"	0.005	υ	mg/L	0.005			0.00438	06/15/04"	13:07"
243226"	Pd3404"	0.005		mg/L	0.005			-0.00188	06/15/04"	13:07"
243226"	S 1820"	0.395		mg/L	0.05			0.39494	06/15/04"	13:07"
243226"	Sb2068"	0.02	U	mg/L	0.02			0.01296	06/15/04"	13:07"
243226"	Se196"	0.05		mg/L	0.05			0.03007	06/15/04"	13:07"
243226"	Si2881"	1.57		mg/L	0.05			1.57164	06/15/04"	13:07"
243226"	Sn1899"	0.079		mg/L	0.01			0.07918	06/15/04"	13:07"
243226"	Sr4215"	0.005	U	mg/L	0.005			0.00157	06/15/04"	13:07"
243226"	Th2837"	0.015		mg/L	0.015			-0.00050	06/15/04"	13:07"
243226"	Ti3349"	0.005	U	mg/L	0.005			0.00124	06/15/04"	13:07"
243226"	TI1908"	0.075	U	mg/L	0.075			-0.07278	06/15/04"	13:07"
243226"	U 4090"	0.1	U	mg/L	0.1			-0.00010	06/15/04"	13:07"
243226"	V_2924"	0.005	U	mg/L	0.005			0.00034	06/15/04"	13:07"
243226"	W_2079"	0.01		mg/L	0.01			-0.00817	06/15/04"	13:07"
243226"	Y_3710"	0.005	U	mg/L	0.005			-0.00001	06/15/04"	13:07"
243226"	Zn2062"	0.077		mg/L	0.005			0.07729	06/15/04"	13:07"
243226"	Zr3496"	0.005	U	mg/L	0.005			0.00058	06/15/04"	13:07"
243227"	Ag3280"	0.005		mg/L	0.005			-0.00038	06/15/04"	13:12"
243227"	AI3082"	0.05		mg/L	0.05			0.04515	06/15/04"	13:12"
243227"	As1890"	0.005	U	mg/L	0.005	L		-0.00135	06/15/04"	13:12"
243227"	B_2496"	2.01		mg/L	0.05			2.01249	06/15/04"	13:12"
243227"	Ba4934"	0.765		mg/L	0.005			0.76532	06/15/04"	13:12"
243227"	Be3130"	0.005	U	mg/L	0.005			0.00005	06/15/04"	13:12"
243227"	Bi2230"	0.01	U	mg/L	0.01			0.00714	06/15/04"	13:12"
243227"	Ca3179"	2.62		mg/L	0.05			2.62002	06/15/04"	13:12"
243227"	Cd2265"	0.005	U	mg/L	0.005			0.00034	06/15/04"	13:12"
243227"	Co2286"	0.005		mg/L	0.005			0.00194	06/15/04"	13:12"
243227"	Cr2677"	0.015		mg/L	0.015			0.00184	06/15/04"	13:12"
243227"	Cu3247"	0.008		mg/L	0.005			0.00836		13:12"
243227"	Fe2714"	0.1		mg/L	0.1	L		0.03388		13:12"
243227"	K_766	9.80		mg/L	0.2				06/15/04	13:34:15
243227"	La3988"	0.005		mg/L	0.005	_		0.00002	the second s	13:12"
243227"	Li670	0.01		mg/L	0.01				06/15/04	13:34:15 13:12"
243227"	Mg2790"	0.537	_	mg/L	0.05			0.53739		
243227"	Mn2576"	0.049		mg/L	0.005			0.04853		
243227"	Mo2020"	0.01	_	mg/L	0.01			0.00114		13:34:15
243227"	Na589	20.1		mg/L	0.2				06/15/04	
243227"	Ni2316"	0.024		mg/L	0.01	_		0.02380	and the second se	
243227"	P_1782"	0.02		mg/L	0.02			0.00776		
243227"	Pb220"	0.005		mg/L	0.005			0.00103		
243227"	Pd3404"	0.005		mg/L	0.005			-0.00160		
243227"	S_1820"	1.04		mg/L	0.05			1.03629		
243227"	Sb2068"	0.02		mg/L	0.02			0.00148	the second se	
243227"	Se196"	0.015		mg/L	0.015			0.00317		
243227"	Si2881"	1.54		mg/L	0.05		l	1.53548		
243227"	Sn1899"	0.01		mg/L	0.01			0.00687		
243227"	Sr4215"	0.014		mg/L	0.005			0.01441		
243227"	Th2837"	0.015		mg/L	0.015	_		-0.00089		
243227"	Ti3349"	0.005		mg/L	0.005			0.00158	and the second se	and the second
243227"	TI1908"	0.02		mg/L	0.02	_		-0.00424		
243227"	U_4090"		U	mg/L	0.1		<u> </u>	0.01053		
243227"	V_2924"	0.005		mg/L	0.005			0.00091		
243227"	W_2079"	0.01	0	mg/L	0.01	<u> </u>		-0.00258	00/10/04	10.12

system id	elem	result	qual	units	rl	tv	rec	ug/ml	date	time
243227"	Y_3710"	0.005		mg/L	0.005		<u> </u>	0.00000	06/15/04"	13:12
243227"	Zn2062"	0.268	<u> </u>		0.005	l	<u> </u>	0.26835		13:12
243227 243227"	Zr3496"	0.200		mg/L	0.005			0.20035	06/15/04	13:12
243228"	Ag3280"	0.005		mg/L	0.005	<u> </u>	<u> </u>	-0.00017	06/15/04	13:12
	Al3082"	0.005	0	mg/L	+		+	0.19406	06/15/04	13:17
243228"				mg/L	0.05	 	<u> </u>	0.00020	06/15/04	13:17
243228"	As1890" B_2496"	0.005	0	mg/L	0.005			2.46841	06/15/04	13:17
243228"	Ba4934"	0.464		mg/L	0.005		<u> </u>	0.46418	06/15/04	13:17
243228" 243228"	Be3130"	0.005		mg/L	0.005			0.00002	06/15/04	13:17
243228"	Bi2230"	0.005		mg/L	0.005			0.00398	06/15/04"	13:17
the second se	the second s	1.31	0	mg/L		<u> </u>				13:17
243228"	Cd0065"			mg/L	0.05			1.30829	06/15/04"	
243228"	Cd2265"	0.005		mg/L	0.005			0.00029	06/15/04"	13:17
243228"	Co2286" Cr2677"	0.005		mg/L	0.005			0.00091	06/15/04"	13:17
243228"		0.015		mg/L	0.015	ļ		0.00050	06/15/04"	13:17
243228"	Cu3247"			mg/L	0.005			0.00096	06/15/04"	13:17
243228"	Fe2714"	0.1	0	mg/L	0.1	ļ		0.06261	06/15/04"	13:17"
243228"	K_766	1.26		mg/L	0.2		<u> </u>	1.2577	06/15/04	13:37:20
243228"	La3988"		_	mg/L	0.005			-0.00035	06/15/04"	13:17"
243228"	Li670	0.01	U	mg/L	0.01				06/15/04	13:37:20
243228" 243228"	Mg2790" Mn2576"	0.364		mg/L	0.05			0.36424	06/15/04"	<u>13:17"</u> 13:17"
243228"	Mo2020"	0.005		mg/L	0.005			-0.00015	06/15/04" 06/15/04"	13:17
243228"	Na589	7.47	0	mg/L	0.01		 	7.4679	06/15/04	13:37:20
243228"	Ni2316"	0.01		mg/L	0.2			0.00023	06/15/04	13:17"
243228"	P_1782"	0.01	0	mg/L	0.01			0.03730	06/15/04	13:17
243228"	Pb220"	0.007		mg/L	0.02			0.00135	06/15/04"	13:17
243228"	Pd3404"	0.005		mg/L	0.005			-0.00133	06/15/04	13:17
243228"	S_1820"	0.987	0	mg/L	0.005			0.98693	06/15/04	13:17
243228	Sb2068"	0.987	11	mg/L mg/L	0.03			-0.00365	06/15/04"	13:17
243228"	Se196"	0.02		mg/L	0.02			0.00387	06/15/04"	13:17
243228	Si2881"	2.97	0		0.015			2.97323	06/15/04"	13:17
243228"	Sn1899"		U	mg/L	0.03			0.00405	06/15/04"	13:17
243228 243228"	Sr4215"	0.001	0	mg/L	0.005			0.00403	06/15/04"	13:17
243228	Th2837"	0.008		mg/L	0.005			-0.00379		13:17
243228"		0.015	0	mg/L	0.015			0.00745	06/15/04	13:17
243228 243228"	TI1908"	0.007	11	mg/L	0.005			0.000745	06/15/04	13:17
243228 243228"	U_4090"	0.02		mg/L mg/L	0.02			0.00098	06/15/04	13:17
243228"	V 2924"	0.005			0.005			0.00440	06/15/04"	13:17
243228" 243228"	W 2079"	0.005		mg/L	0.005			-0.00154	06/15/04	13:17
243228	Y_3710"	0.01		mg/L	0.005		·	0.00001	06/15/04	
		0.005	0	mg/L					06/15/04	<u>13:17"</u> 13:17"
243228"	Zn2062"		11	mg/L	0.005			0.11888	06/15/04	
243228" 243229"	Zr3496"	0.005		mg/L	0.005			0.00051	06/15/04	<u>13:17"</u> 13:37"
243229 243229"	Ag3280" Al3082"	0.005	_	mg/L	0.005			-0.02060	06/15/04	13:37
		the second s	and the second se	mg/L	0.005				06/15/04	
243229" 243229"	As1890" B_2496"	0.005	<u> </u>	mg/L	0.005			0.00370	06/15/04	<u>13:37"</u> 13:37"
<u>243229</u> 243229"		0.142		mg/L	0.005			0.01211	06/15/04	13:37
	Ba4934"	0.012		mg/L					06/15/04"	13:37"
243229"	Be3130"	0.005		mg/L	0.005			0.00008	06/15/04"	13:37
243229"	Bi2230"	0.01	U	mg/L	0.01			0.00280	06/15/04"	13:37*
243229"	Ca3179"	24.7		mg/L	0.05		┝────┤	24.72039		13:37"
243229"	Cd2265"	0.005		mg/L	0.005			0.00036	06/15/04"	the second s
243229"	Co2286"	0.005		mg/L	0.005			0.00076	06/15/04"	13:37"
243229"	Cr2677"	0.015		mg/L	0.015			0.00000	06/15/04"	<u>13:37"</u>
771-4-2-2011	17 117273777	1 111111	11		11111111		. 1	1	06/16/0/**	1 4 4 7

0.005 U

mg/L

0.005

Cu3247"

243229"

Div 20 to#040415-2, 040521-6 06002.01.141

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010038

06/15/04"

13:37"

-0.00012

Div 20
to#040415-2, 040521-6
06002.01.141

system id	elem	result	qual	units	rl	tv	rec	ug/ml	date	time
243229"	Fe2714"		U	mg/L	0.1			-0.00319	06/15/04"	13:37"
243229"	K_766	5.53		mg/L	0.2	ļ		5.5317	06/15/04	13:40:24
243229"	La3988"	0.005	U	mg/L	0.005			-0.00012	06/15/04"	13:37"
243229"	Li670	0.035		mg/L	0.01			0.0352	06/15/04	13:40:24
243229"	Mg2790"	3.29		mg/L	0.05			3.28619	06/15/04"	13:37"
243229"	Mn2576"	0.005		mg/L	0.005			0.00000	06/15/04"	13:37"
243229"	Mo2020"		U	mg/L	0.01			0.00588	06/15/04"	13:37"
243229"	Na589	37.3		mg/L	0.2			37.2965	06/15/04	13:40:24
243229"	Ni2316"		U	mg/L	0.01			-0.00131	06/15/04"	13:37"
243229"	P_1782"	0.025		mg/L	0.02			0.02484	06/15/04"	13:37"
243229"	Pb220"	0.005		mg/L_	0.005			-0.00043		13:37"
243229"	Pd3404"	0.005	0	mg/L	0.005		· · · ·	-0.00257	06/15/04"	13:37"
243229"	S_1820"	8.52		mg/L	0.05			8.52205	06/15/04"	13:37"
243229"	Sb2068"	0.02		mg/L	0.02			-0.00008	06/15/04"	13:37"
243229"	Se196"	0.015	U	mg/L	0.015			0.00546	06/15/04"	13:37"
243229"	Si2881"	24.3	L	mg/L	0.05			24.29212	06/15/04"	13:37"
243229"	Sn1899"	0.016		mg/L	0.01			0.01595	06/15/04"	13:37"
243229"	Sr4215"	0.100		mg/L	0.005			0.10041	06/15/04"	13:37"
243229"	Th2837"	0.015		mg/L	0.015			-0.00517	06/15/04"	13:37"
243229"	Ti3349"	0.005		mg/L	0.005			-0.00031	06/15/04"	13:37"
243229"	TI1908"	0.02		mg/L	0.02			0.00521	06/15/04"	13:37"
243229"	U_4090"	0.1		mg/L	0.1			0.00043	06/15/04"	13:37"
243229"	V_2924"	0.005		mg/L	0.005			0.00326	06/15/04"	13:37"
243229"	W_2079"	0.01	_	mg/L	0.01			-0.00160	06/15/04"	13:37"
243229"	Y_3710"	0.005		mg/L	0.005			-0.00009	06/15/04"	13:37"
243229"	Zn2062"	0.005		mg/L	0.005			0.00221	06/15/04"	13:37"
243229"	Zr3496"	0.005		mg/L	0.005			-0.00001	06/15/04"	13:37"
243230"	Ag3280"	0.005		mg/L_	0.005			0.00013	06/15/04"	13:41"
243230"	Al3082"	0.05		mg/L	0.05			0.01895	06/15/04"	13:41"
243230"	As1890"	0.005	U	mg/L	0.005			-0.00265	06/15/04"	13:41"
243230"	B_2496"	0.258		mg/L	0.05			0.25843	06/15/04"	13:41"
243230"	Ba4934"	0.005		mg/L	0.005			0.00279	06/15/04"	13:41"
243230"	Be3130"	0.005		mg/L	0.005			0.00002	06/15/04"	13:41"
243230"	Bi2230"	0.01	<u>U</u>	mg/L	0.01			-0.00302	06/15/04"	13:41"
243230"	Ca3179"	2.49		mg/L	0.05			2.49218		13:41"
243230"	Cd2265"	0.005		mg/L	0.005			0.00034		13:41"
243230"	Co2286"	0.005		mg/L_	0.005			0.00005		13:41"
243230"	Cr2677"	0.015	the second s	mg/L	0.015			-0.00056		13:41"
243230"	Cu3247"	0.005	<u> </u>	mg/L	0.005			0.00153		13:41"
243230"	Fe2714"	0.136		mg/L	0.1			0.13575	06/15/04"	13:41"
243230"	K_766	3.81		mg/L	0.2				06/15/04	13:53:15
243230"	La3988"	0.005	U	mg/L	0.005			0.00030	06/15/04"	13:41"
243230"	Li670	0.270		mg/L	0.01				06/15/04	13:53:15
243230"	Mg2790"	0.112		mg/L	0.05			0.11207	06/15/04"	13:41"
243230"	Mn2576"	0.005	U I	mg/L	0.005			0.00367		13:41"
243230"	Mo2020"	0.046		mg/L	0.01			0.04588		13:41"
243230"	Na589	206		mg/L	0.2			205.8112		13:53:15
243230"	Ni2316"	0.01	U	mg/L	0.01			-0.00082	06/15/04"	13:41"
243230"	P_1782"	0.057		mg/L	0.02			0.05706		13:41"
243230"	Pb220"	0.005		mg/L	0.005			0.00388		13:41"
243230"	Pd3404"	0.005	<u> </u>	mg/L	0.005			-0.00002	06/15/04"	13:41"
243230"	S_1820"	10.4		mg/L	0.05			10.40335	06/15/04"	13:41"
243230"	Sb2068"	0.02		mg/L	0.02			0.01376	06/15/04"	13:41"
243230"	Se196"	0.05	<u>u</u>	mg/L	0.05			0.02561	06/15/04"	13:41"

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system id	elem	result	qual	units	rl	tv	rec	ug/ml	date	time
243230"	Si2881"	7.88		mg/L	0.05			7.88349	06/15/04"	13:41"
243230"	Sn1899"	0.062		mg/L	0.01			0.06231	06/15/04"	13:41"
243230"	Sr4215"	0.007		mg/L	0.005			0.00696	06/15/04"	13:41"
243230"	Th2837"	0.015		mg/L	0.015			-0.00020	06/15/04"	13:41"
243230"	Ti3349"	0.005		mg/L	0.005			-0.00013	06/15/04"	13:41"
243230"	TI1908"	0.075		mg/L	0.075			-0.07505	06/15/04"	13:41"
243230"	U_4090"	0.1		mg/L	0.1			-0.00299	06/15/04"	13:41"
243230"	V_2924"	0.005		mg/L	0.005			-0.00034	06/15/04"	13:41"
243230"	W_2079"	0.01		mg/L	0.01			0.00136	06/15/04"	13:41"
243230"	Y_3710"	0.005	U	mg/L	0.005			-0.00001	06/15/04"	13:41"
243230"	Zn2062"	0.005		mg/L	0.005			0.00008	06/15/04"	13:41"
243230"	Zr3496"	0.005	U	mg/L	0.005			0.00010		13:41"
243230d	K_766	3.82		mg/L	0.2			3.8217	06/15/04	13:56:19
243230d	Li670	0.265		mg/L	0.01			0.2654	06/15/04	13:56:19
243230d	Na589	203		mg/L	0.2			202.7277	06/15/04	13:56:19
243231"	Ag3280"	0.005		mg/L	0.005			-0.00044	06/15/04"	13:46"
243231"	AI3082"	0.05	U	mg/L	0.05			-0.01994		13:46"
243231"	As1890"	0.010		mg/L	0.005			0.00960	06/15/04"	13:46"
243231"	B_2496"	0.136		mg/L	0.05			0.13600	06/15/04"	13:46"
243231"	Ba4934"	0.008		mg/L	0.005			0.00813	06/15/04"	13:46"
243231"	Be3130"	0.005		mg/L	0.005			0.00011	06/15/04"	13:46"
243231"	Bi2230"	0.01	U	mg/L	0.01			0.00182	06/15/04"	13:46"
243231"	Ca3179"	13.3		mg/L	0.05	·		13.29359	06/15/04"	13:46"
243231"	Cd2265"	0.005		mg/L	0.005			0.00015	06/15/04"	13:46"
243231"	Co2286"	0.005		mg/L	0.005			0.00094	06/15/04"	13:46"
243231"	Cr2677"	0.015		mg/L	0.015			-0.00012	06/15/04"	13:46"
243231"	Cu3247"	0.005		mg/L	0.005			-0.00056	06/15/04"	13:46"
243231"	Fe2714"	0.1	U	mg/L	0.1			0.01436	06/15/04"	13:46"
243231"	K_766	5.68		mg/L	0.2			5.6802	06/15/04	13:59:23
243231"	La3988"	0.005	U	mg/L	0.005			0.00002	06/15/04"	13:46"
243231"	Li670	0.038		mg/L	0.01			0.0381	06/15/04	13:59:23
243231"	Mg2790"	2.05		mg/L	0.05			2.05341	06/15/04"	13:46"
243231"	Mn2576"	0.006		mg/L	0.005			0.00565	06/15/04"	13:46"
243231"	Mo2020"	0.01		mg/L	0.01			0.00976	06/15/04"	13:46"
243231"	Na589	41.9		mg/L	0.2		•		06/15/04	13:59:23
243231"	Ni2316"	0.01		mg/L	0.01			0.00021	06/15/04"	13:46"
243231"	P_1782"	0.02		mg/L	0.02			0.01870		13:46"
243231"	Pb220"	0.005		mg/L	0.005			-0.00014		13:46"
243231"	Pd3404"	0.005	U	mg/L	0.005			0.00176	the second se	13:46"
243231"	S_1820"	6.96		mg/L	0.05		└───	6.95732	06/15/04"	13:46"
243231"	Sb2068"	0.02		mg/L	0.02			0.00281	06/15/04"	13:46"
243231"	Se196"	0.015	U	mg/L	0.015			0.00352	06/15/04"	13:46"
243231"	Si2881"	25.7		mg/L	0.05			25.68427	06/15/04"	13:46"
243231"	Sn1899"	0.013		mg/L	0.01			0.01292	06/15/04"	13:46"
243231"	Sr4215"	0.067		mg/L	0.005			0.06656	06/15/04"	13:46"
243231"	Th2837"	0.015		mg/L	0.015			-0.00306	the second distance of	13:46"
243231"	Ti3349"	0.005		mg/L	0.005			-0.00031	06/15/04"	13:46"
243231"	TI1908"	0.02		mg/L	0.02			-0.00893	06/15/04"	13:46"
243231"	U_4090"	0.1	<u> </u>	mg/L	0.1			0.01220	06/15/04"	13:46"
243231"	V_2924"	0.006		mg/L	0.005			0.00562	06/15/04"	13:46"
243231"	W_2079"	0.01	the second s	mg/L	0.01			0.00058	06/15/04"	13:46"
243231"	Y_3710"	0.005		mg/L	0.005			-0.00007	06/15/04"	13:46"
243231"	Zn2062"	0.005		mg/L	0.005			0.00162	06/15/04"	13:46"
243231"	Zr3496"	0.005	U	mg/L	0.005			0.00023	06/15/04"	13:46"

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system id	elem	result	qual	units	rl	tv	rec	ug/ml	date	time
				Î						
243231s"	Ag3280"	0.051		mg/L	0.005	0.05	102.5%	0.05126	06/15/04"	13:51"
243231s"	AI3082"	1.95		mg/L	0.05	2	97.3%	1.94636	06/15/04"	13:51"
243231s"	As1890"	2.04		mg/L	0.005	2	101.7%	2.04387	06/15/04"	13:51"
243231s"	B_2496"	0.141		mg/L	0.05			0.14074	06/15/04"	13:51"
243231s"	Ba4934"	2.03		mg/L	0.005	2	100.9%	2.02688	06/15/04"	13:51"
243231s"	Be3130"	0.049		mg/L	0.005	0.05	98.7%	0.04937		
243231s"	Bi2230"	0.01	U	mg/L	0.01			0.00819		13:51"
243231s"	Ca3179"	33.7		mg/L	0.05	20	101.9%	33.68361		13:51"
243231s"	Cd2265"	0.050		mg/L	0.005	0.05	99.5%	0.04974		13:51"
243231s"	Co2286"	0.501		mg/L	0.005	0.5	100.2%	0.50096		13:51"
243231s"	Cr2677"	0.197		mg/L	0.015	0.2	98.5%	0.19705		13:51"
243231s"	Cu3247"	0.252		mg/L	0.005	0.25	100.8%	0.25190		13:51"
243231s"	Fe2714"	1.08		mg/L	0.1	1	108.4%	1.08374		13:51"
243231s"	K_766	NA							1	
243231s"	La3988"	0.005	U	mg/L	0.005			0.00010	06/15/04"	13:51"
243231s"	Li670	NA							1	
243231s"	Mg2790"	22.4		mg/L	0.05	20	101.5%	22.35152	06/15/04"	13:51"
243231s"	Mn2576"	0.509		mg/L	0.005	0.5	100.6%	0.50902	· · · · · · · · · · · · · · · · · · ·	13:51"
243231s"	Mo2020"	0.011		mg/L	0.00	<u> </u>		0.01103		13:51"
243231s"	Na589	NA								
243231s"	Ni2316"	0.490		mg/L	0.01	0.5	98.0%	0.48997	06/15/04"	13:51"
243231s"	P_1782"	0.029		mg/L	0.02			0.02887	06/15/04"	13:51"
243231s"	Pb220"	0.497		mg/L	0.005	0.5	99.3%	0.49663	06/15/04"	13:51"
243231s"	Pd3404"	0.005	U	mg/L	0.005			0.00004	06/15/04"	13:51"
243231s"	S_1820"	7.04		mg/L	0.05			7.03781	06/15/04"	13:51"
243231s"	Sb2068"	0.505		mg/L	0.02	0.5	101.1%	0.50545	06/15/04"	13:51"
243231s"	Se196"	2.23		mg/L	0.015	2	111.6%	2.23159	06/15/04"	13:51"
243231s"	Si2881"	25.9		mg/L	0.05			25.88962	06/15/04"	13:51"
243231s"	Sn1899"	0.013		mg/L	0.01			0.01266	06/15/04"	13:51"
243231s"	Sr4215"	0.067		mg/L	0.005			0.06747	06/15/04"	13:51"
243231s"	Th2837"	0.015	U	mg/L	0.015			-0.01570	06/15/04"	13:51"
243231s"	Ti3349"	0.005		mg/L	0.005			-0.00019	06/15/04"	13:51"
243231s"	TI1908"	2.08		mg/L	0.02	2	103.8%	2.07547	06/15/04"	13:51"
243231s"	U 4090"	0.1	U	mg/L	0.1			0.00811	06/15/04"	13:51"
243231s"	V_2924"	0.505		mg/L	0.005	0.5	99.8%	0.50501	06/15/04"	13:51"
243231s"	W_2079"	0.01	U	mg/L	0.01			0.00070	06/15/04"	13:51"
243231s"	Y_3710"	0.005		mg/L	0.005			-0.00008	06/15/04"	13:51"
243231s"	Zn2062"	0.509		mg/L	0.005	0.5	101.8%	0.50897	06/15/04"	13:51"
243231s"	Zr3496"	0.005	U	mg/L	0.005			0.00014	06/15/04"	13:51"
243232"	Ag3280"	0.005		mg/L	0.005			-0.00015	06/15/04"	13:56"
243232"	AI3082"	0.05	U	mg/L	0.05			0.00710	06/15/04"	13:56"
243232"	As1890"	0.008		mg/L	0.005			0.00778	06/15/04"	13:56"
243232"	B_2496"	0.142		mg/L	0.05			0.14230	06/15/04"	13:56"
243232"	Ba4934"	0.014		mg/L	0.005			0.01383	06/15/04"	13:56"
243232"	Be3130"	0.005		mg/L	0.005			0.00014	06/15/04"	13:56"
243232"	Bi2230"	0.01	U	mg/L	0.01			0.00387	06/15/04"	13:56"
243232"	Ca3179"	12.8		mg/L	0.05			12.79881	06/15/04"	13:56"
243232"	Cd2265"	0.005		mg/L	0.005			0.00023	06/15/04"	13:56"
243232"	Co2286"	0.005		mg/L	0.005			0.00000	06/15/04"	13:56"
243232"	Cr2677"	0.015		mg/L	0.015			0.00032	06/15/04"	13:56"
243232"	Cu3247"	0.005		mg/L	0.005			-0.00028	06/15/04"	13:56"
243232"	Fe2714"	0.1	U	mg/L	0.1			0.00607	06/15/04"	13:56"
243232"	K_766	3.82		mg/L	0.2			3.8210	06/15/04	14:02:28
243232"	La3988"	0.005	U	mg/L	0.005			-0.00007	06/15/04"	13:56"

243232* Mg270* 1.07 mg/L 0.05 1.06501 06/15/04* 13 243232* Mm2576* 0.005 0.00023 06/15/04* 13 243232* Mm2620* 0.01 0.00428 06/15/04* 13 243232* Mm2689 48.6 mg/L 0.2 48.5507 06/15/04* 13 243232* Na589 48.6 mg/L 0.02 0.00677 06/15/04* 13 243232* P1520* 0.005 -0.00057 06/15/04* 13 243232* P14304* 0.005 -0.00057 06/15/04* 13 243232* S1280* 0.02 mg/L 0.02 0.00151 06/15/04* 13 243232* S1289* 0.012 mg/L 0.015 0.00231 06/15/04* 13 243232* S12881* 2.6.2 mg/L 0.016 0.01230 06/15/04* 13 243232* S12881* 0.012 mg/L 0.005 0.00014 <th>system id</th> <th>elem</th> <th>result</th> <th>qual</th> <th>units</th> <th>rl</th> <th>tv</th> <th>rec</th> <th>ug/ml</th> <th>date</th> <th>time</th>	system id	elem	result	qual	units	rl	tv	rec	ug/ml	date	time
243232* Mg270* 1.07 mg/L 0.05 1.06501 06/15/04* 13 243232* Mm2576* 0.005 0.00023 06/15/04* 13 243232* Mm2620* 0.01 0.00428 06/15/04* 13 243232* Mm2689 48.6 mg/L 0.2 48.5507 06/15/04* 13 243232* Na589 48.6 mg/L 0.02 0.00677 06/15/04* 13 243232* P1520* 0.005 -0.00057 06/15/04* 13 243232* P14304* 0.005 -0.00057 06/15/04* 13 243232* S1280* 0.02 mg/L 0.02 0.00151 06/15/04* 13 243232* S1289* 0.012 mg/L 0.015 0.00231 06/15/04* 13 243232* S12881* 2.6.2 mg/L 0.016 0.01230 06/15/04* 13 243232* S12881* 0.012 mg/L 0.005 0.00014 <td></td>											
243232* Mn2576* 0.005 U mg/L 0.001 0.00023 06/15/04* 13 243232* Na589 48.6 mg/L 0.01 0.00428 06/15/04* 13 243232* Na589 48.6 mg/L 0.01 0.00571 06/15/04* 13 243232* P1782* 0.02 0.00577 06/15/04* 13 243232* P120* 0.005 -0.00577 06/15/04* 13 243232* P120* 0.005 -0.00137 06/15/04* 13 243232* S1820* 8.09 mg/L 0.02 0.00151 06/15/04* 13 243232* S1280* 0.012 mg/L 0.05 26.22082 06/15/04* 13 243232* S1280* 0.012 mg/L 0.015 0.000511 06/15/04* 13 243232* S12837* 0.015 mg/L 0.015 0.00233 06/15/04* 13 243232* S12837* 0.012	243232"	Li670	0.045		mg/L	0.01			0.0448	06/15/04	14:02:28
243232" Mo2020" 0.01 U mg/L 0.01 0.00428 66/15/04" 13 243232" Ni2316" 0.01 U mg/L 0.2 48.5507 06/15/04" 13 243232" P1782" 0.02 U mg/L 0.02 0.00687 06/15/04" 13 243232" P03404" 0.005 U mg/L 0.005 -0.00137 06/15/04" 13 243232" P03404" 0.005 U mg/L 0.005 -0.00137 06/15/04" 13 243232" Stb266" 0.02 U mg/L 0.02 0.00151 06/15/04" 13 243232" Stb261" 2.02 06/15/04" 13 243232" Stb261" 32 243232" 16/15/04" 13 243232" Stb261" 0.012 mg/L 0.015 0.00231 06/15/04" 13 243232" Stb261" 0.05 0.00233 06/15/04" 13 243232" <td>243232"</td> <td>Mg2790"</td> <td>1.07</td> <td></td> <td>mg/L</td> <td>0.05</td> <td></td> <td></td> <td>1.06501</td> <td>06/15/04"</td> <td>13:56"</td>	243232"	Mg2790"	1.07		mg/L	0.05			1.06501	06/15/04"	13:56"
243222* Na589 48.6 mg/L 0.2 48.557 06/15/04 14:02: 243232* Ni2316* 0.01 U mg/L 0.02 0.00687 06/15/04* 13 243232* Pb220* 0.005 U mg/L 0.02 0.00687 06/15/04* 13 243232* D63040* 0.005 -0.00137 06/15/04* 13 243232* S1820* 8.09 mg/L 0.05 8.09277 06/15/04* 13 243232* Se186* 0.015 U mg/L 0.05 2.8.0287 06/15/04* 13 243232* Se186* 0.012 mg/L 0.015 0.00137 06/15/04* 13 243232* Sn1899* 0.012 mg/L 0.005 0.07771 06/15/04* 13 243232* T1834* 0.022 -0.00233 06/15/04* 13 243232* T1908* 0.022 mg/L 0.026 0.000237 06/15/04* 13 <td>243232"</td> <td>Mn2576"</td> <td>0.005</td> <td>U</td> <td>mg/L</td> <td>0.005</td> <td></td> <td></td> <td>0.00023</td> <td>06/15/04"</td> <td>13:56"</td>	243232"	Mn2576"	0.005	U	mg/L	0.005			0.00023	06/15/04"	13:56"
243222* Ni2316** 0.01 mg/L 0.02 0.00877 06/15/04* 13 243232* Ph220* 0.005 U mg/L 0.005 -0.00877 06/15/04* 13 243232* Ph320* 0.005 U mg/L 0.005 -0.00137 06/15/04* 13 243232* S1820* 8.09 mg/L 0.05 -0.00151 06/15/04* 13 243232* S1826* 0.02 U mg/L 0.05 26.22082 06/15/04* 13 243232* S1899* 0.012 mg/L 0.05 26.22082 06/15/04* 13 243232* S1899* 0.012 mg/L 0.05 2.00771 06/15/04* 13 243232* S18349* 0.005 U 0.005 0.07071 06/15/04* 13 243232* T1908* 0.02 Mg/L 0.01 0.00233 06/15/04* 13 243232* T1028* 0.01 mg/L 0.02 </td <td>243232"</td> <td>Mo2020"</td> <td>0.01</td> <td>U</td> <td>mg/L</td> <td>0.01</td> <td></td> <td></td> <td>0.00428</td> <td>06/15/04"</td> <td>13:56"</td>	243232"	Mo2020"	0.01	U	mg/L	0.01			0.00428	06/15/04"	13:56"
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245108" Be3130" 0.005 U mg/L 0.005 0.00017 06/15/04" 14: 245108" Bi2230" 0.01 U mg/L 0.01 0.00215 06/15/04" 14: 245108" Ca3179" 13.6 mg/L 0.05 13.58609 06/15/04" 14: 245108" Cd2265" 0.005 U mg/L 0.005 0.00004 06/15/04" 14: 245108" Cd2266" 0.005 U mg/L 0.005 0.000120 06/15/04" 14: 245108" Cc2286" 0.005 U mg/L 0.005 0.00032 06/15/04" 14: 245108" Cu3247" 0.015 U 0.005 0.00053 06/15/04" 14: 245108" Fe2714" 0.1 U mg/L 0.2 3.5922 06/15/04" 14: 245108" La3988" 0.005 U mg/L 0.01 0.0013 06/15/04" 14: 245108"									0.01058		14:00"
245108"Bi2230" 0.01 Umg/L 0.01 0.00215 $06/15/04"$ $14:$ 245108"Ca3179"13.6mg/L 0.05 13.58609 $06/15/04"$ $14:$ 245108"Cd2265" 0.005 Umg/L 0.005 0.00004 $06/15/04"$ $14:$ 245108"Cd2266" 0.005 Umg/L 0.005 0.00004 $06/15/04"$ $14:$ 245108"Cd2267" 0.015 Umg/L 0.005 0.00032 $06/15/04"$ $14:$ 245108"Cr2677" 0.015 Umg/L 0.005 0.00032 $06/15/04"$ $14:$ 245108"Cu3247" 0.005 Umg/L 0.005 0.00053 $06/15/04"$ $14:$ 245108"Fe2714" 0.1 Umg/L 0.01 0.01202 $06/15/04"$ $14:$ 245108"K_766 3.59 mg/L 0.2 3.5922 $06/15/04$ $14:09:$ 245108"La3988" 0.005 Umg/L 0.005 0.00013 $06/15/04$ $14:09:$ 245108"Li670 0.042 mg/L 0.005 0.00174 $06/15/04$ $14:09:$ 245108"Mg2790" 1.34 mg/L 0.05 1.34495 $06/15/04$ $14:$ 245108"Mg220" 0.01 U mg/L 0.01 0.00819 $06/15/04$ " $14:$ 245108"Na589 51.7 mg/L 0.02 51.6882 $06/15/04$ " $14:$ 245108"Ni2316" <td>245108"</td> <td></td> <td>0.005</td> <td>U</td> <td></td> <td></td> <td></td> <td></td> <td>0.00017</td> <td>06/15/04"</td> <td>14:00"</td>	245108"		0.005	U					0.00017	06/15/04"	14:00"
245108" Ca3179" 13.6 mg/L 0.05 13.58609 06/15/04" 14: 245108" Cd2265" 0.005 U mg/L 0.005 0.00004 06/15/04" 14: 245108" Co2286" 0.005 U mg/L 0.005 0.00120 06/15/04" 14: 245108" Cr2677" 0.015 U mg/L 0.015 0.00032 06/15/04" 14: 245108" Cu3247" 0.005 U mg/L 0.005 0.00053 06/15/04" 14: 245108" Fe2714" 0.1 U mg/L 0.1 0.01202 06/15/04" 14: 245108" K_766 3.59 mg/L 0.2 3.5922 06/15/04" 14: 245108" La3988" 0.005 U mg/L 0.01 0.0417 06/15/04" 14: 245108" La3988" 0.005 U mg/L 0.01 0.0417 06/15/04" 14: 245108"		Bi2230"				0.01			0.00215	06/15/04"	14:00"
245108" Cd2265" 0.005 U mg/L 0.005 0.0004 06/15/04" 14: 245108" Co2286" 0.005 U mg/L 0.005 0.00120 06/15/04" 14: 245108" Cr2677" 0.015 U mg/L 0.005 0.00032 06/15/04" 14: 245108" Cu3247" 0.005 U mg/L 0.005 0.00033 06/15/04" 14: 245108" Cu3247" 0.05 U mg/L 0.02 3.5922 06/15/04" 14: 245108" K_766 3.59 mg/L 0.2 3.5922 06/15/04" 14: 245108" La3988" 0.005 U mg/L 0.005 0.00013 06/15/04" 14: 245108" Li670 0.042 mg/L 0.01 0.0417 06/15/04" 14: 245108" Mg2790" 1.34 mg/L 0.05 1.34495 06/15/04" 14: 245108" Mg2790" <td></td> <td>14:00"</td>											14:00"
$245108"$ Co2286"0.005Umg/L0.0050.0012006/15/04"14: $245108"$ Cr2677"0.015Umg/L0.0150.0003206/15/04"14: $245108"$ Cu3247"0.005Umg/L0.0050.0005306/15/04"14: $245108"$ Fe2714"0.1Umg/L0.010.0120206/15/04"14: $245108"$ Fe2714"0.1Umg/L0.23.592206/15/04"14: $245108"$ K_7663.59mg/L0.23.592206/15/04"14:09: $245108"$ La3988"0.005Umg/L0.0050.0001306/15/04"14: $245108"$ Li6700.042mg/L0.010.041706/15/04"14:09: $245108"$ Mg2790"1.34mg/L0.051.3449506/15/04"14: $245108"$ Mg2790"1.34mg/L0.0050.0017406/15/04"14: $245108"$ Ma58951.7mg/L0.251.688206/15/04"14: $245108"$ Ni2316"0.01Umg/L0.010.0000006/15/04"14: $245108"$ Ni2316"0.020.0171606/15/04"14:14: $245108"$ Pi220"0.020.0171606/15/04"14: $245108"$ Pi220"0.05-0.0015106/15/04"14: $245108"$ Pi220"0.05-0.0015106/15/04"14: 2				U							14:00"
245108" Cr2677" 0.015 U mg/L 0.015 0.00032 06/15/04" 14: 245108" Cu3247" 0.005 U mg/L 0.005 0.00053 06/15/04" 14: 245108" Fe2714" 0.1 U mg/L 0.1 0.01202 06/15/04" 14: 245108" K_766 3.59 mg/L 0.2 3.5922 06/15/04" 14: 245108" La3988" 0.005 U mg/L 0.005 0.00013 06/15/04" 14: 245108" Li670 0.042 mg/L 0.05 0.00013 06/15/04" 14: 245108" Li670 0.042 mg/L 0.01 0.0417 06/15/04" 14: 245108" Mg2790" 1.34 mg/L 0.05 1.34495 06/15/04" 14: 245108" Mn2576" 0.005 U mg/L 0.01 0.00819 06/15/04" 14: 245108" Ni2316" 0.01 <td></td> <td></td> <td></td> <td>the second s</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>14:00"</td>				the second s							14:00"
245108" Cu3247" 0.005 U mg/L 0.005 0.00053 06/15/04" 14: 245108" Fe2714" 0.1 U mg/L 0.1 0.01202 06/15/04" 14: 245108" K_766 3.59 mg/L 0.2 3.5922 06/15/04" 14: 245108" La3988" 0.005 U mg/L 0.02 3.5922 06/15/04" 14:09:0 245108" La3988" 0.005 U mg/L 0.005 0.00013 06/15/04" 14:09:0 245108" Li670 0.042 mg/L 0.005 1.34495 06/15/04" 14:09:0 245108" Mg2790" 1.34 mg/L 0.005 0.00174 06/15/04" 14: 245108" Mn2576" 0.005 U mg/L 0.001 0.000819 06/15/04" 14: 245108" Na589 51.7 mg/L 0.2 51.6882 06/15/04" 14: 245108" Ni2316"	245108"		the second s	and the second se					0.00032	06/15/04"	14:00"
$\begin{array}{c c c c c c c c c c c c c c c c c c c $											14:00"
245108" K_766 3.59 mg/L 0.2 3.5922 06/15/04 14:09:1 245108" La3988" 0.005 U mg/L 0.005 0.00013 06/15/04" 14:09:1 245108" Li670 0.042 mg/L 0.005 0.0011 0.0417 06/15/04" 14:09:1 245108" Li670 0.042 mg/L 0.01 0.0417 06/15/04" 14:09:1 245108" Mg2790" 1.34 mg/L 0.05 1.34495 06/15/04" 14:09:1 245108" Mg2790" 1.34 mg/L 0.05 1.34495 06/15/04" 14:09:1 245108" Mg2790" 0.05 U mg/L 0.005 0.00174 06/15/04" 14:09:1 245108" Mo2020" 0.01 U mg/L 0.01 0.00819 06/15/04" 14:09:1 245108" Ni2316" 0.01 U mg/L 0.02 0.01716 06/15/04" 14:09:1 245108"											14:00"
245108" La3988" 0.005 U mg/L 0.005 0.00013 06/15/04" 14: 245108" Li670 0.042 mg/L 0.01 0.0417 06/15/04 14:09:0 245108" Mg2790" 1.34 mg/L 0.05 1.34495 06/15/04" 14:09:0 245108" Mg2790" 1.34 mg/L 0.05 1.34495 06/15/04" 14: 245108" Mn2576" 0.005 U mg/L 0.005 0.00174 06/15/04" 14: 245108" Mn2576" 0.005 U mg/L 0.005 0.00174 06/15/04" 14: 245108" Mo2020" 0.01 U mg/L 0.01 0.00819 06/15/04" 14: 245108" Na589 51.7 mg/L 0.2 51.6882 06/15/04" 14: 245108" Ni2316" 0.01 U mg/L 0.02 0.01716 06/15/04" 14: 245108" P_1782" 0.02 U mg/L 0.02 0.01716 06/15/04" 14:	the second s	the second se				0.2				06/15/04	14:09:07
245108" Li670 0.042 mg/L 0.01 0.0417 06/15/04 14:09:0 245108" Mg2790" 1.34 mg/L 0.05 1.34495 06/15/04" 14: 245108" Mn2576" 0.005 U mg/L 0.005 0.00174 06/15/04" 14: 245108" Mn2576" 0.005 U mg/L 0.005 0.00174 06/15/04" 14: 245108" Mo2020" 0.01 U mg/L 0.01 0.00819 06/15/04" 14: 245108" Na589 51.7 mg/L 0.2 51.6882 06/15/04" 14: 245108" Ni2316" 0.01 U mg/L 0.01 0.00000 06/15/04" 14: 245108" P_1782" 0.02 U mg/L 0.02 0.01716 06/15/04" 14: 245108" Pb220" 0.005 U mg/L 0.005 -0.00151 06/15/04" 14: 245108" Pd3404"<				U							14:00"
245108" Mg2790" 1.34 mg/L 0.05 1.34495 06/15/04" 14: 245108" Mn2576" 0.005 U mg/L 0.005 0.00174 06/15/04" 14: 245108" Mo2020" 0.01 U mg/L 0.01 0.00819 06/15/04" 14: 245108" Mo2020" 0.01 U mg/L 0.01 0.00819 06/15/04" 14: 245108" Na589 51.7 mg/L 0.2 51.6882 06/15/04" 14:09:0 245108" Ni2316" 0.01 U mg/L 0.01 0.00000 06/15/04" 14: 245108" Ni2316" 0.01 U mg/L 0.01 0.00000 06/15/04" 14: 245108" P_1782" 0.02 U mg/L 0.02 0.01716 06/15/04" 14: 245108" Pb220" 0.005 U mg/L 0.005 -0.00151 06/15/04" 14: 245108" <									The second s		14:09:07
245108" Mn2576" 0.005 U mg/L 0.005 0.00174 06/15/04" 14: 245108" Mo2020" 0.01 U mg/L 0.01 0.00819 06/15/04" 14: 245108" Na589 51.7 mg/L 0.2 51.6882 06/15/04" 14:09:0 245108" Ni2316" 0.01 U mg/L 0.2 51.6882 06/15/04" 14:09:0 245108" Ni2316" 0.01 U mg/L 0.01 0.000000 06/15/04" 14:09:0 245108" P_1782" 0.02 U mg/L 0.01 0.001716 06/15/04" 14: 245108" P_1782" 0.02 U mg/L 0.02 0.01716 06/15/04" 14: 245108" Pb220" 0.005 U mg/L 0.005 -0.00151 06/15/04" 14: 245108" Pd3404" 0.005 U mg/L 0.005 0.00060 06/15/04" 14: <td></td> <td></td> <td></td> <td></td> <td></td> <td>and the second second</td> <td></td> <td></td> <td></td> <td></td> <td>14:00"</td>						and the second					14:00"
245108" Mo2020" 0.01 U mg/L 0.01 0.00819 06/15/04" 14: 245108" Na589 51.7 mg/L 0.2 51.6882 06/15/04 14:09:0 245108" Ni2316" 0.01 U mg/L 0.01 0.00000 06/15/04" 14:09:0 245108" Ni2316" 0.01 U mg/L 0.01 0.00000 06/15/04" 14:09:0 245108" P_1782" 0.02 U mg/L 0.02 0.01716 06/15/04" 14: 245108" P_1782" 0.02 U mg/L 0.005 -0.00151 06/15/04" 14: 245108" Pb220" 0.005 U mg/L 0.005 -0.00151 06/15/04" 14: 245108" Pd3404" 0.005 U mg/L 0.005 0.00060 06/15/04" 14:			the second s	U		the second s					14:00"
245108" Na589 51.7 mg/L 0.2 51.6882 06/15/04 14:09:0 245108" Ni2316" 0.01 U mg/L 0.01 0.00000 06/15/04" 14: 245108" P_1782" 0.02 U mg/L 0.02 0.01716 06/15/04" 14: 245108" P_1782" 0.02 U mg/L 0.02 0.01716 06/15/04" 14: 245108" Pb220" 0.005 U mg/L 0.005 -0.00151 06/15/04" 14: 245108" Pd3404" 0.005 U mg/L 0.005 0.00060 06/15/04" 14:											14:00"
245108" Ni2316" 0.01 U mg/L 0.01 0.01 0.00000 06/15/04" 14: 245108" P_1782" 0.02 U mg/L 0.02 0.01716 06/15/04" 14: 245108" Pb220" 0.005 U mg/L 0.005 -0.00151 06/15/04" 14: 245108" Pb220" 0.005 U mg/L 0.005 -0.00151 06/15/04" 14: 245108" Pd3404" 0.005 U mg/L 0.005 0.00060 06/15/04" 14:										and the second se	14:09:07
245108" P_1782" 0.02 U mg/L 0.02 0.01716 06/15/04" 14: 245108" Pb220" 0.005 U mg/L 0.005 -0.00151 06/15/04" 14: 245108" Pd3404" 0.005 U mg/L 0.005 0.005 0.00060 06/15/04" 14:				υ							14:00"
245108" Pb220" 0.005 U mg/L 0.005 -0.00151 06/15/04" 14: 245108" Pd3404" 0.005 U mg/L 0.005 0.0050 06/15/04" 14:						the second s					14:00"
245108" Pd3404" 0.005 U mg/L 0.005 0.00060 06/15/04" 14:											14:00"
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		and the second								the second s	14:00"
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Div 20 to#040415-2, 040521-6 06002.01.141

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system id	elem	result	qual	units	rl	tv	rec	ug/ml	date	time
245108"	Si2881"	19.7		mg/L	0.05			19.70862	06/15/04"	14:00"
245108"	Sn1899"	0.01	U	mg/L	0.01			0.00415	06/15/04"	14:00"
245108"	Sr4215"	0.075		mg/L	0.005			0.07474	06/15/04"	14:00"
245108"	Th2837"	0.015	U	mg/L	0.015			-0.00297	06/15/04"	14:00"
245108"	Ti3349"	0.005		mg/L	0.005			-0.00026	06/15/04"	14:00"
245108"	TI1908"	0.02		mg/L	0.02			-0.00225	06/15/04"	14:00"
245108"	U_4090"	0.1		mg/L	0.1			0.01539	06/15/04"	14:00"
245108"	V 2924"	0.013		mg/L	0.005			0.01334	06/15/04"	14:00"
245108"	W_2079"	0.01	U	mg/L	0.01			0.00567	06/15/04"	14:00"
245108"	Y_3710"	0.005		mg/L	0.005			-0.00013	06/15/04"	14:00"
245108"	Zn2062"	0.005		mg/L	0.005			0.00154	06/15/04"	14:00"
245108"	Zr3496"	0.005		mg/L	0.005			0.00061	06/15/04"	14:00"
245108d"	Ag3280"	0.005		mg/L	0.005			-0.00002	06/15/04"	14:05"
245108d"	Al3082"	0.05		mg/L	0.05			-0.02038	06/15/04"	14:05"
245108d"	As1890"	0.009		mg/L	0.005			0.00854	06/15/04"	14:05"
245108d"	B 2496"	0.140		mg/L	0.05			0.13992	06/15/04"	14:05"
245108d"	Ba4934"	0.010		mg/L	0.005			0.01033	06/15/04"	14:05"
245108d"	Be3130"	0.005	U	mg/L	0.005			0.00020	06/15/04"	14:05"
245108d"	Bi2230"	0.01		mg/L	0.01			0.00460	06/15/04"	14:05"
245108d"	Ca3179"	13.2		mg/L	0.05			13.20116	06/15/04"	14:05"
245108d"	Cd2265"	0.005	U	mg/L	0.005			0.00044	06/15/04"	14:05"
245108d"	Co2286"	0.005	Ū	mg/L	0.005			0.00004	06/15/04"	14:05"
245108d"	Cr2677"	0.015	U	mg/L	0.015			-0.00036	06/15/04"	14:05"
245108d"	Cu3247"	0.005	U	mg/L	0.005			0.00058	06/15/04"	14:05"
245108d"	Fe2714"	0.1	U	mg/L	0.1			0.00315	06/15/04"	14:05"
245108d"	K_766	3.58		mg/L	0.2				06/15/04	14:12:11
245108d"	La3988"	0.005	U	mg/L	0.005			0.00000	06/15/04"	14:05"
245108d"	Li670	0.043		mg/L	0.01				06/15/04	14:12:11
245108d"	Mg2790"	1.31		mg/L	0.05			1.30866	06/15/04"	14:05"
245108d"	Mn2576"	0.005	U	mg/L	0.005			0.00158	06/15/04"	14:05"
245108d"	Mo2020"	0.01	Ŭ	mg/L	0.01			0.00826		14:05"
245108d"	Na589	51.8		mg/L	0.2				06/15/04	14:12:11
245108d"	Ni2316"	0.01		mg/L	0.01			0.00068		14:05"
245108d"	P_1782"	0.02		mg/L	0.02			0.01283	06/15/04"	14:05"
245108d"	Pb220"	0.005		mg/L	0.005			-0.00035		14:05"
245108d"	Pd3404"	0.005		mg/L	0.005			-0.00075		14:05"
245108d"	S_1820"	9.20		mg/L	0.05			9.20236	and the second	14:05"
245108d"	Sb2068"	0.02	the second s	mg/L	0.02			0.00174		14:05"
245108d"	Se196"	0.015	U	mg/L	0.015			0.00108		14:05"
245108d"	Si2881"	19.1		mg/L	0.05			19.13470		14:05"
245108d"	Sn1899"	0.01		mg/L	0.01			0.00501	06/15/04"	14:05"
245108d"	Sr4215"	0.073		mg/L	0.005			0.07274	the second s	14:05"
245108d"	Th2837"	0.015		mg/L	0.015	-		-0.00187	06/15/04"	14:05"
245108d"	Ti3349"	0.005		mg/L	0.005			-0.00013		14:05"
245108d"	Ti1908"	0.02		mg/L	0.02			-0.00342		14:05"
245108d"	U_4090"	0.1		mg/L	0.1			0.01616		14:05"
245108d"	V_2924"	0.013		mg/L	0.005			0.01314		14:05"
245108d"	W_2079"	0.01		mg/L	0.01			0.00355		14:05"
245108d"	Y_3710"	0.005		mg/L	0.005			-0.00004		14:05"
245108d"	Zn2062"	0.005		mg/L	0.005			0.00277	06/15/04"	14:05"
245108d"	Zr3496"	0.005		mg/L	0.005			0.00043		14:05"
245108s"	Ag3280"	0.050		mg/L	0.005	0.05	100.9%	0.05043		14:10"
245108s"	AI3082"	1.94	_	mg/L	0.05		97.0%	1.93996		14:10"
245108s"	As1890"	2.03	L	mg/L	0.005	2	101.1%	2.02830	_06/15/04"	14:10"

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system id	elem	result	qual	units	rl	tv	rec	ug/ml	date	time
245108s"	B_2496"	0.142		mg/L	0.05			0.14203		14:10"
245108s"	Ba4934"	2.01		mg/L	0.005	2		2.00761	06/15/04"	14:10"
245108s"	Be3130"	0.049		mg/L	0.005	0.05	97.8%	0.04892	06/15/04"	14:10"
245108s"	Bi2230"	0.01	U	mg/L	0.01			0.00733	06/15/04"	14:10"
245108s"	Ca3179"	33.8		mg/L	0.05	20	100.9%	33.77074	06/15/04"	14:10"
245108s"	Cd2265"	0.049		mg/L	0.005	0.05	98.4%	0.04920	06/15/04"	14:10"
245108s"	Co2286"	0.498		mg/L	0.005	0.5	99.6%	0.49792	06/15/04"	14:10"
245108s"	Cr2677"	0.195		mg/L	0.015	0.2	97.6%	0.19523	06/15/04"	14:10"
245108s"	Cu3247"	0.251		mg/L	0.005	0.25	100.5%	0.25133	06/15/04"	14:10"
245108s"	Fe2714"	1.06		mg/L	0.1	1	106.0%	1.06004	06/15/04"	14:10"
245108s"	K_766	24.1		mg/L	0.2	20	102.8%	24.1459	06/15/04	14:15:15
245108s"	La3988"	0.005	U	mg/L	0.005			-0.00017	06/15/04"	14:10"
245108s"	Li670	0.042		mg/L	0.01			0.0422	06/15/04	14:15:15
245108s"	Mg2790"	21.8		mg/L	0.05	20	102.1%	21.75639	06/15/04"	14:10"
245108s"	Mn2576"	0.501		mg/L	0.005	0.5	100.1%	0.50070	06/15/04"	14:10"
245108s"	Mo2020"	0.01	U	mg/L	0.01			0.00901	06/15/04"	14:10"
245108s"	Na589	72.1		mg/L	0.2	20	101.9%	72.0863	06/15/04	14:15:15
245108s"	Ni2316"	0.482		mg/L	0.01	0.5	96.5%	0.48245	06/15/04"	14:10"
245108s"	P_1782"	0.023		mg/L	0.02			0.02298	06/15/04"	14:10"
245108s"	Pb220"	0.494		mg/L	0.005	0.5	98.8%	0.49408	06/15/04"	14:10"
245108s"	Pd3404"	0.005	U	mg/L	0.005			-0.00092	06/15/04"	14:10"
245108s"	S_1820"	9.31		mg/L	0.05			9.31152	06/15/04"	14:10"
245108s"	Sb2068"	0.501		mg/L	0.02	0.5	100.3%	0.50131	06/15/04"	14:10"
245108s"	Se196"	2.17		mg/L	0.015	2	108.6%	2.17253	06/15/04"	14:10"
245108s"	Si2881"	19.4		mg/L	0.05			19.42317	06/15/04"	14:10"
245108s"	Sn1899"	0.01	U	mg/L	0.01			0.00309	06/15/04"	14:10"
245108s"	Sr4215"	0.074		mg/L	0.005			0.07378	06/15/04"	14:10"
245108s"	Th2837"	0.015		mg/L	0.015			-0.01507	06/15/04"	14:10"
245108s"	Ti3349"	0.005	U	mg/L	0.005			-0.00026	06/15/04"	14:10"
245108s"	TI1908"	2.08		mg/L	0.02	2	104.0%	2.07903	06/15/04"	14:10"
245108s"	U_4090"	0.1	U	mg/L	0.1			0.00060	06/15/04"	14:10"
245108s"	V_2924"	0.507		mg/L	0.005	0.5	98.8%	0.50713	06/15/04"	14:10"
245108s"	W_2079"	0.01		mg/L	0.01			0.00700	06/15/04"	14:10"
245108s"	Y_3710"	0.005	U	mg/L	0.005			-0.00018	06/15/04"	14:10"
245108s"	Zn2062"	0.508		mg/L	0.005	0.5	101.7%	0.50840		14:10"
245108s"	Zr3496"	0.005		mg/L	0.005			0.00003		14:10"
245109"	Ag3280"	0.005	U	mg/L	0.005			-0.00010		14:15"
245109"	Al3082"	0.084		mg/L	0.05			0.08377	06/15/04"	14:15"
245109"	As1890"	0.017		_mg/L	0.005			0.01671	06/15/04"	14:15"
245109"	B_2496"	0.167		mg/L	0.05			0.16706	06/15/04"	14:15"
245109"	Ba4934"	0.007		_mg/L_	0.005			0.00741	06/15/04"	14:15"
245109"	Be3130"	0.005		mg/L	0.005			0.00024	06/15/04"	14:15"
245109"	Bi2230"	0.01	U	mg/L	0.01			0.00180	06/15/04"	14:15"
245109"	Ca3179"	6.69		mg/L	0.05			6.69064	06/15/04"	14:15"
245109"	Cd2265"	0.005		mg/L	0.005			0.00069	06/15/04"	14:15"
245109"	Co2286"	0.005		mg/L	0.005			0.00079		14:15"
245109"	Cr2677"	0.015		mg/L	0.015			0.00088		14:15"
245109"	Cu3247"	0.005		mg/L	0.005			0.00096		14:15"
245109"	Fe2714"	0.1	U	mg/L	0.1			0.03502	06/15/04"	14:15"
245109"	K_766	2.76		mg/L	0.2				06/15/04	14:18:19
245109"	La3988"	0.005	U	mg/L	0.005			-0.00002	06/15/04"	14:15"
245109"	Li670	0.089		mg/L	0.01				06/15/04	14:18:19
245109"	Mg2790"	0.550		mg/L	0.05			0.54993	06/15/04"	14:15"
245109"	Mn2576"	0.005	U	mg/L	0.005			0.00061	06/15/04"	14:15"

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system id	elem	result	qual	units	rl	tv	rec	ug/ml	date	time
245109"	Mo2020"	0.01	U	mg/L	0.01			0.00646	06/15/04"	14:15"
245109"	Na589	77.2		mg/L	0.2			77.1561	06/15/04	14:18:19
245109"	Ni2316"	0.01	U	mg/L	0.01			-0.00032	06/15/04"	14:15"
245109"	P 1782"	0.033		mg/L	0.02			0.03319	06/15/04"	14:15"
245109"	Pb220"	0.005	U	mg/L	0.005			0.00076	06/15/04"	14:15"
245109"	Pd3404"	0.005		mg/L	0.005			0.00015	06/15/04"	14:15"
245109"	S_1820"	7.36		mg/L	0.05			7.35884	06/15/04"	14:15"
245109"	Sb2068"	0.02	U	mg/L	0.02			0.00200	06/15/04"	14:15"
245109"	Se196"	0.015		mg/L	0.015			0.00585	06/15/04"	14:15"
245109"	Si2881"	25.6		mg/L	0.05			25.62435	06/15/04"	14:15"
245109"	Sn1899"	0.01	U	mg/L	0.01			0.00801	06/15/04"	14:15"
245109"	Sr4215"	0.031		mg/L	0.005			0.03147	06/15/04"	14:15"
245109"	Th2837"	0.015	U	mg/L	0.015			-0.00032	06/15/04"	14:15"
245109"	Ti3349"	0.005		mg/L	0.005			0.00056	06/15/04"	14:15"
245109"	TI1908"	0.02	U	mg/L	0.02			-0.00642	06/15/04"	14:15"
245109"	U 4090"	0.1	U	mg/L	0.1			0.00299	06/15/04"	14:15"
245109"	V_2924"	0.005	U	mg/L	0.005			0.00473	06/15/04"	14:15"
245109"	W_2079"	0.01		mg/L	0.01			0.00064	06/15/04"	14:15"
245109"	Y_3710"	0.005	U	mg/L	0.005			0.00006	06/15/04"	14:15"
245109"	Zn2062"	0.005		mg/L	0.005			0.00279	06/15/04"	14:15"
245109"	Zr3496"	0.005		mg/L	0.005			0.00085	06/15/04"	14:15"
245110"	Ag3280"	0.005	U	mg/L	0.005			-0.00048	06/15/04"	14:20"
245110"	AI3082"	0.05	U	mg/L	0.05			-0.02370	06/15/04"	14:20"
245110"	As1890"	0.007		mg/L	0.005			0.00737	06/15/04"	14:20"
245110"	B_2496"	0.141		mg/L	0.05			0.14082	06/15/04"	14:20"
245110"	Ba4934"	0.011		mg/L	0.005			0.01066	06/15/04"	14:20"
245110"	Be3130"	0.005	U	mg/L	0.005			0.00022	06/15/04"	14:20"
245110"	Bi2230"	0.01	U	mg/L	0.01			0.00246		14:20"
245110"	Ca3179"	13.6		mg/L	0.05			13.63298	06/15/04"	14:20"
245110"	Cd2265"	0.005		mg/L	0.005			0.00000		14:20"
245110"	Co2286"	0.005		mg/L	0.005			0.00091	06/15/04"	14:20"
245110"	Cr2677"	0.015	U	mg/L	0.015			-0.00106	06/15/04"	14:20"
245110"	Cu3247"	0.005		mg/L	0.005			-0.00037	06/15/04"	14:20"
245110"	Fe2714"	0.1	U	mg/L	0.1			0.00296		14:20"
245110"	K_766	3.71		mg/L	0.2				06/15/04	14:21:23
245110"	La3988"	0.005	U	mg/L	0.005			-0.00042		14:20"
245110"	Li670	0.044	_	mg/L	0.01			the second s	06/15/04	14:21:23
245110"	Mg2790"	1.34		mg/L	0.05			1.34392		14:20*
245110"	Mn2576"	0.005		mg/L	0.005			0.00163		14:20"
245110"	Mo2020"	0.01	_	mg/L	0.01			0.00798		14:20"
245110"	Na589	52.8		mg/L	0.2			the second s	06/15/04	14:21:23
245110"	Ni2316"	0.01	_	mg/L	0.01			0.00093		14:20"
245110"	P_1782"	0.027	_	mg/L	0.02			0.02714		
245110"	Pb220"	0.005		mg/L	0.005	 		-0.00082		the second s
245110"	Pd3404"	0.005		mg/L	0.005	ļ		-0.00164		
245110"	S_1820"	9.46		mg/L	0.05		·	9.45732		14:20"
245110"	Sb2068"	0.02		mg/L	0.02	 		0.00397		14:20"
245110"	Se196"	0.015		mg/L	0.015			0.00383		14:20"
245110"	Si2881"	19.6		mg/L	0.05			19.64123		14:20"
245110"	Sn1899"	0.017		mg/L	0.01	ļ		0.01658		14:20"
245110"	Sr4215"	0.075	_	mg/L	0.005			0.07517		14:20"
245110"	Th2837"	0.015		mg/L	0.015			-0.00175		14:20"
245110"	Ti3349"	0.005		mg/L	0.005			-0.00029	the second s	14:20"
245110"	TI1908"	0.02	U	mg/L	0.02			-0.01743	06/15/04"	14:20"

system id	elem	result	qual	units	rl	tv	rec	ug/ml	date	time
245110"	U_4090"	0.1	U	mg/L	0.1			0.00769	06/15/04"	14:20"
245110"	V_2924"	0.013		mg/L	0.005			0.01326	06/15/04"	14:20"
245110"	W_2079"	0.01		mg/L	0.01			-0.00068	06/15/04"	14:20"
245110"	Y_3710"	0.005		mg/L	0.005			-0.00014	06/15/04"	14:20"
245110"	Zn2062"	0.005		mg/L	0.005			-0.00016	06/15/04"	14:20"
245110"	Zr3496"	0.005		mg/L	0.005			0.00020	06/15/04"	14:20"
245111"	Ag3280"	0.005	U	mg/L	0.005			0.00000	06/15/04"	14:39"
245111"	Al3082"	0.396		mg/L	0.05			0.39623	06/15/04"	14:39"
245111"	As1890"	0.010		mg/L	0.005			0.00993	06/15/04"	14:39"
245111"	B_2496"	0.171		mg/L	0.05			0.17053	06/15/04"	14:39"
245111"	Ba4934"	0.008		mg/L	0.005			0.00812	06/15/04"	14:39"
245111"	Be3130"	0.005		mg/L	0.005			0.00029	06/15/04"	14:39"
245111"	Bi2230"	0.01	U	mg/L	0.01			0.00311	06/15/04"	14:39"
245111"	Ca3179"	6.97		mg/L	0.05			6.96974	06/15/04"	14:39"
245111"	Cd2265"	0.005		mg/L	0.005			0.00009	06/15/04"	14:39"
245111"	Co2286"	0.005		mg/L	0.005			0.00077	06/15/04"	14:39"
245111"	Cr2677"	0.015		mg/L	0.015			0.00064	06/15/04"	14:39"
245111"	Cu3247"	0.005	U	mg/L	0.005			0.00052	06/15/04"	14:39"
<u>245111"</u>	Fe2714"	0.138		mg/L	0.1			0.13786	06/15/04"	14:39"
245111"	K_766	2.89		mg/L	0.2			2.8883	06/15/04	14:34:14
245111"	La3988"	0.005	U	mg/L	0.005			0.00075	06/15/04"	14:39"
245111"	Li670	0.093		mg/L	0.01				06/15/04	14:34:14
245111"	Mg2790"	0.604		mg/L	0.05			0.60413	06/15/04"	14:39"
245111"	Mn2576"	0.005		mg/L	0.005			0.00083	06/15/04"	14:39"
245111"	Mo2020"	0.01	U	mg/L	0.01			0.00923	06/15/04"	14:39"
245111"	Na589	80.3		mg/L	0.2				06/15/04	14:34:14
245111"	Ni2316"	0.01	0	mg/L	0.01			0.00093	06/15/04"	14:39"
245111"	P_1782"	0.039		mg/L	0.02			0.03884	06/15/04"	14:39"
245111"	Pb220"	0.005		mg/L	0.005			0.00260	06/15/04"	14:39"
245111"	Pd3404"	0.005	<u>U</u>	mg/L	0.005			0.00034	06/15/04"	14:39"
245111"	S_1820"	7.42		mg/L	0.05			7.42317	06/15/04"	14:39"
245111"	Sb2068"	0.02		mg/L	0.02			0.00097	06/15/04"	14:39"
245111" 245111"	Se196" Si2881"	0.015	<u> </u>	mg/L	0.015			0.00800	06/15/04"	14:39"
		27.0		mg/L	0.05			26.99124	06/15/04"	14:39"
245111" 245111"	Sn1899" Sr4215"	0.023		mg/L	0.01			0.02337	06/15/04"	14:39"
245111	Th2837"	0.033	11	mg/L	0.005			0.03319	06/15/04"	14:39"
		0.015		mg/L	0.015			-0.00114	06/15/04"	14:39"
245111" 245111"	Ti3349"	0.005		mg/L	0.005			0.00363	06/15/04"	14:39"
	TI1908"	0.02		mg/L	0.02			-0.00486	06/15/04"	14:39"
245111" 245111"	U_4090"			mg/L	0.1			0.02911	06/15/04"	14:39"
245111	V_2924"	0.005		mg/L	0.005			0.00495	06/15/04" 06/15/04"	14:39"
	W_2079"	0.01		mg/L	0.01			0.00000		14:39"
245111"	Y_3710"	0.005		mg/L	0.005			0.00017	06/15/04"	14:39"
245111" 245111"	Zn2062"	0.005		mg/L	0.005			0.00171	06/15/04" 06/15/04"	14:39"
245111"	Zr3496"	0.005		mg/L	0.005			0.00129		14:39"
245112" 245112"	Ag3280"	0.005		mg/L	0.005			-0.00030	06/15/04"	14:44"
245112	Al3082"	0.05 0.005		mg/L	0.05			-0.01757	06/15/04"	14:44"
245112	As1890"			mg/L	0.005			-0.00103	06/15/04"	<u> 14:44" </u>
	B_2496"	0.05		mg/L	0.05		·	-0.00168	06/15/04"	
245112"	Ba4934"	0.005		mg/L	0.005			0.00014	06/15/04"	14:44"
245112"	Be3130"	0.005		mg/L	0.005			0.00029	06/15/04"	14:44"
245112"	Bi2230"	0.01	<u> </u>	mg/L	0.01			0.00554	06/15/04"	14:44"
245112"	Ca3179"	10.0		mg/L	0.05			10.01406	06/15/04"	14:44"
245112"	Cd2265"	0.005	U	mg/L	0.005			0.00102	06/15/04"	14:44"

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245112* Co2286* OODS U mg/L OODS OUDS	system id	elem	result	qual	units	rl	tv	rec	ug/ml	date	time
225112* Cr2877* 0.015 U mg/L 0.005 0.00006 06/15/04* 14:44* 245112* Fe2714* N.005 U mg/L 0.005 0.00006 06/15/04* 14:44* 245112* K.766 9.08 mg/L 0.02 9.0834 06/15/04* 14:37:18 245112* Lia3988* 0.005 U 0.0015 06/15/04* 14:37:18 245112* Ma2790* 9.84 mg/L 0.005 -0.00030 06/15/04* 14:34* 245112* Ma2790* 9.84 mg/L 0.05 9.83796 06/15/04* 14:34* 245112* Ma2576* 0.005 U 0.00182 06/15/04* 14:34* 245112* Ma258* 0.001 mg/L 0.02 0.0079 06/15/04* 14:34* 245112* Na588 8.94 mg/L 0.02 0.00797 06/15/04* 14:34* 245112* Na589 0.051 mg/L 0.014 0.014*											
245112* Cr2677* 0.015 0.00022 06/15/04* 14:44* 245112* F62714* 10.1 mg/L 0.015 0.00006 06/15/04* 14:44* 245112* K.766 9.08 mg/L 0.02 9.0834 06/15/04* 14:44* 245112* La3988* 0.005 0.00010 06/15/04* 14:44* 245112* La3988* 0.005 0.00030 06/15/04* 14:44* 245112* Ma2790* 9.84 mg/L 0.01 0.0015 06/15/04* 14:44* 245112* Ma2790* 9.84 mg/L 0.02 0.0016* 14:44* 245112* Ma2020* 0.011 0.0012 0.00030 06/15/04* 14:44* 245112* N1256* 0.021 mg/L 0.02 0.0077 06/15/04* 14:44* 245112* N1269* 0.021 mg/L 0.02 0.00717 06/15/04* 14:44* 245112* N1280* 0.005 0.00174	245112"	Co2286"	0.005	U	mg/L	0.005			0.00085	06/15/04"	14:44"
245112" Cu3247" 0.005 0.00006 0011001 11.444" 245112" K, 766 9.08 mg/L 0.2 9.0834 06/15/04" 14:34" 245112" La3988" 0.005 Umg/L 0.01 0.0015 06/15/04" 14:37:18 245112" La3988" 0.005 Umg/L 0.01 0.0015 06/15/04" 14:37:18 245112" Ma276" 0.005 9.83796 06/15/04" 14:44" 245112" Ma2200" 0.01 Umg/L 0.01 0.00162 06/15/04" 14:44" 245112" Ma2020" 0.01 Umg/L 0.01 0.00162 06/15/04" 14:44" 245112" N18216" 0.01 Umg/L 0.02 0.00174 14:44" 245112" N18216" 0.01 Umg/L 0.02 0.00174 14:44" 245112" N18216" 0.005 Umg/L 0.02 0.00174 14:44" 245112" S18206" 0.02 U		Cr2677"	0.015	U	mg/L	0.015			-0.00022	06/15/04"	14:44"
245112" Fe2714" 10.1 mg/L 0.1 10.13740 06/15/04" 14:44" 245112" La3986" 0.005 mg/L 0.005 9.0030 06/15/04 14:37:18 245112" La670 0.01 0.005 9.0035 9.00350 06/15/04" 14:34" 245112" Mg2760" 0.055 9.83766 6/15/04" 14:44" 245112" Mg2700" 0.01 0.00182 06/15/04" 14:44" 245112" Mg2200" 0.01 0.00182 06/15/04" 14:44" 245112" Ng230" 0.01 mg/L 0.02 0.00779 06/15/04" 14:44" 245112" Ng230" 0.020 mg/L 0.02 0.00779 06/15/04" 14:44" 245112" Ng230" 0.050 mg/L 0.020 0.00779 06/15/04" 14:44" 245112" Sta820" 0.050 mg/L 0.025 0.00271 06/15/04" 14:44" 245112" Sta820"			0.005	U		0.005			0.00006	06/15/04"	14:44"
245112" K 766 9.08 mg/L 0.02 9.0834106/15/04 14:37:18 245112" La3988" 0.005 0.00050 06/15/04 14:44* 245112" Mg2700" 9.84 mg/L 0.005 9.83786 06/15/04* 14:44* 245112" Mg2700" 9.84 mg/L 0.005 9.83786 06/15/04* 14:44* 245112" Mg2200" 0.01 mg/L 0.005 9.00030 06/15/04* 14:44* 245112" Ng216" 0.01 mg/L 0.02 8.9422 06/15/04* 14:44* 245112" Ng216" 0.021 mg/L 0.026 0.00779 06/15/04* 14:44* 245112" P1202" 0.0051 mg/L 0.005 0.002171 06/15/04* 14:44* 245112" S1820" 0.021 mg/L 0.025 -0.001217 06/15/04* 14:44* 245112" S1820" 0.051 mg/L 0.015 -0.00217 06/15/04* 14:44* <td></td> <td></td> <td></td> <td></td> <td></td> <td>0.1</td> <td></td> <td></td> <td>10.13740</td> <td>06/15/04"</td> <td>14:44"</td>						0.1			10.13740	06/15/04"	14:44"
245112" L3988" 0.005 U mg/L 0.001 0.0015 06/15/04" 14:44" 245112" LG70 0.01 U mg/L 0.05 9.83796 06/15/04" 14:44" 245112" Mn2576" 0.05 U mg/L 0.05 9.83796 06/15/04" 14:44" 245112" Mn2576" 0.05 U mg/L 0.01 0.00030 06/15/04" 14:44" 245112" Nn2859 8.94 U mg/L 0.02 0.00779 06/15/04" 14:44" 245112" Nn2859 0.05 U mg/L 0.02 0.00779 06/15/04" 14:44" 245112" P 1782' 0.02 U mg/L 0.02 0.00174 06/15/04" 14:44" 245112" S 1280'' 0.05 U mg/L 0.05 0.00174 06/15/04" 14:44" 245112" S 1280'' 0.05 U mg/L 0.05 0.00271 06/15/04" 14:44" 245112" S 1280'' 0.05 U mg/L 0.05 0.00217						0.2			9.0834	06/15/04	14:37:18
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245113"	S_1820"	0.05	U	mg/L	0.05			-0.04056	06/15/04"	14:49"
245113"	Sb2068"	0.096		mg/L	0.02			0.09574	06/15/04"	14:49"
245113"	Se196"	0.094		mg/L	0.015			0.09388	06/15/04"	14:49"
245113"	Si2881"	0.05	U	mg/L	0.05			0.00695	06/15/04"	14:49"
245113"	Sn1899"	0.01		mg/L	0.01			-0.00094	06/15/04"	14:49"
245113"	Sr4215"	9.91		mg/L	0.005			9.91195	06/15/04"	14:49"
245113"	Th2837"	0.091		mg/L	0.015			0.09090	06/15/04"	14:49"
245113"	Ti3349"	0.005	U	mg/L	0.005			0.00005	06/15/04"	14:49"
245113"	TI1908"	0.103		mg/L	0.02			0.10306	06/15/04"	14:49"
245113"	U_4090"	0.1	U	mg/L	0.1			0.03286	06/15/04"	14:49"
245113"	V 2924"	0.098		mg/L	0.005			0.09802	06/15/04"	14:49"
245113"	W_2079"	0.01	U	mg/L	0.01			-0.00022	06/15/04"	14:49"
245113"	Y 3710"	0.005		mg/L	0.005			-0.00009		14:49"
245113"	Zn2062"	0.099		mg/L	0.005			0.09861	06/15/04"	14:49"
245113"	Zr3496"	0.005	U	mg/L	0.005			-0.00027	06/15/04"	14:49"
245114"	Ag3280"	0.005		mg/L	0.005			-0.00012	06/15/04"	14:54"
245114"	AI3082"	0.05		mg/L	0.05			-0.02662	06/15/04"	14:54"
245114"	As1890"	0.005		mg/L	0.005			-0.00248	06/15/04"	14:54"
245114"	B_2496"	0.05		mg/L	0.05			-0.00238	06/15/04"	14:54"
245114"	Ba4934"	0.005	U	mg/L	0.005			0.00007	06/15/04"	14:54"
245114"	Be3130"	0.005	U	mg/L	0.005			0.00028	06/15/04"	14:54"
245114"	Bi2230"	0.01	U	mg/L	0.01			0.00532	06/15/04"	14:54"
245114"	Ca3179"	0.05	U	mg/L	0.05			-0.00018	06/15/04"	14:54"
245114"	Cd2265"	0.005	U	mg/L	0.005			0.00031	06/15/04"	14:54"
245114"	Co2286"	0.005	U	mg/L	0.005			0.00056	06/15/04"	14:54"
245114"	Cr2677"	0.015		mg/L	0.015			-0.00043	06/15/04"	14:54"
245114"	Cu3247"	0.005		mg/L	0.005			-0.00027	06/15/04"	14:54"
245114"	Fe2714"	0.1	U	mg/L	0.1			-0.00667	06/15/04"	14:54"
245114"	K_766	0.2		mg/L	0.2			and the second division of the second divisio	06/15/04	14:43:26
245114"	La3988"	0.005		mg/L	0.005	[0.00042		14:54"
245114"	Li670	0.01		mg/L	0.01				06/15/04	14:43:26
245114"	Mg2790"	0.05		mg/L	0.05			0.00030		14:54"
245114"	Mn2576"	0.005		mg/L	0.005			0.00000		14:54"
245114"	Mo2020"	0.01		mg/L	0.01			0.00091	06/15/04"	14:54"
245114"	Na589		U	mg/L	0.2				06/15/04	14:43:26 14:54"
245114"	Ni2316"	0.01		mg/L	0.01			0.00030		
245114"	P_1782"	0.02		mg/L	0.02	_		0.00610		14:54"
245114"	Pb220"	0.005		mg/L	0.005			-0.00056		14:54" 14:54"
245114"	Pd3404"	0.005		mg/L	0.005	_		0.00044		14:54
245114"	S_1820"	0.05		mg/L	0.05			-0.03566		14:54
245114"	Sb2068"	0.02	_	mg/L	0.02		l	-0.00493		14:54
245114"	Se196"	0.015		mg/L		_		-0.00115		14:54
245114"	Si2881"	0.05		mg/L	0.05	_	·	0.00611		14:54
245114"	Sn1899"	0.01		mg/L	0.01	_		-0.00165		
245114"	Sr4215"	0.005		mg/L	0.005			0.00011		
245114"	Th2837"	0.015		mg/L	0.015			-0.00182		
245114"	Ti3349"	0.005		mg/L	0.005			0.00001		
245114"	TI1908"	0.02		mg/L				0.00043		
245114"	U_4090"		U	mg/L		_		0.00701		
245114"	V_2924"	0.005		mg/L	0.005			-0.00010		and the second se
245114"	W_2079"	0.01		mg/L		_		-0.00148		
245114"	Y_3710"	0.005	the second s	mg/L		_		-0.00003		
245114"	Zn2062"	0.005		mg/L		_		-0.00144		
245114"	Zr3496"	0.00	JU	mg/L	0.005	<u>)</u>		0.0000	1 00/13/04	14.04

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system id	elem	result	qual	units	rl	tv	rec	ug/ml	date	time
245115"	Ag3280"	0.005	U	mg/L	0.005			0.00025	06/15/04"	14:58"
245115"	AI3082"	0.336		mg/L	0.05			0.33616	06/15/04"	14:58"
245115"	As1890"	0.005		mg/L	0.005			0.00522	06/15/04"	14:58"
245115"	B_2496"	0.142		mg/L	0.05			0.14155	06/15/04"	
245115"	Ba4934"	0.012		mg/L	0.005			0.01175	06/15/04"	14:58"
245115"	Be3130"	0.005	U	mg/L	0.005			0.00029	06/15/04"	14:58"
245115"	Bi2230"	0.01	U	mg/L	0.01			-0.00036	06/15/04"	14:58"
245115"	Ca3179"	14.0		mg/L	0.05			13.97375	06/15/04"	14:58"
245115"	Cd2265"	0.005	U	mg/L	0.005			0.00048	06/15/04"	14:58"
245115"	Co2286"	0.005	U	mg/L	0.005			0.00067	06/15/04"	14:58"
245115"	Cr2677"	0.015	U	mg/L	0.015			-0.00023	06/15/04"	14:58"
245115"	Cu3247"	0.005	U	mg/L	0.005			0.00074	06/15/04"	14:58"
245115"	Fe2714"	0.182		mg/L	0.1			0.18186	06/15/04"	14:58"
245115"	K_766	3.69		mg/L	0.2			3.6892	06/15/04	14:47:00
245115"	La3988"	0.005	U	mg/L	0.005			0.00027	06/15/04"	14:58"
245115"	Li670	0.043		mg/L	0.01			0.0434	06/15/04	14:47:00
245115"	Mg2790"	1.42		mg/L	0.05			1.41956	06/15/04"	14:58"
245115"	Mn2576"	0.005	U	mg/L	0.005			0.00452	06/15/04"	14:58"
245115"	Mo2020"	0.01	U	mg/L	0.01			0.00790	06/15/04"	14:58"
245115"	Na589	52.3		mg/L	0.2			52.2764	06/15/04	14:47:00
245115"	Ni2316"	0.01	U	mg/L	0.01			0.00012	06/15/04"	14:58"
245115"	P_1782"	0.037		mg/L	0.02			0.03718	06/15/04"	14:58"
245115"	Pb220"	0.005		mg/L	0.005			-0.00030	06/15/04"	14:58"
245115"	Pd3404"	0.005	U	mg/L	0.005			-0.00215	06/15/04"	14:58"
245115"	S_1820"	9.50		mg/L	0.05			9.50225	06/15/04"	14:58"
245115"	Sb2068"	0.02		mg/L	0.02			0.00236	06/15/04"	14:58"
245115"	Se196"	0.015	U	mg/L	0.015			0.00503	06/15/04"	14:58"
245115"	Si2881"	20.7		mg/L	0.05			20.73791	06/15/04"	14:58"
245115"	Sn1899"	0.01	U	mg/L	0.01			0.00891	06/15/04"	14:58"
245115"	Sr4215"	0.077		mg/L	0.005			0.07695	06/15/04"	14:58"
245115"	Th2837"	0.015		mg/L	0.015	_		-0.00073	06/15/04"	14:58"
245115"	Ti3349"	0.005		mg/L	0.005			0.00379	06/15/04"	14:58"
245115"	TI1908"	0.02		mg/L	0.02			-0.00902	06/15/04"	14:58"
245115"	U_4090"	0.1	U	mg/L	0.1			0.00985		14:58"
245115"	V_2924"	0.014		mg/L	0.005			0.01362		14:58"
245115"	W_2079"	0.01		mg/L	0.01			-0.00187		14:58"
245115"	Y_3710"	0.005		mg/L	0.005			0.00009		14:58"
245115"	Zn2062"	0.005		mg/L	0.005			0.00114		14:58"
245115"	Zr3496"	0.005		mg/L	0.005			0.00113	and a second	14:58"
245116"	Ag3280"	0.005	U	mg/L	0.005			-0.00031	06/15/04"	15:03"
245116"	Al3082"	0.498	<u> </u>	mg/L	0.05			0.49776	06/15/04"	15:03"
245116"	As1890"	0.005	<u>U</u>	mg/L	0.005			0.00188		15:03"
245116"	B_2496"	0.172		mg/L	0.05			0.17214	06/15/04"	15:03"
245116"	Ba4934"	0.008		mg/L	0.005			0.00835	06/15/04"	15:03"
245116"	Be3130"	0.005		mg/L	0.005			0.00035	06/15/04"	15:03"
245116"	Bi2230"	0.01	U	mg/L	0.01			0.00210	06/15/04"	15:03"
245116"	Ca3179"	7.31		mg/L_	0.05			7.31458	06/15/04"	15:03"
245116"	Cd2265"	0.005		mg/L	0.005			0.00019	06/15/04"	15:03"
245116"	Co2286"	0.005		mg/L	0.005			0.00125	06/15/04"	15:03"
245116"	Cr2677"	0.015		mg/L	0.015			0.00020	06/15/04"	15:03"
245116"	Cu3247"	0.005	<u>v</u>	mg/L	0.005			0.00049	06/15/04"	15:03"
245116"	Fe2714"	0.167		mg/L	0.1			0.16654	06/15/04"	15:03"
245116"	K_766	2.96	<u> </u>	mg/L	0.2					14:50:04
245116"	La3988"	0.005	<u>U</u>	mg/L	0.005			0.00050	06/15/04"	15:03"

system id	elem	result	qual	units	rl	tv	rec	ug/ml	date	time
245116"	Li670	0.100		mg/L	0.01	<u> </u>	 	0 0995	06/15/04	14:50:04
245116"	Mg2790"	0.640	<u> </u>	mg/L	0.01	<u> </u>		0.64045		15:00
245116"	Mn2576"	0.040		mg/L	0.005		<u> </u>	0.00119		15:00
245116"	Mo2020"	0.003		mg/L	0.003	<u> </u>		0.00519		15:00
245116"	Na589	85.3	0	mg/L	0.01	<u> </u>			06/15/04	14:50:04
245116"	Ni2316"	0.01	<u> </u>	mg/L	0.2			0.00020	06/15/04	15:00
245116"	P_1782"	0.039		mg/L	0.01	<u> </u>		0.03913	06/15/04"	15:0
245116"	Pb220"	0.005			0.02			0.00125	06/15/04"	15:0
245116"	Pd3404"	0.005		mg/L mg/L	0.005			0.00003	06/15/04	15:0
245116"	S_1820"	7.57	0	mg/L	0.005			7.56595	06/15/04	15:0
245116"	Sb2068"	0.02	<u> </u>	mg/L	0.02			0.00438	06/15/04"	15:0
245116"	Se196"	0.02			0.02			0.00438	06/15/04	15:0
245116"	Si2881"	27.8	0	mg/L	0.015			27.83803	06/15/04	
245116"		0.027		mg/L	0.05					15:0
	Sn1899"			mg/L				0.02658	06/15/04"	15:0
245116" 245116"	Sr4215" Th2837"	0.036		mg/L	0.005			0.03553	06/15/04" 06/15/04"	15:0
245116	Ti3349"	0.015		mg/L	0.015			0.0044	06/15/04"	15:0
245116	TI13349	0.005		mg/L mg/L	0.005		├	-0.02628	06/15/04"	<u>15:0</u> 15:0
245116" 245116"	U_4090"	0.02			0.02			0.01155	06/15/04	
245116" 245116"	V_2924"	0.005		mg/L					· · · · · · · · · · · · · · · · · · ·	15:0
245116 245116"	W_2079"	0.005		mg/L mg/L	0.005			0.00360	06/15/04" 06/15/04"	<u>15:0</u> 15:0
245116"	Y_3710"	0.005		mg/L	0.005			0.00011	06/15/04"	15:0
245116"	Zn2062"	0.005			0.005			0.00210	06/15/04	
245116" 245116"	Zr3496"	0.005	_	mg/L	0.005			0.00210	06/15/04	15:0
csw-F15W1"		0.005	0	mg/L	0.005	0.05	101.0%			15:0
csw-F15W1"	Ag3280" Al3082"	1.91		mg/L			95.4%	0.05048	06/15/04"	12:3
csw-F15W1"	As1890"	1.99	·····	mg/L	0.05	2	99.4 <i>%</i> 99.7%	1.90805 1.99471	06/15/04" 06/15/04"	12:3
csw-F15W1"	B_2496"		U	mg/L	0.005	2	99.1%	0.00225	06/15/04	12:3
csw-F15W1"	Ba4934"	2.01	0	mg/L	0.005	2	100.6%	the second s	06/15/04	12:3
csw-F15W1"		0.049		mg/L	0.005	∠ 0.05	and the second distance of the second distanc	2.01247	06/15/04	12:3
csw-F15W1"	Be3130" Bi2230"		U	mg/L		_0.05	98.8%	0.04939		12:3
بمهرجه الالتقائلة يتزني الاستكانية نبي المستك	Ca3179"	21.0	0	mg/L	0.01		104.8%	0.00485	06/15/04"	12:3
csw-F15W1" csw-F15W1"			<u></u>	mg/L	0.05	20		20.95761	06/15/04"	12:39
	Cd2265"	0.050		mg/L	0.005	0.05	99.3%	0.04966	06/15/04"	12:39
<u>csw-F15W1"</u>	Co2286"	0.499		mg/L	0.005	0.5	99.8%	0.49923	06/15/04"	12:39
csw-F15W1"	Cr2677"	0.208		mg/L	0.015	0.2	104.2%			12:39
csw-F15W1"	Cu3247"	0.252		mg/L	0.005	0.25	100.8%	0.25189	06/15/04"	12:39
csw-F15W1"	Fe2714"	1.14		mg/L	0.1	1	114.1%	1.14084	06/15/04"	12:39
csw-F15E2	K_766	19.2		mg/L	0.2	20	95.8%	the second s		13:15:21
<u>csw-F15W1"</u>	La3988"	0.005		mg/L	0.005			0.00026	06/15/04"	12:39
csw-F15E2	Li670	0.01	U	mg/L	0.01		100.40/			13:15:21
csw-F15W1"	Mg2790"	20.7		mg/L	0.05	20	103.4%	20.68613	the second se	12:39
csw-F15W1"	Mn2576"	0.504		mg/L	0.005	0.5	100.7%	0.50362	06/15/04"	12:39
csw-F15W1"	Mo2020"	0.01	<u> </u>	mg/L	0.01	- 00	05.00/	0.00089	06/15/04"	12:39
csw-F15E2	Na589	19.1		mg/L	0.2	20	95.3%	19.0508		13:15:21
csw-F15W1"	Ni2316"	0.498		mg/L	0.01	0.5	99.6%	0.49792	06/15/04"	12:39
csw-F15W1"	P_1782"	0.02	<u> </u>	mg/L	0.02	- 0.5	00.40/	-0.00113	06/15/04"	12:39
<u>csw-F15W1"</u>	Pb220"	0.497		mg/L	0.005	0.5	99.4%	0.49702	06/15/04"	12:39
csw-F15W1"	Pd3404"	0.005		mg/L	0.005			0.00077	06/15/04"	12:39
csw-F15W1"	S_1820"	0.05	<u> </u>	mg/L	0.05		07.00/	0.00167	06/15/04"	12:39
csw-F15W1"	Sb2068"	0.490		mg/L	0.02	0.5	97.9%	0.48964	06/15/04"	12:39
csw-F15W1"	Se196"	2.04		mg/L	0.015	2	101.8%	2.03529	06/15/04"	12:39
csw-F15W1"	Si2881"	0.050		mg/L	0.05			0.02767	06/15/04"	12:39
csw-F15W1"	Sn1899"	0.01		mg/L	0.01			-0.00142	06/15/04"	12:39
csw-F15W1"	Sr4215"	0.005	υ	mg/L	0.005			0.00074	06/15/04"	12:39

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system id	elem	result	qual	units	rl	tv	rec	ug/ml	date	time
Icsw-F15W1"	Th2837"	0.015	U	mg/L	0.015			-0.01280	06/15/04"	12:39"
lcsw-F15W1"	Ti3349"	0.005	U	mg/L	0.005			0.00015	06/15/04"	12:39"
lcsw-F15W1"	TI1908"	2.06		mg/L	0.02	2	102.9%	2.05851	06/15/04"	12:39"
lcsw-F15W1"	U_4090"	0.1	U	mg/L	0.1			-0.00082	06/15/04"	12:39"
lcsw-F15W1"	V_2924"	0.498		mg/L	0.005	0.5	99.6%	0.49807	06/15/04"	12:39"
lcsw-F15W1"	W_2079"	0.01	U	mg/L	0.01			-0.00013	06/15/04"	12:39"
Icsw-F15W1"	Y_3710"	0.005	U	mg/L	0.005			-0.00012	06/15/04"	12:39"
lcsw-F15W1"	Zn2062"	0.497		mg/L	0.005	0.5	99.4%	0.49694	06/15/04"	12:39"
Icsw-F15W1"	Zr3496"	0.005		mg/L	0.005			0.00027	06/15/04"	12:39"
pbw-F15E1	Ag3280"	0.005	U	mg/L	0.005			0.00078	06/15/04"	12:34"
pbw-F15E1	Al3082"	0.05		mg/L	0.05			0.00668	06/15/04"	12:34"
pbw-F15E1	As1890"	0.005	U	mg/L	0.005			-0.00197	06/15/04"	12:34"
pbw-F15E1	B_2496"	0.05	U	mg/L	0.05			0.00335	06/15/04"	12:34"
pbw-F15E1	Ba4934"	0.005	U	mg/L	0.005			0.00005	06/15/04"	12:34"
pbw-F15E1	Be3130"	0.005	U	mg/L	0.005			0.00000	06/15/04"	12:34"
pbw-F15E1	Bi2230"		U	mg/L	0.01			0.00318	06/15/04"	12:34"
pbw-F15E1	Ca3179"	0.05	U	mg/L	0.05			0.01301	06/15/04"	12:34"
pbw-F15E1	Cd2265"	0.005	U	mg/L	0.005			0.00051	06/15/04"	12:34"
pbw-F15E1	Co2286"	0.005	U	mg/L	0.005			0.00090	06/15/04"	12:34"
pbw-F15E1	Cr2677"	0.015	U	mg/L	0.015			0.01298	06/15/04"	12:34"
pbw-F15E1	Cu3247"	0.005	U	mg/L	0.005			0.00011	06/15/04"	12:34"
pbw-F15E1	Fe2714"	0.1	U	mg/L	0.1			0.09873	06/15/04"	12:34"
pbw-F15E2	K_766	0.2	U	mg/L	0.2			-0.0828	06/15/04	13:12:17
pbw-F15E1	La3988"	0.005	U	mg/L	0.005			0.00112	06/15/04"	12:34"
pbw-F15E2	Li670	0.01	U	mg/L	0.01			0.0006	06/15/04	13:12:17
pbw-F15E1	Mg2790"	0.05	U	mg/L	0.05			0.00807	06/15/04"	12:34"
pbw-F15E1	Mn2576"	0.005	U	mg/L	0.005			0.00133	06/15/04"	12:34"
pbw-F15E1	Mo2020"	0.01	U	mg/L	0.01			0.00206	06/15/04"	12:34"
pbw-F15E2	Na589	0.2	U	mg/L	0.2			-0.0511	06/15/04	13:12:17
pbw-F15E1	Ni2316"	0.01	บ	mg/L	0.01			0.00815	06/15/04"	12:34"
pbw-F15E1	P_1782"	0.02	U	mg/L	0.02			0.00398	06/15/04"	12:34"
pbw-F15E1	Pb220"	0.005	U	mg/L	0.005			0.00006	06/15/04"	12:34"
pbw-F15E1	Pd3404"	0.005	U	mg/L	0.005			0.00414	06/15/04"	12:34"
pbw-F15E1	S_1820"	0.05		mg/L	0.05			0.00535	06/15/04"	12:34"
pbw-F15E1	Sb2068"	0.02	U	mg/L	0.02			0.00509	06/15/04"	12:34"
pbw-F15E1	Se196"	0.015	U	mg/L	0.015			-0.00115	06/15/04"	12:34"
pbw-F15E1	Si2881"	0.050		mg/L	0.05			0.02544	06/15/04"	12:34"
pbw-F15E1	Sn1899"	0.01		mg/L	0.01			-0.00098	06/15/04"	12:34"
pbw-F15E1	Sr4215"	0.005		mg/L	0.005			0.00005	06/15/04"	12:34"
pbw-F15E1	Th2837"	0.015	U	mg/L	0.015			-0.00158	06/15/04"	12:34"
pbw-F15E1	Ti3349"	0.005	U	mg/L	0.005			-0.00003	06/15/04"	12:34"
pbw-F15E1	TI1908"	0.02	U	mg/L	0.02			0.00076	06/15/04"	12:34"
pbw-F15E1	U_4090"	0.1	U	mg/L	0.1			0.04867	06/15/04"	12:34"
pbw-F15E1	V_2924"	0.005	U	mg/L	0.005			0.00034	06/15/04"	12:34"
pbw-F15E1	W_2079"	0.01	U	mg/L	0.01			0.00027	06/15/04"	12:34"
pbw-F15E1	Y_3710"	0.005		mg/L	0.005			0.00000	06/15/04"	12:34"
pbw-F15E1	Zn2062"	0.005	U	mg/L	0.005			0.00047	06/15/04"	12:34"
pbw-F15E1	Zr3496"	0.005		mg/L	0.005			0.00077	06/15/04"	12:34"

TRACE METALS PREPARATORY LABC	ORATORY DIGI	ESTION LOG
SOUTHWEST RESEARCH INSTITUTE		56 214
SAN ANTONIO, TEXAS 78228	BOOK / PAGE:	30 214

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CLIENT(S): D_{1V} , 20			010052
TASK ORDER(S): 040415-21040521-6	SDG(S): 243	222/2	45108
PROJECT NO(S): 06002-01-141			
METHOD:3005A3050B3050B-7.53010A3020A	7760A774	40AHCIO₄	H2SO4 Sb
MicrowaveFusionTeflonRockOTHERStr			
/ATRIX: Water Soil Biota Solid Liquid TCLP I	4		
NSTRUMENT: GFAAICPICP-MSICFLAAH	IYDRIDEOTH	ER	
\CID INORG #: HNO₃# X X HCI# X X H₂SO	₄#HC	CIO4#	HF#,
NTERNAL STD: Sc @ 10 PPM		G# 02-101-02 E	XP: 7-15-04 AMT: 50pl
Oven/Hotplate ID: N/A Temperature (°C):			
SAMPLE IDENTIFICATION PH WT (g) I.V. (mL)	F.V. (mL)	
PBW-FIJEI	5	5	
LCSW-FISE; *	1	1	
64 - 45 243222			
23			
237 KE WE 4/15/104			
24	5	5	
25r			
zsdr			
24			
27r			
281			+
30 r		+	
310			
31 5,7			
V 32/			
245108			
dr			
Sr*			
109~			
lior		<u> </u>	
lur		<u> </u>	
112v		<u> </u>	
113r 114r		┨━━┣━━━━	
		+	· · · · · · · · · · · · · · · · · · ·
115 r	<u> </u>		1
50ml spike -1 (Spex, # 4306, p. 10/04)			
20 w 1(4(-16 SAEX, # 4514, EM. 3/05		1	LOCATION:
RLB 02-042-02 190 HNOB, 500 HCL.		Jonly)	NA
2010-			
REPARED BY: Kell 200	_ DATE: <u>6</u> ~		
EVIEWED BY: John Willt	_ DATE: <u></u>	5-04	

SOUTHWEST RESEARCH INSTITUTE SAN ANTONIO, TEXAS 78228			В	OOK	/ PAGE:		56	215
CLIENT(S): $Div. 20$			(Spe	ctro)			01005
CLIENT(S): <u>Div. 20</u> TASK ORDER(S): <u>040415-2 040</u>	521-6	z SDC	G(S): 2	432	222/	245	108	01000
PROJECT NO(S): 06002.01.141								
METHOD:3005A3050B3050B-7.5	3010A_	3020A;	7760A	_774	0АН	CIO₄_	H₂SO	Sb
MicrowaveFusionTeflonRock								
MATRIX: Water 🖌 Soil Biota Solid	Liquid_	TCLP Ext_		R				
NSTRUMENT: GFAAICP_ <u>//</u> ICP-MS								· · · · · · · · · · · · · · · · · · ·
ACID INORG #: HNO₃# & ★ HCI#_ NTERNAL STD: Sc	<u>*</u> *	H₂SO₄#		_HCI	0₄#	<u>.</u>	HF#_	<u></u>
NTERNAL STD: Sc @ 10 PPM 🗹 Be @ 10	DPPM	_SOURCE:		ORG	# <u>02-101-1</u>	<u>52</u> EX	(P: <u>-7/15/</u>	AMT: Sopel
Dven/Hotplate ID: <u>P/B</u> Tempera	ture (°C):							
			1 1 7		EV		3 2 2 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
SAMPLE IDENTIFICATION	рН	WT (g)	<u> </u>		F.V. (
PBW-FISEZ LCSW-FISEZ #		<u></u>						<u></u>
243222					+		1	
1 23					++			
24				· ·	11			<u></u>
25		<u> </u>					1	
26								
27								
28								
29								
				1		<u> </u>	 	
30d							· · · · · ·	
31				 				
32							<u> </u>	
		·						
245108 1 d								
S #								<u></u>
109								
110				h			1	
112							1	·
1/3								
114								
115								
116					ł			
* Soul Spike -1 (Spex)	4 430	G. Exp.	10/04					
zoul ICAL-1 (SRex,	# 4574	1, ex. 1. 3/0	5)				LOCAT	
		1101 10	320/10	2520)		1/1	4
* # RLB 02-042-02 19, HNC	5,5%	ALL CA	50720					
* # RLB 02-042-02 19, HNO	<u>5, 5%</u>				6-15-	04		<u></u>
	<u> </u>				5-15 -	04		

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FRM-191 (Rev 2/Mar 03)

Swri 02 101

010054

155-02-101-01

ALL SPK SOLIN @ ILMO4.1 GFAA LUL

CLP Spiking Solution @ GFAA LVL ILMO 4.1

Elem.	Source	Inorg #	Exp.	Init.Conc.	Amt.Added	Final Conc.	FV
			Date	(ppm)	(uL)	(ppm)	(mL)
As	IV	4433	02/0105	1000	400	4	100
Cd	IV	4467	03/01/05	1000	50	0.5	100
Pb	IV	4313	11/01/04	1000	200	2	100
Sb	IV	4464	03/01/05	1000	1000	10	100
Se	IV	4152	07/01/04	1000	100	1	100
TI	IV	4435	02/01/05	1000	500	5	100

Prepped by:JWILKS ISS pl Date: 06/1404 Exp Date: 07/01/04

ISS prepped in 1%HNO3, Fisher, Inorg # · #4580

ISS-02-101-02 1000ppm Scindium Solution IV INORGE 4262 ENS: 10-1-04 INITIAL CONE 10000 FPM Amount Added IOME / Final Cenc. 1000ppm / FV 100ML Prepped in 1% ANOS Fisher, INOIS # 4580 DC 6-14-04 155-02-101-03 ippin M2E#3 for Mentor Copp. MDL. 1% HNU3# 4582 elem. Source ICH Exp. FC Antadded FC F.V. M&E#3 Spex # 4366 12130104 10ppm Iml 1-Oppm 10ml prep. dute 6-22-04 exp. 9-22-04. Kell EC= 6/22/04 155-02-101-04 1ppm TC prepid 4/18/04 Added 100 ml of 1000 ppm tC #4435 exp²/05 to 100 ml vol flash a brought up to mark W/ 11 HN03 # 4582 corduña U22104 15502-101-05 10 ppb te prepå 4/18/04 exp 2/15 Added Ime I ppm te (15502-101-04) to 100 ml NOL plash a brought up to mark w/ 11. HNO3# 4582. Corduina 4/22/04

Trace Metals Reagent Logbook 010055

SOUTHWEST RESEARCH INSTITUTE SAN ANTONIO, TEXAS 78228

BOOK / PAGE: 02 042

		,		
Reagent I.D.:	Preparation Description:	Prep Date:	Exp Date:	Initials:
B02-042-01	5090 HN 03 # 4362	6-10-04	9-10-04	KE
	50% HCL # 4586			}
	Dilute Some Each to 1.02			Ţ
V				¥
B-02-042-02	190 HN03 # 4580 (Im))	c-14-04	9-14-04	KE
	540 HCL # 4586 (Sml)	1	1	(
	Sto HCL # 4586 (Sml) dilute to 100% ml Di-water			J
248-02-042-03	EFBAI TCLP ~ 1311			
	66.89 NaDH # 4207, exp. 8/13 148.2 ml Acetic Aud # 0707 of 40	50 6-22-04	9-22-04	kE
	dilute to 26L pi-water	6-22-04	9-22-04	KE
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	· · · · · · · · · · · · · · · · · · ·			·····
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			<u>.</u>	
			,	
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	BOOK/ PAGE 07 300
	ntonio, Texas 78228 • 010
TJA_2 TRA	ACE ICP DAILY LOG
Λ	
ANALYST	DATE 6-15-04
As 189.042 Profile Line	As Intensity: <u>ろをうらい</u>
PEAK POSITION . 013764	STDs PREP DATE:
VERNIER POSITION 753	CLP_STD1_SC 0425
	CLP_STD2_SC 04 (-or
QC PREP DATE:	CLP_STD3_SC /A-EZS
CCV/ICV OFEZ	CLP_STD4_SC 04-6-25
ICSA 1	CLP_STD5_SCOLF FOR CLP_STD6_SCOLFESS
ICSAB	BLK_SC 04/22
COMMENTS FILE CLIENT	TO# PROJECT NO. METHO
BACA152 YUAJUN DIV 20	01015-2 010521-6 06002.01,141 SWEI S
BAOGIDID JACKEL	040610-10 06355-, 24.006 60103 5
BADGIII Lestin	040611-105827.04.006 5
	6-15-04
	2
COMMENTS:	
MAINTENANCE:	
L	
REVIEWED BY: Orduna	DATE: (0/22)
	$\Psi[\Delta L]$

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Page 1 of 2

				BOOK/ PAG	se <u>18 21</u> 2
	SOU	622	RESEARCH INS 20 Culebra Rd onio, Texas 78228	TITUTE	010057
		SPECTRO	DICP DAILY LO	G	
NALYST T	$\hat{\boldsymbol{L}}$		DATE 6	-15-04	
	200		FLOWS:		
-OWER			. 201101	Aux 40 Coolant 60	
			п	Mass Flow Contro	ller_1054
CURRENT AGG)	PROPO:	SED	Na		12
4765	4765		Fe		
4907	4909		Sr		
C PREP DATE:			1	CLP_STD1_SC CLP_STD2_SC	
	04KZ \			CLP_STD3_SC	
CRI)t		CLP_STD4_SC	
ICSA	-idude			CLP_STD5_SC	04621
ICSAB			1		0110-
FILE	CLIENT	TO#	PROJECT NO.	METHOD	PREP PAGE
040615	Dive	040415-2	66007.01.141	LIKNA	56215
	· · ·				
	· <u> </u>	A	15-A		
	 	1/6	15	· · · · · · · · · · · · · · · · · · ·	
		P			
COMMENTS:					
MAINTENANCE:					
Cleaned Torch:		0	THER:		
Changed Pump Tub Cleaned Optics:					
Polished Optics:					
Polished Optics:				,	1
Polished Optics:	Orduína			DATE: 7	2/09

5.2

ICP Calibration Blank/ICB/CCB Solution

ID: BLK-CAEZ(/	1
Date Prepared: 5-21-04	Prepared By:	
Make up as needed in 1000ml volumetric flask.		010058
Added 10 ml HNO3_INORG #:4561	_	
Added 50 ml HCL INORG #:554	-	
Added 1000ul of 10000ppm Sc (INORG. V	ENT.) EXP. Date: 10-1	-04_INORG #: 4262
ICP Calibration Blank/ICI	B/CCB Solution	
ID: BLK- O4FZ1	· · · · •	
Date Prepared: 6-21-04	Prepared By: 014	
Make up as needed in 1000ml volumetric flask.		
Added 10 ml HNO3 INORG #:		
Added 50 ml HCL_INORG #:4556	10-1-	A (-1) -A
Added 50 ml HCL_INORG #:4556 Added 1000ul of 10000ppm Sc (INORG. V	ENT.) EXP. Date: 4267	= MINORG #: 4262_
ICP Calibration Blank/ICE	3/CCB Solution	
ID: BLK-		
Date Prepared:	Prepared By:	
Make up as needed in 1000ml volumetric flask.	· Topalou Dy	
Added 10 ml HNO3 INORG #:		
Added 50 ml HCL INORG #:		
Added 1000ul of 10000ppm Sc (INORG. V		INORG #:
ICP Calibration Blank/ICE	S/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. VI	ENT.) EXP. Date:	INORG #:

FRM-296 (Rev 0/May 02)

ICP ICV/CCV SOLUTION

010059

CCV-04E21	
Date Prepared: <u>5-21-54</u>	_Prepared By:
HNO3 INORG #: <u>4561</u>	_HCI INORG #:4554

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

Element	Std Conc	Amt added	Check	Source	Inorg #	Stock Conc	Exp Date
	(ppm)					(ppm)	
Sc	10	1ml	7	INORGVENT	4262	10000	10-1-04
В	5	5ml		SPEX	4564	1000	4-30-05
Li	5	5ml		SPEX	4439	1000	1-30-05
Мо	5	5ml		SPEX	4440	1000	1-30-05
Р	5	5ml		SPEX	4307	1000	10-30-04
Si	5	5ml		SPEX	4232	1000	8-36-A
Ti	5	5ml	1	SPEX	4234	1000	8-30-04
Sr	5	5ml	/	SPEX	4308	1000	10-30-4
Sn	5	5ml		SPEX	4565	1000	4-30-05
Bi	5	5ml	/	SPEX	4475	1000	2-28-55
La	5	5ml	/	SPEX	4435	1000	4-30-05
Y	5	5ml		SPEX	4441	1000 🖌	11-30-05
Pd	1	1ml	/	SPEX	4417	1000	1-15-05
S	1	1ml	/	SPEX	A140	1000	6-30-A
Th	1	1ml		SPEX	4233	1000	\$-30-A
U	1	1ml		SPEX	4142.	1000	6-30-A
W	1	1ml	/	SPEX	4212	1000	8-15-04
Zr	5	5ml	/	SPEX	4566	1000	4-30-05
Na	10	1ml	1	SPEX	4443	10000	1-30-05
ICV-2A	vary	10ml	/	SPEX	9328	mix	11-30-04
ICV-2B	vary	1ml	/	SPEX	4329	mix	11-30-0+
ICV-2C	vary	10ml	1	SPEX	4330	mix	11-30-04

Expiration Date: 6-30-A

ICP Calibration Standards,

Date Prepared: 5-25-04

_____ Prepared By:

010060

HNO3 INORG #: 4561

HCI INORG #: 4555

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

Prepared	Standard	Element	Std Conc	Added	Check	Source	INORG #	Stock Conc	Exp Date	
	Name		(ppm)	ml				(ppm)		
	STD1-	Al	50	2.50	V	INORVENT	4220	10000	9-1-04-	1
/	2	Ca	50	2.50		INORVENT	4436	10000	2-1-05	
Alers	X.	Fe	50	2.50		INORVENT	4470	10000	3-1-05	
CV'	1 SV	К	50	2.50	2	INORVENT	4320	10000	12-1.04	1
X	At L'	Mg	25	1.25		INORVENT	4204	10000	4-1-04	1
	15 N	Na	50	2.50		INORVENT	4205	10000	8-1-04	1
	6	Li	10	5.00	-	INORVENT	4149	1000	7-1-04	
		Sc	10	0.500		INORVENT	426C	10000	10-1-04	
								<u></u>		
	STD2-	Ba	10	5.00	1	INORVENT	4465	1000	3-1-65	! .
	× x	Be	5	2.50		INORVENT	4062	1000	6-1-045	Ø
12	A.00	Cr	10	5.00	V	INORVENT	4318	1000	12-1-04	1
At 25	As	Cu	10	5.00	V	INORVENT	4469	1000	5-1-05]
v	" N	Ni	10	5.00	V	INORVENT	4472	1000	3-1-05	
	1 5	Sc	10	0.500	V	INORVENT	4262	10000	10-1-04-	
									-	
	STD3-	Cd	10	5.00	in	INORVENT	4467	1000	3-1-05	
(Со	10	5.00		INORVENT	4468	1000	3-1-05	
15	J.S.	Mn	10	5.00		INORVENT	4434	1000	2-1-5	
12		V	10	5.00		INORVENT	4321	1000	12-1-24	
A-25	4.5	Zn	10	5.00		INORVENT	4319	1000	12.1-04	
0	60,8	Sc	10	0,500	<u> </u>	INORVENT	4262	10000	10-1-04	
	6 A D									
	STD4- 5	Ag	2	1.00		INORVENT	4222	1000	9-1-04	
		As	10	5.00		INORVENT	4433	1000	2-1-05	
17		Pb	10	5.00		INORVENT	4313	1000	11.1.0	
. V	12 15	Sb	10	5.00		INORVENT	4464	1000	3-1-05	
0× 625	6 6	Se	10	5.00		INORVENT	4152	1000	7-1-04	
0	6.5	TL	10	5.00	<u> </u>	INORVENT	4435	1000	2-105	
		Sc	10	0.500	/	INORVENT	4262	10000	the pe	5.2
	Č,						1.7.		10124	
	STD5- 🕺	B	10	5.00		INORVENT	4201	1000	8-104	-
	501	Mo	10	5.00	_¥	INORVENT	4471	1000	6-1-04	X A
1		P	10	5.00	_V_	INORVENT	4049	1000		p "
/	× v	Si	10	5.00		INORVENT	+ # + 2+	1000	2-1-05	
17	5 25 St	Ti	10	5.00		INORVENT	4332	1000	12-1-04	
, \ ∕`	12 15	Sr	10	5.00		INORVENT	4154	1000	7-104	-
n ^X	6	<u>Sn</u>	10	5.00		INORVENT	+ 4315	1000	4-1-05	L
0	۲ ^۲	, Bi	5	2.50		INORVENT	4200	10000	8-1-04	
		Sc	10	0.500	1	INORVENT	4262	10000	10-1-04	Γ
							10.001	1000	9-1-04	•
	STD6-	La	10	5,00		INORVENT	4221	1000	8-1-04	
	5.25°5×	Na	1	0.05		INORVENT	4205	10000	3-1-05	
1	X .	Pd	10	5.00		INORVENT	4477	1000		
/	6 5	S	10	5.00		INORVENT	437		12-1-04	
לו .	L .	Th	10	5.00		INORVENT	4283	1000	<u>11-1-04</u>	
Atts	1	U	10	5.00		INORVENT	4473	1000	3-1-65	
с ү ^	6	W	5	2.50		INORVENT	4203	1000	8-1-04	ł
v		Y Zr	10 10	5.00 5.00		INORVENT INORVENT	4513 944Z	1000	4-1.05	

Expiration Dates: STD1: 7 - 1 - 04

> STD2: 6-1-4 STD3: 5-24-4

STD4: 7.1-A STD5: 6-1-A STD6: 8-1-A

> FRM-299 (Rev 0/May 02)

ICP Calib	ration S	Stand	lardş
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Date Prepared: 6-2-04

HNO3 INORG #: 4562

_____ Prepared By: _____ _____ HCI INORG #: _____4557

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

pared	Standard	Element	Std Conc	Added	Check	Source	INORG #	Stock Conc	Exp Date
	Name		(ppm)	ml				(ppm)	
								10000	
<u> </u>	STD1-	A	50	2.50		INORVENT		10000	
		Ca	50	2.50		INORVENT		10000	
		Fe	50	12:50		TNORVENT		10000	
		K	50	6 2.50		INORVENT		10000	
		Mg	23	1.25		INORVENT		10000	
		Na	50	2.50				10000	
		Li	10	5.00		INORVENT		1000	
		Sc	10	0.500		INORVENT		10000	
	1		10	F 00		INORVENT	4465	1000	3-1-05
	STD2-	Ba	10	5.00	1	INORVENT	4592	1000	6-1-05
A	71	Be	5	2.50		INORVENT	4318	1000	12-104
4	x 60	Cr	10	5.00		INORVENT	4469	1000	3-1-65
	diff ⁰²	Cu	10	5.00	-1	INORVENT	4472	1000	3-1-05
		Ni	10	0.500	V	INORVENT	4262	10000	10-1-04
		Sc	10	0.000	<u> </u>				
	STD3-	Cd	10	5.00		INORVENT	1	1000	
	3103-	Co	10	5.00		INORVENT		1000	
		 Mn	10	5.00		INORVENT		1000	
		V	10	5.00		INORVENT		1000	
		Zn	10	5.00		INORVENT		1000	
		Sc	10	0.500		INORVENT		10000	
			A						
	STD4-	Ag	24	1.00		INORVENT		1000	
	1	As .	210	5.00	2	INORVENT		1000	
		Pb b	10	5.00		INORVENT		1000	
		80	10	5.00		INORVENT		1000	
		Se	10	5.00		INORVENT		1000	
		TL	10	5.00		INORVENT		1000	
/	T	Sc	10	0.500		INORVENT		10000	
				No. 19		IN ODVIENT	1.701	1000	4-1-04
	STD5-	В	10	5.00		INORVENT	4701	1000	3-1-05
	1.00	Mo	10	5.00		INORVENT	and the second se	1000	6-1-05
	0-1	Р	10	5.00	15	INORVENT	4593	1000	2-1-05
٨.	ALOU	Si	10	5.00		INORVENT INORVENT	4332	1000	12-1-04
24	STD5-	Ti	10	5.00		INORVENT	4356	1000	7-1-04
		Sr	10	5.00		INORVENT	4512	1000	4-1-04
		OII	10	5.00		INORVENT	4200	1000	5-1-04
		Bi	5	2.50		INORVENT	4262	10000	10-1-04
		Sc	10	0.500	<u> </u>		19000		<u> · · · · · · · · · · · · · · · · · · ·</u>
	OTDC		10	5.00		INORVENT		1000	
	STD6-	La Na		0.05		INORVENT	1	10000	
	4		10	5.00	8	INORVENT	+	1000	
		Pd S	10	5.00		INORVENT		1000	
			10		2.04	INORVENT		1000	
		Th	10	5.00	10-0-	INORVENT		1000	
		U W	10	2.50		INORVENT	-1	1000	
			10	5.00		INORVENT		1000	
			10	5.00		INORVENT		1000	
		Zr SC	10		1	INORVENT		10000	

Expiration Dates:

STD1.

STD1: -----

STD4: ----STD5: 7 - 1-04

STD6: -----

FRM-299 (Rev 0/May 02)

ANALYSIS

PROJ. NO. PROJECT TO# DATE MATRIX LOGBK PG 040415-2 06002.01,141 Divzo 040511-6 6-15-04 march 56 215

INSTRUMENT: Spector FILENAME: 040615

INSTRUMENT DL:_____

EVOLUTION by Micro-Active Australia Pty Ltd 12:46:20 FM June 15, 2004

010063

ieep last result visible enabled ...
Starting run ...
Dreating high priority queue entries ...
BACKGROUND CORRECTED INTENSITIES
Identity 1 : BLK_SC Identity 2 : Type : STD
Weight : 1.00000 Volume : 1.000 Printed : 12:45:32 PM June 15, 2004

# 1 # 2	K_766 14.0 1.0	Li670 -9.5 -12.5	Na589 46.5 37.5	Sc361 4298.0 4246.0
Yean	7.5	-11.0	42.0	4272.0
5D	9.2	2.1	6.4	36.8
%RSD	122.6	19.3	15.2	0.9

INTENSITIES

Identity 1 : BLK_SC Identity 2 : Type : STD Weight : 1.00000 Volume : 1.000 Printed : 12:45:52 FM June 15, 2004

# 1 # 2	K_766 0.0 0.0	L1670 -0.0 -0.0	Na589 ບີ.ບິ ບີ.ບິ	5c361 4298.0 4246.0
Yean	0.0	-0.0	0.0	4272.0
3D	0.0	0.0	0.0	36.8
XRSD	122.3	20,1	14.3	0.9

Jan 124/04

7-6-15-04

SV010110N by Micro-Active Australia Fry Ltd 12:56:22 FM June 15, 2004

010064

BACKGROUND CORRECTED INTENSITIES Identity 1 : CLP_STD1_SC Identity 2 : Type : STD Weight : 1.00000 Volume : 1.00 Printed : 12:48:40 PM June 15, 2004

# 1 # 2	к_766 4829.5 4825.5	L1670 49726.0 49500.0	Na585 28336.5 28229.5
Mean	4827.5	49614.0	28283.0
5D	2.8	161.2	75.7
%RSD	0.1	0.3	0.3

INTENSITIES

Identity 1 : CLP_STD1_SC Identity 2 : Type : STD Weight : 1.00000 Volume : 1.00 Frinted : 12:48:40 FM June 15, 2004

# 1 # 2	K_766 1.1 1.1	Li670 11.6 11.6	Na589 6.5 6.6
Mean	i.i	11.6	6.6
3D	Ø.Ø	0.0	0.0
%RSD	Ø.i	0.1	0.1

BACKGROUND CORRECTED INTENSITIES Identity 1 : CLF_CCV_SC Identity 2 : Type : CV Weight : 1.0000 Volume : 1.00 Printed : 12:51:48 PM June 15, 2004

# 1 # 2	К_766 1881.0 1863.0	Li670 23766.0 23661.0	Na589 16334.5 16333.5	Sc 4316.5 4267.5	Sc361 4316.5 4267.5
Mean	1872.0	23713.5	16334.0	4292.0	4292.0
SD	12.7	74.2	Ø.7	34.6	34.6
XRSD	0.7	0.3	Ø.Ø	0.8	Ø.8

APPARENT CONCENTRATIONS

Identity 1 : CLP_CCV_SC Identity 2 : Type : CV Weight : 1.0000 Volume : 1.00 Printed : 12:51:48 PM June 15, 2004

# 1 # 2	K_766 ppm 19.2673 19.3022	L1670 ppm 4.7503 4.7836	Na589 ppm 28.5975 28.9250	5c 4316.500 H 4267.500	Sc361 ppm 101.0433 99.8945
Mean	19.2847	4.7669	28.7612	4292.000 H	100.4689
SD	0.0247	0.0235	0.2315	34.648	0.8123
%RSD	0.1279	0.4940	0.8050	0.807	0.8085

Checking calibration verification ... Identity 1 : CLP_CCV_SC Identity 2 : Report name Low limit Value High limit 22.000 19.285 18.000 K_766 5.500 4.767 4.500 L1670 28.76133.000 27.000 Na589 BACKGROUND CORRECTED INTENSITIES Identity 1 : Calibration blank Identity 2 : Type : CB Weight : 1.00000 Volume : 1.00 Printed : 12:56:04 PM June 15, 2004

# i	K_766	L1670	Na589	5c	5c361
	16.0	-2.0	23.5	4319.0	4319.0
# 1	10.0	<u> </u>	00 5	·	1020 0

IVOLUTION	bу	Micro-Active	Australia	Fty Ltd	12:56:22 Pi	1 June 15,	2004
íean		12.0	-1.0	22.0	4294.5	4294.5	
SD		5.7	1.4	2.1	34.6	34.6	
RSD		47.i i	41.4	9.6	ŵ.8	Q.8	

AFFARENT CONCENTRATIONS Identity 1 : Calibration blank Identity 2 : Type : CB Weight : 1.0000 Volume : 1.00 Printed : 12:56:04 PM June 15, 2004

# 1 # 2	K_766 ppm 0.0865 0.0052	L1670 ppm 0.0018 L 0.0022 L	Na589 ppm -0.0333 -0.0381	Sc 4319.000 H 4270.000	Sc361 ppm 101.1019 99.9531
iean	0.0459	0.0020 L	-0.0357	4294.500 H	100.5275
SD	0.0575	0.0003	0.0034	34.648	0.8123
(RSD	125.2847	13.9730	9.6094	0.807	0.8080

Thecking cal:	ibration blank	
ídentity i :	Calibration blank	Identity 2 :
Report name	CRDL	Value
3_766	0.100	0.046
_1670	0.010	0.002
1 a589	0.050	-0.036
5c361	Ø. ØØØ	100.527

VOLUTION	έy	Micro	-Active	Australia	Fiy	iτα
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HACHGAUGHE CORRECTED IN THE PARTIES Hach Control and the parties of the parties		N COMBROTED 1	INTENSITIES				
Height : 1.0000 Volume : 1.000 Volume : 1.000 Volume : 1.000 Volume : 1.000 Sc561 * 1 5.0 -21.0 20.0 4.0 4.0 * 1 4.0 -11.0 5.0 4.0 4.0 * 1 4.0 -11.0 5.0 4.0 4.0 * 1 4.0 -11.0 5.0 4.0 4.0 * 1 4.0 -11.0 5.0 4.0 4.0 * 1 4.0 -11.0 5.0 4.0 4.0 * 1 4.0 -11.0 5.0 4.0 2.5 2.5 * 1 4.0 7.1 44.2 5.0 4.0 5.0 5.0 * 1 10************************************			こ ころみんそうもい	2 : pg56-215	Type : BAM	FIR - FE CSA4	010066
 K.766 L10/0 	jeight :	1.0000 Volu	me: 1.00	risted : 12:	59:12 PM Jun	e 13, <i>2004</i>	OTODOD
 K.766 L10/0 						7	
 # 1. 5.0 Tello # 2. 4.0 Tilo 0.0 Tilo <l< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td></l<>							
 # 1 4.0 1100 # 2 4.0 1100 # 1 4.0 1100 # 1 4.0 1100 # 1 4.0 1000 # 1 4.0 1000<						1.0	
isin 2.6 7.1 2.1 2.1 isin 2.6 7.1 44.2 54.3 54.3 isin 47.1 44.2 54.5 54.3 54.3 isin 1.000 Fise 54.5 54.5 54.5 isin 1.000 Fise 54.5 56 56.6 isin 1.000 Fise 55.5 55.6 56.6 isin 1.000 1.000 1.000 1.000 1.000 isin 1.000 1.000 1.000 1.000 1.000 isin 1.000 1.000 1.000 1.000 1.000 1.000 isin 1.012 1.000 1.000 1.000 1.000 1.000 isin 1.000 1.000 Finted 1.000 1.000 1.000 isin 1.000 Finted 1.000 426.5 426.5 426.5 isin 1.0000 Volume 1.000 Finted 1.000 1.000 1.000 isin 1.0000 Volume 1.0	¥ <u>⊇</u>	4.0	-11.0	0.0			
<pre>New 0.00 7.1 2.6 2.1 2.1 2.1 NETARENT CONCENTRATIONS Weight : pbw-FiszZ identity 2 : po56-215 Type : SANFLE Height : 1 @060 Volume 7 000 Frinted : 12:59:12 FM June 15. 2004 N_766 L1670 NB365 5c 5c</pre>		c .a.	-15.0	14.0	2.5		
AFFARAN CURLENTATIONS Identity 2 : pq56-215 Type : SANFLE Weight : 1.0000 Volume Volume Volume Printed : 12:39:12 PH June 15. 2004 N_756 L1670 mesos Sc Sc361 # 1 H 68.7000 L -4.5252 37.6054 4.0000 L -0.0366 # 2 H 177.1252 L -3.4638 H 50.5337 1.0001 L -0.0366 \$52.001 C -0.0376 3.5063 16.0726 2.121 0.0437 XiSD 47.1641 50.0573 12.6631 84.653 55.00380 Starting run Dere retries SACKROBUB CONRECTED INTENSITIES Identity 1 : CLP_CCV_SC Identity 2 : Type : CV Weight : 1.0000 Volume : 1.000 Frinted : 1:00:44 FH June 15. 2004 K 766 L1676 Na565 50 50.531 \$2 : 1652.5 23237.5 : 15393.0 4245.5 : 4245.5 Weight : 1.0000 Volume : 1.000 Frinted : 1:00:44 FH June 15. 2004 K 766 Li670 Na565 50.7 0.7 0.7 0.7 SD i5.6 : 125.2 : 1066.8 29.7 23.7 SD i5.6 : 125.2 : 1066.8 29.7 23.7 XRSD w 0.6 0.5 0.7 0.7 0.7 AFPAGENT CONCENTRATIONS Identity 1 : CLP_CCV_SC Identity 2 : Type : CV Weight : 1.00000 Volume : 1.000 Frinted : 1:05:44 FH June 15. 2004 K 766 Li670 Na569 50 50.3747 XRSD w 0.6075 0.06075 0.06069 25.656 6.3747				£N∕5∕	2.1		
AFFARAN CURLENTATIONS Identity 2 : pq56-215 Type : SANFLE Weight : 1.0000 Volume Volume Volume Printed : 12:39:12 PH June 15. 2004 N_756 L1670 mesos Sc Sc361 # 1 H 68.7000 L -4.5252 37.6054 4.0000 L -0.0366 # 2 H 177.1252 L -3.4638 H 50.5337 1.0001 L -0.0366 \$52.001 C -0.0376 3.5063 16.0726 2.121 0.0437 XiSD 47.1641 50.0573 12.6631 84.653 55.00380 Starting run Dere retries SACKROBUB CONRECTED INTENSITIES Identity 1 : CLP_CCV_SC Identity 2 : Type : CV Weight : 1.0000 Volume : 1.000 Frinted : 1:00:44 FH June 15. 2004 K 766 L1676 Na565 50 50.531 \$2 : 1652.5 23237.5 : 15393.0 4245.5 : 4245.5 Weight : 1.0000 Volume : 1.000 Frinted : 1:00:44 FH June 15. 2004 K 766 Li670 Na565 50.7 0.7 0.7 0.7 SD i5.6 : 125.2 : 1066.8 29.7 23.7 SD i5.6 : 125.2 : 1066.8 29.7 23.7 XRSD w 0.6 0.5 0.7 0.7 0.7 AFPAGENT CONCENTRATIONS Identity 1 : CLP_CCV_SC Identity 2 : Type : CV Weight : 1.00000 Volume : 1.000 Frinted : 1:05:44 FH June 15. 2004 K 766 Li670 Na569 50 50.3747 XRSD w 0.6075 0.06075 0.06069 25.656 6.3747				68.6	84.9	84.9	
AFFARAN CURLENTATIONS Identity 2 : pq56-215 Type : SANFLE Weight : 1.0000 Volume Volume Volume Printed : 12:39:12 PH June 15. 2004 N_756 L1670 mesos Sc Sc361 # 1 H 68.7000 L -4.5252 37.6054 4.0000 L -0.0366 # 2 H 177.1252 L -3.4638 H 50.5337 1.0001 L -0.0366 \$52.001 C -0.0376 3.5063 16.0726 2.121 0.0437 XiSD 47.1641 50.0573 12.6631 84.653 55.00380 Starting run Dere retries SACKROBUB CONRECTED INTENSITIES Identity 1 : CLP_CCV_SC Identity 2 : Type : CV Weight : 1.0000 Volume : 1.000 Frinted : 1:00:44 FH June 15. 2004 K 766 L1676 Na565 50 50.531 \$2 : 1652.5 23237.5 : 15393.0 4245.5 : 4245.5 Weight : 1.0000 Volume : 1.000 Frinted : 1:00:44 FH June 15. 2004 K 766 Li670 Na565 50.7 0.7 0.7 0.7 SD i5.6 : 125.2 : 1066.8 29.7 23.7 SD i5.6 : 125.2 : 1066.8 29.7 23.7 XRSD w 0.6 0.5 0.7 0.7 0.7 AFPAGENT CONCENTRATIONS Identity 1 : CLP_CCV_SC Identity 2 : Type : CV Weight : 1.00000 Volume : 1.000 Frinted : 1:05:44 FH June 15. 2004 K 766 Li670 Na569 50 50.3747 XRSD w 0.6075 0.06075 0.06069 25.656 6.3747	(REI)	-1/.1	٨	-17			
<pre>dentity 1 : pbw-F15E2 Tdeff#2 2 : pp56-215 type 1 sAnFLE weight : 1.00000 Volume 1000 Frinted : 12:59:12 FM June 15, 2004</pre>	APPARENT	CONCENTRATIO	INS				
<pre>Weight : 1.00000 Volume 1000 Frinted : 12139111 Th June 101</pre>				2 : pg56-215	5 Type : SAP	IFLE - 15 0004	
K_766 Li670 Na585 Sc Sc361 ppm ppm ppm ppm ppm ppm # 1 H 66.700 L -4.5252 37.8654 4.000 L -0.0586 gamma # 2 H 177.952 L -3.4633 H 50.5337 1.000 L -0.0586 gamma gamma Washington 3.1013 L -0.0045 49.1745 2.500 L -0.0938 Superior 3.7063 L 16.0728 2.121 0.00497 X5D 47.1681 50.0573 32.6801 84.653 55.0330 Starting run Presting high priority queue entries SACKDROUND CORRECTED INTENSITIES Identity 1 : CLF_CCV_SC Identity 2 : Type : CV Weight 1 : 0000 Volume : 1.00 Printed : 1:00:44 FM June 15. 2004 K 766 Li670 Na583 5c Sc361 # 1 1874.5 23414.5 16144.0 4267.5 4267.5 # 2 1652.5 23237.5 15993.0 4245.5 4266.5 SD 0.8 0.5 0.7 0.7 0.7 XRSD 0.8 0.5 0.7 0.7 0.7 Mean 1663.5 23326.0 16066.5 4266.5 4266.5 4266.5 SD 0.8 0.5 0.7 0.7 0.7 XRSD 0.8 0.5 0.6 0.7 0.7 0.7 Mean 16.03.6 1.1070 Na583 5c Sc361 Identity 1 : CLP_CCV_SC Identity 2 : Type : CV Weight 1 : 0.00000	veight :	1.0000 Volu	ime ເບີ່ມ	Printed : 12:	:59:12 PM Jur	1e 15, 2004	
R_365 L1070 ppm ppm ppm ppm ppm # 1 H 53.7654 -4.5252 37.6654 4.0001 -0.0586 # 2 H 177.452 1.0041 45.1745 2.5601 -0.0936 # 3.1013 1.0043 45.1745 2.5601 -0.0936 50 3.5663 16.0728 2.121 0.0497 6550 47.1631 50.0573 32.6851 64.653 55.0330 Starting run Drem times BACKGROUND CORRECTED INTENSITES Identity 1 : CLF_CCV_SC Identity 2 : Type : CV #eight : 1.0000 Volume : 1.000 Frinted : 1:00:44 PM June 15, 2004 % 766 L1676 Na523 50 53.631 % 766 L1676 Na523 50 53.631 % 167.5 23326.0 160668.5 4265.5 4267.5 % 200 0.6 0.5 0.7 0.7 6.7 % 166. 125.2 106.6 29.7 29.7 7 % 766 L1676 Na583 Sc Sc361	~		1				
<pre># 1 # 56.766/L -4.5232 37.6654 4.0000 L -0.0586 # 2 # 177.1632 L -3.4638 H 60.5337 1.000 L -0.0596 # 2 # 177.1631 50.0573 16.0728 2.121 0.0497 Kean H 33.1019 T 7.0045 45.1745 2.500 L -0.0938 Starting run Treating high priority queue entries BACKGROUND CORRECTED INTENSITIES Identity 1 : CLF_CCV_SC Identity 2 : Type : CV #eight : 1.0000 Volume : 1.00 Frinted : 1:05:44 FM June 15. 2004</pre>		K_766	L1670		20		
<pre># 1 H 68.7668 L -3.4526 37.607 1.000 - 0.1263 # 2 H 177.452 L -3.4526 H 50.5337 1.000 - 0.1263 # 0.1 177.452 L -3.4528 H 50.5337 1.000 - 0.0936 50 52.2576 3.5063 H 50.5337 2.121 0.0497 % 50 47.1631 50.0573 32.6851 84.853 53.0330 Starting run Dreating high priority queue entries BACKGROUND CORRECTED INTENSITIES Identity 1 : CLF_CCV_SC Identity 2 : Type : CV #eight : 1.0000 Volume : 1.00 Frinted : 1:05:44 FM June 15, 2004 % 7.66 L1670 Na585 50 50.551 H 1874.5 23414.5 16144.0 4267.5 4267.5 # 1 1874.5 23414.5 16144.0 4267.5 4267.5 # 1 1874.5 23414.5 16144.0 4267.5 4267.5 # 1 1874.5 23414.5 16144.0 4267.5 4267.5 # 2 1852.5 23237.5 15993.0 4245.5 4245.5 Nean 1865.5 23326.0 16066.5 4266.5 4266.5 SD 15.6 125.2 106.8 29.7 25.7 KRSD 0.8 0.5 0.7 0.7 0.7 AFFARENT CONCENTRATIONS Identity 1 : CLF_CCV_SC Identity 2 : Type : CV Weight : 1.0000 Volume : 1.00 Frinted : 1:05:44 FH June 15, 2004</pre>					4 0.00 1		
<pre># 2 # 177.452 L *9.4858 h Contour iean H 13.1019 L 7.0045 45.1745 2.500 L *0.0938 50 52.7016 3.5005 16.0728 2.121 0.04197 XR5D 47.1681 50.0573 32.6851 64.653 53.0330 Starting run Treating high priority queue entries ACKGROUND CORRECTED INTENSITIES Identity 1 : CLF_CCV_SC Identity 2 : Type : CV #eight : 1.0000 Volume : 1.00 Frinted : 1:05:44 FM June 15, 2004</pre>		88.7085 L					
<pre>Mean if 213.1019 3.5063 16.0728 2.121 0.0457 SD 02.0017 3.5063 16.0728 2.121 0.0457 MRSD 047.1681 50.0573 32.6831 04.653 55.0330 Starting run Preating high priority queue entries BACKOROUND CORRECTED INTERNITIES Identity 1 : CLF_CCV_SC Identity 2 : Type : CV Weight : 1.0000 Volume : 1.00 Frinted : 1:05:44 FM June 15, 2004</pre>	#2 H	177. 43 52 L	-9.4838 n	66.0351			
Mean 13.1013 1.5063 16.0728 2.121 0.0497 SD 17.1681 50.0573 32.6851 64.653 53.0330 Starting run Desting high priority queue entries 1.0014 64.653 53.0330 Starting run Desting high priority queue entries 1.0014 FM June 15, 2004 MARDROWND CORRECTD INTENSITIES Identity 2: Type: CV Weight: 1.0000 Volume: 1.000 Frinted: 1:00144 FM June 15, 2004 K_766 Li670 Na585 50.05361 # 1 1674.5 23414.5 16144.0 4287.5 4245.5 #ean 1663.5 23326.0 16068.5 4266.5 4266.5 50 SD 15.6 125.2 106.8 29.7 29.7 XRSD 0.8 0.5 6.7 0.7 0.7 XRSD 0.8 0.5 6.7 0.7 0.7 XRSD 0.8 0.5 6.7 0.7 0.7 XRSD 0.8 0.5 6.7 0.7 0.7 <t< td=""><td></td><td></td><td>00.15</td><td>49 1745</td><td>2.500 L</td><td>-0.0938</td><td></td></t<>			00.15	49 1745	2.500 L	-0.0938	
SD 1.0003 1.0003 1.0003 1.0003 1.0003 Starting run Dreating high priority queue entries 1.0007 1.0007 1.0007 Starting run Dreating high priority queue entries 1.0007 1.0007 1.0007 Starting run 1.0007 CLARCTED INTENSITIES 1.0007 1.0007 1.0007 Identity 1: CLF_CCV_SC Identity 2: Type: CV K_766 L1670 Na583 5c 5c361 # 1 1874.5 23414.5 16144.0 4287.5 4245.5 # 2 1652.5 23237.5 15993.0 4245.5 4245.5 Hean 1663.5 23326.0 160668.5 4266.5 4266.5 SD 15.6 125.2 1006.8 23.7 25.7 XRSD 0.8 0.5 0.7 0.7 0.7 APFARENT CONCENTRATIONS Identity 1: CLP_CCV_SC Identity 2: Type: CV Weight: 1.0000 Yourme: 1.000 Pom # 1 19.3309 4.7117 28.4546 4287.500 H 1000.3634 # 2 19.2326 4.7223 28.4675 4245.500 95.3787							
ABD C 0.1001 CONTACT Starting run Dreating high priority queue entries DatKGROUND CORRECTED INTENSITIES Identity 1: CLF_CCV_SC Identity 2: Type: CV Weight: 1.0000 Volume: 1.00 Fill 1674.5 25414.5 16144.0 4267.5 # 1 1674.5 25414.5 # 1 1674.5 23237.5 # 2 1652.5 23237.5 15593.0 4245.5 4265.5 #ean 1663.5 23326.0 160668.5 4266.5 SD 15.6 125.2 106.6 25.7 25.7 XRSD 0.8 0.5 0.7 0.7 0.7 APPARENT CONCENTRATIONS Identity 1: CLP_CCV_SC Identity 2: Type: CV Weight: 1.00000 Volume: 1.000 Frinted: 1:05:44 FH June 15. 2004 N_766 Li670 Na569 Sc Sc361 ppm pom pom pom pom # 1 19.3309 4.7117 26.4546 4287.500 H 100.3654 # 2 15.2526 4.7223 28.4676 4245.500 99.3767						53.0330	
Dreating high priority queue entries BACKOROUND CORRECTED INTENSITIES Identity 1: CLF_CCV_SC Identity 2: Type : CV Weight : 1.0000 Volume : 1.00 Frinted : 1:05:44 FN June 15, 2004 X_766 L1670 Na583 5c 50361 # 1 1874.5 23414.5 16144.0 4287.5 4267.5 # 2 1852.5 23237.5 15993.0 4245.5 42645.5 # 2 1852.5 23237.5 15993.0 4245.5 4245.5 Nean 1863.5 23326.0 16068.5 4266.5 4266.5 SD 15.6 125.2 106.8 29.7 29.7 XRSD 0.8 0.5 0.7 0.7 0.7 APPARENT CONCENTRATIONS Identity 1 : CLP_CCV_SC Identity 2 : Type : CV Weight : 1.00000 Volume : 1.00 Frinted : 1:05:44 FM June 15, 2004 X_766 L1670 Na589 5c 50361 ppm ppm ppm ppm # 1 19.3309 4.7117 28.4546 4287.500 H 100.3634 # 2 19.2928 4.7223 28.4676 4245.500 95.8711 SD 0.0269 0.0075 0.00317 0.696 0.6971 Checking calibration verification Identity 1 : CLP_CCV_SC Identity 2 : Report name Low limit Value High limit K_766 16.000 15.312 22.000 L1670 4.500 4.717 5.500	4.850	47.1661	010010				
Dreating high priority queue entries BACKOROUND CORRECTED INTENSITIES Identity 1: CLF_CCV_SC Identity 2: Type : CV Weight : 1.0000 Volume : 1.00 Frinted : 1:05:44 FN June 15, 2004 X_766 L1670 Na583 5c 50361 # 1 1874.5 23414.5 16144.0 4287.5 4267.5 # 2 1852.5 23237.5 15993.0 4245.5 42645.5 # 2 1852.5 23237.5 15993.0 4245.5 4245.5 Nean 1863.5 23326.0 16068.5 4266.5 4266.5 SD 15.6 125.2 106.8 29.7 29.7 XRSD 0.8 0.5 0.7 0.7 0.7 APPARENT CONCENTRATIONS Identity 1 : CLP_CCV_SC Identity 2 : Type : CV Weight : 1.00000 Volume : 1.00 Frinted : 1:05:44 FM June 15, 2004 X_766 L1670 Na589 5c 50361 ppm ppm ppm ppm # 1 19.3309 4.7117 28.4546 4287.500 H 100.3634 # 2 19.2928 4.7223 28.4676 4245.500 95.8711 SD 0.0269 0.0075 0.00317 0.696 0.6971 Checking calibration verification Identity 1 : CLP_CCV_SC Identity 2 : Report name Low limit Value High limit K_766 16.000 15.312 22.000 L1670 4.500 4.717 5.500	Thenting	200					
BACKGROUND CORRECTED INTENSITIES Identity 1: CLP_CCV_SC Identity 2: Type: CV Weight: 1.0000 Volume: 1.00 Printed: 1:00:44 PM June 15, 2004 N_766 Li670 # 1 1874.5 23414.5 1852.5 23237.5 15993.0 4245.5 # 1 1874.5 23326.0 16068.5 4266.5 # 1 1863.5 23326.0 16068.5 4266.5 SD 15.6 125.2 1006.8 29.7 23.7 XRSD 0.8 0.5 0.7 0.7 0.7 AFFARENT CONCENTRATIONS Identity 2: Type: CV Weight: 1.00000 Volume: 1.000 Printed: 1:005:44 PM June 15, 2004 N_766 Li670 Na589 Sc Sc361 # 1 19.3309 4.7117 28.4676 4245.500 99.3787 # 2 15.252.6 4.7223 28.4676 4245.500 95.8711 SD 0.0259 0.0075 0.0090 29.696 0.6962 XRSD 0.1393 0.1595 0.0317 0.696 0.6971 Checking calibration verification Identity 1: CLP_CCV_SC Identity 2:	⊃tarting Treating	high priori	ty queue eni	ries			
Identity 1 : CLP_CCV_SC Identity 2 : Type : CV Weight : 1.0000 Volume : 1.00 Frinted : 1:05:44 FM June 15, 2004 K_766 Li670 Na525 Sc Sc361 # 1 1874.5 23414.5 16144.0 4287.5 4287.5 # 2 1852.5 23237.5 15993.0 4245.5 4245.5 Nean 1863.5 23326.0 16068.5 4266.5 4266.5 SD 15.6 125.2 106.8 29.7 29.7 KRSD 0.8 0.5 0.7 0.7 0.7 AFFARENT CONCENTRATIONS Identity 1 : CLP_CCV_SC Identity 2 : Type : CV Weight : 1.00000 Volume : 1.000 Frinted : 1:05:44 FM June 15, 2004 K_766 L1670 Na529 Sc Sc361 ppm ppm ppm ppm ppm # 1 19.33069 4.7117 28.4548 4287.500 H 100.3634 # 2 19.2928 4.7223 28.4676 4245.500 99.3787 Kean 19.3118 4.7170 28.4512 4266.500 95.8711 SD 0.0265 0.0075 0.00950 29.696 0.6951 KRSD 0.1393 0.1595 0.0317 0.696 0.6971 Checking calibration verification Identity 1 : CLP_CCV_SC Identity 2 : Report name Low Immit Value High limit K_766 16.000 15.312 22.000 L1670 4.500 4.717 5.500	31446900	ND CORRECTED	TNTENSITIES	2			
weight : 1.0000 Volume : 1.000 Frinted : 1.00.44 fri oute 10 error # 1 1874.5 23414.5 16144.0 4287.5 4287.5 # 2 1852.5 23237.5 15993.0 4245.5 4245.5 Wean 1863.5 23326.0 16068.5 4266.5 4266.5 5D 15.6 125.2 106.8 29.7 29.7 XRSD 0.8 0.5 0.7 0.7 0.7 APPARENT CONCENTRATIONS Identity 2 : Type : CV Weight : 1.0000 Volume : 1.000 Frinted : 1:05:44 PM June 15, 2004 k_766 Li670 Na585 5c 5c361 ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm $f 2$ 19.2926 4.7223 28.4612 4265.500 95.8711 SD 0.0259 0.0075 0.0090 29.656 0.6962 XRSD 0.1393 0.1595 0.0317 0.656 0.6571 Checking calibration verification Identity 2 : Report name Low 11mit Yaue <			Tdootii		: CV		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	Weight :	1.0000 Vol	ume : 1.00	Frinted : 1	:05:44 PM Ju	ne 15, 2004	
 A. 766 A. 766 A. 765 A. 766 A. 767 A. 767 A. 766 A. 767 A. 766 A. 767 A. 767 A. 766 A. 717 A. 767 A. 767 A. 717 A. 767 A. 767 A. 767 A. 717 A. 767 A. 767							
<pre># 1 1874.5 2.3414.5 16144.0 12.5 # 2 1852.5 23237.5 15393.0 4245.5 4245.5 Hean 1863.5 23326.0 160668.5 4266.5 4266.5 5D 15.6 125.2 106.8 29.7 29.7 XRSD 0.8 0.5 0.7 0.7 0.7 AFPARENT CONCENTRATIONS Identity 1 : CLP_CCV_SC Identity 2 : Type : CV Weight : 1.0000 Volume : 1.00 Printed : 1:05:44 PM June 15, 2004</pre>		K_766					
# 2 1852.5 2323.5 155556 10000 Hean 1863.5 23326.0 16068.5 4266.5 4266.5 SD 15.6 125.2 106.8 25.7 29.7 XRSD 0.8 0.5 0.7 0.7 0.7 AFPARENT CONCENTRATIONS Identity 1: CLP_CCV_SC Identity 2: Type: CV Weight: 1.0000 Volume: 1.000 Frinted: 1:05:44 FM June 15, 2004 K_766 L1670 Na589 Sc 5c361 ppm ppm ppm ppm ppm # 1 19.3309 4.7117 28.4548 4287.500 H 100.3634 # 2 19.2926 4.7223 28.4676 4245.500 99.3787 Nean 19.3118 4.7170 28.4612 4266.500 95.8711 SD 0.0269 0.0075 0.00950 29.696 0.6962 WRSD 0.1393 0.1595 0.0317 0.696 0.6971 Checking calibration verification Identity 1: CLP_CCV_SC Identity 2: Report name Low 11mit Value High 1imit K_756 16.000 <	# i	1874.5					
Hean 1663.5 23326.0 16008.3 23.7 23.7 SD 15.6 125.2 106.8 29.7 23.7 XRSD 0.8 0.5 0.7 0.7 0.7 APFARENT CONCENTRATIONS Identity 1: CLP_CCV_SC Identity 2: Type: CV Weight: 1.00000 Volume: 1.00 Printed: 1:05:44 PM June 15, 2004 N_766 L1670 Na589 Sc Sc361 ppm ppm ppm ppm ppm # 1 19.3309 4.7117 28.4546 4267.500 H 100.3634 # 2 19.2926 4.7223 28.4676 4245.500 99.3787 Mean 19.3118 4.7170 28.4612 4266.500 99.8711 SD 0.0265 0.0075 0.0090 29.696 0.6952 XRSD 0.1393 0.1595 0.0317 0.696 0.6971 Checking calibration verification Identity 1: CLP_CCV_SC Identity 2: Report name Low 11mit Value High limit K_766 18.000 15.312 22.0000 1.670 4.500 4.717	# 2	1852.5	23237.5	15993.0	4243.3	4240.0	
Hean 1663.5 23326.0 16008.3 23.7 23.7 SD 15.6 125.2 106.8 29.7 23.7 XRSD 0.8 0.5 0.7 0.7 0.7 APFARENT CONCENTRATIONS Identity 1: CLP_CCV_SC Identity 2: Type: CV Weight: 1.00000 Volume: 1.00 Printed: 1:05:44 PM June 15, 2004 N_766 L1670 Na589 Sc Sc361 ppm ppm ppm ppm ppm # 1 19.3309 4.7117 28.4546 4267.500 H 100.3634 # 2 19.2926 4.7223 28.4676 4245.500 99.3787 Mean 19.3118 4.7170 28.4612 4266.500 99.8711 SD 0.0265 0.0075 0.0090 29.696 0.6952 XRSD 0.1393 0.1595 0.0317 0.696 0.6971 Checking calibration verification Identity 1: CLP_CCV_SC Identity 2: Report name Low 11mit Value High limit K_766 18.000 15.312 22.0000 1.670 4.500 4.717		_			4266 5	4266.5	
5D 15.6 125.2 100.0 100.7 0.7 XRSD 0.8 0.5 0.7 0.7 0.7 0.7 AFFARENT CONCENTRATIONS Identity 1: CLP_CCV_SC Identity 2: Type: CV Weight: 1.0000 Volume: 1.000 Frinted: 1:05:44 FM June 15, 2004 k_2766 L1670 Na589 Sc Sc361 ppm ppm ppm ppm # 1 19.3309 4.7117 26.4546 4265.500 99.3787 ## 2 19.2926 4.7223 28.4676 4245.500 99.3787 Mean 19.3118 4.7170 28.4612 4266.500 99.8711 SD 0.0265 0.0075 0.0090 29.696 0.6942 XRSD 0.1393 0.1595 0.0317 0.696 0.6971 Checking calibration verification Identity 1: CLP_CCV_SC Identity 2: Report name Low 1imit Value High limit K_766 18.000 15.312 22.000 L1670 4.500 4.717 5.00 L1670 4.500 4.717 5.300 93.000							
XRSD 0.8 0.5 0.7 0.7 APPAKENT CONCENTRATIONS Identity 1 : CLP_CCV_SC Identity 2 : Type : CV Weight : 1.0000 Volume : 1.00 Printed : 1:05:44 PM June 15, 2004 k_766 Li670 Na589 Sc ppm ppm ppm # 1 19.3309 4.7117 26.4546 # 2 19.2926 4.7223 28.4676 4245.500 Mean 19.3118 4.7170 28.4612 4266.500 99.3787 Mean 19.3118 4.7170 28.4612 4265.500 99.8711 SD 0.0269 0.0075 0.0090 29.658 0.6962 %RSD 0.1393 0.1595 0.0317 0.696 0.6971 Checking calibration verification Identity 1 : CLP_CCV_SC Identity 2 : Report name Low 11mit Value High 11mit K_766 18.000 19.312 22.000 11670 4.500 4.717 Li670 4.500 4.717 5.500 1000 19.312 1000	5D						
Identity 1 : CLP_CCV_SC Identity 2 : Type : CV Weight : 1.0000 Volume : 1.00 Frinted : 1:05:44 PM June 15, 2004	XRSD	ŵ.8	0.5	v. /	0. /		
Identity 1 : CLP_CCV_SC Identity 2 : Type : CV Weight : 1.0000 Volume : 1.00 Frinted : 1:05:44 PM June 15, 2004							
Weight: 1.0000 Volume: 1.000 Printed: 1:00:144 fm sume 10, 1001 $k_{2}766$ Li670 Na589 Sc Sc361 ppm ppm ppm ppm # 1 19.3309 4.7117 28.4546 4287.500 H 100.3634 # 2 19.2928 4.7223 28.4676 4245.500 99.3787 Mean 19.3118 4.7170 28.4612 4266.500 95.8711 SD 0.0269 0.0075 0.0090 29.698 0.6962 %RSD 0.1393 0.1595 0.0317 0.696 0.6971 Checking calibration verification Identity 1: CLP_CCV_SC Identity 2: Report name Low 11mit Value High 11mit K_766 16.000 19.312 22.0000 19.3102 19.000 11.670			cc Identi	+v 2 · Tvn	e : ũ¥		
K_766 Li670 Na589 Sc Sc361 ppm ppm ppm ppm # 1 19.3309 4.7117 28.4548 4287.500 H 100.3634 # 2 19.2926 4.7223 28.4676 4245.500 99.3787 Mean 19.3118 4.7170 28.4612 4266.500 95.8711 SD 0.0269 0.0075 0.0090 29.698 0.6962 %RSD 0.1393 0.1595 0.0317 0.696 0.6971 Checking calibration verification Identity 1 : CLP_CCV_SC Identity 2 : Report name Low limit Walue High limit K_766 16.000 19.312 22.000 1.670 4.500 4.717	Identity	$7 1 : ULF_UUN$	The interior	Frinted :	1:05:44 PM Ju	ne 15. 2004	
k_766 L1870 Nabos ppm ppm ppm # 1 19.3309 4.7117 28.4546 4287.500 H 100.3634 # 2 19.2926 4.7223 28.4676 4245.500 99.3787 Mean 19.3118 4.7170 28.4612 4266.500 99.8711 SD 0.0269 0.0075 0.0090 29.696 0.6962 %RSD 0.1393 0.1595 0.0317 0.696 0.6971 Checking calibration verification Identity 1 : CLP_CCV_SC Identity 2 : Report name Low limit Value High limit K_766 18.000 19.312 22.0000 L1670 4.500 4.717 5.500	Weight	1.0000 101	ume . 1.00	,			
ppm ppm ppm ppm ppm # 1 19.3309 4.7117 28.4548 4287.500 H 100.3634 # 2 19.2928 4.7223 28.4676 4245.500 99.3787 Mean 19.3118 4.7170 28.4612 4266.500 95.8711 SD 0.0269 0.0075 0.0090 29.698 0.6962 %RSD 0.1393 0.1595 0.0317 0.696 0.6971 Checking calibration verification Identity 1 : CLP_CCV_SC Identity 2 : Report name Low limit Value High limit K_766 16.000 19.312 22.000 16.70 4.500 4.500		2 755	1.1670	Na589	Sc	Sc361	
# 1 19.3309 4.7117 28.4548 4287.500 H 100.3634 # 2 19.2928 4.7223 28.4676 4245.500 99.3787 Mean 19.3118 4.7170 28.4612 4266.500 99.8711 SD 0.0269 0.0075 0.0090 29.698 0.6962 %RSD 0.1393 0.1595 0.0317 0.696 0.6971 Checking calibration verification Identity 1: CLP_CCV_SC Identity 2: High limit Report name Low limit Value High limit K_766 18.000 19.312 22.000 Li670 4.500 4.717 5.500							
# 2 19.2926 4.7223 28.4676 4245.500 99.3787 Mean 19.3118 4.7170 28.4612 4266.500 99.8711 SD 0.0269 0.0075 0.0090 29.696 0.6962 %RSD 0.1393 0.1595 0.0317 0.696 0.6971 Checking calibration verification Identity 1 : CLP_CCV_SC Identity 2 : Report name Low limit Walue High limit K_766 18.000 19.312 22.000 1.1670 4.500 4.717 5.500			4.7117	28.4548			
Wean 19.3118 4.7170 28.4612 4266.500 99.8711 SD 0.0269 0.0075 0.0090 29.698 0.6962 %RSD 0.1393 0.1595 0.0317 0.696 0.6971 Checking calibration verification Identity 1 : CLP_CCV_SC Identity 2 : Report name Low limit Value High limit K_766 18.000 19.312 22.000 Li670 4.500 4.717 5.500					4245.500	99.3787	
Mean 19.3118 4.7770 10.4312 1120.4312 1120.4312 SD 0.0269 0.0075 0.0090 29.698 0.6962 %RSD 0.1393 0.1595 0.0317 0.696 0.6971 Checking calibration verification Identity 1 : CLP_CCV_SC Identity 2 : Report name Low limit Value High limit K_766 18.000 19.312 22.000 Li670 4.500 4.717 5.500	# 2	10.2020					
SD 0.0269 0.0075 0.0090 29.696 0.6962 %RSD 0.1393 0.1595 0.0317 0.696 0.6971 Checking calibration verification Identity 1 : CLP_CCV_SC Identity 2 : Report name Low limit Value High limit K_766 18.000 19.312 22.000 Li670 4.500 4.717 5.500	Mean	19.3118	4.7170	28.4612	4266.500		
%RSD 0.1393 0.1595 0.0317 0.696 0.6971 Checking calibration verification Identity 1 : CLP_CCV_SC Identity 2 : Report name Low limit Value High limit K_766 18.000 19.312 22.000 Li670 4.500 4.717 5.500			0.0075	0.0090	29.698	0.0702	
Checking calibration verification Identity 1 : CLP_CCV_SC Identity 2 : Report name Low limit Value High limit K_766 18.000 19.312 22.000 Li670 4.500 4.717 5.500			0.15 9 5	0.0317	0.696	0.6971	
Identity 1 : CLP_CCV_SC Identity 2 : Report name Low limit Value High limit K_766 18.000 19.312 22.000 Li670 4.500 4.717 5.500	/ 						
Identity 1 : CLP_CCV_SC Identity 2 : Report name Low limit Value High limit K_766 18.000 19.312 22.000 Li670 4.500 4.717 5.500							
Identity 1 : CLP_CCV_SC Identity 2 : Report name Low limit Value High limit K_766 18.000 19.312 22.000 Li670 4.500 4.717 5.500	Checkin	g calibratio	n verificat:	ion			
Report name Low limit Value High limit K_765 18.000 19.312 22.000 Li670 4.500 4.717 5.500	Identit	y 1 : CLP_CC	V_SC Ideni	tity 2 :	-1 12-22		
K_766 18.000 19.312 22.000 L1670 4.500 4.717 5.500	Report	name Lo	w limit	Value ni			
Li670 4.500 4.717 5.500			18.000				
	Na589		27.000	28.461	33.000		

EVOLUTION by Micro-Active Australia Pty Ltd 1:15:58 FM June 15, 2004

BACKGROUND CORRECTED INTENSITIES Identity 1 : Calibration blank Identity 2 : Type : CB Weight : 1.00000 Volume : 1.00 Printed : 1:05:58 FM June 15, 2004

K_766 Li670 Na589 Sc 8.5 -5.0 28.5 4359.0 18.5 -4.0 22.5 4340.0 Sc361 X 766 4359.0 # 1 4340.0 # 2 4349.5 Mean13.5-4.525.54349.54349.55D7.10.74.213.413.4XRSD52.415.716.60.30.3

AFFARENT CONCENTRATIONS

Identity 1 : Calibration blank Identity 2 : Type : CB weight : 1.0000 Volume : 1.00 Printed : 1:09:58 PM June 15, 2004

# 1 # 2	K_766 ppm 0.0086 0.1113	L1670 ppm 0.0012 L 0.0014 L	Na589 ppm -0.0250 -0.0352	Sc 4359.000 H 4340.000 H	5c361 ppm 102.0396 101.5542
Mean	0.0600	0.0013 L	-0.0301	4349.500 H	101.8169
SD	0.0726	0.0001	0.0073	13.435	0.3150
%RSD	121.0705	10.3455	24.1128	0.309	0.3093

Checking calibratio	n blank				
Identity i : Calibr	ation blank	Identity	2:		
Report name	CRDL	Value			
K_766	0.100	0.060			
L1670	0.010	0.001			
Na589	0.050	-0.030			
3c361	ଡି. ଡିଡିଡି	101.817			
BACKGROUND CORRECTE	D INTENSITI	ES			
Identity i : pbw-Fi	5E2 Identi	lty 2 : pg56	-215 Type :	SAMPLE	0001
Weight : 1.0000 Vo	lume : 1.00) Printed :	1:12:32 PM	june 15,	2004

# 1 # 2	K_766 -5.0 4.0	Li670 -11.0 -5.0	Na589 8.0 18.0	Sc 4269.5 4197.5	Sc361 4269.5 4197.5
Nean	-0.5	-8.0	13.0	4233.5	4233.5
SD	6.4	4.2	7.1	50.9	50.9
XRSD	1272.8	53.0	54.4	1.2	i.2

APPARENT CONCENTRATIONS Identity 1 : pbw-F15E2 Identity 2 : pg56-215 Type : SAMPLE Weight : 1.00000 Volume : 1.00 Printed : 1:12:34 PM June 15, 2004

# 1 # 2		K_766 ppm -0.1299 L -0.0356	L1670 ppm -0.0000 L 0.0012 L	Na589 ppm -0.0603 -0.0420	Sc 4269.500 4197.500	5c361 ppm 99.9414 98.2534
Mean	Ŀ	-0.0828	0.0006 L	-0.0511	4233.500	99.0974
SD		0.0667	0.0008	0.0129	50.912	1.1936
%RSD		80.5456	141.7299	25.2919	1.203	1.2044

BACKGROUND CORRECTED INTENSITIES Identity 1 : lcsw-F15E2 Identity 2 : pg56-215 Type : SAMPLE Weight : 1.0000 Volume : 1.00 Printed : 1:15:42 PM June 15, 2004

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	1845.0	-: 7 - 6		4247.0	PM June 15, 2004
íean 'n		-14.0	10794.5	4276.5	4276.5
SD Constant	10.6	2.8	58.7	41.7	41.7
RSD	0.6	20.2	Ø.5	i. Ø	1.0
dentit	T CONCENTRAT y 1 : lcsw-F : 1.0000 Vo	15E2 Identi	ty 2 : pg56- Frinted :	215 Type : : 1:15:42 PM J	SAMPLE une 15. 2004
	K_766	L1670	Na589		Sc361
<u>.</u> .	ppm	maa	maa		
# 1	19.0980 L	-0.0010	18.9924	4306.000 H	1.54
# 2	19.2076 L	-0.0002	19.1092	4247.000	99.4139
ean	19.1528 L	-0.0006	19.0508	4276.500 H	100.1055
D	0.0775	-0.0005 0.0005	0.0826	41.719	100.1010 00.1010
RSD	0.4046	90.4781	0.4335	41.719 Ø.976	0.9770
ientity	: 1.0000 VOJ	Identity 2 .ume : 1.00	: pg56-215 Printed : :	Type : SAMPL 1:18:50 PN Ju	ne 15, 2004
1	x_766 55.5	L1670	Na589	Sc	Sc361
2	55.5	-0.5		5012.5	5012.5
		-2.5		5007.5	
an	55.5	-1.5	2454.5	5010.0	5010.0
SD	0.0	1.4	24. ŵ	3.5	3.5
50	Ø. Ø	94.3	1.0	Ø. 1	0.1
PARENT	CONCENTRATI	ONS			
entity	i : 243222	Identity 2	: pg56-215	Type : SAMPLI	Ξ
ight :	1.0000 Vol	ume : 1.00	Frinted : i	:18:50 PM Jun	ne 15, 2004
	K_766	L1670	Na589	Se	Sc361
			•		0001
	(1)(+m)	ppm	maa		0.0 m
i	ррт Ø.4136	Ø. ØØ21	ppm 3.6100	5012.500 H	ppm 117 3600
1 2	ррт Ø.4136	Ø. ØØ21	5 6165	5012.500 H 5007.500 H	ppm 117.3602 117.2430
2	ppm Ø.4136 Ø.4141	0.0021 0.0018	3.6100 3.6651	5007.500 H	117.2430
2	ppm Ø.4136 Ø.4141	0.0021 0.0018	3.6100 3.6651	5007.500 H	117.2430
2	ppm Ø.4136 Ø.4141	0.0021 0.0018	3.6100 3.6651	5007.500 H	117.2430
n ND KGROUN	ppm 0.4136 0.4141 0.4138 0.0003 0.0839 ID CORRECTED	0.0021 0.0018 0.0020 0.0002 12.4149 INTENSITIES	3.6100 3.6651 3.6375 0.0390 1.0716	5007.500 H 5010.000 H 3.536 0.071	117.2430 117.3016 0.0829 0.0707
n SD KGROUN	ppm 0.4136 0.4141 0.4138 0.0003 0.0839 ID CORRECTED 1 : 243223	0.0021 0.0018 0.0020 0.0002 12.4149 INTENSITIES Identity 2	3.6100 3.6651 3.6375 0.0390 1.0716	5007.500 H 5010.000 H 3.536 0.071	117.2430 117.3016 0.0629 0.0707
an SD KGROUM	ppm 0.4136 0.4141 0.4138 0.0003 0.0839 ID CORRECTED 1 : 243223	0.0021 0.0018 0.0020 0.0002 12.4149 INTENSITIES Identity 2	3.6100 3.6651 3.6375 0.0390 1.0716	5007.500 H	117.2430 117.3016 0.0629 0.0707
An SD SKGROUM Sntity ght :	ppm 0.4136 0.4141 0.4138 0.0003 0.0839 ID CORRECTED 1 : 243223 1.0000 Volu	0.0021 0.0018 0.0020 0.0002 12.4149 INTENSITIES Identity 2 me : 1.00	3.6100 3.6651 3.6375 0.0390 1.0716 : pq56-215 frinted : i:	5007.500 H 5010.000 H 3.536 0.071 Type : SAMPLE 21:58 PM Jun	117.2430 117.3016 0.0629 0.0707 e 15. 2004
an SD KGROUM entity .ght : i	ppm 0.4136 0.4141 0.4138 0.0003 0.0839 ID CORRECTED 1 : 243223 1.0000 Volu K_766 572.0	0.0021 0.0018 0.0020 0.0002 12.4149 INTENSITIES Identity 2 Ime : 1.00 Li670 188.0	3.6100 3.6651 3.6375 0.0390 1.0716 : pg56-215 : rinted : 1: Na589 22666.5	5007.500 H 5010.000 H 3.536 0.071 Sype : SAMPLE 21:58 PM Jun Sc 4929 5	117.2430 117.3016 0.0829 0.0707 e 15, 2004 Sc361
an SD KGROUM entity .ght : i	ppm 0.4136 0.4141 0.4138 0.0003 0.0839 ID CORRECTED 1 : 243223 1.0000 Volu	0.0021 0.0018 0.0020 0.0002 12.4149 INTENSITIES Identity 2 Ime : 1.00 Li670 188.0	3.6100 3.6651 3.6375 0.0390 1.0716 : pg56-215 : rinted : 1: Na589 22666.5	5007.500 H 5010.000 H 3.536 0.071 Sype : SAMPLE 21:58 PM Jun Sc 4929 5	117.2430 117.3016 0.0829 0.0707 e 15, 2004 Sc361
n ND KGROUM ntity ght : 1 2 n	PPm 0.4136 0.4141 0.4138 0.0003 0.0839 ND CORRECTED 1 : 243223 1.0000 Volu K_766 572.0 572.0	0.0021 0.0018 0.0020 0.0002 12.4149 INTENSITIES Identity 2 Ime : 1.00 Li670 188.0 189.0	3.6100 3.6651 3.6375 0.0390 1.0716 : pq56-215 : rinted : 1: Na589 22666.5 22705.5	5007.500 H 5010.000 H 3.536 0.071 Sc 4929.5 4909.5	117.2430 117.3016 0.0829 0.0707 e 15, 2004 Sc361 4925.5 4909.5
n ND KGROUM I ght : 1 2	ppm 0.4136 0.4141 0.4138 0.0003 0.0839 ID CORRECTED 1 : 243223 1.0000 Volu K_766 572.0 572.0 572.0 0.0	0.0021 0.0018 0.0020 0.0002 12.4149 INTENSITIES Identity 2 me : 1.00 188.0 189.0 188.5 0.7	3.6100 3.6651 3.6375 0.0390 1.0716 : pg56-215 : pg56-215 : na589 22666.5 22705.5	5007.500 H 5010.000 H 3.536 0.071 Sype : SAMPLE 21:58 PM Jun Sc 4929 5	117.2430 117.3016 0.0829 0.0707 e 15, 2004 Sc361 4925.5 4909.5 4919.5

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Identity 1 : 243223 Identity 2 : pg56-215 Type : SAMPLE Weight : 1.00000 Volume : 1.00 Printed : 1:21:58 PM June 15, 2004

K_768	L1670	Na589	Sc	Sc361
 c occo	ppm 2 227	ppm	1000 E00 H	ppm

WOLUTIO	N by Micro-A	ctive Austra	ilia Fty Lto	i:3i:52 i	-M June 15, 200-	4
lean	5.0838	0.0355	34.8656	4919.500 H	113.1733	
31)	Ø.0148	0.0002	0.1429	1919, 962 H 14, 142 0, 287	Ø.3315	
(RSD	0.2919	0.6209	0.4099	Ø. 287	Ø.2879	
dentity		Identity 2	: pg56-215	Type : SAMPI 1:25:04 PN J		
	K_766	L1670	Na589	Sc	Sc361	
				4915. <i>0</i>		
# 2	4.5	-6.0	5605.5	4924.0	4324.0	
iean	9.0	-8.5	5799.5	4919.5	4919.5	
30	6.4	3.5	8.5	6.4	6.4	
RSD	70.7	41.6	Ø.1	Ø. i	Ø.1	
identity		Identity 2		Type : SAMP 1:25:06 PM Ju		
		L1670			Sc361	
	ppm	opm	ppm	4915.000 H	ppm	
# 1	0.0440	Ø. ØØØG	8.8565	4915.000 H	115.0744	
#2 L	-0.0374	0.0012	8.8587	4924.000 H	115.2854	
iean	0.0033	0.0007	8.8576	4919.500 H	115.1799	
				6.364		
RSD	1735.5152	85.1517	0.0171	Ø.129	0.1295	
Identity	ND CORRECTED 1 : 243225 1.0000 Vol	Identity 2	: pg56-215	Type : SAMPI 1:28:14 PM Ju	.E ine 15, 2004	
		L1670			Sc361	
# 1	21.0	-5. Ø				
#2	27.0	-3.0	1953.5	5011.0	5011.0	
iean	24.0	-4.0	1952.0	4995.5	4995.5	
iD	4.2		2.i			
RSD	17.7	35.4	0.1	Ø. 4	Ø. 4	
PPARENT	CONCENTRATI	ONS				
ldentity	1 : 243225	Identity 2	: pg56-215	Type : SAMPI	"E	
ieight :	1.0000 Vol	ume : 1.00	Printed :	1:28:14 PM Ju	ine 15, 2004	
	K_766	L1670	Na589	Sc	Sc361	
	ppm	ppm	ppm		ppm	
# 1			2.8931	4980.000 H	116.5983	
# 2	0.1613	0.0017	2.8793	5011.000 H	117.3200	
íean				4995.500 H		
SD	0.0368	0.0002	0.00 9 8	21.920	0.5139	
RSD	27.1825	16.1604	0.3386	Ø. 439	0.4394	
	ND CORRECTED			Type : SAMPI	Æ	
			Printed :	1:31:22 PM Ju	ine 15, 2004	
	1.0000 Vol	ume : 1.00				
	1.0000 Vol K_766	ume : 1.00 L1670	Na589	Sc	Sc361	
ieight :	1.0000 Vol	ume : 1.00	Na589 3010.0		Sc361 4977.5	

		K_766	L1670	Na589	Sc	Sc361
₩	i	39.0	5.0	3010.0	4977.5	4977.9
Ħ	2	50.0	7.0	3025.0	5042.5	5042.5

:VOLUTION by Micro-Active Australia Pty Ltd 1:37:56 FM June 15, 2004 46.0 10.6 46.0 7.8 1.4 3D Ø. 9 6.4 0.9 23.6 ZASD 17.5 APPARENT CONCENTRATIONS Identity 1 : 243226 Identity 2 : pg56-215 Type : SAMPLE Weicht : 1.0000 Volume : 1.00 Frinted : 1:31:22 FM June 15, 2004 Na589 Sc Sc361 K 766 L1670 pum ppm ppm opm 0.2699 0.0031 4.5073 4977.500 H 116.5397 0.3623 0.0034 4.4708 5042.500 H 118.0635 # i # 2 0.0033 4.4891 5010.000 H 117.3016 0.3161 liean 0.0258 45.962 1.0775 0.0653 0.0002 SD 7.1939 Q. 917 0.9186 0.5753 ZRSD 20.6620 BACKGROUND CORRECTED INTENSITIES Identity 1 : 243227 Identity 2 : pg56-215 Type : SAMPLE Weight : 1.0000 Volume : 1.00 Printed : 1:34:30 PM June 15, 2004 Sc361 K 766 L1670 Na589 Sc 4928.0 4956.0 -4.5 13115.0 1.5 13228.0 4928.0 # i 1100.5 4956.0 # 2 1099.5 -1.5 13171.5 4.2 79.9 282.8 0.6 4942.0 4942.0 1100.0 iiean 19.8 Ø.7 19.8 SD 0.4 6.4 XRSD Ø. 1 APPARENT CONCENTRATIONS Identity 1 : 243227 Identity 2 : pg56-215 Type : SAMPLE Weight : 1.0000 Volume : 1.00 Printed : 1:34:30 PM June 15, 2004 Na589 Sc Sc361 K 766 L1670 ppm mqq ppm ppm 0.0014 20.0897 4928.000 H 115.3792 0.0025 20.1486 4956.000 H 116.0356 # i 9.8358 # 2 9.7708 20.1192 4942.000 H 115.7074 9.8033 0.0020 iíean 0.0416 19.799 0.4642 0.0459 0.0007 SD 0.401 0.4012 0.4686 37.8783 0.2068 XRSD BACKGROUND CORRECTED INTENSITIES Identity 1 : 243228 Identity 2 : pg56-215 Type : SAMPLE Weight : 1.0000 Volume : 1.00 Printed : 1:37:40 PM June 15, 2004 Na589 Sc Sc361 K_766 L1670 4930.5 4938.0 4929.5 4967.0 4938.0 151.5 2.0 # 1 4967.0 б. 0 # 2 146.5 4930.0 4952.5 4.0 4952.5 149.0 Mean 20.5 20.5 3.5 2.80.7 SD ŵ.4 6.4 2.4 70.7 0.0 %RSD APPARENT CONCENTRATIONS Identity 1 : 243228 Identity 2 : pg56-215 Type : SAMPLE Weight : 1.00000 Volume : 1.00 Printed : 1:37:40 PM June 15, 2004 Sc361 Na589 Sc L1670 K 766 ppm ppm ppm ppm 0.0026 7.4908 4938.000 H 115.6136 # i 1.2841 7.4451 4967.000 H 116.2935 # 2 1.2314 0.0033

- •• - ----1050 500 M · · c

WOLUTION by Micro-Active Australia Pty Ltd 1:48:24 PN June 15, 2004 (RSD) 2.9594 16.7910 0.4327 · 0.414 0.4146 BACKGROUND CORRECTED INTENSITIES Identity 1 : 243229 Identity 2 : pq56-215 Type : SAMPLE Veicht : 1.0000 Volume : 1.00 Printed : 1:40:46 PM June 15. 2004 K 766 L1670 Na589 Sc Sc361 614.5 189.0 183.0 4850.0 **# 1** 23946.5 4850.0 # 2 615.5 24064.5 4884.0 4884.0 615.0 186.0 24005.5 4867.0 4867.0 iean 4.2 24.0 24.0 3D 0.7 83.4 XRSD 0.i 2.3 0.3 0.5 ø.5 APPARENT CONCENTRATIONS Identity i : 243229 Identity 2 : pg56-215 Type : SAMPLE Weight : 1.0000 Volume : 1.00 Printed : 1:40:46 PM June 15. 2004 X_766 L1670 Na589 Sc Sc36i ppm opm ppm pom 37.3352 4850.000 H # i 5.5467 0.0358 113.5506 37.2579 4884.000 H 114.3477 # 2 5.5167 0.0345 4867.000 H 113.9491 jean 5.5317 0.0352 37.2965 3D 24.042 0.0213 0.0009 0.0547 0.5636 0.4946 XRSD 0.3843 2.5997 0.1467 0.494 BACKGROUND CORRECTED INTENSITIES Identity 1 : CLP_CCV_SC Identity 2 : Type : CV weight : 1.0000 Volume : 1.00 Printed : 1:46:06 PM June 15, 2004 X 766 L1670 Na589 Sc Sc361 # 1 1893.5 23696.0 16299.5 4382.0 4382.0 # 2 23748.0 1898.5 16364.5 4380.0 4380.0 23722.0 4381.0 líean 1896.0 16332.0 4381.0 i.4 i.4 3D 3.5 36.8 46.0 %RSD 0.2 0.2 0.3 0.0 6.0 APPARENT CONCENTRATIONS Identity 1 : CLP_CCV_SC Identity 2 : Type : CV Weight : 1.00000 Volume : 1.00 Printed : 1:46:08 PM June 15, 2004 Sc361 ñ 766 Na589 Sc Li670 ppm ppm mag ppm 4382.000 H 102.5788 # 1 19.1048 4.6655 28.1084 # 2 19.1642 4.6779 28.2337 4380.000 H 102.5319 4381.000 H 102.5554 4.6717 28.171119.1345 líean 0.0886 i.414 0.0332 SD 0.0420 0.0087 0.0323 0.2196 0.1872 0.3145 0.032 %RSD Checking calibration verification ... Identity 1 : CLP_CCV_SC Identity 2 : Low limit Value High limit Report name ň 766 18.000 19.134 22.000

5.500

33.000

L1670

Na589

4.500

27.000

4.672

28.171

WOLUTION by Micro-Active Australia Pty Ltd 1:56:54 PM June 15, 2004

ACKBROUND CORRECTED INTENSITIES dentity 1 : Calibration blank Identity 2 : Type : CB leight : 1.0000 Volume : 1.00 Printed : 1:50:20 PM June 15, 2004 010072

# 1 # 2	K_766 17.0 10.0	L1670 -8.5 -11.5	Na589 34.5 27.5	5c 4450.0 4411.0	Sc361 4450.0 44ii.0
iean	13.5	-10.0	31.0	4430.5	4430.5
3D	4.9	2.1	4.9	27.6	27.6
:RSD	36.7	21.2	16.0	0.6	0.6

APPARENT CONCENTRATIONS

Identity 1 : Calibration blank Identity 2 : Type : CB feight : 1.00000 Volume : 1.00 Printed : 1:50:22 PM June 15, 2004

# i # 2	K_766 ppm 0.0917 0.0227 L	L1670 ppm 0.0006 L -0.0000 L	Na589 ppm -0.0157 -0.0273	Sc 4450.000 H 4411.000 H	Sc361 ppm 104.1730 103.2587
iean	0.0572	0.0003 L	-0.0215	4430.500 H	103.7159
3D	0.0488	0.0004	0.0081	27.577	0.6465
4RSD	85.2665	155.8242	37.8338	0.622	0.6234

Checking calibration blankIdentity 1 : Calibration blankieport nameCRDLi_7660.100i6700.010i6830.0505c3610.000	Identity 2 : Value 0.057 0.000 -0.022 103.716
BACKGROUND CORRECTED INTENSITI	
Identity 1 : 243230 Identity Veight : 1.0000 Volume : 1.00	2 : pg56-215 Type : SAMPLE) Printed : 1:53:30 PM June 15, 2004

# 1 # 2	K_766 351.5 352.5	L1670 1245.5 1248.5	Na589 109227.0 109382.0	5c 4134.0 3917.0	Sc361 4134.0 3917.0
iean	352.0	1247.0	109304.5	4025.5	4025.5
5D	0.7	2.1	109.6	153.4	153.4
XRSD	0.2	0.2	0.1	3.8	3.8

APPARENT CONCENTRATIONS Identity i : 243230 Identity 2 : pg56-215 Type : SAMPLE Weight : 1.0000 Volume : 1.00 Printed : 1:53:30 PM June 15, 2004

# 1 # 2	K_766 ppm 3.6967 3.9171	Li670 ppm 0.2620 H 0.2771 H	Na589 ppm 200.1161 211.5064	5c 4134.000 3917.000	5c361 ppm 96.7647 91.6774
Mean	3.8069	0.2696 H	205.8112	4025.500	94.2211
SD	0.1559	0.0106	8.0541	153.442	3.5973
XRSD	4.0946	3.9489	3.9134	3.812	3.8179

BACKGROUND CORRECTED INTENSITIES Identity 1 : 243230d Identity 2 : pg56-215 Type : SAMPLE Weight : 1.0000 Volume : 1.00 Printed : 1:56:38 PM June 15, 2004

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2	353.0	1237.@	108319.0	3942.0	3942.0
an	354.5	1231.5	108001.0	4037.5	1999/10 1995 1
	2.i	7.8	442./	135.1 3.3	100.1
50	0.6	ŵ. 6	0.4	3.3	د.د
PARENT	CONCENTRATIO	NS		Suco . SAMPI	F
entity	i : 243230d	Identity 2	: pg36-213	Type : SAMPL .:56:38 PM Jun	e 15. 2004
ight :	1.0000 Voit	1me : 1.00	Frinced : 1		2 20, 200
	F 766	L1670	Na589	Sc	Sc361
	ົ້ມ	nom	maa	4133.000	ppm
,	2 7459	0 2580 H	197.3340	4133.000	96.7413
1	3.7433	0.2300 H	208.1214	3942.000	92.2635
an	3.8217	0.2654 H	202.7277	4037.500	94.5024
	0.1071	0.0105	7.6278	135.057	3.1663
SD	2.8030	3.9430	3.7626	4037.300 135.057 3.345	3.3505
CKGROL	IND CORRECTED	INTENSITIE	5		-
		Idontity 2	· pa56-215	Type : SAMPLI	
ight :	: 1.0000 Vol	ume : 1.00	Frinted :	1:59:46 PM Ju	ne 15, 2004
	к_766	L1670	Na589	Sc 4907.0 4915.0	30361
¥ 1	633.Ø	207.5	27212.5	4907.U	4507.0
# 2	641.Ø	201.5	27225.5	4915.0	4910.0
ean	637.0	204.0	2/213.0	4911.0 5.7 0.1	5.7
U	5.7	4.2 2.1	3.2	Ø. 1	Ø. 1
RSD	ø.9	<i>4</i> .1	0.0	0.1	
50 1 5 5 1	T CONCENTRATI	- NA			
4		Identity 2	: pa56-215	Type : SAMPL	E
	• 1 0000 Vol	ume : 1.00	Printed :	1:59:46 PM Ju	ne 15, 2004
erğuc	: 1.0000 101	ume . 1.00			
	K_766	L1670	Na589	Sc	Sc361
					ppm
	p	maa	mqq		
# 1	maa	ppm 0.0387		4907.000 H	114.8869
	ppm 5.6488	0.0387	41.9436		114.8869 115.0744
# 2	ppm 5.6488 5.7117	0.0387 0.0376	41.9436 41.8953	4915.000 H	115.0744
# 2	ppm 5.6488 5.7117	0.0387 0.0376	41.9436 41.8953 41.9194	4915.000 H 4911.000 H	115.0744 114.9807
# 2 ean D	ppm 5.6488 5.7117 5.6802 0.0445	0.0387 0.0376 0.0381 0.0008	41.9436 41.8953 41.9194 0.0342	4915.000 H 4911.000 H 5.657	115.0744 114.9807 0.1326
# 2 ean D	ppm 5.6488 5.7117 5.6802 0.0445	0.0387 0.0376 0.0381 0.0008	41.9436 41.8953 41.9194 0.0342	4915.000 H 4911.000 H 5.657	115.0744 114.9807
# 2 ean D RSD	ppm 5.6488 5.7117 5.6802 0.0445 0.7835	0.0387 0.0376 0.0381 0.0008 2.0623	41.9436 41.8953 41.9194 0.0342 0.0816	4915.000 H 4911.000 H 5.657	115.0744 114.9807 0.1326
# 2 ean D RSD	ppm 5.6488 5.7117 5.6802 0.0445 0.7835	0.0387 0.0376 0.0381 0.0008 2.0623 D INTENSITI	41.9436 41.8953 41.9194 0.0342 0.0816	4915.000 H 4911.000 H 5.657 0.113	115.0744 114.9807 0.1326 0.1153
# 2 ean D RSD ACKGRO	ppm 5.6488 5.7117 5.6802 0.0445 0.7835 DUND CORRECTE	0.0387 0.0376 0.0381 0.0008 2.0623 D INTENSITI	41.9436 41.8953 41.9194 0.0342 0.0816	4915.000 H 4911.000 H 5.657 0.115	115.0744 114.9807 0.1326 0.1153
# 2 ean D RSD	ppm 5.6488 5.7117 5.6802 0.0445 0.7835 DUND CORRECTE	0.0387 0.0376 0.0381 0.0008 2.0623 D INTENSITI	41.9436 41.8953 41.9194 0.0342 0.0816	4915.000 H 4911.000 H 5.657 0.115	115.0744 114.9807 0.1326 0.1153
# 2 ean D RSD	ppm 5.6488 5.7117 5.6802 0.0445 0.7835 DUND CORRECTE ty 1 : 243232 : 1.0000 Vo	0.0387 0.0376 0.0381 0.0008 2.0623 D INTENSITI Identity lume : 1.00	41.9436 41.8953 41.9194 0.0342 0.0816 25 2 : pg56-215 Printed :	4915.000 H 4911.000 H 5.657 0.115 Type : SAMPH 2:02:56 PM Ju	115.0744 114.9807 0.1326 0.1153 LE Ine 15, 2004
# 2 ean D RSD	ppm 5.6488 5.7117 5.6802 0.0445 0.7835 DUND CORRECTE ty 1 : 243232 : 1.0000 Vo K_766	0.0387 0.0376 0.0381 0.0008 2.0623 D INTENSITI Identity lume : 1.00 Li670	41.9436 41.8953 41.9194 0.0342 0.0816 25 2 : pq56-215 Printed :	4915.000 H 4911.000 H 5.657 0.115 Type : SAMPH 2:02:56 PM J 50	115.0744 114.9807 0.1326 0.1153 LE Ine 15. 2004 Sc361
# 2 ean D RSD	ppm 5.6488 5.7117 5.6802 0.0445 0.7835 DUND CORRECTE ty 1 : 243232 : 1.0000 Vo K_766 428.0	0.0387 0.0376 0.0381 0.0008 2.0623 D INTENSITI Identity lume : 1.00 Li670 242.0	41.9436 41.8953 41.9194 0.0342 0.0816 25 2 : pq56-215 Printed : Na589 31305.5	4915.000 H 4911.000 H 5.657 0.113 Type : SAMPH 2:02:56 PM J Sc 4887.5	115.0744 114.9807 0.1326 0.1153 LE Line 15, 2004 Sc361 4867.5
# 2 ean D RSD ACKGRC Identit Weight	ppm 5.6488 5.7117 5.6802 0.0445 0.7835 DUND CORRECTE ty 1 : 243232 : 1.0000 Vo K_766 428.0	0.0387 0.0376 0.0381 0.0008 2.0623 D INTENSITI Identity lume : 1.00 Li670	41.9436 41.8953 41.9194 0.0342 0.0816 25 2 : pq56-215 Printed : Na589 31305.5	4915.000 H 4911.000 H 5.657 0.113 Type : SAMPH 2:02:56 PM J Sc 4887.5	115.0744 114.9807 0.1326 0.1153 LE Ine 15. 2004 Sc361
# 2 ean D RSD ACKGRC dentit Weight # 1	ppm 5.6488 5.7117 5.6802 0.0445 0.7835 DUND CORRECTE ty 1 : 243232 : 1.0000 Vo K_766 428.0 432.0	0.0387 0.0376 0.0381 0.0008 2.0623 D INTENSITI Identity lume : 1.00 Li670 242.0 242.0	41.9436 41.8953 41.9194 0.0342 0.0816 2: pq56-215 Printed : Na589 31305.5 31536.5	4915.000 H 4911.000 H 5.657 0.113 Type : SAMPH 2:02:56 PM Ju Sc 4887.5 4904.5	115.0744 114.9807 0.1326 0.1153 LE Ine 15, 2004 Sc361 4887.5 4904.5
# 2 ean D RSD ACKGRC dentit deight # 1 # 2	ppm 5.6488 5.7117 5.6802 0.0445 0.7835 DUND CORRECTE ty 1 : 243232 : 1.0000 Vo K_766 428.0 432.0 430.0	0.0387 0.0376 0.0381 0.0008 2.0623 D INTENSITI Identity lume : 1.00 Li670 242.0 242.0 242.0	41.9436 41.8953 41.9194 0.0342 0.0816 2: pq56-215 Printed : Na589 31305.5 31536.5 31421.0	4915.000 H 4911.000 H 5.657 0.115 Type : SAMFH 2:02:56 PM J 50 4887.5 4904.5 4896.0	115.0744 114.9607 0.1326 0.1153 LE Line 15. 2004 Sc361 4867.5 4904.5 4896.0
D RSD ACKGRC dentit Weight # 1	ppm 5.6488 5.7117 5.6802 0.0445 0.7835 DUND CORRECTE ty 1 : 243232 : 1.0000 Vo K_766 428.0 432.0	0.0387 0.0376 0.0381 0.0008 2.0623 D INTENSITI Identity lume : 1.00 Li670 242.0 242.0 242.0	41.9436 41.8953 41.9194 0.0342 0.0816 2: pq56-215 Printed : Na589 31305.5 31536.5 31421.0 163.3	4915.000 H 4911.000 H 5.657 0.115 Type : SAMFH 2:02:56 PM J 5c 4887.5 4904.5 4896.0 12.0	115.0744 114.9607 0.1326 0.1153 LE Line 15. 2004 Sc361 4867.5 4904.5 4896.0

APPARENT CONCENTRATIONS Identity 1 : 243232 Identity 2 : pg56-215 Type : SAMPLE Weight : 1.0000 Volume : 1.00 Printed : 2:02:56 PM June 15, 2004

K_766	L1670	Na589	Sc	Sc361
* : > 000 * : > 000	mqq	ррт ло лясл	1007 SAA U	ррт 117 лост

VOLUTICI	x by Micro-Ac	iive Austral	ia Pty Ltd	2:12:58 PI	1 June 15, 2004
ean	3.6210	6.6448	46.5507	4895.000 H	114.6290
Ð	0.0161	0.0001	0.1334	12.021	0.2818
RSD	0.4207	0.2334	0.2747	0.246	ø.2458
ACKGROU	ND CORRECTED 1 : 243232s	INTENSITIES Identity 2	: pg56-215	Type : SAMPI 2:06:04 PM Ju	LĒ
	K_766	L1670	Na589	Sc	Se361
# 1	2578.0	239.0	42935.0	4737.0	4737.0
# 2	2572.0	244.0	42785.0	30 4737.0 4725.0	4725.0
iean	2575.0	241.5	42860.0	473i.Ø	4731.0
5D	4.2	3.5	106.1	8.5	8.5
RED	Ø.2	1.5	Ø. 2	4731.0 8.5 0.2	Ø.2
Identity	1.0000 Volu	Identity 2 me : 1.00 F	rinted : 1	Type : SAMF 2:06:04 PM Jun	ne 15, 2004
	K_766	L1670	Na589	Sc	Sc361
	ppm	ppm	ppm	4737.000 H	ppm
# 1	24.0821	0.0457 H	68.5995	4737.000 H	110.9014
# 2	24.0870	0.0468 H	68.5334	4725.000 H	110.6201
				4731.000 H	
SD .	A 0013	0.0402 H 6 8887	5 5464 6 5464	4/31.000 H 8.485	0.1989
(295)	0.00000 0 6146	5.000/	0.0400 0 0.645	0.179	0.179£
3ACKGROU [dentity √eight :	ND CORRECTED 1 : 2 43108 1.0000 Volu	INTENSITIES Identity 2 : me : 1.00 F	245108 (: pg56-215 Printed : 1	CO 4/2A 104 Type : SAMFLi 2:09:14 FM Jun	E ne 15, 2004
	K_766	L1670	Na589	Sc	Sc361
# 1	397.0	221.0			4871.0
# 2	409.0	225.0	33417.0	4878.0	4878.0
íean	403.0	223.0	33301.5	4874.5	4874.5
3D	8.5	2.8	163.3	4.9	4.9
(RSD	2.1	1.3	0. 5	Ø.1	0.1
loentity	CONCENTRATIO 1 : 245100 1.0000 Volu	identity 2	: pg56-215	A (04 Type : SAMPLI 2:09:14 FM Jun	E ne 15. 2004
	к_766	L1670	Na589	Sc	5c36i
	ppm	mqq	ppm		bbw
# 1	3.5402			4871.000 H	
# 2	3.6443	0.0420 H	51.8306	4878.000 H	114.2070
Kean	3.5922	0.0417 H	51.6882	4874.500 H	114.1250
SD	0.0736	0.0005	0.2013	4.950	0.1160
XRSD	2.0475	1.1046	0.3895	9.102	0.1017
Identity	1 : 2 431086	Identity 2	: pg56-215	CO 4/24 (Type : SAMPI 2:12:20 PM Jun	LE

.

		K_766	L1670	Na589	Sc	Sc361
#	i	406.0	224.0	33406.0	4890.O	4890.0
Ŧ	2	402.0	234.0	33669.0	4913.0	4913.0

TACTICS D	y Micro-Active	Australia	Fty Ltd	2:18:54 FM	June 15, 2004
30	2. ô	7.1	186.0	16.0	16.3
.Rûl	ê.7	5.1	ē.6	6.3	Ø.3

FFARENT	CONCENTRATIONS 2491080	CO 10/24/04
Identity	1 : 243106d Identity 2 : p(g56-215 Type : SANFLE
veight :	1.0000 Volume : 1.00 Frin	ted : 2:12:20 FM June 15, 2004

	ñ_766	L1670	Na589	Sc	Selāi
	ppm	ppm	ppm		ppm
# <u>+</u>	3.6079	0.0417 H	51.6862	4890.000 H	114.4883
# 2	3.5545	0.0433 H	51.8494	4913.000 H	115.0275
íean	3.5812	0.0425 H	51.7678	4901.500 H	114.7579
30	Ø.Ø378	0.0011	Ø.1155	16.263	0.3813
(RSD	1.0544	2.6122	0.2230	Ø.332	Ø.3322

BACKGROUND CORRECTED INTENSITIES **2451095 CO 0 24 04** Identity 1 : 249108s Identity 2 : pg56-215 Type : SANFLE Veight : 1.0000 Volume : 1.00 Frinted : 2:15:30 FM June 15, 2004

	K_766	L1670	Na589	Sc	Sc361
# i	2569.0	219.5	44833.5	4724.0	4724.0
# 2	2593.0	219.5	45263.5	4736 <i>.</i> 0	4736.0
iean	2581.Ø	219.5	45048.5	4730.0	4730.0
50	17.0	0.0	304.1	8.5	8. 5
(RSD	0. 7	0.0	Ø.7	Ø.2	0.2

AFFAKENT CONCENTRATIONS **2AG1096 CO4124104** Identity 1 : 2431088 Identity 2 : pg56-215 Type : SAMPLE Veight : 1.0000 Volume : 1.00 Printed : 2:15:30 PM June 15, 2004

	X_766	L1670	Na589	Sc	Sc361
	ppm	ppm	ppm		ppm
# 1	24.0640	0.0423 H	71.8335	4724.000 H	110.5966
# 2	24.2278	0.0422 H	72.3392	4736.000 H	110.8780
íean	24.1459	0.0422 H	72.0863	4730.000 H	110.7373
3D	Ø.1158	0.0001	0.3576	8.485	0.1989
(RSD	0.4797	0.1700	0.4961	0.179	0.1796

 BACKGROUND CORRECTED INTENSITIES 245/09
 CO 4/24/04

 Identity 1 : 243105
 Identity 2 : pg56-215
 Type : SANPLE

 Weight : 1.0000
 Volume : 1.00
 Printed : 2:18:38
 FM June 15, 2004

	K_766	L1670	Na589	Sc	Sc361
# i	316.5	484.0	50107.0	4910.5	4910.5
# 2	309.5	500.0	49653.0	4876.5	4876.5
Xean	313.0	492.0	4988 0.0	4893.5	4893.5
30	4.9	11.3	321.0	24.0	24.0
XASD	1.6	2.3	ŵ. 5	ø.5	Ø.5

AFFARENT CONCENTRATIONS 245109 CO 4/24/04Identity 1 : 243109 Identity 2 : pg56-215 Type : SAMFLE Weight : 1.0000 Volume : 1.00 Printed : 2:18:38 PM June 15, 2004

	K_766	L1670	Na589	Sc	Sc361
	ppm	maa	mqq		mqq
# i	2.7834	0.0872 H	77.2393	4910.500 H	114.9689
# 2	2.7396	0.0906 H	77.0729	4876.500 H	114.1718
18 m m m		0 0000 U	₽5 : €11	1009 SAA U	1:4 570A

Weighigh	by Micro-Ao	tive Austral	ia Pty Ltd	2:29:50 F	N June 15, 2004	
	i.i209	2.7216	ø.i524	0.491	0.4820	
an ta an a' an a ta ta			245110	CO 4 24	04	
dentity 1	i : 24314 0	Identity 2 :	pq56-215	Type : SAMFL	E	
ieight : 1	1.0000 Volu	me : 1.00 P	rinted : 2	2:21:46 FM Ju	ne i5. 2004	
	X 766	L1670	Na589	Sc	50381	
# 1 # 2	412.0	232.0	34412.0	Sc 4945.0 4979.0	4945.0	
# _	434.Ø	244.Ø	34799.0	4979.0	4576.0	
iean	423.0	238.Ŷ	34605.5	4962.0 24.0 0.5	4962.0	
50	15.6	8.5	273.7	24.0	24.0	
					w.c	
APPARENT (CONCENTRATIO	NS 245110		424104	~	
laentity 1	1 : 2 73110 : 6866 Valu	identity 2 :	pgob-210 Vinted : 0	Type : SANPL 2:21:46 PM Ju	na 15. 2004	
verunc	1.0000 (010	ime.1.00 i	11nceu . 2			
	N_766	L1670	Na589	Sc	Sc361	
<i></i>	ppm	ppm	ppm	4945.000 H	ppm 	
# 1 # 2	3.6208	0.0427 H 0.0475 H	02.0017 57 8807	4945.000 H 4979.000 H	115.7778	
π 2	2.7217	0.0445 11	52.0007	10/01000 11	110.0/30	
iean	3.7062	0.0436 H	52.7663	4962.000 H	116.1763	
30	0.1208	0.0013	Ø.1618	24.042	0.5636	
4RSD	3.2605	2.9240	0.3067	Ø.485	Ø.4852	
[dentity]	1 : CLP_CCV_	INTENSITIES SC Identity	2: Туре	≥ : CV		
veight :	1.0000 Volu	ime: 1.00 F	rinted : 2	2:27:06 PM Ju	ne 15, 2004	
	K 766	L1670	Na589	Se	Sc361	
# 1	1912.5	23794.5	16328.0	5c 4413.5	4413.5	
¥ 2	1897.5	23756.5	16319.0	4383.5	4383.5	
íean	1905.0	23775.5	16323.5	4398.5	4398.5	
50		26.9	6.4	21.2	21.2	
ARSD	Ø.6	0.i	Ø. Ø	Ø.5	0. 5	
AFFARENT (CONCENTRATIO	NS				
		SC Identity				
Weight : 1	1.0000 Volu	ime : 1.00 F	rinted : 2	2:27:06 PM Ju	ne 15, 2004	
	X_766	L1670	Na589	Sc	Sc361	
	ppm	ppm	ppm		ppm	
# 1 	19.1590	4.6515	27.9562	4413.500 H 4383.500 H	103.3173	
# 12	19.1387	4.6758	28.1325	4383.500 h	102.6140	
Hean	19.1489	4.6637	28.0444	4398.500 H	102.9657	
50	0.0143	0.0172	0.1246	21.213	0.4973	
XRSD	0.0748	0.3691	0.4445	0.482	0.4830	
		verification				
		SC Identi		nh îdmi:		
keport na K_766		limit Va 18.000				
11670 Li670			4.664	5.500		
··			00 0 <i>4</i> 2			

33.000

28.044

Na589

27.000

IVOLUTION by Micro-Active Australia Ptv Ltd 2:37:56 PM June 15, 2004

BACKGROUND CORRECTED INTENDITIES Identity 1 : Calibration blank Identity 2 : Type : CB Weight : 1.0000 Volume : 1.00 Printed : 2:31:18 PN June 15, 2004

010077

	N_766	L1670	Na569	50	Sc351
# i	16.0	-7.0	35.0	4428.0	4428.0
¥ Î	20.0	-3.0	35.0	4405.0	4405.0
iean	18.0	-5.0	3 5. 0	4416.5	4416.5
5£)	2.8	2.8	ô. Ô	16.3	16.3
(RSD	15.7	56.6	ō.0	ô.4	ô.4

AFFARENT CONCENTRATIONS

Identity 1 : Calibration blank Identity 2 : Type : CB Veight : 1.0000 Volume : 1.00 Printed : 2:31:18 PM June 15, 2004

	K_766	L1670	Na589	Sc	Sc361
	ppm	ppm	ppm		ppm
# 1	6.0825	0.0009 L	-0.0146	4428.000 H	103.6573
₩ 2	0.1236	0.0016 L	-0.0143	4405.000 H	103.1180
iean	0.1030	0.0012 L	-0.0144	4416.500 H	103.3876
5D	0.0291	0.0005	0.0002	16.263	0.3813
4RSD	28.2367	44.0634	1.5306	ø.368	ø.3688

Thecking calibratio	n blank		
Identity 1 : Calibr	ation blank	Identity	2 :
leport name	CRDL	Value	
1_766	0.100	0.103	Contaminated
_1670	0.010	0.001	
va589	0.050		
5e361	0.000	103.388	
BACKGROUND CORRECTE	D INTENSITI	ES 245111	CO 4124104
Identity 1 : 243111	Identity :	2 : pg56-219	5 Type : SAMPLE
weight : 1.0000 Vo.	lume : 1.00	Printed :	2:34:28 PM June 15, 2004

# 1 # 2	К_766 328.0 324.0	Li670 511.0 519.0	Na589 51254.0 52245.0	ຣດ 4885. ຍ 4873. ຍ	Sc361 4885.0 4873.0
Mean	326.0	515.0	51749.5	4879.0	4879.0
3D	2.8	5.7	700.7	8.5	8.5
%RSD	0.9	1.1	1.4	0.2	0.2

APPARENT CONCENTRATIONS 2A5111 CO 4/24/04Identity 1 : 245111 Identity 2 : pg56-215 Type : SAMPLE Weight : 1.0000 Volume : 1.00 Printed : 2:34:28 PM June 15, 2004

	K_766	L1670	Na589	Sc	Sc361
	ppm	ppm	ppm		ppm
# i	2.9028	0.0924 H	79.4219	4885.000 H	114.3711
# 2	2.8737	0.0941 H	81.1585	4873.000 H	114.0898
Nean	2.8883	Ø.0932 H	80.2902	4879.000 H	114.2305
SD	0.0206	0.0012	1.2280	8.485	0.1989
XRSD	0.7124	1.2420	1.5294	0.174	0.1741

BACKBROUND CORRECTED INTENSITIES 245112 CO 42404 Identity 1 : 249112 Identity 2 : pg56-215 Type : SAMPLE Weight : 1.0000 Volume : 1.00 Frinted : 2:37:36 FM June 15, 2004

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S-951

5-

					4 June 15, 2004
				4993.Ø	
iean	1030.5	- 4. 🖗	5942.5	4993.5	4993.5
30	1.4	6.4	33.2	Ø.7	ø.7
GER	0.1	159.1	33.2 Ø.8	0.7 0.0	9.9
AFFARENT	CONCENTRATIO	NS 245112	. (10 412	4104	
Identity	1 : 243112	Identity 2	pa56-215	Type : SAMPL	ani, na tear
Weight :	1.0000 Volu	me: 1.00 F	rinted : 2	Type : SAMPLE :37:36 PM Ju	ne 15, 2004
	K_766	L1670	Na589	Sc	Sc361
¥ :	9 0736	0 0023	A 9657	4994.000 H	116 9265
# 2	9.0,22	6 00020 6 0008	8 97AA	4993.000 H	116.9031
w 44	2 6 W 2 C 2	0.0000	0.0700	1000.000 11	310.2003
isan	9 6491	6 6615	A 6400	4993.500 H	116 G14A
	0.0133 0.1507	0.0011 71 6554	0.0J1/ 6 5707	0.707 0.014	0.0100 0.0100
	un caustater	-	21513	CO 412410	74
Jacottiuu Jacottiuu	1 . ALAINA	INIENDIIIED			
identity	1 : 2 79173 : 2500 "-1	identity 2	, hàne-⊼io : hàne-⊼io	Type : SAMPL: :40:44 PM Ju	2
verdur :	1.0000 YOTI	ime: 1.00 P	·inted : 2	.:40:44 Fn Ju	ne 15, 2004
	v nes	14670	11-500	Sc	04761
				4966.0	
# 2	1022.5	-2.5	5936.0	5027.0	5027.0
íean	1000 C		sanala	1001 F	1057 E
	1020.0	-1.0	J∃∠∠. V	4996.5	4336.3
3D	2.8	1.4	19.8	43.1	43.1
7.RSD	Ø.3	94.3	Ø.3	Ø.9	Ø.9
				101	
AFFARENT	CONCENTRATIO	NS 246 110		4109	_
identity	1 : 21011 0	Identity 2 :	pg56-215	Type : SAMPLI	5
√eight :	1.0000 Volu	ime : 1.00 F	Printed : 2	:40:44 PM Ju	ne 15, 2004
	K_766	Li670	Na589	Sc	Sc361
	ppm	ppm	ppm		ppm
# i	9.0269			4966.000 H	
# 2	8.9517	0.0018	8.8723	5027.000 H	117.7002
íean				4996.500 H	
50	0.0531	0.0002	0.0475	43.134	1.0112
(RSD	0.5912	12.3230	0.5334	0.863	0.6644
			· · · · ·		
BACKGROUI	ND CORRECTED	INTENSITIES	245114	CO 4124	109
Identity	1 : 2431:4	Identity 2 :	: pg56-215	Type : SAMPLE	Ξ
				.:43:50 PN Jun	
~					
	X_766	L1670	Na589	Sc	Sc361
# i	25.0	-7.5		5021.0	
# 2	13.0	Ø.5		5085.0	
íean	19.0	-3 5	1A 5	5053.0	5053.0
SD	8.5	5.7			45.3
			v./ 3.8		40.3 Ø.9
RSD	44.7	161.6	۵.۵	0.9	v. 7
		0/-11		\cap μ	
AFFARENT	CUNCENTRATIC	INS 24011		0 6/24/04	- -
	1 : 243144	identity 2 :	pg56-215	Type : SAMPLE	
				:43:52 PM Jur	

	K_766	L1670	Ne589	Sc	Sc361
ж. ÷	ppm	ppm a accort	mqq	5001 000 H	ppm

WOLUTIO	N by Micro-Ac	tive Austral	ia Fty Ltd	2:54:30 Pi	1 June 15. 2004
315	0.0893 0.0760 83.1309	ଡି.ଡିଡିର୍ଥିତି	-0.0468 0.0008 1.7365	5053.000 H 45.235 0.896	1. VELV
.dentity	i i zadito	identity 2 :	bgae-713	CO 424 Type : SAMFLI 2:47:00 FM Jun	-
ਸ 1 ਸ 2	К_766 416.0 426.0	L1670 236.5 237.5	Na585 34023.5 34532.5	ິລະ 4940. ຍິ 4982. ຢ	Sc361 4940.0 4982.0
iean 3D (RSD	7.1 1.7	0.7 0.3	359.9 1.0		4961.0 29.7 0.6
Identity		Identity 2 :	pg56-215	0 24 04 Type : SAMPLI 2:47:00 PM Jun	
# 1		Li670 ppm 0.0435 H	ppm 52.1094	4940.000 H	Sc361 ppm 115.6605
¥ 2	3.7180	0.0433 H 0.0434 H	52. 4435 52. 2764	4982.000 H 4961.000 H 29.698	116.6452
RSD Backgrou	1.1038	0.2849 INTENSITIES	0.4520 245116	0.599 CO (124	0.5554 104
identity √eight :	1 : 2 43116 1.0000 Volu K_766	identity ∠ : me : 1.00 P L1570	pg56-215 rinted : Na589	Type : SAMPLI 2:50:08 PM Jun Sc	- ne 15, 2004 Sc361
# 1 # 2	310.0 313.0		51026.5 51606.5	4556.0	4556.0 4548.0
iean 3D (RSD	311.5 2.1 0.7	513.5 2.8 Ø.6	410.i 0.8	4552.0 5.7 0.1	4552.0 5.7 0.1
APPARENT Identity √eight :	CONCENTRATIO 1 : 243116 1.0000 Volu	DNS 245 114 Identity 2 : Ime : 1.00 F	pg56-215 rinted :	U 24 04 Type : SAMFLI 2:50:08 FM Jun	2 ne 15, 2004
# 1 # 2	K_766 ppm 2.9427 2.9773	L1670 ppm 0.0990 H 0.1000 H		5c 4556.000 H 4548.000 H	
Mean 3D %RSD				4552.000 H 5.657 0.124	

EVOLUTION by Micro-Active Australia Fly 116 2:55:56 FM June 10, 2004

BACKGROUND CORRECTED INTENSITIES Identity 1 : CLP_CCV_BC Identity 3 : Type : CV Weight : 1.0000 Volume : 1.00 Frinted : 2:55:28 PK June 15, 2004

010080

	R_766	L1670	Na589	Se	Sc361
#	1891.Ø	23773.5	16331.0	4413.Ø	4413.0
¥ ⊇	1924.0	23758.5	16348.0	4388.0	4368.0
fean	1907.5	23766.0	16339.5	4420.5	4400.3
30	23.3	10.6	12.0	17.7	17.7
ZRSD	1.2	Ø. Ø	0.i	Ø.4	Q.4

APPARENT CONCENTRATIONS

Identity 1 : CLF_CCV_SC Identity 2 : Type : CV
Weight : 1.0000 Volume : 1.00 Printed : 2:55:28 PM June 15, 2004

	K_765	L1670	Na589	Se	Sc361
	ppm	ppm	ppm		mqq
# 1	18.9449	4.6479	27.9645	4413.000 H	103.3056
# 2	19.3871	4.6714	28.1536	4388.000 H	102.7195
Kean	19.1660	4.6597	28.0591	4400.500 H	103.0125
SD	0.3127	0.0166	0.1337	17.678	Ø.4144
%RSD	1.6316	0.3569	0.4765	0.402	0.4023

Checking calibration verification ... Identity 1 : CLP_CCV_SC Identity 2 : Report name Low limit Value High limit K_766 18.000 19.166 22.000 5.500 L1670 4.500 4.660 33.000 Na589 27.000 28.059 BACKBROUND CORRECTED INTENSITIES Identity 1 : Calibration blank Identity 2 : Type : CB Weight : 1.0000 Volume : 1.00 Printed : 2:59:42 PM June 15, 2004

	K_766	Li670	Na589	Sc	Sc361
# 1	8.0	-8.5	37.0	4420.0	4420.0
# 2	20.0	-5.5	30.0	4406.0	4406.0
Nean	14.0	-7.0	33.5	4413.0	4413.0
SD	8.5	2.i	4.9	9.9	9.9
XRSD	60.6	30.3	14.8	0.2	Ø.2

APPARENT CONCENTRATIONS

Identity 1 : Calibration blank Identity 2 : Type : CB Weight : 1.0000 Volume : 1.00 Printed : 2:55:42 PM June 15, 2004

	к_766	L1670	Na589	Sc	Sc361
	ppm	ppm	ppm		ppm
¥ 1	0.0024	0.0006 L	-0.0111	4420.000 H	103.4697
# 2	Ø.1236	0.0011 L	-0.0229	4406.000 H	103.1415
Mean	0.0630	0.0009 L	-0.0170	4413.000 H	103.3056
SD	0.0857	0.0004	0.0084	9.899	0.2321
XRSD	136.0060	48.2341	49.2798	0.224	0.2247

Checking calibration blank ... Identity 1 : Calibration blank Identity 2 : Report name CRDL Value K_756 0.100 0.063 WOLUTION by Micro-Active Australia Pty Ltd 3:07:30 FM June 15, 2004

0.000 103.306 36361

PROJ. NO. PROJECT TO# DATE MATRIX LOGBK PG 040415-2 06002.01.141 Div zo 040521-66-15-04 MATRIX S6214

.

INSTRUMENT: TLACE Z FILENAME: B 404152

INSTRUMENT DL:_____

010083

Method:	DAILYS	Standard:	blk
Run Tim	e: 06/15/04	11:40:18	

						· · · · · · · · · · · · · · · · · · ·	
Elem	Ag3280	A13082	As1890	B 2496	Ba4934	Be3130	Bi2230
Avge	0000	.0005	0000	. 0002	-, 0000	0001	0000
SDev	. 0000	. ଉହାଉଡ	, ହାହାହାହ	. 0000	. 0000	, 91919191	, AAAA
XRSD	8.243	. 3134	42.50	16.08	11.71	1.761	115.7
2000		N Tour de Tour	P Loss II Look Tour	K NAT M THE TAP		-16 19 V V(1 ⁺ .04	· · · · · · · · · · ·
#1	0000	. 0005	0001	. 0002	-, ወወወወ	-, 0001	-, aaaa
#2 #2	0000	.0005	0000	. 0001	0000	0001	0000
			and the second second		a da tan tan tan tan t		1 10 10 10 10 10 10 10 10 10 10 10 10 10
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K7664
Avge	. 0000	0000	0000	.0000	.0004	. 0000	.0003
SDev	. 0000	. 0000	. 0000	. 0000	. 0000	. 0000	. 0000
XRSD	2.744	25.03	56.50	175.4	1.208	82.40	7.967
24110.00	1 - 1 - 1 - 1	Tone Sand Mr. Mar Sand		a i cara -i			1.501
#1	. 0000	0000	0000	0000	. 0004	. 0000	. 0003
#2	. 0000	0000	0000	. 0000	.0004	. 0000	. 0003
					10 Tax 144	10 - 100 - 100 - 100 - 100 -	27 THE THE THE THE
Elem	La3988	Li6707	Mg2790	Mn2576	Mo2020	Na3302	Na5889
Avge	0000	. 0000	. 0000	.0000	0000	0002	0104
SDev	. 0000	. 0000	. 0000	. 0000	. 0000	. 0000	. 0000
*RSD	424.9	16.15	47.07	141.4	75.48	6.810	. 1181
		· · · · · ·					87 - 180 - 580- 190.
#1	. 0000	.0000	. 0000	.0000	0000	0002	0104
#2	0000	. 0001	. 0000	. 0000	0000	0002	0103
					an and 1.11 and 1.11		
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	5_1820	S52068
Avge	0000	. 0000	.0001	0000	.0001	.0008	0012
SDev	. 0000	. 0000	. 0000	. 0000	. 0000	. 0000	. 0000
XRSD	358.6	.0758	16.39	47.81	31.88	2.561	.6705
· · · · · · · · · · · · · · · · · · ·							
#1	0000	. 0000	. 0001	0000	. 0001	. 0008	0012
#@	. 0000	. 0000	.0001	0000	. 0001	. 0008	0012
Elem	Sc3613	1960/1	1960/2	Si2881	Sn1899	Sr4215	Th2837
Avge	64.50	0002	. 0001	.0020	. 0000	. 0000	. 0000
SDev	. 05	. 0001	. 0001	. 0000	. 0001	. 0000	. ଉଦାହାହ
XRSD	. 0760	32.56	77.01	.9194	321.7	7.368	34.21
							•
#1	64.47	0001	. 0001	.0020	0000	. 0000	. 0001
#2	64.53	0002	.0002	.0020	.0001	. 0000	. 0000
Elem	Ti3349	T11908	U_4090	V_2924	W_2079	Y_3710	Zn2062
Avge	0001	0002	0004	0000	.0002	. 0000	. 0001
SDev	. 0000	. 0001	. 0000	. 0000	. 0000	. 0000	. 0000
%RSD	15.59	51.12	5.313	5.313	16.60	28.21	11.75
e in a solet dat		haar da ge ale daar	tear of the last			the sector of the sector	
#1	0001	0001	0004	0000	.0002	. 0000	. 0001
#2	0001	0002	0003	0000	.0002	. 0000	. 0001
					en "and" and "And" faces	ан анн дан бай бай.	* ******

Elem Zr3496 Avge .0001 SDev .0000 %RSD 31.47

#1 #은 .0001

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26-15-07 (2404) Jun 4/04

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Wavlen 361.384 <th>084 TUSED</th>	084 TUSED
*R5D .0737625 .0000000 #1 644579 10000 #2 645270 10000	-

.

Method: Run Time	DAILY2 : 06/15/04		d: clp_std	4		01	0085
Elem Avge SDev %RSD	Ag3280 . 0830 . 0000 . 0341	As1890 . 1171 . QQQQ . Q350	2203/1 .3023 .0003 .1009	2203/2 .2612 .0000 .0096	S52068 . 1806 . 0006 . 3068	1960/1 . 2615 . 0002 . 0842	1960/2 , 2682 , 0006 , 2399
#1 #ご	. Ø830 . Ø830	.1171	.3025 .3021	.2611	. 1802 . 1810	.2613 .2617	. 2677 . 2687
Elem Avge SDev %RSD #1 #2	T11908 .2216 .0006 .2874 .2221 .2212						
IntStd Mode Elem Wavlen Avge SDev %RSD	1 *Counts Sc 361.384 648023 630.7393 .0973328	2 Time 10000 .0000000 .0000000	3 NOTUSED 	4 NOTUSED 	5 NOTUSED 	6 NOTUSED 	7 NOTUSED
#1 #2	647577 648469	10000 10000		1464 (14-15			1.000 effe

06/15/04 11:52:55 AM

page 1

010086

Method:	DAILY2	Standard: clp_std1			
Run Time	: 06/15/04	11:49:27			
Elem	A13082	Ca3179	Fe2714	K_7664	

___.

Elem Avge SDev %RSD	A13082 .1122 .0000 .0257	Ca3179 . 1878 . 0001 . 0303	Fe2714 .0984 .0000 .0126	K_7664 .2078 .0006 .2753	Li6707 3.220 .015 .4586	Mg2790 . 0852 . 0000 . 0288	Na3302 . 0089 . 0000 . 0786
#1	. 1122	. 1877	.0984	.2074	3.231	.0852	. 0089
#2	.1122	.1878	.0984	.2082	3.210	.0852	.0089
IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Se						
Wavlen	361.384				erade detre		
Avge	643217	10000			***** *****		
SDev	127.2792	. 0000000					
XRSD	.0197879	. 0000000					
#1	643307	10000					***** ****
#2	643127	10000	, 				***** *****

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06/15/04 11:56:36 AM page 1

Method:	DAILY2	Standar	d: clp_std	5			
Run Time	: 06/15/04	11:53:07					010087
Elem	B_2496	Bi2230	Mo2020	P_1782	Si2881	Sn1899	Sr4215
Avge	.1685	.0342	.3294	.0161	.1754	.1511	2.610
SDev	. 0004	. 0001	. 0017	. 0001	.0005	. 0002	. 004
XRSD	. 2399	. 3588	.5112	.9211	. 2989	. 1114	. 1543
#1	. 1682	.0343	. 3282	.0162	.1758	. 1513	2.607
#C	. 1688	.0341	. 3306	. 0160	. 1751	.1510	2.613
Elem	Ti3349						
Avge	2.598						
SDev	. 002						
XRSD	.0605						
#1	2.597						
#2	2.599						
IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc		17577 SALLS			*****	
Wavlen	361.384						
Avge	647130	10000					
SDev	2438.104	.0000000					
*RSD	.3767565	. 0000000					
#1	645406	10000					
#2	648854	10000	·····				

Method: DAILY2 Standard: clp_std2 Run Time: 06/15/04 11:56:47

			1				
Run Time	: 06/15/04	11:56:47					010088
Elem	Ba4934	Be3130	Cr2677	Cu3247	N12316		
Avge	1.155	1.300	. 3989	. 3194	. 3348	,	
SDev	. 001	.002	. 0001	. 0005	.0004		
*RSD	.0538	.1635	.0372	.1563	.1122		
#1	1.156	1.299	. 3988	.3198	. 3346		
#2	1.155	1.302	. 3990	.3191	. 3351		
IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc						
Wavlen	361.384						
Avge	646431	10000					
SDev	2026.568	.0000000		28.00 Contra			
XRSD	.3135011	. 0000000			54559 AB047		
#1	644998	10000		00755 citres			adar atta
#2	647864	10000					

Standardization Rpt.

Method: Run Time	DAILY2 : 06/15/04		d: clp_std	010089			
Elem Avge SDev %RSD	Cd2265 .9303 .0006 .0669	Co2286 .2052 .0003 .1358	Mn2576 .8268 .0001 .0137	V_2924 .1886 .0002 .1138	Zn2062 .2732 .0000 .0139		
#1 #₽	.9307 .9298	. 2054 . 2050	. 8269 . 8267	.1888 .1885	. 2731 . 2732		
IntStd Mode Elem Wavlen Avge SDev %RSD	1 *Counts Sc 361.384 649341 1798.880 .2770316	2 Time 10000 .0000000 .0000000	3 NOTUSED	4 NOTUGED	5 NOTUSED	6 NOTU:3:5D	7 NOTUSED
#1 #2	650613 648069	10000 10000				1988 tilue 1988 tilue	

Standardization Rpt.

Method: Run Time	DAILY2 : 06/15/04		d: clp_sto	36			010090
Elem Avge SDev %RSD	La3988 . 4844 . 0001 . 0296	Na5889 . 1160 . 0008 . 6760	Pd3404 .2106 .0003 .1664	5_1820 .0357 .0002 .5491	Th2837 .1124 .0003 .2734	U_4090 . 0759 . 0003 . 3942	W_2079 .2004 .0008 .4195
#1 #紀	. 4845 . 4843	.1155	.2109 .2104	.0356 .0359	. 1126 . 1122	.0761 .0757	. 2010 . 1998
Elem Avge SDev XRSD #1	Y_3710 .7869 .0016 .2007 .7881	Zr3496 1.935 .002 .0942 1.936					
#2 IntStd Mode Elem Wavlen Avge SDev ≭RSD	.7858 1 *Counts Sc 361.384 641001 2815.699 .4392660	1.933 2 Time 	3 NOTUSED	4 NOTUSED	5 NOTUSED 	6 NOTUSED 	7 NOTUSED
*RSD #1 #2	- 4392660 639010 642992	1 0000 1 0000					

Method: DAILY2 Slope = Conc(SIR)/IR

010091	0	1	0	0	9	1	
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Floment	Wavelen	High std	Low std	Slope	Y-intercept	Date Standardized
Ag3280	328.068	clp_std4	blk	24.0914	.000635	06/15/04 12:03:46
A13082	308.215	clp_std1	blk	447.553	206454	06/15/04 12:03:46
As1890	189.042	clp_std4	blk	85.3400	.003970	06/15/04 12:03:46
B 2496	249.678	clp_std5	blk	59.4010	009764	06/15/04 12:03:46
		clp_std3	blk	8.65696	.000161	06/15/04 12:03:46
Ba4934	493.409		blk	3.84438	.000459	06/15/04 12:03:46
Be3130	313.042	clp_std2			.002471	06/15/04 12:03:46
Bi2230	223.061	clp_std5	blk	144.922 266.390	010946	06/15/04 12:03:46
Ca3179	317.933	clp_std1	blk		.000283	06/15/04 12:03:46
Cd2265	226.502	clp_std3	blk	10.7460	.000378	06/15/04 12:03:46
Co2286	228.616	clp_std3	blk	48.7321		
Cr2677	267.716	clp_std2	blk	25.0695	000486	06/15/04 12:03:46
Cu3247	324.753	clp_std2	blk	31.3491	013392	06/15/04 12:03:46
Fe2714	271.441	clp_std1	blk	508.561	014984	06/15/04 12:03:46
K_7664	766.491	clp_std1	blk	240.995	078844	06/15/04 12:03:46
La3988	398.853	clp_std6	blk	20.6605	. 000030	06/15/04 12:03:46
Li6707	670.784	clp_std1	blk	3.10552	000147	06/15/04 12:03:46
Mg2790	279.078	clp_stdi	blk	293.428	000682	06/15/04 12:03:46
Mn2576	257.610	clp_std3	blk	12.0959	000075	06/15/04 12:03:46
Mo2020	202.030	clp_std5	blk	30.3568	.000706	06/15/04 12:03:46
Na3302	330.232	clp_std1	blk	5451.53	1.24262	06/15/04 12:03:46
Na5889	588.991	clp_std6	blk	7.95428	.082377	06/15/04 12:03:46
Ni2316	231.604	clp_std2	blk	,29.8645	.000301	06/15/04 12:03:46
P_1782	178.287	clp_std5	blk	623.130	006763	06/15/04 12:03:46
2203/1	220.351	clp_std4	blk	33.0945	004003	06/15/04 12:03:46
2203/2	220.352	clp_std4	blk	38.2847	.001425	06/15/04 12:03:46
Pd3404	340.458	clp_std6	blk	48.7631	003705	06/15/04 12:03:46
S_1820	182.040	clp_std6	blk	286.042	225976	06/15/04 12:03:46
Sb2068	206.838	clp_std4	blk	55.0063	.064650	06/15/04 12:03:46
Sc3613	361.384	blk	dark	1.55038	. 000000	06/15/04 12:03:46
1960/1	196.021	clp_std4	blk	38.2202	.006933	06/15/04 12:03:46
1960/2	196.022	clp_std4	blk	37.3048	004829	<i>06/15/04 12:03:46</i>
Si2881	288.158	clp_std5	blk	57.4359	113905	06/15/04 12:03:46
P6220	220.353	NONE	NONE	1.00000	. 000000	*NOT STANDARDIZED
Se196	196.026	NONE	NONE	1.00000	. 000000	*NOT STANDARDIZED
Sn1899	189.989	clp_std5	blk	66.2107	001128	06/15/04 12:03:46
Sr4215	421.552	clp_std5	blk	3.83124	000056	06/15/04 12:03:46
Th2837	283.730	clp_std6	b1k	92.8931	004178	Ø6/15/Ø4 12:Ø3:46
Ti3349	334.941	clp_std5	blk	3.84891	.000463	06/15/04 12:03:46
T119Ø8	190.864	clp_std4	blk	45.0821	.007338	06/15/04 12:03:46
U_4090	409.014	clp_std6	blk	138.641	.049337	06/15/04 12:03:46
v_2924	292.402	clp_std3	Ыk	53.0046	.002219	06/15/04 12:03:46
w_2079	207.914	clp_std6	blk	24.9624	004432	06/15/04 12:03:46
Y_3710	371.030	clp_std6	blk	12.7050	000049	06/15/04 12:03:46
Zn2062	206.200	clp_std3	blk	36.6208	003095	06/15/04 12:03:46
Zr3496	349.621	clp_std6	Ыk	5.65061	000609	06/15/04 12:03:46

Analysis Report	QC Star	ndand	06/15	/04 12:12:	23 PM	page 1
Method: DAILY2 Run Time: 06/15/04 Comment:				Οp	erator:	010092
Mode: CONC Corr.	Factor: 1	L .				
Elem Ag3280	A13082	As1890	B_2496	8a4934	Be3130	Bi2230
Units ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge .9907	9.691	4.953	4.793	10.01	.9737	5.000
SDev .0010	.005	.003	.000	.01	.0006	.007
%RSD .1057	.0502	.0647	.0027	.1025	.0669	.1379
#1 .9900	9.688	4.955	4.793	10.01	.9742	5.005
#2 .9914	9.694	4.950	4.793	9.999	.9733	4.995
Errors QC Pass	QC Pass	QC Pass	QC Pass	QC Pass	QC Pass	QC Pass
Value 1.000	10.00	5.000	5.000	10.00	1.000	5.000
Range 10.00	10.00	10.00	10.00	10.00	10.00	10.00
Elem Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge 20.20	.9977	4.968	1.947	2.018	10.17	18.20
SDev .21	.0006	.006	.004	.002	.04	.04
%RSD 1.060	.0596	.1306	.1889	.0935	.3727	.2353
#1 20.05	.9973	4.972	1.950	2.016	10.19	18.17
#2 20.35	.9982	4.963	1.945	2.019	10.14	18.23
Errors QC Pass	QC Pass	QC Pass	QC Pass	QC Pass	QC Pass	QC Pass
Value 20.00	1.000	5.000	2.000	2.000	10.00	20.00
Range 10.00	10.00	10.00	10.00	10.00	10.00	10.00
Elem La3988	Li6707	Mg2790	Mn2576	Ma2020	Na3302	Na5889
Units ppm	ppm	ppm	ppm	1998	ppm	ppm
Avge 4.935	Q4.471	19.89	1.008	4.942	Q26.90	Q18.98
GDev .000	.011	.02	.000	.017	.10	.04
%RSD .0075	.2390	.1075	.0165	.3371	.3538	.1993
		19.90 19.87				
Errors QC Pass Value 5.000 Range 10.00		QC Pass 20.00 10.00	QC Pass 1.000 10.00		30.00	QC Fail 30.00 10.00
Elem Ni2316	P_1782	2203/1	2203/2	Fd3404	S_1820	552068
Units ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge 4.873	4.928	4.985	4.986	1.022	.9916	.9843
SDev .012	.333	.000	.023	.001	.0244	.0058
%RSD .2506	6.748	.0018	.4564	.0751	2.462	.5897
#1 4.881		4.985	5.002	1.022	.9743	.9802
#2 4.864		4.985	4.970	1.023	1.009	.9884
Errors QC Pass Value 5.000 Range 10.00	QC Pass 5.000 10.00	NOCHECK	NOCHECK	QC Pass 1.000 10.00	QC Pass 1.000 10.00	QC Pase 1.000 10.00
Elem Sc3613	1960/1	1960/2	Si2881	Pheeø	Se196	Sn1899

Analysis	Report	QC Star	Idard	06/15/	′04 12:12:A	23 PM	page 2
Units	%R	ррт	ррж	ррт	ррт	ppm	ррт
Avge	100.6	5.184	5.170	4.932	4.986	5.175	4.908
SDev	.3	.003	.007	.006	.015	.005	.001
%RSD	.2747	.0597	.1295	.1158	.3049	.1062	.0232
#1	100.4	5.186	5.175	4.928	4.996	5.178	4.907
#2	100.8	5.182	5.165	4.937	4.975	5.171	4.909
Errors Value Range	NOCHECK	NOCHECK	NOCHECK	QC Pass 5.000 10.00	QC Pass 5.000 10.00	QC Pass 5.000 10.00	QC Pass 5.000 10.00
Elem	Sr4215	Th2837	Ti3349	T11908	U_4090	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	Ppm
Avge	5.048	.9715	4.870	5.167	.9821	4.941	.9934
SDev	.002	.0021	.003	.032	.0132	.002	.0021
%RSD	.0401	.2169	.0656	.6166	1.343	.0307	.2148
#1	5.050	. 9730	4.872	5.145	.9728	4,940	. 9919
#ご	5.047	. 9700	4.868	5.190	.9914	4,948	. 9949
Errors	QC Pass	QC Pass	QC Pass	QC Pass	QC Pass	QC Pass	QC Pass
Value	5.000	1.000	5.000	5.000	1.000	5.000	1.000
Range	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Elem Units Avge SDev %RSD	Y_3710 Ppm 4.969 .002 .0302	Zn2062 ppm 1.004 .012 1.158	Zr3496 ppm 4.805 .019 .4035				
#1 #2	4.970 4.968	.9961 1.012	4.792 4.819				
Errors Value Range	QC Pass 5.000 10.00	QC Pass 1.000 10.00	QC Pass 5.000 10.00				

IntStd Mode Elem Wavlen Avge SDev ≭RSD	1 *Counts Sc 361.384 648851 1808.779 .2787665	2 Time 	3 NOTUSED 	4 NOTUSED	5 NOTUSED 	6 NOTUSED 	7 NOTUSED
#1 #2	647578 650130	1 0000 1 0000					5 1000 - 1000

Analysis	Report	Blank S	ample	06/15	/04 12:18:5	9 FM	page 1
	DAILY2 : 06/15/04	•	me: ICB/CC	R	Ope	rator:	
Comment: Mode: CO	NC Corr.	Factor: 1					
Elem	Ag3280	A13082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	pp m	ppm
Avge	.0003	0027	.0015	.0048	. 0001	. 0000	. 0009
SDev	. 0004	.0050	.0016	. 0008	. 0000	. 0000	.0038
*RSD	119.3	183.1	109.8	16.52	.0925	156.8	416.5
#1	. 0006	0063	.0026	.0054	. 0001	0000	.0036
#2	. 0001	. 0008	. 0003	.0043	. 0001	. 0000	0018
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	.0050	. 0500	.0050	.0500	.0050	.0050	.0100
Low	0050	0500	0050	0500	0050	0050	0100
Elem	Ca3179	Cd2265	Co2286	0	Cu3247	Fe2714	V 7664
Units				Cr2677			K_7664
	ppm .0021	ppm .0005	рр м — . 000 3	թթ ։։ . 0004	.0002	ppm .0121	ррт .0013
Avge	. 0009	. 0003	0003	.0002	. 0001	. 0036	.0043
SDev %RSD	43.14	58.66	. 000.5 100.1	43.53	44.21	29,54	332.0
ARBD	and the strends		1 4.4.2 1	ార్జమెటె		5.7 <i>4</i> - 197	->->:" • €5
#1	. 0028	.0007	0005	.0003	. 0001	. 0146	.0043
#2	.0015	. 0003	0001	. 0005	. 0002	. 0095	2017
Ē			LC Pass				
Errors	LC Pass .0500	LC Pass		LC Pass	LC Pass	LC Pass	LC Pass
High Low	0500	.0050 0050	.0050 0050	.0050 0050	.0050 0050	. 0250 0250	. 1000 1000
LUW			6636			0230	1 (1)(1()
Elem	La3988	Li6707	Mg279Ø	Mn2576	Mo2020	Na3302	Na5889
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0005	. 0001	.0012	. 0001	H. 0070	. 0001	.0014
SDev	.0002	. 0000	.0026	. 0000	.0003	.0319	.0003
⊀RSD	49.18	14.31	216.7	69.53	4.352	23820.	24.46
#1	. 0006	.0001	0006	. 0000	H. 0072	0224	.0012
#2	.0003	. 0001	.0031	. 0001	H. 0068	.0227	. 0016
· · · ·	90 - 1900 - 1900 - 1000 - 1000 F	al "Bur" "In" "Bur" an	an and a second second second			H The Servi Reso d	a www.a.a.
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC High	LC Pass	LC Pass
High	.0050	.0050	.0500	.0050	.0050	.0500	.0500
Low	0050	0050	0500	0050	0050	-,0500	0500
Elem	Ni2316	P 1782	2203/1	2203/2	Pd3404	S_1820	S62068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	0000	0005	0000	. 0004	.0014	0062	0026
SDev	.0003	.0103	.0008	.0005	.0017	. 0080	.0049
%RSD	1151.	2142.	2374.	125.8	116.5	129.6	188.8
#1	0003	.0068	0006	. 0008	.0003	0005	. 0009
#2	.0002	0077	. 0005	. 0000	. 0026	L Ø118	0061
Errors	LC Pass	LC Pass	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass
High	.0050	.0100			. 0050	. Ø100	. 0100
Low	0050	0100			0050	0100	0100
Cl	Sc3613	1960/1	1960/2	Si2881	P6220	Se196	C-+000
Elem	909019	1 20/01/1	120675			04170	Sn1899

Units	%R	ррт	PPm	рр#	ррт	ppm	0 1-0 096
Avge	99.78	0000	0026	.0020	, 0003	0017	. 001
SDev	.08	.0009	.0030	.0009	, 0001	.0017	. 0018
%RSD	.0795	2920.	117.2	47.52	33, 16	100.2	.3356.
#1	99.72	0007	0004	.0013	. 0003	0005	.0012
#已	99.84	. 0006	0047	.0026	. 0002	0029	0013
Errors High Low	NOCHECK	NOCHECK	NOCHECK	LC Pass .0100 0100	LC Pass .0030 0030	LC Pass .0050 0050	IC Pass .0050 0050
Elem	Sr4215	Th2837	Ti3349	T11908	U_4090	V_2924	W_2079
Units	ppm	ppm	ppm	₽₽₩	ppm	ppm	FYFM
Avge	.0000	0014	.0001	H.0100	.0256	.0005	.0029
SDev	.0000	.0002	.0000	.0076	.0181	.0003	.0011
%RSD	50.25	10.87	23.35	76.26	68.04	62.16	36.81
#1	. 0001	0015	.0001	H. 0154	.0394	. 0003	. 0037
#ご	. 0000	0013	.0001	. 0046	.0138	. 0007	. 0022
Errors	LC Pass	LC Pass	LC Pass	LC High	LC Pass	LC Pass	LC Pass
High	.0050	.0100	.0050	.0100	.1000	.0050	.0100
Low	0050	0100	0050	0100	1000	0050	0100
Elem Units Avge SDev %RSD	Y_3710 ppm .0001 .0000 70.86	Zn2062 ppm 0002 .0001 54.72	2r3496 ppm .0006 .0003 44.08				
#1 #ご	. 0001 . 0000	0001 0003	. 0008 . 0004				
Errors High Low	LC Pass .0050 0050	LC Pass .0050 0050	LC Pass .0050 0050				

						0	10097
IntStd	1	2 2	.3	4	5	6	7
Mode	*Counts	Time	NOTUSE D	NOTUSED	NOTUSED	NUTUSED	NOTUSED
Elem	Se						
Wavlen	361.384						
Avge	643561	10000					Per 410
SDev	489.3179	. 0000000					64aud 409au
XRSD	.0760329	. 0000000	e-144		***** ****		
#1	643215	10000					
#2	643907	10000					

Method: DAIL Run Time: Ø6 Comment:	_Y2 Sample Na 5/15/04 12:34:34	ame: pbw-Fi	15E1 pg56-	214 Op	erator:	0 1 009 8
Mode: CONC	Corr. Factor: 3	t				
Elem Ag	3280 A13082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units pp	m ppm	w dd	ppm	pp m	ppm	ppm
Avge .Ø	208 . 0067	0020	.0034	. 0001	0000	.0032
SDev .00	206 .0005	.0002	.0007	.0001	. 0000	.0016
*RSD 78.	.69 7.159	11.46	19.76	82.86	40.43	51.80
#1 .00	018 .0070	-,0021	.0038	. 0001	0000	.0043
#2 .00	003 .0063	0018	. 0029	. 0000	ଉଦ୍ଧାପ	. ଅକଟର
Errors LC	Pass I.C Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pase
High .Ø	asa .asaa	. 0050	, 0500	, aasa	. aasa	. 0100
Low C	00500500	0050	0500	0050	0050	0100
Elem Cal	3179 Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units pp		pp m	ppm	ppm	nqq	ppm
- · l	130 .0005	. 0009	H. Ø13Ø	. 0001	H. Ø987	.0311
	235 . 0003	.0003	.0003	.0002	. 0247	.0356
*RSD 27.	.06 61.56	34.83	2.158	173.5	24.97	114.4
#1 .0:	155 .0007	. 0011	H. 0128	.0003	H. 1162	.0563
	105 .0003	.0007	H. 0132	0000	H.Ø813	. 0059
Errors LC	Pass LC Pass	LC Pass	LC High	LC Pass	LC High	LC Pass
High .05	500 .0050	.0050	.0050	.0050	.0250	. 1000
Low (25000050	0050	0050	0050	0250	1000
Elem La	3988 Li6707	Mg2790	Mn2576	Mo2020	Na3302	Na5889
Units ppr	n ppm	ppm	ppm	ppm	ppm	ppm
	. 2021	.0081	.0013	.0021	H. 2533	.0021
	206 . 0001	.0047	. 0000	.0003	.4154	.0048
⊀RSD 52.	.19 83.02	58.63	2.032	15.11	164.0	825.2
#1 .00	215 .0002	. @114	.0013	.0018	H. 5470	.0055
#2 .00	207 .0000	. QQ47	. 0014	.0023	0405	0013
Errors LC	Pass I.C Pass	LC Pass	LC Pass	LC Pass	LC High	LC Pase
	150 .0050	. 0500	.0050	. 0050	. 0500	. 0500
	20500050	0500	0050	0050	0500	0500
Elem Nia	2316 P_1782	2203/1	2203/2	Pd3404	5_1820	Sb2068
Units ppr		ppm	ppm	រ រ ភ្ល ភ្ល ភ្ល ភ្ល ភ្ល ភ្ល ភ្ល ភា ភា ភា ភា ភា ភា ភា ភា ភា ភា ភា ភា ភា	ppm	ppm
Avge H.ØØ		.0003	0001	. 20141	. 0054	. 005.1
SDev .00	007 .0015	.0011	.0013	.0076	. 0028	.0035
*RSD 8.6	306 36.71	373.7	1556.	183.5	51.96	68.66
#1 H.00	aby .0030	0005	0010	H.0095	.0034	.0076
#2 H.ØØ		. 0011	. 0008	0012	.0073	. 0026
Errors LC	High LC Pass	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass
	.0100			.0050	. 0100	.0100
	20500100			0050	0100	0100
Elem Sc3	3613 1960/1	1960/2	Si2881	Pb220	Se196	Sn1899

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Units	%R	ррт	ррт	PP#	PP#	pp#	Fifin
Avge	98.64	.0021	0028	H. Ø254	.0001	0012	0010
SDev	.51	.0056	.0013	. ØØ22	.0013	.0010	. 0018
XRSD	.5181	263.5	47.86	8. 7Ø9	2025.	32.75	184. 9
#1	99.00	.0060	0038	H. Ø27Ø	—, 0008	—. aaas	, 0003
#ご	98.28	0018	0019	H. Ø239	, 0009	—. aais	-, 0023
Errors High Low	NOCHECK	NOCHECK	NOCHECK	LC High .0100 0100	LC Pass .0030 0030	LC Pass .0050 0050	LC Pass .0050 0050
Elem	Sr4215	Th2837	Ti3349	T11908	U_4090	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	PP#	PP#
Avge	.0001	0016	0000	.0008	.0487	.0003	.0003
SDev	.0000	.0007	.0000	.0003	.0390	.0004	.0023
%RSD	42.28	45.54	7.343	32.66	80.08	130.1	822.9
#1	. 0001	0021	0000	. ØØØ9	.0762	. 0000	.0019
#2	. 0000	0011	0000	. ØØØ6	.0211	. 0007	0013
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	.0050	.0100	.0050	.0100	.1000	.0050	.0100
Low	0050	0100	0050	0100	1000	0050	0100
Elem Units Avge SDev %RSD	Y_3710 PP# 0000 .0001 590.4	Zn2062 ppm .0005 .0001 29.94	Zr3496 pp# .0008 .0003 37.83				
#1 #2	. 0000 0000	. 0006 . 0004	. 0010 . 0006				
Errors High Low	LC Pass .0050 0050	LC Pass .0050 0050	LC Pass .0050 0050				

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Analysis Report

IntStd Mode Elem Wavlen Avge SDev %RSD	1 *Counts 3c 361.384 636165 3252.691 .5112968	2 Time 10000 .0000000 .0000000	3 NOTUSED	4 NOTUSED 	5 NOTUSED 	6 NOTUSED	7 NOTUSED
#1 #尼	638465 633865	10000 10000					

Analysis Report

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	DAILY2 : 06/15/04	•	me: lcsw-F	15W1	Ope	rator;	
Comment: Mode: CO	NC Corr.	Factor: 1					
Elem	Ag3280	A13082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0505	1.908	1.995	.0023	2.012	. 0494	" ØØ49
SDev	. 0005	.003	.002	. 0000	. 001	. 0000	. 0085
%RSD	, 9734	. 1466	. 1003	1.971	. 0410	, Ø39Ø	174.6
#1	. 0508	1.910	1.993	.0022	2.013		.0108
#2	. 0501	1.906	1,996	.0023	2.012	. 2494	0011
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	20.96	.0497	.4992	.2084	,2519	1.141	17.05
SDev	. 01	. 0003	. 0001	.0011	.0005	.019	. 00
XRSD	.0293	.6727	.0145	. 5297	.2099	1.626	. 0236
#1	20.96	. 0499	.4993	.2092	.2523	1.154	17.04
#2	20.95	. 0494	.4992	. 2076	.2515	1.188	17.05
Elem	La3988	Li6707	Mg279Ø	Mn2576	Mo2020	Na3302	Na5889
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	0003	. 0001	20.69	. 5036	. 0009	17.78	12.28
SDev	. 0001	.0001	.03	.0001	.0007	. 00	. @1
XRSD	55.05	47.95	. 1689	. 0105	79.64	. 01174	. 1080
#1	. 0004	. 0001	20.71	.5037	.0014	17.78	12.29
#2	. 0002	. 0001	20.66	. 5036	. 0004	17.79	12.27
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	S62068
Units	ppm	pt-m	E) E) M	ppm	ppm	ppm	p.p.m
Avge	. 4979	0011	4981	. 4965	.0008	.0017	. 4896
SDev	.0017	.0210	. 0026	. 0000	. 0016	. 0031	. 0002
XRSD	. 3340	1860.	. 5306	.0022	213.2	184.2	. 0410
#1	. 4991	0160	.4962	, 4964	-, 0004	. 0039	. 4898
# ≥	.4967	.0138	. 5000	. 4965	.0019	0005	. 4895
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avge	97.50	2.026	2.040	.0277	. 4970	2.035	0014
SDev	. 34	.021	. 020	. 0009	. 0009	. 020	. 0001
%RSD	.3533	1.018	.9925	3.332	. 1787	1.001	10.49
#1	97.74	2.011	2.026	.0270	. 4964	2.021	0015
#2	97.25	2.041	2.054	.0283	.4977	2.050	0013
Elem	Sr4215	Th2837	Ti3349	T11908	U_4090	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0007	0128	.0002	2.059	0008	. 4981	0001
SDev	. 0000	.0008	.0001	.012	. 0089	. 0004	.0010
XRSD	2.140	5.951	32.62	.5656	1076.	.0870	756.7
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Elem Units Avge SDev %RSD	Y_3710 PPm 0001 .0000 11.89	Zn2062 Ppm .4969 .0016 .3251	Zr3496 ppm .0003 .0003 97.89			0	10102
#1	0001	. 4958	. 0005				
#2	0001	. 4981	. 0001				
IntStd Mode Elem Wavlen Avge SDev %RSD	1 *Counts Sc 361.384 628807 2187.788 .3479269	2 Time 10000 .0000000 .0000000	3 NOTUSED 	4 NOTUSED 	5 NOTUSED 	6 NOTUSED 	7 NOTUSED
#1 #2	630354 627260	10000 10000					

page 1

HIRLYSI	s Kehour			1007 I.J	hañs.		
Run Time: 06/15/04 12:44 Comment:				2	010103		
Mode: C	UNC Corr.	Factor:	1				
Elem	Ag3280	A13082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	opm	ppm	ppm	ppm	្រុក្រា	ppm	ppm
Avge	0003	Ø136	-, 0007	1.688	. 2966	. 210121 t	. 0030
SDev	. 0004	.0032	.0010	.011	.0014	. 0000	. 0008
%RSD	129.4	23.73	136.1	.6219	" 4832 [.]	21.86	<i>95.</i> 63
#1	0006	0159	0014	1.696	. 2956	. 0000	. 0025
#2	0000	0113	0000	1.681	.2976	. 0001	. 0035
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
t ten i te e	1000 BUTL BOD	and, and, 1986	Arres - 8971, 1025.		1000. 00°C 000	arr. 875 198	

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	PPm	PPm	ppm	PPM	PPM
Avge	29.11	. 0004	.0025	0007	0006	.0802	.1416
SDev	.04	. 0000	.0001	.0001	.0003	.0011	.0058
%RSD	.1349	5. 568	3.929	9.294	49.43	1.321	4.096
#1	29.08	. 0004	.0024	0007	0009	.0810	.1457
#2	29.13	. 0004	.0025	0007	0004	.0795	.1375
Elem	La3988	Li6707	Mg2790	Mn2576	Mo2020	Na3302	Na5889
Units	ppm	ppm	PPm	ppm	PP#	ppm	ppm
Avge	0002	.0002	.0976	.0041	.0015	2.930	1.865
SDev	.0004	.0000	.0004	.0000	.0000	.077	.006
%RSD	239.4	14.57	.3797	1.061	2.018	2.623	.3338
#1	0005	. 0002	.0973	.0041	.0015	2.984	1.860
#2	. 0001	. 0001	.0978	.0041		2.875	1.869
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	PP#	PPm	PFM	ppm	ppm	ppm	ppm
Avge	.0588	0026	0008	.0025	0018	24.94	.0019
SDev	.0026	.0085	.0020	.0011	.0001	.40	.0036
%RSD	4.446	320.6	252.7	43.46	5.638	1.587	186.5
#1	. 0569	0086	0022	. 0018	0017	25.22	. 0045
#2	. 0606	. 0033	. 0006	. 0033	0019	24.66	0006
Elem	Sc3613	1960/1	1960/2	Si2881	P6220	Se196	Sn1899
Units	%R	ppm	ppm	PPm	Ppm	ppm	ppm
Avge	104.9	.0098	0010	.2740	.0014	.0026	0009
SDev	.1	.0005	.0014	.0063	.0014	.0008	.0008
%RSD	.1162	4.870	139.5	2.300	95.70	29.89	89.18
#1	104.9	.0102	0020	.2695	.0005	.0021	0015
#2	105.0	.0095	0000	.2785	.0024	.0032	0003
Elem	Sr4215	Th2837	Ti3349	T11908	U_4090	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.2122	0014	.0001	.0022	.0082	.0002	0013
SDev	.0002	.0003	.0001	.0026	.0129	.0001	.0011
%RSD	.1029	22.02	124.9	116.1	157.6	28.70	86.41
#1	.2120	0012	. 0000	. 0004	-, ØØØ9	. 0002	0005
#2	.2123	0016	. 0001	. 0041	, Ø174	. 0001	0021

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Elem Units Avge SDev %RSD #1	Y_3710 ppm 0002 .0000 26.15 0002	Zn2062 ppm .1116 .0001 .1205 .1117	Zr3496 ppm .0001 .0001 94.89 .0000	-		0	10104
#2	0001	. 1116	.0002				
IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc						
Wavlen	361.384	10000 1000 J		·····			
Avge	676798	10000		10000 claim			
SDev	796.2022						
⊀RSD	.1176425	. 0000000	18180 FF80				40740 BOILO
#1	676235	10000					
#2	677361	10000					1844) 1844-

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Analysis Report		21			06/15/04 12:53:24 PM		
Method:		•	ame: 24322	3	Op	erator:	
Run Time Comment:	e: 06/15/04	12:48:50				0	10105
Mode: CC	INC Corr.	Factor:	1				
Elem	Ag3280	A13082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	n dd	ppm
Avge	0004	0177	.0019	.1383	.0072	. 20201	0002
SDev	.0004	.0001	.0003	.0020	. ଉଉଉଉ	. 0000	.0031
*RSD	95.42	. 3041	15.19	1.478	. 4997	11.03	1346.
#1	0001	0177	.0017	.1397	.0071	. 0001	. 0019
#2	0006	Ø176	. 0021	.1368	.0072	. 0001	ØØ24
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	pp pr m	ts to m	t.t.w
Avge	17.75	.0002	.0010	0009	0010	.0087	4.888
SDev	. 24	.0003	.0014	. 0001	. 0003	. 0066	. Ø17
XRSD	. 2057	186.8	141.0	14.44	29.41	75.67	.3484
#1	17.78	.0004	.0020	0008	0008	.0133	4.876
#2	17.73	0001	. 0000	0009	0012	. 0040	4.900
Elem	La3988	Li6707	Mg2790	Mn2576	Mo2020	Na3302	Na5889
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	0002	.0283	2.783	.0254	.0031	32.05	20.99
SDev	.0002	. 0001	.002	.0001	.0014	. 07	.02
*RSD	94.73	. 3177	. 0888	. 5084	43.77	.2100	.0973
#1	0003	.0284	2.785	.0255	.0021	32.00	20.97
#2	0001	.0283	2.781	.0253	. 0041	32.10	21.00
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	S62068
Units	ppm	ppm	ppm	ppm	ppm	p p m	ppm
Avge	.0008	.0202	0033	,0036	0012	6.809	.0017
SDev	. 0003	.0081	. 0008	. 0004	. 0004	. 006	. 0044
XRSD	38.83	39.88	24.42	10.05	32.02	. 0846	260.1
#1	. 0011	. 0260	0039	. 0033	- <i>.</i> ØØØ9	6.814	-, NN14
井梁	. 0006	.0145	-,0027	. 0039	0015	6.805	. 0048
Elem	Sc3613	1960/1	1960/2	Si2881	Pheeø	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avge	103.8	. 0186	. 0004	19.50	.0013	. 0065	. Ø146
SDev	.7	.0033	.0024	. 06	.0005	. 0005	.0016
*RSD	.6597	17.88	634.4	, 3219	39.23	8.193	10.72
#1	103.3	.0162	.0021	19.55	. 0010	. 0068	.0158
#2	104.3	. 0209	0013	19.46	.0017	. 0061	.0135
Elem	Sr4215	Th2837	Ti3349	T119Ø8	U_4090	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0787	0025	0003	0124	. Ø111	.0017	0028
SDev	. 0001	. 0008	. 0001	.0013	.0060	.0003	. 0020
XRSD	.1200	30.74	24.51	10.65	54.27	17.46	72.30

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Elem Units Avge SDev XRSD	Y_3710 ppm 0001 .0001 117.6	Zn2062 ppm .0003 .0004 161.3	Zr3496 ppm 0001 .0002 182.3			0	10106
#1 #2	0000 0001	. 0006 0000	. 0000 0003				
IntStd Mode Elem Wavlen Avge SDev %RSD	1 *Counts Sc 361.384 669552 4429.317 .6615344	2 Time 10000 .0000000 .0000000	3 NOTUSED	4 NOTUSED 	5 NOTUSED 	6 NOTUSED 	7 NOTUSED
#1 #2	666420 672684	10000 10000					

Method: DAILY2 Sample Name: 243224 **Operator:** Run Time: 06/15/04 12:53:36 010107 Comment: Mode: CONC Corr. Factor: 1 Be3130 A13082 As1890 B 2496 Ba4934 Bi2230 Elem Ag3280 Units ppmppm ppmppm DDB 000 DDM Avge -.0001 -. 0134 .0006 -.0019 .0002 . 0000 .0023 .0001 .0038 .0023 .0002 . 0000 . 0000 .0046 SDev 28.36 415.6 10.78 4.618 158.1 201.0 %RSD 89.77 -. 0000 -. 0107 .0022 -.0017 .0002 -. 0000 #1 .0055 -. 0002 -. 0160 -.0011 -. 0020 .0002 . 01010101 -, 0010 #2 Elem Ca3179 Cd2265 Co2286 Cr2677 Cu3247 Fe2714 K 7664 Units ppm ppm DDM DDM ppm ppm C-C-M Avge 4.997 .0005 .0001 -. 0002 -. 0004 -. 00.31 .0012 .0003 .0001 . 0004 . 0001 SDev .005 .0021 . 0054 XRSD . 0929 72.82 120.2 176.2 22.21 66.96 450.0 5.001 .0007 #1 . 0002 . 0001 -. 0004 -. 0046 . 0050 #2 4.994 -.0005 -.0005 -.0016 .0002 .0000 -.0026 Elem La3988 Mn2576 Mo2020 Na3302 Li6707 Mg2790 Na5889 Units ppm mag ppm ppm ppm ppm ppm Avge -. 0000 -.0002 .0002 -. 0000 .0002 7.468 4.521 .0003 .0000 .0001 .0003 . 109 .000 SDev .0013 **%RSD** 6430. 21.73 578.1 276.0 159.0 1.460 .0097 -.0002 -.0007 -. 0002 -. 0000 7.391 #1 . 0000 4.522 .0002 -.0002 .0011 . 0004 7.545 #2 -. 0001 4.521 Elem Ni2316 P_1782 2203/1 2203/2 Pd3404 S 1820 Sb2068 Units ppm ppm ppm ppm ppm ppm ppm Avoe .0008 .0076 -.0035 -.0003 -.0005 -.0309 -.0005 .0010 .0047 .0013 . 0008 .0128 SDev .0017 . 0000 XRSD 126.8 62.03 37.43 498.5 158.7 41.54 6.443 #1 .0001 .0110 -.0025 -. 0015 -. 0010 -. 0218 -. 0005 #2 .0014 .0043 -.0044 . 0009 .0001 -. 0399 -. 0005 Elem Sc3613 1960/1 1960/2 Si2881 Ph220 Se196 Sn1899 Units %R ppm ppm mqq ppmppm opm Avge 104.1 . 0040 -. 0060 .0323 -. 0014 -. 0026 -. 0006 .0001 SDev 1.1 .0034 .0023 .0007 .0010 . 0008 %RSD 1.016 2.480 7.071 51.56 38.62 84.16 134.1 #1 103.4 .0016 -.0059 .0307 -.0019 -. 00.34 -. 0000 #2 104.9 .0064 -.0061 .0339 -. 0009 -. 0019 -. 0012 Elem Sr4215 Th2837 Ti3349 T119Ø8 U 4090 V 2924 W_2079 Units ppm ppm ppm ppm ppm ppm ppm .0001 .0016 .0001 -. 0002 -.0095 Avge .0005 -. 0009 . 0000 .0005 .0062 . 0006 SDev . 0000 .0016 .0007 %RSD 4.540 102.9 71.43 251.3 64.66 123.1 81.63

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Un Av SE	lem aits /ge)ev RSD	Y_3710 PP# 0000 .0001 329.1	2n2062 ppm .0003 .0000 1.006	2r3496 PP# .0003 .0001 25.74				010108
#1		. 0000	.0003	. 0004				
林湾	2 2	0001	.0003	.0002				
In	ntStd	1	a	3	4	5	6	7
Mo	ode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
E1	em	Sc						
Wa	avlen	361.384				*****		
Av	ge	671668	10000		5	store total		
SC)ev	6832.773	. 0000000			Jacob Amaria		
XF	RSD	1.017285	. 0000000					
			,					
#1	L	666836	10000					*****
#E	2	676499	10000					

Method: DAILY2 Sample Name: 243225 Run Time: 06/15/04 12:58:21 Comment: Mode: CONC Corr. Factor: 1

Operator:

Elem	Ag3280	A13082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	. 0001	0027	0001	1.232	.1832	. 0000	.0065
SDev	. 0004	.0048	.0018	. 009	.0003	. 0000	.0045
⊀RSD	370.7	180.7	1344.	. 7070	.1493	36.63	68.90
#1	. 0004	. 0007	.0011	1.238	. 1834	. 0001	. 0096
#2	0002	0061	-,0014	1.226	.1830	. 0000	.0033
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	t.t.w	ppm -	ppm	ppm	ppm -	ppm	t-t-m
Avge	.2477	.0005	.0007	0007	0006	-, 0008	.0682
SDev	.0021	. 0002	.0010	. ହହାହାହ	. 0001	. 0035	. 0053
XRSD	.8574	46.20	139.9	. 1800	10.14	434.9	7.779
#1	.2492	. 0006	. 0015	2121217	0005	0033	, Ø645
#2	.2462	. 0003	. 0000	0007	0006	.0017	.0720
Elem	La3988	Li6707	Mg2790	Mn2576	Mo2020	Na3302	Na5889
Units	ppm	ppm	ppm	p pm	pp m	ppm	ppm
Avge	.0002	. 0001	.0302	.0011	.0006	2.317	1.360
SDev	.0003	. 0000	.0024	. 0000	.0003	.043	.005
%RSD	201.2	.7869	7.880	1.180	53.83	1.856	. 344Ø
#1	. 0004	. 0001	.0318	.0011	. 0008	2.348	1.364
#2	0001	. 2021	. 0285	. 0011	. 0004	2.287	1.357
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0157	.0039	0018	.0013	0014	. 4319	0029
SDev	.0003	.0020	.0004	.0005	.0040	.0171	.0064
*RSD	1.749	51.08	20.57	40.76	284.8	3.971	222.9
#1	.0159	.0053	0016	. 0009	. 0014	. 4441	. 0017
#R	.0155	.0025	0021	. 0016	0042	. 4198	-,0074
Elem	Sc3613	1960/1	1960/2	Si2881	P5220	Se196	Sn1899
Units	XR	m qq	စ္စုကား	ppm	ppm	ppm	ppm
Avge	104.0	.0063	0036	, 4648	. 0003	0003	. 0016
SDev	" 4	. 00:24	.0021	.0007	. 0002	. 0006	.0010
%RSD	.3634	38.60	59.28	.1534	83.33	228.1	66, 09
#1	103.8	. 0080	0050	. 4653	. 0001	0007	. 0008
#2	104.3	. 0046	—. ØØ21	,4643	. 0004	. Dade	.0023
Elem	Sr4215	Th2837	Ti3349	T11908	U_4090	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	rpm
Avge	.0014	0014	.0002	.0019	.0279	. 0000	.0015
SDev	. 0000	.0001	. 0000	.0008	.0233	. 0001	. 0022
XRSD	.3380	5.852	12.76	39.25	83,59	389.1	147.1
#1	. 0014	0014	.0002	.0024	. Ø443	ଉପଉପ	0001
#2	.0014	0015	.0002	.0014	. @114	. 0001	.0030

Elem Units Avge SDev %RSD	Y_3710 PP# 0000 .0000 100.9	Zn2062 ppm .0394 .0007 2.185	Zr3496 ppm .0004 .0001 23.99			010	110
#1	0000	. 0329	.0005				
#@	0001	. 0319	. 0004				
IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NÓTUSED
Elem	Sc						
Wavlen	361.384						
Avge	671044	10000					
SDev	2440.226	. 0000000				Paury Andra	
%RSD	.3636458	. 0000000					
#1	669319	10000				-	tenda altiga
#2	672770	10000					

Operator:

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010111

Sample Name: 243225d Method: DAILY2 Run Time: 06/15/04 13:03:07 Comment: Corr. Factor: 1 Mode: CONC

Bi2230 Be3130 Ba4934 B 2496 As1890 A13082 Ap3280 Elem ppm ppm 000 ppm DDM DDM ppm Units .0012 . 0000 1.218 . 1816 . 0009 -. 0084 -,0001 Avge . 0000 . 0036 .0003 .006 .0053 .0013 .0003 SDev 304.3 .1390 26.48 . 5000 62.53 145.7 207.7 %RSD .0000 .0037 . 1818 -. 0000 1.223 -. 0047 .0001 #1 . 0000 -. 00114 1.214 . 1815 . 2017 -.0122 -. 0004 #2 K 7664 Fe2714 Cu3247 Cr2677 Co2286 Cd2265 Ca3179 Elem ppm ppm DDB ppm ppm ppm Units DDM -,0005 .0018 .0602 .0011 . 0004 .2422 .0005 Avge . 0068 .0136 .0003 , 0005 . 0001 .0001 .0010 SDev 11.22 91.38 742.4 70.16 14.16 . 4086 14.09 XR:50 2554 . 21114 -. 0002 . 0009 . 0005 .0004 .2415 #1 .0650 -.0078 -, 0009 . 0002 .0005 .0012 .2429 #2 Na5889 Na33Ø2 MARVED Mn2576 Mg279Ø L16707 Elem La3988 OOM 008 000 ppm DDB ppm Units ppm 1.347 2,161 , 0003 .0010 . 0296 .0001 .0002 Avge .093 .006 .0007 .0001 .0003 .0000 .0005 SDev , 4226 4.283 221.9 9.082 11.24 1.649 142.7 %RSD 1.343 2.226 -.0002 .0010 . 0299 -. 0000 .0001 #1 1.351 2.095 .0011 . 0008 .0292 .0001 . 0004 #2 Sb2068 5 1820 2203/2 Pd3404 2203/1 P_1782 Ni2316 Elem ppm ppm ppm ppm ppm opm Units ppm .4193 .0024 -.0019 -.0018 -.0017 .0148 .0020 Avge ,0032 . 0009 .0033 .0020 .0046 . 0004 .0014 SDev .7968 133.4 46.26 109.9 25.80 234.5 9.503 XRSD .0001 . 4169 -. 0004 -.0025 -.0020 .0158 .0052 #1 .0047 -.0013 .4217 -.0033 -.0013 -.0014 .0138 #2 Sn1899 Se196 Pb220 Si2881 1960/1 1960/2 Sc3613 Elem ppm ppm ppm ppm ppm Units XR ncia -.0002 .0019 . 4560 -. 0018 .0071 -. 0039 105.3 Avoe . 0006 .0012 .0002 .0014 .0022 .0035 1.0 SDev 33.16 117.5 .4873 67.97 35.72 48.56 .9075 **XRSD** -. 0000 .0024 -. 0009 -.0049 . 4576 .0096 104.6 #1 -, 0004 . 0015 -, 0026 . 4544 -, ØØ29 . 0047 #2 106.0 W 2079 U 4090 V 2924 T119Ø8 Ti3349 Th2837 Sr4215 Elem prom FIFT ppm ppm DIE M Units ppm ppm . 0006 -.0007 .0012 . 0039 .0002 -.0018 Avge .0014 . 0003 . ប៉ូប៉ូប៉ូប៉ូប .0132 .0001 . (1002 .0015 . 0000 SDev 43.40 2.449 15.93 340.7 51.18 .9277 84.36 XRSD . 0006 -. 0005 .0011 .0132

.0003

.0001

.0013

-. 0029

-. 0007

. 0014

.0014

#1

#2

Elem Units Avge SDev %RGD	Y_3710 Ppm 0000 .0000 98.31	Zn2062 ppm .0318 .0009 2.802	Zr3496 ppm .0001 .0001 95.99			0	10112
#1	0001	.0324	. 0000				
##	0000	.0312	. 0001				
IntStd	1	2	З	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Se						
Wavlen	361.384		20020 10121		*****		
Avge	679264	10000					
SDev	6206.983	. 0000000					
⊀RSD	.9137807	. 0000000					
#1	674875	10000	-				
#2	683653	10000	ratio files				

Operator:

Method: DAILY2 Sample Name: 243226 Run Time: 06/15/04 13:07:52 Comment: Mode: CONC Corr. Factor: 1

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Elem	Ag3280	A13082	As1890	B_2496	Ba4934	Be3130	Bi2230
	-			ppm	ppm	ppm	ppm
Units	ppm	ppm aaaa	ppm aaco	2.091	.2733	. 0001	0034
Avge	0003	.0028	0092			. 0000	. 0060
SDev	. 0001	.0007	.0001	.018	.0002		
%RSD	41.93	23.03	1.303	.8487	.0598	10.07	172.8
#1	0002	.0033	0091	2.104	.2734	.0001	0077
#2	0004	.0024	0093	2.079	.2732	. 0001	. 0008
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.2018	.0002	. 0008	0002	0003	0083	.1393
SDev	.0014	. 0004	. 0007	. 0003	.0002	. 0080	.0072
XRSD	.7149	227.2	88.82	120.0	50.04	95.99	5.136
/-/3.333		Tang Trice & Brance	The say in the say				
#1	. 2008	0001	.0013	0000	0002	@139	. 1348
#2 #2	. 2028	. 0004	.0003	0004	0005	0027	. 1443
#1		* Rucicies	* *C*C**C**.5	" Guguna	" (() () () () ()	H MANAGEN I	· 1 · · · · · · ·
		1 : 7 - 7 - 7 - 7	M-0700	Mn2576	Ma2020	Na3302	Na5889
Elem	La3988	L16707	Mg279Ø				
Units	ppm	pps aaar	ppm Scop	pp m	- .00 12	ppm 3.616	99 m 2 .261
Avge	0003	. 0006	. 0293	. 0011			
SDev	. 0004	.0001	.0038	.0001	,0005	.255	. 001
*RSD	127.4	7.984	13.08	4,489	39.86	7.059	, Ø529
#1	0006	.0006	.0266	. 0011	0009	3.435	2.260
#2	0000	. 0006	.0320	. 0011	0015	3.796	2.261
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	S62068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0356	.0590	.0063	.0034	0019	.3949	.0130
SDev	.0004	.0026	.0024	.0023	.0026	.0024	.0024
%RSD	1.089	4.377	37.43	67.54	140.1	.6145	18.44
#1	.0353	.0571	.0046	.0050	0038	.3932	.0147
#2	.0358	. 0608	. 0080	.0018	0000	.3967	.0113
<i>II I</i>	at the last last last						
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	×R	ppm	ppm	ppm	ppm	ppm	ppm
	108.0	.0678	.0112	1.572	. 2044	. 0301	. 0792
Avge		.0042	. 0046	. 015	. 0007	.0017	.0025
SDev	.9				16.98	5.605	3.185
RSD	.8676	6.205	41.44	.9247	10 20	fa 123 42 ((12.1 T 23.7
	4.4.7 5	330 0	\$\$ \$ \$ \$ \$	1 600	. 0049	. 0289	. 0774
#1	107.3	.0708	.0079	1.582			
#2	108.7	.0649	.0145	1.561	. 0039	.0313	.0810
			~	711000	11 4000	11 0004	11 0070
Elem	Sr4215	Th2837	Ti3349	T119Ø8	U_4090	V_2924	W_2079
Units	to to m	to to un	ppm	ppm	ppm	ptm	Filim
Avge	.0016	0005	.0018	0728	0001	,0003	0082
SDev	, ଉପରାସ	, aaa3	. 0001	. 0078	.0176	. 0101014	. 0003
XRGD	.7993	54.28	8,083	10.66	17480.	104.2	3.159
#1	.0016	0007	.0013	0673	0125	. 0006	ØØR4
井 宗	.0016	0003	.0012	0783	.0123	. 0001	0080
	· •··						

Elem Units Avge SDev %R3D	Y_3710 Ppm 0000 .0001 621.6	Zn2062 Ppm .0773 .0001 .1840	Zr3496 ppm .0006 .0001 21.00			01()114
#1 #은	. 0000 0001	.0774 .0772	. 0007 . 0005				
IntStd Mode Elem Wavlen Avge SDev %RSD	1 *Counts Sc 361.384 696538 6064.855 .8707135	2 Time 10000 .0000000 .0000000	3 NOTUSED 	4 NOTURED 	5 NOTUSED 	6 NOTUSED	7 NOTUSED
#1 #2	692250 700827	10000 10000		-ritar arta	46440 11000 14600 10000		

Operator:

010115

Method: DAILY2 Sample Name: 243227 Run Time: 06/15/04 13:12:38 Comment: Mode: CONC Corr. Factor: 1

-.0014

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.0144

.0016

-.0014

.0129

. 0008

-. 0019

Elem	Ag3280	A13082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	0004	.0452	0014	2.012	.7653	. 0001	.0071
SDev	.0003	.0013	.0015	.010	.0012	. 0000	. 0030
XRSD	72.73	2.837	114.3	. 4937	. 1589	10.75	41.43
AROD	11.10	C. 037	114.0	* *** J J /	* 1307	143. / 5	ማደቀ ማርን
#1	0006	.0442	0024	2.020	.7645	.0001	.0092
#2	0002	. 0461	0003	2.005	.7662	.0001	.0050
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	2.620	. 0003	.0019	.0018	.0084	. 0339	8.919
SDev	. 001	. 0003	.0003	. 0000	.0003	. 0101	. Ø39
XRSD	.0418	85.99	15.69	2.050	3.164	29.87	.4357
#1	2.621	.0001	.0017	.0018	.0085	.0267	8.891
#C	2.619	. 0006	.0022	.0019	.0083	.0410	8.946
Elem	La3988	Li6707	Mg279Ø	Mn2576	Mo2020	Na3302	Na5889
Units			ppm	000	ODB		
Avge	рр т . 0000	թթ տ .0006	. 5374	. 0485	.0011	ppm 18.17	թթա 11.901
				. 0000	. 0003	.28	. Ø1
SDev	.0001	.0000	.0032 .5858	. 0134		1.522	. 0514
*RSD	578.7	5.350	. 3838	. 10134	22.74	1. # 255°12	. 4001.4
#1	0001	. 0006	. 5358	.0485	.0013	18.36	11.89
#2	. 0001	. 0006	. 5396	.0485	.0010	17.97	11.90
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	5_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0238	.0078	.0015	.0007	0016	1.036	.0015
SDev	.0015	.0126	.0006	. 0008	. 0014	.004	.0025
%RSD	6.352	161.9	41.19	104.7	87.99	.3484	167.4
#1	. 0249	0011	.0020	.0002	0026	1.034	.0032
#2	.0227	.0167	. 0011	.0013	0006	1.039	0003
#	# 420EL1E /	. 0107	. (((()))	· KIKI 1.	גוגועוטס	1. 43.07	00003
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avge	102.7	.0146	0025	1.535	.0010	.0032	.0069
SDev	.5	.0014	.0023	.007	.0003	.0010	.0017
*RSD	. 4632	9.632	88.68	. 4346	29.69	32.58	25.23
#1	102.4	.0156	0041	1.540	.0008	. 0024	.0081
#2	103.0	.0136	0009	1.531	.0012	. 0039	.0056
Elen	C	Th2837	T; 7740	T11000	11 4000	11 0004	11 0070
Elem	Sr4215		Ti3349	T11908	U_4090	V_2924	W_2079
Units	ppm @144	ppm aaaa	ppm oot	ppm	ppm atom	ppm aaaa	titiu Litiu
Avge	.0144	0009	.0016	0042	.0105	. 0009	0026
SDev	. 0000	. 0007	. 0001	. 0041	.0033	.0002	. 0010
XRSD	.1870	79.85	3.010	96.38	31.22	17.86	36.81
#1	. @144	0004	. 0016	0071	. 0082	. ወወ1ወ	-,0033
11.00		001	0017	0014	0100	0000	A.A.A.A.A.A.A.A.A.A.A.A.A.A.A.A.A.A.A.

Elem Units Avge SDev %RSD	Y_3710 ppm .0000 .0001 975.8	Zn2062 ppm .2684 .0014 .5268	Zr3496 ppm .0005 .0001 13.99			0 1	0116
#1	. 0001	.2694	. 0006				
#R	0000	.2674	.0005				
IntStd	1	2	З	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc				Later Serve		····· • • •
Wavlen	361.384			41488 bronk	44948 xx118		
Avge	662456	10000			4447 ; 20 744		84011 8 881-
SDev	3067.429	. 0000000				27500 m.ch4	
%RSD	. 4630390	. 0000000			489-10 48 000		
#1	660287	10000					*****
#2	664625	10000				searth Report	

Analysis	Keborr						
Method:	DATLYS	Sample Na	me: 243228	λ.	Ope	mator:	11
Run Time	: 06/15/04					01	0117
Comment:							
Mode: CO	NC Carr.	Factor: 1					
			0 4000	D 0404	Ba4934	Be3130	Bi2230
Elem	Ag3280	A13082	As1890	B_2496	000	ppm	ppm
Unite	ppm	ppm	ppm .0002	ppm 2,468	,355m ,4642	. 2020	. 0040
Avge	0002	. 1941		. 009	. 0007	. 0000	.0041
SDev	. 0001	.0096	.0002 116.9	. 3446	. 1494	39.96	103.5
*RSD	33.68	4.958	110.7	# 1.5-4-4 LS	N		
	0001	. 2009	.0000	2.474	. 4647	. 0000	.0011
#1	0002	. 1873	. 0004	2.462	. 4637	. 0000	. 0069
#2	. KIKIKI	·	H 44 4. 4.				
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	1.308	.0003	. 0009	.0005	.0010	.0626	.9038
SDev	. 000	.0002	.0001	. 0000	,0005	. 0059	.0020
XRSD	.0116	69.23	5.150	3.246	51.59	9.481	.2221
21(20)							
#1	1.308	. 0004	. 0009	.0005	. 0006	.0668	.9024
#2	1.308	.0002	. 0009	.0005	.0013	. 0584	,9052
						N. 7700	Na5889
Elem	La3988	L16707	Mg2790	Mn2576	Mo2020	Na3302	
Units	ppm	pp m	ppm	ppm	ppm aaaa	ppm 6.128	ppm 3.827
Avge	0004	. 0005	. 3642	. 0004	0002	.038	.013
SDev	.0005	. ଉଦ୍ଭଦ୍ୟ	. 0060	. 0001	. 0001	.6181	. 3405
%RSD	151.6	8.194	1.656	22.94	76.35	* 57.01	B 1. 1 1 1. 1.
			21.05	.0003	-,0001	6.102	3,836
#1	. 0000	.0005	.3685	. 0004	0002	6.155	3.817
#2	-, ØØØ7	. 0005	.3600	" <i>K</i> (K(K)-+	a William Carlos	1	
		n 1700	2203/1	2203/2	Pd3404	5_1820	S62068
Elem	Ni2316	P_1782		ppm	ppm	ppm	t.t.m
Units	ppm aaaaa	рр т .0373	₽₽ ™ 0002	.0021	0022	9869	0037
Avge	.0002	.0122	.0016	.0024	.0010	.0153	.0035
SDev	.0017 707.6	32.68	1041.	116.2	44.92	1.554	96.35
*RSD	101.0						
#1	0009	. 0287	.0010	. 0004	0015	.9761	0061
#2	. 0014	.0459	0013	.0038	0029	.9978	0012
₩	* 4-14-1 - T						
Elem	Sc3613	1960/1	1960/2	Si2881	PP550	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avge	104.0	.0134	0009	2.973	.0014	. 0039	.0041
SDev	.7	. 0060	. 0004	.030	.0011	.0017	.0012
%RSD	6455	44.95	48.99	.9952	79.81	44.17	30.15
747600	a fee, a fees mee.						
#1	103.5	.0176	0012	2.994	. 0006	.0051	. 0049
#2	104.5	.0091	0006	2.952	.0021	.0027	.0032
						11 2024	U 2070
Elem	Sr4215	Th2837	Ti3349	T11908	U_4090	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm ookk	ppm aati	рр м 0015
Avge	.0081	-,0038	.0075	.0010	.0044	. 0011 . 0004	0010 . 0009
SDev	. 0001	. 0019	.0002	0025	.0050	36.84	57.22
*RSD	. 7050	49.96	2.165	257.1	112.7	1.2 (2) 1 (2) 19	+,≥ f H kana kana
		400. Mar 2001 B		さんこうち	. 0009	, 0008	
#1	. 0082	0051	. 0076	, ØØ28 	,0079	.0014	0009
#2	.0081	-, 0025	.0073	-, 0008	A NYNY E 1	a narrar 6 a	

Elem Units Avge SDev	Y_3710 PP# .0000 .0002	Zn2062 ppm .1189 .0014	Zr3496 ppm .0005 .0005			01	0118
%RSD	1260.	1.153	92.06				
井1 井湾	0001 .0002	.1199	. 0002 . 0008				
IntStd Mode	1 *Counts	2 Time	3 NOTUSED	4 NOTUSED	5 NOTUSED	6 NOTUSED	7 NOTUSED
Elem	Se			01100 000ge	44565 MB00		40 - C - C - C - C - C - C - C - C - C -
Wavlen	361.384		adder				
Avge	670641	10000					where data.
SDev	4352.949	. 0000000					
%RSD	"649Ø729	. 0000000			again them		m.m then
#1	667563	10000			4886 - 14 - 14		
#2	673719	10000					1.01/2 1011

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	DAILY2 1e: 06/15/0	Sample 04 13:25:44	Name: - COVE	C DH 6-15	-04 0	perator:	
Comment Mode: C		. Factor:				C	10119
Elem	Ag3280	A13082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	្រក្រា	008	ppm
Avge	10001	L-, ØØ34	L.0026	1.0074	1.0001	L. 0001	L 0009
:SDev	.0005	.0037	.0036	.0016	. 0000	. 0000	.0047
*RSD	487.9	107.6	138.5	21.53	14.99	25.31	551.4
#1	L. 0002	L0060	L. 0001	L.0085	L.0001	L.0001	1.0025
#2	L0004	L-, ØØØ8	L.0052	L.0063	L.0001	L.0001	L 0042
Errors	LC Low	LC Low	LC Low	LC Low	LC Low	LC Low	LC Low
High	1.100	11.00	5.500	5.500	11.00	1.100	5.500
Low	. 9000	9.000	4.500	4.500	9.000	. 9000	4.500
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	V 7664
Units	ppm	ppm	ppm				K_7664
Avge	L.0071	L.0005	L.0000	ppm L0010	ppm · aaaa	ppm h	ppm
SDev	. 0099				L0002	L0034	L0032
*RSD	138.4	.0001 28.21	.0005	.0002	. 0001	.0016	.0022
74100	100.4	20.21	1290.	20.42	64.05	45.37	69.30
#1	L.0002	L. 0004	L. 0004	L0009	L 0001	L0023	L0048
#2	L.0141	L. ØØØ6	L 0003	L0012	L 0003	L 0046	L 0016
Errors	LC Low	LC Low	LC Low	LC Low	LC Low	LC Low	LC Low
High	22.00	1.100	5,500	2,200	2.200	11.00	22.00
Low	18.00	. 9000	4.500	1.800	1.800	9.000	18.00
Elem	La3988	L16707	Mg2790	Mn2576	Ma2020	Na3302	Na5889
Units	D D m	ppm	ppm	ppm	ppm	្រទា	្រក្រណ
Avge	10002	L. 0000	L.0015	L 2020	L. 0009	L 0045	1.0016
SDev	. 0000	. 0000	. 0006	. 0000	.0004	. 0268	
%RSD	29.12	162.3	41.46	110.1	46,90		. 0007
		at 10° ko i gi 103	71. 70	1 7 4.* 7	40, 98	593.5	42,65
#1	L0001	L.0000	L.0011	L 0000	L.0012	L 0235	1.0021
#2	L0002	L ØØØØ	L.0020	L 0000	L. ØØØ6	L.Ø144	1.0012
Errors	LC Low	LC Low	LC Low	LC Low	LC Low	LC Low	LC Low
High	5.500	5.500	22.00	1.100	5.500	33.00	33.00
Low	4.500	4.500	18.00	. 9000	4.500	27.00	27.00
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	5_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	
Avge	L 0006	L.0038	0017	.0001	L0011	L.0031	ррм L.ØØ44
SDev	. 0004	.0041	.0038	.0022	.0007	.0050	
XRSD	67.76	108.3	220.7	2936.	64.07	164.1	.0020 46.11
#1	L 0008	L.0009	.0010	.0016	L0006	L0005	
#2	L 0003	L.0067	0044	0015	L0016		L.0030
	ಕ ಕ್ರಾಕ್ಸ್ ಕ್ರಾಕ್ಸಿತಿ			0013	L 0015	L.0066	L.0059
Errors High	LC Low	LC Low	NOCHECK	NOCHECK	LC Low	LC Low	LC Low
High	5.500	5.500			1.100	1.100	1.100
Low	4.500	4.500			. 9000	. 9000	. 9000
Elem	Sc3613	1960/1	1960/2	Si2881	P5220	Se196	Sn1899

Units	%R	ppm	ppm	ppm	ppm	ppm 01	0 120
Avge	100.8	.0046	0028	L.0105	L0005	L0003	L0004
SDev	.2	.0027	.0013	. 0008	.0027	. 0000	. 0001
XRSD	.1706	58.04	45.64	7.575	536.8	9.350	18.51
#1 #2	100.9 100.7	.0027	0019	L.0099 L.0110	L.0014 L0024	L0004 L0003	L 0003 L 0004
17 1	1000.7	.0065	0037	L 40 I I 40	L-, ((():4	L-, 00003	
Errors High Low	NOCHECK	NOCHECK	NOCHECK	LC Low 5.500 4.500	LC Low 5.500 4.500	LC Low 5.500 4.500	LC Low 5.500 4.500
Elem	Sr4215	Th2837	Ti3349	T11908	U_4090	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	L.0000	L0021	L.0000	L 0067	L.0195	L.0004	1.0016
SDev	. 0000	. 0009	. 0002	. 0002	.0070	. 0005	. 0005
%RSD	44.92	41.49	4352.	2.541	35.87	128.9	32.34
#1	L. 0000	L0015	L.0001	L 0068	L. 0244	L. 0007	1.0019
井 湾	L.0000	L0028	L0001	L0065	10145	10000	1.0012
Errors	LC Low	LC Low	LC Low	LC Low	LC LOW	LC LOW	LC Low
High	5.500	1.100	5.500	5.500	1.100	5.500	1.100
Low	4.500	. 9000	4.500	4.500	. 9000	4.500	. 9000
Elem	Y_3710	Zn2062	Zr3496				
Units	ppm	ppm	ppm				
Avge	L0000	L.0015	L.0001				
SDev	.0001	.0032	.0004				
XRSD	223.1	215.9	305.4				
#1	L.0000	L0008	L.0004				
#1 #2	L 0001	L.0038	L0002				
17 L	A 20 76-576-576-5.		2				
Errors	LC Low	LC Low	LC Low				
High	5.500	1.100	5.500				
Low	4.500	. 9000	4.500				

						010	0121
IntStd	1	2	З	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Se						
Wavlen	361.384	*****					
Avge	649998	10000					····· • ·· ··
SDev	1071.267	. 0000000			11000 -1110		
×RSD	.1648109	. 0000000					
#1	650755	10000		*****			
#2	649240	10000					ees make

Run Tim Comment		4 13:32:24	Cert	04 6-15	-a (11)	erator:	010122
Mode: C	UNL Lorr	. Factor:	1.				
Elem Units	Ag3280	A13082	As1890 ppm	B_2496 ppm	Ba4934 ppm	Be3130 ppm	Bi2230 ppm
	ppm N 0000	ppm	H4.922	H4.769	H9.978	H.9720	H4,988
Avge	H. 9899	H9.677					
SDev	.0019	. 029	. 016	.001	.006	.0025	.012
*RSD	.1920	.2965	.3154	. 0229	.0594	.2615	.2419
#1	H.9912	H9.697	H4.933	H4.768	H9.973	H.9738	H4.997
#2	H. 9885	H9.656	H4.911	H4.770	H9.982	H.9702	H4.979
Errors High Low	LC High .0050 0050	LC High .0500 0500	LC High .0050 0050	LC High .0500 0500	LC High .0050 0050	LC High .0050 0050	LC High .0100 0100
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm 	pp m	ppm	ppm	ppm No at A	ppm	ppm
Avge	H20.00	H. 9955	H4.957	H1.945	H2.014	H10.15	H18.24
SDev	. Ø1	.0016	.007	.002	.002	. @1	. Ø1
*RSD	.0680	.1587	.1390	. 0803	. Ø864	. 0820	. Ø285
#1	H20.01	H. 9966	H4.968	H1.946	H2.015	H10.15	H18.23
#2	H19.99	H. 9944	H4.952	H1.944	H2.013	H101.14	H18.24
Errors		LC High	LC High	LC High	LC High	LC High	
High	. 0500	.0050	.0050	.0050	. 0050	. 0250	. 1 212121
Low	0500	0050	0050	0050	-,0050	0250	1000
Elem	La3988	L16707	Mg2790	Mn2576	Mo2020	Na3302	Na5889
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	H4.927	H4. 441	H19.84	H1.006	H4.942	H26.84	H18.95
SDev	.001	.019	.03	.001	.004	. 28	. Ø1
*RSD	.0118	.4323	.1367	.1365	.0874	1.042	.0637
#1	H4.928	H4.427	H19.86	H1.007	H4,939	H27.04	H18.94
#2	H4.927	H4.454	H19.82	H1.005	H4.945	H26.65	H18.96
77 L	114. 327	[]~ ; ~ ;	N13.0C	LIT * KIKIT	M4. 340	nice.cu	LITO* 20
Errors		LC High	LC High	LC High	LC High	LC High	
High	.0050	.0050	.0500	.0050	.0050	.0500	. 0500
Low	0050	0050	0500	0050	0050	-,0500	0500
Elem	N12316	P_1782	2203/1	2203/2	Pd3404	5_1820	S62068
Units	ppm	ppm	ppm	ppm	ppm	mag	ppm
Ävge	H4.858	H4.918	4.994	4.961	H1.017	H. 9918	H. 9852
SDev	.003	.094	. ወወዓ	. 006	, 002	, 0204	.0054
%RSD	.0603	1.902	. 1660	. 1117	. 1613	2.052	. 5506
#1	H4.856	H4.984	4.999	4.965	H1.016	H1.006	H. 9814
#2	H4.86Ø	H4.852	4.988	4, 957	H1.Ø18	H. 9774	H. 9891
TT L	1)"T # 5 103 463	a alla alla su'su'stin	7.8 272343	"T# J\$\${	እንዱ <u>መዳ</u> ዳ አን	118 JEE n 7	F3# 27CY77 &
Errors	LC High	LC High	NOCHECK	NOCHECK	~	LC High	
High	. 0050	.0100			. 0050	.0100	, Ø100
Low	0050	0100			0050	0100	0100
Elem	Sc3613	1960/1	1960/2	S12881	P6220	Se196	Sn1899

010123 06/15/04 01:36:59 PM

Units	%R	ррт	ppm	ррт	ррж	рр м	рр т
Avge	99.43	5.161	5.147	H4.943	H4.972	H5.151	H4.911
SDev	.08	.013	.016	.003	.006	.015	.003
%RSD	.0765	.2425	.3179	.0589	.1299	.2927	.0648
#1	99.37	5.152	5.135	H4.945	H4.976	H5.141	H4.914
#记	99.48	5.170	5.158	H4.941	H4.967	H5.162	H4.909
Errors High Low	NOCHECK	NOCHECK	NOCHECK	LC High .0100 –.0100	LC High .0030 0030	LC High .0050 0050	LC High .0050 0050
Elem	Sr4215	Th2837	Ti3349	T11908	U_4090	V_2924	W_2079
Units	ppm	Ppm	ppm	ppm	pp:m	ppm	F:F:M
Avge	H5.049	H.9684	H4.857	H5.172	H.9760	H4.928	H. 9860
SDev	.008	.0021	.001	.020	.0202	.001	. 0027
%RSD	.1601	.2153	.0213	.3919	2.073	.0287	. 2786
#1	H5.055	H. 9699	H4.858	H5.157	H.9903	H4.929	H. 984Ø
#근	H5.043	H. 9669	H4.856	H5.186	H.9617	H4.927	H. 9879
Errors	LC High	LC High	LC High	LC High	LC High	LC High	LC High
High	.0050	.0100	.0050	.0100	.1000	.0050	.0100
Low	0050	0100	0050	0100	1000	0050	0100
Elem Units Avge SDev %RSD	Y_3710 ppm H4.967 .007 .1355	Zn2062 ppm H.9953 .0000 .0005	Zr3496 ppm H4.808 .023 .4882				
#1 #2	H4.972 H4.962	H. 9953 H. 9953	H4.792 H4.825				
Errors High Low	LC High .0050 0050	LC High .0050 0050	LC High .0050 0050				

Analysis Report

06/15/04 01:36:59 PM

IntStd	1	8	3	4	5	6	7
Mode	*Counts	Time	NUTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Se	80000					
Wavlen	361.384						
Avge	641224	10000	Burder Allife	17/98 40.06	ungeb moto		
SDev	460.3265	. ወወወወወወወ					
XRSD	.0717888	. 0000000					
#1	640898	10000					*****
#2	641549	10000					

010125

Analysis Report

i i i i i i i i i i i i i i i i i i i							
Method:	DAILY2	Sample Na	me: 243229		Ope	erator:	
Run Time	: 06/15/04	13:37:10					
Comment:							
Mode: CO	NC Corr.	Factor: 1					
P** 1	D-2000	A13082	As1890	B_2496	Ba4934	Be3130	Bi2230
Elem	Ag328Ø		ppm	ppm	ppm	ppm	ppm
Units	ppm -,0001	pp m 0206	.0037	. 1417	.0121	. 0001	. 0028
Avge	. 0004	. 0029	. 0025	.0020	.0001	. 0000	.0013
SDev %RSD	365.9	14.17	68.18	1.394	. 7040	28, 39	44.61
ANOD	4.3 S. ³ S. ⁴ H 42						
# 1	0004	0227	. 0019	. 1431	.0121	. 0001	.0019
#2	. 0002	0185	. 0055	. 1403	.0122	. 0001	. 0037
-		0300/ F	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Elem	Ca3179	Cd2265			ppm	Extran	Extrans
Units	рр я 24.72	.0004	.0008	0000	0001	0032	5.348
Avge SDev	. 215	. 0002	. 0001	. 0002	. 0003	. 005.1	. @12
XRSD	. 1959	43.45	19.87	2550.	269.4	160.2	. 2214
AR-30	9 3 <i>3</i> 3 3 4						
#1	24.69	.0003	.0007		. 0001	0068	5.340
林忠	24.75	.0005	. 0009	, 0001	-,0004	,0004	5.357
							N-5000
Elem	La3988	Li6707	Mg2790	Mn2576	Mo2020	Na3302	Na5889
Units	ppm	ppm	ppm	ppm	ppm	ppm 34.42	ppm 22.50
Avge	0001	.0298	3.286	0000	. 0059	.14	.01
SDev	. 0008	.0001	.005	.0001	.0008	.4115	. 0632
%RSD	592.0	. 2006	. 1555	810.3	13.81	n	* 815 55
#1	0007	.0297	3,283	. 0000	.0065	34.32	22.49
#2	.0004	. 0298	3.290	0001	.0053	34.52	22.51
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	5_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	t-bw
Avge	0013	. 0248	0036	.0011	0026	8.522	0001
SDev	.0013	. 0066	. 0005	.0014	.0034	. 038	. 0000
YRSD	100.6	26.53	14.90	123.7	132.5	. 4486	10.41
			0033	.0021	-, 0050	8,549	(10011
#1	0004	.0202 .0295	0040	. 0001	0002	8.495	0001
井 穴	0022	. 0.333	······ " (C.C.C + 12.1	H BARARA A	8 "But" "Su" "Su" "	ta de la companya de	
Elem	Se3613	1960/1	1960/2	Si2881	P6220	Se196	Su1899
Units	%R	ppm	្រុកត	្រុក្រា	p p m	្រុកត	្រទ្ ត
Avge	103.9	.0176	-, øøø6	24.29	-, 0004	. 0055	. @16@
SDev	. 1	, 0003	,0003	. 1 1	.0011	.0001	. 0054
*RSD	. 1065	1.695	45.09	. 4673	260.2	1.557	34.07
					. 0004	.0055	. 0198
#1	104.0	.0174	0004	24.37 24.21	0012	.0054	.0121
#2	103.9	.0178	0008	1. 4 s 1. 1	# 4244.5 A 1	a 4.14.1	H 46.* J. H. J.
Elem	Sr4215	Th2837	Ti3349	T11908	U_4090	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	. 1004	0052	0003	.0052	.0004	.0033	0016
SDev	. 0000	.0013	. 0000	.0145	.0248	. 0008	.0015
%RSD	. @364	24.24	9.554	277.7	5642.	24.11	90.89
							
#1	. 1004	0043	0003	.0155	Ø171	.0027	0026
井倉 .	. 1004	0061	0003	0050	.0180	.0038	0006

Elem	Y_3710	Zn2062	Zr3496			010)126
Units Avge SDev	ррт —.0001 .0000	PP# . 0022 . 0003	ррт —, 0000 , 0003				
XRSD	41.20	15.43	1625.				
#1	0001	.0025	. 0002				
#2	0001	.0020	0002				
IntStd	1	2	З	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc			Addies agentic			
Wavlen	361.384		-	*****	***** ****		
Avge	670390	10000					
SDev	677.4083	. 0000000			****		
%RSD	. 1010469			F8428 40099			antina dilama
#1	670869	10000					
#2	669911	10000		******			

Operator:

010127

Method: DAILY2 Sample Name: 243230 Run Time: 06/15/04 13:41:56 Comment: Mode: CONC Corr. Factor: 1

Elem	Ag3280	A13082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0001	.0190	0027	.2584	. 0028	. 0000	0030
SDev	.0007	.0010	.0034	.0052	. 0001	. 0000	.0063
%RSD	532.5	5.149	127.4	1.999	2.456	114.3	207.7
MROD	പ്പില്ലം പി	war 1 m D	Shin f a sup	3.8 3 3 3 3	all a "T sublid	11.4.5	Sec. Mark I in T
¥1	0004	.0183	0003	.2621	.0028	. 0000	0075
#2	. 0006	. Ø196	0050	. 2548	. 0027	. 0000	. 212134
f F Bana	an a	All "And" of and have	an and the state state	IT have be " I bee	28 - 1947 - 1947 - 844 - 8	1. Articulty, and article	
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	to to m	to to m	ppm	E E E M	pep m
Avge	2.492	. 0003	. 0001	0006	.0015	.1358	4.511
SDev	.021	. 0001	. 0001	. 0009	. ወወወ 1	. 0081	. 050
XRSD	. 8504	23.43	115.2	167.4	5.382	6.005	1.109
#1	2.507	. 0004	. 0001	0012	.0015	. 1415	4.546
#2	2.477	.0003	. 0000	.0001	.0016	.1300	4,475
Elem	La3988	L16707	Mg2790	Mn2576	Ma2020	Na3302	Na5889
Units	ppm	ppm	ppm	ppm	ppm	ppm .	ppm
Avge	.0003	.2591	. 1121	. 0037	.0459	213.4	127.8
SDev	.0012	.0035	.0055	.0007	.0009	3.5	2.0
%RSD	404.0	1.342	4.891	18.39	2.076	1.662	1.544
#1	0006	.2615	. 1082	.0042	.0466	215.9	129.2
#2	.0012	. 2566	. 1160	.0032	.0452	210.9	126.5
77 I	a Mariko di Jun		a 1. 1. () 42.)	a watan atau	a water water.	Entry de Marine - 17	ali kan ba' H ba?
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	S62068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	0008	.0571	. 0044	.0036	0000	10.40	.0138
SDev	. 0014	.0030	.0020	.0059	.0043	.21	.0060
XRSD	175.3	5.210	44.96	163.7	19960.	1.981	43.39
#1	0018	.0592	.0030	.0077	0031	10.55	.0180
井 己	.0002	. 0550	.0058	-, 0006	.0030	10.26	.0095
Elem	Sc3613	1960/1	1960/2	Si2881	Pheeø	Se196	Sn1899
Units	%R	pp m	pp m	ppm	00 0	22 8	ppm
Avge	87.83	. 0546	. Ø111	7.883	. 0039	. 0256	. 0623
SDev	1.93	.0214	.0009	. 236	. 0032	.0065	.0183
%RSD	2.200	39.21	8.045	2,865	83.48	25.54	29.31
#1	86.46	.0697	.0105	8,043	.0062	. 0302	.0752
#2	89.19	.0395	.0117	7.724	. 0016	. 0210	. 0494
		· · · · · · · · · · ·	88 Tr.: -3. Vec 4		88 (984) (8) (1898 <u>844</u>)	W	a a. a . a
Elem	Sr4215	Th2837	Ti3349	T11908	U_4090	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	p.p.m
Ävge	.0070	0002	0001	0751	0030	0003	.0014
SDev	. 0000	.0032	.0002	. 0022	. 0245	. 0011	.0019
%RSD	.1029	1556.	109.2	2.888	818.6	307.0	142.2
#1	.0070	.0020	0000	0735	0203	0011	0000
# 2	.0070	0024	0002	0766	.0143	. 0004	.0027

Elem Units Avye SDev %R:SD	Y_3710 PP# 0000 .0001 475.3	Zn2062 ppm .0001 .0005 626.6	Zr3496 ppm .0001 .0001 69.97			01	0128
#1 #@	—, 0001 , 0000	. 0005 0003	. 0002 . 0001	• • •			
IntStd Mode Elem	1 *Counts Sc	2 Time	3 NOTUSED	4 NOTUSED 	5 NOTUSED	6 NOTUSED	7 NOTUSED
Wavlen Avge SDev %RSD	361.384 566438 12483.97 2.203945	 1 0000 . 0000000 . 0000000			9999 995		
#1 #2	557610 575265	10000 10000				1999 - 1997 - 19	

Operator:

010129

Method: DAILY2 Sample Name: 243231 Run Time: 06/15/04 13:46:41 Comment: Mode: CONC Corr. Factor: 1

Elem	Ag3280	A13082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	n n n n n n n n n n n n n n n n n n n	ppm	ppm	ppm
Avge	0004	0199	.0096	.1360	.0081	.0001	.0018
SDev	. 0004	.0037	.0043	.0016	.0000	. 0000	.0063
%RSD	87.31	18.50	44.46	1.155	.2856	8.566	343.4
#1	0007	0173	.0126	.1371	.0082	. 0001	.0063
#2	0002	0226	.0066	.1349	. 0081	. 0001	0026
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	bb w	b to w	ppm	ppm	ppm	ppm	ppm
Avge	13.29	.0002	. 0009	0001	0006	.0144	5.487
SDev	.05	. 0001	. 0001	. 0003	. 0000	.0015	<i>"</i> Ø43
XRSD	.3715	30.09	16.31	237,4	3.893	10.42	.7770
	a anna ann pr	and and may a					
#1	13.26	. 0001	. 0011	0003	0005	.0154	5. 457
#2	13, 33	. 0002	. 0008	. 0001	0006	. 0133	5.518
Elem	La3988	Li6707	Mg2790	Mn2576	Morara	Na3302	Na5889
Units	ppm	ppm	ppm	opm	ppm	្រុក	ppm
Avge	. 0000	.0310	2.053	.0057	. 0098	39.08	25.33
SDev	. 0006	.0001	.015	. 0000	.0001	.00	. 16
%RSD	2163.	.3252	.7379	.1634	1.238	. 0045	.6361
#1	0004	.0310	2.043	.0057	.0098	39,08	25.22
#2	. 0004	.0311	2.064	.0057	.0097	39.08	25.45
Elem	NI- 0010	0 1700	0000/1	000010	Pd3404	0 1000	Sb2068
Units	Ni2316	P_1782	2203/1	2203/2		S_1820	
Avge	.0002	ppm .0187	ррт 0010	ррт .0003	ppm .0018	ppm 6.957	ppm .0028
SDev	. 0016	.0109	. 0020	.0013	. 0009	.025	.0022
%RSD	737.7	58.50	195.0	459.1	54.10	.3575	79.95
							· · · · · · · · · · · · · · · · · · ·
#1	.0013	. 0110	. 0004	.0012	.0024	6.975	. 0044
井 宅	0009	.0264	0025	0006	.0011	6.940	.0012
Elem	Sc3613	1960/1	1960/2	Si2881	P6230	Se196	Sn1899
Units	%R	ppm	ppm	ppm	ppm	ppm	pp m
Avge	104.1	.0137	0016	25.68	0001	. 0035	.0129
SDev	. 9	.0022	.0015	. 12	.0015	.0003	. 0001
*RSD	. 8688	15.96	93,83	.4819	1079.	7.623	. 3784
#1	103.5	.0153	0027	25.77	. 0009	.0033	. 0130
#2	104.7	.0122	0005	25.60	0012	. 0037	. 0129
II han	1	ar May at hand he		Bu tau ^a M. Tau ^a M.	# 4.•4.• J. K.	a 4.14.10.17	W W. (3 K . (
Elem	Sr4215	Th2837	Ti3349	T119Ø8	U_4090	V_2924	W_2079
Units	to b m	pp:m	ppm	ppm	ppm	to to m	t-t-w
Avge	.0666	0031	0003	0089	.0122	.0056	. 0006
SDev	. 0004	. 0018	. ଉଦଉଦ	. 0030	.0121	. aaa?	. ଉହାହନ
/RSD	. 5745	59.78	9.299	33.93	99 . 02	4.291	103.7
							
#1	.0663	0044	0003	0111	. 0207	.0055	.0002
#2	.0668	0018	0003	0068	.0037	.0058	.0010

Elem Units Avge SDev %RSD	Y_3710 F:PM 0001 .0000 50.94	Zn2062 pp# .0016 .0000 2.194	Zr3496 ppm .0002 .0001 .27.96			01	L0 130
#1 #은	—, 0000 —, 0001	.0016 .0017	. 0003 . 0002				
IntStd Mode Elem Wavlen Avge SDev %RSD	1 *Counts Sc 361.384 671378 5786.962 .8619528	2 Time 10000 .0000000 .0000000	3 NOTU:SED 	4 NOTUBED	5 NOTUSED	6 NOTUSED	7 NOTUSED
#1 #2	667286 675470	10000 10000			talla accu		actor diter

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.0013

Operator:

page 1

010131

Method: DAILY2 Sample Name: 243231s Run Time: 06/15/04 13:51:27 Comment: Mode: CONC Corr. Factor: 1

A13082 As1890 B 2496 Ba4934 Be3130 Bi2230 Aq3280 Elem ppm ppm Units ppm ppm ppm ppm ppm 1.946 2.027 .0494 .0513 2.044 . 1407 .0082 Avde . 004 .0002 .0005 .008 .004 . 0000 . 0046 SDev 1.025 .2134 . 3922 . 1608 . 1938 . 0047 55.81 %RSD 2.024 . 0494 .0516 1.943 2.038 . 1409 .0114 #1 .0494 .0050 #2 .0509 1.949 2.050 . 1406 2.030 Elem Ca3179 Cd2265 Co2286 Cr2677 Cu3247 Fe2714 K_7664 ppm Units ppm ppm ppm ppm DDM DDM 33.68 .0497 .5010 .1971 . 2519 1.084 27.47 Avge . 06 .0007 .015 . 10 SDev . 0001 . 0008 .0013 %RSD . 1741 .2350 . 1690 .6459 .2643 1.410 . 3747 33.64 .0497 . 5004 . 1980 . 2514 1.073 27.40 #1 #;P 33.73 .0498 . 5016 . 1962 .2524 1.095 27.55 Na3302 Elem La3988 Mp2790 Mn2576 Ma2020 Na5889 L16707 Units ppm nqq opm ្រុក្ស ODB 008 000 22.35 61,56 40.81 Avge . 0001 . 0348 . 5090 .0110 . 27 SDev - 0006 . 0001 . 05 . 0000 . 0007 . 02 %RSD 552.0 .2740 . 2055 .0039 6.365 ,4462 . 0414 -.0003 .0349 22.32 . 5090 .0105 61.36 40.80 #1 40.83 #2 . 0005 .0348 22.38 . 5090 .0115 61.75 2203/2 Pd3404 5_1820 S62068 Elem Ni2316 P_1782 2203/1 ppm Units ppm ppm ppm ppm ppm ppm . 5055 . 0289 . 4949 7.038 Avge . 4900 .4975 .0000 SDev .0005 .0089 .0017 .0005 . 0009 . 064 .0015 2094. %RSD .1074 30.86 .3441 .0990 .9100 .2911 7.083 #1 . 4903 .0352 . 4961 . 4978 -. 0006 . 5044 **#**⊅ . 4896 .0226 .4937 .4971 .0007 6.993 . 5065 Elem Sc3613 1960/1 1960/2 Si2881 Pb220 Se196 Sn1899 ppm Units XR ppm ppm nqq DD**M** 000 100.7 2.243 Avge 2.226 25.89 . 4966 2.232 .0127 .008 .015 .05 . 0009 .013 .0026 SDev . 2 %RSD .2380 . 3776 .2073 . 1804 .5677 20.77 .6636 100.5 2.249 2.236 25,93 . 4973 2.241 #1 .0145 2.237 2.223 #2 100.8 2.216 25.85 . 4960 . 0108 Th2837 Ti3349 T119Ø8 U 4090 V 2924 Elem Sr4215 W 2079 Units ppm ppm ppm ppm ppm ppm E-E-B .0675 -.0157 -.0002 2.075 .0081 . 5050 .0007 Avge . 0001 . 0046 . 004 . 0001 . 0006 . 001101 SDev , 0000 XRSD .1367 29.10 36.07 .2165 6.908 . 2012 126.2

Elem Units Avge SDev %RSD	Y_3710 Ppm 0001 .0001 121.0	Zn2062 ppm .5090 .0015 .2892	Zr3496 ppm .0001 .0001 99.45			C	10132
#1 #ご	—. 0001 —. 0000	.5079 .5100	. 0000 . 0002				
IntStd Mode Elem Wavlen Avge SDev %RSD	1 *Counts Sc 361.384 649190 1520.280 .2341810	2 Time 10000 .0000000 .0000000	3 NOTUSED	4 NOTU:3ED 	5 NOTU:3E0 	6 NOTUSED	7 NOTUSED
#1 #2	648115 650265	10000 10000	1000 (000				14499 14444

#1

#2

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.0707

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HBalysis Report 06/15/04 02:00:47 PM						page		
	e: 06/15/04		me: 243232	5	Operator:			
Comment:						01	0133	
Mode: CC	INC: Carr.	Factor: 1						
Elem	Ag3280	A13082	As1890	B_2496	Ba4934	Be3130	Bi2230	
Units	ppm	pps	ppm	ppm	00 m			
Avge	0002	.0071	. 0078	.1423	.0138	ppm .0001	ppm aaaa	
SDev	. 0004	.0053					. 0039	
%RSD	234.9		.0014	.0024	. 0000	. 0000	.0007	
AROD	C04.7	74.08	17.52	1.705	.3017	2.176	17.00	
#1	.0001	.0108	.0068	. 1440	.0138	. 0001	.0043	
#2	0004	.0034	.0088	. 1406	.0139	. 0001	.0034	
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664	
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	
Ävge	12.80	.0002	. 0000	.0003	0003	. 0061	3.814	
SDev	. Ø1	. 0000	. 0003	. 0008	. 0006	.0027	. 008	
*RSD	.0717	.2813	11800.	245.7	203.9	44.77	. 1987	
#1	12.79	.0002	.0003	0002	0004	3303		
#2	12.81	. 0002	0002	. 0009	. 0001	. 0080	3,819	
	A L. # \) A	" "TOTOTO		. 20320 9	-,0007	.0042	3.808	
Elem	La3988	Li6707	Mg279Ø	Mn2576	Ma2 0 20	Na3302	Na5889	
Units	ppm	ppm	ppm	ppm	(3)) m	ppm	000	
Avge	-, 0001	.0385	1.065	. 0002	.0043	45. 98	29.87	
SDev	. 0003	.0001	. 005	. 0002	.0005	. Ø1	. 04	
*RSD	333.0	. 1595	. 4953	91.21	12.32	. 0326	. 1259	
#1	. 0001	. 0384	1.069	. 0004	.0039			
#2	0003	.0385	1.061	. 0001	. ØØ47	45.97 45.99	29.90	
77 Zum	an ann an Shakar Shakar	# ¥. '. '. '	7 1 410 7	* «««««	" <i>V</i> (V(-+ /	14 C.1	29,84	
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	S62068	
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	
Avge	0007	.0088	. 0011	0014	0014	8.093	.0015	
SDev	. 0004	. 0088	.0013	. 0009	.0021	. 108	. 0026	
XRSD	61.97	100.4	121.4	64.58	150.0	1.331	168.2	
							· · · · · · · · ·	
#1	0010	.0150	.0020	0008	. 0001	8.169	0003	
#2	0004	.0025	.0002	0021	0028	8.017	.0033	
Elem	Sc3613	1960/1	1960/2	Si2881	P6220	Se196	P= 1800	
Units	XR	ppm					Sn1899	
Avge	102.9	.0167	ppm 0025	ppm of oo	ppm aaar	ppm	ppm	
SDev	1.2			26.22	0006	. 0039	.0123	
		.0069	.0054	. 19	.0010	.0059	.0022	
*RSD	1,183	41.31	218.9	.7273	182.5	151.0	17.88	
#1	102.0	.0215	. 0014	26.36	.0002	.0081	.0139	
#2	103.7	.0118	-,0063	26.09	0013	0003	.0107	
Elem	Sr4215	3° In (2) (2) 72 77	72 7 7 4 4	17m 3 4 ME.H.				
Units		Th2837	Ti3349	T119Ø8	U_4090	V_2924	W_2079	
	pps anan	ppm	ppm	ppm	bt.w	ppm	to to w	
Avge	.0707	0023	0001	0094	.0224	.0067	.0005	
SDev	. 0000	.0031	. QUAD?	. 0015	. Ø224	. 0003	. 0018	
XRGD	. 0290	134.6	127.2	15.84	100.3	4.169	337.7	

-, aaaa -, 0104

-,0083

-. 0002

. 0382

.0065

.0065

. 0069

. 0018

-. 0007

Elem Units Avge SDev %RSD	Y_3710 PPm 0001 .0000 42.55	Zn2062 ppm 0010 .0003 26.84	Zr3496 ppm 0001 .0002 114.2			010)134
#1 #已	—. 0001 —. 0001	—. 0008 —. 0011	0003 0000				
IntStd Mode Elem Wavlen Avge SDev %RSD	1 *Counts Sc 361.384 663352 7814.237 1.177992	2 Time 	3 NOTUSED 	4 NOTU:3ED 	5 NOTUSED	6 NOTUSED 	7 NOTUSED
#1 #2	657827 668878	10000 10000					

page 1

Method: DAILY? Sample Name: 245108 Run Time: 06/15/04 14:00:58 Comment: Mode: CONC Corr. Factor: 1

010135

Operator:

Elem	0						
Liem Units	Ag3280	A13082	As1890	B_2496	Ba4934	Be3130	Bi2230
Avge	ppm aaa	ppm	្រកាត	ppm	ppm	ppm	ppm
Avge SDev	ØØØ1	0125	. 0061	. 1450	.0106	. 0002	.0022
*RSD	.0001 59.76	.0026	.0018	. 0008	. 0000	. QQQQ	.0015
AROD	37.78	21.16	29.28	.5430	.1696	14.52	72.01
#1	0002	0106	.0049	. 1445	.0106	.0002	.0011
#2	0001	0143	. 0074	.1456	. 0106	. 0002	.0032
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	
Units	ppm	ppm	ppm	ppm	ppm		K_7664
Avge	13.59	. 0000	.0012	.0003	. 0005	рр т .0120	ppm 3.705
SDev	.02	. 0000	.0005	. 0009	. 0002	.0110	
XRSD	.1350	76.03	38.58	274.5	29.32	91.84	.008 .2253
#1	13.57	. 0000	~~~~				
#≥	13.60	. 0001	. 0009	. 0009	. QQQ6	.0198	3.699
	10,00	. 202021	.0015	0003	. 0004	.0042	3.710
Elem	La3988	Li6707	Mg2790	Mn2576	Mo2020	Na3302	Na5889
Units	ppm	ppm	m qq	ppm	ppm	ppm	ppm
Avge	. 0001	.0372	1.345	.0017	. 0082	50.06	32.54
SDev %RSD	. 0001	. 0001	.005	.0001	.0005	. 18	.03
ARSD	44.40	.1373	.3919	4.000	6.237	. 2409	.0818
#1	. 0001	.0378	1.341	.0018	. 0046	40.00	
#2	. 0002	. 0371	1.349	.0017	.0078	49.98 50.15	32.52 32.56
F 1 m m					ar main mar a succe	1963 B L L L	1971, n 1964,
Elem Units	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
	p.p.m	to to m	ppm	ppm	ppm	ppm	p(p)m
Avge SDev	0000	.0172	0023	0012	. 0006	9.427	0005
XRSD	.0010 207000.	. 0006	.0007	.0035	. 0004	. 031	. 0017
2-11-3-0	<i></i>	3.386	30.64	300.2	75.20	.3255	350.9
#1	. 0007	.0168	0028	0036	. 0003	n	
#2	0007	.0176	0018	.0013	. 0003	9.449	. 0007
						9.405	0017
Elem	Sc3613	1960/1	1960/2	Si2881	P6220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avge SDev	102.9	. 0096	0045	19.71	0015	.0003	.0042
%RSD	. 4	.0017	.0014	.07	.0026	.0003	. 0006
ARSD	.3549	17.96	31.06	.3508	168.1	138.6	14.03
#1	102.7	.0084	0035	19.76	0000		
#2	103.2	. 0108	0054	19.66	0033	.0005	. 0046
				10,00	. 0003	. 0000	. 0037
Elem Units	Sr4215	Th2837	Ti3349	T119Ø8	U_4090	V_2924	W_2079
Avge	PPM 0747	ppm	to to u	ppm	ppm	ppm	ppm
Avge SDev	.0747	0030	0003	0023	. 0154	.0133	.0057
SDev %RSD	. 0000 	.0025	. 0000	. 0005	. 0028	. 0001	. 0020
20100	.2074	82,96	4.678	22.68	18.35	. 3668	35.22
#1	.0746	0047	0003	ch (2+	، سبب و الم		
# ₽	.0749	0012	000.3	ØØ26 ØØ19	. 2174	.0134	. <i>Q</i> UQ17 1
	•	•• ~•• ••	9 - 10 - 10 - 10 - 10 - 10 - 10 - 10 - 1	* 10103 L T	.0134	.0133	.0043

Elem Units Avge SDev %RSD	Y_3710 PPm 0001 .0001 49.46	2n2062 ppm .0015 .0005 31.31	Zr3496 ppm .0006 .0001 9.715			()10136
#1	0001	. 0019	. 0006				
#2	0002	.0012	.0007				
IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Se						
Wavlen	361.384	chegg anges					
Avge	663732	10000					
SDev	2319.310	. 00000000			1418 8 1.1838	6889 Russ Ry	
*RSD	.3494347	. 0000000	, the second				Bar - 487
#1	662092	10000				visite refle	Phil 1012
#2	665372	10000					aloga Appro

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Method: DAILY2 Sample Name: 245108d				Operator:			
Run Time: 06/15/04 14:05:44					0	10137	
Comment:						U	10121
Mode: CC	INC Carr.	. Factor:	1				
Elem	Ag32 80	A13082	As 1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	រទ ្ រធា	រភ្ ភ្លោក ភ្លោក	ppm
Avge	0000	0204	.0085	. 1399	. Ø1Ø3	, MAAS	. 0046
SDev	.0006	.0022	.0017	.0001	. 0000	, ଉଦାଦନ	.0016
%RSD	2164.	10.75	19.91	. 1103	, 3152	19,45	35.77
#1	0004	0188	.0097	.1398	.0103	. 0002	. 0058
#2	, 0004	0219	. 0073	. 1400	.0104	. 0002	. 0034
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	13.20	. 0004	. 0000	0004	. 0006	.0032	3.593
SDev	. 00	.0003	.0001	.0011	.0001	.0020	. 002
%RSD	. 0200	57.08	113.9	287.9	14.60	64.36	.0579
#1	13.20	. 0006	. 0000	. 0004	. 0006	.0017	3.591
#5	13.20	.0003	. 0001	0011	.0005	.0046	3.594
Elem	La3988	Li6707	Mg279Ø	Mn2576	Mo2020	Na3302	Na5889
Units	ppm	ppm	ppm	ppm	pp m	pp m	ppm
Avge	0000	. 0361	1.309	.0016	.0083	48.93	31.58
SDev	.0004	.0001	.002	. 0000	.0002	. 214	.03
*RSD	82510.	.3504	. 1444	2.072	1.985	.0878	. 0955
#1	0003	.0360	1.310	.0016	. 0084	48.96	31.60
#2	.0003	. 0361	1.307	. 2016	.0082	48.90	31.56
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	5_1820	S62068
Units	bbw	bbw	t.t.w	ppm	bbw	b to w	t-t-w
Avge	.0007	.0128	0036	.0012	- . 000A	9.202	.0017
SDev	.0015	.0084	. 0006	. 0004	.0010	.032	. ØØS 1
%RSD	217.1	65.56	17.80	33.04	131.8	.3498	121.8
#1	.0017	. 0069	0031	. 0010	0015		. 0033
#R	0004	.0188	0040	.0015	0001	9.180	. 0002
Elem	Sc3613	1960/1	1960/2	Si2881	PB220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avge	106.0	.0066	0017	19.13	0004	.0011	. 0050
SDev	.2	.0014	.0005	. 09	.0001	. 0001	.0007
*RSD	. 1447	20.59	27.22	. 4610	16.68	13.38	14.80
#1	106.1	.0076	0020	19.20	0004	.0012	. 0055
#2	105.9	.0057	212114	19.07	0003	. 0010	.0045
Elem	Sr4215	Th2837	Ti3349	T11908	U_4090	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0727	0019	0001	0034	.0162	. 0131	.0036
SDev	. 0002	.0014	. 0001	.0028	. Ø1Ø1	. 0005	. 0012
*RSD	. 2162	73.07	87.57	82.20	62.39	3.808	34.49
#1	. 0726	0028	0002	0014	. 0233	. 0128	. 0027
#?	. 0729	0009	0001	0054	. 0090	.0135	. 0044
				· · · ·			

Elem Y_3710 Zn2062 Zr3496

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Units Avge SDev %RSD	ррт 0000 .0000 33.23	ppm .0028 .0004 14.72	ррт . 0004 . 0002 53. 08			01	0138
#1 #2	0000 0000	.0031 .0025	. 0006 . 0003				
IntStd	1	2	З	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc						
Wavlen	361.384				-		
Avge	683556	10000			*****		
SDev	990.6566	. 0000000			Table store		
*RSD	.1449270	. ୭୭୭୭୭୭୭					44/14 1000
#1	684856	10000		alaali xuuna	anga ar ta	unada Anguad	
#2	682855	10000					

Method: DAILY2 Sample Name: 245108s Run Time: 06/15/04 14:10:30 Comment: Mode: CONC Corr. Factor: 1

Operator:

010139

Elem	Ag3280	A13082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	្រុកត	ទុទ្ធ	ppm	ppm	00m	008	0pm
Avge	.0504	1.940	2,028	. 1420	2.008	. \$14.89	. 0073
SDev	.0003	.003	. 001	.0002	. 204	. 0000	.0037
%RSD	.6129	. 1658	.0673	. 1561	. 1881	. 0798	50.34
					tr all ter the tak		Concerne a comp
#1	.0507	1.938	2.029	.1422	2.005	. 0489	. 0099
#2	.0502	1.942	2.027	. 1419	2.010	. 0490	. 0047
				# ik 1 2. i		n 45°Y 240	# 41421~F /
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm		ppm	ppm
Avge	33.77	.0492	. 4979	. 1952	.2513	1.060	26.00
SDev	.05	. 0003	. 0001	.0016	. 0004	.003	. 02
XRSD	. 1545	.5418	.0300	.7975	. 1774	.2462	
			a the test the test	.,,,,	• 1.77~+	# 100 ** 10 1 **	.0759
#1	33.73	.0490	. 4978	. 1941	.2510	1.062	25.99
#2	33.81	.0494	. 4980	. 1963	.2517	1.058	
			a	* 1966	a hit with f	1.4000	26.01
Elem	La3988	L16707	Mg2790	Mn2576	Mo2020	Na3302	Na5889
Units	ppm	ppm	ppm	ppm	DDW	ppm	ppm
Avge	0002	. 0404	21.76	.5007	. 0090	72.50	47.49
SDev	.0003	.0000	. @1	.0003	. 0006	. 12	.05
*RSD	170.3	.0755	.0465	.0660	7.090	. 1681	.03
	2. 7 W. H L.		.0400	" <i>KICICIKI</i>	1.40.740	. 1001	, 21949
#1	0004	. 0404	21.75	. 5005	. 0086	72.42	47.53
#2	. 0000	.0404	21.76	. 5009	. 0095	72.59	47.46
					a 4040 0 G	7 h # 64 J	4/* 40
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	4825	.0230	.4958	. 49.32	0009	9.312	. 5013
SDev	.0037	.0119	. 0034	. 0013	.0010	. 299	. 0013
XRGD	.7669	51.95	. 6819	. 2599	110.7	1.061	
		for the Brook Tune	N (2007 N 2	**************************************	3. E 4.5 m f	7 " 6002 7	1.571
#1	. 4798	.0314	. 4934	. 4923	0016	9.381	. 4957
#2	.4851	.0145	. 4982	. 4941	0002	9.242	. 5069
					A 6000000	17 a 11, 19 1	* 1410.3
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avge	102.7	2.176	2.171	19.42	. 4941	2.173	.0031
SDev	- 1	.011	.014	.07	.0020	. 013	. 0007
%RSD	. 1453	. 4900	.6443	.3498	. 3995		
		a	• W (" 347C	. 3773	.5927	22.72
#1	102.8	2.183	2.181	19.47	.4927	2.182	.0036
#2	102.6	2.168	2.161	19.38	. 4955	2.163	
		Takin Million Star Cart			· · · · · · · · ·	10 · · · · · · · · · · · · · · · · · · ·	.0026
Elem	Sr4215	Th2837	Ti3349	T119Ø8	U_4090	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm		
Avge	.0738	0151	0003	2.079	.0006	PP# 5071	ppm aaza
SDev	. 0000	. 0036	. 0000	. @14	.0042	.5071	.0070
XRSD	.0071	24.01	16.45	.6730		.0021	.0018
e - e s sur duf	a turtur tuk	a	.h tan a "P tai	.0/30	695.3	.4125	25.27
#1	.0738	0176	0003	2.069	0024	. 5086	010 D T
林之	.0738	0125	0002	2.089			. 0083
** · ·	an marin babad	w Martin Firmat	a sursurs de m		. 0036	. 5057	.0058

Elem Units Avge SDev %RSD	Y_3710 Ppm 0002 .0001 29.42	Zn2062 ppm .5084 .0009 .1854	Zr3496 ppm .0000 .0002 594.6			01	0140
#1	0002	.5077	0001				
#2	0001	. 5091	.0002				
IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc						
Wavlen	361.384	-					
Avge	662188	10000					****** *****
SDev	965.2007		*****			48890	
%RSD	.1457594	. 0000000					
#1	662870	10000				*****	*****
#2	661505	10000					•

page 1

Method: DAILY2 Sample Name: 245109 Run Time: 06/15/04 14:15:16 Comment: Mode: CONC Corr. Factor: 1 Operator:

010141

Elem	Ag3280	A13082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	PPm	ppm	ppm	ppm	ppm	PP#
Avge	0001	.0838	.0167	.1671	.0074	.0002	.0018
SDev	.0001	.0067	.0001	.0012	.0000	.0000	.0001
%RSD	61.67	7.962	.5235	.7063	.5671	.1158	7.517
#1	—. 0001	. 0885	.0168	.1679	. 0074	. ଉଉଦନ	. 0019
#2	—. 0001	. 0791	.0167	.1662	. 0074	. ଉଉଦନ	. 0017
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	pr:m	ppm	ppm	Ppm	Frpm
Avge	6.691	.0007	.0008	.0009	.0010	.0350	3.029
SDev	.006	.0001	.0001	.0004	.0004	.0005	.014
XRSD	.0953	14.86	5.847	46.46	44.86	1.406	.4667
#1	6.686	. 0006	. 0008	.0006	.0007	.0354	3.019
#2	6.695	. 0008	. 0008	.0012	.0013	.0347	3.039
Elem	La3988	Li6707	Mg2790	Mn2576	Mo2020	Na3302	Na5889
Units	ppm	ppm	ppm	pp#	ppm	ppm	ppm
Avge	0000	.0828	.5499	.0006	.0065	77.91	49.43
SDev	.0002	.0000	.0085	.0001	.0012	.01	.07
⊀RSD	588.9	.0457	1.547	10.03	19.14	.0170	.1454
#1	0001	. 0828	.5439	. 0006	.0056	77.90	49.38
#2	. 0001	. 0829	.5560	. 0007	.0073	77.92	49.48
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	0003	.0332	0015	.0019	.0002	7.359	.0020
SDev	.0006	.0126	.0008	.0029	.0039	.040	.0026
%RSD	177.1	37.98	50.19	155.6	2542.	.5371	129.2
Units	ррт	ррт	ррт	ppm	ррт	ррт	ррт
Avge	—.0003	.0332	0015	.0019	. 0002	7.359	. 0020
SDev	.0006	.0126	.0008	.0029	. 0039	.040	. 0026
Units	ppm	ррж	ррт	ppm	ррт	ppm	ррт
Avge	0003	.0332	0015	.0019	. 0002	7.359	. Фага
SDev	.0006	.0126	.0008	.0029	. 0039	.040	. Фага
%RSD	177.1	37.98	50.19	155.6	2542.	.5371	129.2
#1	0007	.0243	0021	.0039	0026	7.387	. Фаза
Units	PPm	ppm	ррт	pp#	ррт	ppm	ppm
Avge	0003	.0332	0015	.0019	.0002	7.359	.0020
SDev	.0006	.0126	.0008	.0029	.0039	.040	.0026
XRSD	177.1	37.98	50.19	155.6	2542.	.5371	129.2
#1	0007	.0243	0021	.0039	0026	7.387	.0038
#2	.0001	.0421	0010	0002	.0029	7.331	.0002
Elem	Sc3613	1960/1	1960/2	Si2881	Ph220	Sel96	Sin1899
Units	%R	ppm	ррт	Spm	ppm	ppm	ppm
Avge	102.7	.0163	.0006	25.62	.0008	.0059	.0080
SDev	.1	.0068	.0011	.10	.0017	.0030	.0016
Units Avge SDev %RSD #1 #2 Elem Units Avge SDev %RSD #1	ppm 0003 .0006 177.1 0007 .0001 Sc3613 %R 102.7 .1 .0611 102.7	ppm .0332 .0126 37.98 .0243 .0421 1960/1 ppm .0163 .0068 41.37 .0211	ppm 0015 .0008 50.19 0021 0010 1960/2 ppm .0006 .0011 184.7 .0014	ppm .0019 .0029 155.6 .0039 0002 Si2881 ppm 25.62 .10 .4073 25.70	ррт . 0002 . 0039 2542. 0026 . 0029 Рысро ррт . 0008 . 0017 221. 2 . 0020	ppm 7.359 .040 .5371 7.387 7.331 Se196 ppm .0059 .0030 50.90	ppm .0020 .0026 129.2 .0038 .0002 Sin1899 .0080 .0016 20.39 .0092

Elem Units Avge SDev XRSD	Y_3710 PP# .0001 .0001 123.6	Zn2062 ppm .0028 .0004 14.11	2r3496 ppm .0009 .0002 22.47			0	10142
#1 #근	. 0000 . 0001	.0031 .0025	. 0007 . 0010				
IntStd Mode Elem Wavlen Avge SDev %RSD	1 *Counts Sc 361.384 662605 386.0803 .0582670	2 Time 10000 .0000000 .0000000	3 NOTUSED	4 NOTUSED 	5 NOTUSED 	6 NOTUSED 	7 NOTUSED
#1 #2	662332 662878	10000 10000		1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.			

#1

#2

.0752

.0751

-. 0005

-.0030

-.0003

-.0003

-.0164

-.0185

-. 0002

.0156

.0138

.0127

. 0000

-.0014

Method: DAILY2 Sample Name: 245110 Operator: Run Time: 06/15/04 14:20:02 Comment: 010143 Mode: CONC Corr. Factor: 1 Elem Ap3280 A13082 As1890 B 2496 Ba4934 Be3130 Bi2230 Units ppm ppm ppm ppm DDB DDM ppm Avge -.0005 -.0237 .0074 . 1408 .0107 .0002 .0025 SDev .0004 .0035 .0000 .0012 .0001 . 0000 . 0008 %RSD 85.59 14.78 .3772 .8444 1.334 9.563 30.78 井1 -.0008 -. 0212 .0074 . 1417 .0106 . 0002 .0030 #2 -. 0002 -. 0262 . 0074 . 1400 .0108 . 0002 . 0019 Elem Ca3179 Cd2265 Co2286 Cr2677 Cu3247 Fe2714 K_7664 Units DDM DDB ppm ppm ppm perm p.p.m Avge 13.63 . 0000 .0009 -.0011 -. 0004 .0030 3.725 . 03 SDev . 0003 . 0003 . 00101014 . 0001 . 08:42 .031 XRSD .2174 8986. 28, 39 33.59 816.1 21.A5 . 8300 #1 13.61 -. 0002 . 00111 -. 0008 -. 0004 -, Ø141 3.703 #2 13.65 .0002 .0007 -.0013 -.0003 . 0201 3.746 Elem La3988 L16707 Mg279Ø Mn2576 M02020 Na3302 Na5889 Units ppm noq ppm ppm ppm DDM ppm Avge -. 0004 .0371 1.344 .0016 .0080 50,11 32.51 SDev .0006 .0002 .008 .0001 .0004 . 22 . 08 %RSD 151.4 .4212 .5872 6.630 4.621 . 4364 .2498 #1 -. 0009 .0373 1.338 .0016 .0077 49.96 32.46 #2 . 0000 .0370 1.350 .0017 .0082 50.27 32.57 Elem Ni2316 P_1782 2203/1 2203/2 Pd3404 S 1820 Sb2068 Units ppm ppm ppm ppm ppm ppm DDM Avge .0009 .0271 -.0041 .0008 -.0016 9.457 .0040 SDev . 0001 .0165 . 0020 .0013 .0019 .085 .0033 **ZRSD** 9.784 60.75 47.78 162.2 114.0 .8959 82.60 #1 . 0009 . 0388 -. 0055 -. 0001 -. 0030 9.517 .0063 #2 .0010 .0155 -. 0027 .0017 -,0003 9.397 .0017 Elem Sc3613 1960/1 1960/2 Si2881 Ph220 Se196 Sn1899 Units XR 008 p p mppm ព្រក្រធ ្រុក្រា (0,0,0,0)Avge 104.0 . 0166 -.0026 19.64 -. ØØØA . 0038 . 0166 SDev . 2 .0010 .0018 . 014 .0015 .0015 . 0028 %RSD .2091 5.906 70.14 . 2290 181.9 39.79 16.65 #1 103.9 .0173 -.0013 19.67 -.0019 .0049 .0185 #2 104.2 .0159 -. 0038 19.61 .0002 . 0028 . Ø146 Elem Sr4215 Th2837 Ti3349 T119Ø8 U 4090 V 2924 W_2079 Units ppm ppm ppm ppm ppm ppm DDB Avge .0752 -.0018 -.0003 -. 0174 .0077 .0133 -.0007 SDev .0001 .0017 . 0000 .0015 .0112 . 0007 .0010 **XRSD** .0859 98.60 8.534 8.678 145.3 5.566 141.9

Elem Units Avge SDev %RSD	Y_3710 ppm 0001 .0001 74.27	Zn2062 Ppm .0002 .0003 163.1	Zr3496 .0002 .0003 146.0			010)144
#1	0002	. 0000	0000				
#2	0001	0004	. 0004				
IntStd	1	2	з	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc			*****			
Wavlen	361.384						
Avge	670985	10000					
SDev	1401.486	. 0000000					
%RSD	.2088699	. 0000000			estite reaso		
#1	669994	10000		Angga 55410			
#2	671976	10000					

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Method: DAILY2 Run Time: 06/15/0	•	ame: GEV3 Ces3	DH 6-15-	6 4 Op	erator:	
Comment:	. Factor:				0:	L0145
Elem Ag3280	A13082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge L0001	L0119	L.0016	L.0018	L.0001	L.0002	L.0066
SDev .0004	.0021	.0000	.0006	.0000	.0000	.0084
%RSD 321.0	17.48	.5175	31.80	37.92	10.40	126.5
#1 L0004	L0134	L.0016	L.0022	L.0001	L. 0002	L. 0125
#2 L.0001	L0105	L.0016	L.0014	L.0001	L. 0003	L. 0007
Errors LC Low	LC Low	LC Low	LC Low	LC Low	LC Low	LC Low
High 1.100	11.00	5.500	5.500	11.00	1, 100	5.500
Low .9000	9.000	4.500	4.500	9.000	, 9000	4.500
Elem Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units ppm	ppm	ppm	ppm	ppm	99m	ppm
Avge L.0004	L.0004	L.0005	L0003	L.0003	L0056	I0013
SDev .0003	.0002	.0004	.0003	.0001	.0210	.0078
*RSD 85.10	52.87	94.23	117.7	24.93	378.6	583.8
#1 L.0006	L. 0003	L.0002	L 0000	L. 0003	L.0093	L.0042
#2 L.0001	L. 0006	L.0008	L 0005	L. 0004	L0204	L0069
Errors LC Low	LC Low	LC Low	LC Low	LC Low	LC Low	LC Low
High 22.00	1.100	5.500	2.200	2.200	11.00	22.00
Low 18.00	.9000	4.500	1.800	1.800	9.000	18.00
Elem La3988	Li6707	Mg2790	Mn2576	Mc2020	Na3302	Na5889
Units ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge L.0003	L.0002	L.0032	L0001	L.0011	L0007	L.0100
SDev .0001	.0000	.0071	.0002	.0015	.0014	.0003
%RSD 53.80	1.991	226.0	331.9	140.8	211.9	3.132
#1 L.0002	L. 0002	L0019	L0002	L.0000	L.0003	L.0102
#2 L.0003	L. 0002	L.0082	L.0001	L.0022	L0017	L.0098
Errors LC Low	LC Low	1.C 1.00	LC Low	LC Low	LC Low	LC Low
High 5.500	5.500	22.00	1.100	5.500	33.00	33.00
Low 4.500	4.500	18.00	.9000	4.500	27.00	27.00
Elem Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units ppm	ppm	99m	ppm	ppm	ppm	ppm
Avge L0002	L.0028	0001	. 0010	L 0014	L0235	L.0021
SDev .0001	.0095	.0058	. 0007	. 0007	.0079	.0025
%RSD 42.11	336.9	3883.	69. 06	48, 47	33.69	116.4
#1 L0002	L0039	. 0039	.0015	L 0009	L 0179	1 0039
#2 L0003	L.0095	0042	.0005	L 0018	L 0291	1 . 0004
Errors LC Low High 5.500 Low 4.500	LC Low 5.500 4.500	NOCHECK	NOCHECK	LC Low 1.100 .9000	LC Low 1.100 .9000	LC Low 1.100 .9000
Elem Sc3613	1960/1	1960/2	Si2881	P6220	Se196	Sn1899

010146

Analysis Report

06/15/04 02:33:02 PM

Units	%R	ррт	ррж	ppm	ррт	ppm	ррт
Avge	100.8	.0021	-,0030	L.0055	L.0006	L0013	1.0014
SDev	.1	.0029	,0011	.0013	.0024	.0017	.0020
%RSD	.0960	135.9	36,48	23.10	372.8	133.3	142.4
井1	100.8	. 0001	0037	L. 0046	L. 0023	l —, 0024	L. 0028
井沢	100.7	. 0041	0022	L. 0064	L 0010	L—, 0001	L 0000
Errors High Low	NOCHECK	NOCHECK	NUCHECK	LC Low 5.500 4.500	LC Low 5,500 4.500	LC Low 5.500 4.500	LC Law 5.500 4.500
Elem	Sr4215	Th2837	Ti3349	T11908	U_4090	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	L.0000	L0034	L.0001	L.0022	L.0197	L.0003	L0015
SDev	.0000	.0013	.0000	.0010	.0021	.0004	.0023
%RSD	44.16	39.77	23.38	46.28	10.87	118.1	152.2
#1	L. 0000	L0024	L.0001	L.0030	L.0212	L. 0006	L0032
#2	L. 0000	L0043	L.0001	L.0015	L.0182	L. 0001	L.0001
Errors	LC Low	LC Low	LC Low	LC Low	LC Low	LC Low	LC Low
High	5.500	1.100	5.500	5.500	1.100	5,500	1,100
Low	4.500	.9000	4.500	4.500	.9000	4,500	,9000
Elem Units Avge SDev %RSD	Y_3710 ppm L0000 .0000 55.42	2n2062 ppm L0011 .0002 18.23	Zr3496 ppm L.0007 .0001 18.96				
#1 #2	L 0001 L 0000	L0012 L0010	L. 0008 L. 0006				
Errors High Low	LC Low 5.500 4.500	LC Low 1.100 .9000	LC Low 5.500 4.500				

010147

Analysis Report

06/15/04 02:33:02 PM

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IntStd Mode Elem Wavlen Avge SDev %RSD	1 *Counts Sc 361.384 649814 560.7357 .0862917	2 Time 10000 .0000000 .0000000	3 NOTUSED 	4 NOTUSED 	5 NOTUSED 	6 NOTUSED 	7 NOTUSED
#1 #2	650211 649418	10000 10000			1984 sage		

010148 06/15/04 02:39:38 PM

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unier A or :	s nepur			5 STORES & COS	9.5 mg 9.5 La in 15 af in	· 3/13 1" 1"1	ിയെല്ലം മ
Run Time	e: 06/15/0	Sample N 4 14:35:04	ame: CCN3	10H 6-15-09-	- Ot	erator:	
Comment: Mode: CC		. Factor:	1				
Elem	Ag3280	A13082	As1890	8_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	H,9846	H9.644	H4.918	H4,748	H9 .908	H.9699	H4.979
SDev	, 0003	.002	.002	.011	. 001	.0012	.007
%RSD	, 0311	.0169	.0421	.2328	. 0108	.1237	.1410
#1	H. 9848	H9.643	H4.919	H4.740	H9.907	H. 9691	H4.984
#2	H. 9844	H9.645	H4.916	H4.756	H9.909	H. 9708	H4.975
Errors	LC High	LC High	LC High	LC High	LC High	LC High	LC High
High	.0050	.0500	.0050	.0500	.0050	.0050	.0100
Low	0050	0500	0050	0500	0050	0050	0100
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	H19.97	H.9882	H4.928	H1.943	H2.013	H10.10	H18.30
SDev	.08	.0027	.008	.004	.001	.03	.05
%RSD	.3868	.2743	.1642	.1934	.0403	.3177	.2597
#1	H19.91	H. 9862	H4.922	H1.940	H2.014	H10.08	H18.33
#2	H20.02	H. 9901	H4.934	H1.945	H2.012	H10.12	H18.26
Errors	LC High	LC High	LC High	LC High	LC High	LC High	LC High
High	.0500	.0050	.0050	.0050	.0050	.0250	.1000
Low	0500	0050	0050	0050	0050	0250	1000
Elem Units Avge SDev	La3988 ppm H4.925 .003	Li6707 ppm H4.434 .010	Mg2790 ppm H19,81 ,03	Mn2576 ppm H1.003 .001	Ma2020 ppm H4.936 .027	Na3302 ppm H27.03	Na5889 ppm H18.88 .04
%RSD	. 0635	. 2284	. 1582	. 0942	, 5543	. 1089	.8375
#1	H4.923	H4.441	H19.79	H1.002	H4.917	H27.06	H18.91
#2	H4.927	H4.427	H19.83	H1.004	H4.956	H27.01	H18.85
Errors	LC High	LC High	LC High	LC High	LC High	LC High	LC High
High	.0050	.0050	.0500	.0050	.0050	.0500	.0500
Low	0050	0050	0500	0050	0050	0500	0500
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	H4.787	H4.976	4.943	4.939	H1.020	H.9887	H.9809
SDev	.004	.145	.009	.023	.001	.0066	.0040
%RSD	.0838	2.916	.1872	.4716	.1065	.6628	.4023
#1	H4.784	H5.079	4.937	4.922	H1.019	H.9934	H.9837
#2	H4.789	H4.874	4.950	4.955	H1.020	H.9841	H.9782
Errors High Low	LC High .0050 0050	LC High .0100 0100	NOCHECK	NOCHECK	LC High .0050 0050	LC High .0100 0100	LC High .0100 0100
Elem	Sc3613	1960/1	1960/2	Si2881	Ph220	Se196	

010149 06/15/04 02:39:38 PM

Units	%R	ррт	рр т	рр л	рр ж	ррм	ድድም
Avge	100.0	5.178	5.123	Н4.897	Н4.940	H5.141	H4.904
SDev	.4	.004	.039	.004	.019	.027	. ወለይ
%RSD	.3714	.0770	.7551	.0768	.3767	.5274	. ወ978
#1	100.3	5.175	5.096	H4.899	H4.927	H5.122	H4.901
#은	99.74	5.181	5.150	H4.894	H4.953	H5.160	H4.907
Errors High Low	NOCHECK	NOCHECK	NOCHECK	LC High .0100 0100	LC High .0030 0030	LC High .0050 0050	LC High .0050 0050
Elem	Sr4215	Th2837	Ti3349	T11908	U_4090	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	H5.064	H.9634	H4.843	H5.154	H.9829	H4.896	H.9760
SDev	.003	.0031	.001	.043	.0065	.001	.0076
XRSD	.0680	.3217	.0109	.8270	.6589	.0253	.7808
井1	H5.061	H.9656	H4.842	H5.124	H. 9784	H4.897	H. 9706
井ご	H5.066	H.9612	H4.843	H5.184	H. 9875	H4.895	H. 9814
Errors	LC High	LC Hiyh	LC High	LC High	LC High	LC: High	IC Ніць
High	.0050	.0100	.0050	.0100	.1000	.0050	.0100
Low	0050	0100	0050	0100	1000	0050	—.0100
Elem Units Avge SDev %RSD	Y_3710 Frfm H4.954 .002 .0333	Zn2062 ppm H.9986 .0069 .6888	Zr3496 PFM H4.880 .002 .0455				
#1 #2	H4.955 H4.952	H.9938 H1.003	H4.882 H4.878				
Errors High Low	LC High .0050 0050	LC High .0050 0050	LC High .0050 0050				

010150

Analysis Report

06/15/04 02:39:38 PM page 3

IntStd Mode Elem	1 *Counts Sc	2 Time	3 NOTUSED	4 NOTUSED	5 NOTUSED	6 NOTUSED	7 NOTUSED
Wavlen	361.384				rating adapted		
Avge	644960	10000					
SDev	2440.226	. 0000000					
XRSD	. 3783527	. 0000000				airt feili	Laine Bittan
#1	646686	10000					- 20
井 戸	643235	10000	apage for m	Sector annual		auge + desain	Cast & When

Analysi	s Report			06/15	i/04 02:44:	01015	5 1 page	
Method: Run Tim	Method: DAILYP Run Time: 06/15/04		Sample Name: 245111 14:39:50			Operator:		
Comment Mode: C		Factor:	1 .					
Elem	Ag328Ø	A13082	As1890	B_2496	Ba4934	Be3130	Bi2230	
Units	ppm	ppm	pp m	ppm	ppm	pp n	ppm	
Avge	. 0000	.3962	.0099	. 1705	. 2081	.0003	. 0031	
SDev	.0005	.0493	.0050	. 0004	. 0002	. 0000	.0083	
%RSD	169700.	12.44	50.37	. 2268	2.418	4.187	266.0	
#1	0004	. 4311	.0135	. 1708	.0083	. 0003	0027	
#2	. 0004	.3614	. 0064	. 1703	. 0080	. 0003	. 0090	
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664	
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	
Avge	6.970	.0001	. 0008	.0006	. 0005	.1379	3.126	
SDev	.075	. 0001	. 0005	. 0006	. 0001	.0023	.073	
XRSD	1.077	154.5	67.83	91.80	19.77	1.657	2.337	
#1	6.917	0000	.0012	. 0011	. 0005	.1363	3.075	
井已	7.023	.0002	. 0004	. 0002	. 0006	.1395	3.178	
Elem	La3988	Li6707	Mg2790	Mn2576	Ma2020	Na3302	Na5889	
Units	ppm	ppm	ppm	ppm	ppm	រុ ក្ រ ា	្រទ្រធ	
Avge	. 0008	. Ø847	.6041	, ଉହାଡନ	. 0092	79.38	50.66	
SDev	. 0004	. 0008	. 0009	. 0002	. 0000	1.39	.69	
%RSD	46.95	. 8851	.1472	22.00	. 2013	1.748	1.350	
#1	.0010	.0842	.6035	.0010	.0092	78.40	50.17	
#2	. 0005	. 0852	.6048	. naq7	.0093	80.36	51, 15	
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	5_1820	S52068	
Units	ppm	ppm	ppm	bb w	ppm	bt.w	to b w	
Avge	.0009	.0388	.0006	.0036	.0003	7.483	.0010	
SDev	.0023	.0094	.0027	. 0020	. 0019	.134	.0016	
*RSD	244.5	24.23	445.6	55.36	542.6	1.798	162.8	
#1	.0025	.0455	0013	.0022	0010	7.518	0001	
#2	0007	.0322	.0025	.0050	.0017	7.389	.0021	
Flow	9-7617	19607/1	1960/2	G; 2001	05220	Se196	Sn1899	

,	0-74-7	101011	101010	m :	1770 L. 1770 1770 1780	m. + 0.7	
Elem	Sc3613	1960/1	1960/2	Si2881	PP550	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avge	101.6	.0239	. 0000	26.99	.0026	.0080	.0234
SDev	.0	.0034	.0086	. 17	.0022	.0069	.0032
%RSD	.0027	14.14	30430.	.6138	84.70	85.75	13.76
#1	101.6	. 0263	. 0061	27.11	. 0010	.0129	.0256
#5	101.6	.0215	0061	26.87	. 0042	. 0032	.0211
Elem	Sr4215	Th2837	Ti3349	T11908	U_4090	V_2924	W_2079
Units	pepen	ppm	ppm	ppm	ppm	pros	E C M
Avge	.0332	-,0011	. 0036	0049	. 0291	.0050	0000
SDev	. 0003	.0018	. 0004	. 0089	. 0025	. 0006	. 00115
%RSD	.8210	159.9	10.28	182.1	8.721	12.64	35060.
#1	, 0330	. 0001	, ØØ39	. 0014	" ØRØ9	. 0054	. 0010
井 湾	. 0334	0024	.0034	0111	.0273	.0045	0011

010152

Analysis Report

06/15/04 02:44:24 FM page 2

Elem Units Avge SDev %RSD	Y_3710 PPm .0002 .0002 102.8	Zn2062 ppm .0017 .0003 20.71	Zr3496 ppm .0013 .0002 14.76				
#1	.0003	.0020	. 0014				
#2	. 0000	.0015	.0012				
IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc		17174 w2000				te to deter
Wavlen	361.384		eline e.est		11186	the BS of Fact	
Avge	654986	10000					PT 04000
SDev	9.899495	, 0000000			-f suge success	4+68 8 - 344	
*RSD	.0015114	. 0000000		ndert Blane	****		
#1	654979	10000					
#2	654993	10000					

010153

Method:DAILYPGample Name: 24511POperator:Run Time:Ø6/15/04 14:44:36Operator:Comment:Mode:CONCCorr.Mode:CONCCorr.Factor:0ElemAg3280A13082As1890B_2496Ba4934Be3130Unitsppmppmppmppm

Elem	Ag328Ø	A13082	As1890	B_2496	Ba4934	Be3130	Bi2230
Unite	ppm	ppm	ppm	ppm	0.018	្រុក្សា	npm.
Avge	0003	0176	-,ØØ1Ø	0017	. 0001	. 0003	. 0055
SDev	. 0001	. 0008	. 0009	.0014	. 0001	. 0000	. 0047
%RSD	19.75	4.715	84.32	84.71	38.43	1.212	84.27
					Na na tina tanàna minina mi	als of the set the	5 8 86 86. 8
#1	0003	0170	0004	0007	.0002	.0003	. 0089
#2	0003	0182	-,0017	0027	. 0001	.0003	.0022
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	10.01	.0010	. 0009	0002	. 0001	10.14	7.902
SDev	. Ø1	.0002	.0004	. 0003	.0002	. 04	.018
XRSD	. 1166	21.54	42.67	112.9	296.5	. 4042	.2235
#1	10.02	.0012	. 0006	0004	0001	10.17	7.914
# 念	10.01	. 0009	.0011	0000	.0002	10.11	7.889
Elem	La3988	Li6707	Mg279Ø	Mn2576	Mo2020	Na3302	Na5889
Units	ក្រុកត	n p p m	ppm	ppm	ppm	ppm	ppm
Avge	0003	0001	9.838	-, 0000	. 0018	7.891	5.220
SDev	, 0003	. 0000	.017	.0001	.0002	. 111	.003
%RSD	86.77	25.27	.1749	200.4	12.22	1.412	. 0569
<u>#1</u>	0001	0001	9,850	.0000	.0017	7.970	5.218
#2	0005	0002	9.826	-, aai	. 0020	7.812	5.822
				~~~~~	じょうとのと	C 1000	S62068
Flom	NIPTIA	C 1792					
Elem	Ni2316	P_1782	2203/1	2203/2	Pd34Ø4	S_1820	
Units	ppm	ppm	<b>b</b> b <b>w</b>	to to m	ppm	to to m	E-E-m
Units Avge	ppm 0003	ррж . 0078	ppm .0004	ppm .0024	ррт 0014	0292	рф. —.0013
Units Avge SDev	ppm 0003 .0005	ррж . 0078 . 0139	рр <b>т</b> . 0004 . 0026	ppm .0024 .0013	ррт 0014 .0006	PP# 0292 . 0008	ррт —.0013 .0033
Units Avge	ppm 0003	ррж . 0078	ppm .0004	ppm .0024	ррт 0014	0292	рф. —.0013
Units Avge SDev %RSD	ppm 0003 .0005 174.3	ррж .0078 .0139 178.6	PP# .0004 .0026 682.5	рр# .0024 .0013 53.37	ррт 0014 .0006 44.51	ppm −.0292 .0008 2.745	рр <b>л</b> 0013 .0033 257.8
Units Avge SDev	ppm 0003 .0005	ррж . 0078 . 0139	ррт . 0004 . 0026	ppm .0024 .0013	ррт 0014 .0006	PP# 0292 . 0008	ррт —.0013 .0033
Units Avge SDev %RSD #1	ppm 0003 .0005 174.3 .0001	ррж .0078 .0139 178.6 0021	ррт .0004 .0026 682.5 0015	ppm .0024 .0013 53.37 .0015	ррт 0014 .0006 44.51 0009	ррж 0292 . 0008 2. 745 0297	ррт 0013 .0033 257.8 0036
Units Avge SDev %RSD #1	ppm 0003 .0005 174.3 .0001	ррж .0078 .0139 178.6 0021	ррт .0004 .0026 682.5 0015	ppm .0024 .0013 53.37 .0015	ррт 0014 .0006 44.51 0009	ррж 0292 . 0008 2. 745 0297	ррт 0013 .0033 257.8 0036
Units Avge SDev %RSD #1 #2	ppm 0003 .0005 174.3 .0001 0007	ррт .0078 .0139 178.6 0021 .0176	pp# .0004 .0026 682.5 0015 .0022	pp# .0024 .0013 53.37 .0015 .0033	ррт 0014 .0006 44.51 0009 0018	ррж 0292 . 0008 2. 745 0297 0286	pp# 0013 .0033 257.8 0036 .0010
Units Avge SDev %RSD #1 #2 Elem	ppm 0003 .0005 174.3 .0001 0007 Sc3613	ррж .0078 .0139 178.6 0021 .0176 1960/1	ppm .0004 .0026 682.5 0015 .0022 1960/2	pp# .0024 .0013 53.37 .0015 .0033 Si2881	ррт 0014 .0006 44.51 0009 0018 Ръгго	ppm 0292 .0008 2.745 0297 0286 Se196	ppm 0013 .0033 257.8 0036 .0010 Sn1899
Units Avge SDev %RSD #1 #2 Elem Units	ppm 0003 .0005 174.3 .0001 0007 Sc3613 %R	ррж .0078 .0139 178.6 0021 .0176 1960/1 ррж	ppm .0004 .0026 682.5 0015 .0022 1960/2 ppm	ppm .0024 .0013 53.37 .0015 .0033 Si2881 ppm	ррт 0014 .0006 44.51 0009 0018 Рь220 ррт	ррт 0292 .0008 2.745 0297 0286 Se196 ppm	ppm 0013 .0033 257.8 0036 .0010 Sn1899 ppm
Units Avge SDev %RSD #1 #2 Elem Units Avge	ppm 0003 .0005 174.3 .0001 0007 Sc3613 %R 102.6	ррт .0078 .0139 178.6 0021 .0176 1960/1 ррт .0024	ppm .0004 .0026 682.5 0015 .0022 1960/2 ppm 0054	ppm .0024 .0013 53.37 .0015 .0033 Si2881 ppm .0068	ррт 0014 .0006 44.51 0009 0018 РЬ220 ррт .0017	ррт 0292 2.745 0297 0297 0286 Sei96 ppm 0028	ppm 0013 .0033 257.8 0036 .0010 Sn1899 ppm .0004
Units Avge SDev %RSD #1 #2 Elem Units Avge SDev %RSD	ppm 0003 .0005 174.3 .0001 0007 Sc3613 %R 102.6 .4 .3505	ppm .0078 .0139 178.6 0021 .0176 1960/1 ppm .0024 .0049 206.3	ppm .0004 .0026 682.5 0015 .0022 1960/2 ppm 0054 .0047 87.32	ppm .0024 .0013 53.37 .0015 .0033 Si2881 ppm .0068 .0019 28.52	ррт 0014 .0006 44.51 0009 0018 РЬ220 Ррт .0017 .0017 99.14	ppm 0292 .0008 2.745 0297 0286 Se196 ppm 0028 .0048 170.8	ppm 0013 .0033 257.8 0036 .0010 Sn1899 ppm .0004 .0005 120.6
Units Avge SDev %RSD #1 #2 Elem Units Avge SDev %RSD #1	ppm 0003 .0005 174.3 .0001 0007 Sc3613 %R 102.6 .4 .3505 102.4	ppm .0078 .0139 178.6 0021 .0176 1960/1 ppm .0024 .0049 206.3 0011	ppm .0004 .0026 682.5 0015 .0022 1960/2 ppm 0054 .0047 87.32 0088	ppm .0024 .0013 53.37 .0015 .0033 Si2881 ppm .0068 .0019 28.52 .0081	ppm 0014 .0006 44.51 0009 0018 Pb220 ppm .0017 .0017 .0017 99.14 .0005	ррт 0292 .0008 2.745 0297 0286 Se196 ppm 0028 .0048 170.8	ppm 0013 .0033 257.8 0036 .0010 Sn1899 ppm .0004 .0005 120.6 .0008
Units Avge SDev %RSD #1 #2 Elem Units Avge SDev %RSD	ppm 0003 .0005 174.3 .0001 0007 Sc3613 %R 102.6 .4 .3505	ppm .0078 .0139 178.6 0021 .0176 1960/1 ppm .0024 .0049 206.3	ppm .0004 .0026 682.5 0015 .0022 1960/2 ppm 0054 .0047 87.32	ppm .0024 .0013 53.37 .0015 .0033 Si2881 ppm .0068 .0019 28.52	ррт 0014 .0006 44.51 0009 0018 РЬ220 Ррт .0017 .0017 99.14	ppm 0292 .0008 2.745 0297 0286 Se196 ppm 0028 .0048 170.8	ppm 0013 .0033 257.8 0036 .0010 Sn1899 ppm .0004 .0005 120.6
Units Avge SDev %RSD #1 #2 Elem Units Avge SDev %RSD #1 #2	ppm 0003 .0005 174.3 .0001 0007 Sc3613 %R 102.6 .4 .3505 102.4 102.9	ppm .0078 .0139 178.6 0021 .0176 1960/1 ppm .0024 .0049 206.3 0011 .0059	ppm .0004 .0026 682.5 0015 .0022 1960/2 ppm 0054 .0047 87.32 0088 0021	ppm .0024 .0013 53.37 .0015 .0033 Si2881 ppm .0068 .0019 28.52 .0081 .0081 .0054	ррт 0014 .0006 44.51 0009 0018 РБ220 ррт .0017 .0017 .0017 99.14 .0005 .0030	ррт 0292 . 0008 2.745 0297 0286 Se196 ppm 0028 . 0048 170.8 0062 . 0006 . 0006	ppm 0013 .0033 257.8 0036 .0010 Sn1899 ppm .0004 .0005 120.6 .0008 .0001
Units Avge SDev %RSD #1 #2 Elem Units Avge SDev %RSD #1 #2 Elem	ppm 0003 .0005 174.3 .0001 0007 Sc3613 %R 102.6 .4 .3505 102.4 102.9 Sr4215	ррж .0078 .0139 178.6 0021 .0176 1960/1 ррж .0024 .0049 206.3 0011 .0059 Th2837	ppm .0004 .0026 682.5 0015 .0022 1960/2 ppm 0054 .0047 87.32 0088 0021 Ti3349	ppm .0024 .0013 53.37 .0015 .0033 Si2881 ppm .0068 .0019 28.52 .0081 .0054 T11908	ррт 0014 .0006 44.51 0009 0018 РБ220 ррт .0017 .0017 .0017 .99.14 .0005 .0030 U_4090	ррт 0292 . 0008 2.745 0297 0286 Se196 ppm 0028 . 0048 170.8 0062 . 0006 . 0006	ppm 0013 .0033 257.8 0036 .0010 Sn1899 ppm .0004 .0005 120.6 .0008 .0001 W_2079
Units Avge SDev %RSD #1 #2 Elem Units Avge SDev %RSD #1 #2 Elem Units	ppm 0003 .0005 174.3 .0001 0007 Sc3613 %R 102.6 .4 .3505 102.4 102.9 Sr4215 ppm	ррт .0078 .0139 178.6 0021 .0176 1960/1 ррт .0024 .0049 206.3 0011 .0059 Th2837 ррт	ppm .0004 .0026 682.5 0015 .0022 1960/2 ppm 0054 .0047 87.32 0088 0021 Ti3349 ppm	ppm .0024 .0013 53.37 .0015 .0033 Si2881 ppm .0068 .0019 28.52 .0081 .0054 T11908 ppm	ррт 0014 .0006 44.51 0009 0018 РБ220 РРт .0017 .0017 .0017 99.14 .0005 .0030 U_4090 РРт	ррт 0292 . 0008 2.745 0297 0286 Se196 PPm 0028 . 0048 170.8 0062 . 0006 . 0006 V_2924 PPm	ppm 0013 .0033 257.8 0036 .0010 Sn1899 ppm .0004 .0005 120.6 .0008 .0001 W_2079 ppm
Units Avge SDev %RSD #1 #2 Elem Units Avge SDev %RSD #1 #2 Elem Units Avge	ppm 0003 .0005 174.3 .0001 0007 Sc3613 %R 102.6 .4 .3505 102.4 102.9 Sr4215 ppm .0002	ppm .0078 .0139 178.6 0021 .0176 1960/1 ppm .0024 .0049 206.3 0011 .0059 Th2837 ppm 0097	ppm .0004 .0026 682.5 0015 .0022 1960/2 ppm 0024 .0047 87.32 0088 0021 Ti3349 ppm .0003	ppm .0024 .0013 53.37 .0015 .0033 Si2881 ppm .0068 .0019 28.52 .0081 .0054 T11908 ppm .0077	ррт 0014 .0006 44.51 0009 0018 РБ220 РРт .0017 .0017 .0017 .0017 99.14 .0005 .0030 U_4090 РРт .0146	ррт 0292 . 0008 2.745 0297 0286 Se196 ppm 0028 . 0048 170.8 0062 . 0006 V_2924 ppm 0004	ppm 0013 .0033 257.8 0036 .0010 Sn1899 ppm .0004 .0005 120.6 .0008 .0001 W_2079 ppm 0023
Units Avge SDev %RSD #1 #2 Elem Units Avge SDev %RSD #1 #2 Elem Units Avge SDev	ppm 0003 .0005 174.3 .0001 0007 Sc3613 %R 102.6 .4 .3505 102.4 102.9 Sr4215 ppm .0002 .0000	ррж .0078 .0139 178.6 0021 .0176 1960/1 ррж .0024 .0049 206.3 0011 .0059 Th2837 ррж 0097 .0030	ppm .0004 .0026 682.5 0015 .0022 1960/2 ppm 0024 .0047 87.32 0088 0021 Ti3349 ppm .0003 .0001	ppm .0024 .0013 53.37 .0015 .0033 Si2881 ppm .0068 .0019 28.52 .0081 .0054 Tl1908 ppm .0077 .0027	ррт 0014 .0006 44.51 0009 0018 РБ220 РРТ .0017 .0017 .0017 .0017 .0017 .0017 .0025 .0030 U_4090 РРТ .0146 .0122	ррт 0292 . 0008 2.745 0297 0286 Se196 ppm 0028 . 0048 170.8 170.8 0062 . 0006 V_2924 ppm 0004 . 0003	ppm 0013 .0033 257.8 0036 .0010 Sn1899 ppm .0004 .0004 .0005 120.6 .0005 120.6 .0001 W_2079 Ppm 0023 .0007
Units Avge SDev %RSD #1 #2 Elem Units Avge SDev %RSD #1 #2 Elem Units Avge	ppm 0003 .0005 174.3 .0001 0007 Sc3613 %R 102.6 .4 .3505 102.4 102.9 Sr4215 ppm .0002	ppm .0078 .0139 178.6 0021 .0176 1960/1 ppm .0024 .0049 206.3 0011 .0059 Th2837 ppm 0097	ppm .0004 .0026 682.5 0015 .0022 1960/2 ppm 0024 .0047 87.32 0088 0021 Ti3349 ppm .0003	ppm .0024 .0013 53.37 .0015 .0033 Si2881 ppm .0068 .0019 28.52 .0081 .0054 T11908 ppm .0077	ррт 0014 .0006 44.51 0009 0018 РБ220 РРт .0017 .0017 .0017 .0017 99.14 .0005 .0030 U_4090 РРт .0146	ррт 0292 . 0008 2.745 0297 0286 Se196 ppm 0028 . 0048 170.8 0062 . 0006 V_2924 ppm 0004	ppm 0013 .0033 257.8 0036 .0010 Sn1899 ppm .0004 .0005 120.6 .0008 .0001 W_2079 ppm 0023
Units Avge SDev %RSD #1 #2 Elem Units Avge SDev %RSD #1 #2 Elem Units Avge SDev %RSD	ppm 0003 .0005 174.3 .0001 0007 Sc3613 %R 102.6 .4 .3505 102.4 102.9 Sr4215 ppm .0002 .0000 1.560	ррж .0078 .0139 178.6 0021 .0176 1960/1 ррж .0024 .0049 206.3 0011 .0059 Th2837 ррж 0097 .0030 30.62	ppm .0004 .0026 682.5 0015 .0022 1960/2 ppm 0054 .0047 87.32 0088 0021 Ti3349 ppm .0003 .0001 50.69	ppm .0024 .0013 53.37 .0015 .0033 Si2881 ppm .0068 .0019 28.52 .0081 .0054 T11908 ppm .0077 .0027 34.74	ррт 0014 .0006 44.51 0009 0018 РБ220 ррт .0017 .0017 .0017 .0017 .0017 .0017 .0025 .0030 U_4090 ррт .0146 .0122 83.60	ррт 0292 . 0008 2. 745 0297 0286 Se196 ppm 0028 . 0048 170.8 0062 . 0006 V_2924 ppm 0004 . 0003 82.86	ppm 0013 .0033 257.8 0036 .0010 Sn1899 ppm .0004 .0005 120.6 .0008 .0001 W_2079 Ppm 0023 .0007 31.76
Units Avge SDev %RSD #1 #2 Elem Units Avge SDev %RSD #1 #2 Elem Units Avge SDev	ppm 0003 .0005 174.3 .0001 0007 Sc3613 %R 102.6 .4 .3505 102.4 102.9 Sr4215 ppm .0002 .0000	ррж .0078 .0139 178.6 0021 .0176 1960/1 ррж .0024 .0049 206.3 0011 .0059 Th2837 ррж 0097 .0030	ppm .0004 .0026 682.5 0015 .0022 1960/2 ppm 0024 .0047 87.32 0088 0021 Ti3349 ppm .0003 .0001	ppm .0024 .0013 53.37 .0015 .0033 Si2881 ppm .0068 .0019 28.52 .0081 .0054 Tl1908 ppm .0077 .0027	ррт 0014 .0006 44.51 0009 0018 РБ220 РРТ .0017 .0017 .0017 .0017 .0017 .0017 .0025 .0030 U_4090 РРТ .0146 .0122	ррт 0292 . 0008 2.745 0297 0286 Se196 ppm 0028 . 0048 170.8 170.8 0062 . 0006 V_2924 ppm 0004 . 0003	ppm 0013 .0033 257.8 0036 .0010 Sn1899 ppm .0004 .0004 .0005 120.6 .0005 120.6 .0001 W_2079 Ppm 0023 .0007

Elem Units Avge SDev %RSD #1 #2	Y_3710 PPm 0001 .0000 21.42 0001 0001	Zn2062 Ppm .0004 .0001 23.04 .0005 .0003	Zr3496 ppm .0001 .0003 267.1 .0003 0001			∩ <u>1</u> (	154
IntStd Mode Elem	i *Counts Sc	2 Time	3 NOTUSED	4 NOTUSED	5 NOTUSED	6 NOTUSED	7 NOTUSED
Wavlen Avge SDev ⊀RSD	361.384 661990 2382.950 .3599676	10000 . 0000000 . 0000000					Man
#1 #2	660305 663675	10000 10000					aufen frage

Method: DAILY2 Sample Name: 245113 Run Time: 06/15/04 14:49:22 Comment: Mode: CONC Corr. Factor: 1 Operator:

### 010155

Elem	Ag328Ø	A13082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	្រក្រត	ppm	ppm	ppm	opm	pom	opm
Avge	. 1001	.0752	.0921	0033	, 1005	, Ø966	0012
SDev	.0015	.0012	.0035	. 0001	. 0002	. 0002	.0021
%RSD	1.460	1.608	3.816	2.414	. 2083	. 1650	183.6
		T. Fr Last W. C.	Laur of Auron and Auron		an an The Constant	an the test test their	
#1	. 1011	.0761	. 0896	0033	. 1007	.0967	.0003
#2	. 0991	.0743	.0945	0032	. 1004	.0965	0027
// Las	8 Test 17 AN	H 167 F 167	a ter of a ter	an martin that to	a		ar da faar ar
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	p.p.m
Avge	9,959	. 0996	.0988	. 0968	. 0959	10.12	7.932
SDev	. Ø11	. 0009	.0007	.0010	. 0004	. Øi	.037
XRSD	. 1060	.8649	.6761	1.088	. 3936	. 1061	. 4642
#1	9.966	. 1002	.0992	.0976	.0962	10.11	7.958
#2	9.951	.0990	.0983	.0961	.0957	10.12	7.906
Elem	La3988	Li6707	Mg279Ø	Mn2576	Mo2020	Na3302	Na5889
Units	pp <b>m</b>	pp <b>m</b>	ppm	ppm	ppm	ppm	ppm
Avge	-, 0003	—. QQQ1	9.773	. 1007	.0924	8.140	5.288
SDev	.0003	. 0000	.015	.0004	.0027	.083	.016
%RSD	111.5	26.07	. 1491	. 4249	2.911	1.016	. 3087
				1010			-
#1 ···-	0001	0001	9.783	. 1010	.0905	8.198	5.300
#2	0005	0002	9.762	. 1004	. 0943	8.081	5.277
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Elem Units	Ni2316 ppm	P_1782 ppm	2203/1 ppm		Pd3404 ppm		562068 ppm
				2203/2 ppm .0994		S_1820 ppm 0406	
Units	ppm	ppm	pp m	ррт "0994	ррж —, 0013	ррт —.0406	F(F)m . 0957
Units Avge	ppm .0982	ррт . 0044	рр <b>т</b> .0975 .0006	ррт .0994 .0032	to to m	ррт —. 0406 . 0102	FFM . 0957 . 0002
Units Avge SDev	ppm . 0982 . 0008	ррт .0044 .0107	рр <b>м</b> .0975	ррт "0994	ррм 0013 .0015	ррт —.0406	F(F)m . 0957
Units Avge SDev	ppm . 0982 . 0008	ррт .0044 .0107	рр <b>т</b> .0975 .0006	ррт .0994 .0032	ррм 0013 .0015	ррт —. 0406 . 0102	PPM . 0957 . 0002
Units Avge SDev %RSD	ррж . 0982 . 0008 . 8565	ррт .0044 .0107 242.3	ррт .0975 .0006 .6512	ppm .0994 .0032 3.216	ррм 0013 .0015 112.1	9Fm 0406 .0102 25.23	ррт . 0957 . 0002 . 2148
Units Avge SDev %RSD #1	ррт .0982 .0008 .8565 .0977 .0988	ppm .0044 .0107 242.3 .0120 0031	ppm .0975 .0006 .6512 .0970 .0979	ppm .0994 .0032 3.216 .0971 .1016	ррм 0013 .0015 112.1 0023	ррт 0406 .0102 25.23 0478 0333	ррт . 0957 . 0002 . 2148 . 0959 . 0956
Units Avge SDev %RSD #1 #2 Elem	pp: .0982 .0008 .8565 .0977 .0988 Sc3613	ppm .0044 .0107 242.3 .0120	рр <b>т</b> .0975 .0006 .6512 .0970	ppm .0994 .0032 3.216 .0971	ррм 0013 .0015 112.1 0023	ррт 0406 . 0102 25. 23 0478	ррт . 0957 . 0002 . 2148 . 0959
Units Avge SDev %RSD #1 #2 Elem Units	ррж .0982 .0008 .8565 .0977 .0988 Sc3613 %R	ррт .0044 .0107 242.3 .0120 0031 1960/1 ррт	ppm .0975 .0006 .6512 .0970 .0979 1960/2 ppm	ppm .0994 .0032 3.216 .0971 .1016 Si2881 ppm	ррм 0013 .0015 112.1 0023 0003 Рь220 ррм	ррт 0406 .0102 25.23 0478 0333 Se196 ррт	ррт . 0957 . 0002 . 2148 . 0959 . 0956 Sn1899 ppm
Units Avge SDev %RSD #1 #2 Elem Units Avge	pp: .0982 .0008 .8565 .0977 .0988 Sc3613	рртт .0044 .0107 242.3 .0120 0031 1960/1	ppm .0975 .0006 .6512 .0970 .0979 1960/2	ppm .0994 .0032 3.216 .0971 .1016 Si2881	ррт 0013 .0015 112.1 0023 0003 Рь220	ppm 0406 .0102 25.23 0478 0333 Se196 ppm .0939	ррт 20957 20002 2148 20959 20956 Sn1899
Units Avge SDev %RSD #1 #2 Elem Units	ррж .0982 .0008 .8565 .0977 .0988 Sc3613 %R	ррт .0044 .0107 242.3 .0120 0031 1960/1 ррт	ppm .0975 .0006 .6512 .0970 .0979 1960/2 ppm	ppm .0994 .0032 3.216 .0971 .1016 Si2881 ppm	ррм 0013 .0015 112.1 0023 0003 Рь220 ррм	ррт 0406 .0102 25.23 0478 0333 Se196 ррт	ррт . 0957 . 0002 . 2148 . 0959 . 0956 Sn1899 ppm
Units Avge SDev %RSD #1 #2 Elem Units Avge	PP# .0982 .0008 .8565 .0977 .0988 Sc3613 %R 103.0	ррт .0044 .0107 242.3 .0120 0031 1960/1 ррт .0981	ppm .0975 .0006 .6512 .0970 .0979 1960/2 ppm .0917	ppm .0994 .0032 3.216 .0971 .1016 Si2881 ppm .0070	ррж 0013 .0015 112.1 0023 0003 Рьгго ррж .0987	ppm 0406 .0102 25.23 0478 0333 Se196 ppm .0939	ррт . 0957 . 0002 . 2148 . 0959 . 0956 Sn1899 ppm 0009
Units Avge SDev %RSD #1 #2 Elem Units Avge SDev %RSD	ppm .0982 .0008 .8565 .0977 .0988 Sc3613 %R 103.0 .7 .7272	ppm .0044 .0107 242.3 .0120 0031 1960/1 ppm .0981 .0016 1.624	ppm .0975 .0006 .6512 .0970 .0979 1960/2 ppm .0917 .0025 2.685	ppm .0994 .0032 3.216 .0971 .1016 Si2881 ppm .0070 .0016 22.67	PPM 0013 .0015 112.1 0023 0003 Pb220 Pb220 Ppm .0987 .0023 2.371	prm 0406 .0102 25.23 0478 0333 Se196 ppm .0939 .0011 1.184	ppm .0957 .0002 .2148 .0959 .0956 Sn1899 ppm 0009 .0017 179.4
Units Avge SDev %RSD #1 #2 Elem Units Avge SDev %RSD #1	ppm .0982 .0008 .8565 .0977 .0988 Sc3613 %R 103.0 .7 .7272 102.4	ppm .0044 .0107 242.3 .0120 0031 1960/1 ppm .0981 .0016 1.624 .0993	ppm .0975 .0006 .6512 .0970 .0979 1960/2 ppm .0917 .0025 2.685 .0900	ppm .0994 .0032 3.216 .0971 .1016 Si2881 ppm .0070 .0016 22.67 .0081	PPM 0013 .0015 112.1 0023 0003 Pb220 Pb220 Ppm .0987 .0023 2.371	prm 0406 .0102 25.23 0478 0333 Se196 ppm .0939 .0011 1.184 .0931	ppm .0957 .0002 .2148 .0959 .0956 Sn1899 ppm 0009 .0017 179.4 .0003
Units Avge SDev %RSD #1 #2 Elem Units Avge SDev %RSD	ppm .0982 .0008 .8565 .0977 .0988 Sc3613 %R 103.0 .7 .7272	ppm .0044 .0107 242.3 .0120 0031 1960/1 ppm .0981 .0016 1.624	ppm .0975 .0006 .6512 .0970 .0979 1960/2 ppm .0917 .0025 2.685	ppm .0994 .0032 3.216 .0971 .1016 Si2881 ppm .0070 .0016 22.67	PPM 0013 .0015 112.1 0023 0003 Pb220 Pb220 Ppm .0987 .0023 2.371	prm 0406 .0102 25.23 0478 0333 Se196 ppm .0939 .0011 1.184	ppm .0957 .0002 .2148 .0959 .0956 Sn1899 ppm 0009 .0017 179.4
Units Avge SDev %RSD #1 #2 Elem Units Avge SDev %RSD #1 #2	pp: .0982 .0008 .8565 .0977 .0988 Sc3613 %R 103.0 .7 .7272 102.4 103.5	ppm .0044 .0107 242.3 .0120 0031 1960/1 ppm .0981 .0016 1.624 .0993 .0970	ppm .0975 .0006 .6512 .0970 .0979 1960/2 ppm .0917 .0025 2.685 .0900 .0935	ppm .0994 .0032 3.216 .0971 .1016 Si2881 ppm .0070 .0016 22.67 .0081 .0058	PPM 0013 .0015 112.1 0023 0003 Pb220 Ppm .0987 .0023 2.371 .0021 .0971 .1004	ppm 0406 .0102 25.23 0478 0333 Se196 ppm .0939 .0011 1.184 .0931 .0947	ppm .0957 .0002 .2148 .0959 .0956 Sn1899 ppm 0009 .0017 179.4 .0003 0021
Units Avge SDev %RSD #1 #2 Elem Units Avge SDev %RSD #1 #2 Elem	ppm .0982 .0008 .8565 .0977 .0988 Sc3613 %R 103.0 .7 .7272 102.4 103.5 Sr4215	PFm .0044 .0107 242.3 .0120 0031 1960/1 PPm .0981 .0016 1.624 .0993 .0970 Th2837	ppm .0975 .0006 .6512 .0970 .0979 1960/2 ppm .0917 .0025 2.685 .0900 .0935 Ti3349	ppm .0994 .0032 3.216 .0971 .1016 Si2881 ppm .0070 .0016 22.67 .0081 .0058 T11908	PPM 0013 .0015 112.1 0023 0003 Pb220 Pb220 Pb220 Pb220 Pb220 2.023 2.371 .0923 2.371 .0971 .1004	prm 0406 .0102 25.23 0478 0333 Se196 ppm .0939 .0011 1.184 .0931 .0947 V_2924	prpm .0957 .0002 .2148 .0959 .0956 Sn1899 ppm 0009 .0017 179.4 .0003 0021 W_2079
Units Avge SDev %RSD #1 #2 Elem Units Avge SDev %RSD #1 #2 Elem Units	ppm .0982 .0008 .8565 .0977 .0988 Sc3613 %R 103.0 .7 .7272 102.4 103.5 Sr4215 ppm	ррт .0044 .0107 242.3 .0120 0031 1960/1 ррт .0981 .0016 1.624 .0993 .0970 Th2837 ррт	ррт .0975 .0006 .6512 .0970 .0979 1960/2 ррт .0917 .0025 2.685 .0900 .0935 Ti3349 ррт	ppm .0994 .0032 3.216 .0971 .1016 Si2881 ppm .0070 .0016 22.67 .0081 .0058 T11908 ppm	ррт 0013 .0015 112.1 0023 0003 Pb220 ppm .0987 .0023 2.371 .0971 .1004 U_4090 ppm	ргт 0406 .0102 25.23 0478 0333 Se196 ppm .0939 .0011 1.184 .0931 .0947 V_2924 ppm	prprm .0957 .0002 .2148 .0959 .0956 Sn1899 ppm 0009 .0017 179.4 .0003 0021 W_2079 ppm
Units Avge SDev %RSD #1 #2 Elem Units Avge SDev %RSD #1 #2 Elem Units Avge	ppm .0982 .0008 .8565 .0977 .0988 Sc3613 %R 103.0 .7 .7272 102.4 103.5 Sr4215 ppm 9.912	ppm .0044 .0107 242.3 .0120 0031 1960/1 ppm .0981 .0916 1.624 .0993 .0970 Th2837 ppm .0909	ppm .0975 .0006 .6512 .0970 .0979 1960/2 ppm .0917 .0025 2.685 .0900 .0935 Ti3349 ppm .0001	ppm .0994 .0032 3.216 .0971 .1016 Si2881 ppm .0070 .0016 22.67 .0081 .0058 T11908 ppm .1031	PPM 0013 .0015 112.1 0023 0003 Pb220 Ppm .0987 .0023 2.371 .0023 2.371 .0023 2.371 .0024 U_4090 Ppm .0329	prm 0406 .0102 25.23 0478 0333 Se196 ppm .0939 .0011 1.184 .0931 .0947 V_2924 ppm .0980	ppm .0957 .0002 .2148 .0959 .0956 Sn1899 ppm 0009 .0017 179.4 .0003 0021 W_2079 ppm 0002
Units Avge SDev %RSD #1 #2 Elem Units Avge SDev %RSD #1 #2 Elem Units Avge SDev	PP# .0982 .0008 .8565 .0977 .0988 Sc3613 %R 103.0 .7 .7272 102.4 103.5 Sr4215 PP# 9.912 .020	ppm .0044 .0107 242.3 .0120 0031 1960/1 ppm .0981 .0916 1.624 .0993 .0970 Th2837 ppm .0909 .0031	ррт .0975 .0006 .6512 .0970 .0979 1960/2 ppm .0917 .0025 2.685 .0900 .0935 Ti3349 ppm .0001 .0000	ppm .0994 .0032 3.216 .0971 .1016 Si2881 ppm .0070 .0016 22.67 .0081 .0058 Tl1908 ppm .1031 .0009	PPM 0013 .0015 112.1 0023 0003 Pb220 Ppm .0987 .0023 2.371 .0971 .1004 U_4090 PPm .0329 .0029	prm 0406 .0102 25.23 0478 0333 Se196 ppm .0939 .0011 1.184 .0931 .0947 V_2924 ppm .0980 .0004	ppm .0957 .0002 .2148 .0959 .0956 Sn1899 ppm 0009 .0017 179.4 .0003 0021 W_2079 ppm 0002 .0014
Units Avge SDev %RSD #1 #2 Elem Units Avge SDev %RSD #1 #2 Elem Units Avge	ppm .0982 .0008 .8565 .0977 .0988 Sc3613 %R 103.0 .7 .7272 102.4 103.5 Sr4215 ppm 9.912	ppm .0044 .0107 242.3 .0120 0031 1960/1 ppm .0981 .0916 1.624 .0993 .0970 Th2837 ppm .0909	ppm .0975 .0006 .6512 .0970 .0979 1960/2 ppm .0917 .0025 2.685 .0900 .0935 Ti3349 ppm .0001	ppm .0994 .0032 3.216 .0971 .1016 Si2881 ppm .0070 .0016 22.67 .0081 .0058 T11908 ppm .1031	PPM 0013 .0015 112.1 0023 0003 Pb220 Ppm .0987 .0023 2.371 .0023 2.371 .0023 2.371 .0024 U_4090 Ppm .0329	prm 0406 .0102 25.23 0478 0333 Se196 ppm .0939 .0011 1.184 .0931 .0947 V_2924 ppm .0980	ppm .0957 .0002 .2148 .0959 .0956 Sn1899 ppm 0009 .0017 179.4 .0003 0021 W_2079 ppm 0002
Units Avge SDev %RSD #1 #2 Elem Units Avge SDev %RSD #1 #2 Elem Units Avge SDev %RSD	PP# .0982 .0982 .0008 .8565 .0977 .0988 Sc3613 %R 103.0 .7 .7272 102.4 103.5 Sr4215 PP# 9.912 .020 .2055	ppm .0044 .0107 242.3 .0120 0031 1960/1 ppm .0981 .0016 1.624 .0993 .0970 Th2837 ppm .0909 .0031 3.417	ppm .0975 .0006 .6512 .0970 .0979 1960/2 ppm .0917 .0025 2.685 .0900 .0935 Ti3349 ppm .0001 .0000 29.52	ppm .0994 .0032 3.216 .0971 .1016 Si2881 ppm .0070 .0016 22.67 .0081 .0059 T11908 ppm .1031 .0009 .8611	PPM 0013 .0015 112.1 0023 0003 Pb220 Ppm .0987 .0023 2.371 .0023 2.371 .0023 2.371 .0023 2.371 .0023 2.371 .0029 .0029 8.872	prm 0406 .0102 25.23 0478 0333 Se196 ppm .0939 .0011 1.184 .0931 .0947 V_2924 ppm .0980 .0004 .0004 .4583	ppm .0957 .0002 .2148 .0959 .0956 Sn1899 ppm 0009 .0017 179.4 .0003 0021 W_2079 ppm 0002 .0014 649.5
Units Avge SDev %RSD #1 #2 Elem Units Avge SDev %RSD #1 #2 Elem Units Avge SDev	PP# .0982 .0008 .8565 .0977 .0988 Sc3613 %R 103.0 .7 .7272 102.4 103.5 Sr4215 ppm 9.912 .020	ppm .0044 .0107 242.3 .0120 0031 1960/1 ppm .0981 .0916 1.624 .0993 .0970 Th2837 ppm .0909 .0031	ррт .0975 .0006 .6512 .0970 .0979 1960/2 ppm .0917 .0025 2.685 .0900 .0935 Ti3349 ppm .0001 .0000	ppm .0994 .0032 3.216 .0971 .1016 Si2881 ppm .0070 .0016 22.67 .0081 .0058 Tl1908 ppm .1031 .0009	PPM 0013 .0015 112.1 0023 0003 Pb220 Ppm .0987 .0023 2.371 .0971 .1004 U_4090 PPm .0329 .0029	prm 0406 .0102 25.23 0478 0333 Se196 ppm .0939 .0011 1.184 .0931 .0947 V_2924 ppm .0980 .0004	ppm .0957 .0002 .2148 .0959 .0956 Sn1899 ppm 0009 .0017 179.4 .0003 0021 W_2079 ppm 0002 .0014

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Elem Units Avge SDev %RSD	Y_3710 ppm 0001 .0000 27.48	252062 ppm .0986 .0004 .4404	2r3496 ppm 0003 .0001 33.15		•	010	156
#1 #2	0001 0001	.0989 .0983	0002 0003				
IntStd Mode Elem Wavlen Avge SDev %RSD	1 *Counts Sc 361.384 664100 4860.652 .7319157	2 Time 10000 .0000000 .0000000	3 NOTUSED	4 NDTUSED	5 NOTUSED	6 NOTUSED	7 NOTUSED
#1 #2	66 <b>0</b> 663 667537	10000 10000					

Method: DAILY2 Sample Name: 245114 Run Time: 06/15/04 14:54:07 Comment: Mode: CONC Corr. Factor: 1

Operator:

Elem	Ag3280	A13082	As1890	B_2496	Ba4934	Be3130	Bi2230
Unite	ppm	008	ppm	ppm	ព្រុក្សា	ទុក្ខភា	ppm
Avge	2221	0266	0025		. 0001	. 0003	, <b>MAS</b> S
SDev	.0003	.0012	.0012	. 0004	, 0000	, ଉଦ୍ଭରତ	.0028
%RSD	235.0	4.429	48.03	16.60	10.98	,6054	58,30
				179.179.111.4	0001	. 0003	.0034
#1	0003	0258	0016	0021	.0001	, MANS , MANS	.0073
#2	. 0001	0275	0033	-, 0027	. 0001	" Q.Q.Q.C.	, 4141 f
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	t.b.w
Avge	0002	.0003	. 0006	0004	0003	0067	0054
SDev	.0002	.0001	. 0003	.0001	. 0002	.0246	.0065
XRSD	104.2	28.44	46.10	21.78	67.50	368.6	120.9
11.4		. 0004	. 0004	-, 0004	0004	.0107	0008
#1	0003		. 0007	0005	0001	0241	0099
#2	0000	.0003	. (100)	-, 60063	* 6.6.6.1	2 C. 7 X	
Elem	La3988	Li6707	Mg2790	Mn2576	Mo2020	Na3302	Na5889
Units	ppm	ppm	pp <b>m</b>	ppm	ppm	bbw	ppm
Avge	. 0004	0001	. 0003	. 0000	. 0009	0124	0005
SDev	.0011	. 0000	.0011	.0001	.0002	.0241	. 0000
×RSD	252.2	4.944	358.0	1066.	25.28	195.0	5.616
#1	0003	0001	.0011	0000	.0011	.0047	0006
#2	.0012	0001	0005	. 0000	. 0008	0294	0005
77 L.	a 4345 di ka	a 4.74294.72	p 1. 1. 1. 1. 1. 1.				
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	pp pr m	ppm	ppm	ppm	to to w	t.t.w
Avge	. 0003	. 0061	00.31	.0007	. 0004	Ø357	0049
SDev	. 2021	. 0089	. 212144	. 0036	. 0018	. 0078	. 0032
XR:30	21.78	145.3	143.4	542.1	394.6	21,97	65.45
11.4	. 0003	.0124	-,0062	0019	-, 0008	0301	-,0072
#1	. 0003	0002	. 0000	.0032	. 8817	0412	-,0027
井戸	* KUKUKU-D	and the for the second second		a managan ngan	<b>17</b>		
Elem	Sc3613	1960/1	1960/2	Si2881	Ph220	Se196	Sn1899
Units	XR	ppm	ppm	စုစု၏	pp <b>m</b>	ppm	opm
Avge	101.7	.0057	-, ØØ46	.0061	0006	0012	0017
SDev	1.1	.0029	.0019	.0017	.0039	.0003	. 0044
%RSD	1.037	51.21	40.58	27.14	681.0	23.72	267.2
#1	101.0	. 0036	-,0033	.0073	0033	0010	0048
#2	102.5	.0077	0059	.0049	.0022	0013	.0015
11 C	146	• 4040 T T			a Tur' Tea' Rest Room		
Elem	Sr4215	Th2837	Ti3349	T11908	U_4090	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	p p m	ppm	ppm
Avge	.0001	0018	. 0000	.0004	.0070	0001	0015
SDev	. 0001	.0034	. 0001	. 0001	.0130	. 0004	. 0002
XRSD	50.43	187.1	925.9	28,88	185.1	344.7	12.49
41. 1	. 0002	, 0006	. 0001	.0003	0022	-, 0004	0016
#1 #~		0042	0001	.0005	. 0168	.0002	0014
#?	. 0001	" K.G. + 1"	a strategy of a	an ann ann an Sailtean	** ##* oft 3#****		

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Elem Units Avge SDev XRSD	Y_3710 PPm 0000 .0001 355.7	Zn2062 ppm 0014 .0001 7.001	Zr3496 ppm .0001 .0000 29.10			01	0 <b>158</b>
#1	0001	0015	. 0001				
#2	. 0000	0014	. 0000				
IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc						
Wavlen	361.384				might dentes		
Avge	656188	10000					
SDev	6807.317	. 0000000	-				
%RSD	1.037404	.0000000					
#1	651374	10000				these dends	41111 AAAA
#2	661001	10000		-			

Method: DAILY2 Sample Name: 245115 Run Time: 06/15/04 14:58:53 Comment: Mode: CONC Corr. Factor: 1 Operator:

010159

Elem	Ag3280	A13082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	PPm
Avge	.0003	.3362	.0052	.1416	.0118	.0003	0004
SDev	.0002	.0510	.0011	.0005	.0000	.0000	.0047
%RSD	63.24	15.16	20.22	.3849	.3086	7.501	1292.
#1	. 0001	.3722	. 0060	.1419	. 0118	. 0003	, 0030
#2	. 0004	.3001	. 0045	.1412	. 0117	. 0003	—, 0037
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	prm	F(F)
Avge	13.97	.0005	.0007	0002	.0007	. 1819	3.774
SDev	.05	.0001	.0003	.0006	.0003	. Ø197	.026
%RSD	.3590	11.78	44.63	245.5	34.90	10. 84	.6804
#1	13.94	. 0004	. 0005	. 0002	. QQQ6	.1958	3.756
#2	14.01	. 0005	. 0009	0006	. QQQ9	.1679	3.792
Elem	La3988	Li6707	Mg2790	Mn2576	Mo2020	Na3302	Na5889
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0003	.0374	1.420	.0045	.0079	50.67	32.79
SDev	.0002	.0000	.004	.0002	.0014	.13	.03
%RSD	66.30	.0541	.2856	5.366	17.17	.2655	.0944
#1	. 0001	.0375	1.417	. 0047	. 0089	50.58	32.76
#2	. 0004	.0374		. 0044	. 0069	50.77	32.81
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	PPm	ppm	ppm	ppm	ppm	ppm
Avge	.0001	.0372	0019	.0005	0022	9.502	.0024
SDev	.0006	.0048	.0044	.0035	.0022	.170	.0013
%RSD	466.6	13.01	231.9	721.8	101.2	1.789	54.22
#1	0003	. Ø338	.0012	. 0029	-, 0037	9.622	.0033
#≈	.0005	. Ø4Ø6	0051	0020	0006	9.382	.0015
#2 Elem Units Avge SDev	.0005 Sc3613 %R 103.2 1.1	.0406 1960/1 ppm .0145 .0077	0051 1960/2 ppm .0003 .0005	0020 Si2881 20.74 .28	0006 Ph220 Ph320 0003 .0038	9.382 Se196 ppm .0050 .0022	.0015 Sn1899 ppm .0089 .0008
#2	.0005	.0406	0051	0020	0006	9.382	.0015
Elem	Sc3613	1960/1	1960/2	Si2881	Ph220	Sel96	Sn1899
Units	XR	ppm	ppm	99m	ppm	ppm	99m
Avge	103.2	.0145	.0003	20.74	0003	.0050	.0089
SDev	1.1	.0077	.0005	.28	.0038	.0022	.0008
≭RSD	1.020	52.98	208.2	1.357	1261.	43.97	9.103
#1	102.4	.0091	.0006	20.94	.0024	.0035	.0095

						0	4 0 4 0 0
Elem	Y_3710	Zn2062	Zr3496			0	10160
Units	ррт	ppm	ppm				
Avge	. 0001	. @@11	.0011				
SDev	. 0000	.0002	. 0000				
%RSD	13.00	17.41	.4020				
#1	. 0001	. 0013	. 0011				
#2	. 0001	.0010	.0011				
IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc					-1470 44044	
Wavlen	361.384						
Avge	665406	10000					
SDev	6843.379	. 0000000					
*RSD	1.028452	. 0000000					
#1	660567	10000					
#2	670245	10000				Name Conta	

#1

#2

#1

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#1

#2

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#1

#2

Units

Avge

SDev

XRSD

#1

#2

ppm

. 0355

. 0001

.4236

.0354

.0356

ppm

. 0004

. 0020

463.2

-.0010

.0019

Ba4934

ppm

-.0263

8.001

-. 0248

-.0278

.0021

.0116

.0068

58.64

.0163

.0068

.0036

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.2739

.0036

.0036

-.0052

38.46

-, 0066

-.0038

.0020

Operator:

Be3130

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Bi2230

010161

Sample Name: 245116 Method: DAILY2 Run Time: 06/15/04 15:03:39 Comment: Mode: CONC Corr. Factor: 1

B_2496 Ag3280 A13082 Elem ppm ppm ppm ppm ppm Units nag opm .0019 .1721 . 0084 . 0004 .0021 . 4978 -.0003 Avge .0020 .0001 . 0000 .0045 .0002 .1567 .0031 SDev 1.185 1.203 11.90 212.8 31.48 165.8 58.51 %RSD . 0041 .0003 .0053 -. 0002 . 1736 . 0034 .6085 , 0004 -. 00111 -. 0003 . 1707 . 0083 -. 0004 .3870 Cu3247 Fe2714 K_7664 Cr2677 Cd2265 Co2286 Elem Ca3179 ppm ppm E.C.M ppm DECOM Units ppm D D M .0002 3.224 .0013 .0005 . 1665 .0002 Avge 7.315 . 0115. .0273 . 0101014 SDev . 021 . 0000 . 0005 . ହାହାହା 1 .4656 22.17 41.87 69.79 72.54 16.41 XRSD . 2881 , 1859 3.214 . 0001 . 0007 . 0002 . 0009 7.300 3,235 . 0016 .0003 . 0002 .1478 7.329 .0002 Na5889 Na3302 La3988 L16707 Mg279Ø Mn2576 M02020 Elem ppm 008 ppm ppm Units nop ppm ppm 82.50 52.47 .0005 .0879 .6405 .0012 .0052 Avge ,0005 . 51 .21 .0137 .0001 .0005 .0005 SDev .3935 9.945 13.01 .6160 %RSD 107.3 . 5711 2.139 52.32 .0013 . 0048 82.14 .0001 . 0876 .6501 82.86 52.62 .0011 .0056 . 0009 .0883 .6308 S_1820 SP5068 Pd3404 P 1782 2203/1 2203/2 Elem Ni2316 ppm ppm Units ppm DDM DDM ppm ppm . 0000 7.566 .0044 .0028 .0002 .0391 -.0019 Avge .0023 .128 . 0008 . 0001 .0155 .0027 . 0008 SDev 1.694 53.30 28.06 1877. 137.7 XRSD 23.19 39.66 7.657 . 0060 -. 0001 . 0034 -. 0005 . 0002 .0501 7.475 .0027 -. 0038 .0023 ,0006 .0002 .0282 Se196 Sn1899 Si2881 Pheed Elem Sc3613 1960/1 1960/2 ្ទទ្រធ Units XR DOM nom 008 pom DOB 98.94 . 0255 -. 0003 27.84 . 0013 , 0083 , 08.66 Avge .0014 .0035 . 0050 .61 SDev . 76 .0019 ,0043 19.00 1513. 2.206 112.8 41.97 %RSD .7636 7.378 .0302 . 0028 28.27 .0023 ,0108 98.40 . 0269 .0059 . 0230 99.47 .0242 -.0033 27.40 .0003 V_2924 W_2079 Ti3349 T11908 U 4090 Sr4215 Th2837 Elem ppm ppm ppm

ppm

.0043

.0013

30.84

.0052

.0034

As1890

Elem Units Avge SDev %RSD #1 #2	Y_3710 ppm . 0001 . 0000 . 8400 . 0001 . 0001	Zn2062 ppm .0021 .0004 21.13 .0024 .0018	Zr3496 ppm . 0012 . 0005 40. 81 . 0016 . 0009			010	162
IntStd Mode Elem Wavlen Avge SDev %RSD	1 *Counts Sc 361.384 638104 4838.732 .7582989	2 Time  10000 .0000000 .0000000	3 NOTUSED   	4 NOTUSED	5 NOTUSED   	6 NOTUSED   	7 NOTUSED   
#1 #2	634682 641525	10000 10000				-	*****

Method: DAILY2 Sample Name: cov4 Run Time: 06/15/04 15:14:52 Comment: Mode: CONC Corr. Factor: 1

Operator:

## 010163

Elem	Ag328Ø	010000					
Unit		A13082	As1390	B_2496	Ba4934	D-7470	
Avge	her les un	ppm	ppm	ppm		Be3130	Bi2230
	.9813	9.668	4.894	4.745	ppm D D D D D D D D D D D D D D D D D D D	ppm	ppm
SDev	.0001	.003	.003		9.925	.9651	4.957
%RSD	.0120	.0321		. 000	.001	. 0001	. 224
		a weeden d	.0581	. 0048	.0087	.0129	
#1	. 9814					a	"Ø766
#2		9.670	4.892	4.744	9,924		
<i>π</i>	.9812	9.666	4.896	4.745		.9650	4.960
				· · · · · · · · · · · · · · · · · · ·	9,925	.9651	4.955
Error	S LC Pass	I.C Pass	LC Pass				
High	1.100	11.00	and the state of the state of the		LC Pass	LC Pass	
Low	. 9000		5.500	5.500	11.00	1.100	
	* 2030303	9.000	4.500	4.500	9.000		5. 500
J					3 # K3W3W3	. 9000	4.500
Elem	Ca3179	Cd2265	Co2286	<b></b>			
Units	ppm	ppm		Cr2677	Cu3247	Fe2714	K_7664
Avge	19.86	. 9823	[3][3][B	စုခုစ	COM	ppm	
SDev	. 02		4.898	1.931	2.013	10. 04	ppm
*RSD		.0021	. 003	.000	. 003		18.38
247 C. L. L.	.0819	-2107	. 0571	. 1275		. Ø.S	. 05
				کست ۲ ۱۰٬۰۰۰ ۳	. 1634	. 1874	. 2892
#1	19.85	.9809	4,896				
#2	19.87	.9838		1.929	2.011	10.03	18.34
		• 2000	4.900	1.933	2.015	10.05	
Errors						T 60. 61.	18.42
		LC Pass	LC Pass	LC Pass			
High	22.00	1.100	5.500		LC Pass	LC Pass	LC Pass
Low	18.00	. 9000	4.500	2.200	2.200	11.00	22.00
			4.300	1.800	1.800	9.000	18.00
Elem	La3988	1 1 10 1000 100 100					10.00
Units		L16707	Mg2790	Mn2576	Mo2020	k I	
	ppm	ppm	ppm	ppm		Na3302	Na5889
Avge	4.925	L4.457	19.73		ppm	ppm	ppm
SDev	. 001	.006	. @1	.9989	4.920	L26.92	L18, 91
%RSD	.0302	. 1251		.0005	.020	. 05	.02
		<u>ا</u> کې شکې د ه	.0727	.0521	. 4008	. 1984	
#1	4.924					* 7 3 (3+4)	.1274
#2		L4.461	19.72	. 9986	4.906		
HC .	4.926	L4.453	19.74	.9993		L26.89	L18.90
				" 777.5	4.934	L26.96	L18.93
Errors	LC Pass	LC Low					
High	5.500		LC Pass	LC Pass	LC Pass	LC Low	101
Low		5.500	22.00	1.100	5.500		LC Low
· · · · · · · ·	4.500	4.500	18.00	. 9000	4.500	33.00	33.00
1				· · ····	4. 30303	27.00	27.00
Elem	Ni2316	P_1782	2203/1				
Units	ppm	ppm		2203/2	Pd3404	S_1820	562068
Avge	4. 759	4.873	ppm	្រុក្ស	ppm	00 <b>m</b>	
30ev	. 0.01		4.927	4.893	1.024	.9855	ppm
*RSD		. 067	.015	.003	. 00.3		» 9846
	.0116	1.384	. 3083	. 0620		. 0041	.0009
				ar ar have been by	- 336 t	.4152	. (215) 5. 3
¥1	4.759	4.921	4.937	4 00.			
#2	4.758	4.825		4.891	1.022	. 9884	.9852
		The South and South	4.916	4.895	1.026	. 9826	
Errors						a	. 9839
	LC Pass	LC Pass	NOCHECK	NOCHECK			
High	5.500	5.500		1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	LC Pass	LC Pass	LC Pass
Low	4.500	4.500			1.100	1.100	1.100
					.9000	. 9000	.9000
Elem	Sc3613	101011					* 2 6 (6 (V)
		1960/1	1960/2	Si2881	P6220	C-104	
					· · · · · · · · · · · · · · · · · · ·	Se196	Sn1899

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page 2

Units	%R	ррт	PP#	PP#	pp#	ррт	ррт
Avge	100.7	5.178	5.119	4.926	4.904	5.139	4.887
SDev	.1	.005	.007	.001	.003	.003	, ааг
%RGD	.0958	.0997	.1321	.0168	.0620	.0542	.0414
#1	100.8	5.182	5.114	4,926	4,906	5.137	4,889
#₽	100.6	5.174	5.124	4,925	4,902	5.140	4,886
Errors High Low	NOCHECK	NOCHECK	NOCHECK	LC Pass 5.500 4.500	LC Pass 5.500 4.500	LC Pass 5.500 4.500	LC Pass 5.500 4.500
Elem	Sr4215	Th2837	Ti3349	T11908	U_4090	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	5.065	.9635	4.850	5.125	.9755	4.871	.9762
SDev	.000	.0034	.003	.068	.0142	.002	.0040
%RSD	.0097	.3581	.0697	1.321	1.454	.0454	.4073
#1	5.065	.9610	4.847	5.077	.9654	4.869	.9734
#2	5.066	.9659	4.852	5.173	.9855	4.872	.9790
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	5.500	1.100	5.500	5.500	1.100	5.500	1.100
Low	4.500	.9000	4.500	4.500	.9000	4.500	.9000
Elem Units Avge SDev %RSD	Y_3710 PP# 4.945 .004 .0870	Zn2062 ppm .9879 .0007 .0673	2r3496 ppm 4.779 .024 .5104				
#1 #2	4,948 4,948	.9874 .9883	4,761 4,796				
Errors High Low	LC Pass 5.500 4.500	LC Pass 1.100 .9000	LC Pass 5.500 4.500				

649027 10000

•

#2

IntStd Mode Elem Wavlen Avge SDev %RSD	1 *Counts Sc 361.384 649448 596.0910 .0917842	2 Time  10000 .0000000 .0000000	3 NOTUSED   	4 NOTUSED   	S NOTUSED	6 NOTUSED  	7 NOTUSED
%RSD #1	.0917842 649870	. 0000000 10000		- Frage and an			

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Operator:

Be3130

008

. 0004

.0001

13.33

. 000014

. 001014

Analysis Report

Ba4934

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.0003

90.21

. 0001

. 0005

ppm

page 1

Bi2230

127.8

-.0002

-. 0035

.0023

ppm

				<b>`</b>
Method:	DAILYS	Sample N	lame: ccb4	
Run Tim	e: 06/15/04	15:21:28		
Comment	и Л			
Mode: C	DNC Carr.	Factor:	1.	
Elem	Ag3280	A13082	As1890	B_2496
Units	opm	ppm	ppm	<b>n</b> qq
Avge	0001	0224	. 2011	. 20137
SDev	. 0008	. 0058	. 0000	. 0020
%RSD	580.3	25.76	1,248	53.14
林 1	. 0004	0183	. 0011	.0051
#2	0007	-, 0265	. 0011	. 0023

Errors	LC Pass	LC Pass	I.C Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	.0050	.0500	.0050	.0500	.0050	.0050	.0100
Low	0050	0500	0050	0500	0050	0050	0100
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0016	.0004	0001	0014	.0004	0052	0038
SDev	.0005	.0001	.0002	.0000	.0004	.0043	.0047
%RSD	28.84	36.56	145.2	1.174	86.36	52.11	125.9
#1	.0013	. 0005	. 0000	0014	. 0002	0082	0004
#ご	.0020	. 0003	0003	0014	. 0007	0022	0071
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	.0500	.0050	.0050	.0050	.0050	. 0250	.1000
Low	0500	0050	0050	0050	0050	—. 0250	1000
Elem Units Avge SDev %RSD	La3988 ppm 0003 .0003 121.2	Li6707 ppm .0002 .0001 30.34	Mg2790 ppm 0046 .0050 109.2	Mn2576 0000 .0001 3669.	Mc2020 99m H.0062 .0016 25.83	Na3302 ppm H.0550 .0180 32.68	Na5889 ppm .0087 .0010 11.76

#1	0000	. 0002	0011	000 1	H.0073	H.0677	. 0094
#2	0005	. 0003	0082	. 0001	H.0050	.0423	. 0080
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC High	LC High	LC Pass
High	.0050	.0050	.0500	.0050	.0050	.0500	"0500
Low	0050	0050	0500	0050	0050	0500	–.0500
Elem	Ni2316	P_1782	2203/1	2203/2	Fd3404	S_1820	S52068
Units	ppm	PP#	ppm	PP <b>m</b>	ppm	ppm	ppm
Avge	0005	.0027	0003	0004	-,0006	L0155	.0003
SDev	.0001	.0214	.0011	.0007	.0028	.0009	.0024
%RSD	28.15	799.2	416.5	188.7	506.9	5.980	899.1
#1	0006	L0125	0011	. 0001	.0014	L0149	0014
#2	0004	H.0178	.0005	0009	0026	L0162	.0020
Errors High Low	LC Pass .0050 0050	LC Pass .0100 0100	NOCHECK	NOCHECK	LC Pass .0050 0050	LC Low .0100 0100	LC Pass .0100 0100
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899

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page 2

Units	%R	and and 100	ana, 1975, and			ATT. 07. 105	
Avge	101.8	.0035	ppm 0008	ppm .0059	ppm 0003	.0006	рр <b>т</b> 0015
SDev	. 4	.0030	.0035	.0014	. 0001	.0013	. 0018
XRSD	. 4256	86.48	427.2	22.92	31,41	213.4	120.9
#1	101.5	.0014	.0017	.0068	0003	.0016	0002
<b>非</b> 己	102.1	.0056	0033	.0049	0004	0003	0028
<b>5</b>	5 105 05 1 100 05 1 d		- 1 m m 1 1 m m 1 2		1 m m		1 m m
Errors	NOCHECK	NOCHECK	NOCHECK	LC Pass .0100	LC Pass .0030	LC Pass .0050	LC Pass .0050
High Low				0100	0030	0050	.0030 0050
L. U W				QI L CIQI	. 6161.3161	M 421421	······································
Elem	Sr4215	Th2837	Ti3349	T11908	U_4090	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0001	0014	0000	.0081	.0023	0003	. 0009
SDev	. 0001	.0005	. 0000	. 0000	.0118	. 0002	. 0002
%RSD	104.5	31.37	129.7	.5143	519.5	63.24	25.59
#1	, ଉଉତ୍ତତ	0011	0000	. 0080	. 0106	0004	. 2011
#.2	. 0002	0018	0000	. 00A1	0060	0001	. 0008
	8 N.	an a	an affin and a strange at the	a alongot s a	A ACT AND AT A ACT		8 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	. 0050	.0100	. 0050	.0100	. 1000	.0050	.0100
Low	-, 0050	0100	-, 0050	0100	1 ana	ANE-A	Ø100
Elem	11	Zn2062	Zr3496				
Units	Y_3710 ppm	DDM	2r3496 ppm				
Avge	. 0001	0011	.0018				
SDev	. 0001	. 0001	. 0003				
XRSD	161.0	6.482	15.04				
#1	0000	0011	.0020				
#5	.0002	0010	.0016				
Errors	LC Pass	LC Pass	LC Pass				
High	.0050	.0050	.0050				
Low	0050	0050	0050				
man lof TV	of "Ten" The Sour The"	ff The "Tes" Lees' The "	87 "Eus" "Rus" base" "Bas"				

Analysis Report

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page 3

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IntStd Mode Elem Wavlen Avge SDev %RSD	1 *Counts Sc 361.384 656498 2836.912 .4321281	2 Time  10000 .0000000 .0000000	3 NOTUSED 	4 NOTUSED	5 NOTUSED  	6 NOTUSED 	7 NOTUSED 
井1 井元	654492 658504	1 0000 1 0000					4000 BROV

SOUTHWEST RESEARCH INSTITUTE NUCLEAR PROJECT CLIENT: Division 20 TASK ORDER: 040521-6 SRR: 25943 SDG: 245108 CASE: CNWRA VTSR: May 20, 2004 PROJECT#: 06002.01.141

## **Certificates of Analysis**

### FISHER SCIENTIFIC TRACEMETAL GRADE NITRIC ACID

### **CERTIFICATE OF ANALYSIS**

Catalog No. A509	LotNo:114 Release Date: Jai ExpiryDate: Jai	nua ry, 2004
Tests	Units	Value
Assay	%	70%
Color	APHA	<10
Aluminum	ppb	<0.5
Antimony	ppb	<0.1
Arsenic	ppb	<0.1
Barium	ppb	<0.1
Beryllium	ppb	<0.1
Bismuth	ppb	<0.1
Boron	ppb	<1
Cadmium	ppb	<0,1
Calcium	ppb	<1
Chromium	abp	<0.2
Cobalt	ddd	<0.1
Copper	ppb	<0.1
kron	ppb	<1
Lead	ρφο	<0.1
Lithium	ppb	<0.1
Magnesium	ppb	<0.2
Manganese	ppb	<0.1
Mercury	ppb	<0.2
Molybdenum	ppb	<0.1
Nicket	ррь	<0.1
Potass ium	ppb	< 0.2
Selenium	ppb	<0.1
Silver	ppb	<0.1
Sodium	ppb	<0.2
Strontium	ррб	<0.1
Thorium	ppb	<0.1
Tin	ppb	<0.1
Titanium	ppb	<0.1
Uranium	ppb	≪0.1
Vanedium	ppb	<0.1
Znc	ppb	<0.2
Zirconium	ppb	<0.1

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.

B M: Kelvy

Dr. B. McKelvey QA/QC Manager Fisher Scientific Chemical Divisir

Fisher Scientific Chemical Division Pittsburgh, PA, 15275 Phone (412) 490-8300



INDRGANIC LABS/RADCHEM LABS DATE RECEIVED: 06/01/04 DATE EXPIRED: 01/01/0007_105 DATE OPENED: 06/01/04 INDRG: 4500-4585_PO: E53373

### FISHER SCIENTIFIC TRACEMETAL GRADE NITRIC ACID

### CERTIFICATE OF ANALYSIS

Catalog No. A509		1104020 Febru ary, 2004	
		February, 2005	
Tests	Units	Value	
Assay	*	70%	
Color	APHA	<10	
Aluminum	ppb	<0.5	
Antimony	ppb .	<0.1	
Arsenic	ppb	<0.1	
Barium	ppb	<0.1	NORE E
Beryllium	ppb	<0.1	<u>동</u> 특 특 류
Bismuth	ppb	<0.1	중 편 면 편
Boron	ppb	<1	
Cadmium	ppb	<0.1	
Celcium	ppb	<1	្រ ដ្លាប់ត
Chromium	pob	<0.2	MZHM
Cobalt	ppb	<0.1	HSS8
Copper	ppb	<0.1	
iron	ppb	<1	14. žu
Lead	ppb	<0.1	<u>v</u> i i #
Lithium	ppb	<0.1	ECEIVED:
Magnesium	ppb	<0.2	
Manganese	ddd	<0.1	Thom
Mercury	ppb	<0.2	
Molybdenum	ppb	<0.1	- K K K
Nickel	ppb	<0.1	ROP
Potass ium	ppb	<0.2	NER
Selanium	ppb	<0.1	TOPP
Silver	ppb	<0.1	U.F.B.F
Sodium	ppb	<0.2	
Strontium	ppb	<0.1	22
Thorium	ppb	· <0.1	73
Ĩn	ppb	<0.1	
Titanium	ppb	<0.1	
Uranium	ppb	<0.1	i i i i
Vanadium	ppb	≪0.1	
Znc	ppb	<0.2	
Zirconium	ppb	<0.1	

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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Dr. B. McKelvey QA/QC Manager Fisher Scientific Chemical Division Pittsburgh, PA., 15275 Phone (412) 490-8300



### FISHER SCIENTIFIC TRACEMETAL GRADE HYDROCHLORIC ACID

### **CERTIFICATE OF ANALYSIS**

Catalog No. A508	Lot No: 410	3101
	Refease Date: Jar	ка ту, 2004
	Expiry Date: Jar	•
Tests	Units	Value
Assay	%	35%
Color	APHA	<10
Aluminum	ppb	<0.5
Antimony	ppb	<0.1
Arsenic	ppb	<0.1
Barium	ppb	<0.1
Beryllium	ppb	<0.1
Bismuth	ppb	<0.1
Boron	ppb	<0.5
Cadmium	ppb	<0.1
Calcium	ppb	<0.5
Chromium	ppb	<0.1
Cobelt	ppb	<0.1
-Copper	ppb	<0.1
Iron	ppb	<0.5
Lead	ppb	<0.1
Lithium	ppb	<0.1
Magnesium	ppb	< 0.5
Manganese	ppb	<0.1
Mercury	ppb	<0.2
Molybdenum	ppb	<0.1
Nicke	ppb	<0.1
Potess ium	ppb	<0.1
Selenium	ppb	<0.1
Silver	ppb	<0.1
Socium	ppb	<0.5
Stronti um	ppb	<0.1
Thorium	ppb	<0.1
Tim.	ppb	<0.1
Titanium	pipib	≪0.1
Uranium	ppb	<0.1
Vanadium	dada	<0.1
Zinc	ppb	<0.5
Zirconium	ppb	<0.1

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.

B H: Kelver

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Dr. B. McKelvey QA/QC Manager

Fisher Scientific Chemical Division Pittsburgh, PA., 15275 Phone (412) 490-8300



INDRGANIC LARS/RADCHEM LARS DATE RECEIVED: 06/01/01 DATE EXPIRED: 01/01/01 DATE OPENED: 06/01/04 INDRG: 45%-4591 PD: E53393

DATE RECEIVED: 05/05/04 DATE EXPIRED: 01/0/ 3007 DATE OPENED: 05/05/04

ł i 1 INDRGANIC LABS/RADCHEM LABS

DATE OPENED: 05/05/01 INORG: 1552-1557 PO: F53373

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### FISHER SCIENTIFIC TRACEMETAL GRADE HYDROCHLORIC ACID

### **CERTIFICATE OF ANALYSIS**

Catalog No. A508	Lot No:	4103101
	Releam Date:	Janua ry, 2004
	Expiry Date:	Janua ry, 2007
Tests	Units	Value
Assay	*	35%
Galor	APHA	<10
Aluminum	ppb	<0.5
Antimony	ppb	<0.1
Arsenic	ppb	<0.1
Banum	ppb	<0.1
Beryläum	ppb	<0.1
Bismuth	ppb	<0.1
Boron	ppb	<0.5
Cadmium	ppb	<0.1
Calcium	ppb	<0.5
Chromium	dad	<0.1
Cobal	ppb	≪0.1
Copper	ppb	<0.1
iron	ppb	<0.5
Lead	ppb	<0.1
Lithium	ppb	<b>&lt;0</b> .1
Magnesium	ppb	<0.5
Manganese	ppb	<0.1
Mercury	ppb	<0.2
Molybdenum	ppb	<0.1
Nickel	daq	≪0.1
Potass ium	ppb	<0.1
Seienium	ppb	<0.1
Silver	ppb	<0.1
Sodium	ppb	≪0.5
Strontium	daa	≪0.1
Thorium	ppb	<0.1
Tin	ppb	≪0.1
Titanium	ppb	<0.1
Uranium	ppb	<0.1
Vanadium	ppb	<0.1
Zre	ppb	<0.5
Zirconium	000	<0.1

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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Dr. B. McKelvey QA/QC Manager

Fisher Scientific Chemical Division Pittsburgh, PA., 15275 Phone (412) 490-8300





Catalog Number: Description: Matrix: Lot No.: 25-23AS

Spike Sample Standard 1 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.

SPIKE-1

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
<b>A</b> 1	200	199.51	3101a	Pb	50	49.98	3128
As	200	199.89	3103a	Sb	50	50.02	3102a
Ba	200	199.68	3104a	v	50	49.95	3165
Se	200	200.10	3149	Zn	50	50.02	31 <b>68</b> a
TL	200	200.07	3158	Cu	25	25.34	3114
Fe	100	99.91	3126a	Cr	20	20.04	3112a
Co	50	50.25	3113	Ag	5	5.00	3151
Mn	50	49.98	3132	Be	5	5.00	3105a
Ni	50	50.11	3136	Cd	5	4.99	3108

Spex Reference Multi: Lot #2-61BD, 17-55AS, 19-85ASREF

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.

- 2003 Certifying Officer: N. Kochertakota Date 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  $k_{r} = s^2 m$  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, = 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

 $u_e$  is obtained by combining the individual element standard uncertainty components  $u_i$  and  $u_e \sqrt{\Sigma u_i^2}$ 

### **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: Description: Matrix: ICAL-1 Lot No.: 25-178AS Instrument Calibration Standard 1 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	4,984.92	3109a
K	5,000	4,990.26	3141a
Mg	5,000	4,991.82	3131a
Na	5,000	4,998.07	3152a

Spex Reference Multi: Lot #10-100AS, 12-113AS, 5-198VY, 6-28VY-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.

MAR == 2001 Certifying Officer: N. Kochevta.kota Date 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, = mass of sub-sample necessary to ensure a relative sub-sampling error of 1% (68% confidence level) in a single determination

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U=ku, where k=2 is the coverage factor at the 95% confidence level

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### **Certification Traveler Report:**

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### Legal Notice:



#### inorganic ventures

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

INORGANIC LABS/RADCHEM LABS

DATE RECEIVED: 09/24/03 DATE EXPIRED: 10/01/2004 VOS

DATE OPENED: 09/24/03

INDRG: 4262 FO: E5233

### certificate of analysis

### **CUSTOM-GRADE SOLUTION**

10,000 µg/mL Scandium IN 5% HNO₃ (abs)

Catalog Number: CGSC10-1and CGSC10-5

Lot Number: T-SC02053

Starting Material: Starting Material Purity: Starting Material Lot No:

Sc₂O₃ 99.999% 632-5721

### CERTIFIED CONCENTRATION: 10,047 $\pm$ 29 $\mu$ g/mL

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:

n = number of measurements

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

 $(\bar{x}) = mean$ 

Uncertainty  $(\pm) = \frac{2[(\sum_{s} j)^2]^{1/2}}{(n)^{1/2}}$ 

 $x_i = individual results$ 

 $\sum S_i$  = The summation of all significant estimated errors.

Classical Wet Assay: 10,047 ± 29 µg/mL Method: EDTA Titration vs NIST SRM 928 Lead Nitrate.

Instrument Analysis: 9994 ± 41 µg/mL

Method: Inductively Coupled Plasma Spectroscopy (ICP) vs NIST SRM 3148a.

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.

### TRACE METALLIC IMPURITIES DETERMINED BY ICP-MS AND ICP-OES IN $\mu \alpha/mL$ :

Custom-Grade solutions tested for trace metallic impurities by ICP-MS were analyzed in an ULPA-Flitered Clean Room. An ULPA-Filter is 99.9985% efficient for the removal of particles down to 0.3  $\mu m$  .

_				_			• •			_			_	
Q	AI	<0.070	M	Dy	< 0.0060	M	u	<0.010	M	Pr	<0.00030	M	Te	<0.030
M	Sb	< 0.00050	M	Er	< 0.0050	M	Lu	< 0.00040	M	Re	< 0.0010	M	ть	< 0.00030
Μ	As	<0.010	M	Eu	< 0.0030	M	Mg	<0.030	M	Rh	< 0.0010	M	Π	< 0.0010
M	Ba	<0.010	M	Gd	< 0.0010	м	Mn	<0.0040	м	Rb	<0.0010	M	Th	0.028
M	Be	< 0.00050	M	Ga	<0.0010	į	Hg		M	Ru	<0.0020	M	Tm	< 0.00040
M	Bi	0.043	M	Ge	< 0.0060	M	Mo	<0.0020	М	Sm	<0.0010	M	Sn	< 0.0050
Q	В	<0.034	M	Au	<0.0030	м	Nd	<0.0020	<u>9</u>	Sc		Ū	Ti	
М	Cd	< 0.0030	<u>M</u>	Hf	0.030	Q	Ni	<0.084	<u>o</u>	Se	<0.67	M	W	<0.010
Q	Ca	0.17	M	Ho	< 0.00050	M	Nb	< 0.00050	Q	Si	<0.034	M	U	< 0.0020
M	Ce	< 0.0050	M	In	< 0.0010	n	Os		M	Ag	0.0050	M	V	< 0.0020
M	Cs	< 0.00030	М	le 🛛	< 0.0050	M	₽d	< 0.0050	<u>o</u>	Na	<0.16	<u>M</u>	YЪ	< 0.0010
М	Cr	< 0.0050	Q	Fe	< 0.16	1	P		M	Sr	<0.00050	M	Y	< 0.040
M	Co	< 0.0030	M	La	< 0.00050	м	Pt	< 0.0020	ŋ	S		M	Zn	0.075
M	Cu	<0.0060	М	Pb	0.0050	Q	к	< 5.01	м	Ta	<0.0070	м	Zr	0.32
м -	chec	ked by ICP-MS	0-0	heck	ed by ICP-OES	i - sp	pectra	l interference	n - no	t che	cked for	s - solution	stand	lard element

ANALYZED DENSITY OF SOLUTION (measured at 22°C): 1.073 g/mL QA:KL AW.0212030N

(over)

Expires:

Paul R. Haines

Quality Assurance Manager



### **QUALITY STANDARD DOCUMENTATION**

1. ISO 9001:2000 QMI Registered Quality System (Certificate Number 010105)

Members of IQ Net : 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)

- 2. ISO/IEC Guide 34-2000 "General Requirements for the Competence of Reference Material Producers" Reference Materials Production - Accredited A2LA Certificate 883.02
- ISO/IEC17025-1999 "General Requirements for the Competence of Testing and Calibration" Chemical Testing -Accredited A2LA Certificate 883.01
- 4. MIL-STD-45662A
- 5. 10CFR50 Appendix B Nuclear Regulatory Commission Domestic Licencing of Production and Utilization Facilities
- 10CFR21 Nuclear Regulatory Commission Reporting Defects and Non-Compliance Please contact our Quality Assurance Department for further information and copies of documents pertaining to our Quality Standard certifications.

#### STABILITY/ EXPIRATION DOCUMENTATION

Shelf Life -

The length of time that a properly stored and packaged standard will remain within the specified uncertainty. Shelf life is affected by chemical stability and transpiration issues. Inorganic Ventures' Standard Solutions are chemically stable indefinitely. Transpiration loss is linear with time and limits the time a standard can be used with confidence. The smaller the bottle the higher the rate of transpiration. Inorganic Ventures' studies indicate that the shelf life of our 500 mL bottle is 4 years and the shelf life of our 125 mL bottle is 21 months.

Expiration Date - <u>The date after which a standard solution should not be used.</u> A one year expiration date is recommended by most state and federal regulatory agencies. Transpiration issues and repeated use of solutions over a one year period may adversely affect the integrity of the standard.

#### PACKAGING DOCUMENTATION

Purified acid, 18 megohm double deionized water that has been filtered through a 0.2 µm filter and in-house procedure IV-PACK-001 is used to clean all bottles. Contact us for technical information relating to contamination issues in packaging materials.

### **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.

#### **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 428359B and 454678. 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 analytical weight set. These weights are tested annually by a NIST / NVLAP accredited calibration lab. The NIST test number is 822/260017-8.

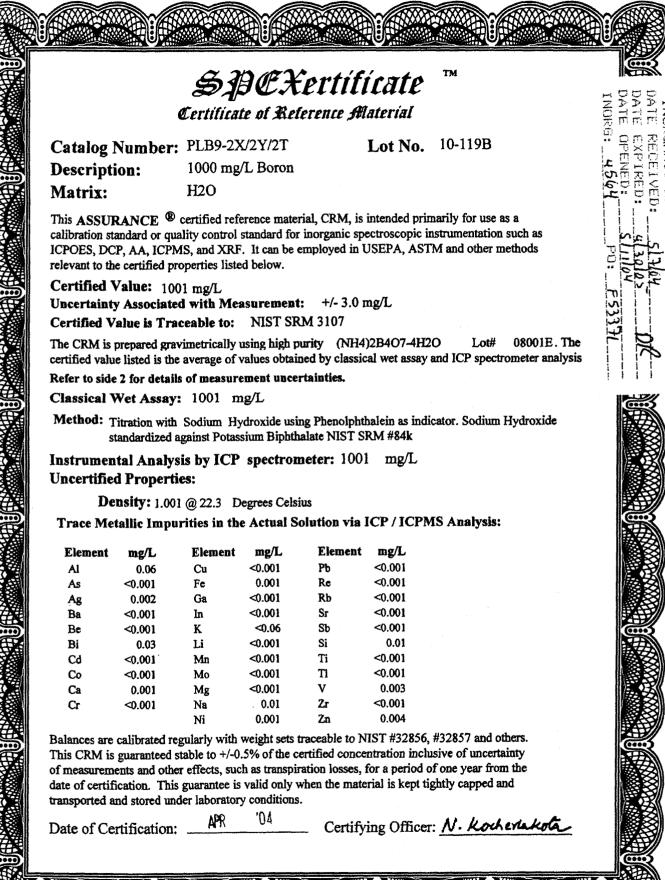
#### THERMOMETER CALIBRATION

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.

#### TECHNICAL SUPPORT

All customers are encouraged to contact us for technical support for the proper use of our products.

TEL 1-800-569-6799 INT'L 1-732-901-1900 FAX 1-732-901-1903 E-MAIL IVtech@ivstandards.com



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

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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:

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### Homogeneity:

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The mathematical expression  $k = s^2 m$  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

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U=ku, 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:

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### Legal Notice:



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10-12LI

Lot No.

Certificate of Reference Material

Catalog Number:PLLI2-2X/2YDescription:1000 mg/L LithiumMatrix: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 relevent to the certified properties listed below.

Certified Value: 997.5 mg/L Uncertainty Associated with Measurement: +/- 3 mg/L Certified Value is Traceable to: NIST SRM 3129a

The CRM is prepared gravimetrically using high purity Lithium Carconate 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: 997 mg/L

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

Instrumentation Analysis By ICP spectrometer: 998 mg/L Uncertified Properties:

Density: 1.014 @ 22.2 Degrees Celsius

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

Element	mg/L	Element	mg/L	Element	mg/L
Al	0.001	Cu	< 0.001	Pb	< 0.001
As	< 0.001	Fe	0.007	Re	< 0.001
Ag ·	< 0.003	Ga	< 0.001	RЪ	< 0.001
В	<0.008	In	< 0.001	Sr	< 0.001
Ba	0.001	ĸ	0.20	Sb	< 0.001
Be	< 0.001	Mn	< 0.001	Si	0.007
Bi	< 0.001	Mo	< 0.001	Ti	< 0.001
Ca	0.017	Mg	< 0.001	Tl	< 0.001
Cr	< 0.001	Na	0.01	v	< 0.001
Cđ	0.008	Ni	<0.001	Zr	<0.001
Co	< 0.001			Zn	0.035

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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.

'04

Date of Certification:

Certifying Officer: N. Kochertakol

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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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s = relative standard deviation in % for one component of the sample. (ie. The sub-sampling uncertainty)

m = the sub-sampling mass

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U=ku, where k=2 is the coverage factor at the 95% confidence level

 $u_e$  is obtained by combining the individual element standard uncertainty components  $u_i$  and  $u_e \sqrt{\Sigma u_i^2}$ 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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		Certifica	te of Rei	terence A	ateríal			
<b>Catalog</b> I	Number:	PLMO9-	2X/2Y/21	Г	Lot No.	10-74MO		
Descripti			/L Molyb					
Matrix:		H2O						NOF
calibration sta	andard or qui P, AA, ICPN	ality control AS, and XRF	standard for . It can be	r inorganic sp	ectroscopic ir	narily for use as a nstrumentation such as M and other methods		16: 4HH
-	y Associate	d with Mea		t: +/-3.0m	g/L			0
Certified V	alue is Tra	ceable to:	NIST SF	CM #3134				P
				ned by classic		Lot# 0301: and ICP spectrometer	IC. The	
continuo valu		a torage of		•	ai not assay i	and let speed onlow	anarysis	4
Refer to side	2 for detail	s of measure	ement unce	rtamnes.				
				rtamnes.				F 5 2
Classical V	Vet Assay	: 998 m	g/L		nd weigh as l	M0O2 (C9H6NO)2.		F 59 300
Classical V Method: P	Vet Assay recipitation	: 998 m using 8 Hydr	g/L oxy Quinoli	ine,filter,dry a		MoO2 (C9H6NO)2.		F59300
Classical V Method: _P Instrumen	Vet Assay recipitation tal Analys	: 998 m using 8 Hydr sis by ICP	g/L oxy Quinoli	ine,filter,dry a	nd weigh as 1 999 mg/L	MoO2 (C9H6NO)2.		F53300
Classical V Method: P Instrumen Uncertified	Vet Assay recipitation tal Analys d Properti	: 998 m using 8 Hydr sis by ICP ies:	g/L oxy Quinoli spectron	ine,filter,dry a neter:		MoO2 (C9H6NO)2.		P53.30
Classical V Method: p Instrumen Uncertified De	Vet Assay recipitation tal Analys d Properti nsity: 0.99	: 998 m using 8 Hydr sis by ICP ies: 89 @ 23.7 D	g/L oxy Quinoli spectron egrees Cels	ine,filter,dry a <b>neter:</b>	999 mg/L	M0O2 (C9H6NO)2. IS Analysis:		F53.300
Classical V Method: p Instrumen Uncertified De	Vet Assay recipitation tal Analys d Properti nsity: 0.99	: 998 m using 8 Hydr sis by ICP ies: 89 @ 23.7 D	g/L oxy Quinoli spectron egrees Cels	ine,filter,dry a <b>neter:</b>	999 mg/L			F53300
Classical V Method: p Instrumen Uncertified De Trace Met	Vet Assay recipitation tal Analys d Properti nsity: 0.99 tallic Impu mg/L 0.002	: 998 m using 8 Hydr sis by ICP ies: 89 @ 23.7 D urities in the	g/L oxy Quinoli spectron egrees Cels e Actual S mg/L 0.003	ine, filter, dry a neter: ius colution via Element Pb	999 mg/L ICP / ICPM mg/L 0.002			F53.300
Classical V Method: p Instrumen Uncertified De Trace Met Element Al As	Vet Assay recipitation tal Analys d Properti nsity: 0.999 tallic Impu mg/L 0.002 0.04	: 998 m using 8 Hydr sis by ICP ies: 89 @ 23.7 D arities in the Element Cu Fe	g/L oxy Quinoli spectron egrees Cels e Actual S mg/L 0.003 <0.10	ine, filter, dry a neter: ius colution via Element Pb Re	999 mg/L ICP / ICPM mg/L 0.002 0.03			F53.306
Classical V Method: p Instrumen Uncertified De Trace Met Element Al As Ag	Vet Assay recipitation tal Analys d Propertinsity: 0.999 tallic Impu mg/L 0.002 0.04 <0.001	: 998 m using 8 Hydr sis by ICP ies: 89 @ 23.7 D arities in the Element Cu Fe Ga	g/L oxy Quinoli spectron egrees Cels e Actual S mg/L 0.003 <0.10 <0.001	ine, filter, dry a neter: 9 ius colution via Element Pb Re Rb	999 mg/L ICP / ICPM mg/L 0.002 0.03 <0.001			F53.300
Classical V Method: p Instrumen Uncertified De Trace Met Element Al As Ag B	Vet Assay recipitation tal Analys d Propertini nsity: 0.99 tallic Impu mg/L 0.002 0.04 <0.001 <0.006	: 998 m using 8 Hydr sis by ICP ies: 89 @ 23.7 D arities in the Element Cu Fe Ga In	g/L oxy Quinoli spectron egrees Cels e Actual S mg/L 0.003 <0.10 <0.001 <0.001	ine, filter, dry a neter: 9 ius colution via 2 Element Pb Re Rb Sr	999 mg/L ICP / ICPM mg/L 0.002 0.03 <0.001 <0.001			F5a300 HUU
Classical V Method: p Instrumen Uncertified De Trace Met Element Al As Ag B Ba	Vet Assay recipitation tal Analys d Propertininsity: 0.999 tallic Impu mg/L 0.002 0.04 <0.001 <0.006 0.001	: 998 m using 8 Hydr sis by ICP ies: 89 @ 23.7 D rities in the Element Cu Fe Ga In K	g/L oxy Quinoli spectron egrees Cels e Actual S mg/L 0.003 <0.10 <0.001 <0.001 0.01	ine, filter, dry a neter: 9 ius colution via Element Pb Re Rb Sr Sb	999 mg/L ICP / ICPM mg/L 0.002 0.03 <0.001 <0.001 0.005			F5a306
Classical V Method: p Instrumen Uncertified De Trace Met Element Al As Ag B	Vet Assay recipitation tal Analys d Propertini nsity: 0.99 tallic Impu mg/L 0.002 0.04 <0.001 <0.006	: 998 m using 8 Hydr sis by ICP ies: 89 @ 23.7 D rities in the Element Cu Fe Ga In K Li	g/L oxy Quinoli spectron egrees Cels e Actual S mg/L 0.003 <0.10 <0.001 <0.001	ine, filter, dry a neter: 9 ius colution via 2 Element Pb Re Rb Sr	999 mg/L ICP / ICPM mg/L 0.002 0.03 <0.001 <0.001			F5a.300
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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, = 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, where k=2 is the coverage factor at the 95% confidence level

ue is obtained by combining the individual element standard uncertainty components  $u_i$  and  $u_i \sqrt{\Sigma u_i^2}$ .

### **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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### 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  $k = s^2 m$  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, 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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		S]	9CX	CETTITI	icate		Ĩ
		-4		terence A			ORG
Catalog ]	Number	PLSI9-22	X/2Y/2T		Lot No.	10-07SI	F
Descripti	io <b>n:</b>	1000 mg/	/L Silicon	L			ا (م در)
Matrix:		H2O / 0.4	4% F-				۳ و
calibration st ICPOES, DC relevent to the	andard or qu P, AA, ICPN e certified pr	ality control and XRF coperties liste	standard for . It can be	r inorganic sp	ectroscopic in	narily for use as a astrumentation such as M and other methods	50 ±0
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Certified V			NIST SF		100177	T	σ
The CRM is present the certified value	prepared gra	vimetrically use average of y	using high p values obtai	ned by classic	2Siro cal wet assav	Lot# 02021D. The and ICP spectrometer analysis	
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<u></u>			~				
Classical V	Wet Assay	: 997 n	ng/L				K
	Wet Assay recipitation		-	date and 8-H	ydroxy Quind	oline. Filter, dry, and weigh as	
Method: P	recipitation		nium Molył	odate and 8-H	ydroxy Quind	bline. Filter, dry, and weigh as	Nor
Method: P	recipitation C9H7ON)4(1	using Ammor H4)[Si(Mo12	nium Molyt 2040)]	odate and 8-Hy		oline. Filter, dry, and weigh as	NOX
Method: P	recipitation C9H7ON)4(Intation An	using Ammor H4)[Si(Mo12 alysis By I	nium Molyt 2040)]			oline. Filter, dry, and weigh as	
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EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition ASTM Guide D6362-98

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ISO Guide 17025: Certification of reference materials, general and statistical principles

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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, = 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, where k=2 is the coverage factor at the 95% confidence level

 $u_e$  is obtained by combining the individual element standard uncertainty components  $u_i$  and  $u_{ee} \sqrt{\Sigma u_i^2}$ 

### **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:





# SPEXertificate

Lot No. 10-38TI

010190

INDROANIO

LABS/RADCHEM LABS

Certificate of Reference Material

Catalog Number:PLTI9-2X/2Y/2TDescription:1000 mg/L TitaniumMatrix: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 relevent to the certified properties listed below.

Certified Value: 1001 mg/L Uncertainty Associated with Measurement: 3.0mg/L Certified Value is Traceable to: NIST SRM #3162a

The CRM is prepared gravimetrically using high purity (NH4)2TiF6 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: 1003 mg/L

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

Instrumentation Analysis By ICP spectrometer: 999 mg/L Uncertified Properties:

Density: 1.001 @ 22.5 Degrees Celsius

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

Element	mg/L	Element	mg/L	Element	mg/L
Al	0.006	Cu	<0.10	Pb	<0.001
As	<0.001	Fe	<0.01	Rb	<0.001
Ag	< 0.001	Ga	< 0.001	Re	<0.001
в	0.003	In	< 0.001	Si	0.52
Ba	<0.001	К	<0.01	St	0.001
Be	<0.001	Li	<0.001	Sb	<0.001
Bi	<0.001	Mg	<0.001	TI	< 0.001
Ca	0.013	Mn	< 0.001	v	< 0.001
Cr	< 0.003	Mo	<0.001	Zr	0.01
Cd	<0.001	Na	0.02	Zn	0.03
Со	0.002	Ni	<0.001		

AUG

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.

'03

Date of Certification:

Certifying Officer: N. Kochertakota

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, = 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, where k=2 is the coverage factor at the 95% confidence level

 $u_e$  is obtained by combining the individual element standard uncertainty components  $u_i$  and  $u_{e^-} \sqrt{\Sigma u_i^2}$ 

### **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:



SPEXertificate

Certificate of Reference Material

Catalog Number:PLSR2-2X/2Y/2TLot No.9-166SRDescription:1000 mg/L Strontium in 2% HNO3Matrix: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 relevent to the certified properties listed below.

Certified Value: 1002.5 mg/L Uncertainty Associated with Measurement: +/- 3 mg/L Certified Value is Traceable to: NIST SRM 3153a

The CRM is prepared gravimetrically using high purity Strontium Carbonate Lot# 02001B. 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: EDTA titration using Methyl Thymol Blue as indicator. EDTA standardized against Pb(NO3)2 NIST SRM #928.

Instrumentation Analysis By ICP spectrometer: 1003 mg/L Uncertified Properties:

Density: 1.010 @ 22.7 Degrees Celsius

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

Element	mg/L	Element	mg/L	Element	mg/L
Al	0.02	Cu	<0.001	Pb	<0.001
As	<0.001	Fe	0.001	Rb	<0.001
Ag	< 0.002	Ga	< 0.001	Re	<0.001
в	< 0.003	In	< 0.001	Si	0.043
Ba	0.008	К	0.10	Sb	<0.001
Be	< 0.001	Li	0.007	Ti	<0.002
Bi	<0.001	Mg	< 0.003	Tl	<0.001
Ca	0.014	Mn	<0.001	v	<0.001
Cr	0.001	Mo	< 0.001	Zr	<0.001
Cd	< 0.001	Na	0.01	Zn	0.04
Co	<0.001	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.

2003

Date of Certification:

Certifying Officer: N. Kochertakola

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  $k = s^2 m$  is employed to determine the sampling size

s = relative standard deviation in % for one component of the sample. (ie. The sub-sampling uncertainty)

 $m \neq$  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, where k=2 is the coverage factor at the 95% confidence level

 $u_e$  is obtained by combining the individual element standard uncertainty components  $u_i$  and  $u_{ee} \sqrt{\Sigma u_i^2}$ 

### **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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0.18	Rb	<0.001		
< 0.001				(Circle)
0.004	Ti	0.009		
0.003	TI	< 0.001		
<0.001	v	<0.40		
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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  $k_{s}=s^{2}m$  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

 $k_e = mass$  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, where k=2 is the coverage factor at the 95% confidence level

 $u_e$  is obtained by combining the individual element standard uncertainty components  $u_i$  and  $u_{ee} \sqrt{\Sigma u_i^2}$ 

### 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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Instrumental An Uncertified Prop Density: Trace Metallic I Element mg/I Al 0.00 As <0.00 B <0.00 Ba <0.00 Ba <0.00 Be <0.00 Cd <0.00	nalysis by I perties: 1.052@23.1 mpurities in Mpurities in Cu Cu Cu Cu Cu Cu Cu Cu Cu Cu Cu Cu Cu	Degrees Cels the Actual Sc ent mg/L 0.002 0.001 <0.001 <0.001 0.002 <0.001 <0.001 <0.001	meter: sius olution via Elemen Pb Re Rb Sr Sb Si Si Ti	1002 mg/L ICP / ICPMS nt mg/L 0.009 <0.001 <0.001 <0.001 0.002 <0.01 <0.001 <0.001		
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Guide To The Expression Of Uncertainty In Measurement 1995

EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement - Second Edition ASTM Guide D6362-98

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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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### Instructions for Use:

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#### Method of Preparation:

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### Homogeneity:

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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. = 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:

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U=kue where k=2 is the coverage factor at the 95% confidence level

 $u_e$  is obtained by combining the individual element standard uncertainty components  $u_i$  and  $u_e \sqrt{\Sigma u_i^2}$ 

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		-		Eertít		
		Certífica	te of Re	terence A	Aaterial	
Catalog ]	Number:	PLLA2-2	2X/2Y		Lot No. 10-27LA	
Descripti			/L Lantha	inum		
Matrix:		2% HNC	)3			
calibration st ICPOES, DC relevent to th	tandard or qui CP, AA, ICPN ie certified pr	ality control AS, and XRF operties liste	standard fo F. It can be	or inorganic s	s intended primarily for use as a pectroscopic instrumentation such as USEPA, ASTM and other methods	ATE OPENED: NORG: <u>1112</u>
	Value: 100			1/20-	- 17	<b>6</b> ⁹ 5
•	y Associated alue is Trac			+/-3.0m RM #3127a	g/L	
The CRM is	prepared grav	vimetrically	using high	purity La(N	O3)3-6H2O Lot# 03951B. cal wet assay and ICP spectrometer and	
Refer to side		-		-	car wet assay and ici specifoliteter and	Ilysis F
Classical V	Net Assay:	1000 n	ng/L			ec to
Method: E	DTA titratio	n using Met	hyi Thymol	Blue as indic	cator. EDTA standardized against Pb(	NO3)2
N	NST SRM #9	28.				
			CP spect	trometer: 9	999 mg/L	
Uncertified	-					Interest
	nsity: 1.010 tallic Impur	-			CP / ICPMS Analysis:	
Element	mg/L	Element	mg/L	Element	mg/L	
Ce	0.02	Lu	<0.001	Th	<0.001	
Ca	0.029	Mn	<0.001	Tm Ti	<0.001	
	⊲0.001 ⊲0.001	Mo Nd	<0.001 <0.001	Ti Tb	<0.001 <0.001	
Dy	-0.001	Ni	< 0.001	Ta	<0.001	
Dy Er				TI	<0.001	
Dy	<0.001	Na	0.01			
Dy Er Eu		Na Pr	0.01 <0.001	v	<0.001	
Dy Er Eu Fe Gd Ga	<0.001 0.005		<0.001 <0.001			
Dy Er Eu Fe Gd Ga Hf	<0.001 0.005 <0.001 <0.001 <0.001	Pr Rb Sc	<0.001 <0.001 0.002	V W Y	<0.001 <0.001 <0.001	
Dy Er Eu Fe Gd Ga	<0.001 0.005 <0.001 <0.001	Pr Rb	<0.001 <0.001	V W	<0.001 <0.001	
Dy Er Eu Fe Gd Ga Hf	<0.001 0.005 <0.001 <0.001 <0.001	Pr Rb Sc	<0.001 <0.001 0.002	V W Y	<0.001 <0.001 <0.001	

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 $k_s = mass$  of sub-sample necessary to ensure a relative sub-sampling error of 1% (68% confidence level) in a single determination

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 $u_e$  is obtained by combining the individual element standard uncertainty components  $u_i$  and  $u_{ee} \sqrt{\Sigma u_i^2}$ 

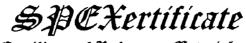
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Lot No. 9-152Y

Certificate of Reference Material

Catalog Number:PLY2-2X/2Y/2TDescription:1,000 mg/L YttriumMatrix: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 relevent to the certified properties listed below.

Certified Value: 1001.5 mg/L Uncertainty Associated with Measurement: +/- 3 mg/L Certified Value is Traceable to: NIST SRM 3167a,

The CRM is prepared gravimetrically using high purity Yttrium Oxide Lot# 08001A. 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: EDTA titration using Methyl Thymol Blue as indicator. EDTA standardized against Pb(NO3)2 NIST SRM #928.

Instrumentation Analysis By ICP spectrometer: 1001 mg/L Uncertified Properties:

Density: 1.010 @ 24.8 Degrees Celsius

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

Element	mg/L	Element	mg/L	Element	mg/L
Ce	< 0.001	- La	<0.001	ТЪ	< 0.001
Ca	0.007	Lu	<0.001	Tm	<0.001
Dy	<0.001	Mn	<0.001	Tl	<0.001
Er	<0.001	Мо	<0.001	Th	<0.001
Eu	<0.001	Nd	<0.001	Ta	<0.001
Fe	0.003	Ni	<0.001	Ti	<0.001
Gd	<0.001	Na	0.005	V	<0.001
Ga	<0.001	Pr	<0.001	W	<0.001
Hf	<0.001	Rb	<0.001	Yb	<0.001
Ho	<0.001	Sc	<0.001	Zr	0.003
In	<0.001	Sm	<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. Kochertakota

# 010201

This Certified Reference Material has been prepared and certified under an ISO 9001 system consistent with the following guides:

### ASTM Guide D6362-98

ISO Guide 34: Quality system guidelines for the production of reference materials.

ISO Guide 35: Certification of reference materials, general and statistical principles

ISO Guide 31: Contents of certificates of reference materials

ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers

### ISO/REMCO N280

### Material Source:

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S = relative standard deviation in % for one component of the sample. (i.e. The sub-sampling uncertainty) m = the sub-sampling mass

k = mass of sub-sample necessary to ensure a

 $k_s = mass$  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 uncertainty of the certified value listed on the reverse of this document is the total uncertainty U.

 $U = 2U_c + B mg/L$ 

Where  $U_c = \text{combined uncertainty components associated with volumetric and gravimetric factors, B is the uncertainty component of two independent methods of analysis (including the systematic and random uncertainties) 95% confidence limits = X + t_{net} <math>\sqrt{\Sigma U_c^2}$ 

### where X =grand mean

 $t_{0.05}$  = the percentile of the student's t distribution for (k-1) degrees of freedom.

### **Certification Traveler Report:**

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Catalog No Description Matrix:	lumber:		9EX	ertifi	ICATO	ТМ	
Description	lumber:				4444		
Description			te of Rel	terence Al			
Description		PLPD3-2	2X/2Y		Lot No.	10-108PD	V
-	)n:		/L Palladi	um			
		10% HC	1				IZ
calibration stan	ndard or qua , AA, ICPM certified pro alue: 100	ality control IS, and XRF operties liste 02.5 mg/L	standard for . It can be o d below.	r inorganic sp employed in I	ectroscopic ii USEPA, AST	narily for use as a nstrumentation such as M and other methods	
Certified Val					ΥL		1
The CRM is pro	repared grav	vimetrically	using high p	ourity Pallad	lium Powder cal wet assay	Lot# 01021A. The and ICP spectrometer analysis	PO,
Refer to side 2							
Classical We	et Assay:	: 1002 r	ng/L				с С
Method: Pre-	ecipitation v	ising Glyoxi	1971				
		mme ci)ovi	me. Filter,	dry, and weig	h as Pd(C4H	702N2)2	e Se
	-				h as Pd(C4H' 1003 mg/L	702N2)2	ولادو
Instrumenta Uncertified	al Analys	sis by ICP				702N2)2	66CE
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Instrumenta Uncertified I Dens Trace Meta Element Al Au Ag	al Analys Propertic asity: 1.017 allic Imput mg/L 0.01 0.003 0.005	sis by ICP es: 7 @ 23.6 D rities in the Element Fe Ga Ir	spectron egrees Celsi e Actual S mg/L 0.024 <0.001 <0.001	neter: ius olution via Element Re Rh Rb	1003 mg/L ICP / ICPM mg/L <0.001 <0.001 <0.001		
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Instrumenta Uncertified Dens Trace Meta Element Al Au Ag B Be Be Bi	al Analys Propertic asity: 1.017 allic Impu: mg/L 0.01 0.003 0.005 <0.002 <0.003 <0.003 <0.001	sis by ICP es: 7 @ 23.6 D rities in the Element Fe Ga Ir In Mg Mn	spectron egrees Cels: e Actual S mg/L 0.024 <0.001 <0.001 <0.001 0.008 <0.001	neter: ius olution via Element Re Rh Rb Rb Ru	1003 mg/L ICP / ICPM mg/L <0.001 <0.001 <0.001 <0.001		
Instrumenta Uncertified Dens Trace Meta Element Al Au Ag B Be Be Bi Ca	al Analys Propertic asity: 1.017 allic Imput mg/L 0.01 0.003 0.005 <0.002 <0.003 <0.001 0.014	sis by ICP es: 7 @ 23.6 D rities in the Element Fe Ga Ir In Mg	spectron egrees Celsi e Actual S mg/L 0.024 <0.001 <0.001 <0.001 0.008	neter: ius olution via Element Re Rh Rb Ru Sn Te	1003 mg/L ICP / ICPM mg/L <0.001 <0.001 <0.001 <0.001 0.007 <0.002		
Instrumenta Uncertified Dens Trace Meta Element Al Au Ag B Be Be Bi Ca	al Analys Propertic asity: 1.017 allic Impu: mg/L 0.01 0.003 0.005 <0.002 <0.003 <0.003 <0.001	sis by ICP es: 7 @ 23.6 D rities in the Element Fe Ga Ir In Mg Mn Na	spectron egrees Cels: e Actual S mg/L 0.024 <0.001 <0.001 <0.001 0.008 <0.001 0.02	neter: ius olution via Element Re Rh Rb Ru Sn Te Ti	IOO3 mg/L ICP / ICPM mg/L <0.001 <0.001 <0.001 <0.001 0.007 <0.002 <0.001		
Instrumenta Uncertified Dens Trace Meta Element Al Au Ag B Be Bi Ca Ca Cd Co	al Analys Propertic asity: 1.017 allic Imput mg/L 0.01 0.003 0.005 <0.002 <0.003 <0.001 0.014 <0.001	sis by ICP es: 7 @ 23.6 D rities in the Element Fe Ga Ir In Mg Mn Na Ni	spectron egrees Celsi e Actual S mg/L 0.024 <0.001 <0.001 <0.001 0.008 <0.001 0.02 <0.001	neter:	IOO3 mg/L ICP / ICPM mg/L <0.001 <0.001 <0.001 <0.001 0.007 <0.002 <0.001 <0.001		

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Signet Sector       Cartificate of Reference Material         Catalog Number:       PLS9-2X/2Y/2T       Lot No. 8-74S         Description:       1000 mg/L Sulfur         Matrix:       H2O         This ASSURANCE © certified reference material, CRM, is intended primarily for use as a calibration studard 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 relevent to the certified properties listed below.         Certified Value:       1003 mg/L         Uncertainty Associated with Measurement:       +/- 3 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 uncertaintles.       Classical Wet Assay:         Classical Wet Assay:       1003 mg/L         Method:       Precipitation using barium chloride, filter, ignite and weigh as BaS04.         Instrumentation Analysis By ICP spectrometer:       1003 mg/L         Uncertified Properties:       Density:         Density:       1.007 @ 23.6       Degrees Celsius         Trace Metallic Impurities in the Actual Solution via ICP / ICPMS Analysis:         Element mg/L       Element mg/L       Al			<u>A</u>		antifi	'esta	TM	DAT INC
Catalog Number: PLS9-2X/2Y/2T       Lot No. 8-74S         Description:       1000 mg/L Sulfur         Matrix:       H2O         This ASSURANCE © certified reference material, CRM, is intended primarily for use as a calibration standard or inorganic spectroscopic instrumentation such as ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevent to the certified properties listed below.         Certified Value:       1003 mg/L         Uncertainty Associated with Measurement:       +/- 3 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 uncertaintles.       Classical Wet Assay:         Classical Wet Assay:       1003 mg/L         Method:       Precipitation using barlum chloride, filter, ignite and weigh as BaS04.         Instrumentation Analysis By ICP spectrometer:       1003 mg/L         Uncertified Properties:       Density:         Density:       1007 @ 23.6       Degrees Celsius         Trace Metallic Impurities in the Actual Solution via ICP / ICPMS Analysis:         Element       mg/L       Element       mg/L         Al       0.001       Ca       0.001       Sa <t< th=""><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th>ភ្លាក់</th></t<>								ភ្លាក់
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 relevent to the certified value: 1003 mg/L         Uncertainty Associated with Measurement:       +/- 3 mg/L         Certified Value:       1003 mg/L         Uncertainty Associated with Measurement:       +/- 3 mg/L         Certified value is the average of values obtained by classical wet assay and ICP spectrometer analysis         Refer to side 2 for details of measurement uncertaintles.         Classical Wet Assay:       1003 mg/L         Method:       Precipitation using barium chloride, filter, ignite and weigh as BaS04.         Instrumentation Analysis By ICP spectrometer:       1003 mg/L         Uncertified Properties:       Density: 1,007 @ 23.6 Degrees Celsius         Trace Metallic Impurities in the Actual Solution via ICP / ICPMS Analysis:         Element       mg/L       Element       mg/L         Al       <0.001       Fe       <0.001       Pb       <0.002         As       <0.001       Fe       <0.001       Re       <0.001         B       <0.001       Fe       <0.001       Re       <			Certificat	e of Reli	erence Ala	iterial		
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 relevent to the certified value: 1003 mg/L         Uncertainty Associated with Measurement:       +/- 3 mg/L         Certified Value:       1003 mg/L         Uncertainty Associated with Measurement:       +/- 3 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 beaverage of values obtained by classical wet assay and ICP spectrometer analysis         Refer to side 2 for details of measurement uncertaintles.       Classical Wet Assay:       1003 mg/L         Method:       Precipitation using barium chloride, filter, ignite and weigh as BaS04.       Instrumentation Analysis By ICP spectrometer:       1003 mg/L         Uncertified Properties:       Density:       1.007 @ 23.6 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       Ca       <0.001       Rs       <0.001         As       <0.001	Catalog	Number:	PLS9-2X	/2 <b>Y/2</b> T	]	Lot No.	8-74S	
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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         relevent to the certified properties listed below.       Certified Value: 1003 mg/L       Uncertainty Associated with Measurement: +/- 3 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 uncertaintles.       Classical Wet Assay: 1003 mg/L         Method:       Precipitation using barium chloride, filter, ignite and weigh as BaS04.         Instrumentation Analysis By ICP spectrometer: 1003 mg/L       Uncertified Properties:         Density: 1.007 @ 23.6 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	- 16		H2O				•	
Density: $1.007 @ 23.6$ Degrees Celsius         Trace Metallic Impurities in the Actual Solution via ICP / ICPMS Analysis:         Element       mg/L       Element       mg/L       Element       ng/L         Al       <0.001       Cu       <0.001       Pb       0.002         As       <0.001       Fe       0.008       Rb       <0.001         Ag       <0.001       Ga       <0.001       Re       <0.001         B       <0.004       In       <0.001       Sn       <0.001         Ba       <0.001       K       <0.001       Sb       <0.001         Bi       <0.001       Mg       0.005       Ti       <0.002         Ca       0.009       Mn       <0.001       Ti       <0.001         Bi       <0.001       Mo       <0.001       Ti       <0.002         Ca       0.009       Mn       <0.001       Ti       <0.001         Cd       <0.001       Na       <0.02       Zr       <0.001         Co       <0.001       Na       <0.02       Zr       <0.001	calibration st ICPOES, DC relevent to th <b>Certified V</b> <b>Uncertaint</b> <b>Certified V</b> The CRM is certified value <b>Refer to side</b> <b>Classical V</b> <b>Method: F</b> <b>Instrumen</b>	andard or qu P, AA, ICPM e certified pr Value: 100 y Associate falue is Tra prepared gra the listed is the 2 for detail Wet Assay Precipitation	ality control s MS, and XRF. roperties lister 03 mg/L ed with Mea acceable to: vimetrically u e average of w s of measure : 1003 m using barium alysis By I	tandard for It can be e below. surement: NIST SR using high p values obtain ment uncer ng/L chloride, filt	inorganic spe mployed in U : +/- 3 mg M 3154 urity Ammo ned by classic rtaintles.	ctroscopic i ISEPA, AST /L onium Sulfat al wet assay weigh as Ba	Instrumentation such as I'M and other methods te Lot# 05891M. T and ICP spectrometer analy 1804.	
Al<0.001Cu<0.001Pb0.002As<0.001	De	ensity: 1.00	7@23.6 D	-		ICP / ICPN	MS Analysis:	
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Ag<0.001Ga<0.001Re<0.001B<0.004			Cu	<0.001	РЪ	0.002		
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Bi       <0.001	Al As Ag B	<0.001 <0.001 <0.004	Ga In	<0.001		<0.001		
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Cd         <0.001         Na         0.02         Zr         <0.001           Co         <0.001	Al As Ag B Ba Ba Bc Bi	<0.001 <0.001 <0.004 <0.001 <0.001 <0.001	Ga In K Li Mg	<0.001 <0.001 <0.001 0.005	Sr Sb Ti	<0.001 <0.001 <0.001 <0.002		
Co <0.001 Ni <0.001 Zn 0.0075	Al As Ag B Ba Be Bi Ca	<0.001 <0.001 <0.004 <0.001 <0.001 <0.001 0.009	Ga In K Li Mg Mn	<0.001 <0.001 <0.001 0.005 <0.001	Sr Sb Ti Tl	<0.001 <0.001 <0.001 <0.002 <0.001		
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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				0.008	Rb	<0.001		
	Al As Ag B Ba Be Bi Ca Cr Cd Co Balances an This CRM i of measurer date of certi	<0.001 <0.001 <0.004 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 e calibrated r s guaranteed nents and oth fication. Th	Ga In K Li Mg Mn Mo Na Ni regularly with stable to +/-0 ner effects, su is guarantee is	<0.001 <0.001 0.005 <0.001 0.02 <0.001 0.02 <0.001 weight sets 0.5% of the o ch as transp s valid only	Sr Sb Ti Tl V Zr Zn traceable to N certified conce iration losses, when the mat	<0.001 <0.001 <0.002 <0.001 <0.001 <0.001 <0.001 0.0075 NIST #32850 entration inco for a period	clusive of uncertainty	
transported and stored under laboratory conditions. Date of Certification: <u>UN</u> '03 Certifying Officer: <u>N. Kochertakota</u>	Al As Ag B Ba Be Bi Ca Cr Cd Co Balances an This CRM i of measurer date of certi transported	<0.001 <0.001 <0.004 <0.001 <0.001 <0.001 <0.001 <0.009 <0.004 <0.001 <0.001 <0.001 e calibrated r s guaranteed nents and oth fication. Th and stored u	Ga In K Li Mg Mn Mo Na Ni regularly with stable to +/-0 her effects, su is guarantee is nder laborator	<0.001 <0.001 <0.001 0.005 <0.001 <0.001 0.02 <0.001 weight sets 0.5% of the och as transp s valid only cy condition	Sr Sb Ti Tl V Zr Zn traceable to N certified conce iration losses, when the mat s.	<0.001 <0.001 <0.002 <0.001 <0.001 <0.001 <0.001 0.0075 NIST #32850 entration inco for a period terial is kept	clusive of uncertainty d of one year from the tightly capped and	

## 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  $k = s^2 m$  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 = 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=kue where k=2 is the coverage factor at the 95% confidence level

 $u_o$  is obtained by combining the individual element standard uncertainty components  $u_i$  and  $u_o \sqrt{\Sigma u_i^2}$ 

### **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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Catalog	Number:	PLTH2-	2X/2Y		Lot No.	10-24TH		5 2
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calibration s ICPOES, DO relevent to th Certified Uncertaint	tandard or qu CP, AA, ICPI he certified pr Value: 999 y Associated	ality control MS, and XRI roperties liste 9 mg/L d with Mea	l standard fo F. It can be ed below. surement:	employed in +/- 3.0 1	pectroscopic in USEPA, AST	narily for use as a instrumentation such a M and other methods		50750766-
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	e 2 for detail Wet Assay:			ertainties.				н
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### ISO/REMCO N280

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S = relative standard deviation in % for one component of the sample, (ie. The sub-sampling uncertainty)

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k = mass of sub-sample necessary to ensure a relative sub-sampling error of 1% (68% confidence level) in a single determination

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U=ku, where k=2 is the coverage factor at the 95% confidence level

 $u_e$  is obtained by combining the individual element standard uncertainty components  $u_i$  and  $u_e \sqrt{\Sigma u_i^2}$ **Certification Traveler Report:** 

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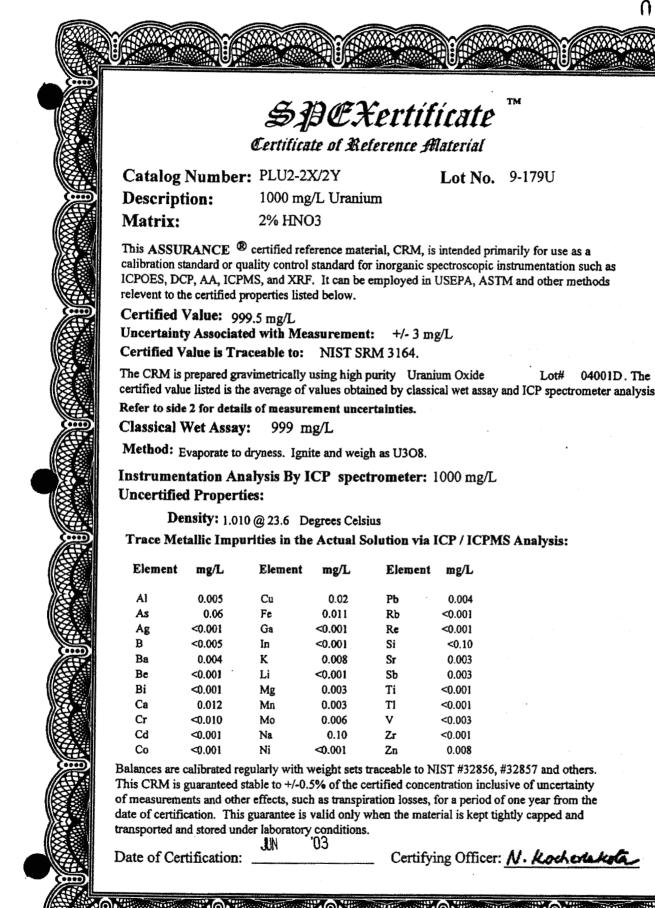
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This Certified Reference Material has been prepared and certified under an ISO 9001 system consistent with the following guides:

Guide To The Expression Of Uncertainty In Measurement 1995

EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement - Second Edition ASTM Guide D6362-98

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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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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

 $k_e = mass$  of sub-sample necessary to ensure a relative sub-sampling error of 1% (68% confidence level) in a single determination

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U=ku, 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  $u_c \sqrt{\Sigma u_i^2}$ 

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SPEXertificate Certificate of Reference Material Catalog Number: PLW9-2X/2Y 9-177W Lot No. 1000 mg/L Tungsten **Description:** H2O Matrix: 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 relevent to the certified properties listed below. Certified Value: 1,000 mg/L Uncertainty Associated with Measurement: +/- 3 mg/L Certified Value is Traceable to: NIST SRM 3163 The CRM is prepared gravimetrically using high purity Ammonium Tungstate Lot# 02001H. 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: Fume with Sulfuric Acid to dryness. Ignite and weigh as WO3. Instrumentation Analysis By ICP spectrometer: 1000 mg/L **Uncertified Properties:** Density: 0.9979 @ 23.7 Degrees Celsius Trace Metallic Impurities in the Actual Solution via ICP / ICPMS Analysis: Element mg/L Element mg/L Element mg/L < 0.001 Al < 0.001 Pb 0.002 Cu

As	0.01	Fe	< 0.01	RЬ	<0.001	
Ag	<0.003	Ga	<0.001	Re	0.004	
B	<0.005	In	<0.001	Si	.56	
Ba	<0.001	к	0.05	Sr	< 0.001	
Be	<0.001	Li	< 0.001	Sb	0.001	
Bi	<0.001	Mg	<0.001	Ti	<0.001	
Ca	0.009	Mn	<0.001	TI	< 0.001	
Cr	<0.001	Мо	0.005	v	0.001	•
Cđ	< 0.001	Na	0.03	Zr	< 0.001	
Co	0.001	Ni	<0.001	Zn	0.01	

AUG

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 of Certification:

Certifying Officer: N. Kochertakel

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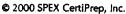
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				ierence M				Rin Ling Ling
Catalo	g Number:	PLZR2-2	X/2Y/2T	]	Lot No.	10-05ZR		
Descri	-	1000 mg/		um				456
Matrix	-	2% HNO	3					6
calibration ICPOES, relevent to	URANCE ® n standard or qu DCP, AA, ICPN o the certified pu	ality control MS, and XRF roperties liste	standard fo . It can be	r inorganic sp	ectroscopic	instrumentat	ion such as	
Uncertai	d Value: 997 nty Associated Value is Tra	d with Meas	urement: NIST SR		ng/L			12 223
The CRM	is prepared gra ralue listed is the	vimetrically	using high	purity Zircon	yl Nitrate al wet assay	Lot# and ICP spe		
	ide 2 for detai			rtainties.				
	l Wet Assay		•					
	Evaporate to	•						
18 <b>1</b>	entation An		CP spect	trometer: 9	97 mg/L	r		
Uncerti	fied Properti	es:						
	-							
113	Density: 1.01	-	-			C A notreise		
113	-	-	-			S Analysis:		
113	Density: 1.01 Metallic Impu	-	-		CP / ICPM mg/L	S Analysis:		
Trace l	Density: 1.01 Metallic Impu nt mg/L 0.03	rities in the Element Cu	Actual So mg/L 0.002	<b>lution via IC</b> Element Pb	mg/L 0.002	S Analysis:		
Trace I Eleme Al As	Density: 1.01 Metallic Impu nt mg/L 0.03 <0.001	rities in the Element Cu Fe	Actual So mg/L 0.002 0.017	l <b>ution via IC</b> Element Pb Rb	<b>mg/L</b> 0.002 <0.001	S Analysis:		
Trace I Eleme Al As Ag	Density: 1.01 Metallic Impu nt mg/L 0.03 <0.001 <0.05	rities in the Element Cu Fe Ga	Actual So mg/L 0.002 0.017 <0.001	lution via IC Element Pb Rb Re	mg/L 0.002 <0.001 <0.001	S Analysis:		
Trace I Eleme Al As Ag B	Density: 1.01 Metallic Impu nt mg/L 0.03 <0.001 <0.05 <0.004	rities in the Element Cu Fe Ga In	Actual So mg/L 0.002 0.017 <0.001 <0.001	l <b>ution via IC</b> Element Pb Rb	<b>mg/L</b> 0.002 <0.001	S Analysis:		
Trace I Eleme Al As Àg B Ba	Density: 1.01 Metallic Impu nt mg/L 0.03 <0.001 <0.05 <0.004 <0.001	rities in the Element Cu Fe Ga In K	Actual So mg/L 0.002 0.017 <0.001	lution via IC Element Pb Rb Re Si	mg/L 0.002 <0.001 <0.001 0.10	S Analysis:		
Trace I Eleme Al As Ag B	Density: 1.01 Metallic Impu nt mg/L 0.03 <0.001 <0.05 <0.004	rities in the Element Cu Fe Ga In	Actual So mg/L 0.002 0.017 <0.001 <0.001 0.10	lution via IC Element Pb Rb Re Si Si Sr	mg/L 0.002 <0.001 <0.001 0.10 <0.001	S Analysis:		
Trace I Eleme Al As Ag B Ba Ba Ba Ba	Density: 1.01 Metallic Imput nt mg/L 0.03 <0.001 <0.05 <0.004 <0.001 <0.001 <0.001	rities in the Element Cu Fe Ga In K Li	Actual So mg/L 0.002 0.017 <0.001 <0.001 0.10 0.002	lution via IC Element Pb Rb Re Si Si Sr Sb Ti Ti Ti	mg/L 0.002 <0.001 <0.001 0.10 <0.001 <0.001 <0.001 <0.001	S Analysis:		
Trace I Eleme Al As Ag B Ba Ba Be Bi Ca Cr	Density: 1.01 Metallic Impu nt mg/L 0.03 <0.001 <0.001 <0.001 <0.001 <0.001 0.11 <0.009	rities in the Element Cu Fe Ga In K Li Mg Mn Mo	Actual So mg/L 0.002 0.017 <0.001 <0.001 0.10 0.002 0.003 <0.001 <0.001	lution via IC Element Pb Rb Re Si Si Sr Sb Ti Ti Ti V	mg/L 0.002 <0.001 <0.001 0.10 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001	S Analysis:		
Trace I Eleme Al As Ag B Ba Ba Ba Ba Bi Ca Cr Cd	Density: 1.01 Metallic Impu nt mg/L 0.03 <0.001 <0.001 <0.001 <0.001 <0.001 0.11 <0.009 0.004	rities in the Element Cu Fe Ga In K Li Mg Mn Mo Na	Actual So mg/L 0.002 0.017 <0.001 <0.001 0.10 0.002 0.003 <0.001 <0.001 0.04	lution via IC Element Pb Rb Re Si Si Sr Sb Ti Ti Ti	mg/L 0.002 <0.001 <0.001 0.10 <0.001 <0.001 <0.001 <0.001	S Analysis:		
Trace I Eleme Al As Ag B Ba Ba Be Bi Ca Cr Cd Co	Density: 1.01 Metallic Imput nt mg/L 0.03 <0.001 <0.05 <0.004 <0.001 <0.001 <0.001 0.11 <0.009 0.004 <0.001	rities in the Element Cu Fe Ga In K Li Mg Mn Mo Na Ni	Actual So mg/L 0.002 0.017 <0.001 <0.001 0.10 0.002 0.003 <0.001 <0.001 0.04 <0.001	lution via IC Element Pb Rb Re Si Sr Sb Ti Ti Ti V Zn	mg/L 0.002 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001			
Trace I Eleme Al As Ag B Ba Ba Be Bi Ca Cr Cd Co Balances	Density: 1.01 Metallic Imput nt mg/L 0.03 <0.001 <0.05 <0.004 <0.001 <0.001 <0.001 <0.001 0.11 <0.009 0.004 <0.001 are calibrated r	rities in the Element Cu Fe Ga In K Li Mg Mn Mo Na Ni egularly with	Actual So mg/L 0.002 0.017 <0.001 <0.001 0.10 0.002 0.003 <0.001 <0.001 0.04 <0.001 weight sets	lution via IC Element Pb Rb Re Si Sr Sb Ti Ti V Zn s traceable to I	mg/L 0.002 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.02	6, #32857 an	d others	
Trace I Eleme Al As Ag B Ba Ba Be Bi Ca Cr Cd Co Balances This CRM	Density: 1.01 Metallic Imput nt mg/L 0.03 <0.001 <0.00 <0.004 <0.001 <0.001 <0.001 0.11 <0.009 0.004 <0.001 are calibrated r f is guaranteed	rities in the Element Cu Fe Ga In K Li Mg Mn Mo Na Ni egularly with stable to +/-0	Actual So mg/L 0.002 0.017 <0.001 <0.001 0.10 0.002 0.003 <0.001 <0.001 0.04 <0.001 weight sets 5% of the	lution via IC Element Pb Rb Re Si Sr Sb Ti Ti V Zn straceable to I certified conc	mg/L 0.002 <0.001 <0.001 0.10 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.003 0.02 VIST #3285 entration inc	6, #32857 and clusive of unc	ertainty	
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	(	Qertiticat	E OI SKEL	erence M		
Catalog I	Number:	PLNA2-3	3X/3Y		Lot No. U8-128NA	
Descripti	on:	10,000 m	g/L Sodiu	ım		HPS
Matrix:		5% HNO	3			NORG NORG
This ASSIT	ANCE ®	certified refe	rence mater	rial CRM is	intended primarily for use as a	с. С. <u>с</u> п
calibration sta	andard or qua P, AA, ICPM	ality control : IS, and XRF	standard for . It can be e	inorganic spe	ectroscopic instrumentation such as JSEPA, ASTM and other methods	YPIRED: •ENED:
Certified V	/ <b>alue:</b> 999	98 mg/L				
Uncertainty			surement	: +/- 30 m	ıg/L	
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	-	9@23.9 D	-		ICP / ICPMS Analysis:	
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Trace Met Element Al	tallic Impu mg/L 0.02	9@23.9D rities in the Element Cu	e Actual S mg/L 0.003	olution via ] Element Pb	mg/L <0.001	
Trace Met Element Al As	tallic Impu mg/L 0.02 <0.003	9@23.9D rities in the Element Cu Fe	e Actual S mg/L 0.003 0.03	olution via Element Pb Re	mg/L <0.001 <0.001	
Trace Met Element Al As Ag	tallic Impu mg/L 0.02 <0.003 <0.03	9 @ 23.9 D rities in the Element Cu Fe Ga	e Actual S mg/L 0.003 0.03 <0.001	olution via l Element Pb Re Rb	mg/L <0.001 <0.001 <0.001	
Trace Met Element Al As Ag B	tallic Impu mg/L 0.02 <0.003 <0.03 <0.03	9 @ 23.9 D rities in the Element Cu Fe Ga In	e Actual S mg/L 0.003 0.03 <0.001 <0.001	olution via Element Pb Re Rb Sr	mg/L <0.001 <0.001 <0.001 <0.002	
Trace Met Element Al As Ag B Ba	tallic Impu mg/L <0.02 <0.03 <0.03 <0.03 0.03	9 @ 23.9 D rities in the Element Cu Fe Ga In K	e Actual S mg/L 0.003 0.03 <0.001 <0.001 0.14	olution via 1 Element Pb Re Rb Sr Sb	mg/L <0.001 <0.001 <0.001 <0.002 <0.001	
Trace Met Element Al As Ag B Ba Ba Be	tallic Impu mg/L <0.02 <0.03 <0.03 <0.03 0.03 <0.02	9 @ 23.9 D rities in the Element Cu Fe Ga In K Li	e Actual S mg/L 0.003 0.03 <0.001 <0.001 0.14 <0.002	olution via 1 Element Pb Re Rb Sr Sb Sb Sn	mg/L <0.001 <0.001 <0.001 <0.002 <0.001 <0.001	
Trace Met Element Al As Ag B Ba Ba Be Bi	tallic Impu mg/L <0.003 <0.03 <0.03 <0.03 <0.03 <0.02 <0.001	9 @ 23.9 D rities in the Element Cu Fe Ga In K Li Mg	e Actual S mg/L 0.003 0.03 <0.001 <0.001 0.14 <0.002 0.30	olution via 1 Element Pb Re Rb Sr Sb Sn Ti	mg/L <0.001 <0.001 <0.001 <0.002 <0.001 <0.001 <0.001 <0.004	
Trace Met Element Al As Ag B Ba Ba Be Bi Ca	tallic Impu mg/L <0.003 <0.03 <0.03 <0.03 <0.02 <0.001 0.52	9 @ 23.9 D rities in the Element Cu Fe Ga In K Li Mg Mn	e Actual S mg/L 0.003 0.03 <0.001 <0.001 0.14 <0.002 0.30 0.008	olution via 1 Element Pb Re Rb Sr Sb Sn Ti Ti	mg/L <0.001 <0.001 <0.001 <0.002 <0.001 <0.001 <0.004 <0.001	
Trace Met Element Al As Ag B Ba Be Bi Ca Cr	tallic Impu mg/L 0.02 <0.003 <0.03 <0.03 <0.03 <0.02 <0.001 0.52 <0.004	9 @ 23.9 D rities in the Element Cu Fe Ga In K Li Mg Mn Mo	e Actual S mg/L 0.003 0.03 <0.001 <0.001 0.14 <0.002 0.30 0.008 <0.003	olution via Element Pb Re Rb Sr Sb Sn Ti Ti Tl V	mg/L <0.001 <0.001 <0.001 <0.002 <0.001 <0.001 <0.004 <0.001 <0.001	
Trace Met Element Al As Ag B Ba Be Bi Ca Cr Cd	tallic Impu mg/L 0.02 <0.003 <0.03 <0.03 <0.02 <0.001 0.52 <0.004 <0.001	9 @ 23.9 D rities in the Element Cu Fe Ga In K Li Mg Mn	e Actual S mg/L 0.003 0.03 <0.001 <0.001 0.14 <0.002 0.30 0.008	olution via 1 Element Pb Re Rb Sr Sb Sn Ti Ti	mg/L <0.001 <0.001 <0.001 <0.002 <0.001 <0.001 <0.004 <0.001 <0.001 <0.001 <0.001	
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Trace Met Element Al As Ag B Ba Ba Be Bi Ca Cr Cd Co Balances are This CRM is of measurem	tallic Impu mg/L 0.02 <0.003 <0.03 <0.03 <0.03 <0.02 <0.001 0.52 <0.004 <0.001 <0.001 calibrated reguaranteed sents and other	9 @ 23.9 D rities in the Element Cu Fe Ga In K Li Mg Mn Mo Ni egularly with stable to +/-0 er effects, suc	e Actual S mg/L 0.003 0.03 <0.001 <0.001 0.14 <0.002 0.30 0.008 <0.003 <0.002 weight sets 5% of the och as transp	olution via 1 Element Pb Re Rb Sr Sb Sn Ti Ti Ti V Zr Zn traceable to N certified conce iration losses,	mg/L <0.001 <0.001 <0.001 <0.002 <0.001 <0.001 <0.004 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.003 NIST #32856, #32857 and others. entration inclusive of uncertainty for a period of one year from the	
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Trace Met Element Al As Ag B Ba Ba Be Bi Ca Cr Cd Co Balances are This CRM is of measurem date of certif transported a	tallic Impu           mg/L           0.02           <0.003	9 @ 23.9 D rities in the Element Cu Fe Ga In K Li Mg Mn Mo Ni egularly with stable to +/-0 er effects, suc s guarantee is der laborator	e Actual S mg/L 0.003 0.03 <0.001 <0.001 0.14 <0.002 0.30 0.008 <0.001 <0.002 weight sets 5.5% of the och as transp s valid only y condition	elution via l Element Pb Re Rb Sr Sb Sn Ti Ti Ti V Zr Zn traceable to N certified conce iration losses, when the mat s.	mg/L <0.001 <0.001 <0.001 <0.002 <0.001 <0.004 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.003 NIST #32856, #32857 and others. entration inclusive of uncertainty for a period of one year from the erial is kept tightly capped and	
Trace Met Element Al As Ag B Ba Ba Be Bi Ca Cr Cd Co Balances are This CRM is of measurem date of certif transported a	tallic Impu           mg/L           0.02           <0.003	9 @ 23.9 D rities in the Element Cu Fe Ga In K Li Mg Mn Mo Ni egularly with stable to +/-0 er effects, suc s guarantee is der laborator	e Actual S mg/L 0.003 0.03 <0.001 <0.001 0.14 <0.002 0.30 0.008 <0.001 <0.002 weight sets 5.5% of the och as transp s valid only y condition	elution via l Element Pb Re Rb Sr Sb Sn Ti Ti Ti V Zr Zn traceable to N certified conce iration losses, when the mat s.	mg/L <0.001 <0.001 <0.001 <0.002 <0.001 <0.004 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.003 NIST #32856, #32857 and others. entration inclusive of uncertainty for a period of one year from the erial is kept tightly capped and	

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=kue where k=2 is the coverage factor at the 95% confidence level

 $u_e$  is obtained by combining the individual element standard uncertainty components  $u_i$  and  $u_e \sqrt{\Sigma u_i^2}$ 

#### 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.

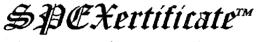
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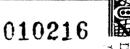
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NUBBAND

2130/RA

ABS

OPENED:

Certificate of Reference Material

Catalog Number: ICV-2A **Description:** Matrix:

Lot No.: 24-84AS **Initial Calibration Verification Standard II** 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	Element	Labeled (mg/L)	Measured (mg/L)	NIST SRM
Ca	2,000	2,005.40	3109a	Ni	500	500.58	3136
K	2,000	1,997.89	3141a	v	500	504.23	3165
Mg	2,000	1,992.26	3131a	Cr	200	203.21	3112a
Na	2,000	1,992.99	3152a	Cu	200	199.75	3114
Al	1,000	1,005.90	3101a	Ag	100	100.46	3151
Ba	1,000	1,001.51	3104a	Be	100	100.04	3105a
Fe	1,000	1,003.17	3126a	Mn	100	100.64	3132
Co ·	500	505.10	3113	Zn	100	100.52	31 <b>68a</b>

Spex Reference Multi: Lot #4-63BD, 14-125AS

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:

NOV -- 2003 Certifying Officer: N. Kocherta kola

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, = 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=kuc where k=2 is the coverage factor at the 95% confidence level

 $u_o$  is obtained by combining the individual element standard uncertainty components  $u_i$  and  $u_{e^*} \sqrt{2} u_i^2$ 

### **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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		-		ETTÍ T terence M			
_				-		10 1000	
Catalog 1					Lot No.	10-43SB	
Descripti	ion:	-	/L Antimo	-			
Matrix:		H2O/0.6	Tart.Acid	tr.HNO3			
This ASSUE calibration sta ICPOES, DC relevant to the	andard or qua P, AA, ICPN	ality control IS, and XRI	standard for F. It can be a	inorganic sp	ectroscopic ir		n such as
Certified V Uncertainty Certified V	y Associate	d with Me			g/L		
	e listed is the	average of	values obtain	ned by classic		Lot# and ICP spec	04021A. The rometer analysis
Refer to side				rtainties.			
Classical V	-		•				
	-	-		ic Acid. Ignit			
Instrumen	•	-	spectron	neter:	1002 mg/ L		
Uncertified							
	nsity: 1.046	•	-				
Trace Met	allic Impu	rities in th	e Actual S	olution via	ICP / ICPM	lS Analysis	:
Element	mg/L	Element	mg/L	Element	mg/L		
Al	0.03	Cu	0.002	РЪ	0.009		
As	<0.001	Fe	0.03	Rb	<0.001		
Ag B	<0.001 <0.004	Ga In	<0.001 <0.001	Re Sr	<0.001 <0.001		
Ba	<0.004	ĸ	0.01	Si	<0.01		
Be	<0.001	Li	<0.001	Ti	<0.003		
Bi	0.002	Mg	0.005	TI	<0.001		
Ca	0.14	Mn	<0.001	v	<0.001		
Cr	<0.002	Мо	<0.001	Zr	<0.001		
Cd	<0.001	Na	0.005	Zo	0.02		
Co	<0.001	Ni	<0.001				
Balances are of This CRM is a of measureme date of certific transported an	guaranteed st ents and other cation. This	able to +/-0 effects, suc guarantee is er laborator	.5% of the co th as transpir valid only w	ertified conce ation losses, i when the mate	ntration inclu for a period o rial is kept tig	sive of uncert f one year fro	ainty m the and

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This Certified Reference Material has been prepared and certified under an ISO 9001 system consistent with the following guides:

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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  $k_{s}$  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, = 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, where k=2 is the coverage factor at the 95% confidence level

 $u_e$  is obtained by combining the individual element standard uncertainty components  $u_i$  and  $u_e \sqrt{\Sigma u_i^2}$ 

### **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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AOKC:

JPENED:

INDREANIC

LABS/RADCHEM LABS

RECEIVED



Certificate of Reference Material

Catalog Number: Description: Matrix: ICV-2C Lot No.: 24-85AS Initial Calibration Verification Standard II 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:

Labeled (mg/L)	Measured (mg/L)	NIST SRM
500	497.85	3103a
500	495.41	3128
500	501.98	3149
500	501.89	3158
100	99.77	3108
	(mg/L) 500 500 500 500	(mg/L)(mg/L)500497.85500495.41500501.98500501.89

Spex Reference Multi: Lot #4-51BDREF, 15-39AS, 11-173AS

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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:

Certifying Officer: N. Kochertakota

### **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  $k_{z}=s^{2}m$  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, = 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+J. U where X = True value (Labeled Value), U= Expanded uncertainty

U=kue 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.





203 Norcross Avenue • Metuchen, NJ 08840 USA 732-549-7144 • 1-800-LAB-SPEX • Fax: 732-603-9647 CRMSales@spexcsp.com • www.spexcsp.com Always Providing Superior Quality . . . Unparalleled Service™



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 Statistical Principles."
- 2.0

DESCRIPTION OF CRM Custom-Grade 10000 µg/mL Aluminum in 5% (abs) HNO3

Catalog Number:	CGAL10-1 and CGAL1	0-5
Lot Number: Starting Material:	W-AL04008 Al metal	
Starting Material Purity (%):		INORGANIC LABS/RADCHEM LABS 1. 1. 2
Starting Material Lot No Matrix:	607116 5% (abs) HNO3	DATE RECEIVED: 08/06/03 DATE EXPIRED: 09/01/0004 NOS DATE DPENED: 08/06/03
		INDRG: 4220 PD: 52224

### 3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Concentration:	10070 ± 31 µg/mL
Certified Density:	1.059 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 (C) = grx

Uncertainty  $(\pm) = \frac{2[(2r_{5})^{2}]^{1/2}}{(1)^{1/2}}$ 

•
(D) = mean
x ₁ = individual results
n = number of measurements
RS = 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 SFW 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
 10006 ± 55 µg/mi.

 ICP Assay NIST SRM 3101a
 Lot Number: 992003

 Assay Method #2
 10070 ± 31 µg/mL.

 EDTA NIST SRM 928
 Lot Number: 880710

- 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.

<u>s</u> Al	I		M	Ðy	<	0.02695	Q	u		0.00011	M	Pr	<	0.00135	<u>N</u>	<u>1</u> Te	<	0.13473	
<u>M</u> SI	b <	0.00225	М	Er	<	0.02245	М	Lu	<	0.00180	M	Re	<	0.00449	Ň	1 Tb	<	0.00135	
<u>M</u> A:	s <	0.04491	M	Εu	<	0.01347	Q	Mg		0.00470	M	Rh	<	0.00449	1	<u>i 1</u> 1	<	0.00449	
<u>M</u> Ba	a <	0.04491	M	Gd	<	0.00449	М	Mn	<	0.01796	M	Rb	<	0.00449	1	1 Th	<	0.00449	
<u>O</u> Be	e <	0.00017	M	Ga	<	0.00449	<u>0</u>	Hg	<	0.00700	м	Ru	<	0.00898	l N	<u>I</u> Tr	<	0.00180	
<u>M</u> BI	. <	0.00180	M	Ge	<	0.02695	M	Мо	<	86800.0	M	Sm	<	0.00449	N	<u>1</u> Sn	<	0.02245	
<u>О</u> В		0.01164	м	Au	<	0.01347	M	Nd	<	0.00898	M	Sc	<	0.04491	N	<u>1</u> TI	<	0.22454	
MC		0.01347	М	Hf	<	0.00898	Q	NI	<	0.00600	M	Se	<	0.03593	N	<u>ı</u> w	<	0.04491	
<u>o</u> c	a	0.01903	M	Но	<	0.00225	M	Nb	<	0.00225	Q	SI		0.07389	1	<u>1</u> U	<	0.00898	
MC	e <	0.02245	0	in	<	0.03000	n	Os			M	Ag	<	0.00898	l N	ŧν	<	0.00898	
MC	s <	0.00135	M	łr	<	0.02245	M	Pd	<	0.02245	Q	Na		0.03359		A YD	<	0.00449	
<u>0</u> Ci	r	0.00336	0	Fe		0.00493	0	P	<	0.03000	M	Sr	<	0.00225		<u>1</u> Y	<	0.17963	
MC	o <	0.01347	м	La	<	0.00225	M	Pt	<	0.00898	0	s	<	0.10000		<u>(</u> Zn	<	0.08982	
M C	u <	0.02695	. — м	РЬ	<	0.01347	0	ĸ		0.02911	M	Та	<	0.03144		( Zr	<	0.02245	
M - Che	ocked	by ICP-MS	0-		:kec	by ICP-OES		spect	ral I	nterference	n - 1	iot C	hec	ked For	s	Solu	ion	Standard Elem	ent

### 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

#### 010224 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; A(H₂O), "

Chemical Competibility - Soluble in HCI, HNO, HF and H₂SO. Avoid neutral media. Soluble in strongly basic NaOH forming the A(OH)_(H₂O)₂' 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% HNO₈ / LDPE container. 1-10,000 ppm solutions chemically stable for years in 2-5% HNO₈ / LDPE container.

Al Containing Samples (Preparation and Solution) - Metal (Best dissolved in HCI / HNOs) (a- Al-O, (Na-CO, fusion in Pt*); y- Al-Os (Soluble in acids such as HCI); Ores (Carbonate fusion in Pt* followed by HCI dissolution); Organic Matrices (sulfuric/peroxide digestion or nitric / sulfuric / perchloric acid decomposition, or dry ash and dissolution in dilute HCI. ation (ICD OFC 01 a amoin المراجع المراجع

peuroscopie minu				I GURBACANEL ARCHA
e/Line	Estimated B.L.	<u>Order</u>	Type	Interferences (underlined indicates severe at atoncs.)
394.401 nm	0.05 / 0.006 µg/mL	1	atom	U, Ce
396.152 nm	0.03 / 0.006 µg/mL	1	atom	Mo, Zr, Ce
167.078 nm	0.1 / 0.009 ug/mL	1	ion	Fe
27 amu	30 ppt	n.b	M'	'*C'*N, **C'*N, 'H'*C'*N, '*B'™O, **Cr™, **Fe*
	<u>æ/Line</u> 394.401 nm 396.1.52 nm 167.078 nm	set ing         Estimated B.L.           394.401 nm         0.05 / 0.006 µg/mL           396.152 nm         0.03 / 0.006 µg/mL           167.078 nm         0.1 / 0.009 µg/mL	sxLine         Estimated B.L.         Order           394.401 nm         0.05 / 0.006 µg/mL         1           396.152 nm         0.03 / 0.006 µg/mL         1           167.078 nm         0.1 / 0.009 µg/mL         1	394.401 nm 0.05 / 0.006 µg/mL 1 atom 396.152 nm 0.03 / 0.006 µg/mL 1 atom 167.078 nm 0.1 / 0.009 µg/mL 1 ion

- 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

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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 (OQS), 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:

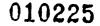
Australia (NATA), Austria (BrnwA), Belgium (BELTEST) (BKO-OBE), Canada (SCC), Chinese Taipei (CNLA), Czech Republic (NAO), Denmark (DANAK), Finland (FINAS), France (COFRAC), Germany (DAR), Hong Kong (HKAS, Ireland (NAB), Italy (SIT) (SINAL), Japan (JAB) (JNLA), Republic of Korea (KOLAS), The Netherlands (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)

INORGANIC LABS/RADCHEM LABS Po 2000 DATE RECEIVED: ____O&/26/03 DATE EXPIRED: ____09/01/2005___VOS 









- 11.1 IV Shelf Life The period of time during which the concentration of the analyte(s) in a property 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: February 13, 2003

**Expiration Date:** 



### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By: JoAnn Struthers, QA Administrative Assistant

Katalin Le, QC Supervisor

**Certificate Approved By:** 

.

**Certifying Officer:** 

Paul Galnes, Chemist, Senior Technical Director

folie Stantier

P.D.A.

01/30/04



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

DATE OPENED:

# 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) HNO3

Catalog Number:	CGCA10-1, CGCA10-2, and CGCA10-5						
Lot Number: Starting Material: Starting Material Purity (%): Starting Material Lot No	<b>W-CA03022</b> CaO 99.999389 C27L01						
Matrix:	1.4% (abs) HNO3	INORGANIC LABS/RADCHEM LABS					

### 3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Concentration:	9968 ± 18 µg/mL	INORG:	4436	_P0:	<u>75</u> 3	303
Certified Density:	1.038 g/mL (measured at 2	2° 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:

Certifled Value (C) = <u>garx</u> ,	(C) = mean
n	x, = individual results
	n = number of measurements
Uncertainty (±) = <u>21(2rs)</u> ²¹⁺²	IS = The summation of all significant estimated errors.
(1) ⁴²	(Most common are the errors from instrumental measurement, weighing, dilution to volume, and the fixed error reported on the NIST SFM 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.

Assay Method #1	9968 ± 18 µg/mL
	ICP Assay NIST SRM 3109a Lot Number: 000622
Assay Method #2	9973 ± 25 μg/mL
	EDTA NIST SRM 928 Lot Number: 880710
	•

- 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.

Q AI 0.00013	<u>M</u> Dy < 0.03067	QLI 0.00011 M	Pr < 0.00153	<u>M</u> Te < 0.15333
<u>M</u> Sb < 0.00256	<u>M</u> Er < 0.02556	<u>M</u> Lu < 0.00204 <u>M</u>	Re < 0.00511	<u>M</u> Tb < 0.00153
<u>M</u> As < 0.05111	<u>M</u> Eu < 0.01533	Q Mg 0.03453 M	Rh < 0.00511	<u>M</u> Ti < 0.00511
<u>Q</u> Ba 0.00063	<u>M</u> Gd < 0.00511	<u>Q</u> Min < 0.00030 <u>M</u>	Rb < 0.00511	<u>M</u> Th < 0.00511
<u>Q</u> Be < 0.00009	<u>M</u> Ga < 0.00511	Q Hg < 0.01100 M	Ru < 0.01022	<u>M</u> Tm < 0.00204
<u>M</u> Bi < 0.00204	M Ge < 0.03067	<u>M</u> Mo < 0.01022 <u>M</u>	Sm < 0.00511	<u>M</u> Sn < 0.02556
<u>Q</u> B < 0.00054	<u>M</u> Au < 0.01533	<u>M</u> Nd < 0.01022 Q	Sc < 0.00002	M TI < 0.25555
<u>O</u> Cd < 0.00450	<u>M</u> Hf < 0.01022	Q NI < 0.00230 Q	Se < 0.00620	<u>M</u> W < 0.05111
<u>S</u> Ca	<u>M</u> Ho < 0.00256	<u>M</u> Nb < 0.00256 Q	Si 0.00253	<u>M</u> U < 0.01022
<u>M</u> Ce < 0.02556	<u>Q</u> in < 0.00200	n Os M	Ag < 0.01022	<u>Q</u> V < 0.00090
<u>M</u> Cs < 0.00153	<u>M</u> Ir < 0.02556	<u>M</u> Pd < 0.02556 Q	Na < 0.00010	<u>M</u> Yb < 0.00511
<u>O</u> Cr 0.00183	<u>Q</u> Fe < 0.00110	Q P < 0.00480 Q	Sr 0.02021	<u>M</u> Y < 0.20444
<u>Q</u> Co < 0.00120	<u>M</u> La < 0.00256	<u>M</u> Pt < 0.01022 Q	S 0.01053	<u>Q</u> Zn 0.02232
<u>O</u> Cu < 0.00400	<u>M</u> Pb < 0.01533	<u>o</u> k < 0.00170 <u>M</u>	Ta < 0.03578	<u>M</u> Zr < 0.02556
M - Checked by ICP-MS	O - Checked by ICP-OES	i - Spectral Interference n - N	lot 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 - 40.078; +2; & Ca(H,O),**

Chamical Compatibility - Soluble in HCI and HNO, Avoid H.SO., HF, H.PO. and neutral to basic media. Stable with most metals and inorganic anions forming insoluble silicate, carbonate, hydroxide, cade, fluoride, sulfate, oxalate, chromate, arsenate and tungstate in neutral aqueous media.

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

Ca Containing Samples (Preparation and Solution) - Metal (best dissolved in diluted HNO,) Ores (Carbonate tusion in Pt* tollowed by HC dissolution); Organic Matrices (dry ash and dissolution in dilute HCI. Do not heat when dissolving to avoid precipitation of SIO₂). The oxide, hydroxide, carbonate, phosphate, and tuoride of calcium are soluble in % levels of HCI or HNO₂. The sulfates (gypsum, anhydrite, etc.), certain silicates and complex compounds require fusion with Na₂CO₂ followed by HCI / 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):

Techniquez Line Estimated D.L. Order Type Interferences (underlined indicates severe atvationcs.)

ICP-OES	393.366 nm 396.847 nm	0.0002/0.00004 µg/ml. 0.0005/0.00006 µg/ml.		ion ion	U,Ce Th
ICP-OES	422.673 nm	0.01 / 0.001 µg/miL	1	atom	Ge
ICP-MS	44 amu	1.200 ppt	n/a	M'	"O,"C, "SI"O, "Sr"

- 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 (QQS), 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 (PSR), Slovenja (SIQ), Spain (AENOR), Switzerland (SQS)

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)

INDRGANIC LABS/RADCHEM LABS 3. 3.43 DATE RECEIVED: 01/2004 DATE EXPIRED: 02/01/2005 V03 DATE DPENED: 01/20/04 INDRG: 4436 F0: F52303

### 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 23, 2003 Expiration Date:

### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:	JoAnn Struthers, QA Administrative Assistant	John Strutt
Certificate Approved By:	Katalin Le, QC Supervisor	Katalia k
Certifying Officer:	Paul Gaines, Chemist, Senior Technical Director	Pauk Aain

#### 010230 ventures inorganic

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

INORG: 4470 PD: F53333

# certificate of analysis

- Inorganic Ventures / IV Labs is an ISO Guide 34-2000 Certified Reference Material (CRM) Manufacturer: 1.0 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 3.5% (abs) HNO3

	Catalog Number:	CGFE10-1, CGFE10-2	, and CGFE10-5
	Lot Number:	W-FE03030	
	Starting Material:	Fe metal	
	Starting Material Purity (%):	99.999569	
	Starting Material Lot No	23166	INDRGANIC LABS/RADCHEM LABS PS. 1042
	Matrix:	3.5% (abs) HNO3	DATE RECEIVED: 03/35/04 DATE EXPIRED: 03/01/2005 V03
)	CERTIFIED VALUES AND L	INCERTAINTIES	DATE OPENED: 00/05/04

### 3.0

**Certified Concentration:** 10,016 ± 25 µg/mL

**Certified Density:** 1.050 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 (C) = <u>erx</u> ,	(C) = mean
n	$x_i = individual results$
	n = number of measurements
Uncertainty $(\pm) = 2[(2\pi s_1)^2]^{1/2}$	ES = The summation of all significant estimated errors.
(1) ^{1/2}	(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	10,031 ± 33 μg/mL ICP Assay NIST SRM 3126a Lot Number: 000606						
	Assay Method #2	10,016 ± 25 μg/mL EDTA NIST SRM 928 Lot Number: 880710						



- 4.2 BALANCE CALIBRATION All balances are checked dally 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.

AI	<	0.00270		4	D٧	<	0.02413	0	н	<	0.00003	м	Pr	<	0.00121	I N	I TO		<	0.12066							
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Sb	<	0.00201	N	1	Er	<	0.02011	M	Lu	<	0.00161	M	Re	<	0.00402	N	<u>(</u> TI	)	<	0.00121							
					-		0.04007				0.00000		-	_	0.00400	1.				0 00400							
As	<	0.04022	1 1	1	EU	<	0.01207	⊻	мg	<	0.00005	™	Rn	<	0.00402	ן ₪	<u>i</u> 11		٢.	0.00402							
Ba	<	0.04022	l N	A	Gd	<	0.00402	0	Mn	<	0.02000	м	Rb	<	0.00402	l N	ת ו	n	<	0.00402							
			<u>-</u>	-	••			- ×				1 -				1 -		•									
Be	<	0.00005	l N	1	Ga	<	0.00402	Q	Hg	<	0.01100	M	Ru	<	0.00804	<u>N</u>	<u>i</u> Ti	n	<	0.00161							
		0.00404	Ι.		<b>A</b> .					_	0.00004	1	D		0.00400					0.00044							
BI	<	0.00161	1		Ge		1	. 🗠	MO	<	0.00804	M	эш	•	0.00402	₽	i S	1	•	0.02011							
в	<	0.00090		٨	Au	<	0.01207	м	Nd	<	0.00804	м	Sc	<	0.04022	N	I TI		<	0.20109							
-			] ~	-								1 -				-	•										
Cd	<	0.01207	Δ	1	Hf	<	0.00804	<u>0</u>	NI	<	0.05000	M	Se	<	0.03218	⊻	i w		<	0.04022							
0-		0.00004	Ι.		<b>ц</b> е		0.00204		МЬ		0.00201	1	ci	-	0.01000		,			0.00804							
Ca		0.00291	1 5	1	по		0.00201	M M	140		0.00201	1 2	91		0.01000	1	1 0			0.00004							
Ce	<	0.02011	1	A	In	<	0.04022	n	Os			м	Ag	<	0.00804	I N	١V		<	0.00804	-						
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Cs	<	0.00121	1	A	lr –	<	0.02011	M	Pd	<	0.02011	1 2	Na		0.00776	⊻	<u>i</u> Y	b	<	0.00402							
~	-	0.02011	1.		Fa				Þ				Sr	<	0.00201		I Y		۲	0 16087							
UI		0.02011	2	2	1.0			1 1				1	0.		0.00201	"			1	0.10001							
Co	<	0.00110	1 1	A	La	<	0.00201	M	Pt	<	0.00804	0	S	<	0.07200	<u>N</u>	Z	ı		0.04876							
			• -										_														
Cu	<	0.02413	<u> 1</u>	Ň	Pb	<	0.01207	Q	ĸ	<	0.00170	M	Та	<	0.02815	⊻	<u>i</u> Zi	•	<	0.02011							
Chec	ked	by ICP-MS	0	- (	Chec	kea	by ICP-OES	1-5	spect	ral i	Interference	n - 1	Not C	he	cked For	s.	Sol	utic	n S	Standard Elem	ent						
	Sb As Ba Bi Bi Cd Ca Ca Ca Ca Ca Ca Ca Ca Ca Ca Ca Ca Ca	Sb       <	Sb       <	Sb       < 0.00201	Sb < 0.00201	Sb       <       0.00201       M       Er         As       <       0.04022       M       Ga         Ba       <       0.04022       M       Ga         Ba       <       0.00005       M       Ga         Bi       <       0.00090       M       Au         Cd        0.00291       M       Hf         Ca       0.002011       M       Ho         Ce        0.00291       M       Ho         Ce        0.00121       M       In         Cr        0.02011       S       Fe         Co        0.00211       M       La         Cu        0.02111       M       Pb	Sb       <       0.00201       M       Er       <         As        0.04022       M       Eu       <	Sb       <       0.00201 $\underline{M}$ $Er$ 0.02011         As       <       0.04022 $\underline{M}$ $Eu$ 0.01207         Ba        0.04022 $\underline{M}$ $Gd$ 0.00402         Ba        0.00005 $\underline{M}$ $Ga$ 0.00402         Ba        0.00005 $\underline{M}$ $Ga$ 0.00402         Ba        0.00161       i $Ga$ 0.00402         Bi        0.00161       i $Ga$ 0.00402         Bi        0.00161       i $Ga$ 0.01207         Cd        0.01207 $\underline{M}$ $Au$ 0.01207         Cd        0.02011 $\underline{M}$ $Ho$ 0.00201         Ce        0.002011 $\underline{M}$ $In$ <       0.04022         Cs        0.002011 $\underline{M}$ $Ir       <       0.02011         Cr        0.00211       \underline{M} Ir        0.00201     $	Sb       <       0.00201       M       Er       <       0.02011       M         As       <       0.04022       M       Eu       <       0.01207       Q         Ba        0.04022       M       Gd        0.01207       Q         Ba        0.00005       M       Ga        0.00402       Q         Be        0.00005       M       Ga        0.00402       Q         Bi        0.00161       i       Ge       M       M       B        0.001207       M         Cd        0.01207       M       Hf        0.00804       Q         Ca        0.00291       M       Ho        0.00201       M         Ce        0.02011       M       In        0.04022       n         Ca        0.002011       M       In        0.04022       n         Ca        0.02011       M       In        0.04022       n         Ca        0.02011       M       In        0.04022	Sb       <       0.00201       M       Er       <       0.02011       M       Lu         As       <       0.04022       M       Eu       <       0.01207       Q       Mg         Ba       <       0.04022       M       Gd       <       0.00402       Q       Mg         Ba       <       0.00005       M       Ga       <       0.00402       Q       Hg         Bi       <       0.00005       M       Ga       <       0.00402       Q       Hg         Bi       <       0.00161       i       Ge       M       Mo         B       <       0.00161       i       Ge       M       Mo         Cd        0.01207       M       Au       <       0.01207       M       Nd         Cd        0.01207       M       Hf       <       0.00804       Q       Ni         Ce        0.02011       M       In       <       0.02011       M       Nb         Ce        0.02011       M       In       <       0.02011       M       Pd         Cr        0.02011<	Sb $< 0.00201$ M       Er $< 0.02011$ M       Lu $<$ As $< 0.04022$ M       Eu $< 0.01207$ Q       Mg<	Sb       < 0.00201       M       Er       < 0.02011       M       Lu       < 0.00161         As       < 0.04022       M       Eu       < 0.01207       O       Mg       < 0.00006         Ba       < 0.04022       M       Gd       < 0.00402       Q       Mn       < 0.02000         Be       < 0.00005       M       Ga       < 0.00402       Q       Hg       < 0.02000         Be       < 0.00005       M       Ga       < 0.00402       Q       Hg       < 0.02000         Bi       < 0.00161       i       Ge       M       Mo       < 0.02000         Bi       < 0.00161       i       Ge       M       Mo       < 0.02000         Bi       < 0.00161       i       Ge       M       Mo       < 0.00804         Cd       < 0.01207       M       Au       < 0.01207       M       Nd       < 0.00804         Cd       < 0.02011       M       Hf       < 0.002011       M       Nb       < 0.00201         Ce       < 0.02011       M       In       < 0.04022       n       Os          Cs       < 0.02011       M       Ir       < 0.02011	Sb $< 0.00201$ M       Er $< 0.02011$ M       Lu $< 0.00161$ M         As $< 0.04022$ M       Eu $< 0.01207$ O       Mg $< 0.00006$ M         Ba $< 0.04022$ M       Gd $< 0.01207$ O       Mg $< 0.02000$ M         Ba $< 0.04022$ M       Gd $< 0.00402$ Q       Mn $< 0.02000$ M         Ba $< 0.00005$ M       Ga $< 0.00402$ Q       Mg $< 0.02000$ M         Be $< 0.00005$ M       Ga $< 0.00402$ Q       Hg $< 0.01100$ M         Bi $< 0.000161$ i       Ge       M       Mo $< 0.00804$ M         Bi $< 0.00090$ M       Au $< 0.01207$ M       Nd $< 0.00804$ M         Cd $< 0.01207$ M       Hf $< 0.00201$ M       Nb $< 0.00201$ Q         Cd $< 0.02011$ M       In $< 0.04022$ n       Os       M       M	Sb $< 0.00201$ M       Er $< 0.02011$ M       Lu $< 0.00161$ M       Re         As $< 0.04022$ M       Eu $< 0.01207$ O       Mg $< 0.00066$ M       Rh         Ba $< 0.04022$ M       Gd $< 0.01207$ O       Mg $< 0.00006$ M       Rh         Ba $< 0.04022$ M       Gd $< 0.00402$ O       Mg $< 0.02000$ M       Rh         Be $< 0.00005$ M       Ga $< 0.00402$ O       Hg $< 0.01100$ M       Ru         Bi $< 0.000161$ i       Ge       M       Mo $< 0.00804$ M       Sm         B $< 0.00090$ M       Au $< 0.01207$ M       Nd $< 0.00804$ M       Sr         Cd $< 0.01207$ M       Hf $< 0.00804$ Q       Ni $< 0.00201$ M       Sc         Cd $< 0.02011$ M       Ho $< 0.00201$ M       Nb $< 0.00201$ Q       Si         Ce $< 0.002011$ <td>Sb       $&lt; 0.00201$       M       Er       $&lt; 0.02011$       M       Lu       $&lt; 0.00161$       M       Re         As       $&lt; 0.04022$       M       Eu       $&lt; 0.01207$       O       Mg       $&lt; 0.00066$       M       Rh       $&lt;$         Ba       $&lt; 0.04022$       M       Gd       $&lt; 0.01207$       O       Mg       $&lt; 0.02000$       M       Rh       $&lt;$         Ba       $&lt; 0.04022$       M       Gd       $&lt; 0.00402$       O       Mg       $&lt; 0.02000$       M       Rh       $&lt;$         Ba       $&lt; 0.04022$       M       Gd       $&lt; 0.00402$       O       Mn       $&lt; 0.02000$       M       Ru       $&lt;$         Ba       $&lt; 0.00005$       M       Ga       $&lt; 0.00402$       O       Hg       $&lt; 0.01100$       M       Ru       $&lt;$         Bi       $&lt; 0.00161$       i       Ge       M       Mo       $&lt; 0.00804$       M       Srn&lt;&lt;         Bi       $&lt; 0.00090$       M       Au       $&lt; 0.01207$       M       Nd       $&lt; 0.00804$       M       Src&lt;         Cd       $&lt; 0.002011$       M       Hf       $&lt; 0.002011$       M       Nb       $&lt; 0.002011$&lt;</td> <td>Sb       $&lt; 0.0201$       M       Er       $&lt; 0.02011$       M       Lu       $&lt; 0.00161$       M       Re       $&lt; 0.00402$         As       $&lt; 0.04022$       M       Eu       $&lt; 0.01207$       Q       Mg       $&lt; 0.00006$       M       Rh       $&lt; 0.00402$         Ba       $&lt; 0.04022$       M       Gd       $&lt; 0.00402$       Q       Mg       $&lt; 0.02000$       M       Rh       $&lt; 0.00402$         Ba       $&lt; 0.04022$       M       Gd       $&lt; 0.00402$       Q       Mn       $&lt; 0.02000$       M       Rh       $&lt; 0.00402$         Ba       $&lt; 0.04022$       M       Gd       $&lt; 0.00402$       Q       Mn       $&lt; 0.02000$       M       Rh       $&lt; 0.00402$         Ba       $&lt; 0.00005$       M       Ga       $&lt; 0.00402$       Q       Hg       $&lt; 0.01100$       M       Ru       $&lt; 0.00804$         Bi       $&lt; 0.00000$       M       Au       $&lt; 0.01207$       M       Nd       $&lt; 0.00804$       M       Sm       $&lt; 0.004022$         Cd       $&lt; 0.00201$       M       Nd       $&lt; 0.00804$       M       Sm       $&lt; 0.00201$         Cd       $&lt; 0.002011$       M       Ho</td> <td>Sb       $&lt; 0.0201$       M       Er       $&lt; 0.02011$       M       Lu       $&lt; 0.00161$       M       Re       $&lt; 0.00402$       M         As       $&lt; 0.04022$       M       Eu       $&lt; 0.01207$       Q       Mg       $&lt; 0.00066$       M       Rh       $&lt; 0.00402$       M         Ba       $&lt; 0.04022$       M       Gd       $&lt; 0.01207$       Q       Mg       $&lt; 0.00006$       M       Rh       $&lt; 0.00402$       M         Ba&lt; $&lt; 0.04022$       M       Gd       $&lt; 0.00402$       Q       Mn       $&lt; 0.02000$       M       Rh       $&lt; 0.00402$       M         Ba&lt; $&lt; 0.00005$       M       Ga       $&lt; 0.00402$       Q       Hg       $&lt; 0.01100$       M       Ru       $&lt; 0.00402$       M         Ba       $&lt; 0.00005$       M       Ga       $&lt; 0.00402$       Q       Hg       $&lt; 0.01100$       M       Ru       $&lt; 0.00402$       M         Ba       $&lt; 0.00005$       M       Ga       $&lt; 0.00402$       Q       Hg       $&lt; 0.01100$       M       Ru       $&lt; 0.00402$       M         Ba       $&lt; 0.00000$       M       Au       $&lt; 0.01207$       M       Nd       $&lt;$</td> <td>Sb       $&lt; 0.0201$       M       Er       $&lt; 0.02011$       M       Lu       $&lt; 0.00161$       M       Re       $&lt; 0.00402$       M       The set is a set is a</td> <td>Sb       &lt; 0.00201</td> M       Er       < 0.02011	Sb $< 0.00201$ M       Er $< 0.02011$ M       Lu $< 0.00161$ M       Re         As $< 0.04022$ M       Eu $< 0.01207$ O       Mg $< 0.00066$ M       Rh $<$ Ba $< 0.04022$ M       Gd $< 0.01207$ O       Mg $< 0.02000$ M       Rh $<$ Ba $< 0.04022$ M       Gd $< 0.00402$ O       Mg $< 0.02000$ M       Rh $<$ Ba $< 0.04022$ M       Gd $< 0.00402$ O       Mn $< 0.02000$ M       Ru $<$ Ba $< 0.00005$ M       Ga $< 0.00402$ O       Hg $< 0.01100$ M       Ru $<$ Bi $< 0.00161$ i       Ge       M       Mo $< 0.00804$ M       Srn<<         Bi $< 0.00090$ M       Au $< 0.01207$ M       Nd $< 0.00804$ M       Src<         Cd $< 0.002011$ M       Hf $< 0.002011$ M       Nb $< 0.002011$ <	Sb $< 0.0201$ M       Er $< 0.02011$ M       Lu $< 0.00161$ M       Re $< 0.00402$ As $< 0.04022$ M       Eu $< 0.01207$ Q       Mg $< 0.00006$ M       Rh $< 0.00402$ Ba $< 0.04022$ M       Gd $< 0.00402$ Q       Mg $< 0.02000$ M       Rh $< 0.00402$ Ba $< 0.04022$ M       Gd $< 0.00402$ Q       Mn $< 0.02000$ M       Rh $< 0.00402$ Ba $< 0.04022$ M       Gd $< 0.00402$ Q       Mn $< 0.02000$ M       Rh $< 0.00402$ Ba $< 0.00005$ M       Ga $< 0.00402$ Q       Hg $< 0.01100$ M       Ru $< 0.00804$ Bi $< 0.00000$ M       Au $< 0.01207$ M       Nd $< 0.00804$ M       Sm $< 0.004022$ Cd $< 0.00201$ M       Nd $< 0.00804$ M       Sm $< 0.00201$ Cd $< 0.002011$ M       Ho	Sb $< 0.0201$ M       Er $< 0.02011$ M       Lu $< 0.00161$ M       Re $< 0.00402$ M         As $< 0.04022$ M       Eu $< 0.01207$ Q       Mg $< 0.00066$ M       Rh $< 0.00402$ M         Ba $< 0.04022$ M       Gd $< 0.01207$ Q       Mg $< 0.00006$ M       Rh $< 0.00402$ M         Ba< $< 0.04022$ M       Gd $< 0.00402$ Q       Mn $< 0.02000$ M       Rh $< 0.00402$ M         Ba< $< 0.00005$ M       Ga $< 0.00402$ Q       Hg $< 0.01100$ M       Ru $< 0.00402$ M         Ba $< 0.00005$ M       Ga $< 0.00402$ Q       Hg $< 0.01100$ M       Ru $< 0.00402$ M         Ba $< 0.00005$ M       Ga $< 0.00402$ Q       Hg $< 0.01100$ M       Ru $< 0.00402$ M         Ba $< 0.00000$ M       Au $< 0.01207$ M       Nd $<$	Sb $< 0.0201$ M       Er $< 0.02011$ M       Lu $< 0.00161$ M       Re $< 0.00402$ M       The set is a	Sb       < 0.00201	Sb       < 0.00201       M       Er       < 0.02011       M       Lu       < 0.00161       M       Re       < 0.00402       M       Tb       <         As       < 0.04022       M       Eu       < 0.01207       Q       Mg       < 0.00066       M       Rh       < 0.00402       M       Tl       <         Ba       < 0.04022       M       Gd       < 0.00402       Q       Mg       < 0.02000       M       Rb       < 0.00402       M       Th       <         Ba       < 0.04022       M       Gd       < 0.00402       Q       Mg       < 0.02000       M       Rb       < 0.00402       M       Th<<         Be       < 0.00005       M       Ga       < 0.00402       Q       Hg       < 0.01100       M       Ru       < 0.00402       M       Th<<         Bi       < 0.00161       i       Ge       M       Mo       < 0.00804       M       Sm< <td>&lt; 0.00402       M       Sn&lt;<td>&lt;</td>         Cd       &lt; 0.00161       i       Ge       M       Mo&lt;<td>&lt; 0.00804       M       Sm&lt;<td>&lt; 0.00402       M       Sn&lt;<td>         Cd       &lt; 0.00201       M       Nd&lt;<td>&lt; 0.00804       M</td><td>Sb       $0.00201$       M       Er       $0.02011$       M       Lu       $0.00161$       M       Re       $&lt; 0.00402$       M       Tb       $&lt; 0.00121$         As       $0.04022$       M       Eu       $&lt; 0.01207$       Q       Mg &lt; $0.00066$       M       Rh       $&lt; 0.00402$       M       Th       $&lt; 0.00402$         Ba       $0.04022$       M       Gd       $&lt; 0.00402$       Q       Mn &lt; $0.02000$       M       Rb       $&lt; 0.00402$       M       Th       $&lt; 0.00402$         Ba       $0.04022$       M       Gd       $&lt; 0.00402$       Q       Mn &lt; $0.02000$       M       Rb       $&lt; 0.00402$       M       Th       $&lt; 0.00402$         Ba       $0.00005$       M       Ga       $&lt; 0.00402$       Q       Hg &lt; $0.01100$       M       Ru       $&lt; 0.00402$       M       Th       $&lt; 0.00402$         Ba       $0.00005$       M       Ga       $&lt; 0.00402$       M       Nm &lt;&lt; $0.00402$       M       Sm &lt;&lt; $0.00201$       M       Sm &lt;&lt; $0.00201$       M       Sm &lt;&lt; $0.00201$       M       Sm &lt;&lt; $0.02011$       M       Sm &lt;&lt; $0.02011$       M       W&lt;&lt;&lt; $0.004022$         Ca&lt;</td></td></td></td></td>	< 0.00402       M       Sn< <td>&lt;</td> Cd       < 0.00161       i       Ge       M       Mo< <td>&lt; 0.00804       M       Sm&lt;<td>&lt; 0.00402       M       Sn&lt;<td>         Cd       &lt; 0.00201       M       Nd&lt;<td>&lt; 0.00804       M</td><td>Sb       $0.00201$       M       Er       $0.02011$       M       Lu       $0.00161$       M       Re       $&lt; 0.00402$       M       Tb       $&lt; 0.00121$         As       $0.04022$       M       Eu       $&lt; 0.01207$       Q       Mg &lt; $0.00066$       M       Rh       $&lt; 0.00402$       M       Th       $&lt; 0.00402$         Ba       $0.04022$       M       Gd       $&lt; 0.00402$       Q       Mn &lt; $0.02000$       M       Rb       $&lt; 0.00402$       M       Th       $&lt; 0.00402$         Ba       $0.04022$       M       Gd       $&lt; 0.00402$       Q       Mn &lt; $0.02000$       M       Rb       $&lt; 0.00402$       M       Th       $&lt; 0.00402$         Ba       $0.00005$       M       Ga       $&lt; 0.00402$       Q       Hg &lt; $0.01100$       M       Ru       $&lt; 0.00402$       M       Th       $&lt; 0.00402$         Ba       $0.00005$       M       Ga       $&lt; 0.00402$       M       Nm &lt;&lt; $0.00402$       M       Sm &lt;&lt; $0.00201$       M       Sm &lt;&lt; $0.00201$       M       Sm &lt;&lt; $0.00201$       M       Sm &lt;&lt; $0.02011$       M       Sm &lt;&lt; $0.02011$       M       W&lt;&lt;&lt; $0.004022$         Ca&lt;</td></td></td></td>	<	< 0.00804       M       Sm< <td>&lt; 0.00402       M       Sn&lt;<td>         Cd       &lt; 0.00201       M       Nd&lt;<td>&lt; 0.00804       M</td><td>Sb       $0.00201$       M       Er       $0.02011$       M       Lu       $0.00161$       M       Re       $&lt; 0.00402$       M       Tb       $&lt; 0.00121$         As       $0.04022$       M       Eu       $&lt; 0.01207$       Q       Mg &lt; $0.00066$       M       Rh       $&lt; 0.00402$       M       Th       $&lt; 0.00402$         Ba       $0.04022$       M       Gd       $&lt; 0.00402$       Q       Mn &lt; $0.02000$       M       Rb       $&lt; 0.00402$       M       Th       $&lt; 0.00402$         Ba       $0.04022$       M       Gd       $&lt; 0.00402$       Q       Mn &lt; $0.02000$       M       Rb       $&lt; 0.00402$       M       Th       $&lt; 0.00402$         Ba       $0.00005$       M       Ga       $&lt; 0.00402$       Q       Hg &lt; $0.01100$       M       Ru       $&lt; 0.00402$       M       Th       $&lt; 0.00402$         Ba       $0.00005$       M       Ga       $&lt; 0.00402$       M       Nm &lt;&lt; $0.00402$       M       Sm &lt;&lt; $0.00201$       M       Sm &lt;&lt; $0.00201$       M       Sm &lt;&lt; $0.00201$       M       Sm &lt;&lt; $0.02011$       M       Sm &lt;&lt; $0.02011$       M       W&lt;&lt;&lt; $0.004022$         Ca&lt;</td></td></td>	< 0.00402       M       Sn< <td>         Cd       &lt; 0.00201       M       Nd&lt;<td>&lt; 0.00804       M</td><td>Sb       $0.00201$       M       Er       $0.02011$       M       Lu       $0.00161$       M       Re       $&lt; 0.00402$       M       Tb       $&lt; 0.00121$         As       $0.04022$       M       Eu       $&lt; 0.01207$       Q       Mg &lt; $0.00066$       M       Rh       $&lt; 0.00402$       M       Th       $&lt; 0.00402$         Ba       $0.04022$       M       Gd       $&lt; 0.00402$       Q       Mn &lt; $0.02000$       M       Rb       $&lt; 0.00402$       M       Th       $&lt; 0.00402$         Ba       $0.04022$       M       Gd       $&lt; 0.00402$       Q       Mn &lt; $0.02000$       M       Rb       $&lt; 0.00402$       M       Th       $&lt; 0.00402$         Ba       $0.00005$       M       Ga       $&lt; 0.00402$       Q       Hg &lt; $0.01100$       M       Ru       $&lt; 0.00402$       M       Th       $&lt; 0.00402$         Ba       $0.00005$       M       Ga       $&lt; 0.00402$       M       Nm &lt;&lt; $0.00402$       M       Sm &lt;&lt; $0.00201$       M       Sm &lt;&lt; $0.00201$       M       Sm &lt;&lt; $0.00201$       M       Sm &lt;&lt; $0.02011$       M       Sm &lt;&lt; $0.02011$       M       W&lt;&lt;&lt; $0.004022$         Ca&lt;</td></td>	Cd       < 0.00201       M       Nd< <td>&lt; 0.00804       M</td> <td>Sb       $0.00201$       M       Er       $0.02011$       M       Lu       $0.00161$       M       Re       $&lt; 0.00402$       M       Tb       $&lt; 0.00121$         As       $0.04022$       M       Eu       $&lt; 0.01207$       Q       Mg &lt; $0.00066$       M       Rh       $&lt; 0.00402$       M       Th       $&lt; 0.00402$         Ba       $0.04022$       M       Gd       $&lt; 0.00402$       Q       Mn &lt; $0.02000$       M       Rb       $&lt; 0.00402$       M       Th       $&lt; 0.00402$         Ba       $0.04022$       M       Gd       $&lt; 0.00402$       Q       Mn &lt; $0.02000$       M       Rb       $&lt; 0.00402$       M       Th       $&lt; 0.00402$         Ba       $0.00005$       M       Ga       $&lt; 0.00402$       Q       Hg &lt; $0.01100$       M       Ru       $&lt; 0.00402$       M       Th       $&lt; 0.00402$         Ba       $0.00005$       M       Ga       $&lt; 0.00402$       M       Nm &lt;&lt; $0.00402$       M       Sm &lt;&lt; $0.00201$       M       Sm &lt;&lt; $0.00201$       M       Sm &lt;&lt; $0.00201$       M       Sm &lt;&lt; $0.02011$       M       Sm &lt;&lt; $0.02011$       M       W&lt;&lt;&lt; $0.004022$         Ca&lt;</td>	< 0.00804       M	Sb $0.00201$ M       Er $0.02011$ M       Lu $0.00161$ M       Re $< 0.00402$ M       Tb $< 0.00121$ As $0.04022$ M       Eu $< 0.01207$ Q       Mg < $0.00066$ M       Rh $< 0.00402$ M       Th $< 0.00402$ Ba $0.04022$ M       Gd $< 0.00402$ Q       Mn < $0.02000$ M       Rb $< 0.00402$ M       Th $< 0.00402$ Ba $0.04022$ M       Gd $< 0.00402$ Q       Mn < $0.02000$ M       Rb $< 0.00402$ M       Th $< 0.00402$ Ba $0.00005$ M       Ga $< 0.00402$ Q       Hg < $0.01100$ M       Ru $< 0.00402$ M       Th $< 0.00402$ Ba $0.00005$ M       Ga $< 0.00402$ M       Nm << $0.00402$ M       Sm << $0.00201$ M       Sm << $0.00201$ M       Sm << $0.00201$ M       Sm << $0.02011$ M       Sm << $0.02011$ M       W<<< $0.004022$ Ca<

#### 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 - Keeptightly sealed when not in use. Store and use at 20 ± 4 %. 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; @ Fe(H,O),"

Chemical Compatibility - Stable in HCI, HNO₂, H₂SO₄, HF and H₂PO₄. Avoid basic media. Stable with most metals and inorganic anions in acidic media.

Stability - 2-100 ppb levels stable for months in 1% HNO₃ / LDPE container. 1-10,000 ppm solutions chemically stable for years in 1-5% HNO₉ / LDPE container.

Fe Containing Samples (Preparation and Solution) - Metel (Soluble in HCI); Oxides (If the oxide has been at a high temperature then Na₂CO₃ fusion in Pt^{*} followed by HCI dissolution otherwise dissolve in dilute HCI); Ores (See Oxides above using only the fusion approach).

Atomic Spi	ectroscopic	Informati	on (ICP-OES B.L.	s are given as	radial/axial vice/):

<u>Technique/Line</u>		Estimated D.L.	<u>Order</u>	Type	Interferences (underlined indicates severe at seconds.)
ICP-OES	238.204 nm	0.005 / 0.001 µg/ml.	1	ion	Ru, Co
ICP-OES	239.582 nm	0.005 / 0.001 µa/mL	1	íon	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'	**Ar'?N'H, **Ar'*O, =Ar''O'H , **Ar'*O, *'CI'*O'H, **Ca**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 (QQS), Belglum (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)

INURGANIC LABS/RADCHEM LABS (3.4.2) DATE RECEIVED: 03/05/04 DATE EXPIRED: 03/05/04 DATE OPENED: 03/05/04 INDRG: 4470 PU: E53323





#### DATE OF CERTIFICATION AND PERIOD OF VALIDITY 11.0



- 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: March 20, 2003

**Expiration Date:** 

EXPIRES 182395

#### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:	JoAnn Struthers, QA Administrative Assistant	ł
Certificate Approved By:	Katalin Le, QC Supervisor	
Certifying Officer:	Paul Gaines, Chemist, Senior Technical Director	C

follen Stutten Knonen an Pauk Ani



# 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:	W-K02111						
Starting Material:	KNO3	INORGANIC LABS/RADCHEM LABS					
Starting Material Purity (%):	99.997230	DATE RECEIVED: 11503					
Starting Material Lot No	K18J19	DATE EXPIRED: 1211204 04					
Matrix:	1.4% (abs) HNO3	DATE OPENED: 11/5/43					
	1.470 (003) 11100	INDRG: 4320 PO: FS2056					

# 3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Concentration: 9930 ± 9 µg/mL

Certified Density: 1.024 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  $(\Box) = \underline{\alpha \cdot x}$ 

Uncertainty (±) = <u>2[(275))^{2] 1/2}</u> (1)^{1/2} (C) = mean
x₁ = individual results
n = number of measurements
IIIS = 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 SFM 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 9926 ± 62 μg/mL ICP Assay NIST SRM 3141a Lot Number: 891312

Assay Method #2

9930 ± 9 µg/mL 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 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.

Q AI < 0.00090	<u>M</u> Dy < 0.02400	<u>O</u> Li < 0.00003	<u>M</u> Pr < 0.00120	<u>M</u> Te < 0.11998
<u>M</u> Sb < 0.00200	<u>M</u> Er < 0.02000	<u>M</u> Lu < 0.00160	<u>M</u> Re < 0.00400	<u>M</u> Tb < 0.00120
<u>M</u> As < 0.03999	<u>M</u> Eu < 0.01200	<u>Q</u> Mg 0.00100	<u>M</u> Rh < 0.00400	<u>M</u> TI < 0.00400
<u>M</u> Ba < 0.03999	<u>M</u> Gd < 0.00400	<u>O</u> Min < 0.00003	M_Rb 0.49948	<u>M</u> Th < 0.00400
<u>O</u> Be < 0.00020	<u>M</u> Ga < 0.00400	<u>O</u> Hg < 0.01500	<u>M</u> Ru < 0.00800	<u>M</u> Tm < 0.00160
<u>M</u> BI < 0.00160	<u>Q</u> Ge < 0.00150	<u>M</u> Mo < 0.00800	<u>M</u> Sm < 0.00400	<u>M</u> Sn < 0.02000
<u>O</u> B < 0.00060	<u>O</u> Au < 0.00300	<u>M</u> Nd < 0.00800	<u>O</u> Sc < 0.00002	<u>O</u> TI < 0.00070
, <u>M</u> Cd < 0.01200	<u>M</u> Hf < 0.00800	<u>O</u> Ni < 0.00230	<u>O</u> Se < 0.05000	<u>M</u> W < 0.03999
<u>O</u> Ca 0.00075	<u>M</u> Ho < 0.00200	<u>M</u> Nb < 0.00200	<u>O</u> Si < 0.00340	<u>M</u> U < 0.00800
<u>M</u> Ce < 0.02000	<u>M</u> in < 0.03999	<u>n</u> Os	<u>M</u> Ag < 0.00800	<u>O</u> V < 0.00090
<u>M</u> Ca < 0.00120	<u>M</u> Ir < 0.02000	<u>M</u> Pd < 0.02000	<u>O</u> Na 0.21730	<u>M</u> Yb < 0.00400
<u>M</u> Cr < 0.02000	<u>O</u> Fe 0.00212	<u>O</u> P < 0.00250	<u>M</u> Sr < 0.00200	<u>M</u> Y < 0.15998
<u>M</u> Co < 0.01200	<u>M</u> La < 0.00200	<u>M</u> Pt < 0.00800	<u>o</u> s < 0.07200	Q Zn 0.00050
<u>M</u> Cu < 0.02400	<u>M</u> Pb < 0.01200	<u>s</u> K	<u>M</u> Ta < 0.02800	<u>M</u> Zr < 0.02000
M - Checked by ICP-MS	O - Checked by ICP-OES	i 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~€. 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; (5); K'(eq)

(Coordination Number in parentheses is assumed, not certain.)

Chemical Compatibility - Soluble in HCi, HNO, H₂SO, and HF aqueous matrices. Avoid use of HCiO, due to insolubility of the perchlorate. Stable with all metals and inorganic anions except CiO.

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

K Containing Samples (Preparation and Solution) - Metal (Dissolves very repidly in water): Ores (Sodium carbonate fusion in Pt^{*} followed by HCI dissolution-blank levels of K in sodium carbonate critical); Organic Matrices (Sulturicipercoide digestion) Africation Spectroscopic Information (ICP.OES D.L. e are given as prolidicated utsute)

Shortnernine aur	オロバルバル ストー・シビン ル	r's ach	14(3) 05	
ruelline	Estimated D.L.	Order	Ive	Interferences (underlined indicates severe at aconcs.)
S 766.490 nm	0.4 / 0.001 µg/mL	1		2 ^{er} order radiation from R.E.s on some optical designs
S 771.531 nm	1.0 / 0.03 ug/mL	1	atom	2 ^{ed} order radiation from R.E.s on some optical designs
S 404.721 nm	1.1 / 0.05 µg/mL	1	atom	U, Ce,
39 amu	10 ppt	nab	M'	"ArH, "Na"O, "Se"
	<b>S 766.490 nm</b> S 771.531 nm S 404.721 nm	Estimated D.L.           S 766.490 nm         0.4 / 0.001 µg/mL           S 771.531 nm         1.0 / 0.03 µg/mL           S 404.721 nm         1.1 / 0.05 µg/mL	Estimated D.L.         Order           S 766.490 nm         0.4 / 0.001 µg/mL         1           S 771.531 nm         1.0 / 0.03 µg/mL         1           S 404.721 nm         1.1 / 0.05 µg/mL         1	S 766.490 nm 0.4/0.001 µg/mL 1 atom S 771.531 nm 1.0/0.03 µg/mL 1 atom S 404.721 nm 1.1/0.05 µg/mL 1 atom

- 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-45862A (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 property 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 lnorganic 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.

INOF	RGANIC LAB	S/RADCHEM	LABS JAZ
DATE	RECEIVED:	1115/03	390
DATE	EXPIRED:	12/1/204	
DATE	OPENED:	115103_	
INDR	: <u>4320</u>	PO:	52258

Certification Date: January 30, 2003

**Expiration Date:** 



#### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:

JoAnn Struthers, QA Administrative Assistant

**Certificate Approved By:** 

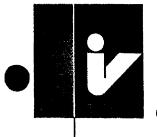
Katalin Le, QC Supervisor

folm Stutten Knonen de Pauk Aprin

Certifying Officer:

Paul Gaines, Chemist, Senior Technical Director

010238



#### inorganic ventures iabs

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

- inorganic Ventures / IV Labs is an ISO Guide 34-2000 Certified Reference Material (CRM) Manufacturer: 1.0 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) HNO3

Catalog Number:	CGMG10-1 and CGMG	10-5
Lot Number:	T-MG03006	
Starting Material:	Mg metal	
Starting Material Purity (%):	99,9968	I
Starting Material Lot No	RML91191	DA DA
Matrix:	1.4% (abs) HNO3	DA

INDR	GANIC	LABS/	RADCHEM	I LABS	Pg. lofa
DATE	RECE IN	/ED:	1316	<u>2</u>	
DATE	EXPIRE	ED:	07/31/C 08/01/3 08/01/0	1004	VD
DATE	OPENEL	);	08/01/	03	
INORG	i: <u>4ac</u>	≥ <u>7</u>	_PD:_F	5239	L

#### **B.O CERTIFIED VALUES AND UNCERTAINTIES**

**Certified Concentration:** 9921 ± 20 µg/mL

**Certified Density:** 

1.050 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 (x) =  $\sum x_{1}$ 

Uncertainty  $(\pm) = 2/(2)$ 

(x) = mean $x_i = individual results$ n = number of measurements 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.)

1.12

#### 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 9998 ± 20 µg/mL EDTA NIST SRM 928 Lot Number: 880710 Assay Method #2 9921 ± 20 µg/mL ICP Assay NIST SRM 3131a Lot Number: 991107

- 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.

<b>Q</b>	A		0.02454	М	Dy	<	0.02455	<b>Q</b>	u		0.00797	М	Pr	<	0.00123	М	Te	<	0.12275
М	Sb		0.00306	М	Er	<	0.02046	М	Lu	<	0.00164	М	Re	<	0.00409	М	ть	<	0.00123
М	As	<	0.04092	М	Eu	<	0.01228	<u>s</u>	Mg			М	Rh	۲	0.00409	Μ	П	<	0.00409
М	8a	<	0.04092	М	Gd	<	0.00409	М	Mn	<	0.01637	M	Rb	<	0.00409	М	Th	<	0.00409
Q	Be	<	0.00017	М	Ga	<	0.00409	Q	Hg	<	0.00900	М	Ru	<	0.00818	М	Tm	<	0.00164
М	Bi	<	0.00164	М	Ge	<	0.02455	М	Мо	<	0.00818	М	Sm	<	0.00409	М	Sn	<	0.02046
<u>0</u>	B		0.00871	М	Au	<	0.01228	М	Nd	<	0.00818	М	Sc	<	0.04092	₽	ТІ		0,10206
М	Cd	<	0.01228	М	Hf	<	0.00818	Q	Ni		0.01404	М	Se	<	0.03273	М	W	<	0.04092
Q	Ca		0.01070	м	Ho	<	0.00205	М	Nb	<	0.00205	Q	Si		0.03186	М	U	<	0.00818
М	Ce	<	0.02046	м	In	<	0.04092	Ω	Qs			М	Ag	<	0.00818	М	v	<	0.00818
М	Cs	<	0.00123	M	lr -	<	0.02046	М	Pd	<	0.02046	Q	Na		0.01817	М	Yb	<	0.00409
Q	Cr		0.02315	٥	Fe		0.02467	Q	P	<	0.01600	М	Sr	<	0.00205	М	Y	<	0.16367
М	Co	<	0.01228	M	La	<	0.00205	М	Pt	<	0.00818	n	S			Q	Zn		0.01892
<u>0</u>	Cu		0.00672	Q	Pb		0.03236	Q	κ	<	0.05000	М	Ta	<	0.02864	М	Zr	<	0.02046
M - C	heck	ed	by ICP-MS	٥-	Chec	ked	by ICP-OES	1-5	pectr	al Ir	nterference	n - t	iot Cl	hec	ked For	<b>s</b> - S	Solutio	n S	tandard 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(H₂O).'*

Chemical Compatibility - Soluble in HCI, HNOs, and H₂SO, avoid HF, H₂PO, and neutral to basic media. Stable with most metals and inorganic anions forming insoluble silicates, carbonates, hydroxides, oxides, and tungstates in neutral and slightly addic media

Stability - 2-100 ppb levels stable for months in 1% HNO1 / LDPE container. 1-10,000 ppm solutions chemically stable for years in 1-10% HNO, / LDPE container.

Mg Containing Samples (Preparation and Solution) - Metal (Best dissolved in dikuted HNO,); Oxide (Readily soluble in above compatible aqueous acidic solutions); Ores (Carbonate fusion in Pt^a followed by HCI dissolution); Organic Matrices (Sulfuric / peroxide digestion or nitric / suffuric / perchiaric acid decomposition, or dry ash and dissolution in dilute HCI). ACD ACC AL

Archie specifiescopie incitiation (ice -ces bicle are given as <u>table/asian</u> view):								
Technique	<u>/Line</u>	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'	(L)*O, **T)*2 , **Ca*2			
	Technique ICP-OES ICP-OES ICP-OES	Technique/Line           ICP-OES         279.553 nm           ICP-OES         280.270 nm           ICP-OES         280.270 nm           ICP-OES         285.213 nm	Technique/Line         Estimated D.L.           ICP-OES         279.553 nm         0.0002 / 0.00003 µg/mL           ICP-OES         280.270 nm         0.0003 / 0.00005 µg/mL           ICP-OES         285.213 nm         0.0002 / 0.00003 µg/mL	Technique/Line         Estimated D.L.         Order           ICP-OES         279.553 nm         0.0002 / 0.00003 µg/mL         1           ICP-OES         280.270 nm         0.0003 / 0.00005 µg/mL         1           ICP-OES         285.213 nm         0.0002 / 0.00003 µg/mL         1	Technique/Line         Estimated D.L.         Order         Type           ICP-OES         273.553 nm         0.0002 / 0.00003 µg/mL         1         ion           ICP-OES         280.270 nm         0.0003 / 0.00005 µg/mL         1         ion           ICP-OES         280.270 nm         0.0002 / 0.00003 µg/mL         1         ion           ICP-OES         285.213 nm         0.0002 / 0.00003 µg/mL         1         stom			

- 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 (OQS), 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 (BrowA), 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)

INORGANIC LABS/RADCHEM LABSP 202 DATE RECEIVED: 07/31/03 DATE EXPIRED: 08/01/2004 V22 DATE OPENED: 08/01/03 INORG: 4204 PD: E52391





#### 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 property 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: August 28, 2002

Expiration Date: EXPIRES 01 22 00 4

#### NAMES AND SIGNATURES OF CERTIFYING OFFICERS 12.0

Certificate Prepared By:

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Certificate Approved By:"

**Certifying Officer:** 

Debbie Newman, GA Administrator 

Paul Gaines, Chemist, Senior Technical Director

Katalin Le, QC Supervisor

12/12/22 

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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:	T-NA03006	
Starting Material:	Na2CO3	INORGANIC LABS/RADCHEM LABS 3 1 + 2
Starting Material Purity (%):	99.999936	DATE RECEIVED: 07/31/03
Starting Material Lot No Matrix:	42095 1.4% (abs) HNO3	DATE EXPIRED: 08/01/2004 VO DATE OPENED: 08/01/03 INORG: 4205 PD: 52391

# 30 CERTIFIED VALUES AND UNCERTAINTIES

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Certified Concentration: 10,005 ± 7 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 (C) = erx

Uncertainty (±) =  $2[(e_1 - s_1)^2]^{w_2}$ 

anny.			
Ø	= mean		
	individual results	· · .	
n =	number of measu	rements	: 1 •
	= The summation	of all significa	ant estimated errors.
			istrumental measurement,
wei	ghing, dilution to v	olume, and the	e fixed error reported on the
NIS	T SFM certificate	of analysis.)	
2 - C - C - E			

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.

# .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 A:	Assay Method #1	10,067 ± 75 µg/mL					
		ICP Assay NIST SRM 3152a Lot Number: 990907					
	Assay Method #2	10,005 ± 7 μg/mL					
		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 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.

	-		•
<u>o</u> ai < 0.00090	<u>M</u> Dy < 0.02499	<u>O</u> Li < 0.00003 <u>M</u> Pr < 0.00125	<u>M</u> Te < 0.12494
<u>M</u> Sb < 0.00208	<u>M</u> Er < 0.02082	<u>M</u> Lu < 0.00167 <u>M</u> Re < 0.00417	<u>M</u> Tb < 0.00125
<u>M</u> As < 0.04165	<u>M</u> Eu < 0.01249	<u>O</u> Mg 0.00015 <u>M</u> Rh < 0.00417	<u>M</u> TI < 0.00417
<u>M</u> Ba < 0.04165	<u>M</u> Gd < 0.00417	<u>O</u> Mn < 0.00003 <u>M</u> Rb < 0.00417	<u>M</u> Th < 0.00417
<u>O</u> Be < 0.00020	<u>M</u> Ga < 0.00417	<u>O</u> Hg < 0.01500 <u>M</u> Ru < 0.00833	<u>M</u> Tm < 0.00167
<u>M</u> Bi < 0.00167	<u>O</u> Ge < 0.00150	<u>M</u> Mo < 0.00833 <u>M</u> Sm < 0.00417	<u>M</u> Sn < 0.02082
<u>O</u> B < 0.00060	<u>O</u> Au < 0.00300	<u>M</u> Nd < 0.00833 <u>O</u> Sc < 0.00002	<u>o</u> ti < 0.00070
<u>M</u> Cd < 0.01249	<u>M</u> Hf < 0.00833	<u>O</u> Ni < 0.00230 <u>O</u> Se < 0.05000	<u>M</u> W < 0.04165
<u>O</u> Ca 0.00160	<u>M</u> Ha < 0.00208	<u>M</u> Nb < 0.00208 <u>O</u> SI < 0.00340	<u>M</u> U < 0.00833
<u>M</u> Ce < 0.02082	<u>M</u> in < 0.04165	<u>n</u> Os <u>M</u> Ag < 0.00833	<u>o</u> v < 0.00090
<u>M</u> Cs 0.00104	<u>M</u> ir < 0.02082	<u>M</u> Pd < 0.02082 <u>§</u> Na	<u>M</u> Yb < 0.00417
<u>M</u> Cr < 0.02082	<u>O</u> Fe < 0.00110	<u>O</u> P < 0.04000 <u>M</u> Sr < 0.00208	<u>M</u> Y < 0.16658
<u>M</u> Co < 0.01249	<u>M</u> La < 0.00208	<u>M</u> Pt < 0.00833 <u>O</u> S < 0.07200	<u>O</u> Zn 0.00130
<u>O</u> Cu < 0.00140	<u>M</u> Pb < 0.01249	<u>О</u> К 0.00873 <u>М</u> Та < 0.02915	<u>M</u> Zr < 0.02082
M - Checked by ICP-N	S 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 = €. 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'(eq) largely ionic in nature (Coordination Number in parentheses is assumed, not certain.)

Chemical Compatibility - Soluble in HCl, HNO₂, H₂SO₄ and HF aqueous matrices. Stable with all metals and inorganic anions. Stability - 2-100 ppb levels stable for months in 1% HNO₂ / LDPE container. 1-10,000 ppm solutions chemically stable for years in 1-5% HNO₂ / LDPE container.

Na Containing Samples (Preparation and Solution) - Metal (Dissolves very rapidly in water). Ores (Lithium carbonate fusion in graphite crucible followed by HCI dissolution - blank levels of Na in lithium carbonate critical), Organic Matrices (Sulturic / peroxide digestion or nitric/sulturic/perchloric acid decomposition).

Atomic Spectroscopic Information (ICP-OES D.L.s ere given as radial/exial view);

india op			e en cryfins		A CONTRACTOR AND A CONTRACTOR OF A CONTRACTOR AND A CONTRACTOR ANTE A CONTRACTOR ANTE A CONTRACTOR ANTE A CO
Technique	Line	Estimated D.L.	<u>Order</u>	Type	Interferences (underlined indicates severe at alboncs.)
ICP-OES	589.595 nm	0.07 / 0.00009 µg/mL	1	atom	2 ^{er} order radiation from R.E.s on some optical designs
ICP-OES	588.995 nm	0.03 / 0.006 µg/mĹ	1	atom	2 ^{er} 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 emu	310 ppt	nia	M'	4#[]12 _4CQ12
		••			•



- 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), Switzedand (SOS),

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 property 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: January 24, 2003 Expiration Date:

#### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:

Debble Newman, LIMS Administrator

010245

Certificate Approved By:

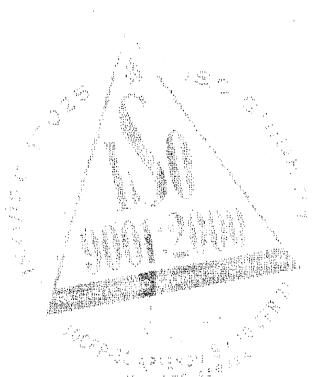
Katalin Le, QC Supervisor

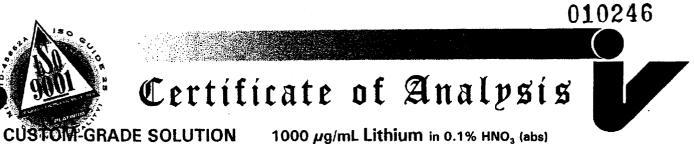
Certifying Officer:

Paul Gaines, Chemist, Senior Technical Director

Aleber Neuman

Port Aain





Catalog Number: CGLI1-1, CGLI1-2 and CGLI1-5

Lot Number:	N	1-1	LI	0	2	0	66	
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Li2CO3 Starting Material: Starting Material Purity: 99.999% Starting Material Lot No: 1053

INDRGANIC	LABS/	RADCHEM	LABS

DATE RECEI	VED:OG/20/03
	D: 07/01/2004 100
	D:
	19PO:E52370

# CERTIFIED CONCENTRATION: 998 $\pm 2 \mu g/mL$

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:

Uncertainty  $(\pm) = 2[(\sum_{j=1}^{2})^{2}]^{1/2}$ 

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

 $(\bar{x}) = mean$ x; = individual results

n = number of measurements  $\sum S_i$  = The summation of all significant estimated errors.

Classical Wet Assay: 998 ± 2 µg/mL

Method: Gravimetric as the Sulfate vs NIST weights #822/254143-94.

### Instrument Analysis: 1000 ± 4 µg/mL

Method: Inductively Coupled Plasma Spectroscopy (ICP) vs NIST SRM 3129a.

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. . ••• .

# TRACE METALLIC IMPURITIES DETERMINED BY ICP-MS AND ICP-OES IN $\mu$ g/mL:

Custom Grade solutions tested for trace metallic impurities 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. 

<u>0</u>	Al	< 0.010	M	Dy	<0.00060	<u>5</u>	Li		М	Pr	< 0.000030	Q	Te	< 0.0090
М	Sb	<0.000050	M	Er	< 0.00050	M	Lu	<0.000040	<u>M</u>	Re	<0.00010	M	Tb	< 0.000030
<u>0</u>	As	< 0.044	M	Eu	< 0.00030	<u>o</u>	Mg	< 0.00010	M.	Rh	< 0.00010	М	TI	< 0.00010
Μ	Ba	<0.0010	М	Gd	< 0.00010	<u>0</u>	Mn	< 0.00020	<u>M</u> .	Rþ	< 0.00010	M	Th	< 0.00010
Q	Be	< 0.000050	M	Ga	< 0.00010	. <u>o</u>	Hg	< 0.0070	M	Ru	< 0.00020	M	Tm	< 0.000040
Μ	Bi	< 0.000040	M	Ge	< 0.00060	M	Мо	< 0.00020	M	Sm	<0.00010	• <u>M</u>	Sn	< 0.00050
Q	в	< 0.0060	0	Au	< 0.010	M	Nd	< 0.00020	<u>М</u>	Sc	< 0.0010	<u>0</u>	Ti	< 0.00030
Q	Cd	<0.0018	M	Hf	< 0.00020	<u>0</u>	Ni	< 0.0040	Q	Se	<0.020	М	W	< 0.0010
<u>0</u>	Ca	0.051	M	Но	< 0.000050	M	Nb	< 0.000050	<u>0</u>	Si	0.023	M	U	< 0.00020
M	Ce	< 0.00050	0	In	<0.030	<u>n</u> _	Os		<u>0</u>	Ag	<0.0040	<u>0</u>	V	< 0.0010
M	Cs	0.0018	M	Ir	< 0.00050	M	Pđ	< 0.00050	0	Na	<0.10	M	Yb	< 0.00010
<u>0</u>	Cr	< 0.0020	0	Fe	<0.0020	Q	Ρ	< 0.030	<u>0</u>	Sr	< 0.0010	M	Y	< 0.0040
Μ	Co	< 0.00030	M	La	< 0.000050	M	Pt	< 0.00020	<u>0</u>	S	< 0.050	Q	Zn	< 0.030
М	Cu	<0.00060	М	Pb	< 0.00030	<u>0</u>	К	0.0070	М	Ta	< 0.00070	М	Zr	< 0.00050
М -	chec	ked by ICP-MS	0-0	heck	ed by ICP-OES	i - sp	ectra	l interference	n - no	t chec	ked for	s - soluti	on sta	andard element

ANALYZED DENSITY OF SOLUTION (measured at 22°C): 1.004 g/mL QA:KL Nev. 022403DN

(over)



Inorganic Ventures, Inc. 195 Lehigh Avenue • Suite 4 • Lakewood, NJ 08701 Orders: 800-669-6799 • FAX (732) 901-1903

Quality Assurance Manager



# **QUALITY STANDARD DOCUMENTATION**

1. ISO 9001:2000 QMI Registered Quality System (Certificate Number 010105)





Members of IQ Net : 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)
- 2. ISO/IEC Guide 34-2000 "General Requirements for the Competence of Reference Material Producers" Reference-Materials Production - Accredited A2LA Certificate 883.02
- 3. ISO/IEC17025-1999 "General Requirements for the Competence of Testing and Calibration" Chemical Testing -Accredited A2LA Certificate 883.01
- 4. MIL-STD-45662A
- 10CFR50 Appendix B Nuclear Regulatory Commission Domestic Licencing of Production and Utilization Facilities
   10CFR21 Nuclear Regulatory Commission Reporting Defects and Non-Compliance
- Please contact our Quality Assurance Department for further information and copies of documents pertaining to our Quality Standard certifications.

### **STABILITY/ EXPIRATION DOCUMENTATION**

Shelf Life -

The length of time that a property stored and packaged standard will remain within the specified uncertainty. Shelf life is affected by chemical stability and transpiration issues. Inorganic Ventures' Standard Solutions are chemically stable indefinitely. Transpiration loss is linear with time and limits the time a standard can be used with confidence. The smaller the bottle the higher the rate of transpiration. Inorganic Ventures' studies indicate that the shelf life of our 500 mL bottle is 4 years and the shelf life of our 125 mL bottle is 21 months.

Expiration Date - <u>The date after which a standard solution should not be used.</u> A one year expiration date is recommended by most state and federal regulatory agencies. Transpiration issues and repeated use of solutions over a one year period may adversely affect the integrity of the standard.

### PACKAGING DOCUMENTATION

Purified acid, 18 megohm double deionized water that has been filtered through a  $0.2 \,\mu\text{m}$  filter and in-house procedure IV-PACK-001 is used to clean all bottles. Contact us for technical information relating to contamination issues in packaging materials.

### **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.

### 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 428359B and 454678. 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 analytical weight set. These weights are tested annually by a NIST / NVLAP accredited calibration lab. The NIST test number is 822/260017-8.

## THERMOMETER CALIBRATION

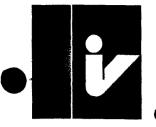
The thermometers used in the determination of the final densities are calibrated vs standard thermometer No. 903-2680 which was certified in accordance with the procedures outlined by ASTM E77-87 and NIST Monograph 150 using NIST Test Nos. and Std Nos.: 769543, 217368/769543, 217368/P14452, 176240/P14452, 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.

### **TECHNICAL SUPPORT**

All customers are encouraged to contact us for technical support for the proper use of our products.

TEL 1-800-569-6799 INT'L 1-732-901-1900 FAX 1-732-901-1903 E-MAIL IVte

E-MAIL IVtech@ivstandards.com



#### inorganic ventures 1 i v 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

INDRG: 4467 PD: F53323

### certificate analysis **O T**

- Inorganic Ventures / IV Labs is an ISO Guide 34-2000 Certified Reference Material (CRM) Manufacturer: 1.0 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 Cadmium in 2% (abs) HNOs

Catalog Number:	CGCD1-1, CGCD1-2, and CGCD1-5			
Lot Number:	W-CD01127			
Starting Material:	Cd shot			
Starting Material Purity (%):	99.998904			
Starting Material Lot No	C14M30	INDRGANIC LABS	RADCHEM LABS PS. 1 . A	
Matrix:	2% (abs) HNO3	DATE RECEIVED:	02/35/04	
		DATE EXPIRED:	03/01/2005 V05	
CERTIFIED VALUES AND L	INCERTAINTIES	DATE OPENED:	_03/35/04	

#### **CERTIFIED VALUES AND UNCERTAINTIES** 3.0

1007 ± 2 µg/mL **Certified Concentration:** 

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

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 (C) = <u>erx</u> ,	(C) = mean
n	$x_i = individual results$
	n = number of measurements
Uncertainty $(\pm) = 2[(2r_5))^{\frac{2}{1}}$	IIS = The summation of all significant estimated errors.
(D)*2	(Most common are the errors from instrumental measurement, weighing, dilution to volume, and the fixed error reported on the NIST SFM 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.

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

"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
		EDTA NIST SRM 928 Lot Number: 880710
	Assay Method #2	1005 ± 5 μg/mL
		ICP Assay NIST SRM 3108 Lot Number: 890312

- 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.

<u>Q</u> AI < 0.00090	<u>M</u> Dy < 0.01191	<u>O</u> LI < 0.00002	<u>M</u> Pr < 0.00060	<u>O</u> Te < 0.00700
<u>M</u> Sb 0.00039	<u>M</u> Er < 0.00993	<u>M</u> Lu < 0.00079	<u>M</u> Re < 0.00199	<u>M</u> Tb < 0.00060
<u>M</u> As < 0.01985	<u>M</u> Eu < 0.00596	<u>O</u> Mg 0.00002	<u>M</u> Rh < 0.00199	<u>M</u> TI < 0.00199
<u>M</u> Ba < 0.01985	<u>M</u> Gd < 0.00199	<u>M</u> Mn < 0.00794	<u>M</u> Rb < 0.00199	<u>M</u> Th < 0.00199
<u>M</u> Be < 0.00099	<u>M</u> Ga < 0.00199	<u>O</u> Hg < 0.01200	<u>M</u> Ru < 0.00397	<u>M</u> Tm < 0.00079
<u>M</u> Bi < 0.00079	<u>M</u> Ge < 0.01191	<u>M</u> Mo < 0.00397	<u>M</u> Sm < 0.00199	<u>M</u> Sn < 0.00993
<u>O</u> B < 0.00900	<u>M</u> Au < 0.00596	<u>M</u> Nd < 0.00397	<u>M</u> Sc < 0.01985	<u>M</u> TI < 0.09925
<u>s</u> Cd	<u>M</u> Hf < 0.00397	<u>Q</u> Ni < 0.00300	<u>M</u> Se < 0.01588	<u>M</u> W < 0.01985
<u>O</u> Ca 0.00378	<u>M</u> Ho < 0.00099	<u>M</u> Nb < 0.00099	<u>O</u> Si < 0.00340	<u>M</u> U < 0.00397
<u>M</u> Ce < 0.00993	<u>O</u> in < $0.00200$	<u>n</u> Os	<u>M</u> Ag < 0.00397	<u>M</u> V < 0.00397
<u>M</u> Cs < 0.00060	<u>M</u> Ir < 0.00993	• <u>M</u> Pd 0.00691	<u>M</u> Na < 0.19849	<u>M</u> Yb < 0.00199
<u>M</u> Cr < 0.00993	<u>O</u> Fe < 0.00110	<u>O</u> P < 0.00300	<u>M</u> Sr < 0.00099	<u>M</u> Y < 0.07940
<u>M</u> Co < 0.00596	<u>M</u> La < 0.00099	<u>M</u> Pt < 0.00397	<u>O</u> S < 0.03000	<u>O</u> Zn 0.00040
<u>M</u> Cu < 0.01191	<u>M</u> Pb < 0.00596	<u>O</u> K 0.00015	<u>M</u> Ta < 0.01389	<u>M</u> Zr < 0.00993
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 . Do not pipet from container. Do not return portions removed for pipetting to container.

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 112.41; +2; 4; Cd. (OH) (aq)" and Cd(OH)(aq) Chemical Compatibility - Stable in HCI, HNO, H, SO., and HF. Avoid basic media forming insoluble carbonate and hydroxide. Stable with most metals and inorganic anions in acidic media. The sulfide, carbonate, oralate, phosphate, and cyanide are insoluble in water and soluble in HCI, HNO, and NH.OH. The chloride, bromide and iodide are soluble in water. Cdl, us one of the few lodides soluble in ethanol. All compounds of Cd are soluble in excess Nal, due to the formation of the complex ion, Cdl, ... Stability - 2-100 ppb levels stable for months in 1% HNO, / LDPE container. 1-10,000 ppm solutions chemically stable for years in 1-5 % HNO,/LDPE container.

Cd Containing Samples (Preparation and Solution) - Metal (soluble in HNO, ), Oxides (Soluble in HCl or HNO, ); Ores ( Dissolve in HCl / HNO, then take to fumes with H,SO... The silica and lead suitate are filtered off after addition of water. ); Organic based (dry ash at 450 % and dissolve ash in HCl) (sulfuric/peroxide acid digestion).

Atomic Spectroscopic Information	(ICP-OES D.L.s are g	jiven <del>as <u>radial/axial</u> view</del>
----------------------------------	----------------------	----------------------------------------------

	Estimated D.L.	Order	Type	Interferences (underlined indicates severe at victorics.)
ICP-OES 214.438 nm	0.003/0.0003 µg/mL	1	ion	Pt, Ir
ICP-OES 228.802 nm	0.003 / 0.0003 µg/mL	1	atom	Co, Ir, As, Pt
ICP-OES 226.502 nm	0.003/0.0003 µg/mL	1	ion	
ICP-MS 111 anu	11 ppt	n/a	M'	Phote 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)

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 Talpei (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)

INDRGANIC LABS/RADCHEM LABS B. 2012 DATE RECEIVED: 03/05/04 DATE EXPIRED: 03/01/2005 VOS DATE OPENED: 02/25/04 INDRG: 4461 PO: F52323





- 11.1 IV Shelf Life The period of time during which the concentration of the analyte(s) in a property 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 24, 2003

**Expiration Date:** 



#### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

**Certificate Prepared By:** JoAnn Struthers, QA Administrative Assistant **Certificate Approved By:** Katalin Le, QC Supervisor

**Certifying Officer:** 

Paul Gaines, Chemist, Senior Technical Director

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# inorganic ventures

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

- Inorganic Ventures / IV Labs is an ISO Guide 34-2000 Certified Reference Material (CRM) Manufacturer: 1.0 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."
- DESCRIPTION OF CRM 2.0

4.1

Custom-Grade 1000 ug/mL Cobalt in 2% (abs) HNO3

	Catalog Number:	CGC01-1, CGC01-2	, and CGCO1-5
	Lot Number:	W-QC001114	
	Starting Material:	Copowder	
	Starting Material Purity (%):	99.995670	
	Starting Material Lot No	22897	
	Matrix:	2% (abs) HNO3	INDRGANIC LABS/RADCHEM LABS P. 1 & a DATE RECEIVED:03/35/04
I	CERTIFIED VALUES AND	UNCERTAINTIES	DATE EXPIRED: 03/01/2005 40

# 3.0

INORG: 4468 PU: F50303 **Certified Concentration:** 1002 ± 3 µg/mL **Certified Density:** 1.016 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 (C) = <u>erx</u>	(C)i = mean
n	x _i = individual results
	n = number of measurements
Uncertainty (±) = <u>2[(@rs,)²]^{1/2}</u>	S = The summation of all significant estimated errors.
(n) ^{1/2}	(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.

Assay Method #1 998 ± 4 µg/mL ICP Assay NIST SRM 3181 Lot Number: 000630 Assay Method #2 1002 ± 3 µg/mL EDTA NIST SRM 928 Lot Number: 880710

- 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.

<u>0</u>	Aj		0.00025	D	1	Dy	<	0.02419	Q	Li		0.00001	M	Pr	<	0.00121	M	Te	<	0.12097
M	Sb	<	0.00202	N	1	Er	<	0.02016	М	Lu	<	0.00161	M	Re	<	0.00403	M	Tb	<	0.00121
<u>0</u>	As	<	0.10000	N	A	Eu	<	0.01210	Q	Mg		0.00045	M	Rh	<	0.00403	м	TI	<	0.00403
М	Ba	<	0.04032	۸.	4	Gd	<	0.00403	<u>0</u>	Mn		0.00003	M	Rb	<	0.00403	М	Th	<	0.00403
М	Be	<	0.00202	N	1	Ga	<	0.00403	Q	Hg	<	0.05000	M	Ru	<	0.00807	M	Tm	<	0.00161
М	Bi	<	0.00161	L	<u>A</u>	Ge	<	0.02419	М	Мо	<	0.00807	M	Sm	<	0.00403	M	Sn	<	0.02016
<u>0</u>	в	<	0.04000	N	A	Au	<	0.01210	М	Nd	<	0.00807	M	Sc	<	0.04032	M	Ti	<	0.20162
M	Cd	<	0.01210	N	A	Hf	<	0.00807	Q	Ni	<	0.02000	M	Se	<	0.03226	M	W	<	0.04032
<u>0</u>	Ca		0.00325	L	Δ	Но	<	0.00202	М	Nb	<	0.00202	0	Si	<	0.00400	М	υ	<	0.00807
М	Ce	<	0.02016	D	Δ	in	<	0.04032	n	Os			M	Ag	<	0.00807	M	v	<	0.00807
M	Cs	<	0.00121	l I	٨	lr	<	0.02016	М	Pd	<	0.02016	2	Na		0.00138	м	Yb	<	0.00403
Μ	Cr	<	0.02016	2	2	Fe		0.00875	n	Р			M	Sr	<	0.00202	M	Y	<	0.16129
<u>\$</u>	Co			1	M	La	<	0.00202	М	Pt	<	0.00807	n	S			M	Zn	<	0.08065
М	Cu	<	0.02419	1	N	Pb	<	0.01210	Q	к		0.03000	M	Ta	<	0.02823	М	Zr	<	0.02016
M - 0	Check	ked	by ICP-MS	0	- 1	Chec	ke	by ICP-OES	i - S	Spec	irai	interference	n - 1	Not C	hea	ked For	5 -	Soluti	on	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 - Keeptightly sealed when not in use. Store and use at 20 ± 4 - €. Do not pipet from container. Do not return portions removed for pipetting to container.

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 58.9332; +2; 6; Co(H,O).*

Chemical Compatibility - Stable in HCI, HNO, , H, SO, , HF, H, PO.. Avoid basic media. Stable with most metals and inorganic anions in acidic media.

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

Co Containing Samples (Preparation and Solution) - Metal (soluble in HNO, ); Oxides (Soluble in HCI); Ores (Dissolve in HCI / HNO,).

### 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 siloncs.)
ICP-OES	238.892 nm	0.017.002 µg/mL	1	ion	Fe, W, Ta
ICP-OES	228.616 nm	0.01/.001µg/mL	1	ion	
ICP-OES	237.862 nm	0.01/.002 µg/mL	1	ion	W, Re, Al, Ta
ICP-MS	59 amu	2 ppt	n/a	M.	"Caro'H, "Ar"O'H, "Ar"Na, "Caro, "Mg"Ci

- 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



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- 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 property 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: August 28, 2003

### Expiration Date:



IND	RGANIC LABS	BIRADCHEM LABSPS. Jora	
DATE	RECEIVED:	02/25/04	
DATE	EXPIRED:	03/01/2005 103	
DATE	OPENED:	03/35/04	
INOR	3: <u>4468</u>	PO: <u>F53333</u>	

#### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:

JoAnn Struthers, QA Administrative Assistant

**Certificate Approved By:** 

Katalin Le, QC Supervisor

**Certifying Officer:** 

Paul Gaines, Chemist, Senior Technical Director

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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 1000 µg/mL Manganese in 2% (abs) HNOs

Catalog Number:	CGMN1-1, CGMN1-2, and CGMN1-5						
Lot Number: Starting Material: Starting Material Purity (%):	W-MN02036 Mn pieces 99.995300						
Starting Material Lot No Matrix:	21563 2% (abs) HNO3	INDRGANIC LABS/RADCHEM LABS					

# 3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Concentration: 1000 ± 2 µg/mL

Certified Density: 1.014 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 (C) =  $\underline{grx}$ , n

Uncertainty (±) =  $\frac{2[(2r_{S})^{2}]^{1/2}}{(r)^{1/2}}$ 

(C) = mean
x = individual results
n = number of measurements
ES = 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 SFM certificate of analysis.)
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DATE EXPIRED: _____OA/01/2005___

DATE OPENED: 01/20/04 INORG: 4434 PD: 15230

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	$1000 \pm 2 \mu g/mL$				
		ICP Assay NIST SRM 3132 Lot Number: 890903				
	Assay Method #2	1003 ± 3 µg/mL				
		EDTA NIST SRM 928 Lot Number: 880710				

- 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.

<u>O</u> Al 0.00221	<u>M</u> Dy < 0.02471 Q	Li 0.00020 <u>M</u> Pr < 0.00124	<u>M</u> Te < 0.12355
<u>M</u> Sb < 0.00206	<u>M</u> Er < 0.02059 M	Lu < 0.00165 <u>M</u> Re < 0.00412	<u>M</u> Tb < 0.00124
<u>M</u> As < 0.04118	<u>M</u> Eu < 0.01236 Q	Mg 0.03350 <u>M</u> Rh < 0.00412	<u>M</u> TI < 0.00412
<u>M</u> Ba < 0.04118	M Gd < 0.00412 \$	Mn <u>M</u> Rb < 0.00412	M Th < 0.00412
<u>M</u> Be < 0.00206	Q Ga < 0.05000 i	Hg <u>M</u> Ru < 0.00824	<u>M</u> Tm < 0.00165
<u>M</u> Bi < 0.00165	Q Ge < 0.00300 M	Mo < 0.00824 <u>M</u> Sm < 0.00412	<u>M</u> Sn < 0.02059
<u>Q</u> B 0.00295	<u>M</u> Au < 0.01236 <u>M</u>	Nd < 0.00824 <u>M</u> Sc < 0.04118	<u>M</u> Ti < 0.20592
<u>M</u> Cd < 0.01236	<u>M</u> Hf < 0.00824 <u>M</u>	Ni < 0.03295 M Se < 0.03295	<u>M</u> W < 0.04118
<u>Q</u> Ca 0.00340	<u>M</u> Ho < 0.00206 <u>M</u>	Nb < 0.00206 Q Si 0.00275	<u>M</u> U < 0.00824
<u>M</u> Ce < 0.02059	<u>M</u> in < 0.04118 🛛	Os <u>M</u> Ag < 0.00824	M V < 0.00824
M Cs < 0.00124	M ir < 0.02059 M	Pd < 0.02059 Q Na 0.00225	<u>M</u> Yb < 0.00412
<u>M</u> Cr < 0.02059	Q Fe < 0.01000 1	P <u>M</u> Sr < 0.00206	M Y < 0.16474
<u>M</u> Co < 0.01236	<u>M</u> La < 0.00206 <u>M</u>	Pt < 0.00824 i S	Q Zn 0.00250
<u>M</u> Cu < 0.02471	M Pb < 0.01236 Q	K 0.00105 <u>M</u> Ta < 0.02883	<u>M</u> Zr < 0.02059
M - Checked by ICP-MS	O - Checked by ICP-OES I - S	pectral 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 %. Do not pipet from container. Do not return portions removed for pipeting to container.

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 54,9380; +2; 6; Mn(H,O).*

Chemical Competibility - Stable in HCI, HNO₁, H₂SO₄, HF, H₄PO₄. Avoid basic media. Stable with most metals and inorganic anions in acidic media.

Stability - 2-100 ppb levels stable for months in 1% HNO₂ / LDPE container. 1-10,000 ppm solutions chemically stable for years in 1-5 % HNO₂LDPE container.

Mn Containing Samples (Preparation and Solution) - Metal (Soluble in dilute acids); Oxides (Soluble in dilute acids); Ores (Dissolve with HCI. If silica is present add HF and then turne off silica by adding H₂SO₄ and heat to SO₂ furnes - dense white turnes).

Atomic Sp	iectroscopic	Information	1 (ICP-0ES U.L.S	are given as	<u>radial/axaal</u> view	):

Technique/Line		Line	Estimated 0.1.	Order	Type	Interferences (underlined indicates severe at alloncs.)		
	ICP-OES	257.610nm	0.0014/0.00002µg/mL	1	ion	Če, W, Re		
	ICP-OES	259.373 nm	0.0016 / 0.00002 µg/mL	1	ion	U, Ta, Mo, Fe, Nb		
	ICP-OES	260.569 nm	0.0021 / 0.00002 µg/mL	1	ion	Co		
	ICP-MS	55 amu	10 ppt	n/a	Μ'	**************************************		
						**Ar'*O'H, *'CI''O'H, **Na**S		

- 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), Slovenja (SIQ), Spain (AENOR), Switzerland (SQS)

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), Portugai (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)





#### DATE OF CERTIFICATION AND PERIOD OF VALIDITY 11.0



- 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: August 04, 2003

**Expiration Date:** 

EXPIRES 122005

#### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:

Katalin Le, QC Supervisor

JoAnn Struthers, QA Administrative Assistant

**Certificate Approved By:** 

**Certifying Officer:** 

Paul Gaines, Chemist, Senior Technical Director

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inorganic ventures

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

Uncertainty  $(\pm) = 2[(\sum_{s})^2]^{1/2}$ 



# **CUSTOM-GRADE SOLUTION**

1000 µg/mL Vanadium in 1.4% HNO₃ (abs) Catalog Number: CGV1-1, CGV1-2 and CGV1-5

Lot Number: T-V02032

Starting Material: Starting Material Purity: Starting Material Lot No: Vanadium Pentoxide 99.999% 46

INOF	GANIC	LABS/	RADCHEM	LABS
DATE	RECEIN	/ED:	115/03	LABS
DATE	EXPIRE	ED:	12/1/200	4 5∂∂58
DATE	OPENEL	):	5/03	
INORG	i:43	21	_PO:	52258

010260

# CERTIFIED CONCENTRATION: 990 $\pm 2 \mu g/mL$

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 ( $\Re$ ) =  $\sum_{x}$ 

(x) = mean

#### $x_i = individual results$ n = number of measurements

 $\sum S_i =$  The summation of all significant estimated errors.

### Classical Wet Assay: 993 $\pm$ 4 $\mu$ g/mL

Method: EDTA Titration vs NIST SRM 928 Lead Nitrate.





Method: Inductively Coupled Plasma Spectroscopy (ICP) vs NIST SRM 3165.

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.

## TRACE METALLIC IMPURITIES DETERMINED BY ICP-MS AND ICP-OES IN $\mu g/mL$ :

Custom-Grade solutions tested for trace metallic impurities by ICP-MS were analyzed in an ULPA-Filtered Clean Room, An ULPA-Filter is 99.9985% efficient for the removal of particles down to 0.3  $\mu$ m.

М	Ai	0.0095	м	Dy	< 0.00060	M	u	< 0.0010	м	Pr	< 0.000030		м	Te	< 0.0030
M	Sb	0.042	M	Er	< 0.00050	M	Lu	< 0.000040	M	Re	<0.00010		M	ть	<0.000030
M	As	< 0.0010	M	Eu	< 0.00030	M	Mg	0.0089	M	Rh	< 0.00010		M	TI	< 0.00010
M	Ba	<0.0010	M	Gđ	< 0.00010	ī	Mn		M	Rb	< 0.00010		M	Τh	< 0.00010
M	Be	<0.000050	M	Ga	<0.00010	i	Hg		M	Ru	<0.00020		M	Tm	< 0.000040
M	Bi	< 0.000040	М	Ge	< 0.00060	M	Мо	0.016	M	Sm	<0.00010		M	Sn	< 0.00050
М	В	<0.0070	Μ	Au	< 0.00030	M	Nd	< 0.00020	М	Sc	<0.0010		Μ	Ti	< 0.0050
M	Cđ	< 0.00030	M	Hf	<0.00020	<u>0</u>	Ni	<0.050	<u>0</u>	Se	<0.40		M	w	0.00055
0	Ca	<0.010	M	Ho	<0.000050	M	Nb	0.00024	<u>0</u>	Si	<0.030		М	U	0.0011
M	Ce	< 0.00050	Q	in	<0.070	<u>n</u>	Os		M	Ag	0.00044		8	v	
M	Cs	<0.000030	M	lr.	<0.00050	M	Pd	< 0.00050	<u>0</u>	Na	< 0.090		M	Yb	< 0.00010
0	Cr	<0.020	<u>0</u>	Fe	< 0.050	L	Ρ		M	Sr	<0.000050		М	Y	< 0.0040
Q	Co	< 0.050	М	La	< 0.000050	M	Pt	< 0.00020	n.	S			M	Zn	0.0041
М	Cu	<0.00060	М	Pb	<0.00030	D	κ		м	Та	<0.00070		М	Zr	<0.00050
м.	chec	ked by ICP-MS	0-0	check	ed by ICP-OES	i - sı	pectra	I interference	n - no	t che	cked for	s - solu	tion	stand	ard element

O - checked by ICP-OES

ANALYZED DENSITY OF SOLUTION (measured at 22°C): 1.015 g/mL 

(over)



Paul R. Haines

Quality Assurance Manager



## QUALITY STANDARD DOCUMENTATION

1. ISO 9001 QMI Registered Quality System (Certificate Number 010105)

Members of IQ Net : 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-



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)

- 2. ISO Guide 25 A2LA .Accredited (Certificate Number 0883-01)
- 3. MIL-STD-45662A
- 4. 10CFR50 Appendix B
- 5. 10CFR21

Please contact our Quality Assurance Department for further information and copies of documents pertaining to our Quality Standard certifications.

### **STABILITY/ EXPIRATION DOCUMENTATION**

 Shelf Life The length of time that a properly stored and packaged standard will remain within the specified uncertainty. Shelf life is affected by chemical stability and transpiration issues. Inorganic Ventures' Standard Solutions are chemically stable indefinitely. Transpiration loss is linear with time and limits the time a standard can be used with confidence. The smaller the bottle the higher the rate of transpiration. Inorganic Ventures' studies indicate that the shelf life of our 500 mL bottle is 4 years and the shelf life of our 125 mL bottle is 21 months.

Expiration Date - <u>The date after which a standard solution should not be used.</u> A one year expiration date is recommended by most state and federal regulatory agencies. Transpiration issues and repeated use of solutions over a one year period may adversely affect the integrity of the standard.

### PACKAGING DOCUMENTATION

Purified acid, 18 megohm double deionized water that has been filtered through a 0.2 µm filter and in-house procedure IV-PACK-001 is used to clean all bottles. Contact us for technical information relating to contamination issues in packaging materials.

### **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.

### **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 428359B and 454678. 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 analytical weight set. These weights are tested annually by a NIST / NVLAP accredited calibration lab. The NIST test number is 822/260017-8.

### 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.

### **TECHNICAL SUPPORT**

All customers are encouraged to contact us for technical support for the proper use of our products.

TEL 1-800-569-6799 FAX 1-732-901-1903 E-MAIL IVtech@ivstandards.com



# 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 Zinc in 1.4% (abs) HNO3

Catalog Number:	CGZN1-1, CGZN1-2, a	and CGZN1-5
Lot Number:	W-ZN02018	
Starting Material:	Zn shot	INDRGANIC LABS/RADCHEM LABS
Starting Material Purity (%):	99.999889	DATE RECEIVED: 115/03
Starting Material Lot No Matrix:	J17L26 1.4% (abs) HNO3	DATE EXPIRED: 1/5/03 DATE OPENED: 1/5/03 INORG: 43/9 PO: F53358

# 3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Concentration: 1006 ± 3 µg/mL

Certified Density: 1.011 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 (C) = <u>er x</u>	(C) = mean
n	x, = individual results
	n = number of measurements
Uncertainty $(\pm) = 2!(2\pi s_1)^2!^2$	ES = The summation of all significant estimated errors.
(n) ^{1/2}	(Most cormon are the errors from instrumental measurement,
	weighing, dilution to volume, and the fixed error reported on the
	NIST SPM 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)

1) 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
 1002 ± 6 μg/mL

 ICP Assay NIST SRM 3168a
 Lot Number: 001402

Assay Method #2

1006 ± 3 μg/mL EDTA NIST SRM 928 Lot Number: 880710

- 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 822/260017-96. 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 cartified 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.

<u>O</u> AI < 0.00200	<u>M</u> Dy < 0.02440	<u>O</u> LI 0.00001	<u>M</u> Pr < 0.00122	<u>M</u> Te < 0.12198
<u>M</u> Sb < 0.00203	<u>M</u> Er < 0.02033	<u>M</u> Lu < 0.00163	<u>M</u> Re < 0.00407	<u>M</u> Tb < 0.00122
<u>M</u> As < 0.04066	<u>M</u> Eu < 0.01220	<u>O</u> Mg 0.00011	<u>M</u> Rh < 0.00407	<u>M</u> TI < 0.00407
<u>M</u> Ba < 0.04066	<u>M</u> Gd < 0.00407	<u>M</u> Mn < 0.01626	<u>M</u> Rb < 0.00407	<u>M</u> Th < 0.00407
<u>M</u> Be < 0.00203	<u>M</u> Ga < 0.00407	<u>O</u> Hg < 0.01000	<u>M</u> Ru < 0.00813	<u>M</u> Tm < 0.00163
<u>M</u> BI < 0.00163	<u>M</u> Ge < 0.02440	<u>M</u> Mo < 0.00813	<u>M</u> Sm < 0.00407	<u>M</u> Sn < 0.02033
<u>O</u> B 0.00015	<u>M</u> Au < 0.01220	<u>M</u> Nd < 0.00813	<u>M</u> Sc < 0.04066	<u>M</u> Ti < 0.20331
<u>M</u> Cd < 0.01220	<u>M</u> Hf < 0.00813	<u>Q</u> Ni 0.00009	<u>M</u> Se < 0.03253	<u>M</u> W < 0.04066
<u>O</u> Ca 0.00022	<u>M</u> Ho < 0.00203	<u>M</u> Nb < 0.00203	<u>O</u> Si < 0.00400	<u>M</u> U < 0.00813
<u>M</u> Ce < 0.02033	<u>M</u> in < 0.04066	<u>n</u> Os	<u>M</u> Ag < 0.00813	<u>M</u> V < 0.00813
<u>M</u> Cs < 0.00122	<u>M</u> ir < 0.02033	<u>M</u> Pd < 0.02033	<u>O</u> Na 0.00055	<u>M</u> Yb < 0.00407
<u>O</u> Cr < 0.00100	<u>O</u> Fe 0.00005	<u>O</u> P < 0.00300	<u>M</u> Sr < 0.00203	<u>M</u> Y < 0.16264
<u>M</u> Co < 0.01220	<u>M</u> La < 0.00203	<u>M</u> Pt < 0.00813	<u>O</u> S < 0.02000	ş Zn
<u>Q</u> Cu < 0.00050	<u>M</u> Pb < 0.01220	<u>О</u> К 0.00018	<u>M</u> Ta < 0.02846	<u>M</u> Zr < 0.02033
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 010264

Storage & Handling - Keep tightly sealed when not in use. Store and use at 20 ± 4 ℃. Do not pipet from container. Do not return portions removed for pipetting to container. Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 65.39, +2; 4; Zn(OH)(ac)* Charried Compatibility - Stable in HCI, HNO, H,SO, HF, H,PO. Avoid basic media that promotes the formation of insoluble carbonate and hydroxide. Stable with most metals and inorganic anions in addic media. Stability - 2-100 ppb levels stable for months in 1% HNO, /LDPE container. 1-10,000 ppm solutions chemically stable for years in 1-5% HNO, /LDPE container. Zn Containing Semples (Preparation and Solution) - Metal (Solutie in HNO, ); Oxides (Solutie in HCI ); Ores (Dissolve in HCI AHNO,); Organic based (Dry ash at 450 - C and dissolve ash in HCI) (Suffuric/peroxide add digestion) Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/aidal view): Type Interferences (underlined indicates severe steedoncs.) Ni, Cu, V Technique/Line ICP-OES 213.856 nm ICP-OES 202.548 nm Estimated D.L. 0.002 / 0.0004 µg/mL 1 Order etom 0.004 / 0.0002 µg/mL 1 ion Nb, Cu, Co, Hf Sp. Ta, BI, Os M. ≉TI+O, *Cr+O, *∿+O, *S+O, , *S+O+O, '*S*O, , *S+O*O, M. ICP-OES 0.006 / 0.0006 µg/mL 1 ion 206.200 nm ICP-MS 7 ppt 66 amu nía 11SHS.115,

- 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 (BriwA), 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), Portugai (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

# 010265



- 11.1 IV Shelf Life The period of time during which the concentration of the analyte(s) in a property 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: May 02, 2003

### Expiration Date:

EXPIRES

## 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By: JoAnn Struthers, QA Administrative Assistant

**Certificate Approved By:** 

Katalin Le, QC Supervisor

Certifying Officer:

Paul Gaines, Chemist, Senior Technical Director

John Stratten Knonen in Paul Aaim

INDR	GANIC LA	BS/RADCHEM	LABS
DATE	RECEIVED	: 11/5/03	21/7
DATE	EXPIRED:	11/5/03 12/1/2004	DR
DATE	OPENED:	1115/03	
INORG	i:_43/9	PO: <u>F</u>	5208

# 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



# CUSTOM-GRADE SOLUTION 1000 $\mu$ g/mL Silver in 3.5% HNO₃ (abs)

Catalog Number: CGAG1-1, CGAG1-2 and CGAG1-5

Lot Number: T-AG02015

Starting Material: Starting Material Purity: Starting Material Lot No: Silver Metal 99.999% F15102

INORGAN	IC LABS/F	RADCHEM	LABS	
DATE RECE	EIVED:	08/96/	03	
DATE EXPI				
DATE OPEN	VED:	08/26	103	
INORG:				

### CERTIFIED CONCENTRATION: 1001 $\pm 2 \mu g/mL$

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  $(\bar{x}) = \sum_{n \neq i} x_{i}$ 

(x) = mean

Uncertainty 
$$(\pm) = 2[(\sum_{s,j})^2]^{1/2}$$
  
(n)^{1/2}  
n = number of measurements  $\sum_{s} \sum_{s} \sum_{s} \sum_{t=1}^{t} \sum_{s} \sum_{s} \sum_{s} \sum_{t=1}^{t} \sum_{s} \sum_{s} \sum_{t=1}^{t} \sum_{s} \sum_{t=1}^{t} \sum_{s} \sum_{s} \sum_{t=1}^{t} \sum_{s} \sum_{t=1}^{t} \sum_{s} \sum_{t=1}^{t} \sum_{s} \sum_{t=1}^{t} \sum_{s} \sum_{t=1}^{t} \sum_{s} \sum_{s} \sum_{t=1}^{t} \sum_{s} \sum_{s} \sum_{t=1}^{t} \sum_{s} \sum_{s} \sum_{t=1}^{t} \sum_{s} \sum_{s} \sum_{t=1}^{t} \sum_{s} \sum_{t=1}^{t} \sum_{s} \sum_{t=1}^{t} \sum_{s} \sum_{t=1}^{t} \sum_{s} \sum_{t=1}^{t} \sum_{s} \sum_{s} \sum_{s} \sum_{s} \sum_{t=1}^{t} \sum_{s} \sum_{s} \sum_{s} \sum_{s} \sum_{t=1}^{t} \sum_{s} \sum_{s}$ 

 $\sum S_i$  = The summation of all significant estimated errors.

010266

### Classical Wet Assay: 1004 ± 3 µg/mL

Method: Volhard Titration vs NIST SRM 999a Potassium Chloride

 $x_i = individual results$ 

### Instrument Analysis: 1001 $\pm 2 \mu g/mL$

Method: Inductively Coupled Plasma Spectroscopy (ICP) vs NIST SRM 3151.

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.

## TRACE METALLIC IMPURITIES DETERMINED BY ICP-MS AND ICP-OES IN $\mu$ g/mL:

Custom-Grade solutions tested for trace metallic impurities 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.

~		< 0.00010		<b>D</b>	< 0.00060	~	ы	< 0.000030	84	Pr	< 0.000030	0	Т	< 0.030
Q	AI	C0.00010	M	Dy		<b>Q</b>	-		<u>M</u>	F1		<u> </u>		
M	Sb	< 0.000050	M	Er	< 0.00050	M	Lu	<0.000040	M	Re	< 0.00010	M	ТЬ	<0.000030
0	As	< 0.0050	M	Eu	< 0.00030	Q	Mg	< 0.000040	M	Rh	< 0.00010	М	П	<0.00010
M	Ba	<0.0010	M	Gđ	<0.00010	Q	Mn	< 0.00030	<u>M</u>	Rb	< 0.00010	<u>M</u>	Th	<0.00010
0	Be	<0.00050	M	Ga	<0.00010	<u>0</u>	Hg	0.00090	M	Ru	< 0.00020	M	Тл	< 0.000040
M	8i	<0.000040	M	Ge	< 0.00060	M	Мо	< 0.00020	M	Sm	< 0.00010	M	Sn	<0.00050
0	8	< 0.0020	Q	Au	< 0.012	M	Nd	< 0.00020	M	Sc	< 0.0010	0	T	<0.00070
Q	Cđ	< 0.0020	M	H	< 0.00020	Q	Ni	<0.0070	Q	Se	< 0.036	<u>M</u>	W	< 0.0010
Q	Ca	< 0.000050	M	Ho	< 0.000050	M	Nb	< 0.000050	<u>0</u>	SI	< 0.0030	М	U	< 0.00020
M	Ce	< 0.00050	0	In	< 0.020	n	Os		Ŧ	Ag		М	v	< 0.00020
Μ	Ca	< 0.000030	M	ir	< 0.00050	M	Pd	< 0.00050	<u>o</u>	Na	< 0.090	M	Yb	<0.00010
0	Cr	< 0.0020	Q	Fe	< 0,00070	Q	Ρ	< 0.030	M	Sr	< 0.000050	<u>M</u>	Y	< 0.0040
M	Co	< 0.00030	M	La	< 0.000050	M	Pt	< 0.00020	Q	S	< 0.020	Q	Zn	< 0.0010
M	Cu	< 0.00060	М	Pb	<0.00030	<u>0</u>	к	<0.0060	<u>M</u>	Ta	< 0.00070	M	Zr	< 0.00050
м.	chec	ked by ICP-MS	0 - c	heck	ed by ICP-OES	i - sp	ectra	l interference	n - no	t che	cked for	s - solution	star	dard element

# ANALYZED DENSITY OF SOLUTION (measured at 22°C): 1.024 g/mL

QA:KL nov.00210208

Pail R. Acines

Quality Assurance Manager

Expires:



## QUALITY STANDARD DOCUMENTATION

1.ISO 9001:2000 QMI Registered Quality System (Certificate Number 010105) Members of IQ Net : Argentina (IRAM), Austrelia (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)

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

3.ISO/IEC17025-1999 "General Requirements for the Competence of Testing and Calibration" - Chemical Testing -Accredited A2LA Certificate 883.01

4.MIL-STD-45662A

5.10CFR50 Appendix B - Nuclear Regulatory Commission - Domestic Licencing of Production and Utilization Facilities 6.10CFR21 - Nuclear Regulatory Commission - Reporting Defects and Non-Compliance

Please contact our Quality Assurance Department for further information and copies of documents pertaining to our Quality Standard certifications.

### STABILITY/ EXPIRATION DOCUMENTATION

Shelf Life -<u>The length of time that a properly stored and packaged standard will remain within the specified uncertainty.</u> Shelf life is affected by chemical stability and transpiration issues. Inorganic Ventures' Standard Solutions are chemically stable indefinitely. Transpiration loss is linear with time and limits the time a standard can be used with confidence. The smaller the bottle the higher the rate of transpiration. Inorganic Ventures' studies indicate that the shelf life of our 500 mL bottle is 4 years and the shelf life of our 125 mL bottle is 21 months.

Expiration Date -<u>The date after which a standard solution should not be used.</u> A one year expiration date is recommended by most state and federal regulatory agencies. Transpiration issues and repeated use of solutions over a one year period may adversely affect the integrity of the standard.

### PACKAGING DOCUMENTATION

Purified acid, 18 megohm double deionized water that has been filtered through a 0.2  $\mu$ m filter and in-house procedure IV-PACK-001 is used to clean all bottles. Contact us for technical information relating to contamination issues in packaging materials.

### **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.

### 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 428359B and 454678. 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 analytical weight set. These weights are tested annually by a NIST / NVLAP accredited calibration lab. The NIST test number is 822/260017-8.

### 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.

### TECHNICAL SUPPORT

All customers are encouraged to contact us for technical support for the proper use of our products.

TEL 1-800-569-6799 INT'L 1-732-901-1900 FAX 1-732-901-1903

E-MAIL IVtech@ivstandards.com









inorganic ventures 1 i v 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."
- **DESCRIPTION OF CRM** Custom-Grade 1000 µg/mL Arsenic in 1.4% (abs) HNO3 2.0

Catalog Number:	CGAS1-1, CGAS1-2, a	nd CGAS1-5
Lot Number:	W-AS02022	
Starting Material:	POLYCRYSTALINE LU	IMP
Starting Material Purity (%):	99.998994	
Starting Material Lot No	23115	
Matrix:	1.4% (abs) HNO3	INORGANIC LABS/RADCHEM LABS% 102 DATE RECEIVED: 01/20/04
CEPTIEIED VALUES AND	INCERTAINTIES	DATE EXPIRED: 03/01/3005 VD

#### 3.0 **CERTIFIED VALUES AND UNCERTAINTIES**

INURG: 4433 PU: F52301  $1014 \pm 3 \,\mu g/mL$ **Certified Concentration:** 1.012 g/mL (measured at 22° C) **Certified Density:** 

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 ( $\Box$ ) =  $\underline{cr} \times \underline{r}$ n

Uncertainty (±) = <u>21(2-5)71^{1/2}</u> (1) ^{1/2}	
------------------------------------------------------------------------	--

(D) = mean
x _i = individual results
n = number of measurements
BS = 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 SFM certificate of analysis.)

DATE OFENED: 91/20/04

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

"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	<b>1014 ± 3 μg/mL (Avg 2 runs)</b> ICP Assay NIST SRM 3103a Lot Number: 891003
	Assay Method #2	1008 µg/mL 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 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.

<u>o</u> ai	0.00038 <u>M</u>	Dy	<	0.01596	Q	u		0.00009	M	Pr	<	0.00080	M	Te	<	0.07978
<u>O</u> Sb < 8	0.01000 <u>M</u>	Er	<	0.01330	М	Lu	<	0.00106	₽	Re	<	0.01000	M	ТЪ	<	0.00080
<u>s</u> As	M	Eu	<	0.00798	<u>0</u>	Mg		0.00009	М	Rh	<	0.00266	M	TI	<	0.00266
<u>M</u> Ba < (	0.02660 <u>M</u>	Gd	<	0.00266	Q	Mn	<	0.00003	м	Rb	<	0.00266	M	Th	<	0.00266
<u>M</u> Be < (	0.00133 <u>M</u>	Ga	<	0.00266	Q	Hg	<	0.01200	M	Ru	<	0.00532	M	Tm	<	0.00106
<u>M</u> Bi < (	0.00106 <u>M</u>	Ge	<	0.01596	м	Мо	<	0.00532	м	Sm	<	0.00266	<u>0</u>	Sn		0.00049
<u>o</u> b < (	0.01200 <u>M</u>	Au	<	0.00798	М	Nd	<	0.00532	М	Sc	<	0.02660	M	Ti	<	0.13297
<u>M</u> Cd < (	0.00798 <u>N</u>	Hf	<	0.00532	М	Ni	<	0.02128	м	Se	<	0.02128	M	W	<	0.02660
<u>O</u> Ca	0.00189 <u>M</u>	Но	<	0.00133	Q	Nb	<	0.00200	Q	SI		0.00415	M	U.	<	0.00532
<u>M</u> Ce < (	0.01330 <u>N</u>	in	<	0.02660	n	Os			М	Ag	<	0.00532	M	V	<	0.00532
<u>M</u> Cs < (	0.00080 <u>N</u>	ir	<	0.01330	М	Pd	<	0.01330	. <u>0</u>	Na		0.00159	M	Yb	<	0.00266
<u>M</u> Cr < (	0.01330 <u>O</u>	Fe	<	0.00110	Q	Р	<	0.00260	м	Sr	<	0.00133	M	Y	<	0.10638
<u>M</u> Co < (	0.00798 <u>N</u>	La	<	0.00133	М	Pt	<	0.00532	Q	S	<	0.02500	<u>0</u>	Zn		0.00057
<u>M</u> Cu < (	0.01596 <u>N</u>	Pb	<	0.00798	<u>0</u>	ĸ		0.00132	М	Ta	<	0.01862	М	Zr	<	0.01330
M - Checked b	y ICP-MS O	Chec	ked	by ICP-OES	I - S	pectr	al l	nterference	n - t	lot C	hec	ked For	<b>s</b> -	Soluti	on t	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 seeled 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 - 74.9216; mix of +3 and +5; 6; H_ASO, and HASO;

Chemical Compatibility -Arsenic has no cationic chemistry. It is soluble in HCI, HNO, H-PO, H-SO, and HF aqueous matrices water and NH,OH. It is stable with most inorganic anions (forms ersenate when bolied with chromate) but many cationic metals form the insoluble arsenates under pH neutral conditions. When flucrineted and / or under acidic conditions arsenate formation is typically not a problem at moderate to low concentrations.

Stability - 2-100 ppb levels stable for months alone or mixed with other elements at equivalent levels in 1% HNO₂ / LDPE container. 1-10,000 ppm solutions chemically stable for years in 1-5% HNO₂ / LDPE container.

As Containing Samples (Preparation and Solution) - As' (soluble in 1:1 H₂O / HNO₂) Oxides (the oxide exists in crystalline and amorphous forms where the amorphoric form is more water soluble. The oxides typically dissolve in dilute addic solutions when boiled) Minerals (One gram of powered sample is fused in a N^a crucible with 10 grams of a 1:1 mix of K₂CO₂ and KNO₂ and the met extracted with hot water ); Organic Matrices (0.2 to 0.5 grams of the sample are fused with 15 grams of a 1:1 Na₂CO₂ / Na₂O₂ mix in a N^a crucible. The fuseate is extracted with water and additied with HNO₂)

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

Technique		Estimated D.L., 0.05 / 0.005 µa/mL	<u>Order</u>	Type	Interferences (underlined indicates severe at albancs.)
ICP-OES	189.042 nm	0.05 / 0.005 µg/mL	.1	atom	Cr
ICP-OES	193.696 nm	0.1 / 0.01 µg/mL	1	atom	V, Ge
ICP-OES	228.812 nm	0.1 / 0.01 µg/mL	1	atom	<u>Cd, Pt,</u> ir, Co [™] A/ [™] Cl, ³³ Co [™] O, ³⁶ A/ ³⁶ Ar ¹ H, ³⁵ Ar ³⁶ Cl, ³⁶ Ar ⁴⁶ K, ¹³⁰ Nd ³¹ , ¹³⁰ Sm ³¹
ICP-MS	75 amu	20 ppt	n/a	M'	Appendiate Colored and a set of the set 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 Acreditación, a.c.(EMA)

Members of IQ Net International Certification Network:

Argentina (IRAM), Australia (QAS), Austria (OQS), 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 Talpei (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)

INORGANIC LABS/RADCHEM LABSP, 2022 DATE RECEIVED: 01/20/04 DATE EXPIRED: 02/01/2005 105 DATE OPENED: 01/20/04 INORG: 4433 PO: 53301

### 11.0 DATE OF CERTIFICATION AND PERIOD OF VALIDITY

010271



- 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: May 01, 2003

Expiration Date: EXPIRES

# 122005

#### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

**Certificate Prepared By:** JoAnn Struthers, QA Administrative Assistant

**Certificate Approved By:** Katalin Le, QC Supervisor

**Certifying Officer:** 

Paul Gaines, Chemist, Senior Technical Director

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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

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#### analysis certificate of.

- Inorganic Ventures / IV Labs is an ISO Guide 34-2000 Certified Reference Material (CRM) Manufacturer: 1.0 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." DATE
- 2.0

**DESCRIPTION OF CRM** Custom-Grade 1000 µg/mL Lead in 0.35% (abs) HNOs

Catalog Number: CGPB1-1, CGPB1-2, and CGPB1-5 Lot Number: W-PB02114 Starting Material: Pb(NO3)2 Starting Material Purity (%): 99.999974 Starting Material Lot No 22150 Matrix: 0.35% (abs) HNO3

3.0 **CERTIFIED VALUES AND UNCERTAINTIES** 

> **Certified Concentration:**  $1006 \pm 2 \,\mu g/mL$ 1.002 g/mL (measured at 22° C) **Certified Density:**

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

Certified Value (C) = <u>erx</u>	(C)1 = mean
n	x _i = indivídual results
	n = number of measurements
Uncertainty $(\pm) = 2i(e_1 \cdot s_1)^{2/1/2}$	ES = The summation of all significant estimated errors.
(11) ^{1/2}	(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  $1005 \pm 2 \,\mu g/mL$ 

ICP Assay NIST SRM 3128 Lot Number: 991504

Assay Method #2

1006 ± 2 µg/mL EDTA NIST SRM 928 Lot Number: 880710

- 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.

<u>o</u> ai	<	0.00270	М	Dy	<	0.01193	<u>0</u>	u	<	0.00002	М	Pr	<	0.00060	⊵	Те	<	0.05965
M St	b <	0.00099	M	Er	<	0.00994	M	Lu	<	0.00080	M	Re	<	0.00199	M	ть	<	0.00060
M As	s' <	0.01989	M	Eu	<	0.00597	Q	Mg		0.00008	₫	Rh	<	0.00900	<u></u>	П		0.00130
<u>M</u> Ba	a <	0.01989	M	Gđ	<	0.00199	M	Mn	<	0.00795	м	Rb	<	0.00199	∣⊻	Th	<	0.00199
<u>M</u> Be	e <	0.00099	М	Ga	<	0.00199	Q	Hg	<	0.01500	М	Ru	<	0.00398	M	Tm	<	08000.0
<u>O</u> BI	i <	0.02000	M	Ge	<	0.01193	М	Мо	<	0.00398	M	Sm	<	0.00199	№	Sn	<	0.00994
<u>о</u> в	<	0.04000	М	Au	<	0.00597	М	Nd	<	0.00398	м	Sc	<	0.01989	M	T	<	0.09942
<u>M</u> Co	d <	0.00597	M	Hf	<	0.00398	М	Ni	<	0.01591	M	Se	<	0.01591	∣⊻	w	<	0.01989
<u>0</u> Ca	а	0.00009	M	Но	<	0.00099	м	Nb	<	0.00099	₽	SI	<	0.00340	l ⊾	U	<	0.00398
<u>M</u> Ce	e <	0.00994	М	In	<	0.01989	n	Os			M	Ag	<	0.00398	∣⊻	V	<	0.00398
M Ca	s <	0.00060	М	lr	<	0.00994	Μ	Pd	<	0.00994	Q	Na	<	0.00600	M	Yb	<	0.00199
M Cr	r <	0.00994	<u>0</u>	Fe		0.00011	Q	Ρ	<	0.00500	M	Sr	<	0.00099	M	Y	<	0.07954
M Co	o <	0.00597	M	La	<	0.00099	M	Pt	<	0.00398	<u>0</u>	S	<	0.10000	l <u>⊾</u>	Zn	<	0.03977
M Cu	u <	0.01193	5	Pb			<u>0</u>	к	<	0.00180	М	Та	<	0.01392	M	Zr	<	0.00994
M - Che	cked	by ICP-MS	0.	Chec	kec	by ICP-OES	I-S	pect	al I	nterference	n - 1	Not C	heo	ked For	S -	Solut	on	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 - 207.2; +2; 6; Pb(H₂O),¹²

Chemical Compatibility - Soluble in HCl, HF and HNO₂. Avoid H₂SO₄. Stable with most metals and inorganic anions forming insoluble carbonate, borate, <u>sulfate</u>, sulfite, sulfide, phosphate, oxalate, <u>chromate</u>, tannete, iodate, and cyanide in neutral aqueous media.

Stability - 2-100 ppb levels stable for months in 1% HNO₂ / LDPE container. 1-10,000 ppm solutions chemically stable for years in 2-5% HNO₂ / LDPE container.

Pb Containing Samples (Preparation and Solution) - Metal (Best dissolved in 1:1 H₂O / HNO₂) Oxides (The many different Pb oxides are soluble in HNO₂ with the exception of PbO₂ which is soluble in HCI or HF); Ores and Aloys (Best attacked using 1:1 H₂O / HNO₂), Organic Matrices (Dry ash and dissolve in dilute HCI.).

Atomic Sp	Atomic Spectroscopic Information (ICP-OES D.L.s are given as <u>radial/axiat</u> view);										
Technique	e/Line	Estimated D.L.	Order	Ivpe	Interferences (underlined indicates severe at efforcs.)						
	168.215 nm	0.03/0.003 µg/mL	1	ion	Co						
ICP-OES	220.353 nm	0.04/0.006 µg/mL	1	ion	Bi,Nb						
ICP-OES	217.000 nm	0.09/0.03 µg/mL	1	atom	W, Ir, Hf, Sb, Th						
ICP-MS	208 amu	5 ppt	n/a	M'							

- 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:

CALL CENER

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)

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 property packaged, unopen edd, 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 i enstability. 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 spec=ial 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.

INORGANIC LABS/RADCHEM LABS + 4 2 DATE RECEIVED: 11/3/03 DATE EXPIRED: 1/1/04 DATE OPENED: _#13 PD: FSJJS INDRG: 43/3

#### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

JoAnn Struthers, QA Administrative Assistant **Certificate Prepared By:** 

Katalin Le, QC Supervisor

**Certificate Approved By:** 

follow Stutten Knownen an Pauk Alain

Certification Date: January 23, 2003

**Certifying Officer:** 

Paul Gaines, Chemist, Senior Technical Director

Expiration Date:

## 010276 inorganic ventures

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

- Inorganic Ventures / IV Labs is an ISO Guide 34-2000 Certified Reference Material (CRM) Manufacturer: 1.0 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."
- **DESCRIPTION OF CRM** Custom-Grade 1000 µg/mL Antimony in 0.7% (abs) HNO3 / 3% Tartaric Acid 2.0

Catalog Number:	CGSB1-1, CGSB1-2 and CGSB1-5
Lot Number:	W-SB02078
Starting Material:	Sb shot
Starting Material Purity (%):	99.989188
Starting Material Lot No	D17L24
Matrix:	0.7% (abs) HNO3 / 3% Tartaric Acid

#### 3.0 **CERTIFIED VALUES AND UNCERTAINTIES**

**Certified Concentration:** 1005 ± 2 µg/mL **Certified Density:** 1.019 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 (C) = erx

Uncertainty  $(\pm) = 2i(2\pi s_1)^2$ 

(C) = mean  $x_i = individual results$ n = number of measurements IS = 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 SFM certificate of analysis.)

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

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	1005 ± 2 μg/mL (Avg 2 runs)							
		ICP Assay NIST SRM 3102a	Lot Number: 990707						
	Assay Method #2	1000 ug/mL							

Gravimetric NIST SRM Lot Number: See Sec. 4.2

INDREANIC LABS/RADCHEM LABS Part a DATE RECEIVED: 02/25/04 DATE EXPIRED: 03/01/2005 VIS DATE OPENED: 00/05/04 INORG: 4464 PD: F53333

1

- 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.

Q AI 0.04519	<u>M</u> Dy < 0.00597	<u>Q</u> Li 0.00004 <u>M</u> Pr < 0.00030	<u>M</u> Te < 0.02983
<u>S</u> Sb	<u>M</u> Er < 0.00497	M_Lu < 0.00040 M_Re < 0.00099	<u>M</u> Tb < 0.00030
<u>M</u> As < 0.00994	<u>M</u> Eu < 0.00298	<u>Q</u> Mg 0.00171 <u>M</u> Rh < 0.00099	M TI 0.00040
<u>O</u> Ba 0.00003	<u>M</u> Gd < 0.00099	<u>Q</u> Mn 0.00321 <u>M</u> Rb < 0.00099	<u>M</u> Th < 0.00099
<u>Q</u> Be < 0.00001	<u>M</u> Ga < 0.00099	Q Hg < 0.01500 M Ru < 0.00199	<u>M</u> Tm < 0.00040
<u>M</u> Bi 0.00170	<u>M</u> Ge < 0.00597	<u>M</u> Mo < 0.00199 <u>M</u> Sm < 0.00099	M Sn 0.00050
<u>O</u> B 0.00100	<u>M</u> Au < 0.00298	<u>M</u> Nd < 0.00199 <u>Q</u> Sc < 0.00016	Q TI 0.00131
<u>M</u> Cd < 0.00298	<u>M</u> Hf < 0.00199	<u>Q</u> Ni 0.00100 M∐ Se < 0.49711	<u>M</u> W < 0.00994
<u>O</u> Ca 0.00884	<u>M</u> Ho < 0.00050	<u>M</u> Nb < 0.00050 <u>Q</u> SI 0.00502	<u>M</u> U < 0.00199
<u>Q</u> Ce < 0.00300	<u>M</u> In < 0.00994	<u>n</u> Os <u>M</u> Ag < 0.00199	M V < 0.00199
<u>M</u> Cs < 0.00030	<u>M</u> Ir < 0.00497	<u>M</u> Pd < 0.00497 <u>Q</u> Na 0.00362	<u>M</u> Yb < 0.00099
<u>Q</u> Cr 0.00954	<u>Q</u> Fe 0.01306	<u>Q</u> P < 0.04000 <u>M</u> Sr < 0.00050	<u>M</u> Y < 0.03977
<u>M</u> Co < 0.00298	<u>Q</u> La < 0.00120	<u>M</u> Pt < 0.00199 i S	Q Zn 0.00141
<u>Q</u> Cu 0.00321	<u>M</u> Pb 0.00060	<u>О</u> К 0.01004 <u>М</u> Та < 0.00696	<u>M</u> Zr < 0.00497
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 - 121.75, +3; It Sb(O)C.H.O.⁴ Chemical Compatibility - Stable in concentrated HCI, dilute or concentrated HF. Stable in dilute HNO₂ as the fluoride or tertrate complex. Avoid basic media. Stable with most metals and inorganic anions in acidic media as the tertrate provided the acidity is not too high or the acid is acidizing causing loss of the stabilizing tertrate ion. The fluoride complex of antimony is stable in strong acid but you should only mix with other metals that are fluorinated.

Stability - 2-100 ppb levels stable for months in 1% HNO₂ / LOPE container. 1-10,000 ppm solutions chemically stable for years in 1-2% HNO₂ / LOPE container.

Sb Containing Samples (Preparation and Solution) - Metal and alloys (Soluble in H₂O / HF / HNO₂ mixture); Oxides (Soluble in HCI and tartaric acid or H₂O / HF / HNO₂ mixtures); Ores (Fusion with Na₂CO₂ in Pt^e followed by dissolving the fuseate in a H₂O / HF / HNO₂ mixture); Organic based (Sulfuric acid / hydrogen peroxide digestion)

Atomic Spectroscopic Information (ICP-OES D.L.s are given as <u>radia/axial</u> view): <u>Technique/Line</u> <u>Estimated D.L.</u> <u>Order Type</u> <u>Interfacences L</u>underlined indicates severe at siloncs.)

	206.833 nm	0.03 / 0.003 µg/mL	1	atom	Ta, Cr, Ge, Hi
ICP-OES		0.05 / 0.005 µg/mL 0.06 / 0.006 µg/mL		atom atom	<u>Nb</u> , W, Re, Fe, Ni, Co. Pt
ICP-MS		5 ppt	n.a	M'	""Pd"O, "Y"O2

- 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 <u>IQ Net International Certification Network</u>:



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"

10.2 ISO/IEC 17025 - 1999 "General Requirements for the Competence of Testir - 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)

INDRGANIC LABS/RADCHEM LABS & Orta DATE RECEIVED: 03/03/04 DATE EXPIRED: 03/01/3005 NOS DATE OPENED: 03/05/04 INDRG: 4464 PD: 53333



- 11.1 IV Shelf Life The period of time during which the concentration of the analyte(s) in a property 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 23, 2003

Expiration Date:

EXPIRES 172005

#### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

**Certificate Prepared By:** 

Katalin Le, QC Supervisor

**Certificate Approved By:** 

**Certifying Officer:** 

Paul Gaines, Chemist, Senior Technical Director

JoAnn Struthers, QA Administrative Assistant

Joll Stutten Knowen an Paux Aain

	•

## 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

de IS	etermined in accordance with IS	50 Guide 31-2000 (Refere m Guidelines for the Produ	pertified value(s) and uncertainty(les) are ance Materials - Contents of certificates and label(s), action of Reference Materials," and ISO Guide 35-1989 ical Principles."										
20	DESCRIPTION OF CRM	Custom-Grade 1000 µg/	mL Selenium in 1.4% (abs) HNO3										
	Catalog Number:	CGSE1-1, CGSE1-2, ar	nd CGSE1-5										
1	Lot Number:	T-SE01102											
	Starting Material:	Se shot											
	Starting Material Purity (%):	99.9971	INORGANIC LABS/RADCHEM LABS										
	Starting Material Lot No	C09L08	DATE RECEIVED:OO/20/03 DATE EXPIRED:OT/01/2004VO										
	Matrix:	1.4% (abs) HNO3	DATE OPENED: 06/03/03 INORG:4152 PO:										
0	CERTIFIED VALUES AND UNCERTAINTIES												
	Certified Concentration:	995 ± 3 µg/mL											
	Certified Density:	1.010 g/mL (measured a	t 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 (C) = <u>erx</u> , n	<b>(C) = mean</b> x, = individual n											
	Uncertainty (±) = $\frac{2[(2r_{3})^{2}]^{1/2}}{(7)^{1/2}}$	(Most cormon weighing, diutio	measurements mation of all significant estimated errors. are the errors from instrumental measurement, on to volume, and the fixed error reported on the licate of analysis.)										
4.0	TRACEABILITY TO NIST A	ND VALUES OBTAINED	BY INDEPENDENT METHODS										
	national or international standards, ed., 1993, definition 6.10)	through an unbroken chain of c	ard whereby it can be related to stated references, usually omparisons all having stated uncertainties." (ISO VIM, 2nd IIST SRMs. The uncertainties for each certified value are										
1			easurement, weighing and volume dilution errors.										
	4.1 Assay Method #1	995 ± 3 µg/mL (Avg. 2	runs)										
1		ICP Assay NIST SRM 3149	Lot Number: 992106										
1	Assay Method #2	1002 µg/mL											
		Gravimetric NIST SRM Lot	Number: See Sec 4.2										

- 4.2 BALANCE CALIBRATION All balances are checked dally 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.

<u>O</u> AI 0.00	17 <u>M</u> Dy	< 0.01196 <u>O</u>	u ·	< 0.00003	М	Pr	< 0.00060	M	Te	<	0.05981
<u>M</u> Sb 0.00	60 <u>M</u> Er	< 0.00997 <u>M</u>	Lu ·	< 0.00080	<u>0</u>	Re	< 0.00900	M	ть	<	0.00060
<u>o</u> as < 0.00	600 <u>M</u> Eu	< 0.00598 <u>O</u>	Mg	< 0.00003	M	Rh	< 0.00199	M	TI	<	0.00199
<u>M</u> Ba < 0.01	194 <u>M</u> Gd	< 0.00199 <u>M</u>	Mn 🖣	< 0.00798	М	Rb	< 0.00199	M	Th	<	0.00199
Q Be < 0.00	09 <u>M</u> Ga	< 0.00199 <u>O</u>	Hg	0,01950	Q	Ru	0.00220	M	Tm	<	0.00080
<u>M</u> Bi < 0.00	980 <u>M</u> Ge	< 0.01196 <u>O</u>	Mo	< 0.00400	м	Sm	< 0.00199	M	Sn	<	0.00997
<u>O</u> B < 0.00	06 <u>M</u> Au	< 0.00598 <u>M</u>	Nd	< 0.00399	М	Sc	< 0.01994	M	П	<	0.09969
<u>M</u> Cd < 0.00	598 <u>M</u> Hf	< 0.00399 <u>O</u>	Ni -	< 0.00090	<u>s</u>	Se		M	W	<	0.01994
<u>O</u> Ca 0.00	200 <u>M</u> Ho	< 0.00100 0	Nb •	< 0.00400	Q	Si	0.00055	M	U	<	0.00399
<u>M</u> Ce < 0.00	997 <u>M</u> In	< 0.01994 <u>n</u>	Os		М	Ag	0.00070	M	۷	<	0.00399
<u>M</u> Cs < 0.00	060 <u>M</u> ir	< 0.00997 <u>M</u>	Pd	< 0.00997	õ	Na	0.00355	M	Yb	<	0.00199
<u>M</u> Cr < 0.00	997 <u>O</u> Fe	0.00060 0	P	< 0.00300	м	Sr	< 0.00100	M	Y	<	0.07975
<u>M</u> Co < 0.00	598 <u>M</u> La	< 0.00100 <u>M</u>	Pt ·	< 0.00399	Q	s	0.00500	M	Zn	<	0.03988
<u>M</u> Cu < 0.01	196 <u>M</u> Pb	< 0.00598 <u>O</u>	ĸ	0.00070	М	Та	< 0.01396	<u>0</u>	Zr	<	0.00040
M - Checked by IC	P-MS O - Check	ed by ICP-OES i-S	Spectral	I Interference	'n - N	lot Ch	ecked For	<b>s</b> - :	Solutio	m S	tandard 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 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 ∞. Do not pipet from container. Do not return portions removed for pipetting to container.

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 78.96; +4; 6; H.SeOa

Chemical Competibility - Soluble in HCI, HNO1, H.PO., H.SO. and HF aqueous matrices and water. It is stable with most inorganic anions but many cationic metals form the insoluble selanites under pH neutral conditions. When fluorinated and/or under acidic conditions precipitation is typically not a problem at moderate to low concentrations.

Stability - 2-100 ppb levels- stable for months alone or mixed with other elements at equivalent levels - in 1 % HNOs / LDPE container, 1-10,000 ppm solutions chemically stable for years in 1-5% HNOs / LDPE container.

Se Containing Samples (Preparation and Solution) - Metal (Soluble in HNO, ); Oxides (Readily soluble in water); Minerals and alloys (Acid digestion with HNO, or HNO, / HF ). Organic Matrices (Acid digestion with hot concentrated H, SO, accompanied by the careful dropwise addition of H₂O₂ until clear)

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

200 pot

Interferences (underlined indicates severe at afforcs.) Technique/Line Estimated D.L. Order Type ICP-OES 195.026 nm ICP-OES 203.985 nm 0.08 / 0.006 µg/mL atom Fe Sb, Ir, Cr, Ta 0.2 / 0.05 µg/mL atom Cr. Pt 0.3 / 0.16 µg/mL ICP-OES 206.279 nm atom 1

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

M

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

n/a

#### QUALITY STANDARD DOCUMENTATION 10.0

82 amu

ICP-MS

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)

	RADCHEM LABS - 2- F 2
DATE RECEIVED:_	06/80/03
DATE EXPIRED:	07/01/2004 105
DATE OPENED:	06/92/03
INORG: 4150	- FO: F59370

### 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 property 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: November 27, 2002

010283

Expiration Date: EXPIRES

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Debbie Newman,

Katalin Le, QC Supervisor

**Certificate Prepared By:** 

Certificate Approved By:

Certifying Officer:

Paul Gaines, Chemist, Senior Technical Director

QA Administrator

lioci Neuma

ų: S



#### inorganic ventures

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

### of analysis certificate

- Inorganic Ventures / IV Labs is an ISO Guide 34-2000 Certified Reference Material (CRM) Manufacturer: 1.0 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 Thallium in 0.5% (abs) HNO3

Catalog Number:	CGTL1-1, CGTL1-2, and	d CGTL1-5
Lot Number:	W-QTL01094	
Starting Material:	TLNO3	
Starting Material Purity (%):	99.996539	
Starting Material Lot No	22928	INORGANI
Matrix:	0.5% (abs) HNO3	DATE RECE
CERTIFIED VALUES AND L	INCERTAINTIES	DATE EXPIN

	/RADCHEM LABS 3-2-F?
DATE RECEIVED:	0\/30/04
DATE EXPIRED:	03/00/04 03/01/2005 V03
DATE UPENED:	
INORG: 4435	_PO:_F53301

#### 3.0 CERTIFIED VALUES AND UNCERTAINTIES

**Certified Concentration:**  $1001 \pm 4 \,\mu g/mL$ **Certified Density:** 1.002 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 ( $\Box I = e_T X_1$ Uncertainty  $(\pm) = 2[(e_1 + s_1)^2]$ 

(L)I = mean
x, = individual results
n = number of measurements
BS = 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 SFM 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 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	1001 ± 4 μg/mL (Avg 2 runs)
		ICP Assay NIST SRM 3158 Lot Number: 993012
	Assay Method #2	1000 µg/mL
		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 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.

M	Al	<	0.01000	<u>1</u>	V	Dy	<	0.00600	Q	Li		<	0.00002	M	Pr	<	0.00030	M	<u>I</u> T	8	<	0.03000
M	Sb	<	0.00050	1	Δ	Er	<	0.00500	M	Lu		<	0.00040	M	Re	<	0.00100	N	<u>1</u> T	b	<	0.00030
М	As	<	0.01000	1	Δ	Eu	<	0.00300	Q	Mą	3		0.00012	M	Rh	<	0.00100	5	Т			
М	Ba	<	0.01000	1	1	Gđ	<	0.00100	М	Mi	n	<	0.00400	M	Rb	<	0.00100	N	I T	h	<	0.00100
М	Be	<	0.00050	1	Δ	Ga	<	0.00100	Q	Hç	3	<	0.01200	M	Ru	<	0.00200	N	<u> </u> T	m	<	0.00040
М	Bi	<	0.00040	1	A	Ge	<	0.00600	М	M	D	<	0.00200	M	Sm	<	0.00100	N	i s	n	<	0.00500
Q	в	<	0.00140	1	N	Au	<	0.00300	M	No	i	<	0.00200	M	Sc	<	0.01000	N	I T		<	0.05000
Q	Cd		0.00150	1	M	Hf	<	0.00200	M	Ni		<	0.00800	M	Se	<	0.00800	N	i N	1	<	0.01000
<u>0</u>	Ca		0.00085	!	N	Ho	<	0.00050	M	Nt	>	<	0.00050	Q	Si	<	0.00340	N	U		<	0.00200
М	Ce	<	0.00500	!	M	In	<	0.01000	n	0	5			M	Ag		0.04000	. M	i v		<	0.00200
М	Cs	<	0.00030	1	M	lr	<	0.00500	М	Po	ł	<	0.00500	Q	Na		0.00050	N	ĮΥ	Ь	<	0.00100
М	Cr	<	0.00500	9	2	Fe		0.00030	Q	Ρ		<	0.00260	M	Sr	<	0.00050	M	ΙY		<	0.04000
М	Co	<	0.00300	1	M	La	<	0.00050	М	Pt		<	0.00200	<u>0</u>	s	<	0.03000		z	n		0.00110
М	Cu	<	0.00600	1	M	Pb		0.00210	Q	к		<	0.00180	М	Та	<	0.00700	M	ĮZ	r	<	0.00500
M - (	Chec	ked	by ICP-MS	C	- (	Chec	ke	by ICP-OES	i - \$	Spec	dra	l li	nterference	n - 1	Not C	heo	ked For	5 -	Sol	utic	n t	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

010286

#### 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 %. Do not pipet from container. Do not return portions removed for pipetting to container.

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 204.383; +1; 6; TI(H,O), "

Chemical Compartibility - Soluble in HCI, HNO, and H,SO. Stable withmost metals and inorganic anions. The sulfite, thiocyanate and oxalate are moderately soluble; the phosphate and assente are slightly soluble and the sulfide is insoluble. Stability - 2-100 ppb levels stable for months in 1% HNO, / LDPE container. 1-10,000 ppm solutions chemically stable for years in 2-5% HNO, / LDPE container.

TI Containing Samples (Preparation and Solution) - Metal (Best dissolved in HNO, which forms chiefly the TI" ion.) Oxide (The Ihallous oxide is readily soluble in water. The thallic oxide requires high levels of acid), Ores (Carbonate fusion in Pt* followed by HCI dissolution), Organic Matrices (Sulfuric/peroxide digestion or dry ash and dissolution in HCI).

Alan	с эр	ectroscopic in	ormation (ICP-VES D.I	".s are gi	<b>ven as</b>	<u>racial/axial</u> vici/);
Techn	ique	Line	Estimated D.L.	Order	Type	Interferences (underlined indicates severe at validoncs.)
ICP-O	ES	190.864 nm	0.04 / 0.004 µg/mL	1	ion	V, Ti
ICP-O	ES	276.787 nm	0.1 / 0.01 µg/mL	1	atom	Te, V, Fe, Cr
ICP-O	ES	351.924 nm	0.2 / 0.02 µg/mL	1	atom	Th, Ce, Zr
ICP-M	S	205 amu	2 ppt	n/a	Μ.	14905160

- 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 (OQS), 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)

INDRGANIC LABS/RADCHEM LABS Baga DATE RECEIVED: 01/20/04 DATE EXPIRED: 02/01/2005 VOS DATE OPENED: 01/20/04 INDRG: 4435 PD: 753301



- 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 09, 2003

Expiration Date:

EXPIRES

#### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By: Debbie Newman, Production Manager

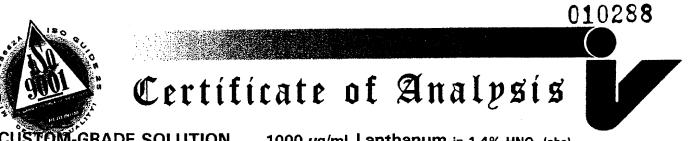
**Certificate Approved By:** 

Katalin Le, QC Manager

Certifying Officer:

Paul Gaines, Chemist, Senior Technical Director

Kebbi Neuman



TOM-GRADE SOLUTION Catalog Number: CGLA1-1 and CGLA1-5

1000  $\mu$ g/mL Lanthanum in 1.4% HNO₃ (abs)

Uncertainty  $(\pm) = 2[(\sum_{s})^2]^{1/2}$ 

### Lot Number: T-QLA01057

Starting Material: Starting Material Purity: Starting Material Lot No:

 $(\bar{x}) = mean$ 

INORGANIC LABS/RADCHEM LABS

DATE	RECEIVED:	0%/36/03
DATE	EXPIRED:_	09/01/2004 100
DATE	OP'ENED:	08/06/03
INOR	3: 4221	PO:53334

### CERTIFIED CONCENTRATION: 1002 $\pm$ 3 $\mu$ g/mL

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:

Lanthanum Oxide

99.999%

LA-0-5-017

Certified Value ( $\mathbf{x}$ ) =  $\sum \mathbf{x}$ 

= individual results

= number of measurements  $\sum S_1$  = The summation of all significant estimated errors.

Classical Wet Assay: 1002  $\pm$  3  $\mu$ g/mL Method: EDTA Titration vs NIST SRM 928 Lead Nitrate.

Instrument Analysis: 1007 ± 3 µg/mL

Method: Inductively Coupled Plasma Spectroscopy (ICP) vs NIST SRM 3127a.



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.

## TRACE METALLIC IMPURITIES DETERMINED BY ICP-MS AND ICP-OES IN µg/mL:

Custom-Grade solutions tested for trace metallic impurities by ICP-MS were analyzed in an ULPA-Filtered Clean Room. An ULPA-Filter is 99.9985% efficient for the removal of particles down to 0.3  $\mu m.$ 

<u>o</u> .	AI	< 0.040	М	Dy	<0.00060		M	U	< 0.0010	ç	Pr	< 0.020	м	Te	< 0.0030
M	Sb	< 0.000050	M	Er	0.0010		M	Lu	0.000040	<u> </u>	• •	<0.00010	M	Tb	< 0.000030
M	Aб	<0.0010	M	Eu	< 0.00030	•	Μ	Mg	< 0.0030	N N	I RH	<0.00010	M	TI	< 0.00010
<u>0</u>	Ba	< 0.020	M	Gđ	0.039		M	Min	< 0.00040	A	t Rb	< 0.00010	M	Th	< 0.00010
М	8e	< 0.000050	Μ	Ga	<0.00010	.• .	<u>0</u>	Hg	< 0.030	Ň	RL	<0.00020	M	Tm	<0.000040
М	Bi	<0.000040	Μ	Ge	<0.00060	. '	М	Мо	< 0.00020	Ň	l Sn	0.00040	M	Sn	< 0.00050
<u>0</u>	B	<0.020	M	Au	< 0.00030		M	Nď	0.00020	N	<u>l</u> So	<0.0010	М	Ti	< 0.0050
М	Cd	<0.00030	M	Hf	< 0.00020		<u>0</u>	Ni	< 0.050	2	Se	< 0.40	M	W	<0.0010
Q	Ca	<0.010	M	Но	0.00010		М	Nb	<0.000050	ç	Si	< 0.020	M	U	< 0.00020
i	Ce		Q	In	< 0.030		Ω_	Os		V	L Ag	< 0.00020	M	v	< 0.00020
n	Св		М	lr	< 0.00050		М	Pd	<0.00050	2	N۶	< 0.090	M	Yb	< 0.00010
M	Cr	<0.00050	Q	Fe	< 0.050		<u>0</u>	Ρ	< 0.050	V	l Sr	< 0.000050	M	Y	< 0.0040
Μ	Co	< 0.00030	5	La			M	Pt	< 0.00020	0	. s		M	Zn	< 0.0020
М	Cu	< 0.00060	М	Pb	<0.00030		n	К		Ν	Ta	<0.00070	М	Zr	<0.00050
Μ.	ahaa	kad by ICD MC	•	haak					línterference		hat ah	acked for	e eskuti		added alament

M - checked by ICP-MS

0 - checked by ICP-OES

i - spectral interference n - not checked for s - solution standard element

### ANALYZED DENSITY OF SOLUTION (measured at 22°C): 1.009 g/mL QA:KSL Nov.1217020H

(over)



# Inorganic Ventures, Inc.

195 Lehigh Avenue • Suite 4 • Lakewood, NJ 08701 Orders: 800-669-6799 • FAX (732) 901-1903 Technical Support: 800-569-6799

Quality Assurance Manager



### QUALITY STANDARD DOCUMENTATION



1. ISO 9001:2000 QMI Registered Quality System (Certificate Number 010105)

Members of IQ Net : Argentina (IRAM), Australia (QAS), Austria (ÖQS), Belgium (Avinter) , Brazii (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)

- 2. ISO/IEC Guide 34-2000 "General Requirements for the Competence of Reference Material Producers" Reference Materials Production - Accredited A2LA Certificate 883,02
- 3. ISO/IEC17025-1999 "General Requirements for the Competence of Testing and Calibration" Chemical Testing Accredited A2LA Certificate 883.01
- 4. MIL-STD-45662A
- 5. 10CFR50 Appendix B Nuclear Regulatory Commission Domestic Licencing of Production and Utilization Facilities
- 6. 10CFR21 Nuclear Regulatory Commission Reporting Defects and Non-Compliance

Please contact our Quality Assurance Department for further information and copies of documents pertaining to our Quality Standard certifications.

#### STABILITY/ EXPIRATION DOCUMENTATION

Shelf Life -

The length of time that a properly stored and packaged standard will remain within the specified <u>uncertainty</u>. Shelf life is affected by chemical stability and transpiration issues. Inorganic Ventures' Standard Solutions are chemically stable indefinitely. Transpiration loss is linear with time and limits the time a standard can be used with confidence. The smaller the bottle the higher the rate of transpiration. Inorganic Ventures' studies indicate that the shelf life of our 500 mL bottle is 4 years and the shelf life of our 125 mL bottle is 21 months.

Expiration Date - <u>The date after which a standard solution should not be used.</u> A one year expiration date is recommended by most state and federal regulatory agencies. Transpiration issues and repeated use of solutions over a one year period may adversely affect the integrity of the standard.

#### PACKAGING DOCUMENTATION

Purified acid, 18 megohm double deionized water that has been filtered through a 0.2 µm filter and in-house procedure IV-PACK-001 is used to clean all bottles. Contact us for technical information relating to contamination issues in packaging materials.

#### **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.

#### **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 428359B and 454678. 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 analytical weight set. These weights are tested annually by a NIST / NVLAP accredited calibration lab. The NIST test number is 822/260017-8.

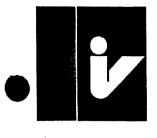
#### THERMOMETER CALIBRATION

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.

#### **TECHNICAL SUPPORT**

All customers are encouraged to contact us for technical support for the proper use of our products.

TEL 1-800-569-6799	INT'L 1-732-901-1900	FAX 1-732-901-1903	E-MAIL IVtech@ivstandards.com	



#### ventures inorganic 1 i v lahe

195 lehigh avenue, suite 4, lakewood, ni 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."
- **DESCRIPTION OF CRM** 2.0

Custom-Grade 1000 µg/mL Palladium in 3.3% (abs) HCL

Catalog Number:	CGPD1-1 and CGPD1-5
Lot Number:	W-PD02019
Starting Material:	Pd(NO3)2
Starting Material Purity (%):	99.999248
Starting Material Lot No	11974A-00
Matrix:	3.3% (abs) HCL DA
	DA

INORGANIC LABS	RADCHEM LABS P. 40 2
DATE RECEIVED:	03/01/04
DATE EXPIRED:	03/01/2005 YDD
DATE OPENED:	03/01/04
INORG:777	FO: <b>F5333</b>

3.0 CERTIFIED VALUES AND UNCERTAINTIES

n

994 ± 3 µg/mL **Certified Concentration: Certified Density:** 

1.022 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 (C) = erx

Uncertainty  $(\pm) = 2!(ars_1)^2!^2$ 

(C) = mean  $x_i = individual results$ n = number of measurements ES = 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.)

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

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	994 ± 3 μg/mL (Avg 2 runs)					
		ICP Assay NIST SRM 3138 Lot Number: 990207					
	Assay Method #2	1000 µg/mL 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 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.

<u>O</u> AI 0.00400	<u>M</u> Dy < 0.00060	<u>O</u> Li < 0.04000	<u>M</u> Pr < 0.00003	<u>O</u> Te < 0.01300
<u>O</u> Sb < 0.00500	<u>M</u> Er < 0.00050	<u>M</u> Lu < 0.00004	<u>M</u> Re < 0.00010	<u>M</u> Tb < 0.00003
<u>O</u> As < 0.01400	<u>M</u> Eu < 0.00030	<u>O</u> Mg < 0.01100	<u>O</u> Rh < 0.00600	<u>M</u> TI < 0.00010
<u>M</u> Ba < 0.00100	<u>M</u> Gd < 0.00010	<u>O</u> Mn < 0.00650	<u>M</u> Rb < 0.00010	<u>M</u> Th < 0.00010
<u>O</u> Be < 0.00009	<u>M</u> Ga < 0.00010	<u>O</u> Hg < 0.01100	<u>O</u> Ru < 0.00200	<u>M</u> Tm < 0.00004
<u>M</u> Bi < 0.00004	<u>M</u> Ge < 0.00060	<u>M</u> Mo < 0.00020	<u>M</u> Sm < 0.00010	<u>O</u> Sn < 0.00700
<u>O</u> B < 0.00090	<u>Q</u> Au < 0.00300	<u>M</u> Nd < 0.00020	<u>Q</u> Sc < 0.00009	<u>O</u> Ti < 0.00100
<u>O</u> Cd < 0.00600	<u>M</u> Hf < 0.00020	<u>O</u> Ni 0.01800	<u>M</u> Se < 0.00080	<u>M</u> W < 0.00100
<u>O</u> Ca 0.00700	<u>M</u> Ho < 0.00005	<u>M</u> Nb < 0.00005	<u>Q</u> Si 0.00600	<u>M</u> U < 0.00020
<u>M</u> Ce < 0.00050	<u>O</u> In < 0.03300	<u>n</u> Os	Q Ag < 0.00670	<u>M</u> V < 0.00020
<u>M</u> Cs < 0.00003	<u>M</u> Ir < 0.00050	<u>s</u> Pd	<u>O</u> Na 0.01500	<u>M</u> Yb < 0.00010
<u>O</u> Cr 0.00450	<u>O</u> Fe 0.04600	<u>O</u> P 0.00600	<u>M</u> Sr < 0.00005	<u>M</u> Y < 0.00400
<u>M</u> Co < 0.00030	<u>M</u> La < 0.00005	<u>O</u> Pt < 0.00600	<u>O</u> S < 0.02500	<u>O</u> Zn < 0.00060
<u>O</u> Cu 0.00360	<u>M</u> Pb < 0.00030	<u>О</u> К < 0.02000	<u>M</u> Ta < 0.00070	<u>M</u> Zr < 0.00050
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; Chamical Form in Solution - 106.42, +2; & Pd(H₂O),²⁴ Chamical Compatibility - Stable in HCl, HNO₂, H₂SO₄, HF, H₂PO₄. Avoid basic media. Stable with most metals and inorganic anions in acidic media. Avoid contact with water soluble organics such as aldehydes since Pd²⁴ is easily reduced. Stability - 2-100 ppb levels. 2pdb Pd is stable for 1 day in 1% HNO₂ /LDPE container. 10 ppb is stable for 3 days in 1% HNO₂ /LDPE container. 100 ppb is stable for 48 months in 1% HNO₂ /LDPE container. 1-10,000 ppm solutions chemically stable for

years in 1-5% HNO₂ / LDPE container. Pd Containing Samples (Preparation and Solution) - Metal (Solutie in HNO₂ or Aqua Regia ), Oxides (Soluble in HCI), Ores ( Dissolve in HCI / HNO₂).

Atomic Spectroscopic Information (ICP.OFS B.L.s are given as radial/axia) view):

manic sp	COLORCOPIC BILO					
Technique	dine	Estimated D.L.	Order	Type	Interferences funderlined indicates	severe at efforcs.)
ICP-OES	340,458 nm	0.04 / 0.003 µg/mL.	1 etom	Ce, Th	, Zr	
ICP-OES	363.470 nm	0.05 / 0.007 µg/mL				
ICP-OES	229.651 nm	0.07 / 0.004 µg/mL	1 ion	Co		
ICP-MS	105 amu	2 ppt	nka	M'	"APRCU, BY	



- 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 <u>IQ Net International Certification Network</u>:



- 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 Taipel (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 property 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 lnorganic 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: March 14, 2003

Expiration Date:



INDRGANIC LABS/RADCHEM LABS P3.2092 DATE RECEIVED: 03/01/04 DATE EXPIRED: 03/01/2005 V2 DATE OPENED: 03/01/2005 V2 INDRG: 4477 P0: F52323

#### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By: JoAnn Struthers, QA Administrative Assistant

Certificate Approved By:

Katalin Le, QC Supervisor

Certifying Officer:

Paul Gaines, Chemist, Senior Technical Director

folm Statten anonen an Paux Aaine



## 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 Sulfur in H20

Catalog Number:	CGS1-1 and CGS1-5	
Lot Number:	W-QS01098	INORGANIC LABS/RADCHEM LABS
Starting Material:	H2SO4	DATE RECEIVED: 1/5/03 1002
Starting Material Purity (%):	99.999965	DATE EXPIRED: 12/12/04 DR
Starting Material Lot No Matrix:	N38818 H2O	DATE OPENED:/5/13 INORG:43/7PO:F52258

### 3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Concentration: 1010 ± 2 µg/mL

Certified Density: 1.000 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 ( $\Box$ ) = $\underline{a_2 x_3}$	(C)) = mean
n	x, = individual results
	n = number of measurements
Uncertainty (±) = $2[(2r-5_i)^2]^{1/2}$	BS = The summation of all significant estimated errors.
(n) ^{1/2}	(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)

D 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 #1 998 ± 8 µg/mL

ICP Assay NIST SRM 3154 Lot Number: 892205

Assay Method #2

**1010 ± 2 µg/mL** Acidimetric NIST SRM 84k Lot Number: 84k



- 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.

Q AI 0.00025	<u>M</u> Dy < 0.01197	Q LI < 0.00016	<u>M</u> Pr < 0.00060	<u>M</u> Te < 0.05984
<u>M</u> Sb < 0.00100	<u>M</u> Er < 0.00997	<u>M</u> Lu < 0.00080	<u>M</u> Re < 0.00200	<u>M</u> Tb < 0.00060
M As < 0.01995	<u>M</u> Eu < 0.00598	<u>O</u> Mg < 0.00004	<u>M</u> Rh < 0.00200	<u>M</u> TI < 0.00200
<u>M</u> Ba < 0.01995	<u>M</u> Gd < 0.00200	<u>M</u> Mn < 0.00798	<u>M</u> Rb < 0.00200	<u>M</u> Th < 0.00200
<u>Q</u> Be < 0.00200	<u>M</u> Ga < 0.00200	<u>Q</u> Hg < 0.01100	<u>M</u> Ru < 0.00399	<u>M</u> Tm < 0.00080
<u>M</u> Bi < 0.00080	<u>M</u> Ge < 0.01197	<u>M</u> Mo < 0.00399	<u>M</u> Sm < 0.00200	<u>M</u> Sn < 0.00997
<u>O</u> B < 0.00990	<u>M</u> Au < 0.00598	<u>M</u> Nd < 0.00399	<u>M</u> Sc < 0.01995	<u>M</u> Ti < 0.09974
<u>M</u> Cd < 0.00598	<u>M</u> Hf < 0.00399	Q NI < 0.00230	<u>Q</u> Se < 0.00620	<u>M</u> W < 0.01995
<u>Q</u> Ca 0.00020	<u>M</u> Ho < 0.00100	<u>M</u> Nb < 0.00100	<u>Q</u> Si < 0.00410	<u>M</u> U < 0.00399
<u>M</u> Ce < 0.00997	M In < 0.01995	<u>n</u> Os	M Ag < 0.00399	M V < 0.00399
<u>M</u> Cs < 0.00060	<u>M</u> Ir < 0.00997	<u>M</u> Pd < 0.00997	<u>O</u> Na < 0.00010	<u>M</u> Yb < 0.00200
<u>M</u> Cr < 0.00997	Q Fe 0.00015	<u>O</u> P < 0.00480	<u>M</u> Sr < 0.00100	<u>M</u> Y < 0.07979
<u>M</u> Co < 0.00598	<u>M</u> La < 0.00100	<u>M</u> Pt < 0.00399	<u>s</u> S	Q Zn 0.00125
<u>M</u> Cu < 0.01197	<u>M</u> Pb < 0.00598	<u>Q</u> K < 0.00170	<u>M</u> Ta < 0.01396	M_Zr < 0.00997
M - Checked by ICP-M	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 - €. Do not pipet from container. Do not return portions removed for pipetting to container.

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 32.068, +6; 6; ( O=), S(OH). Chemical Compatibility - Soluble in HCl, HNO,, H,PO, and HF aqueous matrices water and NH.OH. Stable with all metals and inorganic anions at low to moderate ppm levels under acidic conditions except Ba and Pb and to a lesser extent Sr, and Ca. Stability - 2-100 ppb levels - stability unknown- in 1% HNO, / LDPE container. 1-10,000 ppm solutions chemically stable for years in LDPE container.

S Containing Samples (Preparation and Solution) - We most often get questions about the determination of S in Rocks, Silicates and insoluble sulfates (the finely powered sample is fused in a Pt* crucible with 48 times its weight of Na,CO, + 0.5 grams KNO,. The fuscate is extracted with water. Any BaSO, present in the sample is transposed by the carbonate fusion to the BaCO, which is left behind in the water-insoluble residue. If PbSO, is present the fuscate should be boiled with a sodium carbonate saturated with CO, solution for 1 hour or more where the PbSO, will be transposed to the water insoluble carbonate which can be filtered off. Boiling the fuscate with a saturated carbonate solution is good insurance for samples containing Ba, Sr, and Ca. The Ba, Pb, Sr, Ca, tree filtrate can be addified and measured by ICP.)

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

Technique	Line	Estimated D.L.	Order	Type	Interferences funderlined indicates severe at afforcs.)
	166.669nm	0.2 / 0.19 µg/mL	1	atom	Si, B
ICP-OES	182.034 nm	0.3 / 0.024 µg/mL	1	atom	•
ICP-OES	143.328 nm	0.4 / 0.035 Light L	1	atom	
ICP-MS	32 amu	30,000 ppt	n/a	M'	"O,, "N"O, "N"O, "N"OH, "N"OH

- 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 (BrnwA), 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)



RMSHELF Les liceline Shin Belo Reis. Days to Years 110 Hacht H Yea

- 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.

INORGANIC LABS/RADCHEM LABS DATE RECEIVED: 15/13 DATE EXPIRED: 13/1/204 DR DATE OPENED: 115/03_ INDRG: 43/7 PO: F5005

#### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

JoAnn Struthers, QA Administrative Assistant

Katalin Le, QC Supervisor

**Certificate Approved By:** 

**Certifying Officer:** 

**Certificate Prepared By:** 

Paul Gaines, Chemist, Senior Technical Director

Certification Date: August 27, 2003

010297

Expiration Date: EXPISIES

follen Stutten Knonen en Pauk Aain





Certificate of Analysis

### CUSTOM-GRADE SOLUTION Catalog Number: CGTH1-1 and CGTH1-5

# 1000 $\mu$ g/mL Thorium in 3% HNO₃ (abs)

Uncertainty  $(\pm) = 2[(\sum_{s} \frac{1}{s})^2]^{1/2}$ 

Lot Number: T-TH01059

Starting Material: Starting Material Purity: Starting Material Lot No:

Thorium	Nitrate
99.9999	6
C01L32	

INDRGANIC LAB	S/RADCHEM LABS
DATE RECEIVED:	10/08/03
DATE EXPIRED:	11/01/2004 VOS
DATE UPENED:	10/08/03
INORG: 4883	PO: F53340

THORNEANITE LATER COADER STREET

010298

#### CERTIFIED CONCENTRATION: 1001 $\pm$ 3 $\mu$ g/mL

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  $(\bar{x}) = \sum x_i$ 

(x) = mean  $x_i = individual results$ 

n = number of measurements

 $\sum S_i =$  The summation of all significant estimated errors.

Classical Wet Assay: 1001  $\pm$  3 µg/mL Method: EDTA Titration vs NIST SRM Lead Nitrate.

Instrument Analysis: 1002  $\pm 4 \,\mu$ g/mL

Method: Inductively Coupled Plasma Spectroscopy (ICP) vs NIST SRM 3159.

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.

## TRACE METALLIC IMPURITIES DETERMINED BY ICP-MS AND ICP-OES IN µg/mL:

Custom-Grade solutions tested for trace metallic impurities by ICP MS were analyzed in an ULPA-Filtered Clean Room. An ULPA-Filter is 99.9985% efficient for the removal of perticles down to 0.3  $\mu$ m.

							19 C C C								
<u>0</u>	AI	<0.00090	M	Dy	0.0062	2	<u>u</u>	•	< 0.000030	М	Pr	0.00037	Q	Te	<0.031
M	Şb	< 0.000050	M	Er	< 0.00050	1	<u>≬</u> i∖Lu	iù ∙	<0.000040	M	Re	< 0.00010	M	Тb	<0.000030
Q	As	< 0.014	M	Eu	<0.00030	ç	M	8  4	<0.000060	<u>M</u>	Rh	< 0.00010	M	TI	<0.00010
M	Ba	0.0050	M	Gd	0.0054	. <b>S</b>	2 Mi	A .	< 0.0000030	M	Rb	< 0.00010	5	Th	
0	8e	< 0.00020	M	Ga	< 0.00010	1	Hg	g		M	Ru	<0.00020	M	Tm	<0.000040
M	Bi	< 0.000040	M	Ge	< 0.00060	Ī	<u>/</u> M	ò 4	<0.00020	M	Sm	0.0095	M	Sn	<0.00050
Q	B	< 0.00060	M	Au	< 0.00030	1	<u>A</u> No	đ	0.0026	M	Sc	<0.0010	<u>o</u>	Ti	<0.00092
ō	Cd	< 0.0045	M	Hf	<0.00020	<u> </u>	) Ni	i •	< 0.0023	M	Se	<0.010	M	W	<0.0010
O	Са	< 0.030	M	Ho	0.00022	<u> </u>	<u>A</u> NE	ь -	< 0.000050	<u>0</u>	Si	< 0.0034	M	υ	0.074
M	Се	< 0.00050	ō	In	< 0.0020	1	08	s		М	Ag	< 0.00020	M	v	< 0.00020
M	Cs	< 0.000030	M	lr -	< 0.00050	I	<u>A</u> Pd	ł •	< 0.00050	<u>0</u>	Na	< 0.00010	М	Yb	<0.00010
O	Cr	< 0.00080	Q	Fe	< 0.0011	- <u>i</u>	P			M	Sr	< 0.000050	Μ	Y	< 0.0040
M	Co	< 0.00030	M	La	< 0.000050	1	<u>/</u> Pt	•	< 0.00020	Q	S	< 0.072	Q	Zn	<0.00058
M	Cu	< 0.00060	M	Pb	< 0.00030	9	<u>x</u>	•	< 0.0017	М	Ta	<0.00070	M	Zr	0.0085

M - checked by ICP-MS

-MS O - checked by ICP-OES

i - spectral interference n - not checked for

s - solution standard element

ANALYZED DENSITY OF SOLUTION (measured at 22°C): 1.022 g/mL





# Inorganic Ventures, Inc.

195 Lehigh Avenue • Suite 4 • Lakewood, NJ 08701 Orders: 800-669-6799 • FAX (732) 901-1903 Technical Support: 800-569-6799

Tayl K. Aaines

Quality Assurance Manager



#### QUALITY STANDARD DOCUMENTATION



1. ISO 9001:2000 QMI Registered Quality System (Certificate Number 010105)

Members of IQ Net : 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)

- 2. ISO/IEC Guide 34-2000 "General Requirements for the Competence of Reference Material Producers" Reference Materials Production - Accredited A2LA Certificate 883.02
- 3. ISO/IEC17025-1999 "General Requirements for the Competence of Testing and Calibration" Chemical Testing Accredited A2LA Certificate 883.01
- 4. MIL-STD-45662A
- 5. 10CFR50 Appendix B Nuclear Regulatory Commission Domestic Licencing of Production and Utilization Facilities
- 10CFR21 Nuclear Regulatory Commission Reporting Defects and Non-Compliance Please contact our Quality Assurance Department for further information and copies of documents pertaining to our Quality Standard certifications.

#### STABILITY/ EXPIRATION DOCUMENTATION

Shelf Life -

<u>The length of time that a properly stored and packaged standard will remain within the specified uncertainty.</u> Shelf life is affected by chemical stability and transpiration issues. Inorganic Ventures' Standard Solutions are chemically stable indefinitely. Transpiration loss is linear with time and limits the time a standard can be used with confidence. The smaller the bottle the higher the rate of transpiration. Inorganic Ventures' studies indicate that the shelf life of our 500 mL bottle is 4 years and the shelf life of our 125 mL bottle is 21 months.

 Expiration Date The date after which a standard solution should not be used. A one year expiration date is recommended by most state and federal regulatory agencies. Transpiration issues and repeated use of solutions over a one year period may adversely affect the integrity of the standard.

#### PACKAGING DOCUMENTATION

Purified acid, 18 megohm double deionized water that has been filtered through a 0.2 µm filter and in-house procedure IV-PACK-001 is used to clean all bottles. Contact us for technical information relating to contamination issues in packaging materials.

#### **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.

#### **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 428359B and 454678. 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 analytical weight set. These weights are tested annually by a NIST / NVLAP accredited calibration lab. The NIST test number is 822/260017-8.

#### **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.

#### **TECHNICAL SUPPORT**

All customers are encouraged to contact us for technical support for the proper use of our products.

TEL 1-800-569-6799 INT'L 1-732-901-1900 FAX 1-732-901-1903 E-MAIL IVtech@ivstandards.com



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 Statistical Principles."

2.0

3.0

DESCRIPTION OF CRM Custom-Grade 1000 µg/mL Uranium in 1% (abs) HNO3

Catalog Number:	CGU1-1 and CGU1-5
Lot Number:	W-U01059
Starting Material:	UO2(NO3)2.6H2O
Starting Material Purity (%):	99.994419
Starting Material Lot No	RB0018
Matrix:	1% (abs) HNO3

INDRGANIC LABS/	RADCHEM LABS +9.20 a
DATE RECEIVED:	02/25/04
DATE EXPIRED:	03/01/2005 125
DATE OPENED:	03/01/205 105
INDRG: 4473	PD: F53333

CERTIFIED VALUES AND UNCERTAINTIES

Certified Concentration: 997 ± 2 µg/mL

**Certified Density:** 

1.021 g/mL (measured at 22° C)

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

Certified Value (C) =  $\frac{2rX}{n}$ 

Uncertainty  $(\pm) = 2[(e_{1}e_{3})^{2}]^{1/2}$ 

(🖵 = mean
X, = individual results
n = number of measurements
#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.)

#### 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.

.1 Assa	y Method #1	997 ± 2
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997 ± 2 µg/mL

1000 µg/mL

ICP Assay NIST SRM 3164 Lot Number: 891509

Assay Method #2

Gravimetric NIST SRM Lot Number; See Sec. 4.2

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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.

М	A		0.05166	۱ I	1	Dy	<	0.01494	М	Li	<	0.02490	M	Pr	<	0.00075	M	Те	<	0.07470
М	Sb	<	0.00125	۵	1	Er	<	0.01245	М	Lu	<	0.00100	M	Re	<	0.00249	M	ть		0.00003
M	As	<	0.02490	Δ	1	Eu	<	0.00747	Μ	Mg	<	0.07470	М	Rh	<	0.00249	м	TI	<	0.00249
М	Ba	<	0.02490	1	1	Gd		0.00310	M	Mn		0.00083	M	Rb	<	0.00249	M	Th	<	0.00249
M	Be	<	0.00125	V	1	Ga	<	0.00249	i	Hg			M	Ru	<	0.00498	M	Tm	<	0.00100
М	Bi	<	0.00100	Ň	1	Ge	<	0.01494	М	Мо		0.00093	M	Sm		0.00010	0 0	Sn	<	0.10000
M	B	<	0.17429	L N	1	Au	<	0.00747	М	Nd	<	0.00498	M	Sc	<	0.02490	M	Ti		0.00258
M	Cd		0.00103	N	<u>A</u>	Hf	<	0.00498	М	Ni	<	0.01992	M	Se	<	0.01992	M	W	<	0.02490
<u>0</u>	Ca		0.05395	D	A	Но		0.00052	M	Nb	<	0.00125	1	Si			3	U		
M	Ce		0.00010	M	A	In	<	0.02490	D	Os			M	Ag	<	0.00498	М	v	<	0.00498
Μ	Cs	<	0.00075	L	A	lr	<	0.01245	М	Pd	<	0.01245	2	Na		0.00664	M	Yb	<	0.00249
М	Cr	<	0.01245		4	Fe	<	0.49798	I	P			M	Sr	<	0.00125	M	Y		0.00062
M	Co	<	0.00747	1	1	La		0.00145	M	Pt	<	0.00498	i	s			M	Zn		0.00114
M	Cu		0.00072	ł	۵	Pb		0.00217	I	к			М	Ta	<	0.01743	M	Zr	<	0.01245
M - C	heck	(ed	by ICP-MS	0	- (	Chec	ke	by ICP-OES	i - S	Spect	rall	interference	n - f	Not C	he	ked For	<b>\$</b> -	Soluti	on	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 %. Do not pipet from container. Do not return portions removed for pipetting to container.

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 238.0289; +6; 8; UO;"(uranyl) Chemical Compatibility - Soluble in HCI and HNO;. Avoid H;PO.. H;SO, and HF matrices should not be a problem depending upon [U]. Although the UO;" ion is distinctly basic, any U" will precipitete in basic media. UO;" salts are generally soluble in water and UO;" is stable with most metals and inorganic anions. The uranyl phosphete is insoluble in water. UF, and UF, are water soluble.

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

U Containing Samples (Preparation and Solution) - Metal (Dissolves rapidly in HCI and HNO₃). Oxide (Soluble in HNO₃); Ores (Digest for 1-2 hours with 1 gram of one to 30 mL 1:1 HNO₃. Silica insolubles are removed by filtration after bringing the sample to furnes with conc. H₂SO₅).

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

Technique		Estimated D.L.	<u>Order</u>	Type	Interferences (underlined indicates severe at alborcs.)
ICP-OES	365.958 nm	0.3/0.01 µg/mL	1	ion	Th, Fe
ICP-OES	367.007 nm	0.3 / 0.02 µg/mL	1	ion	Th, Ce
ICP-OES	263.553 nm	0.3/0.01 ug/mL	1	ion	Ce, Ir, Th, Rh, W, Zr, Ta, Ti, Y, Hf, Fe, Re, Ru
ICP-MS	238 amu	2 ppt	n/a	Μ'	2#Pb ¹⁶ Os

- 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)

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)

INDRGANIC LABS/RADCHEM LABS B 304 2 DATE RECEIVED: 02/05/04 DATE EXPIRED: 03/01/2005 V05 DATE OPENED: 02/25/04 INDRG: 4473 PD: F52323



*NOTICE TO ICP-MS USERS: The ²³⁵U in this standard is depleted. The certified abundances in Atom % are as follows:

		Hatural Abundance	IV & COLLINGU MOUNDAINOB
	isotope	Atom %	Atom %
Uranium	238U	99.3	99.8 ± 0.1
	235U	0.70	0.204 ± 0.002

#### 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 property 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 linorganic 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: June 10, 2003

Expiration Date:

FXPIRES

#### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

**Certificate Prepared By:** 

Katalin Le, QC Supervisor

Certificate Approved By:

Katalia

P. J.

**Certifying Officer:** 

Paul Gaines, Chemist, Senior Technical Director

JoAnn Struthers, QA Administrative Assistant

## inorganic ventures / lv 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 Tungsten in 1% (abs) HNO3/1% (abs) HF

Catalog Number:	CGW1-1 and CGW1-5	INORGANIC LABS/RADCHEM LABS 8.4000 DATE RECEIVED:07/31/03						
Lot Number:	W-W01080	DATE EXPIRED: 08/01/004 VO1						
Starting Material:	W Powder	DATE OPENED: 08/01/03						
Starting Material Purity (%):	99.990703	INORG: 4303 PO: E53383						
Starting Material Lot No	21418,C31H46,D02J21,E03K06,D11F29							
Matrix:	1% (abs) HNO3/1% (abs) HF							

### .0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Concentration: 1001 ± 2 µg/mL

Certified Density:

1.006 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 (⊐) = <u>orx</u> n

Uncertainly  $(\pm) = 2[(ars))^{21+2}$ 

 $(\Box) = mean is$   $x_i = individual results$  n = number of measurements IIIS = 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 EFM 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 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	1001 ± 2 μg/mL (Avg 2 runs)					
		ICP Assay NIST SRM 3163 Lot Number: 990209					
	Assay Method #2	1000 µg/mL					
		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 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.

Q	AJ		0.01792	м	Dy	<	0.00595	<u>0</u>	u	<	0.00008	M	Pr	<	0.00030	M	Te	<	0.02974
М	Sb	<	0.00050	м	Er	<	0.00496	м	Lu	<	0.00040	1	Re			м	ть	<	0.00030
М	As	<	0.00991	м	Eu	<	0.00297	Q	Mg		0.00120	M	Rh	<	0.00099	м	TI	<	0.00099
М	Ba	<	0.00991	M	Gd	<	0.00099	М	Mn	<	0.00397	M	Rb	<	0.00099	м	Th	<	0.00099
М	Be	<	0.00050	М	Ga	ı <	0.00099	Q	Hg	<	0.04778	M	Ru	<	0.00198	м	Tm	<	0.00040
М	Bi	<	0.00040	М	Ge	· <	0.00595	м	Мо		0.00050	M	Sm	<	0.00099	м	Sn	<	0.00496
<u>0</u>	8	<	1.19460	м	Au	<	0.00297	M	Nd	<	0.00198	_ 0	Sc	<	0.00036	М	Ti		0.00198
м	Cd	<	0.00297	Μ	Hf	<	0.00198	M	Ni	<	0.00793	M	Se	<	0.00793	<u>s</u>	w		
<u>0</u>	Ca		0.00080	М	Hc	, <	0.00050	Q	Nb	<	0.06371	<u>0</u>	SI	<	0.01354	м	U	<	0.00198
М	Ce	<	0.00496	м	In	<	0.00991	n	Os			M	Ag	<	0.00198	M	v	<	0.00198
м	Cs	<	0.00030	M	Ir	<	0.00496	м	Pđ	<	0.00496	<u>0</u>	Na		0.04778	м	Yb	<	0.00099
м	Cr	<	0.00496	Q	Fe	<	0.03982	ם	P			M	Sr	<	0.00050	M	Y	<	0.03965
М	Со	<	0.00297	M	La	<	0.00050	м	Pt	<	0.00198	<u>n</u>	S			м	Zn	<	0.01983
М	Cu	<	0.00595	M	Pb	I	0.00060	<u>0</u>	к		0.03146	<u>0</u>	Та	<	0.39820	М	Zr		0.00079
M - C	Check	ed	by ICP-MS	0-	Che	cke	d by ICP-OES	1-8	Spect	ral I	nterference	n - I	Not C	hec	ked For	8 -	Soluti	on	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 %. Do not pipet from container. Do not return portions removed for pipetting to container.

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 183.85; +6; 6,7,8,9 WOF, (chemical form as received)

Chemical Compatibility - W is very readily hydrolyzed requiring 0.1 to 1% HF solutions for stable acidic solutions. The WOF, " is soluble in % levels of HCI and HNO, provided it is in the WOF," form. Stable at ppm levels with some metals provided it is fluorinated. <u>Do not mix with Alkaline or Rare Earths</u>. Is best to be mixed only with other fluorinated metals (Ti, Zr, Hf, Nb, Ta, Mo, Si, Sn, Ge). Look for yellow WO, precipitet if mixed with other transition elements at higher levels indicating instability. The yellow WO, will form over a period of weeks even in trace HF, therefore, <u>HF levels of W multi-element blends should be -1 %</u>. Stability - 2-100 ppb levels stable (Alone or mixed with all other metals that are at comparable levels) as the WOF, " for months in 1% HNO, I DPE container. 1-10,000 ppm single element solutions as the WOF, chemically stable for years in 1% HF in an LDPE container.

W Containing Samples (Preparation and Solution) - Metal (Soluble in HF / HNO,); Oxide (Soluble in HF or NH-OH); Organic Matrices (Dry ash at 450  $\ll$  in Pt^{*} and dissolve oxide with HF).

#### 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 adoncs.)

		VI 100		93 1 YOM 1 YOM 1997
207.911 nm	0.03/0.001 µg/mL	1	ion	Ru, In
224.875 nm	0.05/0.005 µg/mL	1	ion	Co, Rh, Ag
209.475 nm	0.05 / 0.005 ug/mL	1	ion	Mo
182 amu	5 ppt	n/a	Μ'	'#Er *O
	207.911 nm 224.875 nm 209.475 nm	207.911 nm         0.03 / 0.001 µg/mL           224.875 nm         0.05 / 0.005 µg/mL           209.475 nm         0.05 / 0.005 µg/mL	207.911 nm 0.03/0.001 µg/mL 1 224.875 nm 0.05/0.005 µg/mL 1 209.475 nm 0.05/0.005 µg/mL 1	207.911 nm 0.03/0.001 µg/mL 1 ion 224.875 nm 0.05/0.005 µg/mL 1 ion 209.475 nm 0.05/0.005 µg/mL 1 ion

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

- 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 <u>IQ Net International Certification Network</u>: Argentina (IRAM), Australia (QAS), Austria (ÖQS), Belgium (Avinter), Brazil (FCAV), Canada (QMi), Hong Kong (HKQAA), Columbia (ICONTEC), Cract Resultic (COS), Denmark (DS), Elaland (SES), Erance (AEAD), Germany (DOS), Greece (El

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), Skyenja (SIQ), Spain (AENOR), Switzerland (SQS)

- 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 (BriwA), Belgium (BELTEST) (BKO-OBE), Canada (SCC), Chinese Taipel (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)

INORGANIC LABS/RADCHEM LABS 3 2 2 DATE RECEIVED: 07/31/03 DATE EXPIRED: 08/01/2004 v0 DATE OPENED: 08/01/03 INORG: 4203 P0: F52383



- 11.1 IV Shelf Life The period of time during which the concentration of the analyte(s) in a property 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: February 10, 2003

Expiration Date:

EXPIRES 122004-

### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

JoAnn Struthers, QA Administrative Assistant

Certificate Approved By:

**Certificate Prepared By:** 

**Certifying Officer:** 

Katalin Le, QC Supervisor

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Paul Gaines, Chemist, Senior Technical Director No. of the other states of 1.03



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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 1000 µg/mL Yttrium in 1.4% (abs) HNO3

Catalog Number:	CGY1-1, CGY1-2, and CGY1-5
Lot Number:	X-QY01101
Starting Material:	Y2O3
Starting Material Purity (%):	99.999727
Starting Material Lot No	9918901OYL
Matrix:	1.4% (abs) HNO3

### 3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Concentration:	1006 ± 2 µg/mL
Certified Density:	1.010 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 (C) = <u>erx</u>	(C) = mean
n	x, = individual results
	n = number of measurements
Uncertainty $(\pm) = 2i(2\pi s_1)^{2/1/2}$	IS = The summation of all significant estimated errors.
(1) ¹²	(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

1004 ± 4 µg/mL

□ "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.

ICP Assay NIST SRM 3167a Lot Number: 790412

Assay Method #2

Assay Method #1

4.1

### 1006 ± 2 μg/mL EDTA NIST SRM 928 Lot Number: 880710

INORGANIC LABS/RADCHEM LABS

DATE RECEIVED: 03/30/04 DATE EXFIRED: 04/01/8005 100 DATE OFENED: 03/30/04 INORG: 4513 FO: F53361

- 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 238090.
- 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.

Q	AI		0.00024		М	Dy	<	0.00595	<u>0</u>	Li	<	\$	0.00002	М	Pr	<	0.00030	M	Te	<	0.02976
<u>0</u>	Sb	<	0.01000		М	Er	<	0.00496	М	Lu	<	5	0.00040	M	Re	<	0.00099	М	ТЬ	<	0.00030
М	As	<	0.00992	1	М	Eu	<	0.00298	Q	Mg			0.00015	М	Rh	<	0.00099	М	TI	<	0.00099
M	Ba	<	0.00992	l	М	Gd	<	0.00099	Q	Mn	<	:	0.00002	М	Rb	<	0.00099	М	Th	<	0.00099
M	Be	<	0.00050		M	Ga	<	0.00099	Q	Hg	<	:	0.02000	М	Ru	<	0.00198	М	Tm	<	0.00040
Μ	Bi	<	0.00040		М	Ge	<	0.00595	М	Мо	<	:	0,00198	М	Sm	<	0.00099	M	Sn	<	0.00496
<u>0</u>	в		0.00013		М	Au	<	0.00298	М	Nd	<	<	0.00198	Q	Sc	<	0.00003	M	Ti	<	0.04959
М	Cd	<	0.00298		М	Hf	<	0.00198	М	Ni	<	:	0.00794	М	Se	<	0.00794	М	w	<	0.00992
0	Ca		0.00100		М	Ho	<	0.00050	М	Nb	<	:	0.00050	Q	Si		0.00170	М	U	<	0.00198
Μ	Ce	<	0.00496		М	In	<	0.00992	n	Os				<u>0</u>	Ag	<	0.02000	Q	v	<	0.00080
Μ	Cs	<	0.00030		М	Ir	<	0.00496	Q	Pd	<	c	0.10000	<u>0</u>	Na	<	0.05000	M	Yb	<	0.00099
M	Cr	<	0.00496		Q	Fe		0.00070	Q	Ρ	<	\$	0.07000	Q	Sr	<	0.00004	<u>\$</u>	Y		•
М	Co	<	0.00298		M	La	<	0.00050	М	Pt	<	:	0.00198	<u>0</u>	S	<	0.04300	Q	Zn		0.00025
M	Cu	<	0.00595		М	Pb	<	0.00298	Q	к	<	<	0.10000	М	Ta	<	0.00694	<u>0</u>	Zr	<	0.00070
M - C	heck	ed	by ICP-MS	• •	0-	Chec	:ke	by ICP-OES	i-\$	Spect	ral	In	iterference	n-t	lot C	hea	ked For	s - S	Soluti	on t	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

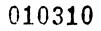
For the validation of analytical methods

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 - €. Do not pipet from container. Do not return portions removed for pipetting to container.

Atomic Weight: Valence: Coordination Number; Chemical Form in Solution - 88.9059; +3; 6; Y(OH)(H,O); '

Chemical Compatibility - Soluble in HCI, H, SO, and HNO, Avoid HF, H, PO, and neutral to basic media. Stable with most metals and inorganic anions forming an insoluble carbonate, oxide, evaluate, and fluoride. Avoid mixing with elements / solutions containing moderate amounts of fluoride.

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

Y Containing Samples (Preparation and Solution) - Metal (Soluble in acids): Oxide (Dissolve by heating in H₂O/HNO₂); Ores (Carbonate fusion in Pt* followed by HCI dissolution): Organic Matrices (Dry ash and dissolve in 1:1 H₂O /HCI or HNO₂). Atomic Spectroscopic Information (ICP-OES D.L.s are given as radial/axial view):

Techniqu		Estimated D.L.	Order		Interferences (underlined indicates severe at efforcs.)
ICP-OES	360.073 nm	0.005 / 0.000036 µg/mL	1	ion	Ce, Th
ICP-OES	371.030 nm	0.004 / 0.00007 µg/mL	1	ion	Ce
ICP-OES	377.433 nm	0.005 / 0.0009 µg/mL	1	ion	Ta, Th
ICP-MS	89 <b>a</b> mu	0.8 ppt	n/a	М.	™Ge  +O, '™Hf''

- 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 Talpei (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)

INORGANIC LABS/RADCHEM LABS P 2012 DATE RECEIVED: 03/30/04 DATE EXPIRED: 04/01/2005 VO DATE OPENED: 03/30/04 INORG: 4513 F0: E5336)



11.1 IV Shelf Life - The period of time during which the concentration of the analyte(s) in a property 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: February 24, 2004

**Expiration Date:** 

#### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

**Certificate Prepared By:** JoAnn Struthers, QA Administrative Assistant Certificate Approved By: Katalin Le, QC Manager **Certifying Officer:** Paul Gaines, Chemist, Senior Technical Director

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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 Custo

Custom-Grade 1000 µg/mL Zirconium in H20 tr. HNO3 tr. HF

Catalog Number:	CGZR1-1 and CGZR1-5	
Lot Number:	W-ZR01056	
Starting Material:	ZrO2	
Starting Material Purity (%):	99.994542	
Starting Material Lot No	22855	
Mətrix:	H20 tr. HNO3 tr. HF	D

	RADCHEM LABS Py 1. + 2
DATE RECEIVED:_	01/23/04 08/01/2005 V03
DATE EXPIRED:	08/01/2005 VOS
DATE OPENED:	01/23/04
	PD: F57306

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Concentration: 1004 ± 2 µg/mL

Certified Density: 0.9

0.999 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 ( $\Box$ ) =  $\underline{a^2 x}$ , n

Uncertainty (±) =  $\frac{2|(e_{1}s_{1})^{2}|^{1/2}}{(n)^{1/2}}$ 

(C) = mean x₁ = individual results n = number of measurements BS = 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 SFM 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 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	1004 ± 2 µg/mL (Avg 2 runs)
		ICP Assay NIST SRM 3169 Lot Number: 990109
	Assay Method #2	1000 µg/mL
		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 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.

<u>0</u>	AI		0.01416	M	Dy	<	0.01188	<u>0</u>	Li	<	0.00012	M	Pr	<	0.00059		M	Te	<	0.05942	
M	Sb	<	0.00099	M	Er	<	0.00990	M	Lu	<	0.00079	M	Re	<	0.00198		M	Тъ	<	0.00059	
М	As	<	0.01981	м	Eu	<	0.00594	Q	Mg	<	0.00012	M	Rh	<	0.00198		Μ	TI	<	0.00198	
М	Ba	<	0.01981	M	Gd	<	0.00198	Q	Mn	<	0.00401	M	Rb	<	0.00198		М	Th	<	0.00198	
Q	Be	<	0.40048	M	Ga	<	0.00198	Q	Hg	<	0.04405	M	Ru	<	0.00396		M	Tm	<	0.00079	
M	Bi	<	0.00079	M	Ge	<	0.01188	Q	Мо	<	0.40048	М	Sm	<	0.00198		M	Sn	<	0.00990	
Μ	8	<	0.13864	M	Au	<	0.00594	М	Nd	<	0.00396	Q	Sc	<	0.00064		Q	Ti	<	0.16019	
<u>0</u>	Cd	<	0.02123	M	Hf		0.04403	Q	Ni		0.01214	М	Se	<	0.01585		M	w	<	0.01981	
Q	Ca		0.00809	M	Но	<	0.00099	Q	Nb	<	0.08010	Q	Si	<	0.80096		М	U	<	0.00396	
М	Ce	<	0.00990	M	In	<	0.01981	ם	Os			Q	Ag	<	0.40048		M	v	<	0.00396	
Μ	Cs	<	0.00059	M	lr	<	0.00990	М	Pd	<	0.00990	<u>o</u>	Na	<	0.02803		М	Yb	<	0.00198	
Q	Cr	<	0.00881	0	Fe		0.00344	Q	Ρ	<	0.01922	M	Sr	<	0.00099		<u>0</u>	Y	<	0.00401	
М	Co	<	0.00594	M	La	<	0.00099	М	Pt	<	0.00396	Q	S	<	0.28033		Q	Zn	<	0.04005	
M	Cu	<	0.01188	<u>M</u>	Pb	<	0.00594	Q	κ	<	0.00681	M	Ta	<	0.01386		<u>s</u>	Zr			
M - (	Checi	ked	by ICP-MS	0-	Chec	жe	by ICP-OES	i - S	Spect	rai	interference	n - 1	Not C	heo	cked For	8	- 8	Soluti	on i	Standard Elen	nent

#### 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 010314

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

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 91.224; +4; 6,7,8 Zr(F).*

Chemical Compatibility - Soluble in concentrated HCI, HF, H, SO. (very hot) and HNO. Avoid H, PO. and neutral to basic media. Unstable at ppm levels with metals that would pull F away (i.e. Do not mix with Alkaline or Rare Earths or high levels of transition elements unless they are fluorinated). Stable with most inorganic anions but precipitation with phosphate, oxalete, and tartrate with a tendency to hydrolyze forming the hydrated oxide in all diute acids except HF.

Stability - 2-100 ppb levels stable (alone or mixed with all other metals that are at comparable levels) as the  $Z_1(F)$ , +  $Z_7(OH)$ , F, * for months in 1% HNO, / LDPE container. 1-10,000 ppm single element solutions as the  $Z_7(F)$ , * chemically stable for years in 2-5% HNO, / trace HF in an LDPE container.

Zr Containing Samples (Preparation and Solution) - Metal (Solutie in H₂O / HF / HNO₂); Oxide - unlike TiO, the ZrO, is best fused in one of the following ways (Na₂O, in Ni*, Na₂CO, in Pt* or Borax in PI*); Organic Matrices (Dry ash at 450 *C in Pt* and dissolve by fusing with Na₂CO, and dissolving in HF / HNO, / H₂O).

Atomic S	pectroscopic in	formation (ICP-OES D.L	s are gi	ven as	<u>radial/axial</u> view):
Techniqu	elLine	Estimated D.L.	Order	Type	Interferences (underlined indicates severe at affoncs.)
ICP-OES	343.823 nm	0.007 / 0.0004 µg/mL	1	ion	Hf, Nb
ICP-OES	339.1 <b>98 nm</b>	0.008 / 0.0007 µg/mL	1	ion	Th, Mo
ICP-OES	272.261 nm	0.018 / 0.001 µg/mL	1	ion	Cr. V. Th, W
ICP-MS	90 ann u	2 ppt	n/a	Μ'	"Ge#O, "Se#O,['#X'2 (where X = Hf, Ta, V)]

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

- 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)

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 Talpei (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)

INORGANIC LABS/RADCHEM LABS Para DATE RECEIVED: 01/33/04 DATE EXPIRED: 08/01/2005 V00 DATE OPENED: 01/23/04 INORG: 4942 PO: F53300



- 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: March 19, 2003

**Expiration Date:** 

EXPIRES C1 \$2 CO 5

#### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

**Certificate Prepared By:** JoAnn Struthers, QA Administrative Assistant

**Certificate Approved By:** Katalin Le, QC Supervisor

**Certifying Officer:** 

Paul Gaines, Chemist, Senior Technical Director

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### 010316 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 ^D

4.1

DESCRIPTION OF CRM Custom-Grade 1000 µg/mL Barium in 0.1% (abs) HNO3

	Catalog Number: Lot Number: Starting Material: Starting Material Purity (%): Starting Material Lot No Matrix:	CGBA1-1, CGBA1-2, a <b>W-BA02023</b> Ba(NO3)2 99.999730 21879 0.1% (abs) HNO3	INDRGANIC LABS/RADCHEM LABS 10-1 of 2 DATE RECEIVED: 02/25/04	
3.0	CERTIFIED VALUES AND UNCERTAINTIES		DATE EXPIRED: 03/01/2005 V03 DATE OPENED: 03/35/04	
	<b>Certified Concentration:</b>	1001 ± 1 µg/mL	INORG: 4465 FO: F5233	
	Certified Density:	0.999 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 (C) = <u>erx</u>	(C) = mean
n	x _i = individual results
	n = number of measurements
Uncertainty (±) = <u>21(ers)</u> /142	ES = The summation of all significant estimated errors.
(1) ^{1/2}	(Most common are the errors from instrumental measurement, weighing, dilution to volume, and the fixed error reported on the NIST SIRM 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.

 Assay Method #1
 998 ± 4 µg/mL

 ICP Assay NIST SRM 3104a
 Lot Number: 992907

 Assay Method #2
 1001 ± 1 µg/mL

 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, 811/2587078, 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.

Q AI 0.00011	M Dy < 0.01269	Q Li < 0.00400	<u>M</u> Pr < 0.00063	M_Te < 0.06343
<u>M</u> Sb < 0.00106	<u>M</u> Er < 0.01057	<u>M</u> Lu < 0.00085	<u>M</u> Re < 0.00211	<u>Q</u> Tb < 0.00390
<u>M</u> As < 0.02114	Q Eu < 0.00040	<u>O</u> Mg 0.00009	<u>M</u> Rh < 0.00211	<u>M</u> TI < 0.00211
<u>s</u> Ba	Q Gd < 0.00052	<u>M</u> Mn < 0.00846	<u>M</u> Rb < 0.00211	<u>M</u> Th < 0.00211
<u>M</u> Be < 0.00106	<u>M</u> Ga < 0.00211	Q Hg < 0.01200	<u>M</u> Ru < 0.00423	<u>M</u> Tm < 0.00085
<u>M</u> Bi < 0.00085	M Ge < 0.01269	<u>M</u> Mo < 0.00423	Q Sm < 0.00071	<u>M</u> Sn < 0.01057
<u>M</u> B < 0.14800	M Au < 0.00634	Q Nd < 0.00330	M Sc < 0.02114	<u>M</u> Ti < 0.10571
<u>M</u> Cd < 0.00634	<u>M</u> Hf < 0.00423	<u>M</u> Ni < 0.01691	<u>M</u> Se < 0.01691	<u>M</u> W < 0.02114
<u>Q</u> Ca 0.00072	<u>M</u> Ho < 0.00106	<u>M</u> Nb < 0.00106	<u>Q</u> Si < 0.00340	<u>M</u> U < 0.00423
<u>M</u> Ce < 0.01057	<u>M</u> in < 0.02114	<u>n</u> Os	M Ag < 0.00423	<u>M</u> V < 0.00423
<u>M</u> Cs < 0.00063	<u>M</u> ir < 0.01057	<u>M</u> Pd < 0.01057	<u>M</u> Na < 0.21142	<u>M</u> Yb < 0.00211
<u>M</u> Cr < 0.01057	Q Fe 0.00062	<u>O</u> P < 0.00260	Q Sr 0.00379	Q Y 0.00040
<u>M</u> Co < 0.00634	M La < 0.00106	<u>M</u> Pt < 0.00423	Q S < 0.02500	Q Zn < 0.00039
M Cu < 0.01269	M Pb 0.00020	<u>Q</u> K < 0.00180	<u>Q</u> Ta < 0.00690	<u>M</u> Zr < 0.01057
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 - 137.33, +2; & Ba(H₂O),¹² Chemical Compatibility - Soluble in HCl, and HNO₂. Avoid H₂SO₄, HF and neutral to basic media. Stable with most metals and inorganic anions forming insoluble silicate, carbonate, hydroxide, oxide, fluoride, sulfate, oxalate, chromate, arsenate, iodate, molybdate, sulfate and tungstate in neutral aqueous media.

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

Ba Containing Samples (Preparation and Solution) - Metal(is best dissolved in diluted HNO₂) Ores( Carbonate fusion in Pt^a followed by HCI dissolution. If sulfate is present dissolve the fuseate using HCI /tartaric acid to prevent BaSO₄ precipitate ) Organic Matrices (dry ash and dissolve in dilute HCI.)

	<b>Atomic Spectros</b>	opic Information	(ICP-OES D.L.s are	given as	radial/axial view):
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Technique/L	ine	Estimated D.L.	Order	Type	Interferences (underlined indicates	severe at «alboncs.)
ICP-OES 4	55.403 nm	0.002 / 0.0001 µg/mL	1	ion	Zr, U	
ICP-OES 23	33.527 nm	0.004 / 0.0003 µg/mL	1	ion	•	
ICP-OES 23	30. <b>42</b> 4 nm	0.004 / 0.0005 ug/mL	1	ion	Mo.Ir. Co	
ICP-MS 1	38 amu	1 ppt	n/a	M'	¹²² Sh ¹⁴ O, ¹² Te ¹⁴ 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), Beland (BCRC), Beduard (ABCER), Singapore (PSR), Science (SIC), Spain (AENOR), Switzerland (SOS),

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



010318

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)

INORGANIC LABS/RADCHEM LABS 73.343 DATE RECEIVED: 03/05/04 DATE EXPIRED: 03/01/005 NOS DATE OPENED: 09/05/04 INORG: 4465 PO: F50303



#### 11.0 DATE OF CERTIFICATION AND PERIOD OF VALIDITY

### 010319



- 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 28, 2003

**Expiration Date:** 

EXPIRES 142005

#### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:	JoAnn Struthers, QA Administrative Assistant	John Stratter
Certificate Approved By:	Katalin Le, QC Supervisor	katalin ka
Certifying Officer:	Paul Gaines, Chemist, Senior Technical Director	DNJ



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### 010320 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 Beryllium in 2% (abs) HNO3

Catalog Number:	CGBE1-1, CGBE1-2, and CGBE1-5			
Lot Number: Starting Material:	<b>W-BE01104</b> Be(OOCCH3)2			
Starting Material Purity (%):	99.999897			
Starting Material Lot No Matrix:	01-10-01 2% (abs) HNO3	INDRGANIC LABS/RADCHEM LABS - 1072		
	. ,	DATE RECEIVED:		

### 3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Concentration:1007 ± 4 µg/mLINDRG:459 aPO:F53393Certified 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 ( $\Box$ ) =  $\underline{\alpha' x}$ n Uncertainty (±) =  $\underline{2[(\underline{\alpha} \cdot \underline{s})]^{1/2}}$ 

(C) = mean
X ₁ = individual results
n = number of measurements
BS = 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 SFM certificate of analysis.)

DATE OFENED: _____OGOVOH

### 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 ±4 μg/mL
		ICP Assay NIST SRM 3105a Lot Number: 892707
	Assay Method #2	1002 µg/mL
		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 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.

<u>0</u> AI < 0.00800	<u>M</u> Dy < 0.01305	Q Li < 0.00002 M Pr < 0.00065	<u>M</u> Te < 0.06525
<u>M</u> Sb < 0.00109	<u>M</u> Er < 0.01087	<u>M</u> Lu < 0.00087 <u>M</u> Re < 0.00218	<u>M</u> Tb < 0.00065
<u>M</u> As < 0.02175	<u>M</u> Eu < 0.00652	Q Mg < 0.00003 M Rh < 0.00218	<u>M</u> TI < 0.00218
<u>M</u> Ba < 0.02175	<u>M</u> Gd < 0.00218	<u>O</u> Mn < 0.00002 <u>M</u> Rb < 0.00218	<u>M</u> Th < 0.00218
<u>s</u> Be	<u>M</u> Ga < 0.00218	Q Hg < 0.01500 M Ru < 0.00435	M Tm < 0.00087
<u>M</u> Bi < 0.00087	<u>M</u> Ge < 0.01305	<u>M</u> Mo < 0.00435 <u>M</u> Sm < 0.00218	<u>M</u> Sn < 0.01087
<u>Q</u> B < 0.01200	<u>M</u> Au < 0.00652	<u>Μ</u> Nd < 0.00435 <u>Ω</u> Sc < 0.00009	<u>M</u> TI < 0.10874
<u>M</u> Cd < 0.00652	<u>M</u> Hf < 0.00435	<u>M</u> Ni < 0.65245 <u>M</u> Se < 0.01740	<u>M</u> W < .0.02175
<u>O</u> Ca 0.00164	<u>M</u> Ho < 0.00109	<u>M</u> Nb < 0.00109 <u>Q</u> Si 0.00649	<u>M</u> U < 0.00435
<u>M</u> Ce < 0.01087	<u>M</u> In < 0.02175	<u>n</u> Os <u>M</u> Ag < 0.00435	<u>M</u> ∨ < 0.00435
<u>M</u> Cs < 0.00065	<u>M</u> ir < 0.01087	<u>M</u> Pd < 0.01087 <u>Q</u> Na 0.00368	M Yb < 0.00218
<u>O</u> Cr < 0.00900	Q Fe 0.00268	<u>л</u> Р <u>M</u> Sr< 0.00109	<u>M</u> Y < 0.08699
<u>M</u> Co < 0.00652	<u>M</u> La < 0.00109	<u>M</u> Pt < 0.00435 i S	<u>M</u> Zn < 0.04350
<u>M</u> Cu < 0.01305	<u>M</u> Pb < 0.00652	Q K < 0.10000 <u>M</u> Ta < 0.01522	<u>M</u> Zr < 0.01087
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 - Keeptightly sealed when not in use. Store and use at 20 ± 4 %. Do not pipet from container. Do not return portions removed for pipetting to container.

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 9.01218; +2; 4; Be'(H,O).'2

Chemical Compatibility - Soluble in HCI, HNOs, H₂SO, and HF aqueous matrices. Stable with all metals and inorganic anions. Stability - 2-100 ppb levels stable for months in 1 % HNOs /LDPE container, 1-10,000 ppm solutions chemically stable for years in 5-10 % HNOs /LDPE container.

Be Containing Samples (Preparation and Solution) - Meta (is best dissolved in diluted H₂SO₄), BeO (boiling nitric, hydrochloric, or sulturic adds or KHSO₄ (usion). Ones (H₂SO₄/HF digestion or carbonate fusion in Pt^o). Organic Matrices (sulfuric/peroxide digestion or nitric/sulfuric/perchloric acid decomposition, or dry ashand dissolution according to the BeO procedure above). Atomic Spectroscopic Information (ICP-OES D.L.s are given as <u>radia/axial</u> view):

	LEADING Showing and and and an					
Techniqu		Estimated D.L.	Order	Type	Interferences (underlined indicates	severe at accords.)
ICP-OES		0.0003 / 0.00009 µg/mL	1	ion	V, Ce, U	
ICP-OES	234.861 nm	0.0003 / 0.00016 µg/mL	1		Fe, Ta, Mo	
ICP-OES	313.107 nm	0.0007 / 0.0005 µg/mL	1		Ce, Th, Tm	
ICP-MS	9 amu	4 ppt	n/a	М,		

- 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: January 08, 2004

Expiration Date:



	RADCHEM LABS B. 2 of 2
DATE RECEIVED:	06/01/04
DATE EXPIRED:	06/01/2005 VOS
DATE OPENED:	06/01/04
INORG: 4592	

### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

010323

Certificate Prepared By:

Debbie Newman, Production Manager

Certificate Approved By:

Katalin Le, QC Manager

Certifying Officer:

Paul Gaines, Chemist, Senior Technical Director

Lever Acuman

Pour Aaine



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

# certificate of analysis

### CUSTOM-GRADE SOLUTION 1

ON 1000  $\mu$ g/mL Chromium⁺³ in 1.4% HNO₃ (abs)

Catalog Number: CGCR(3)1-1, CGCR(3)1-2 and CGCR(3)1-5

Lot Number: W-QCR02033

Starting Material: Starting Material Purity: Starting Material Lot No:

Chromium	Metal
99.995%	
F16l22	

INDRGANIC LABS/RADCHEM LABS
INDICATION USA3
DATE RECEIVED: 11.543 DATE EXPIRED: 13.11304 DATE OPENED: 13.11304 DATE OPENED: 13.11304
DATE EXPIRED:
DATE OPENED://202
DATE OPENED:FO:FS2256

### CERTIFIED CONCENTRATION: 995 $\pm$ 3 $\mu$ g/mL

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

(x) = mean  $x_i = individual results$ 

Uncertainty  $(\pm) = 2[(\sum_{s})^2]^{1/2}$ 

n = number of measurements

 $\sum S_i$  = The summation of all significant estimated errors.

Instrument Analysis: 995  $\pm$  3 µg/mL (Avg of 3 runs) Method: Inductively Coupled Plasma Spectroscopy (ICP) vs NIST SRM 3112a.

Calculated Value: 1002 µg/mL

Method: Calculated, based on starting material.

TRACE METALLIC IMPURITIES DETERMINED BY ICP-MS AND ICP-OES IN µg/mL: Custom-Grade solutions tested for trace metallic impurities by ICP-MS were analyzed in an ULPA-Filtered Clean Room.

An ULPA-Filter is 99.9985% efficient for the removal of particles down to 0.3  $\mu$ m.

o	AI	0.0028	M	Dy	<0.00060	M	IJ	<0.0010	M	Pr	< 0.000030	M	Te	< 0.0030
	• • •			•						-				
М	Sb	< 0.000050	м	Er	< 0.00050	M	ա	< 0.000040	M	Re	<0.00010	M	Tb	<0.000030
M	As	<0.0010	M	Eu	<0.00030	Q	Mg	<0.010	<u>M</u>	Rh	<0.00010	M	Т	<0.00010
М	Ba	< 0.0010	M	Gd	< 0.00010	Q	Mn	<0.050	M	Rb	0.0066	M	Th	<0.00010
M	8e	< 0.000050	M	Ga	0.00070	Q	Hg	<0.10	M	Ru	0.017	M	Tm	<0.000040
М	Bi	< 0.000040	M	Ge	< 0.00060	M	Mo	<0.00020	М	Sm	< 0.00010	M	Sn	<0.00050
М	8	< 0.0070	M	Au	< 0.00030	M	Nd	<0.00020	M	Sc	<0.0010	M	Ti	< 0.0050
M	Cđ	< 0.00030	M	Hf	< 0.00020	0	Ni	<0.10	i	Se	·	M	W	<0.0010
Q	Са	0.0011	M	Ha	< 0.000050	М	Nb	< 0.000050	0	Si	<0.10	M	U	<0.00020
М	Ce	< 0.00050	ō	In	<0.10	n	Os		M	Ag	0.00070	ī	ν	
М	Cs	< 0.000030	M	Ir	< 0.00050	M	Pd	< 0.00050	<u>o</u>	Na	0.016	M	Yb	<0.00010
ŝ	Cr		0	Fe	<0.10	l	P		M	Sr	<0.000050	M	Y	<0.0040
Q	Co	<0.10	M	La	< 0.000050	M	Pt	< 0.00020	n	S		õ	Zn	<0.10
М	Cu	<0.00060	M	Pb	0.00039	n	ĸ		M	Та	<0.00070	M	Zr	<0.00050
M -	chec	ked by ICP-MS	0-0	check	ed by ICP-OES	i - s	pectra	I interference	n - no	t che	cked for	s - solution	stand	ard element

ANALYZED DENSITY OF SOLUTION (measured at 22°C): 1.010 g/mL QA:KSL are approximated

(over)

Paul R. Aaines

Quality Assurance Manager





#### **QUALITY STANDARD DOCUMENTATION**

1. ISO 9001:2000 QMI Registered Quality System (Certificate Number 010105)



Members of IQ Net : 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)

- 2. ISO/IEC Guide 34-2000 "General Requirements for the Competence of Reference Material Producers" Reference Materials Production - Accredited A2LA Certificate 883.02
- 3. ISO/IEC17025-1999 "General Requirements for the Competence of Testing and Calibration" Chemical Testing -Accredited A2LA Certificate 883.01
- 4. MIL-STD-45662A
- 5. 10CFR50 Appendix B Nuclear Regulatory Commission Domestic Licencing of Production and Utilization Facilities
- 6. 10CFR21 Nuclear Regulatory Commission Reporting Defects and Non-Compliance

Please contact our Quality Assurance Department for further information and copies of documents pertaining to our Quality Standard certifications.

#### **STABILITY/ EXPIRATION DOCUMENTATION**

Shelf Life -

<u>The length of time that a properly stored and packaged standard will remain within the</u> <u>specified uncertainty.</u> Shelf life is affected by chemical stability and transpiration issues. Inorganic Ventures' Standard Solutions are chemically stable indefinitely. Transpiration loss is linear with time and limits the time a standard can be used with confidence. The smaller the bottle the higher the rate of transpiration. Inorganic Ventures' studies indicate that the shelf life of our 500 mL bottle is 4 years and the shelf life of our 125 mL bottle is 21 months.

Expiration Date - The date after which a standard solution should not be used. A one year expiration dat recommended by most state and federal regulatory agencies. Transpiration issues repeated use of solutions over a one year period may adversely affect the integrity of the standard.

#### PACKAGING DOCUMENTATION

Purified acid, 18 megohm double deionized water that has been filtered through a 0.2 µm filter and in-house procedure IV-PACK-001 is used to clean all bottles. Contact us for technical information relating to contamination issues in packaging materials.

#### 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.

#### **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 428359B and 454678. 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 analytical weight set. These weights are tested annually by a NIST / NVLAP accredited calibration lab. The NIST test number is 822/260017-8.

#### **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.

#### TECHNICAL SUPPORT

All customers are encouraged to contact us for technical support for the proper use of our products.

TEL 1-800-569-6799 INT'L 1-732-901-1900

1900 FAX 1-732-901-1903

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 Copper in 2% (abs) HNO3

Catalog Number:	CGCU1-1, CGCU1-2,	and CGCU1-5
Lot Number:	W-CU02064	
Starting Material:	Cu shot	
Starting Material Purity (%):	99.999437	
Starting Material Lot No Matrix:	K09C13	INORGANIC LABS/RADCHEM LABS P3-100
Maura.	2% (abs) HNO3	DATE RECEIVED: 02/05/04
·		DATE EXPIRED: 03/01/2005 VOS
CERTIFIED VALUES AND I	JNCERTAINTIES	DATE OPENED: 02/25/04



3.0 **CERTIFIED VALUES AND UNCERTAINTIES** 

> **Certified Concentration:** 1005 ± 2 µg/mL

**Certified Density:** 1.014 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 (C) = erx,

Uncertainty (±) = 21(ers)?

4.1

(C) = mean x = individual results n = number of measurements **BS** = The summation of all significant estimated errors. (Most cormon are the errors from instrumental measurement, weighing, dilution to volume, and the fixed error reported on the NIST SFM certificate of analysis.)

INDRG: 4469 PO: F53333

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.

Assay Method #1 1005 ± 2 µg/mL ICP Assay NIST SRM 3114 Lot Number: 891811 Assay Method #2  $1005 \pm 2 \mu g/mL$ EDTA NIST SRM 928 Lot Number: 880710

- 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.

<u>O</u> AI < 0.00090	<u>M</u> Dy < 0.03027	<u>O</u> LI < 0.00002 <u>M</u> Pr < 0.00151	<u>M</u> Te < 0.15134
<u>M</u> Sb < 0.00252	<u>M</u> Er < 0.02522	<u>M</u> Lu < 0.00202 <u>M</u> Re < 0.00504	<u>м</u> ть < 0.00151
<u>M</u> As < 0.05045	<u>M</u> Eu < 0.01513	<u>O</u> Mg 0.00001 <u>M</u> Rh < 0.00504	<u>M</u> TI < 0.00504
<u>M</u> Ba < 0.05045	<u>M</u> Gd < 0.00504	<u>M</u> Mn < 0.02018 <u>M</u> Rb < 0.00504	<u>M</u> Th < 0.00504
<u>M</u> Be < 0.00252	<u>M</u> Ga < 0.00504	<u>O</u> Hg < 0.01500 <u>M</u> Ru < 0.01009	<u>M</u> Tm < 0.00202
<u>M</u> Bi < 0.00202	<u>M</u> Ge < 0.03027	<u>M</u> Mo < 0.01009 <u>M</u> Sm < 0.00504	<u>Q</u> Sn 0.00439
<u>M</u> B < 0.35312	<u>M</u> Au < 0.01513	<u>M</u> Nd < 0.01009 <u>M</u> Sc < 0.05045	<u>M</u> Ti < 0.25223
<u>M</u> Cd < 0.01513	<u>M</u> Hf < 0.01009	<u>M</u> NI < 0.04036 <u>M</u> Se < 0.04036	<u>M</u> W < 0.05045
<u>O</u> Ca 0.00011	<u>M</u> Ho < 0.00252	<u>M</u> Nb < 0.00252 <u>O</u> Si < 0.00340	<u>M</u> U < 0.01009
<u>M</u> Ce < 0.02522	<u>M</u> in < 0.05045	<u>n</u> Os <u>M</u> Ag < 0.01009	<u>O</u> V < 0.00300
<u>M</u> Cs < 0.00151	<u>M</u> ir < 0.02522	<u>M</u> Pd < 0.02522 <u>O</u> Na 0.00044	<u>M</u> Yb < 0.00504
<u>M</u> Cr < 0.02522	<u>O</u> Fe 0.00054	<u>Q</u> P < 0.00260 <u>M</u> Sr < 0.00252	<u>M</u> Y < 0.20178
<u>M</u> Co < 0.01513	<u>M</u> La < 0.00252	<u>M</u> Pt < 0.01009 <u>n</u> S	<u>M</u> Zn < 0.10089
<u>s</u> Cu	<u>M</u> Pb 0.00050	<u>О</u> К < 0.00180 <u>М</u> Та < 0.03531	<u>M</u> Zr < 0.02522
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; Chamical Form in Solution - 63.546, +2; & Cu(H₂O).*

Chemical Competibility - Stable in HCI, HNOs, H2SOs, HF, H2POs. Avoid basic media. Stable with most metals and inorganic anions in acidic media.

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

Cu Containing Samples (Preparation and Solution) - Metel (soluble in HNOs.), Oxides (Soluble in HCI); Ores (Dissolve in HCI/ HNO.). ar):

Atomic Spectroscopic Information (IC	CP-OES	D.L.s are;	given as	radial/axial u	<b>Jiew</b>
--------------------------------------	--------	------------	----------	----------------	-------------

	324.754 nm	Estimated D.L. 0.06/.001 µg/mL	Order 1	Type atom	Interferences (underlined indicates severe at suboncs.) Nb, U, Th, Mo, Hr
ICP-OES	224,700 nm	0.01/.001µg/mL	1	ion	<u>Pb.</u> Ir, NI, W
ICP-OES	219,958 nm	0.01/.002 µg/mL	1	atom	Th, Ta, Nb, U, Hf
ICP-MS	63 amu	10 ppt	n/a	M'	49A/29Na *1119O, '1N12C2CI, 19O12CECI, 4Ca 9O, 2Na*Ca

- 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)

INDRGANIC LABS/RADCHEM LABS 73. 2 04 2 DATE RECEIVED: 00/05/04 DATE EXPIRED: 03/01/2005 VO3 DATE OPENED: 03/35/04 INDRG: 4469 PD: E53333 ___

#### 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 property 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: May 02, 2003

Expiration Date:

EXPIRES

#### NAMES AND SIGNATURES OF CERTIFYING OFFICERS 12.0

**Certificate Prepared By:** 

**Certificate Approved By:** 

Katalin Le, QC Supervisor

**Certifying Officer:** 

Paul Gaines, Chemist, Senior Technical Director

JoAnn Struthers, QA Administrative Assistant

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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(les) 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 Nickel in 1.4% (abs) HNO3

Catalog Number:	CGNI1-1, CGNI1-2, an	d CGNI1-5
Lot Number:	W-NI02030	
Starting Material:	Ni pieces	
Starting Material Purity (%):	99.999371	
Starting Material Lot No	L06L02	
Matrix:	1.4% (abs) HNO3	INORGANIC LABS/RADCHEM LABS 8-1-2-2
CERTIFIED VALUES AND L	INCERTAINTIES	DATE EXPIRED: 03/01/2005 VDS DATE OPENED: 02/25/04

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3.0

 Certified Concentration:
 1002 ± 2 µg/mL
 INDEG:
 <u>4472</u>
 PO:
 F59333

 Certified Density:
 1.011 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:

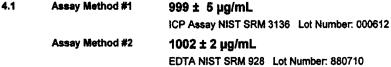
( <b>C)</b> = mean
x _i = individual results
n = number of measurements
IIS = The summation of all significant estimated errors.
(Most common are the errors from instrumental measurement, weighing, dilution to volume, and the fixed error reported on the NIST SRM certificate of analysis.)

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.



- 4.2 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.

<u>ο</u> Α	V < 0.00938	M_ Dy < 0.06577	938 <u>M</u> Dy < 0.06577 <u>Q</u> Li < 0.00006 <u>M</u> Pr < 0.00	0329 M Te < 0.32886
<b>.</b>	.00930	<u>m</u> Cy = 0.06577		JS29 III 10 - 0.32000
MS	b < 0.00548	M_Er < 0.05481	548 M.Er < 0.05481 M.Lu < 0.00439 M.Re < 0.0	1096 <u>M</u> Tb < 0.00329
<u>Q</u> A	s < 0.01689	<u>M</u> Eu < 0.03289	689 <u>Μ</u> Eu < 0.03289 <u>Ω</u> Mg 0.00002 <u>Μ</u> Rh < 0.0	1096 <u>M</u> TI < 0.01096
<u>M</u> B	<b>3a &lt;</b> 0.10962	<u>M</u> Gd < 0.01096	962 <u>M</u> Gd < 0.01096 <u>M</u> Mn < 0.04385 <u>M</u> Rb < 0.0	1096 <u>M</u> Th < 0.01096
<u>o</u> b	e < 0.00626	<u>M</u> Ga < 0.01096	626 <u>M</u> Ga < 0.01096 <u>Q</u> Hg < 0.03441 <u>M</u> Ru < 0.02	2192 <u>M</u> Tm < 0.00439
МВ	Bi < 0.00439	M_Ge < 0.06577	439 M. Ge < 0.06577 M. Mo < 0.02192 M. Sm < 0.0	1096 <u>M</u> Sn < 0.05481
<u>o</u> B	³ < 0.03097	<u>M</u> Au < 0.03289	097 MAU < 0.03289 MNd < 0.02192 MSc < 0.10	0962 <u>M</u> Ti < 0.54811
MC	d < 0.03289	<u>M</u> Hf < 0.02192	289 <u>M</u> Hf < 0.02192 <u>S</u> Ni <u>Q</u> Se < 0.0 ⁻	1877 <u>M</u> W < 0.10962
<u>o</u> c	Ca < 0.01157	<u>M</u> Ho < 0.00548	157 M Ho < 0.00548 M Nb < 0.00548 Q Si 0.00	0188 <u>M</u> U < 0.02192
MC	<b>Xe &lt; 0.05481</b>	<u>M</u> in < 0.10962	481 <u>M</u> In < 0.10962 <u>n</u> Os <u>M</u> Ag < 0.02	2192 <u>M</u> V < 0.02192
MC	<b>)s &lt;</b> 0.00329	<u>M</u> lr < 0.05481	329 <u>M</u> lr < 0.05481 <u>M</u> Pd < 0.05481 <u>Q</u> № 0.00	0102 <u>M</u> Yb < 0.01096
MC	Cr < 0.05481	<u>Q</u> Fe 0.00156	481 Q Fe 0.00156 Q P < 0.31280 M Sr < 0.00	0548 <u>M</u> Y < 0.43849
<u>o</u> c	0.00182	<u>M</u> La < 0.00548	182 <u>M</u> La < 0.00548 <u>M</u> Pt < 0.02192 <u>Q</u> S < 0.07	7820 <u>M</u> Zn 0.00189
<u>M</u> C	Cu < 0.06577	<u>M</u> Pb < 0.03289	577 <u>M</u> Pb < 0.03289 <u>Q</u> K 0.00043 <u>M</u> Ta < 0.07	7674 <u>M</u> Zr < 0.05481
M - Che	ecked by ICP-MS	O - Checked by ICP-OES	P-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 - 58.69; +2; 6; Ni(H,O),*

Charmical Compatibility - Stable in HCI, HNOs, H,SO, ,HF, H,POA. Avoid basic media. Stable with most metals and inorganic anions in acidic media.

Stability -2-100 ppb levels stable for months in 1% HNO₂ / LDPE container. 1-10,000 ppm solutions chemically stable for years in 1-5% HNO₂ / LDPE container.

Ni Containing Samples (Preparation and Solution) - Metal (Solutie in HNO, ), Oxides (Solutie in HCI), Ores (Dissolve in HCI/ HNO,).

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

TechniqueLine	Estimated D.L.	Order	<u>The</u> <u>Interferences</u> (underlined indicates severe at values.)
ICP-OES 221.647 nm	0.01 / 0.0009 jug/mL 1	1	ion Si
ICP-OES 232,003 nm	0.02/0.006 µg/mL 1 a	ton	<u>Cr</u> , Re, Os, Nb, Ag, Pt, Fe
ICP-OES 231.604 nm	0.02 / 0.002 ug/mL 1 k	on	Sb, Ta, Co
ICP-MS 60 amu	100 ppt r	n/a	M' ' "Ca'O'H , "Ca'O, "Na"Ci

- 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 Talpel (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 property 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 linorganic 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 23, 2003 Expiration Date:

P3. 205 2



INORGANIC LABS/RADCHEM LABS P3. 2000 DATE RECEIVED: 03/05/04 DATE EXPIRED: 03/01/2005 V90 DATE OPENED: 03/05/04 INORG: 1473 PU: 53333

#### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

010333

Certificate Prepared By:

Katalin Le, QC Supervisor

**Certifying Officer:** 

**Certificate Approved By:** 

Paul Gaines, Chemist, Senior Technical Director

JoAnn Struthers, QA Administrative Assistant

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			entures / iv labs 195 lehigh avenue, suite 4, lakewood, nj 08701 usa
		•	e: 800-669-6799 • 732-901-1900 • fax: 732-901-1903 s@ivstandards.com • website: www.ivstandards.com
	<b>d</b> certi	ficat	e of analysis
Cen det ISC	<b>tificate #883-02.</b> The certifica ermined in accordance with IS	te is designed and ti O Guide 31-2000 (Re n Guidelines for the Pr	O Certified Reference Material (CRM) Manufacturer: he certified value(s) and uncertainty(ies) are ference Materials - Contents of certificates and label(s), roduction of Reference Materials," and ISO Guide 35-1989 tatisical Principles."
2.0	DESCRIPTION OF CRM	Custom-Grade 100	0 μg/mL Boron in H20
	Catalog Number:	CGB1-1, CGB1-2,	and CGB1-5
	Lot Number:	W-B02042	
	Starting Material:	НЗВОЗ	
	Starting Material Purity (%):	99.999998	INORGANIC LABS/RADCHEM LABS
	Starting Material Lot No Matrix:	OV0133	DATE RECEIVED: 07/31/03 DATE EXPIRED: 08/01/2004 NO
		H20	DATE OPENED: 08/01/03
3.0	CERTIFIED VALUES AND	UNCERTAINTIES	INORG: 4001 PD: E50383
	Certified Concentration:	14	and a second second Second second
	Certified Density:	1.001 g/mL (measu	rred at 22° C)
	The Certified Value is the instrume the uncertainty:	nt analysis value. The fol	lowing equations are used in the calculation of the certified value and
	Certified Value (C) = <u>er X</u> ,	( <b>그</b> ) = ( <b>c</b> )	
	n	in = 1177	idual te suits bei of measurements
	Uncertainty (±) = $2!(273)^{2142}$	(Most co weighing	le summation of all significant estimated errors. mmon are the errors from instrumental measurement, , dilution to volume, and the fixed error reported on the M certificate of analysis.)
4.0	TRACEABILITY TO NIST	AND VALUES OBTA	INED BY INDEPENDENT METHODS
4.0	<ul> <li>"Property of the result of a mean national or international standards"</li> <li>ed., 1993, definition 6.10)</li> <li>This IV product is Traceable to the standards.</li> </ul>	summent of the value of a , through an unbroken ch ) NIST via direct comparis	a standard whereby it can be related to stated references, usually ain of comparisons all having stated uncertainties." (ISO VIM, 2nd on to NIST SRMs. The uncertainties for each certified value are the measurement, weighing and volume dilution errors.
	4.1 Assay Method #1	999 ± 2 µg/mL (A	<b>vg 2 runs)</b> I 3107 Lot Number: 991907

- 4.2 BALANCE CALIBRATION All balances are checked dally 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.

<u>0</u>	AI	<	0.00090	M	Dy	<	0.00600	<u>0</u>	Li	<	0.00002	M	Pr	<	0.00030	M	Te	<	0.03000	
М	Sb	<	0.00050	M	Er	<	0.00500	М	Lu	<	0.00040	M	Re	<	0.00100	M	тъ	<	0.00030	
М	As	<	0.01000	м	Eu	<	0.00300	Q	Mg	<	0.00006	M	Rh	<	0.00100	M	TI	<	0.00100	
<u>0</u>	8a	<	0.00010	М	Gd	<	0.00100	<u>0</u>	Mn	<	0.00002	M	Rb	<	0.00100	M	Th	<	0.00100	
Q	Be	<	0.00017	Q	Ga	<	0.00160	Q	Hg	<	0.01500	M	Ru	<	0.00200	M	Tm	<	0.00040	
М	Bi	<	0.00040	м	Ge	<	0.00600	м	Мо	<	0.00200	M	Sm	<	0.00100	M	Sn	<	0.00500	
ş	В			M	Au	<	0.00300	М	Nd	<	0.00200	Q	Sc	<	0.00002	M	Π	<	0.05000	
M	Cd	<	0.00300	М	Hf	<	0.00200	Q	Ni	<	0.00230	Q	Se	<	0.00620	M	W	<	0.01000	
<u>0</u>	Ca	<	0.00007	М	Но	<	0.00050	м	Nb	<	0.00050	₽	Si		0.00067	M	U	<	0.00200	
<u>0</u>	Ce	<	0.00300	M	In	<	0.01000	ם	Os			M	Ag	<	0.00200	2	V	<	0.00083	
М	Cs	<	0.00030	M	tr	<	0.00500	М	Pd	<	0.00500	2	Na	<	0.00010	M	Yb	<	0.00100	
М	Cr	<	0.00500	<u>0</u>	Fe	<	0.00110	<u>0</u>	Ρ	<	0.00250	M	Sr	<	0.00050	M	Y	<	0.04000	
<u>0</u>	Co	<	0.00110	м	La	<	0.00050	М	Pt	<	0.00200	Q	S	<	0.10000	0	Zn	<	0.00019	
M	Cu	<	0.00600	М	Pb	<	0.00300	Q	к	<	0.00300	M	Та	<	0.00700	М	Zr	<	0.00500	
м - С	heck	ed	by ICP-MS	0-	Chec	kec	by ICP-OES	i-S	pect	ral I	interference	n - I	Not C	hec	ked For	s - :	Soluti	on (	Standard Element	ł

#### 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 seeled 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 - 10.811; +3; 4; B(OH), and B(OH), "

Chemical Compatibility - Moderately soluble in HCI, HNO,, H₂SO, and HF aqueous matrices and very soluble in NH₄OH . Stable with all metals and inorganic anions at low to moderate ppm levels.

Stability - 2-100 ppb levels stable for months in 1% HNO, /LDPE container. 1-1,000 ppm solutions chemically stable for years in 1% HNO, /LDPE container. 1000 -10,000 ppm stable for years in diute NHOH /LDPE container.

B Containing Samples (Preparation and Solution) - Metal (crystaline frm is scarcely attacked by acids or alkaline solutions, amorphous form is soluble in conc. HNO₂ or H₂SO₂); B(OH), (water soluble); Ores(avoid acid digestions and use caustic fusions in Ptry, Organic Matrices ( dry ashmixed with Na₂CO₂ in Ptred 450re then increase heat to 1000re to fuse; or perform a Na₂O₂ fusion in a Nirecrucible / Parr bomb ).

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

Technique/		Estimated D.L.	Order		Interferences (underlined indicates severe at valorcs.)
ICP-OES 2	249.773 nm	0.003/0.001 µg/mL	1	atom	W, Ce, Co, Th, Ta, Mn, Mo, Fe
ICP-OES 2	249.878 nm	0.004 / 0.003 jug/mL	1	atom	Os,W,Co,Cr,Hf
ICP-OES 2	208.959 nm	0.007 / 0.0005 ug/mL	1	atom	Mo
ICP-MS 1	1amu	700 ppt	n/a	М'	

- 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:

010336

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), Beland (CRCC), Bertural (ASCER), Starspore (RSR), Starspore (ASR), Sharena (AENQR), Switterland (SQS),

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)

INDRGANIC LABS/RADCHEM LABS P3. 3 4 3 DATE RECEIVED: 07/31/03 DATE EXPIRED: 08/01/0004 NOS DATE OPENED: 08/01/03 INDRG: 4301 P0: F53383



- 11.1 IV Sheff 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: March 21, 2003

Expiration Date:

EXPIRES 122004-

010337

### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

JoAnn Struthers, QA Administrative Assistant

1

Certificate Approved By:

**Certificate Prepared By:** 

Certifying Officer:

Katalin Le, QC Supervis

Paul Gaines, Chemist, Senior Technical Director



1 inorganic ventures i V 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

- Inorganic Ventures / IV Labs is an ISO Guide 34-2000 Certified Reference Material (CRM) Manufacturer: 1.0 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."
- DESCRIPTION OF CRM Custom-Grade 1000 µg/mL Molybdenum in H20 tr. NH4OH 2.0

Catalog Number:	CGMO1-1, CGMO1-2, and CGMO1-5									
Lot Number: Starting Material: Starting Material Purity (%): Starting Material Lot No	W-MO01132 (NH4)6Mo7O24xH2O 99.995947									
Matrix:	21410									
	H20 tr. NH4OH	DATE RECEIVED:	(ADCHEM LABS <b>B. 1 of 2</b> 03/35/04							
CERTIFIED VALUES AND U	INCERTAINTIES	DATE EXPIRED:	03/01/2005 105							

3.0 **CERTIFIED VALUES AND UNCERTAINTIES** 

DATE OPENED: 00/05/04 INORG: 4471 PO: F5233  $1004 \pm 2 \mu g/mL$ 

**Certified Density:** 0.998 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 (C) = <u>erx</u>

**Certified** Concentration:

Uncertainty  $(\pm) = 2I(a_1s_1)^2I^{4/2}$ 

(C) = mean  $x_i = individual results$ n = number of measurements IS = 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 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	1004 ± 2 µg/mL (Avg 2 runs)
		ICP Assay NIST SRM 3134 Lot Number: 891307
	Assay Method #2	1008 µg/mL
		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 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.

0	AI	<	0.05000	м	Dy	<	0.01198	0	Ц	<	0.01000	Q	Pr	<	0.10000	1	Те		
M	Sb				•			-	Lu			М	Re		0.00200	M	Тb	<	0.00060
<u>im</u>	30		0.00939	M	Er		0.00998	Μ	Lu		0.00080	100	170		0.00200		10	•	0.00000
М	As	<	0.01997	М	Eu	<	0.00599	Q	Mg	<	0.05000	M	Rh	<	0.00200	M	TI	<	0.00200
M	Ba	<	0.01997	М	Gd	<	0.00200	Μ	Mn	<	0.00799	М	Rb		0.02445	M	Th	<	0.00200
М	Be	<	0.00100	M	Ga	<	0.00200	i	Hg			M	Ru	<	0.00399	M	Tm	<	0.00080
М	Bi	<	0.00080	Μ	Ge	<	0.01198	5	Мо			М	Sm	<	0.00200	M	Sn	<	0.00998
Q	B	<	0.50000	Μ	Au	<	0.00599	Q	Nd	<	0.05000	Q	Sc	<	0.05000	Q	τι	<	0.00500
Q	Cd	<	0.50000	М	Hf	<	0.00399	М	Ni	<	0.01597	Μ	Se	<	0.01597	M	w		0.05576
Q	Ca		0.00026	М	Но	<	0.00100	Q	Nb	<	0.10000	Q	Si	<	0.10000	M	U	<	0.00399
Q	Ce	<	0.05000	Μ	In		0.00235	n	Os			M	Ag	<	0.00399	M	v	<	0.00399
Μ	Cs	<	0.00060	М	Ir	<	0.00998	М	Pd	<	0.00998	Q	Na	<	0.10000	M	Yb	<	0.00200
М	Cr	<	0.00998	Q	Fe	<	0.50000	1	Ρ			M	Sr	<	0.00100	M	Y	<	0.07987
М	Co	<	0.00599	M	La	<	0.00100	М	Pt	<	0.00399	1	S			M	Zn	<	0.03993
М	Cu	<	0.01198	М	Pb	<	0.00599	Q	κ		0.00980	М	Ta	<	0.01398	М	Zr	<	86600.0
M - C	heck	ed l	by ICP-MS	0.	Chec	kec	by ICP-OES	1-5	spect	ral I	nterference	n - I	lot C	hea	xed For	\$ -	Soluti	on	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 - 95.94; +6; 6,7,8,9; [MoO.]*(chemical form as received)

Chemical Compartibility - Mo is received in a NH.OH matrix giving the operator the option of using HCI or HF to stabilize addic solutions. The [MoO,]' is soluble in concentrated HCI [MoOC],', dilute HF / HNO, [MoOF,]' and basic media [MoO,]'. Stable at ppm levels with some metals provided it is fluorinated. Do not mixwith Alkaline or Rare Earths when HF is present. Stable with most inorganic anions provided it is in the [MoO,]' chemical form.

Stability - 2-100 ppb levels stable (alone or mixed with all other metals that are at comparable levels) as the [MoOF,]² for months in 1% HNO, / LDPE container. 1-10,000 ppm single element solutions as the [MoO,]² chemically stable for years in 1% NH,OH in a LDPE container.

Mo Containing Samples (Preparation and Solution) - Metal (Soluble in HF / HNO, or hot dilute HCI); Oxide (soluble in HF or NH, OH); Organic Matrices (Dry ash at 450 °C in Pt* and dissolve oxide with HF or HCI).

Atomic S	pectroscopic in	Mormation (ICP-OES U.			
Techniqu	e/Line	Estimated D.L.	Order	Type	Interferences (underlined indicates severe at values.)
ICP-OES	202.030 nm	0.008 / 0.0002 µg/mL	1	ion	Os, Hf
ICP-OES	203.844 nm	0.012 / 0.002 µa/mL	1	ion	
ICP-OES	204.598 nm	0.012 / 0.001 ug/mL	1	ion	ir. Ta
ICP-MS	95 amu	3 ppt	na	M	"Ar#K"O, "Br"O, "Os", "Pt"

- 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), Polymetric (DSCP), Surfaced (SDSP), Surfa

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



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)

INDRGANIL LABS/RADCHEM LABS P3 3 3 DATE RECEIVED: 03/05/04 DATE EXPIRED: 03/01/2025 V03 DATE OPENED: 02/25/04 INDRG: 4471 PD: F52323

#### 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 23, 2003

**Expiration Date:** 

EXPIRES

010341

#### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

**Certificate Prepared By:** JoAnn Struthers, QA Administrative Assistant

**Certificate Approved By:** 

Katalin Le, QC Supervisor

**Certifying Officer:** 

Paul Gaines, Chemist, Senior Technical Director

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### inorganic ventures

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

Uncertainty (±) =  $2[(\sum_{s_1})^2]^{1/2}$ (n)^{1/2}

certificate of analysis

**CUSTOM-GRADE SOLUTION** 

1000 µg/mL Phosphorus in H₂0

Catalog Number: CGP1-1, CGP1-2 and CGP1-5

Lot Number: W-P01123

 $(\bar{x}) = mean$ 

Starting Material: **Starting Material Purity:** Starting Material Lot No: **Phosphoric Acid** 99.999% J18804

INORGANIC LABS	/RADCHEM LABS
DATE RECEIVED:_	06/01/04
DATE EXPIRED:	06/01/2005 103
DATE OPENED:	06/01/04
INORG: 4593	PO: E53393

### CERTIFIED CONCENTRATION: 1006 $\pm 4 \mu g/mL$

x, = individual results

The Certified Value is the wet assay value. The following equations are used in the calculation of the certified value and the uncertainty:

Certified Value  $(\bar{x}) = \sum x_{i}$ 

n = number of measurements

 $\sum S_i$  = The summation of all significant estimated errors.

#### Classical Wet Assay: 1006 ± 4 µg/mL

Method: Acidimetric Titration vs NIST SRM 84k KHP.

Instrument Analysis: 1002 ± 4 µg/mL

Method: Inductively Coupled Plasma Spectroscopy (ICP) vs NIST SRM 3139a.

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.

### TRACE METALLIC IMPURITIES DETERMINED BY ICP-MS AND ICP-OES IN ua/mL:

Custom-Grade solutions tested for trace metallic impurities by ICP-MS were analyzed in an ULPA-Filtered Clean Room. An ULPA-Filter is 99.9985% efficient for the removal of particles down to 0.3  $\mu$ m.

Q	AI	< 0.040	М	Dy	< 0.00060	м	u	< 0.0010	м	Pr	< 0.000030	· .	M	Te	< 0.0030
M	Sb	0.012	M	Er	<0.00050	M	Lu	< 0.000040	M	Re	<0.00010	ļ	M	ть	< 0.000030
М	As	< 0.0010	M	Eu	<0.00030	M	Mg	< 0.0030	M	Rh	<0.00010		M	TI	<0.00010
М	Ba	<0.0010	M	Gd	< 0.00010	М	Mn	<0.00040	M	Rb	<0.00010	1	N	Th	<0.00010
M	Be	< 0.000050	M	Ga	0.00070	<u>0</u>	Hg	< 0.020	<u>M</u>	Ru	< 0.00020	1	M	Tm	< 0.000040
М	Bì	< 0.000040	M	Ge	< 0.00060	M	Мо	< 0.00020	Μ	Sm	<0.00010	Į	N	Sn	< 0.00050
М	в	< 0.0070	M	Au	< 0.00030	M	Nd	< 0.00020	D	Sc		Į	1	Ti	
М	Cđ	< 0.00030	M	Hf	< 0.00020	<u>0</u>	Ni	< 0.050	<u>0</u>	Se	< 0.40	<u>-</u>	M	W	<0.0010
<u>0</u>	Ca	<0.010	M	Ho	< 0.000050	M	Nb	< 0.000050	Q	Si	< 0.020	ļ	N	U	<0.00020
M	Ce	< 0.00050	M	In	< 0.030	D_	Os		M	Ag	< 0.00020	1	N	٧	< 0.00020
M	Cs	< 0.000030	M	łr	< 0.00050	M	Pd	< 0.00050	Q	Na	<0.090	1	1	Yb	<0.00010
М	Cr	< 0.00050	0	Fe	< 0.050	<u>s</u>	Ρ		M	Sr	< 0.000050	1	<u> </u>	Y	<0.0040
М	Co	<0.00030	M	La	< 0.000050	М	Pt	< 0.00020	n	S		1	1	Zn	0.0035
м	Cu	0.080	M	Pb	< 0.00030	n	К		М	Ta	< 0.00070	1	Δ	Zr	< 0.00050
м-	chec	ked by ICP-MS	0-0	check	ed by ICP-OES	i - sı	oectra	Il interference	n - no	t che	cked for	s - solutio	on s	tand	ard element

U - Checked by ICP-UES

spectral interference

solution standard element

ANALYZED DENSITY OF SOLUTION (measured at 22°C): 1.001 g/mL QA:KL Rev.010804DH

(over)

Expires:



Paul R. Acines



Quality Assurance Manager



### **QUALITY STANDARD DOCUMENTATION**

1. ISO 9001:2000 QMI Registered Quality System (Certificate Number 010105)





Members of IQ Net : 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)

- ISO/IEC Guide 34-2000 "General Requirements for the Competence of Reference Material Producers" Reference 2. Materials Production - Accredited A2LA Certificate 883.02
- ISO/IEC17025-1999 "General Requirements for the Competence of Testing and Calibration" Chemical Testing -З. Accredited A2LA Certificate 883.01
- 4. MIL-STD-45662A
- 10CFR50 Appendix B Nuclear Regulatory Commission Domestic Licencing of Production and Utilization Facilities 5.
- 6. 10CFR21 - Nuclear Regulatory Commission - Reporting Defects and Non-Compliance
  - Please contact our Quality Assurance Department for further information and copies of documents pertaining to our Quality Standard certifications.

#### **STABILITY/ EXPIRATION DOCUMENTATION**

Shelf Life -The length of time that a properly stored and packaged standard will remain within the specified uncertainty. Shelf life is affected by chemical stability and transpiration issues. Inorganic Ventures' Standard Solutions are chemically stable indefinitely. Transpiration loss is linear with time and limits the time a standard can be used with confidence. The smaller the bottle the higher the rate of transpiration. Inorganic Ventures' studies indicate that the shelf life of our 500 mL bottle is 4 years and the shelf life of our 125 mL bottle is 21 months.

The date after which a standard solution should not be used. A one year expiration date is **Expiration Date** recommended by most state and federal regulatory agencies. Transpiration issues and repeated use of solutions over a one year period may adversely affect the integrity of, standard.

### **PACKAGING DOCUMENTATION**

Purified acid, 18 megohm double deionized water that has been filtered through a 0.2 µm filter and in-house procedure IV-PACK-001 is used to clean all bottles, Contact us for technical information relating to contamination issues in packaging materials.

#### **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.

#### **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 428359B and 454678. 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 analytical weight set. These weights are tested annually by a NIST / NVLAP accredited calibration lab. The NIST test number is 822/260017-8.

#### **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 traceabl to NIST Identification Nos. 92564, 119016, 471047 and NIST test report Nos. 811/258522, 811/2557078, and 236090.

#### **TECHNICAL SUPPORT**

All customers are encouraged to contact us for technical support for the proper use of our products.

TEL 1-800-569-6799

INT'L 1-732-901-1900

FAX 1-732-901-1903 -2E-MAIL IVtech@ivstandards.com



### inorganic ventur es

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 uncertaintv(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

3.0

Custom-Grade 1000 µg/mL Silicon in H20 tr. HNO3 tr. HF **DESCRIPTION OF CRM** 

Catalog Number:	CGSI1-1, CGSI1-2, and CGSI1-5						
Lot Number:	W-SI02082						
Starting Material:	SiO2						
Starting Material Purity (%):	99.996367						
Starting Material Lot No	C05310C	INORGA					
Matrix:	H20 tr. HNO3 tr. HF	DATE RE					
		DATE EX					

INOR	GANIC LAE	SS/RADCHEM	LABSB 143
DATE I	RECEIVED:	01/20	<i>(04</i>
DATE	EXPIRED:	02/01/	2005 VOJ
DATE I	DPENED:	01/201	04
INORG	:4437_	1º0: _ F	52303

**CERTIFIED VALUES AND UNCERTAINTIES** 

**Certified Concentration:** 1000 ± 5 µg/mL

n

**Certified Density:** 

1.002 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  $(\Box) = Q_1 X_1$ 

Uncertainty  $(\pm) = 2[(2\pi s_1)^2]^{1/2}$ (m)

(C) = mean  $x_i = individual results$ n = number of measurements 88 = 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.)

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

□ "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	1000 ± 5 μg/mL (Avg 2 runs)			
		ICP Assay NIST SRM 3150 Lot Number: 991108			
	Assay Method #2	1001 µg/mL 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 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-Flittered Clean Room. An ULPA-Flitter is 99.9985% efficient for the removal of particles down to 0.3 µm.

	1	1		
<u>O</u> AI 0.02730	<u>M</u> Dy < 0.01358	<u>O</u> LI < 0.00009	<u>M</u> Pr < 0.00068	<u>M</u> Te < 0.06791
<u>M</u> Sb < 0.00113	<u>M</u> Er < 0.01132	<u>M</u> Lu < 0.00091	<u>M</u> Re < 0.00226	<u>M</u> TD < 0.00068
<u>M</u> As < 0.02264	<u>M</u> Eu < 0.00679	<u>O</u> Mg < 0.04991	<u>M</u> Rh < 0.00226	<u>M</u> TI < 0.00226
<u>M</u> Ba < 0.02264	<u>M</u> Gd < 0.00226	<u>M</u> Mn < 0.00906	<u>M</u> Rb < 0.00226	<u>M</u> Th < 0.00226
<u>O</u> Be < 0.00091	<u>M</u> Ga < 0.00226	<u>O</u> Hg < 0.04991	<u>M</u> Ru < 0.00453	<u>M</u> Tm < 0.00091
<u>M</u> Bi < 0.00091	<u>M</u> Ge < 0.01358	<u>M</u> Mo < 0.00453	<u>M</u> Sm < 0.00226	<u>M</u> Sn < 0.01132
<u>O</u> B 0.02409	<u>M</u> Au < 0.00679	<u>M</u> Nd < 0.00453	<u>O</u> Sc < 0.00091	<u>O</u> Ti 0.01325
<u>M</u> Cd < 0.00679	<u>M</u> Hf < 0.00453	<u>O</u> NI < 0.01044	<u>M</u> Se < 0.01811	<u>M</u> W < 0.02264
<u>O</u> Ca 0.00135	<u>M</u> Ho < 0.00113	<u>M</u> Nb < 0.00113	<u>s</u> Si	<u>M</u> U < 0.00453
<u>M</u> Ce < 0.01132	<u>M</u> in < 0.02264	<u>n</u> Os	<u>M</u> Ag < 0.00453	<u>O</u> V < 0.00408
<u>M</u> Cs < 0.00068	<u>M</u> ir < 0.01132	<u>M</u> Pd < 0.01132	<u>O</u> Na 0.02008	<u>M</u> Yb < 0.00226
<u>O</u> Cr < 0.00681	<u>O</u> Fe < 0.00499	<u>O</u> P < 0.02269	<u>O</u> Sr < 0.00032	<u>M</u> Y < 0.09055
<u>M</u> Co < 0.00679	<u>M</u> La < 0.00113	<u>M</u> Pt < 0.00453	<u>O</u> S < 0.11342	<u>M</u> Zn < 0.04528
<u>O</u> Cu < 0.00454	<u>M</u> Pb < 0.00679	<u>O</u> K < 0.00771	<u>M</u> Ta 0.00200	<u>M</u> Zr < 0.01132
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 €. Do not pipet from container. Do not return portions removed for pipetting to container.

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 28.0855; +4; 6; Sl(OH)(F),² Chemical Compatibility - Soluble in HCI, HF, H₂PO₄ H₂SO₄ and HNO₅ as the Sl(OH)(F),². Avoid neutral to basic media. Unstable at ppm levels with metals that would pull F away (i.e. Do not mix with Alkaline or Rare Earths, or high levels of transition elements unless they are fluorinated). Stable with most inorganic anions with a tendency to hydrolyze forming silicic acid (silicic acid is soluble up to ~100 ppm in water) in all dilute acids except HF.

Stability - 2-100 ppb levels - stability unknown - (elone or mixed with all other metals) as the Si(OH), (F),* . 1-10,000 ppm single element solutions as the Si(OH), (F),* chemically stable for years in 2-5 % HNOs, / trace HF in a LDPE container. Si Containing Samples (Preparation and Solution) - Metal (Soluble in 1:1:1 H₂O / HF / HNOs) Oxide - SiOs, amorphic (Dissolve by heating in 1:1:1 H₂O / HF / HNOs) Oxide - quartz (Fuse in Pt*withNa₂CO₂); Geological Samples (Fuse in Pt*with Na₂CO₂) followed by HCI solution of the fuseate) Organic Matrices containing silicates and non volatile silicon compounds (Dry ash at 450 % in Pt* and dissolve by gently warming with 1:1:1 H₂O / HF / H₂Os, or fuse / ash with Na₂CO₂ and dissolve tweater with HCI / H₂O ). Silicone Oils - dimethyl silicones depolymentize to form volatile monomer units when heated (Measure directly in alcoholic KOH / xylene mixture where sample is treated first with the KOH at 60-100 % to "unzip" the Si-O-Si polymeric structure or digest with concentrated H₂SO₂H₂O₂ followed by cooling and dissolution of the dehydrated silica with HF.) Note that the direct analysis of silicone oils in an organic solvent will result in false high results due to high vapor pressure of volatile monomer units like hexamethyloycldirisiloxane. The KOH forms the K₂Si(CH₂)₂O⁻ satisful end room temperature.

- AKUINC (	Wallic Shertaerahic Hintington (175-562 prive or flacting Tanington) Areas									
Techniq	ue/Line	Estimated D.L.	Order	Type	Interferences (underlined indicates severe atvaconcs.)					
ICP-OES	251.611 nm	0.012 / 0.003 µg/mL	1	ion	Ta, U, Zn, Th					
ICP-OES	212.412 nm	0.02 / 0.01 µg/mL.	1	ion	Hf, Os, <u>Mo</u> , Ta					
ICP-OES	288.158 nm	0.03 / 0.004 µg/ml. 1	ion	<u>Ta,</u> Ce,	, Cr, Cd, Th					
ICP-MS	28 amu	4000 - 8000 ppt	na	M'	''N ₄ , "C"O					

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

- 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), Beigium (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), Pater (INSCR), Sectoral (ASAE), Discovery (ISS), Since (SI), Sectoral (ASAE), Sectoral (ISS), Sectoral (IS

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 Talpei (CNLA), Czech Republic (NAQ), 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)

INORGANIC LABS/RADCHEM LABS \$2000 DATE RECEIVED: 01/00/04 DATE EXPIRED: 00/01/2005 V05 DATE OPENED: 01/20/04 INORG: 4437 PO: F50203

### 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: February 24, 2003

**Expiration Date:** 

EXPIRES 122005

### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:	JoAnn Struthers, QA Administrative Assistant	+
Certificate Approved By:	Katalin Le, QC Supervisor	E] K
Certifying Officer:	Paul Gaines, Chemist, Senior Technical Director	D

File Statler Entren an

### 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

### CUSTOM-GRADE SOLUTION

Catalog Number: CGTI1-1, CGTI1-2 and CGTI1-5

Lot Number: T-TI02039

Starting Material: Starting Material Purity: Starting Material Lot No:

### 1000 $\mu$ g/mL Titanium in 1.4% HNO₃ (abs) tr. HF

This standard should not be prepared or stored in glass.

	INORGANIC LABS/RADCHEM LABS
	DATE RECEIVED: 11/24/03
Titanium Metal	DATE EXPIRED: 13/01/2004 VO
99.999%	DATE OPENED: NO563
F29I14	INDRG: 4332 PD: F52279

Uncertainty  $(\pm) = 2[(\sum_{s,j})^{2}]^{1/2}$ 

### CERTIFIED CONCENTRATION: 1010 $\pm$ 3 $\mu$ g/mL

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 (
$$\hat{x}$$
) =  $\frac{\sum x_i}{n}$ 

 $x_i$  = individual results n = number of measurements

 $\sum S_i$  = The summation of all significant estimated errors.

Calculated Value: 1002 µg/mL Method: Calculated, based on starting material.

Instrument Analysis: 1010  $\pm$  3 µg/mL (Average of 3 runs) Method: Inductively Coupled Plasma Spectroscopy (ICP) vs NIST SRM 3162a.

### TRACE METALLIC IMPURITIES DETERMINED BY ICP-MS AND ICP-OES IN µg/mL:

Custom-Grade solutions tested for trace metallic impurities by ICP-MS were analyzed in an ULPA-Filtered Clean Room. An ULPA-Filter is 99.9985% efficient for the removal of particles down to 0.3  $\mu$ m.

~		40.010		<b>D</b>	40.00000			< 0.0010		Pr	< 0.000030		Te	< 0.0030
Q	AI	<0.010	M	Dγ	<0.00060	M	u	<0.0010	M	r(	< 0.000030	M	18	<0.0030
M	Sb	< 0.000050	M	Er	< 0.00050	М	Lu	< 0.000040	M	Re	<0.00010	M	ть	<0.000030
M	As	<0.0010	м	Eu	< 0.00030	<u>0</u>	Mg	< 0.020	M	Rh	< 0.00010	M	П	< 0.00010
Μ	Ba	<0.0010	м	Gd	< 0.00010	M	Mn	0.0020	M	Rb	< 0.00010	М	Th	< 0.00010
M	Be	< 0.000050	M	Ga	< 0.00010	<u>0</u>	Hg	<0.050	M	Ru	<0.00020	M	Tm	<0.000040
M	Bi	< 0.000040	M	Ge	< 0.00060	M	Мо	< 0.00020	<u>M</u>	Sm	< 0.00010	M	Sn	<0.00050
Q	₿	<0.050	Μ	Au	< 0.00030	M	Nd	< 0.00020	<u>0</u>	Sc	<0.0020	5	Ti	
M	Cd	< 0.00030	M	Hf	< 0.00020	0	Ni	< 0.050	Q	Şe	<0.40	M	W	<0.0010
₽	Са	< 0.010	M	Но	< 0.000050	М	Nb	< 0.000050	Q	Si	<0.010	M	U	<0.00020
M	Ce	< 0.00050	Q	In	< 0.020	<u>n</u>	Os		₩	Ag	<0.00020	M	V	<0.00020
M	Cs	<0.000030	М	lr 🛛	< 0.00050	М	Pd	< 0.00050	Q	Na	0.12	<u>M</u>	Yb	<0.00010
М	Cr	<0.00050	<u>o</u>	Fe	<0.010	i	P		M	Sr	< 0.000050	M	Y	<0.0040
M	Co	<0.00030	M	La	< 0.000050	M	Pt	<0.00020	L	S		M	Zn	0.19
õ	Cu	<0.040	М	Pb	<0.00030	n	К	0.23	М	Ta	<0.00070	M	Zr	<0.00050
м -	chec	ked by ICP-MS	0 - c	heck	ed by ICP-OES	i-sp	ectra	l interference	rı - no	t che	cked for	s - solution	stand	ard element

ANALYZED DENSITY OF SOLUTION (measured at 22°C): 1.011 g/mL QA:KL my Distant



(over)

Paul R. Acines

Quality Assurance Manager

Expires:



### QUALITY STANDARD DOCUMENTATION

1. ISO 9001:2000 QMI Registered Quality System (Certificate Number 010105)



Members of IQ Net : 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), Spein (AENOR), Switzerland (SQS)

- 2. ISD/IEC Guide 34-2000 "General Requirements for the Competence of Reference Material Producers" Reference Materials Production - Accredited A2LA Certificate 883.02
- ISO/IEC17025-1999 "General Requirements for the Competence of Testing and Calibration" Chemical Testing -Accredited A2LA Certificate 883.01
- 4. MIL-STD-45662A
- 5. 10CFR50 Appendix B Nuclear Regulatory Commission Domestic Licencing of Production and Utilization Facilities
- 10CFR21 Nuclear Regulatory Commission Reporting Defacts and Non-Compliance Please contact our Quality Assurance Department for further information and copies of documents pertaining to our Quality Standard certifications.

### STABILITY/ EXPIRATION DOCUMENTATION

Shelf Life -

The length of time that a properly stored and packaged standard will remain within the specified uncertainty. Shelf life is affected by chemical stability and transpiration issues. Inorganic Ventures' Standard Solutions are chemically stable indefinitely. Transpiration loss is linear with time and limits the time a standard can be used with confidence. The smaller the bottle the higher the rate of transpiration. Inorganic Ventures' studies indicate that the shelf life of our 500 mL bottle is 4 years and the shelf life of our 125 mL bottle is 21 months.

**Expiration Date -**

The date after which a standard solution should not be used. A one year expiration date recommended by most state and federal regulatory agencies. Transpiration issues a repeated use of solutions over a one year period may adversely affect the integrity of the standard.

### PACKAGING DOCUMENTATION

Purified acid, 18 megohm double deionized water that has been filtered through a 0.2 µm filter and in-house procedure IV-PACK-001 is used to clean all bottles. Contact us for technical information relating to contamination issues in packaging materials.

#### GLASSWARE CALIBRATION

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

#### **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 428359B and 454678. 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 analytical weight set. These weights are tested annually by a NIST / NVLAP accredited calibration lab. The NIST test number is 822/260017-8.

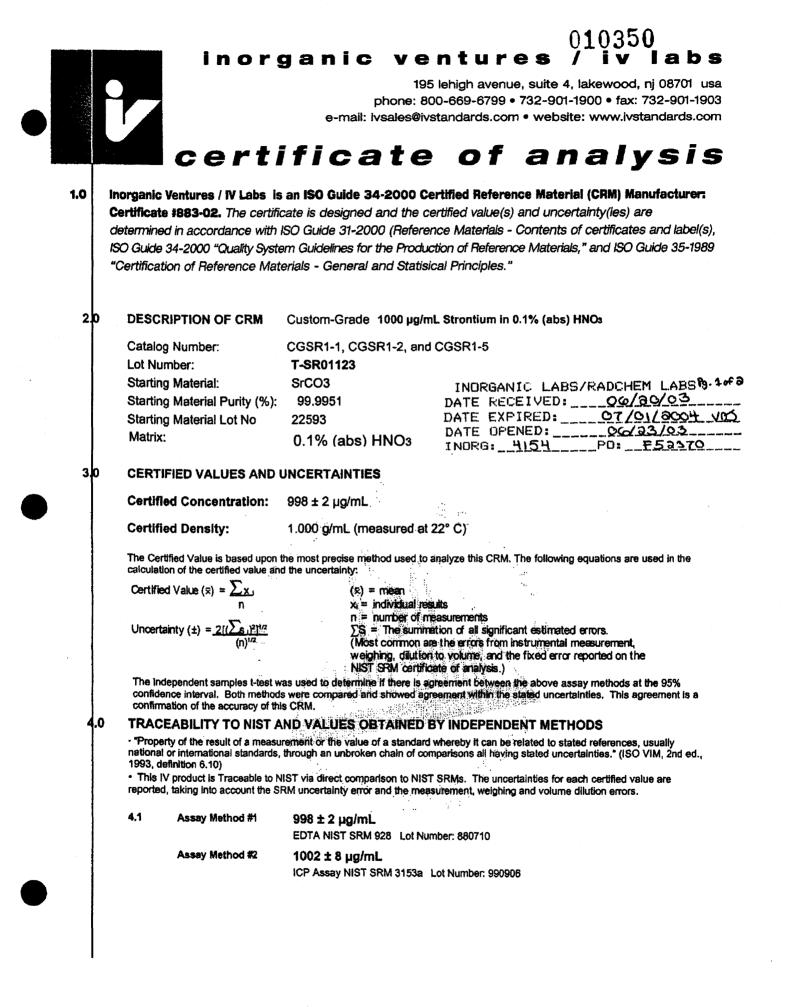
#### THERMOMETER CALIBRATION

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.

#### TECHNICAL SUPPORT

All customers are encouraged to contact us for technical support for the proper use of our products.

TEL 1-800-569-6799 INT'L 1-732-901-1900 FAX 1-732-901-1903 E-MAIL IVtech@ivstandards.com



- BALANCE CALIBRATION All balances are checked daily using in-house procedure number 6-IMM-001. The weights used 4.2 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.
- THERMOMETER CALIBRATION The thermometers used in the determination of the final densities are calibrated vs standard 4.3 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.
- GLASSWARE CALIBRATION In-house procedure 3-QC-002 is used to calibrate all Class A Glassware used in the 4.4 manufacture and quality control of Custom Grade Standards.

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

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.

	2	1	1	1
<u>Q</u> AI < 0.00090	<u>M</u> Dy < 0.00600	Q U < 0.00003	M Pr < 0.00030	Q Te < 0.10000
<u>M</u> SD < 0.00050	<u>M</u> Er < 0.00500	M Lu < 0.00040	<u>M</u> Re < 0.00100	<u>M</u> Tb < 0.00030
<u>O</u> As < 0.00500	<u>M</u> Eu < 0.00300	Q Mg 0.00037	<u>O</u> Rh < 0.00600	M TI < 0.00100
<u>M</u> Ba 0.04001	M Gd < 0.00100	Q Mn 0.00018	l Rb	M Th ≤ 0.00100
<u>Q</u> Be < 0.00009	<u>M</u> Ga < 0.00100	Q Hg < 0.01500	<u>Q</u> Ru < 0.00300	<u>M</u> Tm < 0.00040
<u>M</u> BI < 0.00040	<u>M</u> Ge < 0.00600	<u>M</u> Mo < 0.00200	<u>M</u> Sm < 0.00100	<u>M</u> Sn < 0.00500
<u>o</u> b < 0.00060	<u>M</u> Au < 0.00300	M Nd < 0.00200	M Sc < 0.01000	<u>M</u> Ti < 0.05001
<u>M</u> Cd < 0.00300	<u>M</u> Hf < 0.00200	<u>Q</u> NI < 0.00300	<u>Q</u> Se < 0.05000	<u>M</u> W < 0.01000
Q Ca 0.03600	<u>M</u> Ho < 0.00050	M Nb < 0.00050	Q Si 0.00056	M U < 0.00200
<u>M</u> Ce < 0.00500	Q In < 0.00200	n Os	M Ag < 0.00200	<u>M</u> ∨ < 0.00200
<u>M</u> Cs < 0.00030	<u>M</u> ir < 0,00500	Q Pd < 0.00400	Q Na 0.00520	M Yb < 0.00100
<u>Q</u> Cr < 0.00080	Q Fe 0.00080	Q P < 0.00480	<u>ş</u> Sr	<u>Q</u> Y < 0.00004
<u>M</u> Co < 0.00300	<u>M</u> La < 0.00050	M Pt < 0.00200	n S	<u>M</u> Zn < 0.02000
Q Cu < 0.00140	<u>M</u> Pb < 0.00300	<u>0</u> K < 0.00170	<u>M</u> 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

#### **INTENDED USE** 6:0

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 - 87.62; +2; 6; Sr(H₂O),**

Chamical Compatibility - Soluble in HCl, and HNO,. Avoid H, SO., HF and neutral to basic media. Stablewith 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, / LDPE container. 1-10,000 ppm solutions chemically stable for years in 1 - 3.5% HNO, / LDPE container.

Sr Containing Samples (Preparation and Solution) - Metal (Best dissolved in diluted HNO₂); Ores (Carbonate fusion in Pt^o followed by HCI dissolution); Organic Matrices (Dry ash and dissolution in dilute HCI). Atomic Spectroscopic Information (ICP-OES D.L.s are given as <u>radial/axial</u> view):

Lentile absorbed and big i				
Technique/Line	Estimated D.L.	Order	Tvoe	Interferences (underlined indicates severe at = concs.)
T NALIS IN MARINELING	A DELLARMONT MALERIA			The state of the s
100 000 107 774 mm	0.0004 / 0.00006 µg/mL	4	ion i	U. Ce
ICP-OES 407.771 nm	0.0004 / 0.00000 pgmL	1	ion	

ICP-OES 407.771 nm	0.0004 / 0.00006 µg/mL	1	ion	U, Ca
ICP-OES 421,552 nm	0.0008 / 0.00004 µg/mL	1	ion	Rb
ICP-OES 460.733 nm	0.07 / 0.003 µg/mL	1	atom	Ce
ICP-MS 88 amu	1200 ppt	n/a	M	⁷³ Ge ¹⁰ O, ¹⁷⁰ Yb ¹² , ¹⁷ 4Lt ² , ¹⁷ 4H 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), Belglum (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 Regularements for the Competence of Testing and Calibration" - Chemical Testing - Accredited A2LA Certificate Number 883.01 ACCREDITED 10.3 ISO/IEC Guide 34 - 2000 "General Regulrements for the Competence of Reference Material Producers" - Reference Materials Production - Accredited A2LA Certificate Number 883.02 A2LA Mutual Recognition Agreement Partners: Australia (NATA), Austria (BriwA), 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 property 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 31, 2002

Expiration Date:

EXPIRES 012004

INORGANIC LABS/RADCHEM LABS - 2 - 42 DATE RECEIVED: 06/20/03 DATE EXPIRED: 07/01/2004 VO DATE OPENED: 06/23/03 INORG: 4154 PO: 53370



#### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By:

-----

Debbie Newman, QA Administrator

Certificate Approved By:

Katalin Le, QC Supervisor

Heblie Neuman Known in Paul Hains

Certifying Officer:

Paul Gaines, Chemist, Senior Technical Director



### 010354 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 Tin in H20 tr. HNO3 tr. HF

Catalog Number:	CGSN1-1, CGSN1-2, and CGSN1-5
Lot Number:	X-SN01115
Starting Material:	Sn Shot
Starting Material Purity (%):	99.999438
Starting Material Lot No	G12M23
Matrix:	H20 tr. HNO3 tr. HF

### 3.0 CERTIFIED VALUES AND UNCERTAINTIES

calculation of the certified value and the uncertainty:

Certified Concentration:995 ± 2 µg/mLCertified Density:0.998 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

Certified Value (C) =  $\frac{2r x}{n}$ 

Uncertainty  $(\pm) = 2[(2r_{5})^{2}]^{1/2}$ 

(C) = mean x₁ = individual results n = number of measurements IIS = 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 SFM certificate of analysis.)

### 4.0 TRACEABILITY TO NIST AND VALVES 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 As	say Method #1	995	± 2	µg/mL	(Avg	2 runs)	
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998 µg/mL

ICP Assay NIST SRM 3161a Lot Number: 993107

Assay Method #2

Gravimetric NIST SRM Lot Number: See Sec. 4.2

INORGANIC LABS/RADCHEM LABS PS. 1 of a

DATE	RECEIVED	: 03/30/04
DATE	EVPTPET).	04/01/2005 V05
DATE	OPENED:	03/30/04
INDRO	i: 4512	PO:E5336L

- 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.

<u>0</u>	AI		0.00050	М	Dy	<	0.01205	Q	Li	<	0.00002	M	Pr	<	0.00060	M	Те	<	0.06026
<u>0</u>	Sb	<	0.01000	M	Er	<	0.01004	М	Lu	<	0.00080	M	Re	<	0.00201	м	ть	<	0.00060
Μ	As	<	0.02009	М	Eu	<	0.00603	Q	Mg	<	0.00003	M	Rh	<	0.00201	М	TI	<	0.00201
Q	Ba	<	0.00070	M	Gd	<	0.00201	М	Mn	<	0.00804	M	Rb	<	0.00201	M	Th	<	0.00201
М	Be	<	0.00100	М	Ga	<	0.00201	Q	Hg	<	0.01500	M	Ru	<	0.00402	M	Tm	<	0.00080
М	Bi	<	0.00080	М	Ge	<	0.01205	М	Мо	<	0.00402	М	Sm	<	0.00201	2	Sn		
Q	в	<	0.01200	M	Au	<	0.00603	М	Nd	<	0.00402	М	Sc	<	0.02009	м	Ti	<	0.10043
Q	Cd		0.00009	M	Hf	<	0.00402	Q	Ni	<	0.01000	М	Se	<	0.01607	M	w	<	0.02009
<u>0</u>	Ca	<	0.00150	м	Но	<	0.00100	М	Nb	<	0.00100	Q	Si	<	0.00340	M	U	<	0.00402
М	Ce	<	0.01004	М	In	<	0.02009	Ū	Os			M	Ag	<	0.00402	М	v	<	0.00402
М	Cs	<	0.00060	М	lr	<	0.01004	М	Pd	<	0.01004	Q	Na	<	0.00010	M	Yb	<	0.00201
M	Cr	<	0.01004	Q	Fe	<	0.00110	Q	P	<	0.00500	М	Sr	<	0.00100	M	Y	<	0.08035
Q	Co	<	0.00200	M	La	<	0.00100	М	Pt	<	0.00402	n	S			М	Zn	<	0.04017
М	Cu	<	0.01205	М	Pb		0.00593	Q	κ	<	0.00200	М	Ta	<	0.01406	M	Zr	<	0.01004
M - C	heck	ed	by ICP-MS	0-	Chec	kea	by ICP-OES	i - S	pectr	al I	nterference	n - 1	Not C	hec	ked For	<b>s</b> - :	Soluti	on s	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 %. Do not pipet from container. Do not return portions removed for pipetting to container.

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 118.710; +4; 4,5, 6,7,8 Sn(OH),F,*

Chemical Compatibility - Soluble in HCI and dilute HF / HNO, Avoid neutral to basic media. Unstable at ppm levels with metals that would pull F away. (i.e. Do not mix with Alkaline or Rare Earths or high levels of transition elements unless they are fluorinated.) Stable with most inorganic anions provided it is in the chemical form shown above.

Stability - 2-100 ppb levels stable (alone or mixed with all other metals that are at comparable levels) as the Sn(OH), F, * tor 1 year in 1% HNO, / LDPE container. 1-10,000 ppm single element solutions as the Sn(OH), F, * chemically stable for years in 2-5% HNO, / trace HF in a LDPE container.

Sn Containing Samples (Preparation and Solution) - Metal (Solutie In HF /HNO, or HCI); Oxides - SnO (soluble in HCI), SnO, -very resistant to all acids including HF (Fusion with equal parts of Na₂CO, and S. It is then soluble in water or dilute acids as the thiostamate.); Alloys (Treat first 0.1 g with 10 mL conc. H, SO, to boiling until the alloy disintegrates and nearly all of the sulfuric acid is expelled. Then add 100 mL O, free water and 50 mL of conc HCI or transfer to a plastic container and add 1 mL HF in either case warming gently to bring about solution.); Organic Matrices (Volatility and precipitation of the insoluble stannic oxide are problems. Consultation of the literature should be made for individual matrices / Sn compounds.)

### 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 valid const.)

 ICP-OES
 189.989 nm
 0.03 / 0.003 µg/mL
 1
 Ion

 ICP-OES
 242.949 nm
 0.1 / 0.01 µg/mL
 1
 atom
 W, Mo, Rh, Ta, Co

 ICP-MS
 120 amu
 5 ppt
 n/a
 M*
 '*Te, '*Ru*O, '*Pd*O

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

- 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)



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)

INORGANIC LABS/RADCHEM LABS/Rada DATE RECEIVED: 03/30/04 DATE EXPIRED: 04/01/2005 V03 DATE DPENED: 03/30/04 INORG: 45/2 PD: 5336]



- 11.1 IV Shelf Life The period of time during which the concentration of the analyte(s) in a property 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: February 11, 2004

**Expiration Date:** 

010357

#### 12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

**Certificate Prepared By:** JoAnn Struthers, QA Administrative Assistant

**Certificate Approved By:** Katalin Le, QC Manager

**Certifying Officer:** 

Paul Gaines, Chemist, Senior Technical Director

folm Stutten Knowen an Pauk Aain



### 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@lvstandards.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 Bismuth in 3.5% (abs) HNO3

Catalog Number:	CGBI1-1 and CGBI1-5
Lot Number:	W-BI01089
Starting Material:	Bi needles
Starting Material Purity (%):	99.999090
Starting Material Lot No Matrix:	G25L16 3.5% (abs) HNO₃

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DATE RECEIVE DATE EXPIRED	D: 07/31/0	3
DATE EXPIRED	08/01/	2004 100
DATE OPENED:	: 08/01/0	33
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3.0

Certified Concentration: 1002 ± 4 µg/mL

**CERTIFIED VALUES AND UNCERTAINTIES** 

Certified Density: 1.026 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 ( $\Box$ ) =  $\underline{grx}$ ,<br/>n( $\Box$ ) = mean<br/>x, = individual results<br/>n = number of measurementsUncertainty (±) =  $\underline{2[(\underline{grs})]^{1/2}}$ <br/>(n) ^{1/2} $\blacksquare$ S = The summation of all significant estimated errors.<br/>(Most common are the errors from instrumental measurement,<br/>weighing, dilution to volume, and the fixed error reported on the<br/>NIST SFM 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 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	1002 ± 4 µg/mL (Avg 2 runs)
		ICP Assay NIST SRM 3106 Lot Number: 991212
	Assay Method #2	1002 µg/mL
		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 weights et. These weights are tested annualty 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.

<u>O</u> AI 0.00012	<u>M</u> Dy < 0.01202	<u>Q</u> Li < 0.00002	<u>M</u> Pr < 0.00060	<u>M</u> Te < 0.06008
<u>M</u> Sb < 0.00100	<u>M</u> Er < 0.01001	<u>M</u> Lu < 0.00080	<u>M</u> Re < 0.00200	<u>M</u> Tb < 0.00060
<u>M</u> As < 0.02003	<u>M</u> Eu < 0.00601	<u>O</u> Mg 0.00070	<u>M</u> Rh < 0.00200	<u>M</u> TI < 0.00200
<u>M</u> Ba < 0.02003	<u>M</u> Gd < 0.00200	<u>O</u> Mn < 0.00020	<u>M</u> Rb < 0.00200	<u>M</u> Th < 0.00200
<u>M</u> Be < 0.00100	<u>M</u> Ga < 0.00200	<u>O</u> Hg < 0.01500	<u>M</u> Ru < 0.00401	<u>M</u> Tm < 0.00080
<u>s</u> Bi	<u>M</u> Ge < 0.01202	<u>M</u> Mo < 0.00401	<u>M</u> Sm < 0.00200	<u>M</u> Sn < 0.01001
<u>M</u> B < 0.14018	<u>M</u> Au < 0.00601	<u>M</u> Nd < 0.00401	<u>M</u> Sc < 0.02003	<u>M</u> Ti < 0.10013
<u>O</u> Cd 0.00017	<u>M</u> Hf < 0.00401	<u>M</u> NI < 0.01602	<u>M</u> Se < 0.01602	<u>M</u> W < 0.02003
<u>O</u> Ca 0.00245	<u>M</u> Ho < 0.00100	<u>M</u> Nb < 0.00100	<u>O</u> SI 0.00105	<u>M</u> U < 0.00401
<u>M</u> Ce < 0.01001	<u>O</u> In 0.00105	<u>n</u> Os	<u>M</u> Ag < 0.00401	<u>M</u> V < 0.00401
<u>M</u> Cs < 0.00060	<u>M</u> ir < 0.01001	<u>O</u> Pd < 0.00400	<u>O</u> Na 0.00240	<u>M</u> YD < 0.00200
<u>O</u> Cr 0.00020	<u>O</u> Fe 0.00014	<u>O</u> P < 0.01000	<u>M</u> Sr < 0.00100	<u>M</u> Y < 0.08011
<u>M</u> Co < 0.00601	<u>M</u> La < 0.00100	<u>M</u> Pt < 0.00401	<u>o</u> s < 0.03000	<u>O</u> Zn 0.00008
<u>O</u> Cu 0.00014	<u>O</u> Pb 0.00135	<u>O</u> K 0.00039	<u>M</u> Ta < 0.01402	<u>M</u> Zr < 0.01001
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 - Keeptightly sealed when not in use. Store and use at 20 ± 4 %. Do not pipet from cortainer. Do not return portions removed for pipetting to cortainer.

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 208.9604; +3, 6 ;Bi(O)(H,O)."

Chemical Compartibility - Stable in HCI, HNO, , H, SO, and HF. Avoid basic media forming insoluble hydroxide. Stable with most metals and inorganic anions in acidic media. Many saits that are insoluble in water are soluble in HCI, HNO, and HF. The major problem with Bif is its tendency to hydrolyze at higher concentrations or in dilute acid. Nitric acid solutions should be 5% to hold the Bi in solution in the 100 to 10000 µa/mL concentration range

Stability - 2-100 ppb levels stable for months in 1 % HNO, /LDPE container. 1-10,000 ppm solutions chemically stable for years in 5 - 7% HNO, / LDPE container.

Bi Containing Samples (Preparation and Solution) - Metal (soluble in HNO, ); Oxides (Soluble in HNO, ) Alloys (Dissolve in conc. 4:1 HCI (HNO). Heating may be required.); Organic based (dry ash at 450 °C and dissolve ash in HNO, or acid digestion with conc, hot sulfuric acid adding hydrogen peroxide dropwise and carefully until clear.)

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

	underlined indicates severe at aboncs.)
ICP-OES 223.061 nm 0.0470.005 µg/mL 1 atom Th, Ir, TI Cu	
ICP-OES 306.772 nm 0.08 / 0.01 µg/mL 1 etom Th, U, Zr, Hf,	Fe
ICP-OES 222.825 nm 0.1 / 0.02 µg/mL 1 atom Cr, Hf, Ce, Os	
ICP-MS 209 amu 2 ppt n/a M' ^w ir#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)

INORGANIC LABS/RADCHEM LABS 3 2013 DATE RECEIVED: 07/31/03 DATE EXPIRED: 08/01/2004 VOD DATE OFENED: 08/01/03 INDRG: 4200 PD: 453383









- 11.1 IV Shelf Life The period of time during which the concentration of the analyte(s) in a property packaged, unopened, and unused standard stored under environmentally controlled and monitored conditions will remain within the specified uncertainty range. Shelf #fe 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: March 28, 2003

**Expiration Date:** 

EXPIRES

#### NAMES AND SIGNATURES OF CERTIFYING OFFICERS 12.0

**Certificate Prepared By:** 

**Certifying Officer:** 

Katalin Le, QC Supervisor

**Certificate Approved By:** 

Paul Gaines, Chemist, Senior Technical Director

JoAnn Struthers, QA Administrative Assistant

Jolden Stutten Known an Pauk Aain

SOUTHWEST RESEARCH INSTITUTE NUCLEAR PROJECT CLIENT: Division 20 TASK ORDER: 040521-6 SRR: 25943 SDG: 245108 CASE: CNWRA VTSR: May 20, 2004 PROJECT#: 06002.01.141

# **Pipette Calibrations**

03 031 Book/Page: 010363 ASwRI – Div. 01, Inorganic Labs' Fixed Volume Pipette Verification Log (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	1.0088	1.0069	1.0055	1.01	100.71	
TMA1	1000	1.0043	1.0018	1.0023	1.00	100.28	
TMA2	1000	1.0064			1.01	100.54	-
TMA3	1000	OUT	OF	SERVICE			i
TMA6	1000	NOT	FOUND				Î
TMB1	900	0.9014	0.9018		0.90	100.14	Ì
TMC1	800	0.7999	0.8004		0.80	100.07	
TMDD1	750	0.7543			0.75	100.50	
TMD1	700	0.6974			0.70	99.31	
TMD2	700	0.7059			0.71	100.81	
TME1	600	0.5979	0.5961	0.5948	0.60	99.38	
TMF2	500	0.5	0.4965	9.4956 0.4969	0.50	99.50 99.55 000	1/01/04
TMF5	500	0.5039		Su 1-040.5022	0.50	100.64	
ICF1	500	0.4974		0.4954	0.50	99.33	
L30-500	500	0.5038			0.50	100.42	
TMG3	400	0.3941	0.3949		0.39	98.69	
TMH1	300	OUT	OF	SERVICE			
TMH2	300	0.2974	0.2971	0.2959	0.30	98.93	
TMJ1	250	0.2484	0.248	0.2481	0.25	99.27	
TMJ2	250	0.2487	0.2484	0.2485	0.25	99.41	
TMJ3	250	0.2501	0.2495	0.2491	0.25	99.83	
TMK2	200	0.2007	0.2007	0.2006	0.20	100.33 99.13	
TML1	150	0.1487	0.1488		0.15	100.39	
TMM1	120	0.1206			0.12	100.03	
TMN3	100	0.1001	0.1	0.1	0.10		
ICN1	100	0.1005		0.1009	0.10	100.63 99.83	
TMQ1	80	0.08			0.08	99.00	
TMR1	70		OF	SERVICE			
TMS1	60	OUT	OF	SERVICE			
LAB-30A	50	NOT	FOUND	0.0403	0.04	99.92	
<u>TMU1</u>	40	0.0398			0.04	99.00	
TMU2	40	0.0397	0.0396	and the second se	0.04	98.89	
TMV1	30	0.0297	0.0296		0.03	101.33	
L30-20	20	0.0203	0.0203	and the second se	0.02	101.33	
TMW1	25	0.0253	0.0249 OF	SERVICE	0.03	100.27	
TMY1	15	OUT			L		

### FRM-246 (Rev 1/Mar 03)

Balance #:	Thermo	ometer #: <u>6011</u>	diH20 Tempera	ture (°C):/
Eppendorf #	True Value (µL)	1st Reading (g)	2nd Reading (g)	3rd Reading (g)
Lab30	1000	1.008%	1.0069	1.0055
TMA1	1000	1.0043	1.0018	1.0023
TMA2	1000	1.0064	1.005	1.0048
TMA3	1000	Out	ØF	SEVIC
TMA6	1000	NOT	Found	
TMB1	900	,9014	.9018	.9005
TMC1	800	7999	,8004	8014
TMDD1	750	.7543	,7532	.7538
TMD1	700	10974	, 10946	169360
TMD2	700	,7059	.7054	,7058
TME1	600	5979	5961	,5948
TMF2	500	,5000	,49.570	.49109
TMF5	500	,5039	. 5035	.5022
ICF1	500	4974	. 4971	4954
L30-500	500	,5038	. 50/5	,5010
TMG3	400	. 3941	3919	,3953
TMH1	300	Out	DF-	SERVICE
TMH2	300	2974	,2971	, 2959
TMJ1	250	,2484	.2480	,2481
TMJ2	250	2487	,2484	2485
TMJ3	250	,2501	2495	12491
TMK2	200	.2007	.2007	2006
TML1	150	1487	.1484	1486
TMM1	120	,1204	,1206	.1202
TMN3	100	,1001	,/000	.1000
ICN1	100	,1005	.1005	./009
TMQ1	80	.0800	,0797	.0799
TMR1	70	out	et	Service
TMS1	60	out	AF	Service
AB-30A	50	NOT	Found	
TMU1	40	0398	,0398	.0403
TMU2	40	0397	,0394	10395
TMV1	30	0297	,0296	,0297
L30-20	20	,0203	,0203	. 0202
TMW1	25	.0253	0249	,0250
TMY1	15	Out	.0249 8F	Strvie
	(1,0)		5-28-04	

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SwRI – Div. 01, Inorganic Labs' Adjustable Volume Pipette Verification Log (Space provided for Inorganic Laboratories' Adjustable Volume Pipette Verification Spreadsheet) 010365

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	0.0203	0.0204	0.0201	0.020	101.33
ADJ200-A	100	0.0990	0.0997	0.1001	0.100	99.60
	200	0.1993	0.1991	0.1990	0.199	99.57
	20	0.0202	0.0202	0.0201	0.020	100.83
ADJ200-C	100	0.0991	0.0985	0.0980	0.099	98.53
	200	0.1987	0.1991	0.1991	0.199	99.48
	20	0.0203	0.0202	0.0202	0.020	101.17
ADJ200-D	100	0.0989	0.0996	0.0993	0.099	99.27
	200	0.1989	0.1998	0.1999	0.200	99.77
	20					
ADJ200-G	100					
	200					
	20					
ADJ200-H	100					
	200					
	20					•
ADJ200-J	100					
	200					
	20	0.0204	0.0203	0.0200	0.020	101.17
ADJ200-K	100	0.0999	0.0993	0.0998	0.100	99.67
	200	0.2021	0.2001	0.2000	0.201	100.37
	20					
ADJ200	100					
	200					
	20					
ADJ200	100					
	200					

FRM-247a (Rev 4/Apr 04)

Bal	ance #: <u>34</u>	_ Thermometer #	:G.O.LI	diH20 Tempera	ature (° C)
Γ	Eppendorf #	True Value (µL)	1 st Reading (g)	2 nd Reading (g)	3 rd Reading (g)
		20	,0203	,0204	,0201
Γ	ADJ200-A	100	. 0990	. 0997	./00/
Γ		200	, 1993	- 1991	1990
Γ		20	.0202	, 0202	.0201
Γ	ADJ200-C	100	. 0991	,0985	. , 0980
Γ		200	. 1987	, 1991	.1991
Γ		20	.0203	,0502	.0202
	ADJ200-D	100	. 1989	,0996	, 0993
		200	. 1989	.1998	, 1.999
J		20			
	ADJ200-G	100			
]		200			
E		20			
J	ADJ200-H	100		026-11-04	
L		200		Carlor.	
2		20		A	
1	ADJ200-J	100		0	
L		200			
		20	. 0204	. 0203	,0200
	ADJ200-K	100	.0999	. 0993	.0998
		200	.2021	, 2001	, 2000
		20			
	ADJ200	100		Jer 6-11-04	
		200		7	

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Date: 6-11-04 Date: 06/30/04

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SwRI – Div. 01, Inorganic Labs' Adjustable Volume Pipette Verification Log

(Space provided for Inorganic Laboratories' Adjustable Volume Pipette Verification Spreadsheet)

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Worth A. Malgeli' 06/11/04 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				1. A.	
	200					
	20	*				
ADJ200-D	100					
	200					
	20	0.0201	0.0200	0.0198	0.020	99.83
ADJ200-G	100	0.0985	0.0982	0.0988	0.099	98.50
	200	0.1973	0.1975	0.1996	. 0.198	99.07
	20	0.0203	0.0204	0.0204	0.020	101.83
ADJ200-H	100	0.0996	0.0989	0.0994	0.099	99.30
	200	0.1992	0.2006	0.1999	0.200	99.95
	20	0.0204	0.0203	0.0203	0.020	101.67
ADJ200-J	100	0.0991	0.0991	0.0985	0.099	98.90
	200	0.1984	0.1985	0.1982	0.198	99.18
	20					
ADJ200	100					
	200					
	20					
ADJ200	100					
	200					
	20					
ADJ200-K	100					
	200					

FRM-247a (Rev 3/Oct 03)

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SwRI Div. 01 - Inorganic Laboratory Adjustable Pipette Verification Log

B	SWRI DIV. 01 ·	- Inorganic Laboi	ratory Adjustadi *:	diH20 Tempera	ature (° C) $010368$
	Eppendorf #	True Value (µL)	1 st Reading (g)	2 nd Reading (g)	3 rd Reading (g)
		20			
	ADJ200-A	100			
		200		1	
		20		c.LHT	
	ADJ200-C	100		1401	
		200	1	AF .	
		20	to	•	
	ADJ200-D	100			
E	·	200			
0		20	0.0201	0.0200	0.0198
200	ADJ200-G	100	0.0985	0.0982	0.0988
2		200	0.1973	0.1975	0.1996
		20	0.0203	0.0204	0.0204
	ADJ200-H	100	0.0996	0.0989	0.0994
E		200	0,1992	0.2006	0.1999
20		20	0.0204	0.0203	0.0203
2	ADJ200-J	100	0.0991	0.0991	0.0985
		200	0.1984	0.1985	0.1982
		20			
	ADJ200-K	100		trrli	
		200		LACHT	
	•	20	24	4001	
	ADJ200	100	10''		
	· · · · · · · · · · · · · · · · · · ·	200			

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Date: Date: 04

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SwRI – Div. 01, Inorganic Labs' Adjustable Volume Pipette Verification Log (Space provided for Inorganic Laboratories' Adjustable Volume Pipette Verification Spreadsheet) 010369

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	0.1019	0.1020	0.1018	0.102	101.90
ADJ1000-C	500	0.4963	0.4968	0.4985	0.497	99.44
	1000	0.9940	0.9957	0.9951	0.995	99.49
	100	0.1006	0.1004	0.0994	0.100	100.13
ADJ1000-D	500	0.4959	0.4991	0.4962	0.497	99.41
	1000	0.9956	1.0002	0.9989	0.998	99.82
	100	0.0998	0.0999	0.0999	0.100	99.87
ADJ1000-E	500	0.4965	0.4994	0.4956	0.497	99.43
	1000	0.9968	0.9942	0.9949	0.995	99.53
	100	0.1008	0.1009	0.1013	0.101	101.00
ADJ1000-F	500	0.4958	0.4962	0.4973	0.496	99.29
	1000	0.9947	0.9952	0.9958	0.995	99.52
	100					
ADJ1000-G	500					
	1000					
	100					
ADJ1000-H	500					
	1000					
	100					
ADJ1000-J	500					
	1000					
	100	0.1011	0.1012	0.1015	0.101	101.27
ADJ1000-K	500	0.4977	0.4974	0.4960	0.497	99.41
	1000	1.0009	1.0002	0.9993	1.000	100.01
	100					
ADJ1000	500					
	1000					

FRM-247b (Rev 3/Apr 04)

06 090 Book/page:___

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# SwRI Div. 01 – Inorganic Laboratory Adjustable Pipette Verification Log 10370

Balance #: ______4

Thermometer #: <u>G-011</u> diH20 Temperature (° C) <u>J</u>

Г	Eppendorf #	True Value (µL)	1 st Reading (g)	2 nd Reading (g)	3 rd Reading (g)
		100	, 10/9	,1020	1018
F	ADJ1000-C	500	.4963	. 4968	, 4985
ſ		1000	. 9940	. 9957	.9951
Γ	·	100	, 1006	,1004	. 0994
Γ	ADJ1000-D	500	.4959	. 4991	4962
ſ		1000	,9956	1.0002	.9989
].		100	. 0998	. 0999	.0999
	ADJ1000-E	500	. 4965	,4994	. 4956
		1000	, 9968	.9942	. 9949
I		100	, 1008	. 1009	. 1013
O	ADJ1000-F	500	. 4958	.4962	. 4973
000		1000	.9947	.9952	.9958
2		100			
	ADJ1000-G	500			
		1000			
3		100		lo-11-0-1	
	ADJ1000-H	500		Julia	
S		1000		4	•
100	·	100			
L	ADJ1000-J	500			
		1000			
		100	.1011	.1012	,1015
	ADJ1000-K	500	. 4977	.4974	. 4960
		1000	1.0009	1.0002	,9993
	·	. 100			
	ADJ1000	500		Jev 6-11-0 J	
		1000		0	

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SwRI – Div. 01, Inorganic Labs' Adjustable Volume Pipette Verification Log

(Space provided for Inorganic Laboratories' Adjustable Volume Pipette Verification Spreadsheet)

# Women a. Maegel: 06/11/04 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					
ADJ1000-C	500					
	1000				·	
	100					
ADJ1000-D	500					
	1000				· ·	
	100					
ADJ1000-E	500					
	1000					
	100					
ADJ1000-F	500					
	1000					
	100	0.1019	0.1011	0.1020	0.102	101.67
ADJ1000-G	500	0.4943	0.4978	0.5000	0.497	99.47
4. 	1000	1.0098	1.0072	1.0066	1.008	100.79
	100	0.0998	0.1000	0.0992	0.100	99.67
ADJ1000-H	500	0.4918	0.4936	0.4959	0.494	98.75
	1000	0.9820	0.9863	0.9876	0.985	98.53
	100	0.0991	0.1001	0.1003	0.100	99.83
ADJ1000-J	500	0.4967	0.4955	0.4965	0.496	99.25
	· 1000	0.9927	0.9936	0.9923	0.993	99.29
	100					
ADJ1000	500					
	1000					
	100					
ADJ1000-K	500				-	
	1000					

FRM-247b (Rev 2/Oct 03)

Book/page: 06	094

## SwRI Div. 01 - Inorganic Laboratory Adjustable Pipette Verification Log

Balance #: ____

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Thermometer #:____

diH20 Temperature (° C) 010372

	Eppendorf #	True Value (µL)	1 st Reading (g)	2 nd Reading (g)	3 rd Reading (g)
		100			
	ADJ1000-C	500			
		1000			
		100			
	ADJ1000-D	500		ID	
		1000		INTO	
		100		aler	
	ADJ1000-E	500		200	
		1000	14		
ユ		100	HDI.		
D	ADJ1000-F	500			
2		. 1000	2		
2		100	0.1019	0.1011	0.1020
	ADJ1000-G	500	D.4943	D.4978	0.5000
•		1000	1,0098	1.0072	1. DOldo
5		100	0.0998	0.1000	0.0992
	ADJ1000-H	500	0.4918	0.4936	0.4959
5		1000	0.9820	0.9863	0.9876
		100	0.0991	0.1001	0.1003
	ADJ1000-J	500	0.4967	0.4955	0.4965
·		1000	0.9927	0.9936	0.9973
		100			$\sim$
ļ	ADJ1000-K	500			4
Ļ		1000		Dotti	~ 1
		100	1A	N	
ļ	ADJ1000	500	- tot'	-	
		1000			

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61124

SwRI – Div. 01, Inorganic Labs' Adjustable Volume Pipette Verification Log

(Space provided for Inorganic Laboratories' Adjustable Volume Pipette Verification Spreadsheet)

010373

Eppendorf #	True Value (µL)	1st Reading (g)	2nd Reading (g)	3rd Reading (g)	Avg Wt (g)	% of True Value
	500	0.4941	0.4940	0.4928	0.494	98.73
ADJ5000-C	2500	2.5032	2.5028	2.5024	2.503	100.11
	5000	5.0334	5.0356	5.0234	5.031	100.62
	500					
ADJ5000-G	2500	OUT	OF	SERVICE		
	5000					
	500					
ADJ5000-H	2500	OUT	OF	SERVICE		
	5000					
	500	0.5089	0.5091	0.5088	0.509	101.79
ADJ5000-I	2500	2.5011	2.5089	2.5092	2.506	100.26
	5000	5.0180	5.0258	5.0274	5.024	100.47
	500					
ADJ5000-J	2500					
	5000					
	500					
ADJ5000-K	2500					
	5000					
_	500				·	
ADJ5000-L	2500					
	5000					
	500	0.5022	0.4980	0.5022	0.501	100.16
ADJ5000-M	2500	2.4911	2.4930	2.4936	2.493	99.70
	5000	5.0187	5.0189	4.9959	5.011	100.22
	500	0.5050	0.5037	0.5028	0.504	100.77
ADJ5000-N	2500	2.5066	2.5033	2.5089	2.506	100.25
	5000	5.0232	5.0266	5.0249	5.025	100.50
	500					
ADJ5000	2500					
	5000					
	500					
ADJ5000	2500					
	5000				-	

SwRI - Div. 01, Inorganic Laboratory Adjustable Pipette Verification Spreadsheet

FRM-247c (Rev 3/Apr 04)

Balance #: ____

: 34

Thermometer #: <u>GO/1</u>

diH20 Temperature (° C) <u>3010</u>374

		memometer #.			
	Eppendorf #	True Value (µL)	1 st Reading (g)	2 nd Reading (g)	3 rd Reading (g)
		500	.4941	,4940	2 . 4928
	ADJ5000-C	2500	2.5032	2.5028	4-0- 5-2 2.5024
		5000	5-0334	5.0356	5-0234
		500			
	ADJ5000-G	2500	Out.	OF	Stevice
		5000			
		500			
	ADJ5000-H	2500	OUT	OF	SERVICE
		5000			•
		500	.5089	, 5091	.5088
	ADJ5000-I	2500	2.50(1	2.5089	2.5092
		5000	5-0180	5.0258	5.0274
믹		500	5. 1		
5000	ADJ5000-J	2500			
2		5000			
2		500			
ī	ADJ5000-K	2500			
'.		5000		(e) 6-11-04	
		500		Yes	
4	ADJ5000-L	2500		0	
500		5000			
3		500	,5022	4980	,5022
	ADJ5000-M	2500	2.4911	J.4930	J.4936
	·	5000	5-0187	5-0189	4.9959
		500	,5050	.5037	,5028
	ADJ5000-N	2500	2.50lele	2. 5033	J. 5089
		5000	5.0232	5.0566	5.0249
		500			
	ADJ5000	2500			
		5000			
		500		Jee 6-11-04	
	ADJ5000	2500		9	
		5000			

Analyst: Reviewed by:

Date: 6-11-0 06/30/04 Date:

FRM-244 (c) (Rev 3/Apr 04)

SwRI – Div. 01, Inorganic Labs' Adjustable Volume Pipette Verification Log

(Space provided for Inorganic Laboratories' Adjustable Volume Pipette Verification Spreadsheet)

010375

# Warran a. Naegeli Dle/11/04

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					
ADJ5000-C	2500					
	5000					
	500					
ADJ5000-G	2500					
	5000					
	500					
ADJ5000-H	2500					
	5000					
	500					
ADJ5000-1	2500					
	5000					
	500	0.5006	0.5040	0.5058	0.503	100.69
ADJ5000-J	2500	2.4968	2.4974	2.4999	2.498	99.92
	5000	4.9870	4.9977	4.9976	4.994	99.88
	500	0.4948	0.4954	0.4962	0.495	99.09
ADJ5000-K	2500	2.4969	2.4949	2.4960	2.496	99.84
	5000	5.0356	5.0067	5.0094	5.017	100.34
	500	0.5017	0.5005	0.5019	0.501	100.27
ADJ5000-L	2500	2.4897	2.4897	2.4894	2.490	99.58
	5000	4.9800	4.9833	4.9877	4.984	99.67
	500					
ADJ5000	2500					
	5000					
	500					
ADJ5000	2500					
	5000					
	500					
ADJ5000	2500					
	5000					
	500					
ADJ5000-M	2500					
	5000					

FRM-247c (Rev 2/Mar 03)

# SwRI Div. 01 – Inorganic Laboratory Adjustable Pipette Verification Log

diH20 Temperature (* C) 010376 Thermometer #:__ . . Balance #: _____ 2nd Reading (g) 3rd Reading (g) 1st Reading (g) True Value (µL) Eppendorf # 500 2500 ADJ5000-C 5000 500 ADJ5000-G 2500 5000 500 2500 ADJ5000-H 5000 500 ADJ5000-I 2500 5000 0.5006 0.5040 0.5058 500 7.4999 5000 4968 4974 ADJ5000-J 2500 9870 9977 4.9976 5000 4948 0.4954 .4962 500 4949 491°C ADJ5000-K 2500 1910 0094 5000 0356 ~00lo 5005 5019 500 501 429 4994 2500 <del>1</del>89 ADJ5000-L 500 5000 9800 9833 99. Ł 500 ADJ5000-M 2500 5000 500 ADJ5000-N 2500 5000 500 ADJ5000 2500 5000 500 ADJ5000 2500 5000

m A Maggeli Analyst: Reviewed by: V

Date: DIA Date:

FRM-244 (c) (Rev 3/Apr 04)

SOUTHWEST RESEARCH INSTITUTE NUCLEAR PROJECT CLIENT: Division 20 TASK ORDER: 040521-6 SRR: 25943 SDG: 245108 CASE: CNWRA VTSR: May 20, 2004 PROJECT#: 06002.01.141

# **Balance Calibrations**

# Southwest Research Institute[®] Division 01 **BALANCE VERIFICATION LOG**

<b>BALANCE #:</b>	LOCATION:	SERIAL #:	TOLERANCE:	COMMENTS:
12	Bldg. 70 Lab 27	1122510787	±0.0005	
Date	Std Wt (g)	Recorded Wt (g)	Operator	
6-3-04	2.0000	2.0000	KE	SN: 99- J50526-1
6-4-04	2.0000	2.0000	KE	M
6-7-04	2.0000	2.0001	KE	~
6-8-04	2.0000	2.0000	KE	n
6-9-04	2.0000	2.0000	KE	~
6-10-04	2.0000	2,0001	KE	1
6-11-04	2.0000	2.0001	KE	n
6-14-04	2.0000	1.9999	<u>A</u>	11
6-15-04	2.0000	3.0000	gue	
6-16-04	2.0000	2,0000	KE KE	N

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.

Page 1 of 30

FRM-112 (Rev 2/Aug 03)

### Southwest Research Institute **Division 01 BALANCE VERIFICATION LOG**

BALANCE #	LAB #:	SERIAL #:	TOLERANCE:	COMMENTS:
19	27	0068597	±0.05	
Date	Std Wt (g)	Recorded Wt (g)	Operator	
6-2-04	10.00	10.00	Jer	SN:99-J50624-5
6-3-04	10.00	10.00	1 yE	Ň
6-4-04	10.00	10.00	KE	N.
6-7-04	10.00	10.00	KE	~
6-8-04	10.00	10.00	KE	N
6-9-04	10.00	10.00	KE	11
6-10-04	10.00	10.00	KE	N
6-11-04	10.00	10.01	KE	v
6-14-24	10.00	10-00	Jey	
6-15-04	10.00	10.01	Sa	

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 (x5896) for service.

Page # ____21____

FRM-112 (Rev 1/Dec 99)

### Southwest Research Institute Division 01 BALANCE VERIFICATION LOG

<b>BALANCE #:</b>	LOCATION:	SERIAL #:	<b>TOLERANCE:</b>	COMMENTS:
34	Bldg. 70 Lab 27	1116031935	±0.0005	
Date	Std Wt (g)	Recorded Wt (g)	Operator	5N: 99-J50526-15
6-10-04	2-0000	2.0000	KE	N
6-11-04	2.0000	2.0000	KE	N
1-14-04	2.0000	1.9999	Jen	
6-15-04	2.0000	2.0001	and	
6-16-04	2,0000	2.0000	OKE	~
6-17-04	2.0000	2.0000	jk 6	
6-18-04	2.0000	2.0000	KE	N
6-21-04	2.0000	210000	KE	-
6-22-04	2.0000	2,0000	KE	N
6-23-04	2.0000	2.0000	KE	V

If balance is out of limits, clean the balance and re-calibrate using Class "S" weights.

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If balance is still out of limits, place a "DO NOT USE" sign on it and call (DQA) for service.

•••••

Page 2 of 30

FRM-112 (Rev 2/Aug 03)

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SOUTHWEST RESEARCH INSTITUTE NUCLEAR PROJECT CLIENT: Division 20 TASK ORDER: 040521-6 SRR: 25943 SDG: 245108 CASE: CNWRA VTSR: May 20, 2004 PROJECT#: 06002.01.141

# **DI Water Verification**

# D.I. WATER SYSTEM NOTEBOOK SOUTHWEST RESEARCH INSTITUTE BUILDING 70



Contact U.S. Filter (1-800-466-7873) for repairs/exchanges. (Make sure to have a P.O.)

### HIGH PURITY SYSTEM (HP)

# 010382

		RESISTIVITY	MONITOR	QC LI	GHTS	USAGE	
DATE / TIME	INITIALS	(M OHMS)	QC LT.	QC 1	QC 2	(GALS)	COMMENTS
Staylog Godpm	DR	18.04	V	V	J	1903.8	ALLOK
125/14 6:491M	OR	18.64	V	ン	ν	1946,3	L
5/26/04 Guinm	DR	18.04	レ	ン	$\boldsymbol{\nu}$	1974.6	
statley risten	OR	16,04	V	V	V	1992.2	
childy 64m	OR	18,04	L	レ	V	2012,0	-
6/2/14 6:16pm	OR	15,04	J	5	]	2029,5	
6/3/04 6:20 pm	ØR	18,04	レ	5	$\checkmark$	2044,4	
6/4/04 Sitsom	DR	18,04	$\nu$	V	Z	20547	
6/7/14 5.53 pm	OR	15.05	V	$\checkmark$	)	2072.0	
618/04 J.SYIM	DR	18.05	5	レ	7	2086 5	
claby Filopm	DR	18,04	$\checkmark$	$\boldsymbol{\nu}$	V	2123.7	
Glislay 7:30em	DR	18.05	$\checkmark$	$ $	/	2136,8	
Glaloy Gilbon	DR	16.04	5	V	5	2145,4	5
6/14/04 6:20pm	DR	18.05	$\overline{\prime}$	~	$\checkmark$	2156.2	
6/15/64 5:180m	OR	18.04	5	$\checkmark$	$\checkmark$	2170.7	
Keliller Tom	DR	18.05	$\checkmark$	$\sim$		2187.0	

Legend: Check = Green (OK); X = Red (call for service)

#### **QC LIGHTS** USAGE DATE / TIME | INITIALS QC 1 QC 2 (GALS) COMMENTS 910.7 (14, 5)ULL 0K Yloy Given $\checkmark$ RIL レ 911.6 NK 115.07 N CHIGAN V (15.0) $\sim$ 912.1 64 Gillom N 1, V ٥K 912.3 04 8:561M (15.0) 912,9 ٥K V 115.0 6:49.0m $\checkmark$ 913,7 ŊK $\checkmark$ GILLM [16.0] 7 913,9 OK Gi 200m (16.5 DR -K6.5) $\checkmark$ 914.0 5:430M V 914.0 DR V (1.0) Sisson DR 18,11 914.5 udtorul USE Itar 14.0 4 JUSION X рR 64 Dilopr (125) レ 915.0 P. O. DR X $\boldsymbol{\nu}$ AP.D. Righed. USFither walked 114 7:30pm (17.5) 925.1 NR V (125 917.3 44 1.18 m Vectro 1 DR (14.0)tronk Filter Anchange. Hel OK. 920.5 6/14/64 6:2011 1 ~ Glisliy Silkom 921.7 ŊК $\checkmark$ -(15.4) 16/04 fim Pik (15.5) $\mathbf{\nu}$ 92 3.2 2 V

LOW PURITY SYSTEM (LP)

Legend: Check = Green (OK); X = Red (call for service)