

**SOUTHWEST RESEARCH INSTITUTE
NUCLEAR PROJECT**

CLIENT: Div. 20

TASK ORDER: 031025-1

SRR: 25150

SDG: 236892

CASE: CNWRA

VTSR: October 24, 2003

PROJECT#: 06002.01.081

FINAL REPORT

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

010001

Sample ID

PT 10

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 10/24/03

Matrix: Liquid

Project No.: 20.06002.01.081

Task Order: 031025-1

SRR: 25150

Lab System ID: 236892

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Chromium	<0.167	0.167
Cobalt	<0.167	0.167
Iron	<1.67	1.67
Molybdenum	<0.167	0.167
Nickel	0.183	0.167
Potassium	639	3.33
Sodium	52.5	3.33
Tungsten	<0.333	0.333

SOUTHWEST RESEARCH INSTITUTE 010002

DUPLICATE SUMMARY

Sample ID
PT 10

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 10/24/03

Matrix: Liquid

Project No.: 20.06002.01.081

Task Order: 031025-1

SRR: 25150

Lab System ID: 236892

Analysis	Sample Result (mg/L)	Duplicate Result (mg/L)	RPD
Chromium	<0.167	<0.167	0.00%
Cobalt	<0.167	<0.167	0.00%
Iron	<1.67	<1.67	0.00%
Molybdenum	<0.167	<0.167	0.00%
Nickel	0.183	0.203	10.4%
Potassium	639	628	1.74%
Sodium	52.5	51.6	1.73%
Tungsten	<0.333	<0.333	0.00%

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

010003

Sample ID

PT 9

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 10/24/03

Matrix: Liquid

Project No.: 20.06002.01.081

Task Order: 031025-1

SRR: 25150

Lab System ID: 236893

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Chromium	<0.167	0.167
Cobalt	<0.167	0.167
Iron	<1.67	1.67
Molybdenum	<0.167	0.167
Nickel	<0.167	0.167
Potassium	1052	3.33
Sodium	50.7	3.33
Tungsten	<0.333	0.333

SOUTHWEST RESEARCH INSTITUTE

MATRIX SPIKE SUMMARY

010004

Sample ID

PT 9

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 10/24/03

Matrix: Liquid

Project No.: 20.06002.01.081

Task Order: 031025-1

SRR: 25150

Lab System ID: 236893

Analysis	Sample Result (mg/L)	Spike Result (mg/L)	Spike Added (mg/L)	Recovery
Chromium	<0.167	6.77	6.67	101%
Cobalt	<0.167	16.9	16.7	101%
Iron	<1.67	34.6	33.3	104%
Molybdenum	<0.167	136	133	102%
Nickel	<0.167	17.0	16.7	102%
Potassium	1052	1784	667	110%
Sodium	50.7	632	667	87.2%
Tungsten	<0.333	138	133	104%

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

010005

Sample ID

W 10

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 10/24/03

Matrix: Liquid

Project No.: 20.06002.01.081

Task Order: 031025-1

SRR: 25150

Lab System ID: 236894

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Chromium	<0.167	0.167
Cobalt	<0.167	0.167
Iron	<1.67	1.67
Molybdenum	<0.167	0.167
Nickel	<0.167	0.167
Potassium	24764	25.0
Sodium	90.6	3.33
Tungsten	<0.333	0.333

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

010006

Sample ID

W 9

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 10/24/03

Matrix: Liquid

Project No.: 20.06002.01.081

Task Order: 031025-1

SRR: 25150

Lab System ID: 236895

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Chromium	<0.167	0.167
Cobalt	<0.167	0.167
Iron	<1.67	1.67
Molybdenum	<0.167	0.167
Nickel	0.214	0.167
Potassium	25451	25.0
Sodium	21.6	3.33
Tungsten	<0.333	0.333

SOUTHWEST RESEARCH INSTITUTE

LABORATORY CONTROL SAMPLE

010007

Sample ID

LCSW - K29W3

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: NA

Matrix: Liquid

Project No.: 20.06002.01.081

Task Order: 031025-1

SRR: 25150

Lab System ID: NA

Analysis	Sample Result (mg/L)	True Value (mg/L)	Recovery
Chromium	6.65	6.67	99.7%
Cobalt	16.6	16.7	99.4%
Iron	33.6	33.3	101%
Molybdenum	137	133	103%
Nickel	16.6	16.7	99.4%
Potassium	552	667	82.8%
Sodium	560	667	84.0%
Tungsten	138	133	104%

NA- Not Applicable.

SOUTHWEST RESEARCH INSTITUTE

BLANK SUMMARY

010008

Sample ID

PBW - K29W3

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: NA

Matrix: Liquid

Project No.: 20.06002.01.081

Task Order: 031025-1

SRR: 25150

Lab System ID: NA

Analysis	Sample Result (mg/L)	Reporting Limit (mg/L)
Chromium	<0.167	0.167
Cobalt	<0.167	0.167
Iron	<1.67	1.67
Molybdenum	<0.167	0.167
Nickel	<0.167	0.167
Potassium	<3.33	3.33
Sodium	<3.33	3.33
Tungsten	<0.333	0.333

NA- Not Applicable.

**SOUTHWEST RESEARCH INSTITUTE
NUCLEAR PROJECT
CLIENT: Div. 20
TASK ORDER: 031025-1
SRR: 25150
SDG: 236892
CASE: CNWRA
VTSR: October 24, 2003
PROJECT#: 06002.01.081**

Task Orders/01-QPP-015

Laboratory Task Order**010009**

TO #: 031025-1 Revision: 1

SDG: 236892
VTSR: 10/24/03
CASE: CNWRASRR #s: 25150
Client(s): DIV 20Project(s): 06002.01.081
Manager(s): DAMMANN, MIKE
To PM: 11/06/03
To QA: 12/12/03
To Client: 12/15/03**Instructions**

DIVISION 20 - CNWRA. 14-day TAT on COC. Using 14-day for report/QAU. 21-day TAT on hard copy (subject to change). Point of contact is Darrell Dunn (ext. 6090). Work is 10 CFR 50, Part 21, Appendix B. CONTACT Charlie Butcher (ext. 5928, pager 271-5172) before starting any work. ICP analyses for Chromium, Cobalt, Iron, Molybdenum, Nickel, Potassium, Sodium and Tungsten. Results are critical for project determination, are needed ASAP. CONTACT PM WITH ANY QUESTIONS.
revision 1: Changing due dates to allow time for copies of C of As. (dr120203)

Documents Related to this task order: 7015

Test: DIL-DILUTION
Section: METALPREP

Holding: 28 days from CED

Prep, Dilution

Cnt: 4

System ID	Type	Cont	Matrix	Customer ID	CED	Method Date
236892		1	Liquid	PT 10	24 Oct 03	21 Nov 03
236893		1	Liquid	PT 9	13 Oct 03	10 Nov 03
236894		1	Liquid	W 10	24 Oct 03	21 Nov 03
236895		1	Liquid	W 9	13 Oct 03	10 Nov 03

Test: ICP-SWRI
Section: METALS

Holding: 180 days from CED

ICP Analysis by SwRI Method

Cnt: 4

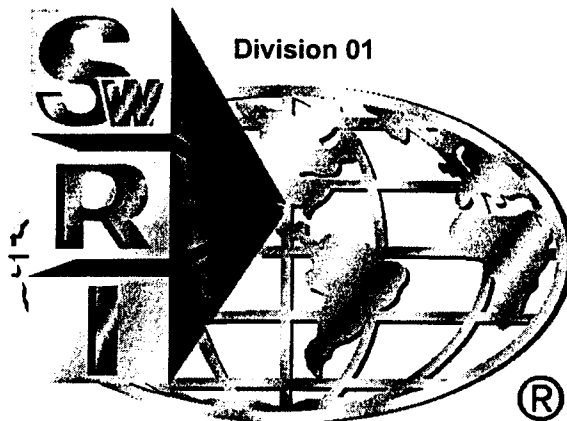
System ID	Type	Cont	Matrix	Customer ID	CED	Method Date
236892		1	Liquid	PT 10	24 Oct 03	21 Apr 04
236893		1	Liquid	PT 9	13 Oct 03	10 Apr 04
236894		1	Liquid	W 10	24 Oct 03	21 Apr 04
236895		1	Liquid	W 9	13 Oct 03	10 Apr 04

010010

01-QPP-015
Division 01
Revision 4
November 2002

Document No. 3

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IF STAMP IS NOT RED, THIS DOCUMENT IS UNCONTROLLED



Chemistry and Chemical
Engineering Division

QUALITY PROJECT PLAN FOR

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

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

010011

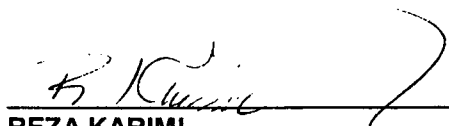
**QUALITY PROJECT PLAN FOR PERFORMANCE OF CHEMICAL ANALYSES
FOR COMMERCIAL NUCLEAR POWER PLANTS
WITHIN THE DEPARTMENT OF ANALYTICAL AND ENVIRONMENTAL CHEMISTRY**

SwRI AUTHORIZATION SIGNATORIES

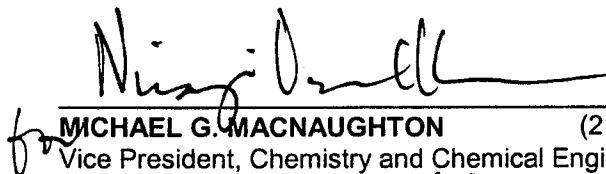
This is to certify that this Quality Project Plan of Southwest Research Institute (SwRI) has been reviewed and approved by the following personnel:


JOANN BOYD (210) 522-2169
Quality Assurance Manager

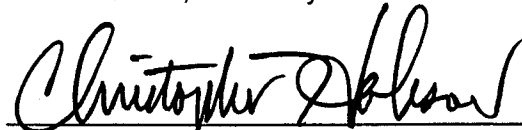
10/30/02
DATE


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

10/30/02
DATE


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

10/30/02
DATE


CHRISTOPHER HOBSON (210) 522-5838
Quality Assurance Engineer

10/30/02
DATE

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010012

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

1.0 INTRODUCTION

This Quality Project Plan (QPP) defines the Quality Assurance (QA) program requirements for personnel providing the chemical analyses for commercial nuclear power plants. Southwest Research Institute (SwRI) **Program Quality Plan (PQP-Nuclear)**, *Nuclear Services* shall implement the QA requirements. Project activities controlled by the PQP-Nuclear shall be accomplished as specified by the appropriate sections of **01-QAP-004, Quality Assurance Plan for Analytical and Environmental Services** and/or nationally recognized testing methods as specified on individual purchase orders. This QPP shall be applied to all projects initiated for nuclear utilities in the Department of Analytical and Environmental Chemistry. If, as a result of complexity, duration, or other factors, it is determined that a unique, project-specific quality plan is required, the project QAE shall notify the Project Manager and a project-specific quality plan shall be generated in accordance with **SOP-01-5.2, Preparation and Revision of Plans**.

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-01-18.1, Qualification and Training**.

4.2 Qualification of Personnel

- 4.2.1 Testing personnel shall be designated as qualified to perform applicable project activities as specified in **SOP-01-18.1, *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 procedures under **SOP-01-5.0, *Document and Data Control***, depending on the type of document supplied. 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.

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 than 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-01-6.1, 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-01-10.1, Inspection and Test Conduct**. 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 to acceptance of a commercial grade item, the receipt inspection shall determine the following:
 - (a) Damage was not sustained during shipment;
 - (b) The item has satisfied the specified acceptance criteria; and
 - (c) Specified documentation, as applicable to the item, was received and is acceptable.
- 4.7.6 Receipt inspection of chemical reagents and standards shall also consist of verification of chemical type, grade, container integrity, certificate of analysis, and shelf life, where applicable. Upon acceptance of chemical reagents and standards, the containers shall be labeled with the following:
 - (a) Chemical name;
 - (b) Chemical grade;
 - (c) Lot code;
 - (d) Date received; and
 - (e) Shelf life, when applicable.

-
- 4.7.7 Expired shelf life items shall not be used for testing purposes.
- 4.7.8 Lot codes of chemical reagents and standards used during equipment standardization and testing shall be recorded on the individual testing data sheets to provide traceability.
- 4.7.9 Samples supplied to SwRI for testing shall be received by the Sample Custodian and logged into the laboratory logbook. Sample documentation and sample custody shall be maintained in accordance with **TAP-01-0407-001**, *Sample Receipt and Login*, and **TAP-01-0407-035**, *Sample/Extract Storage and Custody*.
- 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-01-8.1**, *Item Identification and Traceability*.

4.8 Inspection

- 4.8.1 Inspection for acceptance shall be performed by qualified persons other than those who conduct or directly supervise the work being inspected.
- 4.8.2 Institute Quality System (IQS) personnel shall perform surveillance activities as required to ensure compliance with the contract and this Quality Project Plan. Specific areas in which IQS may perform surveillance activities include, but are not limited to, the following:
- (a) Receiving inspection and labeling of chemical reagents, standards, and testing samples;
 - (b) Testing processes;
 - (c) Calibration and major equipment;
 - (d) Sample and record retention; and

(e) Test records.

4.9 Inspection and Testing

- 4.9.1 Required tests for acceptance shall be conducted under appropriate environmental conditions using the tools and equipment necessary to conduct the test in a manner to fulfill test requirements and acceptance criteria.
- 4.9.2 Tests shall be conducted, controlled, and verified in accordance with **SOP-01-10.1, *Inspection and Test Conduct***.
- 4.9.3 Controls for measuring and test equipment shall be as specified in **SOP-01-11.1, *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-01-13.1, *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-01-15.1, *Handling, Storage, Packaging, Preservation, 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-01-16.1, *Storage and Maintenance of Quality Records***. These documents and this QPP ensure that QA records shall be legible, identifiable, retrievable, and maintained in dual storage.
- 4.11.2 Records shall be traceable to associated items and activities and shall accurately reflect the work accomplished or information required.
- 4.11.3 Documents shall be considered valid records only if stamped, initialed or signed and dated by authorized personnel or otherwise authenticated.
- 4.11.4 Records of test analyses performed by the Department of Analytical and Environmental Chemistry are classified as *nonpermanent* and shall be retained for a minimum of five years. Nonpermanent records are those required to show evidence that an activity was performed in accordance with the applicable requirements, but need not be retained for the life of the item. Based on the use of the final data, the client shall be responsible for determining and implementing permanent storage requirements.

4.11.5 In order to satisfy duplicate storage requirements, one copy of the QA record shall be 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-01-16.1, *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*.

Valerie DeJesus

From: Valerie DeJesus [vdejesus@bams.ccf.swri.edu]
Sent: Tuesday, November 11, 2003 5:04 PM
To: Darrell S Dunn
Cc: Jacqueline M. Ranger
Subject: preliminary sample results - TO#031025-1, SRR#25150



031025-1.xls



031025-1.pdf

Attached are the results for the samples received on 10/24/03, task order 031025-1, SRR 25150. The report for Metals is attached as an Excel (031025-1.xls) and PDF (031025-1.pdf) file. Hard copies of the report will follow shortly. If you have any questions, please contact Jackie Ranger (522.3320).

Thank you,

Valerie DeJesus
Southwest Research Institute
Department of Analytical and Environmental Chemistry
Division 01
Phone 210-522-3129
Fax 210-522-5938

**SOUTHWEST RESEARCH INSTITUTE
NUCLEAR PROJECT
CLIENT: Div. 20
TASK ORDER: 031025-1
SRR: 25150
SDG: 236892
CASE: CNWRA
VTSR: October 24, 2003
PROJECT#: 06002.01.081**

Chain of Custody/Login Paperwork

[illegible]

FORM FOR REQUESTING WORK FROM OTHER DIVISIONS

A. TO BE COMPLETED BY DIVISION 20 PERSONNEL

Requester: Darrell Dunn Request Date: 10/24/03 010021
Project No.: 20-06002, 01-081 Phone No.: X6090
Description of Work Requested: _____

ICP Analysis of solution for
Chromium - Cobalt - Iron - Molybdenum - Nickel - Potassium
Sodium - Tungsten
☐ Optical Microscopy ☐ SEM ☐ Hardness ☐ Profilometer ☐ Auger ☐ Other

QUALITY REQUIREMENTS: The work requested is governed by the CNWRA Quality Assurance Program which addresses requirements of 10CFR50, Appendix B. Personnel performing this work shall be qualified under the CNWRA QA program or equivalently under the SwRI Nuclear QA program. Test and analysis methods shall be documented by approved procedures or recognized, standard methods. Measuring and test equipment shall be calibrated and controlled according to CNWRA and SwRI Nuclear QA program requirements.

<u>Sample Identification</u>	<u>Description</u>
<u>W 9</u>	<u>chloride solution</u>
<u>PT 9</u>	<u>Has 20% HCl In solution</u>
<u>W 10</u>	<u>chloride solution</u>
<u>PT 10</u>	<u>Has 20% HCl In solution</u>

B. TO BE COMPLETED BY DIVISION PERFORMING WORK¹

☐ Optical Microscopy ☐ SEM ☐ Hardness ☐ Profilometer ☐ Auger ☐ Other

Person Assigned: _____ Signature: _____
Division: _____ Date: _____

Make, Model & Serial No. of Equipment Used (attach list if necessary): _____

Software Used (If any): _____

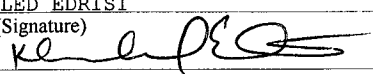
Standards Used (If any): _____

Photographic Negative Numbers (If Applicable): _____

¹ Please sign and date any hardcopy of analysis or list of photographs (The photographs themselves need not be signed). If error occurred during entry, do not erase or overwrite, but strikeout with single line, initial and date, and then reenter correct information.

SAMPLE LOG-IN SHEET

010022

Lab Name Southwest Research Institute			Page 1 of 1	
Received By (Print Name) KHALED EDRISI			Log-in Date 10/24/2003	
Received By (Signature) 				
Case Number CNWRA		Sample Delivery Group No.		SAS Number N/A
Remarks: 06002.01.081				Remarks: Condition of Sample Shipment, etc
		EPA Sample #	Corresponding Sample Tag #	Assigned Lab #
1. Custody Seal(s)	Present/ Absent *	PT 10	None	236892
	Intact/Broken			
2. Custody Seal Nos.	N/A	PT 9	None	236893
		W 10	None	236894
3. Chain-of Custody Records	Present /Absent*	W 9	None	236895
4. Traffic Reports or Packing Lists	Present/ Absent			
5. Airbill	Airbill/Sticker Present /Absent*			
6. Airbill No.	HAND DELIVERED			
7. Sample Tags	Present/ Absent			
Sample Tag Numbers	Listed/ Not listed on Chain of Custody			
8. Sample Condition	Intact /Broken*/Leaking			
9. Cooler Temperature	22.0C			
10. Does Information on custody records, traffic reports, and sample tags agree?	Yes /No*			
11. Date Received at Lab	10/24/2003			
12. Time Received	10:30:00			
Sample Transfer				
Fraction Inorganics	Fraction			
Area # Inorg 3	Area #			
By KHALED EDRISI	By			
On 10/24/2003	On			

* Contact SMO and attach record of resolution

Reviewed By CYNTHIA A. SAUCEDA	Logbook No.	Sample Receipt (25150)
Date 10.28.2003	Logbook Page No.	4869 (SECTION 23 OF 4)

**SOUTHWEST RESEARCH INSTITUTE
NUCLEAR PROJECT
CLIENT: Div. 20
TASK ORDER: 031025-1
SRR: 25150
SDG: 236892
CASE: CNWRA
VTSR: October 24, 2003
PROJECT#: 06002.01.081**

Copies of Login Book

Sample Login Book

010023

Oct 24, 2003

SwRI Login Area
Division 1

Sample Receipt: 25147		Project: 10203.01.1XX	Client: WASHINGTON DEMIL
VTSR Date: Oct 24, 2003		VTSR Time: 08:30:00	Manager: HARDING, JAC
System ID	Customer Sample ID	Matrix	
236851	104202S	Soil	
236852	104205S	Soil	
236853	104302S	Soil	
236854	104304S	Soil	
236855	104305S	Soil	
236856	104306S	Soil	
236857	104307S	Soil	

Sample Receipt: 25148		Project: 10203.01.1XX	Client: WASHINGTON DEMIL
VTSR Date: Oct 24, 2003		VTSR Time: 08:30:00	Manager: HARDING, JAC
System ID	Customer Sample ID	Matrix	
236859	104103V	Vegetation	
236860	104106V	Vegetation	
236861	104202V	Vegetation	

Sample Receipt: 25149		Project: 06673.01.100	Client: Div. 03 (Schulma
VTSR Date: Oct 24, 2003		VTSR Time: 10:51:00	Manager: QUARDERER, SHRADDHA
System ID	Customer Sample ID	Matrix	
236885	Daily Blank	Filter Ext.	
236886	Test #5830	Filter Ext.	
236887	Test #5834	Filter Ext.	
236888	Test #5842	Filter Ext.	
236889	Test #5846	Filter Ext.	
236890	Test #5854	Filter Ext.	
236891	Test #5858	Filter Ext.	

Sample Receipt: 25150		Project: 06002.01.081	Client: DIV 20
VTSR Date: Oct 24, 2003		VTSR Time: 10:30:00	Manager: DAMMANN, MIKE
System ID	Customer Sample ID	Matrix	
236892	PT 10	Liquid	

Sample Login Book

010024

Oct 24, 2003

SwRI Login Area
Division 1

Sample Receipt: 25150		Project: 06002.01.081	Client: DIV 20
VTSR Date: Oct 24, 2003		VTSR Time: 10:30:00	Manager: DAMMANN, MIKE
System ID	Customer Sample ID	Matrix	
236893	PT 9	Liquid	
236894	W 10	Liquid	
236895	W 9	Liquid	

Sample Receipt: 25151		Project: 10079.06.009	Client: BLUE LINE CORP.
VTSR Date: Oct 24, 2003		VTSR Time: 15:00:00	Manager: RANGER, JACKIE
System ID	Customer Sample ID	Matrix	
236896	Zirconium Carbonate S11264	Solid	
236897	Zirconyl Nitrate Solution Lot CM11248	Liquid	

Sample Receipt: 25152		Project: 10079.06.008	Client: Mallinckrodt Med
VTSR Date: Oct 24, 2003		VTSR Time: 10:15:00	Manager: DAMMANN, MIKE
System ID	Customer Sample ID	Matrix	
236898	J782-32567	Solid	
236899	S73701-23124	Solid	
236900	S737-3156	Solid	
236901	S737-3157	Solid	
236902	S737-3158	Solid	

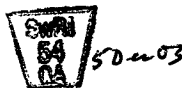
Sample Receipt: 25153		Project: 10192.01.10X	Client: Lynx
VTSR Date: Oct 24, 2003		VTSR Time: 12:55:00	Manager: SUN, GANG
System ID	Customer Sample ID	Matrix	
236903	0310211341	Water	
236904	0310220709	Water	
236905	0310220804	Water	
236906	0310220959	Water	
236907	0310221041	Water	

**SOUTHWEST RESEARCH INSTITUTE
NUCLEAR PROJECT
CLIENT: Div. 20
TASK ORDER: 031025-1
SRR: 25150
SDG: 236892
CASE: CNWRA
VTSR: October 24, 2003
PROJECT#: 06002.01.081**

RAW DATA

Div 20
to#031025-1
06002.01.081

Ranger
11/14/03



1 m
12/1/03

system id	elem	result	qual	units	rl	tv	rec	ug/ml	rl	date	time	iv	fv	mg/L
236892	df33.3	Co2286	0.167	U	mg/L	0.167		0.00207	0.005	10/29/03	19:44	0.15	5	0.069
236892	df33.3	Cr2677	0.167	U	mg/L	0.167		0.00257	0.005	10/29/03	19:44	0.15	5	0.086
236892	df33.3	Fe2714	1.67	U	mg/L	1.67		0.02425	0.05	10/29/03	19:44	0.15	5	0.808
236892	df33.3	K 7664	639		mg/L	3.33		19.16472	0.1	10/29/03	19:44	0.15	5	638.824
236892	df33.3	Mo2020	0.167	U	mg/L	0.167		0.00164	0.005	10/29/03	19:44	0.15	5	0.055
236892	df33.3	Na5889	52.5		mg/L	3.33		1.57622	0.1	10/29/03	19:44	0.15	5	52.541
236892	df33.3	Ni2316	0.183		mg/L	0.167		0.00550	0.005	10/29/03	19:44	0.15	5	0.183
236892	df33.3	W 2079	0.333	U	mg/L	0.333		0.00284	0.01	10/29/03	19:44	0.15	5	0.095
236892d	df33.3	Co2286	0.167	U	mg/L	0.167		0.00197	0.005	10/29/03	19:50	0.15	5	0.066
236892d	df33.3	Cr2677	0.167	U	mg/L	0.167		0.00298	0.005	10/29/03	19:50	0.15	5	0.099
236892d	df33.3	Fe2714	1.67	U	mg/L	1.67		0.03835	0.05	10/29/03	19:50	0.15	5	1.278
236892d	df33.3	K 7664	628		mg/L	3.33		18.83619	0.1	10/29/03	19:50	0.15	5	627.873
236892d	df33.3	Mo2020	0.167	U	mg/L	0.167		0.00128	0.005	10/29/03	19:50	0.15	5	0.043
236892d	df33.3	Na5889	51.6		mg/L	3.33		1.54917	0.1	10/29/03	19:50	0.15	5	51.639
236892d	df33.3	Ni2316	0.203		mg/L	0.167		0.00608	0.005	10/29/03	19:50	0.15	5	0.203
236892d	df33.3	W 2079	0.333	U	mg/L	0.333		0.00209	0.01	10/29/03	19:50	0.15	5	0.070
236893	df33.3	Co2286	0.167	U	mg/L	0.167		0.00215	0.005	10/29/03	19:55	0.15	5	0.072
236893	df33.3	Cr2677	0.167	U	mg/L	0.167		0.00000	0.005	10/29/03	19:55	0.15	5	0.000
236893	df33.3	Fe2714	1.67	U	mg/L	1.67		0.00721	0.05	10/29/03	19:55	0.15	5	0.240
236893	df33.3	K 7664	1052		mg/L	3.33		31.57187	0.1	10/29/03	19:55	0.15	5	1052.396
236893	df33.3	Mo2020	0.167	U	mg/L	0.167		0.00071	0.005	10/29/03	19:55	0.15	5	0.024
236893	df33.3	Na5889	50.7		mg/L	3.33		1.52074	0.1	10/29/03	19:55	0.15	5	50.691
236893	df33.3	Ni2316	0.167	U	mg/L	0.167		0.00205	0.005	10/29/03	19:55	0.15	5	0.068
236893	df33.3	W 2079	0.333	U	mg/L	0.333		-0.00093	0.01	10/29/03	19:55	0.15	5	-0.031
236893s	df33.3	Co2286	16.9		mg/L	0.167	16.7	0.50841	0.005	10/29/03	20:00	0.15	5	16.947
236893s	df33.3	Cr2677	6.77		mg/L	0.167	6.67	0.20323	0.005	10/29/03	20:00	0.15	5	6.774
236893s	df33.3	Fe2714	34.6		mg/L	1.67	33.3	1.03872	0.05	10/29/03	20:00	0.15	5	34.624
236893s	df33.3	K 7664	1784		mg/L	3.33	667	53.53029	0.1	10/29/03	20:00	0.15	5	1784.343
236893s	df33.3	Mo2020	136		mg/L	0.167	133	4.08860	0.005	10/29/03	20:00	0.15	5	136.287
236893s	df33.3	Na3302	632		mg/L	3.33	667	18.96825	0.1	10/29/03	20:00	0.15	5	632.275
236893s	df33.3	Ni2316	17.0		mg/L	0.167	16.7	0.51067	0.005	10/29/03	20:00	0.15	5	17.022
236893s	df33.3	W 2079	138		mg/L	0.333	133	4.14664	0.01	10/29/03	20:00	0.15	5	138.221
236894	df33.3	Co2286	0.167	U	mg/L	0.167		0.00276	0.005	10/29/03	20:06	0.15	5	0.092
236894	df33.3	Cr2677	0.167	U	mg/L	0.167		-0.00090	0.005	10/29/03	20:06	0.15	5	-0.030
236894	df33.3	Fe2714	1.67	U	mg/L	1.67		-0.00139	0.05	10/29/03	20:06	0.15	5	-0.046
236894	df250	K 7664	24764		mg/L	25.0		99.05619	0.1	11/06/03	17:22	0.02	5	24764.048
236894	df33.3	Mo2020	0.167	U	mg/L	0.167		0.00375	0.005	11/06/03	17:32	0.15	5	0.125
236894	df33.3	Na5889	90.6		mg/L	3.33		2.71802	0.1	10/29/03	20:06	0.15	5	90.601
236894	df33.3	Ni2316	0.167	U	mg/L	0.167		0.00349	0.005	10/29/03	20:06	0.15	5	0.116

010025

Div 20
to#031025-1
06002.01.081

system id	elem	result	qual	units	rl	tv	rec	ug/ml	rl	date	time	iv	fv	mg/L
236894 df33.3	W 2079	0.333	U	mg/L	0.333			0.00725	0.01	10/29/03	20:06	0.15	5	0.242
236895 df33.3	Co2286	0.167	U	mg/L	0.167			0.00293	0.005	10/29/03	20:11	0.15	5	0.098
236895 df33.3	Cr2677	0.167	U	mg/L	0.167			-0.00042	0.005	10/29/03	20:11	0.15	5	-0.014
236895 df33.3	Fe2714	1.67	U	mg/L	1.67			0.00285	0.05	10/29/03	20:11	0.15	5	0.095
236895 df250	K 7664	25451		mg/L	25.0			101.80325	0.1	11/06/03	17:27	0.02	5	25450.813
236895 df33.3	Mo2020	0.167	U	mg/L	0.167			0.00159	0.005	10/29/03	20:11	0.15	5	0.053
236895 df33.3	Na5889	21.6		mg/L	3.33			0.64841	0.1	10/29/03	20:11	0.15	5	21.614
236895 df33.3	Ni2316	0.214		mg/L	0.167			0.00643	0.005	10/29/03	20:11	0.15	5	0.214
236895 df33.3	W 2079	0.333	U	mg/L	0.333			0.00441	0.01	10/29/03	20:11	0.15	5	0.147
lcsW-K29W3	Co2286	16.6		mg/L	0.167	16.7	99.7%	0.49854	0.005	10/29/03	17:55	0.15	5	16.618
lcsW-K29W3	Cr2677	6.65		mg/L	0.167	6.67	99.7%	0.19943	0.005	10/29/03	17:55	0.15	5	6.648
lcsW-K29W3	Fe2714	33.6		mg/L	1.67	33.3	100.8%	1.00826	0.05	10/29/03	17:55	0.15	5	33.609
lcsW-K29W3	K 7664	552		mg/L	3.33	667	82.8%	16.56525	0.1	10/29/03	17:55	0.15	5	552.175
lcsW-K29W3	Mo2020	137		mg/L	0.167	133	102.5%	4.10083	0.005	10/29/03	17:55	0.15	5	136.694
lcsW-K29W3	Na3302	560		mg/L	3.33	667	84.0%	16.79896	0.1	10/29/03	17:55	0.15	5	559.965
lcsW-K29W3	Ni2316	16.6		mg/L	0.167	16.7	99.4%	0.49684	0.005	10/29/03	17:55	0.15	5	16.561
lcsW-K29W3	W 2079	138		mg/L	0.333	133	103.3%	4.13179	0.01	10/29/03	17:55	0.15	5	137.726
pbw-K29W3 pg54-261	Co2286	0.167	U	mg/L	0.167			0.00191	0.005	10/29/03	17:44	0.15	5	0.064
pbw-K29W3 pg54-261	Cr2677	0.167	U	mg/L	0.167			0.00046	0.005	10/29/03	17:44	0.15	5	0.015
pbw-K29W3 pg54-261	Fe2714	1.67	U	mg/L	1.67			0.00564	0.05	10/29/03	17:44	0.15	5	0.188
pbw-K29W3 pg54-261	K 7664	3.33	U	mg/L	3.33			0.01105	0.1	10/29/03	17:44	0.15	5	0.368
pbw-K29W3 pg54-261	Mo2020	0.167	U	mg/L	0.167			0.00088	0.005	10/29/03	17:44	0.15	5	0.029
pbw-K29W3 pg54-261	Na5889	3.33	U	mg/L	3.33			0.09918	0.1	10/29/03	17:44	0.15	5	3.306
pbw-K29W3 pg54-261	Ni2316	0.167	U	mg/L	0.167			0.00024	0.005	10/29/03	17:44	0.15	5	0.008
pbw-K29W3 pg54-261	W 2079	0.333	U	mg/L	0.333			0.00489	0.01	10/29/03	17:44	0.15	5	0.163

010020

ICP ANALYSIS

PROJ. NO.	PROJECT	TO#	DATE	MATRIX	LOGBK PG
06002.01.081	Div 20	0310214	10-29-03	Liquid	54 260

06002.01.081	Div 20	031025-1	10-29-03	Liquid	54 261
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_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

INSTRUMENT: TRACE 1 FILENAME: A031029A

I ✓

INSTRUMENT DL: _____

Method: DAILY1 Standard: blk
Run Time: 10/29/03 16:55:06

010027

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Avg	.00003	.00006	-.00000	.00001	-.00000	-.00001	-.00000
SDev	.00003	.00000	.00000	.00000	.00000	.00000	.00000
%RSD	117.21	.2736	19.69	19.31	7.604	6.637	130.1

#1	.00005	.00006	-.00001	.00001	-.00000	-.00001	-.00000
#2	.00000	.00006	-.00000	.00001	-.00000	-.00001	-.00001

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Avg	.0000	.00000	-.00000	.00000	.00004	-.00001	.00015
SDev	.00000	.00000	.00000	.00000	.00000	.00000	.00002
%RSD	5.161	28.39	59.21	14.54	5.232	3.257	15.79

#1	.00000	.00000	-.00000	.00000	.00003	-.00001	.00017
#2	.00000	.00000	-.00000	.00000	.00004	-.00001	.00014

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Avg	.00005	.00001	-.00000	.00000	-.00000	-.00079	-.00002
SDev	.00000	.00000	.00000	.00000	.00000	.00001	.00000
%RSD	3.799	6.571	94.22	28.18	23.46	.7591	19.03

#1	.00005	.00001	-.00000	.00000	-.00000	-.00078	-.00002
#2	.00005	.00001	-.00000	.00000	-.00000	-.00079	-.00002

Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Avg	-.00001	.00001	.00001	-.00000	-.00000	.00000	.00000
SDev	.00000	.00000	.00001	.00000	.00001	.00000	.00000
%RSD	75.15	7.858	89.67	2373.	531.8	114.4	47.24

#1	-.00001	.00001	.00002	-.00000	.00000	.00000	.00000
#2	-.00000	.00001	.00000	.00000	-.00001	.00000	.00000

Elem	Sc3613	1960/1	1960/2	Si2881	Sn1899	Sr4215	Th2837
Avg	69.22	-.00001	.00002	.00014	.00000	.00000	.00000
SDev	.08	.00000	.00000	.00000	.00001	.00000	.00000
%RSD	.1159	39.99	13.08	.8858	217.2	31.53	40.51

#1	69.17	-.00001	.00002	.00014	.00001	.00000	.00000
#2	69.28	-.00000	.00001	.00014	-.00000	.00000	.00000

Elem	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710	Zn2062
Avg	-.00015	-.00000	.00041	-.00000	.00000	-.00000	-.00000
SDev	.00001	.00000	.00001	.00000	.00000	.00000	.00000
%RSD	4.226	27.40	1.314	12.97	51.34	25.61	141.4

#1	-.00014	-.00000	.00041	-.00000	.00001	-.00000	.00000
#2	-.00015	-.00000	.00040	-.00000	.00000	-.00000	-.00000

Elem	Zr3496
Avg	.00002
SDev	.00000
%RSD	2.745

#1	.00002
#2	.00002

Handwritten signature
11/10/03



5 Dec 03

Handwritten signature

10-29-03

010028

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	--	---	---	---	---	---
Avge	692200	10000	---	---	---	---	---
SDev	762.2611	.00000000	---	---	---	---	---
%RSD	.1101215	.00000000	---	---	---	---	---
#1	691661	10000	---	---	---	---	---
#2	692739	10000	---	---	---	---	---

Method: DAILY1 Standards: clp_std4
Run Time: 10/29/03 17:00:47

010029

Elem	Ag3280	As1890	2203/1	2203/2	Sb2060	1960/1	1960/2
Avg	.05388	.1073	.4156	.4359	.1141	.2232	.3945
SDev	.00002	.0002	.0002	.0022	.0001	.0002	.0001
%RSD	.03635	.2189	.0572	.4985	.1234	.0874	.0253
#1	.05387	.1072	.4154	.4374	.1140	.2230	.3944
#2	.05389	.1075	.4157	.4343	.1142	.2233	.3945

Elem	Tl1908
Avg	.0288
SDev	.0001
%RSD	.3276

#1	.0288
#2	.0287

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avg	730000	10000	---	---	---	---	---
SDev	1899.996	.0000000	---	---	---	---	---
%RSD	.2602704	.0000000	---	---	---	---	---
#1	728665	10000	---	---	---	---	---
#2	731352	10000	---	---	---	---	---

Method: DAILY1 Standard: clp_std1
Run Time: 10/29/03 17:05:12

010030

Elem	Al3082	Ca3179	Fe2714	K_7664	Li6707	Mg2790	Na3302
Avg	.1289	.1419	.1010	1.716	3.329	.0545	.0123
SDev	.0000	.0001	.0005	.010	.011	.0002	.0000
XRSD	.0042	.1053	.5111	.5552	.3437	.3880	.0596
#1	.1289	.1418	.1006	1.709	3.321	.0544	.0123
#2	.1289	.1420	.1014	1.723	3.330	.0547	.0123
IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avg	720781	10000	--	--	--	--	--
SDev	1637.659	.0000000	--	--	--	--	--
XRSD	.2272062	.0000000	--	--	--	--	--
#1	719623	10000	--	--	--	--	--
#2	721939	10000	--	--	--	--	--

Method: DAILY1 Standard: clp_std5
Run Time: 10/29/03 17:09:42

010031

Elem	R_2496	Ri2230	Mo2020	P_1702	Si2801	Sn1899	Sr4215
Avge	.3861	.0595	.1548	.0417	.1299	.1788	1.520
SDev	.0019	.0001	.0005	.0001	.0004	.0003	.001
%RSD	.4795	.1217	.3001	.1151	.3070	.1808	.0575
#1	.3848	.0595	.1545	.0417	.1302	.1790	1.520
#2	.3874	.0594	.1552	.0418	.1296	.1785	1.519

Elem	Ti3372
Avge	1.075
SDev	.001
%RSD	.1263

#1	1.074
#2	1.076

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	736148	10000	---	---	---	---	---
SDev	8660.644	.0000000	---	---	---	---	---
%RSD	1.176481	.0000000	---	---	---	---	---
#1	730024	10000	---	---	---	---	---
#2	742272	10000	---	---	---	---	---

Method: DAILY1 Standard: clp_std2
Run Time: 10/29/03 17:13:45

010032

Elem	Ba4934	Be3130	Cr2677	Cu3247	Ni2316
Avg	.6295	.1986	.2846	.3235	.7293
SDev	.0030	.0019	.0006	.0009	.0003
%RSD	.4812	.9648	.2167	.2656	.0421

#1	.6317	.1972	.2842	.3229	.7291
#2	.6274	.1999	.2850	.3241	.7295

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avg	728584	10000	---	---	---	---	---
SDev	11604.33	.0000000	---	---	---	---	---
%RSD	1.592725	.0000000	---	---	---	---	---
#1	720378	10000	---	---	---	---	---
#2	736789	10000	---	---	---	---	---

Method: DAILY1 Standard: clp_std3
Run Time: 10/29/03 17:17:27

010033

Elem	Cd2265	Co2286	Mn2576	V_2924	Zn2062
Avg	1.124	.2696	.3938	.0747	.0845
SDev	.003	.0006	.0014	.0005	.0003
%RSD	.2504	.2424	.3561	.6874	.3774

#1	1.122	.2691	.3928	.0743	.0847
#2	1.126	.2700	.3947	.0750	.0843

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avg	728406	10000	---	---	---	---	---
SDev	3567.354	.0000000	---	---	---	---	---
%RSD	.4897476	.0000000	---	---	---	---	---
#1	730929	10000	---	---	---	---	---
#2	725884	10000	---	---	---	---	---

Method: DAILY1 Standard: clp_std6
Run Time: 10/29/03 17:21:53

010034

Elem	La4086	Na5889	Pd3404	S_1820	Th2037	U_3859	W_2079
Avg	.3835	.1255	.1534	.0535	.0548	.0329	.1294
SDev	.0024	.0032	.0005	.0001	.0001	.0003	.0003
%RSD	.6397	2.519	.3349	.2599	.2269	.7555	.2470

#1	.3818	.1233	.1531	.0536	.0547	.0327	.1292
#2	.3853	.1277	.1538	.0534	.0549	.0331	.1297

Elem	Y_3710	Zr3496
Avg	1.008	1.180
SDev	.002	.002
%RSD	.2038	.1483

#1	1.006	1.181
#2	1.009	1.179

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avg	703789	10000	---	---	---	---	---
SDev	1578.262	.0000000	---	---	---	---	---
%RSD	.2242522	.0000000	---	---	---	---	---
#1	702673	10000	---	---	---	---	---
#2	704905	10000	---	---	---	---	---

Method: DAILY1

Slope = Conc(SIR)/IR

010035

Element	Wavelength	High std	Low std	Slope	Y-intercept	Date Standardized
Ag3280	328.068	clp_std4	blk	37.1364	-.000939	10/29/03 05:21:53
Al3082	308.215	clp_std1	blk	389.916	-.243628	10/29/03 05:21:53
As1890	189.042	clp_std4	blk	93.1305	.004373	10/29/03 05:21:53
B_2496	249.678	clp_std5	blk	25.9058	-.001516	10/29/03 05:21:53
Ba4934	493.409	clp_std2	blk	15.8839	.000631	10/29/03 05:21:53
Be3130	313.042	clp_std2	blk	25.1668	.002363	10/29/03 05:21:53
Bi2230	223.061	clp_std5	blk	83.4072	.003010	10/29/03 05:21:53
Ca3179	317.933	clp_std1	blk	352.470	-.014258	10/29/03 05:21:53
Cd2265	226.502	clp_std3	blk	8.89147	-.000257	10/29/03 05:21:53
Co2286	228.616	clp_std3	blk	37.0928	.000830	10/29/03 05:21:53
Cr2677	267.716	clp_std2	blk	35.1420	-.001244	10/29/03 05:21:53
Cu3247	324.753	clp_std2	blk	30.9438	-.011243	10/29/03 05:21:53
Fe2714	271.441	clp_std1	blk	494.802	.030022	10/29/03 05:21:53
K_7664	766.491	clp_std1	blk	29.1674	-.044459	10/29/03 05:21:53
La4086	408.672	clp_std6	blk	25.2364	-.012578	10/29/03 05:21:53
Li6707	670.784	clp_std1	blk	3.00359	-.000427	10/29/03 05:21:53
Mg2790	279.078	clp_std1	blk	458.131	.005954	10/29/03 05:21:53
Mn2576	257.610	clp_std3	blk	25.3959	-.000092	10/29/03 05:21:53
Mo2020	202.030	clp_std5	blk	64.5889	.001120	10/29/03 05:21:53
Na5889	588.995	clp_std6	blk	7.49795	.059040	10/29/03 05:21:53
Na3302	330.232	clp_std1	blk	3996.88	.874696	10/29/03 05:21:53
Ni2316	231.604	clp_std2	blk	13.7109	.000803	10/29/03 05:21:53
P_1782	178.287	clp_std5	blk	240.275	-.024644	10/29/03 05:21:53
P203/1	220.351	clp_std4	blk	24.0683	-.002279	10/29/03 05:21:53
P203/2	220.352	clp_std4	blk	22.9427	.000034	10/29/03 05:21:53
Pd3404	340.458	clp_std6	blk	66.1503	.000762	10/29/03 05:21:53
S_1020	102.040	clp_std6	blk	187.272	-.002839	10/29/03 05:21:53
Sb2060	206.838	clp_std4	blk	87.6338	-.000570	10/29/03 05:21:53
Sc3613	361.384	blk	dark	1.44725	-.183295	10/29/03 05:21:53
1960/1	196.021	clp_std4	blk	44.8033	.002525	10/29/03 05:21:53
1960/2	196.022	clp_std4	blk	25.3633	-.003994	10/29/03 05:21:53
Si2001	200.150	clp_std5	blk	77.5882	-.111416	10/29/03 05:21:53
Pb220	220.353	NONE	NONE	.000000	.000000	*NOT STANDARDIZED
Se196	196.026	NONE	NONE	1.000000	.000000	*NOT STANDARDIZED
Sn1899	189.989	clp_std5	blk	55.9847	-.001660	10/29/03 05:21:53
Sr4215	421.552	clp_std5	blk	6.57989	-.000086	10/29/03 05:21:53
Th2037	203.730	clp_std6	blk	191.702	-.001939	10/29/03 05:21:53
Ti3372	337.200	clp_std5	blk	9.29267	.013572	10/29/03 05:21:53
Tl1900	190.864	clp_std4	blk	346.998	.014289	10/29/03 05:21:53
U_3859	385.950	clp_std6	blk	346.441	-1.41090	10/29/03 05:21:53
V_2924	292.402	clp_std3	blk	133.931	.001064	10/29/03 05:21:53
W_2079	207.910	clp_std6	blk	38.6394	-.001926	10/29/03 05:21:53
Y_3710	371.030	clp_std6	blk	9.92349	.000158	10/29/03 05:21:53
Zn2062	206.200	clp_std3	blk	110.316	.000085	10/29/03 05:21:53
Zr3496	349.621	clp_std6	blk	9.01537	-.002097	10/29/03 05:21:53

Method: DAILY1 Sample Name: icv/ccv

Operator:

Run Time: 10/29/03 17:27:02

010036

Comment:

Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	1.0091	9.970	4.998	4.807	10.42	1.095	5.068
SDev	.0015	.035	.085	.063	.05	.008	.001
XRSD	.15002	.3468	1.704	1.301	.4556	.7254	.0200
#1	1.0080	9.994	4.938	4.763	10.45	1.089	5.069
#2	1.0101	9.945	5.059	4.851	10.39	Q1.101	5.067
Errors	QC Pass	QC Pass	QC Pass	QC Pass	QC Pass	QC Pass	QC Pass
Value	1.0000	10.00	5.000	5.000	10.00	1.000	5.000
Range	10.000	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
Avg	19.97	.9995	4.934	1.977	2.104	10.12	18.65
SDev	.47	.0230	.087	.039	.009	.19	.18
XRSD	2.337	2.297	1.754	1.961	.4424	1.893	.9840
#1	19.64	.9832	4.873	1.949	2.111	9.982	18.78
#2	20.30	1.016	4.995	2.004	2.098	10.25	18.52
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	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	5.126	4.996	20.05	1.031	4.993	Q49.15	27.06
SDev	.021	.037	.20	.018	.113	.36	.39
XRSD	.4125	.7486	.9831	1.705	2.259	.7391	1.424
#1	5.141	5.022	19.91	1.018	4.914	Q49.41	27.33
#2	5.111	4.969	20.19	1.043	5.073	Q48.90	Q26.78
Errors	QC Pass	QC Pass	QC Pass	QC Pass	QC Pass	QC Fail	QC Pass
Value	5.000	5.000	20.00	1.000	5.000	30.00	30.00
Range	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	4.892	5.014	5.082	4.969	1.061	1.018	1.010
SDev	.088	.049	.075	.099	.012	.016	.010
XRSD	1.802	.9784	1.466	1.989	1.090	1.570	.9653
#1	4.830	4.979	5.029	4.900	1.069	1.030	1.003
#2	4.955	5.048	5.135	5.039	1.053	1.007	1.017
Errors	QC Pass	QC Pass	NOCHECK	NOCHECK	QC Pass	QC Pass	QC Pass
Value	5.000	5.000			1.000	1.000	1.000
Range	10.00	10.00			10.00	10.00	10.00
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899

010037

Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avge	101.4	5.520	5.366	4.963	5.002	5.412	4.915
SDev	2.2	.002	.056	.031	.091	.038	.100
%RSD	2.212	.0300	1.049	.6173	1.812	.7027	2.026
#1	99.83	5.519	5.327	4.942	4.938	5.385	4.844
#2	103.0	5.521	5.406	4.985	5.066	5.439	4.985
Errors	NOCHECK	NOCHECK	NOCHECK	QC Pass	QC Pass	QC Pass	QC Pass
Value				5.000	5.000	5.000	5.000
Range				10.00	10.00	10.00	10.00
Elem	Sr4215	Th2037	Ti3372	Ti1900	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	5.366	1.057	4.912	5.407	1.030	5.001	1.009
SDev	.022	.005	.017	.096	.000	.056	.016
%RSD	.4109	.5067	.3500	1.772	.0438	1.123	1.624
#1	5.382	1.060	4.900	5.339	1.030	4.961	.9973
#2	5.351	1.053	4.924	5.475	1.029	5.040	1.021
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	Y_3710	Zn2062	Zr3496				
Units	ppm	ppm	ppm				
Avge	5.136	.9976	4.942				
SDev	.005	.0355	.008				
%RSD	.1006	3.560	.1527				
#1	5.140	.9725	4.947				
#2	5.133	1.023	4.937				
Errors	QC Pass	QC Pass	QC Pass				
Value	5.000	1.000	5.000				
Range	10.00	10.00	10.00				

010038

IntStd	1	2	3	4	5	6	
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	701965	10000	---	---	---	---	---
SDev	15522.41	.00000000	---	---	---	---	---
%RSD	2.211279	.00000000	---	---	---	---	---
#1	690989	10000	---	---	---	---	---
#2	712941	10000	---	---	---	---	---

Method: DAILY1 Sample Name: icb/ccb

Operator:

Run Time: 10/29/03 17:34:32

010039

Comment:

Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00071	.0025	.0020	.0067	.0025	.0003	H.0065
SDev	.00027	.0005	.0013	.0019	.0013	.0001	.0027
XRSD	37.991	19.70	64.02	28.96	50.36	34.67	41.45

#1	.00052	.0022	.0028	.0080	.0034	.0003	H.0084
#2	.00090	.0029	.0011	.0053	.0016	.0002	.0046

Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC High
High	.00500	.0500	.0050	.0500	.0050	.0050	.0050
Low	-.00500	-.0500	-.0050	-.0500	-.0050	-.0050	-.0050

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0051	.0004	.0021	.0002	.0007	-.0076	.0105
SDev	.0033	.0003	.0009	.0010	.0008	.0264	.0079
XRSD	64.70	71.12	41.46	652.1	112.4	345.3	75.65

#1	.0074	.0006	.0027	-.0006	.0001	L-.0263	.0161
#2	.0020	.0002	.0015	.0009	.0013	.0110	.0049

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	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0019	.0000	.0113	.0002	.0034	.0090	H.1634
SDev	.0006	.0005	.0018	.0000	.0010	.0034	.0736
XRSD	30.80	58.92	16.22	2.301	20.63	34.78	45.02

#1	.0024	.0011	.0126	.0002	.0041	.0122	H.2155
#2	.0015	.0005	.0100	.0002	.0027	.0074	H.1114

Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC High
High	.0050	.0050	.0500	.0050	.0050	.0500	.0500
Low	-.0050	-.0050	-.0500	-.0050	-.0050	-.0500	-.0500

Elem	Ni2316	P_1702	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0012	.0098	.0063	-.0014	.0012	.0051	.0022
SDev	.0006	.0022	.0085	.0033	.0004	.0040	.0024
XRSD	51.51	22.57	135.0	236.1	31.26	77.27	110.0

#1	.0000	H.0114	.0122	-.0038	.0010	.0079	.0005
#2	.0016	.0082	.0003	.0009	.0015	.0023	.0039

Errors	LC Pass	LC Pass	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass
High	.0050	.0100			.0050	.0100	.0100
Low	-.0050	-.0100			-.0050	-.0100	-.0100

Elem	Sc3613	1960/1	1960/2	Si2801	Pb220	Se196	Sn1899
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010040

Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avge	99.77	.0079	-.0025	.0067	.0011	.0010	.0000
SDev	.74	.0030	.0025	.0012	.0006	.0007	.0000
%RSD	.7370	38.02	102.1	17.50	52.06	69.34	37.86
#1	100.3	.0100	-.0043	.0059	.0016	.0005	.0000
#2	99.25	.0058	-.0007	.0075	.0007	.0015	.0000
Errors	NOCHECK	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass	LC Pass
High				.0100	.0030	.0050	.0050
Low				-.0100	-.0030	-.0050	-.0050
Elem	Sr4215	Th2037	Ti3372	Tl1900	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0013	-.0003	.0017	.0003	.0277	.0014	.0043
SDev	.0000	.0045	.0006	.0028	.0069	.0001	.0012
%RSD	61.01	1561.	35.87	33.41	24.87	9.091	26.97
#1	.0019	-.0035	.0021	.0063	.0325	.0013	.0035
#2	.0007	.0029	.0012	H.0102	.0228	.0015	.0051
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	Y_3710	Zn2062	Zr3496				
Units	ppm	ppm	ppm				
Avge	.0014	.0000	.0016				
SDev	.0005	.0002	.0004				
%RSD	37.29	30.87	26.00				
#1	.0010	.0009	.0013				
#2	.0010	.0006	.0019				
Errors	LC Pass	LC Pass	LC Pass				
High	.0050	.0050	.0050				
Low	-.0050	-.0050	-.0050				

010041

IntStd	1	2	3	4	5	6	
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	690561	10000	---	---	---	---	---
SDev	5043.085	.00000000	---	---	---	---	---
*RSD	.7302002	.00000000	---	---	---	---	---
#1	694127	10000	---	---	---	---	---
#2	606995	10000	---	---	---	---	---

Method: DAILY1 Sample Name: pbw-K29W2 pg54-260 Operator:
 Run Time: 10/29/03 17:39:41
 Comment:
 Mode: CONC Corr. Factor: 1

010042

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Ri2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.00024	.0096	-.0004	.0027	.0002	-.0001	H.0054
SDev	.00003	.0000	.0003	.0001	.0000	.0000	.0015
XRSD	13.188	83.50	79.23	5.542	17.39	10.24	26.89
#1	.00026	.0152	-.0002	.0026	.0002	-.0001	H.0065
#2	.00021	.0039	-.0007	.0028	.0001	-.0002	.0044
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC High
High	.00500	.0500	.0050	.0500	.0050	.0050	.0050
Low	-.00500	-.0500	-.0050	-.0500	-.0050	-.0050	-.0050
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0023	.0000	.0022	.0002	.0006	.0019	-.0010
SDev	.0006	.0000	.0002	.0001	.0001	.0022	.0051
XRSD	26.65	877.7	8.342	44.51	22.25	115.5	522.0
#1	-.0019	-.0000	.0023	.0003	.0008	.0035	-.0046
#2	-.0027	.0000	.0020	.0002	.0005	.0004	.0026
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	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0005	.0001	.0097	.0001	.0013	.0041	.0353
SDev	.0002	.0000	.0043	.0001	.0003	.0017	.0379
XRSD	36.76	7.715	44.73	94.75	27.39	41.81	107.3
#1	.0003	.0001	.0067	.0001	.0015	.0029	.0085
#2	.0006	.0001	.0128	.0000	.0010	.0053	H.0621
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	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	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0001	.0049	.0028	-.0015	.0008	.0050	.0012
SDev	.0002	.0017	.0016	.0008	.0006	.0075	.0016
XRSD	267.3	35.32	56.28	54.13	78.99	150.7	143.8
#1	.0002	.0062	.0017	-.0021	.0004	H.0103	-.0000
#2	-.0001	.0037	.0039	-.0009	.0013	-.0003	.0023
Errors	LC Pass	LC Pass	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass
High	.0050	.0100			.0050	.0100	.0100
Low	-.0050	-.0100			-.0050	-.0100	-.0100
Elem	Sc3613	1960/1	1960/2	Si2081	Pb220	Se196	Sn1899

010043

Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avge	95.70	.0003	-.0017	H.0100	-.0001	-.0010	-.0022
SDev	1.48	.0013	.0008	.0003	.0011	.0010	.0008
%RSD	1.548	483.0	50.99	3.089	1462.	98.06	38.46
#1	94.65	.0012	-.0011	H.0110	-.0008	-.0003	-.0016
#2	96.75	-.0006	-.0023	H.0105	.0007	-.0017	-.0027
Errors	NOCHECK	NOCHECK	NOCHECK	LC High	LC Pass	LC Pass	LC Pass
High				.0100	.0030	.0050	.0050
Low				-.0100	-.0030	-.0050	-.0050
Elem	Sr4215	Th2837	Ti3372	Ti1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0000	-.0005	.0003	.0038	.0048	.0005	.0031
SDev	.0000	.0017	.0008	.0009	.0076	.0003	.0003
%RSD	95.68	358.6	319.0	23.93	159.8	58.83	9.104
#1	-.0000	.0007	-.0003	.0032	-.0006	.0007	.0033
#2	-.0000	-.0017	.0009	.0044	.0101	.0003	.0029
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	Y_3710	Zn2062	Zr3496				
Units	ppm	ppm	ppm				
Avge	.0002	.0004	-.0008				
SDev	.0000	.0000	.0002				
%RSD	.2400	1.450	23.36				
#1	.0002	.0004	-.0007				
#2	.0002	.0004	-.0010				
Errors	LC Pass	LC Pass	LC Pass				
High	.0050	.0050	.0050				
Low	-.0050	-.0050	-.0050				

010944

IntStd	1	2	3	4	5	6	
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	662439	10000	---	---	---	---	---
SDev	10202.75	.00000000	---	---	---	---	---
*RSD	1.552256	.00000000	---	---	---	---	---
#1	655168	10000	---	---	---	---	---
#2	669710	10000	---	---	---	---	---

Method: DAILY1 Sample Name: pbw-K29W3 pg54-261

Operator:

010045

Run Time: 10/29/03 17:44:50

Comment:

Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Ri2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00083	.0048	.0017	.0020	.0001	-.0001	H.0060
SDev	.00181	.0082	.0017	.0013	.0000	.0000	.0056
XRSD	219.13	169.7	99.01	64.62	14.41	.3399	93.48

#1	.00211	.0106	.0030	.0030	.0001	-.0001	H.0100
#2	-.00046	-.0010	.0005	.0011	.0002	-.0001	.0020

Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC High
High	.00500	.0500	.0050	.0500	.0050	.0050	.0050
Low	-.00500	-.0500	-.0050	-.0500	-.0050	-.0050	-.0050

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.0048	.0002	.0019	.0005	.0010	.0056	.0111
SDev	.0032	.0003	.0005	.0003	.0002	.0055	.0077
XRSD	66.39	148.5	27.92	55.73	21.60	97.46	69.34

#1	-.0025	.0004	.0015	.0003	.0009	.0095	.0056
#2	-.0070	-.0000	.0023	.0006	.0012	.0018	.0165

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	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0010	.0001	.0118	.0000	.0009	H.0992	H.2167
SDev	.0016	.0000	.0083	.0000	.0003	.0022	.0500
XRSD	163.1	33.43	69.91	71.75	37.92	2.210	23.10

#1	.0021	.0001	.0177	.0001	.0011	H.0976	H.1813
#2	-.0002	.0001	.0060	.0000	.0006	H.1007	H.2521

Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	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
Avg	.0002	.0079	.0022	-.0031	.0007	H.0112	.0042
SDev	.0003	.0147	.0034	.0031	.0016	.0105	.0031
XRSD	104.9	185.2	151.4	101.4	243.3	94.18	73.65

#1	.0001	-.0025	-.0002	-.0009	-.0005	H.0186	.0064
#2	.0004	H.0184	.0046	-.0053	.0018	.0037	.0020

Errors	LC Pass	LC Pass	NOCHECK	NOCHECK	LC Pass	LC High	LC Pass
High	.0050	.0100			.0050	.0100	.0100
Low	-.0050	-.0100			-.0050	-.0100	-.0100

Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
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010046

Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avg	97.74	-.0015	.0018	H.0127	-.0013	.0007	.0009
SDev	1.06	.0018	.0024	.0061	.0010	.0022	.0021
XRSD	1.084	116.8	128.7	48.07	72.91	298.2	233.7
#1	96.99	-.0003	.0035	H.0170	-.0006	.0023	.0024
#2	98.49	-.0028	.0002	.0084	-.0020	-.0008	-.0006
Errors	NOCHECK	NOCHECK	NOCHECK	LC High	LC Pass	LC Pass	LC Pass
High				.0100	.0030	.0050	.0050
Low				-.0100	-.0030	-.0050	-.0050
Elem	Sr4215	Th2837	Ti3372	Ti1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.0000	.0015	.0005	H.0110	.0310	.0006	.0049
SDev	.0001	.0028	.0010	.0134	.0217	.0004	.0047
XRSD	222.3	180.9	203.1	121.4	70.05	73.04	95.65
#1	.0000	.0035	.0012	H.0205	.0464	.0003	.0082
#2	-.0001	-.0004	-.0002	.0016	.0156	.0009	.0016
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	Y_3710	Zn2062	Zr3496				
Units	ppm	ppm	ppm				
Avg	.0002	.0007	-.0007				
SDev	.0000	.0001	.0000				
XRSD	5.997	18.62	4.277				
#1	.0002	.0008	-.0008				
#2	.0002	.0006	-.0007				
Errors	LC Pass	LC Pass	LC Pass				
High	.0050	.0050	.0050				
Low	-.0050	-.0050	-.0050				

010047

IntStd	1	2	3	4	5	6	
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	676537	10000	---	---	---	---	---
SDev	7298.756	.00000000	---	---	---	---	---
%RSD	1.078841	.00000000	---	---	---	---	---
#1	671376	10000	---	---	---	---	---
#2	681698	10000	---	---	---	---	---

Method: DAILY1 Sample Name: lcsw-K29W2

Operator:

Run Time: 10/29/03 17:50:18

010048

Comment:

Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.05335	1.931	2.067	.0020	2.109	.0563	.0094
SDev	.00237	.004	.013	.0013	.006	.0005	.0018
%RSD	4.4507	.2202	.6480	63.81	.2756	.8991	19.09
#1	.05503	1.934	2.076	.0030	2.105	.0567	.0107
#2	.05167	1.928	2.058	.0011	2.113	.0559	.0081

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	19.98	.0511	.5056	.2027	.2635	1.031	16.11
SDev	.11	.0003	.0009	.0008	.0007	.009	.10
%RSD	.5415	.4939	.1732	.3888	.2562	.9038	.6157
#1	20.06	.0513	.5062	.2032	.2630	1.038	16.04
#2	19.91	.0510	.5050	.2021	.2640	1.024	16.18

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0023	.0003	19.89	.5188	.0005	29.69	16.75
SDev	.0020	.0001	.01	.0001	.0006	.24	.36
%RSD	86.42	36.71	.0428	.0087	127.6	.7939	2.142
#1	.0037	.0003	19.90	.5189	.0009	29.53	17.00
#2	.0009	.0002	19.89	.5188	.0000	29.86	16.50

Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2060
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.5037	.0005	.5133	.4999	.0029	.0066	.5150
SDev	.0003	.0050	.0062	.0107	.0085	.0067	.0049
%RSD	.0617	50.81	1.199	2.144	293.7	101.6	.9558
#1	.5035	.0050	.5177	.4924	.0089	.0114	.5184
#2	.5039	.0120	.5090	.5075	-.0031	.0019	.5115

Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avge	96.85	2.124	2.119	.0173	.5039	2.119	.0009
SDev	.19	.000	.021	.0038	.0051	.014	.0034
%RSD	.1938	.0072	.9931	22.16	1.010	.6638	362.1
#1	96.71	2.124	2.104	.0200	.5003	2.109	.0033
#2	96.98	2.124	2.134	.0146	.5075	2.129	-.0014

Elem	Sr4215	Th2837	Ti3372	Tl1900	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0002	-.0039	.0011	2.158	.0553	.5077	.0050
SDev	.0001	.0009	.0015	.003	.0307	.0013	.0056
%RSD	45.21	22.52	135.8	.1230	55.59	.2571	111.1
#1	.0002	-.0033	.0022	2.156	.0770	.5087	.0090
#2	.0001	-.0045	.0000	2.160	.0336	.5068	.0011

010049

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avg	.0002	.5133	-.0002
SDev	.0001	.0027	.0005
%RSD	39.59	.5158	290.4

#1	.0003	.5152	.0002
#2	.0002	.5115	-.0006

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avg	670392	10000	--	--	--	--	--
SDev	1343.503	.00000000	--	--	--	--	--
%RSD	.2004056	.00000000	--	--	--	--	--
#1	669442	10000	--	--	--	--	--
#2	671342	10000	--	--	--	--	--

Method: DAILY1 Sample Name: lcsw-K29W3

Operator:

Run Time: 10/29/03 17:55:47

Comment:

010050

Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.04964	1.896	2.023	-.0074	2.108	.0546	-.0012
SDev	.00210	.013	.018	.0047	.001	.0005	.0076
XRSD	4.2333	.6705	.8898	63.61	.0485	.8796	620.5

#1	.05112	1.905	2.036	-.0041	2.108	.0549	.0041
#2	.04815	1.887	2.011	-.0107	2.109	.0542	-.0066

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	20.10	.0498	.4985	.1994	.2597	1.008	16.57
SDev	.24	.0010	.0054	.0017	.0014	.007	.14
XRSD	1.182	2.049	1.092	.8740	.5561	.7342	.8507

#1	20.27	.0505	.5024	.2007	.2587	1.003	16.47
#2	19.93	.0491	.4947	.1982	.2608	1.013	16.66

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0004	.0001	20.20	.5131	4.101	30.61	16.80
SDev	.0010	.0001	.20	.0045	.019	.26	.23
XRSD	450.4	94.16	.9736	.8831	.4623	.8651	1.374

#1	.0009	.0002	20.34	.5163	4.114	30.42	16.96
#2	-.0017	.0000	20.06	.5099	4.087	30.80	16.64

Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.4968	-.0039	.4927	.5042	-.0013	.0062	.4991
SDev	.0046	.0059	.0147	.0004	.0015	.0108	.0060
XRSD	.9227	153.5	2.990	.0874	117.2	173.4	1.211

#1	.5001	.0003	.5031	.5045	-.0002	.0139	.5034
#2	.4936	-.0000	.4822	.5039	-.0023	-.0014	.4948

Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avge	95.21	2.081	2.134	-.0029	.4998	2.114	-.0048
SDev	.05	.023	.007	.0055	.0052	.003	.0067
XRSD	.0544	1.100	.3267	187.8	1.040	.1409	138.6

#1	95.25	2.098	2.129	.0010	.5035	2.116	-.0001
#2	95.17	2.065	2.138	-.0068	.4962	2.112	-.0095

Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0001	-.0033	-.0008	2.120	.0093	.5006	4.132
SDev	.0001	.0009	.0013	.015	.0424	.0040	.043
XRSD	153.3	27.84	157.4	.6948	454.8	.8071	1.044

#1	.0001	-.0039	.0001	2.130	.0393	.5034	4.162
#2	-.0000	-.0026	-.0018	2.110	-.0207	.4977	4.101

010051

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avg	.0002	.5013	.0031
SDev	.0001	.0009	.0006
%RSD	42.08	1.783	20.73

#1	.0001	.5076	.0026
#2	.0003	.4949	.0035

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avg	659070	10000	--	--	--	--	--
SDev	405.1722	.00000000	--	--	--	--	--
%RSD	.0614764	.00000000	--	--	--	--	--
#1	659356	10000	--	--	--	--	--
#2	658783	10000	--	--	--	--	--

Method: DAILY1 Sample Name: 236555

Operator:

Run Time: 10/29/03 18:01:15

010052

Comment:

Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00311	.0358	.0038	.0217	.0030	-.0002	.0036
SDev	.00084	.0037	.0016	.0009	.0017	.0002	.0004
%RSD	26.943	10.17	43.49	4.164	57.06	121.6	10.30

#1	.00370	.0333	.0049	.0211	.0043	-.0000	.0039
#2	.00252	.0384	.0026	.0224	.0018	-.0003	.0034

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	1.265	.0001	.0027	-.0000	.0030	.1095	51.85
SDev	.005	.0002	.0002	.0000	.0003	.0137	.44
%RSD	.3572	141.2	9.152	131.5	9.626	12.51	.8455

#1	1.262	.0000	.0028	-.0000	.0032	.0998	52.16
#2	1.268	.0002	.0025	-.0001	.0028	.1192	51.54

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0029	.0035	.6924	.0011	.0081	6-51.34	3908.
SDev	.0002	.0007	.0023	.0003	.0036	1.82	6.
%RSD	5.503	19.68	.3380	25.20	43.86	3.551	.1460

#1	.0030	.0030	.6941	.0013	.0106	6-50.05	3904.
#2	.0028	.0040	.6908	.0009	.0056	6-52.63	3912.

Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0017	13.67	.0052	-.0012	.0002	112.3	.0008
SDev	.0007	.11	.0006	.0002	.0006	.4	.0021
%RSD	38.12	.8120	11.12	16.53	275.0	.3202	256.3

#1	.0022	13.59	.0048	-.0011	-.0002	112.6	.0023
#2	.0013	13.75	.0057	-.0014	.0006	112.1	-.0007

Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avg	87.77	.0105	-.0012	.3389	.0009	.0027	.0031
SDev	.78	.0040	.0047	.0029	.0001	.0018	.0004
%RSD	.8894	38.65	392.1	.8502	6.375	65.29	13.80

#1	88.32	.0076	.0021	.3369	.0009	.0040	.0028
#2	87.21	.0134	-.0045	.3409	.0010	.0015	.0034

Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0054	.0043	.0002	-.0008	-.1457	.0009	.0009
SDev	.0000	.0001	.0000	.0090	.0194	.0003	.0046
%RSD	.3408	3.100	5.934	1142.	13.30	32.14	52.24

#1	.0054	.0044	.0002	.0056	-.1594	.0007	.0121
#2	.0054	.0042	.0003	-.0072	-.1320	.0011	.0056

010053

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avg	.0002	.0442	-.0006
SDev	.0001	.0007	.0004
%RSD	29.14	1.521	71.20

#1	.0002	.0437	-.0008
#2	.0002	.0446	-.0003

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avg	607637	10000	--	--	--	--	--
SDev	5446.136	.0000000	--	--	--	--	--
%RSD	.8962812	.0000000	--	--	--	--	--
#1	611488	10000	--	--	--	--	--
#2	603786	10000	--	--	--	--	--

Method: DAILY1 Sample Name: 236555d
 Run Time: 10/29/03 18:06:43
 Comment:
 Mode: CONC Corr. Factor: 1

Operator:

010054

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.00363	.0549	.0025	.0387	.0007	-.0003	.0061
SDev	.00149	.0068	.0015	.0001	.0002	.0000	.0016
%RSD	41.145	12.41	58.95	.3454	31.19	4.576	26.76

#1	.00469	.0597	.0036	.0388	.0008	-.0003	.0072
#2	.00257	.0501	.0015	.0386	.0005	-.0003	.0049

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	1.375	.0000	.0035	-.0014	.0023	.1188	59.48
SDev	.007	.0000	.0008	.0005	.0010	.0240	.44
%RSD	.5045	196.5	23.65	32.22	45.71	20.19	.7400

#1	1.380	.0000	.0029	-.0011	.0030	.1357	59.17
#2	1.370	-.0000	.0041	-.0018	.0015	.1018	59.79

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0040	.0044	.7330	.0007	.0013	S-83.49	4737.
SDev	.0002	.0006	.0019	.0001	.0008	.18	31.
%RSD	5.536	13.81	.2548	13.00	59.87	.2205	.6627

#1	.0041	.0049	.7343	.0008	.0018	S-83.36	4714.
#2	.0038	.0040	.7317	.0007	.0007	S-83.62	4759.

Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0017	14.36	.0254	.0031	.0064	119.1	.0047
SDev	.0009	.26	.0174	.0084	.0039	1.5	.0003
%RSD	55.29	1.837	68.37	272.6	61.42	1.238	7.361

#1	.0024	14.18	.0131	.0090	.0036	118.0	.0050
#2	.0010	14.55	.0377	-.0028	.0092	120.1	.0045

Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avge	85.48	.0110	-.0074	.4823	.0105	-.0013	.0055
SDev	.46	.0168	.0062	.0008	.0002	.0015	.0016
%RSD	.5383	152.3	83.34	.1597	2.016	115.7	28.76

#1	85.15	-.0008	-.0031	.4828	.0103	-.0023	.0066
#2	85.80	.0229	-.0118	.4818	.0106	-.0002	.0043

Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0067	.0054	.0002	-.0003	-.1464	-.0001	.0057
SDev	.0000	.0030	.0000	.0047	.0122	.0010	.0008
%RSD	.4227	55.34	15.01	1586.	8.313	1195.	13.20

#1	.0068	.0076	.0002	-.0036	-.1378	.0006	.0051
#2	.0067	.0033	.0003	.0030	-.1550	-.0008	.0062

010055

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avg	.0000	.3307	.0014
SDev	.0002	.0022	.0032
%RSD	2333.	.6661	226.2

#1	.0001	.3322	.0037
#2	-.0001	.3291	-.0009

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avg	591886	10000	---	---	---	---	---
SDev	3177.031	.00000000	---	---	---	---	---
%RSD	.5367644	.00000000	---	---	---	---	---
#1	589639	10000	---	---	---	---	---
#2	594132	10000	---	---	---	---	---

Method: DAILY1 Sample Name: 236556

Operator:

Run Time: 10/29/03 18:12:12

Comment:

010056

Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.00407	.0237	.0019	.0143	.0005	-.0002	.0015
SDev	.00162	.0078	.0003	.0001	.0001	.0000	.0002
XRSD	39.737	32.87	15.20	.6747	9.226	6.628	12.48
#1	.00293	.0293	.0017	.0144	.0005	-.0002	.0014
#2	.00521	.0182	.0022	.0143	.0006	-.0002	.0017
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	3.702	.0001	.0022	-.0010	.0022	.0194	28.07
SDev	.012	.0000	.0001	.0001	.0001	.0070	.07
XRSD	.3152	13.93	4.792	9.740	3.796	35.99	.2428
#1	3.694	.0001	.0022	-.0011	.0023	.0145	28.11
#2	3.710	.0001	.0023	-.0010	.0022	.0243	28.02
Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0009	.0019	32.18	.0006	.0022	578.34	279.4
SDev	.0004	.0000	.01	.0001	.0001	.56	.1
XRSD	49.79	1.353	.0455	21.42	5.745	.7182	.0450
#1	.0006	.0019	32.19	.0005	.0021	578.73	279.3
#2	.0012	.0019	32.17	.0007	.0023	577.94	279.4
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2060
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0016	11.64	.0012	.0009	-.0006	76.88	.0008
SDev	.0003	.04	.0018	.0014	.0003	.02	.0006
XRSD	17.33	.3211	152.1	145.2	55.44	.0247	77.09
#1	.0018	11.61	-.0001	.0019	-.0009	76.89	.0004
#2	.0014	11.66	.0024	-.0000	-.0004	76.87	.0013
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avge	97.29	.0031	.0027	.3163	.0010	.0029	.0048
SDev	.62	.0003	.0008	.0014	.0003	.0004	.0024
XRSD	.6329	8.650	29.05	.4486	32.08	15.39	50.17
#1	96.85	.0033	.0022	.3173	.0012	.0026	.0031
#2	97.73	.0029	.0033	.3153	.0008	.0032	.0066
Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0017	-.0003	-.0002	-.0182	.0099	-.0003	.0021
SDev	.0000	.0012	.0002	.0009	.0037	.0003	.0012
XRSD	1.312	14.05	113.2	5.089	37.64	93.03	57.33
#1	.0017	-.0001	-.0003	-.0189	.0073	-.0005	.0012
#2	.0017	-.0074	-.0000	-.0176	.0126	-.0001	.0029

010057

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avg	.0001	.1535	.0009
SDev	.0001	.0003	.0017
%RSD	76.07	.1771	198.6

#1	.0000	.1533	.0021
#2	.0001	.1537	-.0004

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avg	673460	10000	---	---	---	---	---
SDev	4252.540	.0000000	---	---	---	---	---
%RSD	.6314466	.0000000	---	---	---	---	---
#1	670453	10000	---	---	---	---	---
#2	676467	10000	---	---	---	---	---

Method: DAILY1 Sample Name: 236556s

Operator:

Run Time: 10/29/03 18:17:40

Comment:

010058

Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.00822	.0271	-.0003	.0151	.0006	-.0004	.0027
SDev	.00060	.0022	.0006	.0004	.0000	.0002	.0013
%RSD	8.2998	8.036	212.5	2.662	5.599	40.70	49.54

#1	.00870	.0286	.0002	.0148	.0006	-.0003	.0036
#2	.00774	.0255	-.0008	.0153	.0006	-.0006	.0017

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	3.807	-.0001	.0016	-.0009	.0020	.0170	29.34
SDev	.034	.0001	.0004	.0000	.0007	.0058	.06
%RSD	.9016	47.51	26.24	3.561	32.50	34.00	.1990

#1	3.783	-.0001	.0013	-.0009	.0025	.0129	29.29
#2	3.831	-.0002	.0019	-.0009	.0016	.0210	29.38

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0012	.0018	33.30	.0006	.0029	579.29	293.8
SDev	.0006	.0000	.11	.0001	.0007	.76	2.4
%RSD	46.97	.2691	.3373	8.001	23.77	.9584	.8011

#1	.0008	.0018	33.22	.0006	.0034	579.83	292.1
#2	.0016	.0018	33.38	.0007	.0024	578.75	295.5

Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2060
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0010	11.82	.0020	.0012	.0008	78.43	.0014
SDev	.0004	.18	.0047	.0023	.0033	.11	.0001
%RSD	39.38	1.503	232.7	190.1	405.0	.1398	7.895

#1	.0013	11.95	-.0013	.0028	-.0015	78.35	.0015
#2	.0007	11.70	.0054	-.0004	.0032	78.51	.0013

Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avge	95.71	.0055	-.0003	.3284	.0015	.0017	.0038
SDev	.48	.0032	.0004	.0010	.0001	.0014	.0008
%RSD	.4984	57.75	161.0	.2957	3.707	80.76	21.03

#1	95.37	.0033	-.0006	.3277	.0014	.0007	.0044
#2	96.05	.0078	.0000	.3291	.0015	.0026	.0033

Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0018	-.0062	.0003	-.0064	-.0069	.0003	.0029
SDev	.0000	.0005	.0004	.0004	.0021	.0000	.0015
%RSD	.6115	8.564	131.8	131.5	30.57	.3701	50.93

#1	.0018	-.0059	.0000	-.0005	-.0054	.0003	.0019
#2	.0018	-.0066	.0006	-.0124	-.0084	.0003	.0040

010059

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	.0001	.1559	-.0002
SDev	.0000	.0011	.0000
%RSD	14.08	.7232	.4194

#1	.0002	.1551	-.0002
#2	.0001	.1567	-.0002

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.304	---	---	---	---	---	---
Avge	662522	10000	---	---	---	---	---
SDev	3253.398	.00000000	---	---	---	---	---
%RSD	.4910631	.00000000	---	---	---	---	---
#1	660221	10000	---	---	---	---	---
#2	664822	10000	---	---	---	---	---

Method: DAILY1 Sample Name: 236557
 Run Time: 10/29/03 18:23:07
 Comment:
 Mode: CONC Corr. Factor: 1

Operator:

010060

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.00770	.0229	-.0006	.0411	.0006	-.0001	.0042
SDev	.00194	.0065	.0021	.0000	.0001	.0001	.0025
XRSD	25.228	28.21	351.7	.1044	10.69	136.7	59.84

#1	.00907	.0275	-.0021	.0412	.0007	-.0002	.0059
#2	.00632	.0183	.0009	.0411	.0006	-.0000	.0024

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	1.303	-.0002	.0024	-.0013	.0017	.1087	32.90
SDev	.005	.0001	.0000	.0007	.0003	.0097	.04
XRSD	.3829	48.57	.3868	54.64	17.39	8.951	.1368

#1	1.307	-.0003	.0024	-.0008	.0019	.1155	32.87
#2	1.300	-.0001	.0024	-.0019	.0015	.1018	32.93

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0014	.0024	.7221	.0005	.0061	574.28	406.3
SDev	.0007	.0000	.0184	.0001	.0001	.80	.2
XRSD	51.05	1.110	2.543	10.73	1.653	1.076	.0581

#1	.0019	.0024	.7351	.0006	.0062	574.85	406.2
#2	.0009	.0024	.7091	.0005	.0061	573.72	406.5

Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0005	13.22	.0013	-.0019	-.0015	107.3	-.0004
SDev	.0003	.04	.0006	.0027	.0022	.5	.0006
XRSD	67.43	.3087	48.01	143.9	150.0	.4861	152.9

#1	.0008	13.19	.0009	.0000	-.0030	106.9	-.0008
#2	.0003	13.25	.0018	-.0038	.0001	107.7	.0000

Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avge	96.35	.0022	-.0021	.5913	-.0008	-.0006	.0024
SDev	.64	.0050	.0028	.0009	.0016	.0002	.0050
XRSD	.6623	229.3	137.2	.1546	197.3	38.21	207.8

#1	95.90	-.0013	-.0001	.5907	.0003	-.0005	.0059
#2	96.80	.0057	-.0041	.5920	-.0019	-.0008	-.0011

Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0013	.0016	-.0001	-.0001	.0258	-.0002	.0012
SDev	.0000	.0005	.0004	.0120	.0175	.0001	.0039
XRSD	.6715	30.67	317.3	10030.	67.70	75.67	319.4

#1	.0013	.0020	.0002	.0084	.0381	-.0001	-.0015
#2	.0013	.0013	-.0004	-.0086	.0134	-.0003	.0039

010061

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avg	.0000	.1695	.0000
SDev	.0001	.0005	.0006
%RSD	1099.	.2862	85.52

#1	.0001	.1698	.0012
#2	-.0001	.1691	.0003

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avg	666964	10000	---	---	---	---	---
SDev	4360.727	.00000000	---	---	---	---	---
%RSD	.6538180	.00000000	---	---	---	---	---
#1	663880	10000	---	---	---	---	---
#2	670047	10000	---	---	---	---	---

Method: DAILY1 Sample Name: 236558
 Run Time: 10/29/03 10:28:36
 Comment:
 Mode: CONC Corr. Factor: 1

Operator:

010062

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.05922	2.188	2.087	.0432	2.175	.0547	.0034
SDev	.00054	.032	.006	.0012	.008	.0008	.0097
XRSD	.91393	1.440	.2854	2.742	.3685	1.367	289.1
#1	.05960	2.210	2.083	.0424	2.180	.0542	-.0035
#2	.05883	2.165	2.092	.0441	2.169	.0553	.0103
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	21.65	.0490	.5091	.1999	.2791	1.151	61.42
SDev	.02	.0012	.0017	.0006	.0019	.005	.89
XRSD	.0846	2.527	.3278	.2876	.6686	.4205	1.442
#1	21.64	.0481	.5079	.2003	.2804	1.148	62.05
#2	21.67	.0499	.5103	.1994	.2778	1.155	60.79
Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0022	.0023	21.57	.5169	.0069	576.22	462.5
SDev	.0012	.0003	.05	.0019	.0003	1.91	5.2
XRSD	54.73	10.85	.2328	.3730	4.473	2.507	1.126
#1	.0014	.0021	21.60	.5182	.0067	577.57	466.2
#2	.0031	.0025	21.53	.5155	.0071	574.87	458.9
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.5044	13.50	.5172	.5227	-.0000	109.0	.5206
SDev	.0046	.36	.0030	.0015	.0001	.1	.0024
XRSD	.9111	2.645	.5805	.2959	643.0	.0830	.4622
#1	.5012	13.75	.5151	.5238	.0001	109.0	.5189
#2	.5077	13.25	.5193	.5216	-.0001	109.1	.5223
Elem	Sc3613	1960/1	1960/2	Si2081	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avge	92.10	2.224	2.247	.6211	.5203	2.237	.0043
SDev	1.88	.002	.015	.0048	.0000	.009	.0084
XRSD	2.042	.0771	.6467	.7728	.0058	.4072	195.5
#1	90.77	2.222	2.257	.6177	.5204	2.244	-.0017
#2	93.43	2.225	2.237	.6245	.5203	2.231	.0103
Elem	Sr4215	Th2037	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0016	-.0060	.0004	2.325	-.0035	.5099	.0022
SDev	.0001	.0003	.0011	.014	.0394	.0017	.0011
XRSD	4.199	4.801	259.7	.6085	1130.	.3372	49.98
#1	.0015	-.0058	-.0004	2.315	-.0314	.5111	.0014
#2	.0016	-.0062	.0012	2.335	.0244	.5087	.0030

010063

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avg	.0001	.6837	.0017
SDev	.0000	.0112	.0002
%RSD	38.82	1.633	12.55

#1	.0001	.6758	.0015
#2	.0001	.6916	.0018

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avg	637574	10000	---	---	---	---	---
SDev	12966.22	.00000000	---	---	---	---	---
%RSD	2.033679	.00000000	---	---	---	---	---
#1	628406	10000	---	---	---	---	---
#2	646743	10000	---	---	---	---	---

Method: DAILY1 Sample Name: CCV2

Operator:

Run Time: 10/29/03 18:39:15

Comment:

Mode: CONC Corr. Factor: 1

010064

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	1.0197	9.945	5.046	4.840	10.36	H1.130	5.063
SDev	.0075	.092	.002	.041	.01	.009	.008
XRSD	.73951	.9210	.0402	.8469	.0749	.7680	.1542
#1	1.0144	9.880	5.047	4.811	10.36	H1.124	5.058
#2	1.0251	10.01	5.045	4.868	10.35	H1.136	5.069
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC High	LC Pass
High	1.1000	11.00	5.500	5.500	11.00	1.100	5.500
Low	.90000	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	ppm	ppm
Avg	20.11	1.008	4.959	1.987	2.105	10.16	18.28
SDev	.21	.008	.059	.025	.006	.12	.15
XRSD	1.033	.7808	1.181	1.275	.2679	1.170	.8416
#1	19.96	1.003	4.917	1.969	2.101	10.08	18.17
#2	20.26	1.014	5.000	2.005	2.109	10.25	18.39
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
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	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	5.073	4.902	20.08	1.036	5.037	H48.19	L26.98
SDev	.003	.048	.25	.012	.046	.57	.33
XRSD	.0552	.9754	1.255	1.156	.9059	1.173	1.220
#1	5.071	4.868	19.91	1.027	5.004	H47.79	L26.75
#2	5.075	4.936	20.26	1.044	5.069	H48.59	27.21
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC High	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	ppm	ppm	ppm	ppm	ppm
Avg	4.917	4.760	5.026	4.968	1.042	.9865	1.010
SDev	.023	.045	.056	.052	.004	.0048	.005
XRSD	.4614	.9483	1.107	1.043	.3660	.4848	.4804
#1	4.901	4.792	4.987	4.931	1.040	.9832	1.007
#2	4.933	4.728	5.065	5.005	1.045	.9899	1.014
Errors	LC Pass	LC Pass	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass
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	Pb220	Se196	Sn1899

010065

Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avg	95.55	5.459	5.385	4.984	4.982	5.404	4.936
SDev	.25	.063	.031	.052	.053	.041	.040
%RSD	.2668	1.155	.5699	1.052	1.064	.7666	.8045
#1	95.73	5.415	5.363	4.947	4.945	5.375	4.907
#2	95.37	5.504	5.407	5.021	5.020	5.434	4.964
Errors	NOCHECK	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass	LC Pass
High				5.500	5.500	5.500	5.500
Low				4.500	4.500	4.500	4.500
Elem	Sr4215	Th2037	Ti3372	Ti1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	5.358	1.032	4.930	5.387	1.020	5.011	.9950
SDev	.009	.013	.005	.051	.007	.053	.0114
%RSD	.1683	1.226	.1095	.9550	.7125	1.058	1.145
#1	5.365	1.023	4.926	5.351	1.015	4.973	.9877
#2	5.352	1.041	4.934	5.424	1.025	5.048	1.004
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	Y_3710	Zn2062	Zr3496				
Units	ppm	ppm	ppm				
Avg	5.124	1.007	4.934				
SDev	.001	.010	.007				
%RSD	.0241	.9819	.1498				
#1	5.123	.9999	4.928				
#2	5.125	1.014	4.939				
Errors	LC Pass	LC Pass	LC Pass				
High	5.500	1.100	5.500				
Low	4.500	.9000	4.500				

IntStd	1	2	3	4	5	6	010066
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	661448	10000	---	---	---	---	---
SDev	1749.382	.00000000	---	---	---	---	---
%RSD	.2644777	.00000000	---	---	---	---	---
#1	662685	10000	---	---	---	---	---
#2	660211	10000	---	---	---	---	---

Method: DAILY1 Sample Name: CCB2
 Run Time: 10/29/03 10:47:22
 Comment:
 Mode: CONC Corr. Factor: 1

Operator:

010067

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00207	.0117	.0010	.0052	.0009	.0000	.0042
SDev	.00029	.0008	.0047	.0012	.0005	.0001	.0019
XRSD	13.931	75.13	461.7	23.54	57.83	114.4	46.60
#1	.00228	.0055	-.0023	.0061	.0012	.0001	H.0055
#2	.00187	.0179	.0043	.0043	.0005	.0000	.0028
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	.00500	.0500	.0050	.0500	.0050	.0050	.0050
Low	-.00500	-.0500	-.0050	-.0500	-.0050	-.0050	-.0050
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.0050	.0001	.0015	-.0008	.0010	-.0019	.0086
SDev	.0012	.0001	.0003	.0000	.0004	.0063	.0032
XRSD	23.22	107.4	20.33	4.221	34.90	327.0	36.70
#1	-.0042	.0002	.0018	-.0008	.0013	-.0064	.0108
#2	-.0058	.0000	.0013	-.0008	.0008	.0025	.0064
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	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0009	.0009	.0101	.0002	.0016	.0220	H.1533
SDev	.0001	.0001	.0010	.0000	.0005	.0014	.0185
XRSD	12.85	15.01	9.609	1.027	30.74	6.606	12.05
#1	.0010	.0010	.0108	.0002	.0019	.0230	H.1403
#2	.0009	.0008	.0094	.0002	.0012	.0209	H.1664
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	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
Avg	.0009	.0029	-.0013	-.0003	.0004	-.0023	.0024
SDev	.0006	.0016	.0004	.0002	.0004	.0083	.0007
XRSD	58.10	55.06	33.69	84.87	102.6	360.5	27.62
#1	.0013	.0040	-.0016	-.0004	.0001	-.0082	.0029
#2	.0006	.0018	-.0010	-.0001	.0007	.0036	.0019
Errors	LC Pass	LC Pass	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass
High	.0050	.0100			.0050	.0100	.0100
Low	-.0050	-.0100			-.0050	-.0100	-.0100
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899

Units	%R	ppm	ppm	ppm	ppm	ppm	010068
Avg	97.06	.0045	.0002	.0057	-.0006	.0016	-.0002
SD	.27	.0005	.0010	.0013	.0003	.0005	.0024
%RSD	.2782	11.43	682.5	22.52	47.86	32.77	954.3
#1	96.87	.0041	.0009	.0066	-.0008	.0020	.0014
#2	97.25	.0048	-.0006	.0048	-.0004	.0012	-.0019
Errors	NOCHECK	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass	LC Pass
High				.0100	.0030	.0050	.0050
Low				-.0100	-.0030	-.0050	-.0050
Elem	Sr4215	Th2837	Ti3372	Ti1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0004	.0021	.0005	H.0112	.0268	.0005	.0061
SD	.0002	.0009	.0002	.0058	.0040	.0003	.0024
%RSD	56.58	45.26	42.82	52.13	14.92	58.65	38.76
#1	.0006	.0027	.0007	H.0153	.0240	.0007	.0078
#2	.0002	.0014	.0004	.0071	.0297	.0003	.0045
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	Y_3710	Zn2062	Zr3496				
Units	ppm	ppm	ppm				
Avg	.0005	-.0000	.0012				
SD	.0002	.0004	.0001				
%RSD	33.77	7718.	12.90				
#1	.0006	.0003	.0013				
#2	.0004	-.0003	.0010				
Errors	LC Pass	LC Pass	LC Pass				
High	.0050	.0050	.0050				
Low	-.0050	-.0050	-.0050				

Method: DAILY1 Sample Name: 236892 df200

Operator:

010069

Run Time: 10/29/03 18:52:53

Comment:

Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.00153	.0127	.0019	.0040	.0007	-.0002	.0025
SDev	.00005	.0070	.0009	.0006	.0002	.0000	.0006
XRSD	3.2531	55.22	46.91	14.29	28.69	8.835	25.67
#1	.00156	.0077	.0013	.0036	.0006	-.0002	.0020
#2	.00149	.0177	.0026	.0044	.0008	-.0001	.0029
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0142	.0000	.0021	-.0005	.0012	.0096	2.551
SDev	.0007	.0002	.0002	.0004	.0000	.0058	.010
XRSD	4.743	757.2	9.605	87.22	2.345	60.32	.3809
#1	.0138	-.0001	.0023	-.0008	.0013	.0055	2.544
#2	.0147	.0001	.0020	-.0002	.0012	.0138	2.558
Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5089	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0004	.0007	.0115	.0001	.0014	.2909	.2715
SDev	.0003	.0000	.0019	.0001	.0003	.0016	.0571
XRSD	78.72	.8563	17.00	60.73	25.28	.5642	21.04
#1	.0002	.0007	.0101	.0001	.0016	.2897	.2311
#2	.0006	.0007	.0129	.0001	.0011	.2920	.3119
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0007	.0081	-.0003	-.0011	.0007	.0123	.0006
SDev	.0001	.0017	.0031	.0009	.0003	.0013	.0007
XRSD	12.34	21.19	919.1	80.89	48.02	10.35	115.8
#1	.0008	.0093	.0018	-.0017	.0009	.0132	.0001
#2	.0007	.0069	-.0025	-.0005	.0004	.0114	.0011
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avge	96.57	.0011	.0026	.0383	-.0008	.0021	-.0023
SDev	.54	.0033	.0002	.0011	.0004	.0012	.0020
XRSD	.5628	305.8	7.284	2.847	52.52	57.88	89.14
#1	96.19	.0034	.0027	.0390	-.0005	.0030	-.0037
#2	96.96	-.0012	.0025	.0375	-.0011	.0012	-.0008
Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0001	.0006	.0000	.0094	.0303	.0006	.0044
SDev	.0000	.0018	.0003	.0011	.0205	.0001	.0023
XRSD	24.73	304.7	1330.	11.48	67.55	24.06	52.32
#1	.0000	-.0007	-.0002	.0101	.0158	.0007	.0061
#2	.0001	.0019	.0002	.0086	.0448	.0005	.0028

010070

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avg	.0001	.0009	-.0009
SDev	.0001	.0004	.0004
%RSD	86.14	43.01	49.04

#1	.0000	.0011	-.0012
#2	.0002	.0006	-.0006

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avg	668481	10000	--	--	--	--	--
SDev	3751.909	.0000000	--	--	--	--	--
%RSD	.5612588	.0000000	--	--	--	--	--
#1	665828	10000	--	--	--	--	--
#2	671134	10000	--	--	--	--	--

Method: DAILY1 Sample Name: 236892d df200
 Run Time: 10/29/03 18:58:21
 Comment:
 Mode: CONC Corr. Factor: 1

Operator:

010071

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.00112	.0140	.0039	.0040	.0001	-.0002	.0047
SDev	.00103	.0032	.0030	.0009	.0001	.0000	.0033
XRSD	91.678	22.53	78.03	21.40	83.99	16.11	69.84

#1	.00185	.0118	.0060	.0046	.0002	-.0002	.0071
#2	.00040	.0163	.0017	.0034	.0001	-.0002	.0024

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0136	-.0001	.0018	-.0007	.0014	.0011	2.543
SDev	.0012	.0001	.0007	.0007	.0005	.0063	.001
XRSD	8.691	79.87	38.41	90.70	32.73	568.2	.0403

#1	.0145	-.0000	.0022	-.0003	.0017	.0056	2.542
#2	.0128	-.0001	.0013	-.0012	.0011	-.0034	2.544

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0003	.0006	.0133	.0000	.0003	.2902	.3724
SDev	.0007	.0000	.0044	.0001	.0005	.0005	.1520
XRSD	268.7	4.818	33.43	207.6	167.5	.1694	40.83

#1	.0008	.0007	.0164	.0001	.0006	.2906	.4799
#2	-.0002	.0006	.0101	-.0000	-.0001	.2899	.2649

Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0005	.0134	.0018	-.0010	.0004	.0109	.0018
SDev	.0005	.0021	.0017	.0031	.0026	.0014	.0032
XRSD	103.6	15.86	95.65	319.3	636.4	13.12	174.8

#1	.0009	.0149	.0030	-.0032	.0023	.0119	.0041
#2	.0001	.0119	.0006	.0012	-.0014	.0098	-.0004

Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avge	95.74	.0018	.0017	.0411	-.0001	.0017	.0003
SDev	.20	.0004	.0035	.0010	.0015	.0022	.0023
XRSD	.2046	23.39	204.3	2.503	2847.	124.2	813.0

#1	95.61	.0015	.0042	.0418	-.0011	.0033	-.0013
#2	95.88	.0021	-.0008	.0404	.0010	.0002	.0019

Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0001	-.0000	-.0001	.0125	.0248	.0002	.0028
SDev	.0001	.0000	.0004	.0026	.0070	.0007	.0017
XRSD	85.53	2.302	316.7	20.89	28.36	440.3	60.93

#1	.0001	-.0000	.0001	.0106	.0298	.0007	.0041
#2	.0000	-.0000	-.0004	.0143	.0198	-.0003	.0016

010072

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	.0000	.0000	-.0010
SDev	.0001	.0005	.0004
%RSD	223.0	63.59	40.30

#1	.0001	.0012	-.0007
#2	-.0000	.0004	-.0013

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.304	---	---	---	---	---	---
Avge	662749	10000	---	---	---	---	---
SDev	1363.302	.0000000	---	---	---	---	---
%RSD	.2057041	.0000000	---	---	---	---	---
#1	661785	10000	---	---	---	---	---
#2	663713	10000	---	---	---	---	---

Method: DAILY1 Sample Name: 236893 df200

Operator:

Run Time: 10/29/03 19:03:48

Comment:

010073

Code: CONC Corr. Factor: 1

Elem	Ag3200	Al3082	As1890	B_2496	Ba4934	Be3130	Ri2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.00068	.0132	-.0028	.0022	.0001	-.0001	.0025
SDev	.00102	.0003	.0002	.0002	.0000	.0001	.0013
XRSD	149.86	62.97	8.701	10.72	49.34	91.27	50.13
#1	.00140	.0073	-.0029	.0024	.0001	-.0001	.0016
#2	-.00004	.0191	-.0026	.0020	.0000	-.0000	.0034
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0025	-.0000	.0015	-.0011	.0013	.0009	4.196
SDev	.0008	.0001	.0004	.0000	.0003	.0029	.047
XRSD	33.74	335.2	26.47	3.490	18.76	337.4	1.118
#1	.0031	.0000	.0018	-.0010	.0015	.0029	4.162
#2	.0019	-.0001	.0012	-.0011	.0012	-.0012	4.229
Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5009	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0003	.0006	.0056	-.0000	.0008	.2795	-.1249
SDev	.0006	.0001	.0025	.0000	.0002	.0066	.2152
XRSD	187.7	17.98	44.43	80.65	27.38	2.350	172.4
#1	.0001	.0005	.0074	-.0000	.0009	.2749	-.2770
#2	-.0008	.0007	.0039	-.0001	.0006	.2842	.0273
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2060
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0003	-.0014	.0011	-.0014	.0000	.0121	-.0001
SDev	.0001	.0011	.0027	.0012	.0022	.0053	.0012
XRSD	32.60	74.30	245.2	85.33	63090.	43.84	1474.
#1	.0003	-.0022	.0030	-.0005	.0016	.0083	-.0010
#2	.0002	-.0007	-.0008	-.0022	-.0015	.0158	.0008
Elem	Sc3613	1960/1	1960/2	Si2081	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avge	94.23	.0009	-.0022	.0390	-.0005	-.0011	-.0011
SDev	.11	.0006	.0028	.0003	.0017	.0016	.0041
XRSD	.1118	63.20	127.2	.8059	309.8	145.7	368.6
#1	94.30	.0013	-.0041	.0393	.0006	-.0023	.0018
#2	94.15	.0005	-.0002	.0388	-.0017	.0000	-.0040
Elem	Sr4215	Th2037	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0001	-.0005	.0001	-.0043	.0109	-.0001	.0005
SDev	.0000	.0025	.0004	.0037	.0007	.0004	.0017
XRSD	43.34	513.6	548.3	86.44	6.185	769.1	322.6
#1	-.0000	.0013	.0003	-.0070	.0114	.0003	.0017
#2	-.0001	-.0022	-.0002	-.0017	.0105	-.0004	-.0007

010074

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avg	.0000	.0002	-.0015
SDev	.0001	.0004	.0003
%RSD	224.0	219.0	21.77

#1	.0001	.0004	-.0013
#2	-.0000	-.0001	-.0017

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avg	652266	10000	---	---	---	---	---
SDev	726.1987	.0000000	---	---	---	---	---
%RSD	.1113347	.0000000	---	---	---	---	---
#1	652700	10000	---	---	---	---	---
#2	651753	10000	---	---	---	---	---

Method: DAILY1 Sample Name: 236893s df200

Operator:

Run Time: 10/29/03 19:09:16

Comment:

010075

Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.05216	1.967	2.063	-.0043	2.152	.0570	.0023
SDev	.00132	.013	.011	.0025	.003	.0003	.0005
XRSD	2.5349	.6832	.5207	57.67	.1287	.4899	22.44
#1	.05310	1.977	2.071	-.0060	2.150	.0572	.0019
#2	.05123	1.958	2.056	-.0025	2.154	.0568	.0027
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	20.02	.0511	.5060	.2021	.2679	1.026	22.75
SDev	.13	.0001	.0032	.0018	.0012	.007	.11
XRSD	.6250	.1342	.6269	.9076	.4575	.6690	.4952
#1	20.11	.0511	.5083	.2034	.2688	1.031	22.67
#2	19.93	.0510	.5038	.2008	.2671	1.021	22.83
Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0007	.0006	20.22	.5219	4.116	31.41	17.12
SDev	.0003	.0001	.10	.0034	.025	.10	.54
XRSD	44.09	22.20	.5035	.6503	.5969	.3093	3.129
#1	.0009	.0005	20.30	.5243	4.099	31.34	16.74
#2	.0005	.0007	20.15	.5195	4.134	31.48	17.50
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.5058	.0138	.5154	.5126	-.0015	.0176	.5152
SDev	.0014	.0110	.0028	.0011	.0032	.0001	.0034
XRSD	.2863	79.71	.5503	.2205	210.6	.7573	.6514
#1	.5048	.0216	.5174	.5134	.0007	.0175	.5128
#2	.5069	.0060	.5134	.5118	-.0038	.0177	.5176
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avge	92.34	2.170	2.179	.0390	.5130	2.174	.0003
SDev	1.50	.019	.019	.0033	.0017	.019	.0013
XRSD	1.629	.8777	.8700	8.429	.3308	.8726	499.8
#1	91.28	2.183	2.192	.0367	.5142	2.187	.0012
#2	93.40	2.156	2.166	.0413	.5118	2.160	-.0007
Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0001	-.0056	.0002	2.156	.0232	.5113	4.109
SDev	.0000	.0002	.0003	.003	.0049	.0031	.010
XRSD	10.47	4.134	137.6	.1608	21.15	.6123	.2519
#1	.0002	-.0054	.0000	2.153	.0198	.5135	4.101
#2	.0001	-.0057	.0004	2.158	.0267	.5091	4.116

010076

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	.0001	.5041	.0015
SDev	.0000	.0045	.0002
%RSD	53.46	.8850	15.44

#1	.0001	.5073	.0016
#2	.0000	.5010	.0013

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	639262	10000	--	--	--	--	--
SDev	10422.05	.00000000	--	--	--	--	--
%RSD	1.630326	.00000000	--	--	--	--	--
#1	631892	10000	--	--	--	--	--
#2	646631	10000	--	--	--	--	--

Method: DAILY1 Sample Name: 236894

df200

Operator:

Run Time: 10/29/03 19:14:45

Comment:

010077

Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00085	.0190	.0035	.0114	.0018	-.0001	.0039
SDev	.00009	.0073	.0022	.0006	.0010	.0001	.0028
XRSD	10.758	38.29	61.11	5.489	56.50	89.59	71.68
#1	.00078	.0242	.0020	.0109	.0025	-.0002	.0058
#2	.00091	.0139	.0050	.0118	.0011	-.0000	.0019
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0172	-.0001	.0022	-.0011	.0009	.0010	123.2
SDev	.0090	.0001	.0005	.0005	.0001	.0142	.1
XRSD	52.47	123.3	21.77	43.73	15.64	1419.	.0831
#1	.0235	-.0002	.0018	-.0014	.0010	-.0091	123.2
#2	.0108	-.0000	.0025	-.0008	.0008	.0111	123.1
Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0004	.0009	.0275	.0004	.0066	.4857	.2488
SDev	.0006	.0000	.0069	.0003	.0027	.0219	.0990
XRSD	126.0	.8859	25.00	64.18	40.96	4.500	39.81
#1	.0000	.0009	.0324	.0006	.0085	.5012	.1788
#2	.0008	.0009	.0227	.0002	.0047	.4702	.3188
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0009	.0672	.0016	.0001	.0002	.0037	.0040
SDev	.0001	.0071	.0021	.0010	.0029	.0020	.0003
XRSD	14.40	10.52	127.4	997.2	1275.	54.72	6.167
#1	.0008	.0722	.0002	-.0006	-.0018	.0022	.0038
#2	.0010	.0622	.0031	.0008	.0023	.0051	.0041
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avg	95.04	.0022	.0006	.3909	.0006	.0012	-.0042
SDev	.10	.0009	.0037	.0010	.0014	.0028	.0011
XRSD	.1072	38.44	599.1	.2468	221.4	235.6	25.89
#1	94.97	.0029	.0033	.3902	-.0003	.0031	-.0034
#2	95.11	.0016	-.0020	.3915	.0016	-.0008	-.0050
Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.0000	-.0017	-.0001	.0085	.0402	.0004	.0068
SDev	.0000	.0029	.0003	.0075	.0123	.0004	.0013
XRSD	29.90	172.9	343.6	87.77	30.52	99.07	18.98
#1	-.0001	-.0037	-.0003	.0032	.0315	.0001	.0078
#2	-.0000	.0004	.0001	.0138	.0488	.0007	.0059

010078

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avg	.0000	.0012	-.0012
SDev	.0001	.0004	.0006
%RSD	985.7	30.41	47.52

#1	-.0001	.0010	-.0016
#2	.0001	.0015	-.0000

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avg	657886	10000	--	--	--	--	--
SDev	685.1865	.00000000	--	--	--	--	--
%RSD	.1041498	.00000000	--	--	--	--	--
#1	657401	10000	--	--	--	--	--
#2	658370	10000	--	--	--	--	--

Method: DAILY1 Sample Name: 236895 df200

Operator:

Run Time: 10/29/03 19:20:13

Comment:

Mode: CONC Corr. Factor: 1

010079

Elem	Ag3200	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00097	.0038	.0031	.0087	.0002	-.0002	.0032
SDev	.00122	.0029	.0049	.0005	.0001	.0000	.0008
XRSD	126.60	75.67	160.0	6.222	49.29	23.82	24.54
#1	.00183	.0018	.0065	.0090	.0003	-.0001	.0027
#2	.00010	.0058	-.0004	.0083	.0001	-.0002	.0038
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0349	-.0001	.0027	-.0009	.0011	.0066	126.1
SDev	.0010	.0003	.0008	.0004	.0001	.0062	.3
XRSD	2.764	283.6	29.84	42.48	11.69	93.64	.2410
#1	.0356	.0001	.0032	-.0006	.0012	.0110	125.9
#2	.0342	-.0003	.0021	-.0011	.0010	.0022	126.3
Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0006	.0013	.0125	.0001	.0009	.2191	.1525
SDev	.0002	.0000	.0015	.0000	.0004	.0018	.0002
XRSD	37.37	3.312	12.06	.3505	46.29	.8073	.1266
#1	.0008	.0013	.0136	.0001	.0012	.2178	.1526
#2	.0005	.0013	.0115	.0001	.0006	.2203	.1523
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0008	.0037	.0062	-.0015	.0031	.0090	.0009
SDev	.0003	.0024	.0052	.0027	.0023	.0024	.0026
XRSD	32.23	65.22	82.83	180.7	75.61	27.14	290.2
#1	.0009	.0055	.0099	-.0034	.0048	.0107	.0028
#2	.0006	.0020	.0026	.0004	.0014	.0073	-.0009
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avg	96.03	.0013	-.0044	.3488	.0011	-.0024	-.0015
SDev	.45	.0022	.0011	.0018	.0001	.0000	.0038
XRSD	.4727	166.8	25.31	.5120	7.857	.3074	256.8
#1	95.71	.0029	-.0051	.3500	.0010	-.0024	-.0042
#2	96.35	-.0002	-.0036	.3475	.0011	-.0025	.0012
Elem	Sr4215	Th2837	Ti13372	Ti1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0000	-.0013	-.0003	-.0001	.0473	.0003	.0019
SDev	.0000	.0007	.0004	.0069	.0092	.0003	.0003
XRSD	108.3	51.14	137.8	13310.	19.46	103.8	14.37
#1	.0000	-.0018	-.0000	.0049	.0538	.0005	.0017
#2	.0000	-.0009	-.0006	-.0050	.0408	.0001	.0020

010080

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avg	.0001	.0023	-.0006
SDev	.0001	.0001	.0003
%RSD	44.33	4.999	48.01

#1	.0002	.0022	-.0004
#2	.0001	.0024	-.0009

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avg	664753	10000	--	--	--	--	--
SDev	3189.052	.0000000	--	--	--	--	--
%RSD	.4797348	.0000000	--	--	--	--	--
#1	662498	10000	--	--	--	--	--
#2	667008	10000	--	--	--	--	--

Method: DAILY1 Sample Name: ccv3
 Run Time: 10/29/03 19:30:52
 Comment:
 Mode: CONC Corr. Factor: 1

Operator:

010081

Elem	Ag3200	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	1.0185	9.911	5.061	4.880	10.28	H1.134	5.074
SDev	.0050	.024	.028	.050	.05	.000	.043
XRSD	.49064	.2470	.5603	1.019	.5286	.0099	.8394
#1	1.0220	9.894	5.041	4.845	10.24	H1.134	5.044
#2	1.0150	9.928	5.081	4.915	10.32	H1.134	5.104
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC High	LC Pass
High	1.1000	11.00	5.500	5.500	11.00	1.100	5.500
Low	.90000	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	ppm	ppm
Avg	20.42	1.025	5.021	2.016	2.093	10.32	18.13
SDev	.05	.007	.039	.016	.008	.04	.22
XRSD	.2681	.6920	.7753	.7983	.3957	.3713	1.238
#1	20.38	1.020	4.993	2.004	2.087	10.29	L17.97
#2	20.46	1.030	5.048	2.027	2.099	10.35	18.29
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
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	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5089	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	5.055	4.867	20.27	1.050	5.097	H47.98	L26.75
SDev	.041	.044	.16	.011	.049	.44	.06
XRSD	.8056	.9114	.7855	1.058	.9532	.9176	.2324
#1	5.026	4.836	20.16	1.042	5.063	H47.67	L26.71
#2	5.084	4.898	20.38	1.058	5.131	H48.29	L26.79
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC High	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	ppm	ppm	ppm	ppm	ppm
Avg	4.975	4.586	5.138	5.059	1.038	.9666	1.016
SDev	.031	.033	.067	.074	.005	.0217	.006
XRSD	.6288	.7253	1.300	1.466	.4397	2.245	.6079
#1	4.953	4.563	5.090	5.006	1.035	.9820	1.011
#2	4.997	4.610	5.185	5.111	1.042	.9513	1.020
Errors	LC Pass	LC Pass	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass
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	Pb220	Se196	Sn1899

010082

Units	xR	ppm	ppm	ppm	ppm	ppm	ppm
Avge	96.27	5.517	5.411	5.021	5.080	5.441	4.996
SDev	.15	.035	.066	.030	.072	.056	.045
xRSD	.1537	.6254	1.228	.5909	1.410	1.024	.9001
#1	96.37	5.492	5.364	5.000	5.029	5.402	4.964
#2	96.16	5.541	5.458	5.042	5.131	5.480	5.028
Errors	NOCHECK	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass	LC Pass
High				5.500	5.500	5.500	5.500
Low				4.500	4.500	4.500	4.500
Elem	Sr4215	Th2837	Ti3372	Ti1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	5.342	1.038	4.927	5.424	1.023	5.064	1.013
SDev	.039	.003	.001	.045	.022	.027	.016
xRSD	.7224	.2428	.0282	.8283	2.184	.5261	1.617
#1	5.315	1.036	4.928	5.392	1.007	5.046	1.001
#2	5.369	1.040	4.926	5.456	1.039	5.083	1.025
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	Y_3710	Zn2062	Zr3496				
Units	ppm	ppm	ppm				
Avge	5.125	1.030	4.932				
SDev	.013	.006	.007				
xRSD	.2632	.6296	.1494				
#1	5.116	1.026	4.927				
#2	5.135	1.035	4.937				
Errors	LC Pass	LC Pass	LC Pass				
High	5.500	1.100	5.500				
Low	4.500	.9000	4.500				

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	666338	10000	---	---	---	---	---
SDev	1011.870	.00000000	---	---	---	---	---
%RSD	.1518555	.00000000	---	---	---	---	---
#1	667053	10000	---	---	---	---	---
#2	665622	10000	---	---	---	---	---

010083

Method: DAILY1 Sample Name: ccb3
 Run Time: 10/29/03 19:39:00
 Comment:
 Mode: CONC Corr. Factor: 1

Operator:
010084

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.00054	.0081	.0030	.0041	.0010	-.0000	.0002
SD	.00042	.0115	.0044	.0008	.0005	.0001	.0034
XRSD	76.998	142.2	145.6	10.90	55.27	106.3	1537.
#1	-.00084	.0162	H.0061	.0046	.0013	-.0000	-.0022
#2	-.00025	-.0000	-.0001	.0035	.0006	-.0001	.0027
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	.00500	.0500	.0050	.0500	.0050	.0050	.0050
Low	-.00500	-.0500	-.0050	-.0500	-.0050	-.0050	-.0050
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.0073	-.0001	.0011	-.0005	.0015	.0117	-.0029
SD	.0009	.0001	.0001	.0001	.0003	.0035	.0012
XRSD	12.08	101.4	10.54	28.74	16.47	30.10	42.68
#1	-.0000	-.0002	.0010	-.0004	.0017	.0092	-.0020
#2	-.0067	-.0000	.0012	-.0006	.0013	.0141	-.0037
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	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.0003	.0007	.0021	.0001	.0026	.0152	-.0117
SD	.0005	.0002	.0016	.0001	.0006	.0020	.0927
XRSD	166.9	25.13	72.64	41.42	21.99	12.87	792.5
#1	-.0006	.0008	.0010	.0002	.0030	.0166	H.0539
#2	.0001	.0006	.0032	.0001	.0022	.0139	L-.0773
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	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	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0009	.0094	-.0020	.0007	-.0012	.0015	-.0005
SD	.0000	.0094	.0028	.0000	.0014	.0033	.0009
XRSD	3.847	99.45	143.2	2.432	121.0	219.5	170.9
#1	.0009	.0028	.0000	.0007	-.0022	-.0008	-.0012
#2	.0008	H.0160	-.0040	.0007	-.0002	.0039	.0001
Errors	LC Pass	LC Pass	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass
High	.0050	.0100			.0050	.0100	.0100
Low	-.0050	-.0100			-.0050	-.0100	-.0100
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899

010085

Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avg	95.66	-.0051	.0038	.0068	-.0002	.0008	-.0016
SDev	1.10	.0021	.0002	.0031	.0009	.0008	.0039
%RSD	1.153	41.70	5.636	46.15	477.6	103.5	246.5
#1	94.88	-.0066	.0036	.0090	.0005	.0002	-.0044
#2	96.43	-.0036	.0039	.0046	-.0009	.0014	.0012
Errors	NOCHECK	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass	LC Pass
High				.0100	.0030	.0050	.0050
Low				-.0100	-.0030	-.0050	-.0050
Elem	Sr4215	Th2037	Ti3372	Tl1900	U_3059	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0003	.0011	-.0001	-.0005	-.0026	.0011	.0011
SDev	.0003	.0050	.0001	.0150	.0163	.0000	.0007
%RSD	75.21	449.5	140.5	3080.	625.8	.5154	64.55
#1	.0005	-.0024	-.0002	L-.0111	-.0142	.0011	.0017
#2	.0002	.0046	-.0000	H.0101	.0009	.0011	.0006
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	Y_3710	Zn2062	Zr3496				
Units	ppm	ppm	ppm				
Avg	.0006	-.0000	.0012				
SDev	.0003	.0001	.0002				
%RSD	45.91	2103.	15.04				
#1	.0008	-.0001	.0013				
#2	.0004	.0001	.0011				
Errors	LC Pass	LC Pass	LC Pass				
High	.0050	.0050	.0050				
Low	-.0050	-.0050	-.0050				

010086

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	662200	10000	---	---	---	---	---
SDev	7614.833	.00000000	---	---	---	---	---
%RSD	1.149930	.00000000	---	---	---	---	---
#1	656815	10000	---	---	---	---	---
#2	667584	10000	---	---	---	---	---

Method: DAILY1 Sample Name: 236892 df33.3

Operator:

010087

Run Time: 10/29/03 19:44:33

Comment:

Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.00016	.0193	.0001	.0177	.0005	-.0001	.0028
SDev	.00046	.0105	.0006	.0003	.0001	.0001	.0013
XRSD	280.92	54.31	636.7	1.666	15.81	117.0	45.50

#1	-.00016	.0119	-.0003	.0179	.0006	-.0000	.0019
#2	.00048	.0267	.0005	.0175	.0005	-.0002	.0037

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.1152	.0000	.0021	.0026	.0029	.0243	19.16
SDev	.0006	.0000	.0002	.0003	.0007	.0096	.20
XRSD	.5671	1153.	7.970	9.637	24.71	39.66	1.056

#1	.1147	-.0000	.0020	.0027	.0034	.0311	19.02
#2	.1157	.0000	.0022	.0024	.0024	.0175	19.31

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0002	.0006	.0288	.0002	.0016	1.576	.9940
SDev	.0008	.0001	.0036	.0000	.0002	.014	.0598
XRSD	416.3	11.52	12.41	10.77	12.63	.8819	6.013

#1	-.0004	.0007	.0263	.0003	.0018	1.566	1.036
#2	.0008	.0006	.0313	.0002	.0015	1.586	.9518

Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2060
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0055	.0164	.0027	.0017	.0005	.0489	.0003
SDev	.0001	.0093	.0011	.0024	.0006	.0037	.0003
XRSD	2.557	56.71	39.84	145.4	118.1	7.514	95.14

#1	.0054	.0098	.0019	-.0000	.0001	.0463	.0001
#2	.0056	.0230	.0034	.0034	.0010	.0515	.0005

Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avge	94.36	-.0024	.0009	.1902	.0020	-.0002	-.0005
SDev	.44	.0028	.0021	.0012	.0020	.0005	.0001
XRSD	.4684	116.5	223.0	.6316	98.59	290.8	25.39

#1	94.68	-.0044	.0024	.1893	.0006	.0002	-.0004
#2	94.05	-.0004	-.0005	.1910	.0034	-.0005	-.0005

Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0005	.0001	-.0001	.0060	.0303	.0006	.0028
SDev	.0000	.0009	.0001	.0026	.0019	.0004	.0026
XRSD	5.863	1221.	121.0	43.14	6.385	77.37	90.18

#1	.0005	-.0006	-.0001	.0042	.0316	.0009	.0010
#2	.0006	.0007	-.0000	.0079	.0289	.0003	.0047

010088

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avg	.0001	.0051	-.0007
SDev	.0001	.0004	.0007
%RSD	84.58	8.020	98.43

#1	.0002	.0048	-.0002
#2	.0001	.0054	-.0012

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avg	653255	10000	--	--	--	--	--
SDev	3032.074	.0000000	--	--	--	--	--
%RSD	.4641486	.0000000	--	--	--	--	--
#1	655399	10000	--	--	--	--	--
#2	651111	10000	--	--	--	--	--

Method: DAILY1 Sample Name: 236892d df33.3 Operator:
 Run Time: 10/29/03 19:50:01
 Comment:
 Mode: CONC Corr. Factor: 1

010089

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.00020	.0112	-.0017	.0172	.0005	.0001	.0037
SDev	.00037	.0019	.0039	.0002	.0001	.0001	.0026
%RSD	181.59	17.29	231.1	.9116	16.64	103.8	71.79

#1	.00006	.0099	.0011	.0171	.0006	.0000	.0055
#2	-.00046	.0126	-.0044	.0173	.0004	.0001	.0018

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.1168	-.0000	.0020	.0030	.0024	.0384	18.84
SDev	.0013	.0001	.0000	.0003	.0001	.0069	.21
%RSD	1.076	161.3	.1467	9.586	3.658	18.13	1.094

#1	.1177	.0000	.0020	.0032	.0025	.0433	18.69
#2	.1159	-.0001	.0020	.0028	.0023	.0334	18.98

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0003	.0006	.0260	.0002	.0013	1.549	.8887
SDev	.0003	.0000	.0024	.0001	.0000	.019	.0413
%RSD	98.10	.9274	9.376	43.57	.0140	1.241	4.644

#1	.0005	.0006	.0243	.0002	.0013	1.536	.8595
#2	.0001	.0006	.0278	.0001	.0013	1.563	.9178

Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0061	.0102	.0002	.0028	-.0012	.0436	-.0023
SDev	.0004	.0076	.0024	.0015	.0013	.0058	.0005
%RSD	6.868	74.60	1309.	54.25	103.6	13.31	19.62

#1	.0064	.0048	-.0015	.0039	-.0003	.0395	-.0027
#2	.0058	.0156	.0019	.0017	-.0022	.0477	-.0020

Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avg	97.52	-.0039	.0010	.1891	.0019	-.0006	.0005
SDev	.26	.0053	.0028	.0028	.0002	.0001	.0029
%RSD	.2616	136.3	292.6	1.491	10.64	16.55	588.4

#1	97.70	-.0076	.0029	.1871	.0021	-.0006	.0026
#2	97.34	-.0001	-.0010	.1911	.0018	-.0007	-.0016

Elem	Sr4215	Th2037	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0005	.0012	.0002	-.0071	.0455	.0006	.0021
SDev	.0000	.0032	.0000	.0040	.0016	.0004	.0000
%RSD	1.631	268.4	13.94	55.79	3.636	71.70	.3236

#1	.0005	.0035	.0002	-.0099	.0443	.0009	.0021
#2	.0005	-.0011	.0002	-.0043	.0466	.0003	.0021

010090

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avg	.0002	.0047	-.0006
SDev	.0000	.0004	.0002
%RSD	12.25	8.076	31.10

#1	.0002	.0045	-.0004
#2	.0002	.0050	-.0007

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.304	--	--	--	--	--	--
Avg	675100	10000	--	--	--	--	--
SDev	1774.838	.00000000	--	--	--	--	--
%RSD	.2629000	.00000000	--	--	--	--	--
#1	676355	10000	--	--	--	--	--
#2	673845	10000	--	--	--	--	--

Method: DAILY1 Sample Name: 236893 df33.3
 Run Time: 10/29/03 19:55:30
 Comment:
 Mode: CONC Corr. Factor: 1

Operator: 010091

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00060	.0106	.0049	.0110	.0004	-.0002	.0032
SDev	.00047	.0028	.0004	.0003	.0000	.0001	.0003
XRSD	78.619	26.84	8.152	2.917	.1158	55.04	8.287
#1	.00093	.0086	.0046	.0112	.0004	-.0003	.0030
#2	.00026	.0126	.0052	.0108	.0004	-.0001	.0034
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0393	.0001	.0022	-.0000	.0016	.0072	31.57
SDev	.0003	.0002	.0001	.0001	.0002	.0004	.16
XRSD	.7791	195.5	3.469	4146.	9.872	6.120	.5037
#1	.0391	-.0000	.0021	.0001	.0017	.0075	31.46
#2	.0395	.0003	.0022	-.0001	.0015	.0069	31.68
Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0011	.0006	.0156	.0001	.0007	1.521	1.101
SDev	.0006	.0000	.0010	.0001	.0007	.008	.030
XRSD	50.17	1.309	6.325	60.24	96.22	.5041	2.680
#1	.0015	.0006	.0163	.0001	.0002	1.515	1.122
#2	.0007	.0006	.0149	.0001	.0012	1.526	1.080
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1020	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0021	.0106	.0041	.0011	.0012	.0374	-.0012
SDev	.0001	.0122	.0014	.0009	.0004	.0045	.0003
XRSD	7.055	114.3	34.02	83.14	32.76	11.99	23.16
#1	.0019	.0020	.0051	.0005	.0010	.0343	-.0010
#2	.0022	.0192	.0031	.0018	.0015	.0406	-.0013
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avg	96.39	-.0031	-.0034	.1745	.0021	-.0033	-.0020
SDev	.17	.0001	.0008	.0012	.0002	.0005	.0017
XRSD	.1813	4.821	23.93	.6773	7.749	15.07	83.29
#1	96.26	-.0030	-.0040	.1737	.0020	-.0036	-.0032
#2	96.51	-.0032	-.0028	.1754	.0023	-.0029	-.0008
Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0001	-.0014	.0006	.0008	.0534	.0002	-.0009
SDev	.0000	.0011	.0001	.0103	.0025	.0001	.0045
XRSD	28.01	78.20	14.34	1324.	4.742	77.02	478.2
#1	.0001	-.0021	.0005	.0080	.0552	.0003	-.0041
#2	.0000	-.0006	.0006	-.0065	.0516	.0001	.0022

010092

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	.0001	.0021	-.0009
SDev	.0000	.0006	.0002
%RSD	34.88	29.78	24.46

#1	.0001	.0026	-.0010
#2	.0001	.0017	-.0007

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	667201	10000	--	--	--	--	--
SDev	1150.241	.00000000	--	--	--	--	--
%RSD	.1735970	.00000000	--	--	--	--	--
#1	666382	10000	--	--	--	--	--
#2	668020	10000	--	--	--	--	--

Method: DAILY1 Sample Name: 236893s df33.3

Operator:

Run Time: 10/29/03 20:00:58

010093

Comment:

Mode: CONC Corr. Factor: 1

Elem	Ag3200	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.05010	1.976	2.056	.0065	2.124	.0563	.0013
SDev	.00070	.013	.006	.0004	.007	.0005	.0026
XRSD	1.5625	.6705	.2749	5.832	.3074	.0308	206.1

#1	.04955	1.967	2.052	.0063	2.119	.0559	-.0006
#2	.05065	1.986	2.060	.0068	2.128	.0566	.0031

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	20.32	.0513	.5084	.2032	.2645	1.039	53.53
SDev	.19	.0008	.0064	.0025	.0002	.011	.08
XRSD	.9206	1.651	1.261	1.226	.0756	1.079	.1461

#1	20.18	.0507	.5039	.2015	.2647	1.031	53.47
#2	20.45	.0519	.5129	.2050	.2644	1.047	53.59

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5089	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0007	.0007	20.22	.5193	4.089	34.88	18.97
SDev	.0012	.0001	.18	.0059	.055	.20	.12
XRSD	187.9	12.47	.8918	1.132	1.355	.5710	.6130

#1	-.0002	.0007	20.09	.5152	4.049	34.74	19.05
#2	.0015	.0008	20.35	.5235	4.128	35.02	18.89

Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.5107	.0146	.5155	.5092	.0026	.0458	.5078
SDev	.0056	.0015	.0042	.0065	.0013	.0113	.0072
XRSD	1.095	9.994	.0107	1.280	47.69	24.68	1.408

#1	.5067	.0135	.5126	.5046	.0017	.0538	.5028
#2	.5146	.0156	.5185	.5138	.0035	.0378	.5129

Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avge	94.72	2.150	2.143	.1948	.5108	2.143	-.0017
SDev	.39	.016	.029	.0057	.0057	.025	.0002
XRSD	.4145	.7392	1.363	2.910	1.122	1.155	14.36

#1	95.00	2.138	2.122	.1908	.5067	2.126	-.0015
#2	94.45	2.161	2.164	.1988	.5148	2.161	-.0019

Elem	Sr4215	Th2837	Ti3372	Ti1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0002	-.0056	.0005	2.184	.0444	.5099	4.147
SDev	.0000	.0026	.0001	.037	.0162	.0039	.041
XRSD	8.570	45.58	18.63	1.679	36.53	.7586	.9866

#1	.0002	-.0074	.0005	2.158	.0329	.5072	4.118
#2	.0002	-.0038	.0006	2.210	.0559	.5126	4.176

010094

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	.0001	.5176	.0018
SDev	.0000	.0108	.0000
%RSD	14.48	2.089	1.942

#1	.0001	.5100	.0018
#2	.0001	.5253	.0018

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	655748	10000	--	--	--	--	--
SDev	2720.240	.00000000	--	--	--	--	--
%RSD	.4148304	.00000000	--	--	--	--	--
#1	657671	10000	--	--	--	--	--
#2	653824	10000	--	--	--	--	--

Method: DAILY1 Sample Name: 236894
 Run Time: 10/29/03 20:06:26
 Comment:
 Mode: CONC Corr. Factor: 1

df33.3

Operator:

010095

Elem	Ag3200	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.00051	.0104	.0005	.0666	.0026	-.0000	.0053
SDev	.00015	.0038	.0013	.0003	.0012	.0000	.0029
%RSD	28.423	36.56	261.8	.4660	46.57	86.45	54.17
#1	.00061	.0077	.0014	.0664	.0035	-.0001	.0073
#2	.00041	.0131	-.0004	.0668	.0018	-.0000	.0033
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0708	.0000	.0028	-.0009	.0016	-.0014	5522.2
SDev	.0093	.0000	.0004	.0011	.0006	.0216	291.7
%RSD	13.16	250.2	16.17	116.5	37.81	1550.	55.86
#1	.0774	-.0000	.0031	-.0002	.0020	.0139	728.4
#2	.0642	.0000	.0024	-.0016	.0012	-.0167	5315.9
Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5809	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0020	.0019	.0576	.0005	.0074	2.718	1.181
SDev	.0001	.0002	.0087	.0004	.0032	.020	.049
%RSD	6.497	9.727	15.07	76.85	42.71	.7328	4.131
#1	.0019	.0018	.0638	.0007	.0096	2.732	1.146
#2	.0021	.0021	.0515	.0002	.0051	2.704	1.215
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0035	.3976	-.0004	.0011	-.0005	.0056	.0033
SDev	.0005	.0039	.0042	.0051	.0002	.0035	.0015
%RSD	15.19	.9815	1031.	484.9	40.10	63.20	44.25
#1	.0039	.3948	-.0034	.0047	-.0004	.0031	.0043
#2	.0031	.4003	.0026	-.0026	-.0007	.0081	.0023
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avge	95.69	.0005	-.0004	2.306	.0006	-.0001	-.0007
SDev	.63	.0018	.0009	.004	.0020	.0000	.0009
%RSD	.6549	386.3	237.0	.1742	353.5	11.84	131.8
#1	95.25	-.0000	.0003	2.303	.0020	-.0001	-.0000
#2	96.14	.0018	-.0010	2.309	-.0008	-.0001	-.0013
Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0001	.0030	-.0005	.0085	.0130	.0005	.0073
SDev	.0000	.0030	.0003	.0030	.0009	.0014	.0062
%RSD	11.11	99.78	54.91	35.53	6.589	277.1	84.85
#1	.0001	.0052	-.0003	.0064	.0136	.0015	.0116
#2	.0001	.0009	-.0006	.0107	.0124	-.0005	.0029

010096

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avg	.0001	.0049	-.0010
SDev	.0003	.0005	.0010
%RSD	428.5	10.94	95.20

#1	.0003	.0053	-.0003
#2	-.0001	.0045	-.0017

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avg	662396	10000	---	---	---	---	---
SDev	4341.636	.00000000	---	---	---	---	---
%RSD	.6554442	.00000000	---	---	---	---	---
#1	659326	10000	---	---	---	---	---
#2	665466	10000	---	---	---	---	---

Method: DAILY1 Sample Name: 236895 df33.3
 Run Time: 10/29/03 20:11:59
 Comment:
 Mode: CONC Corr. Factor: 1

Operator:

010097

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Ri2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.00081	.0097	.0010	.0520	.0003	.0001	.0054
SDev	.00027	.0067	.0027	.0010	.0001	.0001	.0017
XRSD	33.760	69.08	283.1	1.956	43.34	150.7	32.16

#1	.00100	.0145	.0029	.0527	.0004	-.0000	.0066
#2	.00062	.0050	-.0010	.0512	.0002	.0002	.0042

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.1900	.0000	.0029	-.0004	.0019	.0029	763.9
SDev	.0000	.0001	.0003	.0003	.0005	.0112	2.8
XRSD	.0236	182.0	8.620	66.65	23.85	390.5	.3708

#1	.1900	.0001	.0031	-.0002	.0023	.0107	761.9
#2	.1899	-.0000	.0028	-.0006	.0016	-.0050	765.9

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0025	.0055	.0189	.0001	.0016	.6484	.2934
SDev	.0001	.0003	.0019	.0001	.0006	.0058	.2084
XRSD	5.108	5.431	10.22	118.0	35.46	.8986	98.31

#1	.0024	.0053	.0176	.0002	.0020	.6443	.0094
#2	.0026	.0057	.0203	.0000	.0012	.6525	.4973

Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0064	.0145	.0066	-.0041	.0014	.0117	.0007
SDev	.0010	.0133	.0027	.0013	.0014	.0039	.0006
XRSD	15.07	91.29	41.49	31.29	100.9	33.67	87.66

#1	.0071	.0239	.0047	-.0050	.0024	.0145	.0011
#2	.0058	.0052	.0085	-.0032	.0004	.0089	.0003

Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avge	94.00	.0073	-.0007	2.059	-.0005	.0020	-.0020
SDev	.52	.0002	.0041	.004	.0018	.0028	.0021
XRSD	.5493	2.139	629.3	.2184	339.4	138.4	102.0

#1	93.63	.0072	-.0035	2.063	-.0018	.0000	-.0035
#2	94.36	.0074	.0022	2.056	.0007	.0040	-.0006

Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0002	-.0030	-.0001	.0122	.0160	.0005	.0044
SDev	.0000	.0029	.0001	.0075	.0125	.0006	.0030
XRSD	2.370	95.30	101.6	61.75	78.32	124.1	60.24

#1	.0002	-.0010	-.0000	.0175	.0071	.0009	.0066
#2	.0002	-.0050	-.0002	.0069	.0249	.0001	.0023

010098

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avg	.0001	.0100	-.0010
SDev	.0002	.0001	.0005
%RSD	153.1	.7457	48.09

#1	.0002	.0099	-.0007
#2	-.0000	.0100	-.0014

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avg	650683	10000	--	--	--	--	--
SDev	3552.504	.0000000	--	--	--	--	--
%RSD	.5459655	.0000000	--	--	--	--	--
#1	648171	10000	--	--	--	--	--
#2	653195	10000	--	--	--	--	--

Method: DAILY1 Sample Name: ccv4

Operator:

Run Time: 10/29/03 20:22:39

010099

Comment:

Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Ri2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	1.0192	9.979	5.049	4.837	10.38	H1.112	5.065
SDev	.0049	.059	.026	.005	.05	.007	.035
XRSD	.47684	.5877	.5127	.1067	.4919	.6316	.6998
#1	1.0227	10.02	5.067	4.833	10.42	H1.117	5.090
#2	1.0158	9.937	5.031	4.841	10.35	H1.107	5.040
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC High	LC Pass
High	1.1000	11.00	5.500	5.500	11.00	1.100	5.500
Low	.90000	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	ppm	ppm
Avg	20.23	1.013	4.956	1.993	2.103	10.22	18.46
SDev	.18	.011	.039	.017	.004	.09	.03
XRSD	.8841	1.100	.7912	.8668	.2134	.9276	.1707
#1	20.35	1.021	4.983	2.005	2.106	10.28	18.48
#2	20.10	1.005	4.928	1.981	2.100	10.15	18.43
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
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	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	5.079	4.931	20.15	1.037	5.047	H48.53	27.07
SDev	.021	.021	.11	.007	.016	.21	.22
XRSD	.4056	.4347	.5588	.7078	.3185	.4227	.8196
#1	5.093	4.947	20.23	1.043	5.036	H48.68	27.23
#2	5.064	4.916	20.07	1.032	5.058	H48.39	L26.92
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC High	LC Pass
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	ppm	ppm	ppm	ppm	ppm
Avg	4.942	L4.320	5.031	5.022	1.040	.9365	1.011
SDev	.041	.039	.044	.024	.002	.0269	.003
XRSD	.8298	.8986	.8817	.4763	.1956	2.870	.2546
#1	4.971	L4.293	5.062	5.005	1.042	.9555	1.013
#2	4.913	L4.347	4.999	5.039	1.039	.9175	1.009
Errors	LC Pass	LC Low	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass
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	Pb220	Se196	Sn1899

010100

Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avg	93.86	5.424	5.388	5.804	5.020	5.395	4.958
SDev	.45	.020	.054	.022	.001	.029	.044
%RSD	.4774	.3773	1.006	.4432	.0231	.5430	.8859
#1	93.54	5.438	5.350	5.020	5.019	5.374	4.989
#2	94.18	5.409	5.426	4.988	5.021	5.415	4.927
Errors	NOCHECK	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass	LC Pass
High				5.500	5.500	5.500	5.500
Low				4.500	4.500	4.500	4.500
Elem	Sr4215	Th2037	Ti3372	Ti1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	5.364	1.030	4.926	5.388	1.022	5.027	.9976
SDev	.037	.006	.020	.012	.011	.027	.0154
%RSD	.6992	.5371	.4077	.2309	1.120	.5415	1.545
#1	5.390	1.034	4.941	5.397	1.030	5.046	.9867
#2	5.337	1.026	4.912	5.379	1.014	5.007	1.008
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	Y_3710	Zn2062	Zr3496				
Units	ppm	ppm	ppm				
Avg	5.138	1.013	4.944				
SDev	.009	.012	.011				
%RSD	.1679	1.161	.2317				
#1	5.144	1.022	4.952				
#2	5.132	1.005	4.936				
Errors	LC Pass	LC Pass	LC Pass				
High	5.500	1.100	5.500				
Low	4.500	.9000	4.500				

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	649752	10000	---	---	---	---	---
SDev	3070.965	.00000000	---	---	---	---	---
*RSD	.4726368	.00000000	---	---	---	---	---
#1	647500	10000	---	---	---	---	---
#2	651923	10000	---	---	---	---	---

Method: DAILY1 Sample Name: ccb4
 Run Time: 10/29/03 20:30:46
 Comment:
 Mode: CONC Corr. Factor: 1

Operator:

010102

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00037	.0076	.0008	.0051	.0012	.0002	H.0067
SDev	.00051	.0006	.0030	.0014	.0008	.0000	.0013
%RSD	139.61	7.463	398.6	26.79	67.25	14.23	18.88
#1	.00073	.0072	.0029	.0061	.0017	.0002	H.0076
#2	.00000	.0080	-.0014	.0041	.0006	.0002	H.0058
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC High
High	.00500	.0500	.0050	.0500	.0050	.0050	.0050
Low	-.00500	-.0500	-.0050	-.0500	-.0050	-.0050	-.0050
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.0044	.0001	.0016	-.0009	.0012	-.0027	.0039
SDev	.0019	.0000	.0006	.0007	.0007	.0146	.0163
%RSD	44.20	13.44	40.60	72.43	60.32	543.8	415.7
#1	-.0030	.0001	.0020	-.0004	.0017	.0076	.0154
#2	-.0058	.0002	.0011	-.0014	.0007	-.0130	-.0076
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	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0011	.0008	.0102	.0001	.0023	.0091	-.0008
SDev	.0011	.0003	.0010	.0002	.0006	.0037	.1773
%RSD	104.2	32.77	10.10	163.4	24.08	41.21	22220.
#1	.0018	.0009	.0109	.0002	.0027	.0117	H.1246
#2	.0003	.0006	.0094	-.0000	.0019	.0064	L-.1262
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	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	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0009	-.0018	.0012	.0006	.0014	.0018	-.0003
SDev	.0010	.0020	.0021	.0002	.0028	.0022	.0013
%RSD	115.0	111.3	175.7	35.00	196.8	120.6	478.4
#1	.0016	-.0033	-.0003	.0004	.0034	.0003	.0007
#2	.0002	-.0004	.0027	.0007	-.0006	.0034	-.0012
Errors	LC Pass	LC Pass	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass
High	.0050	.0100			.0050	.0100	.0100
Low	-.0050	-.0100			-.0050	-.0100	-.0100
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899

010103

Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avg	95.87	.0039	-.0002	.0076	.0008	.0012	-.0031
SDev	.03	.0019	.0017	.0008	.0008	.0018	.0012
%RSD	.0314	47.63	927.0	9.993	107.5	148.3	40.69
#1	95.84	.0026	-.0014	.0081	.0002	-.0001	-.0022
#2	95.89	.0052	.0010	.0070	.0014	.0024	-.0039
Errors	NOCHECK	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass	LC Pass
High				.0100	.0030	.0050	.0050
Low				-.0100	-.0030	-.0050	-.0050
Elem	Sr4215	Th2037	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0005	.0011	.0005	.0065	.0339	.0006	.0029
SDev	.0004	.0014	.0005	.0037	.0207	.0007	.0005
%RSD	69.59	130.7	98.61	57.51	61.18	123.4	18.77
#1	.0008	.0020	.0009	.0038	.0486	.0011	.0025
#2	.0003	.0001	.0002	.0091	.0192	.0001	.0033
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	Y_3710	Zn2062	Zr3496				
Units	ppm	ppm	ppm				
Avg	.0006	.0004	.0011				
SDev	.0005	.0008	.0011				
%RSD	81.00	171.4	100.3				
#1	.0010	.0010	.0018				
#2	.0003	-.0001	.0003				
Errors	LC Pass	LC Pass	LC Pass				
High	.0050	.0050	.0050				
Low	-.0050	-.0050	-.0050				

010104

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	663612	10000	---	---	---	---	---
SDev	200.8183	.00000000	---	---	---	---	---
%RSD	.0302614	.00000000	---	---	---	---	---
#1	663470	10000	---	---	---	---	---
#2	663754	10000	---	---	---	---	---

ICP ANALYSIS

K+Mo

PROJ. NO.	PROJECT	TO#	DATE	MATRIX	LOGBK PG
06002.01.081	Div 20	031025-1	¹¹⁻⁶⁻⁰³ 4-7-03	Liquid	S4 285
06002.01.141	Div 20	031016-9	11-6-03	Water	S4 286

INSTRUMENT: TRACE 1 FILENAME: A031106B

INSTRUMENT DL: _____

Standardization Rpt.

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Method: DAILY1 Standard: blk
Run Time: 11/06/03 16:34:51

Elem	Ag3280	Al3082	As1890	B 2496	Ba4934	Be3130	Bi2230
Avg	-.00001	.00006	-.00000	.0309	-.00000	-.00001	-.00000
SDev	.00001	.00000	.00000	.00003	.00000	.00000	.00000
XRSD	46.628	2.119	44.71	1.094	.5762	4.598	141.4
#1	-.00001	.00006	-.00001	.0311	-.00000	-.00001	-.00000
#2	-.00002	.00006	-.00000	.0306	-.00000	-.00001	.00000
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K 7664
Avg	.00000	-.00000	-.00000	.00000	.00003	-.00000	.00015
SDev	.00000	.00000	.00000	.00000	.00000	.00000	.00001
XRSD	7.309	85.22	7.745	73.96	1.801	29.33	8.893
#1	.00000	-.00000	-.00000	.00000	.00003	-.00000	.00016
#2	.00000	-.00000	-.00000	.00000	.00003	-.00001	.00014
Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Avg	.00005	.00002	-.00000	.00000	-.00000	-.00065	-.00002
SDev	.00000	.00000	.00000	.00000	.00000	.00000	.00000
XRSD	.5705	1.090	112.9	39.10	110.2	.4257	3.393
#1	.00005	.00002	-.00000	.00000	-.00000	-.00065	-.00002
#2	.00005	.00002	-.00000	.00000	-.00000	-.00065	-.00002
Elem	Ni2316	P 1782	2203/1	2203/2	Pd3404	S 1820	Sb2068
Avg	-.00000	.00001	.00002	-.00000	.00000	.00000	.00000
SDev	.00000	.00000	.00001	.00000	.00000	.00000	.00000
XRSD	918.8	41.17	47.00	27.73	1228.	27.73	.5762
#1	.00000	.00001	.00001	-.00000	.00000	.00000	.00000
#2	-.00000	.00001	.00002	-.00000	-.00000	.00000	.00000
Elem	Sc3613	1960/1	1960/2	Si2881	Sn1899	Sr4215	Th2837
Avg	72.51	.00000	.00001	.1127	.00000	.00000	.00000
SDev	.42	.00000	.00000	.00076	.00000	.00000	.00000
XRSD	.5789	104.0	44.12	6.778	156.2	20.77	8.018
#1	72.21	.00001	.00001	.1180	.00000	.00000	.00000
#2	72.80	.00000	.00001	.1073	-.00000	.00000	.00000
Elem	Ti3372	Ti1908	U 3859	V 2924	W 2079	Y 3710	Zn2062
Avg	-.00013	-.00000	.00041	-.00000	.00001	-.00000	.00000
SDev	.00001	.00000	.00000	.00000	.00000	.00000	.00000
XRSD	5.662	70.28	.0652	27.73	15.38	255.9	141.4
#1	-.00013	-.00000	.00041	-.00000	.00001	.00000	.00000
#2	-.00014	-.00001	.00041	-.00000	.00001	-.00000	.00000
Elem	Zr3496						
Avg	.00002						
SDev	.00001						
XRSD	40.56						
#1	.00002						
#2	.00003						

11-6-03



Standardization Rpt.

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IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	725030	10000	---	---	---	---	---
SDev	4177.587	.0000000	---	---	---	---	---
*RSD	.5761951	.0000000	---	---	---	---	---
#1	722076	10000	---	---	---	---	---
#2	727984	10000	---	---	---	---	---

Standardization Rpt.

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Method: DAILY1 Standard: clp_std4
Run Time: 11/06/03 16:39:26

Elem	Ag3280	As1890	2203/1	2203/2	Sb2068	1960/1	1960/2
Avge	.05291	.1039	.4072	.4264	.1103	.2157	.3807
SDev	.00043	.0001	.0023	.0013	.0003	.0004	.0023
%RSD	.81199	.0452	.5568	.3129	.2774	.1743	.6002

#1	.05260	.1039	.4088	.4254	.1101	.2160	.3791
#2	.05321	.1039	.4056	.4273	.1105	.2155	.3823

Elem	Tl1908
Avge	.0287
SDev	.0001
%RSD	.4730

#1	.0286
#2	.0288

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	722114	10000	---	---	---	---	---
SDev	3946.363	.0000000	---	---	---	---	---
%RSD	.5465018	.0000000	---	---	---	---	---
#1	719323	10000	---	---	---	---	---
#2	724904	10000	---	---	---	---	---

Standardization Rpt.

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Method: DAILY1 Standard: clp_std1

Run Time: 11/06/03 16:43:18

Elem	Al3082	Ca3179	Fe2714	K_7664	Li6707	Mg2790	Na3302
Avge	.1265	.1469	.1004	1.673	3.346	.0535	.0123
SDev	.0002	.0002	.0007	.006	.011	.0003	.0000
%RSD	.1816	.1138	.7125	.3578	.3298	.5498	.1814
#1	.1264	.1468	.0999	1.669	3.338	.0533	.0123
#2	.1267	.1470	.1009	1.677	3.353	.0537	.0122
IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	699224	10000	---	---	---	---	---
SDev	518.3093	.00000000	---	---	---	---	---
%RSD	.0741263	.00000000	---	---	---	---	---
#1	698858	10000	---	---	---	---	---
#2	699591	10000	---	---	---	---	---

Standardization Rpt.

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Method: DAILY1 Standard: clp_std5
 Run Time: 11/06/03 16:47:13

Elem	B 2496	Bi2230	Mo2020	P 1782	Si2881	Sn1899	Sr4215
Avge	.4095	.0575	.1499	.0344	.1963	.1749	1.528
SDev	.0039	.0005	.0022	.0003	.0026	.0013	.005
XRSD	.9424	.8888	1.467	.8677	1.336	.7185	.3248

#1	.4068	.0571	.1484	.0346	.1982	.1740	1.525
#2	.4122	.0579	.1515	.0341	.1945	.1758	1.532

Elem	Ti3372
Avge	1.067
SDev	.001
XRSD	.0519

#1	1.066
#2	1.067

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	716452	10000	---	---	---	---	---
SDev	3973.233	.00000000	---	---	---	---	---
XRSD	.5545711	.00000000	---	---	---	---	---
#1	713642	10000	---	---	---	---	---
#2	719261	10000	---	---	---	---	---

Standardization Rpt.

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Method: DAILY1 Standard: clp_std2

Run Time: 11/06/03 16:50:43

Elem	Ba4934	Be3130	Cr2677	Cu3247	Ni2316		
Avge	.6321	.2016	.2889	.3197	.7289		
SDev	.0001	.0012	.0011	.0008	.0007		
XRSD	.0113	.5896	.3799	.2551	.0973		
#1	.6322	.2008	.2881	.3191	.7284		
#2	.6321	.2024	.2897	.3203	.7295		
IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	694290	10000	---	---	---	---	---
SDev	10715.50	.00000000	---	---	---	---	---
XRSD	1.543375	.00000000	---	---	---	---	---
#1	686713	10000	---	---	---	---	---
#2	701867	10000	---	---	---	---	---

Standardization Rpt.

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Method: DAILY1 Standard: clp_std3
 Run Time: 11/06/03 16:53:52

Elem	Cd2265	Co2286	Mn2576	V 2924	Zn2062
Avge	1.090	.2618	.3953	.0729	.0819
SDev	.006	.0031	.0046	.0005	.0008
%RSD	.5381	1.166	1.157	.6328	.9783

#1	1.086	.2597	.3921	.0726	.0813
#2	1.094	.2640	.3986	.0732	.0824

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	695378	10000	---	---	---	---	---
SDev	4176.880	.00000000	---	---	---	---	---
%RSD	.6006637	.00000000	---	---	---	---	---
#1	698331	10000	---	---	---	---	---
#2	692424	10000	---	---	---	---	---

Standardization Rpt.

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Method: DAILY1 Standard: clp_std6
Run Time: 11/06/03 16:57:44

Elem	La4086	Na5889	Pd3404	S 1820	Th2837	U 3859	W 2079
Avge	.3879	.1348	.1529	.0365	.0589	.0330	.1234
SDev	.0037	.0006	.0003	.0005	.0001	.0000	.0012
XRSD	.9546	.4776	.2300	1.296	.1483	.0168	.9905

#1	.3853	.1343	.1526	.0361	.0590	.0330	.1225
#2	.3905	.1352	.1531	.0368	.0588	.0330	.1243

Elem	Y 3710	Zr3496
Avge	1.014	1.183
SDev	.001	.001
XRSD	.1441	.0533

#1	1.013	1.183
#2	1.015	1.184

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	696860	10000	---	---	---	---	---
SDev	1103.086	.00000000	---	---	---	---	---
XRSD	.1582939	.00000000	---	---	---	---	---
#1	697640	10000	---	---	---	---	---
#2	696080	10000	---	---	---	---	---

Standardization

Report

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Method: DAILY1

Slope = Conc(SIR)/IR

Element	Wavelength	High std	Low std	Slope	Y-intercept	Date Standardized
Ag3280	328.068	clp_std4	blk	37.7930	.000469	11/06/03 04:57:44
Al3082	308.215	clp_std1	blk	396.912	-.225834	11/06/03 04:57:44
As1890	189.042	clp_std4	blk	96.1907	.004251	11/06/03 04:57:44
B_2496	249.678	clp_std5	blk	26.4128	-.815691	11/06/03 04:57:44
Ba4934	493.409	clp_std2	blk	15.8192	.000415	11/06/03 04:57:44
Be3130	313.042	clp_std2	blk	24.7881	.002803	11/06/03 04:57:44
Bi2230	223.061	clp_std5	blk	86.2949	.000299	11/06/03 04:57:44
Ca3179	317.933	clp_std1	blk	340.440	-.009863	11/06/03 04:57:44
Cd2265	226.502	clp_std3	blk	9.17360	.000095	11/06/03 04:57:44
Co2286	228.616	clp_std3	blk	38.1931	.000448	11/06/03 04:57:44
Cr2677	267.716	clp_std2	blk	34.6131	-.000598	11/06/03 04:57:44
Cu3247	324.753	clp_std2	blk	31.3089	-.010277	11/06/03 04:57:44
Fe2714	271.441	clp_std1	blk	497.750	.024351	11/06/03 04:57:44
K_7664	766.491	clp_std1	blk	29.9140	-.045252	11/06/03 04:57:44
La4086	408.672	clp_std6	blk	24.9514	-.012733	11/06/03 04:57:44
Li6707	670.784	clp_std1	blk	2.98909	-.000567	11/06/03 04:57:44
Mg2790	279.078	clp_std1	blk	467.177	.003211	11/06/03 04:57:44
Mn2576	257.610	clp_std3	blk	25.2954	-.000192	11/06/03 04:57:44
Mo2020	202.030	clp_std5	blk	66.7078	.000415	11/06/03 04:57:44
Na5889	588.995	clp_std6	blk	7.08055	.045871	11/06/03 04:57:44
Na3302	330.232	clp_std1	blk	4023.12	.696456	11/06/03 04:57:44
Ni2316	231.604	clp_std2	blk	13.7184	.000028	11/06/03 04:57:44
P_1782	178.287	clp_std5	blk	291.963	-.031373	11/06/03 04:57:44
2203/1	220.351	clp_std4	blk	24.5670	-.004281	11/06/03 04:57:44
2203/2	220.352	clp_std4	blk	23.4536	.000566	11/06/03 04:57:44
Pd3404	340.458	clp_std6	blk	66.3926	-.000095	11/06/03 04:57:44
S_1820	182.040	clp_std6	blk	274.762	-.005680	11/06/03 04:57:44
Se2068	206.838	clp_std4	blk	90.6888	-.002001	11/06/03 04:57:44
Sc3613	361.384	blk	dark	1.38162	-.174982	11/06/03 04:57:44
1960/1	196.021	clp_std4	blk	46.3661	-.001443	11/06/03 04:57:44
1960/2	196.022	clp_std4	blk	26.2764	-.002413	11/06/03 04:57:44
Si2881	288.158	clp_std5	blk	119.112	-13.4181	11/06/03 04:57:44
Pb220	220.353	NONE	NONE	.000000	.000000	*NOT STANDARDIZED
Se196	196.026	NONE	NONE	1.00000	.000000	*NOT STANDARDIZED
Sn1899	189.989	clp_std5	blk	57.2169	-.000753	11/06/03 04:57:44
Sr4215	421.552	clp_std5	blk	6.54361	-.000032	11/06/03 04:57:44
Th2837	283.730	clp_std6	blk	178.279	-.002337	11/06/03 04:57:44
Ti3372	337.280	clp_std5	blk	9.36424	.012591	11/06/03 04:57:44
Tl1908	190.864	clp_std4	blk	347.626	.014355	11/06/03 04:57:44
U_3859	385.958	clp_std6	blk	345.454	-1.41820	11/06/03 04:57:44
V_2924	292.402	clp_std3	blk	137.161	.000473	11/06/03 04:57:44
W_2079	207.910	clp_std6	blk	40.5415	-.003717	11/06/03 04:57:44
Y_3710	371.030	clp_std6	blk	9.85754	.000034	11/06/03 04:57:44
Zn2062	206.200	clp_std3	blk	122.173	-.000084	11/06/03 04:57:44
Zr3496	349.621	clp_std6	blk	8.99069	-.002217	11/06/03 04:57:44

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Method: DAILY1 Sample Name: icv/ccv Operator:

Run Time: 11/06/03 17:02:21

Comment:

Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.99950	9.881	5.047	4.715	10.00	1.077	5.032
SDev	.00496	.023	.015	.033	.04	.007	.011
%RSD	.49582	.2372	.3045	.7079	.3821	.6385	.2236
#1	1.0030	9.865	5.036	4.691	10.05	1.082	5.024
#2	.99599	9.898	5.058	4.739	10.10	1.072	5.040
Errors	QC Pass	QC Pass	QC Pass	QC Pass	QC Pass	QC Pass	QC Pass
Value	1.0000	10.00	5.000	5.000	10.00	1.000	5.000
Range	10.000	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
Avg	20.19	1.034	5.080	1.979	2.028	10.17	18.67
SDev	.10	.001	.016	.004	.011	.06	.17
%RSD	.4723	.1008	.3104	.2258	.5203	.5462	.9225
#1	20.25	1.035	5.069	1.975	2.021	10.13	18.54
#2	20.12	1.034	5.091	1.982	2.036	10.21	18.79
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	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	4.983	4.871	20.01	1.037	5.059	Q44.80	Q26.87
SDev	.026	.038	.06	.003	.045	.46	.10
%RSD	.5194	.7815	.2943	.2562	.8841	1.017	.3673
#1	4.965	4.844	19.97	1.035	5.027	Q44.48	Q26.94
#2	5.001	4.898	20.05	1.039	5.091	Q45.12	Q26.80
Errors	QC Pass	QC Pass	QC Pass	QC Pass	QC Pass	QC Fail	QC Fail
Value	5.000	5.000	20.00	1.000	5.000	30.00	30.00
Range	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	4.900	4.985	5.055	5.124	1.019	1.022	1.008
SDev	.001	.151	.008	.072	.004	.015	.010
%RSD	.0224	3.027	.1564	1.405	.4194	1.480	.9996
#1	4.899	4.878	5.060	5.073	1.022	1.032	1.000
#2	4.900	5.091	5.049	5.175	1.016	1.011	1.015
Errors	QC Pass	QC Pass	NOCHECK	NOCHECK	QC Pass	QC Pass	QC Pass
Value	5.000	5.000			1.000	1.000	1.000
Range	10.00	10.00			10.00	10.00	10.00
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899

Analysis Report

QC Standard

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Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avg	98.89	5.374	5.342	Q-.9195	5.096	5.347	4.975
SDev	.17	.013	.076	.2672	.045	.046	.019
XRSD	.1683	.2328	1.424	29.07	.8889	.8695	.3752
#1	99.01	5.383	5.288	Q-.7305	5.064	5.314	4.962
#2	98.78	5.365	5.395	Q-1.108	5.128	5.380	4.988
Errors	NOCHECK	NOCHECK	NOCHECK	QC Fail	QC Pass	QC Pass	QC Pass
Value				5.000	5.000	5.000	5.000
Range				10.00	10.00	10.00	10.00
Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	5.226	.9679	4.893	5.339	1.022	5.095	1.023
SDev	.025	.0109	.002	.035	.009	.004	.003
XRSD	.4865	1.125	.0368	.6580	.8962	.0694	.2617
#1	5.208	.9756	4.895	5.315	1.028	5.092	1.025
#2	5.244	.9602	4.892	5.364	1.015	5.097	1.022
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	Y_3710	Zn2062	Zr3496				
Units	ppm	ppm	ppm				
Avg	5.055	1.057	4.842				
SDev	.001	.001	.009				
XRSD	.0179	.1009	.1893				
#1	5.055	1.057	4.836				
#2	5.056	1.056	4.848				
Errors	QC Pass	QC Pass	QC Pass				
Value	5.000	1.000	5.000				
Range	10.00	10.00	10.00				

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Analysis Report

QC Standard

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IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	717024	10000	---	---	---	---	---
SDev	1235.316	.0000000	---	---	---	---	---
*RSD	.1722838	.0000000	---	---	---	---	---
#1	717897	10000	---	---	---	---	---
#2	716150	10000	---	---	---	---	---

Analysis Report

Blank Sample

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Method: DAILY1

Sample Name: icb/ccb

Operator:

Run Time: 11/06/03 17:00:45

Comment:

Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00073	.0128	.0007	L-.1891	.0025	.0002	.0005
SDev	.00032	.0015	.0010	.0291	.0017	.0003	.0061
XRSD	43.590	11.86	136.9	15.41	67.11	133.6	1173.
#1	.00096	.0138	.0000	L-.1685	.0038	.0004	.0048
#2	.00051	.0117	.0014	L-.2097	.0013	.0000	-.0038
Errors	LC Pass	LC Pass	LC Pass	LC Low	LC Pass	LC Pass	LC Pass
High	.00500	.0500	.0050	.0500	.0050	.0050	.0050
Low	-.00500	-.0500	-.0050	-.0500	-.0050	-.0050	-.0050
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0064	.0005	.0014	-.0003	.0004	.0039	.0052
SDev	.0033	.0002	.0011	.0002	.0003	.0009	.0035
XRSD	51.70	29.59	83.74	59.58	75.67	22.12	67.15
#1	.0007	.0006	.0022	-.0002	.0006	.0045	.0077
#2	.0040	.0004	.0006	-.0004	.0002	.0033	.0027
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	.00500	.0050	.0050	.0050	.0050	.0250	.1000
Low	-.00500	-.0050	-.0050	-.0050	-.0050	-.0250	-.1000
Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0019	.0009	.0094	.0002	H.0078	.0043	.0037
SDev	.0008	.0006	.0051	.0001	.0029	.0043	.0361
XRSD	42.17	59.79	54.18	72.24	37.23	101.5	976.8
#1	.0024	.0013	.0129	.0003	H.0098	.0073	.0292
#2	.0013	.0005	.0058	.0001	H.0057	.0012	-.0218
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC High	LC Pass	LC Pass
High	.0050	.0050	.0050	.0050	.0050	.0050	.0050
Low	-.0050	-.0050	-.0050	-.0050	-.0050	-.0050	-.0050
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0005	-.0057	-.0007	.0024	.0000	-.0020	.0004
SDev	.0010	.0013	.0044	.0014	.0010	.0019	.0017
XRSD	197.8	22.09	587.2	59.57	2072.	94.08	407.6
#1	.0012	-.0048	.0023	.0035	.0008	-.0007	.0017
#2	-.0002	-.0066	-.0038	.0014	-.0007	-.0034	-.0008
Errors	LC Pass	LC Pass	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass
High	.0050	.0100			.0050	.0100	.0100
Low	-.0050	-.0100			-.0050	-.0100	-.0100
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899

Analysis Report

Blank Sample

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Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avg	98.92	-.0041	.0047	L-8.740	.0014	.0018	.0016
SDev	.44	.0013	.0013	.228	.0024	.0013	.0003
XRSD	.4471	32.04	28.30	2.614	176.1	72.99	19.48
#1	98.60	-.0031	.0057	L-8.578	H.0031	.0028	.0018
#2	99.23	-.0050	.0038	L-8.901	-.0003	.0009	.0014
Errors	NOCHECK	NOCHECK	NOCHECK	LC Low	LC Pass	LC Pass	LC Pass
High				.0100	.0030	.0050	.0050
Low				-.0100	-.0030	-.0050	-.0050
Elem	Sr4215	Th2037	Ti3372	Ti1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0014	-.0007	.0005	.0073	.0385	.0015	.0014
SDev	.0009	.0005	.0018	.0065	.0098	.0008	.0024
XRSD	67.28	75.97	339.5	88.24	25.53	55.97	169.5
#1	.0020	-.0011	.0018	H.0119	.0454	.0021	.0031
#2	.0007	-.0003	-.0007	.0028	.0315	.0009	-.0003
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	Y_3710	Zn2062	Zr3496				
Units	ppm	ppm	ppm				
Avg	.0014	.0005	.0028				
SDev	.0008	.0004	.0035				
XRSD	58.24	70.04	123.7				
#1	.0019	.0003	H.0053				
#2	.0008	.0008	.0004				
Errors	LC Pass	LC Pass	LC Pass				
High	.0050	.0050	.0050				
Low	-.0050	-.0050	-.0050				

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	717166	10000	---	---	---	---	---
SDev	3148.039	.00000000	---	---	---	---	---
*RSD	.4389555	.00000000	---	---	---	---	---
#1	714940	10000	---	---	---	---	---
#2	719392	10000	---	---	---	---	---

Analysis Report

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Method: DAILY1 Sample Name: pbw-L06W3 pg54-285 Operator:
 Run Time: 11/06/03 17:13:21
 Comment:
 Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00002	.0129	-.0002	L-.2436	.0001	-.0002	-.0006
SDev	.00008	.0076	.0004	.0120	.0000	.0000	.0008
XRSD	441.37	59.18	230.6	4.916	.7944	8.941	128.1
#1	-.00004	.0075	-.0005	L-.2351	.0001	-.0002	-.0012
#2	.00007	.0183	.0001	L-.2521	.0001	-.0002	-.0001
Errors	LC Pass	LC Pass	LC Pass	LC Low	LC Pass	LC Pass	LC Pass
High	.00500	.0500	.0050	.0500	.0050	.0050	.0050
Low	-.00500	-.0500	-.0050	-.0500	-.0050	-.0050	-.0050
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0321	.0003	.0032	-.0004	.0004	.0064	.0068
SDev	.0002	.0001	.0001	.0003	.0001	.0043	.0073
XRSD	.5944	47.49	3.875	69.46	14.90	66.64	107.3
#1	.0320	.0002	.0031	-.0007	.0004	.0034	.0016
#2	.0323	.0004	.0033	-.0002	.0005	.0094	.0120
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	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.0001	.0002	.0065	.0001	.0028	.0196	L-.0647
SDev	.0004	.0000	.0020	.0001	.0002	.0006	.0341
XRSD	322.1	13.74	30.36	38.19	6.619	3.143	52.78
#1	-.0005	.0002	.0051	.0001	.0029	.0192	L-.0888
#2	.0002	.0002	.0079	.0002	.0027	.0201	-.0405
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Low
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
Avg	-.0003	.0022	-.0017	.0013	-.0015	.0021	-.0026
SDev	.0007	.0070	.0030	.0002	.0014	.0115	.0025
XRSD	212.4	314.7	170.5	13.19	96.59	552.5	97.83
#1	-.0008	-.0027	.0004	.0014	-.0005	-.0061	-.0043
#2	.0002	.0071	-.0038	.0012	-.0025	H.0102	-.0008
Errors	LC Pass	LC Pass	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass
High	.0050	.0100			.0050	.0100	.0100
Low	-.0050	-.0100			-.0050	-.0100	-.0100
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899

Analysis Report

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Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avg	95.35	-.0047	.0016	L-9.104	.0003	-.0005	-.0006
SDev	.27	.0021	.0017	.148	.0011	.0018	.0003
XRSD	.2784	43.42	104.5	1.625	362.5	376.7	49.39
#1	95.54	-.0062	.0004	L-8.999	.0011	-.0018	-.0008
#2	95.16	-.0033	.0028	L-9.208	-.0005	.0008	-.0004
Errors	NOCHECK	NOCHECK	NOCHECK	LC Low	LC Pass	LC Pass	LC Pass
High				.0100	.0030	.0050	.0050
Low				-.0100	-.0030	-.0050	-.0050
Elem	Sr4215	Th2037	Ti3372	Ti1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0002	-.0007	-.0010	H.0103	.0217	.0000	.0024
SDev	.0000	.0008	.0000	.0057	.0120	.0007	.0004
XRSD	4.265	110.7	.3296	55.28	55.58	13790.	16.25
#1	.0002	-.0012	-.0010	H.0143	.0131	-.0005	.0021
#2	.0001	-.0001	-.0010	.0063	.0302	.0005	.0027
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	Y_3710	Zn2062	Zr3496				
Units	ppm	ppm	ppm				
Avg	.0001	.0008	.0004				
SDev	.0000	.0000	.0011				
XRSD	44.70	.3249	264.2				
#1	.0001	.0008	.0012				
#2	.0001	.0008	-.0004				
Errors	LC Pass	LC Pass	LC Pass				
High	.0050	.0050	.0050				
Low	-.0050	-.0050	-.0050				

Analysis Report

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IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	691346	10000	---	---	---	---	---
SDev	1873.126	.00000000	---	---	---	---	---
*RSD	.2709388	.00000000	---	---	---	---	---
#1	692671	10000	---	---	---	---	---
#2	690022	10000	---	---	---	---	---

Analysis Report

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Method: DAILY1 Sample Name: lcsW-L06W4

Operator:

Run Time: 11/06/03 17:17:57

Comment:

Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Ri2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.05029	2.033	2.081	-.3062	2.127	.0558	-.0011
SDev	.00013	.006	.021	.0109	.001	.0004	.0016
XRSD	.25947	.3193	.9941	3.552	.0486	.7097	145.7

#1	.05020	2.029	2.096	-.2985	2.127	.0555	-.0022
#2	.05039	2.038	2.067	-.3139	2.126	.0560	.0000

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	48.85	.0520	.5134	.1998	.2628	.9940	47.36
SDev	.15	.0008	.0013	.0008	.0003	.0008	.07
XRSD	.3058	1.529	.2485	.4133	.1077	.8871	.1420

#1	48.95	.0525	.5143	.2004	.2630	1.000	47.31
#2	48.74	.0514	.5125	.1992	.2626	.9878	47.40

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0002	.0005	50.22	.5204	10.01	78.47	46.93
SDev	.0001	.0000	.13	.0016	.02	.27	.26
XRSD	73.32	7.704	.2518	.3176	.2296	.3439	.5610

#1	.0003	.0005	50.31	.5216	10.03	78.66	46.75
#2	.0001	.0004	50.13	.5193	9.995	78.28	47.12

Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.4991	.0013	.5207	.5276	-.0025	.0019	.5105
SDev	.0030	.0076	.0062	.0024	.0035	.0083	.0056
XRSD	.5928	567.4	1.192	.4560	141.5	437.4	1.106

#1	.5012	-.0040	.5251	.5293	.0000	.0077	.5145
#2	.4970	.0067	.5163	.5259	-.0049	-.0040	.5065

Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avg	91.15	2.184	2.201	-9.420	.5247	2.193	-.0044
SDev	.68	.023	.013	.234	.0037	.016	.0030
XRSD	.7474	1.049	.5767	2.479	.6991	.7331	69.10

#1	90.66	2.200	2.210	-9.255	.5273	2.205	-.0023
#2	91.63	2.168	2.192	-9.585	.5221	2.182	-.0066

Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0006	-.0121	-.0013	2.226	.0193	.5163	10.39
SDev	.0001	.0013	.0001	.043	.0198	.0016	.09
XRSD	9.947	10.46	6.760	1.920	102.4	.3014	.8264

#1	.0006	-.0130	-.0013	2.257	.0333	.5174	10.45
#2	.0005	-.0112	-.0014	2.196	.0053	.5152	10.33

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	-.0001	.5281	.0093
SDev	.0000	.0044	.0027
XRSD	47.98	.8286	29.28

#1	-.0000	.5312	.0112
#2	-.0001	.5250	.0074

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	660920	10000	---	---	---	---	---
SDev	4987.931	.0000000	---	---	---	---	---
XRSD	.7546952	.0000000	---	---	---	---	---
#1	657393	10000	---	---	---	---	---
#2	664447	10000	---	---	---	---	---

Analysis Report

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Method: DAILY1 Sample Name: 236894 df250 Operator:
 Run Time: 11/06/03 17:22:39
 Comment:
 Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.00054	.0170	.0042	-.3411	.0026	-.0001	.0038
SDev	.00019	.0029	.0044	.0094	.0018	.0000	.0006
%RSD	36.148	16.82	105.3	2.744	70.13	53.24	15.98
#1	.00040	.0149	.0073	-.3344	.0039	-.0000	.0034
#2	.00068	.0190	.0011	-.3477	.0013	-.0001	.0043
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0917	.0003	.0030	-.0003	.0005	.0080	99.06
SDev	.0391	.0001	.0003	.0003	.0007	.0017	.11
%RSD	42.64	18.53	11.35	98.09	138.8	20.98	.1081
#1	.1193	.0003	.0033	-.0001	.0010	.0068	98.98
#2	.0640	.0002	.0028	-.0005	.0000	.0091	99.13
Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0007	.0004	.0671	.0007	.0292	.3326	.0658
SDev	.0011	.0000	.0373	.0004	.0137	.0721	.0988
%RSD	148.3	2.238	55.59	58.71	46.73	21.69	150.1
#1	-.0000	.0004	.0934	.0009	.0389	.3836	.1357
#2	.0015	.0003	.0407	.0004	.0196	.2816	-.0040
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0010	.0537	-.0025	.0004	-.0022	.0102	-.0003
SDev	.0002	.0122	.0006	.0003	.0015	.0064	.0004
%RSD	20.14	22.76	22.28	72.24	68.28	62.53	161.3
#1	.0012	.0450	-.0021	.0002	-.0032	.0057	-.0005
#2	.0009	.0623	-.0029	.0006	-.0011	.0148	.0000
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avge	96.35	-.0018	.0047	-9.246	-.0006	.0025	-.0023
SDev	.12	.0031	.0036	.088	.0000	.0034	.0022
%RSD	.1257	171.1	77.21	.9546	.9559	135.4	96.48
#1	96.44	.0004	.0073	-9.184	-.0006	.0050	-.0038
#2	96.26	-.0040	.0021	-9.309	-.0006	.0001	-.0007
Elem	Sr4215	Th2837	Ti3372	Ti1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0001	.0002	-.0012	-.0031	.0391	.0005	.0182
SDev	.0000	.0008	.0000	.0063	.0045	.0004	.0093
%RSD	16.05	488.9	2.675	206.1	11.61	74.63	50.94
#1	.0001	-.0004	-.0012	-.0075	.0359	.0008	.0248
#2	.0001	.0007	-.0011	.0014	.0424	.0002	.0117

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	.0000	.0018	-.0007
SDev	.0000	.0002	.0001
%RSD	.3327	13.13	7.286

#1	.0000	.0020	-.0007
#2	.0000	.0017	-.0007

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	698598	10000	---	---	---	---	---
SDev	854.8921	.00000000	---	---	---	---	---
%RSD	.1223724	.00000000	---	---	---	---	---
#1	699203	10000	---	---	---	---	---
#2	697994	10000	---	---	---	---	---

Analysis Report

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Method: DAILY1 Sample Name: 236895 df250

Operator:

Run Time: 11/06/03 17:27:35

Comment:

Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.00026	.0178	-.0002	-.3810	-.0001	.0001	.0017
SDev	.00071	.0022	.0010	.0061	.0000	.0001	.0044
XRSD	273.68	12.67	394.2	1.605	.7599	58.54	257.0
#1	-.00024	.0194	.0004	-.3767	-.0001	.0002	-.0014
#2	.00076	.0162	-.0009	-.3853	-.0001	.0001	.0048
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0589	.0001	.0029	-.0011	.0001	.0031	101.8
SDev	.0003	.0001	.0000	.0004	.0007	.0079	.0
XRSD	.5202	121.6	.1419	36.55	650.3	251.8	.0265
#1	.0592	.0000	.0029	-.0014	-.0004	-.0024	101.8
#2	.0587	.0001	.0029	-.0008	.0006	.0087	101.8
Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0007	.0009	.0092	.0001	.0053	.0695	.0740
SDev	.0005	.0000	.0010	.0001	.0007	.0013	.0096
XRSD	72.46	.9708	10.83	53.72	12.41	1.805	121.1
#1	.0003	.0008	.0085	.0001	.0058	.0704	.1374
#2	.0011	.0009	.0099	.0001	.0048	.0687	.0106
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0012	-.0009	-.0014	-.0018	.0003	.0071	.0002
SDev	.0007	.0186	.0015	.0016	.0005	.0061	.0026
XRSD	55.08	2151.	104.4	92.96	185.3	84.88	1484.
#1	.0007	-.0141	-.0004	-.0006	-.0001	.0114	-.0017
#2	.0017	.0123	-.0025	-.0029	.0006	.0029	.0020
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avge	97.67	.0014	.0007	-9.446	-.0017	.0009	-.0007
SDev	.05	.0020	.0012	.100	.0016	.0015	.0037
XRSD	.0487	141.0	185.3	1.057	96.26	160.5	527.8
#1	97.63	.0028	.0015	-9.376	-.0005	.0020	-.0033
#2	97.70	.0000	-.0002	-9.517	-.0028	-.0001	.0019
Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0002	-.0018	-.0015	-.0060	.0363	-.0003	.0035
SDev	.0000	.0005	.0001	.0073	.0231	.0001	.0020
XRSD	20.58	30.28	7.648	121.1	63.69	38.93	57.20
#1	.0001	-.0022	-.0016	-.0112	.0200	-.0004	.0021
#2	.0002	-.0014	-.0014	-.0009	.0527	-.0003	.0050

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	-.0000	.0026	-.0009
SDev	.0001	.0004	.0001
XRSD	454.7	14.15	5.593

#1	-.0001	.0023	-.0010
#2	.0000	.0028	-.0009

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	708122	10000	---	---	---	---	---
SDev	333.0473	.00000000	---	---	---	---	---
XRSD	.0470325	.00000000	---	---	---	---	---
#1	707886	10000	---	---	---	---	---
#2	708357	10000	---	---	---	---	---

Analysis Report

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Method: DAILY1 Sample Name: 236894 df33.3

Operator:

Run Time: 11/06/03 17:32:27

Comment:

Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.00026	.0281	-.0007	-.3614	.0008	-.0000	.0017
SDev	.00046	.0037	.0062	.0076	.0000	.0001	.0000
XRSD	174.22	13.00	867.6	2.116	4.087	2766.	.0214
#1	.00059	.0255	.0037	-.3560	.0008	.0000	.0017
#2	-.00006	.0307	-.0051	-.3669	.0009	-.0000	.0017
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0865	.0000	.0037	-.0009	.0010	-.0054	5529.0
SDev	.0011	.0001	.0003	.0003	.0001	.0014	305.0
XRSD	1.234	230.8	8.800	32.15	12.57	25.57	57.65
#1	.0857	.0001	.0035	-.0011	.0011	-.0064	744.7
#2	.0872	-.0000	.0039	-.0007	.0009	-.0045	5313.4
Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0012	.0013	.0390	.0001	.0038	2.279	.8226
SDev	.0002	.0000	.0001	.0000	.0000	.015	.0531
XRSD	16.23	.9444	.3249	1.319	.5092	.6739	6.451
#1	.0013	.0013	.0389	.0001	.0037	2.268	.8601
#2	.0011	.0013	.0391	.0001	.0038	2.290	.7851
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0031	.4799	-.0002	-.0010	-.0012	.0129	-.0005
SDev	.0000	.0031	.0005	.0006	.0002	.0032	.0015
XRSD	.1071	.6367	325.2	60.29	16.55	24.59	291.9
#1	.0031	.4821	.0002	-.0006	-.0013	.0106	.0005
#2	.0031	.4777	-.0005	-.0014	-.0011	.0151	-.0016
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avge	95.06	-.0014	.0015	-6.746	-.0007	.0006	-.0005
SDev	.32	.0065	.0008	.094	.0006	.0016	.0013
XRSD	.3417	458.3	53.77	1.400	79.93	296.4	256.8
#1	95.29	.0032	.0009	-6.679	-.0003	.0017	-.0014
#2	94.83	-.0061	.0021	-6.812	-.0011	-.0006	.0004
Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0002	.0007	-.0016	.0038	-.0243	.0000	.0013
SDev	.0000	.0005	.0003	.0128	.0038	.0004	.0055
XRSD	5.590	65.98	17.25	339.3	15.56	15610.	425.5
#1	.0002	.0004	-.0014	-.0053	-.0217	-.0003	.0052
#2	.0002	.0011	-.0018	.0128	-.0270	.0003	-.0026

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	-.0000	.0058	-.0012
SDev	.0001	.0004	.0001
XRSD	6514.	6.828	5.718

#1	-.0001	.0056	-.0011
#2	.0001	.0061	-.0012

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	689238	10000	---	---	---	---	---
SDev	2341.231	.00000000	---	---	---	---	---
XRSD	.3396842	.00000000	---	---	---	---	---
#1	690893	10000	---	---	---	---	---
#2	687582	10000	---	---	---	---	---

Analysis Report

QC Standard

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Method: DAILY1

Sample Name: icv/ccv

Operator:

Run Time: 11/06/03 17:41:18

Comment:

Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Ri2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.99495	10.05	4.958	Q4.288	10.39	1.064	5.071
SDev	.00620	.05	.009	.003	.02	.006	.001
XRSD	.62361	.5460	.1856	.0700	.1565	.5338	.0197

#1	.99933	10.09	4.951	Q4.285	10.40	1.068	5.070
#2	.99056	10.01	4.964	Q4.290	10.38	1.060	5.072

Errors	QC Pass	QC Pass	QC Pass	QC Fail	QC Pass	QC Pass	QC Pass
Value	1.0000	10.00	5.000	5.000	10.00	1.000	5.000
Range	10.000	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
Avg	19.34	.9929	4.935	1.926	2.080	9.912	19.63
SDev	.12	.0034	.001	.004	.003	.009	.04
XRSD	.6171	.3448	.0165	.2117	.1509	.0923	.2196

#1	19.43	.9953	4.935	1.929	2.083	9.918	19.66
#2	19.26	.9904	4.934	1.923	2.078	9.905	19.60

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	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	5.087	5.024	19.77	1.016	4.963	Q46.34	27.46
SDev	.002	.013	.08	.002	.025	.12	.17
XRSD	.0414	.2630	.3907	.2138	.5124	.2563	.6189

#1	5.085	5.033	19.83	1.017	4.945	Q46.43	27.50
#2	5.088	5.014	19.72	1.014	4.981	Q46.26	27.34

Errors	QC Pass	QC Pass	QC Pass	QC Pass	QC Pass	QC Fail	QC Pass
Value	5.000	5.000	20.00	1.000	5.000	30.00	30.00
Range	10.00	10.00	10.00	10.00	10.00	10.00	10.00

Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	4.765	5.018	4.897	4.934	1.019	.9789	1.010
SDev	.021	.059	.037	.040	.007	.0188	.001
XRSD	.4400	1.168	.7537	.8171	.7036	1.924	.0535

#1	4.780	5.060	4.923	4.963	1.024	.9922	1.010
#2	4.750	4.977	4.871	4.906	1.014	.9656	1.009

Errors	QC Pass	QC Pass	NOCHECK	NOCHECK	QC Pass	QC Pass	QC Pass
Value	5.000	5.000			1.000	1.000	1.000
Range	10.00	10.00			10.00	10.00	10.00

Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
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Analysis Report

QC Standard

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Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avg	96.69	5.350	5.327	Q-3.316	4.917	5.329	4.822
SDev	.74	.000	.036	.103	.039	.024	.005
%RSD	.7622	.0021	.6736	3.118	.7961	.4477	.1090
#1	96.17	5.350	5.352	Q-3.243	4.945	5.346	4.826
#2	97.21	5.350	5.302	Q-3.390	4.889	5.313	4.819
Errors	NOCHECK	NOCHECK	NOCHECK	QC Fail	QC Pass	QC Pass	QC Pass
Value				5.000	5.000	5.000	5.000
Range				10.00	10.00	10.00	10.00
Elem	Sr4215	Th2837	Ti3372	Ti1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	5.334	.9504	4.904	5.335	.9972	5.038	.9847
SDev	.018	.0019	.022	.021	.0058	.024	.0075
%RSD	.3321	.1948	.4567	.3914	.5786	.4846	.7637
#1	5.347	.9517	4.920	5.321	.9931	5.056	.9901
#2	5.322	.9491	4.888	5.350	1.001	5.021	.9794
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	Y_3710	Zn2062	Zr3496				
Units	ppm	ppm	ppm				
Avg	5.078	.9879	4.879				
SDev	.003	.0014	.009				
%RSD	.0683	.1377	.1765				
#1	5.080	.9870	4.885				
#2	5.075	.9889	4.873				
Errors	QC Pass	QC Pass	QC Pass				
Value	5.000	1.000	5.000				
Range	10.00	10.00	10.00				

Analysis Report

QC Standard

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IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	701068	10000	---	---	---	---	---
SDev	5354.212	.00000000	---	---	---	---	---
*RSD	.7637223	.00000000	---	---	---	---	---
#1	697282	10000	---	---	---	---	---
#2	704854	10000	---	---	---	---	---

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Method: DAILY1 Sample Name: icb/ccb Operator:

Run Time: 11/06/03 17:48:13

Comment:

Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00048	.0095	.0011	L-.5053	.0018	.0004	.0036
SDev	.00133	.0009	.0055	.0129	.0014	.0003	.0008
%RSD	275.65	10.05	519.6	2.546	73.20	72.46	23.07
#1	.00143	.0101	.0050	L-.4962	.0028	.0006	.0042
#2	-.00046	.0088	-.0028	L-.5144	.0009	.0002	.0030
Errors	LC Pass	LC Pass	LC Pass	LC Low	LC Pass	LC Pass	LC Pass
High	.00500	.0500	.0050	.0500	.0050	.0050	.0050
Low	-.00500	-.0500	-.0050	-.0500	-.0050	-.0050	-.0050
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0054	.0005	.0009	.0002	.0003	.0169	.0109
SDev	.0045	.0005	.0008	.0005	.0000	.0051	.0285
%RSD	83.00	103.4	89.00	267.8	11.68	29.89	261.3
#1	.0085	.0008	.0015	.0006	.0003	.0134	.0310
#2	.0022	.0001	.0003	-.0002	.0004	.0205	-.0092
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	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0013	.0009	.0064	.0002	H.0077	.0071	-.0149
SDev	.0016	.0004	.0095	.0001	.0021	.0066	.1650
%RSD	131.6	48.56	148.3	76.54	27.08	92.18	1110.
#1	.0024	.0011	.0131	.0003	H.0092	.0118	H.1018
#2	.0001	.0006	-.0003	.0001	H.0062	.0025	L-.1316
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	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0012	L-.0104	-.0062	.0026	-.0002	-.0021	-.0012
SDev	.0006	.0007	.0063	.0007	.0025	.0034	.0033
%RSD	49.95	7.083	101.6	26.90	1012.	162.9	261.2
#1	.0017	-.0099	-.0018	.0021	.0015	.0003	.0011
#2	.0008	L-.0110	-.0107	.0031	-.0020	-.0045	-.0035
Errors	LC Pass	LC Low	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass
High	.0050	.0100			.0050	.0100	.0100
Low	-.0050	-.0100			-.0050	-.0100	-.0100
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899

Analysis Report

Blank Sample

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Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avg	101.0	-.0051	.0065	L-10.61	-.0003	.0026	.0020
SDev	.5	.0063	.0011	.07	.0016	.0014	.0029
XRSD	.5042	122.9	17.27	.6999	470.5	52.40	146.1
#1	101.3	-.0007	.0057	L-10.56	.0008	.0036	.0040
#2	100.6	-.0096	.0072	L-10.67	-.0015	.0016	-.0001
Errors	NOCHECK	NOCHECK	NOCHECK	LC Low	LC Pass	LC Pass	LC Pass
High				.0100	.0030	.0050	.0050
Low				-.0100	-.0030	-.0050	-.0050
Elem	Sr4215	Th2037	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0010	.0008	-.0001	.0079	.0277	.0013	.0024
SDev	.0008	.0013	.0016	.0037	.0237	.0006	.0001
XRSD	77.43	153.6	1409.	47.22	85.43	42.54	3.508
#1	.0015	-.0001	.0010	H.0106	.0445	.0017	.0024
#2	.0004	.0017	-.0012	.0053	.0110	.0009	.0023
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	Y_3710	Zn2062	Zr3496				
Units	ppm	ppm	ppm				
Avg	.0010	-.0002	.0008				
SDev	.0007	.0006	.0001				
XRSD	67.03	350.1	15.63				
#1	.0015	.0002	.0009				
#2	.0005	-.0006	.0007				
Errors	LC Pass	LC Pass	LC Pass				
High	.0050	.0050	.0050				
Low	-.0050	-.0050	-.0050				

Analysis Report

Blank Sample

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IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	731898	10000	---	---	---	---	---
SDev	3729.988	.00000000	---	---	---	---	---
*RSD	.5096319	.00000000	---	---	---	---	---
#1	734536	10000	---	---	---	---	---
#2	729261	10000	---	---	---	---	---

Analysis Report

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Method: DAILY1 Sample Name: pbw-L06W2 pg54-284 Operator:
 Run Time: 11/06/03 17:53:09
 Comment:
 Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Ri2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00017	.0206	.0034	L-.5237	-.0001	-.0002	.0010
SDev	.00048	.0002	.0006	.0040	.0000	.0001	.0008
XRSD	281.41	.7811	16.02	.7546	1.783	30.84	79.48
#1	-.00017	.0205	.0030	L-.5209	-.0001	-.0002	.0004
#2	.00051	.0207	.0038	L-.5264	-.0001	-.0001	.0015
Errors	LC Pass	LC Pass	LC Pass	LC Low	LC Pass	LC Pass	LC Pass
High	.00500	.0500	.0050	.0500	.0050	.0050	.0050
Low	-.00500	-.0500	-.0050	-.0500	-.0050	-.0050	-.0050
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0200	.0001	.0038	-.0004	.0001	.0080	.0032
SDev	.0017	.0003	.0000	.0000	.0001	.0097	.0133
XRSD	8.353	188.0	.1659	4.478	244.3	121.6	418.6
#1	.0189	-.0000	.0038	-.0004	.0001	.0011	-.0062
#2	.0212	.0003	.0038	-.0004	-.0000	.0149	.0126
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	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0003	.0003	.0048	.0000	.0028	.0199	L-.1591
SDev	.0007	.0001	.0038	.0001	.0001	.0015	.0803
XRSD	225.6	15.25	78.82	196.7	4.708	7.314	50.50
#1	-.0002	.0003	.0021	-.0000	.0029	.0189	L-.2159
#2	.0008	.0004	.0075	.0001	.0027	.0209	L-.1023
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Low
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
Avg	.0002	.0013	-.0004	-.0002	.0010	.0073	-.0017
SDev	.0002	.0094	.0009	.0008	.0011	.0096	.0031
XRSD	74.35	747.2	229.4	346.7	107.3	131.0	180.7
#1	.0001	.0079	-.0010	.0003	.0002	.0005	.0005
#2	.0003	-.0054	.0002	-.0007	.0017	H.0141	-.0039
Errors	LC Pass	LC Pass	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass
High	.0050	.0100			.0050	.0100	.0100
Low	-.0050	-.0100			-.0050	-.0100	-.0100
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899

Analysis Report

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Units	xR	ppm	ppm	ppm	ppm	ppm	ppm
Avg	97.52	-.0022	.0015	L-10.65	-.0003	.0003	-.0012
SDev	.17	.0044	.0046	.04	.0002	.0016	.0020
XRSD	.1776	197.7	309.1	.3923	75.07	617.6	168.9
#1	97.40	-.0054	.0048	L-10.62	-.0001	.0014	.0002
#2	97.64	.0009	-.0018	L-10.68	-.0004	-.0009	-.0026
Errors	NOCHECK	NOCHECK	NOCHECK	LC Low	LC Pass	LC Pass	LC Pass
High				.0100	.0030	.0050	.0050
Low				-.0100	-.0030	-.0050	-.0050
Elem	Sr4215	Th2037	Ti3372	Ti1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0001	.0006	-.0013	.0062	.0276	-.0001	.0010
SDev	.0000	.0006	.0002	.0003	.0202	.0006	.0053
XRSD	18.61	100.4	11.35	5.694	73.38	673.5	535.8
#1	.0001	.0011	-.0014	.0060	.0133	-.0005	.0047
#2	.0001	.0002	-.0012	.0065	.0419	.0003	-.0027
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	Y_3710	Zn2062	Zr3496				
Units	ppm	ppm	ppm				
Avg	.0001	.0006	-.0007				
SDev	.0001	.0005	.0002				
XRSD	129.2	81.02	35.47				
#1	.0000	.0003	-.0009				
#2	.0001	.0010	-.0005				
Errors	LC Pass	LC Pass	LC Pass				
High	.0050	.0050	.0050				
Low	-.0050	-.0050	-.0050				

Analysis Report

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IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	707016	10000	---	---	---	---	---
SDev	1252.286	.00000000	---	---	---	---	---
*RSD	.1771229	.00000000	---	---	---	---	---
#1	706130	10000	---	---	---	---	---
#2	707901	10000	---	---	---	---	---

Analysis Report

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Method: DAILY1 Sample Name: lcsu-L06W3
 Run Time: 11/06/03 17:58:00
 Comment:
 Mode: CONC Corr. Factor: 1

Operator:

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Ri2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.05152	1.999	2.069	-.5483	2.145	.0557	.0010
SDev	.00010	.006	.009	.0037	.001	.0000	.0040
XRSD	.18671	.2947	.4149	.6658	.0451	.0433	397.5
#1	.05159	1.995	2.075	-.5457	2.145	.0558	-.0018
#2	.05145	2.003	2.063	-.5509	2.146	.0557	.0039
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	19.83	.0512	.5119	.1990	.2626	1.008	17.47
SDev	.12	.0004	.0016	.0001	.0006	.002	.15
XRSD	.6165	.8298	.3209	.0465	.2210	.1922	.8397
#1	19.74	.0509	.5108	.1989	.2622	1.006	17.36
#2	19.91	.0515	.5131	.1991	.2630	1.009	17.57
Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0007	.0003	20.20	.5189	.0024	29.36	17.32
SDev	.0002	.0001	.11	.0029	.0003	.23	.02
XRSD	28.62	13.13	.5564	.5616	14.67	.7966	.1110
#1	.0008	.0004	20.13	.5168	.0021	29.19	17.34
#2	.0005	.0003	20.28	.5209	.0026	29.52	17.31
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.4935	.0062	.5060	.5126	-.0005	-.0003	.5185
SDev	.0017	.0069	.0015	.0013	.0007	.0003	.0034
XRSD	.3466	110.1	.2971	.2621	139.3	84.86	.6598
#1	.4923	.0014	.5070	.5116	-.0000	-.0005	.5161
#2	.4947	.0111	.5049	.5135	-.0010	-.0001	.5209
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avg	94.27	2.152	2.173	-10.75	.5099	2.164	-.0014
SDev	.18	.001	.008	.07	.0004	.006	.0006
XRSD	.1883	.0617	.3744	.6477	.0766	.2708	41.69
#1	94.14	2.151	2.167	-10.70	.5096	2.160	-.0010
#2	94.39	2.153	2.179	-10.80	.5101	2.168	-.0018
Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0003	-.0042	-.0014	2.174	.0111	.5172	.0013
SDev	.0000	.0002	.0000	.011	.0059	.0029	.0017
XRSD	6.654	4.505	1.843	.5035	53.22	.5518	133.5
#1	.0003	-.0040	-.0014	2.182	.0153	.5151	.0025
#2	.0002	-.0043	-.0014	2.167	.0069	.5192	.0001

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Analysis Report

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Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	.0000	.5103	-.0003
SDev	.0000	.0009	.0002
XRSD	.1274	.1818	52.88

#1	.0000	.5096	-.0002
#2	.0000	.5109	-.0005

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	683494	10000	---	---	---	---	---
SDev	1298.248	.0000000	---	---	---	---	---
XRSD	.1899429	.0000000	---	---	---	---	---
#1	682576	10000	---	---	---	---	---
#2	684412	10000	---	---	---	---	---

010142

Analysis Report

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Method: DAILY1 Sample Name: 237523
 Run Time: 11/06/03 18:02:52
 Comment:
 Mode: CONC Corr. Factor: 1

Operator:

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00005	.0514	.0077	-.3120	.0064	-.0000	.0029
SDev	.00001	.0075	.0036	.0109	.0017	.0000	.0007
XRSD	24.482	14.53	46.01	3.491	25.93	91.17	24.31
#1	.00004	.0567	.0102	-.3043	.0076	-.0000	.0024
#2	.00006	.0462	.0052	-.3197	.0052	-.0001	.0034
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	2.992	.0002	.0040	-.0004	.0005	.0027	.0105
SDev	.071	.0002	.0005	.0003	.0000	.0066	.0251
XRSD	2.380	93.83	13.04	70.07	6.074	243.6	238.7
#1	3.042	.0003	.0044	-.0002	.0005	.0074	.0283
#2	2.941	.0001	.0037	-.0006	.0005	-.0020	-.0072
Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.0000	.0005	.0353	.0007	.0017	.3590	.0537
SDev	.0005	.0001	.0159	.0004	.0000	.0163	.1269
XRSD	3299.	14.64	44.98	67.58	.4040	4.554	236.5
#1	.0004	.0005	.0466	.0010	.0017	.3705	.1434
#2	-.0004	.0004	.0241	.0004	.0018	.3474	-.0361
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2060
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0007	-.0035	.0012	.0003	.0004	.0025	.0009
SDev	.0009	.0075	.0022	.0012	.0002	.0078	.0003
XRSD	120.5	213.4	178.5	404.4	55.73	308.7	40.89
#1	.0014	.0018	.0028	-.0006	.0005	-.0030	.0011
#2	.0001	-.0089	-.0003	.0012	.0002	.0080	.0006
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avg	96.86	-.0005	.0048	-10.56	.0006	.0031	-.0003
SDev	.36	.0009	.0003	.06	.0001	.0001	.0029
XRSD	.3671	163.1	6.097	.5410	13.07	3.257	875.9
#1	97.11	-.0012	.0051	-10.52	.0006	.0030	.0017
#2	96.61	.0001	.0046	-10.60	.0007	.0031	-.0024
Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0037	.0015	-.0016	-.0055	.0084	.0003	.0003
SDev	.0000	.0014	.0001	.0008	.0101	.0006	.0009
XRSD	.2467	94.00	7.059	14.01	120.4	190.4	282.1
#1	.0037	.0005	-.0017	-.0049	.0155	.0007	-.0003
#2	.0037	.0025	-.0015	-.0060	.0012	-.0001	.0010

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	-.0001	.0057	-.0012
SDev	.0001	.0001	.0003
%RSD	196.8	1.764	22.91

#1	.0000	.0058	-.0010
#2	-.0001	.0056	-.0013

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	702246	10000	---	---	---	---	---
SDev	2580.233	.00000000	---	---	---	---	---
%RSD	.3674255	.00000000	---	---	---	---	---
#1	704071	10000	---	---	---	---	---
#2	700422	10000	---	---	---	---	---

Analysis Report

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Method: DAILY1 Sample Name: 237523d
 Run Time: 11/06/03 18:07:27
 Comment:
 Mode: CONC Corr. Factor: 1

Operator:

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.00033	.0402	.0020	-.3340	.0041	-.0000	-.0005
SDev	.00099	.0097	.0003	.0003	.0000	.0002	.0006
XRSD	301.36	24.19	12.76	.0966	.7655	34110.	118.1
#1	-.00103	.0333	.0018	-.3338	.0041	.0001	-.0001
#2	.00037	.0471	.0021	-.3342	.0041	-.0001	-.0009
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	2.926	-.0001	.0032	-.0007	.0003	.0069	-.0279
SDev	.019	.0003	.0004	.0002	.0001	.0102	.0571
XRSD	.6354	359.1	12.42	21.06	19.06	148.0	205.1
#1	2.913	-.0003	.0029	-.0006	.0002	-.0003	-.0682
#2	2.940	.0001	.0035	-.0008	.0003	.0141	.0125
Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0001	.0004	.0108	.0001	.0008	.3351	-.0928
SDev	.0008	.0001	.0039	.0000	.0001	.0119	.5041
XRSD	1283.	37.46	35.79	31.83	17.40	3.539	543.1
#1	-.0005	.0003	.0081	.0001	.0009	.3268	-.4493
#2	.0007	.0005	.0135	.0001	.0007	.3435	.2636
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2060
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.0003	-.0004	-.0007	.0015	-.0005	.0068	-.0013
SDev	.0006	.0070	.0031	.0033	.0012	.0166	.0024
XRSD	184.8	1563.	425.9	218.1	248.0	243.8	180.7
#1	-.0008	-.0054	-.0029	.0039	-.0014	-.0049	-.0030
#2	.0001	.0045	.0015	-.0008	.0004	.0185	.0004
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avg	95.74	-.0037	.0052	-10.66	.0008	.0023	-.0028
SDev	.40	.0002	.0014	.00	.0012	.0008	.0017
XRSD	.4160	6.332	26.02	.0413	153.7	36.74	62.55
#1	96.02	-.0036	.0043	-10.66	.0016	.0017	-.0040
#2	95.46	-.0039	.0062	-10.66	-.0001	.0028	-.0016
Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0037	.0017	-.0015	.0036	-.0130	.0001	-.0010
SDev	.0001	.0004	.0005	.0053	.0132	.0000	.0017
XRSD	1.652	23.80	31.85	147.1	101.0	.9983	163.0
#1	.0037	.0019	-.0018	-.0001	-.0223	.0001	-.0023
#2	.0038	.0014	-.0011	.0073	-.0037	.0001	.0002

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Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	.0000	.0046	-.0009
SDev	.0001	.0002	.0003
%RSD	303.5	5.012	30.25

#1	-.0000	.0048	-.0011
#2	.0001	.0045	-.0007

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	694148	10000	---	---	---	---	---
SDev	2843.276	.00000000	---	---	---	---	---
%RSD	.4096069	.00000000	---	---	---	---	---
#1	696158	10000	---	---	---	---	---
#2	692137	10000	---	---	---	---	---

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Method: DAILY1 Sample Name: 237524
 Run Time: 11/06/03 18:12:03
 Comment:
 Mode: CONC Corr. Factor: 1

Operator:

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00046	.0417	.0001	-.3525	.0039	-.0000	.0024
SDev	.00027	.0033	.0009	.0076	.0000	.0002	.0043
XRSD	57.998	7.981	898.3	2.160	.0502	605.5	182.0
#1	.00027	.0441	-.0005	-.3471	.0039	.0001	.0055
#2	.00065	.0394	.0007	-.3579	.0039	-.0002	-.0007
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	5.834	.0001	.0039	-.0003	.0007	.0038	.0077
SDev	.000	.0001	.0005	.0001	.0000	.0063	.0108
XRSD	.0005	59.37	13.20	37.51	5.300	167.6	140.2
#1	5.834	.0001	.0035	-.0004	.0008	.0083	.0001
#2	5.834	.0002	.0042	-.0003	.0007	-.0007	.0154
Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0006	.0005	.0159	.0000	.0010	.3320	.2249
SDev	.0001	.0000	.0033	.0000	.0005	.0025	.1686
XRSD	19.81	2.315	20.58	288.3	48.83	.7608	74.97
#1	.0005	.0005	.0136	.0000	.0013	.3302	.1057
#2	.0007	.0005	.0182	-.0000	.0006	.3338	.3441
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2060
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.0001	-.0001	.0010	-.0003	.0017	.0109	-.0002
SDev	.0006	.0045	.0012	.0002	.0008	.0043	.0005
XRSD	491.3	3143.	129.0	72.33	49.18	39.63	224.5
#1	-.0005	-.0033	.0018	-.0002	.0011	.0079	.0001
#2	.0003	.0030	.0001	-.0005	.0023	.0140	-.0006
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avg	95.34	-.0046	.0027	-10.76	.0001	.0003	-.0005
SDev	.93	.0021	.0035	.06	.0006	.0016	.0017
XRSD	.9786	45.66	131.4	.5659	542.4	645.4	373.3
#1	94.68	-.0061	.0052	-10.72	.0005	.0014	-.0016
#2	96.00	-.0031	.0002	-10.80	-.0003	-.0009	.0007
Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0070	.0023	-.0013	.0045	-.0008	-.0002	-.0012
SDev	.0000	.0003	.0003	.0038	.0084	.0001	.0029
XRSD	.0433	12.83	19.87	83.69	1117.	63.32	250.5
#1	.0070	.0026	-.0014	.0072	-.0067	-.0001	-.0032
#2	.0070	.0021	-.0011	.0019	.0052	-.0003	.0009

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Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	-.0000	.0041	-.0009
SDev	.0001	.0002	.0002
*RSD	2692.	5.028	22.10

#1	-.0000	.0039	-.0010
#2	.0000	.0042	-.0008

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	691269	10000	---	---	---	---	---
SDev	6758.527	.00000000	---	---	---	---	---
*RSD	.9776985	.00000000	---	---	---	---	---
#1	686490	10000	---	---	---	---	---
#2	696048	10000	---	---	---	---	---

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Method: DAILY1 Sample Name: 237524s
 Run Time: 11/06/03 18:16:40
 Comment:
 Mode: CONC Corr. Factor: 1

Operator:

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.05095	2.021	2.077	-.3649	2.156	.0562	.0023
SDev	.00031	.007	.003	.0019	.029	.0003	.0037
XRSD	.60968	.3539	.1448	.5156	1.323	.5370	159.8
#1	.05117	2.016	2.075	-.3662	2.135	.0560	-.0003
#2	.05073	2.026	2.079	-.3636	2.176	.0564	.0049
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	25.82	.0522	.5179	.2015	.2634	1.024	17.56
SDev	.06	.0001	.0004	.0004	.0027	.003	.15
XRSD	.2187	.1522	.0794	.1869	1.009	.2604	.8677
#1	25.86	.0522	.5181	.2012	.2616	1.022	17.46
#2	25.78	.0523	.5176	.2017	.2653	1.026	17.67
Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0010	.0005	20.32	.5250	.0023	29.86	17.57
SDev	.0000	.0000	.08	.0005	.0004	.17	.11
XRSD	.1233	6.580	.4099	.0905	17.75	.5672	.6266
#1	.0010	.0006	20.26	.5247	.0021	29.74	17.65
#2	.0010	.0005	20.38	.5253	.0026	29.98	17.49
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.4983	.0008	.5149	.5220	-.0014	.0032	.5206
SDev	.0031	.0006	.0054	.0032	.0005	.0003	.0026
XRSD	.6189	74.06	1.042	.6151	36.99	8.355	.4950
#1	.4961	.0011	.5186	.5198	-.0010	.0034	.5188
#2	.5005	.0004	.5111	.5243	-.0017	.0030	.5225
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avg	94.73	2.142	2.175	-10.81	.5191	2.162	-.0018
SDev	.13	.024	.022	.03	.0004	.022	.0010
XRSD	.1390	1.106	.9950	.3201	.0686	1.032	55.60
#1	94.82	2.126	2.159	-10.79	.5189	2.146	-.0011
#2	94.63	2.159	2.190	-10.84	.5194	2.178	-.0025
Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0072	-.0030	-.0011	2.200	.0141	.5211	.0007
SDev	.0001	.0017	.0000	.021	.0048	.0008	.0010
XRSD	1.098	57.39	1.617	.9641	33.90	.1629	140.0
#1	.0071	-.0042	-.0011	2.185	.0107	.5205	.0014
#2	.0072	-.0018	-.0012	2.215	.0174	.5217	.0000

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Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avg	-.0000	.5241	-.0004
SDev	.0000	.0026	.0003
%RSD	209.8	.4960	64.83

#1	.0000	.5222	-.0002
#2	-.0000	.5259	-.0006

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avg	686804	10000	---	---	---	---	---
SDev	928.4312	.00000000	---	---	---	---	---
%RSD	.1351815	.00000000	---	---	---	---	---
#1	687460	10000	---	---	---	---	---
#2	686147	10000	---	---	---	---	---

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Method: DAILY1 Sample Name: 237525
 Run Time: 11/06/03 18:21:16
 Comment:
 Mode: CONC Corr. Factor: 1

Operator:

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00047	.0420	.0026	-.4324	.0057	.0000	.0028
SDev	.00008	.0092	.0033	.0035	.0024	.0000	.0005
XRSD	16.163	21.94	126.2	.8188	42.41	131.6	19.27
#1	.00053	.0485	.0049	-.4299	.0075	.0000	.0031
#2	.00042	.0355	.0003	-.4349	.0040	.0001	.0024
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	24.03	.0003	.0032	-.0004	.0006	-.0016	.0493
SDev	.20	.0003	.0006	.0001	.0003	.0027	.0155
XRSD	.8128	104.7	17.37	25.12	45.08	164.3	31.50
#1	24.16	.0004	.0036	-.0004	.0007	.0003	.0603
#2	23.89	.0001	.0028	-.0005	.0004	-.0036	.0383
Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0008	.0005	.0578	.0009	.0010	.3253	.1215
SDev	.0003	.0000	.0215	.0007	.0006	.0263	.0157
XRSD	40.26	4.353	37.15	76.73	62.21	8.100	12.88
#1	.0006	.0005	.0730	.0014	.0006	.3440	.1105
#2	.0010	.0005	.0426	.0004	.0014	.3067	.1326
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0006	-.0048	-.0008	.0020	.0003	.0108	.0009
SDev	.0005	.0186	.0029	.0007	.0004	.0103	.0008
XRSD	78.79	386.1	389.6	36.72	125.9	96.27	90.27
#1	.0010	-.0180	.0013	.0015	.0006	.0181	.0015
#2	.0003	.0084	-.0028	.0025	.0000	.0034	.0003
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avg	96.87	.0029	.0071	-11.02	.0011	.0057	-.0019
SDev	.61	.0055	.0023	.0005	.0005	.0033	.0016
XRSD	.6316	190.3	31.89	.4338	46.88	58.44	82.88
#1	96.43	.0068	.0087	-10.99	.0014	.0081	-.0030
#2	97.30	-.0010	.0055	-11.05	.0007	.0033	-.0008
Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0268	.0011	-.0013	.0030	.0219	.0003	.0020
SDev	.0000	.0002	.0001	.0043	.0049	.0006	.0024
XRSD	.0345	17.27	6.221	144.7	22.27	187.3	120.3
#1	.0268	.0010	-.0013	-.0001	.0185	.0007	.0003
#2	.0268	.0012	-.0014	.0060	.0254	-.0001	.0037

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	-.0001	.0036	-.0012
SDev	.0000	.0011	.0001
*RSD	38.36	31.04	5.815

#1	-.0000	.0044	-.0012
#2	-.0001	.0028	-.0013

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	702350	10000	---	---	---	---	---
SDev	4405.275	.00000000	---	---	---	---	---
*RSD	.6272194	.00000000	---	---	---	---	---
#1	699235	10000	---	---	---	---	---
#2	705465	10000	---	---	---	---	---

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Method: DAILY1 Sample Name: 237526
 Run Time: 11/06/03 18:25:54
 Comment:
 Mode: CONC Corr. Factor: 1

Operator:

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.00048	.0380	-.0004	-.4217	.0035	-.0001	-.0013
SDev	.00009	.0015	.0004	.0049	.0003	.0002	.0009
XRSD	19.726	3.950	84.35	1.166	7.950	153.8	69.48
#1	-.00041	.0391	-.0007	-.4182	.0037	-.0002	-.0006
#2	-.00055	.0370	-.0002	-.4252	.0033	.0000	-.0019
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	2.103	.0001	.0034	.0005	.0010	.0199	.0287
SDev	.064	.0001	.0005	.0018	.0012	.0328	.0192
XRSD	3.025	138.4	13.63	388.6	116.6	165.2	66.68
#1	2.148	.0002	.0037	.0017	.0018	.0431	.0423
#2	2.058	.0000	.0030	-.0008	.0002	-.0033	.0152
Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0001	.0008	.0114	.0002	.0013	.3680	.1955
SDev	.0003	.0000	.0037	.0002	.0007	.0045	.1124
XRSD	357.0	1.789	32.26	100.0	49.74	1.216	57.50
#1	.0003	.0008	.0139	.0003	.0018	.3649	.2750
#2	-.0001	.0008	.0088	.0001	.0009	.3712	.1160
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0012	.0019	-.0047	.0048	-.0021	.0099	-.0012
SDev	.0006	.0087	.0033	.0019	.0013	.0001	.0020
XRSD	51.63	450.8	70.54	38.81	62.19	1.087	158.1
#1	.0017	-.0042	-.0071	.0061	-.0012	.0099	.0001
#2	.0008	.0081	-.0024	.0035	-.0031	.0098	-.0026
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avg	98.67	-.0064	.0090	-11.01	.0016	.0039	.0005
SDev	1.09	.0004	.0031	.05	.0001	.0020	.0021
XRSD	1.101	6.449	34.95	.4499	8.486	50.64	401.9
#1	99.43	-.0067	.0112	-10.97	.0017	.0052	-.0009
#2	97.90	-.0061	.0068	-11.04	.0015	.0025	.0020
Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0028	.0005	-.0014	-.0037	.0047	.0006	.0008
SDev	.0000	.0028	.0002	.0015	.0101	.0012	.0030
XRSD	.0236	572.1	16.00	41.76	216.4	213.3	365.6
#1	.0028	.0024	-.0012	-.0026	.0118	.0014	.0029
#2	.0028	-.0015	-.0015	-.0048	-.0025	-.0003	-.0013

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Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	.0002	.0410	-.0003
SDev	.0004	.0005	.0016
%RSD	203.6	1.262	505.7

#1	.0004	.0414	.0008
#2	-.0001	.0407	-.0015

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	715338	10000	---	---	---	---	---
SDev	7791.610	.00000000	---	---	---	---	---
%RSD	1.089222	.00000000	---	---	---	---	---
#1	720847	10000	---	---	---	---	---
#2	709828	10000	---	---	---	---	---

Analysis Report

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Method: DAILY1 Sample Name: 237527
 Run Time: 11/06/03 18:30:31
 Comment:
 Mode: CONC Corr. Factor: 1

Operator:

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.00004	.0435	.0025	-.4482	.0040	-.0002	-.0000
SDev	.00042	.0022	.0026	.0008	.0000	.0001	.0006
XRSD	1094.4	5.080	103.5	.1694	.2149	34.05	4790.
#1	.00026	.0451	.0044	-.4476	.0040	-.0002	.0004
#2	-.00033	.0420	.0007	-.4487	.0040	-.0003	-.0004
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	4.917	.0002	.0034	-.0005	.0012	.0051	.0357
SDev	.011	.0001	.0006	.0001	.0001	.0046	.0086
XRSD	.2324	57.10	16.36	26.45	5.987	91.53	24.13
#1	4.909	.0001	.0037	-.0006	.0011	.0018	.0418
#2	4.925	.0002	.0030	-.0004	.0012	.0083	.0296
Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0005	.0011	.0159	.0001	.0004	.4149	.0624
SDev	.0000	.0000	.0033	.0001	.0007	.0014	.0475
XRSD	8.817	1.169	21.04	80.64	177.6	.3414	76.11
#1	.0005	.0011	.0183	.0000	.0009	.4159	.0960
#2	.0005	.0011	.0135	.0001	-.0001	.4139	.0288
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2060
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0003	.0026	-.0003	.0013	-.0013	.0110	.0007
SDev	.0001	.0088	.0003	.0008	.0001	.0070	.0031
XRSD	47.25	344.6	100.6	63.42	9.975	63.55	422.5
#1	.0002	-.0037	-.0001	.0007	-.0012	.0160	.0030
#2	.0004	.0088	-.0005	.0019	-.0014	.0061	-.0015
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avg	96.09	-.0035	.0045	-11.18	.0008	.0018	-.0011
SDev	.20	.0022	.0037	.0002	.0004	.0032	.0010
XRSD	.2120	64.37	83.48	.1709	58.56	176.1	95.27
#1	95.95	-.0019	.0071	-11.16	.0005	.0041	-.0018
#2	96.23	-.0051	.0018	-11.19	.0011	-.0005	-.0004
Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0061	.0002	-.0011	-.0101	-.0103	-.0003	.0023
SDev	.0000	.0006	.0000	.0071	.0026	.0003	.0005
XRSD	.2181	369.4	2.608	70.17	25.40	87.17	22.18
#1	.0061	-.0003	-.0011	-.0151	-.0084	-.0005	.0027
#2	.0060	.0006	-.0010	-.0051	-.0121	-.0001	.0019

Analysis Report

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Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	-.0000	.0085	-.0013
SDev	.0000	.0003	.0000
%RSD	32.78	4.151	3.141

#1	-.0000	.0083	-.0013
#2	-.0000	.0088	-.0013

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	696715	10000	---	---	---	---	---
SDev	1466.539	.00000000	---	---	---	---	---
%RSD	.2104935	.00000000	---	---	---	---	---
#1	695678	10000	---	---	---	---	---
#2	697752	10000	---	---	---	---	---

Analysis Report

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Method: DAILY1 Sample Name: 237528
 Run Time: 11/06/03 18:35:08
 Comment:
 Mode: CONC Corr. Factor: 1

Operator:

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00005	.0368	.0018	-.5093	.0035	.0000	.0005
SDev	.00020	.0084	.0011	.0009	.0000	.0001	.0018
XRSD	366.92	22.88	59.40	.1823	.9109	418.2	362.0
#1	-.00020	.0428	.0011	-.5086	.0035	-.0000	.0018
#2	.00009	.0309	.0026	-.5100	.0035	.0001	-.0008
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	12.87	.0000	.0036	-.0002	.0012	.0039	.0379
SDev	.03	.0001	.0001	.0003	.0006	.0060	.0071
XRSD	.2194	10460.	1.941	119.3	47.99	152.8	18.66
#1	12.85	.0001	.0037	-.0000	.0017	.0082	.0429
#2	12.89	-.0001	.0036	-.0004	.0008	-.0003	.0329
Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0004	.0007	.0192	.0001	.0014	.2993	.1478
SDev	.0003	.0000	.0003	.0001	.0002	.0024	.0018
XRSD	67.02	2.744	1.574	40.85	14.19	.7884	1.207
#1	.0005	.0007	.0190	.0002	.0015	.3010	.1491
#2	.0002	.0007	.0194	.0001	.0013	.2976	.1465
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0001	.0056	.0014	.0000	-.0001	.0104	-.0007
SDev	.0004	.0027	.0006	.0016	.0003	.0045	.0005
XRSD	576.8	48.90	45.01	3408.	453.4	43.66	76.22
#1	.0004	.0075	.0010	.0012	.0002	.0072	-.0011
#2	-.0002	.0036	.0019	-.0011	-.0003	.0136	-.0003
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avg	97.03	-.0043	.0018	-11.22	.0005	-.0002	.0005
SDev	1.00	.0017	.0011	.01	.0008	.0013	.0004
XRSD	1.032	39.49	63.16	.0943	169.3	543.3	70.37
#1	96.32	-.0055	.0010	-11.22	.0011	-.0012	.0008
#2	97.74	-.0031	.0026	-11.23	-.0001	.0007	.0003
Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0143	-.0008	-.0009	-.0098	.0251	-.0001	-.0017
SDev	.0000	.0003	.0002	.0074	.0142	.0003	.0002
XRSD	.2389	37.10	25.16	75.62	56.41	292.3	8.830
#1	.0142	-.0006	-.0011	-.0046	.0351	.0001	-.0016
#2	.0143	-.0010	-.0008	-.0151	.0151	-.0003	-.0018

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	.0000	.0656	-.0007
SDev	.0001	.0002	.0007
XRSD	175.2	.2743	98.49

#1	.0001	.0655	-.0002
#2	-.0000	.0658	-.0012

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	703470	10000	---	---	---	---	---
SDev	7241.480	.00000000	---	---	---	---	---
XRSD	1.029394	.00000000	---	---	---	---	---
#1	698350	10000	---	---	---	---	---
#2	708591	10000	---	---	---	---	---

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Method: DAILY1 Sample Name: icv/ccv Operator:

Run Time: 11/06/03 18:43:18

Comment:

Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.99733	10.01	5.019	Q4.108	10.22	1.078	5.040
SDev	.00401	.00	.009	.038	.05	.002	.020
%RSD	.40240	.0207	.1707	.9227	.4636	.1419	.3900
#1	1.0002	10.02	5.025	Q4.081	10.18	1.079	5.026
#2	.99449	10.01	5.012	Q4.135	10.25	1.076	5.054
Errors	QC Pass	QC Pass	QC Pass	QC Fail	QC Pass	QC Pass	QC Pass
Value	1.0000	10.00	5.000	5.000	10.00	1.000	5.000
Range	10.000	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
Avg	19.77	1.008	5.007	1.957	2.062	10.04	19.38
SDev	.00	.002	.002	.001	.007	.03	.11
%RSD	.0013	.1902	.0466	.0325	.3263	.3345	.5764
#1	19.77	1.007	5.009	1.958	2.057	10.06	19.30
#2	19.77	1.009	5.006	1.957	2.067	10.01	19.46
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	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	5.048	4.985	19.92	1.032	5.013	Q46.21	27.42
SDev	.020	.015	.00	.002	.043	.18	.01
%RSD	.4021	.2946	.0187	.1472	.8484	.3814	.0257
#1	5.034	4.975	19.92	1.031	4.983	Q46.09	27.43
#2	5.062	4.996	19.92	1.033	5.043	Q46.34	27.42
Errors	QC Pass	QC Pass	QC Pass	QC Pass	QC Pass	QC Fail	QC Pass
Value	5.000	5.000	20.00	1.000	5.000	30.00	30.00
Range	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	4.798	5.114	4.978	5.082	1.014	1.006	1.015
SDev	.016	.045	.020	.002	.003	.008	.002
%RSD	.3242	.8764	.4084	.0451	.2984	.8425	.2316
#1	4.787	5.082	4.964	5.084	1.011	.9995	1.013
#2	4.809	5.145	4.993	5.080	1.016	1.012	1.016
Errors	QC Pass	QC Pass	NOCHECK	NOCHECK	QC Pass	QC Pass	QC Pass
Value	5.000	5.000			1.000	1.000	1.000
Range	10.00	10.00			10.00	10.00	10.00
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899

Analysis Report

QC Standard

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Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avg	98.18	5.411	5.391	Q-4.419	5.042	5.392	4.893
SDev	.36	.045	.003	.006	.005	.017	.010
XRSD	.3646	.0294	.0514	.1327	.1040	.3114	.2000
#1	97.93	5.380	5.389	Q-4.415	5.039	5.380	4.899
#2	98.44	5.443	5.393	Q-4.423	5.046	5.404	4.886
Errors	NOCHECK	NOCHECK	NOCHECK	QC Fail	QC Pass	QC Pass	QC Pass
Value				5.000	5.000	5.000	5.000
Range				10.00	10.00	10.00	10.00
Elem	Sr4215	Th2037	Ti3372	Ti1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	5.296	.9594	4.924	5.384	1.008	5.076	1.005
SDev	.008	.0005	.001	.062	.006	.001	.001
XRSD	.1524	.0568	.0101	1.158	.5653	.0240	.1295
#1	5.290	.9590	4.924	5.340	1.004	5.077	1.006
#2	5.302	.9598	4.925	5.428	1.012	5.076	1.004
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	Y_3710	Zn2062	Zr3496				
Units	ppm	ppm	ppm				
Avg	5.075	1.020	4.884				
SDev	.010	.004	.000				
XRSD	.1899	.4140	.0072				
#1	5.069	1.023	4.884				
#2	5.082	1.017	4.885				
Errors	QC Pass	QC Pass	QC Pass				
Value	5.000	1.000	5.000				
Range	10.00	10.00	10.00				

Analysis Report

QC Standard

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IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	711860	10000	---	---	---	---	---
SDev	2626.902	.00000000	---	---	---	---	---
%RSD	.3690192	.00000000	---	---	---	---	---
#1	710003	10000	---	---	---	---	---
#2	713718	10000	---	---	---	---	---

Analysis Report

Blank Sample

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Method: DAILY1

Sample Name: icb/ccb

Operator:

Run Time: 11/06/03 18:49:47

Comment:

Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00047	.0090	.0027	L-.6919	.0022	.0002	.0010
SDev	.00037	.0008	.0000	.0058	.0016	.0001	.0002
%RSD	77.867	8.807	1.099	.8382	71.41	37.63	16.45
#1	.00073	.0095	.0028	L-.6878	.0034	.0003	.0009
#2	.00021	.0084	.0027	L-.6960	.0011	.0002	.0012
Errors	LC Pass	LC Pass	LC Pass	LC Low	LC Pass	LC Pass	LC Pass
High	.00500	.0500	.0050	.0500	.0050	.0050	.0050
Low	-.00500	-.0500	-.0050	-.0500	-.0050	-.0050	-.0050
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0054	.0004	.0009	-.0002	-.0000	-.0037	.0031
SDev	.0036	.0001	.0004	.0000	.0004	.0009	.0135
%RSD	66.56	12.85	49.21	14.79	2993.	24.24	441.8
#1	.0080	.0003	.0012	-.0002	.0003	-.0043	.0126
#2	.0029	.0004	.0006	-.0002	-.0003	-.0030	-.0065
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	.00500	.0050	.0050	.0050	.0050	.0250	.1000
Low	-.00500	-.0050	-.0050	-.0050	-.0050	-.0250	-.1000
Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0015	.0010	.0080	.0001	H.0070	.0101	L-.0097
SDev	.0003	.0006	.0032	.0001	.0018	.0077	.0478
%RSD	20.79	58.22	40.88	84.31	26.00	76.77	53.27
#1	.0018	.0014	.0103	.0002	H.0083	.0155	L-.0559
#2	.0013	.0006	.0057	.0001	H.0058	.0046	L-.1235
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC High	LC Pass	LC Low
High	.0050	.0050	.0050	.0050	.0050	.0050	.0050
Low	-.0050	-.0050	-.0050	-.0050	-.0050	-.0050	-.0050
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0007	-.0013	-.0019	.0010	-.0005	.0013	.0011
SDev	.0004	.0008	.0001	.0026	.0018	.0076	.0011
%RSD	61.96	599.0	3.028	260.8	325.5	595.9	95.28
#1	.0009	.0043	-.0019	.0029	-.0018	.0067	.0019
#2	.0004	-.0070	-.0020	-.0008	.0007	-.0041	.0004
Errors	LC Pass	LC Pass	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass
High	.0050	.0100			.0050	.0100	.0100
Low	-.0050	-.0100			-.0050	-.0100	-.0100
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899

Analysis Report

Blank Sample

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Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avg	97.80	-.0035	.0038	L-11.78	.0000	.0014	-.0025
SDev	.52	.0029	.0040	.02	.0018	.0017	.0032
XRSD	.5300	84.67	106.5	.1952	7771.	124.0	126.3
#1	98.16	-.0056	.0066	L-11.77	.0013	.0026	-.0003
#2	97.43	-.0014	.0009	L-11.80	-.0012	.0002	-.0048
Errors	NOCHECK	NOCHECK	NOCHECK	LC Low	LC Pass	LC Pass	LC Pass
High				.0100	.0030	.0050	.0050
Low				-.0100	-.0030	-.0050	-.0050
Elem	Sr4215	Th2037	Ti3372	Ti1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0012	.0011	-.0004	.0070	.0033	.0009	.0002
SDev	.0008	.0009	.0012	.0104	.0046	.0003	.0001
XRSD	68.15	81.29	326.2	149.6	140.4	31.37	29.60
#1	.0018	.0005	.0005	H.0144	.0065	.0011	.0002
#2	.0006	.0017	-.0012	-.0004	.0000	.0007	.0002
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	Y_3710	Zn2062	Zr3496				
Units	ppm	ppm	ppm				
Avg	.0011	.0000	.0002				
SDev	.0008	.0001	.0006				
XRSD	66.05	4836.	257.7				
#1	.0017	-.0001	.0006				
#2	.0006	.0001	-.0002				
Errors	LC Pass	LC Pass	LC Pass				
High	.0050	.0050	.0050				
Low	-.0050	-.0050	-.0050				

Analysis Report

Blank Sample

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IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	709026	10000	---	---	---	---	---
SDev	3730.695	.00000000	---	---	---	---	---
*RSD	.5261719	.00000000	---	---	---	---	---
#1	711664	10000	---	---	---	---	---
#2	706388	10000	---	---	---	---	---

Analysis Report

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Method: DAILY1 Sample Name: pbw-L06W4 pg54-286 Operator:
 Run Time: 11/06/03 18:54:42
 Comment:
 Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00014	.0163	.0012	L-.7024	-.0000	-.0001	.0000
SDev	.00029	.0021	.0021	.0028	.0001	.0001	.0021
XRSD	211.25	13.07	176.4	.3948	298.5	91.98	262.7
#1	-.00007	.0178	-.0003	L-.7004	.0001	-.0002	-.0007
#2	.00034	.0148	.0026	L-.7043	-.0001	-.0001	.0023
Errors	LC Pass	LC Pass	LC Pass	LC Low	LC Pass	LC Pass	LC Pass
High	.00500	.0500	.0050	.0500	.0050	.0050	.0050
Low	-.00500	-.0500	-.0050	-.0500	-.0050	-.0050	-.0050
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0357	.0002	.0029	-.0004	.0003	.0038	.0145
SDev	.0001	.0000	.0002	.0009	.0000	.0080	.0008
XRSD	.3584	7.774	5.672	226.3	12.62	211.0	5.608
#1	.0356	.0002	.0031	.0002	.0003	.0095	.0151
#2	.0358	.0002	.0028	-.0010	.0003	-.0019	.0139
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	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0002	.0003	.0080	.0001	.0031	.0265	.0476
SDev	.0001	.0000	.0033	.0001	.0003	.0002	.0661
XRSD	65.36	13.45	41.10	55.57	11.02	.9108	139.0
#1	.0003	.0003	.0057	.0001	.0033	.0264	-.0008
#2	.0001	.0003	.0103	.0001	.0028	.0267	L-.0943
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass
High	.0050	.0050	.0500	.0050	.0050	.0500	.0500
Low	-.0050	-.0050	-.0500	-.0050	-.0050	-.0500	-.0500
Elem	Ni2316	P_1702	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0006	-.0068	-.0016	.0004	-.0006	.0063	-.0011
SDev	.0000	.0146	.0001	.0021	.0001	.0063	.0005
XRSD	3.982	213.8	3.371	556.2	21.44	100.8	40.84
#1	.0006	L-.0172	-.0016	-.0011	-.0005	.0018	-.0015
#2	.0007	.0035	-.0017	.0018	-.0007	H.0107	-.0008
Errors	LC Pass	LC Pass	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass
High	.0050	.0100			.0050	.0100	.0100
Low	-.0050	-.0100			-.0050	-.0100	-.0100
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899

Analysis Report

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Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avg	96.72	-.0060	.0011	L-11.83	-.0003	-.0013	-.0014
SDev	.39	.0019	.0030	.03	.0014	.0014	.0004
%RSD	.4037	32.48	277.9	.2528	460.1	109.1	28.38
#1	96.44	-.0074	.0032	L-11.80	-.0013	-.0003	-.0011
#2	96.99	-.0046	-.0011	L-11.85	.0007	-.0022	-.0017
Errors	NOCHECK	NOCHECK	NOCHECK	LC Low	LC Pass	LC Pass	LC Pass
High				.0100	.0030	.0050	.0050
Low				-.0100	-.0030	-.0050	-.0050
Elem	Sr4215	Th2037	Ti3372	Ti1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0001	.0001	-.0012	.0037	.0150	.0001	.0012
SDev	.0000	.0014	.0002	.0004	.0016	.0006	.0063
%RSD	4.193	1138.	19.78	10.99	10.56	499.8	508.8
#1	.0001	.0011	-.0014	.0034	.0139	.0005	-.0032
#2	.0001	-.0008	-.0011	.0040	.0162	-.0003	.0057
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	Y_3710	Zn2062	Zr3496				
Units	ppm	ppm	ppm				
Avg	.0000	.0010	.0006				
SDev	.0001	.0000	.0016				
%RSD	259.1	.7775	262.2				
#1	.0001	.0010	-.0005				
#2	-.0000	.0010	.0018				
Errors	LC Pass	LC Pass	LC Pass				
High	.0050	.0050	.0050				
Low	-.0050	-.0050	-.0050				

Analysis Report

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IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	701274	10000	---	---	---	---	---
SDev	2012.164	.00000000	---	---	---	---	---
*RSD	.4010075	.00000000	---	---	---	---	---
#1	699286	10000	---	---	---	---	---
#2	703263	10000	---	---	---	---	---

Analysis Report

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Method: DAILY1 Sample Name: lcsu-L06W5

Operator:

Run Time: 11/06/03 18:59:34

Comment:

Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.05074	1.998	2.054	-.7115	2.143	.0560	-.0021
SDev	.00060	.001	.013	.0025	.015	.0001	.0004
XRSD	1.1885	.0598	.6245	.3452	.6772	.2102	18.94
#1	.05116	1.999	2.045	-.7098	2.133	.0561	-.0024
#2	.05031	1.997	2.063	-.7132	2.153	.0559	-.0018
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	19.90	.0514	.5128	.1989	.2631	1.000	17.54
SDev	.02	.0005	.0002	.0000	.0009	.015	.10
XRSD	.0942	.9215	.0466	.0164	.3603	1.535	.5725
#1	19.91	.0510	.5126	.1989	.2624	.9896	17.47
#2	19.89	.0517	.5130	.1989	.2637	1.011	17.62
Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0005	.0004	20.23	.5210	.0019	29.56	17.41
SDev	.0002	.0000	.02	.0013	.0003	.12	.04
XRSD	38.39	7.135	.0905	.2529	14.84	.4001	.2331
#1	.0007	.0004	20.25	.5201	.0017	29.47	17.44
#2	.0004	.0003	20.22	.5220	.0021	29.64	17.39
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.4938	.0010	.5056	.5136	-.0005	.0284	.5142
SDev	.0014	.0045	.0012	.0014	.0004	.0033	.0040
XRSD	.2944	432.0	.2414	.2719	83.18	11.67	.7786
#1	.4928	-.0021	.5065	.5146	-.0007	.0260	.5114
#2	.4948	.0042	.5047	.5126	-.0002	.0307	.5170
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avge	93.84	2.155	2.171	-11.85	.5104	2.164	-.0021
SDev	1.07	.015	.014	.03	.0013	.004	.0015
XRSD	1.136	.7185	.6241	.2760	.2618	.1789	69.48
#1	93.08	2.144	2.181	-11.83	.5114	2.166	-.0011
#2	94.59	2.165	2.162	-11.88	.5095	2.161	-.0032
Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0004	-.0038	-.0013	2.158	.0029	.5171	.0008
SDev	.0000	.0014	.0000	.022	.0043	.0002	.0026
XRSD	7.684	37.43	1.527	1.042	146.2	.0473	321.1
#1	.0004	-.0048	-.0012	2.142	.0060	.5169	-.0010
#2	.0004	-.0028	-.0013	2.174	-.0001	.5173	.0026

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	.0000	.5131	-.0006
SDev	.0000	.0004	.0001
%RSD	111.1	.0724	19.40

#1	.0000	.5129	-.0007
#2	.0000	.5134	-.0005

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	680370	10000	---	---	---	---	---
SDev	7753.426	.00000000	---	---	---	---	---
%RSD	1.139590	.00000000	---	---	---	---	---
#1	674887	10000	---	---	---	---	---
#2	685052	10000	---	---	---	---	---

Analysis Report

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Method: DAILY1 Sample Name: 236236

Operator:

Run Time: 11/06/03 19:04:25

Comment:

Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00021	.0058	.0074	-.5927	.0088	.0001	.0013
SDev	.00061	.0065	.0036	.0066	.0019	.0000	.0049
XRSD	288.74	112.7	49.20	1.119	22.03	40.54	372.5
#1	.00065	.0104	.0099	-.5880	.0102	.0001	.0048
#2	-.00022	.0012	.0048	-.5974	.0075	.0001	-.0022
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	17.90	.0002	.0038	-.0003	.0000	.2816	3.881
SDev	.07	.0000	.0008	.0002	.0002	.0012	.009
XRSD	.3711	8.819	21.81	54.56	1253.	.4103	.2300
#1	17.85	.0002	.0044	-.0002	.0001	.2808	3.875
#2	17.94	.0002	.0032	-.0004	-.0002	.2824	3.888
Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0006	.0412	1.491	.0916	.0048	60.77	38.78
SDev	.0001	.0001	.012	.0005	.0008	.34	.48
XRSD	26.59	.1103	.8268	.5102	17.16	.5534	1.225
#1	.0007	.0412	1.500	.0919	.0042	60.53	38.44
#2	.0005	.0413	1.483	.0913	.0053	61.01	39.11
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0021	-.0042	-.0015	-.0002	-.0014	7.018	-.0008
SDev	.0001	.0021	.0012	.0012	.0014	.067	.0033
XRSD	5.387	50.93	77.45	502.8	99.25	.9541	400.0
#1	.0022	-.0057	-.0007	-.0011	-.0004	7.065	.0015
#2	.0021	-.0027	-.0024	.0006	-.0024	6.971	-.0032
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avg	100.8	.0078	.0089	21.11	-.0007	.0085	.0091
SDev	.4	.0034	.0045	.04	.0004	.0041	.0004
XRSD	.4288	43.74	50.82	.1995	65.11	48.59	4.029
#1	100.5	.0102	.0121	21.14	-.0010	.0114	.0094
#2	101.1	.0054	.0057	21.08	-.0004	.0056	.0089
Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0654	-.0013	-.0017	-.0065	.0333	.0023	-.0015
SDev	.0001	.0001	.0001	.0033	.0143	.0007	.0038
XRSD	.2320	6.081	7.194	50.58	42.95	28.82	251.7
#1	.0655	-.0014	-.0018	-.0042	.0434	.0028	.0012
#2	.0653	-.0013	-.0016	-.0088	.0232	.0018	-.0042

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Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	-.0001	.0050	-.0013
SDev	.0001	.0010	.0001
XRSD	86.47	19.42	10.23

#1	-.0000	.0057	-.0012
#2	-.0001	.0043	-.0013

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	730799	10000	---	---	---	---	---
SDev	3149.454	.00000000	---	---	---	---	---
XRSD	.4309603	.00000000	---	---	---	---	---
#1	728572	10000	---	---	---	---	---
#2	733026	10000	---	---	---	---	---

Analysis Report

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Method: DAILY1 Sample Name: 236236d

Operator:

Run Time: 11/06/03 19:09:18

Comment:

Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Re3130	Ri2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.00003	.0031	.0052	-.5980	.0066	.0001	.0013
SDev	.00015	.0062	.0011	.0055	.0004	.0002	.0015
XRSD	491.04	202.8	21.53	.9124	5.603	229.1	118.0

#1	-.00014	-.0013	.0044	-.5942	.0069	.0002	.0002
#2	.00008	.0075	.0060	-.6019	.0063	-.0000	.0023

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	18.06	.0002	.0028	.0010	.0011	.3188	3.841
SDev	.50	.0001	.0000	.0028	.0018	.0517	.109
XRSD	2.778	26.70	.6026	265.3	161.2	16.20	2.828

#1	18.41	.0002	.0028	.0030	.0024	.3553	3.764
#2	17.70	.0002	.0028	-.0009	-.0002	.2823	3.918

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0006	.0410	1.478	.0917	.0062	60.66	39.04
SDev	.0005	.0005	.018	.0019	.0011	.96	.24
XRSD	92.47	1.324	1.242	2.051	18.38	1.584	.6200

#1	.0002	.0407	1.491	.0930	.0070	59.98	38.87
#2	.0009	.0414	1.465	.0903	.0054	61.34	39.21

Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0030	.0010	-.0034	.0000	.0002	7.105	-.0006
SDev	.0029	.0063	.0019	.0066	.0006	.012	.0024
XRSD	96.81	657.8	54.59	221900.	307.1	.1688	382.7

#1	.0050	-.0035	-.0048	.0046	-.0002	7.114	-.0023
#2	.0009	.0054	-.0021	-.0046	.0006	7.097	.0011

Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avge	101.1	.0029	.0008	21.17	-.0011	.0015	.0067
SDev	2.2	.0031	.0014	.39	.0037	.0020	.0030
XRSD	2.173	107.5	186.2	1.833	327.1	133.5	44.33

#1	102.7	.0050	.0017	21.45	.0015	.0029	.0088
#2	99.54	.0007	-.0002	20.90	-.0038	.0001	.0046

Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0654	-.0018	-.0016	-.0018	.0431	.0033	-.0024
SDev	.0006	.0001	.0001	.0030	.0306	.0026	.0017
XRSD	.9283	7.958	3.520	168.2	71.02	78.26	68.76

#1	.0649	-.0017	-.0016	.0003	.0647	.0052	-.0012
#2	.0658	-.0019	-.0015	-.0039	.0215	.0015	-.0036

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avg	.0004	.0031	.0009
SDev	.0006	.0001	.0026
XRSD	166.5	2.626	298.6

#1	.0008	.0031	.0027
#2	-.0001	.0032	-.0010

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avg	732931	10000	---	---	---	---	---
SDev	15922.63	.00000000	---	---	---	---	---
XRSD	2.172460	.00000000	---	---	---	---	---
#1	744190	10000	---	---	---	---	---
#2	721672	10000	---	---	---	---	---

Analysis Report

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Method: DAILY1 Sample Name: 236237
 Run Time: 11/06/03 19:14:10
 Comment:
 Mode: CONC Corr. Factor: 1

Operator:

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.00001	.0117	.0021	-.5952	.0065	.0002	.0012
SDev	.00004	.0045	.0002	.0010	.0002	.0001	.0013
XRSD	633.85	38.31	10.04	.1702	3.242	34.22	103.3
#1	.00002	.0085	.0023	-.5945	.0064	.0002	.0021
#2	-.00004	.0149	.0020	-.5960	.0067	.0003	.0003
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	18.47	.0003	.0037	.0004	.0006	.3147	3.836
SDev	.08	.0000	.0002	.0012	.0009	.0239	.041
XRSD	.4349	.0951	5.371	291.3	149.5	7.599	1.060
#1	18.42	.0003	.0036	-.0004	-.0000	.2978	3.808
#2	18.53	.0003	.0039	.0012	.0013	.3316	3.865
Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0009	.0413	1.506	.0975	.0060	60.88	38.59
SDev	.0004	.0001	.013	.0008	.0008	.24	.29
XRSD	46.39	.1164	.8447	.8095	13.35	.3964	.7614
#1	.0006	.0413	1.497	.0969	.0054	60.71	38.39
#2	.0012	.0413	1.515	.0980	.0065	61.05	38.80
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0022	.0144	-.0020	.0018	.0003	7.310	-.0015
SDev	.0005	.0021	.0026	.0008	.0005	.075	.0033
XRSD	21.48	14.35	131.3	43.52	172.3	1.032	214.3
#1	.0019	.0158	-.0038	.0024	-.0001	7.257	.0008
#2	.0026	.0129	-.0001	.0013	.0006	7.363	-.0038
Elem	Sc3613	1960/1	1960/2	Si2081	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avg	100.4	.0066	.0021	21.64	.0005	.0036	.0095
SDev	.5	.0046	.0010	.17	.0003	.0008	.0009
XRSD	.4492	70.31	48.40	.7692	63.62	23.55	9.972
#1	100.7	.0033	.0029	21.52	.0003	.0030	.0102
#2	100.0	.0098	.0014	21.76	.0008	.0042	.0088
Elem	Sr4215	Th2037	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0659	-.0006	-.0016	-.0028	.0605	.0025	-.0003
SDev	.0000	.0004	.0001	.0046	.0047	.0009	.0025
XRSD	.0116	65.37	4.958	165.9	7.720	37.51	713.9
#1	.0659	-.0003	-.0017	-.0061	.0638	.0019	-.0021
#2	.0659	-.0009	-.0016	.0005	.0572	.0032	.0014

Analysis Report

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Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	.0002	.0035	.0002
SDev	.0003	.0003	.0008
%RSD	190.1	7.248	361.3

#1	-.0001	.0033	-.0003
#2	.0004	.0037	.0007

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	727596	10000	---	---	---	---	---
SDev	3308.553	.00000000	---	---	---	---	---
%RSD	.4547235	.00000000	---	---	---	---	---
#1	729936	10000	---	---	---	---	---
#2	725257	10000	---	---	---	---	---

Analysis Report

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Method: DAILY1 Sample Name: 236238

Operator:

Run Time: 11/06/03 19:19:02

Comment:

Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.00016	.0005	.0039	-.5983	.0065	.0001	.0025
SDev	.00003	.0019	.0027	.0031	.0003	.0000	.0030
XRSD	15.300	358.6	69.78	.5171	4.049	1.207	123.2
#1	-.00018	-.0008	.0059	-.5961	.0063	.0001	.0003
#2	-.00015	.0019	.0020	-.6005	.0067	.0001	.0046
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	18.41	.0002	.0029	.0006	.0002	.3658	3.875
SDev	.02	.0001	.0003	.0015	.0009	.0305	.026
XRSD	.0907	24.81	10.21	264.1	363.7	8.345	.6769
#1	18.40	.0002	.0027	-.0005	-.0004	.3442	3.857
#2	18.42	.0002	.0031	.0017	.0009	.3874	3.894
Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0006	.0415	1.507	.1061	.0057	61.23	39.17
SDev	.0003	.0000	.000	.0002	.0020	.02	.03
XRSD	48.36	.1011	.0328	.1651	35.30	.0408	.0848
#1	.0004	.0415	1.507	.1059	.0043	61.21	39.19
#2	.0008	.0415	1.507	.1062	.0072	61.25	39.14
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0028	-.0022	-.0124	.0041	-.0014	7.240	-.0026
SDev	.0008	.0145	.0092	.0071	.0011	.134	.0018
XRSD	20.40	654.1	73.93	173.9	82.94	1.854	68.10
#1	.0022	-.0125	-.0059	-.0009	-.0022	7.145	-.0013
#2	.0033	.0080	-.0189	.0091	-.0006	7.335	-.0038
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avg	100.1	-.0043	.0096	21.78	-.0014	.0049	.0062
SDev	.0	.0086	.0064	.08	.0017	.0014	.0015
XRSD	.0275	198.9	67.17	.3551	120.2	28.41	24.91
#1	100.2	.0018	.0050	21.83	-.0026	.0040	.0051
#2	100.1	-.0105	.0141	21.72	-.0002	.0059	.0073
Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0659	.0028	-.0018	-.0005	.0477	.0027	-.0015
SDev	.0001	.0047	.0001	.0055	.0034	.0012	.0005
XRSD	.1694	167.0	7.993	1076.	7.112	44.88	31.69
#1	.0658	-.0005	-.0019	.0034	.0453	.0018	-.0012
#2	.0660	.0062	-.0017	-.0044	.0501	.0036	-.0019

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	.0002	.0035	.0002
SDev	.0003	.0007	.0014
XRSD	166.0	20.47	705.8

#1	-.0000	.0030	-.0008
#2	.0004	.0040	.0012

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	726072	10000	---	---	---	---	---
SDev	180.3122	.00000000	---	---	---	---	---
XRSD	.0248339	.00000000	---	---	---	---	---
#1	726200	10000	---	---	---	---	---
#2	725945	10000	---	---	---	---	---

Analysis Report

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Method: DAILY1 Sample Name: 236243

Operator:

Run Time: 11/06/03 19:23:54

Comment:

Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.00113	.1034	.0010	-.5866	.0290	.0001	-.0007
SDev	.00130	.0069	.0034	.0032	.0001	.0002	.0056
XRSD	115.12	6.664	319.8	.5414	.4327	185.9	751.7
#1	-.00206	.0985	-.0013	-.5844	.0291	-.0000	-.0047
#2	-.00021	.1082	.0034	-.5889	.0289	.0002	.0032
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	16.08	-.0001	.0022	.0002	.0006	.1776	4.249
SDev	.24	.0002	.0017	.0014	.0006	.0228	.071
XRSD	1.474	273.2	75.74	680.0	111.9	12.84	1.675
#1	16.24	-.0003	.0010	.0012	.0010	.1937	4.199
#2	15.91	.0001	.0034	-.0008	.0001	.1615	4.300
Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.0001	.0582	1.410	.1726	.0552	81.44	51.76
SDev	.0010	.0000	.001	.0019	.0012	.00	.21
XRSD	682.2	.0599	.0819	1.102	2.185	.0046	.4039
#1	-.0009	.0582	1.409	.1739	.0544	81.45	51.61
#2	.0006	.0583	1.411	.1713	.0561	81.44	51.90
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0010	.0064	-.0137	.0057	-.0045	8.895	-.0052
SDev	.0011	.0112	.0172	.0118	.0054	.161	.0045
XRSD	113.3	174.7	125.1	206.0	118.6	1.809	85.80
#1	.0017	.0143	-.0259	.0141	-.0083	8.781	-.0083
#2	.0002	-.0015	-.0016	-.0026	-.0007	9.009	-.0020
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avg	98.14	-.0096	.0104	12.21	-.0007	.0037	.0066
SDev	.38	.0179	.0079	.28	.0022	.0007	.0038
XRSD	.3868	185.9	75.93	2.329	287.7	18.65	57.37
#1	97.87	-.0223	.0160	12.41	.0008	.0032	.0039
#2	98.41	.0030	.0048	12.01	-.0023	.0042	.0092
Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0745	.0015	-.0018	-.0255	.0045	.0011	-.0027
SDev	.0004	.0078	.0012	.0043	.0192	.0011	.0026
XRSD	.4924	514.3	68.55	16.95	423.4	94.75	99.64
#1	.0742	.0071	-.0026	-.0286	-.0091	.0019	-.0045
#2	.0747	-.0040	-.0009	-.0225	.0182	.0004	-.0008

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	.0002	.0015	-.0003
SDev	.0004	.0011	.0012
XRSD	175.2	73.85	364.1

#1	.0005	.0007	.0005
#2	-.0000	.0022	-.0012

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	711546	10000	---	---	---	---	---
SDev	2740.039	.0000000	---	---	---	---	---
XRSD	.3850822	.0000000	---	---	---	---	---
#1	709609	10000	---	---	---	---	---
#2	713484	10000	---	---	---	---	---

Analysis Report

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Method: DAILY1 Sample Name: 236255
 Run Time: 11/06/03 19:28:46
 Comment:
 Mode: CONC Corr. Factor: 1

Operator:

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Ri2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.00154	.4611	.0167	-.4855	.0145	.0002	-.0059
SDev	.00237	.1154	.0008	.0087	.0001	.0002	.0046
XRSD	154.48	25.02	5.093	1.795	.3254	103.2	78.41
#1	.00014	.5427	.0161	-.4793	.0144	.0003	-.0026
#2	-.00321	.3795	.0173	-.4916	.0145	.0001	-.0092
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	5.995	-.0001	.0035	.0008	.0031	.4577	5.996
SDev	.141	.0006	.0001	.0006	.0000	.0401	.080
XRSD	2.349	684.2	2.287	82.51	.6521	8.766	1.342
#1	6.094	.0003	.0035	.0012	.0031	.4861	5.939
#2	5.895	-.0005	.0034	.0003	.0031	.4294	6.053
Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0003	.0804	.6531	.0068	.0068	177.7	118.9
SDev	.0020	.0008	.0273	.0003	.0011	1.1	1.4
XRSD	767.3	1.023	4.180	4.366	16.47	.5908	1.146
#1	.0012	.0799	.6724	.0071	.0076	177.0	117.9
#2	-.0017	.0810	.6338	.0066	.0060	178.5	119.8
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0009	.0794	.0029	.0033	-.0001	14.39	-.0025
SDev	.0006	.0048	.0029	.0036	.0015	.09	.0058
XRSD	72.07	6.064	99.61	107.8	2235.	.6331	232.2
#1	.0014	.0828	.0050	.0008	.0010	14.45	.0016
#2	.0004	.0760	.0009	.0059	-.0012	14.32	-.0066
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avge	87.74	.0113	.0085	38.64	.0032	.0095	.0113
SDev	1.07	.0024	.0021	.75	.0014	.0022	.0104
XRSD	1.217	21.30	24.00	1.951	44.56	22.89	92.05
#1	88.49	.0130	.0100	39.17	.0022	.0110	.0186
#2	86.98	.0096	.0071	38.10	.0042	.0079	.0039
Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0651	.0004	.0000	-.0237	.0066	.0070	-.0028
SDev	.0002	.0037	.0025	.0054	.0595	.0003	.0037
XRSD	.3294	1023.	6803.	22.96	900.9	3.526	131.1
#1	.0650	-.0022	.0018	-.0199	.0487	.0072	-.0002
#2	.0653	.0029	-.0017	-.0276	-.0355	.0068	-.0055

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	.0018	.0089	-.0004
SDev	.0001	.0003	.0007
XRSD	5.416	3.285	181.5

#1	.0019	.0091	.0001
#2	.0018	.0087	-.0009

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	636247	10000	---	---	---	---	---
SDev	7717.363	.00000000	---	---	---	---	---
XRSD	1.212951	.00000000	---	---	---	---	---
#1	641704	10000	---	---	---	---	---
#2	630790	10000	---	---	---	---	---

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Method: DAILY1 Sample Name: 236258
 Run Time: 11/06/03 19:33:37
 Comment:
 Mode: CONC Corr. Factor: 1

Operator:

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00001	.0636	.0109	-.6027	.0142	-.0001	.0031
SDev	.00041	.0004	.0013	.0036	.0000	.0000	.0001
XRSD	6082.4	.7144	12.32	.5964	.2219	37.58	1.507
#1	.00029	.0639	.0099	-.6002	.0142	-.0001	.0031
#2	-.00028	.0632	.0118	-.6052	.0142	-.0001	.0032
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	12.43	.0002	.0030	-.0004	-.0005	.0206	4.074
SDev	.21	.0002	.0001	.0006	.0010	.0107	.096
XRSD	1.662	102.4	4.764	137.4	196.5	52.17	2.354
#1	12.28	.0000	.0031	-.0000	.0002	.0282	4.006
#2	12.58	.0003	.0029	-.0008	-.0012	.0130	4.142
Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0009	.0455	1.066	.0090	.0034	73.01	46.94
SDev	.0002	.0003	.011	.0000	.0002	.99	.83
XRSD	25.82	.7358	1.038	.4356	5.884	1.352	1.770
#1	.0007	.0453	1.058	.0090	.0035	72.31	46.35
#2	.0011	.0458	1.073	.0089	.0032	73.71	47.53
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.0004	.0151	-.0033	-.0009	-.0020	8.485	-.0019
SDev	.0005	.0017	.0011	.0007	.0006	.112	.0023
XRSD	113.6	11.35	34.87	79.20	31.06	1.317	118.4
#1	-.0001	.0139	-.0041	-.0004	-.0016	8.406	-.0003
#2	-.0007	.0163	-.0025	-.0014	-.0025	8.564	-.0036
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avg	99.61	.0020	.0049	25.81	-.0017	.0039	.0065
SDev	1.24	.0023	.0005	.04	.0001	.0005	.0024
XRSD	1.245	118.9	9.687	.1390	5.382	11.70	36.18
#1	98.73	.0036	.0046	25.83	-.0016	.0043	.0082
#2	100.5	.0003	.0052	25.78	-.0017	.0036	.0049
Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0752	-.0012	-.0009	-.0016	.0439	.0062	.0029
SDev	.0007	.0010	.0003	.0077	.0008	.0003	.0014
XRSD	.8930	87.92	30.01	482.5	1.835	5.458	46.57
#1	.0747	-.0004	-.0010	-.0070	.0444	.0065	.0039
#2	.0757	-.0019	-.0007	.0038	.0433	.0060	.0020

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	-.0001	.0011	-.0014
SDev	.0001	.0002	.0006
XRSD	265.3	20.34	40.66

#1	.0000	.0009	-.0010
#2	-.0002	.0012	-.0018

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	722162	10000	---	---	---	---	---
SDev	8914.495	.00000000	---	---	---	---	---
XRSD	1.234417	.00000000	---	---	---	---	---
#1	715859	10000	---	---	---	---	---
#2	728466	10000	---	---	---	---	---

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Method: DAILY1 Sample Name: 236258d

Operator:

Run Time: 11/06/03 19:38:29

Comment:

Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.00037	.0679	.0086	-.6047	.0144	.0001	.0022
SDev	.00002	.0002	.0058	.0025	.0001	.0002	.0008
XRSD	6.6862	.2551	67.48	.4095	.6218	238.6	37.53
#1	-.00035	.0681	.0045	-.6030	.0143	.0002	.0016
#2	-.00038	.0678	.0128	-.6065	.0144	-.0000	.0028
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	12.29	.0000	.0033	.0002	-.0001	.0281	4.187
SDev	.01	.0001	.0003	.0001	.0002	.0092	.063
XRSD	.0949	187.8	9.018	85.14	284.3	32.55	1.507
#1	12.28	-.0000	.0035	.0001	-.0002	.0346	4.142
#2	12.30	.0001	.0031	.0003	.0001	.0216	4.231
Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0007	.0463	1.061	.0083	.0035	74.24	47.64
SDev	.0002	.0001	.000	.0000	.0000	.29	.13
XRSD	23.85	.1120	.0222	.2847	.4637	.3848	.2625
#1	.0006	.0463	1.061	.0083	.0035	74.04	47.55
#2	.0008	.0464	1.062	.0082	.0035	74.44	47.73
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.0000	.0026	-.0028	.0012	-.0009	8.548	-.0010
SDev	.0006	.0080	.0003	.0017	.0002	.025	.0009
XRSD	1866.	304.5	10.10	137.7	16.98	.2924	92.30
#1	-.0005	-.0030	-.0026	.0024	-.0008	8.531	-.0016
#2	.0004	.0082	-.0030	.0000	-.0010	8.566	-.0003
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avg	98.79	.0039	.0007	25.63	-.0001	.0018	.0056
SDev	1.14	.0010	.0017	.16	.0012	.0008	.0004
XRSD	1.158	25.16	259.6	.6338	992.5	45.79	7.260
#1	97.98	.0032	.0019	25.74	.0007	.0023	.0058
#2	99.60	.0046	-.0006	25.51	-.0010	.0012	.0053
Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0763	-.0019	-.0012	-.0002	.0207	.0064	.0014
SDev	.0004	.0010	.0000	.0026	.0090	.0003	.0025
XRSD	.5609	51.53	1.309	1130.	43.49	5.346	177.7
#1	.0760	-.0025	-.0012	.0016	.0143	.0061	-.0004
#2	.0766	-.0012	-.0012	-.0020	.0270	.0066	.0031

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	.0001	.0008	-.0009
SDev	.0000	.0003	.0001
XRSD	14.73	41.56	9.069

#1	.0001	.0006	-.0009
#2	.0001	.0011	-.0010

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	716240	10000	---	---	---	---	---
SDev	8263.250	.00000000	---	---	---	---	---
XRSD	1.153698	.00000000	---	---	---	---	---
#1	710397	10000	---	---	---	---	---
#2	722083	10000	---	---	---	---	---

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Method: DAILY1 Sample Name: 236261
 Run Time: 11/06/03 19:43:22
 Comment:
 Mode: CONC Corr. Factor: 1

Operator:

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Ri2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00015	.3046	.0093	-.6013	.0149	.0001	.0025
SDev	.00021	.0275	.0011	.0035	.0001	.0001	.0035
XRSD	143.69	9.041	11.77	.5752	.5126	126.8	143.1
#1	-.00000	.3241	.0085	-.5988	.0149	.0000	-.0000
#2	.00030	.2851	.0101	-.6037	.0150	.0001	.0050
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	12.80	.0001	.0031	.0003	.0001	.1347	4.188
SDev	.04	.0000	.0001	.0001	.0003	.0033	.143
XRSD	.3244	30.05	4.244	18.43	202.5	2.426	3.416
#1	12.77	.0001	.0030	.0003	-.0001	.1370	4.087
#2	12.83	.0001	.0032	.0004	.0004	.1324	4.289
Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0010	.0467	1.123	.0046	.0034	74.73	47.81
SDev	.0005	.0004	.002	.0000	.0004	.60	.95
XRSD	47.07	.9309	.1699	.6804	11.09	.7983	1.992
#1	.0006	.0464	1.122	.0047	.0031	74.31	47.13
#2	.0013	.0470	1.125	.0046	.0036	75.15	48.48
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.0001	.0113	-.0027	.0014	-.0002	9.277	-.0018
SDev	.0006	.0034	.0017	.0026	.0002	.042	.0026
XRSD	801.1	30.53	61.30	179.5	151.4	.4529	144.1
#1	-.0005	.0088	-.0015	-.0004	.0000	9.307	-.0036
#2	.0004	.0137	-.0039	.0032	-.0003	9.247	.0000
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avg	99.55	-.0014	.0034	27.37	.0000	.0018	.0044
SDev	.64	.0046	.0018	.19	.0012	.0003	.0010
XRSD	.6413	325.8	53.74	.6815	2336.	18.42	23.33
#1	99.10	.0018	.0021	27.50	-.0008	.0020	.0037
#2	100.0	-.0047	.0046	27.24	.0009	.0015	.0051
Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0777	.0013	.0016	-.0005	.0363	.0070	.0017
SDev	.0005	.0013	.0003	.0009	.0001	.0002	.0020
XRSD	.6782	98.03	15.38	185.3	.2215	3.308	118.7
#1	.0773	.0022	.0014	.0002	.0362	.0068	.0003
#2	.0781	.0004	.0018	-.0011	.0363	.0071	.0031

Elem	Y_3710	Zn2062	Zr3496				
Units	ppm	ppm	ppm				
Avge	.0001	.0017	-.0002				
SDev	.0000	.0006	.0004				
%RSD	24.15	36.57	251.0				
#1	.0001	.0021	-.0004				
#2	.0001	.0012	.0001				
IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	721746	10000	---	---	---	---	---
SDev	4669.026	.0000000	---	---	---	---	---
%RSD	.6469067	.0000000	---	---	---	---	---
#1	718445	10000	---	---	---	---	---
#2	725048	10000	---	---	---	---	---

Method: DAILY1 Sample Name: icv/ccv Operator:
 Run Time: 11/06/03 19:52:14
 Comment:
 Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Ri2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	1.0005	10.13	4.958	Q4.001	10.34	1.063	5.026
SDev	.0040	.04	.011	.004	.09	.006	.034
XRSD	.40227	.3726	.2294	.1040	.8504	.5490	.6784
#1	1.0034	10.15	4.950	Q4.004	10.40	1.067	5.051
#2	.99769	10.10	4.966	Q3.998	10.27	1.059	5.002
Errors	QC Pass	QC Pass	QC Pass	QC Fail	QC Pass	QC Pass	QC Pass
Value	1.0000	10.00	5.000	5.000	10.00	1.000	5.000
Range	10.000	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
Avg	19.36	.9859	4.926	1.929	2.083	9.938	19.59
SDev	.05	.0035	.016	.009	.002	.046	.12
XRSD	.2406	.3573	.3235	.4564	.0755	.4655	.5999
#1	19.39	.9884	4.938	1.935	2.084	9.971	19.51
#2	19.33	.9835	4.915	1.922	2.081	9.905	19.68
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	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	5.075	5.014	19.73	1.016	4.927	Q46.48	27.59
SDev	.014	.006	.06	.003	.013	.18	.03
XRSD	.2794	.1103	.2878	.3317	.2672	.3790	.1005
#1	5.085	5.010	19.77	1.019	4.918	Q46.35	27.57
#2	5.065	5.017	19.69	1.014	4.937	Q46.60	27.61
Errors	QC Pass	QC Pass	QC Pass	QC Pass	QC Pass	QC Fail	QC Pass
Value	5.000	5.000	20.00	1.000	5.000	30.00	30.00
Range	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	4.723	5.332	4.906	4.978	1.021	1.035	1.010
SDev	.025	.033	.019	.039	.001	.023	.004
XRSD	.5244	.6230	.3900	.7861	.1095	2.249	.4053
#1	4.741	5.309	4.919	5.006	1.020	1.052	1.013
#2	4.706	5.356	4.892	4.950	1.022	1.019	1.007
Errors	QC Pass	QC Pass	NOCHECK	NOCHECK	QC Pass	QC Pass	QC Pass
Value	5.000	5.000			1.000	1.000	1.000
Range	10.00	10.00			10.00	10.00	10.00
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899

Analysis Report

QC Standard

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Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avg	98.76	5.410	5.378	Q-5.212	4.949	5.383	4.807
SDev	1.38	.025	.022	.034	.032	.023	.009
XRSD	1.393	.4619	.4116	.6594	.6553	.4284	.1833
#1	97.79	5.428	5.394	Q-5.188	4.972	5.400	4.813
#2	99.74	5.393	5.362	Q-5.236	4.926	5.367	4.801
Errors	NOCHECK	NOCHECK	NOCHECK	QC Fail	QC Pass	QC Pass	QC Pass
Value				5.000	5.000	5.000	5.000
Range				10.00	10.00	10.00	10.00
Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	5.302	.9613	4.946	5.358	.9955	5.055	.9749
SDev	.021	.0056	.000	.010	.0113	.021	.0018
XRSD	.4019	.5848	.0003	.1914	1.139	.4139	.1828
#1	5.317	.9653	4.946	5.351	1.004	5.070	.9737
#2	5.287	.9573	4.946	5.365	.9875	5.040	.9762
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	Y_3710	Zn2062	Zr3496				
Units	ppm	ppm	ppm				
Avg	5.000	.9858	4.782				
SDev	.003	.0006	.039				
XRSD	.0563	.0660	.8059				
#1	5.002	.9862	4.754				
#2	5.078	.9853	4.809				
Errors	QC Pass	QC Pass	QC Pass				
Value	5.000	1.000	5.000				
Range	10.00	10.00	10.00				

010189

Analysis Report

QC Standard

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IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	716054	10000	---	---	---	---	---
SDev	9959.599	.00000000	---	---	---	---	---
*RSD	1.390899	.00000000	---	---	---	---	---
#1	709012	10000	---	---	---	---	---
#2	723097	10000	---	---	---	---	---

Analysis Report Blank Sample 11/06/03 08:03:55 PM page 1

Method: DAILY1 Sample Name: icb/ccb Operator:

Run Time: 11/06/03 19:59:10

Comment:

Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00080	.0214	H.0053	L-.7409	H.0060	.0005	.0042
SDev	.00053	.0086	.0028	.0024	.0016	.0001	.0018
XRSD	66.246	40.45	53.13	.3193	27.44	31.85	43.55
#1	.00117	.0275	.0033	L-.7393	H.0071	.0006	H.0054
#2	.00042	.0153	H.0073	L-.7426	.0048	.0004	.0029
Errors	LC Pass	LC Pass	LC High	LC Low	LC High	LC Pass	LC Pass
High	.00500	.0500	.0050	.0500	.0050	.0050	.0050
Low	-.00500	-.0500	-.0050	-.0500	-.0050	-.0050	-.0050
Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0124	.0007	.0031	.0003	.0010	.0003	.0074
SDev	.0030	.0003	.0011	.0001	.0001	.0037	.0060
XRSD	24.09	38.32	36.12	20.90	14.98	1261.	80.55
#1	.0145	.0009	.0039	.0004	.0009	-.0023	.0032
#2	.0103	.0005	.0023	.0003	.0011	.0029	.0116
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	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0036	.0021	.0137	.0006	H.0079	.0252	-.0469
SDev	.0009	.0006	.0047	.0001	.0011	.0043	.1558
XRSD	25.80	28.80	33.95	17.82	14.31	17.15	331.9
#1	.0043	.0025	.0170	.0006	H.0087	.0283	L-.1571
#2	.0030	.0016	.0104	.0005	H.0071	.0221	H.0632
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	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0023	.0003	.0026	.0027	.0005	.0013	-.0002
SDev	.0011	.0037	.0023	.0006	.0009	.0033	.0024
XRSD	46.37	1209.	87.15	20.34	174.9	247.3	1363.
#1	.0031	.0030	.0042	.0031	.0011	.0037	-.0019
#2	.0016	-.0023	.0010	.0023	-.0001	-.0010	.0016
Errors	LC Pass	LC Pass	NOCHECK	NOCHECK	LC Pass	LC Pass	LC Pass
High	.0050	.0100			.0050	.0100	.0100
Low	-.0050	-.0100			-.0050	-.0100	-.0100
Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899

Analysis Report

Blank Sample

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Units	XR	ppm	ppm	ppm	ppm	ppm	ppm
Avg	97.22	.0014	.0066	L-12.47	.0027	.0049	.0022
SDev	.17	.0019	.0008	.01	.0011	.0001	.0013
XRSD	.1797	137.4	12.42	.0063	42.22	1.886	58.45
#1	97.34	.0028	.0060	L-12.47	H.0034	.0050	.0032
#2	97.09	.0000	.0072	L-12.48	.0019	.0048	.0013
Errors	NOCHECK	NOCHECK	NOCHECK	LC Low	LC Pass	LC Pass	LC Pass
High				.0100	.0030	.0050	.0050
Low				-.0100	-.0030	-.0050	-.0050
Elem	Sr4215	Th2837	Ti3372	Ti1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.0032	.0015	.0012	H.0131	.0167	.0027	.0023
SDev	.0009	.0004	.0008	.0108	.0050	.0006	.0027
XRSD	26.76	26.63	64.13	82.53	29.72	20.78	116.7
#1	.0039	.0012	.0018	H.0207	-.0202	.0031	.0004
#2	.0026	.0018	.0007	.0055	-.0132	.0023	.0043
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	Y_3710	Zn2062	Zr3496				
Units	ppm	ppm	ppm				
Avg	.0032	.0005	.0031				
SDev	.0008	.0001	.0007				
XRSD	23.97	23.63	23.82				
#1	.0037	.0006	.0036				
#2	.0027	.0004	.0026				
Errors	LC Pass	LC Pass	LC Pass				
High	.0050	.0050	.0050				
Low	-.0050	-.0050	-.0050				

Analysis Report

Blank Sample

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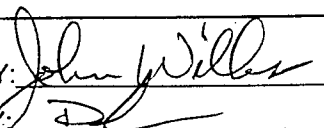
IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	---	---	---	---	---	---
Wavlen	361.384	---	---	---	---	---	---
Avge	704861	10000	---	---	---	---	---
SDev	1277.035	.0000000	---	---	---	---	---
XRSD	.1811754	.0000000	---	---	---	---	---
#1	705764	10000	---	---	---	---	---
#2	703958	10000	---	---	---	---	---

TRACE METALS PREPARATORY LABORATORY DIGESTION LOG

SOUTHWEST RESEARCH INSTITUTE
SAN ANTONIO, TEXAS 78228

BOOK / PAGE: **54 261**

CLIENT(S): DIV 20 010193
 TASK ORDER(S): 031025-1 SDG(S): 236892
 PROJECT NO(S): 06002.01.081
 METHOD: 3005A 3050B 3050B-7.5 3010A 3020A 7760A 7740A HClO₄ H₂SO₄ Sb
 Microwave Fusion Teflon Rock OTHER df 33.3 and df 200 dilutions
 MATRIX: Water Soil Biota Solid Liquid ☒ TCLP Ext OTHER
 INSTRUMENT: GFAA ICP ☒ ICP-MS IC FLAA HYDRIDE OTHER
 ACID INORG #: HNO₃ ** HCl ** H₂SO₄ # HClO₄ # HF #
 INTERNAL STD: Sc @ 10 PPM ☒ Be @ 10 PPM SOURCE: 1V INORG# 4561 EXP: 10/04 AMT: 50uL
 Oven/Hotplate ID: Temperature (°C):

SAMPLE IDENTIFICATION	pH	WT (g)	I.V. (mL)	F.V. (mL)
PBW-K29W3			5	5
1LSW-K29W3 *			5	
236892 df 33.3			150uL	
6892d				
6893				
6893③ *				
6894				
6895				
6892 df 200			25uL	
6892d				
6893				
6893③ *				
6894				
6895				
* Spike 50uL Spike1	Spec#	4074	Exp	5/04
↓ 20uL I-CAL	Spec#	4245	Exp	9/04
↓ 20uL W @ 1Kppm	1V#	4503	Exp	8/04
↓ 20uL Mo @ 1Kppm	1V#	3956	Exp	3/04
** -RLB-02-032-03 1% HNO ₃ / 5% HCL			Exp	1/04
PBW and LSW are prepared at 5 mls - **				
df 33.3 dilutions are prepared as 150uL sample: 4.85 mL - **				
df 200 dilutions are prepared as 25uL sample: 4.975 mL - **				
 10-29-03				
				LOCATION: N/A

PREPARED BY:

DATE: 10-29-03

REVIEWED BY:

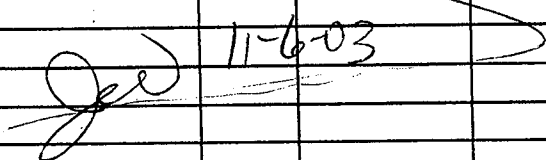
DATE: 10-29-03

DISPOSAL INT/DATE/LOC:

SOUTHWEST RESEARCH INSTITUTE
SAN ANTONIO, TEXAS 78228

BOOK / PAGE: 54 285

CLIENT(S): DIV 20 cont'd from pg 261 BK 54
TASK ORDER(S): 031025-1 SDG(S): 236892
PROJECT NO(S): 06002-01.081
METHOD: 3005A 3050B 3050B-7.5 3010A 3020A 7760A 7740A HClO₄ 010184
Microwave Fusion Teflon Rock OTHER HF 250 and HF 33.3 dilutions
MATRIX: Water Soil Biota Solid Liquid ☒ TCLP Ext OTHER
INSTRUMENT: GFAA ICP ☒ ICP-MS IC FLAA HYDRIDE OTHER
ACID INORG #: HNO₃# XX HCl# XX H₂SO₄# HClO₄# HF#
INTERNAL STD: Sc @ 10 PPM ☒ Be @ 10 PPM SOURCE: 1V INORG# 4362 EXP: 10/04 AMT: 50uL
Oven/Hotplate ID: Temperature (°C):

SAMPLE IDENTIFICATION	pH	WT (g)	I.V. (mL)	F.V. (mL)
PBW-L06W3			5	5
LCSW-L06W4 *			↓	↓
236894 d#250			20mL	↓
6895 ↓			20mL	↓
6894 d#33.3			150mL	↓
* Spike 50mL Spike1	Sp#	4074	Exp	5/04
↓ 50mL I-LAL1	Sp#	4245	Exp	9/04
↓ 20mL W@1kppm	I#	4203	Exp	8/04
↓ 20mL Mo ↓	I#	3956	Exp	3/04
XX-RLB-02-032-04	170	HNO ₃ /5%	HCL	Exp 1/04
PBW and LCSW are prepared as 5mLs - XX				
d# 250 dilutions is prepared as 20mL sample:			4.98mLs - XX	
d# 33.3 dilutions are prepared 150mL sample:			4.85mLs - XX	
				
LOCATION:				

PREPARED BY:

REVIEWED BY: 6

DISPOSAL INT/DATE/LOC:

DATE:

DATE:

Trace Metals Reagent Logbook 010195

SOUTHWEST RESEARCH INSTITUTE
SAN ANTONIO, TEXAS 78228

BOOK / PAGE: 02 032

Reagent I.D.:	Preparation Description:	Prep Date:	Exp Date:	Initials:
RLB-02-032-01	10% HCL	10-28-03	1-28-04	JW
↓	add 180 mLs di water to a 200 mL Nalgene bottle, add 20 mLs HCL invy# 4291	↓	↓	↓
↓	F.V. is 200 mLs	↓	↓	↓
RLB02-032-02	10x Sol. As			
	9.54 L Ascorbic#4272 + 18.756 KI	10-28-03	10-29-03	BL
	#5758 + 18.75 mL HCL# 4292 to	↓	↓	↓
	100 mL with reaq. water	↓	↓	↓
RLB-02-032-03	1% HNO ₃ / 5% HCL	10-29-03	1-29-04	JW
↓	add 100 mLs di water to a 250 mL Nalgene bottle, add 2.5 mLs HNO ₃ invy# 4295,	↓	↓	↓
↓	add 12.5 mLs HCL invy# 4292,	↓	↓	↓
↓	F.V. to 250 mLs with di water	↓	↓	↓
RLB-02-032-04	1% HNO ₃ / 5% HCL	11-4-03	1-4-04	JW
↓	add 100 mLs di water to 250 mL Nalgene bottle, add 2.5 mLs HNO ₃ invy# 4295,	↓	↓	↓
↓	add 12.5 mLs HCL invy# 4292, F.V. to 250 mLs with di water	↓	↓	↓
RLB2-032-05	5% KMNO ₃			
	1506 to 3 L reaq. water	↓	↓	↓
	#3663	11-4-03	11-4-04	BL

SOUTHWEST RESEARCH INSTITUTE®6220 Culebra Rd
San Antonio, Texas 78228**TJA TRACE ICP DAILY LOG**ANALYST DJDATE 10-29-03As 189.042 Profile Line As Intensity: 391.924PEAK POSITION .02989VERNIER POSITION 292AUTOSAMPLER Yes X No

QC PREP DATE:	
CCV/ICV	<u>03323</u>
CRI	<u>DJ 10-29-03</u>
ICSA	
ICSAB	

STDs PREP DATE:	
CLP_STD1_SC	<u>03301</u>
CLP_STD2_SC	<u>03301</u>
CLP_STD3_SC	<u>03301</u>
CLP_STD4_SC	<u>03301</u>
CLP_STD5_SC	<u>03301</u>
CLP_STD6_SC	<u>03308</u>
BLK_SC	<u>03301</u>

COMMENTS	FILE	CLIENT	TO#	PROJECT NO.	METHOD
A310234	Daily32	W.L. Gale	031023-8	01.01446.003	Daily 55080
A310132A	Daily32	Americable	031013-2	10079.06.005	Daily 54259
A031029A	Daily32	Div 20	031021-4	06002.01.081	Daily 54260
A031029A	Daily32	Div 20	031025-1	06002.01.081	54261
A031029B	Daily32	Div 20	0310286	18036.01.107	54259
<u>DJ 10-29-03</u>					

COMMENTS: _____
_____MAINTENANCE:

REVIEWED BY:

CardinaDATE: 11/14/03

SOUTHWEST RESEARCH INSTITUTE®

6220 Culebra Rd
San Antonio, Texas 78228

TJA TRACE ICP DAILY LOG

ANALYST JDDATE 11-6-03As 189.042 Profile Line As Intensity: 410.327PEAK POSITION 035425VERNIER POSITION 293AUTOSAMPLER Yes x No

QC PREP DATE:	
CCV/ICV	<u>03K03</u>
CRI	
ICSA	<u>11-6-03</u>
ICSAB	

STDs PREP DATE:	
CLP_STD1_SC	<u>03K05</u>
CLP_STD2_SC	<u>03K05</u>
CLP_STD3_SC	<u>03K05</u>
CLP_STD4_SC	<u>03K05</u>
CLP_STD5_SC	<u>03S01</u>
CLP_STD6_SC	<u>03K05</u>
BLK_SC	<u>03J29</u>

COMMENTS	FILE	CLIENT	TO#	PROJECT NO.	METHOD
A031106	DAIly3Z	Div 20	031021-4	06002.01.081	DAIly1 N/A
A031106A	DAIly3Z	Div 14	031105-5	R9356.01.002	DAIly1 SA 284
A031106B	DAIly3Z	Div 20	031025-1	06002.01.081	SA 285
A031106B	DAIly3Z	Div 20	031016-9	06002.01.141	SA 286
<u>11-6-03</u>					

COMMENTS: _____

MAINTENANCE:

REVIEWED BY:

CardinaDATE: 11/14/03

ICP Calibration Blank/ICB/CCB Solution

010198

ID: BLK-03202

Date Prepared: 9-2-03

Prepared By: DL

Make up as needed in 1000ml volumetric flask.

Added ☒ 10 ml HNO₃ INORG #: 4197Added ☒ 50 ml HCL INORG #: 4190Added ☒ 1000ul of 10000ppm Sc (INORG. VENT.) EXP. Date: 10-1-03 INORG #: 3683**ICP Calibration Blank/ICB/CCB Solution**

ID: BLK-03225

Date Prepared: 9-25-03

Prepared By: DL

Make up as needed in 1000ml volumetric flask.

Added ☒ 10 ml HNO₃ INORG #: 4237Added ☒ 50 ml HCL INORG #: 4247Added ☒ 1000ul of 10000ppm Sc (INORG. VENT.) EXP. Date: 10-1-04 INORG #: 4262**ICP Calibration Blank/ICB/CCB Solution**ID: BLK- ^{at 10-1-03} ~~03231~~ 03301Date Prepared: ~~9-3-03~~ 10-1-03Prepared By: DL

Make up as needed in 1000ml volumetric flask.

Added ☒ 10 ml HNO₃ INORG #: 4237Added ☒ 50 ml HCL INORG #: 4249Added ☒ 1000ul of 10000ppm Sc (INORG. VENT.) EXP. Date: 10-1-04 INORG #: 4262**ICP Calibration Blank/ICB/CCB Solution**

ID: BLK-03329

Date Prepared: 10-29-03

Prepared By: DL

Make up as needed in 1000ml volumetric flask.

Added ☒ 10 ml HNO₃ INORG #: 4295Added ☒ 50 ml HCL INORG #: 4292Added ☒ 1000ul of 10000ppm Sc (INORG. VENT.) EXP. Date: 10-1-04 INORG #: 4262

ICP ICV/CCV SOLUTION

010199

CCV- 03323

Date Prepared: 10-23-03

Prepared By: 

HNO3 INORG #: 4240

HCl INORG #: 4252

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

Element	Std Conc (ppm)	Amt added	Check	Source	Inorg #	Stock Conc (ppm)	Exp Date
Sc	10	1ml	✓	INORGVENT	A262	10000	10-1-04
B	5	5ml	✓	SPEX	4139	1000	6-30-04
Li	5	5ml	✓	SPEX	4065	1000	5-15-04
Mo	5	5ml	✓	SPEX	4066	1000	5-15-04
P	5	5ml	✓	SPEX	3922	1000	1-15-04
Si	5	5ml	✓	SPEX	4232	1000	8-30-04
Ti	5	5ml	✓	SPEX	4234	1000	8-30-04
Sr	5	5ml	✓	SPEX	3961	1000	2-15-04
Sn	5	5ml	✓	SPEX	4141	1000	6-30-04
Bi	5	5ml	✓	SPEX	4138	1000	6-30-04
La	5	5ml	✓	SPEX	4064	1000	5-15-04
Y	5	5ml	✓	SPEX	4067	1000	5-15-04
Pd	1	1ml	✓	SPEX	3928	1000	1-15-04
S	1	1ml	✓	SPEX	4140	1000	6-30-04
Th	1	1ml	✓	SPEX	4233	1000	8-30-04
U	1	1ml	✓	SPEX	4142	1000	6-30-04
W	1	1ml	✓	SPEX	4212	1000	8-15-04
Zr	5	5ml	✓	SPEX	4213	1000	8-15-04
Na	10	1ml	✓	SPEX	5951	10000	2-15-04
ICV-2A	vary	10ml	✓	SPEX	3773	mix	11-30-03
ICV-2B	vary	1ml	✓	SPEX	3774	mix	11-30-03
ICV-2C	vary	10ml	✓	SPEX	3775	mix	11-30-03

Expiration Date: 11-30-03

ICP ICV/CCV SOLUTION

010200

CCV-03Y03

Date Prepared: 11-3-2003

Prepared By: 

HNO3 INORG #: 4296

HCl INORG #: 4292

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

Element	Std Conc (ppm)	Amt added	Check	Source	Inorg #	Stock Conc (ppm)	Exp Date
Sc	10	1ml	✓	INORGVENT	4262	10000	10-1-04
B	5	5ml	✓	SPEX	4139	1000	6-30-04
Li	5	5ml	✓	SPEX	4065	1000	5-15-04
Mo	5	5ml	✓	SPEX	4066	1000	5-15-04
P	5	5ml	✓	SPEX	4307	1000	10-30-04
Si	5	5ml	✓	SPEX	4232	1000	8-30-04
Ti	5	5ml	✓	SPEX	4234	1000	8-30-04
Sr	5	5ml	✓	SPEX	4308	1000	10-30-04
Sn	5	5ml	✓	SPEX	4141	1000	6-30-04
Bi	5	5ml	✓	SPEX	4138	1000	6-30-04
La	5	5ml	✓	SPEX	4064	1000	5-15-04
Y	5	5ml	✓	SPEX	4067	1000	5-15-04
Pd	1	1ml	✓	SPEX	3924	1000	1-15-04
S	1	1ml	✓	SPEX	4140	1000	6-30-04
Th	1	1ml	✓	SPEX	4233	1000	8-30-04
U	1	1ml	✓	SPEX	4142	1000	6-30-04
W	1	1ml	✓	SPEX	4212	1000	8-15-04
Zr	5	5ml	✓	SPEX	4213	1000	8-15-04
Na	10	1ml	✓	SPEX	3951	10000	2-15-04
ICV-2A	vary	10ml	✓	SPEX	3773	mix	11-30-03
ICV-2B	vary	1ml	✓	SPEX	3774	mix	11-30-03
ICV-2C	vary	10ml	✓	SPEX	3775	mix	11-30-03

Expiration Date: 11-30-03

ICP Calibration Standards

010201

Date Prepared: 9-31-03^{at} 10-1-03 Prepared By: [Signature]HNO₃ INORG #: 4237 HCl INORG #: A249Make up as needed in 500 ml volumetric flasks in 1% HNO₃ and 5% HCl.

Prepared	Standard Name	Element	Std Conc (ppm)	Added ml	Check	Source	INORG #	Stock Conc (ppm)	Exp Date
<u>at</u> <u>9-31-03</u> <u>10-1-03</u>	STD1- <u>03501</u>	Al	50	2.50	✓	INORVENT	4220	10000	9-1-04
		Ca	50	2.50	✓	INORVENT	3900	10000	2-1-04
		Fe	50	2.50	✓	INORVENT	3963	10000	3-1-04
		K	50	2.50	✓	INORVENT	3734	10000	11-1-03
		Mg	25	1.25	✓	INORVENT	4204	10000	8-1-04
		Na	50	2.50	✓	INORVENT	4205	10000	8-1-04
		Li	10	5.00	✓	INORVENT	4149	1000	7-1-04
		Sc	10	0.500	✓	INORVENT	4262	10000	10-1-04
<u>at</u> <u>9-31-03</u> <u>10-1-03</u>	STD2- <u>03501</u>	Ba	10	5.00	✓	INORVENT	3921	1000	3-1-04
		Be	5	2.50	✓	INORVENT	4062	1000	6-1-04
		Cr	10	5.00	✓	INORVENT	3732	1000	11-1-03
		Cu	10	5.00	✓	INORVENT	3955	1000	3-1-04
		Ni	10	5.00	✓	INORVENT	3957	1000	3-1-04
		Sc	10	0.500	✓	INORVENT	4262	10000	10-1-04
<u>at</u> <u>9-31-03</u> <u>10-1-03</u>	STD3- <u>03501</u>	Cd	10	5.00	✓	INORVENT	3972	1000	3-1-04
		Co	10	5.00	✓	INORVENT	3973	1000	3-1-04
		Mn	10	5.00	✓	INORVENT	3921	1000	2-1-04
		V	10	5.00	✓	INORVENT	3740	1000	11-1-03
		Zn	10	5.00	✓	INORVENT	3741	1000	11-1-03
		Sc	10	0.500	✓	INORVENT	4262	10000	10-1-04
<u>at</u> <u>9-31-03</u> <u>10-1-03</u>	STD4- <u>03501</u>	Ag	2	1.00	✓	INORVENT	4222	1000	9-1-04
		As	10	5.00	✓	INORVENT	3499	1000	2-1-04
		Pb	10	5.00	✓	INORVENT	3735	1000	11-1-03
		Sb	10	5.00	✓	INORVENT	3953	1000	3-1-04
		Se	10	5.00	✓	INORVENT	4152	1000	7-1-04
		TL	10	5.00	✓	INORVENT	3922	1000	2-1-04
		Sc	10	0.500	✓	INORVENT	4262	10000	10-1-04
<u>at</u> <u>9-31-03</u> <u>10-1-03</u>	STD5- <u>03501</u>	B	10	5.00	✓	INORVENT	3954	1000	3-1-04
		Mo	10	5.00	✓	INORVENT	3956	1000	3-1-04
		P	10	5.00	✓	INORVENT	4049	1000	6-1-04
		Si	10	5.00	✓	INORVENT	4153	1000	7-1-04
		Ti	10	5.00	✓	INORVENT	3762	1000	12-1-03
		Sr	10	5.00	✓	INORVENT	4154	1000	7-1-04
		Sn	10	5.00	✓	INORVENT	4026	1000	4-1-04
		Bi	5	2.50	✓	INORVENT	4200	1000	8-1-04
		Sc	10	0.500	✓	INORVENT	4262	10000	10-1-04
<u>10-1-03</u>	STD6- <u>03501</u>	La	10	5.00	✓	INORVENT	4221	1000	9-1-04
		Na	1	0.05	✓	INORVENT	4205	10000	8-1-04
		Pd	10	5.00	✓	INORVENT	3964	1000	3-1-04
		S	10	5.00	✓	INORVENT	3739	1000	11-1-03
		Th	10	5.00	✓	INORVENT	3681	1000	10-1-03
		U	10	5.00	✓	INORVENT	3924	1000	3-1-04
		W	5	2.50	✓	INORVENT	4203	1000	8-1-04
		Y	10	5.00	✓	INORVENT	4063	1000	6-1-04
		Zr	10	5.00	✓	INORVENT	3958	1000	3-1-04
		SC	10	0.500	✓	INORVENT	4262	10000	10-1-04

Expiration Dates:

STD1: 11-1-03

STD4: 11-1-03

STD2: 11-1-03

STD5: 12-1-03

STD3: 11-1-03

STD6: 11-1-03 10-1-03

OH
Exp. order

ICP Calibration Standards

010202

Date Prepared: 10-8-03

Prepared By: *DA*

HNO3 INORG #: A239

HCl INORG #: 4250

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

Prepared	Standard Name	Element	Std Conc (ppm)	Added ml	Check	Source	INORG #	Stock Conc (ppm)	Exp Date
	STD1-	Al	50	2.50		INORVENT		10000	
		Ca	50	2.50		INORVENT		10000	
		Fe	50	2.50		INORVENT		10000	
		K	50	2.50		INORVENT		10000	
		Mg	25	1.25		INORVENT		10000	
		Na	50	2.50		INORVENT		10000	
		Li	10	5.00		INORVENT		1000	
		Sc	10	0.500		INORVENT		10000	
	STD2-	Ba	10	5.00		INORVENT		1000	
		Be	5	2.50		INORVENT		1000	
		Cr	10	5.00		INORVENT		1000	
		Cu	10	5.00		INORVENT		1000	
		Ni	10	5.00		INORVENT		1000	
		Sc	10	0.500		INORVENT		10000	
	STD3-	Cd	10	5.00		INORVENT		1000	
		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	
	STD4-	Ag	2	1.00		INORVENT		1000	
		As	10	5.00		INORVENT		1000	
		Pb	10	5.00		INORVENT		1000	
		Sb	10	5.00		INORVENT		1000	
		Se	10	5.00		INORVENT		1000	
		TL	10	5.00		INORVENT		1000	
		Sc	10	0.500		INORVENT		10000	
	STD5-	B	10	5.00		INORVENT		1000	
		Mo	10	5.00		INORVENT		1000	
		P	10	5.00		INORVENT		1000	
		Si	10	5.00		INORVENT		1000	
		Ti	10	5.00		INORVENT		1000	
		Sr	10	5.00		INORVENT		1000	
		Sn	10	5.00		INORVENT		1000	
		Bi	5	2.50		INORVENT		1000	
		Sc	10	0.500		INORVENT		10000	
	STD6-	La	10	5.00	✓	INORVENT	4221	1000	9-1-04
		Na	1	0.05	✓	INORVENT	4205	10000	8-1-04
		Pd	10	5.00	✓	INORVENT	3964	1000	3-1-04
		S	10	5.00	✓	INORVENT	3739	1000	11-1-03
		Th	10	5.00	✓	INORVENT	4283	1000	11-1-04
		U	10	5.00	✓	INORVENT	3974	1000	3-1-04
		W	5	2.50	✓	INORVENT	4203	1000	8-1-04
		Y	10	5.00	✓	INORVENT	4063	1000	6-1-04
		Zr	10	5.00	✓	INORVENT	3958	1000	3-1-04
		SC	10	0.500	✓	INORVENT	4264	10000	10-1-04

4262 10-8-03

Expiration Dates:

STD1:

STD4:

STD2:

STD5:

STD3:

STD6: 11-1-03

ICP Calibration Standards

010203

Date Prepared: 11-5-03

Prepared By: [Signature]

HNO3 INORG #: 4296

HCl INORG #: 4293

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

Prepared	Standard Name	Element	Std Conc (ppm)	Added ml	Check	Source	INORG #	Stock Conc (ppm)	Exp Date
11-5-03	STD1- 03405 mk	Al	50	2.50	✓	INORVENT	4220	10000	9-1-04
		Ca	50	2.50	✓	INORVENT	3900	10000	2-1-04
		Fe	50	2.50	✓	INORVENT	3963	10000	3-1-04
		K	50	2.50	✓	INORVENT	4320	10000	12-1-04
		Mg	25	1.25	✓	INORVENT	4204	10000	8-1-04
		Na	50	2.50	✓	INORVENT	4205	10000	8-1-04
		Li	10	5.00	✓	INORVENT	4149	1000	7-1-04
		Sc	10	0.500	✓	INORVENT	4262	10000	10-1-04
11-5-03	STD2- 03405	Ba	10	5.00	✓	INORVENT	3971	1000	3-1-04
		Be	5	2.50	✓	INORVENT	4062	1000	6-1-04
		Cr	10	5.00	✓	INORVENT	4314	1000	12-1-04
		Cu	10	5.00	✓	INORVENT	3955	1000	3-1-04
		Ni	10	5.00	✓	INORVENT	3957	1000	3-1-04
		Sc	10	0.500	✓	INORVENT	4262	10000	10-1-04
11-5-03	STD3- 03405	Cd	10	5.00	✓	INORVENT	3972	1000	3-1-04
		Co	10	5.00	✓	INORVENT	3973	1000	3-1-04
		Mn	10	5.00	✓	INORVENT	3921	1000	2-1-04
		V	10	5.00	✓	INORVENT	4321	1000	12-1-04
		Zn	10	5.00	✓	INORVENT	4319	1000	12-1-04
		Sc	10	0.500	✓	INORVENT	4262	10000	10-1-04
11-5-03	STD4- 03405	Ag	2	1.00	✓	INORVENT	4222	1000	9-1-04
		As	10	5.00	✓	INORVENT	3999	1000	2-1-04
		Pb	10	5.00	✓	INORVENT	4313	1000	11-1-04
		Sb	10	5.00	✓	INORVENT	3953	1000	3-1-04
		Se	10	5.00	✓	INORVENT	4152	1000	7-1-04
		TL	10	5.00	✓	INORVENT	3922	1000	2-1-04
		Sc	10	0.500	✓	INORVENT	4262	10000	10-1-04
	STD5-	B	10	5.00		INORVENT		1000	
		Mo	10	5.00		INORVENT		1000	
		P	10	5.00		INORVENT		1000	
		Si	10	5.00		INORVENT		1000	
		Ti	10	5.00		INORVENT		1000	
		Sr	10	5.00		INORVENT		1000	
		Sn	10	5.00		INORVENT		1000	
		Bi	5	2.50		INORVENT		1000	
		Sc	10	0.500		INORVENT		10000	
11-5-03	STD6- 03405	La	10	5.00	✓	INORVENT	4221	1000	9-1-04
		Na	1	0.05	✓	INORVENT	4205	10000	8-1-04
		Pd	10	5.00	✓	INORVENT	3964	1000	3-1-04
		S	10	5.00	✓	INORVENT	4317	1000	12-1-04
		Th	10	5.00	✓	INORVENT	4283	1000	11-1-04
		U	10	5.00	✓	INORVENT	3974	1000	3-1-04
		W	5	2.50	✓	INORVENT	4203	1000	8-1-04
		Y	10	5.00	✓	INORVENT	4063	1000	6-1-04
		Zr	10	5.00	✓	INORVENT	3958	1000	3-1-04
		SC	10	0.500	✓	INORVENT	4262	10000	10-1-04

Expiration Dates:

STD1: 2-1-04

STD4: 2-1-04

STD2: 3-1-04

STD5:

STD3: 2-1-04

STD6: 3-1-04

**SOUTHWEST RESEARCH INSTITUTE
NUCLEAR PROJECT**

CLIENT: Div. 20

TASK ORDER: 031025-1

SRR: 25150

SDG: 236892

CASE: CNWRA

VTSR: October 24, 2003

PROJECT#: 06002.01.081

Certificates of Analysis

010204

**FISHER SCIENTIFIC
TRACEMETAL GRADE NITRIC ACID
CERTIFICATE OF ANALYSIS**

Catalog No. A509

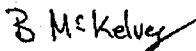
Lot No: 1103070

Release Date: July, 2003

Expiry Date: July, 2006

<u>Tests</u>	<u>Units</u>	<u>Value</u>
Assay	%	69%
Color	APHA	<10
Aluminum	ppb	<0.2
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	<0.5
Chromium	ppb	<0.1
Cobalt	ppb	<0.1
Copper	ppb	<0.1
Iron	ppb	<0.5
Lead	ppb	<0.1
Lithium	ppb	<0.1
Magnesium	ppb	<0.2
Manganese	ppb	<0.1
Mercury	ppb	<0.2
Molybdenum	ppb	<0.1
Nickel	ppb	<0.1
Potassium	ppb	<0.2
Selenium	ppb	<0.1
Silver	ppb	<0.1
Sodium	ppb	<0.2
Strontium	ppb	<0.1
Thorium	ppb	<0.1
Tin	ppb	<0.1
Titanium	ppb	<0.1
Uranium	ppb	<0.1
Vanadium	ppb	<0.1
Zinc	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.



Dr. B. McKelvey
QA/QC Manager

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



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010205

**FISHER SCIENTIFIC
TRACEMETAL GRADE NITRIC ACID
CERTIFICATE OF ANALYSIS**

Catalog No. A509

Lot No: 1103050

Date: May, 2003

<u>Tests</u>	<u>Units</u>	<u>Value</u>
Assay	%	69%
Color	APHA	<10
Aluminum	ppb	<0.2
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	<0.5
Chromium	ppb	<0.1
Cobalt	ppb	<0.1
Copper	ppb	<0.1
Iron	ppb	<0.5
Lead	ppb	<0.1
Lithium	ppb	<0.1
Magnesium	ppb	<0.2
Manganese	ppb	<0.1
Mercury	ppb	<0.2
Molybdenum	ppb	<0.1
Nickel	ppb	<0.1
Potassium	ppb	<0.2
Selenium	ppb	<0.1
Silver	ppb	<0.1
Sodium	ppb	<0.2
Strontium	ppb	<0.1
Thorium	ppb	<0.1
Tin	ppb	<0.1
Titanium	ppb	<0.1
Uranium	ppb	<0.1
Vanadium	ppb	<0.1
Zinc	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 McKelvey

Dr. B. McKelvey
QA/QC Manager

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



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FISHER SCIENTIFIC
TRACEMETAL GRADE HYDROCHLORIC ACID

CERTIFICATE OF ANALYSIS

Catalog No. A508

Lot No: 4103030

Date: March, 2003

<u>Tests</u>	<u>Units</u>	<u>Value</u>
Assay	%	36%
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	<0.5
Chromium	ppb	<0.1
Cobalt	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
Nickel	ppb	<0.1
Potassium	ppb	<0.1
Selenium	ppb	<0.1
Silver	ppb	<0.1
Sodium	ppb	<0.5
Strontium	ppb	<0.1
Thorium	ppb	<0.1
Tin	ppb	<0.1
Titanium	ppb	<0.1
Uranium	ppb	<0.1
Vanadium	ppb	<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 McKelvey

Dr. B. McKelvey
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FISHER SCIENTIFIC
TRACEMETAL GRADE HYDROCHLORIC ACID

CERTIFICATE OF ANALYSIS

Catalog No. A508

Lot No: 4102110

Date: December, 2002

<u>Tests</u>	<u>Units</u>	<u>Value</u>
Assay	%	36%
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	<0.5
Chromium	ppb	<0.1
Cobalt	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
Nickel	ppb	<0.1
Potassium	ppb	<0.1
Selenium	ppb	<0.1
Silver	ppb	<0.1
Sodium	ppb	<0.5
Strontium	ppb	<0.1
Thorium	ppb	<0.1
Tin	ppb	<0.1
Titanium	ppb	<0.1
Uranium	ppb	<0.1
Vanadium	ppb	<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 McKelvey

Dr. B. McKelvey
 QA/QC Manager

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



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SPEXcertificate™

010208

Certificate of Reference Material

Catalog Number: SPIKE-1 **Lot No.:** 25-23AS
Description: Spike Sample Standard 1
Matrix: 5% Nitric Acid/tr Tartaric Acid - HF

This ASSURANCE® certified reference material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

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

Refer to side 2 for details of measurement uncertainties.

Instrumental Analysis by ICP Spectrometer:

Element	Labeled (mg/L)	Measured (mg/L)	NIST SRM	Element	Labeled (mg/L)	Measured (mg/L)	NIST SRM
Al	200	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	3168a
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.

Date of Certification: MAY '03 Certifying Officer: N. Kocherakota

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 05/15/03
DATE EXPIRED: 05/15/2004
DATE OPENED: 05/15/03
INORG: 4074 PO: F503351

010209

SPEXertificate™
Certificate of Reference Material

Catalog Number: ICAL-1 **Lot No.:** 25-176AS
Description: Instrument Calibration Standard 1
Matrix: 5% Nitric Acid

This ASSURANCE® certified reference material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

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

Refer to side 2 for details of measurement uncertainties.

Instrumental Analysis by ICP Spectrometer:

Element	Labeled (mg/L)	Measured (mg/L)	NIST SRM
Ca	5,000	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.

Date of Certification: SEP -- 2003 Certifying Officer: N. Kocherakota

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 09/15/03
DATE EXPIRED: 09/15/2004
DATE OPENED: 09/16/03
INORG: 4045 PO: E50008



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: CGSC1-1and CGSC1-5

1000 µg/mL Scandium IN 5% HNO₃ (abs) **910210**

Lot Number: **W-SC02055**

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

Sc₂O₃
99.99%
632-5721

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 09/04/03
DATE EXPIRED: 10/01/2004
DATE OPENED: 09/24/03
INORG: 4361 PO: F52232

CERTIFIED CONCENTRATION: 1000 ± 5 µg/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:

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

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

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

Classical Wet Assay: 1000 ± 5 µg/mL

Method: EDTA Titration vs NIST SRM 928 Lead Nitrate.

Instrument Analysis: 995 ± 5 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 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 µm.

<u>Q</u> Al <0.070	<u>M</u> Dy <0.00060	<u>M</u> Li <0.0010	<u>M</u> Pr <0.000030	<u>M</u> Te <0.0030
<u>M</u> Sb <0.000050	<u>M</u> Er <0.00050	<u>M</u> Lu <0.000040	<u>M</u> Re <0.00010	<u>M</u> Tb <0.000030
<u>M</u> As <0.0010	<u>M</u> Eu <0.00030	<u>M</u> Mg <0.0030	<u>M</u> Rh <0.00010	<u>M</u> Tl <0.00010
<u>M</u> Ba <0.0010	<u>M</u> Gd <0.00010	<u>M</u> Mn <0.00040	<u>M</u> Rb <0.00010	<u>M</u> Th 0.0028
<u>M</u> Be <0.000050	<u>M</u> Ga <0.00010	<u>Q</u> Hg i	<u>M</u> Ru <0.00020	<u>M</u> Tm <0.000040
<u>M</u> Bi 0.0043	<u>M</u> Ge <0.00060	<u>M</u> Mo <0.00020	<u>M</u> Sm <0.00010	<u>M</u> Sn <0.00050
<u>Q</u> B <0.020	<u>M</u> Au <0.00030	<u>M</u> Nd <0.00020	<u>S</u> Sc	<u>M</u> Ti <0.0050
<u>M</u> Cd <0.00030	<u>M</u> Hf 0.0030	<u>Q</u> Ni <0.084	<u>Q</u> Se <0.67	<u>M</u> W <0.0010
<u>Q</u> Ca 0.016	<u>M</u> Ho <0.000050	<u>M</u> Nb <0.000050	<u>Q</u> Si <0.034	<u>M</u> V <0.00020
<u>M</u> Ce <0.00050	<u>M</u> In <0.00010	<u>n</u> Os <0.00050	<u>M</u> Ag 0.0050	<u>M</u> U <0.00020
<u>M</u> Cs <0.000030	<u>M</u> Ir <0.00050	<u>M</u> Pd <0.00050	<u>Q</u> Na <0.16	<u>M</u> Yb <0.00010
<u>M</u> Cr <0.00050	<u>Q</u> Fe <0.16	<u>Q</u> P i	<u>M</u> Sr <0.000050	<u>M</u> Y <0.0040
<u>M</u> Co <0.00030	<u>M</u> La <0.000050	<u>M</u> Pt <0.00020	<u>n</u> S	<u>M</u> Zn 0.0075
<u>M</u> Cu <0.00060	<u>M</u> Pb 0.00050	<u>Q</u> K <5.01	<u>M</u> Ta <0.00070	<u>M</u> Zr 0.032

M - checked by ICP-MS

Q - checked by ICP-OES

i - spectral interference

n - not checked for

S - solution standard element

ANALYZED DENSITY OF SOLUTION (measured at 22°C): 1.038 g/mL

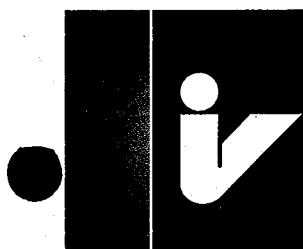
QA:KL Rev.031303JTS

Paul R. Gaines

Quality Assurance Manager

Expires:

EXPIRES
01/2004



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: CGSC10-1 and CGSC10-5

10,000 µg/mL Scandium IN 5% HNO₃ (abs) 010211

Lot Number: **T-SC02053**

Starting Material: Sc₂O₃
Starting Material Purity: 99.999%
Starting Material Lot No: 632-5721

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 09/24/03
DATE EXPIRED: 10/01/2004
DATE OPENED: 09/24/03
INORG: 4262 PO: F52232

CERTIFIED CONCENTRATION: 10,047 ± 29 µg/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:

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

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

$\sum s_i$ = 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 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 µm.

<u>Q</u>	Al	<0.070	<u>M</u>	Dy	<0.0060	<u>M</u>	Li	<0.010	<u>M</u>	Pr	<0.00030	<u>M</u>	Te	<0.030
<u>M</u>	Sb	<0.00050	<u>M</u>	Er	<0.0050	<u>M</u>	Lu	<0.00040	<u>M</u>	Re	<0.0010	<u>M</u>	Tb	<0.00030
<u>M</u>	As	<0.010	<u>M</u>	Eu	<0.0030	<u>M</u>	Mg	<0.030	<u>M</u>	Rh	<0.0010	<u>M</u>	Ti	<0.0010
<u>M</u>	Ba	<0.010	<u>M</u>	Gd	<0.0010	<u>M</u>	Mn	<0.0040	<u>M</u>	Rb	<0.0010	<u>M</u>	Th	0.028
<u>M</u>	Be	<0.00050	<u>M</u>	Ga	<0.0010	<u>i</u>	Hg		<u>M</u>	Ru	<0.0020	<u>M</u>	Tm	<0.00040
<u>M</u>	Bi	0.043	<u>M</u>	Ge	<0.0060	<u>M</u>	Mo	<0.0020	<u>M</u>	Sm	<0.0010	<u>M</u>	Sn	<0.0050
<u>Q</u>	B	<0.034	<u>M</u>	Au	<0.0030	<u>M</u>	Nd	<0.0020	<u>s</u>	Sc		<u>n</u>	Tl	
<u>M</u>	Cd	<0.0030	<u>M</u>	Hf	0.030	<u>Q</u>	Ni	<0.084	<u>Q</u>	Se	<0.67	<u>M</u>	W	<0.010
<u>Q</u>	Ca	0.17	<u>M</u>	Ho	<0.00050	<u>M</u>	Nb	<0.00050	<u>Q</u>	Si	<0.034	<u>M</u>	U	<0.0020
<u>M</u>	Ce	<0.0050	<u>M</u>	In	<0.0010	<u>n</u>	Os		<u>M</u>	Ag	0.0050	<u>M</u>	V	<0.0020
<u>M</u>	Cs	<0.00030	<u>M</u>	Ir	<0.0050	<u>M</u>	Pd	<0.0050	<u>Q</u>	Na	<0.16	<u>M</u>	Yb	<0.0010
<u>M</u>	Cr	<0.0050	<u>Q</u>	Fe	<0.16	<u>i</u>	P		<u>M</u>	Sr	<0.00050	<u>M</u>	Y	<0.040
<u>M</u>	Co	<0.0030	<u>M</u>	La	<0.00050	<u>M</u>	Pt	<0.0020	<u>n</u>	S		<u>M</u>	Zn	0.075
<u>M</u>	Cu	<0.0060	<u>M</u>	Pb	0.0050	<u>Q</u>	K	<5.01	<u>M</u>	Ta	<0.0070	<u>M</u>	Zr	0.32

M - checked by ICP-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): 1.073 g/mL

(over)

QA:KL Rev.021203DH

Paul R. Laines

Quality Assurance Manager

Expires:

EXPIRES

01/2004

SPEXTM Certificate

Certificate of Reference Material

010212

Catalog Number: PLB9-2X/2Y/2T

Lot No. 9-143B

Description: 1000 mg/L Boron

Matrix: H₂O

This ASSURANCE[®] certified reference material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 999.5 mg/L

Uncertainty Associated with Measurement: ± 3.0 mg/L

Certified Value is Traceable to: NIST SRM 3107

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

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 1001 mg/L

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

Instrumentation Analysis By ICP spectrometer: 998 mg/L

Uncertified Properties:

Density: 1.000 @ 23.7 Degrees Celsius

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

Element	mg/L	Element	mg/L	Element	mg/L
Al	0.06	Cu	<0.001	Pb	<0.001
As	<0.001	Fe	0.001	Re	<0.001
Ag	<0.002	Ga	<0.001	Rb	<0.001
Ba	<0.001	In	<0.001	Sr	<0.001
Be	<0.001	K	<0.01	Sb	<0.001
Bi	<0.001	Li	<0.001	Sn	<0.001
Cd	<0.001	Mn	<0.001	Ti	<0.001
Co	<0.001	Mo	<0.001	Tl	<0.001
Ca	0.003	Mg	<0.001	V	0.004
Cr	<0.003	Na	0.026	Zr	<0.001
		Ni	<0.001	Zn	<0.007

Balances are calibrated regularly with weight sets traceable to NIST #32856, #32857 and others. This CRM is guaranteed stable to $\pm 0.5\%$ 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 '03

Certifying Officer: N. Kocherakota

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 06/30/03
DATE EXPIRED: 06/30/04
DATE OPENED: 06/23/03
INORG: 4139 PO: F52370

SPEXTM Certificate

Certificate of Reference Material

010213

Catalog Number: PLLI2-2X/2Y**Lot No.** 9-102LI**Description:** 1000 mg/L Lithium**Matrix:** 2% HNO₃

This ASSURANCE[®] certified reference material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 1002 mg/L**Uncertainty Associated with Measurement:** +/- 3 mg/L**Certified Value is Traceable to:** NIST SRM 3129a

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

Refer to side 2 for details of measurement uncertainties.**Classical Wet Assay:** 1002 mg/L**Method:** Evaporate to dryness. Fume with Sulfuric Acid. Ignite and weigh as Li₂SO₄.**Instrumentation Analysis By ICP spectrometer:** 1002 mg/L**Uncertified Properties:****Density:** 1.014 @ 24.5 Degrees Celsius**Trace Metallic Impurities in the Actual Solution via ICP / ICPMS Analysis:**

Element	mg/L	Element	mg/L	Element	mg/L
Al	0.009	Cu	0.01	Pb	0.001
As	0.004	Fe	0.045	Re	0.002
Ag	<0.001	Ga	<0.001	Rb	<0.001
B	<0.004	In	<0.001	Sr	0.001
Ba	0.004	K	0.05	Sb	0.002
Be	0.002	Mn	<0.001	Sn	<0.001
Bi	<0.001	Mo	0.002	Ti	0.005
Ca	0.03	Mg	0.003	Tl	<0.001
Cr	<0.001	Na	0.02	V	<0.001
Cd	<0.001	Ni	<0.001	Zr	<0.001
Co	0.002			Zn	0.20

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: MAY '03**Certifying Officer:** N. Kocherakota

INORGANIC LABS/RADCHEM LABS
 DATE RECEIVED: 05/12/03
 DATE EXPIRED: 05/15/2004
 DATE OPENED: 05/12/03
 INORG: 4065 PO: F52181

SPEXTM Certificate

Certificate of Reference Material

010214

INORGANIC LABS/RADCHEM LABS
 DATE RECEIVED: 05/12/03
 DATE EXPIRED: 05/12/2004
 DATE OPENED: 05/12/03
 INORG: 4066 PO: F52181

Catalog Number: PLMO9-2X/2Y/2T **Lot No.** 9-49MO

Description: 1000 mg/L Molybdenum

Matrix: H₂O

This ASSURANCE[®] certified reference material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 1000 mg/L

Uncertainty Associated with Measurement: +/- 3 mg/L

Certified Value is Traceable to: NIST SRM 3134

The CRM is prepared gravimetrically using high purity Ammonium Molybdate Lot# 03011C. The certified value listed is the average of values obtained by classical wet assay and ICP spectrometer analysis

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 999 mg/L

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

Instrumentation Analysis By ICP spectrometer: 1001 mg/L

Uncertified Properties:

Density: 0.9987 @ 24.6 Degrees Celsius

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

Element	mg/L	Element	mg/L	Element	mg/L
Al	0.001	Cu	0.004	Pb	0.001
As	0.04	Fe	<0.01	Re	0.03
Ag	<0.001	Ga	<0.001	Rb	<0.001
B	<0.003	In	<0.001	Sr	<0.001
Ba	<0.001	K	0.02	Sb	<0.001
Be	<0.001	Li	<0.001	Sn	<0.001
Bi	<0.001	Mg	0.007	Ti	0.004
Ca	0.006	Mn	<0.001	Tl	<0.001
Cr	<0.005	Na	0.009	V	0.004
Cd	<0.05	Ni	<0.001	Zr	<0.001
Co	<0.001			Zn	<0.001

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

Date of Certification: MAY '03

Certifying Officer: N. Kocherakota

SPXertificate™

Certificate of Reference Material

010215

Catalog Number: PLP9-2X/2Y/2T

Lot No. 9-29P

Description: 1000 mg/L Phosphorus

Matrix: H2O

This ASSURANCE® certified reference material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 1003.5 mg/L

Uncertainty Associated with Measurement: +/- 3 mg/L

Certified Value is Traceable to: NIST SRM 3139a

The CRM is prepared gravimetrically using high purity (NH₄)H₂(PO₄) Lot# A158. The certified value listed is the average of values obtained by classical wet assay and ICP spectrometer analysis

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 1004 mg/L

Method: Precipitation using Magnesia mixture. Filter, ignite, and weigh as Mg₂O₂.

Instrumentation Analysis By ICP spectrometer: 1003 mg/L

Uncertified Properties:

Density: 0.9997 @ 22.9 Degrees Celsius

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

Element	mg/L	Element	mg/L	Element	mg/L
Al	0.05	Cu	<0.001	Pb	<0.001
As	<0.001	Fe	0.019	Rb	<0.001
Ag	<0.001	Ga	<0.001	Re	<0.001
B	<0.005	In	<0.001	Sn	0.006
Ba	<0.001	K	0.17	Sr	0.004
Be	<0.001	Li	0.004	Sb	0.01
Bi	<0.001	Mg	0.3	Ti	0.016
Ca	0.65	Mn	<0.001	Tl	<0.001
Cr	<0.001	Mo	<0.001	V	<0.001
Cd	<0.001	Na	0.5	Zr	<0.001
Co	<0.001	Ni	<0.001	Zn	6.7

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 -- '03

Certifying Officer: N. Kocherlakota

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 01/16/03
DATE EXPIRED: 01/15/2004
DATE OPENED: 01/23/03
INORG: 3927 PO: F52073

*SPC*XertificateTM

Certificate of Reference Material

010216

Catalog Number: PLSI9-2X/2Y/2T**Lot No.** 10-07SI**Description:** 1000 mg/L Silicon**Matrix:** H₂O / 0.4% F-

This ASSURANCE[®] certified reference material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 998.5 mg/L**Uncertainty Associated with Measurement:** +/- 3 mg/L**Certified Value is Traceable to:** NIST SRM #3150

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

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 997 mg/L

Method: Precipitation using Ammonium Molybdate and 8-Hydroxy Quinoline. Filter, dry, and weigh as (C₉H₇ON)₄(H₄)[Si(Mo₁₂O₄₀)]

Instrumentation Analysis By ICP spectrometer: 1000 mg/L**Uncertified Properties:****Density:** 1.010 @ 26.5 Degrees Celsius**Trace Metallic Impurities in the Actual Solution via ICP / ICPMS Analysis:**

Element	mg/L	Element	mg/L	Element	mg/L
Al	0.002	Cu	<0.001	Pb	<0.001
As	<0.001	Fe	0.020	Rb	<0.001
Ag	<0.001	Ga	<0.001	Re	<0.001
B	<0.003	In	<0.001	Sr	<0.001
Ba	<0.001	K	<0.010	Sb	0.03
Be	<0.001	Li	<0.001	Ti	<0.001
Bi	<0.001	Mg	<0.001	Tl	<0.001
Ca	0.018	Mn	<0.001	V	<0.001
Cr	<0.002	Mo	<0.001	Zr	0.05
Cd	<0.001	Na	0.02	Zn	0.06
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.

Date of Certification: AUG '03 Certifying Officer: N. Kocherakota

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 09/05/03
DATE EXPIRED: 08/30/2004
DATE OPENED: 09/05/03
INORG: 4232 PO: 550025

SPEXcertificate™

Certificate of Reference Material

010217

Catalog Number: PLTI9-2X/2Y/2T

Lot No. 10-38TI

Description: 1000 mg/L Titanium

Matrix: H₂O/ 0.24% F-

This ASSURANCE® certified reference material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 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
B	0.003	In	<0.001	Si	0.52
Ba	<0.001	K	<0.01	Sr	0.001
Be	<0.001	Li	<0.001	Sb	<0.001
Bi	<0.001	Mg	<0.001	Tl	<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
Co	0.002	Ni	<0.001		

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

Date of Certification: AUG '03

Certifying Officer: N. Kocherakota

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 09/05/03
DATE EXPIRED: 08/30/2004
DATE OPENED: 09/05/03
INORG: 4034 PO: F50005

SPEXTM Certificate

Certificate of Reference Material

010218

Catalog Number: PLSR2-2X/2Y/2T **Lot No.** 9-166SR
Description: 1000 mg/L Strontium in 2% HNO₃
Matrix: 2% HNO₃

This ASSURANCE[®] certified reference material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 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
B	<0.003	In	<0.001	Si	0.043
Ba	0.008	K	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.

Date of Certification: FEB -- '03 **Certifying Officer:** N. Kocherakota

INORGANIC LABS/RADCHEM LTD.
DATE RECEIVED: 2/15/2004
DATE EXPIRED: 2/15/2004
DATE OPENED: 2/24/03
INORG: 3261
PO: ES20000

SPEXTM Certificate

Certificate of Reference Material

010219

Catalog Number: PLSN5-2X/2Y/2T

Lot No. 9-62SN

Description: 1000 mg/L Tin

Matrix: 20% HCL

This ASSURANCE[®] certified reference material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 1000 mg/L

Uncertainty Associated with Measurement: +/- 3 mg/L

Certified Value is Traceable to: NIST SRM 3161a

The CRM is prepared gravimetrically using high purity Tin Metal Lot# 02891N. The certified value listed is the average of values obtained by classical wet assay and ICP spectrometer analysis.

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 999 mg/L

Method: Precipitation using Ammonium Hydroxide. Filter, ignite, and weigh as SnO₂.

Instrumentation Analysis By ICP spectrometer: 1001 mg/L

Uncertified Properties:

Density: 1.034 @ 24.8 Degrees Celsius

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

Element	mg/L	Element	mg/L	Element	mg/L
Al	0.007	Cu	<0.001	Pb	0.001
As	0.01	Fe	0.02	Rb	<0.001
Ag	0.002	Ga	<0.001	Re	<0.001
B	<0.03	In	<0.001	Sr	<0.001
Ba	<0.001	K	0.10	Sb	0.002
Be	<0.001	Li	<0.001	Ti	<0.001
Bi	<0.001	Mg	<0.001	Tl	<0.001
Ca	0.004	Mn	<0.001	V	<0.001
Cr	<0.005	Mo	<0.001	Zr	<0.001
Cd	<0.001	Na	0.02	Zn	0.03
Co	0.008	Ni	<0.01		

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 '03

Certifying Officer: N. Kocherakota

INORGANIC LABS/RADCHEM LABS
 DATE RECEIVED: 06/20/03
 DATE EXPIRED: 06/30/04
 DATE OPENED: 06/23/03
 INORG: 4111
 PO: FS3370

SPEx CertificateTM

Certificate of Reference Material

010220

Catalog Number: PLBI4-2X/2Y

Lot No. 9-36BI

Description: 1000 mg/L Bismuth

Matrix: 10% HNO₃

This ASSURANCE[®] certified reference material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 1001 mg/L

Uncertainty Associated with Measurement: +/- 3 mg/L

Certified Value is Traceable to: NIST SRM 3106

The CRM is prepared gravimetrically using high purity Bismuth Metal Lot# 04941B. The certified value listed is the average of values obtained by classical wet assay and ICP spectrometer analysis.

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 1001 mg/L

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

Instrumentation Analysis By ICP spectrometer: 1001 mg/L

Uncertified Properties:

Density: 1.052 @ 23.1 Degrees Celsius

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

Element	mg/L	Element	mg/L	Element	mg/L
Al	0.002	Cu	0.034	Pb	0.006
As	<0.001	Fe	0.001	Re	<0.001
Ag	0.002	Ga	<0.001	Rb	<0.001
B	<0.04	In	<0.001	Sr	<0.001
Ba	<0.001	K	0.001	Sb	<0.001
Be	<0.001	Li	<0.001	Sn	<0.001
Cd	<0.001	Mn	<0.001	Ti	<0.001
Co	<0.001	Mo	<0.001	Tl	<0.001
Ca	0.006	Mg	<0.001	V	<0.002
Cr	<0.005	Na	0.005	Zr	<0.001
		Ni	<0.001	Zn	0.02

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

Date of Certification: JUN '03

Certifying Officer: N. Kocherakota

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 06/29/03
DATE EXPIRED: 06/30/2004
DATE OPENED: 06/23/03
INORG: 4138 PO: F52370

SPEXTM Certificate

Certificate of Reference Material

010221

Catalog Number: PLLA2-2X/2Y **Lot No.** 10-17LA
Description: 1000 mg/L Lanthanum
Matrix: 2% HNO₃

This ASSURANCE[®] certified reference material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 996.5 mg/L
Uncertainty Associated with Measurement: +/- 3 mg/L
Certified Value is Traceable to: NIST SRM 3127a

The CRM is prepared gravimetrically using high purity Lanthanum Oxide Lot# 06981D. 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: 998 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: 995 mg/L

Uncertified Properties:

Density: 1.010 @ 23.8 Degrees Celsius

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

Element	mg/L	Element	mg/L	Element	mg/L
Ce	0.009	Lu	<0.001	Tm	<0.001
Ca	0.05	Mn	<0.001	Ti	<0.001
Dy	<0.001	Mo	<0.001	Tb	<0.001
Er	<0.001	Nd	<0.001	Ta	<0.001
Eu	<0.001	Ni	<0.001	Tl	<0.001
Fe	0.006	Na	0.006	V	<0.001
Gd	<0.2	Pr	<0.001	W	<0.001
Ga	<0.001	Rb	<0.001	Y	<0.001
Hf	<0.001	Sc	<0.003	Yb	<0.001
Ho	<0.001	Sm	<0.001	Zr	<0.001
In	<0.001	Th	<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: MAY '03 **Certifying Officer:** N. Kocherakota

INORGANIC LABS/RADCHEM LABS
 DATE RECEIVED: 05/12/03
 DATE EXPIRED: 05/12/04
 DATE OPENED: 05/12/03
 INORG: 4064 PO: F52181

SPEXTM Certificate

Certificate of Reference Material

010222

Catalog Number: PLY2-2X/2Y/2T

Lot No. 9-152Y

Description: 1,000 mg/L Yttrium

Matrix: 2% HNO₃

This ASSURANCE[®] certified reference material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 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	Tb	<0.001
Ca	0.007	Lu	<0.001	Tm	<0.001
Dy	<0.001	Mn	<0.001	Tl	<0.001
Er	<0.001	Mo	<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: MAY '03

Certifying Officer: N. Kocherlakota

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 05/12/03
DATE EXPIRED: 05/15/2004
DATE OPENED: 05/12/03
INORG: 4067 PD: F52181

SPEXTM Certificate

Certificate of Reference Material

010223

Catalog Number: PLPD3-2X/2Y

Lot No. 9-74PD

Description: 1000 mg/L Palladium

Matrix: 10% HCl

This ASSURANCE[®] certified reference material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 995 mg/L

Uncertainty Associated with Measurement: +/- 3 mg/L

Certified Value is Traceable to: NIST SRM 3138

The CRM is prepared gravimetrically using high purity Palladium Powder Lot# 07991E. 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: 990 mg/L

Method: Precipitation using dimethyl glyoxime, filter, dry and weigh as Pd(C₄H₇O₂N₂)₂.

Instrumentation Analysis By ICP spectrometer: 1000 mg/L

Uncertified Properties:

Density: 1.025 @ 26.3 Degrees Celsius

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

Element	mg/L	Element	mg/L	Element	mg/L
Al	<0.004	Cr	<0.009	Pt	<0.004
Au	0.03	Fe	0.02	Re	<0.001
Ag	0.007	Ga	<0.001	Rh	0.002
B	<0.05	Ir	<0.001	Rb	<0.001
Be	<0.002	In	<0.001	Ru	<0.001
Bi	<0.001	Mg	<0.005	Sn	0.08
Ca	0.02	Mn	<0.001	Te	<0.001
Cd	<0.001	Na	<0.03	Ti	<0.001
Co	<0.001	Ni	0.004	W	<0.001
Cu	<0.006	Pb	<0.04	Zr	<0.001
				Zn	0.16

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 -- '03 **Certifying Officer:** N. Kocherakota

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 01/16/03
DATE EXPIRED: 01/15/2004
DATE OPENED: 01/22/03
INORG: 3928 PD: F52073

SPEX Certificate TM

Certificate of Reference Material

010224

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 06/29/03
DATE EXPIRED: 06/30/2004
DATE OPENED: 06/23/03
INORG: ALH PO: F52370

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 quality control standard for inorganic spectroscopic instrumentation such as ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 1003 mg/L

Uncertainty Associated with Measurement: +/- 3 mg/L

Certified Value is Traceable to: NIST SRM 3154

The CRM is prepared gravimetrically using high purity Ammonium Sulfate Lot# 05891M. The certified value listed is the average of values obtained by classical wet assay and ICP spectrometer analysis

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 1003 mg/L

Method: Precipitation using barium chloride, filter, ignite and weigh as BaSO₄.

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	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	Sr	<0.001
Be	<0.001	Li	<0.001	Sb	<0.001
Bi	<0.001	Mg	0.005	Ti	<0.002
Ca	0.009	Mn	<0.001	Tl	<0.001
Cr	<0.004	Mo	<0.001	V	<0.001
Cd	<0.001	Na	0.02	Zr	<0.001
Co	<0.001	Ni	<0.001	Zn	0.0075

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 '03

Certifying Officer: N. Kocherakota

SPEXTM Certificate

Certificate of Reference Material

010225

Catalog Number: PLTH2-2X/2Y

Lot No. 10-24TH

Description: 1000 mg/L Thorium

Matrix: 2% HNO₃

This ASSURANCE[®] certified reference material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 999 mg/L

Uncertainty Associated with Measurement: ± 3.0 mg/L

Certified Value is Traceable to: NIST SRM #3159

The CRM is prepared gravimetrically using high purity Th(NO₃)₄·4H₂O Lot# 01851R. The certified value listed is the average of values obtained by classical wet assay and ICP spectrometer analysis

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 1000 mg/L

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

Instrumentation Analysis By ICP spectrometer: 998 mg/L

Uncertified Properties:

Density: 1.010 @ 22.0 Degrees Celsius

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

Element	mg/L	Element	mg/L	Element	mg/L
Ce	0.01	La	0.003	Tb	<0.001
Ca	0.27	Lu	<0.001	Tm	<0.001
Dy	<0.001	Mn	<0.001	Ti	<0.002
Er	<0.001	Mo	<0.001	Ta	<0.001
Eu	<0.001	Nd	0.003	Tl	<0.001
Fe	<0.01	Ni	<0.001	V	<0.001
Gd	<0.001	Na	0.04	W	<0.001
Ga	<0.001	Pr	<0.001	Y	0.002
Hf	<0.001	Rb	<0.001	Yb	<0.001
Ho	<0.001	Sc	<0.03	Zr	<0.001
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 $\pm 0.5\%$ 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: AUG '03

Certifying Officer: N. Kocherakota

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 09/05/03
DATE EXPIRED: 08/30/2004
DATE OPENED: 09/05/03
INORG: 4233 PO: F52225

SPEX CertificateTM

Certificate of Reference Material

010226

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 06/30/03
DATE EXPired: 06/30/2004
DATE OPENED: 06/23/03
INDRG: AIR2 PO: F52370

Catalog Number: PLU2-2X/2Y**Lot No.** 9-179U**Description:** 1000 mg/L Uranium**Matrix:** 2% HNO₃

This ASSURANCE[®] certified reference material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 999.5 mg/L**Uncertainty Associated with Measurement:** +/- 3 mg/L**Certified Value is Traceable to:** NIST SRM 3164.

The CRM is prepared gravimetrically using high purity Uranium Oxide Lot# 04001D. The certified value listed is the average of values obtained by classical wet assay and ICP spectrometer analysis

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 999 mg/L**Method:** Evaporate to dryness. Ignite and weigh as U₃O₈.**Instrumentation Analysis By ICP spectrometer:** 1000 mg/L**Uncertified Properties:****Density:** 1.010 @ 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	0.005	Cu	0.02	Pb	0.004
As	0.06	Fe	0.011	Rb	<0.001
Ag	<0.001	Ga	<0.001	Re	<0.001
B	<0.005	In	<0.001	Si	<0.10
Ba	0.004	K	0.008	Sr	0.003
Be	<0.001	Li	<0.001	Sb	0.003
Bi	<0.001	Mg	0.003	Ti	<0.001
Ca	0.012	Mn	0.003	Tl	<0.001
Cr	<0.010	Mo	0.006	V	<0.003
Cd	<0.001	Na	0.10	Zr	<0.001
Co	<0.001	Ni	<0.001	Zn	0.008

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 '03**Certifying Officer:** N. Kocherakota

SPEXTM Certificate

Certificate of Reference Material

010227

Catalog Number: PLW9-2X/2Y

Lot No. 9-177W

Description: 1000 mg/L Tungsten

Matrix: H₂O

This ASSURANCE[®] certified reference material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 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
Al	0.002	Cu	<0.001	Pb	<0.001
As	0.01	Fe	<0.01	Rb	<0.001
Ag	<0.003	Ga	<0.001	Re	0.004
B	<0.005	In	<0.001	Si	.56
Ba	<0.001	K	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	Tl	<0.001
Cr	<0.001	Mo	0.005	V	0.001
Cd	<0.001	Na	0.03	Zr	<0.001
Co	0.001	Ni	<0.001	Zn	0.01

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: AUG 03 **Certifying Officer:** N. Kocherakota

INORGANIC LABS/RADCHEM LABS
 DATE RECEIVED: 08/11/03
 DATE EXPIRED: 08/15/2004
 DATE OPENED: 08/13/03
 INORG: 4012 PO: F52018

SPEXertificateTM

Certificate of Reference Material

010228

Catalog Number: PLZR2-2X/2Y/2T

Lot No. 10-05ZR

Description: 1000 mg/L Zirconium

Matrix: 2% HNO₃

This ASSURANCE[®] certified reference material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 997 mg/L

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

Certified Value is Traceable to: NIST SRM 3169

The CRM is prepared gravimetrically using high purity Zirconyl Nitrate Lot# 11011C. 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 ZrO₂.

Instrumentation Analysis By ICP spectrometer: 997 mg/L

Uncertified Properties:

Density: 1.010 @ 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	0.03	Cu	0.002	Pb	0.002
As	<0.001	Fe	0.017	Rb	<0.001
Ag	<0.05	Ga	<0.001	Re	<0.001
B	<0.004	In	<0.001	Si	0.10
Ba	<0.001	K	0.10	Sr	<0.001
Be	<0.001	Li	0.002	Sb	<0.001
Bi	<0.001	Mg	0.003	Ti	<0.001
Ca	0.11	Mn	<0.001	Tl	<0.001
Cr	<0.009	Mo	<0.001	V	<0.001
Cd	0.004	Na	0.04	Zn	0.02
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.

Date of Certification: AUG 03 **Certifying Officer:** N. Kocherakota

DATE RECEIVED: 08/11/03
DATE EXPIRED: 08/15/2004
DATE OPENED: 08/13/03
INDRG: 4013 PO: F52218

SPEXTM Certificate

Certificate of Reference Material

010229

Catalog Number: PLNA2-3X/3Y

Lot No. T8-73NA

Description: 10,000 mg/L Sodium

Matrix: 5% HNO₃

This ASSURANCE[®] certified reference material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 10,036.5 mg/L

Uncertainty Associated with Measurement: +/- 30 mg/L

Certified Value is Traceable to: NIST SRM 3152a

The CRM is prepared gravimetrically using high purity Sodium Carbonate Lot# 02021A. 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: 10,039 mg/L

Method: Evaporate to dryness. Fume with Sulfuric Acid. Ignite and weigh as Na₂SO₄.

Instrumentation Analysis By ICP spectrometer: 10,034 mg/L

Uncertified Properties:

Density: 1.048 @ 23.9 Degrees Celsius

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

Element	mg/L	Element	mg/L	Element	mg/L
Al	0.02	Cu	<0.002	Pb	<0.001
As	<0.08	Fe	0.03	Re	<0.001
Ag	<0.02	Ga	<0.001	Rb	<0.001
B	<0.1	In	<0.001	Sr	<0.001
Ba	0.008	K	1.36	Sb	<0.001
Be	<0.01	Li	<0.002	Sn	<0.001
Bi	<0.001	Mg	0.60	Ti	<0.03
Ca	0.60	Mn	<0.02	Tl	<0.001
Cr	0.002	Mo	<0.001	V	<0.001
Cd	<0.01	Ni	<0.003	Zr	<0.001
Co	<0.001			Zn	<0.05

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

Date of Certification: FEB -- '03

Certifying Officer: N. Kocherakota

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 02/13/03
DATE EXPIRED: 02/15/2004
DATE OPENED: 02/13/03
INORG: 3951 PO: F58060

SPE Certificate™

Certificate of Reference Material

010230

Catalog Number: ICV-2A Lot No.: 22-12AS
Description: Initial Calibration Verification Standard II
Matrix: 5% Nitric Acid

This ASSURANCE® certified reference material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

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

Refer to side 2 for details of measurement uncertainties.

Instrumental Analysis by ICP Spectrometer:

Element	Labeled (mg/L)	Measured (mg/L)	NIST SRM	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	3168a

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.

NOV -- '02

Date of Certification: _____ Certifying Officer: N. Kocherakota

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 11/19/02
DATE EXPIRED: 11/30/2003
DATE OPENED: 11/19/02
INORG: 3223
PO: FS2064
AP

SPE Certificate™

010231

Certificate of Reference Material

Catalog Number: PLSB7-2X/2Y/2T **Lot No.:** 8-175SB-X/Y/T
Description: 1000 mg/L Antimony
Matrix: Water/0.6% Tartaric Acid/tr HNO₃

This ASSURANCE® certified reference material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: Antimony(Sb): 999 mg/L $\pm$ 3 mg/L
Traceable to: NIST SRM 3102a

The CRM is prepared gravimetrically using high purity Antimony Metal (Sb) Lot#R1198A. 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: 998 mg/L

Method: Gravimetric analysis by evaporating to dryness, fuming with Nitric Acid, igniting and weighing as Sb₂O₄.

Instrumental Analysis by ICP spectrometer: 1000 mg/L

Uncertified Properties:

Density: 1.007 at 24.0°C

Trace Metallic Impurities in the Actual Solution via ICP Analysis:

Element	mg/L	Element	mg/L	Element	mg/L
Ag	<0.001	Cu	<0.001	Pb	<0.001
Al	0.030	Fe	0.013	Rb	<0.001
As	0.001	Ga	<0.001	Re	<0.001
B	<0.001	In	<0.001	Sn	<0.001
Ba	<0.001	K	0.030	Sr	<0.001
Be	<0.001	Li	<0.001	Ti	0.001
Bi	<0.001	Mg	0.003	Tl	<0.001
Ca	0.012	Mn	<0.001	V	<0.001
Cd	<0.001	Mo	<0.001	Zn	<0.010
Co	<0.001	Na	0.005	Zr	<0.001
Cr	<0.001	Ni	<0.001		

Balances are calibrated regularly with weight sets traceable to NIST#s 32856, 32867 and others. This CRM is guaranteed stable to $\pm$ 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: NOV -- '02 **Certifying Officer:** N. Kocherakota

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 11/19/02
DATE EXPIRED: 11/30/03
DATE OPENED: 11/19/02
INORG: 3724 PO: F53064

010232

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 11/16/02
DATE EXPIRED: 11/30/2003
DATE OPENED: 11/19/02
INORG: 3775 PO: F53064

SPX Certificate™

Certificate of Reference Material

Catalog Number: ICV-2C **Lot No.:** 22-13AS
Description: Initial Calibration Verification Standard II
Matrix: 5% Nitric Acid

This ASSURANCE® certified reference material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

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

Refer to side 2 for details of measurement uncertainties.

Instrumental Analysis by ICP Spectrometer:

Element	Labeled (mg/L)	Measured (mg/L)	NIST SRM
As	500	497.85	3103a
Pb	500	495.41	3128
Se	500	501.98	3149
TL	500	501.89	3158
Cd	100	99.77	3108

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

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: NOV -- '02 Certifying Officer: N. Kocherakota

010233

SPEXTM Certificate

Certificate of Reference Material

Catalog Number: PLP9-2X/2Y/2T

Lot No. 9-150P

Description: 1000 mg/L Phosphorus

Matrix: H₂O

This ASSURANCE[®] certified reference material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 1002.5 mg/L

Uncertainty Associated with Measurement: +/- 3 mg/L

Certified Value is Traceable to: NIST SRM 3139a

The CRM is prepared gravimetrically using high purity (NH₄)H₂(PO₄) Lot# W1002B. 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 Magnesia Mixture. Filter, ignite, and weigh as Mg₂P₂O₇.

Instrumentation Analysis By ICP spectrometer: 1002 mg/L

Uncertified Properties:

Density: 0.9996 @ 24.0 Degrees Celsius

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

Element	mg/L	Element	mg/L	Element	mg/L
Al	0.002	Cu	<0.001	Pb	<0.001
As	0.001	Fe	<0.001	Rb	<0.001
Ag	<0.002	Ga	<0.001	Re	<0.001
B	<0.002	In	<0.001	Sn	<0.001
Ba	<0.001	K	0.006	Sr	<0.001
Be	<0.001	Li	<0.001	Sb	0.004
Bi	<0.001	Mg	<0.001	Ti	0.004
Ca	0.004	Mn	<0.001	Tl	<0.001
Cr	<0.008	Mo	<0.001	V	<0.006
Cd	<0.001	Na	0.003	Zr	<0.001
Co	<0.001	Ni	<0.001	Zn	0.07

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: OCT -- 2003

Certifying Officer: N. Kocherakota

INORGANIC LABS/RADCHEM LABS
 DATE RECEIVED: 10/31/03
 DATE EXPIRED: 10/31/2004
 DATE OPENED: 11/30/03
 INORG: 4304 PO: F52261

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 10/31/03
DATE EXPIRED: 10/31/2004
DATE OPENED: 11/3/03
INORG: 4308 PO: F502061

SPEX Certificate TM

Certificate of Reference Material

010234

Catalog Number: PLSR2-2X/2Y/2T **Lot No.** 9-166SR
Description: 1000 mg/L Strontium in 2% HNO₃
Matrix: 2% HNO₃

This **ASSURANCE**® certified reference material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICPOES, DCP, AA, ICPMS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 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

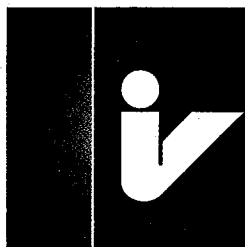
Trace Metallic Impurities in the Actual Solution via ICP / ICPMS Analysis:

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
B	<0.003	In	<0.001	Si	0.043
Ba	0.008	K	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.

Date of Certification: OCT -- 2003

Certifying Officer: N. Kocherakota



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 10235

Catalog Number: CGAL10-1 and CGAL10-5
Lot Number: W-AL04008
Starting Material: Al metal
Starting Material Purity (%): 99.998460
Starting Material Lot No 607116
Matrix: 5% (abs) HNO₃

INORGANIC LABS/RADCHEM LABS Pg. 1 of 2
DATE RECEIVED: 08/26/03
DATE EXPIRED: 09/01/2004
DATE OPENED: 08/26/03
INORG: 4220 PO: F52224

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:

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

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

$\sum s_i^2$ = The summation of all significant estimated errors

(Most common are the errors from instrumental measurement, weighing, dilution to volume, and the fixed error reported on the NIST SRM certificate of analysis.)

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

4.0 TRACEABILITY TO NIST AND VALUES OBTAINED BY INDEPENDENT METHODS

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

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

4.1 Assay Method #1 10006 ± 55 µg/mL

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. **010236**

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	<u>M</u> Dy < 0.02695	<u>O</u> Li 0.00011	<u>M</u> Pr < 0.00135	<u>M</u> Te < 0.13473
<u>M</u> Sb < 0.00225	<u>M</u> Er < 0.02245	<u>M</u> Lu < 0.00180	<u>M</u> Re < 0.00449	<u>M</u> Tb < 0.00135
<u>M</u> As < 0.04491	<u>M</u> Eu < 0.01347	<u>O</u> Mg 0.00470	<u>M</u> Rh < 0.00449	<u>M</u> Tl < 0.00449
<u>M</u> Ba < 0.04491	<u>M</u> Gd < 0.00449	<u>M</u> Mn < 0.01796	<u>M</u> Rb < 0.00449	<u>M</u> Th < 0.00449
<u>O</u> Be < 0.00017	<u>M</u> Ga < 0.00449	<u>O</u> Hg < 0.00700	<u>M</u> Ru < 0.00898	<u>M</u> Tm < 0.00180
<u>M</u> Bi < 0.00180	<u>M</u> Ge < 0.02695	<u>M</u> Mo < 0.00898	<u>M</u> Sm < 0.00449	<u>M</u> Sn < 0.02245
<u>O</u> B 0.01164	<u>M</u> Au < 0.01347	<u>M</u> Nd < 0.00898	<u>M</u> Sc < 0.04491	<u>M</u> Ti < 0.22454
<u>M</u> Cd < 0.01347	<u>M</u> Hf < 0.00898	<u>O</u> Ni < 0.00600	<u>M</u> Se < 0.03593	<u>M</u> W < 0.04491
<u>O</u> Ca 0.01903	<u>M</u> Ho < 0.00225	<u>M</u> Nb < 0.00225	<u>O</u> Si 0.07389	<u>M</u> U < 0.00898
<u>M</u> Ce < 0.02245	<u>O</u> In < 0.03000	<u>n</u> Os	<u>M</u> Ag < 0.00898	<u>M</u> V < 0.00898
<u>M</u> Cs < 0.00135	<u>M</u> Ir < 0.02245	<u>M</u> Pd < 0.02245	<u>O</u> Na 0.03359	<u>M</u> Yb < 0.00449
<u>O</u> Cr 0.00336	<u>O</u> Fe 0.00493	<u>O</u> P < 0.03000	<u>M</u> Sr < 0.00225	<u>M</u> Y < 0.17963
<u>M</u> Co < 0.01347	<u>M</u> La < 0.00225	<u>M</u> Pt < 0.00898	<u>O</u> S < 0.10000	<u>M</u> Zn < 0.08982
<u>M</u> Cu < 0.02695	<u>M</u> Pb < 0.01347	<u>O</u> K 0.02911	<u>M</u> Ta < 0.03144	<u>M</u> Zr < 0.02245

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 $20 \pm 4^\circ\text{C}$. 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; $\text{Al}(\text{H}_2\text{O})_6^{3+}$

Chemical Compatibility - Soluble in HCl , HNO_3 , HF and H_2SO_4 . Avoid neutral media. Soluble in strongly basic NaOH forming the $\text{Al}(\text{OH})_4^-(\text{H}_2\text{O})_2^-$ 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% HNO_3 / LDPE container. 1-10,000 ppm solutions chemically stable for years in 2-5% HNO_3 / LDPE container.

Al Containing Samples (Preparation and Solution) - Metal (Best dissolved in HCl / HNO_3); α - Al_2O_3 (Na_2CO_3 fusion in Pt°); γ - Al_2O_3 (Soluble in acids such as HCl); Ores (Carbonate fusion in Pt° followed by HCl dissolution); Organic Matrices (sulfuric/peroxide digestion or nitric / sulfuric / perchloric acid decomposition, or dry ash and dissolution in dilute HCl).

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

Technique/Line	Estimated D.L.	Order	Type	Interferences (underlined indicates severe at λ lines)
ICP-OES 394.401 nm	0.05 / 0.006 $\mu\text{g/mL}$	1	atom	U, Ce
ICP-OES 396.152 nm	0.03 / 0.006 $\mu\text{g/mL}$	1	atom	Mo, Zr, Ce
ICP-OES 167.078 nm	0.1 / 0.009 $\mu\text{g/mL}$	1	ion	Fe
ICP-MS 27 amu	30 ppt	nd	M'	^{12}C ^{14}N , ^{13}C ^{14}N , ^1H ^{12}C ^{14}N , ^1H ^{16}O , ^{54}Cr , ^{56}Fe

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

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

10.0 QUALITY STANDARD DOCUMENTATION

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

Recognized by:

Registrar Accreditation Board (ANSI-RAB)

Standards Council of Canada (SCC)

Dutch Council for Accreditation (RVA)

Entidad Mexicana de Acreditacion, a.c.(EMA)

Members of IQ Net International Certification Network:

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

10.2 ISO/IEC 17025 - 1999 "General Requirements for the Competence of Testing and Calibration"

- Chemical Testing - Accredited A2LA Certificate Number 883.01



10.3 ISO/IEC Guide 34 - 2000 "General Requirements for the Competence of Reference Material Producers"

- Reference Materials Production - Accredited A2LA Certificate Number 883.02

A2LA Mutual Recognition Agreement Partners:

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

10.4 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

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

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

INORGANIC LABS/RADCHEM LABS Pg. 2 of 2

DATE RECEIVED: 08/26/03

DATE EXPIRED: 09/01/2004

DATE OPENED: 08/26/03

INORG: 4220 PD: F52224



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 13, 2003

Expiration Date:

EXPIRES
1/2004

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By: JoAnn Struthers, QA Administrative Assistant

JoAnn Struthers

Certificate Approved By: Katalin Le, QC Supervisor

Katalin Le

Certifying Officer: Paul Gaines, Chemist, Senior Technical Director

Paul Gaines

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."

010239

2.0 DESCRIPTION OF CRM Custom-Grade 10000 µg/mL Calcium in 1.4% (abs) HNO₃

Catalog Number: CGCA10-1 AND CGCA10-5
Lot Number: T-CA03010
Starting Material: CaO
Starting Material Purity (%): 99.9981
Starting Material Lot No: C27L01
Matrix: 1.4% (abs) HNO₃

INORGANIC LABS/RADCHEM LABS Pg. 1 of 2
DATE RECEIVED: 01/09/03
DATE EXPIRED: 02/01/2004
DATE OPENED: 01/10/03
INORG: 3900 PO: F52071

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Concentration: 10,007 ± 22 µg/mL

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

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

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

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

(Most common are the errors from instrumental measurement, weighing, dilution to volume, and the fixed error reported on the NIST SRM certificate of analysis.)

$$\text{Uncertainty } (\pm) = \frac{2(\sum S)^{1/2}}{(n)^{1/2}}$$

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 10,034 ± 25 µg/mL
ICP Assay NIST SRM 3109a Lot Number: 000622
Assay Method #2 10,007 ± 22 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>Q</u> Al 0.00064	<u>M</u> Dy < 0.02560	<u>Q</u> Li < 0.00002	<u>M</u> Pr < 0.00128	<u>M</u> Te < 0.12798
<u>M</u> Sb < 0.00213	<u>M</u> Er < 0.02133	<u>M</u> Lu < 0.00171	<u>M</u> Re < 0.00427	<u>M</u> Tb < 0.00128
<u>M</u> As < 0.04266	<u>M</u> Eu < 0.01280	<u>Q</u> Mg 0.07143	<u>M</u> Rh < 0.00427	<u>M</u> Tl < 0.00427
<u>Q</u> Ba 0.00071	<u>M</u> Gd < 0.00427	<u>Q</u> Mn 0.00041	<u>M</u> Rb < 0.00427	<u>M</u> Th < 0.00427
<u>Q</u> Be < 0.00009	<u>M</u> Ga < 0.00427	<u>Q</u> Hg < 0.01100	<u>M</u> Ru < 0.00853	<u>M</u> Tm < 0.00171
<u>M</u> Bi < 0.00171	<u>M</u> Ge < 0.02560	<u>M</u> Mo < 0.00853	<u>M</u> Sm < 0.00427	<u>M</u> Sn < 0.02133
<u>Q</u> B < 0.00054	<u>M</u> Au < 0.01280	<u>M</u> Nd < 0.00853	<u>Q</u> Sc < 0.00002	<u>M</u> Ti < 0.21329
<u>Q</u> Cd < 0.00450	<u>M</u> Hf < 0.00853	<u>Q</u> Ni < 0.00230	<u>Q</u> Se < 0.00620	<u>M</u> W < 0.04266
<u>S</u> Ca	<u>M</u> Ho < 0.00213	<u>M</u> Nb < 0.00213	<u>Q</u> Si 0.00214	<u>M</u> U < 0.00853
<u>M</u> Ce < 0.02133	<u>Q</u> In < 0.00200	<u>n</u> Os	<u>Q</u> Ag < 0.04000	<u>Q</u> V < 0.00090
<u>M</u> Cs < 0.00128	<u>M</u> Ir < 0.02133	<u>M</u> Pd < 0.02133	<u>Q</u> Na 0.00571	<u>M</u> Yb < 0.00427
<u>Q</u> Cr 0.00238	<u>Q</u> Fe < 0.00110	<u>Q</u> P < 0.00480	<u>Q</u> Sr 0.08095	<u>M</u> Y < 0.17064
<u>Q</u> Co < 0.00120	<u>M</u> La < 0.00213	<u>M</u> Pt < 0.00853	<u>Q</u> S 0.04048	<u>Q</u> Zn 0.07381
<u>Q</u> Cu 0.00405	<u>M</u> Pb < 0.01280	<u>Q</u> K < 0.00170	<u>M</u> Ta < 0.02986	<u>M</u> Zr < 0.02133

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

010241

Storage & Handling - Keep tightly sealed when not in use. Store and use at $20 \pm 4^\circ\text{C}$. Do not pipet from container. Do not return portions removed for pipetting to container.

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 40.078; +2; 6; $\text{Ca}(\text{H}_2\text{O})_6^{2+}$

Chemical Compatibility - Soluble in HCl and HNO_3 . Avoid H_2SO_4 , HF, H_3PO_4 and neutral to basic media. Stable with most metals and inorganic anions forming insoluble silicate, carbonate, hydroxide, oxide, fluoride, sulfate, oxalate, chromate, arsenate and tungstate in neutral aqueous media.

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

Ca Containing Samples (Preparation and Solution) - Metal (best dissolved in diluted HNO_3), Ores (Carbonate fusion in Pt° followed by HCl dissolution); Organic Matrices (dry ash and dissolution in dilute HCl. Do not heat when dissolving to avoid precipitation of SiO_2). The oxide, hydroxide, carbonate, phosphate, and fluoride of calcium are soluble in % levels of HCl or HNO_3 . The sulfates (gypsum, arhydrite, etc.), certain silicates and complex compounds require fusion with Na_2CO_3 , followed by HCl / water dissolution. Contamination is a very real problem when analyzing for trace levels.

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

Technique/Line	Estimated D.L.	Order	Type	Interferences (underlined indicates severe at concs.)
ICP-OES 393.366 nm	0.0002 / 0.00004 $\mu\text{g/mL}$	1	ion	U, Ce
ICP-OES 396.847 nm	0.0005 / 0.00006 $\mu\text{g/mL}$	1	ion	Th
ICP-OES 422.673 nm	0.01 / 0.001 $\mu\text{g/mL}$	1	atom	Ge
ICP-MS 44 amu	1200 ppt	n/a	M	"O", "C", "Si", "O", "Sr"

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

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

10.0 QUALITY STANDARD DOCUMENTATION

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

Recognized by:

Registrar Accreditation Board (ANSI-RAB)

Standards Council of Canada (SCC)

Dutch Council for Accreditation (RVA)

Entidad Mexicana de Acreditacion, a.c.(EMA)

Members of **IQ Net International Certification Network**:

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

10.2 ISO/IEC 17025 - 1999 "General Requirements for the Competence of Testing and Calibration"

- Chemical Testing - Accredited A2LA Certificate Number 883.01



10.3 ISO/IEC Guide 34 - 2000 "General Requirements for the Competence of Reference Material Producers"

- Reference Materials Production - Accredited A2LA Certificate Number 883.02

A2LA Mutual Recognition Agreement Partners:

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

10.4 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

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

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

INORGANIC LABS/RADCHEM LABS Pg. 2 of 2
 DATE RECEIVED: 01/09/03
 DATE EXPIRED: 02/01/2004
 DATE OPENED: 01/10/03
 INORG: 3900 PO: F52071

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: August 26, 2002

Expiration Date: **EXPIRES**
1E 2004

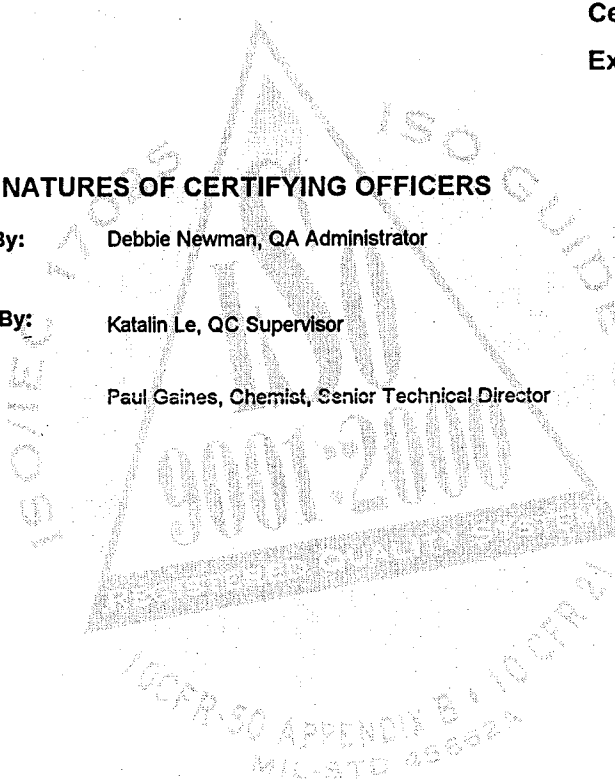
12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

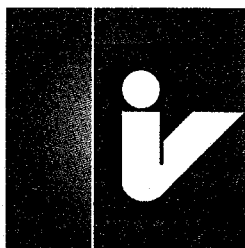
Certificate Prepared By: Debbie Newman, QA Administrator

Certificate Approved By: Katalin Le, QC Supervisor

Certifying Officer: Paul Gaines, Chemist, Senior Technical Director

Debbie Newman
Katalin Le
Paul Gaines





inorganic ventures / iv labs

195 lehigh avenue, suite 4, lakewood, nj 08701 usa
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e-mail: ivsales@ivstandards.com • website: www.ivstandards.com

certificate of analysis

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

010243

2.0 DESCRIPTION OF CRM Custom-Grade 10000 µg/mL Iron in 3.5% (abs) HNO₃

Catalog Number: CGFE10-1 and CGFE10-5
Lot Number: T-FE03028
Starting Material: Fe metal
Starting Material Purity (%): 99.9992
Starting Material Lot No: 23024
Matrix: 3.5% (abs) HNO₃

INORGANIC LABS/RADCHEM LABS Pg. 1 of 2
DATE RECEIVED: 2/28/03
DATE EXPIRED: 3/01/2004
DATE OPENED: 2/28/03
INORG: 3963 PO: F52064

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Concentration: 9920 ± 22 µg/mL

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

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

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

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

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

(Most common are the errors from instrumental measurement, weighing, dilution to volume, and the fixed error reported on the NIST SRM certificate of analysis.)

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

4.0 TRACEABILITY TO NIST AND VALUES OBTAINED BY INDEPENDENT METHODS

- "Property of the result of a measurement or the value of a standard whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons all having stated uncertainties." (ISO VIM, 2nd ed., 1993, definition 6.10)
- This IV product is Traceable to NIST via direct comparison to NIST SRMs. The uncertainties for each certified value are reported, taking into account the SRM uncertainty error and the measurement, weighing and volume dilution errors.

4.1 Assay Method #1

9920 ± 22 µg/mL
ICP Assay NIST SRM 3126a Lot Number: 000606

Assay Method #2

9962 ± 41 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.

010244

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> Al < 0.00270	<u>M</u> Dy < 0.02421	<u>Q</u> Li < 0.00003	<u>M</u> Pr < 0.00121	<u>M</u> Te < 0.12103
<u>M</u> Sb < 0.00202	<u>M</u> Er < 0.02017	<u>M</u> Lu < 0.00161	<u>M</u> Re < 0.00403	<u>M</u> Tb < 0.00121
<u>M</u> As < 0.04034	<u>M</u> Eu < 0.01210	<u>Q</u> Mg < 0.00006	<u>M</u> Rh < 0.00403	<u>M</u> Tl < 0.00403
<u>M</u> Ba < 0.04034	<u>M</u> Gd < 0.00403	<u>Q</u> Mn < 0.05000	<u>M</u> Rb < 0.00403	<u>M</u> Th < 0.00403
<u>Q</u> Be < 0.00005	<u>M</u> Ga 0.00394	<u>Q</u> Hg < 0.01100	<u>M</u> Ru < 0.00807	<u>M</u> Tm < 0.00161
<u>M</u> Bi < 0.00161	<u>i</u> Ge	<u>M</u> Mo < 0.00807	<u>M</u> Sm < 0.00403	<u>M</u> Sn 0.04920
<u>Q</u> B < 0.00090	<u>M</u> Au < 0.01210	<u>M</u> Nd < 0.00807	<u>M</u> Sc < 0.04034	<u>M</u> Ti < 0.20172
<u>M</u> Cd < 0.01210	<u>M</u> Hf < 0.00807	<u>Q</u> Ni < 0.00230	<u>M</u> Se < 0.03228	<u>M</u> W < 0.04034
<u>Q</u> Ca 0.00707	<u>M</u> Ho < 0.00202	<u>M</u> Nb < 0.00202	<u>Q</u> Si 0.00781	<u>M</u> U < 0.00807
<u>M</u> Ce < 0.02017	<u>M</u> In < 0.04034	<u>n</u> Os	<u>M</u> Ag < 0.00807	<u>M</u> V < 0.00807
<u>M</u> Cs < 0.00121	<u>M</u> Ir < 0.02017	<u>M</u> Pd < 0.02017	<u>Q</u> Na 0.00756	<u>M</u> Yb < 0.00403
<u>M</u> Cr 0.00541	<u>s</u> Fe	<u>i</u> P	<u>M</u> Sr < 0.00202	<u>M</u> Y < 0.16138
<u>Q</u> Co < 0.00110	<u>M</u> La < 0.00202	<u>M</u> Pt < 0.00807	<u>Q</u> S < 0.07200	<u>M</u> Zn 0.03739
<u>M</u> Cu < 0.02421	<u>M</u> Pb < 0.01210	<u>Q</u> K < 0.00170	<u>M</u> Ta < 0.02824	<u>M</u> Zr < 0.02017

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 $20 \pm 4^\circ\text{C}$. Do not pipet from container. Do not return portions removed for pipetting to container.

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 55.847; +3; 6; $\text{Fe}(\text{H}_2\text{O})_6^{3+}$

Chemical Compatibility - Stable in HCl , HNO_3 , H_2SO_4 , HF and H_3PO_4 . Avoid basic media. Stable with most metals and inorganic anions in acidic media.

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

Fe Containing Samples (Preparation and Solution) - Metal (Soluble in HCl); Oxides (If the oxide has been at a high temperature then Na_2CO_3 fusion in Pt^0 followed by HCl dissolution otherwise dissolve in dilute HCl); Ores (See Oxides above using only the fusion approach).

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

Technique/Line	Estimated D.L.	Order	Type	Interferences (underlined indicates severe at $\approx$ concs.)
ICP-OES 238.204 nm	0.005 / 0.001 $\mu\text{g/mL}$	1	ion	Ru, Co
ICP-OES 239.562 nm	0.005 / 0.001 $\mu\text{g/mL}$	1	ion	Co, W, Cr
ICP-OES 259.940 nm	0.006 / 0.001 $\mu\text{g/mL}$	1	ion	Hf, Nb
ICP-MS 56 amu	970 ppt	n/a	M*	$^{40}\text{Ar}^{15}\text{N}^+\text{H}$, $^{40}\text{Ar}^{16}\text{O}$, $^{36}\text{Ar}^{17}\text{O}^+\text{H}$, $^{38}\text{Ar}^{18}\text{O}$, $^{37}\text{Cl}^{18}\text{O}^+\text{H}$, $^{40}\text{Ca}^{16}\text{O}$

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

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

10.0 QUALITY STANDARD DOCUMENTATION

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

Recognized by:

Registrar Accreditation Board (ANSI-RAB)

Standards Council of Canada (SCC)

Dutch Council for Accreditation (RVA)

Entidad Mexicana de Acreditacion, a.c.(EMA)

Members of IQ Net International Certification Network:

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



10.2 ISO/IEC 17025 - 1999 "General Requirements for the Competence of Testing and Calibration"

- Chemical Testing - Accredited A2LA Certificate Number 883.01



10.3 ISO/IEC Guide 34 - 2000 "General Requirements for the Competence of Reference Material Producers"

- Reference Materials Production - Accredited A2LA Certificate Number 883.02

A2LA Mutual Recognition Agreement Partners:

Australia (NATA), Austria (BrmWA), 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 Pg. 2 of 2

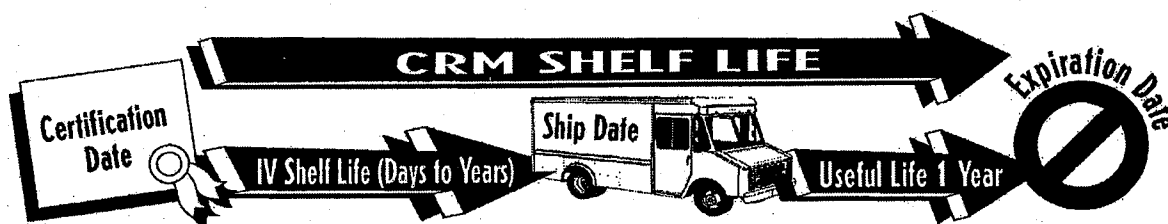
DATE RECEIVED: 2/28/03

DATE EXPIRED: 3/01/2004

DATE OPENED: 2/28/03

INORG: 3963 PO: F52064

11.0 DATE OF CERTIFICATION AND PERIOD OF VALIDITY



11.1 IV Shelf Life - The period of time during which the concentration of the analyte(s) in a properly packaged, unopened, and unused standard stored under environmentally controlled and monitored conditions will remain within the specified uncertainty range. Shelf life is limited primarily by transpiration (loss of water from the solution) and infrequently, by chemical instability. Transpiration studies (P-SP01020) of chemically-stable solutions performed at Inorganic Ventures / IV Labs indicate a CRM shelf-life of four years for solutions packaged in 500-mL low density polyethylene bottles. When stored under special conditions that minimize transpiration and instability, the shelf life can be extended past this limit.

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

Certification Date: October 11, 2002

Expiration Date: **EXPIRES**
12/2004

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By: Debbie Newman, QA Administrator

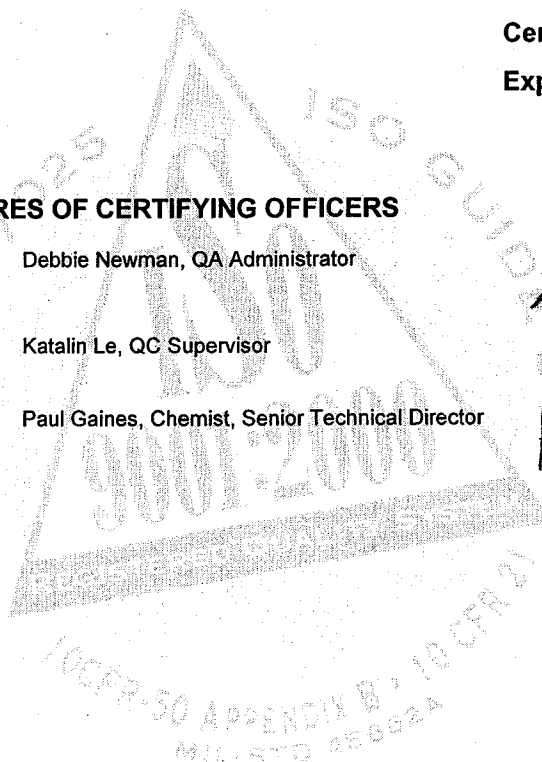
Debbie Newman

Certificate Approved By: Katalin Le, QC Supervisor

Katalin Le

Certifying Officer: Paul Gaines, Chemist, Senior Technical Director

Paul Gaines





Certificate of Analysis

CUSTOM-GRADE SOLUTION

Catalog Number: CGK10-1and CGK10-5

Lot Number: **T-K02102**

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

10,000 µg/mL Potassium in 1.4% HNO₃ (abs) **010247**

Potassium Nitrate
99.996%
K18J19

INORGANIC LABS/RADCHEM LABS

DATE RECEIVED: 10/22/02

DATE EXPIRED: 11/01/2003

DATE OPENED: 10/23/02

INORG: 3738 PO: F52057

CERTIFIED CONCENTRATION: 9999 ± 7 µg/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:

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

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

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

Classical Wet Assay: 9999 ± 7 µg/mL

Method: Gravimetric as the Sulfate vs NIST weights #822/254143-94.

Instrument Analysis: 10,002 ± 27 µg/mL

Method: Inductively Coupled Plasma Spectroscopy (ICP) vs NIST SRM 3141a.

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 µm.

Q Al <0.00090	M Dy <0.0060	Q Li <0.000030	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 Tb <0.00030
M As <0.010	M Eu <0.0030	Q Mg 0.00015	M Rh <0.0010	M Tl <0.0010
M Ba <0.010	M Gd <0.0010	Q Mn <0.000030	M Rb 0.50	M Th <0.0010
Q Be <0.00020	M Ga <0.0010	Q Hg <0.015	M Ru <0.0020	M Tm <0.00040
M Bi <0.00040	Q Ge <0.0015	M Mo <0.0020	M Sm <0.0010	M Sn <0.0050
Q B <0.00060	Q Au <0.0030	Q Nd <0.0020	Q Sc <0.000020	Q Ti <0.00070
M Cd <0.0030	M Hf <0.0020	Q Ni <0.0023	Q Se <0.05	M W <0.0010
Q Ca 0.0016	M Ho <0.00050	M Nb <0.00050	Q Si 0.0025	M U <0.0020
M Ce <0.0050	M In <0.0010	n Os	M Ag <0.0020	Q V <0.00090
M Cs <0.00030	M Ir <0.0050	M Pd <0.0050	Q Na 0.61	M Yb <0.0010
M Cr <0.0050	Q Fe 0.0024	Q P <0.0025	M Sr <0.00050	M Y <0.040
M Co <0.0030	M La <0.00050	M Pt <0.0020	Q S 0.021	Q Zn 0.0021
M Cu <0.0060	M Pb <0.0030	s K	M Ta <0.0070	M Zr <0.0050

M - checked by ICP-MS

Q - checked by ICP-OES

i - spectral interference

n - not checked for

s - solution standard element

ANALYZED DENSITY OF SOLUTION (measured at 22°C): **1.023 g/mL**

(over)

QA:KL Rev.032702DN

Inorganic Ventures, Inc.

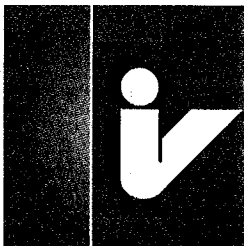
195 Lehigh Avenue • Suite 4 • Lakewood, NJ 08701

Orders: 800-669-6799 • FAX (732) 901-1903

Technical Support: 800-569-6799

Quality Assurance Manager

EXPIRES
12/2003



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."

010248

2.0 DESCRIPTION OF CRM Custom-Grade 10000 µg/mL Magnesium in 1.4% (abs) HNO₃

Catalog Number: CGMG10-1 and CGMG10-5
Lot Number: T-MG03006
Starting Material: Mg metal
Starting Material Purity (%): 99.9968
Starting Material Lot No: RML91191
Matrix: 1.4% (abs) HNO₃

INORGANIC LABS/RADCHEM LABS Pg. 1 of 2
DATE RECEIVED: 07/31/03
DATE EXPIRED: 08/01/2004
DATE OPENED: 08/01/03
INORG: 4204 PO: F52391

3.0 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:

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

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

$\sum s_i^2$ = 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 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.

<u>Q</u> Al 0.02454	<u>M</u> Dy < 0.02455	<u>Q</u> Li 0.00797	<u>M</u> Pr < 0.00123	<u>M</u> Te < 0.12275
<u>M</u> Sb 0.00306	<u>M</u> Er < 0.02046	<u>M</u> Lu < 0.00164	<u>M</u> Re < 0.00409	<u>M</u> Tb < 0.00123
<u>M</u> As < 0.04092	<u>M</u> Eu < 0.01228	<u>S</u> Mg	<u>M</u> Rh < 0.00409	<u>M</u> Tl < 0.00409
<u>M</u> Ba < 0.04092	<u>M</u> Gd < 0.00409	<u>M</u> Mn < 0.01637	<u>M</u> Rb < 0.00409	<u>M</u> Th < 0.00409
<u>Q</u> Be < 0.00017	<u>M</u> Ga < 0.00409	<u>Q</u> Hg < 0.00900	<u>M</u> Ru < 0.00818	<u>M</u> Tm < 0.00164
<u>M</u> Bi < 0.00164	<u>M</u> Ge < 0.02455	<u>M</u> Mo < 0.00818	<u>M</u> Sm < 0.00409	<u>M</u> Sn < 0.02046
<u>Q</u> B 0.00871	<u>M</u> Au < 0.01228	<u>M</u> Nd < 0.00818	<u>M</u> Sc < 0.04092	<u>Q</u> Ti 0.10206
<u>M</u> Cd < 0.01228	<u>M</u> Hf < 0.00818	<u>Q</u> Ni 0.01404	<u>M</u> Se < 0.03273	<u>M</u> W < 0.04092
<u>Q</u> Ca 0.01070	<u>M</u> Ho < 0.00205	<u>M</u> Nb < 0.00205	<u>Q</u> Si 0.03186	<u>M</u> U < 0.00818
<u>M</u> Ce < 0.02046	<u>M</u> In < 0.04092	<u>n</u> Os	<u>M</u> Ag < 0.00818	<u>M</u> V < 0.00818
<u>M</u> Cs < 0.00123	<u>M</u> Ir < 0.02046	<u>M</u> Pd < 0.02046	<u>Q</u> Na 0.01817	<u>M</u> Yb < 0.00409
<u>Q</u> Cr 0.02315	<u>Q</u> Fe 0.02467	<u>Q</u> P < 0.01600	<u>M</u> Sr < 0.00205	<u>M</u> Y < 0.16367
<u>M</u> Co < 0.01228	<u>M</u> La < 0.00205	<u>M</u> Pt < 0.00818	<u>n</u> S	<u>Q</u> Zn 0.01892
<u>Q</u> Cu 0.00672	<u>Q</u> Pb 0.03236	<u>Q</u> K < 0.05000	<u>M</u> Ta < 0.02864	<u>M</u> Zr < 0.02046

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 010250

Storage & Handling - Keep tightly sealed when not in use. Store and use at $20 \pm 4^\circ\text{C}$. 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; $\text{Mg}(\text{H}_2\text{O})_6^{2+}$

Chemical Compatibility - Soluble in HCl , HNO_3 , and H_2SO_4 ; avoid HF , H_3PO_4 , and neutral to basic media. Stable with most metals and inorganic anions forming insoluble silicates, carbonates, hydroxides, oxides, and tungstates in neutral and slightly acidic media.

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

Mg Containing Samples (Preparation and Solution) - Metal (Best dissolved in diluted HNO_3); Oxide (Readily soluble in above compatible aqueous acidic solutions); Ores (Carbonate fusion in Pt^0 followed by HCl dissolution); Organic Matrices (Sulfuric / peroxide digestion or nitric / sulfuric / perchloric acid decomposition, or dry ash and dissolution in dilute HCl).

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

Technique/Line	Estimated D.L.	Order	Type	Interferences (underlined indicates severe at = concs.)
ICP-OES 279.553 nm	0.0002 / 0.00003 $\mu\text{g/mL}$	1	ion	Th
ICP-OES 280.270 nm	0.0003 / 0.00005 $\mu\text{g/mL}$	1	ion	U, V
ICP-OES 285.213 nm	0.002 / 0.00003 $\mu\text{g/mL}$	1	atom	U, Hf, Cr, Zr
ICP-MS 24 amu	42 ppt	n/a	M'	$^7\text{Li}^+\text{O}$, $^{47}\text{Ti}^{12}$, $^{40}\text{Ca}^{12}$

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

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

10.0 QUALITY STANDARD DOCUMENTATION

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

Recognized by:

Registrar Accreditation Board (ANSI-RAB)

Standards Council of Canada (SCC)

Dutch Council for Accreditation (RVA)

Entidad Mexicana de Acreditacion, a.c.(EMA)

Members of IQ Net International Certification Network:

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

10.2 ISO/IEC 17025 - 1999 "General Requirements for the Competence of Testing and Calibration"

- Chemical Testing - Accredited A2LA Certificate Number 883.01

10.3 ISO/IEC Guide 34 - 2000 "General Requirements for the Competence of Reference Material Producers"

- Reference Materials Production - Accredited A2LA Certificate Number 883.02

A2LA Mutual Recognition Agreement Partners:

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

10.4 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

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

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

INORGANIC LABS/RADCHEM LABS Pg. 2 of 2
 DATE RECEIVED: 07/31/03
 DATE EXPIRED: 08/01/2004
 DATE OPENED: 08/01/03
 INORG: 4204 PO: F52391





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 28, 2002

Expiration Date: **EXPIRES**
01/22/04

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

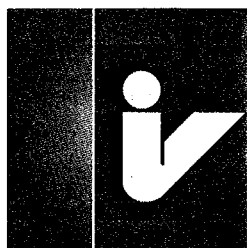
Certificate Prepared By: Debbie Newman, QA Administrator

Certificate Approved By: Katalin Le, QC Supervisor

Certifying Officer: Paul Gaines, Chemist, Senior Technical Director

Debbie Newman
Katalin Le
Paul Gaines

100CFR-50 APPENDIX B - 10/01/02
MIL-STD-45662A



inorganic ventures / iv labs

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

certificate of analysis

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

010252

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
Starting Material Purity (%): 99.999936
Starting Material Lot No: 42095
Matrix: 1.4% (abs) HNO₃

INORGANIC LABS/RADCHEM LABS Pg 1 of 2
DATE RECEIVED: 07/31/03
DATE EXPIRED: 08/01/2004
DATE OPENED: 08/01/03
INORG: 4205 PO: F52391

3.0 CERTIFIED VALUES AND UNCERTAINTIES

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:

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

$\bar{x}$ = mean
 x_i = individual results

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

n = number of measurements

$\sum s_i$ = The summation of all significant estimated errors

(Most common are the errors from instrumental measurement, weighing, dilution to volume, and the fixed error reported on the NIST SRM certificate of analysis.)

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

4.0 TRACEABILITY TO NIST AND VALUES OBTAINED BY INDEPENDENT METHODS

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

□ This IV product is Traceable to NIST via 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 10,067 ± 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.

010253

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 UPLA-Filtered Clean Room. An UPLA-Filter is 99.9985% efficient for the removal of particles down to 0.3 µm.

<u>O</u> Al < 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> Tl < 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> Ho < 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>S</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>O</u> K 0.00873	<u>M</u> Ta < 0.02915	<u>M</u> Zr < 0.02082

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

6.0 INTENDED USE

For the calibration of analytical instruments including but not limited to the following:

ICP-MS, ICP-OES, FAAS, GFAA, XRF, and DCP

For the validation of analytical methods

For the preparation of "working reference samples"

For interference studies and the determination of correction coefficients

For detection limit and linearity studies

For additional intended uses, contact IV Technical Staff

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

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

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 22.98977; +1; (6); Na⁺(aq) largely ionic in nature (Coordination Number in parentheses is assumed, not certain.)

Chemical Compatibility - Soluble in HCl, HNO₃, H₂SO₄, and HF aqueous matrices. Stable with all metals and inorganic anions.

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% HNO₃ / LDPE container.

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

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

Technique/Line	Estimated D.L.	Order	Type	Interferences (underlined indicates severe at 200 nm)
ICP-OES 589.595 nm	0.07 / 0.00009 µg/mL	1	atom	2 nd order radiation from R.E.s on some optical designs
ICP-OES 589.995 nm	0.03 / 0.006 µg/mL	1	atom	2 nd order radiation from R.E.s on some optical designs
ICP-OES 330.237 nm	2.0 / 0.09 µg/mL	1	atom	<u>Pd, Zn</u>
ICP-MS 23 amu	310 ppt	n/a	M'	⁴⁵ Ti ¹² , ⁴⁶ Ca ¹²

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

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

10.0 **QUALITY STANDARD DOCUMENTATION**

010254

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 24, 2003

Expiration Date:

EXPIRES
01/2004

INORGANIC LABS/RADCHEM LABS Pg. 2 of 2
DATE RECEIVED: 07/31/03
DATE EXPIRED: 08/01/2004
DATE OPENED: 08/01/03
INORG: 4205 PO: F52391

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

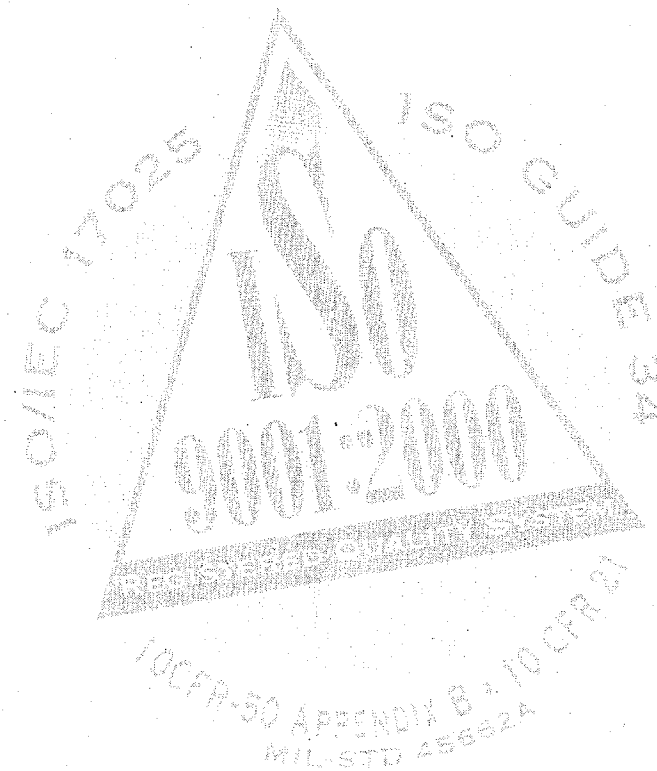
Certificate Prepared By: Debbie Newman, LIMS Administrator

Debbie Newman
Katalin Le

Certificate Approved By: Katalin Le, QC Supervisor

Certifying Officer: Paul Gaines, Chemist, Senior Technical Director

Paul Gaines 10255





Certificate of Analysis

CUSTOM-GRADE SOLUTION

1000 µg/mL Lithium in 0.1% HNO₃ (abs)

Catalog Number: CGLI1-1, CGLI1-2 and CGLI1-5

010256

Lot Number: **W-LI02066**

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

Li₂CO₃
99.999%
1053

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 06/20/03
DATE EXPIRED: 07/01/2004
DATE OPENED: 06/23/03
INORG: 4149 PO: F52370

CERTIFIED CONCENTRATION: 998 ± 2 µg/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:

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

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

$\sum s_i$ = 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 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 µm.

<u>Q</u> Al <0.010	<u>M</u> Dy <0.00060	<u>S</u> Li	<u>M</u> Pr <0.000030	<u>Q</u> Te <0.0090
<u>M</u> Sb <0.000050	<u>M</u> Er <0.00050	<u>M</u> Lu <0.000040	<u>M</u> Re <0.00010	<u>M</u> Tb <0.000030
<u>Q</u> As <0.044	<u>M</u> Eu <0.00030	<u>Q</u> Mg <0.00010	<u>M</u> Rh <0.00010	<u>M</u> Tl <0.00010
<u>M</u> Ba <0.0010	<u>M</u> Gd <0.00010	<u>Q</u> Mn <0.00020	<u>M</u> Rb <0.00010	<u>M</u> Th <0.00010
<u>Q</u> Be <0.000050	<u>M</u> Ga <0.00010	<u>Q</u> Hg <0.0070	<u>M</u> Ru <0.00020	<u>M</u> Tm <0.000040
<u>M</u> Bi <0.000040	<u>M</u> Ge <0.00060	<u>M</u> Mo <0.00020	<u>M</u> Sm <0.00010	<u>M</u> Sn <0.00050
<u>Q</u> B <0.0060	<u>Q</u> Au <0.010	<u>M</u> Nd <0.00020	<u>M</u> Sc <0.0010	<u>Q</u> Ti <0.00030
<u>Q</u> Cd <0.0018	<u>M</u> Hf <0.00020	<u>Q</u> Ni <0.0040	<u>Q</u> Se <0.020	<u>M</u> W <0.0010
<u>Q</u> Ca 0.051	<u>M</u> Ho <0.000050	<u>M</u> Nb <0.000050	<u>Q</u> Si 0.023	<u>M</u> U <0.00020
<u>M</u> Ce <0.00050	<u>Q</u> In <0.030	<u>n</u> Os	<u>Q</u> Ag <0.0040	<u>Q</u> V <0.0010
<u>M</u> Cs 0.0018	<u>M</u> Ir <0.00050	<u>M</u> Pd <0.00050	<u>Q</u> Na <0.10	<u>M</u> Yb <0.00010
<u>Q</u> Cr <0.0020	<u>Q</u> Fe <0.0020	<u>Q</u> P <0.030	<u>Q</u> Sr <0.0010	<u>M</u> Y <0.0040
<u>M</u> Co <0.00030	<u>M</u> La <0.000050	<u>M</u> Pt <0.00020	<u>Q</u> S <0.050	<u>Q</u> Zn <0.030
<u>M</u> Cu <0.00060	<u>M</u> Pb <0.00030	<u>Q</u> K 0.0070	<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

ANALYZED DENSITY OF SOLUTION (measured at 22°C): 1.004 g/mL

(over)

QA:KL Rev.022403DN

Paul R. James

Inorganic Ventures, Inc.

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Technical Support: 800-569-6799

Quality Assurance Manager

EXPIRES

01/22/04



Certificate of Analysis

CUSTOM-GRADE SOLUTION

1000 µg/mL Barium in 0.1% HNO₃ (abs)

010257

Catalog Number: CGBA1-1, CGBA1-2, and CGBA1-5

Lot Number: **T-BA02021**

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

Ba(NO₃)₂
99.999%
21879

INORGANIC LABS/RADCHEM LABS

DATE RECEIVED: 3/03/03

DATE EXPIRED: 3/01/2004

DATE OPENED: 3/04/03

INORG: 3971 PO: E52064

CERTIFIED CONCENTRATION: 1003 ± 2 µg/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:

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

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

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

Classical Wet Assay: 1003 ± 2 µg/mL

Method: Gravimetric as the Sulfate vs NIST weights #822/254143-94.

Instrument Analysis: 1002 ± 3 µg/mL

Method: Inductively Coupled Plasma Spectroscopy (ICP) vs NIST SRM 3104a.

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 µm.

<u>Q</u>	Al	<0.040	<u>M</u>	Dy	<0.00060	<u>M</u>	Li	<0.0010	<u>n</u>	Pr		<u>i</u>	Te	
<u>M</u>	Sb	<0.000050	<u>M</u>	Er	<0.00050	<u>M</u>	Lu	<0.000040	<u>M</u>	Re	<0.00010	<u>M</u>	Tb	<0.000030
<u>M</u>	As	<0.0010	<u>M</u>	Eu	<0.00030	<u>M</u>	Mg	<0.0030	<u>M</u>	Rh	<0.00010	<u>M</u>	Tl	<0.00010
<u>s</u>	Ba		<u>M</u>	Gd	0.0020	<u>M</u>	Mn	<0.00040	<u>M</u>	Rb	<0.00010	<u>M</u>	Th	<0.00010
<u>M</u>	Be	<0.000050	<u>M</u>	Ga	<0.00010	<u>i</u>	Hg		<u>M</u>	Ru	<0.00020	<u>M</u>	Tm	<0.000040
<u>M</u>	Bi	<0.000040	<u>M</u>	Ge	0.0010	<u>M</u>	Mo	<0.00020	<u>M</u>	Sm	<0.00010	<u>M</u>	Sn	<0.00050
<u>M</u>	B	<0.0070	<u>M</u>	Au	<0.00030	<u>M</u>	Nd	0.0020	<u>M</u>	Sc	<0.0010	<u>M</u>	Ti	<0.0050
<u>M</u>	Cd	<0.00030	<u>M</u>	Hf	<0.00020	<u>i</u>	Ni		<u>Q</u>	Se	<0.40	<u>M</u>	W	<0.0010
<u>Q</u>	Ca	<0.010	<u>M</u>	Ho	<0.000050	<u>M</u>	Nb	<0.000050	<u>Q</u>	Si	<0.020	<u>M</u>	U	<0.00020
<u>n</u>	Ce		<u>i</u>	In		<u>n</u>	Os		<u>M</u>	Ag	<0.00020	<u>M</u>	V	<0.00020
<u>n</u>	Cs		<u>M</u>	Ir	<0.00050	<u>M</u>	Pd	<0.00050	<u>Q</u>	Na	<0.090	<u>M</u>	Yb	<0.00010
<u>M</u>	Cr	<0.00050	<u>Q</u>	Fe	<0.050	<u>Q</u>	P	<0.050	<u>M</u>	Sr	0.0040	<u>M</u>	Y	<0.0040
<u>M</u>	Co	<0.00030	<u>n</u>	La		<u>M</u>	Pt	<0.00020	<u>n</u>	S		<u>Q</u>	Zn	<0.030
<u>M</u>	Cu	<0.00060	<u>M</u>	Pb	<0.00030	<u>n</u>	K		<u>M</u>	Ta	<0.00070	<u>M</u>	Zr	<0.00050

M - checked by ICP-MS

Q - checked by ICP-OES

i - spectral interference

n - not checked for

s - solution standard element

ANALYZED DENSITY OF SOLUTION (measured at 22°C): **1.000 g/mL**

(over)

QA:KLRev.112702DN

Inorganic Ventures, Inc.

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Technical Support: 800-569-6799

Quality Assurance Manager

EXPIRES
1/2004

inorganic ventures / iv labs

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 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 1000 µg/mL Beryllium in 2% (abs) HNO₃

Catalog Number: CGBE1-1, CGBE1-2, and CGBE1-5
 Lot Number: **W-BE01100**
 Starting Material: Be(OOCCH₃)₂
 Starting Material Purity (%): 99.999897
 Starting Material Lot No 01-10-01
 Matrix: 2% (abs) HNO₃

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Concentration: 991 ± 3 µg/mL

Certified Density: 1.022 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:

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

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

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

(Most common are the errors from instrumental measurement, weighing, dilution to volume, and the fixed error reported on the NIST SRM certificate of analysis.)

4.0 TRACEABILITY TO NIST AND VALUES OBTAINED BY INDEPENDENT METHODS

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

☐ This IV product is Traceable to NIST via 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

991 ± 3 µg/mL (Avg 2 runs)

ICP Assay NIST SRM 3105a Lot Number: 892707

INORGANIC LABS/RADCHEM LABS Pg. 1 of 2

DATE RECEIVED: 05/09/03

DATE EXPIRED: 06/01/2004

DATE OPENED: 05/12/03

INORG: 4062 PO: F52181

- 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> Al < 0.00800	<u>M</u> Dy < 0.01305	<u>Q</u> Li < 0.00002	<u>M</u> 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	<u>Q</u> Mg < 0.00003	<u>M</u> Rh < 0.00218	<u>M</u> Tl < 0.00218
<u>M</u> Ba < 0.02175	<u>M</u> Gd < 0.00218	<u>Q</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	<u>Q</u> Hg < 0.01500	<u>M</u> Ru < 0.00435	<u>M</u> 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>M</u> Nd < 0.00435	<u>Q</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>Q</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> V < 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	<u>M</u> Yb < 0.00218
<u>Q</u> Cr < 0.00900	<u>Q</u> Fe 0.00268	<u>n</u> P	<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	<u>I</u> S	<u>M</u> Zn < 0.04350
<u>M</u> Cu < 0.01305	<u>M</u> Pb < 0.00652	<u>Q</u> 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 - 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 - 9.01218; +2; 4; Be(H₂O)₄.¹²

Chemical Compatibility - Soluble in HCl, HNO₃, H₂SO₄, and HF aqueous matrices. Stable with all metals and inorganic anions.

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

Be Containing Samples (Preparation and Solution) - Meta l(is best dissolved in diluted H₂SO₄). BeO (boiling nitric, hydrochloric, or sulfuric acids or KHSO₄ fusion). Ores (H₂SO₄/HF digestion or carbonate fusion in Pt¹⁹). Organic Matrices (sulfuric/peroxide digestion or nitric/sulfuric/perchloric acid decomposition, or dry ash and dissolution according to the BeO procedure above).

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 axions.)
ICP-OES 313.042 nm	0.0003 / 0.00009 µg/mL	1	ion	V, Ce, U
ICP-OES 234.861 nm	0.0003 / 0.00016 µg/mL	1	atom	Fe, Ta, Mo
ICP-OES 313.107 nm	0.0007 / 0.0005 µg/mL	1	ion	Ce, Th, Tm
ICP-MS 9 amu	4 ppt	n/a	M'	

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

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

10.0 **QUALITY STANDARD DOCUMENTATION**

010260

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

Recognized by:

Registrar Accreditation Board (ANSI-RAB)

Standards Council of Canada (SCC)

Dutch Council for Accreditation (RVA)

Entidad Mexicana de Acreditacion, a.c.(EMA)

Members of IQ Net International Certification Network:

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

10.2 **ISO/IEC 17025 - 1999 "General Requirements for the Competence of Testing and Calibration"**

- Chemical Testing - Accredited A2LA Certificate Number 883.01



10.3 **ISO/IEC Guide 34 - 2000 "General Requirements for the Competence of Reference Material Producers"**

- Reference Materials Production - Accredited A2LA Certificate Number 883.02

A2LA Mutual Recognition Agreement Partners:

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

10.4 **10CFR50 Appendix B - Nuclear Regulatory Commission**

- Domestic Licensing of Production and Utilization Facilities

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

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

11.0 **DATE OF CERTIFICATION AND PERIOD OF VALIDITY**



11.1 **IV Shelf Life** - The period of time during which the concentration of the analyte(s) in a properly packaged, unopened, and unused standard stored under environmentally controlled and monitored conditions will remain within the specified uncertainty range. Shelf life is limited primarily by transpiration (loss of water from the solution) and infrequently, by chemical instability. Transpiration studies (P-SP01020) of chemically-stable solutions performed at Inorganic Ventures / IV Labs indicate a CRM shelf-life of four years for solutions packaged in 500-mL low density polyethylene bottles. When stored under special conditions that minimize transpiration and instability, the shelf life can be extended past this limit.

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

Certification Date: April 14, 2003

Expiration Date:

EXPIRES
12/2004

INORGANIC LABS/RADCHEM LABS Pg. 2 of 2
DATE RECEIVED: 05/09/03
DATE EXPIRED: 06/01/2004
DATE OPENED: 05/12/03
INORG: 4062 PO: F52181

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By: JoAnn Struthers, QA Administrative Assistant

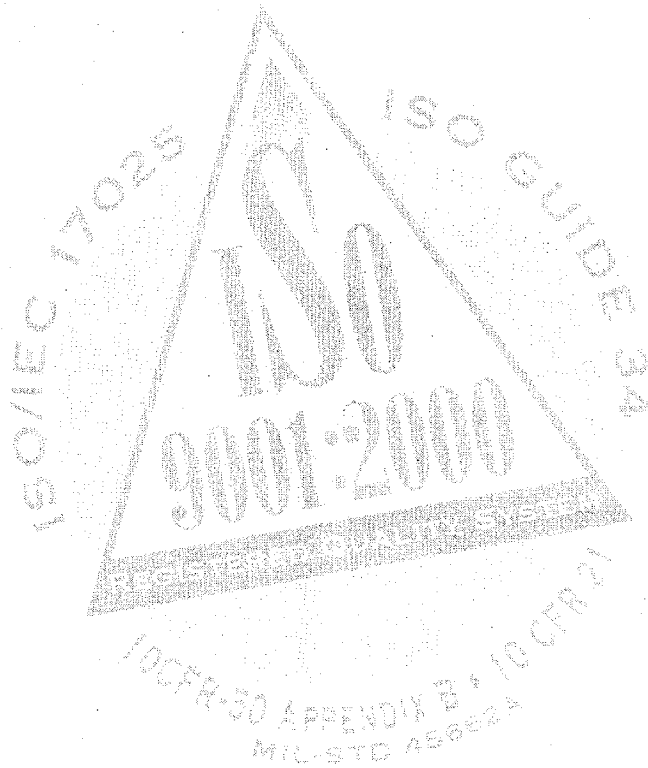
JoAnn Struthers

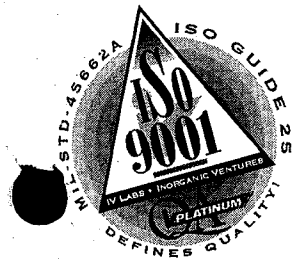
Certificate Approved By: Katalin Le, QC Supervisor

Katalin Le

Certifying Officer: Paul Gaines, Chemist, Senior Technical Director

Paul Gaines 010261





Certificate of Analysis

CUSTOM-GRADE SOLUTION 1000 µg/mL Chromium⁺³ in 1.4% HNO₃ (abs) **10262**
Catalog Number: CGCR(3)1-1, CGCR(3)1-2 and CGCR(3)1-5

Lot Number: **T-CR02125**

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

Chromium Metal
99.995%
F16122

INORGANIC LABS/RADCHEM LABS

DATE RECEIVED: 10/22/02

DATE EXPIRED: 11/01/2003

DATE OPENED: 10/23/02

INORG: 373a PO: F52057

CERTIFIED CONCENTRATION: 995 ± 3 µg/mL

The Certified Value is the instrument analysis value. The following equations are used in the calculation of the certified value and the uncertainty:

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

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

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

Instrument Analysis: 995 ± 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 µm.

<u>Q</u> Al 0.0028	<u>M</u> Dy <0.00060	<u>M</u> Li <0.0010	<u>M</u> Pr <0.000030	<u>M</u> Te <0.0030
<u>M</u> Sb <0.000050	<u>M</u> Er <0.00050	<u>M</u> Lu <0.000040	<u>M</u> Re <0.00010	<u>M</u> Tb <0.000030
<u>M</u> As <0.0010	<u>M</u> Eu <0.00030	<u>Q</u> Mg <0.010	<u>M</u> Rh <0.00010	<u>M</u> Tl <0.00010
<u>M</u> Ba <0.0010	<u>M</u> Gd <0.00010	<u>Q</u> Mn <0.050	<u>M</u> Rb 0.0066	<u>M</u> Th <0.00010
<u>M</u> Be <0.000050	<u>M</u> Ga 0.00070	<u>Q</u> Hg <0.10	<u>M</u> Ru 0.017	<u>M</u> Tm <0.000040
<u>M</u> Bi <0.000040	<u>M</u> Ge <0.00060	<u>M</u> Mo <0.00020	<u>M</u> Sm <0.00010	<u>M</u> Sn <0.00050
<u>M</u> B <0.0070	<u>M</u> Au <0.00030	<u>M</u> Nd <0.00020	<u>M</u> Sc <0.0010	<u>M</u> Ti <0.0050
<u>M</u> Cd <0.00030	<u>M</u> Hf <0.00020	<u>Q</u> Ni <0.10	<u>i</u> Se	<u>M</u> W <0.0010
<u>Q</u> Ca 0.0011	<u>M</u> Ho <0.000050	<u>M</u> Nb <0.000050	<u>Q</u> Si <0.10	<u>M</u> U <0.00020
<u>M</u> Ce <0.00050	<u>Q</u> In <0.10	<u>n</u> Os	<u>M</u> Ag 0.00070	<u>i</u> V
<u>M</u> Cs <0.000030	<u>M</u> Ir <0.00050	<u>M</u> Pd <0.00050	<u>Q</u> Na 0.016	<u>M</u> Yb <0.00010
<u>s</u> Cr	<u>Q</u> Fe <0.10	<u>i</u> P	<u>M</u> Sr <0.000050	<u>M</u> Y <0.0040
<u>Q</u> Co <0.10	<u>M</u> La <0.000050	<u>M</u> Pt <0.00020	<u>n</u> S	<u>Q</u> Zn <0.10
<u>M</u> Cu <0.00060	<u>M</u> Pb 0.00039	<u>n</u> K	<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

ANALYZED DENSITY OF SOLUTION (measured at 22°C): 1.010 g/mL

(over)

QA:KSL Rev.092502DN

Inorganic Ventures, Inc.

195 Lehigh Avenue • Suite 4 • Lakewood, NJ 08701

Orders: 800-669-6799 • FAX (732) 901-1903

Technical Support: 800-569-6799

Paul R. Gaines

Quality Assurance Manager

EXPIRES

11/2003



Certificate of Analysis

CUSTOM-GRADE SOLUTION 1000 µg/mL Copper in 2% HNO₃ (abs)

Catalog Number: CGCU1-1, CGCU1-2 and CGCU1-5

010263

Lot Number: **T-CU02060**

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

Copper Metal
99.999%
K09C13

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 02/13/03
DATE EXPIRED: 03/01/2004
DATE OPENED: 02/13/03
INORG: 3955 PO: F52060

CERTIFIED CONCENTRATION: 1005 ± 2 µg/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:

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

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

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

Classical Wet Assay: 1005 ± 2 µg/mL

Method: EDTA Titration vs NIST SRM 928 Lead Nitrate.

Instrument Analysis: 1003 ± 5 µg/mL

Method: Inductively Coupled Plasma Spectroscopy (ICP) vs NIST SRM 3114.

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 µm.

<u>Q</u> Al <0.010	<u>M</u> Dy <0.00060	<u>Q</u> Li <0.0050	<u>M</u> Pr <0.000030	<u>Q</u> Te <0.031
<u>M</u> Sb <0.000050	<u>M</u> Er <0.00050	<u>M</u> Lu <0.00004	<u>M</u> Re <0.00010	<u>M</u> Tb <0.000030
<u>Q</u> As <0.044	<u>M</u> Eu <0.00030	<u>Q</u> Mg 0.00080	<u>M</u> Rh 0.0010	<u>M</u> Tl <0.00010
<u>M</u> Ba <0.0010	<u>M</u> Gd <0.00010	<u>Q</u> Mn <0.00020	<u>M</u> Rb <0.00010	<u>M</u> Th <0.00010
<u>Q</u> Be <0.00020	<u>Q</u> Ga <0.0070	<u>Q</u> Hg <0.0070	<u>M</u> Ru <0.00020	<u>M</u> Tm <0.000040
<u>M</u> Bi 0.000090	<u>Q</u> Ge <0.010	<u>M</u> Mo <0.00020	<u>M</u> Sm <0.00010	<u>M</u> Sn 0.0013
<u>Q</u> B <0.0060	<u>Q</u> Au <0.010	<u>M</u> Nd <0.00020	<u>M</u> Sc <0.0010	<u>Q</u> Ti <0.00030
<u>Q</u> Cd <0.0018	<u>M</u> Hf <0.00020	<u>Q</u> Ni <0.0060	<u>Q</u> Se <0.020	<u>M</u> W <0.0010
<u>Q</u> Ca 0.00058	<u>M</u> Ho <0.000050	<u>M</u> Nb <0.00005	<u>Q</u> Si <0.0033	<u>M</u> U <0.00020
<u>M</u> Ce <0.00050	<u>Q</u> In <0.030	<u>Q</u> Os	<u>Q</u> Ag <0.0040	<u>M</u> V <0.00020
<u>M</u> Cs <0.000030	<u>M</u> Ir <0.00050	<u>M</u> Pd 0.0024	<u>Q</u> Na <0.10	<u>M</u> Yb <0.00010
<u>Q</u> Cr <0.0020	<u>Q</u> Fe <0.0020	<u>Q</u> P <0.030	<u>M</u> Sr <0.000050	<u>M</u> Y <0.0040
<u>M</u> Co <0.00030	<u>M</u> La <0.000050	<u>M</u> Pt <0.00020	<u>Q</u> S <0.050	<u>Q</u> Zn i
<u>s</u> Cu	<u>M</u> Pb 0.0029	<u>Q</u> K <0.0060	<u>M</u> Ta <0.00070	<u>M</u> Zr <0.00050

M - checked by ICP-MS

Q - checked by ICP-OES

i - spectral interference

n - not checked for

s - solution standard element

ANALYZED DENSITY OF SOLUTION (measured at 22°C): 1.015 g/mL

QA:KSL Rev.070302DN

(over)

Inorganic Ventures, Inc.

195 Lehigh Avenue • Suite 4 • Lakewood, NJ 08701

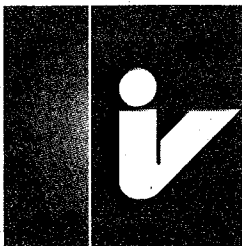
Orders: 800-669-6799 • FAX (732) 901-1903

Technical Support: 800-569-6799

Quality Assurance Manager

EXPIRES

12/2004



inorganic ventures / iv labs

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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."

010264

2.0 DESCRIPTION OF CRM Custom-Grade 1000 µg/mL Nickel in 1.4% (abs) HNO₃

Catalog Number: CGNI1-1, CGNI1-2, and CGNI1-5

Lot Number: T-NI02028

Starting Material: Ni pieces

Starting Material Purity (%): 99.9994

Starting Material Lot No L06L02

Matrix: 1.4% (abs) HNO₃

INORGANIC LABS/RADCHEM LABS Pg. 1 of 2
DATE RECEIVED: 02/13/03
DATE EXPIRED: 03/01/2004
DATE OPENED: 02/13/03
INORG: 39.57 PO: F52060

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Concentration: 998 ± 2 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:

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

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

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

(Most common are the errors from instrumental measurement, weighing, dilution to volume, and the fixed error reported on the NIST SRM certificate of analysis.)

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

4.0 TRACEABILITY TO NIST AND VALUES OBTAINED BY INDEPENDENT METHODS

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

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

4.1 Assay Method #1

1002 ± 3 µg/mL

ICP Assay NIST SRM 3136 Lot Number: 000612

Assay Method #2

998 ± 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. 010265

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> Al < 0.00938	<u>M</u> Dy < 0.06577	<u>Q</u> Li < 0.00006	<u>M</u> Pr < 0.00329	<u>M</u> Te < 0.32886
<u>M</u> Sb < 0.00548	<u>M</u> Er < 0.05481	<u>M</u> Lu < 0.00439	<u>M</u> Re < 0.01096	<u>M</u> Tb < 0.00329
<u>Q</u> As < 0.01689	<u>M</u> Eu < 0.03289	<u>Q</u> Mg 0.00002	<u>M</u> Rh < 0.01096	<u>M</u> Tl < 0.01096
<u>M</u> Ba < 0.10962	<u>M</u> Gd < 0.01096	<u>M</u> Mn < 0.04385	<u>M</u> Rb < 0.01096	<u>M</u> Th < 0.01096
<u>Q</u> Be < 0.00626	<u>M</u> Ga < 0.01096	<u>Q</u> Hg < 0.03441	<u>M</u> Ru < 0.02192	<u>M</u> Tm < 0.00439
<u>M</u> Bi < 0.00439	<u>M</u> Ge < 0.06577	<u>M</u> Mo < 0.02192	<u>M</u> Sm < 0.01096	<u>M</u> Sn < 0.05481
<u>Q</u> B < 0.03097	<u>M</u> Au < 0.03289	<u>M</u> Nd < 0.02192	<u>M</u> Sc < 0.10962	<u>M</u> Ti < 0.54811
<u>M</u> Cd < 0.03289	<u>M</u> Hf < 0.02192	<u>S</u> Ni	<u>Q</u> Se < 0.01877	<u>M</u> W < 0.10962
<u>Q</u> Ca < 0.01157	<u>M</u> Ho < 0.00548	<u>M</u> Nb < 0.00548	<u>Q</u> Si 0.00188	<u>M</u> U < 0.02192
<u>M</u> Ce < 0.05481	<u>M</u> In < 0.10962	<u>n</u> Os	<u>M</u> Ag < 0.02192	<u>M</u> V < 0.02192
<u>M</u> Cs < 0.00329	<u>M</u> Ir < 0.05481	<u>M</u> Pd < 0.05481	<u>Q</u> Na 0.00102	<u>M</u> Yb < 0.01096
<u>M</u> Cr < 0.05481	<u>Q</u> Fe 0.00156	<u>Q</u> P < 0.31280	<u>M</u> Sr < 0.00548	<u>M</u> Y < 0.43849
<u>Q</u> Co 0.00182	<u>M</u> La < 0.00548	<u>M</u> Pt < 0.02192	<u>Q</u> S < 0.07820	<u>M</u> Zn 0.00189
<u>M</u> Cu < 0.06577	<u>M</u> Pb < 0.03289	<u>Q</u> K 0.00043	<u>M</u> Ta < 0.07674	<u>M</u> Zr < 0.05481

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 - 58.69; +2; 6; Ni(H₂O)₆²⁺

Chemical Compatibility - Stable in HCl, HNO₃, H₂SO₄, HF, H₃PO₄. 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% HNO₃ / LDPE container.

Ni Containing Samples (Preparation and Solution) - Metal (Soluble in HNO₃); Oxides (Soluble in HCl); Ores (Dissolve in HCl / HNO₃).

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

Technique/Line	Estimated D.L.	Order	Type	Interferences (underlined indicates severe at ≈ concs.)
ICP-OES 221.647 nm	0.01 / 0.0009 µg/mL	1	ion	Si
ICP-OES 232.003 nm	0.02 / 0.006 µg/mL	1 atom	Cr, Re, Os, Nb, Ag, Pt, Fe	
ICP-OES 231.604 nm	0.02 / 0.002 µg/mL	1 ion	Sb, Ta, Co	
ICP-MS 60 amu	100 ppt	n/a	M ⁺	⁴³ Ca ¹⁶ O ¹ H, ⁴⁴ Ca ¹⁶ O, ²³ Na ³⁷ Cl

- 8.0 HAZARDOUS INFORMATION** - Please refer to the enclosed Material Safety Data sheet for information regarding this CRM.
- 9.0 HOMOGENEITY** - This solution was mixed according to procedure IV-MPM-004 and is guaranteed to be homogeneous.
- 10.0 QUALITY STANDARD DOCUMENTATION**

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

Recognized by:

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

Members of IQ Net International Certification Network:

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



10.2 ISO/IEC 17025 - 1999 "General Requirements for the Competence of Testing and Calibration"

- Chemical Testing - Accredited A2LA Certificate Number 883.01



10.3 ISO/IEC Guide 34 - 2000 "General Requirements for the Competence of Reference Material Producers"

- Reference Materials Production - Accredited A2LA Certificate Number 883.02

A2LA Mutual Recognition Agreement Partners:

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

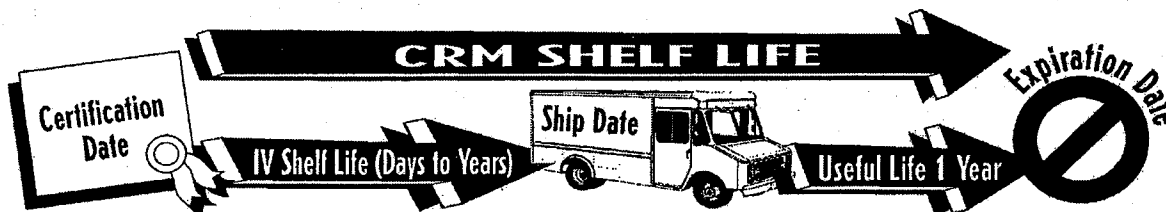
10.4 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

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

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

11.0 DATE OF CERTIFICATION AND PERIOD OF VALIDITY



11.1 IV Shelf Life - The period of time during which the concentration of the analyte(s) in a properly packaged, unopened, and unused standard stored under environmentally controlled and monitored conditions will remain within the specified uncertainty range. Shelf life is limited primarily by transpiration (loss of water from the solution) and infrequently, by chemical instability. Transpiration studies (P-SP01020) of chemically-stable solutions performed at Inorganic Ventures / IV Labs indicate a CRM shelf-life of four years for solutions packaged in 500-mL low density polyethylene bottles. When stored under special conditions that minimize transpiration and instability, the shelf life can be extended past this limit.

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

Certification Date: October 11, 2002

Expiration Date:

EXPIRES
11/2004

INORGANIC LABS/RADCHEM LABS Pg. 2 of 2

DATE RECEIVED: 02/13/03

DATE EXPIRED: 03/01/2004

DATE OPENED: 02/13/03

INORG: 3957 PO: F52060

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

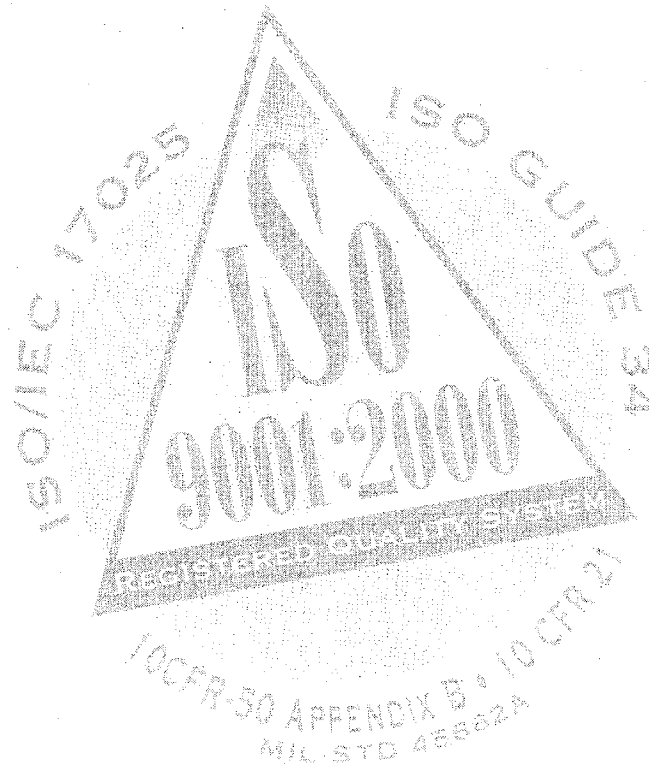
Certificate Prepared By: Debbie Newman, QA Administrator

Debbie Newman
Katalin Le

Certificate Approved By: Katalin Le, QC Supervisor

Certifying Officer: Paul Gaines, Chemist, Senior Technical Director

Paul Gaines 010267





Certificate of Analysis

CUSTOM-GRADE SOLUTION 1000 µg/mL Cadmium in 2% HNO₃ (abs)

Catalog Number: CGCD1-1, CGCD1-2 and CGCD1-5

010268

Lot Number: T-CD01125

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

Cadmium Metal
99.999%
H02K40A

INORGANIC LABS/RADCHEM LABS

DATE RECEIVED: 3/03/03
DATE EXPIRED: 3/01/2004
DATE OPENED: 3/04/03
INORG: 3970 PO: F52064

CERTIFIED CONCENTRATION: 1003 ± 3 µg/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:

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

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

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

Classical Wet Assay: 1003 ± 3 µg/mL

Method: EDTA Titration vs NIST SRM 928 Lead Nitrate.

Instrument Analysis: 1003 ± 3 µg/mL

Method: Inductively Coupled Plasma Spectroscopy (ICP) vs NIST SRM 3108.

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 µm.

<u>Q</u> Al <0.00030	<u>M</u> Dy <0.00060	<u>Q</u> Li <0.0050	<u>M</u> Pr <0.000030	<u>Q</u> Te <0.031
<u>M</u> Sb <0.000050	<u>M</u> Er <0.00050	<u>M</u> Lu <0.000040	<u>M</u> Re <0.00010	<u>M</u> Tb <0.000030
<u>Q</u> As <0.12	<u>M</u> Eu <0.00030	<u>Q</u> Mg <0.00010	<u>M</u> Rh <0.00010	<u>M</u> Tl <0.00010
<u>M</u> Ba <0.0010	<u>M</u> Gd <0.00010	<u>Q</u> Mn <0.00020	<u>M</u> Rb <0.00010	<u>M</u> Th <0.00010
<u>Q</u> Be <0.000050	<u>M</u> Ga <0.00010	<u>Q</u> Hg <0.0070	<u>M</u> Ru <0.00020	<u>M</u> Tm <0.000040
<u>M</u> Bi <0.000040	<u>M</u> Ge <0.00060	<u>M</u> Mo <0.00020	<u>M</u> Sm <0.00010	<u>M</u> Sn <0.00050
<u>Q</u> B <0.0060	<u>Q</u> Au <0.010	<u>M</u> Nd <0.00020	<u>M</u> Sc <0.0010	<u>Q</u> Ti <0.00030
<u>S</u> Cd	<u>M</u> Hf <0.00020	<u>Q</u> Ni <0.0060	<u>Q</u> Se <0.020	<u>M</u> W <0.0010
<u>Q</u> Ca 0.0018	<u>M</u> Ho <0.000050	<u>M</u> Nb <0.000050	<u>Q</u> Si <0.010	<u>M</u> U <0.00020
<u>M</u> Ce <0.00050	<u>Q</u> In <0.030	<u>Q</u> Os	<u>Q</u> Ag <0.27	<u>M</u> V <0.00020
<u>M</u> Cs <0.000030	<u>M</u> Ir <0.00050	<u>Q</u> Pd <0.053	<u>Q</u> Na <0.10	<u>M</u> Yb <0.00010
<u>Q</u> Cr <0.0040	<u>Q</u> Fe <0.0020	<u>Q</u> P <0.030	<u>M</u> Sr <0.000050	<u>M</u> Y <0.0040
<u>M</u> Co <0.00030	<u>M</u> La <0.000050	<u>M</u> Pt <0.00020	<u>Q</u> S <0.020	<u>Q</u> Zn <0.030
<u>M</u> Cu <0.00060	<u>M</u> Pb <0.00030	<u>Q</u> K <0.0060	<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

ANALYZED DENSITY OF SOLUTION (measured at 22°C): 1.015 g/mL

(over)

QA:KL Rev.080102DN

Paul R. James

Inorganic Ventures, Inc.

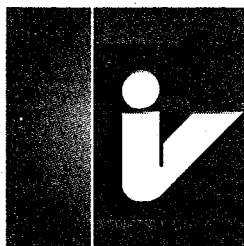
195 Lehigh Avenue • Suite 4 • Lakewood, NJ 08701

Orders: 800-669-6799 • FAX (732) 901-1903

Technical Support: 800-569-6799

Quality Assurance Manager

EXPIRES
1/2004



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."

010269

2.0 DESCRIPTION OF CRM Custom-Grade 1000 µg/mL Cobalt in 2% (abs) HNO₃

Catalog Number: CGCO1-1, CGCO1-2, and CGCO1-5
Lot Number: T-CO01120
Starting Material: Co powder
Starting Material Purity (%): 99.9957
Starting Material Lot No: 22897
Matrix: 2% (abs) HNO₃

INORGANIC LABS/RADCHEM LABS Pg. 1 of 2
DATE RECEIVED: 3/03/03
DATE EXPIRED: 3/01/04
DATE OPENED: 3/04/03
INORG: 3973 PO: F52064

3.0 CERTIFIED VALUES AND UNCERTAINTIES

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:

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

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

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

(Most common are the errors from instrumental measurement, weighing, dilution to volume, and the fixed error reported on the NIST SRM certificate of analysis.)

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

4.0 TRACEABILITY TO NIST AND VALUES OBTAINED BY INDEPENDENT METHODS

- "Property of the result of a measurement or the value of a standard whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons all having stated uncertainties." (ISO VIM, 2nd ed., 1993, definition 6.10)
- This IV product is Traceable to NIST via direct comparison to NIST SRMs. The uncertainties for each certified value are reported, taking into account the SRM uncertainty error and the measurement, weighing and volume dilution errors.

4.1 Assay Method #1

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 $\mu\text{g/mL}$ 010270

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 0.00025	<u>M</u> Dy < 0.02419	<u>O</u> Li 0.00001	<u>M</u> Pr < 0.00121	<u>M</u> Te < 0.12097
<u>M</u> Sb < 0.00202	<u>M</u> Er < 0.02016	<u>M</u> Lu < 0.00161	<u>M</u> Re < 0.00403	<u>M</u> Tb < 0.00121
<u>O</u> As < 0.10000	<u>M</u> Eu < 0.01210	<u>O</u> Mg 0.00045	<u>M</u> Rh < 0.00403	<u>M</u> Tl < 0.00403
<u>M</u> Ba < 0.04032	<u>M</u> Gd < 0.00403	<u>O</u> Mn 0.00003	<u>M</u> Rb < 0.00403	<u>M</u> Th < 0.00403
<u>M</u> Be < 0.00202	<u>M</u> Ga < 0.00403	<u>O</u> Hg < 0.05000	<u>M</u> Ru < 0.00807	<u>M</u> Tm < 0.00161
<u>M</u> Bi < 0.00161	<u>M</u> Ge < 0.02419	<u>M</u> Mo < 0.00807	<u>M</u> Sm < 0.00403	<u>M</u> Sn < 0.02016
<u>O</u> B < 0.04000	<u>M</u> Au < 0.01210	<u>M</u> Nd < 0.00807	<u>M</u> Sc < 0.04032	<u>M</u> Ti < 0.20162
<u>M</u> Cd < 0.01210	<u>M</u> Hf < 0.00807	<u>O</u> Ni < 0.02000	<u>M</u> Se < 0.03226	<u>M</u> W < 0.04032
<u>O</u> Ca 0.00325	<u>M</u> Ho < 0.00202	<u>M</u> Nb < 0.00202	<u>O</u> Si < 0.00400	<u>M</u> U < 0.00807
<u>M</u> Ce < 0.02016	<u>M</u> In < 0.04032	<u>n</u> Os	<u>M</u> Ag < 0.00807	<u>M</u> V < 0.00807
<u>M</u> Cs < 0.00121	<u>M</u> Ir < 0.02016	<u>M</u> Pd < 0.02016	<u>O</u> Na 0.00138	<u>M</u> Yb < 0.00403
<u>M</u> Cr < 0.02016	<u>O</u> Fe 0.00875	<u>n</u> P	<u>M</u> Sr < 0.00202	<u>M</u> Y < 0.16129
<u>s</u> Co	<u>M</u> La < 0.00202	<u>M</u> Pt < 0.00807	<u>n</u> S	<u>M</u> Zn < 0.08065
<u>M</u> Cu < 0.02419	<u>M</u> Pb < 0.01210	<u>O</u> K 0.03000	<u>M</u> Ta < 0.02823	<u>M</u> Zr < 0.02016

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 $20 \pm 4^\circ\text{C}$. Do not pipet from container. Do not return portions removed for pipetting to container.

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 58.9332; +2; 6; $\text{Co}(\text{H}_2\text{O})_6^{2+}$

Chemical Compatibility - Stable in HCl, HNO_3 , H_2SO_4 , HF, H_3PO_4 . Avoid basic media. Stable with most metals and inorganic anions in acidic media.

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

Co Containing Samples (Preparation and Solution) - Metal (soluble in HNO_3); Oxides (Soluble in HCl); Ores (Dissolve in HCl / HNO_3).

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 $\approx$ concs.)
ICP-OES 238.892 nm	0.01/.002 $\mu\text{g/mL}$	1	ion	Fe, W, Ta
ICP-OES 228.616 nm	0.01/.001 $\mu\text{g/mL}$	1	ion	
ICP-OES 237.862 nm	0.01/.002 $\mu\text{g/mL}$	1	ion	W, Re, Al, Ta
ICP-MS 59 amu	2 ppt	n/a	M*	$^{42}\text{Ca}^{16}\text{O}^+\text{H}$, $^{40}\text{Ar}^{16}\text{O}^+\text{H}$, $^{36}\text{Ar}^{23}\text{Na}$, $^{43}\text{Ca}^{16}\text{O}$, $^{24}\text{Mg}^{35}\text{Cl}$

- 8.0 HAZARDOUS INFORMATION** - Please refer to the enclosed Material Safety Data sheet for information regarding this CRM.
- 9.0 HOMOGENEITY** - This solution was mixed according to procedure IV-MPM-004 and is guaranteed to be homogeneous.
- 10.0 QUALITY STANDARD DOCUMENTATION**

010271

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:

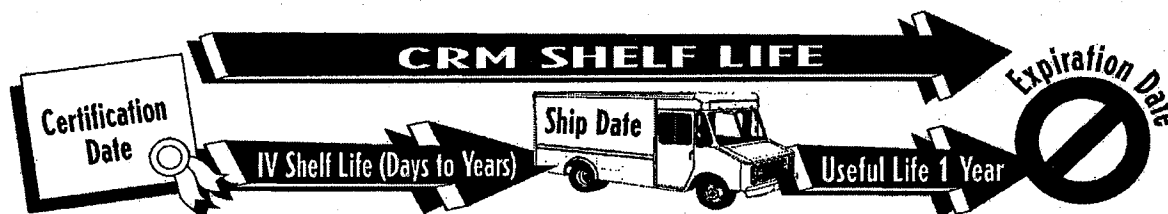
Australia (NATA), Austria (BmWA), Belgium (BELTEST) (BKO-OBE), Canada (SCC), Chinese Taipei (CNLA), Czech Republic (NAO), Denmark (DANAK), Finland (FINAS), France (COFRAC), Germany (DAR), Hong Kong (HKAS), Ireland (NAB), Italy (SIT) (SINAL), Japan (JAB) (JNLA), Republic of Korea (KOLAS), The Netherlands (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: September 05, 2002

Expiration Date:

EXPIRES
1st 2004

INORGANIC LABS/RADCHEM LABS Pg. 2 of 2
DATE RECEIVED: 3/03/03
DATE EXPIRED: 3/01/2004
DATE OPENED: 3/04/03
INORG: 3973 PD: F52064

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

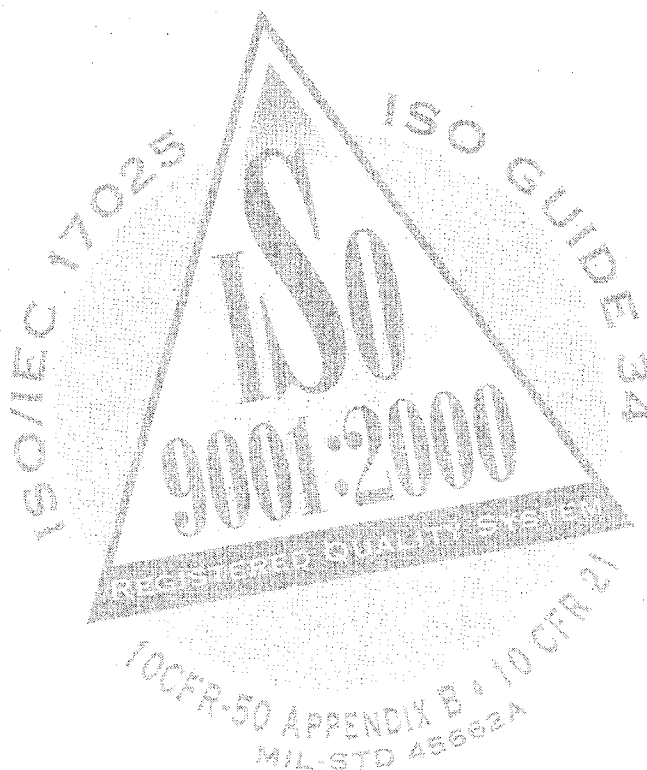
Certificate Prepared By: Debbie Newman, QA Administrator

Debbie Newman
Katalin Le

Certificate Approved By: Katalin Le, QC Supervisor

Certifying Officer: Paul Gaines, Chemist, Senior Technical Director

Paul Gaines 010272





Certificate of Analysis

CUSTOM-GRADE SOLUTION

1000 µg/mL Manganese in 2% HNO₃ (abs)

Catalog Number: CGMN1-1, CGMN1-2, and CGMN1-5

010273

Lot Number: **T-MN02033**

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

Manganese Metal
99.998%
21563

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 01/16/03
DATE EXPIRED: 02/01/2004
DATE OPENED: 01/16/03
INORG: 3921 PO: F52073

CERTIFIED CONCENTRATION: 1004 ± 3 µg/mL

The Certified Value is the wet assay value. The following equations are used in the calculation of the certified value and the uncertainty:

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

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

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

Classical Wet Assay: 1004 ± 3 µg/mL

Method: EDTA Titration vs NIST SRM 928 Lead Nitrate.

Instrument Analysis: 1001 ± 3 µg/mL

Method: Inductively Coupled Plasma Spectroscopy (ICP) vs NIST SRM 3132.

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 µm.

M	Al	<0.00090	M	Dy	<0.00060	M	Li	<0.0010	M	Pr	<0.000030	M	Te	<0.0030
M	Sb	<0.000050	M	Er	<0.00050	M	Lu	<0.000040	M	Re	<0.00010	M	Tb	<0.000030
M	As	<0.0010	M	Eu	<0.00030	M	Mg	0.0040	M	Rh	<0.00010	M	Ti	<0.00010
M	Ba	<0.0010	M	Gd	<0.00010	s	Mn		M	Rb	<0.00010	M	Th	<0.00010
M	Be	<0.000050	i	Ga		O	Hg	<0.030	M	Ru	<0.00020	M	Tm	<0.000040
M	Bi	<0.000040	M	Ge	<0.00060	M	Mo	0.00024	M	Sm	<0.00010	M	Sn	<0.00050
M	B	<0.0070	M	Au	<0.00030	M	Nd	<0.00020	M	Sc	<0.0010	M	Tl	<0.0050
M	Cd	<0.00030	M	Hf	<0.00020	O	Ni	<0.050	O	Se	<0.40	M	W	<0.0010
O	Ca	<0.010	M	Ho	<0.000050	M	Nb	<0.000050	O	Si	<0.020	M	U	<0.00020
M	Ce	<0.00050	i	In		n	Os		M	Ag	<0.00020	i	V	
M	Cs	<0.000030	M	Ir	<0.00050	M	Pd	<0.00050	O	Na	<0.090	M	Yb	<0.00010
M	Cr	<0.00050	i	Fe		i	P		M	Sr	<0.000050	M	Y	<0.0040
O	Co	<0.050	M	La	<0.000050	M	Pt	<0.00020	n	S		M	Zn	<0.0020
M	Cu	<0.00060	M	Pb	<0.00030	n	K		M	Ta	<0.00070	M	Zr	<0.00050

M - checked by ICP-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): **1.015 g/mL**

(over)

QA:KL Rev.082202DN

Inorganic Ventures, Inc.

195 Lehigh Avenue • Suite 4 • Lakewood, NJ 08701

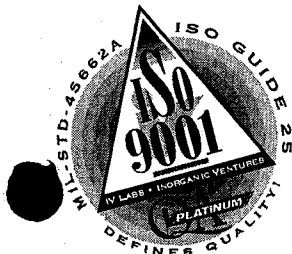
Orders: 800-669-6799 • FAX (732) 901-1903

Technical Support: 800-569-6799

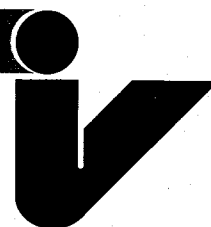
Quality Assurance Manager

EXPIRES

12004



Certificate of Analysis



010274

CUSTOM-GRADE SOLUTION 1000 µg/mL Vanadium in 1.4% HNO₃ (abs)

Catalog Number: CGV1-1, CGV1-2 and CGV1-5

Lot Number: **S-QV01080**

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

Vanadium Pentoxide
99.999%
46

INORGANIC LABS/RADCHEM LABS

DATE RECEIVED: 10/22/03

DATE EXPIRED: 11/01/2003

DATE OPENED: 10/23/03

INORG: 3740 PO: FS2057

CERTIFIED VALUE: 995 µg/mL

The certified value is the average of the classical wet assay and instrument analysis unless otherwise specified. All standards are accurate to a relative precision of ± 0.5% at the 95% confidence level for a period of 1 year. (See expiration date below)

Classical Wet Assay: 999 µg/mL

Method: EDTA Titration vs NIST SRM 928 Lead Nitrate

Sufficient number of sample measurements were made to give a minimum relative precision of ± 0.3% at the 95% confidence level.

Instrument Analysis: 991 µg/mL

Method: Inductively Coupled Plasma Spectroscopy (ICP) vs NIST SRM 3165

Sufficient number of sample measurements were made to give a minimum relative precision of ± 0.5% at the 95% confidence level.

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 µm.

M	Al	0.0095	M	Dy	<0.0006	M	Li	<0.001	M	Pr	<0.00003	M	Te	<0.003
M	Sb	0.042	M	Er	<0.0005	M	Lu	<0.00004	M	Re	<0.0001	M	Tb	<0.00003
M	As	<0.001	M	Eu	<0.0003	M	Mg	0.0089	M	Rh	<0.0001	M	Ti	<0.0001
M	Ba	<0.001	M	Gd	<0.0001	O	Mn	i	M	Rb	<0.0001	M	Th	<0.0001
M	Be	<0.00005	M	Ga	<0.0001	O	Hg	i	M	Ru	<0.0002	M	Tm	<0.00004
M	Bi	<0.00004	M	Ge	<0.0006	M	Mo	0.016	M	Sm	<0.0001	M	Sn	<0.0005
M	B	<0.007	M	Au	<0.0003	M	Nd	<0.0002	M	Sc	<0.001	M	Tl	<0.005
M	Cd	<0.0003	M	Hf	<0.0002	O	Ni	<0.05	O	Se	<0.4	M	W	0.00055
O	Ca	<0.01	M	Ho	<0.00005	M	Nb	0.00024	O	Si	<0.03	M	U	0.0011
M	Ce	<0.0005	O	In	<0.07	n	Os		M	Ag	0.00044	s	V	
M	Cs	<0.00003	M	Ir	<0.0005	M	Pd	<0.0005	O	Na	<0.09	M	Yb	<0.0001
O	Cr	<0.02	O	Fe	<0.05	O	P	i	M	Sr	<0.00005	M	Y	<0.004
O	Co	<0.05	M	La	<0.00005	M	Pt	<0.0002	n	S		M	Zn	0.0041
M	Cu	<0.0006	M	Pb	<0.0003	n	K		M	Ta	<0.0007	M	Zr	<0.0005

M - checked by ICP-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): 1.013 g/mL

QA:KLRev.011002DN

(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

Paul R. Haines

Quality Assurance Manager

EXPIRES

1/2003



Certificate of Analysis

010275

CUSTOM-GRADE SOLUTION

1000 µg/mL Zinc in 1.4% HNO₃ (abs)

Catalog Number: CGZN1-1, CGZN1-2, and CGZN1-5

Lot Number: T-ZN02015

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

Zinc Metal
99.999%
J17L26

INORGANIC LABS/RADCHEM LABS

DATE RECEIVED: 10/22/02

DATE EXPIRED: 11/01/2003

DATE OPENED: 10/23/02

INORG: 3741 PO: F52057

CERTIFIED CONCENTRATION: 1007 ± 2 µg/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:

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

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

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

Classical Wet Assay: 1007 ± 2 µg/mL

Method: EDTA Titration vs NIST SRM 928 Lead Nitrate

Instrument Analysis: 1006 ± 4 µg/mL

Method: Inductively Coupled Plasma Spectroscopy (ICP) vs NIST SRM 3168a

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 µm.

<u>Q</u>	Al	<0.0020	<u>M</u>	Dy	<0.025	<u>Q</u>	Li	0.0000050	<u>M</u>	Pr	<0.0013	<u>M</u>	Te	<0.13
<u>M</u>	Sb	<0.0021	<u>M</u>	Er	<0.021	<u>M</u>	Lu	<0.0017	<u>M</u>	Re	<0.0041	<u>M</u>	Tb	<0.0013
<u>M</u>	As	<0.041	<u>M</u>	Eu	<0.013	<u>Q</u>	Mg	0.00011	<u>M</u>	Rh	<0.0041	<u>M</u>	Tl	<0.0041
<u>M</u>	Ba	<0.041	<u>M</u>	Gd	<0.0041	<u>M</u>	Mn	<0.017	<u>M</u>	Rb	<0.0041	<u>M</u>	Th	<0.0041
<u>M</u>	Be	<0.0021	<u>M</u>	Ga	<0.0041	<u>Q</u>	Hg	<0.010	<u>M</u>	Ru	<0.0082	<u>M</u>	Tm	<0.0017
<u>M</u>	Bi	<0.0017	<u>M</u>	Ge	<0.025	<u>M</u>	Mo	<0.0082	<u>M</u>	Sm	<0.0041	<u>M</u>	Sn	<0.021
<u>Q</u>	B	0.00015	<u>M</u>	Au	<0.013	<u>M</u>	Nd	<0.0082	<u>M</u>	Sc	<0.041	<u>M</u>	Ti	<0.21
<u>M</u>	Cd	<0.013	<u>M</u>	Hf	<0.0082	<u>Q</u>	Ni	0.000085	<u>M</u>	Se	<0.033	<u>M</u>	W	<0.041
<u>Q</u>	Ca	0.00022	<u>M</u>	Ho	<0.0021	<u>M</u>	Nb	<0.0021	<u>Q</u>	Si	<0.0040	<u>M</u>	U	<0.0082
<u>M</u>	Ce	<0.021	<u>M</u>	In	<0.041	<u>n</u>	Os		<u>M</u>	Ag	<0.0082	<u>M</u>	V	<0.0082
<u>M</u>	Cs	<0.0013	<u>M</u>	Ir	<0.021	<u>M</u>	Pd	<0.021	<u>Q</u>	Na	0.00055	<u>M</u>	Yb	<0.0041
<u>Q</u>	Cr	<0.0010	<u>Q</u>	Fe	0.000045	<u>Q</u>	P	<0.0030	<u>M</u>	Sr	<0.0021	<u>M</u>	Y	<0.17
<u>M</u>	Co	<0.013	<u>M</u>	La	<0.0021	<u>M</u>	Pt	<0.0082	<u>Q</u>	S	<0.020	<u>s</u>	Zn	
<u>Q</u>	Cu	<0.00050	<u>M</u>	Pb	<0.013	<u>Q</u>	K	0.00018	<u>M</u>	Ta	<0.029	<u>M</u>	Zr	<0.021

M - checked by ICP-MS

Q - checked by ICP-OES

i - spectral interference

n - not checked for

s - solution standard element

ANALYZED DENSITY OF SOLUTION (measured at 21°C): 1.011 g/mL

QA:KL Rev.051702DN

(over)

Inorganic Ventures, Inc.

195 Lehigh Avenue • Suite 4 • Lakewood, NJ 08701

Orders: 800-669-6799 • FAX (732) 901-1903

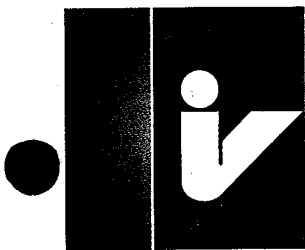
Technical Support: 800-569-6799

Paul R. Gaines

Quality Assurance Manager

EXPIRES

12/2003



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 1000 µg/mL Silver in 3.5% HNO₃ (abs) 01027C

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

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 08/26/03
DATE EXPIRED: 09/01/2004
DATE OPENED: 08/26/03
INORG: 4222 PO: F52224

CERTIFIED CONCENTRATION: 1001 ± 2 µg/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:

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

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

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

Classical Wet Assay: 1004 ± 3 µg/mL

Method: Volhard Titration vs NIST SRM 999a Potassium Chloride

Instrument Analysis: 1001 ± 2 µg/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 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 µm.

<u>Q</u> Al <0.00010	<u>M</u> Dy <0.00060	<u>Q</u> Li <0.000030	<u>M</u> Pr <0.000030	<u>Q</u> Te <0.030
<u>M</u> Sb <0.000050	<u>M</u> Er <0.00050	<u>M</u> Lu <0.000040	<u>M</u> Re <0.00010	<u>M</u> Tb <0.000030
<u>Q</u> As <0.0050	<u>M</u> Eu <0.00030	<u>Q</u> Mg <0.000040	<u>M</u> Rh <0.00010	<u>M</u> Tl <0.00010
<u>M</u> Ba <0.0010	<u>M</u> Gd <0.00010	<u>Q</u> Mn <0.00030	<u>M</u> Rb <0.00010	<u>M</u> Th <0.00010
<u>Q</u> Be <0.00050	<u>M</u> Ga <0.00010	<u>Q</u> Hg 0.00090	<u>M</u> Ru <0.00020	<u>M</u> Tm <0.000040
<u>M</u> Bi <0.000040	<u>M</u> Ge <0.00060	<u>M</u> Mo <0.00020	<u>M</u> Sm <0.00010	<u>M</u> Sn <0.00050
<u>Q</u> B <0.0020	<u>Q</u> Au <0.012	<u>M</u> Nd <0.00020	<u>M</u> Sc <0.0010	<u>Q</u> Ti <0.00070
<u>Q</u> Cd <0.0020	<u>M</u> Hf <0.00020	<u>Q</u> Ni <0.0070	<u>Q</u> Se <0.036	<u>M</u> W <0.0010
<u>Q</u> Ca <0.000050	<u>M</u> Ho <0.000050	<u>M</u> Nb <0.000050	<u>Q</u> Si <0.0030	<u>M</u> U <0.00020
<u>M</u> Ce <0.00050	<u>Q</u> In <0.020	<u>n</u> Os	<u>s</u> Ag	<u>M</u> V <0.00020
<u>M</u> Cs <0.000030	<u>M</u> Ir <0.00050	<u>M</u> Pd <0.00050	<u>Q</u> Na <0.090	<u>M</u> Yb <0.00010
<u>Q</u> Cr <0.0020	<u>Q</u> Fe <0.00070	<u>Q</u> P <0.030	<u>M</u> Sr <0.000050	<u>M</u> Y <0.0040
<u>M</u> Co <0.00030	<u>M</u> La <0.000050	<u>Q</u> Pt <0.00020	<u>Q</u> S <0.020	<u>Q</u> Zn <0.0010
<u>M</u> Cu <0.00060	<u>M</u> Pb <0.00030	<u>Q</u> K <0.0060	<u>M</u> Ta <0.00070	<u>M</u> Zr <0.00050

M - checked by ICP-MS

Q - checked by ICP-OES

i - spectral interference

n - not checked for

s - solution standard element

ANALYZED DENSITY OF SOLUTION (measured at 22°C): 1.024 g/mL

QA:KL Rev.082102DN

Paul R. Gaines

Quality Assurance Manager

Expires:

EXPIRES
1/2/2004



Certificate of Analysis

CUSTOM-GRADE SOLUTION 1000 µg/mL Arsenic in 1.4% HNO₃ (abs)

Catalog Number: CGAS1-1, CGAS1-2 and CGAS1-5

010277

Lot Number: **T-AS02019**

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

Arsenic Metal
99.999%
23014

INORGANIC LABS/RADCHEM LABS

DATE RECEIVED: 01/09/03

DATE EXPIRED: 02/01/2004

DATE OPENED: 01/10/03

INORG: 3899 PO: F52071

CERTIFIED CONCENTRATION: 1006 ± 3 µg/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:

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

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

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

Calculated Value: 1003 µg/mL

Method: Calculated, based on starting material.

Instrument Analysis: 1006 ± 3 µg/mL (Average of 3 runs)

Method: Inductively Coupled Plasma Spectroscopy (ICP) vs NIST SRM 3103a.

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 µm.

<u>Q</u>	Al	0.00030	<u>M</u>	Dy	<0.012	<u>Q</u>	Li	<0.000020	<u>M</u>	Pr	<0.00060	<u>M</u>	Te	<0.060
<u>Q</u>	Sb	<0.010	<u>M</u>	Er	<0.010	<u>M</u>	Lu	<0.00080	<u>Q</u>	Re	<0.010	<u>M</u>	Tb	<0.00060
<u>s</u>	As		<u>M</u>	Eu	<0.0060	<u>Q</u>	Mg	<0.000030	<u>M</u>	Rh	<0.0020	<u>M</u>	Ti	<0.0020
<u>M</u>	Ba	<0.020	<u>M</u>	Gd	<0.0020	<u>Q</u>	Mn	<0.000030	<u>M</u>	Rb	<0.0020	<u>M</u>	Th	<0.0020
<u>M</u>	Be	<0.0010	<u>M</u>	Ga	<0.0020	<u>Q</u>	Hg	<0.012	<u>M</u>	Ru	<0.0040	<u>M</u>	Tm	<0.00080
<u>M</u>	Bi	<0.00080	<u>M</u>	Ge	<0.012	<u>M</u>	Mo	<0.0040	<u>M</u>	Sm	<0.0020	<u>Q</u>	Sn	<0.00053
<u>Q</u>	B	<0.012	<u>M</u>	Au	<0.0060	<u>M</u>	Nd	<0.0040	<u>M</u>	Sc	<0.020	<u>M</u>	Ti	<0.10
<u>M</u>	Cd	<0.0060	<u>M</u>	Hf	<0.0040	<u>M</u>	Ni	<0.016	<u>M</u>	Se	<0.016	<u>M</u>	W	<0.020
<u>Q</u>	Ca	<0.0015	<u>M</u>	Ho	<0.0010	<u>Q</u>	Nb	<0.0020	<u>Q</u>	Si	0.0077	<u>M</u>	U	<0.0040
<u>M</u>	Ce	<0.010	<u>M</u>	In	<0.020	<u>n</u>	Os		<u>M</u>	Ag	<0.0040	<u>M</u>	V	<0.0040
<u>M</u>	Cs	<0.00060	<u>M</u>	Ir	<0.010	<u>M</u>	Pd	<0.010	<u>Q</u>	Na	0.00096	<u>M</u>	Yb	<0.0020
<u>M</u>	Cr	<0.010	<u>Q</u>	Fe	<0.0011	<u>Q</u>	P	<0.0026	<u>M</u>	Sr	<0.0010	<u>M</u>	Y	<0.080
<u>M</u>	Co	<0.0060	<u>M</u>	La	<0.0010	<u>M</u>	Pt	<0.0040	<u>Q</u>	S	<0.025	<u>Q</u>	Zn	0.00019
<u>M</u>	Cu	<0.012	<u>M</u>	Pb	<0.0060	<u>Q</u>	K	0.00096	<u>M</u>	Ta	<0.014	<u>M</u>	Zr	<0.010

M - checked by ICP-MS

Q - checked by ICP-OES

i - spectral interference

n - not checked for

s - solution standard element

ANALYZED DENSITY OF SOLUTION (measured at 22°C): 1.010 g/mL

QA:KSL Rev.061202DN

(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

EXPIRES
1st 2004



Certificate of Analysis

CUSTOM-GRADE SOLUTION

1000 µg/mL Lead in 0.35% HNO₃ (abs)

010278

Catalog Number: CGPB1-1, CGPB1-2 and CGPB1-5

Lot Number: T-PB02110

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

Lead Nitrate
99.995%
22150

INORGANIC LABS/RADCHEM LABS

DATE RECEIVED: 10/22/02

DATE EXPIRED: 11/01/2003

DATE OPENED: 10/23/02

INORG: 3735 PO: F52057

CERTIFIED CONCENTRATION: 1004 ± 2 µg/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:

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

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

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

Classical Wet Assay: 1004 ± 2 µg/mL

Method: EDTA Titration vs NIST SRM 928 Lead Nitrate.

Instrument Analysis: 995 ± 8 µg/mL

Method: Inductively Coupled Plasma Spectroscopy (ICP) vs NIST SRM 3128.

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 µm.

<u>Q</u> Al <0.040	<u>M</u> Dy <0.00060	<u>M</u> Li <0.0010	<u>M</u> Pr <0.000030	<u>M</u> Te <0.0030
<u>M</u> Sb <0.000050	<u>M</u> Er <0.00050	<u>M</u> Lu <0.000040	<u>M</u> Re <0.00010	<u>M</u> Tb <0.000030
<u>M</u> As <0.0010	<u>M</u> Eu <0.00030	<u>M</u> Mg <0.0030	<u>M</u> Rh <0.020	<u>M</u> Tl <0.0050
<u>M</u> Ba <0.0010	<u>M</u> Gd <0.00010	<u>M</u> Mn <0.00040	<u>M</u> Rb <0.00010	<u>M</u> Th <0.00010
<u>M</u> Be <0.000050	<u>M</u> Ga <0.00010	<u>Q</u> Hg <0.090	<u>M</u> Ru <0.00020	<u>M</u> Tm <0.000040
<u>M</u> Bi <0.0010	<u>M</u> Ge <0.00060	<u>M</u> Mo <0.00020	<u>M</u> Sm <0.00010	<u>M</u> Sn <0.00050
<u>Q</u> B <0.020	<u>M</u> Au <0.00030	<u>M</u> Nd <0.00020	<u>M</u> Sc <0.0010	<u>M</u> Ti <0.0050
<u>M</u> Cd <0.00030	<u>M</u> Hf <0.00020	<u>Q</u> Ni <0.050	<u>Q</u> Se <0.40	<u>M</u> W <0.0010
<u>Q</u> Ca <0.010	<u>M</u> Ho <0.000050	<u>M</u> Nb <0.000050	<u>Q</u> Si <0.020	<u>M</u> U <0.00020
<u>M</u> Ce <0.00050	<u>Q</u> In <0.030	<u>n</u> Os	<u>i</u> Na	<u>M</u> V <0.00020
<u>M</u> Cs <0.000030	<u>M</u> Ir <0.00050	<u>M</u> Pd <0.00050	<u>M</u> Sr 0.00034	<u>M</u> Yb <0.00010
<u>M</u> Cr <0.00050	<u>Q</u> Fe <0.050	<u>Q</u> P <0.050	<u>n</u> S	<u>M</u> Y <0.0040
<u>M</u> Co <0.00030	<u>M</u> La <0.000050	<u>M</u> Pt <0.00020	<u>M</u> Ta <0.00070	<u>M</u> Zn <0.0020
<u>M</u> Cu <0.00060	<u>s</u> Pb	<u>n</u> K		<u>M</u> Zr 0.00120

M - checked by ICP-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): 1.002 g/mL

(over)

QA:KSL Rev.061702/JTS

Paul R. Laine

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

EXPIRES

11/2003



Certificate of Analysis

CUSTOM GRADE SOLUTION
1000 µg/mL Antimony in 0.7% HNO₃ (abs) / 3% Tartaric Acid

Catalog Number: CGSB1-1, CGSB1-2 and CGSB1-5

 Lot Number: **T-SB02074**

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

 Antimony Metal
 99.995%
 E14H25

INORGANIC LABS/RADCHEM LABS

 DATE RECEIVED: 02/13/03

 DATE EXPIRED: 03/01/2004

 DATE OPENED: 02/13/03

 INORG: 3953 PO: F52060

CERTIFIED CONCENTRATION: 1003 ± 2 µg/mL

The Certified Value is the instrument analysis value. The following equations are used in the calculation of the certified value and the uncertainty:

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

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

 $(\bar{x})$ = mean

 x_i = individual results

 n = number of measurements

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

 Calculated Value: **999 µg/mL**

Method: Calculated, based on starting material.

 Instrument Analysis: **1003 ± 2 µg/mL** (Average of 2 runs)

Method: Inductively Coupled Plasma Spectroscopy (ICP) vs NIST SRM 3102a.

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 µm.

<u>M</u>	Al	<0.0050	<u>M</u>	Dy	<0.00060	<u>M</u>	Li	<0.0010	<u>M</u>	Pr	<0.000030	<u>n</u>	Te	
<u>s</u>	Sb		<u>M</u>	Er	<0.00050	<u>M</u>	Lu	<0.000040	<u>M</u>	Re	<0.00010	<u>M</u>	Tb	<0.000030
<u>M</u>	As	<0.0010	<u>M</u>	Eu	<0.00030	<u>M</u>	Mg	<0.0030	<u>M</u>	Rh	<0.00010	<u>M</u>	Tl	0.00030
<u>O</u>	Ba	<0.020	<u>M</u>	Gd	<0.00010	<u>M</u>	Mn	0.0080	<u>M</u>	Rb	<0.00010	<u>M</u>	Th	<0.00010
<u>M</u>	Be	<0.000050	<u>M</u>	Ga	<0.00010	<u>O</u>	Hg	<0.030	<u>M</u>	Ru	<0.00020	<u>M</u>	Tm	<0.000040
<u>M</u>	Bi	0.00070	<u>M</u>	Ge	<0.00060	<u>M</u>	Mo	<0.00020	<u>M</u>	Sm	<0.00010	<u>n</u>	Sn	
<u>M</u>	B	<0.0070	<u>M</u>	Au	<0.00030	<u>M</u>	Nd	<0.00020	<u>M</u>	Sc	<0.0010	<u>M</u>	Ti	<0.0050
<u>M</u>	Cd	<0.00030	<u>M</u>	Hf	<0.00020	<u>O</u>	Ni	<0.050	<u>O</u>	Se	<0.40	<u>M</u>	W	<0.0010
<u>O</u>	Ca	<0.020	<u>M</u>	Ho	<0.000050	<u>M</u>	Nb	<0.000050	<u>O</u>	Si	<0.020	<u>M</u>	U	<0.00020
<u>M</u>	Ce	0.0018	<u>O</u>	In	<0.030	<u>n</u>	Os		<u>M</u>	Ag	<0.00020	<u>M</u>	V	<0.00020
<u>M</u>	Cs	<0.000030	<u>M</u>	Ir	<0.00050	<u>M</u>	Pd	<0.00050	<u>O</u>	Na	<0.090	<u>M</u>	Yb	<0.00010
<u>M</u>	Cr	0.031	<u>O</u>	Fe	<0.050	<u>O</u>	P	<0.050	<u>M</u>	Sr	<0.000050	<u>M</u>	Y	<0.0040
<u>M</u>	Co	<0.00030	<u>M</u>	La	<0.040	<u>M</u>	Pt	<0.00020	<u>n</u>	S		<u>M</u>	Zn	<0.0020
<u>M</u>	Cu	0.0016	<u>M</u>	Pb	0.0011	<u>n</u>	K		<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

ANALYZED DENSITY OF SOLUTION (measured at 22°C): **1.019 g/mL**

(over)

QA:KL Rev.082202DN

Paul R. James
Inorganic Ventures, Inc.

195 Lehigh Avenue • Suite 4 • Lakewood, NJ 08701

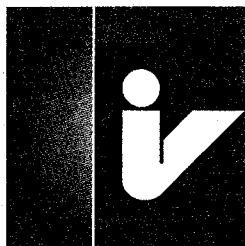
Orders: 800-669-6799 • FAX (732) 901-1903

Technical Support: 800-569-6799

Quality Assurance Manager

Expires:

EXPIRES
1/2004



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."

010280

2.0 DESCRIPTION OF CRM Custom-Grade 1000 µg/mL Selenium in 1.4% (abs) HNO₃

Catalog Number: CGSE1-1, CGSE1-2, and CGSE1-5
Lot Number: T-SE01102
Starting Material: Se shot
Starting Material Purity (%): 99.9971
Starting Material Lot No: C09L08
Matrix: 1.4% (abs) HNO₃

INORGANIC LABS/RADCHEM LABS Pg. 1 of 2
DATE RECEIVED: 06/20/03
DATE EXPIRED: 07/01/2004
DATE OPENED: 06/23/03
INORG: 4152 PO: F52370

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Concentration: 995 ± 3 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:

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

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

$\bar{x}$ = mean

x_i = individual results

n = number of measurements

$\sum s_i$ = The summation of all significant estimated errors

(Most common are the errors from instrumental measurement, weighing, dilution to volume, and the fixed error reported on the NIST SRM certificate of analysis.)

4.0 TRACEABILITY TO NIST AND VALUES OBTAINED BY INDEPENDENT METHODS

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

□ This IV product is Traceable to NIST via 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 #1 995 ± 3 µg/mL (Avg. 2 runs)

ICP Assay NIST SRM 3149 Lot Number: 992106

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.

010281

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> Al 0.00017	<u>M</u> Dy < 0.01196	<u>Q</u> Li < 0.00003	<u>M</u> Pr < 0.00060	<u>M</u> Te < 0.05981
<u>M</u> Sb 0.00160	<u>M</u> Er < 0.00997	<u>M</u> Lu < 0.00080	<u>Q</u> Re < 0.00900	<u>M</u> Tb < 0.00060
<u>Q</u> As < 0.00500	<u>M</u> Eu < 0.00598	<u>Q</u> Mg < 0.00003	<u>M</u> Rh < 0.00199	<u>M</u> Tl < 0.00199
<u>M</u> Ba < 0.01994	<u>M</u> Gd < 0.00199	<u>M</u> Mn < 0.00798	<u>M</u> Rb < 0.00199	<u>M</u> Th < 0.00199
<u>Q</u> Be < 0.00009	<u>M</u> Ga < 0.00199	<u>Q</u> Hg 0.01950	<u>Q</u> Ru 0.00220	<u>M</u> Tm < 0.00080
<u>M</u> Bi < 0.00080	<u>M</u> Ge < 0.01196	<u>Q</u> Mo < 0.00400	<u>M</u> Sm < 0.00199	<u>M</u> Sn < 0.00997
<u>Q</u> B < 0.00006	<u>M</u> Au < 0.00598	<u>M</u> Nd < 0.00399	<u>M</u> Sc < 0.01994	<u>M</u> Ti < 0.09969
<u>M</u> Cd < 0.00598	<u>M</u> Hf < 0.00399	<u>Q</u> Ni < 0.00090	<u>S</u> Se	<u>M</u> W < 0.01994
<u>Q</u> Ca 0.00200	<u>M</u> Ho < 0.00100	<u>Q</u> Nb < 0.00400	<u>Q</u> Si 0.00055	<u>M</u> U < 0.00399
<u>M</u> Ce < 0.00997	<u>M</u> In < 0.01994	<u>n</u> Os	<u>M</u> Ag 0.00070	<u>M</u> V < 0.00399
<u>M</u> Cs < 0.00060	<u>M</u> Ir < 0.00997	<u>M</u> Pd < 0.00997	<u>Q</u> Na 0.00355	<u>M</u> Yb < 0.00199
<u>M</u> Cr < 0.00997	<u>Q</u> Fe 0.00060	<u>Q</u> P < 0.00300	<u>M</u> Sr < 0.00100	<u>M</u> Y < 0.07975
<u>M</u> Co < 0.00598	<u>M</u> La < 0.00100	<u>M</u> Pt < 0.00399	<u>Q</u> S 0.00500	<u>M</u> Zn < 0.03988
<u>M</u> Cu < 0.01196	<u>M</u> Pb < 0.00598	<u>Q</u> K 0.00070	<u>M</u> Ta < 0.01396	<u>Q</u> Zr < 0.00040

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 $20 \pm 4^\circ\text{C}$. 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_2SeO_4

Chemical Compatibility - Soluble in HCl , HNO_3 , H_2PO_4 , H_2SO_4 and HF aqueous matrices and water. It is stable with most inorganic anions but many cationic metals form the insoluble selenites 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 % HNO_3 / LDPE container. 1-10,000 ppm solutions chemically stable for years in 1-5% HNO_3 / LDPE container.

Se Containing Samples (Preparation and Solution) - Metal (Soluble in HNO_3); Oxides (Readily soluble in water); Minerals and alloys (Acid digestion with HNO_3 or HNO_3 / HF); Organic Matrices (Acid digestion with hot concentrated H_2SO_4 accompanied by the careful dropwise addition of H_2O_2 until clear)

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 100ppm)
ICP-OES 196.026 nm	0.08 / 0.006 $\mu\text{g/mL}$	1	atom	Fe
ICP-OES 203.985 nm	0.2 / 0.05 $\mu\text{g/mL}$	1	atom	<u>Sb</u> , <u>Ir</u> , <u>Cr</u> , <u>Ia</u>
ICP-OES 206.279 nm	0.3 / 0.16 $\mu\text{g/mL}$	1	atom	<u>Cr</u> , <u>Pt</u>
ICP-MS 82 amu	200 ppt	n/a	M'	<u>$^{13}\text{C}^{35}\text{Cl}_2$</u>

010282

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

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

10.0 QUALITY STANDARD DOCUMENTATION

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

Recognized by:

Registrar Accreditation Board (ANSI-RAB)

Standards Council of Canada (SCC)

Dutch Council for Accreditation (RVA)

Entidad Mexicana de Acreditacion, a.c.(EMA)

Members of IQ Net International Certification Network:

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

10.2 ISO/IEC 17025 - 1999 "General Requirements for the Competence of Testing and Calibration"

- Chemical Testing - Accredited A2LA Certificate Number 883.01

10.3 ISO/IEC Guide 34 - 2000 "General Requirements for the Competence of Reference Material Producers"

- Reference Materials Production - Accredited A2LA Certificate Number 883.02

A2LA Mutual Recognition Agreement Partners:

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

10.4 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

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

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



INORGANIC LABS/RADCHEM LABS 2 of 2

DATE RECEIVED: 06/20/03
DATE EXPIRED: 07/01/2004
DATE OPENED: 06/23/03
INORG: 4152 PO: F52370

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: November 27, 2002

Expiration Date: **EXPIRES**
01/2004

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By: Debbie Newman, QA Administrator

Certificate Approved By: Katalin Le, QC Supervisor

Certifying Officer: Paul Gaines, Chemist, Senior Technical Director

Debbie Newman
Katalin Le
Paul Gaines

ISO 9001:2000
10 CFR 50 APPENDIX B, 10 CFR 21
MIL-STD 45662A



Certificate of Analysis



CUSTOM-GRADE SOLUTION

1000 µg/mL Thallium in 0.5% HNO₃ (abs)

Catalog Number: CGTL1-1, CGTL1-2 and CGTL1-5

010284

Lot Number: **T-TL01075**

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

Thallium Nitrate
99.999%
59001

INORGANIC LABS/RADCHEM LABS

DATE RECEIVED: 01/16/03

DATE EXPIRED: 02/01/2004

DATE OPENED: 01/16/03

INORG: 3922 PO: F52073

CERTIFIED CONCENTRATION: 997 ± 1 µg/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:

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

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

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

Calculated Value: 1000 µg/mL

Method: Calculated, based on starting material.

Instrument Analysis: 997 ± 1 µg/mL (Average of 2 runs)

Method: Inductively Coupled Plasma Spectroscopy (ICP) vs NIST SRM 3158.

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 µm.

<u>O</u> Al <0.040	<u>M</u> Dy <0.00060	<u>M</u> Li <0.0010	<u>M</u> Pr <0.000030	<u>M</u> Te <0.0030
<u>M</u> Sb 0.000080	<u>M</u> Er <0.00050	<u>M</u> Lu <0.000040	<u>M</u> Re <0.00010	<u>M</u> Tb <0.000030
<u>M</u> As <0.0010	<u>M</u> Eu <0.00030	<u>M</u> Mg <0.0030	<u>M</u> Rh <0.00010	<u>s</u> Tl
<u>M</u> Ba <0.0010	<u>M</u> Gd <0.00010	<u>M</u> Mn <0.00040	<u>M</u> Rb <0.00010	<u>M</u> Th <0.00010
<u>M</u> Be <0.000050	<u>M</u> Ga <0.00010	<u>O</u> Hg i	<u>M</u> Ru <0.00020	<u>M</u> Tm <0.000040
<u>M</u> Bi <0.000040	<u>M</u> Ge <0.00060	<u>M</u> Mo <0.00020	<u>M</u> Sm <0.00010	<u>M</u> Sn 0.00060
<u>O</u> B <0.020	<u>M</u> Au <0.00030	<u>M</u> Nd <0.00020	<u>M</u> Sc <0.0010	<u>M</u> Ti <0.0050
<u>M</u> Cd 0.00090	<u>M</u> Hf 0.0010	<u>O</u> Ni <0.050	<u>O</u> Se <0.40	<u>M</u> W <0.0010
<u>O</u> Ca <0.010	<u>M</u> Ho <0.000050	<u>M</u> Nb <0.000050	<u>O</u> Si <0.020	<u>M</u> U <0.00020
<u>M</u> Ce <0.00050	<u>O</u> In i	<u>n</u> Os	<u>M</u> Ag <0.00020	<u>M</u> V <0.00020
<u>M</u> Cs 0.00010	<u>M</u> Ir <0.00050	<u>M</u> Pd <0.00050	<u>O</u> Na <0.090	<u>M</u> Yb <0.00010
<u>M</u> Cr <0.00050	<u>O</u> Fe <0.050	<u>O</u> P i	<u>M</u> Sr <0.000050	<u>M</u> Y <0.0040
<u>M</u> Co <0.00030	<u>M</u> La <0.000050	<u>M</u> Pt <0.00020	<u>n</u> S	<u>M</u> Zn 0.015
<u>M</u> Cu <0.00060	<u>M</u> Pb <0.00030	<u>n</u> K	<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

ANALYZED DENSITY OF SOLUTION (measured at 22°C): 1.002 g/mL

QA:KL Rev.031402DN

(over)

Inorganic Ventures, Inc.

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Quality Assurance Manager





Certificate of Analysis

CUSTOM-GRADE SOLUTION 1000 µg/mL Boron in H₂O

Catalog Number: CGB1-1, CGB1-2 and CGB1-5

010285

Lot Number: **T-B02038**

Starting Material:

H₂BO₃

Starting Material Purity: #

99.999%

Starting Material Lot No:

S-B02032

INORGANIC LABS/RADCHEM LABS

DATE RECEIVED: 02/13/03

DATE EXPIRED: 03/01/2004

DATE OPENED: 02/13/03

INORG: 3954 PO: F52060

CERTIFIED CONCENTRATION: 1001 ± 3 µg/mL

The Certified Value is the instrument analysis value. The following equations are used in the calculation of the certified value and the uncertainty:

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

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

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

Instrument Analysis: 1001 ± 3 µg/mL

Method: Inductively Coupled Plasma Spectroscopy (ICP) vs NIST SRM 3107.

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 µm.

Q	Al	<0.00090	M	Dy	<0.0060	Q	Li	<0.000024	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	Tb	<0.00030
M	As	<0.010	M	Eu	<0.0030	Q	Mg	<0.000060	M	Rh	<0.0010	M	Ti	<0.0010
Q	Ba	<0.00010	M	Gd	<0.0010	Q	Mn	<0.000023	M	Rb	<0.0010	M	Th	<0.0010
Q	Be	<0.00017	Q	Ga	<0.0016	Q	Hg	<0.015	M	Ru	<0.0020	M	Tm	<0.00040
M	Bi	<0.00040	M	Ge	<0.0060	M	Mo	<0.0020	M	Sm	<0.0010	M	Sn	<0.0050
s	B		M	Au	<0.0030	M	Nd	<0.0020	Q	Sc	<0.000023	M	Ti	<0.050
M	Cd	<0.0030	M	Hf	<0.0020	Q	Ni	<0.0023	Q	Se	<0.0062	M	W	<0.010
Q	Ca	<0.000070	M	Ho	<0.00050	M	Nb	<0.00050	Q	Si	0.00067	M	U	<0.0020
Q	Ce	<0.0030	M	In	<0.010	n	Os		M	Ag	<0.0020	Q	V	<0.00083
M	Cs	<0.00030	M	Ir	<0.0050	M	Pd	<0.0050	Q	Na	<0.00010	M	Yb	<0.0010
M	Cr	<0.0050	Q	Fe	<0.0011	Q	P	<0.0025	M	Sr	<0.00050	M	Y	<0.040
Q	Co	<0.0011	M	La	<0.00050	Q	Pt	<0.0020	Q	S	<0.10	Q	Zn	<0.00019
M	Cu	<0.0060	M	Pb	<0.0030	Q	K	<0.0030	M	Ta	<0.0070	M	Zr	<0.0050

M - checked by ICP-MS

Q - checked by ICP-OES

i - spectral interference

n - not checked for

s - solution standard element

ANALYZED DENSITY OF SOLUTION (measured at 22°C): 0.999 g/mL

QA:KL Rev.073102DN

(over)

Paul R. Gaines

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Quality Assurance Manager

EXPIRES

12/2004



Certificate of Analysis

CUSTOM-GRADE SOLUTION 1000 µg/mL Molybdenum in H₂O tr. NH₄OH

Catalog Number: CGMO1-1, CGMO1-2 and CGMO1-5

Lot Number: **T-MO01130**

010286

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

Ammonium Molybdenum Oxide
99.9943%
21410

CERTIFIED CONCENTRATION: 997 ± 3 µg/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:

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

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

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

Calculated Value: 1000 µg/mL

Method: Calculated, based on starting material.

Instrument Analysis: 997 ± 3 µg/mL (Average of 2 runs)

Method: Inductively Coupled Plasma Spectroscopy (ICP) vs-NIST SRM 3134.

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 µm.

<u>Q</u> Al <0.050	<u>M</u> Dy <0.012	<u>Q</u> Li <0.010	<u>Q</u> Pr <0.10	<u>i</u> Te
<u>M</u> Sb 0.0094	<u>M</u> Er <0.010	<u>M</u> Lu <0.00080	<u>M</u> Re <0.0020	<u>M</u> Tb <0.00060
<u>M</u> As <0.020	<u>M</u> Eu <0.0060	<u>Q</u> Mg <0.050	<u>M</u> Rh <0.0020	<u>M</u> Tl <0.0020
<u>M</u> Ba <0.020	<u>M</u> Gd <0.0020	<u>M</u> Mn <0.0080	<u>M</u> Rb 0.025	<u>M</u> Th <0.0020
<u>M</u> Be <0.0010	<u>M</u> Ga <0.0020	<u>i</u> Hg	<u>M</u> Ru <0.0040	<u>M</u> Tm <0.00080
<u>M</u> Bi <0.00080	<u>M</u> Ge <0.012	<u>s</u> Mo	<u>M</u> Sm <0.0020	<u>M</u> Sn <0.010
<u>Q</u> B <0.50	<u>M</u> Au <0.0060	<u>Q</u> Nd <0.050	<u>Q</u> Sc <0.050	<u>Q</u> Ti <0.0050
<u>Q</u> Cd <0.50	<u>M</u> Hf <0.0040	<u>M</u> Ni <0.016	<u>M</u> Se <0.016	<u>M</u> W 0.056*
<u>Q</u> Ca 0.00026	<u>M</u> Ho <0.0010	<u>Q</u> Nb <0.10	<u>Q</u> Si <0.10	<u>M</u> U <0.0040
<u>Q</u> Ce <0.050	<u>M</u> In 0.0024	<u>n</u> Os	<u>M</u> Ag <0.0040	<u>M</u> V <0.0040
<u>M</u> Cs <0.00060	<u>M</u> Ir <0.010	<u>M</u> Pd <0.010	<u>Q</u> Na <0.10	<u>M</u> Yb <0.0020
<u>M</u> Cr <0.010	<u>Q</u> Fe <0.50	<u>i</u> P	<u>M</u> Sr <0.0010	<u>M</u> Y <0.080
<u>M</u> Co <0.0060	<u>M</u> La <0.0010	<u>M</u> Pt <0.0040	<u>L</u> S	<u>M</u> Zn <0.040
<u>M</u> Cu <0.012	<u>M</u> Pb <0.0060	<u>Q</u> K 0.0098	<u>M</u> Ta <0.014	<u>M</u> Zr <0.010

M - checked by ICP-MS

Q - checked by ICP-OES

i - spectral interference

n - not checked for

s - solution standard element

* W impurity may be due to Mo doubly charged ion and represents the maximum concentration possible.

ANALYZED DENSITY OF SOLUTION (measured at 22°C): 0.999 g/mL

(over)

QA:KL Rev.073102DN

Inorganic Ventures, Inc.

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EXPIRES
12/2004



Certificate of Analysis

CUSTOM-GRADE SOLUTION

1000 µg/mL Phosphorus in H₂O

Catalog Number: CGP1-1, CGP1-2 and CGP1-5

Lot Number: T-P01118

010287

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

Phosphoric Acid
99.999%
J18804

INORGANIC LABS/RADCHEM LABS

DATE RECEIVED: 05/01/03
DATE EXPIRED: 06/01/2004
DATE OPENED: 05/01/03
INORG: 4049 PO: F52180

CERTIFIED CONCENTRATION: 1004 ± 2 µg/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:

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

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

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

Classical Wet Assay: 1004 ± 2 µg/mL

Method: Acidimetric Titration vs NIST SRM 84k KHP.

Instrument Analysis: 1000 ± 3 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 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 µm.

<u>Q</u> Al <0.040	<u>M</u> Dy <0.00060	<u>M</u> Li <0.0010	<u>M</u> Pr <0.000030	<u>M</u> Te <0.0030
<u>M</u> Sb 0.012	<u>M</u> Er <0.00050	<u>M</u> Lu <0.000040	<u>M</u> Re <0.00010	<u>M</u> Tb <0.000030
<u>M</u> As <0.0010	<u>M</u> Eu <0.00030	<u>M</u> Mg <0.0030	<u>M</u> Rh <0.00010	<u>M</u> Tl <0.00010
<u>M</u> Ba <0.0010	<u>M</u> Gd <0.00010	<u>M</u> Mn <0.00040	<u>M</u> Rb <0.00010	<u>M</u> Th <0.00010
<u>M</u> Be <0.000050	<u>M</u> Ga 0.00070	<u>Q</u> Hg <0.020	<u>M</u> Ru <0.00020	<u>M</u> Tm <0.000040
<u>M</u> Bi <0.000040	<u>M</u> Ge <0.00060	<u>M</u> Mo <0.00020	<u>M</u> Sm <0.00010	<u>M</u> Sn <0.00050
<u>M</u> B <0.0070	<u>M</u> Au <0.00030	<u>M</u> Nd <0.00020	<u>n</u> Sc	<u>n</u> Ti
<u>M</u> Cd <0.00030	<u>M</u> Hf <0.00020	<u>Q</u> Ni <0.050	<u>Q</u> Se <0.40	<u>M</u> W <0.0010
<u>Q</u> Ca <0.010	<u>M</u> Ho <0.000050	<u>M</u> Nb <0.000050	<u>Q</u> Si <0.020	<u>M</u> U <0.00020
<u>M</u> Ce <0.00050	<u>M</u> In <0.030	<u>n</u> Os	<u>M</u> Ag <0.00020	<u>M</u> V <0.00020
<u>M</u> Cs <0.000030	<u>M</u> Ir <0.00050	<u>M</u> Pd <0.00050	<u>Q</u> Na <0.090	<u>M</u> Yb <0.00010
<u>M</u> Cr <0.00050	<u>Q</u> Fe <0.050	<u>s</u> P	<u>M</u> Sr <0.000050	<u>M</u> Y <0.0040
<u>M</u> Co <0.00030	<u>M</u> La <0.000050	<u>M</u> Pt <0.00020	<u>n</u> S	<u>M</u> Zn 0.0035
<u>M</u> Cu 0.080	<u>M</u> Pb <0.00030	<u>n</u> K	<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

ANALYZED DENSITY OF SOLUTION (measured at 22°C): 0.999 g/mL

(over)

QA:KL Rev.122002DN

Paul R. James

Inorganic Ventures, Inc.

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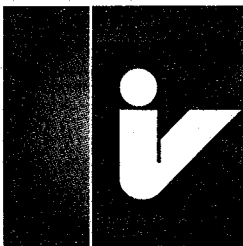
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Quality Assurance Manager

EXPIRES

01/2004



inorganic ventures / iv labs

195 lehigh avenue, suite 4, lakewood, nj 08701 usa
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e-mail: ivsales@ivstandards.com • website: www.ivstandards.com

certificate of analysis

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

010288

2.0 DESCRIPTION OF CRM Custom-Grade 1000 µg/mL Silicon in H₂O tr. HNO₃ tr. HF

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
Matrix: H₂O tr. HNO₃ tr. HF

INORGANIC LABS/RADCHEM LABS Pg. 1 of 2
DATE RECEIVED: 06/20/03
DATE EXPIRED: 07/01/2004
DATE OPENED: 06/23/03
INORG: 4153 PO: F52370

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Concentration: 1000 ± 5 µg/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:

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

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

$\sum s_i^2$ = 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 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.

010289

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 0.02730	<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> Tb < 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> Tl < 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 $20 \pm 4^\circ\text{C}$. Do not pipet from container. Do not return portions removed for pipetting to container.

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 28.0855; +4; 6; $\text{Si}(\text{OH})_4(\text{F})_2^{2-}$

Chemical Compatibility - Soluble in HCl , HF , H_3PO_4 , H_2SO_4 and HNO_3 as the $\text{Si}(\text{OH})_4(\text{F})_2^{2-}$. 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 - (alone or mixed with all other metals) as the $\text{Si}(\text{OH})_4(\text{F})_2^{2-}$. 1-10,000 ppm single element solutions as the $\text{Si}(\text{OH})_4(\text{F})_2^{2-}$ chemically stable for years in 2-5 % HNO_3 / trace HF in a LDPE container.

Si Containing Samples (Preparation and Solution) - Metal (Soluble in 1:1:1 H_2O / HF / HNO_3) Oxide - SiO_2 , amorphous (Dissolve by heating in 1:1:1 H_2O / HF / HNO_3) Oxide - quartz (Fuse in Pt^{a} with Na_2CO_3), Geological Samples (Fuse in Pt^{a} with Na_2CO_3 followed by HCl solution of the fuseate), Organic Matrices containing silicates and non volatile silicon compounds (Dry ash at 450°C in Pt^{a} and dissolve by gently warming with 1:1:1 H_2O / HF / H_2SO_4 or fuse / ash with Na_2CO_3 and dissolve fuseate with HCl / H_2O), Silicone Oils - dimethyl silicones depolymerize to form volatile monomer units when heated (Measure directly in alcoholic KOH / xylene mixture where sample is treated first with the KOH at $60-100^\circ\text{C}$ to "unzip" the Si-O-Si polymeric structure or digest with concentrated $\text{H}_2\text{SO}_4/\text{H}_2\text{O}_2$ followed by cooling and dissolution of the dehydrated silica with HF .) Note that the direct analysis of silicone oils in an organic solvent will result in false high results due to high vapor pressure of volatile monomer units like hexamethylcyclotrisiloxane. The KOH forms the $\text{K}_2\text{Si}(\text{CH}_3)_2\text{O}^-$ salt which is not volatile at room temperature.

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

Technique/Line	Estimated D.L.	Order	Type	Interferences (underlined indicates severe at SiO_2)
ICP-OES 251.611 nm	0.012 / 0.003 $\mu\text{g}/\text{mL}$	1	ion	Ta, U, Zn, Th
ICP-OES 212.412 nm	0.02 / 0.01 $\mu\text{g}/\text{mL}$	1	ion	Hf, Os, <u>Mo</u> , Ta
ICP-OES 288.158 nm	0.03 / 0.004 $\mu\text{g}/\text{mL}$	1	ion	Ta, Ce, Cr, Cd, Th
ICP-MS 28 amu	4000 - 8000 ppt	n/a	M ⁺	¹⁴ N ₂ , ¹³ C ¹⁸ O

010290

HF Note: This standard should not be prepared or stored in glass.

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

9.0 HOMOGENEITY - This solution was mixed according to 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 Pg. 2 of 2

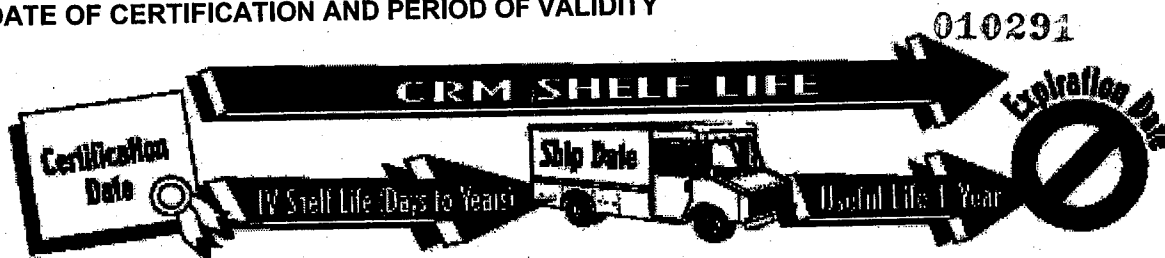
DATE RECEIVED: 06/20/03

DATE EXPIRED: 07/01/2004

DATE OPENED: 06/23/03

INORG: 4153 PD: F52370

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**
01/2004

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

JoAnn Struthers
Katalin Le
Paul Gaines

ISO 9001:2000
10 CFR 50 APPENDIX B, 10 CFR 21
MIL-STD 45662A



Certificate of Analysis

CUSTOM-GRADE SOLUTION

Catalog Number: CGTI1-1, CGTI1-2 and CGTI1-5

1000 µg/mL Titanium in 1.4% HNO₃ (abs) tr. HF

This standard should not be prepared or stored in glass.

Lot Number: T-TI02039

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

Titanium Metal
99.999%
F29114

INORGANIC LABS/RADCHEM LABS

DATE RECEIVED: 11/12/02

DATE EXPIRED: 12/11/2003

DATE OPENED: 11/13/02

INORG: 3762 PO: F52061

CERTIFIED CONCENTRATION: 1010 ± 3 µg/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:

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

$$\text{Uncertainty } (\pm) = \frac{2[(\sum S_i)^2]^{1/2}}{(n)^{1/2}} \quad 010292$$

($\bar{x}$) = mean

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 ± 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 µm.

<u>O</u>	Al	<0.010	<u>M</u>	Dy	<0.00060	<u>M</u>	Li	<0.0010	<u>M</u>	Pr	<0.000030	<u>M</u>	Te	<0.0030
<u>M</u>	Sb	<0.000050	<u>M</u>	Er	<0.00050	<u>M</u>	Lu	<0.000040	<u>M</u>	Re	<0.00010	<u>M</u>	Tb	<0.000030
<u>M</u>	As	<0.0010	<u>M</u>	Eu	<0.00030	<u>O</u>	Mg	<0.020	<u>M</u>	Rh	<0.00010	<u>M</u>	Tl	<0.00010
<u>M</u>	Ba	<0.0010	<u>M</u>	Gd	<0.00010	<u>M</u>	Mn	0.0020	<u>M</u>	Rb	<0.00010	<u>M</u>	Th	<0.00010
<u>M</u>	Be	<0.000050	<u>M</u>	Ga	<0.00010	<u>O</u>	Hg	<0.050	<u>M</u>	Ru	<0.00020	<u>M</u>	Tm	<0.000040
<u>M</u>	Bi	<0.000040	<u>M</u>	Ge	<0.00060	<u>M</u>	Mo	<0.00020	<u>M</u>	Sm	<0.00010	<u>M</u>	Sn	<0.00050
<u>O</u>	B	<0.050	<u>M</u>	Au	<0.00030	<u>M</u>	Nd	<0.00020	<u>O</u>	Sc	<0.0020	<u>s</u>	Ti	
<u>M</u>	Cd	<0.00030	<u>M</u>	Hf	<0.00020	<u>O</u>	Ni	<0.050	<u>O</u>	Se	<0.40	<u>M</u>	W	<0.0010
<u>O</u>	Ca	<0.010	<u>M</u>	Ho	<0.000050	<u>M</u>	Nb	<0.000050	<u>O</u>	Si	<0.010	<u>M</u>	U	<0.00020
<u>M</u>	Ce	<0.00050	<u>O</u>	In	<0.020	<u>n</u>	Os		<u>M</u>	Ag	<0.00020	<u>M</u>	V	<0.00020
<u>M</u>	Cs	<0.000030	<u>M</u>	Ir	<0.00050	<u>M</u>	Pd	<0.00050	<u>O</u>	Na	0.12	<u>M</u>	Yb	<0.00010
<u>M</u>	Cr	<0.00050	<u>O</u>	Fe	<0.010	<u>i</u>	P		<u>M</u>	Sr	<0.000050	<u>M</u>	Y	<0.0040
<u>M</u>	Co	<0.00030	<u>M</u>	La	<0.000050	<u>M</u>	Pt	<0.00020	<u>i</u>	S		<u>M</u>	Zn	0.19
<u>O</u>	Cu	<0.040	<u>M</u>	Pb	<0.00030	<u>n</u>	K	0.23	<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

ANALYZED DENSITY OF SOLUTION (measured at 22°C): 1.011 g/mL

QA:KL Rev.060502DN

(over)

Inorganic Ventures, Inc.

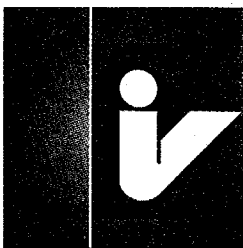
195 Lehigh Avenue • Suite 4 • Lakewood, NJ 08701

Orders: 800-669-6799 • FAX (732) 901-1903

Technical Support: 800-569-6799

Quality Assurance Manager

EXPIRES
12/2003



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."

010293

2.0 DESCRIPTION OF CRM Custom-Grade 1000 µg/mL Strontium in 0.1% (abs) HNO₃

Catalog Number: CGSR1-1, CGSR1-2, and CGSR1-5

Lot Number: T-SR01123

Starting Material: SrCO₃

Starting Material Purity (%): 99.9951

Starting Material Lot No 22593

Matrix: 0.1% (abs) HNO₃

INORGANIC LABS/RADCHEM LABS Pg. 1 of 2
DATE RECEIVED: 06/20/03
DATE EXPIRED: 07/01/2004
DATE OPENED: 06/23/03
INORG: 4154 PO: F52370

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Concentration: 998 ± 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:

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

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

$\sum s_i^2$ = The summation of all significant estimated errors.

(Most common are the errors from instrumental measurement, weighing, dilution to volume, and the fixed error reported on the NIST SRM certificate of analysis.)

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

4.0 TRACEABILITY TO NIST AND VALUES OBTAINED BY INDEPENDENT METHODS

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

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

4.1 Assay Method #1 998 ± 2 µg/mL

EDTA NIST SRM 928 Lot Number: 880710

Assay Method #2 1002 ± 8 µg/mL

ICP Assay NIST SRM 3153a Lot Number: 990906

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> Al < 0.00090	<u>M</u> Dy < 0.00600	<u>Q</u> Li < 0.00003	<u>M</u> Pr < 0.00030	<u>Q</u> Te < 0.10000
<u>M</u> Sb < 0.00050	<u>M</u> Er < 0.00500	<u>M</u> Lu < 0.00040	<u>M</u> Re < 0.00100	<u>M</u> Tb < 0.00030
<u>Q</u> As < 0.00500	<u>M</u> Eu < 0.00300	<u>Q</u> Mg 0.00037	<u>Q</u> Rh < 0.00600	<u>M</u> Tl < 0.00100
<u>M</u> Ba 0.04001	<u>M</u> Gd < 0.00100	<u>Q</u> Mn 0.00018	i Rb	<u>M</u> Th < 0.00100
<u>Q</u> Be < 0.00009	<u>M</u> Ga < 0.00100	<u>Q</u> 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>Q</u> B < 0.00060	<u>M</u> Au < 0.00300	<u>M</u> Nd < 0.00200	<u>M</u> 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
<u>Q</u> Ca 0.03600	<u>M</u> Ho < 0.00050	<u>M</u> Nb < 0.00050	<u>Q</u> Si 0.00056	<u>M</u> U < 0.00200
<u>M</u> Ce < 0.00500	<u>Q</u> In < 0.00200	n Os	<u>M</u> Ag < 0.00200	<u>M</u> V < 0.00200
<u>M</u> Cs < 0.00030	<u>M</u> Ir < 0.00500	<u>Q</u> Pd < 0.00400	<u>Q</u> Na 0.00520	<u>M</u> Yb < 0.00100
<u>Q</u> Cr < 0.00080	<u>Q</u> Fe 0.00080	<u>Q</u> P < 0.00480	s Sr	<u>Q</u> Y < 0.00004
<u>M</u> Co < 0.00300	<u>M</u> La < 0.00050	<u>M</u> Pt < 0.00200	n S	<u>M</u> Zn < 0.02000
<u>Q</u> Cu < 0.00140	<u>M</u> Pb < 0.00300	<u>Q</u> K < 0.00170	<u>M</u> Ta < 0.00700	<u>M</u> Zr < 0.00500

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

6.0 INTENDED USE

For the calibration of analytical instruments including but not limited to the following:
 ICP-MS, ICP-OES, FAAS, GFAA, XRF, and DCP
 For the validation of analytical methods
 For the preparation of "working reference samples"
 For interference studies and the determination of correction coefficients
 For detection limit and linearity studies
 For additional intended uses, contact IV Technical Staff

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

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

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 87.62; +2; 6; Sr(H₂O)₉·2

Chemical Compatibility - Soluble in HCl, and HNO₃. Avoid H₂SO₄, HF and neutral to basic media. Stable with most metals and inorganic anions forming insoluble silicate, carbonate, hydroxide, oxide, fluoride, sulfate, oxalate, chromate, arsenate and tungstate in neutral aqueous media.

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

Sr Containing Samples (Preparation and Solution) - Metal (Best dissolved in diluted HNO₃); Ores (Carbonate fusion in P₂O₅ followed by HCl dissolution); Organic Matrices (Dry ash and dissolution in dilute HCl).

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

Technique/Line	Estimated D.L.	Order	Type	Interferences (underlined indicates severe at ≈ concs.)
ICP-OES 407.771 nm	0.0004 / 0.00006 µg/mL	1	ion	U, Ce
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 ⁺	⁷² Ge ¹⁶ O, ¹⁷⁶ Yb ⁺² , ¹⁷⁶ Lu ⁺² , ¹⁷⁶ Hf ⁺²

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

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

10.0 **QUALITY STANDARD DOCUMENTATION**

010295

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)

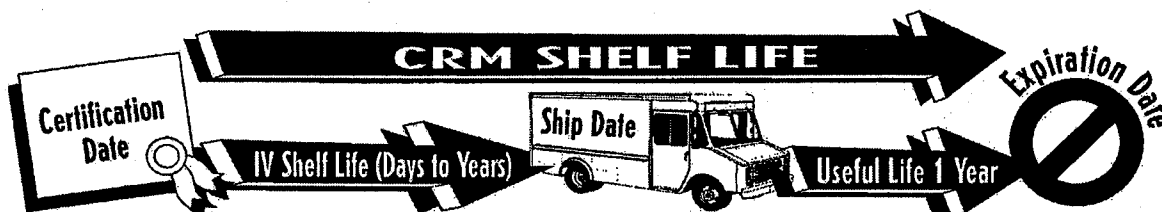
10.4 **10CFR50 Appendix B - Nuclear Regulatory Commission**

- 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: October 31, 2002

Expiration Date: **EXPIRES**

01/22/04

INORGANIC LABS/RADCHEM LABS Pg. 2 of 2

DATE RECEIVED: 06/20/03

DATE EXPIRED: 07/01/2004

DATE OPENED: 06/23/03

INORG: 4154 PO: F52370

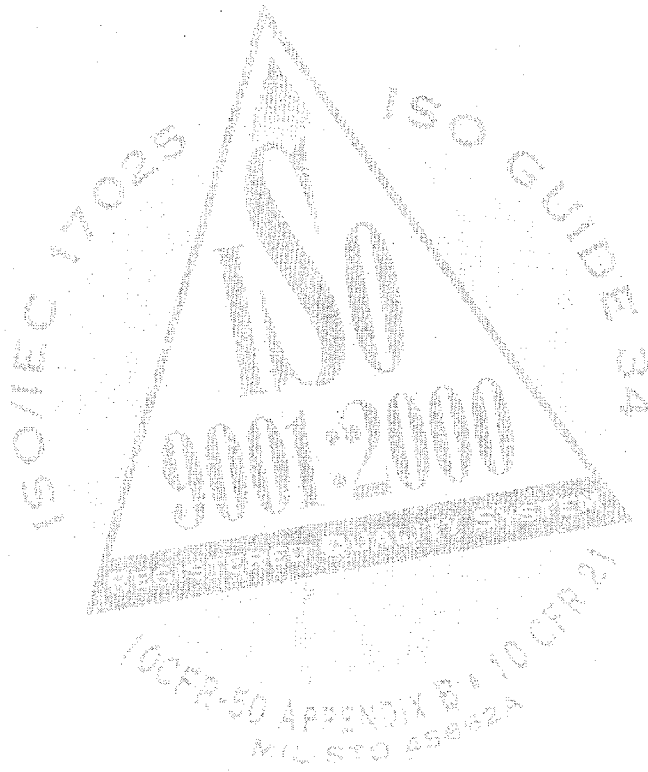
12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

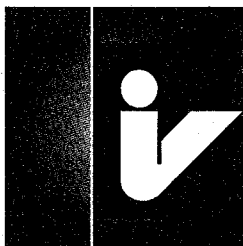
Certificate Prepared By: Debbie Newman, QA Administrator

Certificate Approved By: Katalin Le, QC Supervisor

Certifying Officer: Paul Gaines, Chemist, Senior Technical Director

Debbie Newman
Katalin Le
010296
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inorganic ventures / iv labs

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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."

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2.0 DESCRIPTION OF CRM Custom-Grade 1000 µg/mL Tin in H₂O tr HNO₃ tr HF

Catalog Number: CGSN1-1, CGSN1-2, and CGSN1-5
Lot Number: T-SN01110
Starting Material: #1, #2 SN SHOT
Starting Material Purity (%): 99.9969
Starting Material Lot No: AAJM H12H17, A23F09
Matrix: H₂O tr HNO₃ tr HF

INORGANIC LABS/RADCHEM LABS Pg 1 of 2
DATE RECEIVED: 3/26/03
DATE EXPIRED: 4/01/2004
DATE OPENED: 3/28/03
INORG: 4026 PO: F52167

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Concentration: 1003 ± 5 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:

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

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

$\sum s_i^2$ = 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 1003 ± 5 µg/mL (Avg 2 runs)

ICP Assay NIST SRM 3161a Lot Number: 993107

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.

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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> Al 0.00100	<u>M</u> Dy < 0.01217	<u>Q</u> Li < 0.00002	<u>M</u> Pr < 0.00061	<u>M</u> Te < 0.06087
<u>Q</u> Sb < 0.01000	<u>M</u> Er < 0.01014	<u>M</u> Lu < 0.00081	<u>M</u> Re < 0.00203	<u>M</u> Tb < 0.00061
<u>M</u> As < 0.02029	<u>M</u> Eu < 0.00609	<u>Q</u> Mg < 0.00003	<u>M</u> Rh < 0.00203	<u>M</u> Tl < 0.00203
<u>Q</u> Ba < 0.00070	<u>M</u> Gd < 0.00203	<u>M</u> Mn < 0.00812	<u>M</u> Rb < 0.00203	<u>M</u> Th < 0.00203
<u>M</u> Be < 0.00101	<u>M</u> Ga < 0.00203	<u>Q</u> Hg < 0.01500	<u>M</u> Ru < 0.00406	<u>M</u> Tm < 0.00081
<u>M</u> Bi < 0.00081	<u>M</u> Ge < 0.01217	<u>M</u> Mo < 0.00406	<u>M</u> Sm < 0.00203	<u>S</u> Sn
<u>Q</u> B < 0.01200	<u>M</u> Au < 0.00609	<u>M</u> Nd < 0.00406	<u>M</u> Sc < 0.02029	<u>M</u> Ti < 0.10144
<u>Q</u> Cd < 0.00500	<u>M</u> Hf < 0.00406	<u>Q</u> Ni < 0.01000	<u>M</u> Se < 0.01623	<u>M</u> W < 0.02029
<u>Q</u> Ca < 0.00150	<u>M</u> Ho < 0.00101	<u>M</u> Nb < 0.00101	<u>Q</u> Si 0.02700	<u>M</u> U < 0.00406
<u>M</u> Ce < 0.01014	<u>M</u> In < 0.02029	<u>n</u> Os	<u>M</u> Ag < 0.00406	<u>M</u> V < 0.00406
<u>M</u> Cs < 0.00061	<u>M</u> Ir < 0.01014	<u>M</u> Pd < 0.01014	<u>Q</u> Na 0.00325	<u>M</u> Yb < 0.00203
<u>M</u> Cr < 0.01014	<u>Q</u> Fe < 0.00110	<u>Q</u> P < 0.00500	<u>M</u> Sr < 0.00101	<u>M</u> Y < 0.08115
<u>Q</u> Co < 0.00200	<u>M</u> La < 0.00101	<u>M</u> Pt < 0.00406	<u>N</u> S	<u>M</u> Zn < 0.04058
<u>M</u> Cu < 0.01217	<u>M</u> Pb < 0.00609	<u>Q</u> K < 0.00200	<u>M</u> Ta < 0.01420	<u>M</u> Zr < 0.01014

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 $20 \pm 4^\circ\text{C}$. 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 $\text{Sn}(\text{OH})_4\text{F}_6^{4-}$

Chemical Compatibility - Soluble in HCl and dilute HF / HNO_3 . 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 $\text{Sn}(\text{OH})_4\text{F}_6^{4-}$ for 1 year in 1% HNO_3 / LDPE container. 1-10,000 ppm single element solutions as the $\text{Sn}(\text{OH})_4\text{F}_6^{4-}$ chemically stable for years in 2-5% HNO_3 / trace HF in a LDPE container.

Sn Containing Samples (Preparation and Solution) - Metal (Soluble in HF / HNO_3 or HCl); Oxides - SnO (soluble in HCl), SnO_2 - very resistant to all acids including HF (Fusion with equal parts of Na_2CO_3 and S. It is then soluble in water or dilute acids as the thiostannate.); Alloys (Treat first 0.1 g with 10 mL conc. H_2SO_4 to boiling until the alloy disintegrates and nearly all of the sulfuric acid is expelled. Then add 100 mL O_2 free water and 50 mL of conc HCl 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 $\mu\text{g/L}$ concs.)
ICP-OES 189.989 nm	0.03 / 0.003 $\mu\text{g/mL}$	1	ion	
ICP-OES 242.949 nm	0.1 / 0.01 $\mu\text{g/mL}$	1	atom	W, Mo, Rh, Ta, Co
ICP-MS 120 amu	5 ppt	n/a	M*	¹²⁷ Te, ¹³⁵ Ru ¹⁰ O, ¹⁰⁶ Pd ¹⁰ O

010299

HF Note: This standard should not be prepared or stored in glass.

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

9.0 **HOMOGENEITY** - This solution was mixed according to 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 (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 Pg. 2 of 2

DATE RECEIVED: 3/26/03

DATE EXPIRED: 4/01/2004

DATE OPENED: 3/28/03

INORG: 4026 PO: F52167

11.0 DATE OF CERTIFICATION AND PERIOD OF VALIDITY

010300



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 17, 2002

Expiration Date:

EXPIRES

12/2004

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By: Debbie Newman, QA Administrator

Certificate Approved By: Katalin Le, QC Supervisor

Certifying Officer: Paul Gaines, Chemist, Senior Technical Director

Debbie Newman
Katalin Le
Paul Gaines

10CFR-50 APPENDIX B, 10 CFR 21
MIL-STD 45662A

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 1000 µg/mL Bismuth in 3.5% (abs) HNO₃ **010301**

Catalog Number: CGBI1-1 and CGBI1-5
 Lot Number: **W-BI01089**
 Starting Material: Bi needles
 Starting Material Purity (%): 99.999090
 Starting Material Lot No: G25L16
 Matrix: 3.5% (abs) HNO₃

INORGANIC LABS/RADCHEM LABS Pg. 1 of 2
 DATE RECEIVED: 07/31/03
 DATE EXPIRED: 08/01/2004
 DATE OPENED: 08/01/03
 INORG: 4200 PO: F52383

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Concentration: 1002 ± 4 µg/mL

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:

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

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

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

(Most common are the errors from instrumental measurement, weighing, dilution to volume, and the fixed error reported on the NIST SRM certificate of analysis.)

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 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> Al 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>Q</u> Mg 0.00070	<u>M</u> Rh < 0.00200	<u>M</u> Tl < 0.00200
<u>M</u> Ba < 0.02003	<u>M</u> Gd < 0.00200	<u>Q</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>Q</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>Q</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>Q</u> Ca 0.00245	<u>M</u> Ho < 0.00100	<u>M</u> Nb < 0.00100	<u>Q</u> Si 0.00105	<u>M</u> U < 0.00401
<u>M</u> Ce < 0.01001	<u>Q</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>Q</u> Pd < 0.00400	<u>Q</u> Na 0.00240	<u>M</u> Yb < 0.00200
<u>Q</u> Cr 0.00020	<u>Q</u> Fe 0.00014	<u>Q</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>Q</u> S < 0.03000	<u>Q</u> Zn 0.00008
<u>Q</u> Cu 0.00014	<u>Q</u> Pb 0.00135	<u>Q</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 - Keep tightly sealed when not in use. Store and use at $20 \pm 4^\circ\text{C}$. Do not pipet from container. Do not return portions removed for pipetting to container.

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 208.9804; +3, 6; $\text{Bi}(\text{O})(\text{H}_2\text{O})_2^{3+}$

Chemical Compatibility - Stable in HCl , HNO_3 , H_2SO_4 and HF . Avoid basic media forming insoluble hydroxide. Stable with most metals and inorganic anions in acidic media. Many salts that are insoluble in water are soluble in HCl , HNO_3 , and HF . The major problem with Bi^{3+} 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 $\mu\text{g/mL}$ concentration range.

Stability - 2-100 ppb levels stable for months in 1% HNO_3 /LDPE container. 1-10,000 ppm solutions chemically stable for years in 5-7% HNO_3 /LDPE container.

Bi Containing Samples (Preparation and Solution) - Metal (soluble in HNO_3); Oxides (Soluble in HNO_3); Alloys (Dissolve in conc. 4:1 HCl/HNO_3 . Heating may be required.); Organic based (dry ash at 450°C and dissolve ash in HNO_3 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):

Technique/Line	Estimated D.L.	Order	Type	Interferences (underlined indicates severe at 100ppb)
ICP-OES 223.061 nm	0.04 / 0.005 $\mu\text{g/mL}$	1	atom	Th, Ir, Ti, Cu
ICP-OES 306.772 nm	0.08 / 0.01 $\mu\text{g/mL}$	1	atom	Th, U, Zr, Hf, Fe
ICP-OES 222.825 nm	0.1 / 0.02 $\mu\text{g/mL}$	1	atom	Cr, Hf, Ce, Os
ICP-MS 209 amu	2 ppt	n/a	M'	^{209}Bi

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

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

10.0 QUALITY STANDARD DOCUMENTATION

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

Recognized by:

Registrar Accreditation Board (ANSI-RAB)

Standards Council of Canada (SCC)

Dutch Council for Accreditation (RVA)

Entidad Mexicana de Acreditacion, a.c.(EMA)

Members of IQ Net International Certification Network:

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

10.2 ISO/IEC 17025 - 1999 "General Requirements for the Competence of Testing and Calibration"

- Chemical Testing - Accredited A2LA Certificate Number 883.01



10.3 ISO/IEC Guide 34 - 2000 "General Requirements for the Competence of Reference Material Producers"

- Reference Materials Production - Accredited A2LA Certificate Number 883.02

A2LA Mutual Recognition Agreement Partners:

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

10.4 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

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

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

INORGANIC LABS/RADCHEM LABS Pg. 2 of 2

DATE RECEIVED: 07/31/03

DATE EXPIRED: 08/01/2004

DATE OPENED: 08/01/03

INORG: 4200 PO: F52383

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: March 28, 2003

Expiration Date:

EXPIRES
10/2004

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

JoAnn Struthers
Katalin Le
Paul Gaines



Certificate of Analysis

CUSTOM-GRADE SOLUTION

1000 µg/mL Lanthanum in 1.4% HNO₃ (abs)

Catalog Number: CGLA1-1 and CGLA1-5

010305

Lot Number: **T-QLA01057**

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

Lanthanum Oxide
99.999%
LA-0-5-017

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 08/26/03
DATE EXPIRED: 09/01/2004
DATE OPENED: 08/26/03
INORG: 4221 PO: F53334

CERTIFIED CONCENTRATION: 1002 ± 3 µg/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:

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

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

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

Classical Wet Assay: 1002 ± 3 µg/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 µm.

<u>Q</u> Al <0.040	<u>M</u> Dy <0.00060	<u>M</u> Li <0.0010	<u>Q</u> Pr <0.020	<u>M</u> Te <0.0030
<u>M</u> Sb <0.000050	<u>M</u> Er 0.0010	<u>M</u> Lu 0.000040	<u>M</u> Re <0.00010	<u>M</u> Tb <0.000030
<u>M</u> As <0.0010	<u>M</u> Eu <0.00030	<u>M</u> Mg <0.0030	<u>M</u> Rh <0.00010	<u>M</u> Tl <0.00010
<u>Q</u> Ba <0.020	<u>M</u> Gd 0.039	<u>M</u> Mn <0.00040	<u>M</u> Rb <0.00010	<u>M</u> Th <0.00010
<u>M</u> Be <0.000050	<u>M</u> Ga <0.00010	<u>Q</u> Hg <0.030	<u>M</u> Ru <0.00020	<u>M</u> Tm <0.000040
<u>M</u> Bi <0.000040	<u>M</u> Ge <0.00060	<u>M</u> Mo <0.00020	<u>M</u> Sm 0.00040	<u>M</u> Sn <0.00050
<u>Q</u> B <0.020	<u>M</u> Au <0.00030	<u>M</u> Nd 0.00020	<u>M</u> Sc <0.0010	<u>M</u> Ti <0.0050
<u>M</u> Cd <0.00030	<u>M</u> Hf <0.00020	<u>Q</u> Ni <0.050	<u>Q</u> Se <0.40	<u>M</u> W <0.0010
<u>Q</u> Ca <0.010	<u>M</u> Ho 0.00010	<u>M</u> Nb <0.000050	<u>Q</u> Si <0.020	<u>M</u> U <0.00020
<u>i</u> Ce	<u>Q</u> In <0.030	<u>n</u> Os	<u>M</u> Ag <0.00020	<u>M</u> V <0.00020
<u>n</u> Cs	<u>M</u> Ir <0.00050	<u>Q</u> Pd <0.00050	<u>Q</u> Na <0.090	<u>M</u> Yb <0.00010
<u>M</u> Cr <0.00050	<u>Q</u> Fe <0.050	<u>Q</u> P <0.050	<u>M</u> Sr <0.000050	<u>M</u> Y <0.0040
<u>M</u> Co <0.00030	<u>s</u> La	<u>M</u> Pt <0.00020	<u>n</u> S	<u>M</u> Zn <0.0020
<u>M</u> Cu <0.00060	<u>M</u> Pb <0.00030	<u>n</u> K	<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

ANALYZED DENSITY OF SOLUTION (measured at 22°C): 1.009 g/mL

(over)

QA:KSL Rev.121702DN

Inorganic Ventures, Inc.

195 Lehigh Avenue • Suite 4 • Lakewood, NJ 08701

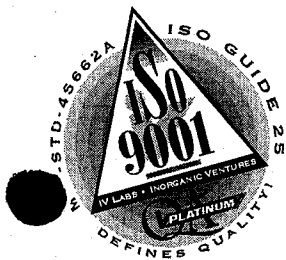
Orders: 800-669-6799 • FAX (732) 901-1903

Technical Support: 800-569-6799

Quality Assurance Manager

EXPIRES

1st 2004



Certificate of Analysis

010306

CUSTOM-GRADE SOLUTION

Catalog Number: CGPD1-1 and CGPD1-5

1000 µg/mL Palladium in 3.3% HCl (abs)

Lot Number: T-PD02014

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

Palladium Nitrate
99.999%
00614

INORGANIC LABS/RADCHEM LABS

DATE RECEIVED: 2/28/03
DATE EXPIRED: 3/01/2004
DATE OPENED: 2/28/03
INORG: 3964 PO: F52064

CERTIFIED CONCENTRATION: 1001 ± 3 µg/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:

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

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

($\bar{x}$) = mean x_i = individual results

n = number of measurements

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

Calculated Value: 1002 µg/mL

Method: Calculated, based on starting material.

Instrument Analysis: 1001 ± 3 µg/mL

Method: Inductively Coupled Plasma Spectroscopy (ICP) vs NIST SRM 3138.

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 µm.

M	Al	<0.00090	M	Dy	<0.00060	M	Li	<0.0010	M	Pr	<0.000030	M	Te	<0.0030
M	Sb	0.0017	M	Er	<0.00050	M	Lu	<0.000040	M	Re	<0.00010	M	Tb	<0.000030
M	As	<0.060	M	Eu	<0.00030	M	Mg	0.0090	O	Rh	<0.020	M	Tl	0.00010
M	Ba	<0.0010	M	Gd	<0.00010	M	Mn	<0.00040	M	Rb	<0.00010	M	Th	<0.00010
M	Be	<0.000050	M	Ga	0.00026	O	Hg	<0.030	O	Ru	<0.010	M	Tm	<0.000040
M	Bi	<0.000040	M	Ge	0.0058	M	Mo	<0.00020	M	Sm	<0.00010	M	Sn	<0.00050
M	B	<0.0070	M	Au	0.00090	M	Nd	0.00090	M	Sc	<0.0010	M	Ti	<0.0050
O	Cd	<0.010	M	Hf	<0.00020	O	Ni	<0.050	O	Se	<0.40	M	W	<0.0010
O	Ca	0.040	M	Ho	<0.000050	M	Nb	<0.000050	O	Si	<0.020	M	U	<0.00020
M	Ce	<0.00050	O	In	<0.030	n	Os		O	Ag	0.26	O	V	<0.010
i	Cs		M	Ir	<0.00050	s	Pd		O	Na	<0.090	M	Yb	<0.00010
O	Cr	<0.020	O	Fe	<0.050	O	P	<0.050	M	Sr	<0.000050	M	Y	<0.0040
M	Co	<0.00030	M	La	<0.000050	M	Pt	0.016	n	S		M	Zn	0.0030
M	Cu	0.0023	M	Pb	0.0022	n	K		M	Ta	<0.00070	M	Zr	<0.00050

M - checked by ICP-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

QA:KSL Rev.050202DN

(over)

Inorganic Ventures, Inc.

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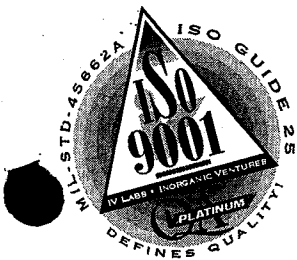
Orders: 800-669-6799 • FAX (732) 901-1903

Technical Support: 800-569-6799

Paul R. Gaines

Quality Assurance Manager

EXPIRES
1/2004



Certificate of Analysis

CUSTOM-GRADE SOLUTION

Catalog Number: CGS1-1, CGS1-2, and CGS1-5

Lot Number: T-S01058

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

1000 µg/mL Sulfur in H₂O

H₂SO₄
99.999%
N38818

010307

INORGANIC LABS/RADCHEM LABS

DATE RECEIVED: 10/22/02
DATE EXPIRED: 11/01/2003
DATE OPENED: 10/23/02
INORG: 3739 PO: F52057

CERTIFIED CONCENTRATION: 1000 ± 2 µg/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:

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

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

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

Classical Wet Assay: 1000 ± 2 µg/mL

Method: Acidimetric Titration vs NIST SRM KHP 84k.

Instrument Analysis: 1003 ± 4 µg/mL

Method: Inductively Coupled Plasma Spectroscopy (ICP) vs NIST SRM 3154.

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 µm.

<u>O</u> Al <0.0030	<u>M</u> Dy <0.012	<u>O</u> Li <0.00016	<u>M</u> Pr <0.00060	<u>M</u> Te <0.060
<u>M</u> Sb <0.0010	<u>M</u> Er <0.010	<u>M</u> Lu <0.00080	<u>M</u> Re <0.0020	<u>M</u> Tb <0.00060
<u>M</u> As <0.020	<u>M</u> Eu <0.0060	<u>O</u> Mg <0.000040	<u>M</u> Rh <0.0020	<u>M</u> Tl <0.0020
<u>M</u> Ba <0.020	<u>M</u> Gd <0.0020	<u>M</u> Mn <0.0080	<u>M</u> Rb <0.0020	<u>M</u> Th <0.0020
<u>O</u> Be <0.0020	<u>M</u> Ga <0.0020	<u>O</u> Hg <0.011	<u>M</u> Ru <0.0040	<u>M</u> Tm <0.00080
<u>M</u> Bi <0.00080	<u>M</u> Ge <0.012	<u>M</u> Mo <0.0040	<u>M</u> Sm <0.0020	<u>M</u> Sn <0.010
<u>O</u> B <0.010	<u>M</u> Au <0.0060	<u>M</u> Nd <0.0040	<u>M</u> Sc <0.020	<u>M</u> Ti <0.10
<u>M</u> Cd <0.0060	<u>M</u> Hf <0.0040	<u>O</u> Ni <0.0023	<u>O</u> Se <0.0062	<u>M</u> W <0.020
<u>O</u> Ca <0.0037	<u>M</u> Ho <0.0010	<u>M</u> Nb <0.0010	<u>O</u> Si <0.0041	<u>M</u> U <0.0040
<u>M</u> Ce <0.010	<u>M</u> In <0.020	<u>n</u> Os	<u>M</u> Ag <0.0040	<u>M</u> V <0.0040
<u>M</u> Cs <0.00060	<u>M</u> Ir <0.010	<u>M</u> Pd <0.010	<u>O</u> Na <0.00010	<u>M</u> Yb <0.0020
<u>M</u> Cr <0.010	<u>O</u> Fe <0.0011	<u>O</u> P <0.0048	<u>M</u> Sr <0.0010	<u>M</u> Y <0.080
<u>M</u> Co <0.0060	<u>M</u> La <0.0010	<u>M</u> Pt <0.0040	<u>s</u> S	<u>O</u> Zn 0.0019
<u>M</u> Cu <0.012	<u>M</u> Pb <0.0060	<u>O</u> K <0.0017	<u>M</u> Ta <0.014	<u>M</u> Zr <0.010

M - checked by ICP-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): 0.999 g/mL

(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

Paul R. Gaines

Quality Assurance Manager

EXPIRES

11/2003



Certificate of Analysis

CUSTOM-GRADE SOLUTION

Catalog Number: CGTH1-1 and CGTH1-5

1000 $\mu\text{g/mL}$ Thorium in 3% HNO_3 (abs)

010308

Lot Number: T-TH01059

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

Thorium Nitrate
99.999%
C01L32

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 10/08/03
DATE EXPIRED: 11/01/2004
DATE OPENED: 10/08/03
INORG: 4283 PO: F52240

CERTIFIED CONCENTRATION: $1001 \pm 3 \mu\text{g/mL}$

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:

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

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

$(\bar{x})$ = mean

x_i = individual results

n = number of measurements

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

Classical Wet Assay: $1001 \pm 3 \mu\text{g/mL}$

Method: EDTA Titration vs NIST SRM Lead Nitrate.

Instrument Analysis: $1002 \pm 4 \mu\text{g/mL}$

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 $\mu\text{g/mL}$:

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 $0.3 \mu\text{m}$.

Q	Al	<0.00090	M	Dy	0.0062	Q	Li	<0.000030	M	Pr	0.00037	Q	Te	<0.031
M	Sb	<0.000050	M	Er	<0.00050	M	Lu	<0.000040	M	Re	<0.00010	M	Tb	<0.000030
Q	As	<0.014	M	Eu	<0.00030	Q	Mg	<0.000060	M	Rh	<0.00010	M	Ti	<0.00010
M	Ba	0.0050	M	Gd	0.0054	Q	Mn	<0.0000030	M	Rb	<0.00010	s	Th	
Q	Be	<0.00020	M	Ga	<0.00010	i	Hg		M	Ru	<0.00020	M	Tm	<0.000040
M	Bi	<0.000040	M	Ge	<0.00060	M	Mo	<0.00020	M	Sm	0.0095	M	Sn	<0.00050
Q	B	<0.00060	M	Au	<0.00030	M	Nd	0.0026	M	Sc	<0.0010	Q	Ti	<0.00092
Q	Cd	<0.0045	M	Hf	<0.00020	Q	Ni	<0.0023	M	Se	<0.010	M	W	<0.0010
Q	Ca	<0.030	M	Ho	0.00022	M	Nb	<0.000050	Q	Si	<0.0034	M	U	0.074
M	Ce	<0.00050	Q	In	<0.0020	n	Os		M	Ag	<0.00020	M	V	<0.00020
M	Cs	<0.000030	M	Ir	<0.00050	M	Pd	<0.00050	Q	Na	<0.00010	M	Yb	<0.00010
Q	Cr	<0.00080	Q	Fe	<0.0011	i	P		M	Sr	<0.000050	M	Y	<0.0040
M	Co	<0.00030	M	La	<0.000050	Q	Pt	<0.00020	Q	S	<0.072	Q	Zn	<0.00058
M	Cu	<0.00060	M	Pb	<0.00030	Q	K	<0.0017	M	Ta	<0.00070	M	Zr	0.0085

M - checked by ICP-MS

Q - 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

QA:KL Rev.050802DN

(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

Paul R. Haines

Quality Assurance Manager

EXPIRES

01/02/2004



Certificate of Analysis

CUSTOM-GRADE SOLUTION

1000 µg/mL Uranium in 1% HNO₃ (abs)

010309

Catalog Number: CGU1-1 and CGU1-5

Lot Number: T-U01056

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

Uranium Oxynitrate*
99.95%
E14L40

INORGANIC LABS/RADCHEM LABS

DATE RECEIVED: 3/03/03

DATE EXPIRED: 3/01/2004

DATE OPENED: 3/04/03

INORG: 3974 PO: F52064

CERTIFIED CONCENTRATION: 1001 ± 1 µg/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:

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

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

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

Instrument Analysis: 1001 ± 1 µg/mL (Avg. 2 runs)

Method: Inductively Coupled Plasma Spectroscopy (ICP) vs NIST SRM 3164.

Calculated Value: 1000 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 µm.

<u>O</u>	Al	<0.20	<u>M</u>	Dy	<0.0060	<u>O</u>	Li	<0.010	<u>M</u>	Pr	<0.00030	<u>M</u>	Te	<0.030
<u>M</u>	Sb	0.00020	<u>M</u>	Er	<0.0050	<u>M</u>	Lu	<0.00040	<u>M</u>	Re	<0.0010	<u>M</u>	Tb	<0.00030
<u>M</u>	As	<0.010	<u>M</u>	Eu	<0.0030	<u>O</u>	Mg	0.012	<u>M</u>	Rh	<0.0010	<u>M</u>	Tl	<0.0010
<u>M</u>	Ba	0.0022	<u>M</u>	Gd	<0.0010	<u>M</u>	Mn	<0.0040	<u>M</u>	Rb	<0.0010	<u>M</u>	Th	<0.0010
<u>O</u>	Be	<0.10	<u>M</u>	Ga	<0.0010	<u>i</u>	Hg	<0.0020	<u>M</u>	Ru	<0.0020	<u>M</u>	Tm	<0.00040
<u>M</u>	Bi	0.00030	<u>M</u>	Ge	<0.0060	<u>M</u>	Mo	<0.0020	<u>M</u>	Sm	<0.0010	<u>M</u>	Sn	0.043
<u>O</u>	B	0.0020	<u>M</u>	Au	<0.0030	<u>M</u>	Nd	<0.0020	<u>M</u>	Sc	0.00080	<u>M</u>	Ti	0.029
<u>M</u>	Cd	<0.0030	<u>M</u>	Hf	<0.0020	<u>i</u>	Ni	<0.00050	<u>M</u>	Se	<0.0080	<u>M</u>	W	<0.010
<u>O</u>	Ca	0.11	<u>M</u>	Ho	<0.00050	<u>M</u>	Nb	<0.00050	<u>i</u>	Si		<u>s</u>	U	
<u>M</u>	Ce	<0.0050	<u>M</u>	In	<0.010	<u>n</u>	Os		<u>M</u>	Ag	<0.0020	<u>M</u>	V	0.00040
<u>M</u>	Cs	<0.00030	<u>M</u>	Ir	<0.0050	<u>M</u>	Pd	<0.0050	<u>O</u>	Na	0.19	<u>M</u>	Yb	<0.0010
<u>M</u>	Cr	0.0047	<u>i</u>	Fe		<u>i</u>	P		<u>M</u>	Sr	0.0011	<u>M</u>	Y	0.56
<u>M</u>	Co	0.014	<u>M</u>	La	0.0014	<u>M</u>	Pt	<0.0020	<u>i</u>	S		<u>M</u>	Zn	0.020
<u>M</u>	Cu	0.022	<u>M</u>	Pb	0.0025	<u>i</u>	K		<u>M</u>	Ta	<0.0070	<u>M</u>	Zr	0.00060

M - checked by ICP-MS

O - checked by ICP-OES

i - spectral interference

n - not checked for

s - solution standard element

****NOTICE TO ICP-MS USERS:** The ²³⁵U in this standard is depleted. The certified abundances in Atom % are as follows:

Isotope	Natural Abundance		IV's Certified Abundance	
	Atom %		Atom %	
Uranium	²³⁸ U	99.3	²³⁸ U	99.8 ± 0.1
	²³⁵ U	0.70	²³⁵ U	0.195 ± 0.005

ANALYZED DENSITY OF SOLUTION (measured at 22°C): 1.008 g/mL

(over) QA:KSL Rev.092502DN

Inorganic Ventures, Inc.

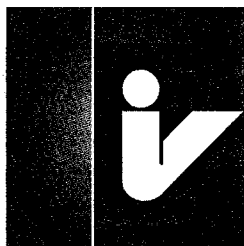
195 Lehigh Avenue • Suite 4 • Lakewood, NJ 08701

Orders: 800-669-6799 • FAX (732) 901-1903

Technical Support: 800-569-6799

Quality Assurance Manager

EXPIRES
1/2004



inorganic ventures / iv labs

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

certificate of analysis

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

010310

- 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	INDORGANIC LABS/RADCHEM LABS Pg. 1 of 2
Lot Number:	W-W01080	DATE RECEIVED: 07/31/03
Starting Material:	W Powder	DATE EXPIRED: 08/01/2004
Starting Material Purity (%):	99.990703	DATE OPENED: 08/01/03
Starting Material Lot No	21418,C31H46,D02J21,E03K06,D11F29	INDORG: 4203 PO: E52383
Matrix:	1% (abs) HNO ₃ /1% (abs) HF	

3.0 **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:

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

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

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

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

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

<u>Q</u> Al 0.01792	<u>M</u> Dy < 0.00595	<u>Q</u> Li < 0.00008	<u>M</u> Pr < 0.00030	<u>M</u> Te < 0.02974
<u>M</u> Sb < 0.00050	<u>M</u> Er < 0.00496	<u>M</u> Lu < 0.00040	<u>i</u> Re	<u>M</u> Tb < 0.00030
<u>M</u> As < 0.00991	<u>M</u> Eu < 0.00297	<u>Q</u> Mg 0.00120	<u>M</u> Rh < 0.00099	<u>M</u> Tl < 0.00099
<u>M</u> Ba < 0.00991	<u>M</u> Gd < 0.00099	<u>M</u> Mn < 0.00397	<u>M</u> Rb < 0.00099	<u>M</u> Th < 0.00099
<u>M</u> Be < 0.00050	<u>M</u> Ga < 0.00099	<u>Q</u> Hg < 0.04778	<u>M</u> Ru < 0.00198	<u>M</u> Tm < 0.00040
<u>M</u> Bi < 0.00040	<u>M</u> Ge < 0.00595	<u>M</u> Mo 0.00050	<u>M</u> Sm < 0.00099	<u>M</u> Sn < 0.00496
<u>Q</u> B < 1.19460	<u>M</u> Au < 0.00297	<u>M</u> Nd < 0.00198	<u>Q</u> Sc < 0.00036	<u>M</u> Ti 0.00198
<u>M</u> Cd < 0.00297	<u>M</u> Hf < 0.00198	<u>M</u> Ni < 0.00793	<u>M</u> Se < 0.00793	<u>S</u> W
<u>Q</u> Ca 0.00080	<u>M</u> Ho < 0.00050	<u>Q</u> Nb < 0.06371	<u>Q</u> Si < 0.01354	<u>M</u> U < 0.00198
<u>M</u> Ce < 0.00496	<u>M</u> In < 0.00991	<u>n</u> Os	<u>M</u> Ag < 0.00198	<u>M</u> V < 0.00198
<u>M</u> Cs < 0.00030	<u>M</u> Ir < 0.00496	<u>M</u> Pd < 0.00496	<u>Q</u> Na 0.04778	<u>M</u> Yb < 0.00099
<u>M</u> Cr < 0.00496	<u>Q</u> Fe < 0.03982	<u>n</u> P	<u>M</u> Sr < 0.00050	<u>M</u> Y < 0.03965
<u>M</u> Co < 0.00297	<u>M</u> La < 0.00050	<u>M</u> Pt < 0.00198	<u>n</u> S	<u>M</u> Zn < 0.01983
<u>M</u> Cu < 0.00595	<u>M</u> Pb 0.00060	<u>Q</u> K 0.03146	<u>Q</u> Ta < 0.39820	<u>M</u> Zr 0.00079

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 $20 \pm 4^\circ\text{C}$. 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 WOF₆ (chemical form as received)

Chemical Compatibility - W is very readily hydrolyzed requiring 0.1 to 1% HF solutions for stable acidic solutions. The WOF₆ is soluble in % levels of HCl and HNO₃, provided it is in the WOF₆ form. Stable at ppm levels with some metals provided it is fluorinated. Do not mix with Alkaline or Rare Earths. Is best to be mixed only with other fluorinated metals (Ti, Zr, Hf, Nb, Ta, Mo, Si, Sn, Ge). Look for yellow WO₃ precipitate if mixed with other transition elements at higher levels indicating instability. The yellow WO₃ will form over a period of weeks even in trace HF, therefore, HF levels of W multi-element blends should be ~ 1 %.

Stability - 2-100 ppb levels stable (Alone or mixed with all other metals that are at comparable levels) as the WOF₆ for months in 1% HNO₃ / LDPE container. 1-10,000 ppm single element solutions as the WOF₆ chemically stable for years in 1% HF in an LDPE container.

W Containing Samples (Preparation and Solution) - Metal (Soluble in HF / HNO₃); Oxide (Soluble in HF or NH₄OH); Organic Matrices (Dry ash at 450 °C 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 λ Donors.)
ICP-OES 207.911 nm	0.03 / 0.001 µg/mL	1	ion	Ru, In
ICP-OES 224.875 nm	0.05 / 0.005 µg/mL	1	ion	Co, Rh, Ag
ICP-OES 209.475 nm	0.05 / 0.005 µg/mL	1	ion	Mo
ICP-MS 182 amu	5 ppt	n/a	M*	¹⁸² Er ¹⁶ O

HF Note: This standard should not be prepared or stored in glass.

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

9.0 HOMOGENEITY - This solution was mixed according to 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 Pg. 2 of 2
 DATE RECEIVED: 07/31/03
 DATE EXPIRED: 08/01/2004
 DATE OPENED: 08/01/03
 INORG: 4203 PO: F52383



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 10, 2003

Expiration Date: **EXPIRES**
1st 2004

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

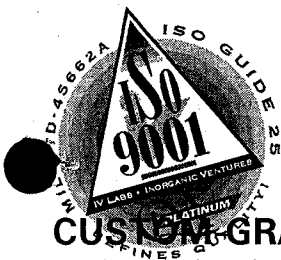
Certificate Prepared By: JoAnn Struthers, QA Administrative Assistant

Certificate Approved By: Katalin Le, QC Supervisor

Certifying Officer: Paul Gaines, Chemist, Senior Technical Director

JoAnn Struthers
Katalin Le
Paul Gaines

ISO 9001:2000
10CFR-50 APPENDIX B, 10CFR 21
MIL STD 45662A



Certificate of Analysis

CUSTOM-GRADE SOLUTION

1000 µg/mL Yttrium in 1.4% HNO₃ (abs)

Catalog Number: CGY1-1 and CGY1-5

010314

Lot Number: **T-Y01086**

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

Y₂O₃
99.999%
Y-O-5-9503201

INORGANIC LABS/RADCHEM LABS

DATE RECEIVED: 05/09/03
DATE EXPIRED: 06/01/2004
DATE OPENED: 05/12/03
INORG: 4063 PO: F52181

CERTIFIED CONCENTRATION: 1004 ± 3 µg/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:

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

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

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

Classical Wet Assay: 1004 ± 3 µg/mL

Method: EDTA Titration vs NIST SRM 928 Lead Nitrate.

Instrument Analysis: 1004 ± 4 µg/mL

Method: Inductively Coupled Plasma Spectroscopy (ICP) vs NIST SRM 3167a.

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 µm.

<u>Q</u> Al <0.00021	<u>M</u> Dy <0.0060	<u>M</u> Li <0.010	<u>M</u> Pr <0.00030	<u>M</u> Te <0.030
<u>M</u> Sb <0.00050	<u>M</u> Er <0.0050	<u>Q</u> Lu <0.000020	<u>M</u> Re <0.0010	<u>M</u> Tb <0.00030
<u>M</u> As <0.010	<u>M</u> Eu <0.0030	<u>Q</u> Mg <0.000030	<u>M</u> Rh <0.0010	<u>M</u> Tl <0.0010
<u>M</u> Ba <0.010	<u>M</u> Gd <0.0010	<u>Q</u> Mn <0.000020	<u>M</u> Rb <0.0010	<u>M</u> Th <0.0010
<u>M</u> Be <0.00050	<u>M</u> Ga <0.0010	<u>Q</u> Hg <0.020	<u>M</u> Ru <0.0020	<u>M</u> Tm <0.00040
<u>M</u> Bi <0.00040	<u>M</u> Ge <0.0060	<u>M</u> Mo <0.0020	<u>M</u> Sm <0.0010	<u>M</u> Sn <0.0050
<u>Q</u> B <0.00014	<u>M</u> Au <0.0030	<u>M</u> Nd <0.0020	<u>Q</u> Sc 0.00024	<u>M</u> Ti <0.050
<u>M</u> Cd <0.0030	<u>M</u> Hf <0.0020	<u>M</u> Ni <0.080	<u>M</u> Se <0.0080	<u>M</u> W <0.010
<u>Q</u> Ca 0.00014	<u>M</u> Ho <0.00050	<u>M</u> Nb <0.00050	<u>Q</u> Si 0.000077	<u>M</u> U <0.0020
<u>M</u> Ce <0.0050	<u>M</u> In <0.010	<u>n</u> Os	<u>M</u> Ag <0.0020	<u>Q</u> V <0.00080
<u>M</u> Cs <0.00030	<u>M</u> Ir <0.0050	<u>Q</u> Pd <0.10	<u>Q</u> Na <0.050	<u>M</u> Yb <0.0010
<u>M</u> Cr <0.0050	<u>Q</u> Fe 0.0015	<u>Q</u> P <0.070	<u>M</u> Sr <0.00050	<u>s</u> Y
<u>M</u> Co <0.0030	<u>M</u> La <0.00050	<u>Q</u> Pt <0.0020	<u>Q</u> S <0.043	<u>M</u> Zn <0.020
<u>M</u> Cu <0.0060	<u>M</u> Pb <0.0030	<u>Q</u> K <0.10	<u>M</u> Ta <0.0070	<u>Q</u> Zr <0.00070

M - checked by ICP-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): 1.010 g/mL

(over)

QA:KL Rev.061802DN

Paul R. James

Inorganic Ventures, Inc.

195 Lehigh Avenue • Suite 4 • Lakewood, NJ 08701

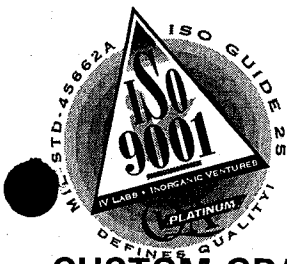
Orders: 800-669-6799 • FAX (732) 901-1903

Technical Support: 800-569-6799

Quality Assurance Manager

EXPIRES

12/2004



Certificate of Analysis

CUSTOM-GRADE SOLUTION

Catalog Number: CGZR1-1 and CGZR1-5

This standard should not be prepared or stored in glass.

1000 µg/mL Zirconium in H₂O tr. HF tr. HNO₃ **010315**

Lot Number: **T-QZR01062**

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

Zirconium Metal
99.999%
SP4811A

INORGANIC LABS/RADCHEM LABS

DATE RECEIVED: 02/13/03

DATE EXPIRED: 03/01/2004

DATE OPENED: 02/13/03

INORG: 3958 PO: F52060

CERTIFIED CONCENTRATION: 1005 ± 6 µg/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:

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

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

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

Instrument Analysis: 1005 ± 6 µg/mL (Average of 2 runs)

Method: Inductively Coupled Plasma Spectroscopy (ICP) vs NIST SRM 3169

Calculated Value: 1000 µg/mL (For informational purposes)

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 µm.

<u>Q</u> Al 0.055	<u>M</u> Dy <0.012	<u>Q</u> Li <0.000030	<u>M</u> Pr <0.00059	<u>M</u> Te <0.059
<u>M</u> Sb 0.00017	<u>M</u> Er <0.0098	<u>M</u> Lu <0.00079	<u>M</u> Re <0.0020	<u>M</u> Tb <0.00059
<u>M</u> As <0.020	<u>M</u> Eu <0.0059	<u>Q</u> Mg <0.000030	<u>M</u> Rh <0.0020	<u>M</u> Tl <0.0020
<u>M</u> Ba 0.013	<u>M</u> Gd <0.0020	<u>Q</u> Mn 0.0020	<u>M</u> Rb <0.0020	<u>M</u> Th <0.0020
<u>Q</u> Be <0.10	<u>M</u> Ga <0.0020	<u>Q</u> Hg <0.011	<u>M</u> Ru <0.0040	<u>M</u> Tm <0.00079
<u>M</u> Bi <0.00079	<u>M</u> Ge <0.012	<u>Q</u> Mo <0.10	<u>M</u> Sm <0.0020	<u>M</u> Sn 0.0011
<u>i</u> B	<u>M</u> Au <0.0059	<u>M</u> Nd <0.0040	<u>Q</u> Sc <0.00016	<u>Q</u> Ti 0.0031
<u>Q</u> Cd <0.0053	<u>M</u> Hf 0.087	<u>Q</u> Ni 0.014	<u>M</u> Se <0.016	<u>M</u> W 0.0016
<u>Q</u> Ca 0.0020	<u>M</u> Ho <0.00098	<u>i</u> Nb	<u>i</u> Si	<u>M</u> U 0.00040
<u>M</u> Ce <0.0098	<u>M</u> In <0.020	<u>n</u> Os	<u>i</u> Ag	<u>M</u> V 0.0016
<u>M</u> Cs <0.00059	<u>M</u> Ir <0.0098	<u>i</u> Pd	<u>Q</u> Na 0.041	<u>M</u> Yb <0.0020
<u>Q</u> Cr 0.034	<u>Q</u> Fe 0.45	<u>Q</u> P <0.0048	<u>M</u> Sr <0.00098	<u>Q</u> Y <0.0010
<u>M</u> Co <0.0059	<u>M</u> La <0.00098	<u>M</u> Pt <0.0040	<u>i</u> S	<u>Q</u> Zn 0.0057
<u>M</u> Cu 0.013	<u>M</u> Pb <0.0059	<u>Q</u> K 0.013	<u>M</u> Ta 0.0011	<u>s</u> Zr

M - checked by ICP-MS

Q - checked by ICP-OES

i - spectral interference

n - not checked for

s - solution standard element

ANALYZED DENSITY OF SOLUTION (measured at 22°C): 1.000 g/mL

QA:KL Rev.100302DN

(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

EXPIRES

12/2004



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."

010316

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
Starting Material Purity (%): 99.997230
Starting Material Lot No K18J19
Matrix: 1.4% (abs) HNO₃

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 11/5/03 10/2
DATE EXPIRED: 12/1/2004
DATE OPENED: 11/5/03
INORG: 4320 PO: FS 2256

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:

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

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

$\sum s_i^2$ = The summation of all significant estimated errors

(Most common are the errors from instrumental measurement, weighing, dilution to volume, and the fixed error reported on the NIST SRM certificate of analysis.)

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

4.0 TRACEABILITY TO NIST AND VALUES OBTAINED BY INDEPENDENT METHODS

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

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

4.1 Assay Method #1 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.

<u>Q</u> Al < 0.00090	<u>M</u> Dy < 0.02400	<u>Q</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> Tl < 0.00400
<u>M</u> Ba < 0.03999	<u>M</u> Gd < 0.00400	<u>Q</u> Mn < 0.00003	<u>M</u> Rb 0.49948	<u>M</u> Th < 0.00400
<u>Q</u> Be < 0.00020	<u>M</u> Ga < 0.00400	<u>Q</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>Q</u> B < 0.00060	<u>Q</u> Au < 0.00300	<u>M</u> Nd < 0.00800	<u>Q</u> Sc < 0.00002	<u>Q</u> Ti < 0.00070
<u>M</u> Cd < 0.01200	<u>M</u> Hf < 0.00800	<u>Q</u> Ni < 0.00230	<u>Q</u> Se < 0.05000	<u>M</u> W < 0.03999
<u>Q</u> Ca 0.00075	<u>M</u> Ho < 0.00200	<u>M</u> Nb < 0.00200	<u>Q</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>Q</u> V < 0.00090
<u>M</u> Cs < 0.00120	<u>M</u> Ir < 0.02000	<u>M</u> Pd < 0.02000	<u>Q</u> Na 0.21730	<u>M</u> Yb < 0.00400
<u>M</u> Cr < 0.02000	<u>Q</u> Fe 0.00212	<u>Q</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>Q</u> S < 0.07200	<u>Q</u> 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 - Spectral Interference n - Not Checked For s - Solution Standard Element

6.0 INTENDED USE

For the calibration of analytical instruments including but not limited to the following:
 ICP-MS, ICP-OES, FAAS, GFAA, XRF, and DCP
 For the validation of analytical methods
 For the preparation of "working reference samples"
 For interference studies and the determination of correction coefficients
 For detection limit and linearity studies
 For additional intended uses, contact IV Technical Staff

7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

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

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 29.0983; +1; (6); K'(aq)
 (Coordination Number in parentheses is assumed, not certain.)

Chemical Compatibility - Soluble in HCl, HNO₃, H₂SO₄, and HF aqueous matrices. Avoid use of HClO₄ due to insolubility of the perchlorate. Stable with all metals and inorganic anions except ClO₄⁻.

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% HNO₃ / LDPE container.

K Containing Samples (Preparation and Solution) - Metal (Dissolves very rapidly in water); Ores (Sodium carbonate fusion in Pt⁺ followed by HCl dissolution-blank levels of K in sodium carbonate critical); Organic Matrices (Sulfuric/peroxide digestion)

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

Technique/Line	Estimated D.L.	Order	Type	Interferences (underlined indicates severe at 400nm.)
ICP-OES 766.490 nm	0.4 / 0.001 µg/mL	1	atom	2 nd order radiation from R.E.s on some optical designs
ICP-OES 771.531 nm	1.0 / 0.03 µg/mL	1	atom	2 nd order radiation from R.E.s on some optical designs
ICP-OES 404.721 nm	1.1 / 0.05 µg/mL	1	atom	<u>U</u> , <u>Ce</u> , ³³ ArH, ²⁴ Na ¹⁸ O, ¹⁸ Se ¹²
ICP-MS 39 amu	10 ppt	na	M'	

- 8.0 **HAZARDOUS INFORMATION** - Please refer to the enclosed Material Safety Data sheet for information regarding this CRM.
- 9.0 **HOMOGENEITY** - This solution was mixed according to procedure IV-MPM-004 and is guaranteed to be homogeneous.
- 10.0 **QUALITY STANDARD DOCUMENTATION**

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

Recognized by:

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

Members of IQ Net International Certification Network:

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

10.2 **ISO/IEC 17025 - 1999 "General Requirements for the Competence of Testing and Calibration"**

- Chemical Testing - Accredited A2LA Certificate Number 883.01

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)**

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.

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 11/5/03
DATE EXPIRED: 12/1/04
DATE OPENED: 11/5/03
INORG: 4320 PO: R52258

Certification Date: January 30, 2003

Expiration Date:

EXPIRES
12/2004

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By: JoAnn Struthers, QA Administrative Assistant

JoAnn Struthers

Certificate Approved By: Katalin Le, QC Supervisor

Katalin Le

Certifying Officer: Paul Gaines, Chemist, Senior Technical Director

Paul Gaines 010319



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 1000 µg/mL Chromium⁺³ in 1.4% HNO₃ (lab)

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%
F16122

INORGANIC LABS/RADCHEM LABS

DATE RECEIVED: 11/5/03
DATE EXPIRED: 12/1/04 DR
DATE OPENED: 11/5/03
INORG: 4318 PO: F52258

CERTIFIED CONCENTRATION: 995 ± 3 µg/mL

The Certified Value is the instrument analysis value. The following equations are used in the calculation of the certified value and the uncertainty:

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

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

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

Instrument Analysis: 995 ± 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 µm.

<u>O</u>	Al	0.0028	<u>M</u>	Dy	<0.00060	<u>M</u>	Li	<0.0010	<u>M</u>	Pr	<0.000030	<u>M</u>	Te	<0.0030
<u>M</u>	Sb	<0.000050	<u>M</u>	Er	<0.00050	<u>M</u>	Lu	<0.000040	<u>M</u>	Re	<0.00010	<u>M</u>	Tb	<0.000030
<u>M</u>	As	<0.0010	<u>M</u>	Eu	<0.00030	<u>O</u>	Mg	<0.010	<u>M</u>	Rh	<0.00010	<u>M</u>	Ti	<0.00010
<u>M</u>	Ba	<0.0010	<u>M</u>	Gd	<0.00010	<u>O</u>	Mn	<0.050	<u>M</u>	Rb	0.0066	<u>M</u>	Th	<0.00010
<u>M</u>	Be	<0.000050	<u>M</u>	Ga	0.00070	<u>O</u>	Hg	<0.10	<u>M</u>	Ru	0.017	<u>M</u>	Tm	<0.000040
<u>M</u>	Bi	<0.000040	<u>M</u>	Ge	<0.00060	<u>M</u>	Mo	<0.00020	<u>M</u>	Sm	<0.00010	<u>M</u>	Sn	<0.00050
<u>M</u>	B	<0.0070	<u>M</u>	Au	<0.00030	<u>M</u>	Nd	<0.00020	<u>M</u>	Sc	<0.0010	<u>M</u>	Tl	<0.0050
<u>M</u>	Cd	<0.00030	<u>M</u>	Hf	<0.00020	<u>O</u>	Ni	<0.10	<u>i</u>	Se		<u>M</u>	W	<0.0010
<u>O</u>	Ca	0.0011	<u>M</u>	Ho	<0.000050	<u>M</u>	Nb	<0.000050	<u>O</u>	Si	<0.10	<u>M</u>	U	<0.00020
<u>M</u>	Ce	<0.00050	<u>O</u>	In	<0.10	<u>n</u>	Os		<u>O</u>	Ag	0.00070	<u>i</u>	V	
<u>M</u>	Cs	<0.000030	<u>M</u>	Ir	<0.00050	<u>M</u>	Pd	<0.00050	<u>O</u>	Na	0.016	<u>M</u>	Yb	<0.00010
<u>s</u>	Cr		<u>O</u>	Fe	<0.10	<u>i</u>	P		<u>M</u>	Sr	<0.000050	<u>M</u>	Y	<0.0040
<u>O</u>	Co	<0.10	<u>M</u>	La	<0.000050	<u>M</u>	Pt	<0.00020	<u>n</u>	S		<u>O</u>	Zn	<0.10
<u>M</u>	Cu	<0.00060	<u>M</u>	Pb	0.00039	<u>n</u>	K		<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

ANALYZED DENSITY OF SOLUTION (measured at 22°C): 1.010 g/mL

(over)

QA:KSL Rev.090403.JTS

Paul R. Laines

Quality Assurance Manager

Expires:

EXPIRES
12/2004



inorganic ventures / iv labs

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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: CGV1-1, CGV1-2 and CGV1-5

1000 $\mu\text{g/mL}$ Vanadium in 1.4% HNO_3 (abs) **010321**

Lot Number: **T-V02032**

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

Vanadium Pentoxide
99.999%
46

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 11/5/03
DATE EXPIRED: 12/1/2004 **OK**
DATE OPENED: 11/5/03
INORG: 4321 PO: F52258

CERTIFIED CONCENTRATION: $990 \pm 2 \mu\text{g/mL}$

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:

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

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

$(\bar{x})$ = mean

x_i = individual results

n = number of measurements

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

Classical Wet Assay: $993 \pm 4 \mu\text{g/mL}$

Method: EDTA Titration vs NIST SRM 928 Lead Nitrate.

Instrument Analysis: $990 \pm 2 \mu\text{g/mL}$

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 $\mu\text{g/mL}$:

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 $0.3 \mu\text{m}$.

M	Al	0.0095	M	Dy	<0.00060	M	Li	<0.0010	M	Pr	<0.000030	M	Te	<0.0030
M	Sb	0.042	M	Er	<0.00050	M	Lu	<0.000040	M	Re	<0.00010	M	Tb	<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	Gd	<0.00010	i	Mn		M	Rb	<0.00010	M	Th	<0.00010
M	Be	<0.000050	M	Ga	<0.00010	i	Hg		M	Ru	<0.00020	M	Tm	<0.000040
M	Bi	<0.000040	M	Ge	<0.00060	M	Mo	0.016	M	Sm	<0.00010	M	Sn	<0.00050
M	B	<0.0070	M	Au	<0.00030	M	Nd	<0.00020	M	Sc	<0.0010	M	Tl	<0.0050
M	Cd	<0.00030	M	Hf	<0.00020	O	Ni	<0.050	O	Se	<0.40	M	W	0.00055
O	Ca	<0.010	M	Ho	<0.000050	M	Nb	0.00024	O	Si	<0.030	M	U	0.0011
M	Ce	<0.00050	O	In	<0.070	n	Os		M	Ag	0.00044	s	V	
M	Cs	<0.000030	M	Ir	<0.00050	M	Pd	<0.00050	O	Na	<0.090	M	Yb	<0.00010
O	Cr	<0.020	O	Fe	<0.050	i	P		M	Sr	<0.000050	M	Y	<0.0040
O	Co	<0.050	M	La	<0.000050	M	Pt	<0.00020	n	S		M	Zn	0.0041
M	Cu	<0.00060	M	Pb	<0.00030	n	K		M	Ta	<0.00070	M	Zr	<0.00050

M - checked by ICP-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): 1.015 g/mL

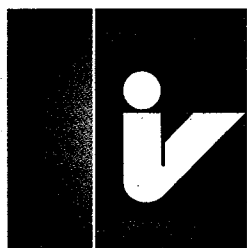
(over)

QA:KLRev.082202DN

Paul R. Gaines

Quality Assurance Manager

EXPIRES
Expires: 12/2004



inorganic ventures / iv labs

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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 1000 µg/mL Zinc in 1.4% (abs) HNO₃ 010322

Catalog Number: CGZN1-1, CGZN1-2, and CGZN1-5
Lot Number: W-ZN02018
Starting Material: Zn shot
Starting Material Purity (%): 99.999889
Starting Material Lot No: J17L26
Matrix: 1.4% (abs) HNO₃

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 11/5/03
DATE EXPIRED: 12/1/2004
DATE OPENED: 11/5/03
INORG: 4319 PO: F55258

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:

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

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

$\bar{x}$ = mean
 x_i = individual results
 n = number of measurements
 $\sum s_i^2$ = The summation of all significant estimated errors
(Most common are the errors from instrumental measurement, weighing, dilution to volume, and the fixed error reported on the NIST SRM certificate of analysis.)

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

4.0 TRACEABILITY TO NIST AND VALUES OBTAINED BY INDEPENDENT METHODS

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

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

4.1 Assay Method #1 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 822/260017-98. 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.

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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> Al < 0.00200	<u>M</u> Dy < 0.02440	<u>Q</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>Q</u> Mg 0.00011	<u>M</u> Rh < 0.00407	<u>M</u> Tl < 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>Q</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>Q</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>Q</u> Ca 0.00022	<u>M</u> Ho < 0.00203	<u>M</u> Nb < 0.00203	<u>Q</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>Q</u> Na 0.00055	<u>M</u> Yb < 0.00407
<u>Q</u> Cr < 0.00100	<u>Q</u> Fe 0.00005	<u>Q</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>Q</u> S < 0.02000	<u>s</u> Zn
<u>Q</u> Cu < 0.00050	<u>M</u> Pb < 0.01220	<u>Q</u> K 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

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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 100%)
ICP-OES 213.856 nm	0.002 / 0.0004 µg/mL	1 atom	Ni, Cu, V	
ICP-OES 202.548 nm	0.004 / 0.0002 µg/mL	1 ion	Nb, Cu, Co, Hf	
ICP-OES 206.200 nm	0.006 / 0.0006 µg/mL	1 ion	Sb, Ta, Bi, Os	
ICP-MS 66 amu	7 ppt	n/a	M'	⁵⁶ Ti ¹⁶ O, ⁵⁶ Cr ¹⁶ O, ⁵⁶ V ¹⁶ O, ¹³⁶ S ¹⁶ O ₂ , ¹³⁶ S ¹⁶ O ¹⁶ O, ¹³⁶ S ¹⁶ O ¹⁶ O ₂ , ¹³⁶ S ¹⁶ O ¹⁶ O ₃ , ¹³⁶ S ¹⁶ O ¹⁶ O ₄ , ¹³⁶ S ¹⁶ O ¹⁶ O ₅ , ¹³⁶ S ¹⁶ O ¹⁶ O ₆ , ¹³⁶ S ¹⁶ O ¹⁶ O ₇ , ¹³⁶ S ¹⁶ O ¹⁶ O ₈ , ¹³⁶ S ¹⁶ O ¹⁶ O ₉ , ¹³⁶ S ¹⁶ O ¹⁶ O ₁₀ , ¹³⁶ S ¹⁶ O ¹⁶ O ₁₁ , ¹³⁶ S ¹⁶ O ¹⁶ O ₁₂ , ¹³⁶ S ¹⁶ O ¹⁶ O ₁₃ , ¹³⁶ S ¹⁶ O ¹⁶ O ₁₄ , ¹³⁶ S ¹⁶ O ¹⁶ O ₁₅ , ¹³⁶ S ¹⁶ O ¹⁶ O ₁₆ , ¹³⁶ S ¹⁶ O ¹⁶ O ₁₇ , ¹³⁶ S ¹⁶ O ¹⁶ O ₁₈ , ¹³⁶ S ¹⁶ O ¹⁶ O ₁₉ , ¹³⁶ S ¹⁶ O ¹⁶ O ₂₀ , ¹³⁶ S ¹⁶ O ¹⁶ O ₂₁ , ¹³⁶ S ¹⁶ O ¹⁶ O ₂₂ , ¹³⁶ S ¹⁶ O ¹⁶ O ₂₃ , ¹³⁶ S ¹⁶ O ¹⁶ O ₂₄ , ¹³⁶ S ¹⁶ O ¹⁶ O ₂₅ , ¹³⁶ S ¹⁶ O ¹⁶ O ₂₆ , ¹³⁶ S ¹⁶ O ¹⁶ O ₂₇ , ¹³⁶ S ¹⁶ O ¹⁶ O ₂₈ , ¹³⁶ S ¹⁶ O ¹⁶ O ₂₉ , ¹³⁶ S ¹⁶ O ¹⁶ O ₃₀ , ¹³⁶ S ¹⁶ O ¹⁶ O ₃₁ , ¹³⁶ S ¹⁶ O ¹⁶ O ₃₂ , ¹³⁶ S ¹⁶ O ¹⁶ O ₃₃ , ¹³⁶ S ¹⁶ O ¹⁶ O ₃₄ , ¹³⁶ S ¹⁶ O ¹⁶ O ₃₅ , ¹³⁶ S ¹⁶ O ¹⁶ O ₃₆ , ¹³⁶ S ¹⁶ O ¹⁶ O ₃₇ , ¹³⁶ S ¹⁶ O ¹⁶ O ₃₈ , ¹³⁶ S ¹⁶ O ¹⁶ O ₃₉ , ¹³⁶ S ¹⁶ O ¹⁶ O ₄₀ , ¹³⁶ S ¹⁶ O ¹⁶ O ₄₁ , ¹³⁶ S ¹⁶ O ¹⁶ O ₄₂ , ¹³⁶ S ¹⁶ O ¹⁶ O ₄₃ , ¹³⁶ S ¹⁶ O ¹⁶ O ₄₄ , ¹³⁶ S ¹⁶ O ¹⁶ O ₄₅ , ¹³⁶ S ¹⁶ O ¹⁶ O ₄₆ , ¹³⁶ S ¹⁶ O ¹⁶ O ₄₇ , ¹³⁶ S ¹⁶ O ¹⁶ O ₄₈ , ¹³⁶ S ¹⁶ O ¹⁶ O ₄₉ , ¹³⁶ S ¹⁶ O ¹⁶ O ₅₀ , ¹³⁶ S ¹⁶ O ¹⁶ O ₅₁ , ¹³⁶ S ¹⁶ O ¹⁶ O ₅₂ , ¹³⁶ S ¹⁶ O ¹⁶ O ₅₃ , ¹³⁶ S ¹⁶ O ¹⁶ O ₅₄ , ¹³⁶ S ¹⁶ O ¹⁶ O ₅₅ , ¹³⁶ S ¹⁶ O ¹⁶ O ₅₆ , ¹³⁶ S ¹⁶ O ¹⁶ O ₅₇ , ¹³⁶ S ¹⁶ O ¹⁶ O ₅₈ , ¹³⁶ S ¹⁶ O ¹⁶ O ₅₉ , ¹³⁶ S ¹⁶ O ¹⁶ O ₆₀ , ¹³⁶ S ¹⁶ O ¹⁶ O ₆₁ , ¹³⁶ S ¹⁶ O ¹⁶ O ₆₂ , ¹³⁶ S ¹⁶ O ¹⁶ O ₆₃ , ¹³⁶ S ¹⁶ O ¹⁶ O ₆₄ , ¹³⁶ S ¹⁶ O ¹⁶ O ₆₅ , ¹³⁶ S ¹⁶ O ¹⁶ O ₆₆ , ¹³⁶ S ¹⁶ O ¹⁶ O ₆₇ , ¹³⁶ S ¹⁶ O ¹⁶ O ₆₈ , ¹³⁶ S ¹⁶ O ¹⁶ O ₆₉ , ¹³⁶ S ¹⁶ O ¹⁶ O ₇₀ , ¹³⁶ S ¹⁶ O ¹⁶ O ₇₁ , ¹³⁶ S ¹⁶ O ¹⁶ O ₇₂ , ¹³⁶ S ¹⁶ O ¹⁶ O ₇₃ , ¹³⁶ S ¹⁶ O ¹⁶ O ₇₄ , ¹³⁶ S ¹⁶ O ¹⁶ O ₇₅ , ¹³⁶ S ¹⁶ O ¹⁶ O ₇₆ , ¹³⁶ S ¹⁶ O ¹⁶ O ₇₇ , ¹³⁶ S ¹⁶ O ¹⁶ O ₇₈ , ¹³⁶ S ¹⁶ O ¹⁶ O ₇₉ , ¹³⁶ S ¹⁶ O ¹⁶ O ₈₀ , ¹³⁶ S ¹⁶ O ¹⁶ O ₈₁ , ¹³⁶ S ¹⁶ O ¹⁶ O ₈₂ , ¹³⁶ S ¹⁶ O ¹⁶ O ₈₃ , ¹³⁶ S ¹⁶ O ¹⁶ O ₈₄ , ¹³⁶ S ¹⁶ O ¹⁶ O ₈₅ , ¹³⁶ S ¹⁶ O ¹⁶ O ₈₆ , ¹³⁶ S ¹⁶ O ¹⁶ O ₈₇ , ¹³⁶ S ¹⁶ O ¹⁶ O ₈₈ , ¹³⁶ S ¹⁶ O ¹⁶ O ₈₉ , ¹³⁶ S ¹⁶ O ¹⁶ O ₉₀ , ¹³⁶ S ¹⁶ O ¹⁶ O ₉₁ , ¹³⁶ S ¹⁶ O ¹⁶ O ₉₂ , ¹³⁶ S ¹⁶ O ¹⁶ O ₉₃ , ¹³⁶ S ¹⁶ O ¹⁶ O ₉₄ , ¹³⁶ S ¹⁶ O ¹⁶ O ₉₅ , ¹³⁶ S ¹⁶ O ¹⁶ O ₉₆ , ¹³⁶ S ¹⁶ O ¹⁶ O ₉₇ , ¹³⁶ S ¹⁶ O ¹⁶ O ₉₈ , ¹³⁶ S ¹⁶ O ¹⁶ O ₉₉ , ¹³⁶ S ¹⁶ O ¹⁶ O ₁₀₀ , ¹³⁶ S ¹⁶ O ¹⁶ O ₁₀₁ , ¹³⁶ S ¹⁶ O ¹⁶ O ₁₀₂ , ¹³⁶ S ¹⁶ O ¹⁶ O ₁₀₃ , ¹³⁶ S ¹⁶ O ¹⁶ O ₁₀₄ , ¹³⁶ S ¹⁶ O ¹⁶ O ₁₀₅ , ¹³⁶ S ¹⁶ O ¹⁶ O ₁₀₆ , ¹³⁶ S ¹⁶ O ¹⁶ O ₁₀₇ , ¹³⁶ S ¹⁶ O ¹⁶ O ₁₀₈ , ¹³⁶ S ¹⁶ O ¹⁶ O ₁₀₉ , ¹³⁶ S ¹⁶ O ¹⁶ O ₁₁₀ , ¹³⁶ S ¹⁶ O ¹⁶ O ₁₁₁ , ¹³⁶ S ¹⁶ O ¹⁶ O ₁₁₂ , ¹³⁶ S ¹⁶ O<

10.0 QUALITY STANDARD DOCUMENTATION



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

11.0 DATE OF CERTIFICATION AND PERIOD OF VALIDITY

010325



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 02, 2003

Expiration Date:

EXPIRES
12/1/2004

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By: JoAnn Struthers, QA Administrative Assistant

JoAnn Struthers

Certificate Approved By: Katalin Le, QC Supervisor

Katalin Le

Certifying Officer: Paul Gaines, Chemist, Senior Technical Director

Paul Gaines

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DATE RECEIVED: 11/5/03 2 of 2
DATE EXPIRED: 12/1/2004 DR
DATE OPENED: 11/5/03
INORG: 4319 PO: F52258



inorganic ventures / iv labs

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phone: 800-669-6799 • 732-901-1900 • fax: 732-901-1903
e-mail: ivsales@ivstandards.com • website: www.ivstandards.com

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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 1000 µg/mL Lead in 0.35% (abs) HNO₃

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 ± 2 µg/mL

Certified Density: 1.002 g/mL (measured at 22° C)

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

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

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

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

(Most common are the errors from instrumental measurement, weighing, dilution to volume, and the fixed error reported on the NIST SRM certificate of analysis.)

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

4.0 TRACEABILITY TO NIST AND VALUES OBTAINED BY INDEPENDENT METHODS

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

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

4.1 Assay Method #1 1005 ± 2 µg/mL

ICP Assay NIST SRM 3128 Lot Number: 991504

Assay Method #2 1006 ± 2 µg/mL

EDTA NIST SRM 928 Lot Number: 880710

INORGANIC LABS/RADCHEM LABS 162
DATE RECEIVED: 11/3/03
DATE EXPIRED: 11/1/04
DATE OPENED: 11/3/03
INORG: 4313
PO: F52258

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> Al < 0.00270	<u>M</u> Dy < 0.01193	<u>Q</u> Li < 0.00002	<u>M</u> Pr < 0.00060	<u>M</u> Te < 0.05965
<u>M</u> Sb < 0.00099	<u>M</u> Er < 0.00994	<u>M</u> Lu < 0.00080	<u>M</u> Re < 0.00199	<u>M</u> Tb < 0.00060
<u>M</u> As < 0.01989	<u>M</u> Eu < 0.00597	<u>Q</u> Mg 0.00008	<u>Q</u> Rh < 0.00900	<u>Q</u> Tl 0.00130
<u>M</u> Ba < 0.01989	<u>M</u> Gd < 0.00199	<u>M</u> Mn < 0.00795	<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>Q</u> Hg < 0.01500	<u>M</u> Ru < 0.00398	<u>M</u> Tm < 0.00080
<u>Q</u> Bi < 0.02000	<u>M</u> Ge < 0.01193	<u>M</u> Mo < 0.00398	<u>M</u> Sm < 0.00199	<u>M</u> Sn < 0.00994
<u>Q</u> B < 0.04000	<u>M</u> Au < 0.00597	<u>M</u> Nd < 0.00398	<u>M</u> Sc < 0.01989	<u>M</u> Ti < 0.09942
<u>M</u> Cd < 0.00597	<u>M</u> Hf < 0.00398	<u>M</u> Ni < 0.01591	<u>M</u> Se < 0.01591	<u>M</u> W < 0.01989
<u>Q</u> Ca 0.00009	<u>M</u> Ho < 0.00099	<u>M</u> Nb < 0.00099	<u>Q</u> Si < 0.00340	<u>M</u> U < 0.00398
<u>M</u> Ce < 0.00994	<u>M</u> In < 0.01989	<u>n</u> Os	<u>M</u> Ag < 0.00398	<u>M</u> V < 0.00398
<u>M</u> Cs < 0.00060	<u>M</u> Ir < 0.00994	<u>M</u> Pd < 0.00994	<u>Q</u> Na < 0.00600	<u>M</u> Yb < 0.00199
<u>M</u> Cr < 0.00994	<u>Q</u> Fe 0.00011	<u>Q</u> P < 0.00500	<u>M</u> Sr < 0.00099	<u>M</u> Y < 0.07954
<u>M</u> Co < 0.00597	<u>M</u> La < 0.00099	<u>M</u> Pt < 0.00398	<u>Q</u> S < 0.10000	<u>M</u> Zn < 0.03977
<u>M</u> Cu < 0.01193	<u>s</u> Pb	<u>Q</u> K < 0.00180	<u>M</u> Ta < 0.01392	<u>M</u> Zr < 0.00994

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 010328

Storage & Handling - Keep tightly sealed when not in use. Store and use at $20 \pm 4^\circ\text{C}$. 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; $\text{Pb}(\text{H}_2\text{O})_6^{2+}$

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

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

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

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

Technique/Line	Estimated D.L.	Order	Type	Interferences (underlined indicates severe at λ borons.)
ICP-OES 168.215 nm	0.03 / 0.003 $\mu\text{g/mL}$	1	ion	Co
ICP-OES 220.353 nm	0.04 / 0.006 $\mu\text{g/mL}$	1	ion	Bi, Nb
ICP-OES 217.000 nm	0.09 / 0.03 $\mu\text{g/mL}$	1	atom	W, Ir, Hf, Sb, Th
ICP-MS 208 amu	5 ppt	n/a	M'	^{222}Rn , ^{220}Rn , ^{218}Rn

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

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

10.0 QUALITY STANDARD DOCUMENTATION

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

Recognized by:

Registrar Accreditation Board (ANSI-RAB)

Standards Council of Canada (SCC)

Dutch Council for Accreditation (RVA)

Entidad Mexicana de Acreditacion, a.c.(EMA)

Members of IQ Net International Certification Network:

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

10.2 ISO/IEC 17025 - 1999 "General Requirements for the Competence of Testing and Calibration"

- Chemical Testing - Accredited A2LA Certificate Number 883.01



10.3 ISO/IEC Guide 34 - 2000 "General Requirements for the Competence of Reference Material Producers"

- Reference Materials Production - Accredited A2LA Certificate Number 883.02

A2LA Mutual Recognition Agreement Partners:

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

10.4 10CFR50 Appendix B - Nuclear Regulatory Commission

- Domestic Licensing of Production and Utilization Facilities

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

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

11.0 DATE OF CERTIFICATION AND PERIOD OF VALIDITY

010329



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 2 of 2
DATE RECEIVED: 11/3/03
DATE EXPIRED: 11/1/04 DL
DATE OPENED: 11/3/03
INORG: 4313 PO: F52258

Certification Date: January 23, 2003

Expiration Date: **EXPIRES**
11/2004

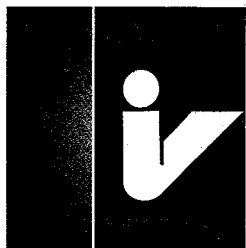
12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By: JoAnn Struthers, QA Administrative Assistant

Certificate Approved By: Katalin Le, QC Supervisor

Certifying Officer: Paul Gaines, Chemist, Senior Technical Director

JoAnn Struthers
Katalin Le
Paul Gaines



inorganic ventures / iv labs

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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."

010330

2.0 DESCRIPTION OF CRM Custom-Grade 1000 µg/mL Sulfur in H₂O

Catalog Number: CGS1-1 and CGS1-5
Lot Number: **W-QS01098**
Starting Material: H₂SO₄
Starting Material Purity (%): 99.999965
Starting Material Lot No: N38818
Matrix: H₂O

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 11/5/03 1 of 2
DATE EXPIRED: 12/1/2004 DR
DATE OPENED: 11/5/03
INORG: 4317 PO: 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:

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

($\bar{x}$) = mean

x_i = individual results

n = number of measurements

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

(Most common are the errors from instrumental measurement, weighing, dilution to volume, and the fixed error reported on the NIST SRM certificate of analysis.)

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

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 #1 998 ± 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 to 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> Al 0.00025	<u>M</u> Dy < 0.01197	<u>Q</u> 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
<u>M</u> As < 0.01995	<u>M</u> Eu < 0.00598	<u>Q</u> Mg < 0.00004	<u>M</u> Rh < 0.00200	<u>M</u> Tl < 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>Q</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	<u>Q</u> 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	<u>M</u> In < 0.01995	<u>n</u> Os	<u>M</u> Ag < 0.00399	<u>M</u> V < 0.00399
<u>M</u> Cs < 0.00060	<u>M</u> Ir < 0.00997	<u>M</u> Pd < 0.00997	<u>Q</u> Na < 0.00010	<u>M</u> Yb < 0.00200
<u>M</u> Cr < 0.00997	<u>Q</u> Fe 0.00015	<u>Q</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	<u>Q</u> 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	<u>M</u> Zr < 0.00997

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 010332

Storage & Handling - Keep tightly sealed when not in use. Store and use at $20 \pm 4^\circ\text{C}$. Do not pipet from container. Do not return portions removed for pipetting to container.

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 32.066, +6; 6 (O=), S(OH).

Chemical Compatibility - Soluble in HCl, HNO₃, H₃PO₄ and HF aqueous matrices water and NH₄OH. 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% HNO₃ / 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 20 times its weight of Na₂CO₃ + 0.5 grams KNO₃). The fuseate is extracted with water. Any BaSO₄ present in the sample is transposed by the carbonate fusion to the BaCO₃ which is left behind in the water-insoluble residue. If PbSO₄ is present the fuseate should be boiled with a sodium carbonate saturated with CO₂ solution for 1 hour or more where the PbSO₄ will be transposed to the water insoluble carbonate which can be filtered off. Boiling the fuseate with a saturated carbonate solution is good insurance for samples containing Ba, Sr, and Ca. The Ba, Pb, Sr, Ca, free filtrate can be acidified and measured by ICP.)

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 1000nm)
ICP-OES 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 µg/mL	1	atom	
ICP-MS 32 amu	30,000 ppt	n/a	M	¹³ C, ¹⁴ N, ¹⁵ N, ¹⁶ O, ¹⁷ O, ¹⁸ O, ¹⁹ F, ²⁰ F, ²¹ F, ²² Ne, ²³ Ne, ²⁴ Ne, ²⁵ Ne, ²⁶ Ne, ²⁷ Ne, ²⁸ Ne, ²⁹ Ne, ³⁰ Ne, ³¹ Ne, ³² Ne, ³³ Ne, ³⁴ Ne, ³⁵ Ne, ³⁶ Ne, ³⁷ Ne, ³⁸ Ne, ³⁹ Ne, ⁴⁰ Ne, ⁴¹ Ne, ⁴² Ne, ⁴³ Ne, ⁴⁴ Ne, ⁴⁵ Ne, ⁴⁶ Ne, ⁴⁷ Ne, ⁴⁸ Ne, ⁴⁹ Ne, ⁵⁰ Ne, ⁵¹ Ne, ⁵² Ne, ⁵³ Ne, ⁵⁴ Ne, ⁵⁵ Ne, ⁵⁶ Ne, ⁵⁷ Ne, ⁵⁸ Ne, ⁵⁹ Ne, ⁶⁰ Ne, ⁶¹ Ne, ⁶² Ne, ⁶³ Ne, ⁶⁴ Ne, ⁶⁵ Ne, ⁶⁶ Ne, ⁶⁷ Ne, ⁶⁸ Ne, ⁶⁹ Ne, ⁷⁰ Ne, ⁷¹ Ne, ⁷² Ne, ⁷³ Ne, ⁷⁴ Ne, ⁷⁵ Ne, ⁷⁶ Ne, ⁷⁷ Ne, ⁷⁸ Ne, ⁷⁹ Ne, ⁸⁰ Ne, ⁸¹ Ne, ⁸² Ne, ⁸³ Ne, ⁸⁴ Ne, ⁸⁵ Ne, ⁸⁶ Ne, ⁸⁷ Ne, ⁸⁸ Ne, ⁸⁹ Ne, ⁹⁰ Ne, ⁹¹ Ne, ⁹² Ne, ⁹³ Ne, ⁹⁴ Ne, ⁹⁵ Ne, ⁹⁶ Ne, ⁹⁷ Ne, ⁹⁸ Ne, ⁹⁹ Ne, ¹⁰⁰ Ne, ¹⁰¹ Ne, ¹⁰² Ne, ¹⁰³ Ne, ¹⁰⁴ Ne, ¹⁰⁵ Ne, ¹⁰⁶ Ne, ¹⁰⁷ Ne, ¹⁰⁸ Ne, ¹⁰⁹ Ne, ¹¹⁰ Ne, ¹¹¹ Ne, ¹¹² Ne, ¹¹³ Ne, ¹¹⁴ Ne, ¹¹⁵ Ne, ¹¹⁶ Ne, ¹¹⁷ Ne, ¹¹⁸ Ne, ¹¹⁹ Ne, ¹²⁰ Ne, ¹²¹ Ne, ¹²² Ne, ¹²³ Ne, ¹²⁴ Ne, ¹²⁵ Ne, ¹²⁶ Ne, ¹²⁷ Ne, ¹²⁸ Ne, ¹²⁹ Ne, ¹³⁰ Ne, ¹³¹ Ne, ¹³² Ne, ¹³³ Ne, ¹³⁴ Ne, ¹³⁵ Ne, ¹³⁶ Ne, ¹³⁷ Ne, ¹³⁸ Ne, ¹³⁹ Ne, ¹⁴⁰ Ne, ¹⁴¹ Ne, ¹⁴² Ne, ¹⁴³ Ne, ¹⁴⁴ Ne, ¹⁴⁵ Ne, 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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: 11/5/03 282
DATE EXPIRED: 12/1/2004 DR
DATE OPENED: 11/5/03
INORG: 4317 PD: F52258

Certification Date: August 27, 2003

Expiration Date: **EXPIRES**
12/2004

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

JoAnn Struthers

Katalin Le

Paul Gaines

**SOUTHWEST RESEARCH INSTITUTE
NUCLEAR PROJECT
CLIENT: Div. 20
TASK ORDER: 031025-1
SRR: 25150
SDG: 236892
CASE: CNWRA
VTSR: October 24, 2003
PROJECT#: 06002.01.081**

Pipette Calibrations

SwRI - 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	1.0184	1.0102	1.0165	1.015	101.50
TMA1	1000	1.0187	1.0064	1.0019	1.009	100.90
TMA2	1000	1.0175	1.0126	1.0052	1.012	101.18
TMA3	1000	Out of Service				
TMA6	1000	1.0013	1.0015	1.0033	1.002	100.20
TMB1	900	0.9002	0.9001	0.9005	0.900	100.03
TMC1	800	0.803	0.7978	0.7995	0.800	100.01
TMDD1	750	0.7484	0.7491	0.7479	0.748	99.80
TMD1	700	0.7009	0.6906	0.6998	0.697	99.59
TMD2	700	0.7065	0.7082	0.7049	0.707	100.93
TME1	600	0.607	0.605	0.6051	0.606	100.95
TMF2	500	0.5077	0.5062	0.5026	0.506	101.10
TMF5	500	0.509	0.5061	0.501	0.505	101.07
ICF1	500	0.5012	0.5014	0.5003	0.501	100.19
L30-500	500	0.4997	0.4998	0.4989	0.499	99.89
TMG3	400	0.3979	0.3958	0.3995	0.398	99.43
TMH1	300	Out of Service				
TMH2	300	0.2993	0.2978	0.3009	0.299	99.78
TMJ1	250	0.25	0.2503	0.2499	0.250	100.03
TMJ2	250	0.2488	0.2492	0.2495	0.249	99.67
TMJ3	250	0.2504	0.2503	0.2519	0.251	100.35
TMK2	200	0.2	0.2001	0.2006	0.200	100.12
TML1	150	0.1486	0.1493	0.149	0.149	99.31
TMM1	120	0.1207	0.1202	0.1205	0.120	100.39
TMN3	100	0.1003	0.1001	0.1002	0.100	100.20
ICN1	100	0.1004	0.0999	0.0993	0.100	99.87
TMQ1	80	0.0799	0.08	0.0799	0.080	99.92
TMR1	70	Out of Service				
TMS1	60	Out of Service				
LAB-30A	50	0.0498	0.0497	0.0496	0.050	99.40
TMU1	40	0.0402	0.0403	0.0402	0.040	100.58
TMU2	40	0.04	0.0399	0.04	0.040	99.92
TMV1	30	0.0296	0.0298	0.0297	0.030	99.00
L30-20	20	0.0199	0.0198	0.0199	0.020	99.33
TMW1	25	0.025	0.025	0.0249	0.025	99.87
TMY1	15	Out of Service				

FRM-246 (Rev 1/Mar 03)

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

Balance #: 16Thermometer #: G011diH2O Temperature (°C): 21

Eppendorf #	True Value (μL)	1st Reading (g)	2nd Reading (g)	3rd Reading (g)
Lab30	1000	1.0184	1.0102	1.0165
TMA1	1000	1.0187	1.0064	1.0019
TMA2	1000	1.0175	1.0126	1.0052
TMA3	1000	out		
<u>TMA6</u> out	1000 ^{WJ 10/31/03}	1.0414 1.0013	1.0220 1.0015	1.0105 ^{WJ 10/31/03} 1.0033
TMB1	900	0.9002	0.9001	0.9005
TMC1	800	0.8030	0.7978	0.7995
TMDD1	750	0.7484	0.7491	0.7479
TMD1	700	0.7009	0.6906	0.6998
TMD2	700	0.7065	0.7082	0.7049
TME1	600	0.6070	0.6050	0.6051
TMF2	500	0.5077	0.5062	0.5026
TMF5	500	0.5090	0.5061	0.5010
ICF1	500	0.5012	0.5014	0.5003
L30-500	500	0.4997	0.4998	0.4989
TMG3	400	0.3979	0.3958	0.3995
<u>TMH1</u> out	300 ^{of service}	0.2992	0.2100	0.2182
TMH2	300	0.2993	0.2978	0.3009
TMJ1	250	0.2500	0.2503	0.2499
TMJ2	250	0.2488	0.2492	0.2495
TMJ3	250	0.2504	0.2503	0.2519
TMK2	200	0.2000	0.2001	0.2006
TML1	150	0.1486	0.1493	0.1490
TMM1	120	0.1207	0.1202	0.1205
TMN3	100	0.1003	0.1001	0.1002
ICN1	100	0.1004	0.0999	0.0993
TMQ1	80	0.0799	0.0800	0.0799
TMR1	70	out		
TMS1	60	out		
LAB-30A	50	0.0498	0.0497	0.0496
TMU1	40	0.0402	0.0403	0.0402
TMU2	40	0.0400	0.0399	0.0400
TMV1	30	0.0296	0.0298	0.0297
L30-20	20	0.0199	0.0198	0.0199
TMW1	25	0.0250	0.0250	0.0249
TMX1	15	out		

Analyst: Laura WrightDate: 10/21/03Reviewed by: Val W. AllenDate: 12/02/03

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

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

010336**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	0.0197	0.0200	0.0200	0.020	99.50
ADJ200-A	100	0.0988	0.0992	0.0985	0.099	98.83
	200	0.1996	0.1993	0.1994	0.199	99.72
	20	0.0202	0.0202	0.0203	0.020	101.17
ADJ200-C	100	0.0988	0.0992	0.0985	0.099	98.83
	200	0.1984	0.1991	0.1979	0.198	99.23
	20	0.0199	0.0202	0.0202	0.020	100.50
ADJ200-D	100	0.0993	0.0990	0.0995	0.099	99.27
	200	0.1984	0.1991	0.1986	0.199	99.35
	20					
ADJ200-G	100					
	200					
	20					
ADJ200-H	100					
	200					
	20					
ADJ200-J	100					
	200					
	20					
ADJ200	100					
	200					
	20					
ADJ200	100					
	200					
	20					
ADJ200	100					
	200					

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Book/page: 04 008

SwRI Div. 01 – Inorganic Laboratory Adjustable Pipette Verification Log

Balance #: 34Thermometer #: 26011
10-24-03diH2O Temperature (°C) 21

Eppendorf #	True Value (μL)	1 st Reading (g)	2 nd Reading (g)	3 rd Reading (g)
20 μL – 200 μL	20	.0197	.0200	.0200
	ADJ200-A	100	.0988	.0985
		200	.1996	.1994
	20	.0202	.0202	.0203
	ADJ200-C	100	.0988	.0985
		200	.1984	.1991
	20	.0199	.0202	.0202
	ADJ200-D	100	.0993	.0995
		200	.1984	.1991
	20			
	ADJ200-G	100		
		200		
	20			
	ADJ200-H	100		
		200		
	20			
	ADJ200-J	100		
		200		
	20			
	ADJ200	100		
		200		
	20			
	ADJ200	100		
		200		

Analyst: John WillesReviewed by: CordunaDate: 10-24-03Date: 10/27/03

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

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

*Ans 10/24/03***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
ADJ200-A	20				0.000	0.00
	100				0.000	0.00
	200				0.000	0.00
ADJ200-C	20				0.000	0.00
	100				0.000	0.00
	200				0.000	0.00
ADJ200-D	20				0.000	0.00
	100				0.000	0.00
	200				0.000	0.00
ADJ200-G	20	0.0200	0.0198	0.0198	0.020	99.33
	100	0.0980	0.0981	0.0980	0.098	98.03
	200	0.1962	0.1963	0.1959	0.196	98.07
ADJ200-H	20	0.0203	0.0201	0.0201	0.020	100.83
	100	0.0983	0.0982	0.0980	0.098	98.17
	200	0.1972	0.1968	0.1967	0.197	98.45
ADJ200-J	20	0.0198	0.0199	0.0200	0.020	99.50
	100	0.0984	0.0984	0.0984	0.098	98.40
	200	0.1986	0.1985	0.1984	0.199	99.25
ADJ200	20				0.000	0.00
	100				0.000	0.00
	200				0.000	0.00
ADJ200	20				0.000	0.00
	100				0.000	0.00
	200				0.000	0.00
ADJ200	20				0.000	0.00
	100				0.000	0.00
	200				0.000	0.00

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SwRI Div. 01 – Inorganic Laboratory Adjustable Pipette Verification Log

Balance #: 34Thermometer #: G011diH₂O Temperature (°C) 21

Eppendorf #	True Value (μL)	20 μL – 200 μL		
		1 st Reading (g)	2 nd Reading (g)	3 rd Reading (g)
	20			
ADJ200-A	100			
	200			
	20			
ADJ200-C	100			
	200			
	20			
ADJ200-D	100			
	200			
	20	0.0200	0.0198	0.0198
ADJ200-G	100	0.0980	0.0981	0.0980
	200	0.1962	0.1963	0.1959
	20	0.0203	0.0201	0.0201
ADJ200-H	100	0.0983	0.0982	0.0980
	200	0.1972	0.1968	0.1967
	20	0.0198	0.0199	0.0200
ADJ200-J	100	0.0984	0.0984	0.0984
	200	0.1986	0.1985	0.1984
	20			
ADJ200	100			
	200			
	20			
ADJ200	100			
	200			

Analyst: [Signature]Reviewed by: [Signature]Date: 10/24/03Date: 11/18/03

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

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

010340**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	0.0201	0.0202	0.0203	0.020	101.00
ADJ200-A	100	0.1021	0.0993	0.0990	0.100	100.13
	200	0.1985	0.1987	0.1990	0.199	99.37
	20	0.0199	0.0202	0.0200	0.020	100.17
ADJ200-C	100	0.0991	0.1006	0.1000	0.100	99.90
	200	0.1998	0.1995	0.2010	0.200	100.05
	20	0.0203	0.0202	0.0204	0.020	101.50
ADJ200-D	100	0.0999	0.1000	0.1003	0.100	100.07
	200	0.2001	0.2001	0.2009	0.200	100.18
	20					
ADJ200-G	100					
	200					
	20					
ADJ200-H	100					
	200					
	20					
ADJ200-J	100					
	200					
	20					
ADJ200	100					
	200					
	20					
ADJ200	100					
	200					
	20					
ADJ200	100					
	200					

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Book/page: 04 012

SwRI Div. 01 – Inorganic Laboratory Adjustable Pipette Verification Log

Balance #: 34

Thermometer #: G-011

diH₂O Temperature (°C) 21

Eppendorf #	True Value (μL)	1 st Reading (g)	2 nd Reading (g)	3 rd Reading (g)
20 μL – 200 μL	20	.0201	.0202	.0203
	100	.1021	.0993	.0990
	200	.1985	.1987	.1990
ADJ200-A	20	.0199	.0202	.0200
	100	.0991	.1006	.1000
	200	.1998	.1995	.2010
ADJ200-C	20	.0203	.0202	.0204
	100	.0999	.1000	.1003
	200	.2001	.2001	.2009
ADJ200-D	20			
	100			
	200			
ADJ200-G	20			
	100			
	200			
ADJ200-H	20			
	100			
	200			
ADJ200-J	20			
	100			
	200			
ADJ200	20			
	100			
	200			
ADJ200	20			
	100			
	200			

Analyst: John Wilks

Reviewed by: [Signature]

Date: 10-31-03

Date: 12/02/03

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

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

*AMS 11/5/03***010342****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
ADJ200-A	20				0.000	0.00
	100				0.000	0.00
	200				0.000	0.00
ADJ200-C	20				0.000	0.00
	100				0.000	0.00
	200				0.000	0.00
ADJ200-D	20				0.000	0.00
	100				0.000	0.00
	200				0.000	0.00
ADJ200-G	20	0.0198	0.0199	0.0199	0.020	99.33
	100	0.0991	0.0985	0.0984	0.099	98.67
	200	0.1971	0.1977	0.1970	0.197	98.63
ADJ200-H	20	0.0202	0.0200	0.0199	0.020	100.17
	100	0.0984	0.0982	0.0982	0.098	98.27
	200	0.1971	0.1969	0.1965	0.197	98.42
ADJ200-J	20	0.0199	0.0199	0.0198	0.020	99.33
	100	0.0985	0.0984	0.0981	0.098	98.33
	200	0.1991	0.1988	0.1981	0.199	99.33
ADJ200	20				0.000	0.00
	100				0.000	0.00
	200				0.000	0.00
ADJ200	20				0.000	0.00
	100				0.000	0.00
	200				0.000	0.00
ADJ200	20				0.000	0.00
	100				0.000	0.00
	200				0.000	0.00

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SwRI Div. 01 – Inorganic Laboratory Adjustable Pipette Verification Log

Balance #: 34Thermometer #: G011diH2O Temperature (° C) 21

Eppendorf #	True Value (μL)	1 st Reading (g)	2 nd Reading (g)	3 rd Reading (g)
20 μL – 200 μL	20			
	ADJ200-A	100		
		200		
		20		
	ADJ200-C	100		
		200		
		20		
	ADJ200-D	100		
		200		
		20		
	ADJ200-G	100		
		200		
		20		
	ADJ200-H	100		
		200		
		20		
	ADJ200-J	100		
		200		
		20		
	ADJ200	100		
		200		
		20		
	ADJ200	100		
		200		

Analyst: AMSReviewed by: Richard H. H.Date: 10/31/03Date: 11/18/03

Book/page: 04 061

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

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

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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	0.0982	0.0989	0.0989	0.099	98.67
ADJ1000-C	500	0.4923	0.4936	0.4920	0.493	98.53
	1000	0.9993	0.9919	0.9933	0.995	99.48
	100	0.1003	0.1016	0.1014	0.101	101.10
ADJ1000-D	500	0.4918	0.4947	0.4961	0.494	98.84
	1000	0.9983	1.0024	1.0056	1.002	100.21
	100	0.1008	0.1017	0.1016	0.101	101.37
ADJ1000-E	500	0.4969	0.4975	0.4993	0.498	99.58
	1000	0.9973	1.0028	1.0015	1.001	100.05
	100	0.1013	0.1003	0.1006	0.101	100.73
ADJ1000-F	500	0.4936	0.4951	0.4960	0.495	98.98
	1000	0.9926	0.9969	0.9987	0.996	99.61
	100					
ADJ1000-G	500					
	1000					
	100					
ADJ1000-H	500					
	1000					
	100					
ADJ1000-J	500					
	1000					
	100					
ADJ1000	500					
	1000					
	100					
ADJ1000	500					
	1000					

FRM-247b (Rev 2/Oct 03)

FRM-244 (Rev 2/Sept 02)

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Book/page: 04 062

SwRI Div. 01 – Inorganic Laboratory Adjustable Pipette Verification Log

Balance #: 34Thermometer #: G-011diH₂O Temperature (°C) 21

Eppendorf #	True Value (μL)	1 st Reading (g)	2 nd Reading (g)	3 rd Reading (g)
100 μL – 1000 μL	100	.0982	.0989	.0989
	ADJ1000-C	500	.4923	.4920
		1000	.9993	.9933
	100	.1003	.1016	.1014
	ADJ1000-D	500	.4918	.4961
		1000	.9983	1.0024
	100	.1008	.1017	.1016
	ADJ1000-E	500	.4969	.4993
		1000	.9973	1.0028
	100	.1013	.1003	.1006
	ADJ1000-F	500	.4936	.4960
		1000	.9926	.9987
	100			
	ADJ1000-G	500		
		1000		
	100			
	ADJ1000-H	500		
		1000		
	100			
	ADJ1000-J	500		
		1000		
	100			
	ADJ1000	500		
		1000		
	100			
	ADJ1000	500		
		1000		

Analyst: John WilberReviewed by: C. AdenaDate: 10-24-03Date: 10/27/03

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

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

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JMA 10/24/03

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	0.1018	0.1013	0.1020	0.102	101.70
ADJ1000-G	500	0.4912	0.4930	0.4943	0.493	98.57
	1000	0.9808	0.9894	0.9863	0.986	98.55
	100	0.1012	0.0999	0.1000	0.100	100.37
ADJ1000-H	500	0.4936	0.4923	0.4916	0.493	98.50
	1000	0.9801	0.9810	0.9824	0.981	98.12
	100	0.1010	0.1008	0.1009	0.101	100.90
ADJ1000-J	500	0.4961	0.4951	0.4949	0.495	99.07
	1000	0.9980	0.9955	0.9928	0.995	99.54
	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)

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Book/page: 04 064

SwRI Div. 01 – Inorganic Laboratory Adjustable Pipette Verification Log

Balance #: 34

Thermometer #: G011

diH2O Temperature (°C) 21

Eppendorf #	True Value (μL)	1 st Reading (g)	2 nd Reading (g)	3 rd Reading (g)
100 μL – 1000 μL	100			
	ADJ1000-C	500		
		1000		
	100			
	ADJ1000-D	500		
		1000		
	100			
	ADJ1000-E	500		
		1000		
	100			
	ADJ1000-F	500		
		1000		
	100	0.1018	0.1013	0.1020
	ADJ1000-G	500	0.4912	0.4930
		1000	0.9808	0.9894
	100	0.1012	0.0999	0.1000
	ADJ1000-H	500	0.4936	0.4923
		1000	0.9801	0.9810
	100	0.1010	0.1008	0.1009
	ADJ1000-J	500	0.4961	0.4951
		1000	0.9980	0.9955
	100			
	ADJ1000	500		
		1000		
	100			
	ADJ1000	500		
		1000		

Analyst: *AMS*Reviewed by: *Richard Henry*

Date: 10/24/03

Date: 11/18/03

Book/page: 04 065

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

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

SwRI – Div. 01, Inorganic Laboratory Adjustable Pipette Verification Spreadsheet

Eppendorf #	True Value (μL)	1st Reading (g)	2nd Reading (g)	3rd Reading (g)	Avg Wt (g)	% of True Value
	100	0.1006	0.1004	0.1006	0.101	100.53
ADJ1000-C	500	0.4942	0.4960	0.4964	0.496	99.11
	1000	1.0033	1.0058	0.9936	1.001	100.09
	100	0.0997	0.1001	0.1002	0.100	100.00
ADJ1000-D	500	0.4928	0.4935	0.4939	0.493	98.68
	1000	0.9929	0.9967	0.9958	0.995	99.51
	100	0.1015	0.1016	0.1015	0.102	101.53
ADJ1000-E	500	0.4938	0.4946	0.4935	0.494	98.79
	1000	0.9962	0.9994	0.9940	0.997	99.65
	100	0.1008	0.1013	0.1012	0.101	101.10
ADJ1000-F	500	0.5044	0.4964	0.4951	0.499	99.73
	1000	0.9987	0.9925	0.9961	0.996	99.58
	100					
ADJ1000-G	500					
	1000					
	100					
ADJ1000-H	500					
	1000					
	100					
ADJ1000-J	500					
	1000					
	100					
ADJ1000	500					
	1000					
	100					
ADJ1000	500					
	1000					

FRM-247b (Rev 2/Oct 03)

FRM-244 (Rev 2/Sept 02)

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Book/page: 04 066

SwRI Div. 01 – Inorganic Laboratory Adjustable Pipette Verification Log

Balance #: 34Thermometer #: G-011diH2O Temperature (°C) 21

Eppendorf #	True Value (μL)	1 st Reading (g)	2 nd Reading (g)	3 rd Reading (g)
100 μL – 1000 μL	100	.1006	.1004	.1006
	ADJ1000-C	500	.4942	.4960
		1000	1.0033	1.0058
ADJ1000-D	100	.0997	.1001	.1002
	500	.4928	.4935	.4939
	1000	.9929	.9967	.9958
ADJ1000-E	100	.1015	.1016	.1015
	500	.4938	.4946	.4935
	1000	.9962	.9994	.9940
ADJ1000-F	100	.1008	.1013	.1012
	500	.5044	.4964	.4951
	1000	.9987	.9925	.9961
ADJ1000-G	100			
	500			
	1000			
ADJ1000-H	100			
	500			
	1000			
ADJ1000-J	100			
	500			
	1000			
ADJ1000	100			
	500			
	1000			
ADJ1000	100			
	500			
	1000			

Analyst: John WellsReviewed by: John WellsDate: 10-31-03Date: 12/02/03

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

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

*Am 11/5/03***010350****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				0.000	0.00
ADJ1000-G	500	0.1019	0.1015	0.1017	0.102	101.70
	1000	0.4922	0.4912	0.4911	0.492	98.30
	100	0.9861	0.9841	0.9826	0.984	98.43
ADJ1000-H	500	0.1011	0.1015	0.1006	0.101	101.07
	1000	0.4926	0.4920	0.4909	0.492	98.37
	100	0.9803	0.9806	0.9805	0.980	98.05
ADJ1000-J	500	0.1022	0.1016	0.1017	0.102	101.83
	1000	0.4973	0.4978	0.4952	0.497	99.35
	100	0.9998	0.9976	0.9981	0.999	99.85
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
	100				0.000	0.00

FRM-247b (Rev 2/Oct 03)

SwRI Div. 01 – Inorganic Laboratory Adjustable Pipette Verification Log

Balance #: 34Thermometer #: G011diH₂O Temperature (°C) 21

Eppendorf #	True Value (μL)	100 μL – 1000 μL		
		1 st Reading (g)	2 nd Reading (g)	3 rd Reading (g)
	100			
ADJ1000-C	500			
	1000			
	100			
ADJ1000-D	500			
	1000			
	100			
ADJ1000-E	500			
	1000			
	100			
ADJ1000-F	500			
	1000			
	100	0.1019	0.1015	0.1017
ADJ1000-G	500	0.4922	0.4912	0.4911
	1000	0.9861	0.9841	0.9826
	100	0.1011	0.1015	0.1006
ADJ1000-H	500	0.4926	0.4920	0.4909
	1000	0.9803	0.9806	0.9805
	100	0.1022	0.1016	0.1017
ADJ1000-J	500	0.4973	0.4978	0.4952
	1000	0.9998	0.9976	0.9981
	100			
ADJ1000	500			
	1000			
	100			
ADJ1000	500			
	1000			

Analyst: AMSReviewed by: Richard HardyDate: 10/31/03Date: 11/18/03

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

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

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
ADJ5000-C	500	0.5026	0.5065	0.5028	0.504	100.79
	2500	2.4970	2.4941	2.4918	2.494	99.77
	5000	5.0023	4.9987	5.0042	5.002	100.03
ADJ5000-G	500	0.5072	0.5076	0.5076	0.507	101.49
	2500	2.5052	2.4952	2.5001	2.500	100.01
	5000	5.0346	5.0240	5.0091	5.023	100.45
ADJ5000-H	500	0.5096	0.5090	0.5060	0.508	101.64
	2500	2.4804	2.4845	2.4940	2.486	99.45
	5000	4.9943	4.9749	4.9738	4.981	99.62
ADJ5000-I	500	0.4946	0.5044	0.5082	0.502	100.48
	2500	2.4963	2.4912	2.4924	2.493	99.73
	5000	5.0097	4.9995	4.9998	5.003	100.06
ADJ5000-J	500					
	2500					
	5000					
ADJ5000-K	500					
	2500					
	5000					
ADJ5000-L	500					
	2500					
	5000					
ADJ5000	500					
	2500					
	5000					
ADJ5000	500					
	2500					
	5000					
ADJ5000	500					
	2500					
	5000					

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SwRI Div. 01 – Inorganic Laboratory Adjustable Pipette Verification Log

Balance #: 34Thermometer #: G011diH₂O Temperature (°C) 21

Eppendorf #	True Value (µL)	1 st Reading (g)	2 nd Reading (g)	3 rd Reading (g)
	500	.5026	.5065	.5028
ADJ5000-C	2500	2.4970	2.4941	2.4918
	5000	5.0023	4.9987	5.0042
	500	.5072	.5076	.5076
ADJ5000-G	2500	2.5052	2.4952	2.5001
	5000	5.0346	5.0240	5.0091
	500	.5096	.5090	.5060
ADJ5000-H	2500	2.4804	2.4845	2.4940
	5000	4.9943	4.9749	4.9738
	500	.4946	.5044	.5082
ADJ5000-I	2500	2.4963	2.4912	2.4924
	5000	5.0097	4.9995	4.9998
	500			
ADJ5000-J	2500			
	5000			
	500			
ADJ5000-K	2500			
	5000			
	500			
ADJ5000-L	2500			
	5000			
	500			
ADJ5000	2500			
	5000			
	500			
ADJ5000	2500			
	5000			
	500			
ADJ5000	2500			
	5000			
	500			
ADJ5000	2500			
	5000			

500 µL – 5000 µL

Analyst: John WilberReviewed by: CordunaDate: 10-24-03Date: 10/24/03

21 60

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

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

AMS 10/24/03

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
ADJ5000-C	500				0.000	0.00
	2500				0.000	0.00
	5000				0.000	0.00
ADJ5000-G	500				0.000	0.00
	2500				0.000	0.00
	5000				0.000	0.00
ADJ5000-H	500				0.000	0.00
	2500				0.000	0.00
	5000				0.000	0.00
ADJ5000-I	500				0.000	0.00
	2500				0.000	0.00
	5000				0.000	0.00
ADJ5000-J	500	0.4940	0.4956	0.4959	0.495	99.03
	2500	2.4860	2.4823	2.4829	2.484	99.35
	5000	4.9711	4.9533	4.9641	4.963	99.26
ADJ5000-K	500	0.5086	0.5091	0.5062	0.508	101.59
	2500	2.4983	2.5007	2.4946	2.498	99.91
	5000	5.0851	5.0357	5.0136	5.045	100.90
ADJ5000-L	500	0.5041	0.5036	0.5030	0.504	100.71
	2500	2.4946	2.4902	2.4842	2.490	99.59
	5000	4.9820	4.9910	4.9660	4.980	99.59
ADJ5000	500				0.000	0.00
	2500				0.000	0.00
	5000				0.000	0.00
ADJ5000	500				0.000	0.00
	2500				0.000	0.00
	5000				0.000	0.00
ADJ5000	500				0.000	0.00
	2500				0.000	0.00
	5000				0.000	0.00
ADJ5000	500				0.000	0.00
	2500				0.000	0.00
	5000				0.000	0.00

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SwRI Div. 01 – Inorganic Laboratory Adjustable Pipette Verification Log

Balance #: 34Thermometer #: G011diH2O Temperature (°C) 21

Eppendorf #	True Value (μL)	1 st Reading (g)	2 nd Reading (g)	3 rd Reading (g)
500 μL – 5000 μL	500			
	ADJ5000-C	2500		
		5000		
	500			
	ADJ5000-G	2500		
		5000		
	500			
	ADJ5000-H	2500		
		5000		
	500			
	ADJ5000-I	2500		
		5000		
	500	0.4940	0.4956	0.4959
	ADJ5000-J	2500	2.4860	2.4823
		5000	4.9711	4.9533
	500	0.5086	0.5091	0.5062
	ADJ5000-K	2500	2.4983	2.5007
		5000	5.0851	5.0357
	500	0.5041	0.5036	0.5030
	ADJ5000-L	2500	2.4946	2.4902
		5000	4.9820	4.9910
	500			
	ADJ5000	2500		
		5000		
	500			
	ADJ5000	2500		
		5000		
	500			
	ADJ5000	2500		
		5000		
	500			
	ADJ5000	2500		
		5000		

Analyst: AMSReviewed by: Cynthia J. J...Date: 10/24/03Date: 11/18/03

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

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

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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	0.4977	0.4998	0.5024	0.500	99.99
ADJ5000-C	2500	2.4913	2.4971	2.4955	2.495	99.79
	5000	4.9929	5.0040	4.9937	4.997	99.94
	500	0.5072	0.5075	0.5077	0.507	101.49
ADJ5000-G	2500	2.4994	2.5082	2.4940	2.501	100.02
	5000	4.9950	5.0078	5.0093	5.004	100.08
	500	0.4982	0.5028	0.5049	0.502	100.39
ADJ5000-H	2500	2.4966	2.4978	2.4956	2.497	99.87
	5000	5.0340	5.0190	5.0196	5.024	100.48
	500	0.5104	0.5096	0.5054	0.508	101.69
ADJ5000-I	2500	2.4940	2.4917	2.4996	2.495	99.80
	5000	5.0348	4.9907	4.9853	5.004	100.07
	500					
ADJ5000-J	2500					
	5000					
	500					
ADJ5000-K	2500					
	5000					
	500					
ADJ5000-L	2500					
	5000					
	500					
ADJ5000	2500					
	5000					
	500					
ADJ5000	2500					
	5000					
	500					
ADJ5000	2500					
	5000					
	500					
ADJ5000	2500					
	5000					

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SwRI Div. 01 – Inorganic Laboratory Adjustable Pipette Verification Log

Balance #: 34Thermometer #: G011diH2O Temperature (°C) 21

Eppendorf #	True Value (μL)	1 st Reading (g)	2 nd Reading (g)	3 rd Reading (g)
	500	.4977	.4998	.5024
ADJ5000-C	2500	2.4913	2.4971	2.4955
	5000	4.9929	5.0040	4.9937
	500	.5072	.5075	.5077
ADJ5000-G	2500	2.4994	2.5082	2.4940
	5000	4.9950	5.0078	5.0093
	500	.4982	.5028	.5049
ADJ5000-H	2500	2.4966	2.4978	2.4956
	5000	5.0340	5.0190	5.0196
	500	.5104	.5096	.5054
ADJ5000-I	2500	2.4940	2.4917	2.4996
	5000	5.0348	4.9907	4.9853
	500			
ADJ5000-J	2500			
	5000			
	500			
ADJ5000-K	2500			
	5000			
	500			
ADJ5000-L	2500			
	5000			
	500			
ADJ5000	2500			
	5000			
	500			
ADJ5000	2500			
	5000			
	500			
ADJ5000	2500			
	5000			
	500			
ADJ5000	2500			
	5000			

500 μL – 5000 μL

Analyst: John WellsReviewed by: MichaelDate: 10-31-03Date: 12/02/03

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

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

MLB 11/5/03

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	0.4949	0.4932	0.4928	0.494	98.73
ADJ5000-J	2500	2.4896	2.4871	2.4870	2.488	99.52
	5000	4.9863	4.9801	4.9824	4.983	99.66
	500	0.5099	0.5063	0.5078	0.508	101.60
ADJ5000-K	2500	2.5008	2.5036	2.4998	2.501	100.06
	5000	5.0627	5.0319	5.0572	5.051	101.01
	500	0.5050	0.5042	0.5027	0.504	100.79
ADJ5000-L	2500	2.5016	2.4991	2.5008	2.501	100.02
	5000	4.9949	5.0025	4.9866	4.995	99.89
	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

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SwRI Div. 01 – Inorganic Laboratory Adjustable Pipette Verification Log

Balance #: 34Thermometer #: G011diH2O Temperature (°C) 21

Eppendorf #	True Value (µL)	1 st Reading (g)	2 nd Reading (g)	3 rd Reading (g)
500 µL – 5000 µL	500			
	ADJ5000-C	2500		
		5000		
	500			
	ADJ5000-G	2500		
		5000		
	500			
	ADJ5000-H	2500		
		5000		
	500			
	ADJ5000-I	2500		
		5000		
500 µL – 5000 µL	500	0.4949	0.4932	0.4928
	ADJ5000-J	2.4896	2.4871	2.4870
		4.9863	4.9801	4.9824
	500	0.5099	0.5063	0.5078
	ADJ5000-K	2.5008	2.5036	2.4998
		5.0627	5.0319	5.0572
	500	0.5050	0.5042	0.5027
	ADJ5000-L	2.5016	2.4991	2.5008
		4.9949	5.0025	4.9866
	500			
	ADJ5000	2500		
		5000		
500 µL – 5000 µL	500			
	ADJ5000	2500		
		5000		
	500			
	ADJ5000	2500		
		5000		
	500			
	ADJ5000	2500		
		5000		
	500			
	ADJ5000	2500		
		5000		

Analyst: [Signature]Reviewed by: [Signature]Date: 10/31/03Date: 11/18/03

**SOUTHWEST RESEARCH INSTITUTE
NUCLEAR PROJECT
CLIENT: Div. 20
TASK ORDER: 031025-1
SRR: 25150
SDG: 236892
CASE: CNWRA
VTSR: October 24, 2003
PROJECT#: 06002.01.081**

Balance Calibrations

Southwest Research Institute
Division 01
BALANCE VERIFICATION LOG

BALANCE #	LAB #:	SERIAL #:	TOLERANCE:	COMMENTS:
16	28	P37987	±0.0005	
Date	Std Wt (g)	Recorded Wt (g)	Operator	
10-28-03	2.0000	1.9999	Jew	SN: 99-J50586-15
10/29/03	2.0000	2.0000	W	"
10-30-03	2.0000	2.0000	Jew	"
10/31/03	2.0000	2.0000	W	"
11-3-03	2.0000	2.0000	Jew	"
11-4-03	2.0000	2.0060	Jew	"
11-5-03	2.0000	2.0060	Jew	"
11-6-03	2.0000	2.0000	Jew	"
11-7-03	2.0000	2.0000	Jew	"
11-10-03	2.0000	2.0000	Jew	"

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.

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11/17/03

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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	
10-28-03	10.00	10.00	Jew	SN: 99-350624-5
10/29/03	10.00	10.00	W	"
10-30-03	10.00	10.00	Jew	"
10/31/03	10.00	10.00	W	"
11-03-03	10.00	10.00	Jew	"
11-4-03	10.00	10.00	Jew	"
11-5-03	10.00	10.00	Jew	"
11-6-03	10.00	10.00	Jew	"
11-7-03	10.00	10.00	Jew	"
11-16-03	10.00	10.00	Jew	"

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.

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Southwest Research Institute
Division 01
BALANCE VERIFICATION LOG

BALANCE #	LAB #:	SERIAL #:	TOLERANCE:	COMMENTS:
34	28	1116031935	± 0.0005	
Date	Std Wt (g)	Recorded Wt (g)	Operator	
10-28-03	2.0000	2.0000	Jew	SN: 99-550526-15
10/29/03	2.0000	2.0000	JW	"
10-30-03	2.0000	1.9999	Jew	"
10/31/03	2.0000	2.0000	JW	"
11-3-03	2.0000	2.0000	Jew	"
11-4-03	2.0000	2.0000	Jew	"
11-5-03	2.0000	2.0000	Jew	"
11-6-03	2.0000	2.0000	Jew	"
11-7-03	2.0000	2.0000	Jew	"
11-10-03	2.0000	2.0000	Jew	"

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.

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**SOUTHWEST RESEARCH INSTITUTE
NUCLEAR PROJECT
CLIENT: Div. 20
TASK ORDER: 031025-1
SRR: 25150
SDG: 236892
CASE: CNWRA
VTSR: October 24, 2003
PROJECT#: 06002.01.081**

DI Water Verification

D.I. WATER SYSTEM NOTEBOOK

METALS LAB

SOUTHWEST RESEARCH INSTITUTE

01 028

010363

DATE	INITIALS	READING (M OHMS)	SET PT./ QC LT. Green=OK	CALL FOR Service LT. Green=OK	USAGE (GALS)	COMMENTS
9/23/03	DR	18.0	✓	✓	51391.3	5:47pm
9/24/03	DR	18.0	✓	✓	51398.6	5:26pm
9/25/03	area under construction, unable to read.				DR 9/25/03	
9/26/03	DR	18.0	✓	✓	51419.0	6:43pm
9/28/03	DR	18.0	✓	✓	51416.8	8:40pm
9/30/03	DR	18.0	✓	✓	51420.3	7:42pm
10/1/03	DR	18.0	✓	✓	51424.2	7:30pm
10/2/03	DR	18.0	✓	✓	51431.3	6:20pm
10/3/03	DR	18.0	✓	✓	51434.5	5:32pm
10/6/03	DR	18.0	✓	✓	51445.0	5:41pm
10/7/03	DR	18.0	✓	✓	51448.9	7:22pm
10/8/03	DR	18.0	✓	✓	51454.0	6:38pm
10/9/03	DR	18.0	✓	✓	51468.8	8pm
10/10/03	DR	18.0	✓	✓	51464.0	6:07pm
← VDS 10/13/03 →						
10/13/03	DR	18.0	✓	✓	51474.8	6:53pm
10/14/03	DR	18.0	✓	✓	51476.1	7:13pm
10/15/03	DR	18.0	✓	✓	51478.3	7:22pm
10/16/03	DR	18.0	✓	✓	51482.3	6:40pm
10/18/03	DR	18.0	✓	✓	51486.5	8:11pm
10/20/03	DR	18.0	✓	✓	51489.2	8:21pm
10/21/03	DR	18.0	✓	✓	51495.4	7:15pm
10/22/03	DR	18.0	✓	✓	51502.2	8:00pm
10/23/03	DR	18.0	✓	✓	51509.0	9:16pm
10/24/03	DR	18.0	✓	✓	51514.5	9:15pm
10/27/03	WD — Reviewed					
10/27/03	DR	18.0	✓	✓	51529.5	9:00pm
10/28/03	DR	18.0	✓	✓	51523.6	6:02pm
10/29/03	DR	18.0	✓	✓	51526.4	7:35pm
10/30/03	DR	18.0	✓	✓	51531.2	8:40pm
10/31/03	DR	18.0	✓	✓	51533.7	5:45pm
11/3/03	DR	18.0	✓	✓	51539.4	7:25pm
11/4/03	DR	18.0	✓	✓	51548.9	7:09pm
11/5/03	DR	18.0	✓	✓	51553.2	8:29pm
11/6/03	DR	18.0	✓	✓	51556.9	7:16pm

✓ *ans*
11/17/03

**SOUTHWEST RESEARCH INSTITUTE
NUCLEAR PROJECT
CLIENT: Div. 20
TASK ORDER: 031025-1
SRR: 25150
SDG: 236892
CASE: CNWRA
VTSR: October 24, 2003
PROJECT#: 06002.01.081**

**SURVEILLANCE REPORTS
From Division 30**