SOUTHWEST RESEARCH INSTITUTE
NUCLEAR PROJECT
CLIENT: Div. 20
TASK ORDER: 031021-4
SRR: 25126
SDG: 236555
CASE: CNWRA
VTSR: October 21, 2003
PROJECT#: 06002.01.081

FINAL REPORT

SOUTHWEST RESEARCH INSTITUTE

SAMPLE ANALYSIS DATA SHEET

010000

Lab Name: Southwest Research Institute

Client: Division 20

Lab Code: SwRI

Date Received: 10/21/03

Matrix: Liquid

Project No.: 20.06002.01.081

SRR: 25126

TO: 031021-4

Sample ID	Lab System ID	Iron Results (mg/L)
Prep Blank	----	<0.025
Lab Control	----	1.04
True Value	----	1.00
Recovery	----	104%
Vessel A	236555	0.140
Vessel B	236556	1.13
Vessel C	236557	1.29
Duplicate result	236557	1.11
RPD	236557	15.0%
Vessel D	236558	1.17
Spike result	236558	5.98
Spike added	236558	5.00
Recovery	236558	96.2%

Reporting Limit: 0.025 mg/L

SOUTHWEST RESEARCH INSTITUTE
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Task Orders/01-QPP-015

Southwest Research Institute

Laboratory Task Order

TO #: 031021-4 Revision: 1

010001

SDG: 236555
VTSR: 10/21/03
CASE: DIV 20 - CNWRA

SRR #'s: 25126
Client(s): DIV 20

Project(s): 06002.01.081
Manager(s): DAMMANN, MIKE
To PM: 11/04/03
To QA: 12/12/03
To Client: 12/15/03

Instructions

DIVISION 20 - CNWRA. 2-week TAT listed on COC, 21-day TAT for hardcopy, subject to change. Point of Contact is Lietai Yang at ext. 2483 (lietai.yang@swri.org). Work is 10 CFR 50, Part 21, Appendix B. Contact Charlie Butcher (ext. 5928, pager 271-5172) before starting ANY WORK. ICP analysis for IRON content. 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: 6985

Test: DIL-DILUTION
Section: METALPREP

Holding: 28 days from CED

Prep, Dilution

Cnt: 4

System ID	Type	Cont	Matrix	Customer ID	CED	Method Date
236555		1	Liquid	Vessel A	20 Oct 03	17 Nov 03
236556		1	Liquid	Vessel B	20 Oct 03	17 Nov 03
236557		1	Liquid	Vessel C	20 Oct 03	17 Nov 03
236558		1	Liquid	Vessel D	20 Oct 03	17 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
236555		1	Liquid	Vessel A	20 Oct 03	17 Apr 04
236556		1	Liquid	Vessel B	20 Oct 03	17 Apr 04
236557		1	Liquid	Vessel C	20 Oct 03	17 Apr 04
236558		1	Liquid	Vessel D	20 Oct 03	17 Apr 04

010002

01-QPP-015
Division 01
Revision 4
November 2002

Document No._____

Division 01

Chemistry and Chemical
Engineering Division

QUALITY PROJECT PLAN FOR

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

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

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

SwRI AUTHORIZATION SIGNATORIES

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

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

TABLE OF CONTENTS

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 then nuclear facilities, and procured from the supplier on the specifications set forth in the manufacturers' published product and description, the item shall be considered "commercial grade".

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

4.7.3 Controls for procurement planning, supplier selection, supplier performance evaluation, and acceptance of procured items and services other than chemical reagents and standards shall be as identified in **SOP-01-6.1**, *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 or acceptance of a commercial grade item, the receipt inspection shall determine the following:

(a) Damage was not sustained during shipment;

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

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

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

(a) Chemical name;

(b) Chemical grade;

(c) Lot code;

(d) Date received; and

(e) Shelf life, when applicable.

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

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

4.7.9 Samples supplied to SwRI for testing shall be received by the Sample Custodian and logged into the laboratory logbook. Sample documentation and sample custody shall be maintained in accordance with **TAP-01-0407-001**, *Sample Receipt 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 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-CHIAN* 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: Monday, November 10, 2003 2:01 PM
To: Lietai Yang
Cc: Jacqueline M. Ranger
Subject: preliminary sample results - TO#031021-4, SRR#25126

010011


031021-4.xls

031021-4.pdf

Attached are the preliminary results for the samples received on 10/21/03, task order 031021-4, SRR 25126.
The report for Metals is attached as an Excel (031021-4.xls) and PDF (031021-4.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
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PROJECT#: 06002.01.081

Chain of Custody/Login Paperwork

0985

SAMPLE LIST/CHAIN OF CUSTODY

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

Shipper Name/ Address:

Client: Div 20 SwRI

Client Purchase Order/Other ID:

Site/Zone ID:

Requested Turnaround:
- [X] 2 Weeks
- [ ] 3 Weeks
- [ ] Other: _____

SwRI Contact: Lictai Pang ext 2983

Analyses Requested

Sample ID	Sample Collection Date (mm/dd/yy)	Sample Collection Time	Matrix Type	Sample Type	# of Containers	iron Content									
Vessel A	10/20/03	1300	L		1	✓									
Vessel B	10/20/03	1300	L		1	✓									
Vessel C	10/20/03	1300	L		1	✓									
Vessel D	10/20/03	1300	L		1	✓									

REMARKS

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

Samples Intact ↓

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

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

Temp: 22.0°C

Therm #: 027

Comments:

	Date	Time
Relinquished by (Print/Signature): Lictai Pang RTD Roger J Lyons	10/21/03	0930
Received by (Print/Signature):	Date	Time
Relinquished by (Print/Signature):	Date	Time
Received by (Print/Signature):	Date	Time
Relinquished by (Print/Signature):	Date	Time

SwRI Project#: 20.06069.01.081

Received by SwRI Lab: (Signature)

Date: 10/21/03 Time: 0930

Samples Disposed: Date: Time:

Samples Disposed by:

6985

FORM FOR REQUESTING WORK FROM OTHER DIVISIONS

A. TO BE COMPLETED BY DIVISION 20 PERSONNEL

010013

Requester: Victoria Yang Request Date: 10/21/03
Project No.: 20.06002.01.081 Phone No.: 2483
Description of Work Requested: Analysed for ~~iron~~ iron content ICP procedure.

☐ 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.*

Sample Identification	Description
Vessel A	Medium A
Vessel B	Postgate No NaCl
Vessel C	Postgate w/ 0.5M NaCl
Vessel D	Postgate / slime / 0.5M NaCl

B. TO BE COMPLETED BY DIVISION PERFORMING WORK[1]

☐ 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

010014

Lab Name: Southwest Research Institute	Page 1 of 1
Received By (Print Name): KHALED EDRISI	Log-in Date: 10/21/2003
Received By (Signature): Khaled Edrisi	
Case Number: CNWRA	Sample Delivery Group No.
Remarks: 06002.01.081	SAS Number: N/A

			Corresponding		Remarks: Condition of Sample Shipment, etc
		EPA Sample #	Sample Tag #	Assigned Lab #	
1.	Custody Seal(s)	Present/~~Absent~~* Intact/Broken	Vessel A	None	236555	Intact
2.	Custody Seal Nos.	N/A	Vessel B	None	236556	Intact
			Vessel C	None	236557	Intact
3.	Chain-of Custody Records	~~Present~~/Absent*	Vessel D	None	236558	Intact
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	10/21/2003				
12.	Time Received	09:30:00				

Sample Transfer		
Fraction: Inorganic	Fraction	
Area #: Inorg 3	Area #	
By: KHALED EDRISI	By	
On: 10/21/2003	On	

* Contact SMO and attach record of resolution

Reviewed By	Cynthia A. Sauceda	Logbook No.	Sample Receipt (25126)
Date	10.23.2003	Logbook Page No.	4866 (Section 1, 2 of 3)

SOUTHWEST RESEARCH INSTITUTE
NUCLEAR PROJECT
CLIENT: Div. 20
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SRR: 25126
SDG: 236555
CASE: CNWRA
VTSR: October 21, 2003
PROJECT#: 06002.01.081

Copies of Login Book

Sample Login Book

Oct 21, 2003

SwRI Login Area
Division 1

Sample Receipt: 25123	Project: 03162.20.10X	Client: HEB
VTSR Date: Oct 21, 2003	VTSR Time: 08:03:00	Manager: SCHATTENBERG, HERB

System ID	Customer Sample ID	Matrix
236537	(WY-A)Strawberries	PRODUCE
236538	(9W-A)Mustard Green, Package	PRODUCE
236539	(J5-A)collard greens	PRODUCE
236540	(IL-A)Lettuce, Iceburg	PRODUCE
236541	(EAG-A)Green Bartlett Pears 26#	PRODUCE
236542	(ACK-A)IFCO Broccoli	PRODUCE
236543	(GG-A)Grapes,Black Sdless (Chi)	PRODUCE
236544	(29-A)Grapes, Red (Chilean)	PRODUCE
236545	(29-B)Grapes, Red (Chilean)	PRODUCE
236546	(AHG-A)Peaches	PRODUCE

Sample Receipt: 25124	Project: 06232.17.00X	Client: NFT, Inc.
VTSR Date: Oct 21, 2003	VTSR Time: 08:40:00	Manager: DAMMANN, MIKE

System ID	Customer Sample ID	Matrix
236548	XB348	Water
236549	XB350	Water

Sample Receipt: 25125	Project: 06685.02.00X	Client: EPA REGION III
VTSR Date: Oct 21, 2003	VTSR Time: 08:40:00	Manager: TAN, CK

System ID	Customer Sample ID	Matrix
236550	C0110	Air #141
236551	C0111	Air #60
236552	C0112	Air #123
236553	C0113	Air #237
236554	C0114	Air #66

Sample Receipt: 25126	Project: 06002.01.081	Client: DIV 20
VTSR Date: Oct 21, 2003	VTSR Time: 09:30:00	Manager: DAMMANN, MIKE

System ID	Customer Sample ID	Matrix
236555	Vessel A	Liquid

Sample Login Book

010016

Oct 21, 2003

SwRI Login Area
Division 1

Sample Receipt: 25126	Project: 06002.01.081	Client: DIV 20
VTSR Date: Oct 21, 2003	VTSR Time: 09:30:00	Manager: DAMMANN, MIKE

System ID	Customer Sample ID	Matrix
236556	Vessel B	Liquid
236557	Vessel C	Liquid
236558	Vessel D	Liquid

Sample Receipt: 25127	Project: 06232.33.00X	Client: NFT, Inc.
VTSR Date: Oct 21, 2003	VTSR Time: 08:40:00	Manager: DAMMANN, MIKE

System ID	Customer Sample ID	Matrix
236559	444T2177RE	Liquid
236560	444T2177RED	Liquid

Sample Receipt: 25128	Project: 10192.01.10X	Client: Lynx
VTSR Date: Oct 21, 2003	VTSR Time: 13:55:00	Manager: SUN, GANG

System ID	Customer Sample ID	Matrix
236564	0310161235	Water
236565	0310161306	Water
236566	0310161324	Water
236567	0310161405	Water
236568	0310170936	Water
236569	0310170937	Water
236570	0310171300	Water
236571	0310171335	Water
236572	0310171346	Water
236573	0310200904	Water

Sample Receipt: 25129	Project: 10079.06.003	Client: DPT Laboratories
VTSR Date: Oct 21, 2003	VTSR Time: 14:10:00	Manager: DAMMANN, MIKE

System ID	Customer Sample ID	Matrix
236561	Blank-1	Wipe

SOUTHWEST RESEARCH INSTITUTE
NUCLEAR PROJECT
CLIENT: Div. 20
TASK ORDER: 031021-4
SRR: 25126
SDG: 236555
CASE: CNWRA
VTSR: October 21, 2003
PROJECT#: 06002.01.081

RAW DATA

Div 20
to#031021-4
06002.01.081

system id	elem	result	qual	units	rl	tv	rec	ug/ml	date	time	iv	fv	mg/L
236555	Fe2714	0.140		mg/L	0.025			0.13970	11/06/03	12:07	5	5	0.1397
236556	Fe2714	1.13		mg/L	0.125			0.22578	11/04/03	12:58	1	5	1.1289
236557	Fe2714	1.29		mg/L	0.125			0.25781	11/04/03	13:03	1	5	1.28905
236557d	Fe2714	1.11		mg/L	0.125			0.22249	11/04/03	13:08	1	5	1.11245
236558	Fe2714	1.17		mg/L	0.125			0.23436	11/04/03	13:13	1	5	1.1718
236558s	Fe2714	5.98		mg/L	0.125	5	96.2%	1.19676	11/04/03	13:18	1	5	5.9838
lcsw-L04w3	Fe2714	1.04		mg/L	0.025	1	103.5%	1.03513	11/04/03	12:15	5	5	1.03513
pbw-L04W2 pg54-273	Fe2714	0.025	U	mg/L	0.025			-0.00950	11/04/03	12:05	5	5	-0.0095

11/6/03

11/10/03

010017

✓

ICP ANALYSIS

PROJ. NO.	PROJECT	TO#	DATE	MATRIX	LOGBK PG
06002.02.081	Div 20	031621-4	11-4-03	Liquid	SA273

INSTRUMENT: TRACE1 FILENAME: A031104M

INSTRUMENT DL:

Method: DAILY1 Standard: blk

Run Time: 11/04/03 11:02:25

010018

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Avge	.00000	.0005	-.0000	.0001	-.0000	-.0001	.0000
SDev	.00001	.0000	.0000	.0000	.0000	.0000	.0000
%RSD	141.42	1.379	60.06	45.58	10.29	4.322	18.10
#1	.00001	.0005	-.0000	.0000	-.0000	-.0001	.0000
#2	.00000	.0005	-.0000	.0001	-.0000	-.0001	.0000

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Avge	.0000	.0000	-.0000	.0001	.0004	-.0000	.0011
SDev	.0000	.0000	.0000	.0000	.0000	.0000	.0004
%RSD	.4300	46.76	60.96	46.71	3.209	.4300	42.17
#1	.0000	.0000	-.0000	.0001	.0004	-.0000	.0007
#2	.0000	.0000	-.0000	.0001	.0004	-.0000	.0014

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Avge	.0005	.0003	-.0000	.0000	-.0000	-.0050	-.0002
SDev	.0000	.0000	.0000	.0000	.0000	.0002	.0000
%RSD	1.799	2.343	.4300	32.34	75.84	3.521	4.748
#1	.0005	.0003	-.0000	.0000	-.0000	-.0051	-.0002
#2	.0005	.0003	-.0000	.0000	-.0000	-.0049	-.0002

Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Avge	.0001	.0000	.0001	-.0001	.0000	.0000	.0000
SDev	.0001	.0000	.0001	.0001	.0000	.0000	.0000
%RSD	86.29	54.63	115.6	69.14	2067.	62.51	75.84
#1	.0001	.0000	.0000	-.0000	-.0000	.0000	.0000
#2	.0000	.0001	.0002	-.0001	.0000	.0000	.0000

Elem	Sc3613	1960/1	1960/2	Si2881	Sn1899	Sr4215	Th2037
Avge	73.13	-.0001	.0003	.0015	-.0000	.0000	.0000
SDev	.31	.0000	.0000	.0000	.0001	.0000	.0000
%RSD	.4283	32.02	7.664	.4956	2709.	7.163	19.78
#1	72.91	-.0001	.0003	.0015	-.0000	.0000	.0000
#2	73.35	-.0000	.0003	.0015	.0000	.0000	.0000

Elem	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710	Zn2062
Avge	-.0014	-.0000	.0040	-.0000	.0000	.0000	.0000
SDev	.0000	.0000	.0000	.0000	.0000	.0000	.0000
%RSD	1.962	260.3	.1381	46.76	18.87	141.4	.0000
#1	-.0014	.0000	.0040	-.0000	.0001	.0000	.0000
#2	-.0014	-.0000	.0040	-.0000	.0000	.0000	.0000

Elem	Zr3496
Avge	.0002
SDev	.0000
%RSD	5.768
#1	.0002
#2	.0002

SWRI 54 CA SDW02

11/5/03

11-4-03

010019

IntStd	1	2	3	4	5	6	7
Mode	%Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	731194	10000	--	--	--	--	--
SDev	3144.504	.0000000	--	--	--	--	--
%RSD	.4300503	.0000000	--	--	--	--	--
#1	728971	10000	--	--	--	--	--
#2	733418	10000	--	--	--	--	--

Method: DAILY1 Standard: clp_std4
Run Time: 11/04/03 11:07:04

010020

Elem	Ag3280	As1890	2203/1	2203/2	Sb2068	1960/1	1960/2
Avge	.05135	.0972	.3865	.3901	.1072	.2150	.3712
SDev	.00013	.0003	.0002	.0054	.0008	.0013	.0063
%RSD	.25838	.2705	.0621	1.366	.7409	.6072	1.708
#1	.05126	.0970	.3863	.3943	.1067	.2141	.3667
#2	.05145	.0974	.3866	.4020	.1078	.2159	.3757

Elem	T11908
Avge	.0271
SDev	.0001
%RSD	.3749
#1	.0270
#2	.0271

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	776570	10000	--	--	--	--	--
SDev	953.0070	.0000000	--	--	--	--	--
%RSD	.1228334	.0000000	--	--	--	--	--
#1	775895	10000	--	--	--	--	--
#2	777244	10000	--	--	--	--	--

Method: DAILY1 Standard: clp_std1

010021

Run Time: 11/04/03 11:10:56

Elem	A13082	Ca3179	Fe2714	K_7664	Li6707	Mg2790	Na3302
Avge	.1304	.1315	.0956	1.798	3.429	.0520	.0127
SDev	.0006	.0006	.0007	.009	.018	.0004	.0000
%RSD	.4896	.4427	.7435	.5203	.5390	.7729	.0394
#1	.1299	.1311	.0951	1.791	3.416	.0517	.0127
#2	.1308	.1320	.0961	1.804	3.442	.0522	.0127

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	797076	10000	--	--	--	--	--
SDev	685.8936	.0000000	--	--	--	--	--
%RSD	.0860512	.0000000	--	--	--	--	--
#1	796591	10000	--	--	--	--	--
#2	797561	10000	--	--	--	--	--

Method: DAILY1 Standard: clp_std5
Run Time: 11/04/03 11:14:54

010022

Elem	B_2496	Bi2230	Mo2020	P_1782	Si2881	Sn1899	Sr4215
Avge	.3644	.0576	.1415	.0326	.1232	.1636	1.538
SDev	.0020	.0000	.0019	.0004	.0000	.0007	.008
%RSD	.5528	.0548	1.324	1.363	.6052	.4298	.5207
#1	.3630	.0576	.1402	.0329	.1227	.1631	1.544
#2	.3658	.0576	.1429	.0323	.1237	.1641	1.533

Elem	Ti3372
Avge	1.055
SDev	.003
%RSD	.2710
#1	1.053
#2	1.057

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	808347	10000	--	--	--	--	--
SDev	295.5707	.0000000	--	--	--	--	--
%RSD	.0365648	.0000000	--	--	--	--	--
#1	808130	10000	--	--	--	--	--
#2	808556	10000	--	--	--	--	--

Method: DAILY1 Standard: clp_std2
Run Time: 11/04/03 11:18:24

010023

Elem	Ba4934	Be3130	Cr2677	Cu3247	Ni2316
Avge	.6541	.1995	.2683	.3248	.6894
SDev	.0028	.0021	.0010	.0001	.0005
%RSD	.4334	1.048	.3579	.0314	.0749
#1	.6561	.1981	.2676	.3247	.6890
#2	.6521	.2010	.2690	.3248	.6897

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	781152	10000	--	--	--	--	--
SDev	14659.03	.0000000	--	--	--	--	--
%RSD	1.876593	.0000000	--	--	--	--	--
#1	770706	10000	--	--	--	--	--
#2	791517	10000	--	--	--	--	--

Method: DAILY1 Standard: clp_std3
Run Time: 11/04/03 11:21:34

010024

Elem	Cd2265	Co2286	Mn2576	V 2924	Zn2062
Avge	1.057	.2543	.3732	.0719	.0761
SDev	.000	.0002	.0001	.0000	.0001
%RSD	.0133	.0956	.0131	.0132	.1470
#1	1.057	.2545	.3732	.0719	.0762
#2	1.057	.2541	.3733	.0719	.0760

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	787797	10000	--	--	--	--	--
SDev	1223.295	.0000000	--	--	--	--	--
%RSD	.1552805	.0000000	--	--	--	--	--
#1	786932	10000	--	--	--	--	--
#2	788662	10000	--	--	--	--	--

Method: DAILY1 Standard: clp_std6
Run Time: 11/04/03 11:25:26

010025

Elem	La4086	Na5889	Pd3404	S 1820	Th2037	U 3859	W 2079
Avge	.3845	.1364	.1428	.0335	.0173	.0333	.0263
SDev	.0002	.0012	.0005	.0005	.0001	.0001	.0001
%RSD	.0546	.8813	.3708	1.559	.2993	.3554	.4952
#1	.3844	.1355	.1425	.0331	.0173	.0332	.0262
#2	.3847	.1372	.1432	.0339	.0173	.0334	.0264

Elem	Y 3710	Zr3496
Avge	.9751	1.185
SDev	.0002	.001
%RSD	.0209	.0925
#1	.9753	1.185
#2	.9750	1.184

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	781564	10000	--	--	--	--	--
SDev	9021.976	.0000000	--	--	--	--	--
%RSD	1.154348	.0000000	--	--	--	--	--
#1	775185	10000	--	--	--	--	--
#2	787944	10000	--	--	--	--	--

Standardization Report 11/04/03 11:29:53 AM page 1

Method: DAILY1 Slope = Conc(SIR)/IR

010026

Element	Wavelen	High std	Low std	Slope	Y-intercept	Date Standardized
Ag3280	328.068	clp_std4	blk	38.9490	-.000160	11/04/03 11:25:26
Al3082	308.215	clp_std1	blk	385.043	-.196162	11/04/03 11:25:26
As1890	189.042	clp_std4	blk	102.816	.003168	11/04/03 11:25:26
B_2496	249.678	clp_std5	blk	27.4462	-.001500	11/04/03 11:25:26
Ba4934	493.409	clp_std2	blk	15.2882	.000450	11/04/03 11:25:26
Be3130	313.042	clp_std2	blk	25.0478	.001867	11/04/03 11:25:26
Bi2230	223.061	clp_std5	blk	86.2101	-.002831	11/04/03 11:25:26
Ca3179	317.933	clp_std1	blk	380.179	-.010399	11/04/03 11:25:26
Cd2265	226.502	clp_std3	blk	9.45960	-.000330	11/04/03 11:25:26
Co2286	228.616	clp_std3	blk	39.3190	.000377	11/04/03 11:25:26
Cr2677	267.716	clp_std2	blk	37.2830	-.002960	11/04/03 11:25:26
Cu3247	324.753	clp_std2	blk	30.8305	-.012290	11/04/03 11:25:26
Fe2714	271.441	clp_std1	blk	522.767	.020019	11/04/03 11:25:26
K_7664	766.491	clp_std1	blk	27.8301	-.029376	11/04/03 11:25:26
La4086	408.672	clp_std6	blk	25.1703	-.012445	11/04/03 11:25:26
Li6707	670.784	clp_std1	blk	2.91659	-.000814	11/04/03 11:25:26
Mg2790	279.078	clp_std1	blk	480.977	.003289	11/04/03 11:25:26
Mn2576	257.610	clp_std3	blk	26.7941	-.000568	11/04/03 11:25:26
Mo2020	202.030	clp_std5	blk	70.6520	.000627	11/04/03 11:25:26
Na5889	588.995	clp_std6	blk	7.07407	.035412	11/04/03 11:25:26
Na3302	330.232	clp_std1	blk	3872.15	.693800	11/04/03 11:25:26
Ni2316	231.604	clp_std2	blk	14.5072	-.000964	11/04/03 11:25:26
P_1782	178.287	clp_std5	blk	307.341	-.015114	11/04/03 11:25:26
P203/1	220.351	clp_std4	blk	25.8840	-.003302	11/04/03 11:25:26
P203/2	220.352	clp_std4	blk	25.1120	.001955	11/04/03 11:25:26
Pd3404	340.458	clp_std6	blk	71.0609	-.000093	11/04/03 11:25:26
S_1820	182.040	clp_std6	blk	299.011	-.003675	11/04/03 11:25:26
Sb2068	206.838	clp_std4	blk	93.2758	-.000828	11/04/03 11:25:26
Sc3613	361.384	blk	dark	1.36984	-.173490	11/04/03 11:25:26
Si1960/1	196.021	clp_std4	blk	46.4972	.002704	11/04/03 11:25:26
Si1960/2	196.022	clp_std4	blk	26.9616	-.007929	11/04/03 11:25:26
Si2881	288.158	clp_std5	blk	81.8885	-.120897	11/04/03 11:25:26
Sb220	220.353	NONE	NONE	.000000	.000000	*NOT STANDARDIZED
Se196	196.026	NONE	NONE	1.00000	.000000	*NOT STANDARDIZED
Sn1899	189.989	clp_std5	blk	61.1740	.000133	11/04/03 11:25:26
Sr4215	421.552	clp_std5	blk	6.50033	-.000093	11/04/03 11:25:26
Th2837	283.730	clp_std6	blk	607.339	-.008718	11/04/03 11:25:26
Ti3372	337.280	clp_std5	blk	9.47049	.013016	11/04/03 11:25:26
Tl1908	190.864	clp_std4	blk	369.127	.003012	11/04/03 11:25:26
U_3859	385.958	clp_std6	blk	340.556	-1.35348	11/04/03 11:25:26
V_2924	292.402	clp_std3	blk	138.998	.000570	11/04/03 11:25:26
W_2079	207.910	clp_std6	blk	190.626	-.008998	11/04/03 11:25:26
Y_3710	371.030	clp_std6	blk	10.2532	-.000007	11/04/03 11:25:26
Zn2062	206.200	clp_std3	blk	131.447	.000000	11/04/03 11:25:26
Zr3496	349.621	clp_std6	blk	8.98049	-.001541	11/04/03 11:25:26

Method: DAILY1 Sample Name: icv/ccv Operator:
Run Time: 11/04/03 11:50:10
Comment:
Mode: CONC Corr. Factor: 1

010027

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	1.0154	9.852	5.153	4.959	10.26	1.004	5.127
SDev	.0102	.020	.020	.013	.05	.004	.022
%RSD	1.0087	.2821	.3948	.2642	.5260	.3547	.4298
#1	1.0081	9.832	5.139	4.950	10.30	1.001	5.143
#2	1.0226	9.872	5.168	4.968	10.22	1.007	5.112
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
Avge	20.01	.9782	4.871	1.960	2.069	10.28	18.89
SDev	.18	.0003	.029	.013	.004	.07	.01
%RSD	.9058	.0317	.6040	.6608	.1911	.7102	.0786
#1	19.88	.9779	4.850	1.951	2.072	10.23	18.88
#2	20.14	.9784	4.892	1.969	2.066	10.33	18.90
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
Avge	5.296	4.991	19.96	1.019	5.083	Q47.12	Q26.71
SDev	.010	.009	.06	.006	.044	.00	.44
%RSD	.1887	.1803	.3198	.6112	.8661	.0022	1.629
#1	5.304	4.998	19.92	1.015	5.052	Q47.12	Q26.40
#2	5.289	4.985	20.01	1.024	5.114	Q47.12	27.01
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
Avge	4.870	5.138	5.085	5.103	1.074	1.007	1.022
SDev	.002	.055	.008	.004	.001	.023	.007
%RSD	.0503	1.063	.1617	.0757	.0521	2.318	.6417
#1	4.869	5.099	5.079	5.100	1.073	.9903	1.017
#2	4.872	5.176	5.090	5.105	1.074	1.023	1.026
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

Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avge	96.49	5.532	5.454	4.919	5.091	5.474	4.945
SDev	.65	.004	.045	.007	.005	.031	.035
%RSD	.6690	.0801	.8222	.1467	.1043	.5725	.7122
#1	96.03	5.529	5.422	4.914	5.088	5.452	4.921
#2	96.95	5.535	5.485	4.924	5.095	5.496	4.970
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	Th2837	Ti3372	T11908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	5.372	Q3.466	4.900	Q5.515	.9974	4.943	Q4.513
SDev	.027	.030	.014	.010	.0143	.017	.011
%RSD	.4976	.8687	.2788	.1795	1.438	.3474	.2327
#1	5.391	Q3.445	4.890	Q5.508	.9872	4.930	Q4.506
#2	5.353	Q3.487	4.909	Q5.522	1.008	4.955	Q4.520
Errors	QC Pass	QC Fail	QC Pass	QC Fail	QC Pass	QC Pass	QC Fail
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	5.288	.9808	4.852
SDev	.010	.0120	.000
%RSD	.1980	1.228	.0102
#1	5.296	.9723	4.852
#2	5.281	.9893	4.853
Errors	QC Pass	QC Pass	QC Pass
Value	5.000	1.000	5.000
Range	10.00	10.00	10.00

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	705650	10000	--	--	--	--	--
SDev	4709.331	.0000000	--	--	--	--	--
%RSD	.6673749	.0000000	--	--	--	--	--
#1	702320	10000	--	--	--	--	--
#2	708980	10000	--	--	--	--	--

Analysis Report Blank Sample 11/04/03 12:01:00 PM page 1

Method: DAILY1 Sample Name: icb/ccb Operator:
Run Time: 11/04/03 11:56:33
Comment:
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.00044	.0198	.0016	.0120	H.0106	.0009	.0024
SDev	.00059	.0009	.0032	.0051	.0060	.0008	.0012
%RSD	136.02	4.352	202.7	42.66	56.91	87.23	49.94
#1	.00085	.0192	.0039	.0156	H.0149	.0014	.0033
#2	.00002	.0204	-.0007	.0083	H.0064	.0003	.0016
Errors	LC Pass	LC Pass	LC Pass	LC Pass	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
Avge	.0198	.0010	H.0051	-.0011	.0016	-.0008	.0174
SDev	.0118	.0005	.0027	.0010	.0015	.0004	.0097
%RSD	59.48	54.19	52.58	90.25	93.56	52.21	55.84
#1	.0281	.0014	H.0070	-.0004	.0027	-.0005	.0105
#2	.0114	.0006	.0032	-.0019	.0005	-.0010	.0242
Errors	LC Pass	LC Pass	LC High	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	H.0052	.0033	.0106	.0006	H.0127	.0320	-.0069
SDev	.0027	.0010	.0103	.0006	.0047	.0139	.1909
%RSD	52.35	54.35	55.67	97.61	37.04	43.57	2754.
#1	H.0071	.0046	.0259	.0011	H.0161	.0418	L-.1419
#2	.0033	.0020	.0113	.0002	H.0094	.0221	H.1281
Errors	LC High	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
Avge	.0038	H.0125	.0030	.0079	.0007	.0082	.0006
SDev	.0027	.0064	.0006	.0026	.0007	.0001	.0012
%RSD	71.41	51.27	21.43	32.84	97.07	.7659	200.4
#1	H.0057	H.0170	.0035	.0097	.0002	.0082	-.0003
#2	.0019	.0080	.0026	.0060	.0012	.0081	.0015
Errors	LC Pass	LC High	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	ppm
Avge	99.79	.0031	.0058	.0041	H.0062	.0049	H.0050
SDev	.54	.0054	.0069	.0048	.0019	.0028	.0004
%RSD	.5397	176.2	118.8	117.7	31.01	57.01	8.768
#1	99.41	-.0008	.0107	.0075	H.0076	H.0069	H.0053
#2	100.2	.0069	.0009	.0007	H.0049	.0029	.0047
Errors	NOCHECK	NOCHECK	NOCHECK	LC Pass	LC High	LC Pass	LC High
High				.0100	.0030	.0050	.0050
Low				-.0100	-.0030	-.0050	-.0050

Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	H.0057	.0038	.0044	-.0015	.0096	.0049	H.0273
SDev	.0032	.0015	.0028	.0028	.0088	.0030	.0076
%RSD	56.79	39.54	63.20	184.8	91.87	62.09	27.73
#1	H.0080	.0027	H.0064	.0005	.0034	H.0070	H.0327
#2	.0034	.0048	.0024	-.0035	.0158	.0027	H.0220
Errors	LC High	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC High
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	H.0055	.0011	.0045
SDev	.0031	.0005	.0025
%RSD	56.79	48.12	54.93
#1	H.0077	.0014	H.0062
#2	.0033	.0007	.0027
Errors	LC High	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	729741	10000	--	--	--	--	--
SDev	3898.987	.0000000	--	--	--	--	--
%RSD	.5342974	.0000000	--	--	--	--	--
#1	726984	10000	--	--	--	--	--
#2	732498	10000	--	--	--	--	--

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Method: DAILY1 Sample Name: pbw-L04W1 pg54-272 Operator:
Run Time: 11/04/03 12:01:10
Comment:
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.00021	.0214	-.0010	.0019	.0005	-.0005	-.0012
SDev	.00002	.0022	.0038	.0008	.0003	.0001	.0004
%RSD	9.5341	10.17	369.9	39.91	56.34	18.52	31.11
#1	.00020	.0229	.0017	.0024	.0007	-.0004	-.0010
#2	.00023	.0199	-.0037	.0013	.0003	-.0005	-.0015
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
Avge	.0311	.0002	.0002	-.0031	.0003	-.0104	.0109
SDev	.0002	.0000	.0004	.0005	.0003	.0073	.0115
%RSD	.6734	9.521	246.5	17.12	78.68	69.93	105.4
#1	.0312	.0002	.0005	-.0027	.0005	-.0053	.0191
#2	.0309	.0002	-.0001	-.0034	.0001	-.0156	.0028
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	.0004	.0002	.0040	-.0001	.0026	H.0856	.0019
SDev	.0004	.0001	.0029	.0001	.0007	.0016	.1770
%RSD	110.9	68.76	72.42	87.68	27.52	1.838	9361.
#1	.0007	.0003	.0019	-.0000	.0032	H.0867	H.1270
#2	.0001	.0001	.0060	-.0001	.0021	H.0845	L-.1233
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC High	LC Pass
High	.0050	.0050	.0500	.0050	.0050	.0500	.0500
Low	-.0050	-.0050	-.0500	-.0050	-.0050	-.0500	-.0500

Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0012	H.0185	.0028	-.0006	.0013	H.0147	.0016
SDev	.0011	.0038	.0001	.0013	.0008	.0083	.0014
%RSD	96.19	20.61	4.722	228.8	64.25	56.93	91.76
#1	-.0004	H.0158	.0028	-.0015	.0019	.0088	.0026
#2	-.0020	H.0212	.0029	.0004	.0007	H.0206	.0006
Errors	LC Pass	LC High	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

Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avge	95.61	.0003	-.0038	H.0241	.0006	-.0024	.0018
SDev	.65	.0010	.0006	.0037	.0009	.0008	.0006
%RSD	.6812	345.3	16.88	15.41	160.6	31.36	31.21
#1	95.15	.0010	-.0033	H.0215	-.0001	-.0019	.0014
#2	96.07	-.0004	-.0042	H.0267	.0012	-.0029	.0021
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	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0003	-.0027	.0002	-.0038	.0021	.0002	H.0209
SDev	.0001	.0087	.0000	.0082	.0024	.0003	.0123
%RSD	38.81	323.4	7.583	214.5	113.9	141.4	59.13
#1	.0004	.0035	.0002	.0020	.0004	.0004	H.0296
#2	.0002	-.0088	.0001	-.0096	.0038	.0000	H.0122
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC High
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	.0013	.0001
SDev	.0003	.0000	.0003
%RSD	110.2	.2972	626.5
#1	.0004	.0013	.0003
#2	.0001	.0013	-.0002
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	699187	10000	--	--	--	--	--
SDev	4775.799	.0000000	--	--	--	--	--
%RSD	.6830503	.0000000	--	--	--	--	--
#1	695810	10000	--	--	--	--	--
#2	702564	10000	--	--	--	--	--

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Method: DAILY1 Sample Name: pbw-L04W2 pg54-273 Operator:
Run Time: 11/04/03 12:05:46
Comment:
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.00010	.0152	.0004	.0001	.0000	-.0005	.0001
SDev	.00004	.0002	.0037	.0003	.0000	.0000	.0006
%RSD	41.277	1.510	899.3	276.4	43.03	8.961	626.1
#1	-.00007	.0151	-.0022	.0004	.0000	-.0005	.0006
#2	-.00014	.0154	.0030	-.0001	.0001	-.0005	-.0004
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
Avge	.0143	.0000	.0001	-.0031	.0018	-.0095	-.0150
SDev	.0003	.0000	.0000	.0001	.0003	.0002	.0349
%RSD	2.114	125.2	57.10	2.423	17.21	1.966	232.1
#1	.0145	.0000	.0001	-.0032	.0016	-.0096	-.0397
#2	.0141	.0000	.0000	-.0031	.0021	-.0094	.0096
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	.0001	-.0001	.0019	-.0001	.0013	H.0782	L-.1728
SDev	.0001	.0001	.0000	.0000	.0005	.0063	.2671
%RSD	42.26	58.07	.6391	27.10	39.12	8.090	154.6
#1	.0001	-.0001	.0019	-.0001	.0009	H.0738	L-.3617
#2	.0002	-.0001	.0018	-.0001	.0016	H.0827	.0161
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC High	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
Avge	-.0018	.0063	.0015	-.0003	-.0004	H.0119	-.0008
SDev	.0009	.0045	.0002	.0003	.0002	.0013	.0010
%RSD	47.92	71.26	11.08	132.1	54.70	10.56	121.5
#1	-.0024	.0094	.0014	-.0000	-.0002	H.0128	-.0001
#2	-.0012	.0031	.0016	-.0005	-.0005	H.0110	-.0015
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

Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avge	94.32	.0001	-.0042	H.0282	.0003	-.0027	-.0001
SDev	.29	.0015	.0005	.0040	.0002	.0008	.0003
%RSD	.3093	2244.	11.49	14.08	51.39	29.33	382.2
#1	94.12	-.0010	-.0045	H.0254	.0005	-.0033	-.0003
#2	94.53	.0011	-.0038	H.0310	.0002	-.0022	.0001
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	T11908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0000	-.0011	-.0002	L-.0138	-.0170	-.0001	.0068
SDev	.0000	.0064	.0001	.0035	.0057	.0002	.0122
%RSD	26.56	558.4	43.32	24.95	33.22	122.0	179.8
#1	.0000	.0034	-.0003	L-.0163	-.0210	-.0002	H.0154
#2	.0001	-.0057	-.0001	L-.0114	-.0130	-.0000	-.0018
Errors	LC Pass	LC Pass	LC Pass	LC Low	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	-.0000	.0005	-.0003
SDev	.0000	.0001	.0001
%RSD	210.7	29.64	37.51
#1	-.0000	.0004	-.0002
#2	.0000	.0006	-.0003
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	689799	10000	--	--	--	--	--
SDev	2112.835	.0000000	--	--	--	--	--
%RSD	.3062972	.0000000	--	--	--	--	--
#1	688305	10000	--	--	--	--	--
#2	691293	10000	--	--	--	--	--

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Method: DAILY1 Sample Name: lcsw-L04W1 Operator:
Run Time: 11/04/03 12:10:23
Comment:
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.05127	1.963	2.159	.0006	2.140	.0583	-.0048
SDev	.00056	.002	.003	.0006	.002	.0001	.0002
%RSD	1.1001	.0820	.1353	105.3	.1015	.1570	4.976
#1	.05088	1.964	2.157	.0001	2.139	.0583	-.0046
#2	.05167	1.962	2.161	.0010	2.142	.0584	-.0049

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	20.76	.0514	.5128	.2045	.2621	1.031	16.49
SDev	.02	.0000	.0016	.0002	.0011	.004	.02
%RSD	.1169	.0025	.3221	.1189	.4336	.4104	.1356
#1	20.75	.0514	.5116	.2043	.2613	1.034	16.48
#2	20.78	.0514	.5139	.2046	.2629	1.028	16.51

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0001	-.0000	20.53	.5327	.0004	29.71	16.79
SDev	.0005	.0000	.03	.0004	.0007	.07	.08
%RSD	698.4	923.7	.1310	.0729	184.2	.2470	.4814
#1	-.0004	-.0000	20.55	.5329	.0008	29.76	16.73
#2	.0003	.0000	20.51	.5324	-.0001	29.66	16.84

Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.5119	4.153	.5286	.5330	.0005	.0103	.5252
SDev	.0021	.146	.0051	.0016	.0019	.0037	.0039
%RSD	.4068	3.509	.9667	.3096	360.4	36.42	.7373
#1	.5105	4.050	.5250	.5319	-.0008	.0076	.5225
#2	.5134	4.256	.5322	.5342	.0018	.0129	.5279

Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avge	93.62	2.198	2.232	.0320	.5310	2.219	-.0004
SDev	.75	.007	.019	.0010	.0028	.015	.0006
%RSD	.8063	.2994	.8731	3.111	.5274	.6839	143.8
#1	93.08	2.193	2.219	.0313	.5291	2.208	.0000
#2	94.15	2.203	2.246	.0327	.5330	2.229	-.0009

Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0003	-.0185	-.0005	2.236	.0122	.5147	.0319
SDev	.0000	.0036	.0003	.007	.0173	.0004	.0020
%RSD	9.634	19.38	64.35	.3101	141.7	.0723	6.193
#1	.0003	-.0160	-.0007	2.231	-.0000	.5149	.0305
#2	.0003	-.0211	-.0003	2.240	.0244	.5144	.0333

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	-.0001	.5205	.0001
SDev	.0001	.0014	.0001
%RSD	69.25	.2700	57.92
#1	-.0001	.5195	.0001
#2	-.0000	.5214	.0002

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	684651	10000	--	--	--	--	--
SDev	5468.764	.0000000	--	--	--	--	--
%RSD	.7987667	.0000000	--	--	--	--	--
#1	680784	10000	--	--	--	--	--
#2	688518	10000	--	--	--	--	--

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Method: DAILY1 Sample Name: lcsw-L04w3 Operator:
Run Time: 11/04/03 12:15:04
Comment:
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.05119	1.954	2.171	.3734	2.116	.0575	.0029
SDev	.00031	.015	.008	.0013	.010	.0006	.0019
%RSD	.60088	.7697	.3878	.3487	.4511	1.105	67.79
#1	.05098	1.965	2.177	.3743	2.122	.0580	.0015
#2	.05141	1.944	2.165	.3725	2.109	.0571	.0043

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	20.59	.0521	.5107	.1999	.2611	1.035	16.16
SDev	.13	.0007	.0056	.0023	.0005	.006	.04
%RSD	.6529	1.405	1.095	1.169	.1903	.6073	.2306
#1	20.68	.0526	.5146	.2015	.2607	1.040	16.13
#2	20.49	.0515	.5067	.1982	.2614	1.031	16.18

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0004	-.0000	20.22	.5337	4.198	29.14	16.60
SDev	.0001	.0000	.16	.0058	.006	.02	.10
%RSD	27.01	137.7	.7718	1.085	.1489	.0673	.5757
#1	-.0003	-.0000	20.33	.5378	4.194	29.15	16.54
#2	-.0005	-.0000	20.11	.5296	4.203	29.13	16.67

Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.5158	.0234	.5509	.5413	.0013	.0198	.5344
SDev	.0059	.0132	.0151	.0017	.0021	.0013	.0025
%RSD	1.140	56.42	2.735	.3150	162.4	6.364	.4599
#1	.5200	.0327	.5616	.5425	.0028	.0207	.5326
#2	.5117	.0141	.5403	.5401	-.0002	.0189	.5361

Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avge	94.82	2.144	2.165	-.1574	.5440	2.156	.0022
SDev	1.60	.014	.016	.0058	.0062	.016	.0007
%RSD	1.692	.6432	.7608	3.664	1.131	.7223	33.20
#1	93.69	2.153	2.177	-.1615	.5483	2.167	.0017
#2	95.96	2.134	2.154	-.1533	.5396	2.145	.0027

Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0002	-.0207	-.0004	2.253	.0817	.5141	19.35
SDev	.0000	.0033	.0003	.007	.0104	.0016	.08
%RSD	4.120	15.94	74.66	.3001	12.77	.3042	.3916
#1	.0002	-.0230	-.0006	2.257	.0890	.5152	19.40
#2	.0002	-.0184	-.0002	2.248	.0743	.5130	19.29

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	-.0000	.5198	.0080
SDev	.0000	.0066	.0013
%RSD	98.53	1.276	15.63
#1	-.0000	.5245	.0089
#2	-.0001	.5151	.0071

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	693471	10000	--	--	--	--	--
SDev	11725.25	.0000000	--	--	--	--	--
%RSD	1.690805	.0000000	--	--	--	--	--
#1	685180	10000	--	--	--	--	--
#2	701762	10000	--	--	--	--	--

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Method: DAILY1 Sample Name: 237179 Operator:
Run Time: 11/04/03 12:19:40
Comment:
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.00182	.3530	.0026	.2154	.0118	-.0001	-.0006
SDev	.00276	.0062	.0075	.0023	.0039	.0002	.0082
%RSD	151.67	1.756	291.3	1.079	33.33	142.9	94.73
#1	.00013	.3574	.0079	.2171	.0146	.0000	-.0020
#2	-.00378	.3486	-.0027	.2138	.0090	-.0003	-.0144

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.3977	.0001	.0023	-.0015	.0159	-.0080	2.996
SDev	.0462	.0006	.0026	.0006	.0006	.0104	.021
%RSD	11.61	760.3	111.1	36.28	3.473	118.3	.6907
#1	.4303	.0005	.0041	-.0011	.0163	-.0014	3.010
#2	.3650	-.0004	.0005	-.0019	.0156	-.0161	2.981

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0009	.0006	.1236	.0020	.0269	12.58	7.299
SDev	.0021	.0001	.0536	.0011	.0113	.20	.301
%RSD	241.2	18.96	43.36	54.56	42.03	1.582	5.218
#1	.0006	.0006	.1614	.0028	.0349	12.44	7.560
#2	-.0024	.0005	.0857	.0012	.0189	12.72	7.030

Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0009	.6776	-.0073	.0087	-.0044	1.556	.1814
SDev	.0015	.0068	.0092	.0057	.0080	.065	.0076
%RSD	182.2	1.003	125.0	65.73	179.9	4.186	4.198
#1	.0020	.6824	-.0009	.0047	.0012	1.602	.1868
#2	-.0002	.6728	-.0138	.0127	-.0101	1.510	.1760

Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avge	97.91	.0000	.0125	1.953	.0034	.0083	-.0000
SDev	1.79	.0097	.0035	.009	.0008	.0056	.0022
%RSD	1.827	57840.	28.30	.4378	22.61	67.10	6451.
#1	99.18	.0069	.0150	1.947	.0028	.0123	.0015
#2	96.65	-.0069	.0100	1.959	.0039	.0044	-.0016

Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0006	-.0004	-.0004	-.0125	.0028	.0020	.0823
SDev	.0001	.0021	.0013	.0163	.0630	.0005	.0655
%RSD	17.19	529.6	365.5	130.3	2253.	23.82	79.58
#1	.0007	-.0019	.0006	-.0010	.0473	.0024	.1287
#2	.0005	.0011	-.0013	-.0241	-.0417	.0017	.0360

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	-.0000	.0049	-.0001
SDev	.0001	.0025	.0006
%RSD	243.3	50.82	654.1
#1	.0000	.0066	.0003
#2	-.0001	.0031	-.0005

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	715992	10000	--	--	--	--	--
SDev	13050.36	.0000000	--	--	--	--	--
%RSD	1.822697	.0000000	--	--	--	--	--
#1	725220	10000	--	--	--	--	--
#2	706764	10000	--	--	--	--	--

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Method: DAILY1 Sample Name: 237179d Operator:
Run Time: 11/04/03 12:24:16
Comment:
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.00065	.3621	.0020	.2210	.0052	-.0004	-.0013
SDev	.00038	.0057	.0019	.0010	.0001	.0001	.0004
%RSD	57.460	1.569	93.83	.4627	2.401	20.67	32.74
#1	-.00092	.3661	.0007	.2202	.0053	-.0004	-.0016
#2	-.00039	.3581	.0033	.2217	.0051	-.0003	-.0010

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.3472	.0003	.0018	-.0024	.0152	-.0055	3.008
SDev	.0031	.0001	.0001	.0005	.0003	.0014	.006
%RSD	.9042	49.53	6.956	20.12	1.765	24.53	.2140
#1	.3494	.0002	.0019	-.0021	.0150	-.0046	3.013
#2	.3450	.0004	.0018	-.0028	.0153	-.0065	3.004

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0000	.0006	.0686	.0010	.0067	12.64	7.565
SDev	.0002	.0000	.0011	.0000	.0011	.03	.186
%RSD	1091.	5.814	1.669	4.397	16.64	.2412	2.465
#1	.0001	.0006	.0695	.0010	.0075	12.66	7.696
#2	-.0001	.0006	.0678	.0010	.0059	12.62	7.433

Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0010	.6964	.0007	-.0013	.0008	1.640	.1844
SDev	.0007	.0028	.0026	.0012	.0021	.053	.0037
%RSD	69.91	.3973	356.8	92.34	272.2	3.227	1.996
#1	-.0014	.6944	.0026	-.0022	.0022	1.603	.1871
#2	-.0005	.6984	-.0011	-.0005	-.0007	1.677	.1818

Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avge	97.31	.0024	-.0014	2.003	-.0006	-.0001	.0017
SDev	1.00	.0061	.0037	.000	.0001	.0004	.0010
%RSD	1.025	249.6	253.6	.0000	8.778	300.0	61.82
#1	96.60	.0067	-.0040	2.004	-.0006	-.0004	.0024
#2	98.01	-.0019	.0011	2.003	-.0007	.0002	.0010

Elem	Sr4215	Th2837	Ti3372	T11908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0007	-.0025	.0005	.0041	.0323	.0001	.0241
SDev	.0000	.0039	.0000	.0022	.0077	.0001	.0161
%RSD	.5645	158.9	9.063	53.55	23.77	99.53	66.58
#1	.0007	-.0053	.0004	.0025	.0269	.0002	.0355
#2	.0007	.0003	.0005	.0056	.0378	.0000	.0128

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	-.0001	.0048	-.0003
SDev	.0000	.0003	.0002
%RSD	61.37	6.353	54.92
#1	-.0000	.0050	-.0005
#2	-.0001	.0046	-.0002

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	711570	10000	--	--	--	--	--
SDev	7312.191	.0000000	--	--	--	--	--
%RSD	1.027615	.0000000	--	--	--	--	--
#1	706399	10000	--	--	--	--	--
#2	716740	10000	--	--	--	--	--

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Method: DAILY1 Sample Name: 237181 Operator:
Run Time: 11/04/03 12:28:52
Comment:
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.00051	.1329	-.0036	.2808	.2099	-.0004	-.0021
SDev	.00009	.0034	.0025	.0032	.0011	.0001	.0034
%RSD	17.509	2.569	70.63	1.143	.5354	29.61	162.9
#1	-.00045	.1353	-.0018	.2785	.2091	-.0003	.0003
#2	-.00058	.1305	-.0053	.2831	.2107	-.0004	-.0044

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	9.942	.0003	.0009	-.0029	.0022	-.0066	3.506
SDev	.058	.0000	.0002	.0005	.0000	.0067	.019
%RSD	.5861	14.10	17.51	18.31	.5997	101.8	.5431
#1	9.984	.0003	.0008	-.0025	.0023	-.0019	3.492
#2	9.901	.0003	.0010	-.0033	.0022	-.0114	3.519

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0002	.0027	2.546	-.0001	.0013	12.60	7.395
SDev	.0005	.0000	.008	.0000	.0008	.05	.053
%RSD	229.0	1.209	.2987	12.10	61.41	.4346	.7219
#1	.0006	.0027	2.552	-.0001	.0019	12.56	7.432
#2	-.0001	.0028	2.541	-.0001	.0007	12.64	7.357

Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0006	.0259	-.0021	.0021	.0005	9.578	.0027
SDev	.0000	.0064	.0001	.0002	.0014	.181	.0019
%RSD	2.991	24.69	5.481	9.935	268.7	1.891	68.90
#1	.0006	.0304	-.0021	.0023	.0015	9.450	.0014
#2	.0006	.0213	-.0022	.0020	-.0005	9.706	.0040

Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avge	94.96	.0043	-.0042	1.783	.0007	-.0014	.0019
SDev	1.01	.0015	.0011	.003	.0002	.0012	.0027
%RSD	1.067	35.71	25.01	.1763	25.45	89.00	141.6
#1	94.24	.0032	-.0050	1.785	.0008	-.0022	-.0000
#2	95.67	.0054	-.0035	1.780	.0006	-.0005	.0038

Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0177	-.0061	-.0003	-.0066	.0167	.0000	.0116
SDev	.0001	.0082	.0000	.0054	.0037	.0000	.0026
%RSD	.4929	133.6	8.120	81.71	22.48	42.35	22.02
#1	.0176	-.0003	-.0003	-.0104	.0140	.0000	.0134
#2	.0177	-.0119	-.0003	-.0028	.0193	.0000	.0098

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	-.0001	.0020	-.0002
SDev	.0001	.0001	.0002
%RSD	99.39	5.467	120.8
#1	-.0000	.0019	-.0000
#2	-.0001	.0021	-.0003

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	694433	10000	--	--	--	--	--
SDev	7420.378	.0000000	--	--	--	--	--
%RSD	1.068552	.0000000	--	--	--	--	--
#1	689186	10000	--	--	--	--	--
#2	699680	10000	--	--	--	--	--

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Method: DAILY1 Sample Name: 237101s Operator:
Run Time: 11/04/03 12:33:28
Comment:
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.05154	2.097	2.156	.2870	2.322	.0560	-.0020
SDev	.00044	.000	.002	.0017	.011	.0003	.0005
%RSD	.84752	.0173	.0843	.5983	.4891	.4992	18.66
#1	.05185	2.098	2.158	.2858	2.314	.0558	-.0032
#2	.05123	2.097	2.155	.2882	2.330	.0562	-.0025

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	31.11	.0510	.5086	.2022	.2657	1.025	23.08
SDev	.05	.0005	.0017	.0002	.0010	.009	.08
%RSD	.1739	1.011	.3261	.1077	.3624	.8649	.3637
#1	31.15	.0507	.5074	.2024	.2650	1.018	23.02
#2	31.07	.0514	.5098	.2021	.2664	1.031	23.14

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0001	.0032	23.72	.5239	.0005	46.75	26.52
SDev	.0001	.0000	.03	.0015	.0004	.08	.07
%RSD	88.07	.3560	.1432	.2885	85.56	.1634	.2468
#1	.0002	.0032	23.69	.5228	.0002	46.70	26.56
#2	.0000	.0032	23.74	.5249	.0008	46.81	26.47

Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.5072	4.074	.5243	.5317	.0007	9.769	.5150
SDev	.0015	.052	.0013	.0034	.0007	.063	.0068
%RSD	.2944	1.281	.2414	.6418	98.44	.6433	1.328
#1	.5062	4.038	.5234	.5341	.0002	9.813	.5101
#2	.5083	4.111	.5252	.5293	.0012	9.725	.5198

Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avge	92.27	2.243	2.262	1.845	.5287	2.253	.0009
SDev	.82	.008	.002	.001	.0019	.004	.0036
%RSD	.8867	.3671	.0719	.0565	.3501	.1697	408.8
#1	91.69	2.249	2.263	1.844	.5300	2.256	.0034
#2	92.85	2.237	2.261	1.846	.5274	2.251	-.0017

Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0181	-.0186	-.0000	2.228	.0119	.5073	.0279
SDev	.0000	.0092	.0001	.024	.0093	.0002	.0060
%RSD	.2028	49.44	1933.	1.071	77.92	.0328	21.53
#1	.0181	-.0121	.0001	2.211	.0184	.5072	.0322
#2	.0181	-.0251	-.0001	2.245	.0053	.5075	.0237

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	-.0001	.5115	.0002
SDev	.0001	.0041	.0002
%RSD	49.57	.8073	82.67
#1	-.0001	.5086	.0001
#2	-.0001	.5144	.0003

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	674832	10000	--	--	--	--	--
SDev	6001.215	.0000000	--	--	--	--	--
%RSD	.8892896	.0000000	--	--	--	--	--
#1	670589	10000	--	--	--	--	--
#2	679076	10000	--	--	--	--	--

Analysis Report QC Standard 11/04/03 12:47:01 PM page 1

Method: DAILY1 Sample Name: icv/ccv Operator:
Run Time: 11/04/03 12:42:12
Comment:
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	1.0327	9.849	5.218	4.998	10.15	1.070	5.138
SDev	.0030	.011	.005	.005	.00	.005	.016
%RSD	.29290	.1107	.1035	.0949	.0035	.4627	.3025
#1	1.0349	9.856	5.214	4.995	10.15	1.074	5.149
#2	1.0306	9.841	5.222	5.002	10.15	1.067	5.127
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
Avge	20.75	1.004	5.003	2.015	2.059	10.49	18.57
SDev	.00	.001	.025	.011	.007	.03	.03
%RSD	.0124	.0924	.4912	.5488	.3268	.3261	.1745
#1	20.75	1.004	5.020	2.023	2.063	10.51	18.59
#2	20.75	1.003	4.985	2.007	2.054	10.46	18.55
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
Avge	5.259	4.958	20.26	1.049	5.187	Q46.96	Q26.70
SDev	.001	.015	.13	.005	.009	.21	.22
%RSD	.0195	.3044	.6250	.4907	.1826	.4453	.8250
#1	5.260	4.969	20.35	1.052	5.181	Q47.11	Q26.85
#2	5.258	4.947	20.17	1.045	5.194	Q46.81	Q26.54
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
Avge	4.960	5.053	5.183	5.255	1.074	1.071	1.029
SDev	.004	.007	.026	.050	.001	.008	.004
%RSD	.0891	.1292	.5067	.9502	.1389	.7077	.3505
#1	4.964	5.049	5.202	5.291	1.073	1.076	1.027
#2	4.957	5.058	5.165	5.220	1.075	1.065	1.032
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

Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avge	94.37	5.511	5.532	4.987	5.226	Q5.519	5.097
SDev	1.28	.019	.042	.025	.042	.034	.048
%RSD	1.354	.3411	.7620	.4989	.8037	.6220	.9324
#1	93.47	5.525	5.562	5.005	5.256	Q5.544	5.130
#2	95.28	5.498	5.502	4.969	5.196	5.495	5.063
Errors	NOCHECK	NOCHECK	NOCHECK	QC Pass	QC Pass	QC Fail	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
Avge	5.371	Q3.504	4.952	Q5.575	1.019	5.025	Q4.651
SDev	.016	.016	.001	.001	.010	.009	.030
%RSD	.2901	.4669	.0259	.0152	.9711	.1818	.6410
#1	5.382	Q3.516	4.953	Q5.576	1.012	5.032	Q4.630
#2	5.360	Q3.493	4.951	Q5.574	1.026	5.019	Q4.672

Errors	QC Pass	QC Fail	QC Pass	QC Fail	QC Pass	QC Pass	QC Fail
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	5.300	1.023	4.849
SDev	.005	.008	.017
%RSD	.1026	.7970	.3514
#1	5.296	1.029	4.837
#2	5.304	1.018	4.861

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

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	690116	10000	--	--	--	--	--
SDev	9314.718	.0000000	--	--	--	--	--
%RSD	1.349731	.0000000	--	--	--	--	--
#1	683530	10000	--	--	--	--	--
#2	696703	10000	--	--	--	--	--

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Method: DAILY1 Sample Name: icb/ccb Operator:
Run Time: 11/04/03 12:49:11
Comment:
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.00028	.0199	.0018	.0063	H.0055	.0002	-.0002
SDev	.00032	.0032	.0002	.0026	.0031	.0002	.0024
%RSD	117.47	16.30	8.676	31.29	56.58	129.2	951.7
#1	.00005	.0222	.0019	.0101	H.0077	.0003	-.0019
#2	.00051	.0176	.0017	.0064	.0033	.0000	.0014
Errors	LC Pass	LC Pass	LC Pass	LC Pass	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
Avge	.0121	.0006	.0029	-.0019	.0004	.0004	.0254
SDev	.0061	.0003	.0013	.0012	.0005	.0030	.0034
%RSD	50.48	49.33	43.87	62.53	130.0	684.3	13.48
#1	.0164	.0009	.0038	-.0010	.0007	.0025	.0230
#2	.0078	.0004	.0020	-.0027	.0000	-.0017	.0278
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	.0033	.0017	.0115	.0002	H.0081	.0158	H.1660
SDev	.0017	.0010	.0058	.0003	.0029	.0066	.0707
%RSD	52.37	59.22	50.23	215.3	35.66	41.52	42.62
#1	.0045	.0024	.0157	.0004	H.0101	.0205	H.1160
#2	.0021	.0010	.0074	-.0001	H.0061	.0112	H.2160
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC High	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
Avge	.0013	H.0207	.0028	.0020	.0010	H.0396	.0020
SDev	.0014	.0119	.0007	.0025	.0002	.0058	.0002
%RSD	111.8	57.31	25.35	120.3	22.29	14.65	11.81
#1	.0023	H.0123	.0023	.0038	.0008	H.0437	.0018
#2	.0003	H.0291	.0033	.0003	.0011	H.0355	.0021
Errors	LC Pass	LC High	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

Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avge	97.28	.0041	-.0048	.0014	.0023	-.0018	.0018
SDev	.99	.0019	.0019	.0027	.0014	.0019	.0008
%RSD	1.022	45.37	39.56	197.8	61.58	103.9	42.46
#1	96.58	.0028	-.0061	.0033	H.0033	-.0031	.0023
#2	97.98	.0054	-.0034	-.0006	.0013	-.0005	.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	Th2837	Ti3372	T11908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0030	.0032	.0021	.0018	.0400	.0025	H.0187
SDev	.0017	.0027	.0014	.0187	.0072	.0016	.0082
%RSD	56.42	83.40	63.74	1026.	17.87	62.50	44.09
#1	.0041	.0013	.0031	H.0150	.0350	.0036	H.0129
#2	.0018	.0051	.0012	L-.0114	.0451	.0014	H.0245
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC High
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	.0028	.0009	.0024
SDev	.0017	.0005	.0014
%RSD	59.33	56.04	57.42
#1	.0040	.0005	.0033
#2	.0017	.0013	.0014
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	711312	10000	--	--	--	--	--
SDev	7236.531	.0000000	--	--	--	--	--
%RSD	1.017350	.0000000	--	--	--	--	--
#1	706195	10000	--	--	--	--	--
#2	716429	10000	--	--	--	--	--

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Method: DAILY1 Sample Name: 236555 Operator:
Run Time: 11/04/03 12:54:06
Comment:
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.00045	.0378	.0004	.0305	.0012	-.0004	-.0031
SDev	.00009	.0013	.0005	.0001	.0000	.0001	.0019
%RSD	19.241	3.432	126.9	.3051	1.364	17.51	61.51
#1	-.00051	.0387	.0000	.0304	.0012	-.0004	-.0045
#2	-.00039	.0369	.0008	.0306	.0012	-.0005	-.0018

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	7.481	.0001	.0001	-.0024	.0020	.0188	61.43
SDev	.021	.0001	.0000	.0002	.0000	.0006	.22
%RSD	.2797	117.5	1.237	6.469	.1188	3.238	.3609
#1	7.466	.0002	.0001	-.0025	.0020	.0193	61.28
#2	7.496	.0000	.0001	-.0023	.0020	.0184	61.59

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0015	.0009	63.82	.0007	.0054	S58.23	623.0
SDev	.0005	.0001	.26	.0000	.0004	.74	.9
%RSD	35.11	10.02	.4150	3.722	6.637	1.265	.1460
#1	.0018	.0009	63.63	.0007	.0052	S58.75	622.3
#2	.0011	.0010	64.00	.0007	.0057	S57.71	623.6

Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0005	23.98	.0040	.0028	-.0006	148.4	.0034
SDev	.0005	.09	.0010	.0021	.0010	4.2	.0004
%RSD	91.21	.3917	24.13	77.50	149.3	2.819	11.09
#1	.0002	23.92	.0033	.0012	-.0013	151.3	.0032
#2	.0009	24.05	.0047	.0043	.0000	145.4	.0037

Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avge	94.50	.0096	-.0004	.6310	.0032	.0029	.0154
SDev	.04	.0036	.0008	.0025	.0017	.0006	.0018
%RSD	.0434	37.53	196.0	.3967	55.10	21.83	11.80
#1	94.47	.0071	.0002	.6292	.0019	.0025	.0141
#2	94.53	.0122	-.0010	.6327	.0044	.0034	.0167

Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0037	-.0228	.0000	-.0243	-.0487	-.0003	.0292
SDev	.0000	.0066	.0001	.0045	.0061	.0002	.0014
%RSD	.5917	28.95	1886.	18.70	12.54	47.09	4.830
#1	.0037	-.0181	.0001	-.0275	-.0444	-.0004	.0302
#2	.0037	-.0274	-.0001	-.0211	-.0530	-.0002	.0282

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	.0000	.3098	.0057
SDev	.0001	.0027	.0025
%RSD	564.8	.8736	44.22
#1	-.0000	.3079	.0075
#2	.0001	.3117	.0039

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	691068	10000	--	--	--	--	--
SDev	265.1650	.0000000	--	--	--	--	--
%RSD	.0383703	.0000000	--	--	--	--	--
#1	690881	10000	--	--	--	--	--
#2	691256	10000	--	--	--	--	--

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Method: DAILY1 Sample Name: 236556 Operator:
Run Time: 11/04/03 12:58:58
Comment:
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.00010	.0585	-.0024	.0854	.0012	-.0004	-.0001
SDev	.00055	.0115	.0011	.0003	.0000	.0002	.0016
%RSD	537.16	19.73	44.99	.3341	1.296	48.12	1083.
#1	-.00049	.0504	-.0031	.0852	.0012	-.0006	.0010
#2	.00029	.0667	-.0016	.0856	.0012	-.0003	-.0013

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	2.767	-.0000	.0010	-.0024	.0014	.2258	74.23
SDev	.009	.0000	.0001	.0000	.0004	.0057	.18
%RSD	.3134	67.60	8.427	1.835	27.55	2.529	.2358
#1	2.760	-.0000	.0009	-.0025	.0011	.2217	74.11
#2	2.773	-.0000	.0010	-.0024	.0016	.2298	74.36

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0016	.0015	1.543	.0007	.0148	549.23	938.2
SDev	.0006	.0001	.065	.0001	.0004	.93	1.3
%RSD	38.81	9.561	4.192	11.99	2.400	1.892	.1438
#1	.0012	.0014	1.589	.0006	.0146	549.89	939.1
#2	.0021	.0016	1.497	.0008	.0151	548.57	937.2

Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0001	27.95	.0019	.0008	.0011	215.5	.0039
SDev	.0001	.32	.0006	.0001	.0003	2.5	.0008
%RSD	74.34	1.137	31.47	17.61	24.06	1.137	20.00
#1	.0001	28.18	.0015	.0009	.0009	217.3	.0045
#2	.0002	27.73	.0023	.0007	.0012	213.8	.0034

Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avge	91.92	.0048	-.0062	1.213	.0012	-.0025	.0094
SDev	.10	.0059	.0025	.004	.0001	.0036	.0001
%RSD	.1034	121.0	39.50	.3695	8.986	139.8	.8155
#1	91.86	.0088	-.0045	1.210	.0011	-.0000	.0094
#2	91.99	.0007	-.0080	1.216	.0012	-.0051	.0093

Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0030	-.0042	.0001	-.0286	-.0383	.0002	.0240
SDev	.0000	.0036	.0003	.0070	.0090	.0001	.0001
%RSD	.7996	83.62	265.4	24.54	23.61	81.94	.3393
#1	.0030	-.0068	-.0001	-.0336	-.0447	.0001	.0241
#2	.0030	-.0017	.0003	-.0236	-.0319	.0003	.0240

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	.0000	.3584	.0049
SDev	.0001	.0042	.0001
%RSD	489.4	1.171	1.656
#1	-.0000	.3554	.0050
#2	.0001	.3614	.0049

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	672276	10000	--	--	--	--	--
SDev	686.6007	.0000000	--	--	--	--	--
%RSD	.1021307	.0000000	--	--	--	--	--
#1	671791	10000	--	--	--	--	--
#2	672762	10000	--	--	--	--	--

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Method: DAILY1 Sample Name: 236557 Operator:
Run Time: 11/04/03 13:03:49
Comment:
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.00121	.0594	.0002	.0417	.0012	-.0006	-.0063
SDev	.00319	.0059	.0045	.0014	.0000	.0000	.0107
%RSD	263.47	9.923	2250.	3.384	1.519	.2494	169.3
#1	.00104	.0553	.0034	.0427	.0012	-.0006	.0012
#2	-.00346	.0636	-.0030	.0407	.0012	-.0006	-.0139

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	2.489	-.0002	.0010	-.0021	.0023	.2578	111.2
SDev	.026	.0005	.0016	.0002	.0004	.0079	2.7
%RSD	1.036	283.5	163.0	9.172	16.31	3.075	2.448
#1	2.507	.0002	.0021	-.0023	.0021	.2522	109.2
#2	2.471	-.0006	-.0002	-.0020	.0026	.2634	113.1

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0025	.0035	1.265	.0010	.0027	S-89.22	7097.
SDev	.0020	.0005	.017	.0001	.0014	126.22	84.
%RSD	80.79	13.52	1.336	8.071	52.93	141.5	1.178
#1	.0039	.0039	1.277	.0009	.0037	S.0354	7038.
#2	.0011	.0032	1.253	.0011	.0017	S-178.5	7156.

Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0004	29.00	-.0010	.0025	-.0019	233.7	-.0023
SDev	.0000	.71	.0076	.0067	.0058	.1	.0076
%RSD	9.805	2.444	741.7	265.3	305.0	.0557	333.9
#1	.0004	29.51	.0044	-.0022	.0022	233.7	.0031
#2	.0004	28.50	-.0064	.0073	-.0060	233.8	-.0076

Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avge	78.06	.0088	-.0041	.6959	.0013	.0002	.0075
SDev	1.99	.0113	.0066	.0057	.0019	.0006	.0090
%RSD	2.549	127.9	160.8	.8136	144.0	295.1	120.2
#1	79.47	.0168	-.0088	.6999	-.0000	-.0002	.0139
#2	76.66	.0008	.0006	.6919	.0027	.0007	.0011

Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0108	.0104	-.0013	-.0331	-.2546	.0003	.0148
SDev	.0001	.0008	.0022	.0147	.0652	.0003	.0211
%RSD	.5243	7.418	174.0	44.22	25.62	103.9	142.5
#1	.0108	.0099	.0003	-.0228	-.2084	.0001	.0297
#2	.0109	.0110	-.0028	-.0435	-.3007	.0005	-.0001

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	.0000	.0900	.0007
SDev	.0000	.0027	.0001
%RSD	98.97	3.032	11.79
#1	.0000	.0920	.0006
#2	.0001	.0881	.0007

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	571089	10000	--	--	--	--	--
SDev	14566.40	.0000000	--	--	--	--	--
%RSD	2.550636	.0000000	--	--	--	--	--
#1	581389	10000	--	--	--	--	--
#2	560789	10000	--	--	--	--	--

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Method: DAILY1 Sample Name: 236557d Operator:
Run Time: 11/04/03 13:08:41
Comment:
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.00178	.0564	-.0013	.0427	.0013	-.0005	-.0086
SDev	.00306	.0018	.0008	.0022	.0002	.0000	.0042
%RSD	172.13	3.212	59.94	5.182	12.58	6.754	49.05
#1	.00039	.0552	-.0008	.0442	.0014	-.0006	-.0056
#2	-.00394	.0577	-.0019	.0411	.0012	-.0005	-.0116

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	2.558	-.0003	.0002	-.0017	.0033	.2225	116.0
SDev	.030	.0005	.0016	.0012	.0005	.0277	2.0
%RSD	1.186	160.0	834.2	68.67	16.44	12.44	1.748
#1	2.580	.0000	.0013	-.0009	.0037	.2421	114.5
#2	2.537	-.0007	-.0009	-.0026	.0029	.2029	117.4

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0018	.0033	1.297	.0009	.0013	S-90.87	7342.
SDev	.0027	.0004	.023	.0001	.0012	128.56	113.
%RSD	153.3	11.49	1.772	16.64	94.78	141.5	1.540
#1	.0037	.0035	1.313	.0010	.0022	S.0354	7262.
#2	-.0001	.0030	1.280	.0008	.0004	S-181.8	7422.

Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0014	29.71	-.0079	.0083	-.0030	237.8	-.0039
SDev	.0010	.28	.0116	.0053	.0080	.5	.0032
%RSD	70.77	.9507	146.9	63.94	262.8	.2171	82.55
#1	.0022	29.51	.0003	.0046	.0026	238.1	-.0016
#2	.0007	29.91	-.0161	.0121	-.0087	237.4	-.0062

Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avge	76.93	-.0037	-.0010	.7193	.0029	-.0019	.0065
SDev	.88	.0039	.0068	.0087	.0003	.0032	.0071
%RSD	1.144	105.2	685.3	1.213	10.86	171.1	109.6
#1	77.55	-.0010	-.0058	.7254	.0031	-.0042	.0116
#2	76.31	-.0065	.0038	.7131	.0027	.0004	.0015

Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0112	.0175	-.0017	-.0250	-.2692	.0005	-.0071
SDev	.0001	.0040	.0016	.0216	.0606	.0007	.0239
%RSD	1.306	22.87	92.13	86.45	22.49	135.6	338.0
#1	.0113	.0203	-.0006	-.0097	-.2264	.0010	.0098
#2	.0111	.0147	-.0028	-.0403	-.3120	.0000	-.0240

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	.0001	.0897	.0010
SDev	.0003	.0028	.0012
%RSD	303.9	3.089	123.8
#1	.0003	.0917	.0010
#2	-.0001	.0878	.0001

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	562832	10000	--	--	--	--	--
SDev	6364.668	.0000000	--	--	--	--	--
%RSD	1.130828	.0000000	--	--	--	--	--
#1	567333	10000	--	--	--	--	--
#2	558332	10000	--	--	--	--	--

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Method: DAILY1 Sample Name: 236550 Operator:
Run Time: 11/04/03 13:13:41
Comment:
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.00080	.0674	.0012	.0758	.0011	-.0005	-.0011
SDev	.00019	.0190	.0024	.0012	.0002	.0001	.0024
%RSD	23.924	28.18	199.2	1.539	19.30	22.82	225.4
#1	.00067	.0540	-.0005	.0750	.0013	-.0004	-.0028
#2	.00094	.0808	.0029	.0766	.0010	-.0006	.0006

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	2.646	-.0001	.0013	-.0030	.0021	.2344	124.4
SDev	.027	.0002	.0001	.0018	.0010	.0213	.6
%RSD	1.017	476.3	10.31	57.96	47.26	9.101	.4628
#1	2.627	-.0002	.0012	-.0018	.0028	.2494	124.0
#2	2.666	.0001	.0014	-.0043	.0014	.2193	124.8

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0044	.0029	1.318	.0010	.0012	S-99.48	8193.
SDev	.0005	.0003	.013	.0001	.0007	140.73	11.
%RSD	10.57	11.62	.9680	15.01	62.06	141.5	.1401
#1	.0048	.0031	1.309	.0011	.0017	S-199.0	8185.
#2	.0041	.0026	1.327	.0009	.0007	S.0354	8201.

Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0010	29.42	.0297	.0243	.0023	244.9	.0021
SDev	.0009	.48	.0099	.0056	.0014	2.6	.0012
%RSD	88.88	1.637	33.39	23.20	60.07	1.081	56.85
#1	.0017	29.08	.0227	.0283	.0013	243.1	.0029
#2	.0004	29.76	.0367	.0203	.0032	246.8	.0012

Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avge	75.76	.0109	-.0075	.9509	.0261	-.0014	.0089
SDev	.24	.0041	.0107	.0099	.0004	.0057	.0015
%RSD	.3232	38.10	142.5	1.042	1.736	424.1	16.38
#1	75.59	.0079	.0001	.9438	.0264	.0027	.0079
#2	75.94	.0138	-.0150	.9579	.0257	-.0054	.0100

Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0132	.0075	-.0002	-.0020	-.2375	-.0008	.0283
SDev	.0000	.0164	.0002	.0056	.0031	.0009	.0267
%RSD	.0491	217.7	99.48	278.5	1.303	104.3	94.52
#1	.0132	.0191	-.0001	.0020	-.2397	-.0002	.0094
#2	.0132	-.0041	-.0003	-.0060	-.2353	-.0015	.0472

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	-.0001	.6401	.0023
SDev	.0003	.0095	.0014
%RSD	349.0	1.485	59.02
#1	.0001	.6334	.0032
#2	-.0003	.6468	.0013

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	554280	10000	--	--	--	--	--
SDev	1772.717	.0000000	--	--	--	--	--
%RSD	.3198230	.0000000	--	--	--	--	--
#1	553027	10000	--	--	--	--	--
#2	555534	10000	--	--	--	--	--

Analysis Report 11/04/03 01:23:13 PM page 1

Method: DAILY1 Sample Name: 236558s Operator:
Run Time: 11/04/03 13:18:32
Comment:
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.06190	2.571	2.397	.4337	2.225	.0470	-.0027
SDev	.00227	.015	.006	.0008	.003	.0004	.0073
%RSD	3.6630	.5936	.2568	.1916	.1317	.8388	272.6
#1	.06030	2.561	2.401	.4331	2.223	.0473	-.0079
#2	.06351	2.582	2.393	.4343	2.227	.0468	.0025

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	21.28	.0454	.4856	.1895	.3203	1.197	170.9
SDev	.01	.0008	.0002	.0006	.0011	.003	.4
%RSD	.0292	1.700	.0498	.3289	.3384	.2911	.2079
#1	21.28	.0448	.4858	.1900	.3195	1.194	170.7
#2	21.27	.0459	.4855	.1891	.3211	1.199	171.2

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0026	.0027	19.90	.5106	4.184	S-105.8	8529.
SDev	.0021	.0004	.04	.0008	.033	149.6	9.
%RSD	80.47	14.54	.2019	.1465	.7848	141.5	.1098
#1	.0011	.0029	19.88	.5112	4.161	S-211.6	8523.
#2	.0040	.0024	19.93	.5101	4.208	S.0354	8536.

Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.4861	29.53	.5963	.6072	-.0021	250.5	.6057
SDev	.0013	.02	.0099	.0001	.0029	4.3	.0081
%RSD	.2723	.0733	1.659	.0243	143.1	1.723	1.340
#1	.4852	29.55	.5893	.6073	-.0041	247.4	.6000
#2	.4871	29.52	.6033	.6071	.0000	253.5	.6114

Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avge	72.61	2.371	2.459	.9777	.6029	2.427	.0075
SDev	.06	.010	.026	.0093	.0032	.021	.0061
%RSD	.0874	.4362	1.045	.9511	.5302	.8468	81.86
#1	72.66	2.364	2.441	.9712	.6007	2.413	.0031
#2	72.57	2.379	2.477	.9843	.6052	2.442	.0118

Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0138	.0020	-.0009	2.864	-.2339	.5051	10.58
SDev	.0001	.0088	.0013	.004	.0256	.0002	.06
%RSD	.6483	450.7	151.2	.1375	10.95	.0460	.3305
#1	.0138	.0082	-.0018	2.867	-.2520	.5053	10.62
#2	.0139	-.0043	.0001	2.861	-.2158	.5050	10.53

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	-.0000	1.148	.0065
SDev	.0001	.001	.0003
%RSD	118.9	.1048	4.720
#1	-.0001	1.147	.0063
#2	-.0000	1.149	.0067

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	531303	10000	--	--	--	--	--
SDev	456.7910	.0000000	--	--	--	--	--
%RSD	.0859756	.0000000	--	--	--	--	--
#1	531626	10000	--	--	--	--	--
#2	530980	10000	--	--	--	--	--

Analysis Report QC Standard 11/04/03 01:32:08 PM page 1

Method: DAILY1 Sample Name: icv/ccv Operator:
Run Time: 11/04/03 13:27:22
Comment:
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	1.0406	9.791	5.262	5.012	10.00	Q1.108	5.114
SDev	.0043	.010	.004	.006	.03	.003	.004
%RSD	.41508	.0994	.0709	.1117	.2761	.2920	.0686
#1	1.0375	9.798	5.259	5.008	10.02	Q1.110	5.117
#2	1.0436	9.784	5.265	5.016	9.984	Q1.106	5.112
Errors	QC Pass	QC Pass	QC Pass	QC Pass	QC Pass	QC Fail	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
Avge	21.28	1.026	5.047	2.048	2.035	10.66	10.35
SDev	.05	.001	.029	.008	.000	.01	.01
%RSD	.2318	.0543	.5731	.3937	.0103	.0654	.0723
#1	21.25	1.027	5.068	2.053	2.034	10.66	10.34
#2	21.32	1.026	5.027	2.042	2.035	10.65	10.36
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
Avge	5.209	4.890	20.33	1.060	5.256	Q47.43	27.52
SDev	.022	.006	.07	.006	.005	.52	.11
%RSD	.4281	.1218	.3202	.5276	.1010	1.094	.3849
#1	5.225	4.895	20.38	1.064	5.252	Q47.80	27.59
#2	5.194	4.886	20.29	1.056	5.260	Q47.06	27.44
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
Avge	5.050	5.112	5.231	5.280	1.066	Q1.104	1.029
SDev	.004	.003	.009	.011	.001	.031	.001
%RSD	.0791	.0510	.1798	.2009	.1066	2.774	.0521
#1	5.053	5.110	5.238	5.272	1.065	Q1.125	1.029
#2	5.047	5.114	5.224	5.287	1.067	1.082	1.028
Errors	QC Pass	QC Pass	NOCHECK	NOCHECK	QC Pass	QC Fail	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

Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avge	96.52	5.403	5.445	5.006	5.258	5.452	5.179
SDev	.83	.014	.029	.008	.004	.014	.005
%RSD	.8600	.2617	.5278	.1552	.0748	.2634	.0987
#1	95.93	5.493	5.424	5.012	5.256	5.442	5.183
#2	97.11	5.473	5.465	5.001	5.261	5.462	5.176
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	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	5.313	Q3.516	4.964	Q5.596	1.029	5.067	Q4.711
SDev	.028	.017	.008	.012	.004	.007	.006
%RSD	.5341	.4888	.1546	.2209	.4169	.1427	.1272
#1	5.333	Q3.528	4.959	Q5.588	1.026	5.072	Q4.715
#2	5.293	Q3.503	4.970	Q5.605	1.032	5.062	Q4.707
Errors	QC Pass	QC Fail	QC Pass	QC Fail	QC Pass	QC Pass	QC Fail
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	5.292	1.053	4.891
SDev	.009	.002	.003
%RSD	.1636	.2225	.0661
#1	5.298	1.054	4.888
#2	5.286	1.051	4.893
Errors	QC Pass	QC Pass	QC Pass
Value	5.000	1.000	5.000
Range	10.00	10.00	10.00

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	705814	10000	--	--	--	--	--
SDev	6083.240	.0000000	--	--	--	--	--
%RSD	.8618751	.0000000	--	--	--	--	--
#1	701513	10000	--	--	--	--	--
#2	710116	10000	--	--	--	--	--

Analysis Report Blank Sample 11/04/03 01:39:02 PM page 1

Method: DAILY1 Sample Name: icb/ccb Operator:
Run Time: 11/04/03 13:34:17
Comment:
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.00074	.0191	.0023	.0100	H.0062	.0005	.0014
SDev	.00069	.0004	.0053	.0038	.0037	.0003	.0014
%RSD	93.827	1.983	226.9	37.77	60.75	64.33	97.84
#1	.00123	.0188	H.0061	.0126	H.0088	.0007	.0024
#2	.00025	.0193	-.0014	.0073	.0035	.0003	.0004
Errors	LC Pass	LC Pass	LC Pass	LC Pass	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
Avge	.0150	.0005	.0030	-.0017	.0001	-.0002	.0217
SDev	.0083	.0005	.0024	.0011	.0009	.0118	.0043
%RSD	55.75	97.97	82.41	62.73	1722.	5544.	20.02
#1	.0209	.0008	.0047	-.0009	.0007	.0081	.0248
#2	.0091	.0001	.0012	-.0024	-.0006	-.0085	.0186
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	.0036	.0018	.0155	.0002	H.0088	.0294	-.0144
SDev	.0022	.0011	.0058	.0004	.0042	.0115	.0461
%RSD	62.39	60.45	37.34	196.8	47.36	39.25	321.5
#1	H.0052	.0026	.0196	.0005	H.0117	.0376	-.0470
#2	.0020	.0010	.0114	-.0001	H.0058	.0213	.0183
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
Avge	.0018	H.0170	.0025	.0051	.0009	H.0142	.0031
SDev	.0025	.0071	.0004	.0022	.0031	.0024	.0013
%RSD	142.9	41.80	17.23	43.52	343.2	17.24	40.06
#1	.0035	H.0120	.0029	.0067	.0031	H.0160	.0040
#2	-.0000	H.0220	.0022	.0036	-.0013	H.0125	.0022
Errors	LC Pass	LC High	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

Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avge	98.07	.0021	-.0014	.0009	H.0043	-.0002	.0039
SDev	.51	.0009	.0021	.0041	.0016	.0017	.0029
%RSD	.5186	44.89	147.6	461.5	38.29	797.1	72.65
#1	97.71	.0028	.0001	.0038	H.0054	.0010	H.0059
#2	98.43	.0015	-.0029	-.0020	H.0031	-.0014	.0019
Errors	NOCHECK	NOCHECK	NOCHECK	LC Pass	LC High	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
Avge	.0033	-.0003	.0024	-.0062	.0537	.0032	H.0272
SDev	.0020	.0009	.0021	.0007	.0113	.0025	.0043
%RSD	60.06	338.5	88.13	10.68	20.96	79.21	15.89
#1	.0048	.0004	.0039	-.0058	.0617	.0049	H.0302
#2	.0019	-.0009	.0009	-.0067	.0458	.0014	H.0241
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC Pass	LC High
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	.0032	.0011	.0026
SDev	.0020	.0005	.0021
%RSD	62.78	48.31	78.75
#1	.0046	.0015	.0041
#2	.0018	.0007	.0012
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	717157	10000	--	--	--	--	--
SDev	3662.813	.0000000	--	--	--	--	--
%RSD	.5107408	.0000000	--	--	--	--	--
#1	714567	10000	--	--	--	--	--
#2	719747	10000	--	--	--	--	--

ICP ANALYSIS

PROJ. NO.	PROJECT	TO#	DATE	MATRIX	LOGBK PG
06002.01.081	Div 20	031021-4	11-6-03	Liquid	NA

INSTRUMENT: ICP ACE 1 FILENAME: A031106

INSTRUMENT DL:

010075

Standardization Rpt. 11/06/03 11:32:57 AM page 1

Method: DAILY1 Standard: blk
Run Time: 11/06/03 11:28:27

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Avge	-.00001	.0006	-.0000	.0000	-.0000	-.0001	.0000
SDev	.00001	.0000	.0000	.0000	.0000	.0000	.0000
%RSD	93.946	1.723	189.0	.6017	6.493	4.209	61.10
#1	-.00000	.0005	.0000	.0000	-.0000	-.0001	.0000
#2	-.00001	.0006	-.0000	.0000	-.0000	-.0001	.0000

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Avge	.0000	.0000	-.0000	.0001	.0004	-.0000	.0004
SDev	.0000	.0000	.0000	.0001	.0000	.0000	.0013
%RSD	34.24	7.335	28.86	52.80	1.711	41.04	326.4
#1	.0000	.0000	-.0000	.0002	.0004	-.0000	-.0005
#2	.0000	.0000	-.0000	.0001	.0004	-.0000	.0013

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Avge	.0005	.0002	-.0000	.0000	-.0000	-.0060	-.0003
SDev	.0000	.0000	.0000	.0000	.0000	.0009	.0001
%RSD	2.438	21.67	65.53	45.54	8.918	14.47	42.37
#1	.0005	.0001	-.0000	.0000	-.0000	-.0066	-.0003
#2	.0005	.0002	-.0000	.0000	-.0000	-.0054	-.0002

Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Avge	.0001	.0001	.0002	-.0001	.0000	.0000	.0000
SDev	.0002	.0000	.0000	.0001	.0000	.0000	.0000
%RSD	114.6	12.26	26.75	70.26	944.8	15.22	4.887
#1	.0003	.0001	.0001	-.0001	-.0000	.0000	.0000
#2	.0000	.0001	.0002	-.0002	.0000	.0000	.0000

Elem	Sc3613	1960/1	1960/2	Si2881	Sn1899	Sr4215	Th2837
Avge	71.29	-.0001	.0002	.0014	-.0000	.0000	.0000
SDev	.43	.0000	.0001	.0000	.0000	.0000	.0000
%RSD	.6048	28.48	39.94	.9656	195.8	85.24	234.6
#1	70.99	-.0000	.0003	.0014	.0000	.0000	.0000
#2	71.60	-.0001	.0002	.0014	-.0000	.0000	-.0000

Elem	Ti3372	Tl1908	U_3859	V_2924	W_2079	Y_3710	Zn2062
Avge	-.0014	-.0000	.0040	-.0000	.0001	-.0000	-.0000
SDev	.0001	.0000	.0000	.0000	.0000	.0000	.0000
%RSD	3.943	55.25	.3792	61.10	32.71	71.16	46.60
#1	-.0014	-.0001	.0040	-.0000	.0001	-.0000	-.0000
#2	-.0015	-.0000	.0040	-.0000	.0000	-.0000	-.0000

Elem	Zr3496
Avge	.0001
SDev	.0000
%RSD	1.488
#1	.0001
#2	.0001

11-6-03

SDW 03

11/6/03

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	712893	10000	--	--	--	--	--
SDev	4289.310	.0000000	--	--	--	--	--
%RSD	.6016765	.0000000	--	--	--	--	--
#1	709860	10000	--	--	--	--	--
#2	715926	10000	--	--	--	--	--

Standardization Rpt. 11/06/03 11:36:49 AM page 1

Method: DAILY1 Standard: clp_std4
Run Time: 11/06/03 11:33:07

Elem	Ag3280	As1890	2203/1	2203/2	Sb2068	1960/1	1960/2
Avge	.05200	.1016	.4016	.4158	.1081	.2139	.3697
SDev	.00035	.0006	.0007	.0005	.0007	.0019	.0043
%RSD	.68079	.5795	.1762	.1281	.6723	.9081	1.176
#1	.05175	.1012	.4011	.4154	.1076	.2126	.3666
#2	.05225	.1020	.4021	.4161	.1086	.2153	.3727

Elem	T11908
Avge	.0280
SDev	.0001
%RSD	.4141
#1	.0279
#2	.0281

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	729871	10000	--	--	--	--	--
SDev	6235.268	.0000000	--	--	--	--	--
%RSD	.8542972	.0000000	--	--	--	--	--
#1	725462	10000	--	--	--	--	--
#2	734280	10000	--	--	--	--	--

Standardization Rpt. 11/06/03 11:40:42 AM page 1

Method: DAILY1 Standard: clp_std1
Run Time: 11/06/03 11:36:59

Elem	A13082	Ca3179	Fe2714	K_7664	Li6707	Mg2790	Na3302
Avge	.1262	.1418	.0985	1.675	3.328	.0527	.0121
SDev	.0011	.0009	.0003	.023	.034	.0001	.0001
%RSD	.8958	.6535	.2923	1.363	1.034	.1186	.7550
#1	.1254	.1425	.0987	1.659	3.304	.0526	.0120
#2	.1270	.1412	.0983	1.692	3.353	.0527	.0122
IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	704300	10000	--	--	--	--	--
SDev	5844.237	.0000000	--	--	--	--	--
%RSD	.8297944	.0000000	--	--	--	--	--
#1	708432	10000	--	--	--	--	--
#2	700167	10000	--	--	--	--	--

Standardization Rpt. 11/06/03 11:44:12 AM page 1

Method: DAILY1 Standard: clp_std5
Run Time: 11/06/03 11:40:51

Elem	B_2496	Bi2230	Mo2020	P_1782	Si2881	Sn1899	Sr4215
Avge	.3700	.0571	.1449	.0321	.1236	.1674	1.540
SDev	.0023	.0001	.0011	.0002	.0003	.0002	.005
%RSD	.6302	.0852	.7748	.6587	.2073	.1364	.2943
#1	.3684	.0571	.1441	.0319	.1238	.1672	1.543
#2	.3717	.0572	.1457	.0322	.1235	.1676	1.537

Elem	Ti3372
Avge	1.063
SDev	.003
%RSD	.3195
#1	1.065
#2	1.060

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	712429	10000	--	--	--	--	--
SDev	2449.418	.0000000	--	--	--	--	--
%RSD	.3438122	.0000000	--	--	--	--	--
#1	710697	10000	--	--	--	--	--
#2	714161	10000	--	--	--	--	--

Standardization Rpt. 11/06/03 11:47:21 AM page 1

Method: DAILY1 Standard: clp_std2
Run Time: 11/06/03 11:44:22

Elem	Ba4934	Be3130	Cr2677	Cu3247	Ni2316
Avge	.6303	.1982	.2814	.3155	.7125
SDev	.0004	.0000	.0013	.0009	.0006
%RSD	.0572	.0150	.4731	.3017	.0776
#1	.6300	.1982	.2823	.3161	.7128
#2	.6305	.1982	.2804	.3148	.7121

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	708226	10000	--	--	--	--	--
SDev	18004.35	.0000000	--	--	--	--	--
%RSD	2.542176	.0000000	--	--	--	--	--
#1	695495	10000	--	--	--	--	--
#2	720957	10000	--	--	--	--	--

Standardization Rpt. 11/06/03 11:51:14 AM page 1

Method: DAILY1 Standard: clp_std3
Run Time: 11/06/03 11:47:31

Elem	Cd2265	Co2286	Mn2576	V 2924	Zn2062
Avge	1.055	.2566	.3848	.0716	.0779
SDev	.002	.0001	.0008	.0001	.0001
%RSD	.1674	.0563	.1987	.1159	.1103
#1	1.054	.2567	.3843	.0715	.0780
#2	1.056	.2565	.3854	.0716	.0779

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	701265	10000	--	--	--	--	--
SDev	9058.038	.0000000	--	--	--	--	--
%RSD	1.291671	.0000000	--	--	--	--	--
#1	694860	10000	--	--	--	--	--
#2	707670	10000	--	--	--	--	--

Standardization Rpt. 11/06/03 11:55:50 AM page 1

Method: DAILY1 Standard: clp_std6
Run Time: 11/06/03 11:51:24

Elem	La4086	Na5889	Pd3404	S_1820	Th2837	U_3859	W_2079
Avge	.3974	.1370	.1536	.0333	.0773	.0332	.1215
SDev	.0012	.0005	.0004	.0005	.0001	.0001	.0004
%RSD	.3087	.3739	.2881	1.561	.1955	.3313	.3673
#1	.3965	.1366	.1533	.0330	.0774	.0331	.1212
#2	.3983	.1373	.1539	.0337	.0772	.0332	.1218

Elem	Y_3710	Zr3496
Avge	1.025	1.182
SDev	.000	.000
%RSD	.0464	.0007
#1	1.026	1.182
#2	1.025	1.182

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	703006	10000	--	--	--	--	--
SDev	3406.133	.0000000	--	--	--	--	--
%RSD	.4845095	.0000000	--	--	--	--	--
#1	700598	10000	--	--	--	--	--
#2	705415	10000	--	--	--	--	--

Standardization Report 11/06/03 11:55:50 AM page 1

Method: DAILY1 Slope = Conc(SIR)/IR

Element	Wavelen	High std	Low std	Slope	Y-intercept	Date Standardized
Ag3280	328.068	clp_std4	blk	38.4527	.000323	11/06/03 11:51:24
Al3082	308.215	clp_std1	blk	397.859	-.220714	11/06/03 11:51:24
As1890	189.042	clp_std4	blk	98.3901	.001235	11/06/03 11:51:24
B_2496	249.678	clp_std5	blk	27.0263	-.000227	11/06/03 11:51:24
Ba4934	493.409	clp_std2	blk	15.8653	.000534	11/06/03 11:51:24
Be3130	313.042	clp_std2	blk	25.2160	.002599	11/06/03 11:51:24
Bi2230	223.061	clp_std5	blk	86.8838	-.002137	11/06/03 11:51:24
Ca3179	317.933	clp_std1	blk	352.628	-.005199	11/06/03 11:51:24
Cd2265	226.502	clp_std3	blk	9.47675	-.000140	11/06/03 11:51:24
Co2286	228.616	clp_std3	blk	38.9683	.000410	11/06/03 11:51:24
Cr2677	267.716	clp_std2	blk	35.5550	-.004121	11/06/03 11:51:24
Cu3247	324.753	clp_std2	blk	31.7357	-.011352	11/06/03 11:51:24
Fe2714	271.441	clp_std1	blk	507.446	.012086	11/06/03 11:51:24
K_7664	766.491	clp_std1	blk	29.8492	-.011962	11/06/03 11:51:24
La4086	408.672	clp_std6	blk	24.3522	-.011837	11/06/03 11:51:24
Li6707	670.784	clp_std1	blk	3.00467	-.000455	11/06/03 11:51:24
Mg2790	279.078	clp_std1	blk	474.535	.004983	11/06/03 11:51:24
Mn2576	257.610	clp_std3	blk	25.9870	-.000803	11/06/03 11:51:24
Mo2020	202.030	clp_std5	blk	69.0104	.001646	11/06/03 11:51:24
Na5889	588.995	clp_std6	blk	6.99523	.041765	11/06/03 11:51:24
Na3302	330.232	clp_std1	blk	4048.96	1.05776	11/06/03 11:51:24
Ni2316	231.604	clp_std2	blk	14.0388	-.001966	11/06/03 11:51:24
P_1782	178.287	clp_std5	blk	312.663	-.028936	11/06/03 11:51:24
2203/1	220.351	clp_std4	blk	24.9085	-.004155	11/06/03 11:51:24
2203/2	220.352	clp_std4	blk	24.0447	.002962	11/06/03 11:51:24
Pd3404	340.458	clp_std6	blk	66.0812	-.000180	11/06/03 11:51:24
S_1820	182.040	clp_std6	blk	300.561	-.006116	11/06/03 11:51:24
Sb2068	206.838	clp_std4	blk	92.5500	-.002142	11/06/03 11:51:24
Sc3613	361.384	blk	dark	1.40518	-.177966	11/06/03 11:51:24
1960/1	196.021	clp_std4	blk	46.7328	.002391	11/06/03 11:51:24
1960/2	196.022	clp_std4	blk	27.0702	-.006007	11/06/03 11:51:24
Si2881	288.158	clp_std5	blk	81.5270	-.111105	11/06/03 11:51:24
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	59.7668	.000875	11/06/03 11:51:24
Sr4215	421.552	clp_std5	blk	6.49288	-.000046	11/06/03 11:51:24
Th2837	283.730	clp_std6	blk	135.913	-.000864	11/06/03 11:51:24
Ti3372	337.280	clp_std5	blk	9.39843	.013538	11/06/03 11:51:24
Tl1908	190.864	clp_std4	blk	356.113	.015511	11/06/03 11:51:24
U_3859	385.958	clp_std6	blk	342.807	-1.37554	11/06/03 11:51:24
V_2924	292.402	clp_std3	blk	139.720	.000687	11/06/03 11:51:24
W_2079	207.910	clp_std6	blk	41.1642	-.002543	11/06/03 11:51:24
Y_3710	371.030	clp_std6	blk	9.75018	.000055	11/06/03 11:51:24
Zn2062	206.200	clp_std3	blk	128.336	.000270	11/06/03 11:51:24
Zr3496	349.621	clp_std6	blk	8.99915	-.001281	11/06/03 11:51:24

Analysis Report QC Standard 11/06/03 12:00:28 PM page 1

Method: DAILY1 Sample Name: icv/ccv Operator:
Run Time: 11/06/03 11:56:00
Comment:
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.99833	10.04	5.000	4.832	10.39	1.068	5.080
SDev	.00095	.04	.015	.018	.09	.005	.010
%RSD	.09530	.3954	.3042	.3800	.8733	.4364	.1928
#1	.99900	10.06	4.989	4.819	10.45	1.064	5.087
#2	.99766	10.01	5.011	4.845	10.32	1.071	5.074
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
Avge	19.60	1.011	4.999	1.942	2.100	9.933	19.49
SDev	.06	.002	.013	.004	.013	.026	.20
%RSD	.3275	.2268	.2540	.2187	.6019	.2593	1.008
#1	19.55	1.009	5.008	1.945	2.109	9.915	19.63
#2	19.64	1.012	4.990	1.939	2.091	9.951	19.35
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
Avge	4.968	5.028	19.90	1.026	5.075	Q45.60	27.88
SDev	.017	.057	.08	.004	.049	.43	.30
%RSD	.3344	1.138	.3791	.4117	.9722	.9380	1.088
#1	4.979	5.068	19.96	1.029	5.040	Q45.90	28.09
#2	4.956	4.988	19.85	1.023	5.109	Q45.30	27.66
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
Avge	4.803	5.131	4.945	5.022	1.045	1.025	1.024
SDev	.008	.006	.003	.003	.019	.012	.001
%RSD	.1624	.1095	.0667	.0581	1.791	1.191	.0670
#1	4.798	5.134	4.948	5.020	1.058	1.033	1.023
#2	4.809	5.127	4.943	5.025	1.032	1.016	1.024
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

Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avge	100.9	5.429	5.446	4.976	4.992	5.435	4.968
SDev	2.9	.023	.029	.019	.001	.027	.016
%RSD	2.884	.4221	.5298	.3860	.0169	.4939	.3251
#1	98.82	5.445	5.467	4.989	4.991	5.454	4.979
#2	102.9	5.412	5.426	4.962	4.992	5.416	4.957
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	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	5.304	Q.7148	4.908	5.342	1.030	5.072	1.006
SDev	.020	.0248	.004	.045	.021	.004	.001
%RSD	.3852	3.469	.0744	.8337	2.080	.0865	.1329
#1	5.318	Q.7323	4.906	5.310	1.045	5.075	1.005
#2	5.290	Q.6973	4.911	5.373	1.015	5.069	1.007
Errors	QC Pass	QC Fail	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	5.026	1.020	4.868
SDev	.004	.000	.000
%RSD	.0801	.0162	.0014
#1	5.029	1.020	4.868
#2	5.023	1.020	4.868
Errors	QC Pass	QC Pass	QC Pass
Value	5.000	1.000	5.000
Range	10.00	10.00	10.00

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	719174	10000	--	--	--	--	--
SDev	20707.62	.0000000	--	--	--	--	--
%RSD	2.879360	.0000000	--	--	--	--	--
#1	704532	10000	--	--	--	--	--
#2	733817	10000	--	--	--	--	--

Analysis Report Blank Sample 11/06/03 12:06:51 PM page 1

Method: DAILY1 Sample Name: icb/ccb Operator:
Run Time: 11/06/03 12:02:25
Comment:
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.00093	.0169	.0016	.0118	H.0070	.0006	.0010
SDev	.00033	.0138	.0005	.0036	.0042	.0006	.0001
%RSD	35.205	81.72	33.00	30.88	60.30	96.03	13.71
#1	.00070	.0267	.0012	.0143	H.0100	.0010	.0011
#2	.00117	.0072	.0020	.0092	.0040	.0002	.0009
Errors	LC Pass	LC Pass	LC Pass	LC Pass	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
Avge	.0137	.0007	.0034	-.0028	.0006	-.0032	.0409
SDev	.0073	.0003	.0021	.0007	.0006	.0041	.0038
%RSD	53.18	48.24	61.65	23.68	113.2	128.3	9.370
#1	.0189	.0009	.0049	-.0024	.0010	-.0003	.0382
#2	.0086	.0004	.0019	-.0033	.0001	-.0061	.0437
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	.0043	.0023	.0165	.0000	H.0096	.0245	H.2745
SDev	.0019	.0014	.0059	.0004	.0036	.0106	.0072
%RSD	43.76	59.60	35.52	889.8	37.31	43.19	2.616
#1	H.0057	.0032	.0207	.0003	H.0121	.0320	H.2694
#2	.0030	.0013	.0124	-.0002	H.0071	.0170	H.2796
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC High	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
Avge	.0007	-.0024	.0027	.0046	.0007	-.0031	.0018
SDev	.0019	.0027	.0045	.0019	.0009	.0012	.0015
%RSD	254.5	111.9	168.0	40.74	141.9	39.72	80.86
#1	.0021	-.0043	.0058	.0059	.0013	-.0023	.0008
#2	-.0006	-.0005	-.0005	.0033	-.0000	-.0040	.0029
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	ppm
Avge	99.18	.0028	.0070	.0051	H.0039	H.0056	H.0062
SDev	1.54	.0033	.0043	.0026	.0027	.0040	.0007
%RSD	1.556	116.8	61.61	52.16	69.28	70.70	12.02
#1	98.09	.0051	.0100	.0069	H.0059	H.0084	H.0067
#2	100.3	.0005	.0039	.0032	.0020	.0028	H.0056
Errors	NOCHECK	NOCHECK	NOCHECK	LC Pass	LC High	LC High	LC High
High				.0100	.0030	.0050	.0050
Low				-.0100	-.0030	-.0050	-.0050

Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0036	.0012	.0030	H.0114	.0226	.0036	.0058
SDev	.0022	.0013	.0016	.0093	.0105	.0022	.0008
%RSD	60.88	108.8	54.35	81.75	46.46	59.36	13.55
#1	H.0052	.0021	.0042	.0048	.0152	H.0052	.0063
#2	.0021	.0003	.0019	H.0180	.0301	.0021	.0052
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
Avge	.0036	.0016	.0034
SDev	.0021	.0004	.0015
%RSD	57.85	25.01	42.38
#1	H.0051	.0019	.0045
#2	.0021	.0013	.0024
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	707092	10000	--	--	--	--	--
SDev	10960.86	.0000000	--	--	--	--	--
%RSD	1.550131	.0000000	--	--	--	--	--
#1	699342	10000	--	--	--	--	--
#2	714843	10000	--	--	--	--	--

010089

Analysis Report 11/06/03 12:11:27 PM page 1

Method: DAILY1 Sample Name: 236555 Operator:
Run Time: 11/06/03 12:07:01
Comment:
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.00071	.1297	-.0172	.1412	.0056	-.0004	-.0060
SDev	.00031	.0031	.0060	.0008	.0001	.0001	.0020
%RSD	43.188	2.399	34.93	.5495	1.155	12.33	33.42
#1	-.00093	.1275	-.0129	.1417	.0056	-.0005	-.0074
#2	-.00050	.1319	-.0214	.1406	.0055	-.0004	-.0046

Elem	Ca3179	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	31.58	.0009	-.0003	-.0006	.0105	.1397	344.6
SDev	.05	.0001	.0015	.0001	.0003	.0016	1.7
%RSD	.1729	6.139	502.8	14.58	2.418	1.181	.4818
#1	31.54	.0008	.0007	-.0005	.0107	.1408	343.4
#2	31.62	.0009	-.0013	-.0006	.0103	.1385	345.8

Elem	La4086	Li6707	Mg2790	Mn2576	Mo2020	Na5889	Na3302
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0034	.0028	284.6	.0047	.0189	S-50.18	3846.
SDev	.0002	.0002	.5	.0000	.0005	1.56	24.
%RSD	4.682	7.888	.1742	.5120	2.507	3.103	.6153
#1	.0033	.0029	284.2	.0047	.0186	S-49.08	3862.
#2	.0035	.0026	284.9	.0047	.0193	S-51.28	3829.

Elem	Ni2316	P_1782	2203/1	2203/2	Pd3404	S_1820	Sb2068
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0059	101.7	.0014	.0160	-.0036	512.4	.0021
SDev	.0002	.8	.0144	.0077	.0053	2.0	.0002
%RSD	2.977	.7973	1012.	48.42	147.4	.3968	10.15
#1	.0057	102.3	.0116	.0105	.0002	510.9	.0019
#2	.0060	101.1	-.0088	.0214	-.0074	513.8	.0022

Elem	Sc3613	1960/1	1960/2	Si2881	Pb220	Se196	Sn1899
Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avge	90.02	.0413	.0268	3.180	.0111	.0316	.0605
SDev	.10	.0114	.0094	.000	.0003	.0025	.0036
%RSD	.1069	27.62	35.22	.0009	3.048	7.868	5.888
#1	90.09	.0493	.0201	3.180	.0109	.0298	.0630
#2	89.95	.0332	.0334	3.180	.0114	.0333	.0579

Elem	Sr4215	Th2837	Ti3372	Tl1908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0176	-.0026	.0021	-.0880	-.3254	.0025	.0052
SDev	.0000	.0018	.0003	.0023	.0113	.0003	.0024
%RSD	.0626	69.78	15.80	2.563	3.466	12.18	45.72
#1	.0176	-.0038	.0023	-.0896	-.3334	.0027	.0069
#2	.0176	-.0013	.0019	-.0864	-.3174	.0022	.0035

Elem	Y_3710	Zn2062	Zr3496
Units	ppm	ppm	ppm
Avge	.0001	1.418	.0075
SDev	.0001	.001	.0019
%RSD	106.8	.0776	25.21
#1	.0002	1.417	.0088
#2	.0000	1.419	.0062

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	641810	10000	--	--	--	--	--
SDev	685.8936	.0000000	--	--	--	--	--
%RSD	.1068686	.0000000	--	--	--	--	--
#1	642295	10000	--	--	--	--	--
#2	641325	10000	--	--	--	--	--

Analysis Report QC Standard 11/06/03 12:20:09 PM page 1

Method: DAILY1 Sample Name: icv/ccv Operator:
Run Time: 11/06/03 12:15:25
Comment:
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	1.0067	10.01	5.098	4.879	10.26	1.000	5.090
SDev	.0054	.07	.003	.045	.06	.001	.027
%RSD	.53491	.7347	.0592	.9213	.5893	.0955	.5262
#1	1.0029	9.956	5.096	4.847	10.22	1.087	5.071
#2	1.0105	10.06	5.100	4.911	10.31	1.089	5.109
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
Avge	20.19	1.038	5.106	1.988	2.087	10.13	19.33
SDev	.00	.000	.012	.005	.013	.03	.17
%RSD	.0214	.0437	.2322	.2454	.6298	.3044	.8832
#1	20.18	1.038	5.097	1.984	2.078	10.11	19.21
#2	20.19	1.038	5.114	1.991	2.096	10.16	19.45
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
Avge	4.906	4.984	20.13	1.046	5.151	Q45.39	28.00
SDev	.018	.034	.06	.002	.027	.16	.16
%RSD	.3716	.6917	.3077	.2049	.5276	.3509	.5872
#1	4.893	4.960	20.08	1.044	5.131	Q45.28	28.12
#2	4.919	5.008	20.17	1.047	5.170	Q45.50	27.89
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
Avge	4.909	5.124	5.041	5.121	1.017	Q1.119	1.026
SDev	.005	.006	.037	.036	.007	.055	.003
%RSD	.1062	.1153	.7404	.6960	.6751	4.931	.2849
#1	4.905	5.120	5.015	5.096	1.012	Q1.158	1.028
#2	4.913	5.128	5.068	5.146	1.022	1.080	1.024
Errors	QC Pass	QC Pass	NOCHECK	NOCHECK	QC Pass	QC Fail	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

IntStd	1	2	3	4	5	6	7
Mode	*Counts	Time	NOTUSED	NOTUSED	NOTUSED	NOTUSED	NOTUSED
Elem	Sc	--	--	--	--	--	--
Wavlen	361.384	--	--	--	--	--	--
Avge	734436	10000	--	--	--	--	--
SDev	444.7702	.0000000	--	--	--	--	--
%RSD	.0605595	.0000000	--	--	--	--	--
#1	734121	10000	--	--	--	--	--
#2	734750	10000	--	--	--	--	--

Analysis Report Blank Sample 11/06/03 12:27:07 PM page 1

Method: DAILY1 Sample Name: icb/ccb Operator:
Run Time: 11/06/03 12:22:19
Comment:
Mode: CONC Corr. Factor: 1

Elem	Ag3280	Al3082	As1890	B_2496	Ba4934	Be3130	Bi2230
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.00028	.0162	-.0003	.0094	.0044	.0002	.0025
SDev	.00019	.0085	.0007	.0029	.0026	.0007	.0021
%RSD	69.311	52.33	216.0	30.45	59.28	319.7	82.34
#1	.00042	.0222	.0002	.0115	H.0063	.0007	.0040
#2	.00014	.0102	-.0009	.0074	.0026	-.0003	.0011
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
Avge	.0079	.0003	.0020	-.0033	.0006	-.0113	.0319
SDev	.0053	.0003	.0014	.0007	.0007	.0029	.0122
%RSD	66.93	116.1	67.17	20.40	108.9	25.69	38.28
#1	.0116	.0005	.0030	-.0028	.0011	-.0093	.0406
#2	.0042	.0000	.0011	-.0038	.0001	-.0134	.0233
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	.0027	.0015	.0087	-.0002	H.0075	.0193	H.1941
SDev	.0011	.0008	.0043	.0003	.0021	.0085	.0950
%RSD	39.84	56.44	48.92	142.2	27.77	43.77	48.93
#1	.0034	.0021	.0118	.0000	H.0090	.0253	H.2612
#2	.0019	.0009	.0057	-.0004	H.0060	.0134	H.1269
Errors	LC Pass	LC Pass	LC Pass	LC Pass	LC High	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
Avge	-.0007	H.0149	.0016	.0028	.0001	H.0140	-.0000
SDev	.0009	.0052	.0001	.0007	.0019	.0092	.0007
%RSD	133.0	34.79	7.259	26.11	3665.	66.02	4636.
#1	-.0000	H.0112	.0017	.0033	.0014	.0075	.0005
#2	-.0013	H.0186	.0015	.0023	-.0013	H.0205	-.0005
Errors	LC Pass	LC High	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

Units	%R	ppm	ppm	ppm	ppm	ppm	ppm
Avge	99.51	.0057	.0009	.0015	.0024	.0025	.0037
SDev	.24	.0012	.0061	.0004	.0005	.0044	.0039
%RSD	.2449	20.18	680.3	29.52	21.88	176.5	107.8
#1	99.33	.0065	.0052	.0019	.0020	H.0057	H.0064
#2	99.68	.0049	-.0034	.0012	.0020	-.0006	.0009
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	T11908	U_3859	V_2924	W_2079
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0023	-.0001	.0017	.0015	.0272	.0025	.0068
SDev	.0013	.0010	.0015	.0120	.0016	.0014	.0003
%RSD	58.96	1025.	88.82	806.0	5.831	55.90	4.568
#1	.0032	.0006	.0027	.0100	.0261	.0035	.0066
#2	.0013	-.0008	.0006	-.0070	.0283	.0015	.0070
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	.0022	.0006	.0020
SDev	.0013	.0005	.0015
%RSD	59.28	82.45	72.01
#1	.0031	.0010	.0031
#2	.0013	.0003	.0010
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	709354	10000	--	--	--	--	--
SDev	1781.909	.0000000	--	--	--	--	--
%RSD	.2512017	.0000000	--	--	--	--	--
#1	708094	10000	--	--	--	--	--
#2	710614	10000	--	--	--	--	--

SOUTHWEST RESEARCH INSTITUTE
NUCLEAR PROJECT
CLIENT: Div. 20
TASK ORDER: 031021-4
SRR: 25126
SDG: 236555
CASE: CNWRA
VTSR: October 21, 2003
PROJECT#: 06002.01.081

PREPARATION SHEETS

TRACE METALS PREPARATORY LABORATORY DIGESTION LOG

SOUTHWEST RESEARCH INSTITUTE
SAN ANTONIO, TEXAS 78228

BOOK / PAGE: 54 273

CLIENT(S): DIV 20 cont'd from pg 260 BK 54
TASK ORDER(S): 031021-4 SDG(S): 236555 010097
PROJECT NO(S): 06002.01.081
METHOD: 3005A ___ 3050B ___ 3050B-7.5 ___ 3010A ___ 3020A ___ 7760A ___ 7740A ___ $HClO_4$ ___ H_2SO_4 Sb ___
Microwave ___ Fusion ___ Teflon ___ Rock ___ OTHER df 5 dilutions
MATRIX: Water ___ Soil ___ Biota ___ Solid ___ Liquid ✓ TCLP Ext ___ OTHER ___
INSTRUMENT: GFAA ___ ICP ✓ ICP-MS ___ IC ___ FLAA ___ HYDRIDE ___ OTHER ___
ACID INORG #: HNO_3# ** HCl# ** H_2SO_4# ___ $HClO_4$# ___ HF# ___
INTERNAL STD: Sc @ 10 PPM ✓ Be @ 10 PPM ___ SOURCE: IV INORG# 4261 EXP: 10/04 AMT: 50mL
Oven/Hotplate ID: ___ Temperature (°C): ___

SAMPLE IDENTIFICATION	pH	WT (g)	I.V. (mL)	F.V. (mL)	
PBW-L04W2			5	5	
LCSW-L04W3 *			5	↓	
236555			1	↓	
↓ 6556			↓	↓	
6557					
6557d					
6558					
↓ 6558S *			↓	↓	
* Spike 50mL Spike1	Spex#	4074	Exp 5/04		
↓ 20mL 4-CAL1	Spex#	4245	Exp 9/04		
↓ 20mL W @ 1Kppm	IV#	4203	Exp 3/04		
↓ 20mL Mo ↓	IV#	3956	Exp 1/04		
** - RUB-02-032-04	1%	HNO_3 / 5%	HCL	Exp 1/04	
PBW and LCSW are prepared w/ 5mLs - **					
df 5 dilutions are prepared as 1mL sample:			4mLs - **		
		11-4-03			
					LOCATION: N/A

PREPARED BY: John Wills DATE: 11-4-03
REVIEWED BY: [signature] DATE: 11.4.03
DISPOSAL INT/DATE/LOC: ___

Trace Metals Reagent Logbook 010098

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 250mL Nalgene	↓	↓	↓
	bottle, add 20mLs HCL inorg# 4291			
↓	F.V. is 200mLs	↓	↓	↓
RLB02-032-02	10 x Sol. As			
	9.5 G L Ascorbic #4272 + 18.75 G KI	10-28-03	10-29-03	BL
	#5758 + 18.75 mL HCL # 4292 to	↓	↓	↓
	100 mL with Reg. water			
RLB-02-032-03	1% HNO_3 / 5% HCL	10-29-03	1-29-04	JW
↓	add 100 mLs Di water to a 250mL Nalgene	↓	↓	↓
	bottle, add 2.5mLs HNO_3 inorg # 4295,			
	add 12.5mLs HCL inorg # 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 250mL Nalgene	↓	↓	↓
	bottle, add 2.5mLs HNO_3 inorg # 4296,			
	add 12.5mLs HCL inorg # 4292, F.V. to			
↓	250 mLs with Di water	↓	↓	↓
RLB2-032-05	5% $KMNO_3$	↓	↓	↓
	150 G to 3 L reag. water			
	#3663	11-4-03	11-4-04	BL

BOOK/ PAGE 15 020

010099

SOUTHWEST RESEARCH INSTITUTE®

6220 Culebra Rd
San Antonio, Texas 78228

TJA TRACE ICP DAILY LOG

ANALYST JL DATE 11-4-03

As 189.042 Profile Line As Intensity: 400.24

PEAK POSITION -.048019

VERNIER POSITION 287

AUTOSAMPLER Yes X No

QC PREP DATE:	
CCV/ICV	03V03
CRI	11-4-03
ICSA	
ICSAB	

STDs PREP DATE:	
CLP_STD1_SC	03301
CLP_STD2_SC	03301
CLP_STD3_SC	03301
CLP_STD4_SC	03301
CLP_STD5_SC	03301
CLP_STD6_SC	03329
BLK_SC	03329

COMMENTS	FILE	CLIENT	TO#	PROJECT NO.	METHOD
A031104	DAily32	Div. 18	031028-6	18036.01.107	Daily1 S4 272
A031104A	DAily32	Div. 48	031021-4	06007.01.081	Daily1 S4 273

11-4-03

COMMENTS:

MAINTENANCE:

REVIEWED BY: CArduna DATE: 11/4/03

BOOK/ PAGE 15 024

010100

SOUTHWEST RESEARCH INSTITUTE®

6220 Culebra Rd
San Antonio, Texas 78228

TJA TRACE ICP DAILY LOG

ANALYST DL DATE 11-6-03

As 189.042 Profile Line As Intensity: 410.327

PEAK POSITION .035425
VERNIER POSITION 293
AUTOSAMPLER Yes x No

QC PREP DATE:	
CCV/ICV	03 K03
CRI	
ICSA	DL 11-6-03
ICSAB	

STDs PREP DATE:	
CLP_STD1_SC	03 K05
CLP_STD2_SC	03 K05
CLP_STD3_SC	03 K05
CLP_STD4_SC	03 K05
CLP_STD5_SC	03 501
CLP_STD6_SC	03 K05
BLK_SC	03 529

COMMENTS	FILE	CLIENT	TO#	PROJECT NO.	METHOD
A031106	DAily32	Div 20	031021-4	06002.01.081	DAily1 N/A
A031106A	DAily32	Div 18	031105-5	R9356.01.002	DAily1 54 284
A031106B	DAily32	Div 20	031025-1	06002.01.081	54 285
A031106B3	DAily32	Div 20	031016-9	06002.01.141	54 286
		DL 11-6-03			

COMMENTS:

MAINTENANCE:

REVIEWED BY: CArduña DATE: 11/14/03

ICP Calibration Blank/ICB/CCB Solution

010101

ID: BLK-03302

Date Prepared: 9-2-03 Prepared By: [signature]

Make up as needed in 1000ml volumetric flask.

Added ✓ 10 ml HNO3 INORG #: 4197

Added ✓ 50 ml HCL INORG #: 4190

Added ✓ 1000ul of 10000ppm Sc (INORG. VENT.) EXP. Date: 10-1-03 INORG #: 3683

ICP Calibration Blank/ICB/CCB Solution

ID: BLK-03325

Date Prepared: 9-25-03 Prepared By: [signature]

Make up as needed in 1000ml volumetric flask.

Added ✓ 10 ml HNO3 INORG #: 4237

Added ✓ 50 ml HCL INORG #: 4247

Added ✓ 1000ul of 10000ppm Sc (INORG. VENT.) EXP. Date: 10-1-04 INORG #: 4262

ICP Calibration Blank/ICB/CCB Solution

ID: BLK- ~~03331~~ DH 10-1-03 03301

Date Prepared: ~~9-30-03~~ DH 10-1-03 Prepared By: [signature]

Make up as needed in 1000ml volumetric flask.

Added ✓ 10 ml HNO3 INORG #: 4237

Added ✓ 50 ml HCL INORG #: 4249

Added ✓ 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: [signature]

Make up as needed in 1000ml volumetric flask.

Added ✓ 10 ml HNO3 INORG #: 4295

Added ✓ 50 ml HCL INORG #: 4292

Added ✓ 1000ul of 10000ppm Sc (INORG. VENT.) EXP. Date: 10-1-04 INORG #: 4262

ICP ICV/CCV SOLUTION

010102

CCV- 03K03

Date Prepared: 11-3-2003 Prepared By: [signature]

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	4305	1000	10-30-04
Sn	5	5ml	✓	SPEX	4141	1000	6-30-04
Bi	5	5ml	✓	SPEX	4134	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

010103

ICP Calibration Standards

Date Prepared: ~~9-30-03~~ 10-1-03 Prepared By: DH

HNO3 INORG #: 4237 HCl INORG #: 4249

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
DH 9-30-03 10-1-03	STD1- 03501	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
DH 9-30-03 10-1-03	STD2- 03501	Ba	10	5.00	✓	INORVENT	3931	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
DH 9-30-03 10-1-03	STD3- 03501	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
DH 9-30-03 10-1-03	STD4- 03501	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	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
DH 9-30-03 10-1-03	STD5- 03501	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
10-1-03	STD6- 03501	La	10	5.00	✓	INORVENT	4221	1000	9-1-04
		Na	1	0.05	42 ✓	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 Exp. ordered OH
		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: 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

010104

ICP Calibration Standards

Date Prepared: 10-29-03 Prepared By: [signature]

HNO3 INORG #: 4295 HCl INORG #: 4292

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	
03329 10-29-03	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	3995	1000	3-1-04
		SC	10	0.500	✓	INORVENT	4262	10000	10-1-04

DA 10-29-03

Expiration Dates:

STD1: **STD4:**

STD2: **STD5:**

STD3: **STD6:** 11-1-03

ICP Calibration Standards

010105

Date Prepared: 11-5-03 Prepared By: JD

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- 03LC5 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- 03LC5	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	4318	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- 03LC5	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- 03LC5	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- 03LC5	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: 031021-4
SRR: 25126
SDG: 236555
CASE: CNWRA
VTSR: October 21, 2003
PROJECT#: 06002.01.081

Certificates of Analysis

010106

FISHER SCIENTIFIC
TRACEMETAL GRADE NITRIC ACID

CERTIFICATE OF ANALYSIS

Catalog No. A509

Lot No: 1103070
Release Date: July, 2003
Expiry Date: July, 2006

Tests	Units	Value
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

Fisher Chemical
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INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 10/10/03
DATE EXPIRED: 10/10/2013
DATE OPENED: 10/13/03
INORG: 4995-4300 PO: F52242

FISHER SCIENTIFIC
TRACEMETAL GRADE NITRIC ACID

CERTIFICATE OF ANALYSIS

Catalog No. A509 **Lot No: 1103050**
Date: May, 2003

Tests	Units	Value
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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INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 09/19/03
DATE EXPIRED: 09/19/2013
DATE OPENED: 09/19/03
INORG: 4935-4940 PO: F52225

010108

FISHER SCIENTIFIC
TRACEMETAL GRADE HYDROCHLORIC ACID

CERTIFICATE OF ANALYSIS

Catalog No. A508 **Lot No: 4103030**
Date: March, 2003

Tests	Units	Value
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
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INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 10/10/03
DATE EXPIRED: 10/10/2013
DATE OPENED: 10/13/03
INORG: 4289-4294 PO: F52212

FISHER SCIENTIFIC
TRACEMETAL GRADE HYDROCHLORIC ACID

CERTIFICATE OF ANALYSIS

Catalog No. A508 **Lot No: 4102110**
Date: December, 2002

Tests	Units	Value
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

Fisher Chemical
A Fisher Scientific Company

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 09/10/03
DATE EXPIRED: 09/10/2013
DATE OPENED: 09/17/03
INORG: 4947-4952 PO: F52088

SPEXertificate™

Certificate of Reference Material

010110

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 05/15/03
DATE EXPIRED: 05/15/2004
DATE OPENED: 05/15/03
INORG: 4074 PO: F52351

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. Kocherlakota

010111

SPEXertificate™

Certificate of Reference Material

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 09/5/03
DATE EXPIRED: 09/15/2004
DATE OPENED: 09/16/03
INORG: 4945 PO: E5228

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. Kocherlakota

inorganic ventures / iv labs

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010112

certificate of analysis

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

2.0 **DESCRIPTION OF CRM** Custom-Grade **1000 µg/mL Tungsten in 1% (abs) HNO_3/1% (abs) HF**

Catalog Number:	CGW1-1 and CGW1-5
Lot Number:	**W-W01080**
Starting Material:	W Powder
Starting Material Purity (%):	99.990703
Starting Material Lot No	21418,C31H46,D02J21,E03K06,D11F29
Matrix:	1% (abs) HNO_3/1% (abs) HF

INORGANIC LABS/RADCHEM LABS Pg. 1 of 2
DATE RECEIVED: 07/31/03
DATE EXPIRED: 08/01/2004
DATE OPENED: 08/01/03
INORG: 4203 PO: E52383

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:

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

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

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

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

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

☐ This 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.

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

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

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

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

O Al 0.01792	M Dy < 0.00595	O Li < 0.00008	M Pr < 0.00030	M Te < 0.02974
M Sb < 0.00050	M Er < 0.00496	M Lu < 0.00040	i Re	M Tb < 0.00030
M As < 0.00991	M Eu < 0.00297	O Mg 0.00120	M Rh < 0.00099	M Tl < 0.00099
M Ba < 0.00991	M Gd < 0.00099	M Mn < 0.00397	M Rb < 0.00099	M Th < 0.00099
M Be < 0.00050	M Ga < 0.00099	O Hg < 0.04778	M Ru < 0.00198	M Tm < 0.00040
M Bi < 0.00040	M Ge < 0.00595	M Mo 0.00050	M Sm < 0.00099	M Sn < 0.00496
O B < 1.19460	M Au < 0.00297	M Nd < 0.00198	O Sc < 0.00036	M Ti 0.00198
M Cd < 0.00297	M Hf < 0.00198	M Ni < 0.00793	M Se < 0.00793	S W
O Ca 0.00080	M Ho < 0.00050	O Nb < 0.06371	O Si < 0.01354	M U < 0.00198
M Ce < 0.00496	M In < 0.00991	n Os	M Ag < 0.00198	M V < 0.00198
M Cs < 0.00030	M Ir < 0.00496	M Pd < 0.00496	O Na 0.04778	M Yb < 0.00099
M Cr < 0.00496	O Fe < 0.03982	n P	M Sr < 0.00050	M Y < 0.03965
M Co < 0.00297	M La < 0.00050	M Pt < 0.00198	n S	M Zn < 0.01983
M Cu < 0.00595	M Pb 0.00060	O K 0.03146	O Ta < 0.39820	M 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 ± 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 - 183.85; +6; 6,7,8,9 WOF_4^{+2} (chemical form as received)

Chemical Compatibility - W is very readily hydrolyzed requiring 0.1 to 1% HF solutions for stable acidic solutions. The WOF_4^{+2} is soluble in % levels of HCl and HNO_3 provided it is in the WOF_4^{+2} 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 WO_3 precipitate if mixed with other transition elements at higher levels indicating instability. The yellow WO_3 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 WOF_4^{+2} for months in 1% HNO_3 / LDPE container. 1-10,000 ppm single element solutions as the WOF_4^{+2} chemically stable for years in 1% HF in an LDPE container.

W Containing Samples (Preparation and Solution) - Metal (Soluble in HF / HNO_3); Oxide (Soluble in HF or NH_4OH) ; 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 ≤ppm conc.)
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+	$^{166}Er^{16}O$

HF Note: This standard should not be prepared or stored in glass.

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

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001:2000 Quality Management System Registration - QMI Certificate Number 010105
Recognized by:
Registrar Accreditation Board (ANSI-RAB)
Standards Council of Canada (SCC)
Dutch Council for Accreditation (RVA)
Entidad Mexicana de Acreditacion, a.c.(EMA)
Members of IQ Net International Certification Network:
Argentina (IRAM), Australia (QAS), Austria (ÖQS), Belgium (Avinter) , Brazil (FCAV), Canada (QMI), Hong Kong (HKQAA), Columbia (ICONTEC), Czech Republic (CQS), Denmark (DS), Finland (SFS), France (AFAQ), Germany (DQS), Greece (ELOT), Hungary (MSZT), Ireland (NSAI), Israel (SII), Italy (CISQ), Japan (JQA), Korea (KSA-QA), Netherlands (KEMA), Norway (NCS), Poland(PCBC), Portugal (APCER), Singapore (PSB), Slovenia (SIQ), Spain (AENOR), Switzerland (SQS)

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

10.3 ISO/IEC Guide 34 - 2000 "General Requirements for the Competence of Reference Material Producers" - Reference Materials Production - Accredited A2LA Certificate Number 883.02
A2LA Mutual Recognition Agreement Partners:
Australia (NATA), Austria (BmwA), Belgium (BELTEST) (BKO-OBE), Canada (SCC), Chinese Taipei (CNLA), Czech Republic (NAO), Denmark (DANAK), Finland (FINAS), France (COFRAC), Germany (DAR), Hong Kong (HKAS, Ireland (NAB), Italy (SIT) (SINAL), Japan (JAB) (JNLA), Republic of Korea (KOLAS), The Netherlands (RvA), New Zealand (IANZ), Norway (NA), Portugal (IPQ), Singapore (SAC-SINGLAS), Spain (ENAC), Sweden (SWEDAC), Switzerland (SAS), United Kingdom (UKAS) and United States (NVLAP) (ICBO ES)

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

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

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

INORGANIC LABS/RADCHEM LABS Pg. 2 of 2
DATE RECEIVED: 07/31/03
DATE EXPIRED: 08/01/2004
DATE OPENED: 08/01/03
INORG: 4203 PO: F52383

11.0 DATE OF CERTIFICATION AND PERIOD OF VALIDITY

010115

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 1 Dec 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 R Gaines

Certificate of Analysis

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 02/13/03
DATE EXPIRED: 03/01/2004
DATE OPENED: 02/13/03
INORG: 3956 PO: F52060

CUSTOM-GRADE SOLUTION 1000 µg/mL Molybdenum in H_2O tr. NH_4OH

Catalog Number: CGMO1-1, CGMO1-2 and CGMO1-5 010116

Lot Number: **T-MO01130**

Starting Material:	Ammonium Molybdenum Oxide
Starting Material Purity:	99.9943%
Starting Material Lot No:	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:

$$\text{Certified Value } (\bar{x}) = \frac{\sum x_i}{n} \qquad \text{Uncertainty } (\pm) = \frac{2[(\sum s_i)^2]^{1/2}}{(n)^{1/2}}$$

$(\bar{x})$ = 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.

O	Al	<0.050	M	Dy	<0.012	O	Li	<0.010	O	Pr	<0.10	i	Te	
M	Sb	0.0094	M	Er	<0.010	M	Lu	<0.00080	M	Re	<0.0020	M	Tb	<0.00060
M	As	<0.020	M	Eu	<0.0060	O	Mg	<0.050	M	Rh	<0.0020	M	Tl	<0.0020
M	Ba	<0.020	M	Gd	<0.0020	M	Mn	<0.0080	M	Rb	0.025	M	Th	<0.0020
M	Be	<0.0010	M	Ga	<0.0020	i	Hg		M	Ru	<0.0040	M	Tm	<0.00080
M	Bi	<0.00080	M	Ge	<0.012	s	Mo		M	Sm	<0.0020	M	Sn	<0.010
O	B	<0.50	M	Au	<0.0060	O	Nd	<0.050	O	Sc	<0.050	O	Ti	<0.0050
O	Cd	<0.50	M	Hf	<0.0040	M	Ni	<0.016	M	Se	<0.016	M	W	0.056*
O	Ca	0.00026	M	Ho	<0.0010	O	Nb	<0.10	O	Si	<0.10	M	U	<0.0040
O	Ce	<0.050	M	In	0.0024	n	Os		M	Ag	<0.0040	M	V	<0.0040
M	Cs	<0.00060	M	Ir	<0.010	M	Pd	<0.010	O	Na	<0.10	M	Yb	<0.0020
M	Cr	<0.010	O	Fe	<0.50	i	P		M	Sr	<0.0010	M	Y	<0.080
M	Co	<0.0060	M	La	<0.0010	M	Pt	<0.0040	i	S		M	Zn	<0.040
M	Cu	<0.012	M	Pb	< 0.0060	O	K	0.0098	M	Ta	<0.014	M	Zr	<0.010

M - checked by ICP-MS O - 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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Paul R. Haines
Quality Assurance Manager

EXPIRES 1 MAR 2004

inorganic ventures / iv labs

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

certificate of analysis

CUSTOM-GRADE SOLUTION — 1000 µg/mL Scandium IN 5% HNO_3 (abs)

Catalog Number: CGSC1-1and CGSC1-5

Lot Number: **W-SC02055**

Starting Material:	Sc_2O_3
Starting Material Purity:	99.99%
Starting Material Lot No:	632-5721

010117
INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 09/04/03
DATE EXPIRED: 10/01/2004
DATE OPENED: 09/24/03
INORG: 4201 PO: E52232

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:

$$\text{Certified Value } (\bar{x}) = \frac{\sum x_i}{n} \qquad \text{Uncertainty } (\pm) = \frac{2[(\sum s_i)^2]^{1/2}}{(n)^{1/2}}$$

($\bar{x}$) = 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 .

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

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): 1.038 g/mL

QA:KL Rev.031303JTS

Paul R. Haines

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 — 10,000 µg/mL Scandium IN 5% HNO_3 (abs) 010118

Catalog Number: CGSC10-1and CGSC10-5

Lot Number: **T-SC02053**

Starting Material:	Sc_2O_3	
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: E52032

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:

$$\text{Certified Value } (\bar{x}) = \frac{\sum x_i}{n} \qquad \text{Uncertainty } (\pm) = \frac{2[(\sum s_i)^2]^{1/2}}{(n)^{1/2}}$$

($\bar{x}$) = 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 .

O	Al	<0.070	M	Dy	<0.0060	M	Li	<0.010	M	Pr	<0.00030	M	Te	<0.030
M	Sb	<0.00050	M	Er	<0.0050	M	Lu	<0.00040	M	Re	<0.0010	M	Tb	<0.00030
M	As	<0.010	M	Eu	<0.0030	M	Mg	<0.030	M	Rh	<0.0010	M	Tl	<0.0010
M	Ba	<0.010	M	Gd	<0.0010	M	Mn	<0.0040	M	Rb	<0.0010	M	Th	0.028
M	Be	<0.00050	M	Ga	<0.0010	i	Hg		M	Ru	<0.0020	M	Tm	<0.00040
M	Bi	0.043	M	Ge	<0.0060	M	Mo	<0.0020	M	Sm	<0.0010	M	Sn	<0.0050
O	B	<0.034	M	Au	<0.0030	M	Nd	<0.0020	s	Sc		n	Ti	
M	Cd	<0.0030	M	Hf	0.030	O	Ni	<0.084	O	Se	<0.67	M	W	<0.010
O	Ca	0.17	M	Ho	<0.00050	M	Nb	<0.00050	O	Si	<0.034	M	U	<0.0020
M	Ce	<0.0050	M	In	<0.0010	n	Os		M	Ag	0.0050	M	V	<0.0020
M	Cs	<0.00030	M	Ir	<0.0050	M	Pd	<0.0050	O	Na	<0.16	M	Yb	<0.0010
M	Cr	<0.0050	O	Fe	<0.16	i	P		M	Sr	<0.00050	M	Y	<0.040
M	Co	<0.0030	M	La	<0.00050	M	Pt	<0.0020	n	S		M	Zn	0.075
M	Cu	<0.0060	M	Pb	0.0050	O	K	<5.01	M	Ta	<0.0070	M	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.021203DN

Paul R. Haines
Quality Assurance Manager

Expires:

EXPIRES
01/2004

SPEXertificate™

010119

Certificate of Reference Material

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 relevent to the certified properties listed below.

Certified Value: 999.5 mg/L

Uncertainty Associated with Measurement: +/-3.0mg/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 +/-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. Kocherlakota

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 06/20/03
DATE EXPIRED: 06/30/2004
DATE OPENED: 06/23/03
INORG: 4139 PO: F52370

SPEXertificate™ 010120

Certificate of Reference Material

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 relevent 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. Kocherlakota

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 05/12/03
DATE EXPIRED: 05/15/2004
DATE OPENED: 05/12/03
INORG: 4066 PO: F52181

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010121

Certificate of Reference Material

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 relevent 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 $MoO_2(C_9H_6NO)_2$

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. Kocherlakota

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 12/3/03
DATE EXPIRED: 12/31/2004 DK
DATE OPENED: 11/3/03
INORG: 4307 PO: F52261

SPEXertificate™

010122

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 relevent to the certified properties listed below.

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

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010123

Certificate of Reference Material

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 09/05/03
DATE EXPIRED: 08/30/2004
DATE OPENED: 09/05/03
INORG: 4232 PO: F5225

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 relevent 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. Kocherlakota

SPEXertificate™

Certificate of Reference Material

010124

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 09/05/03
DATE EXPIRED: 08/30/2004
DATE OPENED: 09/05/03
INORG: 4934 PO: F50005

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 relevent to the certified properties listed below.

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

The CRM is prepared gravimetrically using high purity (NH4)2TiF6 Lot# 02021E. The certified value listed is the average of values obtained by classical wet assay and ICP spectrometer analysis

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 1003 mg/L

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

Instrumentation Analysis By ICP spectrometer: 999 mg/L

Uncertified Properties:

Density: 1.001 @ 22.5 Degrees Celsius

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

Element	mg/L	Element	mg/L	Element	mg/L
Al	0.006	Cu	<0.10	Pb	<0.001
As	<0.001	Fe	<0.01	Rb	<0.001
Ag	<0.001	Ga	<0.001	Re	<0.001
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. Kocherlakota

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 10/31/03
DATE EXPIRED: 10/31/2004
DATE OPENED: 11/3/03
INORS: 4348 PO: P50961

SPEXertificate™

010125

Certificate of Reference Material

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 relevent to the certified properties listed below.

Certified Value: 1002.5 mg/L

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

Certified Value is Traceable to: NIST SRM 3153a

The CRM is prepared gravimetrically using high purity Strontium Carbonate Lot# 02001B. The certified value listed is the average of values obtained by classical wet assay and ICP spectrometer analysis

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 1002 mg/L

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

Instrumentation Analysis By ICP spectrometer: 1003 mg/L

Uncertified Properties:

Density: 1.010 @ 22.7 Degrees Celsius

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

Element	mg/L	Element	mg/L	Element	mg/L
Al	0.02	Cu	<0.001	Pb	<0.001
As	<0.001	Fe	0.001	Rb	<0.001
Ag	<0.002	Ga	<0.001	Re	<0.001
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. Kocherlakota

SPEXertificate™

010126

Certificate of Reference Material

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 relevent 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. Kocherlakota

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 06/20/03
DATE EXPIRED: 06/30/2004
DATE OPENED: 06/23/03
INORG: 4141 PO: F52370

SPEXertificate™ 010127

Certificate of Reference Material

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 relevent 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. Kocherlakota

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 06/20/03
DATE EXPIRED: 06/30/2004
DATE OPENED: 09/23/03
INORG: 4138 PO: F52370

SPEXertificate™

010128

Certificate of Reference Material

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 relevent 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. Kocherlakota

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010129

Certificate of Reference Material

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 relevent to the certified properties listed below.

Certified Value: 1001.5 mg/L

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

Certified Value is Traceable to: NIST SRM 3167a.

The CRM is prepared gravimetrically using high purity Yttrium Oxide Lot# 08001A. The certified value listed is the average of values obtained by classical wet assay and ICP spectrometer analysis

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 1002 mg/L

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

Instrumentation Analysis By ICP spectrometer: 1001 mg/L

Uncertified Properties:

Density: 1.010 @ 24.8 Degrees Celsius

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

Element	mg/L	Element	mg/L	Element	mg/L
Ce	<0.001	La	<0.001	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

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Certificate of Reference Material

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 01/16/03
DATE EXPIRED: 01/15/2004
DATE OPENED: 01/23/03
INORG: 3928 PO: F52073

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 relevent 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(C4H702N2)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. Kocherlakota

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 06/20/03
DATE EXPIRED: 06/30/2004
DATE OPENED: 06/23/03
INORG: 4140 PO: F52370

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010131

Certificate of Reference Material

Catalog Number: PLS9-2X/2Y/2T **Lot No.** 8-74S
Description: 1000 mg/L Sulfur
Matrix: H2O

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

Certified Value: 1003 mg/L
Uncertainty Associated with Measurement: +/- 3 mg/L
Certified Value is Traceable to: NIST SRM 3154

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

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 1003 mg/L

Method: Precipitation using barium chloride,filter,ignite and weigh as BaS04.

Instrumentation Analysis By ICP spectrometer: 1003 mg/L

Uncertified Properties:

Density: 1.007 @ 23.6 Degrees Celsius

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

Element	mg/L	Element	mg/L	Element	mg/L
Al	<0.001	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. Kocherlakota

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Certificate of Reference Material

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 09/05/03
DATE EXPIRED: 08/30/2004
DATE OPENED: 09/05/03
INORG: 4233 PO: F5225

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 relevent 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 syandardized 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 +/-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. Kocherlakota

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010133

Certificate of Reference Material

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 06/20/03
DATE EXPIRED: 06/30/2004
DATE OPENED: 06/23/03
INORG: HH2 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 relevent 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. Kocherlakota

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010134

Certificate of Reference Material

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 relevent to the certified properties listed below.

Certified Value: 1,000 mg/L

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

Certified Value is Traceable to: NIST SRM 3163

The CRM is prepared gravimetrically using high purity Ammonium Tungstate Lot# 02001H. The certified value listed is the average of values obtained by classical wet assay and ICP spectrometer analysis

Refer to side 2 for details of measurement uncertainties.

Classical Wet Assay: 1000 mg/L

Method: Fume with Sulfuric Acid to dryness. Ignite and weigh as WO3.

Instrumentation Analysis By ICP spectrometer: 1000 mg/L

Uncertified Properties:

Density: 0.9979 @ 23.7 Degrees Celsius

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

Element	mg/L	Element	mg/L	Element	mg/L
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. Kocherlakota

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010135

Certificate of Reference Material

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 relevent 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. Kocherlakota

INORG: 4913 PO: F52918
DATE OPENED: 08/13/03
DATE EXPIRED: 08/15/2004
DATE RECEIVED: 08/11/03

SPEXertificate™ 010136

Certificate of Reference Material

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 relevent 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. Kocherlakota

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 02/13/03
DATE EXPIRED: 02/15/2004
DATE OPENED: 02/13/03
INORG: 3951 PO: E32060

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 11/19/02
DATE EXPIRED: 11/30/2003 DP
DATE OPENED: 11/29/02
INORG: 3973 PO: F52064

SPECertificate™ 010137

Certificate of Reference Material

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.

Date of Certification: NOV -- '02 Certifying Officer: N. Kocherlakota

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 11/19/02
DATE EXPIRED: 11/30/03 DC
DATE OPENED: 11/19/02
INORG: 3224 PO: F52061

SPECertificate™ 010138

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 HNO_3

This **ASSURANCE** ®certified reference material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as 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 ± 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 Sb_2O_4.
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 +/- 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. Kocherlakota

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 11/19/02
DATE EXPIRED: 11/30/03
DATE OPENED: 11/19/02
INORG: 3275 PO: F58964

010139

SPECertificate™

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. Kocherlakota

inorganic ventures / iv labs

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

certificate of analysis

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

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2.0 **DESCRIPTION OF CRM** Custom-Grade **10000 µg/mL Aluminum in 5% (abs) HNO_3**

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) HNO_3

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:

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

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

$\bar{x}$ = mean
x_i = individual results
n = number of measurements
$\sigma_r s$ = 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** **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.

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

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

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

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

S	Al		M	Dy	< 0.02695	O	Li	0.00011	M	Pr	< 0.00135	M	Te	< 0.13473
M	Sb	< 0.00225	M	Er	< 0.02245	M	Lu	< 0.00180	M	Re	< 0.00449	M	Tb	< 0.00135
M	As	< 0.04491	M	Eu	< 0.01347	O	Mg	0.00470	M	Rh	< 0.00449	M	Tl	< 0.00449
M	Ba	< 0.04491	M	Gd	< 0.00449	M	Mn	< 0.01796	M	Rb	< 0.00449	M	Th	< 0.00449
O	Be	< 0.00017	M	Ga	< 0.00449	O	Hg	< 0.00700	M	Ru	< 0.00898	M	Tm	< 0.00180
M	Bi	< 0.00180	M	Ge	< 0.02695	M	Mo	< 0.00898	M	Sm	< 0.00449	M	Sn	< 0.02245
O	B	0.01164	M	Au	< 0.01347	M	Nd	< 0.00898	M	Sc	< 0.04491	M	Ti	< 0.22454
M	Cd	< 0.01347	M	Hf	< 0.00898	O	Ni	< 0.00600	M	Se	< 0.03593	M	W	< 0.04491
O	Ca	0.01903	M	Ho	< 0.00225	M	Nb	< 0.00225	O	Si	0.07389	M	U	< 0.00898
M	Ce	< 0.02245	O	In	< 0.03000	n	Os		M	Ag	< 0.00898	M	V	< 0.00898
M	Cs	< 0.00135	M	Ir	< 0.02245	M	Pd	< 0.02245	O	Na	0.03359	M	Yb	< 0.00449
O	Cr	0.00336	O	Fe	0.00493	O	P	< 0.03000	M	Sr	< 0.00225	M	Y	< 0.17963
M	Co	< 0.01347	M	La	< 0.00225	M	Pt	< 0.00898	O	S	< 0.10000	M	Zn	< 0.08982
M	Cu	< 0.02695	M	Pb	< 0.01347	O	K	0.02911	M	Ta	< 0.03144	M	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 ± 4°C. Do not pipet from container. Do not return portions removed for pipetting to container.

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 26.98154; +3; 6; $Al(H_2O)_6^{3+}$

Chemical Compatibility - Soluble in HCl, HNO_3, HF and H_2SO_4. Avoid neutral media. Soluble in strongly basic NaOH forming the $Al(OH)_4(H_2O)_2^{1-}$ species. Stable with most metals and inorganic anions. The phosphate is insoluble in water and only slightly soluble in acid.

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

Al Containing Samples (Preparation and Solution) - Metal (Best dissolved in HCl / HNO_3); α- Al_2O_3 (Na_2CO_3 fusion in Pt[a]); γ- Al_2O_3 (Soluble in acids such as HCl); Ores (Carbonate fusion in Pt[a] 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 ≤ 1000 ppm concs.)
ICP-OES 394.401 nm	0.05 / 0.006 µg/mL	1	atom	U, Ce
ICP-OES 396.152 nm	0.03 / 0.006 µg/mL	1	atom	Mo, Zr, Ce
ICP-OES 167.078 nm	0.1 / 0.009 µg/mL	1	ion	Fe
ICP-MS 27 amu	30 ppt	n/a	M$^+$	$^{12}C^{15}N^+$, $^{13}C^{14}N^+$, $^{1}H^{13}C^{14}N^+$, $^{11}B^{16}O^+$, $^{54}Cr^{2+}$, $^{54}Fe^{2+}$

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

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001:2000 Quality Management System Registration - QMI Certificate Number *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: 09/01/2003
DATE OPENED: 08/26/03
INORG: 4220 PO: F52224

11.0 DATE OF CERTIFICATION AND PERIOD OF VALIDITY

010143

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 SEP 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 R Gaines

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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 Statisical Principles."*

2.0 DESCRIPTION OF CRM Custom-Grade **10000 µg/mL Calcium in 1.4% (abs) HNO_3**

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) HNO_3

INORGANIC LABS/RADCHEM LABS Pg. 1 of 3
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:

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

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

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

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.

O	Al	0.00064	M	Dy	< 0.02560	O	Li	< 0.00002	M	Pr	< 0.00128	M	Te	< 0.12798
M	Sb	< 0.00213	M	Er	< 0.02133	M	Lu	< 0.00171	M	Re	< 0.00427	M	Tb	< 0.00128
M	As	< 0.04266	M	Eu	< 0.01280	O	Mg	0.07143	M	Rh	< 0.00427	M	Tl	< 0.00427
O	Ba	0.00071	M	Gd	< 0.00427	O	Mn	0.00041	M	Rb	< 0.00427	M	Th	< 0.00427
O	Be	< 0.00009	M	Ga	< 0.00427	O	Hg	< 0.01100	M	Ru	< 0.00853	M	Tm	< 0.00171
M	Bi	< 0.00171	M	Ge	< 0.02560	M	Mo	< 0.00853	M	Sm	< 0.00427	M	Sn	< 0.02133
O	B	< 0.00054	M	Au	< 0.01280	M	Nd	< 0.00853	O	Sc	< 0.00002	M	Ti	< 0.21329
O	Cd	< 0.00450	M	Hf	< 0.00853	O	Ni	< 0.00230	O	Se	< 0.00620	M	W	< 0.04266
S	Ca		M	Ho	< 0.00213	M	Nb	< 0.00213	O	Si	0.00214	M	U	< 0.00853
M	Ce	< 0.02133	O	In	< 0.00200	n	Os		O	Ag	< 0.04000	O	V	< 0.00090
M	Cs	< 0.00128	M	Ir	< 0.02133	M	Pd	< 0.02133	O	Na	0.00571	M	Yb	< 0.00427
O	Cr	0.00238	O	Fe	< 0.00110	O	P	< 0.00480	O	Sr	0.08095	M	Y	< 0.17064
O	Co	< 0.00120	M	La	< 0.00213	M	Pt	< 0.00853	O	S	0.04048	O	Zn	0.07381
O	Cu	0.00405	M	Pb	< 0.01280	O	K	< 0.00170	M	Ta	< 0.02986	M	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

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7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL

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

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 40.078; +2; 6; $Ca(H_2O)_6^{+2}$

Chemical Compatibility - Soluble in HCl and HNO_3. Avoid H_2SO_4, HF, H_3PO_4 and neutral to basic media. Stable with most metals and inorganic anions forming insoluble silicate, carbonate, hydroxide, oxide, fluoride, sulfate, oxalate, chromate, arsenate and tungstate in neutral aqueous media.

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

Ca Containing Samples (Preparation and Solution) - Metal (best dissolved in diluted HNO_3); Ores (Carbonate fusion in Pt* followed by HCl dissolution); Organic Matrices (dry ash and dissolution in dilute HCl. Do not heat when dissolving to avoid precipitation of SiO_2).The oxide, hydroxide, carbonate, phosphate, and fluoride of calcium are soluble in % levels of HCl or HNO_3. The sulfates (gypsum, anhydrite, etc.), certain silicates and complex compounds require fusion with Na_2CO_3 followed by HCl / water dissolution. Contamination is a very real problem when analyzing for trace levels.

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

Technique/Line		Estimated D.L.	Order	Type	Interferences (underlined indicates severe at= concs.)
ICP-OES	393.366 nm	0.0002 / 0.00004 µg/mL	1	ion	U, Ce
ICP-OES	396.847 nm	0.0005 / 0.00006 µg/mL	1	ion	Th
ICP-OES	422.673 nm	0.01 / 0.001 µg/mL	1	atom	Ge
ICP-MS	44 amu	1200 ppt	n/a	M+	$^{16}O_2$, ^{12}C, $^{28}Si^{16}O$, $^{44}Sr^{++}$

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

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001:2000 Quality Management System Registration - QMI Certificate Number 010105
Recognized by:
Registrar Accreditation Board (ANSI-RAB)
Standards Council of Canada (SCC)
Dutch Council for Accreditation (RVA)
Entidad Mexicana de Acreditacion, a.c.(EMA)
Members of IQ Net International Certification Network:
Argentina (IRAM), Australia (QAS), Austria (ÖQS), Belgium (Avinter) , Brazil (FCAV), Canada (QMI), Hong Kong (HKQAA), Columbia (ICONTEC), Czech Republic (CQS), Denmark (DS), Finland (SFS), France (AFAQ), Germany (DQS), Greece (ELOT), Hungary (MSZT), Ireland (NSAI), Israel (SII), Italy (CISQ), Japan (JQA), Korea (KSA-QA), Netherlands (KEMA), Norway (NCS), Poland(PCBC), Portugal (APCER), Singapore (PSB), Slovenia (SIQ), Spain (AENOR), Switzerland (SQS)

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

10.3 ISO/IEC Guide 34 - 2000 "General Requirements for the Competence of Reference Material Producers" - Reference Materials Production - Accredited A2LA Certificate Number 883.02
A2LA Mutual Recognition Agreement Partners:
Australia (NATA), Austria (BmwA), Belgium (BELTEST) (BKO-OBE), Canada (SCC), Chinese Taipei (CNLA), Czech Republic (NAO), Denmark (DANAK), Finland (FINAS), France (COFRAC), Germany (DAR), Hong Kong (HKAS, Ireland (NAB), Italy (SIT) (SINAL), Japan (JAB) (JNLA), Republic of Korea (KOLAS), The Netherlands (RvA), New Zealand (IANZ), Norway (NA), Portugal (IPQ), Singapore (SAC-SINGLAS), Spain (ENAC), Sweden (SWEDAC), Switzerland (SAS), United Kingdom (UKAS) and United States (NVLAP) (ICBO ES)

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

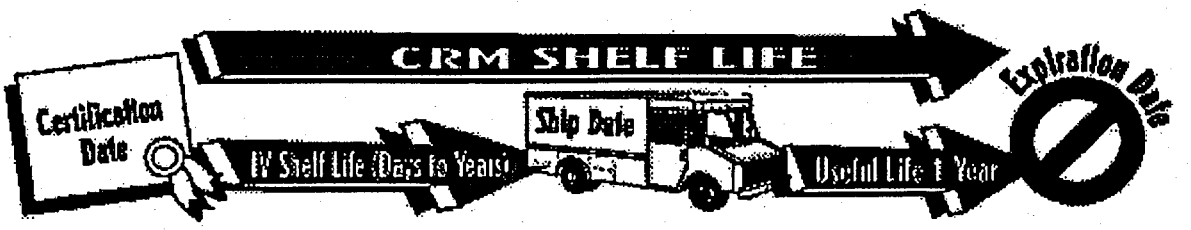
10.5 10CFR21 - Nuclear Regulatory Commission - Reporting Defects and Non-Compliance

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

INORGANIC LABS/RADCHEM LABS Pg. 2 of 3
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

010147



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 1 FEB 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 R Gaines

inorganic ventures / iv labs

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

certificate of analysis

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

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2.0 **DESCRIPTION OF CRM** Custom-Grade **10000 µg/mL Iron in 3.5% (abs) HNO_3**

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) HNO_3

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: E52064

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:

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

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

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

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.

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

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

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

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

O Al < 0.00270	M Dy < 0.02421	O Li < 0.00003	M Pr < 0.00121	M Te < 0.12103
M Sb < 0.00202	M Er < 0.02017	M Lu < 0.00161	M Re < 0.00403	M Tb < 0.00121
M As < 0.04034	M Eu < 0.01210	O Mg < 0.00006	M Rh < 0.00403	M Tl < 0.00403
M Ba < 0.04034	M Gd < 0.00403	O Mn < 0.05000	M Rb < 0.00403	M Th < 0.00403
O Be < 0.00005	M Ga 0.00394	O Hg < 0.01100	M Ru < 0.00807	M Tm < 0.00161
M Bi < 0.00161	i Ge	M Mo < 0.00807	M Sm < 0.00403	M Sn 0.04920
O B < 0.00090	M Au < 0.01210	M Nd < 0.00807	M Sc < 0.04034	M Ti < 0.20172
M Cd < 0.01210	M Hf < 0.00807	O Ni < 0.00230	M Se < 0.03228	M W < 0.04034
O Ca 0.00707	M Ho < 0.00202	M Nb < 0.00202	O Si 0.00781	M U < 0.00807
M Ce < 0.02017	M In < 0.04034	n Os	M Ag < 0.00807	M V < 0.00807
M Cs < 0.00121	M Ir < 0.02017	M Pd < 0.02017	O Na 0.00756	M Yb < 0.00403
M Cr 0.00541	s Fe	i P	M Sr < 0.00202	M Y < 0.16138
O Co < 0.00110	M La < 0.00202	M Pt < 0.00807	O S < 0.07200	M Zn 0.03739
M Cu < 0.02421	M Pb < 0.01210	O K < 0.00170	M Ta < 0.02824	M 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 ± 4° C. Do not pipet from container. Do not return portions removed for pipetting to container.
Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 55.847; +3; 6; $Fe(H_2O)_6^{3+}$
Chemical Compatibility - Stable in HCl, HNO_3, H_2SO_4, HF and H_3PO_4. Avoid basic media. Stable with most metals and inorganic anions in acidic media.
Stability - 2-100 ppb levels stable for months in 1% HNO_3 / LDPE container. 1-10,000 ppm solutions chemically stable for years in 1-5% HNO_3 / LDPE container.
Fe Containing Samples (Preparation and Solution) - Metal (Soluble in HCl); Oxides (If the oxide has been at a high temperature then Na_2CO_3 fusion in Pt^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 ≈ concs.)
ICP-OES	238.204 nm	0.005 / 0.001 µg/mL	1	ion	Ru, Co
ICP-OES	239.562 nm	0.005 / 0.001 µg/mL	1	ion	Co, W, Cr
ICP-OES	259.940 nm	0.006 / 0.001 µg/mL	1	ion	Hf, Nb
ICP-MS	56 amu	970 ppt	n/a	M^+	$^{40}Ar^{15}N^1H$, $^{40}Ar^{16}O$, $^{36}Ar^{17}O^1H$, $^{38}Ar^{18}O$, $^{37}Cl^{18}O^1H$, $^{40}Ca^{16}O$

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

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001:2000 Quality Management System Registration - QMI Certificate Number 010105
Recognized by:
Registrar Accreditation Board (ANSI-RAB)
Standards Council of Canada (SCC)
Dutch Council for Accreditation (RVA)
Entidad Mexicana de Acreditacion, a.c.(EMA)
Members of IQ Net International Certification Network:
Argentina (IRAM), Australia (QAS), Austria (ÖQS), Belgium (Avinter) , Brazil (FCAV), Canada (QMI), Hong Kong (HKQAA), Columbia (ICONTEC), Czech Republic (CQS), Denmark (DS), Finland (SFS), France (AFAQ), Germany (DQS), Greece (ELOT), Hungary (MSZT), Ireland (NSAI), Israel (SII), Italy (CISQ), Japan (JQA), Korea (KSA-QA), Netherlands (KEMA), Norway (NCS), Poland(PCBC), Portugal (APCER), Singapore (PSB), Slovenia (SIQ), Spain (AENOR), Switzerland (SQS)

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

10.3 ISO/IEC Guide 34 - 2000 "General Requirements for the Competence of Reference Material Producers" - Reference Materials Production - Accredited A2LA Certificate Number 883.02
A2LA Mutual Recognition Agreement Partners:
Australia (NATA), Austria (BmwA), Belgium (BELTEST) (BKO-OBE), Canada (SCC), Chinese Taipei (CNLA), Czech Republic (NAO), Denmark (DANAK), Finland (FINAS), France (COFRAC), Germany (DAR), Hong Kong (HKAS, Ireland (NAB), Italy (SIT) (SINAL), Japan (JAB) (JNLA), Republic of Korea (KOLAS), The Netherlands (RvA), New Zealand (IANZ), Norway (NA), Portugal (IPQ), Singapore (SAC-SINGLAS), Spain (ENAC), Sweden (SWEDAC), Switzerland (SAS), United Kingdom (UKAS) and United States (NVLAP) (ICBO ES)

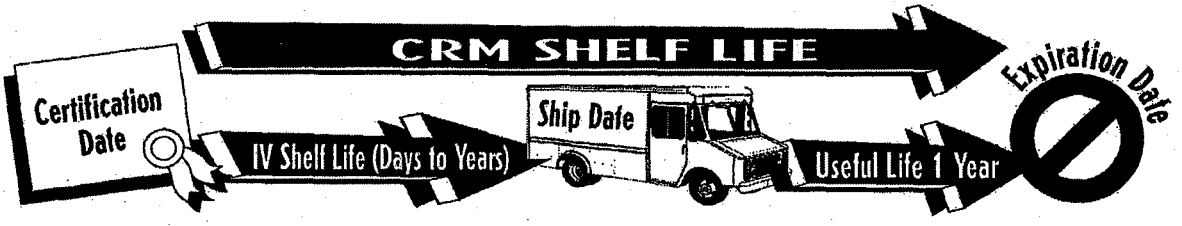
10.4 10CFR50 Appendix B - Nuclear Regulatory Commission - Domestic Licensing of Production and Utilization Facilities

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

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

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: F52004

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 1 MAR 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

Certificate of Analysis

CUSTOM-GRADE SOLUTION — 10,000 µg/mL Potassium in 1.4% HNO_3 (abs)

Catalog Number: CGK10-1and CGK10-5

010152

Lot Number: **T-K02102**

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 10/22/02
DATE EXPIRED: 11/01/2003
DATE OPENED: 10/23/02
INORG: 3738 PO: F52057

Starting Material:	Potassium Nitrate
Starting Material Purity:	99.996%
Starting Material Lot No:	K18J19

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:

Certified Value $(\bar{x}) = \frac{\sum x_i}{n}$ Uncertainty $(\pm) = \frac{2[(\sum s_i)^2]^{1/2}}{(n)^{1/2}}$

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

O	Al	<0.00090	M	Dy	<0.0060	O	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	O	Mg	0.00015	M	Rh	<0.0010	M	Tl	<0.0010
M	Ba	<0.010	M	Gd	<0.0010	O	Mn	<0.000030	M	Rb	0.50	M	Th	<0.0010
O	Be	<0.00020	M	Ga	<0.0010	O	Hg	<0.015	M	Ru	<0.0020	M	Tm	<0.00040
M	Bi	<0.00040	O	Ge	<0.0015	M	Mo	<0.0020	M	Sm	<0.0010	M	Sn	<0.0050
O	B	<0.00060	O	Au	<0.0030	M	Nd	<0.0020	O	Sc	<0.000020	O	Ti	<0.00070
M	Cd	<0.0030	M	Hf	<0.0020	O	Ni	<0.0023	O	Se	<0.05	M	W	<0.0010
O	Ca	0.0016	M	Ho	<0.00050	M	Nb	<0.00050	O	Si	0.0025	M	U	<0.0020
M	Ce	<0.0050	M	In	<0.0010	n	Os		M	Ag	<0.0020	O	V	<0.00090
M	Cs	<0.00030	M	Ir	<0.0050	M	Pd	<0.0050	O	Na	0.61	M	Yb	<0.0010
M	Cr	<0.0050	O	Fe	0.0024	O	P	<0.0025	M	Sr	<0.00050	M	Y	<0.040
M	Co	<0.0030	M	La	<0.00050	M	Pt	<0.0020	O	S	0.021	O	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 O - checked by ICP-OES i - spectral interference n - not checked for s - solution standard element

ANALYZED DENSITY OF SOLUTION (measured at 22°C): 1.023 g/mL

(over)

QA:KL Rev.032702DN

Paul F. Haines
Quality Assurance Manager

Inorganic Ventures, Inc.
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Orders: 800-669-6799 • FAX (732) 901-1903
Technical Support: 800-569-6799

EXPIRES 1 NOV 2003

010153

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 Statisical Principles."*

2.0 **DESCRIPTION OF CRM** Custom-Grade **10000 µg/mL Magnesium in 1.4% (abs) HNO_3**

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) HNO_3

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:

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

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

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

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.

O	Al	0.02454	M	Dy	< 0.02455	O	Li	0.00797	M	Pr	< 0.00123	M	Te	< 0.12275
M	Sb	0.00306	M	Er	< 0.02046	M	Lu	< 0.00164	M	Re	< 0.00409	M	Tb	< 0.00123
M	As	< 0.04092	M	Eu	< 0.01228	S	Mg		M	Rh	< 0.00409	M	Tl	< 0.00409
M	Ba	< 0.04092	M	Gd	< 0.00409	M	Mn	< 0.01637	M	Rb	< 0.00409	M	Th	< 0.00409
O	Be	< 0.00017	M	Ga	< 0.00409	O	Hg	< 0.00900	M	Ru	< 0.00818	M	Tm	< 0.00164
M	Bi	< 0.00164	M	Ge	< 0.02455	M	Mo	< 0.00818	M	Sm	< 0.00409	M	Sn	< 0.02046
O	B	0.00871	M	Au	< 0.01228	M	Nd	< 0.00818	M	Sc	< 0.04092	O	Ti	0.10206
M	Cd	< 0.01228	M	Hf	< 0.00818	O	Ni	0.01404	M	Se	< 0.03273	M	W	< 0.04092
O	Ca	0.01070	M	Ho	< 0.00205	M	Nb	< 0.00205	O	Si	0.03186	M	U	< 0.00818
M	Ce	< 0.02046	M	In	< 0.04092	n	Os		M	Ag	< 0.00818	M	V	< 0.00818
M	Cs	< 0.00123	M	Ir	< 0.02046	M	Pd	< 0.02046	O	Na	0.01817	M	Yb	< 0.00409
O	Cr	0.02315	O	Fe	0.02467	O	P	< 0.01600	M	Sr	< 0.00205	M	Y	< 0.16367
M	Co	< 0.01228	M	La	< 0.00205	M	Pt	< 0.00818	n	S		O	Zn	0.01892
O	Cu	0.00672	O	Pb	0.03236	O	K	< 0.05000	M	Ta	< 0.02864	M	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

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

Atomic Weight; Valence; Coordination Number; Chemical Form in Solution - 24.305; +2; 6; $Mg(H_2O)_6^{+2}$

Chemical Compatibility - Soluble in HCl, HNO_3, and H_2SO_4 avoid HF, H_3PO_4 and neutral to basic media. Stable with most metals and inorganic anions forming insoluble silicates, carbonates, hydroxides, oxides, and tungstates in neutral and slightly acidic media.

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

Mg Containing Samples (Preparation and Solution) - Metal (Best dissolved in diluted HNO_3); Oxide (Readily soluble in above compatible aqueous acidic solutions); Ores (Carbonate fusion in Pt^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 µg/mL	1	ion	Th
ICP-OES	280.270 nm	0.0003 / 0.00005 µg/mL	1	ion	U, V
ICP-OES	285.213 nm	0.002 / 0.00003 µg/mL	1	atom	U, Hf, Cr, Zr
ICP-MS	24 amu	42 ppt	n/a	M+	$^{7}Li^{16}O$, $^{48}Ti^{+2}$, $^{48}Ca^{+2}$

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

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001:2000 Quality Management System Registration - QMI Certificate Number 010105
Recognized by:
Registrar Accreditation Board (ANSI-RAB)
Standards Council of Canada (SCC)
Dutch Council for Accreditation (RVA)
Entidad Mexicana de Acreditacion, a.c.(EMA)
Members of IQ Net International Certification Network:
Argentina (IRAM), Australia (QAS), Austria (ÖQS), Belgium (Avinter) , Brazil (FCAV), Canada (QMI), Hong Kong (HKQAA), Columbia (ICONTEC), Czech Republic (CQS), Denmark (DS), Finland (SFS), France (AFAQ), Germany (DQS), Greece (ELOT), Hungary (MSZT), Ireland (NSAI), Israel (SII), Italy (CISQ), Japan (JQA), Korea (KSA-QA), Netherlands (KEMA), Norway (NCS), Poland(PCBC), Portugal (APCER), Singapore (PSB), Slovenia (SIQ), Spain (AENOR), Switzerland (SQS)

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

10.3 ISO/IEC Guide 34 - 2000 "General Requirements for the Competence of Reference Material Producers" - Reference Materials Production - Accredited A2LA Certificate Number 883.02
A2LA Mutual Recognition Agreement Partners:
Australia (NATA), Austria (BmwA), Belgium (BELTEST) (BKO-OBE), Canada (SCC), Chinese Taipei (CNLA), Czech Republic (NAO), Denmark (DANAK), Finland (FINAS), France (COFRAC), Germany (DAR), Hong Kong (HKAS, Ireland (NAB), Italy (SIT) (SINAL), Japan (JAB) (JNLA), Republic of Korea (KOLAS), The Netherlands (RvA), New Zealand (IANZ), Norway (NA), Portugal (IPQ), Singapore (SAC-SINGLAS), Spain (ENAC), Sweden (SWEDAC), Switzerland (SAS), United Kingdom (UKAS) and United States (NVLAP) (ICBO ES)

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

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

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

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

010156

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 28, 2002

Expiration Date: EXPIRES 01 02 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 R Gaines

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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 Statisical Principles."*

2.0 **DESCRIPTION OF CRM** Custom-Grade **10000 µg/mL Sodium in 1.4% (abs) HNO_3**

Catalog Number:	CGNA10-1, CGNA10-2, and CGNA10-5
Lot Number:	**T-NA03006**
Starting Material:	Na_2CO_3
Starting Material Purity (%):	99.999936
Starting Material Lot No	42095
Matrix:	1.4% (abs) HNO_3

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:

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

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

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

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.

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

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

O Al < 0.00090	M Dy < 0.02499	O Li < 0.00003	M Pr < 0.00125	M Te < 0.12494
M Sb < 0.00208	M Er < 0.02082	M Lu < 0.00167	M Re < 0.00417	M Tb < 0.00125
M As < 0.04165	M Eu < 0.01249	O Mg 0.00015	M Rh < 0.00417	M Tl < 0.00417
M Ba < 0.04165	M Gd < 0.00417	O Mn < 0.00003	M Rb < 0.00417	M Th < 0.00417
O Be < 0.00020	M Ga < 0.00417	O Hg < 0.01500	M Ru < 0.00833	M Tm < 0.00167
M Bi < 0.00167	O Ge < 0.00150	M Mo < 0.00833	M Sm < 0.00417	M Sn < 0.02082
O B < 0.00060	O Au < 0.00300	M Nd < 0.00833	O Sc < 0.00002	O Ti < 0.00070
M Cd < 0.01249	M Hf < 0.00833	O Ni < 0.00230	O Se < 0.05000	M W < 0.04165
O Ca 0.00160	M Ho < 0.00208	M Nb < 0.00208	O Si < 0.00340	M U < 0.00833
M Ce < 0.02082	M In < 0.04165	n Os	M Ag < 0.00833	O V < 0.00090
M Cs 0.00104	M Ir < 0.02082	M Pd < 0.02082	S Na	M Yb < 0.00417
M Cr < 0.02082	O Fe < 0.00110	O P < 0.04000	M Sr < 0.00208	M Y < 0.16658
M Co < 0.01249	M La < 0.00208	M Pt < 0.00833	O S < 0.07200	O Zn 0.00130
O Cu < 0.00140	M Pb < 0.01249	O K 0.00873	M Ta < 0.02915	M 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, HNO_3, H_2SO_4 and HF aqueous matrices. Stable with all metals and inorganic anions.

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

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

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

Technique/Line		Estimated D.L.	Order	Type	Interferences (underlined indicates severe at ≤5ppm conc.)
ICP-OES	589.595 nm	0.07 / 0.00009 µg/mL	1	atom	2nd order radiation from R.E.s on some optical designs
ICP-OES	588.995 nm	0.03 / 0.006 µg/mL	1	atom	2nd order radiation from R.E.s on some optical designs
ICP-OES	330.237 nm	2.0 / 0.09 µg/mL	1	atom	Pd, Zn
ICP-MS	23 amu	310 ppt	n/a	M⁺	$^{46}Ti^{+2}$, $^{46}Ca^{+2}$

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

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

10.0 QUALITY STANDARD DOCUMENTATION

10.1 ISO 9001:2000 Quality Management System Registration - QMI Certificate Number 010105
Recognized by:
Registrar Accreditation Board (ANSI-RAB)
Standards Council of Canada (SCC)
Dutch Council for Accreditation (RVA)
Entidad Mexicana de Acreditacion, a.c.(EMA)
Members of IQ Net International Certification Network:
Argentina (IRAM), Australia (QAS), Austria (ÖQS), Belgium (Avinter) , Brazil (FCAV), Canada (QMI), Hong Kong (HKQAA), Columbia (ICONTEC), Czech Republic (CQS), Denmark (DS), Finland (SFS), France (AFAQ), Germany (DQS), Greece (ELOT), Hungary (MSZT), Ireland (NSAI), Israel (SII), Italy (CISQ), Japan (JQA), Korea (KSA-QA), Netherlands (KEMA), Norway (NCS), Poland(PCBC), Portugal (APCER), Singapore (PSB), Slovenia (SIQ), Spain (AENOR), Switzerland (SQS)

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

10.3 ISO/IEC Guide 34 - 2000 "General Requirements for the Competence of Reference Material Producers" - Reference Materials Production - Accredited A2LA Certificate Number 883.02
A2LA Mutual Recognition Agreement Partners:
Australia (NATA), Austria (BmwA), Belgium (BELTEST) (BKO-OBE), Canada (SCC), Chinese Taipei (CNLA), Czech Republic (NAO), Denmark (DANAK), Finland (FINAS), France (COFRAC), Germany (DAR), Hong Kong (HKAS, Ireland (NAB), Italy (SIT) (SINAL), Japan (JAB) (JNLA), Republic of Korea (KOLAS), The Netherlands (RvA), New Zealand (IANZ), Norway (NA), Portugal (IPQ), Singapore (SAC-SINGLAS), Spain (ENAC), Sweden (SWEDAC), Switzerland (SAS), United Kingdom (UKAS) and United States (NVLAP) (ICBO ES)

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

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

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

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

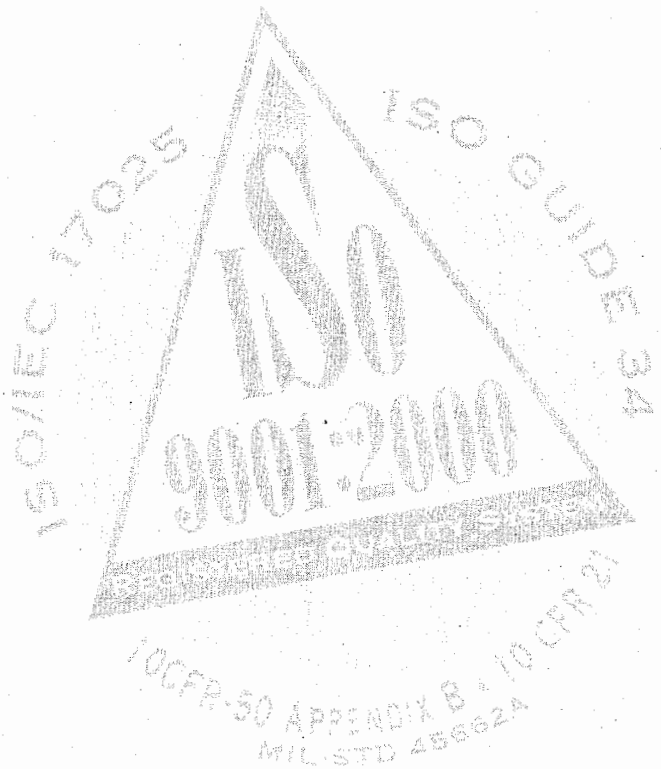
INORGANIC LABS/RADCHEM LABS Pg 2 of 2
DATE RECEIVED: 07/31/03
DATE EXPIRED: 08/01/2004
DATE OPENED: 08/01/03
INORG: 4205 PO: F52391

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By: Debbie Newman, LIMS Administrator

Certificate Approved By: Katalin Le, QC Supervisor

Certifying Officer: Paul Gaines, Chemist, Senior Technical Director



010161

Certificate of Analysis

CUSTOM-GRADE SOLUTION 1000 µg/mL Lithium in 0.1% HNO_3 (abs)

Catalog Number: CGLI1-1, CGLI1-2 and CGLI1-5

Lot Number: **W-LI02066**

Starting Material:	Li_2CO_3
Starting Material Purity:	99.999%
Starting Material Lot No:	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:

$$\text{Certified Value } (\bar{x}) = \frac{\sum x_i}{n} \qquad \text{Uncertainty } (\pm) = \frac{2[(\sum s_i)^2]^{1/2}}{(n)^{1/2}}$$

($\bar{x}$) = 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.

O	Al	<0.010	M	Dy	<0.00060	s	Li		M	Pr	<0.000030	O	Te	<0.0090	
M	Sb	<0.000050	M	Er	<0.00050	M	Lu	<0.000040	M	Re	<0.00010	M	Tb	<0.000030	
O	As	<0.044	M	Eu	<0.00030	O	Mg	<0.00010	M	Rh	<0.00010	M	Tl	<0.00010	
M	Ba	<0.0010	M	Gd	<0.00010	O	Mn	<0.00020	M	Rb	<0.00010	M	Th	<0.00010	
O	Be	<0.000050	M	Ga	<0.00010	O	Hg	<0.0070	M	Ru	<0.00020	M	Tm	<0.000040	
M	Bi	<0.000040	M	Ge	<0.00060	M	Mo	<0.00020	M	Sm	<0.00010	M	Sn	<0.00050	
O	B	<0.0060	O	Au	<0.010	M	Nd	<0.00020	M	Sc	<0.0010	O	Ti	<0.00030	
O	Cd	<0.0018	M	Hf	<0.00020	O	Ni	<0.0040	O	Se	<0.020	M	W	<0.0010	
O	Ca	0.051	M	Ho	<0.000050	M	Nb	<0.000050	O	Si	0.023	M	U	<0.00020	
M	Ce	<0.00050	O	In	<0.030	n	Os		O	Ag	<0.0040	O	V	<0.0010	
M	Cs	0.0018	M	Ir	<0.00050	M	Pd	<0.00050	O	Na	<0.10	M	Yb	<0.00010	
O	Cr	<0.0020	O	Fe	<0.0020	O	P	<0.030	O	Sr	<0.0010	M	Y	<0.0040	
M	Co	<0.00030	M	La	<0.000050	M	Pt	<0.00020	O	S	<0.050	O	Zn	<0.030	
M	Cu	<0.00060	M	Pb	<0.00030	O	K	0.0070	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): 1.004 g/mL

(over)

QA:KL Rev.022403DN

Paul F. Farnes

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Quality Assurance Manager

EXPIRES
01 2004

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

certificate of analysis

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

2.0 **DESCRIPTION OF CRM** Custom-Grade **10000 µg/mL Potassium in 1.4% (abs) HNO_3**

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) HNO_3

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 11/5/03 1 of 2
DATE EXPIRED: 12/1/2004 OP
DATE OPENED: 11/5/03
INORG: 4320 PO: FS2256

3.0 **CERTIFIED VALUES AND UNCERTAINTIES**

Certified Concentration: 9930 ± 9 µg/mL

Certified Density: 1.024 g/mL (measured at 22° C)

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

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

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

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

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.

O Al < 0.00090	M Dy < 0.02400	O Li < 0.00003	M Pr < 0.00120	M Te < 0.11998
M Sb < 0.00200	M Er < 0.02000	M Lu < 0.00160	M Re < 0.00400	M Tb < 0.00120
M As < 0.03999	M Eu < 0.01200	O Mg 0.00100	M Rh < 0.00400	M Tl < 0.00400
M Ba < 0.03999	M Gd < 0.00400	O Mn < 0.00003	M Rb 0.49948	M Th < 0.00400
O Be < 0.00020	M Ga < 0.00400	O Hg < 0.01500	M Ru < 0.00800	M Tm < 0.00160
M Bi < 0.00160	O Ge < 0.00150	M Mo < 0.00800	M Sm < 0.00400	M Sn < 0.02000
O B < 0.00060	O Au < 0.00300	M Nd < 0.00800	O Sc < 0.00002	O Ti < 0.00070
M Cd < 0.01200	M Hf < 0.00800	O Ni < 0.00230	O Se < 0.05000	M W < 0.03999
O Ca 0.00075	M Ho < 0.00200	M Nb < 0.00200	O Si < 0.00340	M U < 0.00800
M Ce < 0.02000	M In < 0.03999	n Os	M Ag < 0.00800	O V < 0.00090
M Cs < 0.00120	M Ir < 0.02000	M Pd < 0.02000	O Na 0.21730	M Yb < 0.00400
M Cr < 0.02000	O Fe 0.00212	O P < 0.00250	M Sr < 0.00200	M Y < 0.15998
M Co < 0.01200	M La < 0.00200	M Pt < 0.00800	O S < 0.07200	O Zn 0.00050
M Cu < 0.02400	M Pb < 0.01200	S K	M Ta < 0.02800	M 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, HNO_3, H_2SO_4 and HF aqueous matrices. Avoid use of $HClO_4$ due to insolubility of the* perchlorate. Stable with all metals and inorganic anions except ClO_4^-.

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

K Containing Samples (Preparation and Solution) - Metal (Dissolves very rapidly in water); Ores (Sodium carbonate fusion in Pt^{lb} 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 ≤ppmcs.)
ICP-OES 766.490 nm	0.4 / 0.001 µg/mL	1	atom	2nd order radiation from R.E.s on some optical designs
ICP-OES 771.531 nm	1.0 / 0.03 µg/mL	1	atom	2nd order radiation from R.E.s on some optical designs
ICP-OES 404.721 nm	1.1 / 0.05 µg/mL	1	atom	U, Ce,
ICP-MS 39 amu	10 ppt	n/a	M'	^{38}ArH, $^{23}Na^{16}O$, $^{78}Se^{+2}$

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

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

10.0 QUALITY STANDARD DOCUMENTATION

010164

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.

INORGANIC LABS/RADCHEM LABS
DATE RECEIVED: 11/5/03 2 of 2
DATE EXPIRED: 12/1/2004 DR
DATE OPENED: 11/5/03
INORG: 4320 PO: P52258

Certification Date: January 30, 2003

Expiration Date:

EXPIRES
1 Dec 2004

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

010165

Certificate Prepared By: JoAnn Struthers, QA Administrative Assistant

Certificate Approved By: Katalin Le, QC Supervisor

Certifying Officer: Paul Gaines, Chemist, Senior Technical Director

SOUTHWEST RESEARCH INSTITUTE
NUCLEAR PROJECT
CLIENT: Div. 20
TASK ORDER: 031021-4
SRR: 25126
SDG: 236555
CASE: CNWRA
VTSR: October 21, 2003
PROJECT#: 06002.01.081

Pipette Calibrations

Book/Page: 03 019

010166

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

(Space provide for Inorganic Laboratories' Fixed Volume Pipette Verification Spreadsheet)

L. Wright 11/4/03

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)

Book/Page 03 020

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

Balance #: 16 Thermometer #: G011 diH20 Temperature (°C): 21 010167

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		
~~TMA6~~ out	1000	~~1.0444~~ 1.0013 (JW 10/31/03)	~~1.0220~~ 1.0015	~~1.0105~~ 1.0033 (JW 10/31/03)
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
TMH1 out!	300	of service 0.2192	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
~~TMY1~~	~~15~~	out		

Analyst: Laura Wright Date: 10/21/03

Reviewed by: [signature] Date: 12/02/03

Book/page: 04 011

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

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

10-31-03

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
	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					

10-31-03

FRM-247a (Rev 3/Oct 03)

Book/page: 04 012

SwRI Div. 01 – Inorganic Laboratory Adjustable Pipette Verification Log

010169

Balance #: 34 Thermometer #: G011 diH20 Temperature (° C) 21

20 µL – 200 µL

Eppendorf #	True Value (µL)	1st Reading (g)	2nd Reading (g)	3rd Reading (g)
	20	.0201	.0202	.0203
ADJ200-A	100	.1021	.0993	.0990
	200	.1985	.1987	.1990
	20	.0199	.0202	.0200
ADJ200-C	100	.0991	.1006	.1000
	200	.1998	.1995	.2010
	20	.0203	.0202	.0204
ADJ200-D	100	.0999	.1000	.1003
	200	.2001	.2001	.2009
	20			
ADJ200-G	100			
	200			
	20			
ADJ200-H	100			
	200			
	20			
ADJ200-J	100			
	200			
	20			
ADJ200	100			
	200			
	20			
ADJ200	100			
	200			

10-31-03

Analyst: John Willis Date: 10-31-03

Reviewed by: Walter Cleyn Date: 12/02/03

Book/page: 04 013

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

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

AMS 11/5/03

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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
	20				0.000	0.00
ADJ200-A	100				0.000	0.00
	200				0.000	0.00
	20				0.000	0.00
ADJ200-C	100				0.000	0.00
	200				0.000	0.00
	20				0.000	0.00
ADJ200-D	100				0.000	0.00
	200				0.000	0.00
	20	0.0198	0.0199	0.0199	0.020	99.33
ADJ200-G	100	0.0991	0.0985	0.0984	0.099	98.67
	200	0.1971	0.1977	0.1970	0.197	98.63
	20	0.0202	0.0200	0.0199	0.020	100.17
ADJ200-H	100	0.0984	0.0982	0.0982	0.098	98.27
	200	0.1971	0.1969	0.1965	0.197	98.42
	20	0.0199	0.0199	0.0198	0.020	99.33
ADJ200-J	100	0.0985	0.0984	0.0981	0.098	98.33
	200	0.1991	0.1988	0.1981	0.199	99.33
	20				0.000	0.00
ADJ200	100				0.000	0.00
	200				0.000	0.00
	20				0.000	0.00
ADJ200	100				0.000	0.00
	200				0.000	0.00
	20				0.000	0.00
ADJ200	100				0.000	0.00
	200				0.000	0.00

FRM-247a (Rev 3/Oct 03)

Book/page: 04 014

SwRI Div. 01 – Inorganic Laboratory Adjustable Pipette Verification Log 010171

Balance #: 34 Thermometer #: G011 diH20 Temperature (° C) 21

20 µL – 200 µL

Eppendorf #	True Value (µL)	1st Reading (g)	2nd Reading (g)	3rd Reading (g)
	20			
ADJ200-A	100			
	200			
	20			
ADJ200-C	100			
	200			
	20			
ADJ200-D	100			
	200			
	20	0.0198	0.0199	0.0199
ADJ200-G	100	0.0991	0.0985	0.0984
	200	0.1971	0.1977	0.1970
	20	0.0202	0.0200	0.0199
ADJ200-H	100	0.0984	0.0982	0.0982
	200	0.1971	0.1969	0.1965
	20	0.0199	0.0199	0.0198
ADJ200-J	100	0.0985	0.0984	0.0981
	200	0.1991	0.1988	0.1981
	20			
ADJ200	100			
	200			
	20			
ADJ200	100			
	200			

ams 10/31/03

ams 10/31/03

Analyst: ams Date: 10/31/03

Reviewed by: Michael A. Hardy Date: 11/18/03

Book/page: 04 065

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

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

10-31-03

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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	0.1006	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					

10-31-03

FRM-247b (Rev 2/Oct 03)

010173 Book/page: 04 066

SwRI Div. 01 – Inorganic Laboratory Adjustable Pipette Verification Log

Balance #: 34 Thermometer #: G011 diH20 Temperature (° C) 21

100 µL – 1000 µL

Eppendorf #	True Value (µL)	1st Reading (g)	2nd Reading (g)	3rd Reading (g)
	100	.1006	.1004	.1006
ADJ1000-C	500	.4942	.4960	.4964
	1000	1.0033	1.0058	.9936
	100	.0997	.1001	.1002
ADJ1000-D	500	.4928	.4935	.4939
	1000	.9929	.9967	.9958
	100	.1015	.1016	.1015
ADJ1000-E	500	.4938	.4946	.4935
	1000	.9962	.9994	.9940
	100	.1008	.1013	.1012
ADJ1000-F	500	.5044	.4964	.4951
	1000	.9987	.9935	.9961
	100			
ADJ1000-G	500			
	1000			
	100			
ADJ1000-H	500			
	1000			
	100			
ADJ1000-J	500			
	1000			
	100			
ADJ1000	500			
	1000			
	100			
ADJ1000	500			
	1000			

10-31-03

Analyst: John Wills Date: 10-31-03

Reviewed by: J Mulvellyn Date: 12/02/03

Book/page: 04 067

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

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

AMS 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
	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	0.1019	0.1015	0.1017	0.102	101.70
ADJ1000-G	500	0.4922	0.4912	0.4911	0.492	98.30
	1000	0.9861	0.9841	0.9826	0.984	98.43
	100	0.1011	0.1015	0.1006	0.101	101.07
ADJ1000-H	500	0.4926	0.4920	0.4909	0.492	98.37
	1000	0.9803	0.9806	0.9805	0.980	98.05
	100	0.1022	0.1016	0.1017	0.102	101.83
ADJ1000-J	500	0.4973	0.4978	0.4952	0.497	99.35
	1000	0.9998	0.9976	0.9981	0.999	99.85
	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

AMS 11/5/03

AMS 11/5/03

FRM-247b (Rev 2/Oct 03)

010175 SD 04 068

Book/page: 04 068

SwRI Div. 01 – Inorganic Laboratory Adjustable Pipette Verification Log

Balance #: 34 Thermometer #: G011 diH20 Temperature (° C) 21

100 µL – 1000 µL

Eppendorf #	True Value (µL)	1st Reading (g)	2nd Reading (g)	3rd Reading (g)
	100			
ADJ1000-C	500			
	1000			
	100			
ADJ1000-D	500			
	1000		AMS 10/31/03	
	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		AMS 10/31/03	
	100			
ADJ1000	500			
	1000			

Analyst: AMS Date: 10/31/03

Reviewed by: Michael Handy Date: 11/18/03

Book/page: 04 121

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

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

10-31-03

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	0.4977	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					

10-31-03

FRM-247c (Rev 2/Mar 03)

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SwRI Div. 01 – Inorganic Laboratory Adjustable Pipette Verification Log

Balance #: 34 Thermometer #: G011 diH20 Temperature (° C) 21

500 µL – 5000 µL

Eppendorf #	True Value (µL)	1st Reading (g)	2nd Reading (g)	3rd Reading (g)
	500	.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			

10/31/03

Analyst: John Wilder Date: 10-31-03

Reviewed by: [signature] Date: 12/02/03

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

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

MLR 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		aml 11/5/03		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		aml 11/5/03		0.000	0.00
	500				0.000	0.00
ADJ5000	2500				0.000	0.00
	5000				0.000	0.00
	500				0.000	0.00
ADJ5000	2500				0.000	0.00
	5000				0.000	0.00

FRM-247c (Rev 2/Mar 03)

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SwRI Div. 01 – Inorganic Laboratory Adjustable Pipette Verification Log

Balance #: 34 Thermometer #: G011 diH20 Temperature (° C) 21

500 µL – 5000 µL

Eppendorf #	True Value (µL)	1st Reading (g)	2nd Reading (g)	3rd Reading (g)
	500			
ADJ5000-C	2500			
	5000			
	500			
ADJ5000-G	2500			
	5000			
	500			
ADJ5000-H	2500			
	5000			
	500			
ADJ5000-I	2500			
	5000			
	500	0.4949	0.4932	0.4928
ADJ5000-J	2500	2.4896	2.4871	2.4870
	5000	4.9863	4.9801	4.9824
	500	0.5099	0.5063	0.5078
ADJ5000-K	2500	2.5008	2.5036	2.4998
	5000	5.0627	5.0319	5.0572
	500	0.5050	0.5042	0.5027
ADJ5000-L	2500	2.5016	2.4991	2.5008
	5000	4.9949	5.0025	4.9866
	500			
ADJ5000	2500			
	5000			
	500			
ADJ5000	2500			
	5000			
	500			
ADJ5000	2500			
	5000			
	500			
ADJ5000	2500			
	5000			

Analyst: [signature] Date: 10/31/03

Reviewed by: [signature] Date: 11/18/03

SOUTHWEST RESEARCH INSTITUTE
NUCLEAR PROJECT
CLIENT: Div. 20
TASK ORDER: 031021-4
SRR: 25126
SDG: 236555
CASE: CNWRA
VTSR: October 21, 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	JW	SN: 99-J5052G-15
10/29/03	2.0000	2.0000	JW	"
10-30-03	2.0000	2.0000	JW	"
10/31/03	2.0000	2.0000	JW	"
11-3-03	2.0000	2.0000	JW	"
11-4-03	2.0000	2.0000	JW	"
11-5-03	2.0000	2.0000	JW	"
11-6-03	2.0000	2.0000	JW	"
11-7-03	2.0000	2.0000	JW	"
11-10-03	2.0000	2.0000	JW	"

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.

✓ AMS
11/17/03

Southwest Research Institute
Division 01

BALANCE VERIFICATION LOG

BALANCE #	LAB #:	SERIAL #:	TOLERANCE:	COMMENTS:
19	27	0068597	±0.05	
Date	Std Wt (g)	Recorded Wt (g)	Operator	
10-28-03	10.00	10.00	JW	SN: 99-J50624-5
10/29/03	10.00	10.00	JW	"
10-30-03	10.00	10.00	JW	"
10/31/03	10.00	10.00	JW	"
11-03-03	10.00	10.00	JW	"
11-4-03	10.00	10.00	JW	"
11-5-03	10.00	10.00	JW	"
11-6-03	10.00	10.00	JW	"
11-7-03	10.00	10.00	JW	"
11-10-03	10.00	10.00	JW	"

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.

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	JW	SN:99-J50526-15
10/29/03	2.0000	2.0000	JW	"
10-30-03	2.0000	1.9999	JW	"
10/31/03	2.0000	2.0000	JW	"
11-3-03	2.0000	2.0000	JW	"
11-4-03	2.0000	2.0000	JW	"
11-5-03	2.0000	2.0000	JW	"
11-6-03	2.0000	2.0000	JW	"
11-7-03	2.0000	2.0000	JW	"
11-10-03	2.0000	2.0000	JW	"

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.

FRM-112 (Rev 1/Dec 99)

SOUTHWEST RESEARCH INSTITUTE
NUCLEAR PROJECT
CLIENT: Div. 20
TASK ORDER: 031021-4
SRR: 25126
SDG: 236555
CASE: CNWRA
VTSR: October 21, 2003
PROJECT#: 06002.01.081

DI Water Verification

D.I. WATER SYSTEM NOTEBOOK
METALS LAB
SOUTHWEST RESEARCH INSTITUTE

01 028

010183

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	5:47 pm
9/24/03	DR	18.0	✓	✓	51398.6	5:26 pm
9/28/03	area under construction, unable to read.				RR 9/28/03	
9/29/03	DR	18.0	✓	✓	51419.0	6:43 pm
9/29/03	DR	18.0	✓	✓	51416.8	8:40 pm
9/30/03	DR	18.0	✓	✓	51420.3	7:42 pm
10/1/03	DR	18.0	✓	✓	51424.2	7:30 pm
10/2/03	DR	18.0	✓	✓	51431.3	6:20 pm
10/3/03	DR	18.0	✓	✓	51434.5	5:32 pm
10/6/03	DR	18.0	✓	✓	51445.0	5:46 pm
10/7/03	DR	18.0	✓	✓	51448.9	7:22 pm
10/8/03	DR	18.0	✓	✓	51454.0	6:38 pm
10/9/03	DR	18.0	✓	✓	51468.8	8 pm
10/10/03	DR	18.0	✓	✓	51464.0	6:07 pm
←		VDJ 10/13/03				→
10/13/03	DR	18.0	✓	✓	51474.8	6:53 pm
10/14/03	DR	18.0	✓	✓	51476.1	7:13 pm
10/15/03	DR	18.0	✓	✓	51478.3	7:00 pm
10/20/03	DR	18.0	✓	✓	51482.3	6:40 pm
10/21/03	DR	18.0	✓	✓	51486.5	8:11 pm
10/28/03	DR	18.0	✓	✓	51489.2	8:01 pm
10/21/03	DR	18.0	✓	✓	51495.4	7:15 pm
10/22/03	DR	18.0	✓	✓	51502.2	8:00 pm
10/23/03	DR	18.0	✓	✓	51509.0	9:16 pm
10/24/03	DR	18.0	✓	✓	51514.5	8:15 pm
10/27/03	LW — Reviewed					
10/27/03	DR	18.0	✓	✓	51529.5	9:00 pm
10/28/03	DR	18.0	✓	✓	51523.6	6:00 pm
10/29/03	DR	18.0	✓	✓	51526.4	7:35 pm
10/30/03	DR	18.0	✓	✓	51531.2	8:40 pm
10/31/03	DR	18.0	✓	✓	51533.7	5:45 pm
11/3/03	DR	18.0	✓	✓	51539.4	7:25 pm
11/4/03	DR	18.0	✓	✓	51548.9	7:09 pm
11/5/03	DR	18.0	✓	✓	51553.2	8:29 pm
11/6/03	DR	18.0	✓	✓	51556.9	7:16 pm

✓ 11/17/03

SOUTHWEST RESEARCH INSTITUTE
NUCLEAR PROJECT
CLIENT: Div. 20
TASK ORDER: 031021-4
SRR: 25126
SDG: 236555
CASE: CNWRA
VTSR: October 21, 2003
PROJECT#: 06002.01.081

SURVEILLANCE REPORTS
From Division 30