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Q200409290004

Scientific Notebook No. 390: Tracking and  
Monitoring the Ongoing Use and Performance  
of the Waters Capillary Ion Analysis (CIA)  
System (02/10/2000 through 11/30/2001)

# LABORATORY NOTEBOOK

CIA Logbook

CNWRA, SWRI

CNWRA  
CONTROLLED  
COPY 390

**NOTEBOOK NO.** 390  
**ISSUED TO** S. Brossia  
**ON** \_\_\_\_\_ **19** \_\_\_\_\_  
**DEPARTMENT** \_\_\_\_\_  
**RETURNED** \_\_\_\_\_ **19** \_\_\_\_\_

CIA  
Logbook

Brian K. Derby - *B. Derby* - BKD

Sean Brossia *CSB* CSB

—SCIENTIFIC NOTEBOOK CO.—  
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TITLE \_\_\_\_\_

From Page No. \_\_\_\_\_

### CIA Initial Notebook Entry

This notebook is intended to track and monitor the ongoing use and performance of the Waters Capillary Ion Analysis (CIA) system. This notebook is to be used as a method for keeping track of instrument utilization rates, any difficulties encountered by users which need to be followed up on by the System Administrator and/or a service call to Waters, initial setup and testing of the system, and to serve as a starting point in the training of new users. Unless otherwise stated, all data from CIA experiments will be recorded in specific project scientific notebooks. Calibration curves should also periodically be included in this notebook (in addition to the individual project scientific notebooks) to track instrument performance.

system = CNWRA - password

To Page No. \_\_\_\_\_

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

SBromie

2/10/00

From Page No. 3

Information potentially subject to copyright protection was redacted from pages 2 through 15 of this scientific notebook. The redacted material is from the following reference:  
Waters Corporation. "Ion Analysis Methods for IC and CIA (registered trademark) and Practical Aspects of Capillary Ion Analysis Theory." Milford, MA: Waters Corporation. 2000.

To Page No. \_\_\_\_\_

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by *SP*

*2/12/00*

From Page No. \_\_\_\_\_

# CLARITAS PPT

CERTIFICATE OF ANALYSIS

Catalog Number: CLPE2-2Y  
 Description: 1,000 ug/mL Iron in 2% HNO<sub>3</sub>  
 Starting Material: Ferric Nitrate Fe<sup>3+</sup>  
 Lot Number: CL1-184FE  
 Density: 1.011 @ 25.1°C

Classical Wet Assay: 998 ug/mL  
 Gravimetry: Precipitation using NH<sub>4</sub>OH, filter, ignite and weigh as Fe<sub>2</sub>O<sub>3</sub>

Instrument Analysis by ICP Spectrometer: 1001 ug/mL via NIST SRM 3126a

Trace metallic impurities in the actual solution, in PPB, via ICP-MS analysis:

Ag	0.50	Ho	<0.01	Ru	<0.03
Al	4.00	In	1.00	Sb	3.00
As	0.90	Ir	<0.01	Sc	<0.60
Au	<0.02	K	77.00	Se	<0.80
B	<5.00	La	0.02	Si	<10.00
Ba	0.20	Li	1.00	Sm	<0.01
Be	<0.20	Lu	<0.01	Sn	0.06
Bi	<0.05	Mg	2.00	Sr	4.00
Ca	4.00	Mn	1.00	Ta	<0.01
Cd	0.02	Mo	0.20	Tb	<0.02
Ce	0.90	Na	10.00	Te	3.00
Co	2.00	Nb	<0.01	Th	<0.01
Cr	2.00	Nd	2.00	Ti	0.30
Cs	<0.01	Ni	1.00	Tl	0.02
Cu	2.00	P	<10.00	Tm	<0.01
Dy	<0.01	Pb	0.80	U	<0.01
Er	<0.01	Pd	<0.02	V	<0.10
Eu	<0.01	Pr	<0.01	W	0.50
Ga	0.20	Pt	<0.01	Y	0.05
Gd	<0.02	Rb	<0.02	Yb	<0.01
Hf	<0.01	Re	<0.01	Zn	<6.00
Hg	1.00	Rh	0.01	Zr	0.50

Balances are calibrated regularly with weight sets traceable to NIST.

CLARITAS PPT reference standards are guaranteed stable and accurate to ± 0.5%, averaged certified analyte concentrations for a period of one year from date of shipment. For these solutions we use the highest purity acids applicable, 18 megohm double-deionized water and acid-leached, triple-rinse bottles. All glassware used is Class A.

# CLARITAS PPT

CERTIFICATE OF ANALYSIS

Catalog Number: CLT19-2Y  
 Description: 1,000 ug/mL Titanium in H<sub>2</sub>O  
 Starting Material: Ammonium Hexafluorotitanate  
 Starting Material Lot No.: 08931A  
 Density: 1.009 at 25.1°C

Classical Wet Assay: 1,003 ug/mL  
 Gravimetry: Precipitation with NH<sub>4</sub>OH filtration and ignition and weighed as TiO<sub>2</sub>

Instrument Analysis by ICP Spectrometer: 1,000 ug/mL via NIST SRM 3162a

Trace Metallic Impurities in the Actual Solution, in PPB, via ICP/CPMS Analysis:

Ag	<0.02	Hg	<0.20	Ru	<0.02
Al	4.00	Ho	<0.01	Sb	0.40
As	4.00	In	<0.01	Sc	<2.00
Au	<0.01	Ir	<0.01	Se	<1.00
B	<5.00	K	100.00	Si	900.00
Ba	10.00	La	<0.01	Sm	<0.01
Be	<0.10	Li	<0.10	Sn	0.70
Bi	1.00	Lu	<0.01	Sr	0.50
Ca	15.00	Mg	20.00	Ta	<0.01
Cd	0.05	Mn	<0.10	Tb	<0.01
Ce	<0.01	Mo	0.02	Te	<0.10
Co	0.09	Na	8.00	Th	0.02
Cr	<0.50	Nb	2.00	Ti	0.05
Cs	0.03	Nd	<0.01	Tm	<0.01
Cu	<1.00	Ni	<1.00	U	0.20
Dy	<0.01	P	<50.00	V	0.50
Er	<0.01	Pb	0.80	W	2.00
Eu	<0.01	Pd	<0.07	Y	0.01
Fe	10.00	Pr	<0.01	Yb	<0.01
Ga	<0.01	Pt	<0.01	Zn	<20.00
Gd	0.03	Rb	<0.01	Zr	1.60
Ge	0.80	Re	<0.01		
Hf	0.80	Rh	0.01		

Balances are calibrated regularly with weight sets traceable to NIST.

CLARITAS PPT reference standards are guaranteed stable and accurate to ± 0.5%, averaged certified analyte concentrations for a period of one year from date of shipment. For these solutions we use the highest purity acids applicable, 18 megohm double-deionized water and acid-leached, triple-rinse bottles. All glassware used is Class A.



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*N. Kozlowski* Manufacturing Manager  
 Date: \_\_\_\_\_

# CLARITAS PPT

CERTIFICATE OF ANALYSIS

Catalog Number: CLCR2-2Y  
 Description: 1000 ug/mL Chromium in 2% HNO<sub>3</sub>  
 Starting Material: Chromium Nitrate Cr(NO<sub>3</sub>)<sub>3</sub> · 9H<sub>2</sub>O Cr<sup>3+</sup>  
 Lot No.: CL1-132CR  
 Density: 1.019 @ 24.2°C

Classical Wet Assay: 999 ug/mL  
 Gravimetry: Precipitation using Ammonium Hydroxide, Filter, Ignite and weigh as Chromium (III) Oxide

Instrument Analysis by Inductively Coupled Plasma [ICP] Spectrometer: 998 ug/mL via NIST SRM 3112a

Trace metallic impurities in the actual solution via ICP-MS analysis:

Element	PPB	Element	PPB	Element	PPB
Ag	<0.10	Ho	<0.01	Sb	<0.01
Al	2.00	In	0.01	Sc	8.00
As	<2.00	Ir	<0.01	Se	<1.00
Au	<0.01	K	250.00	Si	<20.00
B	3.00	La	0.01	Sm	<0.01
Ba	0.20	Li	<0.80	Sn	0.08
Be	<0.05	Lu	<0.01	Sr	0.10
Bi	0.60	Mg	7.00	Ta	<0.01
Ca	10.00	Mn	<0.01	Tb	<0.01
Cd	0.10	Mo	0.30	Te	<0.09
Ce	<0.01	Na	80.00	Th	0.09
Co	0.1	Nb	0.10	Ti	0.70
Cs	<0.01	Nd	<0.01	Tl	<0.01
Cu	<1.00	Ni	9.00	Tm	0.20
Dy	<0.01	P	200.00	U	<0.03
Er	0.06	Pb	0.40	V	3.00
Eu	<0.01	Pd	<0.05	W	0.04
Fe	240.00	Pr	<0.01	Y	0.02
Ga	1.00	Pt	<0.01	Yb	<0.01
Gd	<0.01	Rb	30.00	Zn	15.00
Ge	0.30	Re	<0.01	Zr	<0.008
Hf	0.01	Rh	0.40		
Hg	<0.10	Ru	0.20		

Balances are calibrated regularly with weight sets traceable to NIST.

CLARITAS PPT reference standards are guaranteed stable and accurate to ± 0.5%, averaged certified analyte concentrations for a period of one year from date of shipment. For these solutions we use the highest purity acids applicable, 18 megohm double-deionized water and acid-leached, triple-rinse bottles. All glassware used is Class A.



# CLARITAS PPT

CERTIFICATE OF ANALYSIS

Catalog Number: CLCU2-2Y  
 Description: 1,000 ug/mL Copper in 2% HNO<sub>3</sub>  
 Starting Material: Copper Shot Cu  
 Starting Material Lot No.: 04951N  
 Density: 1.019 at 24.4°C

Classical Wet Assay: 1,003 ug/mL  
 Titrimetry: EDTA titration using PAN as indicator. EDTA is standardized against Pb(NO<sub>3</sub>)<sub>2</sub> NIST SRM 928.

Instrument Analysis by ICP Spectrometer: 1,004 ug/mL via NIST SRM 3114.

Trace Metallic Impurities in the Actual Solution, in PPB, via ICP/CPMS Analysis:

Ag	0.20	Ho	<0.01	Sb	0.01
Al	1.00	In	0.06	Sc	7.00
As	<0.20	Ir	<0.01	Se	4.00
Au	<0.10	K	200.00	Si	<20.00
B	<7.00	La	<0.01	Sm	<0.01
Ba	0.20	Li	<0.20	Sn	0.70
Be	<0.05	Lu	<0.01	Sr	0.10
Bi	0.02	Mg	<1.00	Ta	<0.01
Ca	4.00	Mn	<10.00	Tb	<0.01
Cd	0.09	Mo	<2.00	Te	<0.20
Ce	<0.01	Na	10.00	Th	<0.01
Co	<1.00	Nb	<0.10	Ti	0.20
Cr	<10.00	Nd	<0.01	Tl	<0.01
Cs	<0.01	Ni	<50.00	Tm	<0.01
Cu	<0.01	P	2500.00	U	<0.01
Dy	<0.01	Pb	0.80	V	<0.50
Er	<0.01	Pd	<0.03	W	<0.10
Eu	<0.01	Pr	<0.01	Y	0.10
Fe	<10.00	Pt	<0.01	Yb	<0.01
Ga	<0.03	Rb	<0.01	Zn	<20.00
Gd	0.04	Re	<0.01	Zr	<0.05
Ge	<0.50	Rh	<0.01		
Hf	<0.01	Ru	<0.01		
Hg	0.10				

Balances are calibrated regularly with weight sets traceable to NIST.

CLARITAS PPT reference standards are guaranteed stable and accurate to ± 0.5%, averaged certified analyte concentrations for a period of one year from date of shipment. For these solutions we use the highest purity acids applicable, 18 megohm double-deionized water and acid-leached, triple-rinse bottles. All glassware used is Class A.



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*N. Kozlowski* Manufacturing Manager  
 Date: \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by *CB*

*2/15/02*

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**CLARIAS PPT**  
CERTIFICATE OF ANALYSIS

Catalog Number: CLN2-2Y Lot No.: CL1-172NI  
 Description: 1,000 ug/mL Nickel in 2% HNO<sub>3</sub>  
 Starting Material: Nickel Powder Ni  
 Starting Material Lot No.: 01991A  
 Density: 1.019 at 24.5°C  
 Classical Wet Assay: 1,001 ug/mL  
 Titrimetry: EDTA titration using Murexide as indicator. EDTA is standardized against:  
 Pb(NO<sub>3</sub>)<sub>2</sub> NIST SRM 928.  
 Instrument Analysis by ICP Spectrometer: 1,004 ug/mL via NIST SRM 3136.

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

Ag	<0.01	Hg	<0.10	Sb	0.04
Al	<20.00	Ho	<0.01	Sc	<5.00
As	<50.00	In	<0.01	Se	<1.00
Au	<0.02	Ir	<0.01	Si	10.00
B	<1.00	K	100.00	Sm	<0.01
Ba	0.30	La	<0.01	Sn	<0.03
Be	<0.10	Li	0.05	Sr	0.10
Bi	<0.01	Lu	<0.01	Ta	<0.01
Ca	6.00	Mg	3.00	Tb	<0.01
Cd	0.20	Mn	<0.10	Te	<0.20
Ce	0.03	Mo	0.10	Th	<0.01
Co	<3.00	Nb	10.00	Ti	5.00
Cr	<1.00	Ni	<0.04	Tl	0.02
Cs	<0.01	Nd	<0.01	Tm	<0.01
Cu	1.00	P	200.00	U	0.02
Dy	<0.01	Pb	1.00	V	<1.00
Er	<0.01	Pd	<0.01	W	0.40
Eu	<0.01	Pr	<0.01	Y	0.30
Fe	<10.00	Pt	<0.04	Yb	<0.01
Ga	<0.02	Rb	0.01	Zn	3.00
Gd	<0.01	Re	<0.01	Zr	0.10
Ge	<0.01	Rh	<0.01		
Hf	<0.01	Ru	<0.02		

Balances are calibrated regularly with weight sets traceable to NIST  
 CLARIAS PPT reference standards are guaranteed stable and accurate to ± 0.5% averaged certified analyte concentrations, for a period of one year from date of shipment. For these solutions we use the highest purity acids applicable. 18 megohm double-deionized water and acid-washed, impo-rinsed bottles. All glassware used is Class A.

*N. Kowalski* 24 20  
 Manufacturing Manager Date



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**CLARIAS PPT**  
CERTIFICATE OF ANALYSIS

Catalog Number: CLM09-2Y Lot No.: CL1-159MO  
 Description: 1,000 ug/mL Molybdenum in H<sub>2</sub>O  
 Starting Material: Ammonium Molybdate (NH<sub>4</sub>)<sub>2</sub>MoO<sub>7</sub>·4H<sub>2</sub>O  
 Starting Material Lot No.: N/A (NH<sub>4</sub>)<sub>2</sub>MoO<sub>4</sub>  
 Density: 1.007 at 26.0°C MoO<sub>4</sub><sup>2-</sup> → Mo<sup>6+</sup>  
 Classical Wet Assay: 1,003 ug/mL  
 Gravimetry: Precipitation using 8-Hydroxy Quinoline, filter, dry and weigh as MoO<sub>3</sub>(C<sub>7</sub>H<sub>6</sub>NO)<sub>2</sub>.  
 Instrument Analysis by ICP Spectrometer: 1,000 ug/mL via NIST SRM 3134.

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

Ag	<0.05	Hg	0.60	Sb	0.10
Al	0.50	Ho	<0.01	Sc	1.00
As	<0.05	In	0.50	Se	<1.00
Au	<0.01	Ir	<0.01	Si	<0.02
B	<4.00	K	100.00	Sm	<0.01
Ba	<0.30	La	0.01	Sn	2.00
Be	0.05	Li	<0.10	Sr	<0.01
Bi	<0.01	Lu	<0.01	Ta	<0.01
Ca	3.00	Mg	<2.00	Tb	<0.01
Cd	<2.00	Mn	0.60	Te	<100.00
Ce	<0.70	Na	5.00	Th	<0.01
Co	<0.01	Nb	0.30	Ti	2.00
Cr	<0.60	Nd	30.00	Tl	0.10
Cs	1.00	Ni	<0.30	Tm	<0.01
Cu	3.00	P	<30.00	U	<0.01
Dy	0.04	Pb	<0.05	V	<0.04
Er	<0.01	Pd	0.02	W	40.00
Eu	<0.01	Pr	8.00	Y	<0.01
Fe	<0.01	Pt	<0.01	Yb	<0.01
Ga	<0.01	Rb	0.40	Zn	<40.00
Gd	<0.01	Re	0.10	Zr	0.20
Ge	<0.10	Rh	<0.01		
Hf	<0.01	Ru	<0.01		

Balances are calibrated regularly with weight sets traceable to NIST

CLARIAS PPT reference standards are guaranteed stable and accurate to ± 0.5% averaged certified analyte concentrations, for a period of one year from date of shipment. For these solutions we use the highest purity acids applicable. 18 megohm double-deionized water and acid-washed, impo-rinsed bottles. All glassware used is Class A.

*N. Kowalski* 24 20  
 Manufacturing Manager Date



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(of Cr)

Cr<sup>6+</sup> as K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> 1000 ppm solution Lot # 986999-24  
 Fe<sup>2+</sup> as Fe(NH<sub>4</sub>)<sub>2</sub>(SO<sub>4</sub>)<sub>2</sub> 100 ppm solution Lot # 9326-17

3.5205 x 10<sup>-4</sup> M  
 100 ppm F.A.S. =  $\frac{3.52}{56}$   
 3.5205 x 10<sup>-4</sup> M Fe<sup>2+</sup> ≈ 19.661 ppm  
 7.04101 x 10<sup>-4</sup> M NH<sub>4</sub><sup>+</sup> ≈ 12.701 ppm

Fe <sup>2+</sup>	NH <sub>4</sub> <sup>+</sup>	=	
16 ppm	10.34 ppm	=	407 μL + 93 μL DI
8 ppm	5.17 ppm	=	203 μL + 297 μL DI
4 ppm	2.58 ppm	=	102 μL + 398 μL DI
2 ppm	1.29 ppm	=	51 μL + 449 μL DI
1 ppm	0.65 ppm	=	25.4 μL + 474.6 μL DI

To Page No. \_\_\_\_\_

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

*SJB*

2/10/00

Current Date 2/8/00

1 of 1

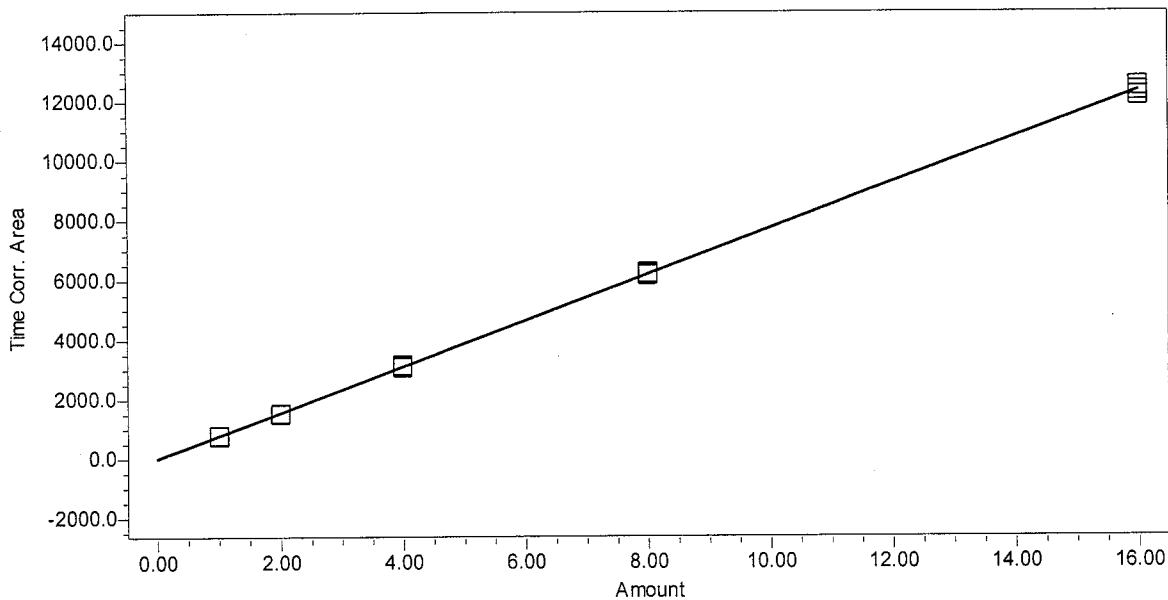
### Calibration Information

Name Ni2+  
System Waters\_CIA  
Channel SATIN

A 1.807854e+001  
B 7.702131e+002  
C 0.000000e+000  
D 0.000000e+000  
R^2 0.999759

Calibration Id 1232  
Date Calibrated 2/3/00 1:47:36 PM  
Time 5.041  
Processing Method Ni2 calibration

### Calibration Plot



Peak: Ni2+

	Name	Level	X Value	Response	Calc. Value	% Deviation	Manual	Ignore
1	Ni2+		1.000000	791.793685	1.004547	0.455	No	No
2	Ni2+		1.000000	779.806372	0.988983	-1.102	No	No
3	Ni2+		1.000000	778.087273	0.986751	-1.325	No	No
4	Ni2+		2.000000	1543.680475	1.980753	-0.962	No	No
5	Ni2+		2.000000	1536.543108	1.971486	-1.426	No	No
6	Ni2+		2.000000	1520.089330	1.950124	-2.494	No	No
7	Ni2+		4.000000	3154.165844	4.071714	1.793	No	No
8	Ni2+		4.000000	3124.810481	4.033600	0.840	No	No
9	Ni2+		4.000000	3091.351307	3.990159	-0.246	No	No
10	Ni2+		8.000000	6234.094004	8.070514	0.881	No	No
11	Ni2+		8.000000	6170.316254	7.987708	-0.154	No	No
12	Ni2+		8.000000	6184.716780	8.006405	0.080	No	No
13	Ni2+		16.000000	12493.290029	16.197091	1.232	No	No
14	Ni2+		16.000000	12163.642561	15.769096	-1.443	No	No
15	Ni2+		16.000000	12334.609204	15.991069	-0.056	No	No

Witness

Recorded by SB Date 2/10/00

lo. \_\_\_\_\_



TITLE \_\_\_\_\_

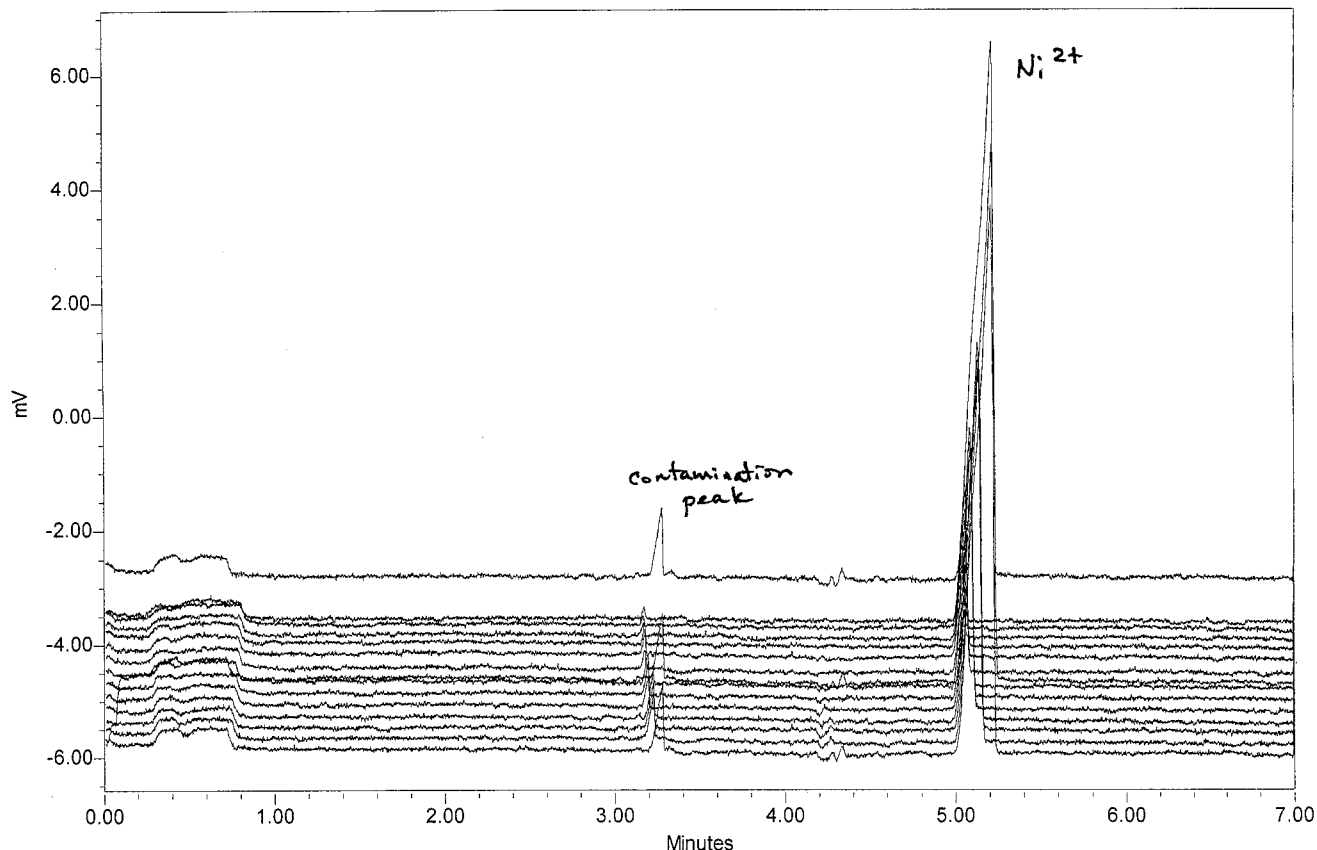
1 of 1

From Pa

Project Name CE\_Setup\_Testin  
User Name Sean  
Software Version 3.05.01

Report Method Name Cation Calibration Overlay  
Current Date 2/10/00

Overlaid Chromatogram



- SampleName 16 ppm Ni2+ Vial 5 Injection 3 Channel SATIN Date Acquired 2/3/00 12:02:21 PM
- SampleName 16 ppm Ni2+ Vial 5 Injection 2 Channel SATIN Date Acquired 2/3/00 11:53:37 AM
- SampleName 16 ppm Ni2+ Vial 5 Injection 1 Channel SATIN Date Acquired 2/3/00 11:44:55 AM
- SampleName 8 ppm Ni2+ Vial 4 Injection 3 Channel SATIN Date Acquired 2/3/00 11:36:11 AM
- SampleName 8 ppm Ni2+ Vial 4 Injection 2 Channel SATIN Date Acquired 2/3/00 11:27:29 AM
- SampleName 8 ppm Ni2+ Vial 4 Injection 1 Channel SATIN Date Acquired 2/3/00 11:18:45 AM
- SampleName 4 ppm Ni2+ Vial 3 Injection 3 Channel SATIN Date Acquired 2/3/00 11:10:03 AM
- SampleName 4 ppm Ni2+ Vial 3 Injection 2 Channel SATIN Date Acquired 2/3/00 11:01:19 AM
- SampleName 4 ppm Ni2+ Vial 3 Injection 1 Channel SATIN Date Acquired 2/3/00 10:52:37 AM
- SampleName 2 ppm Ni2+ Vial 2 Injection 3 Channel SATIN Date Acquired 2/3/00 10:43:53 AM
- SampleName 2 ppm Ni2+ Vial 2 Injection 2 Channel SATIN Date Acquired 2/3/00 10:35:11 AM
- SampleName 2 ppm Ni2+ Vial 2 Injection 1 Channel SATIN Date Acquired 2/3/00 10:26:29 AM
- SampleName 1 ppm Ni2+ Vial 1 Injection 3 Channel SATIN Date Acquired 2/3/00 10:17:45 AM
- SampleName 1 ppm Ni2+ Vial 1 Injection 2 Channel SATIN Date Acquired 2/3/00 10:09:03 AM
- SampleName 1 ppm Ni2+ Vial 1 Injection 1 Channel SATIN Date Acquired 2/3/00 10:00:21 AM

10 Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by \_\_\_\_\_

*SB*

*2/10/00*

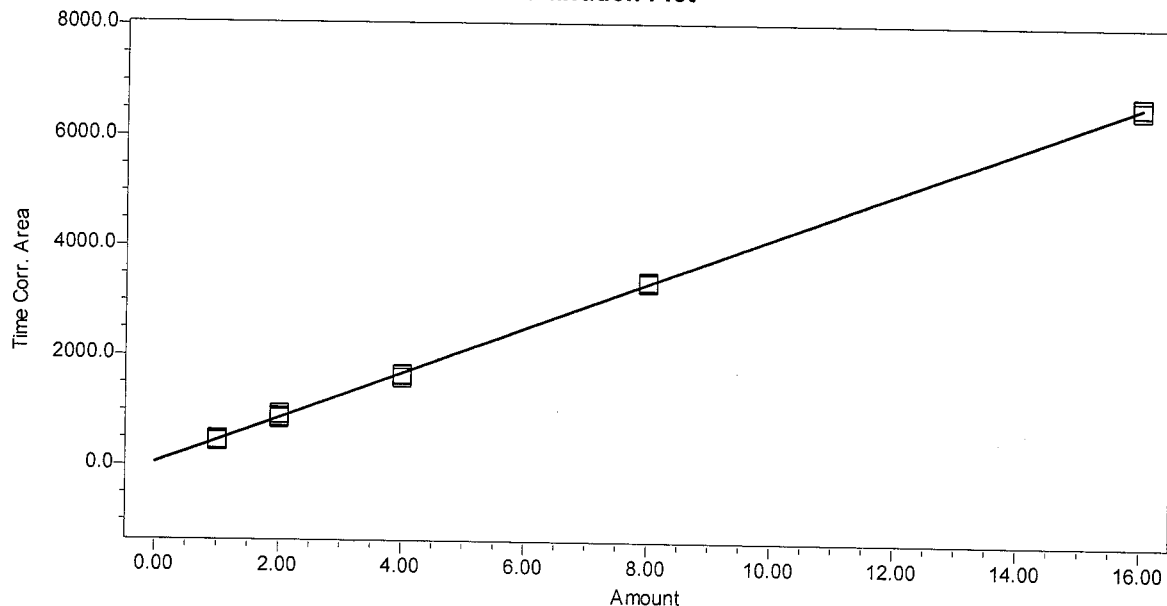
### Calibration Information

Name Cr6+  
System Waters\_CIA  
Channel SATIN

A 4.878263e+001  
B 4.114374e+002  
C 0.000000e+000  
D 0.000000e+000  
R^2 0.999729

Calibration Id 1370  
Date Calibrated 2/4/00 7:43:00 AM  
Time 3.466  
Processing Method Cr6 Calibration

**Calibration Plot**



Peak: Cr6+

	Name	Level	X Value	Response	Calc. Value	% Deviation	Manual	Ignore
1	Cr6+		1.000000	441.812936	0.955261	-4.474	No	No
2	Cr6+		1.000000	477.055569	1.040919	4.092	No	No
3	Cr6+		1.000000	470.700361	1.025472	2.547	No	No
4	Cr6+		2.000000	892.724874	2.051204	2.560	No	No
5	Cr6+		2.000000	939.650855	2.165258	8.263	No	No
6	Cr6+		2.000000	858.451041	1.967902	-1.605	No	No
7	Cr6+		4.000000	1672.134454	3.945562	-1.361	No	No
8	Cr6+		4.000000	1655.539292	3.905227	-2.369	No	No
9	Cr6+		4.000000	1609.943692	3.794407	-5.140	No	No
10	Cr6+		8.000000	3343.334604	8.007420	0.093	No	No
11	Cr6+		8.000000	3379.840095	8.096146	1.202	No	No
12	Cr6+		8.000000	3367.190851	8.065402	0.818	No	No
13	Cr6+		16.000000	6584.259485	15.884498	-0.722	No	No
14	Cr6+		16.000000	6647.256825	16.037614	0.235	No	No
15	Cr6+		16.000000	6655.523482	16.057706	0.361	No	No

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

2/10/00

TITLE \_\_\_\_\_

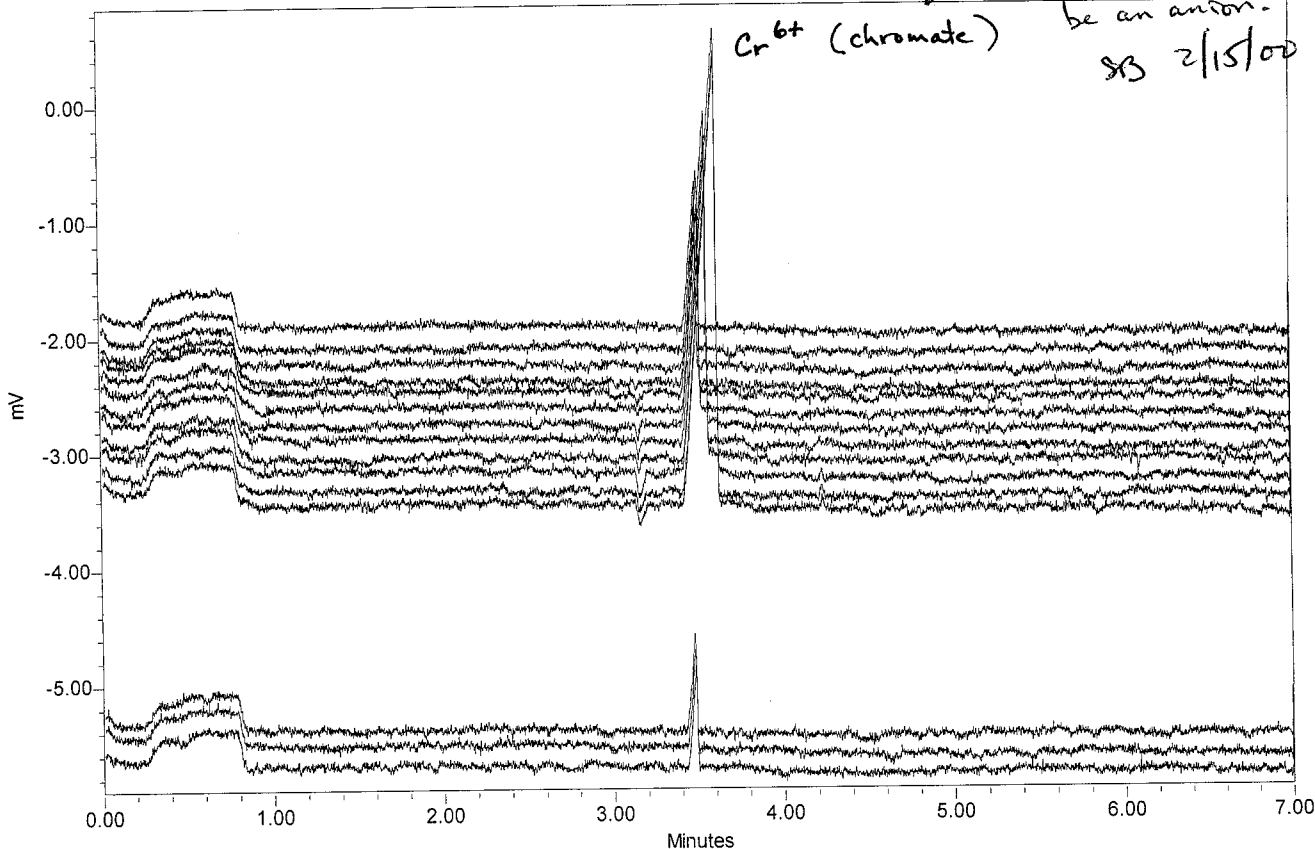
From \_\_\_\_\_

1 of 1

Project Name CE\_Setup\_Testin  
User Name Sean  
Software Version 3.05.01

Report Method Name Cation Calibration Overlay  
Current Date 2/10/00

Overlaid Chromatogram



- SampleName 16 ppm Cr6+ Vial 8 Injection 3 Channel SATIN Date Acquired 2/3/00 6:10:51 PM
- SampleName 16 ppm Cr6+ Vial 8 Injection 2 Channel SATIN Date Acquired 2/3/00 6:02:08 PM
- SampleName 16 ppm Cr6+ Vial 8 Injection 1 Channel SATIN Date Acquired 2/3/00 5:53:25 PM
- SampleName 8 ppm Cr6+ Vial 7 Injection 3 Channel SATIN Date Acquired 2/3/00 5:44:42 PM
- SampleName 8 ppm Cr6+ Vial 7 Injection 2 Channel SATIN Date Acquired 2/3/00 5:36:00 PM
- SampleName 8 ppm Cr6+ Vial 7 Injection 1 Channel SATIN Date Acquired 2/3/00 5:27:17 PM
- SampleName 4 ppm Cr6+ Vial 6 Injection 3 Channel SATIN Date Acquired 2/3/00 5:18:33 PM
- SampleName 4 ppm Cr6+ Vial 6 Injection 2 Channel SATIN Date Acquired 2/3/00 5:09:52 PM
- SampleName 4 ppm Cr6+ Vial 6 Injection 1 Channel SATIN Date Acquired 2/3/00 5:01:09 PM
- SampleName 2 ppm Cr6+ Vial 5 Injection 3 Channel SATIN Date Acquired 2/3/00 4:52:25 PM
- SampleName 2 ppm Cr6+ Vial 5 Injection 2 Channel SATIN Date Acquired 2/3/00 4:43:42 PM
- SampleName 2 ppm Cr6+ Vial 5 Injection 1 Channel SATIN Date Acquired 2/3/00 4:34:59 PM
- SampleName 1 ppm Cr6+ Vial 4 Injection 3 Channel SATIN Date Acquired 2/3/00 4:26:16 PM
- SampleName 1 ppm Cr6+ Vial 4 Injection 2 Channel SATIN Date Acquired 2/3/00 4:17:33 PM
- SampleName 1 ppm Cr6+ Vial 4 Injection 1 Channel SATIN Date Acquired 2/3/00 4:08:50 PM

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by \_\_\_\_\_

*SB*

*2/10/00*

From P Current Date 2/10/00

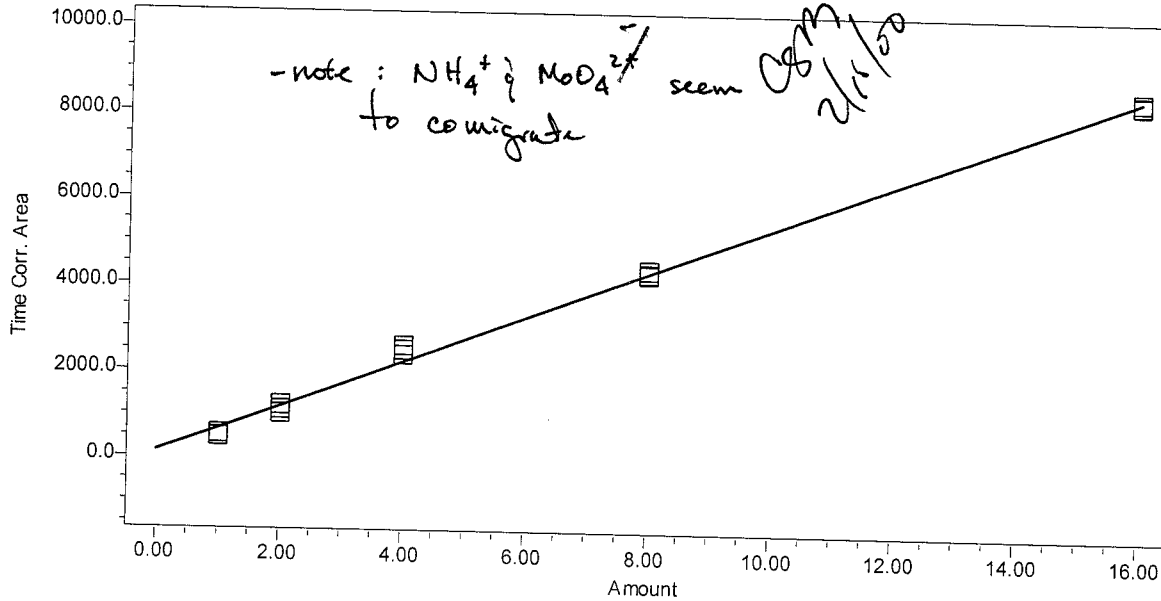
### Calibration Information

Name MoO42+  
System Waters\_CIA  
Channel SATIN

A 1.384091e+002  
B 5.247403e+002  
C 0.000000e+000  
D 0.000000e+000  
R^2 0.996934

Calibration Id 1916  
Date Calibrated 2/10/00 1:48:01 PM  
Time 3.143  
Processing Method Mo6 Calibration new

Calibration Plot



Peak: MoO42+

	Name	Level	X Value	Response	Calc. Value	% Deviation	Manual	Ignore
1	MoO42+	1	1.000000	487.035521	0.664379	-33.562	No	No
2	MoO42+	1	1.000000	544.318989	0.773544	-22.646	No	No
3	MoO42+	1	1.000000	472.679635	0.637021	-36.298	No	No
4	MoO42+	2	2.000000	1025.178430	1.689920	-15.504	No	No
5	MoO42+	2	2.000000	1119.361898	1.869406	-6.530	No	No
6	MoO42+	2	2.000000	1222.250098	2.065481	3.274	No	No
7	MoO42+	4	4.000000	2402.372926	4.314446	7.861	No	No
8	MoO42+	4	4.000000	2611.003451	4.712034	17.801	No	No
9	MoO42+	4	4.000000	2514.690688	4.528491	13.212	No	No
10	MoO42+	3	8.000000	4410.659341	8.141647	1.771	No	No
11	MoO42+	3	8.000000	4327.241109	7.982676	-0.217	No	No
12	MoO42+	3	8.000000	4301.849270	7.934287	-0.821	No	No
13	MoO42+	5	16.000000	8459.992115	15.858479	-0.885	No	No
14	MoO42+	5	16.000000	8534.623713	16.000704	0.004	No	No
15	MoO42+	5	16.000000	8443.728135	15.827484	-1.078	No	No

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by *S Brown*

2/10/00

TITLE \_\_\_\_\_

Project Name CE\_Setup\_Testin

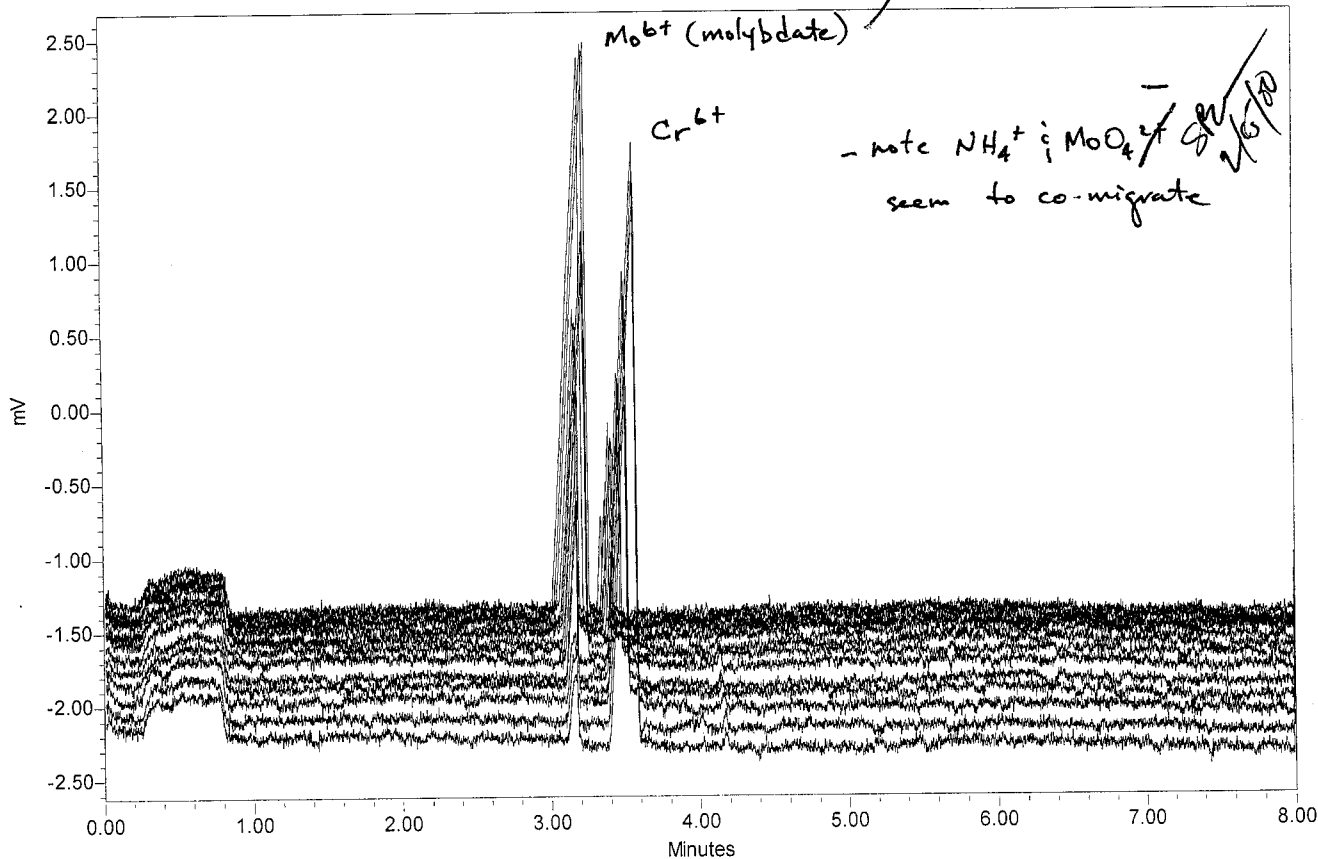
User Name Sean

Software Version 3.05.01

Report Method Name Cation Calibration Overlay

Current Date 2/10/00

Overlaid Chromatogram



- SampleName 1 ppm MoO4 + 16Cr6+ Vial 5 Injection 3 Channel SATIN Date Acquired 2/4/00 11:38:00 AM
- SampleName 1 ppm MoO4 + 16Cr6+ Vial 5 Injection 2 Channel SATIN Date Acquired 2/4/00 11:28:17 AM
- SampleName 1 ppm MoO4 + 16Cr6+ Vial 5 Injection 1 Channel SATIN Date Acquired 2/4/00 11:18:34 AM
- SampleName 2 ppm MoO4 + 8Cr6+ Vial 4 Injection 3 Channel SATIN Date Acquired 2/4/00 11:08:51 AM
- SampleName 2 ppm MoO4 + 8Cr6+ Vial 4 Injection 2 Channel SATIN Date Acquired 2/4/00 10:59:08 AM
- SampleName 2 ppm MoO4 + 8Cr6+ Vial 4 Injection 1 Channel SATIN Date Acquired 2/4/00 10:49:25 AM
- SampleName 8 ppm MoO4 + 4Cr6+ Vial 3 Injection 3 Channel SATIN Date Acquired 2/4/00 10:39:42 AM
- SampleName 8 ppm MoO4 + 4Cr6+ Vial 3 Injection 2 Channel SATIN Date Acquired 2/4/00 10:29:59 AM
- SampleName 8 ppm MoO4 + 4Cr6+ Vial 3 Injection 1 Channel SATIN Date Acquired 2/4/00 10:20:16 AM
- SampleName 4 ppm MoO4 + 2Cr6+ Vial 2 Injection 3 Channel SATIN Date Acquired 2/4/00 10:10:33 AM
- SampleName 4 ppm MoO4 + 2Cr6+ Vial 2 Injection 2 Channel SATIN Date Acquired 2/4/00 10:00:52 AM
- SampleName 4 ppm MoO4 + 2Cr6+ Vial 2 Injection 1 Channel SATIN Date Acquired 2/4/00 9:51:09 AM
- SampleName 16 ppm MoO4 + 1Cr6+ Vial 1 Injection 3 Channel SATIN Date Acquired 2/4/00 9:41:26 AM
- SampleName 16 ppm MoO4 + 1Cr6+ Vial 1 Injection 2 Channel SATIN Date Acquired 2/4/00 9:31:43 AM
- SampleName 16 ppm MoO4 + 1Cr6+ Vial 1 Injection 1 Channel SATIN Date Acquired 2/4/00 9:22:02 AM

To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by \_\_\_\_\_

2/15/00

SIS

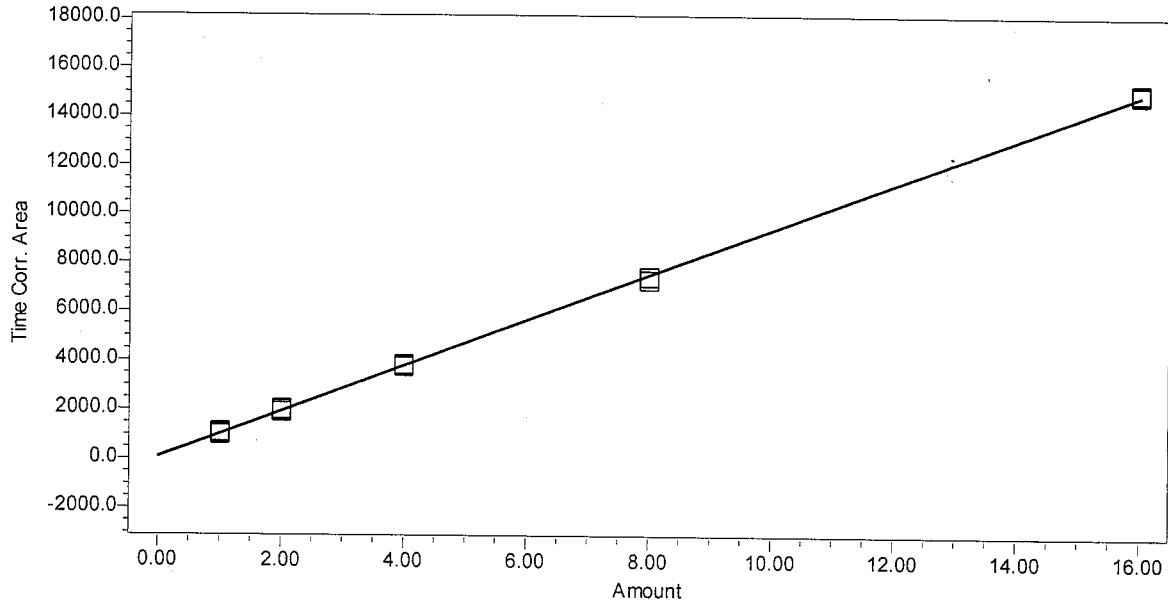
**Calibration Information**

Name Cr3+  
System Waters\_CIA  
Channel SATIN

A 9.189701e+001  
B 9.312502e+002  
C 0.000000e+000  
D 0.000000e+000  
R^2 0.999751

Calibration Id 1984  
Date Calibrated 2/10/00 2:13:52 PM  
Time 4.830  
Processing Method Cr3 Calibration

Calibration Plot



Peak: Cr3+

	Name	Level	X Value	Response	Calc. Value	% Deviation	Manual	Ignore
1	Cr3+		1.000000	1054.162729	1.033305	3.331	No	No
2	Cr3+		1.000000	1104.488534	1.087346	8.735	No	No
3	Cr3+		1.000000	1002.467768	0.977794	-2.221	No	No
4	Cr3+		2.000000	1919.353100	1.962369	-1.882	No	No
5	Cr3+		2.000000	2036.596922	2.088268	4.413	No	No
6	Cr3+		2.000000	2006.143119	2.055566	2.778	No	No
7	Cr3+		4.000000	3773.575337	3.953479	-1.163	No	No
8	Cr3+		4.000000	3862.709745	4.049194	1.230	No	No
9	Cr3+		4.000000	3833.491278	4.017818	0.445	No	No
10	Cr3+		8.000000	7325.980791	7.768142	-2.898	No	No
11	Cr3+		8.000000	7461.077429	7.913212	-1.085	No	No
12	Cr3+		8.000000	7465.041580	7.917469	-1.032	No	No
13	Cr3+		16.000000	15009.709091	16.019124	0.120	No	No
14	Cr3+		16.000000	15105.645385	16.122142	0.763	No	No
15	Cr3+		16.000000	15024.281128	16.034771	0.217	No	No

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

*[Signature]* 2/10/00

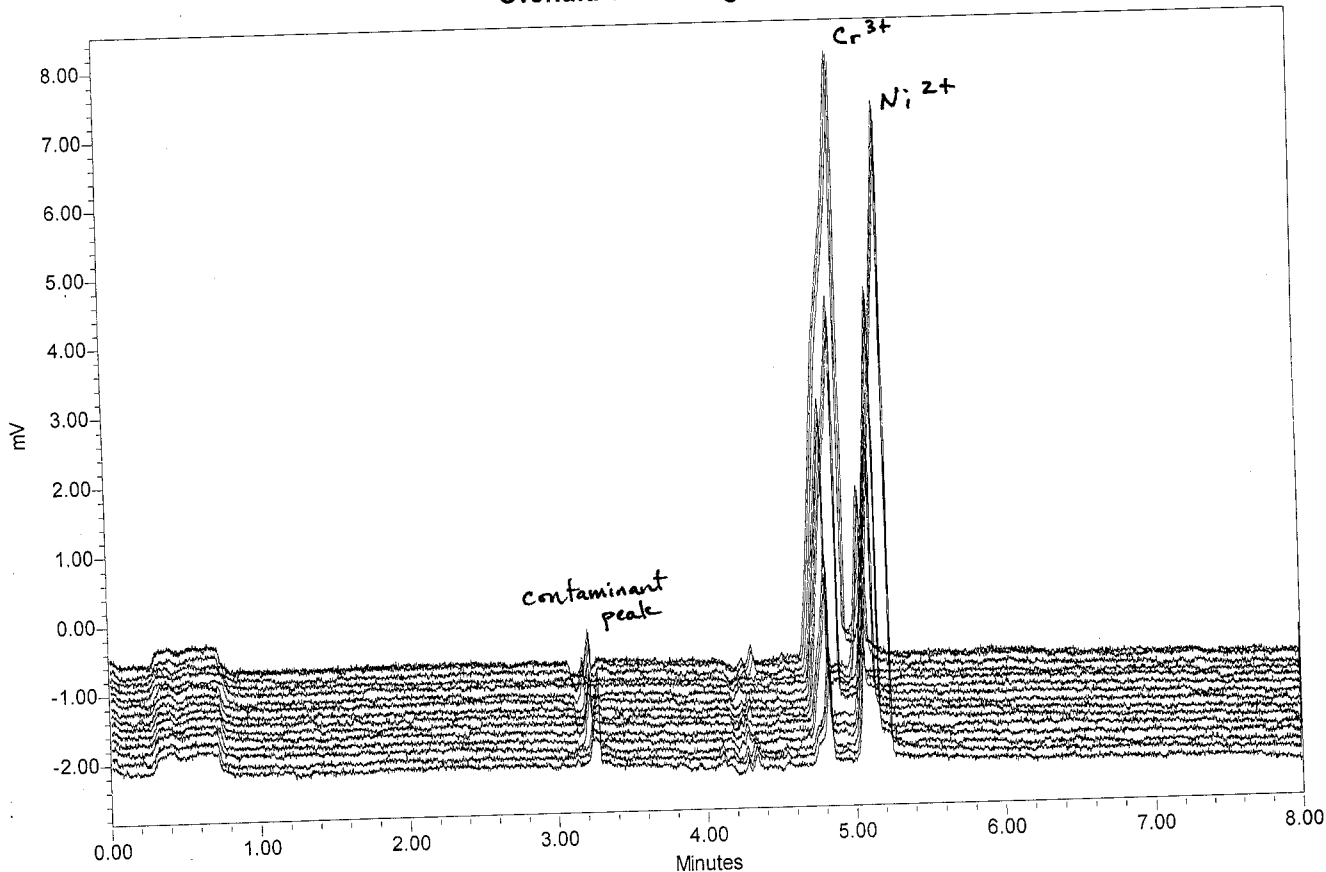
TITLE \_\_\_\_\_

From I

Project Name CE\_Setup\_Testin  
 User Name Sean  
 Software Version 3.05.01

Report Method Name Cation Calibration Overlay  
 Current Date 2/10/00

Overlaid Chromatogram



- SampleName 1 ppm Cr3+ + 16Ni2+ Vial 10 Injection 3 Channel SATIN Date Acquired 2/4/00 2:03:42 PM
- SampleName 1 ppm Cr3+ + 16Ni2+ Vial 10 Injection 2 Channel SATIN Date Acquired 2/4/00 1:53:59 PM
- SampleName 1 ppm Cr3+ + 16Ni2+ Vial 10 Injection 1 Channel SATIN Date Acquired 2/4/00 1:44:16 PM
- SampleName 2 ppm Cr3+ + 8Ni2+ Vial 9 Injection 3 Channel SATIN Date Acquired 2/4/00 1:34:33 PM
- SampleName 2 ppm Cr3+ + 8Ni2+ Vial 9 Injection 2 Channel SATIN Date Acquired 2/4/00 1:24:52 PM
- SampleName 2 ppm Cr3+ + 8Ni2+ Vial 9 Injection 1 Channel SATIN Date Acquired 2/4/00 1:15:09 PM
- SampleName 8 ppm Cr3+ + 4Ni2+ Vial 8 Injection 3 Channel SATIN Date Acquired 2/4/00 1:05:26 PM
- SampleName 8 ppm Cr3+ + 4Ni2+ Vial 8 Injection 2 Channel SATIN Date Acquired 2/4/00 12:55:43 PM
- SampleName 8 ppm Cr3+ + 4Ni2+ Vial 8 Injection 1 Channel SATIN Date Acquired 2/4/00 12:46:00 PM
- SampleName 4 ppm Cr3+ + 2Ni2+ Vial 7 Injection 3 Channel SATIN Date Acquired 2/4/00 12:36:17 PM
- SampleName 4 ppm Cr3+ + 2Ni2+ Vial 7 Injection 2 Channel SATIN Date Acquired 2/4/00 12:26:34 PM
- SampleName 4 ppm Cr3+ + 2Ni2+ Vial 7 Injection 1 Channel SATIN Date Acquired 2/4/00 12:16:52 PM
- SampleName 16 ppm Cr3+ + 1Ni2+ Vial 6 Injection 3 Channel SATIN Date Acquired 2/4/00 12:07:10 PM
- SampleName 16 ppm Cr3+ + 1Ni2+ Vial 6 Injection 2 Channel SATIN Date Acquired 2/4/00 11:57:26 AM
- SampleName 16 ppm Cr3+ + 1Ni2+ Vial 6 Injection 1 Channel SATIN Date Acquired 2/4/00 11:47:43 AM

To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by \_\_\_\_\_

*Signature*

2/10/00

Fri

Current Date 2/10/00

1 of 1

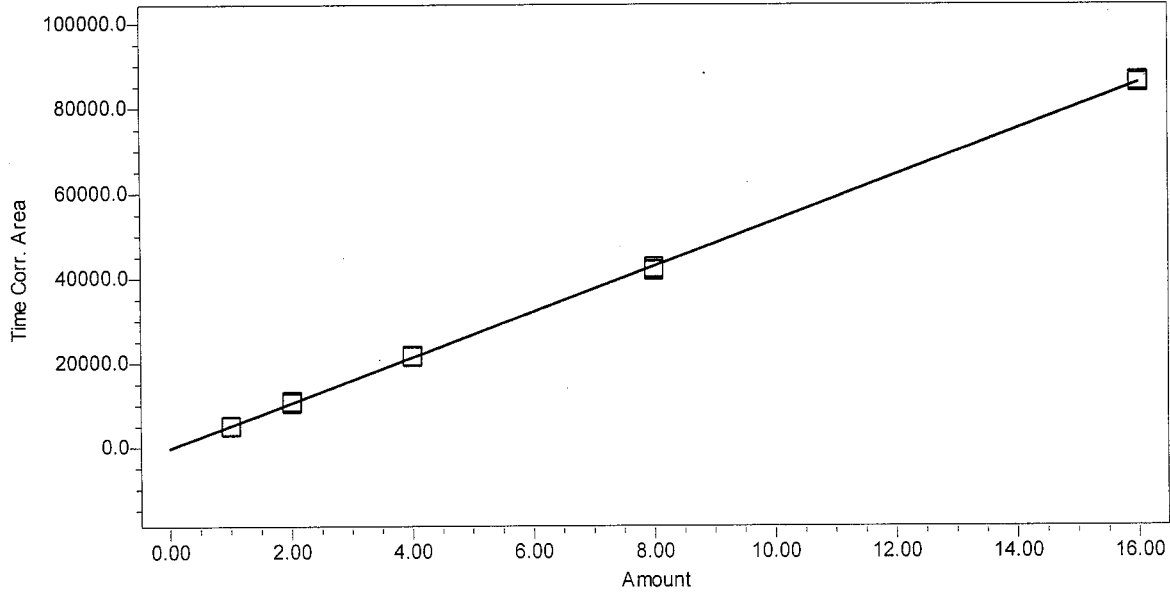
**Calibration Information**

Name Fe2+  
System Waters\_CIA  
Channel SATIN

A -2.672519e+002  
B 5.376621e+003  
C 0.000000e+000  
D 0.000000e+000  
R^2 0.999742

Calibration Id 2007  
Date Calibrated 2/10/00 2:52:57 PM  
Time 4.473  
Processing Method Fe2 Calibration

Calibration Plot



Peak: Fe2+

	Name	Level	X Value	Response	Calc. Value	% Deviation	Manual	Ignore
1	Fe2+		1.000000	4939.883592	0.968477	-3.152	No	No
2	Fe2+		1.000000	5019.182431	0.983226	-1.677	No	No
3	Fe2+		1.000000	5116.215997	1.001273	0.127	No	No
4	Fe2+		2.000000	10413.684502	1.986552	-0.672	No	No
5	Fe2+		2.000000	10603.493741	2.021855	1.093	No	No
6	Fe2+		2.000000	10962.071089	2.088547	4.427	No	No
7	Fe2+		4.000000	21439.744728	4.037293	0.932	No	No
8	Fe2+		4.000000	21532.080512	4.054467	1.362	No	No
9	Fe2+		4.000000	21735.473714	4.092296	2.307	No	No
10	Fe2+		8.000000	41750.843329	7.814963	-2.313	No	No
11	Fe2+		8.000000	42040.543711	7.868845	-1.639	No	No
12	Fe2+		8.000000	42523.163524	7.958607	-0.517	No	No
13	Fe2+		16.000000	85820.933484	16.011578	0.072	No	No
14	Fe2+		16.000000	86360.972082	16.112020	0.700	No	No

- note: 1 16 ppm  
Fe2+ peak discarded  
due to poor  
fit w/ other  
peaks

To Page No. \_\_\_\_\_

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

SB

2/10/00



TITLE \_\_\_\_\_

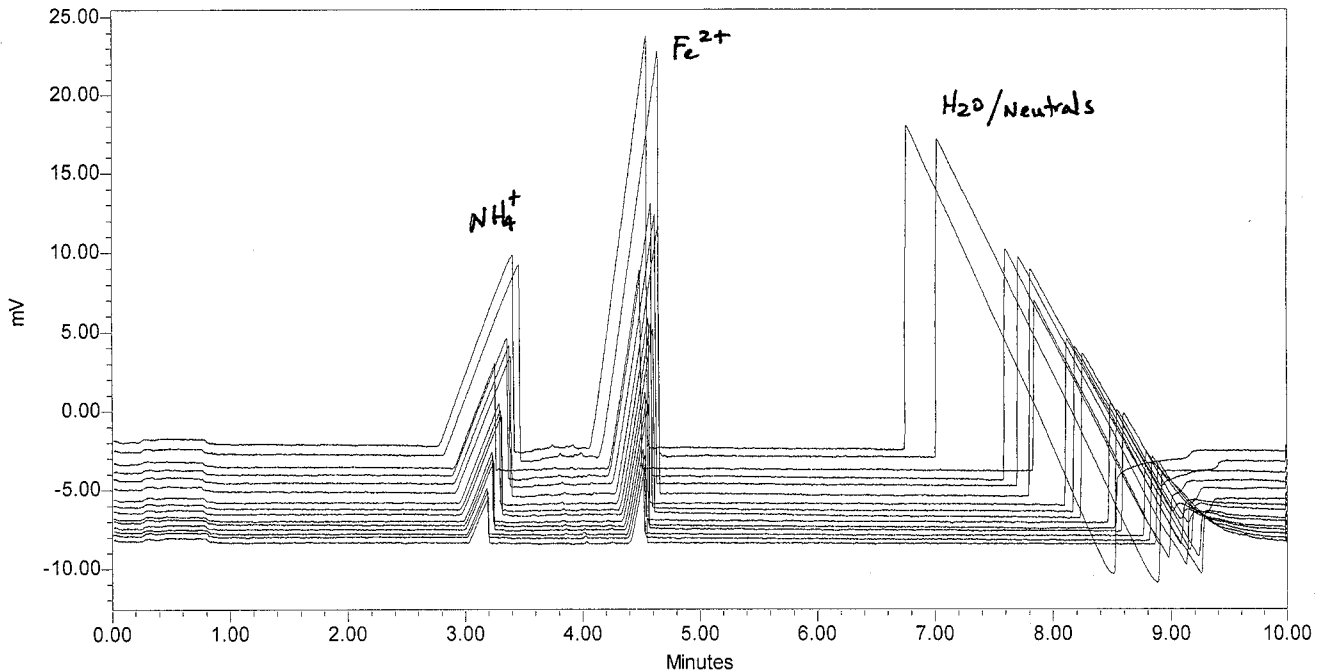
From \_\_\_\_\_

1 of 1

Project Name CE\_Setup\_Testin  
User Name Sean  
Software Version 3.05.01

Report Method Name Cation Calibration Overlay  
Current Date 2/10/00

Overlaid Chromatogram



- SampleName 1 ppm Fe2+ + 0.65 ppm NH4+ Vial 5 Injection 3 Channel SATIN Date Acquired 2/7/00 6:42:47 PM
- SampleName 1 ppm Fe2+ + 0.65 ppm NH4+ Vial 5 Injection 2 Channel SATIN Date Acquired 2/7/00 6:31:06 PM
- SampleName 1 ppm Fe2+ + 0.65 ppm NH4+ Vial 5 Injection 1 Channel SATIN Date Acquired 2/7/00 6:19:22 PM
- SampleName 2 ppm Fe2+ + 1.3 ppm NH4+ Vial 4 Injection 3 Channel SATIN Date Acquired 2/7/00 6:07:39 PM
- SampleName 2 ppm Fe2+ + 1.3 ppm NH4+ Vial 4 Injection 2 Channel SATIN Date Acquired 2/7/00 5:55:56 PM
- SampleName 2 ppm Fe2+ + 1.3 ppm NH4+ Vial 4 Injection 1 Channel SATIN Date Acquired 2/7/00 5:44:15 PM
- SampleName 4 ppm Fe2+ + 2.6 ppm NH4+ Vial 3 Injection 3 Channel SATIN Date Acquired 2/7/00 5:32:31 PM
- SampleName 4 ppm Fe2+ + 2.6 ppm NH4+ Vial 3 Injection 2 Channel SATIN Date Acquired 2/7/00 5:20:48 PM
- SampleName 4 ppm Fe2+ + 2.6 ppm NH4+ Vial 3 Injection 1 Channel SATIN Date Acquired 2/7/00 5:09:07 PM
- SampleName 8 ppm Fe2+ + 5.2 ppm NH4+ Vial 2 Injection 3 Channel SATIN Date Acquired 2/7/00 4:57:24 PM
- SampleName 8 ppm Fe2+ + 5.2 ppm NH4+ Vial 2 Injection 2 Channel SATIN Date Acquired 2/7/00 4:45:42 PM
- SampleName 8 ppm Fe2+ + 5.2 ppm NH4+ Vial 2 Injection 1 Channel SATIN Date Acquired 2/7/00 4:33:59 PM
- SampleName 16 ppm Fe2+ + 10.3 ppm NH4+ Vial 1 Injection 3 Channel SATIN Date Acquired 2/7/00 4:22:16 PM
- SampleName 16 ppm Fe2+ + 10.3 ppm NH4+ Vial 1 Injection 2 Channel SATIN Date Acquired 2/7/00 4:10:35 PM
- SampleName 16 ppm Fe2+ + 10.3 ppm NH4+ Vial 1 Injection 1 Channel SATIN Date Acquired 2/7/00 3:58:52 PM

To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by \_\_\_\_\_

*SB*

2/10/00

From P

Current Date 2/10/00

1 of 1

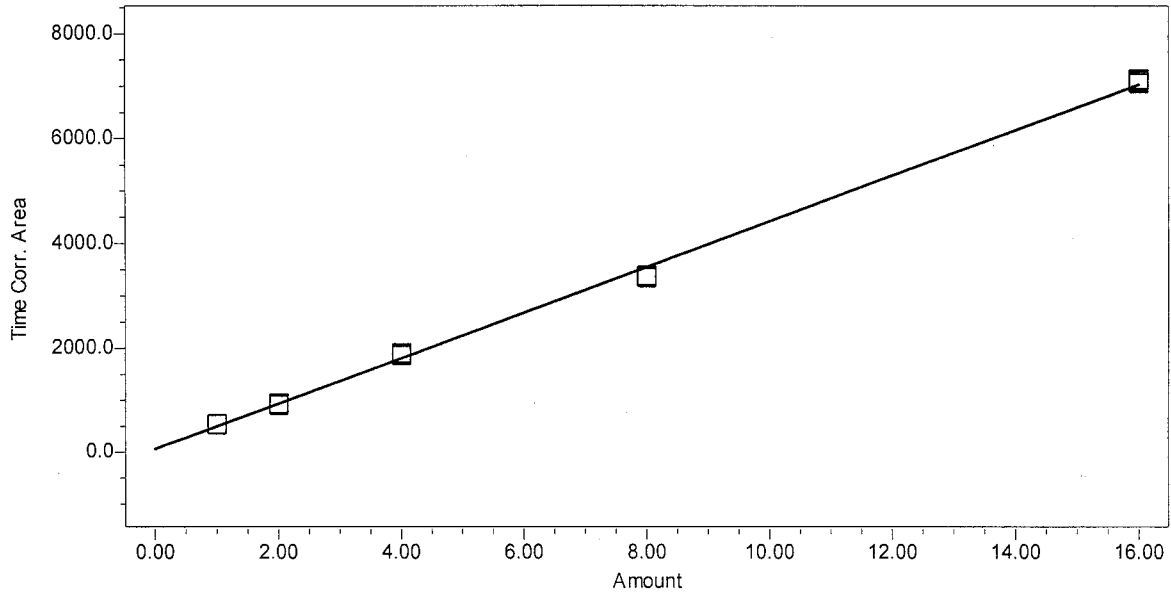
### Calibration Information

Name Cu2+  
System Waters\_CIA  
Channel SATIN

A 6.348324e+001  
B 4.356824e+002  
C 0.000000e+000  
D 0.000000e+000  
R^2 0.998365

Calibration Id 2034  
Date Calibrated 2/10/00 3:00:56 PM  
Time 7.077  
Processing Method Cu2 Calibration

Calibration Plot



Peak: Cu2+

	Name	Level	X Value	Response	Calc. Value	% Deviation	Manual	Ignore
1	Cu2+		1.000000	544.747892	1.104623	10.462	No	No
2	Cu2+		1.000000	537.266359	1.087451	8.745	No	No
3	Cu2+		1.000000	546.913922	1.109594	10.959	No	No
4	Cu2+		2.000000	915.965558	1.956660	-2.167	No	No
5	Cu2+		2.000000	940.229308	2.012352	0.618	No	No
6	Cu2+		2.000000	903.685530	1.928474	-3.576	No	No
7	Cu2+		4.000000	1892.502505	4.198057	4.951	No	No
8	Cu2+		4.000000	1907.356525	4.232150	5.804	No	No
9	Cu2+		4.000000	1860.911186	4.125547	3.139	No	No
10	Cu2+		8.000000	3353.745428	7.551975	-5.600	No	No
11	Cu2+		8.000000	3384.095325	7.621635	-4.730	No	No
12	Cu2+		8.000000	3377.514589	7.606531	-4.918	No	No
13	Cu2+		16.000000	7065.525766	16.071439	0.446	No	No
14	Cu2+		16.000000	7137.314509	16.236212	1.476	No	No
15	Cu2+		16.000000	7102.933654	16.157300	0.983	No	No

To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by S B

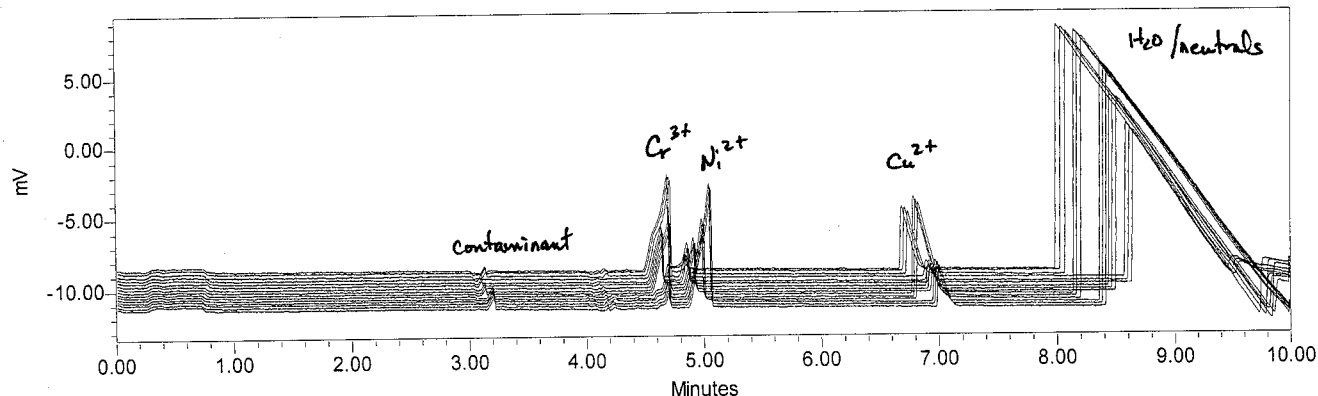
2/10/00

TITLE \_\_\_\_\_

Project Name CE\_Setup\_Testin  
User Name Sean  
Software Version 3.05.01

Report Method Name Cation Calibration Overlay  
Current Date 2/10/00

Overlaid Chromatogram



- SampleName 4 ppm  $Cu^{2+}$  +  $1Cr^{3+}$  +  $16Ni^{2+}$  Vial 10 Injection 3 Channel SATIN Date Acquired 2/7/00 9:38:28 PM
- SampleName 4 ppm  $Cu^{2+}$  +  $1Cr^{3+}$  +  $16Ni^{2+}$  Vial 10 Injection 2 Channel SATIN Date Acquired 2/7/00 9:26:44 PM
- SampleName 4 ppm  $Cu^{2+}$  +  $1Cr^{3+}$  +  $16Ni^{2+}$  Vial 10 Injection 1 Channel SATIN Date Acquired 2/7/00 9:15:01 PM
- SampleName 16 ppm  $Cu^{2+}$  +  $2Cr^{3+}$  +  $8Ni^{2+}$  Vial 9 Injection 3 Channel SATIN Date Acquired 2/7/00 9:03:20 PM
- SampleName 16 ppm  $Cu^{2+}$  +  $2Cr^{3+}$  +  $8Ni^{2+}$  Vial 9 Injection 2 Channel SATIN Date Acquired 2/7/00 8:51:37 PM
- SampleName 16 ppm  $Cu^{2+}$  +  $2Cr^{3+}$  +  $8Ni^{2+}$  Vial 9 Injection 1 Channel SATIN Date Acquired 2/7/00 8:39:53 PM
- SampleName 2 ppm  $Cu^{2+}$  +  $8Cr^{3+}$  +  $4Ni^{2+}$  Vial 8 Injection 3 Channel SATIN Date Acquired 2/7/00 8:28:10 PM
- SampleName 2 ppm  $Cu^{2+}$  +  $8Cr^{3+}$  +  $4Ni^{2+}$  Vial 8 Injection 2 Channel SATIN Date Acquired 2/7/00 8:16:28 PM
- SampleName 2 ppm  $Cu^{2+}$  +  $8Cr^{3+}$  +  $4Ni^{2+}$  Vial 8 Injection 1 Channel SATIN Date Acquired 2/7/00 8:04:47 PM
- SampleName 1 ppm  $Cu^{2+}$  +  $4Cr^{3+}$  +  $2Ni^{2+}$  Vial 7 Injection 3 Channel SATIN Date Acquired 2/7/00 7:53:03 PM
- SampleName 1 ppm  $Cu^{2+}$  +  $4Cr^{3+}$  +  $2Ni^{2+}$  Vial 7 Injection 2 Channel SATIN Date Acquired 2/7/00 7:41:22 PM
- SampleName 1 ppm  $Cu^{2+}$  +  $4Cr^{3+}$  +  $2Ni^{2+}$  Vial 7 Injection 1 Channel SATIN Date Acquired 2/7/00 7:29:38 PM
- SampleName 8 ppm  $Cu^{2+}$  +  $16Cr^{3+}$  +  $1Ni^{2+}$  Vial 6 Injection 3 Channel SATIN Date Acquired 2/7/00 7:17:56 PM
- SampleName 8 ppm  $Cu^{2+}$  +  $16Cr^{3+}$  +  $1Ni^{2+}$  Vial 6 Injection 2 Channel SATIN Date Acquired 2/7/00 7:06:14 PM
- SampleName 8 ppm  $Cu^{2+}$  +  $16Cr^{3+}$  +  $1Ni^{2+}$  Vial 6 Injection 1 Channel SATIN Date Acquired 2/7/00 6:54:33 PM

To Page No. \_\_\_\_\_

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by

2/16/00

From Pa Current Date 2/10/00

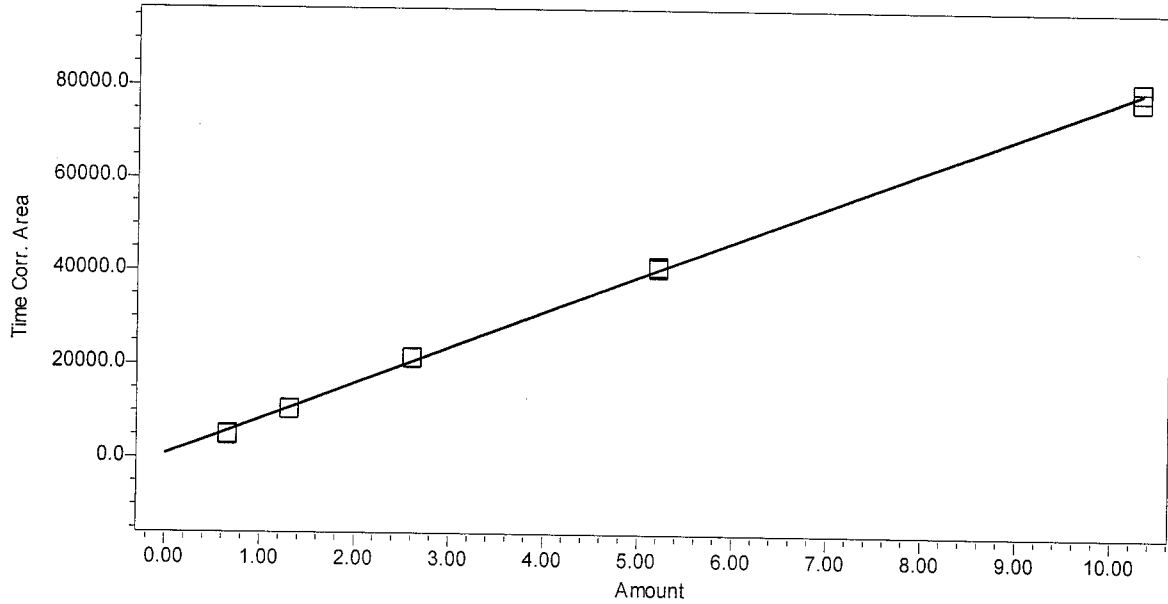
### Calibration Information

Name NH4+  
System Waters\_CIA  
Channel SATIN

A 8.690922e+002  
B 7.647959e+003  
C 0.000000e+000  
D 0.000000e+000  
R^2 0.999063

Calibration Id 2054  
Date Calibrated 2/10/00 3:04:28 PM  
Time 3.117  
Processing Method NH4 Calibration

Calibration Plot



Peak: NH4+

	Name	Level	X Value	Response	Calc. Value	% Deviation	Manual	Ignore
1	NH4+		0.650000	5147.744954	0.559450	-13.931	No	No
2	NH4+		0.650000	4991.833777	0.539064	-17.067	No	No
3	NH4+		0.650000	5229.344978	0.570120	-12.289	No	No
4	NH4+		1.300000	10552.733974	1.266173	-2.602	No	No
5	NH4+		1.300000	10530.355170	1.263247	-2.827	No	No
6	NH4+		1.300000	10557.299289	1.266770	-2.556	No	No
7	NH4+		2.600000	21605.210526	2.711327	4.282	No	No
8	NH4+		2.600000	21529.883033	2.701478	3.903	No	No
9	NH4+		2.600000	21559.875596	2.705399	4.054	No	No
10	NH4+		5.200000	41353.790642	5.293530	1.799	No	No
11	NH4+		5.200000	40972.034278	5.243614	0.839	No	No
12	NH4+		5.200000	41388.066561	5.298011	1.885	No	No
13	NH4+		10.300000	77989.157098	10.083745	-2.100	No	No
14	NH4+		10.300000	80010.718395	10.348071	0.467	No	No

-note: 1 NH4+ 16ppm peak discarded from calibration due to poor fit of other peaks

To Page No. \_\_\_\_\_

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Date

Invented by

Date

Recorded by

2/16/00

TITLE \_\_\_\_\_

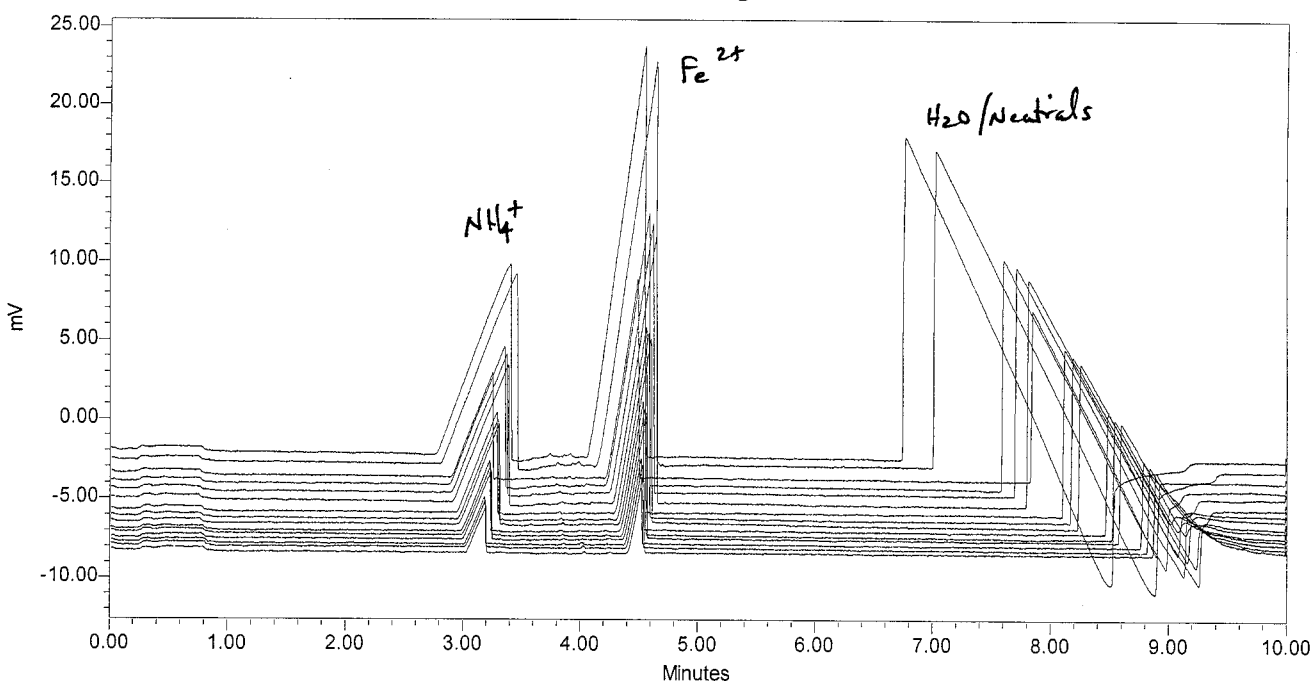
From Pa

1 of 1

Project Name CE\_Setup\_Testin  
User Name Sean  
Software Version 3.05.01

Report Method Name Cation Calibration Overlay  
Current Date 2/10/00

Overlaid Chromatogram



SampleName 1 ppm Fe2+ + 0.65 ppm NH4+ Vial 5 Injection 3 Channel SATIN Date Acquired 2/7/00 6:42:47 PM

SampleName 1 ppm Fe2+ + 0.65 ppm NH4+ Vial 5 Injection 2 Channel SATIN Date Acquired 2/7/00 6:31:06 PM

SampleName 1 ppm Fe2+ + 0.65 ppm NH4+ Vial 5 Injection 1 Channel SATIN Date Acquired 2/7/00 6:19:22 PM

SampleName 2 ppm Fe2+ + 1.3 ppm NH4+ Vial 4 Injection 3 Channel SATIN Date Acquired 2/7/00 6:07:39 PM

SampleName 2 ppm Fe2+ + 1.3 ppm NH4+ Vial 4 Injection 2 Channel SATIN Date Acquired 2/7/00 5:55:56 PM

SampleName 2 ppm Fe2+ + 1.3 ppm NH4+ Vial 4 Injection 1 Channel SATIN Date Acquired 2/7/00 5:44:15 PM

SampleName 4 ppm Fe2+ + 2.6 ppm NH4+ Vial 3 Injection 3 Channel SATIN Date Acquired 2/7/00 5:32:31 PM

SampleName 4 ppm Fe2+ + 2.6 ppm NH4+ Vial 3 Injection 2 Channel SATIN Date Acquired 2/7/00 5:20:48 PM

SampleName 4 ppm Fe2+ + 2.6 ppm NH4+ Vial 3 Injection 1 Channel SATIN Date Acquired 2/7/00 5:09:07 PM

SampleName 8 ppm Fe2+ + 5.2 ppm NH4+ Vial 2 Injection 3 Channel SATIN Date Acquired 2/7/00 4:57:24 PM

SampleName 8 ppm Fe2+ + 5.2 ppm NH4+ Vial 2 Injection 2 Channel SATIN Date Acquired 2/7/00 4:45:42 PM

SampleName 8 ppm Fe2+ + 5.2 ppm NH4+ Vial 2 Injection 1 Channel SATIN Date Acquired 2/7/00 4:33:59 PM

SampleName 16 ppm Fe2+ + 10.3 ppm NH4+ Vial 1 Injection 3 Channel SATIN Date Acquired 2/7/00 4:22:16 PM

SampleName 16 ppm Fe2+ + 10.3 ppm NH4+ Vial 1 Injection 2 Channel SATIN Date Acquired 2/7/00 4:10:35 PM

SampleName 16 ppm Fe2+ + 10.3 ppm NH4+ Vial 1 Injection 1 Channel SATIN Date Acquired 2/7/00 3:58:52 PM

To Page No. \_\_\_\_\_

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2/10/00

From Page No. \_\_\_\_\_

Trying 1.5 mM  $\text{Na}_2\text{SO}_4$  + 2 mM OFM-BT pH adjusted to 10.5 with  $\text{NaOH}$  for analysis of Chromate, molybdate and tungstate in presence of high  $[\text{Cl}^-]$  to support dissolution studies of C-22

- 214 nm direct detection

- Electrolyte prepared w/ DI water,  $\text{Na}_2\text{SO}_4$  (Lot # 901213) and 100 mM OFM-BT solution from Waters Corp. (Lot # 905640)

Stds used:

1000  $\text{Cr}^{6+}$  as  $\text{CrO}_4^{2-} \Rightarrow 2231$  ppm  
 1000 ppm  $\text{Mo}^{6+}$  as  $\text{MoO}_4^{2-} \Rightarrow 1667$  ppm  
 1000 ppm  $\text{W}^{6+}$  as  $\text{WO}_4^{2-} \Rightarrow 1348$  ppm

Example calculation:

$$1000 \text{ ppm } \text{Cr}^{6+} = \frac{1000 \times 10^{-3} \text{ g Cr}}{\text{L}} \left| \frac{1 \text{ mol Cr}}{51.996 \text{ g}} \right. = 0.019232248 \text{ mol/L}$$

$$1 \frac{\text{mol } \text{Cr}^{6+}}{\text{L}} = 1 \frac{\text{mol } \text{CrO}_4^{2-}}{\text{L}}$$

$$[\text{CrO}_4^{2-}] = 0.019232248 \text{ M}$$

$$0.019232248 \frac{\text{mol } \text{CrO}_4^{2-}}{\text{L}} \left| \frac{115.9944 \text{ g}}{\text{mol}} \right. \Rightarrow \frac{2.2308 \text{ g}}{\text{L}} = 2230.8 \text{ ppm}$$

Concentration (ppm)	volume of $\text{CrO}_4^{2-}$	standard in $\text{MoO}_4^{2-}$	100 mL $\text{WO}_4^{2-}$
1	44.8 $\mu\text{L}$	60 $\mu\text{L}$	74.2 $\mu\text{L}$
2	90 $\mu\text{L}$	120 $\mu\text{L}$	148 $\mu\text{L}$
6	269 $\mu\text{L}$	360 $\mu\text{L}$	445 $\mu\text{L}$
16	717 $\mu\text{L}$	960 $\mu\text{L}$	1187 $\mu\text{L}$

To Page No. \_\_\_\_\_

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Date \_\_\_\_\_

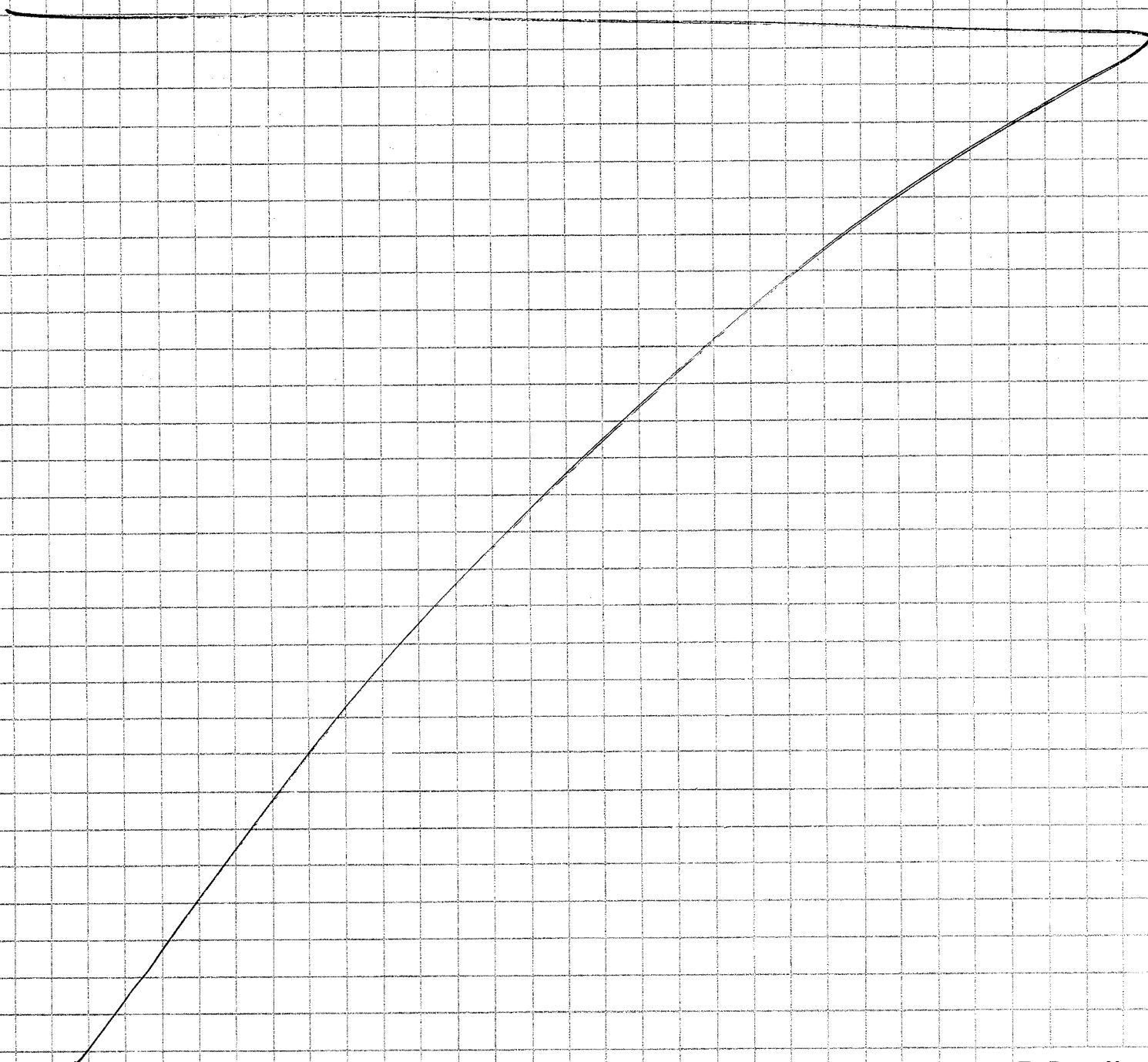
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TITLE \_\_\_\_\_

From Page No. \_\_\_\_\_

- Ni<sup>2+</sup> and Cr<sup>3+</sup> standard calibration curves using 1, 2, 4, 8 ppm generated using alternate cation method for high Na samples
- MDL (min. detection limit) for each also examined



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6/14/00

From Page No. \_\_\_\_\_

C-22 passive dissolution studies  
used alternate cation analysis method to examine cation  
dissolution from C-22 in 1000 ppm  $\text{Cl}^-$  (as  $\text{KCl}$ ) at  $95^\circ\text{C}$   
and  $E_{\text{appt}}$  of  $+0.1\text{V}$  vs  $\text{SCE}$  (reference electrode)

Solution aliquots

Observations

initial (ocp)
24h polarization
94h "
184h "
260h "
311h "

some contaminant peaks, most likely $\text{Mg}$ , $\text{Al}$
no metal cations
no metal cations
no metal cations
no metal cations
no metal cations

- not sufficient charge passed for reaching mol of transition metal cations.

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*CSB*

3/2/00



TITLE \_\_\_\_\_

From Page No. \_\_\_\_\_

C-22 in transpassive range in 1000 ppm Cl (as KCl) at 95°C, deaerated at +500 mV SCE

alliquot timesspecies, concentrations

<u>alliquot times</u>	<u>species, concentrations</u>
7/12 SB initial	initial
7/13 SB 22 h	$\text{CrO}_4^{2-}$ 5.65 ppm, $\text{MoO}_4^{2-}$ 1.51 ppm, $\text{WO}_4^{2-}$ 3.5 ppm, $\text{Ni}^{2+}$ 0.28 ppm
7/14 SB 46 h	$\text{CrO}_4^{2-}$ 8.2 ppm, $\text{MoO}_4^{2-}$ 2.7 ppm, $\text{WO}_4^{2-}$ 4.5 ppm, $\text{Ni}^{2+}$ 0.51 ppm
7/17 SB 122 h	$\text{CrO}_4^{2-}$ 27.2 ppm, $\text{MoO}_4^{2-}$ 6.4 ppm, $\text{WO}_4^{2-}$ 0.2 ppm, $\text{Ni}^{2+}$ 1.5 ppm
7/18 SB 144 h	$\text{CrO}_4^{2-}$ 36.3 ppm, $\text{MoO}_4^{2-}$ 8.1 ppm, $\text{WO}_4^{2-}$ 0, $\text{Ni}^{2+}$ 0.8 ppm
7/19 SB 183.5 h	$\text{CrO}_4^{2-}$ 43.3 ppm, $\text{MoO}_4^{2-}$ 10.1 ppm, $\text{Ni}^{2+}$ 0.5 ppm
7/21 SB 214.8	$\text{CrO}_4^{2-}$ 57.7 ppm, $\text{MoO}_4^{2-}$ 13.7 ppm, $\text{Ni}^{2+}$ 0
7/24 SB 286.4	$\text{CrO}_4^{2-}$ 72.3 ppm, $\text{MoO}_4^{2-}$ 23.1 ppm
7/26 SB 333.3 h (end)	$\text{CrO}_4^{2-}$ 83.1 ppm, $\text{MoO}_4^{2-}$ 25.9 ppm

To Page No. \_\_\_\_\_

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7/12/00

From Page No. \_\_\_\_\_



### CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

#### SCIENTIFIC NOTEBOOK REVIEW CHECKLIST RECORD

Scientific Notebook No.: 390

Accomplished

YES

1. Initial entries per QAP-001

YES

2. Dating of entries

YES

3. Corrections (crossed out, one line through w/initials/date)

YES

4. White out not used

YES

5. Page number visible on original notebook

YES

6. In process entries per QAP-001

N/A

7. Figure numbers present

YES

8. Text visible

N/A

9. Electronic Scientific Notebook changes initialed and dated

NO

10. Permanent ink or type only — pencil used to write down entry password c.de. Corrected SB 8/16/2000

YES

11. Signing of entries (not required on each page)

N/A

12. Statement at the end of electronic Scientific Notebook print outs—"No original text removed"

N/A

13. Electronic media in the scientific notebook property labeled

Discrepancies have been identified. Yes \_\_\_\_\_ No \_\_\_\_\_

Checker: \_\_\_\_\_ Date: \_\_\_\_\_

The discrepancies identified in this Scientific Notebook Review Checklist have been addressed by:

SB  
Signature

8/16/2000  
Date

CNWRA Form QAP-01 (8/2000)

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Date \_\_\_\_\_

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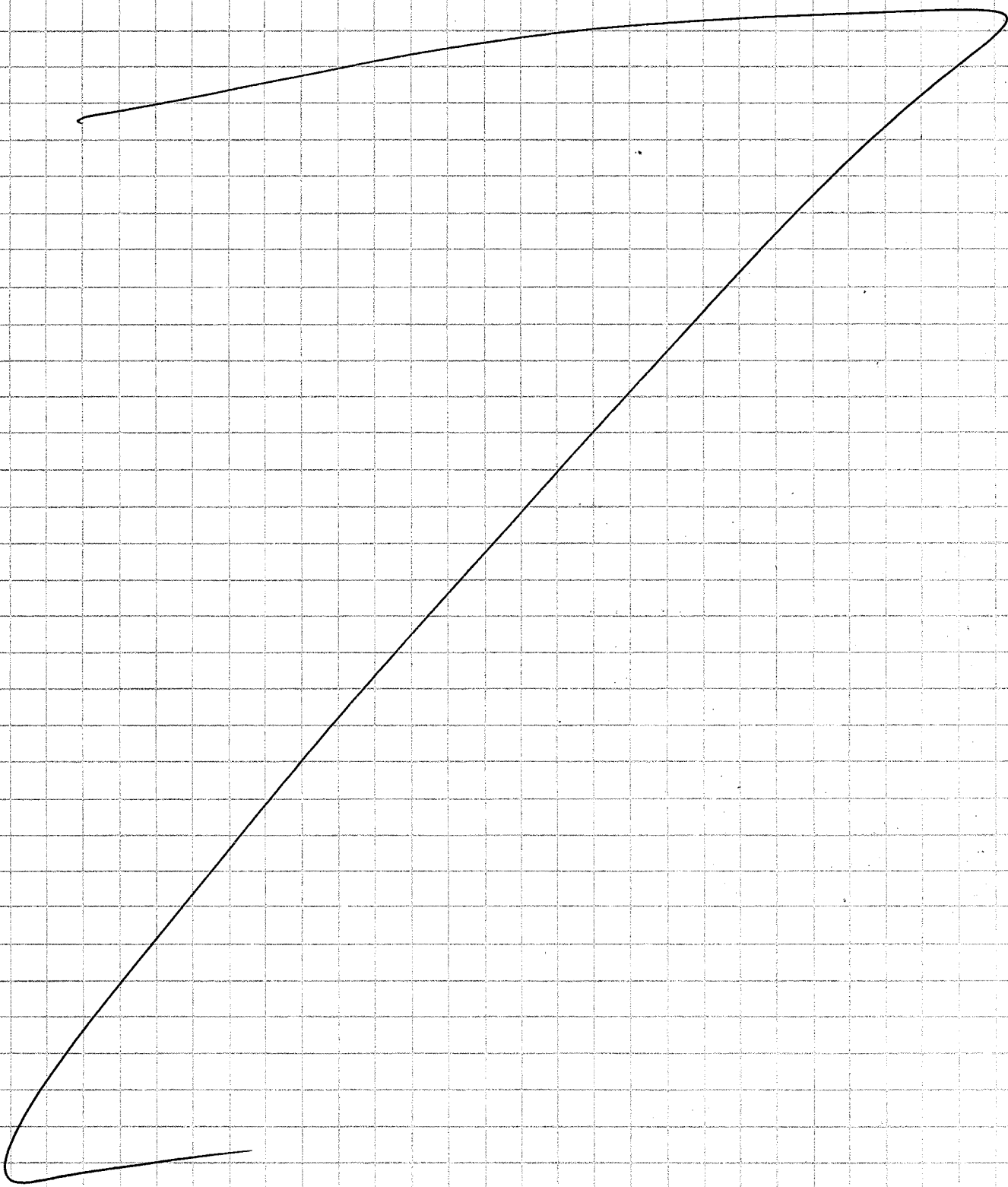
SB

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9/5/2000

From Page No. \_\_\_\_\_

C 22 Passive film Chemistry - Solution 1,000ppm  $\text{Cl}^-$  As  ~~$\text{NaCl}$~~   $\text{KCl}$  also 11/20/01

Standards @ (3 ppm)

 $\text{NH}_4^+$  /  $\text{Fe}^{2+}$   
 $\text{Cr}^{3+}$   
 $\text{Ni}^{2+}$   
 $\text{K}^+$   
 $\text{Na}^+$ 
Also Test solutions are of 20% HCl  
for PT Counter Electrode cleaning/Analysis

Solutions Testers. well #

- #1 =  $\text{Fe}^{2+}$   
 #2 =  $\text{Cr}^{3+}$   
 #3 =  $\text{Ni}^{2+}$   
 #4 =  $\text{K}^+$   
 #5 =  $\text{Na}^+$   
 #6 = Test #6 Solution = 60°C for 96hrs.  
 #7 = Test #6 Solution = 20% HCl PT Flag  
 #8 = Test #7 Solution = 60°C for 168hrs.  
 #9 = Test #7 Solution = 20% HCl PT Flag  
 #10 = Test #8 Solution = 95°C for 168hrs.  
 #11 = Test #8 Solution = 20% HCl PT Flag  
 #12 = Test #9 Solution = 60°C for 168hrs.  
 #13 = Test #9 Solution = 20% HCl PT Flag  
 #14 = Test #10 Solution = 60°C for 168hrs.  
 #15 = Test #10 Solution = 20% HCl PT Flag  
 #16 = Test #11 Solution = 60°C for 168hrs.  
 #17 = Test #11 Solution = 20% HCl PT Flag  
 #18 = DI water

Test checks on #39-41

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Date \_\_\_\_\_

Recorded by \_\_\_\_\_

11/20/01

TITLE \_\_\_\_\_

From Page No. \_\_\_\_\_

C22\_Dissolution as Brian/Analyst - Project Injections

Vial	Injection	SampleName	Sample Type	Sample Set Name	Date Acquired	Acq Method Set
1	17	3 sample 11 20%HCl PT Flag	Unknown	Cation Block Sample	10/11/01 12:19:58 AM	Cation no anal_report
2	17	2 sample 11 20%HCl PT Flag	Unknown	Cation Block Sample	10/11/01 12:09:44 AM	Cation no anal_report
3	17	1 sample 11 20%HCl PT Flag	Unknown	Cation Block Sample	10/10/01 11:59:32 PM	Cation no anal_report
4	16	3 sample 11 @60C for 168hrs	Unknown	Cation Block Sample	10/10/01 11:49:20 PM	Cation no anal_report
5	16	2 sample 11 @60C for 168hrs	Unknown	Cation Block Sample	10/10/01 11:39:08 PM	Cation no anal_report
6	16	1 sample 11 @60C for 168hrs	Unknown	Cation Block Sample	10/10/01 11:28:54 PM	Cation no anal_report
7	15	3 sample 10 20%HCl PT Flag	Unknown	Cation Block Sample	10/10/01 11:18:40 PM	Cation no anal_report
8	15	2 sample 10 20%HCl PT Flag	Unknown	Cation Block Sample	10/10/01 11:08:27 PM	Cation no anal_report
9	15	1 sample 10 20%HCl PT Flag	Unknown	Cation Block Sample	10/10/01 10:58:15 PM	Cation no anal_report
10	14	3 sample 10 @60C for 168hrs	Unknown	Cation Block Sample	10/10/01 10:48:01 PM	Cation no anal_report
11	14	2 sample 10 @60C for 168hrs	Unknown	Cation Block Sample	10/10/01 10:37:49 PM	Cation no anal_report
12	14	1 sample 10 @60C for 168hrs	Unknown	Cation Block Sample	10/10/01 10:27:37 PM	Cation no anal_report
13	13	3 sample 9 20%HCl PT Flag	Unknown	Cation Block Sample	10/10/01 10:17:23 PM	Cation no anal_report
14	13	2 sample 9 20%HCl PT Flag	Unknown	Cation Block Sample	10/10/01 10:07:11 PM	Cation no anal_report
15	13	1 sample 9 20%HCl PT Flag	Unknown	Cation Block Sample	10/10/01 9:56:59 PM	Cation no anal_report
16	12	3 sample 9 @60C for 168hrs	Unknown	Cation Block Sample	10/10/01 9:46:45 PM	Cation no anal_report
17	12	2 sample 9 @60C for 168hrs	Unknown	Cation Block Sample	10/10/01 9:36:32 PM	Cation no anal_report
18	12	1 sample 9 @60C for 168hrs	Unknown	Cation Block Sample	10/10/01 9:26:20 PM	Cation no anal_report
19	11	3 sample 8 20%HCl PT Flag	Unknown	Cation Block Sample	10/10/01 9:16:09 PM	Cation no anal_report
20	11	2 sample 8 20%HCl PT Flag	Unknown	Cation Block Sample	10/10/01 9:05:55 PM	Cation no anal_report
21	11	1 sample 8 20%HCl PT Flag	Unknown	Cation Block Sample	10/10/01 8:55:43 PM	Cation no anal_report
22	10	3 sample 8 @95c for 168hrs	Unknown	Cation Block Sample	10/10/01 8:45:29 PM	Cation no anal_report
23	10	2 sample 8 @95c for 168hrs	Unknown	Cation Block Sample	10/10/01 8:35:17 PM	Cation no anal_report
24	10	1 sample 8 @95c for 168hrs	Unknown	Cation Block Sample	10/10/01 8:25:03 PM	Cation no anal_report
25	9	3 sample 7 20%HCl PT Flag	Unknown	Cation Block Sample	10/10/01 8:14:50 PM	Cation no anal_report
26	9	2 sample 7 20%HCl PT Flag	Unknown	Cation Block Sample	10/10/01 8:04:36 PM	Cation no anal_report
27	9	1 sample 7 20%HCl PT Flag	Unknown	Cation Block Sample	10/10/01 7:54:24 PM	Cation no anal_report
28	8	3 sample 7 @ 60c for 168hrs	Unknown	Cation Block Sample	10/10/01 7:44:12 PM	Cation no anal_report
29	8	2 sample 7 @ 60c for 168hrs	Unknown	Cation Block Sample	10/10/01 7:33:59 PM	Cation no anal_report
30	8	1 sample 7 @ 60c for 168hrs	Unknown	Cation Block Sample	10/10/01 7:23:47 PM	Cation no anal_report
31	7	3 sample 6 20%HCl PT Flag	Unknown	Cation Block Sample	10/10/01 7:13:35 PM	Cation no anal_report
32	7	2 sample 6 20%HCl PT Flag	Unknown	Cation Block Sample	10/10/01 7:03:21 PM	Cation no anal_report
33	7	1 sample 6 20%HCl PT Flag	Unknown	Cation Block Sample	10/10/01 6:53:09 PM	Cation no anal_report
34	6	3 sample 6 @60C for 96hrs	Unknown	Cation Block Sample	10/10/01 6:42:56 PM	Cation no anal_report
35	6	2 sample 6 @60C for 96hrs	Unknown	Cation Block Sample	10/10/01 6:32:43 PM	Cation no anal_report
36	6	1 sample 6 @60C for 96hrs	Unknown	Cation Block Sample	10/10/01 6:22:32 PM	Cation no anal_report
37	5	3 3 ppm Na+	Standard	Cation Block Sample	10/10/01 6:12:18 PM	Cation no anal_report
38	5	2 3 ppm Na+	Standard	Cation Block Sample	10/10/01 6:02:04 PM	Cation no anal_report
39	5	1 3 ppm Na+	Standard	Cation Block Sample	10/10/01 5:51:52 PM	Cation no anal_report
40	4	3 3 ppm K+	Standard	Cation Block Sample	10/10/01 5:41:39 PM	Cation no anal_report
41	4	2 3 ppm K+	Standard	Cation Block Sample	10/10/01 5:31:25 PM	Cation no anal_report
42	4	1 3 ppm K+	Standard	Cation Block Sample	10/10/01 5:21:13 PM	Cation no anal_report
43	3	3 3 ppm Ni2+	Standard	Cation Block Sample	10/10/01 5:10:59 PM	Cation no anal_report
44	3	2 3 ppm Ni2+	Standard	Cation Block Sample	10/10/01 5:00:48 PM	Cation no anal_report
45	3	1 3 ppm Ni2+	Standard	Cation Block Sample	10/10/01 4:50:36 PM	Cation no anal_report
46	2	3 3 ppm Cr3+	Standard	Cation Block Sample	10/10/01 4:40:21 PM	Cation no anal_report
47	2	2 3 ppm Cr3+	Standard	Cation Block Sample	10/10/01 4:30:09 PM	Cation no anal_report
48	2	1 3 ppm Cr3+	Standard	Cation Block Sample	10/10/01 4:19:57 PM	Cation no anal_report
49	1	3 3 ppm Fe2+	Standard	Cation Block Sample	10/10/01 4:09:45 PM	Cation no anal_report
50	1	2 3 ppm Fe2+	Standard	Cation Block Sample	10/10/01 3:59:31 PM	Cation no anal_report

C22\_Dissolution as Brian/Analyst - Project Injections

Vial	Injection	SampleName	Sample Type	Sample Set Name	Date Acquired	Acq Method Set
51	1	3 ppm Fe2+	Standard	Cation Block Sample	10/10/01 3:49:19 PM	Cation no anal_report

To Page No. \_\_\_\_\_

Witnessed & Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by \_\_\_\_\_

*B. Dot*

11/30/01

From Page No. \_\_\_\_\_

C22\_Dissolution as Brian/Analyst - Project Injections

Vial	Injection	SampleName	Sample Type	Sample Set Name	Date Acquired	Acq Method Set
1	17	1 sample 11 20%HCl PT Flag	Unknown	Cation Block Sample 2	10/11/01 10:35:53 AM	Cation no anal_report
2	16	1 sample 11 @60C for 168hrs	Unknown	Cation Block Sample 2	10/11/01 10:20:41 AM	Cation no anal_report
3	15	1 sample 10 20%HCl PT Flag	Unknown	Cation Block Sample 2	10/11/01 10:05:27 AM	Cation no anal_report
4	14	1 sample 10 @60C for 168hrs	Unknown	Cation Block Sample 2	10/11/01 9:50:15 AM	Cation no anal_report
5	13	1 sample 9 20%HCl PT Flag	Unknown	Cation Block Sample 2	10/11/01 9:35:03 AM	Cation no anal_report
6	12	1 sample 9 @60C for168hrs	Unknown	Cation Block Sample 2	10/11/01 9:19:51 AM	Cation no anal_report
7	11	1 sample 8 20%HCl PT Flag	Unknown	Cation Block Sample 2	10/11/01 9:04:39 AM	Cation no anal_report
8	10	1 sample 8 @95c for 168hrs	Unknown	Cation Block Sample 2	10/11/01 8:49:25 AM	Cation no anal_report
9	9	1 sample 7 20%HCl PT Flag	Unknown	Cation Block Sample 2	10/11/01 8:34:13 AM	Cation no anal_report
10	8	1 sample 7 @ 60c for 168hrs	Unknown	Cation Block Sample 2	10/11/01 8:19:00 AM	Cation no anal_report
11	7	1 sample 6 20%HCl PT Flag	Unknown	Cation Block Sample 2	10/11/01 8:03:48 AM	Cation no anal_report
12	6	1 sample 6 @60C for 96hrs	Unknown	Cation Block Sample 2	10/11/01 7:48:36 AM	Cation no anal_report

C22\_Dissolution as Brian/Analyst - Project Injections

Vial	Injection	SampleName	Sample Type	Sample Set Name	Date Acquired	Acq Method Set
1	18	1 DI water	Unknown	Cation Block Specimen 3	10/11/01 4:58:05 PM	Cation no anal_report
2	17	1 sample 11 20%HCl PT Flag	Unknown	Cation Block Specimen 3	10/11/01 4:42:53 PM	Cation no anal_report
3	16	1 sample 11 @60C for 168hrs	Unknown	Cation Block Specimen 3	10/11/01 4:27:41 PM	Cation no anal_report
4	15	1 sample 10 20%HCl PT Flag	Unknown	Cation Block Specimen 3	10/11/01 4:12:27 PM	Cation no anal_report
5	14	1 sample 10 @60C for 168hrs	Unknown	Cation Block Specimen 3	10/11/01 3:57:15 PM	Cation no anal_report
6	13	1 sample 9 20%HCl PT Flag	Unknown	Cation Block Specimen 3	10/11/01 3:42:04 PM	Cation no anal_report
7	12	1 sample 9 @60C for168hrs	Unknown	Cation Block Specimen 3	10/11/01 3:26:50 PM	Cation no anal_report
8	11	1 sample 8 20%HCl PT Flag	Unknown	Cation Block Specimen 3	10/11/01 3:11:40 PM	Cation no anal_report
9	10	1 sample 8 @95c for 168hrs	Unknown	Cation Block Specimen 3	10/11/01 2:56:26 PM	Cation no anal_report
10	9	1 sample 7 20%HCl PT Flag	Unknown	Cation Block Specimen 3	10/11/01 2:41:14 PM	Cation no anal_report
11	8	1 sample 7 @ 60c for 168hrs	Unknown	Cation Block Specimen 3	10/11/01 2:25:59 PM	Cation no anal_report
12	7	1 sample 6 20%HCl PT Flag	Unknown	Cation Block Specimen 3	10/11/01 2:10:48 PM	Cation no anal_report
13	6	1 sample 6 @60C for 96hrs	Unknown	Cation Block Specimen 3	10/11/01 1:55:35 PM	Cation no anal_report
14	5	1 3ppm Na+	Standard	Cation Block Specimen 3	10/11/01 1:40:22 PM	Cation no anal_report
15	4	1 3ppm K+	Standard	Cation Block Specimen 3	10/11/01 1:25:10 PM	Cation no anal_report
16	3	1 3ppm Ni2+	Standard	Cation Block Specimen 3	10/11/01 1:09:57 PM	Cation no anal_report
17	2	1 3ppm Cr3+	Standard	Cation Block Specimen 3	10/11/01 12:54:46 PM	Cation no anal_report
18	1	1 3ppm Fe2+	Standard	Cation Block Specimen 3	10/11/01 12:39:33 PM	Cation no anal_report

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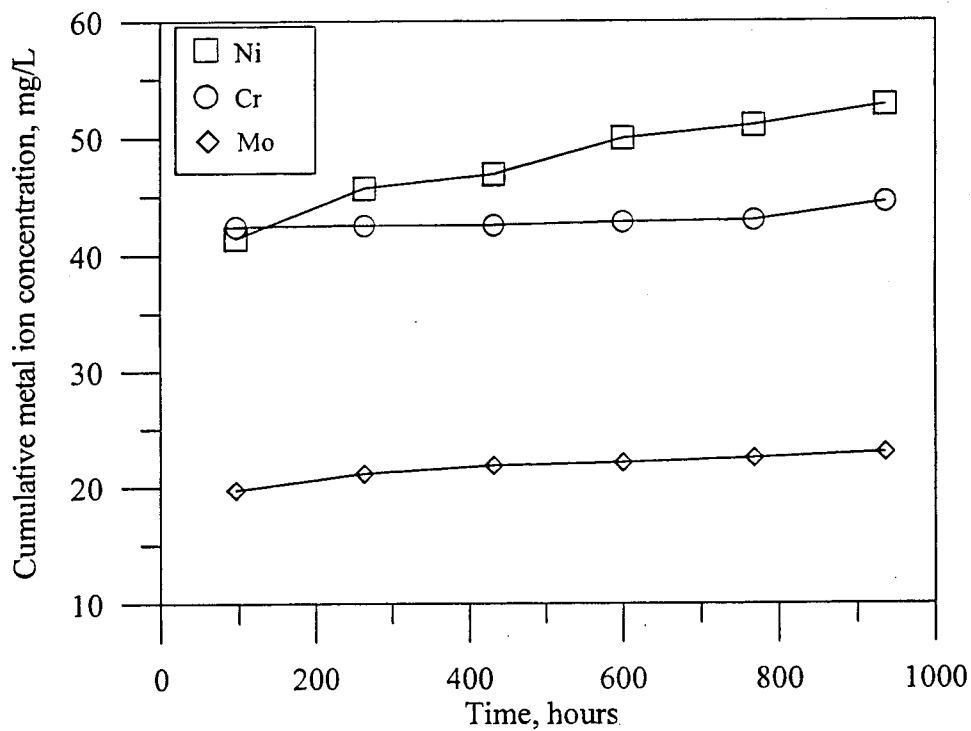
11/30/01



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From Page No. \_\_\_\_\_

Results from Top Analysis for Use  
As a chart for Electrophoresis Results.



To Page No. \_\_\_\_\_

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Date \_\_\_\_\_

Invented by \_\_\_\_\_

Date \_\_\_\_\_

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11/30/01



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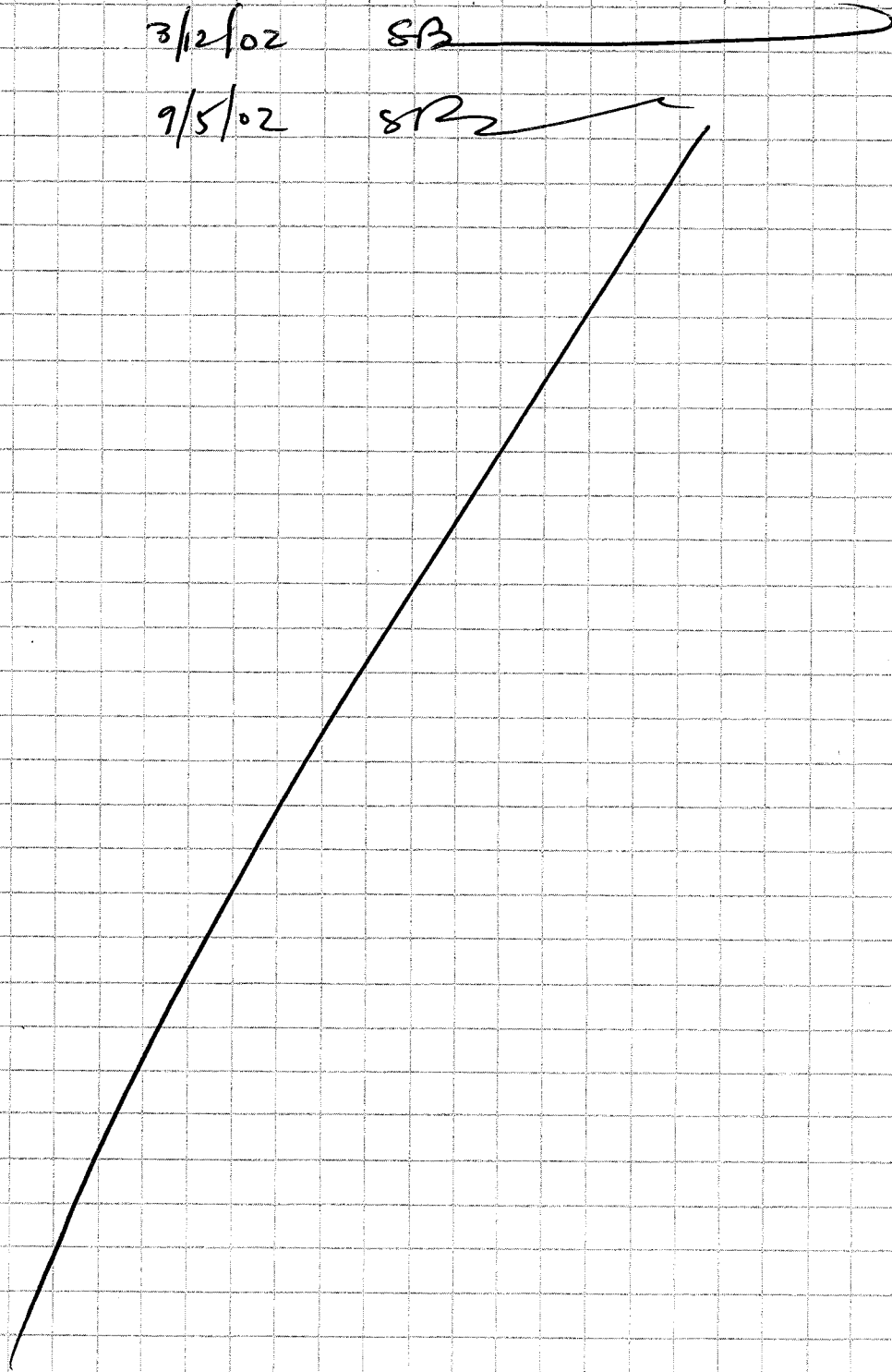
Copy sent to QA records

3/12/02

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9/5/02

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Witnessed & Understood by me,

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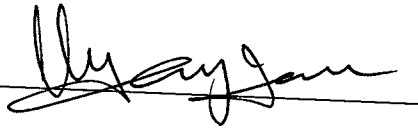
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I have reviewed this scientific notebook and find it in compliance with QAP-001. There is sufficient information regarding procedures used for conducting tests, acquiring and analyzing data so that another qualified individual could repeat the activity.



9/29/2004

To Page No. \_\_\_\_\_

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by