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Level IV Data Package

MWH Group 240233

Method: EPA 7196

2805090137
2805090138

SM 7196A QC Check List — **Hexavalent Chromium** — **Cr VI**

Analyst AZS — Anaysis date 5/9/08

Instrument: HACH DR/4000V — Review date 5/14/08

No — All Samples analyzed within 24 Hr hold time

✓ — All Samples within range of calibration curve, or diluted to within range

QC

✓ — CCB/Blank < 1/2 MRL

✓ — MRL within +/- 50%

✓ — All other calibration points within +/- 10%

✓ — LCS/LCSD revovery within +/- 15%

✓ — MS/MSD recovery within +/- 30%

✓ — MS/MSD RPD is within +/- 20%

✓ — CCV within +/- 10%

✓ — The pH of the samples are 7

✓ — No more than 20 samples per batch

✓ — MS is run at a frequency of 1 every 10 samples and MSD is run at frequency of 1 every 20.

Na — QIR needed for failed QC

Na — Spectial Det Code noted on the cover sheet

Instrument: Hach DR 4000				Cr-VI by EPA Method 7196A								
Analyst: AZS				Date: 5 / 09 / 2008					Start time: 10:59		End time: 11:07	
Cal. Stock Std: Use Built in Curve				Cal. Stock Std exp. Date: 6 / 4 / 08				Cal. Working Std: AZS080404-1				
				LCS Stock Std exp. Date: 6 / 4 / 08				LCS Working Std: AZS080404-2				
Correlation Coeff:--------				Slope: --------				Y-intercept:--------			LCS True Value: 0.05 ppm	
Sample	I.D.	Dilution			Turb Blk							
		sample	total		(same dilution)			Calc.	Reported	Sampling	pH	Comments
		mls	mls	abs	abs	res abs		mg/L	mg/L	date		
Blank		10	10	0.000				0.000	0.000			
Std 1 (0.005 ppm)		10	10	0.009				0.005	0.005			100% Limit: 50 - 150%
Std 2 (0.020 ppm)		10	10	0.038				0.021	0.021			105% Limit: 90 - 110%
Std 3 (0.050 ppm)		10	10	0.091				0.050	0.050			100% Limit: 90 - 110%
Std 4 (0.200 ppm)		10	10	0.383				0.209	0.209			104% Limit: 90 - 110%
Std 5 (0.500 ppm)		10	10	0.918				0.501	0.501			100% Limit: 90 - 110%
LCS - 1		10	10	0.101				0.055	0.055			110% Limit: 85 - 115%
1 2805090238	west	0.5	10	0.203				0.111	2.22	5/8/8	9	HOLD
	MS	0.5	10	0.257				0.157	3.14			92% Limit: 70 - 130%
	MSD	0.5	10	0.297				0.162	3.24			102% Limit: 70 - 130%
280509 0234	~~2805090234~~ discharge	10	10	0.019				0.010	0.010			
3 280509241	east 5/9/8	0.1 5/9/8	10	0.161	0.292			0.161	16.1			
4 2805090138	~~M-11~~ M-10	~~10 0.5~~	10	0.002				0.001	0.001		7	
5 2805090137	M-38	0.1	10	0.683				0.372	37.2			
6			10									
7			10									
0.020 ppm/CCV		10	10									Limit: 90-110%
Blank/CCB		10	10									
8			10									
9			10									
10			10									
	MS		10									Limit: 70 - 130%
11			10									
12			10									
13			10									
14			10									
15			10									
16			10									
0.020 ppm/CCV		10	10									Limit: 90-110%
Blank/CCB		10	10									
17			10									
18			10									
19			10									
20			10									
LCS - 2		10	10	0.095				0.052	0.052			104% Limit: 85 - 115%
0.020 ppm/CCV		10	10	0.033				0.018	0.018			90% Limit: 90-110%
Blank/CCB		10	10	0.000				0.000	0.000			

Analytical Reviewed By:	QC Reviwed by:	Reagent: HACH Perma Chem Chroma Ver3
Entered By:		EXP Date: 8/10 Lot # A7324

5/14/8

VO mm 5/14/8

Standard Preparation Worksheet & Certificate of Analysis

INORGANIC VENTURES™
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inorganicventures.com
tel: 800.669.6799 - 732.901.1900
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CERTIFICATE OF ANALYSIS

RA 201632

1.0 **INORGANIC VENTURES** is an ISO Guide 34:2000 registered Certified Reference Material (CRM) Manufacturer (Certificate #883-02). The certificate is designed and the data is determined in accordance with ISO Guide 31:2000 (Reference Materials-Contents of Certificates and Labels), ISO Guide 34:2000 "Quality System Guidelines for the Production of Reference Materials," and ISO Guide 35:1989 "Certification of Reference Materials - General and Statistical Principals."

2.0 DESCRIPTION OF CRM — 1000 µg/mL Chromium (+6) in H20

Catalog Number:	CGCR(6)1-1, CGCR(6)1-2, and CGCR(6)1-5
Lot Number:	**Z-CR02152**
Starting Material:	(NH4)2Cr2O7
Starting Material Purity (%):	99.989259
Starting Material Lot No:	F04N14
Matrix:	H20

3.0 CERTIFIED VALUES AND UNCERTAINTIES

Certified Concentration: 1000 ± 3 µg/mL

Certified Density: 0.999 g/mL (measured at 22° C)

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

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

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

($\bar{x}$) = 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 product is Traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRMs are available, the term 'in-house std.' is specified.

4.1 **Assay Method #1** **1000 ± 3 µg/mL**
Redox NIST SRM 136e Lot Number: 980702

Assay Method #2 **1001 ± 4 µg/mL**
ICP Assay NIST SRM 3112a Lot Number: 990607

11.0 DATE OF CERTIFICATION AND PERIOD OF VALIDITY

11.1 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 of chemically-stable solutions performed at the manufacturer's facility show a CRM shelf-life of twenty one months for solutions packaged in 125-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. Manufacturer concurs with state and federal regulatory agencies' recommendations that solution standards be assigned a one-year expiration date.

Certification Date: December 06, 2006

Expiration Date: EXPIRES 12/2008

12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS

Certificate Prepared By: Nick Maida, Product Documentation Administrator

Certificate Approved By: Katalin Le, QC Manager

Certifying Officer: Paul Gaines, PhD., Senior Technical Director

HACH COMPANY

P.O.Box 389
Loveland, CO 80539
(970) 669-3050

An ISO 9001 Certified Company

Certificate of Analysis

COMMODITY: **Chromium Reference Standard Solution 1000 \ 10 mg/L as total Cr**
COMMODITY NUMBER: **14664-42** MANUFACTURE DATE: **12/31/2004** DATE OF ANALYSIS: **1/4/2005**
LOT NUMBER: **A5005**

TEST	*SPECIFICATIONS*	*RESULTS*
Hexavalent Chromium Concentration	995 to 1005 ppm	1001.0 ppm
pH of the solution	12 to 14	12.0

The expiration date is Jan 2010

The item 1466442 is traceable to NIST standards SRM 136e Potassium Dichromate LOT N/A.

R 201090

Certified by _____
Paul Kleinwolterink
Analytical Services Chemist

Reagent Documentation

Reagent: Chromium VI Std 1000 ppm
Date Received: 31 Jan 05
Date Expired: Jan '10
Manufacturer: HACH
Storage Condition: roomtemp 10-30°C

Reagent #: 201090
By: LMR
Matrix: aq
Amount: 100 ml
Lot #: A5005

Component	Comment	Standard	Concentration
	HACH cat # 14664-42		

Comment:

Reagent: Turbidity Std - 20 NTU
Date Received: 3 Feb 05
Date Expired: Jan 2006
Manufacturer: GFS Chemicals
Storage Condition: room temp

Reagent #: 201091
By: LMR
Matrix: aq
Amount: 1-L
Lot #: P460346

Component	Comment	Standard	Concentration
	VWR # 66115-150		

Comment:

Reagent: Potassium Phosphate Monobasic
Date Received: 8 Feb 05
Date Expired: Feb '10
Manufacturer: J.T. Baker
Storage Condition: room temp

Reagent #: 201092
By: LMR
Matrix: solid
Amount: 2 x 500g
Lot #: A38142

Component	Comment	Standard	Concentration
	VWR # JT3246-1		

Comment:

Reagent Documentation

Reagent: Antifoam B Silicone Emulsion
Date Received: 08 May 07
Date Expired: May 2010
Manufacturer: JT Baker
Storage Condition: room temp

Reagent #: 201630
By: RH
Matrix: aq
Amount: 125mL
Lot #: C47613

Component	Comment	Standard	Concentration
	JT Baker # B531-05		

Comment:

Reagent: Cyanide, 1000ug/mL
Date Received: 09 May 07
Date Expired: 30 April 08
Manufacturer: High Purity Standards
Storage Condition: room temp

Reagent #: 201631
By: RH
Matrix: aq
Amount: 125mL
Lot #: 629323

Component	Comment	Standard	Concentration
	HP # IC-CN-M		

Comment:

Reagent: Chromium +6 (Cr+6) 1000ppm
Date Received: 5/11/07
Date Expired: 6/1/08
Manufacturer: Inorganic Venture
Storage Condition:

Reagent #: 201632
By: WBH
Matrix: AR
Amount: 125mL
Lot #: Z-CR0215Z

Component	Comment	Standard	Concentration
Cr+6	PN = CGCR(6)1-1		

Comment:

Reagent Preparation Documentation

Page:_____

Reagent: Cr VI Std 5 ppm
Date Received/Prepped: 4/4/8 15/5/8 6/6/8 8/7/8 10·8·8 12/11/08
Date Expired: 6/4/8 5/15/8 10/6/8 10/7/8 12·8·8 12/11/9
Manufacturer:
Storage Condition:

MW #: AZS080404-1
By: AZS
Matrix: I
Amount: 200 ml
Lot #: R201090

Component	Comment	Standard	Concentration
	1ml 1000 ppm std		
	into 200 ml dI		
	add 20 drops H_2SO_4		

Comment:

Reagent: Cr VI QC 5 ppm
Date Received/Prepped: 4/4/8
Date Expired: 6/4/8
Manufacturer:
Storage Condition:

MW #: AZS080404-2
By: AZS
Matrix: I
Amount: 200 ml
Lot #: R201632

Component	Comment	Standard	Concentration
	1ml 1000 ppm std		
	into 200 ml DI		
	pres with 20 drops H_2SO_4		

Comment:

Reagent: 100 ppb Hg 1° Source
Date Received/Prepped: 4/30/08 7/3/8 9·2·8 11·5·8 / /
Date Expired: 6/30/08 9/3/8 11·2·8 11·5·9 / /
Manufacturer:
Storage Condition:

MW #: AZS080130-1
By: AZS
Matrix: I
Amount: 100 ml
Lot #: HG080003

Component	Comment	Standard	Concentration
	0.5 ml 20 ppb into		
	100 ml DI acidified with		
	HNO_3		

Comment: