

[illegible]

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 9201

EVENT NAME: Mortandad/Sandia (Chromium and General Surv.)
MY2015 Q3 Watershed Sampling_Sandia

SAMPLE ID: CASA-15-95827

WORK ORDER: NA

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	05/14/2015	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1151		MEDIA:	UA	↓
PRS ID:	NA		SAMPLE TECH CODE:	UA	GSP
LOCATION ID:	R-11		FIELD PREP:	F	OK
LOCATION TYPE:	MON		FIELD QC TYPE:	REG	↓
TOP DEPTH:	NA		SAMPLE USAGE:	INV	↓
BOTTOM DEPTH:	↓	↓	EXCAVATED:		YES / NO / NA

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	WSP-All Metals	1 LITER POLY	1	HNO3 ICE	Y	NA
↓	WSP-CR52/53	1 LITER POLY	1	ICE	↓	↓
	WSP- GENINORG+PerChlorate	1 LITER POLY	1	ICE	↓	↓
↓	WSP- NH3+NO3/NO2	500 ML AMBER GLASS	1	H2SO4	↓	↓

SAMPLE COMMENTS:

LOCATION COMMENTS:

FIELD PARAMETERS:

Dissolved Oxygen _____ mg/L Flow (in gpm) _____ GPM Oxidation-Reduction Potential _____ mV
pH _____ SU Specific Conductance _____ uS/cm Temperature _____ deg C
Turbidity _____ NTU

COLLECTED BY (PRINT):

RELINQUISHED BY (Printed Name) Austin Tash (Signature) <i>Austin Tash</i>	Date/Time 5-14-15 1555	RECEIVED BY (Printed Name) S. Sherwood (Signature) <i>S. Sherwood</i>	Date/Time 5/14/15 1555
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

Report Date: 04/30/2015

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 9201

EVENT NAME: Mortandad/Sandia (Chromium and General Surv.)
MY2015 Q3 Watershed Sampling_Sandia

SAMPLE ID: CASA-15-95831

WORK ORDER: NA

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	5/15/15	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1220		MEDIA:	UA	
PRS ID:	OK		SAMPLE TECH CODE:	UA	GSP
LOCATION ID:	R-43 S1		FIELD PREP:	F	OK
LOCATION TYPE:	MON		FIELD QC TYPE:	REG	
TOP DEPTH:	OK		SAMPLE USAGE:	INV	
BOTTOM DEPTH:			EXCAVATED:		YES / NO / NA

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
NA	WSP-All Metals	1 LITER POLY	1	HNO3 ICE	Y	NA
	WSP-CR52/53	1 LITER POLY	1	ICE		
	WSP- GENINORG+PerChlorat e	1 LITER POLY	1	ICE		
	WSP- NH3+NO3/NO2	500 ML AMBER GLASS	1	H2SO4		

SAMPLE COMMENTS:

Diesel generator running while sampling

LOCATION COMMENTS:

NA

FIELD PARAMETERS:

Dissolved Oxygen	6.98	mg/L	Flow (in gpm)	1.54	GPM	Oxidation-Reduction Potential	11.6	mV
pH	8.19	SU	Specific Conductance	193	uS/cm	Temperature	20.07	deg C
Turbidity	0.84	NTU						

COLLECTED BY (PRINT):

J. Berryhill

RELINQUISHED BY (Printed Name) (Signature)	William Shaw	Date/Time 5/15/15 1200	RECEIVED BY (Printed Name) (Signature)	K. Green	Date/Time 5/15/15 1:00
RELINQUISHED BY (Printed Name) (Signature)		Date/Time	RECEIVED BY (Printed Name) (Signature)		Date/Time

Report Date: 04/30/2015

SAMPLE COLLECTION LOG/FIELD CHAIN OF CUSTODY

EVENT ID: 9201

EVENT NAME: Mortandad/Sandia (Chromium and General Surv.)
MY2015 Q3 Watershed Sampling_Sandia

SAMPLE ID: CASA-15-95832

WORK ORDER: NA

	AS PLANNED	AS COLLECTED		AS PLANNED	AS COLLECTED
Date Collected (MM/DD/YYYY):	5/19/15	OK	FIELD MATRIX:	WG	OK
TIME COLLECTED (HH:MM):	1243		MEDIA:	UA	I
PRS ID:	OK		SAMPLE TECH CODE:	UA	GSP
LOCATION ID:	R-43 S2		FIELD PREP:	F	OK
LOCATION TYPE:	MON		FIELD QC TYPE:	REG	I
TOP DEPTH:	OK		SAMPLE USAGE:	INV	I
BOTTOM DEPTH:			EXCAVATED:		YES / NO / NA

PRIORITY	ORDER	CONTAINER	#	PRESERVATIVE	COLLECTED Y/N	SPECIAL INSTRUCTIONS
U/t	WSP-All Metals	1 LITER POLY	1	HNO3 ICE	X	U/t
I	WSP-CR52/53	1 LITER POLY	1	ICE	I	I
	WSP- GENINORG+PerChlorat e	1 LITER POLY	1	ICE	I	I
I	WSP- NH3+NO3/NO2	500 ML AMBER GLASS	1	H2SO4	I	I

SAMPLE COMMENTS:

Rebel generator running while sampling

LOCATION COMMENTS:

U/t

FIELD PARAMETERS:

Dissolved Oxygen	3.27	mg/L	Flow (in gpm)	1.53	GPM	Oxidation-Reduction Potential	112.4	mV
pH	8.65	SU	Specific Conductance	198	uS/cm	Temperature	20.52	deg C
Turbidity	1.33	NTU						

COLLECTED BY (PRINT):

J. Berryhill

RELINQUISHED BY (Printed Name) (Signature)	Date/Time 5/19/15 1325	RECEIVED BY (Printed Name) (Signature)	Date/Time 5/19/15 1325
RELINQUISHED BY (Printed Name) (Signature)	Date/Time	RECEIVED BY (Printed Name) (Signature)	Date/Time

Report Date: 04/30/2015

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[illegible]

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Department of Geology
208 Natural History Building
1301 West Green Street
Urbana, IL 61801



28 October, 2015

Ms. Susan Leese
ARS International, LLC
2609 North River Road
Port Allen, LA 70767-3469
225.381.2991 sleese@amrad.com

Subject: Cr stable isotope results

Dear Susan:

Please find below tabulated results from Cr stable isotope analysis of water samples from Los Alamos National Laboratory (LANL). The samples were received on July 2nd, 2015, they were analyzed on October 23rd and 24th, 2015 and results were previously reported via EDD. The slow turnaround on these samples was largely caused by a delay in receiving concentration results from LANL. LANL and ARS were notified of the delay. In the future, we plan to obtain concentration estimates in our laboratory shortly after samples are received so that sample preparation can begin without delay.

COC #	Sample ID	$\delta^{53}\text{Cr}^1$ (per mil)	Duplicate $\delta^{53}\text{Cr}^1$ (per mil)
2015-1493	Cr-Ex-15-89242	Not enough Cr ²	
2015-1493	CrCH2-15-92335	Not enough Cr ²	
2015-1493	CrCH2-15-92370	Not enough Cr ²	
2015-1493	CrCH1-15-91039	Not enough Cr ²	
2015-1493	CRCH3-15-92301	Not enough Cr ²	
2015-1493	CrCH3-15-92309	2.62	
2015-1493	CrCH3-15-92304	1.44	
2015-1493	CrCH3-15-92305	1.56	
2015-1493	CrCH3-15-92392	2.78	
2015-1493	CrCH3-15-92393	2.77	
2015-1493	CrCH4-15-92615	Not enough Cr ²	
2015-1493	CrCH5-15-92842	Not enough Cr ²	
2015-1490	R42Z10-15-101886	0.92	0.96
2015-1490	R42Z11-15-101887	1.18	
2015-1490	R42Z12-15-101888	1.91	1.90
2015-1490	R42Z13-15-101889	Reprep ³	
2015-1490	R42Z14-15-101890	Not enough Cr ²	
2015-1490	R42Z20-15-101891	0.94	
2015-1490	R42Z21-15-101892	1.52	
2015-1490	R42Z22-15-101894	3.17	
2015-1490	R42Z23-15-101893	5.32	
2015-1490	R42Z24-15-101895	Not enough Cr ²	
2015-1492	CAMO-15-95795	1.27	
2015-1492	CAMO-15-95814	1.02	

2015-1492	CAMO-15-95762	1.01	
2015-1492	CAMO-15-95807	1.06	
2015-1492	CAMO-15-95810	1.07	1.04
2015-1492	CAMO-15-95813	1.21	
2015-1492	CAMO-15-95761	1.26	
2015-1492	CAMO-15-95811	1.15	
2015-1492	CAMO-15-95808	1.29	
2015-1491	CASA-15-95831	0.98	1.00
2015-1491	CASA-15-95827	1.28	
2015-1491	CASA-15-95832	1.48	

¹Parts per thousand deviation of the measured ⁵³Cr/⁵²Cr ratio from that of the NIST SRM-979 standard.

²Not analyzed; insufficient Cr(VI) was present in the sample to allow accurate isotope ratio analysis.

³Reanalysis in progress; sample must be prepared again.

The analytical methods used for these samples are identical to those used for LANL water analyses for the past several years, and are described in the article: Reinhard, C.T., et al., 2014. The isotopic composition of authigenic chromium in anoxic marine sediments: A case study from the Cariaco Basin. *Earth and Planetary Science Letters* vol. **407**, pp. 9-18. Nominal precision is ±0.2 per mil, though actual reproducibility is generally better than that.

A raw data table is attached. Analyses identified as "979" are NIST SRM-979. Analyses identified as "3112a" are NIST SRM-3112a, which has a published value of -0.07 per mil. The SRM-3112a standard solutions were processed through the sample preparation procedure with the reported samples. Sample results are normalized to the mean value of SRM-979 for the analytical session.

Chain of Custody (COC) forms are also attached. Some samples, as indicated above, were not analyzed. Where indicated, very little Cr was recovered by our sample preparation method and as a result, precise isotope ratio data could not be obtained. We assume this is because actual concentrations were much lower than those given to us by LANL. Other possible causes are: 1) The samples were acidified or 2) Other dissolved components in the sample (e.g., organic compounds) interfered with our anion exchange process. In some cases, sufficient Cr is present but samples must be prepared a second time to attain an acceptable ratio of double spike to sample Cr. This often happens when the concentrations we are given are inaccurate.

Samples from COC# 2015-1493 arrived warm; standard protocol for Cr isotope analyses is for them to be maintained cold during shipping. Also, several samples from this shipment contained visible, fine solids on the bottoms of the containers. The samples with lower Cr concentrations from this group with less than 50 micrograms per liter Cr appeared did not yield enough Cr for isotopic analysis, perhaps because the Cr concentrations had decreased to less than 1 microgram per liter during shipment.

Sincerely,



Thomas M. Johnson
Professor of Geology

	52 Int (V)	std err	Raw 50/52	std err	Raw 53/52	std err	Raw 54/52	std err	Raw 56/54	std err	Raw 51/52	std err	Raw 49/50	std err	Conv Err	std err	FeCorrEst	std err	VCorrEst	
'979_125ppb' run on	4.82E+00	{ 2.16E-02}	7.69E-01	{ 1.60E-05}	1.18E-01	{ 1.35E-06}	6.54E-01	{ 1.28E-05}	1.41E-02	{ 4.45E-11}	2.02E-05	{ 4.45E-07}	1.03E-05	{ 0.00E+00}	8.09E-06	{ 1.89E-06}	2.83E-01	{ 2.26E-06}	1.50E-05	
'979_125ppb' run on	4.85E+00	{ 1.72E-02}	7.69E-01	{ 9.58E-06}	1.18E-01	{ 1.59E-06}	6.54E-01	{ 6.52E-06}	1.49E-02	{ 8.63E-11}	2.19E-05	{ 4.52E-07}	1.09E-05	{ 0.00E+00}	1.04E-05	{ 2.41E-06}	2.98E-01	{ 1.97E-06}	1.62E-05	
'3112a_125ppb' run	5.69E+00	{ 2.08E-02}	6.59E-01	{ 1.08E-05}	1.18E-01	{ 1.29E-06}	5.58E-01	{ 4.71E-06}	4.89E-03	{ 0.00E+00}	4.91E-05	{ 4.10E-07}	7.30E-06	{ 0.00E+00}	-1.36E-05	{ 3.08E-06}	9.80E-02	{ 6.89E-07}	4.25E-05	
'3112a_125ppb' run	5.68E+00	{ 1.09E-02}	6.58E-01	{ 1.25E-05}	1.18E-01	{ 1.19E-06}	5.58E-01	{ 5.43E-06}	6.73E-03	{ 6.11E-12}	5.06E-05	{ 3.46E-07}	7.13E-06	{ 0.00E+00}	-1.67E-05	{ 2.91E-06}	1.35E-01	{ 9.45E-07}	4.38E-05	
'979_75ppb' run on	2.35E+00	{ 8.70E-03}	7.68E-01	{ 6.44E-05}	1.18E-01	{ 2.36E-06}	6.54E-01	{ 3.67E-05}	1.98E-02	{ 1.24E-10}	2.69E-05	{ 9.16E-07}	1.70E-05	{ 0.00E+00}	1.59E-06	{ 4.09E-06}	3.96E-01	{ 6.02E-06}	1.99E-05	
'979_75ppb' run on	2.39E+00	{ 8.86E-04}	7.68E-01	{ 4.38E-05}	1.18E-01	{ 2.21E-06}	6.54E-01	{ 2.34E-05}	3.07E-02	{ 0.00E+00}	2.75E-05	{ 7.80E-07}	1.72E-05	{ 4.35E-14}	2.35E-05	{ 3.51E-06}	6.15E-01	{ 7.30E-06}	2.04E-05	
'979_125ppb' run on	4.95E+00	{ 1.69E-02}	7.69E-01	{ 3.64E-05}	1.18E-01	{ 1.18E-06}	6.54E-01	{ 2.18E-05}	1.24E-02	{ 1.16E-11}	2.30E-05	{ 4.51E-07}	1.00E-05	{ 5.62E-14}	2.54E-06	{ 1.94E-06}	2.48E-01	{ 2.08E-06}	1.71E-05	
'979_125ppb' run on	4.92E+00	{ 1.12E-02}	7.69E-01	{ 1.93E-05}	1.18E-01	{ 1.28E-06}	6.54E-01	{ 1.19E-05}	1.50E-02	{ 0.00E+00}	2.09E-05	{ 4.14E-07}	1.03E-05	{ 0.00E+00}	3.91E-06	{ 2.06E-06}	3.00E-01	{ 1.95E-06}	1.55E-05	
'979_125ppb' run on	4.83E+00	{ 2.39E-02}	7.69E-01	{ 1.38E-05}	1.18E-01	{ 1.43E-06}	6.54E-01	{ 1.48E-05}	1.32E-02	{ 0.00E+00}	2.15E-05	{ 4.17E-07}	9.72E-06	{ 6.28E-14}	4.91E-06	{ 2.17E-06}	2.65E-01	{ 3.27E-06}	1.59E-05	
'Proc_3112a_8/26' r	1.78E+00	{ 8.35E-03}	5.59E-01	{ 3.70E-05}	1.17E-01	{ 2.08E-06}	4.74E-01	{ 1.81E-05}	4.48E-02	{ 0.00E+00}	6.71E-04	{ 1.25E-06}	4.45E-04	{ 0.00E+00}	-2.85E-05	{ 9.18E-06}	8.97E-01	{ 1.83E-05}	6.83E-04	
'89243' run on Frida	2.12E+00	{ 9.54E-03}	5.65E-01	{ 2.78E-05}	1.18E-01	{ 2.42E-06}	4.83E-01	{ 0.00E+00}	1.35E-01	{ 0.00E+00}	8.79E-04	{ 1.10E-06}	9.84E-04	{ 3.46E-12}	9.97E-04	{ 1.03E-05}	2.69E+00	{ 3.00E-05}	8.84E-04	
'92309' run on Frida	2.06E+00	{ 7.73E-03}	7.37E-01	{ 5.04E-05}	1.18E-01	{ 2.67E-06}	6.33E-01	{ 2.19E-05}	1.98E-01	{ 0.00E+00}	2.23E-03	{ 1.19E-06}	2.22E-03	{ 1.44E-11}	6.62E-04	{ 4.67E-06}	3.97E+00	{ 9.74E-05}	1.72E-03	
'92304' run on Frida	3.66E+00	{ 1.03E-02}	4.31E-01	{ 2.30E-05}	1.17E-01	{ 3.58E-06}	3.60E-01	{ 2.44E-05}	3.53E-02	{ 0.00E+00}	1.76E-03	{ 4.73E-07}	1.85E-03	{ 1.38E-11}	1.39E-03	{ 1.87E-05}	7.09E-01	{ 4.03E-05}	2.33E-03	
'92305' run on Frida	2.88E+00	{ 1.18E-02}	5.08E-01	{ 4.36E-05}	1.18E-01	{ 3.13E-06}	4.29E-01	{ 1.39E-05}	6.27E-02	{ 0.00E+00}	1.35E-03	{ 7.58E-07}	6.13E-04	{ 1.40E-12}	9.39E-04	{ 9.31E-06}	1.26E+00	{ 6.22E-05}	1.52E-03	
'979_125ppb' run on	4.72E+00	{ 2.39E-02}	7.69E-01	{ 2.83E-05}	1.18E-01	{ 1.67E-06}	6.54E-01	{ 7.15E-06}	1.31E-02	{ 0.00E+00}	2.06E-05	{ 4.57E-07}	1.00E-05	{ 3.73E-14}	6.11E-06	{ 2.41E-06}	2.63E-01	{ 3.77E-06}	1.53E-05	
'92392' run on Frida	2.06E+00	{ 1.07E-02}	6.81E-01	{ 6.70E-05}	1.18E-01	{ 2.38E-06}	5.78E-01	{ 3.09E-05}	5.08E-02	{ 3.31E-10}	1.41E-03	{ 1.06E-06}	2.99E-03	{ 1.14E-11}	7.12E-04	{ 5.29E-06}	1.02E+00	{ 2.37E-05}	1.18E-03	
'92393' run on Frida	1.68E+00	{ 6.69E-03}	8.01E-01	{ 7.62E-05}	1.18E-01	{ 2.50E-06}	6.82E-01	{ 4.12E-05}	2.30E-02	{ 0.00E+00}	9.67E-04	{ 1.39E-06}	5.42E-04	{ 2.75E-12}	4.10E-04	{ 3.38E-06}	4.61E-01	{ 8.84E-06}	6.88E-04	
'89243-2' run on Frida	2.20E+00	{ 8.31E-03}	6.13E-01	{ 4.88E-05}	1.18E-01	{ 3.38E-06}	5.05E-01	{ 2.15E-05}	3.71E-02	{ 0.00E+00}	1.91E-03	{ 7.96E-07}	3.42E-02	{ 2.01E-10}	4.60E-04	{ 1.47E-05}	7.41E-01	{ 1.47E-05}	1.83E-03	
'979_125ppb' run on	4.48E+00	{ 2.01E-02}	7.69E-01	{ 3.79E-05}	1.18E-01	{ 1.44E-06}	6.54E-01	{ 1.46E-05}	1.24E-02	{ 0.00E+00}	2.33E-05	{ 4.40E-07}	1.11E-05	{ 0.00E+00}	1.04E-05	{ 2.57E-06}	2.49E-01	{ 4.65E-06}	1.73E-05	
'979_125ppb' run on	4.40E+00	{ 2.41E-02}	7.68E-01	{ 4.57E-05}	1.18E-01	{ 1.42E-06}	6.54E-01	{ 2.70E-05}	1.39E-02	{ 0.00E+00}	2.19E-05	{ 4.38E-07}	1.00E-05	{ 0.00E+00}	9.79E-06	{ 2.30E-06}	2.79E-01	{ 3.30E-06}	1.62E-05	
'979_125ppb' run on	4.35E+00	{ 1.98E-02}	7.68E-01	{ 3.43E-05}	1.18E-01	{ 1.47E-06}	6.54E-01	{ 1.93E-05}	1.06E-02	{ 0.00E+00}	2.08E-05	{ 4.52E-07}	9.71E-06	{ 3.84E-14}	6.63E-06	{ 2.37E-06}	2.12E-01	{ 1.86E-06}	1.54E-05	
'Proc_3112a_10/7' r	1.32E+00	{ 5.32E-03}	5.77E-01	{ 7.38E-05}	1.17E-01	{ 3.17E-06}	4.88E-01	{ 3.55E-05}	1.11E-01	{ 0.00E+00}	3.72E-03	{ 4.52E-06}	4.51E-03	{ 1.92E-11}	-2.57E-05	{ 1.40E-05}	2.23E+00	{ 7.40E-05}	3.69E-03	
'979_125ppb' run on	1.55E+00	{ 3.75E-03}	5.79E-01	{ 7.64E-05}	1.17E-01	{ 2.37E-06}	4.89E-01	{ 2.94E-05}	7.02E-02	{ 0.00E+00}	3.02E-04	{ 1.80E-06}	2.26E-04	{ 0.00E+00}	-2.15E-05	{ 1.23E-05}	1.41E+00	{ 5.22E-05}	2.98E-04	
'979_125ppb' run on	4.29E+00	{ 1.81E-02}	7.68E-01	{ 3.53E-05}	1.18E-01	{ 1.51E-06}	6.54E-01	{ 1.89E-05}	9.70E-03	{ 4.41E-11}	2.15E-05	{ 4.56E-07}	1.01E-05	{ 0.00E+00}	3.26E-06	{ 2.40E-06}	1.94E-01	{ 1.76E-06}	1.59E-05	
'101886' run on Frida	2.90E+00	{ 1.48E-02}	6.19E-01	{ 3.08E-05}	1.17E-01	{ 1.72E-06}	5.26E-01	{ 2.14E-05}	1.62E-01	{ 0.00E+00}	4.78E-04	{ 7.43E-07}	4.48E-04	{ 9.26E-13}	4.29E-04	{ 5.86E-06}	3.25E+00	{ 4.28E-05}	4.42E-04	
'101887' run on Frida	3.31E+00	{ 1.68E-02}	5.50E-01	{ 2.87E-05}	1.17E-01	{ 1.52E-06}	4.65E-01	{ 1.28E-05}	9.89E-02	{ 0.00E+00}	3.24E-04	{ 7.44E-07}	3.49E-04	{ 9.15E-13}	6.37E-04	{ 7.48E-06}	1.98E+00	{ 3.27E-05}	3.37E-04	
'101888' run on Frida	2.92E+00	{ 1.27E-02}	5.41E-01	{ 2.97E-05}	1.18E-01	{ 2.14E-06}	4.57E-01	{ 1.18E-05}	4.46E-02	{ 1.40E-10}	4.10E-04	{ 6.67E-07}	3.80E-04	{ 3.20E-12}	9.38E-04	{ 1.07E-05}	8.94E-01	{ 1.80E-05}	4.33E-04	
'101889' run on Frida	3.27E+00	{ 0.0147}	5.30E-01	{ 0.000259}	1.18E-01	{ 1.59E-06}	5.35E-01	{ 0.000177}	2.51E-03	{ 3.33E-09}	3.90E-04	{ 7.02E-07}	3.89E-04	{ 0.00E+00}	0	{ 1.21E-02}	0.000691	{ 5.03E-01}	{ 0.00184}	4.12E-04
'979_125ppb' run on	3.25E+00	{ 9.99E-03}	7.67E-01	{ 7.54E-05}	1.18E-01	{ 1.65E-06}	6.54E-01	{ 4.25E-05}	1.20E-02	{ 8.23E-11}	2.79E-05	{ 8.17E-07}	1.06E-05	{ 0.00E+00}	5.19E-07	{ 3.07E-06}	2.41E-01	{ 4.64E-06}	2.07E-05	
'101891' run on Frida	2.57E+00	{ 1.33E-02}	5.65E-01	{ 1.30E-05}	1.18E-01	{ 1.76E-06}	4.84E-01	{ 8.52E-06}	2.81E-01	{ 0.00E+00}	4.02E-04	{ 7.02E-07}	5.28E-04	{ 0.00E+00}	6.76E-04	{ 9.10E-06}	5.63E+00	{ 6.87E-05}	4.06E-04	
'979_125ppb' run on	3.40E+00	{ 2.08E-03}	7.67E-01	{ 3.00E-05}	1.18E-01	{ 1.58E-06}	6.55E-01	{ 2.26E-05}	8.87E-03	{ 2.64E-11}	2.35E-05	{ 5.79E-07}	1.20E-05	{ 0.00E+00}	-5.76E-07	{ 2.38E-06}	1.77E-01	{ 1.16E-06}	1.74E-05	
'101892' run on Frida	2.42E+00	{ 9.98E-03}	5.74E-01	{ 1.32E-05}	1.18E-01	{ 1.90E-06}	4.89E-01	{ 9.32E-06}	1.38E-01	{ 7.96E-10}	2.44E-04	{ 7.42E-07}	1.76E-04	{ 0.00E+00}	7.31E-04	{ 7.44E-06}	2.77E+00	{ 3.03E-05}	2.42E-04	
'101894' run on Frida	1.85E+00	{ 7.19E-03}	5.83E-01	{ 1.64E-05}	1.18E-01	{ 2.36E-06}	4.97E-01	{ 1.54E-05}	1.84E-01	{ 0.00E+00}	3.90E-04	{ 9.77E-07}	2.91E-04	{ 1.84E-12}	1.45E-03	{ 8.29E-06}	3.69E+00	{ 3.76E-05}	3.82E-04	
'101893' run on Frida	1.65E+00	{ 6.52E-03}	6.19E-01	{ 2.80E-05}	1.18E-01	{ 2.19E-06}	5.24E-01	{ 1.22E-05}	5.48E-02	{ 0.00E+00}	3.89E-04	{ 1.56E-06}	1.60E-03	{ 0.00E+00}	1.74E-03	{ 7.12E-06}	1.10E+00	{ 1.84E-05}	7.75E-04	
'95795' run on Frida	1.51E+00	{ 6.98E-03}	7.93E-01	{ 3.65E-05}	1.18E-01	{ 2.43E-06}	6.78E-01	{ 2.60E-05}	7.05E-02	{ 4.88E-10}	1.16E-03	{ 1.28E-06}	5.08E-04	{ 8.04E-13}	2.24E-04	{ 3.70E-06}	1.41E+00	{ 1.47E-05}	8.32E-04	
'95814' run on Frida	2.23E+00	{ 1.02E-02}	5.81E-01	{ 1.07E-05}	1.18E-01	{ 1.95E-06}	4.98E-01	{ 1.03E-05}	2.54E-01	{ 1.13E-09}	6.27E-04	{ 8.99E-07}	4.75E-04	{ 0.00E+00}	6.46E-04	{ 7.45E-06}	5.10E+00	{ 5.05E-05}	6.16E-04	
'979_125ppb' run on	3.25E+00	{ 1.09E-02}	7.67E-01	{ 1.85E-05}	1.18E-01	{ 1.90E-06}	6.55E-01	{ 8.83E-06}	8.63E-03	{ 3.62E-11}	2.41E-05	{ 7.54E-07}	1.15E-05	{ 0.00E+00}	5.94E-06	{ 2.69E-06}	1.73E-01	{ 1.37E-06}	1.78E-05	
'95762' run on Frida	2.32E+00	{ 8.86E-03}	8.05E-01	{ 1.95E-05}	1.18E-01	{ 2.08E-06}	6.88E-01	{ 1.41E-05}	4.71E-02	{ 1.92E-10}	4.02E-04	{ 9.73E-07}	7.65E-05	{ 4.05E-13}	1.64E-04	{ 2.81E-06}	9.43E-01	{ 7.13E-06}	2.84E-04	
'95807' run on Frida	2.39E+00	{ 1.11E-02}	5.84E-01	{ 1.13E-05}	1.18E-01	{ 1.95E-06}	4.97E-01	{ 1.36E-05}	6.35E-02	{ 4.12E-10}	3.63E-03	{ 1.02E-06}	1.21E-04	{ 0.00E+00}	4.34E-04	{ 6.50E-06}	1.27E+00	{ 1.17E-05}	3.53E-03	
'95810' run on Frida	2.27E+00	{ 9.02E-03}	5.61E-01	{ 1.24E-05}	1.18E-01	{ 2.19E-06}	4.78E-01	{ 8.91E-06}	1.01E-01	{ 0.00E+00}	5.20E-04	{ 8.28E-07}	1.11E-04	{ 8.66E-13}	5.33E-04	{ 8.13E-06}	2.03E+00	{ 1.39E-05}	5.27E-04	
'95813' run on Frida	2.28E+00	{ 8.89E-03}	5.58E-01	{ 1.51E-05}	1.18E-01	{ 2.19E-06}	4.75E-01	{ 9.89E-06}	1.33E-01	{ 6.48E-10}	5.91E-03	{ 7.83E-07}	2.09E-04	{ 0.00E+00}	6.36E-04	{ 9.51E-06}	2.66E+00	{ 2.60E-05}	6.04E-03	
'95761' run on Frida	1.66E+00	{ 6.85E-03}	5.81E-01	{ 2.22E-05}	1.18E-01	{ 2.17E-06}	4.92E-01	{ 1.20E-05}	2.89E-02	{ 0.00E+00}	1.51E-03	{ 1.41E-06}	5.91E-04	{ 2.37E-12}	4.98E-04	{ 8.15E-06}	5.79E-01	{ 6.50E-06}	1.48E-03	
'979_125ppb' run on	2.95E+00	{ 9.88E-03}	7.67E-01	{ 1.83E-05}	1.18E-01	{ 1.55E-06}	6.56E-01	{ 1.65E-05}	8.81E-03	{ 6.85E-11}	2.09E-05	{ 8.06E-07}	1.05E-05	{ 2.16E-14}	1.02E-05	{ 2.11E-06}	1.76E-01	{ 1.44E-06}	1.54E-05	
'95811' run on Frida	1.87E+00	{ 7.15E-03}	6.00E-01	{ 1.29E-05}	1.18E-01	{ 2.35E-06}	5.10E-01	{ 1.40E-05}	2.42E-02	{ 0.00E+00}	3.36E-03	{ 1.28E-06}	3.12E-04	{ 2.25E-12}</						

std err	TiCorrEst	std err	Mass Bias	std err	54Spk/ 52Nat	std err	Delta 53Cr	std err	sample ID	date	time	Average 979	Final d53	Replicate difference
{ 3.30E-07}	2.56E-03	{ 1.13E-08}	3.08E+01	{ 4.32E-03}	5.88E-01	{ 1.17E-05}	0.02	{ 1.18E-02}	'979_125ppb' run on	23-Oct	10:14	0.01	0.01	
{ 3.35E-07}	2.69E-03	{ 9.86E-09}	3.07E+01	{ 3.58E-03}	5.88E-01	{ 5.89E-06}	0.03	{ 1.50E-02}	'979_125ppb' run on	23-Oct	10:23	0.01	0.02	
{ 3.55E-07}	1.81E-03	{ 7.05E-09}	3.08E+01	{ 3.81E-03}	4.98E-01	{ 6.03E-06}	-0.06	{ 1.23E-02}	'3112a_125ppb' run	23-Oct	10:38	0.01	-0.07	
{ 3.00E-07}	1.76E-03	{ 6.86E-09}	3.08E+01	{ 3.79E-03}	4.98E-01	{ 7.91E-06}	-0.08	{ 1.15E-02}	'3112a_125ppb' run	23-Oct	10:48	0.01	-0.09	
{ 6.79E-07}	4.21E-03	{ 3.55E-08}	3.08E+01	{ 8.23E-03}	5.88E-01	{ 4.33E-05}	-0.03	{ 2.52E-02}	'979_75ppb' run on	23-Oct	11:03	0.01	-0.04	
{ 5.78E-07}	4.25E-03	{ 2.80E-08}	3.07E+01	{ 6.43E-03}	5.87E-01	{ 2.85E-05}	0.08	{ 2.14E-02}	'979_75ppb' run on	23-Oct	11:13	0.01	0.07	
{ 3.34E-07}	2.48E-03	{ 1.16E-08}	3.08E+01	{ 4.55E-03}	5.88E-01	{ 2.57E-05}	-0.01	{ 1.21E-02}	'979_125ppb' run on	23-Oct	11:29	0.01	-0.02	
{ 3.07E-07}	2.54E-03	{ 9.15E-09}	3.08E+01	{ 3.51E-03}	5.88E-01	{ 1.31E-05}	-0.01	{ 1.28E-02}	'979_125ppb' run on	23-Oct	11:39	0.01	-0.02	
{ 3.09E-07}	2.41E-03	{ 1.65E-08}	3.10E+01	{ 6.69E-03}	5.88E-01	{ 9.17E-06}	0.01	{ 1.35E-02}	'979_125ppb' run on	23-Oct	13:23	0.02	-0.02	
{ 1.27E-06}	1.10E-01	{ 1.25E-06}	3.14E+01	{ 1.11E-02}	4.17E-01	{ 2.39E-05}	-0.13	{ 2.18E-02}	'Proc_3112a_8/26'	23-Oct	13:40	0.02	-0.15	
{ 1.11E-06}	2.44E-01	{ 1.51E-06}	3.21E+01	{ 6.05E-03}	4.22E-01	{ 1.84E-05}	2.17	{ 2.37E-02}	'99243' run on Frida	23-Oct	13:55	0.02	2.15	
{ 8.71E-07}	5.51E-01	{ 7.50E-06}	3.12E+01	{ 1.33E-02}	5.62E-01	{ 2.87E-05}	2.64	{ 2.10E-02}	'92309' run on Frida	23-Oct	14:10	0.02	2.62	
{ 6.22E-07}	4.57E-01	{ 1.44E-05}	2.97E+01	{ 3.07E-02}	3.11E-01	{ 5.44E-06}	1.47	{ 2.07E-02}	'92304' run on Frida	23-Oct	14:25	0.02	1.44	
{ 8.46E-07}	1.52E-01	{ 4.16E-06}	3.05E+01	{ 2.68E-02}	3.75E-01	{ 1.49E-05}	1.58	{ 1.65E-02}	'92305' run on Frida	23-Oct	14:40	0.02	1.56	
{ 3.39E-07}	2.47E-03	{ 1.97E-08}	3.05E+01	{ 7.75E-03}	5.88E-01	{ 1.45E-05}	0.01	{ 1.50E-02}	'979_125ppb' run on	23-Oct	14:55	0.02	-0.01	
{ 8.56E-07}	7.40E-01	{ 9.57E-06}	3.11E+01	{ 1.26E-02}	5.15E-01	{ 4.05E-05}	2.81	{ 2.19E-02}	'92392' run on Frida	23-Oct	15:10	0.02	2.78	
{ 9.73E-07}	1.34E-01	{ 1.43E-06}	3.08E+01	{ 1.04E-02}	6.14E-01	{ 4.93E-05}	2.79	{ 2.37E-02}	'92393' run on Frida	23-Oct	15:25	0.02	2.77	
{ 7.65E-07}	8.49E+00	{ 9.35E-05}	3.26E+01	{ 1.08E-02}	4.45E-01	{ 2.68E-05}	0.76	{ 3.28E-02}	'99243-2' run on Fri	23-Oct	15:40	0.02	0.74	
{ 3.26E-07}	2.76E-03	{ 2.86E-08}	3.10E+01	{ 1.01E-02}	5.88E-01	{ 2.05E-05}	0.04	{ 1.60E-02}	'979_125ppb' run on	23-Oct	15:55	0.02	0.02	
{ 3.25E-07}	2.48E-03	{ 1.63E-08}	3.12E+01	{ 6.41E-03}	5.88E-01	{ 3.07E-05}	0.04	{ 1.43E-02}	'979_125ppb' run on	23-Oct	16:10	0.02	0.01	
{ 3.35E-07}	2.40E-03	{ 1.18E-08}	3.13E+01	{ 4.77E-03}	5.88E-01	{ 2.28E-05}	0.02	{ 1.48E-02}	'979_125ppb' run on	23-Oct	16:33	0.04	-0.01	
{ 4.43E-06}	1.12E+00	{ 2.05E-05}	3.07E+01	{ 1.79E-02}	4.29E-01	{ 4.69E-05}	-0.29	{ 3.28E-02}	'Proc_3112a' run on	23-Oct	16:48	0.04	-0.33	
{ 1.78E-06}	5.59E-02	{ 1.15E-06}	2.98E+01	{ 2.00E-02}	4.32E-01	{ 4.43E-05}	-0.19	{ 3.14E-02}	'Proc_3112a_10/7'	23-Oct	17:03	0.04	-0.22	
{ 3.38E-07}	2.50E-03	{ 1.26E-08}	3.14E+01	{ 4.92E-03}	5.88E-01	{ 2.22E-05}	0.00	{ 1.50E-02}	'979_125ppb' run on	23-Oct	17:18	0.04	-0.03	
{ 6.88E-07}	1.11E-01	{ 8.09E-07}	2.97E+01	{ 7.12E-03}	4.64E-01	{ 2.17E-05}	0.91	{ 1.74E-02}	'101886' run on Frid	23-Oct	17:33	0.04	0.88	
{ 7.73E-07}	8.62E-02	{ 7.88E-07}	3.00E+01	{ 8.91E-03}	4.08E-01	{ 1.72E-05}	1.22	{ 1.62E-02}	'101887' run on Frid	23-Oct	17:48	0.04	1.18	
{ 7.07E-07}	9.40E-02	{ 1.05E-06}	3.05E+01	{ 1.09E-02}	4.02E-01	{ 1.70E-05}	1.96	{ 2.33E-02}	'101888' run on Frid	23-Oct	18:03	0.04	1.93	
{ 7.48E-07}	9.61E-02	{ 1.01E-06}	3.01E+01	{ 0.0199}	4.00E-01	{ 0.000106}	2.35	{ 0.0223}	'101889' run on Frid	23-Oct	18:10	0.04	2.31	
{ 6.06E-07}	2.62E-03	{ 2.81E-08}	3.18E+01	{ 1.05E-02}	5.88E-01	{ 5.05E-05}	-0.01	{ 1.90E-02}	'979_125ppb' run on	23-Oct	20:06	0.04	-0.05	
{ 7.09E-07}	1.31E-01	{ 8.84E-07}	3.06E+01	{ 6.60E-03}	4.21E-01	{ 7.85E-06}	0.97	{ 1.79E-02}	'101891' run on Frid	23-Oct	20:21	0.04	0.94	
{ 4.28E-07}	2.97E-03	{ 1.08E-08}	3.19E+01	{ 3.55E-03}	5.88E-01	{ 2.22E-05}	-0.02	{ 1.49E-02}	'979_125ppb' run on	23-Oct	20:36	0.04	-0.05	
{ 7.36E-07}	4.35E-02	{ 2.64E-07}	3.08E+01	{ 5.93E-03}	4.29E-01	{ 7.97E-06}	1.56	{ 1.79E-02}	'101892' run on Frid	23-Oct	20:51	0.04	1.52	
{ 9.57E-07}	7.20E-02	{ 4.07E-07}	3.01E+01	{ 5.51E-03}	4.36E-01	{ 1.31E-05}	3.20	{ 2.03E-02}	'101894' run on Frid	23-Oct	21:06	0.04	3.17	
{ 1.45E-06}	3.96E-01	{ 3.68E-06}	3.03E+01	{ 9.04E-03}	4.64E-01	{ 1.53E-05}	5.36	{ 2.27E-02}	'101893' run on Frid	23-Oct	21:21	0.04	5.32	
{ 9.12E-07}	1.26E-01	{ 7.24E-07}	3.12E+01	{ 5.62E-03}	6.08E-01	{ 2.66E-05}	1.30	{ 2.38E-02}	'95795' run on Frida	23-Oct	21:36	0.04	1.27	
{ 8.87E-07}	1.17E-01	{ 6.45E-07}	3.05E+01	{ 5.35E-03}	4.34E-01	{ 8.04E-06}	1.06	{ 1.69E-02}	'95814' run on Frida	23-Oct	21:51	0.04	1.02	
{ 5.58E-07}	2.84E-03	{ 1.25E-08}	3.20E+01	{ 4.32E-03}	5.88E-01	{ 1.08E-05}	0.03	{ 1.68E-02}	'979_125ppb' run on	23-Oct	22:06	0.04	-0.01	
{ 6.89E-07}	1.89E-02	{ 7.94E-08}	3.14E+01	{ 4.09E-03}	6.18E-01	{ 1.43E-05}	1.05	{ 1.94E-02}	'95762' run on Frida	23-Oct	22:21	0.04	1.01	
{ 9.54E-07}	2.99E-02	{ 1.52E-07}	3.19E+01	{ 4.98E-03}	4.38E-01	{ 1.07E-05}	1.10	{ 1.75E-02}	'95807' run on Frida	23-Oct	22:36	0.04	1.06	
{ 8.39E-07}	2.76E-02	{ 1.05E-07}	3.18E+01	{ 3.71E-03}	4.19E-01	{ 8.64E-06}	1.13	{ 1.90E-02}	'95810' run on Frida	23-Oct	22:51	0.04	1.09	
{ 7.77E-07}	5.17E-02	{ 2.81E-07}	3.10E+01	{ 5.31E-03}	4.16E-01	{ 9.87E-06}	1.24	{ 2.12E-02}	'95813' run on Frida	23-Oct	23:06	0.04	1.21	
{ 1.39E-06}	1.46E-01	{ 9.11E-07}	3.10E+01	{ 6.08E-03}	4.35E-01	{ 1.40E-05}	1.30	{ 2.21E-02}	'95761' run on Frida	23-Oct	23:21	0.04	1.26	
{ 5.96E-07}	2.61E-03	{ 1.19E-08}	3.22E+01	{ 4.44E-03}	5.88E-01	{ 1.47E-05}	0.05	{ 1.32E-02}	'979_125ppb' run on	23-Oct	23:36	0.04	0.02	
{ 1.13E-06}	7.74E-02	{ 4.33E-07}	3.22E+01	{ 5.47E-03}	4.51E-01	{ 1.06E-05}	1.19	{ 2.10E-02}	'95811' run on Frida	23-Oct	23:51	0.04	1.15	
{ 1.03E-06}	6.59E-02	{ 3.95E-07}	3.12E+01	{ 5.85E-03}	4.57E-01	{ 1.27E-05}	1.33	{ 1.97E-02}	'95808' run on Satui	24-Oct	0:06	0.04	1.29	
{ 1.10E-06}	2.75E-02	{ 1.59E-07}	3.09E+01	{ 5.66E-03}	4.18E-01	{ 7.04E-06}	0.99	{ 1.78E-02}	'95831' run on Satui	24-Oct	0:21	0.04	0.96	
{ 1.95E-06}	4.01E-02	{ 2.09E-07}	3.11E+01	{ 5.08E-03}	3.84E-01	{ 7.63E-06}	1.31	{ 1.64E-02}	'95827' run on Satui	24-Oct	0:36	0.04	1.28	
{ 9.33E-07}	5.47E-01	{ 2.59E-06}	3.24E+01	{ 4.63E-03}	4.49E-01	{ 1.35E-05}	1.52	{ 2.38E-02}	'95832' run on Satui	24-Oct	0:51	0.04	1.48	
{ 4.28E-07}	2.69E-03	{ 1.06E-08}	3.22E+01	{ 3.85E-03}	5.88E-01	{ 1.25E-05}	0.09	{ 1.72E-02}	'979_125ppb' run on	24-Oct	1:06	0.04	0.06	
{ 1.02E-06}	4.11E-02	{ 1.81E-07}	3.17E+01	{ 4.30E-03}	4.60E-01	{ 1.13E-05}	0.99	{ 1.68E-02}	'101886-2' run on Sa	24-Oct	1:21	0.04	0.96	0.08
{ 8.85E-07}	5.03E-02	{ 2.56E-07}	3.21E+01	{ 4.96E-03}	3.95E-01	{ 7.78E-06}	1.94	{ 1.74E-02}	'101888-2' run on Sa	24-Oct	1:36	0.04	1.90	-0.03
{ 8.39E-07}	9.27E-02	{ 5.28E-07}	3.22E+01	{ 5.57E-03}	4.16E-01	{ 8.62E-06}	1.08	{ 2.01E-02}	'95810-2' run on Sat	24-Oct	1:51	0.04	1.04	-0.05
{ 6.68E-07}	1.14E-01	{ 6.31E-07}	3.22E+01	{ 5.43E-03}	4.14E-01	{ 1.33E-05}	1.04	{ 1.88E-02}	'95831-2' run on Sat	24-Oct	2:06	0.04	1.60	0.04
{ 5.12E-07}	2.71E-03	{ 1.78E-08}	3.21E+01	{ 6.38E-03}	5.88E-01	{ 1.61E-05}	0.08	{ 1.51E-02}	'979_125ppb' run on	24-Oct	2:21	0.04	0.05	0.08
{ 2.50E-06}	1.15E+00	{ 1.01E-05}	3.16E+01	{ 8.60E-03}	4.29E-01	{ 2.74E-05}	-0.14	{ 3.37E-02}	'Proc_3112a' run on	24-Oct	2:36	0.04	-0.18	
{ 2.50E-06}	5.68E-02	{ 4.16E-07}	3.07E+01	{ 7.15E-03}	4.32E-01	{ 1.73E-05}	-0.01	{ 3.17E-02}	'Proc_3112a_10/7'	24-Oct	2:51	0.04	-0.04	
{ 4.71E-07}	2.59E-03	{ 1.03E-08}	3.22E+01	{ 3.89E-03}	5.88E-01	{ 1.57E-05}	0.07	{ 1.61E-02}	'979_125ppb' run on	24-Oct	3:06	0.04	0.03	
{ 5.55E-07}	2.49E-03	{ 1.59E-08}	3.21E+01	{ 6.23E-03}	5.88E-01	{ 1.53E-05}	0.05	{ 1.78E-02}	'979_125ppb' run on	24-Oct	3:21	0.07	-0.02	