Wadsworth Center

New York State Department of Health

TRACE ELEMENTS IN URINE

Event #1, 2011

March 28, 2011

STATE OF NEW YORK
DEPARTMENT OF HEALTH

Wadsworth Center The Governor Nelson A. Rockefeller Empire State Plaza P.O. Box 509 Albany, New York 12201-0509

Nirav R. Shah, M.D., M.P.H.
Commissioner

March 28, 2011

Trace Elements in Urine
Event #1, 2011

Dear Laboratory Director:

Results from the first proficiency test (PT) event for Trace Elements in Urine have been tabulated and summarized. Target values for Arsenic, Cadmium, Mercury and Lead have been established along with acceptable ranges. Results are graded using element-specific criteria as indicated in each narrative section. A laboratory with an unacceptable significant analytical bias relative to the target value will be expected to investigate the source of the error. A confidential three-digit code number assigned by the PT program identifies participant laboratories.

PT Materials

The source of the test materials is human urine obtained from donor volunteers with informed consent. Urine was collected into polyethylene containers and then stored at 4°C. Following collection, urine from each donor was mixed and acidified to 1% v/v with nitric acid, and 1% (v/v) sulfamic acid was added to stabilize Hg. The urine was stored frozen at -80°; after thawing at room temperature, precipitated salts were removed by centrifugation. The urine was separated into five pools and each was supplemented with different amounts of As, Cd, Hg and Pb as inorganic salts. Each pool was also spiked with additional trace elements that comprise the "NHANES suite" and include: Ba, Be, Co, Cs, Mo, Pt, Sb, Tl, U and W. Each pool was stirred for 24 hours to ensure thorough mixing prior to aliquoting 10-mL samples into acid-leached polypropylene vials. Samples were stored at -80°C prior to circulating for proficiency testing.

The next PT event for Trace Elements in Urine is scheduled to be mailed Wednesday, April 27th, 2011. Please inform our laboratory staff at (518) 474-4484 if the test materials have not arrived within five days of the scheduled mail out date. **The deadline for reporting results is Wednesday, May 25th, 2011.**

Thank you for your participation.

Sincerely,

Patrick J. Parsons, Ph.D.
Chief
Laboratory of Inorganic and Nuclear Chemistry

Mary Frances Verostek, Ph.D.
Assistant Section Head
PT Program for Blood Lead /EP/Trace Elements

Urine Arsenic

The source of the test materials is human urine obtained from donor volunteers with informed consent. Urine was collected into polyethylene containers and then stored at 4°C. Following collection, urine from each donor was mixed and acidified to 1% v/v with nitric acid, and 1% (v/v) sulfamic acid was added to stabilize Hg. The urine was stored frozen at -80°; after thawing at room temperature, precipitated salts were removed by centrifugation. The urine was separated into five pools and each was supplemented with different amounts of inorganic As^{3+}. Each pool was stirred for 24 hours to ensure thorough mixing prior to aliquoting 10-mL samples into acid-leached polypropylene vials. Samples were stored at -80°C prior to circulating for proficiency testing.

The Target Value assigned for each PT material is the robust mean of the results reported by all participants in this event. The robust statistics were obtained utilizing algorithms based on those presented in **ISO 13528:2005E** Statistical methods for use in proficiency testing by interlaboratory comparisons. Values for urine arsenic range from 21.8 µg/L (0.29 µmol/L) to 421.7 µg/L (5.63 µmol/L).

Acceptable ranges. The acceptable range is fixed at ±20% or ±6 µg/L for target values ≤30 µg/L. This provides a more realistic acceptability range at low concentrations of urine As, and the criteria are consistent with those in place for blood As.

Discussion. Based upon the above criteria, 98.5% of test results reported were judged as satisfactory, with none of the 26 participant laboratories reporting 2 or more of the 5 results outside the acceptable ranges.

New York State Department of Health
Urine Arsenic Test Results, 2011 Event #1
ROBUST STATISTICAL SUMMARY

TARGET VALUE ASSIGNMENT AND STATISTICS

	Results (μg/L urine)				
	UE11-01	UE11-02	UE11-03	UE11-04	UE11-05
Robust Mean	**21.8**	**106.4**	**421.7**	**79.1**	**56.9**
Robust Standard Deviation	2.4	7.2	20.4	5.6	2.9
Standard Uncertainty	0.6	1.8	5.0	1.4	0.7
RSD (%)	10.9	6.7	4.8	7.1	5.1
Acceptable Range:					
Upper Limit	27.8	127.7	506.0	94.9	68.3
Lower Limit	15.8	85.1	337.4	63.3	45.5

notes: Results reported as less than the method detection limit are excluded from statistical calculations.

New York State Department of Health
Urine Arsenic Test Results, 2011 Event #1
PERFORMANCE OF PARTICIPATING LABORATORIES

Lab Code	Method	Results (µg/L urine)					Info Only
		UE11-01	UE11-02	UE11-03	UE11-04	UE11-05	
	Target Values:	21.8	106.4	421.7	79.1	56.9	
106	DRC/CC-ICP-MS	21.9	111	443	81.8	59.6	Info
107	DRC/CC-ICP-MS	21.6	105.8	419.6	78.6	57.3	Info
110	DRC/CC-ICP-MS	23.0	113.3	432.8	85.6	61.3	
114	ICP-MS	20.0	101.0	394.0.	81.0	56.0	
116	DRC/CC-ICP-MS	23.3	116.7	461.8	87.0	62.1	Info
147	ICP-MS	19.5	94.4	383.5	70.4	49.7	Info
156	ICP-MS	25.5	110.0	424.0	82.7	58.2	
159	ICP-MS	26.0	111.0	429.0	84.0	61.0	
164	ICP-MS	22.0	105.0	414.0	79.0	55.0	
179	ICP-MS	17.0	101.0	416.0	73.0	52.0	
197	DRC/CC-ICP-MS	23.0	105.0	420.0	75.0	55.0	
200	ICP-MS	19.9	100	406	77.4	55.3	Info
206	ICP-MS	24.1	127.6	462.8	94.0	68.9 ↑	
208	ICP-MS	22.8	89.2	353.6	73.0	56.7	
293	DRC/CC-ICP-MS	21.1	103.0	409.0	76.9	54.3	Info
305	DRC/CC-ICP-MS	22.0	113.0	466.0	83.0	58.0	
312	ICP-MS	21.9	107.1	421.4	77.6	56.8	
324	HR-ICP-MS	18.8	102.1	419.6	77.1	53.7	Info
339	HR-ICP-MS	20.2	104	413	76.6	55.7	Info
359	ICP-MS	23.9	108.8	432.7	83.0	59.2	
366	ICP-MS	23.0	113.0	441.0	71.0	58.0	Info
367	ICP-MS	21.3	106.1	428.0	79.1	56.0	Info
385	DRC/CC-ICP-MS	20.8	106.0	399.0	79.0	56.9	Info
391	DRC/CC-ICP-MS	16.9	103.8	430.0	79.9	56.7	Info
395	DRC/CC-ICP-MS	25.2	116.0	461.3	86.0	60.2	
401	ETAAS other	19	92	314 ↓	71	52	Info

Percent satisfactory results for all participants: 98.5 %

notes: ↑ reported outside upper limit
↓ reported outside lower limit
◥: Unacceptable result

notes: Results reported as less than the method detection limit are excluded from statistical calculations.
Info only: results included for informational purposes only.

New York State Department of Health
Urine Arsenic Test Results, 2011 Event #1
STATISTICAL SUMMARY BY METHOD

	Results (μg/L urine)				
	UE11-01	UE11-02	UE11-03	UE11-04	UE11-05
DRC/CC-ICP-MS					
Number of Sample Measurements:	10	10	10	10	10
Mean:	21.9	109.4	434.3	81.3	58.1
Standard Deviation:	2.2	5.2	23.3	4.1	2.6
RSD (%):	9.9	4.8	5.4	5.0	4.5
ETAAS other					
Number of Sample Measurements:	1	1	1	1	1
Mean:	19.0	92.0	314.0	71.0	52.0
Standard Deviation:	?	?	?	?	?
RSD (%):	—	—	—	—	—
HR-ICP-MS					
Number of Sample Measurements:	2	2	2	2	2
Mean:	19.5	103.1	416.3	76.9	54.7
Standard Deviation:	1.0	1.3	4.7	0.4	1.4
RSD (%):	—	—	—	—	—
ICP-MS					
Number of Sample Measurements:	13	13	13	13	13
Mean:	22.1	105.7	415.8	78.9	57.1
Standard Deviation:	2.5	9.4	27.4	6.4	4.6
RSD (%):	11.6	8.9	6.6	8.2	8.0
All Laboratories					
Number of Sample Measurements:	26	26	26	26	26
Mean:	21.7	106.4	419.0	79.3	57.1
Standard Deviation:	2.4	8.1	33.1	5.6	3.8
RSD (%):	10.9	7.6	7.9	7.0	6.7

notes: ? Insufficient data for calculation.

Urine Cadmium

The source of the test materials is human urine obtained from donor volunteers with informed consent. Urine was collected into polyethylene containers and then stored at 4°C. Following collection, urine from each donor was mixed and acidified to 1% v/v with nitric acid, and 1% (v/v) sulfamic acid was added to stabilize Hg. The urine was stored frozen at -80°; after thawing at room temperature, precipitated salts were removed by centrifugation. The urine was separated into five pools and each was supplemented with different amounts of inorganic Cd^{2+}. Each pool was stirred for 24 hours to ensure thorough mixing prior to aliquoting 10-mL samples into acid-leached polypropylene vials. Samples were stored at -80°C prior to circulating for proficiency testing.

The Target Value assigned for each PT material is the robust mean of the results reported by all participants in this event. The robust statistics were obtained utilizing algorithms based on those presented in **ISO 13528:2005E** Statistical methods for use in proficiency testing by interlaboratory comparisons. Values for urine cadmium range from 1.2 µg/L (11 nmol/L) to 5.4 µg/L (48 nmol/L).

Acceptable ranges. The acceptable range is fixed at ±15% or ±1 µg/L (9 nmol/L) around the target value whichever is greater. These criteria are used by the U.S. Occupational Safety and Health Administration (OSHA) to assess performance for occupational medicine.

Discussion. Based upon the above criteria, 98.5% of test results reported were judged as satisfactory, with none of the 27 participant laboratories reporting 2 or more of the 5 results outside the acceptable ranges.

New York State Department of Health
Urine Cadmium Test Results, 2011 Event #1
ROBUST STATISTICAL SUMMARY

TARGET VALUE ASSIGNMENT AND STATISTICS

	Results (μg/L urine)				
	UE11-01	UE11-02	UE11-03	UE11-04	UE11-05
Robust Mean	**3.4**	**5.4**	**1.7**	**1.2**	**2.7**
Robust Standard Deviation	0.3	0.5	0.2	0.1	0.3
Standard Uncertainty	0.1	0.1	0.0	0.0	0.1
RSD (%)	9.7	9.1	9.0	12.3	10.9
Acceptable Range:					
Upper Limit	4.4	6.4	2.7	2.2	3.7
Lower Limit	2.4	4.4	0.7	0.2	1.7

notes: Results reported as less than the method detection limit are excluded from statistical calculations.

New York State Department of Health
Urine Cadmium Test Results, 2011 Event #1
PERFORMANCE OF PARTICIPATING LABORATORIES

Lab Code	Method	Results (µg/L urine)					Info Only
		UE11-01	UE11-02	UE11-03	UE11-04	UE11-05	
	Target Values:	3.4	5.4	1.7	1.2	2.7	
103	ICP-MS	3.9	6.1	2.2	1.7	3.2	Info
106	ICP-MS	3.3	5.1	1.6	1.2	2.6	Info
107	DRC/CC-ICP-MS	3.5	5.4	1.7	1.2	2.7	Info
110	ICP-MS	3.5	5.6	1.8	1.3	2.8	
114	ICP-MS	3.1	5.0	1.7	1.1	2.5	
116	ICP-MS	3.2	5.0	1.6	1.1	2.5	Info
147	ICP-MS	3.3	5.1	1.7	1.2	2.6	Info
156	ICP-MS	3.2	5.0	1.7	1.0	2.4	
159	ICP-MS	3.4	5.4	1.7	1.2	2.6	
164	ICP-MS	3.3	4.9	1.7	1.3	2.5	
179	ICP-MS	3.8	5.9	1.7	1.2	2.9	
197	DRC/CC-ICP-MS	4.2	6.5 ↑	2.1	1.4	3.2	
199	ICP-MS	2.9	4.6	1.6	1.0	2.3	Info
200	ICP-MS	4.0	6.0	1.9	1.3	2.9	Info
206	ICP-MS	3.5	5.7	1.6	1.3	2.7	
208	ICP-MS	3.3	4.7	1.5	1.2	2.7	
293	ICP-MS	4.2	6.6 ↑	2.1	1.5	3.2	Info
305	ICP-MS	3.8	5.6	1.9	1.3	2.8	
312	ICP-MS	3.7	5.6	1.9	1.1	2.8	
324	HR-ICP-MS	3.7	5.6	2.0	1.0	3.2	Info
339	HR-ICP-MS	3.0	4.8	1.5	1.0	2.3	Info
359	ICP-MS	3.2	5.1	1.7	1.2	2.5	
366	ICP-MS	2.9	5.3	1.7	1.2	2.6	Info
367	ICP-MS	3.6	5.5	1.9	1.3	2.9	Info
385	ICP-MS	3.4	5.3	1.7	1.2	2.7	Info
391	DRC/CC-ICP-MS	3.2	6.0	2.3	1.8	3.3	Info
395	ICP-MS	3.2	5.2	1.6	1.1	2.5	

Percent satisfactory results for all participants: 98.5 %

notes: ↑ reported outside upper limit
↓ reported outside lower limit
◥: Unacceptable result

notes: Results reported as less than the method detection limit are excluded from statistical calculations.
Info only: results included for informational purposes only.

New York State Department of Health
Urine Cadmium Test Results, 2011 Event #1
STATISTICAL SUMMARY BY METHOD

	Results (µg/L urine)				
	UE11-01	UE11-02	UE11-03	UE11-04	UE11-05
DRC/CC-ICP-MS					
Number of Sample Measurements:	3	3	3	3	3
Mean:	3.6	6.0	2.0	1.5	3.1
Standard Deviation:	0.5	0.6	0.3	0.3	0.3
RSD (%):	—	—	—	—	—
HR-ICP-MS					
Number of Sample Measurements:	2	2	2	2	2
Mean:	3.4	5.2	1.8	1.0	2.8
Standard Deviation:	0.5	0.6	0.4	0.0	0.6
RSD (%):	—	—	—	—	—
ICP-MS					
Number of Sample Measurements:	22	22	22	22	22
Mean:	3.4	5.4	1.8	1.2	2.7
Standard Deviation:	0.3	0.5	0.2	0.2	0.2
RSD (%):	10.0	9.0	9.8	12.6	8.7
All Laboratories					
Number of Sample Measurements:	27	27	27	27	27
Mean:	3.5	5.4	1.8	1.2	2.7
Standard Deviation:	0.4	0.5	0.2	0.2	0.3
RSD (%):	10.4	9.5	11.8	15.6	10.4

notes: ? Insufficient data for calculation.

Urine Mercury

The source of the test materials is human urine obtained from donor volunteers with informed consent. Urine was collected into polyethylene containers and then stored at 4°C. Following collection, urine from each donor was mixed and acidified to 1% v/v with nitric acid, and 1% (v/v) sulfamic acid was added to stabilize Hg. The urine was stored frozen at -80°; after thawing at room temperature, precipitated salts were removed by centrifugation. The urine was separated into five pools and each was supplemented with different amounts of inorganic Hg. Each pool was stirred for 24 hours to ensure thorough mixing prior to aliquoting 10-mL samples into acid-leached polypropylene vials. Samples were stored at -80°C prior to circulating for proficiency testing.

The Target Value assigned for each PT material is the robust mean of the results reported by all participants in this event. The robust statistics were obtained utilizing algorithms based on those presented in **ISO 13528:2005E** Statistical methods for use in proficiency testing by interlaboratory comparisons. Values for urine mercury range from 9.4 µg/L (47 nmol/L) to 113.1 µg/L (564 nmol/L).

Acceptable ranges. The acceptable range is fixed at ±30% or ±3 µg/L (15 nmol/L) for target values ≤10 µg/L. The criteria are consistent with those in place for blood Hg.

Discussion. Based upon the above criteria, 87.2% of test results reported were judged as satisfactory, with four of the 25 participant laboratories (16.0%) reporting 2 or more of the 5 results outside the acceptable ranges.

New York State Department of Health
Urine Mercury Test Results, 2011 Event #1
ROBUST STATISTICAL SUMMARY

TARGET VALUE ASSIGNMENT AND STATISTICS

	Results (μg/L urine)				
	UE11-01	UE11-02	UE11-03	UE11-04	UE11-05
Robust Mean	**81.5**	**34.3**	**9.4**	**18.1**	**113.1**
Robust Standard Deviation	8.0	5.1	1.3	2.3	12.7
Standard Uncertainty	2.0	1.3	0.3	0.6	3.2
RSD (%)	9.8	14.8	14.1	12.5	11.2
Acceptable Range:					
Upper Limit	106.0	44.6	12.4	23.5	147.0
Lower Limit	57.1	24.0	6.4	12.7	79.2

notes: Results reported as less than the method detection limit are excluded from statistical calculations.

New York State Department of Health
Urine Mercury Test Results, 2011 Event #1
PERFORMANCE OF PARTICIPATING LABORATORIES

Lab Code	Method	Results (μg/L urine)					Info Only
		UE11-01	UE11-02	UE11-03	UE11-04	UE11-05	
	Target Values:	81.5	34.3	9.4	18.1	113.1	
103	ICP-MS	88.4	32.5	9.0	16.9	112.3	Info
107	DRC/CC-ICP-MS	81.6	35.1	10.4	18.4	110.8	Info
109	CV-AAS	86.4	31.7	9.6	16.5	113.2	Info
110	ICP-MS	80.9	32.8	9.7	18.0	110.0	
114	ICP-MS	82.0	33.0	10.0	19.0	113.0	
147	CV-AAS	71.0	29.1	8.2	15.6	104.1	Info
156	ICP-MS	78.8	39.1	<11.0	17.4	109.6	
159	ICP-MS	74.0	31.0	9.0	16.0	102.0	
164	ICP-MS	74.0	31.0	9.0	17.0	102.0	
179	ICP-MS	81.0	33.0	9.0	18.0	111.0	
197	DRC/CC-ICP-MS	106.0	41.0	11.0	20.0	143.0	
200	ICP-MS	82.1	37.2	14.7 ↑	20.1	122	Info
206	ICP-MS	53.0 ↓	21.0 ↓	6.0 ↓	12.0 ↓	72.0 ↓	
208	CV-AAS	83.6	35.2	10.0	17.8	115.9	
293	ICP-MS	90.1	37.9	11.5	21.3	127.6	Info
305	ICP-MS	86.0	38.0	11.0	19.0	121.0	
312	ICP-MS	97.1	39.4	10.9	20.6	137.6	
324	HR-ICP-MS	110.5 ↑	48.9 ↑	18.5 ↑	29.3 ↑	150.9 ↑	Info
339	HR-ICP-MS	44.0 ↓	23.2 ↓	8.1	13.6	91.4	Info
359	ICP-MS	71.1	28.6	8.9	16.3	99.4	
366	ICP-MS	82.0	37.0	10.0	18.3	106.0	Info
367	CV-AAS	85.2	32.9	9.7	17.7	113.3	Info
385	ICP-MS	79.4	30.2	8.8	16.3	105.0	Info
391	CV-AAS	58.5	57.2 ↑	16.0 ↑	28.3 ↑	146.0	Info
395	ICP-MS	86.7	35.0	10.1	19.3	118.8	

Percent satisfactory results for all participants: 87.2 %

notes: ↑ reported outside upper limit
↓ reported outside lower limit
◥: Unacceptable result

notes: Results reported as less than the method detection limit are excluded from statistical calculations.
Info only: results included for informational purposes only.

New York State Department of Health
Urine Mercury Test Results, 2011 Event #1
STATISTICAL SUMMARY BY METHOD

	Results (μg/L urine)				
	UE11-01	UE11-02	UE11-03	UE11-04	UE11-05
CV-AAS					
Number of Sample Measurements:	5	5	5	5	5
Mean:	76.9	37.2	10.7	19.2	118.5
Standard Deviation:	12.0	11.4	3.0	5.2	16.0
RSD (%):	15.6	30.6	28.4	27.0	13.5
DRC/CC-ICP-MS					
Number of Sample Measurements:	2	2	2	2	2
Mean:	93.8	38.1	10.7	19.2	126.9
Standard Deviation:	17.3	4.2	0.4	1.1	22.8
RSD (%):	—	—	—	—	—
HR-ICP-MS					
Number of Sample Measurements:	2	2	1	2	2
Mean:	77.3	36.1	8.1	21.5	121.2
Standard Deviation:	47.0	18.2	?	11.1	42.1
RSD (%):	—	—	—	—	—
ICP-MS					
Number of Sample Measurements:	16	16	15	16	16
Mean:	80.4	33.5	9.8	17.8	110.6
Standard Deviation:	9.8	4.8	1.9	2.2	14.5
RSD (%):	12.2	14.2	18.9	12.4	13.1
All Laboratories					
Number of Sample Measurements:	25	25	23	25	25
Mean:	80.5	34.8	10.0	18.5	114.3
Standard Deviation:	14.4	7.3	2.1	3.7	17.3
RSD (%):	17.9	21.0	20.5	20.1	15.1

notes: ? Insufficient data for calculation.

Urine Lead

The source of the test materials is human urine obtained from donor volunteers with informed consent. Urine was collected into polyethylene containers and then stored at 4°C. Following collection, urine from each donor was mixed and acidified to 1% v/v with nitric acid, and 1% (v/v) sulfamic acid was added to stabilize Hg. The urine was stored frozen at -80°; after thawing at room temperature, precipitated salts were removed by centrifugation. The urine was separated into five pools and each was supplemented with different amounts of inorganic Pb^{2+}. Each pool was stirred for 24 hours to ensure thorough mixing prior to aliquoting 10-mL samples into acid-leached polypropylene vials. Samples were stored at -80°C prior to circulating for proficiency testing.

The Target Value assigned for each PT material is the robust mean of the results reported by all participants in this event. The robust statistics were obtained utilizing algorithms based on those presented in **ISO 13528:2005E** Statistical methods for use in proficiency testing by interlaboratory comparisons. Values for urine lead range from 23.1 µg/L (0.11 µmol/L) to 213.3 µg/L (1.03 µmol/L).

Acceptable ranges. The acceptable range is fixed at ±10% or ±40 µg/L (0.19 µmol/L) around the target value, whichever is greater. These criteria are consistent with those established under CLIA '88 (Federal Register Volume 57, Number 40, §§ 493.2 and 493.937, February 28, 1992) for blood lead.

Discussion. Based upon the above criteria, 98.6% of test results were judged as satisfactory, with one of the 28 participant laboratories (3.6%) reporting 2 or more of the 5 results outside the acceptable ranges.

New York State Department of Health
Urine Lead Test Results, 2011 Event #1
ROBUST STATISTICAL SUMMARY

TARGET VALUE ASSIGNMENT AND STATISTICS

	Results (µg/L urine)				
	UE11-01	**UE11-02**	**UE11-03**	**UE11-04**	**UE11-05**
Robust Mean	**151.7**	**77.2**	**23.1**	**95.9**	**213.3**
Robust Standard Deviation	9.7	5.1	1.8	7.5	11.3
Standard Uncertainty	2.3	1.2	0.4	1.8	2.7
RSD (%)	6.4	6.6	7.8	7.8	5.3
Acceptable Range:					
Upper Limit	191.7	117.2	63.1	135.9	253.3
Lower Limit	111.7	37.2	0.0	55.9	173.3

notes: Results reported as less than the method detection limit are excluded from statistical calculations.

New York State Department of Health
Urine Lead Test Results, 2011 Event #1
PERFORMANCE OF PARTICIPATING LABORATORIES

Lab Code	Method	Results (µg/L urine)					Info Only
		UE11-01	UE11-02	UE11-03	UE11-04	UE11-05	
	Target Values:	151.7	77.2	23.1	95.9	213.3	
103	ICP-MS	159.7	76.5	21.8	93.1	221.2	Info
106	ICP-MS	156	79.8	23.7	99.5	220	Info
107	DRC/CC-ICP-MS	157.6	80.1	24.0	100.8	221.0	Info
110	ICP-MS	154.0	78.2	23.5	96.8	217.0	
110	ETAAS-Z	150	83	28	104	216	Info
114	ICP-MS	146.0	71.0	21.0	90.0	198.0	
116	ICP-MS	153.3	76.8	22.8	95.1	212.0	Info
147	ICP-MS	152.1	77.9	23.0	95.1	207.2	Info
156	ICP-MS	134.8	63.2	17.6	76.6	188.8	
159	ICP-MS	151.0	77.0	23.0	95.0	208.0	
164	ICP-MS	153.0	77.0	23.0	96.0	210.0	
179	ICP-MS	157.0	81.0	24.0	100.0	220.0	
197	DRC/CC-ICP-MS	167.1	82.1	23.9	106.2	224.3	
199	ICP-MS	139.8	75.4	21.8	85.8	204.2	Info
200	ICP-MS	153	76.9	23.4	99.0	217	Info
206	ICP-MS	147.5	72.0	21.0	92.0	210.0	
208	ICP-MS	139.1	66.5	19.9	88.1	207.7	
293	ICP-MS	186.0	93.2	26.9	116.0	252.8	Info
305	ICP-MS	146.0	75.0	23.0	92.0	198.0	
312	ICP-MS	161.1	83.6	24.4	102.4	227.1	
324	HR-ICP-MS	173.7	93.1	29.1	113.1	243.1	Info
339	HR-ICP-MS	151	74.0	24.0	101	216	Info
359	ICP-MS	147.6	74.8	22.6	94.0	206.3	
366	ICP-MS	140.0	80.0	25.0	93.0	212.0	Info
383	ETAAS-Z	131.4	66.8	17.8	82.3	183.5	
385	ICP-MS	168.0	83.5	25.2	102.0	231.0	Info
391	ETAAS-Z	107.6 ↓	59.8	19.8	75.2	128.5 ↓	Info
395	ICP-MS	152.5	77.9	23.2	97.0	215.6	

Percent satisfactory results for all participants: 98.6 %

notes: ↑ reported outside upper limit
↓ reported outside lower limit
◥: Unacceptable result

notes: Results reported as less than the method detection limit are excluded from statistical calculations.
Info only: results included for informational purposes only.

New York State Department of Health
Urine Lead Test Results, 2011 Event #1
STATISTICAL SUMMARY BY METHOD

	Results (µg/L urine)				
	UE11-01	UE11-02	UE11-03	UE11-04	UE11-05
DRC/CC-ICP-MS					
Number of Sample Measurements:	2	2	2	2	2
Mean:	162.4	81.1	24.0	103.5	222.7
Standard Deviation:	6.7	1.4	0.1	3.8	2.3
RSD (%):	—	—	—	—	—
ETAAS-Z					
Number of Sample Measurements:	3	3	3	3	3
Mean:	129.7	69.9	21.9	87.2	176.0
Standard Deviation:	21.3	11.9	5.4	15.0	44.2
RSD (%):	—	—	—	—	—
HR-ICP-MS					
Number of Sample Measurements:	2	2	2	2	2
Mean:	162.4	83.6	26.6	107.1	229.6
Standard Deviation:	16.1	13.5	3.6	8.6	19.2
RSD (%):	—	—	—	—	—
ICP-MS					
Number of Sample Measurements:	21	21	21	21	21
Mean:	152.3	77.0	22.8	95.2	213.5
Standard Deviation:	11.1	6.2	2.0	7.5	13.4
RSD (%):	7.3	8.0	8.6	7.9	6.3
All Laboratories					
Number of Sample Measurements:	28	28	28	28	28
Mean:	151.3	77.0	23.1	95.8	211.3
Standard Deviation:	14.4	7.4	2.6	9.2	21.6
RSD (%):	9.5	9.7	11.2	9.6	10.2

notes: ? Insufficient data for calculation.

Additional Trace Elements Reported in Urine

Participating laboratories reported analytical results for any other elements that are routinely reported in order to characterize these materials more completely. Results and descriptive statistics are provided for reference purposes. No target value or acceptable range is implied. As, Cd, and Pb were spiked using a stock standard containing all elements in the National Health and Nutritional Examination Survey (NHANES) conducted by the Centers for Disease Control and Prevention. Refer to *www.cdc.gov/exposurereport* for more information on recent NHANES data for these elements in urine. In addition, these samples were spiked with leading elements present in other proficiency testing programs. The following table shows the additional elements spiked in the samples.

NHANES Elements	Additional Elements
Ba	Al
Be	Cr
Co	Cu
Cs	Mn
Mo	Ni
Pt	Se
Sb	Sn
Tl	Te
U	V
W	Zn

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Urine Aluminum Results (µg/L)

Lab Code	Method	UE11-01	UE11-02	UE11-03	UE11-04	UE11-05
114	ICP-MS	36.0	48.0	21.0	18.0	29.0
147	ICP-MS	31.301	43.443	16.919	14.544	23.853
164	ICP-MS	31.0	44.0	16.0	12.0	25.0
179	DRC/CC-ICP-MS	35.0	50.0	19.0	16.0	38.0*
197	ICP-MS	38.0	43.0	21.0	20.0	24.0
305	ICP-MS	25.0	34.0	14.0	11.0	21.0
312	ICP-MS	28.0	44.0	16.1	12.6	24.7
359	ICP-MS	25.9	36.1	14.0	10.6	18.5
391	DRC/CC-ICP-MS	11.7	28.2	16.2	16.4	21.4
Omitted*	**n:**	**9**	**9**	**9**	**9**	**8**
	Arithmetic Mean:	**29**	**41**	**17**	**15**	**23**
	Standard Deviation:	**8**	**7**	**3**	**3**	**3**

Urine Antimony Results (µg/L)

Lab Code	Method	UE11-01	UE11-02	UE11-03	UE11-04	UE11-05
107	ICP-MS	3.206	5.071	1.513	1.022	2.456
110	ICP-MS	3.3	5.3	1.6	1.1	2.7
114	ICP-MS	3.5	5.7	1.7	1.1	2.6
116	ICP-MS	3.47	5.39	1.62	1.14	2.65
147	ICP-MS	3.287	5.211	1.522	1.053	2.593
179	ICP-MS	3.4	5.6	1.6	1.1	2.7
197	ICP-MS	3.9	6.1	1.9	1.2	3.0
199	ICP-MS	3.1	4.5	1.5	0.9	2.3
312	ICP-MS	3.3	5.2	1.5	1.0	2.5
359	ICP-MS	3.0	4.8	1.5	1.0	2.3
385	ICP-MS	3.5	5.8	1.7	1.1	2.8
395	ICP-MS	3.2	5.3	1.5	1.0	2.5
	n:	**12**	**12**	**12**	**12**	**12**
	Arithmetic Mean:	**3.3**	**5.3**	**1.6**	**1.1**	**2.6**
	Standard Deviation:	**0.2**	**0.4**	**0.1**	**0.1**	**0.2**

Urine Barium Results (µg/L)

Lab Code	Method	UE11-01	UE11-02	UE11-03	UE11-04	UE11-05
107	ICP-MS	4.807	7.165	2.626	2.002	3.859
110	ICP-MS	4.9	7.4	2.8	2.1	4.0
116	ICP-MS	4.89	7.26	2.72	2.10	3.92
147	ICP-MS	4.559	6.769	2.513	1.909	3.694
179	ICP-MS	5.0	7.0	3.0	2.0	4.0
197	ICP-MS	4.8	7.4	2.6	2.0	4.0
199	ICP-MS	4.7	7.2	2.8	1.9	3.8
312	ICP-MS	5.1	7.7	2.8	2.2	4.2
359	ICP-MS	4.0	6.1	2.3	1.7	3.2
385	ICP-MS	5.1	7.6	2.8	2.1	4.1
395	ICP-MS	4.8	7.2	2.7	2.1	3.8
	n:	**11**	**11**	**11**	**11**	**11**
	Arithmetic Mean:	**4.8**	**7.2**	**2.7**	**2.0**	**3.9**
	Standard Deviation:	**0.3**	**0.4**	**0.2**	**0.1**	**0.3**

Urine Beryllium Results (µg/L)

Lab Code	Method	UE11-01	UE11-02	UE11-03	UE11-04	UE11-05
107	ICP-MS	4.632	7.505	2.246	1.57	3.638
110	ICP-MS	4.3	6.8	1.9	1.4	3.6
116	ICP-MS	4.82	8.01	2.26	1.46	3.78
147	ICP-MS	3.982	6.162	1.892	1.315	3.054
179	ICP-MS	4.2	6.8	2.1	1.3	3.3
197	ICP-MS	4.9	7.8	2.3	1.7	3.6
199	ICP-MS	3.2	5.2	1.5	1.0	2.5
312	ICP-MS	3.9	6.9	1.8	1.2	3.2
385	ICP-MS	4.2	6.8	2	1.4	3.3
	n:	**9**	**9**	**9**	**9**	**9**
	Arithmetic Mean:	**4.2**	**6.9**	**2.0**	**1.4**	**3.3**
	Standard Deviation:	**0.5**	**0.9**	**0.3**	**0.2**	**0.4**

Urine Bismuth Results (µg/L)

Lab Code	Method	UE11-01	UE11-02	UE11-03	UE11-04	UE11-05
147	ICP-MS	0.230	0.138	0.133	0.118	0.102

Urine Cesium Results (µg/L)

Lab Code	Method	UE11-01	UE11-02	UE11-03	UE11-04	UE11-05
107	ICP-MS	19.27	28.98	10.63	8.216	15.58
110	ICP-MS	19.4	29.5	10.9	8.4	16.3
116	ICP-MS	19.7	29.3	10.9	8.29	15.8
147	ICP-MS	18.474	27.645	10.141	7.788	14.886
179	ICP-MS	18.3	27.9	10.2	7.8	14.4
199	ICP-MS	18.6	25.7	10.7	7.6	14.9
312	ICP-MS	20.2	31.7	11.3	8.8	16.8
366	ICP-MS	16.0*	25.0	10.0	6.0	13.0
385	ICP-MS	20.4	30.5	11.3	8.6	16.4
Omitted*	**n:**	**8**	**9**	**9**	**9**	**9**
	Arithmetic Mean:	**19**	**28**	**10.7**	**7.9**	**15**
	Standard Deviation:	**1**	**2**	**0.5**	**0.8**	**1**

Urine Chromium Results (µg/L)

Lab Code	Method	UE11-01	UE11-02	UE11-03	UE11-04	UE11-05
110	DRC/CC-ICP-MS	9.0	14.1	4.4	3.5	6.9
114	ICP-MS	7.8	12.3	4.1	2.7	6.0
147	ICP-MS	8.164	12.429	3.9	2.6	6.604
164	DRC/CC-ICP-MS	8.2	12.8	4.2	2.9	6.5
179	DRC/CC-ICP-MS	6.9	11.5	3.6	2.5	5.7
197	ICP-MS	8.8	14.4	7.5*	6.3*	9.7*
305	ICP-MS	8.5	13.5	4.1	3.1	6.4
312	DRC/CC-ICP-MS	9.7	14.7	4.7	3.7	7.8
359	ICP-MS	8.2	12.5	4.8	3.7	6.6
391	DRC/CC-ICP-MS	6.5	12.0	4.6	3.5	6.8
395	DRC/CC-ICP-MS	8.1	13.0	4.0	2.7	6.6
Omitted*	**n:**	**11**	**11**	**10**	**10**	**10**
	Arithmetic Mean:	**8.2**	**13**	**4**	**3.1**	**7**
	Standard Deviation:	**0.9**	**1**	**0**	**0.5**	**1**

Urine Cobalt Results (µg/L)

Lab Code	Method	UE11-01	UE11-02	UE11-03	UE11-04	UE11-05
107	ICP-MS	18.74	3.209	1.415	2.581	1.77
110	ICP-MS	17.9	3.1	1.4	2.5	1.7
114	ICP-MS	3.0*	<1.0*	1.3	4.5	2.1
116	ICP-MS	17.7	2.95	1.32	2.43	1.66
147	ICP-MS	16.618	2.899	1.308	2.363	1.597
159	ICP-MS	16.9	2.9	1.3	2.4	1.6
179	ICP-MS	19.1	3.3	1.6	2.7	1.8
197	ICP-MS	15.7	2.5	1.2	2.2	1.5
199	ICP-MS	15.0	3.2	1.4	2.7	1.8
312	ICP-MS	17.4	3.2	1.4	2.4	1.7
359	ICP-MS	14.4	2.7	1.5	2.3	1.6
385	ICP-MS	17.2	3	1.4	3	1.7
391	DRC/CC-ICP-MS	14.3	2.9	1.3	2.5	1.7
395	ICP-MS	17.4	2.9	1.3	2.4	1.6
Omitted*	**n:**	**13**	**13**	**14**	**14**	**14**
	Arithmetic Mean:	**17**	**3.0**	**1.4**	**2.6**	**1.7**
	Standard Deviation:	**2**	**0.2**	**0.1**	**0.6**	**0.1**

Urine Copper Results (µg/L)

Lab Code	Method	UE11-01	UE11-02	UE11-03	UE11-04	UE11-05
110	ICP-MS	173.0	273.0	86.2	60.3	135.0
114	ICP-MS	142.0	224.0	72.0	51.0	110.0
147	ICP-MS	164.549	252.224	78.78	55.781	122.618
159	ICP-MS	164.0	260.0	84.0	59.0	131.0
164	ICP-MS	153.0	240.0	81.0	59.0	126.0
179	DRC/CC-ICP-MS	169.0	271.0	84.0	57.0	132.0
197	ICP-MS	179.0	278.8	94.8	68.4	143.8
200	ICP-MS	171	273	89	64	140
305	ICP-MS	157.0	266.0	82.0	58.0	136.0
312	ICP-MS	167.7	265.5	82.9	58.9	132.2
359	ICP-MS	151.9	240.9	78.6	54.7	116.1
391	DRC/CC-ICP-MS	121.7*	237	84.9	61.8	128.2
395	ICP-MS	168.8	268.0	84.4	59.2	133.8
Omitted*	**n:**	**12**	**13**	**13**	**13**	**13**
	Arithmetic Mean:	**163**	**258**	**83**	**59**	**130**
	Standard Deviation:	**11**	**17**	**5**	**4**	**9**

Urine Iodine Results (µg/L)

Lab Code	Method	UE11-01	UE11-02	UE11-03	UE11-04	UE11-05
107	ICP-MS	69.8	69.6	69.9	70.8	69.7

Urine Iron Results (µg/L)

Lab Code	Method	UE11-01	UE11-02	UE11-03	UE11-04	UE11-05
179	ICP-MS	9	11	6	36	6

Urine Lithium Results (µg/L)

Lab Code	Method	UE11-01	UE11-02	UE11-03	UE11-04	UE11-05
147	ICP-MS	15.822	15.128	14.712	14.92	15.337

Urine Manganese Results (µg/L)

Lab Code	Method	UE11-01	UE11-02	UE11-03	UE11-04	UE11-05
110	DRC/CC-ICP-MS	4.1	6.6	2.3	1.5	3.4
110	ICP-MS	5.24	7.70	2.96	2.19	4.20
114	ICP-MS	<2.5*	3.6	3.9	2.6	8.5*
147	ICP-MS	4.115	6.374	1.956	1.357	3.209
159	ICP-MS	5.2	7.7	3.3	2.7	4.6
179	DRC/CC-ICP-MS	3.5	5.7	1.8	1.2	2.7
305	ICP-MS	4.2	6.6	3.0	2.5	4.0
312	ICP-MS	4.5	6.8	2.6	2	3.8
359	ICP-MS	5.1	7.2	3.1	2.4	3.9
366	ICP-MS	3.8	6.4	2.3	1.2	3.3
391	DRC/CC-ICP-MS	3.5	6.8	2.7	1.7	4.6
Omitted*	**n:**	**10**	**11**	**11**	**11**	**10**
	Arithmetic Mean:	**4.3**	**6**	**2.7**	**1.9**	**3.8**
	Standard Deviation:	**0.7**	**1**	**0.6**	**0.6**	**0.6**

Urine Molybdenum Results (µg/L)

Lab Code	Method	UE11-01	UE11-02	UE11-03	UE11-04	UE11-05
107	ICP-MS	68.38	93.36	46.79	40.31	59.19
110	ICP-MS	69.4	91.9	45.8	38.4	57.2
116	ICP-MS	72.1	97.2	49.1	42.5	62.1
147	ICP-MS	71.689	95.681	48.369	41.363	60.941
179	ICP-MS	70.0	95.0	50.0	42.0	60.0
197	ICP-MS	67.6	92.0	47.7	41.0	58.5
199	ICP-MS	71.1	97.5	49.7	42.3	62.3
312	ICP-MS	66.6	92.6	44.8	40.0	58.2
359	ICP-MS	64.9	89.0	45.2	39.0	56.1
385	ICP-MS	70.0	94.8	47.2	42.8	60.1
391	DRC/CC-ICP-MS	66.1	108.8*	76.7*	75.1*	94.1*
395	ICP-MS	68.5	93.2	47.3	40.8	59.9
Omitted*	**n:**	**12**	**11**	**11**	**11**	**11**
	Arithmetic Mean:	**69**	**94**	**47**	**41**	**60**
	Standard Deviation:	**2**	**3**	**2**	**1**	**2**

Urine Nickel Results (µg/L)

Lab Code	Method	UE11-01	UE11-02	UE11-03	UE11-04	UE11-05
110	DRC/CC-ICP-MS	8.7	6.9	3.1	2.4	4.0
110	ICP-MS	10.6	9.60	4.66	4.28	5.84
114	ICP-MS	<2.5*	<2.5*	<2.5*	<2.5*	<2.5*
147	ICP-MS	7.164	6.87	2.537	2.196	3.57
159	ICP-MS	10.0	10.0	5.0	5.0	6.0
164	ICP-MS	9.2	6.6	2.5	2.2	3.6
179	ICP-MS	6.4	6.8	2.7	2.3	3.7
197	ICP-MS	7.7	8.0	2.8	2.6	4.1
312	ICP-MS	7.5	7.9	31.0*	3.3	4.5
359	ICP-MS	6.4	6.4	3.4	2.8	3.8
391	DRC/CC-ICP-MS	47.6*	25.1*	20.2*	7.2*	61.7*
Omitted*	**n:**	**9**	**9**	**8**	**9**	**9**
	Arithmetic Mean:	**8**	**8**	**3**	**3**	**4**
	Standard Deviation:	**2**	**1**	**1**	**1**	**1**

Urine Platinum Results (µg/L)

Lab Code	Method	UE11-01	UE11-02	UE11-03	UE11-04	UE11-05
107	ICP-MS	1.478	2.411	0.7224	0.4932	1.134
110	ICP-MS	1.5	2.4	0.7	0.5	1.2
116	ICP-MS	1.38	2.13	0.666	0.461	1.05
147	ICP-MS	1.504	2.322	0.741	0.458	1.114
179	ICP-MS	1.6	2.6	0.8	0.5	1.2
199	ICP-MS	1.4	2.2	0.7	0.4	1.0
312	ICP-MS	2.0	3.1	0.9	0.6	1.5
385	ICP-MS	1.5	2.4	0.7	0.5	1.1
	n:	**8**	**8**	**8**	**8**	**8**
	Arithmetic Mean:	**1.5**	**2.4**	**0.7**	**0.5**	**1.2**
	Standard Deviation:	**0.2**	**0.3**	**0.1**	**0.1**	**0.2**

Urine Selenium Results (µg/L)

Lab Code	Method	UE11-01	UE11-02	UE11-03	UE11-04	UE11-05
110	DRC/CC-ICP-MS	72.0	83.5	52.4	39.8	55.6
114	ICP-MS	67.0	88.0	44.0	40.0	56.0
116	DRC/CC-ICP-MS	71.3	95.9	49.8	41.4	60.2
147	ICP-MS	67.457	87.678	45.182	38.547	54.818
179	DRC/CC-ICP-MS	65.0	90.0	42.0	40.0	56.0
197	ICP-MS	76.0	113.0	54.0	<50.0*	67.0
305	ICP-MS	80.0	101.0	62.0	54.0	71.0
312	ICP-MS	72.2	95.2	53.5	41.0	63.1
359	ICP-MS	83.4	109.2	63.1	52.0	73.1
385	DRC/CC-ICP-MS	61.7	86.8	42.2	36.0	54.9
391	DRC/CC-ICP-MS	86.2	250.6*	249.5*	263.3*	283.4*
Omitted*	**n:**	**11**	**10**	**10**	**9**	**10**
	Arithmetic Mean:	**73**	**95**	**51**	**43**	**61**
	Standard Deviation:	**8**	**10**	**8**	**6**	**7**

Urine Tellurium Results (µg/L)

Lab Code	Method	UE11-01	UE11-02	UE11-03	UE11-04	UE11-05
110	ICP-MS	3.1	5.0	1.6	1.0	2.5
197	ICP-MS	3.1	5.3	1.6	<1.0*	2.5
312	ICP-MS	3.5	5.7	1.6	1.2	2.9
359	ICP-MS	3.1	4.4	1.4	1.0	2.4
Omitted*	**n:**	**4**	**4**	**4**	**3**	**4**
	Arithmetic Mean:	**3.2**	**5.1**	**1.6**	**1.1**	**2.6**
	Standard Deviation:	**0.2**	**0.5**	**0.1**	**0.1**	**0.2**

Urine Thallium Results (µg/L)

Lab Code	Method	UE11-01	UE11-02	UE11-03	UE11-04	UE11-05
107	ICP-MS	8.31	13.33	4.044	2.735	6.499
110	ICP-MS	8.2	13.0	3.9	2.7	6.4
114	ICP-MS	7.4	11.7	3.6	2.4	5.7
116	ICP-MS	8.11	12.9	3.89	2.67	6.23
147	ICP-MS	8.034	12.796	3.884	2.596	6.153
159	ICP-MS	7.7	12.6	3.7	2.5	6.0
179	ICP-MS	8.0	12.0	4.0	3.0	6.0
197	ICP-MS	8.4	12.8	3.8	2.6	6.1
199	ICP-MS	7.6	12.5	3.7	2.5	5.8
312	ICP-MS	8.6	14.0	4.1	2.9	6.8
359	ICP-MS	8.1	12.8	4.0	2.7	6.3
385	ICP-MS	8.8	13.7	4.1	2.8	6.6
395	ICP-MS	7.9	12.6	3.8	2.5	6.1
	n:	**13**	**13**	**13**	**13**	**13**
	Arithmetic Mean:	**8.1**	**12.8**	**3.9**	**2.7**	**6.2**
	Standard Deviation:	**0.4**	**0.6**	**0.2**	**0.2**	**0.3**

Urine Tin Results (µg/L)

Lab Code	Method	UE11-01	UE11-02	UE11-03	UE11-04	UE11-05
110	ICP-MS	8.5	13.4	4.1	2.8	6.6
147	ICP-MS	8.040	12.827	3.895	2.755	6.176
179	ICP-MS	8.2	13.3	3.9	2.8	6.4
312	ICP-MS	8.1	12.9	4.0	2.8	6.3
359	ICP-MS	8.0	12.7	4.0	2.8	6.2
395	ICP-MS	8.3	13.2	4.1	2.8	6.5
	n:	**6**	**6**	**6**	**6**	**6**
	Arithmetic Mean:	**8.2**	**13.1**	**4.0**	**2.79**	**6.4**
	Standard Deviation:	**0.2**	**0.3**	**0.1**	**0.02**	**0.2**

Urine Tungsten Results (µg/L)

Lab Code	Method	UE11-01	UE11-02	UE11-03	UE11-04	UE11-05
107	ICP-MS	3.267	5.179	1.531	1.062	2.511
110	ICP-MS	3.3	5.2	1.5	0.9	2.5
116	ICP-MS	3.51	5.40	1.66	1.14	2.66
147	ICP-MS	4.928	7.705	2.225	1.497	3.788
179	ICP-MS	3.3	5.3	1.6	1.1	2.4
199	ICP-MS	3.7	4.5	1.8	1.2	2.9
312	ICP-MS	3.4	5.5	1.6	1.1	2.6
359	ICP-MS	3.2	5.2	1.6	1.0	2.5
385	ICP-MS	3.4	5.4	1.8	1.4	2.8
	n:	**9**	**9**	**9**	**9**	**9**
	Arithmetic Mean:	**3.6**	**5.5**	**1.7**	**1.2**	**2.7**
	Standard Deviation:	**0.5**	**0.9**	**0.2**	**0.2**	**0.4**

Urine Uranium Results (µg/L)

Lab Code	Method	UE11-01	UE11-02	UE11-03	UE11-04	UE11-05
107	ICP-MS	0.4346	0.6932	0.2105	0.1398	0.3399
110	ICP-MS	0.4	0.7	0.2	0.1	0.3
116	ICP-MS	0.408	0.656	0.198	0.134	0.324
147	ICP-MS	0.393	0.624	0.187	0.126	0.31
197	ICP-MS	<1.0*	<1.0*	<1.0*	<1.0*	<1.0*
199	ICP-MS	0.4	0.6	0.2	0.1	0.3
312	ICP-MS	0.4	0.7	0.2	0.1	0.3
359	ICP-MS	0.4	0.6	0.2	0.1	0.3
366	ICP-MS	0.3	0.6	0.2	0.1	0.3
385	ICP-MS	0.5	0.7	0.2	0.1	0.3
395	ICP-MS	0.4	0.6	0.2	0.1	0.3
Omitted*	**n:**	**10**	**10**	**10**	**10**	**10**
	Arithmetic Mean:	**0.40**	**0.65**	**0.20**	**0.11**	**0.31**
	Standard Deviation:	**0.05**	**0.05**	**0.01**	**0.02**	**0.01**

Urine Vanadium Results (µg/L)

Lab Code	Method	UE11-01	UE11-02	UE11-03	UE11-04	UE11-05
147	ICP-MS	3.250	5.005	1.403	1.046	2.378
179	DRC/CC-ICP-MS	3.1	5.0	1.5	1.0	2.4
312	DRC/CC-ICP-MS	5.0	8.1	2.4	1.7	3.8
359	ICP-MS	6.9	8.5	4.5	4.3	4.9
391	DRC/CC-ICP-MS	3.3	5.1	3.1	2.7	3.6
	n:	**5**	**5**	**5**	**5**	**5**
	Arithmetic Mean:	**4**	**6**	**3**	**2**	**3**
	Standard Deviation:	**2**	**2**	**1**	**1**	**1**

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Urine Zinc Results (µg/L)						
Lab Code	**Method**	**UE11-01**	**UE11-02**	**UE11-03**	**UE11-04**	**UE11-05**
110	ICP-MS	341.0	440.0	253.0	225.0	311.0
114	ICP-MS	295.0	370.0	227.0	218.0	266.0
147	ICP-MS	348.366	430.065	248.366	226.144	300
159	ICP-MS	331.0	427.0	248.0	225.0	300.0
164	ICP-MS	303.0	402.0	228.0	214.0	290.0
179	DRC/CC-ICP-MS	332.0	431.0	261.0	225.0	299.0
197	ICP-MS	294.0	398.0	201.0	<200.0*	252.0
305	ICP-MS	265.0	368.0	184.0	171.0*	241.0
312	ICP-MS	350.9	411.2	230.9	202.0	284.1
359	ICP-MS	314.3	413.4	237.8	211.2	279.4
391	DRC/CC-ICP-MS	222.1	362.1	229.1	189.7	276
395	ICP-MS	331.4	432.2	244.0	219.9	296.6
Omitted*	**n:**	**12**	**12**	**12**	**10**	**12**
	Arithmetic Mean:	**311**	**407**	**233**	**216**	**283**
	Standard Deviation:	**38**	**27**	**22**	**12**	**21**

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METHOD NOTES

ATOMIC SPECTROMETRY METHODS

A-1 ETAAS-Z (Electrothermal atomic absorption spectrometry with Zeeman background correction)

A-2 ETAAS other (i.e., D_2, S-H background correction)

A-3 FAAS (Flame atomic absorption spectrometry)

A-4 CV-AAS (Cold vapor atomic absorption spectrometry)

A-5 HG-AAS (Hydride generation atomic absorption spectrometry)

A-6 AFS (Atomic fluorescence spectrometry)

A-7 Other

INDUCTIVELY COUPLED PLASMA

P-1 ICP-MS (Inductively coupled plasma - mass spectrometry)

P-2 DRC/CC-ICP-MS (ICP-MS used in the Dynamic Reaction Cell or Collision Cell mode)

P-3 ICP-AES/OES (ICP atomic/optical emission spectrometry)

P-4 HR-ICP-MS (High resolution ICP-MS)

P-5 ETV-ICP-MS (Electrothermal vaporization ICP-MS)

P-6 ID-ICP-MS (Isotope dilution ICP-MS)

P-7 Other

ELECTROCHEMICAL METHODS

E-1 ASV (Anodic stripping voltammetry without digestion)

E-2 ASV-LeadCare® (Anodic stripping voltammetry using the ESA LeadCare® system)

E-3 Fluoride specific electrode

E-4 Other

MOLECULAR FLUORIMETRY

F-1 EtOAc (Ethyl acetate-acetic acid extraction method for determination of erythrocyte protoporphyrin)

F-2 Aviv hematofluorometry (for determination of EP at hematocrit 35)

F-3 Helena ZPP (for determination of zinc protoporphyrin in μmol ZPP/mol heme)

F-4 Other

OTHER METHODS

If your method is not listed in the above list, please describe it briefly.