Wadsworth Center
NEW YORK STATE DEPARTMENT OF HEALTH
Trace Elements Laboratory

TRACE ELEMENTS IN URINE

Event #1, 2012

March 19th, 2012

Amended 04/12/12

NEW YORK
state department of
HEALTH

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

Sue Kelly
Executive Deputy Commissioner

March 19, 2012

Trace Elements in Urine
Event #1, 2012

Dear Laboratory Director:

Results from the first proficiency test (PT) event for 2012 in the category 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°C; 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, May 9th, 2012. 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 30th, 2012.**

Thank you for your participation.

Sincerely,

Patrick J. Parsons, Ph.D.
Chief, Laboratory of Inorganic and Nuclear Chemistry
Deputy Director, Division of Environmental Health

Mary Frances Verostek, Ph.D.
Assistant Section Head
PT Program for Blood Lead /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°C; 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 30.2 µg/L (0.40 µmol/L) to 207.7 µg/L (2.77 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, 97.6% of test results reported were judged as satisfactory, with one of the 25 participant laboratories (4.0%) reporting 2 or more of the 5 results outside the acceptable ranges.

New York State Department of Health
Urine Arsenic Test Results, 2012 Event #1
ROBUST STATISTICAL SUMMARY

TARGET VALUE ASSIGNMENT AND STATISTICS

	Results (µg/L urine)				
	UE12-01	UE12-02	UE12-03	UE12-04	UE12-05
Robust Mean	**180.8**	**50.5**	**207.7**	**30.2**	**67.6**
Robust Standard Deviation	8.5	3.3	8.3	2.8	5.0
Standard Uncertainty	2.2	0.8	2.1	0.7	1.2
RSD (%)	4.7	6.5	4.0	9.4	7.4
Acceptable Range:					
Upper Limit	217.0	60.6	249.2	36.2	81.1
Lower Limit	144.6	40.4	166.2	24.2	54.1

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, 2012 Event #1
PERFORMANCE OF PARTICIPATING LABORATORIES

Lab Code	Method	Results (µg/L urine)					Info Only
		UE12-01	UE12-02	UE12-03	UE12-04	UE12-05	
	Target Values:	180.8	50.5	207.7	30.2	67.6	
103	ICP-MS	187.0	51.9	211.6	31.2	71.2	Info
107	DRC/CC-ICP-MS	174.6	49.7	210.2	28.2	64.9	Info
110	DRC/CC-ICP-MS	190.0	50.2	218.0	29.0	67.2	
114	ICP-MS	176.0	44.0	200.0	27.0	57.0	
116	DRC/CC-ICP-MS	189.9	48.0	207.2	27.7	62.6	Info
147	ICP-MS	172.3	46.7	197.8	27.0	62.2	Info
156	ICP-MS	189.0	57.0	210.0	32.9	73.9	
159	ICP-MS	182.0	48.0	206.0	29.0	64.0	
164	ICP-MS	172.0	51.0	203.0	34.0	71.0	
179	ICP-MS	182.0	49.0	202.0	32.0	65.0	
197	DRC/CC-ICP-MS	195.0	58.0	237.0	36.0	73.0	
200	ICP-MS	178	54.0	214	33.3	70.3	Info
206	ICP-MS	191.0	48.7	237.4	31.2	75.6	
208	ICP-MS	158.8	51.1	183.3	31.5	65.1	
293	DRC/CC-ICP-MS	179	50	208	29	65	Info
305	DRC/CC-ICP-MS	180.5	50.9	206.9	31.6	67.9	
312	ICP-MS	174.3	45.7	206.1	26.7	62.9	
324	HR-ICP-MS	177.8	49.0	205.0	28.2	64.2	Info
339	HR-ICP-MS	173	47.8	202	25.7	64.5	Info
359	ICP-MS	192.4	53.2	195.1	28.9	70.1	
366	ICP-MS	176.0	54.0	200.0	33.0	80.0	Info
367	DRC/CC-ICP-MS	173.0	53.3	233.0	31.2	71.7	Info
391	DRC/CC-ICP-MS		74.4 ↑	220.4	59.9 ↑	88.7 ↑	Info
401	ETAAS other	186	51	221	30	67	Info
472	DRC/CC-ICP-MS	182.7	48.7	203.1	29.3	64.3	Info

Percent satisfactory results for all participants: 97.6 %

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 Arsenic Test Results, 2012 Event #1
STATISTICAL SUMMARY BY METHOD

	Results (μg/L urine)				
	UE12-01	UE12-02	UE12-03	UE12-04	UE12-05
DRC/CC-ICP-MS					
Number of Sample Measurements:	8	9	9	8	9
Mean:	183.1	53.7	216.0	30.3	69.5
Standard Deviation:	7.9	8.3	12.1	2.7	8.0
RSD (%):	4.3	15.5	5.6	8.9	11.5
ETAAS other					
Number of Sample Measurements:	1	1	1	1	1
Mean:	186.0	51.0	221.0	30.0	67.0
Standard Deviation:	?	?	?	?	?
RSD (%):	—	—	—	—	—
HR-ICP-MS					
Number of Sample Measurements:	2	2	2	2	2
Mean:	175.4	48.4	203.5	27.0	64.4
Standard Deviation:	3.4	0.8	2.1	1.8	0.2
RSD (%):	—	—	—	—	—
ICP-MS					
Number of Sample Measurements:	13	13	13	13	13
Mean:	179.3	50.3	205.1	30.6	68.3
Standard Deviation:	9.3	3.7	12.5	2.6	6.3
RSD (%):	5.2	7.4	6.1	8.4	9.2
All Laboratories					
Number of Sample Measurements:	24	25	25	24	25
Mean:	180.5	51.4	209.5	30.2	68.4
Standard Deviation:	8.5	5.8	12.7	2.6	6.6
RSD (%):	4.7	11.3	6.1	8.7	9.6

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°C; 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 2.1 µg/L (19 nmol/L) to 22.5 µg/L (200 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, 96.0% of test results reported were judged as satisfactory, with one of the 25 participant laboratories (4.0%) reporting 2 or more of the 5 results outside the acceptable ranges.

New York State Department of Health
Urine Cadmium Test Results, 2012 Event #1
ROBUST STATISTICAL SUMMARY

TARGET VALUE ASSIGNMENT AND STATISTICS

	Results (µg/L urine)				
	UE12-01	UE12-02	UE12-03	UE12-04	UE12-05
Robust Mean	**4.2**	**7.5**	**2.1**	**22.5**	**11.5**
Robust Standard Deviation	0.4	0.6	0.1	1.8	0.9
Standard Uncertainty	0.1	0.2	<0.1	0.4	0.2
RSD (%)	8.9	8.4	7.0	7.9	7.5
Acceptable Range:					
Upper Limit	5.2	8.6	3.1	25.9	13.2
Lower Limit	3.2	6.4	1.1	19.1	9.8

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, 2012 Event #1
PERFORMANCE OF PARTICIPATING LABORATORIES

Lab Code	Method	Results (µg/L urine)					Info Only
		UE12-01	UE12-02	UE12-03	UE12-04	UE12-05	
	Target Values:	4.2	7.5	2.1	22.5	11.5	
103	ICP-MS	4.3	7.5	2.0	23.4	11.7	Info
107	DRC/CC-ICP-MS	4.3	7.7	2.1	23.9	11.8	Info
110	ICP-MS	4.4	7.6	2.1	22.9	11.6	
114	ICP-MS	4.0	6.7	2.0	21.1	10.5	
116	ICP-MS	3.8	7.0	2.0	20.7	10.6	Info
147	ICP-MS	4.6	7.2	2.0	20.9	10.8	Info
156	ICP-MS	4.2	7.2	2.0	22.3	11.3	
159	ICP-MS	4.3	7.8	2.0	23.6	11.5	
164	ICP-MS	4.0	7.1	1.9	21.5	10.6	
179	ICP-MS	3.7	7.4	2.3	22.7	11.2	
197	DRC/CC-ICP-MS	4.5	7.9	2.3	22.9	11.7	
200	ICP-MS	4.4	8.2	2.3	24.1	12.5	Info
206	ICP-MS	5.2	8.6	2.3	22.7	13.4 ↑	
208	ICP-MS	3.9	7.6	2.1	21.2	10.9	
293	ICP-MS	4	8	2	23	12	Info
305	ICP-MS	5.2	8.2	2.2	24.8	12.2	
312	ICP-MS	4.5	7.0	2.0	21.7	11.7	
324	HR-ICP-MS	4.6	7.9	2.2	23.0	12.0	Info
339	HR-ICP-MS	2.9 ↓	6.0 ↓	2.0	20.1	10.8	Info
359	ICP-MS	3.9	6.4	1.7	19.8	9.1 ↓	
366	ICP-MS	4.2	7.6	1.5	24.0	11.0	Info
367	DRC/CC-ICP-MS	4.0	7.8	2.4	22.3	11.7	Info
391	DRC/CC-ICP-MS		8.2	2.3	25.2	12.5	Info
401	ETAAS other	4.5	8.5	2.4	26.1 ↑	13.0	Info
472	ICP-MS	3.8	6.5	1.9	19.3	9.8	Info

Percent satisfactory results for all participants: 96.0 %

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, 2012 Event #1
STATISTICAL SUMMARY BY METHOD

	Results (μg/L urine)				
	UE12-01	UE12-02	UE12-03	UE12-04	UE12-05
DRC/CC-ICP-MS					
Number of Sample Measurements:	3	4	4	4	4
Mean:	4.3	7.9	2.3	23.6	11.9
Standard Deviation:	0.3	0.2	0.1	1.3	0.4
RSD (%):	—	2.7	5.5	5.4	3.2
ETAAS other					
Number of Sample Measurements:	1	1	1	1	1
Mean:	4.5	8.5	2.4	26.1	13.0
Standard Deviation:	?	?	?	?	?
RSD (%):	—	—	—	—	—
HR-ICP-MS					
Number of Sample Measurements:	2	2	2	2	2
Mean:	3.8	7.0	2.1	21.6	11.4
Standard Deviation:	1.2	1.3	0.1	2.1	0.8
RSD (%):	—	—	—	—	—
ICP-MS					
Number of Sample Measurements:	18	18	18	18	18
Mean:	4.2	7.4	2.0	22.2	11.2
Standard Deviation:	0.4	0.6	0.2	1.5	1.0
RSD (%):	10.2	8.1	10.0	6.9	8.8
All Laboratories					
Number of Sample Measurements:	24	25	25	25	25
Mean:	4.2	7.5	2.1	22.5	11.4
Standard Deviation:	0.5	0.7	0.2	1.7	1.0
RSD (%):	11.4	8.8	10.2	7.6	8.4

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°C; 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 27.2 µg/L (136 nmol/L) to 118.5 µg/L (591 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, 88.8% of test results reported were judged as satisfactory*, with two of the 25 participant laboratories (8.0%) reporting 2 or more of the 5 results outside the acceptable ranges.

**Amended report issued 04/12/12. A transcription error has been corrected, and target values and limits adjusted after performance of robust statistics.*

New York State Department of Health
Urine Mercury Test Results, 2012 Event #1
ROBUST STATISTICAL SUMMARY

TARGET VALUE ASSIGNMENT AND STATISTICS

	Results (μg/L urine)				
	UE12-01	UE12-02	UE12-03	UE12-04	UE12-05
Robust Mean	**27.2**	**94.1**	**77.2**	**58.6**	**118.5**
Robust Standard Deviation	4.9	6.7	9.1	5.3	11.2
Standard Uncertainty	1.2	1.7	2.3	1.3	2.8
RSD (%)	18.0	7.1	11.8	9.1	9.4
Acceptable Range:					
Upper Limit	35.4	122.3	100.4	76.2	154.1
Lower Limit	19.0	65.9	54.0	41.0	83.0

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

Amended 04/12/12

New York State Department of Health
Urine Mercury Test Results, 2012 Event #1
PERFORMANCE OF PARTICIPATING LABORATORIES

Lab Code	Method	Results (μg/L urine)					Info Only
		UE12-01	UE12-02	UE12-03	UE12-04	UE12-05	
	Target Values:	27.2	94.1	77.2	58.6	118.5	
103	ICP-MS	33.6	89.9	92.6	60.3	119.4	Info
107	DRC/CC-ICP-MS	36.4 ↑	108.4	88.2	68.4	135.9	Info
109	AFS	34.5	105.2	90.0	78.3 ↑	126.5	Info
110	ICP-MS	29.0	100.0	82.4	60.5	127.0	
114	ICP-MS	26.0	94.0	72.0	61.0	122.0	
147	CV-AAS	26.2	89.9	75.6	53.7	100.6	Info
156	ICP-MS	27.6	91.4	75.1	54.9	117.0	
159	ICP-MS	25.0	97.0	75.0	58.0	116.0	
164	ICP-MS	29.0	90.0	74.0	58.0	117.0	
179	ICP-MS	27.0	93.0	74.0	56.0	115.0	
197	DRC/CC-ICP-MS	29.0	97.0	82.0	59.0	124.0	
199	ICP-MS	30.0	103	83.0	62.5	125	Info
200	ICP-MS	26.8	89.6	77.7	59.4	112.5	Info
206	ICP-MS	24.0	97.0	76.0	61.0	131.0	
208	CV-AAS	31.6	104.3	87.0	64.8	129.4	
293	ICP-MS	24	90	73	55	112	Info
305	ICP-MS	19.0	91.1	73.5	61.4	123.5	
312	ICP-MS	27.5	128.0 ↑	94.0	70.0	150.4	
324	AFS	25.5	91.0	69.0	53.3	102.7	Info
339	HR-ICP-MS	3.4 ↓	32.0 ↓	34.4 ↓	18.3 ↓	40.8 ↓	Info
359	ICP-MS	23.2	80.6	61.5	49.4	107.1	
366	ICP-MS	21.0	96.0	73.0	56.0	109.0	Info
367	CV-AAS	31.1	101.2	83.0	61.0	124.0	Info
391	CV-AAS	17.4 ↓	33.8 ↓	34.8 ↓	26.5 ↓	46.5 ↓	Info
401	CV-AAS	39.5 ↑	91.7	76.6	55.6	120.0	Info

Percent satisfactory results for all participants: 88.8 %

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.

Amended 04/12/12

New York State Department of Health
Urine Mercury Test Results, 2012 Event #1
STATISTICAL SUMMARY BY METHOD

	Results (μg/L urine)				
	UE12-01	UE12-02	UE12-03	UE12-04	UE12-05
AFS					
Number of Sample Measurements:	2	2	2	2	2
Mean:	30.0	98.1	79.5	65.8	114.6
Standard Deviation:	6.4	10.0	14.8	17.7	16.8
RSD (%):	—	—	—	—	—
CV-AAS					
Number of Sample Measurements:	5	5	5	5	5
Mean:	29.2	84.2	71.4	52.3	104.1
Standard Deviation:	8.1	28.8	21.0	15.1	34.0
RSD (%):	27.8	34.2	29.4	28.8	32.6
DRC/CC-ICP-MS					
Number of Sample Measurements:	2	2	2	2	2
Mean:	32.7	102.7	85.1	63.7	130.0
Standard Deviation:	5.2	8.1	4.4	6.6	8.4
RSD (%):	—	—	—	—	—
HR-ICP-MS					
Number of Sample Measurements:	1	1	1	1	1
Mean:	3.4	32.0	34.4	18.3	40.8
Standard Deviation:	?	?	?	?	?
RSD (%):	—	—	—	—	—
ICP-MS					
Number of Sample Measurements:	15	15	15	15	15
Mean:	26.2	95.4	77.1	58.9	120.3
Standard Deviation:	3.7	10.5	8.2	4.6	10.7
RSD (%):	14.0	11.0	10.6	7.8	8.9
All Laboratories					
Number of Sample Measurements:	25	25	25	25	25
Mean:	26.7	91.4	75.1	56.9	114.2
Standard Deviation:	7.0	19.8	14.4	12.0	23.7
RSD (%):	26.4	21.6	19.1	21.1	20.8

notes: ? Insufficient data for calculation.

Amended 04/12/12

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°C; 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 28.7 µg/L (0.14 µmol/L) to 161.5 µg/L (0.78 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, 100% of test results were judged as satisfactory, with none of the 24 participant laboratories reporting 2 or more of the 5 results outside the acceptable ranges.

New York State Department of Health
Urine Lead Test Results, 2012 Event #1
ROBUST STATISTICAL SUMMARY

TARGET VALUE ASSIGNMENT AND STATISTICS

	Results (µg/L urine)				
	UE12-01	**UE12-02**	**UE12-03**	**UE12-04**	**UE12-05**
Robust Mean	**32.1**	**104.5**	**28.7**	**53.5**	**161.5**
Robust Standard Deviation	1.7	7.1	2.0	3.7	10.0
Standard Uncertainty	0.4	1.8	0.5	0.9	2.5
RSD (%)	5.3	6.7	7.1	7.0	6.2
Acceptable Range:					
Upper Limit	72.1	144.5	68.7	93.5	201.5
Lower Limit	0.0	64.5	0.0	13.5	121.5

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, 2012 Event #1
PERFORMANCE OF PARTICIPATING LABORATORIES

Lab Code	Method	Results (µg/L urine)					Info Only
		UE12-01	UE12-02	UE12-03	UE12-04	UE12-05	
	Target Values:	32.1	104.5	28.7	53.5	161.5	
103	ICP-MS	32.5	104.1	29.0	53.4	163.6	Info
107	DRC/CC-ICP-MS	34.1	111.0	30.0	56.4	170.9	Info
110	ICP-MS	34.0	111.0	30.6	56.7	171.0	
110	ETAAS-Z	22	92	20	46	153	Info
114	ICP-MS	31.0	102.0	28.0	53.0	158.0	
116	ICP-MS	32.7	108.1	30.2	55.0	168.2	Info
147	ICP-MS	31.9	101.5	28.2	51.2	157.7	Info
156	ICP-MS	29.6	98.8	26.6	49.9	145.2	
159	ICP-MS	32.0	105.0	28.0	53.0	159.0	
164	ICP-MS	33.0	106.0	29.0	53.0	161.0	
179	ICP-MS	32.0	108.0	29.0	54.0	167.0	
197	DRC/CC-ICP-MS	31.8	110.9	30.5	55.6	165.2	
200	ICP-MS	40.0	104	34.3	58.2	168	Info
206	ICP-MS	32.0	118.0	30.0	56.0	171.0	
208	ICP-MS	28.3	95.4	25.1	46.9	137.8	
293	ICP-MS	38	124	33	65	193	Info
305	ICP-MS	31.3	107.1	30.0	58.8	176.0	
312	ICP-MS	32.5	107.5	29.2	54.9	163.0	
324	HR-ICP-MS	34.9	99.0	26.4	47.9	146.1	Info
339	HR-ICP-MS	31.4	97.9	30.4	51.7	144	Info
359	ICP-MS	30.1	98.6	26.7	49.2	156.0	
366	ICP-MS	33.0	110.0	27.0	56.0	165.0	Info
391	ETAAS-Z	22.1	93.8	24.7	51.5	141.1	Info
472	ICP-MS	32.7	104.6	28.7	53.7	161.8	Info

Percent satisfactory results for all participants: 100.0 %

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, 2012 Event #1
STATISTICAL SUMMARY BY METHOD

	Results (µg/L urine)				
	UE12-01	UE12-02	UE12-03	UE12-04	UE12-05
DRC/CC-ICP-MS					
Number of Sample Measurements:	2	2	2	2	2
Mean:	33.0	111.0	30.3	56.0	168.1
Standard Deviation:	1.6	0.1	0.4	0.6	4.0
RSD (%):	—	—	—	—	—
ETAAS-Z					
Number of Sample Measurements:	2	2	2	2	2
Mean:	22.1	92.9	22.4	48.8	147.1
Standard Deviation:	0.1	1.3	3.3	3.9	8.4
RSD (%):	—	—	—	—	—
HR-ICP-MS					
Number of Sample Measurements:	2	2	2	2	2
Mean:	33.2	98.5	28.4	49.8	145.1
Standard Deviation:	2.5	0.8	2.8	2.7	1.5
RSD (%):	—	—	—	—	—
ICP-MS					
Number of Sample Measurements:	18	18	18	18	18
Mean:	32.6	106.3	29.0	54.3	163.5
Standard Deviation:	2.7	6.8	2.2	4.0	11.7
RSD (%):	8.3	6.4	7.6	7.4	7.2
All Laboratories					
Number of Sample Measurements:	24	24	24	24	24
Mean:	31.8	104.9	28.5	53.6	160.9
Standard Deviation:	3.9	7.4	2.9	4.2	12.4
RSD (%):	12.1	7.1	10.1	7.8	7.7

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 Nutrition 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

New York State Department of Health
Urine Additional Elements, 2012 Event #1

Urine Aluminum (µg/L)

Lab Code	Method	UE12-01	UE12-02	UE12-03	UE12-04	UE12-05
147	ICP-MS	39.4	63.4	<26.98	32.65	96.87
164	ICP-MS	31.0	54.0	17.0	30.0	84.0
179	DRC/CC-ICP-MS	31.0	56.0	17.0	31.0	85.0
197	ICP-MS	31.0	59.0	<20.0	31.0	88.0
305	ICP-MS	38.0	58.0	24.0	36.0	75.0
312	ICP-MS	29.8	50.5	16.3	28.8	74.9
359	ICP-MS	28.4	54.8	19.9	34.1	76.1
391	DRC/CC-ICP-MS	QNS	43.2	24.6	40.5	50.3
Arithmetic Mean (n=6-8)		**33**	**55**	**20**	**33**	**79**
SD		4	6	4	4	14

Urine Antimony (µg/L)

Lab Code	Method	UE12-01	UE12-02	UE12-03	UE12-04	UE12-05
110	ICP-MS	3.8	7.6	2.1	4.0	12.0
147	ICP-MS	3.54	7.23	1.95	3.68	11.23
197	ICP-MS	3.7	7.9	2.0	4.0	12.0
312	ICP-MS	3.3	7.3	2.1	3.7	11.4
339	HR-ICP-MS	2.6	5.8	1.8	3.2	11.2
359	ICP-MS	3.8	7.6	2.0	3.8	11.5
391	DRC/CC-ICP-MS	QNS	8.3	2.4	4.1	12.1
472	ICP-MS	3.4	6.9	1.9	3.6	10.8
Arithmetic Mean (n=7-8)		**3.4**	**7.3**	**2.0**	**3.8**	**11.5**
SD		0.4	0.8	0.2	0.3	0.5

Urine Barium (µg/L)

Lab Code	Method	UE12-01	UE12-02	UE12-03	UE12-04	UE12-05
110	ICP-MS	12.5	10.6	3.5	6.7	15.9
116	ICP-MS	12.5	10.5	3.41	6.53	15.8
147	ICP-MS	11.38	9.53	3.089	5.79	14.01
197	ICP-MS	12.1	11.3	4.0	6.7	16.1
312	ICP-MS	11.7	10.0	3.4	6.1	15.2
359	ICP-MS	10.8	9.3	2.9	5.6	13.7
472	ICP-MS	12.4	10.4	3.4	6.7	15.9
Arithmetic Mean (n=7)		**11.9**	**10.2**	**3.4**	**6.3**	**15**
SD		0.6	0.7	0.3	0.5	1

Urine Beryllium (µg/L)

Lab Code	Method	UE12-01	UE12-02	UE12-03	UE12-04	UE12-05
110	ICP-MS	6.5	9.4	2.7	5.0	15.2
116	ICP-MS	5.93	8.83	2.58	4.27	13.6
147	ICP-MS	6.9700	9.3700	2.68	4.72	14.86
197	ICP-MS	7.0	9.1	2.6	4.9	13.7
312	ICP-MS	6.4	8.4	2.4	4.3	13.7
391	DRC/CC-ICP-MS	QNS	9.9	2.6	4.9	15
472	ICP-MS	7.3000	9.6000	2.7	5.2	15.7
Arithmetic Mean (n=6-7)		**6.7**	**9.2**	**2.6**	**4.8**	**14.5**
SD		0.5	0.5	0.1	0.4	0.9

Urine Bismuth (µg/L)						
Lab Code	**Method**	**UE12-01**	**UE12-02**	**UE12-03**	**UE12-04**	**UE12-05**
147	ICP-MS	<0.0627	1.34	2.17	3.590	2.950
339	HR-ICP-MS	0.05	1.38	2.49	3.51	2.68

Urine Bromine (µg/L)						
Lab Code	**Method**	**UE12-01**	**UE12-02**	**UE12-03**	**UE12-04**	**UE12-05**
339	HR-ICP-MS	4.0	2.2	1.7	2.5	2.2

Urine Cesium (µg/L)						
Lab Code	**Method**	**UE12-01**	**UE12-02**	**UE12-03**	**UE12-04**	**UE12-05**
110	ICP-MS	23.9	40.2	12.4	23.1	60.9
147	ICP-MS	22.97	36.36	11.06	21.05	55.42
312	ICP-MS	23.1	37.1	11.7	21.3	57.7
359	ICP-MS	22.0	37.2	11.1	20.1	50.6
366	ICP-MS	24.0	40.0	12.0	22.0	54.0
472	ICP-MS	23.8	39.4	12.0	23.0	60.2
Arithmetic Mean (n=6)		**23.3**	**38**	**11.7**	**22**	**56**
SD		0.8	2	0.5	1	4

Urine Chromium (µg/L)						
Lab Code	**Method**	**UE12-01**	**UE12-02**	**UE12-03**	**UE12-04**	**UE12-05**
107	HR-ICP-MS	19.5*	16.4	4.6	8.4	24.9
110	DRC/CC-ICP-MS	12.2	19.5	5.7	10.7	29.0
147	ICP-MS	11.86	19.81	5.2	9.88	28.34
164	DRC/CC-ICP-MS	11.4	19.2	5.7	9.9	27.9
179	DRC/CC-ICP-MS	10.5	17.8	5.1	9.1	26.4
197	DRC/CC-ICP-MS	11.7	18.3	5.5	10.0	28.2
293	DRC/CC-ICP-MS	12	19	5	10	29
305	ICP-MS	12.2	20.4	5.8	10.6	31.1
312	DRC/CC-ICP-MS	11.2	16.7	5.8	9.8	25.4
339	HR-ICP-MS	11.2	18.0	4.9	9.3	26.3
359	ICP-MS	9.6	15.7	4.7	8.3	25.1
391	DRC/CC-ICP-MS	QNS	18.3	5.7	10.3	27.7
Omitted*						
Arithmetic Mean (n=10-12)		**11.4**	**18**	**5.3**	**9.7**	**27**
SD		0.8	1	0.4	0.8	2

Urine Cobalt (µg/L)						
Lab Code	**Method**	**UE12-01**	**UE12-02**	**UE12-03**	**UE12-04**	**UE12-05**
110	ICP-MS	3.8	4.9	1.4	2.4	6.2
147	ICP-MS	3.61	4.53	1.23	2.08	5.56
159	ICP-MS	3.8	4.9	1.4	2.4	5.9
164	ICP-MS	3.6	4.5	1.3	2.2	5.6
179	ICP-MS	4.3	5.2	1.4	2.4	6.2
197	ICP-MS	3.4	4.7	1.2	2.1	5.7
293	DRC/CC-ICP-MS	4	5	1	2	6
312	ICP-MS	3.5	4.7	1.3	2.2	5.5
339	HR-ICP-MS	3.60	4.66	1.24	2.19	5.96
359	ICP-MS	3.4	4.0	1.2	2.0	5.3
391	DRC/CC-ICP-MS	QNS	5.0	1.4	2.4	6.3
472	ICP-MS	3.90	4.9	1.4	2.4	6.1
Arithmetic Mean (n=11-12)		**3.7**	**4.7**	**1.3**	**2.2**	**5.9**
SD		0.3	0.3	0.1	0.2	0.3

Urine Copper (µg/L)						
Lab Code	**Method**	**UE12-01**	**UE12-02**	**UE12-03**	**UE12-04**	**UE12-05**
110	ICP-MS	99.5	380.0	110.0	199.0	588.0
147	ICP-MS	97.84	355.78	104.83	186.79	548.92
159	ICP-MS	105.0	376.0	107.0	204.0	589.0
164	ICP-MS	94.0	344.0	97.0	181.0	528.0
179	DRC/CC-ICP-MS	93.0	370.0	105.0	192.0	572.0
197	ICP-MS	103.6	371.1	108.0	199.5	576.3
305	ICP-MS	96.0	345.0	104.0	193.0	553.0
312	ICP-MS	90.8	339.5	97.5	178.6	516.7
339	HR-ICP-MS	91	364	103	185	576
359	ICP-MS	89.2	352.8	91.4	172.5	537.9
391	DRC/CC-ICP-MS	QNS	543*	104.3	289.4*	832.5*
Omitted*						
Arithmetic Mean (n=10-11)		**96**	**360**	**103**	**189**	**559**
SD		5	14	5	10	25

Urine Iodine (µg/L)						
Lab Code	**Method**	**UE12-01**	**UE12-02**	**UE12-03**	**UE12-04**	**UE12-05**
107	DRC/CC-ICP-MS	183.0	84.3	74.6	160.1	131.1
339	HR-ICP-MS	195	86	75	168	142

Urine Iron (µg/L)						
Lab Code	**Method**	**UE12-01**	**UE12-02**	**UE12-03**	**UE12-04**	**UE12-05**
339	HR-ICP-MS	6.2	18.1	9.5	16.0	9.4
391	DRC/CC-ICP-MS	QNS	295.7	1	5.6	4.2

Urine Lithium (µg/L)						
Lab Code	**Method**	**UE12-01**	**UE12-02**	**UE12-03**	**UE12-04**	**UE12-05**
147	ICP-MS	18.7	19.6	10.5	23.1	18.7

Urine Manganese (µg/L)

Lab Code	Method	UE12-01	UE12-02	UE12-03	UE12-04	UE12-05
103	ICP-MS	10.2	9.2	2.9	4.9	14.2
110	DRC/CC-ICP-MS	8.9	9.5	2.7	5.0	14.6
147	ICP-MS	10.05	10.27	2.68	5.16	15
159	ICP-MS	10.5	10.4	3.3	6.5	15.3
179	DRC/CC-ICP-MS	8.10	8.80	2.40	4.50	13.00
305	ICP-MS	11.2	10.6	4.0	7.2	15.1
312	ICP-MS	8.2	8.7	2.8	4.8	12.7
339	HR-ICP-MS	8.8	9.1	2.5	4.8	13.6
359	ICP-MS	6.8	6.9	2.1	3.9	29.5*
391	DRC/CC-ICP-MS	QNS	12.5	2.9	5.8	15.1
Omitted*						
Arithmetic Mean (n=9-10)		**9**	**10**	**2.8**	**5**	**14**
SD		1	1	0.5	1	1

Urine Molybdenum (µg/L)

Lab Code	Method	UE12-01	UE12-02	UE12-03	UE12-04	UE12-05
110	ICP-MS	212.0	120.0	44.9	82.2	173.0
147	ICP-MS	202.5	118.04	44.72	80.71	169.87
179	ICP-MS	213.0	124.0	49.0	80.0	164.0
197	ICP-MS	210.3	112.8	50.0	89.1	163.5
312	ICP-MS	214.7	114.8	44.0	78.5	168.2
339	HR-ICP-MS	152*	92	39	69	155
359	ICP-MS	192.8	106.9	41.4	74.1	153.5
391	DRC/CC-ICP-MS	QNS	157.9*	79.03*	107.9*	274.3*
472	ICP-MS	208.2	118.2	44.6	81.1	170.0
Omitted*						
Arithmetic Mean (n=7-8)		**208**	**113**	**45**	**79**	**165**
SD		8	10	4	6	7

Urine Nickel (µg/L)

Lab Code	Method	UE12-01	UE12-02	UE12-03	UE12-04	UE12-05
107	HR-ICP-MS	9.7	8.9	2.8	5.6	13.5
110	ICP-MS	13.3	12.2	4.8	8.9	18.0
147	ICP-MS	12.09	11.16	3.28	6.64	15.68
159	ICP-MS	14.0	13.0	5.0	9.0	18.0
164	ICP-MS	10.6	10.5	3.3	6.6	14.1
179	ICP-MS	10.5	9.6	3.0	6.3	14.9
197	ICP-MS	9.6	8.8	2.8	5.6	13.9
312	ICP-MS	10.9	10.0	3.8	7.2	14.7
339	HR-ICP-MS	10.8	10.0	3.1	6.1	16.0
359	ICP-MS	9.7	8.4	3.4	6.3	12.8
391	DRC/CC-ICP-MS	QNS	8.9	3.6	5.6	12.8
Arithmetic Mean (n=10-11)		**11**	**10**	**3.5**	**7**	**15**
SD		2	1	0.7	1	2

Urine Platinum (µg/L)

Lab Code	Method	UE12-01	UE12-02	UE12-03	UE12-04	UE12-05
110	ICP-MS	3.0	3.7	0.9	1.9	5.7
147	ICP-MS	2.34	2.93	0.698	1.45	4.51
312	ICP-MS	2.6	3.5	0.9	1.8	5.5
359	ICP-MS	2.8	3.2	0.7	1.5	4.6
472	ICP-MS	2.7	3.4	0.9	1.8	5.4
Arithmetic Mean (n=5)		**2.7**	**3.3**	**0.8**	**1.7**	**5.1**
SD		0.2	0.3	0.1	0.2	0.5

Urine Selenium (µg/L)

Lab Code	Method	UE12-01	UE12-02	UE12-03	UE12-04	UE12-05
110	DRC/CC-ICP-MS	59.2	124.0	41.2	81.6	174.0
147	ICP-MS	64.14	126.38	44.15	82.15	164.3
179	DRC/CC-ICP-MS	60.0	128.0	46.0	79.0	168.0
197	ICP-MS	69.0	129.0	<50.0	83.0	168.0
305	ICP-MS	75.0	149.0	55.0	101.0	183.0
312	ICP-MS	72.3	134.1	48.7	93.1	178.9
339	HR-ICP-MS	72	144	48	84	176
359	ICP-MS	78.1	136.1	49.7	84.6	172.3
391	DRC/CC-ICP-MS	QNS	175*	102.9*	133.3*	210.4*
472	ICP-MS	63.1	128.4	42.6	85.3	168.2
Omitted*						
Arithmetic Mean (n=8-9)		**68**	**133**	**47**	**86**	**173**
SD		7	8	4	7	6

Urine Silver (µg/L)

Lab Code	Method	UE12-01	UE12-02	UE12-03	UE12-04	UE12-05
147	ICP-MS	<0.108	<0.108	<0.108	<0.108	<0.108

Urine Tellurium (µg/L)

Lab Code	Method	UE12-01	UE12-02	UE12-03	UE12-04	UE12-05
110	ICP-MS	1.7	7.4	1.7	4.1	11.9
197	ICP-MS	1.5	6.3	1.6	3.4	10.1
312	ICP-MS	1.8	7.4	1.8	3.9	12.0
359	ICP-MS	1.7	6.6	1.9	3.3	11.1
Arithmetic Mean (n=4)		**1.7**	**6.9**	**1.8**	**3.7**	**11.3**
SD		0.1	0.6	0.1	0.4	0.9

Urine Thallium (µg/L)						
Lab Code	**Method**	**UE12-01**	**UE12-02**	**UE12-03**	**UE12-04**	**UE12-05**
110	ICP-MS	5.6	18.7	5.2	9.6	28.8
116	ICP-MS	5.45	18.3	5.12	9.29	28.1
147	ICP-MS	5.21	16.97	4.7	8.57	25.96
159	ICP-MS	5.0	17.4	4.7	8.6	25.9
179	ICP-MS	6.0	18.0	5.0	10.0	27.0
197	ICP-MS	5.3	18.1	4.9	9.2	27.2
312	ICP-MS	5.3	18.1	4.9	9.2	27.4
359	ICP-MS	5.2	17.8	4.8	8.5	27.8
391	DRC/CC-ICP-MS	QNS	9.6*	2.8*	5*	14.4*
472	ICP-MS	5.5	18.0	4.9	9.2	27.4
Omitted*						
Arithmetic Mean (n=9)		**5.4**	**17.9**	**4.9**	**9.1**	**27.3**
SD		0.3	0.5	0.2	0.5	0.9

Urine Thorium (µg/L)						
Lab Code	**Method**	**UE12-01**	**UE12-02**	**UE12-03**	**UE12-04**	**UE12-05**
147	ICP-MS	0.00157	0.00292	<0.00116	<0.00116	<0.00116

Urine Tin (µg/L)						
Lab Code	**Method**	**UE12-01**	**UE12-02**	**UE12-03**	**UE12-04**	**UE12-05**
110	ICP-MS	19.4	19.0	5.2	9.9	29.0
147	ICP-MS	17.46	17.93	4.83	9.26	26.84
312	ICP-MS	17.9	18.5	5.0	9.7	27.9
339	HR-ICP-MS	12.9	14.4	4.7	8.6	26.0
359	ICP-MS	17.5	17.4	4.6	8.4	25.9
Arithmetic Mean (n=5)		**17**	**17**	**4.9**	**9.2**	**27**
SD		2	2	0.2	0.7	1

Urine Tungsten (µg/L)						
Lab Code	**Method**	**UE12-01**	**UE12-02**	**UE12-03**	**UE12-04**	**UE12-05**
110	ICP-MS	3.7	7.6	2.0	3.9	11.9
103	ICP-MS	4.1	8.2	2.3	4.4	13.2
147	ICP-MS	5.19*	10.57*	2.89*	5.59*	16.46
312	ICP-MS	3.5	7.0	1.9	3.7	11.0
472	ICP-MS	3.5	7.0	1.9	3.7	11.0
339	HR-ICP-MS	3.3	6.0	1.8	3.3	8.9
359	ICP-MS	3.8	7.1	2.0	3.8	12.3
366	ICP-MS	3.9	7.4	1.7	3.8	10.0
Omitted*						
Arithmetic Mean (n=7-8)		**3.7**	**7.2**	**1.9**	**3.8**	**12**
SD		0.3	0.7	0.2	0.3	2

Urine Uranium (µg/L)						
Lab Code	**Method**	**UE12-01**	**UE12-02**	**UE12-03**	**UE12-04**	**UE12-05**
103	ICP-MS	0.5	0.9	0.3	0.5	1.4
110	ICP-MS	0.5	0.9	0.3	0.5	1.4
116	ICP-MS	0.451	0.938	0.267	0.481	1.47
147	ICP-MS	0.433	0.855	0.237	0.431	1.32
197	ICP-MS	<1.0	<1.0	<1.0	<1.0	1.4
312	ICP-MS	0.4	0.9	0.2	0.5	1.3
339	HR-ICP-MS	0.42	0.90	0.26	0.43	1.34
359	ICP-MS	0.4	0.9	0.2	0.4	1.3
366	ICP-MS	0.5	1.0	0.3	0.4	1.2
391	DRC/CC-ICP-MS	QNS	0.5*	0.1	0.3	0.7*
472	ICP-MS	0.5	0.9	0.2	0.5	1.4
Omitted*						
Arithmetic Mean (n=9-10)		**0.46**	**0.91**	**0.24**	**0.44**	**1.35**
SD		0.04	0.04	0.06	0.07	0.08

Urine Vanadium (µg/L)						
Lab Code	**Method**	**UE12-01**	**UE12-02**	**UE12-03**	**UE12-04**	**UE12-05**
147	ICP-MS	9.03	7.5	2.09	3.86	11.43
179	DRC/CC-ICP-MS	8.1	7.5	2.0	3.7	11.2
312	DRC/CC-ICP-MS	13.8*	7.6	3.3	3.9	19.7*
339	HR-ICP-MS	8.2	7.1	1.92	3.7	10.4
359	ICP-MS	8.6	7.3	2.2	3.9	13.5
391	DRC/CC-ICP-MS	QNS	7.9	2.9	4.8*	10.8
Omitted*						
Arithmetic Mean (n=4-6)		**8.5**	**7.5**	**2**	**3.8**	**11**
SD		0.4	0.3	1	0.1	1

Urine Zinc (µg/L)						
Lab Code	**Method**	**UE12-01**	**UE12-02**	**UE12-03**	**UE12-04**	**UE12-05**
110	ICP-MS	424.0	530.0	215.0	351.0	724.0
147	ICP-MS	408.5	500	197.39	317.65	673.2
159	ICP-MS	428.0	511.0	198.0	344.0	694.0
164	ICP-MS	404.0	475.0	183.0	308.0	636.0
179	DRC/CC-ICP-MS	394.0	507.0	201.0	324.0	688.0
197	ICP-MS	386.0	487.0	<200.0	289.0	678.0
305	ICP-MS	370.0	464.0	194.0	316.0	690.0
312	ICP-MS	385.1	467.3	195.8	301.7	632.7
339	HR-ICP-MS	399	526	214	321	741
359	ICP-MS	380.7	450.6	183.2	195.7	633.7
391	DRC/CC-ICP-MS	QNS	300.4*	116.1*	195.3	611.1
Omitted*						
Arithmetic Mean (n=9-11)		**398**	**492**	**198**	**297**	**673**
SD		19	27	11	53	41

New York State Department of Health
Trace Elements in Urine
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.