
Wadsworth Center

New York State Department of Health

TRACE ELEMENTS IN URINE

Event #2, 2011

June 21, 2011

June 21, 2011

**Trace Elements in Urine
Event #2, 2011**

Dear Laboratory Director:

Results from the second 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.

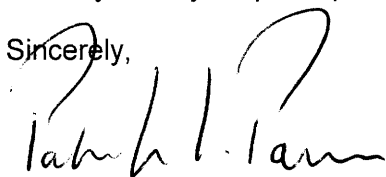
PT Materials

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, Ti, 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, September 21st, 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, October 19th, 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

New York State Department of Health
Event #2, 2011

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 As³⁺. 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 67.7 µg/L (0.90 µmol/L) to 537.4 µg/L (7.17 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, 98.3% of test results reported were judged as satisfactory, with one of the 24 participant laboratories (4.2%) reporting 2 or more of the 5 results outside the acceptable ranges.

New York State Department of Health
Urine Arsenic Test Results, 2011 Event #2
ROBUST STATISTICAL SUMMARY

TARGET VALUE ASSIGNMENT AND STATISTICS

Results ($\mu\text{g/L}$ urine)

	UE11-06	UE11-07	UE11-08	UE11-09	UE11-10
--	---------	---------	---------	---------	---------

Robust Mean	537.4	67.7	418.1	159.0	341.4
Robust Standard Deviation	54.2	5.4	37.0	11.0	25.8
Standard Uncertainty	14.1	1.4	9.7	2.8	6.6
RSD (%)	10.1	8.0	8.9	6.9	7.6
Acceptable Range:					
Upper Limit	644.9	81.2	501.7	190.8	409.7
Lower Limit	429.9	54.2	334.5	127.2	273.1

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, 2011 Event #2
PERFORMANCE OF PARTICIPATING LABORATORIES

Lab Code	Method	Results (µg/L urine)					Info Only
		UE11-06	UE11-07	UE11-08	UE11-09	UE11-10	
Target Values:		537.4	67.7	418.1	159.0	341.4	
107	DRC/CC-ICP-MS	584.9	69.7	447.5	163.9	367.3	Info
110	DRC/CC-ICP-MS	558.0	64.3	459.0	166.0	374.0	
114	ICP-MS	527.0	62.0	415.0	155.0	357.0	
116	DRC/CC-ICP-MS	610	69.3	467	163	377	
147	ICP-MS	494.4	57.6	383.5	143.8	312.4	
156	ICP-MS	522.0	80.0	399.0	163.0	325.0	
159	ICP-MS	534.0	76.0	396.0	173.0	330.0	
164	ICP-MS	573.0	71.0	412.0	155.0	339.0	
179	ICP-MS	547.0	66.0	429.0	155.0	350.0	
197	DRC/CC-ICP-MS	463.0	63.0	359.0	147.0	292.0	
199	DRC/CC-ICP-MS	446.4	66.2	345.8	151.3	320.4	Info
200	ICP-MS	521	66.3	411	156	338	Info
206	ICP-MS	538.2	71.0	425.4	164.9	349.9	
208	ICP-MS	441.9	69.9	379.3	190.3	321.6	
293	DRC/CC-ICP-MS	608.0	73.4	464.0	171.0	386.0	Info
305	DRC/CC-ICP-MS	635.6	78.3	470.0	179.8	348.8	
312	ICP-MS	435.0	59.7	386.2	145.8	314.9	
324	HR-ICP-MS	581.0	72.2	455.3	167.1	368.7	Info
359	ICP-MS	540.5	66.2	410.1	157.4	333.9	
366	DRC/CC-ICP-MS	518.0	68.0	410.0	153.0	347.0	Info
367	ICP-MS	523.0	63.1	407.0	150.0	335.0	Info
385	DRC/CC-ICP-MS	540.0	67.3	415.0	155.0	336.0	Info
391	DRC/CC-ICP-MS	578.5	70.1	451.5	169.5	364.6	Info
401	ETAAS-Z		45 ↓		122 ↓	289	Info
Percent satisfactory results for all participants:							98.3 %

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 #2
STATISTICAL SUMMARY BY METHOD

Results ($\mu\text{g/L}$ urine)					
	UE11-06	UE11-07	UE11-08	UE11-09	UE11-10
DRC/CC-ICP-MS					
Number of Sample Measurements:	10	10	10	10	10
Mean:	554.2	69.0	428.9	162.0	351.3
Standard Deviation:	62.9	4.4	45.3	10.2	28.9
RSD (%):	11.4	6.4	10.6	6.3	8.2
ETAAS-Z					
Number of Sample Measurements:	0	1	0	1	1
Mean:		45.0		122.0	289.0
Standard Deviation:		?		?	?
RSD (%):	—	—	—	—	—
HR-ICP-MS					
Number of Sample Measurements:	1	1	1	1	1
Mean:	581.0	72.2	455.3	167.1	368.7
Standard Deviation:	?	?	?	?	?
RSD (%):	—	—	—	—	—
ICP-MS					
Number of Sample Measurements:	12	12	12	12	12
Mean:	516.4	67.4	404.5	159.1	333.9
Standard Deviation:	40.9	6.6	15.9	12.7	14.0
RSD (%):	7.9	9.7	3.9	8.0	4.2
All Laboratories					
Number of Sample Measurements:	23	24	23	24	24
Mean:	535.7	67.3	417.3	159.1	340.7
Standard Deviation:	53.9	7.2	34.4	13.6	25.4
RSD (%):	10.1	10.7	8.2	8.5	7.5

notes: ? Insufficient data for calculation.

New York State Department of Health
Event #2, 2011

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 Cd²⁺. 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 1.9 µg/L (17 nmol/L) to 9.9 µg/L (88 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, 97.7% of test results reported were judged as satisfactory, with one of the 26 participant laboratories (3.8%) reporting 2 or more of the 5 results outside the acceptable ranges.

New York State Department of Health
Urine Cadmium Test Results, 2011 Event #2
ROBUST STATISTICAL SUMMARY

TARGET VALUE ASSIGNMENT AND STATISTICS

Results ($\mu\text{g/L}$ urine)

	UE11-06	UE11-07	UE11-08	UE11-09	UE11-10
--	---------	---------	---------	---------	---------

Robust Mean	7.6	9.9	3.2	5.4	1.9
Robust Standard Deviation	0.7	0.8	0.3	0.5	0.2
Standard Uncertainty	0.2	0.2	0.1	0.1	0.1
RSD (%)	9.5	8.5	10.2	9.0	12.4
Acceptable Range:					
Upper Limit	8.7	11.4	4.2	6.4	2.9
Lower Limit	6.5	8.4	2.2	4.4	0.9

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 #2
PERFORMANCE OF PARTICIPATING LABORATORIES

Lab Code	Method	Results (µg/L urine)					Info Only
		UE11-06	UE11-07	UE11-08	UE11-09	UE11-10	
Target Values:		7.6	9.9	3.2	5.4	1.9	
103	ICP-MS	8.1	10.8	3.6	5.9	2.1	Info
107	DRC/CC-ICP-MS	7.5	9.9	3.2	5.3	1.8	Info
110	ICP-MS	7.7	10.2	3.4	5.6	2.0	Info
110	ETAAS-Z	7.9	9.9	3.2	5.1	1.7	
114	ICP-MS	7.0	9.2	3.0	4.8	1.7	
116	ICP-MS	6.7	8.9	3.0	4.8	1.7	Info
147	ICP-MS	7.2	9.6	3.2	5.3	2.0	Info
156	ICP-MS	6.6	8.6	2.8	4.6	1.6	
159	ICP-MS	7.8	10.6	3.3	5.3	1.8	
164	ICP-MS	7.3	9.4	3.1	4.9	1.7	
179	ICP-MS	8.0	10.3	3.4	5.7	2.0	
197	DRC/CC-ICP-MS	7.8	10.4	3.6	5.7	2.0	
199	ICP-MS	6.9	9.2	2.9	4.9	1.8	Info
200	ICP-MS	8.5	9.0	3.7	6.0	2.2	Info
206	ICP-MS	8.5	11.3	3.7	5.9	2.1	
208	ICP-MS	7.1	9.1	2.3	5.5	2.4	
293	ICP-MS	7.7	10.2	3.4	5.6	2.0	Info
305	ICP-MS	7.9	10.4	3.4	5.5	2.0	
312	ICP-MS	7.4	9.7	3.1	5.5	2.1	
324	HR-ICP-MS	8.4	11.1	3.7	6.1	2.3	Info
359	ICP-MS	7.1	9.4	3.0	5.2	1.8	
366	ICP-MS	5.7 ↓	9.0	2.6	4.2 ↓	1.6	Info
367	ICP-MS	7.1	9.5	3.1	5.1	1.9	Info
385	ICP-MS	7.1	9.6	3.1	5.1	1.9	Info
391	ETAAS-Z	9.1 ↑	10.4	3.5	5.6	2.1	Info
401	DRC/CC-ICP-MS	8.5	11.2	3.7	6.2	2.3	Info

Percent satisfactory results for all participants: 97.7 %

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 #2
STATISTICAL SUMMARY BY METHOD

	Results ($\mu\text{g/L}$ urine)				
	UE11-06	UE11-07	UE11-08	UE11-09	UE11-10
DRC/CC-ICP-MS					
Number of Sample Measurements:	3	3	3	3	3
Mean:	7.9	10.5	3.5	5.7	2.0
Standard Deviation:	0.5	0.7	0.3	0.5	0.3
RSD (%):	—	—	—	—	—
ETAAS-Z					
Number of Sample Measurements:	2	2	2	2	2
Mean:	8.5	10.2	3.4	5.4	1.9
Standard Deviation:	0.8	0.4	0.2	0.4	0.3
RSD (%):	—	—	—	—	—
HR-ICP-MS					
Number of Sample Measurements:	1	1	1	1	1
Mean:	8.4	11.1	3.7	6.1	2.3
Standard Deviation:	?	?	?	?	?
RSD (%):	—	—	—	—	—
ICP-MS					
Number of Sample Measurements:	20	20	20	20	20
Mean:	7.4	9.7	3.2	5.3	1.9
Standard Deviation:	0.7	0.7	0.4	0.5	0.2
RSD (%):	9.2	7.4	11.2	9.0	10.9
All Laboratories					
Number of Sample Measurements:	26	26	26	26	26
Mean:	7.6	9.9	3.2	5.4	1.9
Standard Deviation:	0.7	0.8	0.4	0.5	0.2
RSD (%):	9.7	7.6	11.0	9.1	11.3

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 13.4 µg/L (67 nmol/L) to 98.3 µg/L (490 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, 95.0% of test results reported were judged as satisfactory, with one of the 24 participant laboratories (4.2%) reporting 2 or more of the 5 results outside the acceptable ranges.

New York State Department of Health
Urine Mercury Test Results, 2011 Event #2
ROBUST STATISTICAL SUMMARY

TARGET VALUE ASSIGNMENT AND STATISTICS

Results ($\mu\text{g/L}$ urine)

	UE11-06	UE11-07	UE11-08	UE11-09	UE11-10
--	---------	---------	---------	---------	---------

Robust Mean	25.0	72.6	13.4	40.1	98.3
Robust Standard Deviation	3.4	6.9	1.6	3.5	8.2
Standard Uncertainty	0.9	1.8	0.4	0.9	2.1
RSD (%)	13.5	9.6	11.7	8.7	8.4
Acceptable Range:					
Upper Limit	32.5	94.4	17.4	52.1	127.8
Lower Limit	17.5	50.8	9.4	28.1	68.8

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 #2
PERFORMANCE OF PARTICIPATING LABORATORIES

Lab Code	Method	Results (µg/L urine)					Info Only
		UE11-06	UE11-07	UE11-08	UE11-09	UE11-10	
Target Values:		25.0	72.6	13.4	40.1	98.3	
103	ICP-MS	18.2	45.4 ↓	10.7	28.6	85.4	Info
107	DRC/CC-ICP-MS	30.7	83.4	16.8	47.5	113.5	Info
110	ICP-MS	24.6	71.3	12.9	40.5	97.0	
114	ICP-MS	24.0	67.0	14.0	39.0	93.0	
147	CV-AAS	23.6	70.3	12.4	39.4	96.2	Info
156	ICP-MS	27.0	66.0	11.6	37.5	99.2	
159	ICP-MS	28.0	83.0	14.0	43.0	107.0	
164	ICP-MS	26.0	73.0	14.0	41.0	97.0	
179	ICP-MS	24.0	72.0	12.0	39.0	96.0	
197	DRC/CC-ICP-MS	23.0	69.0	12.0	39.0	92.0	
199	CV-AAS	20.1	64.3	<12.0	36.7	87.2	Info
200	ICP-MS	25.7	75.4	13.6	42.1	106	Info
206	ICP-MS	25.0	76.5	15.0	41.5	105.0	
208	CV-AAS	26.2	80.7	13.0	43.6	108.0	
293	ICP-MS	24.9	68.4	13.4	37.3	90.9	Info
305	ICP-MS	30.7	85.2	15.5	48.1	112.9	
312	ICP-MS	19.6	68.5	12.6	38.7	95.5	
324	CV-AAS	31.2	73.9	17.0	42.9	98.2	Info
359	ICP-MS	27.2	73.2	13.4	44.0	101.4	
366	ICP-MS	26.0	81.0	13.0	39.0	102.0	Info
367	CV-AAS	23.5	69.5	13.9	38.9	92.9	Info
385	ICP-MS	21.5	67.4	12.1	31.2	90.0	Info
391	DRC/CC-ICP-MS	20.2	66.7	11.8	35.8	91.2	Info
401	DRC/CC-ICP-MS	111 ↑	307 ↑	58 ↑	170 ↑	435 ↑	Info

Percent satisfactory results for all participants: 95.0 %

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 Mercury Test Results, 2011 Event #2
STATISTICAL SUMMARY BY METHOD

Results ($\mu\text{g/L}$ urine)					
	UE11-06	UE11-07	UE11-08	UE11-09	UE11-10
CV-AAS					
Number of Sample Measurements:	5	5	4	5	5
Mean:	24.9	71.7	14.1	40.3	96.5
Standard Deviation:	4.1	6.1	2.0	2.9	7.7
RSD (%):	16.6	8.5	14.5	7.2	7.9
DRC/CC-ICP-MS					
Number of Sample Measurements:	3	3	3	3	3
Mean:	24.6	73.0	13.5	40.8	98.9
Standard Deviation:	5.4	9.1	2.8	6.0	12.7
RSD (%):	—	—	—	—	—
ICP-MS					
Number of Sample Measurements:	15	15	15	15	15
Mean:	24.8	71.6	13.2	39.4	98.6
Standard Deviation:	3.2	9.3	1.3	4.8	7.3
RSD (%):	12.8	13.1	9.6	12.1	7.4
All Laboratories					
Number of Sample Measurements:	23	23	22	23	23
Mean:	24.8	71.8	13.4	39.8	98.2
Standard Deviation:	3.5	8.4	1.6	4.4	7.8
RSD (%):	14.1	11.7	11.9	11.1	7.9

notes: ? Insufficient data for calculation.

New York State Department of Health
Event #2, 2011

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 Pb²⁺. 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 42.6 µg/L (0.21 µmol/L) to 293.9 µg/L (1.42 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, 96.8% of test results 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 Lead Test Results, 2011 Event #2
ROBUST STATISTICAL SUMMARY

TARGET VALUE ASSIGNMENT AND STATISTICS

Results ($\mu\text{g/L}$ urine)

	UE11-06	UE11-07	UE11-08	UE11-09	UE11-10
--	---------	---------	---------	---------	---------

Robust Mean	226.5	143.3	293.9	75.9	42.6
Robust Standard Deviation	14.4	8.2	20.0	5.3	3.1
Standard Uncertainty	3.6	2.1	5.0	1.3	0.8
RSD (%)	6.4	5.7	6.8	7.0	7.2
Acceptable Range:					
Upper Limit	266.5	183.3	333.9	115.9	82.6
Lower Limit	186.5	103.3	253.9	35.9	2.6

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 #2
PERFORMANCE OF PARTICIPATING LABORATORIES

Lab Code	Method	Results (µg/L urine)					Info Only
		UE11-06	UE11-07	UE11-08	UE11-09	UE11-10	
Target Values:		226.5	143.3	293.9	75.9	42.6	
103	ICP-MS	237.9	152.7	312.1	78.4	45.8	Info
107	DRC/CC-ICP-MS	230.8	147.5	307.0	78.2	42.3	Info
110	ICP-MS	234.0	150.0	310.0	79.5	44.4	
110	ETAAS-Z	218	146	298	73	44	Info
114	ICP-MS	209.0	142.0	282.0	70.0	40.0	
116	ICP-MS	241	150	318	81.2	44.8	Info
147	ICP-MS	209.3	137.2	281.8	71.3	41.4	Info
156	ICP-MS	218.0	143.0	302.0	78.4	42.0	
159	ICP-MS	247.0	149.0	283.0	77.0	43.0	
164	ICP-MS	235.0	147.0	299.0	78.0	43.0	
179	ICP-MS	246.0	156.0	320.0	82.0	47.0	
197	DRC/CC-ICP-MS	205.5	132.5	259.0	70.4	39.7	
199	ICP-MS	237.0	156.0	344.2 ↑	81.4	48.5	Info
200	ICP-MS	222	142	293	76	42	Info
206	ICP-MS	229.0	145.0	291.0	77.5	43.0	
208	ICP-MS	220.7	127.9	281.6	69.5	39.9	
293	ICP-MS	225.8	145.0	296.3	67.8	43.3	Info
305	ICP-MS	220.5	137.1	277.6	72.9	42.2	
312	ICP-MS	216.9	136.2	275.3	73.8	40.3	
324	HR-ICP-MS	235.9	149.5	306.5	79.7	49.1	Info
359	ICP-MS	221.7	135.0	282.3	75.8	41.6	
366	ICP-MS	216.0	131.0	273.0	72.0	39.0	Info
385	ICP-MS	243.0	148.0	321.0	82.0	45.6	Info
391	ETAAS-Z	164.6 ↓	96.1 ↓	223.1 ↓	60.5	31.8	Info
401	ETAAS-Z	238	120	287	83	18	Info
Percent satisfactory results for all participants:							96.8 %

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.

New York State Department of Health
Urine Lead Test Results, 2011 Event #2
STATISTICAL SUMMARY BY METHOD

	Results ($\mu\text{g/L}$ urine)				
	UE11-06	UE11-07	UE11-08	UE11-09	UE11-10
DRC/CC-ICP-MS					
Number of Sample Measurements:	2	2	2	2	2
Mean:	218.2	140.0	283.0	74.3	41.0
Standard Deviation:	17.9	10.6	33.9	5.5	1.8
RSD (%):	—	—	—	—	—
ETAAS-Z					
Number of Sample Measurements:	3	3	3	3	3
Mean:	206.9	120.7	269.4	72.2	31.3
Standard Deviation:	37.9	25.0	40.4	11.3	13.0
RSD (%):	—	—	—	—	—
HR-ICP-MS					
Number of Sample Measurements:	1	1	1	1	1
Mean:	235.9	149.5	306.5	79.7	49.1
Standard Deviation:	?	?	?	?	?
RSD (%):	—	—	—	—	—
ICP-MS					
Number of Sample Measurements:	19	19	19	19	19
Mean:	227.9	143.7	297.0	76.0	43.0
Standard Deviation:	12.0	8.0	19.4	4.5	2.5
RSD (%):	5.3	5.6	6.5	5.9	5.9
All Laboratories					
Number of Sample Measurements:	25	25	25	25	25
Mean:	224.9	140.9	293.0	75.6	41.7
Standard Deviation:	17.3	12.9	23.8	5.4	6.0
RSD (%):	7.7	9.1	8.1	7.2	14.5

notes: ? Insufficient data for calculation.

New York State Department of Health
Event #2, 2011

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

Ba
Be
Co
Cs
Mo
Pt
Sb
Tl
U
W

Additional Elements

Al
Cr
Cu
Mn
Ni
Se
Sn
Te
V
Zn

New York State Department of Health
Urine Additional Elements 2011 Event #2
Page 1

Urine Aluminum Results (µg/L)						
Lab Code	Method	UE11-06	UE11-07	UE11-08	UE11-09	UE11-10
147	ICP-MS	59.63	81.76	35.08	46.14	25.2
164	ICP-MS	65.0	83.0	34.0	46.0	23.0
179	DRC/CC-ICP-MS	71.0	92.0	33.0	52.0	25.0
197	ICP-MS	67.0	85.0	30.0	45.0	22.0
305	ICP-MS	71.0	94.0	37.0	52.0	24.0
312	ICP-MS	62.0	81.7	29.0	48.2	21.9
359	ICP-MS	61.3	75.0	26.2	45.7	18.6
391	DRC/CC-ICP-MS	73.7	102.4	38.9	61.4*	28.0
Omitted*		n: 8	8	8	7	8
		Arithmetic Mean:	66	87	33	48
		Standard Deviation:	5	9	4	3

Urine Antimony Results (µg/L)						
Lab Code	Method	UE11-06	UE11-07	UE11-08	UE11-09	UE11-10
107	ICP-MS	7.12	9.21	2.82	5.00	1.61
110	ICP-MS	7.49	10.3	3.26	5.42	1.82
116	ICP-MS	7.48	9.95	3.14	5.27	1.83
147	ICP-MS	7.23	9.47	3.01	5.19	1.73
179	ICP-MS	7.8	10.4	3.3	5.4	1.9
197	ICP-MS	8.9*	12.1*	3.7	6.2*	2.2*
199	ICP-MS	7.9	10.5	3.3	5.5	1.8
312	ICP-MS	7.6	10.0	3.1	5.1	1.7
359	ICP-MS	7.3	9.4	3.0	5.2	1.7
385	ICP-MS	7.7	10.3	3.1	5.4	1.8
Omitted*		n: 9	9	10	9	9
		Arithmetic Mean:	7.5	9.9	3.2	5.3
		Standard Deviation:	0.3	0.5	0.2	0.1

Urine Barium Results (µg/L)						
Lab Code	Method	UE11-06	UE11-07	UE11-08	UE11-09	UE11-10
107	ICP-MS	10.7	13.1	5.36	8.05	3.77
110	ICP-MS	11.2	14.7	6.02	8.65	4.30
116	ICP-MS	11.6	15.1	6.07	8.78	4.19
147	ICP-MS	10.71	13.39	5.89	8.54	3.996
197	ICP-MS	11.5	14.4	5.9	8.7	4.1
199	ICP-MS	10.3	14.6	5.2	7.9	3.9
312	ICP-MS	10.0	12.8	5.2	10.3	3.7
359	ICP-MS	8.9	11.0	4.6	6.8	3.2
385	ICP-MS	11.7	15.2	6.1	8.8	4.3
		n: 9	9	9	9	9
		Arithmetic Mean:	10.7	14	5.6	8.5
		Standard Deviation:	0.9	1	0.5	0.9

New York State Department of Health
Urine Additional Elements 2011 Event #2
Page 2

Urine Beryllium Results (µg/L)						
Lab Code	Method	UE11-06	UE11-07	UE11-08	UE11-09	UE11-10
107	ICP-MS	8.58	11.0	3.50	6.12	1.96
110	ICP-MS	9.41	12.5	3.84	6.45	2.22
116	ICP-MS	10.2	13.9	4.18	7.16	2.33
147	ICP-MS	8.77	11.35	3.72	6.37	2.090
197	ICP-MS	9.3	12.5	3.7	6.5	2.1
199	ICP-MS	9.1	12.2	3.8	6.3	2.2
312	ICP-MS	11.2	13.1	3.5	6.9	2.2
385	ICP-MS	8.7	11.4	3.5	6.1	2.0
n:		8	8	8	8	8
Arithmetic Mean:		9.4	12	3.7	6.5	2.1
Standard Deviation:		0.9	1	0.2	0.4	0.1

Urine Bismuth Results (µg/L)						
Lab Code	Method	UE11-06	UE11-07	UE11-08	UE11-09	UE11-10
147	ICP-MS	0.514	0.508	0.530	0.472	0.516

Urine Cesium Results (µg/L)						
Lab Code	Method	UE11-06	UE11-07	UE11-08	UE11-09	UE11-10
107	ICP-MS	39.7	50.7	18.6	29.0	12.1
110	ICP-MS	41.5	55.1	20.3	31.1	13.5
116	ICP-MS	42.8	55.9	20.5	31.2	13.3
147	ICP-MS	38.94	50.24	19.01	29.51	12.47
199	ICP-MS	36.9	50.8	18.2	28.7	12.1
312	ICP-MS	36.0	46.3	17.4	27.0	11.4
385	ICP-MS	41.9	55.7	20.5	31.4	13.7
n:		7	7	7	7	7
Arithmetic Mean:		40	52	19	30	12.7
Standard Deviation:		3	4	1	2	0.9

Urine Chromium Results (µg/L)						
Lab Code	Method	UE11-06	UE11-07	UE11-08	UE11-09	UE11-10
107	HR-ICP-MS	18.5	24.5	7.9	13.3	4.7
110	DRC/CC-ICP-MS	20.1	26.0	9.38	13.7	5.38
147	ICP-MS	18.15	23.92	7.7	13.16	4.66
164	DRC/CC-ICP-MS	17.2	22.4	7.5	11.8	4.3
179	DRC/CC-ICP-MS	17.7	23.7	8.0	13.3	4.8
197	ICP-MS	18.8	24.9	7.6	13.6	5.0
305	ICP-MS	19.8	26.4	8.4	14.2	5.2
312	DRC/CC-ICP-MS	20.9	25.0	8.7	14.0	5.4
359	ICP-MS	17.6	22.3	8.7	13.6	5.9
391	DRC/CC-ICP-MS	19.2	25.0	11.0*	13.9	5.4
401	DRC/CC-ICP-MS	17	23	7	12	4.5
Omitted*		n:	11	11	10	11
		Arithmetic Mean:	19	24	8.1	13.3
		Standard Deviation:	1	1	0.7	0.8

New York State Department of Health
Urine Additional Elements 2011 Event #2
Page 3

Urine Cobalt Results (µg/L)						
Lab Code	Method	UE11-06	UE11-07	UE11-08	UE11-09	UE11-10
107	ICP-MS	4.07	5.03	5.33	2.99	2.63
110	ICP-MS	4.30	5.47	5.70	3.02	2.70
116	ICP-MS	4.93	6.07	6.35	3.50	3.14
147	ICP-MS	3.79	4.84	5.25	2.73	2.58
159	ICP-MS	4.3	5.6	5.7	3.2	2.9
179	ICP-MS	4.1	5.1	5.5	3.0	2.7
197	ICP-MS	4.2	5.2	5.7	3.1	2.8
199	ICP-MS	3.6	5.6	5.2	2.8	2.6
312	ICP-MS	4.1	5.1	5.3	3.0	2.7
359	ICP-MS	3.4	4.3	4.5	2.5	2.2
385	ICP-MS	4.2	6.4	5.9	3.0	2.7
391	DRC/CC-ICP-MS	4.3	5.5	6.0	3.2	2.8
401	DRC/CC-ICP-MS	3.8	4.8	5.2	2.7	2.5
n:		13	13	13	13	13
Arithmetic Mean:		4.1	5.3	5.5	3.0	2.7
Standard Deviation:		0.4	0.6	0.5	0.3	0.2

Urine Copper Results (µg/L)						
Lab Code	Method	UE11-06	UE11-07	UE11-08	UE11-09	UE11-10
110	ICP-MS	378	498	164	268	97.1
147	ICP-MS	353.24	476.49	155.02	255.4	91.487
159	ICP-MS	367.0	475.0	166.0	274.0	99.0
164	ICP-MS	377.0	503.0	168.0	270.0	102.0
179	DRC/CC-ICP-MS	396.0	525.0	169.0	282.0	100.0
197	ICP-MS	372.9	492.8	167.4	268.0	102.5
305	ICP-MS	368.7	513.1	159.2	260.9	98.5
312	ICP-MS	350.6	451.9	147.9	251.0	89.1
359	ICP-MS	335.2	436.3	145.0	241.6	86.1
391	DRC/CC-ICP-MS	358.3	473.8	158.9	259.2	93.0
n:		10	10	10	10	10
Arithmetic Mean:		366	485	160	263	96
Standard Deviation:		17	27	8	12	6

Urine Iodine Results (µg/L)						
Lab Code	Method	UE11-06	UE11-07	UE11-08	UE11-09	UE11-10
107	DRC/CC-ICP-MS	123.5	125.6	134.5	129.8	133.3

Urine Lithium Results (µg/L)						
Lab Code	Method	UE11-06	UE11-07	UE11-08	UE11-09	UE11-10
147	ICP-MS	20.19	21.1	21.370	20.47	21.37

Urine Manganese Results (µg/L)						
Lab Code	Method	UE11-06	UE11-07	UE11-08	UE11-09	UE11-10
110	DRC/CC-ICP-MS	9.49	13.2	3.95	6.94	2.62
147	ICP-MS	8.96	12.2	4.06	6.54	2.35
159	ICP-MS	12.2	15.2	6.2	9.0	4.3
179	DRC/CC-ICP-MS	8.5	11.2	3.8	6.2	2.1
305	ICP-MS	10.5	14.1	5.8	8.0	4.1
312	ICP-MS	8.3	10.8	3.9	6.1	2.5
359	ICP-MS	9.6	12.1	4.7	7.2	3.2
391	DRC/CC-ICP-MS	11.2	13.2	8.9	8.1	3.1
n:		8	8	8	8	8
Arithmetic Mean:		10	13	5	7	3.0
Standard Deviation:		1	1	2	1	0.8

New York State Department of Health
Urine Additional Elements 2011 Event #2
Page 4

Urine Molybdenum Results (µg/L)						
Lab Code	Method	UE11-06	UE11-07	UE11-08	UE11-09	UE11-10
110	ICP-MS	135	169	82.7	108	65.9
116	ICP-MS	142	178	87.6	114	67.9
147	ICP-MS	135.32	166.03	84.45	110.36	64.97
179	ICP-MS	129.0	160.0	83.0	104.0	65.0
197	ICP-MS	129.8	155.3	89.4	102.0	69.8
199	ICP-MS	114.6	148.6	71.5	95.2	57.0
312	ICP-MS	127.7	153.1	74.5	103.4	59.2
359	ICP-MS	139.2	171.8	86.1	113.9	66.4
385	ICP-MS	139.0	176.0	84.4	112.0	66.8
391	DRC/CC-ICP-MS	152.8	193.0	150.1*	171.0*	137.1*
Omitted*		n: 10	10	9	9	9
		Arithmetic Mean:	134	167	83	107
		Standard Deviation:	10	13	6	6

Urine Nickel Results (µg/L)						
Lab Code	Method	UE11-06	UE11-07	UE11-08	UE11-09	UE11-10
107	HR-ICP-MS	10.4	13.3	5.7	7.6	3.7
110	DRC/CC-ICP-MS	10.2	13.8	6.08	7.64	3.83
147	ICP-MS	10.45	13.62	6.28	7.99	4.43
159	ICP-MS	15.0	18.0*	11.0*	13.0	9.0*
164	ICP-MS	9.1	13.7	6.3	7.3	4.4
179	ICP-MS	10.0	13.0	5.7	7.4	3.7
197	ICP-MS	10.1	13.1	5.7	7.5	3.9
312	ICP-MS	10.1	13.6	6.3	8.5	4.8
359	ICP-MS	9.4	11.4	5.8	7.5	4.3
391	DRC/CC-ICP-MS	35.3*	12.1	7.8	17.2*	5.3
401	DRC/CC-ICP-MS	12.3	14.9	7.8	9.3	5.7
Omitted*		n: 10	10	10	10	10
		Arithmetic Mean:	11	13	6.3	8
		Standard Deviation:	2	1	0.8	2

Urine Platinum Results (µg/L)						
Lab Code	Method	UE11-06	UE11-07	UE11-08	UE11-09	UE11-10
107	ICP-MS	3.35	4.43	1.38	2.48	0.79
110	ICP-MS	3.35	4.60	1.43	2.42	0.778
116	ICP-MS	3.79	4.86	1.51	2.50	0.856
147	ICP-MS	3.28	4.47	1.38	2.42	0.792
179	ICP-MS	3.3	4.5	1.4	2.4	0.8
199	ICP-MS	3.5	4.6	1.5	2.4	0.8
312	ICP-MS	3.3	4.5	1.4	2.3	0.8
385	ICP-MS	3.6	4.9	1.5	2.6	0.8
		n: 8	8	8	8	8
		Arithmetic Mean:	3.4	4.6	1.4	2.4
		Standard Deviation:	0.2	0.2	0.1	0.1

New York State Department of Health
Urine Additional Elements 2011 Event #2
Page 5

Urine Selenium Results (µg/L)						
Lab Code	Method	UE11-06	UE11-07	UE11-08	UE11-09	UE11-10
110	DRC/CC-ICP-MS	136	160	77.7	101	58.1
116	DRC/CC-ICP-MS	124	158	75.5	102	60.5
147	ICP-MS	130.33	157.98	80.57	105.05	62.48
179	DRC/CC-ICP-MS	121.0	154.0	73.0	97.0	58.0
197	ICP-MS	135.0	164.0	82.0	108.0	63.0
199	DRC/CC-ICP-MS	125.8	165.0	76.4	108.4	57.9
305	ICP-MS	141.0	188.0	98.0	125.0	82.0
312	ICP-MS	148.5	168.7	85.6	119.1	68.3
359	ICP-MS	156.1	186.8	95.0	127.5	74.2
385	DRC/CC-ICP-MS	130.0	161.0	76.5	100.0	57.7
391	DRC/CC-ICP-MS	165.5	202.0	138.3*	162.5*	122.6*
Omitted*		n:	11	11	10	10
		Arithmetic Mean:	138	170	82	109
		Standard Deviation:	14	16	8	11

Urine Silver Results (µg/L)						
Lab Code	Method	UE11-06	UE11-07	UE11-08	UE11-09	UE11-10
147	ICP-MS	<0.108	<0.108	<0.108	<0.108	<0.108

Urine Tellurium Results (µg/L)						
Lab Code	Method	UE11-06	UE11-07	UE11-08	UE11-09	UE11-10
110	ICP-MS	7.07	9.89	2.84	5.15	1.88
197	ICP-MS	6.5	8.8	2.7	4.3	1.2
312	ICP-MS	7.6	9.5	3.0	5.0	1.6
359	ICP-MS	6.2	8.0	2.4	3.8	1.5
		n:	4	4	4	4
		Arithmetic Mean:	6.8	9.0	2.7	4.6
		Standard Deviation:	0.6	0.8	0.3	0.6

Urine Thallium Results (µg/L)						
Lab Code	Method	UE11-06	UE11-07	UE11-08	UE11-09	UE11-10
107	ICP-MS	18.0	23.6	7.54	12.9	4.31
110	ICP-MS	18.6	25.1	7.95	13.2	4.47
116	ICP-MS	18.7	25.4	7.91	13.3	4.56
147	ICP-MS	17.21	22.89	7.32	12.43	4.17
159	ICP-MS	18.4	24.2	7.6	12.5	4.2
179	ICP-MS	16.0	22.0	8.0	12.0	5.0
197	ICP-MS	18.0	24.3	7.5	12.6	4.3
199	ICP-MS	18.1	23.8	7.5	12.5	4.3
312	ICP-MS	17.3	22.9	7.2	12.3	4.1
359	ICP-MS	17.0	22.1	7.2	12.2	4.1
385	ICP-MS	18.4	24.1	7.7	12.7	4.4
		n:	11	11	11	11
		Arithmetic Mean:	17.8	24	7.6	12.6
		Standard Deviation:	0.8	1	0.3	0.4

New York State Department of Health
Urine Additional Elements 2011 Event #2
Page 6

Urine Thorium Results (µg/L)						
Lab Code	Method	UE11-06	UE11-07	UE11-08	UE11-09	UE11-10
147	ICP-MS	<0.00116	<0.00116	<0.00116	<0.00116	<0.00116

Urine Tin Results (µg/L)						
Lab Code	Method	UE11-06	UE11-07	UE11-08	UE11-09	UE11-10
110	ICP-MS	19.1	25.7	8.07	13.5	4.79
147	ICP-MS	18.17	23.52	7.83	13.06	4.45
179	ICP-MS	18.5	24.9	8.0	12.9	4.7
312	ICP-MS	18.1	23.2	7.2	13.0	4.3
359	ICP-MS	20.0	25.8	8.4	14.0	4.9
n:		5	5	5	5	5
Arithmetic Mean:		18.8	25	7.9	13.3	4.6
Standard Deviation:		0.8	1	0.4	0.5	0.2

Urine Tungsten Results (µg/L)						
Lab Code	Method	UE11-06	UE11-07	UE11-08	UE11-09	UE11-10
107	ICP-MS	7.22	9.27	2.96	5.20	1.69
110	ICP-MS	7.53	10.1	3.13	5.31	1.78
116	ICP-MS	7.62	10.10	3.25	5.43	1.85
147	ICP-MS	8.72*	11.93*	4.28*	6.23*	2.39*
199	ICP-MS	7.6	10.0	3.2	5.3	1.8
312	ICP-MS	7.1	9.2	2.9	5.0	1.9
359	ICP-MS	7.5	9.6	3.3	5.4	1.8
385	ICP-MS	7.7	10.1	3.4	5.5	1.9
Omitted*		n:	7	7	7	7
Arithmetic Mean:		7.5	9.8	3.2	5.3	1.8
Standard Deviation:		0.2	0.4	0.2	0.2	0.1

Urine Uranium Results (µg/L)						
Lab Code	Method	UE11-06	UE11-07	UE11-08	UE11-09	UE11-10
110	ICP-MS	0.920	1.25	0.391	0.662	0.224
116	ICP-MS	1.00	1.37	0.429	0.723	0.242
147	ICP-MS	0.852	1.11	0.383	0.621	0.212
197	ICP-MS	1.0	1.3	<1.0*	<1.0*	<1.0*
199	ICP-MS	1.0	1.4	0.4	0.7	0.2
312	ICP-MS	0.9	1.1	0.4	0.6	0.2
359	ICP-MS	0.9	1.2	0.4	0.6	0.2
385	ICP-MS	0.9	1.2	0.4	0.6	0.2
Omitted*		n:	8	8	7	7
Arithmetic Mean:		0.93	1.2	0.40	0.64	0.21
Standard Deviation:		0.06	0.1	0.01	0.05	0.02

New York State Department of Health
Urine Additional Elements 2011 Event #2
Page 7

Urine Vanadium Results (µg/L)						
Lab Code	Method	UE11-06	UE11-07	UE11-08	UE11-09	UE11-10
147	ICP-MS	7.19	9.34	3.13	5.15	1.83
179	DRC/CC-ICP-MS	7.1	9.5	3.1	4.9	1.9
312	DRC/CC-ICP-MS	8.1	10.5	3.7	6.4	2.2
359	ICP-MS	10.4	13.0	7.3*	8.4	5.4*
391	DRC/CC-ICP-MS	8.3	10.7	4.2	6.3	2.9
Omitted*		n: 5	5	4	5	4
		Arithmetic Mean:	8	11	3.5	6
		Standard Deviation:	1	1	0.5	1
						0.5

Urine Zinc Results (µg/L)						
Lab Code	Method	UE11-06	UE11-07	UE11-08	UE11-09	UE11-10
110	ICP-MS	585	717	384	481	313
147	ICP-MS	583.01	732.03	437.91	483.01	313.07
159	ICP-MS	619.0	743.0	401.0	499.0	321.0
164	ICP-MS	597.0	771.0	398.0	511.0	329.0
179	DRC/CC-ICP-MS	599.0	729.0	392.0	494.0	324.0
197	ICP-MS	557.0	705.0	375.0	559.0	305.0
305	ICP-MS	521.4	661.8	329.7	426.1	288.9
312	ICP-MS	532.5	630.9	328.9	431.9	274.7
359	ICP-MS	568.9	685.1	370.3	477.5	300.7
391	DRC/CC-ICP-MS	515.8	631.4	339.8	439.5	279.2
		n: 10	10	10	10	10
		Arithmetic Mean:	568	701	376	480
		Standard Deviation:	35	47	35	40
						19

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., D₂, 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 $\mu\text{mol ZPP/mol heme}$)
- F-4 Other

OTHER METHODS

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